NAVAL AVIATION NEWS

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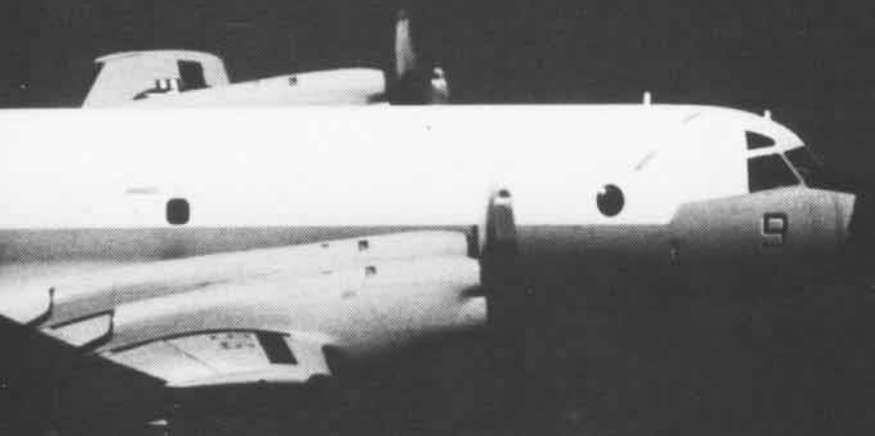
NAVAL AVIATION NEWS

FIFTY-SEVENTH YEAR OF PUBLICATION

THE STAFF

COVERS – *Front, PHCS(AC) R. L. Lawson filmed USS Constellation's C-1A on final approach to CVA-64 during South China Sea operations last summer. Back cover shows Mr. Attack Aviation, Ed Heinemann, after a Skyhawk flight (see box, page 40). Here, an Orion from Glenview-based VP-60 cruises by the Chicago skyline.*



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EDITOR'S CORNER

Like a herd of floating gray elephants, dark clouds slink slowly across the Florida landscape. Rain pelts down on Whiting Field and drenches the neat, idle ranks of red and white T-28s. Flying weather has soured, but the training must go on.

In the ready room, flyers in weary flight suits or tropical khakis cluster around a table. A game is in progress. From a stack on the playing board a young seeker of gold wings selects a red three-by-five card.

"OK, Willie," he says, "here's your question: Recommended rpm with a sump plug warning light is what?"

A pained expression forms on Willie's face. "Well, ah . . .," he begins, "that would be, ah . . . 2,200 rpm."

The young seeker sighs. "You're a dummy, Willie. It's 1,900 to 2,000. Should'a known that. Go back ten blocks."

Disconsolately Willie moves his paper cutout, shaped like a T-28 viewed from overhead, to its proper position. He vows silently to never miss that question again.

"OK, Ace," says a mustachioed senior type, selecting a blue card. "Here you go: Maximum airspeed with the landing lights extended is how many knots?"

Ace beams, tilts his chin upwards about ten degrees and booms, "That answer is 120 knots, most definitely!" He quickly slides his T-28 seven blocks forward.

And so it goes at VT-6 when bad weather cloaks the operating area. At least ever since LCdr. Dave Smereczniak, ground training officer extraordinaire, invented *Natops*, the flying man's *Monopoly*.

The game encompasses all phases of flying: preflight, start, taxi, takeoff, en route, formation, approach, landings, instruments, emergencies, etc. Designed for two to six players, it is a nimble if not revolutionary method of learning NATOPS procedures. The contest is laced with competitive spirit. Important knowledge is exchanged and, hopefully, better retained. And there are a few laughs.

The playing board depicts a snakelike route of squares beginning at the hangar area. It winds its way along the taxi channel to the runway, through a round-robin route and back to home base again. He who shuts down in the chocks first is, of course, the winner. Each block along the flight's path contains a letter code directing the player to select a question from various stacks on the board. Land on an E and you must answer an emergency question. Stop at an A and the stack holds a query on airborne procedures, etc.

For the "Hot Stick" close to home, bent on victory, he can avoid the hold circle by exercising the option of selecting three back-to-back emergency questions. Satisfactorily answer the trio and he's cleared for a straight-in. Miss, and he must suffer the collective retreat directed by all three.

Explains LCdr. Smereczniak, "I got the idea a couple of years ago watching a *Sesame Street* program with my preschool age kids. I discovered that they were learning numbers and letters quickly, at a rapid retention rate. And they were having fun doing it. I thought similar principles could be applied to NATOPS training and, upon assignment here, gave it a whirl."

"I tried the game on a couple of students first," he adds, "and they liked it, partly, I guess, because they thought they could afford to miss a question without embarrassment. I sensed that instructors and senior types might be reluctant to expose a degree of ignorance here and there. But we tried it with the more experienced pilots and once they made a mistake or two — and it didn't prove embarrassing — we felt that *all* of us could benefit."

Smereczniak is thinking of setting up a tournament one of these days, one which would lead to a squadron *Natops* champion. When asked what the winner's reward would be, Smereczniak grins. "Why, we would make him the NATOPS officer!"

VT-6 has been playing *Natops* for about six months. A couple of sets are left in the ready room especially for foul weather day activities. The vital goal is to learn NATOPS procedures. If the players can smile occasionally while learning, more power to them.

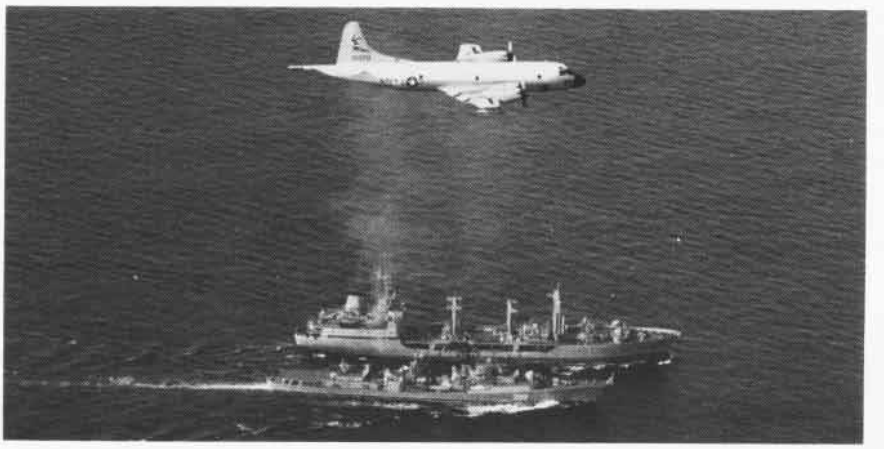
The training squadron's skipper, Cdr. R. L. Kriewall, foresees an expansion in the question bank. "After we feel we've learned the entire deck," he relates, "we'll start throwing in some tricky ones. In the meantime, students as well as instructors are learning. It's a productive game."

If you are interested in setting up *Natops* for the airplane you fly, and need some help, contact LCdr. Smereczniak at Whiting Field, autovon 868-7681.

did you know?

Commemorative Visit

During a recent ocean surveillance mission, two VP-8 aircraft located and photographed the fleet replenishment oiler *Dnestr* and the guided missile destroyer *Boiki* (DDG-288). The Russian ships, in company with the guided missile destroyer *Zuguchy* (DD-290), were en route to a five-day port call at Boston, Mass., in commemoration of the 30th anniversary of V-E Day.



The guided missile frigate USS *Leahy* (DLG-16) and the guided missile destroyer USS *Tattnall* (DDG-19) made a simultaneous visit to Leningrad.

New RPV Configuration

Plans are being made for the Pacific Missile Test Center to flight test a radically new RPV configuration. This new generation drone will be remotely piloted and capable of vertical takeoff and landing from the deck edge of a moving ship.

Components from the MQM-74A target drone and *Harpoon* engine and midcourse guidance unit have been used in design and construction of the new RPV that is expected to climb to 5,000 feet in 8.8 seconds, rotate to a horizontal plane and move at subsonic speeds. It will be controlled throughout flight by ground controllers aboard the ship.

A team of designers at the Naval Ship Research and Development Center has been studying the possibility of simplifying launch and recovery procedures of remotely piloted vehicles.

The tests will begin with the drone taking off from the 10,000-foot runway on San Nicolas Island, following the tethered hover tests made previously at NSRDC. Transition from horizontal to vertical flight will be attempted at 5,000 feet, to allow enough altitude margin for recovery in the event a malfunction arises. During the first transition, the ground control equipment will be operated from a helicopter hovering in the vicinity. If all goes well, the drone will be rotated back to a horizontal position and flown back to a normal landing on its tricycle landing gear.

The ship test will be the final phase of the testing schedule. The RPV will be flown out to a naval vessel equipped with special racks at the stern. As the ship moves,the drone will be lowered to a position just aft of the fantail while moving forward with enough speed to match that of the ship. At the moment of touchdown, ideally the differential velocity will be zero feet per second.

The design team points out that the stern recovery provides an almost perfect safety system. If, for any reason, the drone fails to sit down softly, it will drop into the sea and not crash on deck. Takeoff would be equally safe.

did you know?

The designers claim a number of tactical advantages of an RPV combined with the VTOL. Since the shipborne drone could take off from a nearby coast, its range would be sufficient for reconnaissance, target designation, close-in jamming, and strike against heavily defended targets. The RPVs can be made as small or large as operational considerations dictate.

The model being built is a 560-pound demonstration vehicle. Its ability to hover is derived from the use of four movable vanes made of high temperature steel in the engine exhaust. The amount of movement of the vanes is controlled by electromechanical actuators.

In horizontal flight, the *Harpoon* midcourse guidance unit is used. It acts as both autopilot and inertial navigator by means of an attitude reference assembly that, in effect, acts as the navigator aboard the unmanned drone.

Radar altimeter antennas on the leading edge of the wing will rotate with the drone so as to measure altitude whether the RPV is in horizontal or vertical flight.

Telemetry signals will relay more than 60 kinds of information to the ground controller. These will include engine performance, flight control surface position, deflection rates, air speed, and other measures of RPV performance.

A parachute will be in the fuselage to allow emergency recovery if a flight fails. A drogue chute is also available to slow the RPV during horizontal landing.

The speed of the demonstration vehicle will be limited to attain the longest possible flight. Speed of 147 knots will give a flight of 29.5 minutes that will use 76 pounds of an available 94 pounds of fuel. About two minutes are planned for the hovering and recovery evolution when the drone returns to touchdown.

CH-46E Test Flight

In July, Boeing Vertol Company began flight testing a CH-46E. The Marine combat assault helicopter is a modification of earlier models of the CH-46. Major modification is the installation of T58-GE-16 engines, rated up to 1,800 hp. The

engines provide a flat rated payload of 4,000 pounds up to 3,000 feet and 91.5 degrees F. Other changes include a combat/crash resistant fuel system, crash survivable crew seats, a Doppler/Omega navigation system, a new external rescue hoist and an improved hydraulic system.

The Marines plan to modify over 200 CH-46s by 1981.

NOAA Orion

In June, NOAA-42, the first of two WP-3D *Orions* purchased by the National Oceanic and Atmospheric Administration, was accepted by Dr. W. N. Hess, director of the Environmental Research Laboratories, Boulder, Colo. The aircraft will be operated by NOAA's Research Facilities Center, Miami, Fla.

When instrumented in mid-1976, the *Orion* will fly a broad spectrum of environmental research missions, including severe-storm studies, cumulus cloud and hurricane modification experiments, and investigations of air-sea interaction, air quality, and the relationship of weather patterns to climatic change.

Distinguishing equipment of NOAA-42 includes left wing-tip pitot static boom, a gust probe extending from the forward fuselage and a belly and aft radome. The pitot boom measures gust velocity relative to the aircraft and incremental changes in the angles of attack and side slip. The belly radome houses a 12-foot wide, C-band dish antenna which can be rotated 360 degrees in a horizontal plane and tipped ten degrees up or down. The aft radome houses an X-band radar antenna, four feet wide and six feet long, parallel to the centerline of the aircraft. Providing side-looking coverage, the antenna can be rotated 360 degrees around the centerline.

The aircraft, expected to be the most advanced research aircraft in the world, carries a flight crew of four – pilot, copilot, flight engineer and navigator – and a mission crew of 12 scientists, technicians and observers, with room for five more.

Portable Computer

Naval Reserach Laboratory scientists have designed and developed a portable shipboard computer system to help experimenters acquire, process and analyze data while at sea.

The system, similar to stationary facilities at other laboratories, is being used to support oceanographic research aboard ships and in aircraft in the areas of navigation, underwater photography, and acoustical, climatical, geophysical, biological and chemical oceanography.

It consists of two identical mini-computers: one for real-time acquisition of oceanographic data and navigation, the second for data processing, general purpose computing and spectrum analysis using a fast Fourier analyzer. The computers are operated in a multi-programmed, multi-user environment under a real-time disc-based software system.

Recently an Arctic magnetic study was conducted aboard an aircraft out of Thule, Greenland. One of the NRL shipboard computers with disc, magnetic tape, line printer, CRT and 30-inch drum plotter was placed aboard the aircraft. Approximately 21 days of data were acquired and processed in the plane.

Daniel Steiger, NRL's principal investigator for the program, reports that oceanographic experimenters aboard aircraft are already planning to use the mini-computer system for data acquisition and processing.

Daedalian Award

For the second time in the last four years, the Naval Air Systems Command has been awarded the Daedalian Weapon System Award for superior development of a weapons system.

The Colonel Frank C. Wolfe Memorial Trophy was presented for development of the *Phoenix* missile system and the AN/AWG-9 weapons control system, primary armament for the F-14 *Tomcat*.

The AWG-9 also provides the control function for other F-14 weapons, including *Sidewinders* and *Sparrows*. It is the world's only air-to-air system capable of simultaneous tracking of 24 targets and the near-simultaneous launch of six long-range *Phoenix* missiles at six different targets.

The system is being considered as an anti-ship missile defense system and for other ground and ship-based air defense applications.

In 1971 NavAirSysCom received the trophy for development of the F-4.

GRAMPAW PETTIBONE

Good Head

An F-3B (F3H-2) was launched from a carrier off the East Coast during a post deployment fly-off. Immediately after launch, the pilot discovered that his nose gear would not retract. As he turned back toward the ship, the fire warning light came on. All engine instruments appeared normal and a visual check of the aircraft failed to indicate a fire. The fire warning light went out after approximately five minutes and the pilot elected to burn down external fuel before shooting an approach. While orbiting, waiting for burndown, the pilot noted the fire warning light flickered, then came on steady. The fuel gauge went to zero and the cockpit filled with light smoke, but there was still no external indication of fire. All engine instruments appeared normal.

At this time, the pilot decided to jettison his external stores and recover immediately. As he rolled into the groove, he noted that full power would not hold the aircraft on the glide slope. He also noted that the nozzle indicator showed the nozzles were partially open and that the TOT was about 50 degrees below full military. The A.C. control circuit breaker was pulled with no apparent effect.

The fire warning light continued to burn and the cockpit was filled with smoke. But rather than take it around and make a modulated afterburner pass, the pilot maintained glide slope and airspeed by selecting, then deselecting, afterburner twice.

A normal landing was accomplished with an estimated 3,000 pounds of fuel aboard. After shutdown, an after fire resulted but was extinguished with no further damage to the aircraft. Post landing investigation revealed the most probable cause of the fire and partial power loss was an engine hydraulic system leak.

Grampaw Pettibone says:

Well, pop my buttons, that's really usin' the ole noggin!

The aircraft was pretty severely damaged by fire, but this lad certainly had nothin' to do with it. He just calmly analyzed his hot problem and dealt with the hairy situation like a real professional. You just can't beat that kind of airplane drivin'.

