

What's wrong with America's Fighter Program?

Part 2: The F-35 Joint Strike Force Fighter

In last month's edition, we examined some of the more serious challenges being experienced with the US Airforce's F-22 Raptor fighter jet. In this article we will highlight the design flaws and issues being experienced with the new F-35 JSF jet.

A number of readers have however asked me the question, "What is the difference between the US Airforce's F-22 Raptor and the F-35 Joint Strike Fighter?"

In order to better understand the differences between these two planes,

one needs to understand how the American fighter fleet is composed.

The US Air Force decided way back in the 1970's to adopt a strategy referred to as the Hi-Lo mix. In reality this meant that instead of procuring a number of different planes for different missions, the Air Force would simply purchase two different aircraft. The "Hi" version would be an all out air superiority fighter for pure air-to-air combat missions, which therefore would clear the skies of enemy fighters during a war, and allow more

vulnerable aircraft such as helicopters and bombers to attack the enemy. The F-15 Eagle (F-14 Tomcat for the Navy) used to fulfil this role. The drawback of this strategy was that these kinds of aircraft were prohibitively expensive owing to the state of the art technologies required to provide them with their air superiority. The production numbers were thus relatively low.

To make up for this shortfall, the "Low" version aircraft would be built in bigger quantities but with reduced capabilities. This generally meant a smaller airframe, reduced range, less powerful radar, lower top speed and simpler avionics. This "Low" version would thus sacrifice all out air superiority with its primary purpose being ground attack, bombing runs and general air-to-surface capabilities. Any air-to-air missiles would simply be for self defence. The "Low" fighter would primarily depend on the "Hi" counterpart for defence against enemies planes and ended up being the F-16 Fighting Falcon (F/A-18 Hornet for the Navy).

As per our previous article, the replacement "Hi" air superiority fighter for the Airforce and Navy is the new F-22 Raptor. We highlighted the serious issues currently being experienced producing the plane, including massive costs overruns. For now, we will concentrate on the "Low" replacement, which is designated F-35 JSF (Joint Strike Fighter, owing to the Navy, Air Force and Marine Corps standardising on a common platform)

The F-35A takes advantage of many of the advanced technologies developed for the F-22, but has a shorter range, simpler avionics, and is less manoeuvrable. The company that eventually won this contract against Boeing, was Lockheed Martin with their X-35, in October 2001. Interestingly enough, the designation of the new fighter as "F-35" is out-of-sequence with standard Department of Defence aircraft numbering, by which it should have been "F-24".

The Lockheed Martin F-35 Lightning II fifth generation multirole stealth fighters that can perform ground attack, air defense and reconnaissance missions and is being manufactured in three variants that share 80 percent spare part commonality to reduce costs.

- F-35 A is a conventional takeoff and landing.
- F-35 B is a short take off and vertical-landing (STOVL) (with dual engines fitted).
- F-35 C is a carrier-based variant. (CATOBAR)

Excluding the United States that intends to buy a total of 2,443 aircraft, the United Kingdom, Australia, Italy, Canada, Netherlands, Norway, Turkey, Turkey, Israel and Japan will all equip



The F-35 Joint Strike Force Fighter.

	USAF ~1990	USN	USAF ~2020	USN
"Hi"				
"Lo"				

their air and/or naval forces with the F-35. The total lifecycle cost for the entire American fleet is estimated to be US\$1.51 trillion over its 50-year life, or \$618 million per plane! Lockheed Martin claims that the F-35 would be 400% more effective than legacy fighters in air-to-air combat, 800% more effective than legacy fighters in air-to-ground combat, and 300% more effective than legacy fighters in reconnaissance and suppression of air defenses. It is supposed to be second only in terms of superiority, to the F-22 Raptor, with an operational design life through 2040.

