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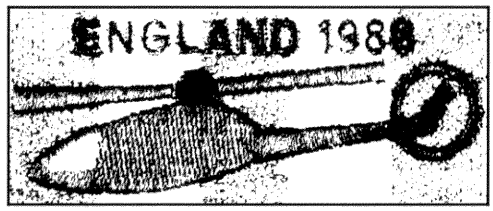

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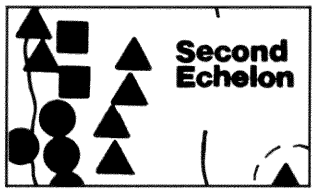

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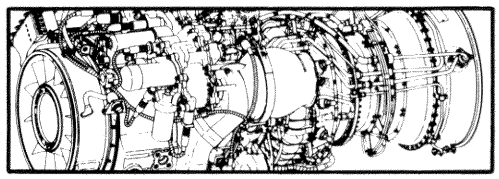

A TOTAL SYSTEM FOR BATTLE

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Honorable John O. Marsh Jr.
Secretary of the Army

Major General Ellis D. Parker
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U.S. Army Aviation Center

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Assistant Commandant
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Editor

The mission of the *U.S. Army Aviation Digest* (USPS 415-350) is to provide information of an operational, functional nature concerning safety and aircraft accident prevention, training, maintenance, operations, research and development, aviation medicine and other related data.

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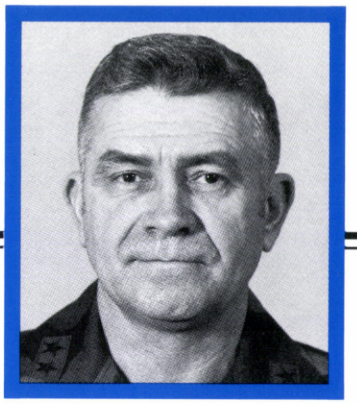
Major General Ellis D. Parker
Chief, Army Aviation Branch



Directorate of Aviation Proponency

The mission of Army Aviation is to find, fix and destroy any enemy through fire and maneuver, and to provide combat support and combat service support in coordinated operations as an integrated member of the combined arms team. This unique, threefold mission must be considered in all we do. We must be ever cognizant that our daily work is vitally tied to fighting and winning on the battlefield. Let me cite aviation proponency as an example.

First, a brief history to set the stage: The creation of the Army Aviation Branch in April 1983, was followed in September by activation of the Aviation Proponency Office (APO). Then, to fully meet the management and professional development needs of aviation personnel, APO was incorporated on 12 May 1986 into the Aviation Center's newly formed Directorate of Aviation Proponency. As Aviation Branch chief, I am responsible for aviation proponency and exercise this responsibility through the new directorate. Colonel Willis R. Bunting was appointed as our first and current director.

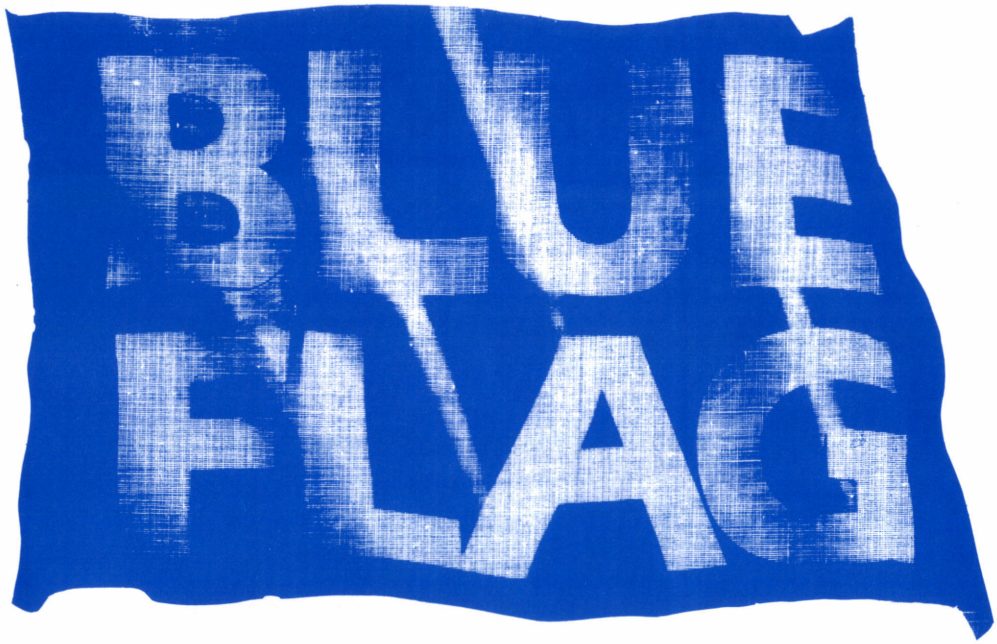
The work of Colonel Bunting and his staff is significant because Army Aviation now has an expanded and critical role in developing personnel management policies. These will directly affect the force structure, force management and professional development of all aviation soldiers.

But how does aviation proponency relate to the battlefield? Aviators fight battles with antitank missiles and aircraft. Directorate staff personnel use pencils and computers. Their main battle is often labeled the battle of fatigue and is fought sitting, while "flying their desks." Attack soldiers may nod in agreement, but let's go a little deeper and use a random example to show the battlefield link.

During the past year, aviation proponency people were key players in recommending and outlining a system to more specifically classify Army warrant officer positions by detailed military occupational specialty (MOS) data. This data is based on a combination of skills, knowledge, abilities and experience needed for each position. The aviation warrant officer MOS classification restructure is now being implemented and will be completed by next March. As a result, we will be able to more rapidly and precisely fill positions with those people who have the skills and qualifications necessary to accomplish the battlefield mission.

Also, the aviation proponency staff is designing the Army Aviation Personnel Plan (A^2P^2) to provide Army Aviation a master plan that effectually meets current and projected force strategies and complements the Army Aviation Modernization Plan. A^2P^2 will encompass personnel considerations for all ranks: commissioned officer, warrant officer and enlisted. As envisioned, this initiative will help Army Aviation Branch managers accurately project personnel requirements and thus field the expertise needed on the battlefield.

Do directorates and their daily staff actions relate to the battlefield? We must be certain our answer is *always yes*! Fighting and winning, in all its complexity, is our mission and our commitment to excellence.



A Unique Joint Training Opportunity

Major Richard J. Ross
4441st Tactical Training Group
Eglin Air Force Base, FL

CONCURRENT WITH the development of air-land battle doctrine and the Joint Initiatives generated by the Army and Air Force Chiefs of Staff, there has been an increased emphasis for some type of training vehicle and systematic instruction to develop and evaluate interservice coordination channels among the Army, Air Force and other services. Further requirements were added to exercise these joint procedures regularly outside of large unified command war games.

Responding to these needs, the commanding general, Training and Doctrine Command (TRADOC); commanding general, Forces Command (FORSCOM); and commander, Tactical Air Command (TAC), agreed to support courses of instruction in joint and combined operations and to provide the facilities and people needed to test, exercise and evaluate these procedures.

The 4441st Tactical Training Group (TTG), commonly referred to as "BLUE FLAG" (BF), developed the exercise to meet the requirements needed to introduce the BLUE FLAG program in December 1976. The 4441st TTG developed training for tactical combat and support force battle commanders, emphasizing interoperability of command, control, communications and intelligence in a realistic threat environment. BLUE FLAG simulates an operations plan in a real-world locale using friendly and enemy order of battle data, contingency plans and concepts of operations. Each exercise also includes use of simulated real-world national collection assets.

Though carefully detailed, each scenario allows battle commanders the flexibility to initiate free play and to employ the latest theater specific concepts, equipment and procedures. The exercise requires the development and management of objectives, training, support and analysis activities.

Each exercise's credibility is reenforced by using current U.S. and Allied documentation and hosting

advisory teams composed of representatives from that particular theater—depending upon the regional scenario. The exercises are conducted four times a year and usually run 9 days.

The first exercise (BF 77-1) was held in December 1976, when people from the Tactical Air Warfare Center (TAWC), Eglin AFB, FL, were deployed to Shaw AFB, SC. Since 1979, the exercise has been located at Hurlburt Field, FL, next to the Air Force Air Ground Operations School (AGOS). The 4441st, in conjunction with the 4442d Tactical Control Group, which provides equipment and facilities for the exercise, starts the planning phase a minimum of 4 months prior to the start of each exercise. Onsite coordination with theater command units is made by selected members of the 50-plus officers and enlisted assigned to BLUE FLAG. Among those are four full-time Army soldiers assigned to the Army Advisory Group (AAG). Although assigned to the Combined Arms Training Activity of Ft. Leavenworth, KA, AAG is the primary liaison from TRADOC to TAWC, with duty as part of the 4441st. AAG advises TAWC about Army matters and coordinates Army participation in BLUE FLAG.

Army participation has increased greatly over the last few years. The importance of ground operations to drive the air portion of the air-land battle was recognized early in the development of BLUE FLAG. Army involvement has increased proportionally.

Exercises have been conducted with as few as 20 Army players to a high in BF 85-3 of 452, including elements of Third Army, XVIII Airborne Corps, and a notional corps made up of soldiers from TRADOC and FORSCOM. No matter what the level of Army participation, from field armies to schools and centers to individual response cells, soldiers are trained in joint operations covering U.S. and Allied battle staff functions. Army players also participate in joint air-land battle decisionmaking processes and real-world problems of implementing plans/orders in the joint/combined force arena. BLUE FLAG also provides training for the corps tactical operations center staff or Army staff, with the associated Air Force liaison air support operations center or tactical air control party.

BLUE FLAG is not restricted to active units. It has included the 87th Maneuver Area Command (MAC) of Birmingham, AL; the 75th MAC of Houston, TX; and the Alabama National Guard. A Memorandum of Agreement on FORSCOM/TRADOC participation, signed in 1981, evenly divides the number of exercises over the year to allow equal participation from both commands.

Although BLUE FLAG is an Air Force, TAC-sponsored exercise, Army participants receive numerous training benefits such as:

• *Theater Awareness:* BLUE FLAG conducts seven theater-specific exercise scenarios. Theater war plans, threat estimates, general defense plans, concepts of operations and appropriate standing operating procedures are used to build a command and control exercise with most of the command and control structure under one roof.

BLUE FLAG coordination center.

• *Joint Procedural Operations:* This is the most significant benefit to Army participants. Procedures taught in the Air Force AGOS, the Command and General Staff College and the advanced courses are practiced with Air Force counterparts deployed to augment intheater forces. Soldiers receive theater-specific training in one or more of the following areas: tactical air support to include close air support; air interdiction; reconnaissance; tactical airlift; electronic combat; joint suppression of enemy air defenses; joint intelligence; Army airspace command and control; electronic warfare; command, control and communications countermeasures; and air defense.

• *An Exchange of Information Among Services and Branches:* Army and Air Force players are joined in selected exercises by Navy and Marine participants.

This provides an excellent quorum to exchange ideas on doctrine and operational procedures. Soldiers from the Transportation Center at Ft. Eustis, VA, are now an integral part of the Army scenario, being needed to help effectively drive the airlift and transportation requirements for Army elements and the Military Airlift Command. The Army Aviation Center, Ft. Rucker, AL, observes BLUE FLAG maneuvers for possible introduction of Army Aviation and airspace management procedures. Ft. Devens, MA, is considering providing students from its intelligence analyst and electronic warfare courses to participate as an end-of-course augmentation to its program of instruction. Each year, one exercise is made up entirely of students from the Command and General Staff College, and another is composed of students and instructors from TRADOC's service schools and centers.

• *Services coordination:* Through joint briefings, interservice reports and personal interface, Army players learn with the other service players how a combined war is fought in a specific theater.

• *Job Related Experience:* BLUE FLAG, in conjunction with TRADOC and the Military Personnel

A camouflaged control unit in the field.

Center (MILPERCEN), is trying to identify people who will be assigned to theater-related jobs played in the BLUE FLAG program—thus providing them the opportunity to participate in an exercise and get job-specific training before they actually arrive intheater. A Korean scenario is scheduled each year in June to train those who are on permanent change of station orders to Korea. A 9-day temporary duty en route delay is required to take advantage of this training opportunity.

• *Cost:* Since TAC provides facilities and support for each exercise, the Army only pays for per diem, travel and lodging.

The operational and training benefits that can be derived from BLUE FLAG are innumerable. BLUE FLAG is a unique, relatively low-cost joint procedural training opportunity that provides benefits to the Army that cannot be obtained elsewhere.

Editor's note: Requirements and procedures needed to apply for AGOS courses are listed in Department of the Army Pamphlet 351-4, "Army Formal Schools Catalog," as 2G-F36 (BSC and 2G-F37/250-F11) (JFCC). Army quotas are controlled by the Deputy Chief of Staff for Training, U.S. Army TRADOC (ATTG-MPS), Ft. Monroe, VA 23651-5000, AUTOVON 680-2161. Quotas are sub-allocated by TRADOC as follows: Active Army, MILPERCEN, AUTOVON 221-8100; Army National Guard, National Guard Bureau, AUTOVON 584-4789; U.S. Army Reserves, FORSCOM, AUTOVON 558-2715.

Requests for attendance should be processed through unit training personnel. Additional information or assistance can be obtained by calling the USAF AGOS Army element at AUTOVON 872-6889, Commercial 904-884-6889.

BLUE FLAG SCHEDULE

86-1	4–11 Dec 85	Korea	12AF/22AF/FORSCOM/87MAC
86-2	9–16 Apr 86	NATO CR	TAC-wide/21AF/TRADOC CGSC
86-3	3–10 Jun 86	Korea	12AF/22AF/FORSCOM/TRADOC
86-4	17–24 Sep 86	AFNORTH	TAC-wide/22AF/TRADOC
87-1	3–10 Dec 86	USCENTAF	9AF/21AF/3d Army
87-2	1– 8 Apr 87	NATO CR	TAC-wide/21AF/TRADOC CGSC
87-3	3–10 Jun 87	Korea	12AF/22AF/FORSCOM/TRADOC
87-4	21–28 Sep 87	USCENTCOM	9AF/21AF/3d Army
88-1	2– 9 Dec 87	5 ATAF	TAC-wide/14AF/21AF/TRADOC
88-2	6–13 Apr 88	NATO CR	TAC-wide/21AF/TRADOC CGSC
88-3	15–22 Jun 88	Korea	12AF/22AF/FORSCOM/TRADOC
88-4	20–27 Sep 88	USCENTCOM	9AF/21AF/3d Army
89-1	Dec 88	6 ATAF	TAC-wide/14AF/21AF/TRADOC
89-2	Apr 89	NATO CR	TAC-wide/21AF/TRADOC CGSC
89-3	Jun 89	Korea	12AF/22AF/FORSCOM/TRADOC
89-4	Sep 89	USCENTCOM	9AF/21AF/3d Army

The Defense of the World Helicopter Championship Title

A Triumph of Excellence

This article consists of highlights I have selected from my diary that I kept while traveling the road with those who formed the U.S. Precision Helicopter team to compete in the Fifth World Helicopter Championship competition last June. I intend it to convey a glimpse of the spirit of this accomplishment, and the dedication to excellence exhibited by this group of Active and National Guard soldiers, who all belong to Army Aviation.

CW3 E. Daniel Kingsley
Department of
Gunnery and Flight Systems
U.S. Army Aviation Center
Fort Rucker, AL

3 January 1986. I arrived at Ft. Rucker, AL, and checked in with the team commander, Lieutenant Colonel Robert E. Harry, before starting my duties with the support group creating the U.S. Army Precision Helicopter Team (USPHT). This group had been building the USPHT framework since November 1985.

6 January. I walked into the training cell and found 'ol Pappy (CW4 Charles Proctor) with his feet up on the desk and his '81 helicopter championship hat tipped back on his head. He chuckled about the fuss I made over that hat—sort of smiled as he listened, took the hat in his hands and turned it carefully, almost studying it. I told him how proud I was to be a part of this team—to take part in something so important.

"You know," Pappy said quietly, "You're preaching to the choir. You don't know the half of it." He turned away and stared at that hat. "You have to see our flag go up over the winners before you can understand," he said.

2 February. I attended the pilot inbriefing for the Ft. Rucker flyoff competition. This event will help the staff work out the bugs of the logistics involved supporting the National Competition.

3 February. The Ft. Rucker flyoffs started. Event 1 (timed arrival and rescue) went without a hitch. *(This is flying over a 70 km course, capped by putting a bottle through a .6 m x .6 m hole in a mock roof.)*

4 February. Event 2 (precision hover) also went well. *(Flying forward, backward and to each side—making 360-degree turns at two corners of a 50 m square quadrangle in less than 2 minutes at a specified height. Weights suspended from the helicopter measure accuracy.)* Tomorrow's Event 3 (long navigation) was scrubbed for the day in favor of Event 4 (slalom course),

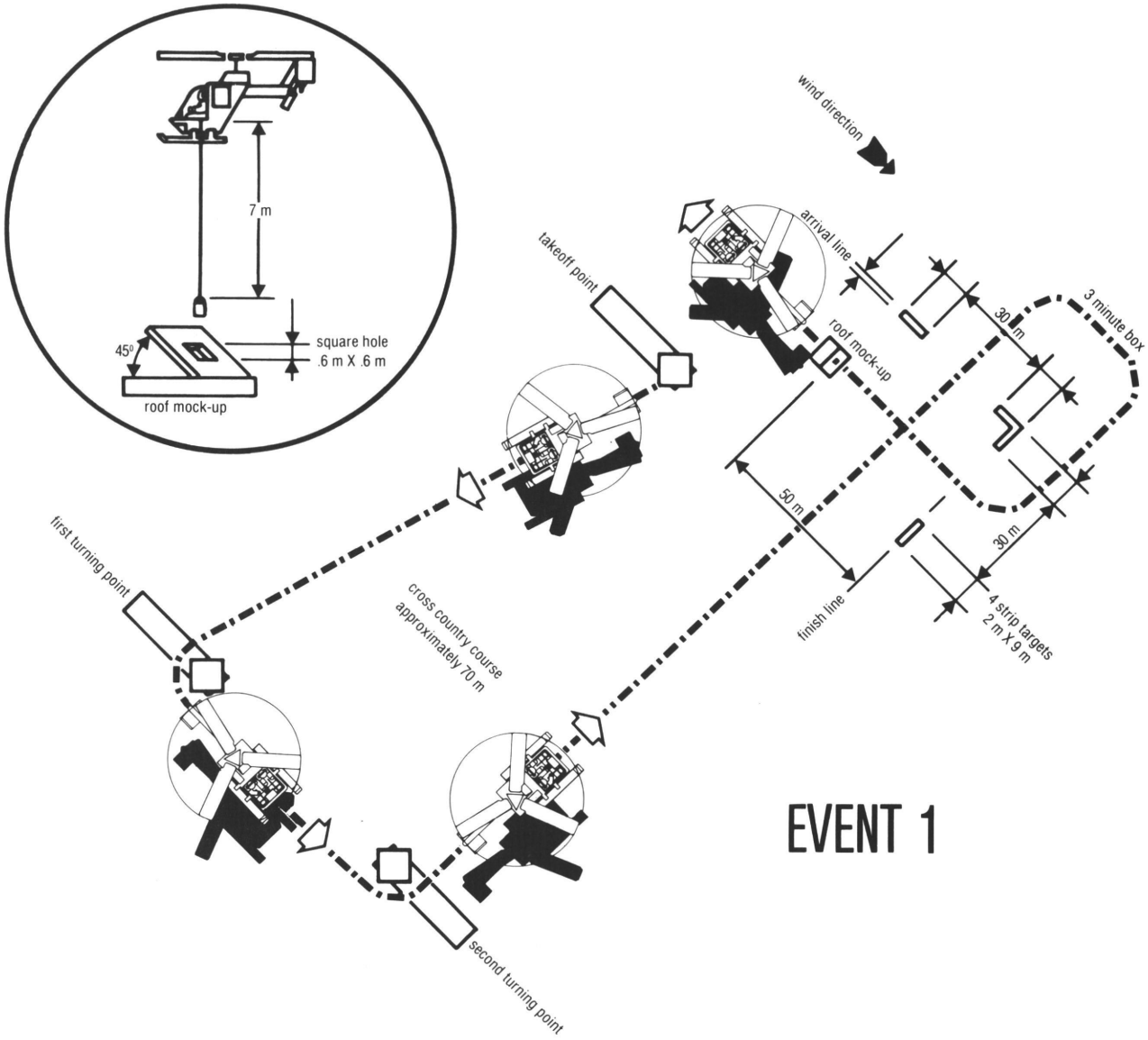


FIGURE 1: National flyoff results.

