

NAVAL AVIATION

NEWS



MAY 1972

**60th Anniversary of
U.S. Marine Corps Aviation**



NAVAL AVIATION NEWS

FIFTY-FOURTH YEAR OF PUBLICATION

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R. G. Smith, Douglas Aircraft Company, came through in his usual fine style when we asked him to do a special painting for this issue. The aircraft, from top, are an E-1 (A-2), first Marine airplane; a DH-4B, the Marines' first bomber; and the A-4M, their latest bomber. The photos on the inside back cover and this one are the work of PH1 Martin Hershenson.

Marine Aviation

On this 60th anniversary of Marine Aviation, it is fitting that we pause, take stock of our past achievements and examine our plans for the future.

The past accomplishments of Marine Aviation stem from our unique mission of providing air support to the Marine air-ground team. This mission has placed a premium on readiness and mobility — readiness to deploy as an air component of naval task forces, as a land-based air arm of national policy and, most of all, readiness to support highly mobile Marine ground units.

To accomplish our mission, Marine Aviation has pioneered fundamental capabilities which have benefited all U.S. forces and contributed substantially to the defense of the U.S. The most notable of these pioneering ventures have been:

- **Close air support:** first employed in Nicaragua — further developed in WW II and refined to a precise science in Korea and Vietnam.

- **Mobile basing:** begun in the 1950's to ensure that tactical air would be capable of supporting Marine ground elements wherever they might deploy. Proved in Vietnam as Marines deployed tactical air long before conventional airfields could be prepared.

- **Vertical envelopment:** born in 1946 at Quantico. First combat troop lift during the Korean War proved validity of the concept. In Vietnam, the helicopter provided unprecedented mobility to Marine and Army units and changed the character of the battlefield dramatically.

- **Night and all-weather attack:** first explored in WW II. Refined in Korea with development of ground controlled radar bombing. In Vietnam the A-6A combined with the RABFAC beacon assured Marine ground units of all-weather support while the TPQ-10 system provided Marine tactical aircraft with an all-weather capability.

- **Automatic high capacity air control system:** the Marine tactical data system is the first deployable, computerized air command and control system in existence. Currently is being further refined as the tactical air command center and the direct air support center are automated.

- **V/STOL tactical air support:** the AV-8A, which has been in service for only one year, has already been subjected to a series of demanding tests. Each of these have served to reinforce our conviction that V/STOL provides a major improvement in our capability to provide responsive accurate air support to the Marine rifleman.

As proud as we are of these notable achievements of the past, we are not content. Our potential adversaries are continually improving their capabilities. Further advances in technology provide ever increasing challenges to develop new concepts and new systems for the needs of

tomorrow. Accordingly, we are actively investigating means of improving our capabilities. The most notable of these are:

- **Improved air defense:** We are pushing forward with our F-14 study in a major effort to obtain a new fighter to replace the aging F-4 to ensure air defense of the landing force. Additionally, an improved Hawk surface-to-air missile is under development.

- **Close air support:** We are pushing ahead in three major areas to improve our capability in this vital mission.

 - Continued procurement of the AV-8A to ensure support to each Marine division.

 - Development of an improved V/STOL light attack aircraft as a follow-on to the AV-8 and a possible replacement for the venerable A-4.

 - Improved weapons delivery. Laser, electro-optical, infrared and computer technology will be exploited to provide a major increase in weapons delivery accuracy while significantly reducing the problems of target identification. Some of the subsystems such as the *Bulldog* missile and the laser target designator system are in production. Further refinements such as night observation gunships and angle rate bombing systems are in advanced development and should appear in the FMF in the near future.

- **Assault support:** Two improvements are under way to improve our capabilities to continue this mission.

 - Larger numbers of AH-1J *SeaCobras* will be introduced for improved escort of assault helicopters.

 - A new program to develop an improved CH-53 capable of carrying 18 tons of cargo.

The major achievements of Marine Aviation stem from our total dedication to provide the best possible support to our customer, the Marine rifleman. The developments which have emerged over the years have made a positive contribution to national defense and have enhanced not only our own but other service capabilities. It is our intention to continue to dedicate ourselves to providing the best possible support wherever and whenever we may be asked to do so.

By so doing, we ensure that the Marine rifleman, upon whom victory ultimately depends, has at his disposal the best air support that can possibly be provided. We also ensure that the Marine air-ground team will continue to provide this country with a unique, deployable force-in-readiness of combined arms capable of countering crisis situations which threaten the vital interests of the United States.

Major General H. S. Hill
Deputy Chief of Staff (Air)
Headquarters, U.S. Marine Corps



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New Rates for Women

WASHINGTON, D.C.—The Chief of Naval Personnel has approved the opening of two more aviation ratings to women: aviation fire control technician (AQ) and aviation antisubmarine warfare technician (AX). School quotas for the ratings have been modified to include women. The opening of these ratings brings the total occupational fields in which women may serve to 24.

Foley is New Gray Eagle

SAN FRANCISCO, Calif.—Rear Admiral Francis C. Foley became the 22nd Gray Eagle on February 29 when Rear Admiral Alfred R. Matter, ComTwelve, retired from active duty. RAdm. Foley, Senior Member, United Nations Command Military Armistice Commission, Seoul, Korea, was in San Francisco to accept the Gray Eagle Trophy which is awarded to the Naval Aviator on active duty with the earliest date of designation.

EA-6B is Named Prowler

NAS NORTH ISLAND, Calif. — The Navy's newest electronic warfare aircraft, the four-place EA-6B, now has a name of its own — *Prowler*. Since being accepted by the fleet more than a year ago, it had been going by the same name as the two-place version of the same aircraft, the *A-6 Intruder*.

The *Prowler* carries a crew of four — pilot and three electronic countermeasures operators — in tandem cockpits with side-by-side seating. The *Intruder* has a single cockpit for its pilot



EA-6B *Intruder* is now the EA-6B *Prowler*.

and bombardier/navigator.

More important, though, are the differences in the missions of the two versions. While the basic *Intruder* is a medium attack bomber, the *Prowler* is designed to intercept, analyze, evaluate and jam enemy radar equipment.

Three VAQ's, 129, 131 and 132, are presently preparing for overseas deployments on Pacific and Atlantic Fleet carriers. Their first WestPac deployment is expected this summer.

Corps' Last CH-53D

STRATFORD, Conn. — During a brief ceremony at the Sikorsky Aircraft plant in January, the Marine Corps took delivery of the last CH-53D *Sea Stallion*. Among those attending the ceremony were representatives of the Marine Corps, Naval Air Systems Command, Chief of Naval Operations and operating units of Fleet Marine Force, Atlantic. Major General H. S. Hill, Deputy Chief of Staff (Air), USMC, headed the group.

The twin-turbine Sikorsky-built helicopter first flew on October 14, 1964, and was delivered to the Marine Corps in November 1966.

Later this year, the H-53 production line will be reactivated as production begins on the RH-53, a special configuration which will be used by the Navy in mine countermeasures operations. Initial deliveries of this aircraft will begin in October.



During three days of shipboard equipment tests at the Naval Air Test Facility, Lakehurst, N.J., an F-14 tested a new, larger jet blast deflector scheduled for installation aboard CVAN-68.

VS-41 Ends Bronco Replacement Training

SAN DIEGO, Calif. — Since May 1969, Air Antisubmarine Squadron 41, the S-2E replacement training squadron at NAS North Island, has been training OV-10A replacement pilots for Light Attack Squadron Four.

When the last OV-10 flight was made in February, VS-41 had counted 8,800 hours in the *Bronco*. In a little over two and a half years, with an average on-board count of four airplanes and five instructors, VS-41 trained 97 replacement pilots and 422 maintenance personnel. The syllabus was geared to give pilots deploying to Vietnam approximately 25 hours of ground training and 75 hours in the air during the 16-week course, so that in-country training was reduced to a minimum.

VAL-4's mission in Vietnam was to provide in-country, quick reaction, close support for river patrol boats and the mobile riverine forces, the *Brown Water Navy*. Known as the *Black Ponies*, VAL-4 was commended many times for saving ground units from being overrun by attacking enemy forces. The *Bronco's* maneuverability, slow speed characteristics and disruptive striking force of five-inch rockets and 20mm cannon with their low level delivery were primary reasons for the success of VAL-4's mission. The *Bronco* is capable of carrying up to 3,600 pounds of ordnance on seven external store stations. In addition, there are four internal 7.62-mm machine guns. The cargo compartment can accommodate more than 3,200 pounds of cargo, five paratroopers with full equipment, six combat-equipped infantrymen or two litter patients with a medical attendant.

Commander Don Florko, VS-41 operations officer, was a plank owner in VAL-4. Other OV-10 instructors on board who have completed a Vietnam tour are LCdr. Fred Lynch, and Lieutenants Mike Wolfe, Charlie Moore and Butch Underkoffler. Cdr. Florko and LCdr. Lynch were the pilots who flew the OV-10 on its last hop at VS-41 prior to transferring the airplanes back to their original owner, the Marine Corps. Cdr. Florko checked out the first VS-41 *Bronco* instructor pilot in December 1968 and also led VAL-4's first armed strike in combat.

LCdr. Lynch flew both the first

student training flight when the squadron received the airplane in 1969 and the last transfer check flight in 1972, with a tour in VAL-4 in between. He has logged over 1,400 hours in the OV-10 and is believed to have more time in the *Bronco* than any other Navy pilot.

VS-41 is commanded by Commander H. E. Helgeson, Jr.

More Good Deals

WASHINGTON, D.C.—New three-year enlistment programs have been announced by the Navy.

Two enlistment options, the Seafarer and Airman programs, are designed for the young man who desires to serve at sea without incurring the longer active duty commitment imposed by attendance at an advanced training school. The programs can guarantee duty with a seagoing unit such as a guided missile destroyer operating in the Pacific or an aircraft squadron on an aircraft carrier in the Mediterranean.

Under the seafarer program, young men will be guaranteed duty on board a ship operating from the coast of their choice. Rather than attend a Class A or an advanced training school after recruit training, men will receive on-the-job training in one of three apprenticeships: seaman (general shipboard duties), fireman (engineering assignments), or constructionman (Seabee or construction trade assignments).

A young man in the airman program is guaranteed assignment to an

aviation unit on the coast of his choice. Duty may be at a naval air installation, in an aircraft carrier or aircraft squadron.

Both the seafarer and airman programs are open to 17-year-olds who are high school graduates, or 18 to 31-year olds who hold a high school diploma or its equivalent. (Waivers may be granted to non-high school graduates who score high on entrance examinations.)

All enlistments will be at paygrade E-1, with a beginning salary of \$280.00 per month plus other military entitlements.

Men in the two programs who later desire to attend an advanced training school will be permitted to apply, provided they contract for the additional service obligation required.

The seafarer and airman programs are the minimum enlistments offered by the regular Navy. The normal enlistment with a guarantee of advanced schooling remains four years. Programs offering up to two years' advanced schooling in the electronics or nuclear propulsion fields carry a six-year obligation.

Additional information on the seafarer and airman programs is available from any Navy Recruiter.

Mufflers Contain Noise

ALAMEDA, Calif. — Noise from jet engines being tested at the Naval Air Rework Facility has been virtually eliminated as the result of a recent major breakthrough achieved by rework facility personnel.

After more than a year of research and testing, mufflers have been per-



Muffler for A-3's perfected by the rework facility at Alameda stops 85 percent of jet roar.

ected which reduce by approximately 85 percent all noise from the ground run-ups of A-3 jet engines being tested after overhaul. Now barely audible at the perimeter of the air station, the test noise should cease to be an irritant to the East Bay civilian communities.

The A-3 mufflers, which are air coupled to the aircraft's tailpipes during ground turn-ups, are 8,000-pound, 14-foot stainless steel units which use an internal diffusion system to reduce the noise created when high velocity gasses pass into the air.

The project began when six B-52 mufflers were obtained by the rework facility's engineers as excess property from the Air Force. Two mufflers have been placed in use. The other four are undergoing further modifications.

