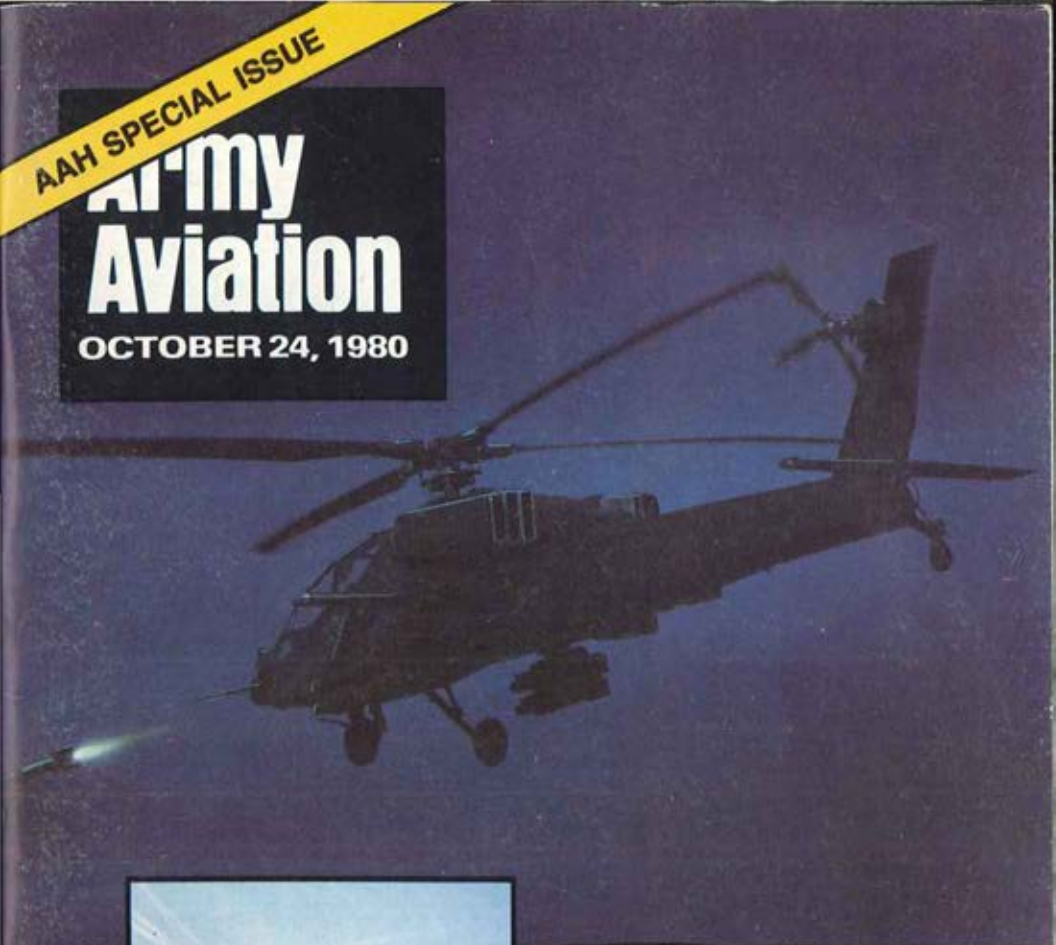
AAH SPECIAL ISSUE

Army Aviation

OCTOBER 24, 1980



Early bird

. . . That's RCA . . . for YAH-64 Support 24 Hours a Day

RCA's automatic test equipment provides total system support to the YAH-64. The test system will reduce maintenance training requirements while improving the YAH-64's combat availability and missile effectiveness. Scheduled for intermediate and depot level maintenance, the YAH-64 ATE will also support the operational test (OT II).

For more information contact:
Director, Marketing
RCA Automated Systems
Burlington, MA 01803

The YAH-64 ATE is one configuration of the RCA-developed AN/USM-410. The test system can be configured to meet your specific ATE requirements.

ENGINEERS interested in career opportunities, forward your resume to: Roger Bishop, Dept. AA, P.O. Box 588, Burlington, MA 01803

RCA Government Systems Division

The U.S. Army/Sikorsky UH-60A BLACK HAWK

UNITED TECHNOLOGIES
SIKORSKY AIRCRAFT

ARMY AVIATION

ARMY AVIATION
A professional journal endorsed by the Army Aviation Association of America (AAAA).

Editor & Publisher
Arthur H. Kesten
Associate Editor
Dale Kesten
Production Assistants
Dorothy Halasz
Mary Ann Stirling

Business Manager
Dorothy Kesten
Advertising Manager
Peter M. Stern
Fulfillment Manager
Wilma J. Thomas

MAGAZINE DETAILS
ARMY AVIATION (ISSN 0004-248X) is published monthly, except February and July by Army Aviation Publications, Inc., 1 Crestwood Road, Westport, CT 06880. Telephones: (203) 226-8184/8185 and 226-0487. Subscription rates for non-AAAA members: $10, one year; $19, two years; add $7.50 per year for foreign addresses other than military APO's. Receipt of Change of Addresses are acknowledged by publication of the residence change in the PCS or "Takeoffs" columns of the magazine. Display and classified advertising rates are listed in SRDS Business Publications, Classification 90. Second class postage paid at Westport, CT.

Volume 29 — October 24, 1980 — Number 10

LETTERS: The Readers Speak Out!
Letters to the Editor on a variety of subjects. . . . 8

SPECIAL ISSUE — THE ARMY'S AAH

THE AAH: A Total System for Battle
by Major General Edward M. Browne, PM—AAH. . . . 19

TADS/PNVS: The Maturity Phase
by Colonel Donald P.Wray, Project Manager, TADS/PNVS. . . . 32

DTTD — Accepting the Challenge
by Maj. Garry M. Bass, Commander, Development Test Training Detachment and CW3 Michael L. Talton. . . . 39

HELLFIRE Completes Operational Test
by Col. Stanley D. Cass, Project Manager—HELLFIRE/GLD, and Captain(P) Phil Terry. . . . 47

MANAGEMENT — AAH-Oriented Activities
Hughes Helicopters AAH Management Team. . . . 50-51
The Army's AAH Program Management Team. . . . 52-53
Development Training Test Detchment & TSM—AH. . . . 54

AAH Transition to Production
by Mr. Ronald E. Boehme, Chief, Prod & Procurement Division, AAH—PMO, and Mr. James E. McKee, Production Manager—AAH Hughes Helicopters. . . . 59

AAH: The Key Element
by Brig. Gen. Richard D. Kenyon, Army Avn Officer-DA. . . . 65

USAAVNC: Training to Fight
by Brigadier General Carl H. McNair, Jr., CG, USAAVNC. . . . 67

TRADOC System Manager's User Comments
by Col. Cecil L. Shrader, TRADOC Systems Manager—AH. . . . 73

INTERNATIONAL
What the Rest of the World is doing in Attack Helicopters. . . . 81, 84

WASHINGTON SCENE
US Government Interest in the Army's Attack Helicopter. . . . 82

TRANSITIONING TO PRODUCTION: Summary
by Major General Edward M. Browne, PM—AAH. . . . 87

SWEEPSTAKES: 1980 AAAA Enrollment
The current individual and Chapter activity leaders. . . . 89

AAAA: National Awards
Nominations Sought for 1980 Accomplishments. . . . 96

INT'L: HCA Sponsors U.S. Team in WHC
Plans for the 1981 World Helicopter Championship. . . . 101

SCHOLARSHIPS: 1981 AAAA Program Details
Applicants for 1981 Scholarship Aid Sought by AAAA. . . . 104

ADDITIONAL FEATURES

AAAA: Calendar of National and Chapter Events. . . . 6
LIST: October, 1980 Issue Advertisers. . . . 88
AAAA: July-August, 1980 New Members. . . . 93
PCS: Changes of Address and Residence. . . . 94

The Army's Chinook D: tested, proven, ready.

The remanufactured CH-47D continues to perform as promised. With the U.S. Army and Boeing Vertol working as a well-disciplined team, the project has stayed on budget and ahead of schedule all the way.

Now, comprehensive developmental and operational testing has been successfully completed. With over 900 test hours flown, payload performance is conservatively rated at 1200 pounds *over* guarantee. Systems reliability, hardware reliability, and maintenance man-hour goals have been met or exceeded.

The advanced Chinook is ready for full production. The Army's need for a modern medium-lift helicopter can be met at a savings of hundreds of millions of defense dollars. And with a bonus in operational capability.

The Chinook D. Still on schedule, still under budget. And now... tested, proven, and ready.

BOEING VERTOL HELICOPTERS
THE LEADING EDGE
Philadelphia, Pa. 19142

ST. LOUIS, MO—COL(P) Charles F. Drenz, right, then BLACK HAWK Project Manager, accepts his one star flag from MG Emil L. Konopnicki, USA TSARCOM Commander, at the time of the former's September 3 promotion to Brigadier General. (USA Photo)

FT. RUCKER, AL— COL Ed Brown, Ret., left, the Army Aviation Museum Foundation's new Director of Development, views a Museum L-4 in the company of Curator "Tom" Sabiston. Brown of Enterprise, AL, assumed his new job on October 1. (USA Photo)

AAAA ACTIVITIES

■■ AUG. 14. David E. Condon Chapter Professional Luncheon Meeting. COL Emmett F. Knight, Director, Applied Technology Lab, guest speaker. Fort Eustis Main NCO Club.

■■ AUG. 20. Lone Star (Austin, TX) Chapter. After dinner professional-business meeting. Coors of Austin Hospitality Room.

■■ AUG. 20 Taunus Chapter. Late afternoon business-social meeting. Wives invited. Terrace Officers' Club.

■■ AUG. 27-28. Monmouth Chapter. "Sport Days" Tennis/Golf Tournaments and Chapter Clam Bake. Fort Monmouth Officers' Club.

■■ AUG. 27. Franconia-Marne Chapter. Membership luncheon and guided tour of new Giebelstadt facilities, Giebelstadt AAF.

■■ AUG. 29. Fulda Chapter. Late afternoon business-social meeting. Chapter elections. Fulda Community Club.

■■ SEPT. 11. Bonn Area Chapter. Late afternoon professional briefings, "Update on German Army Aviation." Brig. Gen. Dr. Harro Tiedgen, Director of German Army Aviation, inducted as AAAA Honorary Member.

■■ SEPT. 12. Lindbergh Chapter Eighth Annual AAAA Scholarship Golf Tournament and Awards Dinner. SLASC Golf Course.

■■ SEPT. 12. Corpus Christi Texas Chapter. Late afternoon business-social meeting. Fall-Winter, 1980 planning. Tides Club, CCNAS.

■■ SEPT. 17. David E. Condon Chapter. Professional luncheon meeting. MSG George Alston, guest speaker. "Aviation Enlisted Career Management—Impact of the CMF 67 Study." Fort Eustis Main NCO Club.

■■ SEPT. 23. Army Aviation Center Chapter. Professional-social luncheon meeting. Presentation of FORSCOM film, "Soldiers." A "Take Your Wife to Lunch" AAAA function. Fort Rucker Officers' Club.

■■ SEPT. 23. Delaware Valley Chapter Professional dinner and reactivation meeting. Brig. Gen. Richard D. Kenyon, Army Aviation Officer—DA, guest speaker. Media Towne House.

■■ SEPT. 25. Lindbergh Chapter. Professional dinner meeting. Maj. Gen. Jack V. Mackmull, Commander, 101st Abn Division (AASLT), guest speaker. The Flaming Pit.

(ACTIVITIES/Continued on Page 98)

Pick of the Crop!

We let you choose from 6 solid state inverters for the precise power conditioning you need.

Get solid state reliability from J.E.T. inverters — plus your choice of the following power outputs:

- **1000VA (pictured above)**
- **1250VA**
- **1500VA**
- **2500VA**
- **3000VA**
- **3000VA 3-phase**

Each one is small and lightweight, and provides a maintenance-free direct replacement for troublesome rotary inverters.

Solid state design also means high efficiency. J.E.T. inverters require less input power than a comparable rotary, yet maintain fully regulated output power to operate flight instruments and accessory equipment.

Each model meets or exceeds requirements of FAA TSO C-73 with thermal, overload, and voltage protection circuits designed in.

For complete information, write or phone: Jet Electronics and Technology, Inc., 5353 52nd Street, S.E., Grand Rapids, Michigan 49508. Phone (616) 949-6600.

J.E.T.®

Jet Electronics and Technology, Inc.

Fresh Ideas in Avionics

SPEAKING OUT

IN view of recent considerations to change uniform items for enhancement of morale for other beneficial purposes, there is at least one area in which a change would be immediately welcome, and felt as a change for the better.

Aviators and flight crew personnel have always prided themselves on the privilege of wearing wings — something that sets flying personnel apart from all others.

Even more prestigious is the wearing of the star or wreath on the wings to indicate senior level or master/chief aircrew level. Our sister branch of service — the USAF — has recently eased requirements for higher level flight crew wings — it would be a change for the better and a real morale enhancement if the US Army would do likewise.

Until recently, AFR 35-13 required airmen to be on flight status for at least seven years for eligibility for senior aircrew wings, and on flight status for at least 14 years for chief aircrew wings (comparable to master aircrew wings in the Army.)

The very same flying longevity requirements for senior aircrew wings and master aircrew wings are still required by AR 672-5-1 for Army flight crew members. Recently, the Air Force changed the requirements for senior aircrew wings to FIVE years on flight status; for chief aircrew wings the requirement is now TEN years on flight status.

The change resulted in no compromise of demonstrated airmanship or overall aircrew quality, but it did serve to add prestige to many flight crew personnel. It would be a beneficial change if the Army would modify the directives pertaining to senior and master aircrew wings in AR 672-5-1 in the same way that the Air Force has done in AFR 35-13 for senior and chief aircrew wings.

The FIVE and TEN year requirements would certainly not detract from the professional knowledge and overall abilities of a dedicated aircrew member.

In addition to enjoying the same elements of prestige as his Air Force counterparts, the Army change would give the Army flight crew member something greater to strive for and to anticipate much sooner.

FRANK B. AUSTIN
SSG, US Army
UH-60 Crewchief
Ft. Campbell, KY

Letters to the editor on any Army Aviation subject are welcomed and should bear the signature and address of the writer. The writer's name will be held on request.

Honest Convictions

*I was very sorry to read the article, **"Uniform Madness"**, by LTC(P) Jerry W. Childers in the August issue. Although undoubtedly an honest man stating his honest convictions, it is difficult for me to understand the chain of reasoning that led him to the suggestion that the Army abandon the flight suit in favor of the new camouflaged utility uniform.*

The writer stated that wearing the grey (sage) one-piece flight suit, with the OD Nomex jacket and the OD soft cap, does not cause him to look or feel like a soldier, and I can well imagine that it does not.

The matching sage-colored jacket that's supposed to be worn with the new flight suits is apparently available within the system, but is not being procured until the stocks of OD Nomex jackets have been exhausted.

As you might imagine, there are plenty of them left since they delayed issuing the OD jackets until they got rid of the grey nylon ones. Other than the anticipated camouflaged cap, and the OD Nomex jacket, it's hard to imagine anything that could possibly look worse with the new flight suit.

All of which leads me to wonder, "Who is making us wear these horrible-looking things?"

I think everyone agrees that either a colored baseball hat or the green overseas hat would look better, but apparently the policy makers are determined to have us look like the guys who sweep up at an all-night Texaco station.

***(SPEAKING OUT)** Continued on Page 10)*

20 MM CANNON

TOW MISSILE

2.75 IN. ROCKETS

ROCKET MANAGEMENT SYSTEM

What's new on the Cobra? Every ounce of fire power.

A new AH-1S Cobra has evolved. And its full-solution computerized fire-control system has already demonstrated unequalled rocket and cannon accuracies.

A revolutionary rocket management system offers a more flexible selection of rocket and warhead types, firing intervals and fuze settings. What's more, the AH-1S can handle other advanced weaponry including Hellfire.

This new Cobra is designed to strengthen our anti-armor for the next two decades! Fire control is just one of the AH-1S traits of tomorrow found in the Cobra of today.

Bell's AH-1S Cobra: Everything's new but the name.

SPEAKING OUT
(Continued from Page 8)

But it also won't make you feel like a soldier. It's NOT supposed to . . it's supposed to make you feel (and look) like an aviator! Just the way green berets make you feel like you're Special Forces, and camouflaged fatigues make you feel like you're a Ranger.

The Colonel also makes the point that flight crewmen will resist the change from flight suits to camouflaged fatigues because they receive the flight suits at no charge. This is most difficult to believe.

It's like saying that the reason Special Forces personnel wouldn't want to give up their green berets is because they have to spend $3 for a new hat. There are many better reasons to resist giving up flight suits than citing that everyone will have to buy a set of fatigues, and this assumes that there are air crewmen somewhere who DON'T already have to maintain fatigues.

The writer maintains that even though there will be post-crash fires and injuries, the fire-retardant flight suit — due to its cost — will not be found to be cost-effective. I cannot pretend to know how much the Army spends on flight suits, but I suspect, when examined in the grand scheme of things, that it isn't very much. . . . Probably about what we spend on aviation sunglasses to make sure that EVERYBODY in the Army has four or five pairs.

He then goes on to state that the money we'd save from not making flight suits could be used to buy more aircraft and flying hours. I confess that I just don't have his faith . . . I suspect that the money saved, if there actually were any savings, would wind up procuring TV's and ping-pong tables in one of our now-famous end of the FY buying sprees.

In any event, I'd guess that flight suits are at least as cost effective as survival radios, life preservers, and maybe even parachutes. I mean — if only one or two guys are saved by parachutes each year, does that justify putting them in all of those ***Mohawks?***

I'd have to say that even if one person is spared the horror of being burned alive that it's probably worth buying all of the parachutes, radios, and one-piece flight suits that we have to. ***Cost-effective*** *is a term that belongs more to the managers at the Ford Motor Company than to people whose concern is supposed to be the safety of their men.*

Elsewhere, the writer stated that because the crashworthy fuel system has proven itself so effective, the additional expense of the flight suit is ***overkill.*** *I hate to keep going back to the same point, but somehow when we're talking about keeping me alive, the thought of a little* ***overkill*** *doesn't trouble me at all.*

Then, we get down to the major complaint . . Colonel Childers feels that many non-aviators, consciously or otherwise, feel ***resentment, envy,*** *or* ***suspicion*** *towards aviators due, in large part, to the fact that aviators "look different," i.e., wear flight suits instead of fatigues.*

This may be true to a certain extent, but since they're the ones who are feeling insecure, I feel that rather than "us" giving up our flight suits we

(SPEAKING OUT*/Continued on Page 12)*

The Only Real Advantage

SOVIET helicopter gunships in Afghanistan provide "the only real advantage the Russians have in battle," according to Afghan guerrilla leaders who were recently interviewed by Michael Kaufman of the *New York Times*.

The guerrillas indicated that a major Soviet offensive in the Kunar Valley in late September was heavily supported by MI-24 gunships firing rockets "into those villages that still stand."

The Afghans told Kaufman that their men "had found ways to attack tanks and armored cars, but that they remained powerless against the gunships with their twin Gatling-type guns and rockets."

"If we only had rockets for the helicopters the Russians would be finished," said one guerrilla.

Kaufman reported that another guerrilla faction, which denies having missiles, has "photographs of its warriors surrounding a downed helicopter."

"Through practice," Kaufman writes, "their men have learned that the MI-24's are vulnerable if shot from above, from mountain perches, as they hover over valley hamlets." □

ASE PROVIDES SNAKE PROTECTION

Even a deadly killer like the AH-1S Cobra needs protection! Designed with the Cobra in mind, Sanders' AN/ALQ-144 Countermeasures Set provides the protection needed against IR heat-seeking missiles. The AN/ALQ-144 means aircraft survivability resulting in increased combat effectiveness!

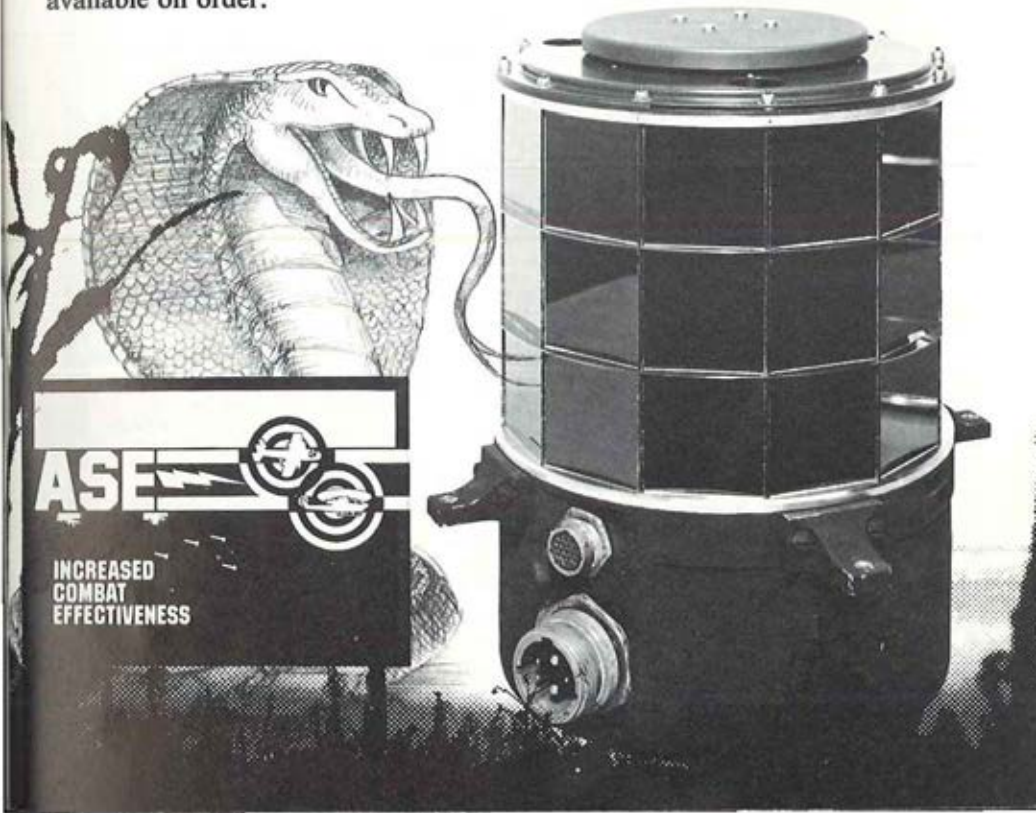
The AN/ALQ-144 features proven high reliability and simple maintenance, and is suitable for worldwide deployment.

The fully flight-qualified AN/ALQ-144 system and its special test equipment are currently in production and are available on order.

SA® SANDERS ASSOCIATES, INC.

For further information on the AN/ALQ-144 or other Sanders systems for fixed and rotary wing aircraft, contact:

Defensive Systems Division
95 Canal Street, Nashua, NH 03061
ATTN: MER 12-1125 (603)885-3583



SPEAKING OUT
(Continued from Page 10)

could reasonably expect "them" to change their attitudes.

If the Colonel is truly anxious to eliminate the friction between aviators and non-aviators, I suggest that he examine the subject of flight pay.

It's a well known bone of contention of non-aviators that commissioned aviators continue to draw flight pay even when they are not allowed to perform flying duties . . I've heard far more complaints about this issue than any I've ever heard about our wearing flight suits.

I can almost guarantee you, however, that you won't hear of anyone standing up and calling for an end to flight pay for non-flying aviators, payments whose magnitude, I should mention, dwarf the amount of funds spent on flight suits and probably all of our other survival equipment as well.

Contrary to the Colonel's claims concerning non-aviators, I've always had the feeling that they were willing to go quite a bit out of their way to assure I was taken care of, whether it involved billeting, transportation, being fed, or just being briefed as to what was going on.

I'm sure some bad feelings do exist, but they are probably caused more by the air of superiority so many aviators tend to exhibit on occasion when around non-flyers. Let's correct this problem if everyone's starting to get sensitive about how the rest of the Army regards us, but good God, don't throw away the flight suit that they've finally given us after our years of effort to get it.

In another article in the same issue, ***General (Richard D.) Kenyon*** *discussed the Army's efforts to increase the level of job satisfaction among Aviation Warrant Officers to help stem the seriously declining retention rates.*

The ***loss of our flight suits,*** *or even the loss of the right to wear them wherever fatigues are normally worn, will only be regarded by Aviation Warrant Officers as another lost privilege, no matter how minor this point may seem to others.*

I never cease to be amazed at the fact that, after years of testing and evaluation by every expert, committee, and review board that the military can muster; after being carefully designed, evaluated in the field, and re-designed; after being demanded again and again, for years, by Army Aviators; and, finally, after being purchased and issued that someone, apparently feeling insecure about non-aviators' feelings about aviators, can stand up and with a perfectly straight face suggest that next year is a "logical time" for us to abandon the flight suits we've just received and switch back to flying in camouflaged fatigues.

I acknowledge that the author undoubtedly possesses considerably more aviation experience than I do. Also, he's a promotable lieutenant colonel and the Deputy G-3 in an Army Corps. As such, I rather doubt that he is in a position that requires the wearing of a flight suit with any frequency. I also feel constrained to add that, except when flying certain Army aircraft, one can wear fatigues anytime one desires.

I normally don't write letters to magazines expressing my opinions, but I do want to make it clear that if we decide to vote on giving up our flight suits for fatigues, I vote ***No.***

TOM P. READ
CW2(P), AV
Fort Sill, OK

LOOK AHEAD!

Army Aviation E.W. Technical Symposium. Emerson Electric World Headquarters, St. Louis, Mo. 10 December. Sponsored by the Gateway Chapter of the Old Crows.

Second Annual "Dustoff" Reunion. Academy of Health Sciences, US Army, Ft. Sam Houston, TX 78234. 27-28 Feb and 1 Mar 1981. For all commissioned officers, WO's, EM, RA, USAR, and ARNG personnel ever assigned in support of Army aeromedevac. For add'l info, write COL Byron P. Howlett, Jr., or MAJs Ronald I. Woodward or Frank R. Hash.

Shallow-minded nitwits

IN response to the August issue article entitled ***"Uniform Madness,"*** *I must stand up and state that he is 180° out. If we sincerely believe that we are resented by our non-flying contemporaries because we dress differently, we must also believe that these contemporaries are all shallow-minded nitwits.*

(SPEAKING OUT*/Continued on Page 16)*

Tracor M-130

MISSIONIZED SURVIVABILITY EQUIPMENT

TRACOR'S M-130 — STANDARD EQUIPMENT ON UH-60

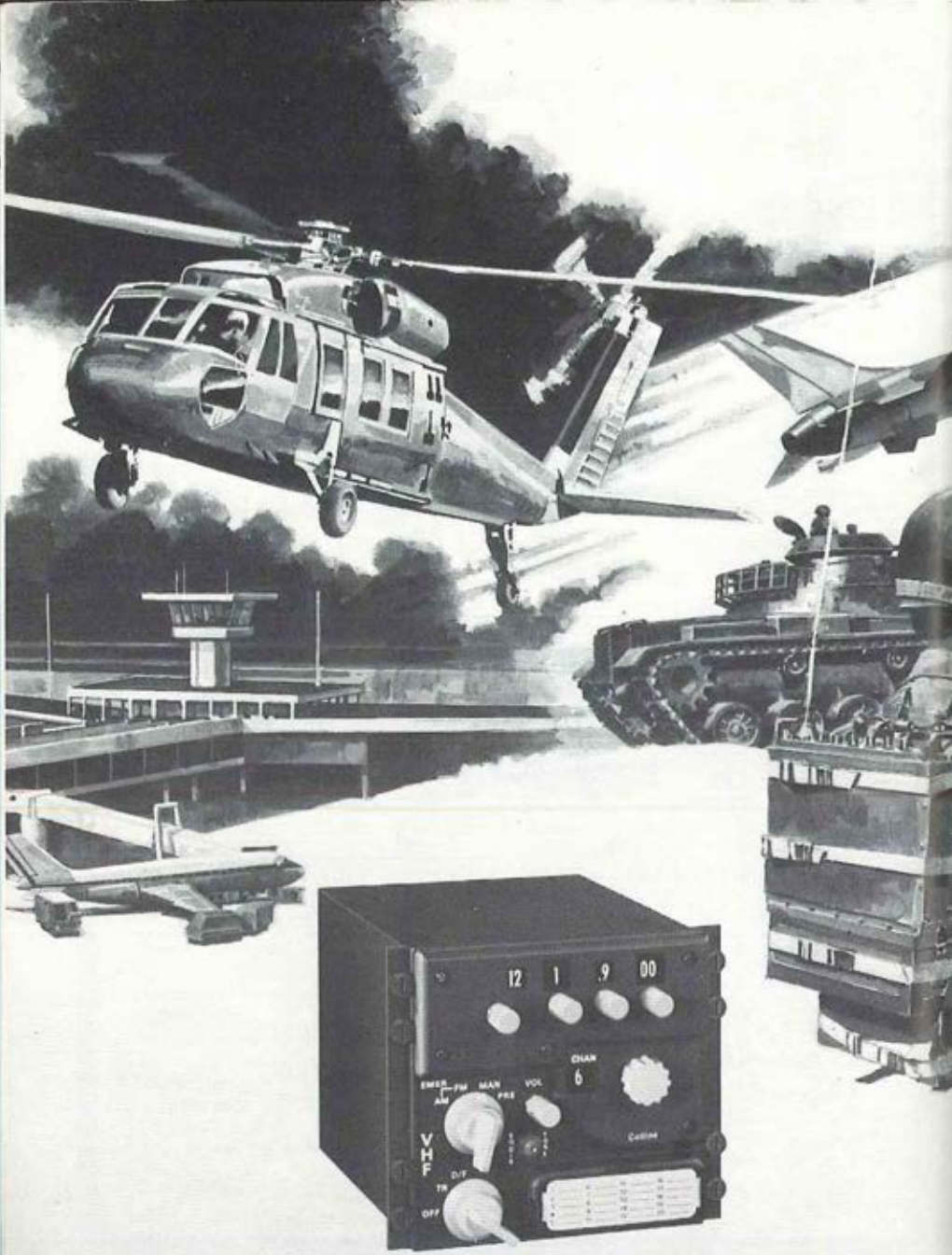
Mission completion on the modern battlefield demands protection from air-defense weapons. The lightweight M-130 provides the needed protection against radar and IR threats using the test-proven M-1 chaff and M-206 flare units. The M-130 can be used on a missionized basis to provide protection when needed in a 30 lb. package. The M-130 is in production at Tracor for the U.S. Army and for an international customer. The M-130 has been successfully test flown on the AH-1, UH-1, OH-58, CH-47, OV-1, RU-21, and the UH-60 Black Hawk. Flight tests will soon be conducted on the AH-64 Advanced Attack Helicopter. Similarity to the USAF AN/ALE-40 standard tactical dispenser allows reduced logistic burden through commonality of expendables and many assemblies and spare parts.

