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Expeditionary Fighting Vehicle

Outlook

- January 2011: Defense Secretary Gates announces termination of the EFV, citing the unsupportable costs of the program
- U.S. Marine Corps subsequently withdraws all funding for the EFV, which was still in its SDD-2 phase
- We no longer forecast any serial production toward a revised USMC procurement objective of 573 vehicles

Orientation

Description. A tracked, amphibious armored personnel carrier/assault vehicle.

Sponsor. The U.S. Marine Corps sponsored the development of the EFV.

Status. In January 2011, the EFV was terminated.

Total Produced. Through 2010, the contractor produced 17 complete EFV prototypes.

Application. A self-deploying, high water-speed, armored amphibious vehicle optimized for carrying

Marines from ships located beyond the horizon to inland objectives. The EFV was the designated follow-on to the AAV7A1.

Price Range. The base EFV vehicle was supposed to carry an initial FY10 unit price of \$20.029 million. However, U.S. Department of Defense budget request documentation indicated an actual FY10 unit cost of \$30.268 million.

The U.S. Marine Corps expected the total unit cost to fall to \$15.955 million in FY13.

Contractors

Prime

General Dynamics Land Systems, Amphibious Systems	http://www.gdls.com , 14041 Worth Ave, Woodbridge, VA 22192 United States, Tel: + 1 (703) 492-3200, Fax: + 1 (703) 492-3410, Email: info@gdls.com , Prime
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Subcontractor

Alliant Techsystems - Armament Systems, Integrated Weapon Systems	http://www.atk.com , 3309 N Reseda Cir, Mesa, AZ 85215 United States, Tel: + 1 (480) 324-8600, Fax: + 1 (480) 324-8758, Email: ammunition.group@atk.com (30mm Bushmaster II/Mark 44 Automatic Cannon)
Allison Transmission Division, General Motors Corp	http://www.allisontransmission.com , PO Box 894, Indianapolis, IN 46206 United States, Tel: + 1 (317) 242-5000 (X-4560 Automatic Gearbox)

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Detroit Diesel Corp	http://www.detroitdiesel.com , 13400 Outer Dr W, Detroit, MI 48239-4001 United States, Tel: + 1 (313) 592-5000, Fax: + 1 (313) 592-5158, Email: defense@detroitdiesel.com (Licensed MT 883 Ka 523 Diesel Engine)
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EG&G Technical Services	http://www.urscorp.com , 200 Orchard Ridge Dr, Suite 101, Gaithersburg, MD 20878-1978 United States, Tel: + 1 (301) 258-9780, Fax: + 1 (301) 869-8728, Email: media_contact@urscorp.com Defunct (EFV Support Services)
Euro Machinery Specialists Inc	http://www.euromachinery.net , N59 W14272 Bobolink Ave, Menomonee Falls, WI 53051 United States, Tel: + 1 (262) 252-4280, Fax: + 1 (262) 252-5073, Email: info@euromachinery.net (Installation of EFV Machining Line)
FN Manufacturing LLC	http://www.fnmfg.com , 797 Old Clemson Rd, Columbia, SC 29229 United States, Tel: + 1 (803) 736-0522, Fax: + 1 (803) 736-4169, Email: laurelh@fnmfg.com (M240-Series Machine Guns)
Honeywell International Inc	http://www.honeywell.com , 101 Columbia Rd, Morristown, NJ 07962 United States, Tel: + 1 (973) 455-2000, Fax: + 1 (973) 455-4807 (AlliedSignal EFV Waterjets)
L-3 Communications - Combat Propulsion Systems	http://www.l-3com.com/cps/ , 76 Getty St, Muskegon, MI 49442-1238 United States, Tel: + 1 (231) 724-2151, Fax: + 1 (231) 724-2664 (EFV Hydropneumatic Retractable Suspension)
MTS Corp	http://www.mts.com , 14000 Technology Dr, Eden Prairie, MN 55344 United States, Tel: + 1 (800) 328-2255, Fax: + 1 (952) 937-4515, Email: info@mts.com (Customized EFV Suspension Test Rig)

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Technical Data

Special Note. In July 2003, the commandant of the Marine Corps ordered the Advanced Amphibious Assault Vehicle (AAAV) program to be renamed the Expeditionary Fighting Vehicle (EFV) program.