The mufflers are a result of a continuing effort by the air station complex to improve the environment of Alameda and other East Bay cities by eliminating or reducing jet engine noise and air and water pollution. A similar noise problem for the A-7 was solved by NARF last year. Noise suppressors for the A-7 eliminated 90 percent of that ground run-up noise.

Return Bout Won

CHERRY POINT, N.C.—Climbing out of a C-117, the Marine lieutenant colonel grinned and waved his hand. "You would have been proud of the landing I made," said Lt. Col. Robert E. White. To this 22-year Marine veteran, the local flight was another goal achieved.

Since last June, when a carpenter struck a nail a glancing blow and it embedded in his right eye, Lt. Col. White has been blind in that eye. Doctors had told him that he would not regain his sight in that eye and would not be able to fly again. To a man whose adult life has been devoted to flying, the future looked bleak. But White is a determined man who has overcome handicaps before.

In 1968, as copilot of a KC-130F approaching Khe Sanh, his aircraft was struck by enemy groundfire as it neared the runway. "We were coming in downwind carrying six 500-gallon bladders of aviation gasoline in the back end," he recalls the painful experience. "We were about 1,200 feet above the base, turning on final approach, when an enemy .50 caliber



In March, this 60-ton combat Army tank came to NATC Patuxent River for three and a half weeks of electromagnetic interference evaluation. Army engineers and technicians tested the M60-A1 in the shielded hangar at the test center's Weapons Systems Test Division.

bullet struck one of the bladders. None of the crew was hit by the bullets fired at us, but the ruptured bladder burst into flame." Only the pilot and Lt. Col. White survived the holocaust. Seven Marines in the aircraft died.

With burns over 37 percent of his body, White was evacuated to the burn center in Yokohama, Japan, and then to Hawaii. Four months later he returned to his unit and to flying.

Today, after successfully passing his flight physical and with his vision improving, Lt. Col. White is restricted to administrative flights as a copilot. "But at least it gets me in the air again and that is the important thing," concludes White.

New Marine Aviation Association is Formed

WASHINGTON, D.C.—A new Marine Corps association has been formed with membership open to all present and former Marines who have served honorably at any time with Marine Corps Aviation.

The Marine Corps Aviation Association (MCAA) was organized in October 1971, an outgrowth of the First Marine Aviation Force Veterans Association (FMAFVA) whose membership was restricted to Marines who had served in Marine Corps Aviation prior to November 30, 1918.

FMAFVA membership dwindled to less than 200 as the years passed and continuation of the group was threatened. The new association was formed to perpetuate the older group and carry on its fraternal spirit of com-

radeship, while fostering and encouraging professional excellence and recognizing noteworthy achievements in Marine Corps Aviation.

While regular members of the FMAFVA are the only charter members of the new group, MCAA is open to Marine Corps Aviation veterans and members of other services who served with Marine air units. The association is open to all ranks and all job specialties including maintenance crews, air controllers, flight crews, logistic and administrative personnel.

The address of the national headquarters is: MCAA, P.O. Box 1912, NAS Glenview, Ill. 60026.

A Helicopter First

WASHINGTON, D.C.—The first fully automatic landings by a manned helicopter at a predetermined spot were made in February by a team of NASA research engineers and pilots.

The accomplishment is considered a milestone in a continuing research program aimed at permitting helicopters and future VTOL aircraft to fly routine missions under poor visibility conditions.

The experiments were conducted at NASA's Wallops Station, Va., using a CH-46 furnished and equipped by the Army.

The landing approaches were fully automatic from a point two to three miles from the intended landing spot, and all landings were made within a few feet of each other. The automatic system was engaged in level flight at 60 mph and 800 feet above the ground.

When the research helicopter intercepted the landing guidance path, the system automatically locked on to start the landing approach. At a predetermined range from the touchdown point, the helicopter began automatic deceleration to zero ground speed, coming to a hover 50 feet over the landing spot. It then descended vertically to a touchdown.

Guidance for the approaches and landings was provided by a ground-based GSN-5 tracking radar linked by telemetry to on-board equipment in the CH-46. An analog computer in the helicopter and a special inertial signal-smoothing device provided control signals to a four-axis electrical input servo control system.



GRAMPAW PETTIBONE

Cleared to Land

Following briefing, two lieutenants and two petty officer aircrewmembers — an SH-3D crew — assembled on the flight deck of the attack carrier to preflight their *Sea King*. They were to deliver four passengers to one of the other ships in the force and then make a parcel pickup on still another ship.

On the way to deliver the passengers, the crew spotted the ship on which it was to make the parcel pickup and decided to stop there first. Unable to establish radio contact with the ship, the crew signaled its intent to land by opening and closing the cargo door and pointing to the hoist. The ship understood the signal and began lowering antennas and clearing the deck.

The helicopter made one gear-up pass to look at the deck and, on the second approach, the landing checklist was followed, gear was down and the helicopter came in for a landing. The landing signal enlisted (LSE) signaled "go-around" as the ship was not yet ready for the landing. The helicopter discontinued the approach, raised the gear and came around again.

The pilot and copilot began going through the landing checklist again. As they turned on final at about 80 feet and ¼ mile, heavy white smoke came from the ship's stack, obscuring the pilot's view. As a result, the pilot and copilot discontinued the checklist and concentrated on making a proper final approach through the smoke. The helicopter flew through the heavy smoke for about 10-15 seconds, coming out about 30 feet above and just to the rear of the ship. The interrupted checklist was never completed and the landing gear was never lowered.

Because of the small landing area, one aircrewman was looking out the cargo door to check for rear wheel clearance. The other aircrewman was checking to ensure that the passengers were in their seats and strapped in. Neither aircrewman checked the gear position.

The pilot brought the helicopter to



a hover over the landing area and the LSE gave three distinct signals: come forward, hover and land. The pilot lowered the helicopter but felt the plane was too low to not have touched the deck. As he pulled up the collective, the ship pitched and a collision occurred. Both pilot and copilot felt the impact but both were of the opinion that the damage, if any, was slight. The plane came around, again, and, this time, after going completely through the checklist—with the wheels down—made a normal landing.

One aircrewman checked the damage and reported a broken rotating beacon and a bent UHF/ADF antenna. No structural damage was visible. Because of the apparent minimal damage, the parcel pickup was made and the rest of the mission completed.



Grampaw Pettibone says:

Holy Hannah! If I've said it once, I've said it a thousand times, anytime you have a break in habit pattern, double check everything. How in the world can a man be

a landing signal director and not notice the wheels up?! I think it's time to check this ship's training program for qualifying LSE's — if one exists! I might say the same thing for the crew members on the helo. Of course, the man in the cockpit is the most responsible, but he sure didn't get any help from his crew or the ship. With the LAMPS program near upon us, it's time for us all to take a mighty close look at our operating and training procedures—ships and squadrons!

One final word, anytime you have a distraction, particularly during landing phase, let a switch in the brain say **double check everything.**

All Claws—No Brains

Student training was secured shortly after morning quarters because of poor weather. Four of the formation instructor pilots made a verbal request to the training office to do some local proficiency flying, "to practice approaches and landings." The request was approved, and the four were assigned two T-28B *Trojans*. Aircraft 201 was manned by a lieutenant junior grade in the cockpit and a lieutenant in the rear seat; aircraft 202 was identically manned. They filed a local area VFR flight plan by telephone. The lieutenant in 202 was designated pilot-in-command. The flight was briefed to include tail chase formation followed by breakup and individual practice of landings and approaches.

Preflight, start, taxi, turn-up and takeoff were uneventful. At altitude, both aircraft began a series of tail chase maneuvers and the lieutenant junior grade in 201 demonstrated high/low air combat maneuvers (ACM's). During this initial portion of the flight, the T-28's were controlled primarily by the JG's in the front seats.

The aircraft climbed, in formation, back to approximately 9,500 where the second series of tail chase tracking maneuvers were performed down to approximately 4,000 feet. Investigation indicates that now the rear cockpit pilots were at the controls. During this second series of yo-yo's (ACM's),

202 changed lead, making 201 the lead aircraft. Both aircraft then climbed to approximately 7,000 feet from where a third series of ACM's were performed.

It is believed the lieutenant in the rear seat was at the controls of 201 during the third series and that the other lieutenant was at the controls of 202. At or near 3,000 feet, 202 maneuvered to a position of about 500 feet above and 1,000 feet behind 201 and maintained a wings-level position for approximately one minute. The pilots of aircraft 202 then observed 201 make what appeared to be two or three shallow angle-of-bank turns of about five degrees heading change, roll to about 45 degrees angle of bank, 20 to 30 degrees nose down, and then accelerate.

Aircraft 202 started to follow 201 but turned left when 201 appeared to dive below the clouds. *Trojan* 202 commenced a climb, leveled off at 9,500 feet, and then attempted visual and radio contact with 201—with negative results. After about ten min-

utes, 202 descended below the cloud layer and searched for its playmate in the approximate area where it was last seen. Two zero two then proceeded to a nearby airport, hoping to find 201.

The pilots of 202 attempted radio contact on tactical frequencies and guard channel. Aircraft 202 contacted the tower to see whether 201 had checked in; the tower reported that it had no contact with 201 and instructed 202 to remain on tower frequency. Then 202 headed back to the original area to search for the missing T-28. Following the search, 202 climbed above the clouds and headed toward home field to land after the tower had asked about its expected landing time.

Ground witnesses reported seeing an aircraft (201) in a steep diving turn coming through the cloud layer, heading approximately south, followed by an attempted pullout. During the pullout and prior to the impact, all airfoil parts, with the exception of the lower half of the vertical stabilizer, separated from the aircraft. And both pilots suffered fatal injuries.



Grampaw Pettibone says:

Jumpin' Jehoshaphat! Pass me another aspirin. I get so dad-blasted mad when I read about needless loss of lives and flying machines. There's a very fine line between aggressiveness and sheer stupidity—these gents didn't know the difference. Can you imagin' a coupla young buck JG's who have never had a fleet tour showin' a couple of lieutenants with fleet tours (even though they were not in the fighter/attack community) how to do air combat maneuvering and, most of all, these lieutenants "standin' for it?" One of these young fellas had a so-called "pure jet" attitude or thought that jet pilots were "tiger aviators." I must agree that the majority of Naval Aviators are "tigers" but they are *professional tigers*. These gents were tiger aviators all right—all claws and no brains. The rules violated, let alone the lack of common sense indicated, are too numerous to list.

I'd like to leave one thought with you young fellas who may be inclined towards a little unscheduled and unbrieffed hasslin'—DON'T.



HARRIER PILOTS . . .

By Lt. Larry C. Wahl, USN

Marine Aviation has one of the latest concepts in weapons delivery systems — the Hawker-Siddeley AV-8A *Harrier*. The addition of the AV-8A to the Marine Corps inventory may well be the most radical departure from conventional aviation since the helicopter was first tactically employed by the Corps.

The *Harrier* introduced a new means of close air support and quick response to the needs of ground troops. After more than a year of operational evaluation of the new aircraft, it is apparent that the AV-8A has exceeded the initial expectations.

Although still in its infancy, vectored thrust combined with vertical

takeoff and landing has been under development for more than 15 years. Design and engineering studies date back to 1954. The first fixed-wing vertical maneuvers were made in October 1958 at Dunsold, England, in the prototype P.1127.

In the past 12 years, engine thrust has expanded from 11,000 pounds of static thrust to the 21,500 pounds now produced by the *Pegasus 11* engine installed in the AV-8A's flown by VMA-513 at MCAS Beaufort, S.C. Airframe design development progressed through the tripartite *Kestrel* to the *Harrier*.

In January 1971, the United States accepted its first AV-8A and began

extensive Board of Inspection and Survey trials at NATC Patuxent River, Md. Three months later, VMA-513 received its first AV-8A and a vigorous training program began. Under the tutelage of five experienced *Harrier* pilots, including a USAF pilot and an RAF exchange pilot, 11 pilots began to appreciate the unique demands of V/STOL flying.

