Congressional Research Service
Informing the legislative debate since 1914

IN FOCUS

Updated May 18, 2022

The Army's Robotic Combat Vehicle (RCV) Program

Background

The RCV is a vehicle being developed as part of the Army's Next Generation Combat Vehicle (NGCV) family of vehicles. The Army plans to develop three RCV variants: Light, Medium, and Heavy. The Army reportedly envisions employing RCVs as "scouts" and "escorts" for manned fighting vehicles to deter ambushes and to guard the flanks of mechanized formations. As originally planned, RCVs are to be controlled by operators riding in NGCVs, but the Army hopes that improved ground navigation technology and artificial intelligence (AI) might eventually permit a single operator to control multiple RCVs or for RCVs to operate in a more autonomous mode.

Three RCV Variants

According to the *Army's Robotic Combat Vehicle Campaign Plan, January 16, 2019*, obtained by CRS, the Army plans to develop three RCV variants:

RCV Light (RCV-L)

The RCV-L (**Figure 1**) is to weigh no more than 10 tons, with dimensions (length, width, height) of no more than 224 x 88 x 94 inches. In terms of transportability, a single RCV-L would be transported by rotary wing aircraft. The RCV-L would also have limited on-board lethality such as self-defense systems, anti-tank guided missiles (ATGMs), or recoilless weapons. The RCV-L is considered an expendable weapon system, meaning its destruction in combat is expected and acceptable.

Figure 1. Example of an RCV-L Prototype

Source: https://www.qinetiq.com/en/news/first-robotic-combat-vehicle-light, accessed July 12, 2021.

RCV Medium (RCV-M)

The RCV-M (**Figure 2**) is to weigh between 10 and 20 tons, with dimensions (length, width, height) of no more than 230 x 107 x 94 inches. In terms of transportability, a single RCV-M is to be transported by a C-130 transport aircraft. The RCV-M is to have increased onboard lethality to defeat light- to medium-armored threats. The RCV-M is considered "durable" by the Army, meaning the Army would like the RCV-M to be more survivable than the RCV-L.

Figure 2. Example of an RCV-M Prototype

Source: https://www.defensedaily.com/textron-team-readying-delivery-first-rcv-m-prototypes-received-deal-electric-variant/army/, accessed July 12, 2021.

RCV Heavy (RCV-H)

The RCV-H (**Figure 3**) is to weigh between 20 and 30 tons, with dimensions (length, width, height) of no more than 350 x 144 x 142 inches. In terms of transportability, two RCV-Hs would be transported by a C-17 transport aircraft. The RCV-H is to have on-board direct fire weapon systems capable of defeating all known enemy armored vehicles. The RCV-H is considered a nonexpendable weapon system, meaning that it should be as survivable as a crewed system.

Figure 3. Example of an RCV-H Prototype

Source: https://sites.breakingmedia.com/uploads/sites/3/2020/10/ALAS-Turret-front-close-IMG_0174.jpg, accessed July 12, 2021.

Status of RCV Effort

According to an August 2020 Government Accountability Office (GAO) report

> The Robotic Combat Vehicle (RCV) effort is currently employing other transaction agreements (OTA) to conduct experiments to determine the availability and maturity of technologies and the validity of operating concepts. The outcome of these experiments will be used to determine whether an acquisition program is feasible, with plans for three vehicle variants—a light, a medium, and a heavy variant. As RCV is not yet a program of record, no acquisition approach has been selected.

On January 10, 2020, the Army announced it would award an Other Transaction Agreement (OTA) to QinetiQ North America (Virginia—main headquarters is in the United Kingdom) to build four RCV-Ls and Textron (Rhode Island) to build four RCV-Ms.

Other Transaction Authority or Agreement (OTA) refers to the authority (10 U.S.C. §2371b) of the Department of Defense (DOD) to carry out certain prototypes, research, and production projects. Other Transaction (OT) authorities were created to give DOD the flexibility necessary to adopt and incorporate business practices that reflect commercial industry standards and best practices into its award instruments. As of the 2016 National Defense Authorization Act (NDAA; P.L. 114-92) Section 845, the DOD currently has permanent authority to award OT under 10 U.S.C. §2371, for research, prototype, and production purposes.

RCV Testing

In March 2021, the Army reportedly stated it would conduct operational experiments for Light and Medium RCVs from June to August 2022 at Ft. Hood, TX. General Dynamics Land Systems will also reportedly provide four RCV-M prototypes for the Army to test at Ft. Hood. The Army noted it plans to decide in FY2023 whether to proceed to the Engineering and Manufacturing Development (EMD) phase for the RCV-L, and to make a similar decision in FY2024 for the RCV-M.

Budgetary Information

Table 1. FY2023 RCV Budget Request

Funding Category	Total Request ($M)	Total Request (Qty)
RDT&E	$115.986	—

Source: Department of Defense Fiscal Year 2023 Budget Estimates, Army Justification Book Volume 2b of 2, Research, Development, Test & Evaluation, RDT&E − Volume II, Budget Activity 5a, April 2022, p. 189.
Notes: RDT&E = Research, Development, Test, and Evaluation; **$M** = U.S. Dollars in Millions; **Qty** = FY2023 Procurement Quantities.

Reportedly, the RCV-L is to be included in the Army's five-year rapid prototyping plan with an open competition selecting up to five companies in the fourth quarter FY2023 to build two RCV-L full systems prototypes for each company. Testing is then planned for the prototypes continuing through the third quarter FY2024. After testing, a single company would be awarded a contract to develop additional RCV-L prototypes for testing in FY2026.

Potential Issues for Congress

- What is the Army's current "concept of operation" for employing RCVs in combat? What are the perceived benefits and drawbacks of RCVs?
- If adopted for use, will RCVs require changes to the Army's current command and control systems and procedures?
- How many RCVs by variant, would the Army procure if RCVs become a program of record?
- What are the planned per unit costs of the "expendable" RCV-L and the "durable" RCV-M? How affordable are these less survivable systems as opposed to crewed systems that they are intended to replace/supplement?
- What are the autonomous ground navigation and artificial intelligence (AI) technological challenges affecting the development of autonomous RCVs?
- Are there plans to develop fully autonomous RCV variants?
- The Army's 2022 RCV prototype testing focuses almost exclusively on the RCV-L and RCV-M variants. What is the Army's current thinking regarding the way ahead for the RCV-H?
- Given the Army's plans for the RCV-H to be able to defeat all known enemy armored threats, what is the potential for the RCV-H to eventually replace the M-1 Abrams tank?

Andrew Feickert, Specialist in Military Ground Forces

IF11876

Disclaimer

This document was prepared by the Congressional Research Service (CRS). CRS serves as nonpartisan shared staff to congressional committees and Members of Congress. It operates solely at the behest of and under the direction of Congress. Information in a CRS Report should not be relied upon for purposes other than public understanding of information that has been provided by CRS to Members of Congress in connection with CRS's institutional role. CRS Reports, as a work of the United States Government, are not subject to copyright protection in the United States. Any CRS Report may be reproduced and distributed in its entirety without permission from CRS. However, as a CRS Report may include copyrighted images or material from a third party, you may need to obtain the permission of the copyright holder if you wish to copy or otherwise use copyrighted material.