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The United States Strategic Security Policy must present a strong show of force or enemies will test the fortitude of America at every opportunity. Projection of force must be obvious and meaningful; the super aircraft carriers of the US Navy serve just that role and purpose. The current fleet of eleven aircraft carriers is too few to handle adequate projection of power and sustain crew and equipment rest and refitting schedules. Twelve aircraft carriers is the number of ships needed to meet the US policymaker's requirements.

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With respect to key regional areas, crew and equipment rotations, potential enemy threats and security of sea communication lines around the globe, the current quantity of CVN's in the US Navy inventory is too few in number.

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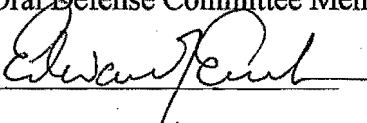
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UNITED STATES MARINE CORPS**

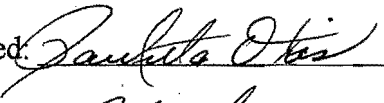
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Executive Summary

Title: CVN's, is Eleven Too Many or Too Few?

Author: Major Robert Thomas, United States Marine Corps

Thesis: With respect to key regional areas, crew and equipment rotations, potential enemy threats and security of sea communication lines around the globe, the current quantity of CVN's in the US Navy inventory is too few in number.

Discussion: The need to globally transport whole aircraft and provide aerial scouting platforms during naval operations after World War I paved the way to the design of the aircraft carrier. The novel concept of ships capable of launching and receiving wooden and canvas dual winged airframes transformed in less than a century into massive capital ships that global freedom of the seas depend on for secure passage of shipping lanes. This research paper will explore the transition of the aircraft carrier from a tactical platform to the strategic use we know today that serves not only the national security policy but maintains the free use of the world sea communication lanes as well. Defense Secretary Gates recently called into question the US defense policy regarding the number, size, and mission of the US Navy's nuclear aircraft carrier (CVN) fleet. This paper seeks to explore Defense Secretary Gates' question by examining the scope and purpose of the carrier fleet of the United States relative to the changing strategic and economic climates within which CVN's exist.

Conclusion: The United States Strategic Security Policy must present a strong show of force or enemies will test the fortitude of America at every opportunity. Projection of force must be obvious and meaningful; the super aircraft carriers of the US Navy serve just that role and purpose. The current fleet of eleven aircraft carriers is too few to handle adequate projection of power and sustain crew and equipment rest and refitting schedules. Twelve aircraft carriers is the number of ships needed to meet the US policymaker's requirements.

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Listening to ulterior motive driven political rhetoric and allowing myself to be lulled into ignorant bliss as to the purpose and importance of the United States super aircraft carrier was my position at the beginning of this research journey. Strangely, I began this research paper with the idea that I was going to find some way to reduce the number of aircraft carriers the US has in its arsenal, maybe even find away to eliminate these massive, enormously expensive machines altogether. With a nearly six and a half billion dollar price tag to produce and stock, it seems easy, almost common sense, to angrily cry out that the aircraft carrier is too expensive and is bringing the US economy down. The interesting research path I followed on the subject of aircraft carriers opened my eyes to just how important these valuable national assets are.

Volume after volume of reading material unfolded a whole new understanding of these magnificent vessels that protect our way of life. I was able to find a slew of websites with critics calling for the end of carriers as a way to save money. Some critics claimed that aircraft carriers were outdated and easily sunk in the modern world of technology. Strong and excited words could sweep the reader into a Hollywood style trance that really has no foundation. As I read through various websites, I found a common theme; no credible research or sources were ever cited. Further research and review of credible sources paved a new view for me on the purpose and importance of aircraft carriers.

Hours and hours of research taught me that aircraft carriers actually serve a vital purpose in our national security as well as in the safe passage of our sea commerce. I began this paper looking for ways to kill the carrier and in the end, in my conclusion; I argue that we need more of them!

Introduction

The need to globally transport whole aircraft and provide aerial scouting platforms during naval operations after World War I paved the way to the design of the aircraft carrier. The novel concept of ships capable of launching and receiving wooden and canvas duel winged airframes transformed in less than a century into massive capital ships that global freedom of the seas depend on for secure passage of shipping lanes. This research paper will explore the transition of the aircraft carrier from a tactical platform to the strategic use we know today that serves not only the national security policy but maintains the free use of the world sea communication lanes as well. Defense Secretary Gates recently called into question the US defense policy regarding the number, size, and mission of the US Navy's nuclear aircraft carrier (CVN) fleet. This paper seeks to explore Defense Secretary Gates' question by examining the scope and purpose of the carrier fleet of the United States relative to the changing strategic and economic climates in which CVN's exist. With respect to key regions of importance, crew and equipment rotation, potential enemy threats and security of sea communication lines around the globe, the current quantity of CVN's in the US Navy inventory is too few in number.

