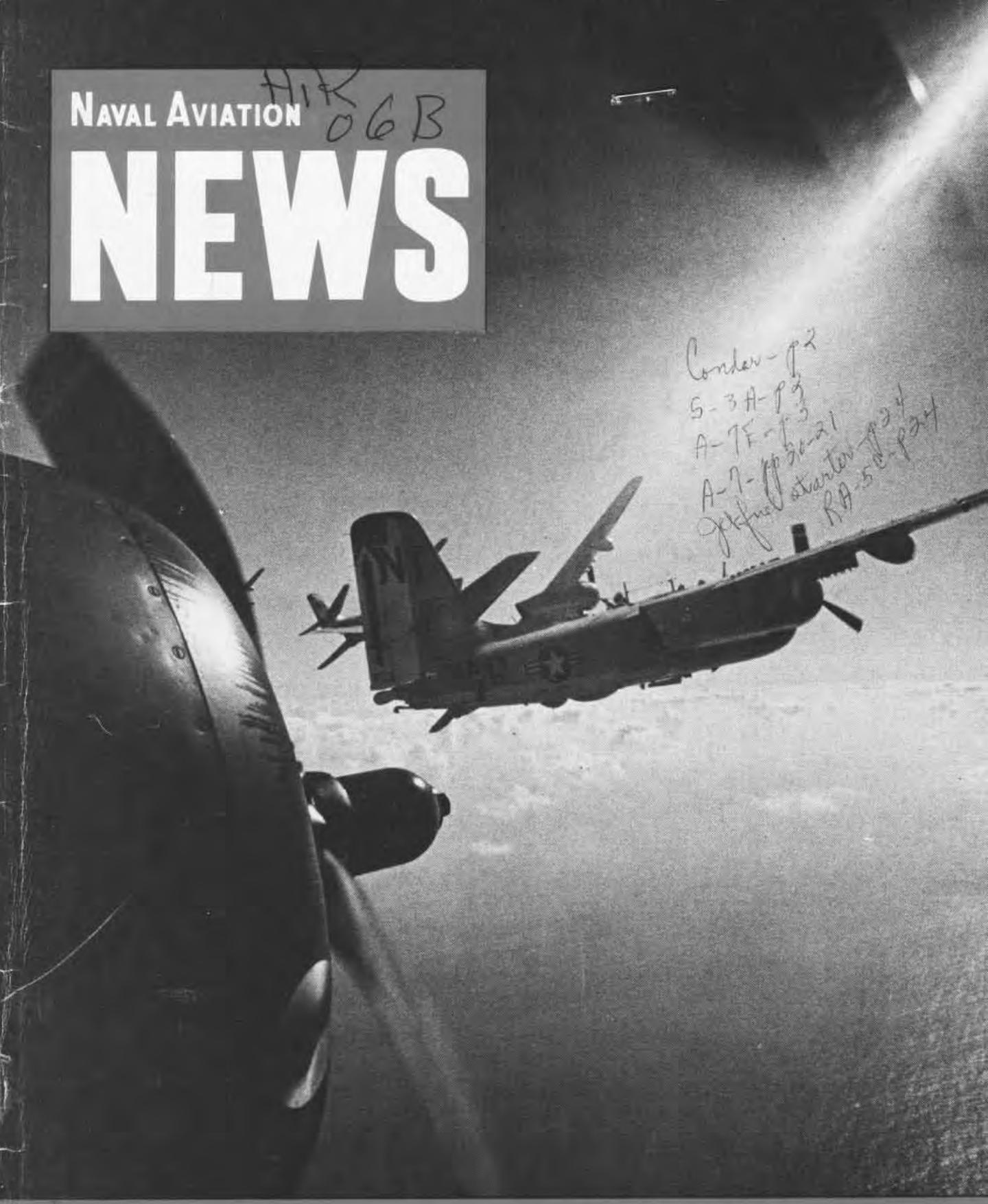
NAVAL AVIATION NEWS



51st Year of Publication

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CALM COURAGE

From the start, the exploration of space has been a hazardous adventure. The voyage of Apollo 13 dramatized its risks. The men. . . epitomized the character that accepts danger and surmounts it. Theirs is the spirit that built America. With gratitude and admiration, America salutes their . . . achievement.
– President Richard M. Nixon.

NAVAL AVIATION NEWS

Vice Admiral Thomas F. Connolly
Deputy Chief of Naval Operations (Air)

Rear Admiral G. E. Miller
Assistant Deputy Chief of Naval Operations (Air)

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PH1 Robert E. Woods reports with pictures and text on VS-33, one of the West Coast ASW squadrons.

Attack Carriers — how many are enough? 12

Admiral Thomas H. Moorer, Chief of Naval Operations, answers the question and talks about the carrier concept in this reprint from Navy, the Magazine of Seapower.

Naval Aircraft: Corsair II 20

This month's center fold opens a new series which will deal with the design and capabilities of naval aircraft.

ASW Aircraft: Part II 28

ASW developments between World War I and World War II and advances during WW II — including the development of carrier-based ASW squadrons and the switch from an all seaplane patrol force to one that mixed sea and landplanes — are discussed in this segment.

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COVERS

PH1 Robert E. Woods flew with VS-33 pilots to photograph this month's cover. The A-7 Corsair on the back cover was photographed by Art Schoeni of Ling-Temco-Vought.

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Air-to-Surface Missile is Tested

First Powered Launch of Condor Made

The first powered launch of the *Condor* air-to-surface guided missile was made at the Naval Weapons Center, China Lake, Calif., late in March.

The Naval Air Systems Command reported that the *Condor*, which was launched from an F-4 *Phantom* at Mach .58, reached a speed of Mach .95 for 147 seconds and flew a pre-programmed trajectory to impact.

The new missile had previously undergone 20 successful firings of the new solid propellent motor – including an airborne captive flight on a QF-9J drone.

The North American Rockwell-built *Condor* is an electro-optically guided conventional warhead weapon.

Navy OK's S-3A Mockup Design

First Flight Slated for Early '72

A 60-member Navy evaluation team of aircraft and ASW specialists approved the S-3A weapons system mockup after a five-day review held in March at Lockheed-California in Burbank. The external configuration of the S-3A was approved by the Navy project office last December.

Each member of the review board inspected the mockup from the standpoint of his own personal involvement in ASW carrier operations. There were seven teams concerned with airframe, propulsion, armament, avionics, crew environment, ship installations, support equipment, and maintainability.

The Navy project manager reported that the results of the mockup review were gratifying and that design details had been firmed up with a minimum impact on weight and cost.

J. Fred Lashley, vice president and general manager of Navy programs at Lockheed-California, said, "We were able to work out solutions to problems and establish excellent communication with members of the review board. The results of the mockup review are very encouraging."

Fabrication and assembly of the first of six research and development aircraft will begin later this year. The first S-3A flight is scheduled for early 1972 and fleet introduction about two years later.

Student Aviators Get MS Degrees

First Graduates Under New Program

The first 21 naval officers to complete the Navy's new Master's Degree Program recently were awarded MS degrees in aeronautical systems during formal ceremonies at NAS Corpus Christi.

The program, which started at Corpus last September (and earlier in the training command at NAS Pensacola) is a cooperative effort between the Navy and the University of West Florida to provide Naval Aviation students an opportunity to earn a master's degree while they progress through naval flight training at Pensacola and Corpus.

Dr. H. B. Crosby, President of the University of West Florida at Pensacola, presented the degrees. He told the recipients, "You are pioneers . . . representing the Navy's first graduates in a farsighted program."

The program was originated to provide Naval Aviators with a well developed background in all phases of man-made systems in aerospace and related aeronautical environments.

Vice Admiral Bernard M. Strean, Chief of Naval Air Training, headquartered at NAS Pensacola, presented wings to the master's degree students who were simultaneously graduating from flight training.

"I envy you the challenges ahead . . . this program will enhance the Navy's capability in aviation as well as that of you youngsters," the Admiral said.

Guam Aids NASA Eclipse Study

Recovers Aerobee 150 in the Atlantic

USS *Guam* (LPH-9) took part in the recovery operations of NASA's 1970 Solar Eclipse Project. Her mission was to recover an *Aerobee 150*, one of over 32 rockets launched during the recent eclipse by NASA from Wallops Island, Va. The rockets were used to measure and record atmospheric and solar data from the upper layers of the atmosphere during the eclipse.

Guam, commanded by Captain Richard R. Renaldi, was at her station 90 miles southeast of Wallops Island where the *Aerobee* splashed down seven minutes after launch. Within 20 minutes, the rocket was returned to the carrier.

The payload was 15 inches in diameter, 96 inches long and weighed 236 pounds. It reached a maximum altitude of 513,221 feet and a maximum

velocity of 5,170 feet per second.

This was *Guam's* second NASA recovery mission. The first was the recovery of astronauts Pete Conrad and Dick Gordon in *Gemini 11.*

A-7E System Accurate on IFR

Five Miles Off on 2,637 Mile Hop

The new A-7E *Corsair II* proved its accuracy in long-distance computerized navigation on an instruments-only flight recently, when Captain Carl Birdwell flew it 2,637 miles across country and arrived at his destination five miles off course.

Birdwell, the Navy's deputy project manager for the Vought A-7, used only the *Corsair II's* computer-oriented navigation equipment on the flight. On the first leg, 1,419 miles from NAS Lemoore to Dallas, he arrived one mile off his course. On the 1,218-mile Dallas to NATC Patuxent River leg, he indicated four miles off course. "The flight demonstrated the accuracy built into the *Corsair II's* navigation system," Birdwell said.

He relied on the head-up display, computer, inertial platform and Doppler radar from takeoff to landing. The equipment was updated once, when he departed Dallas, he said.

'Blues' Need Maintenance Ratings

Apply by Letter to BuPers via C.O.

The *Blue Angels* have announced a need for men in the following rates/ratings: AO3, AZ2, ASM1, ABH1, ASE2, PH2 and DM2.

To be eligible for the aviation maintenance billets, an individual must be fully qualified in the maintenance of the F-4 *Phantom* and its support systems. The PH's and DM's work in the team's public affairs office.

A tour with the *Blues* is two years and counts as preferred sea duty or neutral time. This year the *Blues* will perform in some 50 different locations in the U.S. and overseas; team members can expect to travel to half of the locations.

Interested personnel should submit a letter of request to the Chief of Naval Personnel, via their commanding officer and Commanding Officer, Headquarters Flag Unit, Chief of Naval Air Training.

HMH-463 Sets Transport Record

27,766 Passengers Lifted by Mid-Month

Da Nang-based Marine Heavy Helicopter Squadron 463 set a passenger transportation record in March when 27,766 passengers were lifted by mid-month. The squadron's previous high was in September 1967 when 23,095 passengers were carried.

HMH-463, the Marine Corps' only heavy helicopter squadron in Vietnam, hauled 9,717 tons of cargo and transported 104,696 passengers in 2,335 flight hours during the first three months of this year.

Additionally, the squadron has made 1,032 tactical air recoveries of downed aircraft for a $300-million saving since its May 1967 arrival in the Republic of Vietnam.

A Message of Importance

The 25th Anniversary of the end of WW II is approaching and, to mark the historic event, *Naval Aviation News* would like to tell its readers how it was and what it meant – in the words of those who lived it.

If you would like to share your personal recollection of the period from the end of hostilities until the formal surrender, we would like to hear from you. Any photographs that you have would also be appreciated. (We will make sure thay are returned.) Please include your name, rank or rate, and location at that historic time.

Send all information to:

Naval Aviation News
Rm. 3828 Munitions Building
Washington, D.C. 20360

To meet our deadlines, material must be received by June 15.

THE NET WORKS AS ADVERTISED. *When this F-4B Phantom II lost the wheel from its right main landing gear on an approach to USS Forrestal (CVA-59), the barricade was rigged. The pilot, Lt. John Best of VF-11, nosed into the protective web amid a shower of sparks and a stream of smoke from the wheel-less gear. The emergency landing was textbook perfect.*

GRAMPAW PETTIBONE

Automated Disaster

In these days of automation and computers, accidents are still caused, and must be prevented, by people.

The 27-year-old lieutenant was on his second deployment in an F-4J *Phantom II*. This first flight after a nine-day, in-port period would be a good warm-up and back-in-the-saddle hop. As the flight leader, he briefed the combat air patrol mission, including for the first time the possibility of accomplishing a Mode I (fully automatic) ACLS (automatic carrier landing system) recovery.

Preflight, manning and launch were uneventful, and the routine mission went smoothly. The lieutenant called for and received marshal instructions for a Case II, Mode I, recovery, an approach which he had previously flown to minimums on two occasions. Case II involves descent through IFR conditions with a VFR recovery. The flight departed the marshal point on time, established radio contact with the ACLS radar controller at eight miles and the pilot engaged the autopilot. He received a "locked on, report coupled" from the controller at about six miles and then coupled his aircraft to the ACLS shortly thereafter, a fact which he relayed to the controller.

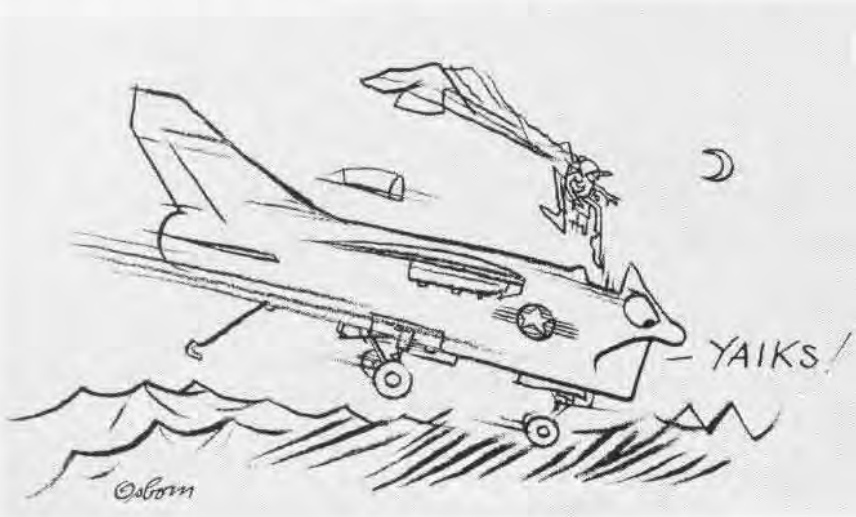
The sun was at a position about 15 degrees to the left of the ship's heading and 30 degrees above the horizon. The glare from the sun and off the water was intense, and the pilot and his radar intercept officer (RIO) realized that they were going to have difficulty spotting the datum lights and the meatball in the lens system. Both, however, strained to see the ball in order to judge the performance of the automatic system.