I'm a great believer that NATOPS is the greatest thing since bubble gum, but nothin' will ever replace this kind of headwork. It's a pleasure to add another name to that "Real Pro" list. (September 1964)

Sailing in a Helicopter

Two Marine Aviators were scheduled for a morning flight to deliver a CH-46 *Sea Knight* to an overhaul activity. The pilots were accompanied by two enlisted crew members and one passenger. The crew obtained a weather brief by phone although a face-to-face brief would have been available locally 45 minutes before scheduled departure time. The freezing level was forecast at 6,000 feet. The pilot filed an IFR flight plan via telephone and requested an altitude of 3,000 feet.

Completing a normal preflight, the pilot started the aircraft and put the clearance on request. He did not have the engine inlet screens removed because of the forecasted freezing level and flight level temperature. He noted a cockpit outside air indication of plus two degrees C. but decided the forecasted temperatures were adequate, and the screens still were not removed. The IFR clearance was received and the aircraft was cleared for takeoff.

Takeoff and climb to altitude were normal until the aircraft reached 2,500 feet where the pilot noticed ice forming on the windscreen. He immediately leveled off and requested an emergency descent and vectors back to home field. Vectors and clearance to descend were given immediately and the aircraft was handed back to local approach control.

The pilot reported descending to 1,000 feet which was acknowledged. At this time approach control did not have the aircraft in radar contact. The crew chief then reported to the pilot, "The #2 engine inlet is icing up pretty fast." Momentary visual contact with the ground was made by the crew chief and the pilot. The pilot reported this to approach control.

About two minutes later the pilot noticed the #2 engine temperature increasing through 800 degrees. He told the copilot to secure the #2 engine. The *Sea Knight* was slowed to 70 knots and power on #1 engine was increased. The pilot reported the engine loss to approach control and requested an emergency descent. The descent was approved and, at 500 feet, a turn was made to a westerly heading toward a river in an effort to return low-level. Once over the river, the pilot continued the descent to maintain visual contact with the surface of the water. At 300 feet, power on the #1 engine decreased to 70 percent. An

ILLUSTRATED BY Osborn

autorotation was commenced to the river below. The helo landed after the rotor rpm was reduced to cushion impact with the water.

The airframe appeared to be intact and the copilot immediately started the auxiliary power unit to regain electrical power in the aircraft. Approach control was contacted and advised that the aircraft was in the water. Next the pilot successfully restarted the #2 engine while the #1 engine was still producing only partial power. He radioed approach control that he would attempt a water taxi to home field.

A shoreline was sighted approximately 500 yards to the crew's left which was thought to be the west bank of the river and water taxi commenced toward land. The emergency throttle was armed but not activated in anticipation of a need for additional power to lift the aircraft out of the water upon reaching the shoreline.

Nearly 100 yards from land, the #1 engine failed completely and about 70 feet from the shoreline, the #2 engine also failed. The pilot allowed the rotors to coast to a stop.

The river current caused the aircraft to drift downstream towards shore, at which time the crew realized they were on the eastern side of the river instead of the western side. The pilot reported this to the tower.

The tower launched the crash rescue boat down the western side of the river and had no communication with the boat at that time. The aircraft had been afloat for almost 20 minutes with the power off when the SAR helo arrived.

Shortly afterwards, the right MLG and nose LG appeared to run aground approximately 40 feet from the shore. The copilot and passenger attempted to throw a line made up of cargo tie-down straps to the crew of the SAR aircraft who had landed on the nearby shore. These attempts were unsuccessful because the straps were not long enough.

The rescue boat arrived and threw a line to the copilot. The aircraft began rolling to port causing the rotor blades to contact the top of the rescue boat. The crew and passenger then boarded the rescue boat. The boat forcefully pulling away from the aircraft dislodged the rotor blades which caused limited damage to the boat. Once the boat was clear, the aircraft continued to roll to port, inverted in the water and sank.

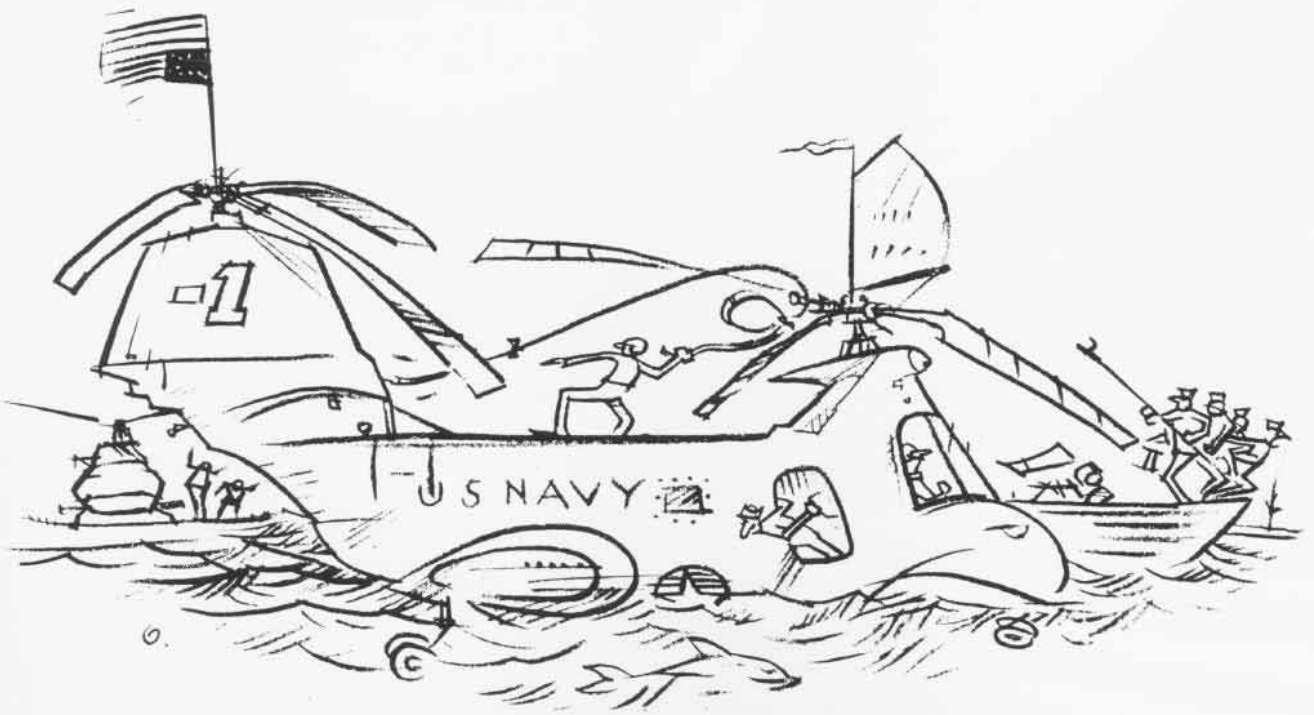
Grampaw Pettibone says:

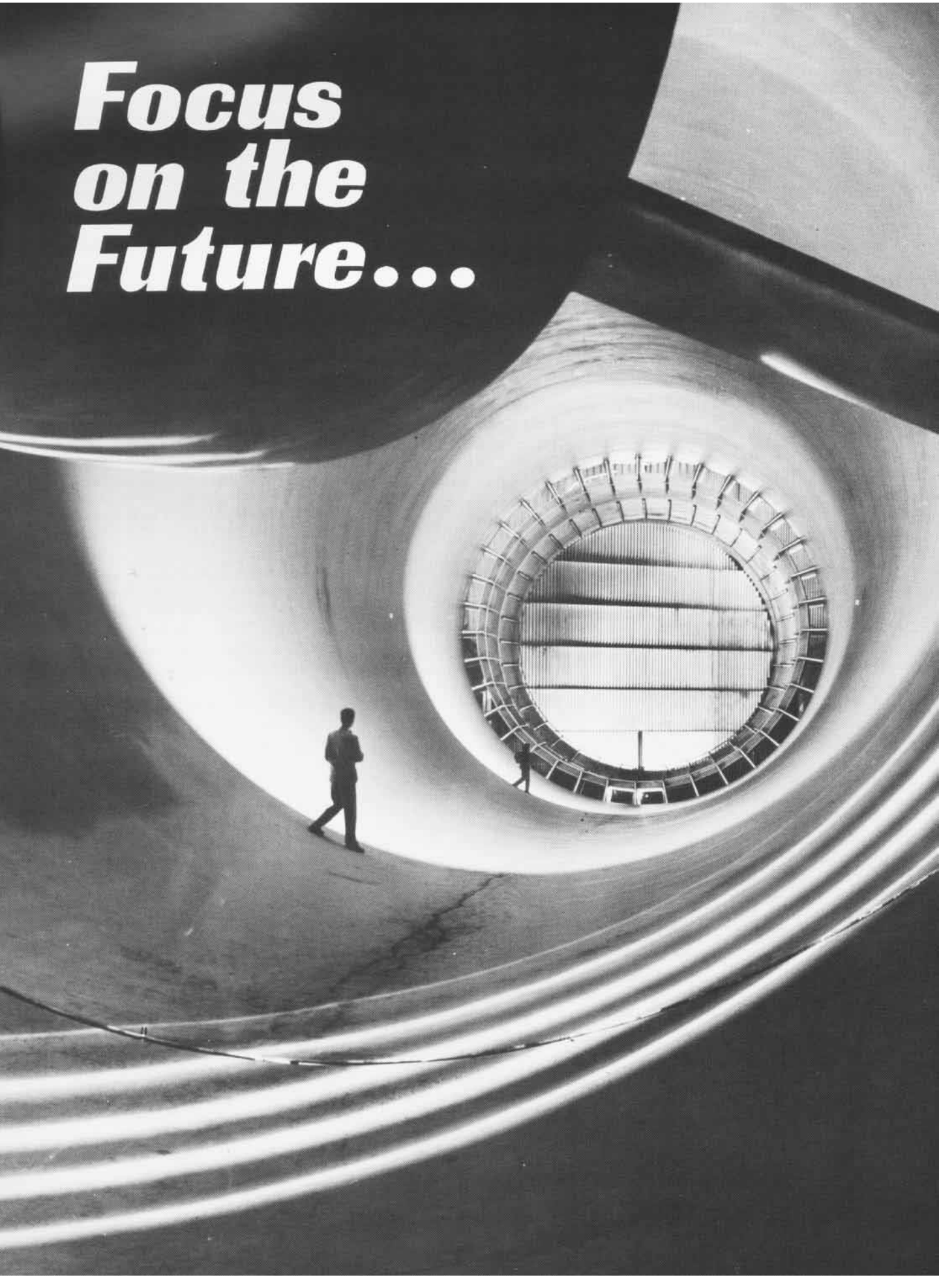
Great grumblin' gremlins! I don't know where to start – with the first accident (the airplane) or the second accident (the boat). Obviously the boat fared much better than the helo.

This driver made so many mistakes I don't know where to start! Seems to me he should'a been a suspicious cuss when he noted the outside air temperature to be two degrees. Doesn't take a math major to figure out that the freezin' level is pretty near the ground.

Then, of course, he never removed the screens which didn't help the engines much when he started to ice up. And why in the heck didn't he check with his local weather people before calling a weather facility miles away? UGH!

I can't say much for the pilot's surface navigation ability either – heading for the wrong side of the river. What was wrong with the wet compass? Oh well, all in all, a pretty poor showin'.




Focus
on the
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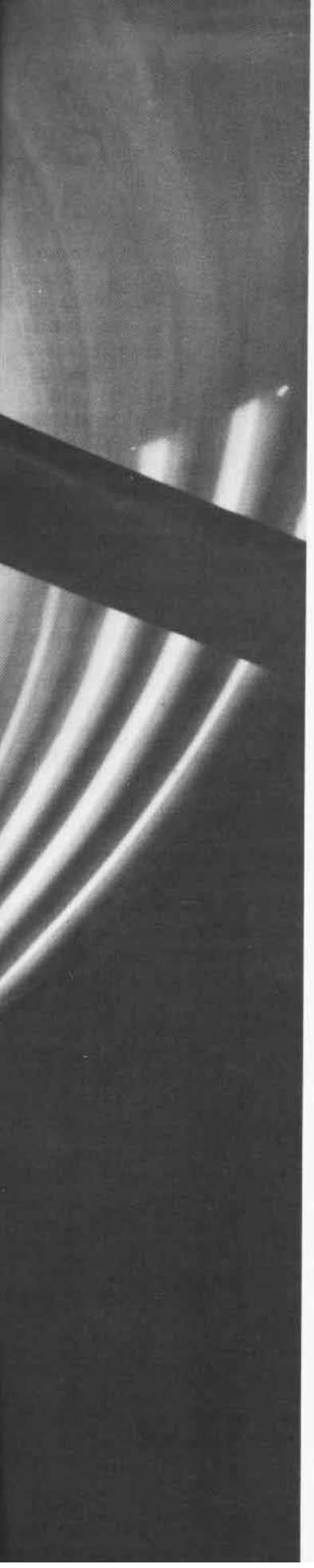


By Commander Rosario Rausa

For a moment you feel like a refugee from the movie *Fantastic Voyage*. Your footsteps echo through the cavernous channel of curving concrete. You could be a Lilliputian lost in the middle of a jet intake.

This transonic wind tunnel is only one feature at the Navy's Aviation and Surface Effects Department. Formerly known as the Aerodynamics Laboratory, ASED is part of the Naval Ship Research and Development Center (NSRDC) in Carderock, Md., near the nation's capital.

ASED's beginnings can be traced to 1896 but 1913 is considered the starting date for an activity whose history is rich in innovative achievement. Brilliant, dedicated and determined men of ASED left their indelible mark on the aviation community of today. Surprisingly, many of these men who pioneered in the field of aerodynamics were *not* flyers themselves. Nevertheless, they possessed a vision of the future and knew that airplanes could play critical roles in both the civilian and military worlds.

More on that later.

ASED's official function statement goes like this: ASED conducts research and development investigations and explorations of new concepts involving application of aerodynamics and aerohydro principles, and technology to the development and improvement of advanced aircraft, weapons, ships and craft.

That's a mouthful, surely. But for the aviation enthusiast, the ongoing research at ASED projects a dynamic air of excitement and challenge. Some concepts being tested could be described as radical.

According to Dr. Harvey Chaplin, ASED's head, there are four major projects currently under way: CCR – the circulation control rotor; SES, surface effect ship; the high-length-to-beam ratio SES; and the conformal carriage.

The CCR concept has been applied in varying forms to other projects and represents a possible breakthrough in rotor aerodynamics performance. It is conceivable that CCR-equipped helicopters will travel at an unprecedented 400 knots. Maintenance requirements can be reduced and overall performance sharply enhanced in Navy and Marine Corps helicopters.

The CCR is mechanically driven and has comparatively thick, hingeless blades with rounded trailing edges. Air at low pressure is pumped into the blade and ejected through a thin, spanwise slot on the upper surface of the trailing edge. An aerodynamic phenomenon called the Coanda effect occurs. Air remains attached to the rounded edge until it reaches the lower surface. This keeps the boundary layer from separating and simultaneously creates high lift.

The pneumatically-operated hub employs a non-rotating flex ring valve control system. This modulates flow to the blades, permitting cyclic control. Ideally, the system would lead to smaller, lighter and simpler substitutes for mechanisms currently in use. The valve control can very easily provide higher harmonic wave forms for the

Only one of its kind in the Navy, ASED's transonic wind tunnel is constructed of heavily reinforced concrete and has a Mach range from 0.4 to 1.15. Air flow is channeled to a test section seven feet high and ten feet wide where effects of air flow over models are measured in complete detail.

suppression of rotor-transmitted vibrations.

