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September 12, 2025

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R48703

CRS REPORT
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SUMMARY

R48703

September 12, 2025

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V-22 Osprey Aircraft: Background and Issues for Congress

The V-22 Osprey is a joint-service, multi-mission, medium-lift rotorcraft. The V-22 is a type of aircraft known as a tilt-rotor, which is a unique design for a crewed military aircraft. A tilt-rotor takes off and lands vertically like a helicopter but flies forward like an airplane by tilting the rotor blades atop each wing forward like a turboprop aircraft. The Osprey can take off or land without a runway or from the deck of a ship in ways that fixed-wing aircraft cannot, and the combination of vertical and forward flight adds speed and range compared with traditional helicopters. The V-22 was developed in the 1980s and declared capable of conducting initial operations in 2007. U.S. military personnel have since flown the aircraft in combat operations in Iraq, Afghanistan, and elsewhere.

The Department of the Navy manages a V-22 Joint Program Office (JPO) for development, support, fielding, and disposal of the aircraft. The V-22 program office works with Bell Helicopter Textron of Fort Worth, TX, and Boeing Helicopters of Philadelphia, PA, to manufacture the aircraft in three types, or *variants*, one each for the Marine Corps, Air Force Special Operations Command (AFSOC), and the Navy. A prototype of the V-22 was made in 1988 and flew for the first time a year later. The U.S. Department of Defense (DOD) has purchased 360 V-22s for the Marines, 53 for the Navy, and 56 for AFSOC, some of which are still in production. DOD is scheduled to close the production line in FY2028. The United States has exported the V-22 to Japan, which has 17 Ospreys.

As of July 2025, 65 military personnel and civilians have died in mishaps involving V-22 aircraft. That figure includes 30 fatalities before 2007, when the aircraft was declared ready for initial operations, and 35 after 2007. Since 2022, V-22s have experienced four fatal mishaps that killed 20 servicemembers and injured another 20. Accident investigation reports state that component failures were the primary cause of at least two of those mishaps. DOD officials have said that similar components may have been at fault for additional mishaps and have restricted flights to within 30 minutes of a landing zone. Citing fatal V-22 crashes in 2022 and 2023, some Members of the 118th and 119th Congresses have expressed concern about the platform's safety. The House Committee on Government Oversight in December 2023 conducted an investigation into the V-22 program and in June 2024 held a hearing on the topic.

The V-22 JPO has stated that it is working to return the Osprey to full operations in 2026 and is pursuing several upgrades to the aircraft's parts and components to improve safety and reliability. The Marine Corps, Air Force, and Navy are also modifying training, and implementing new operating procedures.

Some Members of Congress have also expressed concerns about whether the design of the V-22 can provide any lessons for the Army's development of a new tilt-rotor aircraft, known as the Future Long-Range Assault Aircraft. Congress may consider whether or not to provide oversight of such topics and/or whether to provide funding for such upgrades. In conducting oversight of the V-22, Congress may consider the following issues, among others:

- the size of the V-22 fleets for the Marine Corps, Air Force, and Navy;
- the logistics of carrier-based V-22s;
- funding for V-22 upgrades and their potential effects on safety;
- access to V-22 safety investigation reports; and
- training for V-22 maintenance personnel.

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Introduction

This report provides background information and potential issues for Congress about the U.S. Department of Defense (DOD) V-22 Osprey, a joint-service, multi-mission, medium-lift rotorcraft. The Osprey is produced in three variants, one each for the Marine Corps, Air Force, and Navy. DOD began developing the V-22 in the 1980s to replace the CH-46 and CH-53 cargo helicopters. The V-22 experienced delays and fatal accidents during development and was not declared operational until 2007.[1] Since then, the Marine Corps has deployed the V-22 to Iraq, Afghanistan, and elsewhere. Some military officials have said the aircraft's unique design expanded the fleet's *logistics range* (i.e., a spectrum between self-sufficient forces and those that depend on outside resources) 3.5 times beyond its predecessor aircraft.[2]

As of July 2025, 65 people have died in mishaps involving V-22 aircraft.[3] Since 2022, V-22s have experienced four fatal mishaps[4] that killed 20 servicemembers and injured another 20.[5] According to accident investigation reports, component failures within the V-22 drive system caused two of those crashes.[6] After the mishaps, the Navy temporarily halted V-22 operations before reinstating them in 2024 with a restriction that the craft remain within 30 minutes of a landing site.[7] The Navy and Air Force fleets remain restricted to that limit, which may not be lifted until 2026.[8] Some Members of Congress have expressed interest in the safety of the aircraft, particularly hardware failures; how flying restrictions on the aircraft have affected training and operations of U.S. forces; and to what extent lessons learned from developing and operating the V-22 are informing an Army effort to develop a similar type of aircraft, called the Future Long-Range Assault Aircraft (FLRAA).

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[1] Department of the Navy, U.S. Navy, U.S. Naval Air Systems Command (NAVAIR), MV-22B Osprey website, updated February 2023, https://www.navair.navy.mil/product/MV-22B-Osprey; and archived CRS Report RL31384, *V-22 Osprey Tilt-Rotor Aircraft Program*.

[2] Lieutenant Colonel (ret.) Douglas Thumm, "I Commanded a Marine V-22 Squadron. Here's What I Learned," *Military Times*, March 13, 2024, https://www.militarytimes.com/opinion/2024/03/13/i-commanded-a-marine-v-22-squadron-heres-what-i-learned/.

[3] Flight Safety Foundation, Aviation Safety Network Database, Bell-Boeing V-22 Osprey, accessed on July 1, 2025, https://asn.flightsafety.org/asndb/type/V22. Marine Corps data provided by Marine Corps Legislative Liaison, July 14, 2025. Air Force data provided by Air Force Legislative Liaison, January 7, 2025.

[4] According to DOD Instruction 6055.07, "Mishap Notification, Investigation, Reporting, and Record Keeping," June 6, 2011, updated June 11, 2019, an aviation mishap is "a DoD mishap involving aircraft or flying operations." Mishaps are classified by level of severity. The most serious mishaps are "Class A" mishaps that resulted in death, total disability, damage equal to or greater than $2 million, or resulted in a destroyed aircraft.

[5] Marine Corps data provided by Marine Corps Legislative Liaison, December 12, 2024; Air Force data provided by Air Force Legislative Liaison, January 7, 2025. The Navy Legislative Liaison confirmed on April 21, 2025, that Navy MCV-22s had not experienced any fatal mishaps.

[6] Department of the Navy, U.S. Marine Corps, "Command Investigation Into the Class A Aviation Mishap that Occurred on 8 June 2022 in the R-2512 Range Complex," March 23, 2023, https://www.hqmc.marines.mil/Portals/61/Docs/FOIA/Class%20A%20Aviation%20%20Mishap%20R_2512%20Range%20CI_8%20Jun%2022_1%20of%204.pdf?ver=pSp7_xjQyoGl_sKVQtaS3A%3d%3d; and Brigadier General Michael E. Conley, "United States Aircraft Accident Investigation Board Report, CV-22B T/N 10-0054, Date of Accident: November 29, 2023," Air Force Special Operations Command, https://www.afjag.af.mil/LinkClick.aspx?fileticket=ENTTeS2T9go%3d&portalid=77.

[7] Michael Marrow and Valerie Insinna, "V-22 Ospreys Barred From Full Mission Capability Until 'Mid-2025': NAVAIR Boss," *Breaking Defense*, June 12, 2024, https://breakingdefense.com/2024/06/v-22-ospreys-barred-from-full-mission-capability-until-mid-2025-navair-boss/.

[8] Michael Marrow, "V-22 Will Fly With Restrictions Until 2026," *Breaking Defense*, April 30, 2025, https://breakingdefense.com/2025/04/v-22-will-fly-with-restrictions-until-2026/.

This report discusses 2022 and 2023 mishaps, the services' plans to modernize the V-22 and determine it ready for full flight operations, and design differences between the V-22 and the FLRAA.[9] The report also addresses certain legislative activity and issues that Congress may consider. The **Appendix** provides tables listing V-22 safety statistics during the 10-year period 2015-2024 and figures on fatal V-22 mishaps.

Background

The V-22 is a type of aircraft known as a tilt-rotor, which is a unique design for a crewed military aircraft (see **Figure 1**). Along with the speed and range of propeller-driven forward flight, a tilt-rotor has the ability to take off and land without a runway or from the deck of a ship, similar to a helicopter. The V-22 has an additional feature for maritime use: its wings can rotate and fold horizontally to be transported and stored more easily on an aircraft carrier or assault ship.[10]

The V-22 is produced by a joint venture of Bell Helicopter Textron of Fort Worth, TX, and Boeing Helicopters of Philadelphia, PA, called Bell-Boeing.[11] The Department of the Navy's Naval Air Systems Command (NAVAIR) manages the V-22 Joint Program Office (JPO) for the development, support, fielding, and disposal of the three types of V-22.

