NAVAL AVIATION NEWS
November-December 1988

CVW-5 Aboard Midway

Page 17

NAVAL AVIATION NEWS

Oldest U.S. Navy Periodical (USPS 323-310/ISSN 0028-1417) **Volume 71, No. 1**

Flagship Publication of Naval Aviation

Vice Admiral Robert F. Dunn Assistant Chief of Naval Operations (Air Warfare)

Published by the Naval Historical Center under the auspices of the Chief of Naval Operations

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COVERS—Front, an F/A-18 *Hornet* on patrol off USS *Midway*. Back, each year, thousands of visitors to Washington, D.C., pay homage to U.S. Veterans at the Vietnam Memorial (JO1 Jim Richeson).

Features

Departments

Maine's NAS Brunswick is home of one of two VP Master Augment Units – "Patrol Aviation's New Edge." Read why our reserves are more mobilization ready than ever. **Page 4**

The Naval Air Engineering Center, Lakehurst, N.J., has an impressive lineage. Evolving from the Naval Aircraft Factory, the center today hosts the Navy's "Experts in Systems Integration." **Page 9**

The landing craft air cushion is "Not an Airplane, Not a Ship, But What a Craft!" The LCAC is a high-speed transport for USMC amphibious assault forces working with air support. **Page 15**

Aboard *Midway* in Japan, CVW-5 is the Navy's only permanently forward-deployed air wing. A photo essay depicts the high-tempo flight operations of the CVW-5/*Midway* team. **Page 17**

The annual air show in Oshkosh, Wisc., drew a million spectators and 13,000 aircraft in 1988. Retired reserve Capt. Maury Cagle gives his eyewitness account of the spectacular event. **Page 24**

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

Retention

Naval Aviation today is operating at the highest levels of readiness, with the lowest mishap rate and with the best people I have seen in over 37 years. My own personal observations, and those of all the Naval Aviation leaders I have talked to, confirm that our enlisted and officer personnel are first-rate, hard-charging and professional. That's good, and we all want to keep it that way.

We cannot coast on our laurels, however. When things are going well is exactly the time to take a look and see where the soft spots are. Specifically, it is not enough for us to tell each other how good everybody is. It is not the time to let up on what must be a never-ending effort to recruit and retain outstanding people such as those we now have. There is particular pressure to do that today because, in the years ahead, it is going to be more and more difficult. The pool of eligible recruits is reducing and all the services are competing ferociously for the best talent available. Recruiting isn't enough, though; it is obviously in our best interests to make the good people we have want to stay.

Making people want to stay, retention, may be even more important than recruiting. Given the reduced dollars we have to sustain Naval Aviation these days, we face the many challenges of making the Navy a good place to work. Hopefully, things such as delayed advancements, PCS delays, vagaries in SRB, and increased time-in-rate requirements are things of the past. At least the CNO, the Chief of Naval Personnel and I want them to be in the past. Nevertheless, because it has happened, the rumors abound and those of you who are leaders must work at dispelling those rumors.

Whether it be aircrew, ground officers or enlisted personnel, I can assure you that those of us at the headquarters level are working hard to do everything we can to implement and maintain programs that will enhance retention in Naval Aviation. Bonuses, reduction in family separations, and improved working conditions are just some of the major areas. In any case, we simply cannot accept less than the optimum for our people. Reiterating, they are the best ever and they have set a high standard. We should let them know that — often.

Time and time again, surveys of employees — government, nongovernment and military — clearly state that the best motivated people do the best job. More importantly, what motivates them most is "being appreciated" for the job and "feeling they are an important part of the organization." Money, interesting work, job security, promotion and working conditions were all on the list, but ranked well down from "being appreciated."

By and large, our leaders in the fleet do a very good job of making sure that our people are appreciated, that they are recognized as essential elements of Naval Aviation. We need to reaffirm *that* appreciation in the stringent and challenging days that lie ahead.■

ILLUSTRATED BY Osborn

The Milky Way

A CH-46D *Sea Knight* was tasked with transporting cartons of milk from NAS Overseas to an aircraft carrier at anchor nearby. At the air station, the helo crew coordinated loading of the milk and some other gear with the carrier's food services working party supervisor. The supervisor was not assigned or trained as an air transport officer ashore.

The helo's first aircrewman asked the food services supervisor how much the pallets of milk to be airlifted to the ship weighed. The supervisor lacked knowledge in this area and referred the question to the medical inspector, whereupon a discussion as to the weight of a gallon of milk ensued.

The supervisor and the first aircrewman decided that a gallon of milk weighed 20 pounds. (The milk was contained in six-gallon cartons which actually weigh 53 pounds). Using their erroneous figure, a six-gallon carton of milk would have weighed 120 pounds. There was a bill of lading available which contained an accurate weight figure in kilograms for the milk but no one referred to it throughout this evolution. Also, individual pallets weighed 50 pounds and there were 175 pounds of miscellaneous cargo. But these weights weren't considered in the total.

Despite their erroneous calculations for the weight of a gallon of milk, all participants on the ground and in the flight crew agreed that the cargo weighed approximately 3,000 pounds for the first load. In fact, the milk alone weighed 7,420 pounds (140 cartons at 53 pounds each — they had figured 20 pounds per carton rather than per gallon). In effect, the *Sea Knight* toted more than twice the estimated carton weight on the first flight.

The helicopter aircraft commander (HAC) achieved a hover in ground effect (HIGE) torque of 78 percent and continued the flight. It was decided to reduce the load for the next hop, however. The second and subsequent loads consisted of 120 cartons. Assumed weight was 2,400 pounds. Actual weight was 6,735 pounds. The HAC achieved 70 to 75 percent HIGE torque on the second sortie. On the third delivery, the helicopter second pilot (H2P) had to wave off due to a problem on the flight deck. As rotor

head speed (NR) drooped to 92 percent, the HAC took over, cautioning the H2P on the need for more gradual power application.

The H2P was at the controls for the fifth carrier approach which was flatter than the previous ones. He recognized the lower altitude as he began to decelerate for an intended no-hover landing.

Approaching a position abeam of spot four with forward motion nearly stopped, his collective application was insufficient to arrest the rate of descent. He further increased collective. At this point, NR began to droop and control inputs had reduced effect. The pilot believed he could still make the flight deck and continued his right movement.

The first aircrewman called "up, up, up" over the ICS. The landing signalman enlisted (LSE) observed the aircraft's slowing forward motion and gave a hover signal, followed immediately by a slide right signal. As the helo approached the deck edge, the LSE saw there was insufficient altitude to clear the catwalk and signaled wave-off.

The HAC called for altitude and tried to take the controls for a wave-off but they were not responsive. A moment later, the aircraft struck the side of the ship, rolled onto the flight deck and came to rest on its starboard side. The aft fuselage extended out over the water. The crew safely egressed although the pilot observer exited the aircraft through the ramp and hatch area and fell into the water. He was quickly retrieved.

Shrapnel from the disintegrating rotor blades flew in all directions and struck 18 people, causing minor injuries, and 20 aircraft, inflicting substantial damage.

Grampaw Pettibone says:

Color everybody lucky on this one — and call out the calculators. There's a bit of a math problem here. Ole

Gramps knows the injuries and the damage were costly but he's also amazed nobody was wiped out for good, what with fragments of metal zig-zagging all over the place like ricocheting bullets. Common sense sure took a holiday.

There were some paperwork problems and lack of administrative guidance both aboard the ship and at NAS Overseas. Somebody's gotta be in charge, know how to figure weights and provide specific data to flight crews. Too bad they didn't check that bill of lading.

But I'm stompin' my foot 'cause there were plenty of hints that trouble was awaitin' this Sea Knight. **For instance, how come the aircrewman discounted the weight of additional cargo and the pallets? That tells me somethin' about a possible lax attitude.**

And how come when the crew experienced 92 percent droop on the wave-off, a question mark about the load didn't light up in their minds?

And why didn't doubts arise about the hover check of 78 percent HIGE torque which ain't exactly right with an assumed cargo load of about 3,000 pounds?

And how come somebody didn't ask why the internal winch had to be used to load pallets that reportedly weighed only 600 pounds each?

There's more, but you get the message.

Everybody was tryin' to do their job here. But tryin' ain't enough. Attention to detail, professionalism, NATOPS — these are the buzzwords we gotta live with in Naval Aviation. All of us, not just the folks involved in this accident, need to be real familiar with this trio of subjects.

Midnight Rendezvous

It was a moonless, black evening. The pilot and bombardier navigator (BN) of an A-6 *Intruder* hot-seated for a night field carrier landing practice (FCLP) hop. The offgoing aircrew advised them that the taxi light was inoperative and recommended they taxi with caution. At the "hot pit," the oncoming crew noted that there was more activity than normal. This was because many local squadrons were doing FCLP work.

While taxiing to the runway nearly two miles away, the crew worked on their takeoff checklist. The pair flew together often and knew the airfield well.

After crossing the off-duty runway, they saw that the hold-short area for the duty runway seemed crowded with aircraft and was lit up "like a Christmas tree." As they neared this area, the crew tried to count the number of aircraft ahead of them. In the meantime, a utility truck, en route to air operations, swept its high beam headlights through their cockpit — adversely affecting the crew's night vision. Seconds later, the flyers caught a glimpse of a parked and "unlit" or "midnight" A-6. It had been briefly illuminated by the rotating beacon of the taxiing *Intruder*. The pilot hit the brakes abruptly along with right rudder to avoid a collision. They missed the darkened *Intruder* by 15 feet.

Grampaw Pettibone says:

If these two Intruders hada intruded into the same spot in the hold-short area, they mighta seen a lot more lights than a Christmas tree. The so-called "midnight" A-6 simply didn't "light its candles." The moving Intruder could have gotten a better warning if its taxi light was operative, but that's not a downin' gripe and we ought to be able to handle things without it. The hold-short area accommodates 10 aircraft. Actually, there were only five there at the time. But at night — what with all the blinkin' and shinin' — it seemed like more.

If you run into the same thing as these Intruder fellas, make sure your lights are on when they're supposed to be, and take it slow and easy when goin' up against Christmas trees.

Pain in the . . . Eye

The crew of an A-6 *Intruder* checked in for recovery aboard the carrier and were directed to climb to 17,000 feet and hold. Passing 10,000, they noticed that the cabin pressure was inoperative but they elected to continue climbing. After leveling at 17,000 feet, they felt comfortable without the cabin pressure.

Twenty minutes later, the *Intruder* was cleared for an immediate descent to 5,000 feet to investigate a fighter aircraft with a minor emergency. The pilot banked steeply and descended at

a 6,000-fpm rate. Passing through 10,000 feet, the BN experienced a sudden and sharp pain behind his right eye. "It was as if an icepick was being stabbed in it," he said later, "and my head felt like it was going to explode."

The BN doubled over in pain and took rapid, shallow breaths while wiggling his jawbone in an effort to relieve the pressure. He tried Valsalva and massaged his right eye, which helped a little. Although he was not incapacitated, the BN was unable to perform copilot duties for about one minute.

The *Intruder* landed uneventfully. Believing he was recovered, the BN and his pilot planned to brief for a second assigned hop. They went to the wardroom. As he was eating, blood began trickling from the BN's nose. He lost his appetite and proceeded quickly to sick call. After sinus x-rays, his ailment was diagnosed as barotrauma of the sinuses resulting in a hematoma (trapped blood). He was placed in a medical down status for a minimum of three weeks.

Grampaw Pettibone says:

This admitted Ready Room Cowboy ". . . couldn't stand to be anywhere but in the air." He also said he had a touch of a cold but wasn't going to let an "itsy-bitsy sniffle" keep him on the ground. He knows better now. Bein' up high and goin' down low in a hurry can raise Cain — and pain — in those important chambers inside the skull. Good thing the pilot wasn't in the same kind of fix. Tain't easy flyin' an Intruder from the BN's seat.

Had this fellow checked with the flight surgeon, he might have lost a hop or two but not three or more weeks' worth. Gramps likes the spirit and go-get-em attitude of Ready Room Cowboys. But mix the spirits with common sense!


E4
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VP Master Augment Unit

Patrol Aviation's New Edge

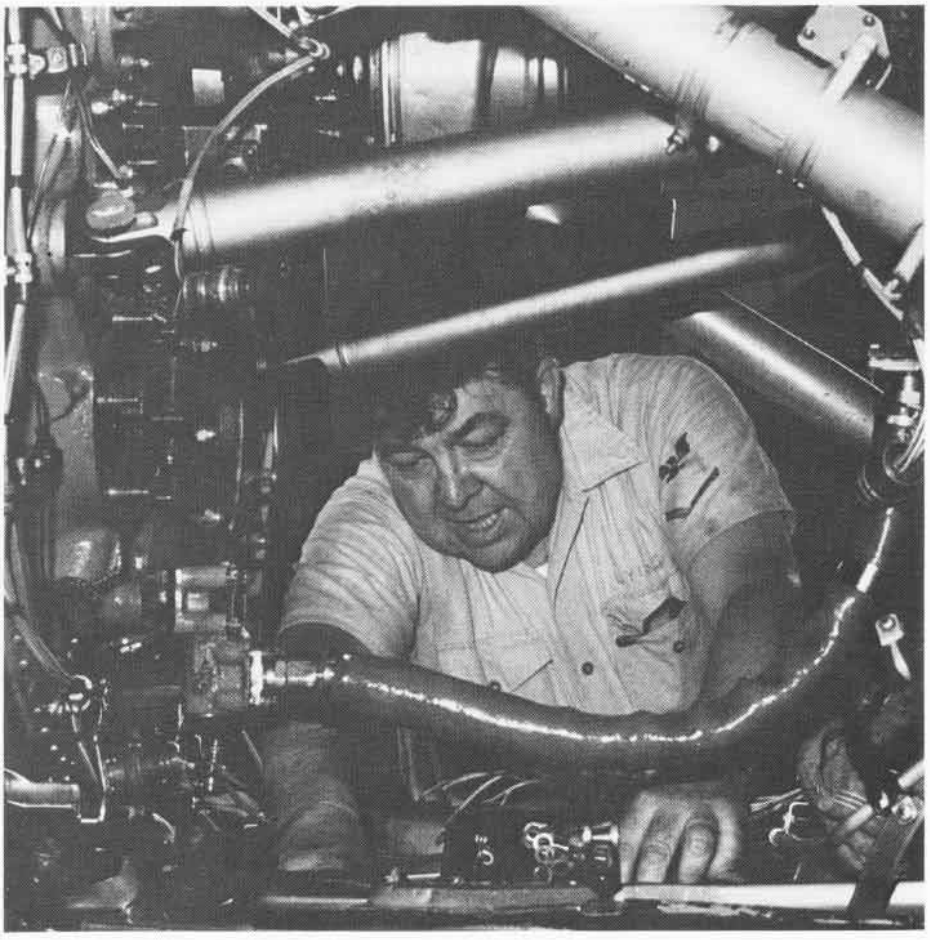
Story and Photos by JO1 Jim Richeson

AD3 Edward M. Lyons, a native of Auburn, Maine, prepares a downed P-3 engine for shipping to NS Rota, Spain's AIMD. In less than 11 days, VP-MAU's maintenance detachment helped VP-44 change five engines and props, complete two phase inspections and install an auxiliary power unit.

The Naval Air Reserve, in addition to providing combat ready squadrons for mobilization, must also provide trained aircrews and maintenance personnel to fleet squadrons upon mobilization to fill wartime allowances for those squadrons. For aircrew personnel alone, this commitment requires training for more than 800 pilots and aircrewmen in most of the Navy's aircraft communities.