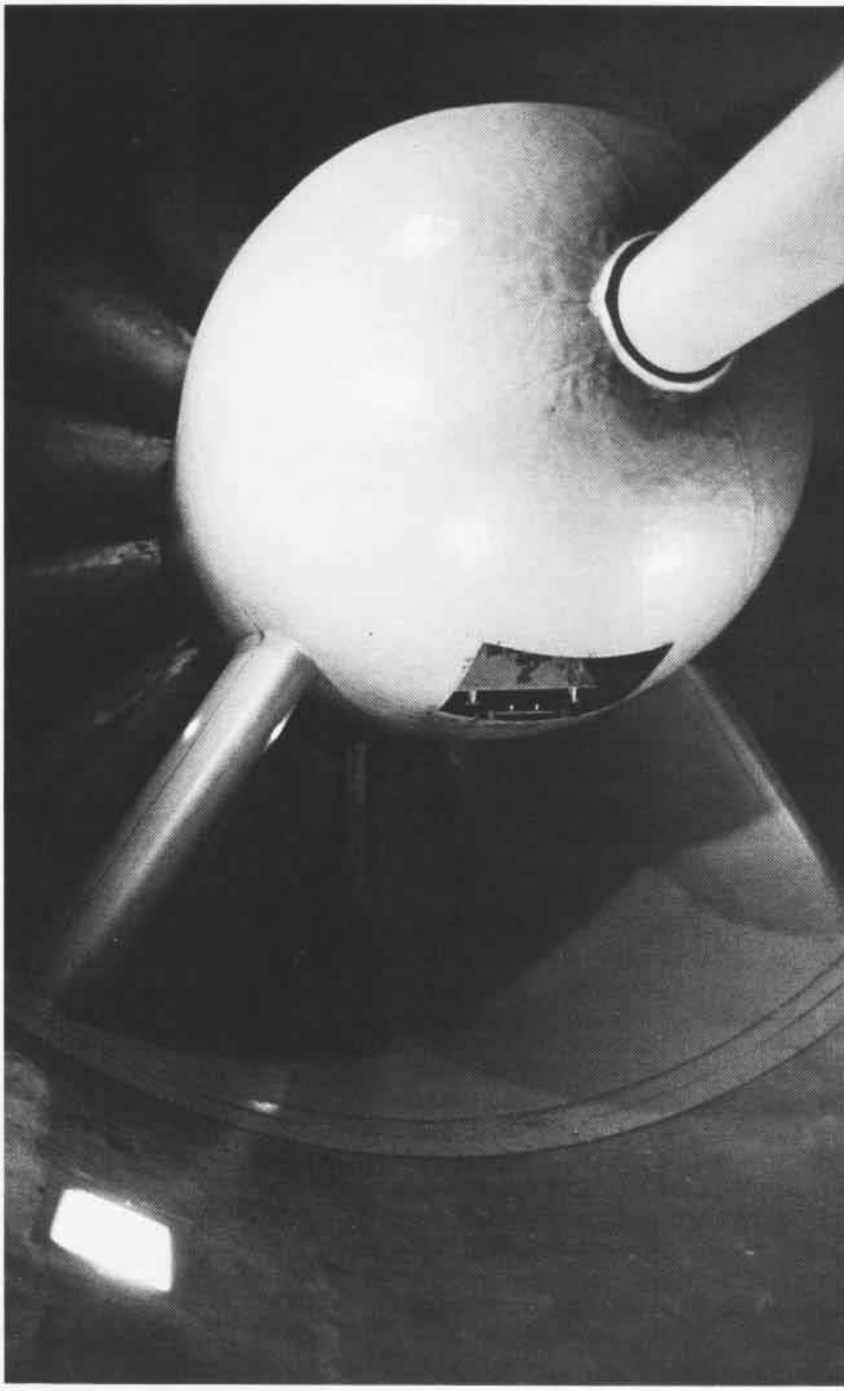
Additionally, the hub, without the encumbrance of linkages, swashplates and the like, can be better faired into the helicopter fuselage, thereby reducing a significant source of drag.

Naval Air Systems Command is sponsoring the CCR program and last year feasibility contracts were successfully completed by Kaman Aerospace Corporation and the Lockheed California Company. Full-scale rotor blade segments and working hub mockups were constructed.

Kaman was selected earlier this year to build and flight test the advanced rotor concept. A single H-2 twin-engine helo will be provided by the Navy for the final flight test phase.

Efforts on the conformal carriage concept began ten years ago as an outgrowth of another program. Fighter-bomber pilots should be very happy about this one.

High-density weapons loads are



Mid-size RPV could function as a pilot-less reconnaissance, ECM jamming or strike aircraft. This one, left, was designed and built at NSRDC. Portion of transonic tunnel resembles a jet engine intake and is a closed-circuit, single-return type, right.

mounted on the bottom fuselage instead of wing pylon stations. In coordination with the Naval Weapons Center, China Lake, after extensive wind tunnel tests at Carderock, an F-4 *Phantom* served as a flying test bed. Advantages of carrying weapons in this manner have proved numerous.

By centralizing the arrangement of stores, aircraft speed and maneuverability are increased. Supersonic acceleration and climb capability with heavy weapons loads are also improved compared with current loading techniques. There is reduced drag both before and after weapon release, improved range performance and less critical ejection force requirements.

Of vital significance, tests proved that the drag reduction using the conformal carriage concept permits the *Phantom* to fly supersonically with external weapons aboard, nearly to the full extent of the flight envelope of a *clean* F-4.

As compared to conventional multiple-rack configurations, the following data have been determined: speed is increased 60 percent with weapons aboard — 40 percent sans weapons; interdiction mission range is increased 20 percent; and sharply improved handling, stability and control of aircraft have been demonstrated.

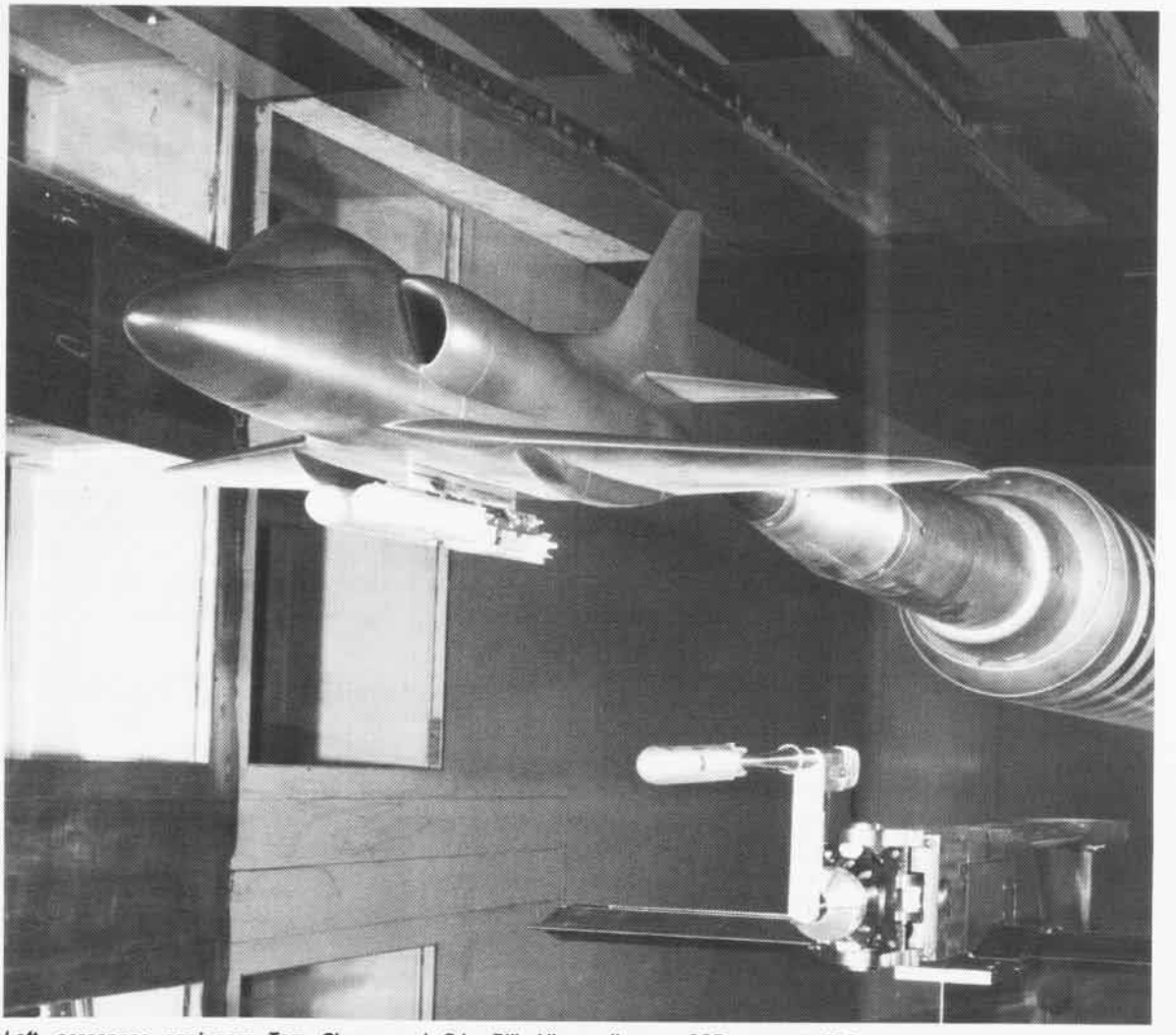
The SES program would bring

gleams to the eyes of the founders of ASED and its parent organization, NSRDC. Aerodynamic principles are closely connected to those used by naval architects for seagoing vessels. Surface effect ships could be described as manifestations of mutual ship-airplane precepts.

Air cushion vehicle technology at ASED began in the late 1950s. The XR-1, first manned craft of this type, was built at the Naval Air Engineering Center in 1963 and tested on the Delaware River. Various models were evaluated including the XR-3, a 23-foot-long craft powered by a pair of 40-hp. outboard engines. It reached speeds close to 30 knots and provided a model simulation of a 4,000-ton SES which could operate at 100 knots. ASED's wind tunnels and NSRDC's towing basins were ideal test areas for these developments.

The Surface Effect Ship Program Office, PMS-304 (NavSeaSysCom) has overall management control of SES development and ASED is the principal resource for in-house technical support. In the blueprint stage are large SESs which could function as ocean-going runways for VTOL and helicopter operations.

The high length-to-beam ratio SES has been widely accepted as the forerunner of similar ships which displace 6,000 tons and greater. Considered



Left, aerospace engineers Tom Clancy and Cdr. Bill Albers discuss CCR concept. T-2 Buckeye model in background is used for high lift wing tests. A-4 model, above, mounted on "sting" in tunnel, was used for testing bomb trajectories at various speeds and attitudes.

intermediate speed ships with high lift-to-drag ratios, they will operate up to 70 knots. At destroyer-size displacement, speeds could reach 55 knots. They would feature, in addition to high-speed capability, excellent power efficiency – hence long, trans-oceanic ranges, low ship motions, and decks long enough to accommodate STOL aircraft.

The XR-5 test vehicle, designed and constructed at NSRDC, is 47 feet long and displaces 7,400 pounds. It has completed successful trials at the Surface Effect Ship Test Facility, NATC Patuxent River.

On the back burners at ASED are seven projects considered "emergent concepts," some of which will soon move into the major achievement category.

Close coupled canards, wherein horizontal stabilizers are affixed forward of the wings, have been wind tunnel tested in 300 different configurations. Significant increases in lift and stall angle have been demonstrated with no penalty in the form of drag resulting.

Carrier pilots would be interested in the *circulation control high lift wing.* Techniques similar to the CCR have been applied to the wings of a test model T-2 *Buckeye* for wind tunnel evaluation. The concept is intended for implementation in future aircraft. Just as with the circular control rotor,

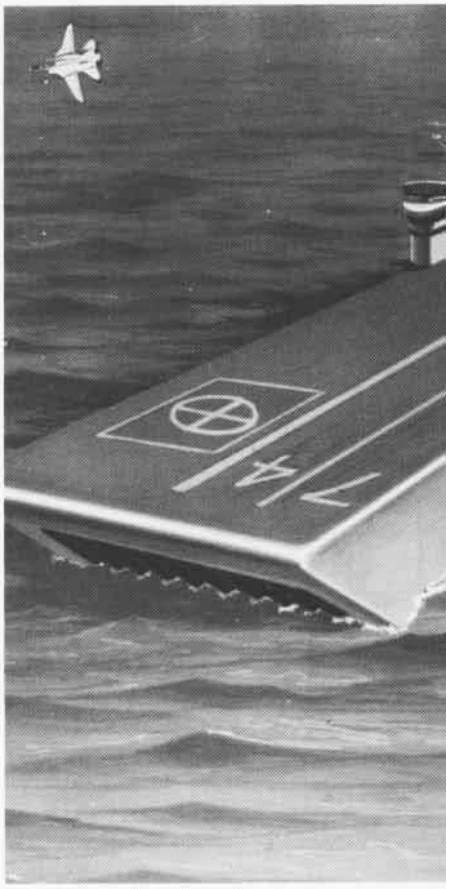
Coanda effect occurs. Carrier aircraft have higher lift at slower speeds while using a lower angle of attack on carrier approaches. Pilots would have better visibility in the critical stages of getting aboard the ship.

Unmanned aircraft are receiving their fair share of ASED's attention. The *mid-size RPV launch and recovery vehicle* is under study. A VTOL tail-sitter RPV weighing about 500 pounds is being tested this year. The craft was designed and constructed at NSRDC. This RPV could fly long endurance missions – where pilot fatigue would ordinarily be a factor – do reconnaissance work, electronic jamming and even strike against heavily defended targets.

Also implementing the CCR concept is the *X-wing composite VTOL aircraft*. Its four-bladed rotor would function as a helicopter for takeoffs and landings. Once airborne, the rotor would be stopped for forward flight maneuvering. The aircraft would have good cruise efficiency at 10,000 feet and could have dash speeds as high as Mach .85. The use of leading and trailing edge air blowing on the rigid, four-bladed rotor/wing is viewed as a solution to the dynamics problems encountered with other stopped rotor concepts.

Wing in ground effect emphasizes fuel-efficient operations and is based on the concept of using ground or water effect at low altitudes. Extensive model testing and limited flight evaluation have been conducted. Excellent

Phantom lifts off with simulated weapons load on conformal carriage flight test, below. Center, artist's concept of high-length-to-beam ratio surface effect ship of the future.



lift-to-drag ratios are expected for low flying aircraft and 250-knot speeds are anticipated using this principle.

At high speeds, the *reverse velocity-circulation control rotor* operates in the autorotative state, providing lift while auxiliary or convertible engines propel the aircraft. Similar in looks to the X-wing vehicle, this aircraft could leap from a small deck at sea and race to an ASW contact 200 miles away at 400 knots.

Finally, the *twin cushion surface effect vehicle* may satisfy the future need for an advanced high-performance craft which can perform a variety of sea control missions. This vehicle shows promise for better speeds in high sea states as compared to the current line of SESs. It would be an ideal travel mode for Arctic operations. Model experiments in NSRDC's test basin have shown that this high-skirted vehicle uses aerodynamic lift with excellent efficiency, could carry large payloads long distances and have impressively sound ride quality.

Two officers and approximately 100 civilians are assigned to ASED. Commander Bill Albers, ASED's aviation program officer, describes his colleagues as "aerodynamicists."

"We're responsive to the needs of the fleet," he adds, "and are primarily concerned with research and development rather than testing – in the true sense of that word."

