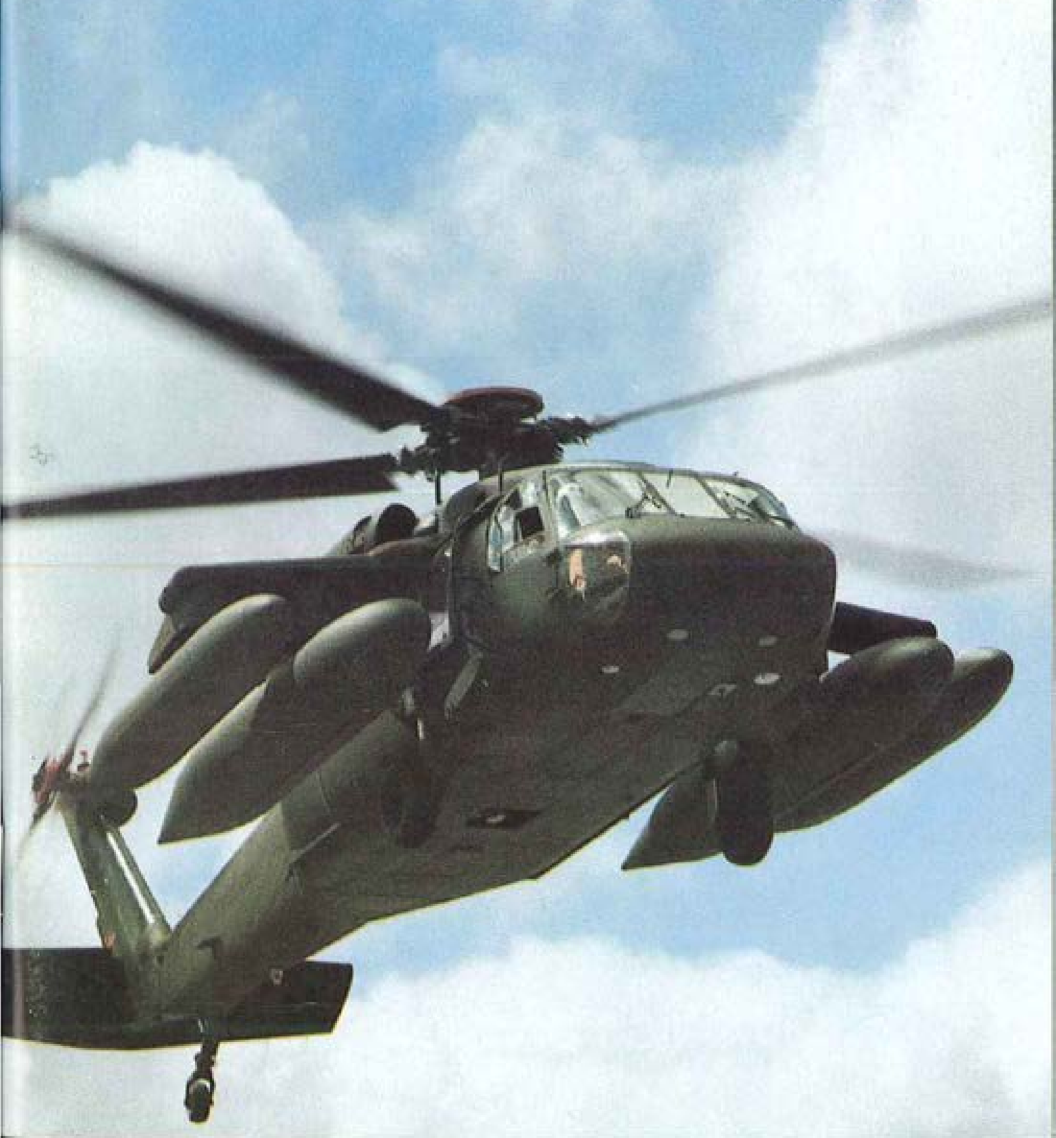
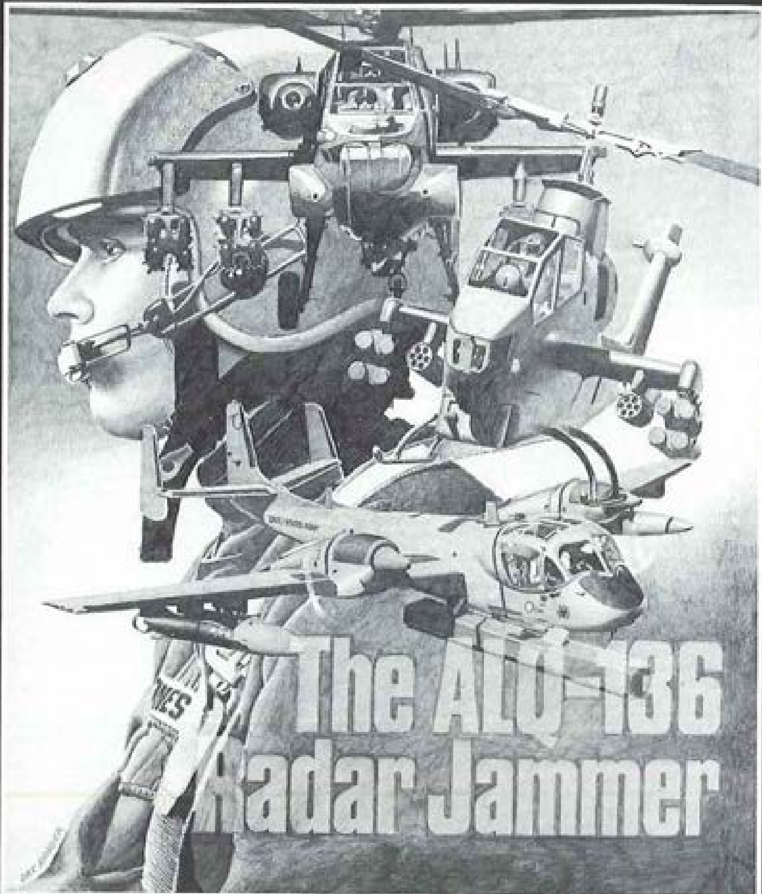
SPECIAL ISSUE: AN UPDATE ON THE U.S. ARMY'S
AIRCRAFT SURVIVABILITY EQUIPMENT PROGRAM

Army Aviation

OCTOBER 31, 1983





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OCT. 1983 SPECIAL ISSUE: AN UPDATE ON THE ARMY'S AIRCRAFT SURVIVABILITY EQUIPMENT (ASE) PROGRAM

Army Aviation

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First AH-64 rolls out two months ahead of schedule

THE first of the U.S. Army's 515 AH-64A APACHEs — the free world's only day-night, adverse weather anti-armor helicopter — rolled out two months ahead of schedule on 30 September at Hughes Helicopters, Inc.,'s APACHE Assembly and Flight Test Center at Mesa, Arizona.

The AH-64A's primary mission is to destroy enemy armored vehicles with precision, 24 hours a day, anywhere in the world, and with potency well into the 21st century. An Apache Indian on horseback and an Army ROTC color guard accompanied the first production version of the AH-64A as it emerged from its hangar at the world's most advanced helicopter assembly facility.

A distinguished gathering

Secretary of the Army **John O. Marsh, Jr.**; Arizona Governor **Bruce Babbitt**; Arizona Senator **Dennis DeConcini,** and an audience of more than 1,600 witnessed the debut of the advanced "tank killer." The audience included Congressmen; local dignitaries; military, industry, and community leaders; and Hughes employees.

"Today we make a statement," said Hughes President and Chief Executive Officer **Jack G. Real.** "Hughes Helicopters, its employees and our outstanding team of suppliers in 36 states, Canada and Germany can be counted on to perform on the Army's No. 1 aviation program.

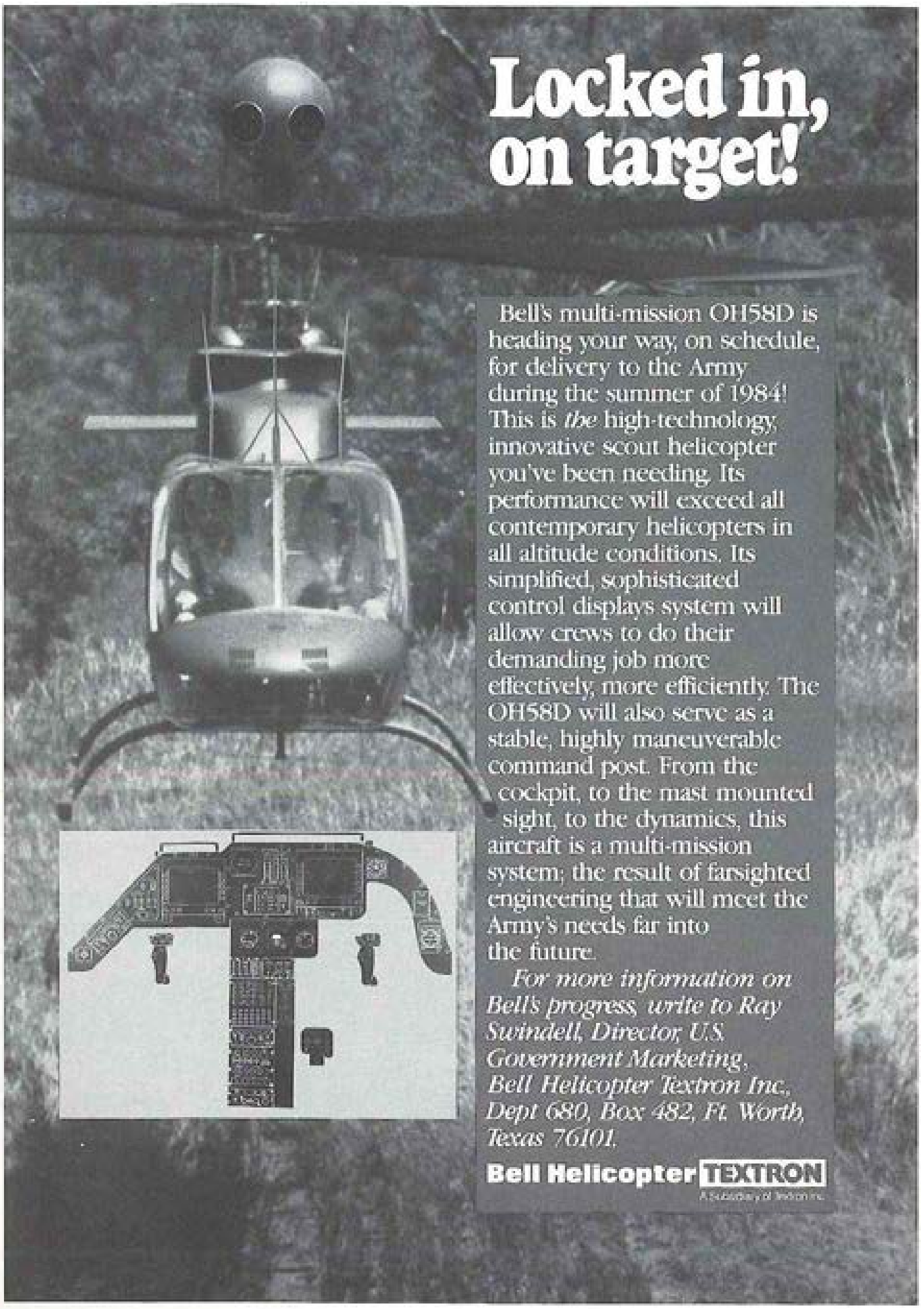
"This ahead-of-schedule rollout will not be the exception," Real added. "We fully realize that the APACHE is an essential component of the Army's new Combined Arms Team — which also includes the M-1 Abrams tank and the M-2 Bradley Infantry Fight Vehicle, and the UH-60 BLACK HAWK helicopter. Our company will continue to produce this sophisticated weapons system on or ahead of schedule and with stringent cost and quality control.

Acceptance testing

The first production APACHE, known as **Production Vehicle 01 (PV01),** is scheduled to begin ground acceptance testing immediately and make its first flight in December.

The helicopter is scheduled for de-

(AH-64/Continued on Page 99)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For more information on Bell's progress, write to Ray Swindell, Director, U.S. Government Marketing, Bell Helicopter Textron Inc., Dept 680, Box 482, Ft. Worth, Texas 76101.
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Updating Four A's: AVNEC, Aviation Branch, APACHE, and ASE

By BG(P) Robert F. Molinelli, Deputy Director of Force Development & Army Aviation Officer, ODCSOPS, Dept. of the Army

THIS month's article is being written on the eve of my departure for the **Aviation Employment Conference (AVNEC)** at Fort Rucker. AVNEC 83 inaugurates the Aviation Center's proponent responsibilities for aviation doctrine development in support of the combined arms team and the AirLand Battle.

I'll have the results of this gathering for you next month. For October, however, I'd like to update you on the recent progress in aviation branch implementation, highlight the AH-64 roll-out ceremony in Mesa, AZ, on 30 September, and provide some thoughts on **Aircraft Survivability Equipment,** which is the theme of this issue of **Army Aviation** Magazine.

Aviation branch update

- The production contract for branch accoutrements was signed on the first of September. We have been promised the first lead strikes of the insignias by 1 November 1983 so they can be verified before beginning full-scale production. Accoutrements will be available in quantity in post exchanges by 1 February 1984.
- MILPERCEN completed work on the branch transfer plan mid-October and forwarded it to the DCSPER for approval. Rated aviators can expect to be-

gin receiving MILPERCEN letters advising them of the plan and their options under it by mid-November. Those officers with dual accession specialties (11/15, 71/91) who are eligible for battalion or brigade command will not receive letters until the command selection board results are published. This policy will allow those promotable majors and lieutenant colonels having two specialties offering command opportunity to see the board results before making their branch transfer decision. To remain in Army Aviation, and be eligible for an aviation specialty code, you must eventually transfer to the new branch. As I mentioned earlier, the MILPERCEN letters will explain the details of branch transfer and how they apply to each individual.

● The decision on warrant officer aviators wearing the aviation branch insignia has not been made. The final resolution of this issue will be determined through the normal Army staffing process. Your voice is important to this decision, so let it be heard through your chain of command.

INDUSTRY AWARD

GE's T700 Engine Product Support Operations has been recognized by the AAAA's Lindbergh Chapter for 'outstanding contributions made to the materiel readiness of Army Aviation.' Accepting the award presented at the recent AAAA Product Support Symposium held in St. Louis is Joseph Wansong, manager of GE's Turboshaft Product Support Group. Joseph P. Cribbins, right, Special Assistant for Aviation Logistics, DA, made the presentation on behalf of the Chapter.

AH-64 Rollout

Another significant event occurred in Army Aviation on 30 September when the first production model of the AH-64A Advanced Attack Helicopter was rolled off the assembly line two months ahead of schedule. A ceremony honoring the occasion was held at the Hughes APACHE Assembly Facility, Mesa, Arizona. This first aircraft will undergo a series of prerequisite ground and flight tests before being accepted by the Army.

The roll-out ceremony was a gala affair hosted by the President, Hughes Helicopters, Inc., with dignitaries from the Senate, House of Representatives, the Secretary of the Army, the Governor of Arizona, and officials of the Army, Hughes, and local civilians in attendance. Also notable was the involvement of APACHE production team members who participated in every event throughout the day. **Mr. Robert Goulet** opened the festivities with his superb rendition of the Star Spangled Banner. An Apache Indian rode his horse on the flank of the aircraft adding another bit of spirit to the affair. Like the fearsome Apache of old, this aircraft is designed to win over superior numerical odds. Following the ceremony, Hughes put on a spectacular aerial demonstration of the capabilities of the APACHE.

The first production model of the APACHE will be assigned to Fort Rucker about September 1984. The second aircraft will roll off the assembly line next month. The production rate will gradually be increased to 12 per month by FY 86.

The APACHE will provide corps and division commanders with an anti-armor and area suppression system capable of operating under day, night, and adverse weather conditions. It is another giant step forward in the modernization of the Army Aviation fleet.

ASE

The theme of the October issue is **Aircraft Survivability Equipment (ASE).** AirLand Battle doctrine demands that Army Aviation play a more important role in both defensive and offensive scenarios. With the growth of the roles of Army Aviation within the front line battle area, ASE has become one of the Army's priority needs.

The ASE program has evolved from a single passive system into a full suite of both active and passive capabilities. The Army's impetus for ASE development continues to be driven by ever increasing threat technology advancements identified by the Army Aviation Mission Area Analysis conducted in 1982.

The objective of ASE today is not only to react to fielded threat air defense systems, but to anticipate and prepare counter systems which will defeat emerging systems. The Army's ASE program no longer follows a reactionary approach to aircraft survivability — it uses emerging technology provided by industry to create synergism by incorporating both optical-electro and IR countersystems, including jammers. These technologies result in equipment capable of not only avoiding threat system engagement, but providing information for the destruction of those systems via computer generated displays provided by on-board radar warning receivers.

The Army's list of both new and upgraded ASE systems already in the field or projected for fielding is impressive to say the least. The goal of ASE is not only to provide survivability of our aviation resources, but to contribute to extended usage of many of our older aviation systems well into the year 2000. ASE cannot help but increase the effectiveness of each aircraft as it is employed in the AirLand Battle.

General Keith opens this month's issue with an overview of the ASE role in the aviation modernization program. Supporting articles look at ASE from a combat developer, system manager, laboratory, and joint service viewpoint; others go into detail on decoy dispensers, optical-electro countermeasures, developmental testing, and field support. I know you will find each one professionally rewarding as you read through the magazine. IIIII

BERTA

LASCH

KEY STAFFERS

Assigned to the recently organized Force Development Directorate within the Office of the Deputy Chief of Staff for Military Operations and Plans in Department of the Army are COL Thomas L. Berta, left, who carries the title of Deputy Army Aviation Officer, and COL John A. "Buzz" Lasch, Chief of the Combat Maneuver Division (DAMO-FDD).

NEW ASSIGNMENT

Nominated by President Reagan for promotion to Brigadier General, Colonel Ronald K. Andreson, BLACK HAWK Project Manager, at USA TSARCOM, is scheduled to become the Deputy Commanding General of the newly-organized Aviation Systems Command (AVSCOM) that will replace the existing AVRADCOM later this year. A USMA graduate and former helicopter assault company commander in Vietnam, Andreson is a native of Abilene, Kan.

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An 80-page in depth look at ASE (Aircraft Survivability Equipment) in current use and planned for Army Aviation in the near future . . .

DEPARTMENT OF THE ARMY
HEADQUARTERS US ARMY MATERIEL DEVELOPMENT AND READINESS COMMAND
5001 EISENHOWER AVENUE, ALEXANDRIA, VA. 22333

AIRCRAFT SURVIVABILITY EQUIPMENT (ASE) ROLE IN AVIATION MODERNIZATION

Army Aviation has become a "Force Multiplier" on the battlefield because of its rapid mobility and its capability to engage armor and materiel targets with devastating firepower. Protection of this combat capability against sophisticated optical, laser, and radar directed anti-air threats has become a major concern.

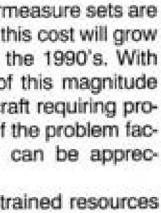
The Army's Aircraft Survivability Equipment (ASE) program has significantly improved the Army aviator's ability to survive and deliver firepower in spite of this complex electromagnetic threat. This improvement is based upon a carefully balanced mix of equipment and tactics designed to match each aircraft's specific combat mission and characteristics. As a result, the ASE Program is recognized as one of the most cost effective programs in Army Aviation. Since the threat is constantly evolving, we cannot rest on past ASE Program successes; the ASE suite for each particular aircraft must be improved to counter the changing threat.

Due to the combined efforts of the Army's ASE Team, government and industry, the US Army has become a world leader in helicopter and small fixed-wing aircraft self-protection.

Donald R Keith

DONALD R. KEITH
General, US Army
Commanding

ASE: A view from the Pentagon



By LTC GEORGE C. LEACH, Department of the Army Staff Coordinator (ASE), Washington, D.C.

ARMY Aviation will play an ever increasing role in future warfare as our doctrine shifts from active defense to offense. Aviation as a full member of the combined arms team will be expected to take advantage of its flexibility and maneuver capability to help mass firepower at the critical time and place to stop or defeat the enemy force.

While all Army Aviation systems are not weapon delivery platforms, they all contribute to the ability to conduct prompt and sustained combat operations, and through technological superiority maintain an advantage over a numerically superior force. The ability of Army aircraft to survive in this environment is of growing concern and the reason for current emphasis on **Aircraft** Survivability Equipment (ASE).

Costly and complex

The cost and complexity of the ASE suite necessary to protect Army aircraft on the modern battlefield has grown exponentially. Simple and low cost **infrared (IR)** heat shields and **radar warning receivers (RWR)** developed during the Vietnam era are no longer effective. The technological improvements and proliferation of threat air defense systems are continuously creating new demands to upgrade existing ASE capabilities and to develop new innovative programs.

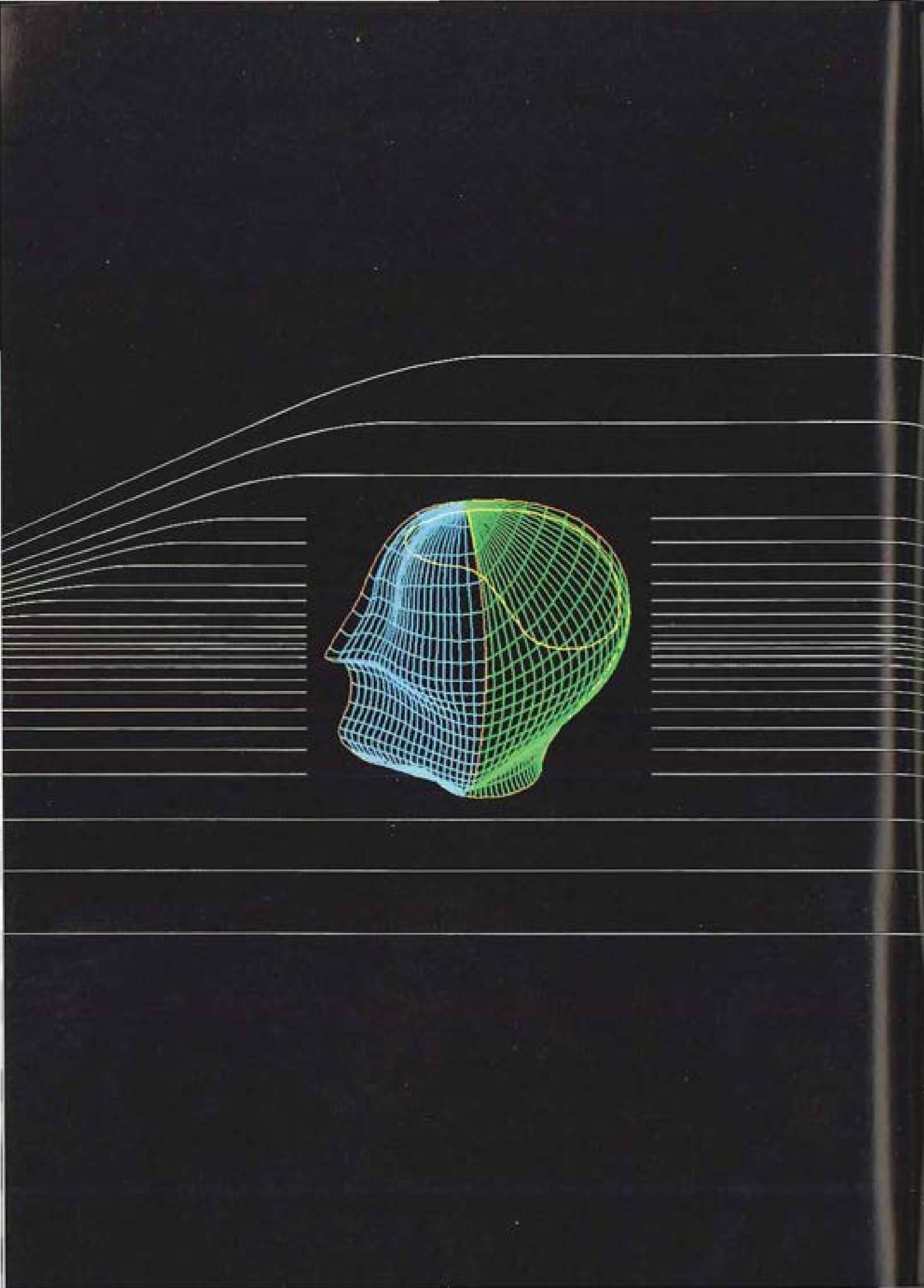
In meeting these demands, the aggressive ASE program has emphasized the systems approach to survivability and vulnerability reduction. A balanced program has evolved which investigates the contributions of all factors which impact on survivability and combat effectiveness and covers the full spectrum of signature reduction, threat warning, countermeasures, counter-countermeasures and hardening. Research and development funding in support of this program has grown to over $25 million a year. New ASE hardware funding is approaching $100 million a year.