Formal development of the V-22 began in the 1980s. During development, the platform experienced mishaps, including one caused by engine failure that killed all seven crew members.[12] As of July 2025, 65 military personnel have died in mishaps involving V-22 aircraft.[13] The first V-22 reached initial operational capability in 2007.[14] DOD plans for production of the aircraft to end in 2028.[15] The procurement total includes 360 V-22s for the Marines, 56 for Air Force Special Operations Command (AFSOC), and 53 for the Navy.[16] Japan has received 17 V-22s.[17] DOD in December 2019 estimated the total V-22 acquisition cost at $55.7 billion.[18]

[9] For more information, see CRS In Focus IF12771, *Future Long-Range Assault Aircraft (FLRAA)*, by Jennifer DiMascio.

[10] Boeing, "22 Fast Facts on the Bell Boeing V-22 Osprey," June 20, 2023, https://www.boeing.com/features/2023/06/22-fast-facts-on-the-bell-boeing-v-22-osprey.

[11] NAVAIR, MV-22B Osprey website.

[12] Charles Doe, "V-22 Osprey Crash Blamed on Engine Failure," *United Press International*, September 29, 1992, https://www.upi.com/Archives/1992/09/29/V-22-Osprey-crash-blamed-on-engine-failure/4228717739200/.

[13] Flight Safety Foundation, Aviation Safety Network Database, Bell-Boeing V-22 Osprey, accessed on July 1, 2025, https://asn.flightsafety.org/asndb/type/V22. Marine Corps data provided by Marine Corps Legislative Liaison, July 14, 2025. Air Force data provided by Air Force Legislative Liaison, January 7, 2025.

[14] NAVAIR, MV-22B Osprey website.

[15] Based on CRS email correspondence with NAVAIR, PMA-275, October 3, 2024.

[16] Based on CRS email correspondence with Marine Corps officials, February 13, 2025. According to budget documents, Congress in FY2024 authorized the purchase of five CMV-22s more than the program of record. https://www.secnav.navy.mil/fmc/fmb/Documents/26pres/APN_BA1-4_Book.pdf.

[17] Colonel [Brian] Taylor, "V-22 Program Overview," V-22 Joint Program Office, April 30, 2024, p. 3, archived at https://web.archive.org/web/20241008122301/https://www.marcorsyscom.marines.mil/Portals/105/001_MDM%202024_NAVAIR_PMA%20275.pdf.

[18] U.S. Department of Defense (DOD), Washington Headquarters Services, Freedom of Information Act Reading Room, Selected Acquisition Reports (SARs), 2019 SARs, *V-22 Osprey Joint Services Advanced Vertical Lift Aircraft (V-22)*, https://www.esd.whs.mil/Portals/54/Documents/FOID/Reading%20Room/Selected_Acquisition_Reports/FY_2019_SARS/20-F-0568_DOC_81_V-22_SAR_Dec_2019.pdf.

The Marine Corps version of the V-22—called the MV-22—carries 24 combat troops and was developed to replace the medium-lift CH-46 and heavy-lift CH-53 helicopters.[19] The MV-22 is designed for amphibious assault, combat support, and medium-lift combat service support missions.[20] The Marine Corps had an inventory of 306 MV-22s, as of June 2024.[21] MV-22s are also a part of Marine Helicopter Squadron One (HMX-1), which supports presidential transport, carrying support personnel, media, and material. [22] (The President and Vice President fly in a separate helicopter called the VH-92 Patriot.[23])

AFSOC operates a variant of the V-22 called the CV-22. The command uses CV-22s to execute long-range infiltration, exfiltration, and resupply missions. Those missions tend to take place in environments that Air Force officials have described as "challenging" and that expose the aircraft to dust and austere landings.[24] The Air Force, which has operated the CV-22 since 2009, has an inventory of 51 of these aircraft.[25] The CV-22 carries up to 32 personnel.[26]

The Navy's V-22 variant is called the CMV-22, which is intended to transport personnel, mail, and priority cargo from advance bases to aircraft carriers, even while under threat.[27] The Navy redesigned the forward sponson fuel tanks and added fuel tanks on the wings so that the aircraft can carry 25% more fuel than the Marine Corps' MV-22 variant.[28] According to an announcement from the Navy, the CMV-22 can haul up to 6,000 pounds over 1,150 nautical miles.[29] The Navy also announced that the CMV-22 variant reached initial operating capability in February 2022.[30] The Navy has 37 CMV-22s, a platform intended to replace 15 aging C-2 Greyhounds, a fixed-

[19] U.S. Marine Corps, Tilt Rotor Aircraft website, https://www.aviation.marines.mil/About/Aircraft/Tilt-Rotor/#:~:text=It%20will%20replace%20the%20Corps,CH%2D53D%20medium%20lift%20helicopters.

[20] U.S. Marine Corps, Tilt Rotor Aircraft website, https://www.aviation.marines.mil/About/Aircraft/Tilt-Rotor/#:~:text=It%20will%20replace%20the%20Corps,CH%2D53D%20medium%20lift%20helicopters.

[21] Written testimony of Vice Admiral Carl Chebi, Commander, Naval Air Systems Command and Gary Kurtz, Program Executive Officer, Air Anti-Submarine Warfare and Special Missions Programs, DOD, for U.S. Congress, House Committee on Oversight and Accountability, Subcommittee on National Security, the Border, and Foreign Affairs, *Addressing Oversight and Safety Concerns in the Department of Defense's V-22 Osprey Program*, hearings, 118th Cong., 2nd sess., June 12, 2024, https://oversight.house.gov/wp-content/uploads/2024/06/Chebi_Kurtz-Written-Testimony.pdf. Figure is most recently reported inventory information.

[22] Chris Riback, "V-22 Gets Presidential Treatment," *Roll Call*, March 23, 2015, https://rollcall.com/2015/03/23/v-22-gets-presidential-treatment/.

[23] NAVAIR, VH-92 Patriot website, https://www.navair.navy.mil/product/VH-92A-Patriot.

[24] Based on CRS communications with Air Force officials, December 5, 2024.

[25] Testimony of Vice Admiral Carl Chebi, Commander, Naval Air Systems Command and Gary Kurtz, Program Executive Officer, Air Anti-Submarine Warfare and Special Missions Programs, DOD, in U.S. Congress, House Committee on Oversight and Accountability, Subcommittee on National Security, the Border, and Foreign Affairs, *Addressing Oversight and Safety Concerns in the Department of Defense's V-22 Osprey Program*, hearings, 118th Cong., 2nd sess., June 12, 2024, H.Hrg. 118-115, https://www.govinfo.gov/content/pkg/CHRG-118hhrg56063/pdf/CHRG-118hhrg56063.pdf.

[26] Department of the Air Force, CV-22 Osprey fact sheet, https://www.af.mil/About-Us/Fact-Sheets/Display/Article/104531/.

[27] Robbin Laird, "Why Adding the Osprey to the Atlantic Naval Air Force Matters," *Breaking Defense*, December 2, 2024, https://breakingdefense.com/2024/12/why-adding-the-osprey-to-the-atlantic-naval-air-force-matters/.

[28] Based on CRS email correspondence with Marine Corps officials, February 13, 2025.

[29] Department of the Navy, Naval Air Station Patuxent River Public Affairs, "Navy's V-22 Achieves Initial Operational Capability Designation," press release, February 18, 2022, https://www.navy.mil/Press-Office/News-Stories/Article/2940299/navys-v-22-achieves-initial-operational-capability-designation/#:~:text=%E2%80%9CThis%20aircraft%20went%20from%20first,operational%20capability%20expected%20in%202023.

[30] NAVAIR, "Navy's V-22 Achieves Initial Operational Capability Designation."

wing aircraft that currently conducts carrier onboard delivery (COD) missions. [31] The Navy has indicated that it plans to retire the remaining Greyhounds by 2026; it has continued to use the C-2s while the Navy's CMV-22s are under flight restrictions.[32]