They certainly have the tools to do the job. In addition to the transonic

The X-wing composite VTOL aircraft utilizes portions of CCR concept. Later versions could have excellent hover characteristics as well as impressive Mach .85 dash airspeeds.

tunnel, there are two subsonic ones and three blowdown-type supersonic tunnels. One of ASED's subsonic tunnels has been modified to accommodate SES lift fan testing. A 12 by 15 foot V/STOL section is in the blueprint stage and will soon be incorporated in the back leg of the gigantic transonic tunnel.

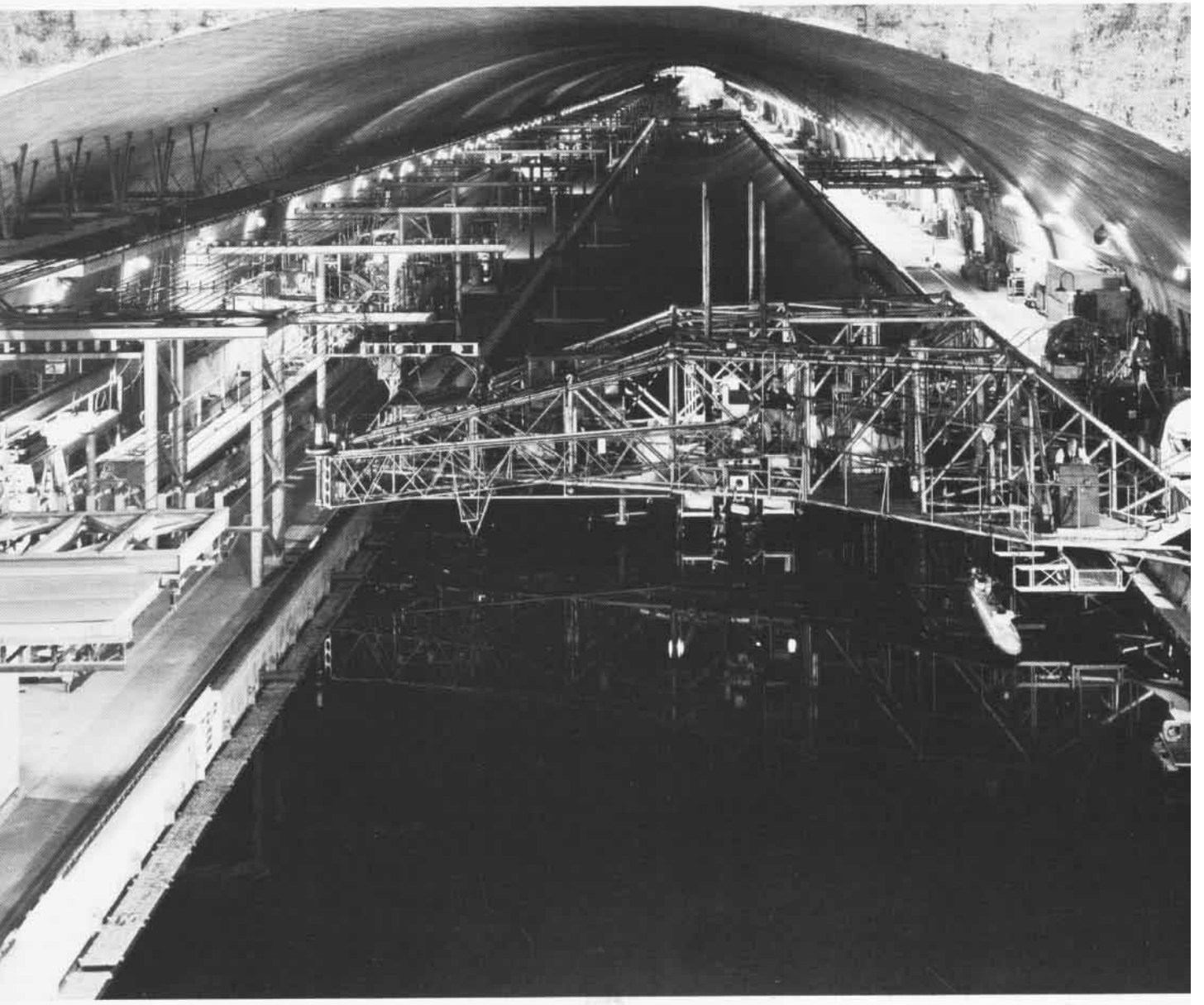
Carriage III resembles a weird complex of scaffolding over a half-mile long, high-speed towing basin used for water testing of SES and other models. This huge system is a companion piece to the most salient feature at Carderock, the deep water basin used principally by NSRDC personnel for their research efforts.

This startling mini-wonder of the engineering world is 2,775 feet long and contains more than 23 million gallons of water.

There are numerous satellite studies under way at ASED. Says Cdr. Albers, "As carrier pilots know, each carrier has a different burble pattern. So, we conduct research to define these and pass the info on to the fleet."

Extensive evaluation of drag patterns along helicopter airframes is proving helpful to both users and industrial companies involved at the manufacturing end of helicopters. In fact, many companies work closely with ASED in mutually productive endeavors.

The helicopter drag effects study is particularly important due to the fact that helos have become "dirtier" as they have become more sophisticated. Albers explains that "We're looking at relationships between the hub on helo rotors and the pylon which supports it. Of course, if we can reduce the drag, the helo will be more efficient."



By mounting a hub/rotor model on a movable axis in one of the wind tunnels, a broad spectrum of pitch and yaw conditions can be simulated.

Jane Wootton, public affairs head at ASED, explains that "We're involved in analytical research rather than nuts and bolts." Adds Cdr. Albers, "We are proud of the new ideas which originate here but we are equally proud of our support role. We try to make whatever system we are working on, work better."

Since its beginning, ASED has succeeded in doing that.

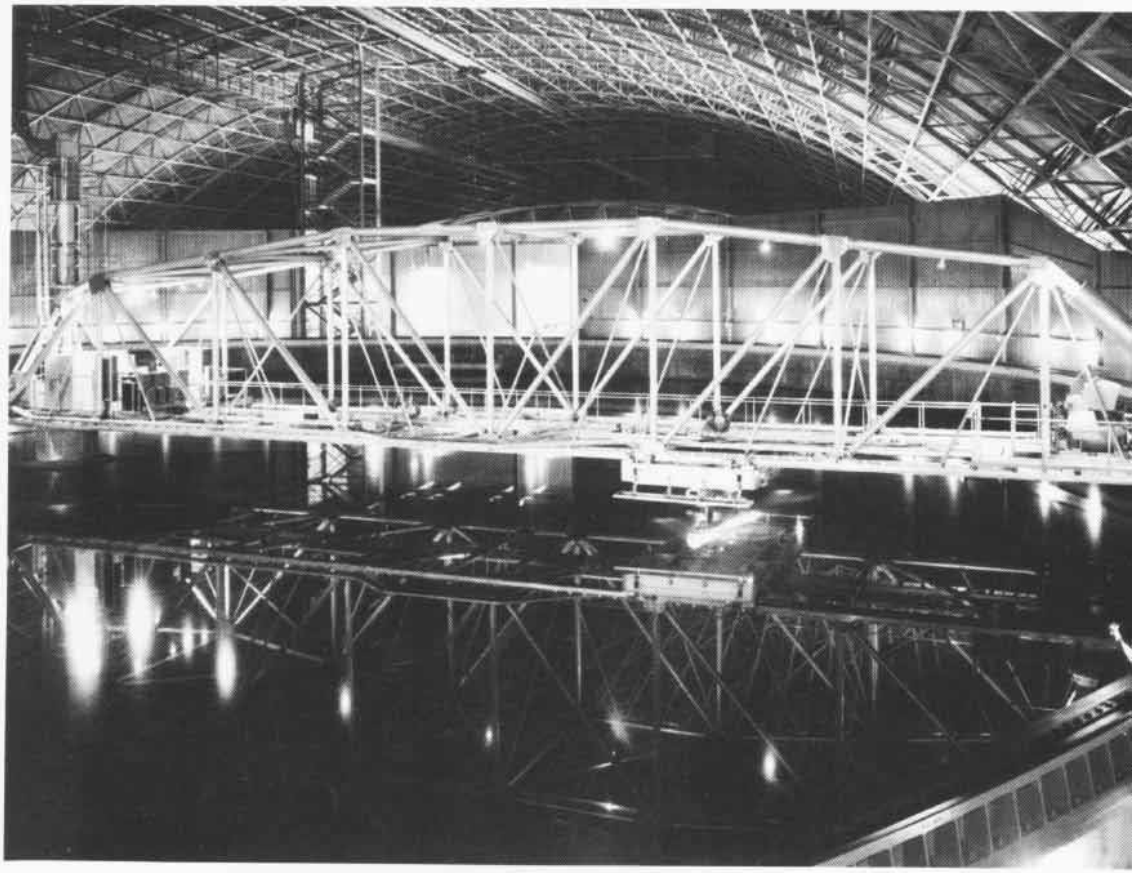
Since its austere beginnings at the Washington Navy Yard in 1913, a number of eminent men figured in the genesis of the Aerodynamics Laboratory, later called ASED. It would be difficult to list here all of those whose dynamic spirit and persistent labor paved the way from the seaplanes of the early 1900s to the *Vikings* and *Orions* of the 1970s. A few stand apart from the others, however.

Captain Washington I. Chambers was a key personality in this evolution. He helped awaken interest in flying in the Navy and, although a non-aviator, stimulated research in aerodynamics. It was Chambers who arranged with the Glenn Curtiss company for Eugene Ely's milestone launch from USS *Birmingham* in 1910. Chambers had correctly forecast that seaplanes would one day augment the surface Navy and make it a formidable military force.

The lab's first director was Captain, later Rear Admiral, David W. Taylor, one of the most prestigious individuals in U.S. naval history. Taylor was a naval constructor and became world renowned for his expertise in naval

Deep water basin at Carderock is 2,775 feet long, 51 feet wide and 22 feet deep. Ship models up to 32 feet long and five feet in width can be tested here.

Rotating arm of the maneuvering and seakeeping basin can move test models at comparatively high speeds. Simulated sea states are achieved by use of pneumatic wavemaker.



architecture. Through his efforts, Congress passed a bill in 1896 for construction of a testing tank for ships. He became an aggressive supporter of aviation and even designed his own wind tunnel in 1912, a year after the Navy had purchased three aircraft.

He was assisted in his pioneering efforts by Gustav Eiffel, designer of France's famous Eiffel Tower and an aerodynamicist in his own right and, among others, two naval officers, Holden Chester Richardson and William W. McEntee.

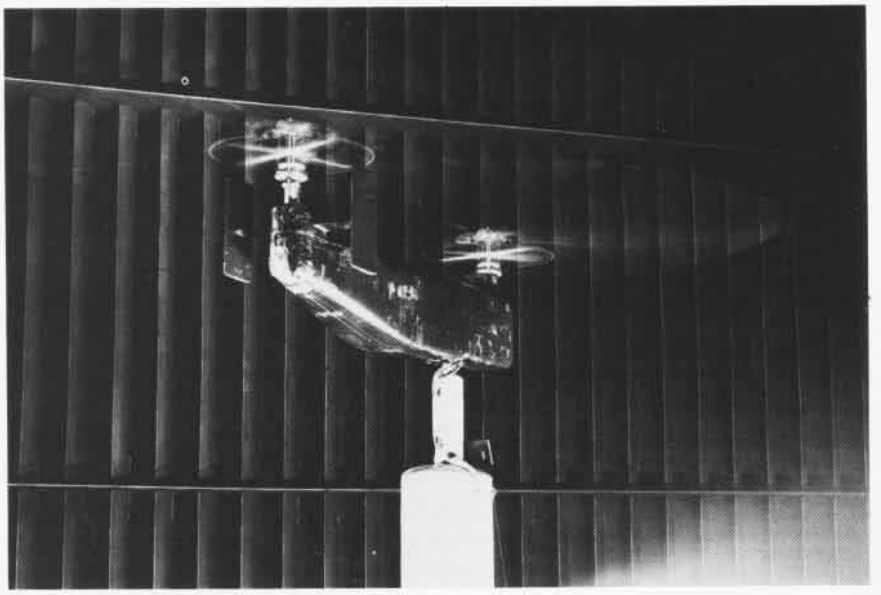
The huge test basin at Carderock is named after Adm. Taylor. His was a singularly vital presence in both ship and aircraft research and development.

Lt. McEntee, a naval constructor, followed Taylor as director of the lab from 1914 to 1917. He had once written, "There is no doubt that many difficulties in aeronautics could have been avoided by the earlier experimenters and many practical advantages can be gained today, by those engaged in aeronautical engineering, through the use of some of the fundamental principles of naval architecture . . . actual aeroplanes . . . have failed because of unsufficient fore and aft stability. They fall headfirst and not tailfirst."

McEntee's thoughts, published in 1911, remain fitting testimony to the compatibility of ship and airplane research – a compatibility personified today at Carderock where vehicles of the sea and the air and their related systems are studied and developed under a "single roof" – albeit one with necessary organizational divisions.

Captain Richardson, also a naval constructor, was director of the lab from 1942 to 1944. However, he was a popular figure much earlier when he worked at the Navy Yard from 1912 to 1916. At that time he tested hydroplanes, redesigned the Navy's first catapult system and conducted a systematic series of model basin tests on seaplane floats and hulls. He could be described as one of the Navy's first test pilots. He gained eminence as a principal involved in the development of the NC-4 flying boat and participated in that May 1919 venture in which the NC-4 became the first aircraft to fly across the Atlantic. He was Naval Aviator #13, designated in 1915.

Dr. Albert F. Zahm followed Lt.



Above, computer graphics are applied at NSRDC. Early helo model is tested in subsonic tunnel during 1954 evaluations.

McEntee and headed the lab from 1917 to 1930. As early as 1893 he had experimented with flying models, a full-scale glider, airplane motors, rocket propulsion and air screws. He developed an open-jet, hand-driven wind tunnel and invented an air speed meter. He also invented an airplane control stick which actuated roll and pitch motions much like in planes today.

Dr. Zahm gave us the phrase "wind tunnel," a term which is employed worldwide today.

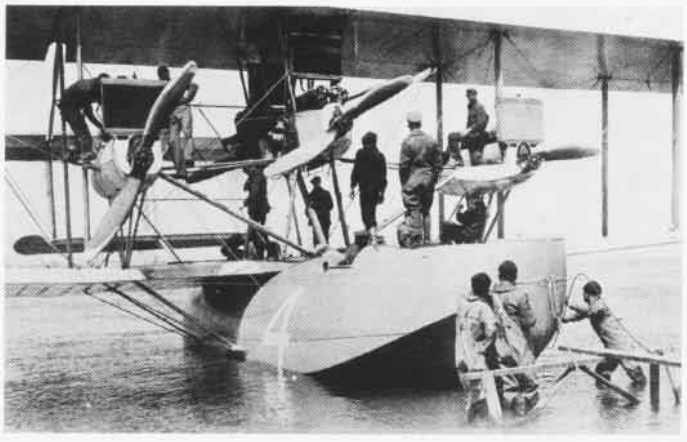
Another non-aviator who figured strongly in aeronautical development was Captain Walter S. Diehl, also a naval constructor. Although not a director of the aerodynamics lab, he spearheaded developments in aerodynamics and hydrodynamics from 1918 until his retirement in 1951. His was a strong influence on airplane design for more than 33 years. One of his many published works, *Engineering Aerodynamics*, was for decades considered a bible in the aeronautical engineering field.

Captain Diehl is especially remembered for influencing and helping to bring about transonic aircraft. His guidance led to the design, procurement and testing of the *Skystreak* and *Skyrocket*, high-speed, high-altitude research planes.

