

# The F-35, the UK and Strategic Considerations

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## BRITAIN DEMONSTRATES THE FLEXIBILITY INHERENT IN THE F-35 PROGRAM

2012-07-16 by Robbin Laird

This week the UK government will officially accept its first F-35B. There are a total of 4 under contract, which includes the first operational aircraft to be received in LRIP 7.

This is a re-affirmation of the importance of the F-35 and the B version for the future of UK military operations. After a period of uncertainty over whether the British carrier would be re-designed to carry a tailhook version, the British determined the cost not worth the effort, and remained with the B.

Lost in the public coverage of this debate was a fundamental element of the F-35 program – once you are in the program, you have the opportunity to switch variants or mix and match planes.

It could well turn out over the life of the F-35 program that the UK ends up with a mix of F-35Bs and F-35As. Or Australia, which is now focused on the F-35As, may decide that Bs would be a nice addition, both for the new projection ship and for the flexibility of basing which the B provides.

This decision does not have to be made now but can be made in the future, as requirements, demands and the strategic environment changes. In other words, not only is this a very upgradeable platform, but the fleet buy can change as the partner nation determines and shapes its needs.

Ironically, the choice process, which Britain demonstrated, underscored a core strength of a global program with multiple variants of the baseline aircraft.

We wrote earlier prior to the official announcement of the continued commitment to the B variant – for the UK had not changed its basic order for Bs to Cs – the B will in time be understood as not simply a USMC aircraft.

Ed Timperlake wrote at [the time of the decision](#):

No longer should the F-35B be considered a boutique niche aircraft only essential for Marine combat con-ops. With vision and commitment on numbers it can become a tactical aircraft that sends a strategic signal.

The reason is simple, an F-35B can stand strip alert on any long runway, U.S. or Allied. From a strategic point of view think of Guam, South Korea or in the Middle East on all long runways. As a crisis situation develops, the F-35Bs can be remotely placed in secret hardened bunkers and revetments and thus become a significant deterrence asset that can instantly sortie into combat and return to gas and go again and again.

The F-35C, Navy version, is tied to large deck “cat and trap” angle decks, whereas the F-35B is a flexible tool able to deploy on many ships, working concurrently with helo and MV-22 flight ops and on many airfields, fixed, long, short, or not even today’s operational airfields but just hard surface roads.

The F-35B reverses the relationship between pre-defined operational bases and the aircraft. The aircraft no longer constrains the definition of an airfield.

The sortie rate of an F-35 aircraft is more than just rearm and “gas and go.” It is continuity of operations with each aircraft linking in and out as they turn and burn without losing situational awareness.

This can all be done in locations that can come as a complete tactical surprise –the F-35B sortie rate action reaction cycle has an add dimension of unique and unexpected basing thus getting inside an opponent’s OODA (Observe, Orient, Decide and Act) loop.

And I wrote at the time of the decision that the [flexibility of the B](#) was part of the emergence of a focus on expeditionary strike groups, not the carrier battle groups.

At the heart of the inherent flexibility is the emergence of a new approach to the Expeditionary Strike Group or ESG presaged in Bold Alligator 2012. In the exercise, the migration from the ARG-MEU already underway under the influence of the Osprey to a much larger strike formation operating from a distributed seabase was evident. The Osprey was at the heart of the tactical mobility, which has strategic consequences for how a distributed seabase can operate.

And the B operating off of the large deck amphibs will add what we have called the honeycombed air system providing air cover and close combat support to the insertion and strike force. ....

The large deck amphibious ship is more analogous to the Queen Elizabeth class carriers than either the Nimitz or the Gerald Ford. And what the large deck amphibs with 22 F-35Bs aboard (if so desired) can do is to tie together an Expeditionary Strike group and tie in other air assets, whether land-based or large deck carrier based.

The deck space on the amphibs or the Queen Elizabeth class carriers can be configured to the mission and evolve what is appropriate to the tasks. The cats and traps built into a Queen Elizabeth will limit the ability to have the flexibility of deck spotting which a V/TOL aircraft can provide.

The Brits are not likely in any case to follow the con-ops of the Carrier Battle Group; they will be evolving the con-ops of the ESG. Whether with their own ships and air assets, or those of allies – American or not – the Queen Elizabeth with F-35Bs on board can operate as an ESG focal point. And because of the deck flexibility, they will be able to mix and match helos with airplanes, unmanned and manned or whatever evolves over the next 40 years of the life of the ship.

The RAF buying F-35As makes inherently good sense because it will be the cheapest of the F-35s and be produced in large numbers over the course of the program. And the shared combat

systems means that the F-35Bs operating off of the carrier can work inseparably with the RAF or ANY other land-based F-35s which the Brits will need to work with.

The flexibility inherent in the F-35 program can allow the UK at a later point to add As to Bs in shaping their variant of an F-35 fleet. And they simply need to get started with the Bs to determine later the proper mix for their national security needs.

Another element of flexibility inherent in the program is the ability to adjust up or down annual production buys from a baseline number to higher number in a given year. The program – as a global program — can absorb the fluctuations in quantity that other production programs cannot.

## THE UK RETHINKS THE F-35C DECISION: SHAPING A BRITISH LED EXPEDITIONARY STRIKE GROUP

3/16/12

by Ed Timperlake

The UK is rethinking its carrier aircraft decision. In large part this is because of the cost necessary to build traps and cats on the Queen Elizabeth class carrier. In part it is because of the impact of Libya and Bold Alligator in reminding strategists and decision-makers of the flexibility provided for deck management and fleet operations of a V/STOL aircraft.

In this article, I am going to take a look at the logic of shifting from the C to the B and how it fits evolving technologies and operational dynamics. I would argue that both technologically and operationally moving back to the B makes great sense as the UK shapes its evolving military capabilities. And indeed a F-35B and F-35A combination provides a significant opportunity to bring the RAF and the Royal Navy on the same page **with both** contributing to a UK ESG construct and approach.



The UK is rethinking which F-35 they want or do they want a mix of F-35 Bs and As? Credit Image <http://www.armedforces.co.uk/navy/listings/navy3c3.htm>

## **Remembering the Debt the U.S. Owes the UK in Naval Operations**

When England went to war to stop Hitler, Sir Winston Churchill was immediately appointed First Lord of the Admiralty and the signal went out to the Royal Navy—“Winston is Back.”

This was the beginning of the greatest Sea war in the history of the world. The Royal Navy at first standing alone would learn invaluable lessons paid for in blood on how to fight and win. The costs were high; tragically ship design defects were uncovered in the crucible of combat.

For example, the loss of the Royal Navy Battle Cruiser Hood was a faulty design in armor because of vulnerability to plunging shells and also the Hood's ammo locker igniting was a contributing fact. Then, during the pursuit of Bismarck the HMS Ark Royal, a British aircraft carrier, launched “Swordfish” bi-planes and with a single torpedo took out the Bismarck's rudder and sealed it's doom.

The shift from battleships to aircraft carriers was dramatic. The HMS Repulse and Prince of Wales fighting alone against Japanese planes without friendly air cover were both lost off Singapore right after the US Navy had its Battleship Fleet sunk pier side by a Japanese carrier air attack at Pearl Harbor.

World War II demonstrated that evolving and innovative tactics, training and technology were needed to fight battles from the Arctic into the southern hemisphere over the expanse of two oceans.

This global ocean war created a tactical and technology partnership between the US Navy and Royal Navy that continues strong to this day. After the war, with the advent of jet engines and the growth of aircraft carriers into “super carriers,” the relationship was deepened.

The contribution of the Royal Navy is heard in every cockpit coming on board a USN carrier on every landing “Meat Ball — Line-up — Angel of Attack” is the scan pattern all USN/USMC Carrier Pilots. That mantra is taught from day one on a Naval Aviators quest to successfully Carrier Qual (CQ) in order to receive their Navy Wings of Gold and join a squadron ready for sea duty. This lifesaving mantra is built on several design gifts given to the US Navy by the Royal Navy.

Centering the “meat ball” puts the aircraft on a perfect glide slope for an “OK-3 wire” the code for a perfect trap. Calling -the “meat ball” to the LSO, along with fuel state, is possible because of the evolution of the fresnel lens which the British pioneered for their early jet carrier operations.

“Line-up.” adjusting for the centerline, is now targeted to align with an angled deck. That design added a huge margin of safety. The angle deck also greatly aided efficient operations during flight quarters effectively to cycle Carrier Air Group (CAG) aircraft into an effective unified airborne fighting force.

Finally, checking the "Angle Of Attack" is an easy and fail safe indicator of having sufficient and safe airspeed to come aboard.

The British also designed the "hurricane bow" because a modern carrier must be sea worthy from the Arctic to the Equator with the ability to operate in all weather, day and night. Sea worthiness against a "cruel sea" is critical and the British got it right as Carrier Aviation transitioned from props to jets. Finally, thanks again to the Royal Navy for steam catapults to give added energy for a successful carrier take off of high performance jets.

It is fair to say that operating day or night, in all weather from ice to tropics, a modern aircraft carrier is one of the most complex engineering achievements of any society. It transports thousands of sailors across all oceans, escorted by support ships and aircraft — all with a mission to project power. 4.5 Acres of sovereign US airfield capable of 30+ knots going into harms way is a significant combat asset.

### **Shaping the Next Round of Naval Aviation and Operational Concepts**

The entire *raison-d'etre* of a modern aircraft carrier is the composition of carrier air wing.

From Korea to Vietnam, to Desert Storm and today's fight a US Aircraft Carrier, like "The Big E" (the USS Enterprise), has a an airwing of aircraft that always has had "generation parity" with any peer competitor flying from land bases. The air wing also had electronic warfare aircraft and flying command and control aircraft. The USN angle deck carrier and aircraft all came together to dominate any potential sea threat and also successfully carry the fight "feet dry" in current modern combat.

The British during the period of super carrier supremacy were pioneering the tactical employment of the AV-8 Harrier from decks that did not need "cats and traps" to operate. Although the V/STOL Harrier was limited, it was very ready and effective in an air-to-ground role and had some modest, but when absolutely needed, fleet saving capabilities in the Falkland Campaign, in the fighter air-to-air role.

But in a never-ending action-reaction cycle of technology improvements, a V/STOL aircraft has emerged which is a significant advance for naval aviation. The F-35 not only will be a successful air-to-ground fighter but also an air-to-air fighter and an EW fighter combined.

The F-35 is not a linear performance enhancement from F/A-18 4th Gen; it has a third performance axis — "Z" The "Z" axis is the pilot's cockpit C4ISR-D "OODA" loop axis.

(For a presentation and discussion of the Z axis please see

<http://www.sldinfo.com/the-northern-edge-difference-re-structuring-the-strategic-debate/>

<http://www.sldinfo.com/the-emergence-of-the-z-axis-changing-the-way-airpower-enables-combat-operations/>

<http://www.sldinfo.com/extending-the-honeycomb-transformation-re-visited/>

<http://www.sldinfo.com/winning-the-airsea-battle/>)

The design characteristics blended together prior to F-35 have been constantly improving range, payload (improved by system/and weapons carried), maneuverability (measured by P Sub s), useful speed, and range (modified by V/STOL—a plus factor). The F-35 is also designed with inherent survivability factors—first redundancy and hardening and then stealth. Stealth is usually seen as the 5th Gen improvement. But reducing the F-35 to a linear x-y axis improvement or to stealth simply misses the point.

Traditionally, the two dimensional depiction is that the y-axis is time and the x-axis captures individual airplanes that tend to cluster in generation improvement.

Each aircraft clustered in a “generation” is a combination of improvements.

Essentially, the aeronautical design “art” of blending together ever improving and evolving technology eventually creates improvements in a linear fashion.

The F-35 is now going to take technology into a revolutionary three-dimensional situational awareness capability.



F-35B Landing on the USS Wasp October 2011 | Credit: SLD

This capability establishes a new vector for TacAir aircraft design. This can be measured on a “Z” axis.

What makes this possible is the F-35B has both a fully up air-to-air and air-to-ground capability. In the AA mode it is supersonic and stealthy with the same “Z-axis” revolutionary C4ISR-D cockpit



that Navy F-35Cs and AF –F-35As both have. Consequently, the F-35B can fit seamlessly into the Air Force/Navy Air Dominance mission.

Historically, air fleet command and control, now C5ISR, was external to 1,2,3, and 4th Generations TacAir. C &C goals were to enhance fleet wide combat performance for all Type/ Model/Series (T/M/S) of TacAir.

This is the modern AWACS , Hawkeye and Aegis battle concept.

Now using a three-dimensional graph the “Z-axis” research takes airpower into a totally different domain. The shift is from externally provided C&C to C5ISR-D in the cockpit carried by the individual air platform.

This is the revolutionary step function that breaks the linear progression of previous Generations.

The “Z” axis is reflected in the emergence of the “C5ISR –D (for decision) cockpit”. This will be conjoined with a new helmet which can integrate with the cockpit. Currently there is still ongoing considerable research on getting the helmet correct-but this is the IR&D vector.

But wait it gets even better.

Since no platform fights alone: the entire F-35 Type/Model/Series connects the Air Force, Navy, Marines, and Allies in a cohesive unified fighting force. This is why a combination of an F-35A with the B can provide a possible vector of RAF and RN synergy and convergence in shaping a combined approach.

Additional assets that can really augment this US and Allied “joint” air force is the Aegis Ships with the SM-3 missile and SSGN with cruise missiles for fire support .

<http://www.usni.org/magazines/proceedings/2012-01/long-reach-aegis>

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The reason is simple, an F-35B can stand strip alert on any long runway, U.S. or Allied. From a strategic point of view think of Guam, South Korea or in the Middle East on all long runways. As a crisis situation develops, the F-35Bs can be remotely placed in secret hardened bunkers and revetments and thus become a significant deterrence asset that can instantly sortie into combat and return to gas and go again and again.

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### **Operational Dynamics and the Impact of the New V/STOL Aircraft**

As the British Ministry of Defense revisits their decision to switch back from an angle deck “cat and trap” aircraft carrier to the F-35B, some current real world data points are significant.

First, the Libyan TRAP mission showed the ready now nature of joint basing of the AV-8 and MV-22s on the USS Kearsage.

Colonel Mark Desens, Commander 26th MEU:

*When we learned that a F-15 crew had ejected east of Benghazi, we immediately focused our efforts on getting ready to rescue them.*

*The mission was given to us for two reasons: one, first and foremost, was the uncertain environment. We didn’t know what was going on on the ground with the pilot. The second is we were the most ready and had the most responsive assets, most notably, the MV-22. Backed up by CH-53s and Harriers, we had very potent reaction force in case we needed to fight to get the crew out or reinforce the recovery or crash site. As an aside, a recovery asset launching from land base — the next closest locations being Sigonella or Souda Bay — would have been four or more hours.*

*There were USAF HH-60G rescue helicopters embarked on the Ponce to give a CSAR capability with improved reaction times. However, you’re comparing 270 knots versus 140. It would have taken at least 45 minutes longer for a helicopter to get there. U.S. forces may well have not been the first to reach that pilot without the MV-22. Given the situation, that was not acceptable. The other thing is that for a helo, a direct flight path (to save time) to the pilot would have gone through Benghazi, a potential threat area at the time. The Osprey could chart a very different path, avoiding any potential air defense threats.*

*Again the speed and range of the Osprey coupled with the ability to have Marines on the ground to secure the perimeter was the key.*

<http://www.sldinfo.com/the-amphibious-ready-group-arg-and-libya/>

Next, the Libyan operation was followed by the experience and lessons learned from Bold Alligator 2012.

The exercise has set in motion the beginning of an Expeditionary Strike Group revolution.

The 2nd ESG Commander articulated the significance of BA-12 very well.

*SLD: What was the major purpose of the Bold Alligator 2012 exercise from your perspective?*

*Rear Admiral Scott Commander ESG-2:*

*Both the Commandant of the Marine Corps and Chief of Naval Operations realized that given the land centric warfare that we were engaged in over the past decade, we had to address atrophy — in terms of operational skills from the sea — for both elements of the Navy and Marine Corps team.*

<http://www.sldinfo.com/admiral-kevin-scott-reflects-on-bold-alligator-2012-shaping-a-culture-of-operating-off-of-the-seabase/>

The ESG-MEB template is a solid foundation able to incorporate and be expanded by the F-35 technological revolution.



F-35B Weapons Carriage Testing, Feb 2012 Credit: Lockheed Martin

According to General Davis CG 2nd MAW :

*Currently, we put up 16 Harriers off of the USS Kearsarge during the exercise. You have sensors on each plane with a range of 40-50 miles of scan capability, limited to using one sensor at a time. And you are not connected to the link (no Link-16). You function as a node and pass information back via voice or Rover (video down-link).*

*What I saw on the BACI-11, I have exponentially greater ability to scan and “see” the battlespace with exponentially greater fidelity than ever before, locating and positively identifying everything from air to sea targets. I can look at the battlespace with the radar, the DAS, a host of other sensors and basically can bring all that information together into one data system, fuse that information — which makes it a flying sensor.*

*The V-22 changed things physically with regard to projecting power from a sea base. With the F-35 we will change things physically again, but on another level we will bring in another huge leap forward in capability from its sensors and its ability to see and share information – from our sea base.*

*I just witnessed tremendous potential on the BACI-11 (the testbed aircraft on which F-35 combat systems are carried to shape new software development for the F-35) to bring in high fidelity data, not only to know what is out there but also to be able to target at a much higher degree of accuracy than I have ever been able to do before. I almost felt like I was in an E2D, able to see that much battle space. What was missing for me was there was not another BACI-11 out there to tie into and to share the sensor data, as we will do with the operational F-35s.*

*But even as a single platform, it was exponentially better than anything that I have seen in any platform. And I fly both the F-18s and Harriers now.*

*SLD: When thinking of the potential of the ESG-MEB operating off of a distributed sea base, the F-35 appears to provide a key match to managing the distributed three dimensional air and surface space within which the ESG-MEB will operate.*

*General Davis: It does. The F-35 community of users – sea based and land based — will be able to create a pretty tight air grid over the top of the distributed battle space so we can share information very freely out there.*

*To me, the key is to have these airplanes networked overtop, where they're able to see deep into the enemy battle space, or the objective area, but also sharing that information. I want not just the airplanes to share their information, but the ships as well to be able basically pass that information back and forth freely.*

*To me that is the next big step we need to take. We need to take the information, which these planes are bringing to us and sharing them with the ships and other combat elements in the operation.*

*With regard to the evolution of the ESG-MEB with the introduction of the F-35B, you can disaggregate your forces because you can bring them under an umbrella that has the kind of protection currently only available with the Prowlers or the Growlers off of the large deck carrier. Now I will have my own organic capability that I can protect these assets. Now I can spread out, like that tsunami that Colonel Boniface talked about. I can actually move my forces out and I can protect them. They can be separated from the ESG, or from the land based assets in our expeditionary Forward operating bases our MWSSs (Marine Wing Support Squadrons) build and sustain.*

<http://www.sldforum.com/2012/03/the-bac1-11-anticipates-the-future-an-interview-with-general-dog-davis/>

The emerging Expeditionary Support Group (ESG) allows for the creation of scalable agile forces against the entire spectrum of threats.

(For a discussion of scalability see our Pacific strategy

<http://www.sldinfo.com/special-report-on-crafting-a-new-pacific-strategy/>).

The other key Commander in the ESG-MEB combination is the MEB Commander. And here the Commander provided insights into the scalable force trajectory.

*BG Owens USMC Commander, 2nd Marine Expeditionary Battalion:*

*One of the things that was different in this exercise from many previous amphibious exercise large scale is we executed in what we called a medium threat, anti-access, area denial, A2AD environment. The threat focus is primarily on the area denial piece, which is closer in, but which is more realistic for the timeframe of the exercise.*

*The threat we faced at sea started with submarines, missile patrol boats, fast-attack craft, fast inshore attack craft, and some asymmetric threats with commandeered fishing boats, low slow-flyers, and some tactical air. But of greater concern was coastal defense cruise missiles, initially fixed sites, as well as mobile, and then ultimately, just a threat of additional mobile sites.*

*And then, the most ubiquitous threat that we're going to face is mines. In the exercise, we faced a very robust mine capability. We had a wide range of capabilities on the Navy side to help deal with those threats, but we also integrated the MEB in that, particularly our air. These assets were used both in targeting threats to the amphibious taskforce ashore, as well as providing defense of the amphibious taskforce primarily with our aviation asset. But we also involved some of our ground combat elements when they were aboard the ship.*

*That continued even after we went ashore. And this is something that we really haven't practiced; this full integration, of the Marine capability in the overall ability to both to project force, and to protect those naval assets that are projecting that force.*

*SLD: I would think a major challenge from the command side is to organize your assets flexibly to deal with the diversity and range of threats within a compressed time period.*

<http://www.sldinfo.com/brigadier-general-owens-on-bold-alligator-2012-“weve-got-to-hit-them-where-theyre-not”/>

The BIG E and surface combatants were engaged in Bold Alligator because no platform fights alone. It is a time of transition from 4th Gen legacy to 5th Gen F-35 capability that does not need an angle deck and cats and traps.

After Bold Alligator the USS Enterprise left Virginia for its last voyage.

<http://www.sldinfo.com/the-final-voyage-of-the-uss-enterprise/>

In the interview with Col. Weisz, 2nd ESG Deputy Commander, the role of the Enterprise in Bold Alligator was highlighted because no platform fights alone:

*Another interesting aspect of the exercise was the integration of the Carrier Strike Group (CSG) into BA 12; this was an important training and educational element for all involved in the exercise, particularly for the ESG-2 and 2d MEB staffs.*

*The ENTERPRISE Carrier Strike Group provided VADM Buss, the Commander of the Combined Force Maritime Component Command, with both aviation and surface capabilities that significantly contributed to the littoral fight.*

*Often forgotten is the robust capabilities that the Cruiser-Destroyer (CruDes) assets possess who are also part of the Carrier Strike Group; these CruDes capabilities are truly significant and are much needed in the littoral operating area, especially when you are conducting ops in a medium threat anti-access/area-denial (A2AD) type environment as we did.*

*At the same time, it is just incredible how much strike, ISR, EW and C2 capabilities that the entire CSG can bring to bear in a fight. Having a CSG by your side as you begin your amphibious assault is very comforting to the Amphibious Task Force and Landing Force Commanders.*

*We just need to conduct more of these types of integrated training opportunities in the future. It is the way we are going in the future; it's the way ahead.*

<http://www.sldinfo.com/the-way-ahead-after-bold-alligator-2012/>

## **Conclusion**

The F-35C for the Royal Navy is the niche aircraft; the F-35B is not.

The F-35B will allow the Brits to get full value out of their carriers and put them center bull into the ESG revolution.

They will not only be on the same page with the USMC and the USN-USMC enabled team, but they will be able to shape collaborative con-ops with allies across the board.

A mix and match capacity with ships, helos and planes led by the F-35B enabled carriers will be forged in combat and in multi-national operations.

(For various book length publications developing several of the themes in this article see the following

<http://www.sldinfo.com/defense-security-publications/>).

## THE UK, ALLIES AND RE-THINKING THE F-35C

3/19/12

by Robbin Laird

As Ed Timperlake has argued in a companion piece, the UK shifting from the F-35C to an F-35B/A mix would make inherently good sense.

<http://www.sldinfo.com/the-uk-rethinks-the-f-35c-decision-shaping-a-british-led-expeditionary-strike-group/>

At the heart of the shift is the ability to gain significant flexibility with the use of the new UK carriers and to integrate the assets flying off of those carriers with the Royal Air Force and/or allied Air Forces flying land based or sea-based air.

At the heart of the inherent flexibility is the emergence of a new approach to the Expeditionary Strike Group or ESG presaged in Bold Alligator 2012. In the exercise, the migration from the ARG-MEU already underway under the influence of the Osprey to a much larger strike formation operating from a distributed seabase was evident. The Osprey was at the heart of the tactical mobility, which has strategic consequences for how a distributed seabase can operate.

And the B operating off of the large deck amphibians will add what we have called the honeycombed air system providing air cover and close combat support to the insertion and strike force.