The controls reacted promptly and smoothly to the data link commands, and the pilot judged it to be an excellent line-up. From the instruments, they found the distance, speed and altitude checks to be flawless. Because his view of the ship was almost obscured by the sun, the lieutenant was vaguely glad he was coupled. (Several pilots from the same recovery period regarded the approach as actually under instrument conditions because of the intense glare.)

Nearing the ship, he received a last transmission from the controller, "3/4 mile, call the ball." He immediately initiated the prescribed call indicating "Clara" (no ball in sight) and that he was coupled. As he waited for the LSO's response, he continued to search for the ball and scan the instruments. At what he judged to be minimum wave-off distance, he could see the deck, which looked clear.

As the *Phantom* crossed the ramp, the pilot's attention was suddenly focused to the right side of the landing area – to a shape moving out onto the deck. He applied left stick, dropped the left wing,then centered it quickly to engage the #1 wire. The aircraft rolled out slightly left of center; the last-second correction had introduced only a small displacement. The RIO had not felt uncomfortable about the approach but noted the same shape as the aircraft crossed the ramp. He quickly grasped the alternate ejection handle as they began the arrestment.

The pilot stated that his first conscious indication that something was wrong was during the roll out as they narrowly missed an RA-5C *Vigilante* which was being taxied out of the parking area. As they came to a stop, he realized that maybe he hadn't received the LSO's acknowledgement of his call. Both occupants of the *Phantom* looked about the flight deck and



ILLUSTRATED BY Osborn

simultaneously realized that there were no yellow shirts ready to control their deck movements. The RIO was the first to voice the fact, which was by then obvious to both, "We must have landed on a fouled deck."

Grampaw Pettibone says:

Whew! This one leaves me breathless! This is almost an exact repeat of a real disaster which occurred on the same CVA exactly six years ago when an F-3 *Demon* landed on board at night during a re-spot. That time there were two fatalities, ten serious injuries, four aircraft destroyed and four more substantially damaged. Why do we have to learn the same lessons over and over again?

The poor pilot was really booby trapped into this one. True control of the situation should have been exercised on board that ship. A host of safety interlocks, NATOPS procedures and just plain good common sense were inactivated and bypassed to precipitate what could have been another tragedy.

The LSO frantically called a wave-off to the approaching *Phantom*, but was on the wrong frequency. He had just arrived on the platform which was not equipped with flares or lights for signaling a fouled deck. Two separate systems, the deck closed telelight in CCA and an indicator from the LSO foul deck circuit, specifically designed to prevent such a mishap, were purposely disabled. CCA personnel, therefore, had no way of knowing that the deck was closed. The air boss and his assistant were,of course, concentrating on the launch and were as surprised as everyone else to see the *Phantom* roll out on deck.

The air officer had robbed himself of any possible way of quickly signaling a wave-off to an aircraft in the groove. As in the previous disaster, the major responsibility rests on his shoulders: a man whose great efforts and months of successful operations often go unrewarded, but whose failures, as well, go undisciplined.

Non-Acrobatic Elephant

The RA-5C *Vigilante* is an extremely valuable supersonic reconnaissance system equipped with a multitude of highly complex sensors for recording electronic and visual information over enemy territory. What it is not . . . we'll get to that later.

The aircraft was being flown on a test flight acceptance check following its delivery to the squadron from progressive aircraft rework.

The well qualified, senior, aggressive Naval Aviator was briefed by the squadron operations duty officer and maintenance quality assurance personnel on the test requirements. After takeoff, the emergency retraction switch had to be used to get the landing gear up because the gear handle did not work. A quick trip to 35,000 feet and back, in the positive control airspace without clearance, completed the first part of the flight.

The remainder of the test required slow flight at a lower gross weight, so the pilot selected afterburner and went into a series of acrobatic maneuvers to burn down. First several wingovers were performed; then he accelerated to .95 Mach at 12,000 feet and pulled up, initially intending to do a barrel roll to the left. This was quickly modified to a loop, and he applied about 2½ G's, using visual reference to the horizon and the attitude indicator. At 90 degrees nose up, the sun partially blinded him and, as the big craft continued to 120 degrees nose up, it ran out of airspeed. The pilot attempted to pull the nose down through the horizon with back stick pressure; however, the aircraft suddenly snapped violently to the right and entered inverted post stall gyrations.

Various control inputs with stick and rudder caused the yawing oscillations to stop and violently reverse several times. The plane did roll to an upright attitude; but, the uncontrolled gyrations continued from 27,000 feet down to 9,000 feet when the pilot initiated command ejection for himself and the radar attack navigator in the back seat.

The flight terminated abruptly when the machine hit the ground in uncontrolled flight, after the crew had ejected.

Both crewmen landed safely with minor bruises and were returned to home base by the SAR helo.

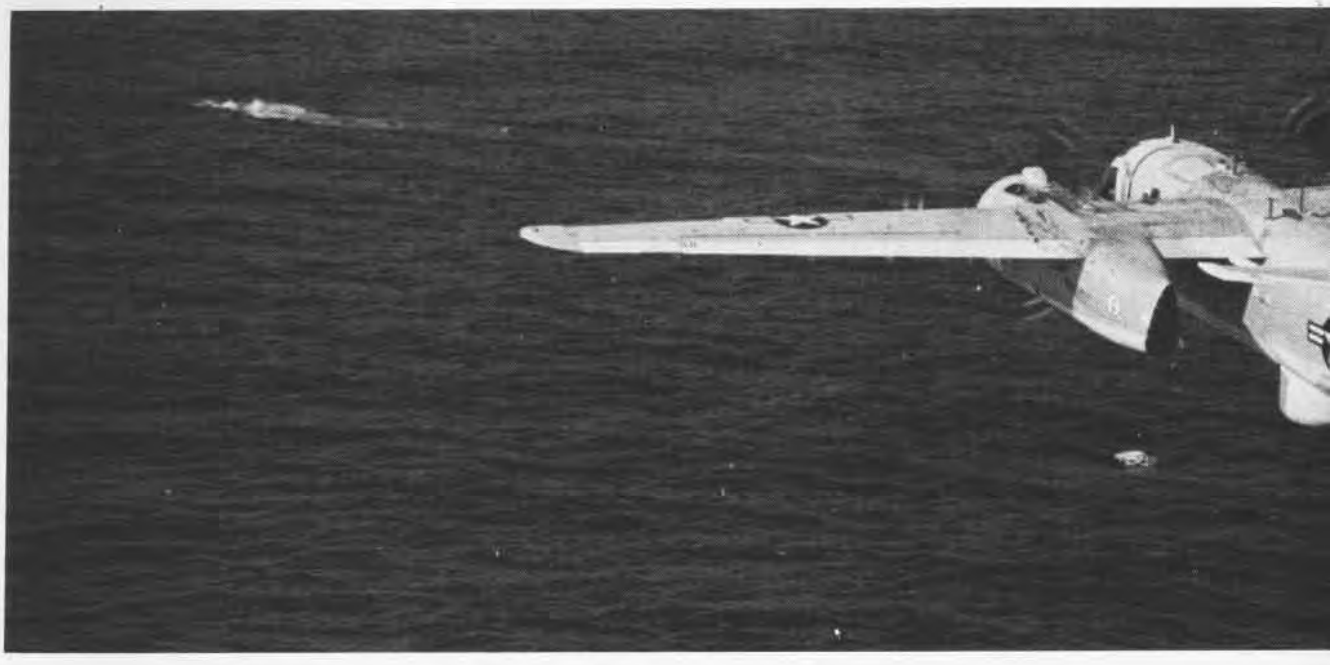
Grampaw Pettibone says:

Jumping Jupiter! If the *Vigilante* was expected to do acrobatics, procedures would have been published; they haven't been. Even the best of our fighters won't do a 2½-G loop at 12,000 feet. In spite of poor entry procedure and technique, and nonexistent stall/spin recovery procedures which might have prevented this accident, the primary error by this pilot was attempting the maneuver in the first place. In combination with his other omissions/commissions, the lack of mature judgment becomes self evident.

This flamboyant tiger will fly no more. As a fighter pilot, he might'a been hard to beat. As a professional Naval Aviator, he is one we can and will do without. The Navy can ill afford to cater to the personal whims and ego-satisfying showmanship of those few individuals whose immaturities dictate the fate of lives and millions of dollars worth of equipment.

FORTU FAVO THE

By PH1 Robert E. Woods



NERS BRAVE

VS-33 is an antisubmarine squadron home-based at NAS North Island in San Diego. Inscribed on its insignia is *Fortes Fortuna Juvat* — roughly translated: Fortune favors the brave.

Ever since its commissioning in April 1960, VS-33 has tried to prove the validity of that motto as it performs its mission of detecting, tracking and destroying enemy submarines.

As a unit of CVSG-59, the squadron has completed five Western Pacific deployments while garnering its share of awards — the most recent being this year's VS-type Battle Efficiency Award for the Pacific. To win a Flatley Flight Safety Award, VS-33 flew more than 60,000 accident-free hours over the past eight years.

Flying S-2E *Trackers,* twin-engine aircraft equipped with updated ASW detection gear, VS-33 is tasked with all-weather ASW protection of convoys and naval task forces; sea and coastal patrol; guarding against enemy submarine penetrations and submarine-launched attacks; and the destruction of enemy shipping — within the S-2E's capabilities.

The squadron was involved in the *Apollo* recovery missions while operating aboard USS *Bennington* (CVS-20) and USS *Hornet* (CVS-12), both now deactivated. As a unit under Commander Fleet Air San Diego/Fleet Air Wing 14, VS-33 also provides operational readiness training for antisubmarine warfare forces in the Pacific.

During World War I, the strategic and tactical importance of submarines was underscored when, over a four-year period, more than 11 million tons of shipping were sunk by German U-boats. The increased activity of the U-boat in WW II led to the adoption of new ASW tactics and devices. With these improved tactics and equipment, aircraft attacks on submarines became more and more successful.

The tactical purpose of the submarine is to destroy naval and commercial shipping. Today, with the advent of nuclear power, submarines can cruise underwater almost indefinitely. And many submarines, including those of the Soviet Union, are designed to fire guided missiles at inland targets from a submerged position. These new capabilities have created a greater demand for improved antisubmarine warfare tactics and equipment.

The *Trackers* of VS-33 are capable of finding and destroying submarines single-handedly or in connection with other air, surface or sub-surface forces. The S-2E's carry an airborne sonar/receiver, radar and magnetic detection devices for locating submarines. Their

VS-33 GROUND SUPPORT *personnel are responsible for maintaining the S-2E Trackers. At left, a mechanic goes over a checkoff list after the plane has been readied for flight. Above is the squadron flight line at NAS North Island. One of the final touches before a flight, below left, is cleaning the observation windows. At right, while the pilot turns up in preflight, a flight line director and ground crewman watch an S-2E engine for possible fire.*

weapons include homing torpedoes and depth charges.

Sonobuoys are the primary detection devices employed by the *Tracker* crews. Dropped in a pattern around the area in which a submarine has been detected, they provide sensitive ears to pry into underwater depths. Basically, the sonobuoy transmits sound waves through the water: echoes from any object struck by the outgoing waves bounce radio signals back to the aircraft. The *Tracker* crews, usually working in teams, can thus localize a submarine's position and keep it under surveillance until a "kill" is made.

Because aircraft make possible the rapid investigation of suspected targets, reduce the time required for surveillance of large areas, and provide powerful detection and kill capability against enemy submarines, they have evolved as one of the primary elements in antisubmarine warfare programs.

With the ever increasing role of the nuclear submarine in modern warfare, VS-33 and similar units which comprise CVS air groups continue to find improved operating methods and equipment to perform their mission.

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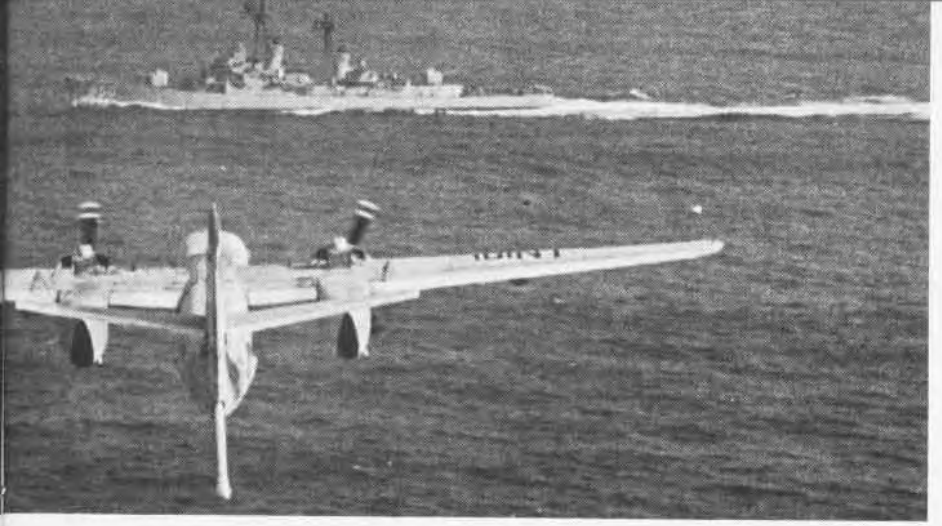


READY FOR A MISSION, *an S-2E pilot unfolds the aircraft's wings on signal from a flight line director, far left. At left, with MAD gear extended, a Tracker approaches a destroyer during operations, and below is a copilot's view of an S-2E in flight.*

THE CNO ANSWERS

ATTACK CARRIERS:

Much has been written and said about the concept and role of attack aircraft carriers in recent months. The challenge to their role has caused many Americans to doubt the feasibility of this concept. Could the famed carriers of WW II and the cold war hold their own and do the job in this Nuclear Era?

The answer is clearly "No" – given those same carriers. If America's global role is to be met, modern attack carriers must be employed.

In many public statements, the Chief of Naval Operations, Admiral Thomas H. Moorer, has explained that the attack carrier concept, while still viable today, can be effectively employed only if the minimum number and modern types of attack carriers can be maintained.

Is the 15 attack carrier concept traditional and outmoded?

This question has been expounded by some critics. It has been said that the number is traditional, that with the ascension of the aircraft carrier and the demise of the battleship after WW II, the attack carrier "inherited" the role of "capital ship" and the right to the number 15 – the number of battleships reportedly maintained from 1921 to 1941 under the Washington Arms Limitation Treaty.

In answer to this allegation, Admiral Moorer makes clear that the number is neither traditional nor arbitrary and that it is, in fact, erroneous, as he points out in the article that follows.

The article is reprinted from Navy, The Magazine of Sea Power *and is the final portion of a memorandum presented to the Secretary of the Navy, John H. Chafee, by CNO.*

NANEWS feels that by presenting this article, our readers will gain a clearer insight into the attack carrier question and into the numbers and types needed to carry out the carrier mission in future years.

