# NAVAL AVIATION NEWS

March-April 1989

# NAVAL AVIATION NEWS

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COVERS—Front: Crewmen aboard *Nimitz* check an A-7's intake port for FOD before engine turnover (JO1 Patrick Winter). Back: Charles Cooney rendered the painting of an early flight demo team flying F6Cs; and the *Blues'* 1989 air show schedule.

## Features



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The meteorological research conducted under Project ERICA will provide a new understanding of rapid intensification of winter storms at sea. **Page 4**

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**PUBLICATION POLICY:**

**Naval Aviation News considers for publication unsolicited manuscripts, photo essays, artwork and general news about aircraft, organizations, history and/or human endeavors which are the core of Naval Aviation. All military contributors should forward articles about their commands only after internal security review and with the permission of the commanding officer. Manuscripts will be returned upon request.**

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By Vice Admiral Robert F. Dunn, ACNO (Air Warfare)

# Mindset

The objective point of the flight was Fort Monroe, Va., and the purpose of the flight was to determine and eradicate the weak points of the machine and to determine the physical strain caused by a long trip . . . . Lt. Towers occupied the right seat . . . and several times during the trip was able to tighten water connections and make minor repairs, doing away with the necessity of landing. Once he stopped a bad water leak by climbing partly out of his seat to the engine section and tightening the water manifold."

So begins the logbook description of the flight of Theodore Ellyson and John Towers, Naval Aviators No. 1 and 3, from Greenbury Point in Annapolis, Md., to Hampton Roads, Va., on October 25, 1911. Despite Tower's heroic first aid, the loss of water eventually caused the engine to overheat and forced the intrepid pair back to earth short of their destination. Ellyson skillfully controlled the hydroaeroplane's landing through a six-foot surf with a 20-knot tailwind — a fitting conclusion to an exciting flight. They had covered 112 miles in two hours.

The Curtiss A-1 was undamaged but the engine required two hours of surgery. One more hop on the 25th brought them to within five miles of Fort Monroe. More engine trouble and a split pontoon, patched with tar and canvas, required overnight repairs. In the morning, the feeble machine was able to lift the weight of only one man from the glassy water. Towers alone arrived by air at the fort.

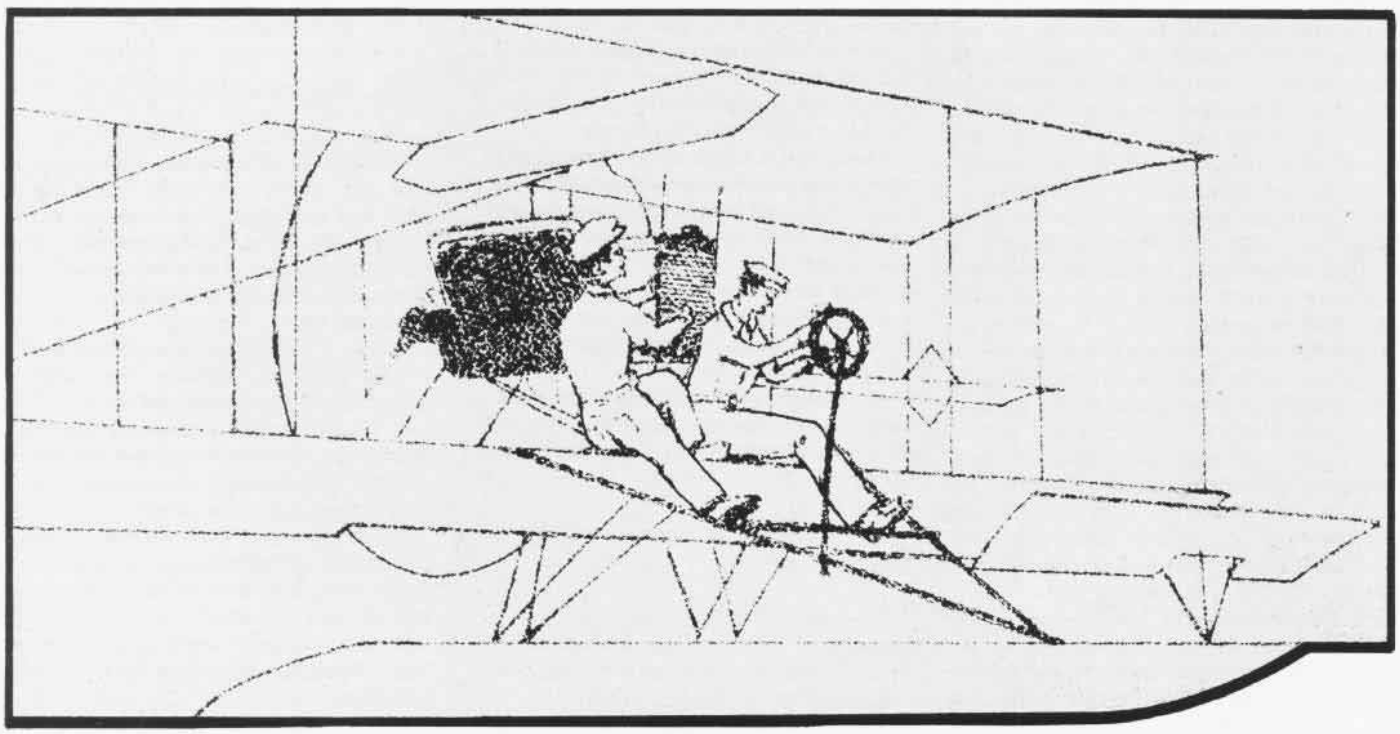
The return to Annapolis was just as eventful. Ellyson and Towers battled the elements and the A-1 for a week before they reached home. In the process, they rebuilt the pesky engine's water pump repeatedly with parts they manufactured themselves using tools borrowed from residents along the shore of the Chesapeake Bay.

This great story from the first days of Naval Aviation has no tactical relevance today, and it certainly has no technical lessons for our maintainers. However, it is a powerful reminder of how much can be achieved — despite the odds — if you really set your mind to it.

During this first year of its existence, Naval Aviation bought three airplanes and conducted all of its operations for less than $25,000 — a paltry sum even then. (The aviators often paid for gasoline out of their own pockets.) Nonetheless, the extraordinary efforts of Ellyson, Towers and the other pioneers who joined them made the Navy's experiment with airplanes a success from the beginning. The first leg of the flight to Fort Monroe set a world record for distance flown by a seaplane.

Today, Naval Aviation won't get by for $25,000, distance records in seaplanes are unlikely, and outside-the-cockpit gymnastics in flight as well as pilot-improvised repair parts are unacceptable. The challenge now is to meet global commitments with vast resources. However, there is a similarity between our first year and the years which lie ahead.

As the Navy strives to maintain readiness for our many missions despite fewer dollars available, the squeeze will be felt throughout Naval Aviation. But with just a fraction of the sense of purpose, innovation and persistence that Ellyson and Towers made part of Naval Aviation's tradition, we'll tighten our belts and still successfully perform our mission. We can do the job if we put our minds to it, now, as they did then. ■



ILLUSTRATED BY Osborn

## Paddles Partners

An A-7 squadron landing signal officer (LSO)-in-training was relaxing in the ready room after working on the platform. After a time, he looked up at the television monitor and noted that the PLAT (pilot landing aid television) crosshairs were on the screen. The LSO proceeded to air operations where an officer told him that a *Corsair* was returning to the ship with total fuel transfer failure. The incoming bird had 1,200 pounds of fuel available. Calls rang out for the air wing LSO — CAG Paddles — to assist in this emergency recovery. Realizing that the platform was unmanned, the LSO-in-training hurried topside to help.

En route, he joined up with his LSO team leader, an F-14 pilot, in the latter's ready room and the two were soon on the platform. Neither were technically "air wing qualified." They turned on equipment, checked NATOPS for necessary information, established communications and adjusted the lens.

They verified the incoming *Corsair*'s final approach speed and fuel state and determined that the A-7 was safely below max trap weight.

Still, there was concern on the platform because CAG Paddles had not arrived. They could not "legally" bring aboard the ailing bird. The air boss inquired if the platform was manned and ready. The LSO-in-training explained who was on the platform and advised that an extensive search was under way for a wing qualified LSO. Weather was clear with 10 miles visibility.

The incoming A-7 pilot called at the eight-mile point with intentions to dirty up at three miles. The LSOs on the platform triple-checked the lens settings, ensured that they were targeting the *Corsair* for the correct wire (number two, with no four wire) and that they had a green (clear) deck. The two officers briefly discussed the use of the informative and mandatory calls should the A-7 go high and/or fast.

The *Corsair* reached four miles and just as the LSO-in-training picked up the phone to advise Primary that CAG Paddles had not yet arrived, the air wing LSO emerged onto the platform.

CAG Paddles took the pickle and the A-7 flew an OK pass to the number two cable.


**Grampaw Pettibone says:**

**The younger LSOs were relieved to see CAG Paddles arrive on the platform. At the same time, they were disappointed in not being able to complete the recovery. Ole Gramps likes this attitude. It's a little like team sports. If a first-stringer goes down, the sub must fill the gap. And if he fills it well, the team holds its own. If not, the team might very well lose.**

**These LSOs were willing and able to handle the emergency aircraft because they were well prepared, knew their stuff and had the right amount of "I'm gonna get the job done!" spirit, which is what Naval Aviation's all about.**

**It's not a bad idea, now and then, for each of us to look deep down within himself or herself and double-check the level of that Naval Aviation spirit — and the readiness to move up and forward when the call comes to do so.**

## Corsair Collision

Two A-7E pilots, a lieutenant and a lieutenant (jg), launched from NAS West Coast on a low-level navigation training flight as part of the fleet readiness squadron syllabus. Weather was relatively clear throughout the route except for a forecast ceiling of 1,400 feet at the coast-in point.

The initial high-altitude portion of the flight was uneventful and about 45 minutes after takeoff the flight began its descent for the low-level phase. The *Corsair II* pilots terminated the IFR (instrument flight rules) segment of the flight plan while at 14,500 feet with the junior pilot in the lead, the instructor in trail, as briefed. The cognizant air traffic control center lost radar contact with the A-7s when they were at about 800 feet. The aircraft followed the coast northbound about two miles offshore and 500 feet above the water.

According to observers, the lead aircraft appeared to be flying straight and level. Number two, the lieutenant, was manuevering side to side behind it. Number two commenced a left turn toward number one, starting from the right and slightly aft. The trailing A-7 then struck the lead aircraft at a high "angle off" of about 45 degrees from slightly underneath the lead. Both aircraft exploded simultaneously and plummeted into the sea offshore. Apparently, neither pilot attempted to eject.

Rescue helicopters were on the scene in minutes and although oil and debris were sighted, the pilots and the aircraft were lost.

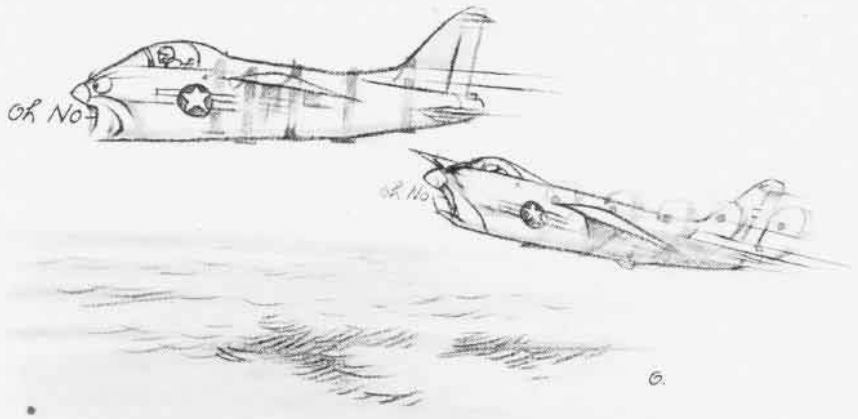
**Grampaw Pettibone says:**

**Goldang it! It busts me up bad to lose two tough, dedicated flyers like this. The lieutenant, particularly, was known as a highly disciplined and professional instructor. He had flown chase on the same training route several times.**

**We don't know the precise cause of this awful midair collision. But it appears that the lieutenant might have momentarily lost situational awareness. Maybe he was doing something in the cockpit, lost lookout on lead and misjudged his closure rate.**

**No matter how professional, disciplined and skilled we get, human bein's make mistakes. And when you're in a fast movin' jet, down low, in company with one or more machines like your own, there just ain't room for mistakes.**

**Ole Gramps doesn't know what wisdom King Solomon would put out**



**on this one. All I can recommend is: remember what happened to these two men and, as best you can, guard against lettin' such a midair happen to you.**

### Lament of a "Turn Qual" Petty Officer

**From a letter to Gramps:**

"We need you to turn and spread 616." With due consideration to varying side numbers, this is a familiar command to a turn qualified sailor assigned to maintain H-3 *Sea Kings*. I keep trying to fix in my mind the warning the NATOPS (Naval Air Training and Operating Procedures Standardization) officer gave us in the quiet learning environment of the cockpit trainer. He said, "Don't let anyone rush you on a turn or talk you into doing something against NATOPS!"

We all know that life in the hectic real world of flight operations can make this a difficult tenet to abide by. Once my flight deck chief told me we had to "fold" an aircraft immediately and that we must use the battery start procedures to do so since no external power was readily available. As diplomatically as I could, I explained to the chief that battery starts were not permitted by turn qual personnel. The chief ordered me to battery start. I complied, of course.

On another occasion, prior to the start sequence, the LSE (landing signal enlisted) said that because the fire bottle was way across the flight line, we could use the aircraft's fire extinguisher instead. Another no-no. Another order to start anyway, without the proper fire bottle.

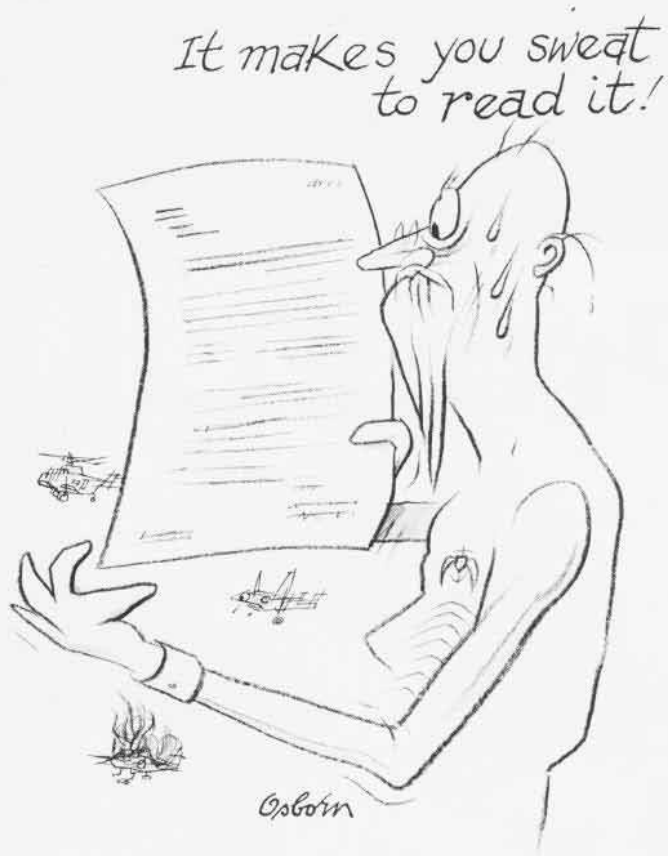
I also remember the maintenance chief who said, "You WILL spread the bird where it sits!" Well, where it sat was right beside an F-14 *Tomcat* which was directly in the blade path.

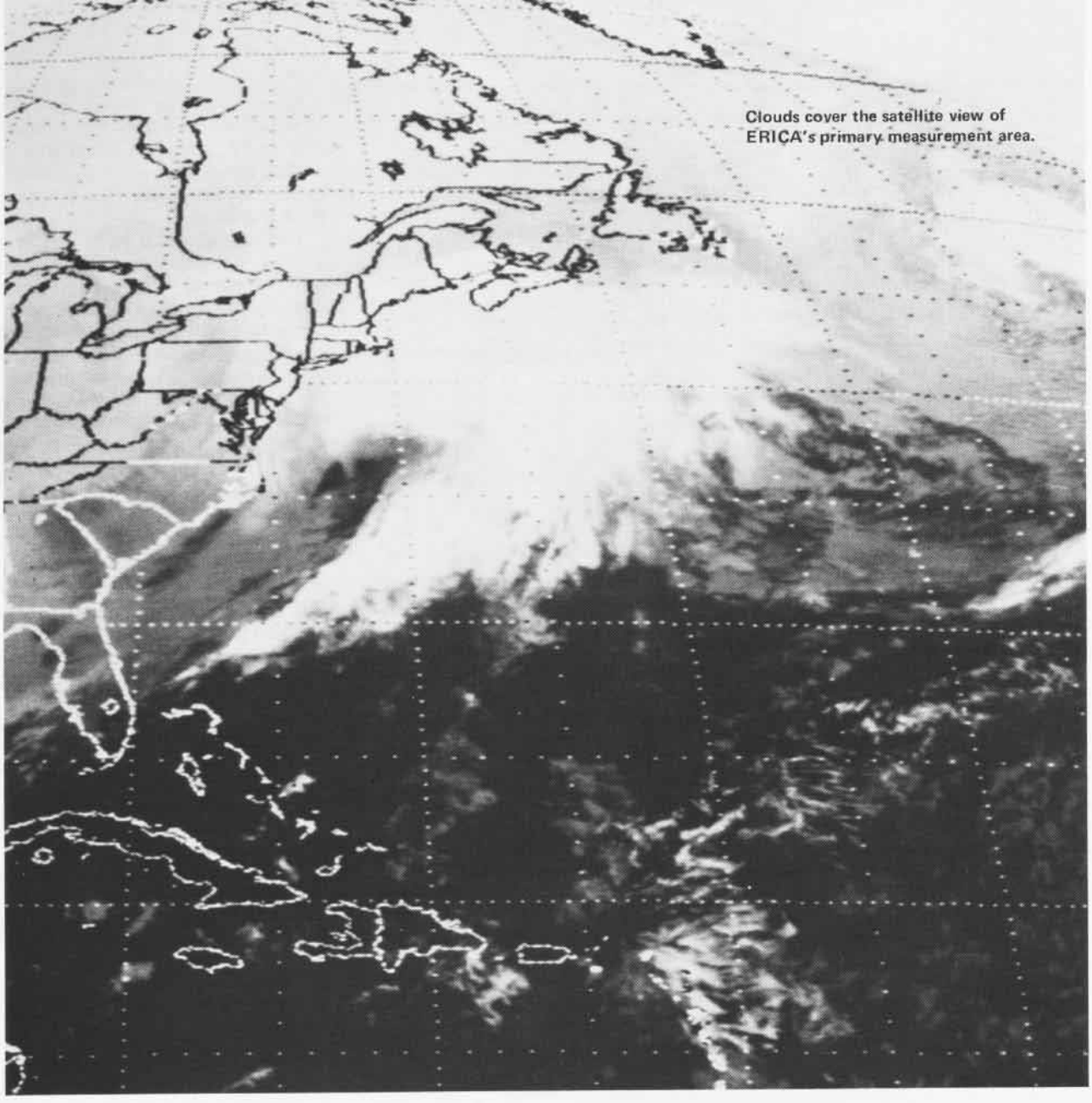
I realize that these are hard-working supervisory personnel but there are times when their only concern is "getting the job done" without regard to the consequences. I think they're going to be with me in front of the investigation board trying to explain why an engine fire consumed a whole aircraft or why a rotor blade sliced through an F-14's canopy.