Place	Pilot	Copilot/Navigator	Total Points
1	CW2 Raymond D. Kent	CW2 Patrick H. King II	591
2	CW2 James A. Maddox	CW2 Howard H. Fancher	527
3	CW2 Jon A. Iseminger	CW3 Jimmy A. Green	511
4	CW3 Don "Earl" Jewkes	CW2 Gary R. Reed	510
5	CW3 James R. Church	WO1 Hal G. Harless	507
6	CW2 George W. Egbert	CW2 Paul W. Hendricks	462
7	CW4 John E. Loftice	CW2 Kenneth W. Wright	448
8	CW2 Noel C. Seale	CW2 Michael C. Pascalar	446
9	CW2 Thomas R. Schaefer	CW3 James E. Smith	413
10	CW2 Donald G. Andrea	CW3 Michael D. Spalding	384
11	CW2 John P. Law	WO1 Steven G. Gray	374
12	Mr. David J. Clark	CW2 Thomas P. Reynard	354
13	CW4 Leslie R. Carlson	CW3 Wayne L. Spell	320
14	CW2 Roger H. Brown	WO1 Jonathan W. Rider	314
15	CW2 Robert G. Mota	1LT Wayne R. Sass	311
16	CW2 Howard C. Arnold	CW4 James E. Jackson	306
17	CW3 Thomas C. Schultz	CPT Michael Powell	298
18	WO1 Albert J. Maes Jr.	1LT John A. Perkins	284
19	CW2 Jamie L. Martin	WO1 Dennis W. McKinney	270
20	CW2 Boyce J. Bingham	CW2 Lowell E. Neese	267
21	CW2 Robert A. Ward	CW2 John M. Fore	234
22	CW3 Steven R. Satar	CW2 William R. Tompkins	231
23	CW3 Colin S. Hudson	CW2 Randy E. Hann	166
23	CW2 Charles D. Beard	CW2 Nigel K. Sapp	166
24	CW2 Maurice A. Pinkney	1LT Thomas W. Charron	139
25	Mr. Michael K. Hynes	Mr. John A. Price	109
26	Mr. Patrick M. Hynes	Mr. Mark A. Latimer	47

because of forecast bad weather. *(Event 3: A five-part map and reconnaissance flight over a 120 km course without use of instruments. Crews are given details of the flight 5 minutes before takeoff. Event 4: Slingloading a bucket of water through 12 gates and setting it on a specified target. Points are lost when water is spilled or gates are missed.)*

5 February. The slalom went well. All aircraft participated without any mishaps.

6 February. We completed Event 3 today. We went to Wheelless Airport in Dothan, AL. Despite bad weather, we got out on time and finished the course without missing a minute.

9 February. All competitors and judges met in Murphy Hall at Ft. Rucker to discuss tomorrow's National Competition here and the rules for all events.

10 February. Events 1 and 2 were postponed because of bad weather.

11 February thru 13 February. All events went smoothly. The National Helicopter Championship results are on page 7 (figure 1).

14 February. This morning the National awards ceremony was held at the Ft. Rucker Officer's Club. Winners of the top eight positions were introduced.

23 February. All of the guys are still getting used to having made the team. Major General Ellis D. Parker, the Army Aviation Branch chief and commander of the Aviation Center at Ft. Rucker, talked to us—outlining the degree of his support for the team and how he had become involved. Each staff member spoke, in addition to yours truly (aviation safety officer), flight surgeon Captain (P) (now Major) Winston K. "Doc" Martin, and LTC Harry. All were told to be at the gym next morning for weigh-in and physical training (PT) test. We will be running 6 miles a day. We began breathing hard, strictly in the spirit of anticipation.

25 February. The PT test was a challenge. After a 2-mile run, we got to force-march the balance of the 6 miles. Then we flew Events 2 and 4.

26 February. Today we ran from the gym at a choppy, fast pace that had the guys in the rear worried. We ran around two corners and met the "ugliest trio" of confidence course instructors you ever saw. We went through a Ft. Rucker course while demonstrators worked the obstacles. Then we did the course ourselves. Twice!

5 March. CW3 Nick Walters, training cell officer, was pretty bold in his comments about some folks who were late for this morning's briefing. So this afternoon's debrief time came and went. Lo and behold, Nick was late. The door was promptly locked and his arrival expected with great glee. Soon he attempted to open the door, and then started banging on it, *loudly!* After it was opened, knowing his goose was cooked, and somewhat embarrassed, Nick swaggered into the room and turned to face the class. "I'm not gonna forget this," he drawled. After the appropriate amount of hooting, the meeting proceeded.

6 March. Met MAJ Stephen G. Kee today, the copilot/navigator of the 1981 World Champion crew. (CW3 George D. Chrest was the World Champion Helicopter Pilot.) MAJ Kee offered to share his experience with the team.

7 March. LTC Harry came into my office today, and sort of banged around for a few minutes.

A panorama of aircraft used in the competition on display for Prince Andrew's visit. First row (far right)—Soviet helicopters, second row—German helicopters, third row—U.S. helicopters, fourth row—British and Polish aircraft, and fifth row—British aircraft.

Our conversation covered weather, team pressure and a few other topics before we discussed the team. We spoke of the whys and hows of the team, individuals and how they fit in the picture. He said that he didn't dream up the PT to be busy, but wanted it to be the focus of any anger or frustration from the start. He believes that this will help maintain a relatively free flow of communication among the crews.

The boss recognizes the peer group leaders and commands with a "carrot and a big stick." When word is passed that the commander wants to see a crew, you can see the weight of it on the crew concerned. I have seen him work this business (the group dynamics) in the CAV at Ft. Lewis, WA, perhaps with less intensity, but it fits his style. Judging from the pilots' reactions to PT and his counseling sessions, he is their sole common denominator. Communication among the crews is, to say the least, open and relaxed.

10 March. Gary Reynolds was killed in a UH-60 Black Hawk accident this evening. He was a 38-year-old WO1 who was easily as superior a new warrant as I ever knew. He was respected and liked by all who knew and worked with him. Gary was a pillar in the planning and execution of the first 2 months of the staff's existence. We are keenly aware of our loss.

11 and 12 March. This is 2 days in a row that weather "benched" us.

14 March. We ran our first complete 6 miles today, in 52 minutes. All hands made it. Flights and training are moving right along.

17 March. We're still running —5 miles today.

I was sitting in the snack bar at Hanchey over lunch when someone mentioned that one of the competitors at the 1981 Polish World Helicopter Championship competition got lost, flew too low through someone's sacred airspace (only a little low, so the story went) and was fined $10,000. Everybody fidgeted a bit over that, but CW3 James A. Maddox stood up, conspicuously, and loudly said, "Man, I just hate that."

As anyone with an aviator ego knows, it's just not cool to find yourself in any situation without some answers. You could almost see the single question sweep through the minds of those present: "What is this guy talking about?" But, in accordance with standard aviator procedure, every poker face remained frozen. Jim would have no part of that. He stood up, so all could see, and said, louder, "I mean, I just hate that, $10,000 fines and all." Then he sat down, as if he didn't care, and didn't care if anyone else cared.

Everyone then turned to watch Jim, and wondered what the heck he was up to. Having captured their attention, he leaned forward from his chair, and took one last look around the room just to be sure everyone was tuned in. "Shucks," he drawled, "I only take a hundred thousand cash on these outings. Ten violations—and I've been had!"

The place went to pieces.

26 and 27 March. Phase I flyoffs went well. We're ready for Phase II tomorrow.

7 April. The first "Broken Bucket Award" was presented to crew #99 (CW2 Raymond D. Kent and CW2 Patrick H. King II) for the briefcase which blew out the back seat of their aircraft. This rather uncoveted award was patterned after the traditional CAV "Broken Saber Award," given periodically for exceptional brain stall. The award was one of the old slalom buckets, which looked sort of like it had been the

CW3 Nick Walter, Training Cell OIC
CPT Wendy Lageman, S4
CPT Bobby Hanna, S1
CPT Wesley Walters, S3
CW4 Charles "Pappy" Procter, Training Cell
CW2 Bob McConnell, Training Cell
CPT (P) Winston K. Martin, MD, Flight Surgeon
CW3 Dan Kingsley, ASO
CW3 George Chrest, 1981 WHC Champion Pilot
LTC Robert E. Harry, Commander

FIGURE 2: Staff members.

The entire U.S. Precision Helicopter Team and staff. FRONT ROW, left to right: SFC Clay H. Kimrey, SGT Chuck Harvey, SFC Robert Howe, LTC Robert E. Harry, SFC Douglas Kratz, SSG James D. Harley, SFC James M. Hopper, CW3 E. Daniel Kingsley.
ROW 2: SSG Terry Jones, SSG Anthony Giannantonio, SFC Manuel F. Perez, PFC Patricia Connell, SGT Richard R. Manuel, SSG Joseph D. Harris, CW4 "AK" George Adkison.
ROW 3: CPT Bobby G. Hanna, GS-3 Sara Berkeypile, CPT Wendy R. Lageman, CPT (P) W. Keith Martin, M.D., CW3 Nick P. Walters, CPT Wesley F. Walters, CW4 Charles "Pappy" Proctor, CW2 Robert "Bob" McConnell.
ROW 4: CW2 Gary R. Reed, CW3 Don "Earl" Jewkes, CW2 Howard H. Fancher, CW3 James A. Maddox, CW2 Patrick H. King II, CW2 Raymond D. Kent, CW4 John E. Loftice, CW2 Kenneth W. Wright.
TOP ROW: CW2 Jon A. Iseminger, CW3 Jimmy A. Green, CW2 Noel C. Seale, CW2 Michael C. Pascalar, CW3 James "Rick" Church, WO1 Hal G. Harless, CW2 Paul W. Hendricks, CW2 George W. Egbert.

bullseye for a grenade range. Ray and Pat were somewhat embarrassed, but took the ribbing well.

8 April. Flew with CW2 Noel C. Seale and CW2 Michael C. Pascalar today. They work well together, and accomplish navigation tasks with precision. Both are a crack-up when healthy banter is appropriate. Noel can talk your leg off when he is not competing.

9 April. Bad weather canceled flying. So, the team members took tests on the 5 kilometer zone around Castle Ashby, England, and on international rules.

10 April. Reported to Cairns Army Airfield at 0345, flew to Atlanta and attended the Army Aviation Association of America (AAAA) convention luncheon.

U.S. Final WHC Standings	Crew #	Pilot	Copilot/Navigator	Crewchief
1st	77	CW2 Jon A. Iseminger (Ft. Rucker)	CW3 Jimmy A. Green (Ft. Rucker)	SSG Anthony Giannantonio (Ohio National Guard)
		Event Scores—1: 199; 2: 200; 3: 185; 4: 185; Total: 769.		
4th	99	CW2 Raymond D. Kent (Ft. Rucker)	CW2 Patrick H. King II (Ft. Rucker)	SFC Clay Kimrey (North Carolina National Guard)
		Event Scores—1: 194; 2: 197; 3: 185; 4: 179; Total: 755.		
5th	33	CW2 George W. Egbert (Texas National Guard)	CW2 Paul W. Hendricks (Texas National Guard)	SFC Manuel F. Perez (Texas National Guard)
		Event Scores—1: 196; 2: 197; 3: 178; 4: 180; Total: 751.		
6th	44	CW3 James Church (Ft. Campbell)	WO1 Hal Harless (Ft. Campbell)	SGT Chuck Harvey (Maine National Guard)
		Event Scores—1: 185; 2: 187; 3: 188; 4: 164; Total: 724.		
13th	88	CW3 James Maddox (Ft. Rucker)	CW2 Howard H. Fancher (Ft. Rucker)	SFC James F. Hopper (North Carolina National Guard)
		Event Scores—1: 198; 2: 190; 3: 88; 4: 192; Total: 668.		

FIGURE 3: World Helicopter Championship final standings.
Each event score is based on a possible 200 points, thus making the grand total a possible 800 points.

We were warmly greeted. LTC Harry briefly discussed the training, pressure and the effort we were making. The entire crowd stood and gave us a standing ovation. It was a powerful moment, which we needed. Our routine was beginning to wear on us. I felt it, and I'm only a rear echelon guy. The AAAA luncheon really picked us up.

14 April. Today, CW3 Walters took the initiative and presented LTC Harry with the "Broken Bucket Award!" It was a scream! The whole mission briefing was in stitches, and over the colonel's mock objections it got louder and louder. He finally went up to "claim the award," and reminded us that he was looking for another worthy recipient. I think this prank did more than any other thing to weld the team together.

18 April. This morning's brief was sort of funny. A police captain called the S3 and asked if we had any aircraft working in a nearby area, which we did. The S3 assured the policeman, without waiting for more info, that we had obtained the right to land in all the panel areas. The policeman assured the S3 that this was a different sort of problem. It seems that one of the drop panels was about 200 meters from a house that was staked out by police who suspected it as a center of drug traffic! Imagine what the police, or suspects, would think of eight aircraft dropping packages at that panel!

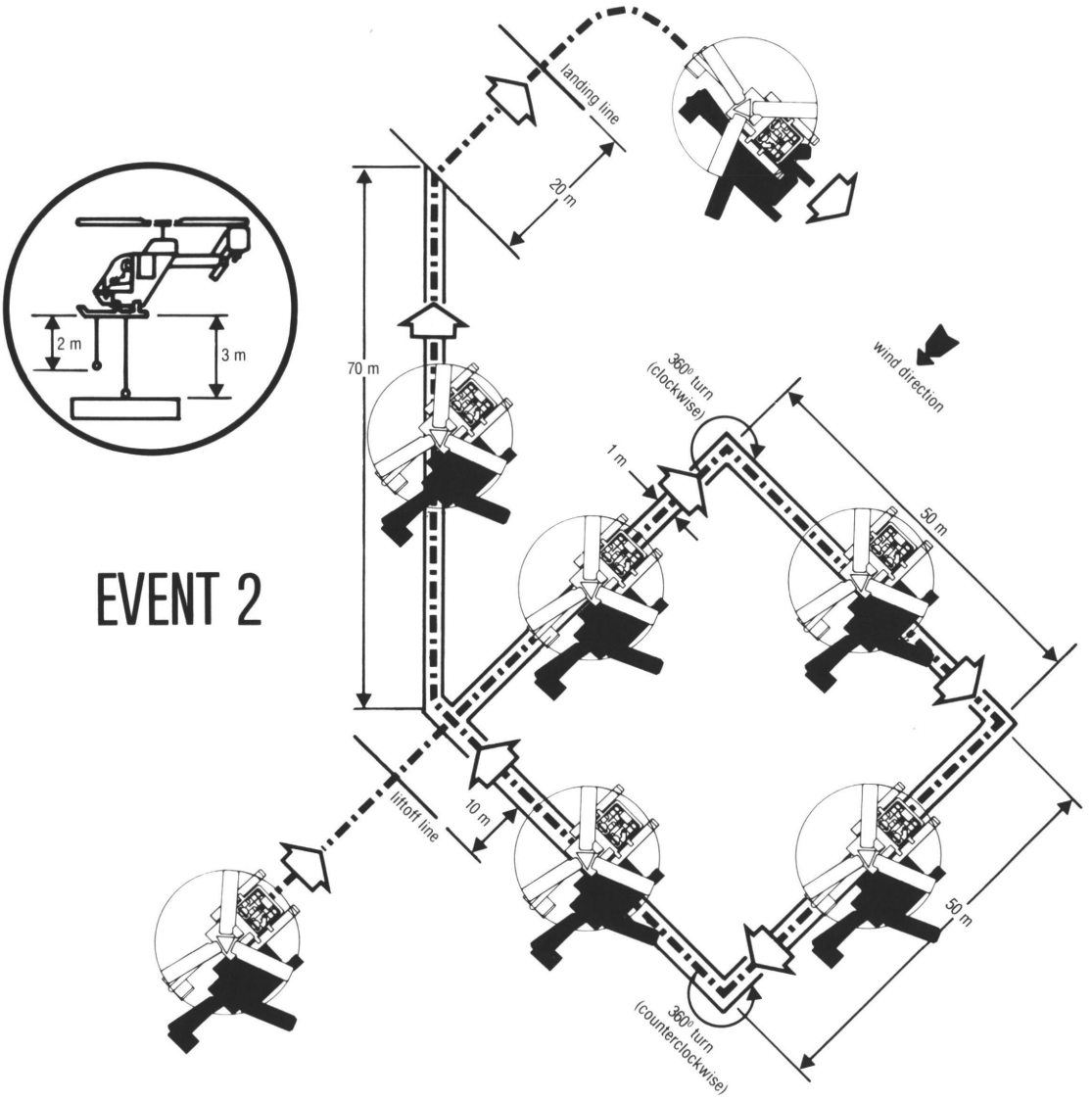
22 April. Today we are *funded!* The team really needed the news, because funding had been a big stress factor. Until today we were not assured of funding.

25 April. Today Phase II flyoffs ended. Bring on Phase III!

28 April to 2 May. TEAM LEAVE!

13 May. Flew with CW4 John E. Loftice and CW2 Ken Wright. These two don't waste time in communicating—each has his own duties for each event. Ken, youngest on the team, is confident in his ability, and has the absolute confidence of his pilot, John. Ken was very good about sharing his methodology with me: He uses a nearly standard clip board and keeps his organization simple.

15 May. Today tension reared its ugly head. One of the pilots



stood up and hollered during the brief. He was just under a lot of pressure. He'll settle down. The team members *all* feel the pressure, and show it in their own ways.

16 May. Briefed a practice run for the Armed Forces Day Flyoff at Ft. Rucker. Then, the official team photos were shot.

17 May. The Armed Forces Day Flyoff went well (the accident prevention people are happy).

2 and 3 June. Phase III flyoffs are completed with things going well. We're just about ready to go to England.

7 June. I reported to building 5701 at Ft. Rucker to catch a 0700 hours bus to the Dothan Airport. After impressive farewells from those who came to see us off and good luck ceremonies at the airport, we boarded an Air Force C-5A and soon were on our way to England.

8 June. We were flown nonstop to Royal Air Force (RAF) Upper Heyford where customs chose two of us for a detailed inspection—CW3 Jimmy Green and myself. Some folks get all the luck, huh Jimmy?

After a long day, we all went to a local pub and enjoyed dinner.

10 June. Rain cancelled PT at 0730. Pilot brief was at 1000 and all the critical folks came to brief us.

Safety and public affairs officers (PAOs) both were there. The commander and I went to PAO and LTC Harry gave the VIP briefing.

Training was canceled for the day, but we did conduct an orientation flight in two UH-1 Hueys.

11 June. LTC Harry called a meeting of the staff group to discuss team pressure. He told us we were responsible for the product now preparing for the WHC. "Team members would not have achieved this level of expertise without your help," LTC Harry said. "The pressure will increase," he went on. "These guys are going to be crabby; you must be happy, smile, offer encouragement. The standard answer is to be, 'I'll take care of it!' No request is unreasonable. There will be moments when you will take a beating, but you must not vent your frustration on the competitors. Major problems should be brought to me, not taken out on a competitor. I am the one who can deal with them," LTC Harry stressed again, then added that he would continue to try to be the focal point of team frustrations, and that the staff must continue to hang in there. He said that as long as the team maintained an "us versus him" attitude, communication and cooperation among team members, and between team and staff, would remain at peak levels. This is essential to a team victory in the WHC.

12 June. Slalom course scores ranged from 125 to 195 out of 200. The average was 174, and the top four scores are considered world class. Event 3 scores went from 168 to 195, and again, most scores were considered good.

13 June. During today's pilot brief, CW2 Paul Hendricks made a comment that helped the crews. He said as crews left the last gate for the table on the slalom course, they stop 15 feet before reaching the table to work out the bucket swing. This means they had to move to the table and stop the swinging *again* before setting the bucket down. Paul reasoned this was costing precious time. He recommended that the crew fly all the way to the table before fighting the oscellation. He recognized that all of the pilots feared overshooting the table, thereby requiring them to back up over it—a difficult and time wasting effort. But concentration on perfecting the timing to fly over the table would pay big benefits.