Cost comparisons

To keep this in proper perspective, a simple comparison of the cost of ASE systems is required. The early radar warning receivers cost $3,500. The new radar warning receiver with pilot workload reduction and threat prioritization features will cost over $35,000 each. The cost of an ASE suite to provide full protection has seen a corresponding increase, growing from under $10,000 in the early 1970's to over $250,000 today.

As additional countermeasure sets are developed and fielded, this cost will grow to almost $500,000 by the 1990's. With funding requirements of this magnitude and the number of aircraft requiring protection, the full scope of the problem facing the ASE program can be appreciated.

The amount of constrained resources in the Defense Budget which can be allocated for ASE protection requires hard decisions to be made. Optimizing survivability/vulnerability reduction with combat effectiveness is a major challenge facing the aviation community. The increased combat exchange ratios provided by ASE through enhancing survivability and staying power is recognized,



A View from the Pentagon

but it must be balanced with Army priorities for modernization of the entire force.

This does not mean survivability will be sacrificed to support other programs. However, it does require tactics and doctrine to be considered with types and mixes of ASE systems to enhance combat effectiveness at an affordable cost. With properly defined operational concepts, the distinction between nice to have ASE systems and features and requirements can be made and supported.

Identifying our needs

To assist in this determination process, several related documents and plans have been developed. The ASE **Required Operational Capability (ROC)** prescribes the basic survivability and vulnerability requirements. The ROC contains the ASE suite of equipment for each aircraft as prescribed by the TRADOC community and approved by DA. It is supported by detailed analytical analysis of specific aircraft missions against air defense threats in approved combat scenarios.

Potential deficiencies are then identified in the **Army Aviation Mission Area Analysis (AAMAA)** which takes the projected 1987 force and pits it against the 1992 postulated threat. The objective of the AAMAA was to determine the ability to conduct and sustain combat operations and examine how deficiencies could be resolved by doctrine, organization, training or materials. Deficiencies were also prioritized and grouped.

The various panels of the **Army Aviation System Program Review (AASPR)** then take the identified key issues from the AAMAA and provides the road map for reaching the desired goals. This makes it possible to plan rather than merely react to allow Army Aviation to counter and defeat the air defense threat.

With the above guidance and the assistance of the ASE Steering Group, the **Project Manager (PM)** is able to define, develop, test, and field equipment capable of enhancing the combat effectiveness of the helicopter fleet and **Special Electronic Mission Aircraft (SEMA).** The ASE PM also works with the other Services through the Joint Technology Coordinating Group on Aircraft Survivability to insure all programs are coordinated.

The list of new and upgraded ASE systems under development or entering production is impressive and a tribute to the initiative and technical expertise of the ASE Program Office. Some of the new systems to be fielded next year are the AN/ALQ-136 Radar Jammer and AN/-ALQ-156 Missile Detector.

The ALQ-136 is the first radar countermeasure set specifically designed for helicopters and will be initially mounted in the AH-1S COBRA. It will provide the pilot with a jamming capability against radar directed air defense threats to allow him to continue an attack.

The ALQ-156 is designed to provide missile warning and countermeasure activation for the CH-47 CHINOOK. Additional versions of these systems are under development to provide the same capability to other aircraft.

Into production

Items which will be entering production next year include the AN/APR-39A **Radar Warning Receiver (RWR).** This system will extend the present radar coverage, provide a digital display and voice warning, and prioritize the threat signals for the pilot.

The AN/AVR-2 **Laser Warning Receiver (LWR)** production will add a new dimension to the pilots warning capability

(PENTAGON/Continued on Page 88)

THE attack team leader was in a state of shock as he directed the remnants of his team to withdraw back to the holding area. It had happened so quickly. One scout and two attack birds were reduced to flaming wreckage in seconds — not one crewmember survived. What had gone wrong?

The direct cause of the disaster was an enemy ZSU-23-4. However, the enemy gunners had a lot of help. One attack helicopter did not have an APR-39 radar warning receiver installed. The APR-39 in the second attack helicopter was not functional because of an unresolved maintenance problem. The scout helicopter had an APR-39 that worked fine, but the crew was not proficient in its operation. Worse, although the team leader had correctly noted the presence of the ZSU-23-4 radar on his scope, he had not made provisions for establishing a team warning net and was unable to talk through the traffic on the team command net.

Deadly potential

Obviously, the above scenario is hypothetical and may never actually occur in real combat. On the other hand, a recent ASE survey indicates that the potential for it to occur does exist because the rapid fielding of urgently needed ASE items has outpaced field support for the items.

One initiative to improve the situation was recently taken by TRADOC. Recognizing that some form of **intensive integrated system support (ISS)** management is needed for ASE, TRADOC assigned specific ASE management functions to two existing aviation **TRADOC System Managers (TSM's).** The plan is for TSM SEMA to manage ASE for all SEMA systems, while TSM Scout Helicopters will manage it for scout, attack, utility, and cargo helicopters.

Since the SEMA TSM has also written an article for this issue, I will confine the remainder of my remarks to ASE other than that for SEMA.

Improved coordination

To accomplish the ASE management function, the TSM Scout Helicopters office will be augmented with a full-time ASE Assistant TSM. He will provide a single TSM point of interface for the ASE Program Manager and, at the same time, will interface with all helicopter TSM's and the Aviation Center's Directorate of Combat Developments. The end result should be a significant improvement in coordination of ASE matters between the materiel and combat developers, and within TRADOC.

The ASE Assistant TSM will primarily focus his efforts on **integrated system support (ISS)** for ASE, especially in the areas of maintenance, training, and publications. He will represent the user in these areas and will be his advocate in the combat and materiel developments arena.

ISS has been given top priority by TRADOC and requires that the TSM consider the full scope of fielding impacts on the user unit prior to it receiving a new item of ASE. For example, he must

TRADOC Systems Management for ASE

By COL ROBERT S. FAIRWEATHER, TRADOC Systems Manager-Aircraft Survivability Equipment, Ft. Rucker, AL

TRADOC Systems

determine what training is necessary to ensure that the unit personnel can properly care for, operate, and employ the equipment; must make sure that the maintenance requirements for the item are compatible with the unit's overall combat maintenance concept; and must determine if changes to doctrine or tactics are needed. Because there are numerous ASE items in various stages of development or fielding, and because the ASE suit for each type of aircraft varies, intense systems management is essential.

Right from the start

By entering into the life cycle management of the new ASE item at the initial stages of development, the ASE Assistant TSM will be able to bring the user (and the TRADOC community) into the picture before developmental plans are locked in concrete. He will assist the combat developer during the critical stage when the system requirements are written, will ensure that provisions have been made for publications, training devices, operational testing, and trained personnel, and will generally monitor any other developmental activity that is of interest to the user.

By working closely with the helicopter TSM's, he will ensure that the ASE item is treated as an integrated part of the whole aircraft system, and not in isolation. This last point is particularly important because the user cannot accept an ASE item that lessens the effectiveness of his mission equipment or other ASE items.

Most of the feedback that I have recently received from units indicates that there is a strong need to improve ASE training. I feel that much can be done to alleviate the training deficiencies by developing and procuring effective training aids and devices that can be used both at institutions and units. Further, manuals and other training literature must be prepared and published to give the user the information he needs to properly operate and employ ASE. There is very little literature available for this purpose, and throughout Army Aviation there is a relatively low level knowledge on the subject.

Soon, the user and the developer will have to determine where we will head with ASE in the future. There are several important questions that immediately come to my mind:

Should we fully integrate future ASE capabilities into the overall mission equipment architecture, or should we continue to develop individual items that can be placed on aircraft when needed?

Should we accept growing weight and space penalties to our aircraft by adding increasing numbers of ASE items to them, or should we consolidate ASE on "Wild Weasel" aircraft that fly in support of the mission aircraft?

These are questions that users must carefully consider and then answer.

The ASE challenge

There is no doubt that we need ASE capabilities now and will increasingly need them in the future. To gain the full measure of these capabilities, we must go well beyond the development and fielding of the equipment items, and ensure that they are accompanied by the full scope of system support.

This is the challenge for the Army, and especially for the TSM charged with ASE management. If you have ideas on how the job can be done better, or need assistance, please contact TSM Scout Helicopters, AUTOVON 558-3808. IIIII

TO CORRESPOND:
Write: The Office of the TRADOC System Manager —Scout Helicopters (TSM-SH), Fort Rucker, Alabama 36362.

From theory to practice

By COL LEONARD G. NOWAK, TSM-SEMA, Ft. Huachuca
& MAJ MICHAEL J. BLACKER, Asst TSM-ASE, Ft. Rucker

EVERYONE has a theory about aircraft survivability. Combat seasoned aviators describe it as an art one learns rapidly and refines continuously; something akin to the battle tested infantryman who gets the job done time after time, living to fight another day despite the odds. Theoreticians, replicating the battlefield with computers, postulate a wealth of seemingly irrefutable axioms about aircraft vulnerabilities in a sophisticated threat environment.

Recently, one high-level study organization postulated all manned radar-surveillance aircraft were "equally unsurvivable." Somewhere between the invincibility of the combat tested aviator and the doomsday rhetoric of a few computer-oriented analysts, lies the truth about aircraft survivability.

ASE testing initiatives

This article reports on initiatives taken by the Army's Intelligence Center and School to transition aircraft survivability training out of the theoretical arena to the users' operational environment.

Getting to the bottom of the survivability story for the **Special Electronic Mission Aircraft (SEMA)** has been the task of the test element at Fort Huachuca. The Army's Intelligence and Security Board, commanded by **COL John F. Phelps,** continues to execute an elaborate test plan employing every type of SEMA platform equipped with current and future **aircraft survivability equipment (ASE).**

Highly trained test pilots have flown specially instrumented aircraft against the most complete threat array assembled for this purpose. These tests have brought home the bacon, giving combat and materiel developers insights into the utility of various ASE hardware. Equally beneficial has been the introduction and refinement of evasive maneuvers, predicated on the use of onboard warning equipment and on pilot sensings of his surroundings.

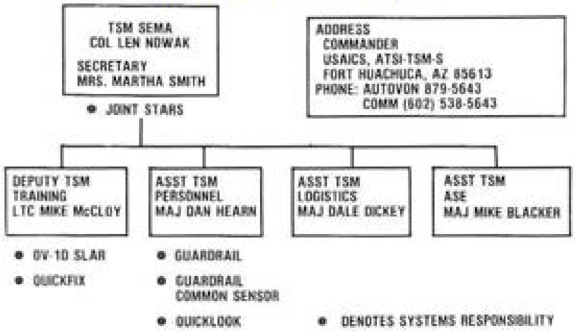
New awareness

Finally, the test results have created a broadening awareness of survivability issues among key members of the aviation community. Collectively, these factors have given survivability equipment and training a nudge into the future.

Capitalizing on the wealth of useful information generated by the tests has been one of the major goals of **BG Sidney T. Weinstein,** Commanding General, U.S. Army Intelligence Center and School. On 1 May 1983, **BG Weinstein** consolidated all SEMA ASE activities under the management of the TRADOC Systems Manager for SEMA (TSM-SEMA).

Concurrently **MAJ Michael F. Blacker,** one of the test pilots responsible for the full range of evasive maneuver and hardware testing, was assigned as an augmentee to the TSM-SEMA office. **MAJ Blacker's** first responsibility was to organize and lead a task force, comprising doctrine, training, and aviation experts from throughout the Intelligence Center to exploit testing lessons learned. The task force was to generate, within 90

TSM SEMA
ORGANIZATION AND FUNCTIONS



days, a survivability "how to fight" manual for the OV-1D aviators.

Filling this requirement is U.S. Army Intelligence Center and School's Draft PAM 95-1, SEMA Survivability, OV-1D/RV-1D. This Draft PAM outlines the timing and sequencing of actions the OV-1D aviator will use against a full array of threat systems. Started on 1 May 1983, the final draft has been produced and the Draft PAM should hit the street in September 1983. Users are encouraged to read this document and give TSM-SEMA feedback on content, format, etc. Future publications can then be tailored according to the users' desires.

TSM-SEMA office

Readers of the article "SEMA Supports the AirLand Battle," in the March 1983 issue of **Army Aviation** noted an organization and function diagram of the TSM-SEMA office configured to manage six aircraft systems. With the addition of the ASE responsibility, the TSM-SEMA office has been realigned as shown above. Users in particular are encouraged to forward their comments and questions on SEMA ASE and survivability to **MAJ Blacker.** Although the TSM office is sparsely staffed, it has access to all the resources at the Intelligence Center as well as throughout TRADOC.

As an aside, it's interesting to note how many great ideas surface as SEMA aviators visit the TSM-SEMA office either as students or enroute to new assignments. The Intelligence Center and School welcomes these contributions and encourages those with comments to drop a line to the Center so others can benefit from the knowledge gained in the field.

Moving onward

MAJ Blacker's Task Force has just begun to fight. With the draft survivability manual for the OV-1D under its belt, the Task Force will now turn its attention to the BLACK HAWK and UH-1H QUICKFIX aircraft, and the U-21 (C-12) GUARDRAIL system.

Concurrently, the Task Force is delving into the impact these initiatives will have on training programs, flying hour allocations, and the Intelligence Center's training budgets for the near and mid-terms.

Refocusing attention on survivability has not been an action taken unilaterally by the Intelligence Center. The Aviation Center and School at Fort Rucker has instituted similar initiatives. For example, TSM-Scout Helicopter recently assumed management responsibility for ASE and survivability of the non-SEMA helicopter fleet. Additionally, the Aviation and Intelligence Center's test activities have closely coordinated ASE testing, ensuring maximum benefit from this very costly effort.

Finally, because the Aviation Center is the proponent for Army Aviation ASE as well as for safety and flight standardization, aviation activities for Fort Huachuca have been fully coordinated with the home of Army Aviation.

New insights

In addition to the immediate benefits of upgraded survivability manuals for SEMA aviators, ASE testing at Fort Huachuca has given TRADOC new insights into aircraft survivability hardware; how it's used and maintained, and the effectiveness of each individual ASE system as well as the combined effectiveness configured as suites. Frankly, the news isn't good. Unlike radios, engines, magnetic compasses, and altimeters, all essential for safe flight and maintained accordingly, survivability equipment tends to take a back seat.

A recent survey contracted by PM SEMA revealed most units need to upgrade their ASE maintenance and training programs. Collectively, these are some of the issues TSM SEMA is addressing via **MAJ Blacker's** Survivability Task Force. While few will argue the current ASE suites provided all the protection needed; it's also clear that aggressive, well trained pilots operating with the existing ASE suites dramatically increase the probability of survival. In the first case reviewed in-depth, the OV-1D, survivability is all but assured if the pilot executes selected maneuvers aggressively and with prevision.

An equally pressing responsibility for the user in the field, as well as the combat developer, is to understand the threat in depth. That's a very complex business, complicated by security constraints and by our constantly expanding knowledge about technical issues. For some of us, the challenge has been too great and we've simply turned that responsibility over to study houses, materiel developers, or to intelligence experts.

That has in the past and will continue to cause the user community untold anguish for three reasons.

First, analytical organizations inhabited by statisticians and not necessarily experts on enemy systems can, and frequently do, inadvertently model omnipotent threat forces, resulting in false perception of our own systems' vulnerabilities.

Second, the materiel developer, although often the best informed on the threat, may be well down the road on a development process before the user realizes the threat has been taken out of context operationally, negating the value of a proposed system.

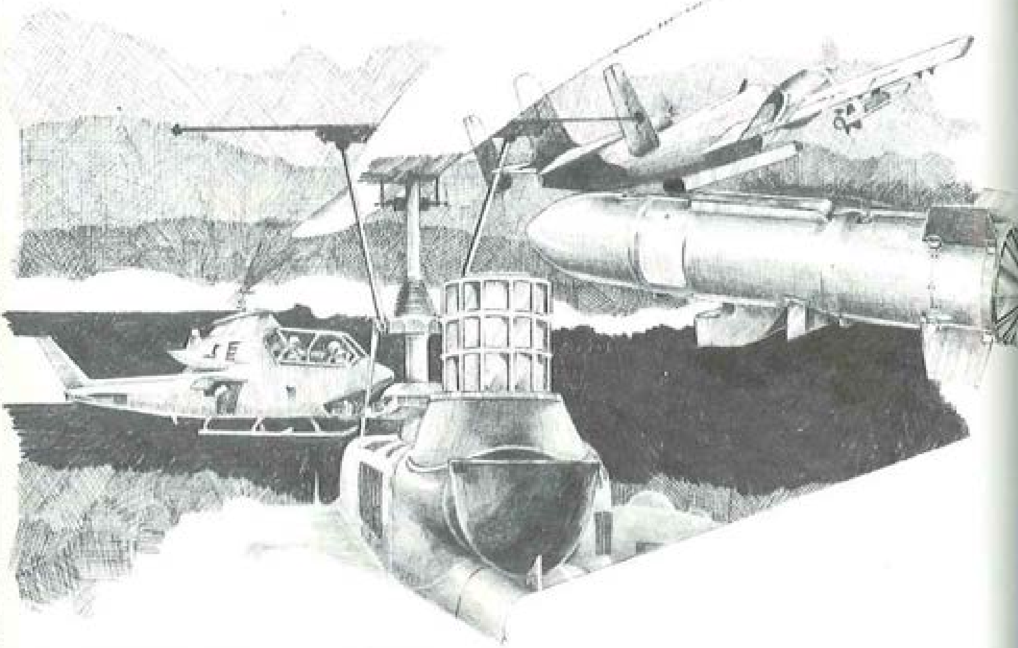
Third, and most important, it is the user who must come face to face with the enemy and win, not the statistician nor the materiel developer.

Dramatic results

In conclusion, the aircraft survivability tests conducted at Fort Huachuca over the past year have and are continuing to produce dramatic results. In the near term, the Intelligence Center is generating valuable how-to-fight documents on an expedited basis, and upgrading resident pilot and ASE maintenance training in order to more effectively capitalize on existing ASE systems. Concurrently, TRADOC and the entire user community must hone their understanding of the threat in order to fight smarter today and to intelligently task the materiel developer for the survivability hardware to meet future threats.

Momentum is now clearly in a positive direction. All of us involved in aircraft survivability must ensure this favorable trend continues and that today's innovations don't become tomorrow's dust gatherers in the archives, as has happened to similar initiatives in the past. Should that occur, we stand to lose more than just momentum. IIIII

FLIGHT INSURANCE...



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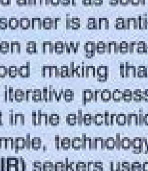
A combat developer's view of ASE

By MAJ TERRY P. NEILON, ASE Project Officer,
U.S. Army Aviation Center, Ft. Rucker, Alabama



THE capabilities of threat air defense systems on the future battlefield influence the requirements for Army Aviation's **Aircraft Survivability Equipment (ASE).** ASE equipment must have the inherent flexibility to operate within the various aviation missions yet retain the ability to successfully perform within the specific parameters of any one type mission. The purpose of this article is to highlight some of the processes which go into the development of these requirements.

The Directorate of Combat Developments, USAAVNC, Fort Rucker, AL, is charged with the responsibility for identifying and stating the users' needs for future ASE. The concept based requirements system calls for evaluation of the Army's mission needs to determine if deficiencies exist. Further evaluation determines whether these deficiencies can be solved by changes in tactics, doctrine, organization or development of new equipment. If the corrective solution is to develop a new piece of equipment, there are several steps to be followed before the requirements can be accurately stated.

First step: analysis

The first step requires analysis of the threat; taking into account both its current capabilities and the anticipated improvements expected in years to follow. Equally important is the assurance that ASE is compatible with the aircraft and its missions, e.g., a radar countermeasure which requires the pilot to maneuver the aircraft countermeasure in order to be effective is not very desirable. Ideally, a countermeasure system should be automatic and require only minimum action by the pilot to operate.

In this light, the aviation community must insist that ASE be developed with the pilot and aircraft mission in mind. The Combat Developer sees, almost weekly, new technologies and equipment which have possible application to Army Aviation. However, equipment cannot be accepted solely because it is available within industry or being developed for use by a sister service. When it is determined, through concept formulation, that new ASE is necessary, a requirements document is then drafted. In most cases this document is in the form of a **Required Operational Capability (ROC).** This document states the characteristics and performance criteria that the aviation community expects of the equipment.

After the coordination and staffing of the requirements document, it then becomes the materiel developers' blueprint for development of the new system.

Quick obsolescence

The evolution of weapons development has always been typified by systems becoming outdated almost as soon as they are fielded. No sooner is an antitank weapon fielded when a new generation of tank is developed making that weapon obsolete. This iterative process is much more prevalent in the electronic warfare arena. For example, technology is developing **infrared (IR)** seekers used in air defense systems hardly stands still long enough to ensure that a particular

IR countermeasure device will provide protection for more than a few years.

Faced with this situation one could decide not to develop any countermeasure equipment, feeling it is pointless to try to keep ahead of fast paced air defense improvements. Another approach would be to develop equipment which lends itself to be upgraded as the threat systems improve. The accepted approach, from a cost and operational view, is to equip our fleet with ASE which is designed to be modularly upgraded with a minimum of effort and expense as technology changes. These modular upgrades would call for easily replaceable internal components or external components, such as antennas. New system designs should allow these component exchanges to be accomplished in the field.

A complete system

Ideally, the user community requires the design of ASE to be lightweight, inexpensive, dependable, and capable of affording a self-protection capability against multiple threat systems with a minimum of components. ASE should be a complete system rather than a collage of "black boxes," each having its own independent function. A systems approach allows for improved capability, maintenance, training, fewer repair parts, and higher reliability. Additionally, the ASE system should be automatic in order to preclude the pilot from being distracted from the performance of his mission.

Another important goal for new ASE is to achieve commonality of equipment throughout the fleet. This reduces maintenance and logistic problems and eases training procedures for both operators and maintenance personnel. However, it is recognized that ASE must also be tailored to meet the need of the aircraft's mission profile. Higher flying **Special Electronic Mission Aircraft (SEMA)** which are exposed to a greater variety of hostile air defense systems may require a more encompassing ASE package than a utility helicopter operating at nap-of-the-earth.

The final step is thorough testing to evaluate the equipment's ability to perform as required. Operational tests performed under realistic conditions are the user's vehicle to ensure new hardware is compatible with the host aircraft and the soldiers who operate and maintain it.

An ASE ROC proposing the above strategy was approved in 1981 by the Department of the Army. Currently, the ASE ROC is undergoing revision. In addition to the considerations listed above, this revision will address development of ASE training devices. In all likelihood, there will be a requirement to build training devices for both individual and collective training programs. Although specific hardware has not been identified, training devices which use and activate ASE in the aircraft are likely to be developed.

The PM ASE and the Combat Developers do not operate alone in the effort to field ASE. Without coordination with the airframe Project Managers or **Readiness Project Officers (RPO),** ASE cannot be successfully fielded. The support of these agencies is necessary to ensure ASE receives priority for timely funding and is properly installed on the aircraft.

An obvious need

The aviation community is becoming more aware of the importance of ASE in the performance of our mission. When reviewing the capabilities and quantities of the threat air defense system, the need becomes very apparent.

It is incumbent upon the Combat Developer to ensure that the Army Aviation's ASE requirements are clearly expressed. Then, close coordination must be maintained with users in the field and program managers at all levels to ensure these requirements are met as the equipment is being developed. IIIII

Decoy dispensers today and tomorrow

By JOHN E. ANDREWS, Project Leader, ARDC, U.S. Army Armaments Munitions Chemical Command, Dover, N.J.

THE Vietnam era emphasized the need for protection of Army aircraft from heat seeking missiles and radar controlled weapon systems. The **Project Manager for Aircraft Survivability Equipment (PM-ASE)** tasked the **Armament Research and Development Center (ARDC),** U.S. Army **Armament, Munitions and Chemical Command (AMCCOM)** to provide a system for dispensing expendable decoys to protect Army aircraft.

Early efforts

The AMCCOM, under the direction of the PM-ASE, initiated an advanced development program on a Mini-Flare System for dispensing a large number of small **infrared (IR)** countermeasure flares from Army aircraft. System feasibility was demonstrated by flight tests performed in August 1970. Later that year a successful IR decoy was demonstrated in flight tests against captive missile systems.

Even though this system was highly successful, it was not carried into development at that time until a new configuration study could be completed. This study took into account the updated design requirements for the dispenser system and decoys based upon the aircraft limitations (size, weight, and space available), other ASE systems on the aircraft, and changes in the threats.

While this study was proceeding, the PM-ASE and ARDC adapted the Navy ALE-29 flare dispenser to Army helicopters. This adaptation was designated the XM-129 Countermeasure Flare Dispenser System and was type classified for limited production. Not only was this type of system used with success in Vietnam, but it was also deployed on selected helicopters in other CONUS locations. Although this system met the critical immediate need, it was large and heavy, and therefore very limited in application to Army aircraft.

