SEA STRIKE

PLATFORMS

Aircraft

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

Description

The AH-1 and UH-1 Upgrade Program will ensure that the MAGTF possesses credible rotary-wing attack and utility support platforms for the next 20 years. The H-1 Upgrade Program will provide 100 UH-1Ys and 180 AH-1Zs to the Warfighter. The H-1 Upgrade Program is designed to reduce life-cycle costs, significantly improve operational capabilities, and extend the service life of both aircraft. Eighy four percent commonality between the two aircraft will greatly enhance the maintainability and deploy-ability of the systems, with the capability to support and operate both aircraft within the same squadron structure.

The Upgrade Program replaces the current two-bladed rotor system on the UH-1N and AH-1W aircraft with a new four-bladed, all-composite rotor system, coupled with a sophisticated fully integrated, state-of-the-art cockpit. In addition to the new main rotor system and cockpit, the H-1 Upgrade will incorporate a new performance-matched transmission, a four-bladed tail rotor and drive system, and upgraded landing gear for both aircraft. The integrated glass cockpit with modern avionics systems will provide a more lethal platform, as well as enhanced joint interoperability through the digital architecture. Operational enhancements include a dramatic increase in range, speed, payload, and lethality of both aircraft, with a significant decrease in logistics footprint. The UH-1Y will operate at nearly twice the current range with more than double the payload. The AH-1Z will realize similar performance increases, with the ability to carry twice the current load of precision-guided munitions.

The H-1 Upgrade Program is an economical and comprehensive upgrade of both UH-1N and AH-1W helicopters, which will resolve existing operational safety issues, while significantly enhancing the capability and operational effectiveness of the attack and utility helicopter fleet. A key modernization effort, the H-1 Upgrade will provide a bridge until the introduction of a Joint Advanced Rotorcraft design. Due to substantial operational demands and aircraft attrition, both resulting from the Global War on Terrorism, the Marine Corps has adopted a "build new" strategy for the UH-1Y beginning in FY 2006 and is currently examining a "build new" strategy for the AH-1Z in order to preclude significant inventory shortfalls.

Status

The preliminary design review was approved in June 1997, and the

critical design review was completed in September 1998. Low rate initial production began in the first quarter FY 2004. Five EMD (Engineering and Manufacturing Design) aircraft have been produced, four of which will eventually become composite maintenance trainers and one aircraft (without an integrated avionics suite) which was used for live-fire test and evaluation. Phase I of OPEVAL concluded in November 2006, with Phase II scheduled to begin in Fall of 2007. Delivery of production aircraft began in January 2007. The UH-1Y is scheduled to meet IOC in the fourth quarter of FY 2008 while the AH-1Z will meet IOC in the third quarter of FY 2011. FOC for the UH-1Y is FY 2012, and FOC for the AH-1Z is FY 2018.

Developers
Bell Helicopter Textron; 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 MAGT. 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., roads, FARPs), and damaged conventional airfields.

Two variants of the aircraft are in operational service: the Night Attack and the Radar/Night Attack Harrier. The Night Attack Harrier improved upon the original AV-8B design by incorporating a Navigation, Forward-Looking InfraRed (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 AN/APG-65 multi-mode radar. The fusion of night and radar capabilities allows the Harrier to be responsive to the MAGTF's needs for expeditionary, night, and adverse weather offensive air support.

Status
The AV-8B Harrier Open Systems Core Avionics Requirement (OSCAR), which updates obsolete software and computer equipment, has entered service. OSCAR with Operational Flight Program H2.0 enables the AV-8B to employ both 1,000 and 500-pound variants of the Joint Direct Attack Munitions and provides tremendous improvements in radar and Litening advanced targeting pod capability.

The Litening advanced targeting pod provides the AV-8B with a significant improvement in its lethality and survivability. This third-generation, forward-looking infrared set, dual field-of-view TV seeker, and infrared marker provides improved target recogni-

tion and identification, while the laser designator and laser spot tracker provide precision targeting capability. Some Litening pods have also been equipped with a video downlink, which enables real-time video to be sent to ground-based commanders and forward-air controllers. This facilitates time-sensitive targeting and reduces the risk of fratricide and collateral damage.

In order to maintain a world-class training environment, the two-seat TAV-8B trainers are undergoing an upgrade program that adds new color displays, night vision goggle-compatible lighting, and a more powerful and reliable Rolls Royce Pegasus (408) engine. These improvements are increasing the training capability of the AV-8B fleet replacement squadron, as well as the abilities of our replacement pilots reporting to their fleet squadrons. The enhancements to the Harrier are a critical link for providing continued support to the MAGTF, until the JSF transition is complete.

Developers
Boeing: St. Louis, Missouri

CNATRA Naval Aviation Training Aircraft

Description
Commander, Naval Air Training Command's (CNATRA) mission, the on-time delivery of aviators (USN/USMC/USAF/USCG pilots and military flight officers) trained with leading edge technologies, is key to affordable fleet readiness and *Sea Power 21*. CNATRA's training aircraft inventory include the T-34C TurboMentor, T-6A Texan II, TH-57, T-2 Buckeye, T-45 Goshawk, T-44A Pegasus, TC-12 Huron, and the T-39 Sabreliner.