FORCE LEVELS

Q. Is it true that the force level number of 15 attack carriers is simply a tradition based on the fact that the Navy has maintained 15 carriers since World War II?

A. No, this recently publicized assertion has absolutely no basis in fact. At the end of WW II, during which the Navy had more than 100 carriers of all types, there were 20 carriers in the active fleet which could be classed as attack carriers. By June 1950, at the beginning of the Korean War, the number of attack carriers had been reduced to seven. The loss of all of our tactical airfields in Korea during the first days of that conflict created an urgent requirement for carriers to

how many are enough?

provide the desperately needed air support for our ground forces. Fortunately there were relatively new *Essex*-class carriers laid up in mothballs in the reserve fleet. By reactivating these ships, the number of attack carriers was increased to 16 by the war's end.

Since 1953, the number of attack carriers has fluctuated between 19 and 14 to meet changing defense requirements and budget constraints.

For the past five years a total of 16 attack carriers have been operated at a very high tempo to meet our defense needs.

Q. What is the currently authorized carrier attack force level?

A. Fifteen attack carriers plus an antisubmarine carrier acting in an attack carrier role for the duration of the war in Southeast Asia.

Q. How is the attack carrier force level determined?

A. The attack carrier force level is determined by the requirements of national strategy derived from our foreign policy. Attack carrier force levels reflect the portion of the total tactical air requirement that it is necessary to operate from sea bases. The desired force level is affected by the geographical areas and the contingencies considered.

A major element of our foreign policy is predicated on overseas alliances. Our overseas allies depend upon our support, which must come by sea and the air over the sea. There is no viable plan for overseas military operations of the Army, Navy, or Air Force that does not depend on our free use of the seas. For example, 98 percent of all the supplies which have gone to Vietnam has been carried by ships.

Our present national strategy relies heavily upon military forces deployed overseas – forces capable of responding to a spectrum of contingencies in overseas areas of primary national interest. These forward deployed forces provide this country with flexible and rapid response to whatever pressures our potential enemies may apply.

Even if our future national strategy were to be changed to withdraw our deployed military forces, our requirements for defense would still extend overseas. The capability of the United States to fight for an extended period in defense of its vital national interests is dependent on our ability to maintain the flow of materials and oil over the seas. The sheer bulk of the daily use of oil for military and industrial needs precludes stockpiling quantities for more than short-term needs.

TACTICAL AIR POWER

An effective tactical air capability is essential to sustain our general-purpose and logistic-support forces against a determined enemy using modern weapons. Sea-based and land-based tactical aircraft are required to provide support for our forces in the areas of the world where we must be prepared to fight.

Land-based tactical aircraft can be employed when their land bases have been adequately prepared, provisioned and defended, and when they are located within range of the area of conflict.

Sea-based tactical aircraft are required when land bases are not available or do not have the capacity to meet the required tactical needs. The attack carriers can provide this sea-based tactical air power.

In our current national strategy, there are two primary overseas areas critical to our national interest where an adequate base structure under U.S. control is not currently available. They are the Mediterranean and Western Pacific littorals. Attack carrier forces in the Sixth and Seventh Fleets provide the only assurance of a capability for quick reaction to threats to our national security and objectives in these areas.

Attack carriers are also required in the Atlantic and Pacific areas contiguous to the United States. For example, the U.S. response to the Cuban and Dominican Republic crises relied heavily on attack carriers in the Atlantic.

FLEET EXERCISES

Attack carriers operating near the United States in the First and Second Fleets also provide for fleet training and maintenance time in home ports. These carriers may be sent individually to reinforce deployed forces, or the entire fleets may deploy from home waters. In this latter connection, the home fleets conduct frequent maneuvers and fleet exercises, proving new equipments and developing new doctrines for their employment. Not more than one or two carriers of the total are in overhaul at any one time.

The number of 15 attack carriers is based upon commitments as well as empirically established planning factors including maintenance and training requirements, which have been validated through experience.

In the past, when similar deployment cycles and operating conditions prevailed, the carrier commitments dictated by the strategy could not be fulfilled when the force level was reduced below 15.

Q. Does a force level of 15 provide enough carriers to cover contingencies?

A. Recent experience has demonstrated that a force level of 15 carriers is inadequate to prosecute the war in Vietnam and simultaneously maintain the posture dictated by our present strategy. In recognition of this deficiency, the Department of Defense has approved a force level of 16 attack carriers for the duration of the war in Southeast Asia. The Navy was able to

A LONG SPAN *of years and technology separates USS Yorktown (CVS-10) from this artist's concept of the nuclear-powered USS Eisenhower (CVAN-69) whose hull was laid in April. Yorktown, commissioned in April 1943, will be decommissioned in July. During her long history, she served in World War II, Korea and Vietnam, and performed in both attack and ASW roles.*

meet this augmented force level only by employing one antisubmarine carrier in the attack carrier role.

Whether 15 carriers is an adequate number under wartime conditions is open to question. It is not possible to accurately foresee the locales of future conflicts as they relate to the existence of adequate land bases, the political availability of such bases and their survivability in action.

TIME ALMOST GONE

Our capability to augment our active carrier force in time of war or crisis is almost gone. There are no longer any attack carriers in the reserve fleet. Since 1952, nine modern attack carriers have been built. The remaining six attack carriers operating today were launched during or shortly after World War II. Four of these are of the *Essex* class. Even the most modern of the *Essex*-class carriers cannot operate the latest generation of tactical aircraft, the F-4, A-6, RA-5C and E-2. We will soon reach the point where the *Essex*-class air wing cannot survive in the threat environment established by new Soviet tactical aircraft.

As this capability to augment the established attack carrier force from the reserve fleet or from *Essex*-class carriers in the antisubmarine force disappears, so does our flexibility in attack carrier force levels. It is apparent that we will fight future wars with the attack carriers in the fleet at the war's inception.

In summary, a force level of 15 attack carriers of modern design has been determined to be a minimum requirement for the type of conflict we have experienced since World War II and to permit us to meet peacetime deployment requirements giving due consideration to peacetime planning factors. This number may not be adequate to provide the required tactical air power for future contingencies, particularly in view of the steady deterioration of our overseas base structure. We will be unable to compensate for the loss of overseas bases to military force or political action in the future by quickly building up carrier force levels over and above peacetime levels. It takes about five years to build a new attack carrier. There are no longer any modern attack carriers in reserve.

Q. Couldn't the attack carrier force level be reduced by using some form of dual crew arrangement on our carriers, as we do on Polaris submarines, to keep all of our carriers overseas?

A. The Navy has conducted studies to determine the feasibility of additional crews for carriers to increase the number continually deployed. It has been determined that such measures are not economical, efficient or desirable in view of the inherent mobility of the carrier itself with its crew aboard.

In the *Polaris* system, dedicated as a nuclear deterrent, only the deployed ships have maximum effectiveness. The full *Polaris* fleet must be overseas ready to fire its missiles in the first few critical hours of a nuclear war.

By contrast, attack carriers must be ready over a longer span of time, for a wider spectrum of war situations, where sustained capability over weeks

and months is important. Moreover, we need carriers in home waters to react to crises close to the United States. For example, our contingency operations for the Cuban crisis and for the Dominican Republic crisis relied heavily on sea-based tactical air to be furnished by home fleet carriers.

It is most efficient, under peacetime conditions, not to keep all carriers at forward stations. In emergencies, however, 85 percent could be maintained in a deployed status. To keep a larger part of our carrier inventory overseas year in and year out during peacetime would require overseas bases for routine maintenance and repair, and homes and schools for dependents. This would certainly add significantly to our gold outflow problems.

Q. Will the new carrier requested by the Navy, CVAN-69, this year increase the attack carrier force level?

A. No. When CVAN-69 joins the fleet it will not increase the number of carriers in the Navy's active inventory. It will replace one of the old WW II veterans which will then be 30 years old.

Q. Since the nuclear powered *Nimitz*-class carriers are so much more capable than the older ships they will replace, why do we need a one-for-one replacement?

A. Attack carriers must be able to conduct operations at sea against determined opposition, with aircraft capable of achieving air superiority against first-line enemy equipment.

The new *Nimitz*-class carriers are needed to meet the growing Soviet threat.

The WW II *Essex*-class ships in our carrier force cannot operate several current modern aircraft necessary to cope with present Soviet planes and weapons. The *Essex* class will not be able to operate an air wing in the 70's which can survive in the environment of Soviet weapons technology.

As our weapons improve with time and technology, so do those of our potential enemies. In WW II, the *Essex*-class carriers operated about 90 aircraft representing the most advanced technology of that era and able to meet the Japanese threat on better than equal terms. Today, the replacement for the *Essex* will be the *Nimitz*, again capable of operating about 90 aircraft capable of coping with the most advanced Soviet weapons technology.

Q. Why can't our old carriers be modernized instead of building new attack carriers?

A. It is not practical or economical to attempt to further modernize the *Essex*-class attack carriers. These ships have previously been converted from straight deck, hydraulic catapult configuration to angled deck, steam catapult configuration. No growth factor is left.

The *Essex*-class attack carrier cannot operate a number of the newer aircraft already in the fleet, such as the F-4 *Phantom II*, RA-5C *Vigilante*, A-6 *Intruder* and the E-2 *Hawkeye*. A significant fact is that these older carriers experience about twice the landing accident rate with attendant higher cost in lives and aircraft, compared with the larger deck *Forrestal* class. The problem is simply that aircraft size and speed have become excessive for the smaller size WW II carrier decks.

The *Essex* design will be over 30 years old when CVAN-69 joins the fleet. These old ships which have served the Navy well through three wars will simply be worn out.

Q. If the attack carrier force level is reduced, will CVAN-69 still be required?

A. Yes. The *Nimitz*-class carriers would be required even if the attack carrier force level were reduced. The improved capabilities of the *Nimitz*-class carriers would become even more vital if the Navy were required to operate a smaller carrier force, since the smaller the force, the more important it would become for each carrier to have the most capability achievable.

If a reduction in force level becomes necessary, it should be accomplished by retiring older carriers in the fleet, not by cancelling new construction ships; six of the Navy's 15 attack carriers were launched during or shortly after WW II.

The Navy's carrier force must have a regular input of new ships, both to upgrade the capability of the force through the infusion of modern technology and to replace older ships which can no longer meet the requirements demanded of an attack carrier because of design limitations and the fact that old ships simply wear out.

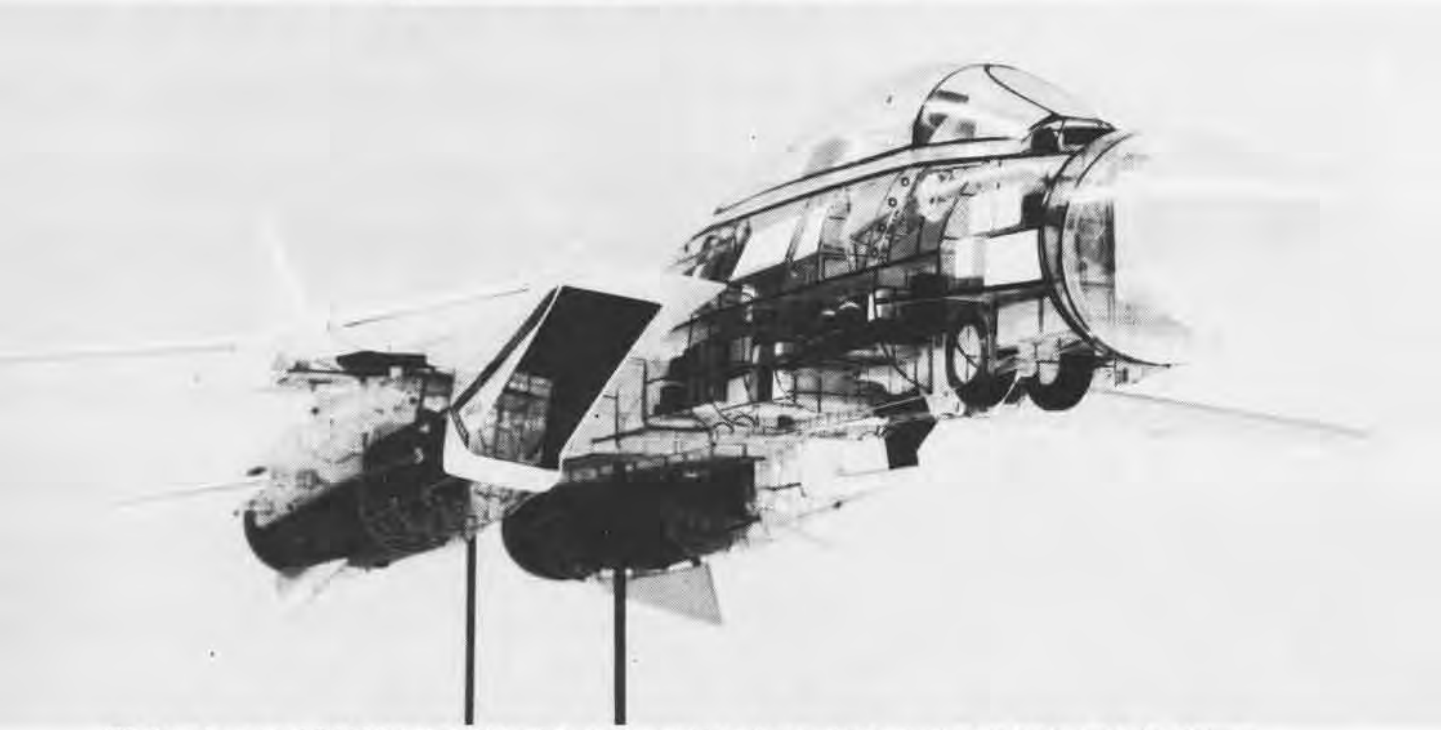
Within a 15-carrier force level, for example, the construction of a new carrier every other year means that attack carriers will reach an age of 30 years before they are replaced — the nominal maximum useful life of a carrier. Even with a force level as low as 12, it would be necessary to build a new carrier every two-and-a-half years to replace the carriers when they become 30 years old.