Recognizing a need

We recognized that a light-weight system was needed that could be configured for small helicopters and aircraft. Based upon the aforementioned configuration study, ARDC was directed to develop a new dispenser for Army aircraft.

This effort culminated in the standardization of the M130 Aircraft General Purpose Dispenser (**Figure 1**), the M206 Aircraft Countermeasure Flare, M1 Countermeasures Chaff, the M91 Electronic Systems Test Set, and the M92 Electronic Systems Test Set.

The M130 system is a light-weight countermeasure system of modular design that allows a flexibility of operational configuration. The modules consist of a dispenser control panel, the dispenser assembly, the payload modular assembly, and the electronic module assembly (**Figure 2**). Each aircraft is modified with appropriate cabling and structural adapters and brackets.

The M130 system can dispense the M1 chaff, the M206 flare, or other expendable jammers. Each payload module accommodates 30 payloads of a single type. The M130 system configuration

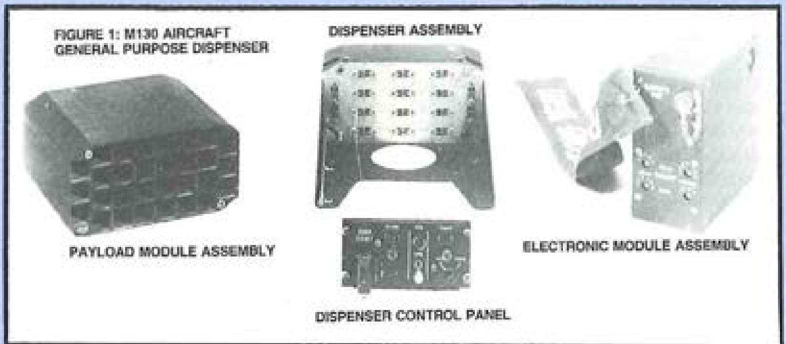


FIGURE 1: M130 AIRCRAFT GENERAL PURPOSE DISPENSER

may be either a single dispenser of 30 payload capacity, or two dispensers with a total payload capacity of 60.

System function is as follows: A stimulus, such as an operator action or input from a threat-warning device, initiates a "Dispense" command pulse to the electronics module where it is outputted to the dispenser. The dispenser pulse immediately activates the sequencer switch which steps to the next position. A high level firing pulse then ignites the pyrotechnic M796 impulse cartridge and the squib gas pressure ejects the payload, and in the case of the M206 ignites the flare during ejection from the case.

A description of the major components and the test sets follows:

- **Dispenser Control Panel (Figure 1):** Functions of the Dispenser Control Panel include manual ARM-SAFE switch w/arm light, counters for chaff/flare payloads, ripple fire switch for the salvo of remaining flares in an emergency, and a manual/program switch for selecting a chaff dispensing pod.

- **Dispenser Assembly (Figure 1):** The dispenser assembly contains a flare sensor circuit for detecting ignition, selector switch for flare or chaff and a reset switch.

- **Payload Module Assembly (Figure 1):** The Payload Module has 30 chambers which will accept either chaff, flares, or other type payloads such as expendable jammers. The payload module assembly is assembled to the dispenser assembly.

- **Electronics Module Assembly (EM) (Figure 1):** The EM contains programmer and a cable assembly. The programmer allows for the setting of chaff burst number, chaff salvo number, chaff burst interval, and chaff salvo interval, and a flare detector. The flare detector circuit is provided to assure that a burning flare is ejected. If a dud is sensed another flare is ejected.

- **M91 Electronic Systems Test Set:** The M91 Test Set is used at AVUM to check the M130 system on the aircraft prior to a mission.

- **M92 Electronic System Test Set:** The M92 Test Set is used at AVUM to fault isolate a defective component assembly of the system (includes testing out the flare sensor circuit) before and after it is mounted on the aircraft. It is also used at AVIM to determine which subassembly or electrical component in a defective DCP, EM, or dispenser assembly is inoperable.

- **Dispenser Payloads:** The chaff, flare, and expendable jammer payloads are normally 25mm by 25mm square configuration, 210mm in length. The payloads require a M796 Impulse Car-

(DECOY/Continued on Page 36)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M130 SYSTEM MOUNTED ON CH-47

Decoy dispensers

tridge for activation. Early in production, the Army coordinated with the Air Force on the flare output requirements to insure the M206 flare would be a bi-service item. The flare can be used in the Air Force ALE-40 dispenser or the Army's M130 system.

The M130 system, loaded with 30 chaff cartridges, has a weight of approximately 25 lbs. If 30 flares are loaded into the system instead of chaff, the weight is 28 lbs. This total weight does not have to be added to the aircraft weight if the system is mounted on the aircraft where ballast can be removed to compensate for its weight. On the AH-1, the dispenser was mounted on the tail assembly and ballast removed so that the system only added approximately 1.5 lbs.

A mixture of decoys

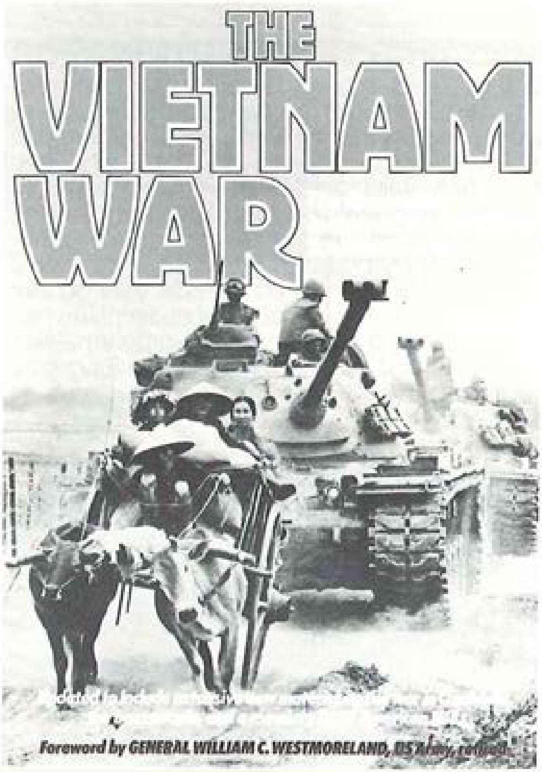
The M130 system has been fielded in CONUS and OCONUS on Army tactical rotary and fixed wing aircraft. The systems fielded are a mixture of decoys in that some aircraft have only chaff capability, some have only flare capability, and still others have both a flare and a chaff capability. The type of system fielded depends upon the type of aircraft, the other survivability equipment already on board, and the mission of the aircraft.

The M130 system was the first small, light-weight system design for use on Army aircraft. The system has met all of the user's stated needs, but technological advances permit improved systems. The PM-ASE and ARDC have not only been looking at future threats, but they are also looking at advances being made in the electronics of dispensers and the advances being made in expendable decoys. In the foreseeable future, a much lighter-weight system could be developed which would have higher reliability, reduced maintenance, a self-test capability, and also would reduce the workload of pilots. Greater use can also be made of solid-state switches, microprocessors, and pre-programmed dispensing plans.

Size reduction possible

Advances in countermeasure expendables has opened the door to reduction of their size. Reduction in the payload size would in turn reduce the size of the dispenser or increase the number of payloads one system could carry without an increase in weight. If the size of the system is reduced, the aircraft adapter size could be reduced which would, in turn, decrease the overall weight of the system significantly.

The PM-ASE and ARDC are working hand-in-hand to insure Army aircraft have a light-weight expendable dispensing system, and are protected against the threats in the field now, and those to be encountered in the future. IIIII



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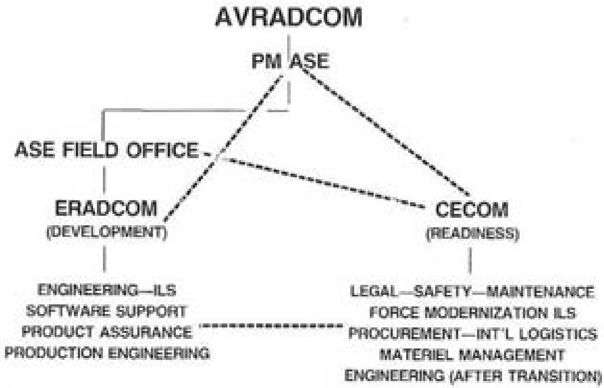
ASE's "Man at Monmouth"

By LTC CHRISTOPHER DORNEY, Chief, Aircraft Survivability Equipment Field Office, Fort Monmouth, New Jersey

THE city of St. Louis served a unique function in the history books. Travelers to the West used the city to build the wagons to transport them, obtain the logistics support necessary for a 2,000 mile trip over rugged terrain and form organizations (wagon train) for safety and mutual support. Now St. Louis, or rather the ASE PM's Office in St. Louis has its own way station (Field Office) located at Fort Monmouth, NJ to help in coordinating the development and fielding functions of ASE equipment.

While the analogy might be a little weak, it was meant to highlight the Field Office's role in ASE activities. The Field Office is a part of the PM's Ofice — its location, at the jumping off point for development and procurement — assists the PM and his staff in negotiating the myriad routes available in staff support provided by the ERADCOM and CECOM activities located at Fort Monmouth. Communication between two people in the same room often breaks down — now, add 200-300 people, 1,500 miles and a complicated technology interface — coordinating becomes a full time job.

The PM ASE Field Office is involved throughout the entire Life Cycle of the system acquisition process. Specific expertise in systems acquisition process. Specific expertise in systems acquisition, procurement and production analysis and logistics are on hand to aid this complex interface task. While the staff at the Field Office would probably have some difficulty in constructing a covered wagon, this highly trained set of professionals can do just about anything else to accomplish the mission. IIIII



THE Aircraft Survivability Equipment **Materiel Fielding Office (MFO)** is collocated in Seckenheim with the U.S. Army Materiel **Development and Readiness Command (DARCOM)**-Europe activities. All Force Modernization activities involving ASE are systematically coordinated with the DARCOM-Europe personnel and integrated into the overall command objectives.

Our primary purpose

The purpose of the MFO is to provide assistance in all Force Modernization efforts related to aircraft survivability. The office serves as a focal point for providing all Materiel Fielding Plans and **Department of the Army Modification Work Order (DAMWO)** Plans established for ASE to **U.S. Army Europe (USAREUR)** elements. The MFO follows up on Materiel Fielding Agreements to assure that the Project Manager's responsibilities are executed.

New fielding efforts are always underway in Germany due to the staggered maturity of the various ASE systems. Several aircraft now have Infrared Suppressors, APR-39 Radar Warning Receivers, Infrared Jammers, and Flare Dispensers. There is one Infrared Suppressor being fielded now with one more still in development. A Radar Jammer and a Missile Detector will also be deployed.

During the production of the basic ASE item, there are concurrent efforts to develop aircraft interface provisions. These provisions, referred to as A Kits, must be installed as a MWO in each aircraft. Each ASE requires a separate A Kit for each respective aircraft type. The aircraft modification to accept the A Kit is an important element to the fielding effort and requires long range planning and coordination just as does the basic ASE system.

The A Kit installation is often a field retrofit program. However, the Project Manager attempts to capitalize on new aircraft production, ongoing aircraft conversion programs, and cyclic overhauls to install the A Kit at the contractor's site, or depot level facility.

Aircraft already fielded without the A Kit modification are scheduled for field retrofit to coincide with fielding of the ASE. Contractor teams are used to execute these retrofit programs to lessen the impact on organic forces.

A slow process

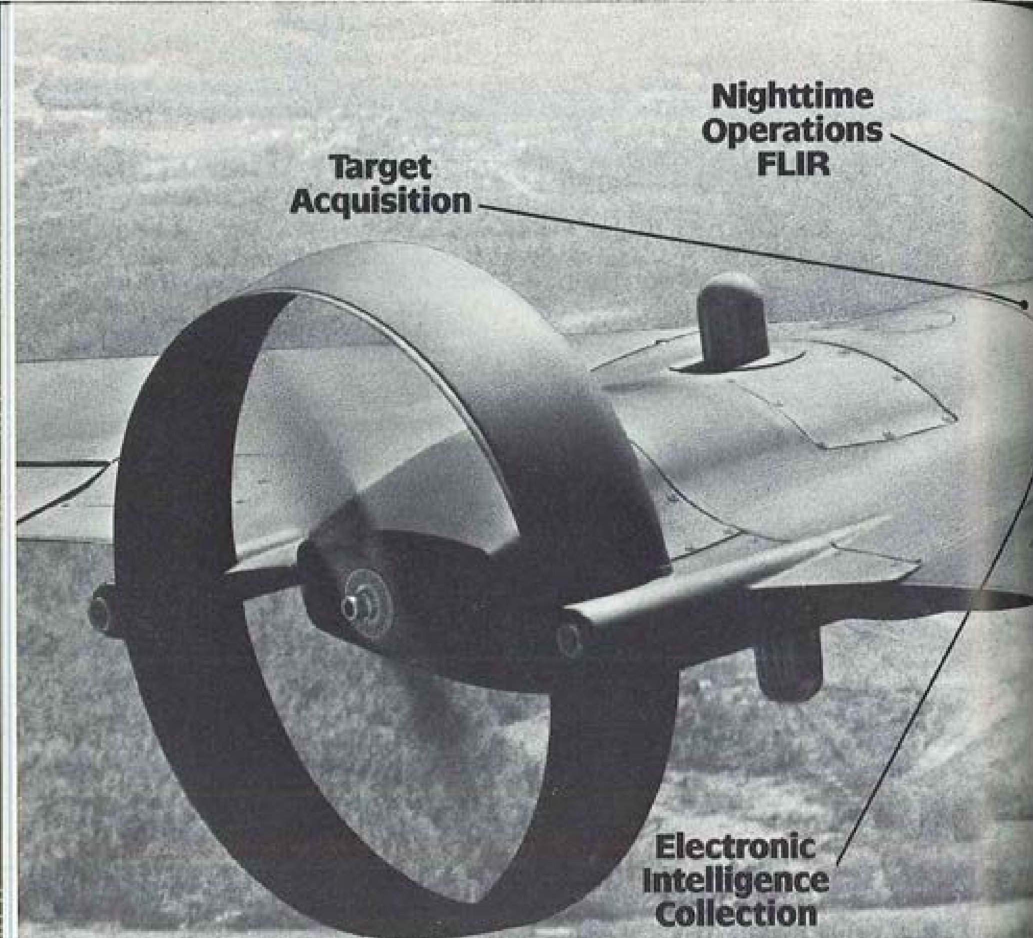
One of the most time consuming activities is the management of the **system support package (SSP)** components. This package consists of a full range of repair parts, test equipment and publications. The requisitioning and subsequent delivery of these items are fraught with peril. Prior to the establishment of the MFO in January 1982, the Project Manager was faced with the impossible task of managing this process from St. Louis.

The ASE MFO is also collocated with the COBRA and BLACK HAWK Materiel Fielding Teams. This allows for easy interaction and coordination in the fielding of ASE on these aircraft.

(FIELD SERVICE/Cont. on Page 88)

ASE field service in Europe

By SERGEANT FIRST CLASS MICHAEL L. ADAMS
Chief, ASE European Field Office/Germany



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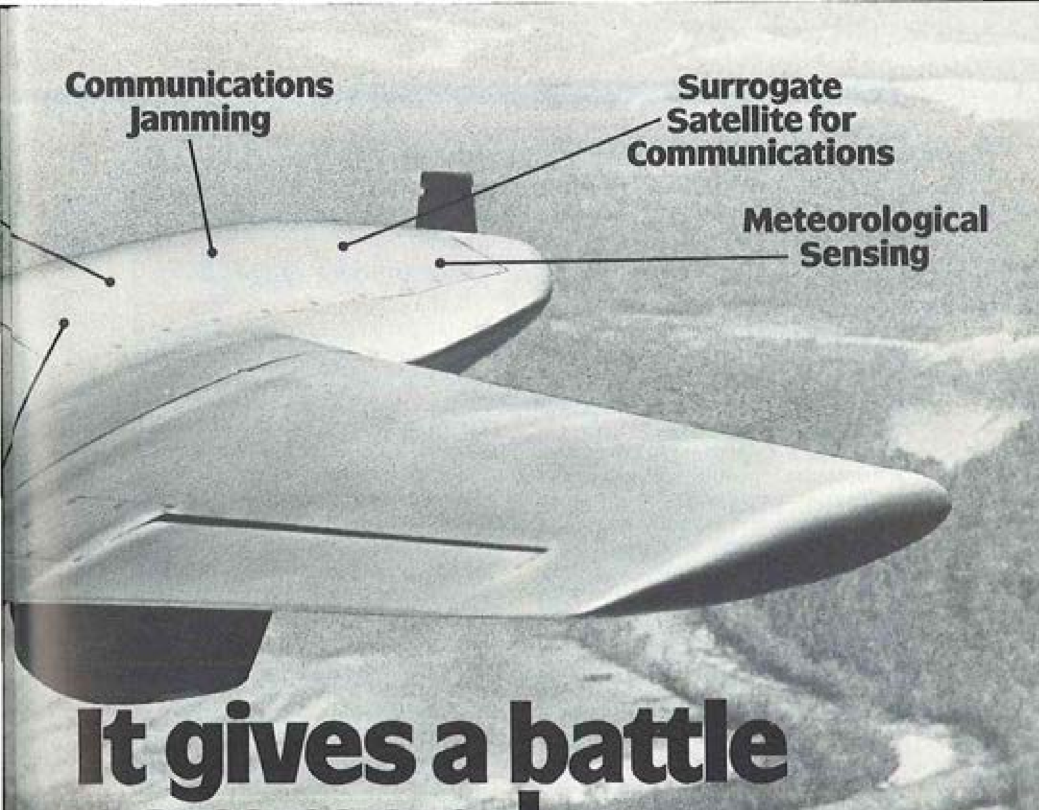

It gives a battle commander better control of the battle.

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Electronic Warfare Lab Support for ASE

By BOB PALAZZO, Chief, EW Protection Division,
Electronic Warfare Laboratory, Ft. Monmouth, New Jersey

THE **Electronic Warfare Laboratory (EWL)** has been a major partner with the PM ASE for almost a decade in the development, production, and fielding of ASE.

Located at Fort Monmouth, NJ, the EWL is part of the **Electronic Research & Development Command (ERADCOM)** based at Adelphi, MD.

Having been tasked by the PM ASE with the development responsibility for all active ASE countermeasure equipments, the EWL has been and will continue to be ready to carry out this mission with technical ingenuity, cost, and schedule responsiveness and dedication in order to sustain and increase the Army's combat effectiveness through survivability on today's and tomorrow's battlefield.

The list of equipment with which the EWL has been a partner with the PM ASE in the development, production, and fielding has been formidable (See **Figure 1.**) The listed Radar Warning Receivers, Radar Jammers, IR Jammers, Missile Detectors, Lasers, and Optical Warning Receivers encompass over $200 million of development and production funding in all.

A solid payoff

The EWL and PM ASE development relationship stands as an example of the payoff that can be achieved through the central management of a commodity (ASE) and the utilization of a Lead Technical Center (EWL) for its development. This relationship and its value has been recently re-emphasized by **GEN Keith** in his letter, SUBJECT: **Project Management (PM)** Study, dated 21 March 1983 to all DARCOM subordinate organizations. The ASE program has surely been a leader and implementer of this guidance.

A responsive organization

As a result of this unique relationship with the PM ASE, EWL has dedicated a full division of engineers and scientists, both military and civilian, to support the ASE program and its hardware development. This Division, the **EW Protection Division,** consists of over 40 technical personnel divided into three branches, each specializing in an ASE development phase as shown in **Figure 2.**

As the development of the ASE progresses, it transitions between the Branches, thereby bringing to bear the proper management expertise required in each development cycle.

The **EW Protection Division** is the lead technical organizational element at EWL. Although this Division consists of all the lead or Project Leader personnel, it does not contain all the personnel required for the complete execution and support of each of the ASE hardware programs. This support is extensive and includes other EWL organizational elements as well as those of ERADCOM and the **Communications Electronic Command (CECOM).**

In the areas of production engineering, product assurance, and ILS, support is provided by another EWL Division, the **Engineering Support Division.** From CECOM, support is provided in many areas to include maintenance, provision-

FIGURE 2
EW PROTECTION DIVISION

ing, new equipment training, safety, and technical publications, etc.

A significant area that is supported by ERADCOM itself is **procurement.** The success of any hardware program is keyed to the expeditious awarding and vigilant monitoring of the development or production contract. Cognizant of this, a separate ASE procurement branch has been in existance with a dedicated contracting officer and staff of eight to ten contract specialists.

All of these CECOM and ERADCOM specialists are assigned to each ASE development, and support the Project Leader in each of their respective areas through the **Project Control Board (PCB)** management system employed by ERADCOM. The PCB, a matrix management system with the EWL Project Leader as its chairman, is the Working Level Development Team on each ASE. (See **Figure 2**).

FIGURE 1
EWL/PM-ASE PARTNERSHIP

RADAR WARNING RECEIVERS:
AN/APR-39(V)1 & (V)2 AND UPGRADES, AN/APR-39A(XE-1) - AN/APR-39A (XE-2) AN/APR-44(V)1 & (V)3.

AN/ALR-XX RFI RADAR JAMMERS:
AN/ALQ-162(V)2 - AN/ALQ-136 (V)1 AND ITS UPGRADES, AN/ALQ-136(XE-1), AN/ALQ-136(XE-5) - AN/ALQ-136 (V)2

IR JAMMERS:
AN/ALQ-147A(V)1 & AN/ALQ-147A(V)2, AN/ALQ-144(V)1 & AN/ALQ-144(V)3, AND ITS UPGRADE, AN/ALQ-144A.

MISSILE DETECTORS:
AN/ALQ-156(V)1, (V)2 & (V)3

EO/LASER AREAS:
AN/AVR-2 LASER - AN/ALQ-169 OPTICAL WARNING RECEIVERS

The Laboratory's role

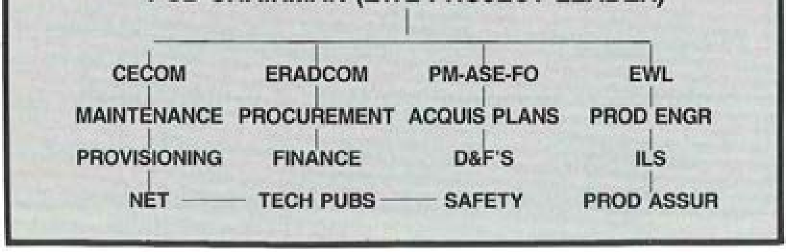
Now that we have discussed the organization and structure set up at EWL to support the PM ASE, let us look at the Laboratory's role in the development process.

While the PM ASE's main function is the expeditious and smooth fielding of total systems against TRADOC needs, the Laboratory's role is keeping ASE at the "cutting edge" of technology and performance to match the advancing threat to Army Aviation.

The Electronic Warfare Laboratory does this through its mission exploratory and research base programs that foster and nuture new ideas, concepts and **countermeasure (CM)** technologies. The state-of-the-art is constantly monitored through technical dialogue with industry and other government laboratories within the three services.

The air defense threat, to include both foreign and friendly systems, is continuously analyzed and studied to assess the capabilities and determine the vulnerabilities that could be capitalized on by new CM hardware or by improve-

FIGURE 3 — PCS PROCESS



ments to existing ASE.

The Laboratory utilizing this technology base and technical expertise in EW will then respond to a PM tasking, or propose to PM ASE, a hardware program to either upgrade or develop a new capability. This will be dialogued mutually and examined to ascertain its contribution to overall ASE and to determine effectiveness, cost, and weight penalties.

Upon program approval, a development team (PCB) will be established to prepare all contractual and technical documents/specifications issued, to evaluate proposals, and to award a contract. This development team will monitor the contract, providing guidance as necessary, accepting hardware and overseeing all testing and evaluation throughout the development and production phases.

Management

How does one delegate and still manage an ASE program as diverse as this one is, with Warning Receivers and Jammers across the total threat spectral band, and still have a responsive and integrated equipment suite that is mission oriented . . . especially, when these two organizations are over 1,000 miles apart?

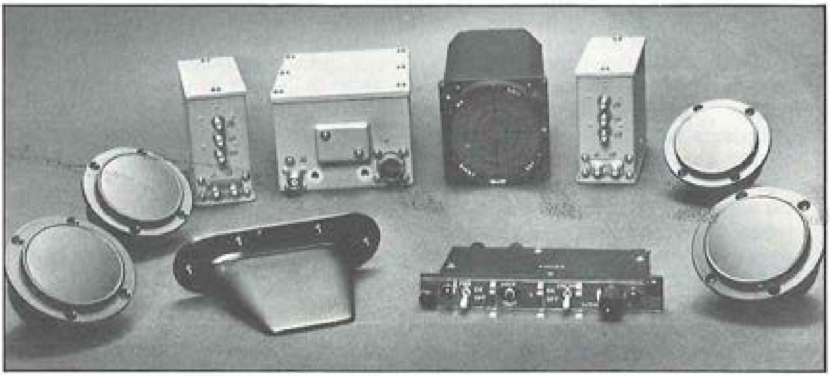
PM ASE is the DARCOM Systems Manager and as such is the overall ASE Configuration Manager responsible for system acquisition testing and fielding. He has delegated to EWL the hardware or black-box configuration management responsibility which is exercised by the EW Project Leader through the PCB and **Configuration Control Board (CCB)** process.