As General "Dog" Davis, 2nd Marine Air Wing, commented in a recent interview:

The F-35 community of users – sea based and land based — will be able to create a pretty tight air grid over the top of the distributed battle space so we can share information very freely out there.

To me, the key is to have these airplanes networked overtop, where they're able to see deep into the enemy battle space, or the objective area, but also sharing that information. I want not just the airplanes to share their information, but the ships as well to be able basically pass that information back and forth freely.

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The large deck amphibious ship is more analogous to the Queen Elizabeth class carriers than either the Nimitz or the Gerald Ford. And what the large deck amphibians with 22 F-35Bs aboard (if so desired) can do is to tie together an Expeditionary Strike group and tie in other air assets, whether land-based or large deck carrier based.

The deck space on the amphibians or the Queen Elizabeth class carriers can be configured to the mission and evolve what is appropriate to the tasks. The cats and traps built into a Queen

Elizabeth will limit the ability to have the flexibility of deck spotting which a V/TOL aircraft can provide.

(On efficiency in using deck space see <http://www.sldinfo.com/augmenting-the-seabase/>).



The USMC operated 16 Harriers off of the Large Deck Amphib the USS Kearsarge presaging what they intend to do when they have the F-35Bs. In this picture, An AV-8B Harrier takes off from the flight deck of the amphibious assault ship USS Kearsarge (LHD 3) during Bold Alligator 2012. Credit: USN

The Brits are not likely in any case to follow the con-ops of the Carrier Battle Group; they will be evolving the con-ops of the ESG. Whether with their own ships and air assets, or those of allies – American or not – the Queen Elizabeth with F-35Bs on board can operate as an ESG focal point. And because of the deck flexibility, they will be able to mix and match helos with airplanes, unmanned and manned or whatever evolves over the next 40 years of the life of the ship.

The RAF buying F-35As makes inherently good sense because it will be the cheapest of the F-35s and be produced in large numbers over the course of the program. And the shared combat systems means that the F-35Bs operating off of the carrier can work inseparably with the RAF or ANY other land-based F-35s which the Brits will need to work with.

The implications for the UK's coalition approach are significant. The inherent flexibility of the F-35B enabled deck means that the British can lead an operation, can contribute to an operation, or support an operation. A distributed sea base is made up of a variety of platforms, ranging from patrol boats, frigates, destroyers, submarines, etc. The F-35B can put a cover over the distributed seabase, providing air cover, seamless transition from air-to-air to close combat support, and can connect through MADL with whatever F-35 assets are available from the RAF or allies. Remembering that allies in Europe and the Middle East are buying F-35As in decent numbers, this means a significant expansion of what the F-35Bs aboard the carrier CAN DO. No platform fights alone in the F-35 world.



It also means that the Royal Navy can operate Special Forces off of the Queen Elizabeth along with the Bs. Deck spotting and deck management are an important part of mission management and mission success. This means as well, that coalition assets can land on the carrier and leverage the sea-base while the F-35B is flying its C4ISR D mission sets.

[http://www.aviationweek.com/aw/generic/story\\_channel.jsp?channel=defense&id=news/awst/2011/08/08/AW\\_08\\_08\\_2011\\_p47-352385.xml](http://www.aviationweek.com/aw/generic/story_channel.jsp?channel=defense&id=news/awst/2011/08/08/AW_08_08_2011_p47-352385.xml)

There is also a special relationship, which can be developed with the Italians, and their new F-35B enabled carrier. In discussions with Italians, it is clear that their carrier not only is built for F-35Bs as the enabler but that the way ahead is a mix of Bs and As. And the Italians are starting down the road thinking of some innovative approaches to combing them into an integrated strike force for operations throughout their areas of interest.



UK F-35B seen on the factory floor of the Final Assembly Line in Fort Worth during a factory tour in early January 2012. Credit Photo: Lockheed Martin

And it is clear that the role of the sea base in the evolution of Mediterranean and Middle East operations is only going to go up. But this is not a sea base isolated from the operations of land-based air. As the ESG exercise demonstrated off of the Shores of Virginia and North Carolina, 16 Harriers can work very nicely with other air assets whether coming from the large deck carriers or from land bases.

This model can be followed with Arab Air Forces, the Israeli Air Force or Western Air Forces deployed temporarily on Arab soil. The point is that the organizer of the spear is on the sea-base, and this capability can be conjoined with the various air combat centers extant or being developed in the region.

<http://www.sldinfo.com/bold-alligator-2012-and-the-middle-east/>

In short, the new British carriers are an important contributor in shaping the future of maneuver warfare from the sea. And as the F-35s are engaged, the forward deployed sensors can

guide a newly enabled surface and sub-surface fleet with a new generation of weapons – loitering, penetrating and lethal – to provide the “arsenal” ship support to the air and ground forces maneuvering to provide for situational dominance.

And with the new approach, the mix and match approach to basing – land, sea and allied – allows for a very flexible capability to provide for strategic and tactical dominance.

(For a discussion of the new maneuver concept see

<http://www.sldinfo.com/re-thinking-maneuver-warfare-from-the-sea/>).

## **THE IMPACT OF THE F-35B: STRATEGIC DETERRENCE WITH TACTICAL FLEXIBILITY**

5/27/12: by Ed Timperlake

Every fighter pilot has had or will have a moment in the air when the biggest indicator in the cockpit is showing how much fuel is left: the fuel indicator immediately can dominate the pilots attention and really focus thinking on where to immediately land.

Fuel is measured in pounds usually with an engineering caveat stating a degree of uncertainty over how low the number may go before all the noise will stop. Pounds of fuel remaining eventually become everything.

It is actually a very simple and terrifying equation, no fuel means simply no noise because the jet engine has stopped working.

Contemplating this very time sensitive dilemma, when the “noise gage” goes to zero, all pilots know that their once trusted and beautiful sleek multi-million fighters that they are strapped into will rapidly take on the flying characteristic of a brick.

Running low on fuel, calling “bingo,” on the radio which is announcing min fuel left for a successful recovery and then realizing you are actually going below “bingo” could occur for a variety of reasons.

In peacetime it is mostly a delay in landing because of weather related issues.

In combat, in addition to horrific weather at times, throw in battle damage to the fuel tanks and it becomes a real life or death problem.

In peacetime you can eject, probably lose your wings and that will be that.

However, in combat, in addition to shooting at you the enemy always gets a vote on other methods to kill you and destroy your aircraft. They will use any means possible.

Consequently if aircraft in their combat strike package get lucky and a few survive to bomb “homeplate” taxiways and all divert fields it can become a significant problem.

Even more realistically in this 21st Century world, missile proliferation, both in terms of quality and quantity, is a key challenge. All nations can be peer competitors because of weapons proliferation.

An enemy may have successfully improved the quantity and quality of their missile such that an Air Battle commander's entire airborne air force can be eliminated by the enemy destroying all runways, taxiways and divert bases.



The First Flight of the UK F-35B. For a look at the video version of the flight on April 13, 2012 see <http://www.sldinfo.com/first-flight-of-uk-f-35b/>

In a war at sea, hitting the carrier's flight deck can cripple the Carrier Battle Group (CBG) and thus get a mission kill on the both the Carrier and perhaps even the entire airborne air wing if they can not successfully divert to a land base.

With no place to land, on the sea or land and with tanker fuel running low, assuming tankers can get airborne, the practical result will be the loss of extremely valuable air assets.

In such circumstances, The TacAir aircraft mortality rate would be the same as if it was during a combat engagement with either air-to-air or a ground –to-air weapons taking out the aircraft.

The only variable left, between simply flaming out in peacetime, vice the enemy getting a kinetic hit would be potential pilot survivability to fly and fight another day.

However, with declining inventories and limited industrial base left in U.S. to surge aircraft production a runway kill could mean the loss of air superiority and thus be a battle-tipping event, on land or sea.

Now something entirely new and revolutionary can be added to an Air Force, the VSTOL F-35B.

Traditionally the VSTOL concept, as personified by the remarkable AV-8, Harrier was only for ground attack. To be fair the RAF needed to use the AV-8 in their successful Falklands campaign as an air defense fighter because it was all they had.

The Harrier is not up to a fight against any advanced 4th gen. aircraft—let alone F-22 5th Gen. Fighters that have been designed for winning the air combat maneuvering fight (ACM) with advanced radar's and missiles.