Table 1. Selected V-22 Specifications

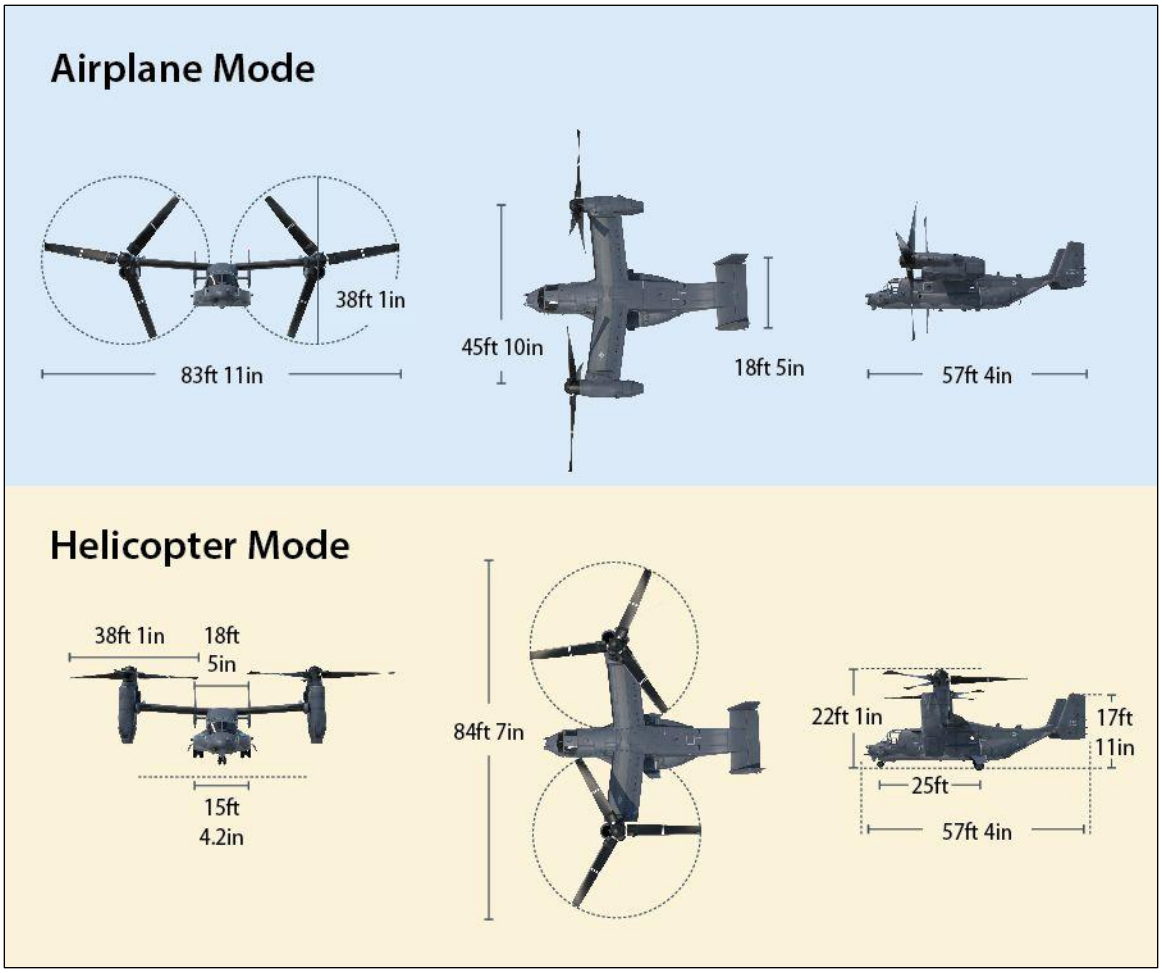
Propulsion	2 Rolls-Royce AE1107C engines
Maximum Vertical Takeoff Weight	52,600 pounds
Fuel Capacity	1,721-2,025 gallons
Maximum Cruise Speed	255 knots
Service Ceiling	25,000 feet

Source: Department of the Navy, U.S. Marine Corps, *V-22 Osprey Guidebook*, https://www.mcipac.marines.mil/Portals/28/Documents/MV22Guidebook.pdf; and NAVAIR, CMV-22 Osprey website, https://www.navair.navy.mil/product/CMV-22B-Osprey.

[31] Chebi, Testimony in H.Hrg. 118-115; and NAVAIR, CMV-22B Osprey website, https://www.navair.navy.mil/product/CMV-22B-Osprey. Number of CMV-22s current as of February 13, 2024, per program office officials.

[32] Sam LaGrone, "Navy Surging C-2A Greyhounds as V-22 Groundings Continue," *USNI News*, February 13, 2024, https://news.usni.org/2024/02/13/navy-surging-c-2a-greyhounds-as-v-22-groundings-continue.

Figure 1. Selected V-22 Osprey Dimensions



Source: Shutterstock-Pixelsquid/Shutterstock.com; and Department of the Navy, U.S. Marine Corps, *V-22 Osprey Guidebook*.

Safety Issues

As previously noted, and as of July 2025, 65 people have died in mishaps involving V-22 aircraft, which includes 30 fatalities before 2007, when the aircraft was declared ready for operations, and 35 after 2007. Of the 35 fatalities since 2007, 23 occurred in Marine Corps aircraft and 12 in Air Force aircraft.[33]

Aviation Mishaps and Investigations

DOD characterizes an aviation mishap in the flight subcategory as a situation "where there is intent for flight and damage to DOD aircraft."[34] Within DOD, the military departments conduct

[33] Flight Safety Foundation, Aviation Safety Network Database, Bell-Boeing V-22 Osprey, accessed on July 1, 2025, https://asn.flightsafety.org/asndb/type/V22. Marine Corps data provided by Marine Corps Legislative Liaison, July 14, 2025. Air Force data provided by Air Force Legislative Liaison, January 7, 2025.

[34] DOD Instruction 6055.07, "Mishap Notification, Investigation, Reporting, and Record Keeping," June 6, 2011, updated June 11, 2019, p. 29, https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/605507p.pdf.

investigations into aviation mishaps under their purview. For example, within the Department of the Air Force, the Air Force Safety Center (AFSEC) oversees mishap investigations for the Air Force and Space Force.[35]

After a mishap takes place, AFSEC appoints an Interim Safety Board to begin an investigation and assigns the mishap a class. DOD defines a Class A mishap, the most serious type, as an incident in which "the resulting total cost of damages to Government and other property is $2 million or more, a DOD aircraft is destroyed (excluding UAS [Unmanned Aerial Systems] Groups 1, 2, or 3), or an injury or occupational illness results in a fatality or permanent total disability."[36]

Next, a Safety Investigation Board takes place to discover the root cause of the mishap. According to DOD, the purpose of safety investigations is to prevent future mishaps. Safety investigation reports produce findings and recommendations for future action. The recommendations and much of the information contained in the documents may be privileged (i.e., legally protected and not for public release). According to DOD, the term "safety privilege" describes "privileges recognized by the courts that protect safety information from release. It is an executive privilege afforded a head of an agency to protect information from release that would hamper the efficient operation of an important Government program and perhaps impair the national defense or security."[37] DOD describes some exceptions to the privilege. One exception is a 1989 agreement between DOD and the House Armed Services Committee (HASC) that allows the chair or the ranking member of the HASC or Senate Armed Services Committee (SASC) to arrange a briefing about safety information.[38] The DOD instruction further states that

> [t]he Chairman and Ranking Minority Member may review the requested portions of the privileged safety report during the briefing, but they may not be provided with advance copies, nor will the Chairman and Ranking Minority Member release any privileged safety information to the public, other Government agencies, or other members of the Congress or staff.[39]

The Air Force may also convene an Accident Investigation Board to conduct a concurrent investigation. The resulting reports differ from Safety Investigation Board reports in that accident investigations may be publicly released, as they are conducted as a legal investigation and do not offer recommendations.[40] The Navy and Marine Corps also may convene Aviation Mishap Boards, the results of which may be privileged.[41] The Navy's Judge Advocate General may also conduct a command investigation, and like the Air Force Accident Investigation Board, the results of that investigation may be disclosed under the Freedom of Information Act.[42]

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[35] Department of the Air Force, Air Force Safety Center, https://www.af.mil/About-Us/Fact-Sheets/Display/Article/104488/air-force-safety-center/.

[36] DOD Instruction 6055.07.

[37] DOD Instruction 6055.07.

[38] DOD Instruction 6055.07.

[39] DOD Instruction 6055.07.

[40] Department of the Air Force, Air Force Safety Center, Mishap Investigation Process website, https://www.safety.af.mil/Home/Mishap-Investigation-Process/; Department of the Air Force, Air Force Instruction 51-307, *Aerospace and Ground Accident Investigations*, March 18, 2019, https://static.e-publishing.af.mil/production/1/af_ja/publication/afi51-307/afi51-307.pdf.

[41] Department of the Navy, Naval Safety Command, "Mishap Investigations," https://navalsafetycommand.navy.mil/Reporting-Investigations/Mishap-Investigations/.

[42] Department of the Navy, Navy Judge Advocate General's (JAG) Corps, Naval Justice School, *JAGMAN Investigations Handbook*, archived at https://apps.dtic.mil/sti/tr/pdf/AD1014458.pdf.

V-22 Mishap Rates, FY2015-FY2024

DOD tracks aircraft mishaps per 100,000 hours of flight. The Class A mishap rate for the Marine Corps' MV-22B aircraft is 2.56 mishaps per 100,000 flight hours for FY2015 to FY2024.[43] The Marine Corps' average for all aircraft over that time frame is 2.67 mishaps per 100,000 flight hours.[44] The Air Force's Class A mishap rate for CV-22 aircraft over the same time frame is 11.55 mishaps per 100,000 flight hours, compared with the Air Force average for its entire fleet of aircraft of 1.65 mishaps per 100,000 flight hours.[45] According to the Navy, its CMV-22s have not experienced any mishaps or fatalities.[46]

For more information on certain military aircraft mishap rates, see **Table A-1**.

Selected Fatal V-22 Mishaps Involving Mechanical Failures

This section discusses two fatal mishaps, one in 2022 and one in 2023 that

- are among the most recent fatal incidents,
- are the most recent mishaps caused by mechanical failures, and
- are mishaps about which some Members of Congress have expressed an interest in potential material solutions.