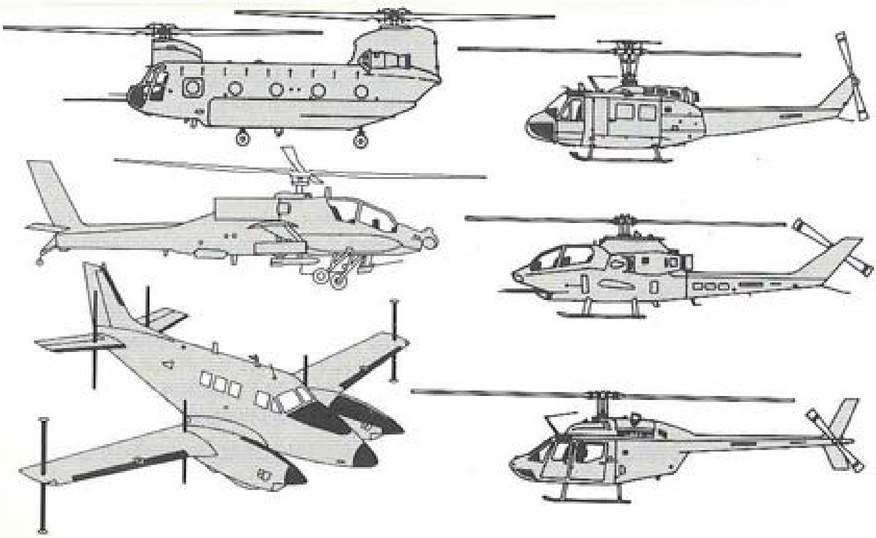
This black-box configuration control is kept by EWL through complete sets of drawings and equipment specifications. When transition occurs, i.e., the AN/APR-39(V)1 to the Readiness Command, these drawings and specifications become the responsibility of CECOM, but EWL still retains technical configuration control responsibility.

Since management of the hardware or black box is only a part of the overall development of an ASE item, PM ASE retains overall system management through a **Assistant Project Manager (APM)** structure. This individual has total ASE responsibility and has a development team consisting of ASE personnel and the EWL PCB team headed by EWL Project Leader. Formal reviews by the PM ASE and EWL management of each of the development programs headed by the APM are held quarterly alternating between Ft. Monmouth and St. Louis.

Also, in order to more closely manage the large development program at EWL,

(Continued on Page 48)





PM ASE has established a field office at Ft. Monmouth. This office has proven invaluable in providing a direct day-to-day contact with the PM ASE in discussing and resolving program issues and problems.

Lastly, it must be realized that any management scheme, no matter how perfect, is doomed to failure if it were not for both PM ASE and EWL believing that together they form a stronger development team with each bringing to the ASE program their respective expertise and mission responsibilities, and thereby making Army Aviation the ultimate win-

Technology Support

A significant area where EWL supports the PM ASE is in the area of technology. Since PM ASE does not have technology base funding as part of its charter, it looks to EWL and the other Army Laboratories within the DARCOM community for the expertise and technological advances to draw upon for future development programs. It is the breeding ground for new ASE programs.

The EW Protection technology under Project ILI62715A042 is provided by EWL under three technology product lines: Radar, Infrared, and Electro-Optical Countermeasures.

Completing these EWL technology product lines are those of other ERADCOM Laboratories (NVEOL & ET&DL) who provide new and improved components (lasers, TWTS, IR sources, etc.).

The major objectives of EWL's technology programs are to:

- perform "What if" studies of presently developed and fielded systems against projected and postulated future threats to assess their effectiveness,
- evolve new methods of countering enemy air defense weapon systems through studies, computer simulations, development of brassboard systems, and field experiments, and
- perform technique investigations to provide state-of-the-art and improve subsystems and components for replacement and insertion into existing hardware design.

This supporting technology is managed within the EW Protection Division so that it is responsive to the technological needs of fielded and developed ASE. This ASE technology base represents about 30% of the total technology budget of EWL and in FY 83 an investment of about $2.2 million.

The value and importance of this supporting EWL technology base to the ASE program is evident in the realization of the development of the extended frequency portion of the APR-39A(XE-1), the advanced capabilities of the AN/ALQ-144A IR Jammer, the frequency extension for the AN/AVR-2 Laser Warning Receiver, and in new capabilities for our Radar Jammers against advanced technical radar threats.

The challenge

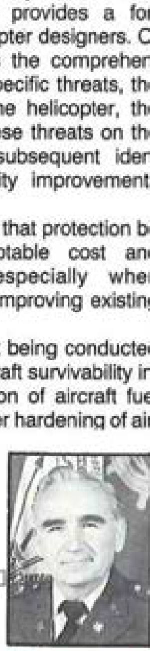
EWL has been a major contributor in the development and fielding of ASE hardware. Its engineers and scientists are dedicated to the survivability and subsequent increased combat effectiveness of Army Aviation on today's and tomorrow's battlefields. Its technology base program is aimed at keeping developed and fielded ASE up-to-date against the ever improving threat through technology insertion.

The existing ASE development program underway at EWL is large, but the development challenges of tomorrow are even more formidable as the threat to Army Aviation gets larger and more sophisticated. To overcome them will take even greater inventiveness, dedication, and development ingenuity.

EWL stands ready to support the PM ASE in these future developments, and it is proud to be part of the ASE Team and to contribute to the success of the ASE program and Army Aviation. IIIII

Inherent toughness: A key to survival

By COLONEL EMMETT F. KNIGHT, Director
Applied Technology Laboratory (AVSCOM), Ft. Eustis, VA



ARMY Aviation is now recognized as a full member of the Army combat team and Army tactics are predicated on the ability of aviation to perform its tasks as a part of the combined arms effort.

The ability of the aviation weapons system to survive while performing the necessary combat, combat support, and training tasks will be critically important to the outcome of any conflict.

Complex issues

Survivability issues with respect to Army aircraft are very complex with the threats facing aviation operations being many and varied — from the small arms fire of the infantryman to sophisticated air defense system capable of placing accurate fire upon our aircraft. Air-to-air combat can be expected with enemy helicopters armed with guns and air-to-air missiles.

Less conventional threats will also be present in the form of tactical nuclear devices, chemical and biological warfare, lasers, and other forms of directed energy weapons, and electronic countermeasures to degrade the mission capability of our systems.

To perform effectively in this environment the modern helicopter must show a marked improvement in its inherent toughness over previous generation helicopters. They must have combat sustainability to operate in any threat environment, receive damage, complete the intended mission and, while damaged, continue operations for a finite period.

Combat survivability of the helicopter is dependent on many factors including operational tactics, speed, agility, maneuverability, observable signatures, weapons, active countermeasures, passive hardening, and crashworthiness. These factors which often oppose one another in the design of an aircraft system must be individually understood and optimally mixed in arriving at the best solution for enhancing the survivability/mission effectiveness of Army helicopters.

This article addresses some of the key efforts underway at AVRADCOM's **Applied Technology Laboratory (ATL),** which are intended to ensure survivability through increased aircraft hardening.

Aircraft survivability

The sophisticated and varied threat environment faced by the Army helicopter in combat provides a formidable task for helicopter designers. Of primary importance is the comprehensive identification of specific threats, the vulnerable areas of the helicopter, the probable effects of these threats on the helicopter, and the subsequent identification of survivability improvements required.

Further, it's imperative that protection be engineered at acceptable cost and minimum weight, especially when retrofitting or product improving existing helicopters.

Major areas of effort being conducted at ATL to improve aircraft survivability include ballistic protection of aircraft fuel systems; NBC and laser hardening of air-

Inherent toughness

craft subsystems and components; development of a lightweight, low power loss **infrared radiation (IR)** suppressor optimized for both hover and forward flight; and improved flight safety and crashworthiness.

Ballistic protection

The in-flight fire or fuel tank explosion is among the worst combat risks faced with Army helicopters in the combat environment. Testing and analysis have shown that the fuel tank area is vulnerable to the high explosive incendiary ballistic threat and can result in fuel tank rupture and subsequent fuel spillage and fire by any one of several means.

One concern is the detonation of the projectile within the ullage area of the fuel tank which generates combustion overpressure capable of rupturing the fuel tank; another is the detonation of the projectile within the liquid fuel itself causing hydraulic ram pressure high enough to rupture the tank; and finally, projectile detonation in the dry bay area between or near the outer skin resulting in fragment and blast damage to the tank wall.

Significant research has been conducted over the past several years towards reducing the threat of in-flight fires and several techniques have evolved which have proven effective in preventing fuel fires and explosions.

These include internal and external foams, powder pack panels (structural and non-structrual), nitrogen inerting of the ullage, and active fire detection/suppression systems. Some applications have shown it to be more weight effective to utilize a **nitrogen inerting unit (NIU)** rather than internal foam to provide explosion protection inside the fuel tank, and to install powder pack panels around fuel tanks rather than using foam.

The most promising concepts are being demonstrated using the AH-1S helicopter and ASE PM support through an ongoing advanced development effort in **Survivability and Vulnerability Improvement (SVI).** For this program nonstructural power pack panels will be added to the forward bulkhead of the forward fuel tank. Active fire detection/suppression modules are being installed in the dry bay areas in and around the fuel tanks.

To prevent the possibility of an explosion in the fuel tank ullage area a nitrogen inerting unit is being installed which provides nitrogen to the fuel tanks to inert the combustible vapors in the ullage space above the fuel.

Weight factors

To offset the added weight of these fire prevention designs, two concurrent efforts were incorporated into the SVI program: one consists of the design of an armored crashworthy crewseat to replace the existing non-crashworthy armored crewseat and the other is to relocate and optimized the size of the engine armor panels.

These designs will be fabricated and installed on an AH-1S helicopter to verify fit and function of both the designs and the modifications to the airframe necessary to accept the various survivability features which are part of the SVI package.

Based on the initial efforts of the SVI program, the **Advanced Attack Helicopter Project Manager (AAH PM)** saw an opportunity to save weight on the AH-64 APACHE through the use of nitrogen inerting of the fuel tanks in lieu of the initial APACHE design utilizing foam inside the tanks. The ASE PM, in conjunction with the AAH PM, funded an accelerated qualification program between the two competing NIU contractors to select one for production installation on the APACHE.

IR signature suppression R&D

IR suppression engineering developments are now using the suppression technology that has been established over the past several years by ATL to design and evaluate lightweight, low horsepower required IR suppression concepts. These new concepts will be more effective in suppressing the IR signature of Army aircraft.

The **eccentric/chute mixer (E/M)** concept technology was selected for the design of the UH-60 BLACK HAWK **hover IR suppressor system (HIRSS).** ATL's successful in-house development of the E/M technology led to a request for ATL support to the GE/Sikorsky Team in the BLACK HAWK HIRSS development program.

The Laboratory was tasked by the ASE PM to fabricate and evaluate a full-scale hot flow model of the suppressor design. Moreover, ATL was further tasked to conduct the **performance, endurance, and thermal cycling (PET)** qualification tests.

A hot flow model was fabricated and installed on a T700 engine. More than 60 evaluations were conducted between July 1982 and April 1983. The aerodynamic and heat transfer design characteristics were refined and a workable design was evolved. These hot flow tests provided valuable structural and reliability information that was used in GE's final design of the production suppressors.

The PET evaluations were initiated on a prototype production unit. These tests are being conducted on a special test rig provided by Sikorsky that provides an aircraft engine installation including aircraft inlet and cowling which can simulate aircraft vibrations at various test vibration levels. Upon completion of the PET tests and scheduled flight test, the new BLACK HAWK hover IR suppressor system will be qualified for use in the field.

Laser countermeasures

As the use of lasers in weapon support systems and the potential for tactical laser weapon systems increase rapidly on the modern battlefield, considerable effort is ongoing to provide countermeasures for Army helicopter crews, electro-optics, sensors, and critical components against those laser threats. Protecting the crew from temporary or permanent blindness and thermal injury from a laser encounter presents a formidable technical challenge.

To avoid burdening the crew with cumbersome clothing or eyewear, research efforts at ATL are concentrating on developing improved helicopter transparencies which provide inherent protection from these laser hazards while retaining all the other characteristics, such as good optical properties and the environmental durability necessary for a military helicopter.

Two approaches are being pursued. One involves the temporary use of a laser hard transparency as needed in the field. Another involves laser hard replacement transparencies installed as a retrofit for helicopter canopies. Both concepts are being developed so that several options are available to meet the evolving laser threat. Prototype hardware will be subjected to field evaluation in the near future.

Laser threat analysis

Laser analysis programs have been initiated for all Army attack and utility helicopters. These analysis have defined the threat in terms of attrition and forced landing and potential protection concepts compatible with the aircraft mission and operational environment. Protection concepts range from parasitic barriers for the shielding of critical components to redesign of replacement components to achieve inherent laser-resistance.

Inherent toughness

Effort is underway at ATL to design, fabricate, and test prototype protection systems for the critical components and subsystems to verify both the environmental durability of the protection concepts and their ability to provide laser protection.

NBC protection

The **Nuclear, Biological and Chemical (NBC)** threat to Army Aviators is real and could be encountered in present-day warfare. The chemical threat is of the greatest concern because of chemical agents stockpiled by the Soviets compared with the U.S. stockpile. Soviet military literature indicates that chemical weapons have moved from the category of special weapons to those of a tactical nature. Use of biological and toxin agents is also being reported in countries involving real or surrogate Soviet forces.

ATL, in response to AVRADCOM and DARCOM objectives, has initiated an exploratory development program with the objective of providing hardware systems to demonstrate the feasibility of practical aircraft/aircrew NBC protection. Improvement is required because of the currently inadequate aviator NBC ensemble (bulk, heat stress, flammability, etc.) and the lack of specific airframe protection features in fielded helicopters. A secondary payoff goal is to minimize needs for internal aircraft decontamination.

The ATL aircraft NBC protection program consists of four basic phases:

- Vulnerability assessment of present fleet and new production aircraft.
- Investigation of concepts for NBC protection.
- Detail design and hardware fabrication.
- Feasibility demonstrator tests of concepts.

ATL has completed initial vulnerability tests of the AH-1S and BLACK HAWK helicopters. A comprehensive aircraft operations test in a toxic environment is planned involving all fleet aircraft. In study programs NBC protection concepts have been developed for the AH-1S, OH-58, and AHIP helicopters.

The payoff of this research will serve to provide NBC protection technology which can be inherent to the aircraft itself, which in turn will lessen or minimize the clothing/equipment burden presently imposed on the aircrew as well as system decontamination requirements. Although this work is aimed at future aircraft systems, retrofit and modernization technology spin-offs will enhance NBC protection capabilities of present fleet aircraft.

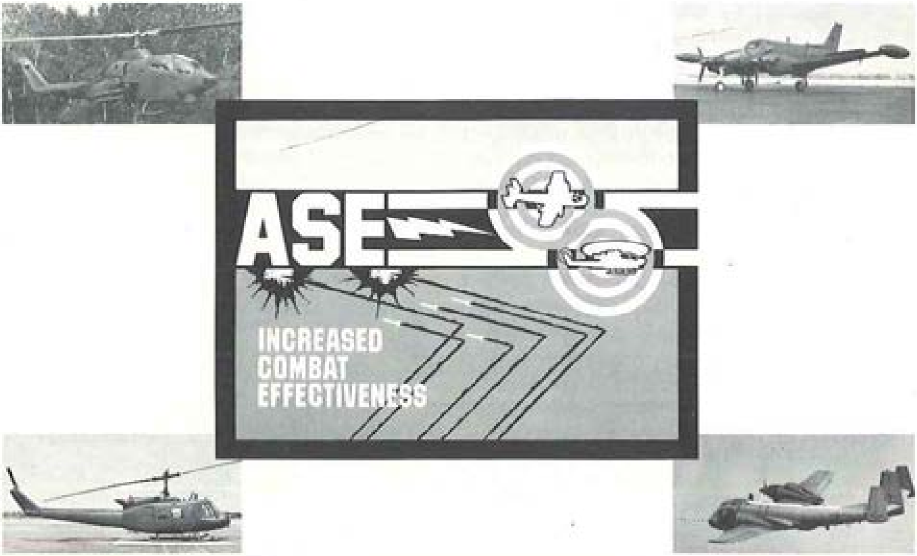
Flight safety and crashworthiness

Although not specifically designated as survivability equipment, concepts developed by ATL which provide crashworthiness and wire strike protection will significantly enhance the survivability of Army helicopters in both training and combat environments.

The benefits of the crashworthy fuel system are illustrated by the fact that thermal fatalities from postcrash fires, which were once a primary cause of Army Aviation deaths, have now become essentially non-existent. With the application of crashworthy landing gear, structure and seats, mission effectiveness can be significantly improved by the reduction of materiel loss, personnel injuries, and fatalities.

A vivid illustration of this is a hypothetical comparison of a UH-1H and a UH-60A impacting the ground at a level attitude with a sink rate of 20 feet per second. In this case the UH-1H would be a total loss with injuries and fatalities likely. For the crashworthy BLACK HAWK there would be no damage or injuries

We are proud to be the System Engineering Contractor supporting the Aircraft Survivability Team



Science Application, Inc. (SAI) is providing system engineering, analysis, and independent evaluation support to the U.S. Army Aircraft Survivability Equipment (ASE) Project Management Office (PMO) in the following areas: (1) Program Definition, Planning, Assessment, and Cost Reduction Analyses; (2) Threat Analysis, Effectiveness Studies, System Requirements, Test Planing and Evaluation, and (3) RSI Planning, Integrated Logistics, Product Assurance, and Production Engineering.

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Inherent toughness

and the aircraft would be mission ready.

Wire strikes have been a serious threat. During the period 1 January 1984 to 1 January 1980, wire strikes accounted for 8% of total Army aircraft damage, 6% of all Army aircraft injuries, and 16% of Army Aviation fatalities. Since many of these mishaps have occurred during training over familiar sites, it can be assumed that the wire impact threat posed by combat operations in unfamiliar areas would result in increased wire strikes.

Since 1977 ATL has been involved in the development of a simple, cost-effective **wire strike protection system (WSPS)** which greatly increases the tolerance of the helicopter to wire strikes. In recent years ATL has conducted verification testing of the OH-58, UH-1, AH-1S and OH-6 WSPS's leading to production contracts for each of these aircraft. WSPS kits are being developed for other helicopters in service as well.

Sustainability

The helicopter is a combat proven machine that has become an integral part of the Army's fighting power. Combat sustainability is essential and survivability against all threats is necessary for the helicopter to do its part. The organization of forces and tactical employment will be strongly influenced or dictated by the ability of organic aviation assets to perform effectively, to survive the hostile environment, and to rapidly reconstitute a fighting capability during and after engagement.

ATL continues to investigate and develop more effective methods for improving combat survivability and sustainability so that Army Aviation can survive on the battlefield. IIIII

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Together, we can find the answers.

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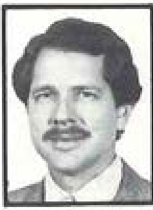

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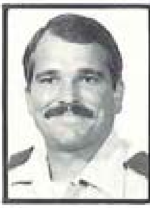

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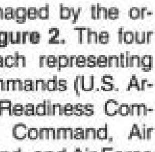
Survivability in the Joint Service Area



By CPT(P) LAWRENCE E. WESSMAN, Joint Technical Coordinating Group for Aircraft Survivability

THE heavy combat losses experienced in Southeast Asia clearly emphasized the need for increased aircraft survivability and improvement in aircraft survivability design criteria for new aircraft.

That such losses occurred in all types of aircraft suggested that survivability was a problem common to each of the services. As survivability developments took place in each of the services, it became apparent that there were many common problems and common solutions, and that coordination was needed to capitalize on facilities and expertise to meet these common problems both effectively and efficiently.

Joint efforts

As part of an overall DOD task to decrease costs and increase effectiveness of research and development efforts, the **Joint Logistics Commanders (JLCs)** established the **Joint Technical Coordinating Group for Aircraft Survivability (JTCG/AS).**

The JTCG/AS was chartered in 1971 as a mechanism to:

- Plan, implement and coordinate joint development and test programs for improved non-nuclear survivability of aeronautical systems,
- Maintain cognizance of survivability programs within DOD, and
- Establish survivability as a design discipline, ensuring that all survivability research and development data and systems criteria are made available to the developers of new aircraft.

In meeting the challenge provided by the Joint Logistics Commanders, the group reviews major survivability impact areas and identifies and fills gaps. Reduced duplication, maximized standardization, and direct benefit to two or more services are baseline criteria for selecting JTCG/AS efforts. From this criteria, the group formulates its Five Year Plan.

Essential dialogue

Essential to attaining the objectives of the plan is a continuous dialogue within DOD, and effective spreading of the survivability discipline through handbooks, information dissemination and training. The JTCG/AS interacts with 30 of the services' technical organizations, four additional agencies, the appropriate headquarters elements, and maintains a broad interface with related segments of the industry (**Figure 1**).

The program is managed by the organization shown in **Figure 2.** The four Principal Members, each representing one of the logistics commands (U.S. Army Development and Readiness Command, Naval Materiel Command, Air Force Systems Command, and Air Force Logistics Command), are empowered to make technical decisions for their respective commanders, and provide general guidance to the JTCG/AS. The Central Office is staffed by representatives of each of the logistics commands.

These representatives are responsible for the day-to-day administration of the program as well as maintaining cognizance over their respective service survivability programs and ensuring that these efforts are considered in formulation of the Joint Program. It is within the functional subgroups that the service engineers gather to discuss common problems and achievements and to suggest areas for joint survivability investigation.

A well-defined discipline

The **Threat Review Advisory Committee** and the **Vulnerability to Directed Energy Weapons Committee** serve in an advisory role to the subgroups and to the Central Office.

The Group's efforts have resulted in an evolution of survivability from a fragmented, underdeveloped technology into a well-defined discipline which is taught in service graduate schools and industry. JTCG/AS products cover the areas of vulnerability reduction and countermeasure techniques, establishment of data bases and analytical tools, coordination of standards and interservice system development agreements, and information dissemination.

The JTCG/AS has conducted extensive research in vulnerability reduction, principally in the areas of flight controls, crew and component protection, and fuel fire reduction. Fire and explosion accounted for over 50% of the combat losses in Southeast Asia, and has concerned the Group since its inception.

Some of the Group's products in this area are the blue foam that is used nearly universally in fighter and attack aircraft fuel tanks, the nitrogen inerting unit for the AH-64, and crashworthy external fuel cell used on H-53 helicopters, powder-packed structural panels to be used around the fuel cell on the AH-1S, and the low flammable hydraulic fluid.

In the area of crew protection, the JTCG/AS is developing armor to meet the increased threat, and has developed the low cost ballistically tolerant crashworthy crew seat selected by the Army and Air Force for use on the BLACK HAWK helicopter. Use of this seat will save the services nearly $20 million over the projected BLACK HAWK buy.

New areas of research

Due to the changing threat and the successful development in the past of vulnerability reduction techniques, the Group has moved on to new areas for present and future research. Considerable effort is being expended in determining to what extent as well as how to protect structures and weapon system sensors from the increasing directed energy weapons threat.

Due to application of previous efforts, power plants have replaced fuel and hydraulic systems as the major vulnerability of combat aircraft. Extensive research has been conducted in learning engine response to damage mechanisms, and work is presently underway on designing a **Full Authority Digital Electronic Control (FADEC)** fuel control to allow a damaged engine to operate under partial power and fly home.

JTCG/AS efforts in the area of analytical tools are directed at the development of standardized methodologies and measures of effectiveness for evaluating aircraft survivability. By developing common data bases and methods, the Group focuses on the need to reach consistant, well founded conclusions in aircraft survivability evaluations. Assessing the benefits of surv-

FIGURE 1

PARTICIPATING ORGANIZATIONS

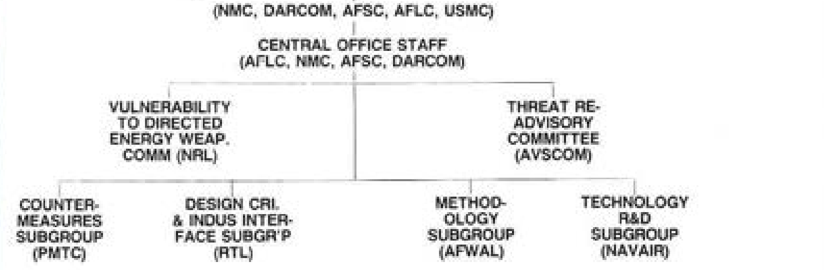
Army: AVSCOM, AMMRC, BRL, FSTC, MIA, RTL/ATL, ERADCOM, AMSAA, NVEOL, EWL, HDL.

