

MARINE CORPS HARRIERS: EXPEDITIONARY FIREPOWER FROM THE SEA

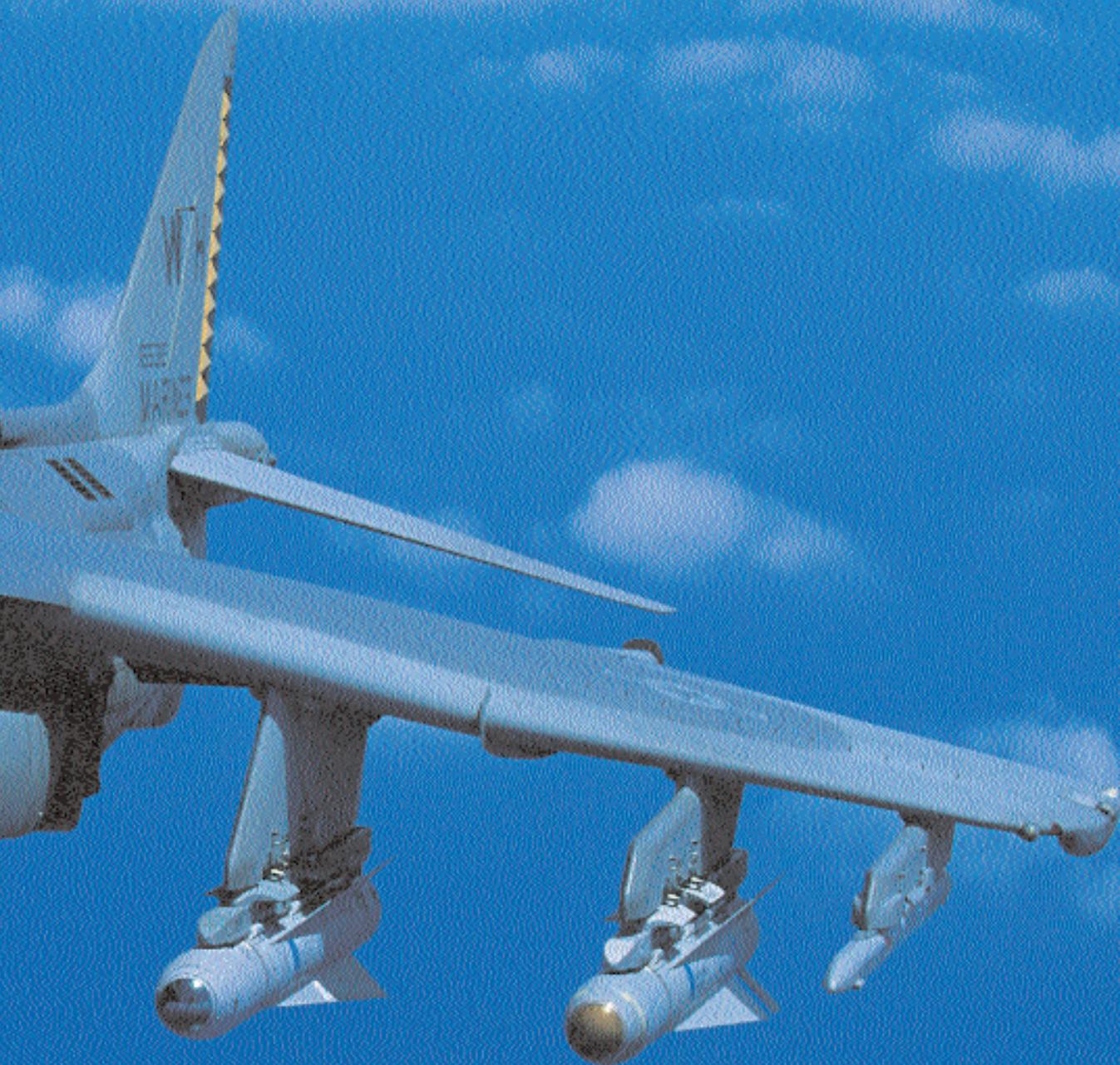
Story and photos by Rick Llinares



From their home at MCAS Cherry Point, N.C., the Marine Attack Squadron (VMA) 542 *Tigers* operate the latest version of the AV-8B *Harrier II Plus* jump jet (above). The unit comprises 16 aircraft, 29 officers (25 of whom are pilots) and 225 enlisted personnel. During a typical year, the squadron participates in two major training deployments, which last 16 to 20 days. A unique aspect of the *Harrier* community in tactical aviation is the fact that at almost any given time, a

portion of the squadron is deployed with a Marine Expeditionary Unit (MEU) aboard ship or in a six-month workup period beforehand. Squadron aircraft, officers and enlisted personnel usually ship out on deployments as an entire unit.

The Marine Corps operates the only U.S. military *Harriers*, with eight units split between two air wings. The training squadron for all new *Harrier* pilots is Marine Attack Training Squadron (VMAT) 203, which



operates both the AV-8B and the two-seat TAV-8B. VMAT-203 and VMAs 223, 231 and 542 are assigned to the 2d Marine Air Wing (MAW) at Cherry Point, while VMAs 211, 214, 311 and 513 are with the 3d MAW at MCAS Yuma, Ariz.

In describing the role of the AV-8B *Harrier II*, VMA-542 Commanding Officer Lieutenant Colonel Francis P. Bottorff said, “The mission of a Marine attack squadron is to attack and destroy surface targets under day and

night conditions and to escort helicopters. Although capable of handling a wide range of taskings, the *Harrier’s* bread and butter has always been close air support [CAS]. With the recent addition of the Litening II targeting pod, the AV-8B has become one of the most capable and sought after precision air-to-ground aircraft in the U.S. inventory.”

Its expeditionary nature is what sets the *Harrier* apart. It is the only fixed-wing aircraft that has the capability to

operate in even the most austere environments, such as during recent operations from sites within Afghanistan. Whether *Harriers* are stationed aboard ship or ashore, they are usually co-located with other elements of the Marine Air-Ground Task Force, whose aviation combat element can work directly with their ground combat element counterparts. Face-to-face mission planning is conducted and key relationships develop which aid on the battlefield. When units plan, brief and execute their missions together, it greatly improves the opportunity for success. The combination of the *Harrier* and the other elements of the Marine Air-Ground Task Force make up an expeditionary capability that is a tremendous force multiplier available to a joint force commander.

In its close air support role, the AV-8B *Harrier II* operates close to the battlefield aboard amphibious ships or ashore at a forward operating base. During a CAS mission when Marines on the ground are in contact with the enemy and need immediate close air support, time is critical. When a request is received it is imperative that the aircraft quickly respond from either an airborne alert or strip alert status. Being situated close to the battlefield significantly reduces response time and increases on-station time since the *Harrier* does not have to use precious fuel to travel greater distances to the objective area. The aircraft can also return to the nearby forward operating base or ship to rearm and refuel, then return to the battlefield.

The *Harrier's* in-flight refueling capability provides additional flexibility, increasing both range and on-station time.

Equipped with the probe and drogue system, the AV-8B is able to take advantage of Marine KC-130, Navy S-3 and Air Force KC-10 tankers or other compatible allied tankers within the area of operations.

Former VMA-542 operations officer Major Steve Hagerty described what it's like to fly the one-of-a-kind jet. "During conventional flight, the handling and flight characteristics of the *Harrier* are similar to any other high-performance tactical combat aircraft. However, the *Harrier's* powerful Rolls-Royce Pegasus engine provides nearly 24,000 pounds of thrust. It accelerates quickly, like a



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dragster, and uses

thrust vector control to direct engine thrust downward through four exhaust nozzles, which augments wing lift and results in short takeoff distances. The stick response is very smooth and controlled and with practice the vertical landing becomes fairly routine. Once on deck, the *Harrier* can again take off vertically and transition to conventional flight at up to 585 knots or 1.0 mach."

In a typical daytime approach and landing in the AV-8B, *Harrier* pilots follow a sequence during the landing process that is not unlike that of their Navy brethren on the carrier. The primary difference is that there is one additional control lever, and the intent is to "stop and land" rather than "land and stop." The ability to stop and land provides first-pass boarding rates near 100 percent and allows the routine use of night-vision goggles for night recoveries.

Former VMA-542 skipper Lt. Col. Eric VanCamp described the steps a *Harrier* pilot goes through to land aboard ship: "The AV-8B pilot approaches the ship at 800 feet and 350





These *Harrier IIs* are from VMA-223 at MCAS Cherry Point, N.C. Opposite, top to bottom: a TAV-8B trainer of VMAT-203 rests on the tarmac; the *Harrier's* loaded cockpit looks all business; a VMA-223 pilot sits at the ready in his aircraft.

knots. Passing close up the right side of the ship, the pilot extends roughly 10 seconds and snaps the stick to the left, rolling the jet into a 4- to 6-G turn. Simultaneously, the pilot pulls the throttle to idle with the left hand and then moves the exhaust nozzle lever to the 60-degree position while easing off the turn.

“Rolling wings level on the downwind leg (opposite direction of initial heading), the pilot descends to 600 feet above ground level. As the aircraft decelerates through 300 knots, the pilot moves the flap switch to the short-takeoff-and-landing position, which causes the flaps to automatically program with nozzle position once the airspeed goes below 165 knots. The pilot extends the landing gear at 250 knots or less, and adds power sufficient to maintain on-speed flight at about 110 knots.

“The engine water injection switch is then moved to the landing position allowing for added thrust if needed. During takeoffs and landings, water can be injected into the turbine section of the AV-8B’s engine to provide an additional 1,500 pounds of thrust if required.

“Continuing the turn, the pilot descends to 450 to 500 feet above ground level behind the ship—referred to as ‘rolling into the groove’—on a line running up the left side of the ship until the jet is at 300 feet above the water. The pilot makes a ‘hover-stop’ call to the landing signal officer [LSO], who helps talk the pilot down to a safe landing. At this point, the pilot smoothly slides the

nozzle lever to hover-stop. This moves the nozzles 90 degrees pointing downward. The pilot then adds power as necessary to maintain glideslope position as indicated on the tower’s optical landing system. The pilot controls the deceleration rate by slightly adjusting the attitude of the *Harrier's* nose. The jet is now alongside the intended point of landing, a mere 120 feet over the water and just 60 feet above the deck of the ship. The LSO says ‘clear to cross’ and the pilot moves the jet sideways to a hover over the designated spot. Once stabilized in the hover, the LSO clears the pilot to land and the pilot eases gently down and chops the throttles to idle. From this point the nozzles are moved to aft and the jet taxis as directed by the flight director.”

Sounds easy, right! It’s all in a day’s work for *Harrier* pilots. The tough little jet is a critical component in the Marine Corps’ arsenal. Until the Joint Strike Fighter comes into production, the AV-8B *Harrier II* will remain ready at a moment’s notice to quickly react in support of America’s 911 force. ✈

Rick Llinares is a professional photographer and writer specializing in Naval Aviation. The author wishes to thank Capt. Dave Nevers and HQ USMC Public Affairs; Col. Nathan Webster and Maj. Stephen Primm of Marine Aerial Refueler Transport Squadron 252; and Lt. Col. Francis P. Bortoff, Lt. Col. Eric J. Van Camp, Maj. Steve Hagerty, Capt. M. Q. Curtsinger and all of the VMA-542 *Tigers* for their assistance with this article.