For information contact David Wallace, Countermeasures Marketing, Tracor, Inc. 6500 Tracor Lane, Austin, Texas 78721. Telephone 512/926-2800. TLX Number 776410, or TWX Number 910/874-1372.

Tracor Aerospace

Tracor, Inc. 6500 Tracor Lane Austin, Texas 78721 TWX-874-1372 Telex 77-6414

"THE LEADING EDGE IN ELECTRONIC SYSTEMS TECHNOLOGY"


12
1
9
00
CHAN
6
EMER
AM
FM
MAN
PRE
VOL
VHF
OFF
Collins

Multimission aircraft? Here's the multiband radio to match: The Collins AN/ARC-186(V).

VHF/FM for tactical close air support operations. VHF/AM for civil air traffic control. The Collins AN/ARC-186(V) gives you both. And at substantially less cost and weight than the many single-band radios it replaces.

AN/ARC-186(V)'s features? 4,080 channels at 25-kHz spacing. Full FM (30 to 88 MHz) and AM (108 to 152 MHz) band coverage. 20 channel presets with nonvolatile memory. Secure voice compatible in both bands. Functional, modular construction utilizing the latest solid-state techniques. Fully MIL-qualified to tough vibration and environmental standards. Designed to provide up to six times the reliability of current military inventory VHF's. And it's available in panel or remote mount configurations.

Small wonder the AN/ARC-186(V) has been selected as the new standard VHF for the U.S. Air Force and is being sold for U.S. Army and international applications. We're delivering 6,000 with options for 7,000 more.

Life cycle costs? Low acquisition costs, high predicted reliability and common support equipment maintenance have more than doubled the U.S. Air Force's originally projected savings.

The Collins AN/ARC-186(V), the ideal multiband radio for today's multimission aircraft. And it's in production now. For details, contact Collins Government Avionics Division, Rockwell International, Cedar Rapids, Iowa 52406. 319/395-4412.

Rockwell International

...where science gets down to business

SPEAKING OUT
(Continued from Page 12)

If resentment exists, it is because we receive incentive pay, and because flying is a hell-of-a-lot more run than mucking around in tanks or trenches, facts which we have never tried to keep secret from non-aviators. Wings and Nomex may be the most visible differences, but money and cockpit assignments are the meaningful differences.

Most regrettably, LTC Childers seems to very casually address the fact that "some guys got burned pretty badly" without Nomex, and goes on to say that the primary reason crew members want Nomex is because it's free. It is difficult to understand how a 20-year aviator can state those kind of things but in so doing, he arouses resentment in all of us. In reality, other service members such as tankers and other types who are always exposed to flame hazards should also be afforded the protection of Nomex.

Since 1956 I have watched numerous safety items being developed for flight crew members, some in the face of opposition from senior officers expressing the same opinions as LTC Childers. Just think of the money we could save by eliminating protective helmets (which look different from steel pots) and survival equipment vests (which look different from web gear and back packs).

The best way to start losing an aviator's sense of professionalism is to tell him that his personal safety is at the whim of his cosmetic acceptance by people not exposed to his work environment.

RICHARD A. SPARKS
MAJ, CA-ARNG
Morgan Hill, CA

DOWNSVIEW, ONT.—Shown on the occasion of the delivery of a deHavilland Aircraft UV-18 to the Alaska-Army National Guard at the deHavilland plant are, left to right, COL John J. Stanko, Ret. Chief Army Aviation Division, NGB; MAJ John O. Elgee and CW3 Ross R. Clement (207th Infantry Group, AK-ARNG), MAJ Terry M. Dorondo (H&H Detachment); CW3 Peter D. Beckner (207th Infantry Group); and LTC John W. Spalding (State AvnO).

Check the records!

*I'D like to correct an article that was published in the September issue. **"Firsts"** on page 31 states that WO Geraldine Siegle was the first woman in Ft. Rucker history to be the first in her flight class to solo.*

*This is, in fact, incorrect. That **"First"** goes to myself, 2LT JoniLynn Siepert. As a member of ORWAC 79-24, I took that honor on 20 April 1979. This fact can be checked with Mr. Kelly, Yankee Flight Commander, and Mr. Jerry Riley, my IP, Ross Aviation, Hanchey AAF.*

*I'm not trying to detract from the accomplishment of Miss Siegle, but if you're going to print a **"First"** article, at least insure that it actually is a **first.***

JONILYNN SIEPERT
2LT, TC
Fort Lewis, WA

(Ed. Note: We're happy to set the record straight and can only cry, "Uncle", in this case. We received Uncle's Release #80/538/1g and the USAAVNC photo that accompanied it, and accepted both as the gospel.)

Right on!

*I want to commend Roy Burrows on his fine article on **"Wire Strike Protection Systems (WSPS)"** in the August issue. The Safety Center (USABAAR, USAAAVS) has long recognized the wire strike problem and has strongly recommended retrofit of all Army helicopters with some type of WSPS, with priority on the OH-58, AH-1, and UH-1. These three aircraft account for about 98% of all Army wire strikes.*

As the Safety Center action officer on this problem from January 1979 through June 1980, I worked closely with Mr. Burrows, LTC Jeff Fields from the Aviation Center Directorate of Combat Developments, and TSARCOM and

***(SPEAKING OUT** / Continued on Page 98)*

THE ARMY'S AAH

A Total System for Battle Transitioning to Production

The Commanders' Edge . . . Attack Day or Night

The U.S. Army's Advanced Attack Helicopter, the Hughes AH-64A is designed to fight and survive on the battlefield day, night and in adverse weather.

Fulfilling all program objectives the AH-64A has:

- **Fired Hellfire missiles.**
- **Demonstrated Fire Control System capability.**
- **Integrated the TADS/PNVS System.**
- **Fired the 30mm CHAIN GUN and rockets.**
- **Operated the Helmet sight (IHADSS) with all weapons systems.**
- **Demonstrated night NOE flight ability.**

All flight envelopes and survivability requirements have been met or exceeded.

The U.S. Army-Hughes AH-64A — Proven, tested and ready for production. Hughes Helicopters, Culver City, California 90230, USA.

A Total System for Battle

Hughes Helicopters
Ahead of TIME Technology

By
Major General
Edward M. Browne
AAH
Program Manager

AAH: A Total System for Battle

AT 0100 hours the call came out for help from the FEBA. It was raining and pitch black outside — nothing could be seen but enemy armor could be heard on the move.

The AAH's on call navigated to firing positions utilizing their PNVS and engaged the enemy with HELLFIRE missiles. Within 30 minutes the Advanced Attack Helicopters had turned the tide of battle. How can this be? Read on and we will present "A Total System for Battle."

This makes the third issue of Army Aviation Magazine devoted to the Advanced Attack Helicopter Program. At the onset I want to express my sincere thanks to Art Kesten, the editor, for this opportunity to provide all interested individuals with a progress report on the Army's Number One aviation program.

Although the background and other information on the AAH has not changed significantly, I repeat part of it here for those of you who may be new readers and also to put all things in their proper perspective.

Background

In June 1973, the Deputy Secretary of Defense authorized the Army to initiate a two-phase development program for an Advanced Attack Helicopter.

Phase I was a competitive development for selection of the best helicopter airframe to enter Phase II, full scale engineering development. Phase II focuses on completing subsystems (missile, cannon, rocket, target acquisition and night vision) development and their integration into the airframe.

Phase I was a competitive development for selection of the best helicopter airframe to enter Phase II, full scale engineering development. Phase II focuses on completing subsystems (missile, cannon, rocket, target acquisition and night vision) development and their integration into the airframe.

In July 1973, Bell Helicopter Company and Hughes Helicopters were each awarded contracts for two flying prototypes to be evaluated in a competitive flyoff. Following the flyoff source selection results were presented to the Secretary of the Army in December 1976.

The Hughes YAH-64 (Fig. 1, Page 17) was selected as the winner and the Deputy Secretary of Defense authorized the Army to proceed with the Phase II full-scale engineering development program which includes the fabrication of three additional flying prototypes. The engineering development program encompasses 56 months.

System Description

The AAH is a two-man twin-engine helicopter with two T-700 (1,560 shp each) engines, a four-bladed fully articulated main rotor, and a four-bladed tail rotor. It uses a three-point landing gear. The pilot is located in the rear of the tandem cockpit arrangement, with the copilot-gunner (CPG) in the front crew station. A variety of armament options are available on the four stores stations mounted under the wings thus providing mission flexibility.

The YAH-64 AAH is the first Army attack helicopter developed to live with the troops in the forward battlefield environment specifically for the day, night, adverse weather, anti-armor mission with emphasis on the ability to fight, survive, and return to fight again.

In order to achieve the above objective, emphasis was placed on development of a weapons platform with superior flight performance that was easily maintained. The best measurement of performance for a helicopter under certain atmospheric conditions, at mission weight, for a specific period of time is ver-

TOTAL SYSTEM (Continued)

tical rate of climb (VROC), cruise speed, and maneuverability (the ability to avoid obstacles at high speeds).

The charts in Figure 2 present the target flight performance of the production AH-64 while carrying enough fuel for 1.83 hours mission endurance.

AAH Armament

The armament system consists of the HELLFIRE anti-tank missile, a 30mm cannon which provides highly responsive area weapon capability for defeating personnel and lightly armored vehicles, and 2.75 inch rockets which are capable of delivering a wide variety of payloads.

HELLFIRE

The HELLFIRE terminally guided missile provides vides the primary anti-tank armament for the AAH. The missile, as shown in Fig. 3 (opposite page), is based on a modular design to facilitate a variety of homing seeker heads. The first missiles to be fielded will be equipped with a laser-guided seeker.

Planned follow-on seekers include a true fire-and-forget seeker that guides on the inherent thermal contrast of the target and an air defense suppression seeker for use against radiating air defense targets.

The missile weighs about 100 pounds, and is 64 inches long and seven inches in diameter.

The AAH can carry up to 16 missiles which are fired from four-rail launchers. The missile offers higher rate of fire, shorter flight times and increased range relative to the current TOW missile. Firing techniques include single, rapid, and ripple fire. In the ripple fire mode, two or more tank platoons could be "blown away" in less than a minute.

The guidance scheme requires that a laser beam be positioned accurately on the target during the terminal phase of the flight path of the missile. The laser designation can be accomplished autonomously by the AAH gunner using his Target Acquisition Designation Sight (TADS) or remotely by a ground or another airborne laser designation system.

The principal virtue of laser guidance is the versatility provided by a multiplicity of firing

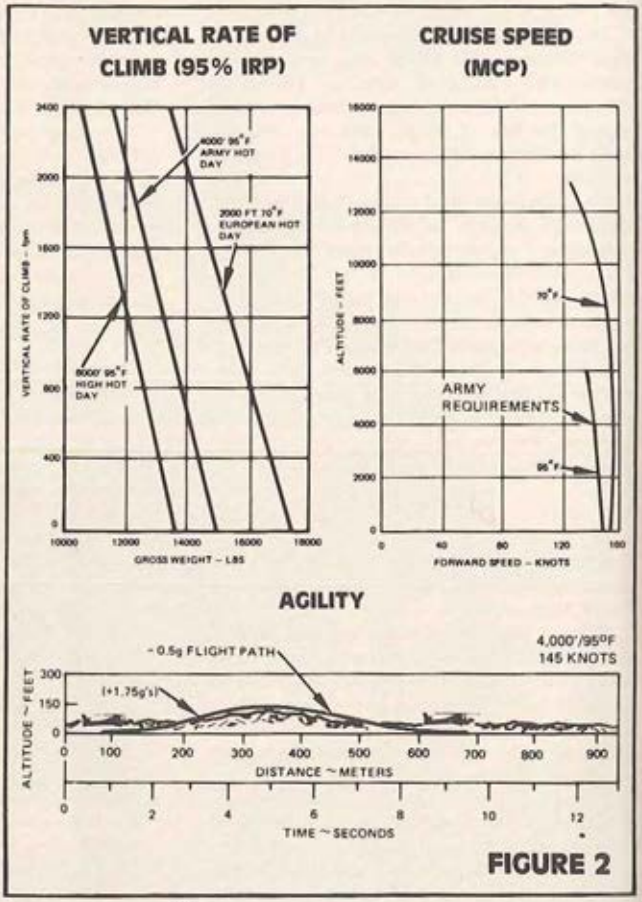


FIGURE 2

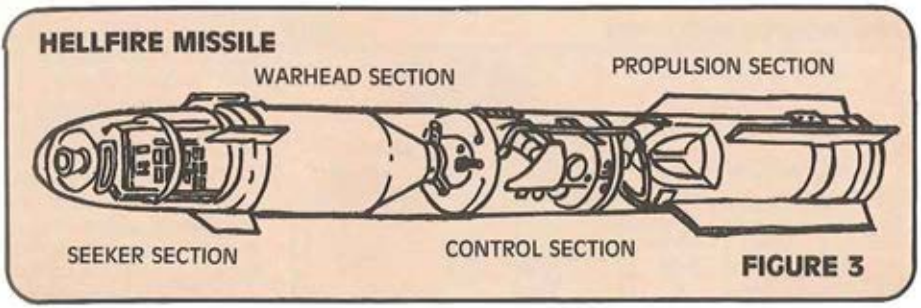


FIGURE 3

modes which permits engagements by direct, indirect, and pseudo-direct fire.

Direct fire is operationally similar to command line-of-sight guidance schemes. The gunner requires line of sight to the target. The seeker can be locked onto the target before launch which provides the greatest latitude in the helicopter launch envelope. Alternately, the seeker can be locked on after launch, which provides extended stand-off range in degraded weather and improved performance under certain types of countermeasure environments.

Indirect fire does not require line of sight, enabling the helicopter to fire from concealed, defiladed positions. The laser guidance signal is provided by a remotely located designator. Target information required to launch the missile is handed off to the helicopter from the remotely located designator. Shortly after launch, as the missile proceeds down range, it picks up the laser signal reflected by the target and enters a guided flight mode.

Pseudo-direct fire is a hybrid of the direct and indirect fire modes. The missile is launched on a ballistic flight path prior to exposing the aircraft. Shortly after launch, the pilot maneuvers the aircraft to establish line-of-sight to the target. The gunner, whose TADS is precisely directed at the known target coordinates by the YAH-64 navigation system, rapidly acquires and designates the target putting the missile into a guided mode. The pseudo-direct mode reduces aircraft exposure time, but requires timely, accurate target hand-off and close coordination between the pilot and gunner.

The lethality of the HELLFIRE against tanks at long standoff ranges has been demonstrated repeatedly throughout the separate missile development program, as well as during the integration of the system into the YAH-64. Colonel Stanley Cass' (the PM-HELLFIRE) article on the recently completed Operational Test (OT) of the HELLFIRE clearly points to the dramatic increase in firepower effect you will be gaining.

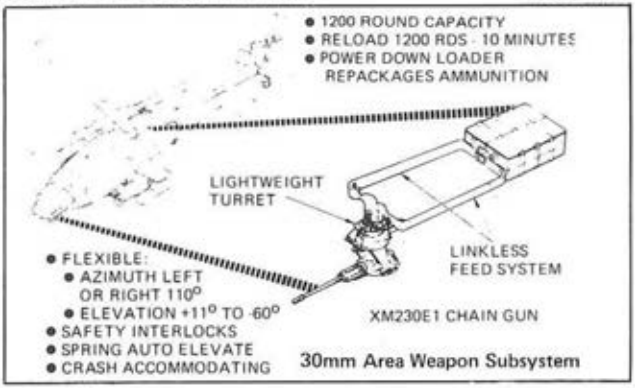
Area Suppression Weapons

Secondary armament consists of the XM-230, 30mm gun and a 2.75 inch rocket system. The XM-230, which is developed by Hughes Helicopters, is a lightweight, externally powered single-barrel gun that emphasizes simplicity and reliability. The chain operated bolt simplifies the design by eliminating declutching feeders, chargers or other special devices to insure firing all rounds. The gun is mounted in a flexible turret underneath the aircraft providing a field of fire of $\pm 110°$ azimuth and $+10°$ to $-60°$ elevation. Total weight of gun, turret, drive motors and control electronics is 110 pounds.

The aluminum cased 30mm ammunition is stored in a 1,092 round "flat pack" magazine and fed to the gun over an endless conveyor (Fig. 4, p. 22). The gun is designed to fire ADEN/DEFA type ammunition. High explosive incendiary and armor piercing rounds are in development. The characteristics of the ammunition are shown in Fig. 5, p. 22.

The principal fire control mode for the gun is through the gunner's TADS. This provides highly accurate gun positioning. All gun pointing corrections are handled automatically by the fire control computer. The gun can be fired in a backup, degraded accuracy mode by the pilot using his helmet sight. This enables the pilot to deliver suppressive fire when the gunner is occupied or disabled.

AREA WEAPON SUBSYSTEM **FIGURE 4**



30MM AMMUNITION CHARACTERISTICS **FIGURE 5**

CARTRIDGE WEIGHT	3.54 Kg (APPROX)
CASE MATERIEL	ALUMINUM
PROJECTILE WEIGHT	240 Kg (APPROX)
MUZZLE VELOCITY	805 M/S ±10
PEAK PRESSURE	290 MPa
IMPULSE	269 N.s.
CARTRIDGE LENGTH	200MM
CARTRIDGE XM788	TRAINING PRACTICE
CARTRIDGE XM789	HIGH EXPLOSIVE DUAL PURPOSE

2.75 ROCKET SUBSYSTEM **FIGURE 6**

76 FFAR ROCKETS

The YAH-64 can carry a payload of seventy-six 2.75 inch rockets (Figure 6. The rockets are carried in four 19-tube lightweight launchers equipped with precision mounting lugs. Controlled by the YAH-64 fire control computer, elevatable pylons permit highly accurate firing without pitch trimming the helicopter.

Two modes of rocket delivery have been incorporated. A precision mode using the TADS and a backup mode in which the pilot can fire using his helmet sight. The rocket control system has been designed to accommodate seven different warhead options, including the multi-purpose submunition warhead currently in development. Rockets can be fired in quantities of one, two, four, eight, 12, 24 or all 76. Fuze setting is automatically controlled through the fire control computer.

Armament Payload

Varying altitude conditions and temperatures will dictate mission loads. The AAH requirement calls for a minimum 450 feet per minute vertical rate of climb with eight HELLFIRE missiles and 320 rounds of 30mm ammunition with 1.83 hours endurance at the Army hot day (95° F, 4,000 feet density altitude, 95% Intermediate Rate of Power). The YAH-64 will exceed that minimum. The chart in Figure 7 depicts several armament options for the YAH-64.

AHS OPTIONS

FIGURE 7

MISSION				PERFORMANCE VROC	V CRUISE	ENDURANCE
ANTI-ARMOR (DEFENSE) MID-EAST PRIMARY MISSION 4000'/95°F	4 HF	320 RDS	4 HF	580 FPM	145 KTS	1.83 HRS
EUROPE ALTERNATE 2000'/70°F	8 HF	995 RDS	8 HF	450 FPM	150 KTS	2.5 HRS
COVERING FORCE (AIR CAV) MID-EAST ALTERNATE 4000'/95°F	4 HF	536 RDS	4 HF	450 FPM	145 KTS	1.83 HRS
EUROPE ALTERNATE 2000'/70°F	4 HF 19 RKTS	654 RDS	4 HF 19 RKTS	450 FPM	150 KTS	2.5 HRS
AIRMOBILE ESCORT MID-EAST (4000'/95°F) ALTERNATE	19 RKTS	195 RDS	19 RKTS	450 FPM	145 KTS	1.83 HRS
EUROPE ALTERNATE (2000'/70°F)	38 RKTS	313 RDS	38 RKTS	450 FPM	150 KTS	2.5 HRS

ADEN/DEFA Ammo & RSI

On 29 September 1976, OSD directed the AAH Program Manager to develop a new 30mm ADEN/DEFA class of ammunition for the Advanced Attack Helicopter that could also be used in the USMC's Harrier, and in the ADEN and DEFA guns of our NATO allies. This was the AAH's first contribution to **Rationalization, Standardization, and Interoperability (RSI)** since 30mm ADEN/DEFA ammunition is used in many NATO and third country aircraft.

Automatic cannons on the British MK IV ADEN gun, and the French 552 and 553 DEFA guns, fire this standard ammunition. There are over 14 30mm weapons systems and aircraft deployed in the active forces of the Free World. Our job is to assure interoperability of this ammunition in these systems.

Survivability

I am convinced that the survivability of helicopters on the battlefield of today is related to three elements:

- Ballistic toughness which must be incorporated into the design of the aircraft.
- Optimization of weapons lethality and fire control during integration and thereby the ability to acquire, shoot, and kill first.
- Development of new doctrine, tactics, and training for employment of this advanced technology system.

With those thoughts in mind, we will now talk about the hardware survivability features designed into the AAH.

Detectability

The low flicker rotor, low glint canopy, use of composite materials, "scissor" tail rotor, and a new engine plume suppressor have resulted in a low signature in the aural, visual, radar, and infrared spectrum (see Page 72.)

Ballistic Tolerance

An assessment of the Army's YAH-64 indicates low vulnerability to 12.7mm fires and 23mm HEI rounds. All components of the attack helicopter's drive system are designed to operate for at least 20 minutes after taking a

TOTAL SYSTEM (Continued)

12.7mm hit. In actual tests most have operated much longer.

The main rotor is designed to operate after a hit from a 23mm projectile. The rotor blades incorporate five overlapping independent spars. We are currently in a "composite" blade development program that will give even greater life and added invulnerability. The first production AH-64 is expected to have these blades.

Protection to the crew is afforded by an acrylic laminate clear shield placed between the gunner and pilot which is capable of stopping 23mm projectiles. Below this shield area a below-the-seat shield is incorporated to protect the lower torso.

Crashworthiness

Innovative design and rugged construction. features minimize system attrition. The crew has a 95% probability of surviving a crash impact at the rate of 42 feet per second in the YAH-64. Our goal is crew survival and repair of the AH-64 so both will fly and fight again.

In summation, the AAH is the most survivable helicopter known. Survivability is achieved due to its highly maneuverable, rugged twin engine airframe which is highly tolerant to high caliber HEI and invulnerable to mid-caliber projectiles. Redundancy in the flight control systems, self-sealing fuel cells — all combine to make the AAH the most survivable helicopter ever built (see **Page 63** and **Fig. 8** below).

Program Schedule

Current plans call for completion of the 56-month development schedule by the end of August 1981 when the three-month **Operational Test (OT II)** is completed. Prior to the completion of development, **long lead time item (LLTI)** funding will be placed on contract in February 1981 for those items requiring extensive leadtimes. The ASARC/DSARC for the AAH will be conducted in October/November 1981 subsequent to OT II and the initial production contract award is planned for early December 1981.

Our production planning indicates a lead time of 34 months from the date of the LLTI contract award to the first delivery, which would make the first AH-64 delivery in November 1983.

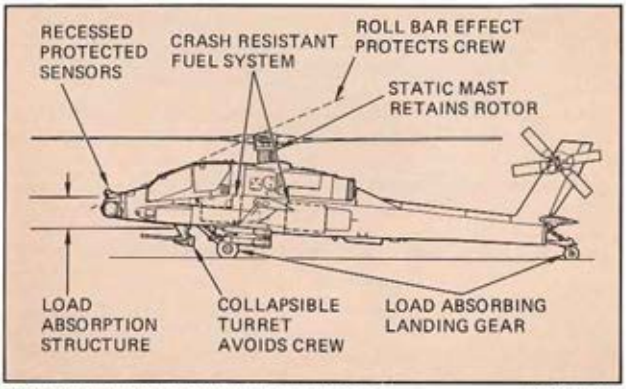
Production/Procurement Goals

The Army currently plans to procure 536 AH-64's over a six-and-a-half year period. Production will continue through FY 90 with the last aircraft to be delivered in March 1990 (see the AAH Program Schedule at **Fig. 9, page 27**). **Mr. Boehme**, Chief of the AAH-PM Procurement and Production Division, and **Mr. McKee**, Hughes AAH Production Manager, discuss in their co-authored article how the AAH is transitioning from engineering development to production.

Contractors

Hughes Helicopters as the prime airframe contractor and systems integrator has developed a "Team" effort with a number of major subcontractors. The subcontractors and their respective products are listed below.

Advanced Structures
Main and Tail Rotor
Aircraft Gear Corporation
Gearboxes
Bendix
Drive Shafts & Couplings
Bertea
Hydr Control Subsystem
Garrett AirResearch
Auxiliary Power Units



CRITICAL COMPONENT MATERIALS **FIGURE 8**

Grumman Aerospace — Boresight Kit
Hamilton Standard — Flight Controls
Honeywell — IHADSS
Litton Precision Gear — Main Transmission, Engine Nose Gearboxes, and HARS
Martin Marietta — TADS/PNVS
Menasco — Landing Gear
RCA — Automatic Test Equipment (ATE)
Rockwell MSD — HELLFIRE Missile Equipment
Science Applications — Fixed Base Data Acquisition System
Sperry Flight Systems — Multiplex, Automatic Stabilization Equipment, and Symbology Generator
Teledyne Ryan — Airframe Structure
Teledyne Systems — Fire Control Computer

Technical Status

As you will recall, last year at this time we were changing the tail design on the AAH to incorporate a movable horizontal stabilizer (stabilator). During this past year, all flight test aircraft have been reconfigured to include the stabilator, and the tail rotor diameter has been increased by ten inches.

Flight test results of this configuration have been dramatic in alleviating the problems experienced a year ago in the areas of flight loads and handling qualities. The test aircraft have been flown to 206 KTAS (237 miles per hour), and have achieved maneuver load factors in excess of three G's in the speed range of 80 to 165 knots. With the increased diameter of the tail rotor, the YAH-64 has achieved 45 knots sideward flight while retaining adequate directional control.

Other improvements to increase the lethality of the YAH-64 now being evaluated are an **Automatic Target Handoff System (ATHS)** and a **Projected Map Display (PMD)**. We plan to include prototype installations of the ATHS and PMD in a test aircraft in order to obtain "user" comments during OT II.

In addition, General Electric is presently under contract for development of a growth version of the T-700 engine, designated as the -701. The increased power available with the new -701 engine will enable the AH-64 to carry an increased ordnance payload during the "hot day" and still exceed the Army's minimum performance requirements.

All weapons subsystems are integrated and functioning as a total weapons system. Two prototype aircraft are participating in the armament and Fire Control Survey in preparation for their formal demonstration of fire power control requirements scheduled for December 1981.

Earlier this year the TADS/PNVS competitive flyoff was completed on schedule and Martin Marietta Corporation was chosen to enter the **Maturity Phase (MP)** of development. **Colonel Don Wray's** article on the TADS/PNVS discusses how the system enables the AAH to find, fix, and eliminate targets in adverse weather, in both day and night.

AAH Commonality Program

The AAH Commonality Program is centered around the DOD Standardization Program to enhance system reliability, maintainability, and cost effectiveness by minimizing the number of new parts, materials, processes, repairable components, tools, and **Ground Support Equipment (GSE)**, and by using parts with Federal Stock Numbers (Standardized) whenever feasible. In short, don't load the combat unit down with more things to carry around and keep track of than absolutely essential.

The Hughes Helicopters' contract requires that a company-wide standardization committee review and resolve all related commonality problems as well as approve all proposed non-standard part application requests. Hughes Helicopters is also required to impose a **Preferred Parts List (PPL)** on all their subcontractors, both major and minor, to minimize the number of individual items used on the AAH. The contractors are required to submit all non-standard item requests to the Government for evaluation. If a similar item is in the DOD inventory that may fulfill the need without adding another item to the inventory, that item becomes a preferred part.

Cost Avoidance

This same process is also used for tools and ground support equipment. As of July 1979, the Gov't had recommended that 2,702 of the proposed non-standard parts be replaced with a current item in the DOD inventory. Hughes and their subcontractors/vendors have ac-

(TOTAL/Continued on Page 26)

TOTAL SYSTEM (Continued)

cepted 2,442 of these recommended items.

While this amounts to a substantial cost avoidance in the supply system when you consider that each item is normally stocked, stored, and issued for at least a ten-year operating period, more importantly we have reduced what the combat user has to cart along with him into battle.

Design Freeze

One of the most significant milestones in the transition from development to production is the completion of the qualification effort and the preparation of the configuration drawing package for production. The current AH-64 schedule requires the prime contractors, Hughes and Martin Marietta, to complete this effort and be audited as to accomplishment of all contractual tasks by the start of OT II in June 1981.

