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Navy Ford (CVN-78) Class Aircraft Carrier Program: Background and Issues for Congress

Ronald O'Rourke
Specialist in Naval Affairs
Foreign Affairs, Defense, and Trade Division

Summary

The Navy's proposed FY2009 budget requests $2,712 million in procurement funding for CVN-78, the first ship in the Gerald R. Ford (CVN-78) class of aircraft carriers, which was earlier known as the CVN-21 class. Although CVN-78 was procured in FY2008, the Navy's budget includes procurement funding for the ship in FY2009, FY2010, and FY2011. The Navy's proposed FY2008 budget also requests $1,214 million in advance procurement funding for CVN-79, the second ship in the class, which the Navy wants to procure in FY2012. The Navy's estimated procurement costs for CVN-78 and CVN-79 are about $10.5 billion and $9.2 billion, respectively. This report will be updated as events warrant.

Background

The Navy's Current Carrier Force. The Navy's current aircraft carrier force includes one conventionally powered carrier, Kitty Hawk (CV-63), and 10 nuclear-powered carriers — the one-of-a-kind Enterprise (CVN-65) and 9 Nimitz-class ships (CVN-68 through CVN-76). The most recently commissioned carrier, the Ronald Reagan (CVN-76), was procured in FY1995 and entered service in July 2003 as the replacement for the Constellation (CV-64). The next carrier, the George H. W. Bush (CVN-77), also a Nimitz-class ship, was procured in FY2001 and is scheduled to enter service in 2008 as the replacement for the Kitty Hawk.

The Aircraft Carrier Construction Industrial Base. All U.S. aircraft carriers procured since FY1958 have been built by Newport News Shipbuilding of Newport News, VA, a shipyard that forms part of Northrop Grumman Shipbuilding (NGSB). Newport News is the only U.S. shipyard that can build large-deck, nuclear-powered aircraft carriers. The aircraft carrier construction industrial base also includes hundreds of subcontractors and suppliers in dozens of states.

CVN-77. CVN-77, which was named the George H. W. Bush on December 9, 2002, is the Navy's tenth and final Nimitz-class carrier. Congress approved $4,053.7 million in FY2001 procurement funding to complete the ship's then-estimated total procurement cost of $4,974.9 million. Section 122 of the FY1998 defense authorization act (H.R. 1119/P.L. 105-85 of November 18, 1997) limited the ship's procurement cost to $4.6 billion, plus adjustments for inflation and other factors. The Navy testified in 2006 that with these permitted adjustments, the cost cap stood at $5.357 billion. The Navy also testified that CVN-77's estimated construction cost had increased to $6.057 billion, or $700 million above the adjusted cost cap. Consequently, the Navy in 2006 requested that Congress increase the cost cap to $6.057 billion. Congress approved this request: Section 123 of the FY2007 defense authorization act (H.R. 5122/P.L. 109-364 of October 17, 2006), increases the cost cap for CVN-77 to $6.057 billion.

Gerald R. Ford (CVN-78) Class Program. The Navy's successor to the Nimitz-class aircraft carrier design is the Gerald R. Ford (CVN-78) class design. The design was earlier known as the CVN-21 class, which meant nuclear-powered aircraft carrier for the 21st Century. Compared to the Nimitz-class design, the Ford-class design will incorporate several improvements, including an ability to generate substantially more aircraft sorties per day and features permitting the ship to be operated by several hundred fewer sailors than a Nimitz-class ship, significantly reducing life-cycle operating and support costs. Navy plans call for procuring at least three Ford-class carriers — CVN-78, CVN-79, and CVN-80 — in FY2008, FY2012, and FY2016, respectively. **Table 1** shows funding for the three ships through FY2013.