In October 1971, with the original 16 pilots thoroughly at home in the aircraft, an intensive air-to-ground bombing program was initiated at NWC China Lake, Calif. In a test of the aircraft's availability in a close air support role, numerous sorties using both live and inert ordnance were flown. In seven hours and twelve minutes, six AV-8A's flew 37 bombing sorties, demonstrating the *Harrier's* quick turnaround and response time, and bearing out the claim that the aircraft is ideally suited for Marine close air support.

Preliminary evaluation of remote site operations was completed in January at MCALF Bogue Field during Exercise *Blue Ax*.

While the Navy presently has no V/STOL aircraft, the AV-8A is being used aboard USS *Guam* (LPH-9) during the Sea Control Ship concept evaluation. AV-8A flight operations aboard *Guam* began in January with initial carrier qualification of VMA-513 pilots. The *Harrier* has adapted well to the small deck which has no catapult or arresting gear. Equally noticeable is the lack of bolters and wave-offs. Continuing test programs include evaluation of cross deck landings and air and surface intercept capabilities. Initial indications show that the aircraft is quite compatible with



A lonely country road serves as a landing strip for *Harrier*, left. Pilot leaves his AV-8A after landing aboard *Guam* (LPH-9), opposite.



helicopter antisubmarine warfare and escort operations.

Versatile Warrior, the Marine command and control exercise held at Bogue Field in March, reaffirmed the versatility of the AV-8A and provided VMA-513 pilots with valuable training as they flew numerous sorties off country roads and 72' by 72' landing zones tucked away in the forests of North Carolina.

VMA-513 has also been conducting a continuing air-to-ground weapons delivery program. The AV-8A is compatible with most U.S. externally carried weapons including the MK-80 series bombs, rockets, cluster bombs and the *Sidewinder*. In addition, it is fitted with the 30mm Aden gun which is ideal for use in both air-to-ground and air-to-air roles.

The use of vectored thrust in an air combat maneuvering environment has yet to be fully explored, but preliminary flights indicate that the AV-8A has tremendous potential in this field. Vectored thrust is proving to be particularly useful in offensive close-in maneuvering when coupled with the aircraft's high acceleration and small, camouflaged profile.

While squadron commitments continue, time still remains to train new pilots. Three more were added last November. In February, seven additional pilots flew to England for initial familiarization flights in the British version.

Learning to fly the AV-8A is perhaps the most challenging and demanding aspect of present day Naval Aviation. Even before setting foot in the aircraft, a complete new glossary of aviation terms and abbreviations must be committed to memory. Thrust vectoring is notably the most unique characteristic of the aircraft. It enables the pilot to select from zero to 98½ degrees deflection of thrust downward from the horizontal de-

HARRIER PILOTS...

pending on the maneuver to be performed. Equally unique are the reaction control valves which open or close valves on the wing tips, nose and tail to provide control during jetborne flights. These same controls are mechanically linked to the normal aerodynamic controls and become functional during both jetborne and semi-jetborne flight.

The AV-8A is equipped with an inertial navigation and attack system and head up display (HUD). HUD provides the pilot primary instrument references coupled with navigation and weapons release information. Also integrated into the inertial system is a moving map display which constantly allows the pilot to monitor his position via one of two scales of micro-film maps.

The *Harrier* has a self-contained auxiliary power unit, a boon to remote site operations, shipboard starting and quick turnarounds at outlying fields.

Once ground school is completed, the real fun begins. Because of the centerline braking, outrigger wheels and the tremendous thrust available, the first ride consists of three acceleration runs. Power nozzle braking, which is similar to reverse thrust braking, is practiced.

The first takeoff in the *Harrier* is comparable only to a first catapult shot—engine acceleration from 55 percent to full power averages two to three seconds. After 1,600-1,800 feet of roll, the aircraft is airborne at 160 knots with a speed in excess of 450 knots at the end of a 12,000-foot runway. Once airborne, the AV-8A is strictly conventional except that its flight controls are more responsive than those of other aircraft. Although stick pressures are exceedingly light, when moved even slightly, the aircraft responds emphatically.

The conventional landing is quite possibly the most harrowing and shunned maneuver to be performed. For a carrier pilot to use a long, flat and shallow approach path is almost heretical but in the AV-8A it is abso-

lutely necessary for a safe conventional landing. Touchdown is on all five wheels at 160 knots but, with powered nozzle braking followed by anti-skid braking, a full stop is easily effected in less than 6,000 feet.

Under the present training syllabus, the third and fourth sorties are hover flights. The power and strength of the *Pegasus* engine is readily felt as the pilot drops the nozzles to the hover stop and adds full power. With a rumble and a slight hesitation, the aircraft is shortly airborne and the pilot finds himself flying a typical fixed-wing jet—but going nowhere. For any one who has hovered helicopters, it is readily apparent how responsive the

reaction controls are and how stable the aircraft is in a hover. With no copilot, the pilot finds himself quickly adapting to visual cues while maintaining a solid hover and performing spot turns.

While learning to fly the AV-8A, every pilot is made aware of the possibility of "random trim changes." As every aircraft has its quirks, so, too, does this one, and the pilot learns to expect the unexpected during jetborne and semi-jetborne flight. On occasion, and for no explainable reason, a wing will drop, or the nose may tuck or pitch up forcing the pilot to "bang the stops" to maintain control. This is but one reason why constant attention is vital and makes flying this aircraft an exciting venture.

Landing from a hover is a simple proposition once the inclination to



Harrier hovers over troops in the field in preparation for a vertical landing, right.

flare is overcome. A slight reduction of power and the plane settles reasonably gracefully to the deck.

Acceleration from a hover to wingborne flight is accomplished by gently easing the thrust nozzles to the full aft position while gaining flying speed. Conversely, when decelerating from wingborne to jetborne flight, the nozzles are rotated to the hover stop some 2,000-3,000 feet short of the intended hover point. Just prior to reaching a hover, a gentle flare—to halt forward motion—is executed.

By now, having mastered the extremes of the landing and takeoff envelope, the pilot is ready to learn a nearly endless number of takeoff and landing techniques. Since the AV-8A is capable of operating under varied climatic, ground, field and weight conditions, the pilot has the option of selecting one or more methods for taking off and landing, in addition to the vertical.

The rolling vertical takeoff (RVTO) and rolling vertical landing (RVL)

are particularly valuable when rocks, loose dirt and other debris that could be ingested into the engine are present. Water poses an unusual problem during vertical takeoff or vertical landings because visibility is obscured during liftoff and touchdown. These problems are alleviated by using RVTO's and RVL's, both done at speeds somewhat in excess of 45-50 knots.

Short takeoff (STO) and slow landings (SL) provide the fourth basic set of liftoff and touchdown techniques. Whether ashore or afloat, STO's provide the greatest flexibility when considering the runway available and gross weight. Takeoff speed and nozzle rotation angle which is based on temperature, pressure and gross weight are computed prior to takeoff. The speed and runway required may be as low as 65 knots and 600 feet up to 120 knots and 1,400 feet. SL's are performed by maintaining a nominal eight units angle of attack until just prior to touchdown with the nozzles rotated to 70 degrees down, followed

by setting the power to gain efficient use of thrust available combined with maximum wing lift for the landing speed desired. Thereafter, the flight path and angle of attack are maintained by the nozzle angle prior to touchdown. This technique results in an extremely short landing rollout when coupled with power nozzle braking.

Every takeoff (except conventional), landing and transition is flown with the aircraft in the same attitude—just as it sits on the flight line.

It would be impossible to find a *Harrier* pilot who would not concede that the AV-8A is the most challenging and rewarding aircraft he has flown. Flying the *Harrier* for an hour can be likened to flying any other aircraft for two hours because of the concentration required.

The role of the AV-8A and its successors in close air support, air combat maneuvering and integral utilization aboard the proposed Sea Control Ship reaches as far as the imagination.

and PLANE CAPTAINS

By Cpl. P. T. Jarrell

Corporals R. L. Stambough and J. W. Piercey, and LCpl. C. R. Swatosh all have one thing in common—each man's name is stenciled on the fuselage of an AV-8A *Harrier*.

Why have these individuals been singled out for such an honor? Could it be that they are hydraulicians, ordnancemen or electricians? No! They are plane captains, members of four to six-man teams who run the flight line and maintain aircraft.

The training these men receive begins with a 12-week course on the basics of jet engines at NATTC Memphis, Tenn. Those persons selected to work with the AV-8A are then sent to MAG-32 in Beaufort, S.C., for additional training. There, they receive an extensive four-week course on airframes and the *Harrier's* engine before being sent to VMA-513.

But even after many weeks of



and PLANE CAPTAINS

schooling, a man is far from being a plane captain. He is first classified as "category A personnel," which is just another term for trainee, and is kept under strict supervision until he becomes proficient at his job. At such time, usually six months later, the individual is eligible to take the plane captain's test, administered by SSgt. R. H. Madsen, VMA-513's flight line noncommissioned officer in charge (NCOIC).

There are only two grades given: 100 and failing.

The successful trainee next faces the squadron's plane captain's board which consists of various pilots, the quality assurance NCOIC and, of course, the ever present flight line NCOIC. Safety is emphasized in each question put to the prospective plane captain. The pilots on the board take a very personal interest in safety—their lives may ultimately rest on the competence of the plane captain.

The life of the plane captain often depends on that same competence. The AV-8A is a unique aircraft with very special dangers. Its presence on the flight line in itself is foreboding, not to mention the many knocks on the head that come from working on its low profile. But the huge air in-

takes which lead to the Rolls-Royce engine are the main concern. While the engine is running, the recommended distance is 45 feet away from its intakes. These are the reasons why the board is very careful about awarding plane captain status to an individual.

When most people think of aviation, they think of bombing raids, reconnaissance runs, photography over enemy lines, or the thrill of flying at Mach 1+. Certainly as important, though not as glamorous, is the maintenance side of aviation. The professionalism at this level determines if the plane is safe.

This is where the flight line and plane captains come into the picture. Some people think of their work as just washing aircraft, cleaning canopies and servicing the plane. But it goes beyond that—way beyond, to the safety of a \$2.5 million aircraft and the life of its pilot. That is a lot of responsibility for a plane captain.

The flight line of VMA-513 has four different crews on three different shifts. The early crew's day often begins at 5 a.m., or earlier, depending on the day's flight schedule. When the crew first arrives at the hangar in the morning, the leader assigns a certain

aircraft to a plane captain for pre-flight inspection. The plane captains ensure that the night crews have completed their daily inspections and that all shops have signed off the gripes from yesterday's flights.

The daily inspection consists of detailed servicing, tire checks and inspection of the aircraft. When the early crew arrives, it's up to it to unsecure the aircraft and start preflights. Plane captains have almost 90 individual items to check before the first flight. When they have completed their preflights and have made certain that the AV-8A's are ready for takeoff, they sign the flight record sheet.

These flight record sheets mean everything in flight operations. The plane captain who signs the flight sheet has committed himself on the safety of the aircraft. If the aircraft happens to crash or becomes involved in an accident, the first thing anyone looks at is that flight record sheet—and there in plain view is the plane captain's signature. So you know how carefully he goes over every inch of that *Harrier* before signing.

Knowing this, pilots seeing the plane captain's signature can confidently begin the mission.

It is the first flight of the day. Pilot and plane captain go out to the AV-8A together to start another preflight inspection which basically consists of a quick check of the fuselage. After the plane captain helps the pilot strap





into the cockpit, it is start time. The plane captain is always on the alert for safety hazards. He is directly responsible for the area around his aircraft.

In the true sense of the word, the plane captain is the eyes of the pilot once the pilot has been strapped into the cockpit, for the pilot's vision is then restricted. Any emergency outside his vision must be detected by and acted upon immediately by the plane captain.

Contrary to popular belief, the plane captain is not just a glorified service station attendant or gas jockey. He must have a working knowledge of every system on the *Harrier* in case of an emergency.

Once the huge Rolls-Royce engine has started, the plane captain communicates with the pilot by hand signals, but his eyes are always roving over the aircraft.

