

## Why GAO Did This Study

The F-35 Lightning II Joint Strike Fighter program is DOD's most expensive weapon system program. DOD estimates it will cost nearly \$1.7 trillion to buy, operate, and sustain the aircraft and systems over its lifetime. DOD is also assessing options for modernizing its engine.

Congress included provisions in three statutes for GAO to review the F-35 program and a Senate report included another. This report (1) identifies the F-35's progress toward full-rate production, (2) assesses DOD's F-35 modernization effort (known as Block 4), and (3) assesses DOD's approach for modernizing its engine and thermal management system. GAO reviewed program, DOD, and contractor documentation on these topics and interviewed program, DOD, and contractor representatives. GAO assessed the program's progress against its own plans. GAO also applied its cost estimating and technology readiness leading practices, as appropriate.

## What GAO Recommends

Congress should consider directing the F-35 program to manage the engine modernization as a separate program. GAO added this matter for Congress because DOD has not committed to a separate engine program consistent with GAO's recommendation. GAO made seven total recommendations to DOD, including that it improve its reporting on Block 4 cost growth and define engine requirements. Overall, DOD concurred with three, partially concurred with three, and did not concur with one recommendation. GAO believes all the recommendations are warranted.

View [GAO-23-106047](#). For more information, contact Jon Ludwigson at (202) 512-4841 or [ludwigsonj@gao.gov](mailto:ludwigsonj@gao.gov).

# F-35 JOINT STRIKE FIGHTER

## More Actions Needed to Explain Cost Growth and Support Engine Modernization Decision

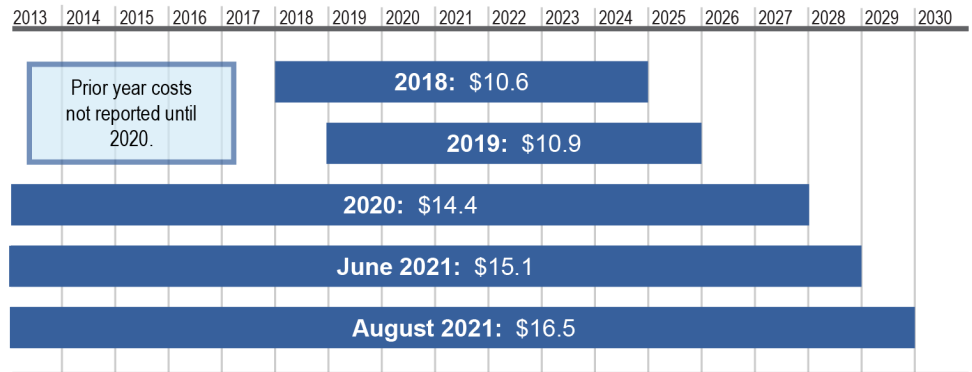
### What GAO Found

The F-35 program continues to experience schedule delays, cost growth, and late deliveries. Program delays in completing the F-35 simulator continue to prevent the Department of Defense (DOD) from completing the testing required to demonstrate that the F-35 is ready for full manufacturing rates, even though the program is already producing over 125 aircraft per year.

The F-35 program's total procurement costs have increased by \$13.4 billion since the last cost estimate in 2019. This is, in part, due to DOD spreading out aircraft purchases and adding years to its delivery schedule. Contractors also continue to have challenges with delivering aircraft and engines on time, but they are working to address these issues.

Further, DOD is 5 years into a development effort to modernize the F-35's capabilities. This effort, known as Block 4, is experiencing developmental delays for important technology updates. Block 4 costs also grew to \$16.5 billion, an increase of more than \$1 billion since GAO last reported.

**F-35 Block 4 Modernization Cost Increases since 2018 (then-year dollars in billions)**



Source: GAO analysis of Department of Defense data. | [GAO-23-106047](#)

The program's cost reporting mechanisms do not fully explain the reasons for cost growth. For example, DOD's reports to Congress on Block 4 cost growth do not distinguish higher-than-expected costs for previously planned Block 4 capabilities from growth due to adding new capabilities. Consequently, Congress does not have a complete picture of escalating F-35 modernization costs.

The program is exploring options for modernizing the F-35's engine and thermal management system that is used to cool aircraft subsystems that generate heat. The program plans to manage this multi-billion dollar effort under the existing program, which is scheduled to transition to sustainment soon and that would limit congressional oversight. The cooling system is overtasked, requiring the engine to operate beyond its design parameters. The extra heat is increasing the wear on the engine, reducing its life, and adding \$38 billion in maintenance costs.

The program assessed some engine and cooling improvement options, but it has not fully defined the requirements for how much future cooling the aircraft will need. By obtaining this key information, DOD and the services would be more informed about the future performance, cost, and technical implications.