NAVAL AVIATION NEWS

January-February 1991

NAVAL AVIATION NEWS

Flagship Publication of Naval Aviation

Oldest U.S. Navy Periodical Volume 73, No. 2

COVERS – Front: This oil painting by John Charles Roach depicts Marine Corps AV-8B *Harrier IIs* of VMA-331 from *Nassau* (LHA-4) during *Operation Desert Shield*. Back: Robert L. Lawson shot this VF-1 F-14A *Tomcat* operating from NALF San Clemente Island, Calif., in 1974.

Publication Policy:

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

For further guidelines on submissions, contact Managing Editor, *Naval Aviation News*, at autovon 288-4407 or (202) 433-4407; FAX: autovon 335-2104, (202) 475-2104.

Subscription Information:

Naval Aviation News (USPS 323-310; ISSN 0028-1417) is published bimonthly for the Chief of Naval Operations by the Naval Historical Center. Editorial offices are located in Building 159E, Room 512, Washington Navy Yard Annex, Washington, D.C., 20374-1595. Second-class postage is paid at Washington, D.C., and additional mailing offices. *Naval Aviation News* is for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, phone (202) 783-3238. Annual subscription: $17.50.

POSTMASTER: Send address changes to *Naval Aviation News*, GPO Order Desk, Superintendent of Documents, Washington, D.C. 20402. The Secretary of the Navy has determined that this publication is necessary in the transaction of business required by law. Funds for printing have been approved by the Navy Publications and Printing Policy Committee.

No Rest for Naval Air

VAdm. Dick Dunleavy, ACNO (Air Warfare)

The November 21 signing of the Paris Charter by leaders of East and West was hailed as the formal end of the Cold War, which, occasionally over its 45 years, got quite hot for Naval Aviation.

Even as the charter was being signed, the wheels were in motion to amass *six* carrier battle groups in the Middle East – equalling the largest gathering of carriers in one theater since WW II.

A dichotomy of dangerous proportion is developing here. On one hand, budget realities and reduction in East-West tensions are propelling force reductions, including the possibility of reductions in the number of carriers. On the other hand, our carriers are meeting an operational commitment on a scale never before envisioned short of war with the now-moribund Warsaw Pact. You don't need to be a rocket scientist to see the problem that is brewing.

In addition to the issue of carrier numbers, the duration of the face-off with Iraq will bear heavily on the bill that comes due. Operation *Desert Shield* is giving our logistics train a thorough workout, with heretofore-unsurpassed demands on fuel, ordnance, avionics, ground support equipment, and other spares. The added stress on ships and aircraft will also take its toll on their material condition in the long term. The ability of future budgets to restock the consummables and repair ships and aircraft will need to be addressed, with the ironic possibility that the bill will pressure even steeper force-level reductions than currently planned.

In the meantime, you forces involved in *Desert Shield* have won the admiration of a nation and its leaders in the professional way that you have responded to the call to deploy. Many lives have been disrupted by the call and, understandably, personnel tempo goals have been temporarily suspended. You showed the world that you were ready, and that you are taking it in stride.

The events in the Persian Gulf, whether they lead to war or not, have accentuated the country's need for you men and women of Naval Aviation – for you to be there, on station, ready to defend the nation and its interests. You are still, and always will be, the tip of the spear. Hang in there, and keep strokin'. ■

Lt. Dave DeMauro

An EA-6B and A-6Es from John F. Kennedy refuel from a KC-135 during Operation Desert Shield.

Osborn

Cotter Pin Calamity

The pilot of an NA-4F *Skyhawk* launched from NAS West Coast on a post-maintenance check flight. He was at 1,600 feet and 420 knots when he retarded the throttle from near military rpm. Power didn't change, however, and rpm remained at 97 percent. The pilot returned the throttle lever to its previous position and again attempted to reduce rpm by easing the throttle back. This time the engine responded normally.

Realizing he had a problem, the pilot set rpm at 80 percent and requested a visual straight-in approach to the field from which he had just taken off. A minute later, the pilot moved the throttle slightly to check engine response but the power plant did not respond. (Automatic power control was not installed in this aircraft and, therefore, could not be utilized to regain control of the throttle.) The pilot decided to hold briefly nine miles from the field and assess the situation. He reviewed NATOPS (Naval Air Training and Operating Procedures Standardization) stuck-throttle procedures and then began the approach.

As he turned onto the final heading, the engine flamed out. The pilot ejected and was recovered safely. The aircraft was destroyed in the subsequent crash.

Grampaw Pettibone says:

The Skyhawk has been around longer than some of the folks who fly 'em. But like any aircraft ever built, it can let you down if you don't give it plenty of tender lovin' care – meanin' MAINTENANCE BY THE BOOK.

Investigation revealed that the PCCRN (power control crank retaining nut) cotter pin was missing when the aircraft left the ground. Except for the PCCRN, the entire throttle linkage system in the Skyhawk is redundant. Without that nut, though, the linkage can slip and the throttle lever no longer manage the fuel control position. The fuel control thus becomes free to float anywhere between 100 percent and zero rpm.

Pilots are supposed to "check throttle rigging condition and security" on preflight, but NATOPS doesn't mention the retaining nut specifically.

Three weeks prior to the mishap, the engine was removed for inspection. The maintenance instruction manuals require disconnecting the throttle linkage by removing the two nuts at either end of the engine power control crank. Instead, the nut at the center of the control crank, the PCCRN, was removed – contrary to procedures. Turns out this was common practice among Skyhawk squadron power plants personnel to facilitate engine removal, testing, and reinstallation.

It gets more complicated from here on. The engine went through a couple more evolutions, and along the way there were "verbal passdowns" regarding reinstallation of the pin. Individuals "assumed" that others would take care of it. There was no paper audit trail. Thus, for lack of a simple cotter pin, a bird was lost and a pilot had to punch out.

Ole Gramps doesn't like the idea of an inexpensive cotter pin bein' so dang important to the safe operation of the aircraft. But it was and is. So, until we improve the system, better go by the book, step by step, whenever we take flyin' machines apart and put 'em back together again.

Latch It or Lose It

During preflight of a TAV-8B, the instructor pilot (IP) and pilot under instruction (PUI) observed light frost on the *Harrier*'s windshield. Outside air temperature was 31°F. The plane captain's attempts to remove the frost were unsuccessful due to high humidity in the atmosphere. The frost reformed after removal because of the

below-freezing temperature and the moisture.

The PUI, in the front cockpit, was uncomfortable with his direct-forward visibility due to the light frost. The decision was made for the IP to make a conventional takeoff. His visibility was adequate since the rear cockpit was slightly stepped up from the one in front.

The *Harrier*'s takeoff roll was normal until reaching 95 knots when the rear canopy opened in the airstream and flew off. The IP successfully aborted the takeoff, but pieces of the canopy and its frame struck the right wing leading edge and fodded the engine.

As the aircrew taxied clear of the runway, the canopy light was not illuminated, even though the rear canopy was gone.

Investigation revealed that the IP had engaged the canopy handle forward to the latched position but did not fully close and lock it. Instead, he rested the canopy locking mechanism hooks on top of the canopy locking mechanism retainers. The warning light didn't come on because the rear canopy microswitch froze in the closed position, falsely indicating to the pilot that the canopy was closed and locked.

Grampaw Pettibone says:

Little things mean a lot. 'Cause the microswitch froze, there was no red light to tell the IP somethin' was amiss. He made the movements of closin' and lockin' the clamshell, right and proper. The canopy sat on those retainers instead. Twas only a matter of millimeters in distance, but it cost a canopy and an engine.

Details, folks. Naval Aviation is a matter of masterin' 'em.

Seasprite Sacrilege

An SH-2F *Seasprite* was on a passenger transfer and antisubmarine warfare (ASW) training mission with added duty as plane guard for a USMC Zodiac operation originating from the parent surface ship. After completing the passenger transfer and ASW portion of the flight, the *Seasprite* was cleared to fly between 100 and 200 feet altitude for plane guard duty.

The helo made several low, fast passes by the ship, one of which featured a sliding, 90-degree stopping turn to face the bridge. The C.O. gave a positive hand gesture to the helo and told the phone talker to pass the word to CIC (combat information center) to advise the *Seasprite* they were looking good but (not verbatim) "it was too bad they couldn't do a loop."

The message, when relayed to the pilot, came out (not verbatim) that "the captain was enjoying the air show and he'd like to see a flip."

The pilot responded to the effect that H-2s were incapable of doing a flip – the last one to try had to replace every revolving part. He added that when he got lighter, the ship might see something special.

A little later the *Seasprite* crossed the ship port to starboard about 60 feet above the water and proceeded 1,000 yards beyond it. The pilot then made a nose-high climb, estimated at 75 degrees, with an estimated 90-degree right turn leading into a steep, nose-down descent. The *Seasprite* flattened out approaching the water and slammed into it with slight nose-down attitude. The aircraft disappeared from sight and never resurfaced.

Grampaw Pettibone says:

There lives a demon inside just about every Naval Aviator. The demon's best friend is temptation. Most fliers are stronger than the demon and keep him in place. Temptation's not such a bully when his best friend ain't around.

The demon loves to flathat and when that rare Naval Aviator gives way to the demon and temptation hitches on for the ride, trouble comes in spades.

This Seasprite pilot had a history of wrappin' the helo around, often unannounced, beyond its NATOPS (Naval Air Training and Operating Procedures Standardization) – not to mention aerodynamic – limits. One copilot told him to knock it off. Others, over a period of time, kept quiet. In this case, the ship's C.O. didn't help matters. But the true responsibility sits on the pilot's shoulders.

Too bad the demon and his pal don't show up on brain x-rays. Until we figure out how to do that, be leery of the likes of fliers who are inclined to show off at somebody else's expense.

Desert Shield CV Force to Double

President Bush announced a decision on November 8, 1990, to double the number of carrier battle groups deployed in support of Operation *Desert Shield*. Once on station with the three carriers already deployed, the three battle groups en route will fill out the largest carrier force assembled in one theater of operations since WW II.

Ranger (CV-61) with CVW-2 aboard, which departed San Diego, Calif., on December 8, 1990, and *America* (CV-66)/ CVW-1, and *Theodore Roosevelt* (CVN-71)/CVW-8 are scheduled to be on station by January 15, 1991. They will join *Saratoga* (CV-60)/CVW-17 and *John F. Kennedy* (CV-67)/ CVW-3, both of which deployed in August 1990, and *Midway* (CV-41)/CVW-5, which replaced *Independence* (CV-62) in the northern Arabian Sea in early November.

Before heading home, *Independence* entered the confined waters of the Persian Gulf on October 3, 1990, and conducted flight operations there – the first carrier to do so since 1974 when *Constellation* (CV-64) operated there. VF-154, VAQ-139, and VS-37 became the first squadrons to launch and recover the F-14A, EA-6B, and S-3A, respectively, while operating in the Persian Gulf. (One of the CVW-14 VFA squadrons became the first to do so with the FA-18 as well.) *Midway* also made a sortie into the gulf after arriving on station.

While on station, the *Desert Shield* carrier air wings have kept up a busy schedule of training, including low-level missions, long-range coordinated strikes, air combat training, and aerial refueling.

As documented in press reports, a variety of naval aircraft have been deployed to the Middle East and the Mediterranean Sea in support of Operation *Desert Shield*, including many detachments of SH-60B and SH-2F helicopters aboard surface combatants. P-3C patrol planes from VPs 1, 11, and 23 have supported the battle groups by conducting shipping surveillance. NAS Sigonella, Sicily-based VR-24 C-2A carrier onboard delivery (COD) aircraft and HC-4 CH-53E vertical onboard delivery helicopters have been busy supplying the battle groups, backed up by C-130F and KC-130F transports from NS Rota, Spain-based VR-22. VQ-4 sent a TC-130Q with a crew to help VR-22 haul cargo around the Mediterranean for a period. Reserve VR squadrons have also supported the build-up with their C-9B and DC-9 aircraft.

In the Indian Ocean, VRC-50 supports the battle group with its US-3A COD aircraft from Diego Garcia. In the Persian Gulf, Detachment 2 of

JO2 Joe Bartlett

The Desert Ducks of HC-2, Detachment 2, keep the mail flowing to ships in the Persian Gulf with their SH-3G Sea Kings.

LCdr. Dave Parsons

An F-14A of VF-32 deployed aboard John F. Kennedy on patrol over the Red Sea.

ABFN Franklin Graham, wearing the new MCU-2P gas mask, refuels an F-14A aboard John F. Kennedy.

PH2 Charles W. Moore

HC-2 hauls personnel and cargo in its SH-3G "Desert Ducks." A detachment of MH-53E mine-sweeping helicopters from NAS Norfolk, Va.-based HM-14 also deployed to the region, as well as HH-60H strike rescue helicopters from reserve squadron HCS-5, based at NAS Point Mugu, Calif.

A considerable portion of Marine Corps aviation has been deployed to the Arabian peninsula and surrounding waters, including one A-6E, four FA-18A/C, and at least three AV-8B squadrons, as well as detachments of OV-10A/D and KC-130F/R aircraft. Numerous squadrons and detachments of CH-46E, CH-53D/E, UH-1N, and AH-1T/W helicopters are also in place. A detachment of reserve squadron HMA-773 at NAS Atlanta, Ga., has been mobilized with its AH-1J gunship helicopters. VMGR-452, a reserve unit from Stewart Field, N.Y., has also been mobilized with its KC-130T tankers.

PH3 Frank A. Marquart

An HS-5 gunner keeps vigil in his SH-3H over Dwight D. Eisenhower as it transits the Suez Canal during Operation Desert Shield.

Cdr. John Leenhouts

A light attack pilot's view from a VA-72 A-7E during a low-level training flight over Saudi Arabia.