Now though, for the first time in history the same aircraft the F-35 can be successful in a multi-role.

The F-35, A, B & C type, model, series, all have the same revolutionary cockpit—the C4ISD-D “Fusion combat system” which also includes fleet wide “tron” warfare capabilities.

<http://www.sldinfo.com/the-f-35-as-a-%E2%80%9Cflying-sensor-fusion-engine%E2%80%9D-positioning-the-fleet-for-%E2%80%9Ctron%E2%80%9D-warfare/>

There has been a lot written about the F-35B not being as capable as the other non-VSTOL versions such as the land based F-35A and the Large carrier Battle Group (CBG) F-35, the USN F-35C.

The principle criticism is about the more limited range of the F-35B. In fact, the combat history of the VSTOL AV-8 shows that if properly deployed on land or sea the VSTOL capability is actually a significant range bonus. The Falklands war, and recent USN/USMC rescue of a Air Force pilot in the Libyan campaign proved that.

The other key point is limited payload in the vertical mode. Here again is where the F-35 T/M/S series have parity if the F-35B can make a long field take off or a rolling take off from a smaller aircraft carrier—with no traps nor cats needed it can carry its full weapons load-out.

The Royal Navy just validated this point by reversing back to the F-35B.

<http://www.sldinfo.com/the-uk-rethinks-the-f-35c-decision-shaping-a-british-led-expeditionary-strike-group/>

<http://www.sldinfo.com/the-uk-allies-and-re-thinking-the-f-35c/>

Give all aircraft commanders the same set of strategic warning indicators of an attack because it would be a very weak air staff that would let their aircraft be killed on the ground or flight deck by a strategic surprise.

Consequently, the longer take off of the F-35 A, B or C with a full weapons complement makes no difference. Although history does show that tragically being surprised on the ground has happened.

Pearl Harbor being the very nasty example. Of course, USN Carrier pilots during the “miracle at Midway” caught the Japanese Naval aircraft being serviced on their flight deck and returned the favor to turn the tide of the war in the Pacific.

In addition to relying intelligence, and other early warning systems to alert an air force that an attack is coming so “do not get caught on the ground!” dispersal, revetments and bunkers can be designed to mitigate against a surprise attack.

Aircraft survivability on the ground is critical and a lot of effort has also gone into rapid runway repair skills and equipment to recover a strike package. All F-35 TMS have the same advantages with these types of precautions.

The strategic deterrence, with tactical flexibility, of the F-35B is in the recovery part of an air campaign when they return from a combat mission, especially if the enemy successfully attacks airfields.

Or is successful in hitting the carrier deck-they do not have to sink the Carrier to remove it from the fight just disable the deck. War is always a confused messy action reaction cycle, but the side with more options and the ability to remain combat enabled and dynamically flexible will have a significant advantage.

With ordinance expended, or not, the F-35B does not need a long runway to recover and this makes it a much more survivable platform — especially at sea where their might be no other place to go.

A call by the air battle commander-all runways are destroyed so find a long straight road and “good luck!” is a radio call no one should ever have to make.

But something revolutionary now exists.

In landing in the vertical mode the Marine test pilot in an F-35B, coming aboard the USS Wasp during sea trials put the nose gear in a one square box. So the unique vertical landing/recovery feature of landing anywhere will save the aircraft to fight another day.

It is much easier to get a fuel truck to an F-35B than build another A or C model, or land one of the numerous “decks” on other ships, even a T-AKE ship then ditch an F-35C at sea.

This unique capability can be a war winning issue for countries like Israel, Taiwan and the U.S. Navy at sea.

### **A Wide Range of Threat Missiles**

Exported Russian Scuds are still the dominant missile threat on the world market, but the Scud is far from a monopoly. A look at other systems that could threaten US air bases begins with China's CSS-6 series, with ranges from 370 to 550 miles. "China has the most active and diverse ballistic missile development program in the world," concluded a study by the Air Force's National Air and Space Intelligence Center (NASIC).

Short-range missiles fired from Iran's coastline in the Persian Gulf region have more than enough range to threaten bases in several neighboring states. All major types of short-range missiles are road-mobile, and some, such as India's Dhanush missile, are even configured for ships.

With missiles, the operational threat is defined partly by range and warhead, but also by number of launchers. Launchers can be reused for multiple missiles.

Medium- and intermediate-range missiles cover distances from 600 to 3,400 miles. Iran's mobile Shahab 3 missile with a range of about 800 miles is a typical example.

"The current generation of Chinese missiles already can strike many of our fixed bases and those of our allies and friends in these regions," such as those on Taiwan, Okinawa, and Guam, noted missile proliferation expert Henry Sokolski in the August 2010 *Armed Forces Journal*.

China and Russia possess intercontinental missiles. North Korea could join the club if and when it deploys the Taepo Dong 2 missile.

Attack drones are another looming possibility, as international air shows are full of vendors hawking an array of unmanned vehicles, and there are also cruise missiles to consider. Their unpredictable, low-altitude flight paths make them especially tough targets to track and intercept.

"Land-attack cruise missiles (LACM) are highly effective weapon systems that can present a major threat to military operations," found NASIC. "At least nine foreign countries will be involved in LACM production during the next decade, and many missiles will be available for export."

NASIC estimates up to 20 countries could possess cruise missiles by 2020.

Credit Graphic:

<http://www.airforce-magazine.com/MagazineArchive/Pages/2010/December%202010/1210missile.aspx>

For a look at some aspects of the missile threat to air operations see the following articles:

<http://www.jpost.com/Israel/Article.aspx?id=189462>

<http://www.abovetopsecret.com/forum/thread342459/pg>

<http://www.strategicstudiesinstitute.army.mil/pubs/summary.cfm?q=594>

<http://www.technologies.co.il/beta/Resources/Pages/1966/Aeros5a.pdf>

<http://www.thenational.ae/news/uae-news/generals-warn-of-missiles-threat-in-gulf>

<http://www.susrisblog.com/2012/04/17/the-gcc-challenge-in-missile-defense/>

[http://www.us-taiwan.org/reports/2010\\_may11\\_balance\\_of\\_air\\_power\\_taiwan\\_strait.pdf](http://www.us-taiwan.org/reports/2010_may11_balance_of_air_power_taiwan_strait.pdf)

And for an overview of what is in the baseline F-35, which of course, is the initial USMC F-35B

<http://www.sldinfo.com/the-baseline-f-35/>

## BOLD ALLIGATOR 2012 AND THE “NEW” MIDDLE EAST

by Robbin Laird

As BA-12 was unfolding, the Iranian threat to mine the Straits of Hormuz was a real world event which seemed to remind folks of the need for amphibious capabilities and the sea basing approach.

The Navy's biggest amphibious exercise in a decade, Bold Alligator, is not specifically designed to counter Iranian threats in the Persian Gulf. But it comes awfully close, according to two senior service officials.

The joint Navy and Marine Corps exercise is geared toward honing the services' amphibious warfare capabilities. Training operations began this week off the coast of Virginia and North Carolina, U.S. Fleet Forces Command chief Adm. John Harvey told reporters at breakfast here today. The massive exercise comes as Marines are in the midst of returning [to the sea after a decade of combat in Iraq and Afghanistan](#). The combat scenarios in Bold Alligator are not tailored to mimic any particular country, Lt. Gen. Dennis Hejlik, head of U.S. Marine Corps Forces Command, said at the same breakfast. But a closer look at those scenarios could lead some to conclude otherwise.

Navy and Marine forces involved with the exercise will work scenarios involving mine warfare, countering small boat attacks and other irregular threats and fighting in shallow coastal waters, Harvey pointed out. Those threats, among others, are [the hallmarks of Iranian naval forces](#). Reiterating Hejlik's comments, Harvey did note the Bold Alligator scenarios were "certainly informed by recent history." Tehran has been flexing their naval muscles over the past few months as part of an overall show of force in the Straits of Hormuz. That said, "Everything we are going to do" during the exercise can be applied to a potential conflict with Iran in the Straits, Harvey said.

