

NOT FOR PUBLICATION UNTIL
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SUBCOMMITTEE ON SEAPOWER AND PROJECTION FORCES

STATEMENT OF
CAPTAIN ROBERT C. RUBEL, USN (RET)
PROFESSOR EMERITUS, U.S. NAVAL WAR COLLEGE
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Mr. Chairman and distinguished members of the Seapower and Projection Forces Subcommittee of the House Armed Services Committee. It is a distinct honor and privilege to be called to testify as a witness on the future of naval aviation just as it was to be a practicing naval aviator for the first twenty years of my 48 year Navy career, 30 of which were active duty. Throughout that career, including 20 as a professor at the Naval War College, I devoted considerable time reflecting on my experiences and thinking and writing about various naval strategic and operational issues, naval aviation being a frequent subject. My overriding concern has been to help naval aviation be ready for what’s next. In my view, it is not.

My outlook on the nexus of naval aviation and maritime strategy was formed early; in fact during my first assignment after graduation from flight training. Reporting to Attack Squadron 66 in late October of 1973 while it was deployed aboard USS Independence. Independence was then operating in the Eastern Mediterranean during the US/Soviet crisis associated with the Yom Kippur War. I quickly discerned that the Navy had neither the weapons nor the doctrine to effectively counter the anti-ship missile-armed Soviet Fifth Eskadra.¹ The best we could do at the time was to “birdog” Soviet ships – orbit overhead of their formations waiting for smoke to appear on deck indicating a missile launch. We started working on anti-ship tactics after that cruise, but we were limited by only having freefall bombs. In my view at the time, even with optimally executed tactics, we would likely lose 2-4 aircraft per single ship attack. The air wing could be effectively put out of commission attacking a six ship formation. It took four years to get Harpoon to the fleet, which gave us at least a fighting chance against well-armed surface combatants.

More broadly, I was concerned about the vulnerability of the aircraft carrier in the relatively constrained waters of the Eastern Mediterranean. During the ’73 crisis air wing strike planners discussed having Independence run west through the Straits of Sicily to get untargeted and perhaps unlocated, such that if hostilities broke out, we would be able to fight an “approach battle” in which we at least

control could some of the geometry as we rolled back Soviet forces. Of course, had we done that, the Soviets could have gone before the UN General Assembly and called for a resolution for naval forces to remain in place, or perhaps issue a demarche to the US to keep its ships west of the Straits. This would have effectively isolated Israel. Even as a junior officer I saw the strategic weakness in relying on aircraft carriers to serve as crisis chess pieces in constrained waters in the face of a well-armed adversary.

The 1973 situation illustrates a danger I subsequently observed coming into play in various war games I conducted over the years. Frequently, neither military officers nor civilian leaders are able to perceive the incipient strategic effects of tactical actions; they “can’t see it coming.” When carriers are dispatched to demonstrate national will and deter aggression during crises, the President is going “all in” in terms of the strategic investment being made in the crisis.² This sets up a potential dilemma as seen in 1973; leaving the carrier in a tactically vulnerable situation risks the loss of not only a scarce and valuable strategic asset, but also would ruin the fearsome reputation of the ship. But maneuvering to reduce tactical risk would also produce strategic harm; reducing deterrence by raising doubts about national will, or perhaps actually catalyzing hostilities by convincing the adversary that such moves are a prelude to a preemptive attack.³

This situation has not changed, although the Navy has been slow and reluctant to recognize the problem. In my various capacities at the Naval War College I worked to convince the Navy of the problem and devise solutions. Among other actions, I wrote articles, established advanced research groups, designed and directed wargames and led the research effort that produced the logic upon which the 2007 A Cooperative Strategy for 21st Century Seapower was based. Some of this work bore fruit, most directly in the relationships developed between the forward fleets and the NWC advanced research groups. Based on these relationships, forward fleet staffs have developed better sets of tactics for the use of the carriers. However, these are basically bandages for a bigger problem; the inappropriate use of carriers as presence platforms.

Today, although I am retired, I remain committed to convincing the Navy to recognize and address the problem of proper aircraft carrier use. This has become even more compelling in the current budget environment. Having been reduced to 11 aircraft carriers, only ten active and currently only five of those available for service, the Navy finds itself unable to provide forces for the forward Combatant

Commanders as it has in the past. A recent Hudson Institute paper asserted that in order to fulfill all strategic demands, 16 carriers would be needed. The paper also wisely added that such a number was likely unaffordable.⁴ The combination of evolving anti-carrier forces and fiscal constraints means that the Navy cannot continue to do business as it has since the end of World War II.

