



F135 Engine

FAST FACTS

PROGRAM HIGHLIGHTS

Pratt & Whitney designs and builds the most advanced military fighter engines in the world. These engines provide reliable and affordable power for cutting-edge aircraft, such as the F-15 Eagle, F-16 Fighting Falcon, F-22 Raptor, and F-35 Lightning II.

- Pratt & Whitney's F135 propulsion system powers the F-35 Lightning II, the fifth generation, advanced, single-engine tactical fighter developed by Lockheed Martin in conjunction with BAE Systems and Northrop Grumman.
- The F135 provides a maximum thrust of 43,000 lbs. for three F-35 variants: the F-35A for conventional takeoff and landing (CTOL); the F-35B for short takeoff and vertical landing (STOVL); and the F-35C for aircraft carrier takeoff and landing (CV).

F-35 Noise Levels are Comparable to Other High Performance Combat Aircraft

- All jets make noise. There are no noise threshold requirements specified for the F-35 aircraft or the F135 propulsion system. However, tremendous advances in engine design provide far more capability for this fifth generation engine while mitigating noise to levels comparable to previously fielded fighter engines.
- Aircraft noise emissions are measured by the sound intensity, which is reflected in decibels (dB) on a sound level meter. For the F-35 this is measured on the ground and in the air. Noise produced by an F-35 will vary based on power settings and the type of flight operations.

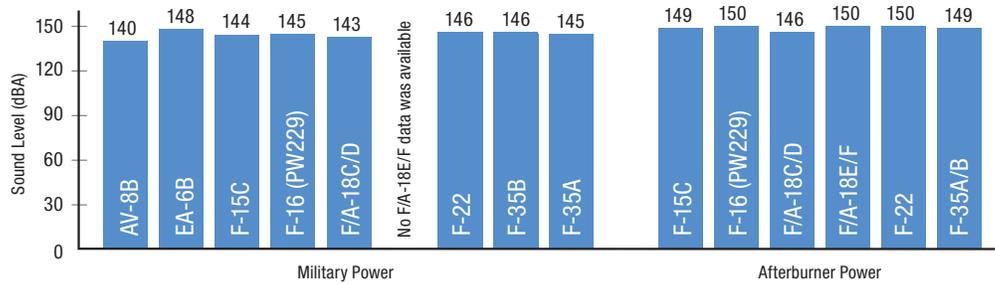
In the air — When flying straight and level flight using Mil Power (the highest engine power setting — 100% engine thrust request — without using the afterburners), the noise from the F-35 is within 1-3 decibels of other high performance fighter aircraft such as the F-18C/D, F-18 E/F, and F-22 on the ground directly under the aircraft with the aircraft at 1000 feet above ground level.

On the ground — When standing ~50 feet away from the engine, the noise is comparable (within 1-3 decibels) to other high performance fighter aircraft, such as the F-22 Raptor and the FA-18 E/F Super Hornet.

- The F-35 can take off safely in all conditions (including with full fuel and weapons stores) at Mil Power without the need for afterburner.
- The F-35 program collected aircraft ground run-up and flyover noise data which was provided to U.S. services, international partners, and foreign military sales customers to use to assess the environmental impact at F-35 bases. The most recent noise data analysis in 2013 generally corroborated the prior 2008 results.

ON THE GROUND

- F-35 engine noise is comparable to most previously fielded fighter aircraft.



IN THE AIR

Condition	F-35A Comparisons				F-35B Comparisons			
	F-35AA1	F-35A	F-16C/D (PW220)	F-16C/D (PW229)	F-35B	F/A-18C/D	F/A-18E/F	AV-8B
	L _{max} (dB)							
Mil Takeoff (1000 ft AGL)	112	111	103	110	110	108	113	105
Arrival (non-break, thru 1000 ft AGL, gear down (F-16 data with gear up))	95	93	79	90	92	103	108	90
Low Approach and Go, downwind leg, 1500 ft AGL, gear down; (F-16 data with gear up)	91	89	79	103	87	97	104	85
Radar Pattern (downwind leg, 2000 ft AGL, gear up)	79	79	75	89	77	81	91	85

- During takeoff, the F-35A (111 dB) is essentially equal in noise level to the F-16 with the latest generation PW-229 engine (110 dB), and was measured at least 10 dB lower on two of three low altitude flight conditions.
- Although the F-35A is generally louder for all conditions when compared to the F-16 with the earlier F100-PW-220 engine, the capability it delivers is a generation ahead (e.g., the F135 delivers more than twice the thrust capability of the F100-PW-220).
- The F-35B is quieter than the legacy F/A-18C/D during approaches and is 2 dB higher than the F/A-18 C/D on takeoff.
- The F-35A is slightly louder (3 dB) than the F/A-18 C/D on takeoff but has lower noise levels on approach. The F-35A is slightly quieter (2 dB) than the F/A-18E/F on takeoff and much quieter (>10 dB) on all three approach flight profiles.

COMMUNITY IMPACT

- Military bases are aware of how noise affects local communities and do their best to minimize its impact by using noise abatement procedures to reduce noise and limit flight hours when possible. However, there are times when pilots must train outside normal flying hours and fly certain routes.
- Noise levels heard by the community will depend on a variety of factors such as the type of flight operations (departures, arrival, pattern work, straight and level flight), the power setting, altitudes and weather conditions.
- Listeners may perceive noises differently, even though sound levels in decibels (dB) are equal. The average listener would barely notice a change in the “loudness” between two sounds that are 3 dB apart. The average listener would perceive a sound that is 10 dB higher than the original sound as “twice as loud”.
- Aircraft noise in the vicinity of an airfield is measured using a variety of computer-based analysis tools and techniques. For the F-35, modelling software uses actual measured acoustic raw signature data, then inputs the number and type of flight operations planned over the course of a year, with definitions of each flight profile. This software then generates noise contours, which are graphical expressions of noise perceptions.
- All F-35 US Services and Partners are using the same noise data. However, the F-35 community noise contours will be different at many installations due to differing regulations determining the calculation method, local takeoff and arrival profiles, terrain, and local environments.