Navy: NAVAIR, NAEC, NAPC, NISC, NPS, NRL, NSWC, NWC, NWSC, NADC.

Air Force: ASD, AFALD, AFWAL (Avionics Lab, Propulsion Lab, Flight Dynamics Lab, Materials Lab), AMRL, AFWL, FTD.

NASA, FAA, NATO, DIA.

FIGURE 2 — JTCG/AS PRINCIPAL MEMBERS



ivability enhancements spans a wide range of considerations, including understanding the threat detailed survivability assessments, operational costs/trade-offs, and insights into life-cycle cost implications as they impact mission effectiveness.

The JTCG/AS has been and continues to be actively involved in standardizing the aircraft industry and DOD in survivability matters. The Electronic Warfare Handbook, MIL STD 2069 (Requirements for Aircraft Non-nuclear Survivability Program), MIL HDBK 336 (Survivability, Aircraft, Non-nuclear), and the Joint Infrared Measurements Standards Guide are some of its recent products.

RCS standardization

Presently, the Group is organizing the Radar Cross Section Coordinating Committee in an attempt to standardize RCS measurements so that future data may be universally utilized, thus reducing duplication of effort. Additionally, the Nuclear/Non-Nuclear Interface Committee is being established to discuss common areas of concern between the nuclear and non-nuclear survivability communities.

Several service agreements on development effort have been coordinated through the JTCG/AS, both informally at the engineer level (within the subgroups) and at the level of the **Office of Primary Responsibility (OPR).** An example is the Memorandum of Agreement developed by the Group which left the Army with the responsibility for developing countermeasure equipment for rotary wing and low, slow fixed wing aircraft for use by all the services. It has been through efforts such as these that duplication within the services has been drastically reduced.

Much duplication in research and development comes about because data from previous research is not available or is not formatted conveniently for other researchers. In order to alleviate this problem, the JTCG/AS, along with the JTCG for Munitions Effectiveness, has proposed and is establishing the **'Survivability Information and Analysis Center (SURVIAC)** to be operational in FY 85.

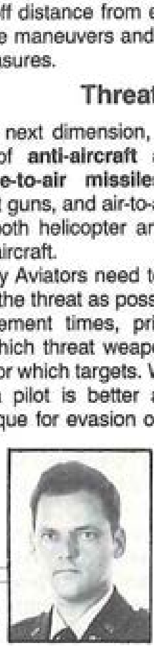
Centralized information

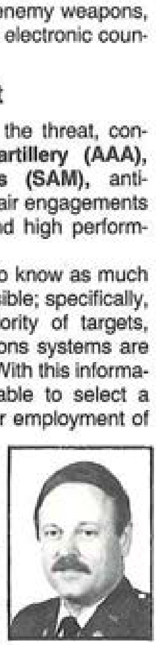
This operation will have the ability to receive and store research data, analyze it, and reduce it to a common formt for use by other researchers. Additionally, the SURVIAC will keep the community abreast of recent developments through newsletters and State of the Art Reviews. The facility will also be able to conduct customer requested analysis, and will serve as a repository for documented survivability models. The overall goal is to develop a single stop shopping center for survivability information.

In summary, the JTCG/AS has been and continues to be a leader in aircraft survivability in the joint services. Through technology gap filling research, coordination and information dissemination, it strives to make DOD aircraft more survivable and thus more able to accomplish the mission. IIIII

The training strategy for ASE

By MAJ PETER M. BARTOSCH, USAAVNC, Ft. Rucker, AL, and
MAJ ALBERT C. LANG, Asst PMO for TNg Devices, PMO-ASE





SINCE the introduction of radar guided weapons during World War II, the U.S. Army has recognized the vulnerability of tactical aircraft to sophisticated air defense weapons. During the war, chaff countermeasures were developed to decoy this threat and protect the aircraft during mission operations.

In Vietnam, with the introduction of the **infrared (IR)** threat missiles, aircrews developed their own techniques for avoidance, or evasion of these threat systems. From all of these early efforts, **nap-of-the-earth (NOE)** flight has evolved as the single most effective measure against all ground-to-air and air-to-air threats.

Despite the effectiveness of NOE, it is important to emphasize the potential of **Aircraft Survivability Equipment (ASE)** to enhance mission operations. No aircraft will be combat effective on the Battlefield 2000 without ASE.

With this fact in mind, an integrated ASE training program is of the utmost importance. To help determine the training strategy for aircraft survivability, a holistic approach must be taken. In understanding this approach, six interacting dimensions must be analyzed. These are mission, threat, technology, airspace, economics, and organizational and administrative.

Mission

Essentially, the two mission profiles to be concerned with are the ground environment, including NOE, contour and low level flight, and the **Special Electronic Mission Aircraft (SEMA)** environment, which includes everything above low level altitudes. The distinguishing parameter between the two regimes is the methods of detection, avoidance, and countermeasures.

The ground environment relies on concealment and cover to avoid detection. Enroute avoidance of the threat involves an evasive maneuver that seeks cover and/or concealment. On arriving at the battle position, the requirement changes for scout and attack aircraft. Their close proximity to the enemy makes them very vulnerable to detection by enemy anti-aircraft systems. This mission is further complicated by the requirement to uncover in order to fire missiles or designate targets for beam riding or wire guided ordinance.

SEMA has an even tougher job in trying to avoid detection. They must rely on standoff distance from enemy weapons, evasive maneuvers and electronic countermeasures.

Threat

The next dimension, the threat, consists of **anti-aircraft artillery (AAA), surface-to-air missiles (SAM),** anti-aircraft guns, and air-to-air engagements from both helicopter and high performance aircraft.

Army Aviators need to know as much about the threat as possible; specifically, engagement times, priority of targets, and which threat weapons systems are used for which targets. With this information, a pilot is better able to select a technique for evasion or employment of his on-board countermeasure systems.

Technology

Survivability technology involves paint and suppressors to hide the aircraft's signature, detectors to alert the crews to the threat, jammers to defeat, decoys to confuse, ba' stic hardening to continue operating, and crashworthiness in case of all the above fail.

Airspace

Airspace is a difficult dimension to analyze. With the proliferation of missiles, artillery, aircraft, aerial mines, and other debris in the air, survivability depends to a great deal upon the airspace management plan and the procedures developed from it. This not only affects "above low level" aircraft which fly in the middle of the confusion, but also the ground environment aviators which must call in artillery, naval gunfire or attack aircraft in support.

Economics

The economics dimension is simply: "Developing a consciousness about the system." Aircraft survivability is a subsystem of aircraft, just as weapons, navigation, communications, training devices, etc. It makes no sense to consider ASE as a separate entity.

Organiz'l and administration

Finally, the organizational and administration procedures to handle the other dimensions listed above must be considered. As can be seen, there is a significant training development project that must be undertaken. Fortunately, the **instructional systems development (ISD)** process is in place to handle this.

This, however, is an ongoing process. The threat will not remain stagnant, nor will the development of new procedures and hardware to counter the threat.

To meet the objectives outlined in the dimensions above, we must:

- Capture present knowledge on threat and current capabilities of aircraft to devise a survivability doctrine.
- Incorporate training devices development in with **electronic countermeasures (ECM)** and **electronic counter-countermeasures (ECCM)** equipment development.
- Test all aircraft with a full up ASE suite against threat simulators to verify or define empirical data.
- Incorporate ASE as a subsystem of survivability for future aircraft such as **Light Helicopter Experimental (LHX).**
- Develop training programs commensurate with the above milestones, and incorporate in **New Equipment Training (NET), Displaced Equipment Training (DTT),** and **New Material Introduction Briefing Team (NMIBT).**

To meet some of these objectives, the ASE-PM, in coordination with the TRADOC community, has established a three level approach in training devices. The first is the **ASE table top part task trainer (ASET);** the second is the inflight threat emitter training device; and the third is a ground threat emitter training device.

ASE ASET

The growing complexity of ASE systems and the requirement for training cannot be supported with the limited field, threat training simulators, and available flight hours. ASET will develop aviator and crew member understanding and confidence in the operation and utilization of ASE. It will also maximize effectiveness of the limited and critical flight training time available.

An ASE ASET, employing computer aided instruction and interactive video disk technology, will be developed to train aviators in the operation and use of ASE. ASET will employ a tutorial mode and then a flight/gaming mode and each will include training and test lessons.

ABOVE THE BEST!

FT. RUCKER, AL—COL Thomas L. Berta, r., Deputy Army Aviation Officer and Asst for Force Development, OACSFOR, DA, talks with WO1 Martin H. Pargee, l., and 2LT Paul R. Scroggins, center, the Distinguished Graduates of the two flight classes that graduated USAAVNC on Oct. 5. As guest speaker, Berta emphasized that as new graduates they must stay abreast of all of the new sophisticated equipment currently being developed for aircraft.

In tutorial training mode, the student will be tested through the use of a survey test. Then a prescribed lesson syllabus will be designed to meet the individual's training needs. It then presents the material comprising the first lesson and tests the student's comprehension. If he fails the test, he is given a remedial lesson and tested again. If he passes, he is presented with the next lesson.

Tutorial testing mode is accomplished by using multiple choice questions. The system will test the student's knowledge of basic radar operating principles, operation of ASE equipment, threat and target capabilities, and tactics. The student is scored at the end of the test and must attain a minimum score before the computer will permit him to advance.

Practical application

The flight/gaming mode is designed to allow the student to practice the application of knowledge and tactics learned from the tutorial mode. The student practices countering threats while flying to, engaging with, and returning from his target. The student flies his trainer through a simulated scene generated by the computer.

Both high altitude (20,000-30,000 ft) and low altitude NOE scene generation will be required because of the fundamental differences between the mission profiles of our SEMA (high altitude) and our helicopters (NOE).

In the flight training mode the student will be confronted with various in-flight decisions. If he makes an incorrect decision the program will be interrupted and will branch to a tutor program, and will then be restarted at a point before the original incorrect decision was made. The student will thus be given a second chance to make the a correct decision.

At the end of the flight the student will be given an overall rating and critique of his performance. As the student gains experience, the scenario will become more difficult with the number of threats and their level of intelligence increasing.

In the flight test mode the student will fly a distinctly different mission than those used in the flight training mode. In this mode, however, the mission is flown until it is either terminated by completion or ended with the aircraft's destruction. No feedback will be provided to the pilot until one of these two terminators has occurred. The pilot will then be scored and provided with a critique of his entire performance.

In-flight training office

The in-flight training device is one that will be used to train individual crews on interpolating the aircraft's APR-39 **radar warning receiver (RWR)** indications and to employing the correct maneuver or countermeasure required as a result of the signal presented on the RWR.

As envisioned, this device will be a unit that will not require any additional wiring on the aircraft, but the present RWR processor will simply be exchanged for the in-flight device. Activation of the in-flight device will be accomplished by controls on the control head of the RWR.

Ground threat emitter

The lightweight **Tactical Radar Threat Generator (TRTG)** is designed to train Army aircrews in a realistic hostile electronic warfare environment. The aviator must intepret the aircraft RWR information and execute prescribed procedures during the performance of tactical operations as a part of unit training.

The TRTG emits radar signals that simulate signals emitted by anti-aircraft gun laying radars and surface-to-air missile target training radars. It is capable of detecting, acquiring, and tracking aircraft in a manner similar to the threat radar, and displaying it on a video monitor; integrating the radar and optics information and displaying it on a video monitor; and optic-only tracking with radar ranging.

The command radio set is incorporated into the system, and when recorded on video tape, together with the radar and TV video, can be used to debrief air crews on their performance.

The entire TRTG is mounted within a modified S-250/G shelter with the exception of the monitor-generator, which is skid-mounted and can be carried on the prime mover or a separate trailer.

High threat survival

To survive in the high threat environment of today's modern battlefield, the Army Aviator must be properly trained to meet the wide variety of threats he will face to successfully complete his mission.

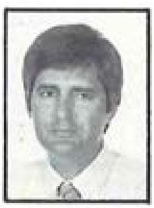
Training devices, such as the ones discussed above, will provide some of the required skills that will insure that Army Aviation will be a Force Multiplier on today's battlefield and the battlefield of the future. IIIII

THREAT SYSTEM IMPROVEMENTS

SYSTEMS	RADAR	INFRARED	ELECTRO-OPTICAL
WARNING	MILLIMETER WAVE COVERAGE	SOPHISTICATED MISSILE PROCESSING; CCM TECHNIQUES HIGH OUTPUT/ EFFICIENT SOURCES	COMPLEX BATTLEFIELD CLUTTER; DISCRIMINATION TECHNIQUES
JAMMING	COUNTER MONOPULSE	BATTLEFIELD ENVIRONMENT; MISSILE SIGNATURES; ATMOSPHERICS	CCM TECHNIQUES; SIGNATURE; MULTI-WAVELENGTH SOURCES
DECOYS	WIDEBAND & EFFICIENT TWTS; IMPROVE DECOY EFFICIENCY/ SIZE EFFECTIVE DECOY DEPLOYMENT	SENSOR DEVELOPMENTS	SENSOR DETECTORS; POINTING & TRACKING DECOY DEPLOYMENT

The program for IR/EO Countermeasures

By DOUGLAS DUNLAP, Asst Project Manager for Electro-Optical Countermeasures, PM-ASE, St. Louis, MO



IN discussing the visible and infrared portion of the electromagnetic spectrum, it is convenient to distinguish between the two basic types of sensors that operate in this region, optical and electro-optical.

Optical devices are defined as visual imaging systems. An optical device senses or transmits radiation from .4 to .7 microns in the electromagnetic spectrum. **Electro-optical systems** are those which employ electronic means to amplify or emit radiation.

Optical systems include the unaided eye, binoculars, and telescopes. These optical devices may be relatively simple in the case of the eye, or may be quite complex and use high magnification, stablized optics, or fiber optics to relay and display the image. Some optical systems are also called direct-view systems when the image is viewed directly through a lens or series of lenses.

Electro-optical systems are even more varied in operation. An electro-optical system may detect a scene in one wavelength band and display it in the visual band. These devices are sometimes called image converters or remote view devices because the image is not directly viewed. The electro-optical devices discussed in this article are limited to those that operate between .4 and 12 microns.

An example of an imaging electro-optical device would be a FLIR. The term **FLIR** is an acronym for **Forward Looking Infrared,** but has now become synonymous with **Infrared (IR)** imaging systems. The FLIR converts heat (or thermal radiation given off by all objects above absolute zero (-273°C), to a visual display, typically a **cathode ray tube (CRT)** or **light emitting diode (LED)** display.

Generally FLIR's operate in the 3 to 5 or 8 to 12 micron band. These wavelength bands are limited by a combination of detector sensitivity and atmospheric attenuation. Some electro-optical systems, such as television, operate in the visual spectrum.

Other systems

Other electro-optical systems do not image a scene but act as seekers for missiles. These seekers provide the guidance commands to the missile by tracking the target. Seekers may operate anywhere in the .4 to 12 micron band. Lasers are another type of electro-optical device which are becoming increasingly common on the battlefield as range finders or designators and as transmitters for missile beam riders.

The goal of the ASE PMO is to develop and field countermeasures for optical and electro-optical threats. This task is very complex because, as discussed above, there are many variations of optical and electro-optical systems to countermeasure. In addition to the differences noted above, some electro-optical systems are characterized as being active because they transmit radiation and others are passive because they only collect radiation. **Passive devices** are much more difficult to detect because they are fundamentally covert.

Passive electro-optical devices fall into two main types, those that detect reflected energy and those that detect radiation emitted from the object itself. In order for the eye, low light level television, or image intensifiers to detect objects, some form of external radiation must illuminate and reflect off the object. The external radiation can be from the sun, moon, stars, sky, or even other sources.

FLIR systems, however, detect the thermal radiation emitted from the object itself. For example, the human body radiates infrared radiation between 4 and 20 microns with a peak response at about 9.2 microns. This radiation is termed the far-infrared or far-IR.

As an object heats up to about 500ºC, it becomes incandescent and will appear to glow red. This type of radiation, most of which is beyond the red sensitivity of the eye, is termed the near-infrared or near-IR.

A turbine engine can produce significant radiation in the near-infrared due to heating of the metal exhaust components. Thus, a helicopter is detectable by the radiation it reflects or emits from .4 to 12 microns in the optical and electro-optical wavelength bands.

Active and passive responses

The countermeasures that this office has developed for optical or electro-optical threats cover the same wavelength bands as the threat. Some of the countermeasures are passive, like paint; some systems are active, like the AN/ALQ-144 which transmits infrared energy. Others are warning systems which warn of being tracked by passive optical or electro-optical systems. Still others warn of being lased or warn of an approaching missile. Some of these countermeasures are discussed below.

The paint that is applied to most Army aircraft has a very dark green, almost black appearance. Its spectral reflectance is very low from the visible to the near-infrared. The dark green color was chosen to provide a low visual contrast to green vegetation.

Green vegetation, because of the chlorophyll it contains, becomes highly reflective at the near-infrared wavelengths. However, the reflectance of the green paint is designed to be low in the near-infrared region. This is to reduce solar glint signature.

The sun is a powerful source of radiation even in the near-infrared wavelength region and this is where some threats operate. To reduce the glint to even lower levels, the surface is made very rough, which is the reason for its sandpaper texture. The dark green paint is sometimes referred to as "IR paint"; however, it should be more accurately described as low near-infrared reflectance paint.

Suppressing IR signatures

Another method of reducing the electro-optical signature of aircraft is by suppressing the infrared signature of the engine. The first suppressor developed was known as the "Bell scoop." This was a very simple device that bolted onto the exhaust of the turbine engine and shielded the hot exhaust pipe from view. Although this device was proven effective, it did not cool the exhaust gases.

Current suppressors not only shield the hot metal components, but also cool the exhaust gas. These suppressors are called **hot metal plus plume (HMPP)** suppressors. They work by mixing cool ambient air with the exhaust gas. This reduces the temperature of the exhaust significantly with only a small performance penalty.

Another tactic useful in countering infrared missiles is to fly **Nap-of-the-Earth (NOE).** Objects on the ground, either man-made or natural, provide background clutter which has the effect of reducing the sensitivity of the infrared missile. This tactic also has the advantage of degrading threat radar system performance for basically the same reason.

The combination of low infrared reflectance paint and a HMPP suppressor reduces the near infrared signature to very low levels for most aircraft. However, some missiles are still sensitive enough to detect and track some of the larger aircraft. For these aircraft additional protection is required. The protection is provided by AN/ALQ-144 infrared countermeasure system. This system operates by confusing the threat missile seeker and driving it off course.

Missiles and lasers

Another method of countering infrared missiles is to use a missile warning receiver to sense the approach of a missile and then to dispense a flare to decoy the missile away from the aircraft. The flare emits infrared energy as well as visible energy which is more intense than that of the aircraft.

The AN/ALQ-156 is a warning system which detects the threat and automatically deploys flares from the M-130 flare dispenser.

Lasers are used on the battlefield as range finders and designators, and to transmit guidance commands for beam rider missiles. To counter this threat, the AN/AVR-2 was developed. This simple, lightweight device warns the aircrew that they are being engaged by a laser directed weapon. These weapons tend to be point weapons of high accuracy. Therefore, when a laser warning is given, the aircrew must take immediate evasive action to degrade the accuracy of the aimpoint.

Conclusion

In conclusion, optical and electro-optical threats present a real challenge to countermeasure because of their many operational modes, and the many techniques necessary to counter these threats themselves. Sometimes the response is simple, such as with paint; and sometimes the response is quite involved as with a missile warning receiver. IIIII

Boeing Vertol awarded third CH-47 Mod Program production contract

The Boeing Vertol Company has been awarded a third follow-on production contract for the CH-47 Modernization Program. The $257.3 million Fiscal Year 1983 contract was awarded September 30 by the USA Aviation Research and Development Command of St. Louis, MO.

The contract provides for the modernization of 24 early model CH-47s to the advanced CH-47D configuration and increases production from the current rate of two per month to three by October, 1984. In addition, funding is included for the purchase of long-lead time materials to modernize 36 CH-47s in FY 84 and 48 in FY 85.

"The on-cost and on-schedule record we've compiled over seven years and through an expenditure of $305 million on the CH-47 Modernization Program is exemplary. This is a tribute to the organizations and people involved . . . to the U.S. Army, as well as Boeing Vertol and its nationwide network of suppliers," said **William P. Jones**, Boeing Vertol's Director of Helicopter Programs.

"The awarding of this contract also parallels the outstanding initial performance of the CH-47Ds now in service with the 101st Airborne Division at Fort Campbell, KY. In their first six months of service, these CH-47Ds became the first Army helicopter fleet ever to achieve an initial 87% availability rate, compared with the Army's standard of 70%. This is a reflection of the 100% fielding support provided by the Army's CH-47 Modernization Project Office," said **Jones**.

Boeing Vertol is scheduled to deliver the first of these 24 aircraft to the Army in March, 1984 with deliveries continuing through January, 1985. At present, the Army has accepted 18 CH-47Ds with the majority in service with the 101st Airborne (Air Assault) Division, as part of the nation's Rapid Deployment Force. The Army's current plan is to modernize 436 CH-47s at Boeing Vertol through the early 1990s.

LOST & FOUND

THE LEIGH CRASH POSITION INDICATOR

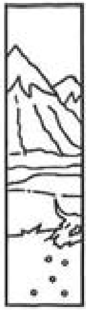
DEPLOYABLE

If an aircraft crashes on land or water, sensors immediately deploy the Crash Position Indicator (CPI) which contains the distress radio beacon.

SURVIVABLE

The beacon, which has a protective foam casing, is propelled clear of crash effects to insure its survivability.

LOCATABLE



Once deployed, the radio beacon begins to transmit an omnidirectional signal that enables search aircraft to locate the crash area.

LEIGH

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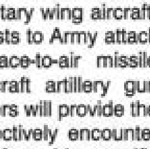
2680 Queensview Drive Ottawa, Ontario, Canada K2B 8J9
Tel: (613) 820-9720 Telex: 053-4129

Tony Bockman, Marketing Manager

THE DEPLOYABLE CPI SYSTEM

Countering the radar threat . .

By RAYMOND O. OPLAND, Assistant Project Manager for Radar, PM-Aircraft Survivability Equipment, St. Louis, MO



IDENTIFYING and countering the radar threat in an electronic environment is a constant, never ending challenge. With newly developed electronic components entering the market daily, new techniques are generated that can be integrated into various systems making their response more effective against the threat. Also, through software programming of data modules, equipment can be built to be more effective against a variety of threats without changing the basic hardware.

Looking at a typical radar, there are a number of ASE threat interactions which take place. First, against a threat operating in a pure radar mode, an aircraft operating at **nap-of-the-earth (NOE)** is a difficult target to pick out from the clutter. This, of course, assumes that line-of-sight exists which might not always be the case not only because of tactics such as NOE, but because the threat weapon system itself must maintain some degree of concealment for self-protection.

Early warning

The **radar warning receiver (RWR)** is capable of detecting the search radars of the air defense systems and alerting the pilot to the presence of the threat system before the threat operator is aware of the aircraft. Again, careful selection of the firing locations together with the knowledge of the relative position of the threat may allow the pilot to engage the enemy and never establish line-of-sight to the threat.

In the event the radar system is able to acquire and track the target, the pilot again has several options, all of which degrade the effectiveness of the threat weapons. The pilot may remask and choose to move his firing location to a more favorable one or move to engage other targets outside of the lethal zone of the threat.

Chaff and jammers

If active countermeasures are available, such as chaff or a radar jammer, these may be employed to decoy the tracking radar. The chaff affords the aircraft time to remask while the jammer may be employed to allow the aircraft to continue the engagement to a successful conclusion before remasking.

Radar jammers like the AN/ALQ-136 and AN/ALQ-162 must have reliable performance in the expected tactical environment. This environment necessitates NOE flying for rotary wing aircraft. A significant threat exists to Army attack helicopters from surface-to-air missile systems and anti-aircraft artillery gun systems. Radar jammers will provide the pilot the ability to effectively encounter threat radars and perform his specific mission.

There are currently several different versions of the AN/ALQ-136 system. Each version is designated for a specific aircraft application whether it's for a rotary or fixed wing aircraft.

For example, the (V)1 jammer that's currently in production will be installed on the AH-1S COBRA. It consists of a receiver/transmitter, control unit and two antennas. Total system weight is only 43 lbs. and requires no more than 644 watts of aircraft electrical power.

The AN/ALQ-162(V)2 will provide automatic detection, threat warning, and active jamming of hostile **continuous wave (CW)** type radars. This equipment provides protection for **Special Electronic Mission Aircraft (SEMA).**

The AN/ALQ-156 Missile Detector System is a pulse doppler warning radar that detects small missiles with sufficient warning time to automatically initiate successful countermeasure flare/chaff decoys from the M-130 dispenser. The M-130 dispenser can be operated manually if the pilot so chooses.