Hull No.	Name	Commissioned	Commanding Officer
CVA-19	Hancock	15 March 1944	Capt. N. P. Foss
CVA-31	Bon Homme Richard	26 November 1944	Capt. D. W. Alderton
CVA-34	Oriskany	25 September 1950	Capt. J. A. Gillcrist
CVA-41	Midway	10 September 1945	Capt. E. J. Carroll, Jr.
CVA-42	F. D. Roosevelt	27 October 1945	Capt. H. S. Sellers
CVA-43	Coral Sea	1 October 1947	Capt. S. G. Gorsline, Jr.
CVA-59	Forrestal	1 October 1955	Capt. C. F. Demmler
CVA-60	Saratoga	14 April 1956	Capt. W. H. O'Neil
CVA-61	Ranger	10 August 1957	Capt. J. P. Moorer
CVA-62	Independence	10 January 1959	Capt. B. B. Forbes
CVA-63	Kitty Hawk	29 April 1961	Capt. E. F. Godfrey
CVA-64	Constellation	27 October 1961	Capt. J. M. Tierney
CVAN-65	Enterprise	25 November 1961	Capt. F. S. Petersen
CVA-66	America	23 January 1965	Capt. T. B. Hayward
CVA-67	John F. Kennedy	7 September 1968	Capt. J. S. Lake
CVS-38*	Shangri-La	15 September 1944	Capt. H. R. Poorman

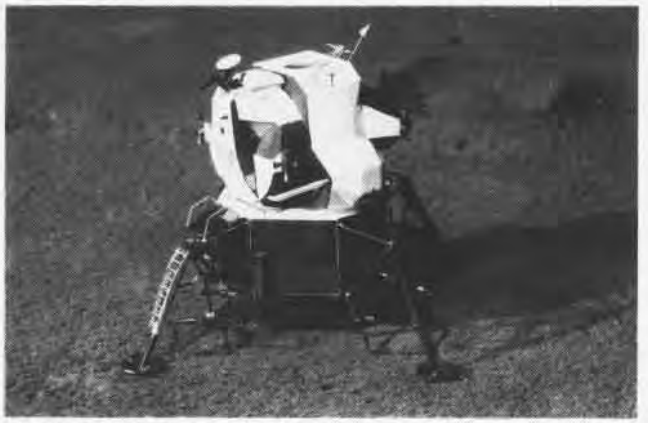
**Antisubmarine carrier temporarily serving as an attack carrier for the duration of the Vietnam conflict.*

Professional Model Making:

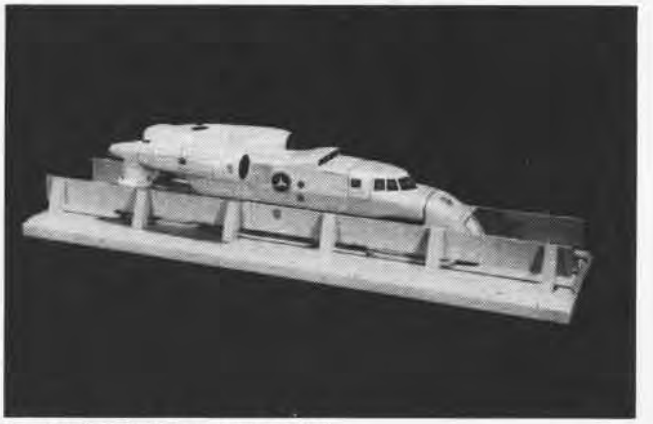
A Nerve-Wracking and Costly Business



See-through model of F-14A has operable landing gear, removable engines, variable geometry mechanism and other features.



Model of the LM is about eight inches high.



Proposed tracked air cushion vehicle.

All those perfectly designed and scaled, manufacturer-produced airplane models you see displayed everywhere – particularly in the Washington area – are not what they might appear to be: they aren't inexpensive; they aren't put together with rubber bands and glue in a couple of hours; they won't fly; and they certainly aren't easy to get. The display models hanging from overheads and sitting on desks represent only a small segment of the professional models turned out by aircraft manufacturers, and they may be the least significant. The models and photographs on these pages were produced by Grumman Aircraft Corp.

Gene DiSernia with 1/48 scale LM.

Ed Kopf works on F-14 nose mold.

Fred Ledogar works on layout on horizontal tail for F-14 model.

Model airplane building is not all freckle-faced, bubble gum-smeared kids in blue jeans and T-shirts trying to get a rubber band-powered glider to fly. Nor does it stop with the sophisticated (and expensive) business of adults finely tuning radio-controlled scale models that are precision reproductions of current and past aircraft.

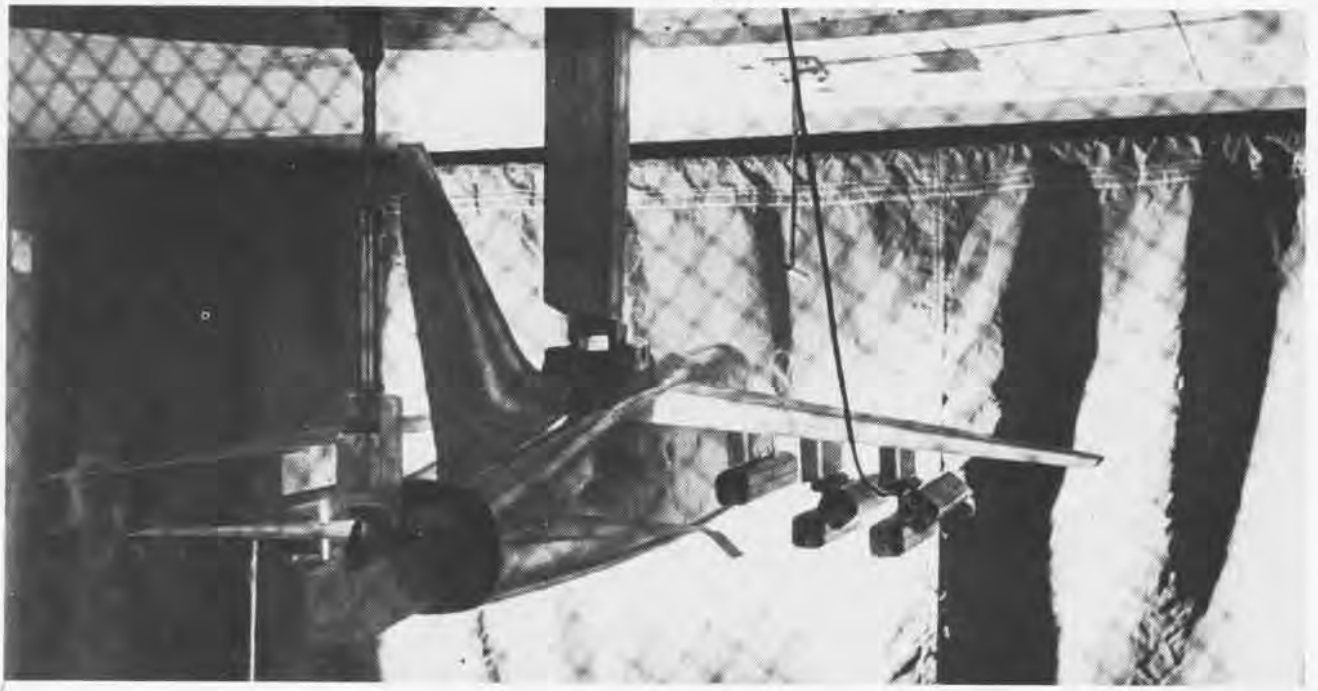
The real grind of model building is handled daily by men, who may or may not be modeling hobbyists, at professional model shops across the country. The models they build from factory-generated ideas range from public relations' giveaway desk models to multi-thousand dollar, wind-tunnel models. It is not a job to relax with. Dealing with expensive models, production schedules and last minute changes during wind-tunnel tests – when the performance of production aircraft is at stake – is the daily forte of professional model makers.

About 55 professional modelers work in Grumman Aerospace Corporation's model shop which is divided into two sections: woodworking and metalworking, with both shops using an increasing amount of plastics, epoxies and fiberglass in their work.

Aircraft corporations look for a high degree of skill in woodworking or metalworking in prospective employees, but considered equally important are imagination, an all-round mechanical aptitude, an ability to work with minimum instruction and, perhaps most important, an ability to work well under extreme pressure. The turnover rate in professional model shops is low: nearly one-fourth of Grumman's modelers have been there more than 20 years, and there are even a few 30-year men.

This kind of business is not for the faint-hearted or the on-again-off-again hobbyist who works on a model when he feels like it – this is an important segment of the aircraft industry.

Experiment + Theory = A Better Navy Product



By Michael G. McDonell

We trundled down the road heading for the Maryland state line. It was zero dark thirty. I was tired and my car sounded tired, too, as it made its way through the Virginia countryside. Glancing balefully at the Chief, our photojournalist, sitting next to me, I thought about the "different" kind of story he had promised me. A story that I had been willing to sacrifice highly valued hours of predawn sleep for. I suppose my curiosity was aroused, but my knuckles showed white as I gripped the steering wheel, my sleep-cheated eyes barely open. "It had better be *different*," I thought malevolently.

We passed through the gates of the Naval Ship Research and Development Center, formerly the David W. Taylor Model Basin, at Carderock, Md., and 20 minutes worth of forms later, met our guide. Proceeding to a nearby building, we found what the Chief had promised: an entire three story building full of men engaged in making models — models of ships, propellers and aircraft — and drawing government paychecks for it: I was wide awake now!

On the first deck, our guide, a young mechanical engineer, told us, "These model makers are highly skilled craftsmen. Their built-to-scale miniatures of real or proposed ships and aircraft will be tested in tanks or wind tunnels under conditions simulating what the actual type may encounter. The results will enable the engineers to correct any design problems that may arise. These models and tests contribute a great deal to the successful final product received by the Navy."

As we continued through the building, I noticed a huge, yellow, shapeless mass that tapered at the far end into a beautifully proportioned bow of a ship. A young man with an air-powered chisel sat on top of the mass — chips of the stuff raining down all around him. His older counterpart stood nearby, eyeing the keel and rapping a pair of caliphers against the palm of his hand. I asked him about the model that they were building. "It's an exact model of an aircraft carrier — the young fellow, he's an apprentice. I'm head of the project. This new synthetic we are working with is easier to use than wood. We should be finished in a few months." He looked pleased with the 30-foot model and I wondered how long it would take to build the racing sloop I had seen at a boat show. The gigantic towing tank used to test the ship models would soon test the polyurethane model to see if the model maker's pride is warranted.

Proceeding to the upper deck, we found parts of wood, metal and fiberglass model aircraft taking form in the hands of skilled craftsmen. Our guide explained how the machinists were being taught to program a computerized machine that produces standardized models of propellers. Made of myriad metals and alloys, the propellers are then hand finished. No two exactly alike, the finished

Photos by JOC James Johnston

MODEL A-7, *left opposite, is tested for drag while carrying external stores, and the source of the subsonic winds at Carderock is examined by our guide. An experimental, expandable fuel tank is fitted at top, while two models await a supersonic wind blast inside their chamber.*

products were as stunning to behold as any modern piece of sculpture – smooth, polished and symmetrical.

This was great, but where were the finished aircraft models? Our guide continued to lecture as we moved toward the door of the building. I looked at my bushy-tailed partner. No longer poised at the ready, his Leica hung limply from the strap around his neck. I saw my own disappointment mirrored in his face. We had risen early, survived a long trip in my mercurial car, after many wrong turns, and now – no model aircraft!

We walked across the street to the subsonic wind tunnel building. In a room between the two wind tunnels, we found them. Stretched before us like a pantheon of heroes were models of some of the late and great of Naval Aviation. Models of blimps, flying boats, biplanes and monoplanes – built for tests in the Navy's first wind tunnel at the old Washington Navy Yard – hung from the walls. In one of the chambers, a ten percent scale model of an A-7 *Corsair II* with external stores was being tested for drag under the watchful eyes of two movie cameras. A gigantic yellow model of a VTOL seaplane sat on a table, its testing completed.

Next to the exit, we noticed a variable geometry model aircraft. The aeronautical engineer who was bent over the model paused for a moment to explain: "This is one of our new proposals. It has an expandable fuel tank on the wing. You fill the tank, located over the efficient supersonic air foil, with fuel, and you have an efficient subsonic air foil. When the fuel is exhausted, the tank collapses, and the aircraft can 'dash back' using the efficient supersonic air foil." An incredible, shrinking aircraft!

We left for the transonic wind tunnel building. Our guide explained that the building was equipped with a sprinkler system to cool off the roof, heated by the friction that the supersonic winds create. Expecting a great rushing howl when the door to the building was opened, we were surprised by the curiously silent atmosphere inside. Capable-looking men went about their work as we entered a soundproof room containing a long console situated in front of a window through which a vague shape could barely be seen. The guide directed our attention to a closed-circuit television monitor. A test model was being exposed to shock waves in the wind tunnel. The model appeared on the screen as a negative surrounded by the angular flow of shock waves.

We finished our tour inside a subsonic wind tunnel, standing before a ten-foot, multi-bladed fan.

The words hypersonic, plasmasonic, supersonic, subsonic and transonic reverberated in our heads just as did our footsteps in the tunnel. In spite of the fact that we were not professional aeronautical engineers, it was clear to us that models have a practical place in the Navy, as do wind tunnels, analysis and imagination. Through experiment on a scale model, theory is tested, and the final result is a better product for the Navy.

O.K., we had our different story.

NAVAL AIRCRAFT

Cor

The *Corsair II* is the U.S. Navy's newest light attack plane. Specifically developed for precision air support of frontline troops and tactical zone bombing, it has twice the weapons delivery accuracy of other single-place attack aircraft in fleet use.

With the introduction of the A-7E, several innovations have been added which improve the *Corsair II's* weapons delivery capability. Among these are a fully integrated avionics package with a micro-miniaturized digital computer which gives the plane its increased accuracy. Another new feature is a head-up display which presents continuous solution cues for bombing and navigation on a transparent mirror directly before the pilot's eyes, allowing him to concentrate on his mission without reference to his instruments. With the central digital computer calling the signals and presenting solutions, the pilot can drop, flip or toss bombs over-the-shoulder at ground targets with unparalleled precision.

Getting to and from the target has also been made simpler and more exact with a new computer-directed map navigation system. The display stores maps of a selected area of the earth covering a million square miles on a single role of 35mm film. Other avionics features include Doppler and forward-looking radar, and an inertial measuring unit.

