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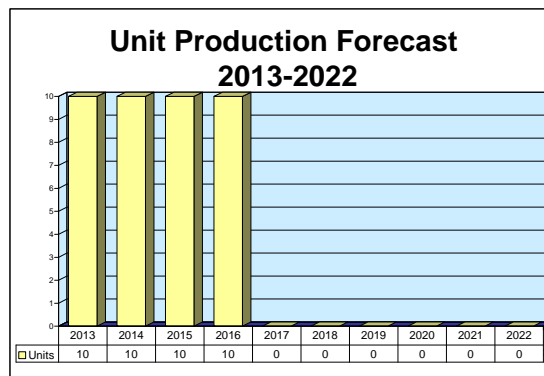
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APX-118

Outlook

- The APX-118 will soon leave production in favor of the APX-123
- APX-118 deliveries will continue only as long as spares are needed to fill the APX-123 interim gap
- Production is expected to cease in FY16



Orientation

Description. The APX-118 Common Transponder (CXP) supports both interrogating and responding operations in a single unit. It supports identification, friend or foe (IFF) modes 1/2/3/4/S.

Status. In production; ongoing logistics support.

Application. The APX-118 equips a wide variety of fixed-wing aircraft, rotary-wing aircraft, and naval ships worldwide.

Price Range. According to contracts from the U.S. Department of Defense, the average price of a single APX-118 is \$34,700 to \$45,000. A January 2013 contract for 10 APX-118s and 688 APX-123s received \$24.187 million in funding, giving a per unit value of \$34,651.

Contractors

Prime

**BAE Systems Inc,
Electronic Solutions**

<http://www.baesystems.com/Businesses/ElectronicSolutions/>, 450 Pulaski Rd,
Greenlawn, NY 11740-1606 United States, Tel: + 1 (631) 261-7000, Prime

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Contractors are invited to submit updated information to Editor, International Contractors, Forecast International, 22 Commerce Road, Newtown, CT 06470, USA; rich.pettibone@forecast1.com

APX-118

Technical Data

| | <u>Metric</u> | <u>U.S.</u> |
|------------------------|---|--------------------------|
| Dimensions | | |
| Weight | 4.5 kg | 9.8 lb |
| Size | 13.65 x 13.65 x 21 cm | 5.375 x 5.375 x 8.375 in |
| Characteristics | | |
| Peak power out | 500 W \pm 2W under all conditions | |
| Transmitter frequency | 1,090 MHz \pm 0.5 MHz | |
| Receive frequency | 1,030 MHz \pm 0.5 MHz | |
| Input power | 30W nominal, +18 to + 30 Vdc | |
| Modes | 1, 2, 3/A, C, 4, and 5 | |
| | Supports Mode S Level 3 and interface to TCAS II | |
| | Interface to TCAS II | |
| Crypto interface | Dual; supports external or embedded crypto (APX-118(V)) | |
| Features | Mid-Air Collision Avoidance System (MCAS) capable | |
| | MIDS/JTIDS compatible | |
| | DoD AIMS 97-1000 compliant | |
| MTBF | 4,000 hours per MIL-STD-781 | |
| Maintainability | Front panel BIT activation | |
| | Side panel access to SRA fault indicators for rapid SRA fault detection and isolation | |
| | WRA status indicator for operational readiness verification | |
| Mounting | Airborne bay mounted | |
| | Airborne remote control unit | |
| | Shipboard versions | |

Design Features. The APX-118 was derived from the APX-111/113(V) combined identification, friend or foe interrogator/transponder and supports all IFF modes in use today or planned for the near future. Growth potential is designed in for future modes (NATO STANAG 4193 Part 5). The CXP can be retrofitted into aircraft as a direct replacement for APX-65(V), APX-72(V), APX-100(V), and APX-101(V).

Both the interrogator and transponder operate in Modes 1, 2, 3A, C, and 4. Additionally, the transponder provides Mode S levels 1 and 2, with software growth to level 3. The APX-118 was designed to accommodate Mode 5.