Development into Tactical Importance

Post World War I, the concept of landing an aircraft on a ship and stowing it on board as part of the ships equipment was first tested by the US Navy on October 17, 1922. The *USS Jupiter*, a collier, first commissioned in 1911, was put into dry dock for two years while her super structure was removed and a flight deck was added across the entire length of the hull.¹ The newly redesigned ship had been transformed into the first American aircraft carrier and was fittingly

renamed after the esteemed aviation pioneer Samuel Pierpoint Langley and designed as CV 1 or carrier vessel. The *USS Langley* was 542 feet long and displaced 11,500 tons. (see figure 1).



Figure 1: *USS Langley* off of San Diego, CA, 1928.



Figure 2: Vought VE-7F, 1922.

All aircraft carriers from then on would hold the CV designation until 1961 when the nuclear air craft carriers were commissioned, the designation was then changed to CVN or carrier vessel nuclear. The *USS Langley* held a functioning compliment of fifty five Vought VE-7F's. (see figure 2). Throughout 1923, the *Langley* served as a test platform for the navy and aviation capabilities. In February 1924, the *USS Langley* sailed to Washington D.C. for a demonstration of her ability to launch and receive aircraft in a safe and military efficient manner. The demonstration proved the point that naval aviation was capable and did have far reaching possibilites. Discussions and eventual planning began on the commissioning of new aircraft carriers. The battle cruisers, *Lexington*, and *Saratoga* were the first to be rebuilt as CV's with an operational purpose in mind.

The concept and mission of naval aviation and aircraft carriers by 1928 was aerial scouting, messenger service and whole air frame transportation. The tactical importance and employment of the aircraft carrier was resctricted to the 290 mile combat range of the VE-7's on the flight deck. The US Navy employed various models of the VE-7 armed with a .30 caliber machine gun that fired by timing through the propellers. The machine gun gave the plane a light fighter capability against a lightly defended opponent. The tactical importance of aircraft carriers was still limited.

Naval tacticians observed the increased operational capability and use of the aircraft by the US Army and tested similar operations for naval aviation. Concepts of torpedo equipped low level bombers were tested. High level bombing of naval and land targets were tested by sea based aircraft. Testing proved successful, opening the gate for naval aviation production on a grand and mission specific scale. Increased mission capability of aircraft, required heavy planes which in turn required larger aircraft carriers for landing and take off. The carriers of 1929 weighed 33,000 tons, almost triple what the *Langley* had weighed in at.² Each carrier was stocked with sixty nine total aircraft of three main types, torpedo bombers, high level bombers, and fighters. By 1929, the *USS Saratoga* and *Lexington* were operational in the Pacific Fleet. The heavy aircraft required more space to take off from and the *Saratoga* flight deck was built to handle this requirement at 880 feet, 340 feet longer than the first aircraft carrier of seven years earlier. (see figure 3).

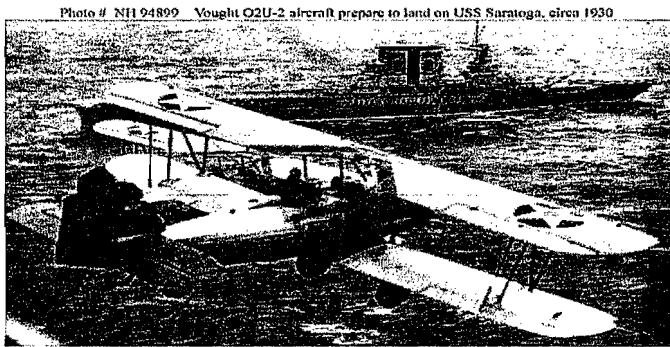


Figure 3: *USS Saratoga* and O2U aircraft, 1930.

A common practice for the navy was to use the carriers as opposing forces during fleet training exercises. On January 26, 1929, the navy embarked on an exercise that centered around the defense of the Panama Canal. The *USS Saratoga* and an escort cruiser were detached from the Pacific Fleet and were directed to sail southward of the Panama Canal before coming up north to an attack position.³ Under the cover of early morning darkness, *Saratoga* launched sixty nine strike aircraft that arrived over the target undetected. The planes were able to complete the

theoretical destruction of two canal locks without any opposition. As a result of the US Navy success in Panama, war plans in both defensive and offensive importance were changed around the world in countries that had naval strength in the sea. The ability of a ship to sail undetected and deliver a massive blow to any country with aircraft looked promising to naval tacticians everywhere.

A typical capital ship of the day in 1929 was the battleship with fourteen inch main guns. The range of a fourteen inch gun on a battleship at fifteen degrees elevation was thirteen miles.⁴ With the exercise in Panama in early 1929, the US Navy demonstrated that naval aviation could extend the offensive arm of the navy from thirteen miles to several hundred miles inland with a devastating effect on the enemy. The effect of the aircraft carrier and the embarked planes on the deck now held operational capability that far outreached its earlier short ranged tactical importance. Operations could be shaped and even decided by the projection of aircraft into the enemy territory that was only a dream a few short years earlier. The aircraft carrier was developing into an important part of navies around the world.

