Sea Strike

PLATFORMS

AIRCRAFT

AH-1Z Super Cobra and UH-1Y Huey Upgrade

Description

The AH-1 Super Cobra is a two-place, twin-engine attack helicopter capable of land- and sea-based operations. It provides rotary-wing close air support (CAS), anti-armor/anti-helicopter, helicopter escort, armed and visual reconnaissance, control of supporting arms, and shipboard and austere base operations, during day/night and adverse weather conditions. The UH-1 Huey is a twin-engine combat utility helicopter, capable of land and seabased operations. It provides airborne command and control, combat assault support, control of supporting arms, medical evacuation, special operations support, search and rescue augmentation, visual reconnaissance, and shipboard and austere base operations, during day/night and adverse weather conditions.

The H-1 upgrade program involves conversion of both the AH-1W and UH-1N from a two-bladed to a four-bladed rotor system, and re-designation to AH-1Z and UH-1Y, respectively (formerly referred to as "4BW" and "4BN," respectively). The upgrade program is designed to resolve existing safety issues in both aircraft, zero airframe time, reduce life-cycle costs, significantly enhance combat capability, and achieve 85 percent commonality between aircraft. Major modifications include a new rotor system with semi-automatic blade fold, new composite main and four-bladed tail rotor, upgraded drive system and landing gear, and pylon structural modifications. These aircraft will have increased maneuverability, speed, range, and payload capability. Additionally, both aircraft will incorporate a newly designed, fully integrated, common cockpit that will reduce operator workload and improve situational awareness.

Status

The preliminary design review was approved in June 1997, and the critical design review was completed in September 1998. LRIP began in the first quarter FY 2004, and milestone III is slated for the third quarter FY 2006. Five EMD (Engineering and Manufacturing Design) aircraft have been produced, four of which will eventually become fleet assets and one aircraft (without an integrated avionics suite) will be used for live-fire test and

evaluation. The program objective calls for a total of 280 airframes to be converted; 180 AH-1Ws to AH-1Zs and 100 UH-1Ns to UH-1Ys, with the last 11 AH-1Zs delivered in FY 2018.

Developers
Bell Helicopter Textron, Inc.; Fort Worth and Amarillo, Texas

AV-8B Harrier II

Description
The AV-8B Harrier II is a single-seat, light attack aircraft that provides offensive air support to the Marine Air-Ground Task Force (MAGTF). By virtue of its Vertical/Short Take-Off and Landing (V/STOL) capability, the AV-8B can operate from a variety of amphibious ships, rapidly constructed expeditionary airfields, forward sites (e.g. FARPs, roads), and damaged conventional airfields. This makes the aircraft particularly well suited for providing dedicated air support to the MAGTF or joint operations in any climate or location.

Two variants of the aircraft are currently in service: the Night Attack and the Radar/Night Attack Harrier. The Night Attack Harrier improved upon the original AV-8B design through incorporation of a Navigation, Forward-Looking Infra-Red (NAVFLIR) sensor, a moving map, night vision goggle compatibility, and a higher performance engine. The current Radar/Night Attack Harrier, or Harrier II+, has all the improvements of the Night Attack aircraft plus the APG-65 multi-mode radar. The fusion of night and radar capabilities allows the Harrier to be responsive to the MAGTF's need for expeditionary, night and adverse weather Offensive Air Support.

The recently completed remanufacture program that rebuilt 74 older Harrier Day Attack aircraft to the Radar/Night Attack standard, extended the service life of these aircraft by 20 years and greatly improved their warfighting capability. The entire Harrier fleet is also being upgraded through COTS technology. The Open Systems-Core Avionics Requirements (OSCAR) program will replace the existing Harrier mission and weapon computers with a COTS system that is affordable and easily upgraded and maintained. Additionally, 96 Litening targeting pods have been acquired, which are used to provide laser and IR target acquisition/designation, further enhancing the AV-8B's precision targeting capability.

Status
The AV-8B is scheduled to remain in service until the STOVL JSF replaces it. In order to remain responsive to transformational concepts and joint warfighting capabilities in support of National Security and Military Strategies and the Global War on Terrorism,

two programs (OSCAR and Litening) are currently addressing critical modernization and warfighting enhancements. OSCAR provides unique software upgrades that enable the AV-8 to employ the Joint Direct Attack Munition (JDAM); IOC was achieved in March 2005. The precision targeting program has acquired the Litening targeting pod, which has been forward deployed in both Operation Enduring Freedom and Operation Iraqi Freedom. The last 20 pods were delivered in the Advanced Targeting (AT) configuration, which provides enhanced acquisition and targeting capabilities through software upgrades. All Litening pods will be retrofitted with AT technology by August 2005. Additionally, 28 Litening pods will incorporate Predator Downlink capability that provides real-time imagery for intelligence, targeting, and friendly force disposition to engaged ground force commanders.

Developers
Boeing; St. Louis, Missouri

E-6 Mercury Airborne Command Post/TACAMO Aircraft

Description
The E-6 platform, derived from the Boeing 707, provides the Commander, U.S. Strategic Command with the command, control, and communications capability needed for execution and direction of strategic forces. Designed to support a robust and flexible nuclear deterrent posture well into the 21st century, the E-6 performs VLF emergency communications, the Strategic Command Airborne Command Post mission, and Airborne Launch Control of ground-based ICBMs. It is the Navy's only survivable means of nuclear command and control.

Status
In order to sustain and improve E-6 capability, the Block I modification program was developed. The contract for Block I was awarded to Rockwell Collins in March 2004 and is designed to repair a number of aircraft deficiencies identified by the Strategic Command. IOC is planned for 2010.

Developers
Rockwell Collins; Cedar Rapids, Iowa

EA-6B Prowler Airborne Electronic Attack Aircraft

Description
The EA-6B Prowler provides Airborne Electronic Attack (AEA) and Anti-Radiation Missile (ARM) capabilities against enemy radar and communications systems. In addition to enhancing the strike capabilities of carrier air wings and Marine expeditionary forces, an expeditionary Prowler force has provided AEA capability during numerous joint and allied operations since 1995 against

both traditional and non-traditional target sets in support of ground forces. These capabilities continue to be demonstrated in the Global War on Terrorism where EA-6B operations in Afghanistan and Iraq protect coalition forces and disrupts critical communications links. The enormous demands for AEA in OEF and OIF have driven EA-6B utilization rates to record levels.