The Navy Yard was the lab's home until 1944 when it was moved to Carderock to share the complex with NSRDC, then known as the David Taylor Model Basin. Over 300 designs have been researched by the lab. More than a third of them eventually became production aircraft.

From the seaplanes, through the airships, WW II combat planes, and onward to the aircraft now flying from distant shores and carriers across the world, Aviation Surface Effects Department has made solid and enduring contributions to Naval Aviation and the flying community.

Pioneer test pilot and aircraft designer Holden C. Richardson was a captain when he headed the Aerodynamics Laboratory from 1942 to 1944. Richardson, Naval Aviator #13, is shown at controls of an AH-8.



Richardson was instrumental in development of the NC-4 and received the Navy Cross for his efforts. In 1919, NC-4 was first aircraft to make a transatlantic crossing.

NAVAL AIRCRAFT

SC SE

The Curtiss *Seahawk* was the last of the long and colorful line of catapult seaplanes to operate from fleet battleships and cruisers. Entering combat service in the Pacific in 1945, it was the only new aircraft design initiated in this country after Pearl Harbor to reach combat. And, in the end, the SC-1s were the first fixed-wing aircraft to be replaced by helicopters.

With the opening of WW II, it rapidly became evident that the existing catapult seaplanes were too small to carry the necessary military load and their performance was totally inadequate in the event they were attacked by enemy aircraft. The requirement for a high performance replacement led to a letter of intent to Curtiss-Wright, in October 1942, for two XSC-1 prototypes. The design featured the use of a turbo supercharger Wright *Cyclone* engine to give the desired combat performance at altitude in a relatively light and straightforward aircraft. In place of the rear seat radioman/gunner of previous catapult seaplanes, the pilot was given up-to-date communications and radar, a "full view" canopy and two forward-firing .50 machine guns. The single main plus wing tip floats, designed and built by Edo, were replaceable by a fixed-wheel landing gear for operations ashore. For rescue operations, one person could be accommodated on a special cot directly behind the pilot's aft armor plate. Automatic wing slats, typical of other Curtiss Navy designs, extended along the entire leading edge. The wings folded aft, turning to a leading edge down position alongside the fuselage.

Orders for additional prototypes and production aircraft, totalling 500 in all, followed those for the first two prototypes. Design and development test work led to the initial flight of the first XSC-1 on February 15, 1944.

While the performance of the SC-1 met expectations, the usual bugs of a newer, more complex aircraft led to some criticism in the fleet, which wasn't helped by structural problems with the main float when operating in rough seas. The unique double bomb bays, one on each side, in the main float were deleted and the float was strengthened. Other changes were also introduced to improve operational characteristics. However, overall assessment of the Navy's needs for catapult seaplanes led to design of the SC-2 in which the turbo superchargers were deleted and other major changes were made to produce an operationally more suitable seaplane.

Before the XSC-2, a converted SC-1, was evaluated, WW II was over and all but 66 of a supplemental order for 450 SC-1s were cancelled. Ten SC-2s were completed, but only the SC-1s, modified to operate without the turbo superchargers, continued in their unique assignment until phased out in late 1949.

SC-1


SC-1


SC-1

AHAWK

SC-2

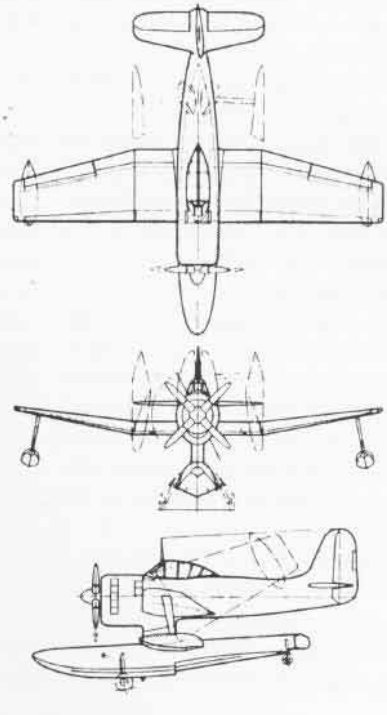
XSC-1

XSC-1

SC

Wing span		41.0′
Length		36′4½″
Height		18.0′
Power plant		
SC-1	Wright R-1820-62	1,350 hp
SC-2	Wright R-1820-76	1,425 hp
Maximum speed		
SC-1 (turbo supercharger)		313 mph/ 28,600′
SC-1 (turbo deleted)		242 mph/2,300′
SC-2		241 mph/12,700′
Service ceiling		
SC-1 (turbo supercharger)		37,300′
SC-1 (turbo deleted)		22,800′
SC-2		28,800′
Range		
SC-1 (full internal fuel)		835 miles
SC-2 (full internal fuel)		925 miles
Crew	Pilot (with provisions for one passenger in aft fuselage)	
Armament	two .50 machine guns wing racks: up to two 325-lb mines -2 plus four 5″ HVARs	

All figures are for seaplane



END OF BIG MOTHERS

"SAR Alert! SAR Alert! Stand by to launch Big Mother!"

Two minutes later the heavy gray helo rose from the fantail of USS *Sterrett* and lumbered into the twilight of the waning afternoon. CIC briefed the helo crew over the radio, giving vectors and distances to find the A-4 *Skyhawk* pilot shot down 32 miles inside of North Vietnam. As the aircraft electrical circuits warmed up and became effective, en route to the coast, the stabilization equipment came on the line to make the big aircraft's flight a little smoother. Checking the flak charts, the pilot elected to cross the beach south of the hills around Vinh to avoid the heavy concentration of AAA sites about the city. The helo crew's body armor in place, weapons cleared and ready, all stations rigged for rescue, and with the A-4 rescue escort on its wing, Big Mother called "feet dry" as they crossed the shore line in the descending darkness.

Once safely past the guns of Vinh, Big Mother turned north. The on-scene commander in another *Skyhawk* cleared the radio emergency guard frequency of all traffic except himself, the helo and the downed pilot. All other assets, including the escort flight, were switched to SAR primary frequency. The on-scene commander made a diving pass and steep pull-up to mark the survivor's position. The arriving helicopter began a descent and approach but 87mm and 100mm AAA fire erupted from the trees and nearby ridges below, driving the helo to the north.

The rescue escort A-4 made several passes at the gun emplacements, successfully suppressing enemy fire enough for Big Mother to make a low-level, high-speed run-in to a hover over a bamboo grove. While the helo crew lowered the forest penetrator through the thicket, hundreds of ground troops peppered the aircraft with small arms and automatic weapons fire.

As soon as the downed A-4 pilot on the hoist was clear of the trees, Big Mother broke hover and departed while the rescue escort continued to suppress the heavy AAA fire. Moments later the survivor was safely aboard the bullet-riddled helicopter.

Retracing their path to the coast, the heavy helo and the escort jinked and maneuvered, continually avoiding the intense AAA from guns along the entire route. The escort *Skyhawks* made repeated bomb attacks beneath Big Mother, suppressing the heavy flak and silencing several of the gun positions.

Back aboard *Sterrett* all was considerably more comfortable for LCdr. Eikel of VA-93, thanks to the skill and teamwork of the crew of Big Mother 74, the on-scene commander from VA-94, the escort pilots of VA-93 and the SAR coordination efforts of CTF 77 in the Tonkin Gulf. This rescue, in the early evening of August 30, 1968, was not unlike a number of others accomplished by the Big Mothers of HC-7.

But Helicopter Combat Support Squadron Seven has ended an era — after nearly eight years of heroic service. The only Navy helicopter squadron ever specifically designated and tasked with the combat search and rescue mission, HC-7 plucked more than 150 downed Navy, Marine and Air Force pilots from North Vietnam and the Tonkin Gulf.

Commissioned September 1, 1967, as a general utility squadron based at Atsugi, Japan, HC-7 provided SAR, vertrep, minesweeping, VIP transport and general helicopter services to the fleet. By the end of 1971, HC-7 had shed all of its original missions save combat search and rescue and had moved to NAS Imperial Beach, Calif. The squadron flew Kaman HH-2Cs and Sikorsky HH-3As from detachments aboard various ships in the Seventh Fleet. A heavy maintenance support detachment was based at NAS Cubi Point. The squadron provided attack and fighter pilots in Southeast Asia a dedicated professional search and rescue force trained and equipped to accomplish rescues under the most hostile conditions.

The HH-3A is specially equipped with self-sealing lines and fuel tanks, a high-speed rescue hoist, armor plating over vital areas, a high-speed fuel dumping system to allow the helo to rapidly lighten its load, and a GE mini-gun capable of firing up to 4,000 rounds of 7.62mm bullets per minute.

When the communist spring offensive of 1972 called for renewed air attacks against North Vietnam, HC-7 had further consolidated its assets to an all H-3 force in an afloat detachment (Det. 110), a maintenance detachment at Cubi Point and a headquarters home guard at Imperial Beach. With five HH-3As, Det. 110 operated for more than six consecutive years on-station in the Tonkin Gulf. Aircraft and crews staged operations from one of the many aircraft carriers and deployed three helicopters to forward pre-position areas on the decks of DLGs and cruisers in search and rescue picket stations along the coast

By Ltjg. Larry D. Nikolaus

A copilot plots reported survivor location and checks flack positions en route to another rescue, far left. Left, a Big Mother H-2C lands aboard DLG-26.

of Vietnam. One remained aboard the carrier in a ready alert status and the fifth helo underwent maintenance and repairs.

Frequently, during heavy bombing raids against the enemy, all five of the Big Mothers were in an airborne alert status, orbiting near the coast awaiting the call to action that might mean another rescue. But, generally, each helo and crew would rotate through the three SAR picket stations and return to the carrier about every third day for much needed upkeep and rest.

The carrier might be home to Det. 110 for as long as a month, or as briefly as one or two days, but the men of the Det. had to conduct a cross-deck transfer of the entire detachment about every ten days. Living in passageways, working in gear lockers, these vagabond "orphans of the Seventh Fleet" seemed to emerge from cruise boxes and laundry sacks to compile an amazing record of daring rescues and to earn the envied distinction of being the most highly decorated squadron of the Vietnam Conflict.

HC-7 counts among its achievements the awarding of the Medal of Honor to the then Lt. Clyde Lassen (the only Navy pilot during the Vietnam Conflict to be so honored), four Navy Crosses, several Silver Stars, more than 50 Distinguished Flying Crosses, numerous Bronze Stars and countless Air Medals and Navy Commendation Medals. In all the time the squadron was accumulating these, it did not lose a single aircraft or crew in combat.

Big Mother rescuees include the first aces of the Vietnam War, Navy Lieutenants William Driscoll and Randy Cunningham, who were pulled from the waters of the Tonkin Gulf moments after they were shot down following their fifth Mig kill.

The monumental task of repairing the frequently battle-damaged aircraft and performing organizational and depot level maintenance fell to HC-7 Det. Cubi Point. The helicopters were sent to Cubi and after repair, back to the line on the most readily available deck headed in the desired direction. There were, of course, many ships which passed back and forth between the Tonkin Gulf and the Philippines.

Det. 110 departed for Conus on September 25, 1973. Det. Cubi left on May 21, 1974.

The maintenance and flight crews similarly rotated from stateside bases to Cubi Point and thence to Det. 110 via ship or COD aircraft. They would normally spend approximately three or four months of a six month deployment on Yankee Station. The remainder of their time was spent at Cubi Point where they flew logistic support and unopposed search and rescue missions.

At Imperial Beach, the "palace guard" carried on the myriad functions necessary to operate a combat squadron. Even while confronting the difficulties of retaining continuity in the face of the high turn-over rate brought on by personnel cruise rotation, the command planned and managed the continuing pilot, aircrew and maintenance training program. It also fulfilled commitments in support of ComFAirSDiego/ComASWWing Pac.

The headquarters group flew various missions in the San Diego area including deep water environment survival training. It also dispatched training detachments to NAS Fallon, Nev., in support of soon-to-deploy air wings.

At Fallon, air wing pilots worked closely with HC-7 and other units. Training involved search and rescue exercises and helped pilots gain invaluable experience as on-scene commanders, rescue escorts and as survivors of mock AAA fire and aggressor forces. Flying these simulated, overland SAR missions allowed the Big Mother crews to hone their skills and to share with the air wing flyers the lessons they had learned during previous live combat search and rescue.

In response to improvements in enemy technology and to new developments in our own capabilities, the Imperial Beach aircrews frequently tested and evaluated new equipment. Some of this was incorporated in aircraft on station in the Tonkin Gulf – for example, the chaff and flare dispensing devices which were installed for antimissile defense.

Now, after nearly eight years, HC-7 has been disestablished. The combat search and rescue capability of the squadron has passed to HC-1.

Big Mother has stepped down but many will remember her.

SCHOOLS & SQUADRONS

By Kathleen Anderson

Six years in a Hanoi prisoner-of-war camp gave Rear Admiral William P. Lawrence a lot of time to think about the Navy. As Commander, Light Attack Wing, Pacific Fleet, NAS Lemoore, Calif., he turned those thoughts into actions.

One of the programs which grew out of RAdm. Lawrence's enforced "planning sessions" is the station's School Adoption Program which is designed to aid Navy recruiting. The program is being put into effect by Lemoore fleet and training squadrons and station personnel. It is coordinated by Commander Ted Kopfman, recruiting liaison officer for ComLAtWingPac.

Initially, NAS Lemoore squadrons were given a list of high schools in the area. After choosing one they felt a rapport with, squadron members contacted school officials suggesting the "adoption."

The program was given an added boost when RAdm. Lawrence hosted a series of tours for San Joaquin Valley school officials in February.

The school adoption program is designed to educate the public about the Navy's missions and goals. Individual schools and squadrons have complete freedom in determining how they will carry out the program.

The squadrons present programs on technical subjects (radar and air traffic control), personnel, first aid, opportunities for women, and Naval Aviation, and conducts just plain fun projects like athletic contests.

During tours of the station, the school's adopted squadron gives the students what may be their first glimpse of a military jet at close range. Tours also include training devices. Students observe the effects of hypoxia in the altitude chamber and sense a Navy pilot's pride as he brings his plane aboard a carrier – in the night carrier landing trainer.

Attack Squadron 215's *Barn Owls* have adopted Coalinga High School, Coalinga, Calif., approximately 30 miles from Lemoore.

After *Barn Owl* skipper Commander R. D. Mixson contacted the Coalinga board of education, the squadron's administrative officer, public affairs officer and two enlisted men met with school counselors to plan the program. Shortly afterward, the school invited the *Barn Owls* to compete in its interclass track meet.

"It was an easy task to find participants among members of the squadron for the track meet," says PAO Doug Shreffler, "partly because of the already existing athletic program and partly because squadron personnel saw it as an opportunity to get out and meet people."

Shreffler, also president of the NAS Lemoore Parachute Club, served as a somewhat unorthodox starter for the meet by staging an exhibition jump onto the athletic field. The *Barn Owls* raced the school's *Horned Toads* in the standard track events plus a sack race and competed in a frisbee throw.

Although the *Barn Owls* lost, they consoled themselves with the explanation that having no female runners made the critical difference in the coed event.

After the track meet, Shreffler talked to student Mary Nimmo who said, "I feel the track meet was much more successful and interesting because of the people that came over from the *Barn Owls*. I think the Navy is pretty fantastic because they come all the way over here and make us feel rather special."

The *Barn Owls* next met with students in March when they transported the entire ComLAtWingPac band to the high school for a concert and jam session. Before the Navy band and the high schoolers blended their musical talents, Cdr. Mixson presented a plaque designating the student body honorary *Barn Owls*.

