F135 ENGINE
Proven Power for the F-35 Lightning II — In Flight, In Production

Providing Fifth-Generation Power
Pratt & Whitney’s F135 engine powers the F-35 Lightning II, the single-engine strike fighter developed by Lockheed Martin in conjunction with Northrop Grumman and BAE Systems. The F-35 includes three variants – the F-35A CTOL (Conventional Takeoff and Landing), F-35B STOVL (Short Takeoff and Vertical Landing) and F-35C CV (Carrier Variant).

Derived from Proven Technology
The F135 has evolved from the proven F119-PW-100 engine, the technologically advanced turbofan engine that exclusively powers the U.S. Air Force’s F-22 Raptor. In service since 2003, the F119 engine has the distinction of being the safest fighter engine introduced in U.S. Air Force history. The F135 offers the same operational pedigree with proven stealth capabilities, along with features such as advanced prognostics and health-management systems.

International Participation
The F-35 is the first truly international fighter aircraft development program, developed to serve the United States, the United Kingdom, Italy, the Netherlands, Turkey, Canada, Australia, Denmark, Norway and other allied nations. To support its customers, Pratt & Whitney has partnered with the best aerospace companies in the world including Rolls Royce and UTC Aerospace Systems to manufacture critical components of the F135, with the goal of producing the most advanced propulsion system the world has ever seen.

Reliability
Since powering the F-35’s first flight in December 2006, the F135 has maintained high readiness levels that have enabled the program to meet flight test objectives and support operational requirements for all three aircraft variants. Supportability features are designed to offer ease of maintenance while achieving unprecedented engine reliability and maintainability. Networked maintenance and logistics support capabilities are projected to significantly lower maintenance costs and increase mission availability. Likewise, common sustainment solutions across the services and partner nations offer economies of scale targeted to lower long-term costs relative to current engine fleets.

Affordability
The F135 program plans to continue to drive down cost as it ramps up production. The F135 produces 20% more thrust and weighs 1,500 pounds more than the F119. The F135 program objective is to achieve comparable production costs as the F119.

Product Facts

<table>
<thead>
<tr>
<th>Engine Characteristics</th>
<th>Values</th>
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<tbody>
<tr>
<td>Maximum thrust class (CTOL/CV)</td>
<td>43,000 pounds (191.3 kN)</td>
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<tr>
<td>Intermediate thrust class (CTOL/CV)</td>
<td>28,000 pounds (128.1 kN)</td>
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<tr>
<td>Length</td>
<td>220 inches (5.59 m)</td>
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<tr>
<td>Inlet diameter</td>
<td>43 inches (1.09 m)</td>
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<tr>
<td>Maximum diameter</td>
<td>46 inches (1.17 m)</td>
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<tr>
<td>Maximum thrust class (STOVL)</td>
<td>41,000 pounds (182.4 kN)</td>
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<tr>
<td>Intermediate thrust class (STOVL)</td>
<td>27,000 pounds (120.1 kN)</td>
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<tr>
<td>Short takeoff thrust class (STOVL)</td>
<td>40,740 pounds (181.2 kN)</td>
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<tr>
<td>Hover thrust class</td>
<td>40,650 pounds (180.8 kN)</td>
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<tr>
<td>Length</td>
<td>369 inches (9.37 m)</td>
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F135 Program Milestones

- **2003-2004**: F135 first engines to test
- **2006-2008**: F135 engines power first flights of F-35A and F-35B
- **June 2010**: F135 engine powers first flight of F-35C
- **October 2011**: F135 engine powers first landing of F-35B on a ship
- **July 2015**: U.S. Marine Corps declares Initial Operating Capability of F-35B
- **August 2016**: U.S. Air Force declares Initial Operating Capability of F-35A
- **December 2017**: Israeli Air Force declares Initial Operating Capability of F-35I “Adir”
- **August 2018**: 400th F135 engine produced
- **April 2018**: F135 engine System Development and Demonstration flight testing completed
- **October 2018**: Belgium selects the F-35 as its next-generation fighter
- **November 2018**: Italian Air Force declares Initial Operating Capability of F-35A
- **January 2019**: UK declares Initial Operating Capability of F-35B
- **February 2019**: U.S. Navy declares Initial Operating Capability of F-35C
- **March 2019**: Japan Air Self-Defense Force declares Initial Operating Capability of F-35A

Military Applications
F-35 Lightning II A, B, C
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