June 8, 2022, Marine Mishap in El Centro, CA

According to the Judge Adjutant General command investigation report on the Class A mishap on June 8, 2022, five Marines from the 3rd Marine Aircraft Wing died during a training flight in El Centro, CA.[47] After departure, one pilot asked to change the landing location to cool rising gearbox temperatures. The crew completed refueling operations at Lake Havasu City Municipal Airport at 11:50 a.m. and then flew on to Yuma Range. The crew proceeded to the training location and were flying in a pattern, conducting live-fire testing. The aircraft conducted three ordnance delivery legs without incident. During the fourth, a crew member reported "indications of 'hot boxes,'" and the aircraft was granted permission to move to an overhead flight position to cool the gearbox—the second time that day the gearbox temperatures were reported rising. Within two minutes, the aircraft lost radar contact and hit the ground. "The mishap was caused by a dual HCE [hard clutch engagement] event that created a Single Engine/ICDS [Interconnect Drive System] failure compound emergency leading to an unrecoverable low altitude departure from controlled flight and rapid rate of descent."[48]

The report further states that "although the root cause of HCE remains unknown, incident trend analysis shows that HCE events have occurred in aircraft with input quills flown more than 800

[43] Based on CRS correspondence with Marine Corps Legislative Liaison for Class A Mishap data, December 12, 2024.

[44] Based on CRS correspondence with Marine Corps Legislative Liaison for Class A Mishap data, December 12, 2024.

[45] Based on CRS correspondence with Air Force Legislative Liaison for Class A Mishap data, January 7, 2025; and https://www.safety.af.mil/Portals/71/documents/Aviation/Mishap%20Summaries/USAF_Aviation_Class_A_Summary-Copy.pdf, p. 2.

[46] Based on CRS correspondence with Office of Navy Legislative Affairs, April 21, 2025.

[47] U.S. Marine Corps, "Command Investigation Into the Class A Aviation Mishap that Occurred on 8 June 2022 in the R-2512 Range Complex."

[48] U.S. Marine Corps, "Command Investigation Into the Class A Aviation Mishap that Occurred on 8 June 2022 in the R-2512 Range Complex."

hours."[49] The input quill assemblies in this aircraft had flown more 800 hours.[50] Vice Admiral Carl Chebi, who leads Naval Air Systems Command, which runs the V-22 Joint Program Office, told the House Committee on Government Oversight that the program has experienced 19 "hard clutch events," and that in 2022, a sharp increase in the number had occurred.[51] "Over time the clutch wears out and has a higher susceptibility to slipping which will cause a hard clutch event," Chebi said. Based on the data, Chebi said he mandated that clutches with more than 800 flight hours would be replaced.[52]

November 29, 2023, Air Force Mishap off Yakushima Island, Japan

A mechanical issue caused another Class A mishap in 2023. On November 29, 2023, eight members of the Air Force's 21st Special Operations Squadron died when the CV-22B in which they were flying crashed into waters about a half mile off the coast of Yakushima Island, Japan.[53] The crew was taking part in a joint interoperability exercise. According to the Air Force Accident Investigation Board report, the pilot received a series of "chip burn" alerts, some of which he disregarded. After receiving a "Land as Soon as Possible" alert, the crew aborted its mission and diverted to a nearby airport. On final approach to the runway, the voice and data recorder recorded cascading failures and auditory warnings. The aircraft rolled to the left and landed in the water.[54]

According to the accident report, the Accident Investigation Board President "found, by a preponderance of the evidence, the mishap was caused by a catastrophic failure of the left-hand Proprotor Gearbox that created a rapidly cascading failure of the [mishap aircraft's] drive system, resulting in an instantaneous asymmetric lift condition that was unrecoverable."[55] The Board also found that the pilot was at fault for failing to divert the flight and land at a different location earlier.[56] The investigation found that the left-hand PRGB had failed and that one of five high-speed pinion gears within the PRGB had fractured.[57] The Navy has said it plans to replace the gearbox components that had experienced corrosion to prevent future defects.[58]

[49] U.S. Marine Corps, "Command Investigation Into the Class A Aviation Mishap that Occurred on 8 June 2022 in the R-2512 Range Complex."

[50] U.S. Marine Corps, "Command Investigation Into the Class A Aviation Mishap that Occurred on 8 June 2022 in the R-2512 Range Complex." The IQA in the left-side proprotor gearbox had flown 2,437 hours—and 1,094 hours since being repaired. The IQU on the right-side proprotor gearbox had flown 2,007 hours.

[51] CQ Transcripts, "House Oversight and Accountability Subcommittee on National Security, the Border, and Foreign Affairs Holds Hearing on V-22 Osprey Program Oversight and Safety," June 12, 2024.

[52] CQ Transcripts, "House Oversight and Accountability Subcommittee on National Security, the Border, and Foreign Affairs Holds Hearing on V-22 Osprey Program Oversight and Safety," June 12, 2024.

[53] Conley, "United States Aircraft Accident Investigation Board Report, CV-22B T/N 10-0054, Date of Accident: November 29, 2023."

[54] Conley, "United States Aircraft Accident Investigation Board Report, CV-22B T/N 10-0054, Date of Accident: November 29, 2023."

[55] Conley, "United States Aircraft Accident Investigation Board Report, CV-22B T/N 10-0054, Date of Accident: November 29, 2023."

[56] Conley, "United States Aircraft Accident Investigation Board Report, CV-22B T/N 10-0054, Date of Accident: November 29, 2023."

[57] Conley, "United States Aircraft Accident Investigation Board Report, CV-22B T/N 10-0054, Date of Accident: November 29, 2023."

[58] NAVAIR, PMA-275 written responses to Congressional Research Service V-22 questions for October 3, 2024. briefing.

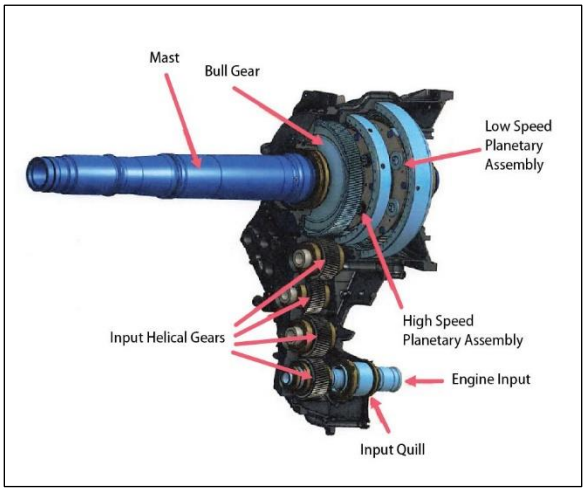
Nacelles

The fatal V-22 mishaps that occurred on June 8, 2022, and November 29, 2023, were linked to mechanical failures that occurred within the nacelles, which are sections located on the edge of each wing that tilt to enable the aircraft's transition from rotary-wing lift to propeller-driven flight. Each nacelle contains an engine, drive system, components, and wiring. The nacelles endure vibration from the engine, and dirt, dust, and engine oil can collect on the wires in the nacelles. Prime contractor Bell Textron said in 2021 that 60% of the V-22's maintenance hours are spent on nacelle work.[59]

Proprotor Gearbox (PRGB)[60]

In particular, investigators found that different types of mechanical failures in a nacelle component called the proprotor gearbox (PRGB) were factors in the fatal V-22 mishaps that occurred on June 8, 2022, and November 29, 2023. Part of the V-22's drive system, located within each nacelle, is a PRGB (see **Figure 2**). The engine provides power to an input quill, which attaches to the clutch assembly. The clutch assembly provides power through a system of interlocking gears and pinions to turn the mast, which drives the corresponding proprotor. The PRGB has magnetic plugs and screens to capture debris, as well as a system of three detectors to send the pilot a "chip burn" alert if debris is detected in the gear oil.[61] Press reports indicate that DOD has reported 60 incidents with V-22 proprotor gearboxes over the past five years and that the military removed 609 proprotor gearboxes for repair over the past 10 years.[62]

Figure 2. Proprotor Gearbox Schematic



Source: Brigadier General Michael E. Conley, "United States Aircraft Accident Investigation Board Report, CV-22B T/N 10-0054, Date of Accident: November 29, 2023," Air Force Special Operations Command, https://www.afjag.af.mil/LinkClick.aspx?fileticket=ENTTeS2T9go%3d&portalid=77.

[59] Bell Boeing, "Bell Boeing Begin Nacelle Improvement on Air Force CV-22," press release, September 23, 2021, https://news.bellflight.com/en-US/202903-bell-boeing-begin-nacelle-improvement-on-air-force-cv-22.

[60] Conley, "United States Aircraft Accident Investigation Board Report, CV-22B T/N 10-0054, Date of Accident: November 29, 2023."

[61] Based on CRS correspondence with Marine Corps officials, February 13, 2025.

[62] Tara Copp and Aaron Kessler, "Weak spots in metal may have led to fatal Osprey crash off Japan, documents obtained by AP reveal," *Associated Press*, August 4, 2024, https://apnews.com/article/osprey-crash-proprotor-japan-v22-d0402b8696e9f1da7d0af4bd368c92f0.