The first aircraft that all aspiring future USN/USMC pilots and flight officers fly is the T-34C TurboMentor (pilots) and the T-6A Texan II (flight officers). The T-34 started its Navy career in 1977 and has successfully and honorably completed its service at NAS Pensacola where it was a primary training aircraft for student Naval Flight Officers (NFOs). While still in use at NAS Whiting Field and NAS Corpus Christi, the TurboMentor is scheduled to be replaced with the T-6A with Avionics Upgrade Package (AUP), Texan II in FY 2011 at Whiting Field and FY 2015 at Corpus Christi.

The T-6A w/AUP Texan II is one component of the Joint Primary Aircraft Training System (JPATS) along with simulators, computer-aided academics, and a Training Integration Management System (TIMS). The aircraft, built by Raytheon Aircraft Company, is a derivative of the Swiss Pilatus PC-9 aircraft with a Pratt & Whitney PT-6A-68 engine, digital cockpit, Martin-Baker ejection seats, cockpit pressurization, and an onboard oxygen-generating system. In FY 2007 the Navy resumes full-scale procurement of the T-6A.

The T-2C Buckeye is used for the tactical maneuvering portion of

Strike/Strike-Fighter NFO training at NAS Pensacola. Designed in the mid-1950s, the Buckeye is scheduled to be divested by FY 2010 and it will be replaced by the T-45 Goshawk.

The T-45 Goshawk, the Navy version of the British Aerospace Hawk aircraft, is used for the intermediate and advanced portions of the Navy/Marine Corps pilot training program for jet carrier aviation and tactical strike syllabus. The T-45 replaces the T-39/T-2 as the training platform for the Strike Fighter Undergraduate Military Flight Office (UMFO) training program. Upgrades to the T-45 include converting all analog cockpits (T-45A) to digital cockpits (T-45C), resolving an engine surge issue to make the aircraft more fuel efficient and safer to operate, and extending service life until 2030. The T-45 is currently in production and the last aircraft will be procured in FY 2007.

The TH-57 Sea Ranger, a derivative of the commercial Bell Jet Ranger 206, is the Navy's sole advanced rotary training platform used at NAS Whiting Field. Upgrades to the TH-57 currently underway include energy attenuating seats, exceedence warning systems and a digital cockpit, guaranteeing aircraft availability and relevance to 2025.

The T-44A Pegasus and the TC-12 Huron are both twin-engine, pressurized, fixed-wing aircraft that are used for intermediate and advanced training for multi-engine aircraft. Future upgrades to both aircraft include wing wiring (T-44A), simulator visual upgrades (T-44A) and digital cockpit for the T-44A.

The T-39 Sabreliner is a multipurpose low-wing, twin-jet aircraft that has been in Naval service since the early 1990's. The primary mission of the Sabreliner is to conduct intermediate and advanced training for Strike/Strike-Fighter NFOs. The T-39 will also be replaced by the T-45 with a Virtual Mission Training System (VMTS) in the NFO syllabus.

CNATRA has recently charted a course to revolutionize NFO training by utilizing the T-6, the T-45C with VMTS and high fidelity simulators to train future NFO's. This new training program will capitalize on cutting edge technologies, while allowing the Navy to divest two aging platforms (T-2, T-39). The new program is planned for IOC at NAS Pensacola in FY 2010.

Status
T-45 and T-6 are currently in production. T-45 procurement programs for 12 aircraft in FY 2007, to meet an inventory requirement of 223. Production line shutdown scheduled for FY 2008. The planned inventory objective is 315 aircraft.

Developers
Ratheon (T-6); Wichita, Kansas
Boeing (T-45); St. Louis, Missouri

E-6B Mercury

Description
The E-6B 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-6B performs VLF emergency communications, the U. S. 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-6B capability, the Block I modification program was developed. The contract for Block I was awarded to Rockwell Collins in March 2004 and it is designed to repair a number of aircraft deficiencies identified by U. S. Strategic Command. IOC is planned for FY 2012. In addition, the Internet Protocol and Bandwidth Expansion program was initiated in 2005 to modernize the E-6B platform as an airborne node of the Distributed National Command and Control system. IOC is planned for FY 2009.

Developers
Boeing; Seattle, Washington
Rockwell Collins; Cedar Rapids, Iowa
L3/VERTEX Aerospace; Madison, Mississippi

EA-6B Prowler Airborne Electronic Attack Aircraft (AEA)

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 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 traditional and non-traditional target sets in support of ground forces. These capabilities continue to be demonstrated in the Global War on Terror where EA-6B operations in Afghanistan and Iraq protect coalition forces and disrupt critical communications links. The enormous demand for AEA in Operation Enduring Freedom and Operation Iraqi Freedom has driven EA-6B utilization rates to record levels.

Status
The Improved Capability (ICAP) III upgrade reached IOC in September 2005 with the "Cougars" of VAQ-139. This generational leap in electronic attack capability deployed for the first time in

2006. The ICAP III includes a completely redesigned receiver system (ALQ-218), new displays, and MIDS/Link-16, which dramatically improve joint interoperability. Additionally, the ALQ-218 will also form the heart of the EA-18G "Growler" AEA system – the follow on platform for the EA-6B.

Developers
Northrop Grumman Corporation; Bethpage, New York

EA-18G Growler Airborne Electronic Attack Aircraft

Description
The EA-18G Growler will replace the EA-6B Prowler as DoD's sole tactical electronic attack aircraft. Like the Prowler, the EA-18G will provide full-spectrum electronic attack to counter enemy air defenses and communication networks. The Growler will maintain a high degree of commonality with the F/A-18F, retaining the latter's inherent strike-fighter and self-protection capabilities while providing air-to-air self-protection to free other assets for other strike-fighter tasking.

Status
The EA-18G Growler is on schedule and under budget as it progresses towards 2009 IOC. The aircraft completed Critical Design Review in April 2005 and initial procurement of the first four aircraft began in FY 2006. The Growler's first flight was flown one month ahead of schedule in August 2006 and is currently undergoing test and development at NAS Patuxent River, Maryland. An inventory objective of 84 aircraft is planned to support a 10-squadron carrier based force structure.

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 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 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 FA-18A through Ds are out of production, the existing inventory of 673 Navy and Marine Corps aircraft will continue to comprise half of Naval Aviation's strike assets through 2012, and will serve in active squadrons until 2023.

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

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

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

Status
Aircraft FA-18E-1 first flew on 29 November 1995 and full-rate production deliveries commenced in October 2001. The Navy awarded a multi-year contract, compared to five single-year contracts, for procurement of 222 aircraft from 2000-2004, saving taxpayers 7.4 percent ($700 million). A second multi-year contract was awarded in FY 2004 for 210 aircraft procured in 2005 through 2009, saving $1 billion over the single-year price. In June 2002, Navy awarded a multi-year contract for production of 480 engines, saving another $51 million. The first Super Hornets to deploy were onboard USS *Abraham Lincoln* (CVN 72) in the summer 2002. VFA-115 (FA-18E) led strikes into Iraq on the opening night of Operation Iraqi Freedom. The second and third Super Hornet squadrons to deploy, VFA-14 (FA-18E) and VFA-41 (FA-18F), flew from USS *Nimitz* (CVN 68) in spring 2003. This deployment initiated 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. ATFLIR reached IOC with VFA-102 in September 2003. Lot 26

(and beyond) FA-18E/Fs will have Active Electronically Scanned Array (AESA) Radar Systems. Pacific Fleet aircraft are based at NAS Lemoore, California and forward deployed to NAF Atsugi, Japan. NAS Oceana, Virginia and MCAS Cherry Point, North Carolina have been chosen as Atlantic Fleet home bases.

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

F-35 Joint Strike Fighter (JSF)

Description
The JSF F-35 Lightning II program will deliver a transformational family of next-generation strike aircraft, combining stealth and enhanced sensors to provide lethal, survivable, and supportable tactical jet aviation strike fighters that complement the FA-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 share a high level of commonality while meeting U.S. service and allied partner needs. The keystone of this effort is a mission systems avionics suite that delivers unparalleled interoperability among U.S. armed services and 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 sixth year of a planned 12-year SDD program. The 31 March 2006 Defense Acquisition Board approved: long-lead funding for LRIP Lot 1 CTOL aircraft; general framework for International Participation in Operational Test; close-out of prior Block 2 net-centric capabilities tasking; and decision criteria for LRIP 1 full funding and LRIP 2 long-lead funding. First CTOL variant SDD flight is scheduled for first quarter FY 2007. First STOVL flight is scheduled for second quarter FY 2008, and the first CV flight in second quarter FY 2009. Marine Corps has scheduled IOC in 2012 and the Navy in 2015. All key performance parameters are projected to be met at IOC. The DoD Base Realignment and Closure Commission 2005 directed the first JSF Integrated Training Center to be at Eglin Air Force Base, Florida.

Developers
Lockheed Martin; Fort Worth, Texas
Pratt Whitney (PW F135 engine); East Hartford, Connecticut

MV-22 Osprey

Description

The MV-22 Osprey is a tilt-rotor, Vertical/Short Take-Off or Landing (V/STOL) aircraft designed as the medium-lift replacement for the Vietnam-era CH-46E and CH-53D helicopters. The MV-22 design incorporates advanced technologies in composite materials, survivability, airfoil design, fly-by-wire controls, digital avionics, and manufacturing. The MV-22 is capable of carrying 24 combat-equipped Marines or a 10,000-pound external load, and has a strategic self-deployment capability of 2,100 nautical miles with a single aerial refueling. The MV-22 flight capabilities are far superior to the CH-46E it replaces in that is has twice the speed, three times the payload, and six times the range. The MV-22's 38-foot proprotor system and engine/transmission nacelle mounted on each wingtip allow it to operate as a helicopter for take-off and landing. Once airborne, the nacelles rotate forward 90 degrees, transitioning the MV-22 into a high-speed (240+ knots), high-altitude (25,000 feet), fuel-efficient turboprop aircraft. The MV-22 represents a revolutionary change in aircraft capability to meet a plethora of expeditionary and unique missions for the 21st Century. A Special Operation Forces variant, the CV-22, is being procured by the U.S. Air Force and SOCOM.