Design Features. The EFV would offer a significantly enhanced capability over the existing AAV7A1 in terms of water speed, survivability, and firepower.

Crew. Three: commander, gunner, and driver.

Armor. The U.S. Marine Corps claims the EFV armor suite offers the following levels of protection:

- All-around protection from projectiles up to 14.5mm at 300 meters (328.08 yd)

- Frontal arc (60-degree) protection from 30mm projectiles at 1,000 meters (1,093.6 yd)
- Top protection from 155mm airburst fire at 15.24 meters (50 ft)
- All-around protection from RPG-7 class anti-tank munitions

The EFV armor suite features aluminum alloy-base armor, supplemented with modular ceramic-based armor. Had the program survived, the EFV could have eventually integrated explosive reactive armor (ERA) modules. The vehicle interior features spall liners and mine-blast-protected seats.

Dimensions. The following data reflect the second-generation EFV prototype.

	<u>SI Units</u>	<u>U.S. Units</u>
Length	9.09 m	29.85 ft
Width	3.65 m	12 ft
Height	3.18 m	10.46 ft
Vehicle curb weight	34.47 tonnes	38.0 tons
Fuel capacity	1,381.63 liters	365 gal

Performance. The maximum water speed is in a calm sea state; the EFV can reportedly land in at least 2.438 meters (8 ft) of plunging surf. The maximum land speed and range data reflect use on paved roads.

	<u>SI Units</u>	<u>U.S. Units</u>
Maximum speed (land)	76.18 kmph	45 mph
Maximum speed (water)	25 kt (46.67 kmph)	25 kt (29 mph)
Maximum cruising speed (water)	9 kt (16.65 kmph)	9 kt (10.35 mph)

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	<u>SI Units</u>	<u>U.S. Units</u>
Maximum cruising range (land)	643.72 km	400 stat mi
Maximum cruising range (water)	104.6 km	65 stat mi
Sea launch distance	46.29 km	28.77 stat mi
Fording	amphibious	amphibious
Troop capacity	18 infantrymen	18 infantrymen
Cargo capacity	2.32 tonnes	2.56 tons

Engine. Motoren- und Turbinen-Union MT 883 Ka 523, produced under license by Detroit Diesel Corporation. This 12-cylinder supercharged diesel powerplant generates 645.03 kilowatts (865 hp), with a power-to-weight ratio of 18.83 kilowatts per tonne (22.9 hp/ton) on land.

At sea, this powerplant generates 1,938.82 kilowatts (2,600 hp), with a power-to-weight ratio of 56.59 kilowatts per tonne (68.84 hp/ton).

Gearbox. Allison X-4560 automatic gearbox, with six gear ratios. Two AlliedSignal waterjets, each 58.4 centimeters (22.99 in) in diameter, provide water propulsion. Engine power is automatically transferred between the gearbox and the waterjets.

Suspension and Running Gear. L-3 Communications hydro-pneumatic, retractable suspension system, with seven roadwheels on each side. The EFV actively dampened suspension apparently does not feature track return rollers. The drive sprocket mounts to the front.

The second-generation EFV mounts lightweight steel track in place of the double-pin aluminum track of the first-generation prototype.

Armament

Main Armament. Alliant Techsystems Mk 44 30/40mm high-velocity automatic cannon. This

ordnance is essentially the 30mm Bushmaster II cannon, which the crew can convert to a 40mm Super Shot weapon by replacing the barrel and ammunition feed components.

The Mk 44 can fire in single-shot, burst, and full-automatic modes; maximum rate of fire is 400 rounds per minute. The maximum effective range of the Mk 44 exceeds 1,500 meters (1,640.4 yd).