V-22 Full-Flight Operations Plans

In December 2023, NAVAIR, which leads the V-22 JPO, grounded all V-22 variants, saying that a preliminary investigation showed a potential material failure had caused the November 29, 2023, mishap.[63] In March 2024, NAVAIR lifted the initial grounding, though it stated in a press release that "the U.S. Navy, U.S. Marine Corps, and U.S. Air Force will each execute their return to flight plans according to service specific guidelines."[64] By May 2024, news reports stated that all variants of the V-22 were still restricted fly within 30 minutes of a suitable divert airfield.[65]

After a near-crash in New Mexico in November 2024, Vice Admiral Chebi briefly reinstituted the fleetwide grounding.[66] On December 20, 2024, NAVAIR directed inspections verifying the number of hours on each PRGB prior to the aircraft's next flight, allowing the aircraft to resume restricted flights.[67]

In a July 16, 2024, letter to then-Defense Secretary Lloyd Austin, the chair and ranking member of the House Committee on Government Oversight, asked for a list of the "date, location, and cause of every Class A Osprey mishap" since 1991. The letter also asked for safety investigation reports from all Class A Osprey mishaps since 1991. The committee, which first requested information from DOD in December 2023, added that it had "encountered significant delays and hurdles to obtain necessary materials."[68] As of September 2025, it is not clear whether the department has transmitted the information.

According to testimony from Kurtz and Vice Admiral Chebi, NAVAIR is conducting engineering testing and analysis to establish criteria for a full unrestricted flight by the V-22. "A return to full mission capability is not expected to occur before mid-2025," they wrote.[69] The Department of the Navy, including the V-22 JPO, NAVAIR, and Bell-Boeing, were reviewing further risk-reduction efforts.[70] In April 2025, Marine Corps officials reportedly said that full-flight operations would not resume until 2026, to provide time for the service to roll out upgrades to PRGB components.[71] The Marines are also reportedly testing a new input quill assembly to mitigate hard-clutch engagements.[72]

[63] NAVAIR, "NAVAIR Grounds V-22 Fleet," press release, December 7, 2023, https://www.navair.navy.mil/news/NAVAIR-grounds-V-22-fleet/Wed-12062023-1923.

[64] NAVAIR, "NAVAIR Returns V-22 Osprey to Flight Status," press release, March 8, 2024, https://www.navair.navy.mil/news/NAVAIR-returns-V-22-Osprey-flight-status/Fri-03082024-0553.

[65] Aaron Mehta, "V-22 Osprey Operating With 'Limited Envelope,' Required to Stay Near Airfields," *Breaking Defense*, May 15, 2024.

[66] Tara Copp, "Military Pauses Osprey Flights Again After More Metal Failures are Found in Near-Crash in November," *Associated Press*, December 9, 2024.

[67] NAVAIR, "NAVAIR Issues V-22 Bulletin and Interim Flight Clearance," press release, December 19, 2024, https://www.navair.navy.mil/news/NAVAIR-Issues-V-22-Bulletin-and-Interim-Flight-Clearance/Thu-12192024-1121.

[68] Letter from James Comer, Chair, House Committee on Government Oversight and Accountability, and Glenn Grothman, Chair, Subcommittee on National Security, the Border, and Foreign Affairs, to Lloyd Austin, Secretary of Defense Lloyd Austin, July 16, 2024, https://oversight.house.gov/wp-content/uploads/2024/07/Osprey-Follow-Up-Letter13.pdf.

[69] Chebi and Kurtz, Testimony in H.Hrg. 118-115.

[70] Chebi and Kurtz, Testimony in H.Hrg. 118-115.

[71] Michael Marrow, "V-22 Will Fly With Restrictions Until 2026," *Breaking Defense*, April 30, 2025, https://breakingdefense.com/2025/04/v-22-will-fly-with-restrictions-until-2026/.

[72] Marrow, "V-22 Will Fly With Restrictions Until 2026."

Selected V-22 Upgrade Plans

DOD has initiated or proposed various maintenance and upgrade programs to improve the V-22 and its drive system. Upgrade efforts include the following:

Proprotor Gearbox Improvements. According to NAVAIR, the design and qualification program is complete, and hardware for hardened PRGB planetary pinion bearings was to start delivery in August 2024 to address a "reliability shortfall."[73] In October 2024, NAVAIR said it planned to replace some PRGB components—including high-speed planetary pinion gears, low-speed planetary pinion gears, bull gears, and sun gears—with a more durable alloy known as X-53 triple-melt alloy to stop inclusions, or unwanted particles, in the metal (see **Figure 2**).[74] According to the Federal Aviation Administration, the triple-melt refers to a manufacturing process for nickel-based alloys that has reduced anomalies and are recommended for use in rotating components.[75] In February 2025, the Navy said it would conduct a triple-melt process on all gears made from double-melt X-53.[76] The Navy has said the parts are planned to be available to the fleet by May 2025. To prevent current flaking of cadmium plating on the upper PRGB mast, the Navy said it planned to add zinc nickel plating to the PRGB mast beginning in 2025.[77]

PRGB Input Quill/Clutch Upgrade. As discussed above, the PRGB clutch can disengage and reengage, resulting in a hard-clutch engagement.[78] The Navy has mandated that all clutches that had flown more than 800 hours be replaced. In January 2023, Bell-Boeing received a $12.7 million contract to engineer the integration, qualification, documentation, and testing for a proprotor gearbox input quill and clutch design for all variants of the V-22.[79] In addition, the Navy said it may select a redesign of the input quill assembly and provide data for a follow-on contract beginning in 2026.[80]

Nacelle Improvement Plan. Naval Air Systems Command awarded Bell-Boeing contracts to develop, design, and install nacelle modification kits for the Air Force's CV-22.[81] The modification provides better access to the nacelle's insides and streamlines the wiring, which helps maintenance personnel diagnose and troubleshoot potential issues with the drive system.[82] In the National Defense Authorization Act for Fiscal Year 2024 (NDAA; P.L. 118-31, §125), Congress directed DOD to upgrade "not fewer than 24 V-22s" under the nacelle improvement program.

Osprey Drive System Safety and Health Information (ODSSHI). ODSSHI is a diagnostic system designed to monitor gearbox vibration and estimate the length of time before a gearbox

[73] Based on CRS correspondence with NAVAIR, PMA-275, October 3, 2024.

[74] Based on CRS correspondence with NAVAIR, PMA-275, October 3, 2024.

[75] U.S. Department of Transportation, Federal Aviation Administration, Advisory Circular 33.15-2, "Manufacturing Processes for Premium Quality Nickel Alloy for Engine Rotating Parts," https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_33_15-2.pdf. According to the document, "Improvements in all stages of melt, remelt, and conversion have resulted in a significant reduction in the occurrence of melt-related defects since the mid-1980s."

[76] Based on CRS correspondence with Marine Corps officials, February 13, 2025.

[77] Based on CRS correspondence with NAVAIR, PMA-275, October 3, 2024.

[78] CQ Transcripts, "House Oversight and Accountability Subcommittee on National Security, the Border, and Foreign Affairs Holds Hearing on V-22 Osprey Program Oversight and Safety," June 12, 2024.

[79] DOD, Contracts, January 20, 2023 (awarded January 18, 2023), https://www.defense.gov/News/Contracts/Contract/Article/3273802/.

[80] Based on CRS correspondence with NAVAIR, PMA-275, October 3, 2024.

[81] NAVAIR, "V-22 Contract Award Kicks Off Major Nacelle Redesign Effort," January 27, 2021, https://www.navair.navy.mil/news/V-22-contract-award-kicks-major-nacelle-redesign-effort/Wed-01272021-1400.

[82] Based on CRS communications with Air Force officials, December 5, 2024.

requires replacement.[83] Bell-Boeing was awarded a $53.6 million contract in March 2023 to engineer a V-22 Gearbox Vibration Monitoring/Osprey Drive System safety and health information system to detect degrading gearbox components.[84]

V-22 Cockpit Technology Refresh (VeCToR). VeCToR is a proposed comprehensive modernization of the aircraft's avionics systems, addressing parts obsolescence and upgrading the flight-control system to improve controls during "brownout" situations, which occur when wind created by rotor blades stir up a blinding amount of dust. DOD initiated a trade study and analysis of alternatives in the third quarter of FY2024 to define requirements. The initial phase of the VeCToR trade study was scheduled to end in the second quarter of FY2025 and inform any follow-on VeCToR upgrade plans.[85]

Renewed V-22 Aircraft Modernization Program (ReVAMP). ReVAMP is a proposed mid-life upgrade designed to allow the Marine Corps continue to operate the MV-22 until 2055. According to the Navy, elements of ReVAMP may include improved drive systems and nacelles, ice protection, and new or re-cored engines.[86] In the fourth quarter of FY2024, the V-22 program office initiated a trade study and analysis of alternatives to define requirements, which is scheduled to end in the first quarter of FY2026.[87]

V-22 Training and Operational Changes

While mechanical failures were factors in the fatal V-22 mishaps that occurred on June 8, 2022, and November 29, 2023, the Accident Investigation Board report for the latter noted that pilot error was also a contributing factor.[88] (The Command Investigation into the June 2022 mishap near El Centro, CA, said human factors were not a factor in the mishap and that pilot and aircrew preparation were appropriate.)[89] Accident investigations determined that that pilot error had caused two other fatal mishaps during the 2022-2023 timeframe—one in Australia and one in Norway.[90]

In addition to seeking to address the mechanical failures, DOD has implemented controls to improve flight safety. In testimony to the House Government Oversight Committee, Vice Admiral Chebi and Gary Kurtz, the DOD Program Executive Officer for Air Anti-Submarine Warfare and Special Missions Programs, wrote that some of those controls include NAVAIR briefings about mishap causal factors and reviews and serial-number verification of "safety critical life-limited components."[91] They also testified that program officials plan to verify on the ground that the V-

[83] Based on CRS communications with officials from Bell Textron, November 21, 2024.

