SPECIAL ASH ISSUE

Army Aviation

OCTOBER 1, 1979

Operation Northern Leap successful- The Army's Boeing Vertol Chinook demonstrates tactical readiness after self-deployment from US to Germany.

ARMY AVIATION

Volume 28 — October 1, 1979 — Number 10

ADVANCED SCOUT HELICOPTER — A SPECIAL ISSUE

ADDITIONAL FEATURES

MAGAZINE DETAILS

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6

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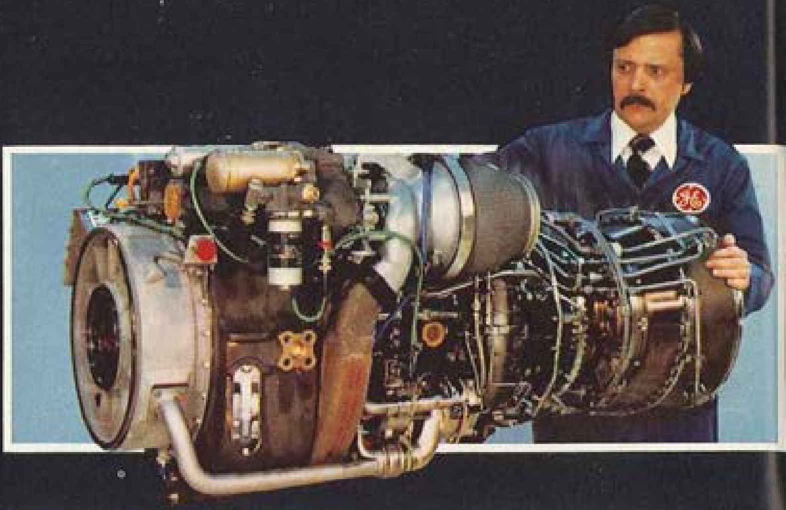

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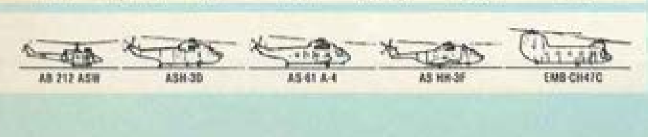

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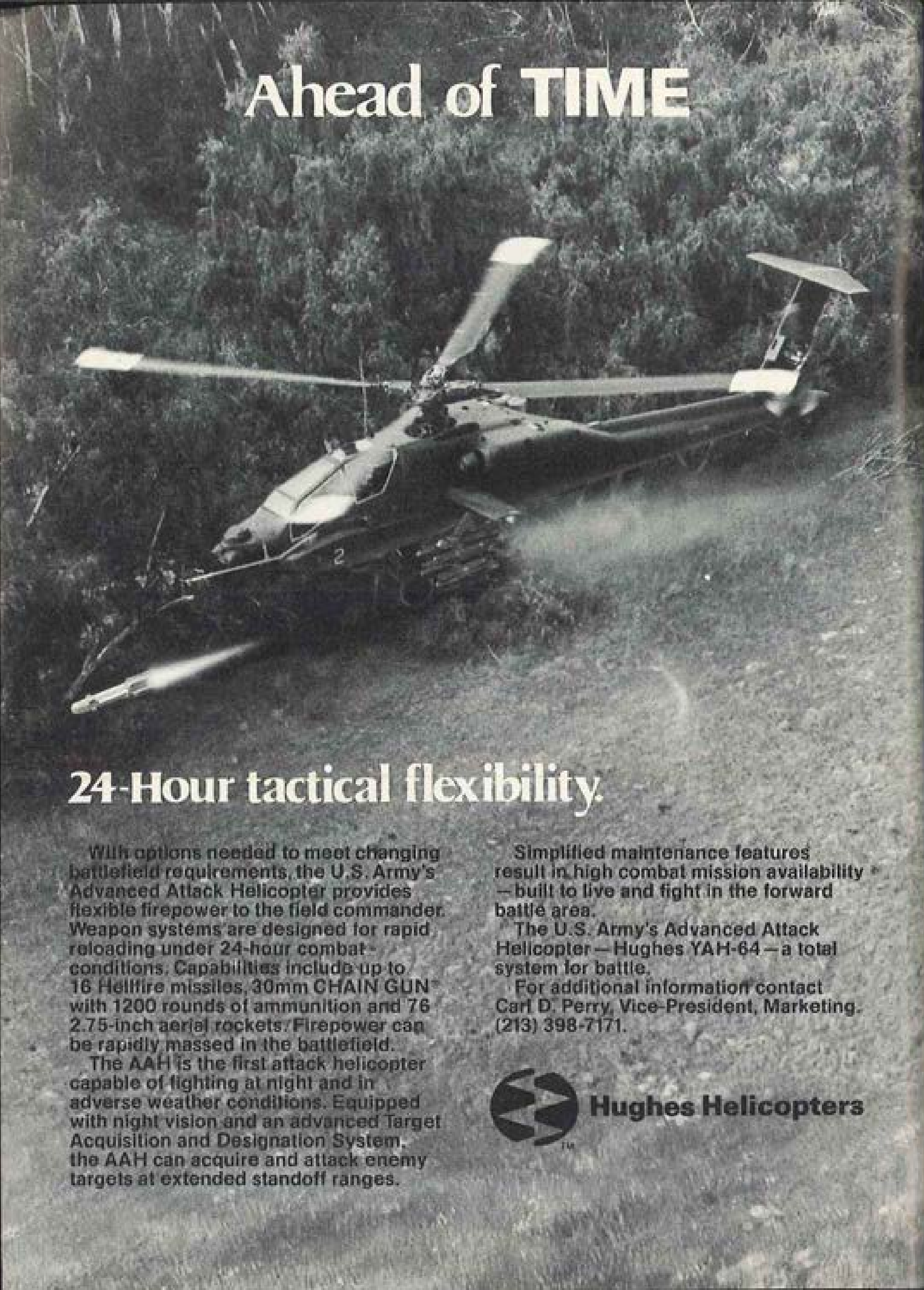
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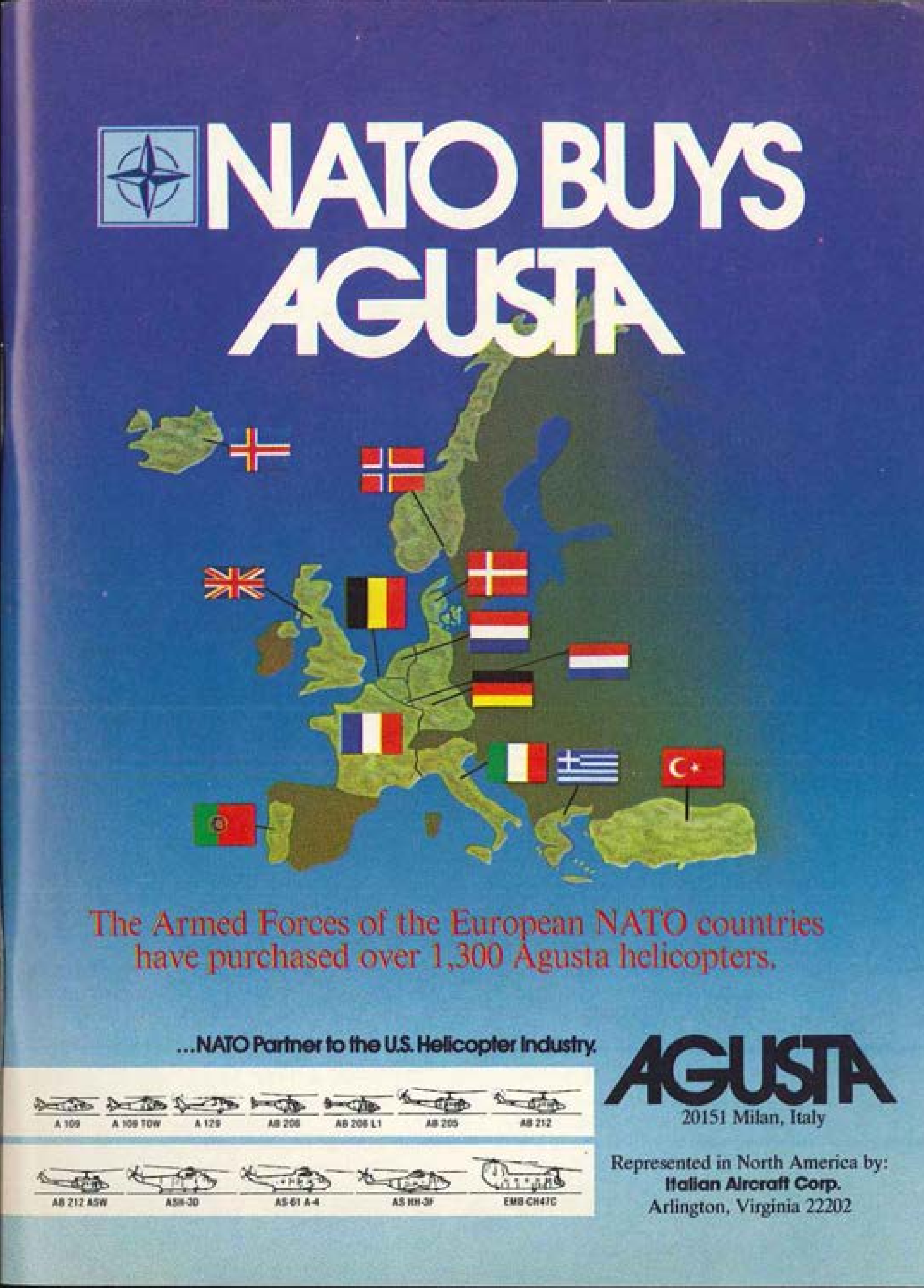
NATO BUYS AGUSTA
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BG Richard D. Kenyon assumes duties as the Dept. of the Army Army Aviation Officer

RICHARD D. KENYON was born in Buffalo, N.Y. on 11 April 1936. On graduating from Lyndonville Central School, Lyndonville, N.Y. in June 1953, he entered the U.S. Military Academy in July 1953. On his graduation in June 1957, he was commissioned as a second lieutenant in the Corps of Engineers.

General Kenyon's then attended the Engineer Officer Basic Course at Ft. Belvoir, Va., and then undertook airborne training at Ft. Benning, Ga. He then took flight primary at Camp Gary, Tex., receiving his aviator wings at Ft. Rucker, Ala. in August 1958, following this with rotary wing qualification at Camp Wolters, Tex.

He served with the 3d Armored Div. in Germany from Jan. 1959 to July 1962. During this period he performed aviation duties with the 503rd Avn Co and company level duties with the 23rd Armored Engr Bn, transferring his branch of assignment to the Transportation Corps in early 1962.

Upon returning to CONUS, he was assigned to Princeton University as a graduate student for a period of two years, graduating with an M.S. in Aeronautical Engineering in June 1964. General Kenyon was then assigned to Vietnam where he first served as Aide-de-Camp to MG General Delk M. Oden, CG of Support Command, Vietnam and then as Platoon Commander in the 197th Avn Co (Attack Helicopter).

In August 1965 he became a student at the Transportation School, Ft. Eustis, Va., completing the Officers' Advanced Course in June 1966. He was then assigned to the Staff and Faculty at the U.S. Military Academy, serving as an instructor and an assistant professor in the Dept. of Mechanics during the next three years.

In August 1969 he attended the Command and General Staff College at Ft. Leavenworth, graduating in June 1970. He was then assigned to Vietnam for a second tour, first as a logistics staff officer in MACV. In November 1970 he assumed command of the 145th Avn Bn (Cbt) and served in this position until his return from Vietnam in July 1971.

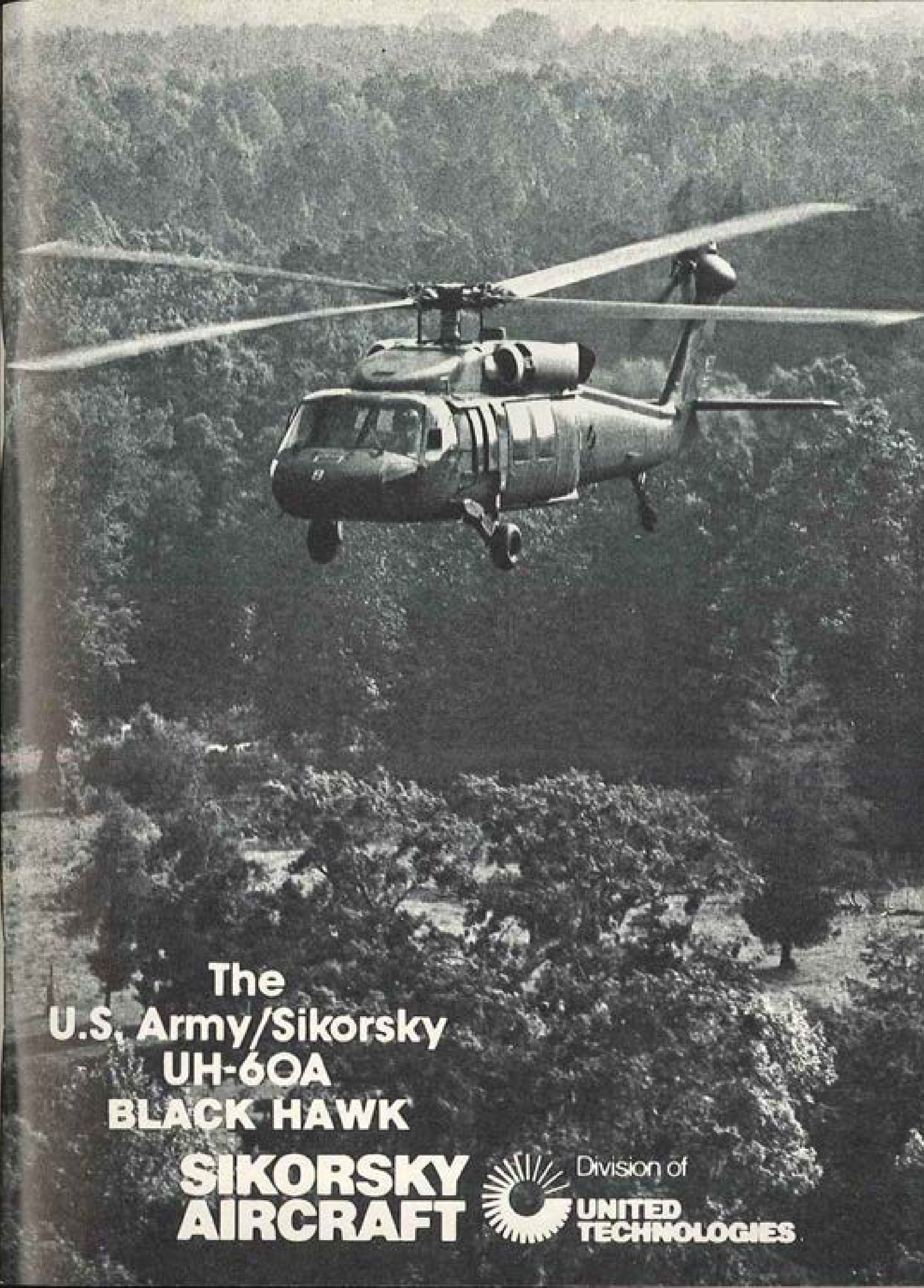
General Kenyon then was assigned to the Office of the Chief of R & D at Dept. of the Army in August 1971 where he served as a staff officer in the Airmobility Division monitoring aviation R & D programs until July 1973.

He next attended the Industrial College of the Armed Forces graduating in June 1974 and then becoming the Executive Officer to the Asst Secretary of the Army (Installations & Logistics).

General Kenyon was designated the Project Manager of the Heavy Lift Helicopter with assignment at HQ, AVSCOM, in St. Louis in November 1974. He later was assigned as Director, Weapon Systems Management, in that HQ on November 1975.

A year later, he was designated and assumed the duties of Project Manager, BLACK HAWK, and served in that capacity through July 1979.

In August 1979 he assumed duties in his current position of Deputy Director of Requirements and Army Aviation Officer, Office, Deputy Chief of Staff for Operations & Plans, Hq, Department of the Army, Washington, D.C.


The
U.S. Army/Sikorsky
UH-60A
BLACK HAWK
SIKORSKY
AIRCRAFT
Division of
UNITED
TECHNOLOGIES

SPEAKING OUT

Yes, I agree it's time to reevaluate some of the aviation gospel we've been absorbing!

IN the July 31, 1979 issue of **Army** Aviation, the readers were treated to a most perceptive "**Speaking Out**" article authored by **CW4 Carl L. Hess.**

My sincerest congratulations go to the editor for having the intestinal fortitude to publish this article, and my congratulations go to **CW4 Hess** for writing it.

Mr. Hess did NOT point his finger at any agency or person for the sorry state we aviators have generated for ourselves, but perhaps, as **Mr. Hess** says, it is time to find out "Who shot John?" and eliminate him or them.

The mentalities who insist on the overuse of checklists and weight and balance forms are the same persons who require us to memorize -10 data to the point of making an annual oral exam a trivia test.

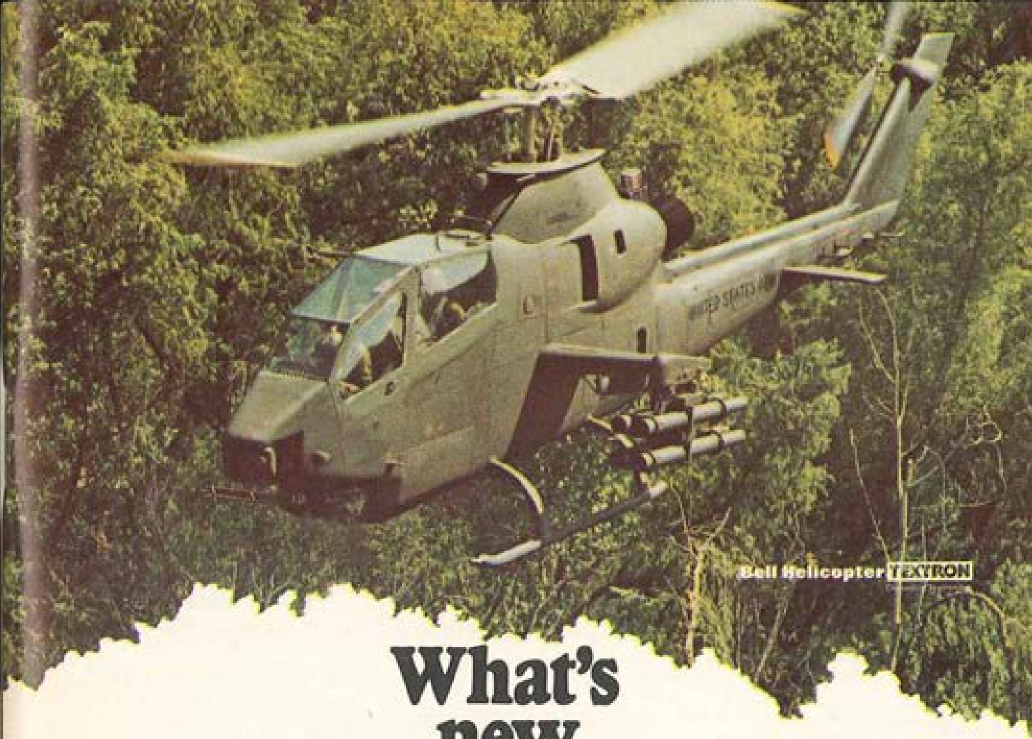
Major David A. Yensan of Aberdeen Proving Grounds seconds CW4 Carl L. Hess' motion.