An EA-6B from VAQ-130, deployed aboard John F. Kennedy, is shown on a low-level training flight over Saudi Arabia.

Cdr. John Leenhouts

F-14D Joins the Fleet

The Navy's newest fighter, the Grumman F-14D *Super Tomcat*, was formally accepted for fleet service in a ceremony held November 16, 1990, at NAS Miramar, Calif.

Three of the new fighters were delivered in October and November to VF-124, the Pacific fleet readiness squadron. LCdr. Mike Higgins and Lt. Clay Snaza made the first acceptance flight on October 18. VF-124 commenced training of its instructors in December and will soon begin training crews from VFs 51 and 111, the first operational squadrons that will transition from the F-14A to the F-14D. Deployment of the F-14D is slated for 1992.

Prior to delivery to VF-124, the F-14D underwent extensive technical evaluation by the Naval Air Test Center, Patuxent River, Md., and the Pacific Missile Test Center, NAS Point Mugu, Calif., and operational evaluation by VX-4, Point Mugu. VX-4 took the F-14D aboard *Nimitz* (CVN-68) in August 1990 for carrier trials.

PH3 Louis Hernandez

One of VF-124's first F-14D Super Tomcats.

Bruce R. Trombecky

VQ-2's Ranger Three, EA-3B BuNo 146453.

Electric Whales Head for Retirement

Fleet Air Reconnaissance Squadron (VQ) 2 has begun the phaseout of the Douglas EA-3B *Skywarrior*, which has served the fleet for over 30 years as its only carrier-capable dedicated electronic reconnaissance aircraft.

VQ-2 dispatched the first of its nine EA-3B "Electric Whales" to storage at Davis-Monthan AFB, Ariz., when "Ranger Three" BuNo 146453 departed NS Rota, Spain, on October 22, 1990. The remaining aircraft will follow over the year, with the last to be retired by September 1991.

The 25 EA-3Bs built were operated by VQs 1 and 2 since 1959, operating from carrier decks and land bases in the intelligence collection role, including extensive service during the Vietnam war. At the end of 1987, the EA-3Bs were removed from carrier use and Guam-based VQ-1 transferred its remaining "Whales" to VQ-2, which continues to operate them from land bases in the Mediterranean and in Europe.

Although the ES-3A is programmed to replace the EA-3B as a carrier-based aircraft, new squadrons will be established to operate them (see "New VQ Squadrons to Stand Up"), and VQs 1 and 2 will continue to operate their EP-3E versions of Lockheed's land-based P-3 *Orion* in the electronic reconnaissance role.

New VQ Squadrons to Stand Up

The Navy will establish two new Fleet Air Reconnaissance (VQ) squadrons in 1991 to eventually deploy the Lockheed ES-3A electronic reconnaissance aircraft aboard carriers in support of battle group operations.

VQ-5 will stand up on April 15, 1991, at NAS Agana, Guam, and will assume the carrier-based reconnaissance role that was previously assigned to VQ-1 (also at NAS Agana) before that squadron phased out its EA-3B carrier detachments at the end of 1987. VQ-5 will be under administrative control of Commander Fleet Air, Western Pacific.

VQ-6 will be established in August 1991 at NAS Cecil Field, Fla.,under the administrative control of Commander, Sea Strike Wing One, which also controls the Atlantic Fleet VS squadrons. VQ-6 will acquire the manpower of and assume the mission currently performed by EA-3B crews of VQ-2 based at NS Rota, Spain (see

"Electric Whales Head for Retirement"). Basing VQ-6 at Cecil Field rather than Rota will enable Atlantic Fleet carrier air wings to integrate ES-3A crews into the air wing in the work-up cycle prior to deployment.

On October 1, 1990, a Lockheed modification team at Cecil Field began work on S-3A BuNo 159404 to convert it into VQ-6's first fleet-standard ES-3A. The conversion process is expected to take six months for the first aircraft and four months for each subsequent ES-3A.

PH2 Dennis D. Taylor

Aircraft of composite CVW-11 crowd the deck of Abraham Lincoln (CVN-72) during its 22,000-mile transit around South America. The Navy's newest carrier departed Norfolk, Va., on September 25, 1990, making port calls and operating with several South American navies prior to its November 20 arrival at NAS Alameda, Calif., becoming the Pacific Fleet's newest carrier. Argentine Super Etendard jets and S-2 Tracker ASW aircraft made nearly 300 touch-and-go landings aboard the CVN in the South Atlantic.

NaDep Jacksonville completed a "major miracle" in 1990 by rebuilding a crash-damaged P-3 Orion that was initially feared to be a "write-off." P-3C BuNo 157330 (top), fresh from retrofit as an Update III aircraft, sheared off a mainmount on February 6, 1988, while attempting a landing at NAS Jacksonville, Fla., and diverted to nearby NAS Cecil Field. The resulting belly landing caused irreparable damage to the wings. Led by project manager Bill Bowmer, a team from NaDeps Jacksonville and Alameda, Calif., removed a set of wings from Royal Australian Air Force P-3B BuNo 155300 (middle), which had been scrapped after a fuselage fire on January 27, 1984. The wings were flown to Cecil Field by a USAF C-5 transport (the Jacksonville runway was under repair), and both wings were trucked to NaDep in November 1988. The P-3C fuselage was trucked to NaDep in January 1989, using a custom-built cradle on a flatbed truck. The wings were married to the fuselage and the P-3C underwent a complete restoration. Labeled "Phoenix – Pride of NaDep" (bottom), the P-3C, a product of a lot of hard work and imagination from many people, rolled out in November 1990 as good as new, and will soon return to the fleet.

(Information and photos courtesy of NaDep Jax PAO Joe Sarver.)

Harrier II Plus Approved

In September 1990 the U.S., Spain, and Italy formally approved a plan to integrate the Hughes APG-65 radar into the AV-8B *Harrier II*, which will be known as the AV-8B *Harrier II Plus*.

The APG-65 radar featured in the *Harrier II Plus*, already used in the FA-18 *Hornet*, will give the AV-8B a multimode, all-weather sensor with the flexibility for air-to-air and air-

to-ground missions. The aircraft will also be equipped with the higher-thrust Rolls-Royce Pegasus 408 engine.

The prototype *Harrier II Plus* is expected to fly in 1992, with production deliveries beginning in 1993. The final 27 of 276 Marine Corps *Harrier IIs* will be delivered in this configuration. Italy is expected to acquire 16 *Harrier II Plus* aircraft and Spain has announced a requirement for 18. Each of the two European countries expects to purchase two TAV-8B trainers as well.

Bruce R. Trombecky

One of three Lockheed P-3C Update II.5s scheduled for delivery to Pakistan is seen here in the livery of the Pakistan Navy.

Dive-bombers Rise from the Deep

Two WW II Navy dive-bombers were recently salvaged from the cold waters of Lake Michigan and have been acquired by the National Museum of Naval Aviation, Pensacola, Fla.

An SBD-3 *Dauntless* and an SB2U-2 *Vindicator*, lost during WW II while conducting carrier qualifications in Lake Michigan aboard paddle-wheeler training carrier *Wolverine*, were recovered by a private salvage crew financed by an anonymous donor. The effort was supervised by Kevin Griffin, a Marine Corps reservist and Pensacola attorney.

The SBD-3, BuNo 06508, spent 47 years in 130 feet of water after it skidded on landing and went over the side of *Wolverine* in 1943. The pilot, Edward Hendrickson, was unhurt. The SB2U-2, BuNo 1383, the only one of its kind known to exist now, was piloted by 2nd Lt. A. W. Lemmons as it crashed over the starboard bow of *Wolverine* into 130 feet of water.

For the Record...

• **VFA-136** received its first FA-18C night-attack *Hornet* on November 13, 1990, when BuNo 164206 was delivered. VFAs 136 and 131, both with CVW-7, are upgrading to the FA-18C from the FA-18A.

• **Unitas XXXI** in 1990 saw extensive participation by Naval Air Reserve P-3 crews. Four squadrons, VPs 65, 90, 92, and 94, sent detachments to participate in the annual exercise with South American navies.

• **HS-6** became the Navy's second deploying **SH-60F** squadron when it received its first *Seahawk* in September 1990. HS-6, scheduled to cruise aboard *Abraham Lincoln* in 1991, will also be the first HS unit to deploy with the HH-60H strike rescue helicopter.

• **VA-122 "Corsair College,"** the A-7 fleet readiness squadron at NAS Lemoore, Calif., is slated for disestablishment in May 1991.

• The Rockwell **X-31A** Enhanced Fighter Maneuverability demonstrator aircraft successfully completed it first flight on October 11, 1990, at Palmdale, Calif. The X-31 project, managed by the Navy, is jointly sponsored by the Defense Advanced Research Projects Agency and the German Ministry of Defense.

• The new Sikorsky **HH-60J** *Jayhawk* medium-range rescue helicopter was accepted into Coast Guard operational service in October 1990 at the Aviation Training Center in Mobile, Ala. The HH-60J will eventually replace the Coast Guard's Sikorsky HH-3Fs and CH-3Es.

• Twenty-one years after the fleet introduction of the P-3C, the active fleet VP community became an **"all-Charlie" force** on September 11, 1990, when VP-22's **last P-3B** flew its last flight with the *Blue Geese*. VP-22 has completed transition to the P-3C Update II.5.

• **VP-91**, a reserve squadron at NAS Moffett Field, Calif., transferred its last **P-3B** in October 1990, marking its transition as the Naval Air Reserve's second P-3C Update III squadron.

• **HMH-361** based at MCAS Tustin, Calif., completed transition from the CH-53D *Sea Stallion* to the more capable **CH-53E** *Super Stallion* in September 1990, bringing to four the number of CH-53E squadrons in MAG-16.

• **NaDep Jacksonville**, Fla., was selected to be the overhaul facility for the forthcoming

A-12 *Avenger* attack aircraft.

• **NATTC Memphis** received the first of 24 **A-7E** aircraft that will serve as ground instructional airframes for the various mechanics schools run by NATTC.

• **NaDep Norfolk**, Va., delivered its first **A-6E** with a composite replacement wing to VA-176 in a ceremony held October 4, 1990.

• **NaDep Cherry Point**, N.C., was selected to modernize the National Science Foundation's seven LC-130s operated by VXE-6 in support of Operation *Deep Freeze*. Under the **LC-130 Improvement Program**, the seven LC-130F/R ski-equipped cargo planes will cycle through the NaDep for an extension of their service life. Each aircraft will require 9 to 12 months of attention, except for LC-130F BuNo 148321, which – having been recently recovered after 16 years buried in the Antarctic snow – will require over 25 months.

• **Stoofs Forever?** Israeli Aircraft Industries' Bedek Aviation Division is upgrading S-2 *Tracker* ASW aircraft for foreign air arms under a program designated **S-2UP**. Improvements include replacement of the S-2's piston engines with twin Garrett TPE 331-15AW turboprops, a 20-year extension on the airframe service life, and various avionics upgrades.

• A restored **TBM-3E** *Avenger* ASW aircraft was dedicated and placed on display at **NAS Cecil Field**, Fla., on October 17, 1990. Restored in VS-27 markings, the aircraft was dedicated by retired VAdm. James Stockdale, a Congressional Medal of Honor winner, former Vietnam POW, and Naval Aviator who once flew TBMs with VS-27.

• The main gate at **NAS Jacksonville**, Fla., is now guarded by more than just a WW II-vintage PBY. **P-3A** BuNo 151374 and **SH-3G** BuNo 148051 were dedicated in 1990 as representative of the aircraft that have made the air station a center for ASW aircraft operations.

Arthur W. Giberson

The Phase III expansion of the National Museum of Naval Aviation, Pensacola, Fla., dedicated on October 12, 1990, is seen here. Devoted to carrier aviation and the WW II and Korean War eras, it features a full-scale replica of a flight deck section and island superstructure built by museum staff using building plans of Cabot (CVL-28). Almost all of the parts of the island came from WW II-era ships

PA3 James Wentworth

A CASA 212-300 turboprop transport, Serial 0393, leased beginning in the summer of 1990 to the Coast Guard from Casa Construcciones Aeronauticas of Spain, is undergoing suitability trials as an austere logistics support aircraft. The aircraft is based at CGAS Miami, Opa Locka, Fla.

Although not on the front pages, Operation Sharp Edge continued off Liberia into December 1990 (see NANews, November-December 1990). The "Black Stallions" of HC-4, based at NAS Sigonella, Sicily, deployed CH-53E helicopters to Lungi and Freetown, Sierra Leone, in support of the operation. By November, U.S. forces had evacuated more than 2,400 citizens of 30 nations from war-torn Liberia.

PH3(AC) Stephen L. Batiz

Grumman Corporation

The first flight of the Tomcat: December 21, 1970, Calverton, N.Y.

The Tomcat at 20

By LCdr. Rick Burgess

Two decades! That's how long it has been since the Tomcat first took off.

On December 21, 1970, the first Grumman F-14 *Tomcat*, BuNo 157980, leaped into the air from the Grumman airfield at Calverton, N.Y., under the control of test pilots Robert Smyth and William Miller. Now, 20 years and almost 700 *Tomcats* later, the F-14 remains the Navy's premier fighter, providing the fleet with the finest air defense it has ever had. And, it keeps getting better.

The F-14 is arguably the most famous contemporary fighter in the world today, made so by its exploits on the silver screen and in combat over the Mediterranean. Many contend that it is also the finest fighter in the world. The latest in a long line of famous Grumman "cats" that have defended the Navy's carriers since before WW II, the F-14 restored the Grumman dominance of Navy fighter production that had been broken in the late 1950s by the Vought F-8 *Crusader* and the McDonnell F-4 *Phantom II*.