[84] DOD, Contracts for March 8, 2023, Navy contracts, https://www.defense.gov/News/Contracts/Contract/Article/3323211/.

[85] Based on CRS correspondence with NAVAIR, PMA-275, October 3, 2024; and Taylor, "V-22 Program Overview," V-22 Joint Program Office, p. 6.

[86] Based on CRS correspondence with NAVAIR, PMA-275, October 3, 2024; and Taylor, "V-22 Program Overview," V-22 Joint Program Office, p. 6.

[87] Based on CRS correspondence with NAVAIR, PMA-275, October 3, 2024.

[88] Conley, "United States Aircraft Accident Investigation Board Report, CV-22B T/N 10-0054, Date of Accident: November 29, 2023."

[89] U.S. Marine Corps, "Command Investigation Into the Class A Aviation Mishap that Occurred on 8 June 2022 in the R-2512 Range Complex."

[90] U.S. Marine Corps, "Command Investigation into the Facts and Circumstances Surrounding the Class A Aviation Mishap of an MV-22B of Marine Medium Tiltrotor Squadron 363 (Reinforced) on 27 August 2023 in Australia," May 4, 2024; and U.S. Marine Corps, "Command Investigation into the MV-22 Aviation Mishap that Occurred on 18 March 2022 During Exercise Cold Response," June 29, 2022.

[91] Chebi and Kurtz, Testimony in H.Hrg. 118-115.

22 drive train is operating properly before a flight, improve mission planning, and modify emergency procedures.[92]

In March 2024, the Marine Corps in a press release indicated it was taking a "three-phased approach" to returning 17 MV-22 squadrons to flight.[93] First, the Marines would provide care and basic skills training for pilots and aircrew. Second, squadrons were to follow training and readiness manuals for basic and advanced proficiency. Third, the squadrons were to conduct pre-deployment, mission-specific training for any next deployment.

Also in March 2024, the Navy in a press release stated it was implementing "a deliberate, multi-phased, conditions-based approach that will prioritize safety during the CMV-22 return to flight."[94] That plan includes maintenance checks and tailored training.[95] The Navy changed its instructions for operations so that pilots would no longer disregard the V-22's on-board alert system.[96]

The Air Force has said it made similar operational modifications. "Our criteria prior was three-chip [warnings] was a 'land as soon as practical,'" Air Force Special Operations Command Commander Lieutenant General Michael E. Conley reportedly stated in September 2024.[97] "We've changed that to one, and then two becomes a 'land as soon as possible.' At the end of the day, there will always be aircraft commander and crew discretion."[98]

Air Force Special Operations Command stated in a press release that it is also implementing a three-phase plan to return CV-22s to full flight operations.[99] The first phase contains ground and simulator training, safety briefings, a review of maintenance records, and refined squadron training with new safety protocols.[100] The second, multi-month phase includes basic training and training for full mission proficiency, as well as additional maintenance training and squadron-level training.[101] The third phase includes a resumption of full mission profiles, with multilateral exercises, and operational deployments.[102]

Tilt-Rotor Lessons Learned

The Army is seeking a next-generation rotorcraft with more speed and greater range than the prior types of helicopters and has chosen to develop a tilt-rotor design similar to the V-22 from Bell

[92] Chebi and Kurtz, Testimony in H.Hrg. 118-115.

[93] U.S. Marine Corps, "Marine Corps Returns MV-22 to Flight Status," press release, March 8, 2024, https://www.marines.mil/News/Press-Releases/Press-Release-Display/Article/3700548/marine-corps-returns-mv-22-to-flight-status/.

[94] U.S. Navy, "Navy Announces CMV-22 Return to Flight Status."

[95] U.S. Navy, "Navy Announces CMV-22 Return to Flight Status."

[96] Mallory Shellbourne, "Navy, Marines Learning to Make Do as V-22 Restrictions Endure," *USNI News*, February 11, 2025, https://news.usni.org/2025/02/11/navy-marines-learning-to-make-do-as-v-22-restrictions-endure.

[97] Greg Hadley, "AFSOC Will Deploy Ospreys in 'Weeks,' But Full Fleet Readiness is Still Months Away," *Air & Space Forces Magazine*, September 18, 2024, https://www.airandspaceforces.com/afsoc-boss-osprey-deploy-weeks/.

[98] Hadley, "AFSOC Will Deploy Ospreys in 'Weeks,' But Full Fleet Readiness is Still Months Away."

[99] Department of the Air Force, U.S. Air Force, Air Force Special Operations Command (AFSOC) Public Affairs, "AFSOC to Resume CV-22 Flight Operations," press release, March 8, 2024, https://www.afsoc.af.mil/News/Article-Display/Article/3700599/afsoc-to-resume-cv-22-flight-operations/.

[100] AFSOC Public Affairs, "AFSOC to Resume CV-22 Flight Operations."

[101] AFSOC Public Affairs, "AFSOC to Resume CV-22 Flight Operations."

[102] AFSOC Public Affairs, "AFSOC to Resume CV-22 Flight Operations."

Textron. Army officials say they intend the aircraft, called the Future Long-Range Assault Aircraft (FLRAA), to replace the Sikorsky UH-60 Black Hawk helicopter.[103]

Although the current FLRAA design is similar to the V-22 in that it is a tilt-rotor, FLRAA differs from that of the V-22 in several noteworthy ways. The V-22 is larger than FLRAA.[104] The V-22's entire nacelle, containing the engine, rotates; on the FLRAA design, only the rotor blades tip forward. Officials from Bell state they have further simplified the nacelle design, using digital tools not available when the current design was created.[105] Technological advancements also potentially enable a less complex wiring system for FLRAA, with wires that are coated and intended to be easier to maintain. Company officials say that the FLRAA clutch is more conventional and akin to other models of helicopter than the V-22's clutch.[106] The current FLRAA prototype design reportedly has a straight wing, which eliminates the need for a mid-wing gearbox like on the V-22.[107]

Legislative Activity

FY2025

Summary of Congressional Action on FY2025 Funding Request

Table 2 summarizes congressional action on the FY2025 funding request for line items referencing the V-22 program.

Table 2. Congressional Action on FY2025 Funding Request for Selected V-22 Line Items

(in millions of dollars of budget authority)

			Authorization			Appropriation		
Line	**Type**	**Request**	**HASC**	**SASC**	**Enacted**	**HAC**	**SAC**	**Enacted**
V-22 (Tilt/Rotor ACFT) Osprey [Navy]	Proc.	$235.1	360.1	325.1	295.1	$295.1	$265.1	$265.1
V-22 (Medium-Lift) [Navy]	Proc.	$60.2	$60.2	$60.2	$60.2	$80.2	$30.2	$30.2
V-22A [Navy]	RDT&E	$109.4	$109.4	$109.4	$109.4	$144.8	$103.9	$108.2
CV-22 Mods [Air Force]	Proc.	$42.8	$42.8	$42.8	$42.8	$42.8	$42.8	$42.8
CV-22 Modification [SOCOM]	Proc.	$49.4	$49.4	$49.4	$49.4	$49.4	$40.8	$40.8

[103] For more information, see CRS In Focus IF12771, *Future Long-Range Assault Aircraft (FLRAA)*, by Jennifer DiMascio.

[104] Based on CRS correspondence with Marine Corps officials, February 13, 2025.

[105] Based on CRS communications with Bell program officials, October 24, 2024.

[106] Based on CRS communications with Bell program officials, October 24, 2024.

[107] Steve Trimble, "A Decade in the Making, U.S. Army Nears Final FLRAA Decision," *Aviation Week Intelligence Network*, October 6, 2022.

			Authorization			Appropriation		
CV-22 Post-Production Support [Air Force]	Proc.	$12.0	$12.0	$12.0	$12.0	$12.0	$12.0	$12.0
CV-22 [Air Force]	RDT&E	$26.2	$26.2	$26.2	$26.2	$26.2	$26.2	$26.2
Total		**$535.1**	**$660.1**	**$625.1**	**$595.1**	**$650.5**	**$521.0**	**$525.3**

Source: Table prepared by CRS based on U.S. Congress, House Committee on Armed Services, *Servicemember Quality of Life Improvement and National Defense Authorization Act for Fiscal Year 2025*, legislative text and joint explanatory statement to accompany H.R. 5009/P.L. 118-159, 119th Cong., 1st sess., H.Prt. 119-2, January 2025; H.R. 8774 and H.Rept. 118-557; S. 4921 and S.Rept. 118-204; and DOD's 1414 Base for Reprogramming Actions, https://comptroller.defense.gov/Portals/45/Documents/execution/FY_2025_DD_1414_Base_for_Reprogramming_Actions.pdf.