Secondary Armament. Coaxially mounted 7.62x51mm NATO (.308 Winchester) M240 machine gun. Photographic evidence suggests the EFV may also mount eight smoke grenade launchers on each side of the turret.

The Mk 44 cannon and the M240 coaxial machine gun mount in the Mk 46 Mod 0 Weapon System two-man turret. The EFV carries a total of 600 rounds of 30mm ammunition (200 ready; 400 stowed), and 2,400 rounds of 7.62x51mm NATO ammunition (800 ready; 1,600 stowed).

Fire Control. The Mk 46 Mod 0 fire control suite features a fully stabilized, full-solution fire control system, with second-generation forward-looking infrared (FLIR) sights and an eye-safe laser rangefinder.



EFV Prototype

Source: U.S. Marine Corps

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Variants/Upgrades

Variants. Simultaneous with the development of the basic EFV personnel carrier, the U.S. Marine Corps was also developing the EFV Command Platform. The seven-workstation EFVCP features a full range of command and control functionality, including:

- The Advanced Field Artillery Tactical Data System (AFATDS)
- The Intelligence Analysis System (IAS)
- The Command and Control Personnel Computer (C2PC)

- Two Single-Channel Ground and Airborne Radio System (SINCGARS) units
- Two ultra-high-frequency (UHF) Enhanced Position Location Reporting Systems (EPLRS)
- Two UHF Have Quick II radios

Modernization and Retrofit Overview. Not applicable, as the EFV was terminated while still in development.



EFV Prototype – Going Nowhere Fast

Source: General Dynamics Land Systems

Program Review

Background. In July 1985, (then) Commandant of the Marine Corps Gen. Alfred Gray fully endorsed the evolving over-the-horizon assault concept for amphibious landing operations. Under what eventually became the Advanced Amphibious Assault Vehicle (AAAV) program, the U.S. Marine Corps sought to develop the next-generation vehicle to replace the LVTP7/AAV7A1 amphibious assault vehicle. The new vehicle will operate in conjunction with the high-speed Landing Craft Air Cushion (LCAC) platform and the MV-22 Osprey tiltrotor aircraft, completing the U.S. Marine Corps triad of over-the-horizon assault assets.

Two Decades of Development

In May 1986, AAI Corp completed the initial test-rig vehicle, under a contract from the David Taylor Ship

Research and Development Center of the Naval Sea Systems Command. NAVSEA used this testbed vehicle to investigate several powerplant, water propulsion, and suspension options. The initial test program was largely complete by 1990.

For the next phase of the development program, AAI fabricated the Propulsion System Demonstrator to demonstrate the feasibility of a full-scale tracked amphibious vehicle attaining a water speed in excess of 20 knots (37 kmph/23 mph). The PSD featured a retractable suspension, a bow flap/deflector, chine flaps, and a transom-mounted flap. For high-speed water operations, four 40.6-centimeter (15.98-in) transom-mounted waterjet units provided thrust; for low-speed water operations, the PSD employed two 30.5 centimeter (12-in) Dowty waterjets. The driver

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used a wire-control system, with backup for both land and water operations.

In September 1993, following completion of the project concept phase, NAVSEA awarded two contracts – to FMC Corp and General Dynamics/AAI Corp – for competitive test and evaluation during the demonstration and validation phase.

In June 1996, General Dynamics Land Systems Division won the contract for full-scale engineering development of its AAAP design. To run the new program, General Dynamics created the Amphibious Systems Division (Woodbridge, Virginia). The serial production line would be located at the Lima Army Tank Plant (Lima, Ohio) facility.

Description. In the basic interior layout, the powerplant mounts at the vehicle's center of gravity – on the centerline of the vehicle, behind the Mk 46 Mod 0 Weapon System turret.

Stability, Survivability, Lethality

The gearbox mounts forward of the powerplant, in the center-front of the hull. The two waterjet units mount at the rear corners of the hull interior.

The driver sits in the left-front of the hull. The driver's station features a single-piece hatch cover with five integral vision blocks and night vision equipment. The right-front of the hull features a secondary single-piece hatch cover, accessible from the troop compartment.