Until 1984, we attempted to train these personnel in our reserve squadrons, but we could neither accommodate sufficient personnel nor train them in fleet-compatible equipment. In 1984, we established Squadron Augmentation Units (SAUs) in Fleet Replacement Squadrons to train these personnel in the aircraft they would operate and support if mobilized. In addition, two Master Augment Units (MAUs) have been established to train P-3C augment crews, using aircraft on loan from the active force. In 1985, we expanded this concept further by scheduling our SAU and MAU aircrews to fly with their gaining commands, the specific fleet squadrons they would augment at mobilization. We are most pleased with the progress of this program.

Vice Admiral Cecil J. Kempf,
Director of Naval Reserve



◀ A view from the Orion's underside reveals the more than 40 launch tubes which are designed to carry sonobuoys for each mission. Equipped with one of the most current ASW platforms, VP-MAU continues to grow and excel in the Navy's maritime patrol community.

New Englanders have always been proud of their rich heritage and seafaring traditions. History has shown that thousands of residents from the northeast have often abandoned their individual trades to bear arms when called upon by the nation.

It is fitting then that Maine's lush evergreen-covered isles, fog-laden outer banks, isolated coves and colonial town settings provide an ideal site for a group comprising college students, teachers, commercial airline pilots, truckers and carpenters and other occupations, who gather two weekends each month and two weeks each year to hone their skills as selected air reservists (SelRes).

NAS Brunswick, sequestered near Maine's coastal waters, is patrol aviation country. Since January 1984, it has also been home to the Patrol Squadron Master Augment Unit (VP-

AD1 Chuck F. Hasley, one of two flight engineers who accompanied aircrew six to Rota, battles the bright sunlight as he checks the unit's P-3C Update II Orion before its nine-hour transit flight.

MAU). Twice monthly, reservists from 17 to 55 years of age arrive from different locales in New England, New York, and as far away as Pennsylvania and Virginia, leaving behind their full-time occupations. Each one plays a vital role in the nation's defense, specifically in the Navy's world of antisubmarine warfare (ASW).

Split into two wings, VP-MAU has two drill weekends to maximize training and to best utilize assigned aircraft. They are required to drill one weekend per month and perform two weeks of active duty annually. Reservists are allowed and encouraged to perform additional drills to maintain currency and to prepare for their two weeks of active duty.

Commander Gary Lopez, a reservist from Massachusetts and a 16-year veteran in patrol aviation, leads the *Northern Sabres* of VP-MAU. The executive officer is Commander Mel Chaloupka, also a reservist, from Newport, R.I., who has 14 years of P-3 experience.

VP-MAU is organized as and looks very much like a reserve patrol squadron. The mission, however, is somewhat different in that, upon mobilization, the unit will break up and augment the Brunswick fleet squadrons. Each reservist is identified with a mobilization billet in a gaining command. For this reason, the MAU does not perform the annual active duty period as a group at a deployed site. The MAU basically splits into six groups of reservists, with each group spending its two weeks active duty with their gaining command. This normally occurs at the deployed site and gives the deployed squadron some extra hands for two weeks while providing outstanding training opportunities for the reservists.

Since the fleet squadrons consider their reservists an asset, they take a keen interest in their training and an active role in this regard.

VP-MAU is comprised of about 200 reservists, 100 active duty TARs (Training and Administration of Reserves) and a few SAMs (Sea and Air Mariners). The SAM program is a recruiting effort which enables civilians with no prior military service to become enlisted members of the reserves. The core of the unit's active duty personnel steady the course in between drill weekends and provide a nucleus of highly skilled and highly motivated individuals. Commander Don R. Veal, as officer in charge, has many years of VP experience in both active and reserve patrol squadrons. Cdr. Veal recently surpassed the 5,000-hour mark in the P-3 and provides the active duty expertise and counsel necessary in a continuous effective and efficient

operation of this size. As he stated, "We're the ones who mind the store when the reservists aren't here. VP-MAU is a full time operation which just increases tempo on the drill weekends."

Both Cdr. Lopez and Cdr. Veal agree that the MAU is meeting its goal of integration with Patrol Wing Five. Cdr. Veal said, "In essence, these guys become part of their squadron. The gaining command knows their strengths." According to Cdr. Lopez, "Due in no small part to the leadership at ComPatWingsLant and ComPatWing Five, we have become an accepted part of the VP community here at Brunswick. The admiral, commodore, base C.O. and the fleet skippers have really supported us and made this program work."

After months of planning and preparation, VP-MAU's capabilities were recently put to the test. Last August, Commander Ted Bode, a veteran P-3 pilot now flying Delta Airlines' commercial jets, headed up the unit's aircrew six for two weeks of active duty training. For Cdr. Bode, the crew's patrol plane commander, this mission was his last operational flight. He also led VP-MAU's first patrol mission.

Aircrew six is comprised of a crack group of men whose combined expertise in patrol aviation total up to more than 100 years of experience and approximately 40,000 flight hours.

Joining them on the mission were some skilled aircraft mechanics — affectionately known as ground pounders in the aviation community — namely, Aviation Machinist's Mates Alex E. Dubbert, Donald W. Wyman and Edward M. Lyons. The over-the-hill gang, as they call themselves, have between them almost 50 years of aircraft maintenance experience.

Upon arrival at Naval Station, Rota, Spain, the aircrew and maintenance personnel became part of Patrol Squadron 44, led by Commander Stanley J. Lichwala, who serves as Patron Rota while on the *Golden Pelicans*' six-month deployment.

Cdr. Lichwala remembers how he was impressed when he first met Cdr. Bode and VP-MAU's aircrew during a previous deployment to Keflavik, Iceland. On April 9, 1987, VP-MAU's aircrew, flying VP-44's P-3C Update II *Orion*, embarked on their first six-hour patrol mission — which successfully proved that reservists can be completely integrated with an active duty patrol squadron.

From an operational standpoint, Cdr. Lichwala said that the Mediterranean Sea is clearly the most challenging environment acoustically for any ASW unit because of the unique water conditions that exist within the region. "It's also challenging from the point of view that you have your assets split between the Azores and Rota, Spain. Split-site deployment is a real challenge for any maritime patrol squadron," he said.

The most formidable challenge for VP-44 during its deployment in Rota was patrolling the world's largest inland sea — spanning 965,000 square miles — with eight of its 12 aircrews. Four aircrews are assigned to Lajes, Azores. To help alleviate this burden, VP-MAU augmented the *Golden Pelicans* and became the squadron's 13th combat aircrew.

Reserve squadron VP-92, home-based at NAS South Weymouth, Mass., also deployed its men and aircraft to Rota during the last phase of its annual active duty training. Commander Eric L. Lekberg, VP-92's commanding officer,

After nine hours of patrolling the Mediterranean Sea at low altitude, VP-MAU's P-3C Update II gets a bird bath to rid the aircraft of salt.

said that the squadron is one of six East Coast-based reserve squadrons which had deployed since February to help augment the active patrol squadron deployed at Rota, Spain. "We help out VP-44 with its operational commitments and our people get some excellent training," he said.

Both VP-MAU and VP-92 are trained to augment the active fleet. In the event of mobilization, VP-92 would deploy as one unit, with its aircraft and personnel, wherever the action is taking place. VP-MAU, on the other hand, would divide its flight crews and maintenance personnel into different groups to join various fleet patrol squadrons already at the scene of conflict.

VP-92, which is divided into a blue and gold wing, arrived with four of its nine modified P-3B TacNavMod aircraft. The blue wing deployed to Rota and Lajes, Azores, for the first two weeks. The gold wing later followed for the remaining two weeks of VP-92's one-month training mission. Cdr. Lekberg added that by splitting up the deployment into two increments, the squadron benefits because the crews receive more intensive training.

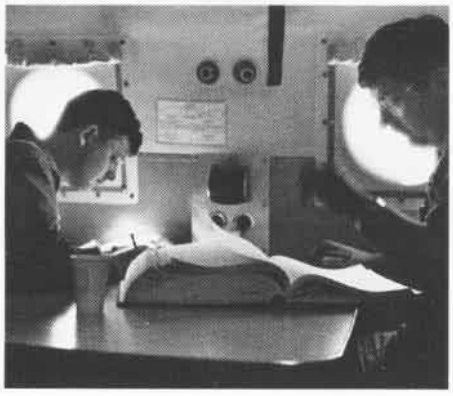
During the course of their deployment, VP-92's aircrews averaged about 65-75 flight hours each and they still had enough time to sponsor a 10-mile walkathon whose proceeds, totaling $1,440, were donated to a senior citizens' home in Puerto, Spain.

VP-MAU, like VP-92, made the most of its two-week active duty training. At the end of their training period, the aircrew logged in more than 40 operational flight hours covering the vast expanse of the Mediterranean Sea. They also participated in coordinated operations with various elements of the French, Dutch and Spanish naval forces.

Not to be outdone, the unit's maintenance detachment assisted VP-44's mechanics with five engine and propeller changes, two critical phase inspections and helped install one auxiliary power unit, all in less than 11 days.

Still, many would call these men weekend warriors. A stereotype which demeans the wealth of experience and talent that SelRes bring to the Navy's patrol aviation arena. Today's reserve patrol community constitutes about 35 percent of the entire U.S. Navy's maritime patrol capability in long-range antisubmarine warfare.

The establishment of NAS Brunswick's VP-MAU, and its counterpart at NAS Moffett Field, Calif., was a result of former Secretary of the Navy John Lehman's commitment to



Under AZC Amos L. McLeod's tutelage, AZ3 Tom J. Balzano, a Sea and Air Mariner assigned to VP-MAU, learns the basics of data analysis.

modernize the Naval Air Reserve. According to Commander Mike Kellard, Reserve ASW Coordinator under the Assistant Chief of Naval Operations (Air Warfare), the goal behind the VP-MAU concept was to better train selected reservists in peacetime for immediate mobilization.

"We have 24 VP squadrons that require augmentation from the selected reserve force," Cdr. Kellard explained. "Each of those squadrons require an augment of approximately three fully formed aircrews. Until October 1983, all of our VP augment people were trained in SAUs which were physically located at the same sites as the reserve VP squadrons."

He added that this posed a problem, since most reserve force squadrons were flying P-3A and P-3B TacNavMod aircraft, as opposed to the P-3C flown by the active VP squadrons. If mobilized, "those augment people would require some post-mobilization training to get up to speed in their assigned aircraft. MAU personnel will not require this post-mobilization training — they are ready when called upon and that's what we want."

Since WW II, the reserves had flown older and often obsolete aircraft which were not compatible with the active fleet's inventory. Secretary Lehman's modernization program enabled components of the reserves to be properly integrated with the active fleet and better prepared once mobilized.

Former Chief of Naval Operations Admiral James D. Watkins once said, "Too many people still think the Naval Air Reserve can be kept in a closet, dusted off quickly in an emergency and then counted upon to perform professionally. It doesn't happen that way. Readiness is an ongoing, full-time commitment . . . and the reserves are a critical element in our readiness equation. For me to do my job, I need a Naval Air Reserve Force every bit as strong, ready and modernized as the active duty forces patrolling the world's oceans."

This commitment is still being voiced today by many of the Navy's policy makers, including Vice Admiral Robert F. Dunn, Assistant Chief of Naval Operations (Air Warfare). During Congress' subcommittee hearings on Department of Defense appropriations for 1988, VAdm. Dunn said, "We will continue to upgrade the reserves. We want to continue to modernize the reserve forces so they will, in fact, mirror the active structure."

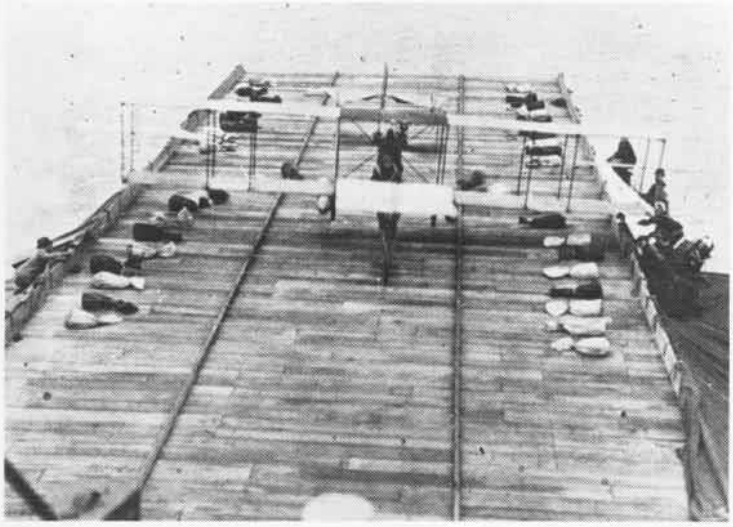
Using the same tactics and equipped with the active fleet squadron's latest ASW platform, VP-MAU continues to grow and excel in the Navy's maritime patrol community. At the same time, the wealth of experience and training that VP-MAU personnel provide the Navy's active fleet squadrons gives them the edge in executing their missions.

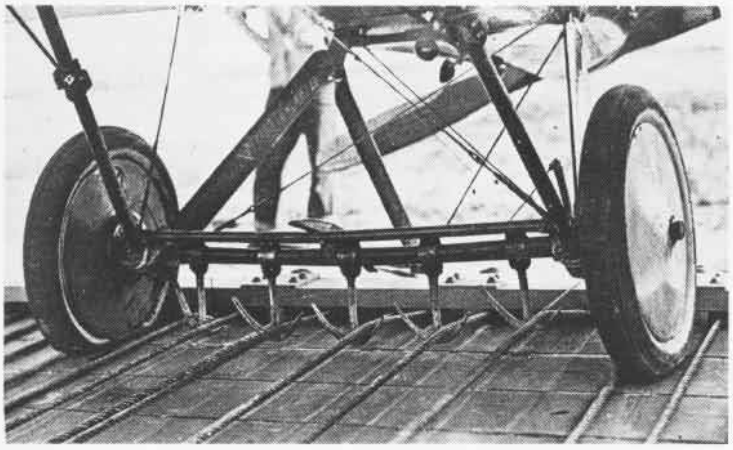
As VP-44's Cdr. Lichwala said, "They come into the job pumped up, ready to do the job. The knowledge that they bring is something that you can't buy. You can't go out and recruit off the streets the experience that these guys have. Some of the men have well over 20 years in ASW."

He added, "It may sound corny but I think what motivates a lot of the reservists is plain old-fashioned patriotism. They like serving their country and, while they have chosen to work in the civilian sector, the reserve duty provides them the opportunity to be patriots and to serve their country proudly. They do that very well."■

Fly Navy With Naval Reserves

Making a career choice? Don't miss this opportunity to fly with the best. Both VP-MAU Brunswick and Moffett Field have aircrew billets available. Consider the choice of being a TAR, SelRes or SAM flying the Navy's updated version of the P-3 *Orion*, from baseline Charlies to the latest Update III, and still be able to pursue other goals. If you are interested, call Cdr. Don R. Veal, VP-MAU Brunswick, at (207) 921-2390/2497 or autovon 476-2390/2497 or LCdr. Ben Arcario and AX1 Roger Purta, VP-MAU Moffett Field, at (415) 966-5431/5214 or autovon 462-5431/5214 for more details.





Naval Air Engineering Center

Experts in Systems Integration

By JO2 Julius L. Evans

Landing 42,000 pounds of rugged aircraft on the pitching and rolling deck of an aircraft carrier at night is the ultimate test of a pilot's ability. Simple yet sophisticated landing aids help guide man and machine down to a tiny runway where the difference between flying — and not — depends on a wire, a hook and the pilot's skill.

But this is not a story about skilled pilots landing on aircraft carriers, nor

Top, originally, 50-pound sandbags secured the 22 arresting wires to the ship's deck. Middle, a series of hooks helped the aircraft stay straight on deck during arrestment. Below, today's wires are able to withstand the force of supersonic aircraft.

about the talented personnel who maintain complex weapon systems or carry chains to lash aircraft to the deck. This is a story behind that story. It is a story of a command whose job it is to make sure the complex flying machines, and the ships from which they operate, integrate smoothly with the men and women who depend on the systems for their lives.