Notes: HAC is House Appropriations Committee; SAC is Senate Appropriations Committee. Proc. is procurement. RDT&E is research, development, test, and evaluation. The Full-Year Continuing Appropriations and Extensions Act, 2025 (H.R. 1968; P.L. 119-4), did not include a list of line-item level dollar amounts for DOD programs. Section 1422 of the full-year CR required DOD, "after consultation with" defense appropriations subcommittees, to submit a detailed "spending, expenditure, or operating plan" for FY2025 within 45 days of enactment (i.e., not later than April 29, 2025). DOD's DD 1414 Base for Reprogramming Actions details the DOD's FY2025 operating plan. See CRS Insight IN12425, *FY2025 Defense Appropriations: Summary of Funding*, by Cameron M. Keys. Table does not include additional V-22 funding for spare and repair parts, support equipment, or certain systems. Table also does not include mandatory funding provided by P.L. 119-21. Figures rounded to the nearest tenth. Totals may not sum due to rounding.

FY2025 National Defense Authorization Act (H.R. 8070; S. 4638; H.R. 5009; P.L. 118-159)

The House Armed Services Committee, in a report (H.Rept. 118-529) accompanying its version of the FY2025 NDAA (H.R. 8070), recommended $125.0 million more than requested for line items referencing the V-22 program (see HASC column of **Table 2**). The committee report, in part,

- directs the Secretary of the Navy to provide a report on how the Navy will support carrier strike groups when the C-2 Greyhound is retired and restrictions on CMV-22 flights, including a description of carrier onboard deliveries during combat operations and a plan for supporting the CMV-22 itself;
- directs the Chief of Staff of the Air Force and the Commandant of the Marine Corps to brief the House Armed Services Committee on expected upgrades to the V-22;
- directs the Secretary of the Navy to brief the House Armed Services Committee on plans for nacelle improvement, including statistics on mission readiness, comparing aircraft that have received improved nacelles to those that have not received improvements;
- directs the Chief of Naval Operations, in coordination with the Chief of Staff of the Air Force and the Commandant of the Marine Corps, to brief the House Armed Services Committee on planned investments for each variant of the V-22; and
- directs the Secretary of the Air Force to provide a briefing to the House Armed Services Committee on the proposed force structure for the CV-22 fleet.[108]

[108] H.Rept. 118-529, pp. 20, 21, 22, 32.

The Senate Armed Services Committee, in a report (S.Rept. 118-188) accompanying its version of the FY2025 NDAA (S. 4638), recommended $90 million more than requested for line items referencing the V-22 program (see SASC column of **Table 2**).

The enacted Servicemember Quality of Life Improvement and National Defense Authorization Act for Fiscal Year 2025 (H.R. 5009; P.L. 118-159) authorized $60 million more than requested for line items referencing the V-22 program (see enacted authorization column of **Table 2**), including $60 million more than requested in the Navy procurement line V-22 (Tilt/Rotor ACFT) Osprey for "safety enhancements."[109]

FY2025 DOD Appropriations Act (H.R. 8774; S. 4921; P.L. 119-4, Division A, Title IV)

The House Appropriations Committee, in a report (H.Rept. 118-557) accompanying its version of the Department of Defense Appropriations Act, 2025 (H.R. 8774), recommended $115.4 million more than requested for line items referencing the V-22 program (see HAC column of **Table 2**).

The Senate Appropriations Committee, in a report (S.Rept. 118-204) accompanying its version of the FY2025 DOD Appropriations Act (S. 4921), recommended $90 million more than requested for line items referencing the V-22 program (see SAC column of **Table 2**). The committee report, in part,

- encourages the Army Program Executive Officer, Aviation to collaborate with the Navy's Program Executive Officer, Air Anti-Submarine Warfare, Assault and Special Mission on lessons learned for the development and operation of tiltrotor aircraft to ensure insights gained across the V-22 program lifecycle can be applied early to FLRAA detailed design activities as appropriate, and
- directs the Secretary of the Navy to provide quarterly updates to the congressional defense committees on the status of the NAVAIR-led comprehensive review of the V-22 program, as well as a final report on the findings and implementation plan of all recommendations, not later than 90-days following the completion of NAVAIR's comprehensive review.[110]

The enacted version of the FY2025 DOD Appropriations Act (P.L. 119-4, Division A, Title IV) appropriated $9.8 million less than requested for line items referencing the V-22 program (see the enacted appropriations column of **Table 2**).[111]

FY2026

Summary of Congressional Action on FY2026 Funding Request

Table 3 summarizes congressional action on the FY2026 funding request for line items referencing the V-22 program.

[109] H.Prt. 119-2, p. 1223.

[110] S.Rept. 118-204, p. 92.

[111] DOD's 1414 Base for Reprogramming Actions, https://comptroller.defense.gov/Portals/45/Documents/execution/FY_2025_DD_1414_Base_for_Reprogramming_Actions.pdf; and FY2026 DOD budget justification documentation.

Table 3. Congressional Action on FY2026 Funding Request for Selected V-22 Line Items

(in millions of dollars of budget authority)

			Authorization			Appropriation		
Line	**Type**	**Request**	**HASC**	**SASC**	**Enacted**	**HAC**	**SAC**	**Enacted**
V-22 (Tilt/Rotor ACFT) Osprey [Navy]	Proc.	$319.1	$319.1	$319.1		$247.8	$309.1	
V-22 (Medium-Lift) [Navy]	Proc.	$47.2	$47.2	$47.2		$50.9	$47.2	
V-22A [Navy]	RDT&E	$125.0	$125.0	$125.0		$144.8	$125.0	
CV-22 Mods [Air Force]	Proc.	$78.7	$78.7	$78.7		$100.4	$78.7	
CV-22 Modification [SOCOM]	Proc.	$19.7	$19.7	$19.7		$19.7	$19.7	
CV-22 Post-Production Support [Air Force]	Proc.					$5.1		
CV-22 [Air Force]	RDT&E	$0.7	$0.7	$0.7		$30.9	$0.7	
Total		**$590.4**	**$590.4**	**$590.4**		**$594.4**	**$580.4**	

Source: Table prepared by CRS based on H.R. 3838 and H.Rept. 119-231; S. 2296 and S.Rept. 119-39; H.R. 4016 and H.Rept. 119-162; S. 2572 and S.Rept. 119-52.

Notes: HAC is House Appropriations Committee; SAC is Senate Appropriations Committee. Proc. is procurement. RDT&E is research, development, test, and evaluation. Table does not include funding for V-22 spare and repair parts, support equipment, or certain systems. Table also does not include mandatory funding provided by P.L. 119-21. Figures rounded to the nearest tenth. Totals may not sum due to rounding.

Proposals for FY2026 National Defense Authorization Act (H.R. 3838; S. 2296)

The House Armed Services Committee, in a report (H.Rept. 119-231) accompanying its version of the Streamlining Procurement for Effective Execution and Delivery and National Defense Authorization Act for Fiscal Year 2026 (H.R. 3838), recommended the requested amounts for line items referencing the V-22 program (see HASC column of **Table 3**). The committee, in the report,

- encourages the Department of Defense to prioritize funding for essential upgrades, such as nacelle improvement, digital interoperability enhancements, and sustainment that increase aircraft availability, and
- directs the Secretary of the Navy, in coordination with the Secretary of the Air Force, to submit a briefing to the House Committee on Armed Services not later than December 1, 2025, on the near- and long-term modernization strategy for the V-22 fleet.[112]

The Senate Armed Services Committee, in a report (S.Rept. 119-39) accompanying its version of an FY2026 NDAA (S. 2296), recommended the requested amount for line items referencing the V-22 program (see SASC column of **Table 3**). The committee, in the report,

[112] H.Rept. 119-231, pp. 24.

- directs the Comptroller General to conduct a review of the V-22 program's safety, cost, reliability, and performance to include an assessment of DOD efforts to incorporate lessons learned from the V-22 program for the FLRAA program;[113]
- encourages the Secretary of the Navy to integrate nacelle improvements into the CMV-22B aircraft fleet;[114] and
- directs the Comptroller General to assess the Department of the Army's FLRAA program and consider the extent to which the Army and contractors incorporated V-22 lessons into the design, risk reduction, and plans for operation and maintenance of FLRAA.[115]

Proposals for FY2026 DOD Appropriations Act (H.R. 4016; S. 2572)

The House Appropriations Committee, in a report (H.Rept. 119-162) accompanying its version of a DOD Appropriations Act, 2026 (H.R. 4016), recommended $4.0 million more than requested for line items referencing the V-22 program (see HAC column of **Table 3**). The committee, in the report,

- directs the Commander of Special Operations Command to submit to the House and Senate Committees on Appropriations, Subcommittees on Defense, a report, with a follow-on briefing, that includes the results of accident investigations pertaining to any crash of the CV-22 Osprey since the introduction of the aircraft or other mishap findings involving the failure of the single high-speed planetary pinion gear.[116]

The Senate Appropriations Committee, in a report (S.Rept. 119-52) accompanying its version of an FY2026 DOD Appropriations Act (S. 2572), recommended $10 million less than requested for line items referencing the V-22 program (see SAC column of **Table 3**).

Potential Considerations for Congress

Congress may or may not approve funding for the modernization, future purchase, and operation of the V-22. Congress also may provide oversight about the platform's safety. Congress has asked for information about aircraft carrier logistics support, nacelle improvement, investment in upgrades, CV-22 force structure, and the program as a whole. Some additional matters for Congress to consider include the following:

Size of V-22 Fleets

DOD plans call for V-22 production to end in 2028; procurement funding requested in FY2026 would not fund the acquisition of new aircraft. Rather it is for components and production line shutdown costs, among other activities. One potential issue for Congress is whether DOD has enough, too many, or too few V-22s to meet operational requirements.