Recently there has occurred within naval circles a dialogue, if not controversy, over the aircraft carrier. Some have called for the retiring of carriers due to their presumed vulnerability. Others, including the leadership of naval aviation have stoutly defended them. In my view, the issue is not whether or not to have aircraft carriers, but rather how to use them. Once the Navy adopts a more strategically sensible way to employ them, in peace as well as war, the number actually needed will become clearer. I want to emphasize at this point that the doctrine for aircraft carrier use and the design of the air wings that populate their decks are interdependent, although in theory, doctrine should dictate design.

My view on aircraft carriers and their air wings is based on the judgment that because of the dual problems of vulnerability and limited numbers, aircraft carriers should not be used for routine day-to-day forward presence and close-in crisis maneuver. An array of missile-armed surface combatants and submarines, along with various joint forces should constitute what I will call the Deterrence, Disruption and Crisis (DDC) Forces based on the concept of “distributed lethality” currently being developed by the Surface Force, Pacific Fleet.⁵ Each forward fleet would have such forces at their constant disposal. The carriers would be preserved for surge, cruising and experimentation. Relieved of station keeping, a whole new approach to designing and using embarked naval aviation would become possible.

Although the USN used multi-carrier task forces during World War II, after the war the normal posture was to operate them singly, perhaps bringing two or three together during crisis or war. This being the case, individual air wings were forced to multi-task, performing both sea control and power projection functions as well as others such as fleet defense. Multi-tasking has always been a dangerous business in carrier warfare. The classic example is the Battle of Midway in which Admiral Nagumo suffered the loss of his four carriers by getting caught trying to rearm his aircraft for ship attack right after conducting attacks against Midway Island. This has been ascribed to hesitation by Nagumo, however, a penetrating analysis by Jonathan Parshall and Anthony Tully reveals a more profound error by Admiral Yamamoto; putting an insufficient force in a position in which it might

have to multi-task. Had the *Kido Butai* been filled out with six instead of four carriers, there would have been sufficient aircraft to conduct multi-tasking at the air fleet level.⁶ This analysis is relevant to current considerations of aircraft carrier use doctrine and air wing design.

I hasten to acknowledge that in Desert Storm the Navy had six carriers participating, between those in the Red Sea and those in the Persian Gulf. However, that was a benign environment from a force protection perspective, and the carriers simply functioned as airfields at sea, feeding sorties into the Air Force managed Air Tasking Order. Facing an opposed environment at sea is an entirely different proposition. The Navy now acknowledges it will be facing, potentially, such an environment in East Asia, the Persian Gulf and even the Eastern Mediterranean. What it has not fully come to terms with is how to use the carriers effectively in these situations.

If the carriers are relieved of station keeping (always acknowledging they may be frequently needed for actual strike operations such as against ISIS), the possibility of creating a multi-carrier task force arises. Having over 200 US Navy aircraft available in a single force significantly changes the equation for potential adversaries. However, establishing such a force is not a function of simply aggregating current air wings. The Navy must develop an understanding of what naval combat would look like if the forward (DDC) force was an array of surface and subsurface combatants operating in the closer littoral and the combat was intensely missile-centric. In my view, a useful way to proceed is to have a set of customized air wings, each of which has a particular strength. In such a “naval air fleet” there might be four kinds of wings:

- **Level of effort wings.** These would be primarily composed of F-18s. They would conduct the kind of high sortie rate ground support and interdiction operations that we have carried out in Afghanistan and Iraq. Essentially these mirror the current type of air wing. However, the Navy should also develop a low cost “Counter-insurgency” aircraft so that strike fighter airframe life is not wasted on less demanding missions.
- **Battlespace Superiority Wings.** These would be composed mostly of F-35Cs and several types of unmanned aircraft (UCAS) along with the necessary support aircraft. Their function would be to roll back enemy anti-access/area denial forces as well as conduct sea control.

- **Littoral Support Wings.** These wings would support the DDC forces by providing a number of services, including high altitude, long endurance line of sight communications relay to reconstitute the battle force network. The wing might also perform reconnaissance and targeting, electronic warfare, operational deception and other functions. They would consist of high aspect ratio UCAS, some F-35s and other types of aircraft not yet designed.
- **Sea Base Wings.** In the event of crisis or war, one or more carriers ought to be configured with especially robust maintenance and repair facilities and carry replacement aircraft that would be readily available to make up combat losses in other wings.