Status
To address increased wing Fatigue Life Expenditure (FLE), congressional supplemental funding allowed accelerated procurement of an existing wing center section replacement program and additional procurement of outer wing panels. Following a reduction in flyable aircraft during FY 2004, the inventory is now returning to its former state. Even at current utilization rates, FLE will not be an issue until well beyond planned transition to the EA-18G. The Block 89A upgrade program (IOC in FY 2000) corrects structural and supportability problems (obsolescence) and improves the Prowler's compliance with civil airspace mandates. The Improved Capability (ICAP) III upgrade, planned to reach IOC in FY 2005, includes a completely redesigned receiver system (ALQ-218), new displays, and MIDS/Link-16, which will dramatically improve joint interoperability. The first ICAP III deployment is planned for January 2006. Most significantly, the ALQ-218 will form the heart of the AEA system installed in the EA-6B follow-on platform, the EA-18G.

Developers
Northrop Grumman Corporation; Bethpage, New York

EA-18G Airborne Electronic Attack Aircraft

Description
The Navy has selected the EA-18G to replace the aging EA-6B Prowler. The EA-18G is a derivative of the two-seat, twin-engine F/A-18F Super Hornet incorporating a repackaged ALQ-218 AEA system from the ICAP III EA-6B Prowler. Like the Prowler, the EA-18G will provide full-spectrum electronic attack to counter enemy air defenses and communication networks. The EA-18G will use existing ALQ-99 jamming pods currently employed on the EA-6B. However, the tactical aircraft's expanded flight envelope offers much greater speed, altitude, and maneuverability. The EA-18G will maintain a high degree of commonality with the F/A-18F, retaining the latter's strike-fighter and self-protection capabilities, while providing air-to-air self-escort to free other assets for other strike-fighter tasking.

Status
EA-18G program started in December 2004 (Milestone B) with a planned IOC in FY 2009. An inventory objective of 90 aircraft is planned to support a 10-squadron force structure. Initial procurement of the first four aircraft begins in FY 2006.

Developers
Boeing; St. Louis, Missouri
Northrop Grumman; Bethpage, New York

F/A-18 A-D Hornet Strike-Fighter Aircraft

Description
The F/A-18 Hornet is Naval Aviation's principal strike-fighter. This state-of-the-art, multi-mission aircraft serves the Navy and Marine Corps, as well as the armed forces of several allied and friendly countries. Its reliability, maintainability, safety record, high performance, and multiple weapons-delivery capability highlight the Hornet's success. Budgeted improvements to the original Hornet A/C/D variants have provided significant warfighting improvements, including the addition of the Global Positioning System (GPS), Multi-Functional Information Distribution System (MIDS), AIM-9X Sidewinder/Joint Helmet-Mounted Cueing System, Combined Interrogator Transponder, Joint Direct Attack Munition/Joint Stand-Off Weapon (JDAM/JSOW) delivery capability, and Digital Communication System for close-air support. The aircraft's weapons, communications, navigation, and Defensive Electronic Countermeasures systems are also being upgraded to ensure combat relevance.

Status
Although the F/A-18A through D are out of production, the existing inventory of approximately 690 Navy and Marine Corps aircraft will continue to comprise half of Naval Aviation's strike assets through 2012.

Developers
Boeing; St. Louis, Missouri
General Electric; Lynn, Massachusetts

F/A-18E/F Super Hornet Strike-Fighter Aircraft

Description
The F/A-18E/F Super Hornet provides the significant improvements in combat range, payload, survivability, and growth capacity required to keep the strike-fighter force lethal and viable well into the 21st century. There is extensive commonality with weapons systems, avionics, and software between F/A-18 variants, and the infrastructure supporting the Super Hornet builds upon existing organizations. The F/A-18E/F is replacing the F-14 and early model F/A-18s. The lethality, flexibility, reliability, and survivability of the F/A-18E/F make it the right aircraft to fulfill missions associated with regional and littoral conflicts.

Status
Aircraft F/A-18E-1 first flew on November 29, 1995. Full-rate production deliveries commenced in October 2001. The Navy awarded a multi-year contract, compared to five single-year contracts, for the procurement of 222 aircraft between the years of 2000-2004, which saved the taxpayers more than 7.4 percent ($700 million). A second multi-year contract was awarded in FY 2004 for 210 aircraft procured in 2005 through 2009, saving the taxpayer more than $1 billion over the single-year price. In June 2002 the Navy awarded a multi-year contract for the production of 480 engines, saving the taxpayers $51 million. The first Super Hornet squadron to deploy, VFA-115 (F/A-18E), deployed onboard the USS *Abraham Lincoln* (CVN-72) in the summer 2002 and led strikes into Iraq on the opening night of OIF. The second and third Super Hornet squadrons to deploy, VFA-14 (F/A-18E) and VFA-41 (F/A-18F), deployed onboard the USS *Nimitz* (CVN-68) in the spring 2003. This deployment initiated Early Operational Capability (EOC) for the Shared Reconnaissance Pod (SHARP), the Joint Helmet Mounted Cueing System (JHMCS), the Multifunctional Information Distribution System (MIDS), and the Advanced Targeting Forward-Looking Infra-Red (ATFLIR) system. Additionally, ATFLIR achieved Initial Operational Capability (IOC) with VFA-102 in September 2003. Lot 25 F/A-18E/Fs and above will have Advanced Mission Computers with computer software using Higher Order Language (HOL). Pacific Fleet aircraft will be based at NAS Lemoore, California The first Super Hornet squadron was forward deployed to NAF Atsugi, Japan in November 2003. NAS Oceana, Virginia and MCAS Cherry Point, North Carolina have been chosen as the Atlantic Fleet home bases.

Developers
Boeing; St. Louis, Missouri
General Electric; Lynn, Massachusetts

F-35 Joint Strike Fighter (JSF)

Description
The F-35 JSF program will deliver a transformational family of next-generation strike aircraft combining stealth and enhanced sensors to provide a lethal, survivable, supportable and affordable tactical jet aviation strike fighters that complements the F/A-18E/F. The Navy Carrier Variant (CV), the Marine Corps Short Takeoff and Vertical Landing (STOVL) and Air Force Conventional Takeoff and Landing (CTOL) "family of aircraft" design shares a high level of commonality while meeting U.S. service and allied needs. The keystone of this effort is a mission systems avionics suite that delivers previously unparalleled interoperability between U.S. armed services and its coalition partners. Agreements for international participation in System Development and Demonstration (SDD) have been negotiated with

Australia, Canada, Denmark, Italy, the Netherlands, Norway, Turkey, and the United Kingdom. Security Cooperation Partnership memorandums of understanding have been established with Israel and Singapore.