Despite the lasting effects of the Great Depression that crushed economies worldwide in October 1929, the US Government and US Navy dedicated portions of the national defense budget to fund a newly designed aircraft carrier in 1931.⁵ The *USS Ranger*, CV 4, was the first US ship to be designed and built as an aircraft carrier. (see figure 4). The previous three CV's were converted ships of various types. The dedication to design and funding showed proof the US war planners understood the importance and potential for the aircraft carrier.

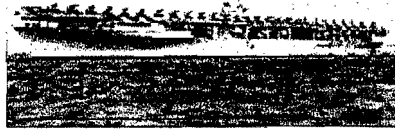


Figure 4: *USS Ranger*, 1933.

Tactical to Operational Transformation

The US Navy was not alone in developing the roles and missions of the aircraft carrier. Japan followed the US developments in ship and plane capabilities very closely. Working through their own sea trails and fleet exercises, the Japanese Navy centered their fleet protection and power projection from the aircraft carrier. From 1920 until 1940, the Japanese focused their fleet on the defeat of the United States Navy. The Japanese believed that the Americans would steam their fleet in force to the defense of the Phillipines and the two navies would meet up in the Marshall Islands.⁶ The Japanese strategy was to use air power to injure and disrupt the American fleet, then use their battle fleet of battleships, cruisers, destroyers and submarines to sink what was left of the American fleet. In May 1940, the US moved the Pacific Fleet from San Diego to Hawaii. This changed the focus of the Japanese from the Marshall Islands to Pearl Harbor. The Japanese strategy changed from open sea battle to catching the American Fleet in the harbor, denying the ability to maneuver and evade attack.

By December 1941, the US Navy had three active carriers in the Pacific Fleet.⁷ The Japanese had six fleet aircraft carriers which were the center piece of their navy. On 7 December 1941, the Japanese tested the aircraft carrier in combat. The Japanese sailed their battle fleet to Hawaii and attacked the US Navy at port, just as they had planned. Unlike previous naval battles of history, no Japanese ships sailed within sight of the American fleet. The Japanese used six aircraft carriers; (*Akagi, Kaga, Soryu, Hiryu, Shokaku, and Zuikaku*) to carry out a massive air

armada to assault the moored American ships. By coincidence, the three American aircraft carriers were on mission out of port during the attack.

At 0600, on 7 December 1941, Japanese aircraft carriers launched their first wave of aircraft consisting of Val dive bombers, (see figure 5), Kate horizontal bombers, Kate torpedo bombers, (see figure 6), and Zero fighters, (see figure 7), against the American fleet anchored in Pearl Harbor.⁸

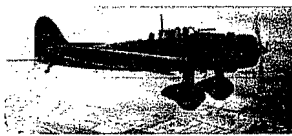


Fig 5



Fig 6

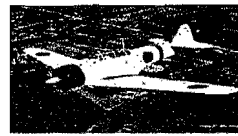


Fig 7

1941 Japanese Val dive bomber . 1941 Japanese Kate bomber. 1941 Japanese Zero fighter.

At 0700, on the same day, the second wave of aircraft launched off the Japanese carrier decks.⁹ Within one hour, the Japanese had launched three hundred fifty bombers and fighters against the American fleet with little to no detection. The Japanese aircraft offensive effort netted the following American casualties: five battleships sunk, two destroyers and two support ships sunk, nine other American warships seriously damaged, two hundred and nineteen American aircraft destroyed and 2,403 American lives lost.¹⁰ The United States Pacific Fleet had been dealt a serious military blow without ever seeing an enemy surface warship. Japanese war planners had demonstrated the versatility of the aircraft carrier to range from tactical scouting and defense to operational level importance by designing a theater level campaign based on their strength.

The Japanese use of aircraft carriers in the offense was masterful. The United States was reeling from the results of the Japanese attack, however, they still had their carrier fleet intact. The US needed an immediate retaliation against Japan and turned to the aircraft carrier to do so.

On 18 April 1942, the US Army Air Corp loaded sixteen B-25 Mitchell, land based medium bombers onboard the *USS Hornet* (CV-8) and bombed Tokyo.¹¹ (see figure 8 and 9).

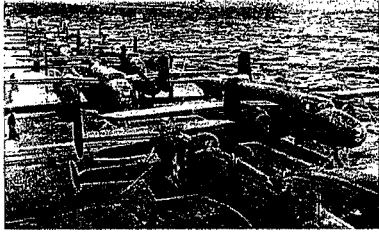


Fig 8. B-25's on the *USS Hornet*.

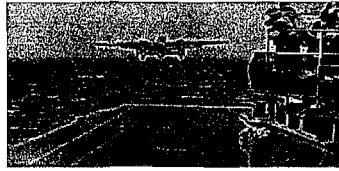


Fig 9. B-25 taking off to Tokyo 1942.