These are notional ideas, meant mostly to indicate the possibilities if aircraft carriers were freed up from having to conduct individual station keeping. A multi-carrier task force with several types of wings would be designed from the outset to conduct multi-tasking effectively.

Another benefit of removing the carriers from presence duty is their availability for fleet experimentation – which would be needed to work out multi-carrier and specialized air wing doctrine. I witnessed the failure of the Navy’s Fleet Battle Experiment Program in the late 1990s and early 2000s. Among the key problems was the need to superimpose the experiments on forces that were in training for deployment. This led to any number of shortcuts and compromises, including the need to pack multiple component experiments into one exercise and the inability to reset and try again, that ultimately led to the demise of the program. The legendary success of the fleet battle experiments in the 1920s and 1930s was predicated on having the battle fleet available for exclusive focus on the exercises. Despite all the lip service that has been paid to innovation and concept development over the past twenty years, the Navy has not been able to free up significant forces for experimentation duty. Removing the carriers from station keeping would significantly boost experimentation. In order to achieve a naval version of “the third offset,”⁷ extensive hands on work involving human/machine collaboration is a must. A force of ready but unengaged carriers offers a laboratory of unequalled value.

In this new type of naval air force structure, a small carrier might have a role. We currently have ten (9 active, 1 under construction) of these in the form of the large deck amphibious ships. The F-35B as well as the V-22 will transform the capabilities of these ships such that they could function effectively as force

multipliers for the CVNs. Of course, strenuous objections from the Marine Corps can be expected to any initiative to use them in this way. However, under the air fleet concept, it is not hard to envision the overriding utility of such use.

Let me say at this juncture that I am convinced of the value of a large, nuclear powered aircraft carrier. What is not generally appreciated by most folks is that a carrier is “fought” on its flight deck and hangar deck. The ability to move aircraft around flexibly as well as the ability to generate maximum sorties with four catapults is at the heart of a carrier’s capability. It does not just happen. The design of the flight deck, including the elevator configuration is critical. As the size of a carrier deck is reduced, aircraft carrying capacity and critically, ability to move aircraft around and thereby generate sorties is reduced. The overall capability of a carrier design as it becomes smaller does not degrade in a linear manner. A carrier half the size of a Nimitz Class would have less than half the sortie generation capability, but would likely cost over half as much. The Ford Class, despite its breathtaking construction costs, represents an efficient approach to having strategically relevant air power at sea. My comments above on the potential utility of small carriers is predicated on the fact that the LHAs and LHDs already exist. This logic mirrors that which led to the construction of light carriers on existing cruiser hulls in 1943. Availability trumped capability.

Those interested in aircraft design will have perceived in this testimony so far that I call for the development of at least two different types of UCAS; a low aspect ratio “strike fighter” similar to the X-47B that has been demonstrated, and a high aspect ratio craft, similar in appearance if not size to the MQ-4C Triton. The potential for a swarm of unmanned fighters, coordinating at machine speed and armed with lethal air-to-air missiles promises to be a game changer in the dense air combat arena of the far littoral. Land air bases supporting the MQ-4C are likely to be threatened by conventional ballistic missiles, so the Navy will need an embarked analogue, both for sea control and for high altitude communications relay.

There are several common sense principles that ought to govern the employment of unmanned aircraft, and in fact the overall design of future air wings:

- ▶ **Aircraft should not be tasked to do what missiles can do.** There are many factors that govern whether a missile is the right weapon for a particular mission, some of which are based on the limits of current technology. However, the USN has a track record of using Tomahawk in

place of manned aircraft for deep strikes, and in the future more advanced variants plus conventional ballistic missiles and even rail guns will take over more of that mission portfolio. This makes it questionable whether the Navy ought to invest in a deep strike bomber.