The intent of this requirement is to achieve a domino effect with the ultimate objective being to freeze the design. It is hard to paint a train while it is moving and it is just as difficult to define a complex system such as the Attack Helicopter when changes are occurring.

We accomplish this by auditing the subsystem and requiring the acceptable configuration item drawing package to be delivered to the Government and, in turn, by requiring the contractor to freeze his design by invoking formal change control procedures. This configuration audit process and design freeze has been initiated as of August 1980 with the completion of the audit for the Symbol Generator Subsystem and will continue with over 30 more item audits through May 1981.

Integrated Logistics Support

The AAH **Integrated Logistics Support (ILS)** Management Team and Individual ILS Element Design Review Teams con tinue to coordinate and direct the ILS concept being developed for OT II testing. These teams represent 22 Army agencies from the development and readiness activities of DA, DARCOM, TRADOC, and the four major materiel readiness commands.

All ILS elements are now yielding products that are being used by the contractors and demonstrated to the Government as each item is ready. Accordingly, this article provides a Logistics Status Report. However, prior to providing this status report, it is important for all supporting individuals/activities to understand that the AAH is a complex system therefore making the **System Support Package (SSP)** and the task to be accomlished at OT II just as complex.

Extensive System Support

To put this in proper perspective, the AAH is probably the first major system that is developing, and will have available for OT II, Peculiar Support Equipment, Skill Performance Aids manuals, Extension Training Materials, Training Devices (both panel and hardware), and Logistics Support Analysis data through the intermediate level of maintenance.

In a separate article, **BG Carl McNair**, Commander of the Aviation Center, addresses the training aspects associated with the AAH. We have learned that it is very difficult to keep up with the design and manufacture of ILS products while we are developing and manufacturing the helicopter. Therefore, there are areas of the System Support Package that will not be complete for OT II. This is primarily because it is almost impossible to keep the ILS products current with the design changes of the helicopter. Any products not ready will be submitted to DA for a waiver for OT II.

Logisitics Support Status

Logistics Support Analysis (LSA) has been completed through the intermediate level except for the gun and turret control boxes and the **Digital Automatic Stabilization Equipment (DASE)**. In addition, some data is still missing for **Logistics Support Analysis Review (LSAR)** H sheets. Missing data have been identified and we expect to be able to produce repair parts summary reports in the near future.

Peculiar Support Equipment (PSE) is in the manufacturing cycle except for the recently changed ammunition loader/down loader resulting from the design change from a drum to a flat pack magazine. All PSE will be available for **Physical Tear Down-Logistics Demonstration (PT-LD)** that will be conducted in January and February 1981.

(TOTAL/Continued on Page 28)

AAH PROGRAM SCHEDULE

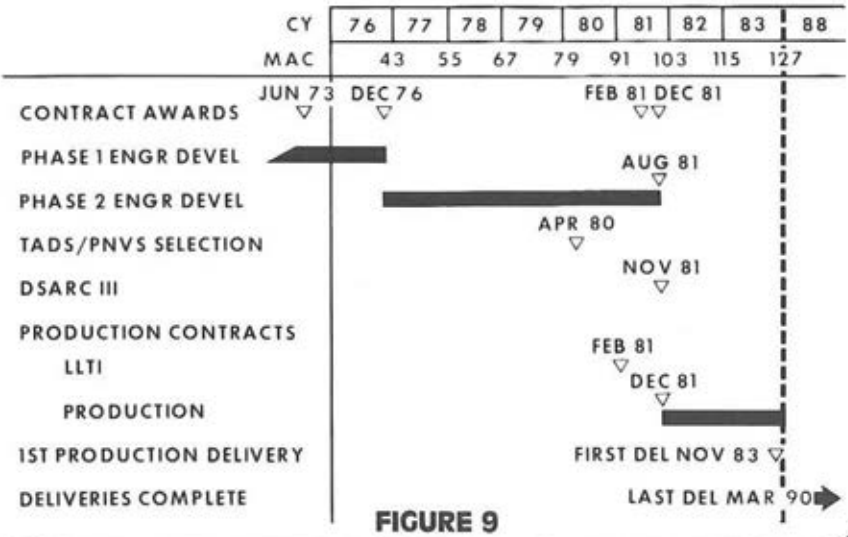


FIGURE 9

AAH PROGRAM MANAGEMENT STRUCTURE

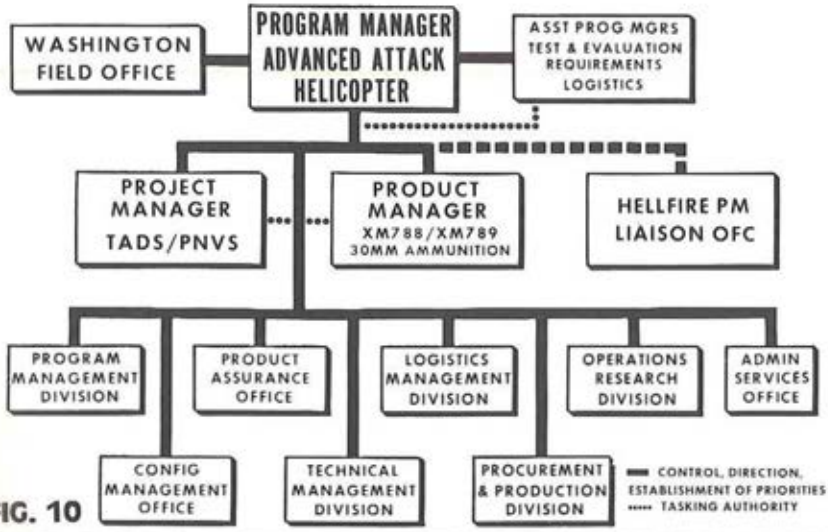


FIG. 10

TOTAL SYSTEM (Continued)

The PT-LD Plan has been prepared and is presently being staffed throughout the Army. The PT-LD will be conducted using YAH-64 No. 5, the Ground Test Vehicle, and Hardware Training Devices. This method of conducting the PT-LD will permit the Army to verify/validate many more tasks than are normally performed during a PT-LD using only a flying prototype system.

Three automatic test equipment stations have now been completed. One has been delivered and is in operation at the TADS/PNVS contractor, Martin Marietta in Orlando, Florida. Martin Marietta will use that system to prepare and validate six Test Program Sets that the soldiers will use during OT II. Hughes Helicopters has just finished demonstrating 12 Test Program Sets for other AAH components. Approximately 69 Test Program Sets will be available for OT II.

Skill Performance Aids (SPA) draft technical manuals are rapidly being reviewed and approved by the Army **In-Process Review (IPR)** team. There are 44 separate manuals in various stages of completion and all of them will be available over the next 60 days. The IPR team is elated over the quality of the SPA products and task adequacy checks are being accepted at a 96% level with little or no change required to the SPA data.

Playing Catch-Up

The on-Board fault detection/location subsystem has not pleased the design community to date. We are presently projecting that this system will monitor some 70 unique items installed on the helicopter. The measuring and programming tasks which will enable the aircraft fire control computer to detect item failures were deferred until a winning TADS/PNVS was selected. Consequently, we are now playing catch-up to analyze detectable faults and verify that they can be processed for display. Both contractor and Government personnel are going full bore to determine where we are, and what can and must be accomplished between now and OT II testing.

In summary, the AAH logistics program is looking good, but there are going to be some problems and missing links. This can and should be expected with a system as complex as the AAH and with a logistics effort of the magnitude that is being developed concurrent with developing the helicopter. However, we are confident that OT II will demonstrate a superior logisitics program, resulting in a truly supportable AAH when fielded.

Management

The AAH is one of the Army's highest priority programs and is the Number One aviation priority. The **Advanced Attack Helicopter Program Manager (AAH-PM)** is chartered by the Secretary of the Army and reports to the CG, USADARCOM.

The Program Manager is delegated full line authority for the management and the technical direction of his program, and is responsible and accountable for total program planning and direction, and controlling the allocation and use of all resources authorized for the execution of the approved program.

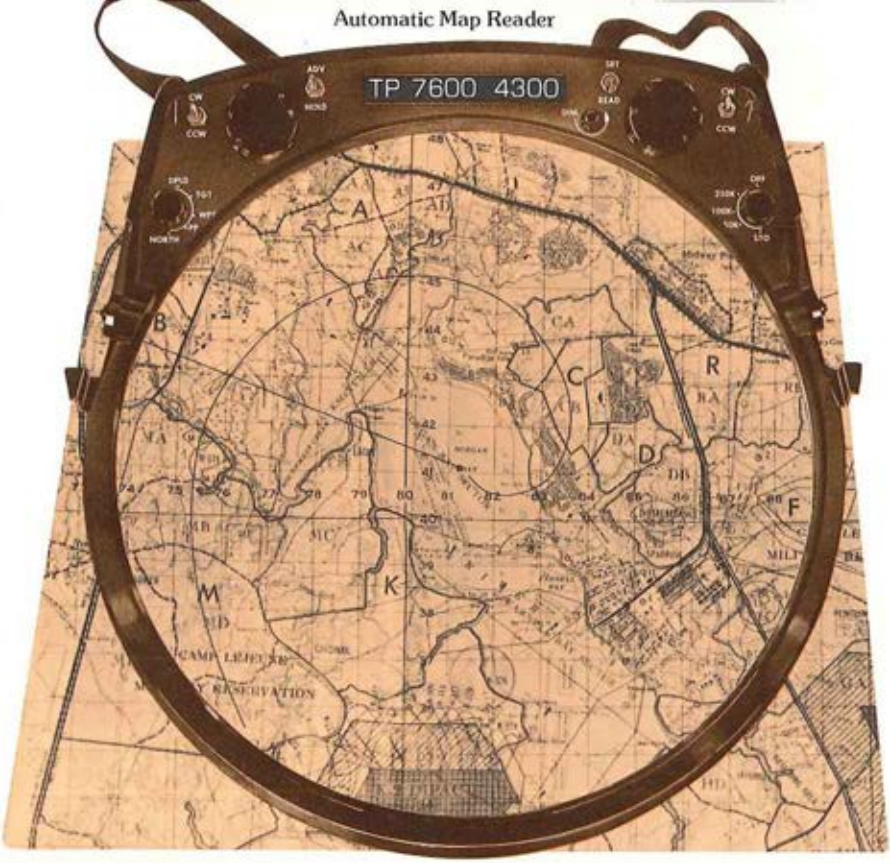
The AAH Program Office is structured under the multi-level project concept. The project managers of the TADS/PNVS and 30mm ammunition developments report to the AAH-PM, and use certain elements of the PMO staff to assist their respective project offices in their development efforts (see **Figure 10**, page 27).

The faces that go with the names and titles are shown on the AAH-PM Management Team photochart in the centerfold of this issue. Since the AAH development program is a joint effort of both the Army and industry, an organization chart of the prime contractor, Hughes Helicopters, follows immediately after the AAH-PM photochart.

The Hughes Helicopters' team is adeptly translating the Army's AAH requirements into a most outstanding weapons system. □

Progam Manager's Comments

The Target Acquisition Designation Sight/Pilot Night Vision Sensor (TADS/PNVS) with the fire control make up the heart of the AAH. This equipment enables the YAH-64 to find, fix, and eliminate targets in adverse weather, in both day and night. In the next article, COL "Don" Wray, the PM for TADS/PNVS, discusses the system, test results to date, and what the Maturity Phase (MP) is. Since last year you will note that COL "Bud" Patnode has passed the baton to COL Wray.



MAKING THINGS HAPPEN

The Automatic Map Reader (AMR) receives data from the navigational source. The aircraft position is displayed by the intersection of ruled lines on two rotating discs. One is a spiral line, the other a radial line. Simultaneously the geographical coordinates appear on a LED alphanumeric display.

The Automatic Map Reader offers the following capabilities: (1) An instantaneous display of present aircraft position over a standard military map. (2) A means of automatically computing the coordinates of any designated point within the map display. This can be a visual fix to update the present position or the coordinates of a target or waypoint. (3) An output of present position or any designated point. This may be used to update the navigational system or transfer target information. (4) Data storage capability to permit use in or out of the cockpit. (5) A very lightweight compact, low cost, highly reliable solution to the topographic navigational display problem.

MARCONI AVIONICS

Marconi Avionics Inc. 4500 N. Shallowford Road Atlanta, Georgia 30338 (404) 394-7800
In USA: Marconi Avionics, Inc. Atlanta, Seattle, Fort Worth.
In England: Marconi Avionics Limited Rochester, Basildon, Borehamwood.

6678

When the target's

Turn to the breakthrough in target acquisition,

the Aquila artillery RPV.

You know targets are beyond the skyline. But exactly where? Your forward observer's line of sight is blocked. Enemy air defense is too dense for aerial observers.

A proven solution to this age-old problem is taking shape at Lockheed under the direction of AVRADCOM. An RPV—so small it's hard to hit—will fly over the enemy and give you an eagle-eyed view of his forces. It's Aquila, and it will send back over its jam-resistant data link a real-time television picture of the situation on the other side. The Aquila system will interface with TACFIRE and will locate targets for artillery so accurately that you can fire for effect on the first round. If you are firing laser-guided munitions, it will illuminate the targets precisely, using its laser designator.

Think small, think jinking.

Even though enemy air defense may be dense, Aquila's small radar cross section and jinking ability will help it survive while it enables you to observe and adjust fire. Then you will be able to assess damage.

Survivability: the Ft. Bliss tests.

The Aquila program demonstration RPV made a number of flights under fire from several types of multibarrelled weapons. There

on the other side...

were many bursts at slant ranges as close as 400 meters. The small, jinking RPV wasn't hit once. As for infrared seekers, it doesn't generate enough heat for homing.

The real world. Soldiers flew the Aquila program demonstrator RPV in 92 successful flights.

What else?

As a target locator and designator, this new system will be unmatched. But that's only a beginning. It can be equipped with FLIR for nighttime operations. And the same size and aerodynamic characteristics that enable it to carry its target acquisition payloads also can enable it to handle other missions.

When the other side has more men, more guns, more tanks, you'd better have a force multiplier. That's exactly what this RPV breakthrough in target acquisition is—a force multiplier that will help get steel on target faster, more accurately than ever before. It can be operational in 1984.

Lockheed Aquila

By
Colonel
Donald P. Wray
TADS/PNVS
Project Manager

TADS/PNVS: The Maturity Phase

THE target had become increasingly difficult to see. There was a heavy amount of jitter on the CRT. Smoke was obscuring the target. Darkness was rapidly approaching. Was the mission in jeopardy?

A hurried conference was held with the lead test engineer who continued to puff at his cigar. With a slight frown he stated that here at Mission Control the situation was still "go" for another YAH-64 test flight that afternoon.

The TADS/PNVS Competitive Evaluation progressed another step towards its conclusion in early March 1980. These exhaustive flight tests yielded a myriad of data for the TADS/PNVS **Source Selection Evaluation Board (SSEB)**. A single contractor was chosen and on 9 April 1980, Martin Marietta Corporation of Orlando, Florida, entered the **Maturity Phase (MP)** of development.

Today, the program progresses in the MP headed for a DSARC and Production Contract rendezvous in December 1981.

TADS

What is TADS/PNVS? What does it do? What is its contribution to the AAH Program?

The **Target Acquisition Designation Sight (TADS)** is the "targeting" system for the AAH. It provides a day/night adverse weather capability to find targets, recognize them and accurately determine range and relative position. If necessary, precision laser designation can be provided by TADS to guide a missile or other "smart" weapon in for the kill.

Here's the guts of a TADS:

- **Laser Rangefinder/Designator (LRF/D)**: Provides target ranging and marking by a precision pointed laser beam.
- **Forward Looking Infrared (FLIR)**: Provides a "thermal" imagery for periods of darkness or reduced visibility; very effective in penetrating smoke, fog, etc.
- **Direct View Optics (DVO)**: Provides direct image of scenes through a dual (low and high) magnification optical train (telescope).
- **Day Television (DTV)**: Provides dual (high and very high) magnification scenes with TV imagery of scene. This sensor is a big help in poor visibility conditions and in reading through camouflage and effective in acquiring targets at maximum ranges.
- **Laser Spot Tracker**: Provides capability to acquire targets which are being lased by someone else for either cooperative engagement or handoff of the target for AAH autonomous engagement. The tracker scans a solid angle to find other laser reflections and then locks on and points TADS to the intended target.

This comprehensive array of sensors is boresighted to a common line of sight and is mounted in a stabilized environment to perform regardless of helicopter maneuvers. The stabilization keeps the laser beam steady and accurate while the missile, artillery round, or other guided weapons speeds in for impact.

Automatic video tracking is also included. The FLIR imagery and the DTV are displayed on a TV screen in the cockpit and the crew can select whichever display is desired (FLIR, DTV, DVO) with the flip of a switch.

PNVS

Separate from the TADS, the **Pilot Night Vision Sensor (PNVS)** incorporates a gimballed FLIR sensor which receives positioning commands from the pilot's head movements via an electroptical head tracking system. It is boresighted to his line of sight — it looks where he looks.

The FLIR imagery is displayed, along with a generous amount of head-up display symbology, to the **Integrated Helmet and Display**

Sight System (IHADSS) monocule in front of the pilot's eye. The PNVS is used primarily for navigation and target detection in all visibility conditions rather than for target acquisition. The TADS FLIR can operate in a back-up mode to perform a similar function if required.

Test Results to Date

Extensive testing of the TADS/PNVS on the YAH-64 at the government test facility, complemented by detailed laboratory testing, has shown the TADS/PNVS to be an outstanding performer — in many areas exceeding specification requirements. Flight tests have been conducted in varying conditions of visibility including smoke, dust, rain and during the hours of darkness.

The TADS has demonstrated a remarkable ability to acquire targets both day and night and has further demonstrated its effectiveness during laser HELLFIRE tests from the AH-64. It has consistently tracked and lased targets well beyond the maximum required ranges.

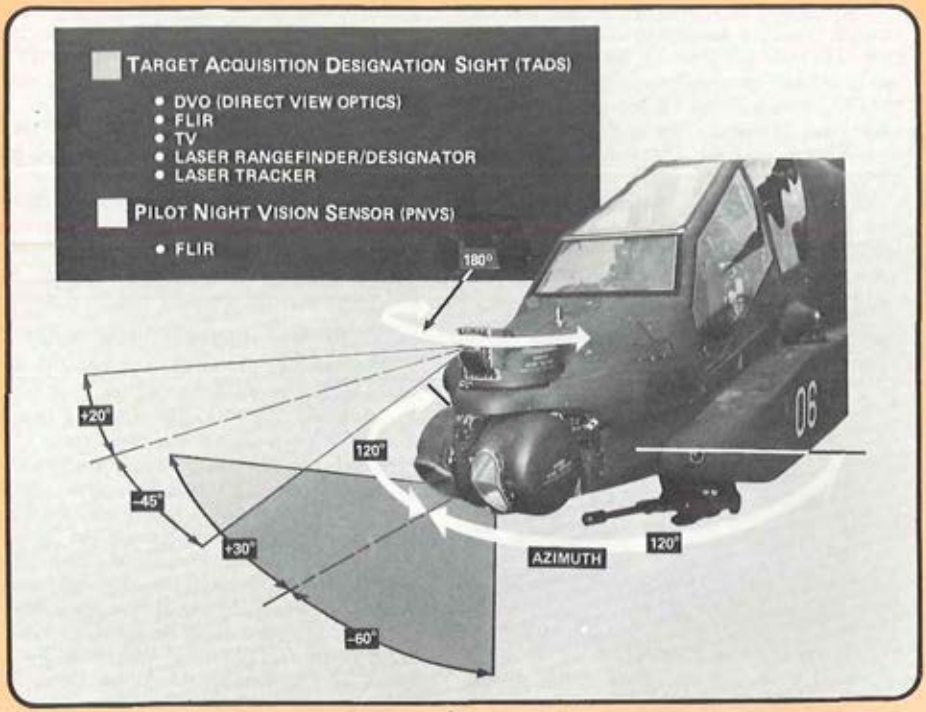
The PNVS has been evaluated in an even wider variety of conditions which included high humidity, rain, snow and sleet. All in all the TADS/PNVS has shown its ability to perform the mission for which it was designed.

The Maturity Phase — What It Is

The recently completed competition was structured to allow the Army to select the best of two different designs. We have done that, and now have the rest of the job to complete — we call this the Maturity Phase.

First, and very important, is the need to support the ongoing AH-64 testing. The TADS/PNVS is an essential part of the total weapon system, and must be kept maintained and operating properly. In addition, some updating and system modifications are being incorporated. Like any test program, a number of "lessons learned" have emerged from the competitive fly-off, and we are including those changes.

An example of this is some minor relocation



of switches and controls based on pilot comments during flight testing. Perhaps the most important aspect of the MP is preparing for production. Hardware must be qualified and performance, reliability, and maintainability will be demonstrated. Following this phase, and the AH-64 Operational Test II in the summer of 1981, we will be seeking production go-ahead at DSARC III.

Operational Use

How does all this magic work on the battlefield? Let's follow an AAH crew into combat and gain that insight.

The AAH gets airborne well after dark in response to an alert scramble. An enemy armor formation has been heard, but not seen, near the FEBA. The ground troops may need support — quickly. Speeding over the friendly ground troops our AAH **copilot-gunner (CPG)** has his concentration focused into the TADS **Optical Relay Tube (ORT)**.

There, using FLIR imagery, he first spots a thermal signature indicating mechanized activity. He calls for a hover. The pilot, using separate FLIR imagery from the PNVS on his IHADSS, drops down behind a tree line for cover and masking. The enemy armor will almost surely have anti-aircraft weapons within their ranks.

There it is! The CPG now has the image of a tank emerging from behind a hill on a dirt road. The pilot is notified. Within seconds a clear view is possible. The lead tank is well within range.

A head-on view of the TADS/PNVS system that has exceeded specification requirements.

LRF/D on! Missiles ready to fire. Several tanks now move forward and there's no time to lose; enemy AAA is visible on the TADS FLIR.

Fire missiles! Systematically, the first half dozen tanks are demolished and more AAH help is arriving. Our crew has done significant damage with their missile load.

It's time to return to base. Bandits — enemy aircraft — have been detected in the vicinity. So it's down among the trees, using PNVS, for the return trip. TADS helps to navigate using position data from known check points using LRF/D measurements and TADS gimbal position data.

A commonplace scene

In combat this scene will be commonplace against an enemy who prefers to fight and move during hours of darkness. Scout helicopters will share the target detection and laser designation tasks also. The AAH TADS will then search for laser-marked targets at which to launch missiles.

The flexibility of TADS, 120° in azimuth, 30° upward, and 60° downward, makes it ideal for close in engagements: also for searching for targets of opportunity. The 120- to 250-hour **mean-time-between-failure (MTBF)** will be appreciated by the maintenance troops — and the aircrew in combat, too.

TADS/PNVS represents the key to performing the AAH mission. It is a tested, dependable and lethal sensor package that is being proven today. □

Program Manager's Comments

Up to this point we have loooked at the YAH-64 and its technical status, and have discussed the TADS/PNVS. Training to use this complex equipment is a tough task.

In order to train without interrupting the AAH development program, surrogate equipment and the AAH Development Test Training Detachment (DTTD) were established.

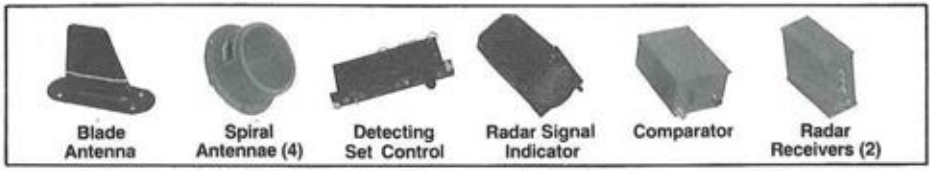
The DTTD Commander, Major Garry Bass, covers his unit's accomplishments, challenges, and future mission in the article that follows. In June of this year, Major Bass assumed command of the DTTD from Major William P. Leach, who is now on the Attack Helicopter TSM team at Ft. Rucker, Ala.

With the AN/APR-39(V) Radar Warning Receiver as the primary element in the multi-mission ASE suite, the AAH will be able to fight and survive.

E-Systems Memcor Division offers a cost effective, airborne, multi-mission radar warning system in production quantities. The AN/APR-39 is currently deployed by the US Army in OH-58, AH-1S, UH-1H helicopters. It is slated for deployment in fixed-wing platforms, CH-47D, AAH and UH-60 helicopters. The system has been qualified and is being procured by US and International forces.

For more information call (813) 885-7826. Or, write: E-Systems, Inc., Memcor Division, P. O. Box 23500, Tampa, Florida 33614.

E-SYSTEMS
Memcor Division
The problem solvers.

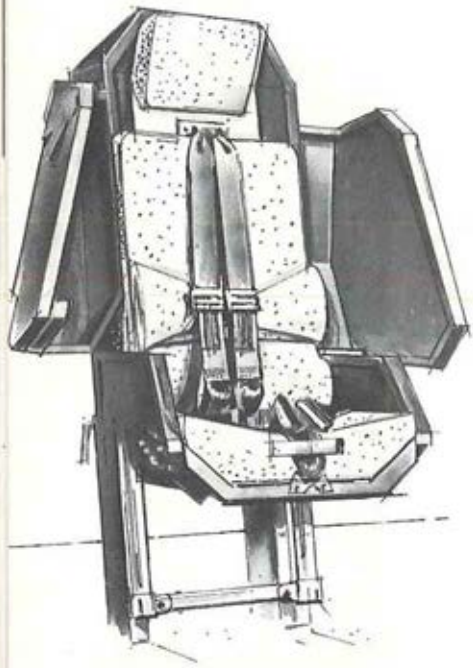


Norton Does The Job for Hughes Helicopters

Norton Company salutes the team that helped build the Hughes Advanced Attack Helicopter. Building the world's best armored crashworthy seats for the Hughes attack helicopter also depends on assembling the best team there is to do the job.

THE NORTON COMPANY "ARMOR TEAM"

Simula Inc.—crashworthy frame
Pacific Scientific—restraint system
Clark Associates and Quintus Enterprises—cushions



The advanced attack helicopter seat features 50 caliber armor piercing ballistic protection by the lightest armor available—NOROC® boron carbide. The energy absorbing frame and newly-developed crashworthy seat pan cushion lessen the effect of crash impacts. The Norton armored crashworthy seat is designed to reduce vertical crash deceleration levels from 48 G's to a non-injurious level of approximately 15 G's for the average occupant. Producing a seat that can deliver this kind of protection has made the Norton team today's state of the art world leader in both armored and unarmored crashworthy aircrew seats.

NORTON INDUSTRIAL CERAMICS DIVISION
WORCESTER, MASSACHUSETTS 01606

Sierracin high technology supports the Hughes AH-64 helicopter

Three of our divisions have played significant development and production roles in the AH-64:

- Our **Thermal Systems Division**—the main rotor and tail rotor de-icing heater blankets. And the nose gear box fairing inlet de-icing system.
- Our **Sylmar Division**—the canopy transparencies, the blast barrier and the electrically heated windshield.
- Our **Magnedyne Division**—the torque motor for the TADS/PNVS.

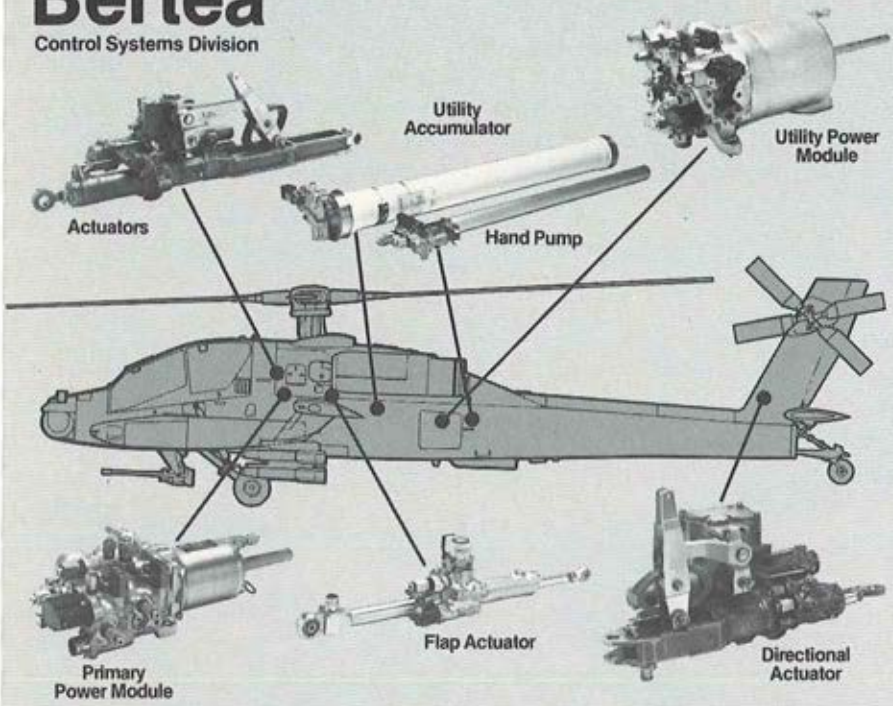
We're proud to be part of the Advanced Attack Helicopter Program—one of the many advanced programs supported by Sierracin high technology.

Sierracin Corporation

12780 San Fernando Rd.
Sylmar, CA 91342

Bertea

Control Systems Division



Flight Control Systems for the AAH

PARKER BERTEA, a world leader in flight control systems, is a member of the Hughes AAH team—designing, developing and producing the complete Hydraulic Flight Control System for this advanced attack helicopter. Total project response and proven system dependability from PARKER BERTEA—putting tomorrow's technology to work today.

