ARCHIVED REPORT

For data and forecasts on current programs please visit

www.forecastinternational.com or call +1 203.426.0800

ALQ-165(V) (ASPJ) - Archived 5/2008

Outlook

- The ALQ-165 was procured by Finland, Switzerland, and South Korea
- The system was chosen as the interim RF generator for IDECM block I in F/A-18E/F until the ALQ-214 was ready
- No new contracts have been signed for new production of the ALQ-165, as newer systems have replaced it in the marketplace
- No further orders expected. This report will be archived in 2008

Orientation

Description. An internally mounted, airborne self-protection electronic countermeasures system, called the Airborne Self-Protection Jammer (ASPJ).

Sponsor
U.S. Navy
Naval Air Systems Command
NAVAIR HQ
47123 Buse Rd, Unit IPT
Patuxent River, MD 20670-1547
USA
Tel: + 1 (301) 342-3000
Web site: http://www.nawcad.navy.mil

Status. Ongoing logistics support.

Total Produced. Through 2005, an estimated 342 units had been produced.

Application. F-14D, F-18, F/A-18C/D, F-16C/D.

Price Range. GAO estimate: $2 million per unit including development. Production unit cost about $1.7 million.

Contractors

Prime

Consolidated Electronic Countermeasures	http://www.ittavionics.com, 100 Kingsland Rd, Clifton, NJ 07014 United States, Tel: + 1 (201) 284-4131, Fax: + 1 (201) 284-4122, Prime

Comprehensive information on Contractors can be found in Forecast International's "International Contractors" series. For a detailed description, go to www.forecastinternational.com (see Products & Samples/Governments & Industries) or call + 1 (203) 426-0800.

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

ALQ-165(V) (ASPJ)

Technical Data

	Height cm/in	Width cm/in	Depth cm/in	Weight kg/lb
Dimensions				
WRA/LRU				
Low-Band Receiver	14.2/5.58	19.9/7.85	40.1/15.77	16.8/37
High-Band Receiver	14.2/5.58	19.9/7.85	40.1/15.77	16.8/37
Processor	14.2/5.58	19.9/7.85	40.4/15.90	17.7/39
Low-Band Transmitter	12.1/4.78	20.8/8.19	64.5/25.38	30.9/68
High-Band Transmitter	12.1/4.78	20.8/8.19	64.5/25.38	29.5/65

Volume		
Five-unit system	0.07 m^3	2.32 ft^3
Seven-unit system	0.10 m^3	3.44 ft^3
Eight-unit system	0.11 m^3	4.00 ft^3

Characteristics	
Frequency Range	1 to 35 GHz
Response	0.1 to -.25 sec
Resolution	5 MHz
Instantaneous BW	1.44 GHz
Minimum Pulse Width	0.1 µsec
Accuracy	± 0.5 to 20 MHz
Modes/Features	Pulse or noise Look-thru while jam Effective against frequency agile jammers Effective against spread spectrum systems Integrated threat library Large threat library capacity Operate stand-alone or integrated with other EW systems
LRUs	
F/A-18C/D	Low Band Receiver High Band Receiver Computer/Processor Low Band Transmitter High Band Transmitter
F-14D	Low Band Receiver High Band Receiver (2) Computer/Processor Low Band Transmitter High Band Transmitter (2)
MTBF	100 - 300 hr (advertised)
Mean Time Between Operational Mission Failures	33.3 hr (1992 test threshold) 45.1 hr during Bosnia operations 31.1 hr (adjusted for 1992 data collection technique)
MTTR	30 min
Built-In Test (requirement)	< 1 min 95% fault detection 95% WRA/LRU isolation

Design Features. The ALQ-165(V) Airborne Self-Protection Jammer (ASPJ) was a joint Navy/Air Force program to develop and produce an advanced, internally mounted defensive electronic countermeasures (DECM) system for tactical aircraft, particularly the F-16 and F/A-18. It was designed to counter sophisticated radar-controlled weapons systems with a variety of noise, deception, and sophisticated jamming techniques. It can either operate as a stand-alone ECM system or be integrated with other systems in a defensive counter-measures suite.

The modular architecture of this jammer made possible electronic countermeasure techniques and capabilities not available in the ALQ-126B(V) and ALQ-162(V) jammer combination used by the U.S. Navy. The ASPJ attempted to increase system commonality so it would be applied to a wide variety of tactical aircraft installations. The line-replaceable units (LRUs) would be interchangeable between platforms without having to change settings or calibrations. Component miniaturization allowed the system to fit in the limited space available in the F-16 and F/A-18.

