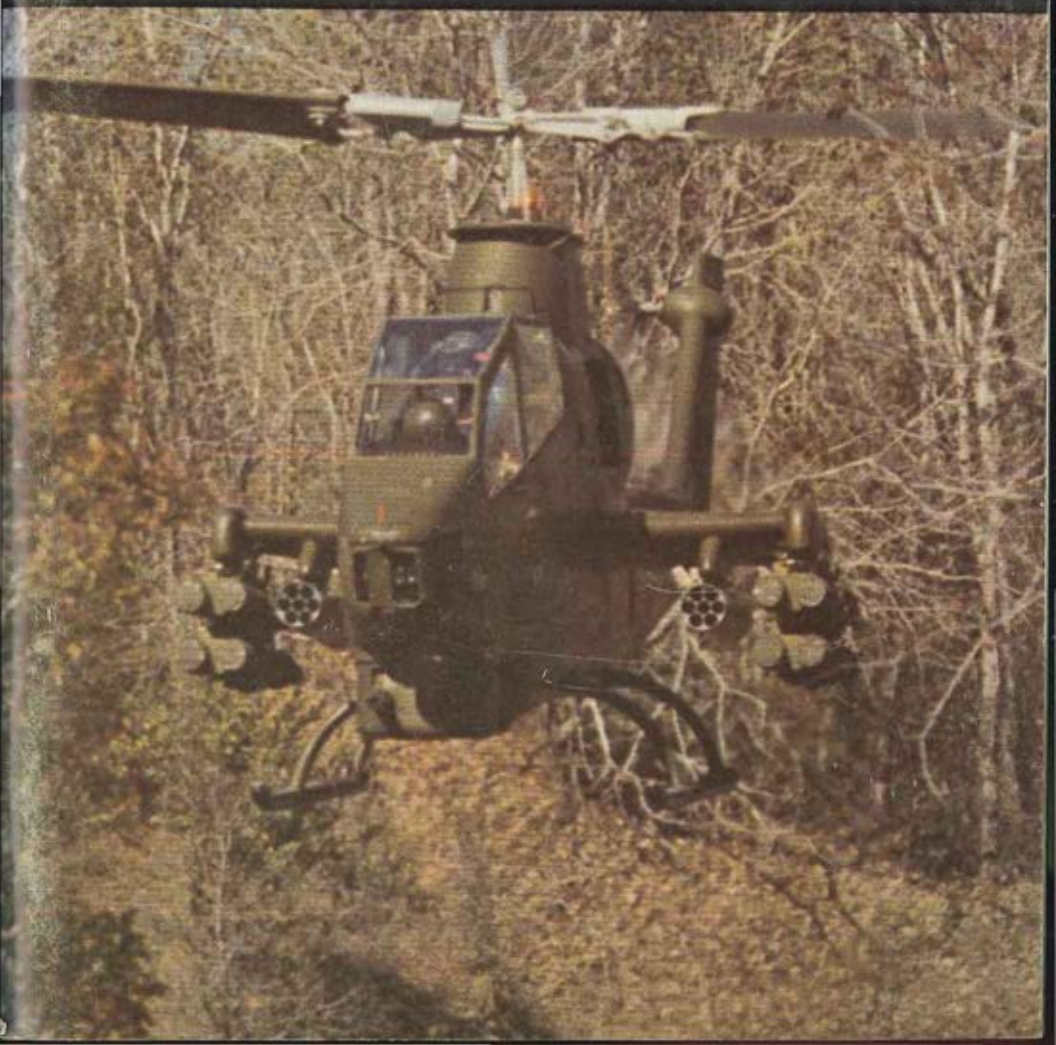
Army Aviation

SPECIAL ISSUE '78

JULY 31, 1978

Cobra TOW . . . The U.S. Army Tank Killer

The Bell AH-1S



"Aerial combat between attack helicopters will be like putting two scorpions in a bottle."

A graphic picture of future air warfare was painted by the Army's **BG Weldon F. Honeycutt** of Forces Command, who formerly served as test director on the UTTAS project which produced the UH-60A **Black Hawk.**

Speaking to the Annual News Conference of the Aviation/Space Writers Ass'n in Atlanta, **Gen. Honeycutt** said there will unquestionably be dogfights between helicopters "and it will be deadly, not the chivalrous kind of thing from WWI."

He cited the Soviet Union's **Mil-24 Hind** helicopter as one which is better in some ways than anything the U.S. has, but he tempered this with high praise for U.S. helicopters now approaching the active inventory.

"With the Bell AH-1 attack helicopter mounting 3,500-meter TOW missiles, and the future **Hellfire** missile with a range up to 10,000 meters, the future for tank crews is very bleak," he said.

Beyond the FEBA

Even more devastating than the anti-tank capabilities of helicopters, **Gen. Honeycutt** said, will be the improved ability of the helicopter to create mischief behind the lines. He cited the example of the battlefield commander preoccupied with fighting a battle to his front when informed a force of enemy helicopters has landed troops and anti-tank weapons to his rear.

Such a force need only remain in place for 30 minutes to force re-deployment on the part of the enemy, then withdraw. **Gen. Honeycutt** recalled that in his extensive experience during both the Korean and Vietnam wars, there was never a time when some gaps did not permit such an incursion behind enemy lines.

Praise for the Bell AH-1 attack helicopters was high, as it was for the Sikorsky UH-60A **Black Hawk** transport helicopter. Getting out of a Vietnam-era **Huey** and into the **Black Hawk,** he said, "is like getting out of a Model-T Ford and climbing into a Cadillac and going down the road at 100 miles an hour." **Gen. Honeycutt** said the aircraft is so fast that it must slow down during escorted flight so it does not outrun the attack helicopters flying with it.

Future of the Hughes YAH-64 advanced attack helicopter was stated somewhat uncertainly by the general when he noted: " . . . IF we get the advanced attack helicopter." The lack of certainty apparently stems from experience with the Boeing Vertol **Heavy Lift Helicopter (HLH)** cancellation and the Lockheed **Cheyenne.**

A particularly deadly affair

Future air-to-air combat between helicopters will be a particularly deadly affair, **Gen. Honeycutt** said, with long-range missiles of either homing or guided types used widely.

He described a probable scenario where attack helicopters could be hovering in thin spots of a forest after learning enemy helicopters were near. The attackers could easily rise slowly above the tree line and fire missiles which would be on their way before the target aircraft realized the attack was on. This has been

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SPECIAL ISSUE '78

ARMY AVIATION

Volume 27 — July 31, 1978 — Number 7

BG McNair replaces BG Canedy at DA

Brigadier General Carl H. McNair, Jr., Executive Officer in the Office of the Assistant Secretary of the Army for Research and Development, Department of the Army, has been assigned as the Deputy Director of Requirements and Army Aviation Officer, Hq, Department of the Army, replacing Brigadier General Charles E. Canedy, who will become an Assistant Division Commander in the 3d Armored Division, USAREUR.

In another change of assignment, Brigadier General Benjamin E. Doty, MILPERCEN, will report to Ft. Hood, TX, as ADC of the 2d Armored Division.

* * *

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THE conventional wisdom in Washington is that NATO, outnumbered in tanks and planes by Soviet and Warsaw Pact forces, none the less can defend Western Europe because of its superiority in electronic warfare, computer-guided weapons and better trained personnel. "We need not match the enemy tank for tank," says U.S. Defense Secretary Harold Brown. "We retain a qualitative edge."

As a society, the West is far ahead of the Soviet Union in computers and electronics. But in the application of technology to warfare it is the Russians, not the Americans, who have the most sophisticated weapons and communications systems now deployed in Europe. Many of the most modern U.S. systems either are still on the drawing boards, don't work as advertised, or are so complex that the troops can neither use nor maintain them and the generals don't understand them.

AN IMAGINARY EDGE

The sad story

There are three main areas in which NATO must have a "qualitative edge" to offset the Warsaw Pact's numerical advantages: electronic warfare, tanks and guided anti-tank weapons, and control of the air. In all three areas, the Soviet forces are qualitatively as well as quantitatively ahead.

The key to an understanding of the present military balance in Europe lies in the 1973 Middle East war, when Soviet and American weapons were last used against each other in combat. I went to Europe this spring for a month of intensive reporting to see how NATO and the U.S. Army and Air Force were absorbing the lessons of that war.

I expected to find new precision-guided weapons being used to hit distant targets, new methods of controlling and massing forces, new systems and tactics for surveying the battlefield so that commanders could locate the enemy and select targets accurately.

I found none of this. In fact, I found that the newer weapons and tactics were on the Soviet side.

THE FIRST area in which NATO has fallen behind is electronic warfare. Electronic warfare (EW) includes a variety of weapons and weapons systems. There is radio and radar jamming so that the enemy can't communicate with his units or locate your tanks and planes. There is eavesdropping on enemy radio communications and finding targets by various means.

In this field of electronic warfare, the experience of the 1973 Middle East war points to a surprising and unpublicized edge for the Russians. Within the first half-hour of their attack, the Egyptian forces had stripped the Israelis of much of their radar and air-ground communications and most of their long-range ground communication. The Israeli radars and radios either were destroyed by Soviet-made beam-riding missiles or jammed by both ground-based and airborne equipment. After that, the Israeli pilots could not be guided to targets from the ground, or hear the cries of ground commanders for help.

Yet, in spite of the fact that one of the major lessons of that war is that ground-based radars and ground-to-air communication will not be present. NATO continues to maneuver and plan as if there were no threat from beamriding missiles or Soviet jammers. Front-line army and air force commanders know that this planning is foolish, and it makes them both apprehensive and angry.

The application of technology to the battlefield is the key to modern warfare. Western defense planners maintain that they have a qualitative advantage, which offsets the Soviet Bloc's numerical superiority in tanks, aircraft, and electronic equipment. This is not the case in the field, writes ARTHUR T. HADLEY, after a month-long investigation of the state of NATO forces in Europe. What is more, he adds, the West has not absorbed the lessons of the 1973 Yom Kippur War, in which weapons from the East and West were last pitted against each other in combat.

The basic unit of U.S. combat communications is the Fire Support Team, or Fist team — six or seven men with special radios deployed at army company level all along the front lines to direct artillery fire missiles and aircraft at attacking enemy tanks and artillery. Because the radios they use for air-ground.communication operate on a unique set of frequencies, the Russians will have an easy time locating them.

"Do you really expect many Fist teams to be alive after the first day?" I ask one officer, walking through his brigade area late at night.

This is a complicated question, he replies. Since published doctrine calls for the Fist teams to be at the front lines with each infantry and tank company, the Soviets know that by locating Fist teams they know just where the front is.

Indeed, he adds, with our poor communications, the Russians will probably have a better idea of where our front is than we will. (He was not the only commander to say this.) So it is to the Russians' advantage to keep the Fist teams alive and merely jam their radios so they can't communicate.

On the other hand, the teams' artillery radios are good enough so that some artillery communications may get through. So it may be to the Russians' advantage to kill Fist teams. He doesn't know which they will do.

BECAUSE the U.S. Defense Department has kept quiet about the Soviet lead in jamming equipment and beam-riding missiles, the public is unaware of other areas of Soviet excellence.

For instance, the U.S. has maintained that the electronic warfare equipment on the **MIG-25** flown to Japan by a defecting Soviet pilot in September 1976 was markedly inferior to that of the U.S. In fact, its electronic equipment performed better. While its radar uses tubes, not modern transistors, it puts out more power to penetrate enemy jamming than does the radar carried by American fighters. The **"black box"** used to separate friend from foe was so sophisticated that it stumped U.S. code-breakers, and only after months of work did the Japanese crack its secrets.

U.S. fighters are still guided to their targets by

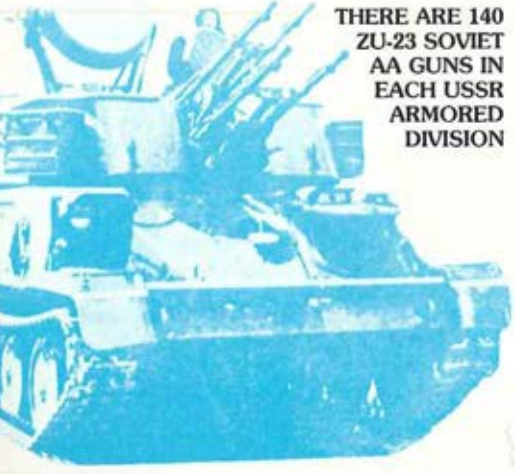
An Imaginary Edge
A report on NATO capabilities

words over radios: "Two bogies, at 3 o'clock, speed 400 knots, 12 miles." Even the old Soviet equipment used by the Egyptians in 1973 prevented such transmissions. The "inferior" **MIG** doesn't rely on words from the ground; its information on where to go and what to attack comes in a data burst, brief enough (less than a second) and powerful enough to burn through jamming. The data is displayed on the pilot's windshield: an arrow for the direction to fly, a symbol for the target and numbers for the target's direction and speed. The pilot's acknowledgement of the message also is data-coded.

We're decisively behind!

Another area in which NATO, with its access to the West's advanced communications industry, should be decisively ahead of the Russians is electronic target location. In fact, it is decisively behind — by "five years," according to two generals, one at NATO headquarters, and the other at a forward airbase.

The Russians have two mobile radio direction-finding units in each division and are about to go to four. These vital pieces of equipment locate the radios being used by enemy headquarters, artillery batteries, or Fist teams, so that fire can be dumped on them. U.S. divisions have none.



THERE ARE 140 ZU-23 SOVIET AA GUNS IN EACH USSR ARMORED DIVISION

The Russians have several mobile radio and radar-jamming units with directional antennae in each division. More primitive models of these tied up the Israelis in 1973. The U.S. has none. The Russians have mobile listening stations and have trained their crews in how to distinguish between targets like tank battalions and intelligence sources like brigade headquarters. U.S. equipment is mostly static, and many of its operators understand Vietnamese, not Russian. "I have no one in this headquarters who can tell a tank battalion headquarters from an artillery battery," says a division intelligence officer.

In a maneuver in Texas last summer, the 1st Cavalry Division was loaned special electronic equipment so that it could fight like a Soviet division. Its opponent, the 2nd Armored Division, relied on its regular electronic warfare equipment. The 2nd Armored was wiped out. The journal **Military Intelligence** drew these conclusions: "The (American) divisional EW equipment was judged, to a large extend, unsuitable for combat. The antennae and vehicles are the wrong type, the system is manpower-intensive, and there is no tactical DF (direction-finding)."

WHEN ASKED about such problems, even on background, senior officials at NATO headquarters and the Pentagon do what I have come to call the "rain dance." They compare the weapon the Russians now have in use in Europe to some American weapon still in the design stage, and the American weapon always beats the Soviet weapon hollow. The trouble is that the American weapons' actual production date is three to five years away, and by then the Soviets may be fielding something better. And many weapons sytems when put in the field don't work as well as claimed.

NATO's problems in electronic warfare extended to the smallest things. Sensors, for instance.

Sensors are small tubes, about 7.5 cms. in diameter and 30 cms. long, that are inserted in the ground behind enemy lines by hand or from the air to measure movement, vibrations, sounds and changes in the electromagnetic field, and broadcast this information automatically so that intelligence officers can gain insight into troop movements they cannot see.

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Division of
UNITED TECHNOLOGIES

sensors are disguised as small palm shoots. Neither the Army nor the Air Force has found the money to change this camouflage. Yet surely a Soviet lieutenant attacking through the pines and snows of Germany will at least blink when his eye lights on a group of baby palm trees along his route.

Next, the sensors broadcast over the same frequencies as German taxis and other private radios. This means that no one gets a chance to practice with them. Yet emplacing sensors correctly and interpreting their data is a complex and demanding process. Do we really believe we can do these things right without constant practice?

IN TANKS, NATO is outnumbered, 3 to 1. Here again, the Warsaw Pact forces also have a qualitative edge. Here again, the American forces in NATO are not well enough trained to use effectively the weapons they do have.

In no other area is the rain dance — the technique of comparing drawing-board U.S. weapons to actively used Soviet weapons — as prevalent. The entire military and civilian high command of the Defense Department compares the Soviet T-72 tank, which is now in the field, to the U.S. XM-1 main battle tank, which will not arrive in NATO until 1982 at the earliest, and whose gun will not have the killing power of the Soviet tank's.

Even the tanks the U.S. does have are so complicated that today's volunteer U.S. Army does not use them very well. Honest American commanders admit that the level of tank-driving skill in the U.S. Army is so low that the tanks don't know how to maneuver individually and can only charge in massed formations.

ANOTHER paramount lesson of the 1973 Middle East war is the importance of precision-guided infantry anti-tank weapons, like the Soviet **Saggers** with which the Egyptian infantry destroyed many charging Israeli tanks. The primary U.S. infantry weapon in this field is the wire-guided **Dragon**. The infantryman has to keep his **Dragon** sight on the target and the missile will automatically correct its course to make a bull's-eye. I never found a single soldier in Nato who had fired a **Dragon**, though commanders were always assuring me that most of their men had qualified.

☐ **Distributed by The Washington Post News Service, and reproduced from the June 16, 1978 Jerusalem Post. Arthur Hadley is Washington correspondent for the "New Times Magazine."**

Slightly bigger than the **Dragon** is the TOW (for Tube-launched, Optically-tracked, Wire-guided) anti-tank missile, which is fired from the M-113 infantry carrier or the **Cobra** helicopter. You can hit a target with a TOW missile, and I found quite a few people who had fired one or even two rounds (supposedly every TOW gunner gets to fire one round every other year.)

Accurate and easy-to-handle

But the man who fires it is my candidate for the bravest man in the world. He sits on top of the M-113, behind a tripod that pops up through the roof. He has to hold his breath as he fires, because the mount is so delicate that his breathing throws the missile off target.

The Soviets fire their TOWs from inside their infantry vehicles.

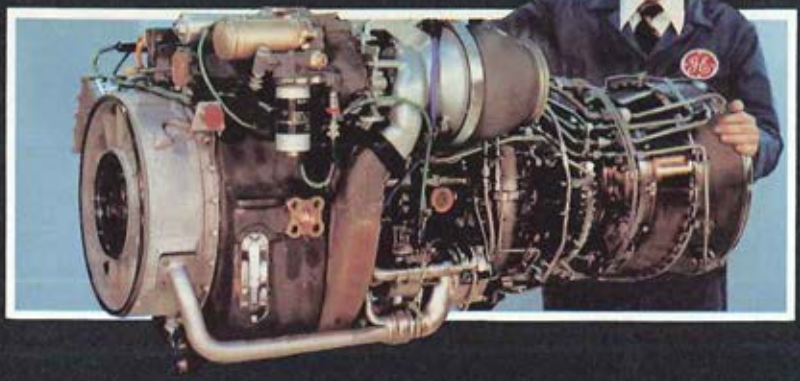
The TOW fired from the **Cobra** helicopter is one of the most sophisticated anti-tank weapons actually deployed in NATO. A gunner in the nose of the helicopter works a small joystick about the size of an index finger to keep the crosshairs in a 14-power telescopic sight lined up on the target while the pilot in the rear seat maneuvers the helicopter. It is an accurate and easy-to-handle weapon. Whether the **Cobra TOW** system can survive under the massed artillery fire the Soviets employ is a question NATO commanders are loath to face. But then, they have so little else that works.

WHAT ABOUT the final area of Nato's presumed "qualitative edge," control of the air? Even if U.S. pilots lack flying time and can't talk to the ground, are not both they and their planes far superior to the Russians?

Again, the lessons of the 1973 Arab-Israeli war paint a dark picture. The Israelis found they couldn't get through the barrage of missiles and anti-aircraft fire protecting the Egyptian and Syrian forces until their tanks and

Black Hawk Power

T700-POWERED SIKORSKY UH-60A BLACK HAWK



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GENERAL ELECTRIC

The Imaginary Edge
A report on NATO capabilities

artillery had knocked out the Soviet anti-aircraft missiles and gun radars.

When Soviet armored divisions attack, they advance under something U.S. pilots call "the bubble." That's a protective covering of SAM-6 anti-aircraft missiles for high-altitude work and ZU-23 self-propelled, four-barrelled anti-aircraft guns with their own radar, by far the best anti-aircraft guns in the world. There are 140 such weapons in a Soviet armored division. The way U.S. aircraft are supposed to penetrate this "bubble" to get at the tanks is to stay below 60 meters while the army fires at the radars and jams them to make a corridor through which the aircraft can fly to hit the enemy tanks and then get back out. But in the real world, the U.S. Army doesn't have the jamming equipment and the locators to find the enemy radar. The Army and the Air Force have not practiced the split-second timing necessary in this maneuver.

There are special Air Force squadrons called **Wild Weasels** that have F-4 jets with on-board jamming equipment and computers to throw off enemy guns and missiles. But the **Wild Weasels** lack effective beam-riding missiles to take out the radars. When questioned about this problem. High Defense Department officials do the rain dance again: "**Harm** takes care pf that." But **Harm** (for **High Speed Anti-Radiation Missile**) will not be ready until the early 1980's at best.

Avoid the FEBA!

Another way to keep U.S. planes alive is to have them stay away from the front lines, and lob their weapons in from low altitude outside "the bubble." The weapons would be laser-guided to their targets by the Fist teams. But the planes don't have the beam-riding bombs and the Fist teams don't have the laser designators.

Many NATO fighter pilots also complain that the Air Force is building the wrong type of fighters. They don't believe that one man can operate all the equipment necessary to stay alive at 60 meters while flying 400 knots in a hostile environment. They contend that the F-15 has the space and power to have been a two-pilot aircraft, but that the old fighter types at the top of service kept it a single-pilot plane. This is a serious charge, vigorously denied by most senior Air Force generals, who insist that the F-15 is so fully automated that it is easier to fly than a World War II fighter.

THE FINAL area of air control in which NATO falls apart is called IFF (for Identification Friend or Foe). In modern battle, all those planes, friends and enemies, are going to be mixed together in the air, attacking targets on the ground, often moving at supersonic speeds or within 60 meters of the surface. Helicopters of both sides will be everywhere. Until now, shooting at your own people didn't matter so much because most shots missed. But modern weapons hit the target. Identification is now vital.

But in their last two NATO maneuvers, the German Air Force discovered that its own troops had shot it out of the air after two days. The British Royal Air Force (RAF) is so short of funds that it has no hope of putting effective IFF equipment on its planes. As a result, the Germans, Americans, and even the French have had to quietly insist that if there is a real war, the RAF had better stay out of it lest it be shot out of the skies by its allies.

Finally, the U.S. medium-range anti-aircraft missile system, the **Chapparral**, requires a man with field glasses to stand in front of the launcher. After the radar picks out a target, he tries to find it in his glasses and tell if it's friend or foe. That's the way it was done in 1944.

On IFF the Defense Department does the rain dance again and talks about **JTIDS** (for **Joint Tactical Information Distribution System**.) The concept is brilliant, simple and workable: a network of some 600 radios is linked by computers that shift their frequencies roughly 10 times a second. Each time a radio comes on it fires off a burst of data that says roughly, "Here I am, I am doing this, I will need that." The data bursts are almost impossible to jam, the codes virtually unbreakable.

But JTIDS is more than three years late. It is so far behind schedule because the Navy is holding out for a more complicated model that

(IMAGINARY/Continued on Page 16)

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Beechcraft

An Imaginary Edge
(Continued from Page 14)

will also tell where its submarines are, and no one in the Defense Department has the courage to take on the Navy and its friends in Congress.

Yet suppose all the weapons work. After two days the Russians, East Germans and Czechs have been fought to a virtual standstill in the most deadly conventional warfare in history. What happens on the third day?

The 1973 Middle East war proved that in the electronic precision-guided munitions age, the losses are horrendous, approaching those of nuclear warfare. NATO war plans call for each American division to fire 5,000 tons of ammunition on the first day, and 3,000 tons on the next day. At these rates of fire, artillery gun tubes will last less than a week. But there are not enough trucks or drivers to bring such masses of supplies forward. And NATO does not have the mechanics to do the repairs. With agony on his face, one officer responsible for this problem tells me he will be 500 rounds short for every gun in his division by the third day.

THE FAULT lies in Washington. No one in the Defense Department will ask Congress for funds for trucks, fork lifts or mechanics. Why? Because those are non-combat troops or "tail." And Congress and President Jimmy Carter want the military to cut the non-combat "tail" in favor of combat "teeth." But as the teeth get more deadly, you must increase the tail, as both the Israelis and West Germans have done since 1973.

NATO plans call for M-60 tanks, stored in climate-controlled warehouses, to be issued to troops that will be flown in from the U.S. In recent maneuvers, these tanks worked better than those in daily use. But they are stored on the wrong side of the Rhine, the West Bank. Will the bridges they must cross still be intact? And the tanks have no radios — the radios are stored in a warehouse miles away, and they don't fit the tanks without a special bracket that takes at least another two days to make.

ANOTHER general tells me about the night sights for his division's machineguns, sights that are so delicate and valuable that they have been kept in those warehouses since their arrival five years ago. He has just checked and found out that the sights don't fit his divisions machine guns. He can build several thousand DLRS65 brackets to fit the sights, but he has been told that his division will get new machine guns two years from now. What should he do?

Over and over one finds examples like this. There is a bitter private jest heard throughout NATO that U.S. plans to fight a war in Europe are based on flying imaginary troops in nonexistent planes to airbases that are destroyed at the command of headquarters no longer in action.

The jest has tragic overtones, because neither the qualitative deficiencies nor the wide gaps in training need occur. The West does have the better technological base. The electronic revolution is more advanced in NATO. But is cannot apply the knowledge and power we have to problems it claims do not exist. ★

Mailing Lists

Neither **Army Aviation Magazine** nor the **Army Aviation Ass'n (AAAA)** make their collective subscriber/member lists available to individuals, agencies, or companies for commercial use.

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Colonel Robert P. St. Louis, Cobra Project Manager and Dr. Ditmar Burger, Managing Director of Dornier Reparaturwerft, during traditional cake cutting.

US Army awarded contract to Dornier

First contract awarded to a German firm to modify US Army aircraft stationed in Germany: Sixty-two Bell AH-1Q „Cobra" helicopters will be modified by Dornier Reparaturwerft GmbH, Oberpfaffenhofen near Munich, to the AH-1S configuration.

The contract to perform this work was awarded by representatives of the US Army Troop Support and Aviation Material Readiness Command, St. Louis, Mo., on May 2nd, 1978.

The conversion programme is being carried out in close cooperation with US Army authorities stationed in Europe. In Germany it is seen as a remarkable step forward. This is the first time that German industry has been contracted to repair and modify US Army aircraft.

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REFLECTIONS ON THE COBRA

BY BRIGADIER GENERAL CHARLES E. CANEDY, ARMY AVIATION OFFICER, HQ, DA

THE Cobra is unique and so are the men who crew it.

Since 1965, I have had the privelege to be associated with Cobras and their crews, either as a staff officer, commander or, more recently, the Army Aviation Officer, HQDA. I look forward to continuing this association with the Cobra in my coming assignment in Europe.

In this brief article, I wish to share with you some personal observations on the origin and development of the Cobra, the evolution of attack helicopter tactics, and some distinctive qualities I view as essential for Cobra crew members.

THE AH-1 COBRA was first fielded to satisfy an urgent requirement for a faster and more effective armed helicopter to replace the UH-1B gunships in Vietnam. I vividly recall Bell Helicopter leadership's solicitation of support from the Pentagon "E" ring and Congress for the Bell 209, a tandem variant of the UH-1 and the AH-1G's immediate prototype predecessor.

Bell had recognized the requirement early, and rapidly developed the Cobra in response to the Vietnam field need. As a major on the Army staff during 1965-66, I saw how quickly the Army and industry can respond together to a combat requirement.