Parker

18001 Von Karman Ave., Irvine, CA 92715
(714) 833-1424/TELEX: 678-427

By Major Garry M. Bass and CWO Michael L. Talton

DTTD: Accepting the Challenge

CHALLENGES are constant fate and forever varied when your mission is to train crewmen to safely operate the new, highly sophisticated **Pilot Night Vision Sensor (PNVS), Target Acquisition Designation Sight (TADS),** and **HELLFIRE Modular Missile System (HMMS)** of the **Advanced Attack Helicopter (AAH).**

Accepting these challenges and routinely producing results in a professional manner has become a way of life for the 56 men and women of the **Development Test Training** Detachment (DTTD).

Organizational Summary

The Detachment's goal, as presented in a November, 1979 article in **Army Aviation Magazine,** is to train AAH crewmen by use of surrogate aircraft and systems, thereby reducing the risk, cost and schedule impact on the AAH developmental program.

The soldiers of DTTD were individually selected because of their expertise in attack helicopter operations, training, and maintenance, and for their particular experience in the research and development of various night vision, target acquisition, and fire control systems.

Training Accomplishments

Initially, Detachment **instructor pilots (IP's)** had the unique task of training themselves on these new night-capable prototype systems.

ABOUT THE AUTHORS
DTTD Commander Major Garry M. Bass collaborated on this 1980 AAH article with CW3 Michael Talton, a DTTD member since its formation. The latter has an extensive background in Night Vision Research and Development, and is an IFE.

Drawing upon the experience and expertise developed during their intensely conducted in-house systems IP training cycle, the Detachment's IP's wrote the academic and flight programs of instruction, the flight syllabus' and the flight maneuver/procedure guides for these new, complex systems.

With these documents forming their course of instruction, the Detachment trained three pilots and three co-pilot gunners who were designated to participate in the AAH **Engineering Design Test (EDT)** as well as the TADS/PNVS competitive flyoff.

Two Detachment IP's were selected to participate in the TADS/PNVS flyoff as evaluator gunners. The extensive technical experience, and operational insight they acquired have been incorporated into the Detachment's training effort to qualify future Army Aviators as TADS-capable attack helicopter operators.

Reverse training

In order to standardize PNVS operator performance among all aviators participating in the AAH developmental program, the DTTD trained seven Hughes Helicopters test pilots to fly the PNVS. The exchange of professional knowledge that occurred during this training cycle proved educational for both groups of pilots and contributed to the "team effort" necessary for success of the AAH program.

Following the training of these contractor test pilots, **MG Edward M. Browne,** Program Manager—AAH, tasked the Detachment to qualify seven Army pilots and six Army gunners on the HMMS so they could participate as player personnel in the **HELLFIRE Operational Test (OT).**

These aviators were trained in target acquisition/recognition techniques, laser designator operational characteristics, and the

DTTD (Continued from Page 39)

employment characteristics and capabilities of the HMMS.

Since May 1979, the DTTD has trained 42 individual aviators; 18 were qualified on the PNVS; 15 on the HMMS/target acquisition system; and the other nine were qualified on both systems. The Detachment has also briefed and/or given flight demonstrations in the surrogate aircraft to approximately 50 VIP's since its inception.

Training Assets

To accomplish its training mission, the Detachment uses two surrogate helicopters which are equipped with "carbon copies" of the AAH PNVS. Other surrogate aircraft equipped with ATAFCS are used for target acquisition training and to introduce gunners to a unique combination of visual acquisition devices such as **direct view optics (DVO), day television (DTV),** and **forward looking infrared (FLIR)** sensors.

These surrogates also enable laser rangefinder and designation training, manual and automatic tracking and laser spot tracker training. A modified HMMS is also mounted on the two ATAFCS surrogates for HELLFIRE system qualification and systems integration training.

In the surrogate helicopter the DDTD has demonstrated the tactical feasibility of the TADS and has flown approximately 150 hours using the ATAFCS. The feasibility of the PNVS has been demonstrated by flying over 600 hours. These surrogate system hours are accident-free and have been flown in all regimes, with the majority of the hours in the night **Nap-of-the-Earth (NOE)** environment.

Night NOE Flight

Prior to the TADS/PNVS flyoff, **MG Browne,** PM—AAH, tasked the DTTD to develop a structured PNVS flight evaluation to demonstrate that both competing contractor systems could perform designated night NOE scenarios. The DTTD was responsible for providing technical advice concerning PNVS operational considerations and Army Aviation tactical employment concepts.

Working in conjunction with the **Night Vision Laboratory (NVL),** the DTTD flew repeated NOE flight profiles at night over unfamiliar terrain. Besides demonstrating that a PNVS-equipped helicopter was extremely effective in the night NOE regime, this demonstration produced comparative data between day and night NOE performance and provided human factors personnel with analytical information concerning FLIR-aided flight operations.

FLIR Performance

As the DTTD accumulated experience with the PNVS, interest grew in the capabilities and limitations of the FLIR Sensor. In an effort to satisfy this interest, **MG Browne** asked the DTTD to conduct a series of flight tests to explore and document the capabilities of the PNVS FLIR.

Since the FLIR is government furnished equipment and common to both the YAH-64 TADS and the PNVS, the Detachment's investigation of its performance parameters with PNVS surrogate aircraft was a particularly cost effective benefit to the AAH Program.

Exploratory Testing

The DTTD conducted appropriate FLIR exploratory testing at NOE altitude. The FLIR Sensor, as installed in the YAH-64's PNVS, demonstrated its ability to perform day and night in these three distinctly different environmental scenarios:

- Hot, dry, sandy desert environment.
- Cold, humid, snow covered mountainous environment.
- Hot, humid, heavily forested swamp environment.

These scenarios represented a temperature range from 20° to 120°F while relative humidity ranged from 14% to 96%.

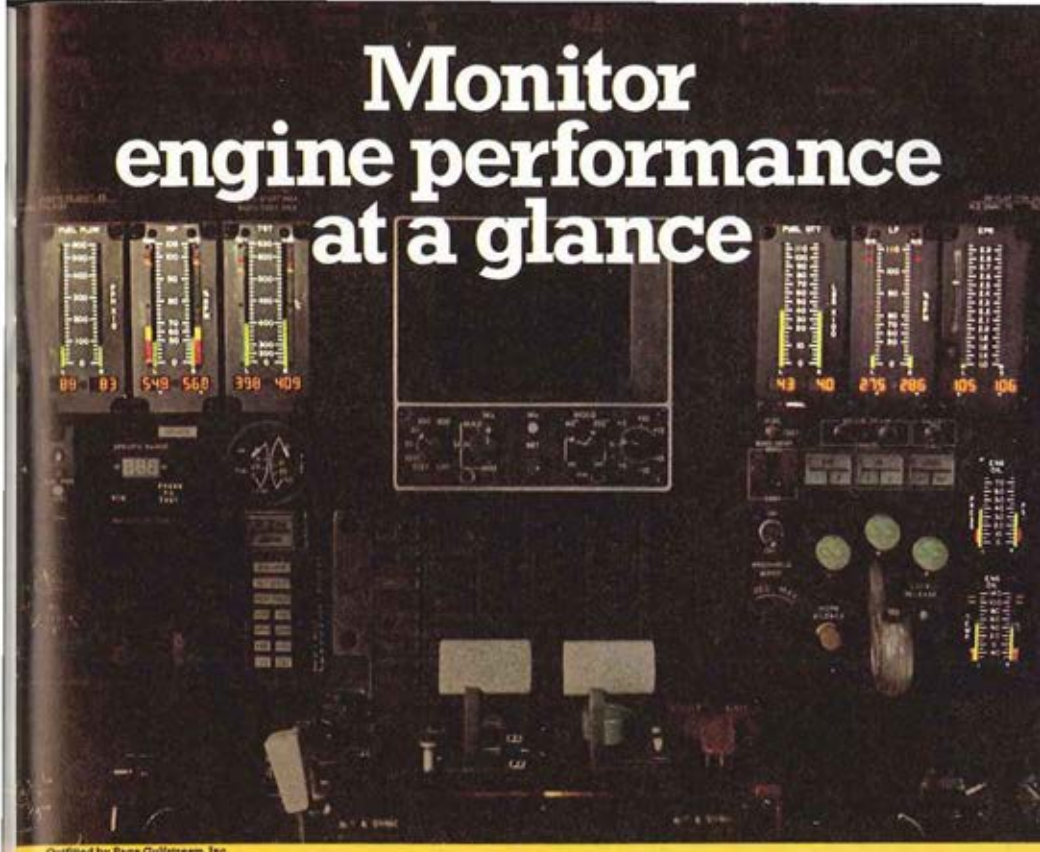
Lessons Learned

The DTTD has been training aviators, performing system flight demonstrations, and conducting FLIR exploratory testing for 18 months. The following list is a highlight of important facts that have been established by the DTTD during this period:

- The YAH-64 PNVS System can effectively fly at NOE altitudes and airspeeds with no ambient light.
- Accurate range estimation and closure

(DTTD/Continued on Page 42)

Monitor engine performance at a glance



Outfitted by Page Gulfstream, Inc.

Color-coded vertical scales with precision digital readouts put high reliability on your instrument panel.

Quick-scan scales are color-coded with easy-to-see digital readouts to reduce pilot workload.
Other outstanding features:

- High reliability
- All solid state with no moving parts
- TSO APPROVED
- Excellent visibility in bright sunlight
- Low cost of ownership
- Available from stock

Presently installed in Grumman Gulfstream GII, Falcons and several military aircraft.

Please contact us for full information

AVIONICS DIVISION

Canadian Marconi Company

Manufacturers for many years of avionics equipment including Solid State Instrumentation; Doppler, Omega and Satellite Navigation Systems.

2442 Trenton Avenue, Montreal H3P 1Y9, Canada/Tel. (514) 341-7630 Ext. 300/Telex: 05-827822/TWX: 610-421-3564

CMC

AH-64 DEPLOYABILITY

687 GAL. AUX FUEL (4 TANKS)
FERRY MISSION CAPABILITY:
NORTH ATLANTIC ROUTE
800 NM (20 KT HEADWIND,
45 MINUTE RESERVE)

AIR TRANSPORTABILITY

C-141B — TWO EACH

C-5A — SIX EACH

DTTD (Continued from Page 40)

rates can be obtained while viewing a monocular, two dimensional, helmet-mounted display.

- A properly trained pilot or copilot-gunner (CPG) can rapidly interpret and efficiently assimilate flight and weapons information displayed in a dynamic symbolic format.
- Anticipated psychological and physiological problems associated with a helmet-mounted monocular display were not manifested.
- YAH-64 flight symbology, in conjunction with the FLIR thermal image, allows a pilot to establish and maintain night confined area and out-of-ground-effect hovers with greater precision than possible with the unaided eye or with night vision goggles.
- The YAH-64 FLIR sensor significantly exceeds both the day and night capability of the human eye and present generation night vision goggles. The FLIR sensor permits visual penetration during periods of blowing dust, haze, blowing snow, smoke, fog, rain, or clouds.

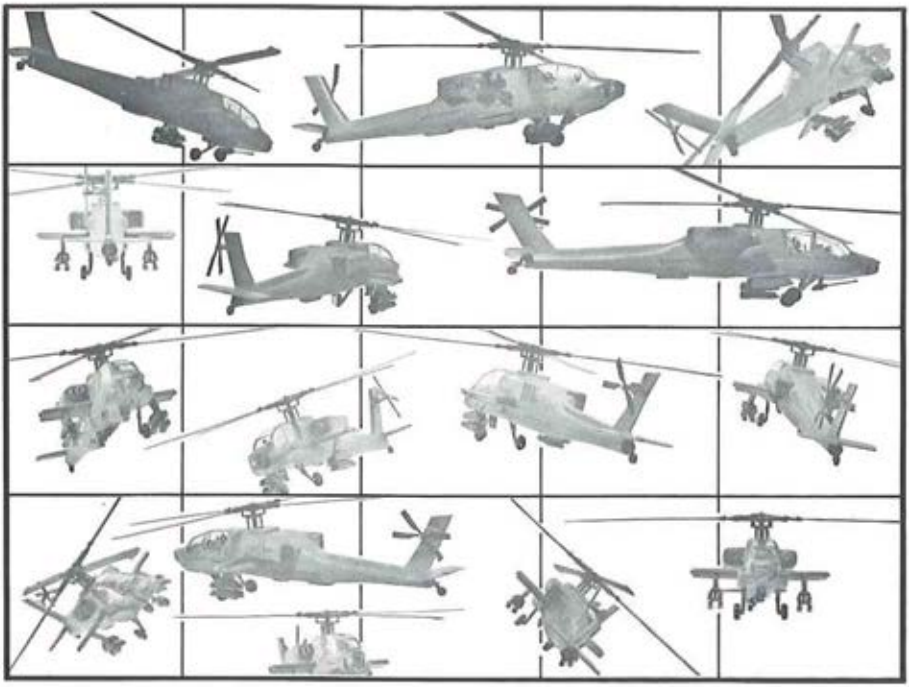
Future Endeavors

The DTTD is presently conducting PNVS training for aviators designated to participate in AAH EDT IV and V. A total of five aviators will complete the rigorous day and night training course.

In late 1980, the DTTD will conduct PNVS and HELLFIRE qualification training and target acquisition introductory training for a total of 14 Pilots and CPG's who will later participate in AAH OT II.Investigation of the effects of various climatic and environmental conditions on FLIR performance will continue during 1981. Planning is underway to more fully explore both PNVS and TADS capabilities, given the atmospheric conditions characteristic of the European environment.

Accepting the Challenge

The future challenges the Development Test Training Detachment to continue its professional commitment to the totally dedicated support of the Advanced Attack Helicopter program. The challenge is accepted! □



Now available to Army aviation-- accurate heading, pitch and roll throughout combat maneuvers.

Litton's new LR-80 strapdown inertial AHRS senses and **accurately measures** all vehicle angular rates and translational accelerations in body-axis coordinates. Velocity-damped Schuler tuned loops continuously maintain accurate **vertical reference throughout high-dynamic flight maneuvers.** The LR-80 provides both true heading and synthesized magnetic heading. **Inertial gyrocompassing** aligns the LR-80 prior to takeoff or, **if rapid-reaction is required, inflight.** In addition to performing the AHRS functions, the LR-80 has combined with Army standard Doppler to demonstrate **navigation accuracy better than 3/4% of distance travelled (CEP).** This performance was achieved in an official Army helicopter navigation demonstration. Litton's strapdown AHRS is a single, self-contained, lightweight reference unit that weighs less than seventeen pounds in a volume less than 1/3 cubic foot.

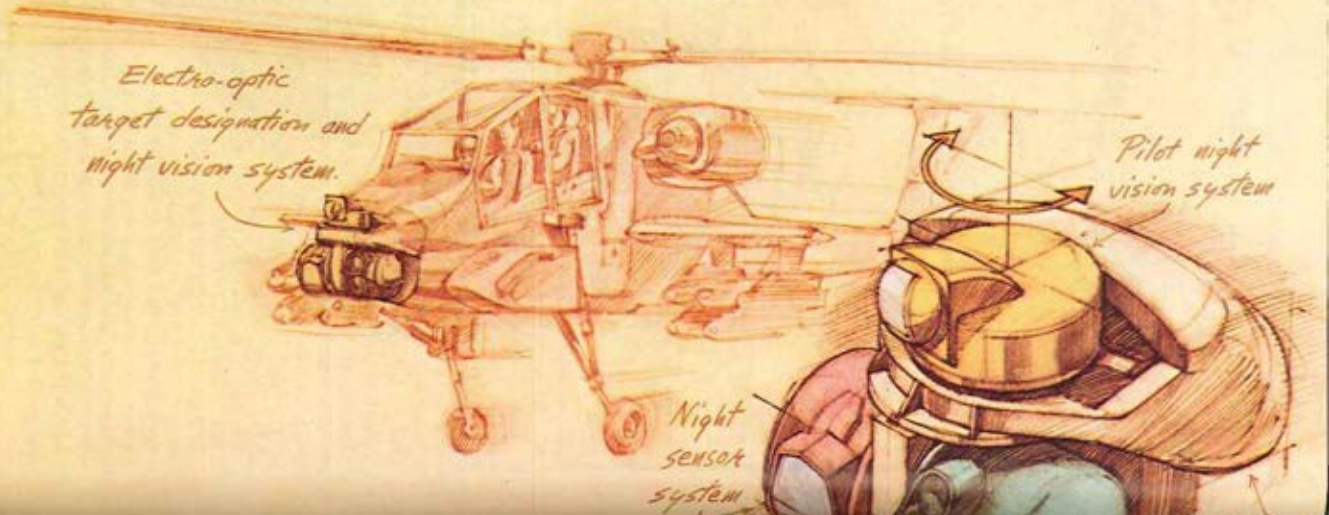
If you need an advanced AHRS that provides accurate all-attitude heading, pitch and roll with **navigation backup and fire-control capability, call (213) 887-4321, or write...**

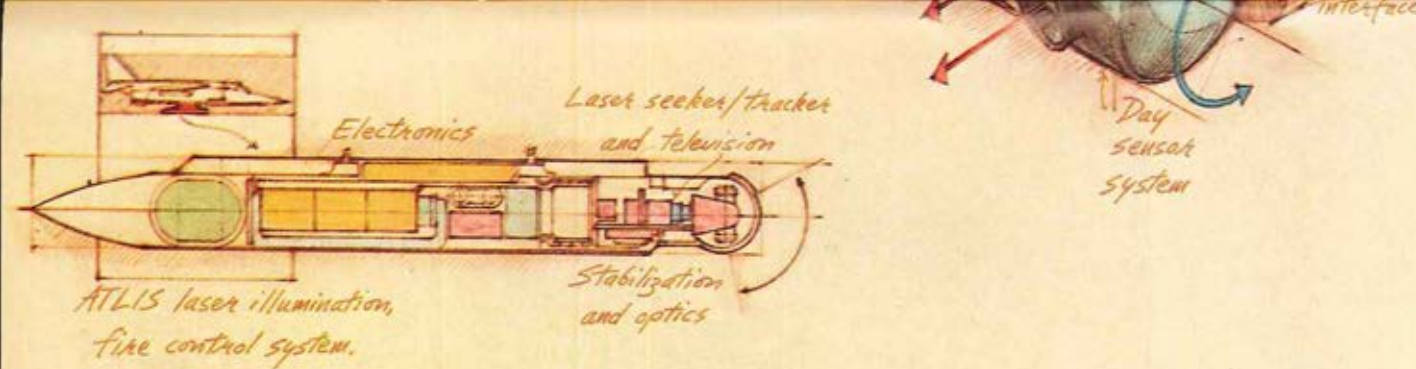
GUIDANCE & CONTROL SYSTEMS

Litton 5500 Canoga Avenue, Woodland Hills, California 91365

What is the advantage of our advanced electro-optics?

It puts you on target.





Martin Marietta has pioneered in the development of electro-optical fire-control systems. Utilizing lasers, forward-looking infrared, and television—these systems permit tactical aircraft to acquire, track and designate targets at extended ranges, and to fly low-level night missions.

With our target acquisition and designation systems, helicopters can track targets around-the-clock. An infrared night-vision system allows pilots to navigate and fly nap-of-the-earth in the dark.

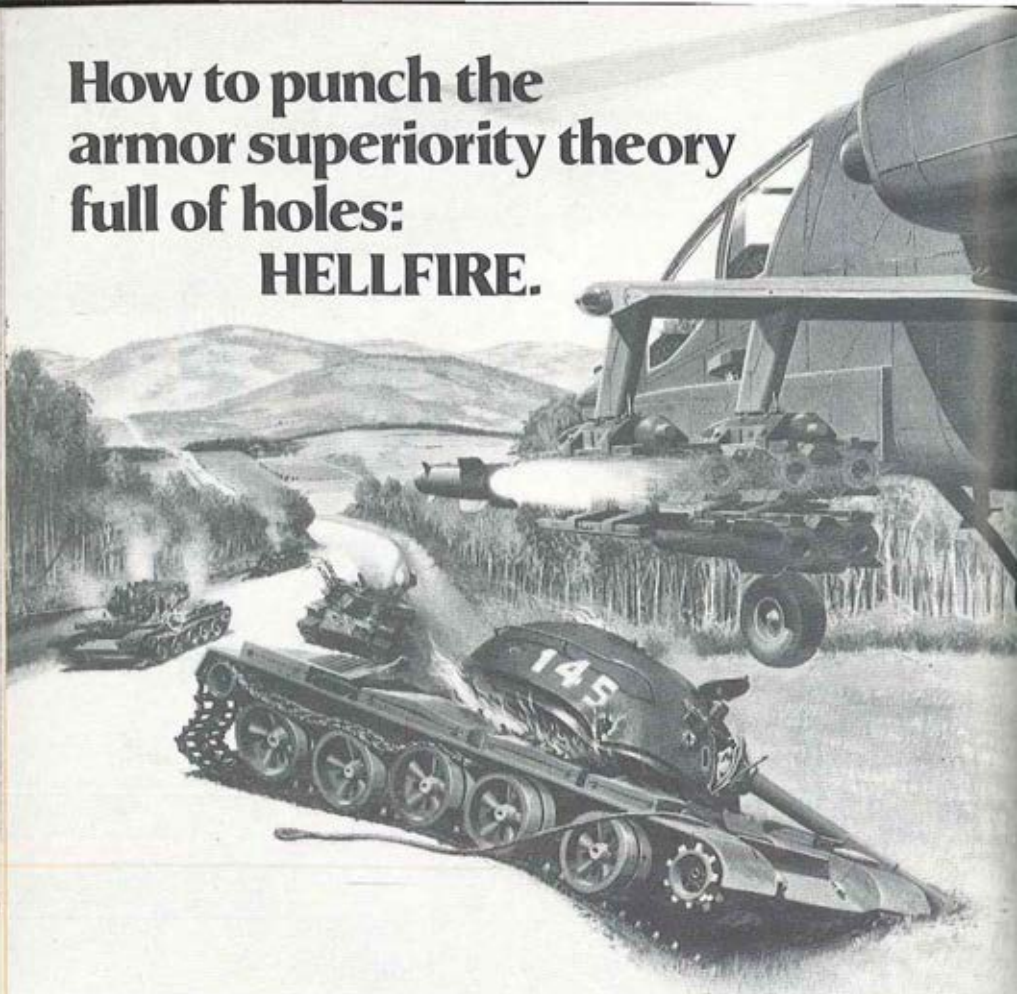
Another of our advanced electro-optical systems provides illumination for the accurate, unassisted delivery of laser-guided weapons by high-speed, single-seat aircraft. This same technology, applied to laser-guided artillery, gives ships and ground forces the capability for first-round accuracy against moving targets.

Our work in applying even newer electro-optical technologies to next generation systems keeps Martin Marietta in the forefront of tactical weapons systems development.

MARTIN MARIETTA

Martin Marietta Aerospace
6801 Rockledge Drive, Bethesda, Maryland 20034

How to punch the armor superiority theory full of holes: HELLFIRE.



HELLFIRE is the armor-penetrating weapon system that's rated AAA — accurate, adaptable and affordable.

- Accuracy. Direct-hit capability has been demonstrated through test-proven performance. Lethality is high.
- Adaptable. Modular design accommodates present and future guidance systems. Airborne or ground launched. Direct and indirect firing modes.
- Affordable. Crew and aircraft survivability, launch and leave and multiple target engagement capabilities add up to true cost-effectiveness.

HELLFIRE was developed by the U.S. Army Missile Command at Redstone Arsenal, Alabama, and the Missile Systems Division of Rockwell International. Missile Systems Division, Avionics and Missiles Group, 4300 East Fifth Avenue, Columbus, Ohio 43216.

Rockwell International

...where science gets down to business

By Colonel Stanley D. Cass and Captain(P) Phil Terry

Operational Test completed by HELLFIRE

THE primary armament for the AH-64 Advanced Attack Helicopter (AAH) is the **HELLFIRE Modular Missile System (HMMS)** under development by the U.S. Army **Missile Command (MICOM)** at Huntsville, Alabama.

HELLFIRE is in the final stage of development and is being readied for production. The performance of this system throughout its series of development tests has met the Army's high expectations.

Operational testing, in which the user operates and evaluates all aspects of a new weapon system, is the final critical milestone prior to production. Preliminary results indicate a high potential for success during the recent **Operational Test (OT)**.

Mid-April 1980 tests

The HELLFIRE operational tests, which began in mid-April 1980 and concluded in mid-July 1980, were conducted in two phases by the U.S. Army **Combat Development Experimentation Command (CDEC)** under the overall test cognizance of the Army's **Operational Test and Evaluation Agency (OTEA)**.

The non-live fire portion was completed in late June after successfully generating data on HELLFIRE effectiveness, exposure times, communications, maintainability, reliability, availability and training. Hundreds of target engagements were simulated using surrogate advanced attack helicopters and HELLFIRE training missiles against instrumented tanks.

The surrogate AAH's were AH-1G Cobras outfitted with **Airborne Target Acquisition and Fire Control Systems (ATAFCS)** utilizing laser designators and both TV and imaging infra-red sensors (See the photo on next page.)

Two AH-1G's without ATAFCS were also utilized as launch helicopters during remote designation missions. The four helicopters were each equipped with HELLFIRE fire control systems, two four-rail launchers and, depending upon the mission requirements, up to eight HELLFIRE missiles.

Expectations exceeded

Due to thorough planning and timely execution on the part of both OTEA and CDEC, in conjunction with the highly reliable and flexible HELLFIRE system, the amount of data collected far exceeded expectations.

Beginning on 1 July 1980, Army aircrews began the live-fire phase, launching HELLFIRE missiles against both stationary and moving tank targets. In less than two weeks a total of 33 missiles were launched under a variety of conditions (day, night, smoke, and dust) exercising all of the available launch modes of this modular anti-armor system.

Of the 33 missiles fired, six were classified as "no test." For the remaining 27 valid tests, the demonstrated probability-of-hit exceeded specification requirements. This was one of the most successful operational tests ever conducted by the Army on a missile system.

Prior to launch, the missiles were transported in their containers by truck to the **Forward Area Refueling Point (FARP)**, where U.S. Army maintenance crews unpacked and unloaded the missiles. After uploading, the missiles and launchers were tested using automatic built-in test equipment.

ABOUT THE AUTHORS

The HELLFIRE article is co-authored by Colonel Stanley D. Cass, Project Manager, HELLFIRE/GLD, USAMICOM, and CPT(P) Phil Terry, R&D Coordinator, Technical Management Division, PMO—HELLFIRE/GLD.

No helicopter exposure

The aircrews then began the fire mission utilizing communications techniques developed during the initial crew training exercises. Twelve of the 33 missiles were launched in the lock-on-after-launch mode, which means that the attack helicopter was never exposed to the enemy force during these missions.

When the smoke and dust had finally cleared, the missile had obtained an excellent system reliability, while the fire control system and launchers had achieved very high MTBFs.

DEVELOPMENT TEST RESULTS
(No. Successful/No. Missiles Fired)

Aircraft Utilized	Ballistic	Programmed	Dev Proto Guided	Tab Proto Guided	Total Guided	Total Employed
AH-1 Cobra	3/3	4/4	11/13	23/28	34/41	41/48
AH-64	14/14	—	11/13	2/4	13/17	27/31
Total	17/17	4/4	22/26	25/32	47/58	68/79

FIGURE 1

Surrogate AAH — The AH-1G Cobra outfitted with Airborne Target Acquisition and Fire Control Systems (ATAFCS)

An AH-64 Attack Helicopter fires a HELLFIRE missile during developmental testing.

Although the system's probability-of-hit performance is classified, the operational test showed that the system had met its stringent performance requirements.

In parallel with the operational tests, development testing has continued. All-up missiles, with live warheads, have recently been launched against steel plate and tank targets to demonstrate the integration of all elements in the arming and fuzing chain. Tests in adverse weather conditions will soon be completed.

Successful operation

The development testing, which has been conducted over a two-year period, has demonstrated successful operation over a wide range of conditions, including very short and very long range, day and night, smoke, dust-maneuvering launch aircraft, the sun in the field of view of the seeker, and all the various HELLFIRE launch modes, including rapid fire and ripple fire with autonomous and remote designation.

Developmental testing of the HELLFIRE on the AH-64 (See photo above) also continues as a final demonstration of successful systems integration. This testing, which is being conducted at the government test facility, is under the auspices of the AAH PMO, (St. Louis). The box score (See Fig. 1, opposite page) shows the missile enjoying the same excellent performance from either the Cobra or the AH-64 during developmental tests.

Are we ready?

Is HELLFIRE ready for production? For the answer, just ask any of the Army crew members who launched HELLFIRE missiles in an operational environment to precise impact on armored targets at very long ranges.

The prime contractor for the HELLFIRE Modular Missile System is the Missile Systems Division of Rockwell International. They plan to produce the system at their new modern production facility in Atlanta, Georgia, with final assembly and delivery taking place at MICOM in Huntsville, Alabama. The HELLFIRE laser seeker was developed by Martin Marietta Corporation, Orlando, Florida.

