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*The
Year in
Review*

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(Air Warfare)

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COVERS—Front, space shuttle *Atlantis* is launched from Kennedy Space Center, Fla., on DoD mission STS-27, 2-6 December 1988. Back, artist Ted Wilbur rendered this painting, "On the Ramp at Rockaway: The Crew of the NC-4" (reprinted with permission). May 1989 marks the 70th anniversary of the first transatlantic crossing by air.

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

Reflection

There is no part of the Navy, no part of the United States Armed Forces, no armed force in the world more efficient, more effective or more versatile than Naval Aviation. The ships are the best, the aircraft are the best, the weapons systems are the best and, above all, the people are the best. It cannot be any other way, because our responsibilities are vast: maintaining a ready capability to gain and maintain air dominance, to control the sea, to punch out against targets afloat, ashore and under the sea, to help put Marines ashore, to support Army, Marine and allied ground forces, to conduct air logistics, to sweep mines with helicopters and more. If a navy brings to its nation's armed forces mobility, flexibility and global reach, then Naval Aviation brings all those things in spades.

In view of the fact that Naval Aviation does bring so much to the defense of our country, I have pointed out many times that no part of the Navy can really do its job unless Naval Aviation does its. Some think that a facetious remark. Not on your life! Where friendly land-based air forces are not available or are not allowed — unless Naval Aviation dominates the air above the sea, above any battle space — neither surface ships nor submarines nor ground forces can do their jobs. Unless Naval Aviation provides the increased flexibility, mobility and speed afforded any force by aviation, the others cannot do their jobs well. It's a heavy responsibility.

It's also a heavy responsibility to be good stewards of the taxpayers' dollars; we must use as efficiently as we can the dollars, equipment and other things the taxpayers afford us to do our job. Waste and abuse of equipment or people have no place in our program. We must all be alert for ways to save, ways to economize and ways to be efficient, without jeopardizing effi-

ciency, readiness and safety.

Safety in Naval Aviation is one of the things we all have the right to be proudest of. We're not yet as safe as we can be, either in the shops, on the ground or in the air. But we have made great strides. My first year in Naval Aviation, 1952, we had 2,066 major aircraft accidents, lost 708 aircraft and had 399 shipmates killed. Last year, 1988, we had 48 major aircraft accidents, lost 47 aircraft and lost 66 shipmates. That's still 47 too many aircraft and 66 too many shipmates lost, but think about the tremendous improvement made in those 36 years.

Reflect on the treasure and lives not needlessly lost. Credit is due many people for this spectacular success, but the major credit is due the frontline enlisted supervisors who are the real backbone of Naval Aviation. Without their dedication, spirit and technical expertise improving by the day and by the hour, Naval Aviation would still be back where it was when I first got my wings: losing airplanes, treasure and people at an alarming rate. You petty officers and those who went before you are the ones that have made it all go. I salute you for it.

Finally, it has been a high honor and a great privilege to have served as the leader of Naval Aviation over these past two and a half years. It has been an even higher honor and greater privilege to have worked with such outstanding men and women, both in the fleet and ashore. Never in my 38 years of commissioned service have I seen more competent, more eager or brighter young people than we have in Naval Aviation today. I wind up my active service secure in the knowledge that we have in place a force of able and skillful people — people whose dedication will ensure that Naval Aviation will continue to be as it has been: the basis, bulwark and spearhead of the United States Navy itself. ■



Vigorous Venturi

A CH-46 was conducting a hoist evolution while two ships were unreping. In addition to the flight crew, there were five passengers onboard the *Sea Knight*. The crew had to contend with a 12-knot tailwind, driving rain and salt spray. The helicopter aircraft commander (HAC) therefore elected to perform the mission from an increased hover height.

Although the hover altitude was higher, occasional water sprays swept over the helo. These sprays were fueled by the turbulent wave activity between the ships created by the venturi effect.

As the hoist cable was retrieved after the third luggage drop, an unusually large amount of water washed over the CH-46. The number two engine began to unwind. The HAC tried to enter forward flight but couldn't maintain rotor rpm.

As rotor rpm (NR) dropped to 82 percent, the HAC executed a controlled landing in the water. He reduced collective to rebuild NR while the emergency throttle was armed to bring the engines to max power.

The engines regained full power almost immediately. No attempt was made to utilize emergency throttle actuators. The aircraft was flown free of the sea and landed at home plate without further incident. The aircraft was undamaged and postflight examination of the engines revealed no evidence of mechanical failure.



Grampaw Pettibone says:

Well, soak my brow with brine from the deep! This one coulda turned nasty. Bet those passengers in the back got a little itchy when the *Sea Knight* pancaked on the ocean.

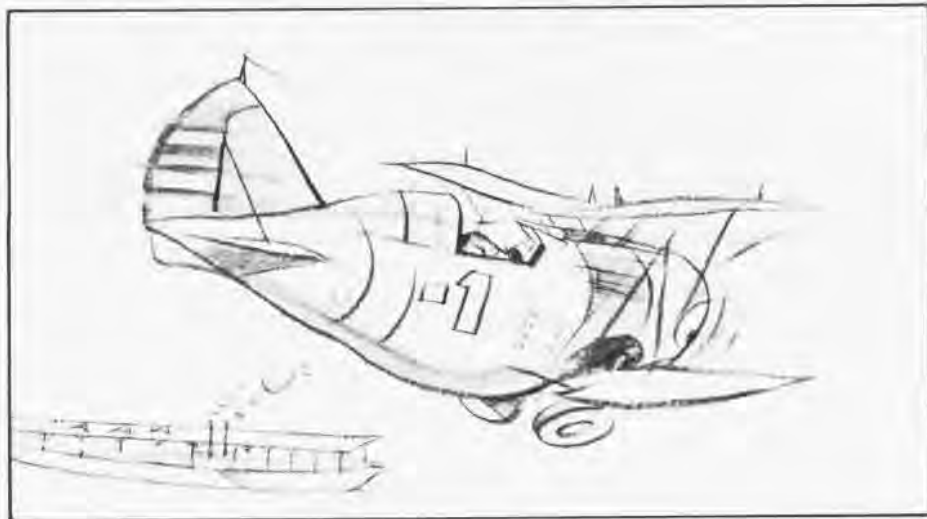
Water between the ships was compressed, forcin' it up in sheets, kinda like clapping your hands in the bathtub. Tack on 12-knot winds from behind, a sea state of four, hard drivin' rain and the DDG's flight deck which is low to the water, and Mr. Mishap is starin' you in the face.

The water sucked down the intake was too much for the engine to swallow. But the pilots up front turned to and made a great recovery while the aircrewmembers in the back were really on the ball and closed the fuselage door



right quick to maintain watertight integrity.

Clappin' hands in the bathtub's O.K. But when a pair a ships are squeezin' the sea and you're in between, look out for flyin' water. It can drown you out — and scare the wits outa passengers in the back.



He Did It His Way

Ole Gramps heard this tale just the other day but it happened way back in the cloth helmet, biplane days aboard the covered wagon — Naval Air's first flattop — USS *Langley*. Maybe there's a lesson here, maybe not. Here goes.

An F2F squadron took on a new pilot who was independent-natured. He liked to make his own modifications to flight equipment. The radio cord was affixed to the left ear pad of his helmet but he preferred to have it on the right side. So he disconnected it and installed it on the right.

In the F2F, the pilot cranked the landing wheels down with a handle located on the right side of the cockpit. Pilots were cautioned to put "opposing" pressure on the handle during cranking because the windstream tended to hurry the gear extension, thus causing the handle in the cockpit to whip around creating the danger of breaking the handle's mounting bolts.

Next day after a mission, the F2Fs returned to *Langley* for landing. When it came time to lower his wheels, the pilot began cranking. His radio cord inadvertently became entangled with the crank. His head was rapidly drawn down toward the instrument panel, totally obscuring his view out of the cockpit.

The F2F nosed over into a sharp descent and a few seconds later, slammed into the sea. The biplane sank but, happily, the pilot managed to disentangle himself and survive to fly another day. It is not known if he con-

tinued his propensity to modify flight equipment. After a tour of duty, he left the Navy and led a long and successful civilian life.



Grampaw Pettibone says:

The old Langley Lariat almost spelled doom for this fellow. He surely put his own noose around his neck. 'Course in those days, they didn't have NATOPS (Naval Air Training and Operating Procedures Standardization) or many standardized procedures for that matter. On the other hand, could it be that an early designer put that cord on the left side just to avoid what happened to our independent-natured pioneer?

Gramps knows you folks wouldn't change your gear around without the riggers' O.K. On the other hand, we've still got Murphy's Law to contend with. Which means: If a part can be installed incorrectly, somebody will install it that way; or, if something can go wrong, it will.

Just a word to the wise from outta the past.

Turn and Burn

The maintenance controller (MC) and crew chief (CC) were absent when the weekend duty medevac pilot in command (PIC) arrived at the squadron. A junior officer with about 500 hours in model, the PIC was unsure which UH-1N was assigned as the primary medevac bird. He called the duty section flight line supervisor at home but the supervisor did not know who had MC duty because he had directed two MCs "to figure it out for themselves" before he departed for the weekend. The PIC summoned one of the MCs living at the barracks to the squadron. Next he called the CC at home, instructed him to report for duty, returned to the flight line and preflighted bird #1. (The CC swore he didn't know he had duty. He had joined the squadron four weeks earlier and no standardization check had been administered before assigning him to fly.)

The PIC noted intake pillows, covers and tie-downs in place but assumed #1 was the back-up aircraft. En route to #2 the PIC was joined by the CC. The PIC asked the CC to open the cowlings on #2, then completed his preflight. The CC did not conduct his preflight.

The MC finally arrived and #2 was made the primary medevac aircraft.

The discrepancy log indicated that a daily/turnaround inspection was required on #2 because it had expired that morning before the PIC signed for the aircraft.

Disregarding the MC, the CC removed the front tie-downs while the PIC performed the prestart checklist and started the engines.

Number one engine's inter-turbine temperature (ITT) stabilized at an abnormal 700 degrees. Number two was slow to start but the PIC was unconcerned, having had a recent similar experience. After two unsuccessful attempts at flight idle stop engagement of the number one throttle, the PIC began control checks and noted a flux in the number one ITT between 600 and 800 degrees.

The PIC asked the CC, still on the number two side, to check the number one side. The CC started for the other side and simultaneously noticed an unusual smell and white smoke coming from number one. Noticing the ITT rise and stabilize at 800 degrees, the PIC became uncomfortable and closed both throttles and fuel switches, then motored the engine attempting to reduce temperature.

The CC heard the engines being shut down and saw white smoke coming from number one engine while it was motoring. Suspecting a faulty fuel dump valve, he signaled the PIC to motor the engine once more. The PIC did so.

Noting the ITT, the PIC also motored number two engine, then number one, a third time. The PIC now smelled a fire. Smoke and flames erupted from number one. The CC discharged a halon fire extinguisher into the intake which lessened the flames.

On inspection, the CC discovered a smoldering intake pillow lodged in the number one plenum chamber and removed it. Flames erupted again and the CC used the fire extinguisher a second time.

The PIC exited the aircraft while the CC climbed onto the top of the helo and found an intake pillow lodged in the number two intake.

The crash crew, summoned by the roving security watch, arrived and put out the remaining fire.

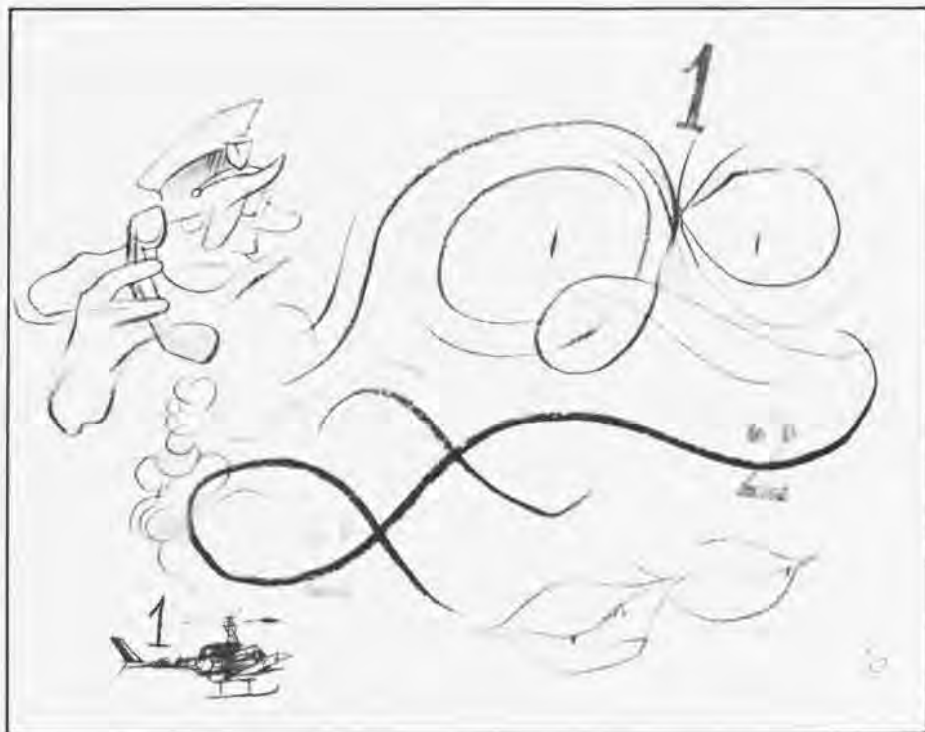


Grampaw Pettibone says:

As Mr. Costello said to Mr. Abbott, "Who's on first?"

This outfit cooked up quite a comedy routine 'cept fires and engine damage aren't so funny. When Navy personnel don't know whether they've got the duty, their outfit is in trouble. Nobody seemed to want to take charge. What if a real life medevac went down?

Poor discipline, poor attitude, poor aircraft. These folks, especially the leaders, better get their act together. And I don't mean somethin' for "Saturday Night Live"!



The Year in Review 1988

By Roy A. Grossnick and Gwendolyn J. Rich

Naval Aviation during 1988 continued to reflect its global commitments in support of national interests and in the defense of freedom. It was the year that America and Naval Aviation returned to manned space flight after a 32-month lapse in the space shuttle program. Ongoing developments in the national and global environments increasingly demanded the dedicated efforts of the Naval Air community. The Persian Gulf and Middle East continued to be areas of focus and, at home, technical development helped keep Naval Aviation in the forefront.

The challenges of 1988 were met with readiness and dedication as Naval Aviation proceeded through its 79th year, which is capsuled in this review.

January

11 Col. Gregory "Pappy" Boyington, top WW II Marine Corps ace, died at age 75. He was C.O. of VMF-214, the *Black Sheep* squadron, during WW II and was credited with the destruction of 28 Japanese aircraft. On 3 January 1944, he was shot down over Rabaul, captured by the Japanese and was a POW for the next 20 months. Col. Boyington received the Medal of Honor for his actions in combat while C.O. of VMF-214 from 12 September 1943 to 3 January 1944.

13 A contract for development of the Navy's Advanced Tactical Aircraft, the A-12, was let to the General Dynamics-McDonnell Douglas team. The new aircraft will eventually replace the A-6 which has been in the Navy's inventory since the early 1960s.



Eisenhower (CVN-69), with CVW-7 embarked, was one of the carriers which boldly displayed its capabilities during 1988 operations in the Mediterranean.



Aviation Command Changes in 1988

Established

VAQ-142	01 JUN 88	Grim Watchdogs
HSL-46	07 APR 88	Grandmasters
CAEWWS	13 JUL 88	(became an independent school)
HCS-5	01 OCT 88	Firehawks

Disestablished

VAK-308	30 SEP 88	Griffins
VA-174	30 JUN 88	Hell Razors
HS-16	01 JUN 88	Nighthawks
VFA-161	01 APR 88	Chargers
VF-191	30 APR 88	Satan's Kittens
VF-194	30 APR 88	Red Lightning
VAW-111	30 APR 88	Seabats
VS-35	01 JUN 88	
CVW-10	01 JUN 88	
HAL-5	01 OCT 88	Blue Hawks

Redesignated

VA-81	VFA-81	04 FEB 88	Sunliners
VA-83	VFA-83	01 MAR 88	Rampagers
VC-12	VFC-12	22 APR 88	Omars
VC-13	VFC-13	22 APR 88	Saint Adversary
NAF Mayport	NAS Mayport	09 SEP 88	



Some recently approved insignia.