Bell formally proposed AH-1 development completion and production on 13 August 1965; the Cobra production contract was awarded in April 1966. Only one year later the Cobra NET team was in training, and by August of 1967 the AH-1G Cobra was committed to combat. **Two short years from proposal to the field!**

DON'T TELL ME that we couldn't repeat that if we had to! Sure, we had some initial operational problems — hot cockpits (no environmental control units then, fellas), some night vision problems (the beautiful blue canopies looked better from the outside than from inside), and we hadn't quite solved the problem of not being able to hear the rounds that missed you, but we had put a fighting system in the field where the fighters were!

Vietnam-oriented product improvements followed rapidly, as most readers will recall. The Cobra and its crews performed with distinction in major battles, such as the TET offensive in 1968, the operations in Laos in the spring of 1971, and countless smaller actions, which built the "Snake", as the Cobra was popularly called, a near-legendary reputation.

FOR MOST OF THE VIETNAM ERA of Army Aviation, the role of the attack helicopter on the mid-intensity battlefield received scant attention. Focusing on the hostilities at hand, we lost sight of potential conflicts in the rest of the world.

With few exceptions, even Army proponents of the Cobra in Vietnam were skeptical of attack helicopter effectiveness and survivability in a "more modern" battle setting. These detractors had lost sight of that portion of the **Howze Board** findings which related to the high threat environment.

Consequently, we did some wheel redesign, if not re-invention, during the early 1970's, as we again begin to explore tactics and technology to cope with sophisticated threat air defense systems and, more particularly, defeating enemy armored vehicles.

IN THE FINAL MONTHS of U.S. combat in Vietnam, and later at Fort Hood, Fort Knox, and elsewhere in the field, through a multitude of studies, simulations, and tests, we reestablished the importance of the attack helicopter on the modern, mechanized battlefield.

Lessons learned resulted in new tactics and

the combining of two proven systems - the Cobra helicopter and the TOW missile system - to give us the Cobra TOW, the Army's current first line attack helicopter for the anti-armor role.

THE COBRA TOW, too, has undergone a series of significant improvements, as discussed elsewhere in this issue. New dynamic components, an improved missile, and other modifications have made the Cobra TOW the free world's most capable attack helicopter.

As importantly, Cobra TOW has been fielded rapidly, and the number of systems in the inventory is increasing monthly. We have already equipped all attack helicopter companies in Europe with Cobra TOW. These units now stand ready to integrate their potent anti-armor punch with the rest of the combined arms team in defense of NATO.

OUR TACTICS for employment of the Cobra in the high threat environment are pretty well defined now. All of our field exercises, tests, and studies have supported the effectiveness and survivability of attack helicopters. As we gain added experience, we will evolve even better tactics.

Most recently we have focused on the development of joint tactics with USAF close air support aircraft. Simply put, we have found that we can do our respective jobs better when we work together. Not a startling finding, but we are beginning to be able to prove it to those who require objective, analytical evidence.

I MENTIONED at the outset that I view some qualities as distinctive and essential for Cobra crew members. These qualities are important for all members of the Army Aviation team, but must be present in unusual measure for Cobra crew members. The three qualities I see as critical are **courage, dedication**, and **innovativeness.**

Courage, I think, needs little discussion. It takes a special type of courage to consciously accept and train for the mission of going into combat as part of an attack helicopter team which will often be fighting from unfamiliar terrain against numerically superior forces attacking toward you in armored fighting vehicles.

Dedication, I cite, because I believe it takes special dedication to train for a uniquely combat-oriented role in a time of peace. All other Army Aviation systems have a peacetime function of carrying passengers, cargo, sensors, etc. The Cobra is a single purpose vehicle-designed to fight.

Cobra maintenance and armament personnel also require a special dedication. Compared to their counterparts on other Army aircraft they rarely get to enjoy the fruits of their labors, They complete an inspection, or a rearming, and then must wait on the ground for their bird to return from its mission.

Perhaps the most hotly debated facet of the Cobra's introduction into the Army was the loss of the crew chief and gunner from the UH-1 gunship's crew. The emotional after effect of this crew "divorce" has not yet been fully overcome nor have we solved the crew chief pay inequity.

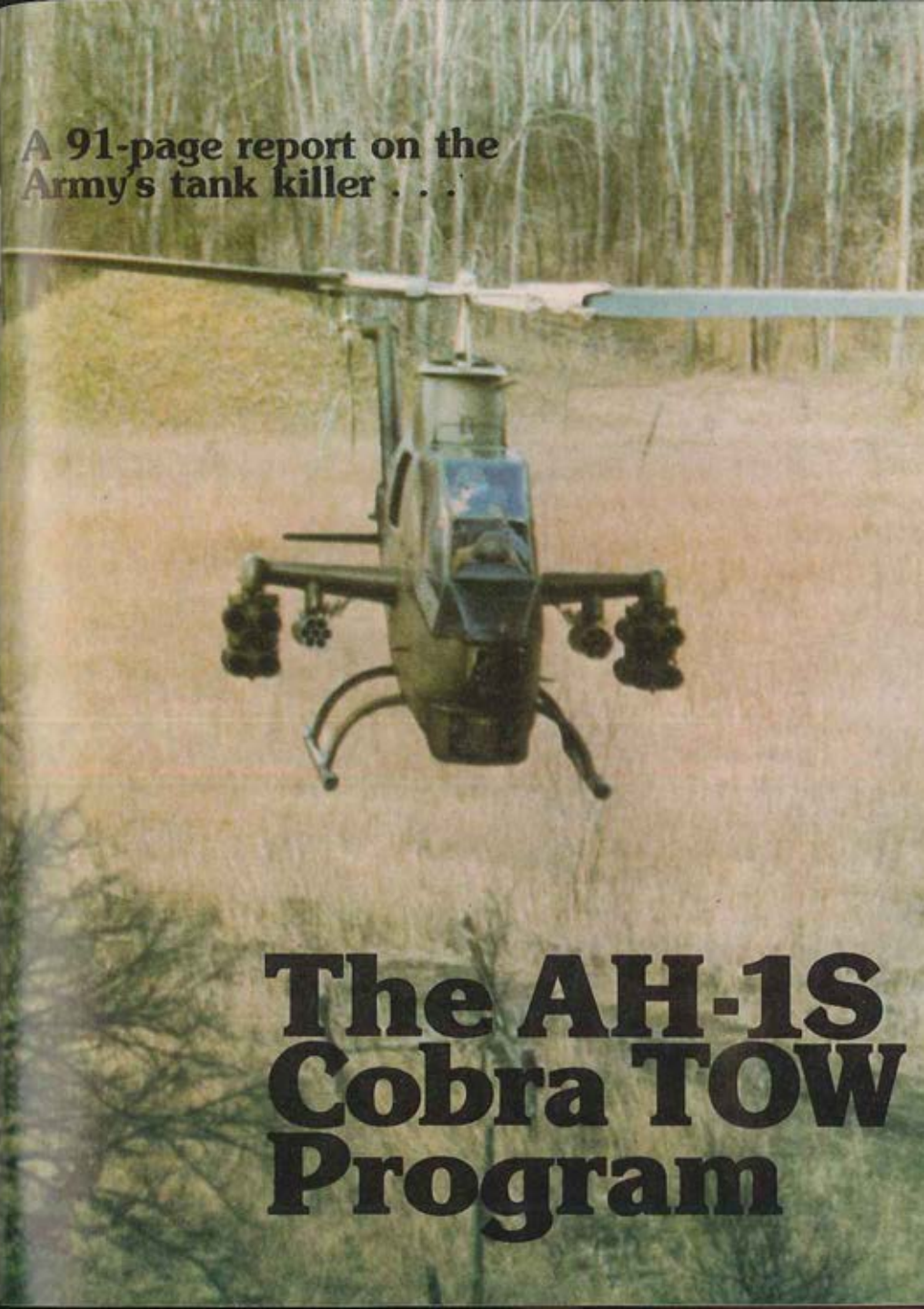
The third quality, **innovation**, is related to the simple fact that the Cobra crew must have a "can do" attitude in an ever changing tactical environment. Rarely will an action be "canned" or go according to plan. Rapid, creative tactical decisions are essential. The high threat environment of the modern mechanized battlefield is intolerant of delayed or ill-considered decisions. I believe that **courage, dedication,** and **innovativeness** are "musts" for Cobra crew members.

LOOKING FORWARD to my next assignment, in Germany, I intend to continue a close association with the Cobra and its crews. I know that the AH-1S Cobra will continue to gain in capability with the improved main rotor blade, wing stores management, and the 30mm gun among future items to be added. I am confident that Cobra TOW will continue to perform its assigned missions with distinction, and that the legends of the "Snake" will continue to grow.

My congratulations and best wishes to the Army Cobra team on the occasion of this feature issue.

I am extremely proud to have been a part of this team.

A 91-page report on the Army's tank killer . . .



The AH-1S Cobra TOW Program

DEPARTMENT OF THE ARMY
HEADQUARTERS UNITED STATES ARMY TRAINING AND DOCTRINE COMMAND
FORT MONROE, VIRGINIA 23651

The AH-1G Cobra, the Army's only fielded attack helicopter, was the first helicopter designed specifically for the attack role. An honored combat veteran of the Vietnam conflict, it provides the aerial platform for the airborne anti-armor TOW missile subsystem.

Modernization of the Cobra TOW helicopter is proceeding at a rapid pace and will enhance both the capability and the survivability of the aircraft. It is noteworthy that this significant increase in mission performance is being accomplished through a product improvement program, another good example of obtaining cost effective increases in capability by improving the assets the Army already owns rather than buying a new item.

The Cobra's mobility, fire power, and responsiveness have enhanced the ground commander's employment of his combined arms team. The modernized Cobra TOW, today's most effective operational anti-armor helicopter, is a key element of this Army team and will be the mainstay of the U.S. Army's attack helicopter capability for years to come.

Donn A. Starry

DONN A. STARRY
General, United States Army
Commanding

THIS IS COBRA COUNTRY!

By COLONEL ROBERT P. ST. LOUIS
COBRA PROJECT MANAGER – TSARCOM

GREAT things have happened and are still happening in Cobra Country. This issue of "Army Aviation" is dedicated to the AH-1 Cobra program.

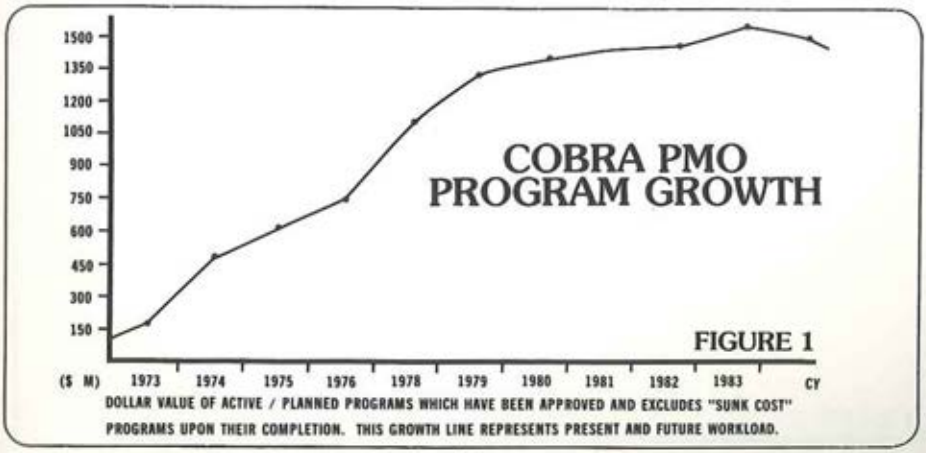
It contains articles which will provide the military community and aerospace industry an insight into the Army's only fielded attack helicopter and the ongoing programs to modernize it to meet the Army's urgent requirement for a heliborne anti-armor capability.

Background

Prototypes of the AH-1 Cobra helicopter were first flight tested by Bell Helicopter Textron (BHT) in September 1965 and demonstrated to the Army only three months after the initial tests at Edwards AFB. After these tests, a contract was negotiated with BHT to start production of this new attack helicopter in March 1966. Designated the AH-1G, it provided the Army with its initial helicopter designed specifically to accomplish the attack role/mission.

Special management of the Cobra series aircraft was established in March 1972 when the charter for the Office of the Project Manager was approved by DA, the office organized, and assigned to the Army Aviation Systems Command. Since its establishment in March 1972, the Cobra program has experienced phenomenal growth in both scope and complexity.

From a single development effort of modifying the AH-1G to the AH-1Q model - plus six AH-1G product improvements - totaling less than $150 million, it has grown to four active development efforts and more than 40 additional product improvements plus new



production aircraft, all integrated into a complex and finely meshed program totaling over a billion dollars and still growing.

The chart in **Figure 1** shows this funding growth through calendar year 1983, a growth in our program that resulted in a new charter for the Cobra office and the upgrading of the management level from a "Product" to a "Project" Manager effective 31 March 1976. The primary objective of the Cobra Project Manager's Office is twofold: to modernize the AH-1 **Cobra** Attack Helicopter as a weapon system which will be capable of meeting the threat envisioned on the 1980s battlefield, and field this modernized **Cobra.**

Modernization - Major Features

What is planned to completely modernize the AH-1 Cobra you ask?

The chart in centerfold shows the major features of the program. These improvements will enhance the combat capability and survivability of the aircraft to meet the Army's requirement through the 1985 time frame.

The first improvement was to add the **Tube Launched Optically Tracked, Wire Guided (TOW)** anti-armor missile and helmet sight subsystems to the basic AH-1G which produced the AH-1Q model. While demonstrating its anti-armor proficiency, the added weight of the TOW missile subsystem degraded the ability of the AH-1Q to perform in a mid-intensity environment.

This led to the AH-1S model which has

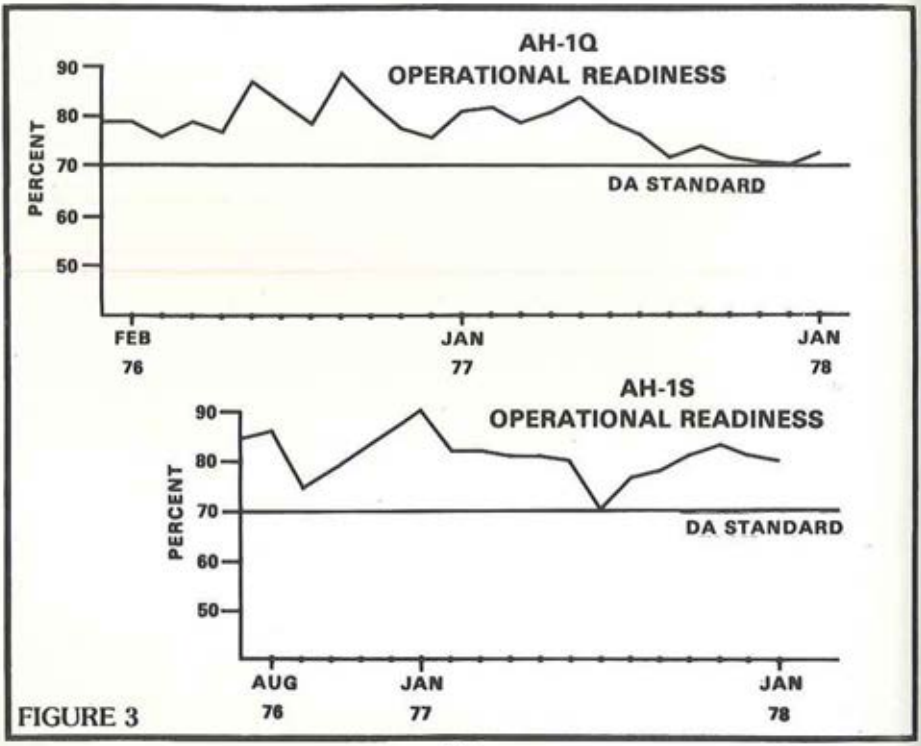


FIGURE 3

Top-of-the-tree air data technology for nap-of-the-earth anti-armor capability

The Marconi Avionics Air Data Sub system
was chosen for the
Bell Helicopter Textron AH-1S Cobra
after evaluations by more Test Activities,
in more helicopters and in greater depth,
than any other system.
In the business of advanced air data systems,
it's top of the tree.

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the same armament subsystem as the AH-1Q, plus a new engine (T53-L-703), gearboxes, and an uprated transmission to improve its agility and performance. We have modified the basic AH-1G to the Mod AH-1S configuration and have produced a new production AH-1S aircraft.

The latter aircraft has a distinctive low glint, flat plate canopy and a Nap-of-the-Earth (NOE) night compatible cockpit layout. These provisions include human factors considerations, provide for improved flight instruments arrangement, accommodate newer avionics, and enhance NOE operations.

Other significant improvements include: the new 100% composite main rotor blade for improved survivability, reliability, and performance; and an infrared (IR) jammer coupled with a hot metal plus plume suppressor, and IR paint to defeat sophisticated heat-seeking missiles.

The AH-1S also provides for an airborne laser tracker for target hand-off and target acquisition; a radar warning device; a new doppler navigation system; a new turret to mount a 20 or 30mm cannon; and a new fire control system to include laser rangefinder, air data sensor, computer, and heads-up display.

Cobra TOW Operational Today

The AH-1Q, Mod AH-1S, and new production AH-1S **Cobra TOW** models have been deployed to operational units in USAREUR and CONUS. USAREUR units had priority for issue of the anti-armor attack helicopter and have the AH-1Q and Mod AH-1S configurations. CONUS units have the Mod AH-1S and new production configurations.

The deployment of these aircraft with the anti-armor capability has been accomplished without any major problems. The success for this deployment is attributed to the DARCOM concept called **"Project Hand-Off"** carried out by the **Cobra Materiel Fielding Team (MFT). Major General Thompson's** article on page 77 provides details on this concept.

Attesting to the success of the **Cobra TOW** Project Hand-Off in Europe the USAREUR Chief of Staff wrote in September 1976: "The USAREUR staff has been working very closely with the Cobra Project Manager's Office, the **Cobra TOW** Materiel Fielding Team, and other members of the AVSCOM staff, as well as with the units receiving the AH-1S. We expect the introduction of the AH-1S to be as successful as that of the AH-1Q which set the USAREUR standard for new materiel introduction."

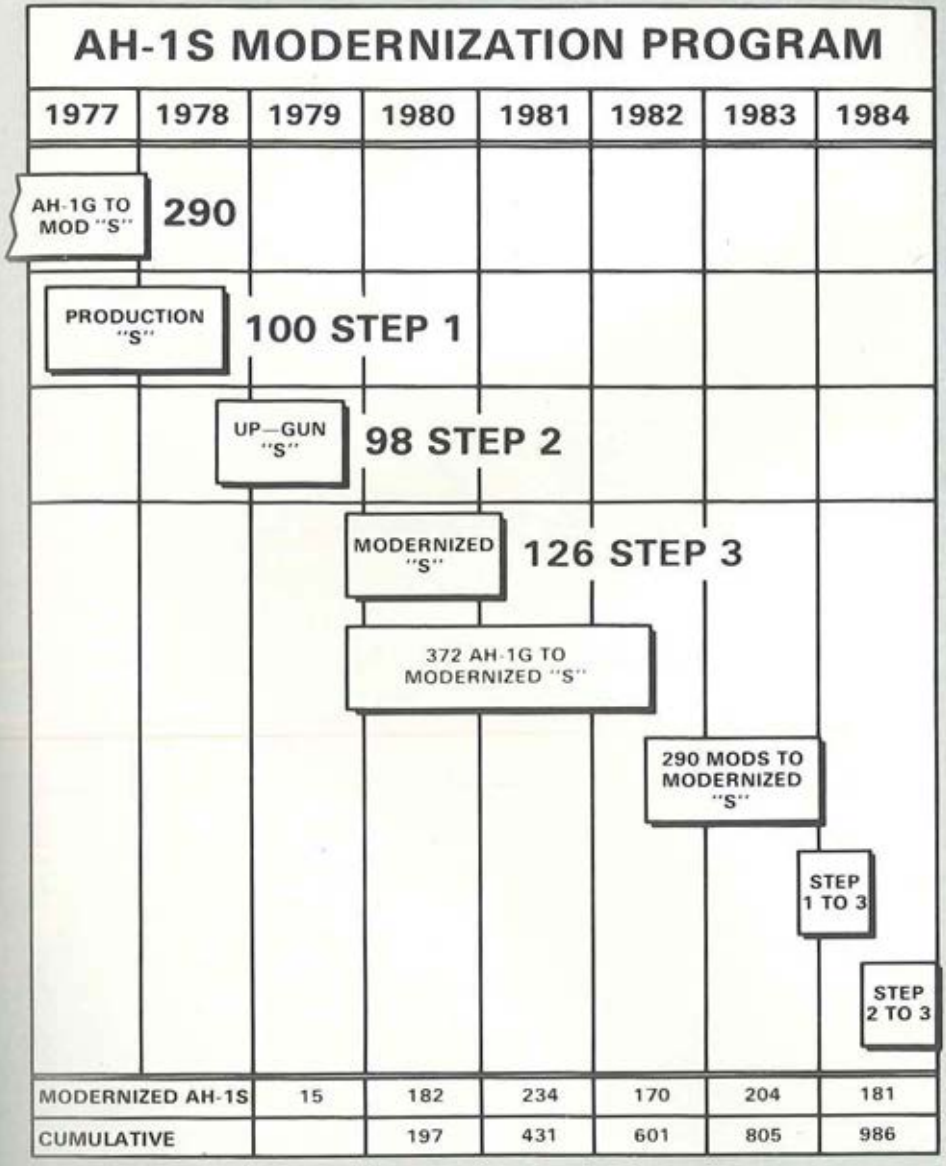
Since the deployment of the **Cobra TOW** to operational units, the operational readiness rates for the aircraft have consistently exceeded the DA Readiness standard. The charts in **Figure 3** depict the readiness of the AH-1Q and AH-1S respectively.

These rates have been accomplished while **Cobra** crews flew over 38,000 hours, fired over 600 TOW missiles from maximum range, engaged both stationary and moving targets up to 20 mph under reduced visibility conditions caused by snow, dust, and light rain and hit the target over 80%of the time. Results of the fielding of the **Cobra TOW** indicate that the pilots, gunners, and maintenance personnel have demonstrated their capability to absorb the training provided and to maintain the system in the field.

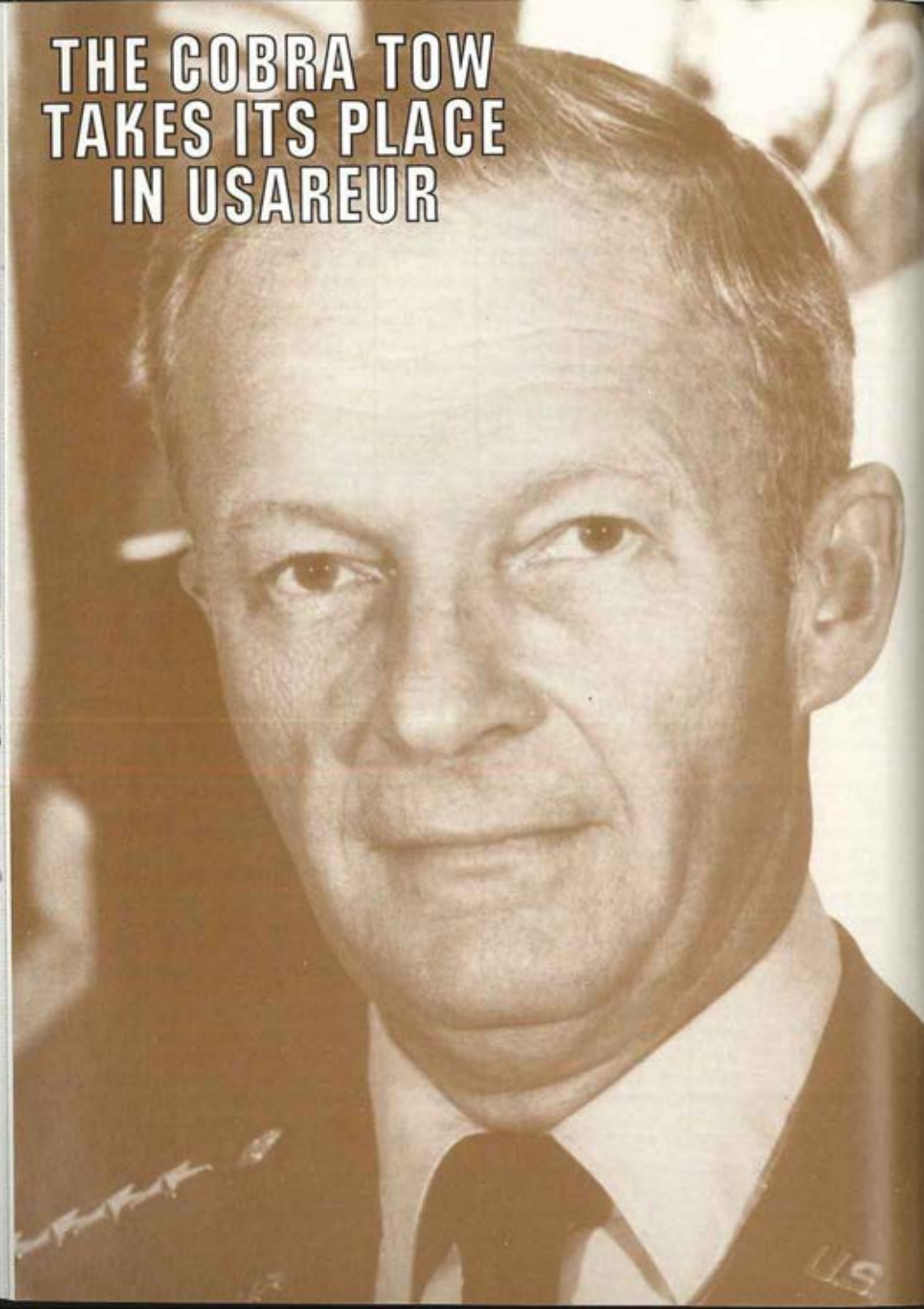
TOW missile firings attest not only to good reliability and accuracy, but to the crews' ability to use the system effectively. Since November 1976 when the draw down from the AH-1G fleet for the 290 modification program was completed, the AH-1G and AH-1 fleet operational readiness has improved steadily.

Modernization Program - Future

The overall plan to modernize the AH-1 Cobra fleet is illustrated in **Figure 4.** Shown at the top are the 290 AH-1G aircraft that were modified to the AH-1Q and AH-1S configurations. These aircraft have been modified, delivered to the Army, and are deployed to operational units. The AH-1Q models will be reconfigured to the Mod AH-1S in Europe beginning in May 1978. ★


AH-1S MODERNIZATION PROGRAM
1977
1978
1979
1980
1981
1982
1983
1984
AH-1G TO MOD "S"
290
PRODUCTION "S"
100 STEP 1
UP—GUN "S"
98 STEP 2
MODERNIZED "S"
126 STEP 3
372 AH-1G TO MODERNIZED "S"
290 MODS TO MODERNIZED "S"
STEP 1 TO 3
STEP 2 TO 3
MODERNIZED AH-1S 15 182 234 170 204 181
CUMULATIVE 197 431 601 805 986

THE COBRA TOW TAKES ITS PLACE IN USAREUR



THREE years ago, if anyone had told me that by the summer of 1978 we could have expected to have ten attack helicopter companies equipped with the AH-1S **Cobra TOW** anti-armor helicopter on station and deployed throughout U.S. Army, Europe, I might have suggested that they were suffering from a severe case of overoptimitis . . . because at that time, there were no attack helicopter companies in Europe nor was there much aviation.