The Stan Board seems to delight in finding aviators who have not memorized the insignificant instrument range numbers. The people who write the annual written exam get off on asking questions which do not pursue our knowledge of our profession, but rather how many meters high or wide some point of land might be.

The ATM's have been written with what appears to be a vengeance.

It is high time, as **Mr. Hess** says, to slay some sacred cattle and - if necessary - the people riding on them. We want to be professionals but we are not being given the opportunity because of an extremely immature mentality emanating from somewhere out in the gray morass of doctrine writing.

Please someone out there, take charge and reverse this trend!



What's new on the Cobra? Everything that moves.

A new generation of Cobra has evolved. Over the past two years, every part of the highly advanced AH-1S's dynamics system has been dramatically upgraded!

There's been a powerful 29% increase in engine SHP, plus a boost in transmission capacity providing excellent hot day performance.

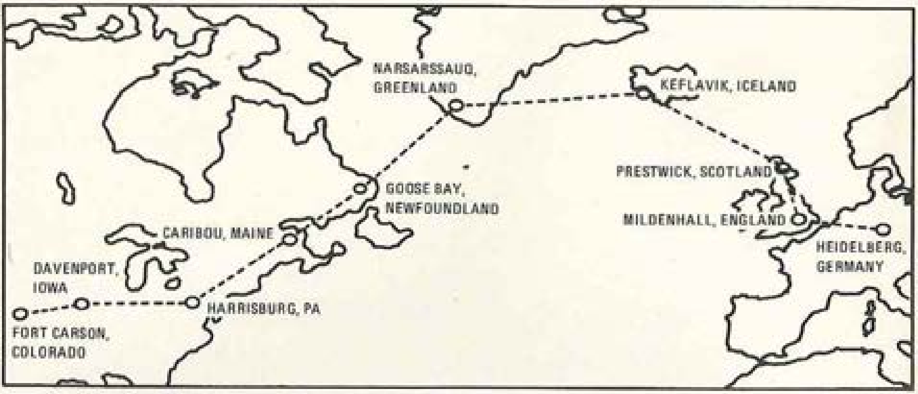
There's a new composite main rotor blade that improves performance as well as survivability.

There's a significant increase in tail rotor thrust enhancing NOE agility.

But that's only part of what's new on the Cobra. Weapon systems, fire control, cockpit layout, active/passive defense systems: all designed to strengthen our anti-armor forces. Now, and for the next 20 years.

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

OPERATION NORTHERN LEAP



GENERAL Frederick J. Kroesen, USAREUR Commander-in-Chief, and the 33rd U.S. Army Band, greeted 12 helicopter pilots and eight crew chiefs and crewmen of four CH-47C **Chinooks** who logged a "first in Army Aviation history" when they touched down here after a two-week, 5,200 nautical mile flight which crossed the Atlantic Ocean.

The trip which began August 6 from Fort Carson, Colorado, stalled momentarily over northern icebergs when unexpected high winds between Greenland and Iceland forced the **Chinooks** back to Greenland.

The Army's four CH-47's logged their air miles with 2,000-gallon newly-designed rubber fuel bladders placed in their cargo holds **(opposite)**, which supplemented the normal 1,100 gallon capacity fuel load.

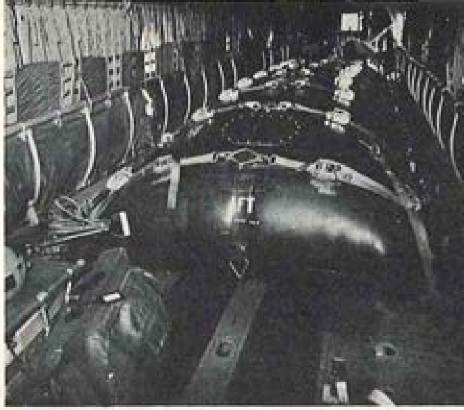
The purpose of the mission was to validate the concept of self deployment of **Chinooks** from the U.S. to Europe.

24-person complement

Each of the **Chinooks** carried a crew of six, and the total complement included a flight surgeon, two representatives from TRADOC, a project engineer from AVRADCOM, and a Canadian officer in that Canada would need to send its **Chinooks** to support its military forces deployed in Europe.

After arrival at the Heidelberg Army Airfield, one of the CH-47 **Chinooks** demonstrated its cargo carrying ability by lifting and transporting a Lance (LZL) missile to another location. **(front cover)**

The CH-47C Chinooks are shown in Harrisburg, PA, at the end of their second leg of their flight.



Routine maintenance is performed on a Chinook at New Cumberland AD by SSG Terry Glascock.

The flight crews included, top row, L-R, MAJ LR Whitehurst; SGT WH Childers; CW3s WM Fox & LW Larsen; CW2 MH Stancel; SSG TL Glascock; MAJ RC Heehn; CW3JL Baker; SSG HJ Rolfe; CW2 TL Lefringhouse; CW3 GW Hall; PVT F. Hill. Bottom, L-R, CW3 GL Baginski; CPT DE Livingston; CW3 LE Tagai; SFC RN Cloutier; SP4s KM Perery & NB Noga; SFC TL Harris; CPT SH Gilbertson; CW2 RD Meacham; CW3 CJ Raymond; CPT L. Piron.

Each CH-47 carried a 2,000-gal. rubber bladder fuel tank to augment its 1,050-gal. normal tank.

The globe-girdling CH-47C Chinooks are shown at the end of their flight at Heidelberg, Germany.

Nominees sought for 1980 induction to the "Army Aviation Hall of Fame"

BACKGROUND: An AAAA-sponsored "Army Aviation Hall of Fame" honors those persons who have made an outstanding contribution to Army Aviation, and records the excellence of their achievements for posterity. The "Hall of Fame" is located at Fort Rucker in the Army Aviation Museum where the portraits and narratives of the Inductees are displayed in a distinctive location. The costs of the program — selection, induction, portraiture, etc. are underwritten by the AAAA. **ELIGIBILITY:** Anyone may nominate a candidate for the "Hall of Fame." All persons are eligible for induction, except AD military personnel Civilian personnel are eligible prior to their retirement.

* * * * *

Nominations should be submitted on or before 1 December 1979 to AAAA, 1 Crestwood Road, Westport, CT 06880, and should include:

(1) The nominee's full name and address.

(2) A 40-50 word summary of the achievement(s) for which the candidate is being nominated to the "Army Aviation Hall of Fame."

(3) A current photograph of the nominee, if living, or information as to where such a photo or photos may be obtained.

TO: AAAA, 1 Crestwood Road, Westport, CT 06880

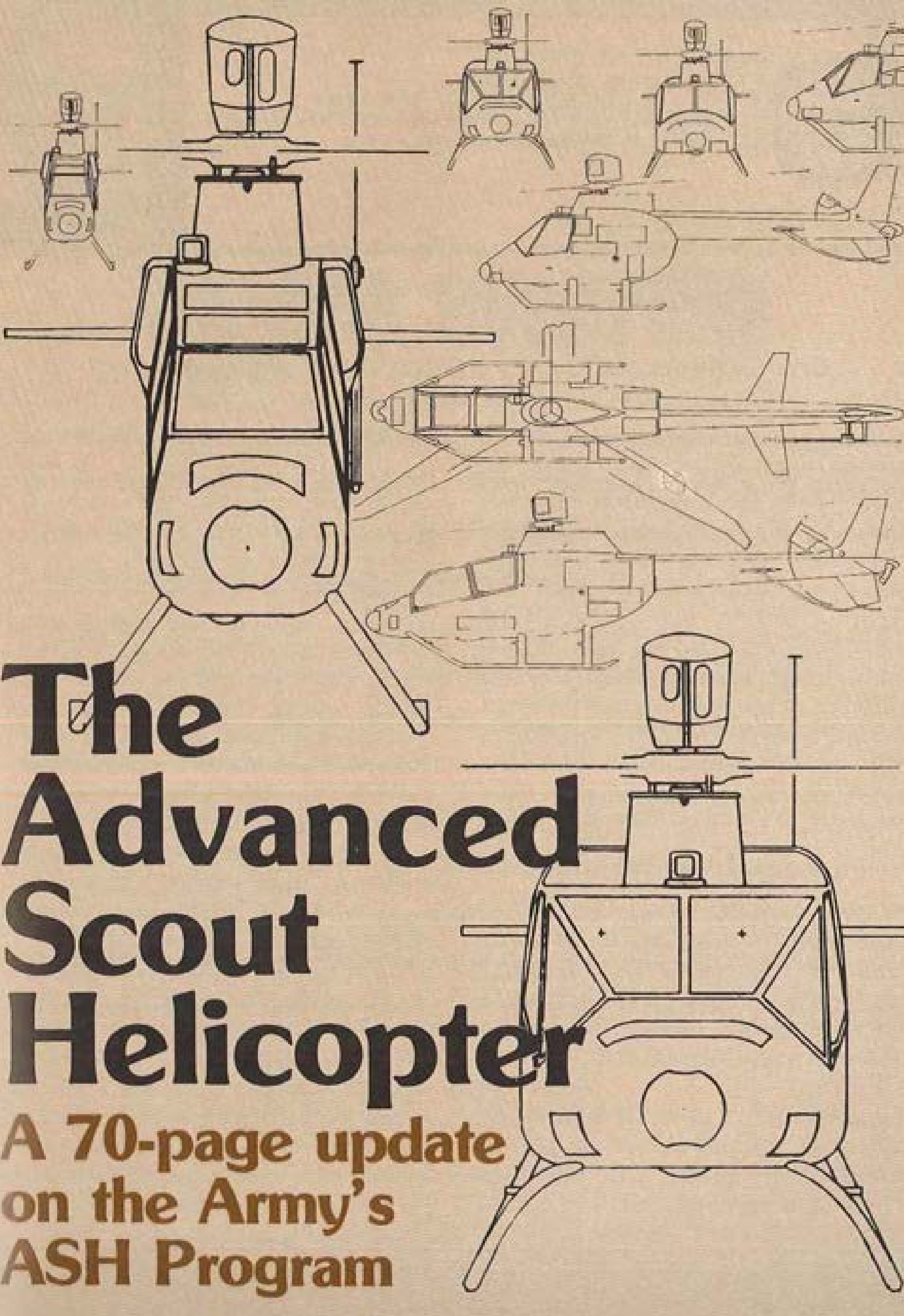
I'd like to nominate the following persons as candidates for induction into the "Army Aviation Hall of Fame" in April, 1980. On separate sheets, I've enclosed their full names and addresses (where known), a brief 40-50 word description of each of their accomplishments, and a photograph of each, where available. (Please print).

Nominee...

Nominee...

Nominee...

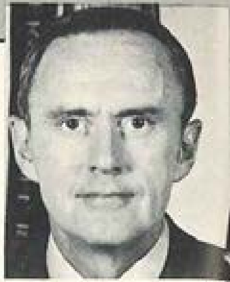
Your signature.......................................



The Advanced Scout Helicopter

A 70-page update on the Army's ASH Program

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



US ARMY AVIATION RESEARCH AND DEVELOPMENT COMMAND

Commanding General

It has been approximately one year since the reestablishment of the Advanced Scout Helicopter (ASH) office. During that year, we've invested many man-hours in considering, evaluating, defining and refining candidate systems. The spectrum of candidates considered ranged from modification of existing helicopters to new development. The necessity for consideration of such a multitude of alternatives had a twofold purpose. The first, and most important, was to determine which system will best be able to perform the Scout mission from an operational effectiveness standpoint and, secondly, to insure that scarce dollar resources will be invested in an end product that will be the most cost effective.

The articles in this issue of AAAA magazine should provide some insight into the activities that have been ongoing in the ASH project office during the past year to field a small, agile, highly maneuverable and survivable Advanced Scout Helicopter.

STORY C. STEVENS
Major General, USA
Commanding

The Army has produced numerous documents during the past decade proclaiming the need for a better scout helicopter than today's LOH.

AN SSG OVERVIEW

BY BG(P) JAMES H. PATTERSON, DIRECTOR, ASH SSG, AND RICHARD S. MacCABE, DEPUTY DIRECTOR, ASH SSG

THE need for a true scout helicopter of any type has never been universally accepted by the Army, Office of the Secretary of Defense, and Congress because articulation of that need **has not been convincing.**

This statement defines my mission as the Director of the **Advanced Scout Helicopter Special Study Group (ASH SSG)** more clearly than any study directive, charter, or pep talk. Support for the **ASH** must be built from an understanding of basic operational and organizational concepts. Thus, our study is "requirements" rather than hardware-oriented.

The **SSG** must also produce all of the analyses and documentation required by regulation to define the need, to select an effective and affordable scout helicopter program and to demonstrate that the **SSG** alternative selected is more cost and operationally effective than all other alternatives considered. But it will be to no avail if we cannot be convincing as to the high priority operational need for **ASH**.

A little background may be helpful at this time. The Army has produced numerous documents and briefings during the past decade proclaiming the need for a better scout helicopter than the current **light observation helicopter (LOH)** being used for this role. We thought that we had succeeded when **General Starry's ASH** Special Task Force efforts were approved by the Army in February 1975 and received tentative approval to initiate a competitive development program from OSD in March 1976.

Short-lived success

This success was short lived, however, as the funds required were deleted by Congress in September of the same year. Two months later, the Army attempted to generate an **Interim Airborne Target Acquisition/Designation System (IATADS).**

The **IATADS** was to be used as an aerial scout by installing the **target acquisition and designation system (TADS)** under development for the AH-64 advanced attack helicopter in

UH-1 utility helicopters to work with artillery and other precision guided munitions. This program also died for lack of Congressional funding.

I feel that these two events are significant to the current effort because they show a shift in priorities from an earlier emphasis on a total new development program for airframe and equipment to an emphasis primarily on mission equipment, needs, and capabilities. The scope of the current **ASH SSG** effort also places primary emphasis on, first, defining the operational need thoroughly and then selecting sensors and equipment to meet that need.

The airframe alternatives

The aircraft itself is viewed as a "carrier" of the selected mission equipment which has broadened the scope of airframe alternatives substantially. The potential "carriers" of **ASH** mission equipment include modest to extensive modifications of existing helicopters, foreign helicopters, and new development helicopters. **Mission equipment options** include current and new developmental target acquisition sensors, target designators, navigation equipment, night vision devices, improved communications systems, and a variety of passive and active devices to improve survivability.

We find technology changing rather rapidly in the sensor equipment area and feel that it is important that **ASH** not be locked-in with current technology, but be futuristic in design and concept. We are insisting on modular design approaches wherever possible so that equipment can be selectively interchanged which permits mission tailoring at unit level. This eliminates the expense of carrying all items all of the time and makes it easier to update specific items as technology advances.

Many of the alternatives considered employ a mast-mounted sight to reduce helicopter exposure while performing its varied mission in different organizations. The majority of aeroscout assets are currently found in **attack helicopter companies (AHC)** and **air cavalry troops (ACT)** where they team with attack helicopters to conduct antiarmor, reconnaissance, security, and economy of force missions.

BG(P) James H. Patterson, Director, Advanced Scout Helicopter Special Study Group

An AAH duplicate?

This association with the attack helicopter has led many to assume that the aeroscout is primarily a target acquisition source for the attack helicopter and they ask "Why duplicate a capability inherent in the attack helicopter itself?"

It is true that attack helicopters can perform some aeroscout functions. It is also true that assuming the need for aeroscout functions exists, using the attack helicopter as a scout would be distracting from their primary role of killing armor.

Additionally, attack helicopters would likely suffer greater attrition due to in-

An SSG Overview

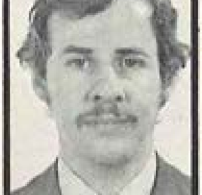
(Continued from Page 18)

creased exposure to threat air defenses. The additional losses also increase costs. A lower cost aeroscout would enable the unit to conserve its attack helicopters and permit them to concentrate on armor engagements while the aeroscouts coordinate with ground units, locate enemy forces, place attack helicopters into suitable firing positions at safe stand-off ranges, and maintain their security by monitoring threat movements, repositioning attack helicopters over secure routes, and conducting air-to-air engagements, if required.

A different emphasis

In both units, the tasks performed by scout and attack helicopters are essentially the same; however, in the **AHC,** the emphasis is on engagement of the enemy whereas the emphasis in an **ACT** is directed towards finding the enemy and understanding his intentions. Aeroscouts also are dedicated to division artillery elements for conventional artillery adjustment and precision designation for **Copperhead.**

In addition, we must provide for other



Richard S. McCabe, Deputy Director, Advanced Scout Helicopter Special Study Group

service precision guided munitions that will assist our ground forces in winning the battle. Be advised, however, that laser or precision designation capabilities are only part of the aeroscouts functions. Many who do not understand aeroscout functions **assume** that to be the total or overriding requirement of an **ASH.**

The expanded target acquisition capabilities of the scout transcends the limited capabilities of current and development helicopters. The use of sensors that are modularly inserted as needed will improve target acquisition capabilities to increase the losses of the red force in the kill zones of 3 to 6 km and beyond.

Fire support management

Additionally, an aeroscout may also be used as a mobile digitally-automated fire support management coordinator for the ground commander. Its day and night capable sensors and improved communications and navigation equipment could significantly increase the commander's capabilities to rapidly traverse his battle area and feel, see, and control the battle.

This and other operational and organizational concepts are being explored by the **SSG** and by the **Division 86 program** which is examining a consolidation of **AHC** and **ACT** missions into a multi-mission **Air Cavalry Attack Troop (ACAT).**

The **SSG** is also examining the issue of whether or not the **ASH** should be armed and if so, with what munitions? The need for an air-to-air missile is obvious, but on which helicopter must be sorted out. We are looking at the trade-offs in size and cost incurred by adding a few **HELLFIRE** anti-armor missiles or by incorporating a multi-purpose lightweight

FT. RUCKER—A one-of-a-kind aircraft, a Hughes Helicopters 500 MD sports a Mast Mounted Sight made by Martin Marietta. Additional details on the TV viewing device may be found on page 55 and page 62.

missile for anti-helicopter use and suppression of radar-directed air defense weapons. We are looking at putting a missile on the **ASH** but have some reservations concerning crew workload and other scout mission degradation.

To avoid these problems, we are also considering adding the missile to the OH-58C as a dedicated anti-helicopter/air defense suppression system. In this way, neither the aeroscout nor the attack helicopter would suffer mission degradation and the HIND threat could be countered.