Status

The JSF is in its fourth year of a planned 12-year SDD program. Additional time to reach design maturity (18 months), combined with overcoming technical challenges has increased SDD funding by $7B to $40.5B ($TY). A October 14, 2004 Defense Acquisition Board approved the optimized STOVL design, revised first flight dates for all variants, and directed awarding the transition contract for the GE F136 engine to prepare for its SDD phase. Significant progress has been made in addressing weight-related aircraft performance issues identified last year. STOVL weight has been reduced by over 2,500 pounds and installed thrust improvements and drag reduction are being incorporated to further improve aerodynamic performance. Many of STOVL design improvements will be incorporated into both the CV and CTOL variants. The software block plan and flight test plan are being modified to align with the revised schedule. The first SDD flight is scheduled for Third quarter FY 2006 (CTOL variant) and the first STOVL flight is expected in the First quarter FY 2008. Marine Corps STOVL IOC is 2012, and Navy CV IOC is 2013. The first JSF training base will be determined under the umbrella of the DoD Base Realignment and Closure Commission (BRAC) 2005 process. In addition, the BRAC process will identify potential operational bases suitable for each service's needs.

Developers

Lockheed Martin; Fort Worth, Texas
Pratt Whitney (PW F135 engine); East Hartford, Connecticut
General Electric (GE F136 engine); Evansdale, Ohio

Joint Unmanned Combat Air System (J-UCAS)

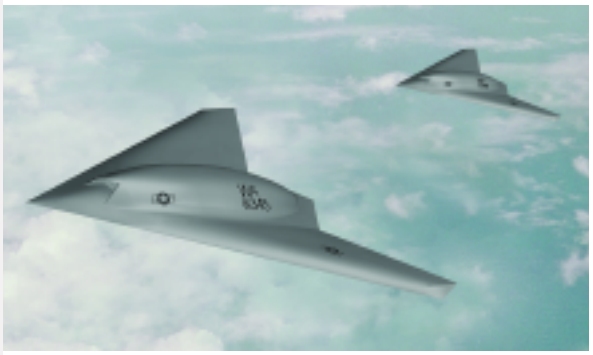
Description

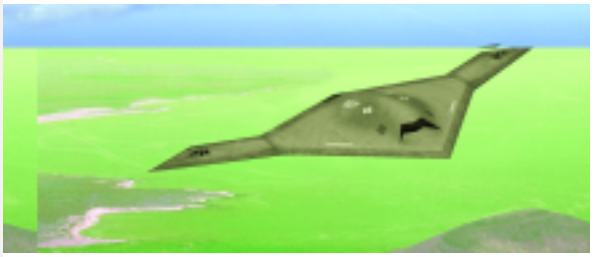
In 2000 the Navy partnered with the Defense Advanced Research Projects Agency (DARPA) to define and demonstrate the value and feasibility of Unmanned Combat Air Vehicles (UCAVs). The Navy directed the demonstration project to explore multi-mission vehicles that cover surveillance/reconnaissance, strike, and suppression of enemy air defenses. The Navy has stressed an initial emphasis on the penetrating surveillance/reconnaissance role, where target identification and precise location capability best leverages the significant Navy investment in stand-off weapons. The Navy effort has been combined with the Air Force into a joint program, J-UCAS. The program office is planning an operational assessment starting in FY 2007-2009 that will assess the combined missions for the Navy and Air Force. The primary focus for the Navy remains on carrier basing of the envisioned

low-observable, multi-mission unmanned vehicle. In addition, it will reduce risk in other areas in preparation for the follow-on acquisition program. This acquisition program will field aircraft carrier-based Navy UCAVs in the 2015 time frame.

Status
The program office is pursuing the design of two airframes, X-45C and X-47B. Detailed planning is now underway for a demonstration phase and follow-on operational assessment. While maintaining the goal of demonstrating a carrier-based multi-mission UCAV the current program intends to develop a joint C4ISR and command and control architecture for the family of J-UCAS vehicles.

Developers
NGC; Rancho Bernardo, California
Boeing; St. Louis; Missouri





VXX Presidential Helicopter Replacement

Description
The VH-3D/VH-60N presidential helicopter replacement, currently referred to as VXX, will be a conventional helicopter. It will provide safe and timely transportation for the President and Vice President of the United States, foreign heads of state, and others as directed by the White House Military Office. When the President is onboard Marine One, this aircraft is the Commander-in-Chief's primary command and control platform and must provide him with the flexibility and capabilities necessary to execute the duties of his office. Its capabilities, which will be delivered in two increments, are split into four functional areas: aircraft operations, communications, survivability, and presidential accommodations. VXX will have increased capabilities in these areas, while retaining core capabilities carried forward from the VH-3D and VH-60N. The VXX will be able to neutralize and defeat current and future threats in order to provide the President of the United States with safe and reliable transportation.

Status
The program was reviewed in late 2004 by OSD ATL and designated as an ACAT 1D. MS B was approved for Increment 1 and 2 SDD. MS C approved for five pilot production Increment 1 aircraft. The SDD Contract for Increment 1 and 2 was awarded to Lockheed Martin on January 28, 2005.

Developers
Lockheed Martin, Agusta Westland, Bell; Owego, New York

SURFACE AND EXPEDITIONARY WARFARE SHIPS AND CRAFT

AIRCRAFT CARRIERS

Nimitz (CVN-68) and CVN-21 Program

Description

Nimitz (CVN-68)-class nuclear-powered aircraft carriers are replacing the Navy's aging conventionally powered (oil-fired) carriers on a one-for-one basis, preserving and recapitalizing aircraft carrier strike group force levels to meet forward-presence, crisis-response, and warfighting requirements. The mission of the *Nimitz*-class aircraft carrier is to support and operate aircraft that engage in attack, surveillance, and electronic warfare against targets at sea, in the air, or ashore in support of Marines or joint forces. America's carriers are forward-deployed world wide in support of U.S. strategy and commitments and are increasingly important as the Navy adjusts its emphasis toward littoral regions, and forward-deployed land-based forces are brought home to the United States Since the mid/late-1960s when the baseline CVN-68 design was finalized, the Navy's carrier force has not had the advantage of an aggressive and robust research and development program to insert leading-edge technologies and systems into subsequent hulls.