The turn qualified petty officer is in charge of the aircraft. It's his or her call in deciding if a procedure is safe or not. There are times when the operational tempo will cause someone to override proper procedures. Still, to my way of thinking, there is no substitute for good judgment, knowledge of procedures, a thorough preflight and, above all, a focus on safety.

**Grampaw Pettibone says:**

**Good points, well taken. Cuttin' corners is as mean a temptation as that rosy apple in the garden. Truth is, you can get away with hurryin' and skippin' certain procedural steps. But when such mistakes catch up with you, there's all kinds of fire and brimstone. It ain't worth it. All hands should take up this young writer's message. The rules have a purpose and that purpose is safety.**





Clouds cover the satellite view of ERICA's primary measurement area.

# Project ERICA

By Commander John A. Norton

EXPERIMENT ON RAPIDLY INTENSIFYING CYCLONES OVER THE ATLANTIC
ERICA
1989

Camp Springs, Md., January 12, 1989 — At a borrowed desk in a borrowed office overlooking a Toys R Us store in suburban Washington, D.C., Ron Hadlock rolls a computer mouse on a blue pad. With a few key strokes and an almost imperceptible click, he can set in motion a multimillion dollar operation using borrowed airplanes, borrowed crews and borrowed scientists.

Working under contract to the Office of Naval Research, Hadlock is the field director of a complex meteorological research project he has tagged "ERICA" for Experiment on Rapidly Intensifying Cyclones over the Atlantic. According to Hadlock, ERICA is designed "to obtain a new understanding of the rapid intensification of winter storms at sea."

In planning since 1985, ERICA combines the resources of numerous U.S. and Canadian government agencies and the academic community into a unique operational team for the intense gathering of meteorological data. All players in ERICA are connected by phone to a computer network which allows for instant communication. Now that the planning is complete and the assets are in place, Hadlock's primary role is to watch the weather and when conditions are right . . . click.

But, today, Hadlock has time to reflect; conditions are not right and there is no immediacy in his voice. "This building is the center of the earth for weather forecasting," he said. Appropriately, his office is in the National Oceanic and Atmospheric Administration's (NOAA) World Weather Building. Outside his door are the finest resources available to nowcast and forecast the weather both locally and worldwide and serve as the hub for his decision-making process.

The core of his operational resources is a small "squadron" of borrowed aircraft, each outfitted for the collection of real-time weather data which is unobtainable by any other means. Aircraft provide the flexibility to adjust operations to the vagaries of the weather. The ERICA observation area covers the northwestern Atlantic Ocean from Cape Hatteras, N.C., to beyond St. John's, Newfoundland, and extends southeast to Bermuda. This is the area where unstable air from the Caribbean, cold Canadian air and the warm waters of the Gulf Stream converge. When conditions are right, within hours, violent storms explode and rip through the Atlantic on a northeastern course. Close to shore, these nor'easters bring destructive winds and snow measured in feet. Navy ships at sea have experienced severe deck damage, ships and boats have sunk and oil rigs have toppled.

The Blizzard of'78 was an ERICA-type storm that will long be remembered. The entire northeast coast of the United States was immobilized by four feet of snow, 29 people were killed and 339

Winter storms at sea are a major concern of the Navy. Data collected by ERICA scientists will help to better predict when to expect severe weather.

Lockheed -California Company


**NOAA's WP-3D flying laboratories penetrate storms for the collection of meteorological data during Project ERICA.**

homes were demolished.

The actual weather conditions from the surface to the tops of the storms — wind, temperature, dew point, humidity and barometric pressure — before, during and after storm inception, are the data this borrowed squadron of aircraft is designed to gather. There is a mix of Navy, NOAA, Air Force and National Center for Atmospheric Research (NCAR) aircraft, especially outfitted for meteorological data gathering.

With the exception of Air Force 53rd Weather Reconnaissance Squadron WC-130s, the storm hunters Hadlock has borrowed are operating from NAS Brunswick, Maine. Two NOAA WP-3Ds, the Navy Research Laboratory's P-3 and an NCAR *Electra* and *Sabreliner* comprise this borrowed squadron. Each has unique data-gathering capabilities that combined should give scientists the most thorough look ever at these rapidly intensifying storms.

The *Sabreliner*, with two pilots and four scientists, flies in the jet stream. Its mission is to detail the structure of the upper-level disturbances as they leave the coast en route to the predicted area of rapid intensification. The twin-engine jet operates sensors that provide data for atmospheric boundary layer surveys, air-sea measurements, cloud physics studies and tropospheric profiling. Working before storm development, NCAR crews fly a double cycle of about three hours with a nominal two-hour turnaround. Twelve hours later, they are airborne again on another double cycle — this time behind the storm in the area where conditions are improving.

Meanwhile WC-130s, home-based at Kessler AFB, Miss., fly ERICA missions from Dover AFB, Del. The *Hercules* and their six-man crews conduct flight operations 12 hours before, during and after rapid intensification. Nominally these crews fly 10-hour missions with a two-hour turnaround for the aircraft. Like a lasso, these H-model C-130s fly a predetermined track around the storm area, collecting data from onboard instruments and dropsondes, which are parachute-retarded devices that measure the current atmospheric conditions as they drop to the ocean surface. The observations are transmitted from the *Hercules* over a high-frequency radio to an Air Force monitor or a high-speed satellite communication link and are relayed to the World Weather Building.

The National Weather Service and the Satellite Applications Laboratory of the National Environmental Satellite and Data Information Service provide the data from which Hadlock makes the decision to begin what he calls an intense observation period (IOP). Looking at weather patterns over the Pacific and northwestern United States, Hadlock needs to make a preliminary decision, some 48 to 96 hours in advance of the storm, that conditions for an IOP will be correct.

Hadlock and I walked through the working spaces of the World Weather Building. Most everything is high tech. Computers grind out continual data and television monitors provide real-time pictures of the earth's current weather from the "GOES" satellite. In stark contrast, sitting at a drawing table, a meteorologist hand draws pressure lines on a synoptic chart.

Hadlock explained, "It is important that we are in front of the storm. If we get in a tail chase, we can expend our resources too rapidly and not obtain the required data." This $8 million collection effort began with its first IOP in December 1988 and will last through eight storms. By mid-January, Hadlock had predicted the right conditions five times.

Brunswick, Maine, January 17 — Willard Scott was predicting a few inches of snow in the northern sections of Maine and Joe Cupo, the local TV weatherman, agreed. Joe was calling for a secondary low to form off the Carolinas which Willard did not mention. It would not be a factor for New England.

Ron Hadlock must have clicked the mouse on his computer the previous day. Before the "Today Show" was over, my phone rang. "There will be an ERICA preoperational briefing for an IOP at 1500. Can you be here?"

This briefing was but a minor part in the larger ERICA scheme. Scientists from throughout the country canceled classes and packed their bags. Throughout the eastern sections of the United States and Canada, weather observers increased the frequency of conventional upper air soundings. Penn State researchers located on Cape Cod readied their doppler wind profiler to take soundings every five minutes. Marines in Brunswick for ERICA operations fine-tuned their tactical Mark IV satellite receiving system. The collection effort was on.

Hadlock told me he was pleased that he had selected NAS Brunswick as the center for ERICA aircraft operations. Having operated from Brunswick for many years, I knew he meant the hospitality and the support . . . not the weather.

Brunswick is the home of Patrol Wing Five. Six active patrol squadrons and the reserve Patrol Squadron Master Augment Unit train here. Carved from blueberry fields in 1943 to support the training efforts of WW II, the station trained Royal Canadian Air Force pilots of the British Naval Command in formation, gunnery and carrier landings. Over 25 British squadrons received their training here before the base was deactivated in 1947. In 1951, NAS Brunswick reopened with a new mission, antisubmarine warfare.

ERICA aircraft operations headquarters is located in hangar two, one of the original WW II hangars that used to hold RN *Corsairs*. The office spaces have been remodeled but the hangar bays remain the same. This wooden hangar is shared with the public works department, and the army of snow plows parked cheek to jowl on the south side remind me that this can

be a miserable place from which to operate.

The uniform of the day at ERICA air ops is blue jeans and sweatshirts. University of Washington, State University of New York at Buffalo and the University of Wisconsin are represented for this IOP. Not advertised on the backs of graduate students are other academic participants: MIT, University of California, North Carolina State University, Yale, McGill University, Penn State, Woods Hole Oceanographic Institution, Drexel University and the Naval Postgraduate School.

There is much grumbling before this planning session. There has been no ERICA activity since early January, and the prevailing opinion is that this storm will be a dud.

Enter Carl Kreitzberg, one of the nation's foremost meteorologists and director of ERICA aircraft operations.

Undaunted by the naysayers, the professor from Drexel University went straight to work. With a blackboard and piece of chalk — no high-tech, state-of-the-art computers — Kreitzberg constructed the operations for the IOP beginning some 36 hours hence.

All aircraft are available. The NRL P-3 will dash to Canada and obtain replacement buoys for failed drifting buoys which send sea surface data to the World Weather Building. The Air Force is on alert and will be collecting its required data. Within 20 minutes, Kreitzberg has constructed a time line, crew list and flight profile for each remaining plane.

Kreitzberg will fly the first mission in the NOAA WP-3D with five supporting scientists, seven NOAA crew members and two press observers. His supporting scientists are three graduate students, a Naval Reserve aerographer's mate and a Naval Reserve lieutenant. "Commander Norton, you may have to sit 'Clouds' if Terri Fairgraves does not get here from Wisconsin," I am advised.

U.S. Air Force

**Air Force WC-130 Hercules fly the perimeter of the storms on predesignated tracks.**

NOAA's two aircraft were scheduled for nominal 10-hour missions. With four aircraft and scientific crews the aircraft will relieve each other, allowing a two-hour turnaround for each aircraft. The storm is predicted to develop and move so quickly that only four flights are possible before the storm is out of useful range.

The snow Willard Scott predicted was on time as the NOAA P-3 left the chocks in search of a yet-to-develop low off the North Carolina coast. Aircraft Commander Howard Tichnor has been flying for NOAA since 1975 and is one of the five civilian pilots remaining. Most of NOAA's 36 pilots are part of the uniformed service which uses the Navy's rank structure. Lieutenant Commander Ron Phillipsborn is the pilot and has just completed a cross-deck tour with the Navy. Both men, as well as the flight engineer, are required to hold the appropriate FAA ratings for their positions.

This crew and aircraft are weathered veterans. Outside the main cabin door, red cyclones are painted for each hurricane this aircraft has tackled. But tonight they are after an unnamed denizen. "Hurricane hunting is easy compared to this," said Tichnor. "We have done it so many times that it is textbook. Flying into these storms is a new experience each time. We are learning as we go."

Aft of the cockpit, NOAA flight director Jack Parrish coordinates the needs of the scientists with the positioning of the aircraft and directs the NOAA engineers in minor repairs to the sophisticated data-gathering equipment. The equipment is amazingly simple to operate. Each station is actually an observation post for specific data being recorded on a mission tape. Graduate students learn to operate it in 30 minutes; Navy commanders take a little longer.

The moon was bright, the winds were light for 22,000 feet and the sea surface appeared to be calm. Kreitzberg entered the cockpit after getting off the radio to the World Weather Building. "You should start to see some cloud development in the next hour and possibly some thunderstorm activity," he predicted. A bright flash appeared off the port wing.

An ERICA storm was in the making.

For the next eight hours, the P-3 and its borrowed crew flew in, around and through weather which for my entire career in aviation I have been trying to avoid. Excited scientists took copious notes and rejoiced each time the barometric pressure dropped another millibar. The NOAA professionals took the weather in stride, silently hoping they did not take a lightning strike.

By daylight, we were headed back to Brunswick. Carl Kreitzberg kneeled at an observation window. "Look at that! Look at that! It's classic. While we've been flying around in the dark, mother nature has created a storm!"

The data from ERICA will take years to digest. Some day we may understand. ■


**The NCAR Sabreliner operates primarily behind storm activity collecting information on upper-level disturbances.**

# Naval Oceanography Command Center, Rota

# Weather Experts Stalking Mother Nature

By JO1 Jim Richeson


Weather can be an aviator's best ally or worst enemy.

The vital environmental information which can determine the success or failure of a mission is provided by a few, seldom recognized sailors within the aviation community. It is through the skilled predictions of aerographer's mates (AGs) that Navy pilots are assured of a safe journey to their destinations.

Numbering more than 1,400, AGs can often be found within the secluded steel compartments aboard aircraft carriers and other major combatants, collecting essential information and gathering data while keeping a steady eye on one of the battle group's most formidable opponents: mother nature.

Within the confines of Naval Station, Rota, Spain, are 100 men and women, mostly AGs, ocean systems technicians, operations specialists and other related ratings, assigned to the Naval Oceanography Command Center (NOCC). The center's mission is to keep the fleet safe today, ready for tomorrow and able to fight smarter using the necessary knowledge to avoid inclement weather.

Equipped with computers, teletype and telefax machines and satellite links, NOCC Rota gathers environmental observations, processes data and disseminates area analysis, which includes weather charts and warnings spanning from the Gulf of Cadiz and the Mediterranean Sea to the Red Sea between the African continent and Saudi Arabia. Its task is to provide total environmental support for ships and aviation weather for all aircraft coming in and out of Rota.

Aided by the Fleet Numerical Weather Central in Monterey, Calif., NOCC Rota is able to accurately predict weather patterns within its region and send the information back to the fleet in real-time. The Monterey facility provides computer-generated environmental information through the Navy Environmental Data System and by weather updates from various weather detachments and surface and aviation commands in the Mediterranean.

Those who've sailed the Mediterranean Sea can attest that it is no picnic to conduct normal operations during winter. While a ship's bow rises and falls beneath the heaving sea, aviators are forced to cope with mother nature's temper tantrums in order to fulfill their missions. One of their toughest challenges is landing an aircraft on board the pitching and rolling deck of an aircraft carrier.

According to Commander Fred C. Klein, NOCC's operations officer, the Mediterranean is like a big lake surrounded by mountains: Atlas, Sierras, Pyrenees (between Spain and France whose highest peak stands at a towering 11,168 feet) and the Alps. There is also a large mass of plateaus over Bulgaria and Turkey.

"As you transition into wintertime, you can have up to 33 different kinds of freak winds that occur," Cdr. Klein said. "It can be 10-15 knots one minute, 60 knots the next. The change is very rapid and when you have a high tempo of operations, whether it is in the Ionian Sea or the eastern Med, you have to be very much attuned to what kind of weather situations are taking place to make sure the fleet knows about it ahead of time."

Time is of vital importance when warning the fleet. To successfully maintain the command center's constant vigil over potentially threatening weather patterns in the Med, NOCC has four duty sections which alternately stand 12-hour shifts every day. Each duty section is headed by a command duty officer, forecast duty officer, meteorological technician, a Navy Environmental Data System operator, an oceanographic technician, flight forecaster and an observer. Cdr. Klein added that the center usually augments each section with an

JO1 Jim Richeson

Opposite page, an ominous funnel cloud hovers above the Rota airfield, suspending flight operations during summer 1985. Left, constant weather updates keep NOCC personnel informed of potentially threatening patterns in the Mediterranean region. Below, aviation weather observer AG3 Richard W. Shea logs current readings into Weather Vision II.

JO1 Jim Richeson

oceanographic watch officer — normally an officer or a chief petty officer.

In addition, NOCC has 23 enlisted personnel assigned to mobile teams which can be put to sea at a moment's notice. They help various seagoing commands assess and gather weather information. The center also has personnel attached to various small weather detachments in Sigonella, Sicily; Lajes, Azores; Naples, Italy; and Suda Bay, Crete, which help support individual airfields and antisubmarine warfare operations centers (ASWOCs). The dets also support units under the Commander in Chief U.S. Naval Command, Europe, and Commander, Sixth Fleet, as well as the Spanish navy on board NS Rota.

Through Weather Vision II, a system which was designed and programmed by the center's personnel, the Spanish air control tower has direct access to NOCC's updates and is capable of translating pertinent weather data which is kept current every hour. This task is one of the duties performed by AG3 Richard W. Shea, an observer with the center's aviation weather branch.

Shea said that depending on existing weather conditions, an observer may take a reading every five minutes. His main concerns deal with ceiling heights, visibility and any significant changes in weather conditions which will affect the station during aircraft operations. He then files his observations into Weather Vision and teletypes all the necessary data so that other regions within the Med and around the world are aware of the current weather situation within the Rota airspace.

As Petty Officer Shea observes, AG1 Richard D. Malone concentrates on predicting when field conditions will start and stop deteriorating. As a flight forecaster, Malone frequently provides briefings to many pilots going through Rota.

When conducting a standard flight brief, Malone places special emphasis on specific weather conditions which an aviator might expect from his point of departure to his destination. He said that most flights headed for the contiguous United States, and all Navy aircraft, receive what is known as a Horizontal Weather Depiction which includes upper level wind charts and altimeter settings and ditch headings.

Lieutenant Commander Robert L. Harrod, one of the center's command duty officers, stressed that more parameters are added to the command's mission when it comes to providing aviation weather. The information which is most closely scrutinized is icing, turbulence, cloud level, wind speed, precipitation and thunderstorms. "We translate [barometric] pressure into what the pilot uses in the cockpit," he said.

The extent of NOCC's scheme of operations is limitless. Besides recording atmospheric pressures and observing ground level conditions, the command also provides refract analysis which enables the Navy to understand how communications can work better in different frequencies by determining radar holes for both surface and aviation platforms. This analysis pays close attention to the effects of the atmosphere on communications, including interferences in the ionosphere and determining the best frequencies to use.

In addition, NOCC Rota provides ocean front and acoustics analysis which is essential to the mission coordination and evaluation (MC&E) of many ASW ships and ASWOCs. During the MC&E phase of ASW operations, every bit of information gathered by a P-3 *Orion*'s crew is carefully analyzed. As Cdr. Klein said, "A crew comes back off a grueling nine-hour patrol on station and the ASWOC evaluates how the mission went. We try to provide specific ocean front analysis to the ASWOCs so that they can better define, for instance, if there's an ocean front here and that's why we lost the submarine. It's a well-known fact that both we and the Soviets use each ocean front as a means of concealment."