The message, as I see it, is that **ASH** has a definite place on the battlefield and is not simply a companion piece to the attack helicopter. The many uses we see for **ASH** are not fully utilized in our current doctrine and aviation units. We are plowing new ground through studies, but expect much more from the "users" after they get "hands on" experience.

Elsewhere in this issue are articles on airframe and equipment alternatives, NATO standardization, program management by the user and developer, use of **cost and operational effectiveness analyses (COEA),** operational concepts, and a historical summary of previous attempts to obtain an **ASH** program. They should produce additional insights on the basic issue of "Why an **ASH?**" in addition to their regular subject matter.

I am encouraged by the fact that both the Senate and House of Representatives Armed Services Committees have funded the program for FY 80 which is a vote of confidence singularly unique to this program's ups and downs history.

We still have a lot to do to meet a very tight schedule of Army and Defense Department approval milestones in October and November this year, but the study group is dedicated to this task.

The ASH's basic problem, as we view it, is one of Research & Development dollar competition with higher priority and more visible aviation programs.

THE PM'S OVERVIEW

BY COLONEL IVAR W. RUNDGREN, JR., PROJECT MANAGER—ASH

THIS **ASH** series will hopefully be the beginning of numerous updates via the **Army Aviation Magazine.**

From the developer's vantage point, I see several features going for the **ASH.** The **Special Study Group (SSG),** headed up by **Brigadier General (P) Jim Patterson** with **Dick Maccabe** as his talented deputy, was scheduled with sufficient time for a first-rate analysis.

Happenings/philosophies

The **SSG** has the unique distinction of starting its deliberations with both a **TRADOC Systems Manager (TSM)** and the DARCOM Project Manager. A central focus for user direction and expertise is mandatory, and I enthusiastically support the **TSM** concept.

Since the developer articles that follow get into the nitty-gritty of hardware, I'll concentrate on outlining some program management and system acquisition happenings/philosophies.

The **ASH** program charter was recently forwarded to the Department of the Army for approval. Complete staffing of the Project Manager's office calls for a total of 39 personnel (35 civilians, four military). At this writing, there are ten civilians and two military authorized.

On 1 October 1979, an additional 13 civilians will be included. The remaining Table of Distribution and Allowances positions are a function of several variables, to wit: resource availability (manpower and funding), program direction, and acquisition strategy.

ASARC/DSARC decision

By program direction, I'm referring to an **Army System Acquisition Review Council/Defense System Acquisition Review Council (ASARC/DSARC)** decision to modify an existing inventory helicopter, i.e., AH-1S, OH-58 and the AH-64, or to proceed with the development of a NATO candidate, or possibly to create a "white sheet of paper" new development approach.

In any event, several program approaches are being investigated as directed by DA. Acquisition strategy varies anywhere from a directed AH-64 add-on

TADS/PNVS

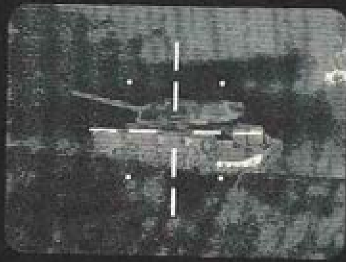
Northrop's TADS/PNVS for U.S. Army's Advanced Attack Helicopter (AAH) permits AAH to attack and survive at extended standoff ranges, day or night, under adverse weather conditions.

TADS (Target Acquisition Designation System) allows direct view target detection and tracking. Night and long-range target recognition. Laser tracking and range finding.

PNVS (Pilot Night Vision System) provides forward-looking infra-red imagery allowing nighttime nap-of-the-earth flight.

Northrop TADS/PNVS designed specifically for Army AAH. Proven technology derived from Northrop's broad range of electro-optical experience. More than 500 Target Identification Systems delivered to U.S. Air Force for F-4 Phantom. Northrop producing Television Sight Unit for U.S. Navy F-14 Tomcat. Developing electro-optics for Seafire fire control system for Navy surface ships.

Northrop Corporation, Electro-Mechanical Division, 500 East Orangethorpe Avenue, Anaheim, California 92801.



STUTTGART—Fully qualified and flying the USAF T-39 Saberliner on a daily basis in support of EUCOM are four of the Army's best: L-R, CW3s James Barry, Larry Ingram, Richard Hanusa and Steven Chaney, all of the 1st Aviation Detachment.

THE PM'S OVERVIEW
(Continued from Page 23)

procurement to a design competition (either a modification or a new development) and finally to a full-fledged production competition, a la **Black Hawk** or **DIVAD Gun.**

Program support for the **ASH** has varied anywhere from those violently opposed to ardent zealots. There is a fundamental and relatively simple explanation for the **ASH's** failing three previous starts. The **ASH** need has never been denied; **ASARC I** and **DSARCs I** and **Ia** supported the **ASH** requirement. There has been a problem, however, in articulating the **ASH** requirement.

Colonel Ivar W. Rundgren, Jr., Project Manager, Advancd Scout Helicopter, AVRADCOM

The **ASH's** basic problem, as I view it, is one of R&D dollar competition with higher priority and more visible aviation programs — i.e., **AAH** and **Black Hawk.** With **Black Hawk** now in production and **AAH** close to concluding its development phase, perhaps the **ASH** can now negotiate the affordability quagmire.

There is no doubt in this developer's mind that the real user (the scout pilot) has had, and will continue to have until the deficiency is alleviated, a need for a light, agile, survivable and affordable "smart" **ASH.**

The fundamental **ASH** issue is:

How does the ASH priority stack up against all the other "critical priorities"" within constrained defense resources?

Simple solutions to complex problems just don't exist!

The TSM-Scout Helicopters has played an extensive part within the ASH Special Study Group effort over its existence for the last twelve months.

THE TSM OVERVIEW

BY COLONEL GEORGE W. SHALLCROSS, TSM-SCOUT HELICOPTERS

THE April 30, 1978 issue of **Army Aviation Magazine** published **An Open Letter to Aeroscouts** by **LTC Lawrence B. Moeller.**

The article introduced the TSM-SH Office and provided an abbreviated history of the SH program. A more detailed history may be found elsewhere in this edition.

This article is intended to update you as to the mission, organization, functions, and responsibilities of TSM-SH.

TSM-SH was established 1 July 1979 at Fort Rucker, Alabama with the mission to conduct total systems management for the Advanced Scout Helicopter and all generic observation helicopters (OH-58, OH-6) within TRADOC, and to insure that the user total system efforts are developed and fully integrated early and continuously throughout the development and deployment cycle.

USER REPRESENTATION
THE TRADOC SYSTEM MANAGER (TSM) REPRESENTS THE
USER!

- **FIRST!**
- **LAST!**
- **ALWAYS!**

The TSM-SH is also responsible for all user actions as delineated in Army and TRADOC regulations and amplified in DA Pamphlet 11-25, **The Life Cycle System Management Model.** In particular and in close coordination with the

THE TSM OVERVIEW
(Continued from Page 27)

AVRADCOM Project Manager and TSARCOM Readiness Project Manager and TSARCOM Readiness Project Officer, he insures that plans for training, personnel, logistical developments and new doctrine/tactics are timely and fully integrated into the materiel development program.

SCOUT HELICOPTER
TOTAL SYSTEM MANAGEMENT

Colonel George W. Shallcross, TRADOC System Manager (TSM) Scout Helicopters (SH), USA TRADOC

PM + RPO + TSM

THE PROJECT MANAGER (PM), READINESS PROJECT OFFICER (RPO), AND THE TRADOC SYSTEM MANAGER DO NOT DUPLICATE EACH OTHER. THEY INTERACT AND THEY WORK TOGETHER FOR TOTAL SYSTEM EFFECTIVENESS.

TSM RESPONSIBILITIES

- ★ TASKING AUTHORITY WITHIN TRADOC
- ★ COORDINATE W/MACOM'S AND OTHERS AS REQUIRED
- ★ REPRESENT USER ON HARDWARE NEEDS
- ★ USER INPUT AND LCSMM TO INCLUDE:
  - COEA
  - DECISION REVIEWS
  - TRADOC POSITION
  - PM INTERFACE
- ★ INTERPRET NEW DOCTRINE & TACTICS
- ★ INTEGRATION OF TRAINING LOGISTICS AND PERSONNEL REQUIREMENTS
- ★ PARTICIPATE IN TEST PLANNING AND TEST DESIGN

To assist the TSM-SH in the accomplishment of his mission his office is organized as shown on page 45 and staffed with officers having responsibilities as indicated.

The **Assistant TSM for Training and Personnel** is directly responsible for the training activities concerned with evaluating the proposed materiel system concept in terms of training implications. Specifically, he's concerned with training activities which involves man's role in the proposed system, indicating when, where, and how training can best be accomplished, assists in preparing an outline **individual-collective training plan (ICTP)**, and provides user requirements for basic system analysis and documentation.

He also coordinates the personnel support planning for the soldier who must operate and maintain the hardware system which will be an integral part of the materiel acquisition process. This planning will begin early in the development of the materiel concept and will continue through the system's life cycle.

TRAINING

- ★ JOB TASK ANALYSIS
- ★ SIMULATORS AND TRAINING DEVICES
- ★ TRAINING TASKS
- ★ ENGAGEMENT SIMULATION
- ★ TRAINING AMMUNITION
- ★ UNIT TRAINING PROGRAMS
- ★ INDIVIDUAL—COLLECTIVE TRAINING PLAN
- ★ SPA
- ★ FACILITIES/RANGE PLANS

PERSONNEL (IPS)

- ★ QUANTITATIVE AND QUALITATIVE PERSONNEL REQUIREMENTS INFORMATION
- ★ TASK AND SKILL ANALYSIS
- ★ INDIVIDUAL AND COLLECTIVE TRAINING PLANS
- ★ BASIS OF ISSUE PLANS
- ★ PLAN, DEVELOP, ACQUIRE, TEST AND DEPLOY REQUIRED PERSONNEL RESOURCES
- ★ OPERATOR/MAINTAINER QUALIFICATIONS
- ★ HUMAN ENGINEERING
- ★ ORGANIZATIONAL STRUCTURE
- ★ SPA

The **Assistant TSM Logistics** will insure that **Letters of Agreement (LOA), Required Operational Capability (ROC)** documents, and **Letter Requirements (LR)** contain essential reliability, availability, maintainability, transportability, and other support characteristics; and that these characteristics are realistic and sufficiently definitive to serve as logistic guidelines for the materiel developer and other agencies.

They will also provide materiel developers with information on the logistic environment in which the system will operate. Using these characteristics and informastion as a base, the **Assistant TSM for Logistics** will monitor developmental tests, participate in planning and conducting operational tests, and assist in preparing development plans. Combat developers in conjunction with the TSM will establish logistic doctrine, organization, and systems for deployed forces and CONUS retail logistic operations.

INTEGRATED LOGISTIC SUPPORT (ILS)

- ★ MAINTENANCE PLAN
- ★ SUPPORT AND TEST EQUIPMENT
- ★ SUPPLY SUPPORT
- ★ TECHNICAL DATA
- ★ TRANSPORTATION AND HANDLING
- ★ FACILITIES
- ★ LOGISTIC SUPPORT RESOURCE FUNDS
- ★ LOGISTIC SUPPORT MANAGEMENT INFORMATION
- ★ FARRP GROUND SUPPORT EQUIPMENT
- ★ PERSONNEL AND TRAINING

The **Assistant TSM Doctrine, Tactics, and Testing** insures that current doctrine and tactics are developed and integrated into the mission profiles, operational concepts and system operational characteristics, and is intended to provide essential information about the system for the tester, the analyst, and the decision

Instruments he can count on.

THE TSM OVERVIEW
(Continued from Page 29)

makers. Clear explanation of current doctrine and tactics early in the system's life cycle precludes later misunderstanding on employment.

He also has direct responsibility in regard to user testing, references for testing, and how testing interfaces with the materiel acquisition process. Information is provided so testing can be conducted to demonstrate how well the materiel system meets its technical and operational requirements; to provide data to assess developmental, operational, and support problems identified in previous testing and insure they have been corrected; and

DOCTRINE AND TACTICS

★ TIMELY AND FULLY INTEGRATED INTO THE MATERIEL DEVELOPMENT PROGRAM
★ COORDINATES THE DEVELOPMENT/FIELDING OF THE REQUIRED DOCTRINAL AND TACTICAL GUIDANCE
★ COORDINATES CONCEPT OF EMPLOYMENT, MISSION PROFILES, AND SCENARIOS TO BE USED IN SYSTEM DEVELOPMENT
★ INSURE ALL TASKS RELATING TO FORCE STRUCTURE, ORGANIZATION, BASIS OF ISSUE, DOCTRINE, AND TACTICS ARE ACCOMPLISHED

TESTING

★ INDEPENDENT EVALUATION PLAN
★ COORDINATED TEST PLAN
★ OUTLINE TEST PLAN
★ TRADOC TEST SUPPORT PACKAGE
★ TEST DESIGN PLAN
★ TEST DIRECTORATE REQUIREMENTS
★ TEST REPORT
★ INDEPENDENT EVALUATION PLAN

to insure that all critical issues to be resolved by testing have been adequately considered.

TSM-SH has had an extensive part to play within the Advanced Scout Helicopter Special Study Group effort over its existence for the last 12 months (discussed on pages 17-21 of this issue).

Primary user spokesman

As the primary user spokesman, I've been designated as the SSG Deputy for User Requirements working for **BG(P) Patterson,** the Study Group Director, and with **COL Rundgren,** the PM and SSG Deputy for Development. In that capacity **GEN Patterson** directed both the TSM-SH and User Requirements team in the formulation of Organizational and Operational Concepts, a Mission Element Need Statement, Basis of Issue Plans, and a myriad of other required documentation to include a detailed analysis of scout functions and tasks which led to the SSG Required Operational Capability document.

The TSM-SH has been in the forefront of activity which will lead to a Special Army System Acquisition Review Council decision in regard to the future of Advanced Scout Helicopter development in November 1979.

Our OH-58C effort

In addition to the effort being expended in the study of the Advanced Scout the TSM-SH is to a great deal involved with the fielding of the OH-58C product improved version of the OH-58. By the time this article is read, the 6th ACCB, the first tactical unit to receive the aircraft, will have already participated in the TASVAL Test using the OH-58C as its primary scout helicopter.

The foregoing is our mission, organization, function, and responsibility. We feel the TSM-SH payoff to the Army and specifically the aeroscout user is great. The application of the TSM concept to the development of the much needed Advanced Scout Helicopter system and participation in the OH-58/OH-6 programs will insure increased combat effectiveness of Army Aviation in the future.

TSM PAYOFF

- ★ **SAVES TIME—CONCEPT TO DEPLOYMENT**
- ★ **QUALITY CONTROL FOR USER REQUIREMENTS**
- ★ **$ INVESTED NOW = LOWER TOTAL $/UNIT COST**
- ★ **ASSIST IN MATERIEL DEVELOPMENT QUALITY CONTROL**
- ★ **INCREASED FORCE EFFECTIVENESS**

Golf and Tennis Champs Cited at the Monmouth Chapter—AAAA Annual Sports Days and Clambake

The Monmouth Chapter— AAAA held its Annual Sports Days and Clambake on 15-16 August. The annual event is heavily supported by gov't and industry with this year's affair topping last year's in attendance. The AAAA Chapter awards Masters' Jackets to the champions of the tennis and golf tournaments, plus a host of prizes based on their ranking in the two tournaments. The "Sports Days' Award Banquet" was held on 16 August with the Masters' Jackets being awarded to the two champions by COL Darwin A. Petersen, the President of the Monmouth Chapter—AAAA.

In the photo above, COL Petersen, far left, has just presented the Masters' Jackets to the champions. To his right are Ken Kelly, Golf Tournament Chairman; Sam Delaney, Sports Days Chairman and Chapter VP, Indus Aff; J. Wyatt, Golf Champion; Michael Dzugan, Tennis Tournament Champion; and MAJ Tim Russell, Tennis Champion.

A group photograph of the Tennis Tournament participants appears in the photo below.

The Chinook D...more for less.

The U.S. Army CH-47D prototypes are flying now, completed ahead of schedule and on budget. When the U.S. Army's Chinook helicopter fleet is fully converted to the new Delta Model, the Defense Department and the American taxpayer will be getting full value for their dollar...one and a half times the current fleet productivity to match the demands of modern combat forces and a 21 percent reduction in operating costs to meet stringent budget limitations.

The mobility, vital for effective tactical and logistic response will be provided by a helicopter of unmatched flexibility and reliability. An affordable aircraft that will give the ground commander the ability to support fast-moving weaponry and combat forces under almost every terrain, weather, or battle condition.

The Chinook Delta Model—the product of a great history of performance, proven advanced technology and positive teamwork. And that, more or less, is what it's all about.

BOEING VERTOL HELICOPTERS
THE LEADING EDGE
Philadelphia, Pa. 19142

Looking back at the ASH Program during the 1970-1979 period shows the programs many stops and starts as well as its gradual acceptance.

A HISTORICAL SUMMARY

BY MAJOR VINCENT P. MANCUSO, ASST TSM—SCOUT HELICOPTERS

SINCE 1970 the Army has formally recognized the requirement for an **Advanced Scout Helicopter (ASH)** to replace the **Light Observation Helicopter (LOH)** being used in the scout role.

The **LOH** was developed for use as an observation helicopter and requires substantial modication to carry the improved communications, target acquisition sensors, laser designator, night vision devices, and other essential mission equipment which is offered by state-of-the-art technology and dictated by scout helicopter tactical requirements.

This historical summary traces the development of the **ASH Program** and is divided into two sections.

Section I covers the period from recognition of the requirement early in 1970 to the initiation of the **ASH Special Study Group (SSG)** in August 1978. **Section II** covers the period from August 1978 to Sept. 1979 during which time the **SSG** conducted its study.

30 JANUARY 1974

During 1970-1973 the Army proceeded with a program to refine the requirement for a scout helicopter. These efforts culminated in a **Required Operational Capability (ROC)** which was approved by HQDA.

MARCH 1974—FEBRUARY 1975

A **Special Task Force (STF)** was appointed by HQDA under the chairmanship of then **MG Donn A. Starry** at Ft. Knox to study the January 1974 **ROC,** validate the requirement, and make recommendations to the **Army Systems Acquisition Review Council (ASARC)** on the most cost-effective means to satisfy the scout helicopter requirement.

FEBRUARY 1975

The **STF** conducted the directed study from March 1974 to January 1975 and made its report to the **ASARC** in February 1975 indicating the Army had a firm and valid requirement for a scout helicopter. The **ASARC** agreed with the **STF** conclusion, and recommended that the review of the program by the **Defense Systems Acquisition Review Council (DSARC)** should not be requested until the following major uncertainties were resolved:

(1) Is there a need for the requirement that the scout hover out of ground effect at 4,000 ft. pressure altitude at 95°F with a 450 fpm vertical rate of climb?

(2) Is there a need for the requirement for an 825 lb mission equipment package, including an airborne laser designator/fire control device, adequate and secure communications, radar warning, and night navigation and target acquisition devices?