Status

The MV-22 completed OPEVAL in June 2005 and designated operationally suitable and operationally effective. The aircraft was subsequently approved for Milestone III and full-rate production in September 2005. The FY 2007 budget contains fourteen MV-22s and two CV-22s. Production is currently ramping up to full-rate. Congress authorized a Joint five-year, multi-year procurement contract (FY 2008 - FY 2012) which will award during the second quarter of FY 2007. The program of record includes 360 MV-22s for the Marine Corps, 50 CV-22s for USSOCOM, and 48 MV-22s for the Navy, for a total of 458 V-22 aircraft. The Osprey will reach IOC in FY 2007. Three CH-46E squadrons (HMM-263 /HMM-162/HMM-266) have been retired and have entered the transition and training to become operational MV-22 squadrons. HMM-263 and HMM-162 have been redesignated as VMM squadrons, and VMM-263 is set for the first operational MV-22 deployment in 2007.

Developers

Bell Helicopter Textron; Fort Worth, Texas
Boeing Defense and Space Group, Helicopter Division; Philadelphia, Pennsylvania
Rolls Royce; Indianapolis, Indiana

Navy Unmanned Combat Air System (N-UCAS)

Description
Originating as two prototype developments for the Navy and Air Force, it became a DARPA managed joint program (J-UCAS) in FY 2004. Program management transferred to the Air Force in FY 2006. The 2005 QDR and other program decisions restructured the J-UCAS program to initiate development of an "unmanned longer-range carrier-based aircraft ... to provide greater standoff capability ... and increase naval reach and persistence." Program management and associated technologies were transferred to the Navy in August 2006. The CV demonstration will mature technologies and reduce risk in preparation for a follow-on acquisition program. The primary operational objective for the Navy is for a carrier based, multi-mission unmanned Low Observable vehicle that conducts surveillance, reconnaissance, strike, and suppression of enemy air defenses. The Navy's emphasis at IOC is on the penetrating surveillance/reconnaissance role, where target identification and precise location capability best leverage the significant Navy investment in stand-off weapons. The acquisition program will field Navy UCAS in the 2021 time frame.

Status
The program intends to hold a limited competition to develop, build and test a CV-based UCAS Demonstration System. Participants will be limited to the Boeing Company and Northrop Grumman Systems Corporation. The Demonstration System effort will be structured to mature critical technologies and reduce risk for aircraft carrier integration of an operationally relevant UCAS with Low Observable platform. This will include Carrier Controlled Approach operations, launch and recovery operations, deck operations and supportability. Activities will focus on a shipboard demonstration in 2013. The Program Office anticipates release of a request for proposal in early FY 2007.

Developers
To be determined.

VH-71A Presidential Helicopter Replacement

Description
The VH-3D/VH-60N presidential helicopter replacement, recently designated VH-71A, is a conventional helicopter based on the Agusta Westland EH-101. 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. VH-71A will have increased capabilities in these areas, while retaining its core capabilities carried forward from the VH-3D and VH-60N.

Status
Milestone B/C Defense Acquisition Board held on 12 January 2005. Milestone B was approved for Increment I and II System Development and Demonstration (SDD). Milestone C was approved for five pilot production Increment I aircraft. The SDD Contract for Increment I and II was awarded to Lockheed Martin on 28 January 2005. IOC is planned for first quarter FY 2010.

Developers
Lockheed Martin; Agusta, Westland
Lockheed Martin; Owego, New York
Bell Helicopter
General Electric

SURFACE AND EXPEDITIONARY WARFARE SHIPS AND CRAFT

Aircraft Carriers

CVN 68, CVN 21 *Nimitz* and CVN 21 Program

Description
There are currently nine *Nimitz*-class nuclear-powered aircraft carriers in active service, comprising more than three-quarters of the U.S. Navy's aircraft carrier force. Since USS *Nimitz* (CVN 68) was commissioned in 1975, these ships replaced, on a one-for-one basis, an ever-aging fleet of fossil-fueled carriers. In doing so, they have allowed the Navy to maintain an operational fleet that meets the Fleet Response Plan commitments, as well as the presence requirements for Combatant Commanders in support of national goals. The mission of the *Nimitz* -class aircraft carrier is to support and operate the aircraft that engage in attack, survey, and conduct electronic warfare against sea-borne, air-borne, and land-based targets in support of Joint and Coalition forces. America's carriers deploy throughout the world in support of U.S. strategy and commitments. Additionally, our carriers continue to play an increasingly important role as the Navy adjusts its emphasis toward the world's littoral regions. This becomes especially important as permanent forward-deployed, land-based forces are brought home to the United States.