For this reason, and to ensure that the carrier/Naval Aviation force will meet the daunting operational requirements of the next century, in 1993 the Navy established a future sea-based air platforms working group to investigate the requirements, available technologies and systems, to ensure that a new class of aircraft carriers could capture elements of the incipient Revolutions in Military and Business Affairs. Based upon these initial studies, the Navy established an approach and program to develop an evolutionary-design next-generation nuclear carrier program—the CVN-21 Program—to reach the fleet in 2014. The next generation carrier will continue to be the centerpiece of *Sea Power 21* and will incorporate a new design, efficient nuclear propulsion plant, Electro-Magnetic Aircraft Launch System (EMALS), advanced arresting gear (AAG), electrical generation capacity nearly three times that of the *Nimitz*-class carrier, improved sortie generation rate and do it all with a significantly less manpower than today's ship/air wing team. Crew quality of life improvements are also a focus for CVN-21 as we expect this class of ship to ply the world's oceans until 2108. Initial investments will be made in new integrated combat systems for CVN-77, under construction in 2005, which will be carried forward, along with other improvements, into the first two carriers of the CVN-21 Program and follow-on carriers. The principal design objectives for the carriers of the CVN-21 Program are to provide a flexible infrastructure that will facilitate the insertion of new warfighting capabilities as they evolve and reduce total ownership costs significantly during each carrier's 50-year service life.

Status
Nine *Nimitz*-class nuclear carriers are in active service in 2005. *George H.W. Bush* (CVN-77), the tenth and final ship of the class, is under construction and is scheduled to deliver in November 2008. CVN-77 is a modified-repeat of the USS *Ronald Reagan* (CVN-76) and will replace the fossil-fueled carrier USS *Kitty Hawk* (CV-63) after 47 years of service. CVN-77 will serve as a transition ship to the first hull built as part of the CVN-21 Program of aircraft carriers. A multi-year research and development program is underway for these future carriers.

The President's FY 2006-2011 FYDP proposal includes split funding for construction of CVN-78, requested in FY 2008 and FY 2009, in order to maintain essential carrier force levels. CVN-78 is slated to replace the Navy's first nuclear carrier, USS *Enterprise* (CVN-65), after 53 years of operational use. CVN-79 and CVN-80 will be follow-on, spirally developed carriers of the CVN-21 Program, and are currently planned for construction starts at intervals necessary to maintain the carrier force structure.

Developers
Northrop Grumman; Newport News, Virginia

SUBMARINES

Advanced SEAL Delivery System (ASDS)

Description
This combat submersible is 65 feet long, operated by a two-man crew, and can carry Navy SEAL personnel or other Special Operations Forces (SOF). The ASDS is a multi-mission platform capable of personnel delivery or intelligence operations. It is launched from one of two host submarines, USS *Charlotte* (SSN-766) or USS *Greenville* (SSN-772), much like the Deep Submergence Rescue Vehicle (DSRV). The ASDS eliminates the extended exposure to water and increased atmospheric pressure inherent with in-service wet submersible SEAL Delivery Vehicles (SDVs), and carries improved sensors and communications equipment, resulting in improved personnel and equipment performance.

Status
The U.S. Special Operations Command requirement is for six ASDSs. The first ASDS is homeported with SEAL Delivery Vehicle Team ONE (SDVT ONE) in Pearl Harbor, Hawaii. Other systems are scheduled to be home-ported in Pearl Harbor and Little Creek, Virginia (SDVT TWO). The ASDS completed OPEVAL in the summer of 2003 and conducted training exercises in the Pacific proving the capability to operate from a forward operating base. Progress toward building the full complement of ASDSs is dependent on the resolution of ongoing technical issues with its batteries and modification of the tail section

for increasing availability and reliability. A review of the program and milestone decision to acquire additional ASDSs is slated for fall 2005. Future SSGNs and *Virginia* (SSN-774)-class submarines will host the ASDS as the program proceeds

Developers
Northrop Grumman; Annapolis, Maryland

SSGN Nuclear-Powered Guided-Missile Submarine

Description
The first four of the *Ohio* (SSBN-726)-class Trident fleet ballistic missile submarines (SSBNs) are being converted to nuclear-powered guided missile and special-operations submarines (SSGNs). The *Ohio*-class SSBN is the Navy's contribution to the nation's strategic deterrent posture, which also includes long-range manned bombers and land-based intercontinental ballistic missiles. The SSBN is the most survivable and enduring leg of the "Strategic Triad" and therefore is one of the Navy's highest policy, program, and operational priorities. The first eight *Ohio*-class ships were configured to carry 24 Trident I/C4 submarine-launched ballistic missiles (SLBMs). The ninth ship, the USS *Tennessee* (SSBN-734) and all later ships are armed with the Trident II/D5 missile system. Trident missiles are capable of carrying Multiple Independently Targeted Reentry Vehicles (MIRVs); in operation Trident II/D5 missiles have been declared at eight MIRV warheads while Pacific Fleet Trident I/C4 missiles have been declared at six under the Strategic Arms Reduction Treaty (START). All 18 of the *Ohio*-class SSBNs have been commissioned; the final ship of the class, the USS *Louisiana* (SSBN-743), joined the fleet in FY 1997. In FY 2000, the last four of the original eight ships began conversion to carry the Trident II/D5 missile.

The first four *Ohio*-class SSBNs are being converted to the SSGN configuration and will be able to carry up to 154 Tomahawk (TLAM/TACTOM) land-attack missiles to conduct large-volume strike with surprise. While on station, with unparalleled non-provocative persistent presence, the SSGN will prepare the knowledge battlespace, using UUVs and other sensors, to enable access for follow-on forces. The SSGN will also have the capability to support a Special Operations Force (SOF) contingent of up to 66 personnel for an extended period of time, providing clandestine insertion and retrieval via built in lockout chambers, dry deck shelters, or the Advanced SEAL Delivery System (ASDS). Operating with two crews and using the existing Trident infrastructure will allow this potent warfighting capability to have a 70 percent in-theater presence. Additionally, the large payload and ocean interface of 24 seven-foot diameter tubes will allow these transformational submarines to leverage future payloads and sensors, thereby increasing the submarine force's future capabilities.

Status
The first two ships, the USS *Ohio* (SSBN-726) and USS *Florida* (SSBN-728), began their refueling and conversion overhauls in FY 2003. The USS *Michigan* (SSBN-727) and USS *Georgia* (SSBN-729) began their conversion in FY 2004 and FY 2005, respectively. The first SSGN will be operational in FY 2007. The anticipated cost for all four SSGN conversions is approximately $4 billion.

Developers
General Dynamics' Electric Boat Corporation; Groton, Connecticut

SENSORS

AIRBORNE

APG-79 Active Electronically Scanned Array (AESA) Radar System

Description
APG-79 AESA Phase I upgrade provides multi-mode function flexibility while enhancing performance in the air-to-air arena, hostile electronic countermeasures environments and air-to-ground targeting functions. Phase II will provide significant electronic warfare improvements to target hostile emitters while providing aircraft electronic protection and electronic attack functions. Growth provisions will allow for reconnaissance capability through the use of synthetic aperture radar technology and improved hardware and software.