The action of bombing Tokyo with land based planes showed the diversity of the aircraft carrier and it empowered the US war planners to think of the carrier in non-traditional capacities. The raid itself raised morale for the Americans and raised the concern of the Japanese about their exposed Eastern flank. Japan began immediate plans to defend their Eastern flank by extending the defense shield around Japan all the way to Midway Island.

US intelligence gathering stations uncoded Japanese message traffic that signaled Japan's intent to invade Midway and draw the remainder of the US Navy into a final trap.¹² Japanese strategy was to form three naval task forces, one centered around aircraft carriers, one around battleships and the third around transports. The carriers strike group was to hit Midway and draw out the US Navy carriers from Pearl Harbor. The battleship strike group, combined with the carrier strike group aircraft were to hit the US Navy and sink it while the transports landed at Midway. The plan most likely would have worked considering the experience of the carrier strike group from Pearl Harbor six months earlier, however, US intelligence reports allowed the to US pre-stage their carrier fleet North of Midway. Again, the US strategy against the Japanese threat was centered around the aircraft carrier. The US only had three fleet aircraft carriers in the Pacific in

June 1942; the *Yorktown*, *Hornet*, and the *Enterprise* which together carried 234 aircraft. The Japanese carrier strike force was centered around four Pearl Harbor veteran aircraft carriers; *Akagi*, *Kaga*, *Soryu*, and *Hiryu*, together they carried 229 aircraft.¹³

The size and aircraft load of the carrier strike groups is important to note at this stage because the world had not seen a full scale, carrier on carrier centric battle yet. The aircraft carrier was still being defined as to how it was to be used in offensive and defensive efforts. The Battle of Midway went on for two days from 4-5 June 1942. Massive sorties were launched one after the other from both countries' aircraft carriers in an epic sea battle. In the end, the Japanese sank one US aircraft carrier, the *USS Yorktown*. In turn, US pilots sank four Japanese aircraft carriers and several escort ships of the fleet. The defeat of Japanese naval forces in Midway was the turning point of the war in the Pacific. At the center of this victory for the US were the aircraft carriers and their lethal capabilities. Japan's loss of four aircraft carriers and many experienced pilots prevented Japan from launching any further offenses. Japan during Pearl Harbor and the US during Midway had planned and executed a theater level campaign plan with the aircraft carrier as the main effort. The aircraft carrier in the Pacific in 1942 was the operational mainstay of naval dominance and serious projection of theater level offensive force.

Operational to Strategic Transformation

From the period of December 1941 until August 1945, US naval shipbuilders built twenty-three fleet aircraft carriers. Although dozens of escort and smaller aircraft carriers were also built during this timeframe, the US Navy focused the fleet around the large deck aircraft carriers with smaller deck carriers in support roles. By the end of World War II, the US Navy had eighteen fleet carriers that served to project the main effort of Pacific campaigns. With the passing of eras

and the defeat of Axis Powers, US policy makers chose to maintain the status of super power after World War II, projecting power and democracy around the world.

Many nations around the globe after 1945 were in a state of rebuilding and lacked the resources or motivation to project power to influence global interests and national security. The US industrial and technological growth through the 1940's put the US on the forefront of world leadership, however, not all countries agreed with this fact. The rise of communism in China and the Soviet Union caused the US enough alarm to continue advancing defense technology and weaponry.¹⁴ The Atomic Age was at hand; however, the ability to show strength and project immediate power without atomic war required strong conventional means. The aircraft carrier had demonstrated excellent operational value during World War II. Nations and people around the globe came to recognize the importance of the aircraft carrier. By earned reputation and demonstrated capability, the aircraft carrier became the symbol of American sea going strength and freedom while sailing around the globe. Naval projection of power and influence were achieved by the US Government through the active world wide deployment of aircraft carriers, demonstrating their strategic importance.¹⁵

Conventional to Nuclear Powered Carriers

The US military needed a more efficient way to propel the massive aircraft carriers. Researchers developed a safe and efficient way to use eight small nuclear powered reactors that could power four turbines to propel the heavy aircraft carrier. In 1961, the first nuclear powered aircraft carrier was commissioned, the *USS Enterprise (CVN-65)*.¹⁶ (See figure 10).