Table 1. Funding for CVN-78, CVN-79, and CVN-80, FY1997-FY2013

(millions of then-year dollars, rounded to nearest million; figures may not add due to rounding)

CVN	97-00	01	02	03	04	05	06	07	08	09	10	11	12	13	Total thru FY13
Procurement (Shipbuilding and Conversion, Navy [SCN] account)															
78	0	22	135	395	1163	623	619	736	2685	2712	688	679	0	0	10457
79	0	0	0	0	0	0	0	53	124	1214	807	465	2312	2286	7261
80	0	0	0	0	0	0	0	0	0	0	0	0	201	886	1087
Subtotal	0	22	135	395	1163	623	619	789	2809	3926	1495	1144	2513	3172	18805
Research and development (Research, Development, Test and Evaluation [RDTEN] account)															
78	308	231	277	317	306	350	303	284	202	223	153	109	107	106	3276
79	0	0	5	0	0	0	0	17	27	38	39	30	19	17	192
80	0	0	0	0	0	0	0	0	0	0	0	42	48	48	138
Subtotal	308	231	282	317	306	350	303	301	229	261	192	181	174	171	3606
TOTAL	308	253	417	712	1469	973	922	1090	3038	4187	1687	1325	2687	3343	22411

Source: Navy data provided to CRS on March 6, 2008.

Gerald R. Ford (CVN-78). CVN-78 was procured in FY2008 and is scheduled to enter service in 2015 as the replacement for Enterprise, which is scheduled to retire in

2012, at age 52.[1] The Navy projects that there will be a 33-month period between the scheduled decommissioning of Enterprise in November 2012 and the scheduled commissioning of CVN-78 in September 2015. During this 33-month period, the Navy's carrier force will decline from 11 ships to 10.

As can be seen in **Table 1**, although CVN-78 was procured in FY2008, the Navy's FY2009 budget includes procurement funding for the ship in FY2009, FY2010, and FY2011. This is consistent with Section 121 of the FY2007 defense authorization act (H.R. 5122/P.L. 109-364 of October 17, 2006), which granted the Navy the authority to use four-year incremental funding for CVN-78, CVN-79, and CVN-80. The Navy's proposed FY2009 budget requests $2,712 million in procurement funding for CVN-78.

The Navy estimates CVN-78's total acquisition (i.e., research and development plus procurement) cost at more than $13.7 billion. As shown in **Table 1**, this figure includes about $3.3 billion in research and development costs through FY2013, and about $10.5 billion in procurement costs. The procurement cost figure includes about $2.4 billion for detailed design and nonrecurring engineering (DD/NRE) work for the CVN-78 class, and about $8.1 billion for building CVN-78 itself. Including the DD/NRE costs for a ship class in the procurement cost of the lead ship in the class is a traditional Navy ship procurement budgeting practice.

CVN-79 and CVN-80. The Navy wants to procure CVN-79 in FY2012 and have it enter service in 2019. The Navy's estimated procurement cost for CVN-79 is about $9.2 billion in then-year dollars, and the Navy's proposed FY2009 budget requests $1,214 million in advance procurement funding for the ship. The Navy wants to procure CVN-80 in FY2016 and have it enter service around 2023. The Navy's estimated procurement cost for CVN-80 is about $10.7 billion in then-year dollars. As shown in **Table 1**, the Navy plans to request an initial increment of $201 million in advance procurement funding for the ship in FY2012.

Procurement Cost Cap. Section 122 of P.L. 109-364 establishes a procurement cost cap for CVN-78 of $10.5 billion, plus adjustments for inflation and other factors, and a procurement cost cap for subsequent Ford-class carriers of $8.1 billion each, plus adjustments for inflation and other factors. The conference report on P.L. 109-364 (H.Rept. 109-702 of September 29, 2006) discusses Section 122 on pages 551-552.

Issues for Congress

Accuracy of Cost Estimate for CVN-78. Both the Congressional Budget Office (CBO) and the Government Accountability Office (GAO) have questioned the accuracy of the Navy's cost estimate for CVN-78. CBO reported in June 2008 that it estimates that CVN-78 will cost $11.2 billion in constant FY2009 dollars, or about $900 million more

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[1] Section 1012 of the FY2007 defense authorization act (H.R. 5122/P.L. 109-364 of October 17, 2006) expressed the sense of the Congress that CVN-78 should be named for president Gerald R. Ford. On January 16, 2007, the Navy announced that CVN-78 would be so named. CVN-78 and other carriers built to the same design will consequently be referred to as Ford (CVN-78) class carriers. For further discussion of Navy ship names, see CRS Report RS22478, *Navy Ship Names: Background For Congress*, by Ronald O'Rourke.