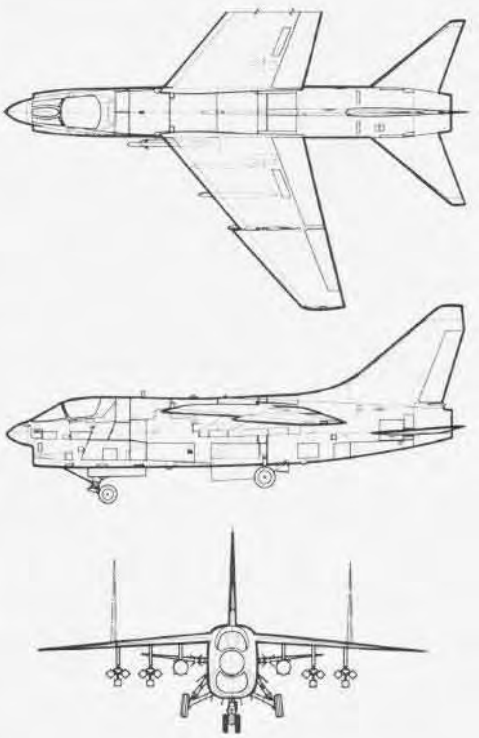
The *Corsair II's* turbo-fan engine permits extended range and a longer loiter time over the target. It carries more than 15,000 pounds of bombs and rockets in various combinations on any single flight. The E model introduces to naval aircraft the M-61 *Vulcan,* a six-barreled 20mm cannon which pours out 6,000 rounds a minute. The earlier A's and B's are equipped with two standard fuselage-mounted 20mm cannons. All models can carry *Sidewinders.*

The *Corsair II,* built by the Vought Aeronautics Division of LTV Aerospace Corporation, has seen combat duty over Vietnam since December 1967 in the A and B versions.

rsair II

A-7A A-7B A-7E

Length	46.13 ft.
Height	16.06 ft.
Wing Span	38.73 ft.
Empty Weight	16,300 lbs. (A)
	16,500 lbs. (B)
	18,380 lbs. (E)
Maximum Weight	38,000 lbs. (A&B)
	42,000 lbs. (E)
Internal fuel	10,200 lbs.
External fuel	8,000 lbs.
(in four 300-gallon drop tanks)	
Engine	P&W TF-30-P-6 (A)
	P&W TF-30-P-8 (B)
	Allison TF-41-A-2 (E)
Thrust S.L.S.	11,300 lbs. (A)
	12,200 lbs. (B)
	15,000 lbs. (E)
Maximum Speed	Mach .89 (A&B)
	Mach .92 (E)



THE SELECTED AIR RESERVE

HS-70N1 Commended

"Your determination to carrier qualify in spite of adverse weather conditions and the distance from the beach is admirable. Your flight professionalism is a tribute to the Naval Air Reserve program." With these words, the C.O. of USS *Guam* (LPH-9) commended HS-70N1 personnel of NARTU Lakehurst for their successful completion of carrier qualifications aboard the ship.

Pilots and aircrewmen of HS-70N1, after four days' delay due to foul weather, displayed their determination to become carrier qualified when conditions at last improved.

LCdr. Michael E. Malone added to the unit's accomplishment by making the 22,000th landing aboard *Guam*. LCdr. Howard C. Cobb was the copilot and PO3 Jerry R. McKeever the aircrewman for the historic touchdown.

The flights to the carrier took place from NAS Willow Grove, Pa., where HS-70N1 was performing its annual active duty, and crew members were attending the Reserve Antisubmarine Warfare Tactical School East.

LCDR. MALONE IS DIRECTED IN FOR 20,000TH LANDING ABOARD GUAM

Denver NARTD Presents Skyray

A Denver public school is the proud owner of an F-6A *Skyray* donated by the Naval Air Reserve Training Detachment, Denver. The presentation ceremonies were held at Buckley Field, home of NARTD Denver. The aircraft and its associated systems maintenance trainer were presented to the aviation department of the Emily Griffith Opportunity School.

Commander Warner W. Tyler, commanding officer of Naval Air Reserve Division D6, presided at the transfer ceremony. The aircraft had been used by Naval Air Reservists at Buckley Field for ground maintenance training until an F-8A *Crusader* was received. It had previously been flown by Naval Air Reservists at NAS Olathe, Kans.

The aircraft and trainer will be moved to the school's aviation facility at Stapleton International Airport where they will give advanced students the opportunity to work with more modern jet aircraft equipment and related systems.

Two Receive Honor

At NAS Dallas, Lt. Dave L. Holmes, recruiting office, and PN1 Don W. McDow, personnel department, were recently honored by being named for inclusion in the 1970 edition of *Outstanding Young Men of America*. The book is an annual biographical compilation featuring the accomplishments of approximately 5,000 outstanding young men throughout the country. Individuals are selected by a panel of nationally prominent executives on the basis of service to others, professional excellence, charitable activities and civic and professional recognition.

Lt. Holmes, who enlisted in the Navy in 1962, was later commissioned and served a tour of duty in Vietnam as a naval intelligence officer.

Petty Officer McDow, an 11-year Navy veteran, also served in the Vietnam area prior to reporting to NAS Dallas.

THE 1970 NATIONALS

at NAS Glenview

July 27-Aug. 2

B/C F4B-2 by Cdr. Ernie Greene and Col. Hurst Bowers

Photo by JOC James Johnston

Jointly sponsored by The Selected Air Reserve and The Academy of Model Aeronautics

Seven days of action-packed flying are in store at the 1970 National Model Airplane Championships. The country's top modelers will compete in 42 events in three classes – radio control, control line and free flight – for more than 500 trophies. For further information, including details of entry and daily competition schedules, write to:

The Academy of Model Aeronautics
1239 Vermont Avenue, N.W.
Washington, D.C. 20005

Jet Fuel Starter Tested at Pax

Newest RA-5C's Are Also Evaluated

Test and evaluation of aircraft and aircraft equipment is one of the missions of the Naval Air Test Center, Patuxent River, Md. Two recent projects involved Navy's first self-contained starter system to be used on a carrier jet aircraft and new production RA-5C's.

At the Service Test Division, the starter system is being evaluated in conjunction with the TF-41-A-2.

The engine, installed in a modified A-7A, incorporates the Garrett Corporation's jet fuel starter — a compact, lightweight jet engine designed for short duration operation. The unit, rated at 90 hp., is 20 inches long, nine inches in diameter and with battery weighs 81 pounds. It burns aircraft fuel and uses a nickel-cadmium battery for its starting power source. Mounted directly to the conventional starter pod on the engine accessory section, it transmits torque through reduction gearing to the engine's high pressure compressor. The starting cycle for the test installation is 35 seconds. The test unit is composed of three modules: accessory, gas generator and power turbine. A DC motor powered by the battery supplies its starting torque. Shutdown occurs automatically through an over-running clutch.

Although subject to limitations similar to present starters, such as duty cycle, engine windmilling limitations and start abort procedures, maintenance and inspection time is minimized. Inspections are based on readings from an elapsed time indicator, and time between overhauls has been estimated to give the system a 1,200-2,000 start operating life.

To date, the system has operated satisfactorily through 300 flight hours at Patuxent River and during trials aboard USS *Independence*.

The Carrier Suitability Branch at the Center has completed land and carrier-based flight tests to determine catapult minimum end airspeeds and carrier-approach and wave-off characteristics of new production RA-5C's.

The new *Vigilantes* are fitted with leading edge wing root fillets to increase longitudinal control effectiveness in the landing configuration; J-79-GE-10 engines for increased thrust; and widened engine inlets to meet the increased airflow requirements of the new engines.

The modified test airplane, although not built as part of the new production series, was aerodynamically and structurally representative of the new *Vigilantes*.

Various modifications of an approach power compensator were evaluated in an effort to develop an APC computer which provided satisfactory airspeed and angle-of-attack control during the landing approach.

During the shore-based and shipboard tests, it was increasingly evident that the new airplane was considerably improved over its predecessor. The increased thrust and rapid acceleration of the new engines and the improved longitudinal control effectiveness offered by the leading edge wing root fillets are especially noteworthy. Its improved catapult launch, approach and wave-off performance will be welcomed by the RA-5 community.

EDITOR'S CORNER

Wave Maintenance Officers? That's right, two Wave ensigns were recently graduated from the Management Analysis Course at the Naval Air Technical Training Center, Memphis, Tenn., after having previously completed the Aircraft Maintenance Officers Course. They were the first women to attend the maintenance courses in NATTC's 19-year history.

The ladies were assigned to the courses to determine whether Wave officers with a technical background obtained from college studies could fill data analysis billets in shore-based organizations if given maintenance management training.

The two, Ensigns Jean Peebles and Catherine Ziegler, received the personal congratulations of Captain Charles Burbage, NATTC commanding officer, at the graduation ceremony. The new maintenance officers have both been assigned to training squadrons in Texas. Ensign Peebles will serve with VT-25 at Beeville, and Ensign Ziegler will perform her data analysis functions at VT-27 at Corpus Christi.

THE CONFEDERATE Air Force has announced that its second annual seminar on World War II aviation will be held at Rebel Field, Harlingen, Texas, June 25-29, 1970. In the past, the seminar has attracted notables of American aviation as guests and speakers.

Just in case you haven't heard of the CAF, it is a non-profit group organized for the purpose of collecting, maintaining and displaying combat aircraft of WW II. It has one of the largest such collections in private hands. Most of the aircraft are in operating condition, including such familiar Navy planes as the F4U, F4F, F6F, F8F, SBD and TBM.

One interesting characteristic of the CAF is that all members are officers commissioned with the rank of colonel. The organization is presently headed by Colonel Jethro E. Culpeper.

Oldtime Naval Aviators remember the PBY-5 *Catalina* as a vintage WW II Allied flying boat which amassed an impressive record against enemy submarines.

George Ventress and Harry Warrner, along with their wives, of Brighton, Ontario, Canada, likewise remember the PBY as they cruise through the sparkling waters of the Thousand Islands of Ontario. The cruiser is the *Sad Sack*, a veteran *Catalina* minus its 104-foot wings, engines and tail sections. "We picked up the PBY from a surplus firm about 15 years ago. She was one of five that was sold," reported Mr. Ventress. The fuselage has been converted into a 48-foot cabin cruiser with a ten-foot, two-inch beam.

Linda Laffin

A NAVY *patrol plane turned cabin cruiser lies in the harbor of Brighton, Ontario. The PBY, minus wings and tail, cruises the Thousand Islands' area still sporting its WW II sobriquet of Sad Sack.*

In the nose of the aircraft – or the bow of the ship – where once a nose gunner sat behind his machine gun, now sit a jar of instant coffee and sundry foodstuffs.

The banks of controls and gauges, meters, lights and buttons in the cockpit have been replaced by sacks of cornflakes, bread, canned soup and suntan lotion.

The gunnery crew space is used to house two 85-hp. V-8 engines, each powering a separate screw.

Where once two side guns protruded through plexiglass bubbles, bunk beds provide sleeping quarters for 12 persons.

Sad Sack, the original name given to the craft by its wartime crew, has been retained on the nose, or bow. With two enemy submarines to its credit, *Sad Sack* has provided 14 years of enjoyable sailing to the two Canadian families and fond memories to Naval Aviators who remember when her breed flew high.

– from the Gananoque, Ontario, Reporter

CAPTAIN D.L. BURBAGE, *NATTC Memphis C.O., presents graduation certificates to Ensigns Jean Peebles and Catherine Ziegler upon their completion of Maintenance Officers Course.*

ON PATROL

with the Fleet Air Wings

VP-1 Deployment Begins Busy

One week after relieving VP-17 in Japan, VP-1 crews found themselves in the middle of search and rescue operations when two freighters sank off the Japanese coast – only three days apart.

Just seven days after VP-1 assumed Fleet Air Wing Six patrol duties, the squadron's ready alert plane was called into action by the Fifth Air Force Joint Rescue Control Center to help search for survivors of a Greek freighter, *Antonios Demades*, which sank 200 miles east of Tokyo while en route from Boston.

The P-3B, with Lts. R. A. Lundstrom and D. W. Richardson at the controls, relieved an Air Force C-130 on the scene three-and-one-half hours after being notified. Twenty-two of the freighter's 30-man crew had been rescued when the P-3 arrived. Reportedly, all the freighter's crew had left the sinking ship aboard a lifeboat but some of them were washed overboard. After three hours of searching the heavy seas and with darkness approaching, the aircraft left the area.

Less than 72 hours later, another VP-1 ready alert crew, with LCdr. M. J. Drees and Ltjg. Bill Sears piloting, answered a distress call from a Japanese freighter, *California Maru*, in the same general area as the earlier disaster. Arriving 75 minutes after receiving the call, Crew Five was notified that 22 seamen had been rescued while six were unaccounted for. The ship's captain is believed to have ridden the freighter down.

VP-46 Gets New Commanding Officer

Commander Robert E. Howey has relieved Commander William D. Cloughley as VP-46 commanding officer. The ceremonies were held at the squadron's deployment headquarters, USNS Sangley Point, R.P.

VP-46 is home-based at NAS Moffett Field.

VP-30 Crewman Re-enlists in P-3C

In the first airborne re-enlistment aboard a P-3C *Orion*, AO2 Walter E. Slocomb of VP-30 shipped for six years, with Commander J. T. Coughlin, commanding officer, administering the oath.

Slocumb is an inflight instructor for ordnance systems aboard the P-3C. VP-30, the East Coast patrol replacement crew training squadron, is headquartered at NATC Patuxent River.

VP-47's Ready Alert Also Busy

When a landing amphibious recovery craft (LARC) with four men aboard was reported missing at sea from NAF Naha, Okinawa, the VP-47 command duty office geared for action. Within minutes, the ready alert crew with LCdr. B. J. Spinks in command, was en route to the LARC's last known position.

Lt. C. D. Chandler, the copilot, soon spotted a flare but, because of high seas and a burned-out searchlight, visual contact was not established. When LCdr. D. N. Holmes, the command duty officer, learned of the aircraft's difficulty, he launched another P-3 with LCdr. M. L. Killingsworth in command. A two-plane search of the area proved unsuccessful and, with fuel consumption and closing weather becoming factors, the first aircraft was ordered back while LCdr. Hollingsworth and Crew Four remained on station.

At first light, another P-3 with Lt. G. W. Woy at the controls relieved Crew Five on station. Within 20 minutes, ATR3 W. E. Wilkes, Crew Ten radio operator, reported a possible sighting of the LARC. After several passes the boat was located, and the four crewmen were rescued by an Air Force helicopter from Okinawa. An LSM towed the LARC to NAF Naha.

E-8 Tests Get Harder Every Year

If Jerry Kerner of VP-9 makes senior chief, he may become the first CPO to achieve E-8 at 24,000 feet in a P-3 *Orion*.

ATC Kerner took the exam in flight out of necessity, not as a gimmick. His talents were needed on an official command trip during the time the exams were being given at NAS Moffett Field.

The conditions at 24,000 feet are not optimum for exam taking, as Kerner noted. Who can do his best with the executive officer, maintenance officer, leading chief, and a planeful of passengers and crewmen periodically stopping by to see how he's doing?

