

Should the Marine Corps Purchase an All-STOVL Fleet of Joint Strike Fighters?

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There is an old adage that warns, "Don't put all your eggs into one basket." However, the Marine Corps has placed the entire future of its tactical aviation (TacAir) fleet on one platform: the Short Take-Off / Vertical Landing (STOVL) variant of the Joint Strike Fighter (JSF). The Joint Strike Fighter is a multi-role, stealth aircraft which will be sold as three distinct variants: the conventional takeoff and landing (CTOL) variant for the Air Force, the carrier variant (CV) for the Navy, and the STOVL variant for the Marine Corps.¹ The Marine Corps has cited the combination of "the basing flexibility of the AV-8B with the multi-role capabilities, speed, and maneuverability of the F/A-18" as its reason for purchasing only the STOVL variant of the JSF.² The F-35B, as it will be designated, will replace the aging fleets of AV-8B Harriers and F/A-18 Hornets, giving the Marine Corps a flexible platform that can deploy with the Expeditionary Strike Group (ESG) or Carrier Strike Group (CSG) and operate out of austere air bases near the front lines. Despite the capabilities of the STOVL variant, the Marine Corps should purchase a mixed fleet of STOVL and CV JSFs to replace its legacy aircraft because of the development problems facing the STOVL variant, the demands of TacAir integration, and the increased capabilities of the CV JSF.

Legacy aircraft

Currently the F/A-18 and AV-8B fleets average about eighteen years and eleven years, respectively, of a twenty year standard service life.³ In September of 2000, the former Commandant of the Marine Corps, General James Jones, stated that, "Since 1995, the direct maintenance man-hours per hour of flight increased by 33% and there has been a 58% increase in our 'cannibalization' rate. During the same time period the full mission capable rate, though still within acceptable parameters, has decreased by 9.4% across the force. These statistics represent data for all Marine Corps aircraft and show a declining level of readiness."⁴ As more Marine Hornets deploy with the Navy, continuous catapult shots and arrested landings aboard aircraft carriers will exacerbate the aging of these platforms.

The age of Marine Corps legacy aircraft have brought many concerns to light. Most of these concerns were addressed in 1999 by former Commandant of the Marine Corps, General Charles Krulak, in his testimony to the Senate Armed Services Committee:

the costs of maintaining our aging fleet of aircraft are becoming exorbitant. We have experienced a 43 percent increase in our average cost per flight hour in the last three fiscal years alone. As with our ground equipment, our aircraft are spending increasing amounts of time in the maintenance hangars and are unavailable for proficiency training. Also like our ground equipment, the price of obtaining spare parts is rapidly becoming prohibitive.

Modernizing our aging aircraft fleet is simply the only solution.⁵

The best summary of the reason for this aging fleet of aircraft was given by journalist Otto Kreisher: "The causes of naval aviation's 'aging crisis' are a decade-long 'procurement holiday' and the current slow rate of procurement caused by low budgets and competing needs."⁶ According to Commandant James Jones' testimony to Congress in 2000, the Marine Corps has been well below its historical steady state funding for fourteen out of the last fifteen years.⁷ This lull in procurement and funding has caused a potential gap which leaves little room to delay future acquisition programs without an alternative to fill the hole.

STOVL timeline

Common to any new acquisition program, there have been some setbacks in the JSF development process. Unfortunately, most of the problems thus far have been linked with the STOVL variant. The most noteworthy problem was a significant weight issue which has driven the cost up and delayed the acquisition timeline at least two years from initial operations capable in FY 2010 to FY 2012.⁸ At the root of the problem was an extra 3,300 pounds which would keep the STOVL aircraft from meeting some key performance parameters. The excess weight was eventually trimmed off by shrinking the weapons bay and by increasing engine thrust

output.⁹ However, the Department of Defense Director of Operational Testing and Evaluation (DOT&E) is concerned that the STOVL JSF faces a weight growth potential of 6% per year based on historical data (much worse than Lockheed Martin's predicted 3%).¹⁰ Couple this weight problem with the development, testing, and production of a technologically new piece of equipment like the STOVL lift fan and the potential for further delays in the F-35B becomes magnified.

Further timeline slides cannot be afforded, given the concerns stated earlier. General Jones recognized that the timeline must be adhered to when he explained to congress that "we must hold the line on this."¹¹ Additional delays would result in flight life extension programs being initiated placing airspeed or G restrictions on aircraft and causing a degradation of training. Such temporary stop-gaps are simply knee-jerk reactions necessary due to a lack of proactive vision and exacerbated because of continued slips to timelines for acquisition of replacement aircraft.