Fig.10. *SS Enterprise CVN 65.*

The *Enterprise* was named after its predecessor, CV-6, the sixth conventional carrier made by the US. The designation change from CV to CVN in the sequence title is for the nuclear powered capability. The sixty-fifth aircraft carrier produced by the United States was the first nuclear powered aircraft carrier in the world. The new CVN was 1,100 feet long and weighed 89,000 tons, compared to the first CV-1 that was 542 feet long and weighed a mere 11,500 tons. The conventionally fueled, *USS Independence (CV-62)*, consumed 150,000 gallons of fuel a day with a movement rate of twenty five knots. Every fourth day, the *Independence*, would be resupplied with one million gallons of fuel during the Vietnam conflict.¹⁷ In comparison, the *Enterprise* required new core rods, used in the nuclear reactors, every 300,000 steam miles. Carriers once required frequent stopping to refuel every few days but could now last three to four years between refueling.¹⁸

Fourteen years after the *Enterprise* was commissioned, technology advances and defense requirements allowed for a new improved class of nuclear powered aircraft carrier, the *Nimitz Class* super aircraft carrier. *Nimitz Class* carriers are powered by only two nuclear reactors, reducing core rod requirements for refueling. *Nimitz* carriers weigh nearly 100,000 tons and carry the latest technological advances in electronics and weaponry.¹⁹ Up to ninety modern war planes can be stationed on the *Nimitz Class* carrier with the ability launch up to 200 sorties a day in surge operations. Six thousand sailors are stationed on the super carrier including ship's crew and flight crews. *Nimitz* super carriers were designed with humanitarian and disaster relief missions in mind, as well as combat missions. Water purification, power production, hospital

services, and rotary wing transport are some of the non-combat capabilities super carriers have. In addition to the *Enterprise*, the US currently has ten *Nimitz Class* carriers in the fleet.¹

Nuclear Aircraft Carriers Enabling Capabilities

CVN's today earned their combat edge from countless lessons of previous sea battles. During the early stages of World War II, the Japanese were able to strike and destroy any enemy at any time because they had the full ability to project overwhelming power. Their projection ability was centered on a well trained, technologically advanced aircraft carrier fleet. In turn, the US was able to defeat the Japanese by first limiting their ability to project power. The limiting ability of the US against the Japanese Navy was accomplished using a naval force centered on aircraft carriers. The strategy of the US and Japanese policymakers of forcing countries to bend to their will was effectively pursued by using carrier fleets to project the necessary force to effect their strategy. From the epic sea battles of World War II, the world over has learned from history that aircraft carriers, and now super aircraft carriers can deliver devastating and consistent attacks.

Modern land warfare and use of military efforts are accomplished using combined arms and maneuver warfare tactics. Ground forces are most effective when they are supported with indirect fire and solid air cover. Large indirect fire weapons consume large amounts of space in equipment and supporting logistics. Air support requires land bases with vast quantities of infrastructure and supporting logistics. The United States is a maritime country that has two

¹ (1) *Nimitz* CVN-68, (2) *Eisenhower* CVN-69, (3) *Carl Vinson* CVN-70, (4) *Theodore Roosevelt* CVN-71, (5) *Abraham Lincoln* CVN-72, (6) *George Washington* CVN-73, (7) *John C. Stennis* CVN-74, (8) *Harry S. Truman* CVN-75, (9) *Ronald Reagan* CVN-76, (10) *George H.W. Bush* CVN-77.

major oceans as borders. In order for the US to affect foreign policy and defend allies and coalition partners, it must have forward operating bases for land, sea and air forces. The number of countries willing to open their borders and give valuable land to the US for military bases are far and few in numbers.²⁰ Conflicts around the globe in the last sixty years almost never began anywhere near where the US had forces forward based. The use of maneuver warfare with combined arms tactics requires forces that can get a foot hold onto the combatant country and allow force build up by the US. During the beginning of the Korean, Vietnam, Desert Storm, and Global War on Terror conflicts, it was the US Navy with the carrier strike groups that responded with immediate air power with little to no warning.

Countries across the globe sign coalition agreements with the US in an effort to combat same enemies, however, political and religious ideals often prevent the actual use of sovereign land of these partners by US forces. For example, in 2001 Turkey had a bilateral support agreement with the US against Iraq; however, US forces were forbidden to use Turkey facilities early on in the Iraq campaign due to religious and political ties concerning Israel.²¹ Initially, the US relied very heavily on carrier base air support until full scale US Air Force operations could be established in Kuwait. Another recent example of sea based air support is the initial combat effort by US force in the Afghanistan Theater. In 2001, the US used four carrier battle groups to provide constant air support to the ground troops 400 miles inland.²² The carriers were able to provide over 300 sorties a day of combat air assault and support, all without establishing a land airbase.

To ensure strong projection of US strength and policy, the US maintains key areas around the globe stationed with a full mission capable carrier strike group. Carrier strike groups are deployed to the Arabian Sea, Mediterranean Sea and West Pacific on regular rotations that allow

for very little delay in their presence anywhere in the region when directed by the President of the United States.²³ With history in mind, the mere physical presence of a super aircraft carrier is an effective deterrent to most aggressors. The psychological effect that a super carrier has on a potential enemy gives US policymakers a unique crisis management and deterrent tool.²⁴ A 100,000 ton ship traveling over thirty knots with up to ninety multi-purpose warplanes on standby on the flight deck is a lethal force to reckon with. In addition to the one carrier strike group an adversary may see on their horizon, most countries understand that one battle group can very quickly become multiple battle groups in a very short period of time. For example, during the early stages of the coalition efforts in the Afghanistan conflict, the US combined four carrier battle groups to conduct operations against the Taliban.