<http://defense.aol.com/2012/01/31/navy-keeps-eye-on-iran-in-latest-round-of-combat-drills/>

And indeed, the DOD is re-fitting the USS Ponce for duty in the Middle East. The Department stopped the decommissioning in order to re-fit for deployment. Although one report focused on the ship as a launch point for Navy seals, a more likely focus is upon de-mining operations and the need for significant helo and related capabilities aboard the USS Ponce. The Ponce was one of the stars of the Libyan engagement and due to significant shortfalls on the US side is being pressed into duty. If you ever wanted a poster child for the USN-USMC call for more amphibs this clearly is it. A real world event is being handled by a Band-Aid approach. If we don't simply want to buy more Band-Aid solutions, we need to buy and deploy appropriate kit for the new con-ops now.

[http://www.washingtonpost.com/world/national-security/pentagon-wants-commando-mother-ship/2012/01/27/gJQA66rGWQ\\_story.html](http://www.washingtonpost.com/world/national-security/pentagon-wants-commando-mother-ship/2012/01/27/gJQA66rGWQ_story.html)

In fact, the Libyan operations as well as evolving events in the Middle East suggest even more strategic relevance of the rapid evolution of the sea-basing approach into a broader understanding of maneuver warfare from the sea.

In later pieces, we will develop the concept of maneuver warfare from the sea featured in BA-12; it is not about amphibious ships, it is about leveraging them as part of sea base to shape a broad maneuver space to shape engagement options and mission success.



The “new” Middle East is rapidly creating the need for such a capability, and such a transformation of US and allied forces. And remember the core role, which allies played in BA-2012. Credit Image: Bigstock

The “new” Middle East is rapidly creating the need for such a capability, and such a transformation of US and allied forces. And remember the core role, which allies played in BA-2012.

With the Arab Spring, the security and defense framework, which the West has underwritten over the past thirty years, is shattered. The Arab Spring states are in upheaval, the Iranians are preparing to enter the stage as a nuclear power; the Conservative Arab states have to prepare to defend themselves against Iran, and the interaction between Arab Spring forces and the stability of the key conservative Arab states is significant. Who will the West be aiding and abetting if the Arab Spring continues to pull the rug out from under the de facto Conservative Arab, Israeli and Western alliance?

Will Western states be able and willing to deploy land based forces, whether ground or air, on Arab soil? And given uncertainties even in key Arab allied states, how might the West best defend its interests, and to ensure energy security in the region?



There are several elements presaged in BA-12, which are relevant to the reshaping of Western capabilities to protect Western interests.

First, sea-basing and engagement forces associated with sea basing are clearly well placed to provide for security of choke points and transit in the Mediterranean and the Gulf.

Second, in the exercise, Harriers based on the USS Kearsarge worked closely with land-based air to provide for a significant air combat capability to shape the battlespace. This model can be followed with Arab Air Forces, the Israeli Air Force or Western Air Forces deployed temporarily on Arab soil. The point is that the organizer of the spear is on the sea-base, and this capability can be conjoined with the various air combat centers extant or being developed in the region.

Third, the F-35B is a game changer. The combat systems aboard the BACH1-11 during the exercise demonstrated the potential impact of being able to have a wide-angle lens on the battlespace transitioning into dynamic battle management using tactical aircraft.

Fourth, the synergy between Aegis and the engagement force is a crucial element ensuring the viability and survivability of Western deployed assets whether on the sea or on land.

The coming Iranian nuclear state coupled with the festering upheavals associated with the Arab Spring can create a perfect storm for the ability of the West to defend its interests in the Middle East.

Shaping an effective engagement strategy in this period of uncertainty and deploying realistic capabilities into the Mediterranean and the Gulf will be a key imperative in the period ahead.

For other sources please see

<http://www.bbc.co.uk/news/16944360>

[http://www.navyrecognition.com/index.php?option=com\\_content&task=view&id=321](http://www.navyrecognition.com/index.php?option=com_content&task=view&id=321)

[http://www.navyrecognition.com/index.php?option=com\\_content&task=view&id=320](http://www.navyrecognition.com/index.php?option=com_content&task=view&id=320)

<http://www.telegraph.co.uk/news/worldnews/middleeast/iran/8981394/US-Navy-will-not-tolerate-Iran-closing-Strait-of-Hormuz.html>

## LOOKING BEYOND THE LIBYAN AIRPOWER MOMENT: SHAPING COALITION COHERENCE

08/26/2011 by Ed Timperlake

For at least a generation of Midshipman at the Naval Academy the famous "ATP-I Alpha" was a blessing and a curse. It was the Allied Tactical Publication that captured the flag signals and Morse code that allowed NATO to execute formations with essentially a single uniform "language." It was a curse because it was classified and woe be to the Midshipman who left their safe unlocked.

Having universally accepted and understood information among allies is critical. Flag hoists, and Morse code has evolved to now agreed on words sent electronically often encrypted, meaning "do something." Accurate and unequivocally clear in meaning communication is essential for commanders to fight the force at all ranks.

However, regardless of significant effort for uniform clarity in communications it is still a fact of combat that language, national customs and traditions can really influence the outcome of battles. In fact the plot of the movie "Inglorious Bastards" turns on the fact that an English special operations Officer who spoke perfect German was tripped up by the way he signaled the number 3 with his fingers. Art or reality? –it makes the point.

The lessons learned from the great and at times deadly aviation cold war rivalry between the US (and our Allies) and the USSR and their surrogates show us-

The lesson on the US-USSR rivalry is that air combat leaders must be able to adjust during the course of an air battle or war by changing strategy and tactics, to achieve exploitation of the enemy's mistakes or weakness. Aircrews must be adaptable enough to follow changing commands from leadership and also, on their own initiative, to change tactics to achieve local surprise and exploitation. Like the quote in Animal House: "knowledge is good." In the cockpit it can be a life saver and aid in mission accomplished.

<http://www.sldinfo.com/the-us-vs-ussr-in-tacair-lessons-learned-from-a-hot-cold-war/>

Now let's look at the current NATO air order of battle (AOB) for the Libyan Campaign.

However, we must first see if all could agree what to call the operation-(from wiki)

- NATO-"Operation Unified Protector"
- Belgium-"Operation Odyssey Dawn" and/or "Operation Freedom Falcon"
- Canada-"Operation Mobile"
- France-"Operation Harmattan"
- UK-"Operation Ellamy"
- Spain- "Operation Odissea al Amanecer"

- US–Italy, Denmark, Norway- “Operation Odyssey Dawn”-

But does calling it “Odyssey Dawn” mean the US is prepared to continue on a Responsibility to Protect (R2P) journey because the original Odyssey was ten years?

Now the Air-order-of Battle by aircraft Type/Model/Series of fixed wing Fighter/Attack aircraft

- Various block's of F-16 (USAF, Royal Danish AF, Belgian, Royal Netherlands AF, Italy, Royal Norwegian AF, Turkey), US-F-15, A-10, AV-8, EA-18, B-2,
- Canada-CF-18
- French Air Force-Mirage (2000-5, 2000D), Rafael, Mirage F-1, Super Etendard
- Italy-Tornado ECRs, Eurofighter, AV-8B
- Spain-F/A-18
- Sweden-JAS-39 Gripen
- UAE-F-16 and Mirage 2000
- United Kingdom-Tornado, Typhoon

Considerable effort also went into Aerial, Refueling, AWACS, and Maritime Patrol. Finally, helicopters were extremely active and effective.

<http://www.sldinfo.com/french-%e2%80%9cvampires%e2%80%9d-and-us-airsea-battle/>

So a good Libyan War lesson learned is simple—current modern war, especially war in the air requires considerable planning, and high level coordination, and extensive high end airborne assets for command and control to be effective.

Now imagine all combat pilots, from all allied countries having the same intelligence and situational awareness about the Battle Space in their individual cockpit. It gets even better — all pilots will have uniformly understood symbols and cockpit display icons that are not language specific. Much like the emerging universal road and other signage that are understood regardless of language.

The F-35 (T/M/S) “Z-Axis” putting “C4ISR-D” (D is for Decision) in the individual cockpit has the potential to revolutionize the ability of an alliance fighting force. All Fighter Pilots flying the F-35 across US services and allied Air Forces will concurrently operate from the same base line of evolving battle intelligence. The possibilities for new combat tactics for a decentralized yet unified air campaign are only limited by the operator’s imagination.