In the Mk 46 Mod 0 Weapon System turret, the commander sits to the right of the main armament; the gunner sits to the left. The commander's cupola features a single-piece hatch cover, five forward periscopes, and one rearward-looking periscope for 360-degree observation. The gunner's station features a single-piece hatch cover. The gunner's Compact Modular Sight (CMS) incorporates second-generation forward-looking infrared (FLIR), day optics, and an eye-safe laser rangefinder.

The troop compartment extends from the right-front of the hull to the hydraulically operated ramp at the rear. Two sliding hatch covers mount in the roof of the troop compartment. The troop compartment of the basic EFV personnel carrier can accommodate up to 18 fully equipped Marines or 2.32 tonnes (2.56 tons) of cargo.

Five bilge pumps (two electric and three hydraulic) mount in the hull interior to maintain buoyancy. The interior design also isolates the diesel fuel cells from the troop and crew compartments. The vehicle also features an automatic fire detection/suppression system, an environmental control system, and a collective NBC (nuclear, biological, and chemical) overpressure protective suite.

Running in Circles

In December 2004, the EFV prototype suffered three serious failures of the hull electronics unit (HEU), the vehicle's main computer system. The failures caused the EFV to lock into a high-speed turn, forcing the driver to shut down the HEU in order to regain control of the vehicle. Although the EFV program office issued a software patch to correct the HEU fault, technical problems continued to plague the EFV prototype vehicle, threatening the entire program.

In February 2006, the EFV program manager, Col. Michael Brogan, noted that system reliability remained the program's "most significant challenge." Indeed, system reliability issues at that time forced the program to delay the Initial Operational Test & Evaluation (IOT&E) phase from 2009 to July 2012.

EFV reliability during the initial SDD phase peaked at a mean time between operational mission failures (MTBOMF) rate of 17.7 hours. While this rate represented significant progress since 2001, it remained far short of the 43.5-hour MTBOMF rate that the U.S. Marine Corps required for the EFV to begin its initial operational evaluation phase. Worse, open-source reporting suggests EFV reliability had actually lost ground, with the MTBOMF falling below 12.5 hours since 2006.

Slip Sliding Away

In the U.S. Department of Defense FY06/FY07 budget request documentation (February 2005), the U.S. Marine Corps cut \$1.5 billion from the EFV program through FY11.

In the U.S. Department of Defense FY08/FY09 budget request documentation (February 2007), the U.S. Marine Corps formally acknowledged the program delays, revising the EFV milestone events. That budget also reflected a 43 percent reduction in the U.S. Marine Corps procurement objective for the EFV, from 1,013 vehicles to 573 vehicles.

In the U.S. Department of Defense FY11 budget request documentation (February 2010), the U.S. Marine Corps further revised the EFV milestone events as follows:

- FY13: LRIP contract award
- FY14-FY15: LRIP deliveries
- FY15: IOT&E phase
- FY16: Full-rate production decision
- FY16: Initial Operating Capability
- FY26: Full Operating Capability

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Since the publication of the U.S. Department of Defense FY09 budget request documentation (February 2008), the U.S. Marine Corps has not even included a budget line for EFV procurement.

SDD-2: EFV 'Do-Over'

While the U.S. Marine Corps maintained the EFV program was vital to force modernization, the perennial technical glitches and cost overruns forced the Corps to swallow some bitter pills with regard to this program.

On February 6, 2007, (then) Navy Secretary Donald Winter sent a letter to congressional committee members formally advising Congress that the EFV program faced a major cost breach, sufficient to force recertification of the program under the provisions of the Nunn-McCurdy Act.

The Nunn-McCurdy Act (10 USC 2433) mandates that Congress must be notified when a major defense acquisition program experiences a cost increase of at least 15 percent. If the increase is 25 percent or more, the secretary of defense must certify to the Congress that the program is essential to national security and adequately managed, that no feasible alternatives exist, and that the new cost estimates are reasonable; otherwise, funding for the program may be suspended.