All Combined Interrogator Transponder signal processing is digital – performing ISLS, RSLs, GTC, diversity selection, defruiting, and degarbling, and using application-specific integrated circuits (ASICs). The all-digital signal processor was a significant improvement over older analog systems. It enhances signal extraction in heavy jamming and self-interference environments. The use of ASICs contributes to the system's reduced size and weight, and substantially increases reliability.

The system features a MIL-STD-1750 processor and a fully compliant, dual-redundant MIL-STD-1553B databus that operates in conjunction with a high-performance 32-bit microprocessor and coprocessor. The system is programmed using Ada

software and is field-programmable via a 1553B databus. This provides rapid on-site load and verification of the computer program.

The transmitter is fully self-contained, and the modular design makes maintenance easier. A statistical reply evaluator increases confidence in the returns processed.

The NATO/Joint Mk XXI/XXIA Mode 5 capability is being developed to combine with Mode S. This cryptologically based identification technique will replace the NSA-decertified Mode 4 Cooperative Identification system.

Operational Characteristics. The APX-118 can interrogate other aircraft, as well as respond to identification queries. Transponders provide a set of established identification codes upon request of IFF/SIF interrogators, providing specific information about the aircraft in question. The system incorporates the advanced features required in today's global military and civil air traffic control environments. It is designed to be upgradeable to meet future needs through software rather than hardware modifications.

The sophisticated Mk XII system is used to specifically identify military aircraft. The system used by combat forces distinguishes friendly aircraft from foes. By using cryptologically based ID codes, identity can be established with better confidence. The system meets all international ATC requirements, as well as AIMS and STANAG standards.

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The Mode S traffic control system provides air traffic controllers with precise location and identification of aircraft within their flight paths. Existing Mk XII IFF systems, such as the APX-100(V) and APX-101(V), are not fully compatible with Mode S. Because military aircraft must be able to operate in established ATC systems, the new systems are specifically designed to accommodate Mode S operation.

The system was also designed for better protection of overall operation in a hostile combat environment. Electronic counter-countermeasures and crypto-coding are not needed on commercial IFF equipment. The upcoming Mode 5 will be crypto-based, and will replace the NSA-decertified Mode 4 coding scheme.



APX-118 CXP

Source: BAE Systems

Variants/Upgrades

APX-117(V). The APX-117 does not include embedded Mode 4 crypto.

APX-118(V). The APX-118 includes embedded Mode 4 and Mode S crypto.

Program Review

In 1998, the Battelle Memorial Institute disseminated a Request for Information (RFI) to seek interested companies to produce a new IFF transponder. The system would have to be able to operate Mode S and have growth potential to (Mode 5) advanced IFF for Air Force operations. The new system design would feature improved reliability and maintainability compared with existing systems. The optimistic estimate was for up to 6,000 aircraft installations.

In 1999, the Naval Air Systems Command announced a planned set of pre-solicitation meetings with potential bidders of an anticipated Common IFF Digital Transponder Program.

In 2000, BAE Systems was awarded a U.S. Navy contract for the First Article Phase and four production options for the CXP. The first full-rate production contract was awarded in 2001.

Replacement for APX-100

In 2002, the U.S. Army began replacing its APX-100s with the APX-118. Additionally, BAE Systems was required to integrate Air Traffic Management Radar Control Beacon IFF Mk XIIA System (AIMS) Mode 5 capability into the APX-118(V) and RT-1832 transponder sets.

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In 2006, BAE Systems received a contract for production of 293 APX-118s and 100 APX-118 spares. Work under this contract, worth \$15.4 million, was completed in December 2007. The systems produced under this contract were to equip naval and aerial platforms for the U.S. Navy, Army, Special Forces, and Coast Guard, as well as Chile, Germany, Greece, Japan, Norway, and South Korea as Foreign Military Sales (FMS).

In September 2006, BAE Systems delivered the 2,000th CXP. BAE Systems was awarded four APX-118 contracts in 2007. In total, the contracts are worth \$60 million and cover 1,121 APX-118s along with system spares, maintenance, and other equipment.