The U.S. Precision Helicopter Team's support group in front of Castle Ashby. FRONT ROW, left to right, CW4 "AK" George Adkison, CPT Bobby G. Hanna, LTC Robert E. Harry, SSG Joseph D. Harris, CPT Wesley F. Walters, CPT Wendy R. Lageman. BACK ROW, left to right, CW3 Nick P. Walters, CW2 Robert "Bob" McConnell, CPT (P) W. Keith Martin, M.D., SGT Richard R. Manuel, CW3 E. Daniel Kingsley. Absent is CW4 Charles "Pappy" Proctor.

The reigning World Helicopter Champion pilot, CW3 Chrest, arrives tonight. He will work with the team and be one of the WHC judges.

LTC Harry announced that there will be no more PT. The team members sort of chuckled, almost in unison. Not a cheer, not joy, just relief from one more pressure.

The staff polled the crews. Most of them wanted to fly Saturday (tomorrow), so they were given permission to fly the slalom and hover course, and told to schedule their own crewchiefs.

17 June. Today we flew Event 3, starting south of Middle Wallop. I went with "Doc" Martin to place panels. We all had a good day.

19 June. LTC Harry discussed the plan for selection of the top five teams. Tomorrow (Friday, 20 June), after the last crew is down, the staff will meet with the commander and discuss each crew. The commander will consider team scores, overall performance and staff recommendations, which will be made in the following areas:

- Crew scores.
- Crew contribution to the team.
- Crew attitude toward team and each other.
- Crew ability to handle pressure.
- Physical fitness.

Winners will be announced tomorrow evening.

20 June. The teams were reminded that no practice would be allowed before competing today. Also, we were told that the turn points in WHC competition would have judges onsite, so crews should be sure to turn around the outside of the point. The crews will not need to identify the point by plotting it on a map, but must be close enough for the judge to identify them.

The Polish Helicopter Team (right photo) maneuvering through the hover course Event 2.

At about 1430, members of the staff (figure 2, page 10) sat down to discuss the crews' performances. There was a little tension as might be expected. The crews were sent away so the staff could discuss crew performances in private. LTC Harry started discussing crew #33, and pointed at each staff member for individual comments.

The staff members made their pitches. Everybody said great things of #33, Egbert and Hendricks, who scored the highest. They had led the pack since beginning Phase II, and earned their peers' respect by holding first place throughout the train-up, amid good-natured teasing that they were "*only* Guard guys" (Texas Army National Guard).

Each crew was discussed individually. The unanimous opinion was that the Guard guys were *easily* among the top five teams. We didn't record any of these conversations or tally any votes, We waited for LTC Harry's announcement of the top five teams which would defend the USA's title in the Fifth World Helicopter Championship competition.

At about 1845, LTC Harry came into the officer's club room where we were all seated. He gave a brief opening remark about the work, the difficulty of selection and the good job being done. Then he turned to a portable blackboard behind him and wrote "#33." He paused a moment, turned toward us with a puzzled look and said, "What were those numbers again?"

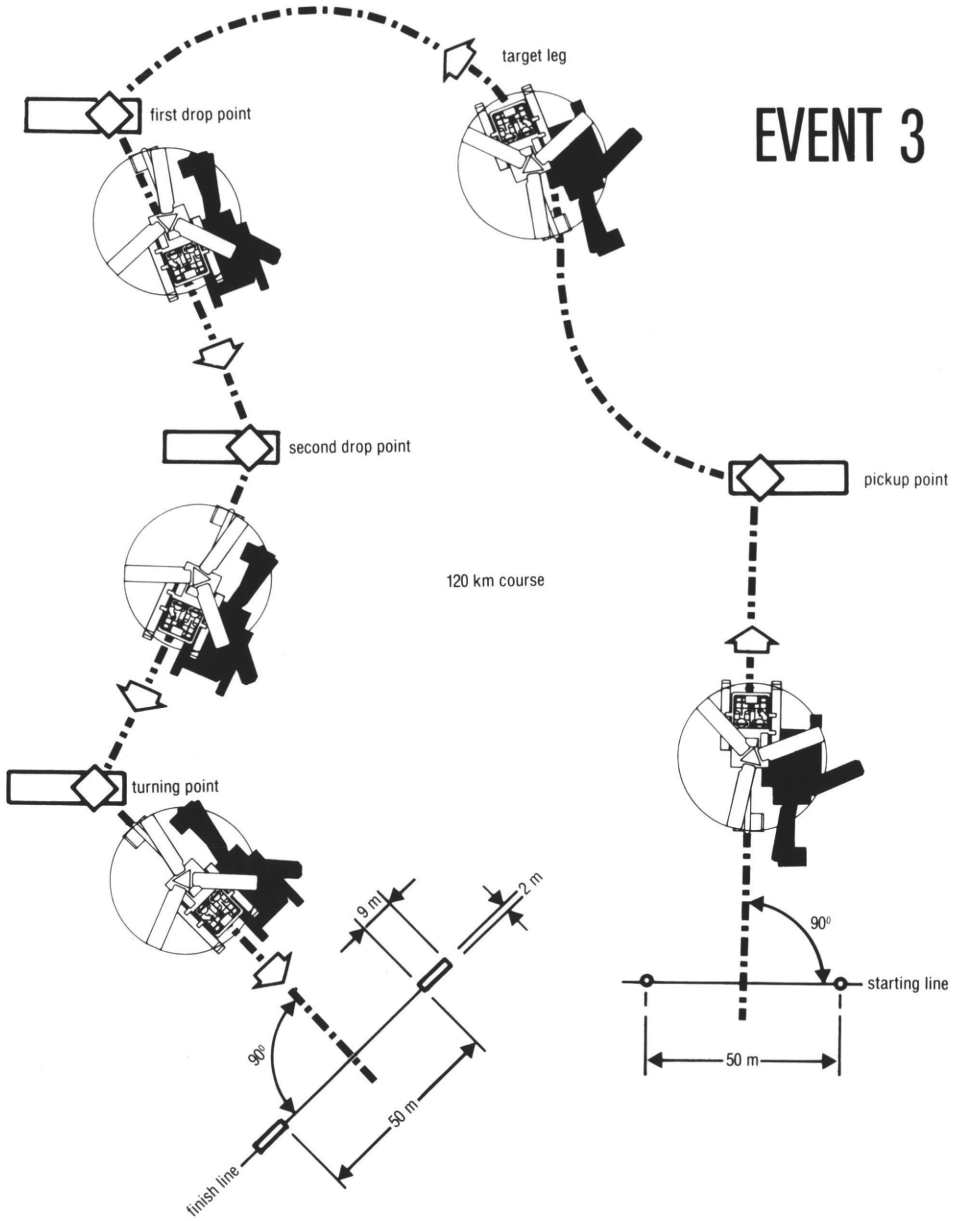
There was a little laughter, but not much, and he turned to write the rest of them: #77, #88, #44 and #99 (figure 3, page 11).

There was a moment of applause, then silence. I believe this was because the crews suddenly realized that someone was left behind, after all this work. One of the gallant men who didn't make the cut, Noel Seale of team #11, stood up after a moment, and waved his beer: "Well—c'mon, fellas! Time to celebrate!" Tension evaporated.

22 June. George Chrest spoke to us. He said we were ready for world class competition and as good as we ever would be. He said, "During the National Competition, when our crews were still novices, skill was 90 percent of the performance; mental toughness was 10 percent. Now, for the World Helicopter Championship, skill is 10 percent, and mental toughness is 90 percent."

George discussed how he dealt with pressure during the 1981 WHC. The night before the event he re-read all rules and bulletins concerning the competition. This gave him an edge during the briefings. It also allowed him to compartmentalize the event, to channel his energy and spend his time waiting in a productive way. He added that:

- After the brief, he would sit in the aircraft and concentrate on the event.
- Except for waiting, the hardest part is hovering to the event.
- He never tried to be first. He always did the best he could to be in the top three in each event. If he could do that, he felt he would win.
- During briefings, we should let the team captain speak—no one else say or do anything. If the rules change, don't "spaz" out. Be flexible. Do not complain to the international judges.
- Crews should not fly to points along the course early, especially the 5-kilometer point.
- To some extent luck will be a factor. For example: a crew's place in the sequence of contestants; or weather changes while flying a course of an event.
- In 1981, a problem developed when Russian judges stood in the chin bubble on the hover course. Don't let something like that rattle us.
- Crews should complete the entire 360 degree turns on the hover course before moving down the corridor, and should watch the heading



changes on the oblique leg.

• He had evaluated every nation's aviators. The Russians are quite good, and so are the Germans.

• After winning, crewmembers should conduct themselves as they want to be seen. They will be watched closely.

Next LTC Harry spoke. He:

• Reminded us that we are unofficial ambassadors of the United States, and that we should conduct ourselves as such.

• Cautioned us to be careful of where we are if we criticize the team, and hoped that such criticism be constructive and a matter of internal business.

• Asked us not to discuss our training prior to the end of our contest. After victory, we can share it with anyone. If we lose, no one will care.

• Told us to make any protests only to him. He, not the crews, would take up any such matters with the judges. The USA would have 8 judges in Event 1; 5 in Event 2; 13 in Event 3; and 4 in Event 4.

• Cautioned the crews not to change the methodology which they have developed for the events; to keep emotions under control, handle changes and march on; to focus on the event; to realize they were ready, mentally and physically.

• Emphasized that the pressure would be intense, and the little things will make the difference be-

ABOVE: The World Helicopter Champions—taken earlier in the train-up phase at Ft. Rucker, AL. At left is CW2 Jon Iseminger and on the right is CW3 Jimmy Green.

LEFT: Chief judges, left to right, Charlotte Kelly, Sergei Sikorsky and Jean Tinsley.

tween winning and losing.

• Stressed not to violate the spirit of competition or pass information about the course to other crews; and to be prepared to react to change.

We arrived at Castle Ashby without incident, and checked into the Moat House in Northampton.

23 June. The International judges decided that since France withdrew from the competition, the USA and Germany each could use two more slots, but that these competitors would be ineligible to win or be listed in the standings. They would be awarded a certificate if they scored well enough, but the score required for this honor was not defined. Crews #22 (Loftice/Wright) and #11 (Seale/Pascalar) filled the USA's two additional slots.

WHC officials announced that in the name of safety the timed arrival and rescue event would be flown with left-hand turns. We objected because we had done only right turns. The senior officials first decided to let the competitors do it either way. Later, in the walk-through of the event, the judges changed their minds again and said it had to be left-hand turns.

Officials also announced that the course was figured at 70 knots, but that the time en route was to be figured by each crew, rounded up to the next minute, written on a piece of paper and handed to the judges before takeoff (this as opposed to

being assigned a time of arrival by the organizer). The senior official was quizzed about that, because the event was supposed to be timed to the second. We never received an exact answer. The crews ended up being allowed to pick the exact time across the arrival line, within limits, and we did well, even with some strange happenings:

Crew #44 (CW3 James Church and WO1 Hal Harless) broke the bottle after having successfully lowered it into the roof-top device. Crew #88 (Maddox and Francher) arrived with a big snarl in its rope, reducing the vertical distance of the bottle from the aircraft to 5 meters.

At the conclusion of today's competition, the USA tied for first and second individual places, and took second place team honors. In the evening, the team attended a party given by the Mayor of Northampton for all the competing teams. We met our competitors face to face for the first time. The evening went well.

Previous World Helicopter Championship Articles

- "U.S. Army Helicopter Team," Reporting Final, April 1981, page 49.
- "World Helicopter Championships, the World's Best," Reporting Final, September 1981, page 22.
- "World Helicopter Champions," Major Bronislaw R. Maca, January 1982, page 2.
- "World Helicopter Championship," Mr. William Hayes, February 1986, page 18.
- "World Helicopter Champions—Ft. Rucker 1986 Finals," Mr. William Hayes, March 1986, page 30.
- "U.S. Precision Helicopter Team—Hail to the Champs," Mr. William Hayes, September 1986, page 2.
- "U.S. Precision Helicopter Team—World Champs," SFC Ed Rolph, page 8.
- "U.S. Precision Helicopter Team—Maintenance Support," SFC Ed Rolph, page 9.

Note: Copies of these articles can be obtained by writing to Editor, *Aviation Digest*, P.O. Box 699, Ft. Rucker, AL 36362-5000; or calling AUTOVON 558-3178; FTS 533-3178; Commercial 205-255-3178.

24 June. The length of the corridors of the precision hover course had to be changed today to accommodate the available space. No 10-foot portion of the course was level, making it quite challenging to fly. The only peculiar twist to the results of this event was that crew #44 failed to cross the finish line and was penalized another 10 points. The event was over by 1700, and the briefing for Event 3 (long navigation) began at 1800.

We were stunned to learn that competitors would not receive the usual route drawn on a map, which would have normally included the curvilinear portion. We were to be given three focal points from which the crews had to draw an eliptical curve. The crews were then supposed to fly it, looking for all the panels. We objected strongly, and LTC Harry stood before the body assembled and repeatedly asked questions. The Russians, seemingly wrestling with a language translation problem, finally came on line with repeated questions, then so did the Germans. The only folks who did not object loudly were the British, who simply took this switch in stride. The protests were refused. The crews felt they knew the basic requirements, but knew they each had to polish the method of drawing the curve before flying the event tomorrow.

All the crewmembers were sort of subdued tonight, though not as badly as I expected. They ate and went to a conference room where they stayed up until around 2330, learning how to figure out the eliptical curve clearly. Their dedication to the team effort was apparent.

25 June. Left hotel at 0830 for Event 3; long navigation. The briefing was short, and we marched right out to plot the magic course line. The first crew onto the course was one of ours, Church and Harless.

The only rough part today occurred when crew #88 (Maddox and Fancher) misplotted one of the focal points, and flew a bad course. They crossed the finish point 2 minutes late, and found only four panels, scoring only 88 points.

26 June. After the WHC freestyle event, we went back and moved all the aircraft to a special parking place for a visit by Prince Andrew and his then fiancee, Ms. Sara Ferguson. They met all of our aviators. They were friendly and interested in each individual. We all were greatly impressed with them.

27 June. A couple of today's ocurrences should be highlighted. Maddox and Fancher came storming back from their poor performance yesterday to top all scoring in the slalom event. Their performance reflected the excellence of the Americans in the competition.

28 June. While aboard the bus at about 0800, en route to the awards presentation, LTC Harry announced the WHC results (figures 3 and 4). We cheered, and made a big fuss over CW2 Jon A. Iseminger, the new World Champion Helicopter Pilot, his copilot/naviga-

Place	Country	Points
1st	USA	2,302
2d	West Germany	2,260
3d	USSR	2,093
4th	UK	1,681

Note: Poland entered one crew, did not figure in team competition.

FIGURE 4. WHC final team standings.

LTC Harry receiving the World Helicopter Championship plaque.

tor, CW3 Jimmy A. Green, and his crewchief, SSG Anthony S. "Tony" Giannantonio of the Ohio Army National Guard.

Iseminger and Green received the Gold Medal for being in first place overall, and a certificate for having the highest score in Event 2, precision hover (200 points). This was the only perfect "200" score for this event.

They also tied for the first place score in Event 1, timed arrival and rescue, with 199 points (missing another perfect performance by only one point).

Kent and King, Egbert and Hendricks, and Iseminger and Green all received certificates for being the #1 WHC team. This honor was given to the three highest scoring crews of the winning team.

Maddox and Fancher received a certificate for the highest score on the slalom event (192 points).

For their outstanding effort, Loftice and Wright received a certificate from the International Aeronautical Federation, the only one of the "spare" crews to be so recognized.

The ceremony was low key. When it was over, everyone was free to give or take rides as appropriate. We flew in formation back to RAF Upper Heyford. It looked terrific, and all the German competitors waved. I wish I had a picture of it.

30 June. After loading, everyone sat around the little O'Club bar while Rick Church took a white table cloth and drew a USPHT OH-58 Kiowa on it (with all the trimmings). It was beautiful. We all signed it and left it there on the wall.

We departed at 2300 hours local on a C-5A for Dover, DE.

1 July. Arrived at Dover Air Force Base, USA, for inspection by customs at 0030 local. After getting showers at a local gym and breakfast at a nearby restaurant, we reboarded the C-5A and flew into Dothan around 0830 local. We got off the plane and, at a special reception, were cheered. We were the center of attention.

2 July. I reported for work 0700. The staff met with LTC Harry in his office where he laid out the priority of the team shutdown. It was aimed at releasing all temporary duty folks as soon as possible so they could return to their homes. There are some rumors of seeing the President, but no firm word.

10 July. We met the President of the United States today, the biggest thrill of my tenure.

CW4 Pappy Proctor, my mentor and sounding board through the hard times on this team, stopped to see me on his way out. He was returning to Georgia to retire next year. Pappy was interested in my thoughts now that the effort was over. He was in civilian clothes, with his 1986 (this time) USPHT ball cap on the back of his head. "Now, Dan," he started, "Do you see what I meant last January? I know the

All of us in the Army Aviation Branch are proud of each of you who were part of the 1986 World Helicopter Championship Team.

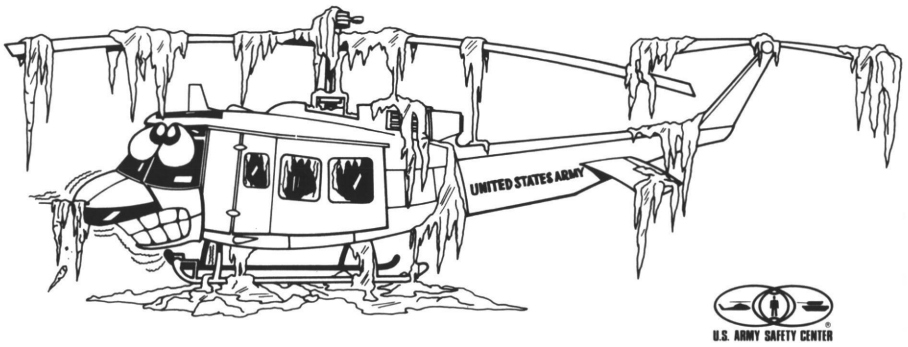
handle
11 m
handle
5 m
28 cm diameter
6 liter capacity
bucket
1 m
5 m
3 m
ground
1 m
gate
30 m
30 m
30 m
30 m
120 m
16 m
20 m
9 m
1 m diameter table
29 m
14 m
40 m
40 m
40 m
40 m
40 m
200 m
10 m
start

EVENT 4

ceremony was low key, but was it all worth it?"

I didn't answer completely, but later I wrote to him: ". . . if I should be asked to do this again, and if I can't find a commander who will let me have blade hours enough to prepare for this event as one of the competitors, I probably would want to come back . . . because the intensity and involvement of this darn business gives me something that can't be described afterall . . . even after seeing the flag go up over the winner.

The Rigors of Winter



October means cool weather, football, leaves turning a myriad of colors. It also means winter is not far away. If your unit has not already started its briefings on cold weather procedures, it soon will. Although units are responsible for conducting thorough training programs in cold weather operations, aviation crewmembers and maintenance people are responsible for protecting themselves against cold weather hazards.

Maintenance and preflight activities can be greatly affected by the cold. It will take more time than usual preparing an aircraft for flight during periods of extreme temperatures. Flight and ground crews move slower and maintenance is slower than normal. Mechanics can lapse into hurry-up attitudes and omit steps they would not think of omitting otherwise. With their attention divided between their work and their growing discomfort, they may honestly think they have completed their work properly when actually they have not. Every step should be checked and rechecked for accuracy.

Cold temperatures and windchill add to the stress of preflight operations. If you're doing your walkaround in 20-degree weather, with the wind blowing hard, you'll tend to rush. Dress so you can give your aircraft the attention it deserves. Clothing should be worn loose and in layers for maximum insulation and retention of body heat. If you get warm, you can remove a layer of clothes. Just as you don't want to be cold, you also don't want to be hot. Overheating causes sweat which, in turn, dampens clothes and dampness reduces the insulation value of clothes. You should remain cool but not cold.