In August 2007, the U.S. Department of Defense released selected acquisition reports indicating total program costs for the EFV had grown from \$11.9 billion to \$16 billion, a 34.2 percent increase.

In 2008, the U.S. Marine Corps announced the EFV had officially failed its SDD review. However, as the Corps maintained the EFV was absolutely vital to future operations, failing the SDD phase did not mean the end of the EFV. The program effectively went back to the drawing board. Seven new EFV prototypes were delivered during the summer of 2010, under the auspices of an SDD-2 phase.

The Budget Axe Falls

After two decades of development, the U.S. Marine Corps had little to show for the EFV program. Finally, in January 2011, U.S. Secretary of Defense Robert Gates announced the termination of the EFV. During the announcement, Gates said that the EFV would eat up the bulk of the Marine Corps' vehicle budget for the foreseeable future, and even most of the service's budget as a whole. The U.S. Marine Corps subsequently announced it would withdraw all further funding for the EFV program.

Related News

Marine Corps Wants More Affordable Amphibious Assault Vehicle – The Marine Corps says it plans to develop a more affordable replacement for its existing amphibious assault vehicle fleet. The move follows a decision to terminate the service's Expeditionary Fighting Vehicle (EFV). Lt. Gen. George Flynn, the head of Marine Corps Combat Development Command, said the unit cost of the replacement vehicle would not exceed \$12 million, compared to the EFV's \$18 million price tag. The service says it will be able to save nearly \$2.4 billion that will be shifted to other priorities.

The Marine Corps plans to invest in its existing fleet of amphibious assault vehicles to keep them operational, and will accelerate the Marine Personnel Carrier program and launch a New Amphibious Vehicle (NAV) program as a follow-on to the EFV. Flynn estimated that the service could spend about \$500 million developing the NAV. (*InsideDefense*, 1/11)

Defense Secretary Gates Outlines Major Budget Decisions – Defense Secretary Robert Gates has announced a series of program and policy decisions stemming from his \$100 billion savings initiative, including the end of the Army's Surface-Launched AMRAAM (SLAMRAAM) and the Marine Corps' Expeditionary Fighting Vehicle (EFV), and a restructuring of the F-35B development effort. Gates also revealed that the U.S. defense budget will see slower growth in the years ahead, but that, with the exception of the aforementioned programs, the Pentagon's modernization accounts have been largely insulated from the damage.

The goal of the savings initiative was to identify \$100 billion in operations & maintenance, contract services, and overhead costs that could be used for higher priorities, namely force structure and modernization. Over a five-year period, according to Gates, the Air Force identified \$34 billion in savings, the Army \$29 billion, and the Navy \$35 billion. Defense-wide agencies, meanwhile, were able to identify \$54 billion in savings over the same period.

The result is that the Pentagon expects to see around 2 to 3 percent real growth in its modernization budget, despite a flattening defense budget topline. Indeed, Gates said the Pentagon's FY12 request will total \$553 billion, which is \$13 billion less than what was projected a year ago, and reflects 1.5 percent real growth over the Appropriations

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Committee's proposals for FY11. The new budget proposal also lowers topline growth in FY13 and FY14, and provides zero real growth in FY15 and FY16.

Altogether, over the next five years, the Pentagon will see a reduction of \$78 billion compared to the previous Future Years Defense Plan (FYDP). That figure includes the \$54 billion in Defense-wide savings described above; \$14 billion saved due to new economic assumptions regarding inflation and pay; \$4 billion saved in the F-35 program, reflecting new pricing and production plans; and \$6 billion saved by cutting the size of the Army and Marine Corps. Beginning in FY15, the Army will shed 40,000 troops, while the Marine Corps will decline by 27,000. The major services, meanwhile, will get to keep the \$100 billion worth of savings outlined above.

In terms of program decisions, Gates announced the termination of the Army's SLAMRAAM and Marine Corps' EFV. The SLAMRAAM would have replaced the Army's Avenger air defense systems. The Army still maintains a requirement to develop and field a replacement system.