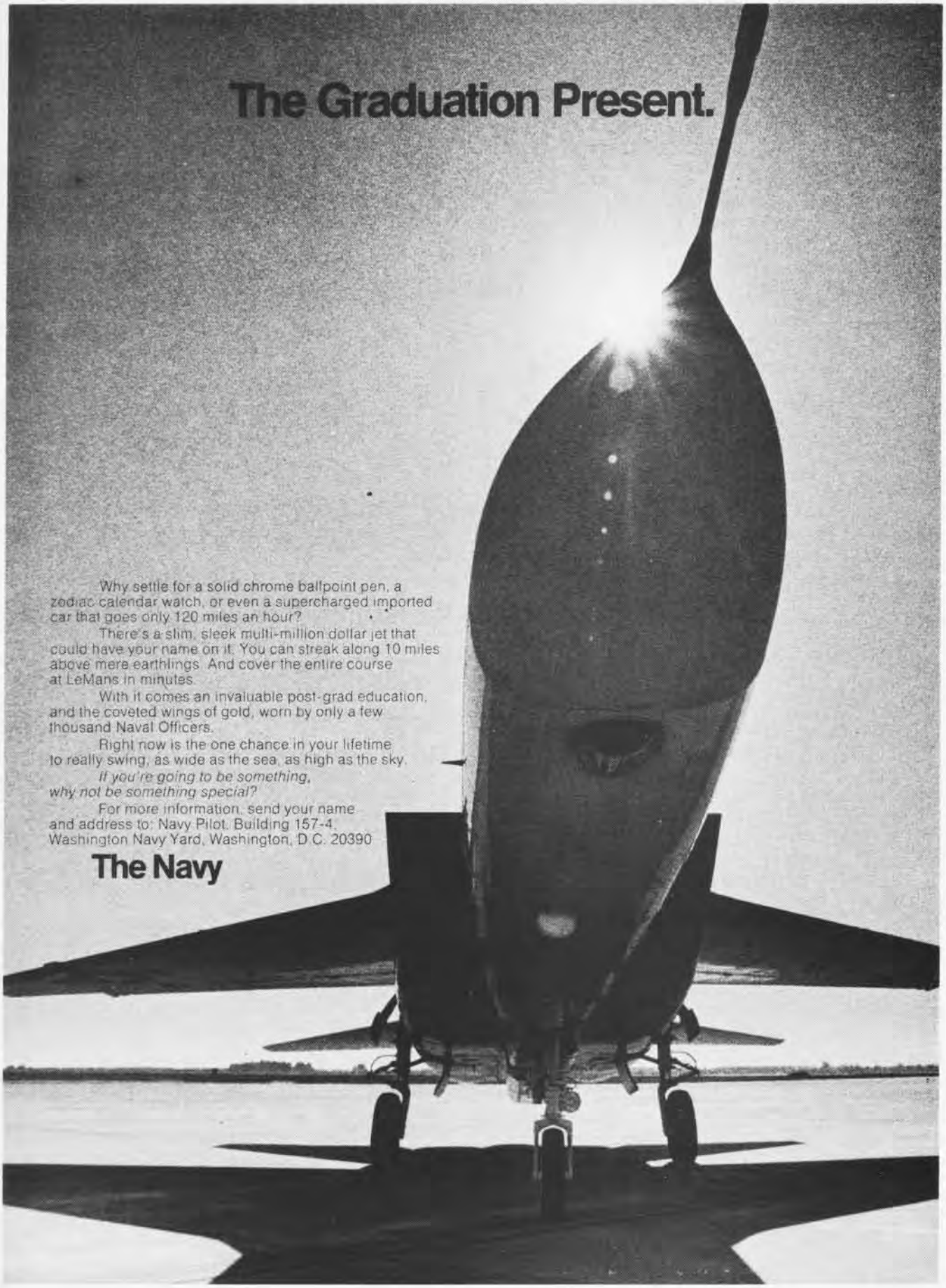
Time will tell.

VP-5 Relieves VP-44 in Sigonella

When VP-5 relieved VP-44 at NAF Sigonella, Sicily, it became the second P-3 squadron to operate from the air facility. VP-44 was the first to introduce *Orions* into the central Mediterranean area. P-2 *Neptune* squadrons previously had operated from Sigonella.

VP-44 operations confirmed the *Orion's* reputation as a fast and highly reliable ASW platform, capable of reaching any point in the Mediterranean within hours.

During the deployment, VP-44 participated in Exercise *Mediterranean* and other Sixth Fleet exercises and regularly flew scheduled ASW screening missions.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The Navy

ASW AIRCRAFT

LCdr. Paul Mullane

After World War I, the Navy's aerial ASW force, composed of an assortment of flying boats and lighter-than-air craft, was sharply reduced. In the case of flying boats, though antisubmarine patrol and escort duties were now identified as part of their mission, their most frequent duties consisted of general reconnaissance and gunfire spotting (particularly during fleet exercises). In the early 1920's, WW I era F-5L's, H-16's and HS-2L's, our principal ASW-capable aircraft, were organized into scouting units and attached to naval air stations. In the late 20's, these units were redesignated patrol squadrons and, during the 30's, they functioned as units of either the Base Force or the Scouting Force. In 1937, all VP squadrons were made components of the Scouting Force and organized into five patrol wings, numbering some 18 squadrons with seven supporting seaplane tenders.

Study of ASW problems in those years was not extensive, and both the United States and its future allies appeared optimistic about their ability to improvise as necessary. However, U.S. Navy patrol planes did practice antisubmarine techniques between the wars. As an example, in the 1929 fleet exercises, patrol aircraft were assigned the mission of attacking submarine scouting forces when they surfaced to radio information. In the Hawaiian Tactical Exercise of 1934, VP aircraft again conducted ASW patrols for the fleet. The primary tactic against submarines during this period was to "keep 'em down," since weapons and detection equipment had improved little since WW I. Though many different patrol aircraft were used during the late 20's and early 30's, the most common types were PM's, PK's, PD's, P2D's and P2Y's, all of which were designed to operate from tenders as well as shore stations.

HS-2L, above, coordinates its activities with a submarine in 1924. Below, F-5L's prepare for flight from base in Haiti during 1920's.

PART II
1919-1945

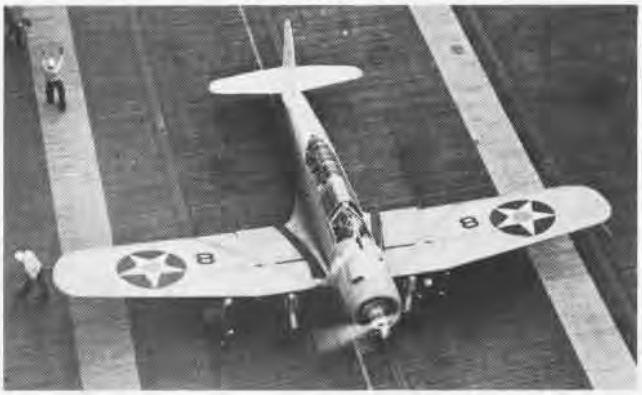
A P2D-1 of VP-3, based at Coco Solo, flies along Panama's coast. Powered by two 575-hp. Wright Cyclones, it cruised at 105 knots.

PM-1, similar to PD-1, had all-metal fuselage and 525-hp. engines. Modified PM-2 had twin vertical stabilizers and more horsepower.

PK-1 carried five crew and joined the fleet in 1932. P2Y's, right, were still being flown by four VP squadrons in 1940. Two Wright R-1820's gave top speed of 140 knots and range of 2,650 miles.

Two-place SOC, above, and SB2U, below, had forward-firing and flex-mounted, .30 cal. machine guns. SOC's carried two 100-lb. bombs, while SB2U's added an additional 500-lb. bomb to that load.

F2A's, above, along with SOC's, were assigned to VS-201 on Long Island. F4F's, below, replaced F3F's on Ranger before Pearl Harbor attack and were in VC squadrons on ASW carriers during the war.



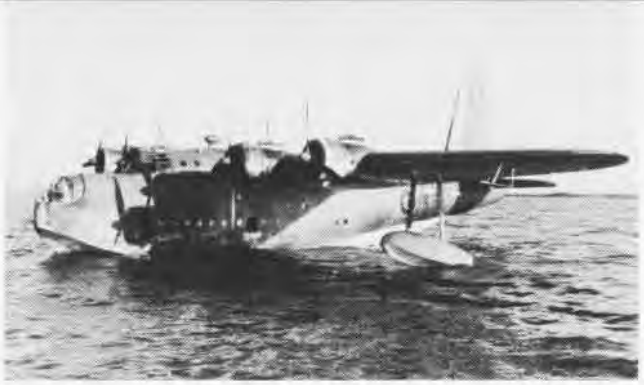
With the outbreak of World War II in September 1939 and the threat of submarine activity in the Atlantic, President Franklin D. Roosevelt ordered the establishment of the Neutrality Patrol, with duties of tracking and reporting belligerent air and naval forces approaching the U.S. or West Indies. Initially, air patrols ranged out to 300 miles from the coast, employing USS *Ranger* (CV-4) and its air group of F3F's, SB2U's and SBU's as well as VP squadrons flying PBY's and P2Y's. As the U-boat menace increased, so did American surveillance. In November 1940, three PBY's of VP-53 were sent to Bermuda to patrol the area around that island. By the following April, the area patrolled was extended to 30 degrees West. CarDiv-3, comprised of *Ranger* and *Wasp* and, later, *Yorktown* and *Long Island*, provided much of the patrolling force for this extension while operating near Bermuda. These carriers utilized a variety of aircraft, including SBU's, SB2U's, SOC's, SBD's, F4F's, F2A's and J2F's.

In early 1941, PBY's patrolling the North Atlantic sea lanes made Argentia, Newfoundland, their temporary base. By July, Argentia was commissioned a naval air station and, in December, VP-82 arrived to operate PBO *Hudsons* which had originally been manufactured as part of a British order. In August 1941, VP's 73 and 74 passed through Argentia in their PBY's and PBM's to set up operations at Skerja Fjord, Iceland. From that advanced base, they provided protection for U.S. convoys for a radius of 500 miles. In addition to these moves to strengthen our prewar ASW posture, the Chief of Naval Operations, Admiral H. R. Stark, established sea frontiers in July 1941 which used aircraft under their cognizance to keep an eye on U-boat activities in their areas. The Neutrality Patrol, while becoming even more active in response to German submarine actions, provided U.S. Navy pilots with excellent training in preparation for WW II ASW operations.

Navy's first land-based patrol planes were PBO-1's. Argentia-based Hudson of VP-82 was first U.S. aircraft to sink a U-boat in WW II.

PBY's, in VP squadrons since 1935, were workhorses of early days of the war. Catalina, below, returns to Iceland from Atlantic patrol.

Anson, above, was a principal ASW plane of RAF in 1939. Note Polish insignia on nose. B-17's, below, were added to Coastal Command forces as were Hudsons, Venturas and widely used B-24 Liberators.



Sunderland, above, called "flying porcupine" for its many guns, had bombs on rails run out from its interior. Wellington, below, of fabric covered, geodetic construction, was first to use searchlight.

Another source of valuable experience was tapped by sending a large number of Navy pilots to Britain as observers with the RAF Coastal Command. The Coastal Command, which had been charged with ASW responsibilities prior to the war, had played an important role in countering the U-boat from the beginning of the hostilities. The British soon discovered that the use of aircraft against submarines had many advantages, among them: speed, relative cheapness, a large field of vision, and economy of personnel and material.

At the beginning of the war in 1939, the German Navy had only 60 submarines, half of which were considered seagoing, the rest, coastal types. Against this the RAF Coastal Command had 220 aircraft and well trained ASW crews flying an assortment of obsolete flying boats and Avro *Anson* landplanes. A few Short *Sunderland* seaplanes and one squadron of U.S.-built *Hudsons* were also on hand. With these aircraft, they were able to make 30 antisubmarine attacks in the first month of the war. Soon Whitworth *Whitleys*, Vickers *Wellingtons* and more Lockheed *Hudsons* were added as the older aircraft were phased out. Coastal Command experience soon showed the value of large land-based bombers as ASW aircraft.

Most of the early anti-U-boat patrols were made in *Ansons* and *Hudsons* which attacked with bombs from 600 to 700 feet, using a two-second delay fuse. While not very effective in sinking submarines, the tactic did have great value because it interfered with the U-boats' effectiveness. At this early period in the war, German submarines had orders to dive when they sighted enemy aircraft. Thus the attacks by British planes often prevented the sub from making contact with a convoy — or caused it to lose contact with one it had been tracking.

Later, with the development of a naval depth charge adapted for aerial use, a much more destructive attack was possible. In April 1941, the Coastal Command was placed under the operational control of the British Admiralty and remained so, operating in close cooperation with the Royal Navy, throughout the war. By mid-1941, the Coastal Command had received its first squadron of *Liberators* and began long-range convoy patrols.

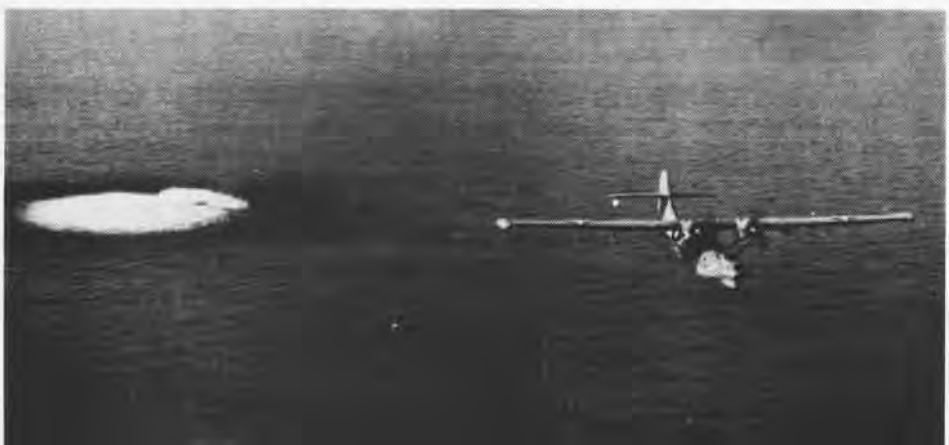
The Royal Navy's Fleet Air Arm also took an active role in ASW affairs. U.S.-supplied, shore-based carrier aircraft were flown on patrols in home waters under the operational control of the Coastal Command. At sea, the British developed an escort carrier by converting the captured German motorship *Hanover* to HMS *Audacity*. The 5,000-ton ship, with a 60 x 400-foot flight deck, carried six F4F's, *Martlets*, as they were called by the British. In its 14 weeks of operation, it escorted six convoys. On one round trip to Gibraltar, its aircraft assisted in sinking five submarines, proving the value of the CVE. British carriers had been used in ASW operations during the first month of the war but were withdrawn when HMS *Courageous* was sunk by a U-boat.

The British also pioneered the use of radar in antisubmarine attacks. Coastal Command and Fleet Air Arm planes were fitted with meter-length radar beginning in September 1940. The first successful attack due to an aircraft radar contact was achieved by a Coastal Command *Whitley* in November 1941 with the sinking of U-206. Most submarine location previous to this was accomplished through the use of a well developed HF/DF network which directed aircraft to the sub's vicinity. Later, HF/DF equipment was also installed in antisubmarine aircraft.