Although most renowned for its mastery of air superiority, the F-14's greatest contribution to fleet air defense – as witnessed by countless intercepts of Soviet *Bear*, *Badger*, and *Backfire* aircraft – has been its ability to counter any threat of long-range supersonic cruise missiles and their launching aircraft in an outer air battle. That capability gave the Navy's carrier battle groups the ability to carry the war to a potential enemy's highly defended doorstep in support of a forward maritime strategy.

The F-14 had its origins in the failure of the Grumman F-111B, the fleet air defense interceptor version of the General Dynamics F-111 strike aircraft. The F-111B was a promising design as a "missileer," built to carry aloft an impressive intercept radar and the AIM-54 *Phoenix* long-range air-to-air missile to enable the fleet to knock enemy strike aircraft before they came within striking range of the fleet. The F-111B fell victim to the risky venture of trying to design an aircraft optimum for both land and carrier operations. In addition, its handling characteristics would have made it a disappointing dogfighter.

Even before the F-111B program's cancellation in 1968, Grumman saw

PH3 Harold Brown

the writing on the wall and began work on a new proposal, Design 303. The timing would prove fortunate for the Navy. After three years of sporadic aerial combat over North Vietnam, the Navy absorbed the lessons learned with the F-4 and F-8 fighters and crystallized its requirements for the kind of fighter it would need in the future. The formidable F-4 needed an internal gun for dogfighting and more fuel and longer range missiles to meet the growing cruise missile threat. The F-111B, even if it had overcome its carrier suitability problems, would have proven unsuitable in the air superiority role. The Naval Air Systems Command concluded that a future Navy fighter had to reign supreme in all aspects of aerial combat.

Design 303, which Grumman submitted in competition with four other companies, was selected in January 1969 as winner of the VFX competition. Design 303 combined the best features of the F-4 and F-111B. The design team, lead by Michael Pelehach, incorporated the variable-geometry wings, twin TF30 engines, AWG-9 track-while-scan radar, and *Phoenix* missiles from the F-111B, with the tandem crew seating and *Sparrow* and *Sidewinder* missiles featured on the F-4. A combat-proven M61A-1 20mm rotary cannon satisfied the need for an internal gun.

The first F-14A rolled out of Grumman's Long Island, N.Y., factory in November 1970, only 20 months after Grumman was awarded a research, development, test, and evaluation contract. Although the first prototype was lost in December 1970 during its second flight because of hydraulic failure, the flight test program resumed in May 1971 with the first of the succeeding development aircraft. Carrier suitability trials began in June 1972 aboard *Forrestal*.

The real mettle of the *Tomcat* was displayed as weapons testing progressed at the Naval Missile Center (now Pacific Missile Test Center) at Point Mugu, Calif. During one test, a *Phoenix* missile hit a target at an astounding distance of 126 miles. The ability of the F-14A to engage six incoming targets simultaneously was demonstrated in November 1973 when six *Phoenix* missiles were guided by the AWG-9 radar to six drones, with four scoring direct hits. Trials with the *Tomcat*'s other weapons also proceeded, despite the mishap that occurred when the sixth F-14A developmental aircraft shot itself down because a *Sparrow* missile failed to clear the aircraft and impacted the fuselage.

Air Test and Evaluation Squadron (VX) Four at NAS Point Mugu was appropriately the first squadron to operate the F-14A, receiving the *Tomcat* in 1972 for its operational evaluation. Fighter Squadron (VF) 124, the F-8 fleet readiness squadron (FRS) at NAS Miramar, Calif., was selected to train future F-14 crews, commencing in 1973. The Navy chose to establish two new squadrons, VFs 1 and 2, on October 14, 1972, to introduce the *Tomcat* to the operating fleet by 1974.

PH3 Harold Brown

The *Tomcat* was in business in September 1974 when VFs 1 and 2 deployed to the western Pacific with Carrier Air Wing 14 aboard *Enterprise*. With the direct U.S. involvement in Vietnam ended, it promised to be a peaceful cruise. As it turned out, *Enterprise*'s F-14s covered the Operation *Frequent Wind* evacuation of South Vietnam in April 1975. The North Vietnamese air force did not rise to challenge the evacuation and the *Tomcat* remained untested.

Over the next decade, the F-14 equipped 22 more fleet fighter squadrons, as well as the Atlantic fleet readiness squadron, VF-101. (Two units, VFs 191 and 194, enjoyed only a brief existence from 1986 to 1988 and fell victim to budget cuts before they could deploy.) In 1984, equipment of the four reserve VF squadrons with F-14As began. The Marine Corps was initially incorporated in the F-14 program but opted out of it in the mid-1970s.

Even before the F-14A joined the fleet, Grumman modified and flew the seventh prototype in 1973 as the F-14B, featuring the higher thrust Pratt & Whitney YF401-P-400 engines. The F-14B program was cancelled, but the F-14B prototype was brought out of seven years of storage to serve as a development testbed for the General Electric F101 DFE engine, which, in its production model, the F110-GE-400, would power the later F-14A+ and F-14D versions. The F-14C was a proposed version of the F-14B which was never built; all of the improvements that it was to feature were incorporated in later F-14As, as well as the F-14A+ and F-14D.

The *Tomcat* developed its justly deserved fame during the 1980s as the carriers from which it operated went wherever the action was, and it became the only fighter in American use to engage hostile aircraft in aerial combat since the Vietnam war.

On August 19, 1981, two VF-41 crews used AIM-9L *Sidewinder* missiles to shoot down two Libyan SU-22 *Fitter* fighters, one of which had launched an *Atoll* missile at the F-14s.

VF-1 (facing page) and VF-2 introduced the F-14 to fleet operations aboard Enterprise (CVN-65). One month after these photos were taken, these Tomcats were covering the April 1975 evacuation of South Vietnam.

Grumman Corporation

Tactical Air Reconnaissance Pods, mounted on the belly of the F-14, turned the outstanding fighter into an outstanding photoreconnaissance platform.

VFs 74 and 103 had an eventful Mediterranean deployment aboard *Saratoga* starting in 1985. On October 10, their F-14s were vectored by a VAW-125 E-2C to intercept the Egypt-Air Boeing 737 airliner that was transporting the terrorists which had hijacked the Italian cruise ship *Achille Lauro*. The airliner was forced to land at NAS Sigonella, Sicily, and the terrorists were turned over to Italian authorities. Later in the deployment, VFs 74 and 103 joined *America*-based F-14As from VFs 33 and 102 to cover carrier strikes on March 24-25, 1986, against Libyan surface-to-air sites, which had earlier fired on Navy aircraft operating over the Mediterranean.

After *Saratoga* departed the Mediterranean, *America*'s F-14s again flew cover for strikes against Libya on April 15, 1986, in retaliation for a terrorist bombing in Berlin, Germany. Nearly three years later, on January 4, 1989, two provocative Libyan MiG-23 *Flogger E* fighters met the same fate as the *Fitters* in 1981, downed by *Sidewinder* and *Sparrow* missiles launched from *John F. Kennedy*-based VF-32 F-14As. The score has remained: *Tomcats* 4, Libya 0. (Actually, Navy *Tomcats* have a fifth aerial shoot-down to their credit, a USAF RF-4C *Phantom II* that was inadvertently downed with a missile during an exercise over the Mediterranean in 1987.)

The *Tomcat* has also been very active in the skies over the Arabian Sea and Persian Gulf. *Nimitz*-based VFs 41 and 84 covered the April 1980 hostage rescue attempt in Iran. When the Navy retaliated against Iranian naval units on April 18, 1988, after the guided missile frigate *Samuel B. Roberts* struck a mine in the Persian Gulf, F-14As from VFs 114 and 213 aboard *Enterprise* flew cover as Navy ships and attack aircraft destroyed Iranian naval units.

The Navy was not the only service to operate the F-14 in the Persian Gulf region. The Imperial Iranian Air Force, the only foreign customer for the *Tomcat*, took delivery of 79 F-14As before the Iranian monarchy was overthrown. (The 80th F-14, not yet delivered, was detained in the U.S. and later pressed into USN service.) Reorganized as part of the Islamic Republic Iranian Air Force, the Iranian F-14s saw action during the 1980s in the war with Iraq. Little has been revealed of their combat record, but it is known that they were hampered by lack of spare parts and experienced crews and technicians.

The only other agency to operate the F-14 was the National Aeronautics and Space Administration. It has used two different F-14As over the years at its Dryden Flight Research Center in California as test aircraft for various projects, including spin and high angle-of-attack tests and a laminar flow research program.

An established success as a fighter, the F-14 has also cornered the market on another mission, carrier-based photoreconnaissance. As the aircraft dedicated to that mission (the RA-5C *Vigilante* and RF-8G *Crusader*) were retired, the Navy decided against developing replacements and opted for development of the Tactical Air Reconnaissance Pod System (TARPS). TARPS, containing forward, vertical, panoramic, and infrared cameras, is carried by specially wired F-14s (49 were thus wired), three of which are operated by the higher numbered VF squadron in each carrier air wing. Despite some initial skepticism that fighter crews would dedicate excellence to this less glamorous but vital mission, the TARPS has proved to be an outstanding success in their hands since its initial service with VF-213 in 1980. In 1983, photo runs over Grenada in October and Lebanon in December by VF-32 from *Independence* were vital to U.S. action in those countries.

As successful as the F-14A was, it needed improvement. Progressive production blocks received avionics improvements, most notably an electro-optical television camera set, but the TF30-P-412A engine was an irritating source of trouble. (Over 115 Navy F-14s have been lost in mishaps during the two decades, many of them to engine problems.) These engines were progressively replaced by the TF30-P-414A, with improved reliability but similar power. The Navy took a major step forward in 1984 by contracting Grumman to produce the F-14A+ as an interim aircraft for the next major version, the F-14D. The F-14A+ features F110-GE-400 engines (giving significant improvement in thrust and fuel economy), computerized fuel control, and improved carrier landing characteristics, as well the new ALR-67 threat warning system.

Production switched to the F-14A+ after 636 F-14A and one F-14B were completed, with 38 new F-14A+s built, and 32 more modified from F-14As. The first modified example, BuNo 158630, flew in December 1986, followed by the first production F-14A+, BuNo 162910, in November 1987. After deliveries to VX-4 and VF-101 for testing and training, F-14A+ aircraft replaced F-14As in VFs 24, 74, 103, 142, 143, and 211. VFs 142 and 143 were the first to deploy with the new variant, leaving Norfolk, Va., on March

Grumman Corporation

The single F-14B prototype served as an engine development platform for the F-14A+ and F-14D.

8, 1990, aboard *Dwight D. Eisenhower*, participating in Operation *Desert Shield* before the end of the deployment. VFs 74 and 103 followed on August 7 aboard *Saratoga*.

Two weeks after the F-14A+ initially deployed, the first production example of the second definitive *Tomcat* version, F-14D BuNo 163412, rolled off the Grumman line – on March 23, 1990. Development began in 1987 using three F-14As modified as avionics testbeds. One of these, BuNo 161867, was fitted with the F110-GE-400 engines, to become the first full-scale development F-14D.

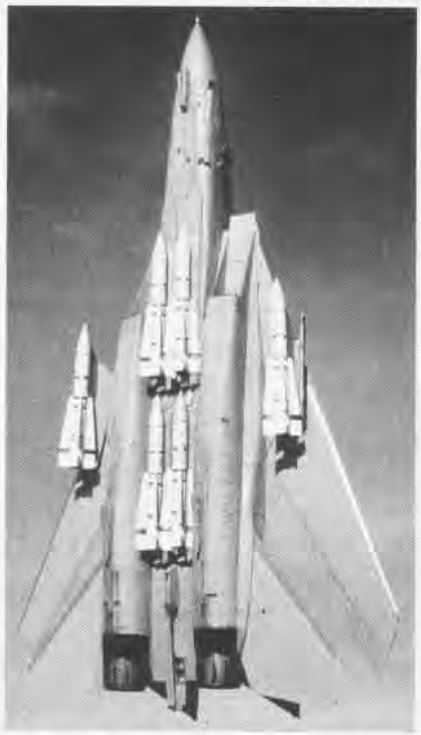
The "D" could stand for "digital" in this vastly improved model. The F-14D *Super Tomcat* has the Hughes APG-71 radar which offers high-speed digital processing, enhanced overland modes, and improved target detection. In addition, new features include a dual 1533B data bus, digital cockpit displays, digital stores management and inertial navigation, two AYK-14 computers, an infrared search and track sensor, the ALR-67 warning receiver, the ALQ-165 jammer, and the Joint Tactical Information Distribution System, as well as a new ejection seat. In addition to the *Tomcat*'s current armament, the F-14D will be able to carry the AGM-88A high-speed anti-radiation missile and AIM-120A advanced medium-range air-to-air missile.

F-14D production is currently funded at 37 new aircraft and the remanufacture of 18 F-14As (as many as 400 may eventually be remanufactured). Evaluation by the Naval Air Test Center, Patuxent River, Md., Pacific Missile Test Center, and VX-4 began during 1990, with delivery to the FRS, VF-124, NAS Miramar on November 16, 1990. VFs 51 and 111 are the first fleet squadrons slated to transition to the *Super Tomcat*.

What next? The F-14D is programmed to be the fleet's fighter into the next century. Its future is clouded by the decision of the Department of Defense to cancel new production beyond that already budgeted, with the line scheduled to close in 1993. The proposed Navy Advanced Tactical Fighter (NATF) design began in 1988 as an eventual replacement for the F-14. The NATF's future hangs on an uncertain budget, however, and any delay may argue for keeping the F-14D production line open. Alternatives to the NATF include the proposed *Tomcat-21*, an advanced upgrade of the F-14D.