Commanded by Captain James R. Macdonald, Naval Air Engineering Center (NAEC), Lakehurst, N.J., is a major Naval Air Systems Command field activity dedicated to providing quality products and services to the fleet in support of Naval Aviation. Its mission includes conducting programs of research and engineering; developmental test and evaluation; developing and building support equipment for aircraft and airborne weapon systems; and providing fleet engineering support in aircraft launching, recovery and landing aid systems.

NAEC did not exist when the first arrested landing on a ship took place in 1911. Today's four wires that are visible on the carrier's deck represent steady progress in arresting gear developed by NAEC and its predecessor, the Naval Aircraft Factory, formerly located in nearby Philadelphia, Pa. The first arresting gear configuration on board ship consisted of 22 wires stretched across the deck of USS *Pennsylvania* (ACR-4) and supported at each end by a single 50-pound sandbag. A series of hooks helped the aircraft stay straight on the deck during arrestment. Eventually, a single hook replaced the series of hooks used in this initial arrested landing.

Later arresting gear consisted of a series of weights attached to stanchions at the deck edges. Cables ran through an eight-part pulley sheave and rope system to moving crossheads. Engagement of an athwartships arresting wire caused the rising crossheads to lift a series of weights in sequence. By inserting shorter or longer crossheads to suit airplane weights and speeds, a lesser or greater number of weights were lifted, thereby allowing different amounts of energy to be absorbed as varying plane weights and speeds were encountered.

The first arresting gear engine was the Mark 2, a band-type brake. The rotary motion of the brake's drum resisted the pull of the arresting cables as they halted an aircraft.

Hydraulic-type arresting gear was developed from the need for a simpler and more efficient brake. Each of the four arresting wires were controlled by four below-deck, hydraulic fluid-driven engines. As the aircraft landed and caught a wire that was connected to a cylinder-pump actuator filled with hydraulic fluid, the force caused the wire to push fluid to the end of the cylinder, which created the resistance needed to stop the aircraft.

As Naval Aviation technology became more sophisticated, and aircraft became faster and heavier, arresting gear was improved to withstand greater loads. Several modifications were made to existing arresting gear which eventually restructured the mechanics of the machinery, but not the principle.

Today's carriers host the Mark 7 Mod 3 arresting gear system. The arresting cables are held above the flight deck under tension by spring-type wire supports so that an incoming aircraft's arresting hook can engage one of the cables. The engagement enables the force of the aircraft's forward motion to be transferred to a purchase cable below deck, which acts as a restraining mechanism, thus absorbing the force of the incoming aircraft.

Rich Davis of the Industrial Department operates the terminal cable press machine.

NAEC is the Navy's sole source of crossdeck pendants (cables). Before distributing them to the fleet, the center ensures that they meet the high standards required to arrest increasingly heavier and higher performance aircraft. NAEC is responsible for all of the Navy's catapult, arresting gear and visual landing aid needs.

"The expertise in engineering, designing, building, manufacturing and maintaining catapults, arresting gear

"A carrier without a catapult [might as well be] a luxury liner."

NAEC's Test Department intentionally crashes an RB-66 aircraft on one of its five high-speed test tracks during a Spring 1983 test conducted for the Federal Aviation Administration. The test was designed to evaluate a jet fuel additive which prevents misting of the fuel to reduce the potential of post-crash fires and fatalities.

and visual landing aids, or any other ship interface systems, comes directly from NAEC facilities," Capt. Macdonald explained. "We are the Navy's prime contractor as far as systems integration goes."

The center, the Navy's first and one of its largest aeronautical engineering, research, development, test and evaluation complexes, is located at the third oldest, continuous-service aviation facility in the Navy. "Our mission of providing quality services and products to the fleet is one we undertake with pride," Capt. Macdonald said.

NAEC also supplies the fleet with the majority of its aircraft support equipment, which ranges from aircraft chocks, tow bars and tractors to mobile fire-fighting crash cranes and avionics automatic test equipment. The bulk of fleet yellow gear equipment is developed and built by NAEC.

In addition to supporting fleet needs with industrial innovations, the center provides technical personnel in most aspects of aviation and ship support. "We have technical representatives in the field as far away as Japan, Italy and the Philippines, as well as throughout the continental United States, ready to assist in maintaining the equipment," Capt. Macdonald commented.

"Furthermore, whenever a carrier goes into a major overhaul or service life extension program, that carrier has to be recertified. NAEC is responsible for conducting the evaluation testing. In the case of catapults, we use wheeled, dead-load vehicles — weighing from 30,000 to 70,000 pounds — which are catapulted into the water, retrieved by

"If it weren't for NAEC, the Navy would find itself in the position of conducting sea-based air operations on a trial-and-error basis...."

NAF/NAMC/NAEC "Firsts"

Established on July 27, 1917, the Naval Aircraft Factory and its successors — the Naval Air Material Center and today's Naval Air Engineering Center — are credited with a number of Naval Aviation "firsts" and world records. Among them are:

1918: Developed Navy's first aerial torpedo launching gear.

1921: Designed/built first compressed air-powered, turntable catapult.

1922: Designed/built TR-1 which won the 1922 Curtiss Marine Trophy Race. First mass torpedo exercise against a live target made by 18 NAF-built PT aircraft. First catapult launch from USS *Langley* (CV-1) made by NAF-built PT seaplane. NAF-built DH-4Bs completed 7,000-mile, 90-flying hour, transcontinental flight.

1923: Built Navy's first shipboard-designed fighter, the TS series. NAF-built DT-2, TS and F-5L aircraft set 19 Class C seaplane world records for speed, distance-duration- payload, and altitude and payload in one month. Built America's first rigid airship, USS *Shenandoah* (ZR-1). It was also the world's first helium-filled rigid airship.

1924: NAF-built PN-7 set four world speed records, four speed with payload records, and a distance and duration record.

1925: First flush-deck catapult launch of landplane demonstrated on USS *Langley* by NAF-built DT-2. NAF-built PN-9 set world endurance record for Class C seaplanes (28 hrs., 35 min., 27 sec.). NAF-built PN-9 set world distance record for Class C seaplanes (1,841 mi.) in first nonstop flight attempt from San Francisco to Honolulu. Forced down at sea due to lack of fuel, it "sailed" the remaining 450 miles to Hawaii.

1926: First flight deck "save" made by NAF-designed/built emergency barricade.

1927: NAF reported first use of anodic coatings to aluminum to decrease corrosion — was major advance in transition from wooden to metal aircraft. NAF-built PN-10 set three world records for Class C seaplanes for distance-payload and duration-payload — one for greatest payload to altitude.

1928: NAF-built PN-12 set world duration record for Class C seaplanes (36 hrs., 1 min.). NAF-built PN-12 set Class C seaplanes world records for speed, payload, distance and duration. NAF-built PN-12 set Class C seaplane world altitude record (19,593 ft.).

1929: Built the Navy's first aircraft designed for dive bombing, the XT2N-1.

1930: First to construct working models of retractable landing gear.

1933: First to develop anti-blackout equipment and abdominal belts for use by pilots.

1934: NAF built first flush deck hydraulic catapult (Type H, Mk I).

1936: NAF built XN3N-1, prototype of famous "Yellow Peril" trainer. Navy's first radio-controlled target drone, the NT-1.

1940: Navy's first guided missile development initiated by NAF using TG-2 airplane it built in 1924.

1941: First Navy glider bomb *(Glomb)* development using television.

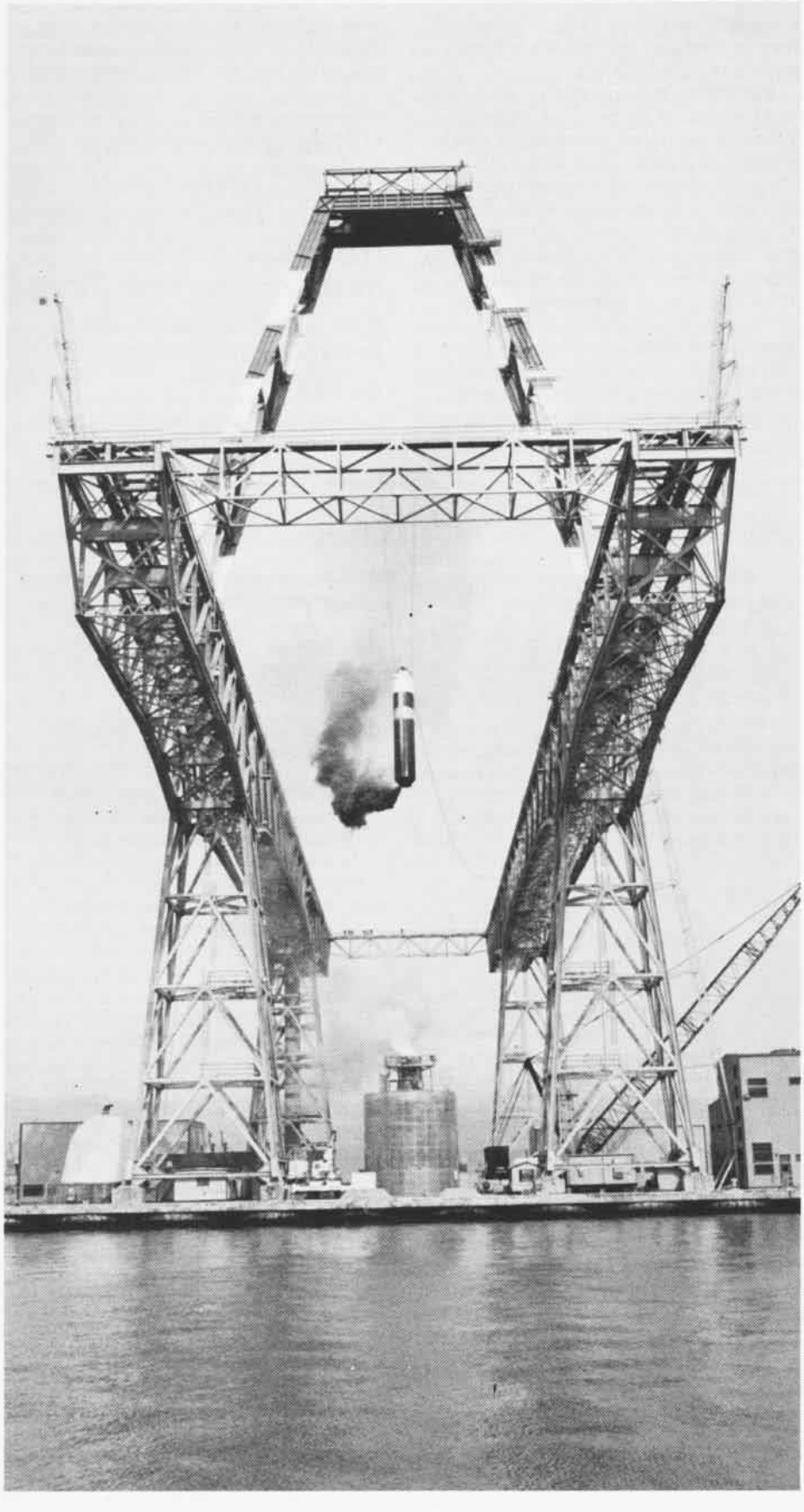
1942: Developed high-altitude pressure suits and designed pressure cabin airplane and altitude test chamber. First assault guided-missile drone, the TDN-1. First amphibious transport glider, the LRN-1.

1944: NAMC pioneered gas-turbine power plants.

1945: Developed *Little Joe* ship-to-air guided missile to counter Japanese *Baka* (suicide) bomb.

1946: NAMC conducted Navy's first successful *live* test of ejection seat.

1956: NAEC developed space suits used in Mercury program.



tugs and brought back on board with cranes to shoot off again," the captain said. This slow process is repeated many times and is a very important part of the testing program. "An aircraft carrier without a catapult [might as well be] a luxury liner," he quipped.

From the extensive research and development programs conducted at the 7,430-acre site, many successful spin-off projects have evolved. One current project stemming from NAEC arresting gear technology is Skycatch. It employs two shipboard-type aircraft arresting gear engines, acting in unison to catch a Trident II missile in midair after it is fired from its launch tube.

"We worked with the Strategic Systems Project Office in developing a system that would allow them to reuse expensive full-scale Trident missiles while testing missile and launcher compatibility prior to deploying the system aboard submarines," Macdonald explained. What makes this type of arrestment particularly complicated is synchronizing the action of two independent arresting gear engines so that they apply equal loading to the missile throughout the test event.

"Innovative technology" are watchwords in today's complex and sophisticated aviation arena. NAEC supports today's Navy by staying abreast of all major changes and modifications which take place in fleet aircraft.

"It's extremely important for contractors to make sure any aircraft they develop can be successfully integrated into the fleet. We ensure that contractor developments are compatible with the government's detailed specifications that define these interfaces," Macdonald said. "One project of great concern when developing an aircraft is its size and how well it will fit on a carrier. We have the resources to do spotting studies with two and three-dimensional aircraft models to make certain the plane can be handled successfully on the deck."

The center is also the Navy's chief barricade qualifier. If a pilot could not lower the tailhook due to hydraulic failure or battle damage, an emergency

◂Skycatch successfully completes the arrestment of a Trident D5 missile in midair.

In some cases, an aircraft's design may ▸ need modification to prevent the plane from shredding the barricade and passing completely through it.

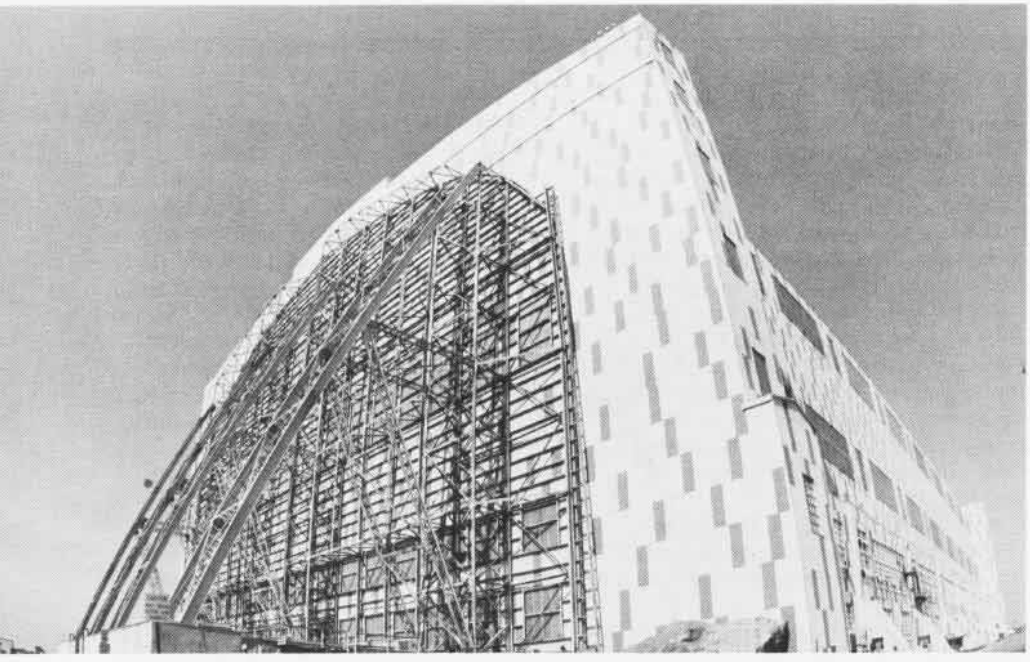
barricade would be stretched across the flight deck for the aircraft to fly into. NAEC is the Navy's sole-source manufacturer for the nylon barricades and their wire cable supports.