The AN/ALQ-156 offers a cost effective solution to protecting helicopters and fixed wing aircraft in a multi-threat battlefield environment. This equipment will operate in an all clutter environment from NOE through the operational ceiling of the aircraft.

Product improvements

Current development programs now underway have **pre-planned product improvements (PPI)** efforts incorporated into the hardware. When planned equipment improvements have been developed and their techniques proven to the Government's satisfaction, they can be connected to the receiver/transmitter unit by simply plugging it to an existing connector.

These improved equipments are now in the feasibility demonstration phase and will cover the other regions of the frequency spectrum, expand digital RF memory, and degrade or defeat more sophisticated type radar threats.

Intelligence information from various organizations, such as the **Foreign Intelligence Office (FIO), Defense Intelligence Agency (DIA), Joint Technical Coordinating Groups (JTCG),** etc. keep the ASE office well informed as to the nature of current and postulated threats.

TOP NCO AND SOLDIER

ABOVE: SSG George A. Coe, left, receives the AAAA Certificate of Accomplishment from SFC William C. Hawkins, recognizing his selection as Ft. Rucker's "NCO of the Month" for September. Hawkins, the Aviation Center Chapter's VP, Programs, presented the award to the member of Co C, 509th Inf.

BELOW: SP4 Michael A. Murray, left, Ft. Rucker's "Soldier of the Month" for September, is shown receiving an AAAA Certificate of Accomplishment from SFC Hawkins at Sept. 26 ceremonies. Murray is also a member of Co C, 509th Inf.

In conclusion, countering the radar threat is not focusing only on the performance of one piece of ASE but the design of the various passive and active countermeasures systems are intended to complement one another.

In addition, great care must be taken when reviewing data from a test in which a single system was evaluated. There must be a clear understanding as to what mode of threat the system was being assessed against, the true meaning of the data, and the issues the test was addressing.

Another conclusion to be drawn relates to the duration during which ASE must accomplish its goal of degrading or completely defeating the weapon effectiveness. Degrading need only occur for a short period of time in order to achieve the desired overall effect of timeline extension. IIIII

Integrated ASE: The Grand Update

By FRANK A. REED, Chief Technical Management Division, PMO-Aircraft Survivability Equipment, St. Louis, MO

IN the last ASE issue we discussed several of the very important guidelines that, taken together, form the management philosophy of the **Aircraft Survivability Equipment (ASE)** program.

Two of the most important of these integrated concepts are:

"Keep it simple" and **"Update where possible!"**

In discussing these concepts, the provoking idea of **perceived** versus **real combat capability** was reviewed relative to the ASE program. The good news was that ASE is now being fielded in quantities large enough to thrust Army Aviation into the modern age of electronic warfare where it can reap the benefits of ASE Force Multiplication.

The sad news was that the Army moves slowly in that even with the equipment fielded, tactical training in using it lags. This barrier too, however, is being erroded because ASE is no longer just a promise; it is here and real with an aggressive program to keep it effective against the evolving threat . . . And this brings us to the topic of **"The Grand Update."**

Update what we have

Normally, when integrated systems are proposed, the primary reason for integration is to reduce cost, weight, space and power; that is, a new system evolves which does the job of the previous many in a smaller package. But for ASE, the goal is different. The synergistic effectiveness of the various ASE items making up a specific aircraft suite has long been known. Prior to this time, however, the ASE items have been in different states of development.

Only recently have we been able to discuss ASE "systems" as they relate to specific aircraft and their threat. But now, based on the maturity of the program, we can point to ASE systems and how "making them talk" to each other will result in greater effectiveness.

Unfortunately, the near term goal cannot be: **"Go for that smaller more efficient system that does more!"** The very real constraints on investment, considering both human and fiscal resources, force the near term goal to be: **"Update what we have."**

One of the best features of the ASE program is the planning that has been accomplished to eliminate technological obsolescence over the near to mid-term such that updating can work.

Benefits of integration

One very important update is to integrate the ASE items. This will produce the following results:

- Enhanced synergistic countermeasure effectiveness of the ASE items.
- Redundant countermeasure capability given a specific ASE item failure during a mission.
- Reduced pilot workload due to an integrated ASE "smart" display.
- Automatic flight line and airborne check-out of the "system" to insure on-line status.

Based on these payoffs, the value of integrating is obvious. To show that it is also within the reach of our "update" resources, let's look at what a hypothetical system would consist of.

As shown in **Figure 1,** the ASE suite consists of the following ASE items (this suite is only an example to illustrate the point):

AN/APR-39(V)2 **Radar Warning Receiver (RWR),** AN/ALQ-156(V)2 **Missile Detector (MD),** M-130 **Expendable Dispenser (EXPD),** Chaff, Flare and RF Expendables, and AN/ALQ-XXX **ASE Integrator (ASEI).**

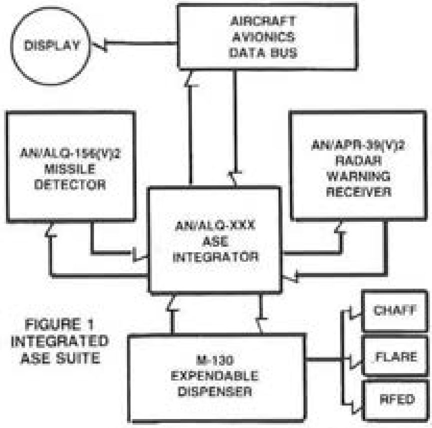


FIGURE 1
INTEGRATED ASE SUITE

A typical mission

The mission for the day (an electronic recon mission) starts by plugging the integrated ASE automatic flight line test set into its ASE system recepticle on the side of the OV-1D. The flight line test set interrogates the AN/ALQ-XXX ASEI; which quickly determines the status of each of the ASE items.

The AN/ALQ-XXX is, in this example, a central processing unit (a smart computer) connected to each ASE item and the cockpit by a high speed digital data bus. Given a green status, the mission continues to checkpoint delta bravo where a climb to data altitude puts the aircraft in contact with the threat and its targets.

Ten minutes into the mission, the AN/APR-39(V)2 RWR sends digital data to the AN/ALQ-XXX ASEI that it's being scanned by the acquisition radar of a long range threat missile system. For the time being, this data is stored in the ASEI's memory. When the missile radar jumps to acquisition followed by track, the RWR processes the radar signals, identifies the threat and passes the information to the ASEI.

In response, the ASEI performs the following functions:

- Sends message to integrated ASE display to alert crew to threat status.
- Sends message to M-130 system to set for dispense of the RF expendable.
- Sends message to AN/ALQ-156 (V)2 MD to adjust warning time for optimum dispense of the RF expendable.
- Monitors all systems for return messages that commands have been accomplished and status is operational.
- Sends message to integrated ASE display to notify the crew that the integrated ASE system is ready to counter the threat should a missile be fired.

If the pilot blinked, the time from the first threat alert to the ASE system ready notice would have elapsed. Notice that the AN/ALQ-156(V)2 MD was able to be set-up based on information from the RWR along with the M-130. Missile decoy would have been automatic!

But is it affordable?

We think so because it is connecting the ASE items together by a smart computer that can be taught when it needs to be. That's not a big job considering that the ASE items are available.

All of the ASE items noted above have been or are being integrated into the OV-1D right now along with other systems with the exception of the AN/ALQ-XXX ASEI system.

So what are we waiting for? Let's get going on "**the Grand Update**" — Integrating the ASE! If you like the idea, join the ASE team and drop us a line. We need all the help and support we can get to make Army Aviation the most effective combat force today and tomorrow. IIIII

Applicants for 1984 Scholarship Assistance sought by the AAAA

$6,000 Available for 1984 College-Entry Applicants

The AAAA Scholarship Foundation, a separate non-profit educational activity created to provide scholarship aid the sons and daughters of AAAA members and deceased members, announces the availability of $6,000 in assistance funds for the 1984 college-entry year.

Award Philosophy

Operating on the premise that ample scholarship assistance is available to those in need, the AAAA National Scholarships are awarded primarily on the basis of academic merit and personal achelvement. The AAAA seeks to honor those outstanding students whose well-rounded secondary school activities indicate solid career potential.

Application Procedure

Student-applicants are asked to request the appropriate application forms by writing to the AAAA Scholarhip Foundation at 1 Crestwood Road, Westport, CT 06880. Requests for applications must be received on or before December 15. All forms, together with other supporting data, must be returned to the Foundation on or before January 21 to receive Awards Committee consideration. The student-prepared application should state the full name of the applicant's parent-member and address of student if different.

Eligibility Criteria

The AAAA applicant must also be: (1) unmarried and a citizen of the United States; (2) a high school senior who has applied to an accredited college or university for Fall, 1984 entry as a freshman; (3) program participation is limited to the children of members with an effective date of membership on or before March 31.

Selection and Notification

Selection of winners will be made by the 20-member AAAA National Awards Committee during the 15-28 February period with each applicant to receive a list of the winners not later than 1 April.

Overall Supervision

The 13-member AAAA Scholarship Foundation, Inc., Board of Governors includes Bryce Wilson, Glenbrook, NV; MG John L. Klingenhagen, Ret., Alexandria, VA; COL Rudolph D. Descoteau, Ret., Alexandria, VA; Arthur H. Kesten, Westport, CT; Donald F. Luce, Bridgeton, MO; Mrs. William B. Bunker, McLean, VA; CW4 Elmer M. Cook, Ret., Alexandria, VA; Paul L. Hendrickson, Ferguson, MO; MAJ Linda M. Horan, Leavenworth, KS; COL Nelson A. Mahone, Jr., Ret., Panama City, FL; COL John W. Marr, Ret., Arlington, VA; Frank N. Piasecki, Philadelphia, PA; and Richard S. Steele, Freehold, NJ.

ARMY AVIATION ASSOCIATION

Application Form

....

**Applicant's Name (Please Print)

....

Street

....

City State ZIP

....

*Parent's Name Rank/Grade (If applicable)

....

Residence Phone Number

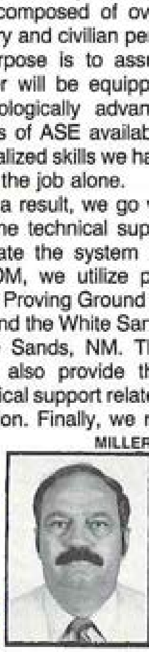
*Program participation is limited to the children of those members who have an effective date of membership on or before 31 March.

**Return application on or before 15 December to: AAAA Scholarship Foundation, Inc., 1 Crestwood Road, Westport, Conn. 06880

**SAT, test scores, senior year mid-term grades, and all other data must be received not later than 21 January.

ASE development testing

By COL WILLIAM B. WOODSON, ROY L. MILLER, and CHARLES A. BLOCK, Avn Development Test Activity, Ft. Rucker, AL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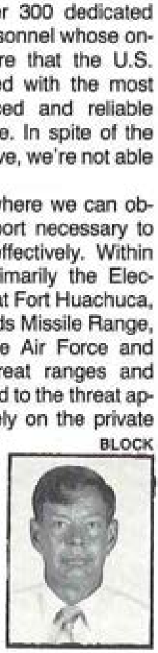
BLOCK

THE **U.S. Army Aviation Development Test Activity (USAAVNDTA)** at Fort Rucker, AL, acts on behalf of the **U.S. Army Test and Evaluation Command (TECOM),** Aberdeen Proving Ground, MD, for the management of **development testing (DT)** of **Aircraft Survivability Equipment (ASE).**

Does it work?

TECOM is the agency charged with the primary responsibility for DT testing within the Army. DT testing is conducted on ASE systems to demonstrate that the engineering design and development process is complete; the design risks have been minimized; and the system will meet specifications, and to estimate the system's utility.

What this boils down to is that we determine whether the system does what the manufacturer claims it will do.

The USAAVNDTA has been testing ASE for a number of years; however, most of the testing has involved individual items on a variety of different aircraft. The items tested included radar and infrared jammers, infrared suppressor, radar and laser warning receivers, and low reflectivity paint. All of these items were individually tested under controlled and repeatable conditions.

Controllability and repeatability are two of the hallmarks of developmental testing. While the operational tester looks to see if the item can be used by the field soldier, the developmental tester deals with laboratory type experiments that are executed under controlled and repeatable conditions. Therein lies the major difference between the two types of tests.

Who does the job?

Although the "Activity," as USAAVNDTA is affectionately referred to, performs a variety of testing, we focus on several distinct areas. These are systems performance and integration, reliability, logistics supportability, human factors, and safety.

Each of these areas requires a specialized discipline, but each area also impinges on the other. For example, human factors testing focuses on the man-machine interface problems which are encountered in performance testing, logistics supportability, and systems, integration testing. This requires a specialized but multi-disciplined work force.

The "Activity" has such a work force. It is composed of over 300 dedicated military and civilian personnel whose only purpose is to assure that the U.S. soldier will be equipped with the most technologically advanced and reliable pieces of ASE available. In spite of the specialized skills we have, we're not able to do the job alone.

As a result, we go where we can obtain the technical support necessary to evaluate the system effectively. Within TECOM, we utilize primarily the Electronic Proving Ground at Fort Huachuca, AZ, and the White Sands Missile Range, White Sands, NM. The Air Force and Navy also provide threat ranges and technical support related to the threat application. Finally, we rely on the private sector to fill the gap and augment our in-house capabilities.

Fortunately, we possess most of the skills required and the majority of our ASE testing is conducted in the Fort Rucker area where we can also get help from the U.S. Army Aviation Center's expertise. The Center activities that provide most of the assistance are the U.S. Army Safety Center, the U.S. Army Aeromedical Laboratory, and the U.S. Army Research Institute, as well as the combat development elements of the Aviation Center.

How DT is accomplished

There are no set rules as to how or when the "Activity" gets involved in the testing of a piece of ASE. Our involvement varies from a quick technical feasibility assessment to full blown production qualification tests. The one thing the two tests have in common is that all of our testing, in effect, is directed by TECOM Headquarters. They prioritize and assign testing on the basis of the user's urgency for the system as well as the "Activity's" workload.

After the customer has sent his request to TECOM, it is translated into a test directive that we are given to plan, execute, and report upon. Oftentimes, the details are sketchy, and require our project officers and test coordinators to exercise their imaginations and technical skills to the utmost. Although ASE testing fits into neat categories such as a technical feasibility, product improvement, or development test, no two tests are alike. The fact provides a continuing challenge to the Activity's personnel.

The ASE suite

All of the "Activity's" previous testing involved a single item of ASE. Let's take a look at the testing that preceded the ASE suite that we're now testing. We started with the test of a radar warning receiver that allows the pilot to know when the aircraft is being followed by a hostile radar. This informs the pilot he has a problem, but doesn't do much to help him.

Now if we were to build and test a chaff dispenser that will emit chaff and confuse the hostile radar and combine it with the radar warning receiver, we would have a hostile radar protection system.

Similarly, we tested a flare dispenser and infrared radar jammer to defeat infrared guided weapons. This, combined with other devices that reduce the total IR signature of the aircraft, improved the survivability of the pilot and crew when operating against a threat that contains IR guided weapons.

We're also faced with weapons that are laser-guided as well as weapons systems that use laser range finders. To counter this threat, we tested a laser warning receiver.

Each of the above systems functioned very well individually, but will they operate together as a system or will one interfere with the other?

To answer this question, we put them all on an AH-1S aircraft and will test them as a full system.

Cobra test suite

Let's discuss the specifics of the ASE suite for the AH-1S (Mod). The system is composed of a radar warning system (APR-39(V)). The unit is designed to warn flight crews they're being tracked by threat radar. To counter this threat radar, we have the AN/ALQ-136 radar jammer system.

Another system is the AN/ALQ-144(V) infrared jammer which is a self-contained system requiring only 28 volts aircraft power to operate.

The counter-attack to missiles is the M-130 Aircraft General Purpose Dispenser which is designed to dispense either IR decoy flares or chaff flares. The system is common to all Army aircraft

and provides effective survival countermeasures against radar-guided weapon systems and/or infrared seeking missile threats.

The ASE suite also consists of three passive systems. One is a **Hot Metal Plume Suppressor** which reduces the infrared signature from visible hot metal surfaces by eliminating line-of-sight detection and by cooling the metal surfaces. Secondly, this particular AH-1S is **painted** a desert sand color with a low level infrared paint, which is also designed to reduce the infrared signature of the aircraft.

Finally, the helicopter has a **flat plate canopy** designed to reduce solar glint, which will reduce the susceptibility of the aircraft to ground observation.

Compatability

This test has been labeled a "Logistics Evaluation Test of the ASE Suite." The official objective of this six-month effort is to, first, assess the electromagnetic compatibility between all aircraft systems and structures and the ASE system, as well as the electromagnetic compatibility between the mutual ASE systems, to include any developmental system (such as the laser warning receiver) which might be installed in the test bed aircraft.

Secondly, we will assess the interoperability between the aircraft system and the ASE system and between mutual ASE systems and related aircraft interface.

Finally, we will assess the reliability, maintainability, and logistics supportability and human factor aspects of the integrated ASE system.

Key questions

All of this testing answers the questions: "**Does any of the ASE interfere with aircraft navigation, communication, or fire control system or vice versa, and is the ASE reliable? Can we maintain the system and support it when fielded?**"

To satisfy these objectives, we will fly the aircraft as many hours as possible each week. Six flight hours are dedicated to utilizing and checking out the ASE systems, and the remaining flying hours are used in performance of routine AH-1S missions. In essence, what we are doing is exercising the equipment in the integrated environment where it was designed to be used.

We're practicing our motto, "**Trial before Combat,**" and insuring that the U.S. Army is equipped with the best ASE that technology can provide. IIIII

IN very few project offices does one have the opportunity to work in several life cycle phases at one time. PM ASE is one of those offices.

Being afforded that kind of opportunity elicits mixed feelings for each life cycle brings with it peculiar requirements and objectives to be satisfied. To span the life cycle phases through the execution of several independent programs during the same timeframe definitely makes apparent the impact that the quality of work done in one phase has on the results possible in succeeding phases.

Valuable lessons

Lessons learned from one program can be quickly capitalized on another program. In addition, the stark realization of field support problems in the same office where development programs are getting their start, has a sobering effect upon the importance of early attention to logistics requirements.

One thing learned through the many iterations of program planning and execution is that in logistics the popular saying of "**Practice makes perfect**" is just not so. "**Practice makes better.**" — "**Only providence makes perfect.**"

ASE has had a mixture of experiences in fielding equipment. As the complexity of the equipment increases, more risks are involved. As an example, the AN/APR-39 **Radar Warning Receiver (RWR)** is a relatively easy item to support in the field.

Prior to the Army production, there had been considerable work on radar warning receivers. The item was basically field repairable with piece part replacements, as well as highly reliable. Skill level to repair the item was compatible with available personnel skills currently in the field and the test equipment was adequate.

Complex problems

On the other hand, the initial fielding of the fuel fired Infrared Jammer (AN/ALQ-147) on the MOHAWK aircraft in 1977 never achieved a high level of pilot confidence. It was a much more complex item than the RWR and had a considerable number of moving parts. The added feature of burning jet fuel to create the **Infrared (IR)** source within the equipment while extended from a wing station produced an element of concern to the crew.

Added to these problems were the lack of sufficient repair parts and technical publications during the initial support period. Deployment of the Improved IR Jammer (AN/ALQ-147A) replaced the older model and has resulted in a marked improvement in the reliability and maintainability aspects.

The introduction of the AN/ALQ-144 electric Infrared Jammer for the Modernized COBRA has shown payoffs in attention to testing, reliability and the system support package. This system has been deployed with complete logistics documentation. There was a problem identified, thanks to the contractor's documentation, which was related to the procurement of the necessary initial repair parts and spares. The early contractor recognition of the problem

The fielding and support of ASE

By GEORGE B. HENDON, III, Chief, Logistic Management Division, PMO-ASE, St. Louis, Missouri assisted in the provisioning effort.

This effort greatly improved the timeliness and availability of the parts package . Industry and the Government worked as a team in resolving a difficult hurdle in the identification, ordering and delivery of the necessary spare parts to effect a scheduled deployment.

The user community's reluctance to accept systems from the development community into the field without complete and adequate system support packages has added impetus to early considerations for supportability as well as planning through test programs. This has been an extremely sobering revelation to development managers and has caused the reevaluation of the approach being taken on developing and producing systems today.

A common problem

The pilot/machine interface is a problem that is being faced by many programs that are incurring rapid development of high technology equipment, along with a requirement to handle a large amount of information effectively and efficiently.

One objective of PM ASE is to train the aviator thoroughly and in such a manner that his attention to ASE becomes one of reflex rather than studied analysis. At the present time, tactics and doctrine and the use and employment of ASE are still undergoing development and refinement by TRADOC.

Because ASE is a defensive system and is employed only in response to aircraft threat weapons, it presents unique problems in training. One step forward in the training of the aviator with ASE has been the development and deployment of the **Tactical Radar Threat Generator (TRTG),** also known as the **GRETA.** This system is a highly versatile threat simulator that is field mobile and can be deployed in the field much as an anti-aircraft system.

The TRTG has on board video recorders that can visually record the acquisition and tracking of the aircraft by the TRTG and capture the pilot's maneuvers to avoid the TRTG once the pilot has received a warning via the **radar warning receiver (RWR).**

After the field exercise is over, this video can be played back in the presence of the pilot so that he can see for himself the time it took for the threat weapon to acquire and track him, as well as the time it took him to break radar lock. This system is currently deployed in CONUS and Germany.

Deployment challenges

There are several challenging elements involved in the deployment of ASE. One of these elements is the reprogrammability of the individual black boxes. The radar warning receivers and infrared and radar jammers depend on software programs to provide flexibility in countering changes in the threat weapons. When the frequency requirements change, as they most likely will, the equipment must be adaptable to these changes.

Many factors have played a part in the development of effective reprogramming approaches. These factors involve the intelligence gathering from threat systems in the field and the timely distribution of these changing threats through the intelligence community to the PM's Threat Working Group.

Other factors involve the eventual translation of the new threat into the appropriate countermeasure response, the changes to the software and hardware, and the distribution of these changes to the field. Also involved at the field level is the verification of the changes to the appropriate threat response.

A significant problem in maintaining current countermeasure programs in ASE is the time that it takes to complete the cycle from the initial receipt of a change in the threat to the actual reprogramming of the equipment in the field. During combat situations where the reprogramming of equipment is to be the most critical, the distribution of the changes must be accomplished in such a way as to not compromise the data, while transmitting the data to field units in the shortest time possible.

The maintenance concept must include the requirement for reprogrammability. It is important to identify early tools and personnel required and where each task is to be performed. Also involved is the configuration management of several threat tables used in the various theaters. It is anticipated that the threat scenarios will continue to vary from one geographical theater to another.

Security considerations

The classified nature of ASE hardware presents an inherent problem to the operational and maintenance procedures. The storage, use, and repair of this equipment must be accomplished in a secure environment. Many Army units with ASE are not used to having classified hardware in the unit and have not had repair facilities for the classified hardware in the past. Army aircraft are not always located in a secure area and, therefore, it has become important to look for alternative solutions to leaving the equipment on the aircraft all the time.

ASE with quick disconnects to remove and replace in a minimum of time makes it more feasible to store the equipment when the aircraft is not in use. Unless the equipment can be easily and quickly reinstalled, it is ineffective for quick reaction.

The use of this equipment during training programs must take into consideration the risk of compromise in frequencies and countermeasure techniques during the training exercise. As critical as training is in the use of ASE, the risks of compromise cannot be overlooked and must be thoroughly recognized and precautions used to reduce this risk to as low as possible.

Force Modernization efforts associated with ASE are hampered by a number of factors. As has already been mentioned, ASE is made up of many individual, separate countermeasure sets, each designed to fill a specific role in the survivability aspects of the aircraft. But each is also part of a larger whole in the countering of general threats to Army Aviation. Many weapon systems employ more than one means of acquiring and tracking aircraft. The fielding efforts for ASE recognize the importance of ASE as a suite.

Unfortunately, a complete suite of ASE equipment for a particular aircraft type is not always available at any given point in time. Consequently, equipment is placed on the aircraft as soon as possible to defeat specific and individual threats, even though the equipment available does not round out a total countermeasure suite.

The key ingredient

The complexity of ASE programs has brought new and challenging opportunities. The testing of the ASE systems has been increasingly more involved with the complete system support package, eliminating much of the logistical risk involved in placing new equipment in the field. The most important ingredient in ASE has been the aviator, whose ingenuity and courage are now being highlighted through regular operational experience and intensified training programs.

Great strides have been made in cutting the logistical niche for ASE in the Army support system, but much remains to be done. The Project Manager's Office has committed itself toward the fielding of ASE with the same mark of excellence that has been evident in the development of the technological base. IIIII

ASE lessons learned and program status

By COL EDWARD C. ROBINSON, RET.,
Former Project Manager, Aircraft Survivability Equipment

AS the Aircraft Survivability Equipment Project Manager for the last 2½ years, I would like to provide some lessons learned. First, the mission of the ASE PMO is to provide countermeasures against **infrared (IR)** seeking missiles, radar controlled weapons systems, and optically or electro-optically controlled weapons. ASE does this for all Army aircraft.

