NAVAL AVIATION NEWS

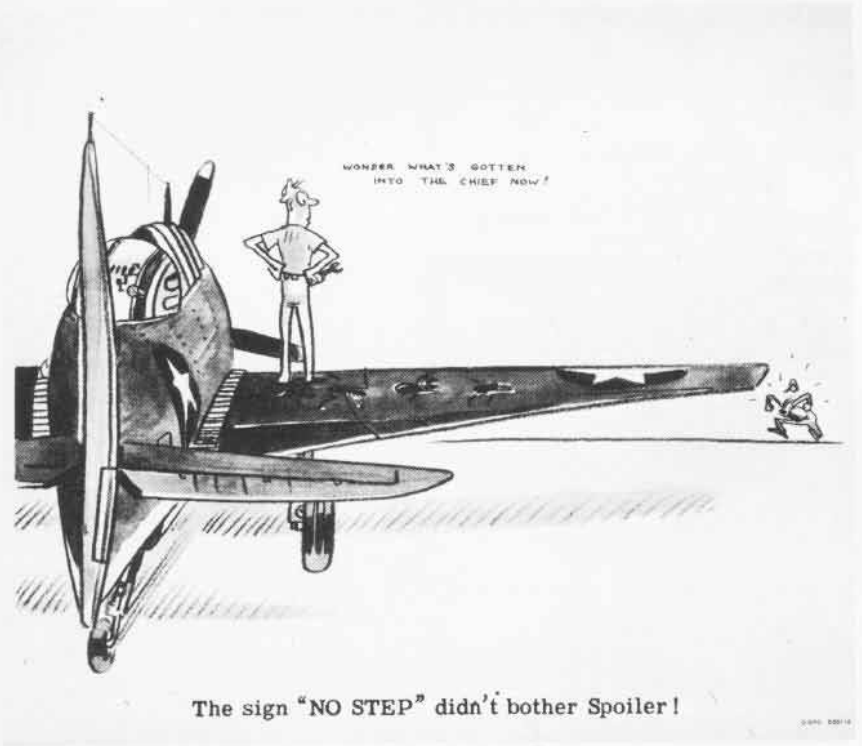
July 1978

NAVAL AVIATION NEWS

SIXTIETH YEAR OF PUBLICATION

COVERS – NANews' Charles Cooney arranged front cover views of survival gear, past, present and in action. Left to right, CPO Walter N. "Bud" South displays flight gear, 1917; current mobile helicopter crewman configuration; and LCdr. Thomas Tucker being rescued by HS-6 after ejecting from his disabled RF-8 Crusader, August 31, 1966, in Haiphong Harbor. See feature on aircrew survival enhancement program beginning on page 8. Bob Lawson took 1974 photo of USS Constellation C-1A, above.

editor's corner

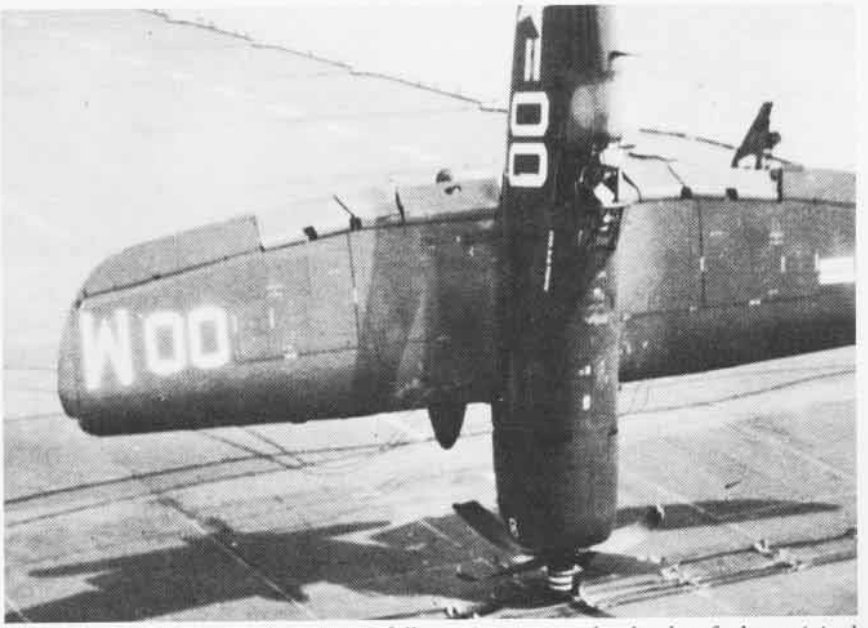


The sign "NO STEP" didn't bother Spoiler!

Recall to Duty? This month's centerspread poster of Robert Osborn's Dilbert the Pilot, circa WW II, is published with an ulterior motive behind it. *NANews* is soliciting views from readers as to the value of reissuing the Dilbert and Spoiler (Dilbert's maintenance counterpart) illustrations which were popular in the 1940s and 50s. Well aware that the flyers and maintenance hands of today are a more sophisticated breed, we have no illusions about the posters as dynamic safety tools. Still, is it not possible that prominent display of them in hangars, working spaces, ready rooms, et al., might promote safety with a convenient blend of humor? Human nature being what it is, it seems as if some of the mistakes we were making 30 years ago still occur. It follows that Osborn's charges could be recalled to duty and remind us of this phenomenon.

Please call or write with your comments. Our phone number and address are in the small print on page 40.

A Little Traveling Music, Please. VP-1's Ltjg. Robert Brannon described his squadron's peripatetic bent in NAS Barbers Point's *Pointer,* March 3, 1978: "Although our primary mission is airborne antisubmarine warfare, we often wonder if it isn't also providing the basis for the next edition of Rand McNally's *World Atlas.* At any given time, aircraft and personnel from VP-1 can be found at such exotic ports as Mahe, Seychelles; Nairobi, Kenya; Bangkok, Thailand; Hong Kong and Korea. During the runway closure at NAS Cubi Point, the squadron was required to detach its aircraft and personnel to six different sites including Bandar Abbas, Iran; Diego Garcia, British Indian Ocean Territory; Kadena AFB, Okinawa; NAS Agana, Guam; Clark AFB, Republic of the Philippines, and the administrative base back at Cubi Point.



From the Desk of Art Schoeni. "This picture frustrates me . . . . I'm always wondering which way the F4U-4 fell after it balanced on its nose like this for the photographer. The 'Woo' on the wing is appropriate, although it wasn't meant to be. There is no caption on the back of the original print, only that it happened on August 2, 1950, on *Coral Sea.* It might be an F4U-5 but the CAG ought to have to buy the drinks after that one. . . ."

NAVAL AVIATION NEWS did you know?

Space Shuttle

Four two-man crews have been selected by NASA to begin training for early orbital flights of the space shuttle. John W. Young, commander, and Robert L. Crippen, pilot, will be the prime crew for the first orbital flight test scheduled for launch from the Kennedy Space Center, Fla., in the spring of 1979. Young is a retired Navy captain. Joe H. Engle and Richard H. Truly, a Navy commander, will be the backup crew. Flight assignments for the other two crews will be made at a later date. Included in this group is Lieutenant Colonel Jack R. Lousma, USMC.

NASA plans a series of six orbital flight tests, each of increasing complexity, to check out the first reusable spacecraft. On the first four flights, the 75-ton orbiter will return from space to an unpowered landing on a dry lake bed at NASA's Dryden Flight Research Center, Edwards, Calif. After that, the spacecraft will return to a specially constructed runway at the launch site.

Corsair II Trainers

As new *Corsair* trainers arrived at NAS Patuxent River in April for BIS trials, the station began to look like a temporary home port for a TA-7C squadron. Five of the two-seat aircraft will participate in service tests.

At present, a pilot learning to fly the *Corsair II* is followed by an instructor in another aircraft. In the two-seat version, the instructor occupies the rear seat. An onboard closed-circuit TV system will permit him to monitor the student pilot's head-up display presentation. The instructor does not have all the weapons control switches in the back seat but lights indicate when the student pilot has released bombs or fired rockets or missiles.

Sixty A-7B and A-7C light attack planes are being extended 34 inches by the Vought Corporation to accommodate the second seat. The aircraft is also four inches taller and has a banana-like curvature in the fuselage which is necessary for tailpipe clearance on landings and takeoffs.

An NATC team headed by project officer Lt. Richard E. Batdorf and project

engineer Bill Pitcher is assisting BIS representative Maj. Tom Carter, USMC, during approximately 200 hours of flight testing.

The new trainer is intended to help cut fuel consumption by about half in training flights and reduce the number of aircraft needed for transition training.

In the photo, Dale Rebarchick, technician, shows Lt. Batdorf some of the instrumentation being installed in the TA-7C.

NAVAL AVIATION NEWS did you know?

CNO Safety Awards

The 1977 CNO Safety Awards were announced in April, covering an extended reporting period. In his message congratulating the winners, the Chief of Naval Operations stated that their professional achievements had made the 1977 reporting period the safest in Naval Aviation history. He added that the 1977 winners had applied another ingredient to the safety success formula, a strong dedication to the conservation of our human and material assets.

Winners:

NavAirLant: VAs 35, 37 and 45, VF-74, VP-26, VS-22, VRC-40, RVAHs 7 and 120, HS-11 and HSL-34.

NavAirPac: VF-211, VAs 128, 147 and 165, VAW-115, VP-48, VAQ-138, VS-21, VX-4, HC-3 and HS-6.

FMFLant: VMA-223, VMAQ-2, HMT-204 and H&MS-31.

FMFPac: VMA(AW)-121, VMFA-212, HML-267, HMH-463 and HMM-165.

CNATra: VTs 6, 10, 22, 24 and 19.

CNavRes: VA-303, VF-301, VP-92, VFP-306, VR-52 and HC-9.

MARTC/4th MAW: VMA-131, HMM-774.

Special congratulations went to repeat winners which included VP-92, VF-301, VTs 6 and 19, HML-267, VMFA-212, VA-128, VS-21, HC-3 and VS-22.

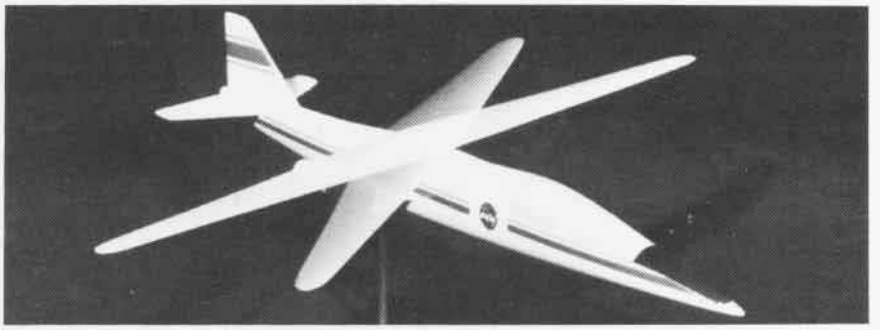
Correction

Unintentionally omitted from the last issue under the item Awards, page 3, was the following: CVWR-30 is the first recipient of the Commander Michael L. Plattis Award in memory of the VA-305 executive officer who lost his life during a reserve tactical air test onboard *Ranger* in November 1976.

Pivot Wing Aircraft

The Ames Industrial Corporation, Bohemia, N.Y., is developing a small, lightweight, manned, oblique wing aircraft under a contract from NASA's Dryden Flight Research Center. Because the pivoting oblique wing concept is a significant departure from conventional aircraft design, NASA has undertaken this exploratory program to study the fundamental aspects of piloting such an aircraft.

At lower flight speeds, the wing is oriented perpendicular to the fuselage. The



engine thrust required for takeoff is substantially reduced, which provides for quieter operations during takeoff and landing.

At high-speed flight, the wing is pivoted fore and aft to form oblique angles up to 60 degrees with the aircraft's fuselage. This decreases air drag and permits increased speed and longer range for the same fuel expenditure.

Delivery of the aircraft to NASA is expected in late 1978, with first flights planned for early 1979.

AH-1T Shipboard Trials

A test team for the Naval Air Test Center, Patuxent River, Md., recently combined a new Marine Corps AH-1T helicopter with a new amphibious assault ship, USS *Saipan* (LHA-2), to ascertain the operating envelope, day and night, of this helicopter and ship marriage.

A total of 132 day and night landings were made covering 13 flight hours during evaluation in the Virginia Capes area of Norfolk. SH-3 helos from HS-75, Lakehurst, N.J., provided search and rescue and logistic support. The shipboard compatibility evaluation consisted of four functional areas: ground support systems, rotor engage-disengage, takeoffs and landings, both day and night. The evaluation was part of the service acceptance trials of the basic AH-1T *Sea Cobra* under the auspices of the Board of Inspection and Survey. At the same time, *Saipan* was completing her own initial qualification tests. The AH-1T is the first of the H-1 series in which the engines can be started without engaging the main rotor blades.

Isbell Trophy

The Arnold Jay Isbell Trophy, sponsored by the Lockheed California Company, recognizes ASW squadrons for superior performance. It is named for Captain Isbell who served with great distinction in antisubmarine warfare during WW II. He was killed in action in March 1945.

Eight awards are made each year to the outstanding VP, VS, HS and HSL squadrons in each fleet nominated by the fleet commanders and approved by CNO. The trophy, which remains in the office of CNO, is engraved with the names of the winning squadrons and Lockheed prepares appropriate plaques for presentation to each squadron.

The winners for 1977 are: Atlantic Fleet: VP-24, VS-31, HS-5 and HSL-34; Pacific Fleet: VP-9, VS-21, HS-6 and HSL-35.

grampaw pettibone

Pro Sans Luck

While cruising at 7,000 feet, the port engine of the SP-2E commenced backfiring. The pilot reduced power and the engine smoothed out. The engine analyzer, however, indicated that number one and two cylinders were not firing on the left magneto. The PPC increased manifold pressure and the engine began backfiring again. A small amount of oil was seen coming from the inboard cowl flap and the PPC immediately secured the engine. The shutdown was normal in all respects, and further inspection gave no evidence of fire. With the situation temporarily squared away, the PPC elected to continue on to his destination which was the nearest military field. The control center was informed and a descent to 6,000 feet was approved.

About five minutes later, smoke was observed coming from the port engine. An emergency was declared and the pilot was given a vector to a nearby civilian airport. The crew was directed to make preparations for bailing out as the fire increased in intensity. The center was informed it would be necessary to land immediately or the crew would be forced to bail out.

The center vectored the *Neptune* to a small private airport directly below and a single engine landing was attempted on a 3,300-foot runway. The PPC brought the P-2 to a complete stop 500 feet off the end of the runway with no apparent damage incurred on landing; all hands exited without injury. The airport fire jeep arrived within two minutes, but did not have sufficient equipment to extinguish the fire. Before the city fire trucks could reach the scene, the

aircraft was completely engulfed in flames.

Grampaw Pettibone says:

Too bad! The operation was a success but the patient died. This is an outstanding testimonial to back up my insistence on using military fields as much as possible. This plane crew was well organized and handled the emergency in a professional manner, but was unfortunate enough not to be close to a military field which could have fought the fire and saved the plane. (The culprit causing this mishap was failure of the exhaust valve on the number two cylinder.)

It gets Ole Gramps right in the pocketbook to lose one of these machines, but it sure makes me proud to add these boys to the Ole Pro list. (January 1967)

Basically Basic

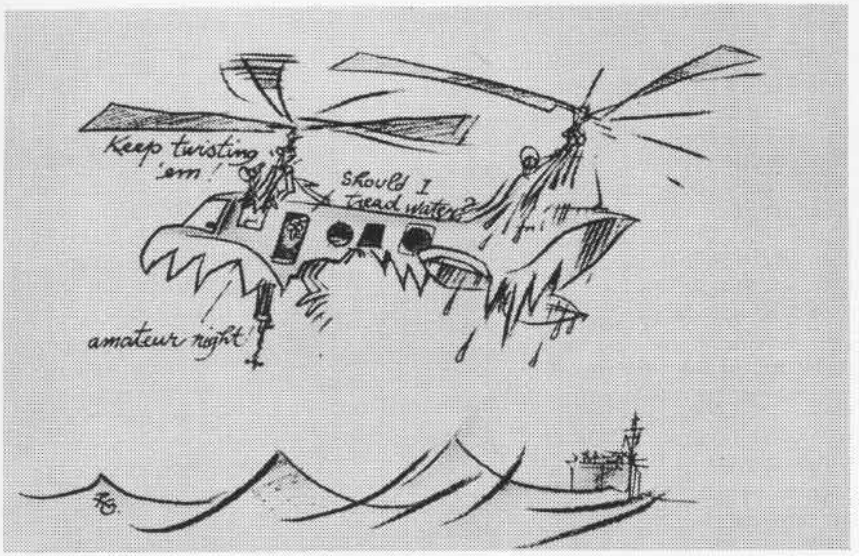
A CH-46D was airborne for a day/night practice vertrep mission and touch and go's. During the early portion of the flight all had gone well. About half an hour after darkness the pilot was making an approach to the ship from port to starboard. As the aircraft reached an in-close position, the deck was noted fouled and a wave-off initiated. The weather was beginning to deteriorate rapidly and on the wave-off, without warning, the helo encountered heavy rain.

As the CH-46D passed the stern of the ship, the pilot told the copilot to activate the right side windshield wiper. This accomplished, the pilot asked the copilot to activate the left side wiper. The copilot couldn't reach the left side wiper control, so an aircrew member was called forward to assist. At this point the helo was on the starboard side of the ship at 300 feet AGL and 60 knots.

Visibility dropped to below one mile. It was pitch black with no horizon. The pilot could not determine if his wipers were functioning, so, after setting the aircraft in a 10-degree angle-of-bank starboard turn at 300 feet AGL and 60 knots, he gave control of the aircraft to the copilot. The pilot told the copilot to maintain the aircraft at 300 feet and continue turning to setup for another approach. The exchange of aircraft control was a positive and understood change.