He noted that while weather conditions may be ideal for surface and aviation units during the summer months in the Med, from a tactical ASW standpoint the acoustic conditions are lousy and the reverse generally occurs during winter. According to the veteran oceanographer, the Mediterranean is the hardest body of water to figure out acoustically, citing that the acoustic energy within the Med will travel in various ways depending upon what the mass structure of the water looks like. He emphasized, "There's never a dull moment around here."

Cdr. Klein said that the center conducts an inchop/outchop for every ship that stops at NS Rota. "We send somebody to each ship for a face-to-face turnover to make sure they understand all the support that we can provide," he explained. "Part of the center's mission is to educate the fleet about the environment. Our goal is to provide the information necessary for the fleet to obtain maximum effectiveness from its weapon systems."

Keeping track of mother nature's ways, while ensuring the fleet is safe, smart and ready to fight even in the worst environment, is a monumental task which the men and women of NOCC Rota tackle every day.■

# Personal Excellence:

**By Sandy Russell**

Personal excellence is not a small challenge. Whether it's an individual concern or an organizational program, personal excellence is a lofty and sometimes seemingly unreachable goal.

But the Navy has never shied away from challenges. The unequivocal success of its alcohol and drug rehabilitation program attests to that fact. When it comes to helping people, the Navy pulls out all stops.

Initiated in 1987, the Personal Excellence Partnership Program is a cooperative effort designed to increase the personal excellence of American youth. It fosters collaborative partnerships — Navy command-sponsored programs or projects with a school or youth group that have specific goals in the areas of education, health/fitness and citizenship. Such a collaborative effort ensures the pooling of resources to meet the personal excellence needs of youth in these areas.

According to Lieutenant Commander Keith Canty, Personal Excellence Partnership Division, Naval Military Personnel Command, "Coaching a baseball team or heading a Boy Scout troop are positive actions, but they are not what the personal excellence program is seeking. We prefer a more enduring, formalized relationship with the community — the kind that causes the community to grow and which evolves into a lasting partnership," he explained. "Navy personnel are transient. We want the commanding officers of commands to solicit volunteers on a continuing basis." He said that the program's success will result in stronger, more qualified people who are able to serve their country if necessary. For business, it means that Americans will be able to fill the high-tech jobs of the future.

Former Chief of Naval Operations (CNO) Admiral James D. Watkins said in 1986, "It is estimated that business and industry spend $40 billion annually to train their employees in the basics needed at entry level to be productive workers." He added, "Out of 100,000 new recruits coming into the Navy, 22,000 cannot read above the eighth grade level, yet all hold high school diplomas . . . . We need to get on with a national program to boost the youthful skill base and to motivate that skill base into the nation's youthful work force."

In their communities nationwide, individual Navy commands participate in volunteer partnerships which stress academics, health/fitness and civic awareness. Two of the most common partnerships between the Navy and local schools are Adopt-a-School and Saturday Scholars.

Adopt-a-School represents the majority of Navy partnerships. It includes a wide range of volunteer activities from tutoring, lectures and teacher assistance to fitness runs, field trips and pen pals when ships deploy for sea duty.

Saturday Scholars is primarily a tutorial program in which active duty sailors volunteer to assist youngsters in elementary and secondary schools, on a one-on-one basis, to improve their skills in reading, mathematics and science. The tutoring occurs typically on six consecutive Saturday mornings with "graduation" during the seventh week.

In the Personal Excellence Partnership Program, Navy assistance in education focuses on math, science, reading, writing, languages, knowledge of other cultures and computer literacy. In health/fitness, the focus is on nutrition/weight control, exercise, stress management, high blood pressure control, prevention of drug/alcohol abuse, smoking prevention/cessation and motor vehicle safety. Citizenship addresses self-esteem, self-responsibility and community service.

The program targets preschool through 12th grade, with particular attention on "youth at risk," or those from backgrounds which challenge personal growth. Demographic projections to the year 2000 indicate an increasing pool of youth who will be less prepared for the military, the work force or life in a complex society. Contributing to the sense of national urgency are the mounting statistics of illiteracy, drug/alcohol abuse, teenage pregnancy, poor physical fitness and overall unhealthy lifestyles. Left unchecked, these factors imperil the development of self-worth, dignity and — in the long run — the contribution that these youths can make to society.

Navy personal excellence partnerships can increase the number of youths able to meet entry-level work force standards in the near and distant future by raising the levels of academic performance and healthy behavior. They can also decrease youth risk indicators and foster community service and good citizenship among today's youth.

Naval Aviation units are heavily involved in partnership activities. Although the formal Navy-wide program is relatively new, some individual commands have partnerships that are several years old. Others have just begun the planning phase, but their efforts are enthusiastic and seem certain to succeed.

There are many success stories in Navy partnerships. In Brunswick, Maine, Rear Admiral J. S. Yow, Commander Patrol Wings, Atlantic, was appointed to the Maine Aspirations Compact, a consortium of public and private organizations seeking to raise the personal aspirations and educational performance of Maine students.

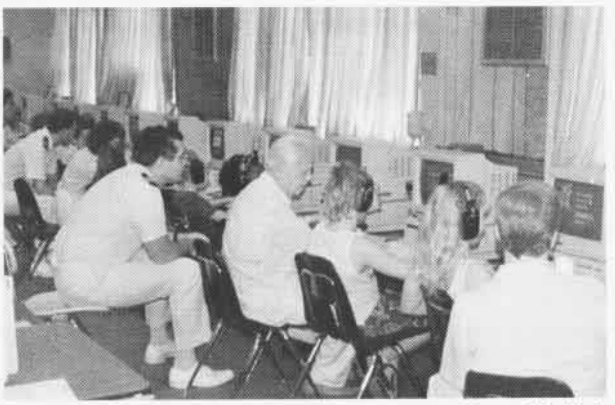
In a letter last year, CNO Admiral C. A. H. Trost commended Naval Aviation Depot (NADEP), Alameda, Calif., for work with Chipman, one of its three adopted schools, which was selected as a California Distinguished Middle School. The school cited its Adopt-a-School program with the Navy as a major factor in its selection.

In NADEP Alameda's Partnerships in Education program, depot employees strive to strengthen the educational process by cultivating the interaction between schools and employers. A committee for each adopted school is comprised of volunteers whose talents encompass a wide range of skills and backgrounds. Through "job shadowing," students receive hands-on experience in areas such as sheet metal repair, welding, upholstering, machining, production control, electricity, tool making, computer maintenance, clerical work and public affairs. Other depot partnership activities include "Say No to Drugs" programs and courses which teach students communication and leadership skills.

The personal excellence program under Rear Admiral R. H. Jesberg's leadership as Commander Helicopter Wings, Atlantic, in Jacksonville, Fla., is so popular that a partnership network was established to coordinate the

# A Navy/ Community Partnership

Sherri Withrow



Left, 1988 graduates of Melrose Elementary participated in "job shawdowing" at NADEP Alameda. Above, VP-45 X.O. Cdr. William Evers teamed up with Reed Miller from Jacksonville's retirement community to tutor students on computers. VP-45 received Florida's Commissioner's Business Recognition Award for its volunteer work with Green Cove Springs Elementary.

efforts of the 727 Navy volunteers in his area. Chief of Staff Captain Vann Goodloe spearheads the projects.

Jacksonville is in its fourth year of involvement in Saturday Scholars, which includes 250 volunteers, and area Navy commands have adopted 16 schools under the Adopt-a-School program. Patrol Squadron 45 has a unique relationship with the Green Cove Springs Elementary School. When the squadron deploys, spouses take over the sponsorship duties while the children correspond with deployed members as pen pals until VP-45 returns home. Through letters and postcards, the kids get to travel around the world.

The demographics of an area seem to determine the paygrade/rank of its volunteers. Overall participation in Jacksonville is a 50-50 mix of enlisted and officer personnel from E3 to commander, but the most active levels are E4 to E5 and lieutenant. "We have a lot of involved young people in the Navy who are very proud of what they're doing," Capt. Goodloe stated. "When we get the word out and make them aware of the programs, they step forward. Because they are a part of the community they want to give to the community."

The captain said the Personal Excellence Partnership Program is important because "kids are an investment in our future. It's critically important that we become involved with the community, showing that we Navy men and women enjoy our profession and that it's a proud profession," he emphasized. "Our Navy representatives are fantastic role models. They're highly motivated, they're eager and they want to share."

A Navy lieutenant from NAS Whiting Field, Fla., serves as a valuable role model for two school girls.

Last year, Capt. Goodloe attended the fifth national symposium on Partnerships in Education in Washington, D.C. The purpose of the meeting is to get organizations involved in partnerships by letting them know what programs are available and how to get them started. He said the Navy was by far the most involved in educational partnerships among the military services. In fact, recently the State of Florida formally recognized the value of the Navy partnership activities in Jacksonville. Capt. Goodloe was invited by the Commissioner of Education to become a member of the statewide advisory council for school volunteer programs.

Summing up, the captain said, "We have a unique assortment of role models across the board — young enlisted and young officers who are actively involved in the community. It's fun. They're really enjoying it."

At NAS Whiting Field, Fla., air station personnel, as well as volunteers from the five squadrons led by Commander, Training Air Wing Five (TraWing-5) Captain Steve McDermaid, participate in partnerships with local schools. Since aircraft maintenance functions previously performed by enlisted personnel are now the responsibility of civilian contractors, TraWing-5 has only about 25 enlisted members. That means that squadron volunteers — numbering 20 to 40 — are mostly officer instructor pilots. Capt. McDermaid commented that since TraWing-5 is a shore activity, its routine is more stable than a unit that deploys, which allows the air wing to contribute to partnerships year-round.

When asked what motivates Navy personnel to get involved in these activities, Capt. McDermaid said, "Personal excellence initiatives are very

worthwhile and we strongly support CNO's objectives. Contributing to the community makes a better quality of life for everyone." He added, "If you look at the kind of people who are here as instructors, they really are superstars. They've had fleet experience, are now back at shore and are interested in education. Most of them are self-starters." He applauded the superb support of TraWing-5's squadron skippers, emphasizing that being a part of the community contributes to a better Navy.

One new program which was kicked off last February in Washington, D.C., is called Pentagon Kids. It is the brain child of Rear Admiral P. H. Cressy, then Director, Aviation and Manpower Training Division, under the Assistant Chief of Naval Operations (Air Warfare). The pilot program involves 60 volunteer students from D.C. schools who each have a primary and secondary tutor to provide continuity so that travel and meeting schedules can be accommodated. Its objective is to provide the inner city children with positive role models, a success-oriented environment and tutoring in basic reading and math skills.

Every Thursday through mid-May, officer, enlisted and civilian volunteers from Navy aviation, surface, subsurface and logistics communities in the Pentagon instruct 34 of the children, while tutors under Chief of Naval Personnel Vice Admiral J. M. Boorda in the Navy Annex work with the other 26 students. Instruction lasts for one hour after which the children are transported back to their schools by bus.

Commander Steve Beal is the driving force in the Pentagon Kids program. He hopes that it will be a catalyst for similar projects. Cdr. Beal said, "A lot of Navy people are becoming aware of the importance of community involvement. It can be very rewarding."

These are only a few examples of effective Navy/community partnerships. The Navy believes that it bears a responsibility with other public and private organizations to strengthen the excellence of America's youth. By establishing partnerships with local schools and communities, the Personal Excellence Partnership Program assists young people in reaching their fullest potential in education, health/fitness and citizenship.

People helping people — achieving personal excellence, the Navy way. ■

# Turnkey Training for the E-6A

By Joan A. Frasher

Hermes, the Greek god of heralds and messengers, lives again in the 20th century through the emergence of the Navy's largest aircraft, the E-6A *Hermes*.

An innovative Navy training concept developed by the Naval Training Systems Center (NTSC), Orlando, Fla., provides E-6A trained pilots, operators and maintenance personnel to Fleet Reconnaissance Squadrons Three and Four in the Pacific and Atlantic fleets, respectively, through a contractor-operated, Navy-monitored effort. The "turnkey" system consists of two training facilities — mainly for flight crews in Waco, Texas, and maintenance personnel in Huntsville, Ala.

The incorporation of the *Hermes* into the operational Navy is being accomplished by the turnkey system. Navy personnel begin and complete their training at the two facilities, figuratively "turn the key" and take off. The new system will shorten instructional time.

Waco is home to the contractor-manned E-6A Contract Flight Crew Training System (CFCTS) and Naval Training Support Unit (NavTraSuppU) comprising Navy personnel. Two specially modified Boeing 707s are contractor owned and operated at the Waco installation. These aircraft provide basic pilot and E-6A aircrew proficiency training, including air-to-air refueling and landing pattern instruction. A contractor-operated computer-based instruction area, cockpit procedures trainer and an operational flight trainer (OFT) complement the in-flight training. The OFT has a motion base with six degrees of freedom and a computer-generated visual system. Ten different courses of instruction will be conducted at the Waco facility — nine are for flight crews and one is for maintenance personnel.

NavTraSuppU fulfills the role of a Navy fleet readiness squadron for the E-6A. The 10-man unit ensures that the contractor — Reflectone Training Systems, Inc. — provides graduates to the fleet who are trained to a contract-defined level of proficiency. In addition to providing standardization checks, the NavTraSuppU personnel provide administrative support to the students undergoing training. Overall administrative and operational command of the unit rests with Commander Patrol Wings, U.S. Pacific Fleet, NAS Moffett Field, Calif.

The number of students in the CFCTS program at any given time will be between 28 and 35. The projected annual student load will increase from 244 in the first year's operation to 928 by 1991. Navy personnel, including pilots, flight officers and flight engineers, entering the Waco facility will bring to the program varying degrees of experience and proficiency. Individuals with previous tours of duty in fleet reconnaissance squadrons or exchange duty with the Air Force will train with recent graduates of Navy training programs in multiengine aircraft, navigation and maintenance.

Acquisition of the E-6A CFCTS by NTSC was directed by the E-6 program manager at the Naval Air Systems Command, Washington, D.C., in response to a fleet requirement developed through the Navy's Director for Space Command and Control in the Office of the Chief of Naval Operations.

The companion installation at Huntsville is a maintenance training facility to instruct Navy aircrews in the maintenance of aircraft components,


Boeing Company

**Left to right, AD1 Ronnie Martin, AD2 Fred Mullins and AT1 Phil Layton of the Naval Aviation Maintenance Training Detachment 1080 work through the acceptance tests at Huntsville, Ala.**

such as hydraulic systems, landing gear and fuel systems. It houses classrooms and open-frame and panel trainers. The maintenance training system includes functional simulation panels for the aircraft systems and mockups of selected aircraft subsystems. Seventeen personnel, members of the Naval Aviation Maintenance Training Detachment 1080, are assigned to the Huntsville installation.

The E-6A Take Charge and Move Out (TACAMO) aircraft will replace the retiring EC-130s. Since the new aircraft is expected to be accepted by the Navy early in 1989, aircrew training through the E-6A CFCTS has already begun at Waco. Because of the "turnkey" capabilities of the two new facilities, the TACAMO aircraft (the Navy's airborne very low-frequency system) transition will be a departure from the norm by requiring no squadron stand-down. The critical importance of the mission dictates that the transition occur while 100-percent communications coverage is maintained on both coasts.

The Hermes provides a platform that will fly higher, faster and longer and be capable of in-flight refueling. The capabilities of this new aircraft will greatly enhance the TACAMO mission.

The TACAMO communication system will serve as an airborne link between the Navy's ballistic missile submarine force and higher authority. The E-6A is based on the E-3 airborne warning and control system. Its airframe, a derivative of the Boeing 707-320B commercial aircraft, is nuclear-hardened against electromagnetic, thermal and blast effects and gamma and neutron radiation.

This aircraft is vital to the ballistic missile submarine force — one leg of our strategic nuclear deterrent. Two major communications systems currently serve this force: land-based communications stations and the TACAMO aircraft.

While the EC-130 has filled the TACAMO need admirably over the last two decades, it has reached its operational limits. The E-6A will extend these limits to provide a more survivable airborne link to both the Atlantic and Pacific fleets.■

PH3 M.J. Behrend

# Nimitz Attack Squadrons In Transition

By JO1 Patrick E. Winter

When Attack Squadrons (VA) 146 and 147 deployed last year aboard USS *Nimitz* (CVN-68), they took along their mainstay — the A-7 *Corsair II* — for the last time.

The A-7 has a long and illustrious history. It was first flown in combat by the VA-147 *Argonauts* in 1967 during the Vietnam conflict. Once painted with menacing teeth near the air intakes, when catapulted off carriers the *Corsairs* spelled impending doom for targets in Vietnam and, recently, in Libya and the Persian Gulf.

Next deployment, VA-146's *Blue Diamonds* and the *Argonauts* will be flying the F/A-18 *Hornet*. Pilots who have thousands of hours in the A-7 will miss the plane and her familiar capabilities.

"Fuel specs and visual ordnance delivery are the two things that stick out in my mind about the A-7," VA-146 X.O. Commander Philip Mills said. "Because of the single-engine efficiency, it fits right in with long cycles. A lot of jets come back to the ship with low fuel states or depend on tankers. The A-7 is not one of them. Plus, she's always been a super visual bomber."

After VAs 146 and 147 make the transition, there will be four active duty A-7 squadrons left on the West Coast and two on the East Coast. The transition is scheduled for completion in 1992.

The *Corsairs* now in use won't go straight to the boneyard. *Blue Diamond* and *Argonaut* aircraft are updated versions and will be sent to the remaining A-7 squadrons and fleet readiness squadrons. Reserve units won't necessarily be getting hand-me-downs either since most of them are also transitioning to the F/A-18.

Ease of maintenance is one of the advantages expected with the *Hornet*. The ability to do a complete engine change in as little as two hours on the F/A-18 and have the plane back on the catapult, compared with at least six hours now needed for an A-7, makes aviation mechanics smile with anticipation.

"The *Hornet* is current technology as opposed to the A-7's sixties and seventies-vintage technology," stated Lieutenant Commander Mark Emerson, VA-147's maintenance officer. "The turnaround time on the F/A-18 is shorter because of the advanced technology. Utilizing better diagnostic equipment, you can evaluate what the problem is and correct it more expeditiously than with the A-7," he said. "It will be easier to maintain with less people."

Commander Terry Nolan, C.O. of VA-147, explained, "The difference in materials between the two planes requires different skills for airframe maintenance. We've made quantum leaps in maintenance when it comes to the *Hornet*," he said. "We have people who have worked on the aircraft before and they rave about it."

When a plane is being phased out, the threat of the parts supply drying up is a concern. The Navy is reluctant to stockpile parts.