The EFV termination is not a shock, given the enormous cost that has gone into the program – with little to show for it. In addition to the development problems that the program has faced over the years, Gates said that the EFV would eat up the bulk of the Marine Corps' vehicle budget for the foreseeable future, and even most of the service's budget as a whole. The decision does not mean that the Marine Corps is abandoning its fundamental amphibious requirements, however. Power projection will be achieved through a mix of sea and air power, and new vehicles. The existing amphibious fleet will be upgraded until a more suitable replacement can be found, according to Gates.

Meanwhile, Gates also outlines some areas that will benefit from the Pentagon's latest budget shuffling. Of the approximately \$100 billion in savings outlined by the services, approximately \$28 billion will cover higher than expected operating costs. The remaining \$70+ billion will bolster high-priority military capabilities.

The Army will continue to modernize its Abrams tanks, Bradley fighting vehicles, and Stryker wheeled vehicles, and will accelerate fielding of a new tactical communications network. Given the rising demand for ISR assets, the Army will also buy additional MC-12 reconnaissance aircraft, accelerate procurement of the advanced Gray Eagle UAVs, and begin development of a new vertical unmanned air system (UAS).

Secretary Gates said that the FY12 budget plan represents the minimum level of defense spending necessary to support the U.S. military, given today's threats. Joint Chief of Staff Adm. Mike Mullen also said the services are at their limit when it comes to restricting budget growth, and any additional pressure on the budget would require additional force structure cuts. (FI, 1/11)

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Funding

Since the publication of the U.S. Navy's FY09 budget request documentation (February 2008), there has been no budget line for U.S. Marine Corps procurement of the Expeditionary Fighting Vehicle. The following funding data reflect U.S. Navy FY12 budget request documentation (February 2011) for research, development, test & evaluation of the cancelled EFV, and the follow-on New Amphibious Vehicle (NAV), under program PE#0603611M (Marine Corps Assault Vehicles).

In January 2011, U.S. Secretary of Defense Robert Gates announced the termination of the EFV. The U.S. Marine Corps subsequently announced it would withdraw all further funding for the EFV program.

U.S. FUNDING

	FY08 <u>QTY</u>	FY08 <u>AMT</u>	FY09 <u>QTY</u>	FY09 <u>AMT</u>	FY10 <u>QTY</u>	FY10 <u>AMT</u>
RDT&E						
AAAV (EFV)	-	-	-	256.0	-	292.2
NAV	-	-	-	-	-	-
Total	-	-	-	256.0	-	292.2

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RDT&E	FY11 QTY	FY11 AMT	FY12 QTY	FY12 AMT	FY13 QTY	FY13 AMT
AAAV (EFV)	-	242.8	-	-	-	-
NAV	-	-	-	12.0	-	36.7
Total	-	242.8	-	12.0	-	36.7

RDT&E	FY14 QTY	FY14 AMT	FY15 QTY	FY15 AMT	FY16 QTY	FY16 AMT
AAAV (EFV)	-	-	-	-	-	-
NAV	-	105.6	-	196.3	-	157.0
Total	-	105.6	-	196.3	-	157.0

All amounts are in millions of U.S. dollars.

Contracts/Orders & Options

Since January 1, 2008, the U.S. Marine Corps Systems Command (MARCORSYSCOM) has awarded the following contracts for the EFV program. All amounts are in U.S. dollars.

Date	Contract	Contractor	Amount	Description
2008/01/17	M67854-01-C-0001	GDLS	\$19,490,208	Continuation of EFV SDD phase (spares material).
2008/01/18	M67854-05-C-0072	GDLS	\$11,960,776	Advanced procurement of long-lead materials for EFV SDD-2 phase.
2008/08/01	M67854-08-C-0003	GDLS	\$766,816,525	Development and manufacture of EFV SDD-2 prototypes.
2008/12/01	M67854-02-A-9011	EG&G Technical Services Inc	\$5,193,076	EFV support services.
2009/12/02	M67854-02-A-9011	EG&G Technical Services Inc	\$5,743,621	EFV support services.
2010/09/09	M67854-10-C-0036	Carley Corp	\$35,756,944	EFV training systems development to produce the training system for Marine Corps EFV accession training, as well as for training fleet and reserve forces.