In any case, the *Tomcat* will likely be prowling the skies over the world's oceans for another 20 years. Its place in history already secure, the F-14 may yet again demonstrate its superiority in the skies over the Middle East or wherever else a crisis calls for carrier battle groups.■

Grumman Corporation



An F-14A+ from VF-211 displays the long-range claws of the Tomcat – six AIM-54 Phoenix missiles.

Navy F-14 Operators

Present

VF-1	VF-103
VF-2	VF-111
VF-11	VF-114
VF-14	VF-124
VF-21	VF-142
VF-24	VF-143
VF-31	VF-154
VF-32	VF-201
VF-33	VF-202
VF-41	VF-211
VF-51	VF-213
VF-74	VF-301
VF-84	VF-302
VF-101	VX-4
VF-102	

Naval Air Test Center
Naval Air Development Center
Pacific Missile Test Center

Former

VF-191
VF-194

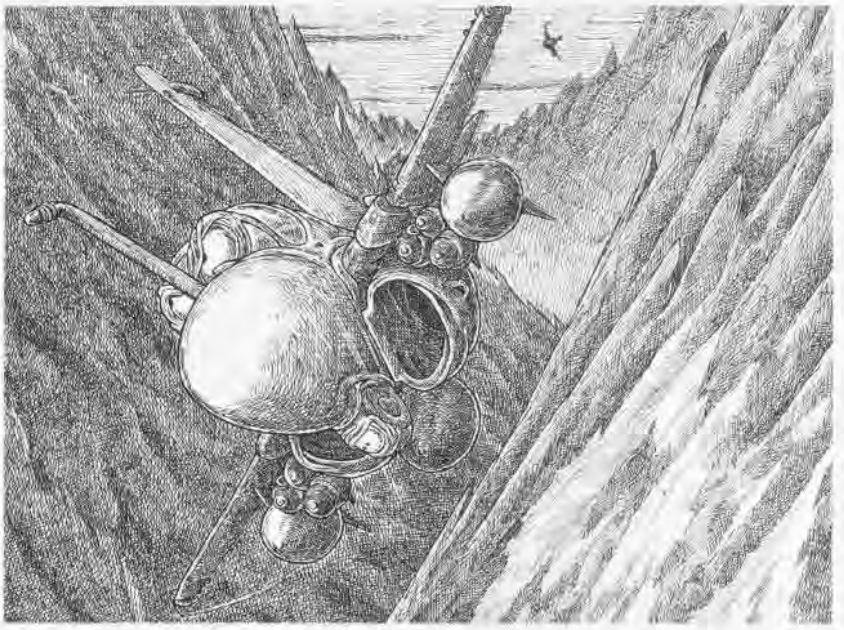
Above, the F-14 gave the battle group commander the capability to intercept intruders long before they reached striking distance. Here, a VF-14 F-14A escorts a Soviet TU-95 Bear D reconnaissance aircraft. Below, VX-4 introduced the F-14D Super Tomcat to the deck of Nimitz (CVN-60) in August 1990.

AD3 Seeley

Special thanks to Peter Kirkup of the Grumman History Office, and to Rene Francillon.

A Stroll Through Intruder Country

There is a distinct difference in attitude between attack and fighter pilots. Attack pilots just don't think that spending the majority of a mission flying at high altitudes and benign attitudes is really any fun. They prefer the sustained challenge and excitement of constantly flying close formation with the terrain at altitudes and speeds that keep the adrenalin flowing and attention focused. Getting there and coming back should be at least as much fun as being there. This attitude became especially real for me when I was invited to share the *Intruder* experience firsthand with the *Golden Intruders* of VA-128 at NAS Whidbey Island, Wash., in July 1990. VA-128 is the Pacific Fleet's A-6 readiness squadron.

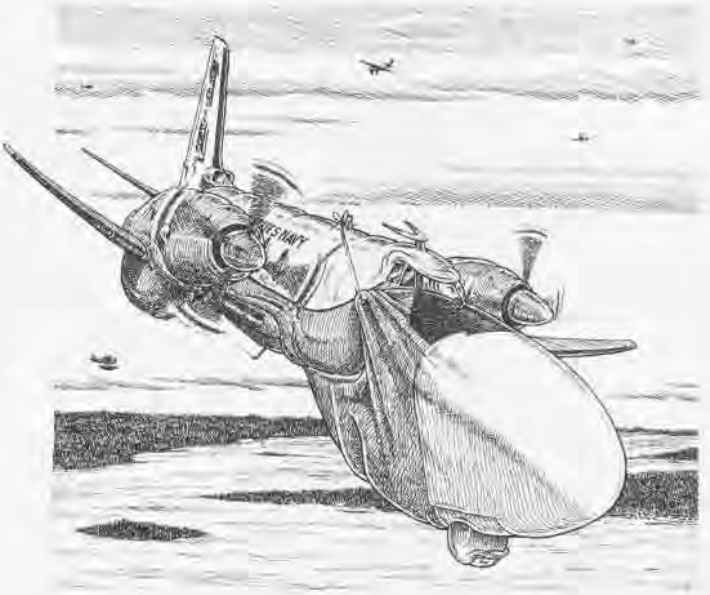


Strolling

Flying through the Cascade Mountains on the VR 1355 training route doesn't offer much opportunity for straight and level flying. With a clearance of 500 feet or less between our A-6E *Intruder* and the rockscape, the margin for error is measured in heartbeats. Opportunities for lapses in judgment are abundant. What really caught my attention was how quickly significant geological obstacles were lost in the sun and haze. As Marine Captain Jeff Olsen deftly sidestepped and leapfrogged the ridgelines and outcroppings that presented themselves, it was not hard to see why the attack community is so enthusiastic about what it does best.

TIC Attack

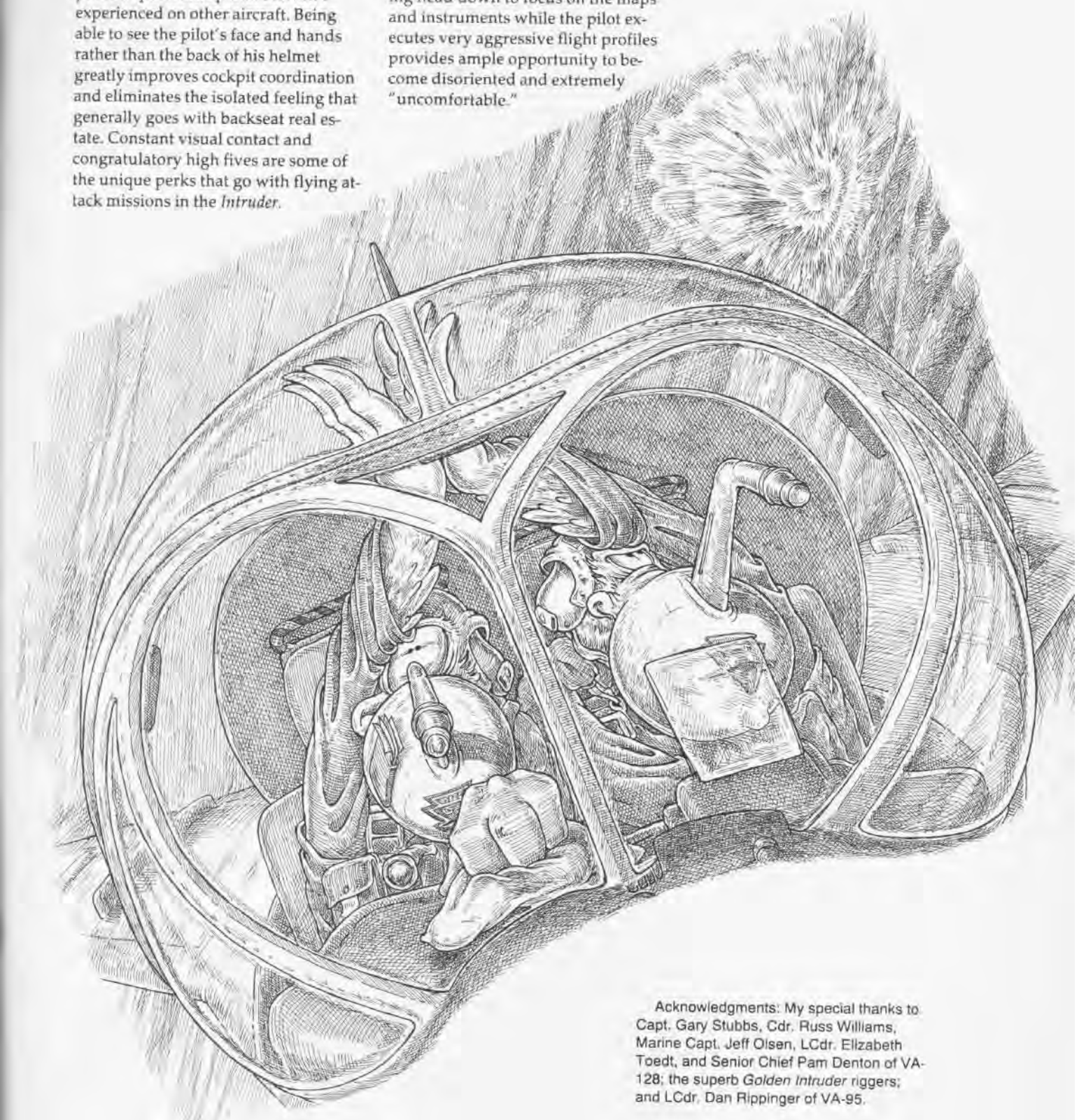
The A-6 is designed as a two-person aircraft: the pilot cannot prosecute the attack mission successfully without the other half of the cockpit team, the Bombardier Navigator (BN). Because of the intensity and variety of the threats and the complexity of the cockpit tasks, a special flying classroom helps provide the apprentice BN with the necessary skills for the mission. The TC-4 is an ex-*Gulfstream* business aircraft, burdened with a grafted-on A- 6 nose and an A-6 cockpit installed in the rear of its darkened interior. As the "TIC" flies through the civilian skies over Puget Sound, the BN trainee directs the pilot to attack designated "hostile" ground targets while the instructor makes the BN's task as difficult as possible.



High Five

The side-by-side seating for the A-6 flight crew creates a unique atmosphere of partnership that I haven't experienced on other aircraft. Being able to see the pilot's face and hands rather than the back of his helmet greatly improves cockpit coordination and eliminates the isolated feeling that generally goes with backseat real estate. Constant visual contact and congratulatory high fives are some of the unique perks that go with flying attack missions in the *Intruder*.

(However, there is a dark side to flying the BN half of the cockpit: keeping head down to focus on the maps and instruments while the pilot executes very aggressive flight profiles provides ample opportunity to become disoriented and extremely "uncomfortable."



Acknowledgments: My special thanks to Capt. Gary Stubbs, Cdr. Russ Williams, Marine Capt. Jeff Olsen, LCdr. Elizabeth Toedt, and Senior Chief Pam Denton of VA-128; the superb *Golden Intruder* riggers; and LCdr. Dan Rippinger of VA-95.

MO-1

By Hal Andrews

There are often problems in trying too hard. When the Navy's Bureau of Aeronautics (BuAer) was established in August 1921, early objectives included providing airplanes to meet fleet needs and, at the same time, advancing the early aviation technology. This would prove to be a difficult balance.

Among the first in-house aircraft designs developed by BuAer, Number 9 was initiated in late 1921 for a cantilever-wing monoplane, three-place battle force "spotter." It would use the 350-hp Curtiss CD-12A, a production version of the water-cooled V-12 engine that had just powered the Navy's Pulitzer Prize-winning Curtiss racer. Fitting between the smaller, more operationally flexible two-place biplanes and the larger scout and torpedo planes powered by large water-cooled engines, these "spotters" would be twin-float seaplanes, taking advantage of the new engine to achieve climb and altitude performance rather than speed. They would be launched by catapults from battleships – or, using launch carts, from the anticipated carriers – and retrieved after landing at sea. Use of the new engine would reduce the airplane's size. The cantilever monoplane construction would allow easier assembly aboard ship without requiring the typical rigging of the wire-braced biplanes of the period. An alternate wheeled landing gear would be provided for shore-based operations.

The Glenn L. Martin Company, then in Cleveland, Ohio, had added to its staff a German engineer with WW I experience on the Junkers all-metal, cantilever-wing monoplanes and proposed a largely metal structure, fabric-covered design based on extensive use of the new aluminum alloy, duraluminum. Production was being initiated by the Aluminum Company in this country. The basic fuselage would be of steel tubing – a feature that would soon become widely used in military and, subsequently, commercial airplanes.

The general configuration followed the BuAer design, particularly in the thick wing based on the Army's newly developed USA 27 airfoil section and the design of the twin floats. The high wing allowed the spotter's cabin to be under the wing with appropriate windows. Unlike conventional biplanes, this provided an unobstructed "spotting" view for the observer, though his forward vision as copilot was extremely limited. The gunner's cockpit would be on top of the fuselage just aft of the wing. Specifications and design and contract arrangements were negotiated between BuAer and Martin in early 1922, with a contract awarded for six MO-1s in April 1922.

By then, Martin had already built a mockup – without engine, since not even a mockup engine was available. BuAer's one-officer mockup board gave a generally favorable report, though concerned with various instrument placements, including whether or not the observer could adequately see past the pilot and read some of the instruments when flying as copilot. Dispersed downward and sidewards for this purpose, they were hardly optimum for the pilot, either. Final observer window configuration was deferred until the first airplane was completed.

VO-1, 1923

Over the following months, as detailed design and construction proceeded, the usual items were resolved. Steel replaced the duraluminum in parts of the wing spars, and while the airplane was frequently referred to as "all metal," wood ribs for the horizontal stabilizer were added to those used in the wings. Structural load sand tests were agreed upon for wing and tail components. With an expanded workforce of metal workers, construction moved along on schedule. However, the lack of an engine (by this time redesignated as the D-12), or even a mockup, held up engine installation design and construction until Curtiss furnished a mockup in July.