"Part support [for the A-7] has been pretty good," VA-146 skipper Commander David Kendall said. "We're not having any harder time than the other squadrons on the *Nimitz*.

Transitioning to another plane also means retraining maintenance personnel and aircrew. Both squadrons are scheduling schools and working out tour rotations for personnel, well ahead

JO1 Patrick Winter

**Above left, in Vietnam, A-7s often sported menacing teeth near the air intakes. Left, plane captain Jim Leinen makes last-minute checks on a Corsair before it is catapulted from Nimitz's deck. Below, a VA-147 Argonaut A-7 is prepared for launch from CVN-68.**

of time, to minimize any problems for their people or the squadrons' operational commitments.

"For about six months, a squadron is spread out going to schools," VA-147 X.O. Commander Jeffrey Lehman explained. "In a normal training schedule, no more than 10 percent of your people are at school. [During transition] we'll have upwards of 50 percent of our maintenance people and pilots in training."

Cdr. Mills continued, "We're already going through the scheduling plans for training all the maintenance personnel and the transition planning for the pilots moving to the F/A-18. Everything is on track. Everytime I talk about it I look for some wood to knock on because, as much as I like the A-7, I'm looking forward to the transition."

"We're concerned where the people are going to go," added Cdr. Nolan. "We're also concerned about when the planes are going to go. For example, if we keep a bunch of A-7s and also try to start training with the *Hornet*, we'll have the problem of having a dual set of publications, maintenance gear and that sort of thing. Plus, we need to identify the people that are going to stay with us early, so we can determine who needs to extend in order to make the transition," he said.

Despite the large effort required in the retraining, Nolan sees distinct advantages for the pilots, even though they may have just begun flying the A-7. "I think it's good for their careers; it's a real bonus for them," he said. "They get exposed to some of the things the A-7 can do and they can take that experience with them when they go to the *Hornet*."

Tactically, with the F/A-18, the pilots will have the newest technology available with heads-up display and the ability to take on air-to-air encounters en route to a bombing mission. With the A-7, fighter escorts were depended on to provide cover. With the F/A-18's speed, armament and maneuverability, pilots have a multi-threat capability.

"In the A-7, all our air-to-air tactics are based on mutual defense and support," Cdr. Lehman said. "There were not very many fighters we could compete with, air to air-wise. The objective of the A-7 is to get to the target, drop the bombs and get off the target. With the F/A-18, the objective remains the same but the *Hornet* has a better ability to defend itself with a good offense.

"We'll be taking on a fighter mission with the F/A-18, in addition to our air-to-ground mission," Cdr. Lehman continued. "The A-7 can do a limited air-to-air fighter mission. We've got a pretty good gun and can carry *Sidewinder* missiles. The F/A-18, on the other hand, is designed to do both missions," he added. "It has *Harpoon*, *Maverick*, *Sparrow* and *Sidewinder* missiles and [radar with both air-to-air and air-to-ground capability]."

Skipper Nolan has flown *Corsairs* since 1971, including in combat. When asked if he'll miss the A-7, he admitted, "In a sense, because it really is a good airplane. It's matured over the years. The first A-7A I flew had virtually no computer aids and the avionics were primitive compared to what we're using today. Now, we have computer systems to bring us up to date," he said.

A 15-year veteran in A-7s, Cdr. Kendall added, "We end up doing a number of different missions for the battle group. It's the A-7s that are always available. We've got a pretty good share of planes — 22 between the two squadrons. We have enough airplanes to do cyclic events and keep doing it for a long time," he said. "If it requires an armed, ready airplane to be somewhere, we can go quite a distance. Reliability and flexibility are the real strong aspects of the A-7."

Keeping the venerable workhorse alive is a challenge in which the two squadrons take pride. Until the transition is completed, both squadrons know the job before them.

"The A-7 is still a front-line airplane and it will be until the last one flies," Cdr. Lehman emphasized. He pointed out that both VA-146 and VA-147 aboard *Nimitz* are more than capable. "The latest Persion Gulf [operations saw A-7s and A-6s in action]," he said. "Both of those planes have been around since the mid to late sixties." ■


**Two A-7A Corsair IIs of VA-147 fly formation over the snow-covered mountains of southern California. The Argonauts were the first Navy unit to fly the light attack aircraft in combat during the Vietnam conflict.**

JO1 Patrick Winter

# FB

By Hal Andrews

In today's world, Boeing is recognized for its transport aircraft. Back in the 1920s, the company got its first major recognition as a builder of fighter aircraft. Then, as now, their products matched advancing technology to the market. As a result, almost all of their company-financed prototype fighters resulted in production orders, the most successful designs being ordered by both the Army Air Corps and the Navy.

Boeing first got real notice in the U.S. aviation scene when the company underbid all other airplane manufacturers to build 200 production Thomas-Morse designed MB-3A pursuits (*NANews*, May-June 1987) for the Army in 1921. While these were being built, Boeing's engineers concluded that a considerably improved pursuit plane could be designed, using already proved features, such as the welded steel tube fuselage and thick section airfoils used on the WW I German Fokker DVII and a tunnel radiator under the engine. Armament would be two synchronized guns, one .30 and the other either a .30 or a heavier .50, both under the cowling in front of the pilot.

With these features and using tapered wings, they designed and built their new pursuit plane, using one of the latest 400-hp Curtiss D-12 water-cooled engines, loaned by the Army. Following first flight in June 1923 and successful tests, the Army bought the prototype — plus two more to be built — as PW-9s (the Army's 9th model water-cooled engine pursuit, after initial standard designations were established). In 1924, when production quantities of new pursuits were ordered, both Curtiss *Hawks* and Boeing PW-9s were ordered. With an interest in fighters for its new carrier squadrons, the Navy also bought some of each, 14 FB-1s being added to the second Army PW-9 order in December. The FB-1s were to be land based, with Curtiss D-12 engines essentially the same as the Army's PW-9s.

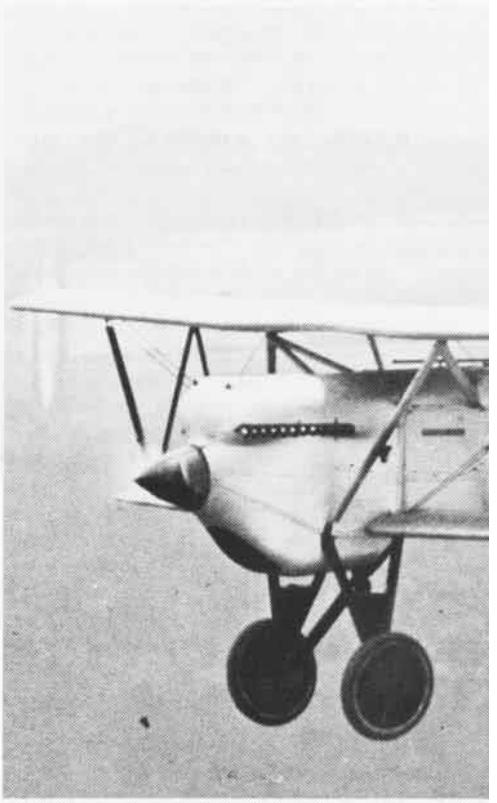
The last four were revised, two as FB-2s with carrier landing provisions (tail hooks and modified landing gear with aligning hooks on the main cross axle), one FB-3 with a Packard 510-hp water-cooled engine and convertible landing gear (wheels or twin floats) and the FB-4, also a convertible landplane or seaplane with a newly developed Wright P-1 450-hp air-cooled radial engine.

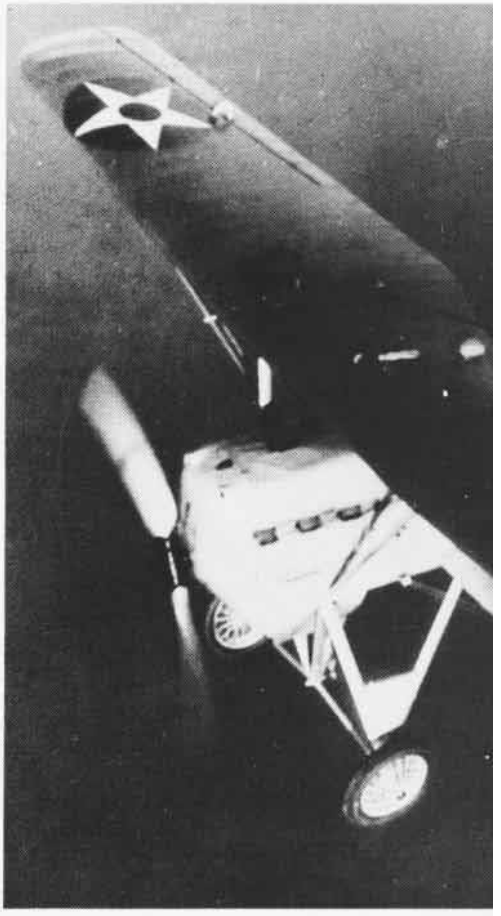
The FB-1s were initially slated to go to VF-2 at North Island, San Diego, Calif., but when delivered in late 1925-early 1926, only four were sent to the squadron. The rest finally went to the Marines at Quantico, Va., late in the year, where they were used by both VF-1M and VF-2M. At VF-2 the first two assembled were used in comparative trials with Curtiss F6C-1 *Hawks* (also the same as their land-based Army counterparts). While many characteristics were quite comparable, the FB-1's lack of vision in combat and simulated carrier landings, and overly sensitive control characteristics, gave the nod to the F6C-1 as the preferred potential carrier fighter.

The modified airplanes also started trials during the same period, the two FB-2s on *Langley*. While the FB-3 crashed at Seattle during Navy seaplane trials, two more ordered for further testing were delivered in May 1926. The FB-4 was shipped to Anacostia, but development of the Wright P-1 engine was dropped and it was shipped to the Naval Aircraft Factory to become the FB-6 with an early Pratt & Whitney Wasp, returning to Anacostia for landplane trials in the summer.

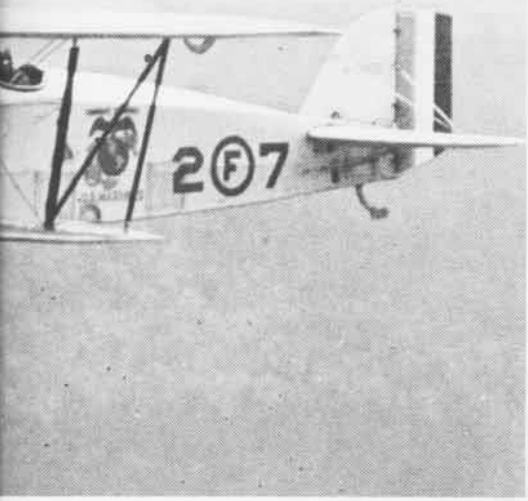
While the higher powered Packard engine improved the performance of the FB-3, visibility and control characteristics remained concerns. The second FB-3 had an extra balanced rudder for tests as well as modified elevators for evaluation. The vision problem was tackled with a proposed redesign to increase the wing stagger, moving the lower wing aft one structural bay and the upper wing forward, to maintain balance.

With the revised wing design, 27 production FB-5s were ordered as carrier or seaplane fighters in 1926. Along with the balanced rudder finally selected, other changes were a new landplane landing gear, narrower fuselage and adjustable pilot's seat (up and forward for carrier landings). Internal fuel capacity was reduced, but the same 50-gallon external tank could be carried. Delivery was unusual — from the Boeing plant onto lighters and hoisted directly aboard *Langley* at Seattle, Wash., in January 1927. They equipped two 12-plane carrier fighter

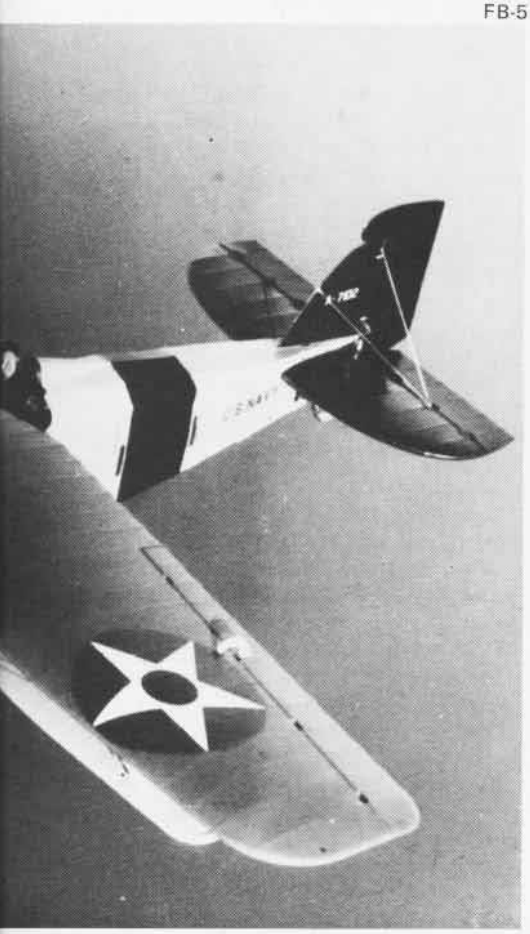




FB-1



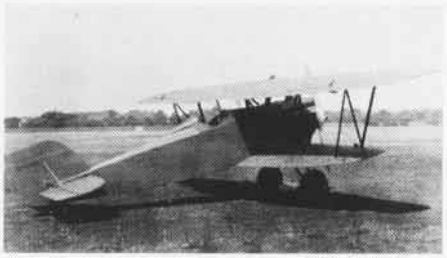
FB-5



squadrons assigned to *Langley* at San Diego.

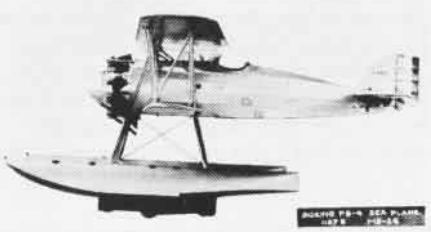
With Marine land-based aircraft required for service with the 3rd Brigade in China starting in late 1926, the Quantico FB-1s went to the West Coast Expeditionary Force and were shipped to China. The two FB-2s had been sent back to Boeing for modifications, but they and the two remaining FB-3s were sent to San Diego for conversion to FB-1s with D-12 engines to augment the Marine inventory, though not all of them went to China.

In late 1928, the remaining FB-1s were coming back from China, many of them too worn out to be worth overhauling, and the last were surveyed by late summer 1929. The FB-5s were being replaced by later Wasp-powered Boeing fighters and went on to serve with one West Coast Marine fighter squadron before they were declared obsolete and surveyed in July 1930. Being in reasonable condition, many were transferred to schools for ground training. One of these survived and is now in the Marine Museum at Quantico, an example of a typical carrier fighter 60 years ago, just before the Navy completed its changeover to air-cooled engines for carrier aircraft. ■



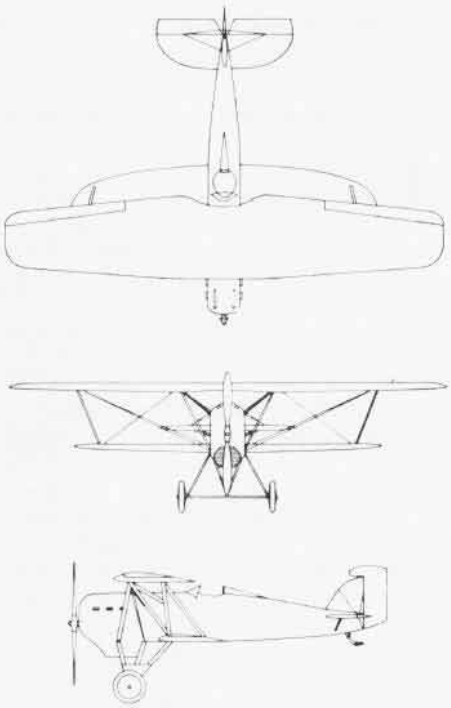
PW-9 Prototype

FB-6



FB-4

| | FB-1 | FB-5 |
|---|---|---|
| Span | 32′ | 32′ |
| Length | 22′6″ | 22′6″ |
| Height | 8′9″ | 9′4″ |
| Engine | Curtiss D-12, 400 hp | Packard 2A-1500, 525 hp |
| Maximum speed | 167mph | 169mph |
| Service ceiling | 21,200′ | 20,200′ |
| Range (internal fuel) | 509 mi | 299 mi |
| Armament (FB-1/FB-5) | Two .30 machine guns; or one .30 and one .50 machine gun. | |




# Rigging the Game:

## The Flight Crew's Guardian Angels

**Story and Artwork by Hank Caruso**

Throughout my life, the term "rigging" has always carried a nefarious connotation. People that rigged games were criminals at worst, manipulative and self-serving at best. When someone else rigged the game, you knew that you were going to come out a loser.

At least that used to be my impression until I began "slipping the surly bonds" in the back seats of Navy tactical jets. First step in the journey: see the parachute riggers — the doormen to the flight line. Get fitted in an olive drab ensemble to meet the cockpit dress code. Watch the riggers debate about which pilot to borrow a helmet from (someone who hopefully has compatible cranial contours). The first one fits fine, but the visor won't clear my eyeglasses. Try again. Embed the oxygen mask in my face so the riggers can check the radio and pressure breathing and ward off leaks. (My face is apparently not standard issue. No matter how tight the straps are winched down, perverse puffs of cool air climb the sides of my nose into the corners of my eyes. The top of the mask lifts my glasses above my eyes.)

Extrude my extremities through the gummed appendages of a poopy suit. (No, it's inside out!) On with the flight suit over the poopy suit — a combination designed to drain the body of sweat and reshape the liquid into a hollow puddle shaped like a person. Halfway there . . . now find a G-suit that's short enough but can still be zipped over my calves. Watch while the riggers weave a mystic tangle (to my eyes) of laces around my legs to tailor the fit.

Torso harness next. Step in, pull it up, squat, wriggle and pull on the straps to form a truss. Everything's fine except I can't buckle the chest strap . . . too tight. The riggers try compressing my rib cage a little more but still no dice. Wriggle out and top off the sweat in my poopy suit while they patiently search their paraloft for a size that will cooperate. This one buckles but I still can't inflate my lungs 100 percent. (It'll have to do.)

Almost done. Now for the survival vest. The riggers check the radio, the flares, the inflation cartridges and all of the other nooks and crannies built into the vest. Put it on, zip it, hook it. As a final demonstration of forethought (or lack of confidence), one of the riggers stuffs a zip-lock bag in my pocket — just in case.

Flight's on. I'm sitting in a seat that contains my parachute, my seat pack with life raft and survival gear: my final insurance policies — all underwritten by the riggers.

Flight's over and it's back to the riggers again. They note the gripes, make the gear ready for the next user, return the borrowed portion of the ensemble, clean, disinfect, recharge, repair and repack. While I'm debriefing, the riggers make up "commemorative" flight tags for me (a real aviator would be naked without one), reflecting my experience with the local squadron. And "Oh, by the way, could you add some Velcro to my flight suit and airplane patch?" (The rigger and his

industrial strength sewing machine take it in stride.)

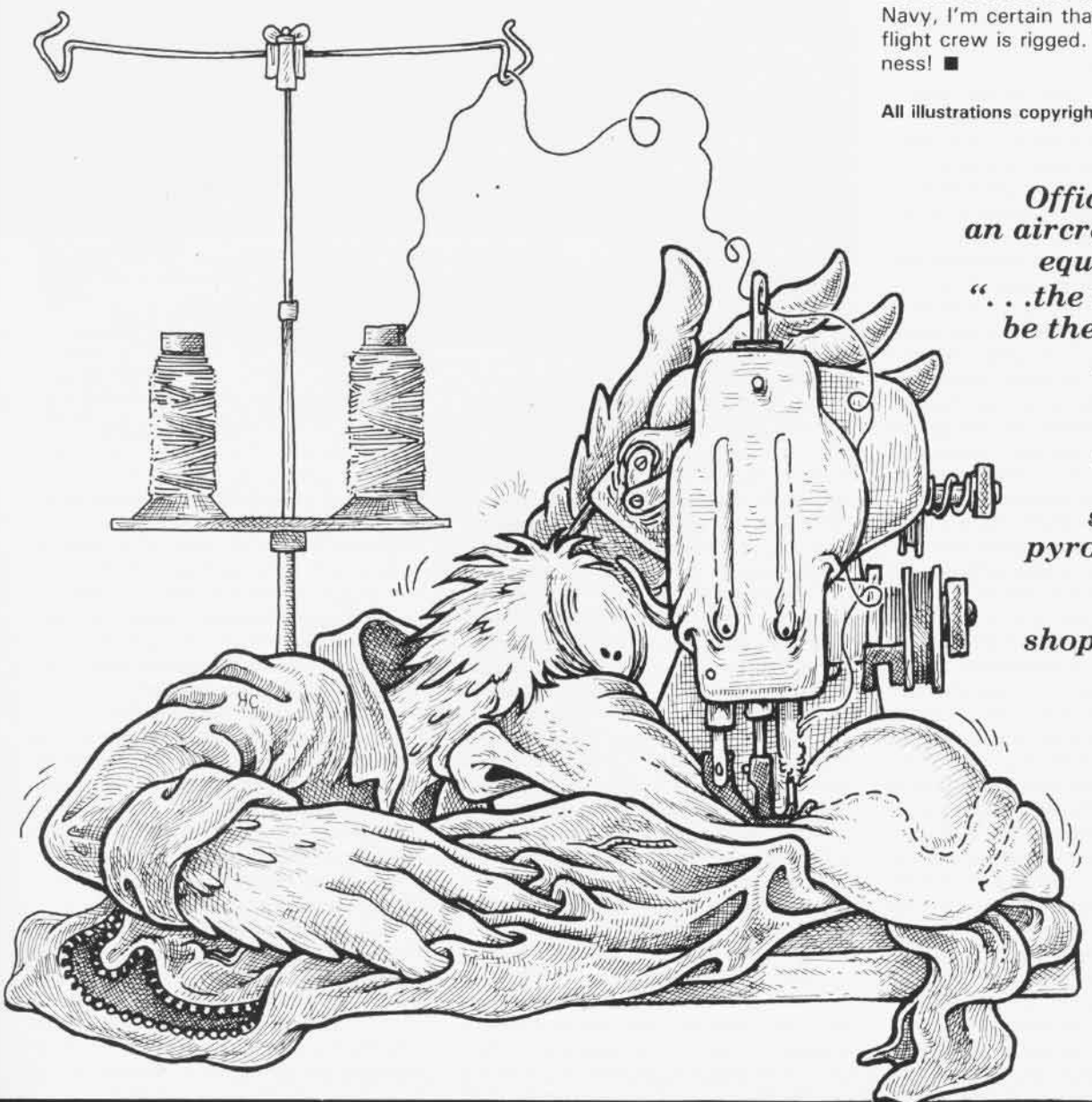
Of course, as a visitor to the system I needed more special attention than the flight crews. This aside, what the riggers have done for me, they've done for everyone that flies Navy. All the riggers I've talked to seem to genuinely enjoy what they do — which is a lot. As the story above shows, the rigger must be the proverbial jack-of-all-trades: mechanic, electrician, tailor, seamstress, pyrotechnician, materials specialist, shopkeeper and diplomat. The enjoyment seems to go beyond the logistical details of the equipment and specialties . . . it extends to the special relationship that must exist between the riggers and flight crew.

I can think of no other situation in which so many officers spend so much time in enlisted country. I am always impressed by the implicit trust that the flight crews have in the riggers and by the very positive attitude that the riggers have toward the officers with whom they work. The riggers I've talked to have asked to be where they are. They care. They are true professionals.

When I was in college, some of us in our engineering class took perverse pride in bragging that our entire class was in the bottom half of the school. The opposite seems to be the case with the riggers. No matter where I fly from, flight crews invariably praise the riggers and paralofts at their station as some of the best in the Navy. All of the riggers seem to be in the top half of their class.

About my opening thoughts on the meaning of rigging . . . I still harbor suspicions about whether lotteries and professional sports really happen according to random chance. I still become paranoid thinking about how lawyers, accountants and politicians may be manipulating "the system." But when it comes to flying in the Navy, I'm certain that the game for the flight crew is rigged. Thank goodness! ■





***Officially called an aircrew survival equipmentman, ". . .the rigger must be the proverbial jack-of-all-trades: mechanic, electrician, tailor, seamstress, pyrotechnician, materials specialist, shopkeeper and diplomat."***

# V-22 Osprey

## An Inside Look

By Hal Andrews

*(Second of a two-part article — continued from January-February 1989)*

The first V-22 running up on elevated test stand at Bell's Arlington, Texas, flight test center in preparation for first flight. The elevated stand allows operation through full proprotor tilt range.

All eyes are focused on the aircraft when a new design makes its initial flight — and properly so. In most cases, particularly for military aircraft these days, it's the one time when the attention is all positive. However, it's easy to lose track of the tremendous effort that has been made to reach this point, and of the continuing effort still to be made by those in the program to bring the new aircraft to operational service. For the program people, at every level, first flight is just one more milestone passed — though, for many reasons, a most important and satisfying one.

As the *Osprey* now reaches that stage of its development, Brigadier General Harry Blot, V-22 program manager for the past three years, and the many government and industry participants at all levels can look with pride at what they have accomplished. They know best that many challenges still lie ahead before the V- 22s take on their first operational assignments with the Marines, and later with the other services.

On two counts, the *Osprey* gets particular attention. Not only is it the first tilt-rotor to be developed for operational use, but it is also the first to be developed from the start as a joint service aircraft, meeting mission needs of four services. On both counts, there are many individuals not currently involved in the V-22 program who also can derive satisfaction as the *Osprey* flies — now in test and later in service.

### The JVX/V-22 Program

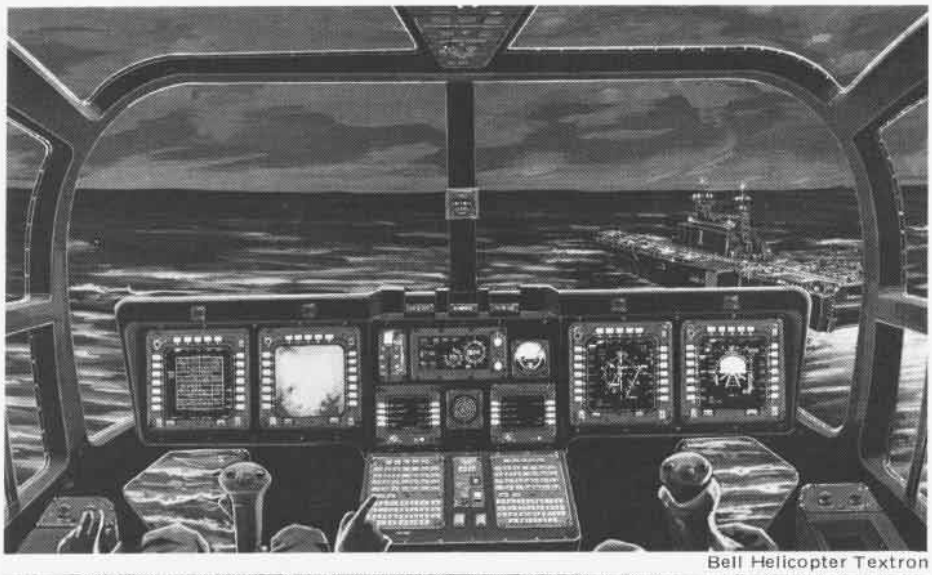
The V-22 program dates from a late December 1981 Deputy Secretary of Defense memorandum to the three service secretaries which formally established a joint services aircraft program. Its purpose was to meet identified Army, Air Force, Marine and Navy needs — utilizing a V/STOL (vertical/short takeoff and landing) aircraft — with the Army as executive service and the program manager to be a Marine officer. Within the Navy, and the Naval Air Systems Command (NavAir), the HMX program manager was given the lead since the Marine HMX was the major Navy Department mission for the proposed aircraft.

While the tilt-rotor configuration, well demonstrated by the Bell XV-15 technology demonstrator, clearly met the anticipated needs, it was only one of the contenders in the view of various industry and government interested parties. The first step in the new program was to quantify joint mission requirements. Next, a joint technology assessment group of engineers from the three military departments and the National Aeronautics and Space Administration (NASA), under the direction of Charles Crawford, then techical director of the Army's Aviation Systems Command, evaluated the performance and technology status of the principal contenders.

The results of this assessment clearly pointed to the tilt-rotor though NavAir engineers remained concerned whether the major requirements could be met at the calculated weights, even taking advantage of the latest technologies applied. With these results available in late spring 1982, action was initiated for a tilt-rotor acquisition program: the Joint Services Advanced Vertical Lift Program (JVX). At that time, NavAir's HMX program manager Colonel Jim Creech was assigned as JVX program manager under the Army Aviation Systems Command; and Bell Helicopter Textron and Boeing-Vertol, the two companies which had been actively developing tilt-rotor technology, signed a teaming agreement.

By fall, with the joint service operational requirements formally established, it was clear that the Marines would become the lead service for the JVX and the Navy became the executive service with the PMA a NavAir function. Office of the Secretary of Defense approval initiated preliminary design and development testing as necessary to reach a full-scale development decision.

Competitive action was taken for this contracted phase. But with the two experienced companies teamed and insufficient time for others to effectively reach a competitive level for full-scale development competition at the end of the two-year preliminary design phase, even with all of the prior NASA and



Bell Helicopter Textron

**Top, an artist's conception of the V-22's cockpit with the Osprey in nighttime operations at sea. Above, the second of six Ospreys being built for the V-22 development program is seen in final assembly at Bell. After initial flights there, it is scheduled for major testing at Boeing's flight test facility in Wilmington, Del.**

other government-funded engineering information made available to them, only the joint team bid was received. In April 1983, they began the JVX design phase.

Soon after, with other higher priorities such as their LHX light helicopter competing for planned funds, the Army dropped out of the JVX program. In the fall, the Defense Resources Board decided that all development funding for the basic JVX would be moved to the Navy budget and the Army rejoined the program with a mission — and an aircraft configuration — much closer to that of the Marines.

The initial portion of the preliminary design phase addressed many specific areas in support of a general design approach based on work already done by the two companies. Included were such things as wind tunnel tests, critical element tests, construction of major portions of the wing and fuselage for static tests, piloted flight simulations, and many design tradeoff studies to support design decisions. In keeping with the life cycle approach, integrated logistics support analyses were conducted to be sure that the final design would not compromise the eventual maintainability and supportability of the in-service aircraft. Many potential problems were resolved in this phase. NavAir aerodynamics engineers, for example, identified a wind tunnel drag discrepancy, which when resolved resulted in increased internal fuel to meet mission requirements while the change could still be made "on paper."

A large-scale proprotor was also designed, built and tested. With this work well under way, the second phase covered mock-up construction, initiation of long lead subsystems and — as additional technical definition was available — thorough review of requirements, specifications and producibility to eliminate any unnecessary costs. Throughout all these efforts, particular attention was paid to the effect of any design decisions on aircraft weight.

### V-22 Full-scale Development

In early 1985, the full-scale development proposal was submitted and the contractors began the work in midyear. A NavAir-run competition resulted in the selection of Allison's proposed engine in December 1985. The 6,000-hp engine was based closely on the T56 with many updating improvements. Designated the T406, it featured modern modular construction and promised minimum development risk — and cost.

Construction of the six full-scale development airplanes was initiated with the basic design and construction effort divided where the wing attaches to the fuselage. Bell handled the wing, engine nacelles and proprotors; and Boeing the fuselage, including cockpit, flight control systems, tail and landing gear. Both partners would be involved in the overall design and all integration activities, and each would assemble and flight test some of the six aircraft. The digital flight control system was to be furnished by General Electric and the detail design and construction of the composite tail assembly was subcontracted to Grumman.

In addition to the aircraft themselves, three major ground test facilities and corresponding test systems were to be developed. Most unique was the ground test article (GTA) propulsion test system, located at Bell's flight test facility. The test rig was built so that the proprotors could be operated throughout the vertical, conversion and conventional flight regimes at all power settings, testing the GTA or a complete aircraft. The GTA would be used for preflight propulsion tests, as well as extended ground endurance testing.

Structural test rigs at Boeing, testing both a static test article and a fatigue life article, would be typical of fixed-wing aircraft practice. With the more complex systems, the flight-control-system integration rig at Boeing would encompass a full-scale test system for the complete flight control system, including fly-by-wire and hydraulic power system components, tied to a piloted cockpit simulator, and test systems capable of applying simulated flight loads to the control surfaces. Many test arrangements would also be provided for individual components, such as the stainless steel ring which carries the loads between the wing and fuselage and on which the wing rotates for shipboard stowage. Motion-based flight simulators would be located at

both Bell and Boeing, the latter tied to the flight-control-system integration rig as noted.

Design and fabrication of aircraft components — and of the major test systems — proceeded through the next three years. In late spring 1988, rollout ceremonies were held for the first V-22. The various major test systems subsequently began their preflight tests, with necessary modifications and adjustments made to both test article and number one aircraft to provide the basis for first flight release. Typical of most new aircraft development programs, the many detailed hardware — and software — issues have resulted in more preflight effort than anticipated. With all resolved, the flight program begins.

As the other five aircraft join number one in the flight test program, the planned three-year-plus development and operational test program will reach full speed. With all of the latest technology and a new aircraft concept, these years promise their share of challenges. At the end will come the introduction of the *Osprey* into Marine operations in 1992 — a time that will bring full rewards to all those who have "made it happen."

### Tilt-rotor Beginnings

As the V-22 program enters the last phase before the *Osprey* reaches operational service, some reflection on the tilt-rotor events that led up to the V-22 is appropriate. While the V-22 depends on many of the new technologies that have matured in aeronautics generally, the roots of the tilt-rotor concept itself can be directly traced. They go back four decades in terms of continuous activities that have a direct link to the current program.

The trail was a long and arduous one. Whether in industry, NASA (and its National Advisory Committee for Aeronautics predecessor) or the military services, other programs and research almost always came first. However, the believers, both in government and industry engineering and management, persevered. The V-22 program today, and subsequent operational *Ospreys*, will stand as tributes to their capabilities and determination.

The genesis of the tilt-rotor, and other fixed-wing V/STOL aircraft, can be traced to what might be labeled the "convertiplane movement" of the late 1940s. In this postwar period, two of aviation's major advances of the war years — gas turbine engines and the helicopter — were being put into early military and civilian use, and further applications explored. Along with other research in aerodynamics done during the war years, these advances focused attention on the potential of aircraft that would be able to take off and land vertically, hover as helicopters did, and have cruise and high-speed flight characteristics similar to conventional airplanes. Recognizing the need for two different lift systems in the two regimes, they were identified as "convertiplanes."

In the late forties, two national "Convertiplane Congresses" were held, attended by enthusiasts, inventors and engineers. The different concepts proposed were legion; almost all of those that have since materialized were addressed in rudimentary form. Serious industry and military interest was not far behind. With the impetus of the Korean War, the Army — working through the Air Force's Air Research and Development Command — sponsored the initiation of three convertiplane projects, all based on the use of rotors for vertical flight. One of these, designated XV-3, was with Bell Helicopter to pursue their research on tilt-rotor aircraft. The experimental aircraft would be based on a potential four-place utility aircraft, powered by a single 450-hp Pratt and Whitney R-985 radial engine mounted in the mid-fuselage with shaft drive to the wing tip tilting rotors. Additional research was also funded with Transcendental Aircraft, a new entrepreneural company which was privately building a small, single-place tilt-rotor.

While convertiplane enthusiasts foresaw early use of their designs, engineers tackled the tough problems involved, particularly in conversion between helicopter and airplane flight. With the loss of their prototype — the first tilt-rotor to fly — Transcendental dropped out without completing a full conversion. Bell's first XV-3 hovered in 1955, but dynamics problems resulted in its loss and required a whole new rotor system before the second XV-3 achieved full conversion to airplane flight in 1958.