Timetable

Month	Year	Major Development
Late	1985	NAVSEA awards AAI Corp contract for test rig fabrication
Late	1988	AAI begins propulsion-system demonstrator fabrication
Oct	1990	Propulsion-system demonstrator tests
Late	1994	NAVSEA stretches AAAV program
Jun	1996	GDLS wins AAAV development/production contract
Early	2000	First prototype begins testing program
Late	2001	Program slipped another year for further development
Mid-	2003	AAAV enters SDD phase; additional prototypes in production
Jul	2003	Commandant of the Marine Corps officially renames AAAV program the Expeditionary Fighting Vehicle program
	2008	EFV fails initial SDD phase
	2009	Development and testing under SDD-2 begun
Jan	2011	DoD terminates EFV program

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Worldwide Distribution/Inventories

Export Potential. The projected high unit price of the EFV would have placed it beyond the budgets of most nations. However, with the January 2011 termination of the program, the export potential of the EFV has become a moot point.

Country. United States (17 prototypes).

Forecast Rationale

After two decades of development, the U.S. Marine Corps had little to show for the Expeditionary Fighting Vehicle program. Finally, in January 2011, U.S. Secretary of Defense Robert Gates announced the termination of the EFV. During the announcement, Gates said that the EFV would eat up the bulk of the Marine Corps' vehicle budget for the foreseeable future, and even most of the service's budget as a whole. The U.S. Marine Corps subsequently announced it would withdraw all further funding for the EFV program

At the time of this announcement, the EFV remained mired in development. The program was in its second System Development and Demonstration phase (SDD-2), which also involved the additional seven new EFV prototypes that were delivered in June-July 2010.

System Failures

EFV reliability during the first SDD phase peaked at a mean time between operational mission failures (MTBOMF) rate of 17.7 hours. While this rate represented significant progress since 2001, it remained far short of the 43.5-hour MTBOMF rate that the U.S. Marine Corps required for the EFV to begin its initial operational evaluation phase. Worse, open-source reporting suggests EFV reliability had actually lost ground, with the MTBOMF falling below 12.5 hours since 2006.

Slippage

In the U.S. Department of Defense FY08/FY09 budget request documentation (February 2007), the U.S. Marine Corps formally acknowledged the program delays, revising the EFV milestone events. That budget also reflected a 43 percent reduction in the U.S. Marine Corps procurement objective for the EFV, from 1,013 vehicles to 573 vehicles.

In the U.S. Department of Defense FY11 budget request documentation (February 2010), the U.S. Marine Corps further revised the EFV milestone events. This further revision pushed the EFV's Initial Operating Capability milestone back to FY16.

Since the publication of the U.S. Department of Defense FY09 budget request documentation (February 2008), the U.S. Marine Corps had not even included a budget line for EFV procurement.

Second Chance

In 2008, the U.S. Marine Corps announced the EFV had officially failed its SDD review. However, as the Corps maintained the EFV was absolutely vital to future operations, failing the SDD phase did not mean the end of the EFV. The program effectively went back to the drawing board. Seven new EFV prototypes were delivered during the summer of 2010, under the auspices of an SDD-2 phase.

Life After the EFV

With the demise of the EFV, the U.S. Marine Corps plans to develop a more affordable replacement for its existing AAV7A1 fleet. According to the Marine Corps Combat Development Command, the unit cost of the replacement vehicle would not exceed \$12 million. The Marine Corps says it will be able to save nearly \$2.4 billion, that will be shifted to other priorities.

The U.S. Marine Corps plans to invest in its existing fleet of AAV7A1 vehicles to keep them operational. It will also accelerate the Marine Personnel Carrier (MPC) program and launch a New Amphibious Vehicle (NAV) program as a follow-on to the EFV. The Marine Corps could spend about \$500 million developing the NAV.

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