than the Navy's estimate of $10.3 billion in constant FY2009 dollars, and that if "CVN-78 experienced cost growth similar to that of other lead ships that the Navy has purchased in the past 10 years, costs could be much higher still." CBO also reported that, although the Navy publicly expresses confidence in its cost estimate for CVN-78, the Navy had assigned a confidence level of less than 50% to its estimate, meaning that the Navy believes there is more than a 50% chance that the estimate will be exceeded.[2]

GAO reported in August 2007 that:

> Costs for CVN 78 will likely exceed the budget for several reasons. First, the Navy's cost estimate, which underpins the budget, is optimistic. For example, the Navy assumes that CVN 78 will be built with fewer labor hours than were needed for the previous two carriers. Second, the Navy's target cost for ship construction may not be achievable. The shipbuilder's initial cost estimate for construction was 22 percent higher than the Navy's cost target, which was based on the budget. Although the Navy and the shipbuilder are working on ways to reduce costs, the actual costs to build the ship will likely increase above the Navy's target. Third, the Navy's ability to manage issues that affect cost suffers from insufficient cost surveillance. Without effective cost surveillance, the Navy will not be able to identify early signs of cost growth and take necessary corrective action.[3]

Technical Risk. The Navy faces challenges in developing certain new technologies intended for CVN-21, particularly the electromagnetic aircraft launch system (EMALS) — an electromagnetic (as opposed to the traditional steam-powered) aircraft catapult. Problems in developing EMALS or other technologies could delay the ship's completion and increase its development and/or procurement cost. GAO reported in March 2008 that:

> Five of 15 current critical technologies [for CVN-21] are fully mature, including the nuclear propulsion and electric plant. Six technologies are expected to approach maturity, while four others will remain at lower maturity by construction contract award.... Of CVN 21's technologies, the electromagnetic aircraft launch system (EMALS), the advanced arresting gear, and the dual band radar (composed of the volume search and multifunction radars) present the greatest risk to the ship's cost and schedule.... Challenges in technology development could lead to delays in maintaining the design schedule needed for construction....
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> EMALS will not be tested at sea, but a production model is now scheduled to begin land-based testing in 2009. Difficulties developing the generator and meeting detailed Navy requirements have already led to a 15-month schedule delay. Problems manufacturing the generator recently delayed testing scheduled to begin by February

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[2] Congressional Budget Office, *Resource Implications of the Navy's Fiscal Year 2009 Shipbuilding Plan*, June 9, 2008, p. 20.

[3] Government Accountability Office, *Defense Acquisitions[:] Navy Faces Challenges Constructing the Aircraft Carrier Gerald R. Ford within Budget*, GAO-07-866, August 2007, summary page. See also Government Accountability Office, *Defense Acquisitions[:] Realistic Business Cases Needed to Execute Navy Shipbuilding Programs, Statement of Paul L. Francis, Director, Acquisition and Sourcing Management Team, Testimony Before the Subcommittee on Seapower and Expeditionary Forces, Committee on Armed Services, House of Representatives*, July 24, 2007 (GAO-07-943T), p. 15.

2008. The Navy is considering authorizing production of the generators prior to completing initial testing in order to ensure delivery to support CVN 78's construction schedule. As a consequence, production may begin prior to demonstrating that the generators work as intended. Timely delivery of EMALS remains at risk. Problems that occur in testing or production will likely prevent EMALS from being delivered to the shipyard to meet the construction schedule.

The dual band radar is being developed as part of the DDG 1000 [destroyer] program.[4] In 2007 DOD reassessed the multifunction radar's readiness. Since modes critical to CVN 21 have not yet been tested, including electronic protection and air traffic control, the radar could not be considered fully mature. While the multifunction radar has been tested at sea, considerable testing remains for the volume search radar. Due to problems with a critical circuit technology, the volume search radar will not demonstrate the power output needed to meet requirements during upcoming testing. Full power output will not be tested on a complete system until the first production unit in 2010, and the radar will not be fully demonstrated until operational testing on DDG 1000 in 2013. Problems discovered during testing may affect installation on the carrier scheduled to begin in 2012.

The advanced arresting gear completed early verification tests that proved the system's concept and tested components. Integrated testing with simulated and live aircraft is scheduled to begin in 2009. Delays have led the Navy to consolidate test events in order to maintain the shipyard delivery date, leaving little time to address any problems prior to production. Late delivery will require the shipbuilder to install this system after the flight deck has been laid, disrupting the optimal build sequence and increasing cost.