The copilot flew and monitored the flight instruments, only breaking his scan with a glance to see how the pilot was coming with the wiper controls. As he broke his scan, the aircraft began a subtle descent. The copilot noted the radar altimeter pass through

ILLUSTRATED BY Osborn



25 feet AGL and initiated a positive climb simultaneous with water impact. Ascending through 100 feet the pilot took control of the aircraft, checked the controls, and completed a successful landing back aboard the ship. Fortunately, no one was hurt. The aircraft sustained damage to the fuselage skin, nose gear support structure, antennas, pitot system, and was missing the nose landing gear.

Grampaw Pettibone says:

Holy splashdown! It amazes me what some guys get away with. This was as demanding an instrument environment as you can find (IFR, night, overwater, low altitude, no horizon). The situation called for good basic instruments, crew coordination, and maximum attention to flying the aircraft. Gramps says, "Oh Boo!" to passing aircraft control IFR in a turn. Basic air work, basic instruments, basic headwork, and basic discipline were handled in a basically casual fashion and the outcome was basically predictable.

Basic Ignorance

An EA-6B launched on a routine hop from USS *Aircraft Carrier*. The flight was uneventful until entry into the break for landing. The pilot (using cold mike) entered a 60-degree angle-of-bank turn four miles ahead of the ship. The speed brakes were opened and the power reduced to idle. The pilot felt the throttles go beyond the idle position to the "off." Realizing he had inadvertently shut the engines down, he initiated an immediate air start.

Attempts to restart the engines were unsuccessful and the pilot initiated command ejection at 700 feet and 220 knots. Ejection, parachute descent and water entry for all three crew members were as advertised. The search and rescue effort went well except that the new D ring (W/GATE P/N SA-82071-1, aircrew systems change 361) was not compatible with the swimmer rescue harness snap link (P/N MS 22018-1). A horse collar was used for the pickup of all three crew members.

Grampaw Pettibone says:

Holy retarded throttle jockey! Guess who didn't learn in the replacement training squadron that you don't bring the throttle below 75 percent rpm in the break. Nothing surprises your Ole Gramps anymore. This proves to me there is always a need to review basics.

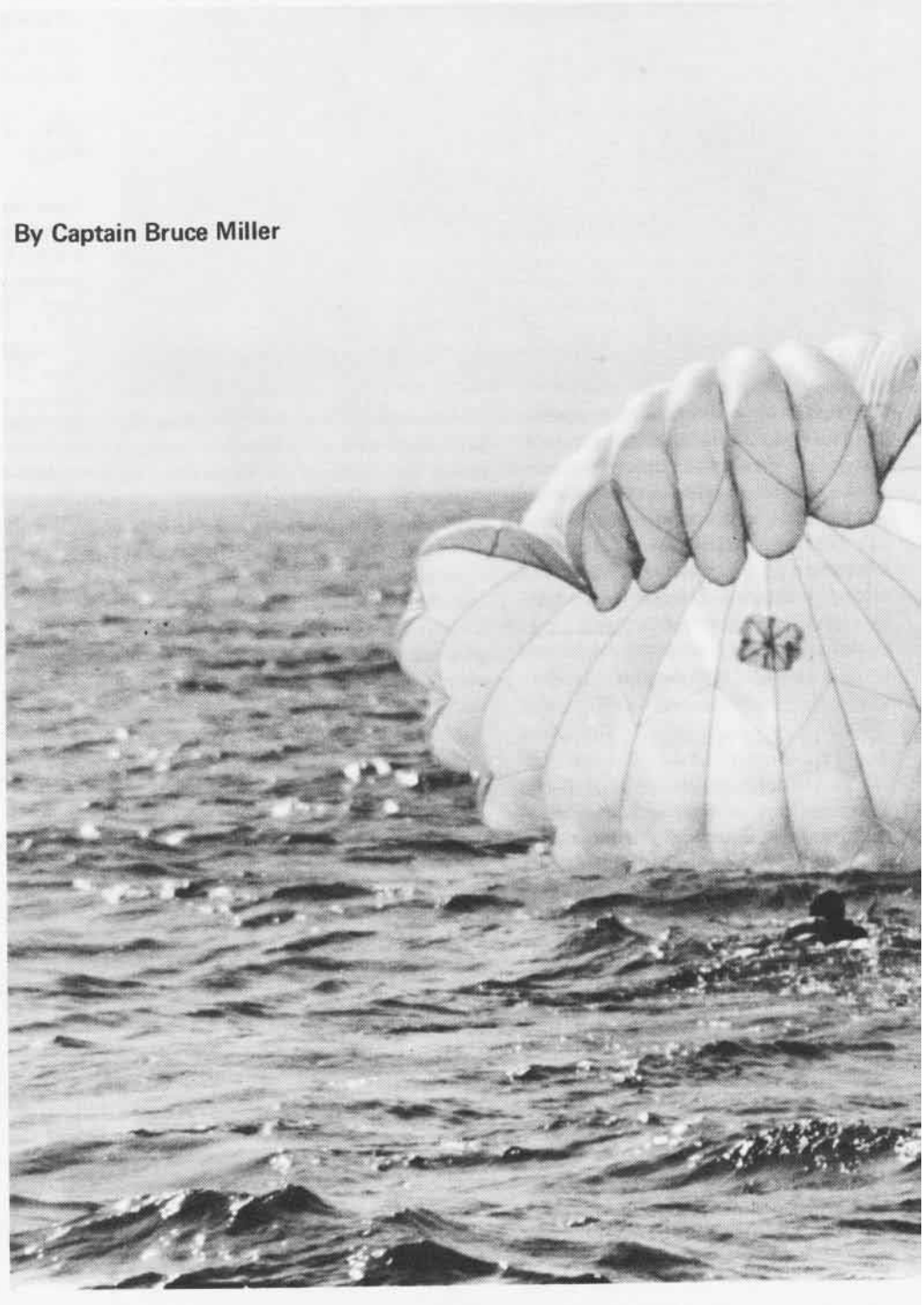
Riding around in dynamic environments "cold mike" is another sore point. Someday it's gonna cost you big. A few words at the right time may save your bottom and help save the aircraft.

As for the rescue problem between the swimmers and the downed crewmen: What a neat time to find out compatibility problems exist between equipments. Why didn't the SAR Det know what the air wing flyers were using and vice versa? Incredible!!

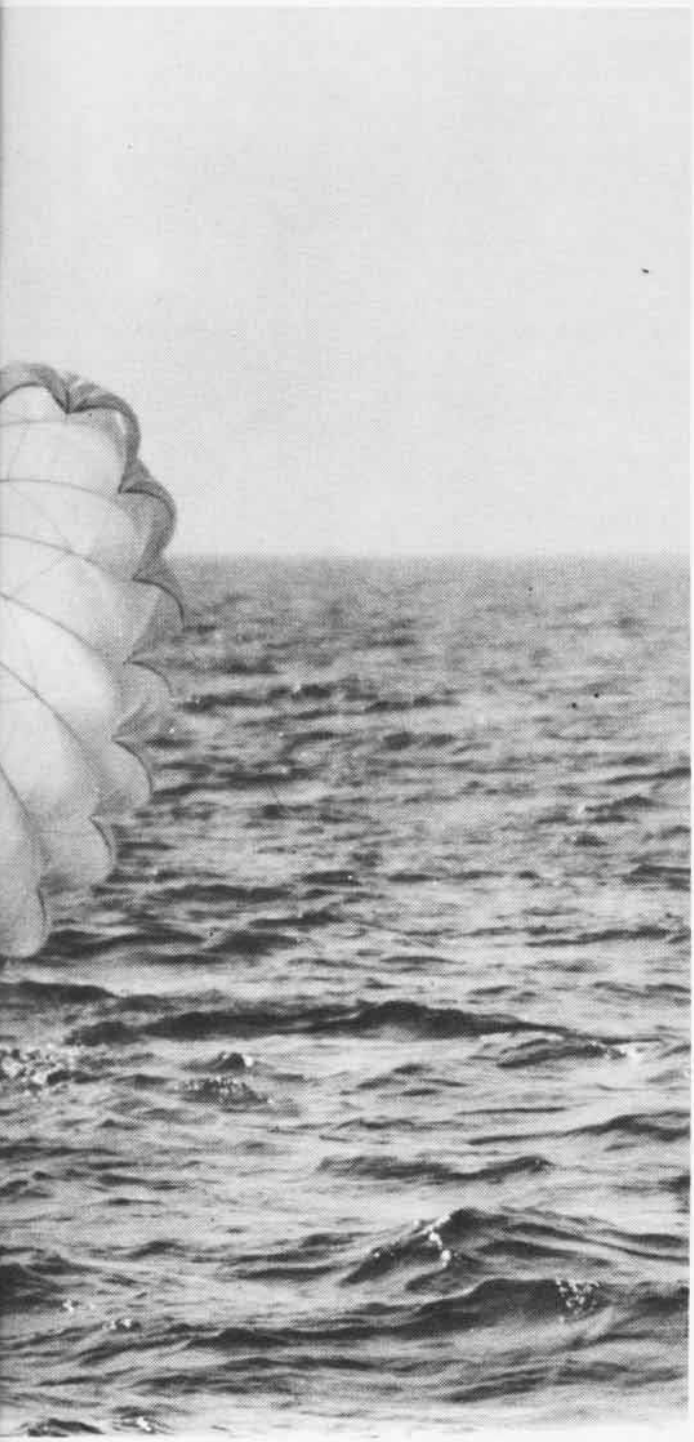
This entire accident smacks of ignoring basics. Simple ignorance is not knowing; compound ignorance is not knowing that you don't know. Let's get back to basics!

ASEP

By Captain Bruce Miller



One of the Aircrew Survival Enhancement Program's main features is a chute divestment system which will help the downed flyer rid himself of his billowing burden.



Flight is the most unnatural of human accomplishments and without all sorts of external aids – such as airplanes, for instance – human flight would be quite impossible. The legendary Icarus was the first to know the ecstasies and agonies of human flight. He was also the first to experience deficient life support equipment. Not only did Icarus have improper flight gear, he took off in an airframe that was neither airworthy nor crashworthy, and he carried no chute because of aircraft weight limitations. What finally got him, though, was the lack of a wing overheat circuit, which allowed his wax job to melt.

Aircraft safety and aircrew survivability issues have changed a bit since then, but their importance remains the same and the associated problems have multiplied exponentially. Emergency egress is a good starting point, for example, especially ejection seats. In spite of advances in seat capability and a continuing reduction in the overall incidence of ejections, a corresponding drop in the percentage of unsuccessful ejections has not been observed over the last several years. At the root of some of these failures has been the outdated state-of-the-art in seat installations. In other cases, it has been inadequate training for the increasingly demanding operational environment in which aircrews operate.

In May 1977, Vice Admiral Frederick C. Turner, DCNO (Air Warfare), solicited recommendations from the operating forces on how best to improve emergency egress training and enhance aircrew survivability. With the floodgates thus opened, literally dozens of thought-provoking recommendations poured in. Many related directly to training and training devices, such as parachute disentanglement trainers, night water survival instruction and flight simulators to measure aircrew reactions under various ejection parameters. Others related to improvements in flight equipment, like automatic life vest actuators, automatic chute divestment and helicopter-compatible flight gear. Still others were concerned with changes in Natops design and contents.

It became apparent that an OpNav focal point was necessary to evaluate and advocate the best of the proposals and to coordinate aircrew survivability issues in general. In September, VAdm. Turner established the Aircrew Survivability Enhancement Program (ASEP) and named a steering committee for the program, chaired by Rear Admiral William P. Lawrence, ADCNO(Air Warfare). In addition, he assigned Captain Bruce Miller as executive director for the committee and CNO program coordinator for ASEP.

Originally chartered to meet quarterly, the committee now meets monthly to evaluate problems, establish prior-

ities, determine resource and program sponsorship and provide advocacy in all aircrew survivability matters. The committee has budgetary input authority and is the coordinating agency for all aspects of survivability from evaluation of requirements to fleet delivery.

The program coordinator, Op-50C, is responsible for pulling together and coordinating the various operational and budgetary aspects of the ASEP components. He also ensures that urgent requirements are met in as timely a manner as is possible. ASEP is involved with acquisition and improvement of the various aviation life support systems (ALSS) items. These include helmets, anti-exposure suits, ejection seats, life vests and other gear. The program also has cognizance over survival training, including devices and media, search and rescue (SAR), and critical aviation safety issues which relate to survivability, such as helicopter flotation, crash worthiness and underwater egress.

A new OpNav instruction will be published in the near future to formalize ASEP, define the charter and govern its management. A working group has been appointed to propose methods for improved ALSS management. One action being considered is appointment of a project manager (PMA) in NavAirSysCom to manage the development, acquisition and support of ALSS, under CNO sponsorship, by DCNO(Air Warfare).

The ASEP steering committee and program coordinator have been active in accelerating introduction of ongoing development programs to meet urgent fleet requirements. These programs have been hampered in the past by lack of funding and priority in development, testing and procurement. A status report on the most significant initiatives follows:

ESCAPAC Ejection Seat Replacement Program. In January of this year, the decision was made to replace the ESCAPAC seats which are based on technology of 15 years ago, and which are installed in the A-7, A-4 and S-3 aircraft. The replacement will be a current state-of-the-art, off-the-shelf seat selected in open competition. It will provide improved performance and reliability and, above all, improve aircrew survivability. Initial action has been taken to draw up the seat specification which will be used in requesting proposals from industry. Possible contenders could come from the Stencel SEU-3/A in the AV-8A, the Martin Baker MK-10 in the F-18, the Douglas Aces II in the A-10, F-15 and F-16, or any other qualified seat which may be submitted in response to the proposal request. The seat should be introduced in 1980-81.

Helicopter ASEP. Considerable evaluation has been made concerning potential features which could provide near-term payoff for crew, passenger and troop survivability in helicopters. The areas with highest potential are helicopter flotation; underwater egress, including hatch lighting and hatch jettison; crash attenuation in seats and fuel cells; and helo-peculiar personal survival equipment. Some of these features are already in various stages of development or are the subjects of engineering change proposals on certain rotary wing models. A source document is being prepared which will tie together all of these features under an umbrella program. It will provide for a separate source of development funding and for coordinated management to expedite the high potential areas noted above. Since all the features do not apply equally to all the helicopter platforms, NavAirSysCom will establish which features in which platforms will produce optimum survivability payoff.

Aramid Knit Flyer's Coverall (CWU-48/O). Forty of these suits have been tested at NATC Patuxent River. They received very favorable response in terms of fit, comfort, appearance and mobility. A principal feature of the Aramid double knit Nomex fabric is that it provides significant improvement in fire resistant properties over that of present Nomex flight suits. Operational evaluation (opeval) should commence late this summer with approval for service use expected in March 1979. Fleet introduction is slated for fiscal year 1979-80. The suits eventually may be a tri-service item.

Lightweight Helmet (HGU-33P/34P) and Oxygen Mask (MBU-12P). Two versions of a new lightweight helmet and a new lightweight oxygen mask are in the offing. For versatility, one version of the helmet is form-fitting for permanent issue, while the other has exchangeable pads for temporary issue. In all other respects, they are identical. The mask is a soft rubber, much lighter unit than present masks. The total weight of the new helmet/mask combination is only 3.6 pounds as compared to the APH-6/A-13A combination weight of 5.75 pounds. Both the helmet and mask have completed opeval. Approval for service use, although delayed a bit from earlier estimates, is expected this summer. Depending on whether the masks are procured for attrition of existing gear or for retrofit, they could be available for the fleet in early 1980.

Automatic Life Vest Actuator and Chute Divestment. The urgent need for these needs no further documentation. Both programs are in progress with just about the maximum push being applied while still maintaining reasonable managerial prudence. Initial testing is complete on four hardware proposals for the life vest auto-actuator. The concept involves a battery, activated by immersion, which fires a squib to initiate the CO_2 inflation. The Conax Corporation's proposal, an earlier model of which is already in use by Canadian military pilots,was selected. A contract was

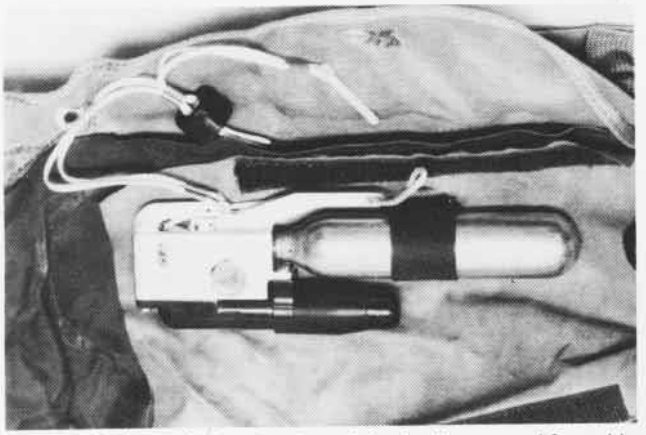
Mobile helo crewman gear under development includes HGU-27/P helmet with radio; life preserver made of heat-sealable fabric with exterior Nomex casing; chaps, especially helpful for mine countermeasures personnel working in a prone position; gloves of heavy material for cable handling; and elastic kneepads.

issued for production of a quantity of actuators for service release testing and opeval, both of which will begin this fall. On completion of these evolutions and approval for service use, fleet introduction is expected about October 1979.

Clarification of several points may be helpful. First, rain will not actuate the device but fresh or salt water immersion will. Second, although probability of inadvertent actuation in the cockpit is extremely small, there is a chance it could happen. This should be taken into account just as with any CO_2 or cartridge-actuated device. In any case, the risk is far outweighed by the value of automatic actuation in the water in cases of injury or incapacitation. Third, it is a bonus feature. It does not substitute for the manual toggle actuation but backs it up. In fact, if a survivor is not incapacitated and is complying with Natops, he won't get a chance to use the auto feature anyway. He will already have popped the toggles before hitting the water.

The chute divestment automatic feature is moving along in development but will be a year behind the life vest. The concept involves additional research to ensure safe, reliable operation. It will have both manual and automatic release capability. Test and evaluation is planned through this October. Fleet introduction is slated for the A-7 in the fall of 1979. Other aircraft follow in 1980. An acronym which you will be seeing for this system is SEAPAC for sea actuated parachute automatic crew release.