Status
The APG-79 completed subcontractor competition in November 1999, and the Engineering and Manufacturing Development (EMD) contract was awarded in February 2001 to reach IOC in 2006. AESA Total Phase I program procurement is 415 systems, 280 forward fit and 135 retrofit. AESA milestone C and LRIP II approval was received in January 2004, for initial delivery with Lot 27 Super Hornets in FY 2005.

Developers
Boeing; St. Louis, Missouri
Raytheon; El Segundo, California

ASQ-228 Advanced Targeting Forward-Looking Infra-Red (ATFLIR)

Description
The ATFLIR will provide the F/A-18A+/C/D/E/F with a significantly enhanced capability to detect, track, and attack air and ground targets. New laser-guided and GPS standoff weapons systems, and higher-altitude attack profiles, require improved performance over the current AAS-38/46 Targeting FLIR. The ATFLIR is designed to provide a quantum leap in operational effectiveness to fully support the standoff precision strike mission.

Improved reliability and maintainability will increase operational availability while reducing total ownership costs.

Status
ATFLIR completed Phase I Operational Test and Evaluation in September 2003 and was determined to be operationally suitable and effective and recommended for further fleet introduction. ATFLIR achieved initial operational capability with VFA-102 in September 2003 and demonstrated its combat capability in support of OIF. The program was awarded MS III/FRP decision on October 17, 2003. The Navy will procure 66 ATFLIR in FY 2005. Program objective is 574 systems.

Developers
Boeing; St. Louis, Missouri
Raytheon; El Segundo, California

ASD-12V Shared Reconnaissance Pod (SHARP)

Description
The SHARP replaces the F-14 Tactical Airborne Reconnaissance Pod System (TARPS) and will be carried on the F/A-18F supporting strike warfare, amphibious warfare, and anti-surface warfare decision-making. SHARP provides near real time dual-band EO/IR medium and high altitude standoff imagery. SHARP incorporates NITF formatted day/night digital imagery utilizing the USQ-123 Common Data Link-Navy (CDL-N) for real time connectivity. SHARP deployed with VFA-41 in support of OIF in 2003 and with VFA-102 as part of the forward-deployed naval forces in Japan.

Status
SHARP MS III is scheduled for September 2005, with an IOC of October 2006 in June 2005; 21 pods are funded.

Developers
Raytheon; Indianapolis, Indiana
Recon Optical Inc.; Barrington, Illinois
L3Comm West; Salt Lake City, Utah

SUBSURFACE

BYG-1 Submarine Combat Control System

Description
The BYG-1 is the combat control system common across all submarine platforms (except *Ohio* (SSBN-726)-class) which incorporates tactical control, weapon control and Tactical Local Area Network (TacLAN) functions into a single procurement program. BYG-1 allows the submarine Navy to rapidly update the ship safety

tactical picture, integrates the common tactical picture into the battlegroup, improves torpedo interfaces, and provides tactical Tomahawk capability. BYG-1 systems will be continuously updated with hardware enhancements to address COTS obsolescence and capability improvements as defined by the Advanced Processor Build (APB) process. These updates are referred to as Tech Insertion (TI) kits and are differentiated by year of development (i.e., TI00, TI04, and so on). The TI upgrades provide the baseline for all future BYG-1 procurements. In addition, this budget also provides tech insertion "kits" to update existing BYG-1 platforms.

Status
BYG-1 is currently installed on 12 attack submarines and is scheduled to be installed on all attack submarines by FY 2012.

Developers
Raytheon; Portsmouth, Rhode Island
General Dynamics Advanced Information Systems; Manassas, Virginia
Progeny; Manassas, Virginia
Lockheed Martin; Eagan, Montana

WEAPONS

AIRBORNE

AGM-84E Standoff Land-Attack Missile (SLAM) and AGM-84H/K SLAM-Expanded Response (ER)

Description
The SLAM is based on the highly successful and reliable Harpoon anti-ship missile with a Global Positioning System (GPS)-aided Inertial Navigation System (INS) for mid-course guidance, a Maverick imaging infrared sensor, and a Walleye data link for precise, "man-in-the-loop" terminal guidance. SLAM provides the capability to conduct over-the-horizon attacks with precision. As Naval Aviation's follow-on to the SLAM Standoff Outside Area Defense (SOAD) weapon, SLAM-ER is a day/night, adverse-weather, precision-strike weapon with a range of more than 150 nautical miles. SLAM-ER provides the Navy and Marine Corps with improved precision-strike capability. A modified Tomahawk warhead improves lethality and penetration, while new planar wings double the range and allow terrain-following flight. Mission-planning time has been reduced to less than 30 minutes, and targeting has been improved via a "freeze frame" command that reduces pilot workload. SLAM-ER's effectiveness has been further increased with inclusion of an Automatic Target Acquisition (ATA) capability, making it a fully autonomous weapon and enhancing the missile's capability against small targets and targets in urban environments. ATA uses a match-

ing algorithm to recognize the aimpoint and surrounding scene, reducing or eliminating manual pilot intervention via a data link, while providing precise aimpoint placement. SLAM-ER also has an anti-ship capability and is testing land moving target capability.

Status
SLAM reached IOC in 1991 and was procured through FY 1995. In May 2000, SLAM-ER completed all developmental and operational testing and received approval to enter into full-rate production. The Navy will have procured 498 tactical SLAM-ERs through FY 2004.

Developers
Boeing; St. Louis, Missouri

AGM-88 High-Speed Anti-Radiation Missile (HARM)

Description
A joint-service program with the Navy as the lead service, HARM is the Navy's only anti-radiation, defense-suppression, air-to-surface missile. Employed successfully in naval operations for decades, HARM is designed to destroy or suppress broadcasting enemy electronic emitters, especially those associated with radar sites used to direct anti-aircraft guns and surface-to-air missiles. The AGM-88B (Block IIIA) and the AGM-88C (Block V) are the current fielded fleet configurations of the HARM.

The latest evolution of the HARM weapon system is the AGM-88E Advanced Anti-Radiation Guided Missile (AARGM). The AGM-88E is an ACAT-IC SDD program completing development in FY 2008. The AGM-88E was successfully demonstrated in the Quick Bolt ACTD, sponsored by European Command and completed in FY 2003. The AGM-88E project upgrades legacy HARM with a new guidance section incorporating multi-sensor, multi-spectral digital ARM detection capability, GPS/INS guidance, and a millimeter wave terminal seeker. AARGM also includes a netted situation awareness/targeting capability and weapon impact assessment reporting via direct connectivity with national technical means.