(3) What is the requirement for armament?

(4) What is the feasibility and consequences of delaying the program one to two years for further study and testing?

The **ASARC** also agreed that the Army should proceed with a low-cost program to product improve 783 models of the OH-58 LOH to give it a daytime capability to function as an interim scout and work with the **Cobra** helicopter.

Following the **ASARC,** the CG, TRADOC received HQDA approval to conduct the additional study required to resolve the foregoing uncertainties.

24 MARCH 1975

A **Scout Helicopter Special Study Group (SHSSG)** was established at Ft. Monroe to undertake this study in preparation for a **DSARC** review to be conducted on 28 July 1975.

Major Vincent P. Mancuso, Asst TSM-Scout Helicopters, USA TRADOC

6 JUNE 1975

The **SHSSG** briefed the **ASARC** on its findings and recommended that:

(1) the Army seek DOD approval to proceed with advanced development of the **ASH** with a procurement goal of 723 **ASH's** capable of accepting light armament, and

(2) the **ASH** be a new development — not an off-the-shelf derivative — that would would possess a day/night target acquisition and precision designation capability; i.e., be compatible with the **AAH.**

12 SEPTEMBER 1975

DSARC completed its review of the Army's requirement for an **ASH,** gave its approval for the need, and authorized initiation of a development program. However, it stipulated that another review be conducted within 60 days to rule on the Army's recommendation for hardware development.

MARCH 1976

DSARC IA gave tentative program approval to the Army's proposed **ASH** development program that called for:

(1) a competitive new airframe development employing a single T700 engine and have provisions for missile armament.

(2) selection of a competitive **target acquisition and designation system (TADS)** and **pilot night vision system (PNVS)** which would have common application to **ASH** and **AAH,** and

(3) optional provisions for **light at-**

tack helicopter (LAH) and light utility helicopter (LUH) prototypes.

9 SEPTEMBER 1976

Congressional action by the Joint Appropriations Committee deleted FY 77 funds of $2 million nededed to get the **ASH Program** underway.

The Army's attempts to use uncommitted FY 76 and 7T **ASH** funds were unsuccessful, even though loss of these funds would delay the program for two years and close DARCOM's **ASH** Project Manager's Office.

4 OCTOBER 1976

The ASH—PMO at HQ,AVRADCOM in St. Louis, MO, was closed.

9 NOVEMBER 1976

The Vice Chief of Staff was briefed on the DOD proposal to delete FY 78 **ASH** funding ($40 million). The **ASH STF** recommended that an **interim airborne target acquisition/designation system (IATADS)** be developed for employment with field artillery cannon-launched guided projectiles.

The VCSA approved the **IATADS** program pending approval of a complete **ASH Program** and its presentation to the **ASARC** for decision. **ASARC** approved the program, but because of a perceived lack of total Army support, the high costs involved, and the threat of losing the **ASH Program** altogether, Congress did not fund this effort.

1 JULY 1977

The **TRADOC System Manager (TSM)—ASH Office** was established at Ft. Rucker, AL.

In another July 1977 action, DA asked TRADOC to submit an update to the DA-approved 30 January 1974 **ASH ROC** to be reviewed by a board of senior Army officials **(Mini-ASARC)** prior to **DSARC** now tentatively scheduled for the first quarter FY 79.

19 AUGUST 1977

The **TSM—ASH** prepared, coordinated, and submitted an updated **ROC** which emphasized survivability and the incorporation of technological advances not available in 1974.

This update was approved by TRADOC and submitted to DCSOPS for HQ DA staff review.

NOVEMBER 1977

The **Mini-ASARC** review was delayed, and instead an investigation of **rationalization, standardization, and interoperability (RSI)** initiatives and options was undertaken.

The Army's **ASH Program** was introduced to the NATO Alliance during a Panel X meeting. This initiative supported DOD policy to include NATO S&I considerations in major equipment development programs.

DECEMBER 1977

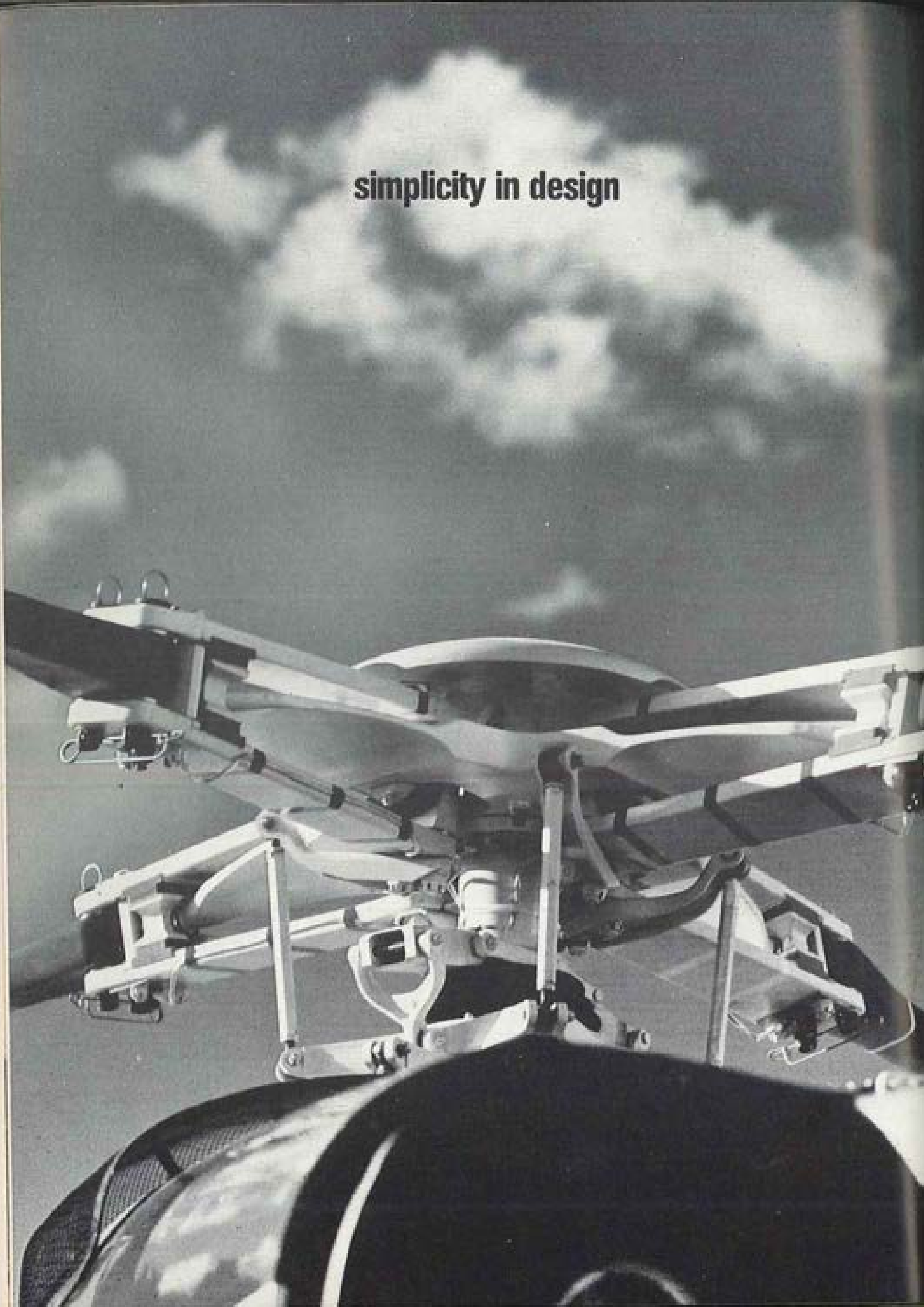
The updated **ROC** was returned to TRADOC with HQDA staff comments.

11 JANUARY 1978

These comments were reviewed, coordinated, and incorporated as appropriate by the **TSM—ASH** into a revised **ROC** which was subsequently approved by TRADOC and resubmitted to DCSOPS.

During the period August 1977—January 1978, DA **ASH** acquisition

(HISTORICAL/Cont. on Page 40)


simplicity in design

Only advanced technology could make it possible to perform a complicated function with simplicity in design.

The Starflex rotor heads of our AS 350 and Dauphins are positive and existing proof. The best, and most desirable blend between the rigid and articulated rotor using 75 percent fewer parts than a conventional rotor head.
All lubrication is eliminated by a wide scale employment of composite materials and application of elastomeric bearings.
Easy on-condition maintenance with only visual checks is needed.
We can also talk of other advanced technology such as composite material blades, the fenestron (shrouded tail rotor) and rotor blade de-icing features. But let our customers be our direct testimonial. Over 450 of them operating in every climate in 92 countries using over 5,000 Aerospatiale helicopters.

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strategy was redefined as it became clear that it would be necessary to conduct a Concept Formulation Effort to provide quantifiable answers to Congress to such questions as scout/attack mix, **ASH** vs current airframe alternatives, armament, and configuration requirements.

MAY 1978

The CG, USA Armor Center, requested that **TSM—ASH** host a TRADOC working group to provide a current position paper on user requirements for the **ASH** and, specifically, to determine the essential equipment required to perform the aerial scout mission without "gold plating."

31 MAY—2 JUNE 1978

TRADOC reps from Fts. Rucker, Sill, Knox, and Leavenworth met with the **TSM—ASH** to review the 11 January 1978 **ROC,** reevaluate user requirements statein therein, and establish a joint position in regard to their continued need. However, due to the now recognized requirement for a new Concept Formulation Effort (which would result in a new **ROC),** the January 1978 **ROC** was set aside.

MARCH—AUGUST 1978

The **TSM—ASH** Office became involved with the preparation and delivery of numerous briefings to members of Congress, DOD, DA, MACOMS, and others for the purpose of providing justification for FY 79 **ASH Program** money and articulating the importance of reopening the Project Manager's Office.

AUGUST 1978

Congress favorably settled the FY 79 funding issue stipulating, however, that future support was contingent upon fielding the **ASH** by December 1984. (A summary of Congressional actions in regard to the **ASH Program** from 1974-1979 appears on Page 70.)

An SSG formed

Because of a three-year program delay, DA asked TRADOC - with DARCOM assistance - to form another **ASH Special Study Group** to:

(1) Perform a comprehensive ASH **Concept Formulation Package (CFP)/Cost and Operational Effectiveness Analysis (COEA)** and provide a **Decision Coordinating Paper (DCP)** with **Mission Element Need Statement (MENS)** Annex.

(2) Provide **Emerging Results** in Febru-ary 1979 to be used as justification for the FY 80 **ASH Program** to Congress.

(3) Recommend the preferred alternative system/systems to perform the aerial scout mission to **ASARC/DSARC II** in the October-November 1979 time frame.

21 AUGUST 1978

ASH Concept Formulation Study tasked USAAVNC to form the **ASH Special Study Group (ASH—SSG).** (See **SSG** Milestones in separate box.)

29 SEPTEMBER 1978

The **Study Advisory Group (SAG I)** of the **ASH—SSG** met for the first time.

13 OCTOBER 1979

The President signed a bill providing $5.5 million to the **ASH Program** allowing the **ASH Project Manager's Office (ASH—PMO)** to reopen, and permitting the conduct of a concept formulation effort and the examination of NATO opportunities.

9 NOVEMBER 1978

The ASH—SSG conducted a briefing of interested industry firms that involved eight national entities, 91 companies, and 143 industry representatives. Eleven NATO military representatives were present.

20 NOVEMBER 1978

The **ASH Study Advisory Group (SAG)** met for the second time. **(SAG II).**

DECEMBER 1978

Members of the **ASH—SSG** (Director, and Deputies for Requirements and Developments) visited Europe: United Kingdom (Westland), Italy (Agusta), France (Aerospatiale), and Federal Republic of Germany (MBB). It found that:

(1) Italy and FRG exhibited the most interest and potential for govt/industry **RSI** collaboration.

(2) FRG was the only country that provided firm requirement support, and recommended joint requirements meeting.

(3) All contractors, except Westland, exhibited substantial commercial interest in the **ASH** development.

(4) No contractor provided a new development initiative for the **ASH Program.**

(5) No contractor visited had the known expertise and capability for mission equipment technology (TADS/PNVS) which exists in the U.S. today.

(6) French/German HAC/PAH-2 collaborative development was at a standoff awaiting the resolution of several critical issues.

(7) The HAC/PAH-2 was an improbable **ASH** variant due to IOC availability and mission gross weight.

25 JANUARY 1979

The Secretary of Defense delivered his FY 80 annual report to Congress which included the following recommendation regarding **ASH Program** funding:

"The **ASH** is intended to operate as an aerial scout in air cavalry, artillery, and attack helicopter units. When teamed with the **Advanced Attack Helicopter (AAH)** the **ASH** will locate and designate targets for the **AAH.** Funding is provided in FY 1980 to initiate development of a low costs system based on an existing airframe."

DEVELOPMENT $ IN MILLIONS
FY 78 Actual Funding. 0.0
FY 79 Planned Funding. 5.5
FY 80 Proposed Funding. 7.5

26 JANUARY 1979

The **ASH Study Advisory Group (SAG)** met for the third time **(SAG III).**

2 FEBRUARY 1979

The **ASH—SSG** briefed the **ASA (RDA)** and the **DCSRDA** on the SSG **Emerging Results** in preparation for Congressional hearings on the FY 80 budget. In summary, the **Emerging Results** did not conclusively support or provide adequate detailed justification for the FY 80 budget request for $7.5 million.

Consequently, the **ASA (RDA)** and the **DCSRDA** provided further guidance to develop a supportable **ASH Program** strategy.

(HISTORICAL/Cont. on Page 53)

In an October 1978 questionnaire participants were asked to project themselves into the '85 time frame and select ASH mission equipment.

DESIGN SURVEY RESULTS

BY MAJOR MICHAEL F. McCLELLAN, ASST TSM—SCOUT HELICOPTERS

IN the October 1978 issue of the **Aviation Digest** a questionnaire was published in the article "You Can Help Equip the **ASH**," requesting that readers help select the mission equipment package for the **advanced scout helicopter (ASH)**.

The questionnaire was designed by the **ASH Special Study Group (SSG)** to obtain subjective data in several controversial and critical areas. The information obtained is being used to revise and update the **ASH required operational capabilities (ROC)**.

A broad experience level

The responses represented experience levels from zero to more than 2,000 hours of **light observation helicopter (LOH)** flight time. Most aviators completing the questionnaire had **LOH** experience, and many had flown the **LOH** in combat.

Commanders and former commanders of units employing **LOH** were included among the respondents. Additionally, all the instructor pilots of the Aeroscout Branch, Directorate of Training at the U.S. Army Aviation Center completed the questionnaire.

In the questionnaire participants were asked to project themselves into the 1985 timeframe and select a mission equipment package for the **ASH.** Each questionnaire participant was instructed to select 1,000 pounds or less of mission equipment from a total package of 29 items, which weighed 2,704 pounds.

Prioritized equipment

Each person was asked to prioritize those items in the 1,000 pounds of equipment. The number of responses for each item of equipment and the priority assigned was statistically evaluated. The list in **Figure 1** is the priority ranking that resulted from the evaluation of all returned questionnaires.

It indicates that the respondents were concerned primarily about aircraft survivability components, target acquisition devices, a built-in pilot's night vision device, and communication equipment. Based on a mission equipment package

FIGURE 1—1,000-LBS. PRIORITIZED

1. APR-39. . . . . 16. 7.62 armament
2. Mast-mounted sight (TADS). . . . . 17. IHADSS
3. PNCS. . . . . 18. IFF/SIF
4. Auto Tgt Handoff. . . 19. IFF APX-100 (Transponder)
5. ASN-128 (Doppler & PMD). . . . . . 20. TAC beacon
6. KY 58 (Secure Voice). . . . . 21. Missiles
7. F-SSB. 22. EMMADS
8. AN/ARV-2 (Laser Warning). . . . . 23. HSI
9. ALQ-144 (IR Jammer). . . 24. KY-75-secure voice HF
10. IACS. 25. CONUS nav
11. ALQ-136 (Radar Jammer). . . 26. M-130 (chaff/flare)
12. Radar Alt. . . . . 27. Hover hold
13. TADS-nose mounted. . . . . . . 28. 30 mm armament
14. ARC-164 (UHF). . . . . 29. Wheels
15. ARC-186 (FM & VHF)

of 1,000 pounds, no armament would have been available for the **ASH.** The priority indicated influenced the mission equipment package established by the **ASH Special Study Group.**

The questionnaire also asked for responses concerning aircraft configuration. The percentage of participants favoring a particular configuration and their reasons for doing so are shown below.

CONUS — 70% believed that an **ASH** designed to fly **nap-of-the-earth (NOE)** did not require a CONUS navigation package.

Engine Requirements — 53% selected a twin-engine **ASH.** The reason stated was survivability if one engine were lost.

Major Michael F. McClellan, Asst TSM-Scout Helicopters, USA TRADOC

Wheels versus Skids — 66% selected skids because they weight less, require less maintenance, and are better suited for parking in rough terrain.

Seating — 70% recommended side-by-side seating. The participants indicated that side-by-side seating facilitates crew communications by their being able to coordinate with hand signals and also simplifies cockpit design by common usage of various instruments and other aids. Many who selected side seating believed that this configuration afforded better observation than tandem seating.

Ability to Carry Passengers — 59% recommended that the **ASH** not have the capability to carry passengers. Keeping the **ASH** small and avoiding transporting VIPs were the main objections to having a passenger-transporting capability.

Armament — 80% indicated that the **ASH** should definitely be armed. The reasons for arming the **ASH** included self defense, killing tanks, and shooting enemy helicopters down.

Additional salient comments were

(DESIGN/Continued on Page 66)

FIGURE 2 — ASH INNOVATIVE IDEAS

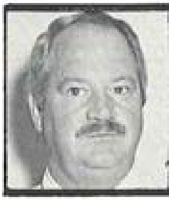
Design ASH to be a Scout, not ASH & TRASH	Air-to-air
Damage assessment missions	Decoy missions
Equip with loudspeaker for talking to ground troops without landing	Courier
Kill tanks	Equip with metal detector
Aircrew rescue	Suppress enemy radar
Radio relay	Resupply
Convoy cover	Arm and employ in swarm
Antisubmarine	Medical evacuation
Arm to infiltrate enemy rear	Forward air controller
Wire cutting	Float in water - speed in water comparable to speed boat
Command and control	

ADVANCED SCOUT HELICOPTER PROJECT MANAGER'S OFFICE (ASH-PMO)

PROJECT MANAGER, ASH
COLONEL
IVAR W.
RUNDGREN, JR.
0730

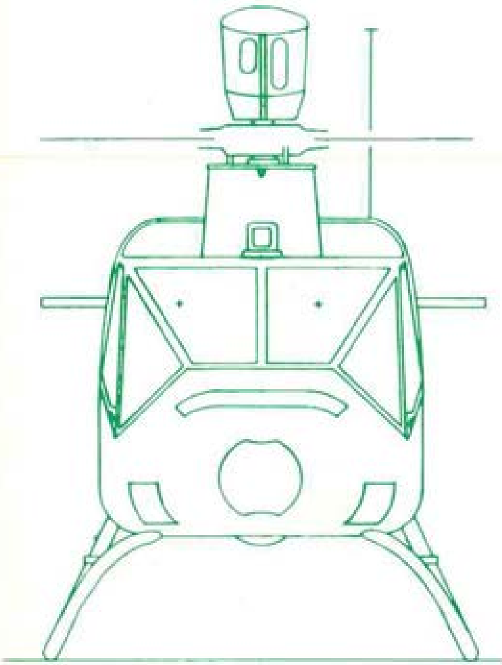
Program Management & Operations Division
Earl Gatlin
0738

Deputy Project Manager, ASH
James F. Matthews
0730



Technical Management Division
John A. McLaughlin
0733

Product Assurance and Test Division
Thomas J. Pojeta
0733



Operations Research and Systems Analyst
John G. Indellicate

Program Analyst
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AVRADCOM design studies on the ASH represent design possibilities rather than the actual ASH design that might ultimately be developed.