While the baseline *Nimitz* design is still one of the most potent

warfighting machines ever made, little has been invested in research and development during the past 40+ years that could have incrementally incorporated leading-edge technologies and systems into these premier capital ships. It is primarily for this reason that the Navy has embraced a program to develop, acquire, and operate a new-design aircraft carrier to replace all U.S. aircraft carriers in service today. In 1993, in an effort to ensure that a new class of aircraft carriers would capture the elements of the Revolutions in Military and Business Affairs, the Navy established a future sea-based air platforms working group to investigate the requirements and technologies and systems available at the time. Based primarily on these initial studies, the Navy established the CVN 21 Program to develop an evolutionary, next-generation, nuclear-powered aircraft carrier.

CVN 78, the lead ship of the CVN 21 Program, is scheduled for delivery to the Fleet in late 2015. The follow ships, CVN 79 and CVN 80, will be built as CVN 78 repeats at four-year intervals and are expected to deliver to the fleet in 2019 and 2023, respectively. Following this and subsequent three-ship blocks, a fifth year will be inserted into the construction cycle to allow for the insertion of new technologies that have evolved in the previous decade. This class of aircraft carriers will incorporate such advanced features as: a new, more efficient nuclear propulsion plant, an Electro-Magnetic Aircraft Launch System (EMALS), Advanced Arresting Gear (AAG), and a nearly three-fold increase in electrical generation capacity when comparing it to a *Nimitz*-class carrier. These improvements, coupled with a slightly expanded Flight Deck and other topside changes designed to increase operational efficiency, will provide significantly higher sortie generation rates. At the same time, maintenance and manpower requirements for the ship will be greatly reduced from today's levels, allowing the Navy to reap over $5 billion dollars in life-cycle cost savings per ship over their 50-year service life.

Quality of life improvements for the crew are of utmost importance for Navy leaders, as it is anticipated that this class of aircraft carrier will sail the world's oceans for the next 100 years. The principal design objectives for the ships of the CVN 21 Program are to provide a flexible infrastructure that will facilitate the seamless insertion of new warfighting capabilities as they become available, and to continue reducing total ownership costs. Meeting these objectives is a high priority for the Navy, and ensures that our aircraft carriers remain the centerpiece of *Sea Power 21*, and that they are fully capable of meeting the daunting operational requirements well into the next century.

Status

USS *George H.W. Bush* (CVN 77), the tenth and final ship of the *Nimitz*-class, is currently under construction at the Northrop Grumman Newport News Shipyard in Newport News, Virginia. CVN 77 was christened and launched in October 2006, with delivery expected in November 2008. CVN 77 is a modified-repeat

of the USS *Ronald Reagan* (CVN 76) and is the numerical replacement for USS *Kitty Hawk* (CV 63), which retires in 2008 after 47 years of service. All aircraft carriers acquired subsequent to CVN 77 will be developed by the CVN 21 Program. Delivery of the lead ship, CVN 78, is scheduled for 2015. CVN 78 is the numerical replacement for the Navy's first nuclear-powered aircraft carrier, USS *Enterprise* (CVN 65), which is scheduled for decommissioning in 2013, following more than 52 years of operational service. CVN 79, the second ship of the class, is scheduled for delivery in 2019.

Developers
Northrop Grumman; Newport News, Virginia

Submarines

Advanced SEAL Delivery System (ASDS)

Description
ASDS, a combat submersible, is 65 feet long, is 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 *Greeneville* (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 first ASDS is home ported with SEAL Delivery Vehicle Team ONE (SDVT ONE) in Pearl Harbor, Hawaii. 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 improving the operational reliability of ASDS Hull 1. Future SSGNs and *Virginia* (SSN 774)-class submarines will host the ASDS as the program proceeds.

Developers
Northrop Grumman; Annapolis, Maryland

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 2007. 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

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-18E/F to support 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 Operation Iraqi Freedom in 2003 and with VFA-102 as part of the forward-deployed naval forces in Japan.

Status
SHARP MAS EO/IR completed IOC in September 2006.

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

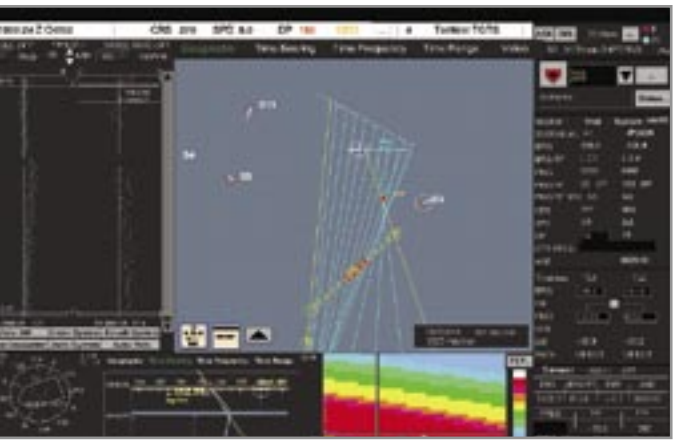
ASQ-228 Advanced Targeting Forward-Looking Infra-Red (ATFLIR)

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 OPEVAL in September 2003 and was determined to be operationally suitable and effective, and was recommended for further fleet introduction. ATFLIR achieved IOC with VFA-102 in September 2003 and demonstrated its combat capability in support of Operation Iraqi Freedom. The program was awarded Milstone III/FRP decision on 17 October 2003. The Navy will procure 82 ATFLIR in FY 2007. Program objective is 410 systems.