Status
FY 1992 was last year of production of Navy all-up HARM rounds. The AGM-88E AARGM planned IOC is FY 2009. The AGM-88E program plans conversion of 1,750 older AGM-88B weapons for the F/A-18C/D/E/F and EA-18G aircraft.

Developers
HARM: Raytheon; Tucson, Arizona
AARGM: ATK Missile Systems Company, Inc.;
Woodland Hills, California

AGM-154 Joint Standoff Weapon (JSOW)

Description
A new family of Stand-off Outside Point Defense (SOPD) weapons was added to the fleet with the introduction of the JSOW in 1999. A joint Navy/Air Force weapon-development program, with the Navy as the lead service, JSOW replaces five types of the aging air-to-ground weapons currently in the naval inventory. With war-proven effectiveness, the JSOW family of precision-guided weapons allows naval aircraft to attack targets at increased stand-off distances, greatly increasing aircraft and aircrew survivability. The JSOW is usable in adverse weather conditions, and gives air-crews the ability to attack multiple targets in a single sortie. The JSOW family uses a common weapon body or "truck" for all variants. The AGM-154A variant carries BLU-97 combined-effect bomblets for use against area targets. The AGM-154C (Unitary) was developed with a penetration warhead (BROACH).

Status
AGM-154A reached IOC in 1999, and the AGM-154C variant reached IOC in FY 2005. Procurement of JSOW C continues across the FYDP with a total of 2,938 units FY 2005-2011.

Developers
Raytheon; Tucson, Arizona

AIM-9X Sidewinder Short-Range Air-to-Air Missile

Description
A major modification to the AIM-9M Sidewinder, the AIM-9X is a joint USN/USAF program that upgrades the missile with a staring focal plane array in the seeker, an extremely agile airframe, and state of the art signal processors resulting in enhanced target acquisition, missile kinematics, and improved infrared counter-countermeasures capabilities. The missile will provide the U.S. fighters with air superiority well into the 21st century. When coupled with the Joint Helmet-Mounted Cueing System, the Sidewinder's high off-boresight capability will revolutionize the way these air-to-air missiles are employed. Current integration includes the F/A-18A+/C/D Hornet with integration on the F/A-18E/F Super Hornet underway; the Navy has planned IOC for mid-2005.

Status
Operational testing was completed in summer 2003. The first Low Rate Initial Production (LRIP) contract deliveries began in September 2002 with the second and third LRIPs awarded in November 2002 and November 2003 respectively. Approval for

the fourth LRIP was received July 2003 and full-rate production approval was received May 2004. The program funds 889 AIM-9X missiles in the FYDP, including 135 in FY 2005.

Developers
Raytheon; Tucson, Arizona

AIM-120 Advanced Medium-Range Air-to-Air Missile (AMRAAM)

Description
The AIM-120 AMRAAM missile is deployed on the F/A 18A+/C/D Hornet and the F/A-18E/F Super Hornet and will be deployed on the EA-18G and Joint Strike Fighter (JSF) aircraft. Joint Air Force and Navy procurement of AMRAAM continues and deliveries of the AIM-120C are under way. The AIM-120C Pre-Planned Product Improvement (P3I) Program is a key factor in maintaining medium-range air superiority. This modernization plan includes clipped wings for internal carriage, a propulsion enhancement program, increased warhead lethality, and enhanced electronic counter-countermeasures (ECCM) capabilities through hardware and software upgrades. Ultimately, AMRAAM will be the Department of the Navy's sole Medium/Beyond Visual Range (M/BVR) missile. As part of the continuing weapons neck-down strategy, the radar-guided AIM-54C Phoenix has been phased out. The AIM-7 Sparrow will be phased out by the end of the FYDP and no further software or hardware improvements are planned for this legacy weapon.

Status
Deliveries of the AIM-120C began reaching the fleet in 1996. The AIM-120C-7 configuration is a product of P3I Phase 3 and is scheduled to achieve IOC in FY 2006. Continued procurement of the joint AMRAAM, with a P3I Phase 4 contract, will provide significant network-centric warfare capability, GPS, improved high-off-boresight capability, and missile kinematics. Phase 4 AMRAAM is scheduled to IOC in FY 2008. Planned procurement across the FYDP is 587 missiles, including 46 in FY 2005.

Developers
Raytheon; Tucson, Arizona

GBU-10/12/16/24 Laser-Guided Bomb (LGB)

Description
The LGB is a joint Navy/Air Force effort with the Air Force as the lead/executive service for procurement. An LGB is comprised of an MK-80/BLU-series warhead fitted with a laser-guidance kit consisting of a Computer Control Group (CCG), mounted on the nose of the bomb body, and a rear-mounted Airfoil Group (AFG).

The warhead is initiated by an electronic fuse housed in the aft section of the bomb body. The seeker, housed in the CCG, senses laser energy and sends signals to the CCG canards to guide the weapon to the reflected energy spot. The laser energy can be applied to the target by ground or airborne designators, and even self-designated by laser-configured aircraft. LGBs include Paveway I, which has been retired; Paveway II, the current variant (GBU-10, 12, and 16) that uses MK-80/BLU series general-purpose bomb bodies; and Paveway III (GBU-24) that uses the BLU-109 bomb body incorporating state-of-the-art guidance and control features. Paveway II LGBs are designated GBU-12 (500-pound class), GBU-16 (1,000-pound class), and GBU-10 (2,000-pound class).

Status
Procurement continues through FY 2008.

Developers
Raytheon Company; Tucson, Arizona
Lockheed Martin; Bethesda, Maryland

GBU-31/32/38 Joint Direct Attack Munition (JDAM)

Description
The JDAM is a multi-service program, with the Air Force as the lead service, for a strap-on, Global Positioning System (GPS)-aided, Inertial Navigation System (INS) guidance kit to improve the accuracy of existing 500-pound, 1,000-pound and 2,000-pound general-purpose and penetrator bombs (BLU-109) in all weather conditions. JDAM is a true force multiplier, allowing a single aircraft to attack multiple targets from a single release point, and has been proven in operations in Iraq, Kosovo, and Afghanistan.

Status
LRIP for the 2,000-pound kits began in FY 1997, and milestone III was reached in FY 2001. The 1,000-pound JDAM kit reached IOC in FY 2002, and IOC for the 500-pound weapon occurred during the second quarter of FY 2005. Procurement of JDAM continues across the FYDP, with 19,420 kits programmed.