October saw the sand load tests accomplished and the first MO-1 completed, except the government contract D-12s were still not available. Curtiss agreed to loan a company-

Original Configuration

Production Model

owned engine, and the first flight was made on November 11. With additional flights and minor adjustments over the next week, the Preliminary Trials Board arrived on the 17th, with trials completed on the 21st. A window configuration for the spotter's cabin was established and a standard windshield recommended for the pilot. Except for some concern over the climb performance (which could be addressed with testing of different propellers), noticeable vibration in the aft fuselage and tail, and indications of low roll response to the ailerons, the comments were generally quite favorable. It was recognized that final recommendations would have to await full trials at NAS Anacostia, D.C., as a seaplane.

The first MO-1 was ferried to Anacostia, where its floats had been shipped and these trials were held in mid-December. Concern over the propeller design was again expressed, though performance specifications were met, and the addition of brace struts for the horizontal tail was considered necessary to control the tail vibration. With the MO's minimum maneuverability, the forward-firing fixed gun was considered useless and its deletion recommended. While seaplane operations in smooth water were satisfactory, concern was expressed over the strength of the floats and struts in rough-water landings. The sluggish response in roll brought a suggestion to test a wheel control since it was difficult to move the stick laterally to get adequate control.

BuAer was anxious to get the overall positive results so that acceptance action could be taken on the other five MO-1s and decisions made on production of spotting seaplanes. The second airplane was shipped to Anacostia since extensive catapult testing was planned along with regular aircraft testing. Three were shipped to San Diego, Calif., and the last was to be held at Martin in an uncovered state as a pattern aircraft for an order of 30 MO-1s being negotiated. The contract for 30 was signed in February 1923. Soon after, as squadron operations began at VO-1 and VO-2 and testing continued with the first two airplanes, more problems were identified. BuAer and Martin were anxious to fix the production configuration, and special tests to identify necessary action were undertaken, particularly for a nose-down tendency when power was reduced at low speeds. While the variable stabilizer trim gave some control, it was decided to move the center of gravity aft by relocating the gunner's cockpit one bay further back. The deletion of the forward fixed gun and addition of stabilizer brace struts would also help, but tail ballast was still required.

Paddle balances, similar to those used on the rudder, were tested for both the ailerons and elevators, the aileron balances becoming a production feature. Since the elevator balance didn't help, and both these and the rudder balances were considered to add to the tail vibration problems, production MOs didn't use tail paddle balances. As seaplane trials proceeded at Hampton Roads, Va., the inadequacy of the float struts was demonstrated and strengthened struts and fittings designed for production and backfit. Damage to the second MO-1 in September tests was extensive; it went to the Naval Aircraft Factory for repair and overhaul, though these were never done.

The changes resulting from test and fleet experience with the initial MOs caused only slight delays in production, the first rolling out at the end of September and flying on October 3. The Trials Board was concerned over evidence of corrosion in the fuselage steel tubing, particularly in the inside and where the tubing had been welded. Investigation showed this to be a potential problem, but that Martin had strictly followed BuAer specs and procedures; careful inspection would be required during the airplanes' service lives. While tail vibration was still present, it was considered undesirable but not unacceptable, and acceptance of the production MO-1s followed. Then came reinforcement of fuselage and float landing gear members, though the trials were only conducted as a landplane.

Radio installation was deferred to the delivery air station, and in November the first six of 18 destined for San Diego were shipped. Twelve would initially equip VO-1 and VO-2, with the others as "spares." In December, the first two of an eventual eight went to Hampton Roads for newly formed VO-6. At San Diego, the two VO squadrons had gone south for fleet winter maneuvers and VF-1 was given the job of assembling and operating the 12 MO-1s during January and February of 1924. The last four of the 30 production airplanes were delivered to the Naval Aircraft Factory for storage as spares; as events transpired, neither the San Diego nor NAF spares were ever put in service.

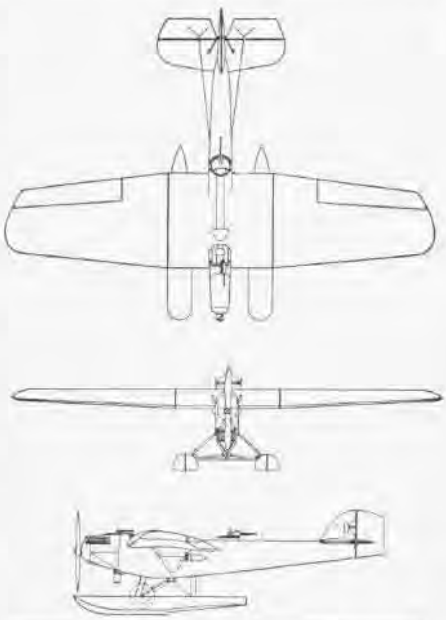
VF-1 found the altitude performance and control of the MO-1s to be poor, though they did manage a five-airplane formation altitude flight in March. Meanwhile, VO-6 was operating three MOs as seaplanes and three

Continued on page 27

MO-1

Span		**53'2"**
Length		**38'1"**
Height	**seaplane**	**12'11"**
	landplane	**12'3"**
Engine	**Curtiss D-12**	**350 hp**
Maximum speed	**seaplane**	**98 mph**
	landplane	**108 mph**
Service ceiling	**seaplane**	**10,000'**
	landplane	**10,600'**
Range	**seaplane**	**467 m**
	landplane	**482 m**

Crew (pilot, observer gunner) **3**
Armament
1 flexible, 30-cal. machine gun



VXE-6: Antarctic

Antarctica is the coldest landmass on earth. The mean annual interior temperature is -56.6°C (-70°F), and the region holds the world's coldest recorded temperature: -89.2°C (-128.5°F). Winds as high as 175 knots have been recorded along the coast and in the dry valleys located near McMurdo Station. The continent encompasses 5.4-million square miles and all but about 2.5 percent is covered by an ice sheet that averages about 7,100 feet in thickness and in places reaches over 15,000 feet. Precipitation in the interior usually averages only a few inches a year with the mean humidity of approximately 3 percent. This also counts Antarctica among the world's deserts.

Antarctic Development Squadron (VXE) Six is the main "air arm" in support of the U.S. Antarctic program known as Operation *Deep Freeze*. Each year the *Puckered Penguins* of VXE-6 ship thousands of tons of cargo and coordinate the transport of hundreds of scientific and support personnel to and from Antarctica. Many of these personnel are further ferried to isolated research sites around the continent. VXE-6 is the only naval aerial support unit participating in the annual exploration and research in Antarctica, and has been providing this exclusive support for over 35 years.

Besides providing a wide range of transportation services throughout the continent, VXE-6 is responsible for aerial-mapping services, search and rescue operations, reconnaissance support for scientists, and transportation of essential fuel, supplies, and morale-boosting mail to outlying camps and stations. The squadron presently comprises approximately 120 aircrew and 280 maintenance/support personnel who maintain two LC-130F and four LC-130R ski-equipped *Hercules* transports and six UH-1N *Huey* helicopters. VXE-6 is home-based at NAS Point Mugu, Calif.

Every year, as the sun begins to rise in August, the LC-130s open the Antarctic summer season with turnaround flights. During the few hours of daylight available, the squadron flies 2,100 miles from Christchurch, New Zealand, to McMurdo, Antarctica. Winter fly-in (WINFLY) provides McMurdo Station with personnel and materials necessary for the beginning of austral summer in October. Extreme cold, high winds, and limited daylight hours make WINFLY operations some of the most hazardous flying conditions in the world. Weather may change from a calm, clear day to totally obscure and blowing snow in literally seconds, making accurate forecasts impossible.

In October, VXE-6 LC-130s are augmented by U.S. Air Force C-141 transports and, for the first time in 1989, C-5As. These heavy haulers assist in transporting personnel and cargo from Christchurch to McMurdo utilizing the seasonal ice runway. After mid-December, this runway becomes unusable and flights take off from the permanent ski runway at Williams Field. Flight operations at this stage are accomplished solely by VXE-6's

Vanguard

By Lt. Mark Hinebaugh

An LC-130R lands at the South Pole to drop off supplies and fuel. Each year, the LC-130s haul to the South Pole approximately 150,000 gallons of diesel fuel (Antarctic) for heating. The ceremonial pole is surrounded by flags representing the 13 member nations of the original Antarctic Treaty.

LC-130F BuNo 148321 is undergoing modernization at Naval Aviation Depot, Cherry Point, N.C., to return it to active service in Antarctica. The aircraft was buried in the snow for over 16 years (see NANews, May-June 1988).

LC-130s, which also support outlying stations/outcamps throughout the season. The squadron's UH-1Ns are used for close support around McMurdo Station and are normally limited to a 120-mile radius from a fuel cache.

The 1989/90 season was one of the most successful scientific support seasons to date for squadron helicopters. VXE-6 had a major head start with the transport of four totally assembled UH-1Ns in the C-5A. The preseason helo support requirements were planned at 1,500 hours; 1,632 hours were actually flown, supplemented by Royal New Zealand Air Force (RNZAF) and U.S. Coast Guard helicopters.

A long-range medevac to the British research facility at Halley Station, Antarctica, took place on December 1, 1989. VXE-6's coordination with the station and RNZAF personnel culminated in a flawless lifesaving transfer of a critically ill patient over 3,500 miles to New Zealand medical facilities.

The first wheeled landing by an LC-130 on permanent unprepared "blue ice" was made by then-C.O. Commander Keith Armstrong on January 28, 1990, on Mill Icefield near the Beardmore Glacier. A permanent station located on that icefield would allow wheeled landings by various cargo transports and has the potential to considerably broaden the U.S. Antarctic Research Program.

At the same time, *Deep Freeze 89/90* had its difficulties, due in part to frustrating environmental conditions, such as high-frequency communication blackouts caused by solar activity and extremely poor weather. An increased operational tempo throughout the squadron for most of the season resulted from a demanding agenda, but only 2 of 19 LC-130 projects were canceled. Squadron personnel pushed themselves to their limits, exercising resourcefulness and flexibility to reach a successful completion of operations on February 26.

During the 1989/90 season, VXE-6 LC-130s and UH-1Ns flew a total of 4,917.6 hours, transported 3,156,312 tons of mail, cargo, and fuel, and hauled 3,828 passengers in the frozen wastelands of Antarctica.

PH2 R. B. Cordell

VXE-6 is one of only two Navy squadrons (the other is VXN-8) which have scientific support as a sole mission. The *Puckered Penguins* are the Antarctic vanguard, a group of enthusiastic aviators and support personnel who risk life and limb each year as they deploy to some of the most challenging flying and most austere weather conditions in the world.■

Lt. Hinebaugh is a polar aircraft commander in VXE-6 and is spending his second season "on the ice."

PH2 D. R. Armer

A killer whale cruises for food. Young penguins, always wary of mother's warnings, decide to wait a while before returning to the water.

Facing page, a killer whale surfaces through a break in the seasonal ice for a breath of air and to look for "lunch." Below, a VXE-6 UH-1N takes a break at Lake Vanda in the dry valleys. Winds can reach in excess of 100 mph in these valleys and snow quickly disappears. Lake Vanda, on the other hand, is a fresh water lake which in the summer months melts enough to create a small source of running water in the frozen wasteland.

Under this dome at the South Pole lies a small town filled in the summer months with about 60 scientific and support personnel.

A ceremonial igloo built by Russian scientists at Vostok Station. Note the drilling platform to the right rear. Here, Soviet scientists drill for ice core samples which are located thousands of feet below the surface. Some of the ice was frozen millions of years ago and the samples aid scientists today in researching what earth was like before man.

PHC D. B. Smith

Wings of Victory,

Part 2

Technical Development during WW II

By Lee M. Pearson

During WW II, aircraft and equipment were manufactured in unprecedented numbers, shortcomings were corrected, and new designs were begun. The wings of victory grew from designs that were in existence at the beginning of the war, but others, with much greater capability, were nearing combat at the war's end. Areas that had been largely overlooked during the interwar years were hastily, but intelligently, entered – antisubmarine warfare (ASW) in particular. Newer technologies, such as radar, jet propulsion, guided missiles, rockets, and helicopters, were explored. Of these, radar was crucial. If the war had continued, other new fields would have increased in importance.

American aircraft production increased from 5,856 in 1939 to 26,277 in 1941 and peaked at 96,318 in 1944. Naval aircraft acceptances were: 1939, 303; 1941, 4,229; and 1944, 29,515. (1941 and 1944 figures include aircraft manufactured for the U.S. in Canada.) In 1938, French and British orders and money started the industry's expansion. After the fall of France in May 1940, President Roosevelt called for the U.S. to produce 50,000 planes a year. After the Pearl Harbor attack, he upped this to 60,000 planes for 1942 and 125,000 in 1943. These latter numbers were never met but served as goals and prods.

Production required decisions on types, numbers, designs, and delivery schedules of aircraft for the Army, Navy, and America's allies. The Joint Army-Navy-British Purchasing Commission came into being for that purpose in mid-1940. It became the Joint Aircraft Committee in April 1941, and finally the Aircraft Production Board. Subordinate elements included the Aircraft Resources Control Office and Aircraft Scheduling Unit. These organizations defined Army, Navy, and British needs for American aviation material and thus permitted orderly production plans and material and manpower allocations. In mid-1941, production cognizance was divided

Curtiss SB2C Helldivers were also manufactured by two Canadian companies as SBWs and SBFs.

between the Army and Navy.