Yet today, this is precisely our status and future plans call for one additional attack helicopter battalion to be integrated into each corps.

"Flat on its back"

A starkly realistic description of our situation in 1974-75 would be to say aviation was flat on its back in USAREUR. Warrant officer aviators were convinced that Vietnam-type requirements where they had played such a vital part were no longer valid.

Officer aviators faced attempts to take away their flight pay and the problem of meeting the gates.

And, to make matters worse, we weren't getting any new equipment or aircraft in Europe.

What then caused the renascence of aviation in Europe?

To some degree it was the realization that something had to be done to meet the growing Warsaw Pact threat to western Europe. We had to develop an effective force multiplier and do it in a hurry. Thus, the **Cobra TOW** became a likely candidate.

The 1974 USAREUR Aviation Reorganization Study provided the initial impetus for an aviation buildup. This study established **Combat Aviation Battalions (CAB)** in each division and reorganized the aviation portion of our **Armored Cavalry Regiments (ACR)**. The combat thrust of this reorganization was the ten attack helicopter companies it provided, two in each division and one in each ACR.

In order to effect this realignment of aviation assets, USAREUR had to give up its air cavalry troops. This was entirely a matter of priorities. We simply did not have the spaces for ten attack helicopter companies in addition to six air cavalry troops. In view of the threat, we opted for the ten attack companies.

This is not to say, however, that air cavalry troops are not needed in Europe or do not have a place on the modern battlefield. Future plans should provide for reestablishment of our air cavalry troops when the resources became available.

The second push . . .

The second push of Army Aviation in Europe was provided by the ARCSA III recommendations approved by the Chief of Staff of the Army in early 1977. These recommendations substantiated the USAREUR Aviation Reorganization Study and provided additional capabilities/assets for our utilization. ARCSA III will be implemented in Europe during 1980-84.

Throughout the turbulence created by these reorganizations, three groups of people stand particularly tall. These are the support personnel who got the AH-1S into the command and then saw to it that it was properly fielded; the ground commanders who are currently training with and employing these aviation assets; and last but not least, the aviators who are making the reorganization work. It is a real success story from which the entire Army can learn.

A July, 1978 Report

by GENERAL GEORGE S. BLANCHARD, Commander-in-Chief, U.S. Army, Europe

In 1975, General John R. Deane, the CG of AMC (Army Materiel Command), later DARCOM, realized that something needed to be done to "bridge the gap" between the designer, the contractor, the technical community, and the Army in the field. **Project Hand Off** was developed to do that and proved to be the key element in getting the AH-1S into USAREUR.

The idea behind the operation was to ensure field-unit ability to support a new piece of equipment by having DARCOM (the specific commodity commands) assume responsibility for its fielding, its initial logistical demands, and the training requirements created by the new equipment.

Fielding a complicated system

As it turned out in a widely dispersed command like USAREUR, this was an ideal way to approach the fielding of a complicated system like the AH-1S. Further success was almost assured when the fielding team was directed to deploy the AH-1S under the constraints imposed by current USAREUR directives and policies.

The actual buildup of **Cobra TOW** assets in USAREUR, therefore, took about a year and a half. Training of personnel was accomplished by two New Equipment Training Teams who trained over 420 pilots and maintenance personnel during this period. Concurrently, two Materiel Readiness Teams from AVSCOM serviced our two widely separated corps seeing to it that the AH-1S was properly received by our field units and that the system was ready to fight.

Throughout the entire process, units were never "down" or off the line. Had the need arisen, they could have been ready to fight. And, based on over 20,000 flying hours during this critical 18-month period, we consistently bettered the established DA NORM and NORS rates, proving we could manage the **Cobra TOW** system and validating the **Project Hand Off** concept once again.

Today, the impact of the **Cobra TOW** system on U.S. Army, Europe, has been striking. We have immensely enhanced our anti-armor capability and have done so in a relatively short period of time. Today's ground commander is beginning to realize that he has an extremely valuable asset in the **Cobra TOW** system.

The real challenge now is getting each commander totally on board in respect to **Cobra TOW** tactics, training, and capabilities as we integrate this significant tank-killing asset into the USAREUR, combined arms team.

"Nothing is sacred."

Looking forward, I have directed our aviation personnel to undertake a project designed to maximize USAREUR's tank-killing capability. They are looking at all aspects of training, employment, communications, and support that have an impact on the **Cobra TOW's** capability to kill tanks in support of us and our NATO allies - nothing is sacred. They started their work in February and we are looking forward to their recommendations shortly.

In the interim, as we gain experience in the employment of the **Cobra TOW**, we are relearning how vital a role Army Aviation can play on the modern battlefield. Our defenses have been expanded upward, offering a new dimension to the defense. And with follow-on systems like the advanced attack helicopter coming along, we can expect our capabilities to be further improved.

So we are extremely pleased with the introduction and the fielding of the **Cobra TOW** in the U.S. Army, Europe. We are pleased with the additional dimension it adds to our defense. And we are confident that the employment of the **Cobra TOW** in the future will be limited only by the ingenuity of the commander using this vital new element in our combat equation.

We've got a good foundation and a good structure for Army Aviation started in Europe. As we implement ARCSA III, we can finish the job by sprucing up our tactics, improving our support structure, and totally integrating the **Cobra TOW** into our operations. ★

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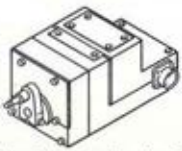


Electromechanical Actuator

Bearing-Distance Heading Indicator

Attitude Indicator

MEETING THE CHALLENGES!

* * *

By MAJOR GENERAL
E.A. PARTAIN,
PRESIDENT,
USAREUR REGION – AAAA

* * *

EXCERPTS TAKEN FROM THE KEYNOTE ADDRESS AT THE 1978 USAREUR REGION – AAAA CONVENTION AT GARMISCH

At last year's AAAA Regional Convention we reported that 118 Cobra TOW's were in Europe at the close of calendar year 1976.

By the close of calendar year 1977, that figure had nearly doubled to a total of 230 Cobra TOW's.

Last year, we reported on the major ongoing USAREUR reorganization - later validated by ARCSA III - and indicated that major portions of the reorganization progressed pretty well as planned, and that we now have an active combat aviation battalion stationed with, and for employment by, each of the four full U.S. divisions found in the Central Army Group Region.

The air defense challenge

One of the challenges identified last year was the Soviet anti-aircraft artillery and rocket capability that we in Army Aviation would have to face. This year, I can report on actions already taken to counter those threats.

These actions are the installation of infrared suppressors on all 230 Cobra TOW aircraft; installation of 97 of 146 IR suppressors authorized for UH-1's; and a formal request for early installation of a new generation IR suppressor for selected OH-58's in Europe which, if approved, could commence during the third quarter of FY 78.

Countering the threat

Additionally, more than one-half of USAREUR's aircraft scheduled for low reflective IR paint have been painted, with the remainder of the fleet to be completed during the next year. Presently, contractors are busy installing the APR-39 Radar Warning Receivers on the USAREUR fleet. Those receivers are capable of telling the pilot when he is under radar surveillance, and will prove significant in countering the threat air defense systems addressed last year.

Under-wire and under-bridge flight have been authorized by the German government in the interest of supporting realistic, necessary, nap-of-the-earth training - again to assist in countering the threat of anti-air weapons systems.

During the past year the total number of Army aircraft has increased from 950 to nearly 1,100 aircraft.

Night vision goggles have been intro-

duced to Europe, and an initial IP/SIP qualification course has been completed providing a potential training base for the units in Europe.

The first in a series of planned bi-national aviation exercises conducted jointly by the III GE Corps, VII US Corps, and 11th Aviation Group occurred in May 1977, and led to the development of a bi-national aviation SOP which will be evaluated during **Albatros II**, which will take place later in April.

The USAREUR accident rate was the lowest world-wide. It is obvious that a lot has happened in aviation in Europe during the past year - many of you have contributed a vital part in keeping aviation on the move.

What is ahead in 1978 - a year that my perception tells me will be an exciting year for aviation in Europe?

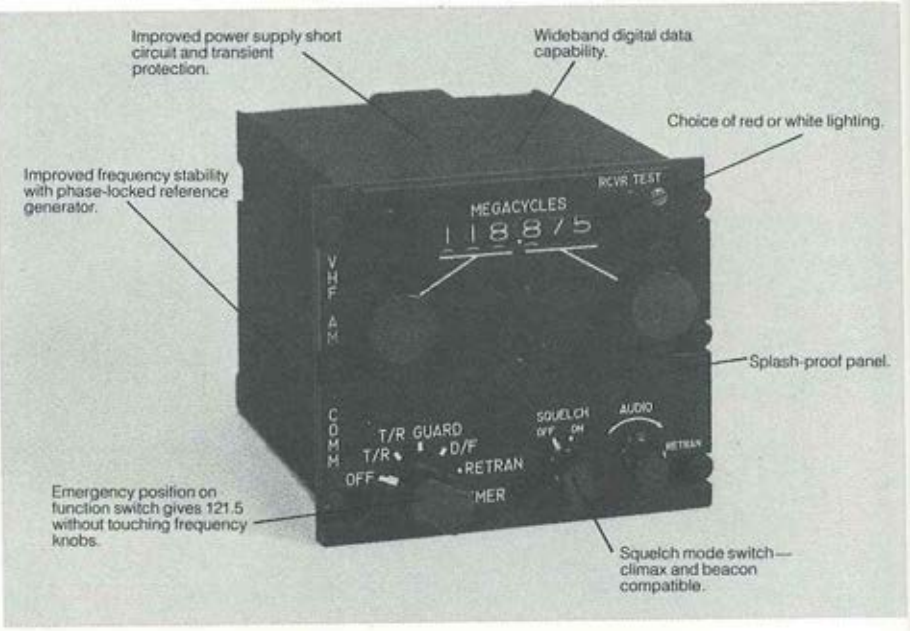
Although a lot has been accomplished in the recent past, a great deal remains to be done. When USAREUR's new Aviation Officer, **Colonel Lewis McConnell**, reported to his job in December, he was charged by **General Blanchard** to review the entire spectrum of aviation in Europe, and to orient the aviation effort during the year toward maximizing the attack capabilities of the **Cobra TOW**.

In order to accomplish this mission, **Colonel McConnell** conceived **Project Maximize** and established a USAREUR-wide study group to review the status of the entire aviation and aviation support system as it pertains to the fighting ability of the **Cobra TOW**.

Initial report completed

Today, the **Project Maximize** study group is completing its initial report, after visits to the field, in preparation for briefing **General Blanchard**. As suspected, the challenge to maximize the fighting capability of the **Cobra TOW** encompasses nearly every facet of aviation in Europe today.

I have selected a few of the actions that many of you will see and contribute to during the next year. Among these is an improved aerial gunnery program - a program with USAREUR standards that will provide both the ground commander and the aviation commander definitive guidelines so that range schedulers and major commanders alike know what's necessary for aviation gunnery qualification.



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The "tankers" have done this successfully. They can tell us how many days and what ranges are necessary to satisfy level one or level two tank gunnery standards. We expect to use their lessons to our benefit.

Once the guidelines are established, we expect to compete for and to gain adequate range time to meet our annual qualification requirements. If we can't get the time on the ranges currently available in Germany, we will look for other options.

We have a fleet of aircraft that, with 70% availability and 80% chance for hitting the target when fired, has potential for destroying 940 tanks on one rearming. We must insure that the crews are trained and the equipment is ready when the battle starts. For if trouble develops, you can rest assured that the highly maneuverable, fast-reacting **Cobra TOW** will be called for.

Fighting the night battle

Another area where you will see activity as a result of **Project Maximize** is night training. This is an area that will affect everyone in aviation in Europe. We will be looking at, and rethinking, our concept for fighting the night battle - as we know our opponents are not going to wait for daylight to attack.

We need to, and will be, defining the missions for which night vision goggles are best suited on the European battlefield. We will then tailor unit night vision goggle training to satisfy those missions. We don't expect the goggles to be the sole means of fighting the battle. They may be best used for Med Evacs, resupply, or moving to battle positions.

Use of illumination will be encouraged and must be practiced in night training. Ideally, 2.75" Rocket illumination would be provided by our own Army aircraft giving us the capability of fighting at night while out of the range of friendly artillery. Late this year we will see a limited number of fixed-range 2.75" illumination rounds made available. In the interim, we must use the artillery regularly to insure we are ready for the night battle.

Multi-national training will also receive a great deal of attention during 1978 as an integral part of **Project Maximize**. Earlier, I addressed **Albatros I** and **Albatros II**, as well as development of a draft Joint German/American Air Transport SOP.

That SOP will be exercised and evaluated during **Albatros II** later this month, refined - and then evaluated again during an exercise between III German and V US Corps. The result will be an SOP that can be of use to any German or American unit conducting a joint airlift.

Working together

How does this apply to Project Maximize? In a number of ways. For example, after a particularly difficult battle, there may be a requirement to move large amounts of replenishing stocks - both ammunition and fuel - rapidly so that the **Cobra TOW** can sustain its tank-killing capability. The joint SOP provides flexibility so that German and American assault support aircraft can work together if necessary to move those replenishments.

Think also of the flexibility provided the commander in a rear area security role by his ability to move - with German and American aircraft in a single lift - a reinforced battalion across congested bridges and roads to counter a threat attack into the rear area, an attack aimed at cutting off critical supplies - critical not only to the **Cobras**, but to all friendly forces.

The next step, and one that you can expect to see developed during 1978, is a multi-national attack helicopter SOP defining procedures for employment of U.S. attack assets in support of forces from other nations. As attack helicopters are introduced by other countries, we can expect to see a modification to this SOP so that, if required, attack helicopters from one nation can be effectively employed in conjunction with a battle being fought by another nation.

There is no anti-armor asset in the inventory today capable of the rapid lateral deployment found in the attack helicopter. ★

AIR Troop with its 21 Cobra TOW's and Support Troop with its M56 mine-dispensing platoon and scout platoon, are the most responsive and lethal units in the Cavalry Regiment. They are frequently the only assets which can immediately influence the outcome of a battle or correct a mistake in judgement during the course of a battle.

Over the past two years, aviation units of the 2d Armored Cavalry Regiment have earned a healthy, if begrudging, respect from the Regiment's ground troops. The once cynical view of ground cavalrymen that helicopters are out of their element in the European environment, and in the type of conflict which would most probably occur in Europe, has been replaced by a genuine acceptance of their contribution to the Regiment's combat capability.

A transformation of attitudes

This transformation of attitudes has occurred because of an evolution in organization and tactics and a series of training exercises during which the air troops of the Regiment proved conclusively to even the most skeptical that air units possess deadly anti-armor systems capable of rapid response and full integration into both offensive and defensive operations. The other air elements of the Regiment such as the scouts and M56 mine dispensing platoons have reinforced and enhanced this opinion.

In sum, ground cavalrymen looked beside and above them and found highly aggressive, capable, and highly-motivated cavalrymen in aircraft who thought, reacted, and executed combat actions with the same intensity and spirit as they, and more important, that the air cavalrymen acted a lot faster. They found that when fighting vastly superior forces these cavalrymen in the air often meant the difference between victory and defeat.

As scouts, these cavalrymen in helicopters found the enemy quickly, scouted him deftly from new angles, and contributed importantly to the intelligence flow. As fighting cavalry, the airmen moved quickly and aggressively to counter enemy progress with withering long range fire into formations immobilized by helicopter-emplaced minefields.

Moreover, this was all done during the most marginal of weather conditions. Ultimately, ground cavalrymen came to understand the significant combat capability possessed by the Regiment's air units, especially when fully integrated with the ground efforts.

Over the past two years the Regiment practiced the full integration of Regimental air and ground elements during its field training. These ranged from platoon and troop live fire exercises at major training areas to full Regimental maneuvers.

Full air-ground integration

In all of these exercises, air and ground units focused on the same training objectives. This encouraged full integration of all combat capabilities - both ground and air. During platoon and troop/company live fire exercises, members of each element, ground and air, observed first hand the full capability of the other.

Leaders of both ground and air units were challenged to find innovative, effective techniques of employment which combined their particular strengths to maximize the lethality of the Cavalry force. All weapons systems - tank and sheridan main guns, mortars and artillery were directed in unison against varying arrays of simulated enemy formations. The combined effects were impressive.

These combined live fire exercises were followed by several free maneuver, opposing forces operations in which both ground and air units of the Regiment were extended to their maximum against major opposing forces in simulated combat. Time-distance factors, logistical constraints, communications problems, and heavy enemy pressure complicated opera-

ABOUT THE AUTHOR

Colonel Harold R. Page serves in U.S. Army, Europe, as the commander of the 2d Armored Cavalry Regiment. ■

tions considerably but never disrupted the cooperation of ground and air cavalry.

Rather, the strengths of one type of unit often served to offset the weaknesses of the other. Throughout the experience new lessons were learned and new techniques were developed to better capitalize on the unique capabilities of each type unit. What evolved represents what I think is the most closely integrated air-ground team in Europe.

Background

How did the Regimental aviation troops develop into such a dynamic, lethal fighting force?

From the early 1960's when CH-34 cargo helicopters were flying surveillance missions along the international border while using UH-1M "gunships" with SS11 wire guided missiles, to the early 1970's when the first five AH-1G Cobras were introduced into USAREUR, the Regiment's concept for the effective blending of air cavalry with ground troops was steadily developed.

During REFORGER 75, an Air Troop (Heavy) concept with a single commander and centralized maintenance (AVIM) was employed, and for the first time in USAREUR a simulated TOW missile tank killing capability was tested. Concurrently, under the Aviation Reorganization Study, MTOE's were submitted to DA which subsequently resulted in the development of two Aviation Troops.

During the latter part of 1975 and early 1976 AH-1Q Cobra TOWS were received and utilized immediately in training exercises culminated by REFORGER 76' when the Regiment first integrated the **Cobra TOW** with ground units.

Through trial and error the air cavalrymen adapted themselves and their machines to the harsh environment of the European theater. The potential for a well-rounded fighting force became obvious. As the preconceived glaring vulnerabilities of combat helicopters were suppressed, unexpected potential emerged. Through the summer of 1977, Air Troop continued to conduct air ground integration exercises.

During the same period, additional OH-58 scouts were brought on board to enhance the Regiment's overall scouting capability. As REFORGER 77 was approaching, The Regiment received a big boost by the introduction of the M56 minelaying capability.

During REFORGER 77, the Regiment put it all together for the first time. Air Attack, scout, and mine laying systems were fully integrated with the Regiment's awesome ground combat capabilities. The effect was dramatic. Each system supported and complemented the other, and the result was an unbeatable combination.

Concept of employment

The basic tactics used by the air cavalry of the 2d ACR differ very little from Army doctrine - aggressive, intensely-studied NOE flight combined with a full grasp of mission requirements and a thorough knowledge of the terrain bring these basic skills to a rare pitch of perfection.

What is unique to the Regiment is the degree to which integration of air and ground units during tactical operations has been achieved. The doctrine and techniques of employment outlined in Field Manuals have been adopted, and in some cases modified to fit the peculiarities of the European environment and the tactics of the Regiment. What has been fully grasped by all from ground scout through Regimental Commander is a working knowledge of the capabilities and limitations of the various weapons systems found in the Regiment and the tactics surrounding their employment and survival.

As an example, every ground scout, armor cavalryman, and intermediate commander in the regiment knows that enemy air defense weapons must be located and neutralized before the full lethality of the **COBRA TOW** helicopters can be brought to bear without undue risk. And in a fight, these ground cavalrymen fully appreciate the decisive role that the attack helicopters can perform when integrated with ground systems.

It's not unusual for a ground cavalry unit leader, or even individual members of a ground platoon, to state bluntly that the

Integration of Air and Ground Units

A REPORT BY COLONEL HAROLD R. PAGE, COMMANDER, 2D ARMORED CAVALRY REGIMENT

number one priority target is not the enemy tank, but the enemy's most lethal forward air defense weapons system (which they each know and can identify). To identify and destroy these systems opens the way for a devastating combination of air and ground anti-tank fires to be brought on advancing enemy armor formations.

More timely decisions

The integration of air and ground elements involves more than fighting intense engagements. Each contributes to a vital requirement of "seeing the battlefield" in the execution of the Regiment's tactics of high risk delay and active defense. Reports from ground units and aerial observers through unit channels (and directly to Squadron and Regimental headquarters) provide essential information on the location and movements of both enemy and friendly formations.

The reports enable commanders at Squadron and Regimental level to keep better track of developing situations over an extended and cluttered battlefield. Decisions are more timely and invariably are based on more valid information than normally is possible . . . and in an environment where time is a critical factor in the lateral movement of forces, this timely information is the difference in being able to execute the high risk delay or Active Defense successfully.

Several techniques of employment have been tried and evaluated by the Regiment during several major exercises, including three successive REFORGER's. Initially, it was thought that because of the extended frontages over which the Regiment operated the best method of employment was to place an attack helicopter platoon under the operational control of the deployed line squadrons with commitment authority reserved by the Regimental Commander.

While this concept deployed attack helicopters well forward in areas of probable battle, it did not fully exploit the mobility and firepower of the attack troop. Massing of the dispersed platoons when needed was difficult and often untimely.

Experience led to the more effective employment of the troop as a unit, with its platoons employed singly, in pairs, or all together according to the nature of the threat. This concept insured that the maximum destructive power of the attack helicopters could be massed at the decisive places and times as the battle developed.

While employment of the **Cobra TOWS** by platoon was still a viable technique, it clearly was not the optimum. Techniques for command and control at the Air Troop had to be developed. Questions concerning the control of the attack helicopter platoons during their integration into the battle arose.

"Passing off" techniques

During pre-REFORGER 77 exercises, it was established clearly that the best technique was to pass control of the Air Troop to the squadron in which it was to be employed. The squadron could either employ the unit separately or further pass control to a ground troop commander for integration into his battle plan. While feasible, the practice of passing control of Air Troop or its platoons to a platoon leader, or lower, would not be done normally.

The techniques of "passing off" control of the Air Troop to subordinate units was cumbersome at first, and eventually it became necessary to dispatch the Air Troop Commander or a senior representative of the troop to the gaining squadron Command Post to effect coordination and to assess the situation.

Integration of Air and Ground Units

Meanwhile, scouts followed by the Cobra TOWS would be enroute. Pertinent information obtained by liaison officers about enemy and friendly forces and the battle plan was relayed to the attack force. If the air unit was to be passed to a ground troop, the coordination of fires and maneuvers between ground and air units at this level was the responsibility of the ground unit commander.

The Air Troop Commander decided how best to employ his troop - in mass or by rotating his platoon to keep freshly armed and fueled aircraft in the fight. On completion of the engagement, the Air Troop would exit the area to regroup or to move to another critical area of the battle.

The use of aerial scouts

A great side benefit of employing the Air Troop in this fashion was the use of aerial scouts throughout the battlefield in the collection of vital battle information and its conveyance to the Regimental Staff Aviation Officer. Timely information on both enemy and friendly situations proved invaluable in assisting the Regimental Command elements to "see the battle" as it was developing.

While most attention is naturally focused on the Air Troop and its tank-killing role, three other air elements of the Regiment have also developed into critical members of the air-ground team. The M56 mine-dispensing platoon has evolved into a highly responsive unit of critical importance in Cavalry missions.

For the first time anti-tank obstacles can be emplaced during the conduct of a battle at the times and places determined by a ground commander, in support of the maneuvering of ground and air units to counter already developing enemy actions. If not used in that way, it can assist the engineer effort by emplacing portions of subsequent hasty barrier traces rapidly. The development of the M56 system represents a major step forward in terrain enhancement, and squadron commanders have been quick to grasp the value to their units.

The scout platoon, presently attached to the Air Troop, has allowed other units of the Regiment, both ground and air, to be employed in high threat areas while the scout platoon performs surveillance operations in an economy of force sector.

The command and control element of the Support Troop (Air) has converted its command console-equipped helicopters into highly mobile, ground command posts (HELTAC) that can be moved rapidly about the battlefield transporting the command group, alternate command group, or radio relay teams. This unit concept allows the command group to move quickly to decisive sectors or to positions where reliable communications can be established and maintained with all Regimental, adjacent, or higher units.

Summary

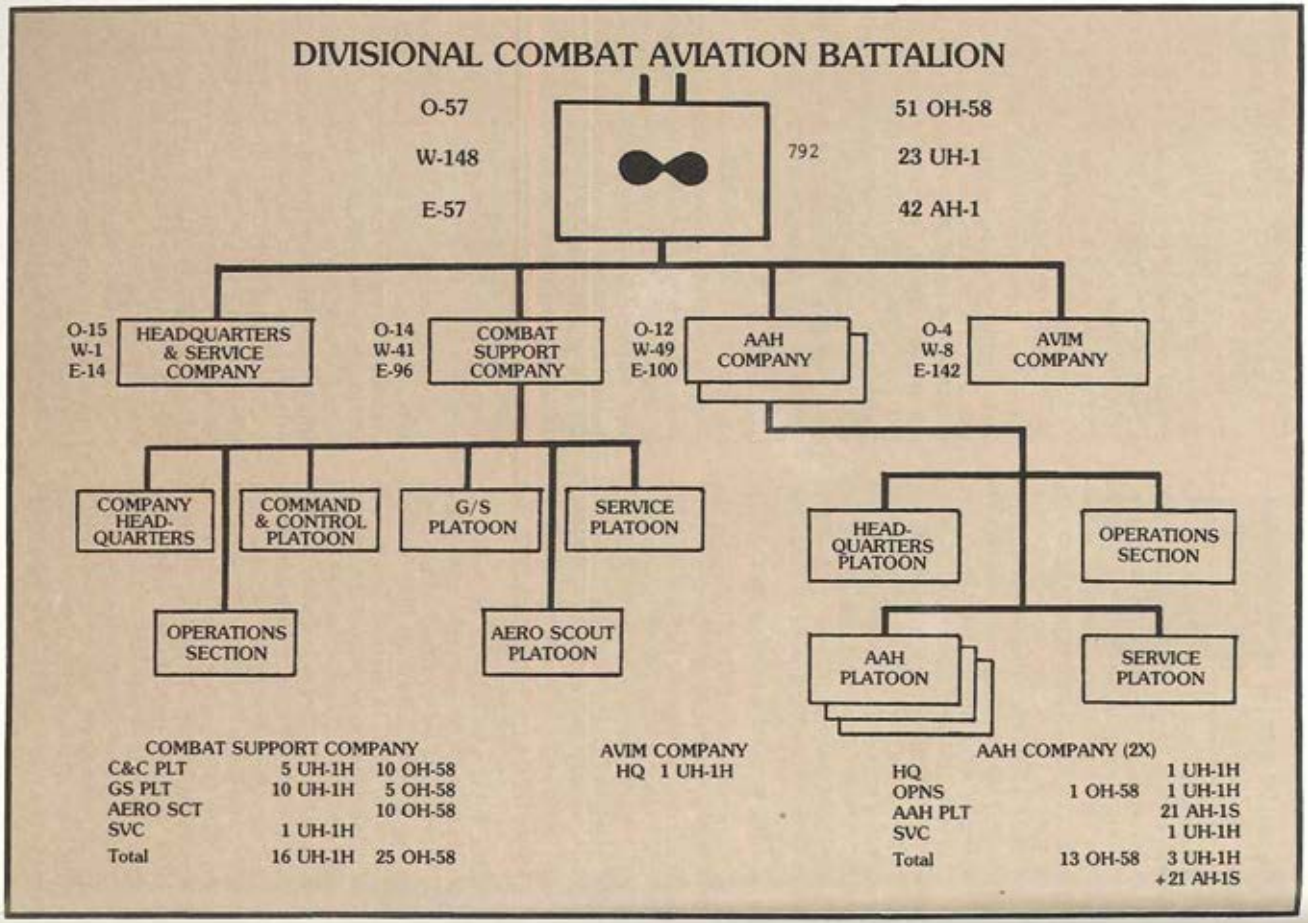
From the foregoing, it should be obvious that every element of the Regiment is committed to the air-ground team effort. If it were possible, the ground commanders of the Regiment would like to see every utility and observation helicopter in the Regiment capable of shooting rockets (for suppression, illumination, smoke, etc.) or capable of mounting and employing the M56 mine-dispensing system.