Anti-exposure Suits (CWU-33/P and CWU-21/P). Several developments have occurred in this area. OpNavInst 3710.7J, Natops general flight and operating instructions, contains a revision to Chapter VII which provides new criteria for wearing anti-exposure garments. These criteria are based on extensive medical data which indicate that when core temperature of the body is maintained at or above 95 degrees, normal recovery without ill effect, other than discomfort, is virtually assured. This information is coupled with empirical observations that well over 90 percent of overwater naval air operations take place where surface water temperatures are above 45 degrees, and successful SAR recoveries occur within two hours. It is therefore specified that anti-exposure suit wear is required whenever water temperature is below 50 degrees and outside air temperature is below 32 degrees, including chill factor. Natops then presents a sliding scale ranging from 50 to 60 degrees, and between one and three hours. This defines an area in which the commanding officer will make the final determination based on SAR capability, aircraft class, combat environment and other factors. Above 60 degrees, anti-exposure suit wear is at the option of the crew member and his C.O.



CWU-48/P knit flight suit, above right, has been tested favorably and should reach the fleet during FY 79-80. Automatic life vest activator system contains a battery, activated by fresh or salt water, which fires a squib to initiate CO_2 inflation.

Another development involves CNO policy concerning the various anti-exposure suits themselves. For years, this has been a thorny problem. Either the suit was terribly uncomfortable, or it was very difficult to maintain thermal integrity, often both. They have been disliked and wearing the suits has often been avoided when possible. A problem now centers around the CWU-33/P ventilated wet suit. It is poor from the point of comfort, mobility and fleet aircrew acceptance. But it is in reasonably good supply and provides fairly efficient protection.

An alternative is the CWU-21/P ventile dry suit which consists of an inner and outer garment. Although fairly comfortable and therefore popular, it suffers from poor reliability and maintainability, difficult logistic support and lack of appreciation for the value of the inner garments for thermal protection. Another semi-official alternative has been off-the-shelf commercial wet suits, procured by open purchase.

In the past, there has not been a formal operational requirement (OR) based on reasonable and realistic criteria, toward which Navy anti-exposure suits could be designed and tested. At times there have been arbitrary, excessively high criteria which drove the design toward immobility and discomfort. On occasion, the Band-Aid approach has been used which led to poor quality control and reliability.

To resolve these problems, a conference was held in April at NavAirSysCom with representatives from the fleet, development community, ASO, BuMed, MarCorps, CNO and other activities.

The following recommendations have received tentative approval and will serve as the basis for a formal CNO policy statement on the subject:

• An OR, developed at the conference, should be approved. It should be based on hard design points required for environmental/physiological limits and mission accomplishment, and configured for mission-specific requirements of ejection seats, fixed seats and mobile aircrew categories. The systems, not necessarily anti-exposure suits, are to be developed for production and fleet introduction as soon as is reasonably possible, but within four years. Pending that time, the following policy will adhere:

• The CWU-21/P ventile suit, with its CWU-23/P inner liner, will be the preferred Navy anti-exposure garment over the next four years. Improved logistic support will be pursued. The suit will remain a TyCom controlled item until further notice.

• The CWU-33/P wet suit will continue to be an authorized item when the CWU-21P/23P assembly is not available. It will stay in inventory for four years and be supported during that time but will not be procured after July 1978.

• Over the next four years, certain versions of commercial wet suits will be authorized items for procurement under TyCom control when the CWU-21P/23P assembly is not available. Specific criteria for acceptability and procurement of these wet suits will be circulated this summer by NavAirSysCom.

Emergency Radios (URT-33/PRC-90/PRC-112). On this subject there are two innovations and one problem area:

• URT-33A beeper. The bad news is that this radio has not enjoyed a reputation for reliability. Based on 200 milliwatt power source, its range should be 60 to 70 miles. If the seat pan kit (RSSK) is not deployed from 25 to 35 percent of signal strength and part of the omnidirectional capability are lost. So if an aircrewman is satisfied with only 40-or-less miles range, he should forget to deploy the seat pan on the way down in the chute. Of course, he should also consider that the lower he deploys it, the less line-of-sight range is available.

Another problem centers around battery source, inspection and test procedures. The current alkaline battery has been a Navy procurement item for about four years. It has a two-year life, but can be attenuated faster under some environments. In view of this, toward the end of last year, NavAirSysCom recommended changing the batteries each time that the RSSK kit is pulled for servicing, regardless of battery life indicated. Intermediate level test procedures are set forth in NavAir 16-3OURT33-1, which is being updated by NARF Pensacola. Maintenance cycles on the various RSSK kits vary but have a maximum of 26 weeks. New batteries, therefore, should be installed every six months.

Batteries should not be in short supply, but if they are, the Air Force URT-33C model uses mercury batteries which are compatible with the Navy URT-33A model. Their batteries are rated at a three-year vice two-year life, not measurable by meter, as alkaline batteries are, but they are more vulnerable to freezing temperatures than Navy's. Otherwise, they are probably about equal in reliability. There are two types in Air Force supply: Model #7747390-10 S/N 6135-01-50-3193LS and Model #4D12C300 S/N 6135-01-009-9135LS.

• PRC-90 radio. An initiative is under consideration to provide PRC-90s as part of rescue motor whaleboat equipment. This would help close the communications gap with the rescue helo in the ship/boat/helo rescue team. Another possible alternative for closing the loop, although longer term and higher cost, would be to equip the rescue helos with VHF/FM capability. This would also provide interface with civilian rescue vehicles.

• PRC-112. The long-range development in this field is a tri-service project under Air Force management. It will provide a multi-channel survival radio with automatic transponder capability and interface with the rescue vehicle. The interrogator system on the rescue vehicle will give range and bearing, discrimination between multiple survivors, authentication and long-range data relay to a rescue center. The Navy is ordering 20,000 PRC-112s with fleet introduction expected in October 1981 and deliveries through fiscal year 1985.

Aircrew Survivability. Water survival instruction as well as search and rescue training have suffered over the years from a lack of centralized management, and especially from non-standardization. Different activities in different locations, all with the best of intentions, have done their own thing as they saw the need. A familiar pattern has been the use of obsolete life support equipment because of funding constraints. Often the programs have not been fleet oriented. What has enabled them to keep their heads above water, pun intended, has been the innovative skills, inge-

nuity and hard work of dedicated people. This is not the way to manage such crucial matters, considering the lives involved. It will no longer be the way in the future.

• Aviation physiology and water survival training. The entire scope of these has been reviewed. A number of long term management and training decisions have been reached. On April 11 of this year, CNO promulgated a letter which established the Naval Aviation water survival training and the Naval Aviation physiology training programs. These are tailored to meet fleet training requirements. The overall program manager will be Op-59, with CNET as program coordinator. CNET will coordinate requirements with the aviation training model manager (ATMM).

• The official ATMM for physiology is the Aviation Physiology Training Unit at NAS Norfolk. For water survival, it is the Naval Aviation Schools Command. These two commands will be the focal point and standardization source for all activities and changes relating to their respective areas of authority, just as is the case with the ATMM for a specific aircraft model. In other innovations, deep-water environmental survival training (DWEST) will become part of the Navy-wide standardized water survival training syllabus. Several new water survival instructional devices will be introduced in the next three years. Especially important will be the procurement of current issue life support equipment to enhance the overall training systems concept.

• SAR. Two major CNO-sponsored SAR conferences have taken place within the past six months. Recommendations made at these conferences are being implemented. Chapter VII of OpNavInst 3710.7J establishes HC-16 as the SAR ATMM and HS-1 as the ATMM for the SAR swimmer curriculum. Other requirements identified called for implementing standard equipment lists, one for overwater and overland rescue personnel, the other for rescue helos, surface ships and rescue boats. Various needs of combat and medical SAR equipment, along with specialized – including medical – training for both line and medical personnel, were formalized. Implementing actions were assigned to the cognizant commands.

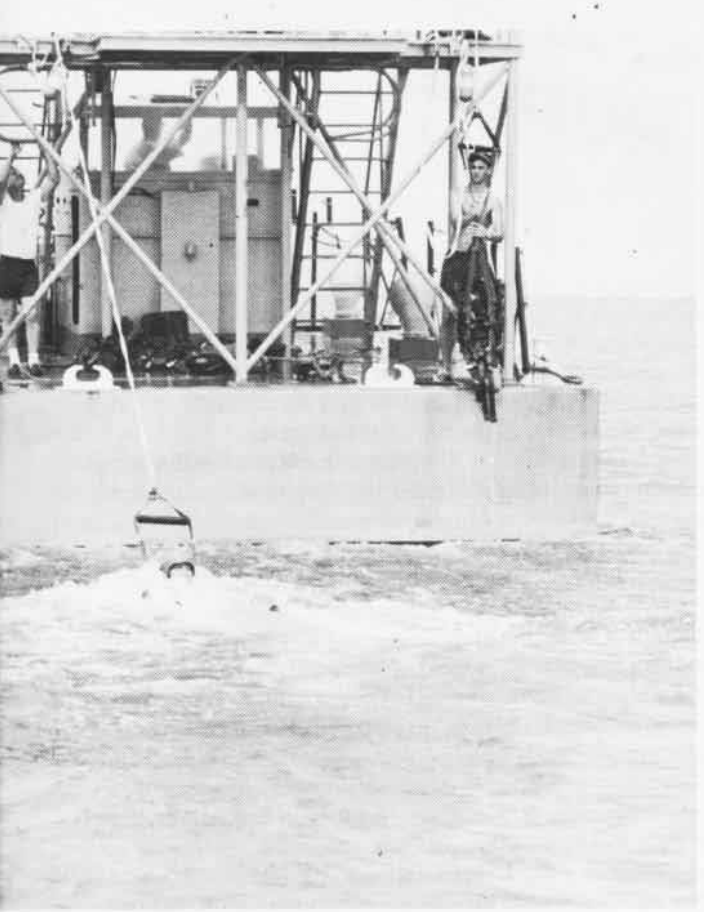
Improvement in Natops. A recent NavAirSysCom study noted that, despite large-scale improvements in ejection hardware since 1971, ejection survival percentages have remained nearly constant. It further noted that, of the four phases in the evolution, (pre-egress, egress, descent and survival/rescue), the first and last phases, which contain the highest human factor, also measure lowest in total system reliability. The study concluded that the total system performance was more sensitive to human improvement than to hardware improvement.

Under ASEP, the Chief of Naval Education and Training will be coordinator for aviation physiology and water survival training programs. Water survival instruction, such as parachute drag training shown here, will be under the purview of the Naval Aviation Schools Command.

Emergency sections of Natops manuals as the primary source of user information on ejection philosophy and procedures have been carefully analyzed. It was found that presentation methods not only vary greatly between manuals but preparation of the emergency portions are generally not up to current state-of-the-art practices. Procedures are presented in a random, informational manner rather than being structured for decision making. Sequenced evolutions are given in excess detail and illustrated with pictures not associated step by step with the description. In short, presentation techniques appear to be out of date.

Supporting the conclusions, an experiment was conducted during which the T-2 Natops ejection procedure presentations were redesigned employing state-of-the-art methods. Two groups of basic flight students were selected. One group studied the standard Natops ejection presentation. The other studied the revised presentation. Both groups were tested. The results showed, in all cases, that the new write-up increased significantly the user's awareness of seat limitations and procedures needed to operate the hardware. This surely should lead to improved aircrew survivability.

As a result of this study, a two-phase program will be initiated. The first involves analyzing and, as necessary, rewriting of the MilSpecs which govern Natops manuals to ensure standardized formats and utilization of state-of-the-art presentation techniques. It will also provide a model Natops manual to guide standardization of other manuals. The second phase will endeavor to revise emergency sections of the various aircraft Natops manuals. Care will be required in order to coordinate revisions with other innovations in technical manuals, simulators and instructional systems development.



New Training Initiatives. In order to prepare flight personnel adequately for the stresses of flight, DCNO(Air Warfare) has directed the procurement of several new training devices. These will be put into service at Navy and Marine Corps air stations throughout the country.

- Underwater helicopter escape trainer (9D5). Already under testing at Pensacola is a trainer for underwater helicopter escape. This Dilbert Dunker with a difference will provide egress training for helicopter aircrewmen and is the first of several such trainers to be procured.
- Spatial disorientation demonstrator. The first single-place vertigo demonstrator was recently delivered to the Aviation Physiology Training Unit at Norfolk. The trainer is designed for periodic vertigo indoctrination. If the one-year test results of this first device are satisfactory, the Navy will buy follow-on units for the major aviation physiology training sites.
- Parachute drop and disentanglement trainer (9F6). This device will be delivered early in 1979. The name is self-explanatory. The trainer will fill a long standing need. Follow-on trainers will eventually be put into use at all Navy and Marine water survival training sites.
- Multi-station spatial disorientation trainer. In early 1980 the preflight phase of undergraduate flight training at Pensacola will utilize a spatial disorientation trainer at the Naval Aerospace Medical Institute. This multi-station device will provide the first taste of flight vertigo for prospective flyers.
- Simulated ejection parameters measurement. In late 1978 a prototype ejection parameters measurement system will be installed in the TA-4J flight simulator at NAS Oceana. The system will evaluate the success or failure of ejections in simulated emergency situations and will heighten awareness of how quickly the safe envelope erodes in certain flight situations. After initial evaluation, it will be retrofitted into all flight trainers capable of simulating ejections. Look for this in mid to late 1979.

Clearly, there is high level advocacy for ASEP. It exists in the person of a top Naval Aviator, DCNO(Air Warfare), supported by a steering committee, a program coordinator and many other individuals who are aware of the program's importance. Anyone wishing to make suggestions or correspond with OpNav on this subject may call, autovon 225-2623, or write:

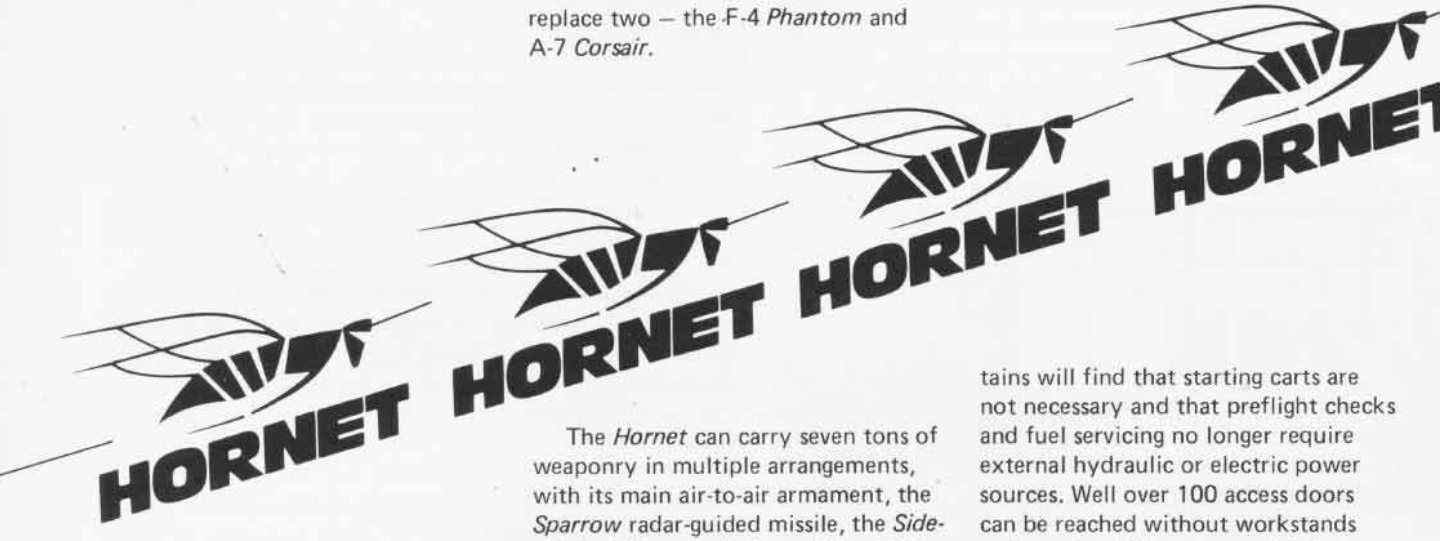
ASEP Coordinator (OP-50C)
Office of Chief of Naval Operations
Navy Department
Washington, D. C. 20350

F/A-18

The U.S. Navy and Marine Corps F/A-18 *Hornet* strike fighter will fly for the first time this fall. Its maiden journey will culminate an unprecedented, long-range design effort and inaugurate an aircraft which will help perpetuate Naval Aviation strength for the years to come.

No doubt about it, the *Hornet* is a nifty airplane with punch. It has two engines, twin tails and a leading edge extension on each wing for extraordinary maneuverability at high angles of attack.

Hornets will be used for two basic operations in the fleet and Marine Corps escort fighter and light attack missions. Thus, one basic aircraft will replace two – the F-4 *Phantom* and A-7 *Corsair*.



The *Hornet* can carry seven tons of weaponry in multiple arrangements, with its main air-to-air armament, the *Sparrow* radar-guided missile, the *Sidewinder* infrared missile, and the M61 20mm cannon. The *Hornet* has a top speed of about Mach 1.8, a 50,000-foot combat ceiling, 400-nm radius for fighter escort missions, and a 550-mile radius for close air support purposes. With external tanks installed, ferry range is 2,000 miles.

Maintainability, Reliability and Survivability have been prominent factors in *Hornet* development, emphasized from the outset of the program. For example, an 11 to 1 direct maintenance man-hour per flight hour ratio is a goal, along with an 80-percent operational availability rate.

Four technicians can change a *Hornet* engine within the shadow of the plane in less than 30 minutes. The radar rolls forward on a slide rack and can be replaced in about 20 minutes.

BIT (built-in test) should bring smiles to the Group IX folks. Panels in the nosewheel well are connected with sensors throughout the aircraft to show if and where a problem exists in the avionics, landing gear, fuel and power plant systems. In the problem area itself, the malfunctioning component bears a "red flag." In the air, the procedure is similar except that the pilot gets discrepancy information through cockpit visual displays.

The line chief and his plane captains will find that starting carts are not necessary and that preflight checks and fuel servicing no longer require external hydraulic or electric power sources. Well over 100 access doors can be reached without workstands and another 100 are accessible from the top of the aircraft.

