

A Multidimensional Force

Marine Corps Set To Reap Long-Desired Mobility Upgrades

The Marine Corps' long-sought V-22 tilt-rotor aircraft is scheduled for low-rate initial production approval next month. The unique aircraft can take off, hover, and land vertically like a helicopter and fly horizontally like a C-130 transport.

From a modernization standpoint, the US Marine Corps appears to have a very bright future, with several major new weapons systems slated for delivery beginning in 1999.

Achieving much greater mobility is the key to the Service's plans, particularly to make possible high-speed amphibious assaults from over the horizon (OTH) and rapid advances on land. Three new systems are in the pipeline that will dramatically improve the speed and maneuverability of Marine units: the V-22 tilt-rotor aircraft, the Advanced Amphibious Assault Vehicle (AAAV), and the Lightweight 155mm Howitzer.

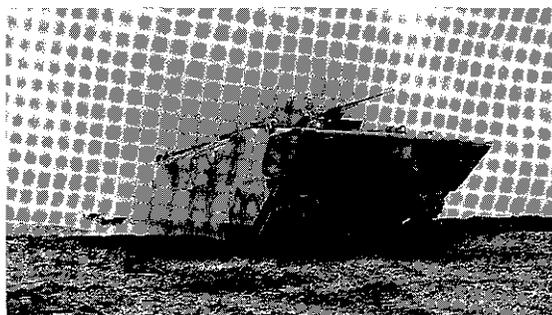
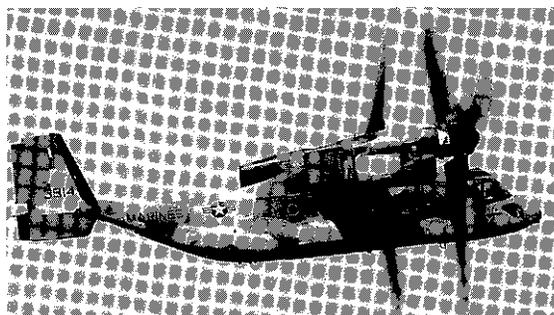
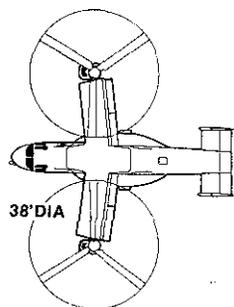
OSPREY IN SIGHT

The Marine Corps fought long and hard in Pentagon budget battles for the unique Bell-Boeing V-22 Osprey tilt-rotor aircraft, which will replace its aging CH-46E assault transport helicopters. Senior DoD officials are scheduled to give the final go-ahead for V-22 Low-rate initial production next month.

development (EMD) aircraft were set to fly last month as this issue went to press. The third and fourth will undergo operational evaluations from August 1998 through January 1999. The first of 425 production MV-22s will be delivered to the Marine Corps in 1999. The aircraft is slated to achieve an initial operational capability (IOC) in 2001.

FROM SEA TO LAND

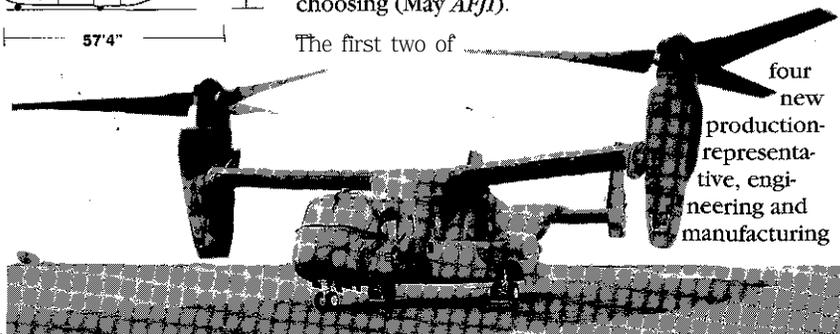
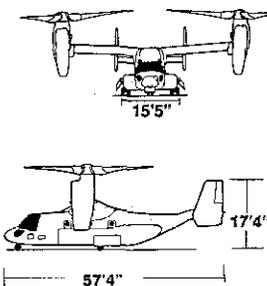
The high-water-speed AAAV ("triple-A-V") is the real key to a true OTH amphibious assault capability. The 37-ton vehicle will transport 18 Marines and its own crew of three over water at speeds in excess of 25 knots (29 miles per hour), allowing amphibious ships to remain 25-40 nautical miles offshore, threatening a longer coastline while reducing their exposure to coastal defense weapons. As it moves out of the water, the AAAV will quickly transition to an agile land combat vehicle with speed and maneuverability equal to the Army's M1A1 tank, able to race inland at speeds of up to 45 mph.