Strength at a Price

The US ability to project power comes at a heavy cost. On average, it costs around \$220 million a year to operate one single super aircraft carrier in a non-combat role.²⁵ The operating cost is in addition to the \$4.5 billion price tag to produce one carrier, without crew or the ninety planes that will be stationed onboard.²⁶ Each plane, depending on type may cost upwards of \$78 million each. The high cost of building and maintaining the super carrier is valued on the thought of how devastating would it be to not having strength projected forward by the US. If there was no immediate threat of any world retaliation for actions, enemy states would act without hesitation to close sea communication lanes or worse, invade neighboring rivals at will. For example, the cost of building up forces without immediate air cover during Operation Desert Shield could have allowed Saddam Hussein and his forces the ability to crush the forming coalition forces and easily invade Saudi Arabia. Without forward bases in that region of the world, the US relied exclusively on air power projected from the sea at the time.

Throughout modern history, the US has required immediate air power without the luxury of building up land air components. Korea, Vietnam, Desert Shield, Afghanistan, and Iraq all required immediate air support. The standing and ever ready US Navy responded to the need for air power immediately with carrier strike groups. It takes upwards of three years to build one super carrier. If the US was to wait for a crisis before starting to build a carrier, the enemy would have a three year head start on hostilities. In addition to needing a floating, experienced navy, the shipbuilders need to keep their specialized nuclear building capabilities honed. The US has maintained a constant state of building carriers since the nuclear carrier first sailed in 1961. Shipbuilders of the type it takes to make a nuclear carrier are not trained quickly. To be effective in world dominance, the US must maintain its ability to build as well as sail the ships needed for projection of respected power.

Congress has reviewed the carrier program throughout the different political administrations that have led the United States. During times of conflict, the carrier is immediately justified even though it requires such a large price tag. In years when the US is at peace throughout the world, study groups and special sessions of congress have convened to review if the carrier program is needed or can be diminished in anyway.²⁷ In 1946, the US had eighteen carriers at sea, in 2011; the US has eleven super aircraft carriers. Study groups and congress agree time and time again, that the super carrier fleet is very expensive, but very necessary.²⁸ President Clinton in 1993 restated a common question that all modern Presidents of the United States have asked as a crisis materializes, "When word of a crisis breaks out in Washington, it's no accident that the first question that comes to everyone's lips is: 'Where is the nearest carrier?'"²⁹

Carrier Force Rotation

There are three general oceanic regions of the world where US influence and policy is vital to stability and sea commerce; the Mediterranean Sea, Indian Ocean and the South Pacific Ocean.³⁰ In the Mediterranean Sea, the Strait of Gibraltar and the Suez Canal are key choke points of sea travel and potential hot spots for adversary blockades. On 18 February 2011, Iran sailed two warships to the Southern end of the Suez Canal. Egypt controls the shipping in the Suez Canal and authorized the Iranian warships to travel the canal, however, the United Nations asked for a delay of the travel until 23 February 2011 in order to allow the US super aircraft carrier, *USS Enterprise* and her six US warship escorts to safely transit the Suez Canal from North to South. The show of force and presence of a US aircraft carrier projects immediate capable military influence to any seaborne threat that can potentially block transit of the vital trade route through the canal. A blockade of the Suez would stop all sea traffic from the Indian Ocean to the Mediterranean Sea. In the Indian Ocean and the South Pacific, the direct presence of an American battle group centered on a super aircraft carrier provides military strength to back US policy and influence in the area.

What does it mean to have power projection on a constant basis? Ships and material cannot function alone and certainly cannot function indefinitely. Man power operates the ships and planes of the carrier strike group. Personnel must have rest time in order to stay mentally in condition for optimum operating levels, in addition to needing time to tend to families and personal business. Six thousand sailors man the super carrier, and studies show six months is ideal length of time to deploy those sailors without degrading mental conditions.³¹ Adequate shore rest time and refitting of a carrier is eighteen months. Ideal rotations of aircraft carriers are six months at sea and eighteen months in port at home. Combat and major maintenance requirements often foul the ideal rotation schedule. One ship on duty station at sea, allows the

previous ship to return home for eighteen months of rest and refit. A third ship in the cycle allows for transit and work ups for deployment. The complete cycle has one ship on post, one coming off post and one preparing to take post in each of the three regions.³²

Rotation of ships in even cycles works without refueling and major maintenance cycles. A super carrier can take up to eighteen months to refuel and install upgrades and handle major maintenance or overhaul concerns. Each region cycle rotation would need one more carrier to rotate with in order to handle the maintenance down time. Three regions would require a total of twelve carriers to sufficiently handle equipment and personnel rotation timelines with one ship in each region in major overhaul. The math works out smartly on paper and does not consider combat, multiple ship requirements or non-scheduled maintenance concerns. The costly projection of power with the purpose of maintaining world stability is a fragile balancing act.