February

13 *Abraham Lincoln* (CVN-72), the Navy's sixth nuclear-powered aircraft carrier, was launched at Newport News, Va. The *Nimitz*-class carrier was named in honor of the 16th president of the United States. Her overall length is 1,092 feet, with a beam of 252 feet, and she will displace 96,000 tons when fully loaded.

20 Ground breaking took place for Naval Station, Ingleside, located near Corpus Christi, Texas, new home port for the Navy's training carrier *Lexington* (AVT-16) and its supporting ships. The carrier visited Ingleside on 19 February for the ground-breaking ceremonies.

March

17 *Vanguard I*, the world's longest orbiting manmade satellite, built by the Naval Research Laboratory, marked its 30th anniversary in space. It was the first satellite to use solar cells to power its instrumentation. Although the satellite's radio transmitter is no longer operative, it provided a wealth of information on air density, temperature ranges and micrometeorite impact during its six years of transmitting.

April

11 The Navy's first F-14A(Plus) to be assigned to an operational squadron was accepted by VF-101 at NAS Oceana, Va. The F-14A(Plus) has two General Electric F-110 engines that each develop 7,000 pounds more thrust than the original *Tomcat* power plants. This additional power greatly extends the performance capabilities of the aircraft.

12 An AGM-136A Navy/Air Force *Tacit Rainbow* antiradar missile, launched from an A-6E *Intruder*, made a successful free flight during full-scale development by the Northrop Corporation. The missile is one of a new breed of "smart weapons" designed to clear a safer path for tactical aircraft, flying ahead of the main strike force into land or sea combat areas and automatically attacking and disabling air defense radar warning and tracking systems.

16 The Navy's new trainer, the T-45A *Goshawk*, performed its maiden flight at Douglas Aircraft Company, Long Beach, Calif. The T-45 is scheduled to become the Navy's primary aircraft for training Naval Aviators.

18 The Navy retaliated against Iran following the 14 April incident in which USS *Samuel B. Roberts* (FFG-58) struck an Iranian mine in international waters. The retaliation involved both surface and air units. CVW-11's squadrons from USS *Enterprise* (CVN-65) were the major aviation participants. VAW-117's *Nighthawks* provided airborne early warning tracking and analysis of targets as well as air intercept control. The initial American strikes centered around a surface group action against two Iranian oil platforms that had been identified as support bases for Iranian attacks on merchant shipping. Elements of CVW-11 provided air support for the surface groups in the form of Surface Combat Air Patrols, flying A-6E *Intruders* and A-7E *Corsair IIs*, and Combat Air Patrols with F-14 *Tomcats*.

The initial action began with coordinated strikes by two separate surface groups. One group, consisting of two destroyers and one amphibious ship, attacked the *Sassan* platform while the other group, comprising a guided missile cruiser and two frigates, attacked the *Sirri* platform. Iranian response to the destruction of the two oil platforms



An artist's concept of the *Vanguard I* satellite which remains in orbit around the earth.

involved the dispatching of numerous gunboats to prey on various targets in the Persian Gulf. Following an attack by Iranian Boghammar speedboats on an American-flagged supply ship and a Panamanian-flagged ship, A-6Es from VA-95 were vectored in on the speedboats by an American frigate. The aircraft dropped *Rockeye* cluster bombs on the speedboats, sinking one and damaging several others.

Action continued to escalate. The *Joshan*, a Combattante II *Kaman*-class fast attack craft, challenged USS *Wainwright* (CG-28) and her surface group. The American ships responded following a *Harpoon* attack by *Joshan*, which resulted in the sinking of the Iranian ship. Fighting continued when the Iranian frigate *Sahand* departed Bandar Abbas and challenged elements of an American surface group. She was observed by two VA-95 A-6Es while they were flying surface combat air patrol for USS *Joseph Strauss* (DDG-16). The *Sahand* launched missiles at the A-6Es and the *Intruders* returned the favor with launches of two *Harpoons* and four laser-guided *Skipper* bombs. This was followed by a *Harpoon* firing from *Joseph Strauss*. The weapons delivered against *Sahand* were successful. Her decks were blazing and the fires eventually reached her magazines resulting in the final explosions that led to her sinking.

The loss of *Sahand*, one of Iran's most modern ships, was not enough to stop the suicidal sorties of the Iranian navy. A sister ship, *Sabalan*, departed her port for operations in the gulf. She fired on several A-6Es from VA-95 with a surface-to-air missile. One of the *Intruders* responded with a laser-guided bomb that hit *Sabalan* and stopped her dead in the water. The Iranian frigate was taken in tow by an Iranian tug with the stern partially submerged. VA-95's aircraft, as ordered, did not continue the attack. This action ended the retaliatory strikes against Iran that began as a result of Iranian mining in international waters.

— The Navy's only squadron to operate the F-21A *Kfir*, VF-43, transferred its aircraft in April when the contract expired between the U.S. Navy and Israeli Air Force for the lease of the F-21As. The aircraft had been used in the adversary role and were replaced by F-16Ns. A Marine Corps squadron, VMFT-401, will continue to operate the F-21A until sometime in 1989.

May

6 A prototype F/A-18D *Hornet* equipped as an advanced night attack aircraft



HC-5, Det 1, provided medevac and equipment to Samuel B. Roberts (FFG-58) after landing its HH-46 Sea Knight aboard the damaged frigate.

made its maiden flight at McDonnell Douglas in St. Louis, Mo. The night attack version is equipped with a new forward-looking infrared (FLIR) sensor called a Thermal Imaging Navigation Set (TINS) designed to help pilots navigate and assist in locating, identifying and attacking ground targets at night. The F/A-18D is a two-seat model and will employ a pilot and Naval Flight Officer in tactical missions.

15 The remains of Marine Corps Capt. Stephen C. Leslie and Kenneth W. Hill were recovered in the central Persian Gulf 15 miles southeast of Abu Musa Island. They had been killed one month earlier during the U.S. retaliatory strike against Iran. Assigned to HMLA-16, their AH-1 *Cobra* helicopter vanished while operating in the gulf during the 18 April strike. Both were posthumously awarded the Distinguished Flying Cross and the Purple Heart for their actions.

16 The production model of the Navy's new E-6A communications aircraft arrived at NATC Patuxent River, Md., for extensive electromagnetic testing.

23 The revolutionary tilt-rotor aircraft, the V-22 *Osprey*, made its debut during rollout ceremonies at Bell Helicopter's facility in Arlington, Texas. The V-22 combines the attributes of a helicopter and a turboprop aircraft and was developed from the start to serve the needs of all four armed services.

Right, the F-14A (Plus) made its debut in VF-101. Above, the T-45A Goshawk, the Navy's new trainer, is depicted in carrier operations by artist R. G. Smith.



Iranian oil platforms burn following attacks by Navy surface groups in retaliation for the Iranian mines which Samuel B. Roberts (FFG-58) struck in international waters.





The Navy's new E-6A TACAMO communications aircraft is scheduled to replace the retiring EC-130s.

June

14 The *Sunday Punchers* of VA-75 became the first fleet A-6 squadron to launch a HARM (high-speed, anti-radiation missile). C.O. Cdr. John Meister and operations officer LCdr. Rich Jaskot scored a direct hit on a target ship. The missile was fired from a new A-6E SWIP (system weapons integration program) aircraft. The modified aircraft was upgraded to launch the latest air-to-surface missiles including HARM, *Harpoon* and *Maverick*, as well as its normal array of air-to-surface weapons.

14 Reserve Patrol Squadron 62 fired its first AGM-84 *Harpoon* missile and scored a direct hit, signaling a new chapter in Naval Air history. The missile was launched from the *Broad-arrows'* new P-3C Update III aircraft during coordinated fleet operations with other 2nd Fleet units. Based at NAS Jacksonville, Fla., the squadron had been selected earlier as the first reserve patrol squadron to receive the P-3C as part of the Navy's horizontal integration program.

15 Adm. Ronald J. Hays assumed the title of Gray Eagle following the retirement of Lt. Gen. Frank E. Petersen, Jr., USMC. The Gray Eagle is the most senior Naval Aviator by date of designation. Adm. Hays became the 37th Naval Aviator to inherit the title.

July

13 Carrier Airborne Early Warning Weapons School (CAEWWS) was established as a separate command on the same principles as Top Gun and Strike University. Emphasis will be on warfare training for E-2C *Hawkeye* aircrews.

22 Reserve Attack Squadron 304 took delivery of a KA-6D, marking the introduction of the *Intruder* to the Naval Air Reserve. By September 1988 the squadron had three KA-6Ds and two A-6Es.

August

2 USS *Constellation* (CV-64) successfully fought a severe fire in the main engineering space using the installed HALON firefighting system. This was

the first carrier use of the system in fighting a fire.

5 Dwaine L. Lyon received his Wings of Gold and was commissioned an ensign, becoming the first Naval Aviation Cadet to complete the jet strike training pipeline since the NAVCAD program was reinstated in 1986. The program, which began in 1935, was an important source of Naval Aviators until it was terminated in 1965. Under the current NAVCAD program, aviation cadets with a minimum of two years of college or its equivalent undergo flight training as noncommissioned officers.

17 USS *Shangri-La* (CVA-38) departed Philadelphia Naval Shipyard on her final voyage following her sale to a scrap company in Taiwan. *Shangri-La* was decommissioned on 30 July 1971 and stricken from the U.S. Navy register on 15 July 1982. The carrier had been at the shipyard since 1971. During WW II she participated in numerous combat actions against the Japanese.

17 The maiden flight of the Navy's



Adm. Ronald J. Hays is honored as the most senior active duty Naval Aviator by receiving the Gray Eagle trophy.

new Helicopter Combat Support (HCS) aircraft, HH-60H, was conducted at Sikorsky Aircraft, Stratford, Conn. The helo is a derivative of the SH-60F. The primary mission of the new HH-60H will be strike rescue with secondary tasks involving special warfare missions. The HH-60Hs are the first new aircraft purchased for and operated exclusively by the Naval Air Reserve.

September

9 Master Chief Avionics Technician (AW) Duane R. Bushey became the seventh Master Chief Petty Officer of the Navy.

29 The space shuttle *Discovery* was launched into orbit at 11:37 a.m. from Cape Canaveral, Fla. It marked the end of a 32-month lapse in American space flights following the January 1986 *Challenger* accident. Naval Aviator Capt. Frederick H. Hauck commanded *Discovery*'s five-man crew on a four-day mission to deploy a NASA communications satellite.

30 The Navy's last operational reciprocating-engine aircraft, a C-1A Trader (Bureau Number 146048), retired from active service and was transferred to the Naval Aviation Museum, NAS Pensacola, Fla. The C-1A had been based at the air station, providing carrier onboard delivery support for the Navy's training carrier *Lexington* (AVT-16).

30 During FY 88 the Navy trained 1,407 pilots and 541 Naval Flight Offi-

cers. The rotary wing pipeline recorded the highest number of pilots trained — 560.

30 Aerial Refueling Squadron (VAK) 308 was disestablished at NAS Alameda, Calif., leaving only one Reserve Force squadron flying the KA-3B *Skywarrior* — VAK-208 on the East Coast. VAK-208 is scheduled to disestablish in 1989.

October

1 Helicopter Combat Support Special Squadron (HCS) 5 was established at NAS Point Mugu, Calif., the first squadron of its kind. HCS-5 is a reserve squadron with a primary mission of combat search and rescue (strike rescue) and special warfare support. It will operate the HH-60H *Seahawk*.

3 The aircraft designation A-12A was established, designating a new carrier-based, attack aircraft with a two-man crew.



AVCM Duane R. Bushey (left), the seventh Master Chief of the Navy, with Mrs. Bushey and VAdm. Leon Edney, Chief of Naval Personnel.



The Navy's last C-1A Trader leaves the flight deck of Lexington (AVT-16).



The LRAACA, the Navy's new maritime patrol aircraft, will eventually replace the P-3C Orion.

7 Phase III of the Naval Aviation Museum expansion program was initiated with a ground-breaking ceremony at NAS Pensacola, Fla. The third phase of the expansion will add more than 138,000 square feet of display area, more than doubling the current space. The addition is expected to be complete by October 1990.

14 The Navy selected Lockheed Aeronautical Systems Company to develop a replacement for the P-3C *Orion* maritime patrol aircraft. The new aircraft, currently designated LRAACA for long-range, air antisubmarine warfare-capable aircraft, will have new fuel-efficient, modern-technology turboprop engines to increase its range and efficiency, an increased payload capability and an improved avionics suite. First delivery is expected in 1994.

17 VAdm. Robert F. Dunn became the 38th Naval Aviator to be designated the Gray Eagle. He assumed the title from Adm. R. J. Hays who retired.

November

3 The Navy's first standoff land attack missile (SLAM) rolled out at McDonnell Douglas' facility in St. Charles, a suburb of St. Louis, Mo. SLAM is a derivative of the *Harpoon* antiship missile system. It is designed for deployment from carrier-based aircraft and allows an aircraft to attack land targets and ships in port or at sea from an extended range, in excess of 60 nautical miles.

10 Ens. Joy D. Warner became the first woman to earn her Wings of Gold through the newly reinstated Naval Aviation Cadet program. She joined the program in June 1987 and completed basic flight training with HT-8.

29 The Navy Department transferred an F-4S *Phantom II* (Bureau Number 157307) to the Smithsonian's National Air and Space Museum, upon its arrival at Dulles International Airport, Va. This F-4 saw action in Vietnam and was a MiG killer. On 21 June 1972 the F-4, piloted by Cdr. Samuel C. Flynn, Jr., with Lt. William H. John as radar intercept officer, shot down a MiG-21. The F-4 was assigned to VF-31 operating off USS *Saratoga* (CVA-60) at the time. The museum plans to display the F-4 in a future Vietnam war exhibit.

December

1 The model RC-12M was established designating a UC-12M configured aircraft with maritime wings and removable tip tanks, surface search radar, mission control console and miscellaneous equipment racks to enable performance of the specialized range surveillance and clearing (RANSAC) mission.

2 Space shuttle *Atlantis* completed a successful liftoff at 9:31 a.m. from its launch pad at Cape Canaveral, Fla. Aboard were Naval Aviator Cdr. Robert Gibson as mission commander, Air Force Col. Guy Gardner as pilot, Col. Richard Mullane, Lt. Col. Jerry Ross and Cdr. Bill Shepard, who was making his first flight. Four days later, after deploying its payload, the spacecraft landed at Edwards AFB, Calif.

2 The model AGM-119B was established, designating a helicopter-launched MK 2 MOD 7 *Penguin* missile, which differs from the AGM-119A in that it uses a different warhead, fuze booster, rocket motor and wing and canard assemblies.

5 The model AGM-88C was established, designating a HARM missile

which has an improved guidance section with new operational capabilities against the latest threats.

13 The model AGM-84D was established, designating a *Harpoon* AGM-84C missile modified for increased range, mid-course waypoints and selectable (sea skim/pop-up) terminal trajectory.

14 The model AGM-84E was established, designating a modified AGM-84D *Harpoon* missile. It is an air-launched strike weapon for use by carrier aircraft against land targets, ships in port and ships at sea.

19 The name John C. Stennis was approved by the Secretary of the Navy for CVN-74. When constructed CVN-74 will be the Navy's seventh *Nimitz*-class carrier and eighth nuclear-powered carrier.

30 USS *Theodore Roosevelt* (CVN-71), the Navy's newest aircraft carrier, departed Norfolk, Va., for its first operational deployment to the Mediterranean. The *Nimitz*-class carrier, with CVW-8 onboard, was part of a 12-ship battle group and was accompanied by a five-ship amphibious ready group. *Roosevelt* had completed an earlier two-month deployment to the North Atlantic and Norwegian Sea where it participated in an annual NATO exercise.

31 The Aviation Officer Continuation Pay (AOCP) program was terminated and a new program was instituted on 1 January 1989. Called Aviation Continuation Pay (ACP), the new program applies only to pilots and Naval Flight Officers below paygrade O-5. Determination of eligible communities and payment rates is based on analysis of current year group shortages, department head requirements and other pertinent management factors. ACP payment could reach up to \$12,000 for each year of the contract if the officer agrees to remain on active duty to complete 14 years of continuous service.

31 The year 1988 ended as the "safest in aviation history" for the Navy/Marine Corps team, according to Secretary of the Navy William L. Ball. The rate used as an index of flight safety recorded 48 class "A" mishaps — down to 2.16 mishaps per 100,000 flight hours for 1988.