PV-1 had armament arrangements with up to ten machine guns. This version mounted six. Bomb load of 2,500 lbs. was carried internally. It was powered by two 1,850 hp. engines.

PBM had top speed of over 200 knots and range in excess of 2,000 miles. Mariners were replacing PBY's by 1943. Depth charges were carried in bomb bays within engine nacelles.

Ubiquitous PBY served throughout the war as a successful ASW weapon. Four 325-lb. depth charges could be carried under the wings outboard of engines. U-boat, below, feels effect.



With U.S. entry into the war in December 1941, submarine activity moved to the thinly protected and more productive sea lanes off the American coast. The heavy loss of 100,000 tons of shipping in January 1942 climbed steadily to a high of 712,000 tons by November. Most sinkings took place off Cape Hatteras and the Hampton Roads area. As countermeasures grew in strength, the U-boats moved their activities to Gulf and Caribbean areas. Against this threat, the Eastern and Gulf Sea Frontiers used all available aircraft to protect coastal shipping and transiting convoys. A wide variety of aircraft engaged in this endeavor, including those assigned to patrol wings, naval districts, the Coast Guard and the Army Air Corps. Even the Civil Air Patrol contributed its efforts.

In December 1941, the Atlantic Fleet had 15 patrol squadrons, 13 equipped with PBY *Catalinas* and one each with PBM *Mariners* and PBO *Hudsons*. The patrol wings were meant to be mobile entities of the fleet — each with its own staff and seaplane tender. These units were shifted to areas of greatest need as the U-boat campaign demanded. The naval districts supplemented this force with aircraft from various activities under their control, providing OS2U *Kingfishers*, SOC *Seagulls* and J2F *Ducks*. Limited endurance restricted these planes to patrol near the coast. Assistance was also forthcoming from the Coast Guard which flew OS2U's, J2F's and J4F *Widgeons* over coastal waters and occasionally provided convoy escort. Most of these planes were armed with two 325-pound depth charges and frequently made attacks on German submarines. The Coast Guard's only patrol squadron, VP-6, flew longer range patrols in PBY-5A's from Narsarssuak, Greenland.

The Civil Air Patrol contributed to the inshore patrol force, flying civilian light aircraft, armed with one depth charge or two 100-pound bombs, in which they patrolled approximately 40 miles offshore. Their principal value lay in spotting survivors and reporting suspicious surface vessels but, by their phase-out in September 1943, they had flown 86,685 missions

(5,684 as convoy escorts) and reported 173 submarine contacts.

The Navy's biggest source of assistance, however, came from the Army Air Corps. On the day of the Pearl Harbor attack, the Navy requested AAC assistance in combating the U-boat threat. The request was quickly honored and Army planes of the First Bomber Command began overwater flights in January 1942. In March, this force was placed under the operational control of the Eastern Sea Frontier and continued to work with naval forces until September 1943.

As the center of U-boat operations moved southward from the East Coast to the Gulf of Mexico and the Caribbean area, ASW units moved to new positions from which to attack. PBY's of VP-31, operating from a seaplane tender, opened Navy antisubmarine activity in the Trinidad area. They joined British *Hudsons* and Army B-18A *Bolos* and A-29 *Hudsons* to protect convoys carrying vital raw materials. The white camouflaged RAF *Hudsons* and our own Army *Bolos* were considered to be the most effective ASW force in the area. A significant aspect of the submarine blitz of the Caribbean in 1942 was that it was countered almost entirely by aviation forces. The Panama Sea Frontier, charged with protecting the approaches to the Panama Canal, relied on Navy PBY's and OS2N's, and Army B-18's and B-25's. Further south, PBY's of VP's 52 and 83 set up operations in Brazil. Navy aircraft operated principally from Natal but also from Belem, Fortaleza, Recife and Bahia. They were reinforced by the Brazilian Air Force flying B-25's in an ASW role.

The first submarine kills in the Atlantic by U.S. forces were scored by PBO's of Argentia-based VP-82 when they sank U-656 and U-503 in March 1942. Aircraft were not very successful at first since visual search was the only method of locating the target. Soon the addition of radar changed the situation to one less favorable to the submarine. Other factors which improved the ASW picture were the decisions made in the summer of 1942 that land-based patrol planes were in many cases more effective than sea-

OS2U's, above and below left, under naval district control provided off-shore protection for merchant shipping. In float or land version, they were armed with two depth charges.

J2F-5, above right, also contributed to coastal patrol in Navy and Coast Guard service. Coast Guard J4F, similar to the one below, sank U-166 off Mississippi passes in 1942.

planes, and plans for the Navy to procure more for ASW use. One of the most effective landplanes was found to be the B-24 *Liberator,* first used against U-boats by the Army's First Bomber Command and the British Coastal Command. B-24's were particularly effective for long range patrols, protecting convoys far at sea. With a much greater range than other ASW aircraft, they shrank the area in which German submarines could operate without fear of attack. The Navy had, in the meantime, added PV-1 *Venturas,* developed from the Lockheed *Lodestar* (a commercial transport), at the request of the British, who ordered them for their Coastal Command.

SBD's of Santee's VC squadron prepare to launch during convoy escort duty in June 1943. Each is armed with two depth charges. In the latter part of the war, SBD's were removed from ASW carriers.

Obsolete Swordfish torpedo plane filled ASW attack role on British escort carriers until replaced by TBM's. It carried up to 1,500 lbs. of depth charges and was first to use rockets against subs.

TBM is rearmed, above, while aboard CVE in the Atlantic. Avenger, below, was armed with three forward-firing guns and one each in top turret and underside. It carried 2,000 lbs. in the bomb bay.

F4F's line the deck as an SBD is positioned aft. Wildcat's six .50 cal. guns were used against submarine gun crews. Two 250-lb. bombs were also carried. Below, U-boat zigzags to escape attack.

ASW AIRCRAFT

By the end of 1942, air cover over the Atlantic stretched 400 miles east of Newfoundland, 500 miles south of Iceland and 700 miles west of England, leaving a big hole in the center. German submarine operations moved into this mid-ocean gap as ASW effectiveness increased in the western Atlantic. As the U-boats' toll dropped along the East Coast, sinkings in mid-Atlantic rose.

Into the gap stepped a force used with some success earlier in the war – the escort carrier. The idea of using aircraft carriers to protect merchant shipping was first tried by the Royal Navy; however, the first true escort carrier was built by the U.S. Proposed in the fall of 1940, the concept became reality when USS *Long Island* (CVE-1), a converted C-3 hull, was commissioned in June 1941. Her service in an ASW role was limited to a short period of operation with CarDiv-3 during the Neutrality Patrol when, with VS-291 aboard, she was equipped with seven F2A *Buffalos* and twelve SOC-3A *Seagulls*. *Ranger*, equipped with SB2U's, F4F's and SOC's, joined in convoy protection by escorting British transports carrying troops to the Mid-East by way of Capetown, which she reached two days after the attack on Pearl Harbor. She later joined British carriers to provide escort for Russia-bound convoys in the Norwegian Sea. Many British escort carriers were sister ships of *Long Island*, part of 39 such ships built in the U.S. and turned over to the Royal Navy. They normally carried a mix of *Martlets* and *Swordfish* torpedo planes. Later in the war, TBF *Avengers* were introduced as a replacement for the slow *Swordfish* biplane.

Ranger also participated in the escort of the North African invasion force in November 1942. She was at that time equipped with 54 *Wildcats* and 18 *Dauntless* SBD's and assisted in her escort duties by CVE's *Sangamon*, *Santee* and *Suwannee*, all converted tankers, carrying F4F's, TBF's and SBD's. British escorts accompanying this force were outfitted with *Swordfish*, *Albacore*, *Martlets*, *Seafires* and *Sea Hurricanes*.

These efforts, however, were not directed at a systematic ASW campaign in support of regular trans-Atlantic convoys carrying food, fuel, munitions and raw materials to Europe. Only with the appearance of the *Bogue*-class CVE was a true anti-submarine campaign launched in mid-ocean. *Bogue* (CVE-9) joined the struggle in March 1943 and was quickly followed by *Card* (CVE-11), *Core* (CVE-13), *Block Island* (CVE-21) and numerous others for a total of 17 by mid-1943. These jeep carriers operated F4F's, TBM's and SBD's organized into a single VC squadron. Their *Wildcats* and *Avengers* combined strafing and bombing attacks against submarines surprised on the surface. The first of the carrier escort groups, consisting of a CVE and four to six destroyers, was organized in March. At the same time, the first escort support group was formed around *Bogue* and four WW I four-stackers to complement the work of the convoy escorts and to operate in areas adjacent to the convoy. In the Azores area in May, CVE's, while still continuing convoy duties, conducted search and destroy operations aimed at U-boat replenishment operations from tanker submarines. As a result, most of these "milch-cows" were destroyed.

In June, *Card* was authorized to operate independently against sub concentrations which might approach a convoy, and the modern hunter-killer concept was born. New tactics were introduced into CVE operations as the war progressed. "Night Owl" *Avengers*, unarmed and with guns removed to permit extra gas tanks providing up to 14 hours' endurance, provided continuous air cover for convoys. Aircraft-launched rockets, first employed by *Swordfish* from HMS *Archer* to sink U-752 in May 1943, were used by U.S. Navy TBF-1C's from *Block Island* in January 1944. By early 1944, carrier aircraft had emerged as one of the most dangerous threats to U-boat operations. They proved so effective that of the 2,200 ships escorted by carriers from May to December 1943, only one was sunk by a submarine.

CVE's filled mid-ocean gap when submarine activities moved away from coasts. Ranger, center, saw much service in early period.

SBD, above, began replacing Kingfishers, below, in shore-based VS squadrons in U.S. and Caribbean toward the end of the war.

Brazilian-based PBM flies past Sugar Loaf in harbor of Rio de Janeiro en route to convoy escort duties in the South Atlantic. PB4Y's and PV's also flew from Brazil. Light colors were widely used by Atlantic patrol aircraft, including carrier planes, as camouflage to prevent their sighting by submarines. Note lack of bow turret in this VP-211 plane.

While escort carriers fought the sea raiders in mid-Atlantic, ASW air power ashore continued to increase and improve. New aircraft and new equipment were introduced into the conflict and by late 1942, microwave S-band radar was being installed in aircraft. The Germans, unable to detect the new radar, lost a large number of submarines during the spring and summer of 1943. Sonobuoys were introduced in 1943 along with the homing torpedo and a large 500-pound depth bomb which had a greatly increased kill radius. The British introduced the aircraft searchlight in 1942 – a 24-inch Leigh light installed in the lower turret of a *Wellington* and used particularly in the Bay of Biscay. The U.S. Navy developed its own 60 million-candlepower, wing-mounted searchlight in 1943. Magnetic airborne detection equipment (MAD) appeared on PBY's and was used to monitor the Strait of Gibraltar, contributing to the first U-boat sinking there in February 1944.

Quantity and quality of shore-based aircraft also continued to improve. Patrol forces received more PV's and PBM's and, when the Army ceased antisubmarine operations in 1943, the Navy received a large number of ASW-configured *Liberators*, redesignated PB4Y's. As more PB4Y's became available, they were sent to squadrons where their long range could best be utilized in such places as Argentia, Ascension, Azores, Brazil, and especially in England. Under the operational control of the RAF Coastal Command, our PB4Y's flew regular ASW sweeps in the Bay of Biscay from August 1943 to June 1944, releasing Army B-24's, which had previously provided this service, for bombing duties over the continent. Earlier, Navy *Liberators* had begun antisubmarine patrols from Port Lyautey under the control of the Moroccan Sea Frontier and were equipped with MAD gear to detect U-boats attempting to pass through the Strait of Gibraltar.

The number of seaplanes in use was also increased and, in 1943, two squadrons of PB2Y *Coronados* were added to the growing number of PBY's and PBM's. One PB2Y squadron set up operations in Bermuda and the other at Coco Solo. In mid-1944, Bermuda-based VP-15 joined its sister *Coronado* squadron, VP-1, in protecting the approaches to the Panama Canal.

The Eastern Sea Frontier was also able to call on the services of other aircraft in performing its ASW mission. Scouting squadrons flying OS2U's conducted short range patrols offshore. These VS squadrons were re-equipped with SBD's during 1943 and 1944. Patrol and other type aircraft within sea frontier jurisdiction were called on to assist in antisubmarine efforts as needed.

By July 1943, the picture had changed: the number of German submarines sunk exceeded the number of Allied merchant ships sunk. Of the 46 U-boats sent to the bottom, aircraft accounted for 34. As a result of the Allies' increased ASW capability, submarine wolf-pack tactics broke down completely in the presence of antisubmarine aircraft. Because of heavy U-boat losses in the summer of 1943, German submarines were withdrawn from the North Atlantic and redeployed to safer areas. Their tactics switched to self-preservation. Operating on the surface, now mainly at night, they forced ASW aircraft to develop more effective night-attack procedures using flares and airborne searchlights.

Coastal Command and Navy *Liberators*, using a combination of radar

PB4Y-1 from base in Great Britain flies patrol over Bay of Biscay, where it assisted RAF Coastal Command in hunting down transiting submarines. Powered by four 1,200-hp. R-1830 engines, the Liberator had the fuel and ordnance capacity to become a highly successful long-range ASW plane. The PB4Y-1 was operated from bases throughout the Atlantic area.

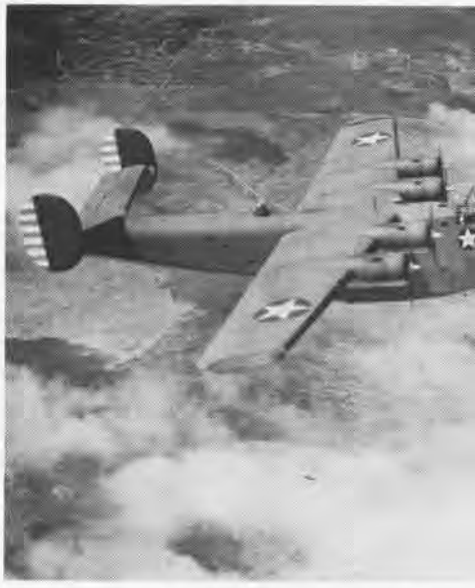
and searchlights to catch unsuspecting U-boats on the surface while passing through the Bay of Biscay, caused the submarine command to switch tactics again. Since long transits to operating areas, submerged both day and night, were unacceptable, German subs countered by adding to their antiaircraft firepower and fighting back during daylight surface transits. Armament usually consisted of a 37mm Bofors and quad 20mm guns on the conning tower, thus heavily outgunning attacking aircraft. Though planes were lost to this strategem, it was not successful in halting the increased submarine sinkings. By 1944, U-boat sinkings rose to 261, over half credited to aircraft.

