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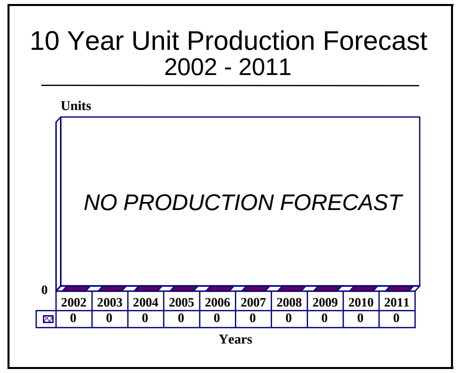
ALQ-131(V) - Archived 04/2003

Outlook

- Workhorse EW pod
- In service; modernization and logistics support continue
- Usage will support spares market for fielded systems
- Further production not likely



Orientation

Description. Airborne dual-mode ECM jamming pod.

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Status. In service, with ongoing logistics support.

Total Produced. An estimated 1,350 units have been produced. Most Block I pods have been upgraded to Block II.

Application. The pod has been certified on the A-7, A-10, F/RF-4, F-16, F-111, AC-130, and C-130.

Price Range. The cost of a Block II pod, with receiver/processor, has been estimated to be US$1.2 million.

Price is estimated based on an analysis of contracting data and other available cost information, and a comparison with equivalent items. It represents the best-guess price of a typical system. Individual acquisitions may vary, depending on program factors.

Technical Data

	Metric	US
Dimensions		
Size:	279.8 x 29.5 x 63 cm	111 x 11.7 x 25 in
Weight:	299.2 kg	659 lb

Characteristics	
Frequency coverage:	2 to 20 GHz
Configurations:	17 possible (1,2, or 3 bands)
Jamming waveforms:	48 simultaneous
Reliability:	MTBF +125 hr (3 times spec)
Fault detection:	100%
MTAT:	<2.1 hr
MTTR:	<1.5 hr

Design Features. The ALQ-131(V) modular electronic countermeasures pod is fitted in a canister which provides environmental protection, structural support, and cooling. The entire length of the canister is bisected by an integral fluorocarbon-cooled I-beam with equipment bays located on three sides. Individual mission jamming requirements can be met by 17 different structural configurations. The design emphasizes operational flexibility through flightline reprogramming as well as high reliability and maintainability. The design goal was to increase system availability.

The control and interface (C/I) module is based on a programmable digital computer and is the functional heart of the pod. Simultaneous waveforms for jamming modulations are provided by a digital waveform generator. To reduce weight and drag for high-performance aircraft while providing selected frequency coverage, the ALQ-131(V) offers modular partitioning in one, two, or three frequency band configurations.

The Block II update incorporated new countermeasures techniques as well as redesigned hardware that maximized performance in a dense signals environment. An improved receiver which is controlled by the processor searches for radar signals, and pod response is tailored for optimum jamming. The pod has a look-through feature for surveillance of the signal environment while the jamming feature is being used.

The Block II receiver/processor is a wideband, frequency-agile, double-conversion, superheterodyne receiver using a crystal video receiver for low-band coverage. A self-contained processor automatically sorts signals and identifies threats. The pod is flightline-programmable and can generate a variety of preset and automatic jamming modes. The enhanced receiver/processor reduces the need for cockpit intervention, reducing pilot workload in combat situations. The system is power managed and has a built-in test system.

A missile warning and countermeasures dispensing capability has been designed for the pod. In the future, it could be enhanced with the addition of communications jammers, high-power standoff jamming, electronic support measures, synthetic aperture radar, and navigation/targeting capabilities.

Operational Characteristics. When integrated with an external radar warning receiver or used with a power management module, the ALQ-131(V) becomes a computer-controlled, completely automatic system capable of jamming threat radars on a user-programmable, pre-assigned basis. A Memory Loader/Verifier allows the computer's operational software to be programmed in less than 15 minutes while on the flightline. Up to 48 simultaneous waveforms can be generated by the integrated circuit (IC) module and are designed to counter a wide range of contemporary threats.

The power management system tailors response technique, frequency, and timing, allowing the pod to be more efficient and reducing the number of extraneous signals transmitted. This results in more efficient use of system resources, and reduces unwanted interference among members of a mission package. It also reduces the ability of hostile forces to use stray emanations to detect and track aircraft equipped with the ALQ-131(V) pod.

Pod maintenance is based on the Central Integrated Test System (CITS), which provides a comprehensive functional check of system operation and automatic fault isolation down to the module level. The CITS can be used for in-shop maintenance and operates continuously during in-flight operations.

ALQ-131

Source: North Gruman

Variants/Upgrades

ALQ-131(V) Block I. This was the original version. A major update overcame reliability and maintainability problems and adapted the pod to a changing threat requirement.