We also maintain the technical data base for aircraft survivability. The mission of the ASE PMO evolved in the latter stages of the Vietnam War when the SA-7 missile first appeared. It had an immediate impact on the aviation tactical environment. We then developed various quick reaction countermeasures to defeat the SA-7 missile using simple, quickly fabricated IR suppressors and/or hand-operated flare IR decoys.

Looking ahead

Unfortunately, due to the increasing sophisticated nature of the threat today, the Army can no longer depend upon quick reaction programs to provide adequate protection. As an example, we have an approximate development time lag of approximately seven years for some countermeasures systems. The projected threat capabilities must be addressed by **current** programs if the Army is to properly and quickly respond to the threats on the battlefield.

I see opportunities for accommodating the radar/IR/EO threat spectrum in several new emerging programs within the Army and the joint service arena, such as the JVX, J-STARS, LHX, and ACH programs. All of these programs should be taking an integrated systems approach to aircraft survivability wherein the synergistics effects and hardening of aircraft systems are optimized. The good news is that the radar and infrared countermeasure areas are in relatively good shape if funding is retained in the FYDP for the planned advanced development and/or engineering development programs.

Upgrading our response

In the radar countermeasures area, we currently have the AN/APR-39(V)1 radar warning receivers available on some of our Scout/Attack, utility, and cargo type of aircraft. We have ongoing programs to upgrade the AN/APR-39(V)1 into other wavelengths. We're incorporating a digital micro-processor so that the RWR can automatically sort, track, prioritize, and display the threats alphanumerically. A voice augmentation capability will minimize pilot workload in a nap-of-the-earth environment through voice warning.

The **Special Electronic Mission Aircraft (SEMA)** radar warning receiver is the AN/APR-39(V)2 Radar Warning Receiver. It also uses a sophisticated microprocessor. We also have programs to add frequency banding and more capable receivers to permit processing more sophisticated types of radar systems. For SEMA and selected Scout/Attack type aircraft, the AN/APR-44 Radar Warning Receiver is also available.

The current pulse radar jammer is the ALQ-136(V)1, which is being procured for the AH-1 COBRA and the AH-64 APACHE. The ALQ-136(V)1 is an ongoing multiyear procurement which has enabled the Army to provide a maximum number of systems at a minimum cost through a very efficient, stable procurement program.

This program is unique in that it is an exception to the normal way of doing business in the ASE procurement arena. ASE hardware was previously procured as funds were available in a rather unstable fashion. We also have the AN/-ALQ-162 Radar Jammer being developed by the Navy for the SEMA aircraft.

Complementing the radar jamming capability is the M-130 General Purpose Dispenser which provides the capability to deploy decoys or expendables. The most common type of decoy currently available is chaff, which has application on the Scout/Attack, Utility, and SEMA aircraft. The user community has recently determined that the M-130 General Purpose Dispenser should be installed on the Scout/Attack aircraft with the installation to be made when funding is available.

IR countermeasures

In the infrared countermeasure program, various equipments are available for infrared signature reduction and jamming. The signature reduction programs include flat canopies and IR paint for reduced IR and optical signatures, and hot metal suppressors, which have been replaced on some aircraft by hot metal plus plume suppressors for increased suppression capability.

It is important that the signature of the aircraft be reduced to minimize the detection of the aircraft, as well as to minimize the capability of IR seekers to lock-on the aircraft. Signature reduction makes the aircraft jammers more effective because jammer effectiveness is a function of the **jam to signature (J/S)** ratio. Thus, lower signatures greatly increase the jamming effectiveness of the ASE countermeasures.

In warning against infrared threats, the current warning device is the AN/ALQ-156 Missile Detector. The ALQ-156 was designed for application to the CH-47 helicopter, as a means of cueing the M-130 General Purpose Dispenser to release a flare. The detector can also be applied to other type aircraft. The detector works in association with a flare dispenser, the M-130 General Purpose Dispenser.

The Army should fund programs to add a micro-processing capability to the M-130 wherein warning signals, obtained from the various warning devices, can be processed through a micro-processor, thus automatically cueing the M-130 General Purpose Dispenser to release the optimum countermeasure device for the appropriate threats.

The AN/ALQ-144 is the basic IR jammer for helicopters, and the AN/ALQ-147 is the fixed wing IR jammer. Improvement programs to these systems need greater attention and prioritization if they are to come to fruition.

Lessons from Lebanon

Radar and IR countermeasure programs are the good news. I believe that lessons from Lebanon in the 1982 Israeli conflict and various DOD tests should be given more attention. The Israelis demonstrated that they have developed very refined tactics which integrate electronic warfare countermeasures capability against active radar and infrared air defense systems.

They brilliantly displayed these tactics in the Bekaa Valley against Syrian-manned Soviet radar and IR air defense (SA-6, SA-8, SA-9, ZSU-23) type of radar systems. For those who watched the nightly news and saw the Israeli aircraft ejecting countermeasure flares as they attacked, it is apparent that the Israelis have learned to counter the IR threat capability as it existed in Lebanon.

Part of the Israeli strategy was to force the Syrians to turn on their radars through various means which have been addressed in the open press, such as decoys, and RPVs. They were able to successfully either jam threats long enough to engage them or to destroy the radar threats with anti-radiation missiles from both surface-to-surface and to air-to-surface platforms.

Thus, through excellent intelligence, tactics, and hardware, they quickly eliminated the radar and IR threats from the battlefield. A lesson learned from this encounter should be that one will quickly learn the utility of passive optical or electro-optical fire control systems. The North Vietnamese learned to use optical backup in Vietnam.

Developing threats

Various DOD tests have demonstrated the effectiveness of optical and electro-optical fire control systems which are particularly effective when complemented with laser ranging, laser radars or laser guidance. Lasers are being employed as primary fire control guidance on several new air defense systems available on the international arms market, such as the Swedish Oerlikon, **Air Defense Anti-Tank System (ADATS),** uses a TV/FLIR electro-optical sighting devices with a laser range finder and a laser beam rider missile to engage aircraft or tanks.

Potential countermeasures for this type of system include detecting the system either through detection of its laser or of its optical sighting device, or through jamming its fire control.

The electro-optical countermeasure area priorities need to be increased and I shall now address this area. Optical signature reduction has been achieved through IR low reflectance paint. An IR paint for the desert environment has been developed. Flat plate canopies have done much to attentuate optical signatures. The AN/AVR-2 Laser Warning Receiver is finishing development to detect laser fire control systems.

The M-130 General Purpose Dispenser could provide countermeasures against optical and electro-optical systems through the development of smoke and aerosol expendables and decoys for lasr-guided missile systems. A mix of expendables would necessitate the advanced processing capability for the M-130 dispenser, which was discussed earlier, in order that appropriate expendables could be released depending upon the type of threat perceived by the warning devices.

ASE: a top priority?

This has been a summary of the methodology behind our ASE radar, infrared, and optical countermeasure programs. In recapping some of the problem areas which I have perceived in the last 2½-years of my stewardship of the ASE program, the dominant problem is the lack of appropriate prioritization afforded to the ASE program.

Simply put, the capabilities of aircraft survivability equipment to provide a force multiplier effect to Army Aviation are not fully understood and with the limited number of aviation resources available to the U.S. Army, and the limitations on our capabilities to replace these materiel and human resources, I feel it is imperative that we appropriately prioritize the procurement of ASE for fielded aircraft and for those new aircraft which are in procurement or in development at the present time.

These aircraft must be adequately and appropriately equipped to survive on the battlefield. This could be done by buying several fewer aircraft and equipping all the aircraft with the appropriate survivability equipment, and by doing this we would retain significantly more aircraft and crews on the battlefield should hostilities begin. **(Cont. on Page 88)**

COL C.J. Herrick assumes ASE-PM role in AVSCOM

Colonel Curtis J. Herrick, Jr., an infantry aviator, assumed the duties of the ASE PM, AVRADCOM, in St. Louis on 22 August 1983. He brings a strong "user" orientation with his R&D experience to the ASE program. As a user, he commanded airborne rifle and assault helicopter companies, was the S-3 of an armored brigade, and the commander of an Air Cavalry Squadron.

In the Republic of Vietnam, he was an infantry battalion advisor; and in SOG, an O-1 BIRD DOG platoon leader and airmobile task force commander. His R&D experience includes an assignment as New Developments Officer at the Infantry School Weapons Department; service as a battalion advisor in the Iranian Aviation Program; attendance at the Defense Systems Management College Project Managers' Course; a tour as an OTEA operations officer; ODCSRDA duties as an aviation **Department of the Army Systems Coordinator (DASC)**; and an assignment as Procurement Programs and Budget Division Chief.

Colonel Herrick holds a Master of Arts Degree in Supervision and Management from the Central Michigan University and is a graduate of the Army War College.

HELMOT 1

The AAAA's Colonial Virginia Chapter, in conjunction with the Hampton Roads Chapter of the American Helicopter Society, is sponsoring a Nov. 7-10, 1983 "Helicopter Military Operations Technology Specialists' Meeting at the Ft. Magruder Inn in Williamsburg, Va. The 2½-day unclassified program features presentations and panel discussions on military R/W systems development programs currently under discussion. The keynote address will be given by GEN William R. Richardson, USA TRADOC Commander, with five follow-on panels being chaired by senior Army Aviation officials.

1984 MOHAWK REUNION

And we mean all OV-1 aviators, technical operators, DAC's, contractor representatives, and other interested parties . . and especially those of the Vietnam era and prior!

We're planning a one-time **Worldwide Mohawk Reunion** to be held in conjunction with the 1984 AAAA National Convention to be held at the J.W. Marriott Hotel in Washington, D.C., on March 30, 1983.

If you are interested in attending this one-time function, and it could be a mammoth cocktail party, a luncheon, or a private dinner, please contact:

Joel L. DiMaggio
Director of Army Marketing
Grumman Aerospace Corporation
Bethpage, N.Y. 11714. (516) 575-7238.

If you're not interested in attending the '84 Reunion, please write anyway and let us know your whereabouts.

IN GOOD HANDS!

**MG James C. Smith, Ret.
President, AAAA
1 Crestwood Road
Westport, CT 06880**

Dear General Smith:

Just wanted to say THANKS for your letter and the Past President's lapel pin. I enjoyed my tenure as Chapter President and leave the position (at the Coastal Empire Chapter) in good hands with MAJ(P) Mike Jacobi.

With the advent of our own branch, ALL Army Aviators need to be out "selling" Army Aviation. All too often, we find our non-rated counterparts (1) can't spell "aviation," (2) don't understand aviation or (3), in some cases, let preconceived ideas get in their way. Our greatest challenge is educating those we serve—and ourselves, and AAAA helps to meet that challenge.

Good luck and thanks. You can be assured that I will give Mike Jacobi my support.

**Seth F. Hudgins, Jr.
LTC, Aviation
Hq, 24th CAB
Hunter AAF, Georgia**

The lessons learned

Still another problem is the need for additional ASE training. While initial training accompanies the equipment to the field, unless pursued, ASE training is lost over a period of time. A means of continuing training must be developed.

The recent designation of two existing **TRADOC Systems Managers (TSM)** to perform additional roles as TSMs for ASE should help to focus user priority on Aircraft Survivability issues. These officers are fully knowledgeable in ASE and electronic warfare and are totally dedicated to getting the job done in consonance with other TRADOC and DARCOM elements. They should provide the additional emphasis and authority to get and keep things moving.

We've done much to identify long standing ASE problem areas and to develop potential solutions. The developer and the user must now see that this happens. IIIII

A View from the Pentagon

by displaying laser illumination information on the RWR display indicator.

The AN/ALQ-162 Radar Jammer for SEMA aircraft developed by the Navy will also enter production. This system will provide a continuous wave jammer capability for production against surface-to-air and airborne interceptor missiles.

In addition to the new ASE equipment, a second buy of the **Tactical Radar Threat Generator (TRTG)** has been initiated to expand the ASE training capability. The TRTG allows the pilot to train against the air defense threat using unit or combined arms tactics.

This will add another dimension to ASE training and give pilots confidence in the use and exploitation value of their ASE capability. This training is an essential part of the total program. Unless pilots can practice with ASE and include it in their training scenarios, they will not be prepared to fully utilize ASE in combat and will lose the tactical advantage it provides.

This has been a brief update on where we are with Aircraft Survivability Equipment and the challenges facing us in the future. The investment in ASE systems to improve combat effectiveness and survivability is extensive and growing. The next step is up to you.

Are you prepared to train with and integrate the ASE into your tactics?

Will you be ready to use the ASE when you need it? IIIII

Field Service in Europe

The MFO's close proximity to Headquarters, Deputy Chief of Staff for Operations at Heidelberg has been an asset in maintaining a close working relationship with the USAREUR staff. Plans and schedules are negotiated easily and alternative solutions developed as required for deployment of ASE.

The 200th Army Theater Materiel Management Center at Zweibruecken also requires close working relationships. The coordination of the DAMWO Application Plans, Mission Support Plans, and the requisitioning of repair parts are centered here. The loop is then closed through the coordination with the gaining Army units.

There have been twenty separate fielding programs in USAREUR for ASE in the past years. Most of these were accomplished without permanently assigned personnel in-country. These fieldings have met with varying degrees of success. Future fieldings will be supported with better coordination in-country and continual monitoring and evaluation of their progress. IIIII

THE first item I would like to address for the future is the assignment of a new Project Manager for Aircraft Survivability Equipment **Colonel Curtis J. Herrick, Jr.**

Colonel Herrick brings with him a strong background in procurement, budgeting, and aviation operations. This is most appropriate since many of the ASE systems have completed development and are in the acquisition and field support portions of their life cycle. He'll be on board as the ASE PM, and getting his feet wet by the time this issue is published.

Now, for the more programmatic type of information on the future of ASE. The ASE program has progressed from developing the simple countermeasures to the development of much more sophisticated, complex, and, therefore, more expensive countermeasures. The countermeasures are developed for the optical, electro-optical, infrared, and radar threat systems.

Room for growth

Many of the systems previously developed and currently in production lend themselves to preplanned **product improvement (PPI)** because of their previously designed-in areas for growth. These growth areas were originally required because of the problem of changing enemy air defense weapon threats. The world of electronic warfare is one of continual change: we design a countermeasure for a weapon, and then it is redesigned or specific **counter-countermeasures (CCM)** are included.

Many of the ASE systems were designed with excess internal space for later electronic circuitry improvements. On those systems where it's not easy to add internal capability, it's possible to add applique type devices in the form of small boxes appended to the outside of the basic electronic countermeasure sets.

Some of the systems lend themselves to frequency extensions or higher output capabilities as a result of minor internal changes. ASE systems fit very well with the defense acquisition improvement program initiative of PPI.

This philosophy is currently being applied to the AN/ALQ-144 Infrared Jammer to give it an increased capability to jam new and evolving threat missile systems. It is being applied to an even greater degree on the AN/ALQ-136 Radar Jammer to incorporate new and improved radar jamming techniques. These programs will insure that the most sophisticated enemy threats can continue to be countermeasured successfully by the aviation fleet.

Many of the ASE systems are software reprogrammable. This capability enables the Army to continuously update threat files and include new techniques within microprocessor capacity. As new threats are confirmed or a threat parameter changes, we have to react with well planned and expedited reprogramming actions.

Making it all work

Another area of new product developments is the need for very well integ-

Where do we go from here?

By GARY L. SMITH, Deputy Project Manager for Aircraft Survivability Equipment, PMO-ASE, St. Louis, MO rated onboard systems. This subject is addressed elsewhere within this issue by **Frank Reed** of our staff. In the past, technology was not available to be able to perform an efficient onboard integrated ASE suite. That technology is here today and we should take maximum advantage of it.

In fact, both the J-STARS aircraft and the new LHX development will require a highly integrated ASE suite which is fully integrated with the other onboard subsystems. This is imperative in the high workload environment of combat aircraft. Multiple control actions must be eliminated for separately installed subsystems.

Integrated test equipment

Another fruitful area for improvement is the development of integrated test equipment. For some time now, it has been the DARCOM policy that new equipment must be designed to be supported and tested by the Army standard **automatic test equipment (ATE)** AN/USM-410. This is very appropriate for new developmental systems and aviation units that will be equipped with the AN/USM-410.

However, most ASE systems were developed and entered production prior to this policy. Some aviation units with a large amount of ASE are not supported by ATE. In these situations, we have a problem of multiple "suitcase type" testers, a type of tester that is definitely undesirable.

Our plans include developing an integrated tester for those units not equipped with ASE. This test set would be capable of checking out all onboard ASE with one test set. For those aviation units with ATE support, interface devices will be developed to make the older designed ASE compatible with ATE. This should greatly improve the logistic supportability of ASE in the field.

Another area requiring a dedicated development effort is system peculiar training devices. Through the conduct of an ASE worldwide logistics assessment, we discovered a severe lack of training equipment and knowledge of ASE utility and tactics. As new equipment is deployed to the field, a very well structured materiel fielding is accomplished with a **New Equipment Training Team (NETT)** included.

However, with the pertubation and reassignment of personnel, it is very difficult to maintain proficiency and knowledge without refresher courses.

Working together

Training is also addressed elsewhere within this issue. We're working closely with the user community to correct this situation. **Field Manual 1-101** is now being revised to address ASE. A number of video training films will be developed, and a table top trainer is being planned for development. The training device needs to be at the unit or organizational level with the aviator and troops for maximum benefit.

We're also procuring additional **Tactical Threat Radar Generators (TRTG)** for field training in a realistic combat environment. The TRTG is a radar simulator coupled to a television camera mounted in an S-250 shelter. This system has been very successfully used in Europe and CONUS to evaluate aviators' performance in breaking lock against simulated radar threats.

The Marine Corps is also planning to procure these devices along with the Army while the USAF will use another version of the TRTG to train against. It's hoped that this new training equipment will keep our aviation operators and maintainers at a high level of proficiency.

Since the ASE program has evolved to a large suite of equipments, we must concentrate on improving our acquisition strategies by structuring more economical procurements. In the past, ASE procurement funding was provided to the ASE PM by each of the aircraft projects, resulting in very uneconomical small quantity buys of individual pieces of ASE. An effort is underway to restructure the ASE program with its own procurement budget line to enable combining ASE subsystem procurements from all of the various aircraft requirers to yield sound economical order quantity buys.

Procurement savings

In FY 82, we were able to demonstrate a large savings from the purchase of the AN/ALQ-136 Radar Jammer by awarding a multiyear contract to purchase 600 units. We were able to achieve a savings of $34.6 million out of the original $108.5 million program. ASE systems are very conducive to this type of procurement because of the large number of electronic components comprising each system. If the prime contractor can order large quantities in one buy, tremendous savings can be realized.

In addition, extreme competition is created with vendors because of the order size. It would be smarter and more logical to not buy the small quantities each year and sacrifice the wait for the equipment in order to make one large order buy. It would be of maximum benefit to be able to procure all ASE systems in this manner.

How important is ASE?

To be able to accomplish all of the developments and procurements that I've addressed, the ASE program must have the appropriately assigned priority within the user and developer community. The priority of ASE is driven by the perception of the need by the Army. The modern battlefield will be densely populated with electronic warfare threats, an environment in which the U.S. Army has not fought in the past. The recent Falkland Islands and Bekaa Valley conflicts proved the effectiveness of electronic warfare on the modern battlefield. We must continue to survive against the numerical superiority of the opposing forces.

Should we wait?

Some might think it appropriate to develop ASE but not produce it until needed as happened during the Vietnam conflict. The countermeasures that were developed then were very simple and easy to manufacture in a relatively short period of time.

Today's threat and the equipment needed to countermeasure those threats call for extremely complex sophisticated electronics. These components sometimes have unrealistic long lead times for manufacture, assembly, and integration into fully performing systems. Our most expedited lead times for quantity deliveries of systems today is 18 months with a fully mature production package.

The time is now

It is reasonable to assume that a future conflict will not allow this time reserve for us to begin delivery and installation of ASE onto our aircraft. We must plan now the appropriate procurements for possible later contingencies. This can only be done by a full awareness of the threat we face and our ability to counter that threat with the attendant increase in the priorities of ASE development and procurement programs.

There are several other developments underway and more details available on the items discussed in this issue. However, many are too sensitive to discuss in open publication. The ASE Project Manager's Office is available to provide additional information to appropriately cleared U.S. government and defense contractor personnel. Please feel free to contact the Project Manager's Office at the address indicated in the centerfold organizational chart. IIIII

The First Annual AAAA Aircraft Equipment (ASE) Symposium

Loral Electronic Systems, Yonkers, N.Y. — 15-16 November 1983

PROGRAM

All events including Registration will be held at the Loral Electronic Systems new facility in Yonkers, N.Y., except the 15 Nov. Reception and Dinner which will be held at the Marriott Hotel-Westchester in Tarrytown, N.Y. The Symposium is open to all interested AAAA members (U.S. citizens only) and will be at a secret, "no foreign" level. Information may be obtained by phoning Ms. Lynn Coakley, AAAA, at (203) 226-8184. Speakers, subjects, and the times of presentation are tentative and subject to change.

■■■

TUESDAY, 15 NOVEMBER

■■■

0830-0930. . . . . Registration (Coffee and Danish)

■■■

0930-0940. . . . . Welcome
Maj. Gen. James C. Smith, Ret., President, AAAA, and Mr. Irving Kaufman, President, Loral Electronic Systems

■■■

0940-0955. . . . . Opening Remarks
Colonel Curtis J. Herrick, Jr., PM-ASE

■■■

0955-1015. . . . . Keynote Address
Brig. Gen. Robert F. Molinelli, Deputy Director of Requirements and Army Aviation Officer, Department of the Army, Washington, D.C.

■■■

1015-1045. . . . . Army Aviation Missions and Roles in the Air/Land Battle by Lt. Col. Leroy E. Golly, Chief, Avionics, Visionics, & Electronic Warfare Branch, Directorate of Cbt Development, USAAVNC, Ft. Rucker, AL

■■■

1045-1115. . . . . ASE Training
Lt. Col. Leroy E. Golly, USAAVNC, Ft. Rucker, AL

■■■

1115-1130. . . . . Refreshment Break

■■■

1130-1230. . . . . ASE Programs Overview
Frank A. Reed, Chief, Technical Management Division, PMO-ASE

■■■

1230-1300. . . . . ASE Logistics Overview
George B. Hendon, III, Chief, Logistic Management Division, PMO-ASE

■■■

1300-1400. . . . . Luncheon

■■■

1400-1430. . . . . LHX Multi-Sensor Integration
Thomas L. House, Chief, Aeronautical Systems Division, Applied Technology Laboratory, Ft. Eustis, VA

■■■

1430-1500. . . . . QuickfIx-EW With A Punch
Colonel William D. Taylor, Project Manager—SEMA

■■■

1500-1530. . . . . ASE Requirements Update (SEMA)
Lawrence A. Eusanio, Principal Research Engineer, Calspan Corporation

■■■

1530-1545. . . . . Refreshment Break

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1545-1615. . . . . High Energy Laser Countermeasures, Douglas Dunlap, Chief Physicist, PMO-ASE

■■■

1615-1645. . . . . RFI System Requirement Review
An Aircraft Survivability Equipment Symposium presentation by a company representative from Science Applications, Inc.

■■■

1900-2000. . . . . Reception (Open Bar)
Pool Gallery, Marriott Hotel-Westchester, Tarrytown, NY

■■■

2000-2300. . . . . Dinner and Guest Speaker
Maj. Gen. Richard D. Kenyon, Asst Deputy Chief of Staff for Research, Development and Acquisition, D/A, Grand Ballroom Salons F, G, H at the Marriott Hotel-Westchester, Tarrytown, NY

■■■

WEDNESDAY, 16 NOVEMBER

■■■

0800-0900. . . . . Coffee and Danish

■■■

0900-0930. . . . . Multipath Suppression RF Direction Finder by Everett A. Nelson and Pope Peter Britt, Senior Research Engineers, Georgia Institute of Technology

■■■

0930-1000. EW Training Philosophy
An Aircraft Survivability Equipment Symposium presentation by a company representative from the Emerson Electric Company

■■■

1000-1030. . . . . : Functions and Integration of ASE
Donald Toman, Engineering Staff Consultant, Loral Electronic Systems

■■■

1030-1045. . . . . Refreshment Break

■■■

1045-1115. . . . . . . AN/ALQ-156 Missile Warning System
Martin E. Mehron, Engineering Fellow-Radar, Sanders Associates, Inc.