Comparison of the changing USAF and USN Hi-Lo mixes

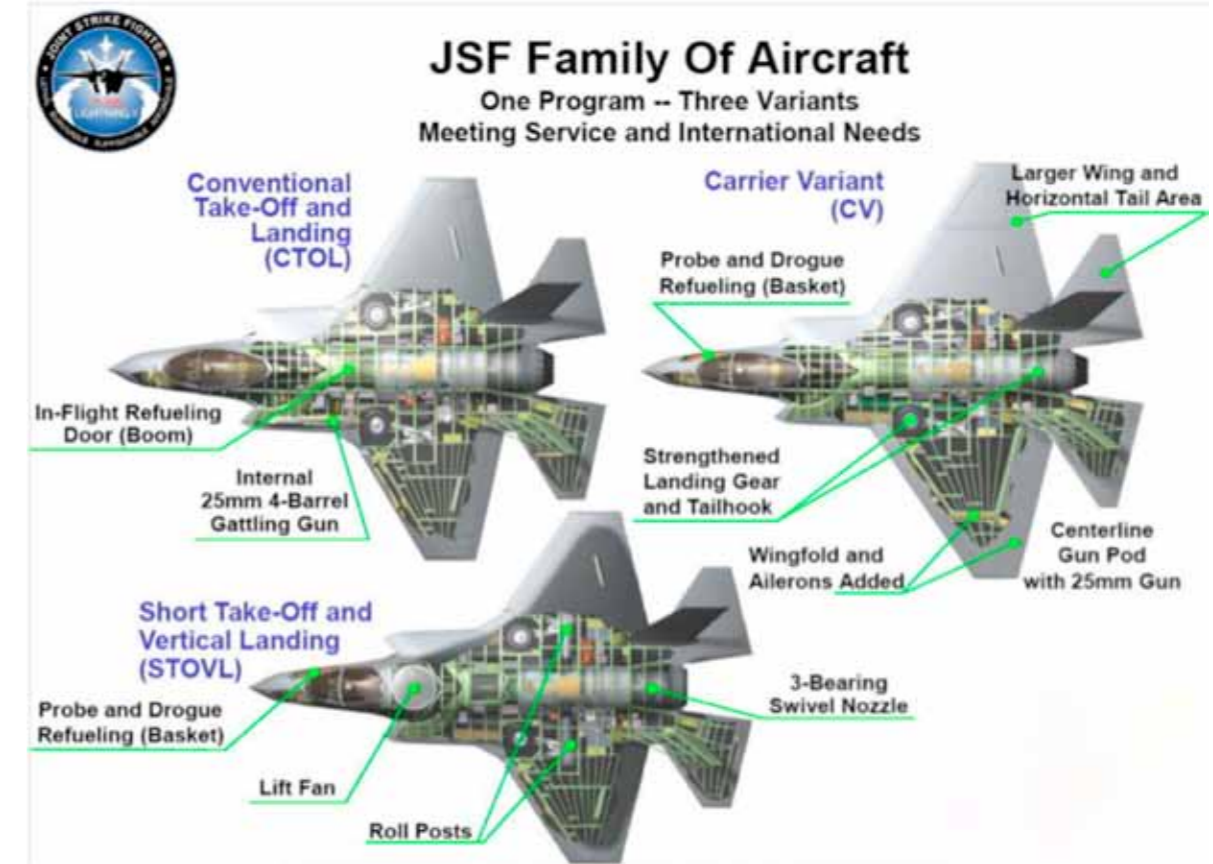
The scale diagram clearly illustrates the previous Hi-Low fighter mix (F-15/F14 and F16/F18) compared to the F-22/F-35 currently being rolled out. The F-22 will only be purchased by the Air Force, owing to its air superiority role, whilst the F-35 will be procured in far greater numbers by the Air Force, Navy and Marine Corps. (Owing to its multi-role, ground attack optimised design.)

Since the first prototype of the F-35 flew in 2006, a number of design flaws, cost overruns and compromised features started to surface.

In 2012, in order to avoid further redesign delays, the US Department of Defense accepted a reduced combat radius for the F-35A and a longer takeoff run for the F-35B. In addition to that, the F-35B's radius has also decreased 15 percent from initial JSF objective.

The 2011, Canada voiced concerns over the F-35's single engine design in the event of engine failure. Canada previously experienced an high accident rate with their Lockheed CF-104 Starfighters, with many attributed to engine failure. America's Defense Minister Peter MacKay, when asked what would happen if the F-35's single engine failed, replied "it won't".

The Pentagon finally released



a report in November 2011, highlighting serious areas of concern w.r.t. production of the F-35. They include:

- Severe limits in automated logistics management, (doesn't fit into USAF skills training scheme), various components in the system (deployable server kits and other connectivity) do not work reliably
- Because of the helmet mounted display system failure (partly influenced by buffet in the heart of the combat envelop), weapons cannot be cued including the gun.
- Thermal management issues affecting avionics and other systems. The air conditioner fails to keep the pilot and controls cool enough, the roll posts on the F-35B overheat, and using the afterburner damages the aircraft.
- IPP (core system) has significant reliability flaws
- Night flight operations are limited or not recommended.

- Flight limitations (dive limits) because fuel inerting can't catch up.
- The fuel dump subsystem poses a fire hazard and requires a redesign.
- The Integrated Power Package is unreliable and difficult to service.
- The F-35C's arresting hook for carrier landings does not work
- Classified "survivability issues", which have been speculated to be about stealth.
- The wing buffet is worse than previously reported.
- The airframe is unlikely to last through the required lifespan.
- The flight test program has yet to explore the most challenging areas.
- The software development is behind schedule. As of the end of 2010, only 15% of the software remains to be written, but this includes the most difficult sections such as data fusion. It was revealed that only 50% of the eight million lines of code had actually been written and that

it would take another six years and 110 additional software engineers in order to complete the software for this new schedule. The aircraft is in danger of going overweight or, for the F-35B, not properly balanced for VTOL operations.

The Lightning protection on the F-35 is uncertified, with areas of concern.

Post flight logistics/maintenance data-link takes 30 minutes to download 1G of data. Coupled with the review of the current challenges facing production of the F-22 Raptor, the issues being experienced with the F-35 JSF will not be resolved before 2016, according to reliable sources in the industry.

Watch this space for further updates on America's fighter program and our upcoming article on China's attempt at a 5th generation stealth Fighter.

Rising to new dimensions



The largest exhibition of air, sea and land capability on the African continent



19-23 September 2012

AFB Waterkloof, Centurion
Pretoria, South Africa

www.aadexpo.co.za



AAD Partners:



Supported by:

