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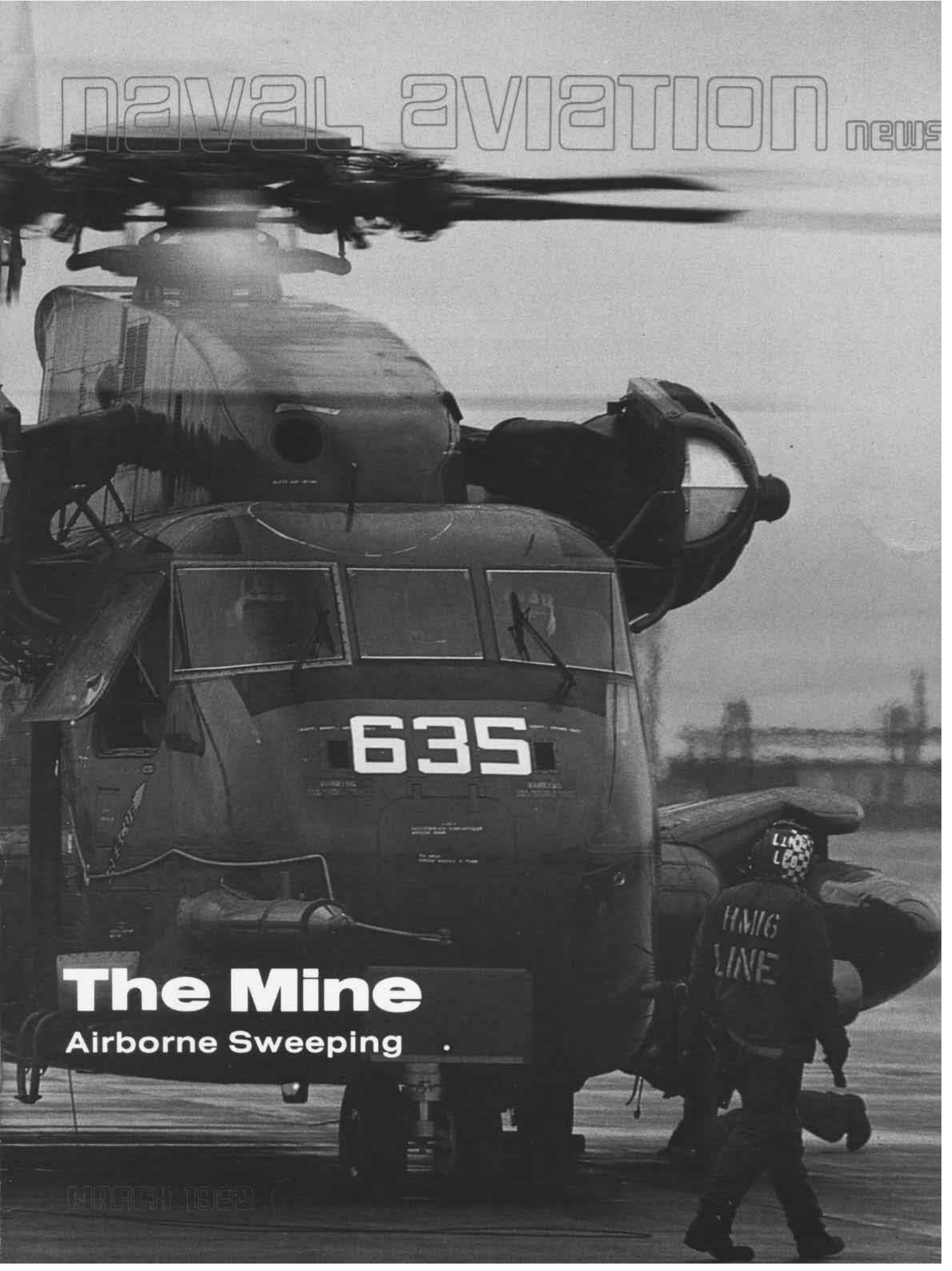

The Mine

Airborne Sweeping

MARCH 1982

naval aviation news

Sixty-Fourth Year of Publication

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COVERS—Front, mine countermeasures helicopters from HM-16 warm up under an overcast Canadian morning sky, during training exercises near Halifax, Nova Scotia last fall. Inside, with the Mk 105 sled in tow, an HM-16 Sea Stallion sweeps the approach to the harbor at Halifax.

Features

Departments

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STATE OF THE ART

Full-scale Aircraft Test Facility

David B. Polish

At present, the A-7 is being configured for use with the full-scale aircraft test facility; however, other aircraft such as the A-6, F-4, F/A-18 and F-14 can also be accommodated as the need arises.

A new facility is being used at the Naval Air Development Center (NADC), Warminster, Pa., to provide a wide range of capabilities for test and evaluation of both antennas and complete avionics systems mounted in full-size fleet aircraft. Under the joint sponsorship of the Naval Air Systems Command and NADC, this facility is configured to allow efficient, cost-effective, high-speed and high-reliability data acquisition and analysis.

An airplane is mounted on a large two-axis turntable (positioner) which allows rotation in both the azimuth and elevation directions. The aircraft and positioner are mounted at an elevation of about 35 feet above ground level over a two-story building, which houses range control equipment and receiver instrumentation. A 40-foot transmit tower, which houses the various transmit antennas used to illuminate the antennas located on the test aircraft, is located about 1,000 feet from the aircraft and its positioner. A transmit antenna can be

remotely controlled from the building to vary polarization, squint and antenna position in elevation. Remotely-controlled transmit signal sources are also located in the transmit tower. Control of the tests performed at this facility can be automated using a minicomputer located in the receive building immediately below the aircraft.

The test facility will be used to evaluate the effects of aircraft fuselage, wings and external stores on the pattern performance of radar warning receiver antennas, direction-finding antenna systems, communication antennas, adaptive array antennas and active jammer antennas. By simulating various jamming signal sources and monitoring appropriate system outputs, flight tests of avionic systems such as communications and electronic warfare equipment can be achieved. It is anticipated that this facility will shorten the research and development cycle, and reduce costs for future avionic systems by reducing the flight time required to assess performance.

Lockheed's 2,000th Transport

On November 19, 1981, Lockheed-Georgia Company's 2,000th transport aircraft was delivered. The plane, an EC-130Q TACAMO (take action and move out) communications aircraft, was handed over to the Navy, marking a major milestone for the company. Since rolling out the first production C-130 in 1955, Lockheed-Georgia has developed and produced 1,634 *Hercules* transports (Including 88 commercial-type L-100s). It has also built 285 C-141 *Starlifter* transoceanic range fanjet transports, and 81 C-5 *Galaxy* heavyweight airlifters, the world's largest aircraft.

The EC-130Q is used by the Navy as a worldwide communications backup for its shore-based stations. Flying over both the Atlantic and Pacific Oceans, the aircraft ensure that Navy commanders in each region have the ability to communicate with their deployed strategic forces.

Harpoon

Six *Harpoon* antiship cruise missiles, launched from air, surface and submarine units, all scored direct hits on a target ship in a coordinated attack during *ReadiEx 1-82*. The exercise was planned so all missiles would be launched near maximum range, with warheads removed to avoid sinking the target on the first shot. Targeting information was collected by air and surface units.

The *Harpoon*, developed by the Navy, is deployed in the U.S. fleet and the fleets of 13 allied nations. It has performed reliably in over 90 percent of all launches. The purpose of the combined air, surface and subsurface exercise was to maintain a high standard of fleet readiness and test the latest Navy weapon in a tactical environment.

Civilian-operated Target Launching

Lockheed Aircraft Service Company, Ontario, Calif., has successfully completed the first civilian-operated aerial target-launching mission in support of the U.S. Navy's quarterly mobile sea range (MSR) exercises. In a three-day operation in the Caribbean late in November 1981, Lockheed personnel maintained and operated two specially modified DC-130A *Hercules* aircraft and launched BQM-34 aerial targets to train and test the combat readiness of surface fleet crews. Previously, aerial target launching had been conducted by Navy personnel.

Operating under this program, the Navy can concentrate personnel in combat and combat-support units. It also provides a cost-effective means of operating and maintaining some noncombat Navy aircraft. The contract includes options for research, development, testing and evaluation of drone targets other than the BQM-34.

Towers Award

VT-6, based at Whiting Field, Fla., has received the Vice Admiral John H. Towers Award for FY 81. The Daedalian-sponsored honor, named for one of Naval Aviation's foremost pioneers, recognizes the training squadron with the best mission-oriented safety record. In announcing the recipient, Chief of Naval Air Training, Rear Admiral Edward H. Martin, cited VT-6's "excellent training record, obvious dedication to the assigned mission, comprehensive safety program and outstanding safety record."

Grampaw Pettibone

Hair Raiser

An accident that doesn't happen is usually the business of my friend Anymouse, but Ol' Gramps just couldn't pass up this one about a quick thinkin' VR crew.

An R5D on a scheduled airlift took off at 0925 EST from Miami International Airport with 44 passengers and crew aboard or, as they say in the transatlantic business, 44 SOB. It was a beautiful day, weather perfect all the way, and they were flying a VFR flight plan.

At 1053 EST, they heard the Navy Sanford tower broadcast a blind flight advisory concerning a reported bomb that had been placed aboard a military transport at Miami. It was due to detonate at 1100 EST!

The R5D had passed Daytona some time back, cruising at 9,500 feet. A quick look around the area disclosed only a WW-II abandoned airfield below. While the copilot radioed NAS Jax for confirmation and got it, the pilot commenced an emergency descent. Passengers were ordered to strap in (most of 'em thought they were goners by now anyway) and were told that this was an emergency landing, and to get out fast when told to do so.

Meanwhile the clock ticked inexorably on, subtracting minutes and seconds in a deadly countdown to the anticipated blast. The pilots pushed the nose over, diving for the abandoned field at the maximum rate of descent. In the race with time, wheels and flaps were lowered in a short final approach to what looked like a 5,000-foot landing strip but, as they crossed the threshold, the clock stood at 1100 EST. Rollout and hard braking brought them to a stop at 1101 EST. All hands exited the big R5D posthaste as the engines were secured. Who knows when a bomb will let go?

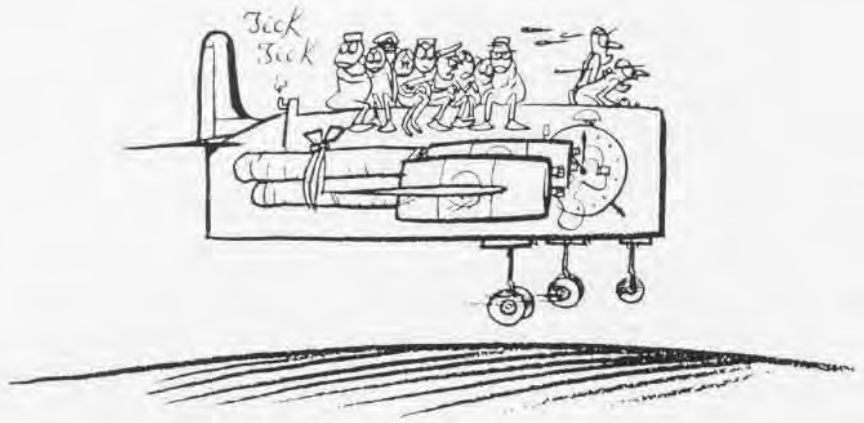
Almost two hours later a helo arrived with ordnance experts and a complete inspection was made of the entire aircraft and all baggage. No bomb! Nothing! Whew!

Immensely relieved, all hands boarded their now trusty aircraft and completed the rest of the journey uneventfully.

Grampaw Pettibone says:

What a clutch this musta been! Seems like they were the only military transport out of Miami at the time! Kinda narrows it down. Never did find out who planted that rumor, but these lads were real cool in handling the emergency. It pays to maintain a listening watch on that radio, VFR or not.

(Reprint from NANews, February 1961.)



Hypoxic Hare

A crusading Marine F-8V pilot filed a flight plan for a cross-country to a Midwest air base. The requested en route altitude was surprisingly lower than normal and, after some discussion concerning adequate fuel reserve, the flight operations duty officer authorized the flight plan.

Preflight and taxi appeared normal. While holding for takeoff, the pilot lazily fingered the fuzzy fur of his lucky rabbit foot. The en route leg of the hop was routine until approximately 175 miles from the destination. There, the flight service air

ILLUSTRATED BY Osborn

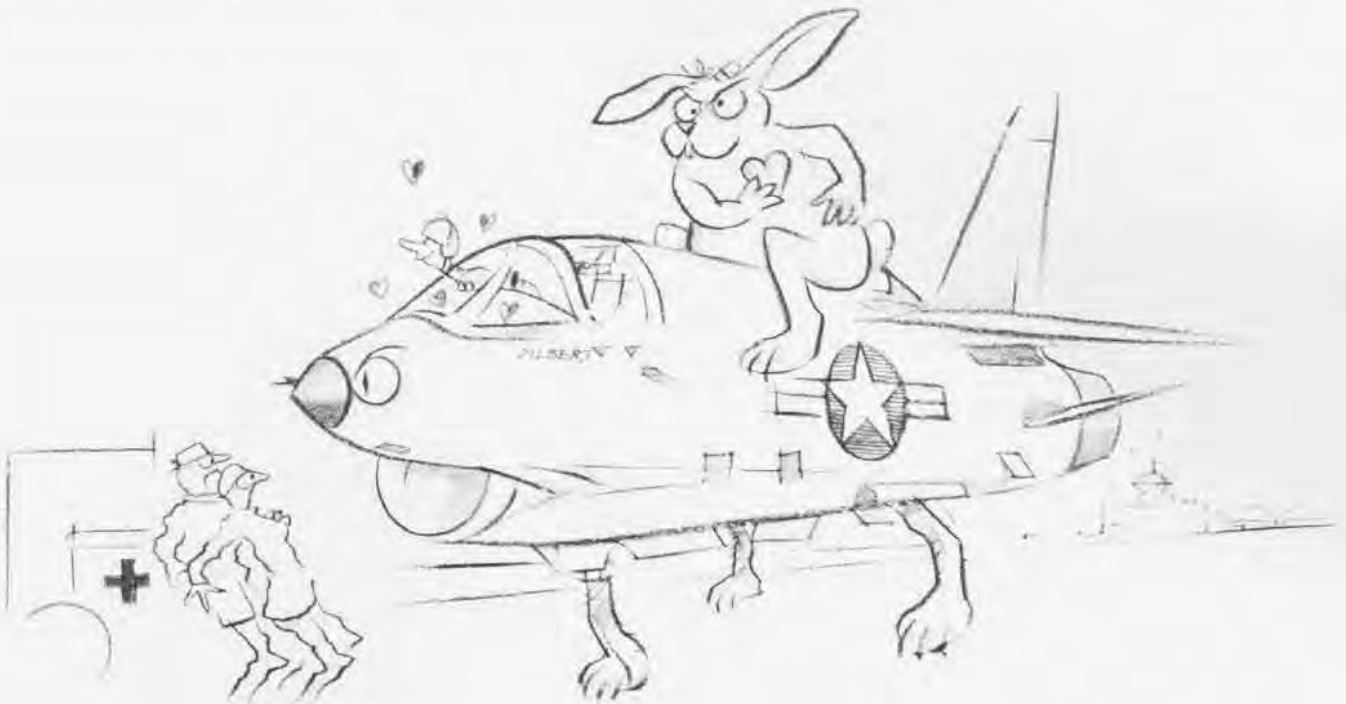
traffic controller received the following transmission, "Center, this is Marine_____. Request immediate descent and direct routing to destination. I'm losing cabin pressure, my rabbit is hypoxic and he's running all around the cockpit – at least I think he's hypoxic. "Center, how do you read?" The center air controller copied and believed that the pilot was hypoxic and hallucinating. The request for descent was immediately granted and Center notified the destination air base that the inbound *Crusader* was being flown by a pilot who was suffering from severe hypoxia and was hallucinating. Contact was maintained between Center and the rapidly descending *Crusader* throughout the approach and landing.