Seven hundred students and faculty members voluntarily skipped a lunch break to hear the Navy musicians play everything from Glenn Miller "big band" numbers to hard rock, and after the concert the students discussed everything from politics to sight-reading music.

In a recent letter to the squadron, guidance counselor Daren Niekirk said, "The students gave the band a standing ovation and the band reciprocated with an encore. I assure you this was a highlight in assemblies at Coalinga High School and one step further toward our goal of a closer, warmer relationship between the squadron and our high school. The faculty and students feel that VA-215 is not only doing a fine professional job but they really appreciate the squadron taking time to come over for a human experience."

The *Barn Owls* followed the concert with a tour of the squadron in April. Niekirk feels that the exchange

AG Cindy Yates explains weather to school administrators visiting Lemoore's Naval Weather Service Environmental Detachment.

Admiral, did you first get the idea of the program as a POW?

Throughout my career I've tried to help improve community/Navy relations. But as a POW I gave the idea extensive thought. I decided that, upon my return, I would try to do something significant to improve the image of the Navy man and woman. Anti-military feelings were quite well known during the Vietnam Conflict and I felt that aiming at the high school community would be a good approach to help alter those anti-military impressions while improving the somewhat eroded image of sailors and officers which may have existed in some quarters.

Are you satisfied that the Lemoore area has accepted the program?

Yes, very much so. I observed no bias there and like to think the high school adoption program has played a part in enhancing favorable military/civilian relationships. The school administrators, principals, counselors and, most importantly, the students have accepted our efforts with enthusiasm.

What are the program's major goals?

We want to create a positive indicator of the Navy for young people. We simply put it right on the line and tell it like it is. We go to the schools. They come to the squadrons and the lines of communication are continuously open. We exchange information, answer questions and display our wares, so to speak. We feel that we are reaching today's high school students. We show them that the typical Navy individual doesn't fit the image of a drunken sailor or a derelict from McHale's Navy.

The Navy League, incidentally, is a big help to us and we coordinate our efforts closely with it.

How do squadrons like the program?

They think it's great. Squadrons have about a year's turnaround time between deployments and they have time to participate. Even when deployed, a unit will maintain contact with the particular school it adopted.

In fact, some outfits have been so enthusiastic I had to pull in the reins a bit. The program is about nine months old now and going strong.

Do you recommend that other stations implement the program?

It's feasible for others to try it. They should keep in mind, though, that a lot of thought, planning and finesse is required. It isn't advisable to charge into a high school and say, "Hey! We're Navy and we want to talk to you."

Any other comments?

If what we learned in the Lemoore area is any indication, the civilian element in our society, once directly exposed to and educated about Navy activities, is going to get the true image of Navy men and women – that of intelligent, well-trained and dedicated people doing an important job for their country.

Large numbers have visited our facilities since inception of the program and, invariably, they leave with favorable impressions. They view our personnel as hard-working, organized individuals working together diligently and productively for the taxpayers. We endeavor to tell it how it is – and how it is, is pretty darn good.

Rear Admiral William P. Lawrence was Commander, Light Attack Wing, Pacific Fleet, when he initiated the School Adoption Program. He is currently assigned as Director of Aviation Programs, DCNO(Air Warfare), Washington, D. C. He was commanding officer of VF-143 when he was shot down in North Vietnam on June 28, 1967. He was released from captivity on March 4, 1973.

of technical and professional information was beneficial, but the most important aspect was for the "kids to meet new people, a new world so close by."

The Lemoore squadrons are sandwiching their school adoption activities between sea duty and weapons deployments, as well as regular operational requirements. To ensure continuity in spite of deployments, two squadrons with alternating sea duty have adopted Lemoore High School. Ten other squadrons have adopted high schools and the air station staff has adopted West Hills College.

Commander K. S. Jones of VA-153 sent his squadron's adopted school a detailed list of programs and activities the *Blue Tail Flies* can present, either at the air station or the school. The list includes specific films and speeches, counseling on student projects, tours, athletics and survival swim training.

Recently NAS Lemoore's executive officer, Commander G. H. Berry, guided a tour for West Hills College department heads. Later the NAS staff participated in the college's Achievement Day for 500 to 700 students. The station's A-4 *Skyhawk* and a search and rescue helicopter were on hand and a concert was provided by the ComLAtWingPac band. Then in April the station educational services officers met with division heads at the college.

VA-146 hosted a tour of the data processing department for students of Hanford Joint Union High School, and PAO Mike Pfleuger spoke to the geography class on the People's Republic of China. The *Blue Diamonds* are planning a sports event with the high school. One highlight of the *Blue Diamonds'* program was the enlistment of two students by Commander D. K. Tyler, C.O.

RAdm. William P. Lawrence, ComLAtWingPac, relinquished his command to RAdm. John M. Tierney, ComMAt/VAQWingPac, on May 29. RAdm. Tierney will command both the light attack and medium attack communities from his headquarters at Whidbey Island. RAdm. Lawrence now heads up the Aviation Programs Division in the office of DCNO(Air Warfare).

In a ceremony on May 19, Cdr. Dan A. Pedersen relieved Cdr. I. Carmichael as Commander, CVW-15, embarked in *Coral Sea*. Cdr. Carmichael's present duty station is Washington, D.C., where he is head of the VFAX program.

Command of VA-45 passed from Cdr. Stephen A. D. Picciuolo to Cdr. Leo G. Huatt on May 29 at Cecil Field. Cdr. Picciuolo has reported to the staff of ComSeventhFlt in Yokosuka, Japan.

In a May 30 ceremony at NAS North Island, Cdr. E. B. Smedberg relieved Cdr. W. C. Christenson as commanding officer of VS-29. The S-3A squadron is preparing for deployment aboard *Enterprise*.

Cdr. Richard J. Inman became C.O. of NARU Memphis in a combination change-of-command and retirement ceremony on June 28 at the naval air station. Capt. Leib retired after completing 30 years of naval service.

On June 9, Cdr. Eldon S. Baker relieved Cdr. Monroe J. Ahrenstein as C.O. of VAW-117. Cdr. Ahrenstein reported to Carrier Group Two for his new duty assignment. VAW-117 is based at North Island and is the latest addition to the AEW community, flying the E-2B *Hawkeye*. It celebrated its first birthday July 1 aboard *Independence*.

A former executive officer of *Independence* assumed command of the carrier on June 24 when Capt. James E. Service relieved Capt. William B. Warwick. The latter, a selectee for rear admiral, is now Assistant Chief of Naval Personnel for Enlisted Distribution in Washington, D.C.

Command of VT-28, NAS Corpus Christi, passed from Cdr. John J. Higgins to Cdr. Richard L. Babb on June 9. Cdr. Higgins has been assigned to the Human Resources Management Center at Alameda.

LCdr. Maurice R. Butts, formerly X.O., took command of HT-18 on May 16 at Whiting Field.

VA-97 acquired a new C.O. when Cdr. Robert P. Nicolls relieved Cdr. Bert D. Terry on June 26 at NAS Lemoore. Cdr. Terry has reported to ComNavAirPac at North Island.

In a ceremony aboard *Kitty Hawk* on June 2, Cdr. Donald E. Kentopp turned over command of VAQ-136 to the squadron's former executive officer, Cdr. Donald L. Dietz. Cdr. Kentopp has been transferred to Supreme Allied Command, Europe, in Brussels, Belgium.

Capt. Robert A. Wenning has taken command of NARU Norfolk from Capt. Fred Thorn. He has also relieved Capt. Thorn as local air coordinator for Naval Air Reserve activities in the Tidewater, Va., area.

Capt. Edward O. Williams became the 16th commander of CRAW-1 on June 5, succeeding Capt. Clifford E. Thompson. The latter has been assigned to the staff of DCNO(Air Warfare). The reconnaissance unit flies out of NAS Key West.

Command of VA-146 passed from Cdr. Don Tyler to LCdr. Leslie A. Sanders on June 11 in a ceremony at NAS Lemoore.

Cdr. Harry W. Lineback relieved Cdr. William D. Pocklington as skipper of HC-1 at NALF Imperial Beach on June 13. Cdr. Pocklington went to ComCruDesGruOne as air operations officer.

RVAH-3, based at Key West, has as its new commander, Cdr. Arthur R. Skelly, who took over from Cdr. Harry W. Wright. The latter's present duty station is the Naval Electronics Systems Command, Washington, D.C.

Cdr. George C. Greene yielded command of VS-21 to Cdr. Anthony M. Stoeckel on June 20 in a ceremony at North Island. Cdr. Greene has reported to the staff of ComCarGruThree in Alameda.

Command of reserve squadron VP-67 was transferred from Cdr. Stanford L. Brown to Cdr. Jerry F. Healy at NAS Memphis on May 17. Cdr. Healy is a pilot for TWA in his civilian occupation.

Ltjg. David J. Nichols, assigned to VA-46, landed an A-7B *Corsair II* on *John F. Kennedy* for the 75,000th arrested landing since her commissioning in September 1968. *JFK* is deployed to the Mediterranean.

A contribution of over $800 has been made by VA-25 to the Naval Aviation Museum. The squadron's X.O., Cdr. P.W. Ogle, and Lt. C. S. Chapman presented the check to VAdm. M. W. Cagle, USN (Ret.), at the museum in front of the A-1 *Skyraider* donated to the museum by VA-25 in 1968.

The *Warhawks* of VA-97 celebrated three years of accident-free flying on May 16. During the period, the squadron participated in *Linebacker I and II* operations in SEAsia aboard *Enterprise.* During its last cruise, deployed aboard *Enterprise* again, VA-97 was among those tasked with providing protection in the evacuation of Saigon.

On May 27, VP-49 completed 100,000 hours of accident-free flight when Crew #1 taxied its P-3C into the chocks. The *Woodpeckers* have kept their slate clean of accidents since March 1962 when P5M *Marlins* were the aircraft of the day. Cdr. G. W. McDonald is C.O.

"Safety is our business and business is good." With these words Cdr. Terrence W. Halm, C.O., congratulated VP-46 crewmen on the squadron's 100,000th accident-free flight hour. The hours were accumulated over the past 11 years.

A VP-16 *Orion* made NS Keflavik's 50,000th ground controlled approach on May 14. The Navy began recording GCA landings at Keflavik in 1961 when it relieved the Air Force as host activity. VP-16 is home-ported in Jacksonville.

The Pearl Harbor-based USS *Davidson* (DE-1045) is the first ship to win the Adm. James H. Flatley Memorial LAMPS Ship Safety Award. Twenty-six LAMPS-configured ships were in the competition, which recognizes high standards, aggressive flight activity and an outstanding safety program.

Capt. James R. Bilbow, USMCR, was recently awarded a Silver Star for Bravery by the American Federation of Police at an NAS Willow Grove ceremony. The award cited his rescue of a woman and her two teen-aged children trapped by fire on the second story of their home. Capt. Bilbow serves as flight equipment officer with HAMRon 49.

The 78,000-ton aircraft carrier *Ranger* has moved from Alameda to North Island

where it will share the quay wall with *Kitty Hawk* and *Constellation.* The home-port change gives carriers with similar engineering plants the same home port.

Ranger, skippered by Capt. John L. Nicholson, Jr., will deploy to WestPac this fall before being modified to handle the F-14 *Tomcat* and S-3 *Viking* in mid-1976.

The Virginia Chapter of the International Organization of Licensed Women Pilots was recently hosted by VRC-40 at NAS Norfolk. They were welcomed aboard by the squadron's X.O., Cdr. J.E. Roth, and his wife, who is a member of the club. Amelia Earhart was its founder and first president. Many of the members are or have been associated with the military.

VR-1, based at Norfolk, has completed its second year of operations with the C-9B *Skytrain II* which it received in May 1973. It was a major step toward VR-1's becoming Navy's first all-jet transport squadron. It now has four C-9Bs in its inventory.

Enterprise's normal complement of crewmen was increased by more than 150 during a five-day trip from Hawaii to NAS Alameda. The ship was returning from an eight-month deployment. The extras, ages 8 to 18,

represented sons of the men and officers of *Enterprise* and her embarked air wing, CVW-14. There were also a few who are sons of men missing or killed in Vietnam. During the trip, they saw the carrier/air wing team in action.

The aircraft carrier *Enterprise* has an "annex" located at the Bullock Elementary School in Garland, Tex. The annex's commanding officer is Mrs. Ann Boriskie, a teacher who introduced a program to indoctrinate her students in the Navy way of life. Through her efforts each student has a pen pal aboard *Enterprise* and the carrier's crew members visited the class. Students in the class carry *Enterprise* I.D. cards and are identifiable by the white sailor hats they wear. The class observes military protocol which requires visitors to sign in and out in official log books. They are responsible for such Navy basics as quarterdeck procedures, leadership and general military bearing. Now that another school year is over, "Captain" Boriskie is making plans for the new crew which will be coming aboard Enterprise Annex. Although they won't be afloat, they will feel part of the Navy's fleet.

VP-5 has been selected by CinCLantFlt to represent Naval Aviation in the 16th annual *UNITAS* exercise this fall involving the U.S., Peru, Chile, Argentina, Brazil, Colombia, Uruguay, Ecuador and Venezuela. The five-month exercise will demonstrate the ability of Pan-American forces to work together in naval operations.

It is small and easy to overlook but the Point Mugu Air Terminal is a busy place. It serves as the arrival and departure point for flights to Spain, Puerto Rico, Cuba, Diego Garcia Island, Guam, Okinawa, Japan, Alaska, Antarctica, New Zealand and elsewhere. Herman Moraga is manager of the terminal, assisted by his deputies Larry Johnston and Joe Lopez.

In 1974, 50,714 passengers passed through its electronic metal detector gates, 5,210 flights were cleared and the terminal handled 3,160,465 pounds of cargo. Normally, during their 17-hour day from 6 a.m. to 10:30 p.m., terminal personnel move from 100 to 400 people. During peak periods that number can double or triple. The terminal also services all transient aircraft which use its facilities.

An obscure monument stands in the fork between Cuba and Henderson Streets one mile south of the boat basin on Parris Island, S.C. The inscription says "Page Field, named in honor of Captain Arthur Hallet Page, Jr., Marine Corps Aviation."

Capt. Page learned to fly in 1918 and was the first Naval Academy graduate to go into Marine Aviation. In 1930 he was engaged in experimental work in blind flying, entirely by instruments, and in night flying by radio beacon. That year he competed in the National Air Races in Chicago and flew the only military entry, a Navy-modified Curtiss *Hawk* XF6C-6. Apparently carbon monoxide, leading into the cockpit from the plane's engine, made Page lose consciousness. The plane crashed and Page died from injuries the next day.

Today Page Field consists of three intersecting runways across the southern portion of Parris Island. It is deserted. Weeds have grown between the cracks in the pavement. In place of planes are Marine recruits engaged in field training. Parris Island is no longer an air station but devotes its full time to recruit instruction. But the marker is a reminder of Capt. Page's achievements.

RVAH-11, established November 1, 1955 as Heavy Attack Squadron 11, was disestablished at Key West on May 31. Cdr. Thomas W. Brown was the squadron's last C.O.

Crash crews receive extensive training, but the inventory of aircraft is vast and complex. Therefore, an airfield's crash crew will probably be more familiar with the planes which use their field most frequently. The

squadron safety department is the obvious base from which to start training. VP-46, home-ported at Moffett Field, has organized a safety team to acquaint WestPac airfield crash crews with the P-3 *Orion*. The team's

first demonstration was at Yokota Air Base, Japan. During a two-day period, the base's Air Force crash rescue crew were given lectures and training sessions culminating in staged emergencies where the crews actually worked with the aircraft. The VP-46 safety team would like to provide instruction to crash crews at all of the airfields in WestPac.