More carriers would allow great flexibility in strategic policy and greater ease in equipment and personnel care. A larger fleet costs more money and brings to bear a greater burden from congress and the American people. The balance of effectiveness is finely defined as what is absolutely necessary and what becomes excess or worse, not enough assets. The model number of twelve super carriers gives the US maximum flexibility in policy enforcement and projection of strength. Navy analysts advertise that a twelve carrier fleet allows the US to deploy two carriers to a crisis scene within two weeks and could increase the carrier numbers to nine within ninety days for a major crisis.³³ The worst case deployment scenario for a twelve carrier fleet makes assumptions about ship maintenance status and location of incident are within reason. A similar deployment model is assumed with a ten carrier fleet with much degraded response times for the carriers. A ten carrier fleet would require three to four weeks to deploy two carriers to a crisis and ninety days to deploy a total of seven carriers. The ten carrier model makes

assumptions of increased maintenance times and greater deployed distances due to lack of fleet carrier numbers.

Enemy Threats to Carriers

Adversaries of the expensive aircraft carrier ignorantly cite the weaknesses of the carrier as a warrant for their demise. From the first carrier to newest one in service today, the lessons of battles past have been applied to effectively improve the defenses of the super aircraft carrier. In 1942, the Battle of Midway demonstrated the weakness of the aircraft carrier. At the time, the only real defense the aircraft carrier had was the fighter planes stationed on the flight deck. Arrays of heavy machine gun banks were placed along the hull, just under the flight deck. These machine guns could deliver high rates of fire; however, they had restricted firing paths around the flight deck. This left a large bank of uncovered flight space for incoming aircraft to exploit. US and Japanese naval strategy employed aircraft carriers with protecting destroyers and cruisers to shield carriers from incoming aircraft. American and Japanese planners employed more aircraft against the carrier battle group, than the protecting ships could handle.

Waves of aircraft that numbered in the several hundred, would allow enough attacking planes to get through the defenses and deliver bombs and torpedoes against the carriers. During the early morning hours of 4 June 1942, the US sent several waves of torpedo and high level bombers to attack the Japanese carrier fleet. The waves arrived in such numbers that the Japanese anti-aircraft fire and protecting fighter planes were able to destroy or fend off the Americans before any damage could be done to the ships. Between 0930 and 1030 of the same day, the Americans changed tactics having learned their lesson from the earlier unsuccessful air assault. The new tactic employed was one of overwhelming numbers of attacking planes from

different angles. The Americans employed fighters and bombers off of one American carrier to attack the Japanese fleet from one side. The Americans launched all the planes off of the two remaining aircraft carriers to attack the Japanese fleet from high altitude and opposing side as the first wave. The plan worked beautifully. The first wave drew all the fighters and ship fire, fully exposing the overhead sky for high level bombers and torpedo planes to attack from the opposing side of the sea.³⁴ The Japanese could not counter the multi-sided and overwhelming force. At the time, the tactic of attrition warfare with aircraft was highly effective against the carriers. Upon conclusion of Midway, the Japanese had four less aircraft carriers. The Americans learned how to effectively employ naval air power against ships and more importantly learned how to better defend a carrier fleet.

Japanese submarines played major roles in sinking four US aircraft carriers; the *Lexington*, *Yorktown*, *Wasp*, and *Hornet*. Both American and Japanese naval forces improved defensive tactics by using submarines as screening defense against underwater threats to the carrier fleet. Submarines were employed in a 360 degree circle around the deployed carrier group. The idea was that submarines acted as a defense shield, increasing the interception rate of any enemy submarines attempting to enter the circle. To this day, US carrier battle groups include an undisclosed number of submarines that serve to intercept underwater threats. Torpedoes are a major threat to be acknowledged in the defense of ships.

An unprotected carrier could take a tremendous amount of ordinance before sinking. The sheer length of the aircraft carrier allowed the installation of multiple water tight shut off compartments throughout the length of the ship. The compartments were sealed off in an effort to combat sinking once a bomb or torpedo opened the hull in that section. The Japanese carrier, *Zuikaku*, took six torpedo hits and seven bombs before it sunk.³⁵ Being able to take severe

punishment is not a valid defense, but worthy to note that multiple attacks were needed to sink a carrier. Even in modern defenses, the Soviets researched for many years on a weapon that could destroy a navy ship the size of a super carrier. Other than a nuclear warhead, no singular weapon design could be mastered that proved effective with one shot against a carrier.³⁶ The Soviets eventually gave up on their anti-carrier weapon due to cost effectiveness.