A better solution would be to accelerate the CV acquisition timeline to replace the aging F/A-18s if additional significant delays with STOVL are encountered. Air Force Major General John Hudson, the JSF program manager, stated in a 2002 interview that the CV JSF could be accelerated with some adjustments in production schedules and budgets.¹² Also, since the CV has less

weight issues and does not depend on new technology (such as the shaft driven lift fan around which the STOVL is designed), it would likely hit fewer speed bumps along the way. This would facilitate a smoother and possibly earlier transition into the initial operations capable (IOC) phase. The CV JSF would be a perfect candidate to replace those F/A-18s that are currently deployed aboard Navy aircraft carriers as part of the TacAir Integration plan.

TacAir Integration

TacAir integration is currently a large scale undertaking between the Navy and the Marine Corps tactical aviation communities. According to the TacAir Integration plan, the number of Marine F/A-18 squadrons deployed aboard aircraft carriers will increase from four squadrons to ten (one for each carrier air wing) by FY 2010.¹³ The goal of TacAir integration is to make the most efficient use of naval aviation assets by more closely integrating Marine Corps and Navy aircraft. A key underlying factor within this concept is "global sourcing" or being able to task any Marine or Navy squadron with any mission of the other service.¹⁴

As the Marine Corps and Navy move towards a more integrated force through visions such as Marine Corps Strategy 21 and the Navy's Sea Power 21, it would behoove the Marine Corps to maintain a more flexible fleet of warplanes. As a force that

will most likely continue to operate as part of both the ESG and the CSG while the F-35 is fielded, it is logical for the Marine Corps to purchase both the STOVL and the CV JSF. This allows for 100% commonality for the carrier air wing (consisting of all CV aircraft) and would allow the Marine Corps to have both variants operating in relative proximity, giving it a lethal air combat power capability.

CV Capabilities

A fleet of only STOVL variants would rob the Marine Corps of complementary capabilities afforded by a mixed fleet of CV and STOVL. While the STOVL variant provides basing flexibility, it also has several degraded parameters that make it less capable. The first parameter is combat radius. The STOVL advertises about 450-500 nautical miles (nm) range while the CV JSF boasts a range greater than 700 nm.¹⁵ Greater fuel capacity also translates into increased loiter or "on-station" time, meaning that the CV JSF will be able to hold overhead a target area for much longer than the STOVL JSF. This allows the supporting aircraft to be immediately responsive for greater periods of time when providing close air support (CAS) for infantry units in contact with the enemy (the bread and butter of Marine TacAir).

Another area which limits STOVL performance in combat is the smaller weapons bay of the STOVL variant which has been

shrunk to save weight. With the change to the weapons bay, the STOVL JSF can only carry 1000 pound bombs (GPS guided or Mk-80 series unguided) while the CV JSF can carry 2000 pound bombs. Even when small diameter bombs (SDB) are fielded, the CV JSF will be able to carry more to the target area than STOVL.

Both fuel capacity and payload directly influence the ability of an aircraft to conduct offensive air support (OAS). While the primary advertised mission of the Marine aviation combat element (ACE) is to provide CAS to ground troops, Marine air is often employed in the deep fight as well to shape the battlefield for ground commanders. The degraded range and payload detract from the ability of the STOVL JSF to do so. It is in this instance where having both JSF variants in the fight would be extremely advantageous. While the CV JSF flies further into enemy territory to shape the deep battlespace, several STOVL variants may cycle in and out of the target area in the close battlespace using forward bases to maintain responsiveness. The result is an extremely flexible ACE able to influence the entire battlefield for the Marine Air-Ground Task Force commander.

Conclusion

The STOVL JSF will undoubtedly bring amazing capabilities to Marine Corps aviation. These capabilities will likely revolutionize the way Marine TacAir is employed. If the STOVL

variant is successful, the Marine Corps will have an aircraft capable of taking off from a large-deck amphibious ship, ingressing to the target area without being detected, dropping its payload on the target, egressing without being detected, refueling and rearming at an austere forward arming and refueling point, and flying another mission. The value of this capability cannot be understated.

However, with a mixed fleet of STOVL and CV JSFs, the Marine Corps would have the added ability to fly deep air interdiction missions, provide greater on-station time for more responsive CAS, and carry more weapons to the target all while maintaining 80% parts commonality and sea-basing. It will also give the Marine Corps an acquisition option should there be further delays in the delivery of the F-35B.

There is no danger in carrying all of your eggs in one basket if you can be absolutely certain that you will not drop it. However, there can never be such a guarantee in the complex world of defense acquisition and military operations. Programs may be delayed and missions may change, making it imperative to maintain a flexible alternative when purchasing a major weapons system. A mixed fleet of STOVL and CV JSF would guarantee the longevity and viability of Marine Corps tactical aviation for many years to come.

Notes

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