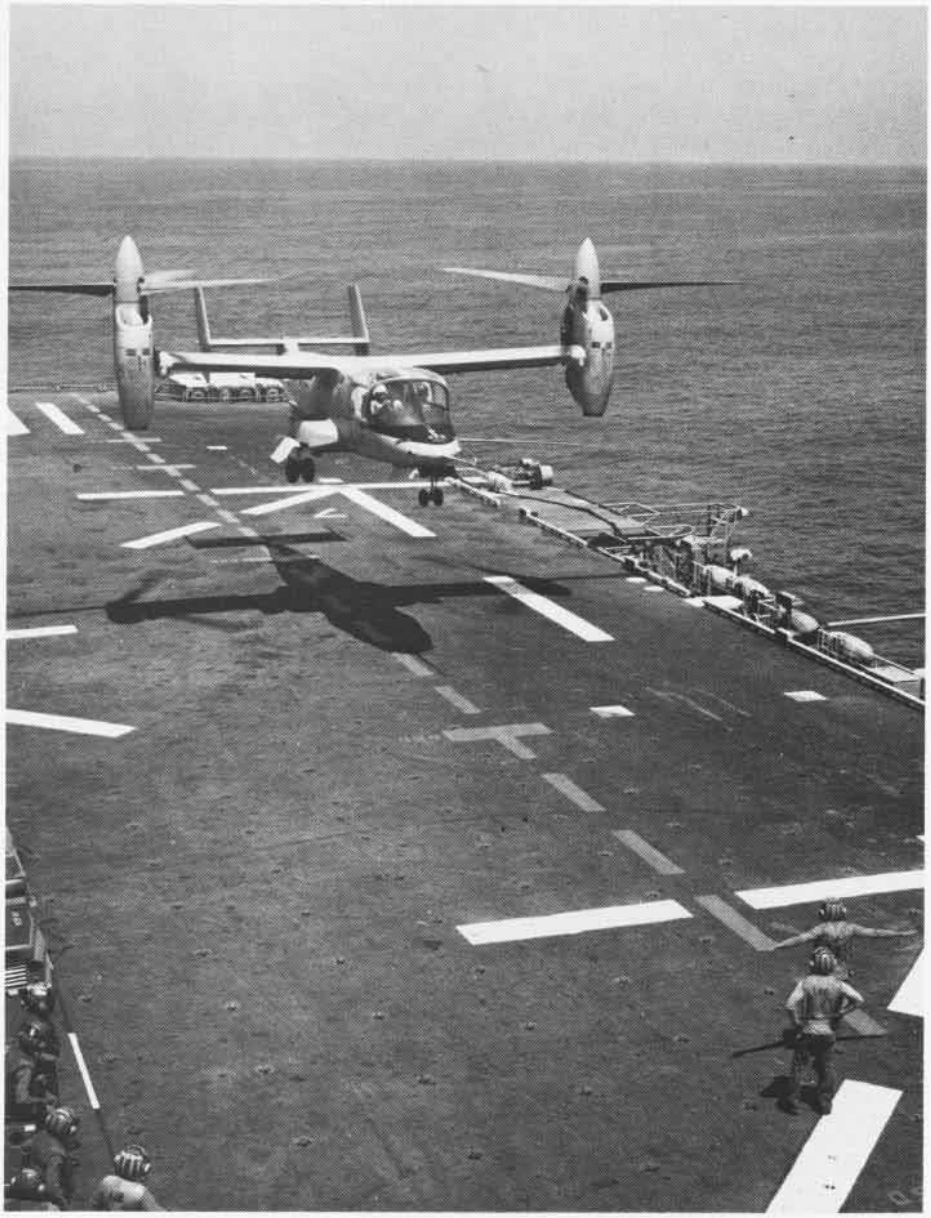
Following Bell testing and Air Force evaluation at Edwards AFB, Calif., the XV-3 went to NASA's Ames Resarch Center at Moffett Field for extensive flight research, and wind tunnel testing in the Ames 40-by-80-foot tunnel. While national interest in V/STOL aircraft turned to other concepts, NASA and Bell continued to refine and improve the empirical and analytical understanding of tilt-rotor aircraft in the different flight regimes. The XV-3 tests were completed in the mid-sixties after which the Southeast Asia priorities shifted research and development emphasis to short-term payoffs. The success of the XV-3, and problems with other concepts flight tested, lead Bell to continue in-house tilt-rotor research, and encouraged new interest at Boeing-Vertol.

In 1968, taking advantage of the smaller gas turbine engines that had become available, Bell initiated design of a new demonstrator aircraft having its two turbine engines — each driving a rotor (or both rotors through cross shafting) — mounted in tilting nacelles at the wing tips. Sized to fit in the Ames full-scale wind tunnel, the basic design was also adaptable for a future commercial executive transport. Subsequent experimentation was scaled for components to fit this aircraft. Problems of rotor/pylon/wing dynamics at higher airplane mode speeds, and a newly designed rotor, received particular attention. NASA support of this research increased, and NASA and the Army jointly initiated action for competitive procurement of two technology demonstrator aircraft similar in size to the Bell design, but using larger Avco Lycoming T-53 turbine engines which had already been flight qualified for tilt operation.

### The XV-15 and Navy/Marine Interest

Bell was awarded the contract to design and build two XV-15 demonstrators in July 1973. By that time, NavAir had taken its first serious look at tilt-rotor aircraft for Navy applications. This was part of a joint Naval Sea Systems Command/NavAir "Sea Control Ship" study in response to Admiral Elmo Zumwalt's interest in this small air-capable ship. Without catapults or arresting gear, it would operate two types of V/STOL aircraft, a fighter/attack and a sensor carrier/support aircraft. To be useful in this role, the otherwise attractive tilt-rotor would require a simple wing folding system. Two Advanced Systems engineers in NavAir's Research and Technology Group — John Vaughn, now retired, and Russel Perkins, currently NavAir's Director for Systems Alternatives — invented the wing and overall folding system now used on the V-22, and were subsequently awarded a patent for their invention.

With the demise of Sea Control Ship efforts, other Navy studies took over the V/STOL interests. The V/STOL A Program of the mid-seventies included Bell's tilt-rotor entry — a larger version of the Sea Control Ship contender. However, overall concentration was on



**Successful shipboard trials with one of the two Bell XV-15 tilt-rotor research aircraft were conducted on Tripoli (LPH-10) in 1982.**

fan-powered designs at the time this program faded from the scene in the late seventies.

By 1979, the Army had turned away from high-speed rotorcraft as nap-of-the-earth tactics directed their advanced technology interests to other areas. NASA had its own budget problems and the XV-15 program, by then approaching full flight stage, was looking towards a significant stretch out — or worse. At this juncture, another set of interests and actions entered the picture.

For some years, Lieutenant General Thomas Miller, then the Marine Corps Deputy Chief of Staff for Air, had been aware of the Marines' need to take advantage of advanced aeronautical technology to keep the Marine assault forces capable of achieving their objectives in an ever-advancing threat environment. Earlier, as a colonel, he and Lieutenant Colonel Bud Baker had played a major role in convincing his deputy chief of staff predecessor, Major General Keith McCutcheon, to initiate action to bring the V/STOL *Harrier* into the Marine Corps inventory. Becoming aware of the XV-15 program problems, he contacted Rear Admiral C. P. Ekas, then Navy Chief of Development, and the two agreed that it would be of value to the Marines — and Navy — for the Navy to become involved in the XV-15 program. With no advanced development funding available, RAdm. Ekas turned to NavAir and asked for a technical evaluation of the high-speed rotorcraft research programs under way, and what funding would be necessary to bring any that were promising for future Navy/Marine operational applications to a successful completion. If the technology payoff would be great enough, and the funding level not excessive for exploratory development resources, he proposed that this would be done if higher Navy levels concurred. A small Research and Technology Group team undertook the task, identifying three ongoing research programs for investigation.

Their study concluded that funding the XV-15 would be beneficial to the Navy in providing a technical data base for any future consideration of tilt-rotor concepts for Navy/Marine missions, and action to provide the needed funds to NASA was taken. In return, NASA agreed that one XV-15 would be made available for shipboard trials at an appropriate future date.

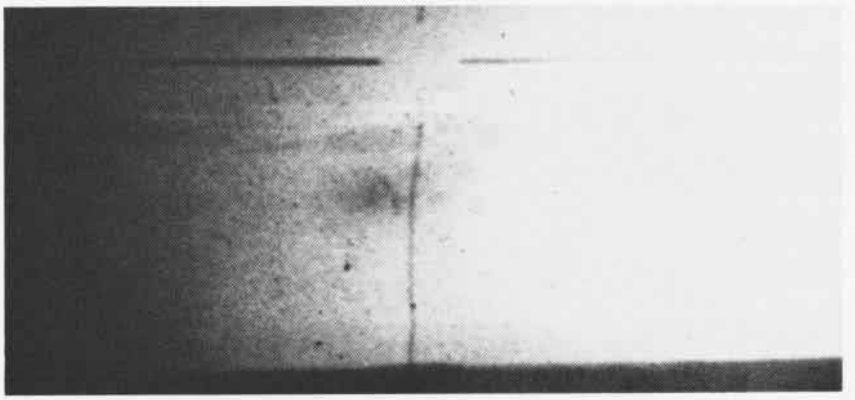
One unanticipated result of the acceleration of the flight program by the injection of Navy funds was that the XV-15 was able to appear — and fly — at the Paris Air Show in June 1981. Secretary of the Navy John Lehman was invited to fly the XV-15 while there and became an enthusiastic supporter of the tilt-rotor concept. Later that summer, he directed that the planned program to develop a replacement helicopter for the Marine's CH- 46 be redone to address a technologically advanced aircraft such as the tilt-rotor rather than a basic helicopter.

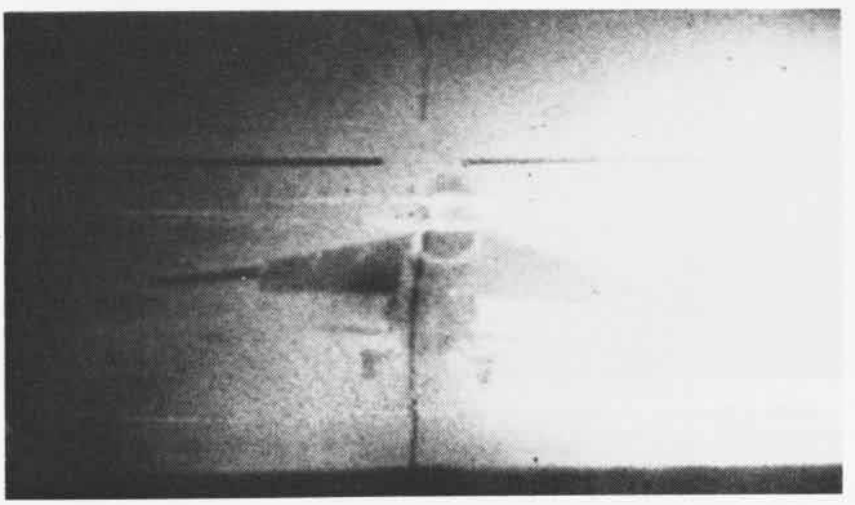
At this time, Richard Delauer, then Undersecretary of Defense for Research, Development and Engineering, directed his Tactical Warfare Office to look at total Defense Department rotorcraft planning. When the action officer, Marine Colonel Bill Scheuren, reported back to him that a common advanced medium rotorcraft would go a long way towards meeting many of the future needs listed by all of the services, a proposal was born to develop such an aircraft jointly. A memorandum was signed out to the service secretaries requesting their response.

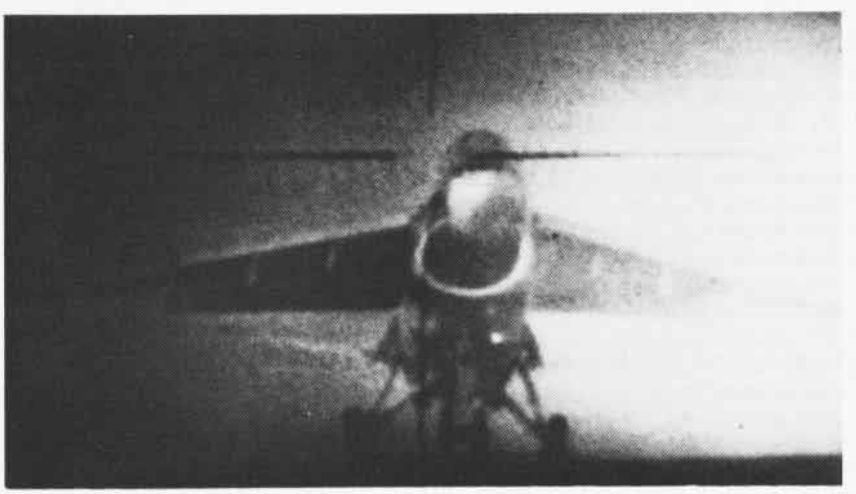
As noted early in this article, the favorable response signaled the start of the major development and acquisition program to provide the services with the major enhancement in capability that the V-22 *Osprey* represents.■

# The Pilot's Automatic Carrier Landing System

By JO2 Julius L. Evans







The pilot landing aid television aboard USS Independence (CV-62) documented this A-7 Corsair making a zero-zero approach using the AN/SPN-42 recovery system.

# Back-up

***He promised himself he would not bolter again. But visibility was terrible and the ship's stern seemed to rise higher and higher with each pass he made. A bolt of lightning lit up the midnight sky, illuminating the blanket of heavy rain which surrounded the aircraft's cockpit. He thought of making a mode 1 recovery, but just as quickly as the lightning had vanished so did the thought of an automatic landing. This would be just a man and his machine against the elements of nature.***

Recovering aircraft aboard a carrier is one of the most difficult tasks facing a Navy pilot. Throw in severe sea states, heavy rainfalls and moonless nights and the recovery cycle becomes even more challenging. To overcome these inherent difficulties, in 1952, the Navy established an operational requirement to make all carrier landing operations computer controlled.

An automatic carrier landing system (ACLS) that consisted of three landing approach modes was developed. The system's role was to help ensure that all aircraft would be able to return to the ship regardless of weather or pilot conditions. Mode 1 was fully automatic landing — hands-off — while mode 2 required the pilot to fly the flight path indicated by cockpit needles and, in mode 3, the pilot followed instructions transmitted by radio from the carrier. Modes 2 and 3 gained wide acceptance with the fleet, but mode 1 developed a reputation for unreliability, causing widespread mistrust which continues today.

Since efficient operations on the flight deck require compatible launching and landing cycles, the entire recovery must perform like clockwork. At night and when the weather is bad, full instrument approaches or "case three" recoveries are required. During a case three recovery, aircraft are stacked aft of the ship in a holding pattern. Shipboard air traffic controllers using radar and computers provide aircraft separation and the order of aircraft recovery. Aircraft depart the stack from the bottom at their assigned times.

The ACLS is used during case three recoveries and, in its fully automatic mode, takes control of the plane once it reaches four to eight miles aft of the ship and at approximately 1,200 feet of altitude. At that point, the aircraft proceeds inbound until it intersects the glideslope of the flight deck. The aircraft then descends toward the ship, without assistance from the pilot, until touchdown. In an emergency, the pilot can deactivate the system simply by grabbing the aircraft's control stick.

In 1954, the Naval Electronic Systems Engineering Activity and Naval Air Test Center (NATC), Patuxent River, Md., were assigned to evaluate and conduct electrical and flight tests on the AN/SPN-10 (XN-1) and AN/SPN-10 (XN-2) radar systems developed to meet the ACLS function. These two systems represented two different types of radar and aircraft control.

The tests determined that the aircraft control system of the AN/SPN-10 (XN-1) and the radar tracking techniques of the AN/SPN-10 (XN-2) produced the best results. The two were combined to create the AN/SPN-10 (XN-3) and, in 1956, it was delivered to NATC for flight testing. After completing successful trials there, the shipboard phase of the research and development testing was performed aboard *Antietam* (CVS-36) using the F-3D *Skyknight* jet.

When promising results were achieved aboard ship, AN/SPN-10 (XN-3) production contracts were awarded to the Bell Aerospace Company. This ACLS incorporated then-state-of-the-art analogue computer techniques, such as its ability to stabilize the glideslope so that the effect of the ship's motion was eliminated until the plane touched down. During the final 11.5 seconds of the approach, deck motion compensation (a computer software program) is automatically activated to put the aircraft in phase with the ship's motion to assure a safe landing.

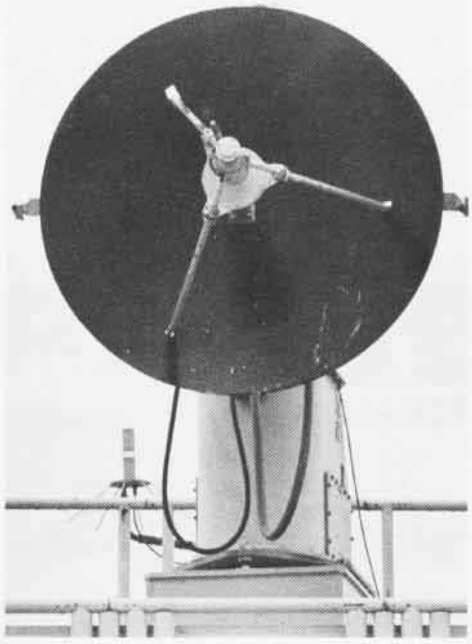
The first AN/SPN-10 (XN-3) ACLS was delivered to the Navy in 1962 for tests at NATC using the Navy's new F-4 *Phantom II*. Initial shipboard evaluations began aboard *Midway* (CV-41) and continued aboard *Ranger* (CV-61) and *Kitty Hawk* (CV-63). But these evaluations uncovered marginal performance for operational use. In addition to a power supply problem, the system's versatility, equipment maintainability and equipment reliability produced borderline success.

Eventually, innovative technology in the digital computer field provided a solution to the problems. The digital system made processing information easier, faster and more reliable. It was reasonably smaller in size and had ample memory storage space. The digital system was put to work in 1965.

This updated version, AN/SPN-42, began shipboard testing on *Forrestal* (CV-59) in 1967. Although all problems were not corrected, operational approval of the fully automatic landing system was given in 1968.

The AN/SPN-42 hardware package was installed on all 14 aircraft carriers as well as aboard five naval air stations for shore-based pilot training. The system was used heavily during the Vietnam era, saving many lives and aircraft. Some carriers logged as many as 800 mode 1 landings per deployment. However, problems stemming from the original design and the 1950s technology and mission requirements continued to plague the system. Radar performance during inclement weather was deficient and the system's inability to adapt to field

An A-6 Intruder "In the Groove" is captured on canvas making a final approach in ideal weather. Painting by Dr. Carlton A. Eddy, San Antonio, Texas.



NATC Patuxent River conducts tests with AN/SPN-46 radar that are identical to those aboard a carrier.

changes without a complete system redesign made it practically obsolete.

"The system was extremely hard to maintain. A lot of the original parts manufacturers were no longer in existence, hence parts were specially made for the system," said Dick Huff, Special Assistant for Advanced Programs at NATC.

It was obvious that a new system was needed. The updated version, now designated AN/SPN-46, takes advantage of electronic systems improvements to correct or eliminate the problems. The new, smaller system employs the standard airborne computer, AN/AYK-14, which has superior software and hardware capabilities and provides common support to aircraft deployed on carriers. The AN/SPN-46 was delivered to NATC in 1984 and has been undergoing testing and development since then, producing encouraging results.

"The system provides a significant improvement in the ability to acquire the aircraft in the rain, which was a great deficiency of the AN/SPN-42," said Jerry Carter, NATC's Supervisor, Landing Aids Section. "Just getting the AN/SPN-42 to lock on to the aircraft was a major problem."

The problems experienced with the original AN/SPN-42 system have prejudiced some aircrews against automatic carrier landings. "Of course, the people certifying the system want to see it used as much as possible, but our goal is to make sure the system is operable when the pilot wants to use it," Dick Huff explained.

"The pilot might make one mode 1 recovery during an entire deployment, but that landing should be a number three wire trap," he continued. "If a pilot only makes 10 percent of his approaches in mode 1, so be it, but did he get 100 percent completion? That's what the system was designed to accomplish."