ALQ-131(V) Block II. The Block II effort was developed as a quick reaction program to integrate the lessons learned from the ALQ-131(V)'s growth process, several System Project Office studies, and the Airborne Self-Protection Jammer (ASPJ) program. It consists primarily of a new receiver/processor.

Block II can generate many advanced jamming techniques and is fully power managed for efficiency. It has a look-through feature, is more fully integrated with host aircraft systems, and provides three operational modes controlled from the cockpit. Block II pods were used during Operation Desert Storm.

New receiver/processor units have been in production since 1985, with over 500 delivered for US and Foreign Military Sales customers.

ALQ-131(P). The ALQ-131(V) components can be repackaged by Per Udsen Co of Denmark into an F-16 weapons pylon to make full capability possible with no reduction in weapons-carrying capability.

ALQ-131(V) Plus. This is a standard ALQ-131(V) Block II pod with a MIL-STD-1553 Augmentation Board and a three-sensor AAR-54(V) installed for full lower hemisphere missile warning. An off-the-shelf countermeasures dispenser and DIRCM can be added. In addition, an ALE-50(V) fiber-optic towed decoy can be added to the rear of the pod, and can be upgraded to an infrared (IR) towed decoy. It has been demonstrated on the F-16.

A standard pod can be field-modified for the ALE-50(V), and the towed decoy dispenser interchanged between pods. The configuration has undergone live-fire tests and a flight demonstration.

ALQ-131(V) Receiver/Processor. This is a self-contained module within the jamming pod that facilitates completely automatic computer-controlled jamming and enhances the pod's performance in single- and multiple-radar threat environments. It has been included in roughly 700 US and allied pods.

Program Review

Background. Development of the ALQ-131(V) began in 1972 and it entered full-scale engineering development in 1976. Flight testing and evaluation were completed quickly and an initial production contract was awarded in 1977.

Full USAF reliability demonstration tests of the Block II upgrade were completed in August 1986. Fifteen Block II pods were delivered to the Air Force in July and three were delivered to the Royal Netherlands Air Force. Delivery of the eighth production lot began in July, for a total of 129 Block II pods.

In August 1988, the Air Force advocated a "two-pod" strategy. Under this acquisition plan, both the ALQ-184(V) and the ALQ-131(V) would be procured, with quantities based on an annual competition. The Air Force argued that each system had advantages over the other, and sources believed that the competition would run over a five-year period and involve up to 1,000 pods.

In September 1989, the Air Force selected only the ALQ-184(V) to meet its annual requirement. Exclusive ALQ-184(V) annual procurement continued through January 1993.

The Air Force deployed 260 Block II and 130 Block I ALQ-131(V)s to the Persian Gulf for Operation Desert Storm. They were carried on 8,000+ sorties by a variety of tactical aircraft facing the Iraqi ground defenses in the Kuwait Theater of Operations. Block I pods were carried by RF-4C and F-16 aircraft. Block II pods were carried by F-15, RF-4C, F-4G, F-16, F-111, and A-10 aircraft. The low attrition rate of Coalition air forces was directly attributed to the destruction of Iraq's air defense infrastructure and the effective electronic warfare performance throughout the theater of operations.

A major reprogramming effort during the Desert Shield buildup enabled the pods to effectively counter the variety of threat systems used by Iraq. Because of these intensive reprogramming efforts, the Block II receiver/processor achieved Initial Operating Capability (IOC) in October 1990 instead of January 1991, as planned. Sources indicate that reliability and maintainability during combat operations were good.

ALQ-131(V) pods remained operational in the theater of operations and were carried by USAF and RNLAF aircraft involved in Operation Southern Watch, Provide Comfort, and Deny Flight.

In 1993, the Air Force upgraded 60 fielded Block II pods with low-band modules removed from retired Block I systems. Many of the new pods were earmarked for possible use in Bosnia. Responding to changing threat analysis, the Air Force extended the low-frequency capabilities of Block II pods. Reports indicate that fewer than 100 Block II pods were acquired with modules to cover all three frequency bands (450 Block I pods carried all three canisters).

By 1994, a conversion kit was developed that could upgrade an existing Block I pod into Block II configuration, producing a pod identical to a production Block II. The conversion retained common Block I/II components, replacing the others.

In 1994, the Royal Netherlands Air Force awarded a US$17 million, three-year contract to update all of its Block I pods to Block II standard as part of the F-16 Mid-Life Upgrade program. The first conversion system was delivered in December 1994. Production deliveries began in 1995.

Also in 1994, a US$22 million contract to build and integrate 54 Receiver/Processor units for RNLAF Block II ALQ-131(V) pods was awarded. Deliveries were completed by June 1996.