Clothing should also be clean. Dirty clothes lose much of their insulation value. Air pockets in dirty clothes are filled up or crushed, and heat can escape from the body more easily.

Heads, hands and feet present special problems in cold weather. An uncovered head and neck lose heat up to 10 times faster than any other area of the body. Some kind of head covering is essential, and a scarf is a tremendous asset.

The correct fit of shoes, socks and gloves makes the difference between relative comfort for the person on the flightline and frostbitten fingers and toes. Shoes, socks and gloves that are too tight restrict blood circulation and invite cold injuries. When feet get wet, they should be dried and dry socks put on as soon as possible. Each time socks are changed, the feet should be massaged. The inside of boots also should be wiped as dry as possible.

Hopefully, you won't ever have to use your survival gear. But you must be prepared in case you do. First of all, be sure you have signaling devices with you—and be sure your passengers know where to locate them in case you aren't able to tell them after a crash. These signaling devices should be in your cold weather survival kit, which should be in your aircraft during all flights in cold weather. Signaling skills could mean the difference between rescue and death. If one method fails, use another.

A recent U.S. Air Force review of actual winter survival episodes indicated that death was most likely under the following conditions. The crewmembers:

- Wore inadequate clothing for the climate,
- Was injured and
- Had little knowledge of proper winter survival techniques.

If you are not soon rescued, protection from the cold becomes a problem. Don't try to live in the air-

craft. You need a shelter that is well insulated: Snow is a good insulator.

Get a fire going as soon as possible. Standing dead trees make the best firewood because they are reasonably dry and produce less smoke. Dry grass will burn longer if it is gathered in bunches and knotted together. To get maximum benefit from the fire, make some sort of reflector to radiate the heat toward you. A reflector can be fashioned from trees, logs, metal from the aircraft, or most any material that is available.

To prevent cold injuries and hypothermia, you must stay dry. If you get wet, change into dry clothes or dry your wet clothes. Keep your sleeping bag dry and clean by using some type of insulation, such as plenty of branches, underneath it.

Your survival kit should contain combat rations for at least 3 days. If you need more food, you can fashion snares and traps to catch small animals. If there is no food available, remember you can survive several days without food.

To prevent injuries and stay warm when it's cold, remember **C O L D:**

C—for cleanliness and care. Clothing, feet and socks are warmer when clean. Constant care of the feet is essential.

O—for overheating. Overheating will rob heat through sweat and result in dehydration and coldness.

L—for loose and layered. Loose layers of clothing ensure circulation and insulation. Adjust the number of layers to the temperature and activity.

D—for dry. Dry clothes are essential to heat retention. A wet garment is a cold garment.

Even if you are prepared for the cold, you can still fall victim to hypothermia and cold weather dehydration. Hypothermia describes the rapid, progressive mental and physical collapse that accompanies chilling of the vital organs. It is caused by exposure to any combination of cold, wetness and wind and is aggravated by exhaustion.

Hypothermia is the lowering of the body core temperature (temperature of the vital organs: heart, lung, brain, etc.). To function properly, the body core temperature must be 98.6 degrees Fahrenheit. A shift of half a degree can cause illness, fever or chills. Shifts of 5 degrees in either direction can cause life-threatening problems.

Victims of hypothermia will be aware of feeling cold. Some may realize they are becoming clumsy, but most will not be aware of what is happening to them. As skin temperature drops, sense of touch and pain decrease; muscles and their motor nerves are weakened. Shivering produces heat, but it also consumes energy. If it is intense and prolonged, it can result in exhaustion.

Continued heat loss produces:

- Violent and uncontrollable shivering,
- Speaking difficulty,
- Sluggish thinking and
- Amnesia.

Advanced heat loss results in:

- Muscular rigidity,
- Erratic heartbeat and labored breathing,
- Unconsciousness and, finally
- Death.

Signs of hypothermia include:

- Uncontrollable fits of shivering,
- Slurred or vague, slow speech,
- Incoherence,
- Lapses in memory,
- Fumbling hands,
- Frequent stumbling or lurching gait,
- Drowsiness and
- Apparent exhaustion.

The best treatment for hypothermia is rapid warming, and protective clothing is the best defense against hypothermia.

You need 2 to 3 quarts of water a day to prevent dehydration. If you are doing anything physical, you need to increase your water intake. Drink water before you become thirsty. Drinking warm water will prevent loss of body heat. Warm the water in a container over a fire or by holding it close to your body.

If drinkable water is not available, you can melt snow or ice; preferably ice, because it will yield more water by volume. If you must melt snow by heating, it should be compressed before it is put in a container. Never eat snow, however. Both snow and ice absorb a large amount of energy (heat) from your body in order to convert them to a liquid state.

Insensible water loss (sweat absorbed by clothing), obvious sweating and increased urination all affect water requirements.

A person can easily follow his state of hydration by checking the "snow spots." Deep yellow, orange or brown urine indicates the need for more water. Other signs of dehydration are slow motion, no appetite, nausea, sleepiness and a higher than normal temperature. This will be followed by dizziness, a dry mouth, tingling in the arms and an inability to walk.

Only through knowledge of cold weather problems and careful planning can you deal with the rigors of winter.

PEARL'S

Personal Equipment And Rescue/survival Lowdown

PRC-112 Battery Safety/ Performance Requirements

Although the new PRC-112 survival radio is quite a way down the pike, perhaps we should be looking at possible battery storage requirements.

A meeting was recently convened by the Tri-Services to discuss PRC-112 battery safety/performance requirements. Issues discussed at the meeting affect the high temperature storage requirement of the PRC-112 and are passed along for information, in order that you may be aware of what is coming down the pike. Lithium cells are designed to vent in storage temperatures beginning at 200 degrees Fahrenheit. The feature is designed to prevent serious accident or injury due to battery explosion when the battery is exposed to extremely high temperatures. Chemical degradation occurs at temperatures beyond 200 degrees Fahrenheit that could cause a catastrophic explosion.

A thermal switch will be placed in the battery to prevent internal heat buildup; this will reduce the high temperature limit at which the battery can be stored. The thermal switch in the PRC-112 battery will be designed to open at 190 degrees Fahrenheit, ±5 degrees Fahrenheit. This will maximize the high temperature storage capability as much as possible, provide a safety margin before reaching 200 degrees Fahrenheit, and fulfill safety requirements, preventing thermal buildup during radio operation.

This article is provided for advance information and as a courtesy of PEARL. Source of information is: Message R202050Z May 86, ASD Wright-Patterson AFB, OH.

Thanks for the Memories and Terrific Support

From time to time I am sure you may hear some rumors concerning ALSE. Best to ignore rumors and be assured that the ALSE area is alive and well. We have orchestrated a second to none ALSE program and will continue its support. PEARL is moving right along and continues to give excellent support in this critical area.

What are some of our accomplishments?

- A skill identifier code for warrant officers qualified in ALSE has been approved and is identified as 1F.
- A skill identifier of Q2 is approved for all enlisted personnel who have participated in and graduated from an ALSE approved school of instruction.
- We are pushing for the establishment of career ALSE military occupational specialties. We are getting good support in this area.
- We have many ALSE schools and continue the training of personnel in ALSE worldwide.
- Officer/warrant officer training in ALSE is scheduled to become part of the Aviation Maintenance Management Officer Course at Ft. Eustis, VA. This course will provide attendees with necessary information on ALSE maintenance, inspection and repair, which will result in better support to the ALSE user.
- Sixth U.S. Army has an ALSE Western Region Survival and Escape/Evasion School at Camp Rilea, OR. The school is sponsored by the Sixth U.S. Army and the Oregon Army National Guard is primarily responsible for training of Reserve Forces. Requests for attendance can be submitted through your training officer.

Survival

We are flying over the ocean and are wondering—what would happen if we experience failure of a critical aircraft component! One thing is certain, we'll be going down.

We now become concerned, how will we handle this one. "No sweat," we say. "The airborne rescue unit should be overhead shortly. They'll take care of us."

Not so fast Bubbie. Don't bet your last dime on a speedy recovery. Search and rescue (SAR) recovery

PEARL, Dawna Salazar, shows us a well-planned storage locker for SPH-4 helmet replacement parts. To the right of the locker is an expended TOW missile launcher that has been set up for storing a hot weather survival kit for AH-1s.

units will get to us as soon as they are notified of our emergency, but it just doesn't happen that quick. Best that we concern ourselves about our survival plan and putting it into effect. Here are some considerations that can be practiced before you are faced with a survival problem: Become familiar with FM 20-151, "Aircraft Emergency Procedures Overwater"; use your survival radio and don't forget the advantage of that good ole ELT; the emergency locator transmitter will continuously send out your position until you turn it off. It is an important electronic signaling device and is even more useful with the new search and rescue satellite (SARSAT) recently commissioned. SARSAT can fix your position to within 6 nm within 30 seconds after your ELT or your survival radio beacon mode transmission is received.

Environmental Exposure. Retaining your body heat is a most important consideration. Know where your life raft is and get into it. Don't swim to your raft—pull it to your position. Antiexposure suits really do help as the chart points out.

As shown in the chart, without antiexposure suits and with possible loss and/or malfunction of your raft, you can easily get into trouble fast. (Why do some units ever consider requesting waivers from wearing these lifesaving suits?) Even if the rescue aircraft is directly overhead as you hit the water, you have to get into the raft to limit exposure, chances are slim that someone will be dropped into the water to assist you, *even if you are injured.* Additional rafts and supplies will be dropped to you as soon as possible. But do not leave the raft, even if they drop you a 20 man/woman raft and you can get into it, remember to keep your one man/woman raft. By using the smaller raft inside a larger floatation device, you will be better able to insulate yourself from the elements and retain your body heat.

Time of Useful Consciousness in Antiexposure Suit

water temperature	with suits	without suits
50°F	up to 8 hours	65 minutes
40°F	3 hrs, 45 minutes	30 minutes
30°F	1 hr, 50 minutes	15 minutes

Conserve Survival Equipment. Using your ELT and survival radio, you will have up to 18 hours or more of continuous use. *Remember* to turn off the ELT before you attempt to use your survival radio. Conserve drinking water. Once the SARSAT picks up your distress signal, the recovery phase of rescue will be initiated immediately. Air traffic control (ATC) will notify appropriate rescue control centers; they will alert the nearest SAR assets to find you and effect a rescue. Additionally, rescue forces can request maritime control agencies to divert maritime shipping for your recovery. Pickup by surface vessel is the most likely method of extraction from the water. Perhaps you have heard that precautionary airborne search and rescue escort missions have ended. That's true. Now, SAR assets will only respond to actual emergency/distress situations. Although you may feel less comfortable because of this recent change, you can conclude from the above discussions that *your actions* are the key to your rescue/survival. In fact, some advantages can be gained since the regional SAR control center can focus all of its available assets and its capabilities on the recovery effort.

Hopefully, this article will "tickle" your concern and enhance your personal attitude toward overseas/overwater flight. Credit for portions of this article is given to *TAC ATTACK*, Major Denny Granquist, HQ TAC/DOXD, and PEARL.

If you have a question about personal equipment or rescue/survival gear, write PEARL, AMC Project Officer, ATTN: AMCPO-ALSE, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798 or call AUTOVON 693-3817 or Commercial 314-263-3817.

VIEWS FROM READERS

Editor:

The enclosed poem (below) was written by my son as an English assignment in the Lake Braddock Secondary School, Fairfax County, VA. Doug's English teacher was impressed, so I thought the poem might be worthy of publication. Therefore, I am submitting it for consideration by the *Aviation Digest* staff.

LTC William J. Wallace
Springfield, VA

An Ode to an Army Helicopter Pilot

He came from the West,
And no one could deny,
That he did his best
As he flew into the sky.

As the sun rose,
The green glow of the instrument panel faded.
The search for the hostile village closed
As the enemy waited.

As the firing began,
He knew he had been hit.
Knowing he had to land,
Hoping that everything would be copacetic.

Going down, God flashed in his mind.
He wondered if he could shake God's hand.
Even though they hadn't had time
To talk; he hoped God would understand.

By Doug Wallace

Editor:

The Army Aviation Association of America's (AAAA) National Convention will be held 8 to 12 April 1987 at the Tarrant County Convention Center in Ft. Worth, TX.

For more information contact Lynn Coakley at AAAA, 1 Crestwood Road, Westport, CT 06880, or call Commercial 203-226-8184.

Editor:

The article "COBRA GOLD '85" in the April 1986 edition of *Army Aviation Digest* was read with interest and simpatico in our work center. There was one disconcerting note however. The picture of the UH-1 on page 19 showed, that while that "CAN DO" spirit is alive and well in the maintenance department, there is a lack of respect for sound safety practice.

The individual on top of the cabin in shorts and tennis shoes: Where is his supervisor? Where are his safety shoes? Where is safety? Another question is, why are we changing a single blade with a B-4 stand, while what appears to be a perfectly good chain fall hoist is left idle? A much safer proposition than manhandling a 200+ pound blade.

There are times for our maintenance department personnel to learn field expedient measures, but there is always time to do the job safely. Keep up the fine publication.

GYSGT E. S. Napoleon
U.S. Marine Light Attack
Squadron Helicopter 269
Jacksonville, NC

Editor's Note: Thanks to GYSGT Napoleon for his letter and comments. We fully agree with him.

Editor:

I couldn't have agreed more wholeheartedly with CW2 Charles E. Butler's article (May 1986 issue), "Army Aviation—Trained to Fight?" Being in the National Guard, a Reserve Component, makes for any training time a premium, let alone something as important as combat training. Things like training areas and weapons ranges cannot be taken for granted in an area where the flight facility is right in the middle of a large civilian metropolis.

A solution for combat training exists for Reserve Component aviators with little or no increase in money under our present, newly augmented AFTP [aircrew flight training period] program. All that's required is some more work to get the job done and emphasis from our commanders with implementation of a good schedule. We need a dedicated unit tactics/threat officer with no other duties but that. And we need a full day's work schedule (2 AFTPs) to have enough time to get the job done.

CW2 Bill Radovich
DET 1, HHC, 33d Inf Bde
ILARNG

Editor:

I started my Army Aviation career in August 1967 at Ft. Wolters, TX. I've spent 9 years flying in an Active Duty status, including two tours in Vietnam, and 10 years flying as a Reservist and National Guardsman. I've been a line pilot, a platoon leader, an aviation safety officer, a unit commander, an instructor pilot (IP) and an aviation staff officer. During these 18 plus years I think I've seen or heard of just about every possible way to crash an aircraft and have seen a myriad of fixes applied

to bring down the accident rate within Army Aviation.

I believe the average aviator in the field is as frustrated as anyone when it comes to the skyrocketing accident rate. However, there seem to be serious misgivings in the Army Aviation program when it takes an hour-and-a-half to complete the paperwork for an hour-and-a-half flight. It is the frustration of the aviation bureaucracy that has emerged over the past several years that compelled me to put my thoughts on paper.

Let's face it, when Army Aviation goes to war the current required procedures that precede each flight will be canned in short order. In combat, though, there is also a desire to prevent accidents. Possibly a safety program could be developed for peacetime use that would carry over to a wartime scenario. If Army Aviation is going to train the way it fights, it also should apply this axiom to aviation safety.

From my vantage point I firmly believe that there are no new cause factors for aviation accidents, and the ways to prevent aircraft accidents from happening have not changed since invention of the airplane or helicopter.

Many aspects and agencies within the Army must be continually monitored if the aircraft accident rate is to be lowered. One of the areas I believe needs to be closely monitored is personnel assignments. It amazes me how the Army can assign a bunch of kids fresh out of flight school to fill units under commanders with limited aviation experience, expect them to train to combat readiness and not expect units to have accidents. It can't be done. If units are going to have an acceptable accident rate there needs to be an equitable mix of experience with new blood, and unit commanders need to have reached an experience level that indicates competency in knowledge and performance of the units' missions prior to being allowed to command. The fact that commander designees are IPs also doesn't necessarily indicate how well the job will be done. If commanders are performing their jobs properly, they won't have time to instruct and the knowledge they gain from the IP course won't have a significant impact on how they run their units. In my opinion experience at section and platoon positions will better prepare young officers for company commands. The more experienced in the unit mission, the more they know what's right and what's wrong and, weighing all factors, what needs to be done to keep from crashing aircraft.

Command emphasis always has been a deciding factor in aviation accident prevention and it always will be. But, aviation commanders must be able to show competency in their trades if they hope to generate the respect and confidence from the aviators under them.

Of equal importance to the accident prevention program is aviator standardization and unit training. They go hand in hand. Individual aviators need to know their aircraft, what it can do, what it can't do and what to do if something goes wrong so they can get the aircraft on the ground with minimal problems. Aviators also must be aware of their limitations and know what they can and cannot do in the types of aircraft they are flying. It is the IPs' responsibility to monitor the aviators and to ensure that they follow published procedures. The IPs also must have a feel for the capabilities of individual aviators and so advise the chain of command. If an aviator is weak, the IP must provide training to bring the individual up to standards or recommend other action. Commanders and their chains of command have the responsibility for training toward combat readiness. Training must be conducted by the safest means possible, yet ensure that all aviators are ready for combat, and that they make their aircraft perform within design envelopes, while training to that end. Violations of published procedures and regulations must be dealt with quickly and sternly to avoid repeat performances.

Strong chains of command and unit standardization programs, to me, are the keys to aircraft accident prevention. Without them, units are almost sure to have higher than average accident rates. You can institute procedures for aviators prior to their climbing into the cockpits, but if the units do not have a handle on how they fly the aircraft on any given mission, the basics are lost.

It seems the aviation community is overreacting in areas that are unnecessary in the hope that some magic button will be found to eliminate accidents. This may come from frustration at the Department of the Army level, pressures on a peacetime Army, or inexperience at the policymaking level. Whatever the cause I believe a back to basics approach to accident prevention is needed. A UH-1 is not a very complicated aircraft to fly and when you need to take a pilot in command checkride in each seat to fly the aircraft, something is being lost in the translation. This is but one example of the present shotgun approach. There are many others that can be cited. Whoever is making policy needs to apply some commonsense to the aviation safety program. The aviator is being so encumbered with unnecessary restrictions in the name of aviation safety that training time is being lost, training is becoming unrealistic and when Army Aviation does go to war it will take 6 months before unit effectiveness can be achieved because of the present and ever-increasing ties.

MAJ (P) John W. Sutch
Assistant Aviation Officer
79th Army Reserve Command
NAS Willow Grove, PA

*Articles from the **Aviation Digest** requested in these letters have been mailed. Readers can obtain copies of material printed in any issue by writing to: Editor, **U.S. Army Aviation Digest**, P.O. Box 699, Ft. Rucker, AL 36362-5000.*

Operator's Manuals and Checklists

Mr. Wilburn James
Directorate of Evaluation and Standardization
U.S. Army Aviation Center
Fort Rucker, AL

IN OUR CONTINUING effort to improve operator's manuals and checklists, we are initiating a new concept in the way we conduct our user review conferences.

In the past, we sat around conference tables and cussed and discussed and rewrote sentences and paragraphs that were not wrong—but in the view of the participant—could be better written. This in itself is not wrong and in some cases it is indeed good. But, the conference table practice is extremely time-consuming and usually the results adopted are based on the views of those who argued loudest and longest. Also, in some cases procedures and paragraphs too often are being rewritten at each user review conference. This is because attendees are never the same group of people.

Having the same participants at every review conference would cut out unnecessary discussion and fewer unnecessary changes would be generated. But, this is not possible, due in part to the need to rotate Army personnel among several jobs. So, a new user review conference format will be tried.

You still will be asked to send in a DA Form 2028 through proper channels when you discover an error or any information that may reflect on safety of flight. But, the entire operator's manual no longer will be discussed page by page, or paragraph by paragraph. The group will review only proposed changes submitted through channels and received prior to the conference.

As stated on the table of contents page of the operator's manual, "You can help improve this manual. If you find any mistake or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Commander, U.S. Army Aviation Systems Command (AVSCOM), ATTN: AMSAV-MPSD, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798. A reply will be furnished directly to you."