■■■

1115-1145. . . . . Laser Supplement to Radar Threats
An ASE Symposium presentation by a company representative from the Perkin-Elmer Corporation

■■■

1145-1215. . . . . Conformal DF Systems for RFI Helo Applications. An ASE Symposium presentation by a company representative from Litton Amecom

■■■

1215-1300. . . . . Closing Remarks
Colonel Curtis L. Herrick, Jr., PM-ASE

■■■

1300-1400. . . . . Luncheon

DEPARTMENT OF THE ARMY
HQ, US ARMY AVIATION RESEARCH AND DEVELOPMENT COMMAND
4300 GOODFELLOW BOULEVARD, ST. LOUIS, MO 63120

SUMMARY

The Aircraft Survivability Equipment (ASE) Project Manager's Office of AVRADCOM has made progress in producing equipment to counter current enemy air defense threats. However, the threat continues to advance in new areas with new technologies for which we must develop countermeasures.

ASE systems extend greatly the combat sustainability of our aviation fleet -- allowing attack aircraft to stay on station longer for higher target kill, survive on the way back to reload, and return to the battle for more target engagements. The cumulative probability of attrition because of multiple exposures would be unacceptable without the protection afforded by ASE.

The ASE Program is complex and multifaceted because of the many technologies of the threat systems. This is the world of electronic warfare. Meeting and performing the requirements of the program necessitate that many disciplines be followed in the day-to-day activities of planning, developing, fielding, and supporting the different ASE systems. A dedicated team of professionals from Department of the Army Headquarters, US Army Materiel Development and Readiness Command, US Army Training and Doctrine Command, and US Army Forces Command continues to work the many and varied problems. To "close the loop" even better, the ASE Project Manager reestablished the Permanent Steering Group for ASE this past spring. This group of 06 officers will meet semiannually to give the ASE Program the necessary top level direction in establishing the program's goals.

The US Army Aviation Research and Development Command will continue to develop aircraft survivability equipment to insure that the aviation fleet is survivable with maximum combat effectiveness on the modern battlefield.

Orlando E. Gonzales

ORLANDO E. GONZALES
Major General, USA
Commanding

It's time to prepare for AAAA National Award nominations

1984 AAAA Award Presentations

AAAA National Awards for accomplishments made during Calendar Year 1983 will be presented at the Annual Awards Banquet to be held at the 1984 AAAA National Convention in Washington, D.C., next March 31. The Secretary of the Army is invited to present the "Aviation Soldier of the Year Award" with the Army Chief of Staff presenting the awards to the outstanding aviation units. The "Army Aviator of the Year Award" is normally presented by the Vice Chief of Staff while a representative of the McClellan Memorial Foundation makes the annual safety award presentation. The Commander of DARCOM is invited to present the "Outstanding DAC of the Year Award."

"Outstanding Aviation Unit of the Year Award"

Sponsored by Hughes Helicopters, Inc., this award will be presented "to the aviation unit that has made an outstanding contribution to or innovation in the employment of Army Aviation over and above the normal mission assigned to the unit during the awards period encompassing the previous calendar year." Any Army Aviation unit or organization that has met the foregoing criteria is eligible.

"Outstanding Reserve Component Unit Award"

This award, sponsored by the Avco Lycoming Division, will be presented "to the Reserve Component aviation unit that has made an outstanding contribution to or innovation in the employment of Army Aviation over and above the normal mission assigned to the unit during the awards period encompassing the previous calendar year." Any Reserve Component Army Aviation unit or organization that has met the foregoing criteria is eligible for consideration.

"Army Aviator of the Year Award"

Sponsored by the Sikorsky Aircraft Division, this award will be presented "to the Army Aviator who has made an outstanding individual contribution to Army Aviation during the awards period encompassing the previous calendar year." Membership in AAAA is not a requirement. A candidate for this award must be a rated Army Aviator in the Active U.S. Army or Reserve Components, and must have made an outstanding individual achievement.

"Aviation Soldier of the Year Award"

This award, sponsored by Bell Helicopter Texttron, will be presented "to the enlisted man serving in an Army Aviation assignment, who has made an outstanding individual contribution to Army Aviation during the awards period encompassing the previous calendar year." Membership in AAAA is not a requirement. A candidate for this award must be serving in an Army Aviation assignment in the Active U.S. Army or in the Reserve Components, and must have made an outstanding individual achievement.

"James H. McClellan Aviation Safety Award"

Sponsored by the many friends of Senator John L. McClellan in memory of his son, James H. McClellan, a former Army Aviator who was killed in a civil aviation accident in 1958. The award is presented to an individual who has made an outstanding contribution to Army Aviation safety in the awards period encompassing the previous calendar year. Membership in AAAA is not a requirement; any individual, military or civilian, is eligible as a nominee for this award. The award is not intended to be given for competitions between units for safe flying, or for the accumulation of operational hours without accidents by any aviation unit. Membership in AAAA is not a requirement. Any individual, military or civilian, is eligible as a nominee for this award.

"Outstanding DAC of the Year Award"

This award will be presented to the Department of the Army Civilian who has made an outstanding contribution to Army Aviation in the awards period encompassing the previous calendar year. A candidate for this award sponsored by the Boeing Vertol Company must be a current Department of the Army Civilian. Membership in AAAA is not a requirement for consideration.

Administrative Details

ACCOMPANYING DATA FOR INDIVIDUAL AWARDS: Documentation should include the nominee's name; his unit assignment, unit name, and address; and the name of his current unit and commander. A cover sheet should provide a brief outline of not more than 100 words citing the main reason(s) for the nomination. Detailed supporting information should be attached as inclosures; and be limited to 1,500 words or three pages (whichever is greater). The documentation should be typed, and include a recent photo and the nominee's biographical sketch.

ACCOMPANYING DATA FOR THE UNIT AWARDS: Documentation should include the name and address of the unit, and the name of the present commander. A cover sheet should provide a brief outline of not more than 100 words citing the main reason(s) for the nomination. Detailed supporting information should be attached as inclosures; be limited to 1,500 words or three pages (whichever is greater). Please TYPE all entries to assist in the photocopying of data. This form may be reproduced locally.Receipt of each nomination will be acknowledged by National Office of the AAAA.

SUSPENSE DATE: The nomination data should be mailed on or before 15 January 1984 to: AAAA National Awards Chairman, 1 Crestwood Road, Westport, Connecticut 06880. Be certain to include the appropriate nominee photo and brief blio.

Monterey Bay Chapter leads AAAA in first month totals

LARGEST MEMBERSHIP GAIN
(Standings as as 1 October 1983)

Name of Chapter		Membership Gain
1	Monterey Bay Chapter	35
2	Lindbergh Chapter	18
3	Aloha Chapter of Hawaii	17
4	Schwaebisch Hall Chapter	16
5	Army Avn Center Chapter	14
6	So. California Chapter	12
7	Combined Arms Ctr Chap.	11
8	Wings of the Marne Chapter	8
9	Chicago Area Chapter	7
9	Indiantown Gap Chapter	7
10	Monmouth Chapter	6
11	Colonial Virginia Chapter	5
11	Coastal Empire Chapter	5
12	Jack H. Dibrell (Alamo)	4
13	Pikes Peak Chapter	3
13	Lone Star Chapter	3
13	Greater-Atlanta Chapter	3
13	Morning Calm Chapter	3
13	Nurnburg Chapter	3
14	Mid-America Chapter	2
14	Fort Sill Chapter	2
14	Hanau Chapter	2
14	Bonn Area Chapter	2
15	Fort Bragg Chapter	1
15	Air Cavalry Chapter	1
15	Connecticut Chapter	1
15	Taunus Chapter	1
15	Cedar Rapids Chapter	1
16	Tennessee Valley Chapter	0
16	Suncoast Chapter	0
16	Checkpoint Charlie Chapter	0
16	Delaware Valley Chapter	0
17	Rhine Valley Chapter	-1
17	Stuttgart Chapter	-1
17	The Citadel Chapter	-1
18	Washington, DC Chapter	-2
18	Fort Hood Chapter	-2
18	"Follow Me" Chapter	-2
18	Chesapeake Bay Chapter	-2
19	Corpus Christi Chapter	-3
19	Mount Rainier Chapter	-3
19	Mainz Chapter	-3
19	Valley View Chapter	-3
19	Old Ironside Chapter	-3
20	Air Assault Chapter	-4
20	Fulda Chapter	-4

LARGEST PERCENTAGE GAIN
(Standings as as 1 October 1983)

Name of Chapter		Membership Gain
1	Monterey Bay Chapter	18%
2	Schwaebisch Hall Chapter	17%
3	Aloha Chapter of Hawaii	15%
4	Combined Arms Ctr Chap.	10%
5	Chicago Area Chapter	7%
6	Nurnburg Chapter	6%
7	Pikes Peak Chapter	5%
7	Indiantown Gap Chapter	5%
7	Coastal Empire Chapter	5%
8	Lone Star Chapter	4%
8	Wings of the Marne Chapter	4%
9	Mid-America Chapter	3%
9	So. California Chapter	3%
9	Fort Sill Chapter	3%
9	Jack H. Dibrell (Alamo)	3%
9	Monmouth Chapter	3%
10	Colonial Virginia Chapter	2%
10	Lindbergh Chapter	2%
10	Greater-Atlanta Chapter	2%
10	Bonn Area Chapter	2%
10	Cedar Rapids Chapter	2%
11	Army Aviation Center Chapter	1%
11	Air Cavalry Chapter	1%
11	Connecticut Chapter	1%
11	Hanau Chapter	1%
11	Taunus Chapter	1%
11	Morning Calm Chapter	1%
12	Checkpoint Charlie Chapter	0%
12	Delaware Valley Chapter	0%
12	Fort Bragg Chapter	0%
12	Tennessee Valley Chapter	0%
12	Suncoast Chapter	0%
13	Air Assault Chapter	-1%
13	Corpus Christi Chapter	-1%
13	Fort Hood Chapter	-1%
13	Mount Rainier Chapter	-1%
13	Rhine Valley Chapter	-1%
13	Stuttgart Chapter	-1%
13	Washington, DC Chapter	-1%
14	"Follow Me" Chapter	-2%
14	Mainz Chapter	-2%
14	Chesapeake Bay Chapter	-2%
14	The Citadel Chapter	-2%
15	Valley View Chapter	-4%
15	Old Ironside Chapter	-4%
16	Fulda Chapter	-7%

PRIZES

LARGEST MEMBERSHIP GAIN: An appropriate plaque to be presented at the AAAA National Convention and an all-expense paid complimentary Chapter Hospitality Suite for one night at the 1984 AAAA National Convention (Total value, $300).

LARGEST PERCENTAGE GAIN: An appropriate plaque to be presented at the 1984 AAAA National Convention and a a $150.00 Cash Award (Total value, $170).


THE NEW GENERATION

AH-64 Rollout
(Continued from Page 6)

livery to the Army early in 1984. Later, Army pilots at Mesa will employ the helicopter to verify the production design's structural, performance, and flight handling capabilities.

A total of 59 production APACHE's are currently under contract, and Congress recently authorized an additional 112 AH-64As for **Fiscal Year 1984 (FY84).**

The unit flyaway cost of the APACHE is $7.8 million in FY84 dollars, including all mission equipment, government furnished equipment, and amortized production tooling.

All AH-64As will be assembled at Hughes Helicopters' APACHE Assembly and Flight Test Center in Mesa. The 550,000-square-foot facility was completed on schedule in July, 16 months after groundbreaking.

Five additional APACHEs are in various stages of assemlbly at the Mesa facility. The aircraft will roll off the line at the rate of one aircraft a month through mid-1984 with production reaching a peak of 12 aircraft a month in 1986.

THE PM'S

Norman B. Hirsh, VP, AAH Program, and Jack G. Real, HHI President, left, chat with the three former AAH-PM's on hand at the rollout. They are, left to right, BG Samuel G. Cockerham, Ret.; MG Edward M. Browne, Ret.; and BG(P) Charles F. Drenz, the current Program Manager.

BELOW: Jack G. Real, Hughes Helicopters, Inc. President, addresses the audience during the Sept. 30 rollout ceremonies at the company's Mesa, Ariz., facility.

AH-64 Rollout

(Continued from Page 99)

The APACHE Assembly and Flight Test Center currently is equipped to produce a maximum of 15 AH-64A's a month on a 1½ shift-per-day, five-day-week basis. The plant is designed for expansion to meet higher production rates and concurrent production of more than one aircraft type.

For the record, Stephan Hanvey, HHI's chief experimental test pilot, put the first production APACHE through a series of high performance flight maneuvers following the rollout — eight years to the day after this aircraft became the first prototype APACHE to fly.

The first prototype will soon be used to train Hughes Helicopters' production test pilots and Army production acceptance pilots. IIIII

THE ARMY TEAM

Four key members of the "Army Team" who assisted in the fielding of the first production AH-64A APACHE are shown at the Mesa, AZ, rollout. They are, left to right, COL Donald P. Wray, PM, TADS/PNVS; LTG Robert L. Moore, DCG, Research, Development & Acquisition USA DARCOM; BG(P) Charles F. Drenz, Program Manager, Advanced Attack Helicopter; and COL Stanley D. Cass, PM—HELLFIRE/GLD.

BELOW: With the curtains drawn open and the center curtain, a mammoth American flag, raised on high, some 30 Hughes Helicopter employees, representating the full HHI work force at Mesa, stand beside the first production "bird" and receive a well-earned round of applause from the rollout attendees.

USA
1984 HELICOPTER TEAM

TRADOC offers Benning as site

Reporting for **BG(P) Robert F. Molinelli**, the DA Army Aviation Officer and a member of AAAA's International Affairs Committee, **MAJ James G. Richards** indicated that the USAF had expressed an interest in participating in the U.S. Team effort at the **1984 World Helicopter Championships,** and that the USN and USMC were uncertain at this time regarding participation.

Briefing AAAA Nat'l Executive Board members at their 19 Oct. business meeting, he said TRADOC offered to have Ft. Benning serve as the site for the August-September, 1984 Competitions. The project, which at present is being monitored at the Army staff level, awaits a final decision by OSD on underwriting. There has been no response to date by the "commercial side" of the house (HAI, AHS, industry) regarding participation in or underwriting of any part of the 1984 WHC.

While Committee member **LTG HWO Kinnard** expressed doubts that the State Department would invite Warsaw Pact participation in light of the Korean airliner incident, the USSR's role in the '84 Olympics may provide an early clue. Other Board members expressed the view that France (Aerospatiale), Italy (Agusta), and West Germany (MBB) could field commercial models, and that both Canada and Mexico might consider participation at a U.S. site. IIIII

**Delivering More Firepower,* 24 Hours a Day,
Than Any Other Helicopter in the World.
AH-64 APACHE**

Hughes Helicopters, Inc.
Culver City, California 90230

* Armament shown is for typical U.S. Army Mission options. Nearly 2 1/2 tons of armament payload is available. 1000 lbs per weapons pylon. Numerous armament options available.

Calendar

DECEMBER						
M	T	W	T	F	S	
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4	5	6	7	8	9	
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31						

APRIL						
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23	24	25	26	27	28	29
30						

AUGUST 1983

■■ AUG 25. Air Cavalry Chapter. Late afternoon professional-business meeting. MAJ Bill Filippini, Sr VP, guest speaker. Chapter goals, programs, and plans. Ft. Knox O-Club.

■■ AUG 27. Stuttgart Chapter. General membership meeting and "Carolina Bar-B-Q". Non-members invited. Nellingen O-Club.

SEPTEMBER 1983

■■ SEP 9. Taunus Chapter. Fall "social"—FREE keg beer and snacks. Ballfield, Maurice Rose AAF.

■■ SEP 13. Delaware Valley Chapter. "Beef and Beer". Raffle prizes. Knights of Columbus, Crum Lynn, PA.

■■ SEP 15. Army Aviation Center Chapter. Professional-social meeting. Keg beer and snack foods. COL Ernest F. Estes, Director for Training Developments, USAAVNC, guest speaker. Ft. Rucker O-Club.

■■ SEP 20. Washington, D.C. Chapter. Kickoff meeting and dinner event. Honorable James R. Ambrose, Under Secretary of the Army, guest speaker. Ft. McNair O-Club.

■■ SEP 21. Jack H. Dibrell (Alamo) Chapter. Professional dinner meeting. LTG Edward A. Partain, CG, Fifth U.S. Army, guest speaker. Ft. Sam Houston O-Club Main Ballroom.

■■ SEP 21. Combined Arms Center Chapter. Professional-business meeting (Members only). MG Crosbie E. Saint, Deputy Commandant, CGSC, guest speaker. Classroom 97, Bell Hall.

■■ SEP 22. Suncoast Chapter. Professional luncheon meeting. MG James C. Smith, Ret., AAAA Nat'l President, guest speaker. MacDill AFB O-Club.

■■ SEP 24. Morning Calm Chapter. Fall general membership meeting. Dunk tank, raffle prizes, aircraft display, Industry display. Mongolian Bar-B-Q, FREE Beer and Soft Drinks. Camp Humphreys, ASH Hangar.

■■ SEP 27. Aloha Chapter of Hawaii. General membership meeting. Daedalians, Aloha Flight 28 as special guests. Static display of aircraft. Cocktails and dinner at Wheeler O-Club.

■■ SEP 29. Air Assault Chapter. Professional-social meeting. FREE hors d'oeuvres. Chapter elections. BG Ellis D. Parker, ADC, 101st Abn Div, guest speaker. Ft. Campbell O-Club.

■■ SEP 29-30. Bonn Area Chapter. Professional-social meeting with separate Ladies Program. MTU in Friedrichshafen on Thursday; Dornier, Immenstaad on Friday.

OCTOBER 1983

■■ OCT 4. Citadel Chapter. Joint professional meeting with AUSA. MAJ Frank Leggio, guest speaker. Jenkins Hall Auditorium.

■■ OCT 5. "Follow Me" Chapter. Professional-social dinner meeting. Sergei I. Sikorsky, Sikorsky Aircraft Division, guest speaker. Ft. Benning O-Club Main Ballroom.

■■ OCT 11. Ft. Bragg Chapter. Profesional luncheon meeting. Clifford Holgate, Program Manager, Boeing Vertol Company, guest speaker. Ft. Bragg O-Club.

■■ OCT 13. Washington, D.C. Chapter. Profesional luncheon meeting.Justus "Judd" P. White, Staff Aide, HASC, guest speaker. Quality Inn, Pentagon City.

■■ OCT 18. Rhine Valley Chapter. Professional-social gathering. Sergei I. Sikorsky, Sikorsky Aircraft Division, guest speaker. Mannheim O-Club, BFV.

■■ OCT 20. Lone Star Chapter. General membership meeting. COL Ed Lethcoe, APID, ODCSPER, DA, guest speaker. Coors Hospitality Room, Austin, TX.

■■ OCT 20. Ft. Hood Chapter. Professional Organizational Meeting in honor of Aviation Hall of Fame Members. COL Ed Lethcoe, ODCSPER, HQDA, guest speaker. Ft. Hood O-Club.

■■ OCT 21. Jack H. Dibrell (Alamo) Chapter. Luncheon-general membership meeting. COL Ed Lethcoe, Chief, APID, ODCSPER, HQDA, guest speaker. Ft. Sam Houston O-Club.

■■ OCT 22. Checkpoint Charlie Chapter. Chapter dinner meeting and "Social". Short business meeting followed by dinner and dancing. Berlin Golf Course.

■■ OCT 29. Fort Indiantown Gap Chapter. Business-social dinner meeting. Presentation of the "Aviation Soldier of the Year" Award. A band for your dancing pleasure. Community Club Ballroom, Bldg. 9-65, Ft.Indiantown Gap.

NOVEMBER 1983

■■ NOV 1. Combined Arms Center Chapter. Professional Meeting. COL Ron Adams, Chief, Aviation Branch, and LTC Steve DeVault, Majors' Assignment Officers, Aviation Branch-MILPERCEN, guest speakers. Marshall Auditorium, Bell Hall.

■■ NOV 5. Lindbergh Chapter. Second Annual President's Dinner Dance. Music for your dancing pleasure. Stadium Club, St. Louis, MO.

■■ NOV 5. USAREUR Region. Fourth Annual Army Aviation Ball. Heidelberg Officers' Club, Patrick Henry Village.

■■ NOV 6. Corpus Christi Chapter. Pre-Game Survey Cowboys-Eagles Football Game. Includes Round-Trip Transportation, Your Hotel Room, and Game Ticket! For AAAA Members! Cowboys' Stadium.

■■ NOV 9. Aloha Chapter of Hawaii. Dinner Ball in Commemoration of the First Combat Action of Army Aviation. Schofield Barracks O-Club.

■■ NOV 17. Bonn Area Chapter. Professional luncheon meeting and candlelight dinner at Achum Officers' Casino. Dave Woods, Singer Company, Link Flight Simulation Division, guest speaker. Bueckeburg, "The Home of Germany Army Aviation".

■■ NOV 18. Corpus Christi Chapter. AAAA Barbecue and Dance. Music by the "Jukebox Cowboys". B.Y.O.B. Moravian Hall.

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TRADOC Commander tells AAAA to make Branch the right choice

GENERAL William R. Richardson, Commander of the U.S. Army Training and Doctrine Command(TRADOC), Fort Monroe, VA, speaking at the quarterly meeting of the AAAA's Army Aviation Center Chapter, on Oct. 13, challenged the new Army Aviation Branch to ". . . formulate doctrine, develop tactics, and conduct training that will rival anything that has ever been done in TRADOC."

GEN Richardson told his 300-plus audience that Army Aviation has altered the contours of battle and that it promises to be of even greater importance in the future. "The Army that can harness the lethality and exploit the mobility of helicopters in the next war will gain and maintain a big advantage," he said.

The four-star general discussed the strengths and weaknesses of the Army and defined aviation courses to capitalize upon strengths to overcome weaknesses.

A tremendous advantage

"Aviation," he said, "embodies more of the principles of AirLand Battle than any of the other combat arms. For some time the speed, firepower, and maneuverability of aviation have given it a tremendous advantage over ground-maneuver elements.

"What the Army needs from you now is thinking and training to match. However, first-rate thinking and training, like first-rate weapons and aircraft, cannot be produced, Aladdin-like, overnight. You might begin thinking today.

"Begin by taking the lead in developing doctrine and tactics to employ attack helicopters, air cavalry, and air assault in new and innovative ways. You must study and write so that you can design the organizations, determine the weapons requirements, formulate the doctrine, and develop the tactics, techniques, and procedures which enable soldiers to train and fight to achieve the greatest benefit on the battlefield."

GENERAL WILLIAM R. RICHARDSON

GEN Richardson said his main priority as TRADOC Commander is training. "I am convinced," he stressed, "that the main function of an Army in peacetime is the training and education of soldiers and units for war.

"Sheer speed of thought"

"Aviators," he continued, "must train to take risks and fight a high payoff brand of mobile war. Young officers must be taught not only to shoot and fly, but to integrate mobility and firepower in combined arms, to think ahead, to improvise, and to take risks when risks can render some decisive advantage or induce the collapse of enemy forces. The salient characteristic of aviation must be sheer speed of thought and action on the battlefield."

GEN Richardson also cautioned his audience: "Branch status presumes your willingness to become expert in a wide array of areas relating to aviation proponency. But I do want to emphasize that unless you maintain the proper perspective, you can easily lose your cohesion and identity with the rest of the Army. The proper role of aviation is to help achieve the Army's purpose of be-

(TRADOC/Cont. on Page 111)

October 31, 1983 Issue Advertisers

NEXT MONTH: The November 30 issue will carry the professional-personal listings of some 736 Aviation Warrant Officers (AWO's) in the "1983 Who's Who in AWO Aviation" detachable centerfold insert as well as an eight-article, in depth look at the new "Aviation Logistics School" featuring an overview written by Major General Aaron L. Lilley, Commanding General, Eustis, Virginia.

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I certify that the statements made by me in this statement dated September 16, 1982 are correct and complete.

—Dorothy Kesten
Managing Editor

TRADOC

(Continued from Page 109)

ing prepared to fight and win a war."

The general concluded his talk by saying that Army Aviation has a noble tradition:

"The message of that tradition is clear. It says you have a vast community of supporters who are proud of their service to the Army and to Army Aviation, and who expect you to share their pride and to continue their good work.

"Will you permit Army Aviation to be condemned by the complexities of this new frontier, or will you capitalize on the promise that is clearly there?

"The hour of decision is at hand, and you must help your branch make the right choice." IIIII

(Ed. Note: GEN Richardson was the Nov. 8 keynote speaker at the joint AAAA-AHS HELMOT 1 Specialists' Meeting that was held recently at Williamsburg, Va. (See Page 87).

THANKS!

(There was a helping hand!)

The staff of the magazine would like to express its appreciation to Mrs. Thyra V. Bonds, a key official in the Office of the Project Manager for Aircraft Survivability Equipment, for her assistance in providing us with the extensive editorial material in this special issue. Mrs. Bonds, a GS-14 assigned to AVRADCOM who's also served as a National Vice President of AAAA for the past two years, helped to develop the basic editorial plan with the PMO, coordinated with the various agencies on getting proper copy clearances, and expedited the flow of material, photos, and charts. Translated, all of the foregoing simply means this: "Thyra, thanks for digging into the real nitty gritty and doing a fine job while you were about it."—*Art Kesten*