Upon touchdown, the pilot thanked Center for the expeditious handling and single frequency approach. The pilot also stated that the rabbit had finally calmed down. Center passed all this information to the tower who in turn alerted medical personnel. During rollout, the pilot noted several crash vehicles moving rapidly toward the runway. In the descent, he had misplaced his approach plate and was unable to locate tower frequency. Thinking that another aircraft was inbound with an emergency, the pilot braked hard and turned off the runway at the first available taxiway. He was much surprised to find himself surrounded by crash and medical vehicles, and came to a stop on the taxiway. Several personnel, including two medical officers, emerged from one of the vehicles and with hand signals attempted to direct the pilot to shut down the engine. Having some difficulty in understanding the signals, the pilot opened the canopy and leaned over the cockpit rail. As the pilot motioned for the personnel to come closer to the aircraft, a small white rabbit jumped from the cockpit of the *Crusader*, landed upright at the feet of the medical personnel, and then disappeared at a dead run across the taxiway as the medical squad watched with great bewilderment.

Grampaw Pettibone says:

"Holy hypoxic hare-i-see!" – to quote the mystified medical men. I've known some pilots who I thought had bees in their bonnets, but a hypoxic hare hopping around in your hatch could be more than a hare-raising experience.

This lad was en route to deliver a bunny to his honey to replace one that had died. He should have brought a ring instead, or maybe a box of candy. Chocolate-covered almonds at altitude may be "nutso," but they don't go goofy, or eat your approach plates. Old Gramps doesn't know much about animal husbandry or rabbit habits, but before any of you other young bucks decide to take a hare for hop you'd do well to recall that rabbits, on occasion, have been known to attack humans – with total disregard for rank or status. Nuff said.



Clearing the Way

Story and Photos by JOC Kirby Harrison

The steady beat of helicopter rotor blades bounced off a gray Canadian sky last November, rattling windows in the hangar and drawing the attention of those nearby.

"Bloody grim-looking bird, isn't it?" asked a Canadian helicopter pilot, watching as the RH-53 *Sea Stallion* hovered half-hidden by a rise of ground near the runway.

Dressed in dark gray warpaint, the big helo was never meant to be a thing of beauty to the average eye. On the ground, it squats like a menacing, hunch-shouldered insect. In the air, it is quite simply a functional tool of war. And, if it appears grim, it is no less so than the job it is meant to do. Grim is a euphemistic description for the task of finding and rendering harmless underwater mines powerful enough to break the backs of the largest ships afloat.

The *Sea Stallion* lifting off at the Shearwater Canadian Forces Base near Halifax, Nova Scotia, was one of six from U.S. Navy Mine Countermeasures Squadron 16. The main body of the 280-man squadron was assigned to sweep the harbor approach and channel for mines as part of the annual joint forces CANUS MARCOT naval exercise. It was a training operation, and the mines were for drill. But, according to HM-16's skipper Commander Paul Erny, "In this business, we never know when the next time will be for real."

A lanky Naval Aviator who has been flying helicopters since 1966, Erny has had on-the-job experience with the reality of mine warfare. He was the mine warfare officer when HM-12 was ordered to aid in clearing mines from North Vietnamese waters following the war.

"In the 10 years since the first squadron was formed, airborne mine countermeasures units have been called upon for rapid deployment five times," says Erny, adding, "All five times were either by executive order of the President or Joint Chiefs of Staff directive."

Three of the deployments involved live mine sweeps by HM-12. One was the major job of Operation *End Sweep*

Left, an RH-53D Super Stallion from HM-16 tows the Mk 105 sled during the mine-clearing phase of joint Canadian-U.S. exercises last fall. Above, AD2 Robert Cooley stays warm during operations at the Shearwater Canadian Forces Base near Halifax, Nova Scotia.

The airborne mine countermeasures squadrons have a high percentage of ratings other than the aviation group. BM1 Ostell Hargrove is a boatswain's mate involved with hooking-up and lowering of tow equipment.

in North Vietnamese waters and the other two actions involved clearing the Suez Canal and Port Said. Both HM-14 and HM-16 responded during the hostage crisis in Iran, and HM-16 provided eight helicopters used in the rescue attempt. The last response came during the early period of the conflict between Iran and Iraq when the Navy feared the vital Straits of Hormuz and portions of the Persian Gulf might be mined. Although this threat never materialized, helicopters from both HM-14 and HM-16 were deployed and ready.

Rapid response was the primary reason for formation of the first airborne mine countermeasures squadron in 1971. The concept was given impetus by Admiral Stansfield Turner, now retired, who had been assigned to systems analysis in the Office of the Secretary of Defense.

"I had the minesweeping desk and I became persuaded the helicopter was ready and was a good way to go," he recalls. "You can get a minesweeping capability to anywhere in the world much more quickly with the airborne mine countermeasures concept."

Turner had commanded a minesweeper as a junior officer, during which time the vessel had made a long 10-knot crossing of the Pacific. "I have vivid memories of how slow the minesweeper is," he says.

HM-12 was the first of the mine countermeasures squadrons, followed in 1978 by an expansion of squadron detachments and additional people and aircraft to form HM-14 and HM-16. About the same time, HM-12 was redesignated as the replacement air group training squadron. All three units are organized under Helicopter Sea Control Wing One, commanded by Captain J. J. Hatcher. HM-16 and HM-14 are capable of deploying within 72 hours aboard the C-5A. The squadrons also have a self-lift capability.

There is the normal amount of competitive instinct that results in an equal amount of healthy rivalry between the squadrons. But there is also a certain loyalty to the mission that could be labeled clan allegiance.

According to Cdr. Erny, transfers of personnel are very frequent from one mine countermeasures squadron to another. "Once they spend a tour of duty with one of the squadrons, they ask for an extension or, if that isn't possible, transfer to one of the other units."

Lieutenant Commander Richard Moody, pilot and admin officer, agrees. "For every guy in the squadron who *likes* it, we have another one who *loves* it."

"Look at him," said Moody, pointing to a pilot crossing the hangar. Dressed in thick long-john underwear, squeezed into a wet suit and topped off by additional pounds of flight gear, the flyer had just completed four hours of low-level, precision flying. Rather than exhaustion, there was a bounce in his stride and an obviously satisfied smile on his face. "I'm not sure anybody would believe it," said Moody, "and sometimes we probably don't quite believe it ourselves, but we really do enjoy this job."

Enlisted or officer, they tend to stay in airborne mine countermeasures. Says Capt. Hatcher, "There is one guy I've promoted three times, and the last time was to chief."

He also remembers Ensign Stanley Reed, with whom he had served in

An RH-53D from HM-16 takes to the air during joint Canadian-U.S. operations. Airborne mine countermeasures squadrons presently flying the D version of the Super Stallion expect to begin receiving the updated MH-53E helicopter by the mid-1980s.

The helicopter crew awaits an early morning lift-off after heavy rains drenched the field at the Shearwater Canadian Forces Base.

Vietnam when Reed was a third class petty officer. Reed later completed the requirements for his college degree, received a commission as an officer and earned his wings as a helicopter pilot.

"I don't think I ever really considered anything else," says Reed, whose first duty station as a pilot was with HM-12. And when his first transfer came earlier this year, it was little more than a touch-and-go away. He now flies for HM-16, just a few hangars away at NAS Norfolk where all three squadrons are home-based.

The job specialties in the airborne mine countermeasures squadrons in general tend to vary more than with most aviation units. In addition to the usual aviation ratings, there are boatswain's mates for the difficult business of getting the towing gear hooked up and in the water, operations specialists for the precision job of determining exact flight patterns, and Seabee construction mechanics for

repair and maintenance of a multitude of ground support equipment.

"Most of them end up with at least six medals after a tour of duty with one of the squadrons," says Cdr. Erny, citing such awards as unit citations, expeditionary medals and Battle Es for excellence."

During sweeping, the helicopter usually carries a crew of seven, the pilots and five enlisted aircrew. One operates the RAYDIST precision navigation system and another mans the control programmer tied into the towed hydrofoil sled. The crew is rounded out by a ramp director and his counterpart at the personnel door, and the first crewman who supervises the overall operation and acts as a safety observer.

Three prepositioned antennae allow for precise sweeping at approximately 20 knots. "Actually, the speed is determined by the tow tension and can vary a little on either side of that," says Erny, who adds that with ideal conditions the sweeps are accurate to within five feet of the desired track.

The Mk 103 mechanical sweeping gear is streamed by the helicopters to clear the old-type moored mines. The Mk 104 is used to sweep against acoustic mines which are set to react to the sound signature of ships, and the Mk 105 for clearing mines set to respond to the magnetic field produced by transiting vessels. Used in combination, the two latter devices are called the Mk 106 system and can be used to sweep waters which may contain both acoustic and magnetic mines or individual mines that may be set for either magnetic or acoustic influence.

The Mk 105 system is perhaps the most visually spectacular, consisting of a hydrofoil sled towed at the end of a 450-foot cable containing both electrical control leads and a fuel transfer line. The sled platform contains a turbine generator used to power the two-electrode tail, producing a magnetic field similar to that of a ship.

There is a growing sophistication in airborne minesweeping techniques,

Taking up the slack, AD3 Gilbert Salinas (l.) and AMH3 Richard Thornton handle the tow cable containing electrical control leads and fuel transfer line to the sled.

and in equipment available. Those in the community emphasize a need to continue development. "... mine countermeasures is always about a step behind the people developing the mines," points out Lieutenant Commander Keith Martello, a pilot with HM-16 who has been in mine countermeasures since 1974. "The AMCM (airborne mine countermeasures) structure has matured, but we need continued growth in terms of technique, equipment and people."

The equipment is on the way, according to HM-16's skipper, pointing to a $93 million, five-year budget that is a long way from the total of $10 million originally earmarked for AMCM equipment in 1971. In addition to the technically more sophisticated equipment, there is the new MH-53E helicopter now in the development stage. It is a reconfigured version of the CH-53E from Sikorsky Aircraft, for which the Navy can expect to pay just under $13 million each. Sikorsky officials say the Navy expects to purchase a total of 55 of the MH-53E version. (See centerfold for MH-53E details.)

The future of AMCM will also be affected by the Navy's plans for surface mine countermeasures. The present inventory of surface minesweepers (MSOs) totals three in active service, two on the West Coast and one operating out of Panama City, Fla., under the Naval Coastal Systems Center. Another 22 of the old wooden-hulled craft are in the reserve fleet.

The Navy, however, has authorized construction of 14 new mine countermeasures vessels, to be designated as MCMs. According to a Navy spokesman at the Ship Acquisition Office, the first of the 213-foot mine countermeasures ships will be delivered in 1985, and the remainder by the end of 1988.

"Technically, they are much more advanced than the old MSOs," he added, pointing out that coordination with the mine countermeasures efforts of the helicopter squadrons was being taken into consideration.

Lieutenant Randy Merritt, formerly a pilot with HM-14, is the airborne mine countermeasures representative on the staff of Commander Mine Warfare in Charleston, S.C. He points out that efforts are continuing to coordinate mine countermeasures between airborne and surface units. "The view that one or the other approach is the only way to go has changed on both sides," he says.

Exercise *Ocean Venture 82*, scheduled for April, will involve a joint mine-clearing operation between Naval Reserve minesweepers and airborne mine countermeasures squadron helicopters. And, last year, MSOs and helos teamed up in a Mediterranean exercise. Merritt adds that organization is still in a formation stage, but it is expected that such mine-clearing operations in the future would be coordinated under a mine countermeasures commander within a surface forces operational chain of command.

One of the first and most successful instances of a coordinated effort by both airborne and surface mine countermeasures was the clearing of Haiphong harbor and the approaches in 1973 following the war in Vietnam.

He and others in the mine countermeasures community feel both airborne and surface mine countermeasures have advantages. Two of the more obvious for the helicopter squadrons are safety and rapid deployment capability. On the other hand, the ships have a longer time on station and the ability to search for mines at greater depths.

"While there may be specific and justifiable arguments for one over another, there is no way to justify either method of mine countermeasures to the exclusion of the other," emphasizes Lt. Merritt.

"Airborne mine countermeasures is a fact, and in the future will play an increasingly important role, individually and coordinated with the surface ships."

Naval Aviation News acknowledges as source material "Weapons that Wait," by Gregory K. Hartmann, U.S. Naval Institute Press and Military Technology magazine, November 1981.

With the sled up on the foils, an HM-16 Super Stallion prepares to sweep the harbor entrance to Halifax, Nova Scotia, for mines during a joint Canadian-U.S. exercise.

By JOC Kirby Harrison

Danger

The underwater mine waits in ambush for its prey. Its reputation is sinister and its use often considered a less than honorable way of waging war. But its effectiveness as a tool of war has been proven time and again, ever since the Phoenicians slowed the amphibious assault of Alexander the Great by dumping piles of rock in the harbor entrance to Tyre in 55 B.C.

In the years between then and now, and the accompanying wars, mine warfare advanced along with technology. Famous names were associated with developing mines, names more often connected with other areas of expertise. David Bushnell of submarine fame floated mines made from wooden kegs down the Delaware River in 1777, in an attempt to sink British ships anchored off Philadelphia. Robert Fulton, in 1797, proposed that the British use floating explosive charges against the French and, when the idea was rejected, went to France in an attempt to convince them to use submarine-laid mines against Britain. And Samuel Colt, better known for his .45-caliber revolver, proposed using an electric current to explode the mine. In fact, the most effective mine used by the Confederate forces in the War Between the States was referred to as the "Singer" mine, invented by the brother of the sewing machine manufacturer.

When Admiral David Farragut told the captain of USS *Brooklyn*, "Damn the torpedoes, Captain Drayton, go ahead," he was referring to mines. Fortunately for Farragut, most of the mines were inert due to corrosion and wave action, and the only loss was USS *Tecumseh*. Later Farragut is quoted as having told the Secretary of the Navy, "Torpedoes [mines] are not so agreeable when used by both sides; therefore, I have reluctantly brought myself to it. I have always deemed it unworthy of a chivalrous nation, but it does not do to give your enemy such a decided superiority over you."

It was the Russo-Japanese War of 1904 that offered first positive proof of the effectiveness of offensive and defensive mine warfare. Russian minefields prevented Japanese ships from providing gunfire support for troops ashore, and more Japanese ships were lost to mines in that war than were lost to any other form of attack. The Russians learned the hard way that Farragut had luck as well as courage going for him when they lost the 11,000-ton battleship *Petropavlovsk* and Admiral Makaroff. Makaroff had refused to believe mines were dangerous, sailed into a known Japanese minefield, and died with his ship.

In 1917, a field of more than 70,000 mines extending 240 miles closed the German navy's exit to the North Atlantic. In that war, 102 German warships were lost to mines. Germany's experience in the next war was little better. By the time WW II ended, German minesweeping assets had grown larger than the entire German navy had been when the conflict began.

In the Pacific during WW II, mine warfare reached a peak. The U.S. mined the harbor of Haiphong on October 16, 1943, when a single 14th Air Force B-24 dropped three mines. A month later, another B-24 laid three more. Just six mines but as a result, the 3,000-ton freighter *Shozan* and the 500-ton *Tytsuya* went to the bottom. A 10-ship convoy hesitated outside the port for three hours. Afraid to risk the minefield, they finally headed for northern Hainan Island. Some 14th Air Force bombers caught them and sank six ships. Shortly thereafter, a 30-ton Japanese vessel was sunk by a mine and, for the remainder of the war, the Japanese closed the port of Haiphong to anything larger than a junk.

Navy TBF *Avengers* from three carriers converged on the Harbor at Palau on March 30, 1944, mining the entrance channels. Later carrier strikes destroyed the trapped ships.

The single most devastating example of offensive mine warfare was Operation *Starvation*, the mining of Japanese waters begun in April 1944. Japan is an island nation, dependent in many areas on imports. By 1944, Japanese industry requirements for ocean-transported imports were at 80 percent for oil, 88 percent for iron and 20 percent for food. According to a 20th Air Force analysis of the mining, declassified in 1972, nutritional standards in Japan at that time were such that the difference of 20-30 percent was the

Below

difference between actual subsistence and starvation for a large part of the population.

This estimate was later confirmed by a report from Japanese civilian authorities to the military, delivered in late 1945, which warned that if the war continued another year 7,000,000 Japanese might be expected to die of starvation. The figure was considerably higher than the highest estimates of more than 375,000 dead following the atomic blasts that leveled Hiroshima and Nagasaki.

Advocates of the mine refer to it as "the most humane form of warfare." It might be more accurately described as "a less inhumane form of warfare." Bill Emshwiller of the Navy's airborne mine defense office at the Naval Air Systems Command describes mine warfare succinctly as "a damn dirty business."

While the mining of Japanese waters in WW II may have been a dirty business, it was effective. The Air Force analysis estimated that more than a million tons of enemy shipping was sunk or damaged by mines, while the number of sorties necessary to lay the mines was only about six percent of the entire 20th Air Force effort.

Japanese navy Commander Saburo Tadenuma told postwar interrogators that the mining was "one of the main causes of our defeat."

During the Korean War, the U.S. Navy discovered the effectiveness of defensive mining at Wonson. In addition to losing two minesweeping vessels and more than 90 men, the amphibious landings were delayed a week when intelligence sources learned the waters had been mined. Historians have concluded that had it not been for a simultaneous land offensive against Wonson and minimal resistance by the enemy, there might have been no amphibious landings as a result of the minefields.

In the latter days of the Vietnam War, the U.S. somewhat belatedly mined the Haiphong harbor and its approaches, laying 11,000 Destructors and 100 Mk 52 mines. At the cost of one aircraft during the mine delivery process, ship movement effectively ceased until the war ended in January 1973 and mine clearance operations were completed in July.

Experts in mine warfare point out that even the ability to neutralize mines does not render mine warfare ineffective. A case in point is the incident at the port of Sacramento, Calif., in 1980, when an anonymous caller informed a local radio station that the 30-mile ship channel between the port and San Francisco had been mined. Some marine insurers quickly notified clients that ships attempting to navigate the channel would be doing so without insurance, and, for approximately 24 hours, ship movement was at a halt while a Navy minesweeper confirmed that the threat was a hoax.

"You don't really have to lay mines," points out Emshwiller. "Sometimes, all you have to do is say you did. If all you did was fly over and drop out concrete blocks, the initial effect is the same."

It can be especially frustrating to those in mine countermeasures. "It's a fact of life that mine countermeasures is always about a step behind the people developing the mines," says Lieutenant Commander Keith Martello, a pilot with Airborne Mine Countermeasures Squadron 16 (HM-16).

With today's advanced technology, mines still fall into four basic categories: contact mines actuated by a ship coming into contact with a long antenna; acoustic actuated by the noise of a ship passing over; magnetic actuated by

A dummy mine is dropped from a C-130 Hercules. Lockheed-Georgia is presently carrying out full-scale, hydraulically-powered ground tests of the Cargo Aircraft Minelayer System (CAML).

Danger Below

the presence of the magnetic field of the passing ship; and pressure mines actuated by a change in water pressure caused by the passage of the ship. The last three are known collectively as influence mines, and the cost of any of the four may be as little as $3,000 per mine.

It becomes far more complicated for mine countermeasures when combinations and ship counters are considered. A minefield need not contain just one type of the four basic mines, and the mine can be equipped with a counting mechanism set to allow a set number of ships to pass safely before arming itself.

To make things even more difficult, there are mines such as the U.S. Navy's Captor development. Captor would lie on the bottom and, upon detecting an enemy vessel, release a homing torpedo.

To meet the challenge, the U.S. and other NATO nations are actively engaged in a reemphasis of mine countermeasures. The Navy's three airborne mine countermeasures squadrons will be receiving new MH-53E helicopters toward the end of the decade, along with more effective sweeping gear. And a new class of mine countermeasures vessel will make its debut by 1985.

The NATO approach is primarily aimed at a fully-fitted ocean vessel designated as a mine hunter/sweeper (MHSO). It would carry a wire sweep (Oropesa); a magnetic sweep; acoustic sweep; mine-hunting sonar (including sideways-looking search sonar); and a method of neutralizing a bottom mine by countermining. The countermining might be by use of a remote-controlled submersible such as the French PAP 104, which would search out the mine and attach an explosive charge. The hunter/sweeper would also incorporate an advanced navigation system for accurate sweeping and buoys to be used as navigational markers.

The British have been testing the hovercraft surface effect ship as a minesweeper, with some success as a mine hunter in coastal areas. Commander Paul Erny, command-

ing officer of HM-16, spent a tour of duty with the British during evaluation of the hovercraft. He describes one test in which a mine exploded beneath the craft. "The mine blew up directly under the hovercraft and a shower of water completely hid the vessel. When it cleared, there was the hovercraft, still operating. There was apparently very little structural damage."

The Germans have devised the Troika system, primarily for coastal minesweeping. It consists of three unmanned craft of 95 tons each, fitted with remote-controlled magnetic and acoustic sweeps. They are controlled by radio from a converted *Lindau*-class, 370-ton minesweeper, which is also equipped with mine-locating sonar.

Both in NATO and U.S. areas, mine countermeasures will emphasize a coordinated effort between airborne and surface assets. With this in mind, HM-14 recently completed a Mediterranean deployment in which mine countermeasures operations involving helicopters and minesweeping vessels were demonstrated to NATO observers. "We felt like it was very successful and certainly impressed everyone with the advantage of using airborne and surface mine countermeasures as a team," says HM-14 skipper Commander F. T. Massey.

The adversary relationship between mine experts and countermeasures is what mine warfare is about. It is adequately described by an Air Force evaluation study which noted, "Mine warfare has always been considered as a contest between mine designers on one side and countermeasures experts on the other; the side taking the offensive in a mine laying campaign can, by judicious employment of the different types of mine firing devices, achieve a tremendous advantage over an enemy. In consideration of the destructive possibilities of offensive mine laying against a maritime nation, great stress should be placed upon the development of countermeasures to defeat such an attack."

By JOC Kirby Harrison

Airborne

Those who know say it started at Wonson Harbor in October 1950 when helicopters were used to provide an aerial assist to minesweeping vessels. The Korean War at Wonson had become one of mines and mine countermeasures. By the time the amphibious landings took place, the U.S. had lost the minesweepers *Pirate* and *Pledge* with 92 casualties. Shortly thereafter, the Navy began investigating the possibility of helicopter minesweeping.

"There were some doubts, but Frank Piasecki thought it could be done," recalls Bill Emshwiller, director of the Airborne Mine Defense Program at Naval Air Systems Command in Washington, D.C. Emshwiller has been involved in airborne mine countermeasures since the earliest days of the program, when Frank Piasecki, the controversial designer of the tandem-rotor helicopter, helped in evaluating the concept with his HRP-1 "flying banana" helo.

Emshwiller points out also that the primary advantage of the helicopter over the ship in clearing mines is the same today as that which provided initial impetus for the program, the trade-off difference. "You risk losing a $30 million ship and 70 men, or a $13 million helicopter and seven men," he explains.

He adds that a helicopter mine countermeasures capability does not eliminate the need for minesweeping vessels, but is a valuable if not indispensable part of a team effort.

Frank Piasecki's "flying banana" hovers during tow testing in June 1953.

A mine countermeasures Sea Stallion from HM-12 moves along the rugged North Vietnamese coast during mine-clearing operations in 1973.

Sweeping

An HSL-1 tows a heavy load during the 1956 evaluation of towing characteristics. Note the extreme nose-down attitude of the helicopter.

The HSS-1 Seabat, in 1958, was the first single-rotor helicopter tested as a mine countermeasures vehicle.

The mine countermeasures support ship Ozark, crew on deck for rendering honors, carries an RH-3 mine countermeasures helicopter on her flight deck aft. Originally built in 1944 as a large minelayer, Ozark and her sister ship Catskill were converted to the mine countermeasures support role in 1966 and 1967, respectively. They supported 20 minesweeping launches and two helicopter minesweepers. Ozark was decommissioned in 1970.

"In those early days," says Emshwiller, "we even tested the ZPG-1 airship as an airborne mine countermeasures vehicle. Unfortunately, we discovered that going downwind, we were nothing but a balloon, and control under those conditions was somewhere between marginal and none at all."

By 1964 the Navy had tested the airborne mine countermeasures concept, using the HRP-1, YH-21 *Work Horse,* HRS-1 *Chickasaw,* HSL-1, HSS-1 *Seabat* and RH-3A *Sea King.* The idea was sound; however, what was needed was a helicopter with greater lift capacity and the ability to remain on station for extended periods. Enter the Marine Corps' RH-53A which had just made its first flight, with deliveries scheduled for 1966.

The airframes of all but the first 34 of the aircraft were strengthened and fitted with hardpoints for towing mine countermeasures equipment. By 1970, airborne mine countermeasures had support from the top and Chief of Naval Operations Admiral Elmo Zumwalt's Project 60, Decision #5, ordered recomposition of mine countermeasures to emphasize use of helicopters. The next year the Navy borrowed 15 CH-53A *Sea Stallions* from the Marines to equip the first squadron, HM-12.

The RH-3A, seen here with the towing apparatus extended, was introduced into the fleet in 1966 as a mine countermeasures vehicle.

Photo by PH2 Carter Sawtell

A minesweeping sled is loaded aboard a C-133 during deployment for an airborne mine countermeasures exercise.

Mine countermeasures equipment quickly followed and the squadron was soon using mechanical trailing gear with cutters as well as acoustic and magnetic response sweeping equipment.

In May 1972, North Vietnamese waters were mined and airborne mine countermeasures units were deployed to the Navy's base at Subic Bay, Philippines. Less than a year later, the pilots and crewmen of HM-12 were putting their training into practice. Ironically, they were sweeping U.S. mines that had been laid in North Vietnamese waters. In 1974-75 HM-12's rapid deployment capability was called upon twice, once to sweep the Suez Canal and again to clear the waters of Port Said.

The community was expanded in 1978 to form HM-14 and HM-16, while HM-12 was redesignated as the training squadron. A year and one-half later, both squadrons were deployed to the Indian Ocean in response to the hostage crisis in Iran. Helicopters used in the ill-fated rescue attempt came from HM-16. The Indian Ocean and Persian Gulf soon began to look like home-away-from-home to the men in the squadrons. No sooner was the hostage crisis ended than they were called upon to deploy again to the Indian Ocean when war broke out between Iran and Iraq. Navy officials had feared the vital Straits of Hormuz

A Mk 105 minesweeping sled is taken under tow by an RH-53A Sea Stallion during operations with the dock landing ship Raleigh in 1971.

might have been mined and wanted to be able to move quickly to remedy the problem if necessary. The anticipated situation did not develop, but airborne mine countermeasures were there and ready.

The future for airborne mine countermeasures looks bright. New equipment and new helicopters are on the horizon, and efforts are continuing to organize the U.S. mine countermeasures capability to ensure the most complete response possible by combining the best features of surface and airborne units.

It's a long way from Frank Piasecki's peeled-back flying banana equipped with outsized innertubes.

Towing minesweeping gear, an HM-12 helicopter passes offshore islands during Operation End Sweep off the North Vietnamese coast in 1973.

Towing the Mk 105 sled, an HM-12 Sea Stallion sweeps for mines in the Suez Canal during Operation Nimbus Star/Moon, 1974.

Photo by LCdr. S. G. Riley

Hovering over the minesweeper Illusive, an HM-14 helo prepares to hook up to sweeping gear during joint surface/airborne mine countermeasures demonstrations in the Mediterranean in 1981.

Photo by PH2 Tibor Zoller

Photo by JO1 Peter Sundberg

Photo by Sikorsky

The CH-53E prototype of the mine countermeasures version flies during testing by Sikorsky.

The MH-53E

Now in the development stage by Sikorsky, the MH-53E will be a reconfigured version of the CH-53E *Super Stallion* presently being introduced into the Marine Corps. The prototype, seen in cutaway at right without enlarged fuel sponsons, made its first flight on December 23 last year. It is now undergoing evaluation and testing at the Naval Coastal Systems Center in Panama City, Fla.

The MH-53E's triple turbine engines will provide greater lift for mine countermeasures operations while enlarged sponsons will carry additional fuel to allow up to six hours of time on station. The new configuration will also feature the airborne mine countermeasures coupled, dual digital automatic flight control system. The system consists of two digital computers, a cockpit control box, six accelerometers, and five position sensors. It is 42 percent lighter, occupies 54 percent less volume and consumes 41 percent less power than the older analog system. There is no organizational level maintenance required. The computers continually cross-check one another and disable any potential false inputs to the automatic flight control system servos. If one computer fails, the other will automatically double its output, eliminating any degradation in automatic flight control performance.

Also part of the new mine countermeasures capability is a dedicated AMCM hydraulic system, improved AMCM navigation, 30,000-pound tension tow boom, better mirrors and better crew environment.

The MH-53E *Super Stallion* is capable of inflight refueling and can be refueled at hover. It is also shipboard compatible with amphibious ships serving as airborne mine countermeasures platforms. The aircraft will sweep waterways for mines by flying above the surface, towing electronic or magnetic sweeping gear as well as gear for neutralizing moored mines.

The Navy anticipates a requirement for 55 of these helicopters.

Cutaway illustration courtesy of Air International, March 1981.

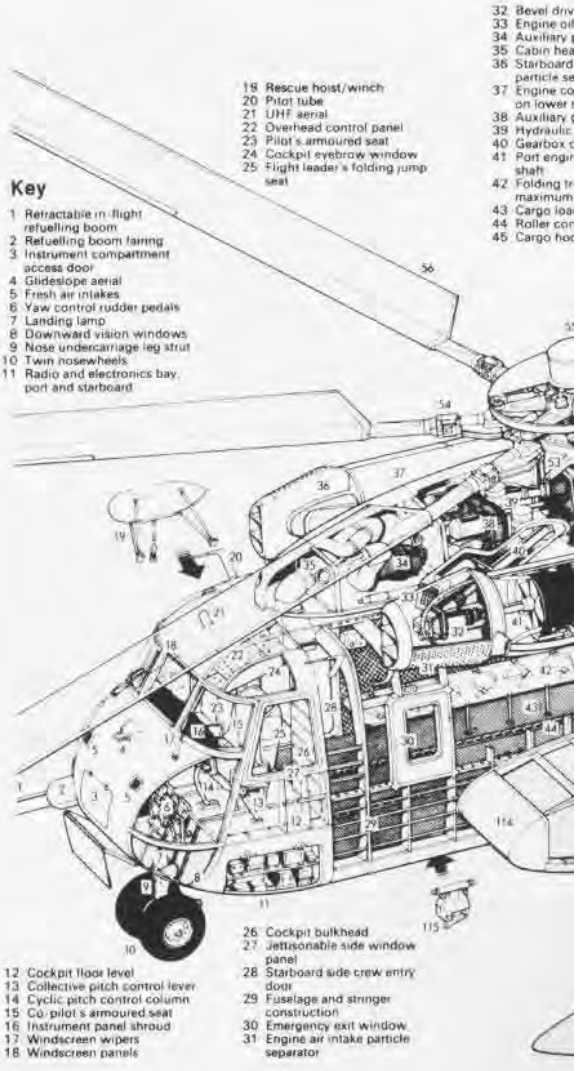
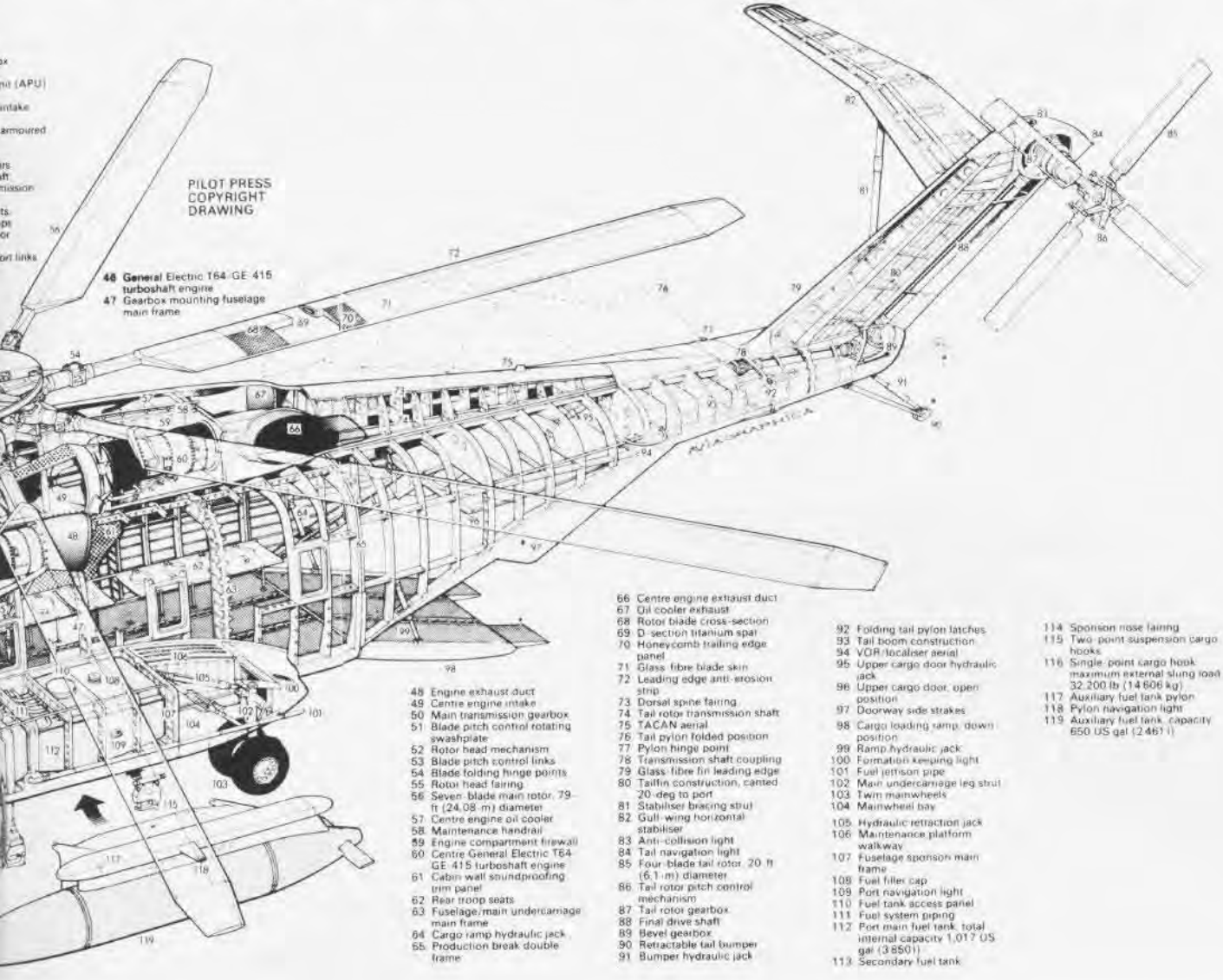


Illustration Courtesy Sikorsky

In an artist's concept, the MH-53E Super Stallion is seen in flight during minesweeping operations. Note enlarged fuel sponsons adding to on-station time.

Minesweeping Super Stallion



48 General Electric T64-GE-415 turboshaft engine
47 Gearbox mounting fuselage main frame

48 Engine exhaust duct
49 Centre engine intake
50 Main transmission gearbox
51 Blade pitch control rotating swashplate
52 Rotor head mechanism
53 Blade pitch control links
54 Blade folding hinge points
55 Rotor head fairing
56 Seven-blade main rotor, 79-ft (24.08-m) diameter
57 Centre engine oil cooler
58 Maintenance handrail
59 Engine compartment firewall
60 Centre General Electric T64-GE-415 turboshaft engine
61 Cabin wall soundproofing trim panel
62 Rear troop seats
63 Fuselage/main undercarriage main frame
64 Cargo ramp hydraulic jack
65 Production break double frame
66 Centre engine exhaust duct
67 Oil cooler exhaust
68 Rotor blade cross-section
69 D-section titanium spar
70 Honeycomb trailing edge panel
71 Glass-fibre blade skin
72 Leading edge anti-erosion strip
73 Dorsal spine fairing
74 Tail rotor transmission shaft
75 TACAN aerial
76 Tail pylon folded position
77 Pylon hinge point
78 Transmission shaft coupling
79 Glass-fibre fin leading edge
80 Tailfin construction, canted 20-deg to port
81 Stabiliser bracing strut
82 Gull-wing horizontal stabiliser
83 Anti-collision light
84 Tail navigation light
85 Four-blade tail rotor, 20-ft (6.1-m) diameter
86 Tail rotor pitch control mechanism
87 Tail rotor gearbox
88 Final drive shaft
89 Bevel gearbox
90 Retractable tail bumper
91 Bumper hydraulic jack
92 Folding tail pylon latches
93 Tail boom construction
94 VOR/localiser aerial
95 Upper cargo door hydraulic jack
96 Upper cargo door, open position
97 Doorway side strakes
98 Cargo loading ramp, down position
99 Ramp hydraulic jack
100 Formation keeping light
101 Fuel jettison pipe
102 Main undercarriage leg strut
103 Twin mainwheels
104 Mainwheel bay
105 Hydraulic retraction jack
106 Maintenance platform walkway
107 Fuselage sponson main frame
108 Fuel filler cap
109 Port navigation light
110 Fuel tank access panel
111 Fuel system piping
112 Port main fuel tank, total internal capacity 1,017 US gal (3 850 l)
113 Secondary fuel tank
114 Sponson nose fairing
115 Two-point suspension cargo hooks
116 Single-point cargo hook, maximum external slung load 32,200 lb (14 606 kg)
117 Auxiliary fuel tank pylon
118 Pylon navigation light
119 Auxiliary fuel tank, capacity 650 US gal (2 461 l)

FILL

Hooked up, an S-3 Viking gets a drink during testing of the KC-10. Above, an F-14 Tomcat edges up on approach to the new tanker.

Photos and illustrations, courtesy McDonnell Douglas

'ER UP

By Harry Down
and
Lieutenant Gray Morrison

A new flying tanker is going to make gas-on-the-go for Navy and Marine Corps pilots easier, faster and safer on flights that call for aerial refueling. The plane is the Air Force KC-10, a reconfiguration of the DC-10 convertible freighter, presently being evaluated at the Naval Air Test Center, Patuxent River, Md., for refueling Navy tactical aircraft.

The modification includes two integral fuselage bladder tanks in the lower cargo compartments and installation of both an aerial refueling boom and an integral hose reel, permitting inflight refueling by both probe or receptacle-equipped receiving aircraft. In addition, the KC-10 will not be constrained to one given receiver system, once in the air.

Navy pilots who once had to contend with the nine-foot hose drogue of the KC-135, with its associated high-gain, restrictive tolerance formation flying, will be delighted with the KC-10's 80-foot hose and large, 26-inch-diameter basket drogue.

Lieutenant Tom Frey, an A-7 pilot, says, "The basket is very stable, especially to offcenter hits, and the A-7 requires no trim changes to plug the basket."

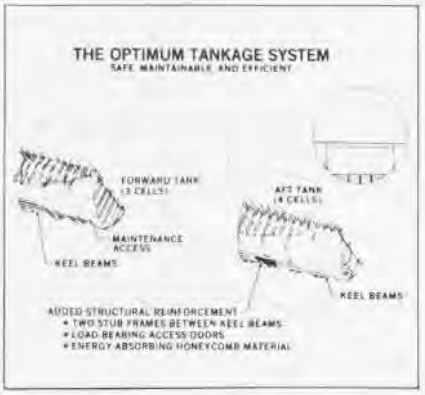
The high flow rate of 4,000 pounds per minute (600 gallons) will be a major relief for pilots who have had to "push the C" behind the KC-135 for 10 minutes or more. "Pushing the C," according to pilots, is the job of maintaining contact with the basket, a process that keeps the flexible section of hose pushed into a "C" shape. It is a process, they say, that can only add gray hair.

Day or night rendezvous with the KC-10 will be simplified by the large visual profile presented by the tanker. Visual contact may be made at distances up to 10 miles, depending on intercept geometry and weather conditions. The KC-10 also has its own tacan station on board, providing azimuth and distance-measuring equipment information. Night rendezvous,

from three miles to 500 feet, is aided by a profuse array of running, fuselage and vertical tail lighting.

Marine pilots, says Major Jay L. Elliott, can expect a significant improvement in the approach to the refueling station. Elliott, a test pilot at the Naval Air Test Center, explains, "Compared to the KC-130, the primary Marine Corps tanker, the lack of prop wash and associated turbulence of the KC-10 make the initial stabilization and contact easier, and significantly reduces pilot workload when plugged."

However, an attempt to take a section through the wake of the KC-10, demands care. The standard carrier rendezvous with 500 to 1,000-foot stepdown works well and normally keeps the receiver aircraft clear of



wake turbulence. And turbulence from the wingtip vortices of a 600,000-pound gross weight aircraft can be phenomenal.

In the near-field region of 500 feet or closer, the vortex, when encountered, is not dispersed enough to cause more than moderate turbulence to the receiver. However, from one to three nautical miles aft, the vortex expands to anywhere from one-half to twice the receiver aircraft wingtip distance. At this point, it may cause the most pronounced rolling and sideslip.

Normally the vortices will descend, but under certain atmospheric conditions they can rise above the initial flight path. It is good practice to remain clear of the KC-10's tail from one to five nautical miles, 200 feet above and 1,000 feet below in altitude, and one-half mile laterally.

In the precontact position, the Navy receiver pilot will have a sight picture similar to that approaching the KA-3 or KA-6D. The hose trails about 80 feet aft, with an array of hose reel status annunciator lights aft of the hose exit area. In this position, the pilot will feel a mild lateral centering force imparted from the wake of the KC-10. When going high, there may be a slight tendency to rise, which is easily controlled, according to pilots who have tested the tanker approach.

The boom operator, a "boomer" in Air Force parlance, controls operation of the hose reel system from a large station directly next to where the hose exits the airplane. He and his crew of two or more face aft and can observe the pilot's technique through a large observation window.

To establish contact, the common Navy receiver technique is used. Closure speed should be controlled between one and five knots. After establishing contact, the receiver pilot will discover the task of maintaining refueling position easier than with any other tanker. There are few or no side forces or lateral inputs required to maintain position, and the wide refueling range from 5 to 40 feet of hose displacement allows the pilot to determine his own comfortable sight picture and position.

An even more attractive feature of the KC-10 may be its versatility. The big plane can provide simultaneous refueling, cargo and personnel transport capability. It can carry 75 persons, 17 pallets (7,567 cubic feet) and still provide tanker support. It is a feature that will allow rapid deployment of tactical aircraft via a greater selection of routes and increased independence from en route bases. A triple redundant inertial navigation system provides excellent pathfinder capability.

It is anticipated that a KC-10 could deliver six tactical aircraft from the continental U.S. to an aircraft carrier almost anywhere in the Atlantic or Pacific Ocean areas, or take an entire squadron of maintenance equipment, personnel, and aircraft to any land-based combat theater.

"With its capability to refuel at faster receiver speeds, at high altitudes, over longer distances with quicker transfer rates, receiver pilots will certainly appreciate the KC-10," emphasizes the project officer at Patuxent River.

Some fleet pilots have already had an opportunity to refuel from the KC-10. The new tanker was available last fall during a naval exercise in the Caribbean. As production continues, KC-10 tankers will bring the total number available for use by the Navy to six.

Lieutenant Gray Morrison is the test pilot/project officer for the Navy KC-10 interoperability test and evaluation program. He has been assigned to the Naval Air Test Center for three years. Mr. Harry Down, Navy KC-10 interoperability project engineer, has just retired after 31 years of flight testing at the Naval Air Test Center.

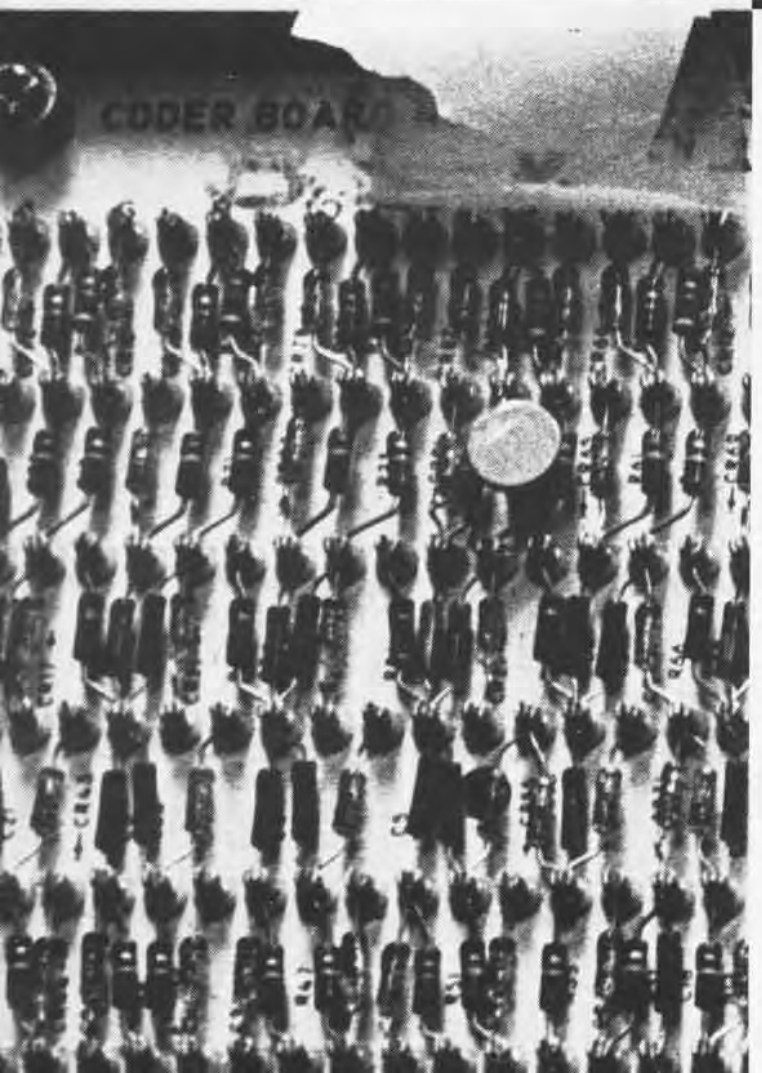
An S-3 Viking pilot "pushes the C" behind a KC-135 tanker, maintaining pressure against the flexible portion of hose to remain hooked up.

The underside lighting array of the KC-10 provides an excellent visual reference during approach under low visibility conditions.

Seen from an A-6, the basket presents a relatively larger target and pilots say it is easier to plug into for refueling.

The Nuts and Bolts of It

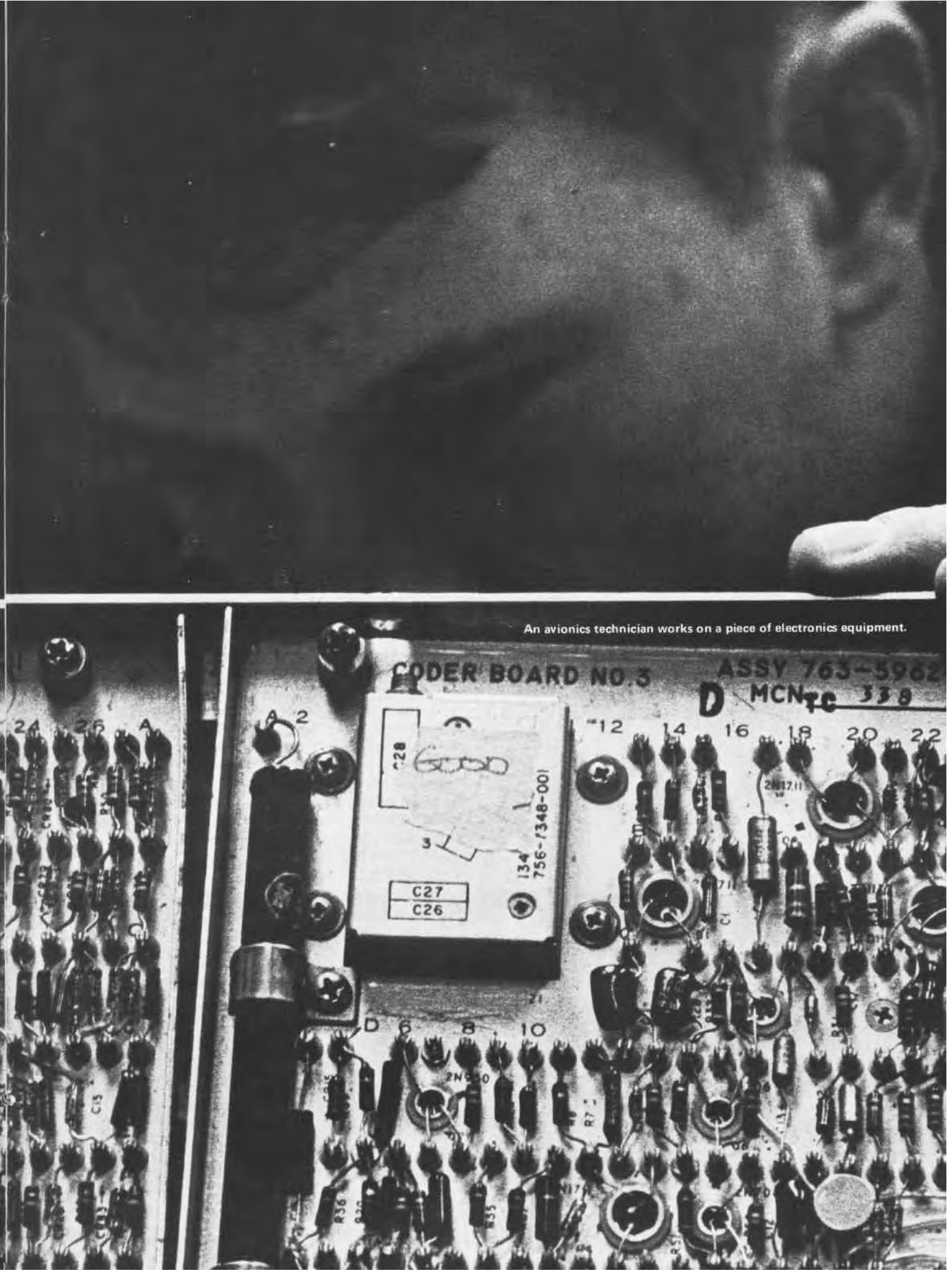
Story by Sandy Russell
Photos by JOC Kirby Harrison



Fitting square pegs into round holes (or you can't get there from here) is a challenge that every maintenance department faces at one time or another. The Aircraft Intermediate Maintenance Department (AIMD) at NAF Washington, D.C., is no exception. But besides the everyday obstacles, the department has problems peculiar to the particular aircraft it maintains. Of the permanently-assigned aircraft which the AIMD supports, many have been around for over 20 years. Older aircraft often present special problems, such as nonavailability of parts. When a particular part is no longer manufactured, it must be made in the AIMD or a contract must be let to have it produced. Either course is time-consuming and directly affects turnaround time in getting an aircraft back in the air. Sometimes it is outdated ground support equipment (GSE) which must be adapted to the repair of more up-to-date aircraft components.

The AIMD personnel seem undaunted by such stumbling blocks. A visitor to the department finds well-equipped work centers, functioning in a busy atmosphere. In talking with workers, one may be a little confused by the jargon which is liberally sprinkled with acronyms such as GSE, IMRL, NDI and the like. But one thing is very clear. This is a place where *people* are the key ingredients. They have one goal in common and that is getting the job done and the aircraft flying again as quickly and efficiently as possible.

There's a feeling of unity and pride of workmanship that



An avionics technician works on a piece of electronics equipment.

one senses from every member of the team. Morale is high here. It's evident in the clean, well-organized work spaces and in the attitudes of department personnel. From airmen to shop supervisors and division chiefs, to division officers and the department head, the same kind of comment can be heard. "It's a great place to work, and the *people* make the difference."

Commander D. C. Shelby, AIMD Officer, attributes the success of his department to its highly-motivated personnel. He says, "The thing that's never talked about is the resourcefulness of the average sailor. Give a sailor a challenge and there's nothing he can't do. . . . That's a real plus."

With 250 billets filled by Navy, Marine Corps and civilian personnel, the AIMD is the largest department at NAF Washington. Added to the nucleus of permanently-assigned personnel are those who are assigned TAD from the units the AIMD supports. Personnel from a squadron bring with them specialized skills in the repair of a particular airplane. On the other side of the coin, duty with an AIMD provides experience in intermediate level maintenance which will be invaluable to a squadron wherever it may be deployed in the event of mobilization.

The AIMD supports 33 aircraft and a number of activities. Light Photographic Squadrons 206 and 306 fly aerial photographic missions in RF-8Gs. Fleet Logistics Support Squadron 48 flies C-131Hs for cargo and personnel transport, including weekend airlifts of reservists to and from West Virginia, Kentucky and Pennsylvania. There is also the AIMD's biggest customer, MAG-41/VMFA-321 from the Marine Air Reserve Training Detachment, which flies F-4Ns and trains Marine reservists in attack and fighter tactics. The Aircraft Support Detachment of Headquarters, Marine Corps has two C-12s, and an aging C-118 which will soon be replaced by a P-3. A VIP unit, Reserve Tactical Support Wing Detachment, flies T-39s and an A-3 for the Chief of Naval Operations and the Secretary of the Navy, as well as other Navy officials and dignitaries traveling to and from the Washington area. The AIMD also works with the Air Force Reserve and Air National Guard, supporting each when needed.

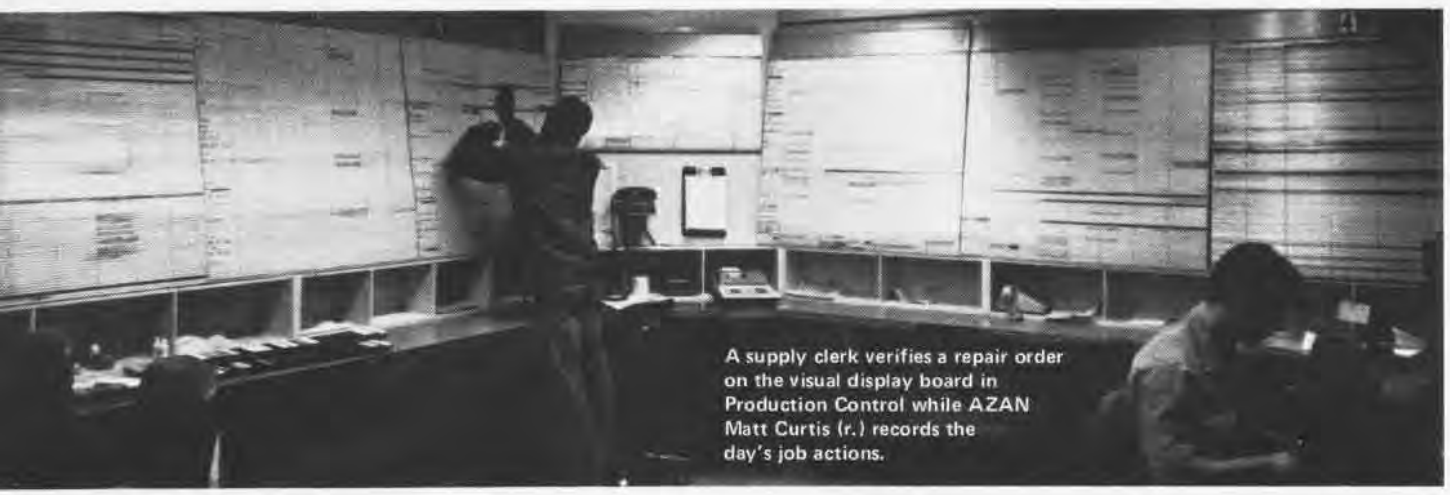
Like all maintenance departments, NAF Washington's AIMD functions under the Standard Navy Maintenance and Material Management System (abbreviated 3-M), which was introduced in the mid-sixties. At its inception, 3-M was labeled by some as the greatest paperwork project ever to hit Naval Aviation maintenance, but it turned out to be the foundation of a vastly improved organization for repairing aircraft. There really wasn't any increase in paperwork, just a more systematic approach to the preparation and collection of required documentation. Unnecessary duplication was largely eliminated and today only those forms that serve a useful purpose remain in use. The information from each form is filed in a computer from which meaningful data is extracted when needed.

The 3-M system was prompted by an initiative of the Secretary of Defense in 1962. Dissatisfied with the management of military aircraft maintenance, he wanted something done to improve it. He suggested, in a memorandum to the Secretary of the Navy, that the Air Force maintenance management system might be worth considering. Today's 3-M system is an outgrowth of the Air Force management operation and corporate management techniques adapted to the needs of Naval Aviation.

Under the 3-M system, there are three levels of maintenance: organizational, which is a function of squadrons or operating units; intermediate, accomplished by station aircraft intermediate maintenance departments; and depot level which applies to work performed by naval air rework facilities or in contractors' plants.

3-M is part of a program to enable Navy aircraft to operate more often, more efficiently and more cost-effectively. It covers three broad areas: improved maintenance and material, a planned maintenance system and a maintenance data collection system. It also provides a standard cost accounting system and a standard equipment readiness reporting system.

Some of this information is produced at NAF Washington's AIMD in the form of a statistical report called the 3-M System Monthly Summary. This analysis of the previous month's operations tells Cdr. Shelby just how well his department is performing. The report contains figures on repairable components, ground support equipment production, component turnaround, supply support and manpower utilization. The conclusions reached from the summary results are also a means of comparing the AIMD to its seven counterparts under type commander, Chief



A supply clerk verifies a repair order on the visual display board in Production Control while AZAN Matt Curtis (r.) records the day's job actions.

of Naval Reserve.

Located aboard Andrews Air Force Base, Md., NAF Washington is known as the "Crossroads of the Navy" because so many transient aircraft pass through. Testifying to this fact, ADC Danny Lange says that last November 700 aircraft were serviced by the AIMD's transient line crew. He is proud of the fact that even though the line is manned by only 33 personnel it accommodates 600 to 650 aircraft every month. Arriving and departing daily are Navy and Marine Corps aircraft carrying scores of uniformed and civilian officials to and from worldwide commitments in support of fleet and shore establishments. Anyone flying on a Navy or Marine Corps hop into D.C. has probably stepped across the quarterdeck at NAF Washington.

A large part of the action in the AIMD at the air facility is supervised by Ensign Ron Sutton. As the Maintenance Material Control Officer, he oversees all the production effort within the production divisions. Ens. Sutton is a limited duty officer and has 14 years of experience in intermediate level maintenance. He was a Chief Electronics Technician when he joined the LDO program in April 1981.

One area under his direction is Material Control, which orders parts and pieces, and checks the status of those on order. All equipment which comes into the AIMD comes through Material Control to be screened and sent on to the work centers for repair. AKC B. A. Ackley ramrods this section which processes over 450 requisitions a month. Chief Ackley worked in the supply area for 10 years and knows the business from both perspectives. Now he says he's on the other end of the stick.

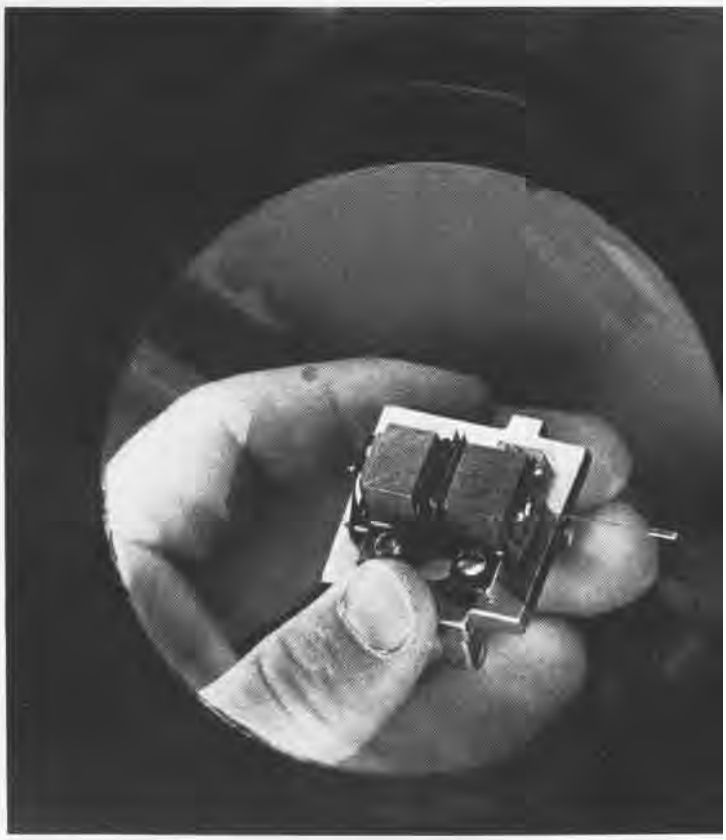
A close liaison must be established and maintained between supply and maintenance. When a pilot returns from a flight and "gripes" some piece of equipment, a technician goes out to the plane to check it. If it is malfunctioning, he may remove it from the aircraft and take it to the squadron's organizational maintenance department. The equipment is then placed on the supply dock for pickup. If the part is holding the airplane down, the Supply Department may issue a new one immediately, and send the old one to the Material Control screening unit. If the part is repairable, it is scheduled into the AIMD work centers. After repair and inspection, the part is sent back to Material Control for transfer to supply. It will then be placed back into the supply system for reissue.

"Our job is a joint job with supply," says Ens. Sutton. "Maintenance and supply together have to keep the squadrons at the peak of combat efficiency. That's our mission — to maintain combat-ready aircraft the maximum amount of time." The faster a part gets repaired, the faster the aircraft goes back in the air.

An expediter in this process is what is called pre-ex bins, short for bins of pre-expended items. The bins contain items which usually cost under $25, such as nuts, bolts, washers, resistors, wiring, etc. Keeping them on hand all the time saves man-hours and paperwork by not having to order them every time one is needed. The quality of the pre-ex bins can determine how fast a part is repaired.

AIMD personnel are constantly trying to find ways to improve their ability to provide the most efficient and effective support possible so aircraft will stay up longer. One way to accomplish this is to extend the mean time between failure, which translates into readiness. This means making maximum use of innovative ideas as well as producing high-quality workmanship.

For example, the Navy has recently discovered that by taking avionics components and running them through corrosion control — by washing them down with distilled water and then drying them out — the mean time between failure rate can be increased by one-third. Dust and dirt act as insulators, creating excess heat which breaks down the components more quickly.



Large magnifying lenses are used in the repair of microminiature components.

In Material Control, all equipment required for the repair of an aircraft appears on the individual material readiness list (IMRL). Each activity is accountable for all the IMRL equipment it has for supporting the various aircraft systems. The AIMD has over $15 million in IMRL which Material Control keeps tabs on. The latter also orders, maintains and completes a quarterly inventory of all tools in the department.

Ens. Sutton calls Production Control the heart of AIMD operations. It does exactly as its name implies. It "controls" the workload of each production division. The work center within the division then assigns the individual to do the job. Production Control is informed anytime some ground support equipment or one of the test benches goes down, because that will directly affect the ability to repair equipment in a timely fashion. Production Control also maintains records of funding and

VFP-306's line crew prepares an RF-8G Crusader for flight.

personnel leave time.

Maintenance Chief AECS Benny LeBon has two main jobs. He's the primary pusher in Production Control, and he's a people manager. He is responsible for scheduling workers for weekend work centers, the transient line and generally managing personnel and billets below E-6. It's a demanding job which requires remembering a lot of things, like people, qualifications, equipment status and production requirements. Senior Chief LeBon takes it all in stride.

When Production Control is working on a No. 1 priority, meaning that a piece of equipment was removed from an aircraft but there is no replacement, it's a challenge to see how fast the part can be pushed through the system, sent back to supply, and replaced in the aircraft. Ens. Sutton says, "There's a lot of pride that goes into all this – how fast you can do it and how well you can do it."

There are several checks to see whether a job is being accomplished efficiently or not. The primary responsibility for this falls to the Quality Assurance Division, which sets the quality standards of all parts and equipment repaired by the production divisions. Cdr. Shelby calls this division the AIMD's check and balance system. "It's like a scales," he says, "production requirements versus quality, and somewhere in between the two there's a balance for the quality level of the items we produce. You can't have all production and no quality, or the quality level set so high that you have no production." Ens. Sutton explains the importance of the Quality Assurance Officer's position. "He can tell me where I'm hurting if my people aren't putting out quality equipment. I'm pretty spread out in my duties and can't get around everywhere to see everything that's going on. He's really my eyes for quality."

The Avionics Division, headed by ATCS Lou Mallow, is the largest, personnel-wise. It handles electronic, electrical and calibration work. Some of the equipment repaired must be calibrated before going back to supply, and this is where the calibration lab comes in. The lab has 1,471 items of equipment to calibrate each year, plus another 1,387 which are sent off-station but are accounted for by the lab.

Some of the division work spaces are located in several

vans just outside the hangar where most of the AIMD work centers are housed. There is also a Marine Corps mobile van complex which supports the 14 F-4Ns assigned to VMFA-321. In case of mobilization, the vans go with the Marines, along with their technicians and avionics benches.

The Airframes Division, under acting division head AMH1 R. L. Bailey, does hydraulic/pneumatic work, welding, tire buildup, and nondestructive inspection (NDI), repairs structural members of aircraft, and has a machine shop. Over in one corner of the hangar works the AIMD's only machinist, civilian Elmer Frazier, who calls himself "the mole in the hole." He says he's been working in the shop for 12 years but most people don't even know his name. But when a part can no longer be ordered, say for an older aircraft, you can bet people know whose expertise and skill to call upon to make one!

This division has an interesting room which looks like part of the intensive care unit of a hospital. Known as the "clean room," it is painted stark white and is spotless. It has a laminar flow bench for testing close-tolerance parts which must be dirt-free, as well as a component test room with hydraulic/pneumatic capability.

Another unusual method of testing aircraft components is the nondestructive inspection method. A team of three specially-trained technicians operate the complicated equipment used in inspecting various parts of an aircraft for cracks in the metal. In testing ferrous materials, the Magnaflux uses AC-DC current to set up a magnetic field in the part to test for defects. An oil-based solution transfers metal particles to any crack. In Zyglo testing of nonferrous material, a fluorescent solution soaks into the crack and an emulsifier removes all solution except at the defect. Another piece of test equipment uses eddy current, or sound waves, and there is also an X-ray machine, both of which test for thickness of metal to determine stress areas.

PRCS G. T. Burch is in charge of the Aviator's Equipment Division, better known as the paraloft, where parachutes and survival equipment are maintained. He is also responsible for the LOX plant which stores liquid oxygen used for aviators to breathe, and nitrogen for inflating tires and in running various tests.

Other AIMD divisions include Power Plants, where aircraft engines and props are torn down and rebuilt; Armament, which repairs pod-mounted machine guns and bomb racks, and builds up missiles, rockets and bombs; and Ground Support Equipment, where all GSE used to start and service aircraft is maintained.

All the areas of the AIMD must work together to get the job done. Even with the diverse assemblage of aircraft at NAF Washington, unusually difficult maintenance problems are handled routinely and without fanfare. This is a *people* place, where the *people* make it work. The name of the game is quality aircraft maintenance and everybody plays!

PR2 Jay Pratt provides tender loving care for the parachutes in the drying tower.

ONE MORE TIME

Doolittle adds another first

By Helen Collins

Lieutenant General James H. Doolittle — famed WW II air commander, aeronautical engineer, holder of speed records, aviation executive and public servant — with many firsts to his credit, added another on December 11, 1981, when he became the first Air Force officer to be made an Honorary Naval Aviator.

Forty years ago, on April 18, 1942, the man from Shangri-La led 16 Mitchell B-25 bombers all the way to the Japanese homeland and started America on the long road to victory.

The Tokyo raid is one of the best-known war epics in American history and Jimmy Doolittle contributed more than his share of that history. Because of the secrecy surrounding the raid, President Roosevelt announced that American bombers based in the mysterious Tibetan city of James Hilton's *Lost Horizon* had blasted Japanese cities. The news electrified America and her allies. It shattered the myth of Japanese invincibility and gave the world hope in the midst of a succession of enemy victories in the Pacific. The Japanese, who believed the homeland out of reach of American warplanes, were badly shaken by the event.

What of the man who spearheaded the daring attack? James Doolittle was born in Alameda, Calif., educated in Nome, Alaska, and spent a year at the University of California School of Mines. When the U.S. entered WW I in 1917, Doolittle enlisted as a flying cadet in the Aviation Section of the Army Signal Corps Reserve and trained at the School of Military Aeronautics. Following duty as a flight instructor and border patrol pilot, he received his regular commission and promotion to first lieutenant in July 1920.

Doolittle came to national prominence two years later when he made the first transcontinental crossing in less than 24 hours, flying a DH-4 from Pablo Beach, Fla., to San Diego, Calif., with one refueling stop at Kelly Field, Texas.

In July 1923, Doolittle was one of the first junior officers to study at the Massachusetts Institute of Technology in Boston, Mass., where he earned an M.S. in aeronautical engineering in 1924 and his doctorate in 1925.

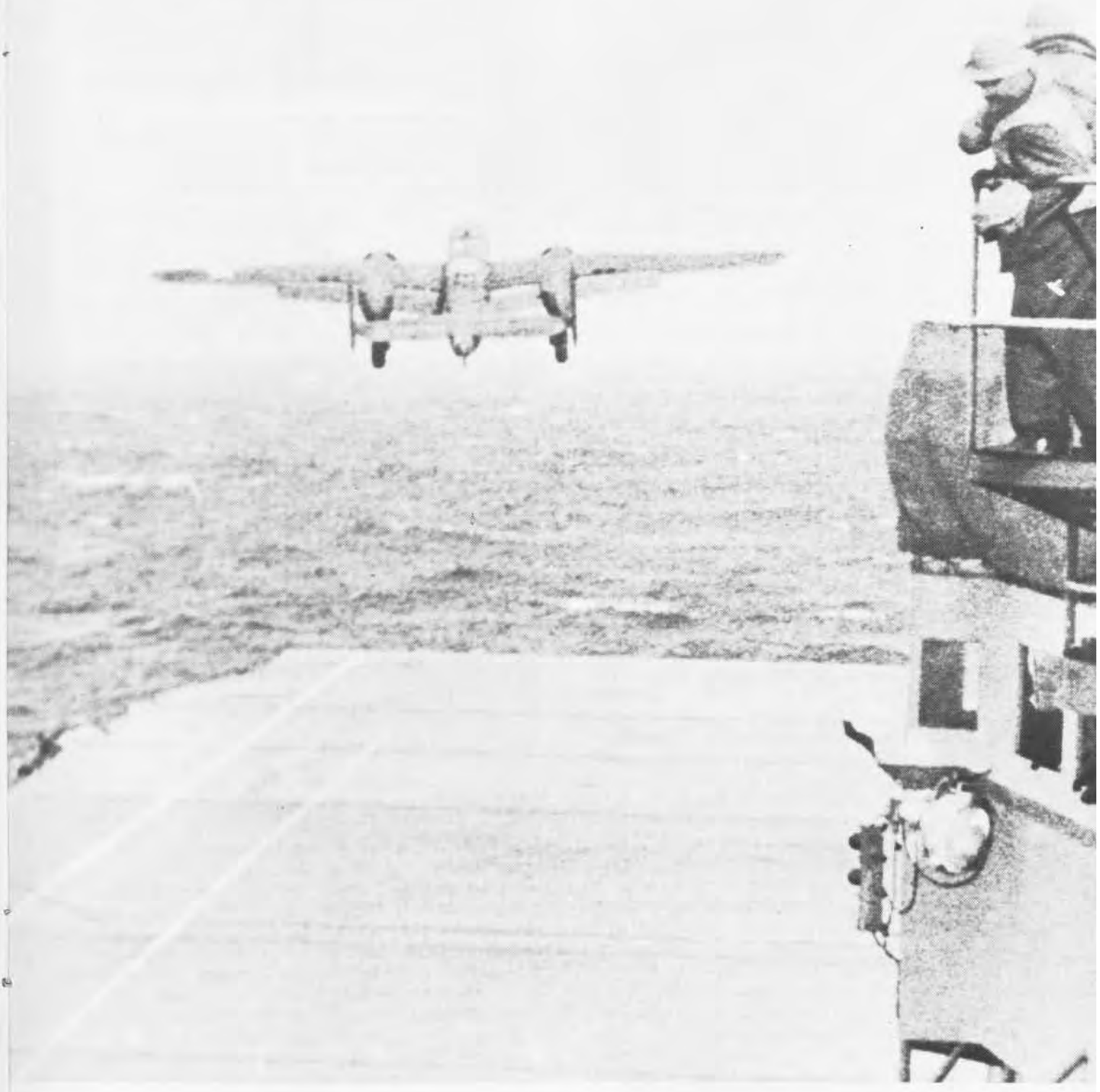
Back in flying status as a pilot following graduation, he won the Schneider Cup Seaplane Race for the Army in a float-equipped Curtiss R3C-2.

In the spring of 1926, Doolittle was given a leave of absence to go to South America to demonstrate the Curtiss P-1 pursuit plane. In Chile he fractured both ankles in an accident unrelated to his flying, but went on — the first North American (and the first man with his legs in casts) to fly across the Andes.

After a period of recuperation until April 1927 at Walter Reed Hospital in Washington, D.C., Doolittle, flying a P-1 from Wright Field in Ohio, accomplished what many engineers and pilots had considered impossible, the first outside loop.

It was a naval officer who secured a two-year assignment for Doolittle in September 1928 to participate in a pioneering project at Mitchel Field for the development of "blind" flying equipment and procedures. Two very important instruments were the result, one the artificial horizon and the other the directional gyroscope. On September 24, 1929, Doolittle demonstrated that an airplane could be flown by reference to instruments only when he made the

Here, a B-25 takes off from Hornet on its way to Tokyo, April 1942. Opposite page, Chief of Naval Operations Adm. Thomas B. Hayward pins Honorary Naval Aviator wings on Lt.Gen. James H. Doolittle, USAF(Ret.).



first "blind" flight in a Consolidated NY-2 Navy trainer. With a hood over the rear cockpit and depending solely on instruments, he took off, flew a prescribed flight pattern and landed safely. Doolittle considers this work one of the most important achievements of his career because it made the airplane a reliable transportation vehicle 24 hours a day in almost any weather. He attracted wide newspaper coverage and was later awarded the Harmon Trophy for this important contribution to aviation.

Doolittle resigned his regular Army commission in February 1930. He was commissioned a major in the Specialist Reserve Corps the following month and from time to time went back on active duty as a reserve officer.

He joined Shell Petroleum in St. Louis as manager of its Aviation Department, and in that capacity conducted numerous aviation experiments. One of the more noteworthy was his work toward the development of 100-octane aviation gasoline as the standard fuel for improved aircraft engine performance. Many called it Doolittle's one million dollar blunder but it was not long before the military, the airlines, engine manufacturers and gasoline producers perceived the advantage of the new fuel and adopted it. This bold engineering decision enabled U.S. aircraft to perform better than those of the enemy in WW II, giving a performance edge especially with regard to fighters in air combat.

While at Shell, Doolittle won the Bendix Trophy Race in 1931, flying a Laird Super Solution racer from Burbank, Calif., to Cleveland, Ohio, then continuing on to Newark, N.J., to establish a coast-to-coast record of 11 hours, 16 minutes. A year later, he took the Thompson Trophy Race at Cleveland in the Gee Bee R-1 racer, setting a new world landplane speed record.

Jimmy Doolittle returned to active duty in July 1940 as a major in the Army Air Corps to troubleshoot the expansion of aircraft and engine production. He worked with large auto manufacturers on the conversion of their plants. He also flew a P-40 fighter plane under all weather conditions, developing the necessary equipment and techniques which resulted in the removal of instrument flight restrictions imposed up to then on fighter planes.

After Pearl Harbor, on January 2, 1942, Doolittle was promoted to lieutenant colonel and sent to Headquarters, Army Air Forces to plan the first aerial raid on the Japanese homeland. The war was barely a month old and Japanese victories across the Pacific had battered American morale and spirit. A demonstration of America's ability to strike back at the enemy was needed, something that would take the offensive directly to Japan. Doolittle received General Hap Arnold's approval to lead the attack of 16 B-25 medium bombers from the aircraft carrier *Hornet*, with targets in Tokyo, Kobe, Osaka and Nagoya. It would be a joint Army-Navy operation.

The mission was supersecret and many thought it impossible. Doolittle and his men had time for only 30 days' training. A strip at Eglin Field was marked off in the dimensions of *Hornet's* flight deck and, under the instruction of Navy Lieutenant Henry L. Miller, the pilots practiced taking off from the restricted space. They never had the opportunity for even one practice launch from a real carrier deck.

Hornet departed California on April 1, 1942, for a rendezvous with Admiral William (Bull) Halsey's task force at a point between Midway and the Western Aleutians. To make place for the 16 Army bombers aboard *Hornet*, C.O. Captain Marc Mitscher had the carrier's aircraft stored below. *Wildcats* and *Devastators*, with wings folded, and dismantled *SBDs* were packed into every available space, even hung from the overhead.

Lt.Gen. Jimmy Doolittle and Capt. Matt Portz, USNR(Ret.), of The Aerospace Corporation and former Head, Naval Aviation Periodicals, compare Doolittle's Air Force Command Pilot and Portz's Naval Aviator neckwear. The Bronze bust of the general between them is part of the new Doolittle Collection displayed at The Aerospace Corporation in Los Angeles.

The Army planes were to launch within 500 miles of Japan, which would allow only enough reserve fuel to get them to Japan and, once their bombs were dropped, to continue to China where it was hoped they would land behind friendly Chinese lines. However, when *Enterprise, Hornet's* escort carrier, reported that it had been spotted by a Japanese patrol vessel, Halsey knew that the bombers, even though they would have marginally sufficient fuel, would have to be launched far sooner than planned. He sent a message to *Hornet*: "Launch planes. To Colonel Doolittle and his gallant command, good luck and God bless you."

The 16 Army crews and their B-25 bombers were launched on their one-way mission 668 miles from Tokyo, instead of the planned 500. They reached Tokyo one-half hour after noon and made their drops. "In my opinion," wrote Adm. Halsey of Doolittle and his men, "their flight was one of the most courageous deeds in all military history."

Once the bombs were released, one of the crews flew northwest to Vladivostok where the members were interned by the Russians. Aided by favorable winds, the other 15 crews kept flying toward China until their fuel was exhausted. Four planes made crash landings. The crews of the other 11 planes bailed out into the black night. One was killed in the parachute descent, four were drowned. Of those captured by the Japanese, two were executed and one died in a Japanese prison. Doolittle bailed out and fortunately landed in a rice paddy near Chuchow. Along with most of the others, he was able to make his way to friendly Chinese lines.

The Tokyo raid gave a tremendous lift to American morale, and the strategic influence it had on the Pacific

war was out of all proportion to the damage inflicted. Goaded by the fact that bombers launched from U.S. carriers had raided the supposedly invulnerable Home Islands, the Japanese Navy plunged ahead into the Battle of Midway in June. The battle, that was to have destroyed the remaining U.S. carriers, turned instead into a disaster for the enemy who lost four front-line flattops. It is often called the "turning point of the Pacific war."

Jimmy Doolittle was advanced two grades to brigadier general the day after the Tokyo attack. In September he became commanding general of the 12th Air Force in North Africa and this was followed by his promotion to major general later in the year. Doolittle took command of the 15th Air Force in Italy in 1943, and of the 8th Air Force in England in 1944. There he directed thousands of bombers and fighters in the destruction of military targets in Nazi-occupied Europe. After the German defeat, he and the 8th Air Force moved to the Pacific, where the war ended before they could go into action against Japan.

Doolittle circa late 1920s or early 30s.

Doolittle was greatly respected by his subordinates as a man who knew what air combat was all about. In fact, he appears to have had difficulty staying out of a good fight. General Eisenhower, learning that Doolittle personally had piloted a fighter plane during a sweep against the enemy, wired him to the effect that "you can be a lieutenant flying fighter missions or you can be a general. Take your choice." Doolittle kept his stars. He was the only reserve officer to command an air force during WW II.

Doolittle reverted to inactive reserve status in May 1946, and returned to Shell as a vice president and director. Thereafter, he served as director or trustee of many companies.

In March 1951, he was appointed a civilian special assistant to the Air Force Chief of Staff for scientific matters. His service in this capacity contributed to the Air Force ballistic missile and space programs. Doolittle retired from his Air Force duties in February 1959 but continued to serve his country as head or member of many government boards, panels and committees, including the National Advisory Committee for Aeronautics, the Air Force Scientific Advisory Board, the Defense Science Board and the President's Science Advisory Committee.

The many facets of Jimmy Doolittle's life are displayed in the James H. Doolittle Collection, a permanent exhibit in a new Aerospace Corporation facility which is named in his honor. Doolittle was an Aerospace trustee from 1963 to 1969 and also served terms as board vice chairman and executive committee chairman. A plaque honoring him is being placed in the lobby of the new facility, which reads in part, "Jimmy's leadership as an aviator, engineer, scientist and public servant will inspire new generations for as long as there are Americans."

The project to honor Doolittle began when Aerospace Corporation president Eberhardt Rechtin asked Matt Portz, the company's office of information director and former Head, Naval Aviation Periodicals, to prepare a permanent exhibit which would tell the Doolittle story. Portz put the collection together with help from the Smithsonian's National Air and Space Museum, the Library of Congress, National Archives, USAF Academy, International Hall of Fame and others. The collection features memorabilia and early photos, models of the important planes Doolittle flew, and facsimiles of military documents.

On December 11, 1981, three days before his 85th birthday, General James Doolittle was honored at The Aerospace Corporation by observance of "Jimmy Doolittle Day." Climaxing the day of tributes, in which many leaders in the aviation community took part, Chief of Naval Operations Admiral Thomas B. Hayward pinned Navy wings on General Doolittle, making him an Honorary Naval Aviator, the fifteenth to be so designated since the award was first given in October 1939. The honor is conferred on non-Naval Aviators who have made significant contributions to Naval Aviation. He did much more. His victories in racing and his technical and research contributions all contributed to advancing man's knowledge of aeronautics.

Doolittle, in speaking of his feeling about the planes he has flown, has said that when an aeroplane takes a pilot where he is going and brings him back – and does it repeatedly – he develops a certain attachment for it. When this happens over a long period of time, even if the plane has some very basic faults, the pilot no longer sees them because he has become part of the aeroplane.

In spite of Doolittle's strong attachment for the planes he flew, he feels that if he were entering aviation today, he would be more interested in the technical field than in strictly flying. His great interest would be in improving the tool. And, of course, that is exactly what he has done.

Electronic Warfare and the Naval Air Reserve

Story and Photos by LCdr. D. Timothy Pinkney, USNR-R

The Naval Air Reserves have become enthusiastic participants in the fast changing world of electronic warfare (EW), electronic surveillance (ESM), electronic countermeasures (ECM) and electronic counter-countermeasures (ECCM).

The Reserve Carrier Air Wings (CVWRs) are no longer without airborne sophisticated electronic warfare capabilities. Both East and West Coast CVWRs and Marine MAG-42 Det C have tactical electronic warfare (VAQ) squadrons flying the EA-6A *Intruder*.

This aircraft was used to meet and beat the Vietnam surface-to-air missile (SAM) threat. The old reliable A-6 airframe was modified to quickly create an airborne EW system. Initially six A-6A bombers were converted to EA-6As and six others were built on the A-6A production line as EA-6As. Fifteen more were built from the keel up as EW birds on the EA-6A production line. The addition of internal receiving antennas and external wing-mounted jamming pods created a powerful electronic counter-countermeasures platform, which quieted enemy SAM and fire control radars. The plane also has the ability to drop chaff, utilizing one or two ALE-41 external pods.

Forerunner to the supersophisticated, computer-controlled, four-seat EA-6B *Prowler*, the two-seat EA-6A

VFP-306 snapped this shot of two Axemen Intruders. Far left, a VAQ-309 pilot and electronic warfare officer watch the rerun of their jamming hop on the NAS Fallon range. Left, a close-up of the ALQ-41 chaff pod control box.

Far left, EA-6A lines up for landing. Left, Axemen C.O. Cdr. Dixon Smith makes a point during preflight brief.

Loading an ALE-41 chaff pod takes a lot of coordination and mechanical muscle.

was originally flown in Vietnam in support of Marine operations. When the Marines transitioned to the third generation of *Prowlers* in the late seventies, the decision was made to provide the Reserves with this needed capability. Before delivery to the Reserves, the aircraft underwent extensive overhaul and updating of avionic systems. However, the onboard EW system was left intact. It is a first generation system possessing a wide variety of manual capabilities.

Fleet commanders find that the EA-6A insures effective and timely use of the electromagnetic spectrum by friendly forces. Additionally, it can simultaneously determine, exploit, reduce or deny the same spectrum by the enemy. In other words, the *Intruders* with their trained air crews assist in detecting and targeting hostile land and sea-based radars, while making it difficult for the enemy to detect and target friendly forces.

NAS Whidbey Island, located about 60 miles north of Seattle, is home for West Coast A-6 squadrons, as well as the Navy's entire inventory of EA-6Bs. It is also the home station of reserve squadrons VAQ-309 and VMAQ-4.

The Navy's newest tactical electronic warfare squadron is VAQ-309 which was established in December 1979. The *Axemen* have four EA-6As with one active duty and five reserve flight crews. They are assigned to CVWR-30 as EW, ESM and ECM experts and are the Navy's only West Coast reserve A-6 squadron.

During two periods of two-week active duty for training at NAS Fallon, Nev., VAQ-309's *Axemen* flight crews briefed sister air wing squadrons on the electronic warfare capabilities of the EA-6A. Crews emphasized the often misunderstood EW parameters needed for maximum strike group effectiveness. These briefs took some of the mystery out of what it is that the EA-6A can and cannot do.

To help confirm the usefulness of jamming to skeptical air crews from other squadrons, flight leaders were taken to Fallon's Wilson Electronic Warfare Range radar sites for a first-hand look. They observed air wing strikes with and without jamming. As one converted commander stated, "That fabulous magic really does work! You guys sure can zap them!"

As a consequence of the briefs and on-site demonstrations, EW aspects are being taken into consideration in strike planning tactics to a much greater extent than was previously the case.

With fleet EA-6Bs overworked and overtasked, the Reserves have helped to take on some of the load. The East Coast-based *Star Warriors* of VAQ-209 flew their four aircraft to France to provide airborne EW for a NATO exercise.

On the other side of the country, VAQ-309 has frequently provided an ECM environment for Top Gun fighter weapons training. In conjunction with CVWR-30, the *Axemen* have often carried out war-at-sea scenarios against West Coast ships.

The dynamic forces of electronic warfare are undergoing constant innovation and rapidly changing threat densities. With the addition of the EA-6A to the CVWRs, the Reserves now have an effective capability to meet the modern electronic warfare threat.

PEOPLE·PLANES·PLACES

Records

Several squadrons marked accident-free flying in years: VS-33, 21 years; VAW-121, 15; VAW-114, 11; VP-4, VAQ-131, VAW-124 and VS-29, 10; VA-146, 9; HT-8, 8; VT-10, 7; HSL-35,4; VF-211, 3; and VAQ-135 and VT-9, 2.

A CH-46 *Sea Knight* helicopter from HMM-264 was the 15,000th aircraft to land aboard *Saipan* (LHA-2). The landing took place during operations in the Gulf of Aden.

Duluth (LPD-6) marked her 16,000th consecutive safe landing when a UH-1 *Huey* from HMM-265 touched down in November.

A COD C-1A became the 100,000th plane launched from *Ranger* last December while the ship conducted carrier qualifications off the southern California coast.

John Rodgers (DD-983) completed 108 helicopter landings in 11½ hours last December while operating with aircraft from HS-1, 11 and 15 and HSL-36 near Jacksonville.

Cdr. J. B. Yakeley, X.O. of VF-114, is believed to be the first Navy pilot to accumulate 2,000 flight hours in the F-14 *Tomcat*. The 2,000th hour was logged on a routine combat air patrol mission in the Indian Ocean from the deck of *America*.

Lts. Charles D. Wakefield and Gordon B. Aaseng of VT-23 have each achieved 1,000 accident-free flight hours in the T-2C.

Cdr. Lewis W. Dunton III, former skipper of VA-87, surpassed 4,000 flight hours in the A-7 last December while flying a practice bombing mission.

Several units marked accident-free flight-hour milestones: VP-49, 140,000 hours; VT-86, 60,000; HMT-301, 35,000; HS-15, 29,000; VC-12, VA-303 and VR-53, 20,000; HMM-268, VF-161 and HMM-268, 10,000.

Some individuals marked milestones in their flying careers: VF-114's Cdr. Jay B. Yakeley achieved 2,000 flight hours in an F-14. VA-174's Cdr. Robert S. Smith recorded his 2,000th hour in an A-7. VS-29's Cdr. Jack L. Olson reached his 2,000th hour as a pilot in the S-3A. VS-32's AW1 Randy Stubbs recently became the first Atlantic Fleet Aviation Antisubmarine Warfare Operator to fly 1,000 hours in the S-3A. VA-85's LCdr. Lamar Willis and Lts. Carl Behr and Charley Williams have all surpassed the 1,000-hour mark in the A-6.

A LAMPS helicopter from HSL-36, Mayport, Fla., deployed aboard USS *Paul*, recently logged its 500th flight hour and 337th shipboard landing, completing the squadron's four and one-half month cruise. This achievement was accomplished safely through the hard work of every member of the LAMPS/frigate team. Averaging over 100 flight hours per month, the SH-60B proved equal to the challenge as the squadron participated in Exercise *Open Ocean Missile 81* off the Libyan coast, in eastern Mediterranean contingency ops, and numerous Sixth Fleet antisubmarine and antiship surveillance and *Harpoon* targeting exercises. True to the frigate's motto, squadron personnel and ship's company demonstrated how *"Paul* does it all."

Ponce (LPD-15) reached a new milestone as she conducted her 18,000th safe aircraft landing last October 8 in Turkey, while the ship was participating in NATO Exercise *Display Determination 81*. The *Huey* that made the record landing was from HMM-263, New River, N.C., piloted by 1st Lts. R. O. Horne and L. J. Viverette. *Ponce* operates all types of Navy and Marine Corps helos as well as the V/STOL *Harrier*.

Rescues

A CH-46 *Sea Knight* from HMM-264, deployed aboard *Saipan* (LHA-2), was airborne within minutes recently in response to a medical emergency aboard a Dutch tug. The tug's master had suffered a heart

attack. Hoisting the victim aboard the helo was difficult because of a massive oil derrick which the tug had in tow and a cable which ran through the hoist area. The helo pilot, Capt. G. M. Russell, assisted by LCpl. J. W. Scott, maneuvered the helo so that SAR crewman, AD1 M. T. Demetrius, could bring the stricken man aboard by litter. He was immediately evaluated and given medical treatment on the flight to *Saipan*, where he was placed in intensive care.

Four members of the SAR team at NAS Lemoore were honored last November for their rescue earlier in the year of a 26-year-old girl, unconscious and suffering from a skull fracture, suspended in a climbing rope 1,500 feet above the valley floor on the sheer face of Cathedral Rock in Yosemite National Park. Pilot LCdr. Daniel Ellison, Lt. Michael Helms, AMS1 Ranier Streib and HM3 Olga Misko made up the SAR team, assisted by several park rangers. While the helo hovered five feet out from the cliff and 75 feet above the victim, a park ranger rappelled adjacent to her. He swung back and forth until he was able to grasp her climbing rope. The ranger and the young woman were hoisted aboard the helo and flown to the meadow below where a doctor waited. From there she was flown to Valley Medical Center in Fresno. Turbulence and the close proximity of the cliff face made it a difficult rescue. Its success was a tribute to the skill of the SAR team and the park rangers.

Thirteen crew members of a Liberian grain carrier owe their lives to a U.S. Navy pilot and his Canadian Forces crew. LCdr. Dave Cradduck is an exchange pilot serving with 423 Squadron at Canadian Forces Base Shearwater. The Liberian ship had run aground on Sable Island. LCdr. Cradduck and his crew, fighting winds gusting to more than 60 knots and navigating in complete darkness, reached Sable Island in their Sea *King* helicopter and hovered above the broken ship. The rescue lasted more than two hours, during which 13 of the 26 crew members were hoisted aboard the helo and carried ashore. The remaining 13 crewmen were later rescued by another Canadian Forces helicopter.

Honing the Edge

The *Star Warriors* of VAQ-209 recently returned to Norfolk after an eight-day special AcDuTra assignment at Peterson AFB, Colo., where they were hosted by the 154th Tactical Control Facility. With their EA-6A *Intruders*, the Naval Reserve squadron flew sorties against F-4s and F-106s from the North Dakota Air National Guard's 5th and 178th Fighter Interceptor squadrons, respectively. Missions were also flown against Denver's Buckley Air National Guard A-7 squadron. VAQ-209 accumulated 31 flights and 60 hours of flight time in its role of tactical electronic jamming of airborne radars.

Darth Vadar surprises VAQ-209's Star Warriors during the squadron's special AcDuTra at Peterson AFB. The costumed "invader" is an Air Force civilian employee and a fan of the movie character pictured in the center of the squadron insignia.

The *Eagles* of VA-115 recently proved just how capable the A-6E *Intruder* can be in a war-at-sea environment. During a three-day exercise off the western coast of the Republic of the Philippines, squadron aircrews expended a variety of precision-guided munitions, including AGM-45 Shrike and AGM-78 Standard ARM missiles, and laser-guided bombs. These successful launches prove the immense value

of the anti-radiation missile. One *Intruder* can effectively neutralize an enemy's detection and defensive capabilities, thus improving the survivability of the strike group. Likewise, the effectiveness of precision guided bombs allows a single aircraft to perform missions formerly requiring several aircraft and multiple sorties.