In some cases, an aircraft's design may need modification to prevent the plane from shredding the barricade and passing completely through it. Additionally, any new engineering changes that will affect catapult or arresting gear will also affect the barricade, which is tested on site prior to being used in the fleet. "The F-14A (Plus) has a lot more thrust and, prior to aircraft carrier qualifications and shipboard interfacing, we test it here to make sure everything is compatible with shipboard equipment," Macdonald stated.

NAEC strives to ensure that carriers and small ships maintain their aviation capability. The ships have to make sure that their equipment is in an up status to support the flight operations. At the same time, their support equipment must be maintained to assure the continuity of flight deck operations. "Designing the best possible equipment, getting the aircraft aboard safely and taking all the risks out of flight operations is inherent in increasing fleet survivability," Macdonald emphasized.

As Vice Admiral E. R. Seymour, USN(Ret.), former Commander, Naval Air Systems Command, once noted, "If it weren't for NAEC, the Navy would find itself in the position of conducting sea-based air operations on a trial-and-error basis, or never trying anything new. NAEC provides us with the opportunity to test new ideas. Until the Navy gives up on Naval Aviation, NAEC will always be there."

NAEC is staffed with professionals who are aware of the problems associated with the fleet. Capt. Macdonald concluded, "We understand how difficult it is for sailors to operate the carriers in high-stress environments; therefore, we are dedicated to providing the best possible support that we can." ■



Hangar One at one time served as home for every rigid airship in the Navy, as well as the renowned, German-built Hindenburg.

NAEC — A Brief History

By JO2 Julius L. Evans

Four months after WW I began, the fledgling U.S. aircraft industry could not fulfill both the Army and Navy demands for airplanes. Secretary of the Navy Josephus Daniels authorized the establishment of the Naval Aircraft Factory (NAF) on July 27, 1917. On August 10, ground was broken for NAF at League Island, a 740-acre lot in the Philadelphia Navy Yard. It was America's first and only Government-owned aircraft factory. Its mission was to build aircraft, undertake aeronautical developments and provide aircraft construction data. The work conducted there made the facility a leader in aircraft manufacturing.

On October 16, 1917, the factory began augmenting the nation's aircraft inventory by building planes already ordered by the Navy from private industry. One such plane was the H-16 long-range antisubmarine patrol flying boat. In March 1918, the NAF-built H-16 flew for the first time there. One week later, it was shipped to a U.S. Navy base in Europe.

NAF was also the world's first aircraft manufacturer to subcontract. Since aircraft were relatively simple, many parts were fitted together by the cut-and-try method. Through subcontracting and subassemblies, by war's end, aircraft like the F-5L were rolling off the NAF assembly line at the rate of one a day. The factory built 137 H-16s and 31 F-5Ls during WW I, as well as some experimental N-1 pusher seaplanes of its own design. NAF produced more than 2,200 aircraft of all types between 1918 and 1944.

When the demand for aircraft decreased after WW I, and the aircraft industry pressured the Navy and Congress to close the factory, the Navy proposed a compromise. Instead of building airplanes in quantity, NAF would concentrate half of its efforts on building new prototypes and modifying and overhauling existing planes. The rest of the time would be devoted to research, test and development. Thus, the Navy had a place of its own where it could conduct classified, developmental work.

NAF later became the Naval Air Engineering Center (NAEC), which eventually moved to NAS Lakehurst, N.J., in 1973. Over the years, some of NAF's original functions have been absorbed by what are known today as the Naval Air Development Center, Warminster, Pa., and the Naval Air Propulsion Test Center, Trenton, N.J. — two activities which were spawned by NAF.

Commissioned as a naval air station on June 28, 1921, Lakehurst is rich in historical background. A former ammunition proving ground for the Russian Imperial government from 1915 to 1917, it later became a U.S. Army ammunition proving ground known as Camp Kendrick, which also provided a testing location for French army artilleries.

The site later became the country's first transatlantic international airport. It served as the North American terminal for the German-built and operated, passenger-carrying airships *Graf Zeppelin* and *Hindenburg* during their commercial air operation period. It was there on May 6, 1937, that the *Hindenburg* was destroyed by a fire during landing operations.

The six large hangars that remain standing there today housed lighter-than-air craft. Hangar One, which at one time served as home for every rigid airship in the Navy, now accommodates what is believed to be the world's largest training aid — a 400-foot-long, mini-aircraft carrier flight deck. The training aid is used by the Naval Air Technical Training Center, one of the 16 tenant commands based at NAEC.

Hangars Two and Three, built in 1941 and 1942, respectively, presently host NAEC's Industrial Department, which is primarily engaged in manufacturing equipment used exclusively in the catapulting and arrestment of carrier-based aircraft. Hangar Four was relocated from Hampton Roads, Va., in 1932 and is a storage area for the Defense Property Disposal Office, which conducts bid sales of surplus government equipment once every month. Hangars Five and Six, the largest single arch, wooden structures in the world, house a variety of tenant activities.

Today, 71 years after the establishment of the Naval Aircraft Factory, NAEC continues to provide innovative technology to the Naval Aviation community. The center, located at what is commonly referred to as Navy Lakehurst, employs more than 4,500 military and civilian personnel, of which 2,700 are assigned to the center.

NAEC is committed to improving the quality of its products and services delivered to the fleet by continually updating its technical capabilities. The center's endeavors in technical and automated support of fleet air combat readiness ensure that fleet aircraft today will be prepared for the needs of tomorrow. ■

Not an Airplane, Not a Ship, But What a Craft!

By Capt. Rosario Rausa, USNR(Ret.)

"Tower, this is Lima Charlie Two, request clearance to the ramp, over."

"Roger, Lima Charlie Two, you are cleared."

The pitch of the gas turbines deepens as Lima Charlie Two rises slowly, powerfully, four feet above the concrete parking apron. The craft-

Artist R. G. Smith rendered this painting which shows how LCACs may look in the future in coordination with air support – in this case, F/A-18s.

master (a chief petty officer) at the controls in the enclosed compartment on the starboard side, forward, manipulates the aircraft-like yoke, putting Lima Charlie Two into an easy, level turn. The incessant roar of the enormous power plants booms off the embankment that shields the ocean from the apron and carries inland a hundred yards or so across the parking area toward a huge hangar and adjacent administrative buildings.

The chief guides the machine toward a wide concrete ramp that slopes down gradually from the apron and opens to a section of uninhabited beach a quarter mile in the distance. Beyond the sand lies the vast Pacific.

Maintaining only three or four knots and communicating through headsets with his alert four-man crew, the chief carefully brings the vehicle around, aiming it directly at the water and beginning the shallow descent toward the sea — keeping that four-foot height above the solid surface below.

On the left, a few yards off the beach, stands the tower, a pillar capped by 360 degrees of glass.

"Tower, Lima Charlie Two requests clearance to go feet wet, over." The chief scans the area ahead, relying on the vigilant eyes of his crew, as he negotiates the vehicle downward toward the beach and the waves breaking upon it.

Winds are less than 10 knots from seaward but the gently rolling waves seem to be peaking around six feet.

"Lima Charlie Two, you are cleared feet wet," returns a voice from the tower.

"Roger," acknowledges the chief.

A moment later, the vehicle has crossed the strip of beach and moved out over the water. The driving downflow of air from the turbines creates a fury of foam aft. The chief advances the prop pitch controls and with hardly a nod of the head Lima Charlie Two, one of the U.S. Navy's 12 LCACs (landing craft air cushion — L-kack in the vernacular), is whistling along in its element, separated from the water by a cushion of air. The speed indicator reads 40 knots and then some.

It is not a boat. Neither is it an airplane. Yet, it does operate above the ground and at Assault Craft Unit (ACU) Five based at the Marine Corp's Camp Pendleton on the California coast, the phrase "Who's flying today?" is not uncommon. Indeed, one aviation-oriented observer said, "It sounds like a C-130 *Hercules* to me."

There are two LCAC bases in the Navy. The second is located at Naval Amphibious Base, Little Creek, Va. Each has six of the air cushion vehicles and will gain more in the years ahead.

LCACs are essential to the USMC's amphibious assault mission. Their principal task is to transport, at high speed, USMC vehicles and crews from ships well out at sea to the beach. They must deposit their loads at a point on the destination shore where the soil is firm enough to support the heavy equipment. LCACs don't have to stop at the beach's edge. They can maneuver well inland, if necessary, seeking the best possible disembarkation site.

Former ACU-5 C.O. Commander Walt Fini, a surface warfare officer who headed the staff of 10 officers and 165 enlisted personnel, said, "LCACs allow access to a greater percentage of the world's littoral regions. Without LCACs, we can maneuver onto 17 percent of the world's coastal areas. With LCACs, we can operate over 80 percent of them. Working in conjunction with helicopters or strike-fighters, LCACs permit high-speed, over-the-horizon assault capability. Because LCACs can begin their runs to the beach from ships many miles from assault destinations, they reduce the vulnerability of the ships," he explained.

An LCAC weighs a hefty 75 tons and is 81 feet long with a beam of 47 feet. The huge twin fans on the stern distinguish it from any other craft. These fans, which feature four-bladed, controllable-pitch propellers, are driven by a quartet of TF-40B gas turbine engines. A 5,000-gallon fuel load gives the LCAC five hours endurance, enough to travel 200 miles. Rotatable bow thrusters divert 20 percent of engine power for maneuvering.

In addition to the bow thrusters and controllable-pitch propellers, the LCAC's control system employs air rudders (which use prop-produced slipstream) and fly-by-wire electronics.

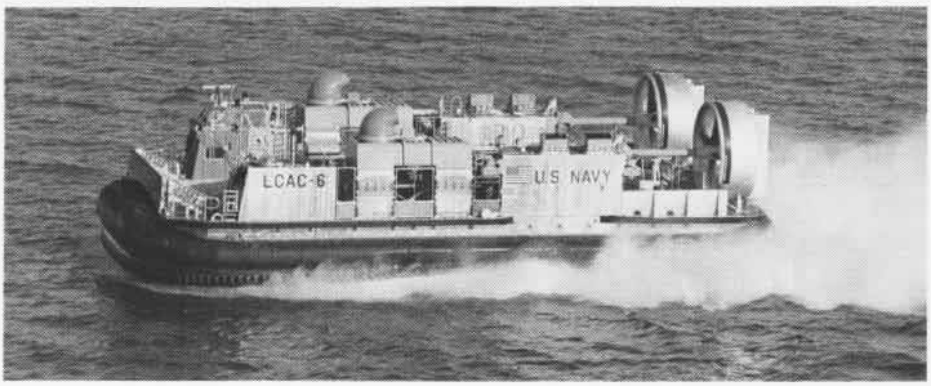
A skirt installed fully around the LCAC contains the air cushion beneath the craft. Interestingly, pressure inside the skirt system is only about one pound per square inch over atmospheric; pressure throughout the rest of the cushion is slightly less than one pound per square inch above atmospheric.

The LCAC has state-of-the-art navigation and communications equipment, plus an infrared searchlight and other gear which enable it to operate at night. Armament includes a pair of M-60 machine guns, a grenade launcher, and small arms for the crew.

Crew members, as expected, must complete a rigid training curriculum before assignment to LCAC duty. A typical crew consists of a craftmaster (normally a BMC), an engineer, navigator, loadmaster and deck hand/mechanic.

"As in any Navy ship or aircraft operation," said Cdr. Fini, "teamwork and crew coordination are essential to success aboard LCACs. We must operate the craft itself effectively while working with air support to get the job done. That job is to deliver the Marine Corps amphibious forces to a secure area on the beach, on time, gaining maximum tactical surprise in the process."■

Captain D. L. Ihlenfeld relieved Cdr. Fini as skipper of ACU-5 in June 1988.



LCACs ushered in a new era in amphibious operations. The landing craft air cushion will deliver USMC troops and vehicles from ships to the beach and inland, at high speed, enabling maximum tactical surprise

CVW-5 Aboard Midway

WANTED: PILOTS AND NAVAL FLIGHT OFFICERS FOR EXOTIC OVERSEAS DUTY. EXTENSIVE TRAVEL TO FOREIGN LANDS. GOOD PAY AND FRINGE BENEFITS. MUST BE ABLE TO HANDLE HIGH TEMPO OF CARRIER OPERATIONS. PRIOR EXPERIENCE NOT REQUIRED. OJT PROVIDED.

If the Navy advertised to fill Carrier Air Wing (CVW) Five billets, perhaps that's how the ad would read. CVW-5 is the Navy's first and only air wing permanently based overseas. It's been assigned to USS *Midway*, home-ported in Yokosuka, Japan, since 1973. In ensuing years, *Midway* and CVW-5 have made numerous deployments throughout the western and northern Pacific, South China Sea and Indian Ocean.

In 1986, the wing underwent some changes. Its A-7E squadrons were disestablished, F-4S squadrons transitioned to the F/A-18 strike fighter, and a new A-6E squadron stood up from NAS Whidbey Island, Wash. Eight squadrons now comprise CVW-5: VFAs 151, 192 and 195 fly the F/A-18 *Hornet*; VAs 115 and 185, A-6E *Intruder*; VAW-115, E-2C *Hawkeye*; VAQ-136, EA-6B *Prowler*; and HS-12, SH-3H *Sea King*.

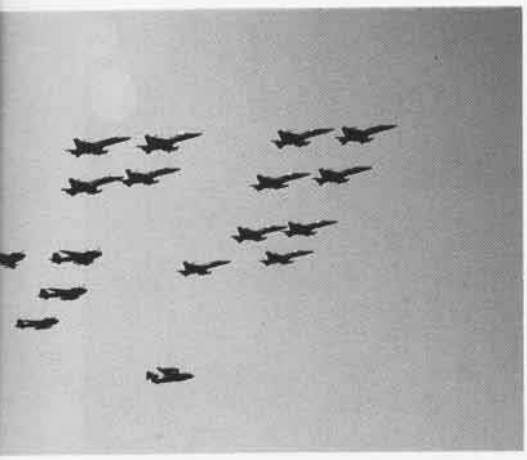
Carrier Air Wing Five is commanded by Captain D. L. Carroll.

Above, the sun's early morning light is reflected from the propellers of an E-2C Hawkeye. Right, USS Midway's limited deck space requires precise parking by the carrier's air department personnel.

CVW-5 Aboard Midway

F/A-18 Hornets and A-6E Intruders — CVW-5's striking arm — fly in formation with an EA-6B Prowler and E-2C Hawkeye.

Two F/A-18s in a close lead/trail formation.



Maintenance personnel of HS-12 ready one of its SH-3H Sea Kings in preparation for a night mission.

CVW-5 Aboard Midway

Four of Midway's Hornets overfly the ship prior to landing.

A VFA-151 Hornet is readied for launch.

H-46: Workhorse of the Fleet

LCdr. Kim Sheldon

A UH-46D of HC-6 vertreps rocket motors from USS Savannah, 1987.

LCdr. Kim Sheldon

The distinctive twin-rotor shape of the Boeing Vertol H-46 has been a familiar sight to Marines and sailors for nearly 24 years of operational service. Perhaps not as well publicized as the Army *Huey*, and often confused with the CH-47 *Chinook*, the *Sea Knight* — affectionately known as the *Frog* — has been the workhorse of the Navy and Marine Corps transport helicopter force from Southeast Asia to Norway and from the Middle East to Grenada. In the Marine Corps, the *Sea Knight* introduced turbine power to the medium assault transport force, replacing the venerable piston-engined HUS-1 (H-34). In the Navy, the *Sea Knight* made the concept of vertical replenishment (vertrep) of warships at sea a viable and effective force multiplier by greatly increasing the rate at which ships could resupply while under way, thus extending their range and endurance.