With the invasion of Europe in June 1944, submarine activity centered around England with a final effort made against cross-Channel shipping. The attempt was countered primarily by Coastal Command aircraft and, although five cargo ships and two escorts were sunk, the Germans lost 12 U-boats. This was not the last effort on the part of Hitler's undersea fleet, but its poor showing clearly marked the feeble state from which it never recovered – even with the introduction of the snorkel and various other innovations.

During the remainder of 1944 and until the end of the war, German submarine operations were centered around the British Isles and the Norwegian Sea where they received appropriate attention from the Coastal Command and U.S. PB4Y's. U-boats, during this period, also continued to operate in small numbers with little success in many other areas, including the North Atlantic, Caribbean, American coastal waters, South Atlantic and Indian Ocean. In most of these locations, U.S. aerial ASW forces continued to make life short and hazardous for the enemy.

Though the U-boat threat was not eliminated until Germany surrendered in May 1945, attacks after 1943 did not pose the serious problems that they had early in the war. A majority of the credit for this accomplishment must be given to the aircraft and aircrews engaged in the antisubmarine campaign which ranged over vast areas in ever increasing numbers. They gave the submarine less and less opportunity to fulfill its mission and added a greater risk: that of being detected and ultimately destroyed.

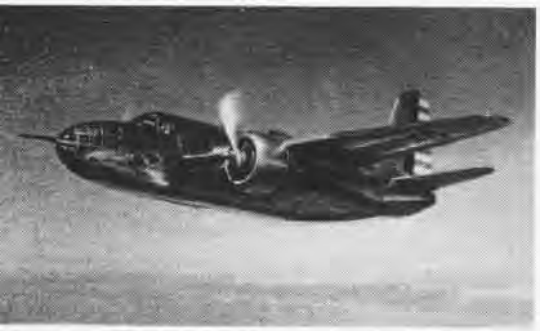
Two squadrons of PB2Y's flew in Atlantic. They carried ordnance in wing bomb bays.



German sub under attack from U.S. patrol plane when caught unaware on surface.

ASW AIRCRAFT

Unarmed O-47 with three-hour endurance patrolled 40 miles seaward along East Coast.



A-20A, above, was found in many of the Air Corps ASW units in the Caribbean area.

B-25, above, and B-18, below, were used to good effect in early days of the conflict.

Under various military appropriation acts prior to World War II, the Army had been specified to control procurement of land-based aircraft (with a few minor exceptions), and the Navy received mainly seaplanes, except for carrier-based aircraft. With the rapid shift of enemy submarine operations to American waters following our entry into the war, the Army was called on to assist naval forces in combating the U-boat. Though not expecting to include ASW within its duties, the Army quickly responded by placing the 1st Bomber Command under the operational control of the Navy.

The command was at first equipped with A-20 *Havocs*, A-29 *Hudsons*, B-17 *Flying Fortresses*, B-18 *Bolos* and B-25 *Mitchells*, none fitted with radar, but by March 1942, some of the B-18's had received radar equipment. The force had about the same number of planes the Navy had available for ASW. Later, B-24's which became the backbone of the force were added and, together with B-17's, patrolled up to 600 miles seaward.

The 1st Bomber Command operated under the control of the Eastern Sea Frontier where Army and Navy personnel worked side by side in the control rooms of its New York headquarters. In June, the Air Corps unit was reorganized to be employed in ASW operations in the Caribbean and Gulf areas as well. B-18's, B-25's and A-20's from fields in Puerto Rico, Trinidad and the Canal Zone made up the bulk of the aircraft used for this purpose by the Caribbean Air Force. Later, they were organized into three Sea Search Attack Groups with B-18's and B-24's.

In October 1942, the command became the Army Air Force Antisubmarine Command; its organization and tactics greatly influenced by the RAF Coastal Command. The AAFASC was composed of two antisubmarine wings with headquarters in New York and Miami. By the end of the summer of 1943, the command reached a strength of 25 squadrons equipped mainly with *Liberators* modified for ASW duties. During late '42 and early '43, B-24's of this force, fitted with microwave radar, were sent to England to assist the Coastal Command in operations in that area. This group later provided antisubmarine services from Morocco for the Mediterranean area.

With a reallocation of B-24 production in July 1943, to give the Navy a share for its needs, the AAFASC neared its end. The following September, the Army turned over to the Navy 187 ASW-configured B-24 *Liberators* and the Army's antisubmarine command was disbanded.

Army Air Corps B-24's of the 1st Bomber Command provided much needed assistance in the antisubmarine campaign along the Atlantic Coast early in the war. Many of these same planes were transferred to the Navy in 1943. Note the early type radar antennas on wings.

Between the wars, no American airship was produced with patrol or ASW capabilities until the construction of the first ZNP-K type in 1931. Rigid airships in the Navy were being built with the mission of long-range scouting. All nonrigids since WW II had been designed and used as training ships.

The K-1 was at that time the largest nonrigid airship built for the Navy. It measured 219 feet in length and displaced nearly 320,000 cubic feet. Two 300-hp. engines gave the blimp a maximum speed of 55 knots or a maximum range of 1,640 miles at 40 knots. Though the K-1 marked a step forward in LTA design, it was not popular with its pilots who tended to look on it as being too big for a nonrigid. It was deflated and surveyed after its last flight in September 1940.

A newer and larger version, the K-2, was delivered to the Navy in December 1938 by the Goodyear-Zeppelin Corporation and served as the prototype for the wartime K type. This model had an envelope volume of 416,000 cubic feet, a length of 248½ feet and was powered by two Pratt & Whitney R-1340's producing 400 hp. each. In later models (K-9 and after), this was boosted to 425 hp. The dimensions also increased in later models; from K-14 on, the displacement grew to 425,000 cubic feet and the length to 252 feet.

All the K types after the K-2 had a maximum speed of about 65 knots and normally cruised at 50 knots. The K-2 had a range of 1,950 nautical miles and an endurance of 39 hours at its cruising speed. This performance in subsequent models was slightly lower in both categories due mainly to increased weight. The K-ships carried a crew of ten – pilot, copilot, navigator, radio/radar operators, aviation mechs and riggers. Armament included one .50 cal. machine gun located above the pilots' stations and four 375-lb. bombs – two in an internal bomb bay and two on external racks. Early in the war, some blimps carried destroyer-type depth charges in the cabin and dropped them by rolling them through the door.

At the time of U.S. entry into the war, only ten nonrigids were in naval service, four were K-type patrol blimps and the rest training ships. With our involvement in ASW operations, the L and TC ships were pressed into temporary patrol service off the West Coast. Airships were organized into two LTA squadrons, ZP-12 at NAS Lakehurst and ZP-32 at NAS Moffett Field.

Early in the war, radar and sonobuoys were added to the blimp's detection equipment, and various techniques were developed for dipping, dunking and towing detection devices underwater.

Blimp tactics against the U-boat called for attack only if the submarine was diving or submerged. If unable to reach the target in time to attack, the blimp marked the contact area with smoke and dye markers and called in other ASW ships or aircraft. If the U-boat remained on the surface, the airship was to take a position upwind, track the target and call for ASW aircraft.

During WW II, Navy blimps were concentrated in the Atlantic, though a few patrolled the Pacific Coast. Fleet Airship Wings provided protection for convoys along the East Coast, over the Gulf of Mexico and the Caribbean Sea, and off the coast of South America where airships escorted vital shipments of bauxite and rubber from the Guianas and Brazil. They were found to be particularly useful for night convoy duty.

One squadron of blimps entered the European theater of operations in May 1944 when ZP-14 moved to NAS Port Lyautey, Morocco. The initial operational flight in the European area was made by K-123 on D-Day, June 6, 1944, employing MAD gear to set up a low altitude barrier across the Strait of Gibraltar.

By war's end, LTA forces had grown to 134 K-type airships and four new M-type blimps as well as 22 L and 8 G-type training nonrigids. Airships did not sink any U-boats during the war, though they assisted in a number of sinkings and were credited with having damaged several. The main contribution of the blimps was to keep the submarine submerged and report sub sightings. Lighter-than-air craft made 55,900 operational flights, stayed aloft 550,000 hours and escorted 89,000 ships (77,500 in the Atlantic) without the loss of a single ship to submarine action – an enviable record for any ASW force.

K-type blimps with long endurance and a full range of ASW equipment escorted eighty-nine thousand ships without loss to submarines.

Designed for training, the L-type performed patrol duties early in the war until enough K-type became available to relieve them.

M-type had 647,500 cubic-foot envelope, 50-knot cruise speed and 50-hr. endurance. Its 117-foot car carried 2,400 lbs. of bombs.

Letters

USS Lexington (CV-2)

Enclosed is a check for one year's subscription to *Naval Aviation News*. I am an ardent reader of your excellent publication.

The 17th National Reunion of the USS *Lexington* (CV-2), the Navy's second carrier, will be held July 15-18 at the Netherland Hilton Hotel in Cincinnati, Ohio. Keynote speaker will be Rear Admiral James R. Dudley, USN (Ret.), who was navigator in the carrier when she was sunk in the Battle of the Coral Sea.

Former members of the crew, squadron personnel and Marines who served in the ship may contact me for details.

Walter D. Reed, LCdr., USN (Ret.)
Public Relations Director
USS Lexington (CV-2)
5410 Broadway (Apt. 105)
Oakland, Calif. 94618

Designation Sheet

I have the second revision of U.S. Naval Aircraft Designations from September of 1967. In order to keep up on the new jet aircraft, I was wondering if any new designations have been made.

Through reading *NANews*, I have heard of many aircraft not listed on this chart because they are of recent origin.

If possible could you please send a newer one?

Thomas E. Bowden
124 Hawthorne Street
Roselle Park, N.J. 07204

¶ The designation sheet you have is still quite current. Navy's two major new aircraft are still on the drawing boards, the S-3 and F-14. A few other new models have come into the inventory, such as the TH-57A's and C-3A's. In addition, some new model series, such as the A-7E, have been introduced into the fleet.

Squadron Mates?

I enjoy reading *Naval Aviation News* every month and look forward to each issue.

I was a member of VF-73 and was TAD to USS *Tarawa* (CVS-40) in 1952-53. I would appreciate hearing from anyone who was in the squadron at that time.

Allen F. Linder
51 Wilson Drive
Babylon, L.I., N.Y. 11702

Naval Aviation Films

The following motion picture films are among the latest released by the Film Distribution Division, U.S. Naval Photographic Center. They deal with specifics in Naval Aviation.

MN-10403 (unclassified) *The ASW Coordinated Tactics Trainer Device 14A6: Fleet Introduction.* Discusses the capabilities of the trainer device for coordinated tactics training for ASW units (25 minutes).

MN-10649 (unclassified) *Basic Turbine Theory.* The development of the turbine engine from steam power to jet turbines (20 minutes).

MN-10650 (unclassified) *The Theory of Helicopter Flight.* How the helicopter obtains lift, directional stability and control. Use of helicopters in war and peace (21 minutes).

MN-10655A (unclassified) *The Martin-Baker Ejection Seat: Operating Theory.* Basic techniques, in art and animation, for pre-ejection, ejection and post-ejection of the Martin-Baker MKH-7 seat installed in the F-4 (24 minutes).

MN-10655B (unclassified) *The Martin-Baker Ejection Seat: Seat Removal.* The egress system installed in the F-4, and seat removal procedures (21 minutes).

MN-10655C (unclassified) *The Martin-Baker Ejection Seat: Periodic Inspection and Maintenance.* Catapult disassembly and servicing, inspection and maintenance of the catapult system (26 minutes).

MN-10655D (unclassified) *The Martin-Baker Ejection Seat Maintenance: Drogue Chute Inspection and Maintenance.* Chute removal, inspection and re-installation (12 minutes).

MN-10655E (unclassified) *The Martin-Baker Ejection Seat: Re-installation and Inspection.* Survival gear connection, installation of seat actuator and canopy and performing post-installation and preflight inspections (22 minutes).

Instructions for obtaining prints of newly released films are contained in OpNav Instruction 1551.1E.

Tailhook Reunion

The fourteenth annual Tailhook Reunion will be held November 13, 14 and 15 in Las Vegas, Nev., at the Stardust Hotel.

This is the only Navy/Marine/Air Force/Industry event in which active and retired carrier aviators can get together to discuss problems of pilot retention, morale and overall improvement of tactical carrier flying.

Further information can be obtained by contacting the commanding officer of VRF-32 at NAS North Island, Calif.

22 Grads in NTPS Class 54

Maj. Henderson, USA, Top Man

Rear Admiral G. E. Miller, ADCNO(Air), was guest speaker at the graduation of the Naval Test Pilot School Class 54 at NATC Patuxent River, Md.

Major John C. Henderson, USA, was named the outstanding student in the class which consisted of 14 engineering test pilots, two NFO's, and six test project engineering students.

Since its commissioning in 1948, TPS has graduated approximately 1,210 pilots and engineers associated with the aviation field. The school originally trained only Navy and Marine Corps pilots, but now selected training is offered to other U.S. armed forces, other government agencies, aviators and non-aviators from foreign countries, and major aerospace contractors.

VT-7 Flight Instructor Honored

Among the Outstanding Young Men

Lt. Sammy B. Kyzar – 1969 David S. Ingalls Award winner and former enlisted man and submariner – has been selected as one of "America's Outstanding Young Men" for 1970. Captain Lyle H. Sette, NAS Meridian commanding officer, nominated Kyzar for the honor.

The selection of the NAS Meridian pilot was made by the Outstanding Americans Foundation in Chicago. The 16-man selection board, headed by Doug Blankenship, past U.S. Jaycee president, said that the men selected have distinguished themselves in one or more fields.

Lt. Kyzar reported to flight instructor duty with VT-7 in May 1967, after a tour in Southeast Asia with VP-22. Eight months later, he was nominated for the David S. Ingalls Award. He enlisted in 1961 and completed electronics training and submarine school.

PROBLEM

Getting to see each issue of *Naval Aviation News* on time? Have a subscription sent home. Response indicates it goes over big with the wife, kids, and even the neighbors.

SQUADRON INSIGNIA

Originally commissioned VJ-1 on October 5, 1925, VC-1 is led by Commander J. B. McDaniel. From home base, NAS Barber's Point, VC-1 uses the F-8K, A-4C, US-2C, UH-34J and DP-2E to perform a variety of tasks: from aerial photography to control of target drones. The squadron insignia is the 'Alii,' an ancient Hawaiian warrior, on a background of the Hawaiian archipelago.

ANNOUNCING A NEW SERIES

NAVAL AVIATION NEWS

With this issue, Naval Aviation News begins a new series (with the A-7) on pages 20, 21. We plan to feature naval aircraft — past and present — and invite our readers' suggestions on aircraft they would like to see included.