- ▶ **Manned aircraft should not be tasked to do what unmanned aircraft can do.** The X-47B has already demonstrated the capability to take off and land on a carrier. An unmanned combat aircraft (UCAS) is essentially a robot and robots are best employed in doing jobs that are either too risky, too difficult or too boring and repetitive for humans. As artificial intelligence matures, there will be a widening area in the naval aviation mission portfolio between those best handled by missiles and those that must be handled by manned aircraft. These missions will tend to be long endurance and able to be handled by machine intelligence in partnership with remote humans. Communications relay, reconnaissance and sea control (surface and subsurface) suggest themselves. However, the potential swarming capabilities of UCAS opens up a whole new arena of air superiority operations since coordination at machine speed among multiple fighters seems likely to overpower human-occupied fighter formations.
- ▶ **A single air wing should not be asked to multi-task in the face of significant opposition.** Because of a lack of opposition and other reasons, the USN is accustomed to operating air wings singly. Navy air wings are accustomed to practicing sea control, fleet defense and power projection operations simultaneously at times. Of course, in a low/no threat environment, these tasks can be performed by just a few aircraft. The Navy does possess a command and control mechanism for handling simultaneous functions (Composite Warfare Commander or CWC) but lacks doctrine and practice in coordinating multiple CVNs in highly contested operations. Although the F-18 is a strike fighter that, depending on its loadout on a particular launch, is capable of mission switches in the air, the decision matrix when faced with simultaneous mission/threat situations is difficult at best. Some have contended that the Hornet, by being a jack of all trades is a master of none. Despite the Hornet's (and soon the Lightning's) superior capabilities, there is some validity to the charge, especially when it comes to aircrew training. However, if air wings are allowed to specialize, and if the Navy commits to developing a true multicarrier force doctrine, both Hornet and Lightning II crews could get better at particular missions.

- ▶ **High end aircraft should not be used for low end missions.** As previously mentioned, when high end fighters are used for counter-insurgency type missions, their high end capabilities are not being used. This would not be a problem if the fighter's service life was not being used up and if the Navy had lots of fighters (including attack jets) as it did in Vietnam. But neither is the case, and especially in view of the cost of modern fighters, the Navy can no longer afford the inefficiencies involved in using high end fighters for low end missions. A naval cousin to the Air Force A-10 would be a logical solution.
- ▶ **Only use up high end jet service life for absolutely essential purposes.** This seems to be redundant with the previous principle, but it has a different focus. A fighter jet, in principle, ought to be used only for its designed combat missions and the training required for aircrew. However, on a daily basis, air wing F-18s are employed for service functions around the strike group, including tanking, surface search, training of radar operators and combat information center crews, and other non-tactical tasks. The retirement of the S-3 Viking placed all those missions into the laps of strike fighter squadrons. Each sortie assigned for these purposes uses up a bit of the service life of the Hornet. Using up airframe life on a \$7 million A-7 for "housekeeping" missions was cost effective; on a \$300+ million F-35C it is not. An inventory of all the service missions should produce a set of mission requirements in addition to some other key function like anti-submarine warfare that could be handled by a dedicated aircraft.

These principles imply a future set of air wings that will feature a variety of unmanned aircraft. This, in turn, raises the question of what future manned aircraft should be developed.

A recent Center for New American Security paper by Dr. Jerry Hendrix⁸ chronicles the progressive reduction in average unrefueled combat radius of the carrier air wings. Hendrix regards this as a key factor in the vulnerability of the carriers, forcing them to move closer to enemy access denial systems in order to perform their missions. I disagree with this diagnosis. Unrefueled strike range was a key factor in attack aircraft design up through the 1970s. This was a function of the nuclear strike mission of the carriers. Once that requirement was removed, unrefueled combat range became less critical because conventional strike is more a function of level of effort – repeated sorties – than pure range. If a few

conventional bombs at extreme range could prove decisive, then cruise missiles ought to be used, as indeed they routinely have been. Moreover, the development of anti-ship ballistic missiles with progressively greater range makes any attempt to insulate the carriers from such attack by building longer range strike aircraft an exercise in futility and a waste of money. Instead, if additional range is an issue, a new, dedicated organic tanker ought to be developed to add range to the air wing.

One of the reasons for the so-called strike fighter gap, the current paucity of airframes on carrier flight decks, is the rapid expenditure of F-18 airframe life due to the wars in Afghanistan and Iraq and delays in the fielding of the F-35C. Per the principles above, many, if not most of the missions in those wars could have been handled by a cheaper, less capable aircraft, thus preserving F-18 airframe life. The F-35C will also have a finite airframe life, and its cost makes preserving airframe life even more critical than that of the F-18. Carrier aircraft must perform all manner of missions on a day-to-day basis, most of which do not require the capabilities of the F-18 and F-35. However, the F-18 costs almost an order of magnitude less than the F-35, so it is my view that the F-18 production line should remain open, and the Navy should develop a cheaper, lower capability light attack aircraft for the kinds of missions F-18s are performing today over Iraq.