He added, "If the pilot is not making a mode 1 approach and the ship can't lock on to the aircraft, then the pilot can't make a carrier-controlled approach either. That's why it's so important to have a system that will be able to acquire the aircraft in all weather conditions, so the pilot can make the type of approach he wants."

Additionally, design improvements in aircraft radar beacon systems and autopilot systems would significantly improve the reliability and maintainability efforts of the AN/SPN-46 system. "Ninety percent of the failed recoveries are due to aircraft systems-related malfunctions," Huff explained.

Consequently, flight testing results to date have been favorable. The system's performance aboard *John F. Kennedy* (CV-67) during a recent deployment was satisfactory, according to NATC's Carrier Suitability Branch. The system is expected to be given full approval for implementation for Navy-wide use once the power supply problem is resolved.

The AN/SPN-46 has a built-in test capability and it allows the ship's technicians to routinely verify that all portions of the communications loop are in peak condition and available when needed. Furthermore, if a problem is detected, maintainability has been increased by the use of standard electronic modules which will be available aboard ship for replacement. The shipboard system includes a tracking radar, ship's motion sensors, an automatic handoff from one carrier approach radar system to another, a data link to communicate with the aircraft and a computer to connect the appropriate aircraft commands.

In the air, the F/A-18 is the first aircraft which incorporates, in its autopilot, a new vertical velocity input to dramatically improve the system's glideslope performance. Future naval aircraft will be designed similarly, which will produce identical system improvements.

The AN/SPN-46 system has made two complete cruises aboard *Kennedy* and is currently being installed aboard *Kitty Hawk* while it is in the Service Life Extension Program in the Philadelphia Naval Shipyard.

Returning to the ship after a four-hour demanding sortie can be extremely draining. Yet the task of landing the aircraft aboard the carrier remains the pilot's responsibility. During inclement weather recoveries, the new AN/SPN-46 system should serve as the reliable back-up envisioned by the fleet back in 1952.■

# Association of Naval Aviation Bimonthly Photo Competition

Marine Captain Richard Mullen of HMH-464, MCAS New River, N.C., took the first bimonthly prize in the Association of Naval Aviation Photo Contest. His photograph of a paradrop from an HMH-464 CH-53E Super Stallion (above) was taken over Camp Lejeune.

The competition was keen. Honorable mention photos included a VMA-231 AV-8B Harrier landing aboard USS Nassau (LHA-4) shot by Mr. Paul Arcuri of NATC, Patuxent River, Md. (below left), and another entry by Capt. Mullen of a CH-53E refueling from a C-130 Hercules over North Carolina (below right).

The contest continues throughout 1989. Rules appear on the inside back cover of this issue.

## Anniversary

The *Battlecats* of HSL-43 celebrated their fourth birthday in October 1988. During its years of operation, the squadron has received numerous awards, including the Meritorious Unit Commendation, two Battle Es, two CNO Aviation Safety Awards, two Arnold Jay Isbell Trophies, two Top Torp Awards and the ComASWWing-Pac semiannual retention award.

HSL-41 recently celebrated its sixth birthday. Established January 21, 1983, at NAS North Island, Calif., it provides initial training requirements for personnel operating and maintaining the SH-60B *Seahawk* aircraft which is part of the LAMPS MK III shipboard weapons system.

Flying the H-46 Sea Knight, HC-3 is believed to be the first fleet helicopter squadron in U.S. naval history to accumulate 100,000 Class A and B mishap-free flight hours.

## Awards

The Top Torp Award was presented to the *Wolfpack* of HSL-45 by ComASWWingPac. The award is a year-long competition involving the entire LAMPS MK III community stationed on the West Coast. The winner is the squadron that has the highest success rate.

The *Tester*, serving NAS Patuxent River and Southern Maryland, was selected as the Navy Chief of Information Merit Award winner for the second year. It topped 33 entries in the category for authorized civilian enterprise newspapers — those supported by commercial advertising.

## Records

Capt. Paul Pedisich, C.O. of NAS Whiting Field, Fla., flew his 6,000th flight hour while piloting a TH-57 SeaRanger.

Several units marked safe flying time: VF-126, 41,000 hours and 8 years; NRLFltSuppDet, NAS Patuxent River, Md., 39,000 hours and 26 years; HSL-43, 37,000 hours and 4 years; HS-75, 26,821 hours and 10 years; VAW-116, 24,000 hours and 13 years; VA-105, 23,500 hours and 5 years; VA-37, 20,000 hours and 4 years; and VMFA-115, 20,000 hours.

Cdr. Richard "Dusty" Rhoades, Dep. Dir., U.S. Naval Test Pilot School, NAS Patuxent River, Md., flew his 5,000th accident-free flight hour.

Capt. Jerry D. Norris, C.O. of CVW-3, recorded his 1,000th arrested landing in an F-14 *Tomcat*. He has accumulated over 4,000 flight hours during his 25-year career.

## Redesignated

The Expeditionary Air Field's Fleet Marine Force (EAFFMF) Augment was redesignated Marine Wing Support Squadron (MWSS) 173 in October 1988. Prior to this reorganization, the EAFFMF Augment's primary purpose was to run the airfield's operational requirements at Marine Corps Air/Ground Combat Center, Twentynine Palms, Calif. As a support squadron, MWSS-173 will now be able to supply a complete spectrum of support at the combined arms exercises. This will result in a reduction of the personnel augmentation requirements.

## Honing the Edge

*Carl Vinson* (CVN-70) returned to its home port of NAS Alameda, Calif., in December 1988, following a successful six-month deployment to WestPac, the Indian Ocean and North Arabian Sea.

The nuclear aircraft carrier participated in numerous operations with U.S. and allied forces, including exercises with the U.S. Air Force in the Gulf of Alaska, air training with Japanese Air Self-Defense Force aircraft and air and surface exercises with the Royal Thai navy and air force. The ship also served as a training platform for midshipmen participating in the Navy's summer training program.

After returning from a Med deployment, VF-143 completed a turnaround cycle including the Fleet Fighter ACM Readiness Program (FFARP). During FFARP, the "Dogs" pushed themselves and their aircraft to the limit testing fighter tactics against F-16s and A-4s simulating the most current Soviet threat. FFARP was conceived by the fighter community to keep F-14 aircrews proficient in all aspects of air-to-air combat.

HAL-4, NAS Norfolk, Va., recently participated in an exercise at the Army's Fort A. P. Hill weapons and tactical flying range at Bowling Green,

Va. This was the last time that HAL-4 fired rockets and Gatling guns which comprise two-thirds of the HH-1K *Huey's* firepower.

By December 1989, HAL-4 will become Helicopter Combat Support Squadron (HC) 4 and will exchange the *Hueys* for twin-engine Sikorsky HH-60Hs, which are armed with two door-mounted M-60s.

Located a few miles west of San Clemente Island lies SCORE, an 8-by-14-mile instrumented block of water that serves as the Pacific Fleet's premier training arena for antisubmarine warfare.

The Southern California Offshore Range began its operations in 1985 with an exercise pitting an SH-3 helicopter against a *Los Angeles*-class submarine. Since then, SCORE has conducted hundreds of exercises involving air, surface and subsurface ASW platforms of all types.

Originally known as SOAR by range users, the southern California ASW range was conceived and developed as a readily available ASW training facility for Pacific Fleet units. Before SOAR, ASW training required ships and aircraft to make costly detachments to other ranges in Hawaii or in Keyport, WA, to complete training requirements. Now, SCORE can provide a multitude of ASW scenarios for the Pacific Fleet, especially those units based in southern California.


Cpl. Charlie Crouch

**Sgt. Scott Linder, a UH-1N Huey crew chief from HMLA-167, briefs members of the Quantico, Va., crash, fire and rescue team on the differences between a combat loaded helicopter and a passenger aircraft. HMLA-167 sent two Cobras and a Huey to support a three-day exercise at the USMC Basic School.**

PH2 J. P. Buckner

**Forrestal (CV-59) and Theodore Roosevelt (CVN-71) steam side by side during Teamwork 88. The carriers participated in the North Atlantic NATO exercise which took them north of the Arctic Circle.**

PH3 M. Haley

**An F-14 Tomcat sits shrouded in catapult steam on the deck of Forrestal (CV-59). The fighter from VF-11 was preparing to launch during Teamwork 88.**

## Et cetera

A Naval Aviation first occurred November 10, 1988, at NAS Whiting Field, Fla., when Joy D. Varner pinned on her Wings of Gold and received her commission as a naval officer.

While the Navy has had female pilots for some time, Ens. Varner is the first to become a Naval Aviator under the Naval Aviation Cadet Program.

Varner is currently enrolled in intermediate helicopter training until September 1989, when she will report to HC-2, NAS Norfolk, Va., to fly the CH-53E.

A jet engine arriving for repair at the Aircraft Intermediate Maintenance Department (AIMD), NAS Cubi Point, P.I., from a Seventh Fleet squadron operating in the Western Pacific is handled in AIMD's Power Plants Division — or "Jet Shop" — one of the world's largest aircraft engine repair facilities.

The division repairs engines for F-14 *Tomcats*, F/A-18 *Hornets*, A-7 *Corsairs*, S-3 *Vikings*, A-4 *Skyhawks*, A-6 *Intruders*, EA-6 *Prowlers* and E-2C *Hawkeyes* — most planes that fly off aircraft carriers. In support of the helicopter community, the Jet Shop repairs engines for SH-60 *Seahawks*, SH-3 *Sea Kings*, H-46 *Sea Knights* and H-53 *Sea Stallions*. The division also works on engines for C-130 *Hercules* and P-3 *Orions*.

PH1 Ted Salois

**ADAN Hugh D. Carpenter checks for cracks in the exhaust tunnel in one of AIMD's nine test cells.**

Two aging OV-1 *Mohawks* in the inventory of the Naval Test Pilot School (NTPS), NAS Patuxent River, Md., recently departed on their last flight for NTPS to the National Guard Aviation Depot in Gulfport, Miss. The *Mohawks* were retired because the cost of maintaining them was prohibitive. The more than 25-year-old aircraft included a 1962 model that was

**An OV-1 Mohawk sits on the tarmac in front of the Naval Test Pilot School.**

the first *Mohawk* the school acquired.

Replacing the *Mohawks* will be two U-21 utility aircraft from Davison Army Airfield, Fort Belvoir, Va. The U-21s are turboprop aircraft which will give rotary-wing test pilot students needed turboprop experience for programs such as the V-22 *Osprey*.

Naval Aviation Museum Foundation

**Adm. Thomas H. Moorer, USN(Ret.), Chairman of the Board, Naval Aviation Museum Foundation, welcomes SecNav William L. Ball III to the museum ground-breaking ceremony for Phase III Expansion.**

A ground-breaking ceremony for Phase III Expansion of the Naval Aviation Museum in Pensacola, Fla., took place in October 1988, with the Honorable William L. Ball III, Secretary of the Navy, officiating.

Construction will expand the current 107,000 sq. ft. of display area to over 245,000 sq. ft. The completed expansion will allow display of numerous additional naval aircraft (approximately 100), an expanded space exhibit, multiple aviation displays, and will feature a WW II carrier island and flight deck display with an operational aircraft elevator. The new expansion is scheduled to be completed by the fall of 1990.

USS *Kitty Hawk* (CV-63) has found a new home. In 1991, the ship and its 3,000-man crew are slated for a pier at NAS Pensacola. The ship's air wing will mostly be located at Oceana, Va., and Cecil Field, Fla. *Kitty Hawk* entered the Philadelphia Naval Shipyard for a 37-month, $750 million overhaul last July after the completion of a six-month deployment to the Indian Ocean. When it arrives in Pensacola, it will be virtually a new ship.

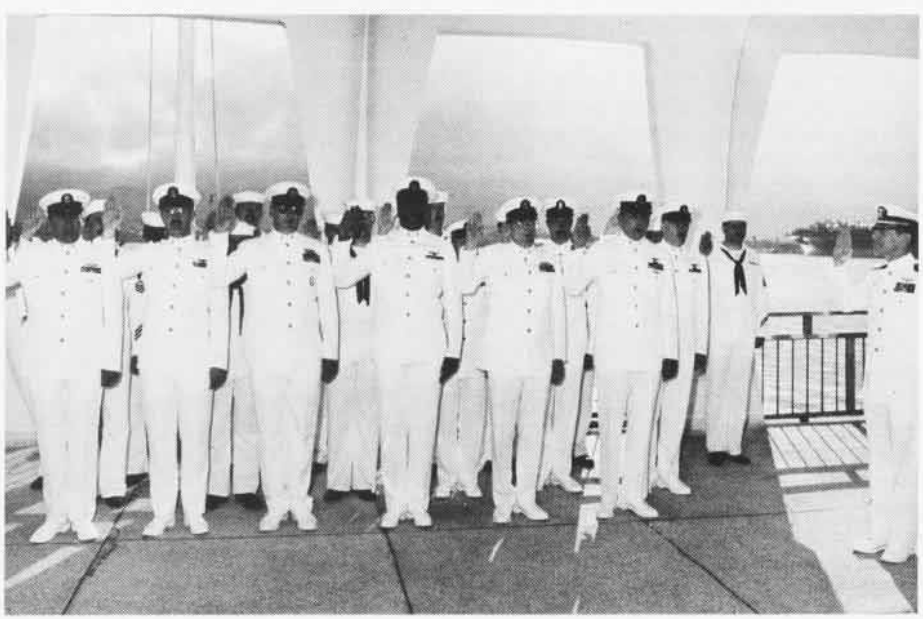
Then-Secretary of Defense Frank C. Carlucci announced that the Department of Defense (DoD) again logged the best aviation safety record in its history, breaking the previous mark set in FY 87. Contributing directly to the new DoD milestone, the Army, Navy and Marine Corps each set new records, and the Air Force continued an already excellent record.

The Army's new record rate of 1.86 betters its previous mark of 2.04 set in FY 86. The Navy's rate of 2.08 surpasses its previous record of 2.73 set last year, and the Marine Corps' new record of 3.18 significantly betters its previous record of 4.12 set in FY 86.

Last year, 22 crew members from *Nimitz* (CVN-68) took their oaths during a special reenlistment ceremony conducted by the carrier's skipper, Capt. Brent M. Bennitt, on the Arizona Memorial in Pearl Harbor, HI.

*Nimitz* changed her home port from Norfolk, VA, to Bremerton, WA, in July 1987.

The Arizona Memorial was dedicated on Memorial Day, 1962, to honor the 1,177 *Arizona* crewmen who perished in the surprise Japanese attack on December 7, 1941, which launched the U.S. into WW II. "I think the memorial represents a place of rebirth for our modern Navy," Capt. Bennitt said. "For since that day, the U.S. Navy has risen to an ascendancy in the world that's never before been achieved, and has managed to maintain [it]."



**Twenty-two members of Nimitz reenlisted aboard the Arizona Memorial in Pearl Harbor, HI.**

## Change of Command

*Blue Angels*: Cdr. Pat Moneymaker relieved Capt. Gil Rud.

CVW-8: Capt. John F. Manning, Jr., relieved Capt. Joseph W. Prueher.

CVW-13: Capt. W. B. Christie, Jr., relieved Capt. W. H. Switzer III.

CVW-17: Capt. Asbury Coward IV relieved Capt. Austin E. Chapman.

HC-8: Cdr. R. R. Gangewere relieved Cdr. L. T. Stites.

HSL-34: Cdr. Scott L. Hendrickson relieved Cdr. Richard H. Dejaegher.

HSL-94: Cdr. Ronald A. Pignataro relieved Cdr. William J. Hughes, Jr.

MAG-39/50: Col. Coleman D. Kuhn, Jr., relieved Col. Lowell E. Austin.

NSWC: Capt. Arthur N. Langston relieved Capt. Robert G. Brodsky.

VA-34: Cdr. Eugene K. Nielsen relieved Cdr. Bernis H. Bailey.

VA-36: Cdr. Daniel J. Franken relieved Cdr. T. LaMar Willis.

VA-37: Cdr. L. Scott Jacobsen relieved Cdr. James R. O'Hora.

VA-55: Cdr. John W. Henson relieved Cdr. Ralph E. Suggs.

VA-95: Cdr. John F. Schork relieved Cdr. William H. Miller.

VA-165: Cdr. William H. Shurtleff IV relieved Cdr. Donald C. Brown.

VA-185: Cdr. Michael J. McCamish relieved Cdr. William J. Magnan.

VC-5: Cdr. Stephen L. Madey, Jr., relieved Cdr. George M. Moore.

VF-14: Cdr. Peter B. Strickland relieved Cdr. Daniel M. Chopp.

VF-74: Cdr. Mark P. Grissom relieved Cdr. Kenneth L. McCrory.

VF-124: Cdr. R. J. Bradley, Jr., relieved Cdr. K. E. Shean.

VFA-25: Cdr. Daniel W. Gabriel relieved Cdr. Anthony V. Colantoni.

VFA-131: Cdr. Jerry B. Singleton relieved Cdr. Dean L. Steele.

VFA-305: Cdr. J. D. Janiec relieved Cdr. J. P. Hazelrig.

VMFA-531: LCol. John F. Goodman relieved LCol. James L. Cieslak.

VP MAU Moffett Field: Cdr. Roger Franssen relieved Capt. James P. Schear.

VT-2: Cdr. Ronald S. Dargo relieved Cdr. Albert E. Bennett, Jr.

VXN-8: Cdr. Daniel E. Brown relieved Cdr. Marshall R. Fenn.

# STATE OF THE ART

## Advanced Tactical Air Command Central

The Space and Naval Warfare Systems Command awarded Grumman Corporation a development contract for the Advanced Tactical Air Command Central (ATACC) program. The nine-year, $115 million award calls for design, development and production of mobile battlefield command centers for the Marine Corps.

ATACC is a mobile command and control system that will be used to plan and direct coordinated air operations in support of the ground units of a joint task force. In the field, the system will generate air task orders automatically and provide decision support, communications processing, graphics and text displays, information management and monitoring of friendly and hostile forces. Battle details such as the overall defense situation, enemy threat and unit readiness will be communicated instantly to the air commander on ATACC's automated displays. In turn, the commander will be able to issue orders immediately over digital and voice communications systems.

Each ATACC is comprised of six workstations and three microprocessors, powered by mobile generators in the field. Housed in rugged eight-by-eight by 20-foot shelters, and weighing 9,500 pounds each, they will be easily transportable by fixed-wing aircraft, helicopter, truck, ship or forklift.

## Standoff Land Attack Missile

The first standoff land attack missile (SLAM) rolled out last November at the McDonnell Douglas *Harpoon* missile production facility in St. Charles, Mo. SLAM provides Navy carrier-based aircraft the capability to attack land targets, ships in port or ships at sea from ranges in excess of 60 nautical miles.