WHAT'S NEW IN ASH DESIGN?

BY DR. MICHAEL P. SCULLY, AEROSPACE ENGINEER, AVRADCOM

WHAT could we get if we could afford a "clean sheet of paper" ASH program?

What is the incremental cost (in terms of size and weight) of various features which might be included in a new ASH?

These are the questions which the AVRADCOM design studies address. Industry would be responsible for the final design of any new **ASH** should the Army opt for a new development.

Therefore, the AVRADCOM designs represent design possibilities rather than the actual **ASH** design that might ultimately be developed.

The **Mission Equipment Package (MEP)** is the primary reason for **ASH** and the trade-offs involved in selecting the baseline **MEP** are discussed in a separate article. All of the new **ASH** designs discussed in this article carry the baseline 822-pound **MEP** including a **Mast Mounted Sight (MMS)**, unless a specific statement to the contrary is made. This 822-pound **MEP** includes provisions for an extra 140 pounds of modular mission equipment, but the equipment itself is not included.

Table 1 outlines the most important **ASH** design criteria. There are two important values of gross weight from a design point of view. The **Mission Gross Weight (MGW)** is the gross weight used in the various performance requirements which size the engine and drive system.

The **Structural Design Gross Weight (SDGW)** is the gross weight used to size the structure. The **SDGW** is higher than the **MGW** because the user is willing to accept some performance degradation when the extra 140 pounds of modular **MEP,** the external stores, and full fuel are carried.

No mention of speed is made in **Table 1**. This is because speed does **not** drive the design. There is a desired speed capability of 150 knots for 30 minutes **Intermediate Rated Power (IRP)** under 4,000 feet/95°F conditions. This is achieved by all of the baseline designs without any increase in engine size.

However, it has been assumed that drag reduction is given a high priority dur-

Table 1-ASH Design Criteria

Mission Gross Weight (MGW) includes the specified MEP and fuel to fly the 2.5 hour ASH mission profile at 4,000 feet/95°F.

A minimum Vertical Rate of Climb (VROC) of 500 feet per minute at MGW under 4,000 feet/95°F conditions using 95% of Intermediate Rated Power (IRP).

Blade loading similar to Black Hawk and AAH (C_T/r = .080 at MGW under 4,000 feet/95°F conditions).

Single engine ASH designs have autorotation capabilities at MGW at least as good as the AH-1 at 9,000 lbs.

Twin engine ASH designs have autorotation capabilities at MGW at least as good as Black Hawk at 16,800 lbs.

Twin engine ASH designs can Hover in Ground Effect (HIGE) at MGW and 5 feet landing gear altitude under 2,000 feet/70°F conditions with One Engine Inoperative (OEI) using an emergency rating on the remaining engine.

Structural Design Gross Weight (SDGW) is MGW + 140 pounds of extra MEP = 600 lbs of exernal stores (structural limit of hard points) + fuel to fill tanks.

Ultimate load factor of 5.25 at SDGW.

Fuel tanks sized for 2.5 hour ASH mission profile at SDGW under Sea Level Standard (SLS) conditions.

ing the design process (faired hub, faired skid landing gear, faired **MMS,** careful fuselage design, well integrated inlet and exhaust flows, etc.).

Five baseline **ASH** designs have been considered. These are tandem seating with single T700 engine or twin **Advanced Technology Engine (ATE),** and **Side-by-Side (SBS)** seating with single T700 engine, twin **ATE,** or single **ATE.**

Table 2 shows the level of passive protection provided in these designs. The crew frag barrier provides protection such that one 23mm **High Explosive (HE)** round will not kill both crew members.

It is possible to fit such a frag barrier to both tandem and **SBS** designs; however, the use of the barrier in a **SBS** design eliminates most of the advantages of the **SBS** configuration (crew coordination) so the baseline **SBS** designs have no frag barrier. Except for the frag barrier the four lightweight designs (tandems and **SBS,** single T700 engine and twin **ATE**) have the same level of protection. The fifth design (single **ATE**) is the lighter weight **ASH** and it has a reduced level of protection.

Table 3 shows a comparison of the five baseline **ASH** designs. The parameters shown are: rotor and engine size, a build-up of **MGW, SDGW,** performance, and **Main Rotor (MR)** blade survivability. Notice that two values of **Vertical Rate of Climb (VROC)** are given for 4,000 feet/95°F conditions.

The first value is the requirement (**VROC** at **MGW** using 95% of **IRP**), while the second value is a degraded performance point (**VROC** at **MGW** + 140 pounds extra modular **MEP** + 300 pounds external stores, using **IRP**). This 300 pounds of external stores is only half of the structural capability of the hard points; however, it is envisioned to be the normal armament package. The extra drag and download of the external stores are accounted for in the calculations.

A comparison of **Table 3** with **Table 2** shows that designs having the same level of passive protection have a different passive protection weight. This is because single-engine designs have an armored engine while twin-engine designs only have an armored barrier between the engines to provide redundancy and because the crew armor protection configur-

TABLE 2: ASH BASELINE PASSIVE PROTECTION

SEATING	TANDEM	SIDE-BY-SIDE (SBS)	
ENGINE(S)	Single T700 Engine or Twin ATE	Single T700 Engine or Twin ATE	Single ATE
THREAT (mm/m). . . .			
Crew Seats.	12.7/800	12.7/800	7.62/100
AP Crew Barrier. .	12.7/800	12.7/800	7.62/100
Airframe.	12.7/800	12.7/800	7.62/100
Frag Crew Barrier. . .	23 HEI	None	None
MR Blade Threat. . .	23 HEI	23HEI	12.7 AP
Tail Boom Threat. . .	23 HEI	23 HEI	23 HEI
TR Blade Threat. . . .	23 HEI	23 HEI	7.62 AP

What's New in ASH Design

ation is dependent upon the seating arrangement.

The T700-powered designs in **Table 3** substantially exceed the 500 fpm **VROC** requirement, while the **ATE** powered designs exactly meet this requirement. This is because the T700 is a production engine and it would be very expensive to develop a smaller version.

Improved performance

Thus, the T700-powered designs have excess power. This increases their size, weight, and fuel consumption; however, it yields improved performance especially when carrying the extra 440 pounds of equipment and external stores. The **ATE** is in development so its size can be adjusted from the nominal 840 hp, within reasonable limits. Naturally, an **ATE** of any size has an associated development cost which has already been paid for in the case of the T700.

The **SBS** seating designs are smaller and lighter than the equivalent tandem seating designs. This is due to a variety of reasons: a more compact, lighter fuselage; no crew frag barrier; less instrument duplication; and electronics air conditioning, but no crew air conditioning (the greenhouse on the tandem requires crew air conditioning).

The lighter weight single **ATE ASH** is more than 875 pounds lighter than the **SBS,** twin **ATE** design; although it has a somewhat larger main rotor diameter because it optimizes at a lower disc loading than the twin. The sacrifices that the lightweight single **ATE ASH** makes compared to the twin are: the passive protection differences shown in **Table 2,** the lack of **One Engine Inoperative (OEI)** capability, and a somewhat lower speed capability.

Table 4 shows some of the more interesting variations from one of the baseline designs. Similar variations have been made for all five baseline designs, but are not presented here. The baseline values of cruise speed at 4,000 feet/95ºF using **Maximum Continuous Power (MCP)**; the total installed power (both engines, **IRP**); and the **MGW** are given plus delta values for each variation. The baseline design uses skid landing gear. **Table 4**

shows the price of using wheels instead (four knots, 34 horsepower).

The twin **ATE** baseline **OEI** capability is Hover in Ground Effect at **MGW** under 2,000 feet/70°F conditions. **Table 4** shows the price of increasing this capability to 4,000 feet/95°F conditions. There is a large speed increase due to the large increase in installed power. This speed increase only occurs under 4,000 feet/95°F, cruise **(MCP)** conditions, because at lower altitudes and temperatures or at dash **(IRP)** the speed is transmission limited. Increasing the transmission rating to allow full engine **IRP** to be used under 2,000 feet/70°F conditions would cost about 250 pounds of increased **MGW**.

Design vs costs

The twin **ATE** baseline design has canopy deice, but no main rotor or tail rotor blade deice. The price of adding blade deicing capability to be compatible with **AAH** is shown in **Table 4**. The baseline **SBS** seating designs have air conditioning for the electronics, but not the crew. Adding crew air conditioning is costly because of the extra accessory power required by the compressor. The baseline design has a flat glass canopy to reduce glint signature. Deleting this feature provides a significant speed increase and modest power and weight savings.

Other factors are weighed

The advantages ot making the extra 140 pounds of **MEP** and the 300 pound armament package modular (i.e. a performance degradation is accepted when these items are carried) are shown in **Table 4**, where the penalty of designing to always carry these items is presented. Notice that the cruise speed capability goes up. This is due to the extra installed power which is, in turn, due to the higher **MGW** required.

The twin **ATE** baseline passive protection against armor-piercing threats is 12.7mm at 8m. **Table 4** shows the results of increasing this protection to

TABLE 3: ASH BASELINE DESIGNS

SEATING	TANDEM		SIDE-BY-SIDE		
ENGINES	Single T700	Twin ATE	Single T700	Twin ATE	Single ATE
MR Diameter (ft)	32.3	31.7	31.5	30.9	32.9
Engine Size (IRP)	1 x 1,561	2 x 695	1 x 1,561	2 x 644	1 x 991
Empty Weight (lb)	3,750	3,611	3,541	3,391	2,833
Mission Equipment (lb)	822	822	822	822	822
Passive Protection (lb)	407	332	355	280	242
Crew (lb)	500	500	500	500	470
Fuel + Fluids (lb)	1,070	1,064	1,023	922	741
Mission Gross Weight (lb)	6,549	6,329	6,242	5,985	5,108
Structural Design Gross Wt. (lb)	7,414	7,214	7,102	6,869	5,964
4,000 feet/95°F					
VROC (MGW, .95 IRP)(fpm)	1,300	500	1,700	500	500
VROC (MGW + 440, IRP)(fpm)	1,000	140	1,400	100	70
CRUISE (MCP)(kts)	151	152	157	151	143
DASH (IRP)(kts)	175	164	180	163	154
2,000 feet/70°F					
VROC (MGW, IRP)(fpm)	2,800	21,370	2,800	2,350	2,130
DASH (IRP) (kts)	177	170	176	169	160


FREQ/(CHAN)
VOL
BRT
VHF/UHF
243
MAN
GUARD
PRESET
CHAN SEL
T/R&G
T/R
DF
TEST
FM
AM
FM
AM/FM
30
88
108
156
174
225
400
40.5
121.5
156.8
243
CLOSE AIR SUPPORT
AIR TRAFFIC CONTROL
MARITIME
MILITARY/NATO

What's New in ASH Design

12.7mm at 200m and of decreasing the protection to 7.62mm at 100m. Another possibility is to provide 12.7/200 protection for the airframe and 7.62/100 protection for the crew. This weighs about the same as 12.7/800 protection for both airframe and crew.

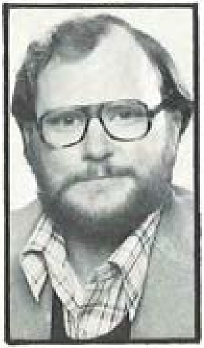
This alternative seems strange at first due to the unbalanced level of protection. However, consider the following scenario: the **ASH** unexpectedly discovers a tank mounting a 12.7mm gun under a tree 300m away and the tank opens fire on the scout. If the **ASH** has only 12.7/800 protection then it is very vulnerable until it gets at least 800m away from the tank.

Probability is small

If the **ASH** has 7.62/100 protection the scout is vulnerable until it can get beyond the effective range of the 12.7mm gun. Since the probability of an iron sight, 12.7mm gun hitting a rapidly retreating **ASH** at greater than 800m is not very great, the vulnerability of the 7.62/100

TABLE 4: SBS, 2xATE ASH VARIATIONS

	Cruise Speed (kts)	Installed Power (IRP)	MGW (lbs)
Baseline Design	151	1289	5985
Wheel Landing Gear	−4	+37	+158
OEI at 4,000 ft/95%F	+13	+339	+168
MR + TR Blade Deice	−	+21	+103
Crew Air Conditioning	−	+55	+124
Delete Flat Glass	+5	−9	−23
No modularity/MEP + 440 lb	+4	+155	+754
12.7/200 Passive Protection	−	+32	+160
7.62/100 Passive Protection	−	−24	−120
Same Autorotation as SE	−	+39	+106



Dr. Michael P. Scully, Aerospace Engineer, USA Research and Technology Lab, AVRADCOM

protected **ASH** is not much greater than that of the 12.7/800 protected **ASH**, in this case. If the **ASH** has 12.7/100 airframe protection and 7.62/100 crew protection then the tank must disable both crew members to bring the scout down.

Otherwise, the remaining crew member can fly his wounded partner back to safe haven instead of crashing. The tank's chance of disabling both crew members is considerably reduced because the crew is protected from behind by the transmission and fuel tank in addition to their 7.62/100 armored seats.

Autorotation capabilities

The twin-engine **ASH** designs are required to meet a less stringent autorotation capability (same as **Black Hawk** at 16,800 pounds) than the single-engine **ASH** designs (same as AH-1 at 9,000 pounds). The price of increasing the twin-engine autorotation requirement to be the same as the single-engine is shown in **Table 4**. This increased autorotational capability is obtained by adding tip weights to the main rotor blades, thus increasing main rotor inertia.

In a breakdown of the differences between the **SBS**, twin **ATE** lightweight

Table 5 shows a breakdown of the differences between the **SBS,** twin **ATE** lightweight **ASH,** and the **SBS,** single **ATE** lighter weight **ASH.** The number of main rotor blades and the disc loading are varied as necessary to minimize the **MGW.** The change in autorotation, for example, caused the disc loading to go from 6 psf to 8 psf. Thus, the **MGW** went down but the engine size went up. The autorotation change shown in **Table 4** was done at a constant disc loading (8 psf), thus the **MGW** change is larger than it would be if optimum disc loading were used.

This article provides some answers to the questions listed in the opening paragraph. A much more complete set of answers will be found in the final report of the **ASH Special Study Group.** The **ASH** designs discussed here use the latest advances in helicopter technology: advanced composite structures, advanced rotors, fly-by-light, advanced engine, and drive system technology. These advances allow a smaller, lighter, more survivable and crashworthy, less vulnerable, less fuel thirsty, and less detectable **ASH** than the various **MOD** or derivative **ASH** alternatives.

HISTORICAL SUMMARY
(Continued from Page 41)

9 APRIL 1979

An **ASH Mini-SAG** was held for the purpose of evaluating the strategy which surfaced at the Emerging Results Briefing on 2 February 1979, and making recommendations regarding the **ASH Program.**

In summary, the **Mini-SAG** determined that numerous - and reasonable - alternative **ASH** solutions exist, and that affordability and the long term requirement demand a comprehensive evaluation. The **Mini-SAG** agreed that there should not be any preemptive Army decision on scout alternatives, and that the **ASH—SSG** effort should be continued to evaluate all alternatives.

MAJOR ASH SSG MILESTONES
8 AUGUST 1978—9 APRIL1979

DA LOI	8 August 78
TRADOC Tasking	21 August 78
SAG I	29 September 78
Presentation to Industry	9 Nov 78
SAG II	20 November 78
Visit to Europe	6 December 78
SAG III	26 January 79
Emerging Results	2 February 79
Mini—SAG	9 April 79

APRIL—SEPTEMBER 1979

During this period the **ASH SSG** effort was in full swing. Major products such as the **MENS,** Basis of Issue Plan, **ROC,** and Draft Decision Coordinating Paper were produced. In addition, numerous briefings, work sessions, and meetings were held during this period which will lead to the completion of the following:

FUTURE ASH MILESTONES

SAG IV	27 September 79
ASARC Prelimary Review	4 Oct 79
Special ASARC	6 November 79
SSG Terminates:	
OSD Program Review	4 December 79
RFP to Industry	March 80
ASARC II	September 80
DSARC II	October 80

We believe in the success of the **Advanced Scout Helicopter Program** and the ultimate delivery of a much needed capability to the user.

The battlefield of the late 1980's and early 1990's will require an ASH that's equipped with mission equipment that provides a high degree of mobility.

ASH MISSION EQUIPMENT

BY CLEMENCE P. MUDD, JR., SECONDARY SYSTEMS PM, AVRADCOM

THE continued refinement of the **ASH** mission and tactics have resulted in refinement of the operational requirements.

Redefinition and further refinement of the mission equipment package for the **ASH** is a continuing process due to its multi-mission reconnaissance role of the **ASH.**

The battlefield of the late 1980's and early 1990's will require an **ASH** equipped with mission equipment which will provide a very high degree of mobility.

NOE helps survivability

Regardless of the particular mission scenario, the **ASH** will have to operate, navigate, and communicate in a **nap-of-the-earth (NOE)** environment to dramatically increase the survivability. Remaining highly manueverable, lightweight, and undetectable are key ingredients to the ASH mission success. In addition, the mission equipment must permit operation under extreme weather conditions during day or night.

As a result, emphasis is placed on the modularity concept of the mission equipment. This technique will permit the unit commander the flexibility to configure the **ASH** for a particular mission. Mission equipment can be selected for a day or night mission, desired navigational accuracies, desired communication capabilities, etc. The modularity concept will permit ease in adding future systems and integration of next generation components into existing systems.

Early detail planning

The obvious key to the success of the modularity approach lies in early, exceptional detail planning by the airframe contractor and/or mission equipment integrator to accommodate modular and future system growth. Incorporation of a multiplex system is an outstanding technique for providing the aircraft with modularity provisions and the flexibility for the required future expansion of the mission equipment on the **ASH.** .

In addition, the multiplex system assures a highly effective man-machine interface. The intensity of the crew workload at **NOE** demands that routine control functions be automated to the maximum extent practical and a simplified, highly integrated cockpit is a must. The other obvious advantages of a multiplex system are improved mission reliability due to the redundancy and decreased maintenance time.