NATO Exercise *Ocean Venture 81*, the largest maritime exercise since WW II, concluded last October 15 after more than two months of maneuvers involving more than 120,000 personnel, 1,000 aircraft and 250 ships from 14 nations. It ranged from the South Atlantic through the Caribbean into the North Atlantic, and concluded in the Baltic Sea. The U.S. participated in all phases of the exercise while several nations, including the United Kingdom, France, the Netherlands and the Federal Republic of Germany, joined in more than one. Atlantic command officials believe that *Ocean Venture 81* achieved its major objective to demonstrate that western navies can protect and maintain sea lines of communication.

An HH-1K from HAL-5, Point Mugu, served as photo platform during a Harpoon missile firing aboard the Australian ship HMAS Canberra (FFG-02). The missile is being evaluated by Pacific Missile Test Center and the reserve helicopter squadron was tasked with photographing the activity.

Et cetera

HT-8, NAS Whiting Field, has received two new TH-57A helicopters, the first two of seven to be delivered. The new 57s have a bigger engine and a better avionics and environmental control system. They cruise between 115 and 120 knots.

RAdm. Fred H. Baughman (l.), Commander, Pacific Missile Test Center, shared in the excitement as the Reagans and the Hickerson family recalled their first meeting in 1969.

President and Mrs. Ronald Reagan's visit to Point Mugu after Thanksgiving was especially exciting for one Navy family. It had been 12 years since 15-year-old Todd Hickerson and his mother last met the Reagans but neither family had forgotten their meeting. In 1969, during a POW/MIA press conference in California, three-year-old Todd walked up to then Governor Reagan and asked to be taken to the bathroom. Later, he asked Governor Reagan to "help bring my daddy home." Todd's father was Marine Corps Maj. Steve Hanson who had been listed as missing in action over Laos for two years. He was later declared dead. President Reagan was so impressed by the incident that he began wearing a POW/MIA bracelet engraved with Maj. Hanson's name and Mrs. Reagan wrote about Todd in her autobiography. Mrs. Hanson later married Capt. Jim Hickerson who spent more than five years in POW camps around Hanoi. He watched the heart-warming reunion with special interest.

The crew of the nuclear-powered aircraft carrier *Eisenhower* recently used a day of liberty to clean, paint and repair a day-care center on the Island of Barbados. Besides the renovation work, the sailors also cleared the grounds of shrubs and weeds.

Mark Roth

Served on a silver platter? From all appearances, this SH-46 looks like it may be the main dish served on the radar dome of an E-2C aboard *Ranger*. Actually, the effect was produced by the angle chosen by the photographer who snapped this unique shot.

The paths of two military officers with the same name, from two different countries, crossed for the second time when Capt. David N. Rogers, USN, C.O. of *Okinawa*, met Wing Commander David N. Rogers, Royal Australian Air Force from Headquarters Operational Command at Glenbrook, aboard *Okinawa* in Sydney, Australia, just before Exercise *Kangaroo 81*. Their first meeting took place in August 1978 aboard *Enterprise* off Perth, Australia, following Exercise *Beacon South*, and they have continued to correspond since then.

Oceana's VF-33 Starfighters, commanded by Cdr. John A. Best, recently transitioned from the F-4 Phantom II to the F-14A Tomcat. The squadron aircraft paint scheme has displayed the lightning bolt and star since before the Korean War.

During a recent central Florida air show, *Blue Angels'* left winger LCdr. Bob Stephens found plenty in common with Kirby Grant, television's "Sky King" of the fifties and sixties. Stephens brought Grant up to speed on the sophisticated instrumentation of his A-4 *Skyhawk*. Grant, now 70, served as a role model of sorts for many of today's *Blue Angels* as they were growing up.

The *Warhawks* of VA-97 and the *Royal Maces* of VA-27, both home-based at Lemoore, find themselves deployed at sea aboard *Coral Sea*. This provides much healthy competition for the two light attack squadrons.

Change of Command

ComMAtWing-1: Capt. Bruce B. Bremner relieved Capt. Robert H. Ferguson.

HMM-263: Lt.Col. William G. Barnes, Jr., relieved Lt.Col. Roger H. Gingrich.

H&MS-26: Maj. William W. Scheffler relieved Lt.Col. Barnes.

HS-8: Cdr. Mack A. Thomas, Jr., relieved Cdr. Joseph S. Walker.

HSL-35: Cdr. Michael J. Coumatos relieved Cdr. David A. Stull.

Monticello (LSD-35): Cdr. D. L. Wetherell relieved Capt. J. T. Worthington.

VA-34: Cdr. B. L. Liner relieved Cdr. B. K. McDanel.

VA-83: Cdr. Douglas J. Bradt relieved Cdr. Austin E. Chapman.

VA-85: Cdr. John I. Dow relieved Cdr. Daniel A. Wright.

VA-93: Cdr. James H. Finney relieved Cdr. Marion R. Rackowitz.

VC-8: Cdr. Fredrick R. Purrington relieved Cdr. George W. Lundy.

VMGR-352: Lt.Col. William B. Shively relieved Col. Donald L. Stiegman.

VMFA-531: Lt.Col. Robert R. Renier relieved Lt.Col. John L. Vogt.

VP-5: Cdr. F. A. Holk, Jr., relieved Cdr. K. H. Kaeser.

VP-46: Cdr. Peter D. Reinger relieved Cdr. Louis D. Milioti.

VP-62: Cdr. Brian Young relieved Cdr. Samuel Butler.

VT-27: Cdr. William A. Snider relieved Cdr. James E. Joplin.

Professional Reading

By Lieutenant Commander Peter Mersky, USNR

Casey, Louis S. Curtiss. *The Hammondsport Era 1907-1915*. Crown Publishers, Inc., One Park Avenue, New York, N.Y. 10016, 1981. 235 pp. Illustrations, drawings, indexed, appendices. $19.95.

Taking advantage of some very fine period photography and large double page spreads, this book provides an in-depth look at Glenn H. Curtiss, one of the great pioneers of aviation. It focuses on the inventor's early achievements, beginning with the work of the Aerial Experiment Association and ending with the training aircraft and flying boats produced during the period just prior to the entry of the U.S. into WW I. Curtiss is especially remembered for the development of waterborne aircraft and the invention of the flying boat. He is also one of the foremost pioneers of Naval Aviation, having built the Navy's first aircraft and trained the Navy's first aviator. The Navy-Curtiss relationship is well covered in this book. *Curtiss* is a fine effort by a former curator of aircraft for the Smithsonian Air and Space Museum, who has spent 20 years researching his subject. Anyone interested in this early period, or in Glenn H. Curtiss and his impact on aviation, will find this book a gold mine of information.

Hartmann, Gregory K.: *Weapons That Wait*. Naval Institute Press, Annapolis, Md. 21402. 294 pp. Illustrations, appendix, hard cover. $22.95 ($18.95 members).

Written from an advocacy point of view, Hartmann covers extensive areas of both mines and mine countermeasures, including a well researched history of both areas of mine warfare. The material is presented in an interesting manner, yet includes enough technical detail to keep the attention of those involved in mine warfare. He refers to the Nimrod Report in emphasizing a need for attention to mine warfare, speculating that it may be a lack of tactical excitement in the use of mines or difficulty in assigning credit that resulted in past lack of interest. In the epilogue, Hartmann quotes Rear Admiral Roy F. Hoffman, former Commander Mine Force, on the use of mines, "Such employment could be among the most decisive actions of a conventional war." The book is adequately laced with photographs ranging from WW II through Operation *End Sweep* at the conclusion of the Vietnam War. Numerous illustrations offer details ranging from laying a mine field to damage zones of the typical ship. An excellent primer for anyone involved in mine warfare.

Letters

Thunderbirds

The tragic loss of four Air Force *Thunderbirds* is of deep and grave concern, with possible negative consequence not only to the U.S. Air Force, but to our country.

As one might expect, and as has happened often in the past, a loss by the *Thunderbirds* or the Navy's *Blue Angels* brings forth those who would call for disbanding these fine organizations in the name of safety and savings. Yet, for reasons best known to themselves, there will be nary a whimper over millions spent on projects of questionable value to the nation.

The men who died in this accident were four of our nation's finest military pilots who gave their lives in the service of their country no less so than if they had died in combat. Like other professional military men and women, they fully understood and accepted the risks involved. Theirs was the pursuit of professional excellence and in this they strove to set the highest standards of performance to which others might aspire, to the ultimate benefit of all.

Millions of Americans, young and old, have been awed and inspired by the performance of the *Thunderbirds*. Their purpose and that of the *Blue Angels* has not been to carnivalize military aviation but to project pride in one's country, competence in one's chosen profession and to motivate those who must follow.

Americans have good reason to be proud of the military pilots who serve this nation and they should continue to have an opportunity to see them perform at their best. The death of four fine men is immeasurable in human terms and the destruction of four aircraft is a significant loss. Still, in an era which sometimes seems short on pride, purpose and dedication, let us hope that we will not be stampeded into abandoning a tradition which helps to instill these qualities in our young aviators and symbolizes so well the vital and moving spirit of America.

Butch Voris, Captain, USN(Ret.)

Ed's note: Captain Voris is a Navy Ace, the originator of the Blue Angels and the 1st and 5th leader of the Navy team.

Spitfire in WW II

I am writing a book about the British *Spitfire* in WW II. There are two instances at least where the U.S. Navy used this airplane:

1. A *Spitfire Mark IIC* was based at NAS Patuxent River in 1944 for Royal Navy comparative tests with captured enemy aircraft. I would like to write about the presence of this aircraft historically, and also through the eyes of U.S. Navy pilots and stationkeepers who were there then.

2. The USAAF 67th Tactical Reconnaissance Group gave its *Spitfire Mark VBs* to the U.S. Navy in about March 1944 for use in artillery ranging and spotting during the Normandy invasion on June 6, 1944. I have one eyewitness to this hand-over, who watched them train. It is assumed that the Navy got rid of the *Spitfires* shortly after that since the aircraft were not returned to the USAAF 67th TRG.

Any help your readers can give me will not only be remembered, but I will pursue all details and make a full account of these two bits of Navy history.

Paul A. Ludwig
P.O. Box 9844
Queen Anne Hill
Seattle, WA 98109

Pacific War Museum

The Nimitz Steamboat Hotel, Fredericksburg, Texas, has been restored and will house The Museum of the Pacific War. At the request of Fleet Admiral Chester Nimitz, Commander in Chief, Pacific, it is dedicated to all those who served with him. Rare aircraft exhibited in the museum include a Japanese *Val* and *Rex* and an SBD *Dauntless*. Exhibits will lead visitors chronologically from Pearl Harbor to Tokyo Bay. A center of interest will be a 30-foot-long history wall, where relics and mementos from the Pacific War will be displayed.

A few choice items are still being sought. For information, write Superintendent, Admiral Nimitz State Historical Park, P.O. Box 777, Fredericksburg, TX 78624.

Stearman

In the story about the Oshkosh '81 meet, it is stated (*NANews*, October 1981, p. 29) that "The Stearman was perhaps the world's most produced biplane. More than 8,000 copies of various models were . . ." This isn't even close to the record! I think it is safe to say that the Polikarpov organization has the biplane record sewed up with 40,000 examples of their Po-2/U-2, built from 1928 into the mid-1950s. The Polikarpov Po-2/U-2 has to be the most produced *airplane* of all time. Still love the Stearman, though — went through primary in it!

Lt. Robert G. Schipf, USNR(Ret.)
3100 Bancroft
Missoula, MT 59801

Ed's note: We appreciate the information. Any other candidates for world's most produced biplane?

Blue Blasters

The "deceased" pictured on the *Blue Blaster's* helmet (*NANews*, December 1981 cover) is not inappropriate. A skimmer type (1110), I have fished for a goodly number of Naval Aviators who did not have an equal number of takeoffs and landings. The lesson always relearned—helmets other than white are difficult to spot in daylight, and nigh impossible at night. The hue of *Blaster* blue is particularly fine camouflage.

Capt. C. G. Farnham
FCDSSA, San Diego
200 Catalina Blvd.
San Diego, CA 92147

Ed's note: We are told that the Blue Blaster insignia to which you make reference as well as the stars and a strip down the center of the helmet are done in white reflective material. Your point, however, is well made. Another reader points out (correctly) that OPNAVINST 3710.7K calls for light colored reflective tape covering 80 percent of the helmet. Grampaw Pettibone observes that helo drivers who have spent a lot of time in SAR operations tend to cover every inch of their helmets with reflective material. Could be they know something!

F-4 in Combat

I am writing a book for Janes Publishing Company to be entitled *The McDonnell Douglas F-4 in Combat*. I urgently need combat accounts, anecdotes and good photos. I would like to hear from Navy pilots, NFOs and ground personnel who were involved in the operation of these aircraft. All material will be carefully handled and returned. Please send to: Walter J. Boyne, Assistant Director, National Air and Space Museum, Smithsonian Institution, Washington, DC 20560, (202) 357-1745.

Omega

That was an excellent article on Omega in the January issue. I agree it is a phenomenal piece of navigation equipment. Why did Mr. Hertzberg leave the UC-12B off the NavAir list of Omega-equipped aircraft? About a third of the UC-12B inventory has the Marconi Omega system installed.

Capt. Bruce Miller, USN(Ret.)
1533 Longfellow Street
McLean, VA 22101

Ed's note: According to Mr. Hertzberg, his list was meant to be only a representative listing of Omega-equipped aircraft.

Reunions, Conferences, etc.

All former VXN-8 Blue Eagle/ World Traveller officers interested in attending the Eighth Annual World Traveller's Ball at the Ceder Point Officers' Club, NAS Patuxent River, Md., on April 30, 1982, write: LCdr. H. M. Stewart, VXN-8, NAS Patuxent River, MD 20670, or call (301) 863-4485.

U.S. Naval Test Pilot School 34th Annual Reunion and Symposium will be held May 1, 1982, at the Cedar Point Officers' Club, Patuxent River, Md. TPS alumni are requested to send their current mailing addresses to: LCdr. Thom Bernsen, Reunion Coordinator, U.S. Naval Test Pilot School, NATC, Patuxent River, MD 20670.

Carrier Air Group 17 (1943-45) reunion, May 6, 1982, Anaheim, Calif., in conjunction with the Association of Naval Aviation's meeting. For information, contact Cdr. James A. Chinn, 2558 Blaze Trail, Diamond Bar, CA 91765, (714) 598-1762.

squadron insignia

Helicopter Mine Countermeasures Squadron 14 was activated May 12, 1978, at NAS Norfolk, Va. Like its sister squadron, HM-16, it is an independent, self-contained, operational squadron tasked to provide rapid response mine countermeasures capability anywhere in the world. The 280-man squadron may be deployed aboard C-5A aircraft or by self-lift.

HM-14 is not limited to rapid deployment situations, however, and has worked effectively from both aircraft carriers and amphibious assault ships. In 1978, HM-14 participated in Exercise *Olives Noires* off Toulon, France, and Operation *Crazy Horse* near La Spezia, Italy. At home in May 1979, HM-14 employed self-lift capability and deployed all eight aircraft from their home port at NAS Norfolk to NAS North Island in San Diego, Calif.

In April 1980, the squadron was embarked aboard the carrier *Eisenhower* in the Indian Ocean in response to the Iranian hostage crisis. Elements of the squadron remained in the Indian Ocean until November 1980 when the main body rejoined the detachment and established the first airborne mine countermeasures capability in the Indian Ocean/Persian Gulf area.

In April 1981, after just three months at home, the squadron deployed to Europe for almost six months as the keystone element of the first integrated mine countermeasures task group, along with other surface and underwater units. The group scheduled mine countermeasures demonstrations in Belgium, Scotland, Spain, Greece, Turkey and Portugal during that period.

HM-14's skipper is Commander F. T. Massey.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