St. Louis promptly forwards DES at the Aviation Center, Ft. Rucker, AL, a copy of your DA Form 2028. If the recommendation appears to be of an urgent nature, AVSCOM, to minimize the time delay of formulating a safety-of-flight message or an urgent change, calls the Aviation Center and the proposed change is discussed. But, DES strongly recommends that when you discover an error or develop a better procedure, that you discuss it with your unit standardization instructor pilot and commander to get their concurrences and recommendations on your proposal.

Rest assured that the moment your DA Form 2028 is received, it will be carefully reviewed and if it warrants an urgent change or a safety-of-flight message, one will be prepared and transmitted as soon as possible.

If your recommended change is not urgent, or safety-of-flight related, write the proposed change *exactly* as you think it should be printed in the operator's manual. This does not mean your recommended change will be immediately published. It will be retained until the next scheduled user review conference when it will be reviewed by the attendees. It may be adopted as written or in part with some modification. Your recommendations are seldom totally rejected. Due to budget constraints and soaring costs of publishing revisions, only *necessary* changes will be submitted for publication. *(If it ain't broke, we ain't gonna fix it!)*

The operator's manual *is not* a maintenance or training manual. As its name clearly states, it is a

manual intended to help operators fly their missions. Note at the beginning of chapter 1, "This manual contains the best operating instructions and procedures for the aircraft under most circumstances. The observance of limitations, performance, and weight/balance data provided is mandatory. The observance of procedures is mandatory except when modification is required because of multiple emergencies, adverse weather, terrain, etc. **Your flying experience is recognized, and therefore, basic flight principles are not included."**

In the future, messages similar to the one below will be sent to all major commands requesting user representation/participation in all operator's manual reviews. The major command will select a representative to attend (see message below that was sent on 24 July 1986):

"1. A USERS REVIEW CONFERENCE COVERING ALL CHAPTERS OF TM'S 55-1510-209-1 AND CL (CHECKLIST); 55-1510-214-10 AND CL; 55-1510-215-10-2 AND CL; 55-1510-219-10 AND CL; 55-1510-220-10 AND CL; WILL BE HELD AT USAAVNC ON 10 THRU 19 DEC 86. THE MEETING WILL CONVENE AT 0800, 10 DEC, AT THE RECREATION CENTER, BLDG 9204. ALL USERS ARE REQUESTED AND ENCOURAGED TO SUBMIT RECOMMENDED CHANGES TO THIS OFFICE NLT 15 NOV 86. ONLY THOSE RECOMMENDED CHANGES RECEIVED IN THIS OFFICE BY 15 NOV WILL BE CONSIDERED FOR INCLUSION IN THE NEXT REVISION OF THE OPERATOR'S MANUALS.

"2. POINT OF CONTACT FOR THIS CONFERENCE IS MR. JAMES, AV 558-4770: MAILING ADDRESS: CDR, USAAVNC, ATTN: ATZQ-ESO-L, FT. RUCKER, AL 36362-5000."

Remember, we in DES, Literature Review Branch, represent you, the user, to AVSCOM. To help us better represent you, we need your recommendations.

DES welcomes your inquiries and requests to focus attention on an area of major importance. Write to us at: Commander, U.S. Army Aviation Center, ATTN: ATZQ-ES, Ft. Rucker, AL 36362-5000; or call us at AUTOVON 558-3504, FTS 533-3504 or Commercial 205-255-3504. After duty hours call Ft. Rucker Hotline, AUTOVON 558-6487 or 205-255-6487 and leave a message.

U.S. Army Class A Aviation Flight Mishaps

	Number	Flying Hours	Rate	Fatalities	Total Cost (in millions)
FY 85 (to 31 August)	42	1,401,776	3.00	29	$79.0
FY 86 (to 31 August)	31	1,461,273*	2.12	25	$73.8

*estimated

AVIATION PERSONNEL NOTES

Aviation Field Grade Officer Refresher Course

The U.S. Army Aviation Center, Ft. Rucker, AL, is developing a nonresident course for Army Aviation field grade officers. It is available to attend before reassignment from a functional or branch immaterial area to an Army Aviation assignment.

The Aviation Field Grade Officer Refresher Course is scheduled to be completed and ready to field by fiscal year 87/1. It will acquaint the officers with the latest Army Aviation operations and increase their knowledge of the Army of Excellence, "Above The Best." Details about the course contents should be addressed to: Commander, United States Army Aviation Center, ATTN: ATZQ-CAT-D, Ft. Rucker, AL 36362-5000.

759 – Your Way to the Assignment of Your Dreams

Many personnel decisions for aviation warrant officers are, of course, based upon individual aviation related qualifications. Indeed, the most obvious decision a career manager could make, based upon aviation related qualifications, would be in the area of assignments. But, aviators in the field may not necessarily understand the entire list of qualifications that the career manager actually reviews.

Naturally, aircraft qualification and prior aviation assignment history are the first things that come to mind when an aviator is considered for a specific assignment. Did you realize, though, that individual DA Forms 759 are also used by career managers when determining who will fill a requisition for some assignments?

According to AR 95-1, and FM 1-300, unit operations officers are required to forward to individual career managers at the Military Personnel Center (MILPERCEN) copies of the DA Form 759 on each aviator during an annual closeout. DA Forms 759 are placed in each aviator's career management information file and are a valuable source of information.

Compliance with the requirements of AR 95-1, and FM 1-300, is sporadic at best. So, some decisions by career managers are made on outdated information or no information at all. This may serve to eliminate some highly qualified officers from consideration for specific assignments.

It is imperative that aviators, after their annual closeouts, ensure that current copies of their DA Forms 759 are forwarded to their career manager at MILPERCEN. It also is requested that unit commanders ensure appropriate submission of DA Forms 759 in a timely manner. Who knows, your next 759 may be the determining factor in your being selected for that plum assignment about which you have long dreamed. But it still may be only a dream if your preference statement is not up to date.

Would you rather cruise the skies of Korea, on your next overseas tour, rather than those of Germany? Do you have a yearning to see Mt. Ranier during your off-duty hours, or be situated comfortably in bass fishing country on your next stateside assignment? Well then, the next question is, obviously, when was the last time you updated your DA Form 483, Officer Assignment Preference Statement?

Please, no groaning or laughing. We know you have all heard countless times that your preference statements must be kept current. We know many of you

have, once or twice, chuckled at the thought of the statement actually getting you the tour of your choice. No matter how you may feel about the advantages of the preference statement, *update yours with MILPERCEN.*

Each time career managers pull files in preparation of your next move, one of the first things they look for is your preference statement. They really care where you would prefer to go and what you would like to do upon your arrival. If no preference statement exists, the only assumption that may be made is that the officer has no specific preferences. If the preference statement is outdated, the career manager can only assume that the listed preferences are still current. Naturally, preferences do change over a period of time, so it is important that you keep yours current.

This does not mean, of course, that the entire 100A population will be simultaneously assigned to Hawaii. Naturally, the needs of the Army must take first priority. Still, where several options are available for the aviator, it would definitely be of great assistance to have an idea of which option the aviator would prefer.

Take 5 minutes and grab the nearest pencil. Perhaps your effort will result in that unbelievable assignment you secretly desired for years!

Aviation Branch, Warrant Officer Division, Personnel Changes

Key personnel within Aviation Branch, Warrant Officer Division, recently completed their tours at MILPERCEN and now have returned to the field. CW4 Grant L. South has been replaced as the Aviation Branch chief by CW4 Thomas A. Story. CW4 Story, prior to his arrival, served 3 years at Ft. Hood, TX, where he was assigned to the III Corps G1 as the aviation warrant officer assignment officer.

CW4 Al Salinas, career manager for UH-60 Black Hawk, rated aviation warrant officers and UH-1H Huey and OH-58 Kiowa rated aviation warrant officers overseas, has been replaced by CW4 William J. Clark. CW4 Clark came to MILPERCEN from a 3-year tour at Ft. Campbell, KY, where he served as the A Company, 158th Aviation Battalion UH-60 instrument flight examiner and standardization instructor pilot.

CW4 Timothy R. Cline, arriving after a 3-year tour at Ft. Carson, CO, has taken the responsibilities of CW4 Joseph Hines. CW4 Cline will be managing the careers of UH-1H and OH-58 rated aviation warrant officers in the continental United States, and air traffic control technicians. CW4 Cline, while assigned to Ft. Carson, served as the UH-1H standardization instructor pilot for D Troop, 1st Squadron, 10th Cavalry.

Reclassification of Grounded Aviation Warrant Officers

Permanent grounding. An unpleasant subject, but something that does happen. There are any number of reasons that an aviator may be permanently grounded—the most common being medical disqualification from flight crewmember duty. CW3 Albert K. De Lucia, chief, Personnel Actions Branch, Warrant Officer Division, provided the following overview of the steps that are taken to reclassify grounded aviators into appropriate technical service military occupational specialties.

First, unless the aviator is within a year of separation or retirement, or the aviator requests separation, reclassification does take place. Warrant officers are not forced out of the Army merely because they can no longer function in an aviation specialty.

Once the permanent grounding orders are published, Personnel Actions Branch, Warrant Officer Division, contacts the officer by letter. The aviator is provided a list of all technical service specialties open for procurement. It is up to the aviator to select from the list three specialties into which reclassification would be justified. Once the specialties are selected, a resume for entry into each is prepared by the aviator. Personnel Actions Branch supplies an example of the resume to be used. Within 30 days of receipt of the letter, the aviators return their choices, and resumes for each to Personnel Actions Branch for submission to a reclassification board.

A note to aviators with a background in a technical service specialty not listed as open for procurement. If a background would warrant accession into such a specialty, the aviator should, if desired, include that specialty as one of the three choices. It will be given equal consideration.

MILPERCEN convenes a reclassification board on the average of once every 2 months. Grounded aviators will have their requests carefully studied by the board, with one specialty selected for reclassification.

Factors considered by the board include perceived trainability, as evidenced by aptitude scores, needs of the Army in each considered specialty, and desires of the individual. Where possible, an individual's choices will be met.

MONTHLY WRITING AWARD

THREAT

Mr. Edward J. Bavaro
Threat Branch
Directorate of Combat Developments
U.S. Army Aviation Center
Fort Rucker, AL

Running The Gauntlet

"The Tank . . . is an offensive weapon. Any defensive system involves the dispersal of forces over a wide territory, leaving them strong in some places and weak in others. And it is where they are weak that the tanks will appear in enormous concentrations."

Viktor Suvorov, *Inside the Soviet Army*

WHEN SUVOROV wrote the words above he was not fully convinced of the capabilities of attack helicopters and lacked the foresight of Soviet Army Major General M. Belov, the leading Soviet advocate for attack helicopters.

Belov recognized the versatility of attack helicopters on the modern battlefield. Today the most acknowledged value of attack helicopters in a high intensity conflict is in the antiarmor role. Attack helicopters represent the most responsive and lethal antiarmor systems available today and have special significance in such a target rich environment. In the future, though, the air-to-air role may become the most prominent mission for attack helicopters as contending powers seek to neutralize the rotary wing threat. Belov has articulated the need for *fighter helicopters* to destroy enemy combat helicopters. The Soviets may be leaning in that direction with the prototype helicopter known as "Hokum." It may simply be a test-bed vehicle to test concepts, but also it may be a first generation version of a *fighter helicopter*.

Fighter helicopters pose a great threat to our attack helicopters. But even when and if Soviet fighter helicopters become a fact, and after the organizational structure and tactical scheme have been worked out for their employment, one of the biggest hurdles attack helicopters will have to contend with is the air defense (AD) system protecting ground forces. The Soviets have put together as comprehensive an array of AD assets as can be found. These assets, ranging from a variety of missiles, guns, aircraft and support equipment, combine to provide a redundant and flexible protective umbrella over Soviet maneuvering forces.

To protect their forces, the Soviets apply the principle of defense-in-depth when deploying AD systems. Significantly they manage their AD assets as a cohesive system composed of various elements instead of as a series of separate entities operating individually. AD is treated as an integral part of Soviet combined arms operations. It is coordinated both in planning and execution with other facets of combat operations.

Every tactical command echelon of the Soviet Army, from the front to the maneuver regiments, has an organic AD unit that is integrated into the total air defense system. Soviet frontal AD exercises command and control down to the combat battalion level; it integrates the information received from its various surveillance radars for engagement assignments as

appropriate for given situations. The surveillance radars include early warning, target acquisition and height finding radars as well as some fire control radars that have limited target acquisition capabilities.

The Soviet tactical air defense system at division level plays a prominent role in the close-in battle. While discussing here only the organic assets involved, it must be remembered that Soviet regiments and battalions in the first echelon normally have their organic AD elements augmented with antiaircraft artillery and/or surface-to-air missile (SAM) elements of the next higher organization. The Soviet allocation of AD assets generally is weighted in favor of maneuver units where the threat is perceived to be the greatest.

The air defense system in a typical Soviet motorized rifle division (MRD) begins with the AD platoon of each motorized rifle battalion. These AD systems are usually the systems that would be closest to our attack helicopters during the close-in battle. The AD platoon is equipped with nine SA-7 SAM launchers. The SA-7 Grail is a shoulder-fired, low-altitude missile with a high explosive (HE) warhead and passive infrared homing guidance. Basically a tail chase missile, the SA-7 attempts to lock-on to the heat source of the target. It is used primarily for close-in protection against low-altitude threat aircraft.

The SA-7, as a manpack weapon system, presents an insidious form of danger to our forces because of the absence of any "tell-tale" vehicles to alert attack helicopter crews of impending peril. Russian amphibious armored personnel carrier-equipped motorized rifle or airborne companies have organic antiaircraft missile squads consisting of three SA-7 operators with gripstocks (a total of nine for the battalion) to which attachable canister-tubes containing the missile are added. Armored personnel carrier (BMP)-equipped motorized rifle battalions (figure 1) have organic antiaircraft platoons consisting of nine operators transported by the platoons' three BMPs. A target is engaged by aiming at it and partially depressing the trigger until the red indicator light turns green indicating the infrared seeker is locked onto the target. Then the trigger is fully depressed and the missile fires.

The SA-14, the Soviet's newest version of the manpack SAM, is replacing the SA-7 in higher priority divisions. Generally, observation and firing posts for

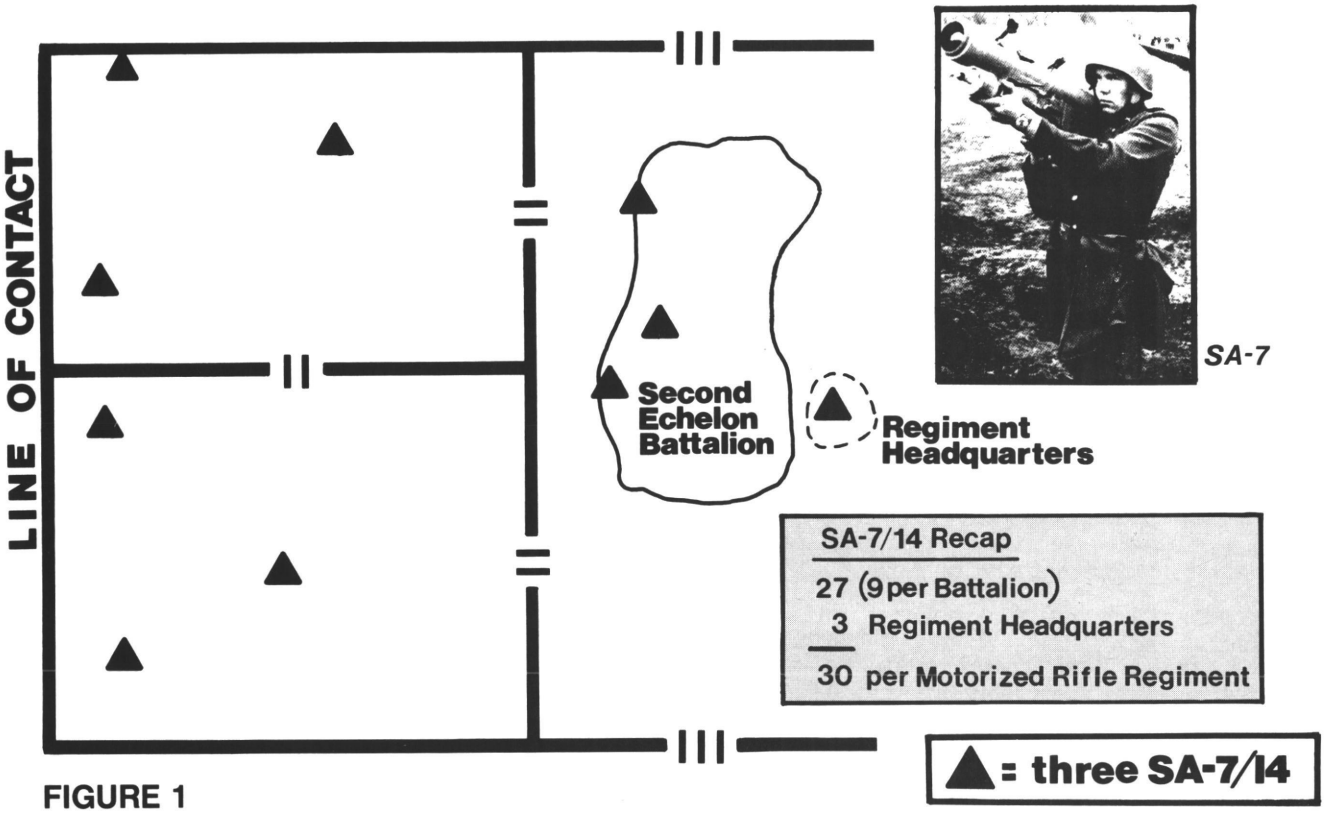


FIGURE 1

these weapons are selected to cover the most likely routes for approaching attack helicopters and other low-flying aircraft. There are no organic SA-7s/14s in Soviet tank battalions.

The air defense batteries of the tank and motorized rifle regiments provide the next layer of protection in the AD system. These batteries are equipped with a platoon of four ZSU-23-4 self-propelled antiaircraft guns* and a platoon of four SA-9 or SA-13 SAM systems. Also, each regimental headquarters has a squad of three SA-7s/14s.

The ZSUs normally are employed in pairs and are usually kept within several hundred meters of one another. Generally they are employed well forward with priority of coverage provided to the main ground effort or where the greatest air threat is anticipated. The ZSUs usually are sited within 400 meters of the regiments' lead attack elements. They have good response time, a good volume of fire and excellent mobility. The ZSUs are not amphibious and not well protected—having only thin armor plating on their superstructures. Heavy machinegun fire can penetrate their hulls and turrets (the follow-on to the ZSU-23-4 is expected to be mounted on a more heavily armored chassis).

Both the SA-9 and SA-13 SAM systems are equipped with short-range infrared SAM missiles. The SA-9s have four canisterized missiles mounted on a modified Russian amphibious armored reconnaissance scout vehicle BRDM-2. The missiles have passive infrared seekers and HE warheads. The SA-9s team with the ZSU-23-4s to cover the "dead" space of the divisional SAM regiment's protective umbrella. The SA-9s usually are employed as a group and normally will remain amid the maneuver regiments main body where they can better provide coverage to most of the regiment. Since 1980, new SA-13 SAM systems have been replacing the SA-9s.

The SA-13 is mounted on a modified MT-LB tracked amphibious chassis. The new canisterized missile on the SA-13 has a cooled infrared seeker and operates in dual frequency bands to discriminate against countermeasures. The tracked chassis gives the SA-13 a cross-country mobility improvement over the SA-9—making it comparable to that of the tank units and the BMP-equipped motorized rifle units it protects (figure 2).

*The ZSU-23-4 is a self-propelled antiaircraft system consisting of 4 liquid-cooled 23 mm automatic cannons mounted on an armored track chassis.