In the late 1950s, the Marine Corps was looking for a helicopter to replace the Sikorsky HUS-1 *Sea Horse*, which equipped its medium assault transport (HMM) squadrons. The HUS was originally designed to meet Navy specifications for an antisubmarine warfare (ASW) helicopter to replace the older HO4S (Sikorsky S-55). The Marines, for lack of an adequate replacement of their version of the S-55 (the HRS-1), adopted the HUS-1 as an interim solution to their problem. While reliable, the HUS-1 lacked the power and troop transport features the Marines were looking for. The Navy follow-on to the ASW HSS-1 (later redesignated SH-34) was to be the new HSS-2 (SH-3A) *Sea King*. This aircraft featured twin gas turbine engines, with a superior power-to-weight ratio over piston-engined helos, and the Marines evaluated a proposed troop transport version of the HSS-2 as the answer to their need. However, some of the same shortcomings encountered in the *Sea Horse* plagued the *Sea King*: embark and debark were limited to the one main cabin door, bulky loads had to be carried externally, and weight distribution was limited to a very narrow margin about the aircraft's center of lift.

While Sikorsky worked to develop a troop and cargo-carrying version (eventually resulting in the CH-3 for the Air Force), Vertol approached the Marine Corps with its Model 107. Vertol, which before March 1956 had been Piasecki Helicopter Corporation, had pioneered the development of tandem-rotor helicopters. Through the evolution of designs like the HRP-1 and HRP-2 for the Marines, the HUP *Retriever* series of search and rescue (SAR) helos for the Navy, the H-21 *Shawnee* for the Army, and the huge YH-16 heavy-lift prototype for the Air Force, Vertol had proven the reliability and efficiency of the tandem configuration.

The Model 107 was designed from the outset to be either a military transport, or a commercial transport to carry passengers from large metropolitan centers to outlying airports. The semi-monocoque aluminum fuselage was constructed with small stub wings to serve as mounting points for the fixed main landing gear and to contain the fuel cells, thus providing a more spacious cabin interior. The twin rotors were mounted on two aerodynamically shaped vertical pylons and overlapped each other. Both rotor systems were synchronized and rotated in opposite directions via the connecting shaft, which served as the forward rotor drive shaft, positioned along the fuselage top between fore and aft transmissions. To reduce noise level and provide an unobstructed full-length cabin, the twin Lycoming T53 gas turbine engines were mounted on a shelf above the aft cabin within the aft pylon structure. A stability augmentation system (SAS), coupled with automatic stabilization equipment (ASE) provided the desired level of in-flight stability necessary for passenger comfort and all-weather instrument flight conditions. The 107 prototype first flew on April 22, 1958.

The Army showed interest in the military version and ordered 10 YHC-1As, powered by GE T58 engines. The first YHC-1A for the Army flew on August 27, 1959, and this version now incorporated a small rear loading ramp for cargo and small vehicles. The Army reduced its order for 10 YHC-1As to three when it was decided that a larger helicopter would better suit its needs. The third YHC-1A was used to test features of a greatly improved commercial model, the 107-II, using uprated T58 engines with increased diameter rotors and many other detailed improvements. These were built for U.S. helicopter airlines and for export, as well as being built under license in Japan. Vertol meanwhile had demonstrated the YHC-1A to the Marine Corps at Quantico in March 1960 and generated USMC support for its design as a possible alternative to the Sikorsky design based on the HSS-2. Changes which would be incorporated to meet USMC requirements included a wider ramp in the aft fuselage bottom to accommodate a standard jeep and folding rotor blades to facilitate shipboard use. Any new military design would also be based on the improved commercial 107-II.

What emerged was the Vertol (now Boeing Vertol) Model 107M and, in February 1961, it was selected as winner

of the design competition conducted by the Bureau of Naval Weapons for the Marine Corps. Designated HRB-1, the aircraft was named *Sea Knight* and, in addition to the wider ramp and blade fold mechanisms, it had uprated T58-GE-8 engines, an auxiliary power plant and an integrated cargo handling system. Redesignated CH-46A under the unified DoD system in 1962, the *Sea Knight* was designed to carry 25 equipped troops in the assault role, 15 litters and two attendants in the medevac role, or up to 4,000 pounds of cargo internally. (Although advertised as having provisions for accommodating 25 troops, the H-46 was generally regarded as being capable of lifting only 17 and, as temperature or density altitude increased, this number fell to even less). A 10,000-pound-capacity hook, mounted within a centerline hatch in the *Sea Knight's* underside, enabled external transport of sling loads. The first CH-46A rolled off the assembly line on April 30, 1962, and first flight was October 16, 1962.

Development flight tests and acceptance trials conducted on the first order of 14 aircraft concentrated on reducing high vibration levels and other "bugs" in the CH-46A. The incorporation of three absorbers under the cockpit dampened the three-per-rev vibration to an acceptable level, but also added 355 pounds to the aircraft's weight. Finally, the first squadron delivery took place on June 30, 1964, to HMM-265, MCAS(H) New River, N.C., and additional contracts in annual increments brought the total number produced to 624 by the end of 1970.

The Navy showed an early interest in the CH-46A. Experimentation with the vertrep concept using UH-34s had proven disappointing, due in part to limited load capacity, but mainly due to the inherent limitations of tail rotor helos in crosswind situations. The wider envelope of wind limitations available to a tandem-rotor helo made the CH-46A an attractive candidate for the vertrep mission. A number of aircraft from the Marine contract were therefore converted to UH-46A versions, whose chief difference was an internal filter for helicopter in-flight refueling from small ships without flight decks. HU-1 (later HC-1) was the first Navy squadron to take delivery of UH-46As on July 1, 1964.

The Marine Corps, which had been flying its helicopters in Vietnam since

An HMM-262 CH-46D does a "two-wheeler" to a Vietnamese hillside as it unloads Marines and supplies, circa 1968.

An HC-6 UH-46D hooks up to a sling load aboard USS Concord in 1987.

LCdr. Kim Sheldon

1962 with Operation Shufly, was anxious to replace the HUS with its new CH-46As and, on March 8, 1966, HMM-164 arrived at Marble Mountain, RVN with its 27 *Sea Knights* from USS *Valley Force* (LPH-8). In their first 35 days in country, HMM-164 flew 2,700 sorties. HMM-265 arrived aboard USS *Boxer* (LPH-4) in June and, with the arrival of HMMs 165 and 262 by the end of 1966, the CH-46A was well on its way to replacing the *Sea Horse*.

The *Sea Knight* quickly demonstrated its potential. Extremely maneuverable and responsive, the H-46 was fun to fly. Its aft ramp configuration made possible pinnacle landings to remote hilltop fire bases where there was otherwise no room to set a helo down. The pilot merely had to place the main landing gear on the chosen spot and unload cargo or troops over the ramp, while keeping the nose suspended in a hover. The high clearance of the aft rotors even made it possible to back up to hillsides to load or unload directly into protected positions — something nearly impossible for conventional, tail-rotor helos. Navy vertrep pilots found the *Sea Knight* the ideal aircraft for their mission and developed a unique style of flying, which facilitated speed and accuracy in transferring ordnance, parts, food and personnel from logistics vessels to warships at sea.

The high, hot and dusty environment of the Vietnamese coastal areas and highlands soon dictated changes to the CH-46A. Sand and dirt ingestion eroded turbine and rotor blades, causing an unacceptably high rate of engine and rotor blade changes. Also, the addition of .50 caliber or M-60 machine guns, armored seats, and protective armor around engines and flight control closets added significant weight to the CH-46A, reducing its useful load.

Lieutenant General Victor Krulak, commanding the Marines in Vietnam, complained that instead of the advertised 25 troops, his *Sea Knights* were often limited to only 15. Sand erosion was tackled by providing barrier inlet screens for the engine inlets and a nickel erosion strip on the rotor blades. More powerful T58-GE-10 engines were incorporated into the new production standard CH-46D model beginning in 1967. The CH-46D also introduced cambered, "droop snoot" rotor blades and a lengthened aft pylon with a symmetrical airfoil section versus the cambered shape of the CH-46A. A series of fatal crashes traced to failures in the aft pylon and transmission area of CH-46As and Ds temporarily grounded all fleet *Sea Knights* in 1967, and delayed the transition from UH-34s. A massive round-the-clock maintenance effort at MCAF Futenma, Okinawa, resulted in major fixes made to reinforce the structural weaknesses found to be the cause of the mishaps and, by early 1968, the crisis had passed.

The CH-46 crisis had passed none too soon for, in January 1968, the Marines would need the *Sea Knight*'s capabilities desperately. At a fire base called Khe Sanh, the North Vietnamese, in an apparent attempt to duplicate their victory over the French at Dien Bien Phu in 1954, surrounded the U.S. Marine garrison of 5,600 with over 40,000 NVA regulars and cut them off from all but aerial resupply. Aircraft flying supplies into Khe Sanh's small airstrip had to pass through a deadly gauntlet of 12.7mm and 37mm antiaircraft fire thrown up by the North Vietnamese from their concealed positions in the heavily jungled mountains surrounding the fire base.

The Marines soon developed what was called the Super Gaggle. A massed flight of CH-46s, all carrying 3,000-pound sling loads of ammo, food, water and medical supplies, flew into Khe Sanh and its hilltop outposts, preceded by Marine A-4 *Skyhawks* flying from Chu Lai. The fast movers did their best to saturate the approach route with napalm, frags, CS gas and then smoke to suppress and throw off the NVA gunners' aim while the Super Gaggle made its approach into Khe Sanh. Dropping off their external loads on the first pass, the *Sea Knights* unloaded reinforcements and picked up wounded for evacuation from the beleaguered stronghold on their second. From the first Super Gaggle on February 23 until the end of the 77-day siege in early April, three and sometimes four gaggles a day were flown, often in adverse weather. In February alone, the *Sea Knights* flew in 465 tons of supplies.

"The Dien Bien Phu That Wasn't" more closely resembled a repeat of the Leathernecks' triumph at Guadalcanal in 1942; the tenacity of American fighting men shattered the centerpiece of the Communist Tet Offensive in 1968. Like the ubiquitous C-47 of WW II, the H-46 had firmly established itself as the backbone of Marine transport aviation. Likewise, Navy vertrep *Sea Knights* had proven themselves an indispensable link in the logistics chain which kept the carriers and warships of the Seventh Fleet on station in the South China Sea, sustaining the naval gunfire support and carrier air war against the Communists. There was, as always, a price — by the end of the war in 1975, 106 Marine and two Navy *Sea Knights* had been shot down in combat.

Continuous improvements were made on the H-46. An extensively upgraded version was planned as the CH-46E. While these plans were crystallizing, production changes resulted in the last CH-46s off the line being designated CH-46Fs. The CH-46F incorporated improved avionics and space for a doppler and hover coupler system which was never installed. Early on, a trial minesweeping version, the RH-46A, was evaluated but never pursued. A specialized SAR version, the HH-46A, was created from CH-46As which had not received full conversion to the D configuration. Equipped with a doppler and hover coupler system, a loud hailer and a new externally mounted rescue boom at the forward crew door, the HH-46A equipped most Navy and Marine air station SAR dets through the seventies and early eighties.

The Navy received the UH-46D concurrent with the Marines' CH-46D in 1967 and, in 1975, Boeing Vertol began conversion work on the USMC D and F models to create the CH-46E. The E model incorporated uprated T58-GE-16 engines, providing 1,870 shp as opposed to the 1,400 shp of the -10 power plant, fiberglass rotor blades, and a second independent hydraulic flight control boost system. Other changes designed to improve the *Sea Knight*'s survivability included a crashworthy fuel system, crash attenuating armored pilots' seats, heat reducing engine exhaust devices, provision for flare and chaff dispensers and radar warning receivers. CH-46Es equipped all Marine HMM squadrons by 1982.

Even before completion of the E model conversions, minds were focused on what would be necessary to keep the type in service through the 1990s. The safety, reliability and maintainability (SR&M) program involved a major rebuilding of each aircraft, incorporating new transmissions, new hydraulic systems, state-of-the-art avionics, a solid state automatic flight control system to replace the SAS/ASE combination, and modernized instrumentation — to name a few of the most significant improvements. Established in 1980, the SR&M program continues today, with Marine CH-46Es completed and Navy UH- and CH-46Ds presently undergoing conversion. Some 360 *Sea Knights* remain in Navy/Marine service today.

When the Marine Corps transitions to another twin-rotor aircraft, the V-22 *Osprey*, Navy helicopter combat support squadrons will continue to rely on the *Sea Knight* as the workhorse of the fleet for vertrep well into the 1990s and beyond. ■

Oshkosh '88

Story and Photos by Capt. Maury Cagle, USNR(Ret.)

The restoration of this F7F Tigercat made the aircraft look like it just came from the factory.

They should sell T-shirts which proclaim, "I survived Oshkosh '88." The 36th annual fly-in and convention of the Experimental Aircraft Association (EAA) at Oshkosh, Wisc., this summer was memorable. I remember a badly sunburned lower lip, 100-plus temperatures and crowds I had rarely experienced. I also remember my ears ringing with the roar of jet engines, the unique clatter of big radial engines and the sweet whine of 12-cylinder Merlins. Most of all, I remember airplanes — and more airplanes.

The scale of Oshkosh is difficult to describe without using superlatives. How do you put into words the feel of a show which draws almost a million people and gathers more than 13,000 aircraft in one place?

For me, it was one of those items on my personal checklist of things I wanted to do before I got too old. My work on the 75th Anniversary of Naval Aviation Project Staff whetted my appetite. Oshkosh proved to be a feast.

As you approach the 8,000-foot runway of Wittman Field (named for famed aircraft racer and designer Steve Wittman), you begin to grasp the magnitude of the show. After a half-mile hike from the parking lot, you see the tower way off in the distance. You thread your way through rows of trailer trucks and then tents, where you can buy anything imaginable dealing with aviation.

I headed for the warbird area to take pictures. There were aircraft I had seen before, such as F-51 (formerly P-51) *Mustangs*. But 16 of them?! There were two F-47 *Thunderbolts*, a P-38 *Lightning*, several B-25s, a B-26 and an A-20 *Havoc*.

Rarities included a Yak-11 — its blunt, no-nonsense, solid look keeping with its Soviet origin. There was an Bf-108, the fast, four-place aircraft from which Willy Messerschmitt learned much of

The TBF/TBM Avenger made its name in WW II as a rugged torpedo plane used effectively against surface vessels in the Pacific and from CVEs in the Atlantic as an antisubmarine warfare attack plane.

what he put into the Bf-109. There were two P-40 *Tomahawks*, one painted an awful salmon color in an attempt to duplicate the color that the desert sun of North Africa bleached its original gray.

As I walked along, an unmistakable shape rose above the heads of the crowd: a Mossie! The only flying De Havilland *Mosquito* in the world belongs to Kermit Weeks, an avid warbird collector from Florida.

Naval Aviation was well represented. I saw two F4U *Corsairs*, two TBF/TBM *Avengers*, an F4F *Wildcat*, F6F *Hellcat* and an AD *Skyraider*. My personal favorite was an F7F *Tigercat*, one of only three still flyable. I had seen F7Fs only in museums. Sitting on the tarmac, looking as if it had just left the Grumman ironworks at Bethpage, N.Y., this was a handsome aircraft — a sleek, narrow fuselage and two huge radial engines perched atop long tricycle landing gear. The quality of the restoration was amazing.

The warbird area was ringed with more SNJs, T-28s and T-34s than I could count. It seemed like a time warp back to the Pensacola of 20, 30 or 40 years ago.

Leaving the warbirds, I entered the custom-built area. This was a celebration of ingenuity, dedication and beautiful workmanship. The range of home-builts was incredible — half-scale fighters from WW II and some from WW I, such as SE-5s and Nieuports.

I gave up counting the number of Vari-Ezes. One entire section was set aside for these fast, light aircraft designed by Burt Rutan, who designed the *Voyager*. Behind them was a Ford Trimotor, looking ready for passengers or cargo. A little further down, a B-1B bomber sat facing the Concorde. Not far away, the oldest aircraft to fly in, a 1910 Curtiss pusher, drew a crowd.

During its air show demonstration, the AV-8B was second only to the Concorde on noise.

