

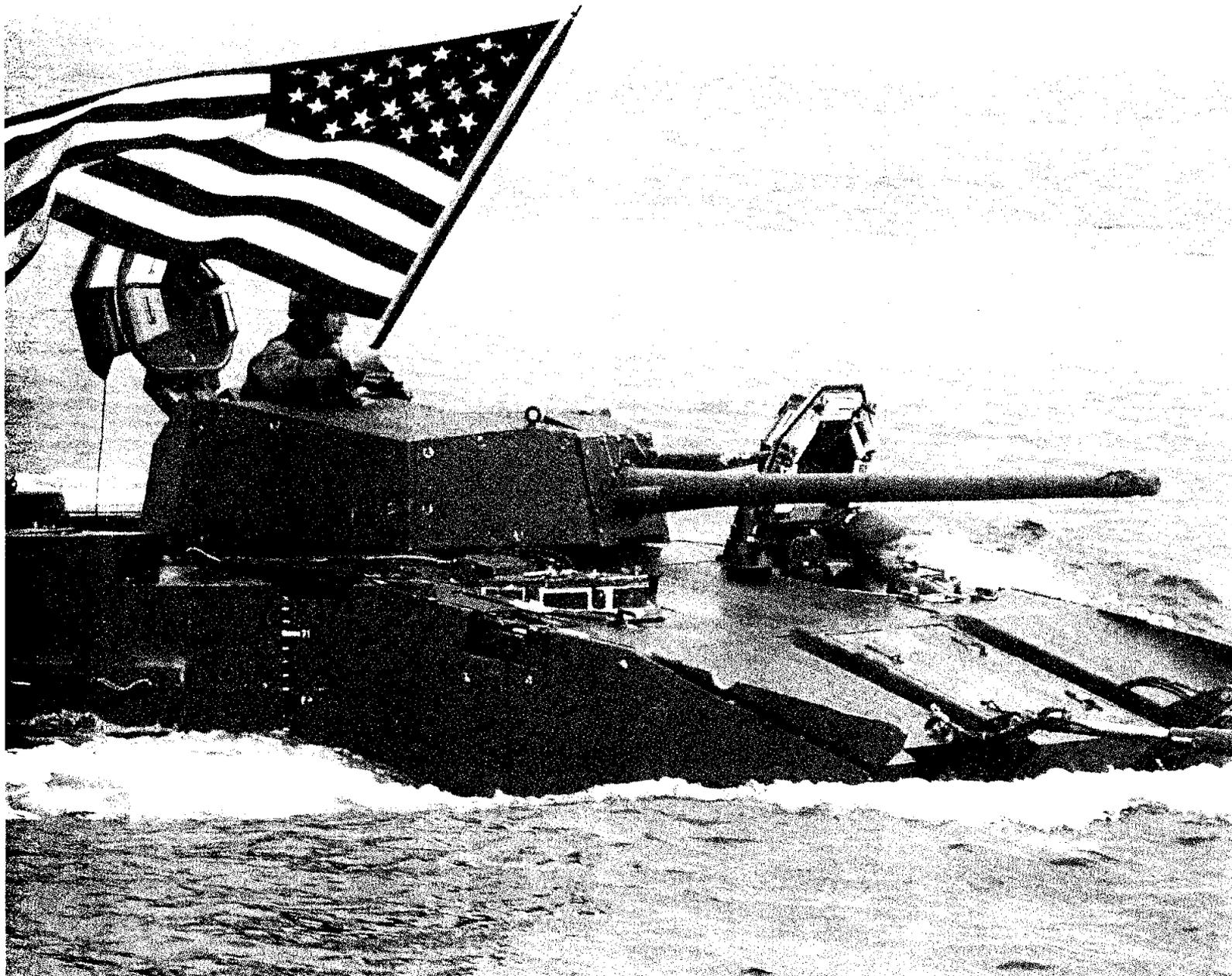
Marines

JANUARY - JUNE 2002

Official Magazine of the Marine Corps

*Making of a
Sergeant Major*

By Mike Mitchell





AAAV: More Than a Better AAV

by Sgt. M. V. Trindade
Headquarters Marine Corps
WASHINGTON, D.C.

The Marine Corps began studies on the development of the Advanced Amphibious Assault Vehicle well over a decade ago in the effort to push the limits of what Leathernecks have done so well for over half a century - assaulting a beachhead.

Today the AAV prototype is a reality and is well underway to become a revolutionary weapon in the Corps' armament.

The AAV is a "concept-based requirement," meaning that studies were put into determining what the Corps would need in the long run as opposed to just making "a follow on version of the current vehicle," said Maj. William Brannen, AAV operations officer.

Project developers tailored a vehicle specifically for the Corps' changing roles and projected needs. "You don't necessarily want just a bigger and better piece of new equipment to replace an aging platform," Brannen explained, "the goal is to design, build, buy, and field a piece of gear that truly satisfies Marine

Corps warfighting requirements for the foreseeable future. The AAV will do just that."