— VQs 1 and 2 removed the last of the EA-3B *Skywarriors* from active service aboard aircraft carriers. Electronic warfare-configured S-3As (ES-3s) are scheduled to replace the EA-3Bs.

1988 Carrier and Air Wing Deployments

USS Midway (CV-41)

CVW-5 (Tail code: NF) WestPac/IO, 15 Oct 1987-12 Apr 1988 (Forward deployed in WestPac)

Squadrons	Aircraft
HS-12	SH-3H
VA-115	A-6E
VA-185	A-6E
VAQ-136	EA-6B
VAW-115	E-2C
VFA-151	F/A-18A
VFA-192	F/A-18A
VFA-195	F/A-18A

USS Coral Sea (CV-43)

CVW-13 (Tail code: AK) Med, 29 Sep 1987-28 Mar 1988

Squadrons	Aircraft
HS-17	SH-3H
VA-55	A-6E
VA-65	A-6E
VAQ-133	EA-6B
VAW-127	E-2C
VFA-131	F/A-18A
VFA-136	F/A-18A
VFA-137	F/A-18A

USS Forrestal (CV-59)

CVW-6 (Tail code: AE) Med/IO/NorLant, 25 Apr-7 Oct 1988

Squadrons	Aircraft
HS-15	SH-3H
VA-37	A-7E
VA-105	A-7E
VA-176	A-6E/KA-6D
VAQ-132	EA-6B
VAW-122	E-2C
VF-11	F-14A
VF-31	F-14A
VS-28	S-3A

USS Independence (CV-62)

CVW-17 (Tail code: AA) Solant/EastPac, 15 Aug-8 Oct 1988 (CVW-17 was aboard only for the transit from the East Coast to the carrier's new home port in California. A different air wing will be assigned to *Independence*.)

Squadrons	Aircraft
HS-3	SH-3H
VA-155	A-6E
VAW-125	E-2C
VF-103	F-14A
VFA-131	F/A-18A
VS-30	S-3A

USS Constellation (CV-64)

CVW-14 (Tail code: NK) WestPac, 1 Dec 1988-present

Squadrons	Aircraft
HS-8	SH-3H
VA-196	A-6E/KA-6D
VAQ-139	EA-6B
VAW-113	E-2C
VF-21	F-14A
VF-154	F-14A
VFA-25	F/A-18A
VFA-113	F/A-18A
VS-37	S-3A

USS Enterprise (CVN-65)

CVW-11 (Tail code: NH) WestPac/IO, 5 Jan-3 Jul 1988

Squadrons	Aircraft
HS-6	SH-3H
VA-22	A-7E
VA-94	A-7E
VA-95	A-6E/KA-6D
VAQ-135	EA-6B
VAW-117	E-2C
VF-114	F-14A
VF-213	F-14A
VS-21	S-3A

CVWR-30 (Tail code: ND) At-sea training on USS *Enterprise* (CVN-65), August 1988

Squadrons	Aircraft
HS-85	SH-3H
VAQ-309	EA-6A
VAW-88	E-2C
VF-301	F-14A
VF-302	F-14A
VFA-303	F/A-18A
VFA-305	F/A-18A

USS John F. Kennedy (CV-67)

CVW-3 (Tail code: AC) Med (2 Aug 1988-1 Feb 1989)

Squadrons	Aircraft
HS-7	SH-3H
VA-75	A-6E/KA-6D
VAQ-130	EA-6B
VAW-126	E-2C
VF-14	F-14A
VF-32	F-14A
VMA(AW)-533	A-6E
VS-22	S-3A

USS Nimitz (CVN-68)

CVW-9 (Tail code: NG) WestPac/IO, 2 Sep 1988-2 Mar 1989

Squadrons	Aircraft
HS-2	SH-3H
VA-146	A-7E
VA-147	A-7E
VA-165	A-6E/KA-6D
VAQ-138	EA-6B
VAW-112	E-2C
VF-24	F-14A
VF-211	F-14A
VS-33	S-3A

USS Dwight D. Eisenhower (CVN-69)

CVW-7 (Tail code: AG) Med, 29 Feb-29 Aug 1988

Squadrons	Aircraft
HS-5	SH-3H
VA-34	A-6E/KA-6D
VA-46	A-7E
VA-72	A-7E
VAQ-140	EA-6B
VAW-121	E-2C
VF-142	F-14A
VF-143	F-14A
VS-31	S-3A

USS Carl Vinson (CVN-70)

CVW-15 (Tail code: NL) WestPac/IO, 15 Jun-14 Dec 1988

Squadrons	Aircraft
HS-4	SH-3H
VA-27	A-7E
VA-52	A-6E/KA-6D
VA-97	A-7E
VAQ-134	EA-6B
VAW-114	E-2C
VF-51	F-14A
VF-111	F-14A
VS-29	S-3A

USS Theodore Roosevelt (CVN-71)

CVW-8 (Tail code: AJ) NorLant, 25 Aug-11 Oct 1988 Med, 30 Dec 1988-present

Squadrons	Aircraft
HS-9	SH-3H
VA-35	A-6E
VA-36	A-6E
VAQ-141	EA-6B
VAW-124	E-2C
VF-41	F-14A
VF-84	F-14A
VFA-15	F/A-18A
VFA-87	F/A-18A
VS-24	S-3A

Outchop Briefing: Vice Admiral Robert F. Dunn



JO1 Jim Richeson

VAdm. Robert F. Dunn, Assistant Chief of Naval Operations (Air Warfare), will retire on May 25 during ceremonies at NAS Norfolk, Va. VAdm. Dunn graduated from the Naval Academy in 1951 and served in a destroyer during the Korean War before entering flight training. He flew A-1 Skyraiders and A-4 Skyhawks. He commanded VA-146 in Vietnam combat, Carrier Air Wing Seven, Carrier Group Eight, USS Mount Whitney (LCC-20), USS Saratoga (CV-60), the Naval Safety Center, Naval Military Personnel Command, and was Chief of Naval Reserve and Commander Naval Air Force, U.S. Atlantic Fleet.

NANews: Two years ago you told NANews your main goal was to enhance the capabilities of fleet commanders and subordinate aviation commands and to maintain their then high levels of readiness. How successful have you been in achieving that goal?

VAdm. Dunn: The high levels of readiness have been sustained. I'm not so sure it's because of what we did here in the Pentagon. It's because we have dedicated, well-trained people in the fleet who are maintaining those levels of readiness. Not only in the fleet but in the supply and maintenance systems, and we're continuing to set new records for readiness, for safety. I'm a little concerned what might happen in the future because in the last couple of years, we haven't had as much funding as we should have for things like spare parts and depot level maintenance for overhaul of our aircraft and engines. I'm concerned that we may be living off the fat of the land a little bit.

Do you see any immediate impact?

No, it's going to be gradual, almost insidious. We just have to be very careful about what we do. If we have to maintain the same level of operating commitments, we will draw down on the resources we have accumulated to keep the aircraft in good shape — I'm talking about the spare parts inventory, the ordnance inventory. Then, in three or four years, we could be in trouble. While I've attempted to guard against that, my successor is going to have a real problem trying to sustain adequate levels.

Which achievement during your leadership of Naval Aviation do you consider the most memorable?

Well, it's not something I did. But it's something that occurred while I was here which I think is great. In two successive years, we set new marks for aviation safety. In both calendar years 1987 and 1988, we made tremendous improvements in safety and 1989 is starting out towards another new low

in aircraft accidents . . . new records in lives saved and aircraft saved

To what do you attribute this marked improvement?

There's no one single thing. But it began with adequate funding in the early 80s so that we're able to get enough flying hours to train our people, buy enough spare parts to keep the aircraft up and spend enough money recruiting and training quality people to work on our airplanes. That, coupled with improved leadership in the fleet, made a tremendous difference. We recognized that we weren't as disciplined as we should be in the air. The type commanders have taken it upon themselves to weed out those who are guilty of poor air discipline. The kinds of accidents that we've had in previous years, like flatfating and unauthorized flights, have almost disappeared.

Is there an important goal that you were unable to achieve?

I'd like to have been able to convince everyone that Naval Aviation is part and parcel to the rest of the Navy. That it's needed by the rest of the Navy so they can do their job. Unfortunately, there are still people around who think Naval Aviation is a luxury and it's not needed in every place. For that reason, I go around giving a lecture I call Naval Aviation 101, frequently trying to educate people to that effect.

What do you consider the major challenges facing Naval Aviation today?

In a reduced funding climate, maintaining the same levels of readiness, the same safety performance and the same retention performance we've had in recent years. It is going to require some innovative approaches to things. And I hasten to add that when I tell you to be innovative, I'm telling you I don't know what to do; you have to figure it out. That's the biggest challenge.

What is your vision of Naval Aviation 20 years from now?

The ships we're going to have are either built or about to be launched and commissioned. A lot of the aircraft we have today will be around. Many of the people we have today will be around in 20 years and they'll be the leaders. But we're pointing towards a reduced number of types of aircraft on our

ships. I think 20 years from now, we can look forward to seeing a fighter, probably the F-14D and maybe the Navy version of the ATF (advanced tactical fighter) — some ships with one, some with the other. A-12s for the medium attack and some version of the F/A-18, as we know it now or maybe a later model, and then the SH-60F. Those will be the aircraft aboard our aircraft carriers. The helicopter community will be flying SH-60Bs with some improvements in avionics, flight controls and weapon systems. The H-46, I'm afraid, will still be aboard the combat logistics force ships. We could very well see the V-22 as a COD (carrier onboard delivery) aircraft for the Navy replacing the C-2, and the ASP (advanced surveillance platform) replacing the E-2, S-3 and the EA-6. On land-based aviation, we'll have the LRAACA (long-range, air antisubmarine warfare-capable aircraft) with a name and number by then.

Naval Aviation will still be required to do the same job it's doing today, that is, the basic things: gaining and maintaining air superiority over potential battle space, striking out with aircraft against both sea targets and land targets, and those under the sea as well, and conducting supply and mine-sweeping — all the things we do today. I don't see too much change in mission. Long-range cruise missiles will be the most appropriate weapon for some targets but will not replace the manned aircraft as far as the principal striking element. We'll be using increasing numbers of unmanned air vehicles for things such as surveillance and reconnaissance, but they're not going to replace the manned aircraft because man is needed in the loop.

We're currently experiencing a 1,500-pilot shortfall. If you were a C.O. today, what advice would you give the aviator making that career decision?

It's always a tough problem. It's really not a lot different today than it was 20 years ago when I was a squadron commander. You have to be honest with people who are in your unit and lay out things for them. I would tell them, if you stay on in the Navy, Naval Aviation is a career. You will have an opportunity for excitement which you wouldn't have anywhere else. You'll have an opportunity to meet challenges and responsibility a lot sooner than you probably would anywhere else. You'll have a chance to contribute to the defense of your nation by being a part of a really first-rate team. Like any job, you're going to get

what you put into it. I got an awful lot out of the Navy and I recommend it highly, but it's not for everybody. Each individual has his or her own special needs and must make that personal decision. If an aviator does decide to leave, I hope he joins the Naval Reserve.

Is today's shortage causing a leadership problem downstream?

I doubt that very much. Although I don't get out to the fleet as often as I want, every time I go out, I'm impressed with the quality of the young people that we have whether they are enlisted or junior officers. They're going to rise right to the top. I've never had a problem with depending upon the younger folks rising up to meet the leadership challenge. We're going to be O.K. there.

Do you have a tour of duty which is most memorable?

I suppose most memorable has to be two combat cruises, because that's where I did what I had been trained for. While we can debate whether that particular war was right or wrong, the fact is that we were doing something we believed in and, by and large, Naval Aviation measured up very well. I'm very proud to have been a part of that.

Is there one that was most rewarding?

That has to be when I was commanding officer of the *Saratoga*. I took over on short notice when the ship was having some problems. Together with some other fine people, we were able to turn the ship around and increase the morale and meet all of our operational commitments, improve readiness and safety markedly. I was able to leave that command with a sense of having done something really good for the Navy.

Would you do it all over again?

Absolutely.

Is there anything you would like to add?

Yes. I highly value *Naval Aviation News*. It is an important medium for getting the message of Naval Aviation to everybody from seaman to admiral. It reaches all the ready rooms, shops and office spaces throughout Naval Aviation and beyond. It is an effort that we have to continue to support. ■

C-1A/TF Trader

By Hal Andrews

In terms of name recognition, the *Trader* is almost unknown. However, carrier crews and aviators have looked on Grumman's TF-1/C-1A with affection as the Carrier Onboard Delivery (COD) aircraft — their link to shore for the past 33 years.

With development of the Navy's first twin-engine, carrier-based antisubmarine warfare (ASW) airplane, the S2F, well along at Grumman in 1953, attention turned to potential derivatives for other missions. Of particular interest was one that could replace the single-engine types in use for carrier onboard delivery, providing more useful cargo capacity as well as carrying more passengers efficiently. With a small expansion in the fuselage volume, a cargo floor and a double door cargo hatch on the port side, either nine passengers or 3,500 pounds of cargo could be carried. The same airplane, without the S2F's ASW systems, could be a more effective, twin-engine, carrier-capable trainer.

Full carrier landing and deck launch or catapulting capability would be available from CVE-105 escort and all larger class carriers, following from the S2F design. Wings, tail, engines and landing gear would carry over directly. The larger horizontal tail of the S2F-2 then under development with an enlarged weapons bay compensated for the transport/trainer's larger cross-section fuselage. The rear of the nacelles was also redesigned, replacing the sonobuoy launchers with a streamlined "boat tail."

In 1953, 45 of the transport/trainers were ordered, using the trainer designation, TF-1s. While the first would be instrumented for flight testing, only limited testing was needed to supplement S2F test results, and the first airplane was a full production aircraft. On January 19, 1955, it made its first flight, with subsequent TFs rolling off the line and initial deliveries to fleet logistics squadrons before the end of the year.

By the time these were delivered,

the as-yet-unnamed TF had spawned two of its own derivatives. Earlier, a version of the S2F with a top mounted APS-20 radar as an airborne electronic warfare airplane had gotten as far as receiving the WF-1 designation. But with the larger fuselage of the TF and larger, more powerful radars, it was dropped for a new proposal. The out-sized antenna would rotate in a large streamlined radome carried on struts and a stub fin above a modified TF airframe. Ordered as the WF-2, one TF was modified to serve as an aerodynamic prototype for the unique configuration, carrying the full radome shell and equipped with the WF-2's new twin tail. In spite of its appearance, the flight characteristics turned out quite satisfactorily. With a forward fuselage extension to accommodate all of the avionics and the crew, the WF-2 went into production and fleet service. After flight tests to show that the WF-2 could be ferried without its radome, the aerodynamic prototype went into use in that configuration in support of Navy programs at Grumman — the only twin (+ stub) tail TF.

At this point, the nonidentical triplets finally got their official names: S2F *Tracker*, TF *Trader* and WF *Tracer*. These were a bit late. The S2F had long since become the "Stoof," and while "Stoof with a Roof" was quite

descriptive of the WF, the shorter "Willy Fudd" became commonly used by those who maintained and flew it. The TF became known by its function; it was the "COD."

With electronic countermeasures (ECM) receiving ever-increasing attention, the other TF-1 offshoot sprouted all kinds of external antennas, and the cargo compartment was stuffed with black boxes and display/control panels. Four TF-1s appeared in this configuration as TF-1Qs. They were used by several fleet squadrons for ECM training.

A second order for 42 brought the total TF-1/1Q aircraft to 87, all becoming C-1As/EC-1As in the 1962 designation changes. Over the years, many approaches were taken to find a COD airplane with a larger cargo capacity and longer legs. While an initial batch of C-2As supplemented the C-1As, the

TF-1



C-1A



TF-1

latter remained *the* COD, whether assigned to the carriers directly or to fleet logistics squadrons or air stations. Long after the S-2s and E-1s were retired, the end for the C-1s came as reciprocating-engine airplanes and their avgas were phased out of the carriers and the Navy. As they went, the very first C-1A built put in its "30" and retired, assigned to USS *Forrestal*

(CV-59) in April 1985, having logged more than 15,700 hours.

