F-35 Joint Strike Fighter: Costs & Challenges

What Is It?

The F-35, known as the Lightning II, is a Joint Strike Fighter (JSF, emphasis added) because contracts exist for the United States Air Force, Marine Corps, and Navy, as well as eight NATO countries and three non-NATO partners. The fighter has three variants, one (F-35A) of which will have a nuclear weapons capability.

The F-35 was designed to be a jack of all trades, created to excel in areas of interoperability and air-to-ground strikes. However, it struggles to meet these mission parameters. The F-22, which shares traits with the F-35, maintains superiority in air-to-air combat, and the F-35 continues to be outmaneuvered by older fighters, including the F-16.

Despite these ongoing issues, Lockheed Martin has already delivered 154 F-35 models to the Department of Defense, with 45 released in 2015. An additional 7 jets were distributed to international partners, including Australia, Italy, and Norway.

The F-35 is designed to replace the Air Force’s A-10 and F-16, the Navy’s F/A-18, and the Marine Corp’s F/A-18 and AV-8.

Challenges

To date the F-35’s advantages are tempered by multiple shortcomings.

Manikin Tests

Tests in July and August of 2015 demonstrated a 23% probability of death and a 100% probability of neck injury upon ejection for pilots weighing between 136 and 165 pounds. Pilots below this weight are exposed to even higher risk, and subsequently banned from flying the F-35.

Structural

Despite having planes in rotation, recent in-flight testing determined the need for a pressure relief valve, as its absence limits the speeds and altitudes at which the F-35 can fly. Durability tests revealed cracking in the wing structure with potentially disastrous results. Furthermore, the fighter’s average flight time prior to engine failure falls below anticipated thresholds.

ALIS

The Autonomic Logistics Information System (ALIS), which is designed to work with the aircraft on anything from mission planning to identifying failing systems, has struggled on multiple fronts; the system is oversized, malfunctions, and misrepresents information. At this moment, it does not cover the whole of the plane, omitting reports on components such as health management.

Similarly, ALIS is subject to vulnerabilities in cybersecurity, augmented by Lockheed Martin’s unwillingness to allow comprehensive testing. The fear is that such tests might disrupt the operational capability of ALIS, as well as the Autonomic Logistics Operating Unit (ALOU). The potential fragility of the F-35’s critical systems to cyberattack, alongside recurring lags in software stability between updates, has generated concern of systematic weaknesses in the F-35’s advanced network.

Gen III

The Gen III is an innovative helmet with a Mounted Display System (HMDS) meant to improve integration between the pilot and flight systems. The Gen III experienced glitches during basic flight exercises that made
readings impossible to follow while executing regular training maneuvers. A second, lighter weight version of the Gen III is due to be released, but the improvements have yet to be flight-tested.

**How Much Does It Cost?**

The F-35’s price per unit is $98 million per F-35A, $104 million per F-35B, and $116 million per the F-35C.

In 2014, reports from the Government Accountability Office (GAO) cited a cumulative acquisitions estimate of $54.1 billion from 2015 to 2019. That number includes an order of 243 F-35 aircraft for the Air Force, 64 for the Navy, and 97 for the Marine Corps. From 2022 through the subsequent decade, the price of the F-35 is expected to ratchet up to $14 billion per year, making the total acquisitions cost for 2,457 planes over 22 years approximately $400 billion.

Total cost overruns currently sit at approximately **$160 billion**. Overall costs, including operations and sustainment, are expected to hit **$1 trillion** or more.

**Recommendations**

The high price tag of the program stands in counterpoint to the inordinate number of challenges that remain. Reducing procurement plans and testing before building is the safest, most cost-effective approach. This would allow comprehensive testing and evaluation to be completed before the fighters are procured and deployed. Alternate suggestions call for cancelling the program altogether and subsequently buying a mix of F-15E Strike Eagles, F-16s, F/A-18E/F Super Hornets, although that may be more costly than completing the F-35 program.

Until the F-35 is able to improve efficacy and reduce liabilities, the Department of Defense should not move forward with plans to make the fighter nuclear capable. The air leg of the nuclear triad is already fully operational, with a new B-21 stealth bomber rounding out plans for modernization. Nuclear capability on the F-35 would be more of a risk than reassurance.

*Sources: Lockheed Martin, Government Accountability Office, Office of the Director of Operational Test and Evaluation, House Armed Services Committee*