In mid-1994, the Special Operations Command evaluated both ALQ-131(V) and ALQ-184(V) pods for use on its AC-130 gunships. The ALQ-131(V) Block II pod, with the new receiver/processor, was selected after test flights. The pods were to be used by the gunships until ALQ-172(V) internal jammers could be installed.

RNLAF C-130s were modified to carry ALQ-131(V) Block II pods for use during humanitarian relief and troop transport missions. The experiences of air forces engaged in the Bosnian air lift generated further interest in C-130 protection. For example, the Belgian Air Force expressed interest in procuring ALQ-131(V)s for use on its F-16 and C-130 aircraft. Pods would come from USAF Block I stock and be updated to Block II standard later. In early 1995, the Belgian Air Force was trying to acquire 25 ALQ-131(V) pods from US Air Force stock to operate in conjunction with the Carapace radar warning and jamming system on Belgium's F-16s. Belgian F-16s had flown without ECM for 14 years. The pods and Carapace would work in conjunction with the ALE-40(V) countermeasures dispensers already carried by the aircraft. Demonstrations proved that the ALQ-131(V)s would not interfere with Carapace.

A January 1996 notice in the *Commerce Business Daily* disclosed that the Air Force was soliciting engineering services and engineering materials needed to integrate and test the GEC-Marconi Fiber-Optic Decoy subsystem with the ALQ-131(V) Block II ECM pod.

In February 1998, the Belgian pod upgrade effort was completed and all 25 pods achieved IOC. In April 1998, the US Department of Defense published a notice that the government of Norway was interested in contracting to upgrade 16 ALQ-131 Block I pods to Block II configuration with receiver/processor and low-band capability, along with modification kits, spare and repair parts, support and test equipment, and the required training. Estimated cost would be US$47 million.

In September 1998, the Pentagon issued an announcement of the possible sale of Block II upgrades for the 40 pods being used by the Israeli government. The estimated US$76 million effort would include upgrades, spares, support, technical data, and training. Also in September 1998, the DoD announced that the government of Egypt planned to upgrade 40 ALQ-131(V) pods from Block I to Block II configuration. That project was valued at US$76 million.

In April 1999, Mitsubishi Electric Corp awarded Northrop Grumman a US$19.6 million contract to supply ALQ-131(V) components for assembly and license production. This was a follow-up to annual procurements of ALQ-131(V) components since licensing in 1991. Deliveries began in April 2000.

A June 1999 announcement noted that the Royal Norwegian Air Force had awarded a contract worth US$15.8 million for 16 ALQ-131(V) Block II upgrades. Norwegian pods would be upgraded at the Northrop Grumman Regional Support Center in Robins, Georgia.

Also in June 1999, New Zealand agreed to buy the 28 F-16A/B Block 15 aircraft originally bought by Pakistan but never delivered owing to concerns about the Pakistani nuclear weapons program. The Air Force said that reports that the package would include 12 ALQ-131(V) pods were false.

In January 2000, Egypt awarded Northrop Grumman a US$39 million contract for 39 Block II conversion kits for the Egyptian Air Force. The pods are to be used on the EAF’s F-4, F-16, and C-130 aircraft.

In April 2001, the Bahrain Amiri Air Force announced that it would upgrade Block I pods to the Block II standard by procuring Receiver/Processors as part of a US Navy contract for 12 R/P units. The other six would be used to upgrade Block I pods in the US inventory for sale to Bahrain. The pods would be used on its F-16s as part of a larger upgrade and modernization of its air force.

Funding

Funding is now primarily from O&M or depot accounts.

Recent Contracts

Contractor	Award ($ millions)	Date/Description
Northrop Grumman	15.8	Jun 1999 – ALQ-131(V) FMS production for Norway. (F09603-99-C-0124)
Lockheed Martin	15.8	Nov 1999 – FFP contract for 39 Receiver/Processors for ALQ-131(V) to support FMS to Egypt. Completed 2001. (F09603-99-C-0417)
Northrop Grumman	39.0	Dec 1999 – FFP contract for 49 Block I to Block II upgrade kits. FMS for Egypt. Completed 2001. (F09603-00-C-0043)
Northrop Grumman	9.6	Dec 2000 – FFP contract for the upgrade of six ALQ-131(V) systems from Block I to Block II configuration, including associated support services. To be complete December 2003. (F09603-01/C-0049)
BAE Systems	6.2	Feb 2001 – FFP contract to provide 12 Receiver/Processors for the ALQ-131(V) Block II pod. The effort supports FMS to Bahrain. (F09603-01/C-0094)