Industrial expansion took many forms. Companies enlarged plants – usually with federal funds – expanded into leased space, and subcontracted. Plants were erected in areas that tapped new labor sources, and companies whose normal business was suspended "for the duration" became airplane builders. For example, Grumman's floor space at Bethpage, N.Y., was increased 25 times. It also leased available nearby space; despite that, subcontracting accounted for 27% of total output. Even more Grumman airplanes were needed. The General Motors Corporation, through its Eastern Aircraft Division, converted East Coast automobile assembly plants to airplane factories and built F4F *Wildcat* fighters as FMs and TBF *Avenger* torpedo bombers as TBMs. Eastern built about three times as many of these aircraft as Grumman.

New plants were erected at Columbus, Ohio, to manufacture Curtiss Navy aircraft and at Johnsville, Pa., north of Philadelphia, for Brewster. Engine production was similarly decentralized. Pratt & Whitney (P&W) engines were manufactured by five different automobile and small airplane engine companies. A P&W subsidiary operated a new plant at Kansas City, Mo.

Production seemed to be an end in itself as the phrase "production pipeline" indicated. Changes, whether for military utility or safety of flight, could not be made if they slowed deliveries. Thus, many new airplanes required modification before delivery to combat units. This was particularly true of the multiengine Army bombers that were converted to patrol planes. Air stations and other units were involved in such endeavors. Finally, as aircraft builders became adept at production management, they learned to introduce blocks of changes without delaying deliveries.

Prior to the war, only a single airplane was available to flight test a given configuration. If it crashed, testing and subsequent procurement were either delayed until a replacement could be built or, frequently, procurement was initiated without complete testing. This miserly approach was not necessary during the war; with airplanes streaming out of factories, many were available for flight testing modifications and design changes. As many as 100 fighters, and a comparable number of other types, were used at a time in various development and test projects.

In July 1941, a Navy Coordinator of Research and Development was established to improve intra-Navy research and development and to work with such agencies as the National Defense Research Council (NDRC). Dr. J. C. Hunsaker, who had headed the Navy Bureau of Construction and Repair's Aircraft Division during WW I and had directed the Bureau of Aeronautic's (BuAer) aircraft development until the mid-1920s, was first Coordinator. He then became Director of the National Advisory Committee for Aeronautics (NACA). As the Navy Department staff grew like wildfire, NACA was crowded from its space next to BuAer and moved about a mile away. Thus, the casual day-to-day contact of BuAer-NACA interwar relations was lost. Key employees, however, retained a residual understanding that contributed to solving the scientific and technical problems.

Research and development field activities grew apace. Flight testing, having outgrown NAS Anacostia, D.C., relocated in 1943 to the newly established NAS Patuxent River, Md. The Naval Air Test Center was established there in 1945. Naval Aircraft Factory (NAF) work became so diverse that in 1943 an overall command, the Naval Air Material Center, was established with subordinate units: the Naval Aircraft Modification Unit (NAMU), the Naval Auxiliary Air Station, and the Naval Air Engineering Station (NAES), as well as NAF. Within NAES were the Aeronautical Engine Laboratory, Aeronautical Radio and Radar Laboratory, and the Aeronautical Photographic Experimental Laboratory. A Ships Installation Division, which developed catapults and arresting gear, was reassigned from NAES to NAF.

After the Brewster factory at Johnsville was closed in 1944, NAMU relocated there; its primary role be-

Modifying PV-1 Venturas similar to that shown, the Marines pioneered night-fighter development and operations.

came the development of guided missiles. It was the forerunner of the Naval Air Development Center, Warminster, Pa. In November 1943, Naval Ordnance Test Station, Inyokern, Calif., was established to develop and test rockets and other weapons.

Experimental and developmental work were widespread. Special projects dealing with various aspects of airborne radar included: Project Roger, set up at NAF in May 1941 to test airborne radar; Project Affirm (originally Argus) set up in April 1942 at NAS Quonset Point, R.I., to develop and test night-fighter equipment and tactics; and Project Cast begun in April 1943 at NAS Squantum, Mass., to test radio and electronic equipment developed by NDRC's Radiation and Radio Research laboratories. Guided missile development involved NAF and naval air stations at Cape May, N.J., Traverse City, Mich., and Clinton, Okla.

On January 1, 1943, the Commander Air Force, Atlantic Fleet (AirLant) was established. Readying new airplanes, ships, and newly trained men, AirLant welded the air elements into combat-worthy units. In addition to training air groups and overseeing carrier shakedown cruises, AirLant tied together loose ends of airplanes and equipment. Through control of air stations, it was in the midst of the various aircraft modification programs. The Navy's overall lack of ASW experience gave AirLant an even more active role in that field. To help, the Air Anti-Submarine Development Detachment, Atlantic Fleet was established at NAS Quonset Point on April 1, 1943. In September, its mission was broadened as it became the Anti-Submarine Development Detachment.

BuAer was responsible for the various aviation material programs. Its engineering elements became a division that handled research, development, design, and evaluation: airplanes, engines, structures, instruments, catapults, arresting gear, etc. Guns, bombs, torpedoes, and rockets were developed by the Bureau of Ordnance. Radio and radar responsibilities were shared with the Bureau of Ships; the Naval Research Laboratory and NDRC's Radiation Laboratory shared actual development with the radio and electrical industries.

The Chief of BuAer reported to the Secretary of the Navy but advised the Chief of Naval Operations (CNO) on aviation matters. This proved adequate during the first year and a half of the war when production was the major problem. As war materials became available in quantity, the logistical problems of meeting fleet needs began to dominate. Logistical planning was a CNO function. Thus, in August 1943, a Deputy Chief of Naval Operations (Air) was established and five BuAer divisions were transferred to it. Military characteristics of aircraft and equipment involved consideration of technical feasibility and military needs; hence, they required a meeting of minds of engineers and planners in BuAer and DCNO (Air).

WW II aircraft were short-lived, with a 7 to 13-year service life, compared to modern machines that have service lives of 20 to 30 years. Advancing technology and military necessity caused designs to become obsolete. For example, the top speed of the F4F was about 330 mph; the F6F, 380 mph; and the various F4Us, 415 to 445 mph.

The foregoing surveys major areas involved in equipping the Navy with aircraft and material. We will now look in more detail at some particular areas: selected aircraft types, ASW, radar, guided misiles, and power plants.

Fighters

Four designs were used during the war: the Brewster F2A *Buffalo*, Grumman F4F/FM *Wildcat*, Vought F4U/FG/F3A *Corsair*, and the Grumman F6F *Hellcat*. The first two were in service in December 1941. F2A production ended in April 1942 and it was phased out of service after the Battle of Midway in June.

In December 1941, the fixed-wing F4F-3 was operational and the F4F-4, the first Grumman aircraft with folding wings, was entering production. The Japanese A6M *Zero* surpassed the F4F in speed, maneuverability, and climb rate. Despite that, the analysts that wrote the Commander in Chief, Pacific Fleet report of the Battle of Midway said that three *Zeros* were shot down for each F4F. Halving that to allow for over-optimistic claims, still leaves the F4F with an appreciable edge. As the analysts noted,"However much of this superiority may exist in our splendid pilots, part at least rests in the armor, armament, and leakproof tanks of our planes." By implication, this included the ruggedness that let the F4F continue flying after heavy battle damage.

The F4F was the Navy's main fighter for another year. In February 1943, the F4U began combat from shore bases and on August 31 the

Navy Multiple Source Aircraft Production

Designer/Designation		Multiple Sources/Designations	
Consolidated	PBY	Naval Aircraft Factory	PBN
		Vickers (Canada)	OA-10 (for AAF)
		Boeing (Canada)	PB2B
Curtiss	SB2C	Canadian Car & Foundry	SBW
		Fairchild of Canada	SBF
Grumman	F4F	Eastern Aircraft	FM
	TBF	Eastern Aircraft	TBM
Vought	TBU*	Vultee (later Consolidated Vultee)	TBY
	F4U	Goodyear	FG
		Brewster	F3A
	OS2U	Naval Aircraft Factory	OS2N
Brewster	SBA*	Naval Aircraft Factory	SBN

*Experimental prototype only, no production.

Robust, rocket-armed F6F Hellcats made excellent strike aircraft in the last year of the war.

F6F entered combat from fast carriers. Grumman installed a 1,350-hp engine in a new *Wildcat*, the XF4F-8 (earlier F4Fs had 1,200 hp); produced by Eastern as the FM-2, this airplane operated from escort carriers in both the Atlantic and the Pacific for the duration.

The F6F was begun in June 1940 when BuAer requested the R-1830 engine in the F4F be replaced with an R-2600. Grumman made a completely new design. The XF6F-1, with a 1,700-hp R-2600 engine, made its first flight in June 1942 and the XF6F-3, with a 2,000-hp R-2800 engine, flew in July. (The Navy recovered its first repairable Japanese *Zero* from the Aleutians in June; the near conjunction of dates disproves the oft-repeated myth that the F6F was based on a captured *Zero*.)

The F6F and F4U, begun in 1939, were the first-line fighters during the 1943-45 offensives. They were powered by 2,000-hp R-2800 engines. The F4U-4 used a 2,100-hp R-2800 "C" engine. Later F4Us and F6Fs had water-injection engines, as did the FM-2, permitting 10 minutes of increased power. Some were equipped with APS-4 search radar and others with APS-6 night-intercept radar.

Many changes were made to increase combat effectiveness of the F4U over the XF4U-1. To mention one, a self-sealing fuel tank in the fuselage replaced integral wing tanks. This required moving the cockpit aft and caused loss of vision that made the F4U unsatisfactory for carrier operations. A raised cockpit and longer tail wheel did much to overcome the problem. In January 1945, the F4U began regular sustained operations from carriers.

After the dive-bomber became a naval aircraft type in the mid-1930s, fighters were designed primarily as gun platforms. However, the strength and power that characterized the F4U and F6F enabled them to be readily modified to fighter bombers. Each could carry forward-firing rockets, two 1,000-lb. bombs, or a droppable fuel tank. The proportion of fighters assigned to fast carriers increased steadily from 25% of complement in 1942 to 50% in 1944 and to 70% in 1945. The dual role made this great increase in air-to-air combat power possible with little loss in carrier air-to-surface capability.

When the Germans' daytime bombing losses over England in 1940 became unacceptable, they switched to night bombing. Thus, before the U.S. entered the war, the British found radar-equipped night fighters to be necessary. In the Pacific, exhausted troops on Guadalcanal had their sleep disrupted by night hecklers – or "Washing Machine Charlies." Aviation forces had little success countering them with improvised night-fighting schemes and shore-based fighter direction. In late 1943, carrier pilots attempted to fend off night intruders with F6Fs flying wing on a TBF equipped with search radar.

Anticipating such needs, BuAer in September 1941 had asked NDRC to develop radar for single-seat fighters. In April 1942, a night-fighter development project (originally Project Argus, later Affirm) was established at NAF Quonset Point. In the meantime, the Marine Corps, following recommendations of observers who had studied British equipment and techniques, requested a twin-engine aircraft with AI (aircraft intercept) radar. The first Marine night-fighter squadron, VMF(N)-531, activated on November 16, 1942, eventually obtained a few twin-engine PV-1s and fitted them with the obsolete British Mk IV AI radar.

Project Affirm continued the single-place night-fighter concept and, in late 1942, NAF began modifying F4U-1s into F4U-2s by fitting them with AI radar from NDRC. On April 1, 1943, Navy squadron VF(N)-75 was established and Marine Night Fighter Group 53 was activated. Navy and Marine units deployed into the Solomons on October 31 and a pilot from VF(N)-75, aided by VMF(N)-531's ground-based fighter director, made a successful night interception.

An improved aircraft intercept radar, the APS-6, was used in the F6F-3N. Later, red-lighting instrument panels and a redesigned windshield improved the pilot's night vision, thus increasing effectiveness of the F4U-4N and F6F-5N. The above three models were used aboard carriers.

50 Years Ago — WW II

February 1: The Atlantic and Pacific fleets were established, completing the division begun in the previous November and changing the titles of aviation commands in the Atlantic Fleet to "Aircraft, Atlantic Fleet" and "Patrol Wings, Atlantic Fleet." No change was made in the Pacific Fleet aviation organization at this time.

February 15: Naval Air Station, Kaneohe, Oahu, T.H., was established.

February 26: An extensive modification of aircraft markings added National Star Insignia to both sides of the fuselage or hull and eliminated those on the upper right and lower left wings; discontinued the use of colored tail markings, fuselage bands, and cowl markings; made display of vertical red, white, and blue rudder stripes mandatory; and changed the color of all markings, except the national insignia, to those of least contrast to the background.

The usual method of increasing fighter performance was to increase engine power. This was true with the machines discussed above and with other developmental fighters. The Grumman F7F *Tigercat* increased power by using two rather than one engine; it was begun in 1941 and approved for production in 1943. A two-seat version with provisions for AI radar was built to meet Marine Corps night-fighter requirements.

The Grumman F8F *Bearcat*, begun in 1943, used the R-2800 "C" engine (also used in the F4U-4) in a machine somewhat smaller than the F4F. The goal was an interceptor to operate from both fast and escort carriers. Severe weight-saving features were employed, including a reduced safety factor and "safety wing tips" that would break away at ultimate load leaving it with reduced span and higher landing speed but still intact and flyable.

Both the F7F and the F8F were nearing combat introduction in August 1945.

Other new fighters used the R-3350 and R-4360 engines. Goodyear modified the F4U design into the F2G using the R-4360 engine. After the close of the war, they became surplus and some were acquired and used by racing pilots.

The Vought XF5U-1 had an almost circular wing and outboard propellers. It promised a top speed of almost 500 mph and vertical takeoff. An initial contract for the V-173 flying scale model was issued in February 1940, months before a Navy fighter achieved 400 mph. The military XF5U-1 was undertaken during the war. Maintaining balanced airflow required that the dual engines and propellers be interconnected. If that wasn't complicated enough, articulating propellers were also found to be necessary. The XF5U-1 was finally reported to be completed in 1948, but by then it had no military mission. To many BuAer engineers, its complex power transmission and control system seemed an Achilles heel; therefore, it was scrapped without having ever flown.