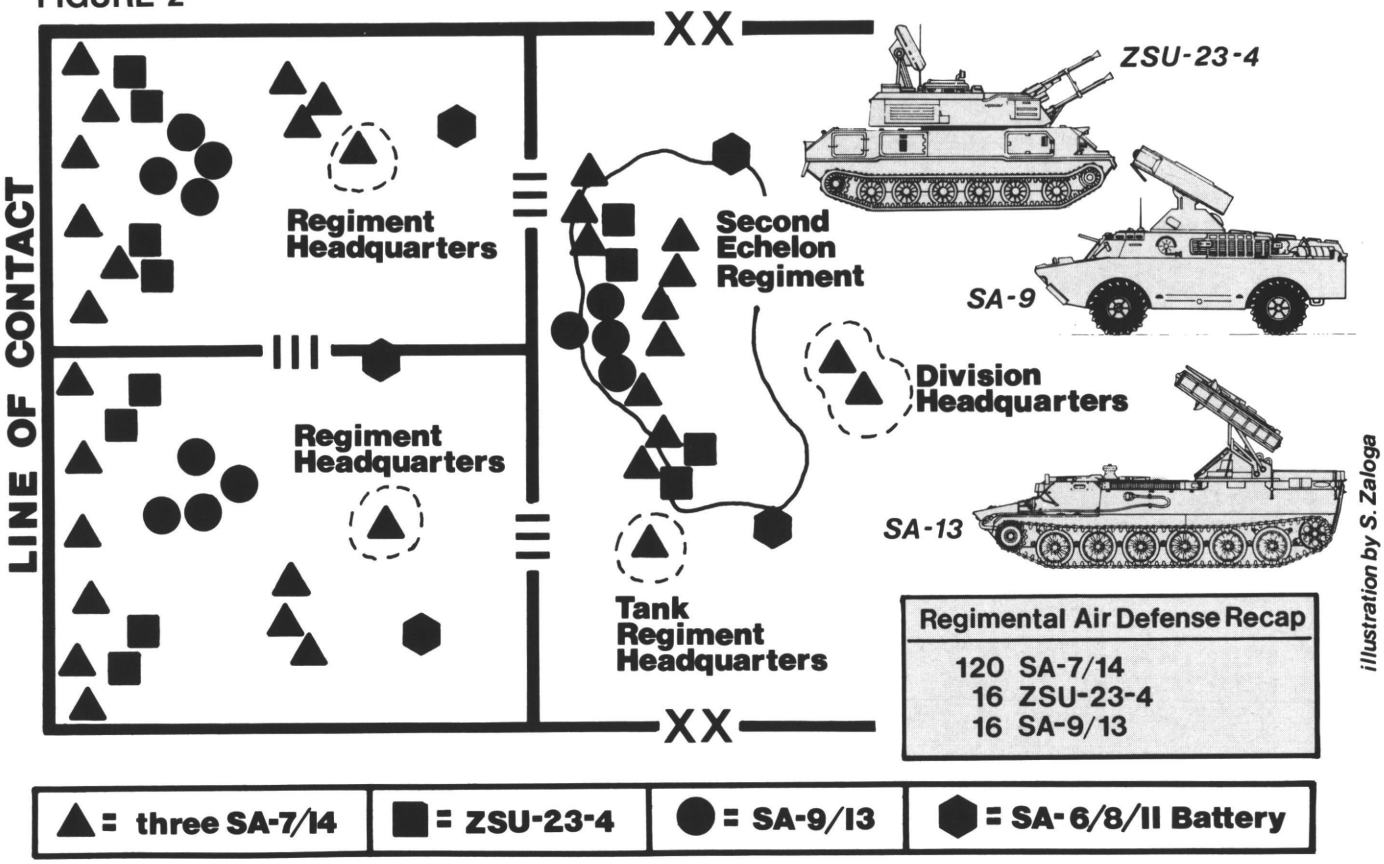
The divisional backstop, or "clean-up hitter," of the organic AD system of the Soviet division is the air defense regiment (figure 3) equipped with either SA-6 or SA-8 SAMs. SA-6 equipped regiments have 20 transporter erector launchers (TELs) in 5 batteries. Each TEL carries three SA-6 solid-fuel missiles with a radio frequency command link with the target acquisition and fire control (STRAIGHT FLUSH) radar system that services that battery. Each battery of four TELs has a (STRAIGHT FLUSH) radar system mounted on a tracked vehicle. As most key vehicles in an SA-6 regiment are tracked, they have excellent mobility and are well suited for the fast-paced operations the Soviets prefer.

The SA-6 TEL is mounted on a modified PT-76 tank chassis and is not amphibious—thus requiring bridging support at most water obstacles. Normally SA-6 systems receive early warning target data alerts from the regiments' LONG TRACK surveillance radars. But, the STRAIGHT FLUSH radar of the battery can handle target acquisition as well as target tracking and target illumination. When the target is within range, the missile is launched and homes to the reflected (illumination radars continuous wave) signal bouncing off the target aircraft.

The SA-11 system (mounted on tracked vehicles) has a slight improvement in range and a lower minimum altitude over the SA-6. But its best feature (over the SA-6) is that each SA-11 missile-carrying vehicle has its own onboard radar that can handle acquisition, tracking and illumination thus allowing it to operate autonomously. This enables *each* transporter erector launcher and radar (TELAR) to engage a target whereas a whole SA-6 battery would be tied to a single engagement that the STRAIGHT FLUSH was servicing. Each TELAR independently engaging a target should improve an air defense commander's task of protecting the division.

The SA-8 is a solid-fuel, short-range, low-altitude, all-weather, surface-to-air missile system, and it is a self-contained amphibious TELAR. The wheeled vehicle has a boatlike appearance, carries four missiles and has a busy superstructure containing the LAND ROLL target acquisition and fire control radar system. The LAND ROLL system has a folding surveillance radar, a large tracking radar dish flanked by two small command radar dishes. The two small I-Band command guidance radars have their own frequency to frustrate electronic countermeasures. A low light level television camera mounted on top of the fire control assembly is used for optical tracking.

FIGURE 2



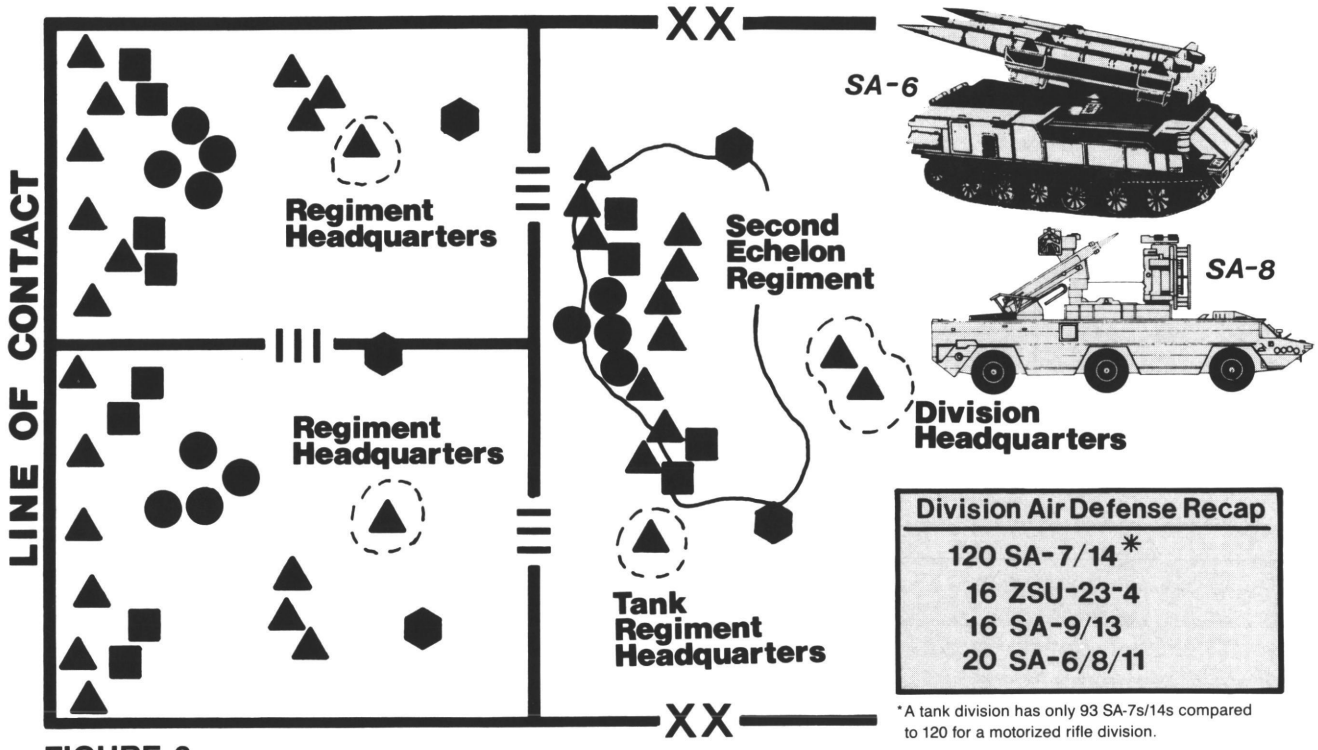
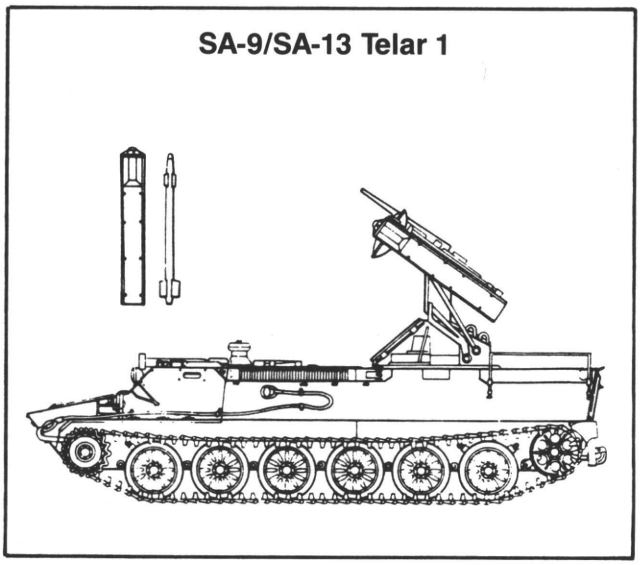


FIGURE 3

The amphibious SA-8 system provides some mobility and tactical advantages over the SA-6 system. While the SA-6s/11s provide greater depth of coverage, making them well suited for operational maneuver



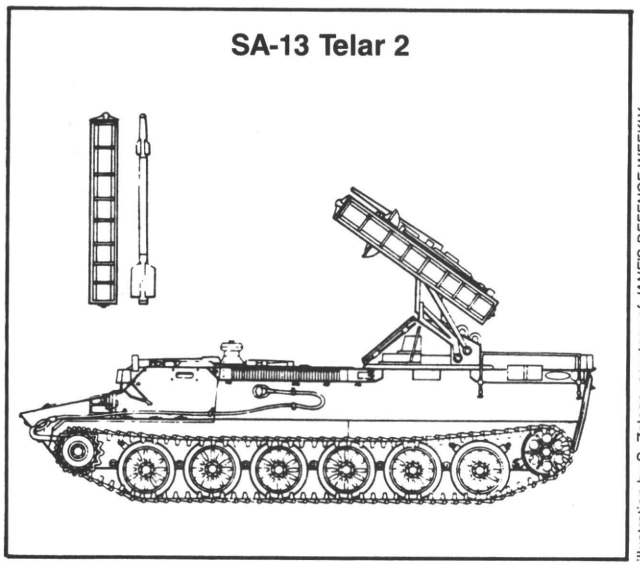


illustration by S. Zaloga, courtesy of *JANE'S DEFENCE WEEKLY*

group-type operations, the SA-8s can operate autonomously and carry a missile reload internally. That plus the SA-8's ability to travel at higher speeds on the road and, combined with its amphibious capabilities, is especially well suited for pursuit or exploitation operations. Newer versions of the SA-8 carry six missiles mounted in canisters.

This recapitulation of the MRD organic air defense assets reflects that the division fairly bristles with protection. Maneuver divisions' air defense systems have both area and point defense elements. Their air defense regiments, SA-6s/8s/11s, are primarily the area defense assets. The remaining air defense assets of the divisions' subordinate elements are predominantly point defense systems. As evident from the number of air defense assets, conducting close-in and deep strike operations means running a fearsome gauntlet which can reach out and slap an allied combat or service support unit down even though the allied unit may be somewhat removed from the forward line of own troops (FLOT).

Whereas the SA-7s/14s may be physically closer to the allied unit, the long reach of systems such as the SA-6s/11s makes them a certain threat well beyond the range of the SA-7s/14s and the ZSU-23-4s. So, diligence must be maintained by aircrews operating in the vicinity of the FLOT. In January 1986, the *Aviation Digest's* threat section covered Soviet efforts to close the "Operational Window" of attack helicopters by supplementing the air defense effort with tank main guns, infantry combat vehicle (ICV) cannons, machineguns, antitank guided missiles, lasers and fighter helicopters. Apart from nuclear weapons, attack helicopters pose the greatest threat to Soviet maneuver forces and any means available will be used to deter that threat.

Can American forces run the gauntlet, avoid unacceptable attrition in so doing and still be an effective force on the battlefield? Obviously they can and testament to that belief is the current production of the AH-64 Apache and the ongoing development of the Light Helicopter Family and AHIP (Army helicopter improvement program with the OH-58 Kiowa). Most of us understand how attack helicopters, these seemingly fragile aircraft, can face such a potent onslaught and survive. But many, outside the aviation community, let alone friends and family back home, cannot fathom an attack helicopter force being more proficient at stopping threat armored forces than a fixed wing airplane force. Once the Army Aviation liturgy of:

- *Terrain flight* frustrating line of sight systems, such as SAMs, antiaircraft artillery, lasers and—
- *Superior weapons* outranging tank main guns, ICV cannons, antitank guided missiles and—
- *Night operations* denying visual systems such as SA-7/14, SA-9/13, lasers and—
- *Aircraft survivability equipment* providing a degree of immunity from radars, infrared/radio frequency systems, lasers and small arms, and finally—
- *Suppression of enemy air defense* systems—

is explained, the picture becomes clearer, with the realization that helicopters are more than just noisy dust-swirling jeeps. Modern Army helicopters, by virtue of their mode of employment and by their outstanding technological equipment, can successfully run the gauntlet.

GOAL – $2,500,000
OCTOBER 1986 – $2,100,000 cash and pledges

Army Aviation MUSEUM

This is a series about the Army Aviation Museum Foundation fund drive. Currently, plans call for building a modern complex to house your Army Aviation Museum. Since last month additional donations have been received. However, we still have a ways to go, as the barometer above shows. If you would like to help "build" the Army Aviation Museum's new home, you are invited to send a tax deductible contribution to: The Army Aviation Museum Foundation, Box 610, Ft. Rucker, AL 36362-5000. If you desire additional information call Mr. Ed Brown at (205) 598-2508.

A Look At What's In Your Museum

Hiller XROE-1 Rotorcycle

In 1954, the Hiller Aircraft Corporation was successful in winning the contract for manufacturing a portable one-man helicopter to meet U.S. Navy standards. Flight evaluation of the XROE-1 began in January 1957 and ended 6 months later. A joint U.S. Army/U.S. Marine Corps program to test the helicopter as a rescue "drop package" to downed aviators, resulted in the XROE-1 never becoming a part of the inventory of either service. Some uses of this aircraft were intended to be observation and liaison duties, small unit tactical maneuvers, and pilot recovery. It has 13 quick disconnect, yellow-painted pins that allow easy assembly and disassembly of the helicopter in a matter of minutes. In 1964, the XROE-1 Rotorcycle on display was transferred from the U.S. Army Test Facility at Edwards Air Force Base, CA, to the U.S. Army Aviation Museum, Ft. Rucker, AL.

AH-64

A TOTAL SYSTEM FOR BATTLE

This is the third in a series of articles about the AH-64A Apache aircraft and weapons systems. The systems addressed this month include the T700-GE-701 engines, engine instruments and the auxiliary power unit. The information contained in this article is for familiarization with the AH-64A and must not be used to operate or maintain the aircraft. This series will continue in the December issue.

Mr. Raymond L. Stockman
Mr. Willis J. Brown

Engines

Apache is powered by two T700-GE-701 engines (figure 1) made by General Electric. They drive the main transmission and all related power takeoffs throughout the entire operational envelope. In the event of an engine failure, the remaining engine can fulfill most power requirements.

Apache's front-drive turboshaft engine weighs 427 pounds (dry), and produces 1,690 shaft horsepower at 20,952 revolutions per minute. It can use JP-4, JP-5 or JP-8 fuel and incorporates an automatic fuel management system with overspeed and overtemperature protection. There are six main bearings with three sumps provided for lubrication and either MIL-L-7808 or MIL-L-23699 oil can be used depending on climatic conditions. The engine will operate for 30 seconds at intermediate rated power with zero oil pressure.

One engine is located on each side of the fuselage just above the wings, about 5 feet behind the pilot's crewstation. The left engine is designated the number 1 engine.

Composed of four modules (figure 2), the engine has a cold section, hot section, power turbine section and an accessory gearbox (AGB) section.

The *cold section module* is designed to filter, direct and then compress the intake air in preparation for mixing with fuel. It also provides mounting for the history recorder, electrical control unit (ECU) and AGB.

The compressor is made up of five axial stages and one centrifugal stage. Variable inlet guide vanes and variable first and second stage stator vanes are used for more efficient engine starting air flow and to minimize compressor stalls.

The engine has an inlet particle separator that uses swirl vanes to guide the inlet air into a swirling motion creating a centrifugal force; this separates foreign objects from the inlet air. A blower (driven by the engine gearbox) then exhausts foreign objects overboard.

A *hot section module* provides the area for mixing fuel and air and the resultant combustion. It includes:

- an annular, smokeless combustion liner,
- stage 1 nozzle and rotor,
- gas generator turbine stator,
- stage 2 rotor.

Twelve fuel injectors are installed into the forward face of the combustion liner. The liner is cooled by air striking it and by a film of air, supplied from the centrifugal stage of the compressor.

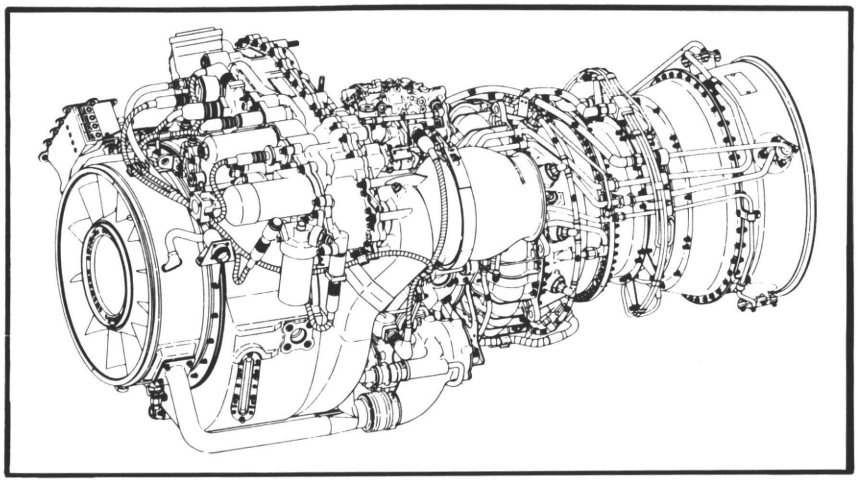


FIGURE 1: T700-GE-701 engine (left side).

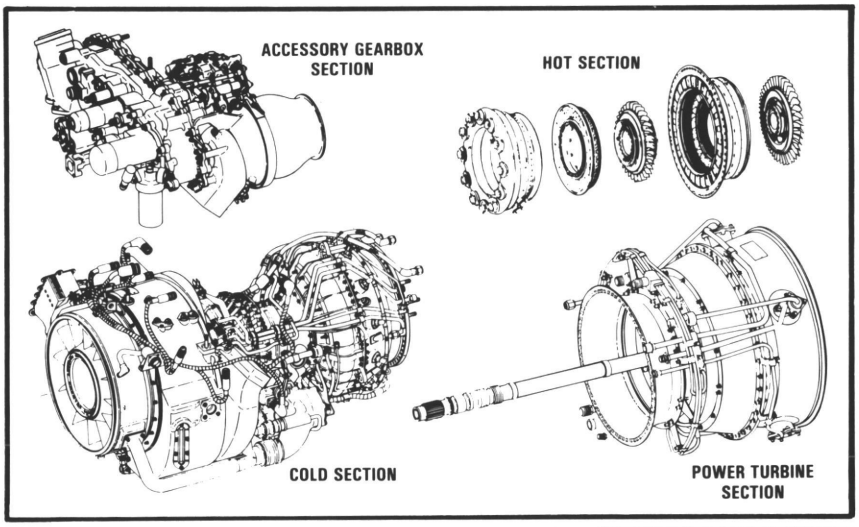


FIGURE 2: Engine modules.