It is clear to those in the Regiment that a significant - but presently unutilized - capability exists in Europe. Every helicopter should be convertable and capable of joining the battle in some form against a numerically superior, heavily mechanized enemy.

The development of new tactics and techniques for integration of the Cavalry Air-Ground team is continuing in the Regiment. The innovativeness and boldness of both air and ground unit commanders are the only limitations as new technologies are pushing the threshold of tank-killing capabilities to extended heights and extending them to all hours.

TOUJOURS PRET! ★

DIVISIONAL COMBAT AVIATION BATTALION



COMBAT SUPPORT COMPANY		
C&C PLT	5 UH-1H	10 OH-58
GS PLT	10 UH-1H	5 OH-58
AERO SCT		10 OH-58
SVC	1 UH-1H	
Total	16 UH-1H	25 OH-58

AVIM COMPANY	
HQ	1 UH-1H

AAH COMPANY (2X)		
HQ		1 UH-1H
OPNS	1 OH-58	1 UH-1H
AAH PLT		21 AH-1S
SVC		1 UH-1H
Total	13 OH-58	3 UH-1H +21 AH-1S

The formation of USAREUR CAB's: A quantum leap!

A look at the reorganization of the aviation structure in USAREUR by LTC Gerald E. Lethcoe, Jr., the former commander of the 3d Aviation Battalion (Combat)

LTC GERALD E. LETHCOE, JR., Combat Division, Requirements Directorate, ODCSOPS, Dept. of the Army

FEW actions, in recent years, involving Army Aviation have had a more profound impact on developments than has the U.S. Army Europe Aviation Reorganzation Phase I.

This dynamic and refreshing look at the Army Aviation force structure was a quantum leap forward towards integrating Army Aviation into the combined arms team at the Division level. The highlight of this effort was the reorganization, expansion, and the ultimate formation of Combat Aviation Battalions in each of the USAREUR Armor and Mechanized Infantry Divisions.

Test preceded reorganization

The reorganization concept was prefaced with a Divisional Combat Aviation Battalion Test by the 3rd Combat Aviation Bn during December 1974-75. The main test objective was to examine and refine aviation tactics and techniques for employment as an integral member of the combined arms team in a mid-intensity European war environment.

The test was conducted; the results and recommendations were approved by Department of Army; and the basis for changes to the aviation structure in USAREUR are now a reality. The subsequent reorganization of existing assets, and the addition of new elements from CONUS, are really the final challenges of this action.

Then the painstaking, and in many instances, emotional job of reorganizing and relocating commenced. The division artillery and brigade aviation sections were consolidated with the division aviation company as one company; however, as experience was gained, it became necessary to divide this large element into two separate companies. The result was a headquarters and service company and a combat support company.

In addition, the combat support company was augmented with an aerial scout platoon. The organic air cav troop in the division cav squadron was reassigned to the battalion and subsequently converted into an attack helicopter company in accordance with MTOE-17387-H.

One major highlight of the reorganization was the assignment and relocation of the 235th Aviation Company (Attack Heli-

copter) from Fort Knox to USAREUR, in June 1976. These actions had a very significant affect on the aircraft inventory, increasing existing assets from 54 aircraft previously assigned to a grand total of 116.

To provide the necessary support, the aircraft maintenance company from the organic maintenance battalion was augmented with additional personnel and equipment and reassigned to the aviation battalion as the **Aviation Intermediate Maintenance Company (AVIM).** Also, each of the operational companies was augmented with an additional **Integrated Direct Support Maintenance (IDSM)** capability.

An outline of the results of these reorganization efforts are shown in the accompanying chart.

The above explanation has been a "quick and dirty" overview of the efforts of many dedicated professionals and do not reflect the numerous changes, refinements, and adjustments necessary to arrive at the optimum solution.

Adding a new dimension

The results of the reorganization efforts combined with the addition of the AH-1Q and AH-1S **Cobra TOW** helicopter have added a new dimension to the Division's combined arms team. The **Cobra TOW** will be the decisive weapon in any war in Europe because of its rapid battlefield mobility and lethality of its mis sile system.

Cobra TOW has been totally integrated into combined arms training in the 3rd Infantry Division as evidenced by participation in combined live fire exercises, field exercises, Division semi-annual **ARTEPS (Army Training and Evaluation Programs),** and **REFORGER.**

The ultimate compliment for the **Cobra TOW** and crews came at the termination of the REFORGER 77 exercise when the Division commander emphatically stated, "I wish I had three more Cobra battalions in this Division!"

The necessary capability to find the enemy and inititate the "tank-killing" process was provided by the aero-scout platoon in the Combat Support Company. After many varied but fruitful efforts, the commander and staff of the 3rd Aviation Bn (CBT) determined that the most beneficial mission to support the Division was to place the scouts in general support, with mission-tasking requests normally coming from the coordinated efforts of the G-2 and G-3.

It is realized that there are many differing opinions as to what is the best mission for the scouts, but the fact remains that the flexibility of this element allows the commander to employ them as the situation dictates.

The "Sunday Punch"

In addition to the numerous activities mentioned above, the 3rd Aviation Bn (CBT) was able to train in the use of night vision goggles, anti-armor detection devices, complete tactical operations with radio silence, and **Nap-of-the-Earth (NOE)** techniques.

As a result of these reorganization efforts, the anti-armor capability of the Division has been greatly enhanced, and the opportunity to provide support to the combined arms team is unlimited.

Flexibility, versatility, and effectiveness have characterized the performance of the 3rd Aviation Bn (CBT). With its fleet of over 100 helicopters, including 42 **Cobra TOWs** and a host of **Huey** and OH-58 light observation helicopters, the future of the aviation battalion in Europe is bright indeed.

General George S. Blanchard, Commander-in-Chief, USAREUR, stated at a recent European Army Aviation Association Convention that he views the **Cobra TOW** as his "Sunday Punch" which provides an equalizing effect against the numerically superior Warsaw Pact armor threat.

Having the 42 **Cobra TOW** available to the Division commander is truly an immeasurable element of combat power that just may tip the balance in the armor/anti-armor mid-intensity conflict in Western Europe. ★

The Cobra is Now... *and Tomorrow!*

The AH-1S "Cobra" has been on the job since 1967, and has proven itself a deadly armored vehicle killer plus a highly effective close-support weapon system. HR has been there too...supplying hydraulic flight controls and components on all Cobra models. And, we'll still be on board as the Cobra evolves into an even more efficient weapon—providing controls that feature higher survivability through new design concepts and service-proven actuator reliability that has become well known to the industry.

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THE COBRA TEAM

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LT. COLONEL
PHILIP J.GRUSHETSKY
Assistant Project Manager—
Materiel Fielding Team

MR. WALTER D.
BOWDEN
Chief, Logistical
Management Division

MR. DONALD BREWER
Chief,
Technical Management
Division

LT. COLONEL
SIDNEY LYONS
Chief, Prod. Assurance, Test,
& Configuration Division

MR. VICTOR J.
SCHULTE, JR.
Chief, Business
Management Division

FIRST ROW

L.-r.: Marie Zimmerman, LTC Sidney Lyons, Donald Brewer, Victor Schulte, COL Robert P. St. Louis, Marlyn Buffington, LTC Floyd Eberhard, Walter Bowden, & Kathy Sinclair.

SECOND ROW

L.-r.: Marcia Koester, Ruth Williams, Mary Griffin, Judith Hurt, Donna Eller, Vicki Hirsh, Cecelia Planthold, Ruth Coleman, Michael Ryan, & Paul Dobbs.

THIRD ROW

L.-r.: Peter Sheppard, Ralph Crawford, Louise Tekotte, Hattie Haywood, Carl Spesier, Charles Krill, Robert Curley, (CW3(P) Gilbert Fluhr, MAJ Jim Remy, & LTC Richard Catron.

FOURTH ROW

L.-r.: Albert Kassing, John Fowler, Kenneth Tillck, CPT Donald Cilley, Jack VanKirk, Lary Dite, Ray Quillman, Doris Austin, & Carroll McCosh.

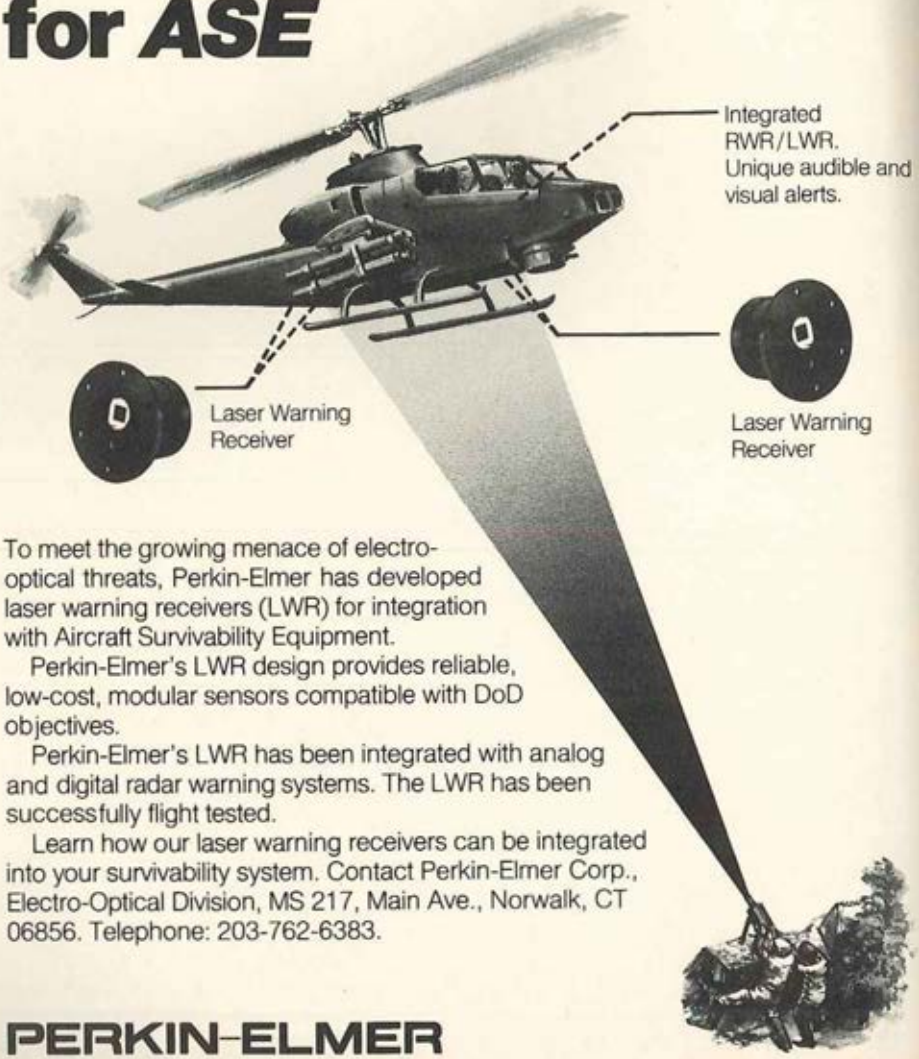
NOT SHOWN

LTC John Griffiths, CPT(P) Bruce Gardner, Robert Biddle, Curt France, Gilbert Horan, Kenneth Kimball, Harry Murphy, Van Puryear, & Barbara Williams.

STATIONED IN GERMANY

LTC Philip J. Grushetsky, CW4 Albert Gay, SFC Lucian Chappelle, SFC Werner Schaefer & Ethel Ringgold.

Laser Warning Receivers– Sharp New Eyes for *ASE*



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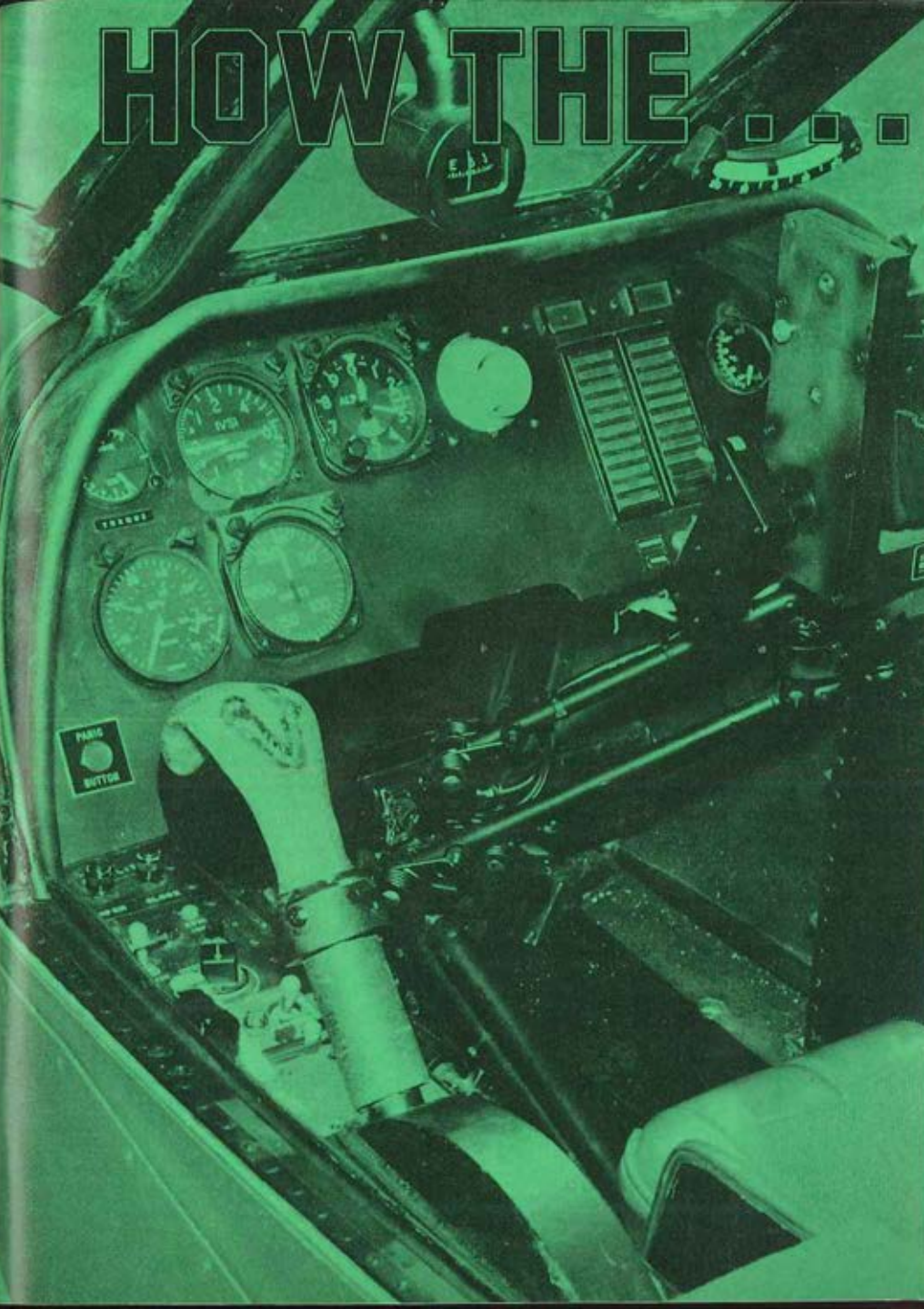

HOW THE . . .
PANIC
BUTTON

. . Cobra got its name!

COBRA is on the verge of becoming a synonym in the military lexicon meaning **helicopter gunship.** How it got its name and the variations while enroute to its final nomenclature form an interesting and seldom-recounted story.

First of all, the **Cobra** was not named after an Indian chief, tribe, or historical event. The UH-1 parent of the **Cobra** was named after the renowned **Iroquois** tribe, but that famous Indian name never did catch on with the aviators. They preferred to call it the **Huey,** but more about that later. The **Cobra** was informally named by Bell Helicopter and officially accepted by the U.S. Army.

Bell Helicopter Company really started in Buffalo, N.Y., as the helicopter division of Bell Aircraft Corporation. During World War II, before helicopters were in production, Bell Aircraft developed and produced two excellent fighter aircraft called the P-39 **Airacobra** and the P-63 **Kingcobra** with total production of 9,588 P-39s and 2,971 P-63s! At one time at the Buffalo plant, the production rate of the **Airacobra** ran to over 650 ships per month!

One winter during a particularly heavy snowfall, before the runways could be plowed out, the P-39s were coming off the assembly line so fast they had to be pushed into snowdrifts to make room for the next batch coming out. Now that's production!

A Bit of Historic Nostalgia by One Who Knows, "CLIFF KALISTA", Vice President, Marketing & Programs (Iran) Bell HelicopterTextron

The P-39 **Airacobra** had several interesting features including a nose-mounted 30mm cannon firing through the hub of its propeller. The P-63 **Kingcobra** was a growth or evolution version of the P-39. Now, based on this lineage, you might think that, the AH-1 **Cobra's** nom de plume came solely from the **Airacobra** and **Kingcobra.**

But there was more to it. Here's what happened:

During the conflict in Viet Nam, we at Bell became quite attached to and familiar with many of the units in action there, and with their traditions, exploits, amd memorabilia. We followed the first UTT Company very closely and supported it with the armed HU-1A gunships when they went "in country" in the early 1960s.

Many of the units had unique emblems painted on the nose and sides of the aircraft. Many kept score on the side of the fuselage of their conquests.

Thanks to the 114th!

A lot of us remember the Soc Trang **Tigers** and the Vinh Long **Cobras;** the **Mavericks, Playboys, Buccaneers,** etc. And it's from the Vinh Long **Cobras,** the guns of the 114th Air Mobile Company, that the AH-1 **Cobra** really got its name.

Veteran aviators may recall that, in April 1963, the 114th Airmobile Company was the first **Huey** company to be deployed from the states directly to Viet Nam where it joined the Delta Battalion. Some may argue that the UTT Company was the first one, but it came from Okinawa and was a provisional unit.

The 114th Airmobile Company had been reorganized at Fort Knox from Troop C, 17th Cavalry. The brand new UH-1Bs the unit received after it arrived in Vinh Long were products of the high-priority Hotshot program, a joint Army/Bell/Emerson venture to develop and

The **Scout** was an off-shoot of the famous **HU-1 Warrior**, a Bell proposal to the Army that never got beyond the mockup stage. Built and flown, the **Sioux Scout**, was actually a slimmed-down version of the notable H-13 of Korean war vintage.

Cobra a Scout?

So, it was in 1964 that the **Scout** was first recognized in Bell internal management meetings. Surprisingly enough, the missions Bell envisioned for the **Scout** were reconnaisance, armed reconnaisance, and security missions.

The weights and performance visualized at that time were not too different from the current ROC for the ASH helicopter now under consideration by the Army. In fact, we always felt from that day to the present that the AH-1 would make a first-class scout helicopter.

The initial **Cobra** or **Scout** was carefully designed by Bell to fit well below the AAFSS capability. At the time of the Bell internal go-ahead for the **Cobra**, the AAFSS program was still an open competition with Bell, Sikorsky, and Lockheed in the running.

Lockheed eventually won the competition with its **Cheyenne**, and by the time the **Cheyenne** program was terminated by the Army, 1,000 **Cobras** had been produced!

In our early briefings about this new **Scout** helicopter, we called it the **UH-1 Cobra**, based on the **Cobra** platoon of the 114th Airmobile Company. One day,

THE COBRA COLLECTIVE

During the early Cobra visits and demonstrations, Bell used many interesting gadgets. For example, did you know that the collective stick on the Bell Cobra demonstrator was the actual head of a hooded Cobra encased in plexiglass (as is shown above and in the page 47 photo.)?

Every night before the ship went into the barn, Joe Mashman, the demonstrator pilot, would carefully remove the Cobra head from the collective stick, place it in a highly-polished mahogany case, lock the case, and then stow it away for safekeeping until the next morning.

Bell wasn't averse to coming up with the "real thing" to help market its remarkable gunship and several of the Cobra's military enthusiasts wound up with authentic (but stuffed) Cobras as doorstops or stands for small glass-top tables.

The one that stopped us short was in one corner of the front vestibule of the MacDill quarters of G.P. (then MG) Seneff. Except for the black fangs, it duplicated the Cobra at the bottom of this page. Needless to say, it got your immediate attention and respect.

Art Kesten

co-bra/ˈkō-bre/n [Pg cobra (de capello), lit., hooded snake, fr. Latin **colubra** snake] : 1. any of several venomous Asiatic and African elapid snakes (genus Naja) that when excited expand the skin of the neck into a hood by movement of the anterior ribs; also: any of several related African snakes. See **Indian Cobra, King Cobra** 2. either of two Asiatic snakes that detect their enemy visually, or (FLIR?) by body heat at night and spit their venom from a distance.

How the Cobra Got Its Name

General "Ham" Howze, then working for Bell, walked into the author's office and suggested that we do not call it the UH-1 **Cobra**, but the **HueyCobra**. From that day on, it had **HueyCobra** as its official name.

In naming this new bird, we also felt that the characteristics of the helicopter and its real life counterpart were extraordinarily similar, i.e., the cobra snake resides in Far East climes, can detect his enemy visually or by sensing body heat, and can strike quickly spitting venom with deadly accuracy.

Why "HueyCobra"?

The first time the Army recognized this new bird in writing, it called it the UH-1H, believe it or not! Then, on 19 May 1966, the Army (in a mod to the contract) changed the designation officially from the UH-1H to AH-1G. On 13 July 1966, another mod to the contract was issued making the ship the AH-1G (**Cobra**).

Some of you may ask, "Why **HueyCobra**?", and "Where did **Huey** come from?". The first helicopter in the H-1 series was the HU-1A **Iroquois**; however, units in the field started calling it the **Hui-Aye**, spelled **Huey**. So that's how the **Huey** came to be.

The original **Cobra** schedule was a remarkable one, and we challenge aspiring program managers to top it! See the box below.

Those of us talking to the Army about the **Cobra** those days kept an ample supply of realistic-looking rubber cobra snakes which we would coil on an unsuspecting briefee who, while recovering from his initial shock, would listen to our tabletop briefing.

There's a whole raft of stories about snakes we could tell here, but let's go on.

THANKS!

Grateful acknowledgment is given to **Hans Weichsel, Joe Mashman, Jim Woodard, Phil Norwine, Frank Radspinner,** and **Jack Doyle** who helped this author fine tune the foregoing information.

—**Cliff Kalista**

Cobra family increases

In 1968, the Marine Corps purchased a twin-engine version of the AH-1 and called it the AH-1J **SeaCobra**. Later in 1972, Bell proposed to the Army and Marine Corps a **Cobra** with uprated dynamic components called the **KingCobra**.

This name came from Bell Aircraft's P-63 **KingCobra**, and many of its ordnance and configuration details were remarkably similar to the original P-63. The USMC eventually procured a twin-engine version of the **KingCobra**, but opted to call it the AH-1T **Improved SeaCobra**.

So - in its short and fairly spectacular history - the **Cobra** has had many names and many missions. Army pilots in Nam called it the **Snake**. Over 1,500 of these versatile attack helicopters have been built to date, are in the armed forces of five countries, and are headed for others.

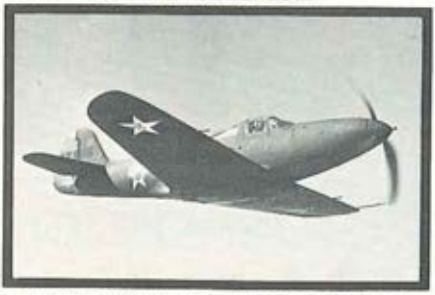
Many of us at Bell have dreamed about the day when the H-1 series will develop its way through the entire alphabet. The AH-1T **Improved SeaCobra** is as far as it has proceeded to this writing.

However — who knows what the AH-1Z will look like?

THE ORIGINAL COBRA SCHEDULE

Internal Bell Helicopter decision meetings on go-ahead. . August-Dec. 1964	First flight. . . . . 8 September 1965
Go-ahead to build a company sponsored prototype. . . . . March 1965	Army evaluation. . . . . OctoberNov. 1965
Bell proposal to Army. . . . . August 1965 (This was an ECP to the UH-1B)	Development & Prod'n ContractApr. 1966
	First Production Delivery of a Cobra to the U.S. Army. . . . . May 1967
	Deployed to Combat. . . . . August 1967

THE COBRA LINEAGE



P-39 AIRACOBRA - WORLD WAR II

P-63 KINGCOBRA - WORLD WAR II

HU-1 WARRIOR - 1962

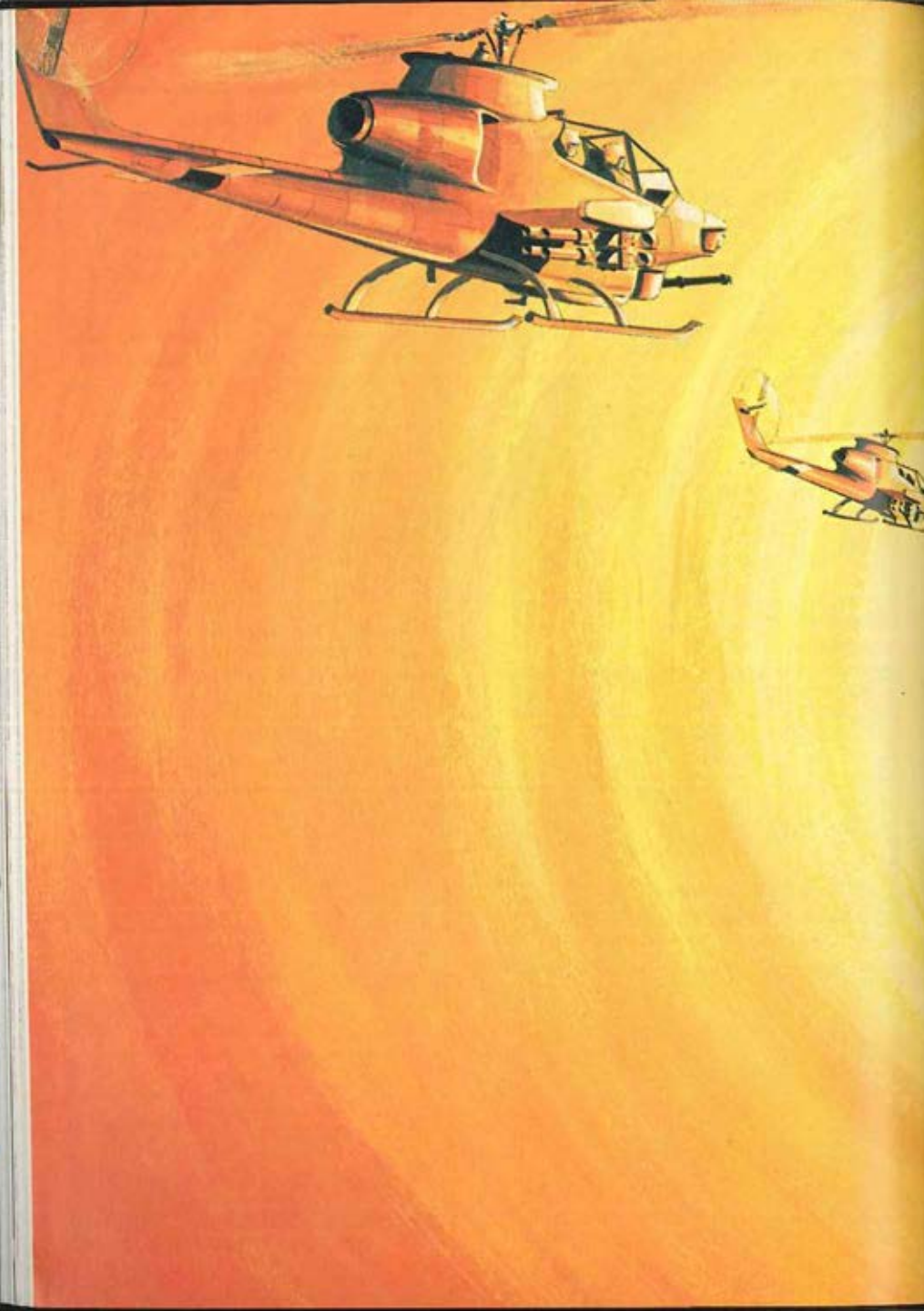
H-13 SIOUX SCOUT - 1963

HUEYCOBRA PROTOTYPE - 1965

AH-1J SEACOBRA - 1968

AH-1T IMPROVED SEACOBRA 1976

AH-1S COBRA TOW - NOW!



THE EDGE

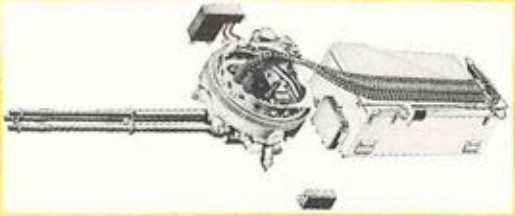
THE COBRA HAS THE EDGE
THE GE UNIVERSAL TURRET

The AH-1S Cobra . . . an attack helicopter developed and produced by Bell to meet the Army's requirements today, and well into the future. Every AH-1S Cobra will carry the GE Universal Turret .... THE EDGE.

Bell and the Army have made their choice. Like the Cobra, truly versatile and totally adaptable to its ever changing role, the Universal Turret is designed to accommodate a variety of weapons and ammunition, including the standard 20-mm M-197 Gun and the Army 30-mm XM788/XM789 round. And with the evolving threat of air to air combat, the Universal Turret system's ability to adapt to both low and high rate guns will keep the Cobra current into the future.

The GE Universal Turret . . . matched with the Bell AH-1S helicopter for survivability today, tomorrow, and beyond.

Aircraft Equipment Division
Burlington, Vermont



THE GE UNIVERSAL TURRET .....
THE COBRA'S EDGE.

GENERAL ELECTRIC

Bell Helicopter TEXTRON

J.F. ATKINS
PRESIDENT

The U.S. Army Aviation Program has developed over the past thirty years and has been most successful in providing air mobility for the ground forces. Bell Helicopter Textron has been proud to serve as a member of the Army Team with its famous series of helicopters - the H-13's, Hueys and Cobras. Bell was there to support the major air operations in Korea and Vietnam.

Bell pioneered the tandem seating arrangement for armed helicopters based on its Warrior Conceptual Studies, its Sioux Scout Demonstrator and, of course, the Cobra, developed as part of our Independent Research and Development Program. The Cobra, a helicopter ahead of its time, was fielded in Vietnam eighteen months after Army contract go-ahead and served the Army with great distinction in time of need.

The Army has now taken major steps to modernize its Cobra fleet. The Cobra TOW Program has been structured in a series of discrete, affordable steps keyed to incremental increases in system capability and early field deployment. Bell, as the prime contractor for systems integration and development, under the direction of the Army Cobra Program Manager has selected a team of highly capable system developers and suppliers.

The Army is to be commended for its foresight in modernizing and expanding the Cobra fleet at relatively low development, production and modification costs while greatly increasing the mission capability of the system. This is particularly true when you recognize that the Cobra system now constitutes 100% of the Army's anti-armor attack helicopter capability and is programmed to remain the largest proportion of the armed helicopter fleet for

the foreseeable future. The Cobra will be the vehicle with which the large majority of Army attack helicopter crews will face hostile armor for years to come. The option of further improving the Cobra through the addition of FLIR to the TOW Missile systems is being considered by the Army and would provide the very desirable night attack capability.

The Department of Defense has described the concept of using the improved Cobra - AH-1S - as the system vehicle as a relatively low cost, high pay-off program. The Cobra is truly one of the best examples of the high-low mix theory - - a good mission capability for low cost.

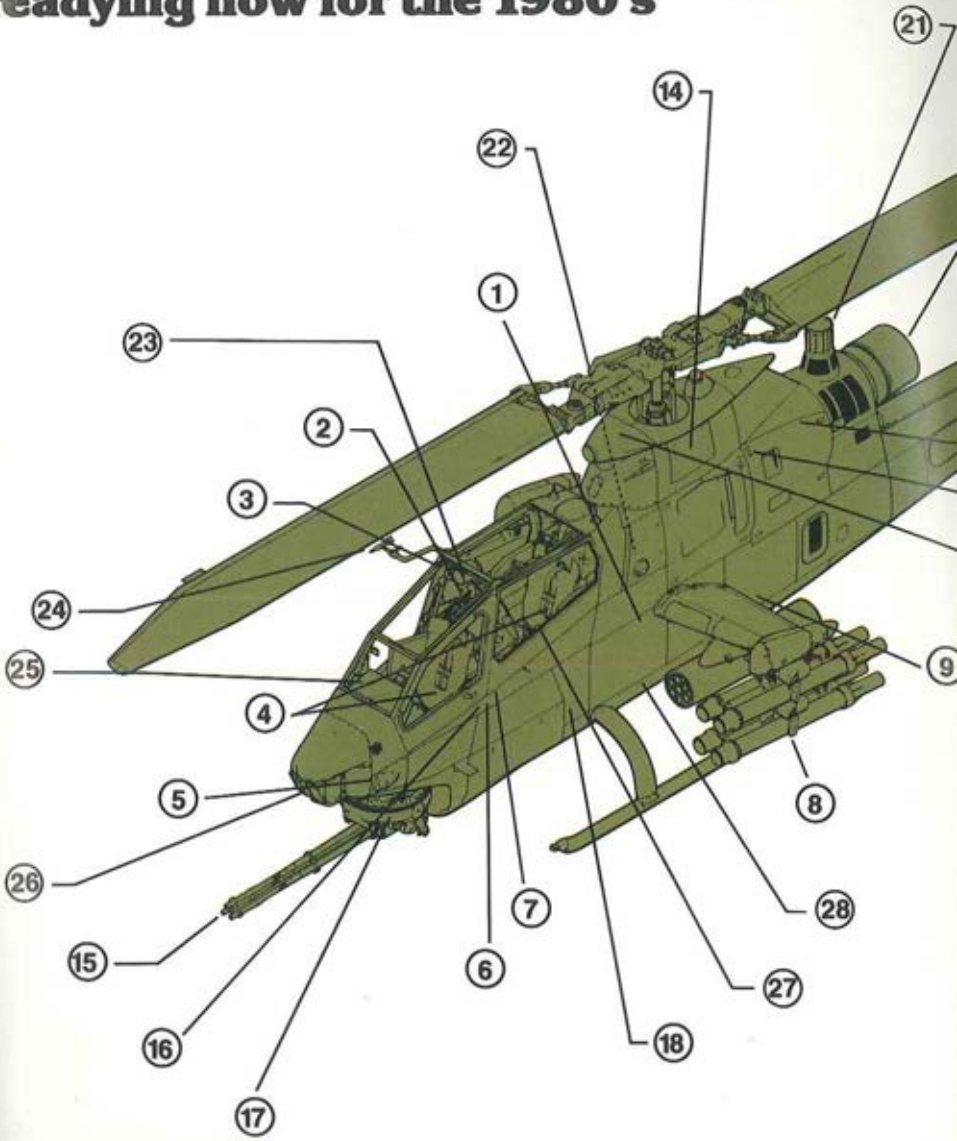
The success in developing, producing and fielding the AH-1S has been due in large part to the highly effective direction of the Army's Cobra Project Management Team, headed in turn by Brigadier General Orly Gonzales, Colonel Chuck Drenz and now Colonel Bob St. Louis. We feel that the relationship which has existed between the Army's team and our Program Management staff at Bell has exemplified government/industry cooperation at its very best.

Bell Helicopter Textron pledges its very best efforts to fully support the Army's Program with our proven development, production and logistics capabilities.

J. F. Cutting

Bell's AH-1S modernized Cobra is combat ready...

AH-1S Modernization Program:
readying now for the 1980's



STEP ONE
Initial Production Configuration Apr. 77-Aug. 78

1 HYDRAULIC PUMP
electrically driven — provides collective control in event of hydraulic failure and system bore-sighting without mule

2 HELMET SIGHT SYSTEM
provides gun turret and TSU drive for target acquisition

3 FLAT PLATE CANOPY
reduces sun glint signature provides more headroom for pilot

4 NOE COCKPIT
improved instrument arrangement plus lighting compatible with night vision goggles

5 RADAR WARNING
AN/APR-39 provides pilot azimuth display & aural warning of threat radar signals

6 SLAE RADIOS
AN/ARC-114FM, AN/ARC-164 UHF, and AN/ARC-115 VHF-AM

7 FIRE DETECTION
engine compartment fire detection and indicator for pilot

8 TOW MISSILE SYSTEM

9 RADAR ALTIMETER

10 UPRATED (ICAM) DYNAMICS
1290 SHP transmission

11 ENGINE
T53 — L703 1800 SHP

12 CONUS NAVIGATION
VOR, ILS, glide slope, marker beacon

13 PUSH-PULL ANTI-TORQUE CONTROLS
eliminates cables, pulley cranks, etc. in tail rotor control system

STEP TWO
Up-Gun Equipment Additions to Step One Aug. 78-Oct. 79

14 10 KVA ALTERNATOR
provides additional electrical power for new systems

15 20mm/30mm GUN

16 WING STORES MANAGEMENT SYSTEM
provides pilot capability to select warhead types, firing intervals, fuzes, single or multiple rockets, and rocket inventory

17 UNIVERSAL TURRET
gun turret will accept 20mm or 30mm weapon

18 SCAS COMPENSATION
automatic compensation for off-axis gun fire

19 IMPROVED MAIN ROTOR BLADE
new composite main rotor blade

STEP THREE
Modernization Equipment Additions to Steps One & Tw Nov. 79-Feb. 81

20 IR SUPPRESSOR
reduces engine hot metal and exhaust plume signature

21 IR JAMMER
AN/ALQ 144 protects against IR and heat seeking missiles

22 CLOSED CIRCUIT REFUELING

23 HEADS UP DISPLAY
pilot's display with moving reticle, fire control and flight information

24 OMNI DIRECTIONAL AIRSPEED SYSTEM
low airspeed system for input to fire control — improves cannon and rocket accuracy

25 IFF
AN/APX-100 lightweight, solid state

26 LASER RANGEFINDER
provides accurate range to 10,000 meters, inputs to fire control computer

27 SECURE VOICE
KY-58 replace KY-28 permits single channel secure voice on FM or VHF

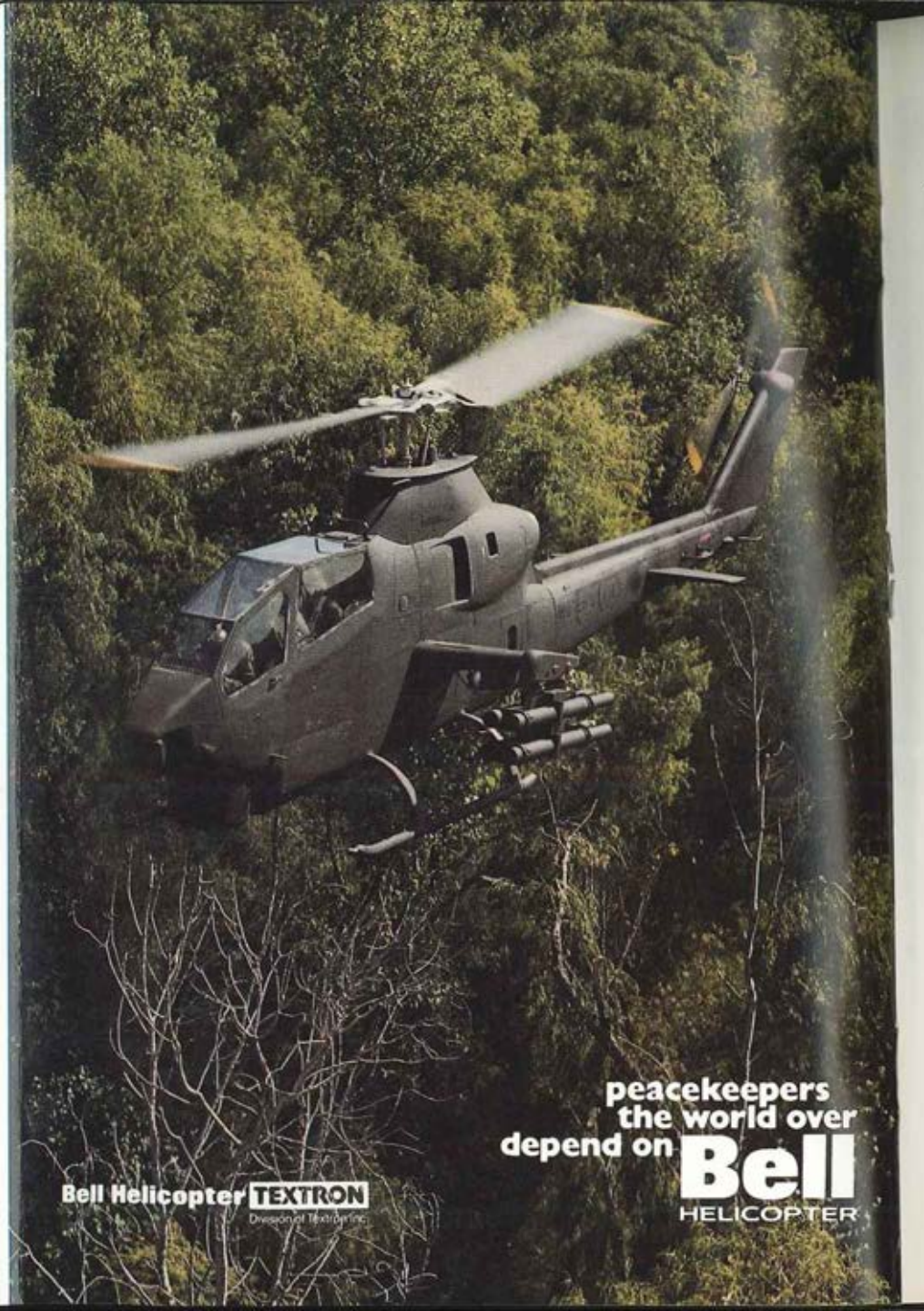
28 DOPPLER
navigation system accuracy 2% distance traveled

29 AIRBORNE LASER TRACKER
searches for, locks onto, tracks pulse coded laser reflected energy from designated targets, cues the TSU to target.

30 FIRE CONTROL COMPUTER
full solution fire control for turreted weapon and FFAR rocket system

NOW!

The most advanced aircraft technology available is incorporated in Bell's AH-1S. Firepower versatility, battlefield flexibility, compact size, survivability and desirable pilot handling qualities are some of its important features. But the most outstanding feature is the fact that it's deployed in combat-ready units with contingency plans for world-wide engagement... NOW!


peacekeepers
the world over
depend on
Bell
HELICOPTER
Bell Helicopter TEXTRON
Division of Textron Inc.

FROM THE UH-1B TO THE AH-1S

Advanced Structures Division, a Cobra team member, has provided Bell Helicopter Textron with adhesive bonded structural panels and main and tail rotor blades for a variety of Bell Helicopter models since 1960.

•Available for your production programs are 275,000 square feet of manufacturing area, including environmentally controlled clean rooms, large autoclaves, diversified process lines, complete quality control laboratories, and supporting facilities such as machine shops and tool design and fabrication departments.

•Advanced Structures is fully equipped and staffed with experienced personnel to handle your full requirements for lightweight, high strength, adhesively bonded structural assemblies of both metal and composite materials.

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- Allows the pilot to select the quantity and type of rockets, and fire them in singles, pairs and quads at multiple firing rates, automatically maintaining proper weight balance at all times.
- Maximizes RC fuze concept for optimum warhead effectiveness.
- RMS permits random loading within each zone for faster loading turn-around.
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- RMS is upward compatible with new warhead designs, insuring future growth potential and cost-effectiveness.
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System is comprised of one cockpit Display Unit (DU), 4.5 x 5.75 x 7 inches; and four Operation Units (OU), 3.1 x 4.1 x 7.5 inches each unit. The entire Rocket Management System weighs less than 18 lbs. (8.2 kg.)

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THROUGHOUT history, the principles of war have not changed. Mobility and firepower remain the cornerstones for victory. Only the vehicles capable of destroying the enemy and their techniques of employment have been altered.

From the fields of Cambrai emerged Goliath - the tank. It would change the face of battle and not until the Yom Kippur War would its supremacy as the single, dominant weapon be challenged. Although the absolute importance of the tank on the battlefield was not denied, it was very pointedly relearned on the Golan Heights and in the Sinai that only as part of a Combined Arms Team is the tank - or any other weapons system - utilized to its fullest potential.

A "new" weapon system

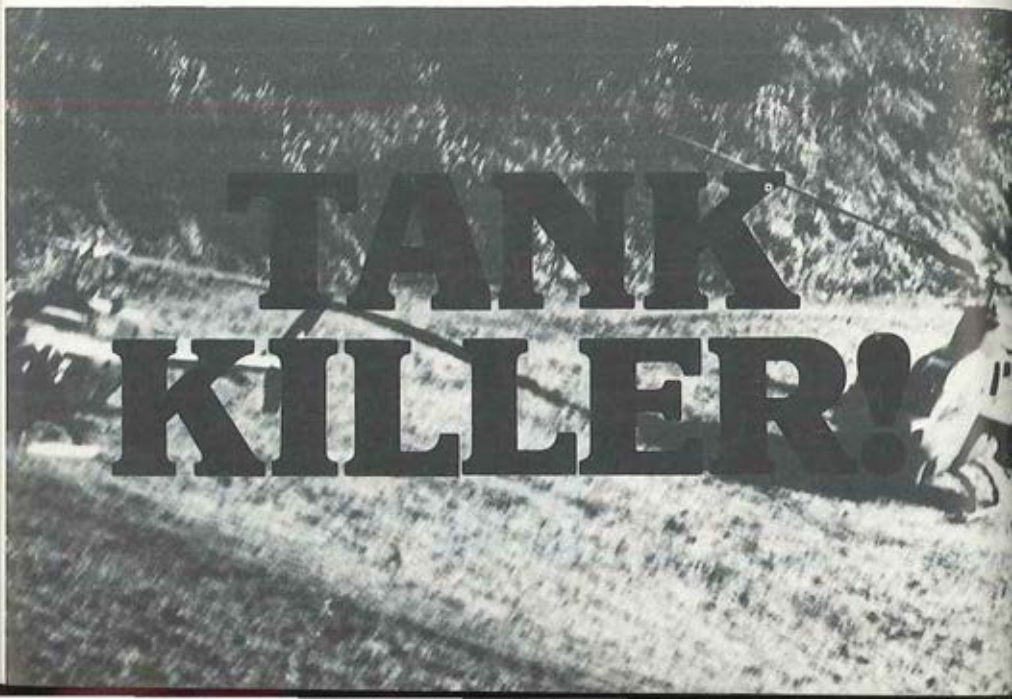
In 1961 General Hamilton Howze chaired the Army Tactical Mobility Review Board and a new important weapon system emerged under similar conditions to the introduction of the tank in World War I. A weapon system that was initially shrouded in controversy, doubt, and general disbelief is now taking its rightful place as prestigious member of the Combined Arms Team - the **Attack Helicopter.**

The attack helicopter's high degree of mobility enables it to move quickly and concentrate its devastating fires at critical time and places. By being able to focus its tank-killing combat power rapidly, the attack helicopter, as a part of the Combined Arms Team, can force a decision and then exploit its successes rapidly.

A deciding factor

When employed as part of the Combined Arms Team, the attack helicopter can be the deciding factor of a delicate force balance on the battlefield by servicing targets that overload the ground forces.

While the attack helicopter revolutionizes the concept of mobile warfare, in order to optimize its effectiveness it should be habitually employed as a maneuver force along with the other maneuver forces. It must be remembered that the attack helicopter is not a fire support weapon, but that attack helicopter units



are maneuver forces that take maximum advantage of their capabilities. The ground commander must provide sufficient planning and allocation of resources to suppress enemy air defenses.

Tanks enhance their survivability with armor protection, firepower, mobility, shock action, and multiple means of communication. The attack helicopter survives through tank-killing firepower, agility, speed, multiple means of communication, and stand-off distance. It utilizes terrain flight techniques, proven armor-type tactics, and deception, and is always totally integrated with artillery, armor and infantry.

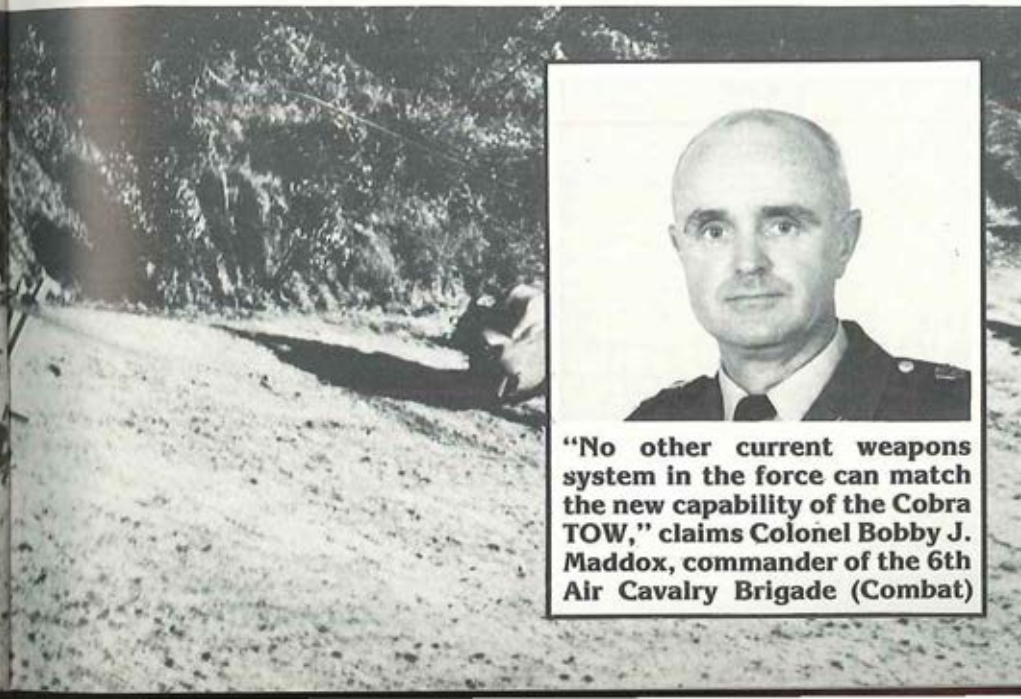
No matter what the form of combat action - covering force, screen, economy of force, active defense, or the offense - the fundamentals of the attack helicopter unit employment remain the same; maximizing combat power at the decisive point and time, rupturing the enemy's defensive belts, and destroying his forces, thereby eliminating his ability to fight.

The mobility differential of the attack helicopter over conventional ground vehicles, by being just freed of the terrain and using Nap-of-the-Earth methods, coupled with its ability to place a high volume of anti-tank fire on enemy forces and then re-arm and return to fight in minutes, can dynamically influence the combat power ratio on the battlefield. No other current weapons system in the force can match the new capability of the **Cobra TOW.**

Mandatory usage

The aerial anti-armor systems of the 6th Cavalry Brigade (Air Combat) can and must be used, when and if required to conduct a series of offensive and defensive operations that will reduce enemy armor and mechanized forces. These operations would take maximum advantage of the AH-1S attack helicopter's unique characteristics of maneuverability, reaction, and flexibility.

The AH-1S is a most capable weapons system now in the force. The 6th Cavalry Brigade is highly trained in the use of this aircraft and is prepared to demonstrate its capability in any contringency in which it may be committed. ★



"No other current weapons system in the force can match the new capability of the Cobra TOW," claims Colonel Bobby J. Maddox, commander of the 6th Air Cavalry Brigade (Combat)

SCIENCE/SCOPE

More than 500 airborne systems for TOW, the U.S. Army's Tube-launched, Optically-tracked, Wire-guided missile, have been produced and delivered by Hughes for the Cobra TOW program. In all, approximately 1000 AH-1S Cobra TOW-equipped helicopters are scheduled to be delivered over the 6-year production program.

Soon the Cobra TOW will operate more effectively at the maximum range of the TOW missile (3750 meters). This will occur when the Laser Range Finder (LRF) has been integrated into the M65 TOW Missile System as part of the Cobra Modernization Program. This increased stand-off capability will make Cobra less vulnerable to hostile fire. Cobra will have a significant range advantage over front line threat air defense systems.

The first developmental LRF model has been delivered by Hughes to Bell Helicopter for integration into the Army's M65 airborne system. Flight testing of the LRF will start during summer, 1978.

Improved performance during night and low visibility conditions will soon be made possible by a modified Hughes Cobra TOW sight called FACTS (FLIR Augmented Cobra TOW Sight). FLIR (Forward Looking Infrared) senses minute differences in temperature, then displays the target image clearly in the gunner's optical sight.

In over 1500 test firings in the Cobra TOW Program, the success ratio of 93% has been achieved.

GOODBYE, "G"!

THE AH-1S IS WELCOMED IN THE 101ST AIRBORNE DIVISION

THE introduction of the AH-1S Cobra TOW to the Air Assault Division was greeted with the enthusiasm that warrants the beginning of a new era.

A deliberate effort was made to ensure that this new weapon system was properly introduced into the division - for it was more than just another piece of new hardware - it represented the most responsive and most lethal antitank weapon system in the division arsenal. It had been a long time in coming!

"An impressive ceremony"

Consequently, an arrival ceremony was planned, and on Oct. 17, 1977 the bleachers on Son Drop Zone were filled with officers, soldiers, and families of the Air Assault Division, many of them curious as to why "just another helicopter" should create so much excitement.

Then they saw for themselves - as the S-Model went through its paces, climbing vertically to 200 feet, and after a left pedal turn, a dash to 175 knots and back to a hover, and still over Son DZ as tanks of the Tennessee National Guard were engaged by 15 undetected helicopters from up to 2¼ miles away, the audience began to appreciate the awesomeness of this new weapon.

Perhaps even more impressed were the Cobra pilots themselves. For nearly two years they had been practicing for this day with tired and battle-worn AH-1G's, old birds that had trouble unmasking when loaded, let alone doing left pedal turns at 200 feet and then dashing to maximum speed. For the first time, the crews really could see the tanks from two miles away.

It was an impressive ceremony for all concerned and the desired effect had been achieved. **Colonel Robert St. Louis** concluded the ceremony by presenting the division commander with the keys and logbook to the first aircraft.

The Air Assault Division now had the AH-1S Cobra TOW!

What impact has the AH-1S made on the division?

Obviously, the antitank capability of

A REPORT FROM LTC MERLE L. MULVANEY, COMMANDER, 229TH ATTACK HELICOPTER BATTALION, 101ST ABN DIV (AIR ASSAULT)

the division has been increased drastically. No longer is it necessary to pretend that point targets can be seen, engaged, and destroyed from max standoff range -it really can be done.

Perhaps this has been one of the most significant impacts of the AH-1S. It has made the attack helicopter tactics much more credible to skeptics and increased the confidence of the aviators executing those tactics.

It has also resulted in a more conscientious application of the terrain flight techniques. The APR-39 radar warning receiver removes much of the subjectivity on how well the pilot uses the terrain to his advantage in a high threat environment. The net result: flying lower, and slower with more attention to map reading.

The primary focus in the division is on the attack helicopter's antitank capability; however, its capability to deliver a variety of responsive and accurate ordnance lends itself well to the diversified contingency missions of the division.

In certain instances the AH-1S will be called upon to clear corridors ahead of an airmobile assault, and, as an exception, may even fly escort for high priority raid missions. With the 20/30 mm turret, wing stores management, and hopefully the fielding of **Colonel Jim Tow's** 2.75 illumination rocket, the versatility of this weapon system will be enhanced even more.

Training crews to deliver responsive and accurate fire is a demanding and expensive process, and it's becoming even

more expensive with the advent of the TOW missile. The effectiveness of a crews ability to deliver iron on target-with the exception of the TOW missile - is highly subjective.

The Attack Battalion is working on a new range concept that eliminates that subjectivity by using electronic scoring devices similar to those used by the Air Force on its gunnery ranges. Preliminary tests look promising.

The range will accomodate a variety of scenarios, will enhance training, and will reduce ammunition costs to achieve a desired level of proficiency. Arguments about whether or not a target was engaged effectively should decline, and competition for the "top gun" distinction should increase.

Cold weather performance

Since its arrival in the division, the AH-1S has participated in numerous Emergency Deployment Readiness Excercises, field exercises, and new equipment tests. The highlight to date, however, was the joint cold weather training exercise **"Empire Glacier"** at Ft. Drum N.Y. in January of this year.

Operating from isolated field locations in deep snow and sub-freezing temperatures, the AH-1S proved very effective against the opposing armored threat. Parking in deep snow and the signature of blowing snow were not the insurmount able problems originally envisioned.

Predeployment cold weather training for all personnel paid off with no personnel injuries or aircraft incidents or accidents. Only two problems developed that were peculiar to the AH-1S; the OAT gage, because of its installation, gave an inaccurate reading after the ECU was turned on, thus precluding an accurate HIT check (easily corrected by taking the OAT reading before turning on the ECU); and the tendency for the flight idle solenoid to malfunction. Both problems are being pursued by the project manager and the factory. The problem of warping canopies, encountered in the AH-1G as a result of extreme temperature changes, was not a problem in the AH-1S.

Many lessons were learned on **Empire Glacier**, but probably the most important one, and the one that must be continually proven and reproven, is that the well-trained and highly adaptable American soldier can take his equipment and be very effective in an unforgiving environment.

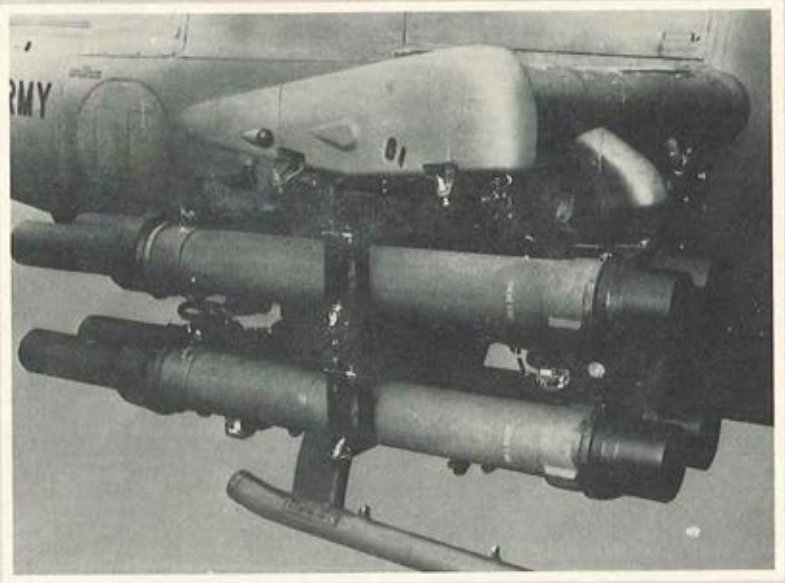
This fall the Attack Battalion will head up a task force from the 101st to support the 5th Mechanized Division for **REFORGER 78**. The task force will deploy with about half of its attack fleet being new production S-Models. It promises to be an excellent opportunity to employ the attack helicopter against a large force in an unfamiliar environment. In addition to supporting the 5th Mechanized Division, the task force will be working closely with **Colonel John Toolson's** 11th Combat Aviation Group to evaluate the proposals of ARCSA III.

"The tempo picks up . . "

The tempo picks up when you have S-models. It seems that every exercise requires the added capabilities offered by the AH-1S, and is a definite planning factor to be considered by units scheduled to receive their first new aircraft. The first S-models in the division went to **Major Warren Chunn's** A Company, and his company has not had a breather since their arrival.

Fortunately, there have been few serious maintenance problems. The aircraft and its systems are reliable. In spite of severe personnel shortages, system availability has remained high and the PMP turnaround time is about 75% less than for the AH-1G.

The arrival of the AH-1S to the 101st did signal the start of a new era. The pilots like the aircraft, and the customer likes what it can do for them. As more aircraft arrive, the days of pretending are rapidly becoming history. The AH-1S was a long time coming - but it is here now and those days of pretending were well spent. The division commander finally has his "Sunday Punch." ★



The Cobra delivers TOW missiles with accuracy. We deliver the Cobra TOW launcher.

Deep within the heartland of America, the Flight Structures Division of Western Gear Corporation produces the Hughes Aircraft TOW launcher for the famous AH-1S Bell Cobra Helicopter. The launcher is a significant factor in overall TOW mission reliability. Western Gear, working together with Hughes, brought the prototype launcher into high-volume production.

This lightweight yet very precise metal structure, which carries an integral electronic control, could only be made by a systems-oriented manufacturer with a very broad manufacturing engineering base and the experience to produce close-tolerance, complex equipment. That's why Hughes Aircraft chose Western Gear Corporation for its TOW launcher team.

Western Gear. The company of choice for weapons delivery systems.

We Deliver.

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EMPLOYMENT OF THE "S" MODEL COBRA IN THE AIR CAVALRY

BY
LT. COL. HILBERT CHOLE,
COMMANDER, 1/17 CAVALRY
82ND AIRBORNE DIVISION

MUCH has been written in recent years on the employment of the **Advanced Attack Helicopter (AAH)** against an armored threat in the European scenario.

In fact, we have seen Air Cavalry, as a concept, as a unit, taken out of the force structure in Europe. This, to me, is an alarming situation.

It may appear out of context to get into a discussion on the worth of Air Cavalry in an issue devoted to extolling the worth of the "S" model; however, it is necessary to first understand the role of Air Cavalry before we discuss how the "S" model helps us better fulfill that role.

In this era of tight money and competing demands, an objective we dare not lose sight of is that of developing a balanced force structure. If the attack helicopter is to be built at the expense of Air Cavalry, then I say we need to re-evaluate our priorities.

Air Cavalry is an economy of force unit. It is capable of performing many missions simultaneously and can be task organized to meet the needs of the Commander quicker — and with less problems than any other unit in the Division.

Cavalry is synonymous with flexibility. We can perform a variety of roles and can form a variety of units from within our own organization. We can employ the Air Cavalry Squadron as it is organized with a Scout platoon, Aero Weapons platoon, and Aero Rifle platoon in each of our three Air Cavalry Troops, or we can scramble the Squadron to form three distinct and separate Air Cavalry Units — one organized with all scouts, one organized with all Aero Weapons, and one with all Aero Rifles.

There are many variations on organization that can be developed to meet the needs of the unit, but nowhere is there another unit in the Army that has the capability to task organize as effectively or with as much diversity as an Air Cavalry Unit.

Whatever the task organization, the ultimate objective of Cavalry is to provide

reconnaissance to the Commander; to give the Commander the information, and most important the time he needs to organize, meet, and defeat the threat.

Cavalry has not been developed in a capricious fashion. The organization of Cavalry is founded on the lessons learned from history. The scout needs fire support to enable him to perform his mission. Since Cavalry often works out of range of Division Artillery it was recognized that the scout needed fire support that could move with him.

The Infantry, in ground Cavalry, is used to provide close-in anti-armor protection and to conduct limited patrols. In Air Cavalry the Infantry is used to conduct reconnaissance where the scout is unable to observe. Some would say we don't need Cavalry in Europe since the enemy will not be able to surprise us since they cannot conceal their movement.

I would only point to the entrance of the Chinese into Korea or the movement of Corps of German armor into the Ardennes during World War II to illustrate that large bodies of men and equipment can move around the battlefield without being detected by sophisticated detection devices.

The eye and ear are still our most reliable detection devices!

Our newest and best

The "S" model is our newest and best yet fire support aircraft for our scouts and Infantry. The increased range and direct fire reliability of the TOW missile have added a degree of protection to the scout and aero rifle platoon that we have never experienced before. After all these years of talking, and practicing the employment of the airborne TOW missile, it feels good to have it on board and operational.

In Air Cavalry the "S" model is used in the overwatch role more frequently than in any other role. With its increased optical capability the "S" model has made a tremendous contribution to our reconnaissance capability. While they never should be employed as a scout, when they are working in conjunction with a scout, their reconnaissance capability is upgraded tremendously.

LTC HILBERT CHOLE

When the Aero Weapons platoons are scrambled they have the capability to mass fire and to function, for a short period of time, as an attack helicopter company. They would only be organized in this fashion if there was no attack helicopter company available, and only then to defeat an armor threat.

We still must improve!

Although the "S" model has improved our present needs, we must not be satisfied with the present state of affairs. We still need the additional capabilities the AAH will give us, and we need to strengthen our weakest link, which at the moment is our Aero Scout.

We need an optical and range-finding capabililty on our scout in addition to a target designation system. All of this needs to be mounted on an airframe that has higher crash survivability, and has a power plant with more horsepower.

The "S" model has been fielded with great success and has met our expectations, for the "LO" side of the HI-LO mix of the Army's attack helicopter fleet. ★

A LOOK AT COBRA TOW LOGISTICS SUPPORT

BY MAJOR GENERAL RICHARD H. THOMPSON, COMMANDER, USA TROOP SUPPORT AND AVIATION READINESS COMMAND

ELSEWHERE in this magazine the reader will find articles which describe the significant steps taken to improve the combat performance of **Cobra TOW** helicopters.

The pace and the aggregate scope of the many separate product improvement programs which contribute to this increased combat capability have an equally significant impact on the essential requirements for logistics support.

Scope of Program

It is doubtful that when the **Cobra TOW** program was given conceptual approval in 1972 there was a clear vision of what that program was to become. Initially the plan only included the modification of eight AH-1G aircraft with prototype TOW missile subsystems to evaluate further this anti-armor capability which had previously seen limited use in Vietnam installed in the UH-1. From that relatively small beginning, the **Cobra** program has grown steadily in scope and complexity.

The **Cobra** program, as now approved, actually consists of eleven distinguishable sub-programs. The first eight involve development, qualification, testing, and production effort. The last three will accomplish the recycling of fielded aircraft through contractor or depot facilities for modernization.

Program Management

The growth in the technical complexity of the **Cobra TOW** has been accompanied by a growth in the numbers of contractor participants in the various sub-programs. For example, at the outset of the **Cobra** program, there were three principal contractors involved and about 700 supporting vendors. Today, the number of principal contractors has increased to eleven with over 3,000 supporting vendors.

It is readily apparent, therefore, that the management of the program has become increasingly difficult as have the problems of provisioning spares and test equipment and producing the expanded volume of technical publications required.

TSARCOM is assigned system respon-

sibility for **Cobra TOW** aircraft and serves as the **National Inventory Control Point (NICP)** and **National Maintenance Point (NMP)** for the basic aircraft and its organic components. Overall program management is the responsibility of the Cobra Project Manager, chartered by the Secretary of the Army, and assigned to TSARCOM.

The US Army Aviation Research and Development Command (AVRADCOM) provides aircraft system engineering and procurement support of developmental sub-programs. Other subordinate commands of the **USA Materiel Development and Readiness Command (DARCOM)** have major responsibilities for development and logistic support of **Cobra TOW** subsystems.

We at TSARCOM consider the time required to place improved and supportable **Cobra TOW** aircraft into the hands of the user as the most important criterion in measuring the true effectiveness of the program. The elapsed time from the award of initial development contracts to the first issue of modified or new aircraft to the troop units runs from a high of 42 months to a low of 20 months. The average for the eight sub-programs is 29.6 months.

However, the **average interval** between fielding these new aircraft and/or subsystems is only 12 months. Think for a moment of the real life problems those statistics create for the Government and

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A Look at the AH-1S Logistic Suppport

contractor program managers, the engineers, the logisticians within DARCOM and in field commands, the training base, and, most importantly, the soldiers who operate and maintain the equipment.

While there are ample regulatory and procedural guidelines on how to accomplish the process of producing and fielding new equipment, in the final analysis only those people referred to above can and are making it happen. Someone once said that when properly motivated, ordinary people can do extraordinary things. Considering the success of the **Cobra** program to date, one can only conclude that a lot of people, in and out of uniform, are indeed properly motivated.

Status of Deployment

The **Cobra TOW** System was the first Army aircraft to be fielded under the DARCOM **Project Hand-off** concept. Simply stated, this concept is aimed at assuring user satisfaction with newly-fielded materiel. A **Materiel Fielding Plan (MFP)** is developed and negotiated with each major command scheduled to receive aircraft.

The MFP includes descriptions of the aircraft and subsystems, pertinent training and logistic support details, and a **Statement of Quality and Support (SOQAS).** The SOQAS is, in effect, a DARCOM warranty on the aircraft for a stated period of time.

During the period of warranty failed parts are replaced at no cost to the user. A **Materiel Fielding Team (MFT),** comprised of DARCOM and contractor representatives, verifies the condition of aircraft prior to issue to using units, administers the SOQAS agreement and assists using units during the initial period of fielding.

The comments by **General Blanchard** in his article highlight the success, from the user point of view, of the **Hand-off concept** as implemented during the Cobra deployment to Germany. The concept has also proven to be of material benefit to both DARCOM Readiness Commands and the contractors. Rapid feedback from the MFT on quality problems and/or service revealed difficulties have permitted expedited corrective actions on the production line or in the Army support system.

During the period Nov 75 - Mar 78 TSARCOM **New Equipment Training Teams (NETT)** have trained 1,355 personnel in the field to operate and maintain **Cobra TOW** aircraft (383 pilot-gunners and 972 maintenance personnel). The instructors for the NETT were provided by the **USA Forces Command (FORSCOM),** the **USA Training and Doctrine Command (TRADOC)** Schools, and DARCOM Readiness Commands.

DA standards met

The fielding of the **Cobra TOW** thus far has been free of any significant technical or logistical problems. Records of missile firings indicate clearly that pilot-gunners have the ability to absorb the training provided and attest to the reliability and accuracy of the TOW missile subsystem. The cumulative hit performance to date exceeds the subsystem design requirement.

The cumulative **Operationally Ready (OR)** rate for the **Cobra TOW** has consistently been above the Department of Army standard. The cumulative **Not Operationally Ready-Supply (NORS)** and **Not Operationally Ready-Maintenance (NORM)** rates have remained within DA standards and reflected no adverse trends.

Many challenges lie ahead for the logistic community as we continue to modernize the **Cobra** fleet. It is certain that our jobs will not get any easier. In point of fact, it is bound to get increasingly difficult as a function of the growing density and complexity of the fleet.

However, the past accomplishments of the using units, TRADOC, the contractors, and our supporting DARCOM Commands all indicate that, together, we shall continue to be successful. ★

MODERNIZED AH-1S BORESIGHTING

BY GEORGE L. COHILL, BELL HELICOPTER TEXTRON

THE accuracy required of the **Modernized Cobra** gun and rocket subsystems is more demanding than any armed helicopter in existence or in development for the U.S. Army.

The laser rangefinder, air data subsystem, head-up display, and digital fire control computer, integrated with the existing AH-1S ECAS armament and fire control subsystems, provide the potential for meeting these requirements. For this potential to be realized, however, the elements of the armament and fire control system must be precisely aligned with each other.

The process of bringing all of the elements of the system into alignment is referred to as **boresighting.** In **Figure 1,** (shown in the sketch immediately below), the components requiring boresighting are identified. The orientation of each of these components must be aligned mechanically and/or compensated electronically with respect to the aircraft reference (on top of the TOW telescopic sight unit) to accuracies ranging from 0.25 degree down to 0.015 degree.

This kind of precision is accomplished in the factory during assembly of the AH-1S by means of highly accurate assembly jigs and a large, rigid boresight fixture with high precision optical telescopes and collimators. The factory boresight fixture is shown on Page 81.

It is easy to see that a boresight fixture as large and heavy as the factory fixture is impractical for application in the field. BHT, therefore, undertook the design of a boresight fixture capable of providing the required alignment accuracies but more suitable to field use.

The first model of a field portable boresight fixture is shown mounted on the nose of the AH-1S (Fig. 2 opp.). This unit provides the same basic functions as the factory boresight fixture. The boresight fixture is used with standard Army elbow borescopes, and a new unit called the

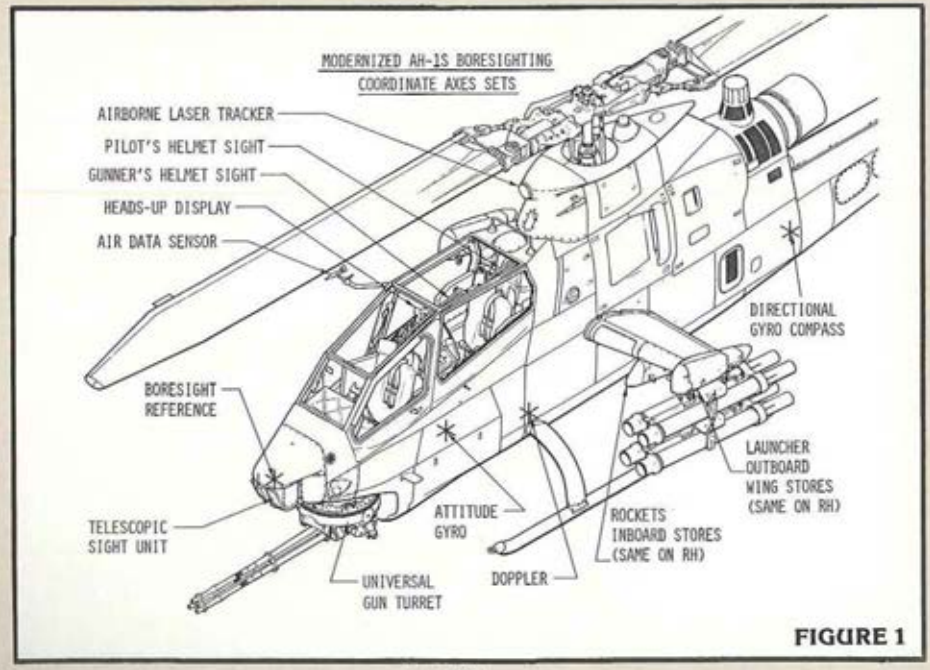

FIGURE 1

Boresight Controller (Fig. 3 below).

The **Boresight Controller** is connected electrically to the fire control computer, and permits the Aircraft Armament Repairman to use the fire control computer to assist in boresighting the system. This is one of the major features of the new fire control system for the AH-1S.

The fire control computer automatically compensates for boresight errors among the armament and fire control components by storing these errors during boresighting and then incorporating boresight corrections

AN UPDATE
BY
GEORGE L. COHILL,
CHIEF
OF SUBSYSTEMS
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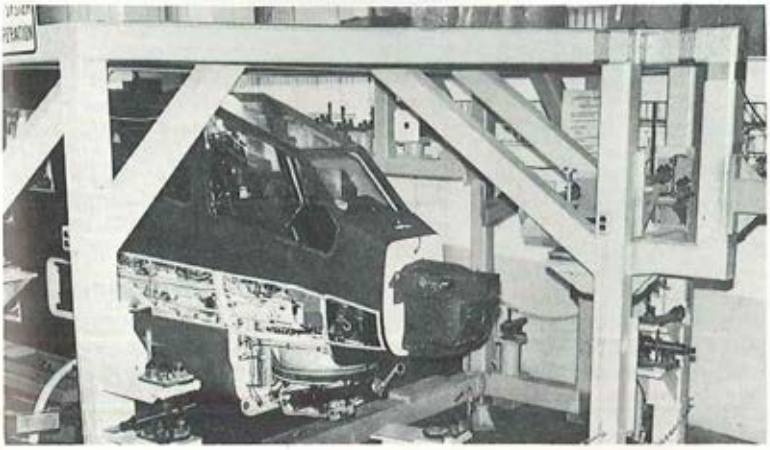

FIGURE 2

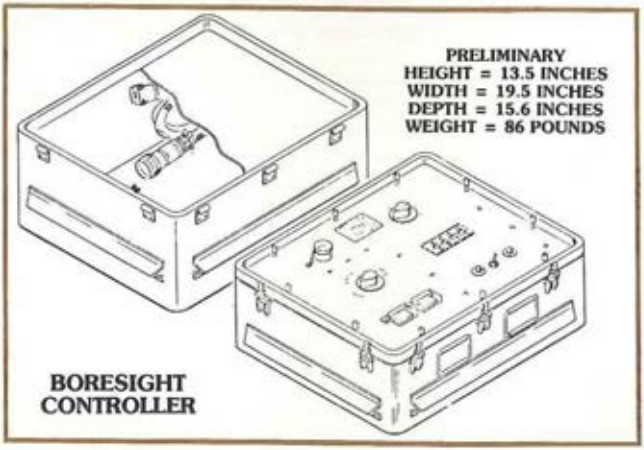

FIGURE 3

dynamically into the fire control solution during actual firing of the weapon.

The boresight fixture is mounted directly on the TOW telescopic sight unit (TSU) and aligned with the reference pads on top the TSU. By virtue of the rigidity of the fixture, it extends these reference points out to convenient points to insert the elbow borescopes and sight on other components in the armament and fire control system.

Storing the corrections

The Aircraft Armament Repairman attaches the standard Army elbow borescope at various points on the fixture and observes the misalignment of the corresponding elements of the armament and fire control system. Then, using the boresight control unit, he introduces a boresight correction signal into the fire control computer which causes the component to move in azimuth or elevation until it is properly aligned. When alignment is achieved, the operator signals the computer through the Boresight Controller and the computer stores the appropriate boresight correction in memory.

This procedure is repeated for 90° left, 90° right, and straight ahead. The fire control computer interprets the three readings to compensate for pitch, roll, and azimuth errors.

This techique applies to the following pairs of armament/fire control components;

Telescopic Sight Unit (TSU) and Universal Turret Subsystem (UTS).

Pilot's Helmet Sight (PHS) and TSU,

Gunner's Helmet Sight (GHS) and TSU,

PHS and UTS,

GHS and UTS,

TSU and head-up display,

Airborne laser tracker and TSU.

In order to boresight the inboard and outboard stores stations it is necessary to align the TOW launchers or 2.75" rocket launchers with the corresponding positions on the boresight fixture by means of mechanical adjustment of the ejector rack sway braces, pitch links, and azimuth adjustments.

The doppler transmitter/receiver, vertical gyro, and heading gyro require alignment with the system only during installation or replacement. These units will be aligned mechanically.

The boresight concept for the Modernized Cobra armament and fire control system has been developed with careful consideration given to the problems of maintaining and replacing components in the field. If it is necessary to replace the telescope sight unit, the system must be reboresighted. The head-up display unit, the air data sensor, and the fire control computer can be replaced without reboresighting.

The boresight correction data that is stored in the fire control computer is contained in a small module on the front panel of the computer. This module is removed by unscrewing a finger tight cover, pulling out the boresight memory module, and transferring it to the replacement computer.

A number of advantages

The Modernized Cobra boresight kit provides a number of advantages over the approach used on the AH-1Q. Despite the much tighter accuracy requirements and the new components requiring boresighting, the new system can be boresighted in considerably less time than before. This is due primarily to the fact that in boresighting the AH-1Q it was necessary to jack up and level the aircraft and set out targets over a large clear level area, and all of the final alignments were done by means of adjustment of resolvers or mechanical means.

In the Modernized Cobra it is not necessary to jack up or level the aircraft; day or night, indoors or out, any space large enough to hold the aircraft will do; no targets are required; and finally, most of the high accuracy adjustments are eliminated because the fire control computer stores these small differences and accounts for them in the fire control solutions. ★

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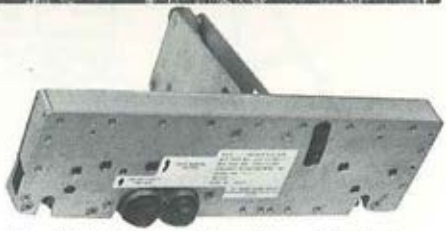

The AH-1S ejector rack shown here weighs less than 13 pounds.

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THE **Modernized Cobra** with its survivability improvements is the most survivable attack aircraft in the world today. The improved hot metal plus plume suppressor and low reflectivety paint in conjunction with the ALQ-144 jammer should defeat the current and postulated future infrared (IR) missile threats.

Radar-type threats will be handled by the APR-39 radar and laser warning receivers teamed up with the ALQ-136 radar jammer (with the M-130 chaff system as back-up).

The low glint canopy and low contrast IR paint will degrade the optical capability of threat systems significantly. Since much was published concerning the above items of **Aircraft Survivability Equipment (ASE)** in last month's June 1978 issue of **Army Aviation Magazine**, it is unnecessary to pursue them further in this article.

Ballistic Vulnerability

One area of AH-1S survivability that has not been given adequate coverage is the very successful program for the reduction of ballistic vulnerability. Although our primary technique for survival is the prevention of successful threat

AH-1 AIRCRAFT SURVIVABILITY

By COLONEL JACK L. KEATON, PROJECT MANAGER-ASE

engagements by the use of proper tactics combined with appropriate ASE, we can realistically expect to take occassional ballistic hits.

The small size, and thus the small presented area of the **Cobra**, inherently make it a difficult target to hit - particularly from the normal stand-off ranges associated with the TOW mission.

Goal is zero weight increase

The goal of the program is to achieve ballistic vulnerability reduction with no weight increase nor any other penalties in aircraft performance. This is a difficult feat to accomplish and requires new and innovative approaches.

The use of high tolerant metals and the advent of lightweight, advanced composite materials makes this goal achievable.

The AVRADCOM's Applied Technology Laboratory at Ft. Eustis and Bell Helicopter Textron have been conducting an aggressive imaginative program for many years, the past few years of which have been aimed primarily at the **Modernized Cobra.**

Results: One tough bird

The improved main rotor blade is tolerant to 23mm HE rounds. The current fuel system is tolerant to 7.62 and 12.7 rounds and an improved dry powder pack technique and ullage protection promises to increase this tolerance to 23mm HE.

Testing is nearly complete on a modified main transmission that will permit it to operate up to 30 minutes without lubrication. The **Modernized Cobra** tail boom structure already is capable of withstanding 23mm HE hits.

A fly-by-wire triple redundant directional control system is in test. A ballistically tolerant composite tail rotor driveshaft with maintenance-free Thomas couplings will result in no weight increase at a lower maintenance cost. Thus, the entire tail boom area can be tolerant to all ballistics up to 23mm HE.

The critical components of the cyclic and collective flight control systems (bellcranks, end fittings, bearings, control tubes, etc.) can be directly replaced with new advanced composite materiel designs of reduced cost that will be ballistically tolerant as well as more durable, resulting in less maintenance.

Investigations are underway that will reconfigure the armor to reduce weight and provide increase crew and critical component protection. A transparent blast/fragment barrier between the pilot and copilot-gunner could provide additional protection to the crew from 23mm HE hits in the cockpit. Also, a study is in process to permit the use of transmission oil as an emergency engine lubrication in the event of the loss of the primary engine lube system.

In summary, today's advances in technology permit an already tough bird to be one of the most survivable aircraft in the world. The **Cobra** can proudly take its place with Army Aviation's family of aircraft, which are the most survivable weapon systems on the modern battlefield. ★

REPOSITORY!

☐The prestigious AAAA "Outstanding Aviation Unit Award" is shown on display at Ft. Hood at Hq, 7th Sqdn, 17th Cav, the 1976-1977 winners. The $40,000 solid silver award had previously been on display at Fort Hood in 1972 when it was won by the 227th Aviation Battalion. The trophy is now in California where its sponsors, Hughes Helicopters, are adding a new walnut base to accommodate the "silver medallions" of the winning units during the '80's and '90's.

U.S. Army P.I.P. Programs Pay Off. The 1800 hp T53-L-703 engine powering the AH-1S Cobra is setting tough new standards. Standards of reliability and life cycle cost. Standards by which U.S. Army turbine power plants will be measured for years to come. All a result of long-life RAM-D improvements developed and qualified under U.S. Army Product Improvement Programs. ☐ A three-fold improvement over the T53-L-13B model in engine-related depot return rate during the first 50,000 operating hours. ☐ A mean time between engine-caused depot return of over 8,000 hours. Added to prior year P.I.P. programs, it all pays off in reduced operating costs for the U.S. Army AH-1S Cobra TOW attack helicopter. That's Cobra power from Avco Lycoming.

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COBRA TOW TRAINING AT THE U.S. ARMY AVIATION CENTER

DURING the last year and half the U.S. Army Aviation Center at Fort Rucker, Ala., has graduated more than 200 AH-1 Cobra TOW qualified aviators and upgraded its fleet from AH-1Q's to AH-1S's (Mod) and AH-1S (Production).

The Cobra TOW course of instruction covers airframe differences between the "G" and "S" models; detailed instruction on the TOW Missile System (M65); Helmet Sight Subsystem (HSS) (M12); and the Turret Subsystem (M28A1E1).

Students each receive dual flight instruction which consists of practice tracking; range firing and the use of the pilot steering indicator (PSI). They each fire 3,000 rounds of 7.62mm and 250 rounds of 40mm using the M28A1E1 turret, and one student per class fires an armed TOW.

Instruction on system operation begins in academics, which is completed before students report to the flight line where they learn airframe differences on the "S" model. Weapons systems instruction includes unit description, location and function of the major components, principles of operation, and operator troubleshooting of system malfunctions.

Cockpit teamwork all-important

Flight line orientation covers the effective use of the system. A prime vehicle for accomplishing this is the AH-1S checklist which outlines the armament check to be performed after engine run-up checks.

Crew coordination and cockpit teamwork are most important. Cobra TOW pilots still do the flying and also provide covering fire with the turret using the HSS. Gunners fire the TOW making their functions much more critical. Repeated battle drills with the same crew members greatly reduce the required engagement time and enhance crew survivability.

Crew coordination is addressed in the TOW course by involving both members in the armament checks, in various discussions on target acquisitions, in engagement and disengagement techniques, and in a target hand-off procedure to be used when the pilot acquires a target of opportunity and wants the gunner to engage it using the Telescopic Sight Unit (TSU).

Relative consistency scored

During training the gunner tracks a moving target and receives feedback from the instructor pilot (IP) in the form of a numerical score produced by the gunner's accuracy control panel (GACP; also called GAZAP). The GACP measures how consistently the gunner tracks a moving infrared target. Scores displayed indicate the relative consistency with which students track the target in both the horizontal and vertical axes. This device, while extremely valuable in initial qualification, has little application in tactical training and may not be widely available in the field units.

A FIRSTHAND REPORT BY MAJOR GENERAL JAMES C. SMITH, COMMANDANT, USA AVIATION CENTER AND FT. RUCKER, ALA.

While learning to track smoothly, students learn that they can be their own worst enemies. The track stick, unlike a helicopter cyclic, does not move in response to pressures applied to it. It merely measures the pressures applied and moves the TSU accordingly. Errors increase if a loss of pressure is applied. A very light touch produces the desired results.

The course also includes a basic introduction to vehicle identification, range estimation using the 13X optics, and boresighting of the TOW Missile System. (We learned more characteristics of the system in the "school of hard knocks.")

Concentration all-important

Extreme caution must be exercised when using the HSS to fire the turret. It's human nature to turn the head and look at anything that catches the eye. If an aircraft suddenly unmasks to the side while a crew member is firing, that person wants to turn and look, which creates the possibility of shooting the wingship down. Many other flying duties require crew members to have their "heads on a swivel," but they must remember to concentrate on the target during firing. Only the nonfiring crew member's head should "be on swivel."

When the gunner is looking through the TSU, particularly in high magnification, the concentration area on the target results in a tunnel vision effect. The gunner may not realize the aircraft is moving or notice that something is about to interrupt the direct line of sight, and thus he does not compensate for a changing range to the target or he fails to give the pilot ample warning that something is about to break direct visual contact.

The initial search for targets and their acquisition are accomplished by elements other than the attack helicopter. But once the attack helicopter unmasks in the firing position, it still must make visual contact with the target before it can fire on it. On the mid-intensity battlefield, targets will not be very obliging. Gunnery training often is conducted on cleared ranges with uncamouflaged targets, often stationary ones.

In combat, stationary targets are concealed and camouflaged. Moving targets make maximum use of camouflage and natural cover, requiring attack helicopter pilots to search for them. Cross training with scout crews can be of great value to accomplish this search.

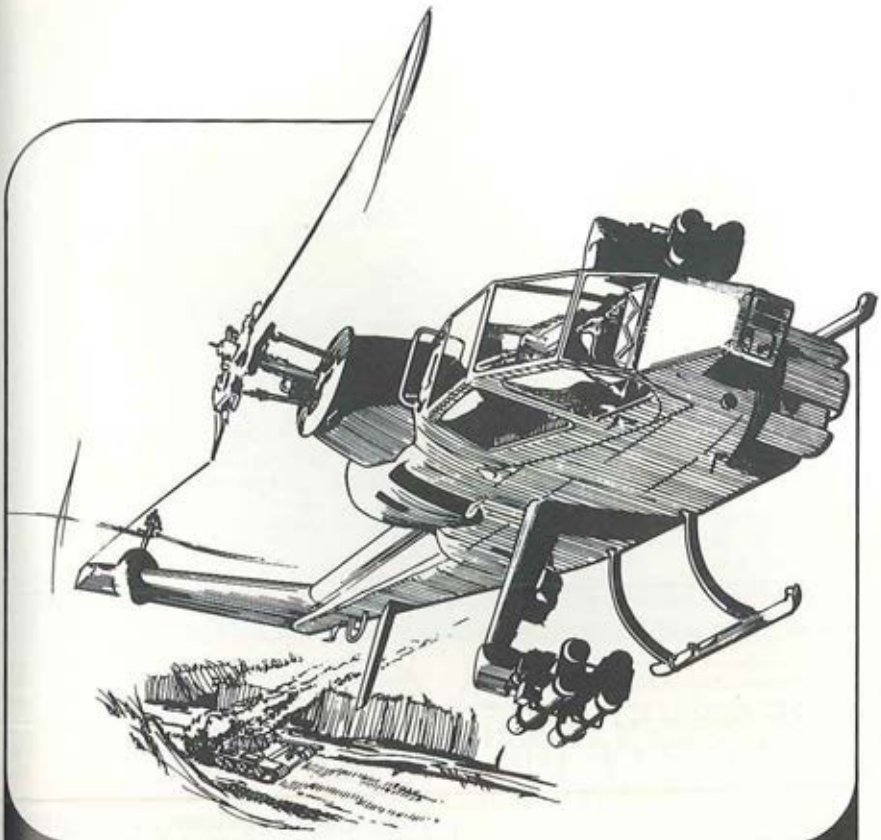
Three general searching means have evolved using the Cobra TOW systems;

- Both the pilot and gunner use their helmet sights. This is required when the situation dictates a search of a large area. When locating a target or a suspected target, the gunner manipulates the appropriate switches and takes a closer look using the TSU's magnified optics.
- The gunner searches with 2X optics while the pilot uses the HSS. This is used when target information restricts the potential search area to a general location. The gunner has a 28° field of view and about a 70° per second slue rate with the TSU. This allows coverage of a restricted area in detail in a short time, and enhances crew survivability by reducing exposure time.
- The gunner searches with 13X optics while the pilot uses the HSS. When the target is known to be in a relatively small area, the pilot unmasks the aircraft on the known heading to the target and the gunner searches with the 13X optics. This allows picking out greater detail but imposes a 4.6° field of view restriction and a slue rate of only about 4 degrees per second.

Concept applicable to Scouts

The three means of searching outlined are tied to the TOW system. But the concept behind them applies as well to the scout pilots.

Today, the Cobra TOW is the system on which Army Aviation must depend if it is to conduct combat operations on a high threat battlefield successfully. At the U.S. Army Aviation Center, we are graduating Cobra TOW qualified aviators who will ensure the combat effectiveness of Army Aviation. ★



putting it all together

Fire Control
Boresighting
Rocket Control
Target Acquisition and Tracking

the modernized **COBRA (AH-1S)** fire control computer by

TELEDYNE SYSTEMS COMPANY
19601 NORDHOFF STREET NORTHRIDGE, CALIF. 91324

By
COL ROBERT A. BONIFACIO,
COMMANDER,
U.S. ARMY AVIATION BOARD

ACE

Air Combat Engagement Tests designed to provide the winning difference

BECAUSE of the increasing number and complexities of helicopter systems throughout the world, the **U.S. Army Aviation Board (USAAVNBD)** was tasked by the **U.S. Army Training and Doctrine Command (TRADOC)** to conduct a multiple series of **Air Combat Engagement - Tactics Development Evaluations (ACE-TDE).**

ACE Phase I

ACE Phase I was conducted by the Aviation Board from 1 November through 16 December, 1977 with the Air Warfare Division of the **U.S. Army Material Systems Analysis Activity (AMSAA)** assisting in the collection and analysis of data related to weapon systems performance.

Essentially, ACE Phase I was designed to provide an initial low resolution evaluation of aerial combat between two helicopters and to provide baseline data for future more sophisticated phases of evaluation. An assessment of the effectiveness of current and near term friendly and postulated threat tactics and weaponry is in process.

Hit-Kill data being assessed

Weapon systems lethalities in terms of probability of hit (P_h) and probability of kill (P_k) for various flight maneuvers, ordnance combinations and weapon ranges are being prepared. "C" band distance measuring radar equipment and time, range annotated, voice receptive video gun camera film are only a few of the many complex items of instrumentation that were employed to insure effective and timely data collection. **COL John C. Bahnsen,** TRADOC System Manager (TSM) for the attack helicopter, was the test proponent supplying the initial evaluation framework.

Aviation Board aviators flew a total of 347 hours during the evaluation in AH-1S and UH-1M helicopters. The UH-1M served as a surrogate threat helicopter with appropriate limitations being placed on operation and flight regimes to insure realis-

tic simulation. Because of the demanding cockpit workload, flight profiles and innovative nature of the evaluation, only highly experienced Cobra and UH-1M pilots participated. Flight safety was highly stressed and two command and control helicopters were used to supervise the evaluation.

The need for teamwork

Emerging evaluation results indicate that **Nap-of-the-Earth (NOE)** tactics are valid when used in air combat against another helicopter and emphasize the need for a high degree of team work and crew integrity among Cobra TOW crews.

Additionally, recommendations are forthcoming on crew switchology, NOE navigation techniques and weapon systems operational procedures. Many training recommendations that have evolved are under study by my analysts.

The Aviation Board is currently in the process of preparing test designs to participate with the Air Force in the **Joint Countering of Attack Helicopters (J-CATCH) Program.** This is a multi-phased program designed to provide higher resolution data on weaponry and tactics and is a follow-on to the ACE evaluation.

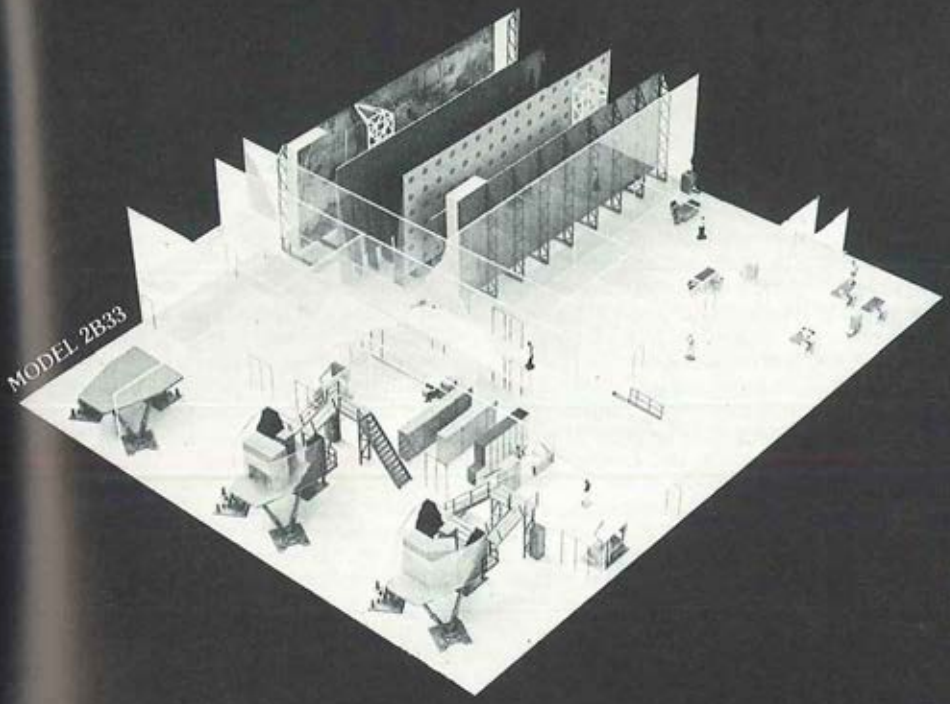
The entire thrust of this evaluation has been oriented towards developing tactics and hardware that will assist the attack helicopter team in countering an attack helicopter threat while primarily providing anti-armor support to ground elements.

A fine attack helicopter!

We have a fine attack helicopter in our AH-1 series which has or may further be improved with the addition of a flat plate canopy, improved main rotor blades and improved engine performance.

The Aviation Board has been involved with operational tests of these improvements during the past eighteen months and we, at the Aviation Board, are working on tactics and weapons to put you on the winning team. ★

THE AH-1 FLIGHT SIMULATOR.



THE LATEST ADDITION TO THE FANTASTIC FLYING FAMILY

IN the mid-1960's the Army was searching for ways to improve its rapidly expanding aviation training requirements. After considerable research and study, the unanimous answer to the problem was to employ a high fidelity flight simulator capable of simulating a specific aircraft and making it look, feel, and fly much like the real aircraft as technologically possible.

To meet this training requirement, a **Qualitative Materiel Requirement (QMR)** document was written and approved by DA for the development of a high fidelity **Synthetic Flight Training System (SFTS).**

The initial simulator

The first simulator to be developed under this QMR was the **UH-1 Flight Simulator (UH1FS).** It was delivered to the **U.S. Army Aviation Center (USAAVNC)** in December 1970. Development of the **AH-1 Flight Simulator (AH1FS),** began in 1974, and has been delivered to the USAAVNC for Government acceptance.

The AH1FS consists of two cockpits independently mounted on a 6° of freedom motion system, a computer complex, and two terrain model boards for visual presentations in the cockpits. One cockpit represents the pilot's position while the other cockpit represents the gunner's position.

Each of these cockpits is equipped with instructor and observer positions, this arrangement permiting the gunner and pilot to be trained separately or as an integrated team for crew training. Additionally, each cockpit has visual display systems which provide real world visual presentations from the terrain model boards. They are configured identically to the pilot and gunner positions of the actual aircraft.

A Report by LT. COLONEL ELMER E. CURBOW, USAAVNC

Engine, transmission, flight instruments, and all controls are actual aircraft components and function identically to the actual aircraft to include on-board weapon systems. The gunnery functions of the aircraft are also duplicated. The **Telescopic Sight Unit (TSU)** is used to present a computer-generated target image. The relative distance and direction to the targets are in proper perspective and hit and miss data are recorded by the computer for future reference.

Computer-generates imagery

A Camera Model System (CMS) provides the media for visual flight training. It uses two identical 64' by 24' model boards which are scaled at 1500:1. This provides approximately a 15NM x 6NM operational area, plus a 2NM x 6NM nap-of-the-earth (NOE) flight area.

The visual presentations are provided to the pilot and gunner cockpits through cathode-ray tubes, commonly known as special colored televisions. Either cockpit will allow the pilot or copilot to fly in day, night, dusk, or instrument meteorological conditions.

The visual portion of the weapons simulation is made possible through the use of computer generated imagery. This allows the pilot and gunner to see such weapon effects as gun tracer trajectories, free flight aerial rocket flight path, TOW missle flight path, weapon burnout, or ground impact.

The computer-generated imagery weapon simulation video is superimposed on the background video scene coming from the terrain model boards by the camera system.

Standardized instruction is provided to all trainees through the preprogrammed demonstration capability. Procedures for a VFR and a gunnery checkride are examples of this capability. The weapon system employment is scored and displayed at the instructor station. Information such as target number, weapon, type,

range, direction, number of rounds fired, number of hits, and location and distance of misses are displayed, all capable of placement on a printout for use by the instructor as a critque aid.

Training Benefits

The AH1FS was designed as a training vehicle to support all phases of **Cobra** flight training from the new aviator in the **Aircraft Qualification Course (AQC)**, through unit or individual training of aviators to maintain combat proficiency, to the experienced aviators in the **Instructor Pilot Course (IPC)**. As such, it possesses many training advantages over the actual aircraft.

The student can be trained faster, easier, better, and safer in the simulator than in the actual aircraft. There are no lost flight days due to bad weather, wind, and maintenance, nor is the training quality reduced during days when flight is done in marginal weather. The AH1FS provides the ideal aircraft situated in the ideal environment suitable for the training objectives.

Gunnery training is of necessity a slow process because extreme safety precautions must be exercised. Many hours are spent changing the aircraft from one armament configuration to another in order to train the student on all possible weapons combinations, plus the time spent on the armament pad loading and unloading the different weapon systems. When everything is readied, then time-consuming range safety rules must be followed.

The AH1FS assures complete safety, even for the new student. Any one of ten possible **Cobra** weapon system configurations can be instantly selected. When the ammunition supply is exhausted it can be instantly reloaded by the simple push of a button. The age old problem of assessing hits and misses is now solved as the computer will tell the student and instructor how many hits he had, how many misses and by how much.

No time is wasted in flying around the range and waiting for your firing turn, instead, by the push of a button the simulator can be repositioned to the firing position, re-armed, or reconfigured and ready for the next training run.

The biggest user of the AH1FS is going to be the TOE AH-1 units where the AH1FS is going to be a real blessing. In the past, many of the combat skills necessary for battlefield survival and mission accomplishment were not fully developed until actual introduction into combat.

In a peacetime environment many of the flight maneuvers demanded in combat are forbidden by Army, FAA, ICAO, or DOD regulations. Therefore, proficiency could only be developed in these maneuvers after combat started. It's believed that if there is another war, the early stages will be so fast and furious that we can no longer afford to wait for the outbreak of combat to learn these skills.

Also, a highly-trained and combat-ready supply of replacement aviators will be needed. These are the areas where the AH1FS is expected to have a major impact on increasing and maintaining the **Cobra** units' combat readiness. However, the impact can go much farther than just keeping the individual aviators flying skills sharp. The AH1FS will add realism and the added training benefits can be realized all the way to the Division CG.

"Amazing!"

The previous SFTS devices at the USAAVNC have developed a reputation as "Fantastic Flying Machines." The early experience with the AH1FS indicates that it is going to be an exciting addition to this family.A number of VIP's and senior commanders have already been given AH1FS demonstrations.

A few of the adjectives overhead were, "Magnificient," "Tremendous," "Wonderful," "Beautiful," "Unbelievable," "Amazing," "Overwhelming," "Great," "Outstanding," "Astounding," and after a crash (simulated, of course!) "Terrifying!'

Due to the visual systems, motion cues and trainer capabilities, it is believed that the AH1FS is the most advanced operational flight and weapons simulator in the world today. ★

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ATTACK HELICOPTER EVOLUTION:

A TEST PILOT'S VIEWPOINT

BY DICK KJELLANDER,

EXPERIMENTAL FLIGHT TEST PILOT
BELL HELICOPTER TEXTRON

DURING eight years as an Army Aviator and 15 years as a test pilot at Bell Helicopter Textron, I have been involved in armed helicopter programs from the addition of guns and rockets at Ft. Rucker in 1958 to the first aerial artillery battery where 4.5 inch rockets were fired from an H-34, through development testing of the AH-1G, AH-1J, AH-1Q, AH-1R, YAH-63, AH-1T, and now the AH-1S.

Having fired every turret weapon, rocket system, and missile candidate for current attack helicopters during my ten years of weapons testing with Bell, I've seen several extremes in systems/aircraft interface during this evolutionary period.

We have had our growing pains and set backs, but a look at today's products quickly confirms the satisfaction and pride within the attack helicopter community.

At this writing, the Modernized AH-1S Bell Cobra prototypes are in their final stage

testing the new fire control stores management, laser range finder, doppler navigation, TOW interface, and the 20mm cannon. Needless to say, I look forward to the opportunity to employ all these improvements.

The 20mm cannon is not new to the AH-1. I first fired it from the ground on a G model in 1968, before we had the automatic stow circuit installed. During one firing cycle, we had experienced a few anxious moments as the gun depressed and 20mm rounds began bursting just below the nose of the aircraft. We developed a fix for that in a hurry.

Taming the recoil

In 1969, the cannon system was further refined as it was fired from a U.S. Marine Corps' AH-1J. When the TOW system was married to the 20mm cannon on the Iranian AH-1J, a new recoil adapter was developed to protect our gunners from cut noses and black eyes resulting from firing vibrations in the cockpit with the gunner looking through the TOW sight.

With the recoil tamed, the TOW sight greatly increased the accuracy of the 20mm at 2,000 meters. A recoil compensator, added during the AH-1T program, further enhanced the accuracy of the system. This same recoil compensator working through the SCAS keeps the upgunned AH-1S from pitching, yawing, and rolling due to recoil from the firing weapon.

Having fired over 100 TOW missiles, I continue to be impressed with the system. Our first firing from a Cobra in 1972 left us with some apprehension however. As we fired a dummy missile with only a launch motor from the ground, overpressures almost disassembled the aircraft. Rivets popped; the trailing edge of the elevator split wide open; doors and latches sprung open; and the tailboom cracked.

We realized we had some beefing-up to do on the fuselage along with some other changes. With Approximately 1,000 production missiles fired, and achieving better than 80% hits, we must have done something right.

All the improvements in wing stores armament were qualified by extensive testing. Each new store was jettisoned at all extremes of the flight envelope. Drops were made asymmetrically loaded, in sideslips, and other worse conditions to prove safety of the jettison system.

Heads-up-display

I am impressed with the new instrument panel in the AH-1S. The instrument installations with the internally illuminated, easily interpreted gauges allow the crew more time to observe outside the cockpit.

A fast glance at the instrument panel gives the pilot the indications he needs. This improves the pilot's ability to operate the helicopter in a nap-of-the-earth (NOE) environment. The heads-up display in the new fire control will not only make his cross-check easier, but improve the pilot's forward visibility.

The stability augmentation system enhances the handling qualities of the helicopter at NOE. The aircraft is stable throughout the C.G./gross weight envelope. Maneuvering stability and control harmony and response make the helicopter easy to fly, yet very maneuverable and agile. The basic aircraft handling qualities are good enough that the mission can be continued with a stability augmentation system failure.

The simplicity, ruggedness, and reliability of the machine enables it to live in the field with a minimum of maintenance and a maximum availability.

At publication of this issue, we will be firing the **Modernized Cobra prototype** at Yuma. I am confident the aircraft, to be fielded in November 1979, will reflect another successful step in **Cobra** evolution and a tribute to the requirement, development and management people in the AH-1 attack helicopter business. ★

TEAMWORK: THE ESSENTIAL INGREDIENT

BY ROBERT E. EGGERS, ATTACK HELICOPTER PROGRAM MANAGER, BELL HELICOPTER TEXTRON

A VIEWPOINT BY ROBERT E. EGGERS, AH-1 PROGRAM MANAGER, BELL HELICOPTER TEXTRON

TEAMWORK between the Army's Cobra Program Management and Bell Helicopter Textron (BHT) has been the key to a series of on-cost, on-schedule AH-1 modification and production programs.

Naturally, we are proud of this record and, from my perspective, how it was accomplished.

Being industry's counterpart to the Cobra PM is a rewarding and challenging job. I have been the industry counterpart for **Colonel Charles Drenz** prior to **Colonel Robert St. Louis**, and for **Brig. Gen. Orlando Gonzales** (then Colonel) prior to **Colonel Drenz.**

So you can see, the **Modernized Cobra Program** is a team effort involving many individuals. This team has successfully accomplished the many milestones **Colonel St. Louis** referred to and will continue with the fully **Modernized Cobra.**

The industry PM serves primarily as the BHT spokesman to the customer, and at BHT, is responsible for all interface with engineering, production control, procurement, manufacturing, etc. Very simply, his job is to see that the program needs are accomplished by the appropriate members of the Bell team.

Over the years, some rather humorous situations have arisen. I recall that during **General Gonzales'** tour, we were frantically attempting to accomplish some successful TOW missile firings at Yuma prior to a briefing scheduled in Washington. The afternoon before the briefing we finally got off some successful firings.

The film of the shots was specially processed that night, flown to Washington, picked up at 2:30 a.m. at Dulles, and then edited during the wee hours of the morning to fit **General Gonzales'** briefing. At the

TEAMWORK is the essential ingredient

8:30 a.m. briefing, General Gonzales was able to calmly say, "As these successful firings of the TOW at Yuma yesterday afternoon clearly show . . . etc. . . . etc." The Army/BHT team was proud of that one as the Cobra TOW program got a boost.

Colonel Drenz entered the program with his primary task being the successful fielding of the Cobra TOW. I guess most of the readers are familiar with his visits to Europe to work with the units in the field to ensure successful functioning of the Cobra TOW materiel fielding team (MFT).

Justified plaudits

It was during that period when I learned to appreciate the scope of the Program Manager's task, which also includes his peronal attention to chasing and dispatching aircraft parts. Colonel "Chuck" Drenz and his MFT earned justified plaudits for their efforts.

Colonel "Bob" St. Louis appeared on the program at the point where it had gained maximum speed and momentum. His primary task was the CONUS fielding of the production AH-1S. This has certainly been successful, as feedback from the receiving units has generously praised the efforts of the NETT and the excellent product quality.

Much of this can be attributed to Colonel St. Louis' ability to assimilate and manage the information necessary to run a program traveling at this speed.

You must remember that during each of these periods of time while the Project Managers were charged with priority tasks, they also had to assure that the team continued efforts to complete a gamut of multifaced commitments.