Meanwhile, jet engines had shown how to achieve 500 mph and much more. BuAer began studying jet fighters in 1942. Two small companies, McDonnell and Ryan, received the first jet contracts – McDonnell in January 1943 for the twin-jet XFD-1 and Ryan in March for the composite XFR-1. The XFD-1 used two Westinghouse 19B jet engines and was to determine requirements for carrier-based jet fighters. The XFR-1, powered by an R-1820 engine with a General Electric I-16 jet in the tail for takeoff and high-speed flight, was to be used on escort carriers. For fast carrier use, BuAer contracted with Curtiss for the XF15C-1 powered by an R-2800 engine and an Allis-Chalmers production model of the British H-1 Halford jet. A production contract was issued for 100 FR-1s; over two-thirds of them were delivered and one squadron was outfitted. As other engine combinations became interesting, Ryan received contracts for other composite fighters. All composite fighter programs were terminated in 1947.

The XFD-1 *Phantom* first flew on January 21, 1945, and 19 months later a *Phantom* became the first jet to operate from an American carrier, *Franklin D. Roosevelt*. The production model was redesignated FH-1.

In 1944, based in part on the promise of earlier designs and in part on the maturing of the wartime aviation industry, BuAer held its first wartime design competition – for a new fighter. Three new designs were selected for development, the Vought XF6U-1, the North American XFJ-1, and the McDonnell XF2D-1 (redesignated XF2H-1). With these three designs and the FD-1/FH-1, the Navy entered the jet age. ■

See the next issue for Part 3, the conclusion of "Wings of Victory."

Continued from "Naval Aircraft: MO-1," page 16

as landplanes to obtain the widest experience with the new airplanes. In March, a flight of the three seaplanes by steps to Miami ended at Morehead City, N.C., when one spiraled into shallow water from 100 feet during its landing approach. Fortunately, none of the three crewmen were seriously injured – viewed at the time as quite a contrast to similar accidents with typical wood and wire airframes. Another minor accident mid-month added to the continuing concern over the MO's suitability, and on March 27, flying was suspended for all fleet MO-1s except two of VO-6's which would be used along with the test airplane at Anacostia for finally resolving the MO problems.

Wind tunnel tests of possible new horizontal tail designs and flight testing of various changes to the wing and ailerons were followed by Martin's building a new tail, flown in November. VO-6 flew its airplanes extensively, both for tests of fixes and operational experience until turning them in in November. One of the airplanes at Hampton Roads was transferred to the National Advisory Committee for Aeronautics (predecessor of today's NASA) for its assistance on fixes.

By early 1925, all of the fixes came together, and resumption of flying was authorized. Unfortunately, some months earlier, in May 1924, BuAer had agreed that the smaller Vought UO-1 two-place seaplanes, powered by 200-hp Wright air-cooled radial engines, would be the standard battleship and cruiser "spotter." The battleship *Mississippi*, fitted with a turret-mounted gunpowder catapult, did operate two MOs during much of 1925-26. VJ-1 used three and both VS-2 and *Langley* had one or two assigned for short periods on the West Coast, while NPG Dahlgren, Va., also used one of the East Coast airplanes. By 1927, those in storage were considered unfit for service and most were donated to high schools, trade schools, and colleges over the next year; the rest were scrapped. The fleet had its "spotters" and a big step forward in aeronautical technology had been shown feasible. But the airplane that would have done both proved too big a challenge for its time. Not until 1940 would cantilever monoplane Vought OS2Us replace the traditional battleship/cruiser biplanes. ■

Awards

LCdr. Ed Schunk, a reservist assigned to NR Fleet Logistics Support Squadron 4086, NAS Norfolk, Va., was named **Carrier Onboard Delivery Pilot of the Year.** The award commends "superior performance" in the C-2A *Greyhound*. Schunk accumulated more than 100 flight hours and supported several Coast Guard detachments during FY 90.

PH1 David Moreno

AO2 Jesse Rosas (left) and AO1 Guy Rose test their ordnance-loading skills during ComResPatWingPac's first annual mining training assist competition which was won by VP-65, NAS Point Mugu, Calif. The mining derby was a competitive event testing a variety of skills associated with inert mines.

The Noncommissioned Officers Association (NCOA) recently named a VA-185 petty officer as the Navy recipient of the 1990 NCOA **Vanguard Award** for heroism.

AO2(AW) Eric C. Lewis was recognized for his heroism during an aircraft fire involving an A-6E *Intruder* at NAS Cubi Point, R.P., in January 1989. Lewis was credited with saving the life of the plane captain, pilot, and other nearby personnel after the aircraft burst into flames when fuel spilled during a routine hot-fueling operation.

The eight-year Navy veteran chased down the fleeing plane captain and held him until another sailor could extinguish the flames with a fire extinguisher. Lewis then returned to the burning aircraft, organized firefighting and hose teams, and aggressively fought and extinguished the fire. For his actions, he was also awarded the Navy and Marine Corp's medal for heroism.

Naval Air Development Center, Warminster, Pa., was presented the annual **Secretary of the Navy Omnibus Award for Small and Disadvantaged Business Utilization** in recognition of the command's contributions to the program.

Records

Cdr. Jon V. Shay, C.O. of VQ-4, surpassed his 7,000th career flight hour.

LCdr. Charles B. Carnes of VR-22 marked 5,000 career flight hours.

During the last year, the **VAW-121** *Bluetails* reached the following aviation milestones in the E-2C *Hawkeye*: C.O. Cdr. Mark R. Milliken, 3,000 flight hours; X.O. Cdr. Mark F. Klauss, 4,000 flight hours; LCdrs. John E. Laughlin and Jack E. Frazier, 3,000 flight hours; LCdrs. Robert G. Collier and Mark A. Smith, 2,000 flight hours; and Lts. John Rasmussen, Eric Gardner, and Ford Carson, 1,000 flight hours.

Lt. Rich Savage, USCG, surpassed 6,000 hours of accident-free flight time. He is attached to VT-23 at NAS Kingsville, Texas, and is the only Coast Guard aviator assigned as an intermediate strike instructor pilot flying the T-2 *Buckeye*. Lt. Savage is also a helo pilot who has completed a tour at CGAS San Diego, Calif., flying HH-3Fs and HH-65As.

Units marking **safe flying time:**

Squadron	Hours	Years
CNATRA Strike Det	35,000	2
HC-2	15,000	3
HMH-362	31,000	7
HMM-166	27,000	5
HMT-302	15,000	3
HS-3	31,000	9
HS-10	77,098	14
HSL-42	36,000	4
HSL-46	8,000	1
HSL-47	20,000	
HSL-48	3,000	1
NAS Adak	800	1
NAS Cubi Point	41,000	20
NAS Whidbey Island	30,000	10
PacMisRanFac	35,000	19
SOES MCAS Cherry Point	127,000	26
VA-37	27,000	6
VA-52	14,000	3
VA-304	55,000	16
VAW-110	70,000	15
VAW-115	12,000	5
VC-8	15,000	5
VF-2	9,000	2
VF-24	31,000	
VF-111	8,000	2
VF-126	4,000	1
VF-143	7,000	2
VF-211	15,000	4
VMA(AW)-224	20,000	5
VMAQ-2	37,000	7
VMFA-235	16,000	4
VMFA-451	50,000	13
VMFT-101	50,000	5
VP-8	79,000	12
VP-40	160,000	23
VP-64	74,551	20
VP-66	71,411	20
VP-68	89,147	20
VP-94	70,983	20
VPU-2	21,000	8
VR-22	22,000	6
VR-60	24,000	1
VRC-40	32,000	7
VRC-50	15,000	2
VS-29	79,000	19
VS-33	139,000	30
VT-26	100,000	5

Cdr. Bob Besal, skipper of the VA-75 Sunday Punchers, achieved his 1,000th arrested landing when he trapped aboard John F. Kennedy (CV-67) in an A-6 Intruder.

Rescues

HSL-36 was practicing pattern work at NAS Mayport, Fla., when the squadron received a distress call from the tower that a man was stuck in the mud of the Broward River and required assistance. When the helo crew arrived, they found two men in trouble. A civilian fisherman had been trying to free his boat from the mud when he became stuck. He was buried up to his chest about 200 yards offshore. Two companions in the boat, along with rescue workers from the Sheriff's Office and Fire Department, were unable to reach the victim. One of the firemen who was trying to assist the stranded man became stuck himself. Circumstances worsened when the tide began to come in.

The crew hoisted the civilian into the SH-2F shortly before the incoming water covered the mud flat. The helo crew then rushed him to a local hospital, where he was treated for shock and hypothermia. An SH-3 from NAS Jacksonville rescued the fireman, who was not injured.

The prototype **SH-60F** helicopter proved its capabilities in June during a rescue of two downed fliers from *John F. Kennedy* (CV-67). The VF-84 aircrewmen ejected from their F-14 *Tomcat* during a routine training flight about 55 miles northwest of *Kennedy* in the Atlantic Ocean.

While an S-3A *Viking* from *Kennedy*'s air wing kept the downed aviators in sight, a VX-1 SH-60F from the carrier was directed to the area. The helo arrived on the scene within 45 minutes after the initial assistance call, and its SAR swimmer assisted both men aboard.

Scan Pattern

Bruce McCandless II has retired from NASA and the Navy. McCandless helped develop the space agency's Manned Maneuvering Unit, a jet-powered backpack, and was the first to wear it in space on a flight in February 1984. He became the first human to move in space untethered.

Capt. McCandless flew in space for a second time, in 1990, helping deploy the Hubble Space Telescope in April.

A new "family affair" chapter was recently written when the first mother and son team appeared onboard *Nimitz* (CVN-68). VA-304 deployed along with the remainder of CVWR-30's squadrons for its annual training on the West Coast last August. Aboard was **AD1 Donald Carpenter and his mother, MSCS Mary W. Carpenter** of VP-65 who was supervising the forward officers' wardroom one deck below. Donald's father, AD1 James Carpenter, also serves in VP-65.

Cdr. Randy Cunningham, USN(Ret.), the first American ace of the Vietnam war, was recently elected to the House of Representatives as a Congressman from California. Then-Lt. Cunningham, pilot, and Ltjg. William Driscoll, Naval Flight Officer, became the first "dual aces" in Naval Aviation history when they downed 5 aircraft during action in Southeast Asia.

HSL-34 played host to the Australian ship *HMAS Sydney* (FFG-03), her air detachment, and crew. Also on hand to welcome *Sydney* was the Australian Ambassador to the United States, the Honorable M. J. Cook.

HSL-34's pilots and aircrew were as

"Help!" Appearing to be eaten by some monster, a squadron maintenance crewman inspects an engine intake as part of a preflight check of a VA-34 A-6E Intruder aboard Dwight D. Eisenhower (CVN-69) during Fleet Ex '90.

JO3 Oscar Sosa

anxious to fly the Australian AS-350B *Squirrel* as the Australians were eager to fly the SH-2F *Seasprite*. After a check flight, the *Squirrel* was flown to HSL-34 at the NAS Norfolk, Va., heliport, where an exchange of flights began. HSL-34'S Ltjg. Andy Newton first flew the *Squirrel*, while Australian Lt. Jon Collins-Bird flew the SH-2F. Each pilot was impressed with his "new" helo.

PH1 Stephen P. Davis

HSL-34's SH-2F and the Australian AS-350B fly in formation during the Australians' recent visit to the Virginia Capes.

Change of Command

CVW-1: Capt. Michael L. Bowman relieved Capt. R. R. Wittenberg.

HelSeaConWing-3: Capt. R. Timothy Ziemer relieved Capt. Raymond M. Wikstrom.

HS-4: Cdr. Chris Hale relieved Cdr. Paul Stevens.

HS-15: Cdr. John J. Waickwicz relieved Cdr. Richard W. Strickler.

HS-17: Cdr. Stephen J. Bury relieved Cdr. Russell E. Tate.

HS-75: Cdr. Noel G. Preston relieved Cdr. James W. Aires.

HS-85: Cdr. Robert P. Blickle relieved Cdr. Harry M. Dereniuk.

HSL-35: Cdr. Ronald Rutter relieved Cdr. Richard Mayne.

HSL-36: Cdr. John Thogerson II relieved Cdr. Michael J. Brinkac.

HSL-47: Cdr. Timothy Naple relieved Cdr. James Boyer.

HT-8: Cdr. Richard M. Eubanks relieved Cdr. John B. McGill.

MAG-46: Col. T. D. Seder relieved Col. David F. Underwood.

NAS Barbers Point: Capt. Alan L. Ross relieved Capt. Louis D. Milioti.

PatWing-1 Det. Kadena: LCdr. Woody Shortt relieved Cdr. Dennis Corrigan.

PatWingsPac: RAdm. Anthony R. Maness relieved RAdm. Jesse J. Hernandez.

StrkFightWpnsScolLant: Cdr. M. T. Ramirez relieved Cdr. John H. Matlock.

VAW-88: Cdr. Robert K. Ferguson relieved Cdr. David R. Guebert.

VAW-123: Cdr. Michael L. Maurer relieved Cdr. William J. Tyson III.

VF-51: Cdr. T. G. Sobieck relieved Cdr. R. F. Willard.

VF-211: Cdr. William W. Reynolds relieved Cdr. Daniel R. McCort.

VFA-81: Cdr. William T. Anderson relieved Cdr. Gerald L. Hoewing.

VFA-132: Cdr. John L. Fleming relieved Cdr. Robert C. Stephens.

VFA-136: Cdr. Jeffrey R. Nelson relieved Cdr. John B. Sandknop.