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

Subsurface



BYG-1 Submarine Combat Control System

Description
The BYG-1 is the combat control system common across all submarine platforms [except *Ohio*-class (SSBN 726)] which incorporates tactical control, weapon control, and Tactical Local Area Network (TacLAN) functions into a single procurement program. BYG-1 allows the submarine force to rapidly update the ship safety tactical picture, integrates the common tactical picture into the battle group, improves torpedo interfaces, and provides tactical Tomahawk capability. BYG-1 systems will be updated continuously 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 scheduled to be installed on all attack-and guided-missile submarines by FY 2012.

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

WEAPONS

Airborne

AGM-88E Advanced Anti-Radiation Guided Missile (AARGM)

Description
The latest evolution of the HARM weapon system is the Navy's AGM-88E AARGM. The AGM-88E is an ACAT-IC SDD program with a planned IOC in FY 2009. AARGM was successfully demonstrated as an ATD and Quick Bolt ACTD sponsored by European Command. The AGM-88E project upgrades legacy HARM with a new guidance section incorporating multi-sensor, multi-spectral digital anti-radiation homing 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. The U.S. DoD and the Ministry of Defense of the Republic of Italy have signed an international Memorandum of Agreement for cooperative development of AGM-88E. The AARGM system will provide U.S. Navy/Marine Corps and the Italian Air Force with a transformational and affordable Destruction of Enemy Air Defenses (DEAD) and time-sensitive strike capability upgrade to HARM. The legacy HARM program was a joint-service program with Navy as lead service. HARM is 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. AGM-88B (Block IIIA) and AGM-88C (Block V) are the currently fielded fleet configurations of HARM.

Status
FY 1992 was the last year of production of Navy all-up HARM rounds. 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
AARGM: ATK Missile Systems Company, Inc;
Woodland Hills, California
HARM: Raytheon; Tucson, Arizona

AGM-154 Joint Standoff Weapon (JSOW)

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

Status
AGM-154A reached IOC in 1999, and the AGM-154C variant achieved IOC in FY 2005. Procurement of JSOW C continues across the FYDP with a total of 3,879 units FY 2006-2013.

Developers
Raytheon; Tucson, Arizona

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

Description
The AIM-9X Sidewinder is a joint Navy/Air Force program that provides a major upgrade to the existing AIM-9M missile by integrating a steering focal plane array seeker, an extremely agile airframe, and state-of-the-art signal processors. This enhanced capability results in significantly improved target acquisition, missile kinematics, and improved infrared counter-countermeasures performance. The AIM-9X Pre-Planned Product Improvement (P3I) Program will result in SRM air superiority well into the 21st Century. Coupled with the Joint Helmet-Mounted Cueing System, the Sidewinder's high off-boresight capability revolutionizes employment of these air-to-air missiles. The AIM-9X is planned for the Joint Strike Fighter and integrated on F/A-18A+/C/D Hornet and the F/A-18E/F Super Hornet.

Status
The AIM-9X Program is a post-Milestone C program. Achieving IOC in February 2004, the missile is being produced as part of Lot 5 and is ahead of schedule. AIM-9X BLOCK II is a P3I program that will incorporate a redesigned Advanced Optical Targeting Device (AOTD) to address obsolescence and incorporation of datalink capability. AIM-9X BLOCK II production will begin FY 2009. Planned procurement across the FYDP is 1,232 missiles, in addition to 174 in FY 2007.

Developers
Raytheon; Tucson, Arizona

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

Description
AIM-120 AMRAAM is an all-weather, all environment radar guided missile developed by the U.S. Air Force and Navy. The missile is currently 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. Entering the fleet in September 1993, AMRAAM has evolved to maintain air superiority through Pre-Planned Product Improvement (P3I) programs. This modernization plans include clipped wings for internal carriage, a propulsion enhancement program, increased warhead lethality, and enhanced electronic counter-countermeasures (ECCM) capabilities through hardware and software upgrades. Most importantly to the warfighter, the missile has improved capabilities against low and high altitude targets in an advancing threat environment.

Status
The AMRAAM is a post-Milestone C program. Deliveries of AIM-120C began reaching the fleet in 1996. The AIM-120C7 missile variant is a product of P3I and is scheduled to achieve IOC in third quarter FY2007. Continued procurement of the AMRAAM, with a P3I contract for the AIM-120D missile, will provide significant network-centric warfare capability, GPS, improved high-off-boresight capability, and missile kinematics. AIM-120D IOC is scheduled for first quarter FY 2010. Planned procurement across the FYDP is 550 missiles, in addition to 150 missiles planned for FY 2007 (BES08 Data).