Hunter UAS and FMS

Northrop Grumman reported in June 2007 that it had recently upgraded its Hunter unmanned aerial system with a new avionics suite. The upgrade included modified flight and mission computers and the addition of an auxiliary power distribution unit, an LN-251 inertial navigation system with GPS, a downsized datalink, and an APX-118 IFF transponder.

In September 2008, a \$28.3 million contract was awarded for a number of transponder systems, including 663 APX-118s, remote control units, power supplies, and Mode 5 kits. This contract combined purchases for the U.S. Navy, Army, and Coast Guard and for the governments of Thailand and Japan.

In other activity, the U.S. Navy awarded BAE Systems a \$13.24 million contract for a variety of IFF hardware and associated platform integration and testing in December 2008. The award included 509 APX-118 IFF digital transponders and spares for the U.S. Navy and Army. It also included three APX-118s for Australia and a single APX-118 for Canada.

APX-118 Being Replaced on the Osprey

The Federal Business Opportunities Web site noted in May 2009 that the Naval Air Systems Command (NAVAIR) intended to place an order with Bell/Boeing for the replacement of the APX-118 IFF system with the APX-123 for the MV-22 Osprey aircraft. The pre-solicitation noted that all MV-22 aircraft subject to operational deployment will be fitted with the APX-123(V)4.

In June 2009, the U.S. Navy awarded BAE Systems a \$20 million contract for IFF hardware and associated platform integration and testing. The contract includes 44 APX-118s for the U.S. Navy and two for the U.S. Army, as well as 400 kits to modify APX-118s to the APX-123 Mode 5 configuration. The Navy will receive 90 of these kits and the Army 310. The award

also includes provision of Mode 5 kit integration, plus technical and engineering services. Additionally, the award includes associated platform technical / engineering services for the Navy. Work was expected to be completed in December 2011.

2009 Production to Date

BAE Systems reported in May 2009 that the company had delivered more than 4,000 APX-118 common transponders to the Navy and Army under the NAVAIR contract since 1999.

2010 Contracts

In April 2010, BAE Systems was awarded a contract for the repair of 286 APX-118 units. This contract covers the repair of 37 units for the Navy, with the balance of the repair work for the Army. The contract also includes six APX-118 CXPs for the Navy and a variety of other equipment and services. Work was expected to be completed in February 2012.

Two months later, the U.S. Navy awarded BAE Systems a contract modification for 23 APX-118 transponders for the Army, plus other items. Work was expected to be completed in March 2012.

BAE Systems closed out 2010 with a \$25.47 million contract modification for procurement and integration of various CXP IFF units for the U.S. Navy, Army, and Air Force, as well as the governments of Canada, Saudi Arabia, and Taiwan. Hardware being procured includes common digital transponders, mounts, receivers and transmitters, signal processors, power supplies, battery packs, and Mode 5 modification kits.

Chinook Sale

In December 2009, Congress was notified of an FMS to the UAE Air Force of 16 CH-47F Chinook helicopters and related equipment, including 20 APX-118 IFF transponders.

Current Contracts

The U.S. Navy is the lead service for CXP contracts. Recent contract awards have not disclosed the specific IFF transponder that was purchased. However, the contracts include CXP IFF hardware, associated platform integration and testing, and ancillary items such as mounts.

In December 2010, BAE Systems was awarded a \$25.47 million contract modification for procurement and integration of various CXP IFF units for the U.S. Navy, Army, and Air Force, as well as the governments of Canada, Saudi Arabia, and Taiwan. Hardware being procured includes common digital transponders, mounts, receivers and transmitters, signal

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processors, power supplies, battery packs, and Mode 5 modification kits. Work is expected to be completed in August 2013.

A year later, BAE Systems was awarded an additional \$13.5 million for CXP hardware to support the U.S. Navy/Army as well as Saudi Arabia and the Netherlands. The FMS portion makes up 5 percent of the contract value. Work is expected to be completed by December 2014.

Both contract announcements did not specifically list the CXP hardware that was purchased, but based on concurrent Federal Business Opportunities

announcements, both APX-118 and APX-123 units were included.