"HELLFIRE is ready when you are!" □

Hughes Helicopters

J. G. REAL
PRESIDENT &
AAH PROGRAM
MANAGER
4330/5060

J. E. McKEE
ASSISTANT
PROGRAM
MANAGER
PRODUCTION
5433

N. B. HIRSH
DEPUTY
PROGRAM
MANAGER
5448

R. P. KENNEDY
MANAGER
PROTOTYPE
MANUFACTURING
5296

T. P. PAPPAS
MANAGER
PROGRAM
FINANCIAL
MANAGEMENT
5446

V. F. CREMONESE
MANAGER
PRODUCT
SUPPORT
5348

W. E. BROWN
CHIEF
ENGINEER
5560

J. L. MARTIN
MANAGER
PLANNING &
SCHEDULE
CONTROLS
5431

G. M. JACOBSON
PROGRAM
MANAGER
AREA WEAPON
SYSTEM
3024

MANAGEMENT

AAH PROGRAM MANAGEMENT TEAM (HUGHES)

M. I. LEIB
ASSISTANT PROGRAM MANAGER DEVELOPMENT
5472

TELEPHONE NUMBERS
COMMERCIAL TELEPHONE
(213) 305-XXXX

CORRESPONDING ADDRESS:
CENTINELA & TEALE STREETS
CULVER CITY, CA 90230

K. B. AMER
MANAGER TECHNOLOGY CHIEF SCIENTIST
5418

R. E. SNYDER
MANAGER AVIONICS & WEAPONIZATION
5380

C. L. LANDERS
MANAGER MECHANICAL SYSTEMS
5382

L. C. MILLER
MANAGER ENGINEERING SERVICES
5575

M. E. LARSEN
MANAGER ENGINEERING FLIGHT TEST
5000 (EXT 320)

T. D. DUHAMEL
MANAGER SYSTEMS ANALYSIS
5497

MAJOR GENERAL EDWARD M. BROWNE
AAH PROGRAM MANAGER
1911/12

COLONEL DONALD P. WRAY
PROJ MANAGER TADS/PNVS
1992

MR. WILLIAM H. BRABSON, JR.
DEP PROGRAM MANAGER
1911

MR. ROBERT D. HUBBARD
CHIEF, TECH MGT DIVISION
1961

MR. ROBERT L. JACKSON
CHIEF, LOG MGT DIVISION
1946

MR. FREDERICK D. MURPHY
CHIEF, PROG MGT DIVISION
1925

DR. FRANCIS E. SPRING
CHIEF, OPNS RES DIVISION
1931

MR. RONALD E. BOEHME
CHIEF, PROC & PROD DIVISION
1937

LT. COLONEL JOHN MARCY
ASST PROGRAM MANAGER (LOGISTICS)
1921

MANAGEMENT

AAH PROGRAM MANAGEMENT TEAM (ARMY)

COLONEL HAROLD L. JOHNSON
ASST PM
(TEST & EVAL)
AV 899-5105

LT. COLONEL DAVID LOGAN
PROJ MANAGER
30 MM AMMO
AV 880-3612

MR. ALBERT J. LAUBER
CHIEF, PRODUCT
ASSUR OFFICE
1952

LT. COLONEL GALEN ROSHER
ASST PROGRAM
MANAGER
(REQUIREMENTS)
1921

MR. JAMES N. HEMMER
CHIEF, CONFIG
MGT OFFICE
1941

MAJOR LYLE D. MONSON
ASST TO PM FOR
ANALYSIS, RE-
SEARCH, & MGT
1912

TELEPHONE NUMBERS
MILITARY AUTOVON
693-XXXX
COMMERCIAL TELEPHONE
(314) 263-XXXX

CORRESPONDING ADDRESS:
ADVANCED ATTACK HELI-COPTER PM
4300 GOODFELLOW BLVD.
ATTN: DRCPM—AAH
ST. LOUIS, MO 63120

TRADOC SYSTEM MANAGER (TSM) ATTACK HELICOPTER

COLONEL CECIL L. SHRADER TRADOC SYSTEM MGR

MAJOR JIM ROOP, LOGISTICS

LIEUTENANT COLONEL(P) JOHN D. ROBINSON, PERSONNEL

MAJOR MICHAEL L. BRITTINGHAM, TEST AND EVALUATION

MAJOR WILLIAM P. LEACH, TRAINING

MAJOR GARY M. BASS, COMMANDER, DTTD

DEVELOPMENT TEST TRAINING DETACHMENT

CW3 GARY W. DOMBROSKI, MAINTENANCE OFFICER

MAJOR ALLAN G. JOHNSTON, XO AND OPNSO

MASTER SERGEANT ANTHONY JOSEFOWICZ. 1SG — DTTD

SERGEANT FIRST CLASS JOE E. GASSETT, MAINT NCOIC

CLOSE ENCOUNTERS

OF THE TACTICAL KIND

MADE FASTER, EASIER, SAFER WITH OUR PMD

PROJECTED MAP DISPLAY

Close tactical encounters, close support demand a lot from the pilot. Flying NOE missions requires fast and accurate navigation, especially at night.

With our Projected Map Display, the pilot can remain terrain-oriented—regardless of weather, visibility, altitude, or speed. To establish position at any time during flight requires only a glance at the display.

Target hand-off is simple and straightforward—the PMD can display target coordinates in lat/long and UTM grid.

Comprehensive trials in five tactical aircraft have proven the PMD. Seven years of operational use have demonstrated pilot confidence and a reduction in cockpit workload.

Features of the PMD include:

- instant orientation—north or track up
- fast in-flight destination revision
- easy recce point storage
- full sunlight viewability
- demonstrated compatibility with night vision goggles

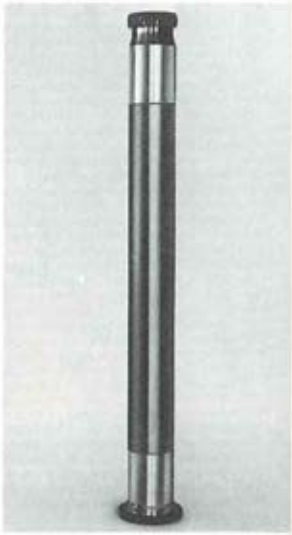
Let us tell you more. Contact us at Computing Devices Company, P.O. Box 8508, Ottawa, Canada K1G 3M9. You can also reach us by phone at 613/596-4841 or Telex 053-4139.

COMPUTING DEVICES COMPANY
a division of Control Data Canada, Ltd.

CONTROL DATA

Aircraft Gear Corp. Performs
For Hughes Helicopters YAH-64 Team

Aircraft Gear Corporation produces the intermediate and tail rotor gearboxes for the Hughes YAH-64. A unique feature of the gearboxes is that they employ only grease lubrication for high reliability and low maintenance. These grease gearboxes represent the first time this technology has been successfully demonstrated in the helicopter industry. Complete load-run testing is accomplished on test facilities established at Aircraft Gear Corporation.



The Main Rotor Shaft utilizes the unique marriage of INCO 718 and maraging steel through an inertia weldment. Weight saving: approx. 16 pounds.

Aircraft Gear has delivered 55,000 Aircraft Engine Gearboxes and Shafts to the aerospace industry over the past 17 years and is proud to be a member of the U.S. Army-Hughes No. 1 Team

AIRCRAFT GEAR CORPORATION

6633 W. 65th Street • Chicago, Illinois 60638 • Telephone 312 594-2100
TWX No. 910-224-3044

Today's pacesetter in helicopter avionics.

Helicopter builders need sophisticated, highly miniaturized avionics instrumentation and proven actuation mechanisms . . . the kind of equipment that advances the state of the art. And they find it at Clifton Precision.

That's why Clifton indicators were chosen for the Hughes YAH-64 Advanced Attack Helicopter, and why Clifton avionics components are making significant contributions to other major helicopter and aerospace programs.

Call our helicopter instrumentation specialists at (215) 622-1000 to discuss how Clifton components can contribute to your program.

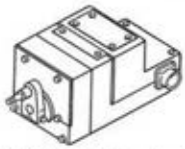
Litton **CLIFTON PRECISION®**
Special Devices · Drexel Hill, PA 19026

Radio Magnetic Indicator

Triple Tach Indicator

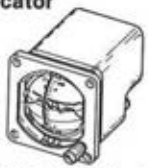
Triple Torque Indicator

Dual Torque Indicator



Electromechanical Actuator

Bearing-Distance Heading Indicator



Attitude Indicator

THE STANDARD FOR DOPPLER RADAR NAVIGATION SYSTEMS

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

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

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

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

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

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

The CDU performs three functions for the ASN-128:

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

Operational Advantages:

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

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

Kearfott

a division of The **SINGER** Company

By Mr. Ronald E. Boehme and Mr. James E. McKee

AAH Transition to Production

THE transition of the AH-64A Advanced Attack Helicopter from engineering development began on 10 December 1976 when Hughes Helicopters was awarded a contract to continue system development and integration on the YAH-64.

Currently, the program is in month 46 of the 56-month Phase 2 development contract. At the conclusion of the development program, the YAH-64 must demonstrate that it not only meets all of the Army's performance requirements; but also the entire system must achieve specific design-to-cost objectives conceived to optimize producibility and to ensure affordability.

To that end, a substantial **producibility engineering and planning (PEP)** effort has been included in the Phase 2 development as a funded requirement. The PEP program is the most ambitious production planning effort ever attempted by an Army Aviation program and will contribute substantially to the success of the AH-64 production program, particularly in meeting established cost goals and delivery schedules.

Purpose of PEP

The fundamental purpose of PEP is to ensure the economic producibility of the YAH-64 rial as well as to provide a smooth transition from development to production. Thus, PEP must be an integral part of the engineering design effort to identify potential manufacturing problems and suggest design and schedule tradeoffs which will facilitate the manufacturing process.

ABOUT THE AUTHORS

Mr. Ronald E. Boehme serves as the Chief of the Production and Procurement Division, AAH Program Manager's Office. Mr. James E. McKee is the Production Manager—Advanced Attack Helicopter at the prime contractor, Hughes Helicopters.

Two major tasks

PEP is really two distinct tasks: The first is producibility engineering where manufacturing specialists work in conjunction with design engineers to optimize the production design. This optimization includes the selection of the proper materials and processes to achieve the required levels of aircraft performance without adversely affecting availability and affordability of selected materials.

For example, cost trade-off analyses are made to determine if castings or forgings are more cost effective than other methods. Similar trade-offs are made during design review of the hydraulics, avionics, electrical, and environmental control systems.

Concurrent with the design review activity, selection of the most cost effective manufacturing process is considered as it relates to the manufacturing state-of-the-art. Hughes Helicopters, the prime contractor, has made a sizable capital investment in machine tooling and equipment as well as refurbishing and improving existing facilities to assure maximum production efficiency.

Specific major subcontractors and supporting vendors are being evaluated and selected on the basis of their overall capability to meet the technical and affordability standards of the AH-64 production program.

In addition to the producibility engineering activities, separately funded **Manufacturing Methods and Technology (MM&T)** programs are being conducted under the guidance of AVRADCOM. MM&T programs are purposely aimed at reducing high cost or improving low

PRODUCTION (Cont. from P. 59)

reliability manufacturing processes.

Examples include advanced metal forming and joining methods, tooling concepts for non-metallic structures, and advanced composite manufacturing techniques. The effects and results of these MM&T programs are being evaluated and applied to the AH-64A production plans to create efficiencies and reduce production risks.

The use of advanced composites is being considered for the production aircraft and will be introduced into the production program at an appropriate point when technical risks have been eliminated and direct weight, cost and/or affordability benefits can be realized. Specific components of the AH-64A being considered for advanced composite applications are the main and tail rotor blades, the tail boom, and empennage surfaces.

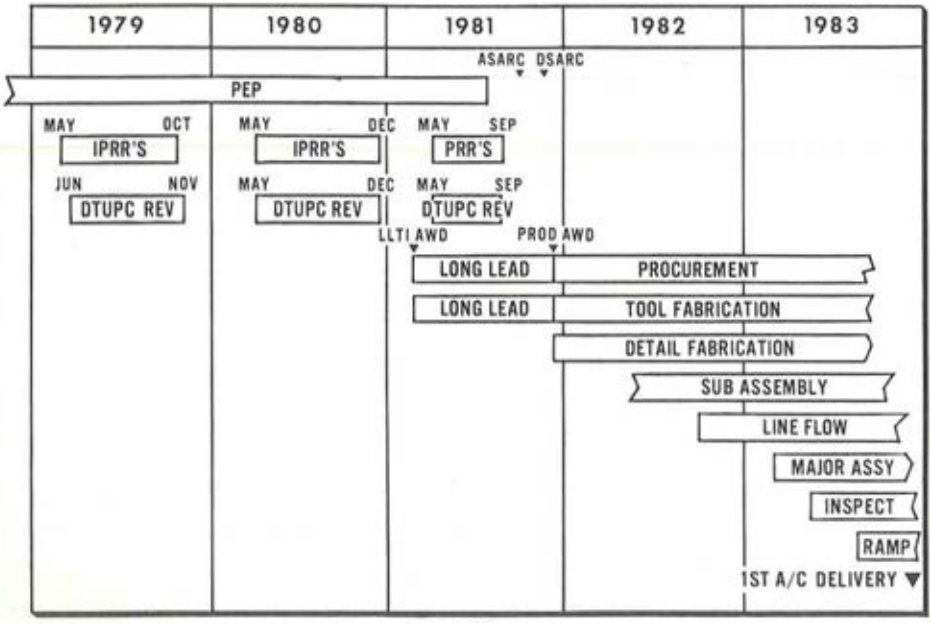
The objective of the producibility engineering task is to generate completed production drawings supported by qualified hardware so that the AH-64 will go into production with producible components in a practical manufacturing system.

The second major PEP task is **planning.** Planning means much more than just the preparation of the documents that initiate and control the material procurement, manufacturing, and quality assurance operations.

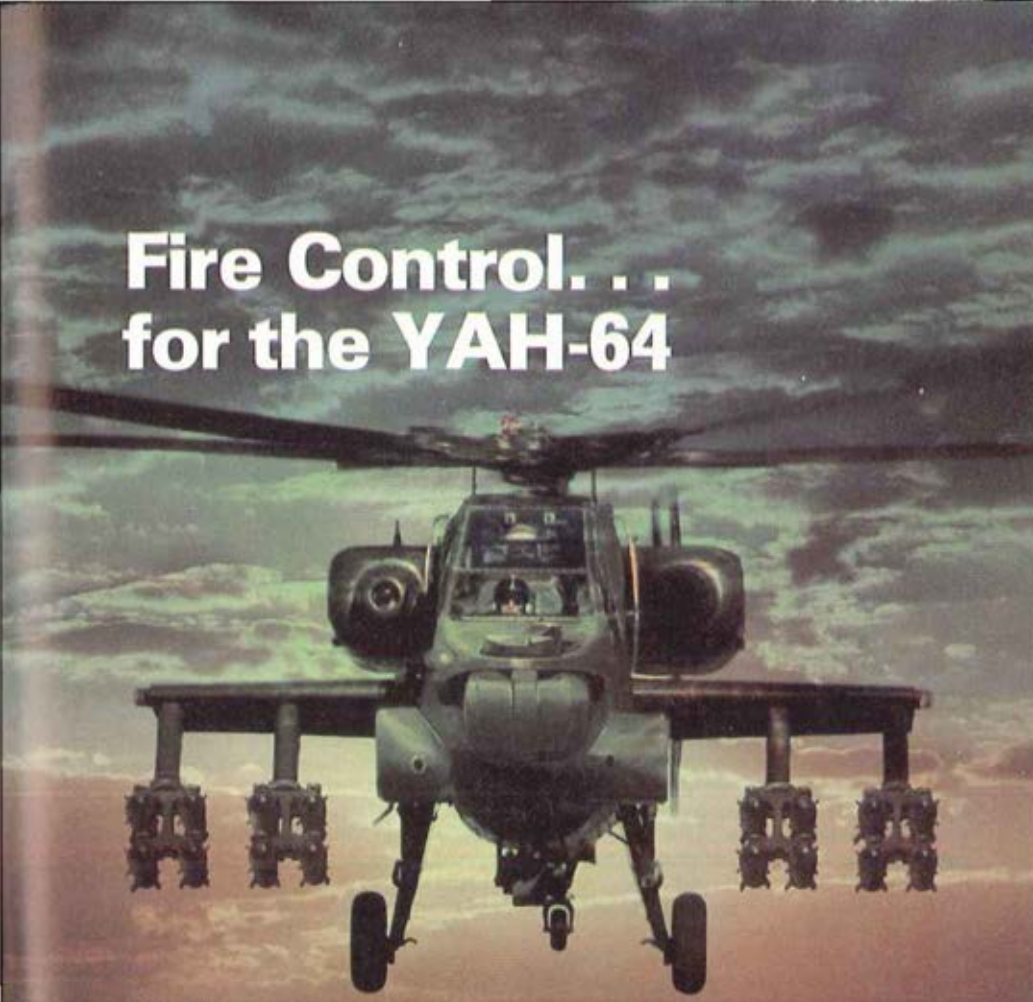
Plans for facilities, equipment, human resources, training, and subcontractor and vendor selection must be formulated, coordinated, and documented. Detailed review and analysis of procedures for Quality Assurance, Production Control, Accounting, and Reporting must be performed to insure that all systems are operational when production begins and will yield the control and visibility required to manage the program.

Other planning considerations include rate buildup analysis, rate tooling requirements, interface control tooling requirements, interchangeability and replaceability plans, and make-or-buy decisions.

AAH PRODUCTION TRANSITION



Fire Control. . . for the YAH-64



The Advanced Attack Helicopter (AAH) is ready for production. The AAH lethality and performance are unmatched by any helicopter.

The Fire Control Computer (FCC) is the heart of the sophisticated fire control system.

The FCC computes ballistic trajectories for all weapons on-board the AAH, monitors the health of the 14 subsystems and is the primary bus controller.

Teledyne Systems Company is the worlds largest supplier of computers for Army helicopters. It's no wonder that Hughes Helicopters and the Army selected Teledyne Systems Company to design and build the FCC.

Want more power? Teledyne Systems has a version which runs in excess of 1.3 mega-operations per second.

TELEDYNE SYSTEMS COMPANY

"The Army Systems Company"

Planning activities are in progress at all major subcontractor AAH Team facilities. Hughes is leading this team effort to build a coordinated and integrated production plan which will be ready to implement when the production contract is awarded.

As a method of documenting PEP effort, Hughes is required to submit a Production and Facilities Plan. When completed, this Plan will contain a Production Master Phasing Chart, a Manufacturing Plan, a Facility Description, a Tooling Design Approach, a Proposed Production Control System, a Make-or-Buy Plan, a Materiel Plan, Estimated Production, Manpower Requirements, Identification of Long Lead Materials and Items, and the Status of Existing MM&T projects.

The Production and Facilities Plan is a progressive document and is updated on a quarterly basis. It will be the major document utilized by the Government to determine Production Readiness status prior to the Production DSARC currently scheduled for November 1981. Currently, Hughes is contemplating a final assembly line comprised of 22 stations.

Long Lead Time Items

The period of time between the AAH production award and the completion of the first production article is 24 months (See Figure 1). However, some material procurement and fabrication activities must be initiated up to ten months earlier to insure first article delivery on schedule.

Most of the long lead materials fall into the categories of castings, forgings, electrical connections, titanium plate, microprocessor components, and maraging steel. Fabrication of master models, tool masters, casting patterns and forging dies will also be part of the long lead effort required.

Program Schedule

Sufficient PEP must be completed prior to February 1981 to support the initiation of long lead procurement efforts. All PEP effort must be essentially complete by August 1981 when Engineering Development ends. Long lead procurement efforts will be restricted to those items required to achieve a first production delivery 34 months later.

The December 1981 production award will include the balance of funding required to deliver 14 aircraft to meet the required delivery schedule, provide the ancillary support required to field the aircraft, and fund the long-lead effort for the FY 83 buy of 78 aircraft.

AAH PROCUREMENT QUANTITIES

FY	PROCUREMENT	AWARD
1981	LLTI	FEB 81
1982	14 A/C	DEC 81
1983	78 A/C	OCT 82
1984	96 A/C	OCT 83
1985	96 A/C	OCT 84
1986	96 A/C	OCT 85
1987	96 A/C	OCT 86
1988	60 A/C	OCT 87

Subsequent contract award dates and aircraft quantities are shown in **Figure 2.** The peak production rate of eight aircraft per month will be reached in the second production year and will be maintained until buy is made in FY 88.

Long Lead Time Items

In May 1980, the Government issued a **Request for Proposal (RFP)** to Hughes for **long lead time items (LLTI).** The Hughes technical proposal was received by the Government in August 1980 and the cost proposal in September 1980. Subsequent proposal evaluation and fact-finding by the Government will lead to negotiations in December 1980, culminating in the award of a February 1981 LLTI contract.

A February 1981 LLTI award is also planned with Martin Marietta on the TADS/PNVS based on an option negotiated during the TADS/PNVS source selection process. The long-lead contract for 12 GE T-700 engines will be awarded in February 1981 based on an option currently planned for inclusion in the **Black Hawk** fifth year production buy now scheduled for award in October 1980.

Production Readiness Reviews

Periodically during the PEP program, the Army conducts **Production Readiness Reviews (PPR).** Teams comprised of production specialists from the AAH Program Manager's Office, supported by other technical experts from various commodity commands

and the DOD Production Engineering Services Office (PESO), conduct in-depth reviews of major subcontractors, vendors, and the prime contractor, Hughes Helicopters. These reviews are intended to identify areas of risk to the production program and elicit specific action plans to prevent potential problems.

The Army conducted the initial series of AAH PRR's at Hughes Helicopters and their major subcontractors during the last half of 1979. The second series of preliminary reviews began in July 1980 and will be completed in Dec 1980. Final PRR's will be conducted from May to Sept 1981 and will provide the final production readiness check-point prior to initial production contract award.

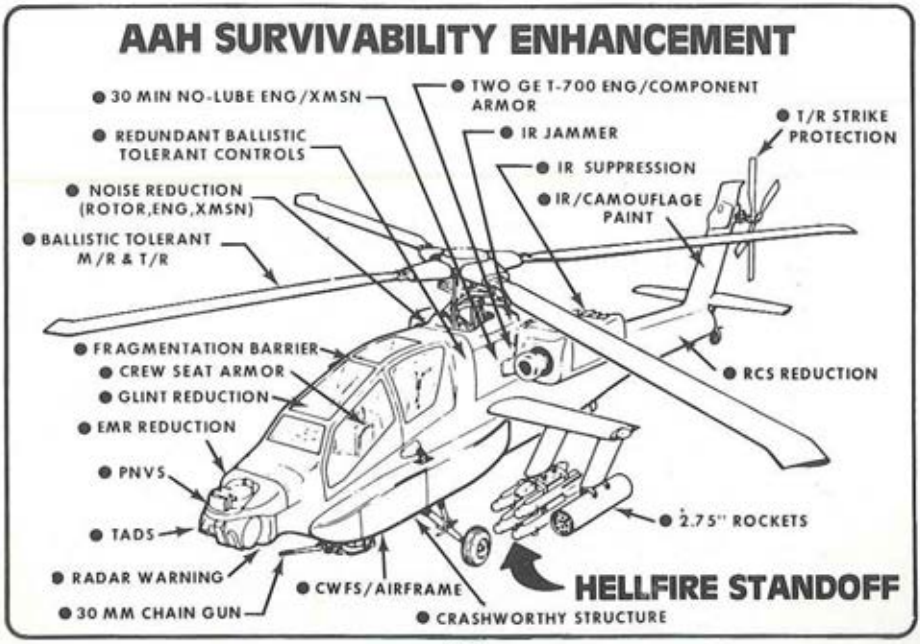
The AAH Program is depending heavily on the early initiation of PEP activities to provide a smooth transition to production. The current status of Hughes'in-house PEP effort reveals that as of August 1980 approximately 50% of the identified Manufacturing Planning Packages are complete. This PEP status has been attained at a time when 13 months of engineering development effort remains to be accomplished and full production award is still 17 months away.

It is likely that some production replanning will have to be done in response to unforeseen design changes that may be necessary before the development program concludes. The significant investment made by the Government in the PEP area, combined with the early production planning accomplished by the AAH contractors and subcontractors, will minimize the impact of last minute changes and will insure that the transition of the AAH to production will be accomplished in accordance with current plans and schedules.

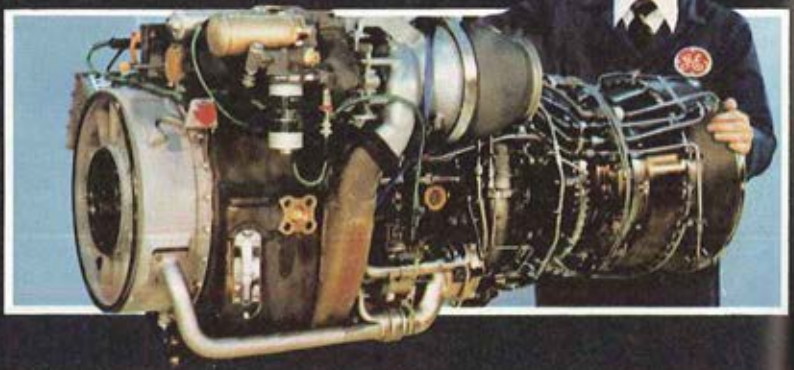
The benefits of this early planning should make itself felt throughout the AAH production phase and contribute significantly to on-time deliveries within established cost goals. □

Program Manager's Comments

In the following article, the ODCSOPS Army Aviation Officer, Brigadier General 'Dick' Kenyon, provides us the Pentagon perspective on the AH-64's anticipated contributions to the Army Aviation force modernization.



AAH Power



The T700: The in-production engine ready for the rugged AAH mission

One real test of anti-armor airborne weapons is the nap-of-the-earth mission. Backed by rigorous testing and field experience in Army helicopters, T700 engines are superbly suited for the Hughes AH-64A Advanced Attack System. The reasons: integral inlet protection, fast response and power margins that provide durability, survivability and mission reliability.

GENERAL ELECTRIC

By
Brigadier General
Richard D. Kenyon
Army Aviation
Officer—DA

AAH: The Key Element

OUR highest priority aviation system continues to move along at an enviable pace. Since I last addressed the **Advanced Attack Helicopter (AAH)** program, significant progress has been made toward completing developmental testing and preparing for operational testing, thus setting the stage for the forthcoming production decision.

This progress has been the result of efforts by members of the entire Army Aviation team. For the Project Manager, **Major General Ed Browne** and the members of his team, this has meant installing new stabilators on all flying prototypes, supervising the **Target Acquisition Designation Sight (TADS)** and **Pilot Night Vision Sensor (PNVS)** fly-off, and integrating the weapons system.

The major advance

For the HELLFIRE PM and TRADOC Systems Manager, the most important advance made last year was the successful completion of HELLFIRE Operational Test. The favorable results reflect the tremendous efforts put forth by both in conjunction with those made by the Combat Development Experimentation Command and contractor personnel. In fact, HELLFIRE has been one of our more successful missile development programs.

Additionally, the Attack Helicopter TSM expended considerable effort preparing for the upcoming AH-64 operational test. DA staff officers have responded promptly in providing answers to DOD, OMB, and Congressional inquiries on the status of development, funding, and operational employment of the AH-64.

Without this integrated and coordinated approach my report would be considerably less encouraging. We can all be proud of the outstanding effort of this All-American team.

The AAH continues to promise an increased anti-armor capability for the ground commander and a new dimension for the role of Army Aviation as an integral member of the combined arms team.

Enhanced survivability is the AAH's single most significant advance. It gives the AAH an increased anti-armor capability and its advantage over existing airframes. This survivability comes from substantial improvements in agility, vertical rate of climb, and hover out-of-ground-effect that optimize **nap-of-the-earth (NOE)** flight.

Coupled with improved airframe design, an optimized **aircraft survivability equipment (ASE)** suit, and extended range engagement, this NOE capability enables the AH-64 to survive on the FEBA while providing the commander with the firepower needed to kill tanks.

This past year has been particularly significant in the life cycle development of the AH-64 as it continues to mature with its full suit of equipment — an array of weapons, sophisticated fire control, and unique target acquisition and night sensor systems. As integration of these items approaches completion, the Army Aviation community must turn its eyes to the future. After the decision is made to proceed with procurement of the AH-64, other people and agencies must assume more important roles in supporting the fielding of the AH-64.

The key concept among the efforts to insure the smooth and timely intoduction of the AH-64 into TOE units is the Army's concept of **Integrated Logistics Support (ILS)**. The word, "integrated", in ILS means that logistics support planning must be conducted and implemented simultaneously and on a co-equal and integrated basis with the materiel development events of the AH-64.

The Transportation Center at Ft. Eustis, the AH-64 Program Manager, and other members of the Army logistics community now face the

ELEMENT (Cont. from Page 65)

challenge of coming up with a workable maintenance plan that will insure continuous operational readiness of this most important combat asset. Their joint effort must consider the experience level of our current soldiers as well as that of expected wartime inductees.

Support and test equipment that is reliable, simple, and rugged must be designed, tested, procured, and delivered to the maintainer to support the maintenance plan. The challenge here is that a highly trained and well-experienced maintenance person in a major combat unit would need less elaborate test equipment than a less experienced man; proper balance must be achieved.

Maintenance Planning

Concurrent with maintenance planning, the logistics community is addressing the multi-faceted challenges of supply support, transportation, and handling. This includes the necessary management actions to determine requirements for acquisiting, cataloging, packaging, storing, transferring, issuing, and disposing of repair parts, spares, fuel, ammunition, and materiel systems.

To operate and maintain the technically advanced AH-64 the crewman and field mechanic must have readily available and readable manuals that are accurate and functionally laid out. Additionally, these manuals must recognize the changing nature of today's soldier while insuring quality mission performance.

A long-range challenge to fielding the AH-64 is the planning and construction of production facilities by the manufacturer, maintenance facilities by the maintainer, and daily storage pads and training ranges by the user. Lead time in planning the construction of these facilities dictates that a timely distribution plan be formulated based on priorities, the postulated threat, and availability of assets.