Still sporting the 75th Anniversary markings, Connie Edwards' PBY continues to promote Naval Aviation through goodwill visits to air shows and naval air stations.

In the antique and classic section, each aircraft had a sleeve-like card on its prop, telling the brand, year built, power plant, speed, etc. Names from the past popped up as I walked down the rows: Stinson, Bellanca, Aeronca, Spartan, Monocoupe, Stearman, Buhl, Ryan and Waco.

The owners of most of the aircraft were standing by their pride and joy, and were willing to talk flying. One man had a pristine Grumman *Goose*, a medium-sized amphibian with two radial engines, gleaming in white and green trim. He had retrieved the craft from a nearby lake bottom, where it had sat for 17 years! Imagine the number of hours he and his friends spent on that restoration.

When the air show began, I settled down on my camp stool in the minimal shade of a Luscombe's wing. I've been to a lot of air shows, but nothing like this one.

The 16 F-51s went by in formation, then peeled off in echelon into the tail chase pattern that allowed them to bring maximum firepower on a target. An F4U chased away a bunch of simulated Japanese *Kates*, *Vals* and *Zeros* — fashioned out of SNJs and T-6 *Texans*. Talk about *Texans*! Thirty-one of them flew by in formation, making quite a racket. Other formations were made up of 16 T-28s and 16 T-34s. The crispness of the patterns showed a lot of practice and expert airmanship.

The Concorde operated both days of the air show, taking a steady stream of passengers on a two-hour ride for an astronomical amount of money. For sheer noise, nothing can beat the Concorde.

The Marine Corps demonstrated the AV-8B *Harrier II*. It is startling, even when you are expecting it, to see a high-speed jet fighter slow down to practically nothing, hover, turn in circles and then back up. A nice touch was added when an F4U *Corsair* in Marine markings joined the AV-8B for a flyby.

The seaplanes had a flyby of their own. I spotted Connie Edwards' PBY *Catalina*, still proudly bearing its 75th Anniversary of Naval Aviation markings. The up-from-the-lake Grumman *Goose* was included, as well as assorted *Mallards*, *Widgeons* and an *Albatross*. Putting along in solitary splendor was a 1930 Savoia-Marchetti amphibian, flown from Long Island by its restorer.

The high point of the air show for me was a display of aerobatic artistry put on by a 76-year-old man named Duane Cole. He has been flying for 60 years, and it shows. In a simple, venerable, though very powerful high-wing monoplane, Cole put on a show that demonstrated how flying ought to be done. His loops, stalls, spins and rolls seemed effortless. The announcer said, "That conclude's Duane Cole's powered routine," but I didn't pick up on the subtlety.

About 10 minutes later, after the next act, the announcer called our attention to Cole's plane, some 3,000 feet above the crowd. He switched off his engine and, in the next few minutes, went through many of the same maneuvers he had earlier — but without power. The huge crowd quieted down and only the rush of air through his plane's struts could be heard. He ended with a series of about eight loops, maintaining perfect position over the runway, and finished with just the right amount of altitude for a perfect dead-stick landing — with enough momentum to carry him down the runway and onto the ramp in front of the tower. It was the most impressive flying I've ever seen.

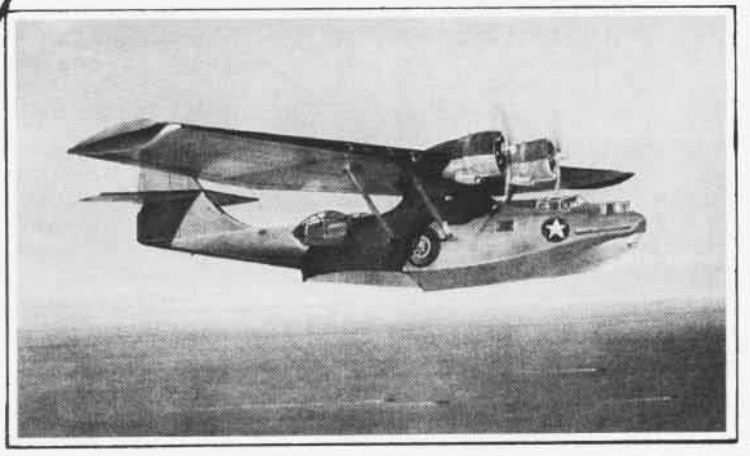
Oshkosh activities last for a week. There are lectures, seminars, workshops and award ceremonies everyday in a wooded outdoor amphitheater. Tucked away in little byways are exhibits such as a crew building a tiny, streamlined plane with the goal of becoming the first official propeller-driven aircraft to break the sound barrier.

While airplanes are center stage, the people make Oshkosh what it is. They all share a love of aircraft and flying. Some may fly there in planes worth $5,000 and others in rare birds worth several million. Some, like myself, don't own an airplane or even have a pilot's license. But the thousands of people who gather at Oshkosh have a common bond. It was hot and crowded, yet I never heard a cross word, or ran across an official or volunteer who was too busy or hassled to pause and give directions or answer a question. And when some particularly well-done piece of flying occurred, perfect strangers smiled when our eyes met.

After two days, I was tired, dirty, sunburned and my feet ached. But I was immensely satisfied. I was also impressed by the way that the EAA organized this massive effort. Their attention to detail, sense of timing and good humor produced an extremely enjoyable event.

If you love airplanes, I hope you get the chance to attend Oshkosh. If so, you'll see me — the guy with the beard — balancing too much camera gear and a camp stool, running from one exhibit to another, trying to take it all in before the air show starts. ■

Naval Aviation Exhibit



PBY

Joseph C. Cason designed and helped produce the first exhibits for the dedication of the Naval Aviation Museum at NAS Pensacola in May 1975. It was his museum exhibit design experience, use of color and logical arrangements that set his displays apart from the normal. He has the ability to blend exhibits so that visitors can follow the flow of the presentations and better understand the subject matter displayed.

Cason also designed various exhibits in the Phase II expansion of the museum. In 1981, he became a full-time visual information specialist at the museum.

But Joe's talents extend beyond designing museum exhibits; he is also an accomplished artist. In the studio of his self-designed home, he spends his spare time rendering pencil drawings on subjects ranging from birds and beach scenes to Navy aircraft. Four examples of his art are displayed here.

Although his name is not recorded on the exhibits at the Naval Aviation Museum, his mark of excellence remains.■

H-57

H-46

Designer

USS Enterprise (CV-6)

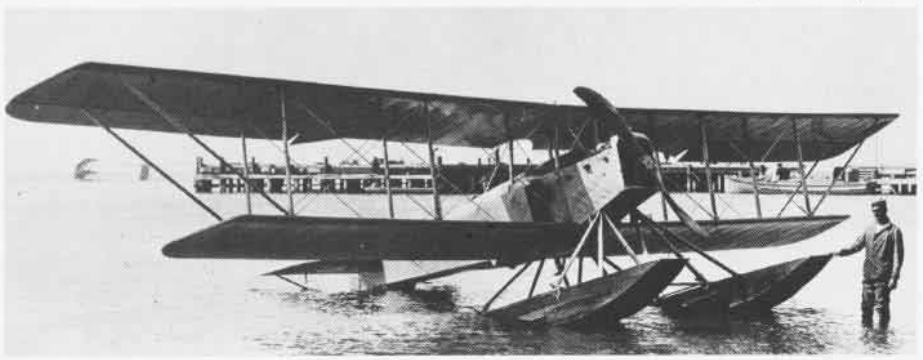
Thomas HS

By Hal Andrews

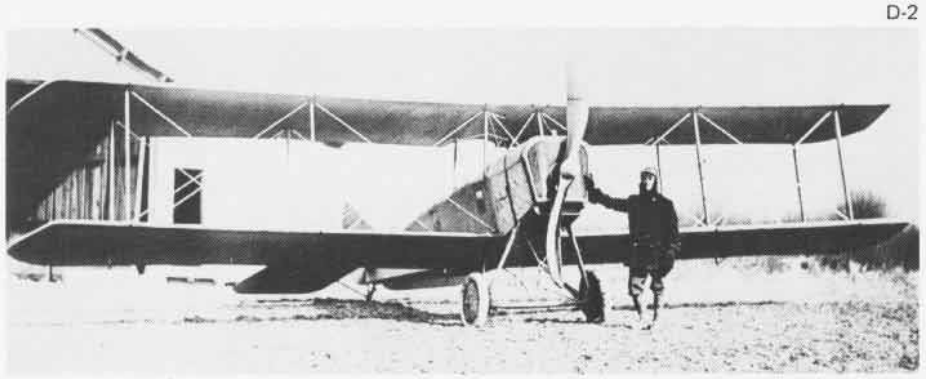
Naval Aviation at Pensacola, Fla., in 1915 was all the Naval Aviation there was — entirely seaplanes, and not very many of them. All were pusher types; most of those used for training were open biplanes with the pilots' seats at the leading edge of the lower wing, in front of the engine. They weren't very different from the first Navy airplane, the Curtiss A-1 of 1911, though the forward elevator mounted on the bow of the single float had been eliminated.

In Europe, military aviation had progressed much more rapidly than in the United States. By the time WW I started in August 1914, both numbers and aircraft design characteristics were far ahead of those here. In particular, enclosed fuselages were common and tractor designs were becoming the most widely used aircraft. With Europe at war, aviation progress there had become even more rapid.

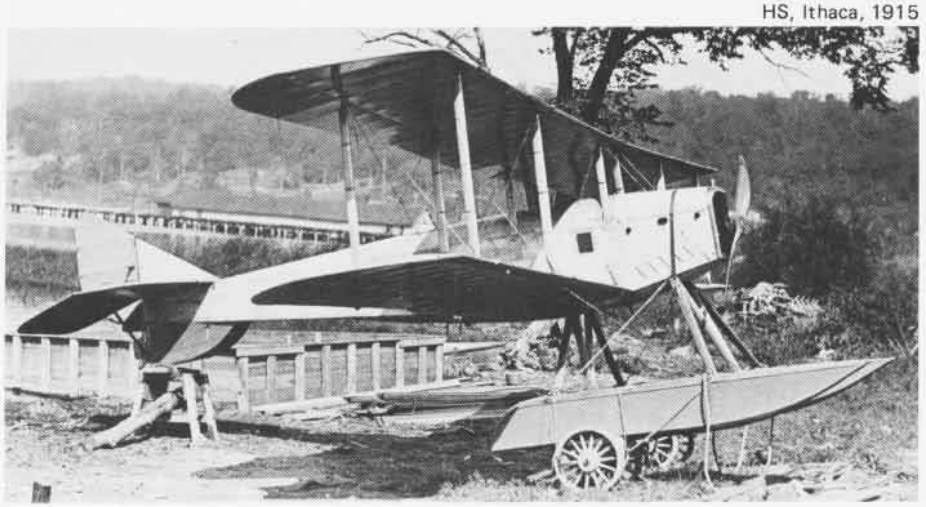
HS, Pensacola, 1916



D-2



HS, Ithaca, 1915



Meanwhile, at San Diego's North Island, the Army's base for flight training at the time, their pushers had been replaced by tractor designs and the pushers condemned. In accidents, not infrequent in those days, the pilot was too often crushed by the engine when the airplane stalled at low altitude and dove into the ground. Spurred on by the Army's decision, as well as potential aircraft orders from Europe, the infant U.S. aeroplane "industry" began to design and build various models with enclosed fuselages — or nacelles, in the case of pusher designs. But the Navy was still procuring the old pusher types, though the aviators themselves increasingly pressed for their replacement.

In mid-1915, action was taken to obtain the first tractor seaplanes. First a French Paul Schmitt seaplane was ordered to take advantage of European progress, and because no tractor seaplanes were readily available in the U.S. The Navy's first contract for tractor seaplanes from a U.S. "aeroplane" manufacturer followed in July.

W. T. Thomas, of the Thomas Brothers Aeroplane Company in Ithaca, N.Y., offered to provide two tractor seaplanes, with delivery in two months. Thomas Brothers was the earliest aeronautical antecedent of the present General Dynamics Corp., though by later purchase rather than direct organizational descendancy. While the time to design and build a new airplane in those days was short, this quick delivery was proposed based on converting a landplane tractor — which Thomas was already flying — to a "twin float" seaplane.

Thomas Brothers had moved to a factory in Ithaca, N.Y., in December, 1914, with a British Royal Navy order for 24 tractor landplane trainers, powered by 90-horsepower Curtiss OX-5 engines. These were designed by B. Douglas Thomas — no relation to the two Thomas brothers (but, like them, from England), who had designed for Curtiss the first of what later became the famous Curtiss series of *Jenny* trainers.

While the British trainers were in production, Thomas designed and built an improved tractor, using a 135-horsepower Sturtevant engine. Like the earlier T-2s, the new D-2 was a two-bay, equal-span biplane of "wood and

wire" construction, fabric covered. Slightly larger, the higher power engine gave it considerably better performance than its predecessor.

Aircraft engine procurement was a difficult problem, and the Thomas brothers acquired the services of two co-designers of the Sturtevant engine. They then established the Thomas Aeromotor Co., initially to build a near duplicate of the Sturtevant engine.

Conversion of the D-2 landplane design to twin short main pontoons, plus a tail pontoon, was rapid and the seaplane HS made its first flight from Cayuga Lake within two months. The D-2 in its seaplane form was given the company designation HS. In those days, the Navy didn't assign specific model designations.

From this point on, things did not go well and the Navy took delivery of a later-ordered Martin tractor seaplane before Thomas could deliver its two. With greater weight and drag due to the floats, the new HS did not repeat the success of its predecessor. The radiator was inadequate to cool the engine with the higher power required at any flight condition. When it boiled over in flight, the seaplane stalled and suffered a hard landing and considerable damage. While it was being repaired, improvements were made but the results in early winter were the same. This time the airplane was destroyed when it dove into the lake, fortunately, without fatal injuries to the pilot.

Further changes to the HS design finally resulted in a deliverable airplane. Compared to the original HS, additional wing area was provided by strut-braced span extensions to the upper wing panels, with larger upper wing-only ailerons replacing those on both upper and lower wings. Radiators were added on both sides of the fuselage next to the front cockpit. The rear float was mounted on struts to lift the aft fuselage out of the water when the airplane was afloat. Shipped to Pensacola in late February 1916, initial flights were made by the Thomas pilot in early March, followed by Navy pilots and finally acceptance on March 30. It was still powered by a 135-horsepower Sturtevant engine. The near-twin Thomas "8" engine had meanwhile run successfully on the test stand and would be ready for the second HS.

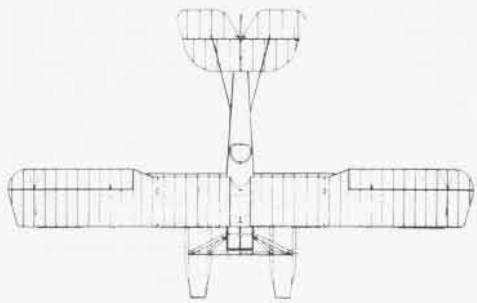
Assigned service number AH-20 in the series applied to all naval aircraft in 1914,* the new HS was flown regularly for familiarization and training over the next several weeks until it was grounded, awaiting engine parts — a condition that plagued it most of the rest of the year. [*Note: In March 1914, the original designations of Navy aircraft were replaced by a two-letter (class and type) designation followed by a sequential number. In AH, A designated heavier than air, H indicated floatplane (hydroaeroplane) — making the Thomas HSs the 20th and 21st floatplanes placed in service by the Navy, starting with the original Curtiss A-1 of 1911. In February 1916, while the HSs were still at the factory, construction numbers were assigned to all Navy aircraft being built, starting arbitrarily at 51A. In this series, the HSs became 57A and 58A. The latter series evolved into the current Navy serial number (BuNo) system and the service numbers were discontinued in 1917.]