The *Hornet's* F404-GE-400 engines are in the 16,000-pound-thrust class. Although its power output is similar to the J79, the F404 weighs half as much and has 7,700 fewer parts. Extensive testing shows the F404 has excellent afterburner operation, air-start capability and stall margin. A smokeless engine, it emits a low infrared signature, making detection by enemy aircraft more difficult. The engine casings are designed to contain compressor and turbine blades if failure of either occurs.

Reducing pilot workload to allow efficient one-man operation dictated

the need for a well-integrated cockpit and the F/A-18 has a superb one. There is a concentration of displays, and control functions are within easy reach. Cockpit visibility is excellent. For example, the right vertical stabilizer is visible over the pilot's left shoulder. Cathode ray tubes and information controls replace most traditional gauges. The head-up display projects flight and target information onto a clear screen at eye level. HOTAS (hands on throttle and stick) incorporates all critical switches on either the throttle or stick. Virtually all *Hornet* sensors can be managed with HOTAS, including radar mode switching, air-to-ground sensor operations, weapons moding and target designation.

The *Hornet's* multimode radar has several methods of detecting and acquiring airborne targets. It also guides the *Sparrow* missile. Air-to-ground ranging is available along with forward-looking infrared and laser spot tracker systems which aid in finding and attacking ground targets with guided or unguided weapons.

Control-by-wire blends basic aerodynamic characteristics with the pilot's commands for smooth handling. Two digital computers are the heart of this system. The *Hornet* approach speed is a comfortable 132 knots down the glide slope at six to seven degrees angle of attack.

Survivability and "get home" features are well designed in the *Hornet*. There are self-sealing fuel tanks (fuel is carried in four bladder-type internal tanks in the fuselage and in the wings), built-in fire extinguishers, foam in the wing tanks to suppress explosion, filler foam in the fuselage for fire suppression and such devices as the hydraulic reservoir level sensing system. This hydraulic sensing system automatically detects hydraulic leaks, isolates them and allows operation throughout the rest of the system. Among the many redundancies built into each *Hornet* is a mechanical backup for the flight controls.

The Naval Air Test Center F-18 Program Office is preparing to support the *Hornet* full scale development program at Patuxent. After initial contractor test flights in St. Louis, the first F-18 will be flown to Patuxent River in early 1979 to continue contractor testing. Ten additional F-18s will be delivered to Patuxent during 1979 to support both the contractor's and Navy's flight evaluation programs. A flight team from VX-4 will also conduct initial operational test and evaluation flights in the aircraft at Patuxent River.

A consolidated fenced-in hangar complex at the Naval Air Test Center is now being readied to support the F-18 development program. It will feature support facilities for both contractor and Navy flight test personnel, in keeping with the single-site testing concept.

NATC is programmed to get additional *Skywarrior* tanker, *Skyhawk* target and *Phantom* chase aircraft to support *Hornet* test operations.

The Navy and Marine Corps have ordered 811 *Hornets,* including twin-seat versions for training purposes. McDonnell Douglas is the prime contractor and is building the forward fuselage, cockpit, wings, horizontal stabilizer, landing gear and arresting hook.

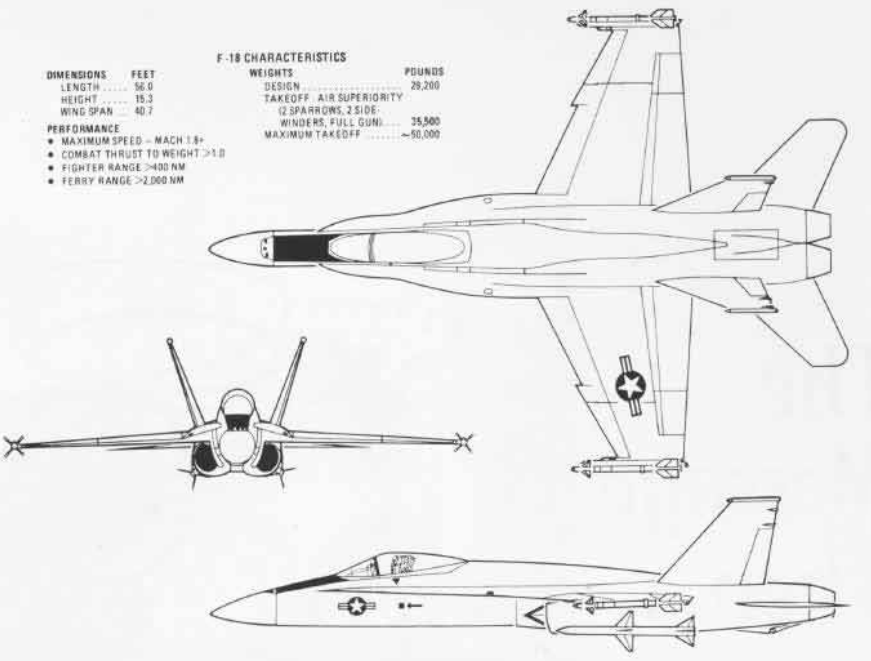
Northrop Corporation is building the main structural section of the airframe, including the center and aft fuselage and vertical fins. Northrop also will handle hydraulic, fuel, environmental control and secondary power systems, as well as engine installation. General Electric is providing the power plants. McDonnell Douglas will make final assembly of the aircraft at its plant in St. Louis where the initial flight will take place.

In testimony before the Defense Subcommittee of the Senate Appropriations Committee last March, Vice Admiral F. C. Turner, DCNO (Air Warfare), commented, "This is a highly important aircraft to all in Naval Aviation. It is planned to replace all Marine

HORNET

Corps F-4s, some Navy F-4s and all Navy A-7s. The *Hornet* embodies our philosophy to have reliability and maintainability designed into the system at the very beginning. Arrival in the fleet will mark the first new airframe introduction to our carrier air wings in over 10 years.

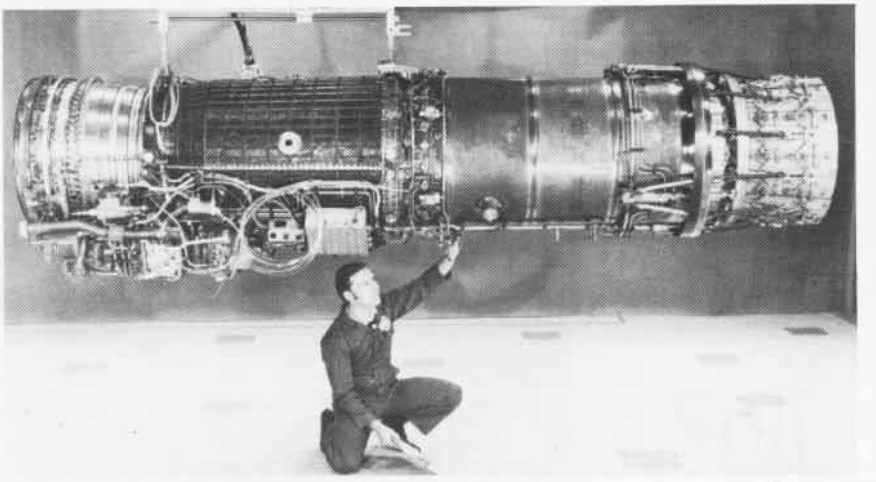
"We are very excited about the reliability and maintainability we see



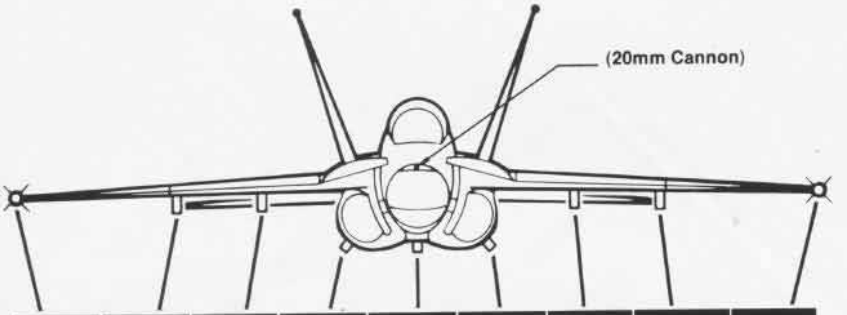
coming in this aircraft," added the admiral.

In testimony later that month before the Tactical Air Power Subcommittee of the Senate Armed Services Committee, he said, "Stalls and departures from stable flight have been a concern to us for modern aircraft. This one looks like it is going to be a jewel in that regard, in terms of safety."

The F/A-18 *Hornet,* with its multimission strike fighter capabilities, is destined to provide the Navy and Marine Corps with superb operational flexibility.

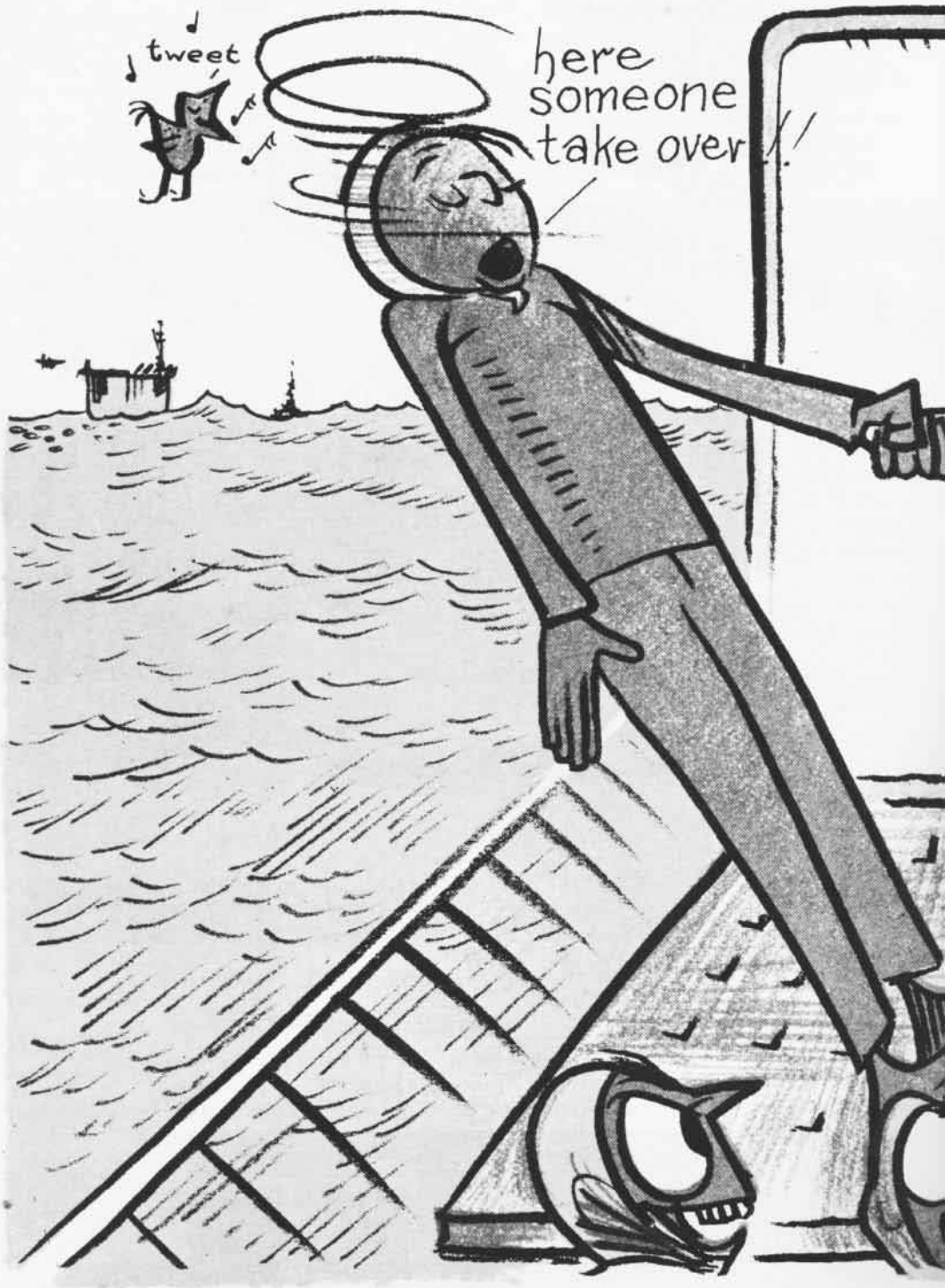


F404 engine



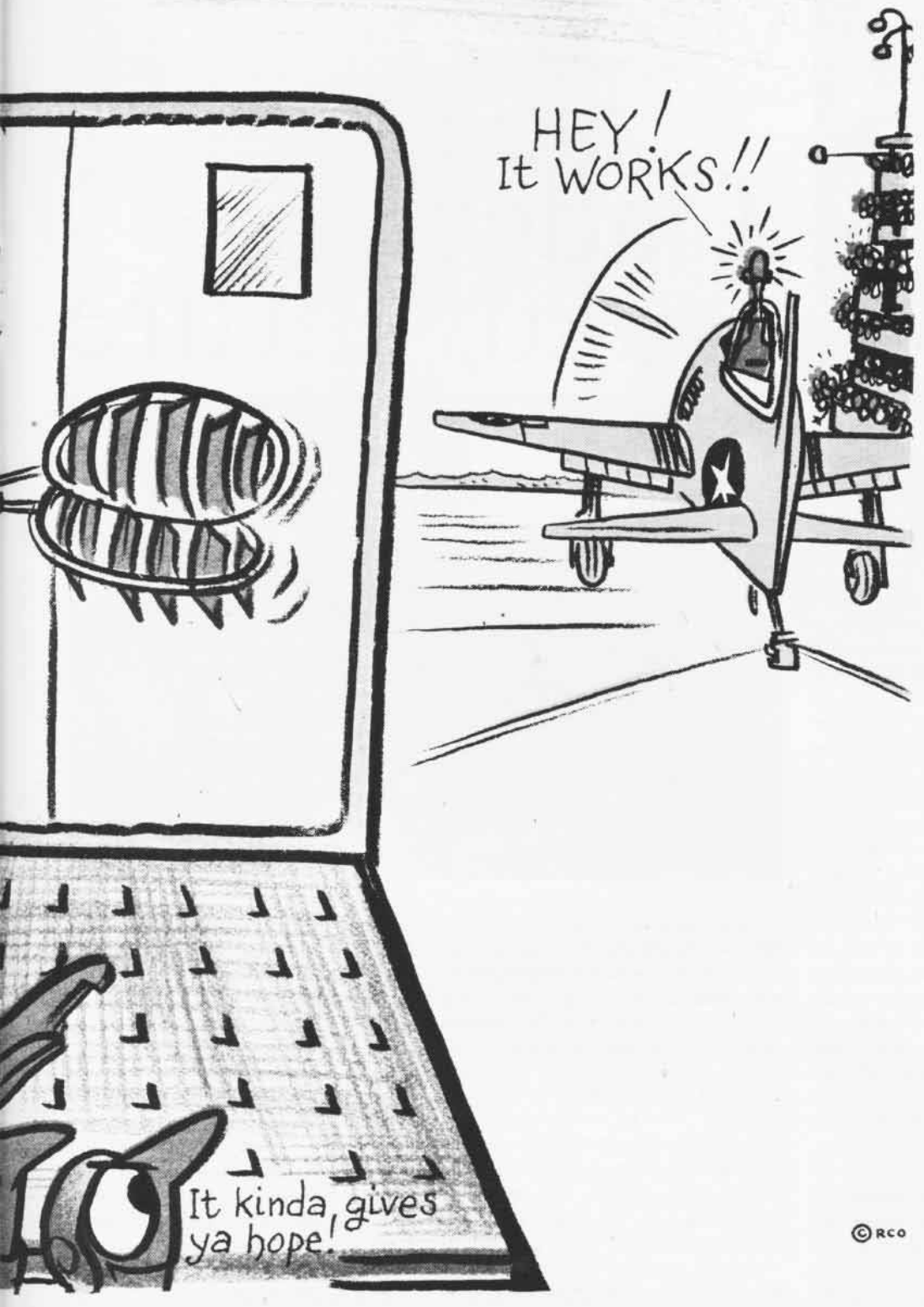
AIM-9 300 lbs.	2350 lbs.	2500 lbs.	500 lbs.	2400 lbs.	500 lbs.	2500 lbs.	2350 lbs.	AIM-9 300 lbs.
Sidewinder Only	Sparrow or Sidewinder or Ordnance	300 gal Tank or Ordnance	Sparrow or LST Pod	300 gal Tank or Ordnance	Sparrow or FLIR Pod	300 gal Tank or Ordnance	Sparrow or Sidewinder or Ordnance	Sidewinder Only

The Message Then...



See page 2.
Recall to Duty

The fainting! The yells of joy! The c
apply the tips the L.S.O. gives him al



...Still Applies

©RCO

ew's pride when Dilbert begins to
out landings!

U.S. NAVY
TRAINING DIVISION

By Lester M. Cisniewics

Sea Cadet Adventure

Naval personnel often ask who Sea Cadets are and what they do. Sea Cadets are young men and women between the ages of 14 and 18 who seek experience, adventure and technical training. They earn advanced instruction in the Sea Cadet Corps which is recognized by the Navy should they later decide to join. The training is based on the reserve program which includes two cruises during the summer as well as various correspondence courses.

The two-week Airman School, first held in August 1975 at NAS Glenview, was devised to teach cadets aviation by actual experience. Staff instructors were obtained from several services.

Before cadets can attend the school, they must complete a two-week boot camp, qualify as third class swimmers, be E-3s and provide their own transportation and messing fees. Students, who also include Canadian cadets on exchange programs, come from as far as California and Maine.

For the 1977 session, instructors and flights were provided by VPs 60 and 90, VR-51, the Marine air reserve training detachment and the Glenview Coast Guard.

Instructors followed a group of cadets and listened to their comments during 13 days of classes, which included physical training, time in the C-118 simulator, aircraft familiarization flights and land-sea survival courses.