Various equipment packages have been synthesized by the **ASH** Special Study Group to accommodate the many airframe sizes which have been investigated as **ASH** candidates. This article will discuss only the package which most nearly meets the technical requirements stipulated in the Draft Advanced Scout Helicopter **Required Operational Capability** (ROC).

Many discriminators were employed in the selection of the Equipment Packages. Among the paramount discriminators were:

- the availability of equipment to meet the I.O.C. date.
- the commonality of equipment which will be in service with other Army aircraft of the time frame.
- equipment which will demonstrate good reliability and maintainability in a tactical environment.
- the ability of the equipment to adapt to the modular **ASH** concept. The overriding discriminator, which is of major importance, of course, is cost.

Clemence P. Mudd, Jr., Secondary Systems Project Engineer, AVRADCOM

Equipment, which has been developed for the AH-64 Advanced Attack Helicopter or is now being developed, was investigated in detail for **ASH** applicability. As a result, the following equipment was identified as candidate mission equipment or systems for **ASH** application:

- Nose-mounted **Target Acquisition/Designation System, Pilot's Night Vision System (TADS/PNVS)**
- Repackaged **PNVS** Components for mast mounted **ASH** configurations
- Video Recorder
- **Integrated Helmet and Display Sight System (IHADSS)**
- Heading Attitude Reference System
- Symbol Generator

The majority of the remaining communications, navigation, **Aircraft Survivability Equipment (ASE),** and mission avionics will be items which are common to Army Aviation in the time frame.

Target Acquisition/Designation System (TADS)

The **Target Acquisition/Designation System** would consist of either a **Modular Mast-Mounted Sight (MMMS)** or a nose-mounted AH-64 **TADS/PNVS.** Since the advantages and disadvantages of the nose-mounted sighting system are well known, only the mast-mounted sight will be discussed in this article.

The **Modular Mast-Mounted Sight** would permit the unit commanders the flexibility to select a TV sight or a FLIR sight prior to starting a mission. The aircraft equipped with the **Modular Mast-Mounted Sight** shall be capable of day and night operation, and operation in poor atmospheric visibility conditions, such as fog, haze, and smoke, enabling detection and identification of targets for a distance compatible with the range of the anti-tank missiles installed on attack helicopters.

The sight will consist of an integral laser rangefinder/designator and spot tracker. The laser designation system shall also be capable of illuminating targets for laser-seeking weapon systems such as **HELLFIRE** and **COPPERHEAD.** An instant playback video recorder is an integral part of the targeting system to reduce aircraft detectability and increase survivability by permitting the **ASH** to remask after scanning a section and studying the video tapes in more detail for targets or threats.

AWARD—COL Albert B. Luster, r., receives the Meritorious Service Medal (2OLC) from MG Story C. Stevens, l., CG, AVRADCOM, for his exceptional work on the CH-47 Modernization Program. As Commander of the US Plant Rep Office, Boeing Vertol Co., COL Luster led the ARPRO in helping to bring the $50 million Mod Program in four months ahead of schedule and under cost.

Redstone Arsenal tests

Operational detectability measurements were made on a mast mounted sight helicopter during the July-September 1979 time frame to assess the detectability enhancement provided by a mast-mounted sight. These tests were conducted at the Redstone Arsenal and verified and substantiated the value of a mast mounted sight in an **ASH** mission.

Pilot's Night Vision System

It is envisioned that the **PNVS** will consist of a repackaged AH-64 thermal image type FLIR with flexibility in azimuth and elevation and slaved to the pilot's helmet AH-64 (IHADSS), which will also provide the pilot with the image as a **Heads Up Display (HUD).**

The **HUD** will provide the pilot with essential flight control data during night and tactical flights. The **IHADSS** will permit the pilot to hand off targets or target areas to the observer for target evaluation and/or designation. Ease of expansion of the **IHADSS** to include a **HUD** for the observer shall be retained and is inherent in the AH-64 design.

As an alternative, the next generation of Night Vision Goggles appear to be very attractive for an austere **ASH.** This would permit the crews the ultimate of ease in the installation and removal of the **PNVS.**

Aircraft Survivability Equipment

A radar warning receiver shall be installed with the capability to discriminate between hostile surveillance radars and antiaircraft weapon radars which present an immediate threat. Complete provisions shall be included for a laser warning receiver to alert the crew when the aircraft is being "painted" by a hostile laser. Additional **ASE** would be installed when the requirement is identified and aircraft performance degradation would be accepted when the equipment is added to the **ASH.**

Communications

The communications sytem consists of an intercom set between the two crew members. A multiband VHF-FM/AM radio set of the time frame to provide tactical commnications (FM) and civil traffic control (AM). A UHF-AM radio set shall be provided for tactical air traffic control and interservice communications. A **NOE** package shall be required consisting of an FM amplifier **(Improved FM)** for each FM set and complete provisions for an HF/SSB radio set to provide long range radio with ground units.

Based on the success of the new development programs such as the **Black Hawk** and **AAH**, it is envisioned that all communications antennas shall be structurally integrated or flush mounted on the airframe. The provisions to secure each radio set shall be installed when the **ASH** is operating in the tactical environment.

ASH MISSION EQUIPMENT

A. TARGET ACQUISITION AND VISIONICS
(1) MODULAR MAST MOUNTED SIGHT
(2) PILOT'S NIGHT VISION SYSTEM (PNVS) (3) VIDEO RECORDER
(4) SYMBOLOGY GENERATOR
B. INTEGRATED HELMET AND DISPLAY SIGHT SYSTEM (IHADSS)
C. AIRCRAFT SURVIVABILITY EQUIPMENT
(1) APR-39V(2) RADAR WARNING (2) LASER WARNING (CPO)
D. AVIONICS
(1) COMMUNICATIONS
(A) VHF-AM/FM WITH IMPROVED FM COMMUNICATIONS (2)
(B) UHF-AM, (C) HF/SSB (CPO), (D) INTERCOM (2)
(E) VHF/UHF SECURITY (3), (F) HF/SSB SECURITY (CPO)
(2) NAVIGATION
(A) DOPPLER NAVIG SYS (B) HEADING ATTITUDE REF SYS
(C) MAP DISPLAY (CPO) (D) GLOBAL POSITIONING SYS (CPO)
(E) ABN DATA TRANSF SYS (F) TACTICAL BEACON NAVIG SYS
(3) INTEGRATED AVIONICS CONTROL SYSTEM
(MAY BE PART OF AIRCRAFT MULTIPLEX SYSTEM)
(4) IFF TRANSPONDER, (5) IFF SECURITY, (6) RADAR ALTIMETER
THE TOTAL WT OF THE INSTALLED ASH MISSION EQUIPMENT PACKAGE IS APPROX. 820 POUNDS. AIRCRAFT PERFORMANCE DEGRADATION WOULD BE ACCEPTED FOR ADD'L FUTURE EQUIPMENT AS IT'S IDENTIFIED FOR INSTALLATION ON THE ASH.

Navigation

The primary návigation suit will be provided by a Heading Attitude Reference System (HARS), such as the LR-80, which is common to the AH-64, a Doppler Navigator, and a Tactical Beacon Navigation System. Under normal usage, position update of the doppler will be provided by manual updating of known landmarks or lasing on known landmarks.

For higher accuracy position location, complete provisions will be provided for installation of a **Global Positioning System (GPS)** for hybrid augmentation. Complete provisions shall also be provided to install a Projected Map Display which will be slaved to the navigation system through the multiplex bus. The building block arrangement within the navigation system provides a high degree of modularity which permits the unit commander the flexibility to construct a navigation/position location system with the required accuracy for his particular mission.

The key to a successful navigation system is the ability to integrate existing and future systems into the aircraft system by use of the digital multiplex system. An **Airborne Data Transfer System** shall be incorporated to encode target location position for handoff to airborne or ground units.

An airborne transponder shall be incorporated which will be compatible with the civil airways and can be made to operate in the **Identification Friend or Foe (IFF)** mode by the installation of an **IFF** securing set.

Based on the requirements specified in the Draft **ASH Required Operational Capability,** the mission equipment package is shown in the box on this page.

No ASH Concept Formulation Study would be complete or even accepted unless it included an analysis of the use of the helicopters existing today.

MODIFICATION OF ALTERNATIVES

BY JAMES A. O'MALLEY, III, AEROSPACE ENGINEER, USA AVRADCOM

AN Army Concept Formulation Study is a requirement when new threats or a new mission mandates the need for an additional weapons system.

The recognized need for a sophisticated **Aerial Scout** is no exception and as such, requires a comprehensive examination of the helicopter in this role. No Concept Formulation Study which includes helicopters would be complete or even accepted unless it included the analysis of the use of existing helicopters.

Current models won't cut it

It is no easy task for an existing helicopter to take on the responsibilities of the Aerial Scout mission. Therefore, the existing helicopter must submit to various degrees of modification that enables it to earn the title of **Advanced Scout Helicopter (ASH).**

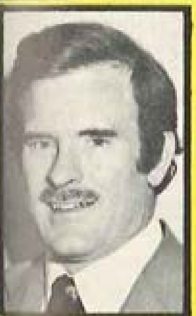
Towards this end, design analyses are being conducted by the ASH Special Study Group on three general categories: 1) Helicopters from the U.S. Army Inventory; 2) European Helicopters which satisfy some degree of NATO Standardization and Interoperability, and 3) Commercial Helicopters. The requirements which provided the principle guidelines for these analyses are as follows:

- The ASH should have a **Vertical Rate of Climb (VROC)** equal to 500 ft/min at **Intermediate Rated Power (IR)** and 4,000 ft/95°F. This requirement is similar to that imposed upon the YAH-64 and the UH-60A, except that full power is allowed (instead of 95%/**IRP**) to minimize the need for a full engine change merely to satisfy a 5% deficiency of power.
- The ASH should have a mission endurance of 2.5 hours at 4,000 ft/95°F and Sea Level Standard temperature. The ASH mission includes one hour of hovering (in ground effect and out of ground effect), one hour of mostly Nap-of-the-Earth low speed flight and .5 hours of reserve fuel available at the end of the mission. The requirement to have the ability to conduct the mission also at Sea Level insures the full 2.5 hours will be available for most situations.
- The ASH should have a cruise

speed of 120 knots at 4,000 ft/95°F. Although nearly all the Advanced Scout Helicopters derived from the existing helicopters are able to easily surpass this requirement, it nevertheless remains a requirement in order to minimize any modification effort that a higher speed may require.

● The ASH should have the ability to sustain 2.5 g's maneuver for two seconds and 0 g's for one second, each at no particular specified speed. The ASH should have the ability to perform severe maneuvers at the low speeds where it will most often operate. The positive g maneuver requires a high solidity rotor while the low g maneuver requires positive coupling between the rotor and fuselage even when there exists no lift on the rotor blades.

● Provisions should exist for a **Mast Mounted Sight (MMS).** This requirement is a difficult one, since the least development work has been done in this area. The prediction of the vibration environment of the total system is very difficult and thus causes a very challenging effort to design the **MMS** mounting mechanism. This problem is made more complex as a result of the environment changing with the different flight conditions. In spite of the difficult problems, the development of an ASH with a **MMS** remains very worthwhile because of the potential for lower detectability.



James A. O'Malley, III, Aerospace Engineer, AVRADCOM

● The ASH should be able to be retrieved by the UH-60A at 4,000 ft/95° F. This requirement places a definite quantifier on the desire for a small sized ASH as well as providing a means of bringing back the expensive mission equipment in the unlikely event the ASH is downed. Very few of the derivative Advanced Scout Helicopters can satisfy this requirement.

● The ASH should be self-deployable (800 nautical miles with 20 knots headwind). This requires provisions for auxiliary fuel tanks enough to allow the helicopter to fly the North Atlantic and not depend upon Air Force transports.

● The ASH should have minimum detectability. This includes the minimization of such cues as visual, aural, radar, and **IR.** This, in addition to the use of a **MMS,** will significantly enhance the ASH mission effectiveness.

● The ASH should be invulnerable to 12.7mm **API.** This requires the derivative ASH to carry strategically placed armor that will protect the helicopter and crew and allow the continuation of the mission in case of a hit from 12.7mm ballistics.

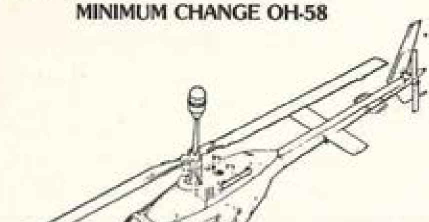
● The ASH should have protection against **Chemical, Biological,** and **Radiological (CBR)** type warfare. Protection of this type, of course, increases ASH invulnerability on the battlefield and allows continued mission effectiveness in case CBR warfare is employed.

● The ASH should satisfy the crashworthy requirements set forth in MIL STD 1290. If this requirement is impractical within the scope of the effort, then at least crashworthy seats with sufficient stroke and cockpit liveable volume should be accounted for. The fuel system should be crashworthy and self-sealing.

The design analyses are being conducted in such a manner as to arrive at a derivative ASH which represents a realistic solution, given reasonable time and level of effort.

This sometimes results in partial fulfillment of the above requirements but provides a design that can be used during Concept Formulation to determine to what degree the ASH mission is affected. The flight performance requirements (VROC, Endurnce, and Cruise Speed) are those which were given priority and dictate the limits of the airframe modifications.

MINIMUM CHANGE OH-58



OH-58D

Helicopters which cannot meet the flight performance requirements are allowed to carry less mission equipment if the modification effort to meet the flight performance is judged excessive (approaching a complete New Development or limited by cost).

The OH-58C is considered a candidate for ASH because of the large number available in the Army inventory. A small part of the ASH mission includes the OH-58C scout function. This would make it practical to retrofit part of the OH-58C fleet. The OH-58D is envisioned to be the result of a minimum modification program. The existing structural gross weight limit of 3,200 lbs is adhered to thus retaining the present OH-58C flight performance, but does not permit the helicopter to carry sufficient equipment to satisfy the full requirements stated for ASH.

The principal difference between the OH-58C and the OH-58D is the addition of a **Mast Mounted Sight.** The OH-58D **MMS** has daytime capability only and is mounted above the rotor plane. The Army is presently conducting a **Mast Mounted Sight** development program (using the OH-58C) which has provided the valuable experience necessary for the OH-58D application.

Improved handling qualities

The other notable mofifications include a redesigned tail rotor and the addition of the **Stability Augmentation System (SAS)** commercially available for the Bell 206 helicopter. These changes to the OH-58C will improve the handling qualities of the helicopter when it is used as an ASH. However, because of little excess power available (ASH mission weight is the limit 3,200 lbs and the existing engine installation is used) and the inability of the unmodified teetering rotor to perform maneuvers approaching 0 g's, the OH-58D will not satisfy ASH maneuvering requirements.

For a weight penalty that would detract from mission equipment or endurance, the teetering hinge of any 2-blade rotor can be modified (by the addition of a spring) to allow low g maneuvers. The OH-58D retains the vulnerability and crashworthiness of the OH-58C in order to include a maximum amount of mission equipment. The mission equipment deficiencies are mainly the lack of UHF-AM communications and no ASH navigation capability, except a Heading Attitude Reference System.

In order to give the night capability to the OH-58, a maximum modification effort is needed. This is done by installing a 4-bladed main rotor (already developed for the 206L-M) and a modular **MMS** that has the ability of carrying a day TV or a FLIR. The 4-bladed rotor permits a more favorable vibration environment (as compared to a 2-bladed rotor) for the **MMS.** The 4-bladed rotor will improve the handling qualities of the OH-58 when combined with an improved tail rotor and **SAS.**

DAY/NITE OH-58

The improved tail rotor includes a novel "ring" tail design that reduces the usual tail rotor/vertical fin interference problems. This so called "OH-58E" exceeds the 3,200 lbs structural gross weight limit now imposed upon the OH-58 airframe and investigations are now underway to determine the actual airframe limits through a NASTRAN analysis and an airframe static test.

These investigations will provide engineering data which will aid in any airframe modifications necessary to allow the usual 3.5 g structural design condition at the OH-58E mission gross weight.

The use of the present OH-58C engine (T63-A-720) does not provide the OH-58E with adequate performance. An uprated transmission has been included in the OH-58E and allows the use of more engine power at altitudes below 4,000 ft. The higher rated transmission also permits installation of larger engines (LTS101-750 or an advanced technology engine, ATE). The ATE is under development by the Army now, but will probably not be available until the middle 1980's; however, the LTS101-750 is an adequately powered interim engine. The crashworthiness of the OH-58E has not been improved over the 58C because of the extensiveness of the modifications and the marginal performance already available.

MINIMUM CHANGE AH-1/ASH

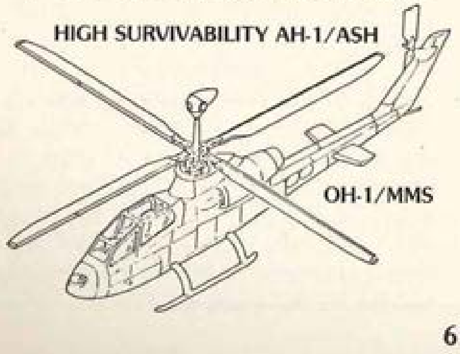
The next size class available from the U.S. Army inventory oversteps that class needed for an ASH which would result from a New Development. The OH-1 **TADS (Target Acquisition Designation System)** represents an estimate of the minimum modification necessary to convert an AH-1S to a helicopter used solely as an ASH. The Army has many AH-1 airframes; however, most are committed to emerge as AH-1S models badly needed for the attack role.

Therefore, the OH-1/**TADS** would probably be the result of a new assembly line which takes advantage of the design work and tooling already available for the construction of the AH-1 airframe. The use of nose-mounted visionics precludes the advantages of the **MMS** but removes much development risk because of their availability. Further, there are presently efforts underway which have as their objective the installation and use of the YAH-64 **TADS** and **PNVS (Pilot Night Vision System)** each on separate AH-1's (surrogate trainers used during **TADS/PNVS** development). The remaining full mission equipment functions required of ASH are included in the OH-1/**TADS.**

Other OH-1 modifications

Other significant modifications necessary are crashworthy seats and crew barrier protection against 23mm HEI. This extent of modification allows the present AH-1S engine (T53-L-703) to be retained with some sacrifice in **VROC.** When full survivability provisions are included, the uprated version of the T700 (GE-701) similar to Navy LAMPS GE-401) needs to be installed and provides adequate performance at a mission gross weight of 8,480 lbs.

The full survivability provisions include crashworthy seats, transparent crew barrier (for 23 HEI crew protection), extra engine armor, provisions for more crashworthy and self-sealing fuel system, engine inlet de-ice, and provision for CBR protection.



Similar to the OH-58 analysis, a maximum modification version of the AH-1 is included. The OH-1/**MMS** included a 4-bladed rotor and the full suit of ASH mission equipment with a modular mast-mounted sight. The 4-bladed rotor is a high solidity 20-inch chord survivable blade which is controlled through five separate hydraulic pump, actuator combinations, any three of which will provide full control capabilities.