At the end, USS *Lexington's* (AVT-16) "Blue Ghost" was the last to go, making its last carrier operations in September 1988 and going to the Naval Aviation Museum in Pensacola, Fla. — a fitting end to the era of reciprocating engine-powered Navy aircraft at sea. ■

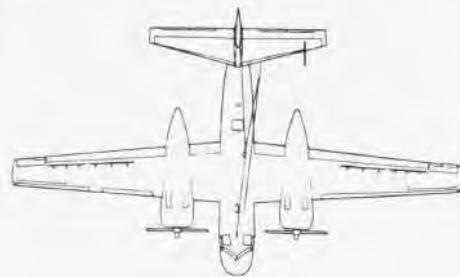
TF-1Q/EC-1A



C-1A/TF



Span	69'8"
Length	40'0"
Height	16'4"
Engine: Wright R-1820-82	1,525 hp
Maximum speed	251 kn
Service Ceiling	24,800'
Range	965 nm
Crew	Two pilots
Accommodations	Nine passengers; or 3,500 lbs. cargo



Vanguard in Space

A Photographic Naval History

In the late fifties, successful orbits by the *Vanguard* and *Explorer 1* satellites provided the impetus for the Navy's involvement in the U.S. space program. For the first time, Naval Aviators were assigned to NASA as prospective astronauts.

The Navy's role in space rapidly expanded during the 1960s. In May 1961, Commander Alan B. Shepard became the first American to go into space as his space capsule *Freedom 7* reached an altitude of 116 miles high and 302 miles downrange from Cape Canaveral, Fla. Manned orbital flight became a reality when Lieutenant Colonel John H. Glenn, USMC, and his spacecraft *Friendship 7* took three turns around the earth in February 1962. Years later, other Naval Aviators made history with Apollo 8's first flight to the moon in 1968, and the first lunar landing in 1969 when Neal A. Armstrong, mission commander of Apollo 11, took the first walk on the moon.

Navy ships and squadrons made the recoveries of all the astronauts from the Mercury, Gemini and Apollo space shots, as well as from the Skylab series during the seventies. Skylab 2 comprised an all-Navy crew in the first U.S. manned orbiting space station. Satellites developed by Navy scientists expanded our knowledge of space, and the Navy space surveillance and satellite navigation systems gave to all nations an accurate means of traveling the earth's oceans.

Naval Aviation in the 1980s has moved forward in the space program. An all-Navy crew manned the space shuttle *Columbia* in April 1981 on her maiden voyage. In November of that year, astronaut Captain Richard H. Truly rode

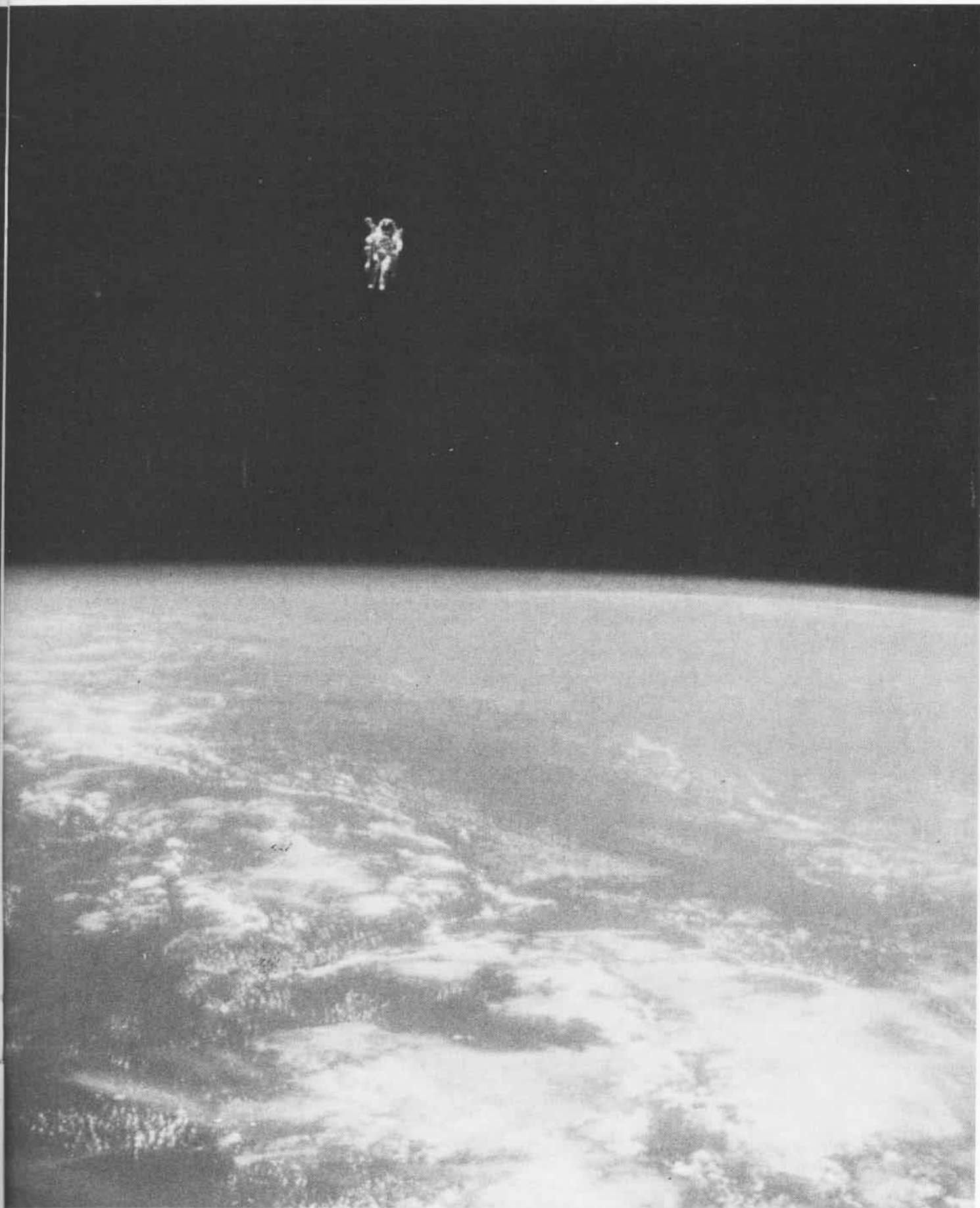
aboard *Columbia* to become one of the first men to fly into space and return in a previously flown spacecraft. In November 1982, former Navy and Marine Corps aviators were on board the space shuttle during its first operational flight. As a result of the Navy's expanded role in space, the Naval Space Command was established in 1983, headed by Capt. Truly, to consolidate the Navy's space-related activities. On February 7, 1984, astronaut Captain Bruce McCandless II made history when he took the first untethered walk in space.

The tragic explosion of the space shuttle *Challenger* on January 22, 1986, killed all seven crew members, including Naval Aviator Commander Michael J. Smith, and slowed progress in the U.S. space program. But Naval Aviation was back in space in September 1988 with the successful launch of the space shuttle *Discovery* and her five-man crew, commanded by Naval Aviator Captain Frederick H. Hauck.

In the years ahead, as in the past, Naval Aviation will remain in the forefront of the space effort — leaving its calling card on the doorstep of the universe. ■

Capt. Bruce McCandless II, astronaut aboard *Challenger* on February 3-11, 1984, became the first man to "walk" untethered in space thanks to the nitrogen-powered, backpack-like Manned Maneuvering Unit. He traveled up to 320 feet away from the space shuttle.





Lt.Col. John Glenn, USMC, became the first American to orbit the earth on February 20, 1962. Glenn is shown here entering the Friendship 7 spacecraft prior to launch.



Carpenter



Schirra

Glenn

Shepard



Four Naval Aviators, three Navy and one Marine, were among the seven men selected as astronauts under Project Mercury for space exploration and manned orbital flight: Lt. M. S. Carpenter, USN; Lt.Col. J. H. Glenn, Jr., USMC; Lt.Cdr. W. M. Schirra, Jr., USN; and Lt.Cdr. A. B. Shepard, Jr., USN.

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Cdr. Alan B. Shepard became the first American to be rocketed into space on May 5, 1961. His space capsule, Freedom 7, was launched from Cape Canaveral and recovered at sea by a Marine Corps HUS-1 helicopter.



On December 21, 1968, a 363-foot-high Saturn V space vehicle lifted off from Kennedy Space Center, Fla., carrying Naval Aviator James Lovell and fellow astronauts Frank Borman and William Anders. The mission: Apollo 8's first flight to the moon.

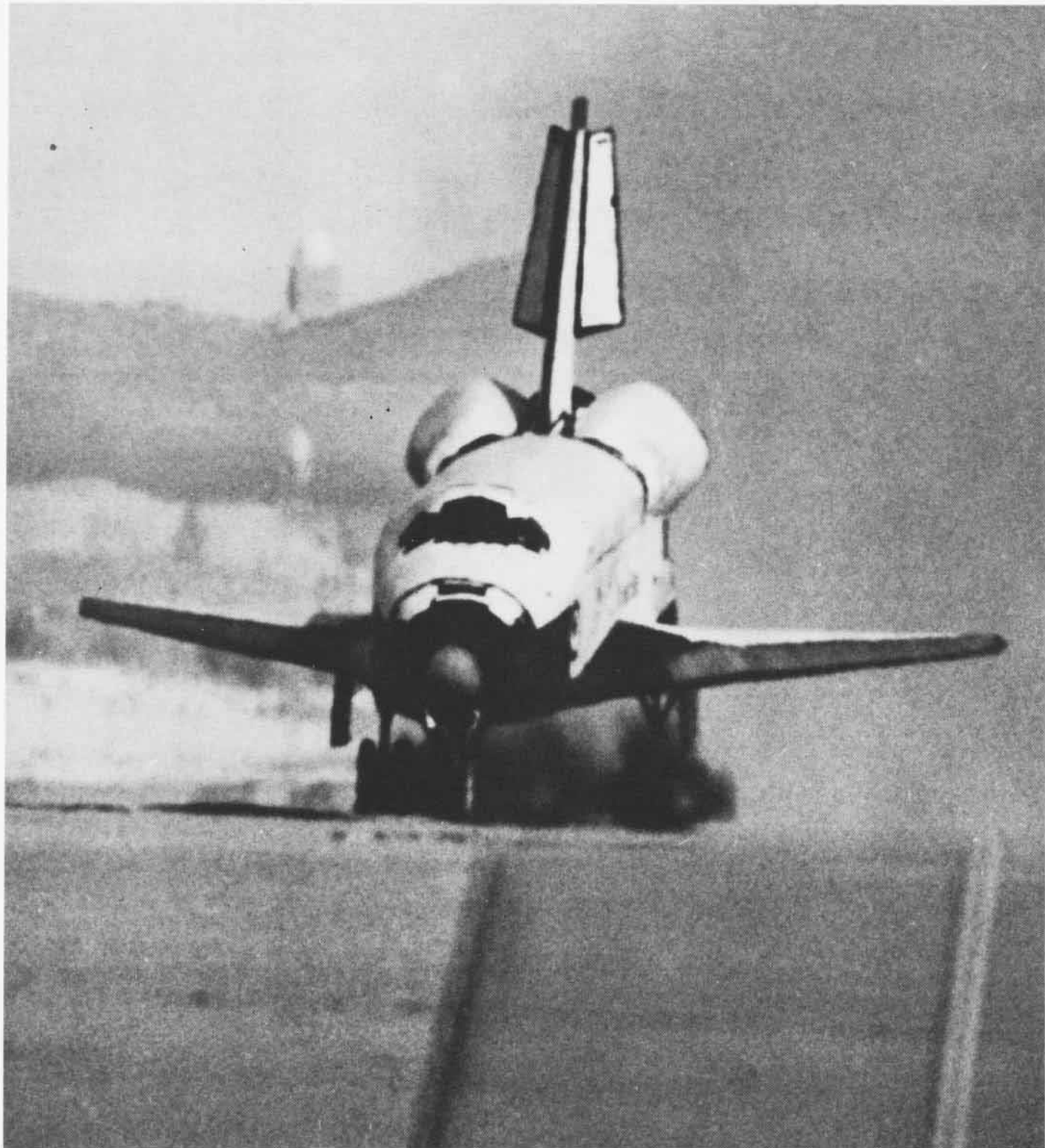
Footprint on the moon. On July 20, 1969, former Naval Aviator Neil Armstrong, mission commander of Apollo 11, became the first man to walk on the moon. His words became history: "That's one small step for a man, one giant leap for mankind."

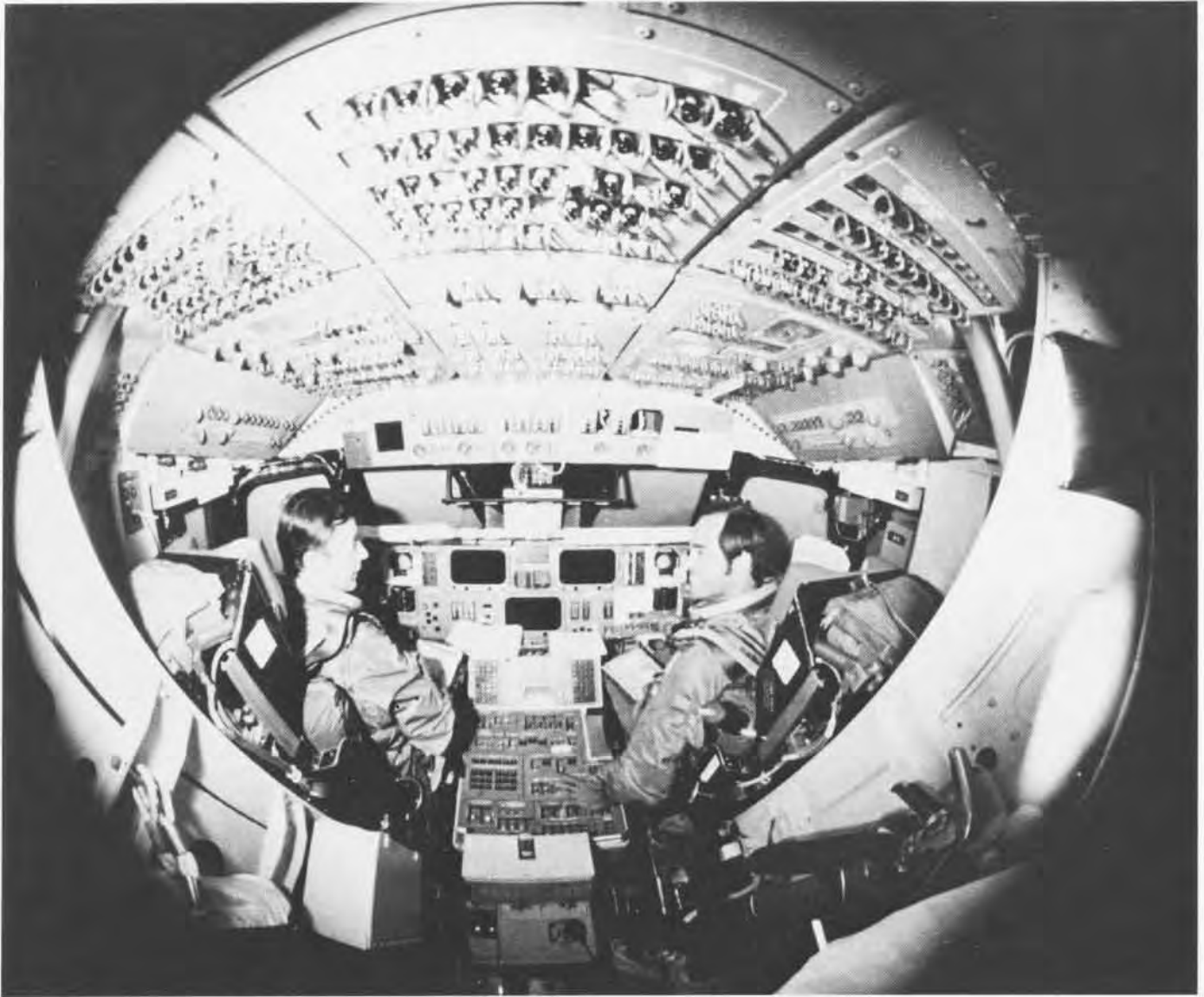


Following a 28-day flight, the all-Navy crew of Skylab 2 splashed down in the Pacific on June 22, 1973. Mission commander Capt. Charles Conrad, pilot Cdr. Paul Weitz and Cdr. Joseph Kerwin, MC, were met by pararescue men from Ticonderoga (CVS-14).



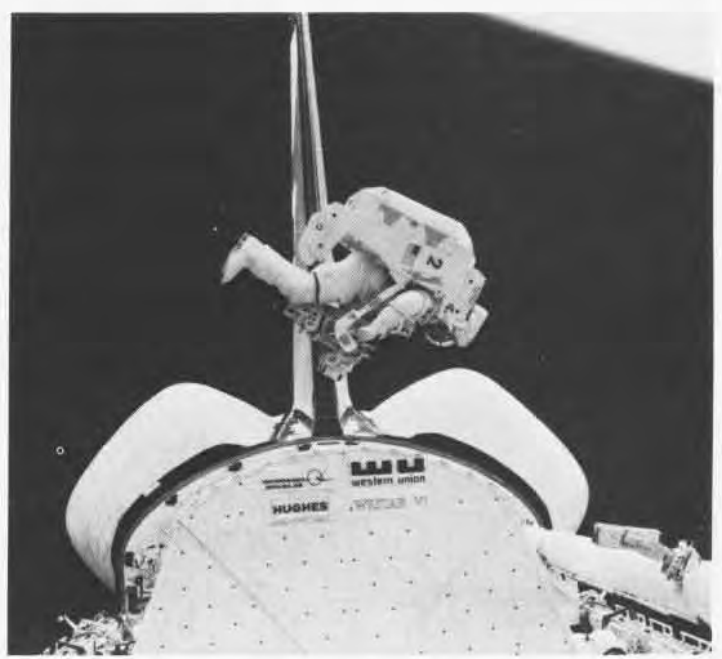
An all-Navy crew aboard the space shuttle Columbia conducted the first mission of the Space Transportation System (STS-1) on April 12-14, 1981. The craft launched from Kennedy Space Center, Fla., and returned to earth at Edwards AFB, Calif.





Naval Aviators John Young and Robert Crippen were at the controls onboard Columbia during her maiden flight (STS-1).

Capt. Bruce McCandless II moves closer to the space shuttle Challenger to conduct a test on equipment while wearing the Manned Maneuvering Unit. He made the first untethered walk in space on February 7, 1984.





The space shuttle Challenger lifted off from Pad 39B, Kennedy Space Center, Fla., on January 28, 1986, at 11:38 a.m. EST with seven crew members aboard. An explosion 73 seconds later claimed the spacecraft and the lives of the crew, including pilot Cdr. Michael J. Smith.

The U.S. and Naval Aviation were back in the space program on September 29, 1988. The crew of Discovery posed with then-Vice President George Bush after completing a four-day mission aboard the space shuttle. Left to right: pilot Col. Richard Covey, USAF; VP Bush; mission commander Capt. Frederick Hauck, USN; and mission specialists Col. David Hilmers, USMC, John Lounge and George Nelson.



Space — Truly's Quest for America's Destiny

JO1 Jim Richeson

By JO1 Jim Richeson

Seventy-three seconds. In a brief 73 seconds on January 28, 1986, an explosion destroyed the space shuttle *Challenger* and claimed the lives of its seven crew members.

On that day, America's devastated space program lay at the bottom of the Atlantic with the shattered remains of the spacecraft.

While the nation mourned its tragic loss, many within the National Aeronautics and Space Administration (NASA) knew that conquering space was America's destiny and began rebuilding the country's space program despite the uncertainty and waning public support which followed the accident.

Rear Admiral Richard H. Truly, NASA's associate administrator for space flight, never gave up this dream. Less than one month after the tragedy, the veteran Naval Aviator, astronaut and shuttle pilot began directing the administration's task force investigating the events which led to the *Challenger's* demise.

Since then, the process of getting America back into space has been a slow, highly scrutinized evolution. From 73 painful seconds, there would be a 32-month hold on the countdown before the nation again saw another spectacular liftoff from Cape Canaveral, Fla.

While the nation's space shuttle program remained grounded, RAdm. Truly, who is responsible for NASA's space transportation programs which include the space shuttle, expendable launch vehicles and the advanced planning of future manned and unmanned spacecraft, enlisted the country's best talents in redesigning the joints on the rocket boosters, one of which failed causing the *Challenger* accident.

Upon taking over as NASA's new shuttle chief, RAdm. Truly neither defended nor denied the loss of the

Challenger and her crew. "To defend the indefensible and pretend we didn't lose the *Challenger* and crew would be ludicrous," he stated during a press conference. The admiral still contends today what the American public has always known — flying in space involves tremendous risks.

Candidly, the admiral mentioned that he does not think the United States can print enough money to take all the risks out of manned space travel. "No matter what you do, aviation and, of course, space flight is a risky business. But that's part of the beauty of it," RAdm. Truly said. "Once you understand that risk and choose to take it, the immense achievement on the other side makes it worthwhile."

An astronaut since 1969, RAdm. Truly is keenly aware of the benefits that the country reaps from each successful mission. The 51-year-old Mississippian first flew into space in November 1981 as the pilot of the shuttle *Columbia* during the Space Transportation System's second mission, STS-2. It was the first manned spacecraft to be reflown into space. During this mission, Truly participated in major flight test objectives one of which included the first unloading test of the Canadian-built Remote Manipulator Arm.

In August 1983, he commanded the five-member *Challenger* crew (STS-8) during its six-day deployment. It was the most ambitious and productive



RAdm. Richard H. Truly

mission of all the shuttle flights, recording the first night launch and landing. The crew included the first black to fly into space, Guion S. Bluford, Jr., and Dr. William Thornton, 54, the oldest astronaut.

After traveling 2.2 million miles around the planet, the *Challenger* crew performed the first tests of shuttle-to-ground communications using a new Tracking and Data Relay Satellite. While accomplishing a number of scientific experiments, its crew successfully deployed India's INSAT-1B and exercised the Remote Manipulator System with its heaviest load to date.

Ironically, the shuttle's liftoff from Kennedy Space Center, Fla., was aided by the first of a new group of lighter, more powerful solid rocket boosters — which later felled the *Challenger*.



The countdown has begun for the shuttle Atlantis' next mission.



As backup astronauts for STS-1, Trully and fellow crew member Joe Engle receive briefing on the emergency pad escape system.

He added that one of the most important lessons learned from the accident is to make sure that your resources balance with the commitment you are making. "We see that in the Navy where our leadership — the Chief of Naval Operations and Secretary of the Navy — fights for resources, adequate ships, planes and home-port time for our people. The same way in the space program, you have to be very careful that what you promise you're going to deliver or try to deliver is matched by adequate dollars and people to do the job.

"And if the dollars and people resources are not there, it's not ethically right to promise more than you know you can achieve," Trully stated. He also said that he didn't mind at all being ambitious. "I don't mind pushing people to do their best and achieve what they're capable of achieving, but you can get yourself in a box where you really don't have the resources to do the job. That's something you have to avoid."

When asked if he thought the stress on the space agency's people having to meet aggressive launch date schedules was in some way related to the mishap, Trully responded, "Frankly, I think that has been overplayed a little bit, although the workload was very high at the time of the accident."

He emphasized that as much as NASA wants to fly, there are those within the administration who have never lost sight of insisting safety before schedule. "The other side of that coin is to meet them with resources — enough people and enough good facilities — so that the people you have, even though working hard, are continuing to do their jobs well and they have the tools to produce the kind of flight rates that are needed," RAdm. Trully said.

The former commander of the Naval Space Command pointed out that a careful balance has to be continually struck. "Since the *Challenger* accident,

if we're not ready to fly, we're not going to fly no matter what the schedule says. We've said that over and over. I really believe that in the long run we'll have a much more successful space program, even if we slip a schedule or two. You just can't stand unreliability. I think we struck a pretty good balance," he said.

With the success of *Discovery's* September-October 1988 flight test mission and subsequent shuttle launches to date, RAdm. Trully was confident in announcing that America is once again back in space. "But luckily for us, we still have a lot to do. We've got a whole series of exciting missions in front of us," he observed. "Over the next couple of years, the nation is going to see some of the finest science missions that we've ever flown."

RAdm. Trully particularly noted that the next shuttle mission's objective is to deploy the planetary probe *Magellan*. The unmanned spacecraft will begin to map the entire surface of the planet Venus for the first time by using specialized radar instruments when it arrives in mid-1990.

In addition, *Discovery*, which is scheduled to launch again before the end of this year, will carry what may be the most important scientific instrument that has ever been built, the great observatory — the \$1.4-billion Hubble Space Telescope — which will allow astronomers to look seven times closer to the stars.

Galileo is another important cargo which is slated to be delivered into space this year. Once deployed, the unmanned spacecraft will travel to Jupiter gathering essential data on the giant planet's many moons. These and other Department of Defense missions, which the services have grown to rely upon heavily for satellite information in areas of navigation, communications and reconnaissance data, promise to be a very productive agenda for NASA.

If all goes well with NASA's revived space shuttle program, by the latter part of the 1990s, RAdm. Trully foresees the completion of the space station Freedom, which is currently in its first year of full funding. "I do see that it's going to have to continue to get the support of the Congress in order to keep the funding for us to build it," he added. "We are doing that so far. By the late 1990s, it will be totally assembled and, for the first time, we will have American men and women permanently working in space."

Reflecting on the highlights of his 30-year career, RAdm. Trully realizes that he is a lucky man. "I really enjoyed my carrier flying days," he reminisced about his early days as a young Navy

pilot. He flew F-8 *Crusaders* with Fighter Squadron 33 from the aircraft carriers *Intrepid* and *Enterprise*, where he amassed more than 300 carrier landings. "That had to be near the top," he said.

"So did the approach and landing test when we flew the orbiter *Enterprise* from the top of the 747 in demonstrating the landing capability of the shuttle back in 1977. And then, of course, my two space flights. Those were at the top," he added.

From his vantage point, the admiral was quick to point out Naval Aviation's most visible and significant contribution to the space program: the many astronauts who came to NASA from the Navy and Marine Corps. "Starting with names like John Glenn and Alan Shepard, down through the years, there have been so many of them, including John Young, Bob Crippen, Rick Hauck and Mike Coats. Naval Aviation has provided a tremendous amount of talent and real leadership to the space program for a long time," Trully said.

He emphasized that even with the current state of pilot retention in the Navy, he does not anticipate there will ever be a lack of people who want to fly in space.

RAdm. Trully is the space agency's approving authority in selecting new appointees. "Typically, when NASA puts out a call for crew people, either pilots or mission specialists, it has the opposite problem. We have thousands of applications and only a handful of opportunities. I must say that some of the very best people selected come from the military services and Naval Aviation, both Navy and Marine Corps," he added.

Like the many aviators who have preceded him, RAdm. Trully epitomizes Naval Aviation's contributions to NASA. His leadership in regaining the public's confidence in the nation's space shuttle program has prompted another former Naval Aviator, President George Bush, to ask Congress for an additional \$1-billion increase in the space administration's budget this year.

Along with his predecessors, President Bush knows how important technology is and what the space program means to the United States. Regarding the President's space policy, RAdm. Trully said, "I believe he appreciates the tremendous value of striving for something that is difficult but which represents achievement. There's nothing I know of that is more visible to the world."

During his initial speech to Congress, President Bush said, "Space is not merely our ambition, it is our destiny." RAdm. Trully's quest for this destiny has rekindled the nation's dream. ■



An artist's concept of a NAVSTAR Global Positioning System satellite.

Global Positioning System A Step Ahead in Space-based Navigation

By JO2 Julius L. Evans

Not long ago sailors and aviators had to be satisfied with a 180 to 2,200-meter range of accuracy in establishing their positions. These are the capabilities of existing electronic navigation systems, such as LORAN (long-range navigation), the British-developed Omega and TACAN (tactical

air navigation). But state-of-the-art technological advances have provided much improved navigation with the deployment of NAVSTAR (navigation satellite tracking and ranging) Global Positioning System (GPS) satellites.

GPS is a space-based radio navigation network which, when in the fully developed state, will consist of 21 operational satellites and three orbiting standby satellites. They will provide 24-hour, worldwide, all-weather precision positioning and navigation information to both military and civilian users — within accuracy ranges to 16 meters and 100 meters, respectively. Unlike in many other current systems, the user is totally passive and the system serves an unlimited number of users.

The joint military program began in 1973 — combining the technical resources of the Air Force, Navy, Marine Corps, Army and the Defense Mapping Agency — to develop a highly accurate space-based system. The Air Force is the lead service and manages the joint program at the Air Force Systems Command's Space Division in Los Angeles, Calif. Expected to be fully operational by late 1992, GPS will be incorporated into all military ships and aircraft.

Recent problems with the U.S. space program slowed progress of GPS, but the project was put back on track with the launch of its first operational satellite, *Delta II*, in February 1989, and it is expected to revolutionize air, land and sea-based navigation. Within the next few years, GPS will replace Transit, the nation's oldest operational satellite navigation system, which consists of a multisatellite constellation that provides two-dimensional (longitude and latitude) position coordinates to thousands of shipborne and land-based receivers around the world.

With its NAVSTAR satellites, built by Rockwell International under an Air Force \$1.2-billion, fixed-price contract awarded in 1983, GPS provides three-dimensional (longitude, latitude and altitude) position fixes. The receivers, which allow navigators and pilots to use the system, will be manufactured by a subdivision of Rockwell. The equipment will employ a surveying technique known as pseudo-ranging to read altitude, longitude and latitude within 52 feet, velocity within a fraction of a meter per second, and time within 100 trillionths of a second.

Additionally, GPS will act as a force enhancer by satisfying needs of a broad spectrum of military users. It should significantly improve U.S. strategic capabilities, increase the probabilities of target acquisition, facilitate

passive low-level ingress/egress, and improve the accuracy of over-the-horizon weapons.

GPS research and development satellites were first launched in 1978, and were preceded by two Navy-developed technology satellites in 1974 and 1977. Once deployed, they revolve around the earth at a 55-degree inclination in six orbital planes (paths) at about 11,000 miles above the earth's surface. The satellites have a 12-hour orbit, with at least four satellites positioned to transmit signals to receivers at any time. This is one of the major advantages of GPS over existing navigation systems.

"It takes about 18 satellites for a system to have a worldwide, 24-hour, three-dimensional coverage, and the equipment has to be able to receive signals from at least four of those satellites. Transit does not have that many satellites, therefore, someone trying to use that system would have to wait for a satellite to appear overhead," said Guy Burke, Space and Naval Warfare Systems Command (SpaWar) Deputy Program Manager of the Navigation Systems Office. "With GPS there is no waiting. A submarine could come to periscope depth, put its antenna up, receive the signals and go back down in seconds."

Supported by the most aggressive launch schedule in the history of the U.S. space program, the GPS constellation will be the largest ever fielded.

"We currently have seven satellites in orbit capable of providing useful nav-

igation information. Our latest projections are that the Air Force will launch about five satellites per year. If we can support that schedule, by 1991, there will be worldwide, two-dimensional coverage. By March 1992, we expect to have 18 satellites in orbit which will provide worldwide, three-dimensional coverage."

The satellites broadcast on two L-band frequencies, one a commercial signal that delivers position fixes less accurately than military signals but more accurately than current systems. The other is more precise and is encoded. To control access to the maximum accuracies of the system, selective availability and antispoofing techniques have been applied for military use. A user must have a crypto-capable receiver and the appropriate crypto-variable key to decode the signals.

The total GPS system is divided into three segments — control, space and user. The control segment is operated by the 2nd Space Control Squadron at the Air Force Space Command's Consolidated Space Operations Center, Falcon Air Base, Colorado Springs, Colo. The other control segments are located in Kwajalein, Diego Garcia, Ascension Island and Hawaii. The control stations use a GPS receiver to track all satellites in view and thus accumulate ranging data from the satellite signals. The information is processed at the master station in Colorado to determine satellite orbits and to update the navigation message transmitted. This updated information



Cdr. Robert King, head of NavSpaceCom's Systems Branch, points out an orbit track for a GPS satellite generated by a special orbit prediction program which can be run on shipboard computers.

is transmitted to the satellites via ground antennas.

"Personnel at the 2nd Space and Control Squadron 'fly' the satellites," said Lieutenant Commander Ted Klapka, SpaWar's air integration officer. "Although tracking stations located worldwide enable the satellites to complete the mission, the squadron personnel maintain constant monitors of the satellites."

The space segment comprises satellites. "They are super communications satellites with a navigation processing computer onboard that allows them to carry out their mission. The message they broadcast is converted into navigation data the same way any other navigation signal is broadcast," Klapka said. "The whole reason for NAVSTAR GPS is the user segment."

The user segment consists of receivers, antennas, other electronics and three types of multiservice common GPS receivers: a portable man-pack receiver for use by land forces, a receiver for ships and submarines, and a receiver for aircraft. The user equipment is configured differently to accommodate installation on a variety of ships, aircraft, trucks and in the ground forces' backpacks.

For shipboard and aircraft use, the receiver has five channels which permit satellite tracking even in the most adverse conditions. A one-channel backpack configuration can be truck-

mounted or hand-carried. Production and distribution began in January 1989 with initial contracts for a total of 1,774 sets. Department of Defense long-range requirements are for 42,000 receivers by 2000. GPS-derived information will be routed to an aircraft's flight instruments. GPS will replace TACAN as the primary navigation aid and will be used to fly nonprecision approaches.

The Naval Space Command (NavSpaceCom), Dahlgren, Va., monitors the development of all three segments of GPS and acts as an interface for fleet users to ensure Navy navigation requirements are met. Through this command, education for future users of the system is provided, as well as assistance for fleet users in acquiring the best possible stand-alone GPS receiver equipment. SpaWar is responsible for integrating GPS into the inertial navigation systems presently employed by the fleet.

According to Lieutenant Joseph Spry, NavSpaceCom's navigation officer, "The systems being integrated into the fleet will not create a difficult training task."

Even though the Global Positioning System is not fully operational, NavSpaceCom has been instrumental in helping fleet units use GPS navigation data which is available from the satellite constellation now in orbit. In particular, the command has supplied

predictions of GPS satellite coverage to operating naval forces, including those stationed in the Persian Gulf.

Clearly, GPS will enable us to better perform any task requiring navigation information. It will make smart weapons smarter and enable the type of precisely timed and coordinated maneuvers that can wreak havoc on less-capable enemy forces. It will permit ships and submarines to rendezvous accurately at sea during radio and radar silences. Troops will have pinpoint coordinates to target locations. It will enhance electronic countermeasures and ensure accurate all-weather resupply operations. Minefields can be laid so that friendly vessels, knowing their precise location, can pass safely. Pilots can fly tactical aircraft at high speed and low altitudes without fear of impacting known obstacles. Airspace and battle group coordination will be significantly improved. All the forces will be using the same reference, worldwide.

GPS also contributes to peacetime activities including harbor navigation, at-sea search and rescue, and the restructuring of civil airways for greater safety. Today, nearly every commercial and military ship and aircraft has a Transit receiver. In the future, GPS will provide a step ahead in space-based navigation. ■

A quartermaster aboard John F. Kennedy (CV-67) plots the carrier's position at sea with the aid of the NAVSTAR GPS console and a sextant.



PH2 Stephen Trotter

Pioneer Navy Astronauts: Where Are They Now?

By Joan A. Frasher

Where were you 28 years ago? I was just entering college — Naval Aviation had completed its first half century — the first Gray Eagle Award (donated by Chance Vought Corporation) was presented to Admiral C. R. Brown as the senior active duty Naval Aviator — and the Navy introduced its new high-visibility paint scheme for aircraft.

That same year, Commander Alan B. Shepard, Jr., became the first



Alan B. Shepard, Jr.

American in space. In May 1961, in his *Freedom 7* spacecraft, he was launched on a ballistic trajectory suborbital flight — a flight which carried him to an altitude of 116 statute miles and a landing point 302 statute miles down the Atlantic Missile Range.

Shepard made his second space flight as spacecraft commander on Project Apollo 14, January 31 to February 9, 1971. Accompanied by the mission pilot, Naval Aviator Edgar D. Mitchell, they maneuvered their lunar module "Antares" to a landing in the Fra Mauro region of the moon. There they deployed and activated various scientific equipment and experiments and collected almost 100 pounds of lunar samples for return to earth.

Upon completion of 216 hours and 57 minutes in space, Rear Admiral Shepard assumed the duties of Chief, Astronaut Office in 1971 and served in this capacity until he retired from the National Aeronautics and Space Administration (NASA) and the Navy in August 1974. For his outstanding accomplishments in space, Shepard was awarded the Congressional Medal of Honor (Space) in 1978.

RAdm. Shepard entered private

business upon his retirement and is currently the president of Seven Fourteen Enterprises, Houston, Texas.

Approximately nine months after Shepard's historic flight, a Marine Corps lieutenant colonel from Ohio, John H. Glenn, piloted the Project Mercury *Friendship 7* spacecraft on the first manned orbital mission of the U.S. He completed three successful orbits around the earth, reaching a maximum apogee of approximately 162 statute miles and an orbital velocity of approximately 17,500 miles per hour. The time of the flight from launch to touchdown was four hours, 55 minutes and 23 seconds.



John H. Glenn, Jr.

Lt. Col. Glenn resigned from NASA's Manned Spacecraft Center, Houston, Texas, in January 1964. He retired from the Marine Corps as a colonel in January 1965 and became a business executive until his election to the United States Senate from Ohio in November 1974. As a senator, he serves as Chairman of the Governmental Affairs Committee and is a member of the Special Committee on Aging, Select Committee on Intelligence and the Armed Services Committee.

Glenn also received the Congressional Medal of Honor (Space) in 1978 for his accomplishments in space.

Captain Walter M. Schirra, a 1945 graduate of the U.S. Naval Academy, has the distinction of being one of the original seven astronauts and the only one to have flown on the first three projects — Mercury, Gemini and Apollo. As command pilot, he flew the initial flight of the Apollo series (Apollo 7)



Walter M. Schirra, Jr.

and was deeply involved in the quality assurance and quality control aspects of the "total vehicle system."

Following his retirement from the Navy and NASA in 1969, Schirra accepted various chairman and director positions with several businesses. In January 1979, he started his own business and serves as president of Schirra Enterprises.

Eugene A. Cernan received his commission through the Navy Reserve Officer's Training Corps program at Purdue University in Indiana. Selected as one of fourteen astronauts by NASA in October 1963, Cernan's first space flight was on Project Gemini 9. The crew of this mission distinguished itself by using three different techniques to effect rendezvous with the previously launched Augmented Target Docking Adapter, an *Agena* spacecraft. Cernan logged two hours and 10 minutes outside the spacecraft in extravehicular activities (EVA). After 72 hours and 20 minutes, with a perfect reentry and recovery, Gemini 9 landed within one and a half miles of the prime recovery ship USS *Wasp* (CVS-18).

On his second space flight, Cernan was lunar module pilot on Apollo 10, May 18 to 26, 1969. This mission, in addition to demonstrating that man could navigate safely and accurately in the moon's gravitational fields, photographed and mapped tentative landing sites for future missions.

His third space flight was as spacecraft commander on Apollo 17 — the last scheduled manned mission to the moon. It was also the first manned



Eugene A. Cernan

nighttime launch. This last trip to the moon established several new records for manned space flight which include: longest manned lunar landing flight (301 hours, 51 minutes); longest lunar surface EVA (22 hours, 6 minutes); largest lunar sample return (an estimated 249 pounds) and longest time in lunar orbit (147 hours, 48 minutes).

Cernan was the second American to walk in space, having spanned the circumference of the world twice in a little more than two and a half hours. He was one of the two men to fly to the moon on two occasions and, as commander of the last mission to the moon, had the distinction of being the last man to leave his footprints on the surface of the moon.

Capt. Cernan retired from the Navy in 1976 with over 20 years of service. He concurrently terminated his formal association with NASA — then joining a private business. Five years later, he started his own company, The Cernan Corporation. He has also been a co-anchorman on ABC-TV's presentations on the flight of the space shuttle.

Captain Alan L. Bean, one of the third group of astronauts selected by NASA in October 1963, was lunar module pilot on Apollo 12, man's second lunar landing. In his next space trip, Bean was spacecraft commander of Skylab 3, July 28 to September 25, 1973. This trip was a record-setting flight of 59 days, 24,400,000 miles.

His next assignment was back-up spacecraft commander of the U.S. flight crew for the joint American-Russian Apollo-Soyuz Test Project. Bean retired from the Navy in October 1975 but continued as head of the Astronaut Candidate Operations and Training Group within NASA's Astronaut Office.

Bean resigned from NASA in June 1981 to devote full time to painting. He felt that in his 18 years as an astronaut he had visited realms that no artist's eyes, past or present, had ever viewed firsthand, and he hoped to express his experiences through art.

His interest in art was not a new development. He began formal art training in night school while a test pilot in the Navy. He feels that exploration of space is the most historically significant event of our time and he

plans to make a contribution to art by capturing those events on canvas. Capt. Bean is currently working out of his Houston, Texas, home.



Alan L. Bean

Naval Aviator Ronald E. Evans was notified of his selection to the astronaut program while he was on sea duty in the Pacific. He was assigned to VF-51, flying F-8 *Crusaders* from USS *Ticonderoga* (CVS-14) during a seven-month period of Vietnam combat.

On his first journey into space, Evans was command module pilot on Apollo 17 from December 6 to 19, 1972. He maintained a solo vigil in lunar orbit aboard the "America," completing assigned work tasks which required visual geological observations, hand-held photography of specific targets, and the control of cameras and other highly sophisticated scientific equipment. Completing his first space flight, Evans logged 301 hours and 51 minutes in space — one hour and six minutes of which were spent in EVA. He holds the record for the most time in lunar orbit.

He retired from the Navy as a captain on April 30, 1976, with 21 years of service, and remained active as a NASA astronaut involved in the development of NASA's space shuttle program until March 1977.

Evans now resides with his family in Scottsdale, Ariz., and is Director, Space Systems Marketing for Sperry Flight Systems in Phoenix.



Ronald E. Evans

Richard F. Gordon, Jr., received his wings as a Naval Aviator in 1953 and was subsequently assigned to an all-weather fighter squadron at NAS

Jacksonville, Fla.

Winner of the Bendix Trophy Race from Los Angeles to New York in May 1961, he established a new speed record of 869.74 miles per hour and a transcontinental speed record of two hours and 47 minutes.

On September 1966, Gordon served as pilot for the three-day Gemini 11 mission — during which rendezvous with a previously launched *Agena* spacecraft was achieved in less than one orbit. He executed docking and performed two periods of EVA, which included attaching a tether to the *Agena* and retrieving a nuclear emulsion experiment package.



Richard F. Gordon, Jr.

He occupied the command module pilot seat on Apollo 12, November 14 to 24, 1969. Throughout the 31-hour, lunar surface stay by fellow Naval Aviators Charles Conrad and Alan Bean, Gordon remained in lunar orbit aboard the command module "Yankee Clipper," obtaining mapping photographs of tentative landing sites for future missions.

Gordon completed two space flights, logging a total of 315 hours and 53 minutes in space — two hours and 44 minutes of which were spent in EVA.

At the completion of the Apollo 15 flight in 1971, Gordon was given new responsibilities as NASA's Chief, Advanced Programs, Astronaut Office, and worked on the design and testing of the shuttle.

Captain Gordon retired from NASA and the Navy in January 1972 and accepted a position as Executive Vice President of the New Orleans Saints Professional Football Club in the National Football League. In March 1982, he became President of Astro Sciences Corporation, which was incorporated as Astro Systems and Engineering, Inc., Los Angeles, Calif. In the summer of 1984, Gordon was a technical advisor for and played the part of "Cap-com" in the CBS miniseries *Space*, from the book by James A. Michener.

These former Naval Aviators/astro-nauts, "... have slipped the surly bonds of earth and danced the skies on laughter-silvered wings . . ." returned to earth, and are firmly anchored in the hearts of Americans. ■

Association of Naval Aviation Bimonthly Photo Competition

Lieutenant(jg) Reggie P. Carpenter of VA-128, NAS Whidbey Island, Wash., won the second bimonthly prize in the Association of Naval Aviation Photo Contest. His photograph (right) depicts the introduction of dynamic formation flying to which students are exposed in the training command. An added feature is the actual reflection of the aviator in the TA-4's canopy.

Honorable mention photos included (below) VAW-115 E-2C Hawkeyes aboard Midway (CV-41), shot by Lt. Greg Lotz, VFA-151; and (bottom) four HC-8 CH-46 Sea Knights flying formation over Naval Base, Norfolk, Va., as the destroyer Arthur W. Radford (DD-968) is pushed pierside, taken by PH1(AC) Stephen P. Davis.



F-4 MiG Killer

By JO2 Julius L. Evans

Although the F-4 Phantom II is being phased out of the Navy and Marine Corps inventory, its 28-year history is illuminated with countless accomplishments and battle victories. The following is a recap of F-4 Bureau Number 157307's battle with MiG enemy aircraft on Yankee Station off the coast of Vietnam on June 21, 1972. The aircraft was recently acquired by the National Air and Space Museum and is currently stored at Dulles International Airport, Va., for future restoration and display.

Saratoga (CV-59) was diverted to the South China Sea from her originally scheduled deployment and had been on station for several months.

Normally, East Coast carriers don't make Western Pacific cruises, but *Saratoga* had just completed her operational readiness requirement workups in preparation for her upcoming Mediterranean cruise. Docked at Mayport, Fla., she was the ready carrier. A short time remained before departure for the Med and just as all carrier crews are advised to have their seabags ready to detach earlier than scheduled if necessary, *Saratoga's* crew was prepared. Unexpectedly, the need arose.

Saratoga was in the 30-day period of preparation for deployment that follows the completion of at-sea workups. While the ship was being readied for her upcoming Med deployment, some crew members took leave and left the area, while others chose to enjoy the company of their families for the few

remaining weeks before the men in white manned the rails as the ship returned to deep-water operations.

It was the night of the "Phantom Fling." The officers and their wives were prepared for the gala, which normally received maximum participation from the fighter squadronmates who were not deployed. Many hours went into selecting the right dress for some of the wives and last-minute tailoring was done on some of the white mess-dress uniforms in anticipation of the festivities.

Thousands of miles away, combat in Vietnam was escalating. The Vietcong had proved to be a more challenging enemy than many Americans imagined. More power was needed on Yankee Station, and at the last minute a West Coast carrier was unable to deploy as scheduled. The Joint Chiefs of Staff wasted no time in making their decision. *Saratoga* would be routed to the Western Pacific to beef up operations.

F-4 157307's crew launched the MiG CAP from Saratoga.





Cdr. Flynn watches Lt. John record their MiG kill on Phantom 157307's fuselage in June 1972.

Back in the United States, as the "Fling" was in full swing, commanding officers learned in hushed whispers that *Saratoga* was to deploy immediately. It was a complete surprise. "No one expected an emergency deployment. Once we received notice, we had about 72 hours to get under way," said then-Lieutenant William H. John, the radar intercept officer who later flew in *Phantom* 157307 during the MiG mission. "That included fully supplying and outfitting the ship with everything we needed for a WestPac cruise and getting supplies and personnel from Oceana, Va., to Mayport, Fla.

"We stayed up all night calling everyone back from leave," John said. "Some personnel had to meet the ship at sea. It was quite an involved process to get everyone back onboard and get under way, but we were steaming well within our allotted time."

Once *Saratoga* arrived on station and joined forces with USS *Kitty Hawk* (CV-63), flight operations accelerated. "We were on the front line flying combat missions from May until June," said then-Commander Sam C. Flynn, executive officer of VF-31 and pilot of the MiG mission.

Flying *Phantom* 157307, Cdr. Flynn and Lt. John led the MiG Combat Air Patrol (MiG CAP), which consisted of two *Phantoms*. Their mission was to

fly in protection of strike force attack aircraft comprised of A-6 *Intruders* and A-7 *Corsair IIs*, whose mission was to strike targets between Haiphong and Hanoi.

The MiG CAP was to position itself between the strike force and the airfield from which MiGs were likely to come. The lead aircraft had just completed in-flight refueling when USS *Long Beach* (CGN-9), the MiG CAP's control ship, reported that MiGs were airborne.

"We ingressed over enemy territory about five minutes before the strike force," Cdr. Flynn said. When the two F-4s crossed ridge lines, the ground crews began firing surface-to-air missiles (SAMs) at them. They had barely escaped the missiles' path when *Long Beach* vectored them north to the MiGs which were 15 to 20 miles away.

The *Phantoms* were clear to fire during the run-in toward the MiGs before they made visual contact. However, the MiGs were at a higher altitude than expected so the F-4s did not detect them on radar. Lt. John explained, "After maneuvering against the SAMs, we came in at about 7,000 feet and expected the MiGs to be below us. They were actually well above us."

According to Cdr. Flynn, when the *Phantom* met the MiGs, "It was like something out of the old days. We had a standard Mark One dogfight, as if it were right out of WW II. If you could have spoken to the Red Baron, of WW I fame, he could have probably told you some of the maneuvers we used."

The wingman initiated engagement but because the MiGs rolled in from above, the *Phantom* was at a disadvantage. "Our wingman who had the initial tally was unable to achieve an engaging position, so we took the offensive and came in behind the lead MiG's wingman," Lt. John said.