Returning to the 1973 crisis, the Navy found itself in a precarious situation because it had spent the previous 27 years focusing on land attack, both nuclear and conventional. This caused it to not recognize the emergence of the Soviet Navy's new sea denial capability. There has been an analogous development since the fall of the Soviet Union. Since Desert Storm the Navy has again focused exclusively on land attack – for many valid reasons, but the emergence of an increasingly powerful Chinese Navy and signs of a revitalizing Russian Navy provide reason for it to rediscover and refurbish its war at sea capabilities. However, the pride and comfort associated with being effectively unchallenged at sea dies hard, and it has been difficult to gain traction for the idea that the Navy, especially its aircraft carriers, might be vulnerable. I am heartened by CNO Admiral Richardson's recent paper entitled *A Design for Maintaining Maritime Superiority*. In it, he calls for the development of alternative fleet designs, which opens the door to new thinking on the role of aircraft carriers.

The development of a DDC force and the relief of the carriers from routine presence duty may provide an opportunity for monetary savings needed to develop new weapons and aircraft. Beyond savings in operational costs, the Navy may be

able to reduce the total carrier force by deferring or cancelling the refueling of several Nimitz Class carriers. For now, it seems inadvisable to terminate construction of Ford Class carriers as doing so could result in the loss of national capability to build more in the future.

I hope that this brief testimony has imparted to you the vision of a new, more strategically efficient and robust naval aviation establishment. My intent is not to present a specific blueprint, but to illustrate a different way of thinking about carrier-based aviation and indicate the possibilities. I believe it is possible to field a significantly more strategically efficient force within feasible budget levels, one that improves warfighting and deterrence, reduces strategic risk and one that best leverages “third offset” technologies.

¹ See Lyle Goldstein and Yuri Zhukov, “[Tale of Two Fleets, A: A Russian Perspective on the 1973 Naval Standoff in the Mediterranean](http://www.usnwc.edu/Publications/Naval-War-College-Review/2004---Spring.aspx),” *Naval War College Review*, Spring 2004, p 27-63. (<http://www.usnwc.edu/Publications/Naval-War-College-Review/2004---Spring.aspx>)

² For a more in-depth discussion of this issue see Robert C. Rubel, “Deconstructing Nimitz’s Principle of Calculated Risk,” *Naval War College Review*, Winter 2015, pp 31-46. www.usnwc.edu/getattachment/e0c936f8-6add-4653-8163-627244ed890f/Deconstructing-Nimitz-s-Principle-of-Calculated-Ri.aspx

³ Robert C. Rubel, “Cede No Water: Naval Strategy, the Littorals and Flotillas,” *Proceedings Magazine*, September 2013, Vol139/9/1327, (Annapolis, MD: US Naval Institute Press), p 42. <http://www.usni.org/magazines/proceedings/2013-09/cede-no-water-strategy-littorals-and-flotillas>

⁴ Seth Cropsey, Bryan McGrath and Timothy Walton, *Sharpening the Spear; The Carrier, The Joint Force and High End Conflict*, October 2015, (Washington, DC: The Hudson Institute) p. 39. <http://www.hudson.org/research/11731-sharpening-the-spear-the-carrier-the-joint-force-and-high-end-conflict>

⁵ Vice Admiral Thomas Rowden, Rear Admiral Peter Gumataotao and Rear Admiral Peter Fanta, “Distributed Lethality,” *Proceedings Magazine*, January 2015, Vol 141/1/1343, (Annapolis, MD: US Naval Institute Press), pp. 18-23. <http://www.usni.org/magazines/proceedings/2015-01/distributed-lethality>

⁶ Jonathan Parshall and Anthony Tully, *Shattered Sword The Untold Story of the Battle of Midway*, (Washington, DC: Potomac Books, 2005), pp. 405-406.

⁷ Robert Work, quoted by Cheryl Pellerin, “Work: Human-Machine Teaming Represents Defense Technology Future,” Department of Defense, DoD News, Defense Media Activity, November 8, 2015. <http://www.defense.gov/News-Article-View/Article/628154/work-human-machine-teaming-represents-defense-technology-future>

⁸ Dr. Jerry Hendrix, *Retreat from Range: The Rise and Fall of Carrier Aviation*, October 2015, (Washington, DC: Center for New American Security). <http://www.cnas.org/sites/default/files/publications-pdf/CNASReport-CarrierAirWing-151016.pdf>