After the plane has taxied out, there is little pause. His day is just starting; someone else is waiting for his services. The first launch has gone out, yet the plane captain is still on the move, squaring away the flight line area, servicing flight line gear such as nitrogen bottles, oil bowsers and tires. When the time comes for his

aircraft to return, he and his assistants go to the fuel pits. This is where the turnaround inspections are held and the aircraft is refueled.

The plane captain taxis his *Harrier* into the pits. After the pilot shuts off the engine, the plane captain is there to assist him from the cockpit. While the assistants fuel and take readings, the plane captain is inspecting. After refueling has been accomplished, the plane is towed to the line, either to have maintenance done or to wait for

another pilot. If maintenance is required, after it is completed there has to be another inspection to make sure the aircraft is ready for flight.

The plane captain is in charge of the aircraft most of the day and really gets to know it. He can almost tell if something is wrong, with just a look.

During the day, an emergency may come up such as a tire blowout or a fire, but the plane captain is on the spot or the first to get there. For example, suppose a tire blows on the runway. The tower calls the flight line to tell the crew the situation—perhaps that there are other aircraft coming in on the runway and they would like the crew to hurry.

As always, the flight line is in a rush. While the aircraft is down on the runway, the AV-8A plane captains still have other flights to send out and receive.

This is how the VMA-513 flight line operates—work goes on in many different places at the same time. Because of the heavy flight requirements and a limited number of aircraft, sometimes there is no time to eat, and seldom is there an hour off for dinner. But most plane captains do not think of the flight schedule as work, but rather as another chance for accomplishment.

They know their squadron has a mission to perform and they have an important part in getting it done.



AV-8A's rest in fuel pit, opposite. Plane captain calls the flight line, top. Inspecting the horizontal stabilizer takes finesse, right.

By 1st Lt. John M. Shotwell, USMCR



"Shamrock 211, Phantom, ball, state four point one." "Roger, ball."

You've never seen an aircraft carrier until today and now you're in the groove, lining up to land 18 tons of F-4J. As you see the meatball drop slightly, you hear your RIO in the rear cockpit call "Power" and you add the necessary airspeed to intercept the glide path. You touch down and your body, which had been traveling at 150 knots, comes to a sudden, lurching halt. You shove your throttles to 100 percent and, feeling solid resistance, cut them back to idle. As you taxi across the foul line your RIO congratulates you—your first trap was a three wire. Then you remember to breathe again.

at Sea with VMFA-



Marines are no strangers to naval vessels in general and aircraft carriers in particular. Marine aircraft operated from carriers during WW II and the Korean War, but until Marine Fighter Attack Squadron 333 deployed aboard USS *America* last year as part of CVW-8, no Marine F-4J squadron had ever undertaken a carrier cruise. The deployment is part of the first stage of an expanding program to incorporate Marine fighter squadrons into carrier aviation. The squadron stabilized with 17 aircrews. (Four USAF-trained pilots and 15 RIO's had never seen a carrier deck.) After a successful day-carrier-qualification period aboard *Independence*, and day/night quals on *America*, VMFA-333 embarked with CVW-8 on a series of shakedown cruises, in-

cluding an operational readiness exercise in the Caribbean. With each mini-cruise the aircrews became more proficient, more keen-eyed and alert, but far from complacent.

What goes into making a successful deployment? How does a squadron of landlubbing Marines distinguish itself in a boatload of cruise-hardened sailors? They made blunders, to be sure. There were giant gaps in knowledge about carrier ops that no amount of *esprit de corps* could fill. Naturally, there was a little bit of apprehension on the part of all when they embarked in early July to transatlant. As squadron members approached Pier 12 at NS Norfolk, *America* loomed high above, gray, bulky and oppressive. An aircraft carrier's form strictly follows its function — it is a floating runway, an airport balanced on a giant metal hull. Sponsons and ramps jut from its sides like gargoyles on an old castle.

America's anchors were barely afloat when VMFA-333 plunged into the business of flying and engaged in cyclic ops almost every day while crossing the Atlantic. There were several reasons for this. For one thing, some of the pilots had not flown from the carrier in several weeks. For another, if aircraft are allowed to sit for any length of time, little gremlins have a way of sneaking inside and causing all sorts of problems that didn't exist the last time the plane was flown. Another reason for a heavy flying schedule, especially as the ship moved farther eastward, was a possible overflight by Soviet reconnaissance planes. (These overflights present a constant readiness test for our attack carriers.) If the ship is able to launch fighters to intercept and escort the opposing aircraft before they reach the task force, then it is a safe assumption that, should actual combat occur, the fighter aircraft would be able to effectively defend the fleet. While at sea, aircrews were maintained in an alert status, standing by in their aircraft or ready room, capable of launching the aircraft in a matter of minutes against any imminent threat.

After about three weeks at sea, *America* dropped anchor in the harbor of Naples, the first liberty port, and most of the water-weary Marines of

VMFA-333 enjoyed their first taste of European liberty — for many, their first encounter with Old World culture. Naples has no pier large enough to accommodate an aircraft carrier, so the nearly 5,000 officers and men of *America* commuted via liberty boat. This is an inconvenient, albeit necessary, fact of carrier life in the Med, especially bothersome when some of the liberty boats break down, or the weather deteriorates, as it did in Barcelona later in the cruise.

During the cruise, *America* visited a variety of colorful ports — Athens, Cannes, Palma de Majorca and Rhodes, to name a few. But the liberty was well-deserved, since long hours were the norm and around-the-clock operations not uncommon while at sea. Most at-sea periods involved the squadron in one or more exercises. Some of these, such as Operation *Deep Furrow*, were large scale, involving forces from other countries. Others were small, concentrated mainly within the fleet forces. Each involved a hypothetical enemy (the sinister Orange Force) and followed a scenario which occasionally culminated in an amphibious landing utilizing other Marine units in the Med.

To get an idea of the type of mission normally flown by a *Phantom* crew in one of these exercises, put yourself in the rear cockpit of an F-4J and imagine you are a radar intercept officer. Yours is one of the most highly specialized jobs in military aviation. It has taken nearly two years of intense training to hone you for this particular mission and an entire sophisticated weapons system costing several million dollars depends on your skill.

One hour and 45 minutes prior to takeoff, you and your pilot and the crew of the aircraft scheduled to fly your wing begin briefing. The initial brief is in the ship's integrated operational intelligence center (IOIC) where you are given an updated weather report and current intelligence information. Your assigned mission is a combat air patrol; you are assigned a specific station from which to protect the task force from incoming raids. Later in the cruise, this data is relayed to the ready rooms via closed circuit television.

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Meanwhile the maintenance crews on the flight and hangar decks are preparing the F-4's for flight, giving them fuel and oxygen and making minor last minute repairs. After the IOIC brief, you are given further pertinent instruction from your flight leader on the finer points of mission conduct. At approximately the same time, the earlier flights have just launched, and flight deck personnel are busily re-spotting your airplanes to their start positions, loading them with ordnance and giving them a thorough preflight.

The call to man aircraft comes exactly 30 minutes before launch, and you and your pilot proceed topside. As you walk across the flight deck carrying your camera, tape recorder, encoder/decoder packet, helmet and nav bag, you feel like a cross between James Bond and a Bolivian beast of burden. Once you have given your bird a careful preflight, your plane captain straps you in and you prepare for one of the highest adventures within the realm of human experience—the cat shot. In order to reach minimum takeoff speed, the F-4 must be literally shot off the bow of the ship using a steam operated catapult which propels the plane from a standing start to 175 miles an hour in less than three seconds. Slowly, precisely, the yellow-shirted handler guides you over the shuttle and into place on the catapult.

When the catapult officer gives your pilot the signal for afterburner, you feel the cockpit shudder from the sheer force of two giant fingers of flame at your back. The cat officer exchanges salutes with the pilot, touches the deck, points toward the bow and, suddenly, everything outside becomes a blur. The experience defies description. Take all the thrills, fright and exhilaration of the world's largest roller coaster, multiply it by 50, and compress that emotion into a three-second explosion of sound and speed, and you might approach a weak comparison of the cat shot.

Once launched, your flight proceeds to the assigned CAP station where you are under control of either a ship-based or airborne radar. The radars act as an early warning system, detecting possible threats. After you have been on station about ten minutes, your controller vectors you toward an unknown bogey. You immediately turn on the portable cassette player which is wired into the

radio and intercom system in order to record events as they occur within the mission, as well as document any communication jamming the bogey may attempt. You also activate your passive electronic countermeasures equipment in an attempt to detect the types of radiation emitted from the bogey's own electronic gear. As you close into the range of your own radar, you acquire the target that you suspect to be yours, inform your controller and reply "Judy," meaning that you are taking complete control of the intercept. Interpreting the data on your radarscope, you give your pilot the necessary heading, speed and altitude changes necessary to bring your aircraft within visual range of the other aircraft. The pilot spots your target and identifies it as a *Badger*, a Soviet-built medium bomber. You move in as close as the rules of engagement allow and use your 35mm camera to obtain as much information as possible concerning antennas, radomes, camera ports, missile pylons or any other significant characteristics. You confirm its markings as Egyptian.

After the intercept is discontinued, your pilot decides to refuel, and you ask your controller for vectors to the inflight tanker. The *Phantom*, with its two powerful J-79 engines, is a thirsty animal. In order to employ its maximum envelopes of airspeed and maneuverability, extra fuel is needed to complete the normal one-and-one-half-hour cycle. Aircraft on *America* equipped for inflight refueling were the A-3 *Skywarrior*, A-6 *Intruder* and A-7 *Corsair*. While the F-4 can be adapted for tanking, it is rather like hiring an alcoholic as a bartender.

As your cycle time begins to run out, you check out with your controller and head back to the ship. Flight physiologists tell us that pilots undergo more physical and mental tensions while landing aboard a carrier than when actually conducting combat missions in a hostile environment. Even *America*, with one of the largest flight decks in the world, looks like a cork bobbing in a bathtub.

To land 18 tons of flying machine on a moving, pitching deck requires extensive training, superior skill and technique and just plain guts. For instance, during night and foul weather landings, each aircraft is assigned a specific spot in the sky and a specific time to leave it and commence the

approach. If your pilot makes a mistake and begins his approach just a mile or a few seconds off, the entire landing pattern is thrown awry, and the controllers in the carrier air traffic control center are forced to juggle airplanes like apples to adjust for the error. These approaches are radar controlled until the final three-quarter mile. From there the pilot makes the landing visually by means of a complex lens or a mirror system, recognized by the meatball. By centering the meatball, the pilot can make the correct altitude and heading adjustments to touch down at the proper spot on the deck so the hook engages the arresting gear wire and brings the *Phantom* to an abrupt, but very reassuring, halt.

As soon as you step out of your *Phantom*, you are met by a team of maintenance troubleshooters who are anxious to know how the aircraft and all its systems performed during the flight. This is how they determine whether or not they can put it on the up line for the next event. If it is "hard down," flight deck control whisks it below to the hangar deck on one of *America's* four elevators. You then return to IOIC where you turn in your cassettes and film and thoroughly debrief the intelligence officers on your intercepts.

The flight described above is similar to the thousand or so VMFA-333 flew aboard *America* during the cruise, all accident free, by the way. This "typical" hop is far more than a two-man job. Maintenance and flight deck crews alike had to work long, back-breaking hours during flight operations, and the pace never slackened until the last aircraft was safe in the chocks. From the man who changes the tires to the man who pulls the throttles, a highly complex machine, the Marine fighter squadron, is the sum of its many parts, all interdependent, each vital.

In the words of Captain T. B. Russell, Jr., commanding officer of *America*. "A few months ago most of us thought three treys were part of a full house and shamrocks were something the Irish got uptight about. Now we know differently. They are synonyms for one of the best squadrons in the Navy—yes, I said Navy! VMFA-333 has carved a place in *America*. You are ours now—we like it that way and we want it that way next deployment."

PHOTO RECON

By Capt. H. T. Carter, USMC

The concept of airborne reconnaissance necessitates close cooperation between aircrew, photographic, maintenance and flight line personnel. The Marine composite reconnaissance squadron epitomizes this concept of coordination, each member contributing a specific skill vital to the completion of the mission.

Typical peacetime missions include reconnaissance in support of amphibious operations and photo missions, including photography of earthquake fault lines and infrared ecology studies of rivers and lakes for the Environmental Protection Agency. Each sortie develops aircrew readiness and proficiency, qualifying the crewmen as reconnaissance pilots and systems operators.

Upon receipt of a photo request, a chain of events is set in motion which results in a sophisticated photographic product with detailed perimeters of scale, coverage and film type.

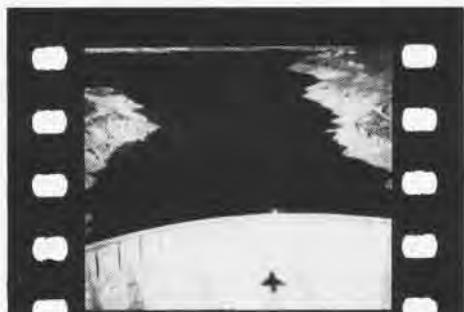
The planning and briefing section plots coordinates and scales on sectional maps, and briefs the aircrew. A variety of film may be required, depending on the nature and complexity of the task. Color, black and white, infrared or camouflage detection film may be loaded in separate cameras.

After the photo brief, the aircrew preflights and prepares to start the aircraft. The photo section loads film magazines in properly configured cameras. The plane captain assists the aircrew, checking systems to ensure that all function normally. Maintenance men stand by to correct discrepancies.

The aircraft launches for its first target, a dam east of Phoenix, and from there back to Lake Havasu for a pollution study. A bridge which will be a target for Marine attack squadrons during practice exercises is photographed next. Targets are located and photo runs made while the cameras adjust automatically for the correct focus, speed and light setting.

In less than two hours, the plane has returned to base. While the aircraft is refueling, the photo crew unloads the film which will be developed in a portable photo van.

In half an hour, planning and briefing officers have the negatives.



A-6A/RABFAC

During the Vietnam War, Marine Aviation perfected a new bombing system for use in close air support. Called the A-6A/RABFAC bombing system (RABFAC is the acronym for radar beacon, forward air controller), it was used from 1968 until the conclusion of Marine participation in the conflict. Although a Marine Corps system, it was extensively employed throughout the I Corps tactical zone of South Vietnam by U.S. Army

By Maj. Carl H. Dubac

units. In fact, the number of Army operations using this system increased until Army units were using it more than the Marines.

What exactly was so revolutionary about the particular bombing system?

It enabled us, for the first time, to conduct close air support missions under all-weather battlefield conditions. By definition, all-weather includes con-

ditions that vary from clear to zero visibility, day or night. With this in mind, one must add that A-6A/RABFAC requires that the ground observer or forward air controller has the target in sight. For this reason only, the bombing system is not truly all-weather. The point becomes academic since close air support missions, by definition, are air strikes against hostile targets which are in close proximity to friendly forces and require detailed integration of each strike with the fire and movement of the friendly ground forces.

If the FAC can observe the target, regardless of the weather conditions, day or night, the A-6A/RABFAC bombing system can be employed in the close air support role.

To understand how this all-weather close air support capability is achieved, the two subsystems must be examined.

The first, and by far the most complex, is the A-6A *Intruder*. Designed as an all-weather, subsonic, carrier-based attack aircraft, the *Intruder* relies upon radar-derived information to conduct attacks against targets under all-weather conditions. The A-6A's radar detects and then provides tracking information to a sophisticated computer in the aircraft. Unfortunately, not all tactical targets can be detected by radar since many do not reflect enough radar energy to be distinguishable to the radar operator or bombardier/navigator.

This particular problem is not confined to the *Intruder's* radar system, but is a restriction inherent in all present operational radar sensors. As a result, the A-6A designers incorporated an alternate method of all-weather radar bombing: offset bombing. This method still relies upon the radar system to provide tracking information to the aircraft computer by using a point on the ground which is "radar significant" (a point distinguishable on the radarscope). The difference is that the radar significant point is not the target, but an aim-point at a known position relative to the target.

In other words, if the location of the target (range, azimuth and eleva-



tion) is known relative to a radar significant aimpoint, the *Intruder's* weapons system can attack the target under all-weather conditions by using offset bombing. This method of bombing was extensively and successfully employed in Vietnam during interdiction missions against stationary targets which were not radar significant.

In a close air support environment, targets are seldom radar significant and aimpoints for offset bombing are normally nonexistent. The second subsystem, RABFAC, fills a vital need. The electronic part of RABFAC is a radar transponder which receives a radar signal from the A-6 and replies with a coded signal which is detected by the aircraft's radar. This portable transponder, which weighs ten pounds (26 pounds with battery), is deployed with the forward air controller. The position of the FAC and his radar transponder on the battlefield becomes the radar significant aimpoint for offset bombing.

The coding feature in the transmitted signal provides positive identification to the aircrew. Offset data (range, azimuth and elevation of the target relative to the RABFAC position) is supplied by the FAC. As in conventional close air support, the FAC has absolute control during bombing missions, ensuring integration and coordination with friendly forces.

This bombing system did not evolve by chance. As soon as the *Intruder* became operational in the Marine Corps, efforts to utilize its exceptional capabilities in close air support were pursued. The aircraft's ordnance-carrying capability (28 500-pound bombs) and extensive loiter time were attractive features.

In March 1965, VMA(AW)-242, the first Marine Corps A-6A squadron, proposed developing an all-weather close air support concept. The proposal called for a radar augmentation device that the FAC could carry and which would provide a radar significant aimpoint for offset bombing. As a result, the Marine Corps Development and Education Command (MCDEC) was directed to conduct a feasibility evaluation of this concept.

Initial MCDEC efforts considered passive radar augmentation devices such as radar reflectors and a Luneberg lens. The limitations of these devices were evident, and the program



was expanded to include active radar devices (radar beacons or transponders). In May 1966, because of a need for a radar ground position location and identification device for the A-6A, MCDEC launched an extensive development and evaluation program.

Three prototype devices were initially considered. Two were designed with conventional magnetron transmitters; the third contained a solid state transmitter. Only the magnetron designs were evaluated; the solid state unit was never satisfactorily completed. The evaluation called for comparison testing in three separate phases: technical evaluation of the devices by a research laboratory, operational evaluation by the Second Marine Aircraft Wing and Aircraft Test and Evaluation Squadron Five, and combat evaluation by the First MAF in Vietnam.

In July 1968, prior to completion of the second phase, the devices were shipped to the First MAF for combat evaluation. The evaluation was accelerated because of the immediate need for all-weather close air support in Vietnam. Initial success under combat conditions prompted the commanding general of the Third Amphibious Force to submit an urgent request for additional RABFAC's to satisfy operational needs during the 1968-69 winter monsoons. As a result, 30 additional transponders were procured. Initial delivery of the AN/SST-122 device to the III MAF began in August 1968.

The story of A-6A/RABFAC bombing would not be complete without mention of at least one of the many combat successes of this bombing system. On the morning of September 28, 1968, the enemy initiated a series of attacks by fire and ground assaults

upon Thuong Duc Special Forces Camp and its outposts. At least two NVA regiments, plus elements of an artillery regiment, took part in the attacks.

The defenders were taking heavy casualties and the camp was in serious danger of being overrun. Late in the afternoon of the first day, when it became apparent that continuous close air support would be required to meet the enemy threat and that deteriorating weather conditions might preclude the use of airborne FAC-directed air strikes at night, a forward air controller with his radar transponder was inserted.

Eighteen A-6A/RABFAC bombing missions were flown in support of the camp during the nights of September 28 and 29. The enemy was repulsed.

The camp commander indicated that the camp would have been overrun without the air support received, and called particular attention to the outstanding support provided by A-6A/RABFAC bombing, which apparently caught the enemy by surprise because the enemy offensive faltered after each mission. The A-6A/RABFAC bombing was instrumental in turning the tide of battle.

New improvements in the bombing system for the A-6E will provide refinements in the overall effectiveness. Many improvements will result from innovations which were designed into the new aircraft system. In the RABFAC subsystem, efforts continue not only to reduce the size and weight of the portable transponder but also to improve the operational capabilities of the device.

Still other efforts are being directed toward new concepts in operational use of the A-6A/RABFAC system.

Marine Aircraft

1912-1972



First Marine Aviator, A. A. Cunningham, instructs second, B. L. Smith, in Wright B-1. Above, HS-2L of post-WW I Guam detachment was similar to planes of 1st Marine Aeronautic Company in Azores during war.



DH-4B's of VO-4M line field in Nicaragua during period of Marine support against rebels. The nearest one is an ambulance version.



VE-7 of VO-8M also appeared in fighter and trainer versions. Below, F6C-3 was Marine version of standard Navy carrier fighter of 1920's.



Liberty-engined MBT was flown in 1921 as first USMC heavy bomber. Below, radial-engined version of F6C served in VF-10M at San Diego.





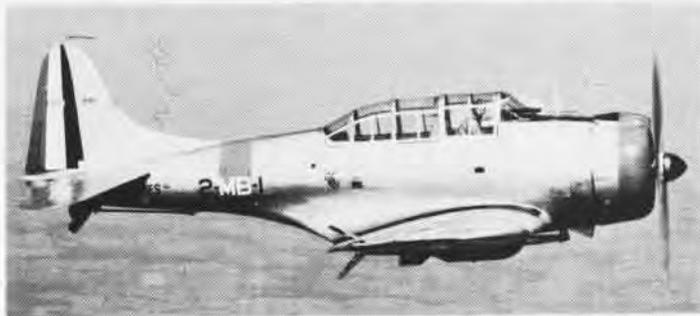
Among aircraft used in late 1920's and early 1930's were: OC-1's, left; O2C-1 above; RS-3 amphibian transport, below left; and RA-3, below, used by East Coast Expeditionary Force in Nicaragua by VJ-6M.



O3U-6 Corsairs supplied to three observation squadrons in 1935 had enclosed forward cockpit. F3F-2, below, was last biplane fighter.



F4B-4 was standard Navy and Marine fighter throughout the 30's. SBD-1 Dauntless, below, of VMB-2 appears in pre-WW II paint scheme.



Marine Aircraft

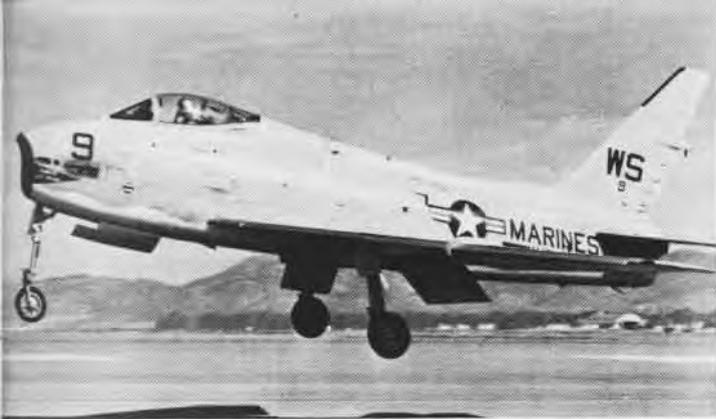


F2A, above, suffered early losses at Ewa and Midway and was soon displaced by F4F's, above right, which made their mark at Wake and Guadalcanal. More powerful F4U, below, appeared at Bougainville with VMF-124 in 1943. PBJ, below right, first served with VMB-413.



The Korean War saw a whole new set of Marine aircraft employed, although modified versions of the F4U saw active service in attack roles. Among the new planes were F7F Tigercat, above left; F9F Panthers, above; F2H Banshee, below; and the R4Q-1 below left.





Prominent Marine Corps aircraft in the post-Korean war period were the FJ-4 Fury, above left, and the F4D Skyray, above. A-4 Skyhawk, below left, and F-8 Crusader entered Marine squadrons in late 50's.



Significant in the current aircraft inventory are the KC-130 Hercules, above, A-6 Intruder, above right, F-4 Phantom, below, and Marine Aviation's newest and most unique aircraft, the AV-8A Harrier, V/STOL attack plane, below right.



Those Wonderful Wind Machines



In September 1939, Igor Sikorsky lifted the wheels of a bizarre-looking machine a few inches off the ground and hesitantly began to move forward, backward, sideways, up and down.

This first flight of a direct lift aircraft was to have a profound effect on the Marine Corps as we know it today, for thus was born the modern helicopter. Of course, the theory and idea behind the helicopter is far from new. As early as 1100, Chinese children were playing with helicopter-like devices. In 1483, Leonardo Da Vinci, considered by many to be the father of the helicopter, designed a workable helo. Only the lack of a suitable power plant kept it from flying. From this rather unpretentious beginning was born versatility far beyond the most abandoned, starry-eyed dreams of the small group of men who stood watching on that September morning.

It was not until the late 1940's, however, that the Marine Corps became strongly interested in this strange creation. It all started with the purchase of the Sikorsky HO3S.

Marine Helicopter Squadron One (HMX-1) was formed at Quantico, Va., in December 1947. Its mission was not to determine if the *Bumblebee* could really fly but to develop techniques and tactics in connection with the movement of assault troops in an amphibious operation. And if it could pursue the even tenor of its way in the air, would it have enough muscle left to be of any value to the Corps?

In May 1948, HMX-1 participated in Operation *Packard II*, an amphibious exercise in which helicopters moved troops from an aircraft carrier to simulated combat zones behind the beach. In this first helicopter amphibious assault exercise, the helicopter proved that its use in amphibious operations was completely feasible. Payloads were miniscule by today's standards, but the helicopter could transport troops and cargo deep inland behind the beach, could lay communications wire at very high speeds and over impossible obstacles, could evacuate the wounded and spot for artillery and naval gunfire.

Apparently there were enough affirmative answers to these early questions for on January 15, 1951, a squadron was commissioned to fly these wonderful windwagons.

Marine Helicopter Transport

By CWO Frank Washam
Pfc. Charles Rowe



The Piasecki HRP Flying Banana is tested in early exercise by HMX-1 and VX-3, above. The helicopter was 54 feet long and had a maximum speed of 104 mph. The Sikorsky HO3S, below, proved its worth during medevac operations in the Korean War. Despite its designation as an observation helicopter, the 103-mph HO3S served in a wide variety of roles with HU-1.





Marines test vertical envelopment tactics with the HRS during an amphibious exercise held on the beach at Dikili, Turkey, in June 1956.

Squadron 161 became the first operational transport helicopter squadron in the Corps. As a portent of things to come for Marine helicopters, HMR-161, equipped with HRS-1's, set sail for Korea on August 15, 1951, just seven months after commissioning. Within a few days after landing at Pusan, the squadron was flying the first combat missions in history of a helicopter squadron.

Korea turned out to be a good proving ground for helicopter combat tactics and the Marine Corps used it to good advantage. Missions included troop lifts, resupply, medevacs and a large-scale helicopter night combat mission.

In Operation *Summit*, HMR-161 was given a chance to show its stuff. In four hours, the helicopters airlifted 224 troops and 18,000 pounds of cargo to the top of a 2,900-foot hill. Without the helicopter, the operation would never have taken place—a precedent had been set.

Operation *Bumblebee* was another chance for Marine helicopters to prove their versatility and ability. In six hours, they transported a 1,000-man fully equipped battalion to the fighting front.

The helicopter was beginning to prove a truly versatile workhorse. It added a new dimension to the mobility of the combat Marine and proved indispensable in military operations. It was considered an absolute necessity for future amphibious operations. HMR-161 departed Korea in April 1953, having lifted 60,046 personnel, transported 7,544,366 pounds of cargo and performed 2,748 medevacs, a task of monumental proportions

when one pauses to consider the lift capability of the HRS-1.

On April 5, 1951, HMR-261 was commissioned at MCAS Cherry Point, N.C., as the East Coast tactical helicopter squadron. Later that year, it joined a newly-formed sister squadron, HMR-262, aboard USS *Siboney* to begin development of ship-to-shore and vertical envelopment maneuvers off the coast of Little Creek, Va.

The helicopter was coming of age, for in June 1952 MAG-26 was commissioned—an all-helicopter Marine air group. It was the last of three Marine air groups—MAG's 16 and 26 had previously been formed on the West Coast.

As the machine is versatile, so must the men who fly it be versatile. In October 1954, HMR-261 was aboard a ship cruising the Caribbean when it was suddenly dispatched to aid the hurricane-stricken people of Port-au-Prince, Haiti. As a result of that operation, the squadron was nominated for the William J. Kossler award for "the greatest achievement in practical application of rotary-winged aircraft."

The following September, MAG-26 sent 12 helicopters to Connecticut to aid the victims of Hurricane *Diane*. Later in 1955, the entire MAG deployed aboard ship to participate in an effort to assist the people of Tampico, Mexico, who were suffering from the ravages of a flood. The helos carried supplies of food and evacuated the sick and injured.

The versatility of the helicopter began to grow like Topsy. Uses begat uses and July 1956 found helicopters from MAG-26 lifting a full company of recon troops from the air facility at New River to the submarine *Sea Lion*. This was the first attempt at this concept of troop deployment.

During the winter of 1957, HMX-1 was added to the presidential transportation fleet. An executive version of the combat helicopter was designed, completely refitted to provide for the comfort and convenience of the President and his staff. Dwight D. Eisenhower was the first president to take a trip in a Marine helicopter. The helicopter provided greater speed and vastly improved security for local missions formerly conducted in automobiles. By 1959, the helicopter had accompanied the President to Spain, Afghanistan and Brazil.

In March 1958, the largest amphib-



HUS-1's (H-34's) operate off Boxer's flight deck at Vieques Island in March 1959, above. The helicopter is used during 1964 amphibious exercise held at Camp Lejeune, N.C., below.



ious airlift to that date took place when a fleet of helicopters moved a reinforced Marine regiment from two CVS's to shore. *LantPhibEx-58* covered four days and, when it was completed, helicopters had moved 6,000 troops, 100 vehicles and hundreds of tons of supplies and equipment. The success of this operation was possible largely because the Marine Corps had acquired its first heavy lift helicopter, the HR2S. Designed to carry five tons of equipment or 30 combat troops, this helicopter added a new dimension to Marine air operations.

MAG-26's HMR(L)-262, Sub Unit-1, was sent to revolt-torn Lebanon in July 1958, where it operated from the Beirut International Airport with ground troops dispatched by the United Nations.

Later that year, helicopters from the group began participation in Project *Mercury*, America's first successful attempt to orbit a man in space and return him safely. HMM-262 and HMH-461 were part of the recovery team and were responsible for the recovery of Commander Alan Shepard in May 1961 and Virgil Grissom two months later.

In April 1959, a defective antenna atop an 85-foot tower at the Cape Hatteras weather station was replaced with the help of two helicopters from HMH-461.

On July 9, 1960, six aircraft, 17 officers and 33 men of HMM-264 deployed aboard USS *Wasp* and stood combat-ready in African waters until August.

On November 30, 1960, a detachment from HMM-264 with six aircraft, pilots and crew members went aboard USS *Hermitage* (LSD-34) for *Solant Amity I*, a dual purpose cruise which made port calls in Spain, the Congo and many areas of South Africa and South America. In addition to being a force in readiness, the men also acted as good will ambassadors.

The Corps received the first operational turbine powered helicopter (UH-1E) in March 1964. The turbine helicopter proved its value in a troop lift operation held a few weeks later at Quantico, Va. An executive version of this aircraft was designed and has been used by Presidents Kennedy, Johnson and Nixon as well as many other government officials.

In September 1961, 28 MAG-26 helicopters departed New River and



A VH-3A of HMX-1's executive flight detachment flies over the Jefferson Memorial in Washington, D.C. Squadron helos were added to the Presidential transportation fleet in late 1957.



Marine requirements for an assault helo that would carry a variety of military loads in addition to troops led to development of the HR2S. HMX-1 took initial delivery in 1956.



flew to the aid of victims in Texas after Hurricane *Carla*, one of the most destructive natural disasters in recent history, devastated the area near Galveston and Freeport. Extensive search and medical aid missions were flown to help relieve the disaster area.

Two months later, helicopters from the group embarked aboard USS *Antietam* and went to the aid of victims of Hurricane *Hattie* in British Honduras. While there, pilots and crews lived ashore and set up field operations at Velize Airport, flying food, medicine and clothing to the stricken natives.

During 1961 and the years following, MAG-26 maintained a detachment at Guantanamo Bay, Cuba. It was this Gitmo detachment's mission to fly the boundary fence and keep a close watch on Castro's "Cactus Curtain."

In August, ten pilots from HMM-

161 were selected to train in down-range recovery techniques for Project *Mercury*. Their mission was to pick up the astronaut after his landing in the Pacific Ocean. The project involved actual work with *Mercury* capsules and a trip to Cape Canaveral, Fla., to meet astronauts Schirra and Cooper and to put the final touches on the recovery techniques.

In October 1962, HMM-161 helicopters participated in the recovery of astronaut Schirra and *Sigma-7*, and later furnished backup SAR for the space shot with Astronaut Cooper.

On Palm Sunday 1962, HMM-362, commanded by Lt.Col. Archie Clapp, landed at Soc Trang, Republic of Vietnam, with the first Marine helicopters to arrive in that troubled, war-torn land. When the last squadron left in 1970, a new volume had been written in Marine Aviation history.

Performing a variety of missions and adapting to the terrain, the weath-

er and the nature of the war tested the helicopter's versatility as never before.

Marine helicopters ferried troops and supplies, acted as gunships and tactical air controllers, carried VIP's and rescued downed aircraft and crews.

Perhaps the single greatest achievement of the helicopters in Vietnam was their perfection of medevac. In places where no one else could set down, the helicopter made it in to pick up wounded. Moving faster than a litter team hacking its way through the jungle or a motorized convoy negotiating Vietnam's mined and muddied roads, the helicopter guaranteed prompt medical assistance to the man who needed it.

Flying in foul weather and fair, helicopters earned a well done from all. During the monsoon seasons, the war did not stop. Viet Cong and NVA continued to fight — as did we. A heli-

copter was often the only way to ensure delivery of food and ammo to cold, wet, combat-weary troops. In the field or penned up in a forward outpost, these men measured their own life span by the number of missions the copter squadrons could fly.

In the hills around Khe Sanh, the mountains near the DMZ, the walled fortress of Hue, the jungles of A Shau Valley and the paddies of the Mekong Delta, the helicopter was a link with life. It was used again and again, doing everything that had to be done.

In late 1966, the CH-46 was becoming the workhorse. As a transport helicopter, it was called on to do everything it was designed for and then some. It carried every type of load and flew every type of mission, in all weather and over all types of terrain.

The CH-53 *Sea Stallion* was introduced to Vietnam in 1967. This heavy lift helicopter wasted no time getting acquainted. During its first 11 months of combat, the CH-53 recovered 183 aircraft, worth more than \$60 million, which would otherwise have been abandoned.

In April 1968, one of the most unusual missions in the history of the helicopter occurred. A Montagnard hill tribe needed elephants to haul timber over rough terrain to a sawmill — the backbone of the village economy. Two elephants were tranquilized and carried to Chu Lai by fixed-wing transport. From there a Marine helicopter took over and completed a journey which would have been impossible by any other means.

The helicopter performed so many different kinds of missions in so many places that it ceased to be just a machine. It became a valuable and trustworthy friend and ally in that agonizingly frustrating war.

All Marine helicopters did not go to Vietnam. Many were needed to fulfill commitments elsewhere and also wrote new chapters in Marine Corps Aviation.

In 1964, VMO-1 proved itself ready for any situation when it was asked to rescue engineers trapped in Peru by hostile natives. At the request of the Peruvian government, VMO-1 dismantled two HOK's, loaded them aboard a C-130 and flew them to Peru where they were reassembled and used to rescue the engineers.