The transmission path for actuator control is fiber optics. This system (STAR) is under development through IR&D at Bell Helicopter and is in the hardware stage with plans to flight test in the future. The tail rotor is a wide chord survivable system with a fiber optics actuated control system. In order to meet the ASH performance requirements at the mission gross weight of 8,400 lbs, the OH-1/**MMS** must accept installation of the uprated T700 engine.

Next: The UH-1H

The next step in the Army inventory is the UH-1H which has a four foot bigger rotor than the AH-1. The Army certainly has many **Hueys;** however, availability for conversion to ASH is uncertain. The UH-1H, when allowed an engine conversion to the T53-L-703 (AH-1S engine) can carry the nose-mounted ASH mission equipment configuration and almost meet the mission performance requirements. Other modifications are intended to increase the survivability of this OUH-1/

TADS. These include crashworthy seats, a more crashworthy self-sealing fuel system, engine armor, STAR fly-by-light main rotor control system, and a new tail rotor with fly-by-wire controls. The mission gross weight of the OUH-1 then becomes about 8,700 lbs.

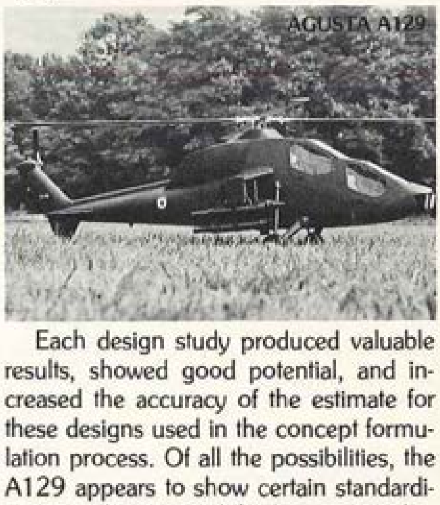
The final Army inventory helicopter to be considered is the YAH-64. The plan to use this helicopter would be to leave the weapons systems intact and off-load the weapons (or most of them) while the ASH mission is being performed. The AOH-64, as it might be designated, would then have a dual role and would have most of the required capabilities of the ASH (some ASH equipments, such as a video recorder are not presently included).

Excess performance

The AOH-64 is much larger than required and also more expensive than desired for the ASH. With all weapons off-loaded, the ASH mission AOH-64 gross weight is 13,450 lbs and thus has excess performance. However, the uprated T700 is required to give this twin engine helicopter the power to **Hover-In-Ground Effect (HIGE)** with **One Engine Inoperative (OEI)** at 2,000 ft/70° F.

This HIGE, OEI ability greatly enhances the ability of a twin engine ASH to bring home the mission equipment in case of an engine failure. Since the ASH spends much of its time hovering behind trees, hills, etc., this OEI capability must be available within a short response time. This requires an electronic fuel control which is especially designed for this purpose.

In an attempt to strengthen the NATO posture by providing for standardization and interoperability of the weapons systems, the possibility of using a European Helicopter was investigated. Therefore, the U.S. Army procured a Design Analysis Study each from Agusta, Aerospatiale, and MBB. The results of these studies produced detailed descriptions of the parent helicopters (A129, AS350, and B0105) and detailed descriptions of the derivative ASH designs that carried either the **MMS** or **TADS/PNVS** mission equipment.



Each design study produced valuable results, showed good potential, and increased the accuracy of the estimate for these designs used in the concept formulation process. Of all the possibilities, the A129 appears to show certain standardization and interoperability because it is being built as an attack helicopter for the

Italian Army. Since it is still in the design stage (first flight not later than mid 1982) the opportunity exists for the U.S. Army to influence the design in favor of ASH.


AEROSPATIALE AS350

Agusta has already decided to design the rotor mast with a sufficient inside diameter to accept a **MMS.** The AS350 derivative ASH design represents a small lightweight single engine design (1,000 hp **ATE**) which is the result of extensive modification efforts. The B0105 is also an extensively modified derivative which uses twin LTS101-750 engines (in place


MBB BO105

of the original C20B engines). Both use rotor blades presently being developed for larger versions of each parent and require some transmission redesign to accept the higher installed power as well as the **MMS.**

Both are now in use

An interesting AS350 modification is the installaton of the SA361 fenestron in place of the standard tail rotor. The fenestron was designed for the higher installed power of the SA361 and thus should provide the high directional control required for the ASH. The B0105 exists as a HOT missile version (PAH-1) and at the present time is used by the West German Military. The AS350 is strictly commercial, but is enjoying great popularity.

The commercial category of U.S. helicopters in the concept formulation study includes the Sikorsky S-76 and the Bell 222. In the case of the S-76, the


SIKORSKY S-76

rotor and drive system offer the limit capabilities that allows their use in an ASH that can carry the required mission equipment. However, the higher power available from the LTS101-850 (800 hp ⁹ SLS) engines is required. These LTS engines are the same as those planned for the A129 and are still in development. The fuselage must be completely replaced in order to satisfy the ASH requirements for crashworthiness since the helicopter will have the ability to carry the required ASH mission equipment.

The Bell 222 ASH version represents a lower level of effort which installs mission equipment very similar to that installed in the OH-58D, yet provides the required performance. The original LTS101-650 engines have to be replaced with the higher power LTS101-750 engines and is the principal airframe modification.

The above summarized investigations represent a wide spectrum of ASH alternatives, some of which take advantage of lower cost, and more readily available alternatives with the knowledge that those alternatives do not meet all the requirements. It is the responsibility of the ASH Special Study Group to provide the decision makers with sufficient information so that the ultimate decision on ASH can be made, in light of the external pressures of time and money as well as mission effectiveness.

Design Survey
(Continued from Page 43)

gleaned from the questionnaires of those respondents who took the time to provide innovative ideas or suggestions to the **ASH SSG.** Since these comments were outside the purview of the basic questions, no statistical analysis could be made; however, they were deemed valid and considered by the **ASH SSG.**

Innovative ideas

Figure 2 (Page 43) lists the most mentioned innovative ideas or missions.

Figure 3 is a list of design concepts the participants believed should be considered for the **ASH.**

To survive and be effective in the

Day/night capability

future, the **ASH** must have the capability to operate and detect targets during the day and night and under adverse weather conditions. The **ASH** also must have an effective **NOE** communication system and modern aircraft survivability equipment. ◄

FIGURE 3—SUGGESTED DESIGN CONCEPTS

KEEP IT SIMPLE	JETTISON-TYPE CANOPY
KEEP IT INEXPENSIVE	CRASHWORTHY
KEEP IT RELIABLE	STIRRUP PEDAL
BLACK BOX	ROTOR BRAKE
DESIGN IT TO BE QUIET	FAST
COMFORTABLE TO REDUCE FATIGUE	POWERFUL

The building of stronger ties with our NATO partners will assure that we eliminate waste and maintain technological excellence in our combat forces

RSI

BY MAJOR LOUIS KRONENBERGER, SYSTEMS ENGINEER, AVRADCOM

ONE of the high priority goals of the U.S. Government is to build stronger ties with NATO and strengthen the Alliance politically, economically, and militarily.

At the May 1977 NATO Summit Meeting in London, President Carter emphasized the need for improved cooperation by NATO countries in development, production, and procurement of Alliance defense equipment. The President called for a major effort to eliminate waste and duplication in national programs and to maintain technological excellence in all Allied combat forces.

Congressional support for this concept is detailed in Public Law 94-361, dated 14 July 1976, which states that it is U.S. policy that equipment procured for U.S. Armed Forces under NATO should be standardized, or at least interoperable, with equipment of other NATO countries.

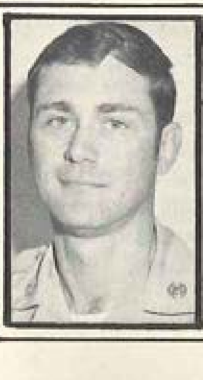
Standardization and Interoperability considerations for the **Advanced Scout Helicopter (ASH)** are not new. Although the need for **ASH** has existed since early 1972, it was in August 1977 that the **ASH** was identified as a prime candidate for the first NATO Joint Interoperable Major System Development Program. This identified potential was the subject of several Army level briefings discussing off-shore/off-shelf acquisition and associated problems.

In January and February of 1978, the U.S. Army Aviation **Rationalization-Standarization-Interoperability (RSI)** Review investigated the requirements for the U.S. **ASH** and compared them with the French and German requirements for an anti-tank helicopter. Doctrinal similarities and differences for Scout and Attack Helicopter teams were reviewed and it was determined that the concepts of tactical employment of France, Germany, and the United Kingdom were converging toward the U.S. Doctrine. Specifically, all seem trending toward the use of dedicated helicopters for the attack, reconnaissance/scout, and utility roles.

The potential for cooperative development and co-production agreements are being explored at this time. Such discussions, however, are only in the formative stage. The **ASH Special Study Group (SSG)** is developing a broad and general **(RSI)** plan. The U.S. will have to maintain a degree of flexibility in its alternatives until such a time as agreements have been reached or operational characteristics and potential cooperative options have been explored in detail with interested countries.

Cooperative efforts

The basic approach is to obtain agreements with interested NATO countries to pursue cooperative efforts for the **ASH.** These efforts should eventually lead to agreement on required operational characteristics, participation in technical data exchanges, jointly evaluating results of concept studies and development tests, and preparing **Memoranda of Understanding (MOU's)** on potential cooperative development and production projects. The **RSI** approach is highly contingent upon responses to proposals, counterproposals, negotiations, system availability, and certainly, affordability. As a result, the **RSI** plan must be flexible and dynamic.



Major Louis Kronenberger, Systems Engineer, USA AVRADCOM

There are **three** generally recognized approaches to achieving Standardization and Interoperability of U.S. and NATO equipment:

- Other member nations of NATO may adopt a U.S.-developed design and procure the equipment directly from U.S. sources or enter into licensed production or co-production agreements.
- The U.S. may adopt a foreign-developed design and procure the equipment from foreign sources or enter into licensed production or co-production agreements.
- Alliance nations may enter into cooperative research and development programs and procure the developed product through any of a number of various production plans.

Additionally, there are cooperative agreements that involve integration of subsystems of different major systems to achieve interoperability. From a practical standpoint, the **ASH** mission equipment probably represents the best opportunity for **RSI** involvement.

Possible industry reaction

However, a decision to co-develop and/or co-produce the **ASH** from a European derivative airframe could result in a strong reaction from U.S. helicopter industries and other special interest groups.

Department of Defense (DOD) policy guidance states that all military components must include NATO **RSI** potential initiatives in their respective development and procurement programs. The project **Decision Coordinating Paper (DCP)** must address the NATO **RSI** analysis. This analysis will include the two-way contribution of the U.S. program to NATO on **RSI,** information on the availability of NATO candidate systems, and the potential for cooperation.

At stake are beneficial exchanges of technology and cooperative international research and development or co-development. It is of maximum benefit to all governments concerned that coordination on **RSI** matters begin as early as possible in the Conceptual Phase. Sharing of advanced technology is a prerequisite to total success in NATO Standardization and Interoperability.

The achievement of **RSI** agreements will undoubtedly require a willingness on the part of the U.S. to accept compromises on schedules and costs, as well as a willingness to accept the NATO countries as full technological and economic partners. Specifically, it will require the sharing of advanced technology in engines, control technology, rotor systems, visionics and composite materials.

Assessing the requirements

The greatest opportunities for **RSI** present themselves when similar requirements exist between two or more NATO countries. A potential exists in assessing the requirements for an **ASH,** or a derivative utilizing the airframe, and pursuing the similarities with Germany, France, or Italy. If a common requirement can be defined, a sharing of technology and costs by the countries would be a benefit to the concerned countries.

However, cost estimating on international programs presents an inherently more difficult situation than on a national program. Unusual requirements will include licensing and data rights associated with the sensitivity of technology transfer. Normal parametric **Cost Estimating Relationships (CER's)** would prove difficult to apply to an international program.

A program with international involvement quite naturally lends itself to a unique management requirement. The project manager of a foreign program will require the assistance of personnel possessing expertise in a variety of fields peculiar to an international program. Familiarization with the mores and social customs of the NATO countries is a necessity.

National holidays, for example, are more prevalent in Europe and can exert a strong influence on European work schedules.

At the same time, the U.S. Project Manager and contractors must have multinational empathy. While being sensitive to the customs and cultural conditions in all the countries participating in the program, they must be prepared to present alternatives that can lead to effective compromises. Financial and schedule crises will occur requiring immediate response with positive and innovative solutions.

Study contracts let

The **ASH** Project Manager's Office has taken the initiative to explore the **RSI** potential by letting study contracts with three European helicopter manufacturers: **Aerospatiale** of France, **Messerschmitt - Boelkow-Blohm** of West Germany, and **Augusta** of Italy. **Preliminary Design Studies (PDS's)** for an **ASH** were undertaken with these organizations in the April - June 1979 timeframe.

The resulting final reports from the **PDS's** yielded no less than 26 candidate aircraft. The field of candidates was narrowed to six aircraft that were fully capable of complying with the essential characteristics of the **ASH** draft **Required Operational Capability (ROC).**

Two of the six candidates will be utilized in an ongoing **Cost and Operational Effectiveness Analysis (COEA).** The studies are important initiatives from the standpoint of allowing the **ASH** PMO to assess the cost, schedule, and technical performance capabilities of potential European contenders.

The interest and desirability for an **ASH** and **RSI** are currently receiving high visibility. However, there exists a need to temper the enthusiasm with the realistic approach that the management of such a program will be complex; there will be delays in the decision and implementation process; schedules will be overly optimistic; costs will more than likely be underestimated; and performance parameters will be subjected to numerous compromises.

CONGRESSIONAL ACTIONS ON ASH, 1974-1979

Year of Req.	Request by Army	House Armed Services Comm.	Senate Armed Services Comm.	Joint Conference	House Approp. Comm.	Senate Approp. Comm.	Final Final
1974	$1.0M to support RFP for	$1.0M	Deny. Premature.	—	—	—	0
1975	$6.0M to begin dev. Task Force estab'd.	$6.0M	Funds not req'd until 76. $640K for in-house costs.	$1.916M for in-house costs.	$700K	$700K	$700K
1976	$10.7 for FY 76; $8.8M for FY 7T	$10.7 for FY 76; $8.8M for FY 7T	$700K for 76 + $200K to support in-house efforts.Recog	$5.0M for FY 76; $7.0M in FY 7T	$5.0M for FY 76; $7.0M in FY 7T	$5.0M for FY 76; $7.0M in FY 7T	$5.0M for FY 76; $7.0M in 7T
1977	$26.0M revised prog to delay start to FY 78. Use full $26.0M for TADS and PNVS.	Deny due to lack of devel plan. Not question the requirement.	$2.0M in ASH for prog mgt. Transfer $18.7M to AAH for TADS and PNVS.	$2.0M for program management.	Deny and move prior year ASH $ funds to be used for	$1.0M for program management.	0
1978	$18.3M for development of of the ASH.	Deny. Support for ASH questioned. Concern over Army vacillation.	$18.3M in directed $ to develop fully capable ASH.	$3.0M. Army said this was all it could use.	Deny. Pre-	$3.0M	0
1979	$5.5M for ASH. Concept formulation and NATO investigations.	Deny. Army unable to present a prog plan. Affordability is major concern.	$5.5M	$5.5M. Concerned over affordability; look at all alternatives, 1984 IOC.	$5.5M	$5.5M	$5.5M

A Cost and Operational Effectiveness Analysis (COEA) documents the comparative effectivess of alternate means of eliminating or reducing a force.

ASH COEA SPEEDS DECISIONS

BY LIEUTENANT COLONEL ROBERT BROWN, COEA DIVISION, ASH SSG

BEFORE the **Advanced Scout Helicopter (ASH)** becomes a reality, it must meet the approval of two decision-making bodies — the **Army Systems Acquisition Review Council (ASARC)** and the **Defense Systems Acquisition Review Council (DSARC).** One of the aids used by these decision-makers in determining whether the Army and DOD should commit funds to a program is the **Cost and Operational Effectiveness Analysis (COEA).**

What is a "COEA"?

This article will explain the workings of a **COEA** and show how the **ASH COEA** will contribute to the final decision on the **ASH** program.

A **COEA** is "a documented investigation of the comparative effectiveness of alternative means of eliminating or reducing a force or mission deficiency against the defined threat and the cost of develo-ing, producing, distributing, and sustaining each alternative system in a military environment for a time preceding the combat application."

Although this definition may seem somewhat complex, a **COEA** is very much like the process one goes through in selecting a car for personal use from among various models and optional equipment. We attempt to buy the car and options that yield the most utility for the money spent.

Benefits vs Costs

"The point is that every weapon system we buy has both benefits and costs associated with it. You cannot get effectiveness without paying a cost. Each program uses up resources that could otherwise be put to some other useful purpose. Sensible decisions on the use of these resources must depend on the costs incurred in relation to the military effectiveness obtained."

A **COEA** contains many parts. A recent Department of the Army Letter of Instruction lists ten parts of the analysis. These parts are briefly described below:

- The analysis of mission needs, deficiencies, and opportunities is generally conducted within the context of future wartime situations (scenarios). The purpose of this analysis is to identify mission needs, define deficiencies of current systems in meeting those needs, and discover opportunity areas where efficiency and combat effectiveness may be improved.

● The analysis of threats and operational environments determines the hostile forces that could be used against our systems and the natural environments within which the system must operate.

● The analysis of constraints is concerned with identifying the factors that limit the set of admissible alternatives and understanding the consequences of these constraints.

● The analysis of operational concepts examines the ways in which people and things would be arranged and employed to accomplish the objective of the system under consideration.

● The analysis of specific functional objectives derives specific goals or standards against which the effectiveness of the alternative systems is measured in terms of the extent to which the goals or standards would be achieved.

● The analysis of system alternatives identifies the candidate courses of action or system solutions that offer prospect of meeting the functional objectives and mission needs.

● The analysis of system characteristics, performance, and effectiveness is begun by defining what the system should be in terms of size, weight, configuration, etc. Next, the system is defined in terms of what it is capable of doing. Rate of climb, payload, and endurance are factors considered in the **ASH** performance analysis. Finally, the effectiveness of the alternative systems on the battlefield is estimated. How this is being done with relationship to the **ASH** will be discussed later.

● The analysis of costs determines the resource implications of each alternative. These costs are estimated for acquiring, operating, and maintaining each system over a specified peacetime life span, usually 20 years.

● The analysis of uncertainties deals with the uncertainties associated with each of the above sub-analyses. The goal of this analysis is to establish the range within which a system can perform and still be a suitable solution.

● The analysis of the preferred alternative is the final sub-analysis. Its purpose is not to decide which alternative is preferred, but rather, to present the information from the foregoing analyses in such a manner as to facilitate comprehension by the decision-makers.

Conceptually, these sub-analyses should be sequential, that is, the first one should be completed before the second is started. In actual practice this is not always practical or possible; however, completion must be sequential. For example, the analyses of costs and effectiveness cannot be completed until all systems have been identified and defined.