Corrections Needed

According to the FY11 U.S. Office of the Director, Operational Test & Evaluation report, the Navy needs to investigate and apply corrections to the APX-118 aircraft track angle information disparity and verify those corrections. The deficiency was found during Follow-on Operational Test & Evaluation of Pre-Planned Product Improvement components on the Sikorsky MR-60R/S ship-based multimission helicopter.

Contracts/Orders & Options

| <u>Contractor</u> | <u>Award (\$ millions)</u> | <u>Date/Description</u> |
|--------------------------|---------------------------------------|---|
| BAE Systems | 20.1 | Mar 2007 – Mod to a previously awarded contract (N00019-05-D-0027) to exercise an option for 348 APX-118s and other equipment. Completed Feb 2009. |
| BAE Systems | 6.5 | Jul 2007 – Order of Option Year 2 to a previously awarded contract (N00019-05-D-0027) for 105 APX-118s and other equipment. Completed Jun 2009. |
| BAE Systems | 10.7 | Sep 2007 – FFP mod to a previously awarded contract (N00019-05-D-0027) for 249 APX-118s and other equipment. Completed Aug 2009. |
| BAE Systems | 21.6 | Dec 2007 – Mod to a previously awarded contract (N00019-05-D-0027) to exercise an option for 419 APX-118s and other equipment. Completed Sep 2010. |
| BAE Systems | 28.3 | Sep 2008 – FFP contract for production and delivery of IFF hardware and associated platform integration and testing, consisting of 3 APX-117s, 663 APX-118s, 6 Mode 4 remote control units (RCUs), 304 Mode 5 RCUs, 170 APX mounts, 9 receiver/transmitters, 276 power supplies, and 201 Mode 5 kits. This contract combined purchases for the U.S. Navy, Army, and Coast Guard and for Thailand and Japan. Completed Oct 2010. (N00019-08-C-0061) |
| BAE Systems | 13.24 | Dec 2008 – Contract mod for CXP IFF hardware and associated platform integration and testing, consisting of 3 APX-118s for Australia; 1 APX-118 for Canada; 509 APX-118s for the U.S. military – Navy (73), Army (420), and NAVICP (16); plus other items. This contract combined purchases for the U.S. Navy (14.8%); U.S. Army (81.2%); NAVICP, DoD Working Capital Fund (3.0%); Canada (0.19%); Japan (0.06%); and Australia (0.73%). Completed Jan 2011. (N00019-08-C-0061) |
| BAE Systems | 20.0 | Jun 2009 – Contract mod for CXP IFF hardware and associated platform integration and testing consisting of 46 APX-118 for the U.S. Navy (44) and Army (2); 400 APX-118 to APX-123 Mode 5 modification kits for the U.S. Navy (90) and Army (310); integration technical/engineering services related to Mode 5 kits; and associated platform technical/engineering services for the Navy. Completed Dec 2011. (N00019-08-C-0061) |