The ALQ-165(V) is made up of 56 separate plug-in modules that can be replaced if defective, or upgraded with newer modules if required. In addition to the control panel, the LRUs include the high- and low-band receivers, the central processor, and the high- and low-band transmitters. Two transmitting antennas are provided for each transmitter, and located forward and aft on the aircraft.

The dual-mode transmitters feature parallel pulsed and continuous-wave traveling wave tubes. The entire system can be flight-line programmed to meet different mission requirements. Customized racks are used to adapt the five basic components of the ALQ-165(V) to specific aircraft types. If more power is needed for a larger aircraft, the design makes it possible to add transmitters. Its software can reconfigure the system to adapt to threat changes.

The basic architecture consists of a high-band transmitter and receiver, a low-band transmitter and receiver, and a processor. Versions adapted to the F-14D carried an additional high-band transmitter and high-band receiver to provide enhanced rear quadrant coverage.

Built-in test features were designed for effective 0-Level maintenance. The system can detect and accurately isolate problems, and maintainers can extract/plug-in WRAs and LRUs in less than four minutes. An I-Level System Test Set or Consolidated Avionics Support Station (CASS) supports higher level maintenance needs. Once detected, defective modules do not require special skills to change; base-level intermediate maintenance is easily accomplished.

Originally, ALQ-126Bs were planned for the first F/A-18E/Fs to come off the production line because the IDECM system would not be ready in time. Plans changed, however, and the Navy decided to use in-stock ALQ-165(V) ASPJ systems as the onboard jammer and the ALE-50(V) Towed Decoy as the Block I IDECM system. Block II IDECM would incorporate the planned ALQ-214(V) onboard system.

Operational Characteristics. The ALQ-165(V) counters the growing threat from radar-guided missiles and radar fire control systems on hostile aircraft. Both noise and deception jamming techniques are used. The ALQ-165(V) provided a substantially greater number of refined countermeasures to address the multiple threats of ground-based anti-aircraft systems integrated with aircraft defenses than did the older systems it was designed to replace.

The jammer covers a wider frequency band than older systems and was designed to counter coherent-pulse Doppler airborne radars, as well as CW surface sensors. Jamming techniques were developed that can counter acquisition radars, tracking systems, and guidance and illumination modes. There is full frequency coverage forward and aft.

The ALQ-165(V) receiver was designed to operate in dense signal environments. It can handle conventional pulsed, high-duty cycle pulsed, complex waveform and continuous-wave transmissions, with the appropriate signal processing and threat evaluation/prioritization accomplished automatically.

ALQ-165(V)

Source: Northrop Grumman

Variants/Upgrades

The basic design can be used on various aircraft with minimal change needed.

To reduce development risk and provide electronic warfare protection for the F/A-18E/F, a phased approach would be used. Three sequential phases of onboard jammers and towed decoys would be used.

IDECM Block I was set up to use existing ALQ-165(V) ASPJ jammers and the ALE-50(V) Towed Decoy until the ALQ-214(V) Jamming Signals Generator became available.

IDECM Block II would use the ALQ-214(V) and ALE-50(V).

IDECM Block III would use the ALQ-214(V) integrated with the ALE-55(V) Fiber Optic Towed Decoy – the full IDECM system.

Program Review

The ASPJ entered full-scale development (FSD) in 1979 and LRIP in 1989. The F/A-18A and F-16A underwent flight testing on DoD electronic warfare ranges, but key performance criteria for effectiveness and suitability were not met, and the FSD systems were not considered production-representative.

In 1990, the Defense Acquisition Board agreed to revised-ASPJ effectiveness measures. The Joint Requirements Oversight Council validated these measures in August 1991, and USD (Acquisition) approved the Acquisition Program Baseline, incorporating it in December 1991.

Subsequent phases of DT and OT, including hardware-in-the-loop and open-air range tests, were conducted with production-representative systems and the F/A-18C. OPEVAL (OT-IID) was completed in May 1992. DOT&E assessed the ASPJ as not operationally effective because it did not meet the requirement threshold value for increasing the survivability of an ASPJ-equipped F/A-18 strike force over that of a non-ASPJ baseline F/A-18 strike force. DOT&E also assessed ASPJ as not operationally suitable because it did not meet required criteria for mission reliability or built-in-test (BIT) effectiveness. BIT false-alarm problems were a significant factor in the failure to meet mission reliability requirements.