The primary alternative aircraft being

considered in the **ASH COEA** are:

- OH-58/OH-6
- AH-64
- AH-1
- A lightweight single engine new development helicopter
- A twin engine new development helicopter
- NATO helicopters
- Various modifications to existing aircraft

The heart of the **COEA,** as the name implies, is the analysis of cost and effectiveness. While all parts of the **COEA** are important, the area that receives the most attention is the effectiveness analysis. The effectiveness, or operational effectiveness analysis, seeks to determine a system's impact on battle outcome. Operational effectiveness "is the degree to which the ability of a force to perform its mission is improved or degraded by the introduction of the system . . . into the force."

FIRST FLIGHT—The XV-15 rotor research aircraft, being developed by Bell Helicopter Textron for NASA and the Army's Research and Technology Laboratories (AVRADCOM), has completed its first in-flight conversion from helicopter to the airplane mode. Lasting £& -minutes, the historic flight was made at Bell's Arlington, Texas Flight Research Center.

Closely akin to operational efffectiveness, but treated separately, is system performance. The reason for this distinction is that while a new system may outperform an existing system, its increased performance may not significantly improve the ability of the force to perform its mission. As an example, helicopter "A" may have a cruise speed much faster than helicopter "B"; nevertheless, its operational effectiveness may not be significantly greater than that of helicopter "B" because the bulk of the helicopter mission time is flown at nap-of-the-earth where airspeeds are considerably less than normal cruise.

The ideal way to determine a system's operational effectiveness is to use it in its intended role in actual combat. Since this is impractical, we rely on models to represent the systems at issue and the expected battlefield environment. But because models represent the real world in varying degrees of fidelity, we can only achieve an estimation of a system's actual or potential operational effectiveness.

The **ASH COEA** employs three primary models in the analysis of alternative helicopter performance and operational effectiveness.

The Carmonette model

The first of these is the **Carmonette** model. **Carmonette** is a Monte Carlo, fully-computerized simulation of ground combat. It can create a realistic representation of close combat during brief intense engagements and is primarily concerned with movement, target acquisition, and the firing of weapons. The broad categories of input are terrain, weapons, sensors, mobility, and units. Each unit must be directed to move, stay, or fire by means of a detailed set of preprogrammed instructions that will control its actions throughout the simulated battle.

Carmonette is being used to evaluate scout helicopter alternatives in attack helicopter companies operating in partnership with ground combat units. The scenario is a central battle area in defense of Europe. **Carmonette** has been used to evaluate the **Advanced Attack Helicopter (AAH), Copperhead**, IFV//CFV, and XM-1 before the present application to **ASH.**

It maintains the basic XM-1 scenario and gaming, but has been modified to provide a more precise definition of helicopter tactics and performance of antiarmor systems working through natural and battle-created visibility obscurants. This process of successive improvements to an existing battle simulaton has the obvious advantage of timeliness and the additional benefits of continuity between studies which minimizes the challenges that the game has been rigged to support a particular system.

TOP PILOTS—WO Steven E. Rinehart and 1LT James L. Brooke, 2d and 3d from left, were the Distinguished Graduates of the WORWAC and ORWAC classes completing USAANVC training on August 29. Pinning on their wings are COL Patrick N. Delavan, left, Ft. Rucker's Chief of Staff, and BG Leroy N. Suddath, Jr., ADC(S), 82d Abn Div.

Aviation wargame developed

An aviation wargame, known as **"AV-WAR"**, was developed by the study group to evaluate the effectiveness of alternative scout helicopters in an air cavalry role. The wargame is similar to, but more comprehensive in scope and detail than that used in the **Air/Ground Cavalry 1985 Study**. It is a two-sided, free-play wargame which is being played in a closed mode, that is, neither side has knowledge of the other's actions except that gained from the play intelligence sources.

Each side works from a mapboard located in different rooms. Computer support is used prior to and during the gaming to resolve line-of-sight, target detection, communications attempts, and firing engagements. Gaming is done in one minute "slices" of combat. The overall scheme of play is for each side to maneuver forces, locate the opponent, communicate as required, and employ minefields, smoke, or fires as appropriate. The aviation wargame allows for decisions to be made as the game progresses, as opposed to the preprogrammed instructions for units simulated in the **Carmonette** model.

A third model

The third primary model being used in the **ASH COEA** is the **Aircraft Reliability and Maintainability Simulation (ARMS)** model. This model is used primarily to evaluate the performance of an aircraft system while the system is being used to accomplish a tactical task.

Each element of the system is mathematically modeled in considerable detail. The time to prepare a mission (preflight, refueling, arming, etc.) is precisely accounted for; likewise, the enroute time and time in the mission area is modeled to the nearest minute to account for the performance characteristics of each aircraft. Various routines establish and control mission demands. Aircraft are then selected, flown, and tested for failure. Combat damage may be introduced in addition to reliability failures. Manpower expended in preparing the aircraft for flight and returning them to a mission-ready condition is tabulated and maintained on individual aircraft.

A "picture" is obtained

The output data describes maintenance actions by MOS type, number of times used; average time per use; queue size; average delay time when queued; hours used for scheduled, unscheduled, and combat damage maintenance. Thus, a picture of the maintenance resources required to support each aircraft is obtained.

STRANGE!—This hard-to-recognize photo of a Cobra TOW was taken during an ARTEP in USAREUR by Sergeant R.T. Edwards.

Perhaps now we should answer the answer, **"How is operational effectiveness measured?"**

Operational effectiveness is measured by quantitative indicators appropriately known as **measures of effectiveness MOE**. The primary MOE for measuring the contribution of alternative systems to the outcome of a battle is Red and Blue casualties. Other indicators which contribute to battle outcome and the attainment of primary MOE are sometimes termed MOE but, in reality, are measures of performance. Indicators that fall in this category are such attributes as number of targets detected and area coverage.

The "What if" questions

After the main effectiveness and cost analyses have been completed, the COEA must examine the effects of uncertainties in the data used in performing the mainstream analyses. This analysis, sometimes called sensitivity analysis, answers the "What if" questions. If the cost of alternative "A" is understated by 15%, what is the effect on its overall ranking? If likely opponents develop a given countermeasure, how will it affect the operational effectiveness of the system under study? The answers to these and similar questions must be presented along with the results of the basic analyses.

The **ASH COEA** is the first to employ such a variety of models and analyses to gain a complete picture of the contribution of a conceptual system to the combined arms team. It is an ambitious effort to complete in time for the decision milestones of October and November dates for **ASARC** and **DSARC**. The study group has accepted this challenge and will meet it.

LETTERS

Dear Editor:

I received my May 31, 1979 edition, and wish to comment that the magazine is no longer the publication it was five years ago. Recent issues have catered to the **political** and **social** aspects of Army Aviation.

Army Aviation has emerged as a publication for handshakers and a social register for retired aviators.[1] How about the pilots still on the line?

Consider the aviator who is maintaining FAC 1 ARL 1 status; what has AAAA done for the current aviator?[2]

Let us know what's going on![3] What is the latest status on the UH-60[4], ASH[5], AAH[6], HLH[7], the product improvements in the UH-1[8] series?

How about the interests of the Aviator who is still twisting the throttle? We pay dues, too![9]

Thank you for all of the past information on today's aircraft; we appreciate it. Please consider the challenge of tomorrow's.

CPT LEE N. McMICHAEL
OpnsO, 63rd Med Det
APO New York 09180

(Ed. Note: On the other hand, if the magazine were identical with that published five years ago, we would receive "Ho hum.' letters from our readers. We admit we've changed but:

[1]The "SPOOF Roster" for retired AAAA members is augmented by a 'Who's Who" for AWO's and a "DAC Pack" for AAAA's Dept. of the Army Civilian members. A "Young Turks" roster of our commissioned company grade members is a 1980 possibility.

[2]For starters, we cite regular professional briefings at Chapters and Regional (Garmisch) and National conventions.

[3]The monthly column of the DA Aviation Officer attempts to do this.

[4]Latest status on the UH-60A? The coming 164-page August-Sept. issue is devoted solely to this aircraft.

[5]The ASH? Approximately 70 pages on the ASH Program will appear in the October issue.

[6]AAH? BG "Ed" Browne, the AAH-PM, would like you to read through the November 1979 AAH Special Issue.

[7]HLH? This apparently is a dead issue. Keep checking the "Congressional Corner" column — you might see an HLH reference someday.

[8]UH-1 product improvements? We'll check this out with the PMO.

[9]We're aware of this, of course. A June, 1980 "Army Aviation Equipment Issue" should please.

We're trying our best to publish a magazine of interest to ALL membership segments. It isn't easy.

TEAM MEMBERS!

We thought the readers would like to know that another Colonel (O6) list came out (Medical Corps) and a number of aviation-oriented soldiers were on the list. I'm not sure all are AAAA members, but all are aerospace medicine specialists, and are not very numerous. As such, we constitute the Army's senior and most experienced (and knowledgeable) flight surgeons. We feel we are essential team members in the Army Aviation community. The promotees include David Karney, Anton Jirka, Robert Kreutzmann, and myself.

We're committed towards keeping the Army Aviator flying! Best regards.

DANIEL S. BERLINER, M.D.
LTC(P), MC, SFS
San Francisco, CA


COMMAND MOBILITY

The Nominations Are Open


NATIONAL AWARDS

NOMINATION FOR THE AWARD TO THE ARMY AVIATOR OF THE YEAR

Be a participant in the selection of the "Aviator of the Year" and the "Aviation Soldier of the Year." Write to AAAA for the one-sided, simple nomination form that will put your candidate into the hopper for national recognition at the coming AAAA National Convention.

Many deserving people are never recommended because they are never nominated.

Please join in!

AAAA's "Outstanding Aviation Unit Award" along with its "Outstanding Reserve Component Aviation Unit Award" recognize the finest unit performances during the 1979 calendar year. Does your unit measure up?

The "James H. McClellan Aviation Safety Award" and the "Outstanding DAC Award" single out unique people. Tell us about them. The nominations close January 15.

1979 AAAA National Awards

Submit your nominations to AAAA, 1 Crestwood Road, Westport, CT 06880 by January 15, 1980.

NEW DAEDALIAN SAFETY AWARD

BY
BG CARL H. McNAIR, JR.

ASST COMMANDANT,
USAAVNS - FT RUCKER

DURING the 1979 Annual Convention of the **Order of Daedalians** held recently in Dayton, Ohio, Army Aviation's newest safety award was presented for the first time.

By the way of background, for those who may not be totally familiar with the **Daedalians,** the **Order** was organized on 26 March 1934 by a representative group of American World War I pilots to perpetuate the spirit of patriotism, the love of country, and the high ideals of sacrifice which place service to nation above personal safety or position.

The **Order** is dedicated to insuring that America will always be preeminent in air and space — the encouragement of flight safety, fostering an esprit de corps in the military Air Forces, and promoting the adoption of military service as a career. Among the **Order's** 10,000 + members are many prominent men in aviation circles, past and present, and some 340 living founder-members who flew military aircraft during World War I.

In fact, serving on their National Board of Directors is one of the Army's foremost and most senior Army Aviators, **LTG (Ret.) Allen M. Burdett, Jr.**

For some years now, the **Order** has presented an annual Flying Safety Award to a training division of USAAVNS which has shown the greatest improvement, accomplishment, or overall performance in aviation safety during the preceding year.

An Army-wide competition

In 1978, the **Daedalians** broadened their Army Aviation Safety Award sponsorship to include an additional award open to Army-wide nominations of an Army Aviation unit which has made a singularly outstanding contribution to the advancement of safety in the preceding year.

The award was subsequently approved

PHOTO ABOVE: BG McNair, right, presents the '78 Daedalian Trophy to MAJ Raymond P. Mulcahy, B Co, 2d Avn Bn (Cbt), 2d Inf Division.

CLOSE ENCOUNTERS

OF THE TACTICAL KIND

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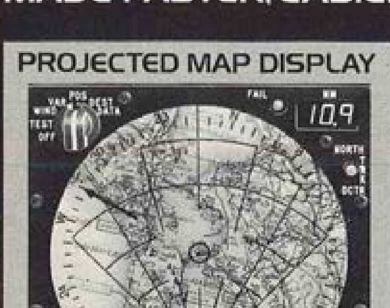

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With our Projected Map Display, the pilot can remain terrain-oriented—regardless of weather, visibility, altitude, or speed. To establish position at any time during flight requires only a glance at the display.

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

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Features of the PMD include:

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COMPUTING DEVICES COMPANY
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CONTROL DATA

by DA and incorporated in AR 672-2. Nominations are due to ODCSOPS, HQDA, in March for achievements in the preceding calendar year. Thus, commanders and units considering such a nomination should begin to gather their data and prepare their nomination towards the close of the year.

The **Order of Daedalians** has named the respective service safety awards after a distinguished aviator of the service who during his career made a significant contribution to the advancement of Aviation and safety within the military services.

Named for Carl Hutton

In the Army's case, the award has been named for **Brigadier General Carl I. Hutton,** the First Commandant of the U.S. Army Aviation School upon transfer of Army Aviation Tactical Training from Fort Sill, Oklahoma, to Fort Rucker, Ala. in 1954.

General Hutton, a distinguished field artilleryman before entering pilot training in 1947, served consecutively as Assistant Director, then Director, of the Department of Air Training which at that time was part of the Artillery School at Fort Sill. He was instrumental in establishing the Army's first Helicopter Advanced Tactical Training Course and during his tour as Commandant of the Aviation School, was a catalyst in the development of the first successful armed helicopters. Thus was conceived the concept of Army airmobile forces based on Air Cavalry, the forerunner of today's modern Army Aviaton Combat Forces.

Initial presentation made

It was especially fitting, therefore, that the new safety award should be named after such a distinguished Army Aviator and presented annually thereafter to a unit emulating the high standards of operations and safety of which **General Hutton** would have been proud.*

On 16 June 1979, the initial presentation was made to **"B" Company, 2d Aviation Battalion (Combat), 2d Infantry Division,** Camp Casey, Korea. Accepting on their behalf was **Major Raymond P. Mulcahy,** Commander of Company B during much of the unit's 24,800 accident-free flying hours. The large silver trophy which stands almost 2-½ feet high was appropriately engraved and shipped to the winning unit where it will be on display throughout 1979.

***Hutton Plaza, the PX, Commissary, and this theater complex at Fort Rucker were also named in honor of General Hutton.**

ATC CLASS GRADUATES—Twelve members of the sixth class to complete the six-week Officer and WO Air Traffic Control Course at Ft. Rucker are, front row, l-r, CWO DE Nees; MAJ RM Graves; CPTs RA Honeywell & JR Pelton; CWOs DM Adams & Perry M. Smith. Back row, l-r, LTCs RE Evans, EV Freeman, & KE Larson, Jr.; 1LT JF Dunn; CPTs S, Psarrakos & RC Heh. Not pictured, CWO JE Jackson. Psarrakos of Greece was the first foreign graduate. (Aug. 3)

Calendar

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DECEMBER						
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17	18	19	20	21	22	23
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31						

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APRIL						
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23	24	25	26	27	28	29
30						

★★ AUG 17. Embry-Riddle Chapter. Summer General Membership Meeting. Treasure Island Motel, Beachside. Pay-as-you-go Bar. Fall trimester meeting days and times to be scheduled. October "Riddle Regatta" team selection. Prospective members welcome.

★★ AUG 22. Air Assault Chapter. Professional-Social Breakfast in conjunction with the 5th Transportation Battalion. Top Six Club. Pay-as-you-go breakfast. Reps from the major aerospace firms will be in attendance.

★★ AUG 24. David E. Condon Chapter. Combined AAAA-AHS Professional Dinner Meeting. Fort Eustis Officers' Open Mess. CONG. PAUL TRIBLE, guest speaker. Cocktails (Cash Bar), Dinner, Dancing.

★★ SEPT 13. Coastal Empire Chapter. Professional Meeting. Hunter AAF Officers' Open Mess. MG GEORGE S. BEATTY, JR., Nat'l President, AAAA, guest speaker.

★★ SEPT 14. Hanau Center Chapter. Professional-Social Meeting. Beacon Club (Hanau AAF). JOSEPH P. CRIBBINS, guest speaker. Pay-as-you-go bar. Casual dress.

★★ SEPT 16. Aloha Chapter. Beach Call at Nimitz Beach. Open to non-members. Bring cooler, picnic basket, family, (and your rubber duck)!

★★ SEPT 19. Army Aviation Center Chapter. Professional Luncheon Meeting. Fort Rucker Officer's Club. BG CARL H. McNAIR, JR., guest speaker. Duty Uniform. Bring a new member!

★★ SEPT 25. Fort Hood Chapter. Professional Luncheon Meeting. Fort Hood Main NCO Club, Bldg. 194. PHIL NORWINE, Bell Helicopter Textron, as guest speaker. Sandwich Bar.

★★ SEPT 27. Old Ironside Chapter. Membership Ceremony and Social Get-Together. Katterbach Officer's Open Mess. Bring your spouse! Cocktails and Dinner (Pay-as-you-go). COL TOOLSON, Commander 11th Avn Gp, guest speaker.

★★ SEPT 27. Bonn Area Chapter. Professional-Dinner Meeting. American Embassy Club in Bad Godesberg. LTC EUGENE H. BOORTZ, USAF, Ramstein AFB, guest speaker.

★★ SEPT 28. Corpus Christi Chapter. General Membership Meeting (Happy Hour!). Come as you are after work. Two FREE kegs of beer! Corpus Christi NAS O'Club.

★★ OCT 8. Fulda Chapter. Members Only Meeting. Elections. Appointments will also be made for next year's Tour Committee. Fulda O'Club.

★★ OCT 17. Nat'l Executive Board Business Meeting. Officers' Club. Ft. Myer, VA. 1330 hours.

PLAN AHEAD!

The 1980

AAAA National Convention

will be held at the Sheraton Atlanta Hotel during Thursday, April 10, to Sunday, April 13

★★★★★

General Robert M. Shoemaker, Army Aviation's most senior aviator, will again serve as Chairman of the Convention's Presentations Committee.

★★★★★

The AAAA Convention's Friday, April 11 Luncheon will serve as the 1980 site for the triennial inductions to the "Army Aviation Hall of Fame."

OCTOBER, 1979 ADVERTISERS — ASH SPECIAL ISSUE

month's takeoffs

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Applicants for 1980 AAAA Scholarship Aid Are Sought

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 1980 college-entry year. Program participation is limited to the children of members with an effective date of membership on or before March 31, 1979.

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, 1979. Grades and test scores must be submitted by February 15, 1980. All forms, together with other supporting data, must be returned to the Foundation on or before February 1, 1980 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, 1980 entry as a freshman; and (2) unmarried.

SELECTION & NOTIFICATION

Selection of winners will be made during the month of March 1980 with each applicant to receive a list of the winners not later than 1 April 1980.

BACKGROUND DATA

Incorporated in December 1963, the AAAA Scholarship Foundation provided 11 scholarships in 1979, and has furnished more than $64,100 in direct aid.