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The Army's M-1E3 Abrams Tank Modernization Program

Background

The M-1 Abrams Tank (**Figure 1**) is designed to maneuver under fire and destroy enemy armored forces on the battlefield by means of mobility, survivability, and firepower. The M-1 is named for General Creighton Abrams, a noted World War II armored battalion commander who later served as Army Chief of Staff from 1972 to 1974. M-1 Abrams tanks are the primary major weapon system in Armored Brigade Combat Teams (ABCTs). At present, the Active Army has 11 ABCTs, and the Army National Guard has 5 ABCTs. Each ABCT has 87 M-1 Abrams tanks.

Figure 1. M-1A2 Abrams Tank



Source: U.S. Army Acquisition Support Center, <https://asc.army.mil/web/portfolio-item/abrams-main-battle-tank/>, accessed September 8, 2023.

The M-1 program began in December 1971. In June 1973, two contracts were awarded by the Army for prototype development to the Defense Division of Chrysler Corporation (which in 1982 became General Dynamics Land Systems [GDLS]) and the Detroit Diesel Allison Division of General Motors (GM). In 1988, GDLS was awarded a contract for the M-1A2 version, and the first M-1A2s began to enter service in late 1992. The M-1A2 is the baseline export version of this tank. Export versions feature a variety of armor and communications packages. The United States has sold M-1A1 and M-1A2 variants to Australia, Egypt, Iraq, Morocco, Kuwait, and Saudi Arabia via Foreign Military Sales (FMS). On January 25, 2023, President Biden announced that the United States would provide Ukraine with 31 M-1 Abrams tanks.

Ongoing M-1 Abrams Modernization Efforts

M-1 Abrams modernization efforts have been focused on fielding a M-1A2 System Enhancement Package (SEP) Version 3 (v3) and developing a new M-1A2 SE Pv4 variant. According to the Army, both M-1A2 SE Pv3

production and M-1A2 SE Pv4 development began in FY2018. In FY2020, the first unit was equipped with M-1A2 SE Pv3. In December 2020, GDLS received a \$4.6 billion contract for SE Pv3 upgrades, which were expected to be completed by June 2028. For FY2024, the Army requested \$698 million for the Abrams Upgrade Program.

The New M-1E3 Abrams Modernization Program

On September 6, 2023, the Army announced it would “close out the M-1A2 SE Pv4 effort and develop the M-1E3 Abrams.” The Army’s announcement quoted Major General (MG) Glenn Dean, Program Executive Officer for Ground Combat Systems, describing the rationale for the decision:

The Abrams Tank can no longer grow its capabilities without adding weight, and we need to reduce its logistical footprint. The war in Ukraine has highlighted a critical need for integrated protections for soldiers, built from within instead of adding on.

The Army announcement elaborated that the new platform

[w]ill include the best features of the M-1A2 SE Pv4 and will comply with the latest modular open systems architecture standards, allowing quicker technology upgrades and requiring fewer resources. This will enable the Army and its commercial partners to design a more survivable, lighter tank that will be more effective on the battlefield at initial fielding, and easier to upgrade in the future.

Regarding M-1A2 SE Pv3 production, the Army noted that

the Army will continue to produce the M-1A2 SE Pv3 at a reduced rate until production transitions to the M-1E3 Abrams.

The Army projects achieving Initial Operational Capability (IOC) in 2030. The Army’s FY2025 budget proposal submitted to the Office of the Secretary of Defense (OSD) reportedly included a request for funds to begin M-1E3 design work.

Possible Features and Capabilities of the M-1E3

While the Army has not made public the new M-1E3 requirements, reportedly a 2019 Army Science Board study on a future tank influenced senior Army leadership to establish the M-1E3 program. The Army Science Board study reportedly recommended a \$2.9 billion, seven-year program to develop a “fifth generation combat vehicle,” with proposed capabilities including

- a hybrid electric drive;

- an autoloader and new main gun;
- advanced munitions, such as maneuvering hypersonic and gun-launched anti-tank guided missiles;
- integrated armor protection;
- improved command, control, and networking capabilities;
- artificial intelligence (AI) applications;
- ability to pair with robotic vehicles; and
- masking capabilities to reduce the vehicle's thermal and electromagnetic signatures.

Although, as noted, the Army has not articulated formal M-1E3 program requirements, reportedly both weight reduction and a hybrid electric power drive are seen by the Army as essential features and are being prioritized in order to reduce logistical requirements.

In October 2022, GDLS reportedly unveiled the Abrams X Technology Demonstrator (**Figure 2**). Some Abrams X features reportedly include

- reduced weight (10 tons less than the current M-1 Abrams);
- a hybrid electric diesel engine 50% more fuel efficient than the current Abrams;
- an unmanned turret which would reduce the crew from four to three soldiers;
- enhanced armor to protect against bombs dropped by drones;
- ability to communicate with unmanned aerial vehicles; and
- an onboard AI system that could both alert the crew to long-range threats and prioritize fires against multiple threats.

While the Abrams X might not meet all of the Army's eventual requirements for a M-1E3 candidate for procurement, it is seen as demonstrating current tank design capabilities.

Current Program Update

Reportedly, in early May 2024, the Army awarded a contract to GDLS allowing the Army to work closely with GDLS to shape requirements for the M-1E3. The Army hopes to be able to bring the M-1E3 into service along a similar timeline as the XM-30 Mechanized Infantry Combat Vehicle (see CRS In Focus IF12094, *The Army's XM-30 Mechanized Infantry Combat Vehicle (Formerly Known as the Optionally Manned Fighting Vehicle [OMFV])*, by Andrew Feickert), which is currently under development. Reportedly, the Army hoped to have a firmer program timeline by the fall of 2024. Over the next 18 months, the Army and GDLS plan to work through a number of technology maturation efforts, including autoloader capabilities for the main gun to facilitate an unmanned turret, alternate power trains, and an active protection system (APS) designed to protect the M-1E3 from anti-tank

guided missiles, rocket-propelled grenades, and threats from a variety of armed aerial drones and loitering munitions.

A Hybrid – Electric M-1E3

Reportedly, the M-1E3 is to be the Army's first hybrid-electric combat vehicle, leveraging lessons learned from the Ukraine conflict. An Army official noted that

[t]he hybrid version of the upgraded tank [M-1E3] will reduce the amount of fuel the service has to lug around the battlefield and will reduce the vehicle's electromagnetic footprint. The tank will be lighter than ever, and it will come with an active protection system that can take down enemy drones through kinetic or non-kinetic means.

Figure 2. General Dynamics Land Systems (GDLS) Abrams X



Source: Breaking Defense, <https://breakingdefense.com/2023/03/armys-fy24-budget-request-doesnt-include-funding-for-new-abrams-prototype/>, accessed September 8, 2023.

Considerations for Congress

Potential oversight considerations for Congress could include the following:

- What is the Army's detailed program plan for reduced M-1A2 SEPv3 production?
- How will funds appropriated for M-1A2 SEPv3 production be reallocated?
- What is the economic impact on the defense industrial base participating in M-1A2 SEPv3 production, in particular, the smaller companies involved in the program?
- Will the M-1E3 replace current M-1 Abrams tanks in service on a one-for-one basis, or will the Army maintain a mixed fleet of tanks?
- Will Army National Guard ABCTs receive M-1E3s?
- How many years will it take to field M-1E3s to all of the Army's ABCTs?
- Will M-1E3s be authorized for Foreign Military Sales (FMS)?

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