"When he went high, we followed him and after a series of loops, turns and high-speed maneuvers, we locked up the MiG and attempted to fire a *Sparrow* missile but it malfunctioned on the aircraft."

Meanwhile, the lead MiG maneuvered behind our wingman and was about to fire an *Atoll*, the Soviet equivalent of a *Sidewinder*. "We had the advantage on our MiG but after the missile malfunction, and switching to *Sidewinder*, I came out of the cockpit," Lt. John said, referring to looking out of the cockpit instead of using radar. "Knowing where our wingman should be — 10 o'clock high in that a MiG was at his 7 o'clock and pulling lead to fire — I told Nick, our wingman, that he had a MiG at his 7 o'clock who was firing, and called Sam off the MiG we were engaging and told

him that our wingman was at 11 o'clock high. Sam immediately broke off the chase."

The wingman evaded two missiles by the time the lead *Phantom* arrived. "Sam told him to keep pulling on the stick and to keep it in afterburner because the MiG was still at his 7 o'clock," Lt. John said. The lead *Phantom* was able to get a good firing position on the MiG, but his wingman was too close to his line of fire. "I didn't know if the missile would guide on the *Phantom* or the MiG, so I fired a *Sidewinder* off to the right, hoping that the MiG would turn back around to engage me," Cdr. Flynn continued.

Because the MiG could not turn the *Phantom*, Cdr. Flynn knew he didn't have much time to stay in the *Sidewinder* envelope. "I was about 45 degrees off his tail and realized that he was going to be out of the missile envelope real soon," Flynn said. The MiG fired a third missile at the wingman. At that instant, the wingman pulled back hard, causing the MiG to yo-yo high, allowing *Phantom* 157307 to fall in right behind the MiG.

"Once we got in position, we were able to fire two additional *Sidewinders* at him. The first missed, but the second went right up the tailpipe and blew off part of the empennage, Lt. John recalled. "He went into a flat spin and tried to recover a couple of times but eventually ejected at about 1,000 feet."

The entire episode lasted about a minute and a half but for the aircrew of *Phantom* 157307, the adventure will probably last a lifetime. "The opportunity to successfully engage in combat instills a feeling of accomplishment," Cdr. Flynn stated. "You're honed right to the razor's edge and after 24 years of training for this event, you could say a sense of self-satisfaction sums up everything."

Lt. John added, "This was like the graduation of all my training. It was an exhilarating experience that very few pilots or radar intercept officers get the opportunity to go through." For their gallant efforts, they each received the Navy Silver Star.

As for the *Phantom*, it also experienced the flight of a career and is now at rest waiting to be displayed in an aviation museum not yet constructed.

Coincidentally, Cdr. Flynn and Lt. John are still stationed together — in Virginia. They are no longer on active duty but are still involved with Naval Aviation. Both are currently employed by Ford Aerospace, Inc., who was contracted by the Navy to provide Fighter Squadron 101 with flight simulation instructors for the F-14 *Tomcat* at NAS Oceana, Va. ■



Aircraft Battle Force Multiplier for

From point blank range, the 50-caliber round tore into the skin of the A-7 Corsair II aft fuselage. The sharp thud of impact was instantly followed by a series of events all carefully captured by the video camera. Black smoke and bright orange flames rose from the fuselage and a flaming stream of burning hydraulic fluid jetted straight down to the concrete deck.

A firefighter, well prepared and on the ready, appeared and with a number of waving spurts from the CO₂ bottle quickly extinguished the flames. The technicians would have to let the hot metal of the stricken Corsair cool before beginning their examination.

The scene was an outdoor laboratory located on one of the numerous satellite sites of the vast Naval Weapons Center, China Lake complex in California. The firing of the 50-caliber round was another in a lengthy and continuing series of tests performed in support of a concept called ABDR — Aircraft Battle Damage Repair. The Systems Engineering Branch of the Survivability Engineering Division at China Lake is the action agency. Program management resides

with Naval Air Systems Command Headquarters in Washington, D.C., as AIR-411B.

The nature of warfare has changed dramatically over the past decade. The generation of a maximum number of combat sorties during the first few days of the conflict is now essential to victory. In the event of war, it can be expected that a significant number of Navy and Marine aircraft will incur damage during combat missions, launch, flight recovery, deck handling, enemy attack or maintenance that could prevent their use until some measure of assessment or repair has been made. It is also likely that the carrier or assault ship itself could be damaged by attack, which could seriously degrade the aircraft repair capability available.

In WWs I and II, production rates of new aircraft frequently provided replacement planes before repairs could be completed on damaged ones. During WW II, most of the damaged aircraft on carriers went "over-the-side." The Korea and Southeast Asia experiences taught us that production surge capacity could no longer be relied upon to provide replacement aircraft. Aircraft could no longer be pushed "over-the-side" unless the safety of the ship was at risk. The Israeli wars and the Falk-

lands fighting highlighted that rapid repair is a definite war-fighting requirement. Massive production of aircraft is no longer economically feasible. Any future engagement combat capability must be sustained with the assets on hand. Replacement aircraft will not be able to be readily provided, and movement of personnel and material from CONUS or any other staging site to a carrier or forward base will be restricted. Sustained combat capability depends on ABDR, the force multiplier for the leading edge.

The primary purpose of Aircraft Battle Damage Repair is to restore sufficient strength and servability to permit damaged aircraft to fly additional operational sorties of at least partial mission capability, within time to contribute to the outcome of the ongoing battle. The secondary purpose of ABDR is to enable those aircraft damaged beyond unit repair capability to make a one-time flight to home station, rear area base or major repair facility. A basic ABDR technical manual, NAVAIR 01-1A-39, covers typical damage assessment and repairs applicable to all aircraft. Specific weapon systems technical manuals will address peculiar battle damage assessment and specialized structural and systems repairs information pertinent to each particular aircraft.



Far left, students assess damage and perform repair on aircraft structures that have been ballistically impacted. This provides invaluable experience in tracing projectile penetration through the airframe and components. Left, salvaged jets serve as training platforms for battle damage repair training. Above, practicing battle damage repair using special tools from the ABDR kit provides realistic experience to prepare fleet personnel for wartime repair practices.

Damage Repair the Leading Edge

The ABDR type model series technical manuals will be as simple, basic and general as possible to give ABDR-trained technicians latitude to apply innovative repair techniques, ingenuity and initiative to effect timely repairs which may not be covered in the standard technical manuals. This approach represents a significant departure from the peacetime dependency upon detailed, structured, voluminous and very restrictive technical data. This innovative approach is essential to support the Navy ABDR objective of rapid repair in combat.

Aircraft Battle Damage Repair concerns the entire aircraft and its support — not just structural repairs. Power plants, airframes, avionics, armament equipment and systems are all included. It also covers the entire integrated logistics support realm — personnel, training, support, facilities, management information systems, publications and support equipment. ABDR encompasses all the levels of maintenance: organizational, intermediate and depot.

At that remote site on the China Lake desert, a team of engineers and technicians conduct detailed tests to determine the effects of battle damage. To date they have trained more than 500 sailors, Marines and

civilians how to assess battle damage and make the necessary repairs to keep an aircraft available for combat or, as circumstances dictate, render a one-time repair that would enable evacuation of the aircraft to a rearward area for more extensive repairs.

This is the first year that the program has been funded by the Chief of Naval Operations. Although no Navy enlisted classification (NEC) is currently given for the training, the manpower system is working toward establishing one. Plans are now under way to incorporate the basic training for ABDR into the "A" school program, while technician training will be available in Naval Aviation Maintenance Training Groups, Naval Aviation Depots, Jacksonville, Fla., and North Island, Calif., are developing shipboard trainers which will be utilized for retaining and developing the skills.

In the case of the A-7 intentionally hit with a 50-caliber round, there was no engine in the aircraft although hydraulic lines in the area of the tail section were rigged to operate under pressure. This allowed a better simulation of what might happen when the round hit and accounted for the burning stream of fluid that jetted downward after impact.

The *Corsair* had long since been

stricken from the inventory. It was turned over to China Lake as a test hulk amid good company. The remains of a variety of aircraft, including F-4 *Phantoms*, F/A-18 *Hornets* and RA-5C *Vigilantes* wait in ranks under the desert sun for a number of survivability tests.

When the A-7 cooled down and the technicians poked their heads into the exhaust section, they discovered that the 50-caliber round had ricocheted inside the rounded tail area and torn the metal skin in several places. It was determined, however, that had an engine been installed, the strong outer casing of the power plant would have prevented disabling damage. At the same time, the holes created by flying 50-caliber shrapnel could be studied and even repaired by students attending the ABDR school.

Past experience and the experimentation now taking place at China Lake serve as the springboard for developments essential to the evolution of a viable Aircraft Battle Damage Repair program. ABDR is synonymous with combat capability. A force multiplier, ABDR hones the leading edge. ■

Commander Thomas J. Pruter, former ABDR program manager in the Naval Air Systems Command, contributed to this article.

Awards

On his first trip back to his native New England since serving as space-craft commander for the shuttle *Discovery* mission, NASA astronaut and Navy Capt. Frederick Hauck was honored at the tenth annual New England Navy Holiday Ball held in Boston, Mass.

Capt. Hauck received a commission as honorary Commodore of Boston Harbor. The award is presented annually to the ball's keynote speaker in recognition and appreciation of the speaker's experience and accomplishments. He spoke on space flight and his years of preparation with the Navy and NASA to achieve that goal.

The *Mighty Shrikes* of VA-94 received the 1988 Ltjg. Bruce Carrier Award for maintenance excellence. The award is presented to the best maintenance department in the Pacific Fleet A-7 community.

A program aimed at betterment of people at NAS Pensacola, Fla., helped the air station win the FY-88 Chief of Naval Air Training Golden Anchor Award. Judging criteria included advancements, reenlistments, professional and off-duty education and development, family and reserve programs and community involvement.

Records

Several units marked safe flying time: VQ-4, 190,000 hours and 17 years; VP-46, 187,000 hours and 25 years; VP-40, 150,000 hours and 21 years; VP-48, 146,148 hours and 21 years; VP-66, 80,000 hours and 18 years; VP-68, 80,000 hours and 18 years; VP-64, 67,500 hours and 18 years; VP-94, 63,000 hours and 18 years; VMO-4, 50,000 hours; HS-75, 26,821 hours and 10 years; VAQ-129, 26,700 hours and 4 years; VR-60, 21,000 hours and 6 years; VA-55, 17,920 hours and 5 years; VS-27, 9,200 hours and 2 years; NAS Bermuda, 7,200 hours and 11 years; and VT-6, 7 years.

During *Forrestal's* (CV-59) 1988 deployment cycle, Capt. Patrick C. Hauert, ComCVW-6, and his deputy, Cdr. T. L. Hightower, each achieved a career milestone of 1,000 carrier arrested landings.

Disestablished

MAG-15 and H&MS-15 were disestablished at MCAS Iwakuni, Japan, in December 1988. MAG-15 was formed March 1, 1942, at Camp Kearney, Calif., and saw service during WW II in the Pacific theater as a transport group.

Established

Naval Air Reserve Center, Barbers Point, Hawaii, was established February 12, 1989, at NAS Barbers Point. Led by Cdr. Richard B. Warner, the center has two officers and 15 enlisted personnel on the full-time staff, providing services in administration, medical, supply and training.

The establishment of HM-19 at NAS Alameda, Calif., provides the West Coast with its first reserve aerial mine warfare capability. The squadron will fly the RH-53D *Sea Stallion* equipped with state-of-the-art airborne mine countermeasures hardware. This establishment brings the total number of reserve force squadrons at Alameda to five.

Rescue

While on a routine training flight in a VX-1 SH-3H near NAS Patuxent River, Md., aircraft commander LCdr. Jim McDonnell was informed by the Patuxent tower that an Army *Huey* helo needed assistance. The pilot, Lt. Jeff Strabala, immediately turned toward the scene and, within minutes, LCdr. McDonnell spotted the *Huey* in shallow waters off a heavily wooded island. The *Sea King* relayed the crash location to the tower and established communications with the downed crew.

A nearby sand spit was chosen as the most suitable landing site for the rescue helo, which made a controlled, no-hover landing, maintaining power to prevent sinking. Aided by AW2 Andy

Rouse, the three downed Army crewmen were quickly retrieved and the *Sea King* returned to the air station where the Army crewmen were turned over to medical personnel.

Honing the Edge

Forrestal (CV-59) and embarked CVW-6 received the Meritorious Unit Citation for combat readiness and exceptional performance from May 1, 1987, to October 8, 1988. The citation recognized participation in exercises *Ocean Safari '87*, *Ocean Venture '88*, *Teamwork '88* and a successful six-month deployment.



PH3 M. Haley
Signalmen on *Forrestal* hoist the Meritorious Unit Citation pennant.

NATTC Lakehurst's AB School is expecting "Top Cat," the catapult launch systems trainer. "Top Cat" is designed to provide training to the aviation boatswain's mate equipmentmen (ABE) and catapult officer students who launch the Navy's carrier-based aircraft.

The same equipment that is currently used on the newest nuclear aircraft carriers has been simulated for use in the new trainer. The catapult trainer instructor can preselect one of 35 simulated aircraft launching malfunctions for training exercises. These preselected faults help to improve the ABE's troubleshooting ability each time

he overcomes a launching error. If a student fails to correct the launching malfunction, the video screen will freeze and sound will be suspended. The student is then unable to continue without instructor intervention.

Several years ago, the Navy crossed a new threshold — contracted maintenance, which is now well established in the training command. The Navy set up regulations, agreed to by the contractor, so that the civilian effort conformed to contracted specifications. Maintenance monitoring teams were developed to oversee the established specs. These later became Chief of Naval Air Training Contracts Administration Residency (CCAR) groups at each training air wing, comprising active duty Navy and Civil Service personnel.



TH-57 SeaRanger helos are used by TraWing-5 for basic helo pilot training at NAS Whiting Field, Fla. Maintenance of the helos is performed by contractor personnel which are monitored by a Navy CCAR.

The amphibious assault ship *Wasp* (LHD-1), the first *Wasp* to go to sea since CVS-18 was decommissioned in 1972, began its initial sea trial in December 1988. LHD-1 will be the tenth Navy ship to bear the name



Wasp (LHD-1) is currently undergoing sea trials in the Gulf of Mexico.



A P-3 Orion from NATC Patuxent River, Md., launches an AIM-9 Sidewinder during tests of the air-to-air missile as a defense weapon for antisubmarine warfare patrol aircraft.

Wasp when she is commissioned this year.

Like her predecessors, CV/ CVS-18 and CV-7, the newest *Wasp* will be able to launch and recover state-of-the-art aircraft in support of amphibious assault and sea control missions. The new *Wasp* will be able to launch and recover landing craft air cushion and other USMC amphibious assault vessels.

Et cetera

After a NavAir IG inspection, Naval Aviation Depot, Alameda, Calif., received positive DoD recognition for its depot model installation program. A major reason for its success was the outstanding communication and commitment to the employees from the depot's C.O. and X.O. For example, the employees helped write the instal-

lation mission statement and designed the new command logo. Every quarter, C.O. Capt. William J. Tinston, Jr., has a "skipper's walkaround" during which he visits all employees. He discusses productivity and other important issues, presents awards and describes how Alameda compares with other depots.

Capt. Tinston also established a question and answer period when the employees talk directly to him. Any unresolved questions are answered by the staff the following day. Later, the questions and answers are distributed to the employees.

Adm. William J. Crowe, Jr., Chairman, Joint Chiefs of Staff, made an appearance in an episode of the television sitcom "Cheers." In the March 16 show, the admiral played himself, visited Boston and met bartender Sam Malone (Ted Danson) at a banquet. Malone then invited the admiral to visit the popular neighborhood bar to meet some of its colorful customers.

"Being on the show was a wonderful way of bringing the military to part of America — Hollywood," Crowe said. "There's no deep message intended in my appearance; it was just good humor and wit. Other times, I have found some of their humor useful in my speeches."

Adm. Crowe was invited to appear on "Cheers" after its producers found out that the show is one of the admiral's favorites.

LCdr. Bruce E. Melnick, USCG, was notified by NASA in June 1987 of his selection as a space shuttle astronaut candidate. He started his training at NASA Houston, Texas, in August and was assigned to Astronaut Selection Group 12 — pilots and mission specialists.

Melnick is the only Coast Guard aviator/astronaut trainee at present. Since his selection to NASA, he has been promoted to the rank of commander.