During October and November 1964, MAG-26 took part in Operation *Steel Pike*, an amphibious and verti-



HMM-165 Sea Knights fly back to their home base at Ky Ha after transporting RVN Rangers to an area south of Da Nang in August 1967. Five squadrons received the first H-46's in 1965.



UH-1E Hueys touch down with their loads at a fire support base in South Vietnam in January 1969 in support of artillery units, above. A UH-34D Seahorse lands beside a tank in a battlefield to pick up wounded Marines during Operation Starlite in August 1965, below.





UH-34 Seahorses from Marine Medium Helicopter Squadron (HMM) 163 carry Army of the Republic of Vietnam (ARVN) troops into an operating area northwest of Hue and Phu Bai in 1966.



AH-1G HueyCobras fly attack mission in support of troops in the Republic of Vietnam, above. HR25 of HMR-462 recovers an HRS during initial evaluation of tactical aircraft recovery, below. The HR25 led to the development of the CH-53 Sea Stallion for the Marine Corps.



cal envelopment exercise on the coast of Spain which was the largest troop exercise in Europe since WW II. Six tactical squadrons were deployed on three amphibious assault ships, *Boxer*, *Okinawa* and *Guadalcanal*.

Once again, in May 1965, MAG-26 was called upon to perform duty in the Caribbean, following the outbreak of disorders in the Dominican Republic. HMM-263 and HMM-264, with detachments from VMO-1 and HMM-461, aided in the evacuation of American citizens and refugees from the strife-torn country. While flying these missions, HMM-264 set a Marine first by successfully completing 50,000 hours of accident-free flying. The first all-helicopter amphibious vertical assault under actual combat conditions and into an unsecured landing zone at night was accomplished by HMM-264 at this time.

Another history-making year for MAG-26 was 1970. HMM-365 formed up for a Caribbean cruise, in itself no notable event. The significance of HMM-365's cruise was the composition of the squadron. In the past, when a squadron deployed aboard ship it took along detachments from other squadrons and support units in the group. Now, however, HMM-365 was going as a composite squadron, consisting of CH-46's, CH-53's and UH-1's, both "slicks" and gunships.

It was up to the officers and men of this squadron to make the mix work.

During the early part of the cruise, an earthquake occurred in the high mountains of Peru and HMM-365 was called upon to carry food and medical aid to the disaster victims in unprepared landing zones up to 14,000 feet above sea level.

Later in 1970, HMM-365 was still aboard ship, but this time headed in a different direction — to the Mediterranean. What started as a normal landing exercise ended in a MAG-26 commitment — standing by in the eastern Med to evacuate an Army hospital unit and other American nationals from Jordan should it become necessary.

In 1971, HMM-365 folded its colors and retired from the scene after writing a relatively short but colorful chapter in Marine Corps Aviation.

The concept of vertical envelopment

made possible by the helicopter gives the Marine Corps much more flexibility and a greater number of places to land than going in over the beaches.

Training for those operations is the bread-and-butter of the Marine air/ground team. Continuous practice is the only way to ensure that the team will function at maximum efficiency in combat.

Exotic Dancer, Blue Ax, Snowy Beach, Snowflex and Firex 72 represent a lot of work and a lot of sweat. It is Marine helicopters which help them succeed. Versatile in all roles, the helicopter is the key to success.



CH-53 Sea Stallion proved to be a workhorse for the Marine Corps, as it can move troops, above, and field equipment, below, in addition to recovering downed aircraft and helicopters. Delivery to Marine units began in 1966, and it entered service in Vietnam in 1967.



THE SELECTED AIR RESERVE



Two Days, Four 'Cobras - and the Desert

The only thing wrong was that there wasn't more."

"Most importantly, it provided the enlisted Marines an opportunity to fly and really see what the *Cobra* can do."

"Never before has a Reserve squadron deployed on a weekend drill for gunnery training."

These remarks summarize Marine Reserve Helicopter Attack Squadron 773's February training period.

The 45 officers and men of the AH-1G *HueyCobra* squadron moved to NAF El Centro, Calif., for a two-day drill at the sprawling desert site.

Lieutenant Colonel William J. Geiger, HMA-773's commanding officer, summed up the weekend with the comment that the only thing wrong was "that there wasn't more."

His statement was supported by Colonel Albert C. Pommerenk, the El Toro MARTD's commanding officer. The colonel, who took part in the aerial rocket firing, added, "They could have easily doubled the amount of ordnance."

The four *Cobras*, flown in four sep-

Photos by Sgt. John E. Henderson

arate launches, fired 216 2.75-inch rockets during the 16 flights.

Maj. Nicholas J. Adamo, operations officer, was particularly pleased with the accuracy of the weaponry and the amount of training for the "no down time" weekend.

He emphasized the 46 aircraft hours earned for the two days versus the normal 140 to 150-hour monthly total for many squadrons. The major stressed two main accomplishments of the weekend deployment: qualifying all 11 squadron pilots in rocket gunnery and coordinating ordnance handling by enlisted Marines.

"We do have a tremendous advantage," Maj. Adamo said, "because we were just formed in September and don't face a turnover problem like other squadrons.

"Following our training syllabus, we have been able to check off three of 15 items. By the time of our annual two weeks of active duty for training

in July, we plan to have accumulated 350 hours of flight time for each aviator."

He also singled out the contribution of the six MARTD enlisted Marines accompanying the squadron, led by Capt. Robert S. Massey, assistant detachment operations officer. All squadron enlisted had the opportunity for an orientation flight in the AH-1G following the gunnery missions.

The squadron was airlifted to El Centro by a C-119 from Reserve Marine Transport Squadron 216, Whidbey Island, Wash.

"The change of scenery bolstered morale and certainly increased interest in the program," Col. Pommerenk stated.

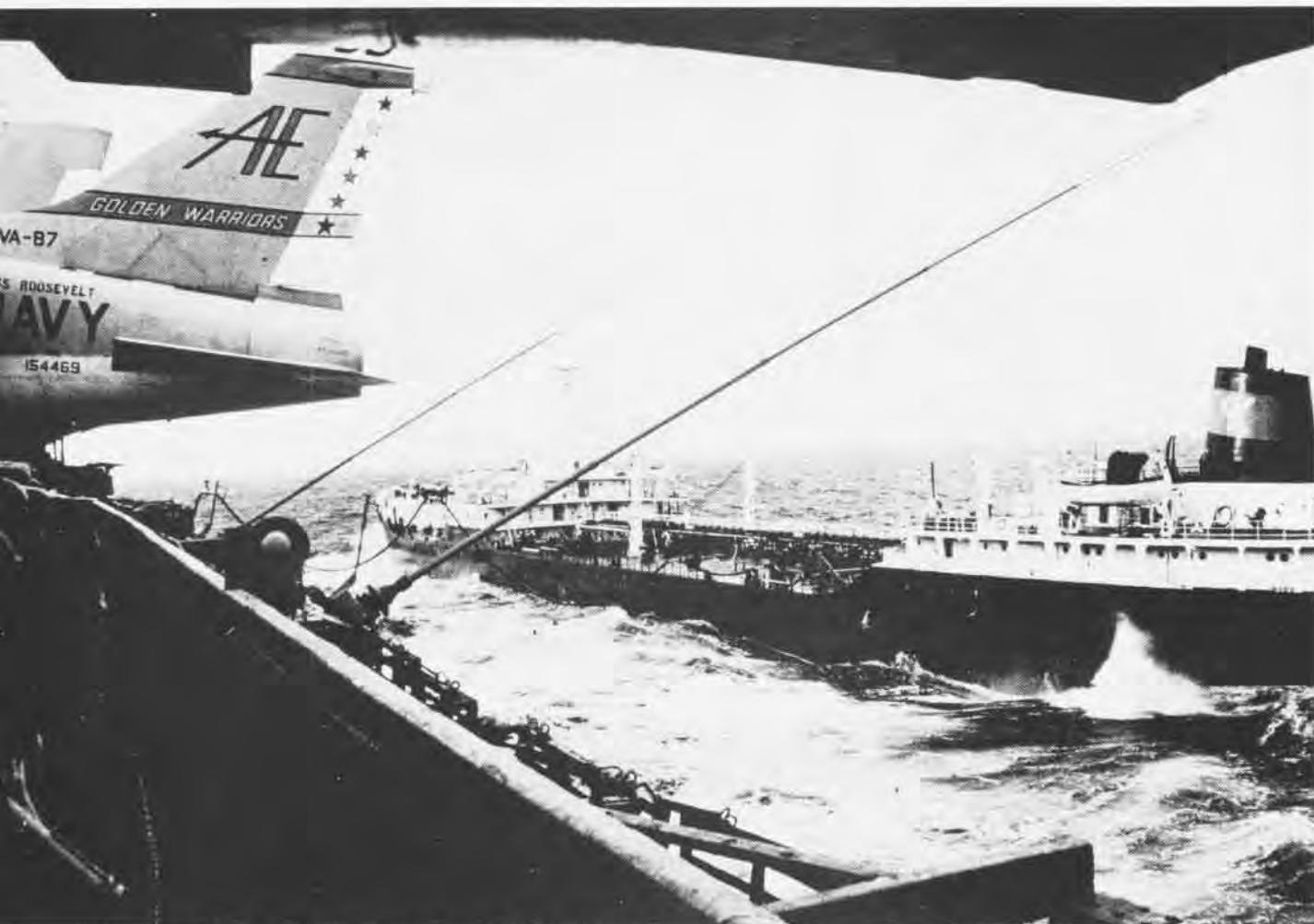
Maj. Adamo summed up the El Centro training by referring to the squadron's mission of escorting troop helicopters. The following drill weekend, the *Cobras* were doing just that as they provided support for CH-46 *Sea Knights* of HMM-764. The *Huey-Cobras* flew escort during simulated extract training on San Clemente.



AH-1G prepares to make a rocket run over the California desert, opposite. At left, a seven-rocket salvo on the way and, above, on the target. Prior to the mission, an HMA-773 pilot and maintenanceman preflight a HueyCobra, right. Below, the electrical system for a 2.75-inch rocket pod is tested prior to a firing sortie at NAF El Centro.



at Sea with the Carriers



A commercial tanker, SS Erna Elizabeth, refueled Franklin D. Roosevelt while underway. The tanker operated for three weeks with NATO.

Constellation (CVA-64)

Embarked HC-1 Det Three recently rescued eight Nationalist Chinese from their badly damaged fishing vessel which had lost its mast.

Shortly after 3 a.m. on a dark morning, LCdr. Ray Lazo, OinC of Det Three, prepared for a possible rescue mission at first light. The detachment rolled out an SH-3G which LCdr. Lazo would pilot. Special nets were readied to lessen the dangers of a pickup. A box of provisions including hot soup and dry clothes was loaded on board for possible use in case a rescue was not necessary. A Chinese

interpreter was even produced. AMH2 Frank W. Wong, of the detachment's maintenance department, is a native of Taiwan. He would be needed if the men were to be rescued and had to come aboard for any length of time.

At 6:30 a.m., the helo took off. During heavy seas and high winds, Lazo piloted the helicopter to the damaged craft. Wong was lowered by rescue hoist to the deck and quickly explained rescue hoist procedures to the Chinese.

In less than 40 minutes, the eight crewmen were on board *Constellation*. An injured crewman was taken to the ship's medical department for treat-

ment; the others were given hot showers, dry clothes and a warm breakfast.

Members of the rescue crew included Ltjg. Scot Anderson, AE2 Michael Martin and ADLAN Pat Garrett.

• True or false?

Everybody talks about the paper work in the Navy but few do anything about it.

The ever increasing volume of necessary paper work is one of the difficulties the Navy must meet. But on board *Constellation*, Ens. Jon Kozuch has found a way to solve at least part of the problem.

Kozuch works in the carrier's supply department's data processing arm. Arriving on board in October, the ensign observed a waste of manpower. As he describes it, "Any supply procurement-related message leaving the ship at sea was being typed once on a message blank; retyped onto a teletype tape by communications; and punched onto an IBM card for the computer records of supply. The same process was being repeated three times."