Analysis of the current vehicle, the AAV7A1, found it deficient in mobility on both water and land, firepower, survivability and command and control capabilities, according to several Mission Area Analyses.

These analyses validated the requirement that the AAV needed to overcome the operational deficiencies of its predecessor. The AAV, once completed, will support the Marine Corps 21st Century capstone concept of Expeditionary Maneuver Warfare.

To accomplish everything the Corps needs in the AAV requires a significant amount of dedication to development. And unlike the acquisition of any other major ground combat vehicle, the Marine Corps is solely responsible for development and funding of the AAV.

"Nobody else develops amphibious vehicles," explained Brannen, "so the Marine Corps was not going to depend upon another service to develop the one platform in our inventory that is central to our signature mission, amphibious operations".

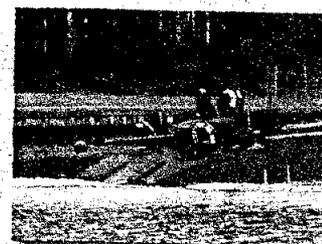
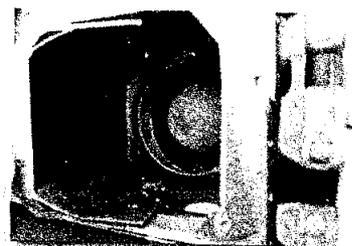
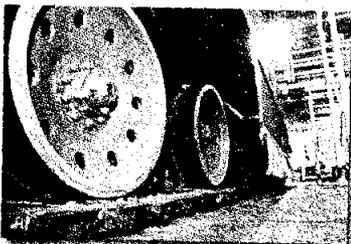
According to Walter Zeitfuss, AAV director of test and evaluation, development for the vehicle has used input from fleet Marines to "get feedback as they go along."

"We asked for and got Marines to participate with design," Zeitfuss said. "As designs were being formulated, Marines were telling us how they do it in the fleet, telling us what worked and what didn't."

One very important developmental aspect of the AAV was ensuring the vehicle would have "over-the-horizon" capability. Currently the AAV doesn't have the range to launch from a Naval vessel and surprise the enemy.

"The days of launching from one to two clicks (approximately one to two kilometers) are gone," Zeitfuss explained. "We can't afford to bring the ships in that close. The lethality of weapons of the beach could work the ships over with the present operations plan."

The requirement is for the AAV to be able to navigate over 25 miles of ocean, and still have an additional 200 miles of range on land, which allows for greater flexibility of landing location and



considerably improves tactical surprise.

"What we're really looking at is ship to objective maneuver," Zeitfuss said of the AAV's intended combat goals. "In the old scenario the AAV would hit the shore, drop the ramp and the grunts would come out shooting. We won't have to do that anymore. We'll have the capability to go right to the objective."

Things such as rivers that can represent obstacles to the AAV will not be a problem for the AAV, according to Zeitfuss. This is in part because of the twin turbo diesel engine that will allow mobility against river currents.

Although much time has gone into determining what the AAV should be able to accomplish, getting it to meet those requirements hasn't been easy.

One problem with increasing the range and speed of the AAV is the fact that it isn't very hydrodynamic.

The key to increasing the range of the AAV is to make it go fast in the water. "We're basically trying to make a brick fly," commented Brannen. Achieving significant high water speeds with a displacement hull vehicle that weighs in excess of 70,000 lbs. is currently an "engineering and fiscal impossibility," said the program office.

However, with the deployment of an extended bow plane, along with chine and transom flaps resembling side and undercarriage spoilers, the AAV transitions into a planing hull vehicle that can achieve truly remarkable speed in the water.

"It's like a real Transformer," said Sgt. Sam Shaw AAV test pilot, comparing the first functional prototype at Patuxent River, also known as "P1" to the old 80's cartoon. "With the push of a button this thing will be able to go from land mode to water mode."

"People need to understand this vehicle isn't evolutionary," Zeitfuss said, "it's revolutionary." Zeitfuss likened the armor-plated behemoth as superior to the AAV as jet fighters are to the propeller

fighters of WWII. "It's completely different," he said.

Although the high water speed requirement is for between 20-25 knots for AAV, the current prototype vehicle has achieved speeds in excess of 38 knots with an engine that produces more than 2,700 horsepower, and two 23" water jets, which is a vast improvement over the 6-8 knots achieved by its predecessor.

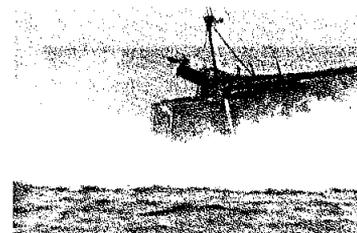
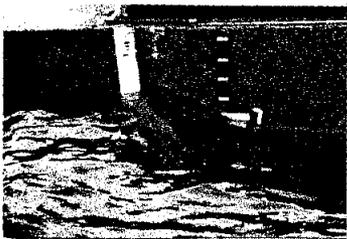
Increased aquatic capabilities aren't the only new aspect of the AAV. The vehicle will offer superior protection for embarked infantry. As configured now, the vehicle will hold approximately 17 combat-loaded Marines.