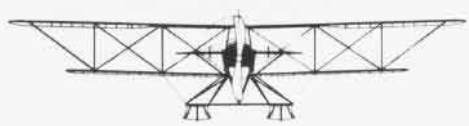
While AH-20 was being flown, the second HS for the Navy was shipped to Pensacola, with the new Thomas engine installed. Modifications were made there to install a pressure fire extinguisher discharging into the engine compartment, and it was flown and accepted on June 18, designated AH-21. It flew regularly over the summer, mostly on training or proficiency (practice) flights. The flight controls were modified and in September the flippers (elevators) were removed and recovered due to water damage (the trailing edge rested in the water when the airplane was afloat). In the fall, the many short flights added up to four hours and 44 minutes airplane time with six hours, 16 minutes engine time when the engine was changed. Training flights continued through November, when its use was shifted to early "wireless" experiments. Both HSs were used for this purpose in the early months of 1917 as the new Curtiss N-9 seaplanes picked up the training load.

Following U.S. entry into war in April 1917, using one or two of each of the several older seaplane types at Pensacola was no longer justified, and the two HSs were stricken in June 1917. ■

Thomas HS

Span	**48'6"**
Length	**29'9"**
Height	**10'3"**
Engine	
Sturtevant or Thomas	**135 hp**
Maximum speed	**72.5 mph**
Maximum range	**300 mi**
Crew	**Two**
No armament	





HS, Pensacola, 1917

Awards

Actor Brian Keith, a former Marine who served in WW II, received several awards and badges for his Marine Corps service during an MCAS El Toro, CA, awards and retirement ceremony.

Keith received the Air Medal for service in the Solomon Islands in 1943, the Asiatic-Pacific Medal with three bronze stars, the World War II Victory Medal, the Combat Air Crew Insignia, and the rifle and pistol expert shooting badges. The actor, who is listed in Marine Corps records as PFC Robert A. Keith, served as a Marine gunner in dive-bombers in the Pacific theater.

At the same ceremony, LCol. Novatus N. Kirby, assistant chief of staff, 3d MAW, received the Meritorious Service Medal for "exceptionally meritorious conduct in the performance of outstanding service as C.O. of VMA-214, C.O. of MAG-13 Det. B and his current position.

VMA-214's safety record earned the squadron the Marine Corps Aviation Association's Marine Attack Squadron of the Year award for 1987.

Lt. Doug Bandy and Ens. Chris Blow of VT-6 were aboard a T-34C about 15 miles south of Whiting Field, Milton, FL. During an aerobatic manuever, the fuel control unit malfunctioned. Power was at maximum and not controllable.

Bandy immediately responded by initiating the correct NATOPS procedures and flew the aircraft to a position over Whiting Field, at 7,500 feet and 200 knots. He then shut the engine down and made a perfect engine-out landing.

His heroic efforts not only saved the crew from injury but a million-dollar aircraft and VT-6's six-year, 275,000-hour-plus accident-free safety record. Bandy was awarded the Navy Achievement Medal for his superior airmanship.

Records

Aircraft from VR-22 have landed cargo, mail and passengers in the Mediterranean area and European theater, but recently the aircraft have carried a special cargo for in-flight delivery. In early August, the squadron delivered its millionth pound of fuel in the air.

Approximately 90 percent of the VR-22 refueling flights originate outside Spain, generally from Sigonella, Sicily. The KC-130s can refuel two helicopters or two aircraft at once. The aircrafts' wings have a pod that contains the hose and "basket," the connecting device for the fuel delivery. Flying at about 230 knots for a jet, the pilot catches the basket and swings away from the tanker to drink its fuel.

A helo's refueling speed is about 110 knots. The helicopter flies straight and level while the KC-130 slows down and reels out the 50 to 82 feet of hose. The helicopter slides behind the aircraft and makes the connection with the basket for refueling, during which there is only about 20 feet of clearance between the two.

A *Hercules* tanker can carry about 63,000 pounds of fuel in two wing tanks and a large steel tank inside the aircraft. Originally, the KC-130s were ordered for the Marine Corps as transports and tankers. The Navy later acquired some of the aircraft for use in its refueling mission.

Disestablished

VAK-308, established at NAS Alameda, CA, in 1970, was disestablished in September 1988. This was a result of the Navy's effort to upgrade the Naval Air Reserve Force with active duty fleet-compatible aircraft.

Honing the Edge

During 1986 and 1987, the newly enhanced S-3B *Viking* underwent flight testing and evaluations at Lockheed, the Naval Air Test Center and VS-27, the fleet replacement squadron (FRS). In July 1988, the *Diamondcutters* of VS-30 became the first fleet squadron to receive the modified S-3B.

Numerous weapon system improvements significantly enhance the S-3B's multimission capability through: identification of new generation submarines; improved submarine localization and attack capability; improved radar detection, classification and tracking; electronic support measure refinements; electronic countermeasures; *Harpoon* missiles; and increased testability, maintainability and reliability.

Flight crews are currently undergoing S-3B transition training at the FRS located at NAS Cecil Field, FL. VS-30 is scheduled to deploy with CVW-7 aboard *Independence* (CV-62) this year.

The Navy and Army interfaced recently aboard *Nassau* (LHA-4) when Army helicopter pilots operated with the amphibious assault ship. The pilots were members of the 82nd Division stationed at Fort Bragg, NC.

PH3 Bob Keefer

Airman Earl Moore signals an Army AH-64 Apache to land on board Nassau.

"This is one of the more fun things we've ever done," said Army Capt. Mark Robinson. "It's very interesting and very different for us to land on a moving ship in open water. The professionalism of the Navy flight deck crew helped to make it easier for us; they were very impressive," Robinson said.

The helos the Army trained with on board *Nassau* were the OH-58 *Kiowa*, UH-60 *Blackhawk* and the AH-64 *Apache*, the Army's newest attack helicopter.

Even though this was the first time that most of these Army pilots had operated with a ship, the consensus among *Nassau's* air community was that they performed like old hands. This was clearly evident in the over 500 accident-free landings and takeoffs.

Et cetera

The *Grey Knights* of VP-46, led by Cdr. Bill Zell, were the first VP squadron to receive a P-3 with the low-visibility tactical paint scheme. Featuring an all-gray color, similar to that used on

carrier-based aircraft, the paint is in marked contrast to the white-over-gray scheme found on other fleet *Orions*.

A P-3 from VP-46 sports a low-visibility paint scheme. This Orion is configured with an ALQ-157 infrared survivability and vulnerability enhancement device.

In a small corner of H&MS-36, MCAS Futenma, Okinawa, sit 18 Marines who give new meaning to the phrase "desk job." Their job is vital, but it is possibly one of the least exciting on the air station.

This is the Quality Assurance Division which includes experts from all areas of the Intermediate Maintenance Activity, such as avionics, power plants and airframes.

Quality assurance, analysis and publications sections make up the division. The technical publications section maintains more than 10,000 reference manuals in its library, and a microfiche library contains over 40,000 items and supply parts listings.

The quality assurance team keeps squadrons of MAG-36 current on equipment and maintenance procedures. The team travels together to greet and inspect each squadron upon its arrival, discussing everything from corrosion to record keeping. In addition to monitoring productivity of the unit, QA manages and monitors 20 continuous programs, including discrepancy reporting, tool control, corrosion control and foreign object damage.

Sgt. Rosemarie Fitzsimmons

SSgt. R. W. Kitchens, air frames inspector, checks for corrosion on an OV-10 Bronco from VMO-2.

Reserve squadron HSL-94, NAS Willow Grove, PA, and reserve frigate *Patterson* (FF-1061), Naval Base, Philadelphia, joined forces to support U.S. Coast Guard Law Enforcement Operations drug interdiction program in the Bahamas.

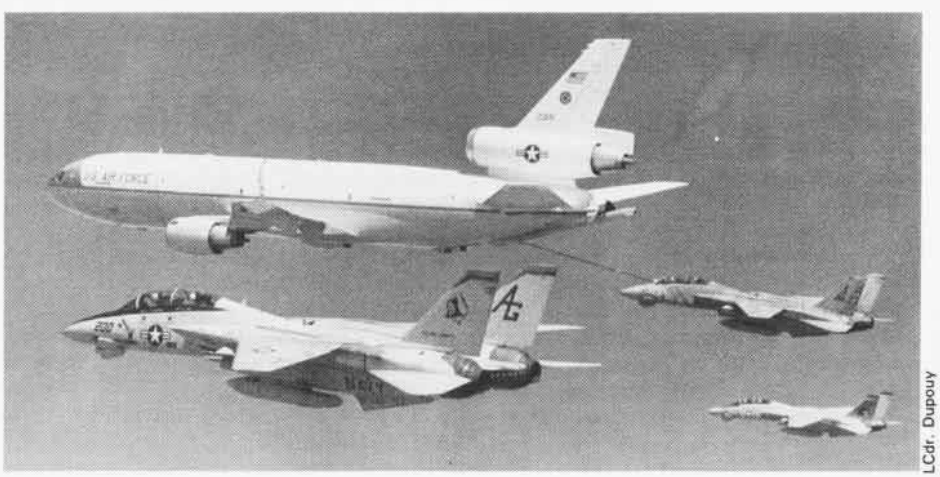
Det 6 deployed on board *Patterson* with members from USCG Law Enforcement Detachment 2, from Key West, and CG Group, St. Petersburg, FL.

The SH-2F successfully patrolled the 4,500-square-mile operating area off the eastern bank of the Bahamas. Det 6 aircrews were able to acquire and evaluate over 60 contacts, fly 18 sorties and make more than 105 total day/night landings.

JOCM Troy Snead

Marshal of the Soviet Union Sergei D. Akhromeyev talks with pilots (left to right) LCdr. John LaBella and Lt. Cris Lipphardt after a flight from Theodore Roosevelt (CVN-71) to NAS Norfolk, VA, in a C-2A Greyhound from VR-40. Akhromeyev and his entourage were treated to a show of the Navy's airpower on the supercarrier. The Soviet chief of the armed forces was visiting the U.S. as a guest of Adm. William J. Crowe, Jr., chairman of the U.S. Joint Chiefs of Staff.

Ens. Dwaine L. Lyon became the first Naval Aviation Cadet in 23 years to successfully complete the jet strike training pipeline. During a TraWing-1



LCdr. Dupouy

An Air Force KC-10 tanker refuels F-14s from VFs 142 and 143 stationed aboard USS Dwight D. Eisenhower (CVN-69) while on an extended deployment in the Mediterranean.

designation ceremony at NAS Meridian, MS, he received his wings and was commissioned an ensign in the Naval Reserve. In March 1986, the NavCad program was reinstituted as a low-cost method of training aviators for the fleet.

NavCads differ from other student aviators in that they must be single with no dependents, be between the ages of 19 and 24 and have completed two years of college or service accepted equivalent.

Ens. Lyon performed well throughout flight training. He earned three Es for bombing accuracy, the "Top Hook" title by achieving the highest score in carrier qualification in his group, and an overall composite flight score that is the highest achieved in VT-7.

PH3 Thornton

Ens. Lyon conducts a preflight inspection on a TA-4J Skyhawk at VT-7.

Change of Command

America: Capt. John J. Coonan relieved Capt. James A. Lair.

Coral Sea: Capt. L. E. Allen relieved Capt. Bruce B. Bremner.

FitWing-1: Capt. Curtiss W. Schantz, Jr., relieved Capt. John F. Manning, Jr.

HMH-462: LCol. David Stockwell relieved Maj. Peter Farley.

HS-1: Cdr. Roy Resavage relieved Cdr. Mark Vanderberg.

HSL-47: Cdr. David A. Rannells relieved Cdr. John D. McAfee.

MACG-38: Col. Joseph W. Robben, Jr., relieved Col. Thomas L. Jones.

MAG-16: Col. J. J. Barrett relieved Col. A. J. Allega.

NAS Alameda: Capt. Roger P. Boennighausen relieved Capt. Larry J. Pickett.

NAS Pensacola: Capt. Harry A. Jupin relieved Capt. James W. Dickson.

NATC: RAdm. Donald V. Boecker relieved RAdm. John F. Calvert.

NATTC Millington: Capt. Thomas W. Finta relieved Capt. John F. Healy.

NavAvionicCen: Capt. Russell J. Henry relieved Capt. Wallace C. Courtney.

NavSafeCen: RAdm. James E. Taylor relieved RAdm. Denis T. Schwaab.

PatWing-5: Capt. Edward R. Enterline relieved Capt. John M. Evans.

PatWing-10: Capt. John R. Ryan relieved Capt. Melvin E. Thompson.

PatWingsPac: RAdm. J. J. Hernandez relieved RAdm. P. D. Smith.

PMTC: RAdm. George H. Strohsahl, Jr., relieved Capt. Sam L. Vernallis.

ResPatWingPac: Capt. J. E. Batwinis relieved Capt. Jerry F. Huss.

VA-65: Cdr. Michael C. Vogt relieved Cdr. Stephen H. Baker.

VA-94: Cdr. John A. Roe relieved Cdr. Tad Chamberlain.

VAW-112: Cdr. Geoffrey W. Dundas relieved Cdr. Terry E. Magee.

VC-10: Cdr. Edward D. Ulrich relieved Cdr. John E. Hilburn.

VF-102: Cdr. Charles E. Milstead, Jr., relieved Cdr. William G. Fischer.

VF-126: Cdr. T. R. Brown relieved Cdr. Bill Butterworth.

VFA-82: Cdr. R. A. Eason relieved Cdr. G. A. Pike.

VMFA-333: LCol. W. G. Bowdon relieved LCol. R. W. Chambliss.

VMFA-451: LCol. Ronald L. Lard relieved LCol. T. David Seder.

VP-11: Cdr. Donald K. Miskill, Jr., relieved Cdr. David A. Larson.

VP-40: Cdr. Lawrence D. Getzfred relieved Cdr. Keith D. Hahn.

VP-46: Cdr. William E. Krayer relieved Cdr. William B. Zell.

VP-47: Cdr. Martin R. Hill relieved Cdr. Chris S. Larsen.

VP-67: Cdr. Herbert W. Foote relieved Cdr. Eric M. Crayon.

VP-68: Cdr. Gregory W. Hinchliffe relieved Cdr. Bradford A. Kirley.

VQ-2: Cdr. Thomas K. Quigley relieved Cdr. Jay R. Kistler.

VQ-4: Cdr. Kermit A. Ayres relieved Cdr. Andrew S. Riddile.

VR-57: Cdr. Charles L. Beauchesne relieved Cdr. Thomas L. Sanderson.

VT-3: LCol. Richard F. Thayer relieved LCol. James Y. Wallace III.

VT-6: Cdr. Timothy G. Stone relieved Cdr. Harry F. Thomas.

VT-26: Cdr. Chet E. Strait relieved Cdr. Fredrick I. Grant.

New Naval Aviation News and Aviation History Director

In September, Capt. Steven U. Ramsdell became head of *Naval Aviation News* and the Naval Aviation History Office under the Assistant Chief of Naval Operations (Air Warfare) and the Naval Historical Center.

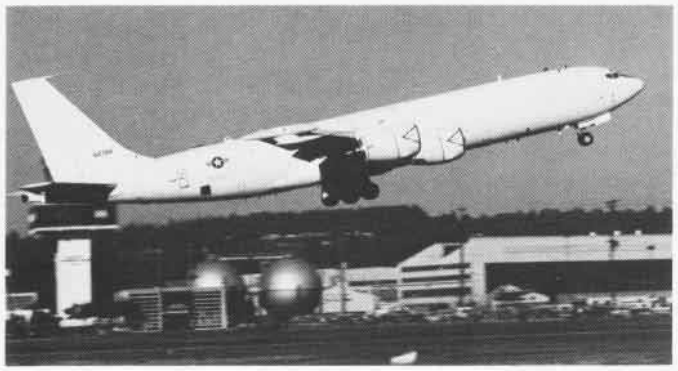
Capt. Ramsdell graduated from the University of Washington in Seattle and was commissioned an ensign through its Navy ROTC program in 1965. After completing flight training, he was designated a Naval Aviator at NAS Kingsville, TX, in December 1966.