Paul E. Burbank is treasurer of the Golden Eagles Association, an active group of early, retired Naval Aviators. Previously, the association membership was limited to those with Naval Aviator numbers below 2,000, but today it is open to all retired or inactive Naval Aviators. Burbank was No. 1903. Earlier this year, he donated an N-9 propeller to the Naval Aviation Museum.

Recently he visited NS Keflavik, Iceland. As he listened to the roar of an F-4C *Phantom,* he reminisced about NAS Pensacola in 1918 where he was a bombing instructor and flew the N-9. "In Pensacola, when the water was calm and we had no wind, we'd have to get an airplane out in front of us to create enough wind to get us airborne. The antenna on the early radio had something like a fishing weight on the end and we reeled it out from a very primitive wheel in the back of the airplane, I guess for more than 150 feet." He laughed. "We lost a lot of antennas because we forgot to reel them in before we landed."

Today, Burbank is retired in a Maine coastal village only six miles from NAS Brunswick, which he visits frequently. He says, "I still feel very much a part of Naval Aviation and enjoy the close association with Brunswick."

The Naval Test Pilot School at Patuxent River graduated its 67th class on May 30. The 30-member class was composed of personnel from the Navy, Marine Corps, Army, Air Force and Coast Guard; from the Canadian Armed Forces, Israeli Air Force, Royal Australian Air Force, one civilian contractor from Boeing Aircraft Co., three civil service engineers and a pilot from NASA Houston.

The school trains experienced aviators to become fully qualified test pilots. Since its beginning in 1948, more than 1,400 pilots, naval flight officers and civilian engineers have graduated.

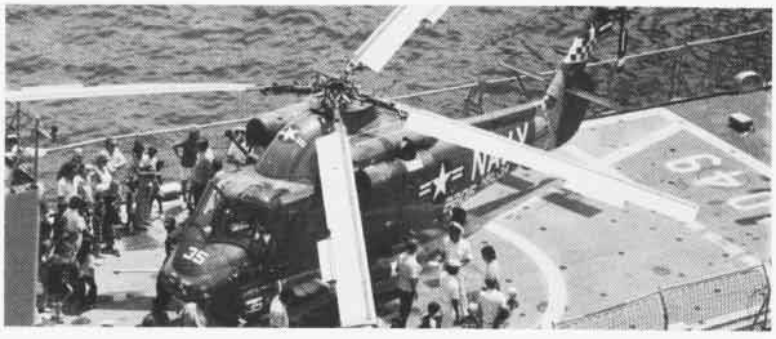
ADJ1 John T. Litzinger of HSL-34 has been named by CNO as the Atlantic Fleet Sailor of the Year. Following a visit to Washington, D.C., together with the Pacific Fleet and Shore Activities Sailors of the Year, he will be awarded a meritorious promotion in recognition of outstanding contributions to the service.

HSL-34 also has among its personnel three Army retreads. Ens. Bob Scott, an ex-Army M.P., is now the airframes division officer. Ens. Jack Bloom, an ex-Army infantry captain and helo pilot, is avionics division officer. And Ens. Russ Jowers, ex-Army CWO helo pilot, is now squadron public affairs officer.

The squadron passed the 1,000-hour mark on June 6 during a flight made by pilots Lieutenants Jim Swoope and Pat Tierney.

With nine Kaman H-2 aircraft, the squadron is preparing to deploy three detachments for six months.

In May HSL-34's Det 2 recorded the first landing aboard USS *Koelsch* (DE-1049) which was recently certified for LAMPS.



THE

James Falk

ENLISTED RATING SERIES

AVIATION BOATSWAIN'S MATE

Mark Meyer

By Bob Moore

The ship is headed into the wind and the helicopter plane guard is launched. Planes crammed into the cavernous hangar deck are positioned on giant elevators by Aviation Boatswain's Mates (ABs) and lifted to the flight deck where a yellow-shirted AB flight director flashes his closed-fist signal to hold the brakes. Other signals tell blue-shirted airmen to remove tiedowns and chocks before the first planes are guided to the catapults.

A huge jet blast deflector is raised – and hold-back fittings keep the eager aircraft from galloping off too soon.

Whipped by the wind into a blur of green, ABs in the catapult crews move to within inches of the screaming jets to attach cat bridles after hooking the wire around the deck shuttle. As each job is completed, these green-shirts give their hand signals and charge out of the way. Their senses reel under the thundering roar, the parching exhaust, and the acrid smell of burning fuel as the pilots gun their aircraft.

The time gong rings. The countdown is backed up by red, amber and green lights. Four, three, two, one – launch aircraft!

The catapult crews can shoot a 70,000-pound plane off the deck at 150 miles an hour within 250 feet in less than two seconds. They work in heat, noise and danger on the flight deck. They work below decks in a rumbling, steam-conditioned inferno, where two 6,000-pound pistons, 18 inches in diameter, on 12-foot shafts, slam the aircraft forward.

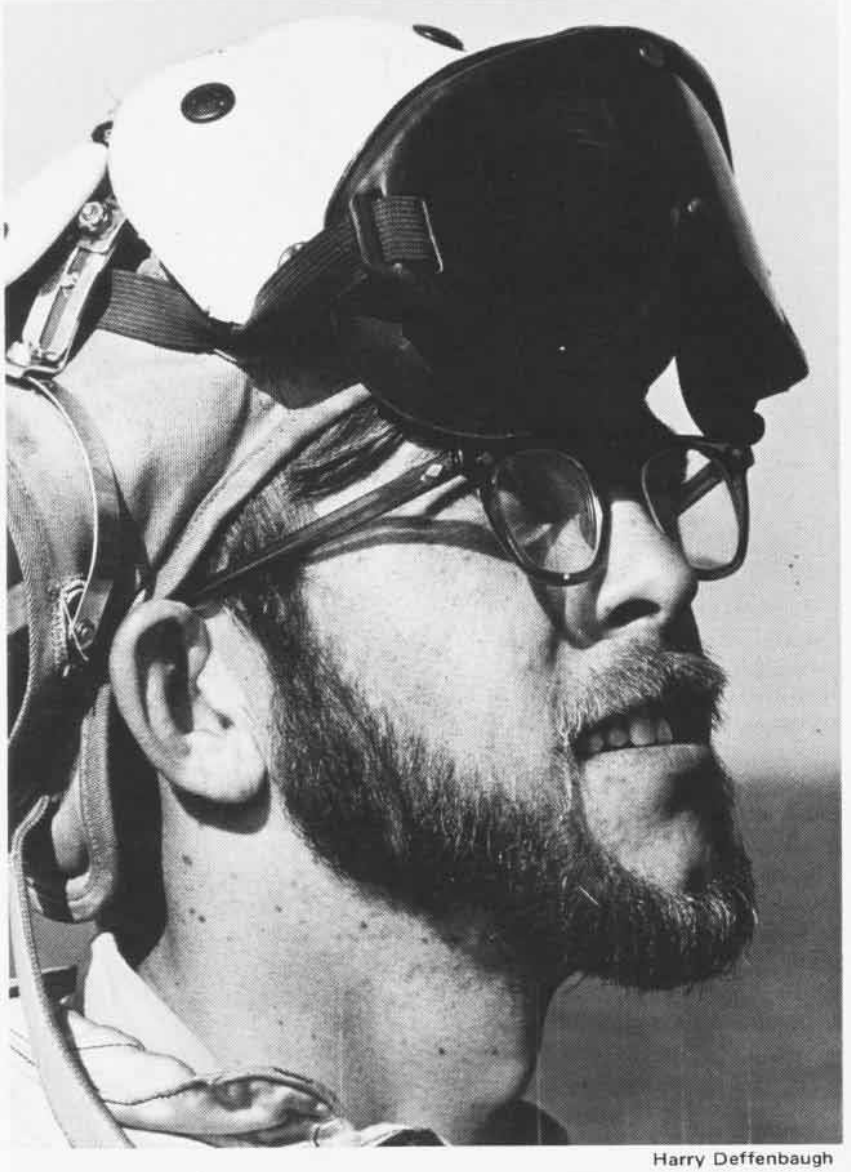
As soon as the last plane is safely aloft, the first plane of the previous launch is in the slot and headed for touchdown. Once the incoming aircraft is identified, the arresting gear unit is notified so its engines can be set for the proper stress.

As each plane hits the deck, its tail hook snags one of four 105-foot, 400-pound pendants attached to a 1,900-foot purchase cable. This cable reeves around the arresting gear engines below deck. As thick as a man's wrist, each cable can stand 155,000 foot-pounds of force while driving a large ram into a cylinder of hydraulic fluid to absorb the impact.

The returning planes come in at 120 miles an hour to a three-second, 300-foot stop. Other green-shirted ABs

This VMA-22 Skyhawk looks toy-like as an Aviation Boatswain's Mate guides it toward Hornet's catapults, title page. A plane handler, above, talks the sign language of the flight deck. Below, an Intrepid deck edge operator signals to tension for a launch.

As one Skyhawk is launched, another A-4 is positioned on Oriskany's starboard cat, above. Below, Aviation Boatswain's Mate shows the special empathy between pilot, plane, and launch crew as he follows the shot into the bright sky over the Tonkin Gulf, Vietnam.



Harry Deffenbaugh

may be the arresting gear operators or hook runners who signal the director when the plane is freed from the pendant. These cross-deck pendants are constantly checked – and changed every 100 landings. ABs can replace a worn or damaged pendant in two quick minutes.

An emergency nylon webbing barricade, which the arresting crew can also rig within two minutes, is always ready to recover damaged aircraft that are unable to use their tail hooks or have similar difficulties.

After landing, bomb racks are empty and fuel tanks nearly so. Under the direction of purple-shirted aviation fuel specialists, hundreds of feet of hose are dragged from deck stations. These special ABs designate the type and amount of fuel for the various planes and are responsible for the giant fuel storage tanks, pumping, filtration and hangar deck refueling stations, and the fuel equipment repair shop.

From vultures' row on the 08 level, these AB operations make the flight deck look like an ant hill stirred with a stick into astericks of action. These ABs really move.

Aviation Boatswain's Mates have been the movers of Naval Aviation since their rating began in 1944. The men in the bright-colored jerseys, with the crossed, winged anchors on their sleeves, have all the know-how to operate and maintain their ship's elevators, winches, cranes, catapults and barricades. The ABEs are launch and recovery technicians. The ABHs are aircraft handlers and ABFs are the fuels specialists.

The handling of aviation fuels has come a long way since the birth of the Aviation Boatswain's Mate rating – all the way from straining fuel through chamois skins to centrifugal purifiers.

Contaminated fuel can cause a costly malfunction. Flame-outs can cost lives, not to mention airplanes. So constant checks must be made by purple-shirted professionals trained in piping systems, pumps, pressure regulators, tanks, gauges and nozzles.

These gas jockeys of the flight deck become fuel farmers ashore. A typical fuel farm can be made up of gigantic

Top and below, this AB hook runner watches an arrested landing during the heat of flight deck operations aboard John F. Kennedy. Bottom left, wear on the arresting cable is measured with calipers by ABs James H. Craft and Bobby R. Hayes aboard Enterprise. Bottom right, flight deck ABs aboard Ranger show why they're the movers in Naval Aviation.

storage tanks, holding millions of gallons of fuel, with miles of underground pipelines to refueling points along the runway.

The fuel farm's biggest customers are the rapid fuel pits which can handle four planes simultaneously. Once a plane is guided into these pit areas, its engines stay on when hot refueling is the order of the day. Working pumps and monitoring gauges, the fuel men keep the pits open as long as there are planes in the air. When an aircraft cannot make it to the pits, the refuelers rely on 5,000-gallon tanker trucks to do the job.

Since fueling's biggest concern is safety, ABs in the crash crews are always on hand:

"NAS crash crew, this is the tower with an emergency. We have a C-121 with its number two engine on fire. There are 23 aboard. The plane is carrying 11,000 pounds of fuel. Pilot estimates the field is 15 minutes. Landing will be on runway six left. Any questions?"

Donning their protective clothing, the crash crews roll to their assigned positions. The red trucks speed out to the 2,000, 4,000 and 6,000-foot marks along the runway.

Then the speck in the sky becomes a wing and fuselage. The landing gear drops and the tires screech on the concrete. The C-121 begins to taxi down the runway while the crash trucks speed toward the plane.

This sort of readiness requires constant practice. Rolling stock must be maintained. On-the-job training twice a week teaches AB firemen how to lay down a protective screen of foam and water. When setting up their tanker, they pull spreader bars to either side of the truck tail to foam a 25-foot strip of runway. The turret operator sprays out beyond this width. Before the first foul odor of protein waste rises from the meringue-like ooze, the truck is already 1,000 feet down the runway, stretching the spurts into a three-inch foam blanket. This procedure will help ease a landing and smother sparks until rescue men can save any trapped passengers or crew.

Above and below, ABFs are fuel specialists who discuss their job with professional intensity. Facing page, Ranger's crash and salvage crew climbs into its asbestos hot suits to spray Purple K — a mixture of potassium carbonate and light water — on a simulated fire. These ABs drive the Twin-Ball Express which features a tandem nozzle attached to hoses from twin-mounted balls to supply the purple potassium and watered detergent so the two-man unit can provide the flight deck with fire-quenching speed.

Mark

Bob Moeser

Above, an A-4 is directed from parked position with the special rock 'n' roll gyrations of an Aviation Boatswain's Mate on the deck. Below, a Skyhawk aboard Saratoga is hooked to a cat as the launch cycle begins again during flight ops.

Aviation Boatswain's Mates can rescue a pilot from a burning plane in lifesaving seconds — or handle, launch, recover and fuel high-speed naval aircraft at sea and ashore. They understand all the basics of their airplanes and the fundamentals of hydraulics, physics and mechanics. They're trained to stay cool and efficient in emergencies during busy flight deck operations and in all kinds of weather.

Standing on a slippery deck, in a driving rain, under a roaring jet, while holding a 300-pound bridle on a catapult's tow hooks, may not make an AB. But it sure makes a believer.

Three feet from the bow, an AB flight director backs into 35 knots of wind while spotting an aircraft recovery on a dark night. With the same confidence, a young tractor driver maneuvers a multimillion-dollar aircraft into a close deck-edge spot and a runner retrieves a stuck bridle from the cat horns just a slip away from the water 100 feet below.

For these men, operating on a carrier flight deck is somewhat like running a three-ring circus. The deck is divided into three arenas with Aviation Boatswain's Mates as the ringmasters.

In the forward arena, an AB supervises the men who move and park incoming aircraft during recovery.

In the center arena, men in yellow, red, blue, green and purple jerseys dart in, out, around and under, to park, secure, start, break out and send planes forward to be launched. The AB ringmaster in this arena signals the landing pilot to raise his tail hook, fold his wings, and move out so other planes can land.

The after arena initiates all this action with ABs re-spotting planes for launch amidst high winds, whirling propellers, and the deafening, 140-decibel blast of jet aircraft.