In light of emerging terrorist threats, to include Nuclear, Biological, and Chemical in nature, the AAV, according to Brannen, will be the first combat vehicle in the world to feature an overpressure air system to protect not only the crew, but the embarked infantry as well from NBC assaults.

Even though Marines will be safer in the vehicle, infantrymen will also have better direct fire support from the AAV's lethal turret mounted MK 46 30/40mm weapon system. The weapon has unprecedented accuracy because of its full solution digital fire



Prior to launch, Shaw runs through several last minute details with a few of the members of the AAV maintenance crew. Photo by Sgt. M. V. Trindade



control system, full stabilization and second generation Forward Looking Infrared.

Couple this with a vast assortment of 30mm ammunition and the AAV sports the "most powerful medium-caliber machine gun in the world," according to the program office.

"Basically this gun has the same type of targeting system as the M1 Abrams tank," said Shaw. "It can laser a target across the river at Solomon's (Island) and put a round in it. Basically if I can see it, I can shoot it."

The AAV's arsenal will allow it to destroy enemy infantry threats, lightly armored vehicles, coastal combatants, and various urban and bunker materials. This increased lethality will, for the first time, allow an assault amphibian vehicle to truly provide direct fire support to embarked infantry at extended ranges during mechanized operations ashore.

Although testing has been ongoing for several years, the ride hasn't necessarily been smooth.

"It's always a hell of a lot better to have something break during testing," said Tim Williams, field engineer, General Dynamics. "Some of the more problematic systems have already been redesigned for the next generation prototypes."

Despite spending a considerable amount of time in maintenance, LtCol. John Quigley, director Amphibious Vehicle Test Branch, said that's exactly what they're supposed to do.

"The engineers," Quigley began, "will tell us to basically wear out a part. That's a standard. GM does it, as does Boeing or Ford. When

one part fails we'll replace it and then make it fail again. If the failure's acceptable, we'll annotate it and say, 'this part will last X number of hours,' if not then it'll get redesigned." Many of the systems on PI have already been redesigned.

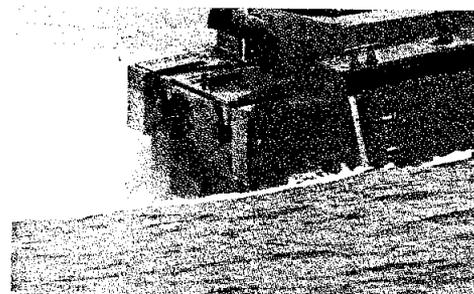
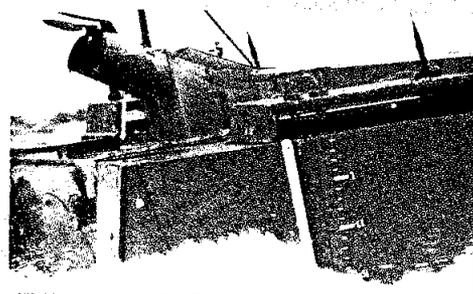
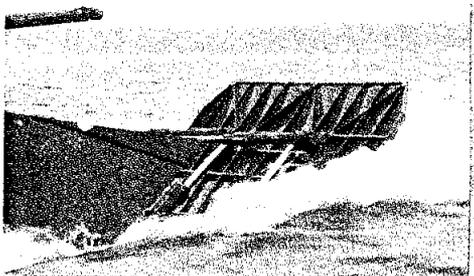
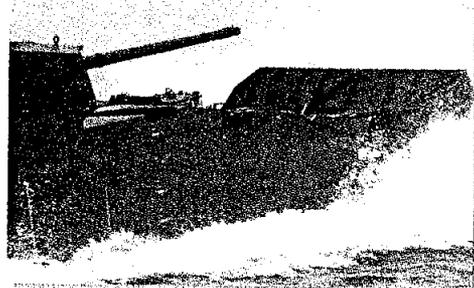
"Eventually we'll drive them (the prototypes) until they cannot function anymore," Quigley continued. "We're trying to get three to five years wear put on in six months."

One interesting aspect of the AAV is the amount of software lines it has in it, explained Zeitfuss. "There are exactly zero lines of software in the AAV," he said. "The AAV has over a million. It's fly by wire, everything's computer controlled."

The vast amount of hardware/software might seem like the AAV is inviting trouble, but redundancy systems are inherently built into many aspects of the vehicle. Eventually, everything a modern office has in it will be aboard a command and control version of the AAV, which will provide commanders and their staff the capability to function as a tactical echelon command post.

Currently, Initial Operating Capability for the AAV program is scheduled for calendar year 2007. Eventually, the Corps will have 1,013 AAV's with the last one scheduled for delivery in 2017.

For more information on the AAV, visit www.aaav.usmc.mil.



All photos of AAV taken by Sgt. M. V. Trindade