Kozuch quickly found the solution: a teletype wired to supply's computer, plus the proper program, would cut out two of the three steps. He immediately went to work putting his solution into effect.

The computer was no problem. Communications, happy to save time, gave him a teletype. Supply had its own computer. What took time was the computer programming.

A message order for supplies fits a general standardized format. But the problem of translating that format into a set of binary numbers which would be understood by the computer was a difficult one.

Kozuch was the only one on board who could develop such a program. His civilian experience proved to be invaluable and by February the program was up and working. Now, when supply sends a message, a keypunch operator prepares the card and the computer provides the completed message tape. The two intermediate steps disappear entirely. The result is an annual saving of nearly \$12,000.

Kitty Hawk (CVA-63)

At sea, off the coast of Southern California, *Kitty Hawk* men prepare lectures, poster boards and information kits to provide ethnic awareness training for the ship's crew.

"In preparing this educational program," stresses Lt. David L. Combs, minority affairs officer, "we hope to enhance racial harmony and establish better relationships through a thorough understanding of the histories and cultures of all minorities.

"Understanding each other's problems, backgrounds and feelings toward certain things usually eliminates many problems.

"Since minorities make up only a



On the occasion of his 900th carrier landing, Commander Gordon L. Murray, Jr., C.O. of VS-33, was presented a well worn tire. The record landing took place aboard *Independence*.

small percentage of the crew, they can sometimes be mistakenly overlooked without any intention to discriminate against the members; therefore, as the command's representative for minority affairs matters, I ensure that this does not happen."

When asked why a black man was chosen to represent minorities aboard

the ship, Combs replies, "Mainly, because blacks are the most visible minority aboard the ship as well as in the U.S., and have yet to be assimilated into this culture."

Though Black History Week 1972 kicked off the ship's program, according to the ship's C.O., Captain Owen H. Oberg, "Black history and world history aboard *Kitty Hawk* go hand in hand.

"Black history is being made every day aboard *Kitty Hawk*, and in doing our job we present not only black history in the making, but world history as well.

"Lt. Combs was appointed to head the ship's minority affairs program, but actually every man aboard, no matter to what race he belongs, is an assistant in making our program work."

In expounding on this point, Capt. Oberg says a ship the size of *Kitty Hawk* cannot afford racial disagreements since the work is tedious, the hours long, and often the jobs are done in close quarters where any spark of tension, racial or otherwise, could endanger her effectiveness.

"We strive to establish a mutual understanding among the crew," he says, "so that each man will consider his fellow man and avoid doing anything that would offend or discredit."



Intrepid's commanding officer, Captain Charles S. Williams, has no problem remembering the names of his three Marine orderlies, Lance Corporals Johnson, Johnson and Johnson.

FLASH GORDON

RESULT
RY, OF
DESIR
WHICH

FALL BRAZOR'S
SH STANDS BETWEEN
A FEROCIOUS TREE
VERY TOUCH IS DEADLY
POISON!



HEARING
DALE'S
MUFFLED
CREAM FOR HELP,
FLASH KNIFES

MARINE ALEX



Hawk-Men. Monkey-Men. Airplane men and carrier men. From the Kingdom of Mongo to the island of Okinawa and the Borneo coast, Alex Raymond portrayed men of conflict in distant, often mystical, worlds.

His magic hand created dreamlike settings for good guys battling the bad and a generation of young Americans translated his masterful expertise into an unquestionable moral code.

Any faithful follower soon learned exactly how to deal with creeping, crawling, leaping, lurking evil: *ZAP!*

Raymond's supreme achievement, "Flash Gordon," was perhaps the summit of one of America's unique art forms, the adventure comic strip.

Flash could really bring Dad to life on Sunday — curious, in view of what we now think we know about reader "identification" and credibility.

Maybe it was the great girls. But I suspect it was Raymond's ability to effectively *dramatize* the frightening and bizarre that lent so much authority to his work. His characterizations were varied and mature; his plot situations were often handled with, shall we say, "savoir-Flash."

It is interesting to note that "Flash Gordon" was created in response to the formidable challenge presented by another (equally unreal) adventure strip, "Tarzan."

In 1929, the immense talents of illustrator Harold Foster had been applied to Edgar Rice Burroughs' lightly-clad jungle hero. Tarzan was a solid fellow of considerable proportions, who effected good rapport with apes and other assorted creatures, and who possessed an inexplicable resistance to mosquitoes — a combination of factors which chafed Foster's sensibilities and eventually prompted him to seek solace in the Dark Ages, with "Prince Valiant."

And so, we had "Flash Gordon" rocketing along, neck and neck (or page to page) in a popularity race, first with Foster's great white savage, and then with his witty, medieval swordsman.

COMBAT ARTIST RAYMOND

Raymond was considered to be one of the truly great draftsmen among the newspaper artists while Foster was acknowledged to be the "king of the comics." Their big, illuminated Sunday panels were to become collectors' items.

Pearl Harbor and the war with Germany and Japan had its impact on both yarns. The invincible Prince's point was soon skewering historic Huns while, on the "Flash Gordon" page, vile Emperor Ming and his sordid bunch acquired even more of an Oriental slant.

The soaring costs of wartime newsprint subsequently reduced Foster's panels to a half page — exactly one-quarter the size of the magnificent originals; and Flash Gordon, suspiciously attired in something resembling an Air Force uniform, returned to Earth, benevolently offering his generous assistance to our hard-pressed military. Gone were the good old days!

By early 1944, Raymond had turned his strip over to another artist. With a captain's commission in the Marine Corps, he was assigned to USS *Gilbert Islands* and saw action with the carrier at Okinawa and Borneo, finally ending up off Tokyo with the Third Fleet.

During this time, Raymond produced a number of pictures dealing mainly with life aboard a carrier. Characteristically, he concentrated on drawings of people — mechs, cooks, pilots, gunners. But, strangely, there he was, portraying *real* men in a *real* war — and he only showed them at *rest*. His combat art for the Marine Corps is devoid of the flamboyant violence of his previous work.

A major in 1946, Raymond returned to civilian life, but not to "Flash Gordon." Instead, the dapper artist created another successful strip, a daily, in black and white, about a sophisticated detective named "Rip Kirby." The original artwork he had done during the war was exhibited briefly, then was lost.

In the fall of 1956, Alex Raymond's spectacular career ended in the fatal crash of a skidding sports car on a New England road.

— Capt. Ted Wilbur



HE UNDER
LINGING
INGS ON
HE HOIST
OVER THE

ONE ARM AND
TO HIS LEGS,
FOR DEAR
SWINGS
BUBBLING

FOR MING, THE MERCILESS,
DEATH IS THE GREAT TRIUMPH
HE IS SHOWERED WITH THE
INFAMOUS COL

① IN A FURIOUS A
CONTINUOUS ATTACK
ROCKET BOMBER'S
THERMITON TANKS
FLASH'S FORTRESS
MISSHAPEN MASS OF
METAL, WITH FURIOUS
RESISTANCE IMPOS
FLASH SPIRITS HIS
FREEMEN INTO THE M
UNDER-CITY TUNNEL
ONLY TO THE POWER
MONGO—





In contrast to his previous explosive work, Raymond's 1945 Marine pictures, which were drawn aboard the carrier USS Gilbert Islands "somewhere in the Pacific," portrayed pilots, gunners, mechs, barbers and other personnel calmly carrying out the uneventful daily routine.





MARINE COMBAT ARTIST
ALEX RAYMOND

The sampling of Alex Raymond's wartime art which appears on these pages is reproduced from old negatives on file in the Marine Corps Art Collection. The original drawings disappeared following Raymond's postwar exhibition in Washington.



Letters

Unidentified Individual

I thought the unidentified individual on page 2 of the January issue of *Naval Aviation News* was RAdm. D. W. Harrigan because he then flew *Hawks*, but he says he left the squadron before Adm. Gardener organized his stunt team with Trapnell and Putt Storrs. Adm. Harrigan and I agree that it looks like Jesse Johnson (rear admiral or captain, retired and living in the Norfolk area).

I think somebody is wrong about this team performing at the National Air Races at Chicago in 1930. I had just resigned from the regular Navy (VF-1, *Saratoga*) and was there. Maybe they were there in '29. (1930 was the year that Duke Deshazo, VF-1, was killed — also Capt. Art Page, USMC.)

But pages like this soothe my nostalgia. Many thanks.

Max Welborn, Capt., USNR (Ret.)
2701 East Sunrise Boulevard
Fort Lauderdale, Fla. 33304

Marineluctvaartdienst

The Dutch Marineluctvaartdienst (M.L.D.) is, from April 1971 onwards, receiving its own nine Breguet *Atlantics*, built at the new Breguet factory at Toulouse-Colmiers and designated SP-13A by the M.L.D. The *Atlantics* are a welcome addition for the ASW capability of NATO in the northern area since the decommissioning of the carrier Hr.Ms. *Karel Doorman* sold to Argentina on May 25. No. 321 squadron, formed August 8, 1969, has been working up with four *Atlantics* on loan of the French Aeronavale. The photo depicts one of these.

C. van der Kemp
Vinkerpolderweg 24
Alblasserdam, 3230, Holland

Patches and Badges

I am a collector of shoulder patches and divisional crests of which I have the largest privately owned collection in New York, and I am always looking for more to add. I do not have many Navy patches which I am having difficulty getting hold of. I would appreciate any of the above mentioned.

Joseph R. De Felice
50½ Nelson Street
Auburn, N.Y. 13021



Four of NAS Point Mugu's aviation recovery vessels are framed by the hawser eye of a ship.

Aviation Recovery Vessels Support PMR

POINT MUGU, Calif. — In the early morning fog that shrouds Port Hueneeme harbor in a white darkness, the first sign of life is usually the crew of *Hostile Method 8* — or another of the six aviation recovery vessels (AVR's) assigned to NAS Point Mugu — beginning its work day.

Craftmaster BM1 Richard Brooks and his six-man crew have already given their craft its final check and are preparing for a long day at sea. By 3:30 a.m. the orange and white vessel will clear the Port Hueneeme breakwater and head towards a location somewhere near San Nicolas Island.

The mission of the Point Mugu service craft is to support Pacific Missile Range operations with on-the-scene surveillance and to assist in recovering drones. These sturdy craft and their crews recover, on the average, about \$120,000 worth of reusable equipment each month.

Once on station, the crew of *Hostile Method 8* will provide range safety by keeping the operating area under constant surveillance and warning other craft in the immediate vicinity of target and missile operations.

When a drone operation is finished and the target is parachuted into the sea, the AVR will recover the parachute which separates from the drone on impact. The AVR then stands by while a helicopter recovers the target. A trained swimmer will be put into the water to assist in the recovery, if necessary. While in the water, he is

protected from sharks by armed crew members aboard the service craft.

If the helicopter cannot recover the target, it will be picked up by the service craft and returned to Port Hueneeme.

Another function of the Point Mugu AVR's is military and civilian search and rescue in the area. A duty SAR craft, available round the clock, can be underway in less than ten minutes.

Hardhats for VA-85

NAS OCEANA, Va.—Attack Squadron Eighty-Five's maintenance department has added a new item to its equipment inventory, one which promises to promote greater safety in the Navy. On the recommendation of the squadron maintenance officer, construction workers' hardhats were purchased locally for each branch. The idea originated after joint operations by civilian and VA-85 maintenance personnel on the A-6E *Intruder* showed that the civilian workers' head gear provided them far more protection. The calendar check branch used the hardhats initially, as a test group, and found them to be extremely suitable for work in the hangar area. Shortly thereafter, the entire aircraft division was supplied with the hardhats at minimal cost to the squadron. Since introduction of the hardhats, the danger of head and facial injuries has been greatly reduced.



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VMFA-312 was originally commissioned VMF-312 on June 1, 1943, at Parris Island, S.C. During its 27 years of continuous service, it has been redesignated four times: VMA-312 during the Korean War, VMF again in 1954, VMF(AW)-312 in 1963, and VMFA-312 in 1966 when it acquired the F-4B Phantom. The MCAS Cherry Point squadron is led by Lt. Col. R. T. Roche.



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