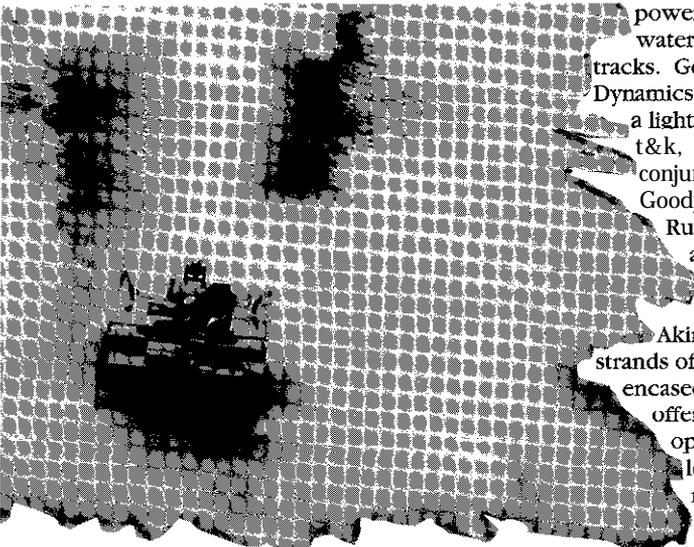
The V-22, which will carry 24 combat-loaded Marines, can take off, hover, and land vertically like a helicopter and fly horizontally like a C-130 transport at a speed of nearly 300 knots by tilting its two huge rotors forward. It flies more than twice as fast as the CH-46E and has about four times the range. It will give Marine units on Navy amphibious assault ships tremendous reach ashore at points of their own choosing (May AFJ).

General Dynamics Land Systems Division was selected over United Defense last June for the AAAV program's demonstration-validation phase of development, which will culminate in the fabrication and testing of three vehicle prototypes. An EMD phase is slated to follow in 2001. Delivery of more than 1,000 production vehicles-935 personnel and 78 command and control variants-is scheduled to begin in 2005, with an IOC with 14 AAAVs achieved in FY2005-FY2006.

The first two of



The AAAV's planing hull design deploys planing appendages (bow, transom, and side flaps) and is propelled through the water by two 23-inch-diameter AlliedSignal waterjets. When the AAAV approaches the beach, it retracts the appendages and lowers tracks, roadwheels, and hydropneumatic suspension units. A mechanical drivetrain, provided by Allison Transmission and already in use on combat vehicles, will allow the AAAV to transition rapidly from water to land mode by incrementally transferring engine



power from the waterjets to the tracks. General Dynamics hopes to use a lightweight band t&k, developed in conjunction with Goodyear Tire and Rubber, in lieu of a standard metal block-type track. Akin to parallel strands of bicycle chain encased in rubber, it offers very quiet operation and less rolling resistance.

Two alternative diesel

engines will compete to provide the requisite 2,600 horsepower for water operations and 800 hp for land mobility. Detroit Diesel and Germany's MTU are up powering the latter's MT88312-cylinder engine used on France's Leclerc tank for the AAV. The UK's Varsity Perkins is also developing a 16-cylinder version of its CV12 engine, which is used on British Army Challenger 2 tanks and will power the US Army's Crusader next-generation howitzer.

The AAV will have a non-corrosive aluminum armor hull and additional ceramic armor tiles mounted in upper areas of the vehicle.

A two-man turret will house the vehicle commander and gunner, a 25mm Bushmaster chain gun, a coaxial 7.62mm machine gun, an infrared night-vision sight for the gunner, and a computerized fire control system. The turret assembly has provisions to accept a 30mm gun and a missile system. Eight periscopes will provide the vehicle commander a 360-degree view.

USMC Col. James M. Feigley, the Service's AAV program manager, told *AFJ*, "Our ultimate goal in demonstration-validation is to test some prototypes, starting in Fiscal Year 2000, that represent the best possible design and the best balance of operational capability and cost. We hope to avoid the next development phase-EMD-or to substantially reduce the amount of activity associated with that phase. So we're pushing very hard to get a mature design early."

The AAV program got a leg up during the preceding Concept Exploration phase, accomplishing many activities not traditionally done until later, such as building automotive and hydrodynamic test rigs and a weapon station as well as testing armor samples. As a result, the program is "half a phase ahead," Feigley said, and is already moving to test second-generation technologies for subsystems such as the water jets and the suspension.

Feigley's biggest worry is software development. He said the highly automated AAV's software "could easily exceed one million lines of code, for everything from the engine controller to the gas pedal to the embedded diagnostics to the ballistic computers to the moving map display." The AAV's suspension system is his next biggest concern. "Because it is so important to the vehicle for both high water speed and cross country mobility, we want to be absolutely certain of the reliability and durability and physical performance of the suspension system." The vehicle's weight is also a critical element. "We have a fixed amount of horsepower and, if we go beyond a certain upper weight limit, we'll be unable to achieve the desired high-water-speed performance."

ANTITANK WEAPONS BOLSTER FIREPOWER

The Marine Corps will get a boost in firepower beginning in 1999 when it fields the Army's new Javelin manportable antitank missile system. Developed by a Texas Instruments-Lockheed Martin joint venture, Javelin is slated to enter full-rate production in May. The fire-and-forget Javelin

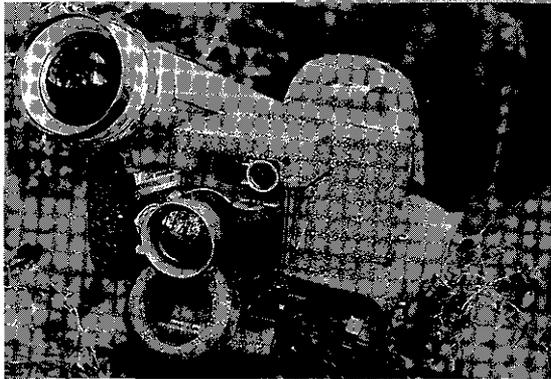
missile has a range of 2,000 meters. The shoulder-fired system, consisting of a reusable command launch unit with an infrared (IR) sight and a disposable launch tube housing the missile, currently weighs about 49 pounds. The five-inch-diameter missile, equipped with an imaging IR seeker, flies a top-attack trajectory; its two-stage warhead can defeat

conventional and reactive armor.

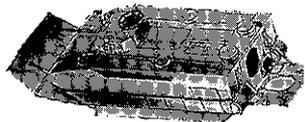
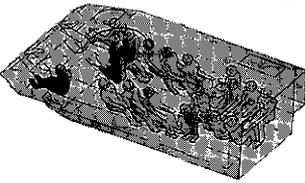
Javelin, which entered low-rate initial production in June 1994, was fielded with the three battalions of the Army's 75th Ranger Regiment beginning last June; the 82nd Airborne Division is the next unit receiving Javelin. The first multiyear production contract, to be awarded in May, will include the first USMC buy.

The Marine Corps has developed a shorter-range, low-cost antitank weapon on its own that will complement Javelin. Predator, like Javelin, is a man-portable, shoulder-launched weapon with a top-attack, fire-and-forget missile, but its range is 600 meters. Developed by Lockheed Martin Aeronautics, the lightweight Predator weighs just under 20 pounds, and its disposable launch tube is only 35 inches long.

It is slated to enter production in late 1999. ■



Feigley told *AFJ*, "There is a desire and a need to introduce the AAV sooner than currently planned in the Fleet Marine Force. If we're excruciatingly rigorous in the [technical performance vs. cost] tradeoff analyses we're doing right now and the subsystem testing we'll do over the next three years, I think we'll be able to accelerate the program [without undue risk]."



The high-water-speed AAV will carry 18 Marines and a crew of 3. The AAV's planing hull design retracts its tracks, rood wheels, and suspension units and deploys bow, transom, and side flops for ship-to-shore movement. It is propelled by two large water jets.