Some analysts argue that the Navy should buy more CMV-22s to respond to the Navy's logistics needs, which are growing as the Navy moves toward Distributed Maritime Operations (DMO) for

[113] S.Rept. 119-39, pp. 17-18.

[114] S.Rept. 119-39, pp. 16-17.

[115] S.Rept. 119-39, p. 51.

[116] H.Rept. 119-162, p. 54.

operations in the Asia-Pacific.[117] These analysts contend that the CMV-22's vertical take-off and landing capability—even at night—enables the aircraft to provide logistics support without a need for the aviation infrastructure, such as runways, required by the C-2 Greyhound cargo aircraft.[118] Congress may consider seeking additional information about the CMV-22's role in DMO and whether or not to provide funding to maintain production of the CMV-22 beyond plans to close the production line in 2028. Congress may also consider whether to pursue alternatives to the CMV-22.

Separately, some Members have asked for a report about the Air Force CV-22 force structure. A report accompanying the HASC-reported version of the FY2025 NDAA (H.R. 8070; H.Rept. 119-529) questioned the adequacy of CV-22 fleet size, stating that the Air Force has put CV-22s in storage until 2026. The Air Force has reportedly transferred certain CV-22s to storage in part to better maintain and operate a more limited number of aircraft.[119] A potential question for Congress is whether the U.S. military has the capacity to increase the number of V-22s in service, given declining readiness rates for the aircraft. A Congressional Budget Office (CBO) report released in November 2024 analyzed the availability of DOD's rotary wing aircraft.[120] CBO found that the Air Force CV-22 availability has declined from a 61% availability rate in 2017 to a 33% availability rate in 2023. The study was conducted using data before the November 29, 2023, fatal V-22 mishap.[121]

Congress may evaluate requested information from the Air Force to provide oversight regarding decisions about the future size of AFSOC's CV-22 fleet and funding, as well as future plans for nacelle improvement.

Aircraft Carrier Logistics

As noted above, the Navy is phasing in the CMV-22 to replace the C-2 Greyhound for carrier onboard delivery missions until 2026. The CMV-22 remains under a 30-minute flight restriction. The Navy has indicated that it anticipates the CMV-22B will "return to its full operating envelope in support of this transition with no interruption to the mission."[122]

Citing the V-22 safety record and flight restrictions, some Members have asked what other platforms the Navy might use as an alternative to the CMV-22 for carrier onboard delivery. Navy officials say that a heavy-lift helicopter, such as the CH-53K, is capable of undertaking the C-2 mission.[123] Congress may consider whether or not to direct the Navy to further extend the use of the C-2, whether or not to direct the Navy study alternatives to the CMV-22, or whether or not to fund the CMV-22.

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[117] Sandy Clark, "Time to Double Down on Naval Combat Logistics with the Osprey," *Real Clear Defense*, June 14, 2024, https://www.realcleardefense.com/articles/2024/06/14/time_to_double_down_on_naval_combat_logistics_with_the_osprey_1038039.html. For information about DMO, see CRS In Focus IF12599, *Defense Primer: Navy Distributed Maritime Operations (DMO) Concept*, by Ronald O'Rourke.

[118] Tim Hanifen, "The CMV-22 Osprey: A Game-Changer for Today's COD and Tomorrow's Contested Combat Logistics Support," *Center for Maritime Strategy*, August 13, 2024, https://centerformaritimestrategy.org/publications/the-cmv-22-osprey-a-game-changer-for-todays-cod-and-tomorrows-contested-combat-logistics-support/.

[119] Greg Hadley, "AFSOC Put 15 CV-22 Ospreys in Storage to Increase Mission Readiness for Rest of Fleet," *Air and Space Forces Magazine*, May 24, 2024, https://www.airandspaceforces.com/afsoc-cv-22-ospreys-flyable-storage/.

[120] Congressional Budget Office (CBO), "Availability and Use of Rotary-Wing Aircraft in the Department of Defense," November 2024, https://www.cbo.gov/system/files/2024-11/60663-dod-rotary-wing.pdf.

[121] CBO, "Availability and Use of Rotary-Wing Aircraft in the Department of Defense."

[122] Based on CRS correspondence with NAVAIR, PMA-275, October 3, 2024.

[123] Based on CRS communications with NAVAIR officials, September 19, 2024.

Funding for Future Upgrades

One potential issue for Congress is whether or not to support the Marines' stated intention to continue operating the MV-22 until 2055. DOD may request future authorization and appropriation of funding for upgrades, such as the VeCToR and ReVAMP initiatives described above.

Marine Corps officials say that the V-22's speed, range, and ability to refuel made the Osprey essential to operations in Afghanistan and will make it an asset in the Indo-Pacific region. They argue that its safety record is comparable to other aircraft in its fleet. A Marine Corps official told Members that initial flight restrictions on the MV-22 hampered about 75% of the Marines' assault support, because the MV-22 is critical to the contested logistics mission.[124]

Congress in the FY2025 NDAA (H.R. 5009; P.L. 118-159) authorized an additional $60 million for V-22 safety enhancements. Some Members have asked for additional information about DOD plans. Congress may use the results to consider whether or not to authorize or appropriate funding for future upgrades.

Safety Investigation Reports

The House Committee on Government Oversight has expressed frustration about a lack of access to safety investigation reports. A July 16, 2024, letter to then-Defense Secretary Lloyd Austin requesting those reports and information about all Osprey class A mishaps since 1991 states: "If DoD continues to fail to produce the requested documents by July 30, 2024, the Committee will consider additional measures, including use of the compulsory process, to gain compliance and obtain this critical material."[125]

DOD Instruction 6055.07 states that "components protect privileged safety information to ensure commanders quickly obtain accurate mishap information." The instruction also lays out guidelines for privileged information within safety investigations, including the promise of confidentiality to sources who provide information.[126]

As previously discussed, DOD has an agreement with the chairs and ranking members of the House and Senate Committees on Armed Services to provide them with briefings, by request, on the results of safety investigation boards. Congress may or may not consider changing this agreement to include more Members and/or professional staff of the committees. Broader dissemination of the results of a safety investigation board could increase transparency and help Congress provide oversight. On the other hand, a wider release of the findings could have unintended consequences, such as compromising the confidentiality of sources assisting with an investigation.

Maintenance Training

Some analysts have said that the development, training, and education of Marine aviation technicians and maintainers have not kept pace with the rate of innovation in the Marine aircraft

[124] CQ Transcripts, "House Armed Services Subcommittee on Readiness Holds Hearing on the Fiscal Year 2025 Military Readiness Budget Request," April 30, 2024.

[125] Letter from Comer and Grothman to Lloyd Austin, July 16, 2024.

[126] DOD Instruction 6055.07, "Mishap Notification, Investigation, Reporting, and Record Keeping."

fleet, including for the MV-22.[127] They argue that to be more successful, maintenance technicians need the kind of squadron-specific training that pilots and aircrews receive.[128] Congress could consider the costs and benefits of offering squadron-specific training for aircrew maintainers. Congress could also consider whether or not to provide additional funding for squadron-level maintenance training.

[127] Chief Warrant Officer 3 Brian P. Brewer, U.S. Marine Corps, "Aviation Maintenance: A Critical Vulnerability in the Marine Corps," *U.S. Naval Institute*, November 2024, https://www.usni.org/magazines/proceedings/2024/november/aviation-maintenance-critical-vulnerability-marine-corps.

[128] Brewer, "Aviation Maintenance: A Critical Vulnerability in the Marine Corps."

Appendix. Safety Statistics

The table below compares the Class A Mishap rates per 100,000 flight hours of the V-22 against other selected Marine Corps and Air Force rotary-wing aircraft, including the Marines' AH-1Z attack helicopter, the CH-53E heavy-lift transport helicopter, and the UH-1Y medium-sized utility helicopter. Other Air Force rotorcraft include the HH-60 medium-lift utility helicopter and the H-1 helicopter. It does not include the CMV-22, which has not experienced any Class A Flight Mishaps.

Table A-1. Selected Marine Corps and Air Force Class A Flight Mishaps and Mishap Rates, FY2015-FY2024

(Number and Rate, by Service and Type of Aircraft)

Aircraft Type	Number of Mishaps	Rate
All U.S. Marine Corps aircraft	**57**	**2.67**
AH-IZ	2	0.81
CH-53E	13	5.49
MV-22B	11	2.56
UH-1Y	4	1.54
All U.S. Air Force aircraft	**293**	**1.65**
HH-60	3	1.29
H-1	2	0.66
CV-22	11	11.55

Source: Marine Corps data provided by Marine Corps Legislative Liaison, December 12, 2024; Air Force data provided by Air Force Legislative Liaison, January 7, 2025.

Notes: Rate of Class A Flight Mishaps is calculated based on 100,000 flight hours.

Table A-2. Number of Fatalities Due to V-22 Mishaps

(across all V-22 variants)

1991-2007	2007-2025
30	35

Source: Marine Corps Legislative Liaison, Air Force Legislative Liaison, Aviation Safety Network Database, https://asn.flightsafety.org/asndb/type/V22.

Note: The first V-22 variant to achieve initial operational capability was the MV-22 in 2007.

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