Program Canceled by U.S. Navy

The ASPJ program was canceled by the Navy and production was terminated. One hundred ASPJs had been delivered by that time to equip the F-14D (ground attack upgrade) fleet. The F-14D was specifically equipped to carry ASPJ, and it was not considered economically feasible to modify the aircraft to carry a different self-protection jammer. In FY93, the Navy obtained permission to field the existing ASPJ systems in the F-14D based on satisfactory performance during FOT&E. The limited operational effectiveness criteria for ASPJ were presented in an F-14D document in a report entitled "Is the F-14D More Survivable with ASPJ than Without it?"

ASPJ was approved for export following the earlier Navy program cancellation; the production line had remained open to fill foreign military orders. The FY97 Defense appropriation directed that the Navy procure an additional 36 ASPJ systems with spares and support. The Navy would use these systems as a rotatable pool to equip three squadrons of USN/USMC F/A-18C/D aircraft, forward deployed for contingency operations, thereby keeping the ASPJ available for the F-14D.

Limited Deployment Approved

Limited testing was conducted by the Navy and the Commander, Operational Test and Evaluation Force (COMOPTEVFOR) in late FY95 and early FY96, monitored by the DOT&E, and supported the secretary of defense's decision to deploy the ASPJ systems in storage to F/A-18C/Ds engaged in contingency operations. The Navy was responsive to DOT&E suggestions concerning the scope of these tests, which focused on confirming the effectiveness of aircraft integration (since the aircraft baseline had changed after FY92 OPEVAL).

In addition, with on-site monitoring by COMOPTEVFOR and DOT&E, a USMC F/A-18 squadron in Aviano, Italy, collected data during the fourth quarter of FY95 to support an assessment of ASPJ suitability.

In December 1993, (then) Deputy Secretary of Defense William J. Perry approved the commercial sale of ASPJ hardware to South Korea.

ASPJ opponents Senators David Pryor (D-Ark) and William Roth (D-Del) attacked the decision to sell the system on the international market, writing to the secretary of state and the General Accounting Office asking that activities be suspended until the GAO had completed a six-week investigation into the commercial licenses of ASPJ.

Although the senators said they did not oppose ASPJ itself, they contended that the development violated congressional “fly-before-buy” rules. They had been aggressive critics of the ASPJ acquisition.

The GAO found that selling the hardware as a commercial transaction and the software under FMS rules was in compliance with the DoD policy established by Undersecretary of Defense for Acquisition Donald Yockey (the Yockey Policy).

U.S. Government Responsible for Performance

The U.S. government, as the contracting party, would be responsible for the contractor’s adherence to software design specifications stated in the Letter of Agreement (LoA). Moreover, foreign government officials stated that they expect items to meet the specifications included in the LoA and would “look to the United States, rather than to the contractor, to ensure performance.”

In response to GAO queries, both the Swiss and the Finns said that being unable to buy ASPJ “would not jeopardize their aircraft purchases.” However, the Swiss said that the inability to buy ASPJ could have implications for future purchases from the U.S. government.

First FMS Orders

In September 1994, ending months of speculation, the government of Finland agreed to procure the ASPJ for the 46 F-18 aircraft it intended to buy. Finland believed that the problem lay not with the system, but with the DoD’s testing of it. Finland broke the initial procurement into buys of 25 units and 21 units. An option for additional systems was exercised in June 1995. The first unit was delivered November 21, 1995.

More International Users

In November 1994, Switzerland became the second nation to follow through and procure the ALQ-165(V) ASPJ. The jammers would be installed on their 44 F/A-18s.

South Korea formally solicited bids for the ASPJ in January 1996. In January 1997, the Republic of Korea awarded a contract valued at more than $100 million to acquire the ALQ-165(V) for its F-16 fighters. The ASPJ hardware was procured as a direct commercial sale by the ROKAF from the ITT Industries/Northrop Grumman joint venture team. Software and integration associated with the system were provided through Foreign Military Sales (FMS).

In July 2000, the government of Australia requested a possible sale of equipment for the F/A-18 Hornet upgrade program (Phase II). The upgrade would include either 42 ALQ-165(V) ASPJ or ALQ-214(V) RF countermeasure systems, as well as a variety of other components for the aircraft. The RAAF opted for the ALQ-214(V).