The school began on Sunday evening after the cadets were introduced to their company officers – one a Canadian drill instructor and one an ensign. Here is a cadet's version of the initial session:

"The first day was the hardest, what with the fearless Canadian DI who stood like the Eiffel Tower, and then that ensign. Discipline was demanding, but the ensign showed us that nothing was impossible – from running three miles to flying airplanes. Somehow he always knew what we were doing and thinking. The ensign was a great teacher."

Monday morning, 0530 reveille and then PT class, accompanied by company officers. Muster and colors at 0800 and off to class for a welcome aboard speech by the aviation technical training officer. Morning classes described aircraft aerodynamics and functions. In the afternoon, cadets were introduced to various types of aircraft. Evening classes commenced at 1900 and ended at 2100 with water survival – life-raft drills, swimming in aviator equipment and qualifications for first class swimmer.

Tuesday classes were in aircraft instruments, fire fighting and first aid. On Wednesday, the cadets were briefed on aircraft safety and hand signals and attended management classes. Students then proceeded to the flight line to direct and tie down aircraft. On Thursday and Friday, they studied power plants, electrical circuits and hydraulic systems, flew in the C-118

Opposite page, helmeted Cadet Chris Skafidas is ready for a flight and Cadet Les Brown runs through a preflight on a C-130. Left, Capt. Clark, C.O. of NAS Glenview, presents citation to Cadet Pasnich. Below, cadet water survival training.

simulator and received water survival and aviation equipment instruction from the Coast Guard.

Another cadet's reactions after simulator instruction:

"This was just supposed to be a training flight in the C-118 with a little stick time, but at about 24,000 feet when my #4 engine lost oil pressure, I feathered the prop, rang the alarm bell and put the plane into a glide. At 20,000 feet, #3 engine blew up and caught fire. I started the plane down in a circle to the left, keeping the two good engines down. By the time I reached 12,000 feet, the fire light was still on. At 10,000 feet, #2 sputtered, backfired and quit.

"Control was nearly impossible. With my hands full, I gave the order to restart #4. By 1,000 feet it was working at full power with all the red lights on. Keeping the nose up for four or five more miles, then dropping the flaps and landing gear, we touched down.

"However, we landed at the wrong airfield. Getting out of the seat, with my clothes wet with perspiration, it was Miller Time. I mean, Cadet Miller was next to fly the C-118 simulator."

Saturday the cadets went to Fort Sheridan to visit the Army survival museum, then to Great Lakes for lunch, after which they had target practice with M1s. By midafternoon the last shot was fired and they were off to the harbor. Putting on life jackets, they climbed into a landing craft and cast off lines. They were dropped at the farthest end of the harbor. Students and instructors made their way back under the guidance of the landing craft and a Coast Guard helo.

Returning to the air station, they marched 10 miles around the base perimeter, put up tents and feasted on K rations. Evening classes included discussions on the use of flares with signal guns.

Sunday was a day of rest, a chance to see the *Blue Angels* and take liberty.

The second week of training started with Monday walk-throughs and lectures in ground control approach, meteorology and paraloft. Tuesday and Wednesday were spent working in an actual aircraft intermediate maintenance department and GCA shop.

Tuesday was special for five cadets. Earlier arrangements had been made with the 9th Naval Recruiting District to grant five hops in a T-34. Each student studied the Natops manual and anxiously waited his turn. After the flights, the pilot's grin told the story: the first three cadets came back with white faces; the fourth had a problem landing when his stomach caught up with him; but the last cadet, an intrepid soul, asked if there was enough gas to go again.

Thursday classes were presented by the Marines: lectures on ground support, followed by helicopter rides.

On Friday there was a final exam, graduation and an awards ceremony in the afternoon. By evening the barracks were vacated. Only empty lockers and bunks remained. Empty, that is, until until the next training session.

By Helen F. Collins

Naval Air Station, Willow Grove, Pa., is a major reserve training facility serving the six-state mid-Atlantic region of Pennsylvania, New Jersey, New York, Connecticut, Delaware and West Virginia. Lying about 20 miles north of Philadelphia, it is one of many similar activities near major population centers which maintain the Naval Air Reserve in a state of combat readiness.

A large portion of the land on which the air station stands was once Pitcairn Airfield, built by Harold F. Pitcairn, who brought the *Autogiro* to America and developed it as the first commercially successful rotary wing aircraft. Between 1929 and 1943, 12 different *Autogiro* models were manufactured and flown from the field. Pitcairn also designed and built conventional airplanes, the best known one being the *Mailwing*.

About the time that Pitcairn was building his airfield in 1929, Naval Reserve Air Base Mustin Field was being established at the Philadelphia Navy Yard, staffed by 53 enlisted men and 16 officers with 4 seaplanes and 7 landplanes. The unit was from the training school in Rockaway, N.Y., which had been closed.

The Naval Air Reserve Force today bears little resemblance to the units of the Naval Reserve Flying Corps of 1916, made up largely of college men from Yale, Harvard and Princeton. When WW I began, Naval Aviation was in its infancy and there were few reserve pilots. As the war gained momentum, college men became interested and formed reserve units which, because of the lack of funds, existed only because their members donated their time and abilities, often using facilities supplied by local citizens. This had been the beginning of the Naval Aviation unit which became Naval Reserve Air Base Mustin Field. It was the center of all reserve aviation in the Philadelphia naval district.

As the shadow of the war in Europe hung heavily over the U.S. in 1939, NRAB Mustin Field became a primary flight training unit, at first to screen applicants for the aviation cadet program, later to provide operational instruction in combat team tactics, gunnery, bombing and rocket firing. When America was finally caught up in the war and the need for pilots became urgent, expansion was a must and the government bought land in Horsham Township, north of Philadelphia,

which included Pitcairn Airfield. The personnel at Mustin, 250 strong, moved, with their equipment, from the Philadelphia Navy Yard to the new station. With 30 N3N *Yellow Perils* they pursued their mission of primary flight training.

The local post office supplied the station's first name when it was commissioned NAS Hatboro on January 1, 1943. But when the volume of air station mail was about to burst the seams of the tiny Hatboro post office, mail was re-routed through the Willow Grove post office and the station became NAS Willow Grove about six months later.

The air station received a new mission early in 1943 when it began training combat squadrons for wartime duty aboard carriers. Six squadrons passed through Willow Grove on their way to war. Their training paid off aboard *Princeton, Independence, Cowpens, Monterey, Belleau Wood* and *Cabot.*

Willow Grove came under the operational control of BuAer in October 1943. Its major task was to modify the PV-1 *Ventura* patrol bombers. New ASD radar equipment was to be installed for the first time in service aircraft, which then had to be flight tested. By the following May, 345 installations had been completed. Before the end of that year, the air station also became a terminal for the Naval Air Transport Service, which used its facilities until March 1946.

In April 1944, the station became part of a BuAer prototype program in which BuAer assigned projects and provided the necessary aircraft and equipment for them. The station made items to order, installed them and flight tested the gear involved in each project. While this program was still going on, a detachment came on board to install rockets on fighter planes, including F6F *Hellcats.*

Many of the station's activities were phased out when the war ended but others continued unabated. Reserve training again became its primary function and Willow Grove was designated a reserve training station on December 1, 1945, under the Chief of Naval Air Reserve Training. Squadrons were commissioned and the number of reserve officer and enlisted personnel grew in the wake of a major recruiting drive. Aircraft arrived, together with equipment, engines and spare parts.

The first jet, an FH-1 *Phantom,* was delivered on September 24, 1949, making the air station one of four in the air reserve command flying turbine as well as propeller aircraft.

When the Korean War began and then escalated, Willow Grove reservists were called up, together with other Weekend Warriors – VP-931 in September 1950 and VMF-451 and VS-931 the following year. Vice Admiral H. M. Martin, Commander, Naval Air Force, Pacific Fleet, wrote to Rear Admiral L. A. Moebus, CNAResTra, saying in part, "... I am likewise firmly convinced that never before has our country realized such dividends from a peacetime training program." During the Korean War, under the mutual defense assistance program, Willow Grove was designated one of two naval air stations to train Royal Netherlands Naval Air Force crews.

As the Korean Conflict came to an end, modern fleet aircraft began to appear in the Naval Air Reserve. Runways had to be lengthened to accommodate them. More land was acquired and the construction enabled the station to handle any kind of aircraft. As a new hangar neared completion, the old tower and operations building burned to the ground, saving the Navy demolition costs.

Just before the Berlin crisis in 1961, the Air Force Reserve and the Pennsylvania Air National Guard moved into their combined facility next door to the air station, a move which created a large military complex at Willow Grove. When the Berlin blockade began, Willow Grove reservists of VP-933 and VS-935, some veterans of both WW II and Korea, deployed with the fleet. They were

Marines demonstrate vertical insertion tactics.

gone almost a year before they picked up the threads of their normal lives again. Speaking of this recall, the Honorable Carl Vinson, Chairman of the House Armed Services Committee, said, "These reserves were ordered to active duty to prevent a war, not to fight a war."

Although the reserves were not mobilized during the Cuban crisis in October 1962, reservists on their annual active duty training cruises flew hundreds of flight hours, many on surveillance missions.

Willow Grove reserve squadron VF-931 was called to active duty in January 1968 close on the heels of the Tonkin Gulf incident. It was released nine months later without seeing any carrier duty. However, for the next 10 years, during the Vietnam Conflict, Willow Grove VR aircraft made regular flights into South Vietnam with personnel and cargo.

Through the years, apart from their military commitments, Willow Grove reservists helped their neighbors and the civilian community in storms, floods, fires, accidents and other emergencies. During one snowstorm, reservists not only rescued people and carried food to stranded families, they also delivered two babies when the expectant mothers were unable to get to a hospital in time. After disaster relief operations in *Hurricane Agnes,* 19 members of the reserve support team were awarded the Navy Unit Commendation.

Reserve training expanded, during the years that followed Vietnam, as reservists signed up and units were added. And although its mission remains basically unchanged, the Naval Air Reserve has kept pace with modern defense requirements. On its 50th anniversary, the State of Pennsylvania adopted a resolution and the City of Philadelphia drew up a citation, both stating their appreciation of the Naval Air Reserves in general and Willow Grove reservists in particular.

Aboard the air station today are Navy reserve squadrons VPs 64 and 66, and VR-52. There are also a number of support and non-tactical units, the Reserve ASW Tactical School and the MARTD which supports elements of the 4th Marine Aircraft Wing (VMA-131, H&MS-49, MABS-49, HMH-772 and MATCU-73). The air station meets the needs of its Navy and Marine reserve units, training their pilots, aircrewmen, mechanics and support personnel. In addition, it is host to weekenders from the other services who use the air station to maintain and update their military skills — Air Force 913th Tactical Reserve Airlift Group, 79th Army Reserve Command, and the Pennsylvania Air National Guard 111th Tactical Air Support Group. About 8,000 reservists train aboard each month, a well-trained, combat-ready reserve force.

The Reserve Antisubmarine Warfare Tactical School (ResASWTac) at Willow Grove had its beginning in the airborne electronics training division that was formed in 1951. The division proved to be so valuable in keeping reserve VP and VS aircrews up to date with the then exploding technology of ASW that it evolved through several stages into the school which was established in 1957. It is the only school in the Navy which provides operational and maintenance training in airborne avionics.

The school maintains and updates combat readiness with hands-on training, providing instructional support to 3,000 students each year. Most of the trainers were built and put into operation by the school. They include:

- DIFAR (direction low-frequency analyzer and ranging) trainer. By using acoustic training tapes, AW students become proficient in *Jezebel*-gram analyzation and extraction of tactical data.
- Radio trainer. A 12-position device for both new and advanced operators.
- Tactical navigation trainer. An eight-seat installation that is useful for all types of tactical problems.
- Tactical coordinator trainer. Built around three Tacco and four navigation positions, for all phases of training from knobology to running complete tactical problems. This trainer is a must for P-3C Taccos as well as non P-3 navigators transitioning to P-3As and Bs.
- Sensor station three trainer, a four-seater. The ESM (electronic support measures) can display all types of intercepts, the MAD system is completely operable, and the radar indicates up to six targets. It can be used for preflight, trouble-shooting and maintenance instruction.
- Team trainer. Completely home built, for the entire tactical crew including flight communicator and ordnance stations. The crew can run through an entire mission without ever leaving the ground. The trainer is set up for crew coordination, personnel qualification standards and for practicing ASW qualifications before attempting them for readiness grading.
- Celestial navigation simulator. The newest addition to the inventory.

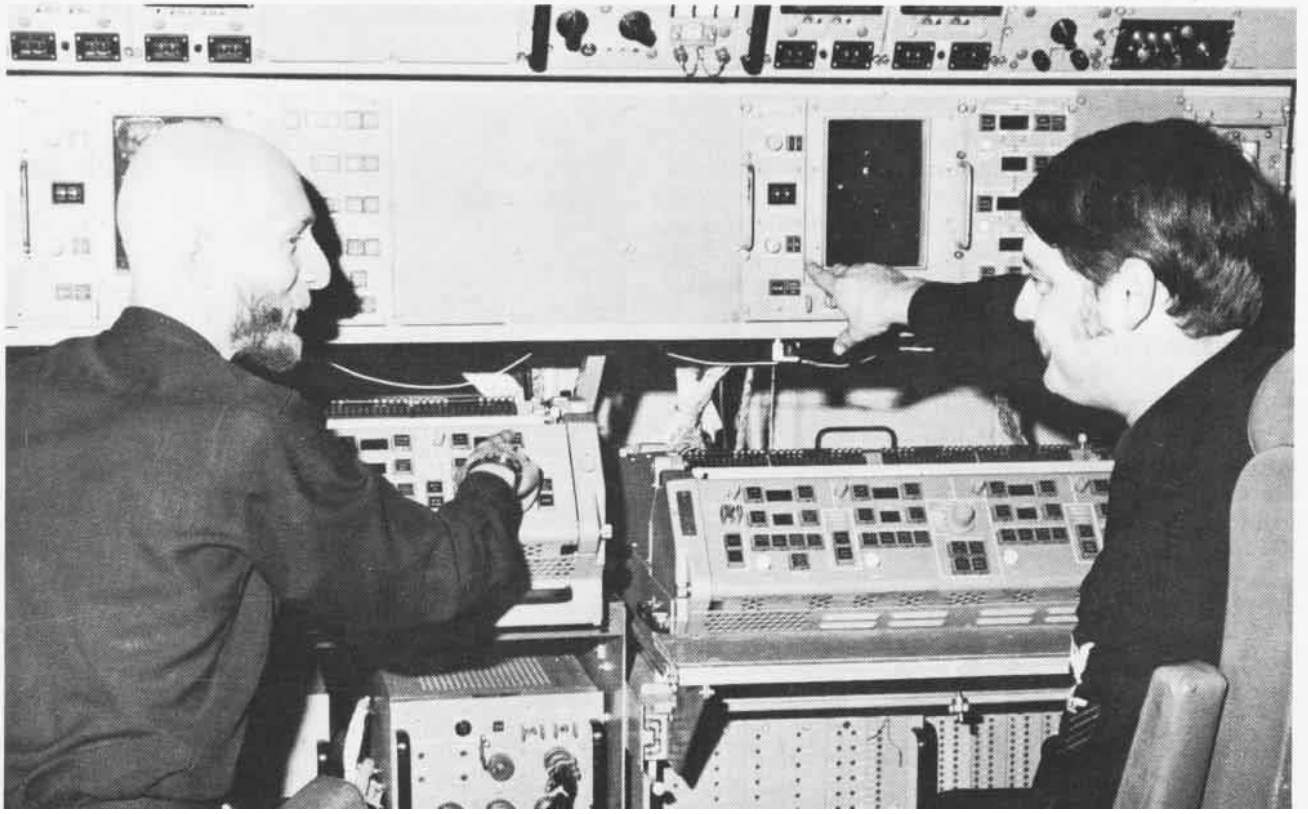
Beyond the trainers, the school has developed a smorgasbord approach to individual qualification courses. Any member of an ASW tactical aircrew can review his qualification records and pick the courses he needs.

The school is also the home of the CNavRes Natops team, established in 1974 to evaluate the 13 VP squadrons and 26 VP augmentation units of the Naval Air Reserve. This team of highly qualified individuals maintains its aircraft qualifications by alternating its annual check with the ComNavAirLant and ComNavAirPac Natops teams.

In order to provide current information to reserve VP squadrons preparing for their annual cruise, the school offers OP-11 briefs. These briefs are a combination of seat position refresher training and operational information at a unit's active duty training site. The OP-11 courses are offered on a seven-day-a-week schedule because of the constant demand for them from the reserve VP squadrons. In addition, all major training devices are made available for use seven days a week.

Thus, the school provides what the reserve VP crewman needs to place him on a par with his fleet counterpart, from his introduction to the gear, through operation and trouble-shooting, to the point where he can handle live targets with the needed expertise.

ResASWTac School personnel work at sensor station trainer.



NAVAL AVIATION NEWS **naval aircraft**

Panther

With the *Panther*, Grumman maintained its position into the jet age as a major supplier of Navy carrier fighter aircraft. The *Panther* never enjoyed the recognition of Grumman's last piston engine fighter, the F8F *Bearcat*, as a spectacular performer. However, it did extend to jets Grumman's reputation for building rugged, effective fighter aircraft.

The F9F series began when development was initiated on the large two-place four-jet XF9F-1 night fighter. Before design work was completed, the XF9F-1 was dropped and the project shifted to the single-place, single-jet XF9F-2 day fighter. The imported Rolls-Royce *Nene* jet engines of the two XF9F-2 prototypes were replaced in production F9F-2s by Pratt & Whitney-built J42 *Nenes*. In the XF9F-3 and production F9F-3s, an Allison J33 replaced the *Nene*. Only engine installation details differed between the -2 and -3 *Panthers*. Permanently attached tip-mounted external fuel tanks were the most obvious change added to all *Panthers* early in the program.