A *power turbine module* converts the hot gas energy from the hot section module into mechanical shaft power. It consists of a two-stage power turbine, a drive shaft that is coaxial with the compressor rotor shaft, and the exhaust frame. The drive shaft is coupled directly to the engine nose gearbox.

The power turbine module also provides mounting for seven thermocouple probes and a harness, engine power turbine speed (N_p) torque/overspeed sensor, and an N_p governing sensor.

Centrally located, the *accessory gearbox* section provides mounting pads for various accessories necessary for engine operation. The AGB section receives power from the compressor rotor shaft, which drives a power takeoff (PTO), radial drive shaft and beveled gears.

The engine *fuel system* (figure 3) provides the proper fuel flow to the engine under all operating conditions, including start, idle, normal flight and maximum power operations. Working in conjunction with the engine ECU, the fuel system provides automatic trim of engine power. To help cool the engine oil, the fuel is routed through the oil cooler.

Included in the fuel system are a boost pump, fuel filter, hydromechanical unit (HMU), overspeed and drain valve, fuel pressure switch and fuel injectors. There are no primer nozzles in this engine; a start is achieved through the fuel injectors.

All engine main bearings, drive shafts and gears are lubricated through the engine lubrication system. It also provides hot oil to the scroll vanes continuously as part of the anti-ice system. The oil system (figure 4) is a self-contained, pressurized, recirculating, dry sump system, consisting of:

- an oil tank,
- lube and scavenge pump,
- scavenge screens,
- oil filter,
- filter bypass sensor switch,
- impending bypass indicator,
- cold oil relief valve,
- oil cooler,
- oil cooler relief valve,
- chip detector,
- oil pressure switch,
- oil pressure transducer.

The oil tank oil cooler and main frame are an integral aluminum casting. The tank has a capacity of 7 quarts and is filled from the right side through a 3-inch gravity port.

Oil is supplied to the oil pump via a screen, which is removable through the forward tank wall and also serves as the tank cleanout port. Visual indication of the oil level is through fluid level indicators on each side of the oil tank.

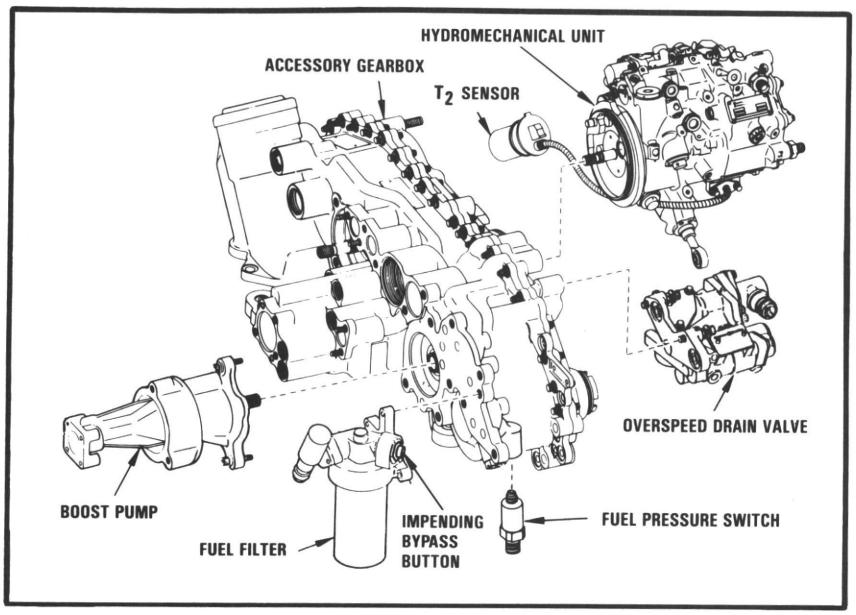


FIGURE 3: Fuel system components.

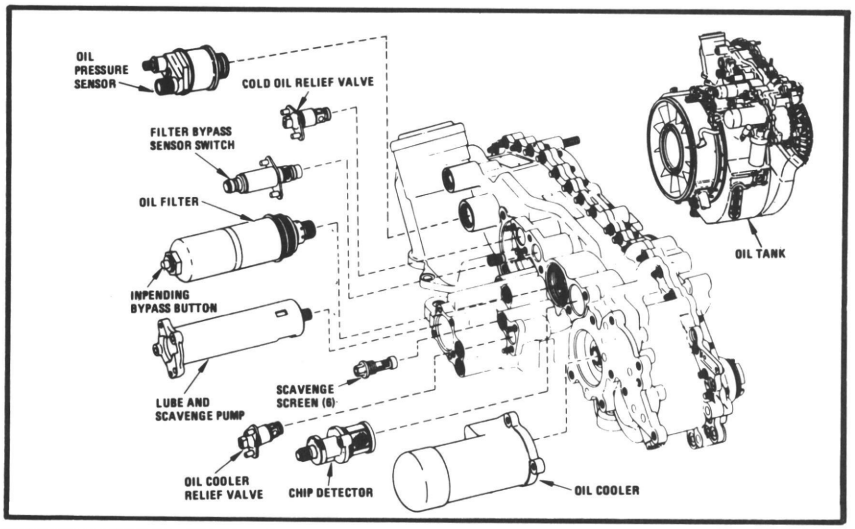


FIGURE 4: Lubrication system components.

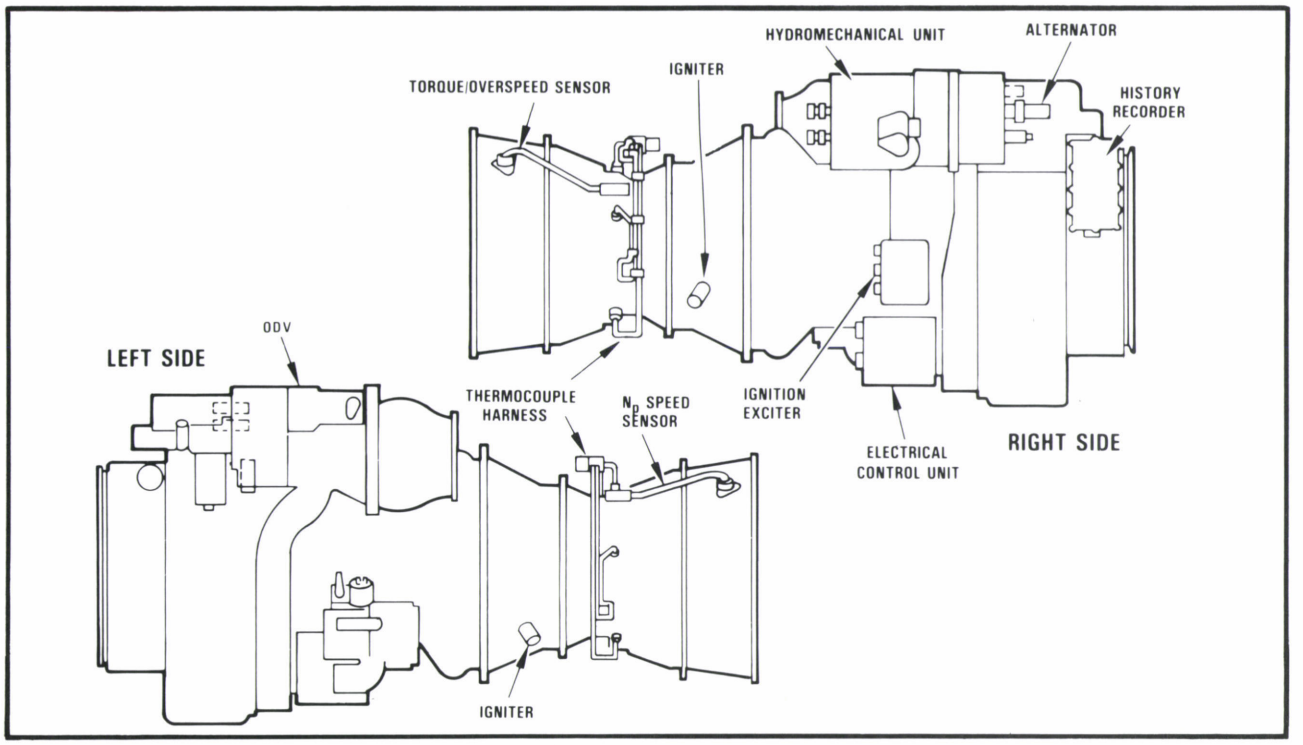


FIGURE 5: Electrical system component locations.

Electrical System

The *electrical system* (figure 5) provides ignition, control of engine power, engine anti-icing airflow, and indications of engine operation and overlimit warnings. Included in the system are:

• *Alternator* supplies power for all essential engine functions, including power to the ignition exciter and the electrical control unit, and the engine gas generator speed (N_g) signal to the crewstation instrumentation.

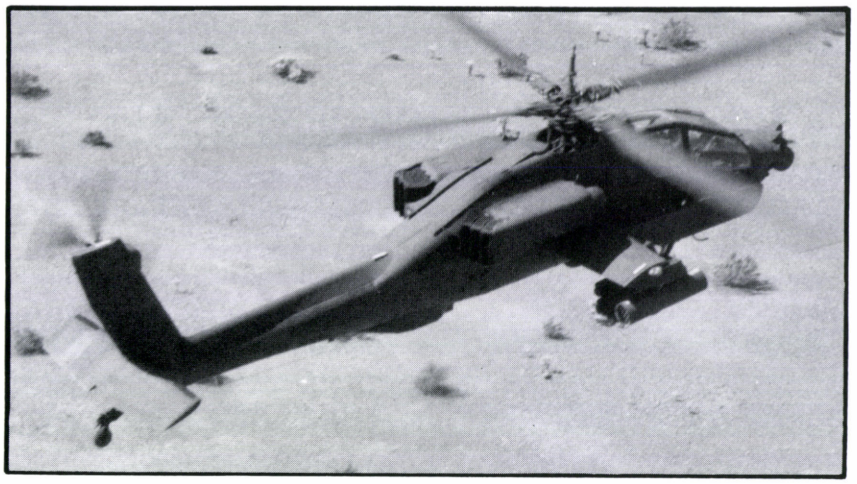
• *Electrical control unit* regulates the HMU to maintain N_p governing, torque sharing and turbine gas temperature (TGT) limiting systems. Inputs are ac power from the alternator or airframe (emergency power), N_g from the alternator, TGT thermocouple, HMU control feedback signal, N_p sensor, N_p reference signal, torque/overspeed sensor and opposite engine ECU torque outputs.

The ECU N_p governing channel monitors the N_p sensor and develops an output signal to the hydromechanical unit. The HMU modulates fuel flow to maintain 100 percent N_p while the torque matching system operates by increasing power on the low torque engine. Also provided by the ECU are N_g, TGT, hours and time-temperature index indications to the history recorder and signals to the pilot's and copilot gunner's instrumentation. Power turbine tachometer, torquemeter and TGT information is simultaneously supplied to the vertical scale instruments.

•*Ignition system* is an ac-powered, capacitor-discharge, low-tension type system. It consists of two ignitors and one dual-exciter unit that is powered by one winding of the alternator. This winding is shorted out by the engine clear relay when the relay is in the OFF position, preventing engine starting. The exciter circuit is electrically connected to the engine start circuit, and becomes deenergized at starter cutout speed (about 50 percent N_g).

• *Two N_p sensors* are located in the exhaust frame; they are identical and interchangeable, but serve different functions. The power turbine shaft is equipped with two pairs of teeth that induce electrical pulses into the N_p sensors. These teeth permit measurement of the torsion or twist of the shaft, proportional to output torque. The left-hand sensor provides the N_p governing and tachometer signal to the ECU while the right-hand sensor feeds the torque computation circuit and the N_p overspeed protection system.

• *Thermocouple harness* is an assembly with seven probes that sense the average temperature of the bases between the two turbine sections. This signal is used by the ECU for crewstation indications, TGT limiting and history recorder readings.



Low exhaust plume temperature helps mask the Apache.

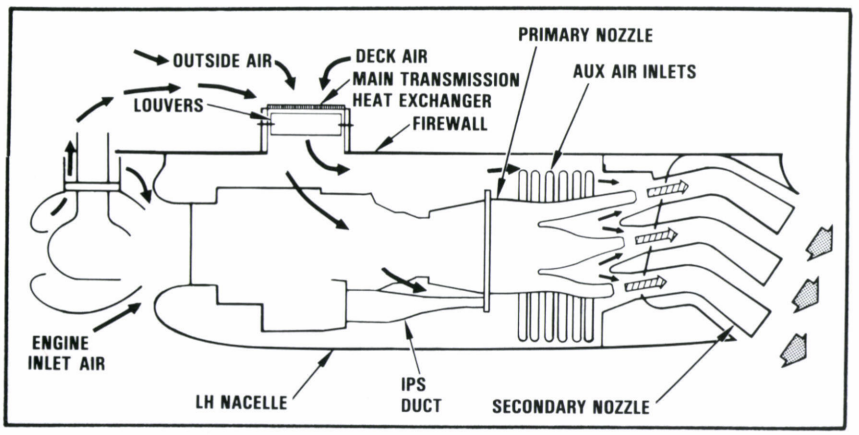


FIGURE 6: IR suppression system operation.

IR Supression System

IR suppression system (figure 6) serves to mask the infrared (IR) signature of the engine exhaust by reducing the engine exhaust plume temperature and by reducing the hot metal signature of the engine exhaust components. Ambient air is drawn from the transmission deck area, through the main transmission heat exchanger, into the engine nacelle, across the engine, and out through the secondary nozzles.

Additional cooling air is drawn into the engine nacelle through the nacelle louvers, mixing with the transmission deck airflow. Also, mixed air is drawn into the exhaust stream of the primary nozzle by action of the exhaust gas velocity (Bernoulli's principle). Finally, contributing to reduce the IR signature significantly are bends in the nozzles and the low-reflective paint. Dispersion of exhaust gas by secondary nozzles, in conjunction with rotor downwash and forward airspeed, further contribute to reduction of the exhaust gas temperature.

Instruments

Two *power levers*, one for each engine, are located in the power level quadrant in the center portion of the left console of *each* crewstation (figure 7). The quadrants are interconnected and the power levers are mechanically connected in series with each other and to the HMU power-available spindle by use of ball bearing flexible control cables.

A two-way interlock prevents the power levers from being advanced past *idle* with the rotor brake switch in *lock* position and prevents the rotor brake from being activated with at least one power lever forward of the *idle* position.

Power lever friction may be adjusted by using the slider type adjustment on the pilot's quadrant.

The levers have two stops, one at *idle* (retarding power) and one at *fly* (increasing power). A stop override is located under the lever handles; the pilot's override is mechanical while the copilot gunner's override is electromechanical with the controlling solenoid located on the pilot's power lever quadrant.

With the power lever in the *off* position, fuel to the engine is shut off at the HMU. Moving the power lever to the *idle* position will open the HMU fuel outlet and set the idle schedule for the respective engine.

The *lockout* position is reached by lifting the detent override and moving the power lever to *lockout*. This action locks the ECU out and allows the pilot/copilot gunner to control the engine manually. All governing/sharing/limiting functions are disabled except N_p overspeed protection.

When the power lever is placed in the *fly* position, the HMU fuel outlet is open and the automatic schedule performs simultaneous N_p and main rotor speed (N_r) governing at 100 percent, load sharing (matched to higher engine), TGT limiting, N_p limiting and N_g limiting.

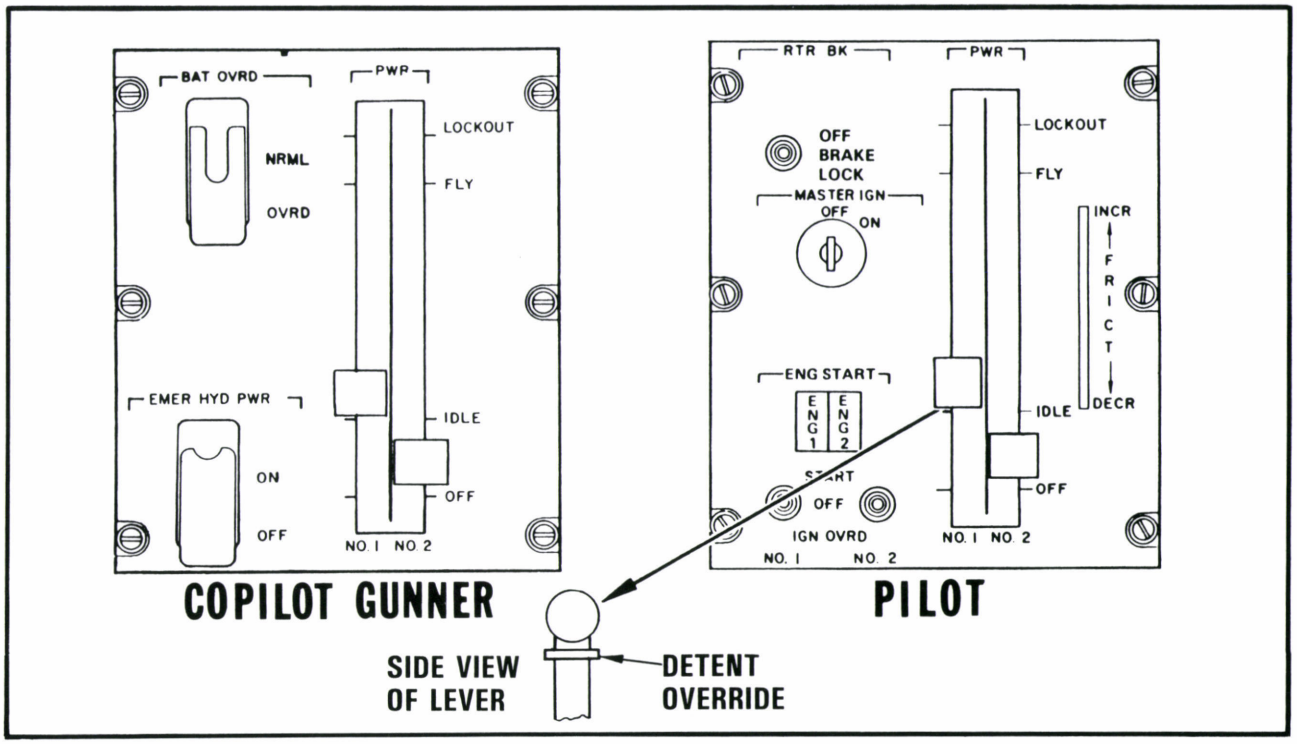


FIGURE 7: Pilot's and copilot/gunner's power lever quadrant.

The *load demand spindle* control provides an input to the HMU load demand spindle, enabling the HMU to accommodate rapid changes in rotor load demands. Using this input to vary N_g, the HMU maintains a constant 100 percent N_p.

The *master ignition* switch, located on the pilot's power lever quadrant, is used to prevent unauthorized personnel from starting or cranking (motoring) the engines of the AH-64. By using a key to move the switch to the ON position, the pilot applies power from the emergency dc bus to the engine start switches.

The *engine (ENG) start* portion of the pilot's power lever quadrant contains two engine *(start/ignition override)* switches and an indicator light for each engine. The engine *start/ignition override* switches are three-position switches; momentary START, discrete OFF and discrete ignition override. They are used to initiate the automatic start sequence, when momentarily held in the START position, and to abort the automatic start and/or to crank the engines for cooling, when placed in the ignition override position.

The two ENG indicator lights are illuminated by a mechanical switch in the respective engine air turbine starter when the automatic start sequence is initiated; they are extinguished when the start sequence is automatically terminated.

An *engine chop collar* is used to rapidly reduce engine power to the idle setting on both engines simultaneously without moving the power levers. The chop collar is located on the pilot's and copilot gunner's collective stick, immediately aft of the collective switch box.

A *selectable digital display* (figure 8) located in the upper right-hand portion of the copilot gunner's instrument panel provides digital readouts of engine performance and fuel remaining.

