

B-52J Commercial Engine Replacement Program (CERP)



The B-52J Commercial Engine Replacement Program (CERP) completed initial Middle Tier of Acquisition (MTA) rapid prototyping efforts with delivery of Virtual System Prototype digital models in FY23. At Air Force Acquisition Executive direction, the program is transitioning to the Major Capability Acquisition pathway with a planned Milestone B decision in FY24.

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. 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 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-52 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 MTA rapid prototyping efforts with delivery of Virtual System Prototype digital models in FY23. These models support initial system performance analysis,

production planning, system support analysis, and early training activities. Digital models developed during the MTA phase will require extensive ground and flight test validation to enable their use as primary program data sources.

At Air Force Acquisition Executive direction, the program is transitioning to the major capability acquisition pathway with a planned Milestone B decision in FY24. The proposed acquisition strategy extends system development until FY31 to better integrate with preceding modernization upgrades, to include the radar modernization and communication system upgrades, along with ongoing aircraft sustainment programs. The proposed program schedule includes system-level Critical Design Review in FY25 followed by modification of two test aircraft. Developmental and integrated flight testing would begin in FY28 leading to IOT&E in FY31. The proposed production program would award low-rate initial production (LRIP) contracts to procure engines and modify 70 percent (52 of 74) of B-52 fleet aircraft prior to the completion of IOT&E in FY31. A full-rate production decision for the remaining 22 aircraft is planned for FY32. IOT&E will be conducted with two fully modernized B-52J LRIP aircraft.

Integration of new engines on a legacy aircraft is a major design change. B-52J commercial engine integration will require extensive flight tests 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 compatibility with all supporting tanker aircraft and recertification of all weapons employed from external wing stations. Based on results from previous flight test programs, the risk of deficiency discovery in one or more of these areas is high.

The proposed Air Force acquisition strategy implements a highly concurrent flight test and production program with LRIP contracts awarded for 70 percent of fleet aircraft prior to IOT&E. Contracts for the first two LRIP lots totaling 20 aircraft would be awarded prior to the start of the flight test program. Two additional LRIP contracts for 32 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. Air Force rationale for establishing 70 percent of fleet aircraft as the

minimum LRIP quantity necessary for these limited purposes is based on a 2017 Business Case Analysis. That analysis 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 is coordinating with the Air Force to develop the B-52J CERP Milestone B Test and Evaluation Master Plan. DOT&E approved the B-52J Cybersecurity T&E Strategy in September 2023. The strategy defines a comprehensive cybersecurity test approach across all planned modernization programs, including CERP, radar modernization, multiple communication system upgrades and system sustainment programs.

» MAJOR CONTRACTORS

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

TEST ADEQUACY

DOT&E is coordinating with the Air Force to develop the B-52J CERP Milestone B Test and Evaluation Master Plan. It will define an adequate operational test strategy for the modernized B-52J aircraft configuration.

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 FY28. IOT&E will assess operational effectiveness, suitability, and survivability in FY31.

RECOMMENDATIONS

The Air Force should:

1. Continue to develop verification and validation plans for digital models developed during the MTA phase to enable future use as primary engineering decision tools.
2. 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.