To fly, to maintain, and to rearm and refuel the AH-64, personnel in the number and skills necessary to accomplish these functions must be recruited, trained, and deployed to our user units. To accomplish this Ft. Knox has accepted the challenge of insuring that we have carefully thought out operational TOE's and fully articulated organizational and operational concepts.

Fort Rucker and Fort Eustis have the challenge of insuring that we have thoroughly trained pilots and crewmembers who understand the complexities and employment of this advanced system. To support training and to insure a more cost effective product, combat simulators and other training devices must be utilized to the maximum extent possible. This is dictated by our declining resources coupled with our necessity to maintain the highest level of combat readiness possible.

A Great Promise

Perhaps the greatest challenge in implementing ILS will be funding the design, procurement, issue, and combat utilization of the AH-64; this challenge must not be underestimated. With inflationary, across-the-board cost increases, the PM, together with TRADOC and using units, are forced to apply innovative solutions to the problem of resource conservation. All our analytical skills and management tools must be brought to bear on this problem for it will take a continuous effort and our combined talents to ensure a favorable outcome.

The great promise of the AAH has become a reality because of the full efforts of all members of the Army Aviation community. We're now challenged to transition rapidly and smoothly from development to full field operational capability.

I've attempted herein to address the parameters of this challenge. While promise of success is clearly evident, significant challenges still remain. These will be met and answered by the continued praiseworthy efforts of the entire AAH team! □

A NATURAL!

Two Army Aviation families were united on August 16 when Deborah Ann Crouch, daughter of Colonel and Mrs. William E. Crouch, Jr., of Ft. Rucker, AL, was married to Lieutenant James Marsh Hesson, Jr. at Fort Rucker's Chapel of the Flags. The groom, an Army Aviator, is the son of Colonel(P) and Mrs. James M. Hesson, of Ballwin, MO. Both, coincidently, are members of the Army Aviation Association's National Executive Board.

By
Brigadier General
Carl H. McNair, Jr.
Commander, U.S.
Army Aviation
Center

USAAVNC: Training to Fight!

THE Advanced Attack Helicopter (AH-64) is the most significant system advancement in the history of Army Aviation. As such, it is destined to make a tremendous contribution to the combined arms team on the field of battle.

From its inception, the AH-64 has been engineered and developed as an attack system incorporating the most advanced weapons systems technologies. While the **Target Acquisition Designation Sight (TADS)**, the **Pilot's Night Vision Sensor (PNVS)**, and **HELLFIRE Modular Missile System (HMMS)** are the most visible and pronounced, there are a multitude of other advancements, including unprecedented crashworthiness and survivability characteristics. These components combine with a unique airframe, rotor system, and powerplant to make the AH-64 the world's foremost tank killer.

Greatest challenge ahead

While the successes of the past year have been significant in the AH-64 development program, the coming year will bring the greatest challenge yet. The ship will be placed in a tough realistic operational environment to assess its mission performance, responsiveness, reliability, and flexibility — in other words, it will be evaluated as a fighter for "any future battlefield."

We anticipate that the AH-64 will measure up to our expectations and its specific requirements and that its total acquisition will be a vital and essential addition to our current attack helicopter force — if we are to meet and defeat the battlefield threat of the eighties.

Rather than cover the same ground as other articles in this special issue devoted to the attack helicopter, I would like to focus my efforts upon the role of the U.S. Army Aviation Center in training combat aviators to fly in and fight with the AH-64 system.

When the system is introduced into our force structure in a couple of years, we must accomplish the integration in a rapid efficient manner, thereby assuring full combat readiness in the shortest possible time. To gain the full impact of the AH-64 as a force multiplier, our flying and maintenance support personnel must be top quality and thoroughly trained from the outset.

Institutional Training

It certainly comes as no surprise that the AH-64 embodies many sophisticated subsystems about which the Army lacks field experience. We simply cannot get the kind of battlefield performance we expect and need without such technological sophistication. Therefore, preparing for the arrival of the AH-64 will be a total TRADOC team effort with Fort Eustis qualifying maintenance test pilots and providing the 67 and 68 series specialists and Fort Gordon and Fort Eustis qualifying the 35 series personnel to include operators for the new **Automatic Test Equipment (ATE)** and the **Equipment Repair Facility (ERF)**.

AH-64 flight crew training (pilot and copilot/gunner) will be conducted at Fort Rucker in an institutional environment. Here, all the essential training aids, simulators, and field facilities to include an expanded range complex to accommodate the HELLFIRE missile will be provided to insure a total product.

The program of instruction currently being planned not only calls for teaching flying skills, but also how to fight the AH-64 as a weapons system. This is somewhat of a new role for Fort Rucker. While the school here has long trained the aviator in individual skills and fundamentals, the actual tactical employment of the

TRAINING (Continued from P. 67)

weapons system and the crew training has been accomplished in our units. Where better, however, with this new and most demanding system to fine tune the tactical skills than at the Aviation Center?

Thus, we will train to fight with a weapons system and to fly the aircraft carrying it. Each pilot must be trained to fly and fight from either crew station, and to fly and fight in all weather conditions during daylight or darkness. Two factors motivate the above statements: first, manpower constraints (especially in peacetime) that limit crew rations; and, secondly, operational restrictions that would occur if specialized personnel were required for day or night or if crewmembers were qualified in only one crew compartment.

Full Training Necessary

The AH-64 must be able to respond rapidly to accomplish any assigned mission under all conditions. This argues persuasively for fully trained personnel capable of efficient employment from either crew station and at any time of the day. However, once individual training is completed and unit/collective training begins, the crews should be formed and stabilized to build teamwork and establish required crew coordination.

Furthermore, as in armor and other combat units, crews should be assigned to a specific aircraft as a team. This coordinated crew arrangement serves to enhance a thorough man-man/machine interface. A crew's thorough knowledge of their weapons system greatly contributes to their overall combat effectiveness.

Combat effectiveness is also based on an acceptable availability rate of equipment. This can only be achieved and sustained if the maintenance personnel are well trained. The AH-64 is sufficiently sophisticated and different from current inventory aircraft that all maintenance personnel should be trained in an institutional environment as opposed to training with the New Equipment Training Team concept. We cannot afford to do otherwise if near term readiness is to be achieved and sustained.

Training Strategy

The Aviation Center is actively involved in developing the necessary training strategy to produce a fully qualified combat aviator for assignment to operational units. Hughes Helicopters, by contract, will provide all training programs, training aids, and equipment manu-

als for use by the Army. This requirement is being orchestrated by the TRADOC System Manager and accomplished through the close coordination and cooperation of TRADOC schools, TRADOC training advisors, the Program Manager, and Hughes' training developers.

I have visited with each of these activities to make a training status assessment and am pleased to report that the training program is coming together in a comprehensive and cohesive fashion.

A More Complex System

Our experience with fielding the UH-60A **Black Hawk** and the inception of its training program, a success in its own right, has been of great value to us in planning for the AH-64. The AH-64, however, is a more complex system and the added elements of attack tactics with the TADS, night operations with the PNVS, and overall crew harmonization present us with some unique considerations which have not occurred in the **Black Hawk** program.

Every opportunity is being taken to update or validate the training information to keep it abreast of the development program. After every mandatory test phase, the lessons learned are used to revise and update this information. Upon completion of OT II, a revision will occur and the training and support material (POI's, checklists, technical manuals, and training aids) will be available for instruction concurrently with the fielding of the production AH-64. The updated information will be delivered to the U.S. Army for use in the development of formal courses of instruction at the TRADOC Schools.

Experience — Expertise

The AH-64 is the first helicopter in the world which will provide a night target acquisition and pilotage capability. Thus, we have much to learn about its employment if we are to gain the absolute maximum which the unique features of this system permit.

During the last 18 months, pilots of the **Development Test and Training Detachment (DTTD)**, located at the Advanced Attack Helicopter test site, have made an extremely valuable contribution to this heretofore unknown arena of piloting technique using a monocular FLIR video image augmented with dynamic symbology.

This experience and expertise in flight technique and instructional techniques are presently assembled for the U.S. Army only in

An Army AAH is shown lurking in defilade and awaiting its call into action.

A Call to Arms for the YAH-64

IMC is proud of its contribution as a supplier to the Army Aircraft Industry.

IMC Manufacturers:

- Specialized AC & DC Motors
- Fans & Blowers
- Valves
- Atomizers
- Pressure Switches & Actuators
- Auxiliary Power Supplies

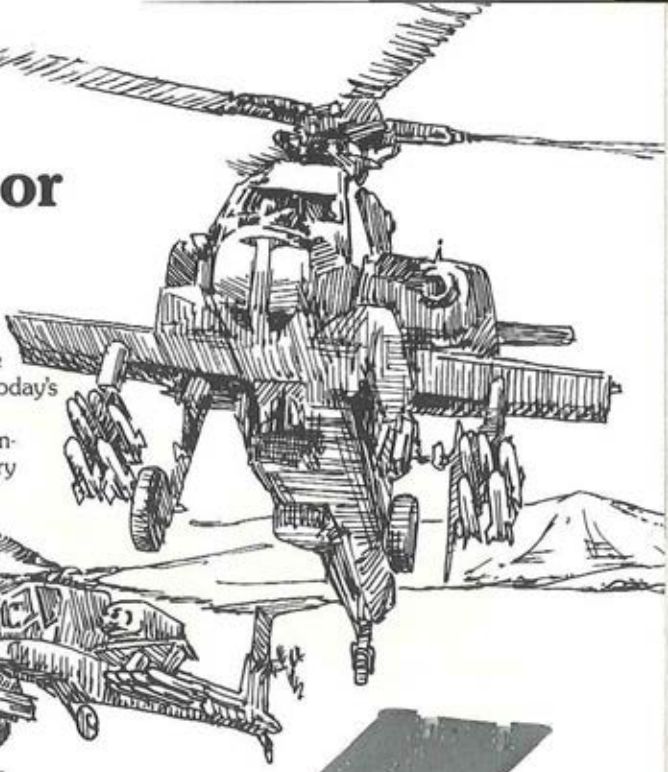
Bugler
Veteran Corps of Artillery, SNY
Organized 1790

IMC MAGNETICS CORP.

Executive Offices and Eastern Division—570 Main Street, Westbury, New York 11590
Arizona Division—1900 East Fifth Street, Tempe, Arizona 85281
New Hampshire Division—Route 16B, Rochester, New Hampshire 03867
Western Division—6058 Walker Avenue, Maywood, California 90270
Hansen Manufacturing Company, Inc.—McKaw Summit, Princeton, Indiana 47670
A.K. Fans Limited—20 Upper Park Road, London, NW3 2UR England

Be on target with

AHF Ejector Systems



AHF ejector systems are built rugged and tough, yet have the quality and precision to meet today's requirements for sophisticated weaponry. With an AHF custom-built ejector system your military helicopter, fighter or bomber becomes a more efficient weapon.

Strong & Reliable

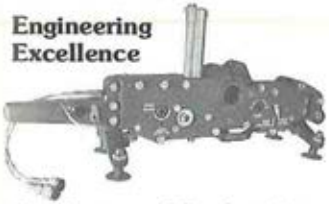
Designed to obtain maximum strength at a minimum weight, AHF ejector systems can be provided with internal safe locking, self latching suspension hooks, automatic swaybracing and emergency jettison.

Cost Effective

All manufacturing, including machined parts, sheet metal forming and electrical assembly is done by AHF. This all-in-one capability assures you of a lower cost per unit.

If you want a quality weapon suspension system for that helicopter or aircraft that can't afford to be off target — then make AHF ejector systems your first choice.

Engineering Excellence



Our Engineered Products Division can build ejector systems to your specific criteria. We have our own laboratory for experimental and qualification testing.

AIRCRAFT HYDRO-FORMING, INC.

131 East Gardena Boulevard / Gardena, CA 90248

Telephone (213) 321-0563 TWX 910-346-7632

Mailing Address: Post Office Box 2170 / Gardena, CA 90248

this organization. Problems first expressed, such as binocular rivalry, physiological and psychological adaptability, and workload saturation have been investigated and found to be relevant, but not paramount, in the selection and training criteria for pilot personnel. Effective training techniques can minimize the areas of concern.

An effort is underway to insure that the knowledge and experience gained by the DTTD will be available to the Aviation Center and the Transportation School to aid in establishing the training base for the AH-64 mission. I have been surprised by the comments of the crew that pilot workload is not all that much greater than in the AH-1S and that the aircraft is surprisingly easy to handle.

Of necessity, a total systems orientation and an intimate working knowledge of those systems are essential, but these too come with training. The **Heads-Up Display (HUD)** gives the pilot an unprecedented flexibility for coupling aircraft operations, day and night, with weapons employment.

Flight and hardware simulation will play a more important role than ever before in the training of AH-64 crewmembers and maintenance personnel. Aggressive coordination efforts by AAH-PMO, TRADOC training advisors, and PM-TRADE to identify and initiate procurement actions for the required simulation devices are underway.

Maintenance instruction will be supplemented using composite training devices simulating component location and workings of the AH-64. Aircrew training will be aided by state-of-the-art Combat Mission Simulators, and PNVS and TADS Simulators.

The Bottom Line

We at the Army Aviation Center are totally committed to providing operational units with individual aircrewmen, trained and qualified in both the front and rear seats, for all-weather/day and night tactical NOE operations. In concert with the other TRADOC schools, we will insure that personnel flying and maintaining the AH-64 system are thoroughly trained so as to facilitate the introduction of this system into the force structure.

With these well trained personnel complementing the AH-64 weapons system, the Army will be able to rapidly obtain full combat effectiveness from the fielded units. As with all Aviation Center products in the past, our motto is our trademark:

"We strive for excellence — Above the Best." □

Program Manager's Comment

TRADOC initiated the TRADOC Systems Manager (TSM) concept to have a single point of contact to coordinate with the user. Colonel "Lynn" Shrader is the TRADOC System Manager for the Attack Helicopter. In the next article he discusses the upcoming OT II on the AAH.

By
Colonel
Cecil L. Schrader
TRADOC Systems
Manager—AAH

TRADOC System Manager's User Comments

THE last year has been an eventful one for the AH-64. The stabilator has replaced the T-Tail and flight tests are showing that the stabilator is a success.

The TADS/PNVS competitive fly-off was completed on time; and the winner, Martin Marietta, and Hughes Helicopter Company, are heavily engaged in completing the systems integration. Last, but not least, efforts on the part of DARCOM, TRADOC, Concepts Analysis Agency, and the DA staff in defense of the AH-64 program have resulted in achieving a sound basis of support for the AAH in DOD and Congress.

Program successes of the past year have allowed us to start preparations for the coming year. As stated earlier, the past year was eventful, but the coming year will be even more so. The successful completion of the events scheduled for next year will mean that the Army will have an advanced attack helicopter under a production contract for the first time since the Cheyenne.

Operational Test II

The key event necessary to achieve a production contract award in December 1981 for the AH-64 is the completion of **Operational Test II (OT II)**. The OT II is scheduled to be conducted next year. On site test preparations will begin on 1 June 1981 and the test will be completed by 31 August 1981.

FORSCOM has designated the 7th Infantry Division to provide the player personnel for the test. The 7th ID has further designated its 7th Aviation Battalion to provide the attack helicopter company for the OT II. D Company, 7th Aviation Battalion, commanded by **Major Rick Diamond**, is the attack company that will be used as the test unit.

The **Combat Development Experimentation Command (CDEC)** is charged with the actual conduct of the test, but the **Operational Test and Evaluation Agency (OTEA)** is the agency which has the regulatory responsibility for the OT. OTEA is responsible for analyzing the OT II data and briefing the test results to the ASARC and DSARC scheduled in November 1981.

Test Objectives

The AAH OT II test objectives below are quoted from the outline test plan:

- "To obtain data to assess the operational effectiveness of the AAH weapons system in an operational environment, to include mission performance, mission responsiveness, mission flexibility, and weapons compatibility."
- "To obtain data to determine the correction of discrepancies discovered during DT/OT I."
- "To obtain data to partially assess the operational **reliability, availability, maintainability (RAM)**, and supportability of the AAH weapons system."
- "To obtain data to assess survivability of the AAH weapons system in an operational environment."
- "To obtain information on the deployment of the AAH weapons system."
- "To obtain information on the adequacy of the prepared training for operator and maintenance personnel on the AAH weapons system."

To address the objectives, OT II data will be generated by flying three AH-64's a total of 350 flight hours. The test is currently planned to have three phases — a training phase, a non-live fire phase, and a live fire phase. The non-live fire phase will involve a force-on-force tactical scenario.

Through a number of test iterations, the

TSM (Continued from Page 73)

AH-1S (MC) will serve as a baseline aircraft representing the best of our currently fielded attack helicopter technology; the AH-64 will be compared with the AH-1S (MC) to assess the performance differences between the two systems during typical attack helicopter tactical missions both day and night.

On the surface, it might appear that the AAH OT II is a relatively simple undertaking. As with so many things appearances can be misleading.

D Company of the 7th Aviation Battalion is heavily engaged in a training program to become proficient in the AH-1S (MC) and to become night vision goggle qualified. Collective training is being emphasized so that the unit will be at level one ARTEP standards by January 1981. This is important because training courses begin in January 1981 for the maintenance personnel and aviators who will transition into the AH-64. Fourteen aviators will be qualified in the AH-64; twelve personnel will be primary test players and two will be back-ups.

From the objectives listed previously, it can be seen that much will be learned from OT II. For the first time, the AH-64 will be placed in the hands of typical user personnel. This will provide an excellent opportunity to evaluate the training programs developed to date for the maintenance personnel and flight crews, evaluate the draft manuals and AH-64 associated equipment, and to assess the RAM characteristics and supportability of the AH-64 in an operational environment. The lessons learned from OT II will then be applied to refine training programs, manuals, and crew selection criteria.

To insure a good OT II, CDEC, OTEA, the test unit, the AAH-PMO, the Armor Center, and my office are deeply involved in the necessary planning and coordination for the test. At this time all systems appear go, and we are looking forward to the AH-64 and the HELLFIRE missile to really demonstrate their outstanding tactical effectiveness.

To conclude this report, I would like to summarize the missions and to update the status of the **TRADOC System Manager Office for Attack Helicopters (TSM-AH).**

The TSM-AH Office has the mission to conduct total system management for Attack Helicopters within TRADOC. This is a broad mission and includes the AH-1 as well as the AAH. The TSM-AH in effect is the user's representative in attack helicopter matters. In this respect I encourage calls and letters from the field to surface problems, ask questions, or tell us when something works well.

Since last year there has been a heavy personnel turnover in the TSM-AH office. **LTC Jerry Hipp** was reassigned to ODCSOPS-Aviation, Hq, USAREUR; **LTC Joe Moffett** was reassigned to Bremerhaven, FRG, and **MAJ Chuck Crowley** is commanding an Air Cavalry Troop in Korea. **Mr. Don Artis** is now in the Directorate of Combat Developments, Materiel Division here at Fort Rucker.

The current TSM—AH organization and personnel are shown in the photochart that appears on page 54 of this issue.

Program Manager's Comment

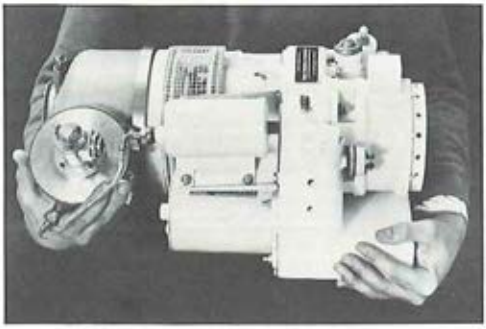
In the next editorial pages of this issue you will:

- *Look at other efforts around the world in Attack Helicopters.*
- *See photographs of distinguished foreign visitors to the AAH program, and*
- *Note that there is substantial interest in the AAH in our own country.*

WELL DONE!

This special issue of 'Army Aviation Magazine' devoted to the AAH marks the third time we've dedicated an issue to this program. Once again, as he did only 12 months ago, Major Lyle D. Monson, Assistant to the Program Manager for Analysis, Research, and Management, coordinated the flow of the issue's AAH articles, charts, and photographs, and obtained full copy clearance. In Skip Monson's own words, "This was not an easy task for it is an 'additional duty' when you work for the No. 1 Aviation Program under the best Program Manager in the business. I hope the readers appreciate the effort." (We're sure they do, Skip.)

Isn't it about time small helicopters got the same break the Titan APU gives the bigger guys?



Introducing Gemini

First we pioneered Titan,® the only auxiliary power unit used by the big production helicopters such as the Boeing Vertol Chinook and the Sikorsky Black Hawk.

Now comes Gemini.™

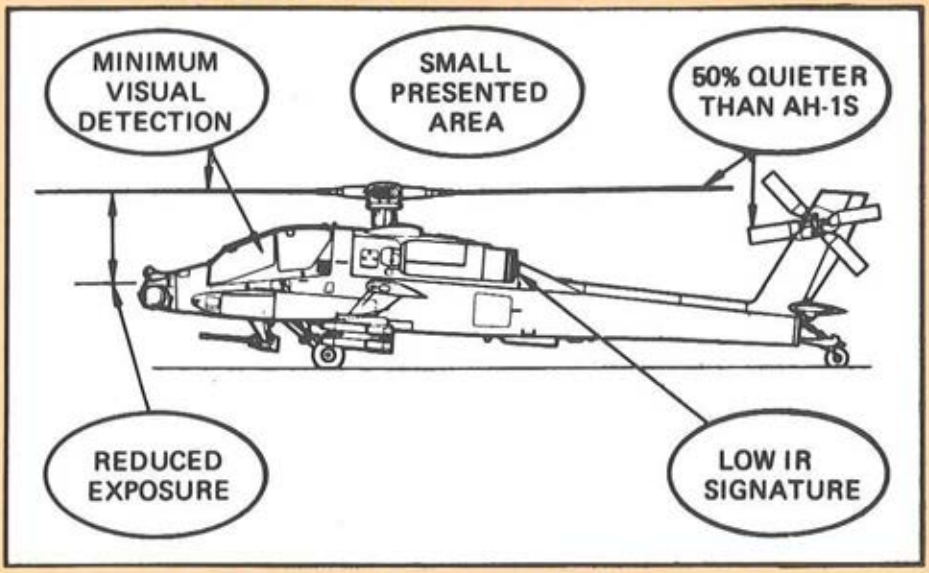
What Titan does for the big guys, Gemini can now do for the smaller helicopters, like the Cobra. Gemini provides self-sufficient starting without the use of ground carts. And saves main engine life, fuel, and maintenance costs, too.

Yet the Gemini gas turbine weighs just 53 pounds. That's less than half the weight of any other APU. And it uses a mere fraction of the fuel required by the main engine to provide the same services on the ground. What's more, Gemini is a rugged workhorse, designed to go 2,000 hours between overhauls.

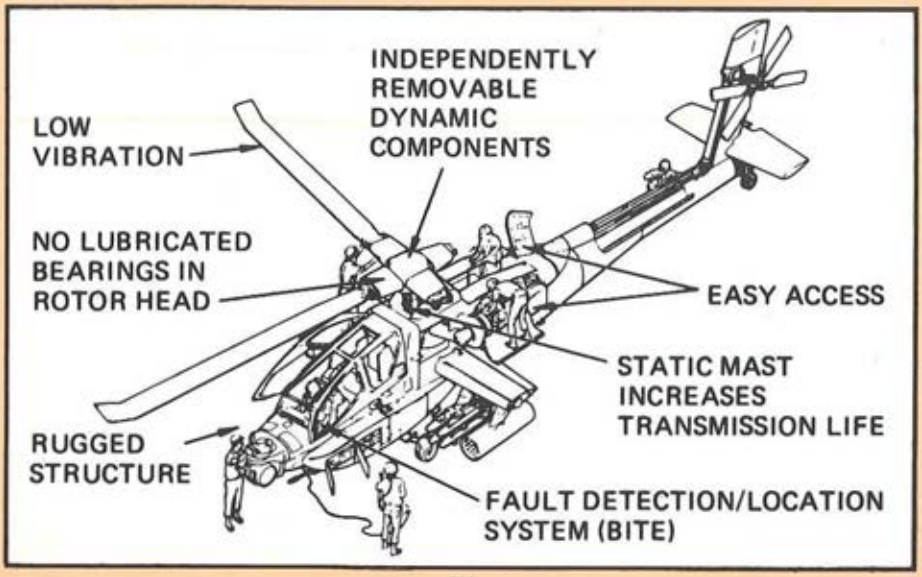
Meet the smallest, most reliable APU ever. Gemini.

TURBOMACH
A Division of Solar Turbines International
An Operating Group of International Harvester
4400 Ruffin Road, Dept. 2A,
San Diego, California 92123 • (714) 238-5754

Low Detectability of the AAH



RAM Features of the AAH



Colt Industries

Menasco Inc
California Division

The AH-64A airframe structures are ready for production...

Our homework is done, our facilities are in place and we're ready for Phase 3.

TELEDYNE RYAN AERONAUTICAL
a member of the AH-64A 'No. 1 Team'

What the rest of the world is doing in Attack Helicopters

As the U.S. moves cautiously to develop a true AAH, the rest of the world, heeding the lessons of Vietnam and aware of the impact of Soviet gunships in Afghanistan today, has moved rapidly in developing and fielding attack helicopters. The aircraft shown here represent some of the major international efforts.

AH'S WORLDWIDE

Top left and clockwise: MIL MI-24 Hind-A, USSR's armed assault helicopter.

Top center — Great Britain's Westland LYNX.

Top right, France's DAUPHINE SA 361H.

West Germany's MBB BO-105 PAH-1 (Panzer Atk Hel-1)

A French and German entry, the PAH-2/HAC.

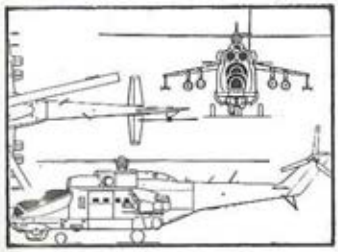
At the bottom right is France's ALOUETTE 3.

Below is Italy's Agusta A-109.

At bottom left, Italy's A-129.

The Soviet Union's Hind-D.

France's GAZELLE SA 342L.



Briefing and Inspections of U.S. Army's AAH Program

William R. Lummis, Chairman, Summa Corp.; Adm (Ret.) Isham W. Linder, OUSDR&E; Mr. Real; Dr. William J. Perry, USDR&E; and MG Browne.

Rep. Wm. L. Dickinson, Ala. Rep. Richard H. Ichord, Mo.

Rep. Wm. L. Dickinson, Ala.

MG Edward M. Browne; Hon. Percy A. Pierre, ASA (R&D); Jack G. Real, HH President.

Rep. James F. (Jim) Lloyd, California

Hughes AH-64A, during '80

Left to right: MG Edward M. Browne; Bill Newton, HH Test Pilot; Sen. Barry M. Goldwater.

MG Browne: GEN Donn A. Starry, CG, USA TRADOC; Norman B Hirsh, HH Deputy Program Director—AAH.

Don Waunch, staffer to Rep. James F. Lloyd, Cal. (in turtle neck, chats with the HH crew and MG Browne.

Robert G. Ferry, HH Chief Test Pilot; HH ground crew member; GEN John R. Guthrie, CG, USA DARCOM.

International Interest in the AAH

PROGRAM MANAGER'S COMMENT: I mentioned earlier that our first effort at Rationalization, Standardization, and Interoperability (RSI) in the AAH Program was in the area of ADEN-DEFA ammunition. I've briefed the NATO Panel X on air vehicles for tactical air mobility on the AAH, and I see excellent potential for some commonality/standardization among NATO attack helicopters. The photos below depict some of the distinguished visitors from NATO countries who have been briefed on the U.S. Army's AAH Program this year.

CULVER CITY, CA—Shown at the Hughes Flight Test Center at Palomar Airport, Carlsbad, California. receiving an update briefing on the Advanced Attack Helicopter (AAH), from left, are Hans-Juergen Wiess, West Germany Ministry of Defense, Foreign Armament Dept; Maj. Gen. Edward M. Browne, AAH-PM; Brig. Gen. Hans-Guenther Kannegiesser, West German Air Force Staff; Brig. Gen. Harro Tiedgen, West German Chief of Army Aviation; and Lt. Col. GS Franz Lanz, West German Air Force Staff.

PALOMAR, CA—Maj. Gen. James Withall, Director of the British Army Air Corps, right, chats with Maj. Gen. Browne, left, the AAH—PM, and Colonel Harold L. Johnson, Assistant AAH Program Manager for Test and Evaluation, during his visit to the Government Test Facility for an AAH briefing.

PALOMAR, CA—Shown in a group photo when the German Army delegation visited the Gov't Test Facility are, left to right, front row, Lt. Col. Franz Lanz; HH employee; Hans-Juergen Wiess; Maj. Gen. Browne; Jack G. Real, Hughes President; and Warren V. Griffith. Back row: HH employee; Brig. Gen. Kannegiesser; HH employee; Brig. Gen. Tiedgen; HH employee.

Proven performance from the only source
for accurate, full-range omni-directional air data

The Pacer Omni-Directional Air Data Sub-System for the AH-64

From −50 kts. to +200 kts. Three-axis. Fully compatible with other mast-mounted sensors. Provided with angle-of-attack sensing and anti-icing.

The Pacer Omni-Directional Air Data System feeds the following AH-64 systems: fire control, stability augmentation, navigation and pilot displays.

