

B-52J Commercial Engine Replacement Program (CERP)



Following its transition from the Middle Tier of Acquisition rapid prototyping pathway to the major capability acquisition pathway in December 2023, the B-52J Commercial Engine Replacement Program (CERP) is now undergoing subsystem laboratory and platform integration testing. The program's Milestone B (MS B) TEMP, which will guide T&E through the current phase of development, is pending final approval.

SYSTEM DESCRIPTION

The B-52J CERP is the final phase of a multi-year, multi-program modernization effort that will produce the B-52J aircraft configuration. The B-52J CERP replaces legacy TF33 engines with Rolls Royce F130 commercial-derivative engines to increase system reliability and

reduce sustainment costs. This upgrade will also increase fuel efficiency and electrical power generation capacity and provide modern digital engine controls and displays.

MISSION

Theater commanders will use units equipped with the B-52J CERP to conduct long-range, all-

weather, conventional and nuclear strike operations that employ a wide range of munitions against ground and maritime targets in low-to-medium adversary threat environments. B-52J theater mission tasks will include strategic attack, time-sensitive targeting, air interdiction, close air support, suppression/destruction of enemy air defenses, maritime mining, and nuclear deterrence.

PROGRAM

The B-52J CERP completed initial Middle Tier of Acquisition rapid prototyping efforts with delivery of Virtual System Prototype digital models in FY23. The program is currently testing the different engine subsystems, which will inform the system's Critical Design Review (CDR) in FY26. This phase of testing will include various subsystem tests and creation of subsystem laboratories. Prior to the MS C decision point, the current phase of testing will end with the modification of two low-rate initial production (LRIP) aircraft for use in testing.

At the direction of the Air Force Acquisition Executive, the program transitioned to the major capability acquisition pathway in December 2023. The acquisition strategy extends system development until FY33. The program schedule includes a system-level CDR in FY26, followed by the modification of the two LRIP aircraft in FY27 for testing. Developmental and integrated flight testing is scheduled to begin in FY29, leading to IOT&E in FY32. The proposed production program would award LRIP contracts to procure engines and modify 51 of the 74 B-52 fleet aircraft (69 percent) prior to the planned completion of IOT&E in FY32. IOT&E will be conducted using the two fully modernized B-52J LRIP aircraft. Two full-rate production decisions, planned for FY33 and FY34, will address the remaining 23 aircraft.

Integration of new engines on a legacy aircraft is a major design change. B-52J commercial engine integration will require extensive flight testing to evaluate

safety and performance in the areas of aircraft structures, wing flutter, propulsion system compatibility, aerodynamic performance, and aircraft flying qualities in critical phases of flight. Changes in aircraft performance and flight characteristics require recertification of air refueling tanker aircraft, and recertification of all weapons.

The Air Force acquisition strategy implements a highly concurrent flight test and production program, awarding LRIP contracts for 69 percent of fleet aircraft prior to IOT&E. Contracts for the first two LRIP lots, totaling 17 aircraft, would be awarded prior to the start of the flight test program. Two additional LRIP contracts for 34 more aircraft would be awarded prior to completion of the developmental flight test program and IOT&E. Previous aircraft development programs with highly concurrent flight test and production schedules of this kind have frequently incurred significant cost increases and schedule delays driven by deficiency discoveries.

To minimize concurrency risks, section 4231 of title 10, U.S. Code limits LRIP quantities to the minimum necessary to provide production-representative articles for operational test, to establish an initial production base for the system, and to permit an orderly increase in the production rate. The Air Force's rationale for establishing 69 percent of fleet aircraft as the minimum LRIP quantity necessary for these limited purposes is based on a 2017 business case analysis that projected significant cost savings from procurement of a commercial

engine replacement in fewer and larger lots with installation schedules aligned with existing B-52 periodic depot maintenance schedules.

DOT&E approved the B-52 Cybersecurity T&E Strategy in September 2023. The strategy defines a comprehensive, integrated cybersecurity test approach across all planned modernization programs, including CERP, radar modernization, multiple communication system upgrades, and system sustainment programs. Prior to the MS C decision in FY29, DOT&E requires both an updated TEMP and a CERP-specific update to the B-52 Cybersecurity T&E Strategy.

» MAJOR CONTRACTORS

- The Boeing Company – Oklahoma City, Oklahoma
- Rolls-Royce North America – Indianapolis, Indiana

TEST ADEQUACY

DOT&E is awaiting the approved MS B TEMP, which should define an adequate operational test strategy for the modernized B-52J CERP aircraft configuration. The program will update the TEMP prior to MS C in FY29 to prepare for ground and flight testing starting at the end of FY29. The DOT&E-approved B-52 Cybersecurity T&E Strategy defines an adequate cybersecurity test approach across all B-52 modernization programs, but it will require a CERP-specific update prior to the MS C decision point.

PERFORMANCE

» EFFECTIVENESS, SUITABILITY, AND SURVIVABILITY

The B-52J CERP is still in the system design phase. Developmental and integrated flight testing is proposed to begin in FY29. DOT&E will evaluate integrated test data for the potential to reduce IOT&E requirements. DOT&E will assess operational effectiveness, suitability, and survivability following IOT&E in FY32.

RECOMMENDATIONS

The Air Force should:

1. Ensure that the subsystem component-level testing is complete prior to the CDR in FY26 and LRIP test aircraft modification in FY27.
2. Develop and submit for DOT&E approval a CERP-specific update to the Cybersecurity T&E Strategy prior to the program's MS C decision.
3. Continue to mitigate concurrent flight test and production risks by establishing clear, data-driven exit criteria based on flight test results for each of the four LRIP contract award decision points, as recommended in the FY23 and FY24 Annual Reports.