The new weapon system combines the airframe propulsion and control systems of the *Harpoon* with existing guidance systems: the *Maverick* imaging infrared seeker, *Walleye* data link and a global positioning system (GPS) receiver. While SLAM is in flight, the GPS receiver updates and corrects the missile's inertial navigation system, ensuring that its *Maverick* imaging infrared seeker is pointed directly at the target. When the seeker is activated, it sends a video message to the pilot, who selects a specific aimpoint on the target. After being locked onto the target, SLAM makes a precision strike while minimizing damage to surrounding areas.

## Remotely Piloted Vehicle

The *Pioneer* remotely piloted vehicle (RPV) is undergoing testing at the Naval Air Propulsion Center, Trenton, N.J., to evaluate the performance characteristics of a new rotary power plant. With installation of this engine, the *Pioneer* could experience gains in power and operational reliability.

The new engine may be configured to run on a variety of fuels, including JP-5 and diesel fuel marine, which are carried on the Navy's aviation-capable ships. These fuels are less flammable than the avgas which now powers the *Pioneer*'s two-cycle engine. The rotary engine would increase the RPV's power from 26 to 42 horsepower, as well as fuel efficiency at altitude.

# AWARDS

## Marine Corps Aviation Association

The Marine Corps Aviation Association presented the following awards for 1988:

Alfred A. Cunningham Aviator: LtCol. Larry D. Outlaw, HMLA-167.

Robert G. Robinson Naval Flight Officer: Maj. Terry L. Breithaupt, VA-128.

Aviation Ground Officer: Col. Donald E. Davis, DC/S Aviation.

Air Command and Control Officer: Capt. Chad W. Hocking, 3d LAAD Battalion.

Bud Baker V/STOL Enhancement: Maj. Duane D. Thiessen, VMA-231.

Air Command and Control Marine: Sgt. Brian E. Dundon, H&HS-28.

Aviation Electronic Technician: Cpl. James H. Parish, Jr., HMLA-169.

Fixed Wing Aircrewman: MSgt. James R. Noe, VMGR-352.

Helicopter Aircrewman: Sgt. James E. Bowling III, HMH-464.

Plane Captain: Sgt. Steven R. Davis, VMFA-115.

James Maguire Enlisted Aviation Safety: GSgt. Peter T. Aguon, HMM-364.

James E. Nicholson Enlisted Leadership: GSgt. George C. Johnson IV, HMH-464.

Exceptional Achievement (Individual): MSgt. Michael S. Mullen, VMFA-251.

Commandant's Aviation Efficiency Trophy: VMGR-352.

Lawson H. M. Sanderson Attack Squadron: VMA-311.

Robert M. Hanson Fighter Squadron: VMFA-115.

Keith B. McCutcheon Helicopter Squadron: HMLA-169.

Edward S. Fris Air Command and Control Unit: 3d LAAD Battalion.

Pete Ross Safety: VMA-142, MAG-42.

## McCampbell Award

Ltjg. Richard Robinson captured the Capt. David McCampbell training award presented by the American Fighter Aces Association. The award recognizes the Navy pilot who displays the best performance in air combat maneuvering while in the training command. Robinson is currently assigned to VFA-86, NAS Cecil Field, Fla., flying the F/A-18 *Hornet*.

By Cdr. Peter Mersky, USNR-R

Miller, Jay. *McDonnell Douglas F/A-18 Hornet*. Aerofax, Inc., Box 76006, Arlington, TX 76006. 1988. 48 pp. Illustrated. $7.95.

The latest minigraph (No. 25) in the established series of books from Aerofax, *Hornet* includes the three-column, small-type text with numerous photos and reproductions of manual charts and panels that make these books a modeler's dream. Dedicated enthusiasts will also find details galore.

An eight-page center gatefold displays a selection of color photos, as well as 1/100 profiles and 1/72-scale general arrangement drawings. The latest F/A-18C and D models are shown, and there is special attention to details such as landing gear and various panels and instrumentation.

If you're looking for references to finish off that 1/32-scale model, this book has them.

Francillon, Rene. *Tonkin Gulf Yacht Club*. U.S. Naval Institute, Annapolis, MD 21042. 265 pp. Illustrated. $24.95.

A unique variation of the established format of Vietnam histories, this latest volume combines an overall survey with useful tables detailing squadron deployments, combat losses and aircraft types. As in any such large undertaking, various errors creep in, especially involving specific incidents or people. Wartime legends can sometimes obscure facts, but Dr. Francillon is well qualified to write such a book and his effort is sure to benefit many readers, from historians and researchers to those seeking a good, light history of U.S. Naval Aviation in Southeast Asia.

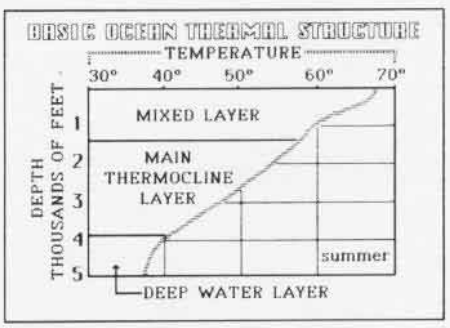
Photo coverage is complete, with many new or rarely published views, as well as full-page maps. The most interesting sections are those that detail squadron and ship deployments and the chapter that uses USS *Coral Sea* (CVA-43) as a representative carrier. Compiled from cruise books and combat reports, this mini-history of *Coral Sea* at war will be of interest especially to those crewmen who served in the ship during the war.



By Capt. Neil F. O'Connor, USN(Ret.)

# The AXBT

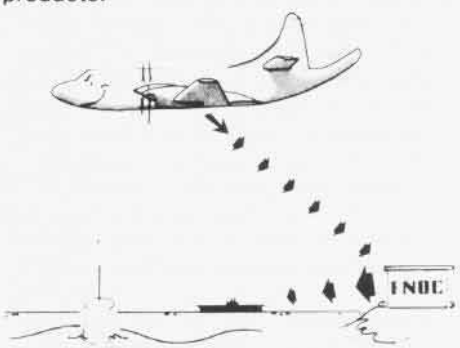
Of the various means for detecting and locating submarines, the use of underwater sound propagation is by far the most efficient. The ability to predict sound propagation requires frequent sampling of the ocean environment, particularly the upper layer (mixed layer), which responds to rapid changes in weather conditions. The conclusion: use aircraft (fixed wing and rotary) as platforms to obtain the required oceanographic observations. This was recognized years ago as an ideal means to obtain the information especially in remote areas far removed from operational surface combatants. Today it is a routine procedure. The air-launched sensor is called the




aircraft-launched expandable bathythermograph or AXBT. Supply officers know it as the AN/SSQ-36 sonobuoy; aviators call it a "BT."

The AXBT is deployed from an on-station antisubmarine warfare aircraft in a standard sonobuoy launch tube or free fall chute. When it reaches the ocean surface, a thermistor is released from beneath the floating transmitter and descends rapidly to a depth of 1,000 feet. Changes in water temperature are recorded by variations in the resistance sensed by the thermistor. The result is a detailed ocean temperature profile recorded aboard the orbiting aircraft. The significance is that variations of temperature are directly related to underwater sound transmission. For example, an increase in temperature produces an increase in sound. While observational data is used by the on-station aircraft, it is also encoded and transmitted to the nearest regional oceanography center and to the Fleet Numerical Oceanography Center (FNOC), Monterey, Calif.

Once received at Monterey, the main frame computers quickly digest the information. Coupled with other aircraft and shipboard observations, sound propagation forecasts are calculated for various sensor systems and reissued to the fleet in the form of active acoustic sensor range predictions (ASRAPs), ships/helicopter acoustic range predictions (SHARPs) and other acoustic products.



### Aviation Continuation Pay

New Aviation Continuation Pay (ACP) regulations became effective January 1, 1989, replacing the FY-89 Aviation Officer Continuation Pay (AOCP) program. ACP applies only to pilots and naval flight officers (except those designated 1327) below paygrade 0-5. Determination of eligible communities and payment rates is based on analysis of current year group shortages, department head requirements and other pertinent management factors. ACP payment shall not be more than $12,000 for each year of the contract if the officer agrees to remain on active duty to complete 14 years of continuous service; or not more than $6,000 for each year if the officer agrees to remain on active duty for one or two years.

Detailed information and application instructions for the ACP program are published in ALNAV 132043Z DEC 88 ZEX ZYB or by contacting Naval Military Personnel Command, Code OP-130E2, autovon 223-2307 or (202) 693-2307.

### Korean War Exhibit

The Navy Museum in Washington, D.C., is planning to commemorate the fortieth anniversary of the Korean War with an exhibition. Three-dimensional artifacts are desperately required to illustrate the Navy's role in air combat, amphibious operations and mine warfare.

If you can assist this project, please contact: Dr. Oscar P. Fitzgerald, Director, The Navy Museum, Bldg. 76, Washington Navy Yard, Washington, DC 20374-0571, autovon 288-4882 or (202) 433-4882.

### Korea Veterans

I wish to locate former Navy medical personnel and their support personnel, including other services, who served in Korea during any part of 1950 through 1954. Interviews or correspondence are needed to provide background for a book on the Korean War. Persons who supply information, anecdotes, etc., will be acknowledged (with their permission) in the book upon publication.

Ted S. Wilkin
Dept. of History
Univ. of Southern Colorado
Pueblo, CO 81001

### A-4 Flight Record

An *NANews* reader claims to have flown 637 individual A-4 *Skyhawk* bureau numbers. If anyone knows where he can confirm this record or wishes to challenge it, write: Robert M. Krall, 106 Terrace Ct., Hercules, CA 94547.

### Reunions, Conferences, etc.

**Naval Aviation Ball,** April 29, Crystal Gateway Marriott Hotel, Arlington, VA. Open to all active duty and retired Navy and Marine Corps aviators, naval flight officers and other aviation-related officers, as well as aviation supporting corporate personnel. Contact Capt. Bill Franson at autovon 224-6020 or (202) 694-6020.

**HC-7 reunion,** April 11-15, Jacksonville, FL, in conjunction with NHA Convention. Contact J. C. Spillman, HS-75, Box 87, NAS Jacksonville, FL 32212-0087, autovon 942-4495 or (407) 746-3875/(904) 772-4495.

**VP-72 reunion,** May 2-5, Pensacola, FL. Contact Sport Little, 2435 Pleasant Hill Rd., Pleasant Hill, CA 94523, (415) 935-3139.

**Naval Aviation Symposium,** highlighting "Naval Aviation in Space," jointly sponsored by the Naval Aviation Museum Foundation and the U.S. Naval Institute, May 4-5, Pensacola, FL. Contact Naval Aviation Museum Foundation, NAS Pensacola, FL 32508, (800) 327-5002.

**USS Franklin D. Roosevelt (CV-42) / air wings reunion,** May 18-21, Atlantic Beach, FL. Contact John P. Lyons, 4213 Harry St., Corpus Christi, TX 79412, (512) 992-7976.

**American Helicopter Society Annual Forum and Technology Display,** May 22-24, Boston, MA. Contact AHS, Inc., 217 N. Washington St., Alexandria, VA 22314, (703) 684-6777.

**USS Essex (CV/CVA/CVS-9) reunion,** June 12-16, Charleston, SC. Contact Jack Gallagher, Box 3156, Lakewood, CA 90711-3156, (213) 866-4463.

**VXE-6 reunion,** May 26-27, NAS Point Mugu, CA. Contact O.A.E. Rep, VXE-6, NAS Point Mugu, CA 93042-5014, autovon 351-7585 or (805) 989-7585.

## The Association of Naval Aviation Photo Contest

The Association of Naval Aviation and its magazine, *Wings of Gold*, is sponsoring an annual photo contest, beginning in January 1989. There will be six bimonthly winners and end-of-year first, second and third-place winners. The contest is intended to capture on film the exciting world of Naval Aviation, its airplanes, ships and people in the Navy, Marine Corps and Coast Guard. Winners will be announced with their photos in *Wings of Gold* and *Naval Aviation News*. Everyone is eligible except the staffs of the Association of Naval Aviation and *Naval Aviation News*. The ONLY requirement is that the subject matter pertain to Naval Aviation. Submissions can be in black and white or color, slides or prints of any dimension.

**Cash Awards**

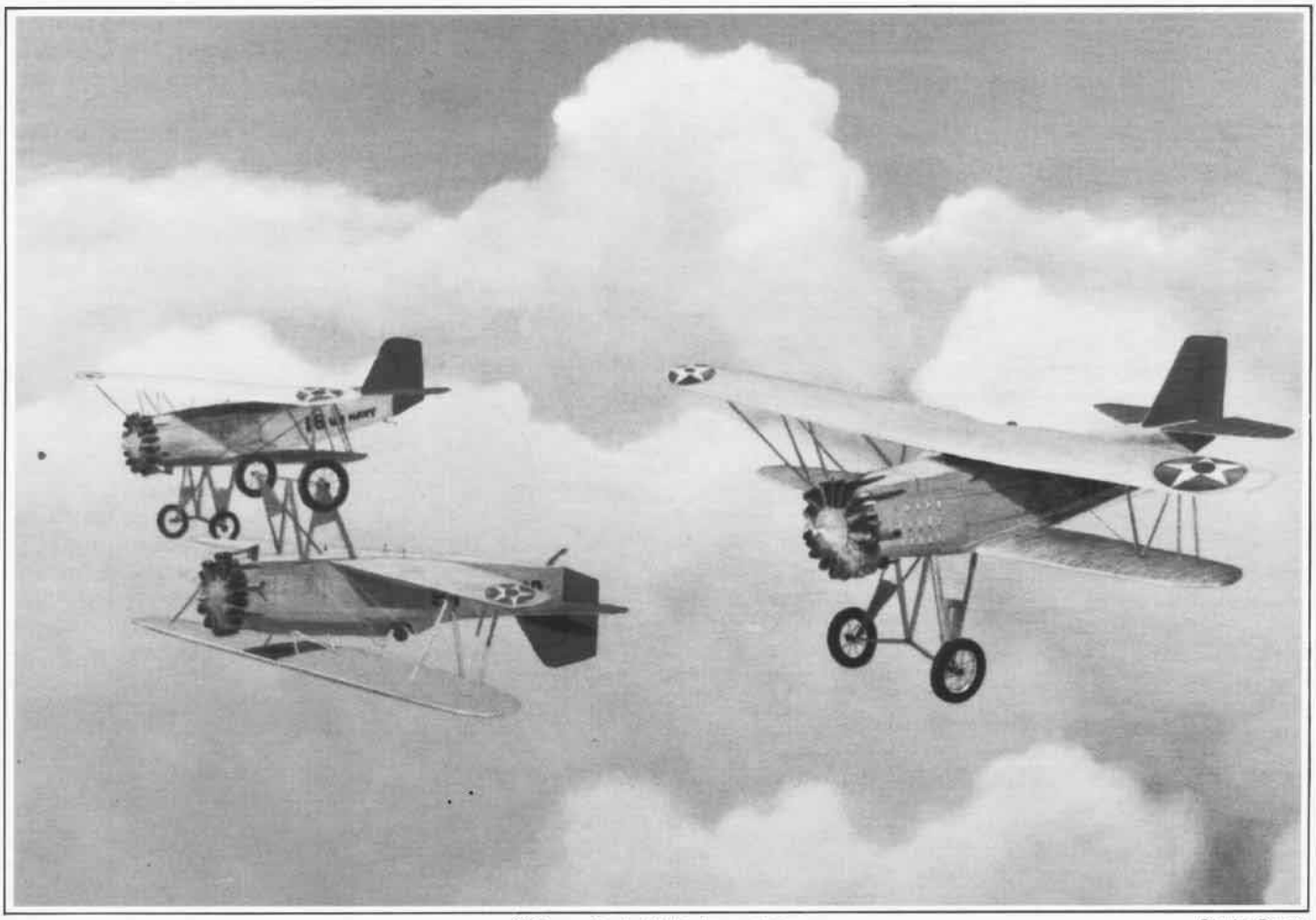
| | |
|---|---|
| Bimonthly: | $100 |
| Annual: | |
| First | $500 |
| Second | $350 |
| Third | $250 |

Deadlines for submissions for the bimonthly awards are the 1st of February, April, June, August, October and December. The deadline for the annual awards is December 1. Please be sure to include a complete name and address with each entry.

Bimonthly winners will be selected by the staffs of *Wings of Gold* and *Naval Aviation News*. All photos submitted throughout the contest period, whether or not they were bimonthly winners, will be considered for the annual awards by an expanded panel of judges which will include recognized out-of-house experts in the photography field.

This ensures that EVERY ENTRY will get a fresh look. Photographs may be published by the Association of Naval Aviation (ANA) and *Naval Aviation News* and used for promotional purposes by the ANA, but owners retain their rights of usage.

Mail photographs, **WITH CAPTIONS,** to: Association of Naval Aviation Photo Contest, 5205 Leesburg Pike, Suite 200, Falls Church, VA 22041.



*F6Cs — Early flight demo team*

Charles Cooney

# 1989 Blue Angels Schedule

| | | | | | |
|---|---|---|---|---|---|
| March | | June | | September | |
| 18 | NAF El Centro, CA | 3-4 | Racine, WI | 1-3 | Toronto, Canada |
| 25 | Williams AFB, AZ | 10-11 | Otis ANGB, MA | 9 | Syracuse, NY |
| | | 17-18 | Oklahoma City, OK | 10 | NAS Brunswick, ME |
| April | | 24-25 | Davenport, IA | 16-17 | Peoria, IL |
| 8-9 | NAS Cecil Field, FL | | | 23-24 | McGuire AFB, NJ |
| 15-16 | NAS Norfolk, VA | July | | 30 | Topeka, KS |
| 22 | MCAS Cherry Point, NC | 1-3 | NAS Moffett Field, CA | | |
| 23 | Barksdale AFB, LA | 8-9 | Klamath Falls, OR | October | |
| 28-30 | MCAS El Toro, CA | 15 | Pensacola Beach, FL | 1 | Topeka, KS |
| | | 22-23 | Dayton, OH | 7 | San Francisco, CA |
| May | | 29-30 | Detroit, MI | 14-15 | El Paso, TX |
| 6 | Vandenberg AFB, CA | | | 21-22 | NAS Dallas, TX |
| 7 | NAS Lemoore, CA | August | | 28-29 | Little Rock AFB, AR |
| 13-14 | NAS Corpus Christi, TX | 5-6 | Seattle, WA | | |
| 20-21 | Richards Gebaur AFB, MO | 9 | NAS Whidbey Island, WA | November | |
| 27 | NAS Patuxent River, MD | 12-13 | NAS Miramar, CA | 4-5 | Opa Locka, FL |
| 29 | Naval Academy, MD | 19-20 | Reading, PA | 11 | NAS Pensacola, FL |
| | | 26-27 | Duluth, MN | | |

NAVAL AVIATION NEWS

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