Developers
Boeing; St. Louis, Missouri

Joint Common Missile (JCM)

Description
The JCM is a follow-on reactive precision-guided missile to replace Maverick, Hellfire, and Tube-launched Optically-tracked Wire-guided (TOW). The Army is the lead service for acquisition

of this weapon, which is the Strike Operational Advisory Group's number-one priority. The JCM will provide fixed-wing aircraft and helicopters with a precision weapon that is designed to kill moving and short-dwell re-locatable targets. The weapon system includes a precision multi-mode seeker with fire-and-forget capability, a dual-mode warhead and an advanced launcher for fixed wing aircraft. The JCM will provide twice the engagement range of Hellfire. No other weapon is currently capable of providing reactive targeting. Replacement of Hellfire/Maverick/TOW is a significant issue for Naval Aviation in order to prosecute the assigned target set effectively.

Status
The JCM program was terminated in 2005.

Developers
Lockheed Martin; Bethesda, Maryland

SUBSURFACE, SURFACE, AND EXPEDITIONARY

Advanced Gun System (AGS)

Description
The 155mm AGS is planned for installation in the DD(X) destroyer (see separate program summary) to provide precision, volume and sustained fires in support of distributed joint and coalition forces ashore. AGS is a fully integrated, automatic gun and magazine weapon system that will include two separate guns for each DD(X) warship. Each system will be capable of independently firing up to 10 rounds per minute from a fully automated magazine. The AGS program includes development of the GPS guided 155mm Long-Range Land-Attack Projectile (LRLAP), the first of a family of AGS munitions. AGS, fully integrated into DD(X), is designed to meet the reduced manning and radar-signature requirements of DD(X) ship program.

Status
The program started in FY 1999 and is an integral part of the DD(X) program. The first gun system is scheduled for delivery in FY 2008, to support the first DD(X) fleet delivery in FY 2011.

Developers
United Defense Limited Partnership, Minneapolis, Minnesota, in partnership with the DD(X) industry team led by Northrop Grumman Ship Systems and Raytheon

Advanced Tomahawk/Tactical Tomahawk Weapon Control System (ATWCS/TTWCS)

Description

ATWCS is an evolutionary upgrade to the current Tomahawk Weapon Control System. ATWCS uses COTS/GOTS hardware and software to reduce overall reaction time and operator workload, enhance training capabilities at all levels, and improve the Tomahawk Land-Attack Missile's (TLAM) effectiveness. ATWCS incorporates an open system architecture to provide for future growth, eliminates stand-alone Tomahawk desktop computers, and enhances command-and-control interoperability. It will be phased-in through two releases: Track Control Group Replacement (TCGR) and Launch Control Group Replacement (LCGR). TTWCS is a significant upgrade to the Tomahawk Weapon System and incorporates an ATWCS COTS/GOTS refresh. TTWCS provides the firing platform the ability to conduct mission planning and coordination functions, monitor Battle Damage Indication and Imagery (BDII), flex in-flight TLAMs to alternate preplanned aimpoints, and receive in-flight health and status updates from the missile. Most significantly, TTWCS provides the ship with the onboard ability to plan Global Positioning System (GPS)-only Tactical TLAM missions and retarget in-flight Tactical TLAMs to new GPS coordinates. TTWCS will be fully compatible with all versions of TLAMs.

Status

TCGR reached IOC in September 1998. LCGR reached IOC in 2000. Funding support for ATWCS, balanced against other requirements, is within available resources. TTWCS has completed Developmental Testing and Operational Evaluation. The Block III weapon control system capability IOC in 2003 allowed TTWCS to shoot Block IV missiles. Full Block IV IOC occurred in 2004 with introduction of the Tactical Tomahawk missile. The USS *Stethem* (DDG-63) launched a Block III and several Block IV Tomahawk missiles using the new TTWCS, successfully testing Launch Platform Mission Planning (LPMP). LPMP enables individual ships and submarines to plan and execute Tomahawk cruise missile strikes with both the Block III and Tactical Tomahawks.

Developers

Hardware: DRS Laurel Technologies; Johnstown, Pennsylvania, Boeing, St. Louis, Missouri.
Software: Telos; Ashburn, Virginia, Raytheon; San Jose, California, Southeastern Computers Consultants, Inc.; Austin, Texas, Lockheed Martin MDS; Valley Forge, Pennsylvania, Naval Surface Warfare Center; Dahlgren, Virginia, and Naval Underwater Warfare Center; Newport, Rhode Island

BGM-109/UGM-109 Tomahawk Land-Attack Missile (TLAM)

Description

The TLAM is the Navy's premier, all-weather, long-range, subsonic land-attack cruise missile deployed on surface warships (BGM-109) and attack submarines (UGM-109 on both SSNs and SSGNs). The TLAM/C variant is armed with a unitary conventional warhead, while the TLAM/D variant is armed with submunitions. The original TLAM's guidance incorporated an onboard Inertial Navigation System (INS) and a Terrain Contour Matching (TERCOM) system that correlates actual terrain contour with stored terrain contour. Additional accuracy was attained through multiple Digital Scene Matching Area Correlation (DSMAC) updates, which take digital pictures of the terrain and compare them with stored digital maps. The TLAM Block III upgrade improves accuracy and global strike capability with the addition of Global Positioning System (GPS) guidance capability, improved DSMAC IIA, and increased range. Tactical Tomahawk (TACTOM), the Block IV upgrade to TLAM, preserves Tomahawk's long-range precision-strike capability while significantly increasing responsiveness and flexibility at significantly lower cost. TACTOM improvements include:

- ***In-flight retargeting***
- ***Ability to loiter over the battlefield and to respond to emergent targets***
- ***Ability to monitor the health and status of the missile in flight via a satellite data link***
- ***Battle Damage Indication Imagery capability that gives a digital look-down "snapshot" of the battlefield and sends it via satellite data link***
- ***GPS mission planning onboard the launch platform, enabling the shooter to plan and rapidly execute strike missions against emergent battlefield targets***
- ***Improved anti-jam GPS that minimizes the susceptibility to jamming***
- ***A missile design that allows for alternative payloads, including smart submunitions, a penetrator warhead, and multiple response warhead.***

Status

TACTOM program began in FY 1998, and full IOC occurred in FY 2004. The Navy completed the first ground test of the TACTOM missile in 2002, vertically launching the missile, which flew a fully guided 550-mile flight using the GPS and digital scene matching area correlation navigation updates. Through the end of CY 2003, eight of eight successful flight tests from both surface ships and attack submarines demonstrated all system capabilities. Current plans call for the Navy to procure more than 2,200 TACTOM missiles. Additional TACTOM procurement is constrained by fiscal priorities.