<http://www.sldinfo.com/the-emergence-of-the-z-axis-changing-the-way-airpower-enables-combat-operations/>

The achievable vision is that a USMC F-35B afloat will have the same SA as an airborne or strip alert USAF or allied F-35 pitching into the fight. The agility of such an Airpower force is unlimited compared to stove-pipe technology-even fighting an air battle with emerging 5th Gen stealth being developed by Russians and Chinese.

At least in the future if the Nations have trouble with something as basic as to what to call the war-the combat pilots will fight as one. That is if the US keeps the F-35 promise, especially the strategic value of basing for the F-35B.

## 21ST CENTURY AGILITY: LEVERAGING THE F-35B AS A STRATEGIC ASSET

08/11/2011 by Ed Timperlake

The F-35B will give the United States Marine Corps the ability to advance against any enemy from the sea with air cover moving ashore in support of Marine ground combat forces.

This agility and flexibility in selecting the initial objective to seize and move out is rooted in "air field agility." The ability of the F-35B and associated Amphibious Ready Group assets to operate from any 3000 feet hard straight surface shapes a new strategic tool set.

What makes this possible is the F-35B has both a fully up air-to-air and air-to-ground capability. In the AA mode it is supersonic and stealthy with the same "Z-axis" revolutionary C4ISR-D cockpit that Navy F-35Cs and AF –F-35As both have. Consequently, the F-35B can fit seamlessly into the Air Force/Navy Air Dominance mission.

The F-35 is not a linear performance enhancement from F/A-18 4th Gen; it has a third performance axis "Z" The "Z" axis is the pilot's cockpit C4ISR-D "OODA" loop axis. The memo does not address this revolutionary point. Traditionally, the two dimensional depiction is that the x-axis is time and the y-axis is performance and captures the evolution of individual airplanes that tend to cluster in generation improvement. Each aircraft clustered in a "generation" is a combination of improvements. Essentially, the aeronautical design "art" of blending together ever improving and evolving technology eventually creates improvements in a linear fashion.

The design characteristics blended together prior to F-35 have been constantly improving range, payload (improved by system/and weapons carried), maneuverability (measured by P Sub s), useful speed, and range (modified by VSTOL—a plus factor). The F-35 is also designed with inherent survivability factors—first redundancy and hardening and then stealth. Stealth is usually seen as the 5th Gen improvement. But reducing the F-35 to a linear x-y axis improvement or to stealth simply misses the point. The F-35 is now going to take technology into a revolutionary three-dimensional situational awareness capability. This capability establishes a new vector for TacAir aircraft design. This can be measured on a "Z" axis.

Historically, C3I was external to 1,2,3, and 4th Generations TacAir. C3I's goal was enhancing fleet wide combat performance for all Type/Model/Series (T/M/S) of TacAir. This is the modern AWACS battle concept. Now using a three-dimensional graph the "Z-axis" takes airpower into a totally different domain. The shift is from externally provided C3I to C4ISR-D in the cockpit carried by the individual air platform. This is the revolutionary step function that breaks the linear progression of previous Generations. The "Z" axis in which the F-35 is the prototype for the first "C4ISR –D (for decision) cockpit" But wait it gets even better the entire F-35 Type/Model/Series connects the Air Force, Navy, Marines, and Allies in a cohesive unified fighting force. One additional assets that can really augment this US and Allied "joint" air force and that is the Aegis Ships with the SM-3 missile.

## Osan Airfield Damage

afnkorea 994 videos



1,913

Uploaded by afnkorea on Aug 6, 2007

What good is an Air Force Base without a runway? That's exactly the point.

3 likes, 0 dislikes

Airfields under duress can be part of any 21st century operation. The F-35B provides a bridge solution and protects the airfield during repairs. It can provide both defensive and offensive capabilities during downtime. And linked with Aegis can provide a significant bubble of protection for an airfield under attack.

<http://www.youtube.com/watch?v=i9DJVhIQIM>

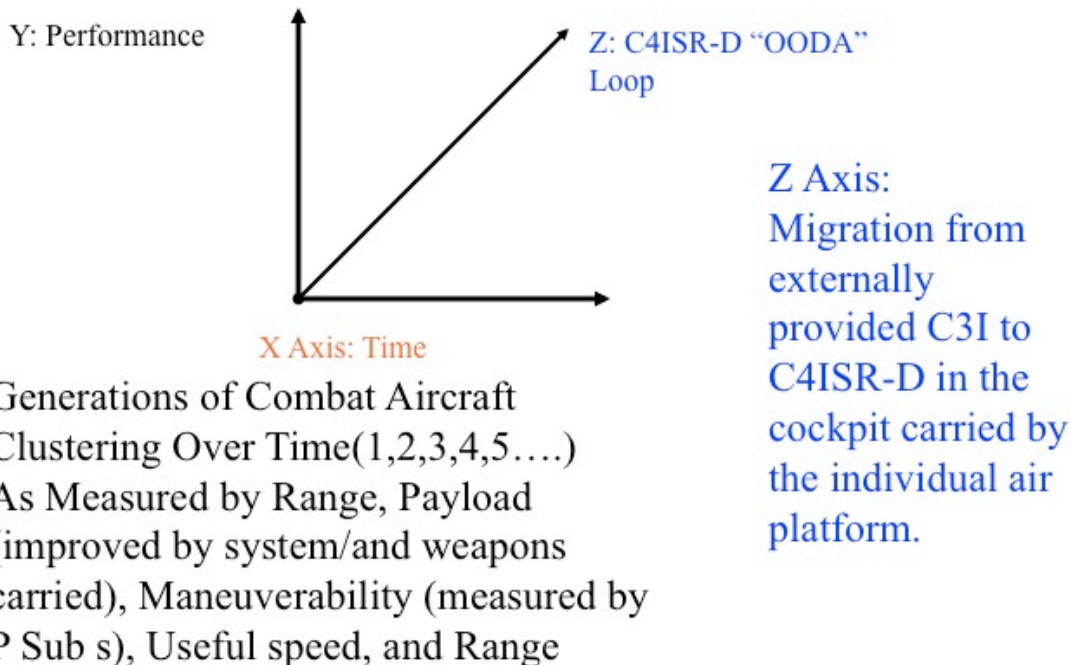
No longer should the F-35B be considered a boutique niche aircraft only essential for Marine combat con-ops. With vision and commitment on numbers it can become a tactical aircraft that sends a strategic signal.

The reason is simple, an F-35B can stand strip alert on any long runway, US or Allied. From a strategic point of view think of Guam, South Korea or in the Middle East on all long runways. As a crisis situation develops, the F-35Bs can be remotely placed in secret hardened bunkers and revetments and thus become a significant deterrence asset that can instantly sortie into combat and return to gas and go again and again.

(<http://www.sldinfo.com/the-f-35b-has-a-unique-war-winning-capability/>)

By using a detachment of F-35Bs the issue of enemy runway area denial and need for rapid runway repair does not become a show stopper to ops-tempo both offensively and defensively.

## The Z Axis for Combat Aircraft



Tie an F-35B to the Aegis and the entire "wasting argument" about asymmetric IRBM and enemy strike against our hard fixed land targets becomes moot. This is because Guam for example will still have air power in its defense. This principal can be applied globally.

Unfortunately, there was no way to express this in Under Secretary Work's memo. It would be important to highlight the discriminator among the aircraft in terms of ability to connect with adjacent weapons platforms be a basic operating assumption.

Clearly, he could not suggest the Air Force and Allies buy the F-35B. But he can sure insist and guarantee the USMC only buys F-35B and that would be a very good thing to do. And this will then open the gates to the possibility of allies beyond Spain and Italy buying F-35Bs, and would highlight that the F-35C is the boutique aircraft, because tied to carrier air decks, whereas the F-35B is a flexible tool able to deploy on many ships and on many airfields, fixed, long, short, or not even today operational airfields. The F-35B reverses the relationship between pre-defined operational bases and the aircraft. The aircraft no longer constrains the definition of an airfield.

As far as USAF and Allies a few Squadrons of F-35Bs could be an invaluable insurance asset to stay in the battle if runways are sucker punched by the crazy follow on to the "Dear Leader" in North Korea, or Iranian fanatics with IRBMs. Taiwan could also send a powerful signal to the PLAAF if we allowed them to purchase the F-35B.