Its heart is the LORAS™ proven air data system. This system can also output airspeed components, ambient pressure, air density, temperature, pressure altitude, vertical speed, side slip, angle-of-attack, V_{ne}, and fault alerts for any helicopter application that involves: *fire control – flight control – flight recorders* (AIRS) – *navigation – pilot displays – performance computers* (API).

Pacer Air Data Systems are in production for the USCG HH-65.

Write or call:

Pacer Systems, Inc.

87 Second Avenue,Burlington, MA 01803 USA
Phone: 617-272-5995 TWX 710 332 6400

AAH-Firepower on

A TOTAL System fo
HARDWARE·ILS·TRAINI

Transitioning to Production

BY MG EDWARD M. BROWNE

As the foregoing articles in this AAH special issue have described, we have had a very busy year of testing, selecting, and integrating.

Changing the tail design to a stabilator and increasing the diameter of the tail rotor have dramatically alleviated the problems that we had at this time last year. I have flown the AAH in the nap-of-the-earth environment with these changes and its responsiveness and handling qualities are simply super.

With the selection of the Martin Marietta system, we have moved into the Maturity Phase of the TADS/PNVS. This electro-optical system enables the AAH to fly and fight during day and night and adverse weather. This system will enable us to alter battle schemes and deprive the enemy of freedom of movement under the cover of darkness or adverse weather.

The HELLFIRE missile has completed an Operational Test. Initial indications are that the results were excellent. The missile is now in its final stages of development, and is being readied for production.

The combination of AAH, TADS/PNVS, and HELLFIRE is truly *"A Total System for Battle — Transitioning to Production"*! All efforts are now directed at preparing for AAH Operational Test II which is, if you will, the prelude to the production decision.

My goals, and those of all who work on the AAH Program, are to:

- Meet or exceed the performance goals established in the **Materiel Need (MN)** document for the AAH.
- Produce the AAH and its weapons at an affordable price, and to
- Provide the U.S. Army with this *"Total System for Battle"* and thus add a new dimension of lethality to our combat power.

The AAH Army/Industry team will make sure that the AH-64 can accomplish its tank-killing mission.

Combined Arms Team: Your *"AAH Total System for Battle"* is Truly Transitioning to Production! □

OCTOBER 15, 1980 ISSUE ADVERTISERS

Aircraft Gear Corporation....56
Aircraft Hydro-Forming, Inc....71
Arvey Corporation....77
Autronics Corporation....79
Beech Aircraft Corporation....Cover III
Bell Helicopter Textron....9
Bertea Control Systems....38
Boeing Vertol Company....5
Canadian Marconi Company....41
Clifton Precision....57
Computing Devices Company....55
Dynamic Controls Corporation....79
E-Systems Memcor Division....35
Fairchild Aircraft Service....78
General Electric Company....64
Honeywell....79
Hughes Helicopters....Cover I, 18
IMC Magnetics Corporation....70
Jet Electronics & Technology, Inc....7
Kaman Aerospace Corporation....100
Litton Gudiance & Controls Systems....43
Lockheed Aircraft Service Company..77, 88
Lockheed Missiles & Space Company, Inc....30-31
Marconi Avionics, Inc....29
Martin Marietta Aerospace....44-45
Menasco, Inc....80
Norton Industrial Ceramics Div....36
Pacer Systems, Inc....85
Pneu Devices, Inc....78
RCA Gov't Systems Division....Cover II
Rockwell Int'l, Collins Government Avionics Division....14-15
Rockwell International, Missiles Systems Division....46
Sanders Defensive Systems Division....11
Sierracin Corporation....37
Sikorsky Aircraft....3
Singer Company, Kearfott Division....58
Teledyne Ryan Aeronautical....80
Teledyne Systems Company....61
Tracor Aerospace....13
Turbomach....75

FIVE DRAWINGS! NO PURCHASE IS NECESSARY!
ENROLL ONE NEW AAAA MEMBER TO COMPETE!

1980 AAAA SWEEPSTAKES

AIRCRAFT MODELS, TRIPS, MANY OTHER PRIZES!
HELP AAAA REACH ITS 1980 MEMBERSHIP GOAL!

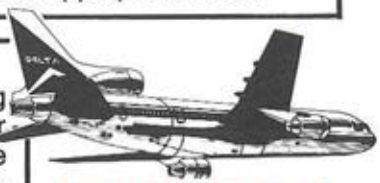
PRIZES!
The "starter" list of Sweepstakes' Prizes includes many hard-to-get models of the aircraft employed in Army Aviation, an expense-paid trip to AAAA's 1981 National Convention site, AA rings, 19" aluminum wings, an aviation "library", and other prizes to be announced in subsequent months. Help AAAA reach its Dec. 31, 1980 membership goal of 10,000 members by participating in the 1980 National Sweepstakes!

GRAND SWEEPSTAKES' FIRST PRIZE

As Grand Sweepstakes' winner, fly round-trip accommodations for two between any two points served by Delta Air Lines in the Continental U.S. on or before Dec. 31, 1981. The new members you enroll may also win **substantial** prizes! Their coupons will be entered in a separate **End-of-Sweepstakes' Drawing** for new members only. It's easy to enter! Just complete one or more of the coupons that follow, and have your new members complete the opposite side, and remit them with the appropriate dues.

FIVE CHANCES TO WIN!

Sign up **ONE** new AAAA member using the application form provided, and your coupon will be entered in **FIVE** separate Sweepstakes' drawings . . . You'll be competing for prizes in three **bi-monthly drawings** during the 1980 calendar year, the **Grand Sweepstakes' Drawing** to be held on January 15, 1981. That's **four** drawings in which you may still compete for prizes, and if you want to enter the **"Top Gun Drawing"** for AAAA's **Top Recruiter,** that's a **FIFTH** opportunity to win!



GENERAL RULES
No purchase is required. An AAAA member may submit as many entries as he wishes, and is not limited in the number of prizes he or she wins. All Federal, State, and Local Regulations apply, and an entry is void where prohibited by law.

Individual, Chapter Sweepstakes Leaders

SWEEPSTAKES' TOP GUN — THE INDIVIDUAL MEMBERSHIP ENROLLMENT LEADER
CAPTAIN WILLIAM S. BROPHY of the 101st Airborne Division (Air Assault) at Fort Campbell, Kentucky, is the current "Top Gun" in the 1980 AAAA National Membership Enrollment Sweepstakes having enrolled 140 new members during the period 1 January-31 July 1980.

CATEGORY I: LARGEST MEMBERSHIP GAIN (DIFF. BETWEEN 1 JAN—31 DEC 1980)
Chapter Prize: AAAA Walnut Plaque and an All-Expense Paid Chapter Hospitality Suite for One Night at the 1981 AAAA National Convention in Washington. D.C.
LEADER: Air Assault Chapter, Fort Campbell, Kentucky — Gain of +292 members.

CATEGORY II: LARGEST PERCENTAGE GAIN (% GAIN AT 31 DEC 1980 OVER 1 JAN)
Chapter Prize: AAAA Walnut Plaque and $100 Cash Award Payable at the 1981 AAAA National Convention in Washington, D.C.
LEADER: Old Ironside Chapter (Illesheim) — 69.5% Membership Gain over 1 January 1980

1980 CHAPTER TROPHY % MEMBERSHIP GAIN

Old Ironside (Illesheim)	69.5%
Morning Calm (Seoul)	54.6%
Bonn Chapter	46.6%
Air Assault Chapter	41.3%
Chicago Area Chapter	40.0%
Franconia-Marne Chapter	36.4%
Coastal Empire Chapter	34.1%
David E. Condon (Ft. Eustis)	33.5%
Stuttgart Chapter	29.6%
Metro-Atlanta Chapter	23.8%

1980 CHAPTER TROPHY NET MEMBERSHIP GAIN

Air Assault Chapter	+292
David E. Condon Chapter	+52
Morning Calm Chapter (Seoul)	+41
Lindbergh Chapter	+39
Old Ironside Chapter (Illesheim)	+32
Coastal Empire Chapter	+29
Franconia-Marne Chapter	+27
Leavenworth Area Chapter	+27
Southern California Chapter	+26
Monmouth Chapter	+25

WINNER—1SG James Neale, right, 101st Aviation Group, 101st Abn Div (AASLT), is all smiles as he accepts a UH-60A Black Hawk model as the winner of the January-February 1980 AAAA National Sweepstakes' drawing. Making the award presentation is COL Teddy G. Allen, President of AAAA's Air Assault Chapter at Fort Campbell, Kentucky.

DRAWING--Boeing Vertol President Joseph Mallen, left, draws the slip of the July-August Sweepstakes' winner, CW4 Norris M. Woodruff, as BV's Director of Medium Lift Helicopter Programs William P. Jones, right, holds the bowl. Holding the winner's model is BG Richard D. Kenyon, the DA Army Aviation Officer and a member of AAAA's National Executive Board.

1980 AAAA NAT'L SWEEPSTAKES
1 CRESTWOOD ROAD, WESTPORT, CT 06880

As a member of AAAA and in accordance with the Sweepstakes' general rules, I enter this Coupon in the 1980 AAAA National Sweepstakes. I've enclosed the first year dues of the new member whose application appears on the reverse side. I understand I need not be present at any drawing to win.

Print Name.....

Address .....

City .....State ..... ZIP .....

GENERAL RULES
An entrant must be an AAAA member at the time of entry. Renewals of January-December, 1979 memberships are not considered as "new memberships." Entry constitutes full approval to publish name, address, and/or photo without add'l compensation. Additional '80 Sweepstakes' forms available on request, or a same size facsimile may be utilized.

Recruiter's Coupon

1980 AAAA NAT'L SWEEPSTAKES
1 CRESTWOOD ROAD, WESTPORT, CT 06880

As a member of AAAA and in accordance with the Sweepstakes' general rules, I enter this Coupon in the 1980 AAAA National Sweepstakes. I've enclosed the first year dues of the new member whose application appears on the reverse side. I understand I need not be present at any drawing to win.

Print Name.....

Address .....

City .....State ..... ZIP .....

GENERAL RULES
An entrant must be an AAAA member at the time of entry. Renewals of January-December, 1979 memberships are not considered as "new memberships." Entry constitutes full approval to publish name, address, and/or photo without add'l compensation. Additional '80 Sweepstakes' forms available on request, or a same size facsimile may be utilized.

Recruiter's Coupon

1980 AAAA NAT'L SWEEPSTAKES
1 CRESTWOOD ROAD, WESTPORT, CT 06880

As a member of AAAA and in accordance with the Sweepstakes' general rules, I enter this Coupon in the 1980 AAAA National Sweepstakes. I've enclosed the first year dues of the new member whose application appears on the reverse side. I understand I need not be present at any drawing to win.

Print Name.....

Address .....

City .....State ..... ZIP .....

GENERAL RULES
An entrant must be an AAAA member at the time of entry. Renewals of January-December, 1979 memberships are not considered as "new memberships." Entry constitutes full approval to publish name, address, and/or photo without add'l compensation. Additional '80 Sweepstakes' forms available on request, or a same size facsimile may be utilized.

Recruiter's Coupon

ARMY AVIATION ASSOCIATION

1 Crestwood Road, Westport, Conn. 06880

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

RANK FIRST NAME LAST NAME

STREET ADDRESS

CITY STATE ZIP

☐ CHECK ENCLOSED PAYABLE TO AAAA. ☐ PLEASE CHARGE ☐ MASTER CHARGE ☐ VISA CARD NO.

AMOUNT $ EXP. DATE INTERBANK NO. (MASTER CHARGE ONLY)

SIGNATURE

List your AAAA Professional Qualification

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

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

AAAA ANNUAL DUES

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

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

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

ARMY AVIATION ASSOCIATION

1 Crestwood Road, Westport, Conn. 06880

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

RANK FIRST NAME LAST NAME

STREET ADDRESS

CITY STATE ZIP

☐ CHECK ENCLOSED PAYABLE TO AAAA. ☐ PLEASE CHARGE ☐ MASTER CHARGE ☐ VISA CARD NO.

AMOUNT $ EXP. DATE INTERBANK NO. (MASTER CHARGE ONLY)

SIGNATURE

List your AAAA Professional Qualification

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

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

AAAA ANNUAL DUES

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

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

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

ARMY AVIATION ASSOCIATION

1 Crestwood Road, Westport, Conn. 06880

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

RANK FIRST NAME LAST NAME

STREET ADDRESS

CITY STATE ZIP

☐ CHECK ENCLOSED PAYABLE TO AAAA. ☐ PLEASE CHARGE ☐ MASTER CHARGE ☐ VISA CARD NO.

AMOUNT $ EXP. DATE INTERBANK NO. (MASTER CHARGE ONLY)

SIGNATURE

List your AAAA Professional Qualification

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

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

AAAA ANNUAL DUES

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

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

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

New Members

New Members Joining AAAA in July-August

CPT John J. Adams, APO NY 09036
SGT John Allen, APO NY 09031
Mr. Erich Allmer, Elberon, NJ
CPT M. F. Anderson, Newport News, VA
CPT Frank Atkins, Oak Grove, KY
Mr. Boyd F. Baldwin, Philadelphia, PA
COL John R. Banister, III, Kerrville, TX
WO1 Peter D. Banks, APO NY 09146
CPT Stephen Barton, APO NY 09031
Mr. Fred S. Belyea, Binghamton, NY
CW4 John R. Benham, Fort Eustis, VA
SSG James D. Berlin, APO NY 09031
SGT Joseph L. Bloom, APO NY 09093
CW3 Alfred Boellace, APO NY 09611
WO1 David Bouse, APO NY 09326
CW3 Lawrance Bradley, Mililani Town, HI
CPT Michael Brandt, APO NY 09702
CPT Arron Brown, Wahiawa, HI 96786
SGT Fred A. Buckley, Chicago, IL
E4 Robert C. Burchwell, APO NY 09757
MAJ James Busbee, Enterprise, AL
CPT Roger Calvary, APO NY 09036
CW2 Frank M. Candela, Niles IL
Ms. Laurel H. Carlson, Corpus Christi, TX
Mr Bud Carper, Newport News, VA
CW3 Miguel Castaneda, Caguas, PR
Mr. Randall Chambers, Lawton, OK
CPT Alan Chandler, Wahiawa, HI
LTC Richard A. Chilcoat
SP4 Artie Conley, Fort Cambell, KY
CPT James R. Correia, Enterprise, AL
CPT Thomas Crews, APO NY 09031
MAJ Don R. Crider, Yorktown, VA
CW3 Ron W. Current, APO NY 09168
2LT Stephen A. Darden, Enterprise, AL
SFC Lawrence D. Delany, Wheeling, IL
CW3 Mike Denniston, Evanston, IL
Mr. Richard Dikant, Newport News, VA
CW3 Bruce H. Eckerson, Savannah, GA
CW2 F. A. Eisenstaedt, APO SF 96271
E7 Danny Elzie, APO NY 09611
SGT Vivian Evans, Fort Cambell, KY
Mr. Jack Farnsworth, Boston GA
MAJ Miguel A. Fernandez, Rio Piedras, PR
E2 Willie Forrest, Birmingham, Al
SP4 Michael Freeman, Fort Cambell, KY
Mr. Roy Fyfe, Binghamton, NY
CPT Michael L. Gilliland, Fort Cambell, KY
Mr. Richard Gilmartin, Johnson City, NY
Mr. Fernando Gomez, Gregory, TX
CPT Eddie Gonzalez, San Juan, PR
CW4 Roberto Gonzalez, Bayamon, PR
SGT John Goodwin, APO NY 09611
SGT Larry R. Gray, Fort Cambell, KY

PFC Alex Hale, Detroit, MI
Mr. Deter Halff, Munich, Germany
SSG Gary Harris, Fort Campbell, KY
CW3 Samuel L. Harrison, APO NY 09702
Mrs. Barbara Hartley, Jackson, NJ
Ms. Martha L. Hawkins, Redmond, WA
Mr. James S. Hayden, Edwards, CA
CPT James A Herberg, Clarksville, TN
CPT Sonja B. Hiler, APO NY 09742
SSG Robert W. Honka, Downers Grove, IL
SP4 Steven Hooper, Camden, TN
Mr. Thomas House, Williamsburg, VA
Mr. Maurice J. Houston, Eatontown, NJ
CPT Jimmy Don Hudson, Monroe, LA
Maj John Hyatt, APO SF 96271
MAJ Joe B. Jenkinson, Ft. Leavenworth, KS
1LT Marvin J. Johns, APO NY 09093
Mr. George B. Johnson, Lake George, NY
MAJ James L. Johnson, San Antonio, TX
E4 Phillip Johnson, Fort Campbell, KY
SGT Terry A. Johnson, APO NY 09742
SGT Willard Johnson, Chicago, IL
SGT Steven Karoly, Savannah, GA
Mr. William Kay, Utica, NY
SP5 Edward P. Kearns, Chicago, IL
Mr. R.J. Keller, Syosset L.I., NY
1LT Keenan J. Kline, APO NY 09146
CW3 Thomas M. Kolb, Newport News, VA
LTC A.C. Lawrence, Ft. Leavenworth, KS
MAJ Roy J. Leatherberry, Columbus, GA
CW2 John Lee, Fort Campbell, KY
CW3 Jan E Lindbak, Fort Rucker, AL
CW2 Michael R. Long, Clarksville, TN
MAJ Jose Maldonado, Guaynabo, PR
1LT Leonard N. Marino, Savannah, GA
WO1 Patricia Marler, Fort Hood, TX
Mr. Richard R. Masch, Carlstadt, NJ
Mr. George McAllister, Newport News, VA
CPT Douglas H. McArthur, St. Marc, Canada
SP4 Earnest Meadows, APO NY 09031
Mr. Ivergen Michels, Speyer, W. Germany
LTC Anthony R. Miklinski, Largo, FL
MAJ Fred S. Minnich, Ft. Leavenworth, KS
CW2 Francisco A. Miranda, San Juan, PR
WO1 Milan Montgomery, Clarksville, TN
CW3 Dale J. Moore, APO NY 09036
SP4 Jeffrey Morrison, Fort Campbell, KY
E4 James Neathery, APO NY 09039
MAJ Rondle L. Nelson, Newport News, VA
Mr. John H. Newman, Shrewsbury, NJ
1LT Richard Nollen, APO NY 09358
Mr Lou Oberndorf, Baltimore, MD
E4 Fabriel Ortiz, Fort Campbell, KY
CW3 Terrence R. Pestel, Lombard, IL

Mr. Kurt Pfleiderer, Munich, Germany
CPT William Pokorny, Savannah, GA
1LT Roy Ponder, APO NY 09742
MAJ Dan R. Popham, Savannah, GA
LTC Wilmer L. Preston, Ret., Phoenix, AZ
CW3 Peter D. Quigley, APO NY 09611
Mr. Walter J. Raksa, Jr., Tinton Falls, NJ
SFC William Ranson, APO NY 09031
MAJ Joseph O. Reed, Jr., Ft. Leavenworth, KS
Mr. Robert Reinicke, El Segundo, CA
MAJ Henry J. Richter, Jr., Ft. Leavenworth, KS
Mr. Daniel Rodgers, Olathe, KS
CW4 David Rosario Laguna, Bayamon, PR
2LT Fred A. Salisbury, APO New York 09742
CW3 Ellery Sayerss, APO NY 09611
Mr. Wolfgang Schad, Munich, Germany
SGT Kevin R. Schmidt, Burbank, IL
CPT John S. Schwab, III,Tampa, FL
MAJ Larry Seals, APO NY 09742
CW3 James L. Shireley, APO NY 09093
SP4 Samuel D. Simmons, APO NY 09611
Mr. Walter Siver, Binghamton, NY
CPT Douglas S. Slick, Mililani, HI
CW3 Robert G. Smithson, Fort Hood, TX
CW3 Lawrence M. Snyder, Florissant, MO
SFC John Somerville, Jr., Chicago, IL
SP4 Jerry Sparks, Chicago, IL
CW3 Charles Spillner, Santurce, PR
Mr. Helmet Standke, El Segundo, CA
MAJ Cameron Stewart, Lansing, KS
MAJ Joseph Sutton, APO NY 09146
MAJ John H. Sydow, Savannah, GA
LT Gus H. Thompson, Fort Campbell, KY
Mr. Dan Tisdale, Melbourne, FL
CPT Frank Tolle, Savannah, GA
Mr. Robert N. Tomb, Washington, DC
Mr. William Tomecek, Binghamton, NY
SSG Billy J. Tupper, APO NY 09742
1LT Mark Valentine, Fort Rucker, AL
COL Emilio Valente, Rome, Italy
CW2 Wayne Waersch, APO NY 09093
Mr. William Wang, El Segundo, CA
SFC Steven L. Washington, APO NY 09031
WO1 Terry L. Webb, APO NY 09165
Mr. Emil Weiland, Munich, Germany
E5 Dale H. Wilke, Bollingbrook, IL
LTC Dean R. Willwerth, Trumbull, CT
CW3 Steve A. Wing, APO NY 09702
CW3 Thomas B. Wood, APO NY 09702
CPT Robert L. Wyatt, Fort Campbell, KY
MAJ Paul Yacovitch, Wahiawa, HI
SFC David Young, APO NY 09611
CW3 Eric H. Young, St Petersburgh, FL
Mr. Pablo Zepeda, Odem, TX

months takeoffs

Generals

DRENZ, Charles F., BG
Cdr, DCASR NY, 60 Hudson St.
New York, NY 10013
LILLEY, Aaron L., Jr., BG
FORSCOM/DCSLOG
Fort McPherson, GA 30330

Colonels

CROUCH, William E., Jr.
Route 12, Box 55
Dothan, AL 36303
FRAKER, William W.
10 Lakeview Drive
Poquoson, VA 23662
GRIFFIN, Turner D., Jr.
U.S. Defense Attache Office
APO New York 09662
KLOSE, John A.G.
Chief, Public Aff, Hq, 6th USA
Presidio of San Fran, CA 94129
McGLOCKTON, William H.
AVRADCOM-4300 Goodfellow
Blvd., St. Louis, MO 63120
PERSHING, Jay W.
89 Hop Brook Road
Simsbury, CT 06070
STENEHJEM, George N.
7656 Woodview Court
Edina, MO 55435
TOW, James L.
907 Green Terrace
Duncanville, TX 75137
WOLIVER, Clarence H.
13E Wheeler Drive
Fort McPherson, GA 30330

Lt. Colonels

BRODEUR, Alfred F.
1338 Coral Place
Hampton, VA 23669
BUTLER, Billy C.
117 Reams Court
Marina, CA 93933
CRASK, Garnett
USA ROTC Instr Gp-Univ of TN
Knoxville, TN 37916
CURTIS, Danny D.
2042 Rurline
St. Louis, MO 63141
EADY, Doug
4359 Walsh Street
Fort Knox, KY 40121
GRAHAM, Bobby L.
HHC, 7th ATC
APO New York 09114
HANNON, James P.
2510 Clairemont Dr., Apt. 103
San Diego, CA 92117
HOWE, Michael B.
5980 Queenston Street
Springfield, VA 22152
JONES, Alan F.
HHD, 14th Aviation Battalion
Fort Sill, OK 73503

Lt. Colonels

KEEFER, Gary L.
107 King Drive, N.A.S.
Corpus Christi, TX 78419
LAFERTE, Albert E.
DARCOM LAO, 502 Myrtle Lane
Hinesville, GA 31313
McDEVITT, Coleman J.
DCSRM-FD, Ft. McNair
Washington, D.C. 20319
McGEE, Albert P.
Letterkenny Army Depot, Bx 94
Chambersburg, PA 17201
McGUIRE, Matthew M.
HHC, VII Corps (G-1)
APO New York 09107
MURRAY, Thomas E., II
10701 Janway
El Paso, TX 79935
NIELSEN, Donald A.
S60 W38091 Highway 106
Dousman, WI 53118
PAGE, William C.
601 Cedar Drive
Copperas Cove, TX 76522
PETERSON, Frank W.
67-D Elm Street
Fort Devens, MA 01433
PETERSON, Jon M.
7301 River Road, Apt. 106
Newport News, VA 23607
RADSPINNER, Frank H.
816 Sylvan Drive
Fort Worth, TX 76112
ROBINSON, James E.
18548 Prince William Lane
Houston, TX 77058
THOMAS, Steven A.
664 Hood Drive
Claremont, CA 91711
THOMPSON, James B.
6645 Marshall Street
Fort Hood, TX 76544
WATTS, Olen C.
430 Funston
Wahiawa, HI 96786

Majors

ALLARI, Ronald L.
P.O. Box 5039
Fort Lee, VA 23801
ALVARADO, Michael J.
87 3rd Infantry Road
Fort Leavenworth, KS 66027
ARNOLD, Buddy L.
12308 Colby Drive
Woodbridge, VA 22192
BERKEY, Richard O.
6843 Brian Michael Court
Springfield, VA 22153
BROWN, George P.
3 4th Artillery Road
Fort Leavenworth, KS 66027
BRYAN, John P., Gangplank
Marina-600 Water Street,S.W.
Washington, D.C. 20024

Majors

COLEMAN, William E.
HHC, 59th ATC Battalion
APO New York 09025
CONNOLLY, Raymond J.
105 8th Avenue
Dover, NJ 07801
COZZALIO, Ace A.
252 Hancock
Fort Leavenworth, KS 66027
DARNLEY, James H.
117 5th Artillery Road
Fort Leavenworth, KS 66027
DAVIS, Thomas G.
Route 2, Box 315
Russellville, AR 72801
ENYEART, Robert D.
103 Kramer Court
Enterprise, AL 36330
FITZGERALD, Dennis M.
HHD, 17th Aviation Group
APO San Francisco 96301
FULLER, Marvin E., Jr.
4711 Pebble Glen
San Antonio, TX 78217
GILLMAN, Jay E.
2980 Springwater Drive
St. Louis, MO 63129
HANLON, Thomas
284 Hancock
Fort Leavenworth, KS 66027
HARDY, William J.
P.O. Box 441
State Line, PA 17263
HEEHN, Richard C., TMO
Stuttgart, 3rd Movement Region
APO New York 09154
HIBL, Kenneth A.
1208 Mindoro Street
Norfolk, VA 23511
INSELMAN, John J.
National Training Center
Fort Irwin, CA 92311
JACKSON, David C.
1162 Porter Road, AFSC
Norfolk, VA 23511
JACKSON, Jerry D.
Route 2
Troy, AL 36081
JENKS, James E., Jr.
554-B Connor Road
West Point, NY 10996
JENNINGS, Lew
P.O. Box 320
Fort Knox, KY 40121
KOEHLER, Harold C.
5663 Wood Climb
San Antonio, TX 78233
LACY, Eugene L., Jr.
1213 N. Taft Street
Arlington, VA 22201
LITCHFIELD, John
3413 Stonehenge Drive
Manhattan, KS 66502
MARCH, James H.
304 Hancock Avenue
Fort Leavenworth, KS 66027

Majors

MARTY, Larry J.
339 Lofton Drive
Fayetteville, NC 28301
McFARLIN, Tommie A.
ODCSOPS-AV, Box 2444,
USAREUR/7A, APO NY 09403
McMANUS, William W.
12825 Stillwood Drive
Savannah, GA 31406
MOJICA, Simon T.
1234 Michigan Street, N.E.
Grand Rapids, MI 49503
MOON, Timothy D., Sr.
78 Gary Drive
St. Peters, MO 63376
O'HARA, David B.
720 E. Greenview Place
Lake Forest, IL 60045
PETROSKY, Daniel J.
41 Dragoon
Fort Leavenworth, KS 66027
PIGOTT, Joel E.
645 Aline Drive
Erie, PA 16509
RHODES, Danny L.
49 4th Artillery Road
Fort Leavenworth, KS 66027
RYLAND, Charles
474-B Tripp Drive
Redstone Arsenal, AL 35808
SCHERER, Robert J.
2939-B Summerall Circle
Fort Eustis, VA 23604
SCIPIONI, Louis, Jr.
4 Walker
Fort Leavenworth, KS 66027
SCOTT, Donald R.
1902 N.W. 72nd Street
Lawton, OK 73505
SHANNON, James M.
11 Buckner
Fort Leavenworth, KS 66027
SMITH, Wayne S.
35 4th Artillery Road
Fort Leavenworth, KS 66027
SPARKS, John E.
105 5th Artillery Road
Fort Leavenworth, KS 66027
SPRINGFIELD, James H.
Mil Sci Dept-Univ of Houston
Houston, Texas 77004
STAHL, William T.
4707 Bohill Drive
San Antonio, TX 78217
SYVERUD, Roger L.
Hq, 3rd Movements Region
APO New York 09757
THOMAS, Charles A. (P)
400 Shreveport Road
Barksdale AFB, LA 71110
WEAVER, Michael D.
5137 Lost Dutchman Drive
Lithonia, GA 33058
WILLIAMS, James C., Jr.
279 Hancock
Fort Leavenworth, KS 66027

Majors

WOOD, Gail W.
326 Hancock
Fort Leavenworth, KS 66027
WYMAN, Samuel D.
2 4th Artillery Road
Fort Leavenworth, KS 66027

Captains

BEAUCHEMIN, Richard R.
16022 Timberway
San Antonio, TX 78247
BUBB, David L.
A Company, 503rd Aviation Bn
APO New York 09165
DEMERS, Robert P.
4352 9th Street, Apt. 3
Fort Wainwright, AK 99703
ETZLER, Will
HHC, 503rd CAB
APO New York 09165
GODWIN, Robert E.
P.O. Drawer 1298
Sarasota, FL 33578
GROVES, Gary E.
22643 Covello Street
Canoga Park, CA 91304
HORAN, Linda M.
HHD, 59th ATC Battalion
APO New York 09025
HUDGENS, Richard C.
312 Cedar Drive
Enterprise, AL 36330
ITEN, Tom J.
HHC, V Corps
APO New York 09079
JOHNSON, Paul J.
5740 Bailey Street
Fort Hood, TX 76544
KAUFMANN, Joseph G., Jr.
HHC, 222nd Aviation Battalion
Fort Wainwright, AK 99703
KEENAN, Maureen J.
HHD, 394th Transportation Bn
APO New York 09061
MARTIN, Fred G.
5727 South 93rd Street
Omaha, NB 68127
McELWEE, William
16 Stillwood Court South
Savannah, GA 31406
OLER, Roy P.
Avn Sect, Berlin Bde, PSC 1484
APO New York 09611
OLSON, Michael N.
1635 Croyden Road
Norfolk, VA 23503
OMLIE, Austin R.
P.O. Box 3063
Yuma, AZ 85364
RAMPY, Michael R., Apt. 206
201 W. Montgomery Cross Road
Savannah, GA 31406
ROSS, Danny W.
210 Janice Street
Enterprise, AL 36330
RYAN, William A.
HHC, 501st ABC
APO New York 09326
SIMON, Robert W.
947 Marcus Drive, Apt. 12
Newport News, VA 23602
WATSON, Donald P.
Box 236, Station 11 ACR
APO New York 09146
WEST, James C.
Rural Route 5, Sunset Drive
Connersville, IN 47331
ZAGORSKI, Don R.
P.O. Box 307
APO Seattle 98733
ZOLLER, Guy R.
93 Kings Way, Apt. 31
Sierra Vista, AZ 85635

2nd Lieutenant

BOLTRALIK, William J.
5017 Whistler Drive
Fort Worth, TX 76133
COTTON, Edmund W.
609 Gibson Court
Fort Benning, GA 31905

CW4's

BIAS, James E.
118 Parker Court
Fort Bragg, NC 28307
BORGSTEDE, Charles A.
7th DMMC
Fort Ord, CA 93941
CATES, Jerry L.
D Company, 34th Support Bn
Fort Hood, TX 76544
DANIELS, Gerald T.
705 S. Beach Street, Apt. 34
Daytona Beach, FL 32014
DAVIS, William W.
P.O. Box 121
Boron, CA 93516
DOWNING, Clinton E.
8445 6th Street N.
St. Petersburg, FL 33702
DUMAS, James K.
1296 Peoria Street
Aurora, CO 80011
FEUTZ, Lester
101 Mills Circle
Fort Huachuca, AZ 85613
FOULKES, Vincent R.
504 Morris Road
Wahiawa, HI 96786
HESS, Carl L.
1412 Tymer Road
Fort Sill, OK 73503
KEEN, Howard G.
7760 Inca Avenue
El Paso, TX 79912
KRAMER, Roger V.
243rd Aviation Company
Fort Lewis, WA 98433

CW3's

BISHOP, Gaylord M.
P.O. Box 327
Fort Campbell, KY 42223
HARP, Charles E.
169 Taft Drive
Clarksville, TN 37040
KERNAHAN, Harold E.
180th Aviation Company (ASH)
APO New York 09025
KILLMER, Charles E., Jr.
6562 Oakwood Drive
Douglasville, GA 30135
LINER, Jerry E.
1150-B Drennan Park
Fort Campbell, KY 42223
LUCAS, Charles W.
10 Avellino Street
Fort Bragg, NC 28307
PEREZ, Joseph
1902 Eisenhower Street
Killeen, TX 76541
PHILLIPS, Jackie L.
HHC, 7th Signal Brigade
APO New York 09028
RANDALL, Henry T.
7 Ferry Hill Road
Granby, MA 01033
SAUNDERS, Gary K.
4720 Dover Drive
Colorado Springs, CO 80916
SMITH, Richard L.
Box 574, C Co, 501st ABC
APO New York 09140
WISE, James F.
50 Richardson Drive
Daleville, AL 36322

CW2's

DOYLE, Arthur J.
6 Cobb Place
Fort Stewart, GA 31313
JENKINS, Willie
2213 Wade Road
Augusta, GA 30909
JOHNSTON, Fletcher S.
48326 Hoenshell Drive
Selfridge ANGB, MI 48045
RADONOVICH, Michael A.
1227 Warner
Olympia, WA 98506
ROWLANDS, Daniel S.
CMR 2, Box 5009
Fort Rucker, AL 36362

Enlisted

WOLDEN, Robert, CSM
132 Pickering Drive
Shelton, WA 98584
TOMPKINS, Tommy V., MSG
213th Aviation Company
APO San Francisco 96271
LITTLE, DAVID, SSG
586 Six Flags Drive, Apt. E-18
Austell, GA 30001
CORREIA, Paul, E5
1306 Courtney
Clarksville, TN 37040

Civilians

BAUCCIO, Michael L.
3209 January Avenue, Apt. 1
St. Louis, MO 63139
BISBEY, Jay B.
7705 Long Point Drive
Austin, TX 78731
DEERING, D.J., Northrop Corp.
8800/AR, 3901 W. Broadway
Hawthorne, CA 90250
HAWKINS, Martha L.,
16641 N.E. 40th Street
Redmond, WA 98052
IERARDI, Philip N.
1714 Besley Road
Vienna, VA 22180
LABANSKY, John
9 Woodsend Avenue
Huntington, CT 06484
RAECE, Ray C., Sperry Flt Sys
5533 W. Cinnabar Avenue
Glendale, AZ 85302
ROGERS, James R.
3510 Farm Road
Aberdeen, MD 21001
WHITELEY, Horace Teleflex
Suprenant – Old Turnpike Rd
Jaffrey, NH 03452

Retired

ABBEY, Charles W., LTC
3626 Tanglebrook Trail
Clemmons, NC 27012
BAETHGE, Luther, SGM
P.O. Box 1031
Fredericksburg, TX 78624
BOWEN, FRED W., LTC
1433 Pintoresco
El Paso, TX 79935
BRESETTE, Allen A., LTC
659 Las Colindas Road
San Rafael, CA 94903
BROADHURST, Edw. C., MAJ
2133 Yorkhull Lane
Columbus, OH 43229
CARTER, Norman D., LTC
1505 Ontario Street
Greensboro, NC 27403
CHRITTON, Wm. R., Jr., COL
Route 1
West Plains, MO 65775

Retired

GIBBONS, Willard, CPT
7321 Skyview Road
Riverside, CA 92509
GRIFFITH, Warren E., II, LTC
7520 County Road 203
Durango, CO 81301
HENDRICKSON, Don E., LTC
2509 W. Shandon Avenue
Midland, TX 79701
LEUTY, Ray S., LTC
4004 Austin Woods Drive
Austin, TX 78759
LONG, Donald E., LTC
640-C Robin Hood Drive
Maitland, FL 32751
MADDOX, William J., Jr., MG
PSC, P.O. Box 1554
APO New York 09616
MASON, Willieoran, CW3
5333 Yvette
El Paso, TX 79924
MILLER, William R., LTC
570 Grace Avenue
Newark, NY 14513
MIYAMOTO, Atsuchi A., LTC
NAC Negev Airbase Const.
Dyneteria, APO NY 09674
MOUNTCASTLE, Art M., MAJ
5000 Belle Terrace, Apt. 51
Bakersfield, CA 93309
NICHOLSON, Rowland J., LTC
2108 Old Fort Hills Court
Fort Washington, MD 20022
NIELSEN, John R., CW4
211 A Street
Encinitas, CA 92024
ORAM, Charles J., COL
13970 Painter Court
Carmel, IN 46032
ORDWAY, Frank, MSG
4771 South Saginaw Road
Freeland, MI 48623
PATNODE, C.A., Jr., COL
8746 South Rustler Road
Sandy, UT 84070
PHILLIPS, Pete, COL
620 S.W. 103rd Street
Oklahoma City, OK 73139
SETZER, Howard L., Jr., COL
5508 Helmsdale Lane
Alexandria, VA 22310
SHAIN, Robert G., LTC
104 Scenic Hill Road
Trumbull, CT 06611
SHALLCROSS, G.W., COL
4112 Aspen Lane
Montgomery, AL 36106
SHAEFFER, Phillip G., LTC
374 Branchport Drive
Chesterfield, MO 63017
SMITH, Donald R., CW3
315 Edgeton Court
Houston, TX 77015
STEWART, Harvey E., COL
18 Greenbriar Lane
Oneonta, AL 35121
VAN WINKLE, Daniel G., LTC
P.O. Box 1824
Orlando, FL 32802
WOSICKI, Walt J., COL
6105 Housatonic Court
Fairfax Station, VA 22039

Not receiving your issues? Did you send in a change of address? — Page 95

It's Ti
AAAA

AAAA National Awards for accomplishments during the 1980 calendar year will be presented at the **Annual Awards Banquet** to be held at the **1981 AAAA National Convention** in Washington, D.C., April 25. The Secretary of the Army normally makes the award presentation to the "Aviation Soldier of the Year," with the Army Chief of Staff presenting the awards to the outstanding aviation units. The "Army Aviator of the Year" award is presented by the Vice Chief of Staff while a representative of the McClellan Memorial Foundation makes the safety presentation. The Commander of DARCOM is invited to present the "Outstanding DAC of the Year Award."

NOMINATION FOR THE "OUTSTANDING ARMY AVIATION UNIT OF THE YEAR AWARD"

BACKGROUND: Sponsored by the Hughes Helicopters Division, this award is presented "to the aviation unit that has made an outstanding contribution to or innovation in the employment of Army Aviation **over and above the normal mission assigned to the unit** during the previous calendar year."

NOMINATION FOR THE "OUTSTANDING RESERVE COMPONENT AVIATION UNIT OF THE YEAR"

BACKGROUND: Sponsored by the AAAA, this award is presented annually "to the Reserve Component aviation unit that has made an outstanding contribution to or innovation in the employment of Army Aviation **over and above the nor-**

ıe to Nominate for National Awards!

mal mission assigned to the unit during the awards period ending the previous calendar year."

NOMINATION FOR THE AWARD TO THE "ARMY AVIATION SOLDIER OF THE YEAR"

BACKGROUND: Sponsored by the AAAA, this award is presented "to the enlisted man serving in an Army Aviation assignment, who has made an outstanding individual contribution to Army Aviation during the awards period ending the previous calendar year."

ELIGIBILITY: A candidate for either of the above awards must serve in an Army Aviation assignment in the active U.S. Army or its Reserve Components. Membership in AAAA is not a requirement for consideration.

NOMINATION FOR THE "OUTSTANDING DEPARTMENT OF THE ARMY CIVILIAN OF THE YEAR"

BACKGROUND: This AAAA-sponsored national award is presented annually to a Dept. of the Army Civilian who has made an outstanding contribution to Army Aviation during the previous calendar year. A nominee for this award must have been a DAC for the awards period, and must have made an outstanding **individual** achievement.

ELIGIBILITY: A candidate for this award must be a current Dept. of the Army Civilian, and must have made an outstand ding individual contribution during the awards period. Membership in AAAA is not a requirement for consideration.

NOMINATION FOR THE "JAMES H. McCLELLAN AVIATION SAFETY AWARD"

BACKGROUND: Sponsored by the McClellan Memorial Foundation and the many friends of Senator John L. McClellan in memory of his son, James H. McClellan, an Army Aviator who was killed in a civil aviation accident in 1958, the award is presented "to an individual who has made an outstanding contribution to Army Aviation safety during the previous calendar year.

ELIGIBILITY: Any individual - military or civilian -is eligible as a nominee for this award. Membership in AAAA is not a requirement.

DOCUMENTATION FOR AWARDS

ACCOMPANYING DATA: Documentation should include the name and address of the individual or unit, and the name of the present commander. A cover sheet should provide a brief outline of not more than 100 words citing the main reason(s) for the nomination. Additional supporting information should be attached as inclosures and is limited to 1,500 words or three pages (whichever is greater); and be typed.

SUSPENSE DATE: Nominations should be mailed on or before January 15 to: AAAA, ATTN: National Awards Committee Chairman, 1 Crestwood Road, Westport, CT 06880.

Suspense Date: January 15, 1981

AAAA ACTIVITIES

(Continued from Page 6)

■■ SEPT. 30. Jack H. Dibrell (Alamo) Chapter. Professional dinner meeting. Brig. Gen. Charles E. Canedy, Chief of Staff, Fifth US Army, and Vince Crees, Control Data Corp., guest speakers. Ft. Sam Houston Officers' Club.

■■ SEPT. 30. Stuttgart Chapter. Late afternoon professional meeting. COL James H. Kitterman, Commander, 11th Aviation Group (Cbt), guest speaker. "Army Aviation in the '80's". Nellingen O-Club.

■■ OCT. 1. Chicago Area Chapter. After dinner professional meeting. William Ellis, Mgr, Mil Mktg, Hughes Helicopters, guest speaker. "AH-64 Attack Helicopter." O'Hare Air Force Base Officers' Club.

■■ OCT. 1. Ft. Monroe Chapter. Professional dinner meeting. MG Edward M. Browne, AAH-PM, guest speaker. "AAH—A Total System for Battle." Langley AFB Officers' Club.

■■ OCT. 15. AAAA National Executive Board Quarterly Business Meeting. Washington, D.C.

■■ OCT. 17. David E. Condon Chapter. Professional luncheon meeting. Maj. Gen. Edward M. Browne, AAH-PM, guest speaker. "AAH Program Update." Fort Eustis Main NCO Club.

■■ OCT. 22. Southern California Chapter. Professional dinner meeting. Rep. Jim Lloyd, 35th Congressional District, guest speaker. "The Congressional View of the Future of the Helicopter." Hacienda Hotel, El Segundo.

■■ OCT. 22. Washington, D.C. Chapter. Professional dinner meeting. COL John Zugschwert, Deputy for Aviation, OASA (R&D). Ft. McNair Officers' Club.

■■ OCT. 24. Corpus Christi Texas Chapter. Halloween Bar-B-Q Dinner Dance. Tides Club.

■■ NOV. 1. First Annual USAREUR Region—AAAA Aviation Ball sponsored by the Rhine Valley Chapter. Formal. Heidelberg Officers' and Civilians' Club, Patrick Henry Village, Heidelberg.

■■ NOV. 12. Connecticut Chapter. Professional dinner meeting. LTG Robert R. Williams, Ret., Chairman, Army Aviation Museum Foundation, guest speaker. Site to be announced.

■■ NOV. 13. Ft. Hood Chapter. Fifth Region-AAAA Awards Luncheon for 1979 Regional Award Winners. Presentations by BG John C. Bahnsen, ADC, 2d AD. Ft. Hood Officers' Club.

SPEAKING OUT

(Continued from Page 16)

AVRADCOM representatives in closely monitoring the Canadian system decribed in the article. After witnessing the tests Roy describes, we were convinced of the feasibility of simple lightweight wire strike protection for helicopters (see FLIGHTFAX, 12 December 1979).

*The only question remaining was the perennial issue of funding priorities. With the support of FORSCOM, USAREUR, and Eighth U.S. Army, the Safety Center, TSARCOM, and ATL launched a major effort to gain **Priority One** for WSPS procurement. I'm pleased to report that as a result of that effort, **Priority One** funds were identified beginning in FY 80 for procurement of WSPS.*

Since several firms expressed an interest in WSPS contract competition, CG TSARCOM was required by federal law to initiate a competitive procurement. This process is being executed as expeditiously as possible, consistent with statutory requirements, and hopefully we will see OH-58 kits in the field in spring or early summer of 1981, followed closely by UH-1 and AH-1 retrofits.

Effective wire strike prevention is centered on strong command supervision and aircrew professionalism (see FLIGHTFAX, 19 March 1980), but helicopter wire strike protection will save the Army invaluable lives and equipment, especially if the "bad guys" decide to jump the fence and deny us the time to figure out where all the wires are located.

JOHN W. LOWE, JR.
MAJ, INF
Fort Rucker, AL

More on Guardrail

*A couple of errors in the **DCSRDA** Update appearing in the June-July issue on the SEMA Program. **Guardrail IV** no longer is a fielded system — **Guardrail V** is deployed in Korea, Europe, and CONUS. The Improved Guardrail Program will begin in 1981 and will include conversion to the RC-12D aircraft as mentioned in the article. The photograph depicting the Army's RC-12D is actually a picture of the RU-21H **Guardrail V** aircraft. The **Quick Fix** EH-60A prototype contract will be awarded in September of this year.*

I thoroughly enjoyed your very comprehensive issue and the four decades of hardware.

SYLVESTER C. BERDUX, JR.
COL, AR
PM—SEMA
St. Louis, MO

A Double-Take!

I ENJOYED looking at the photos of the aircraft of the past (and some present) in the June-July issue, and doing a lot of reminiscing. However, when I started reading the listed airspeeds of some of the aircraft I used to fly, I had to do a double-take! Either my memory is failing, or the your editor received some inaccurate data, or it could be a little of both. I'm not a nit-picker and hope the data will be corrected for the ***Equipment Issue*** *is one that I know all of us "old" ex-Army Aviators would like to keep. Although I've been retired for 12 years, I enjoy the publication and appreciate your contributions to Army Aviation.*

On another tack, your readers might like to know that out here in (Torrance) California, 16 of us have purchased L-19 ***Bird Dogs*** *and are organizing a club. Most are being restored to their original military configuration and paint job. It might be fun to have a fly-in at Ft. Rucker or Ft. Sill sometime.*

DAVID E. PIERSON
Major, Ret.
California-ARNG

Where did those cruising speeds for the old "L" aircraft come in June-July ***Equipment Issue****? The L-4 cruising speed @ 120 knots? The stalling speed @ 60 knots? That, you remember, was the aircraft's cruising speed.*

LEROY VANCE HESTER
Denver, CO

(Ed. Note: Even though we rue the slide rule error we made — see p. 20 of the ***Equipment Issue*** *and p. 38 of the September 15 issue — the incident proved rather conclusively that the readers do read the magazine, and that a large number — in this case, an embarrassing number — will pick up a pen when they spot a major editorial botch. We're putting together an "Errata" page on the goofs, will place it on the inside back cover of the coming issue, and you may tear it out and scotch-tape it to your* ***Equipment Issue*** *inside back cover to set the record straight.)* □

October Authors Not Pictured in Centerfold Photocharts

Brig. Gen. Carl H. McNair, Jr.
Commander, USA Aviation Center
Ft. Rucker, AL
"Training to Fight", Page 67

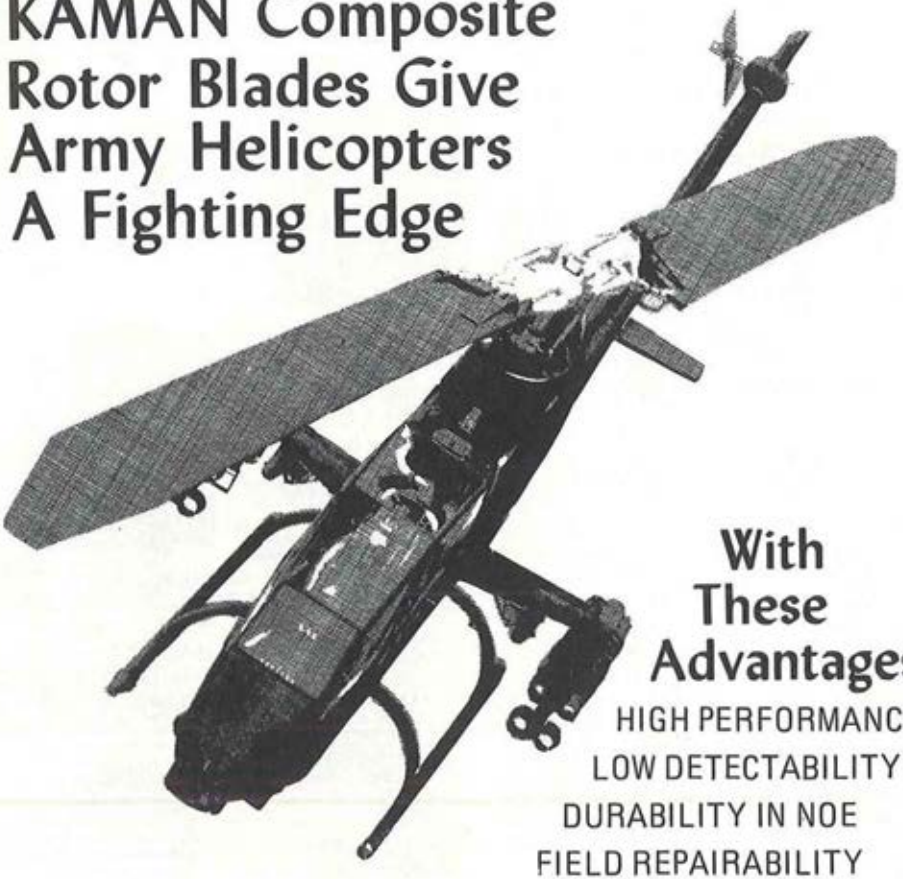
Brig. Gen. Richard D. Kenyon
Army Aviation Officer, Dept. of the Army
"AAH — The Key Element," Page 65

Captain(P) Phil Terry, Technical Management Div., OPM, HELLFIRE
"Operational Test Completed by HELLFIRE," Page 47

Colonel Stanley D. Cass
Project Manager, HELLFIRE/GLD
"Operational Test Completed by HELLFIRE," Page 47

CW3 Michael L. Talton, Development Test Training Detachment
"DTTD: Accepting the Challenge"
Page 39

KAMAN Composite Rotor Blades Give Army Helicopters A Fighting Edge



With These Advantages.

HIGH PERFORMANCE
LOW DETECTABILITY
DURABILITY IN NOE
FIELD REPAIRABILITY
LOW LIFE CYCLE COST
EXTENDED FATIGUE LIFE
BALLISTIC SURVIVABILITY

Continuing Technology Development For Future Rotor Blade Requirements

KAMAN AEROSPACE CORPORATION

OLD WINDSOR ROAD, BLOOMFIELD, CONNECTICUT 06002

U.S. Team Effort for 1981 World Helicopter Championship under HCA Sponsorship

The **Helicopter Club of America (HCA)** was formed in 1979. Membership is now being made available to persons from all walks of life who wish to foster and promote sport helicopter flying on a national and international basis.

A non-profit organization, **HCA** has been designated as the Helicopter Division of the National Aeronautic Association which, in turn, is the official U.S. representative of the Federation Aeronautique Internationale. The FAI not only regulates international sport flying competitions, but is the official organization for verification, recognition, and documentation of world aviation records.

The **Helicopter Club of America** is responsible for the sponsorship and development of the U.S. team which will participate in the next international helicopter competition now scheduled to be held in Poland in 1981. This will be a series of precision, non-acrobatic flying events.

Both civilian and military pilots' flying skills will be evaluated during regional competitions to determine who will represent the United States during the 1981 **World Helicopter Championship.**

Your participation as a member in the activities of the **HCA** will contribute greatly to the development of professionalism and sportsmanship in the operation of rotary wing aircraft.

Members will receive a membership card, HCA notices and bulletins; may vote in accordance with HCA by-laws; will have the opportunity to participate in HCA-sanctioned events; have free entrance to sanctioned HCA contests as a spectator; will receive an HCA directory; and may participate on HCA committees.

Donations and dues are tax deductible. To submit an application or to obtain additional information about the **Helicopter Club of America,** please use the form on this page.

U.S. ARMY MILESTONES

A. August 1980. Installations begin training for local preliminary trials.

B. 15 Oct. 1980. Installation finalists selected in local competition and training continues for FORSCOM and Army trials.

C. Mid-November 1980. FORSCOM trials conducted at Fort Hood.

D. 19 December 1980. Army trials conducted. Selectees continue training for HCA "Fly-Offs."

E. February 1981. HCA fly-offs conducted with the final selection of a U.S. Team composed of eight two-member crews. Training for the World Helicopter Championships on 14-23 August 1981 continues.

AAAA will provide team prizes for the Army "finals."

Editor's Note: The above dates may be revised in view of the WHC slippage from the earlier 19-20 June dating to 14-23 August 1981. **101**

Application for HCA Membership

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

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

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

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

First Name_____ **MI**____ **Last**_____

Address _____

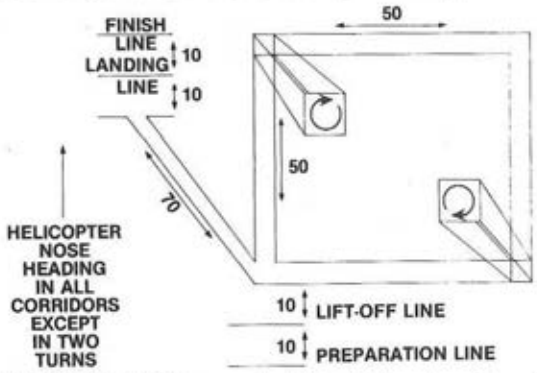
City_____ **State**_____ **ZIP**_____

Home Phone_____ **Bus. Phone**_____

Briefly outline your interests_____

Event #2—Precision Flying Event
Fourth Helicopter World Championship

PART 2 OF AN 8-PART MAGAZINE SERIES



AEROKLUB PRL INSTRUCTIONS

"There will be the square course of a corridor one meter wide clearly marked on the Aerodrome surface. The oblique extension of this course will serve as the exit corridor 70 meters long and one meter wide.

The competitor will fly the described course keeping the helicopter 2.5 ± 0.5 m high and facing into wind, i.e., flying forwards, sideways, and backwards as necessitated by the change of direction of the course sections. At two corners the competitor will perform 360° turns. The first turn will be clockwise and the second one — anticlockwise.

"After passing the square course the competitor will proceed along the exit corridor flying also at the height of 2.5 ± 0.5 m and facing into wind. Then, the competitor will land at the landing line, lift-off again, and cross the finish line.

"There will be two ropes attached to the helicopter fuselage with weights of 0.5 kg each. They will serve to control the flight height. The sorter rope, 2 meters long, will be attached as near as possible to the pilot's seat and the longer rope, 3 meters long, will be attached to the main undercarriage at the same side as occupied by the pilot's seat.

"The given rope lengths will relate to the gape between the ground and the lowest undercarriage point. The course is to be flown keeping the bottom weight on the ground and the top weight off the ground.

"The event will be timed from the lift-off at the line 10 m in front of the course to the landing at the line 10 m in front of the course exit. Time allowed will be three minutes 30 seconds (210 seconds)."

SCORING

Maximum scoring: 200 points.

PENALTY POINTS

"One penalty point will be incurred per every second above 210 seconds of flight.

"For the helicopter being outside corridor limits up to 10 seconds (three penalty points).

"And for being outside limits longer than 10 seconds (10 penalty points).

"For the deviation from the allowed height the penalty points will be incurred as follows: for the bottom weight being off the penalty points, and for being off the ground or touching the ground for longeer than 10 seconds (10 penalty points).

"For the duration of a 360° turn in hovering shorter than 15 seconds (10 penalty points).

"For the change of the maneuver sequence (15 penalty points).

"For omitting any of manevers (20 penalty points).

"For the change of heading during the execution of flight by more than 30° (10 penalty points).

"For the landing non-complete or behind the landing line (10 penalty points).

"For touching the ground by any part of a helicopter during the flight along the course — 100 penalty points.

"If the sum of penalty points exceeds 200 the competitor receives 0 points for the whole event."

This top-ranking military jetprop is volunteering for more special missions.

Beechcraft's rugged C-12 jetprop has earned its military stripes as a hardworking military transport. Its turboprop economy has been saving money for the Army, Air Force and Navy and Marines all over the world. In addition, the C-12 has gained an enviable reputation for reliability.

Now it's ready for more special assignments.

With available installations for aerial surveillance, tactical field support, ECM, photography, Infra-Red, Side Looking Radar (SLAR), remote sensing, and many others, this versatile aircraft offers a broad range of mission capabilities.

And because many of these special equipment packages can be quickly removed or converted, one C-12 airframe can be used to fill the roles of several special missions aircraft.

In addition, the comprehensive Beech logistics support program now assumes total responsibility for all on-site maintenance, crew training, parts inventory, and worldwide technical service. As a result, the C-12 continues to deliver operational readiness rates well in excess of 90%.

If your command could use a special mission support system with this kind of multi-role capability, write Beech Aircraft Corporation, Aerospace Programs, Wichita, Kansas 67201.

Beechcraft

APPLICANTS FOR 1981 SCHOLARSHIP AID SOUGHT BY AAAA

The AAAA Scholarship Foundation, a separate non-profit educational activity created to provide scholarship aid to the sons and daughters of AAAA members and deceased members, announces the availability of assistance funds for the 1981 college-entry year. Program participation is limited to the children of members with an effective date of membership on or before March 31, 1980.

APPLICATION PROCEDURE

Student-applicants are asked to request the appropriate application forms by writing to the AAAA Scholarship Foundation at 1 Crestwood Road, Westport, CT 06880. Requests for applications must be received on or before December 15, 1980. Grades and test scores must be submitted by February 15, 1981. All forms, together with other supporting data, must be returned to the Foundation on or before February 1, 1981 to receive Awards Committee consideration. The student-prepared application should state the full name of the applicant's father-member and address of student if different.

ELIGIBILITY CRITERIA

The AAAA applicant must also be: (1) a high school senior who has applied to an accredited college or university for Fall, 1981 entry as a freshman; and (2) unmarried.

SELECTION & NOTIFICATION

Selection of winners will be made during the month of March 1981 with each applicant to receive a list of the winners not later than 1 April 1981.

BACKGROUND DATA

Incorporated in December 1963, the AAAA Scholarship Foundation provided 11 scholarships in 1980, and has furnished more than $67,700 in direct aid.

Army Aviation Magazine
1 Crestwood Road
Westport, Conn. 06880