Other technologies will not be fully matured by construction contract award, but present less risk to ship construction....

According to the Navy, the design [for CVN-78] is on track to support construction. However, the program may face challenges in maintaining its design schedule due to delays in the receipt of technical information on some key technologies. In particular, late delivery of information on EMALS is driving inefficiencies in design development and must be resolved to prevent late delivery of design products needed for construction.[5]

Decline in Carrier Force Between Enterprise Decommissioning and CVN-78 Commissioning. As mentioned earlier, during the projected 33-month period between the scheduled decommissioning of Enterprise in 2012 and the scheduled commissioning of CVN-78 in 2015, the carrier force under Navy plans is to decline from 11 ships to 10. 10 USC 5062(b) requires the Navy to maintain a force of at least 11 carriers. The Navy in 2007 asked Congress for legislative relief to waive this provision so as to permit the carrier force to decline to 10 ships during the period between the decommissioning of Enterprise and the commissioning of CVN-78. Congress in 2007 did

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[4] For more on the DDG-1000 program, see CRS Report RL32109, *Navy DDG-1000 Destroyer Program: Background, Oversight Issues, and Options for Congress*, by Ronald O'Rourke.

[5] Government Accountability Office, *Defense Acquisitions[:] Assessments of Selected Weapon Programs*, GAO-08-467SP, March 2008, pp. 65-66.

not act on that request. The Navy in 2008 has again asked Congress for legislative relief on this issue.[6]

Legislative Activity for FY2009

The House and Senate Armed Services Committees, in their reports (H.Rept. 110-652 of May 16, 2008 and S.Rept. 110-335 of May 12, 2008, respectively) on the FY2009 defense authorization bill (H.R. 5658/S. 3001), recommended approval of the Navy's FY2009 procurement and advance procurement funding request for the CVN-78 program (see page 79, lines 001-002 of H.Rept 110-652, and page 57, lines 001-002 of S.Rept. 110-335).

Neither committee agreed to the Navy's request for legislative relief to temporarily waive 10 USC 5062(b) so as to permit the carrier force to temporarily decline to 10 ships. H.Rept. 110-652 states:

> The committee notes that section 5062 of title 10, United States Code, requires the Department of Defense to maintain 11 active aircraft carriers. The committee is aware that the Department of Defense requested legislative relief to waive this statutory requirement for the period between the proposed decommissioning of the USS Enterprise (CVN-65) and the initial operating capability of the USS Ford (CVN-78). The committee is concerned with the position of the Department of Defense, especially since the Department recently reached a compromise with Congress to reduce the statutory requirement from 12 aircraft carriers to 11 in section 1011 of the John Warner National Defense Authorization Act for Fiscal Year 2007 (Public Law 109-364). Moreover, the committee notes that the period between the proposed decommissioning of CVN-65 and the initial operating capability of CVN — 78 will be a minimum of 33 months and may be more than 4 years, depending on the construction progress of the first-of-class CVN-78 and its post-commissioning testing and evaluation period.
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> Consequently, the committee rejects the request of the Department to allow a waiver to section 5062 of title 10, United States Code, for the purpose of retiring CVN-65 in fiscal year 2013. However, the committee understands that there are significant schedule and cost implications associated with a depot maintenance period which would be necessary to maintain CVN — 65 in active service after fiscal year 2013 and that, even with an overhaul, the CVN — 65 has limited nuclear fuel life.
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> Therefore, the committee directs the Secretary of the Navy to submit a report to the congressional defense committees on the cost and potential schedule implications of either returning USS Kennedy (CV-67) to service or retaining USS Kitty Hawk (CV-63) in service during the period between the scheduled retirement of CVN-65 and the commissioning of CVN-78. The committee directs the Secretary to include in the report the number and location of dry-docks in United States shipyards, both public and private, which have the capacity to dock and make repairs to either CV-63 or CV-67. The report should be submitted within 90 days after the date of enactment of this Act, but in any event not later than February 3, 2009. (Page 81)

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[6] See, for example, the Statement of Honorable Donald C. Winter, Secretary of the Navy, Before the House Armed Services Committee, 6 March 2008, p. 10.