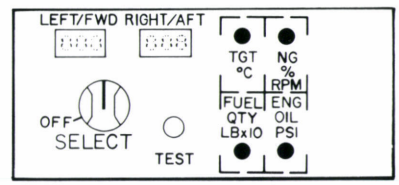


FIGURE 8: Selectable digital display.

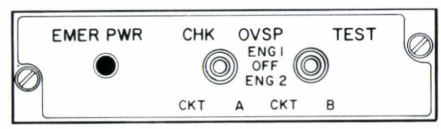


FIGURE 9: Engine overspeed test control panel.

The *overspeed test control panel* (figure 9) enables the pilot to verify that the N_p overspeed protection system is operating properly. It is

installed just forward of the power lever quadrant in the pilot's left console. The panel contains two, three-position toggle switches (spring-loaded to *off*) and one indicator light. Each switch has *ENG 1, off*, and *ENG 2* positions.

When power is applied to the Marconi indicator gauges (figure 10), the lowest segment (blue) will illuminate. The concept of "optimistic scaling display" is incorporated; each lamp represents an extracted band of value. When the lowest value of the lamp threshold is reached, that particular lamp will illuminate. As pressure increases, the segments illuminate vertically in sequence from one range into the next. Once pressure reaches a maximum and starts to decrease from a higher color range to a lower color range, the entire lower color range will illuminate as the pressure drops into that lower range.

The instrument test panel (figure 11) located on the left side of the pilot's instrument panel, controls the operation of the vertical scale Marconi indicators. The panel contains a photocell, auxiliary power indicator, a three-position control switch and a dimming control.

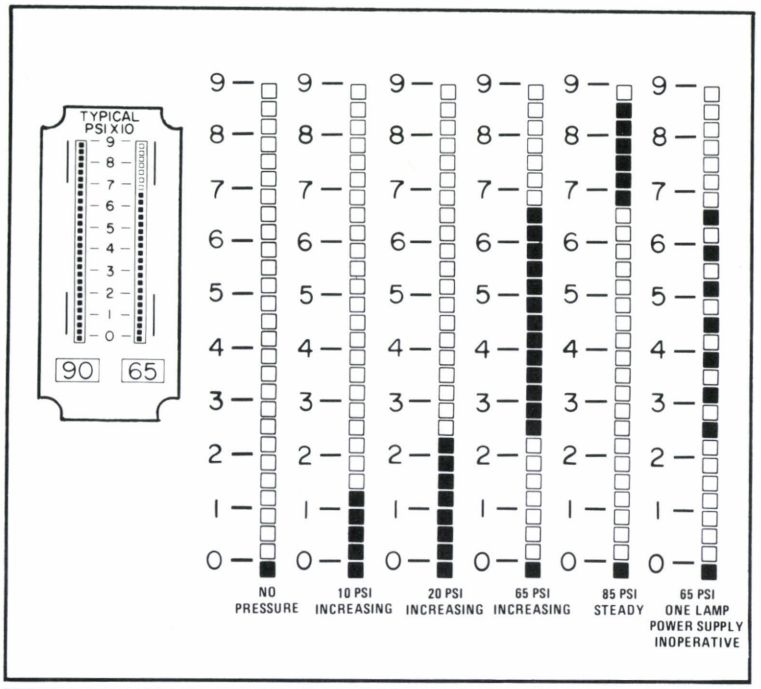


FIGURE 10: Marconi indicator operation.

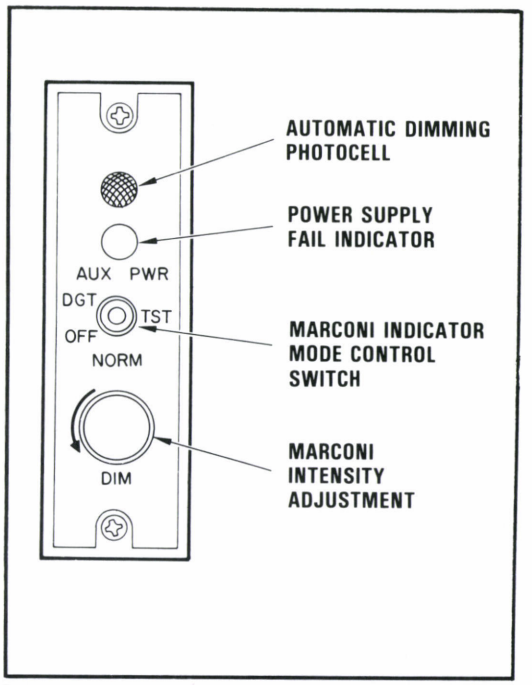


FIGURE 11: Instrument test panel.

Previous AH-64 Apache Articles

- "Bell AAH YAH 63," Bell Helicopter Textron, May 1976.
- "Hughes AAH YAH-64," Hughes Aircraft Company, May 1976.
- "On the Attack Helicopter," BG Edward M. Browne, January 1979.
- "Keep the Apache Flying and Fighting," MAJ Troy J. Roop, March 1982.
- "AH-64 Apache Aviator Training," CPT Richard A. Scales, December 1983.
- "The AH-64 and OT II," CPT Robert L. Johnson Jr., January 1985.
- "AH-64 Update," CPT David W. Starr, March 1985.
- "AH-64 Apache," MG Charles F. Drenz, December 1985.
- "AH-64 Apache Combat Mission Simulator—Kill or be Killed":

"Part I: The Battleground," CW4 William Yarlett, March 1985.
"Part II: The Apache," CW4 William Yarlett, April 1985.
"Part III: The Tactical Algorithm," CW4 William Yarlett, May 1985.
"Part IV: Instructional Features," CW4 William Yarlett, August 1985.
"Part V: The Future," CW4 William Yarlett and Mr. Richard Oswald, September 1985.

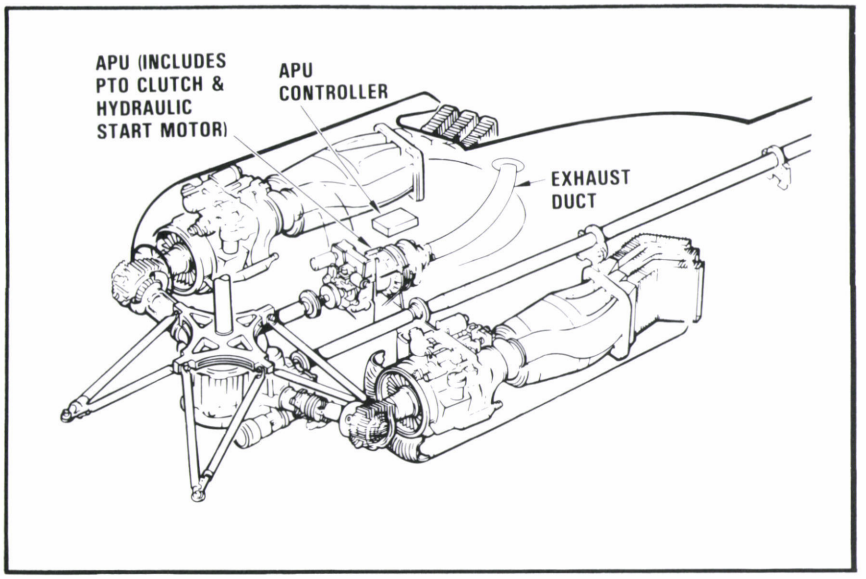


FIGURE 12: Auxiliary power unit (APU) components.

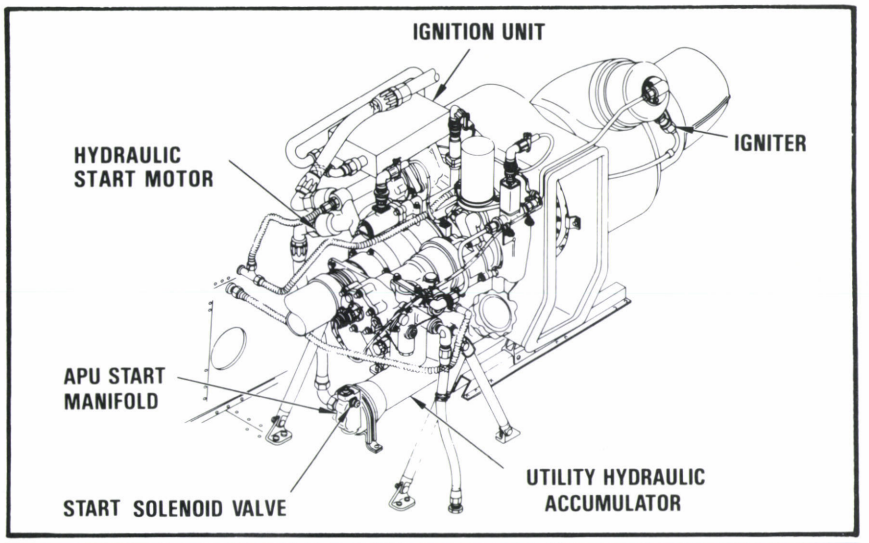
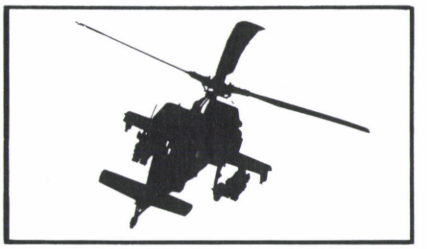


FIGURE 13: APU starting system components.



Auxiliary Power Unit

The purpose of the AH-64's Airesearch GTCP 36-55(H) auxiliary power unit (APU) is to drive the accessory gearbox of the main transmission when the rotor is not turning. Indirectly the APU provides hydraulic pressure, pressurized air and electrical power to the aircraft systems. Main engines may be started with the APU without dependence on ground service units. Enclosed in its own compartment for cooling, the auxiliary power unit (figure 12) is located on the right side of the fuselage deck, aft of the transmission, between the engine nacelles. It is composed of four sections: gear box; air inlet; compressor; and turbine section.

The *gearbox section* provides mounting and drive power, where required, for the following:

- speed sensor,
- hydraulic starter,
- PTO clutch,
- fuel control,
- fuel shutoff valve,
- oil filter,
- low oil pressure switch,
- oil level indicator,
- oil sump,
- integral oil pump and
- magnetic plug.

Composed of a one-piece fiberglass shroud, the *air inlet section* has an inlet screen, and oil cooling baffles. The baffles are located on the aft side of the gearbox and protrude into the inlet airflow.

Apache's APU starting system is shown in figure 13. The compressor section is located *within* the inlet shroud; the compressor and turbine are mounted on a common shaft. Located aft of the inlet shroud is a single-stage inward flow turbine. Mounted on the turbine section are the hoisting eye, thermocouple, plenum chamber drain, rear

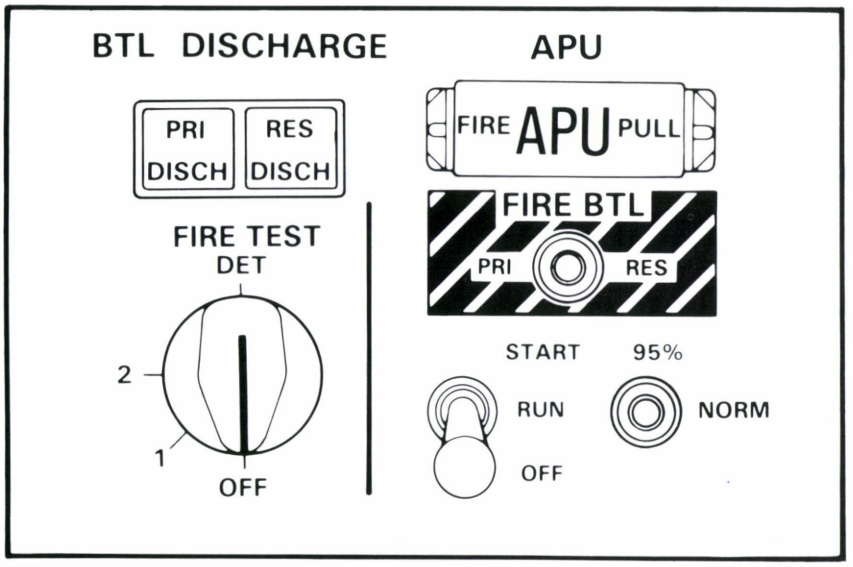


FIGURE 14: APU control panel.

100th Apache

The U.S. Army has accepted its 100th production AH-64A Apache attack helicopter from McDonnell Douglas Helicopter Company in Mesa, AZ. The milestone aircraft was flown by Army pilots to Ft. Hood, TX, where it will be part of the second Apache attack helicopter unit. In all, the Army plans to equip and train at least 34 Apache attack helicopter units at the Texas post. Signing a commemorative poster following the milestone delivery are COL Joe Campbell, commander of the Army Plant Representative Office in Mesa, left, and Mr. Stuart Dodge, McDonnell Douglas Helicopter Company's vice president for Apache programs. Assisting are COL Walt Yates, commander of the 6th Cavalry Brigade (Air Combat), left, and LTC Barney Jenkinson, commander of the 1st Squadron, 6th Cavalry Brigade.

mount, ignition unit, and main connector. The combustor is external to and mounted above the turbine section.

The APU control panel (figure 14), located near the aft end of the pilot's right console, provides for APU operation, fire warning and control of the APU fire extinguishing system.

An APU three position toggle switch is spring loaded from *start* to *run* and lift-locked from *run* to *off*.

Also located on the control panel is an APU *fire pull* handle. It will illuminate when a fire is detected in the APU compartment and, when pulled, will close the APU fuel shutoff valve, turn off the APU fuel boost pump, and arm the fire bottle select switch. Extinguishing agent is routed to the APU compartment when the bottle select switch is moved. This switch, spring loaded to the center position is used to select the fire bottle, primary or reserve, to be discharged.

To prevent injury to ground personnel, the APU exhaust plume is directed upward and to the side; this also prevents overheating of a main rotor blade when the rotor system is not operating.

ABOUT THE AUTHORS

Mr. Stockman works with analysis, design, development and presentation of aircrew training ground school programs. He has 30 years background experience in fixed and rotary wing aircraft. When he retired as a chief warrant officer with 22 years in the U.S. Army, Mr. Stockman was serving as an aviation maintenance officer.

Since joining McDonnell Douglas Helicopter Company in January 1979, he has held positions in front end analysis, maintenance analysis and trainer engineering as well as aircrew training.

Mr. Brown is responsible for active and reserve component marketing development of the Apache helicopter. He has served in U.S. Military Marketing since joining McDonnell Douglas Helicopter Company in 1985. He has an extensive background in laser guided and airborne weapons system marketing.

Mr. Brown has more than 11 years experience in Army Aviation. He is rated in the UH-1, AH-1, Bell 206 and Bell 204.

U.S. Army Information Systems Command
ATC ACTION LINE

Alternate Minimums—Some Answers

Alternate minimums have often been a source of confusion to aviators over the years—there doesn't seem to be any relief in sight.

One of the biggest stumbling blocks to understanding alternate minimums stems from the many different publications required to search out all the rules. The following explanations to some often asked questions help explain the ins and outs of alternate minimums:

Why does the criteria for the requirement to file an alternate differ between Army and Federal Aviation Regulations (FARs)?

FAR 91, para 91.83(a) (9) requires an alternate airport be filed except as provided in para (b). The Army has an exemption for 91.83(a) (9) from the Federal Aviation Administration (FAA) effective 22 Oct 1963. By being exempt from this paragraph, an assumption has been made that the Army is automatically exempt from para (b). However, the rationale used by the Army in obtaining this waiver has changed significantly. When the waiver was granted, the Army did not require an alternate if the current weather forecast and trend indicated that ceiling and visibility would be 5,000-5 at the estimated time of arrival (ETA) and for 2 hours after. Today an alternate is not required if the ceiling and visibility are at or greater than 400-1 above weather planning minimums at the ETA to ETA plus 1 hour.

Then is the Army also exempt from para 91.83(c)?

Paragraphs 91.83(b) and (c) refer to the instrument approach procedures (IAPs) prescribed in FAR 97. The military services do not publish IAPs in FAR 97. It has been interpreted that these paragraphs do not apply to the military services.

What basis is used to determine whether or not an airfield can be used as an alternate?

"Terminal Instrument Procedures TM 95-226," paragraph 122, requires terminal weather observations and reporting facilities before an airport can be used as an alternate. FAA Handbook 8260.19, "Flight Procedures and Airspace," paragraph 812, requires weather reporting and paragraphs 211 and 212 require the facility's navigational aids (NAVAIDs) to be monitored when used as an alternate. FAA Handbook 7400.2 requires weather observation and reporting before a control zone (CTLZ) can be designated.

Do Army requirements for selecting alternates consider the above factors and if so, how can an aviator determine if an airfield meets the above criteria?

The existing requirements for alternates contained in AR 95-1 do consider the above factors. The requirements that the NAVAID must be monitored and the CTLZ must be in operation provide an added safety margin to Army aviators in selecting an alternate. Currently NAVAID monitoring information is contained in the En Route Supplements. All NAVAIDs are considered to be monitored 24 hours unless otherwise indicated. The same is true for CTLZ operating hours. The hours are published on the en route charts when the CTLZ operates less than 24 hours. One of the principal factors in CTLZs operating less than 24 hours is the lack of weather observations and reporting capabilities, which are basic requirements for use as an alternate.

NOTE: Sometimes this information is not published due to "people" errors. If you notice an error or omission in FLIP, please use a Comm Card to notify the United States Army Aeronautical Services Office so that a correction/addition can be made.

Readers are encouraged to address matters concerning air traffic control to: Director, USAATCA Aeronautical Services Office, Cameron Station, Alexandria, VA 22304-5050.

ABOVE THE BEST

CW3 Clinton D. Nelson

Chief Warrant Officer, CW3, Clinton D. Nelson, of the 507th Medical Company (Air Ambulance), Ft. Sam Houston, TX, was one of three military pilots who recently were presented the American Legion Aviator Valor Award in ceremonies at Ft. Hamilton, NY. This annual award is given each year to only three military aviators, one each from the Army, Air Force and Navy.

CW3 Nelson, his unit's maintenance officer, was cited for his courageous performance during a particularly hazardous flood rescue mission on 6 June 1985. A flash flood hit the north side of San Antonio, and by late afternoon, gusty winds and raging flood waters caused many to flee for high ground. Three crews from the 507th worked through the night, plucking people from treetops and swirling waters.

CW3 Nelson and his crewmembers were called to Leon Creek near Grisom Road, where four children playing at a low water crossing were caught in flood waters and trapped among the bushes and trees.

High winds made the UH-1 Huey helicopter difficult to control, remembers the copilot, CW2 Roy Meade. He was not able to maintain control of the aircraft, and Nelson took over. Holding the chopper at a high hover, he instructed the medic to descend on the hoist to pick up the first child.

Lowering the hoist and the medic resulted in a lateral shift in the aircraft's center of gravity, compounding the difficulty in controlling it.

The medic, Sergeant Eric Schaberg, grabbed the exhausted child just as he let go of a tree and was being swept away by the current. CW3 Nelson landed on a nearby bank where emergency medical personnel were waiting to render aid.

The rescue of the next two children was equally touchy, especially since two news helicopters were also hovering uncomfortably close.

As the third child was lifted from the rushing waters, winds became more severe, but CW3 Nelson skillfully maneuvered the helicopter to high ground. Observers reported that the fourth child was lost and CW3 Nelson began painstakingly searching every inch of the area up and down the swollen creek. He sustained the search until his fuel supply was depleted, then was forced to return to his home base.

"Had it not been for CW3 Nelson's expertise, professionalism, perseverance and courage, the outcome of this mission might have been dramatically altered, perhaps tragically, with further injuries and loss of life," CW2 Meade reported.

CW3 Nelson has logged more than 3,500 hours, earning his Master Army Aviator wings early this year. Equally experienced in the field of aviation maintenance, he has been involved with Army Aviation aircraft since 1963. He served three tours in Vietnam, the first in 1964 to 1965 as a door gunner on a helicopter gunship. During his second tour (1968 to 1969) he was an aircraft technical inspector and from 1972 to 1973 he was an aviation maintenance officer.

He has been the maintenance officer for the 507th since 1976, except for a 1-year stint in Korea. The 507th has been awarded several important safety awards from U.S. Army Forces Command during that time, and the unit has not had a reportable accident in more than 10 years. CW3 Nelson is proudest of that safety record.