Nimitz Class super carriers have been built with defense in mind based on historical events of previous carrier defeats. Anti-air missile and gun batteries are installed around the hull of the ship with the capability of engaging and defeating multiple aircraft from all sides of the ship simultaneously. Anti-ship missiles are a threat to a carrier if delivered in high numbers. To combat missile threats, the *Nimitz* carriers have specialized high volume, computer tracked machine guns and anti-missile-missiles systems that are specifically designed to bring down anti-ship missiles.³⁷ In an effort to further combat air threats, the super carrier has a sophisticated array of radar and satellite linked systems that track all threats to the ship by movement, heat, and electronic signal. These weapons systems onboard the carrier work as part of a system that are bolstered and reinforced by other surface ships in the carrier group. Cruisers, destroyers and submarines work together with the carrier to provide a tight net of warning and defense of the fleet. In addition to the integrated electronic warning and weapons systems, the super carrier also has have up to ninety state of the art warplanes at its disposal that carry a full array of weapon systems themselves that serve to defend the fleet as well as project offensive power.

Enemy threats against the super carrier are closely monitored and analyzed for progression in an effort to stay one step ahead of potential threats. The Chinese developed the Silk Missile, an anti-ship missile that can sink a smaller vessel with one burst. Many of the defenses used in the modern carrier battle group were designed and employed with this missile in mind to identify it

and destroy it. Within the last year, the Chinese have worked to produce a missile that can defeat the defenses currently employed by the US Navy. The Dong Feng 21D is being tested now to defeat all current defenses used by carrier battle groups. (see figure 11).

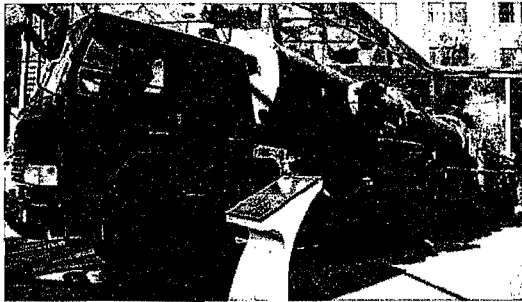


Fig. 11. Chinese Anti-ship Dong Feng 21A, similar to D version.

The Chinese are aware of the US Navy countermeasures for anti-ship missile defense. Their researchers set about developing a missile that can fly two to three times the speed of sound and travels only ten meters off the surface of the water. Speed and low altitude make tracking much more difficult. Additionally, the Dong Feng is designed to fly with erratic flight patterns, and at times able to cut almost ninety degree turns, defeating the computer machine gun defenses that are designed to shoot and track straight path weapons.³⁸ The Dong Feng has a range of up to 2000 meters which means it can hit a ship in less than twelve minutes after takeoff at full range. Chinese efforts are admirable because if they are able to succeed in this technology, it could radically change the use of naval force within range of these warheads. At present, the testing phase is facing great difficulties in tracking and maintaining target lock on a US ship with current technology and jamming efforts used by the US. For now, US technology and equipment surpass the enemy threat capabilities, making the super carrier a major force to be reckoned with. Enemy focus on weapon development to defeat the carrier shows the amount of respect the world has for the 100,000 ton warships that are projecting the power of the United States on the sea. Enemy focus is closely monitored for countermeasures and proof of policy effectiveness.

Conclusion

The aircraft carrier started off as a novel idea after World War I. During the epic sea battles of World War II in the Pacific, the aircraft carrier proved its worth in tactical and operational dominance. Following the years after World War II, the aircraft carrier became the strategic physical projection of strength of the United States. Technology and modern advances in science allowed the aircraft carrier to progress into a nuclear powered vessel, capable of going years between refueling. During the early stages of Korea, Vietnam, Desert Shield, Afghanistan, and Iraq conflicts, the aircraft carrier provided vital air power that allowed the US to gain a foothold on land to gain the offensive initiative.

Key choke points of sea communication lines stay open for free travel of commerce due in large part to the protection and threat of retaliation from the US through supreme naval power centered on super aircraft carriers. Continuous projection of power and the ability to respond rapidly to crisis requires US strategy to keep several aircraft carrier strike groups at sea at the same time, deployed to hot spots. Crew rest and maintenance requirements must be adhered to in order to keep the carriers functioning at optimum levels.

The current carrier fleet has eleven nuclear carriers in it. Naval analysts highly recommend the fleet be increased to twelve total carriers in order to provide the most efficient and flexible projection of force for the United States. Defense budget reviews and requests by the US Defense Secretary to cut spending in the defense of the United States make the expensive aircraft carrier a lucrative target. History has shown time and time again, that a standing and ready force is the only way to quickly seize and maintain the initiative in any crisis. The aircraft carrier

provides the multi-faceted platform the US has used in every major military engagement since World War II and continues to require around the globe. The US nuclear super aircraft carrier current fleet of eleven hulls is too low and should be increased to twelve hulls in an effort to fulfill strategic demands and meet maintenance requirements.

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