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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 that 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. The Light and Medium RCVs were planned to be used to conduct a company-level experiment at the end of 2021. The results of that experiment and several virtual experiments are to inform a decision on how to proceed with the RCV effort in 2023.

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.

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 prototypes for the Army to test at Ft. Hood as well. 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. FY2022 RCV Budget Request

Funding Category	Total Request ($M)	Total Request (Qty.)
RDT&E	$87.2	—

Source: Department of Defense Fiscal Year 2022 Budget Estimates, Army Justification Book Volume 2a of 2, Research, Development, Test & Evaluation, RDT&E – Volume II, Budget Activity 4, May 2021, p. 368.
Notes: RDT&E = Research, Development, Test, and Evaluation; **$M** = U.S. Dollars in Millions; **Qty.** = FY2022 Procurement Quantities.

Table 2. FY2022 RCV Defense Authorizations and Appropriations

Funding Category	Authorized ($M)	Appropriated ($M)
RDT&E	$75.0 (S. 1605)	$83.2 (H.R. 4432) $58.5 (S. 3023)

Sources: Rules Committee Print 117-21, Text of House Amendment to S. 1605, p. 1826; H.Rept. 117-88 to accompany H.R. 4432, p. 241; Explanatory Statement to accompany Senate Appropriations Committee-released Department of Defense Appropriations Act, 2022, p. 163.

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 2019 Robotic Combat Vehicle Campaign Plan and ongoing 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?

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