LCdr. Bruce E. Melnick

There's a "Junkyard Dog" loose aboard *Nimitz* (CVN-68) — better known as AW3 Johnny A. Moncayo, Jr., an ASW operator for HS-2.

In 1981, one year out of high



AW3 Johnny Moncayo, Jr., is one of 22 ASW operators assigned to HS-2 aboard *Nimitz*.

school, Moncayo was the World Super Middle Weight Kickboxing Champion with the nickname of "Junkyard Dog." It was during his kickboxing days that he got his nickname — not for his karate skills but for his daytime job.

"I had an old WW II transport truck I drove in the auto parts business," he said. "CBers gave me the name." Moncayo held the title for three years until 1986 when he joined the Navy.

He has a variety of responsibilities, including working as a submarine hunter and rescue frogman when he's in the air aboard an SH-3 helicopter. Moncayo uses an array of electronic equipment to search, detect and track enemy submarines. The helo can use active dipping sonar pods and sonobuoys, passive listening sonobuoys and magnetic anomaly detection equipment.

Change of Command

CarGru-3: RAdm. Daniel P. March relieved RAdm. David N. Rogers.

Forrestal: Capt. Louis E. Thomassy, Jr., relieved Capt. John A. Pieno.

HelWingRes: Cdr. Michael R. Matt relieved Capt. Harvey G. Fielding.

HSL-44: Cdr. Richard L. Dick relieved Cdr. William C. Turville.

MAWing-1: Capt. William J. Fallon relieved Capt. Robert E. Houser.

Midway: Capt. Bernard J. Smith relieved Capt. Richard A. Wilson.

NAR Point Mugu: Capt. Timothy G. Palmer relieved Capt. George T. Lloyd.

VA-176: Cdr. Frank W. Montesano relieved Cdr. Ross A. Word.

VAW-110: Cdr. Ronald B. Weber relieved Capt. Dannie H. Allen.

VAW-120: Capt. Richard F. Braden relieved Cdr. Ralph K. Zia.

VAW-122: Cdr. Joseph J. Grosel relieved Cdr. Thomas C. Lang.

VAW-126: Cdr. Edward C. Geiger relieved Cdr. Gordon C. Reif, Jr.

VC-6: Cdr. John J. Nacht relieved Cdr. John M. Cutcher.

VF-11: Cdr. Robert L. Kimmel relieved Cdr. Issac E. Richardson III.

VF-101: Cdr. John M. Lyle relieved Cdr. Jay A. Campbell.

VF-213: Cdr. Greg L. Gerard relieved Cdr. David L. Bunnell.

VFA-137: Cdr. Philip Howard relieved Cdr. B. J. Dysart.

VFC-12: Cdr. Douglas E. Sameit relieved Cdr. Patrick D. Gravitt.

VMFP-3: LCol. John C. Pastuf relieved LCol. Thomas E. Wilson.

VRC-30: Cdr. Michael T. Beresky relieved Cdr. Fort A. Zackary, Jr.

VS-27: Cdr. Phillip D. Voss relieved Capt. Braden J. Phillips.

VT-4: Cdr. Steven Brown relieved Cdr. Steve Therrell.

VT-10: Cdr. William H. Hobgood relieved Cdr. Robert G. Ponton.

U.S. Coast Guard

JO1 Patrick E. Winter

STATE OF THE ART

P-3 Testbed Aircraft

The Naval Air Development Center, Warminster, Pa., recently completed extensive structural and electrical modifications to its fourth P-3 research testbed aircraft. The *Orion* was outfitted with four large optical windows in its belly which can accommodate a variety of optical sensors and laser systems. Project support equipment can be installed in specially designed roll-on/roll-off racks which can accept standard-width avionics boxes. The electrical system can supply 28 volts DC as well as 115 volts AC (60 Hz and 400 Hz) to the equipment.

Each of the P-3s is modified to perform a specific research task, such as sonobuoy development, laser communications and synthetic aperture radar studies.



This testbed P-3's belly radome, which contains a synthetic aperture radar, can be replaced with either windows or additional sonobuoy chutes.

Large Anechoic Chamber

An anechoic chamber large enough to accommodate aircraft the size of the Navy's new E-6A *Hermes*, or up to four tactical jets, is planned for construction at the Naval Air Test Center (NATC), Patuxent River, Md., beginning in 1991. The test facility is lined with special foam cones that absorb electromagnetic signals. The welded steel shell prevents external radiation from contaminating experiments and keeps the experiments from interfering with other electronic systems on station. It further protects the testing from unfriendly surveillance. The chamber and its support spaces total 178,048 square feet and will cost an estimated \$58.7 million.



PH2 Dave Kellerman

An artist's rendering of the large anechoic chamber was presented to RAdm. Donald V. Boecker, NATC Commander, by (from left) Bob Davis, Technical Director, Systems Engineering Test Directorate; Ken Mowbray, Public Works planning director; and Bob Russell, NATC staff, all members of the chamber planning team.

Advanced Helo Rotor System

Bell Helicopter Textron, Inc., flew its newest, all-composite, four-bladed, bearingless rotor system for the first time last January on an AH-1W *Super Cobra* loaned from the Marine Corps. The rotor system allows the AH-1W to perform loops, rolls and other aerobatic maneuvers normally associated with high-performance, fixed-wing aircraft. Having these capabilities would provide a tactical advantage to the *Super Cobra*. After extensive testing, the modified aircraft will be demonstrated to the Marines and offered for operational evaluation.



Bell Helicopter Textron

In the new system, the main component of the rotor hub — the yoke (which attaches the rotor blades to the transmission mast) — is fabricated from fiberglass and epoxy resin. When cured under high pressure and temperature, the yoke has great structural strength which enables it to accommodate the high centrifugal and bending forces exerted by the rotating rotor blades. The yoke's tapered design, with ridges and grooves molded into it, provides torsional softness. This allows the fiberglass rotor blades to change pitch without bearings. The entire rotor system is designed to survive ballistic hits from projectiles up to 23mm high-explosive incendiary rounds.

AWARDS

SecDef Maintenance

The following aviation units received 1988 Secretary of Defense Maintenance Awards: *Saratoga* (CV-60), U.S. Atlantic Fleet; VMFA-115, MCAS Beaufort, SC; and H&MS-16, MCAS Tustin, CA. The award program was established to encourage maintenance excellence, to recognize outstanding achievement in maintenance management and production, and to demonstrate the essential role of maintenance in the readiness and sustainability of our force.

Goldthwaite Award

The 1988 Vice Admiral Robert Goldthwaite Award was presented to VT-10, NAS Pensacola, Fla. Competition is based on overall efficiency in training students to become Naval Aviators/Naval Flight Officers. Established in 1973 and sponsored by Rockwell International, the award is named in honor of VAdm. Goldthwaite who contributed significantly to the Naval Air Training Command during his 45-year career.

Conway Trophy

NAS Willow Grove, Pa., was awarded the Edwin Francis Conway Memorial Trophy which recognizes the reserve naval air station, naval air facility or naval air reserve unit judged to be the most effective in readiness, recruiting, retention and fiscal management. Established in 1936, the award is presented by Commander, Naval Air Reserve Force, New Orleans, La.

The award honors Lt. Conway, C.O. of Naval Reserve Aviation Base, Floyd Bennett Field, N.Y., who was killed in an airplane crash in 1933.

Nimitz Award

Mr. Lawrence O. Kitchen, Chairman of the Board and Chief Executive Office of Lockheed Corporation, received the 1988 Fleet Admiral Chester W. Nimitz Award from the Navy League of the United States. The award is presented annually to an individual who has made exemplary contributions to U.S. maritime strength and national security.

By Cdr. Peter Mersky, USNR-R

Broughton, Jack. *Going Downtown: The War Against Hanoi and Washington*. Orion Books, 225 Park Ave. S., New York, NY. 1988. 336 pp. Illustrated. \$18.95.

Going Downtown — the phrase used by Vietnam combat pilots for missions over the heavily defended Hanoi-Haiphong complex — is the appropriate sequel to the author's 1969 memoir, *Thud Ridge*. In some respects, it duplicates the earlier work, especially in the descriptions of flying the F-105 *Thunderchief*, the Thud, and the frustration of the pilots against the Washington bureaucracy.

Colonel Broughton was already a combat-experienced pilot when he flew the first of 102 missions in Vietnam, having flown the F-84 *Thunderjet* in Korea. He received the Air Force Cross for his work in Southeast Asia. But he retired in disgust after his court-martial following the incident in which two of his most seasoned combat pilots fired on a Soviet ship on which anti-aircraft guns had been placed. Accumulated anger and a desire to protect his men led Broughton to destroy the gun camera film which held damning evidence of his men's attack against a forbidden target. The details of the incident and its aftermath are the last portion of *Going Downtown*.

The F-105 has received a lot of attention for its work in Southeast Asia, and Colonel Broughton's two books give candid accounts of one experienced man's tour of duty.

Weston, Robert and Robert Taylor. *The Air Combat Paintings of Robert Taylor*. David & Charles Publishing Co., London. U.S. distributor Howell Press, 2000 Holiday Dr., Charlottesville, VA 22901. 128 pp. Illustrated. \$45.

We recently devoted a column to the growth of aviation art as a modern medium, especially in the U.S. and Great Britain. One of the younger artists who has contributed to this growth is Robert Taylor.

The chronology of the paintings in this oversized book ranges from a WW I scene of Sopwith *Camels* on patrol through WW II and the Falklands — with emphasis on WW II and the role played by the RAF's Bomber and Fighter Commands, as well as the German Luftwaffe.

Taylor pays attention to backgrounds, setting the scene and telling unusual stories with his renderings. A painting of Royal Navy F4U *Corsairs* in Ceylon has as its main character an elephant named "Fifi" used for pulling aircraft out of the mud after the planes ran off rain-slicked runways. A unique story.

For the large color reproductions and additional color plates, this book's price is not exorbitant. It allows the reader to peek over the shoulder of one of today's better known aviation artists, and there is something to be learned from such close observation.

WEATHER FRONT

Sonic Booms

The relationship between sound transmission and the atmosphere is one aspect of the science of meteorology that is pretty well understood. This association was clearly illustrated near military and civilian airfields last summer. Engine noise from outbound aircraft was focused earthward by an extremely hot layer of air capped off by a strong temperature inversion aloft. Residents living in the vicinity of airports have in general become accustomed to the din of aviation activity. However, in mid-June 1988, the FAA was swamped by complaints from citizens in the vicinity of Chicago's O'Hare International Airport about "ear-splitting" jet noises. But the classic case of sound pollution (and other phenomena) occurred back in August 1883 with the eruption of

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



Krakatoa. This much-studied volcano was located off the west coast of Indonesia in the Sunda Strait. When Krakatoa destroyed itself, the explosion was loudly heard 1,000 miles away, while rumblings of the volcano's demise were audible up to 5,000 miles distant. Imagine the complaints of the local residents in the immediate area!

A temperature inversion is the critical ingredient required to concentrate aircraft engine noise earthward at takeoff or at high altitudes and supersonic speeds. In the case of sonic booms, inversions simply bounce sonic shock waves great distances — and sometimes through a neighborhood window. Fortunately, low-level airport noises that occur at places like O'Hare don't usually result in physical damage. Not so with the sonic boom. The Air Force

paid \$67,003 for 160 damage claims during the 1987 budget year.

Of course, Mother Nature is not entirely to blame for the phenomenon. The occurrence of sonic booms depends on other variables such as aircraft size, speed, altitude and *how* the aircraft is operated. Occasionally, however, Mother Nature calls up a few of her elements to create a spectacular symphony as she did over Arizona in 1975. The combination of high-velocity jet stream winds, a pronounced vertical wind shear, a strong temperature inversion, and nearby mountains collectively focused on Tucson. The resultant blast was not unlike a mini-Krakatoa. In addition to the initial sonic boom, there were several aftershocks that caused widespread local concern about a major earthquake.



Appearing in May on TV's Discovery Channel is a four-part series of documentary aviation films well worth watching. *Chopper Wars* has excellent footage of helicopters in action during Vietnam, while *Top Guns* interjects interviews with Naval Aviators accompanied by excellent carrier footage and Vietnam action. Vietnam ace Randy Cunningham discusses his day in the sun in depth. The professional aviator will find flaws in the commentary and analysis, but the aviation footage overcomes this occasional detractor. Also scheduled are *Fighter Ace* and *The B-29 Story/Ghost Squadron*. This series is a follow-on to "Great Planes," a collection of exceptionally well-done documentaries on many of the world's most significant aircraft. The "Great Planes" series will be expanded later this year to include a total of 26 military and civilian aircraft. Check your local listings for scheduling information.

Locator

I wish to contact the following former Navy personnel: Lt. M. H. "Kip" Tinker, VA-115 aboard USS *Hancock* in SEAsia, 1966-67; and LCdr. "Tad" Riley, VFP-62, Cecil Field, Fla., 1961, and VRF-32, North Island, Calif., 1974.

Paul Gillcrist
300 S. Lucerne Blvd.
Los Angeles, CA 90020

The International Group for Historic Aircraft Recovery is trying to locate a pilot and three observers who participated in the 1937 search for Amelia Earhart from the battleship USS *Colorado*. They are: pilot Ltjg. L. O. Fox and Naval Aviation Cadets J. A. Wilson, W. Jordan and R. A. Leake. If anyone can provide information about the status or whereabouts of these individuals, it would help us accurately document that historic effort.

Richard E. Gillespie
1121 Arundel Dr.
Wilmington, DE 19808

Reunions, Conferences, etc.

American Helicopter Society 45th Annual Forum and Technology Display, May 22-24, Boston, MA. Contact AHS Headquarters, 217 N. Washington St., Alexandria, VA 22314, (703) 684-6777.

Tactical Electronic Warfare Symposium, June 6-8, NAS Whidbey Island, WA. Contact LCdr. Steve Ewell, VAQ-129, NAS Whidbey Island, Oak Harbor, WA 98278, autovon 820-2093 or (206) 257-2093.

USS Salisbury Sound (AV-13) reunion, July 6-9, Albuquerque, NM. Contact Marian Bruce, 813 Branding Iron SE, Albuquerque, NM 87123, (505) 293-3841.

NAS Pasco reunion, in conjunction with Tri-Cities International Airshow, July 15-16, Pasco Airport, WA. Contact Jerry Bell, 2305 W. 41st St., Kennewick, WA 99337, (509) 582-7986/376-0680.

EAA International Fly-In Convention and Sport Aviation Exhibition, "From Jennies to Jets," July 28-August 3, Oshkosh, WI. Contact John Burton, EAA, Wittman Airfield, Oshkosh, WI 54903-3086, (414) 426-4800.

USS Independence (CV-62) reunion, July 13-16, Norfolk, VA. Contact Denis J. Bagley, 12 Trenton Ave., Edison, NJ 08817.

International Air Tattoo 89, saluting NATO's 40th anniversary and hosting the second International Patrol and Search and Rescue Meet, July 19-23, England. Contact Sue Bushell, International Air Tattoo, Bldg. 1108, RAF Fairford, Gloucestershire GL7 4DL, (0285) 713300, ext. 332.

Air Group 87 aboard USS Ticonderoga during WW II planned reunion. Contact Jerry Shearer, 20817-A 32nd Lane S., Des Moines, WA 98198, (206) 824-4196.

USS Bon Homme Richard (CV/CVA-31) and air groups reunion, August 11-13, Bayview Inn, Bremerton, WA. Contact Ralph Pound, Box 1531, 410 Clark St., Tupelo, MS 38802, (601) 842-8247 or 842-0572.

USS Enterprise (CV-6) reunion, August 16-20, Norfolk, VA. Contact Cdr. Howard Childress, USN(Ret.), 4143 Ewell Pt., Virginia Beach, VA 23455, (804) 464-1970.

USS Independence (CVL-22) reunion, August 17-19, Comstock Hotel, Reno, NV. Contact C. J. Horth, 200 W. San Bernardino Ave. #117, Rialto, CA 92376, (714) 874-6849.

The Association of Naval Aviation Photo Contest

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

or color, slides or prints of any dimension.

Cash Awards

Bimonthly:	\$100
Annual:	
First	\$500
Second	\$350
Third	\$250

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

Bimonthly winners will be selected by the staffs of *Wings of Gold* and *Naval Aviation News*. All photos submitted throughout the contest period, whether or not they were

bimonthly winners, will be considered for the annual awards by an expanded panel of judges which will include recognized out-of-house experts in the photography field.

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

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



On May 27, 1919, Naval Aviators became the first men to conquer the Atlantic by air.