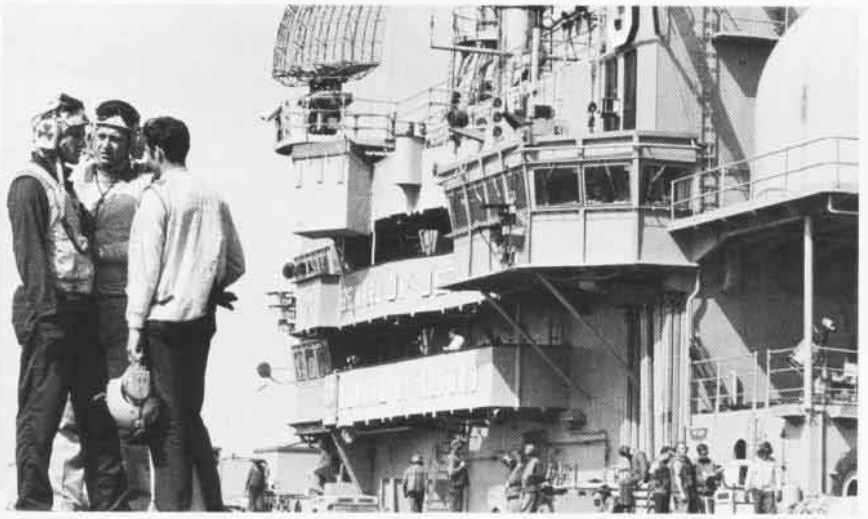
"Check chocks, tiedowns, firebottles, and all loose gear on the flight deck. Helmets on and fastened. Goggles and sleeves down. Check starting units. Start the go aircraft."

And when one of those things that isn't supposed to happen does, it's the Aviation Boatswain's Mate who steps into the ring and handles it.

AB1 Walter Doherty

Ringmaster

By PH1 Claude Sneed



JMEMs

"*What weapon* should I use against this target?"

"How many sorties and how many weapons are required?"

"What is the best way to deliver available weapons?"

"What fuze setting should be used for maximum effect?"

These are questions often asked by operational users when planning air strikes in a combat environment. Answers to such questions are now more readily available than they were in the past.

The Joint Munitions Effectiveness Manuals for Air-to-Surface weapons (JMEM/AS) contain the most extensive compilation of authenticated technical data available on munitions effectiveness. These publications contain data which aid in planning a single target or target complex attack.

Basic procedures when using the manuals include analyzing each target to define vital components, identifying vulnerabilities and establishing appropriate damage criteria for each target, selecting weapons capable of achieving the desired damage, evaluating weapons for delivery accuracy, and making final selection of weapons for the target.

In 1963 the Joint Chiefs of Staff directed the services to develop a manual system which would provide standardized information on air-to-surface, non-nuclear munitions. Previously, it was difficult to compare data accumulated from the different military branches. JMEM was quickly accepted, especially in view of the growing conflict in Southeast Asia.

Consequently, the Secretary of Defense requested similar information for surface weapons, and established the Joint Technical Coordinating Group for Munitions Effectiveness (JTCG/ME) for executing the assignment. It is guided by a steering committee composed of one principal and one alternate member from the Army, Navy, Marine Corps and Air Force, plus one from the Defense Intelligence Agency. The overall JTCG/ME efforts have been expanded to include working groups operating in target vulnerability, surface-to-surface weapons, aircraft attrition, air-to-air weapons, and battle damage, as well as the advancement of the original air-to-surface weapons efforts.

The JMEM/AS program is manned by civilian analysts and engineers, as well as military personnel from the service branches. Active working groups are involved with methodology, target acquisition, weapons characteristics, delivery accuracy, target vulnerability and standardization/authentication. The JMEM/AS steering committee is co-chaired by the Navy and Air Force participants. Navy/Marine Corps activities contributing to the JMEM/AS program include: headquarters – OpNav, NavMat, NavAirSysCom, USMC; fleet/operational units – VX-5, MAWTUPac, MAWTULant, CinCPacFlt, NWTG/Pac; and laboratories – NWC China Lake, NSWC (Dahlgren, White Oak Laboratories), NATC Patuxent River, NCSL Panama City. Air Force and Army aviation personnel are provided from similar agencies and field stations.

In addition to a set of JMEM/AS manuals, there are technical publications on target vulnerability, weapons characteristics and delivery accuracy. A number of specialized reports are also available.

The delivery accuracy report contains data from both combat and training ranges. This information allows the assignment of combat accuracy estimates to different weapons systems, modes of delivery, and delivery environment. These accuracy estimates help predict overall kill and damage probabilities.

The Weapons Characteristics Handbook presents detailed descriptions of operational air-to-surface weapons and lists parameters which define the kind of damage each type of warhead can produce. Information includes explosive blast dimensions, earth and concrete cratering and fragmentation patterns, and armor penetration as

books for bombers

achieved by shaped-charge warheads. Fire-producing effects are also covered. The JMEM/AS effort has also led to standardized testing procedures which enable evaluation of new and proposed weapons systems.

The Target Acquisition Working Group of JMEM has published a series of special reports featuring aspects of pilot and crew performance in target acquisition and mathematical modeling of human performance. These include studies of flare position and color effect on acquisition, camouflage pattern selection, airborne observer positions (such as tandem versus side-by-side seating), and imaging systems (television and infrared search sets).

The standardization and authentication working group is composed of operational military personnel who ensure the validity of weapons loadouts, tactics, and other operational aspects. Representation is provided by VX-5 from the Navy, MAWTU/Pac/Lant for the Marines, and the USAF's Tactical Fighter Weapons Center.

The JMEM Weaponeering Manuals provide data through open-ended methods, pre-calculated solutions, and more recently the introduction of computerized methods using semi-portable programmable electronic calculators. These computer devices are available at relatively low cost and greatly facilitate generation of data. The time required to achieve solutions when worked by hand is also reduced. The pre-calculated solutions, such as are available in the manuals for visual deliveries and radar deliveries, are designed to provide fairly rapid solutions through charts, monograms and tabulated data.

The primary weapon effectiveness manuals published by JMEM/AS are:

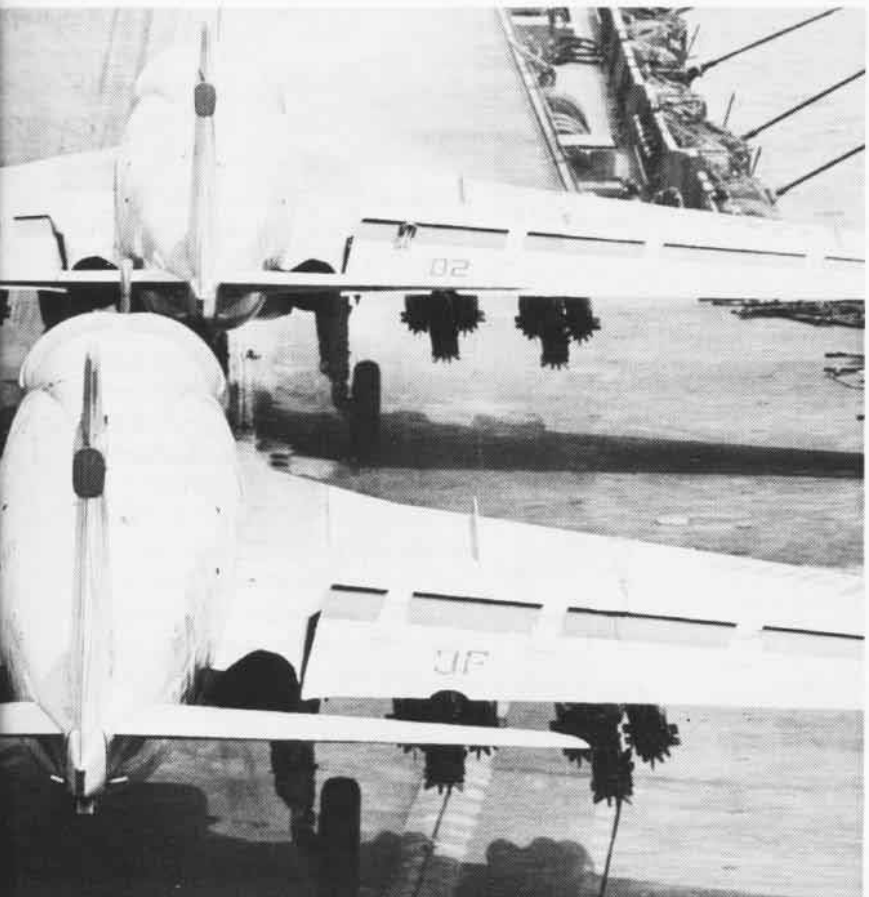
1. Basic JMEM/AS – Weapon Effectiveness, Selection and Requirements
2. Air Delivered Non-Nuclear Munitions Effectiveness, Radar Deliveries
3. Visual Deliveries, including Fixed Sight and Computer-Aided Visual Deliveries and Guided Missiles

In addition to continued advancements and improvements to these publications, plans include the issue of an effectiveness manual for slow-speed aircraft. A draft version of a manual for armed helicopters is now being reviewed by the Army and Marine Corps.

The JMEM's are joint service technical manuals. Each military branch authenticates the manuals, stocks them under its own publication identification number, and issues them through its own channels.

The information presented in the JMEMs has application in all phases of weapons use. For combat crews and operational planners, it spells out the most effective employment of weapons and munitions, and their selective applications. For commanders, weaponeers, operational planners and logisticians, JMEMs can provide a sound basis for scientific insight and professionalism. This knowledge of factors affecting target vulnerability and accuracy of delivery can contribute to the defeat of individual targets which, in sum, adds up to victory.

JMEMs amd JTCG/ME Special Reports may be obtained through JTCG/ME Publication Manager (MMSU), Oklahoma City ALC, Tinker Air Force Base, Okla. 73145. A complete listing of available publications is contained in Index-Specialized Technical Handbooks for JMEMs and Related TH 61-1-2.



Munitions manuals will make mission planning easier for all concerned units. Attack aircraft like A-7 Corsair, far left, and A-6 Intruder, left, will especially reap benefits.

Letters

Flying Combat Aircraft

Mr. Robin Higham, editor of *Aerospace Historian*, is seeking help from Naval Aviators past and present. He is preparing a companion volume, to succeed his publication *Flying Combat Aircraft of the USSAF/USAF*, which will feature, from the pilot's vantage point, summarized histories of aircraft ranging from WW II planes to the present. He's interested in all aircraft be they TBF *Avengers* or F-14 *Tomcats*. He seeks writers who could describe their experiences flying a certain plane along with a general history of the plane. He would like manuscripts by October 1, 1975, if possible. Those interested should contact Mr. Robin Higham, Department of History, Kansas State University, Manhattan, Kans. 66506.

Yorktown and Patriots Point

On page 22 of the June issue of *Naval Aviation News*, Bill Schemmel reports that the ex-*Yorktown* (CVS-10) was bought by the State of South Carolina from the Navy for $1. *This is not so.* The ex-*Yorktown* was donated to the State of South Carolina (Patriots Point Development Authority) by the authority of Section 7308 of Title 10, United States Code. The statute permits the Secretary of the Navy to transfer by gift, on terms prescribed by him, any obsolete vessel of the Navy to – any state, territory, commonwealth or possession of the United States or municipal corporation or political subdivision thereof; the District of Columbia, the Canal Zone or any corporation or association whose charter or articles of agreement denies it the right to operate for profit. The law also states that each agreement for transfer shall include a stipulation that – (1) the transferee will maintain the vessel in a condition satisfactory to the Department of the Navy; (2) no expense to the United States will result from the transfer; (3) no transfer can take effect unless a notice of the proposal to make such transfer is sent to Congress; and (4) 60 calendar days of continuous session of Congress have expired after the notice is sent to Congress.

All of the above conditions were satisfied and a bilateral agreement (donation contract N00024-75-C-0200) was fully executed by the Secretary of the Navy, The Honorable J. William Middendorf II, on May 8, 1975.

Stephen C. Yednock
Special Assistant to Director
Congressional and Public Affairs
Naval Sea Systems Command

Mr. Attack Aviation

Ed Heinemann has been known as Mr. Attack Aviation for many years. The title well fits the man who designed more attack aircraft than anyone else. He was personally responsible for the design of 20 planes which embodied a Heinemann trademark – fundamental simplicity.

The Navy has particularly reaped the benefit of Heinemann's genius. His major creations include the SBD *Dauntless*, the A-1 *Skyraider*, the A-3 *Skywarrior* and, perhaps, his most prestigious achievement, the A-4 *Skyhawk*. Still in production, the *Skyhawk* has been called Heinemann's Hot Rod, and was first flown in 1954. Yet it wasn't until 20 years after its maiden flight that the author of the *Skyhawk* rode in the plane.

The back cover picture was taken of Heinemann as he disembarked after a hop in a VF-126 TA-4 at NAS Miramar in 1974.

Other Heinemann credits through the years include the A-26 *Invader*, the F3D *Skyknight*, the F-4 *Skyray* and the D-558-2 *Skyrocket*.

Heinemann, who never graduated from college but is considered one of the singularly important aerodynamic engineers in the aviation community, is still active as a consultant. He has recently been slowed by a stroke but is recovering nicely. Those interested in dropping him an attaboy can reach Mr. Attack Aviation at P.O. Box 1795, Rancho Sante Fe, Calif. 92067.

Which PBY

Being an old PBY mechanic, I believe that the PBY in the photo in your October 1974 issue is a PBY-5A, as the PBY-1 through 4 did not have landing gear.

Steve V. Boggs, ADRC, USN (Ret.)
Jacksonville, Fla.

Ed's Note: Thou art correct.

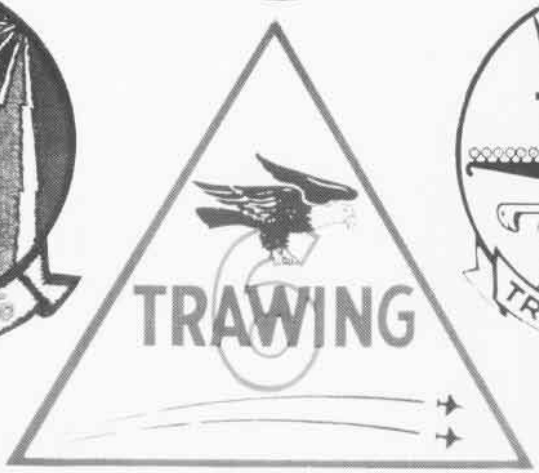
Reunions

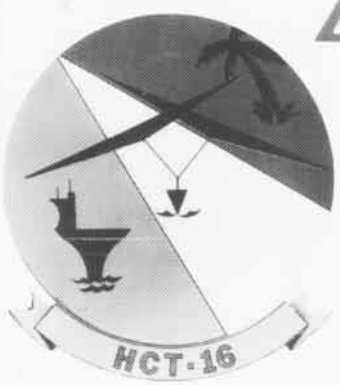
VA-923, which served aboard USS *Bon Homme Richard*, will celebrate its 25th anniversary September 5-7 in St. Louis, Mo., at the Sheraton Airport Inn. For further information contact Mr. John Vieth, Chairman, 9644 Midland Blvd., Overland, Mo. 63114.

VPB-216 (1943-1945) – PBM *Mariners* – will hold its first reunion October 17-19 at the Holiday Inn, Hagerstown, Md. For further information contact Dick Gingrich, Chairman, 468 E. Baltimore, Greencastle, Pa. 17225, or Bob Smith, 6468 W. 85 Place, Los Angeles, Calif. 90045.

Reserve Squadron VS-873, Alameda, Calif., is planning a reunion in October 1975. For further information contact AOC D. L. Pittman (Ret.), 157 Homewood Avenue, Napa, Calif. 94558.

Training Air Wing Six operates out of NAS Pensacola in pursuit of its mission. Training Squadrons One and Five fly T-34B Mentors for primary flight training. VT-4 operates T-2C Buckeyes and TA-4J Skyhawks giving basic and advanced students jet instruction. VT-10 gives basic flight and academic training to student Naval Flight Officers, using T-2Bs and T-39 Sabreliners. VT-86 flies TA-4Js and T-39Ds for advanced jet navigation and radar intercept training for advanced NFOs. HCT-16 operates HH-46As to provide search and rescue support for USS Lexington and the Pensacola training complex. It also trains and transitions pilots and aircrewmen in the Sea Knight.





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NEWS

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