Developers

Raytheon Missile Systems; Tucson, Arizona

Electromagnetic Railgun

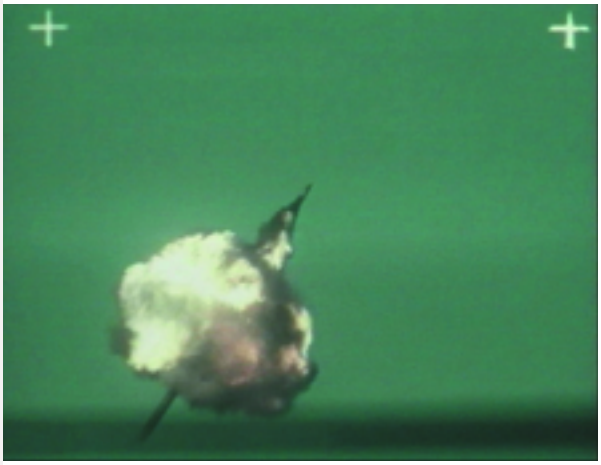
Description
The Electromagnetic Railgun is a long range, direct/indirect fire weapon system that uses a hypersonic electromagnetic-launched guided projectile with kinetic energy lethality. It will provide long range naval surface fires support (200-400nm), provide significantly shorter time-of-flight than current land-attack missile systems, and high-lethality (energy-on-target).

Status
Not yet a formal program of record, the Railgun is being evaluated for naval applications using Science & Technology funding. A Railgun research facility is being built at the Naval Surface Warfare Center, Dahlgren, Virginia

Developers
To be determined.

Extended-Range Munition (ERM)

Description
The ERM is a rocket-assisted projectile capable of carrying a Unitary blast-fragment warhead with an associated height-of-burst fuze. The 100 plus-pound aerodynamic projectile is five inches in diameter and 61 inches in length and uses a coupled Global Positioning System/Inertial Navigation System (GPS/INS) guidance system. The guidance system is resistant to jamming, enabling the ERM to attack targets in an electronic countermeasures environment. Its long range and precise GPS targeting capability will improve Naval Surface Fire Support (NSFS) and provide gunfire support for expeditionary operations, suppression, and destruction of hostile anti-shipping weapons and air defense systems in support of the joint land battle.



Status
Milestone I/II was reached in July 1996, allowing the ERM to enter EDD. Developmental work continues as the program overcomes technical challenges. Work also continues on increasing lethality, designing the highly accurate guidance system that can withstand the harsh environment encountered during a gun firing, and other areas to provide cost-effective, accurate, and lethal munitions that meet NSFS requirements. Competitive competition to award final phase of EDD in the first quarter of FY 2006.

Developers
To be determined.

MK-45 Mod 4 Five-Inch/62-Caliber Gun System Upgrade

Description

The MK-45 Mod 4 5-inch 62 Gun will significantly enhance Naval Surface Fire Support capabilities, significantly improve maintenance procedures, and provide fire mission flexibility for anti-surface and anti-air warfare. The 5-inch (127mm)/62-caliber MK-45 Mod 4 gun incorporates structural improvements to accommodate higher energies required to fire Extended-Range Munitions (ERM) and the current inventory of conventional 5-inch ballistic ammunition. Modifications include a longer (62-caliber) barrel, an Ammunition Recognition System, a Gun/ERM interface and a digital control system. Modifications to the ammunition magazine for the MK-45 Mod 4 gun have also been developed to facilitate stowage of the larger ERM rounds and assist shipboard ammunition handling personnel with handling and loading the heavier rounds. The MK-45 Mod 4 gun is currently being forward-fit in *Arleigh Burke* (DDG-51)-class Aegis destroyers (DDGs 81-112).

Status

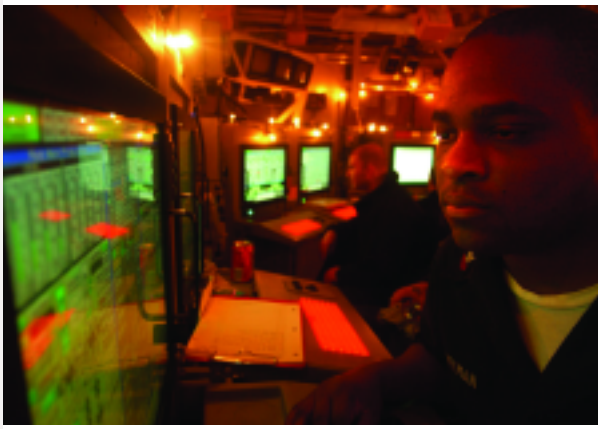
Milestone I/II was reached in January 1996, allowing the MK-45 Mod 4 Gun to enter EMD. The Navy awarded the MK-45 Mod 4 gun design and development contract on February 5, 1996. Three MK-45 Mod 4 kits have been produced to facilitate development and testing. The first kit was installed in a proof of concept gun, which successfully completed testing in July 1997 at the Naval Surface Warfare Center, Dahlgren (NSWC/DD) Virginia. All critical exit criteria associated with land-based testing were met allowing for LRIP approval on 12 April 1999. The gun completed testing with conventional rounds in 2003 and was approved to fire conventional ammunition per April 24, 2004 milestone C decision. The gun will be evaluated for ERM functionality in parallel with the ERM test schedule. There are currently 14 DDG-51 destroyers equipped with the MK-45 Mod 4 gun. The program's procurement rate has been balanced within available resources.

Developers

United Defense Limited Partnership; Minneapolis, Minnesota

Naval Fires Control System (NFCS)

Description
The NFCS is the enabler for surface land-attack in network-centric warfare operations. It automates shipboard land-attack battle-management duties, and communicates with the ground force's primary fire support command and control network, the Advanced Field Artillery Tactical Data System (AFATDS). NFCS will be interoperable with joint C4ISR systems, providing the mission-planning and fire-support coordination functions required to support expanded mission capability afforded by the extended range and precision accuracy of the improved MK-45 Mod 4 (5-inch/62-caliber) gun, Extended Range Munition (ERM), and the Advanced Gun System (AGS). See separate program summaries



Status
Milestone III was reached on December 6, 2004 which authorized full-rate production of NFCS with a limited fleet introduction. IOC is expected in June 2005, contingent upon successful demonstration that the operational test deficiencies have been corrected. Program development and procurement is on track for installation on DDGs 81-112 and CGs 52-73. A total of 45 systems (32 DDGs and 13 CGs) are planned for fielding FY 2005-2011.

Developers
NSWC/DD; Dahlgren, Virginia
SPAWAR; San Diego, California
NUWC; Keyport, Washington
General Dynamics Information Systems (GDIS); Arlington, Virginia
GEC-Marconi Electronics Systems; Wayne, New Jersey