After his first operational tour with VF-13, he served as an instructor of military history at the Stanford University NROTC Unit in California. Following tours in VT-25, VF-124 and VF-32, he completed the course at the Armed Forces Staff College and then went to VF-101.

Capt. Ramsdell became X.O. of VF-143 in August 1979 and assumed command of the squadron in December. Subsequent assignments included air ops officer aboard *Dwight D. Eisenhower* (CVN-69), and director of the Leadership Management Education and Training Department at the Naval Amphibious School, Little Creek, VA, during which he earned a master's degree in history at Old Dominion University. Capt. Ramsdell came to *NANews* and Aviation History from the faculty of the National War College in Washington, DC.

STATE OF THE ART

E-6A Hermes



Boeing Aerospace

The prototype of the Navy's newest communications platform took off from Boeing Field, Seattle, WA, on July 22, bound for the Naval Air Test Center, Patuxent River, MD, to undergo developmental testing. The TACAMO (take charge and move out) aircraft will replace the retiring EC-130s.

AH-1W Super Cobra

Bell Helicopter Textron, Inc., was awarded $146.9 million for 30 AH-1W *Super Cobras* for the Marine Corps. Deliveries will begin in 1990.

An improved version of the AH-1T *Sea Cobra*, the AH-1W features twin General Electric T700-401 engines, a Rockwell laser-guided *Hellfire* system, plus enhanced survivability and cockpit design innovations. USMC crews have the option of arming from a variety of ordnance, depending on the anticipated battlefield scenario.

USCG HH-65A Modifications

Grumman St. Augustine, a division of Grumman Corporation, was selected by the U.S. Coast Guard to modify and equip three of its HH-65A *Dolphin* helicopters with a TALON decklock system for operations at sea. The system contains a probe that locks into a grid system on the helicopter landing pad situated aft on USCG cutters. The probe locking device facilitates landing during bad weather in heavy seas. It also permits the helo to be safely shut down after landing to eliminate any danger of rotor blade injury to the aircraft's handling crew. The decklock system can be removed for land-based helicopter operations.

Recce AV-8B

The Naval Air Development Center, Warminster, PA, is investigating the concept of providing forward-based responsive reconnaissance (recce) to a ground commander using the V/STOL AV-8B. A pod will be installed on the centerline of the recce *Harrier II* to carry the expeditionary tactical air reconnaissance system (ETARS), consisting of an infrared line scanner (down-looking, low-altitude, high-speed, day/night sensor), video recorder (for ground station playback) and a data annotation system (for latitude, longitude, time and airspeed).

The medium and large Marine air-ground task forces have recce capability in the F/A-18. ETARS, in concert with the AV-8B night attack program, will provide the smaller Marine expeditionary units with mobile air reconnaissance 24 hours a day.

AWARDS

Collier Trophy

The 1987 Robert J. Collier Trophy went to NASA's Lewis Research Center and the NASA/Industry Advanced Turboprop Team, Cleveland, OH. Awarded annually by the National Aeronautic Association, the award recognizes the greatest achievement in aeronautics or astronautics in America. The winners were honored for developing the technology and testing advanced turboprop propulsion systems, which offer dramatic reductions in fuel usage and operating costs for subsonic transport aircraft.

SecNav Energy Conservation

FY 87 Secretary of the Navy Energy Conservation Awards went to the following aviation units: *Forrestal* (CV-59), large ship; VP-6, aviation squadron; NAS Brunswick, ME, large shore; Naval Weapons Center, China Lake, CA, industrial; and MCAS Yuma, AZ, Marine Corps.

The following civilians from the aviation community were selected by the Department of Energy as winners of Federal Energy Efficiency Awards: Dan Quagliarello, Naval Air Systems Command, and Richard Iwamoto, Pacific Missile Range Facility.

Noel Davis Trophy

The 1987 winners of the Noel Davis Trophy for mobilization readiness are reserve squadrons HS-75, VAQ-209, VF-301, VFA-303, VP-94 and VR-57. Donated to the Navy by Harry F. Guggenheim, the trophy was first presented in 1927. It symbolizes "the best" in the Naval Air Reserve Force.

The award is named in honor of LCdr. Noel Davis, a pioneer Naval Reserve aviator who was killed in a plane crash while preparing for the first New York to Paris flight — 24 days before Charles Lindbergh's successful solo transatlantic crossing.

Isbell Trophy

The 1987 Captain Arnold Jay Isbell Trophy for overall excellence and superior performance in air antisubmarine warfare was awarded to HS-3, HSLs 32 and 42, VP-10 and VS-30 in the Atlantic Fleet; and HS-14, HSLs 33 and 43, VP-47 and VS-21 in the Pacific Fleet.

Sponsored by the Lockheed-California Company, the award honors the ASW commander under whose leadership planes and escort carriers operating in the Atlantic during WW II developed into a powerful combat force. Capt. Isbell was killed in action in 1945 while serving aboard the aircraft carrier *Franklin*.

PROFESSIONAL READING

By Cdr. Peter Mersky, USNR-R

Guenther, Ben and Jay Miller. *Aerofax Datagraph 3: Bell X-1 Variants*. Aerofax, Inc., Arlington, TX. 1988. 64 pp. Illustrated. $12.95.

A fascinating look at American post-WW II experimental aircraft, this latest volume from Aerofax showcases the Bell X-1 series of rocket-powered aircraft — the most famous of which is one of the three X-1s that Chuck Yeager flew to break the sound barrier in October 1947. The text is full of information and data, but the real meat of this book is the large number of high quality photos detailing the X-1 series, including a nice selection of views showing the many color schemes these early planes carried.

The center gatefold also carries side views of all the X-1s. Modelers of these planes are well served and will have no trouble finding just the right view to complete their scale representations. Each aircraft's career is detailed, along with dates and performance figures of every flight.

Even if your interest is not in the world of X-planes, this book is certainly worth a look, as it covers a phase of U.S. aviation which has passed.

Dorr, Robert F. *Vietnam MiG Killers: Deadly Duel Over Vietnam*. Motorbooks International, 729 Prospect Ave., Osceola, WI 54020. 1988. 128 pp. Illustrated. $24.95.

This is a large format picture book with lots of beautiful color shots of aircraft which shot down at least one MiG in Vietnam. It focuses on the Air Force and the Navy's record is limited to one chapter.

There are a few minor errors. The F-8 scored 18 *confirmed* kills, with a 19th in 1972 sometimes loosely credited, since the North Vietnamese pilot bailed out rather than fight the two oncoming *Crusaders*. Several other kills are official "probables." The photo of a VF-111 F-8, with what appears to be two MiG silhouettes on the fuselage strakes, raises questions. VF-111 scored one kill in F-8s, in 1968, and one in F-4s in 1972. Thus, an F-8 with two kills is inaccurate and the explanation for the double marking must be elsewhere.

The sequence showing a MiG-17 "under fire" is, in fact, the December 1967 engagement in which Dick Wyman scored a kill after two squadrons of F-8s took on a small number of MiGs in a violent dogfight.

The serious reader will find few new details on MiG kills but the book makes for pleasant browsing.

Dorr, Robert F. *Air War Hanoi*. Sterling Publishing Co., 2 Park Ave., New York, NY 10016. 1988. 190 pp. Illustrated. $24.95.

Robert Dorr has taken his turn at a history of the air war in Vietnam, and it is one of the best written books on the subject. While his emphasis is on Air Force action, the Navy and Marine Corps are treated in sufficient detail, including the longest account yet published of the MiG-21 kill by VMFA-333 in September 1972 when a Marine F-4 flown by a Marine aircrew destroyed the North Vietnamese fighter.

Many of the photos are new and illustrate the aircraft involved in operational circumstances, many times on actual missions. Aircraft development, subsequent models and weapons are at the book's core. There are details of various operations — Proud Deep, Dewey Canyon and Lam Son — told in adequate depth. Maps and charts round out the graphic content of this fine effort which has a refreshing writing style.

This book is one of the top five on the Vietnam air war. I highly recommend it.

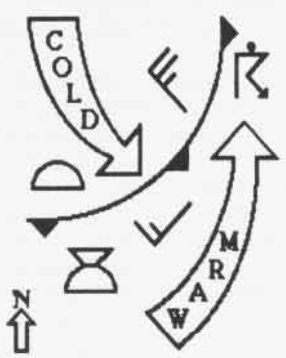
WEATHER FRONT

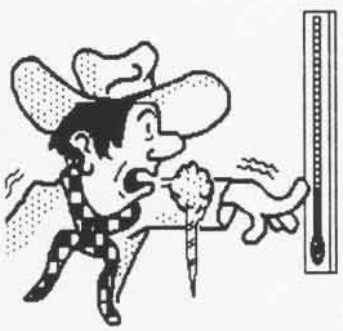
Cold Fronts

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

It is the cold front that is most responsible for the big changes in weather this time of year. A cold front is no more than the leading edge of an advancing cold air mass from higher latitudes pushing southward. Speed of movement averages from 15 to 25 knots. At the surface, warm air is overtaken and forced aloft. This flow creates a favorable condition for the development of thunderstorms, often with their associated hail, lightning and clear icing conditions aloft.

The area of precipitation along the cold front is usually showery and limited in nature. However, with slow-moving cold fronts, the band of weather is usually much wider. Colder temperatures, decreased humidity, gusty northwest surface winds and clearing skies are typical conditions observed after the passage of a cold front. The combination of high winds and rapidly falling temperatures brings increasing importance to awareness of the wind chill factor.





The passage of some cold fronts has taken place in a rather spectacular manner, particularly the block-buster record breakers. Consider the shock of the residents of the tiny western town of Browning, Montana, in January 1916. In one 24-hour period, the citizenry watched the mercury dive from plus 44 degrees Fahrenheit to 56 degrees below zero — an unbelievable plunge of 100 degrees. This bone-chilling event is still retained in the record books.

Kudo

I anxiously await the next article in *NANews* written by Dr. Malcolm Muir, Jr. His eloquent description and close-up observation — "Hooked But Not Trapped," May-June 1988 — of carrier ops from elevator positioning to cat shots and traps made delightful reading. His respect for the job performance of newly assigned flight deck crewmen, as well as the responsibilities of the commanding officer, was vividly described. A wonderful addition to your 1987 Year in Review issue.

Capt. Phil Fahs, USNR(Ret.)
3418 Lake Country Ct.
Dallas, TX 75234

Locator

I was a member of VB-139, Fleet Air Wing Six, from April 1943 to March 1944, and want to contact surviving officers.

James H. Moore
P.O. Box 1647
Lake City, FL 32055

I wish to hear from Navy pilot Robert Ellsworth Bowlby, USNR, NATC, Corpus Christi, TX, 1945. Could mail memorabilia to interested relatives.

J. McCluer
2202 W. North Loop #229
Austin, TX 78756

Information Wanted

I have been commissioned to write a book titled *A-4 Skyhawk at War*. I wish to obtain photographs of the following: USN and USMC A-4C/E/Fs and TA-4Fs taken during the Vietnam war, Argentine Navy A-4s, combat damage, and LCdr. Theodore R. Swartz of VA-76 on 1 May 1967 aboard CVA-31 after his MiG-17 kill. I also need details of USN and USMC A-4 combat and operational losses during Vietnam and the breakdown, SAMs, AAA, etc. One chapter will tell the story of a USN A-4 squadron on Yankee Station and a USMC A-4 squadron based at Chu Lai and their combat deployments, aircrew photos, etc. Any information will be greatly appreciated.

Salvador Mafe Huertas
P.O. Box 11017
46080 Valencia, Spain

I am researching a book to be titled *Axis Aircraft in Allied Hands*. In November 1945, an ME-262 crashed on takeoff from NAS Patuxent River, MD. It was destroyed and the pilot slightly injured. I wish to obtain photos showing the crash and will reimburse all expenses.

Norman Malayney
519 Semple St. #3
Pittsburgh, PA 15213-4315

I request answers to the following questions:
1. Is there a Navy aircrewmen's association?
2. Has there been or will there be a reunion of AEWBARRONPAC?
3. Where can I obtain patches from NAS/NATTC Glynco, GA; NAS Memphis, TN; and NAS Barbers Point, HI?

Harry Kooyman
1010 Fernridge SE
Grand Rapids, MI 49506

I am currently researching a project on the Vietnam conflict. I wish background information on *all* U.S. casualties (KIA or accidental death — USN, USMC, USA, USAF, USCG and civilian), unit to which individual was assigned, unit's base, locale incident occurred, country, etc. I have all names, paygrades, etc., but need supporting material.

David W. Schill
132 Harding Ave.
Moorestown, NJ 08057

I am writing a book on the history of the U.S. Naval Test Pilot School and am interested in corresponding with graduates concerning aircraft flown, anecdotes and thoughts on the curriculum. I would appreciate hearing from interested aviators.

Terry Treadwell
45 Forest View Road
Moordown, Bournemouth BH9 3BH, UK

French Aviation Buff

I am a French aviation enthusiast, private pilot, photographer and collector of aviation memorabilia. I wish to make contact with any U.S. Naval Aviation enthusiasts who would like to exchange information, photos, insignia, etc. I am also interested in corresponding with U.S. Navy pilots who have been exchange officers with the French navy.

Antoine J. Givaudon
34 La Gaillarderie
78590 Noisy Le roi
France

Reunions, Conferences, etc.

VT-10 (1942-45) reunion, January 12-15, 1989, Hanalei Hotel, San Diego, CA. Contact Tom Powell, 860 Piccard Ave., San Diego, CA 92154, (619) 690-3528.

Beeville Link Instructor Waves (1943-45) reunion, April 10-15, Deltona, FL. Contact Marion F. Goffin, 2291 Alton Rd., Deltona, FL 32738.

NAAS Barin Field reunion, April 15-16, OLF Barin Field, Foley, AL. Contact Ms. Hattie Smith, P.O. Box 1117, Foley, AL 36536, (205) 943-3291, or Cdr. Bruce Ferguson, Autovon 868-7376.

VPB-123 reunion, April 25-30, Anaheim, CA. Contact Norman H. Maffit, 14709 Carlos Cir. #70, Rancho Murieta, CA 95683.

USS Hoggatt Bay (CVE-75) and VC-14 reunion, May 1989, Seattle, WA. Contact D. L. Canady, 5868 Argyle Way, Riverside, CA 92506, (714) 787-8666.

USS Ticonderoga (CV/CVA/CVS-14) reunion, May 4-7, Patriots Point, Charleston, SC. Contact Dallas B. Long, Jr., P.O. Box 1442, Wilmington, NC 28402, (919) 763-1251.

USS Ommaney Bay (CVE-79) and VC-75 reunion, May 25-28, Seattle, WA. Contact Richard D. Whisner, 4028 Seymour St., Riverside, CA 92505, (714) 687-3366.

Interservice/Industry Training Systems Conference, November 29-December 1, Orlando, FL. Contact Conference Publicity Office, Naval Training Systems Center, Orlando, FL 32826-3224, (407) 380-8208.

PBM Martin Mariner, Mars, Marlin and Seamaster reunion, April 26-29, Anaheim, CA. Contact Larry Lammers, 18931 Santa Catherine, Fountain Valley, CA 92708-6314, (714) 962-3453.

VBF-87 reunion planned. Former members who served aboard USS *Ticonderoga* (CV-14) in WW II contact Jerry Shearer, 17225 32nd Ave. S. #C-2, Seattle, WA 98188, (206) 241-5756.

PBY Catalina Association reunion, April 26-30, Anaheim, CA. Contact James P. Thompson, 1510 Kabel Dr., New Orleans, LA 70131, (504) 392-1227.

NANews

A-B

C-H

1988 Index

NAVAL AVIATION NEWS

Remember...