In October 2000, the Republic of Korea awarded a follow-on contract for ASPJ systems for its F-16 program. The contract would run through 2005 and include systems, spares, and technical support.

Support for Navy Systems Continues

On June 5, 2001, Naval Air Systems Command announced that it intended to issue a cost-plus-fixed-fee delivery order to ITT Industries/Northrop Grumman joint venture to procure an Engineering Investigation (EI) to determine repair requirements and the preparation of repair cost estimates for the government of Switzerland for ALQ-165(V) Weapon Replaceable Assemblies (WRAs) and Shop Replaceable Assemblies (SRAs). This would include testing, disassembly, and visual inspection necessary to identify the repair material and labor required to return the WRAs and SRAs to a serviceable condition.

On August 2, 2001, Naval Air Systems Command said that it intended to negotiate a delivery order with the joint venture (ITT/Northrop Grumman) under the Basic Ordering Agreement (BOA) N00019-01-G-0178 to provide ALQ-165(V) test support services.

In September 2001, the Defense Security Cooperation Agency notified Congress of a Foreign Military Sale of five ALQ-165(V)s to Malaysia. The contract would include the ASPJs, pre-amplifiers, filters, racks, update/development of electronic warfare suite software, spare/repair parts, support/test equipment, modification kits, and training, as well as publications and data. The systems would be installed on Malaysian F-18Ds at an estimated cost of $45 million.

In a January 2004 *Federal Business Opportunities*, Naval Air Systems Command announced that it intended to issue a firm-fixed-price delivery order to the joint venture (JV) of ITT Industries/Northrop Grumman to procure materials and determine repairs of the ALQ-165(V). The companies would examine the Navy’s WRAs and SRAs and determine repair requirements and repair cost estimates.

Timetable

Month	Year	Major Development
	1976	Specification issued
Aug	1979	Full-scale engineering development approved
Jun	1981	Design completed and frozen, DOT&E
Oct	1981	Phase II contract awarded
Jul	1985	Instrumentation testing aboard F-16 begins
Mar	1987	First flight of a podded ALQ-165(V) aboard an AV-8B
Oct	1987	F/A-18C update version delivered
Nov	1987	Limited preproduction approved
Mar	1988	F-14D update version delivered
Jun	1988	Developmental testing completed; operational test phase begins
Jun	1989	DAB initial low-rate production approved
Oct	1989	ITT/Westinghouse production contracts for Lot 1 awarded
Dec	1989	USAF withdrawal from ASPJ program announced; first production verification units delivered to Navy
	1991	Deliveries of Lot 1 units begin
	1993	Testing in F-14D authorized
Nov	1994	Procurement decision by Switzerland
Jul	1995	ASPJ units deployed to Bosnia for operational use
Nov	1995	First Finnish ASPJ delivered
Sep	1996	First deliveries to Switzerland
Jan	1997	Procurement decision by Korea
Dec	1997	Contract for added ASPJ unit for the U.S. Navy and Air Force approved
Feb	1999	First Korean F-16 modified for the ASPJ
Dec	1999	End of current USN/USAF ASPJ add-on contract
Jun	2000	Australia requests possible sale of equipment for the F/A-18 Hornet upgrade program
Oct	2000	ROK third order
Sep	2001	Malaysia requests FMS of five ASPJ units
	2005	End of Korean production

Worldwide Distribution/Inventories

ASPJ has been selected by **Finland** for installation on its F-18s, **Switzerland** for its F/A-18C/Ds, and **South Korea** for its F-16s. The **United States** operates the ALQ-165 on some F/A-18s and F-16s.

Forecast Rationale

New Systems Replace ALQ-165 in Marketplace

The ALQ-165 has had a successful career onboard F/A-18s and F-16s around the world. It has been involved in wars from the Persian Gulf to Bosnia, and has served pilots well in dangerous situations. When the U.S. Navy wanted to make the Integrated Defensive Electronics Countermeasures (IDECM) system for its new F/A-18E/Fs, the jammer of choice, the ALQ-214, was not available yet. The Navy decided to deploy the ALQ-165 on block 1 IDECM suites.

Since that time, the ALQ-214 has entered production, and therefore replaced the ALQ-165 in the IDECM. No new contracts have been signed for new production of the ALQ-165 as newer systems have replaced it in the marketplace. The systems already in use around the world will continue to be supported, even though no new production will take place. This report will be archived next year.

Ten-Year Outlook

No further production expected. This report will be archived in 2008.

* * *