Developers
Raytheon; Tucson, Arizona

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

Description
The LGB is a joint Navy/Air Force effort with U.S. Air Force as lead service for procurement. LGBs are comprised of a 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 that uses MK-80/BLU series general-purpose bomb bodies; and Paveway III (GBU-24) that uses the BLU-109 bomb body and incorporates 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). The resultant precision strike weapon will provide increased range and allow delivery through adverse weather using GPS/INS and Laser guidance systems.

Status
In response to an urgent USMC request for a through-the-weather, precision weapon, DoN awarded a contract for a Dual Mode Laser Guided Bomb kit to Lockheed Martin in November 2005. Approximately 10,000 Dual Mode Kits will be procured through the life of the program.

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

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

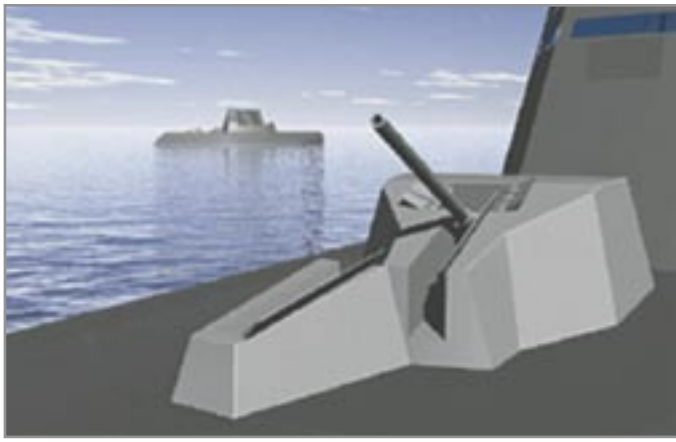
Description
The JDAM is a multi-service program, with U.S. Air Force as lead service, for a strap-on, Global Positioning System (GPS)-aided, Inertial Navigation System (INS) guidance kit to improve accuracy of existing 500-pound, 1,000-pound, and 2,000-pound general-purpose and penetrator bombs (BLU-109) 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.

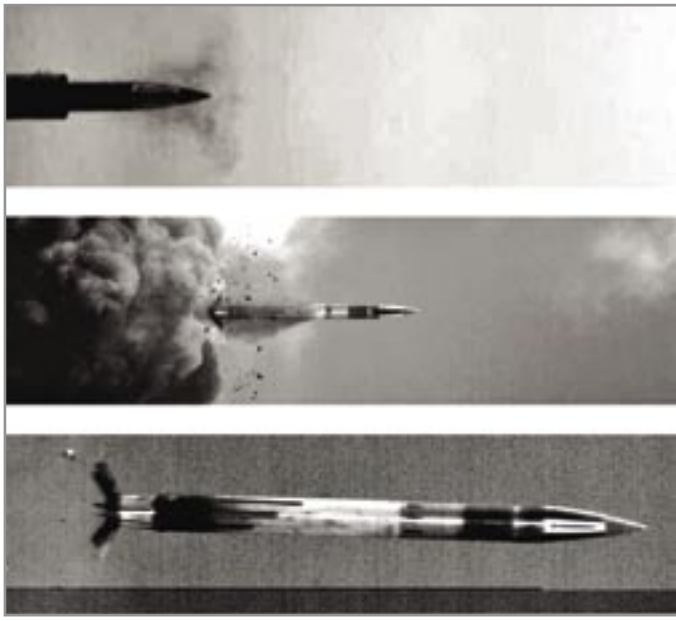
Status
LRIP for the 2,000-pound kits began in FY 1997, and Milestone III was reached in FY 2001. The 1,000-pound JDAM kit reached IOC in FY 2002, and IOC for the 500-pound weapon occurred during second quarter of FY 2005. Procurement of JDAM continues across the FYDP until FY 2012.

Developers
Boeing; St. Louis, Missouri

Subsurface, Surface, and Expeditionary

Advanced Gun System (AGS)





Description
The 155mm AGS is planned for installation in DDG 1000 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 support the DDG 1000 Naval Surface Fire Support mission. 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 DDG 1000, is designed to meet the reduced manning and radar-signature requirements of DDG 1000 ship program.

Status
The program started in FY 1999 and is an integral part of the DDG 1000 program. The first gun system is scheduled for delivery to support the first DDG 1000 fleet delivery in FY 2012.

Developers
BAE Systems; Minneapolis, Minnesota

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 and attack submarines. Block IV Tactical Tomahawk (TACTOM), BGM-109E/UGM-109E, an upgrade from the original TLAM Block III missile, 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

• Global Positioning System (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 sub munitions, a penetrator warhead, and multiple response warhead

The TACTOM program began in FY 1998 and reached IOC 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. Eight flight tests from both surface ships and attack submarines demonstrated all system capabilities. Current plans call for the Navy to procure more than 3,000 TACTOM missiles. TLAM Block III BGM-109 and UGM-109 missiles are still deployed in the Fleet. Block III TLAM Missiles undergo periodic recertification and maintenance to assure their continued viability.