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| <u>Contractor</u> | <u>Award (\$ millions)</u> | <u>Date/Description</u> |
|-------------------|--------------------------------|--|
| BAE Systems | 18.3 | Apr 2010 – Contract mod for CXP IFF hardware and associated platform integration and testing consisting of the repair of 286 APX-118s for the U.S. Navy (37) and Army, 6 APX-118 CXPs for the U.S. Navy, and other equipment and services. Completed Feb 2012. (N00019-08-C-0061) |
| BAE Systems | 5.5 | Jun 2010 – Contract mod for IFF CDTs for 23 APX-118 transponders. This contract combined purchases for the Army (97%) and U.S. Navy (3%). Completed Mar 2012. (N00019-08-C-0061) |
| BAE Systems | 25.47 | Dec 2010 – Contract mod for the procurement and integration of various CXP IFF hardware, including common digital transponders, mounts, receivers and transmitters, signal processors, power supplies, battery packs, and Mode 5 modification kits. This contract combines purchases for the U.S. Army (67.6%), Navy (24%), and Air Force (0.8%) and for the governments of Taiwan (3.9%), Canada (2.3%), and Saudi Arabia (1.4%), under FMS program. Work is expected to be completed in Aug 2013. The Naval Air Systems Command, Patuxent River, MD, is the contracting activity. (N00019-08-C-0061) |
| BAE Systems, IESI | 13.48 | Dec 2011 – FFP contract to procure common (IFF) digital transponder (CXP) hardware. This contract combines purchases for the Navy/Army (\$12,824,610, 95%) and the governments of Saudi Arabia and the Netherlands (\$656,300, 5 percent), under FMS program. Work is expected to be completed in Dec 2014. The Naval Air Systems Command, Patuxent River, MD, is the contracting activity. (N00019-12-C-2011) |
| BAE Systems, IESI | 12.19 | Aug 2012 – Modification to a previously awarded CPFF performance-based services contract to exercise an option for CXP hardware for the U.S. Army (\$7.161 million; 58.7%) and Navy (\$1.997 million; 16.4%), and the governments of Saudi Arabia (\$1.239 million; 10.2%), Australia (\$904,000; 7.4%), the Netherlands (\$413,000; 3.4%), Taiwan (\$245,000; 2%), and France (\$238,000; 1.9%). Transponders, mounts, and modification kits are included. Work will be completed in Aug 2015. (N00019-12-C-2011) |
| BAE Systems IESI | 24.19 | Jan 2013 – Modification to a previously awarded FFP contract to exercise an option for procurement of CXP hardware for the U.S. Army (\$9.171 million; 38%), Navy (\$13.045 million; 53.9%), and Coast Guard, and the governments of Saudi Arabia (1.084 million; 4.5%), Australia (\$298,000; 1.2%), the Netherlands (\$473,000; 1.9%), and the UAE (\$116,000; 0.5%). Transponders, mounts, modification kits, and remote control unit modes are included. Work is expected to be completed in Aug 2015. (N00019-12-C-2011) |

Timetable

| <u>Month</u> | <u>Year</u> | <u>Major Development</u> |
|--------------|-------------|---|
| Nov/Dec | 1998 | RFI for interested sources |
| Oct | 1999 | "Sources sought" for CXP |
| Mar | 2000 | Selected by Navy and Army as next-generation Common Digital Transponder |
| | 2001 | First contract awarded |
| Dec | 2003 | Lot 1 procurement begins |
| Dec | 2004 | Lot 1 production completed |
| Sep | 2006 | 2,000th production APX-117/118 delivered |
| May | 2009 | More than 4,000 APX-118 CXPs delivered to U.S. Army and Navy |
| | FY16 | Last APX-118 CXP could be delivered |

Worldwide Distribution/Inventories

The APX-118 CXP is operated in the **United States** by the Army, Navy, Special Forces, and Coast Guard. **Australia, Canada, Chile, France, Germany, Greece, Japan, the Netherlands, Norway, Saudi Arabia, South Korea, Taiwan, and Thailand** also operate the system.

Forecast Rationale

The BAE Systems APX-118 Common Transponder will soon leave production as it is replaced by the upgraded APX-123 Common Transponder. The two units are nearly identical, although the APX-123 possesses a few advancements and refinements, including the new Mode 5 standard.

APX-118 production will continue only as long as interim spares are needed before the APX-123 is adopted by the world's full force. At this time, Forecast International projects production to cease in 2016.

Ten-Year Outlook

| ESTIMATED CALENDAR YEAR UNIT PRODUCTION | | | | | | | | | | | | |
|--|-----------|-----------------|------|------|------|-----------------|------|------|-------------|------|------|-------|
| Designation or Program | | High Confidence | | | | Good Confidence | | | Speculative | | | |
| | Thru 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | Total |
| BAE Systems Inc, Electronic Solutions | | | | | | | | | | | | |
| APX-118 <> Worldwide | | | | | | | | | | | | |
| | 4,304 | 10 | 10 | 10 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 40 |
| Total | 4,304 | 10 | 10 | 10 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 40 |