The 21st Century US Military has the potential to be the most agile combat force in the world by leveraging the F-35B throughout the force, rather than considering this solely a USMC weapon system.

## SHAPING REDUNDANT RESPONSE U.S. MILITARY SPACE CAPABILITIES

7/1/12: by Robbin Laird and Ed Timperlake

In a recent report by The U.S.-China Economic and Security Review Commission, the evolving threat to U.S. space capabilities was highlighted.

“China is pressing forward with an ambitious counterspace program, including a ground- and space-based space surveillance systems, electronic warfare capabilities, and kinetic kill vehicles;” the report said.

<http://www.uscc.gov/>

As the United States shapes an Asian pivot, the ability to network U.S. and allied forces is growing in importance. The Chinese understand this, and their counterspace program is designed precisely to degrade such U.S. and allied capabilities and to undercut confidence in what the U.S. and its allies can do to deal with threats in the Pacific and beyond.

The answer to such a challenge is clearly robust and redundant space-enabled C5ISR (command, control, communications, computers, combat systems, intelligence, surveillance and reconnaissance) capabilities.





the network is not about hierarchy and the ability of an adversary to whack the head of the hierarchy; it is about a honeycomb of deployed and distributed capability that no adversary can cripple with a single or easy blow. Credit Image: Bigstock

But the response is not simply in terms of space platforms; it is about building from the recognition that air breathing systems being deployed and about to be deployed into the Pacific provide crucial building blocks for robust redundancy.

“No platform fights alone” is a key point in understanding the design of the attack and defense enterprise of the 21st century.

Space platforms are not being tasked to provide the only response to a Chinese counterspace threat.

Rather, the entire C5ISR enterprise built into a honeycomb is the correct response and approach.

The Pacific capability of the U.S. military can be built around three principles: presence, economy of force and scalability.

Presence refers to having U.S. forces present and interdependent with allied forces in the Pacific. Economy of force is built around not having to bring overwhelming force to presence. But that only works if the force is scalable and has the capability to reach back and up to a surge of capability to provide for overwhelming force as necessary.

(For our look at a Pacific strategy built around these principles see our Special Report on the Pacific

<http://www.sldinfo.com/special-report-on-crafting-a-new-pacific-strategy/>

The key linchpin to do this is the C5ISR enterprise in the Pacific. With robust and redundant ISR, the enterprise enables a distributed force presence to be honeycombed.

That is, the network is not about hierarchy and the ability of an adversary to whack the head of the hierarchy; it is about a honeycomb of deployed and distributed capability that no adversary can cripple with a single or easy blow.

A key element for shaping a robust and redundant ISR system in the Pacific is the F-35, **a tactical aircraft with strategic impact**. The new aircraft is a flying combat system that has C5ISR built into the cockpit.

As a fleet, the F-35s provide a critical layer in shaping a robust and redundant ISR system, which is both synergistic with space systems and complementary to those systems.

A deployed fleet of F-35s — allied and U.S. — provides a powerful deterrent to any Chinese thought of a first strike on U.S. military space systems. It makes such a strike significantly less effective and useful to Chinese military planners.

From the outset, the deployed fleet and space systems forge a powerful deterrent capability.

To understand how the F-35 can intersect with the deployed C5ISR systems and provide robust redundancy for military space, it is important to understand briefly what the F-35 actually is.

The F-35 is often simply referred to as a tactical aircraft, and a replacement for fourth-generation or legacy aircraft. It is really something quite different.

It represents a dramatic shift from the past. Individual F-35 pilots will have the best database of real-time knowledge in the history of combat aviation.

And all of this is internal to their cockpit and enabled by advances in computer processing and sensor information fusing.

Each F-35 pilot combined with human sensing (seeing visual cues outside the cockpit) will be enabled by machine-driven sensor fusion to have combat “situational awareness”—better than any opponent.

Concurrent with their ability to look-see, which is limited by physical realities, the F-35 pilots will be able to “see” using cockpit electronic displays and signals to their helmet allowing them not to just fight with their individual aircraft but be able to network and direct engagements at more than 1,200 kilometers in 360 degrees of three-dimensional space out to all connected platforms.

A fleet of F-35s will be able to share their fused information display at the speed of light to other aircraft and other platforms, such as ships, subs, satellites, and land-based forces, including

unmanned aerial vehicles and eventually robots. Tactically, "Aegis is my wingman," "SSGN is my fire support" will be developed for conventional warfare.

This enables a "tactical" aircraft to evolve into a key technology for strategic operations and impacts.

See our Special Report on the baseline F-35

<http://www.sldinfo.com/the-baseline-f-35/>

The F-35 is known as a fifth-generation player in the state-of-the-art for both the air-to-air fighter; and air-to-air attack combat roles. It also adds an "electronic" warfare component to the fight.

Electronic warfare is a complex subject with many discreet but also connected elements. It was designed inherently into the F-35 airframe and C5ISR-D (for decision) cockpit.

Electronic warfare can include offensive operations to identify opponents' emissions in order to fry, spoof or jam their systems. In successful electronic war, often-kinetic kill weapons can be fired.

An F-35 can be a single sensor/shooter or off-load it's track to other platforms such as planes, ships and subs and eventually unmanned aerial combat systems.

The kinetic kill shot is usually a high-speed missile designed to (home on jam). It has been said on the modern battlefield — air, sea or land — if not done correctly, "you emit and you die."

Defensively in electronic warfare there are a lot of other issues, such as, electronic counter measures, and all things "cyber-war," which is a subject unto itself, extremely complex and not well understood.

Electro magnetic pulse concerns, infrared sensing and always protecting "signals in space" of the friendly info being transmitted and, as mentioned, jamming opponents' signals, all are key considerations in electronic warfare.

What is necessary to succeed in evolving capabilities to fight in the age of electronic or Tron warfare?

In taking a lesson from history, before World War II, AT&T long lines research found that in order to build and keep operational a U.S. phone system, the key to success was the need for "robust and redundant" systems.

Two generations later, the F-35 was designed as both inherently robust and redundant with many sensors and systems built into the airframe structure from initial design forward.

All the F-35 systems designed and developed sent electronic information into the aircraft cockpit "fusion engine." Trusted fusion information generated by inherent aircraft systems, queued up electronically by threat, will send to the cockpit displays, and the pilot's helmet battle-ready, instantaneous situational awareness.

<http://www.sldinfo.com/the-f-35-as-a-%E2%80%9Cflying-sensor-fusion-engine%E2%80%9D-positioning-the-fleet-for-%E2%80%9Ctron%E2%80%9D-warfare/>

The ability of the deployed F-35s — again owned by allies as well as U.S. forces — presents a diversified, and honeycombed presence and scalable force.

This baseline force is significantly enhanced by reachback to space assets, but the space assets now receive redundancy by being complemented as well by a deployed fleet of flying combat systems. This joint capability means that the value of space-based targets goes down to the Chinese or whomever, and diversification provides significant enhancement of deterrence as well.

In short, in rethinking the way ahead with regard to military space — notably in a period of financial stringency — getting best value out of your entire warfighting enterprise is highlighted.

Re-organizing the space enterprise within an overall C5ISR approach enabled by a honeycombed fleet of F-35s is a strategic opportunity of the first order.

And this re-enforces an American and allied advantage in facing competitors like China. In countless articles on the People's Liberation Army and its way of war, author after author refer to the brilliance of Sun Tzu and his "Art of War." The point they often make is always be alert to advantages accruing to the side that creates an "asymmetric war" advantage.

The evolving capability described above actually foreshadows U.S. and allied asymmetric robust and redundant strategic technologies. It is the beginning of a new level of deterrence against proliferating 21st century threats.

However, one of the best examples of the American "Art of War" was forcefully stated by William Tecumseh Sherman, a West Point-trained officer who arguably was one of the most visionary and capable generals in history. His words— 150 years ago cautioning the South not to trigger a war still ring true to this day: "You are rushing into war with one of the most powerful, ingeniously mechanical and determined people on Earth — right at your door. You are bound to fail."

This article first appeared in *Space News* on June 25, 2012.