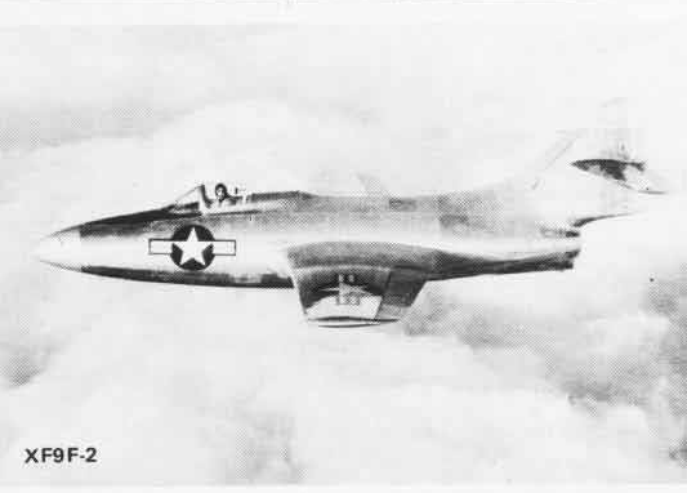
While the first aircraft to see squadron service were the -3s which VF-51 received in May 1949, the *Nene*-powered -2 became the sole production version following early deliveries.

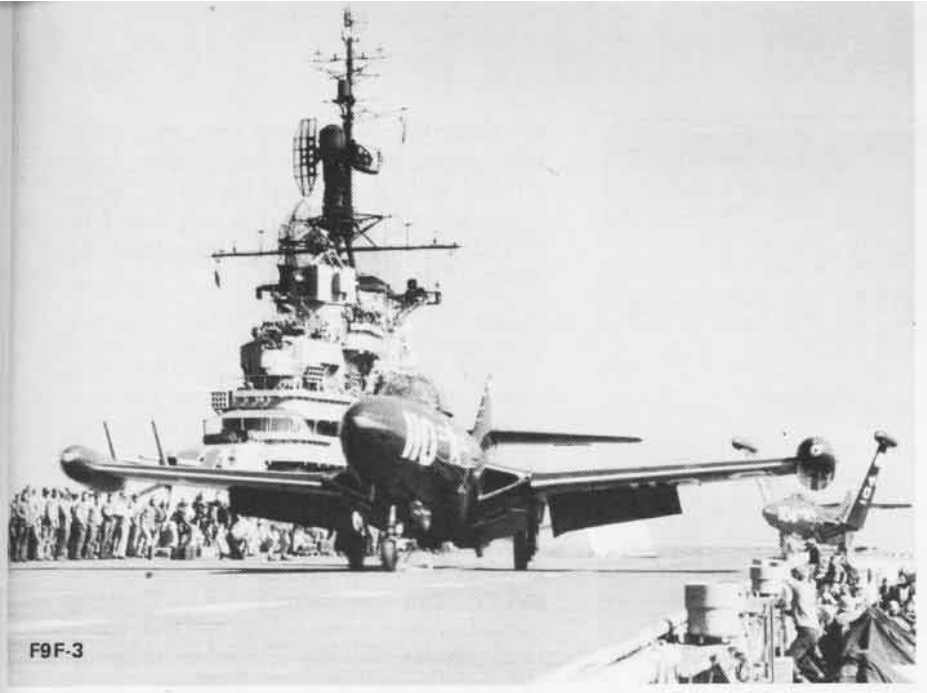
An increased thrust version of the Allison J33 led to the -4 with a longer fuselage and increased area vertical tail. The same airframe with the P&W-produced J48 version of the Rolls-Royce *Tay* engine became the F9F-5; the -5s joined the -2s as the major production versions. Photo versions, the Navy-modified -2P and Grumman-built -5P, also served in carrier air groups of the early Fifties. A total of 1,385 *Panthers* were delivered to the Navy.

The *Panthers* became a mainstay of Navy and Marine forces in Korea. They were the first carrier jets to fly in combat, shooting down two YAK-9s on their first mission in July 1950. Later, in November, LCdr. W. T. Amen, C.O. of VF-111, was the first carrier jet pilot to shoot down a MiG-15.

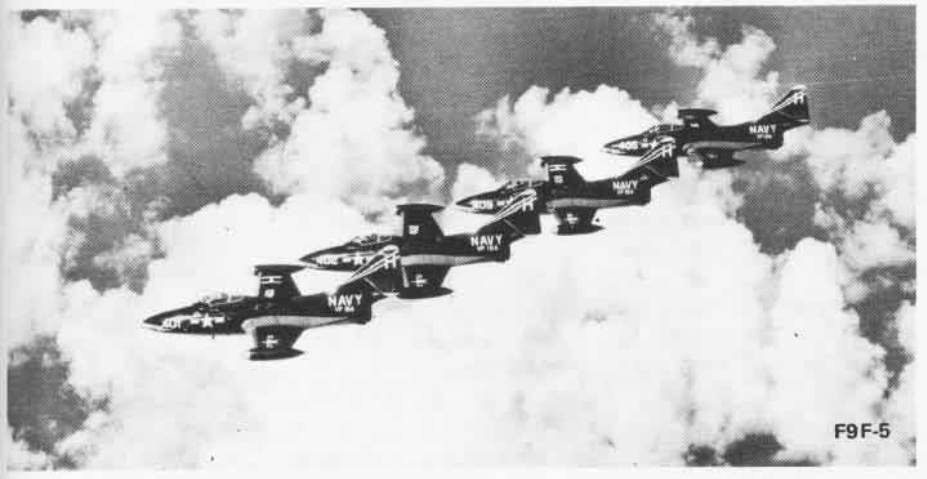
As the -4 and -5 *Panthers* replaced the -2s in carrier squadrons, the -2s took over advanced training, drone/drone control, reserve squadron and other duties, followed in turn by the -4s and -5s as they were replaced by their swept-wing F9F-6 successors (*NANews*, September 1972). The last Marine combat squadrons to use *Panthers* kept their -5s until late 1957, and a few drone control F9F-5KDs remained to be redesignated DF-9Es under the 1962 DOD redesignations.

F9F-2P


XF9F-2



F9F-3

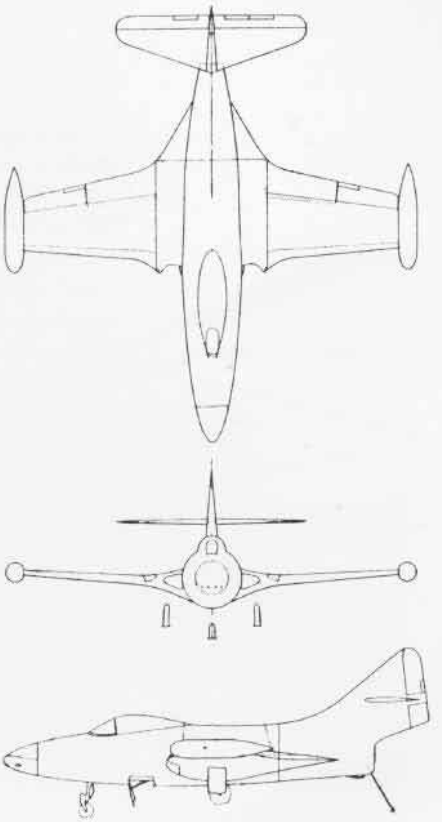


F9F-5

F9F-5P

F9F

Length		
-2,-3		37'3"
-4,-5		38'10"
Span		
-2,-3		38'0"
-4,-5		38'0"
Height		
-2,-3		11'4"
-4,-5		12'3"
Engines		
-2	P&W J42-P-4/P-8	5,750 lbs
-3	Allison J33-A-8	5,400 lbs
-4	Allison J33-A-16	6,900 lbs
-5	P&W J48-P-6	7,000 lbs
Maximum speed		
-2		500 kts
-5		525 kts
Service ceiling		
-2		44,600'
-5		43,900'
Maximum range		
-2		1,175 nm
-5		1,130 nm
Armament		
-2,-3		four 20mm guns Up to four 500-lb. or two 1,000-lb. bombs
-4,-5		four 20mm guns Up to six 500-lb. or two 1,000-lb. bombs



PEOPLE PLANES AND PLACES

The Navy Test Pilot School (TPS), Patuxent River, and the University of Maryland instituted a master's degree program in May 1977 which enables officers to get additional training.

Candidates must be in the top 10 percent of their TPS class and must meet Maryland's graduate school requirements. After selection, they are required to maintain high class ranking.

TPS students usually serve two to three years at NATC after completing 11 months of technical training, then return to the fleet as test pilots. The agreement with the university would interrupt that sequence; the students would attend Maryland for one year, obtain a graduate degree in aerospace engineering or a related field, and then return to the fleet.

The student is responsible for the tuition fee at Maryland but may be eligible for in-service veterans benefits for tuition costs.

The prototype Pave Low III helicopter, developed in-house by Air Force Systems Command's aeronautical systems division at Wright-Patterson AFB, gives the Air Force the capability, for the first time, of rescuing personnel at night and in bad weather. Eight HH-53s will be modified by NARF Pensacola under the program. The first Pave Low HH-53 is expected to be completed by March 1979.

Since arrival in WestPac, VP-19 has received many accolades for crew performance. Representative of this is the Golden Lens award given to Crews Six and Nine for December 1977 and January 1978, respectively.

The award recognizes the expertise of aircrews whose ocean surveillance photography with the *Orion's* KA-74 internal camera system is the best in the task force. Crew Six received the award for its photograph of the Soviet oiler *Aktuba* conducting replenishment operations with two other Soviet ships. Crew Nine was recognized for its photo of the Soviet ship *Protractor*.

Four medals for "heroic achievement in aerial flight" were presented recently on behalf of the President to members of the Lemoore SAR team. The medals were for a high altitude rescue of two injured ice climbers from a small sloping ledge on the northeast face of Mt. Mendel in the Sierra Nevadas.

Capt. L. B. Keely, C.O. of Lemoore, presented the medals to Lt. Kerry Sullivan, pilot of the helicopter; LCdr. Arland Dyer, copilot; crewman Wesley Foster, Jr., and HM William Bethards.

According to the citation, Sullivan flew the helo at the "raw edge of its performance capabilities" while Foster "with no margin for error, directed his pilot three times into a precarious hover," and LCdr. Dyer monitored the aircraft's performance and "at its maximum limit, provided information on obstacle clearance of the aircraft's left side and simultaneously hauled in the belay line used as a safety backup for the hoist." Bethards rappelled 50 feet to the ledge carrying a litter, medical bag and portable FM radio.

The helo hovered while one victim was moved to a safe ledge in a litter. It then returned to make a double hoist of Bethards and the second victim. The first victim was picked up and the helicopter proceeded to a nearby airport where an ambulance waited to transfer the climbers to a hospital.

Two inventive Navy men at NATC Patuxent River have streamlined turbine assembly installation on P-3 *Orion* engines.

ADC J. R. Smith and AD2 Roger Burbeula collaborated to develop the Turbine Express, a transport stand which represents an improved means of handling T-56 engine turbine assemblies. In addition to providing safe transportation to the aircraft site, the new invention incorporates an adapter that accommodates the removed unit. Other features include a drip pan under the adapter and a permanently mounted tool box silhouetted for positive tool control.

The Turbine Express was fabricated from a B-3000 ground support trailer and surplus horizontal rail adapter fitted with locally designed steel adapter plates to accept the

adapter for mounting the turbine.

Cdr. O. L. Gilchrist, head of AIMD, is calling the P-3 community's attention to the idea, citing its low cost and versatility.

In photo, admiring their invention, are ADC Smith (left) and AD2 Burbeula.

While flying from the deck of *America* during their second Med deployment, two aviators from VF-143 marked milestones. Cdr. Jim Lusk recorded his 300th trap in an F-14 and LCdr. Karl Volland, RIO, achieved 1,000 hours in the *Tomcat*.

The *Woodpeckers* of VP-49, led by Cdr. Bob Howard, returned to Jacksonville recently after deployment to Sigonella. The squadron participated in two international exercises, *Isle D'or '77* and NATO's *Sardinia '78*, and two national exercises, *Display Determination* and *National Week XXIV*, while in the Med.

For the second consecutive time, VP-49 was presented the ComPatWing-11 Top Gunner Award for superior ability to execute

torpedo attacks against submarines, and the ComPatWingsLant Top Bloodhound Award for weapons accuracy. The squadron also surpassed 115,000 accident-free flight hours.

Would you travel 3,000 miles each month to attend a meeting? There is a person who does exactly that — SSgt. Robert G. Burns, USMCR.

Burns travels from Fort Lauderdale to Willow Grove each month to drill with HMH-772, where he is NCOIC of the hydraulic shop. He is also a qualified crew chief.

Although there is a Marine reserve squadron located closer to his Florida home, it operates only fixed-wing aircraft. Burns' specialty is strictly helicopters and the nearest base is Willow Grove. He said, "When I travel the 3,000 miles to Willow Grove each month it costs me approximately $130 and I make $123, so you really can't say I do it for the money." He also admits he has an ulterior motive. His parents live in New York City, so he flies to New York on Thursday night, spends Friday with them, then drives to Willow Grove with another reservist.

The Marine earned the Silver Star for heroic action during the Korean Conflict. He also received two Purple Hearts, the first of which he was awarded one year to the day after enlisting in the Marine Corps on April 15, 1952.

Oscar Madison had no cause to celebrate when he and Felix Unger passed their 1,000th hour of togetherness in TV's *The Odd Couple*. Each made the other's life

miserable, for they had no common goal.

Capts. N. A. Collyar and Dave Deats did have a common goal, however, as they took off in their VMA-231 *Harriers* from Cherry Point. Each pilot had 999.8 flight hours in the plane as they moved to the end of runway 32 to practice grass hops on the ground beyond. When they returned, they had achieved their goal – 1,000 accident-free flight hours in the AV-8A.

"The *Harrier* is a great plane for its designed mission of providing close air support," MAG-32's assistant ops officer Collyar (right in photo), emphasized. "It's difficult trying to compare it with other

aircraft in the Corps' aerial arsenal, however, because it's just not the same. The *Harrier* isn't a fighter like the F-4 or a heavy attack aircraft like the A-6, but it is an excellent light attack jet because it's so versatile."

Deats, VMA-231's weapons tactics instructor, said, "I had five years of general aviation experience as a civilian. I found that flying civilian aircraft became monotonous after a while but this definitely isn't the case with the *Harrier*. There's something new to learn about the aircraft every day. It always presents a challenge."

The *Bobcats* of VT-24, Chase Field, exceeded 61,000 accident-free flying hours in the TA-4J, surpassing the previous record held by VT-21, Kingsville. The feat was accomplished while flying the *Skyhawk* in student pilot training.

The squadron also received the FY 1977 CNO Safety Award.

While attached to VT-3 at Whiting Field as an instructor pilot, Ens. Edward C. Gatterdam, USNR, was promoted to Ltjg. This ended an era in Naval Aviation. He is believed to be the last ensign instructor pilot in the Naval Air Training Command.

Under the selected and retained graduate program, certain newly designated Naval Aviators were assigned to duty as flight instructors immediately upon completion of flight training. Recently, however, the increasing needs of the fleet precluded assigning new aviators to the training command, and the program was eliminated. All pilots now being assigned as flight instructors have completed at least one fleet tour and are Ltjg. or higher.

Changes of command:

CinCPacFlt: Adm. Donald C. Davis relieved Adm. Thomas B. Hayward.

VA-25: Cdr. Warner L. Butler relieved Cdr. James B. Hamilton.

VA-34: Cdr. John M. McNabb relieved Cdr. Robert H. Byng.

VA-56: Cdr. R. F. Flower relieved Cdr. R. E. Smith.

VA-93: Cdr. C. S. Vaught relieved Cdr. J. W. Patterson.

VA-105: Cdr. Brent M. Bennitt relieved Cdr. Franklin H. Saunders.

VA-146: Cdr. Larry H. Price relieved Cdr. R. I. Howson.

VAQ-129: Cdr. Kenneth L. Carlsen relieved Cdr. Denis J. Taft.

VAQ-135: Cdr. Mark Oetinger relieved Cdr. Frederick E. Wilmot.

VAW-123: Cdr. Harry E. Meese relieved Cdr. Robert A. Allen.

VF-14: Cdr. Timothy W. Wright relieved Cdr. Francis J. Dougherty.

VMAT-102: LCol. Thomas W. Krimminger relieved LCol. Thomas L. Reeves.

VP-30: Cdr. Craig S. Campbell relieved Cdr. Ronald G. Castle.

VP-48: Cdr. William T. Boyd III relieved Cdr. John W. Ciboci.

VP-62: Cdr. John T. Tate relieved Cdr. Charles E. Combs.

VP-93: Cdr. Richard B. Duxbury relieved Capt. Edward J. Furdak.

RVAH-7: Cdr. Thomas A. Myers relieved Cdr. David R. Sharp.

AIR BOARD

Photo by Harry Gann, McDonnell Douglas, shows A-4Ms from VMA-211, VMAT-102 and VMA-223, and a VMA(AW)-242 A-6E. Units were at Yuma for major training exercises last spring.

The Naval Aviation Air Board held its semi-annual meeting last April at NAS Fallon, Nev. Chaired by Vice Admiral Frederick C. Turner, DCNO (Air Warfare), the conference's main theme was air-launched weapons. A number of other matters were also addressed, however.

In attendance were VAdm. P. N. Charbonnet, Jr., ComNavAirResFor; LGen. L. E. Brown, C.G., FMFPac; VAdm. R. P. Coogan, ComNavAirPac; LGen. T. H. Miller, Jr., Deputy Chief of Staff for Aviation, HQMC; VAdm. F. S. Petersen, ComNavAirSysCom; VAdm. G.E.R. Kinnear II, ComNavAirLant; RAdm. C. J. Seiberlich, Deputy Chief, BuPers; MGen. N. C. New, DepCom, FMFLant; RAdm. B. H. Shepherd, CNATra; MGen. W. B. Fleming, C.G., 4th MAW/MARTC; and MGen. W. R. Maloney, C.G., 3rd MAW.

Although the Board formerly met on an annual basis,VAdm. Turner now advocates twice a year conferences. "I have found that the meetings are of significant assistance to me in focusing on the major issues that confront Naval Aviation. Getting our senior aviation managers to openly discuss problem areas and propose solutions has proven to be a most effective management tool."

"I sometimes feel like Clyde Beatty trying to tame the lions," VAdm. Turner commented after the conference, "but these vigorous exchanges are healthy and immensely valuable."

Highlighting the April forum was a brief on material readiness presented by RAdm. Van T. Edsall, C.O., Aviation Supply Office, Philadelphia. He pointed out ongoing initiatives designed to enhance material readiness. Included in these are an aviation supply control center, repairable asset management offices which, in five months, will be able to track every repairable item in the supply system, and material management centers, similar to the one established for the F-4 at NAS North Island.

Considerable discussion focused on manning problems within the training command. Pilot shortfalls are anticipated due to both instructor and aircraft shortages.

Aviator retention got prime attention. The Navy's and Marine Corps' top flyers are acutely aware of lieutenant and lieutenant commander, captain and major resignations. This migration and the concomitant attraction of airline employment, which is at an all time high, were viewed as serious matters.

Board members agreed that key factors influencing lack of retention were the peacetime environment, with its associated limitations on actual flight time, coupled with generous airline employment opportunities and the monetary compensation associated with them.

To curb the migration, the Board directed examination of the following:

Reinstating proficiency flying,

Aviator monetary bonus,

Increase of "hands on" flight time,

Redesignation of some support billets requiring a pilot officer so that unrestricted (or restricted) line officers of another designator may be assigned to them.

In the safety category, aircrew error, ACM related mishaps, and ground and weapons handling accidents were discussed at length. In the first two areas, increased flight time, it was agreed, might be a partial answer to the problems.

Intermediate level maintenance repair facilities were the subject of a presentation by Cdr. Ray Fox, NavAirSysCom, Code 411A. He reviewed the IMA level organization and offered alternate approaches to increase productivity within aircraft intermediate maintenance departments.

Because of already existing cramped quarters aboard CVs, the Board cautioned that in future procurements of equipment or support material requiring storage aboard ship (including weapons) careful consideration must be given to space requirements. The Board concurred that retention, morale and efficiency of people – our most important asset – suffer when space is not available for at least minimum berthing.

In closing, VAdm. Turner reasserted the need for follow-up action to the Board's recommendations. "It is most important," he stated, "to make things happen."

The Board will meet again next October at a Marine Corps air station, which will be announced later.

A History of Sea-Air Aviation

Wings Over The Ocean

part twelve

By John M. Lindley

Although there were many naval officers who understimated the role of the aircraft carrier during the 1920s and 30s, there were others, such as Adm. Reeves, who believed in the future of the carrier. Unlike the proponents of the battleship, who believed that the next war would be fought by gunnery duels between battle fleets in the tradition of Jutland, Adm. Reeves tried to experiment with new carrier tactics which would free the carrier from the battle line and give it a role as an offensive weapon. The battleship people argued that the vulnerability of the carrier to naval gunfire was a compelling reason against allowing the carrier to act independently of the battle line as *Saratoga* had done in 1929. While admitting that there was an element of vulnerability for the carrier in a possible duel between it and capital ships, Adm. Reeves wanted, nevertheless, to develop a fleet tactical organization which permitted independent carrier operations.

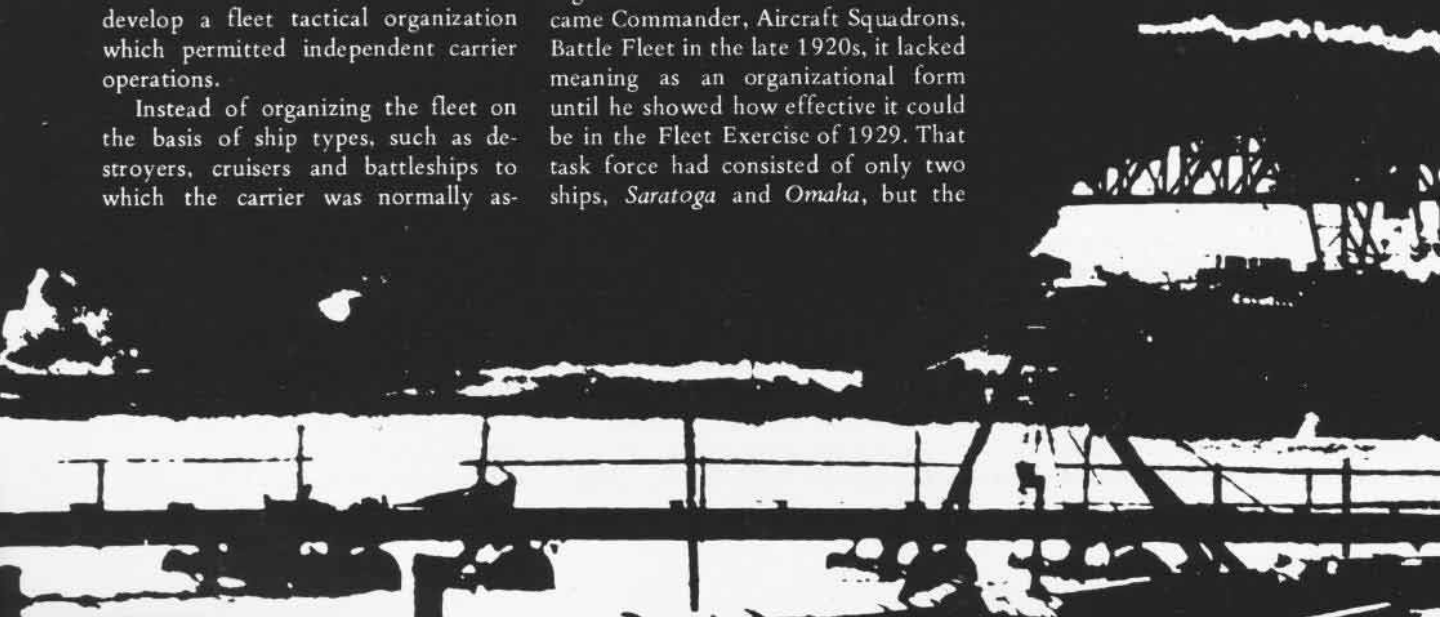
Instead of organizing the fleet on the basis of ship types, such as destroyers, cruisers and battleships to which the carrier was normally assigned, Reeves advocated organizing the fleet on the basis of the particular mission to be accomplished. All the naval forces necessary for this mission would also be under the tactical command of the man best qualified for the assignment. Ordinarily, U.S. Navy ships operated with others of the same type. This meant that, in practice, carriers such as *Langley*, *Saratoga* or *Lexington* were under the tactical command of either the commander of the battle forces or the commander of the scouting forces. Consequently the carriers would be stationed on the disengaged side of the fleet while the different groups of gun ships – battleships, cruisers and destroyers – engaged the enemy.

Adm. Reeves wanted to try a different form of tactical organization which would be based upon the task assigned and not on the ship types involved. This change would mix up the ship types, putting gun ships with carriers, usually with the former screening for the latter. All would operate together under a common officer in tactical command rather than taking their operational orders from the senior officer responsible for their particular ship type.

The assignment of big gun ships and carriers to a common officer in tactical command, in a given fleet operation, had the advantage of combining a concentration of heavy guns with the mobile striking power of carrier aircraft. Together these ships would form what is called a naval task force. Although the concept of task force organization existed before Reeves became Commander, Aircraft Squadrons, Battle Fleet in the late 1920s, it lacked meaning as an organizational form until he showed how effective it could be in the Fleet Exercise of 1929. That task force had consisted of only two ships, *Saratoga* and *Omaha*, but the task forces of WW II would consist of as many as 16 carriers and dozens of escorts.

Even a rudimentary task force organization such as Reeves proposed caused considerable difficulty at first. Fast carriers were built to steam at 25-33 knots, but the battleships built before 1922 could make only 21 knots. Thus they could not generally be assigned to a fast carrier task force. Cruisers and destroyers had the speed to operate with fast carriers, but they had, as Admiral Ernest J. King discovered in 1939, little proficiency in taking screening stations around a carrier. Thus King learned that anytime he had cruisers and destroyers formed-up as a carrier screen, there always had to be plenty of signaling to deal with the confusion that resulted from a lack of doctrine and practice in carrier task force manuevers.

These fleet maneuvers in the late 1930s showed that U.S. Navy carrier doctrine was somewhat uncertain and immature. Despite some problems in the development of doctrine, other carrier experiments at this time were more immediately successful and convincing. *Saratoga*, for example, refueled underway, from a fleet oiler, in June 1939. The ability of the logistics forces of the fleet to provide the fast carriers and their escorts with food, fuel and ammunition would be one of the noncombat triumphs of WW II. The subsequent development of underway replenishment techniques during the war was a very necessary part of



the emergence of the fast carriers as mobile, long-range strategic capital ships.

The problems and controversies raised by the uncertain role of the aircraft carrier in the fleet during the interwar period were neither superficial nor easily resolved. They involved the fundamental direction of development in the major navies of the world. The U.S. Navy was not alone in having these problems. The Japanese Navy, which was also expending considerable effort to develop the aircraft carrier as a weapons system and to integrate it into its fleet, also went through a similar period of uncertainty over carrier doctrine in the 1930s.

Adm. Moffett understood, perhaps better than anyone else at the time, the seriousness and significance of these problems in terms of technology, tactics, organization and doctrine. In 1926 Moffett wrote Adm. Joseph M. Reeves that the way to understand the hostility and criticism of the battleship people toward Naval Aviation was to compare it to the antagonism between line officers and engineering officers in the nineteenth century. Moffett believed that this friction in an earlier period of great technological change in the U.S. Navy "was due to lack of knowledge and therefore lack of understanding. As soon as the line officers took up engineering and knew something about it, the friction and the misunderstanding ceased. It will be the same with aviation, but it will be a long time." In the phrase "lack of knowledge and therefore lack of understanding" Adm. Moffett probably meant personal knowledge and understanding of the principles of the steam cycle and the operation of steam plants on ships. In a broader sense, however, Moffett's phrase also means knowledge and understanding of the function of Naval Aviation, especially the fast carrier, in naval operations; in short, an understanding of fast carrier doctrine. Doctrine provides the fleet with its "heading" in the use of its weapons. Since fast carrier doctrine was immature in the interwar period, the resentment and criticism of the carrier and Naval Aviation in general were hardly surprising.

Moffett not only understood why Naval Aviation had an uphill struggle for acceptance within the fleet; he also saw the impact that aviation would eventually have on the Navy. In a memorandum drafted for the Secretary of the Navy in 1931, Moffett explained that "The basis of power in a fleet is balance. As evolution in naval architecture occurs, the structure of the fleet must be changed in order to maintain this balance under the new conditions. The history of our Navy

Pearl Harbor, December 7, 1941


RAdm. W. A. Moffett

clearly demonstrates this point." For example, the development of the torpedo had meant, Moffett wrote, that "the whole structure of the fleet had to be changed in order to cope with the possibilities of the new weapon." Submarines were built to use torpedoes. Then navies built destroyers to defend against submarine attacks and to fire torpedoes at capital ships. To counter the threat of torpedo attack from destroyers, the naval powers had built fast cruisers. In addition they changed battleship design by adding an armor belt along the waterline of the battleship to reduce the effectiveness of the torpedo. At the same time that these changes had taken place in ship design, navies "entirely revised" fleet tactics to cope with the threat of possible torpedo attacks. "Today," Adm. Moffett pointed out, "we are in the midst of a similar evolution. The airplane has affected fleet tactics to an even greater degree than the torpedo . . . ." Although Moffett did not elaborate on what he saw as the changes which the airplane had wrought in fleet tactics, the experiments with the fast carrier task force in the interwar period were certainly an example of one such change. The admiral's analogy between the changes in ship design and fleet tactics, brought about by the torpedo and the changes caused by Naval Aviation and the fast carrier, is a key insight which helps significantly in understanding the problems of Naval Aviation in the period between the World Wars.

Changes in military technology, such as the introduction of a new weapon like the airplane or the aircraft carrier, subsequently produced changes in ship design and fleet tactics. Similarly, changes in tactics usually resulted in other kinds of changes in military organization, institutions or administration. These relationships may not have been very clear to naval leaders in 1939, but they would soon have ample opportunity to ponder the implications of these developments in the coming world war. Statistics alone gave some measure of the magnitude of these imminent changes. On August 31, 1939, the carrier strength of the major navies of the world stood as follows:

	Completed	Under Construction
Great Britain	7	6
Japan	6	2
United States	5	2
France	1	1
Italy	0	0

By the end of the war the United States alone had 28 large fleet carriers and 71 smaller escort carriers. The British carrier fleet also underwent similar expansion. No navy could add so many combatant ships of this type without also undergoing substantial changes in its organizational structure and tactical doctrines.

Just as ancient cavalrymen had tried to sweep down unexpectedly upon their human foes, and Bellerophon and Pegasus had taken advantage of the mobility which the winged steed provided, so also the Japanese mounted a deadly surprise attack on Pearl Harbor with planes from six aircraft carriers. The Japanese air strike put five battleships of the Pacific Fleet out of action and forced the U.S. Navy to use its undamaged aircraft carriers as capital ships. This near-crippling blow subsequently accelerated the transformation of the great battleship fleets of the United States, Great Britain and Japan into modern air navies, and it marked indelibly the point at which the centuries-old dream of aerial warfare came of age – on both land and sea.

Naval Aviation in World War II

When Hitler's armies rolled into Poland on September 3, 1939, they used the now famous blitzkrieg, a combination of tanks, infantry and tactical air support, to overwhelm the Polish defenders. Less than a week after WW II began in Poland, three British aircraft carriers, *Ark Royal, Courageous* and *Hermes,* went to sea with their escorts to hunt for German U-boats. They scored their first submarine kill on September 14, but U-29 fired two torpedoes into *Courageous* three days later, killing 1,779 officers and men. Following the loss of *Courageous,* the Royal Navy withdrew its large carriers from antisubmarine hunts because of their vulnerability to U-boat attack.

In the winter of 1939-1940 the land forces of Germany and the Allies settled into the "phony war" of no combat; but at sea the pace of operations only slowed. The British Force K trapped the Nazi "pocket battleship" *Admiral Graf Spee* in December in the harbor of Montevideo, Uruguay. When the German commander realized that his ship had no chance against a British force which included the carrier *Ark Royal* and several cruisers, he chose to scuttle his ship rather than take on such overpowering forces. The phony war ended on April 8, 1940, when the Germans invaded Denmark and Norway. During the brief period of combat in Denmark, 16 British *Skua* fighter-bombers attacked and sank the German light cruiser *Konigsberg,* which had been damaged by Norwegian shore batteries. This cruiser was the first major warship to be sunk in combat by the airplane. From Norway and Denmark the German armies stormed into the Low Countries and France. By the end of June 1940,

Hitler controlled key bases in Holland and Belgium, and the French Channel ports. He then ordered the Luftwaffe to destroy the British RAF prior to an invasion of England. Despite heavy losses in aircraft and pilots, the RAF, armed with its *Hurricanes* and *Spitfires* and a new weapon – radar – successfully held off the German aerial siege. The failure of the Luftwaffe to gain command of the air over Britain in the fall of 1940 forced Hitler first to postpone and then to abandon his plans for a cross-Channel invasion. Eventually he turned his attention eastward toward the Soviet Union, which he attacked in June 1941. Again the blitzkrieg quickly overpowered the defenders just as it had earlier in Poland and France.

While Hitler's armies were swiftly moving across the western plains of the Soviet Union, the military leaders of Japan were planning their Pacific Ocean strategy. They decided that in order to secure the necessary oil, rubber and other raw materials in the resource-rich East Indies, they would first have to destroy the United States Fleet at Pearl Harbor and the American and British military forces in their western Pacific bases such as Manila and Singapore. Drawing upon his experience with carrier-based aviation in the ongoing war with China, Admiral Isoroku Yamamoto of the Imperial Japanese Navy developed the plan for the carrier raid on Pearl Harbor. When that plan was executed on December 7, 1941, some 350 Japanese aircraft from 6 carriers sank 4 battleships, severely damaged another 4, and destroyed the bulk of the United States military aircraft on the island of Oahu. American losses also included 2,335 officers and men. Japanese losses amounted to only 30 aircraft and 55 aviators, mostly due to belated American antiaircraft fire.

Almost simultaneously, the Japanese struck southward with attacks on U.S. forces under the command of General Douglas MacArthur in the Philippines, and American, British and Dutch forces on Wake Island, Guam, Hong Kong, Thailand, Singapore, North Borneo, Java and the Netherlands East Indies. The naval highlight of this southern drive came on December 10 when land-based Japanese aircraft sank, with bombs and torpedoes, the British battleship *Prince of Wales* and the battle cruiser *Repulse* off the coast of Malaya. These Japanese G3M *Nell* bombers showed the world that in this war no capital ship would be safe from determined aerial attack unless it had its own aerial defenders and stout antiaircraft fire. Shortly after the British warships were sank, Japanese bombers and *Zero* fighters caught USS *Langley* trying to ferry aircraft to Java and sank her, on February 21, 1942. In April, HMS *Hermes* fell victim to Japanese *Val* dive bombers off Ceylon. Thus, by the end of the first four months of the war in the Pacific, the Japanese had not lost a single major warship while their airplanes had sank five Allied battleships, one carrier, two heavy cruisers, seven destroyers and several other merchant ships, auxiliaries and small craft. In addition they had damaged three battleships and twelve other warships.

The initial German successes in Europe with the blitzkrieg and the Japanese victories in the Pacific with land and carrier-based airplanes emphatically demonstrated the revolutionary use of air power that would characterize WW II. Although the belligerents in WW I had used airplanes in both land and sea warfare, they had not fully exploited the aerial weapon. In WW II, however, both sides tried to make full use of their aircraft on both land and at sea. Thus the Germans had their Luftwaffe and the Japanese their carrier and Army air forces. In Europe, the Allies developed bombers and long-range fighters for strategic bombing of the industrial heartland of Germany. At sea in the Pacific, the United States led the way in developing the fast carrier task force as a means for defeating the Japanese Navy. Consequently the history of sea-air aviation between 1939 and 1945 consisted of the global battle between the Axis and Allies for command of the sea and the air. In Europe that battle focused upon the combat between Axis submarines and Allied merchant convoys and their escorts; in the Pacific it centered upon the emergence of the aircraft carrier as *the* capital ship of modern air navies.

In the European Theatre the struggle for command of the sea had two basic dimensions: protection of merchant shipping and amphibious operations. Aviation played a crucial role in both areas. Since neither Nazi Germany nor Fascist Italy had operational aircraft carriers during WW II, seaborne aviation belonged to the Royal Navy and the U.S. Navy (the French carrier *Béarn* was never moved from Martinique after the Franco-German armistice of 1940). In the Atlantic and the Mediterranean the Axis fought the Allied merchant marine so vigorously with submarines, surface raiders and land-based aircraft that, in 1940 and 1941, the Royal Navy was hard pressed to keep open its Mediterranean sea lines. A key base in the maintenance of these east-west sea lines was the island of Malta. Malta served not only as a base for Allied traffic between the eastern and western Mediterranean, but also as an obstacle in the Axis lines of communication with


HMS Eagle (1931)

German General Erwin Rommel's forces in North Africa. Initially the British sent their carriers *Eagle* and *Ark Royal* to the Mediterranean to ferry convoys and aircraft to Malta. The old carrier *Argus* operated from Gibraltar in an effort to protect the sea lines between England and the "Italian lake." By September 1940 they had also assigned the new fast carrier *Illustrious* with her armored flight deck and radar to operations in the Mediterranean.

Illustrious immediately tried to ease some of the Axis pressure on Malta with a raid on the Italian port of Taranto. On November 11, 1940, 21 *Swordfish* torpedo bombers from the carrier attacked the warships in the harbor with bombs and torpedoes. Although the biplane *Swordfish* was inferior to many of its counterparts in the Axis and Allied air forces, it performed magnificently on this raid, sinking three out of the six Italian battleships, one cruiser and one destroyer in the harbor. Despite heavy antiaircraft fire, the British lost only two airplanes.

When Hitler realized his Italian ally was struggling to drive the British naval forces from the Mediterranean, he sent his *Fliegerkorps X* to aid the Italians. Using gull-winged monoplane dive bombers (the Ju 87 *Stuka*), *Fliegerkorps X* evened the score with the British somewhat when it used these land-based airplanes to bomb *Illustrious* on January 10, 1941. Although she took six direct bomb hits, *Illustrious* somehow managed to stay afloat and retreat to Malta where she underwent emergency repairs while fighting off further attacks. Once repaired, the carrier slipped out of the Mediterranean through the Suez Canal. The departure of *Illustrious* left only *Ark Royal* in the Mediterranean. She performed gallantly until November 13 when U-81 torpedoed her while she was ferrying fighters to Malta. She sank before she could be towed to Gibraltar for repairs.

The battle to keep Malta alive continued into 1942. In early March, the Royal Navy delivered the first RAF *Spitfires* to that island, launching them from *Ark Royal* for the final flight to Malta. The U.S. loaned the carrier *Wasp* to the British at this time and she similarily delivered more *Spits* to beleaguered Malta in April and May. In August, four Royal Navy carriers, *Eagle, Victorious, Indomitable* and *Furious,* tried to resupply the island in Operation *Pedestal.* Although the *Spitfires,* along with some of the merchant ships did reach Malta, this aid had a high cost: *Eagle* was sank and *Indomitable* was severely damaged en route.

Between 1940 and 1942 Royal Navy carriers and merchant vessels ferried 718 single-engined aircraft to Malta. These missions kept the island going, despite frequent enemy air attacks. Malta remained a constant threat to Axis supply lines to North Africa. Only after the Allies invaded North Africa in Operation *Torch* (November 1942) did Malta experience any letdown in attacks on its line of supply.

The Allied battle against the U-boats and surface raiders in the Atlantic was just as dangerous and evenly fought as in the Mediterranean. A steady merchant marine supply line bringing food, raw materials and war supplies to Great Britain was essential. Thus the Germans set out to destroy that supply pipeline, just as they had in WW I. They were mostly unsuccessful with their surface raiders, especially their large warships, because the Royal Navy usually kept an aircraft carrier in home waters. Her airplanes kept the German capital ships holed up in port or immediately struck at them when they put to sea. When one of these dreadnoughts, such as the battleship *Bismarck,* did escape into the Atlantic to strike at merchant commerce, it was hunted down. In the case of *Bismarck,* RAF flying boats tracked her until *Swordfish* from *Ark Royal* could attack with torpedoes, May 26, 1941. Although this attack did not sink *Bismarck,* it did enough damage to her rudders, propellers and steering gear that Royal Navy surface ships overtook her the following day and sank her with torpedoes and naval gunfire.

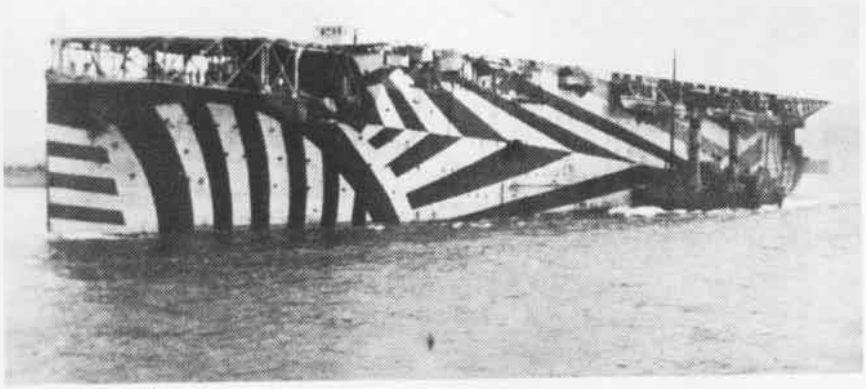
The Allied war with the U-boat, in contrast, usually did not involve dramatic fleet engagements. Instead the Battle of the Atlantic was a war of statistics — merchant ship losses versus U-boats sank. If the submarine had won this battle, Britain would have been cut off and would probably have fallen to the Nazis. Fortunately for the Allies, the U-boat did not win the Battle of the Atlantic because the Allies eventually developed the weapons and tactics which defeated the submarine menace.

After Germany began WW II, President Franklin D. Roosevelt declared the neutrality of the United States and directed the Navy to begin a Neutrality Patrol in the Atlantic. The naval vessels involved in this patrol had orders to observe and report the movement of all foreign warships. The patrol lasted 27 months and included the ocean area from the northeast coast of South America to the high latitudes of the North Atlantic, extending about 300 miles out from the U.S. coastline. Within this area, the belligerents were forbidden to conduct military operations, thereby preventing U-boats from attacking neutral shipping. Although at first the Neutrality Patrol was not an offensive naval operation, by the fall of 1941 it had become an undeclared war against the U-boat as Roosevelt endeavored to take all steps "short of war to aid Great Britain."

During 1939-1940 the Royal Navy held its own against the submarine menace in the Atlantic but, beginning in 1941, their merchant ship losses began to grow. For example, one night in April 1941 a Nazi wolf pack sank 10 of 22 ships in one slow trans-Atlantic convoy. From the beginning the Allies had relied upon the battle-tested tactics of merchant convoys to shepherd vessels between the coastal waters of North America and England. They found in 1941, however, that even with warship escorts, they could not drive off or sink all the U-boats prowling the Atlantic. In addition they lacked a sufficient number of escort vessels to provide protection to all the merchant ships traveling the Atlantic. Consequently the Allies turned to air patrols to help fight the submarine.

The U.S. Navy established air stations in 1941 in Newfoundland,

HMS Argus (1917)



Greenland and Iceland from which it flew long-range patrols and antisubmarine operations over the western stretches of the North Atlantic. The RAF flew its Sunderland flying boats on similar patrols out of Iceland, northern Ireland and England to cover the eastern portion of the northern transAtlantic route. Other air stations situated along the eastern U.S. provided air patrols over coastal waters of the Atlantic, Caribbean and Gulf of Mexico.

Initially the U.S. Navy used Consolidated PBY *Catalina* flying boats for these over-ocean patrol duties. It also used Martin PBM *Mariners* and Consolidated PB2Y *Coronados*. Some of these patrol bombers were slow and lacked the range of land-based aircraft. In addition, the flying boats could not fly with regularity during the winter months (roughly November to March) in the high latitudes of the Atlantic because extreme weather conditions made takeoffs and landings difficult, even in a sheltered harbor area. Consequently the U.S. Navy modified Consolidated B-24 *Liberators*, which it got from the Army starting in the summer of 1942, for work as land-based patrol bombers. These four-engine airplanes, modified for antisubmarine missions, were designated PB4Ys in 1943. Joined by the twin-engine Lockheed PV *Ventura*, these land-based planes provided additional coverage in antisubmarine patrols by hunting for U-boats from new shore bases around the world.

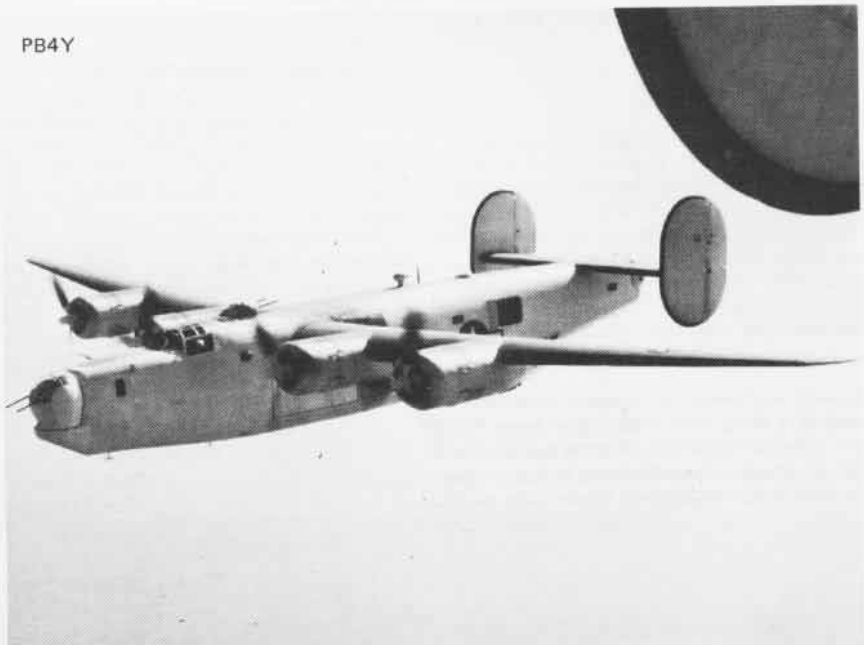
While the U.S. Navy was building up these air patrol forces, the Germans launched an assault on merchant traffic along the eastern seaboard of the United States in January 1942. Operation *Paukenschlag* (roll of the drums) devastated the Allied merchant fleet and showed how inadequate the defending antisubmarine forces were. At one time the U-boats were sinking Allied merchant ships faster than they could be replaced with new ones. German submarine crews later called this period "the happy time."

Gradually the Allies mustered their forces to fight back. Construction of escort vessels, such as destroyer escorts, took time, but these ships began to make their presence felt in late 1942 and 1943. Sonar, which the British called asdic, was improved. (This electronic device which used sonic echo-ranging to locate submerged U-boats had been perfected by the British and Americans during the interwar period.) Combined with better search tactics, sonar improved the record of Allied escorts against the wide-ranging wolf packs. By mid-1942 radar began to have an impact on the submarine battle. Mounted in surface ships or aircraft, it allowed the defenders to spot a surfaced U-boat long before it was visible to human eyes. With this advance warning, merchant vessels could take action to avoid a submarine; and surface or air units could attack the U-boat. The introduction of improved microwave radar in the spring of 1943 greatly increased the number of Allied submarine kills.

The introduction of the new electronic devices and the adoption of antisubmarine warfare tactics took time. While the Allies fought on the defensive, the toll of merchant ship losses rose so high it gravely threatened the overall war effort. In March 1943 alone, U-boats sank 108 ships totaling 627,000 tons. Only 15 submarines were lost during the same time. Just as the Battle of the Atlantic seemed most serious, the tide of losses began to turn in favor of the Allies. On May 1, 1943, Admiral Ernest J. King, Commander-in-Chief, U.S. Fleet, and Chief of Naval Operations, organized the U.S. Tenth Fleet, under his personal command. It combined and coordinated all antisubmarine warfare activities. This improvement in organization was matched by the arrival of more and more escort vessels from U.S. and British shipyards. Air patrols by *Catalinas* and modified *Liberators* also picked up, and they were joined by the Navy airship fleet, which by this time was well-organized and equipped.

To be continued

PB4Y



NAVAL AVIATION NEWS letters

SOC Sea Story

In an editor's note on page 40 of the March 1978 issue you invited readers to emulate Captain Barnaby's submission of an aviation anecdote. Hope you will find this one as interesting to read as I did to live.

In 1941 I wandered ashore one evening to the O Club at Cavite Navy Yard in the Philippines where I encountered and made fast friends with a young Naval Aviator named Windy Winslow who was at the time flying an SOC-1, a two-seat float plane of 1935 vintage, temporarily based at Sangley Point. At some late hour he invited me to accompany him on a weather flight in the morning, which at the time seemed like an elegant idea.

Next day I was awakened by the below-decks watch of the submarine in which I was serving, to be informed that a seaplane was circling the boat and the pilot was shouting my name. Pulling on some clothes I went topside, and there was Windy waving me to come on. I hailed a passing 40-foot motor launch and was soon en route, Windy all the while slowly idling into the wind and cautioning us to be extremely careful to avoid coming in contact with the pontoon float of the SOC.

As I made my leap for the hand grabs on the side of the plane the boat's bow nudged the pontoon just hard enough to punch a sizable hole at the waterline, and flooding began. Windy shouted for me to hang on and get into the after cockpit as he gunned the engine to get us up on the step before we sank.

We cleared the surface as I was scrambling headfirst into the cockpit, and were soon climbing to altitude, where things seemed to settle down a bit. As we winged out over Corregidor at 10,000 feet, Windy passed me a penciled note which said, "The damn weather recorder is coming unfastened from the wing strut. It's a loose screw—do you have a screwdriver?" I wrote back, "What would I be doing up here with a screwdriver? But I have a 10 centavo coin . . .will that help?" Windy said it would do and that we would have to land on Manila Bay where I could climb out on the wing and tighten the loose screw!! Well, to keep the ruptured pontoon from flooding, Windy had to keep the plane moving fast enough to stay on the step, and so I went out on the wing with some trepidation, to say the least.

But I managed to make the fix, and back up we went where at least we wouldn't sink. Fuel shortage ultimately became a problem and Windy announced that we would have to put her down and try to make the ramp before she sank. We almost did, but not quite. . .the SOC sank quietly to the bottom about 10 feet from shore.

I thanked Windy profusely and assured him I had had my last airplane ride. He later joined USS *Houston* and was taken as a POW when that unfortunate cruiser was sunk in the Java Sea.

I stuck with submarining, which to this day I consider a much more sane and rational mode of travel than flying!

Worth Scanland, Capt., USN (Ret.)

SOC

I am writing to request the assistance of Naval Aviators who flew or worked with the SOC *Seagull*. As a serious historian, I have, for the past two years, been researching the *Seagull* and its catapult operations. My objective is to document and record some of the many tasks performed by the *Seagull*, which appears to be the last bi-wing Navy aircraft used in combat operations.

I am specifically interested in the *Seagull* and its missions from cruisers and battleships, including information related to the powder-driven P-6 catapult.

I would appreciate any reader response and the opportunity to borrow any personal photographs, manuals, squadron histories or other documents.

I will carefully use and return all material.

Bob LaBouy
2777 70th Place S.E.
Mercer Island, Wash. 98040

P.S. The photo of the SOC was taken aboard USS *Northampton* at Pearl Harbor in the late Thirties.

809 Squadron Buccaneers

HMS *Ark Royal*, our last fixed-wing aircraft carrier comes to the end of her final commission in December and the 809 Squadron *Buccaneers* will disband at that time.

Over the past 16 years many aircrew officers of the U.S. Navy served on exchange with the *Buccaneers* and we would like very much to see as many of them as possible at our final party on December 9 in the Wardroom, HMS *Daedalus*, Lee on Solent. For further information contact:

K. D. MacKenzie, LCdr.
X.O., 809 Naval Air Squadron
HMS Ark Royal
B.F.P.O. Ships

Published monthly by the Chief of Naval Operations and Naval Air Systems Command in accordance with NavExos P-35. Offices are located in Bldg. 146, Washington Navy Yard, Washington, D. C. 20374. Phone 202-433-4407; Autovon 288-4407. Annual subscription: $12.85, check or money order ($3.25 additional for foreign mailing) direct to Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Single copy $1.25.

NAVAL AVIATION NEWS SURVEY

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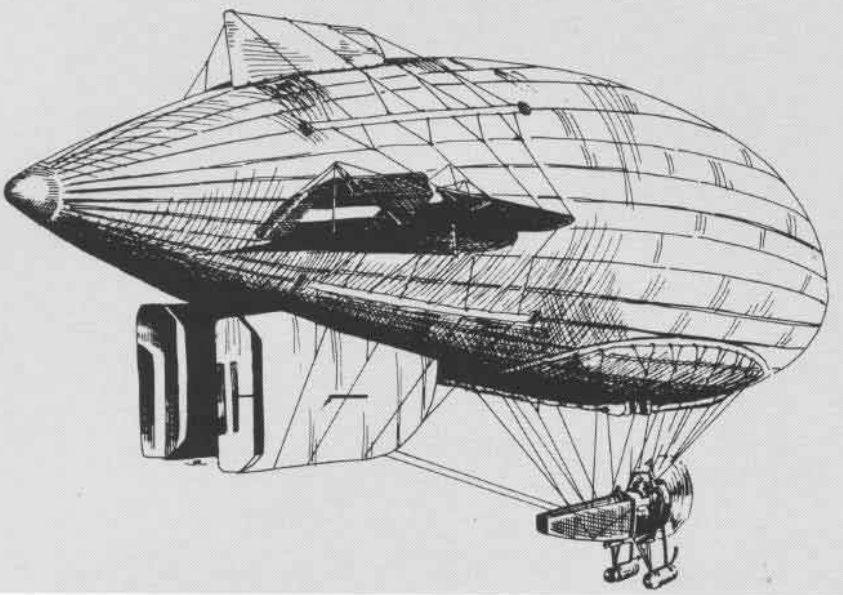

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