VFA-137: Cdr. Craig B. Henderson relieved Cdr. Phillip G. Howard.

VFA-147: Cdr. Craig F. Weideman relieved Cdr. Jeffrey A. Lehman.

VMA-513: Maj. Charles S. Patton relieved Lt. Col. Donald M. Mitchell.

VMFT-401: Lt. Col. Robert K. Lunday, Jr., relieved Lt. Col. Edward P. Hay, Jr.

VP-10: Cdr. Peter A. Masciangelo relieved Cdr. James A. Carman.

VP-23: Cdr. Larry W. Crane relieved Cdr. F. Brown Word.

VP-30: Cdr. Paul S. Semko relieved Capt. Benjamin P. Riley III.

VP-47: Cdr. William E. Munsee relieved Cdr. Frederick S. Gay.

VP-60: Cdr. James L. Cook relieved Cdr. James C. Schultz.

VP-62: Cdr. John B. Miner relieved Cdr. John H. Birge.

VQ-3: Cdr. Hartwell T. Trotter relieved Cdr. Vernon C. Lochausen III.

VR-22: Cdr. Jeffrey M. Stone relieved Cdr. P. Gary Hobbs.

VS-32: Cdr. Mark Kikta relieved Cdr. Andrew Jackson.

VS-33: Cdr. Frank Coleman, Jr., relieved Cdr. Paul Hennessy.

VS-0294: Cdr. Michael J. Woiwode relieved Cdr. James A. Gosma.

VT-19: Cdr. Denny Murray relieved Cdr. Richard B. Moore.

VT-86: Lt. Col. Steven D. Summers relieved Cdr. John J. Doyle.

Association of Naval Aviation Bimonthly Photo Competition

Top: PH2 Charles W. Moore won the sixth bimonthly ANA Photo Contest with this shot of VF-14 and 32 F-14 Tomcats aboard John F. Kennedy (CV-67) standing ready alert in support of Operation Desert Shield. Above: these SH-3Hs on the wet flight deck of Constellation (CV-64) were captured on film by reservist LCdr. Dick Benne of Vallejo, Calif. Left: The Hook's editor, Robert L. Lawson, photographed this A-6E as it commenced its bombing run.

The Association of Naval Aviation Photo Contest

The Association of Naval Aviation and its magazine, *Wings of Gold*, is continuing its annual photo contest which began in 1989. Everyone is eligible except the staffs of *Wings of Gold* and *Naval Aviation News*. The ONLY requirement is that the subject matter pertain to Naval Aviation. Submissions can be in black and white or color, slides or prints of any dimension. Please include the photographer's complete name and address, **and PHOTO CAPTION**.

Cash awards: Bimonthly — $100; Annual — First, $500; Second, $350; Third, $250.

For deadline and submission details, call (703) 998-7733.

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

PROFESSIONAL READING

By Cdr. Peter Mersky, USNR-R

Nelson, Derek, and Dave Parsons. *Hell-Bent for Leather: The Saga of the A-2 and G-1 Flight Jackets*. Motorbooks International, Osceola, WI 54020. 1990. 160 pp. Ill. $29.95.

The first book by this team – a civilian writer and editor, and a Navy radar intercept officer – tells the history of the romantic leather flight jacket. In a pictorial essay, the authors trace the development of this vital part of a military aviator's wardrobe.

Beginning with a forward by best-selling author and former Naval Aviator Stephen Coonts, the book contains an impressive collection of color and black-and-white photos of pilots and crewmen in their pride-and-joys. Even nonaviator General Douglas MacArthur appears in his favorite A-2-style jacket, which he wore from the Philippines to Inchon.

Like so many large-format books, the lovingly chosen photos are worth the price of the volume and offer a few hours of pleasant browsing. I would have liked more detail in the captions, but their folksy, humorous style moves the book along.

This is a fine effort that many readers will want for their reference library, and one that they will occasionally thumb through just for the fun of it.

Francillon, Rene J. *Grumman Aircraft Since 1929*. U.S. Naval Institute, Annapolis, MD 21402. 1990. 584 pp. Ill. $35.95.

One of the best of the Putnam-USNI series, this new volume gives a full account of one of the most important American aircraft manufacturers. There is a full-length introduction on the history of Grumman, and the individual aircraft entries feature solid historical research. This foundation covers not only the aircraft themselves but their operational careers and, when applicable, combat records. Such well-known types as the F4F, F6F, and A-6 benefit from this fine presentation of facts and photos.

The photographs are well chosen, and in many cases are unique, if not completely unpublished. There are interesting views of French *Hellcats* in the Gulf of Tonkin and Grumman's XF10F *Jaguar*, the first "polymorphic" jet aircraft in the U.S. The WF prototype is shown as a transport, without the characteristic radome of the "Willie Fudd."

Grumman's participation in the U.S. space program is also covered by an appendix on the Apollo Lunar Module. Other lesser known and current endeavors are discussed, including the X-29 program and nonaviation areas, such as the Allied Division which produces the LLVs (long life vehicles) seen in neighborhoods as U.S. Postal Service trucks.

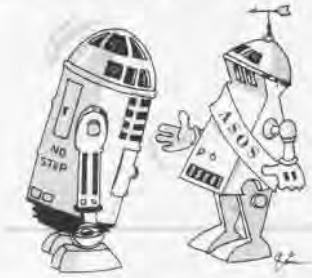
All in all, a fine effort by an experienced author.

WEATHER FRONT

The Next Generation Weather Observer

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

First it was R2D2 and his buddy, C3PO. Now, science and technology introduces Naval Aviation to ASOS – the Automated Surface Observing System.



ASOS digital weather observations will be filed for transmission 24 hours a day and integrated into reports from similar ASOS systems of the National Weather Service, the Federal Aviation Administration, and the Air Force. These observations will be made available directly to the cockpit via the Aeronautical Data Link.

Presently, weather observations in the Navy are made by humanoids known as Aerographer's Mates, who visually judge cloud heights and visibility and determine present weather. ASOS will be taking over these tasks with the skill of an old Chief Aerographer. Cloud heights, for example, will be measured by a laser ceilometer to within 100 feet in the range between 100 and 12,000 feet. Snow depths will be calculated to an accuracy of + 0.5 inches, while a vibrating electronic sensor will detect freezing rain with 99-percent accuracy.

ASOS sensors will be placed in two primary areas at naval air stations; the laser ceilometer, visibility measuring device, and precipitation detector will be positioned at the end of the primary runway. Temperature and dew point, wind, and precipitation measuring sensors will be located in center field. ASOS displays will be in air traffic control towers and ground control approach units.

Between now and FY 95, the Navy will procure 85 of the automated systems. It is presently planned to install 62 of them at CONUS Navy and Marine Corps air stations with the greatest concentration in southern California. The remaining units will be placed at auxiliary and outlying fields, aviation weapon ranges, and harbor installations. Units are also planned for sites in Hawaii, Puerto Rico, and Adak, Alaska.

Rear Admiral Jim Koehr, Commander, Naval Oceanography Command, described ASOS as "...another example of a machine taking over labor-intensive chores, allowing more efficient use of our most important resource: our people." Don't be surprised when ASOS comes on line to hear the response to your request for weather from our own Naval Air Systems Command C3PO.

FLIGHT BAG

VA-122 Disestablishment

VA-122 "Corsair College" is scheduled to close its doors in May 1991. An A-7 reunion, and wake, is scheduled for April 5. All *Corsair* pilots and friends are invited to this end-of-an-era celebration. We will honor the passing of this workhorse of the fleet and celebrate the abiding "spirit of light attack." Be there!

Memorabilia will be available soon. Contact Ens. Davey, VA-122, NAS Lemoore, CA 93246-5122, AV 949-3685 or 209-998-3685.

VRC-30 Pilot Sets New Record

On November 17, 1990, LCdr. Larry Smith, Operations Officer of VRC-30, made history when he landed a Grumman C-2 *Greyhound* aboard *Abraham Lincoln* (CVN-72). He is believed to be the first pilot to trap aboard *every* U.S. Navy aircraft carrier currently on active duty.

During his career, LCdr. Smith has amassed over 4,600 flight hours and 250 carrier arrested landings onboard carriers flying the fleet logistics mission, primarily in the C-2. In addition to the 15 active carriers, he has also landed aboard *Ticonderoga* (CVS-14), *Lexington* (AVT-16), and *Coral Sea* (CV-43).

Ed's note: Bravo Zulu, LCdr. Smith. The Naval Aviation History Office, colocated with our magazine, has no information to contradict your feat as being a record. Any readers who can offer a challenge are invited to contact the editor.

NavCads

Reference your excellent article, "Naval Aviation Cadet – Meeting the Challenge," in your November-December 1990 issue. I want to set the record straight regarding this statement on page 12: "Upon graduation from AOCS [Aviation Officer Candidate School], Naval Aviation Cadets are equal to a cadet at the Naval Academy." Cadets attend the U.S. Military, Air Force, and Coast Guard academies. Individuals attending the U.S. Naval Academy are ranked as *midshipmen*. If you want to raise the hackles of a mid, just call him/her a cadet.

Capt. David B. Young, Jr., USN(Ret.)
USNA Class of 1953
52 Turtleback Trail
Ponte Vedra Beach, FL 32082

Ed's note: We received a similar letter a day after yours. Thanks for keeping us accurate.

Aviation Medicine Display

An aviation medicine section is being established in the National Museum of Naval Aviation, NAS Pensacola, Fla. Suitable photographs and artifacts are needed for display to tell the story of aviation medicine's contribution to U.S. Naval Aviation.

Capt. R. E. Mitchell, USN(Ret.)
Naval Aerospace Medical Institute
NAS Pensacola, FL 32508-5600

Kudo

I think your November-December 1990 issue is excellent.

Looks like your editor, too, has that "defective gene" that compels a person to photograph airplanes. I've had the problem since I was 14 years old. My great grandfather, a Civil War veteran, took me down to Clover Field, where the Douglas aircraft plant was located, when I was six years old in 1926. I saw the Douglas DT-2 and was fascinated by it. After 64 years, nothing has changed.

Incidentally, I recently resubscribed to *Naval Aviation News* after a 6-year lapse. I like very much what you are doing with the magazine.

William L. Swisher
725 White Oak Drive
Santa Rosa, CA 95409

Dillon Memorial Award

VA-122 is trying to locate all previous winners of the Lt. Geoffrey A. Dillion Memorial Award established in 1970 for carrier landing excellence. Please contact Commanding Officer, VA-122, NAS Lemoore, CA 93246-5122, autovon 949-3683 or (209) 998-3683.

Aviation Maintenance Openings

San Jose State University Department of Aviation has tenure-track and full and part-time temporary openings in Aviation Maintenance and/or Operations. Normally, a master's degree and evidence of progress toward the doctorate are required. Appropriate FAA certification is also mandatory.

Interested persons should submit a letter of application, detailed resume, and three letters of recommendation to Dr. H. Gene Little, Department Chair, Aviation Department, SJSU, One Washington Square, San Jose, CA 95192.

Seeking PB-1 Info.

I wish to correspond with anyone connected with the Navy PB-1W or Coast Guard PB-1G programs for a forthcoming book. I would also like information on the 20 USAF RB-17Gs transferred from the Air Force to the Navy in late 1949 and early 1950 and their eventual fate.

Scott A. Thompson
5900 Laguna Vale Way
Elk Grove, CA 95758

Reunions, Conferences, etc.

VS-21 reunion, APR 16, San Diego, CA. POC: Lt. Scott Lewis, PAO, VS-21, NAS North Island, CA 92135, AV 735-7080 or 619-545-7080.

VPB-116 reunion, APR 17-21, San Diego, CA. POC: F. P. Chiavetta, 1640 D Seacoast Dr., Imperial Beach, CA 92032, 619-429-4416.

VP/VPB-213 reunion, APR 17-21, San Diego, CA. POC: Norman Maffitt, 14709 Carlos Cir., Rancho Murieta, CA 95683, 916-354-2219.

VP/VPB-53 reunion, APR 18-20, New Orleans, LA. POC: Louis Maduell, 338 12th St., New Orleans, LA 70124, 504-486-1270.

VP-72 reunion, APR 23-26, Charleston, SC. POC: N. K. Little, 2435 Pleasant Hill Rd., Pleasant Hill, CA 94523, 415-935-3139.

Naval Test Pilot School reunion, APR 27, O-Club, Patuxent River, Md. POC: Reunion Coordinator, NTPS, NATC Patuxent River, MD 20670, AV 356-4107 or 301-863-4107.

NAS Corpus Christi Navy personnel 1963-68 reunion, MAY 91. POC: Cidney Engberg, 1817 N. Summit St., Wheaton, IL 60187, 708-690-8517.

Lexington (CV-2) reunion, MAY 8-11, Pensacola, FL. POC: Walt Kastner, USS Lexington (CV-2) Club, 466 Ivy Glen Dr., Mira Loma, CA 91752, 714-681-1101.

Philippine Sea (CV-47) reunion, May 11, Boston, MA. POC: Cdr. Bob Buerger, USN(Ret.), 26 Minnehaha Cir., Maitland, FL 32751.

Franklin D. Roosevelt (CV-42) reunion, May 16-19, Pensacola, FL. POC: John Crossley, 10740 Bridge Creek Dr., Pensacola, FL 32506, 904-456-8823.

San Jacinto (CVL-30) reunion, May 23-27, Washington, DC. POC: J. C. Lohr, 738 Campbell Dr., Belpre, OH 45714, 614-423-7373.

Yorktown (CV-5) reunion, JUN 6-9, Annapolis, MD. POC: David Hartlove, 93 Waterview Dr., Mechanicsville, MD 20659, 301-934-1752.

NAVAL AVIATION NEWS
January-February 1991