Status

LRIP I, II, and III are complete. Raytheon Missile Systems began missile deliveries in May 2004 and is currently delivering FRP 1 missiles. The full-rate production contract signed on 18 August 2004 was the Navy's first multi-year contract for weapons procurement and will procure approximately 2,000 missiles. Future procurement plans will add an additional 1,000 missiles to the inventory. Tactical Tomahawk made its first significant deployment in May 2005 in USS *Higgins* (DDG 76). Tactical Tomahawk is now an integral part of defense capability with more than 500 missiles in the fleet.

Developers

Raytheon Missile Systems; Tucson, Arizona

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 fuse. The 100 pound-plus 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 accurate 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 reliability, 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.

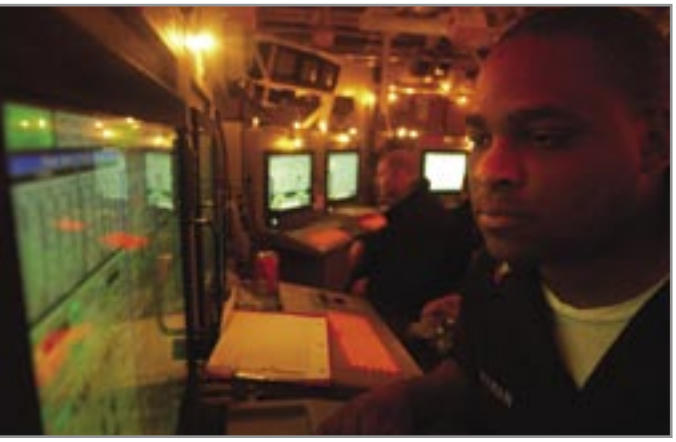
Developers
To be determined.

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 (NSFS) 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 5 February 1996. The first gun was successfully tested in July 1997 at the Naval Surface Warfare Center, Dahlgren, 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 24 April 2004 Milestone C decision. The gun will be evaluated for ERM functionality in parallel with the ERM test schedule. There are currently 21 DDG 51 destroyers equipped with the MK-45 Mod 4 Gun.

Developers
BAE Systems; Minneapolis, Minnesota



Naval Fires Control System (NFCS)

Description
Over the last ten years, ground forces have moved to communication with digital devices, including the fire support community. NFCS allows surface ships to communicate with the ground force's primary fire support command and control network, the Advanced Field Artillery Tactical Data System (AFATDS). NFCS is 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-45Mod 4 (5-inch/62-caliber) gun, Extended Range Munition (ERM),and the Advanced Gun System (AGS).

Status
Milestone III was reached on 6 December 2004 which authorized full-rate production of NFCS with a limited fleet introduction. The system achieved IOC 5 July 2005 and currently 21 systems are installed. Program development and procurement is on track for installation on DDGs 81-112. A total of 32 systems are planned for fielding FY 2005-2011.

Developers
Naval Surface Warfare Center; Dahlgren; Dahlgren, Virginia
Space and Naval Warfare Systems Center; San Diego, California
Naval Undersea Warfare Center; Keyport; Keyport, Washington
General Dynamics Information Systems; Arlington, Virginia

Other Developer
GEC-Marconi Electronics Systems; Wayne, New Jersey

Tactical Tomahawk Weapon Control System (TTWCS)

Description
TTWCS is the next significant upgrade to the current Advanced Tomahawk Weapon Control System (ATWCS). TTWCS initializes, prepares and launches Block III and Block IV Tomahawk Land Attack missiles. TTWCS also introduces the ability for firing units to plan Block III and Block IV GPS-only missions, retarget Block IV missiles to alternate pre-planned targets, and monitor missiles in-flight. The upgraded system reduces the number of equipment racks required aboard surface ships, introduces common software for the various Tomahawk capable platforms (DDG, CG, SSN, SSGN, and U.K. SSN) and reduces overall reaction and engagement planning timelines. TTWCS also improves operator interaction with the system and provides an integrated training capability at all levels. Furthermore, TTWCS builds upon the ATWCS system architecture to maintain existing Tomahawk Weapon System (TWS) Baseline III functionality, provides for future growth, and enhances command-and-control interoperability.

Status
The TTWCS Block III weapon control system capability reached IOC in 2003. Full Block IV IOC occurred in 2004 with the introduction of the Tactical Tomahawk Block IV missile. The USS *Stetham* (DDG 63) launched a Block III and several Block IV Tomahawk missiles using the new TTWCS Version 4, successfully testing Launch Platform Mission Planning (LPMP) and other Baseline IV TWS capabilities. TTWCS Version 5 continues to enhance the TTWCS capabilities with a scheduled IOC in third quarter 2007. SSGNs will also be outfitted with TTWCS scheduled IOC in 2007. TTWCS functionality is also currently planned for installation on the DDG 1000 combatant.

Developers
Naval Surface Warfare Center, Dahlgren; Dahlgren, Virginia
Lockheed Martin; Valley Forge, Pennsylvania
Naval Undersea Warfare Center, Keyport; Keyport, Washington
Southeastern Computers Consultants Inc.; Austin, Texas
Naval Undersea Warfare Center; Newport, Rhode Island

SEA SHIELD

PLATFORMS

Aircraft

Broad Area Maritime Surveillance (BAMS) Unmanned Aircraft System (UAS)