These included the AH-1G to AH-1S modifications, the development of kits for the incorporation of the AH-1S uprated dynamic components to AH-1Q's in the field, the initiation of four fiscal years of production AH-1S deliveries, the change in mid-program to the upgun AH-1S, and, finally, the fully Modernized Cobra.

PINNED!— MG Herbert E. Wolff, the senior Army commander in Hawaii and an Army Aviator, presents Master Aviator wings and the Meritorious Service Medal to CW4 Clinton E. Downing, Avn Sect, DIC, WAA, during awards ceremonies held earlier at Fort Shafter, Hawaii. □

The team also initiated a program to modify the majority of the remaining AH-1G's to AH-1S's which will commence deliveries in November 1979.

A continous dialogue

It's my opinion that the teamwork on this program has been aided measurably by monthly reviews where Army and industry representatives would study the progress of the program. There is no doubt that many pitfalls or show-stoppers were avoided with this continuous dialogue and knowledge guiding the program.

The Army/BHT team approach to orderly evolution in the Cobra program is a low-cost, low-risk approach to the Army requirement to improve and maximize the Cobra contribution as the "LO" side of the "HI/LO" mix.

This team has given the user the most advanced, mission-capable attack helicopter in the world, and the mutual benefits produced by this teamwork are obvious. I am confident that future needs of the user will be met with the same team effort and will achieve the same success. ★

THE user community has the responsibility to insure that the AH-1 fleet has, and will continue to have, the capability to counter the current and future threat. The users recognize that space, weight and power provisions available for future modifications on the **Cobra** are extremely limited.

A key concern is whether improvements can be made to the AH-1S without major changes to the aircraft - major changes being a bigger, new airframe; a more powerful engine; and possibly a better transmission. Limited dollars, and possible competition with our **Advanced Attack Helicopter (AAH)** procurement, dictate a well thought out, cost-effective AH-1 improvement program.

A disruption to AAH?

In fact, there are those who fear that if the Army improves the AH-1S too much, it could disrupt the AAH program. If this were possible, then we wouldn't need an AAH; but nothing could be further from the truth.

However, we cannot adopt an "ostrich with its head in the sand" approach concerning this issue. It must be discussed in open forum - and based on the facts, the Army must continually articulate its case relating the improvement need to the ever present threat.

The AAH is an advanced technology, highly survivable, super-improved tank-killing machine. The AAH can do the job better than the AH-1S in every area, from its load of 16 Hellfire missiles versus eight TOW missiles, to its better crew survivability, to its superb flight performance, and to its unique 24-hour, all-weather capability.

They're complementary!

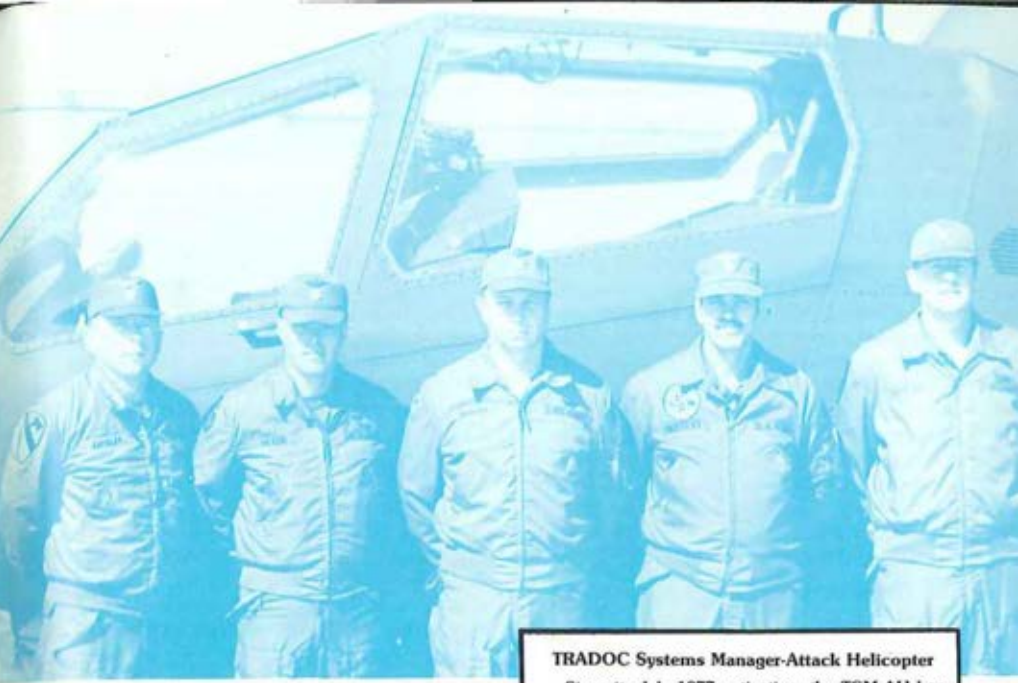
The AAH really does not need to be defended as a competitor with the AH-1S. It is complementary to the AAH and with enough improvements, it will keep us prepared during development of AAH. The AAH is the XM-1 tank of our helicopter force; the AH-1S is the M60A1E3!

There is a definite job for the AH-1S to do. For the user to maintain the status quo rather than improve this effective weapons system, which has a 20-year life, would be self defeating.

This is especially true in view of the projected HI-LO mix of AH-1's to AAH's in our helicopter fleet through the 1980's and 1990's. Eventually, Army Aviation

How Good Is Good Enough?

By COL JOHN C. BAHNSEN, TRADOC System Manager—Attack Helicopter



TRADOC Systems Manager-Attack Helicopter

Since its July 1977 activation, the TSM-AH has been commanded by COL John "Doc" Bahnsen. On Aug. 28, he'll be replaced by COL "Bob" Mills, a Master AA and Armor Officer now assigned to Hq, USAREUR. Shown above, l-r, are MAJ Charles C. Crowley, Asst TSM-Log; MAJ Beach, Asst TSM-T&E; COL Bahnsen, TSM-AH; LTC Joe U. Moffett, Asst TSM-Tng; & LTC Gerald T. Hipp, Asst TSM-Per.

will have a 2 to 1 mix of AH-1's to AAH's.

The real question is: How much AH-1S improvement is needed to be cost-effective, and remain capable of defeating the enemy; and how much can the present airframe endure?

Current plans are for the user and developer to meet periodically to determine what improvements are feasible, which changes would complement the forthcoming AAH, and what would be cost-effective. It is realized that any improvement program cannot be done on the spur of the moment and cannot be implemented overnight.

Nevertheless, the user community is driven by what will be required to defeat projected threat capability and quite often that fact necessitates change.

Possible improvements

Let's look at some areas where improvements are possible:

• **Night/Adverse Weather Capability** -Effectiveness of the AH-1S during periods of darkness and reduced visibility is limited. Night vision goggles give AH-1S a navigation capability, but target acquisition still requires artificial illumination. During periods when visibility is reduced due to fog, haze, smoke, or other battlefield obscuration, target acquisition and engagement are limited to those targets which the gunner can acquire with the naked eye.

It is possible to equip the AH-1S with a "lightweight" target acquisition system. While this system does not meet the performance criteria of the AH-64's **TADS (Target Acquisition Designation System)**, it will provide a significant improvement in capability of the AH-1S to operate at night and during periods when visibility is reduced by adverse weather or battlefield obscuration.

Addition of any item of this type will impact on helicopter design and weight limitations. As a note of caution concerning this area, we could find ourselves putting five lbs. in the proverbial four lb. bag.

• **Better Weaponry** - The Addition of the TOW missile system has given the **Cobra** a deadly set of fangs. The Army has also embarked on a program to upgun the **Cobra** with a 30mm turret weapon as well as adding a new family of 70mm rockets.

The programmed addition of fire control to AH-1S will greatly improve the accuracy of both cannon and rockets in air-to-ground delivery. Additionally, we must consider adding weapons to counter a potential helicopter air threat. Commander, USAAVNC is currently conducting a series of tests (ACE-TOE's) to determine which weapons are most effective for this role.

New and better weaponry

In essence, new and better weaponry must provide the user with the flexibility to do his job. Off-line and on-line, suppressive and point target, long range and short range are all needed to give the pilots, and thus the unit commanders, the employment flexibility needed to win on future battlefields.

• **Reliability and Maintainability** - The Army seeks to increase reliability and maintainability characteristics of all weap ons systems. The AH-1 fleet is a case in point. AH-1 improvements could include better maintenance procedures, clearer, more useable publications, better automatic test and diagnostic equipment, as well as small improvements to the airframe and its subsystems.

Any changes to provide commonality of types of helicopters would be helpful. Proliferation of various models causes an increase in parts, tools, and mechanics skills. Adding **ITDT (Integrated Technical Documentation and Training)** to the AH-1S program may prove cost-effective.

Overall, the goal in the logistics area is to make the maintenance and supply system more responsive to the needs of Attack Helicopter and Air Cavalry Unit commanders. Standardization of the AH-1's remains the top order of business, not only in logistics, but with people and in our tactics.

• **Easier to Fight** - It is now possible to provide improvements which reduce crew workload and provide greater responsiveness to the ground commander. Potential improvements in this area include better radios for NOE communications, new navigation equipment such as Projected Map Displays, and **IACS (Integrated Avionics Control Systems).**

These items could significantly reduce crew workload. Better instrument displays and a simpler cockpit are always feasible, and are also areas for improvement consideration.

• **Survivability** - As the threat increases, the Army must continue to reduce the vulnerability of its AH-1's. The addition of radar threat warning devices and redundant systems, as well as the use of improved materials such as composites, are some of the hardware improvements which could increase the survivability of the AH-1S.

Refinement of tactics will also continue to reduce vulnerability to the sophisticated air defense systems facing us on the future battlefield.

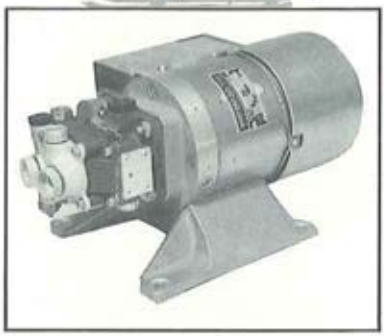
Need for a continuous review

In summary, the user/development community must make a continuous review of hardware improvements such as discussed above. This review is a must to insure that the Army fields a fighting system capable of sustained operations on the next battlefield against whatever threat it faces.

Hardware improvements must be carefully assessed in terms of improved combat performance and overall cost-effectiveness. Fleet configuration must be under full control. Technology moves forward at a rapid pace.

Becoming enamored with the status quo could be fatal on future battlefields. Ever increasing dollar constraints require a carefully reasoned decision on "How good is good enough?"

★



Abex pumps the power for your Cobra.

Bell picked Abex pumps to power the flight control actuators and forward gun turret of your AH-IS Cobra. Every Cobra is equipped with two of these 7.4 gpm pumps, although one can do the job in emergencies.

Cobra also carries an auxiliary Abex motor pump package, driven by an electric motor off the battery Ideal for power and armament checkout on the ground, and as emergency back-up for collective pitch control in the event of hydraulic system failure in flight.

Why did Bell specify Abex for the Cobra? Simply because our pumps and controls have an outstanding record of reliability, longer life, and minimum maintenance.

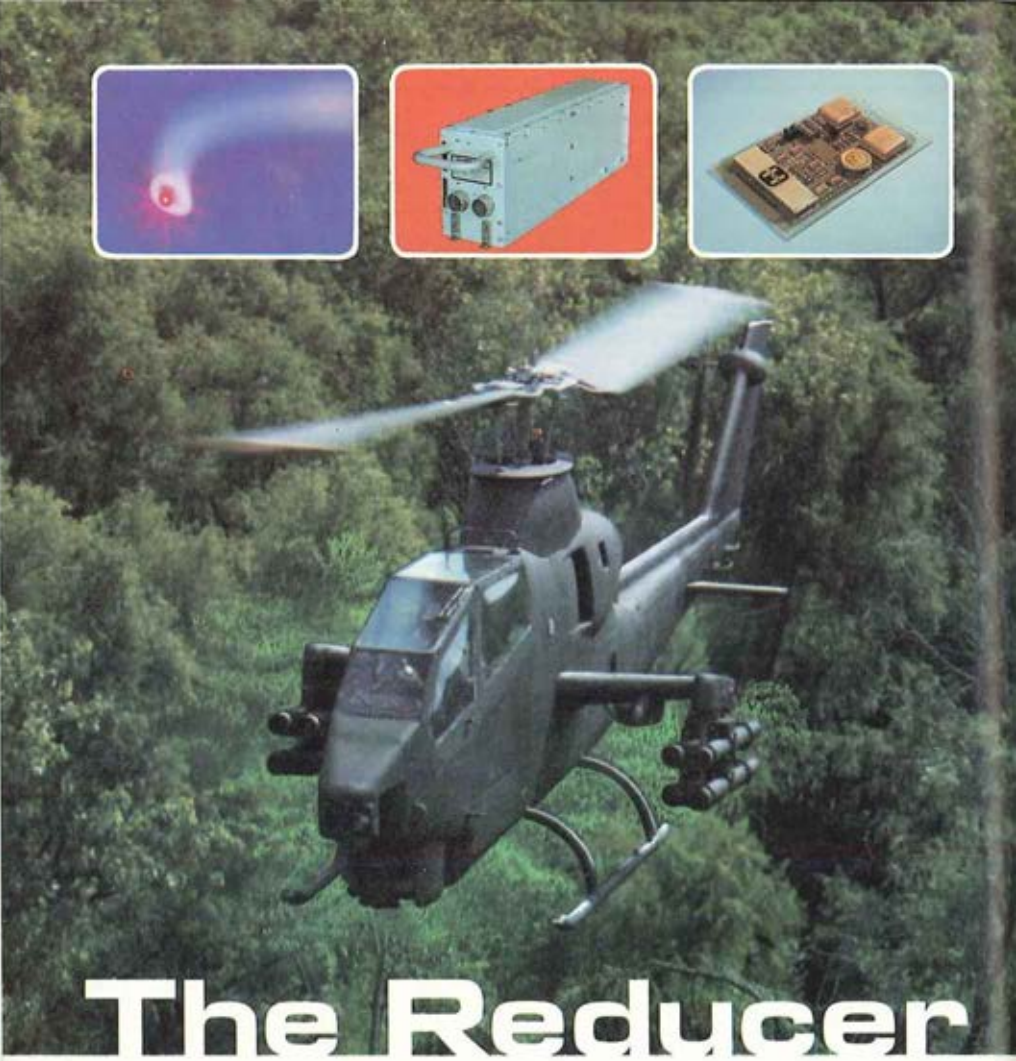
Bell isn't alone. Of the 36 hydraulic pumps used in new helicopter programs since 1965, 27, or 75% are supplied by Abex!

Congratulations to Bell on the Cobra. We're with you all the way.

Abex Corporation, Aerospace Division
3151 West 5th St., Oxnard, Calif. 93030

Abex **Aerospace Division**

An **IC Industries** Company



The Reducer

The Cobra is an effective, operational, major weapons system. It is currently going through a comprehensive modernization cycle which will further improve its battlefield effectiveness. Installation of Multiplex System Integration is the next logical step in the Cobra program. Improvements realized will reduce pilot workload, weight, cost, and vulnerability. The system will also add flexibility. From the leader in total aircraft multiplexing, Harris Corporation.

HARRIS

HARRIS CORPORATION Government Systems Group
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SUMMARY:

LOOKING TO THE FUTURE

By
COL ROBERT P. ST. LOUIS,
Project Manager-Cobra, TSARCOM

THE views expressed in the preceding articles attest to the well established and steadily increasing value of the **Cobra** as a vital element of the combined arms team.

Program success to date is a measure of the dedication and competence of the many individuals - military, contractor, and Department of the Army civilian - who have made the program go.

Future Product Improvements

The first annual user/developer **AH-1 Priority Aircraft Subsystem Suitability Intensive Review (PASS In Review) II** was held at Fort Rucker, Alabama, 11-13 April 1978. The goal of this conference was to review the **Cobra Modernization Program** as defined today and to determine what evolving technologies could be incorporated to insure that the **Cobra TOW** will continue to defeat the potential threat we face in the future.

PASS In Review II identified additional **product improvement programs (PIP)** considered necessary to enchance further the **Cobra TOW** capability as a full-time member of the Army combined arms team. The TRADOC Attack Helicopter Systems Manager has staffed the following potential additional PIP's throughout the user community:

- **Night Capability:** A true night operational capability is required for full integration of attack helicopters into modern battles. Current AH-1S night capability is limited to flying with night vision goggles and attacking targets with the use of artificial illumination.

The **Cobra** must have the ability to engage targets with primary weapons without external illumination. It also must be able to terrain fly at night and during adverse weather to and from the area of engagement. Adding these night fighting capabilities will double the combat value of current Cobra assets.

- **Weight Reduction:** Addition of a night capability in the **Cobra** will impose a weight penalty. Since the user cannot compromise ordnance and fuel payload and vital survivability equipment, a substantial reduction of the AH-1S basic weight is deemed absolutely essential.

The best approach to achieve significant weight reduction without sacrificing essential combat capabilities is to use multiplexing, which will reduce vulnerability, increase maintainability, lower life cycle costs, and reduce cockpit/panel space requirements and clutter.

- **Battlefield Navigation Capability:** To insure that the night and adverse weather navigation capabilities are enhanced commensurately with other improvements, it is desirable to have a terrain/map display system. This will reduce reliance on handheld maps, especially at night. In order to improve doppler navigation accuracy, calibration and utility, an improved directional gyrocompass system is also necessary.

- **Increased Performance Engine:** The potential value of increasing hot day performance by improving the AH-1S engine was recognized by the user. This improvement is supported if it is determined to be cost-effective and affordable.

An "on schedule" program

This issue of **Army Aviation** has provided a synopsis of the Cobra program, past, present and future. The program is on schedule with no known significant technical or logistical problems.

Given adequate funding, it is my conviction that the planned evolution of this outstanding weapons system can continue to bolster the combat effectiveness of the Army to the end of this century. ★

"Like Two Scorpions" (Continued from Page 8)

likened by some observers to a modern adaptation of 18th century North American Indian ambushes.

Combat between attack helicopters will be like putting two scorpions in a bottle. With the armament, maneuverability, electronic systems and other modern attributes of attack helicopters on both sides, the dogfight will return to the low levels and speeds of 1918. Gone will be the white scarf as nap-of-the-earth flight cuts top speeds to survivable levels. Opposing helicopters may not even see each other as black boxes handle all the sensing, ranging, target illumination, and weapons firing.

No U.S. air superiority can be expected, as was the case in Vietnam, and American forces must learn theirs will not be the only helicopters in the air. Before the Vietnam war, tests were conducted in California to determine the helicopter's vulnerability in wartime. The clear conclusion at that time, said **Gen. Honeycutt,** was that helicopters could not possibly survive a battle.

During the recent Ogaden war in Africa, helicopters figured prominently, even though neither of the major powers was involved. (**HeliNews,** 20 Mar/45). **Gen. Honeycutt** said the major powers can agree to whatever restraints they wish, but third parties are not bound by these (restraints), and the distribution of helicopters around the world now assures an increasing role for them in any "brush fire" war.

Simpler future designs were urged by the general, who said the present black boxes are nice, but "We need simpler machines . . machines that will survive . . that are simple . . that a simple guy can fly."

He expressed apprehension concerning the availability of good pilot candidates to fly new modern helicopters. He also predicted more than one crew for each helicopter — assuming qualified crews became available — such as taxicab and truck or bus companies now have. Current helicopters are too expensive NOT to get the high utilization allowed by having relief crews keeping them flying, he said. ★

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HELP NEEDED!

I'm in the process of researching the material for a book on the employment of U.S. Army aircraft in Indochina during the decade, 1962-1972. Input from the readers of "ARMY AVIATION" is welcomed. Prose, poems, artwork, and songs would be considered for inclusion. Of particular interest are photos, especially of aircraft clearly displaying unit insignia and nicknames.

While credit for material used will be given, no remuneration can be made. To guard against inadvertent loss of valuable material, only duplicate items should be submitted.

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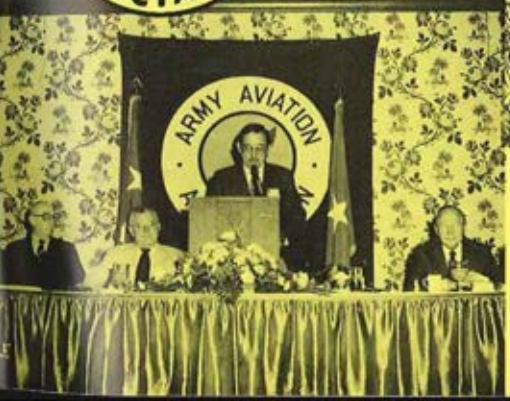
Above: TSARCOM Commander MG Richard H. Thompson speaking at the 1978 Army Aviation Product Support Symposium in St. Louis. Don Luce, AAAA Chairman, listens attentively.

Top right: 'Joe' Cribbins, ODCS-LOG, Symposium moderator, presents the Lindbergh AAAA Chapter's 'Outstanding DAC Award' to John Greenwell, TSARCOM (left). Left: BG Arthur J. Junot, DCG at TSARCOM, talks to attendees. Right: Al Cooke, TSARCOM; MG Story C. Stevens, AVRADCOM CG; and 'Joe' Cribbins during a panel session. Bottom right: LTG 'Bob' Williams, AAAA Nat'l President, awards an 'Aces Club Certificate' to Mildred Stanton for enrolling 51 new members in Quad-A.



Left: Shown, l-r, at Symposium Dinner are 'Joe' Cribbins, moderator; MG Richard H. Thompson, guest speaker; Don Luce, M.C.; and LTG 'Bob' Williams, AAAA President.

Fifth Army Meet Cites ARNG and USAR Units for '77 Safety Records

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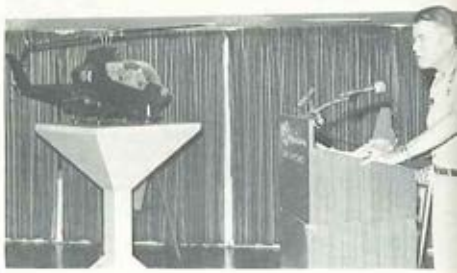

LTG Allen M. Burdett, Jr., then Fifth Army CG, speaks to Fifth Army Aviation Standardization, Safety, and Maintenance Conference attendees at the El Tropicano Motor Hotel in San Antonio, TX.

Michael R. Hayes, AvnSafO of the 88th ARCOM (St. Paul, MN), accepts the FORSCOM first place trophy from LTG Allen M. Burdett, Jr., Fifth Army CG, for the unit's 4,151 accident-free hours in '77.

MAJ Gerard H. Stokley, CO, 300th Aviation Co (Dallas NAS), receives a FORSCOM award plaque from Gen. Burdett for his unit's runner-up position in 1977.

CPT C.D. Owens (left), ExecO, and CPT Jack L. Peebles, CO of the 273d Medical Det (Tomball, TX), hold the FORSCOM first place "Detachment-size" trophy for 1977 aviation safety achievements.

Calendar

DECEMBER						
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17	18	19	20	21	22	23
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31						

APRIL						
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30						

MAY—OCTOBER AAAA ACTIVITIES

★ ★ MAY 26. Corpus Christi Chapter. Social Hour. Refreshments. O-Club.

★ ★ MAY 30. Lone Star Chapter. Business meeting with representative of the Austin Police Department as guest speaker. Austin Aviation Support Facility.

★ ★ MAY 30. Riyadh (Saudi Arabia) Chapter. Activation ceremony, election of officers, entertainment. Desert Inn.

★ ★ JUNE 3. Air Assault Chapter. Summer Skirmish. Competitive games, awards presentations. BG Joseph H. Kastner, Chapter President, award presentations. Clarksville Base Picnic Grounds.

★ ★ JUNE 6. Monmouth Chapter. Business-Social meeting. Nomination of officers and future program planning. Pay-as-you-go bar, luncheon. Gibbs Hall. ★ Members only.

★ ★ JUNE 15. Stuttgart Chapter. Professional-Business meeting. Films and discussion with Dwight L. Lorenz, Boeing Vertol Co., and Ralph E. Pineo, Bell Helicopter Textron,as guest speakers. Snoopy's Lounge.

★ ★ JUNE 15. Suncoast Chapter. Reactivation Meeting and social get-together. Hors d'oeuvres/cocktails (Pay-as-you-go bar). MacDill AFB Officer's Open Mess.

★ ★ JUNE 18. Morning Calm Chapter. Professional-Social meeting. Cocktails/buffet dinner with COL George Newton as guest speaker. Frontier Club in Yongsan.

★ ★ JUNE 20. Connecticut Chapter. Joint AAAA-AHS Professional-Social meeting. Colonel John T. Top, Project Manager for Special Electronic Mission Aircraft, TSARCOM, and Captain (USN) William O. Wirt, R/W Test Director, NAVAIR Test Center, as guest speakers. Cocktails/Dinner. Jake's Place, Stratford Motor Inn.

★ ★ JUNE 22. David E. Condon Chapter. General Membership Luncheon. Joint meeting with Fort Monroe Chapter. Cocktails/Luncheon with Dr. David S. Jenney as guest speaker. FEOOM.

Not Receiving Your Issues?
Did You Send In A Change of Address?

★ ★ JUNE 22. Monmouth Chapter. Gala AAAA Birthday Ball. Open bar, dinner, entertainment, installation of new Chapter officers. Fishermen's Wharf, Rumson, NJ.

★ ★ JUNE 22. Mt. Rainier Chapter. Annual AAAA Awards Dinner Meeting. AA, Aviation Soldier, Outstanding Unit Awards presented. Ft. Lewis NCO Club.

★ ★ JUNE 23. Lindbergh Chapter. AAAA Scholarship Golf Tournament and Tournament Awards Dinner. Cocktails, Dinner, Awards Presentations at Clubhouse, SLASC Golf Course.

★ ★ JUNE 23. Tar Heel Chapter. Spring Dinner—Juke Box Dance. Short business meeting. Plantation Inn, Raleigh, NC.

★ ★ JUNE 24. Corpus Christi Chapter. Fishing Tournament/Bar-B-Q. Sunrise Beach, Mathis, Texas.

★ ★ JUNE 27. Tennessee Valley Chapter. Spring Get—Together. Refreshments, food, recreation, fun, and relaxation. University Noojin House.

★ ★ JULY 19. Lindbergh Chapter. Joint AAAA-AHS Professional Dinner Meeting with Gerald J. Tobias, President, Sikorsky Aircraft Division, as guest speaker. Khorassan Room, Chase-Park Plaza Hotel.

★ ★ JULY 21. Corpus Christi Chapter. Late afternoon business-social meeting. Free beer. Members, no charge; non-members, $1. BOQ, Ward Room.

★ ★ JULY 22. AAAA National Awards Committee Meeting. Selection of 1977 National Award Winners. Stouffer;s National Center Hotel, Arlington, VA.

★ ★ JULY 28. Aloha of Hawaii Chapter. Professional luncheon meeting with Brig. Gen. Edward M. Browne, AAH Program Manager, DARCOM, as guest speaker. Schofield Barracks Officers' Club.

★ ★ AUG. 14. Army Aviation Center Chapter. Professional luncheon meeting with Lt. Col. Reginald A. Neuwien, USA Aviation Board, as guest speaker. Selection of Nat'l Convention Delegates. FROOM.

★ ★ AUG. 16-17. Monmouth Chapter. Third Annual Tennis (Aug. 16) & Golf (Aug. 17) Tournaments, and Clam Bake, Ft. Monmouth O-Club Gibbs Hall.FROOM.

★ ★ OCT. 12-15. 20TH AAAA National Convention. Stouffer's National Center Hotel, Arlington, VA.

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