Timetable

Month	Year	Major Development
	1972	Engineering development
	1976	Full-scale engineering development
	1977	Initial production contract
May	1983	Block II production begins
Oct	1984	SEEK RAM contract awarded

Month	Year	Major Development
Apr	1985	SEEK RAM critical review
Jul	1985	Initial flight tests of Block II pods
Oct	1986	SEEK RAM acceptance tests started
	1988	SEEK RAM canceled
Jul	1988	1,000th pod manufactured and delivered to USAF
Jun	1989	FFP contract for eleventh production lot
Oct	1990	Block II R/P IOC (planned for Jan 1991)
Mar	1992	Missile warning system additions proposed
	1995	End of pod production; upgrades and enhancements continue
Jun	1999	Norwegian upgrade contracted
Dec	1999	Egyptian upgrade kits contracted
Feb	2001	FMS for 12 Block II Receiver/Processor upgrades for Bahrain
Dec	2001	Egyptian upgrade deliveries to be completed

Worldwide Distribution

Procurement estimates are as follows:

Bahrain. Procured 6 pods for F-16s. Upgrading to Block II and procuring six more Block II pods
Egypt. Procured 82 Block II pods for its F-16s. Upgrading Block Is to Block IIs
Israel. Procured 20 pods for F-15 and F-16 use
Japan. Procured 60 pods for its F-4J and F-4E aircraft
Netherlands. Procured 105 pods for its F-16 fleet
Norway. Procured pods for its F-16 aircraft. Upgrading 16 Block Is to Block IIs
Pakistan. Procured 40 pods for tactical aircraft
Portugal. Procured 8 pods for A-7 aircraft
Singapore. Procured pods for tactical aircraft
Taiwan. Procured pods for F-16 aircraft
United States. Carries 1,018 pods on a variety of tactical aircraft

Forecast Rationale

The ALQ-131(V) is used by both US and Allied forces. It is an important EW asset for the USAF tactical fleet and has proven effective in a variety of combat training environments, including the demanding Red Flag and EW CAS electronic combat scenarios. During the Persian Gulf War, the ALQ-184(V), ALQ-131(V), and ALQ-119(V) pods were carried by the Air Force, with the ALQ-184(V) and ALQ-131(V) supporting the missions calling for the most threat protection. The ALQ-119(V) was used as backup and on low-threat missions. The ALQ-184(V) was carried by the F-4G Wild Weasels that deployed from George AFB, California. Block II ALQ-131(V) pods were carried by Wild Weasels from Spangdahlem AFB, Germany, and by the rest of the tactical fleet. The ALQ-131(V) pods used were Block II versions and are still operated by forces in the region.

Aircrews are familiar with the pod and have confidence in its performance, and a logistics support system is in place. The manufacturer has an ongoing upgrade and enhancement program to keep the system up to date. The Block II Receiver/Processor performance enhancement is popular. The upgrades have an advantage since upgrade kits modify original, on-hand pods.

In 1989, the Air Force decided that the ALQ-184(V) would be the only pod procured by the USAF in its annual pod buys. The reason cited for the sole contract to Raytheon was the lower cost of modifying existing ALQ-119(V) pods compared with the cost of producing all new pods. Additionally, this approach would not reduce the stock of ALQ-131(V) pods in the inventory. Another factor favoring Raytheon was the immediate availability of ALQ-184(V) test equipment.

Support continues. The international air forces that carry the ALQ-131 consider it their premier pod, and will continue to support it for many years to come. Upgrades to existing pods will meet many users' needs. US support will continue for pods in the inventory, as will upgrades, especially the addition of missile warning system enhancements.

Future jammers will be internally mounted in the next-generation aircraft or the aircraft will use towed decoys. Pods cause drag, take up a weapons hardpoint, and cannot be used with low-observable airframes, so internal systems will be standard for future tactical electronic warfare equipment. But delays in developmental programs, defense budget cutbacks, and experience with current systems in actual combat make it unlikely that the new hardware will be retrofitted into current aircraft, extending the need for jamming pod support.

A major lesson learned in the Persian Gulf was the importance of missile warning systems to protect tactical aircraft from heat-seeking surface-to-air missiles. The Air Force initiated an effort to integrate missile warning and expendable dispensers into existing EW pods, and the Air Force has been testing new systems.

When Captain Scott O'Grady's F-16 was shot down over Bosnia, he was carrying an ALQ-131(V) pod, and there was concern as to why it did not protect his aircraft from the Serbian missile. One of the problems was a lack of vigilance and ECM application – typical during "peacetime" operations, when crews are not as faithful about setting up and using protective equipment as they are in a combat theater. The launch tactic was creative and minimized the warning time by using offset radars to target Captain O'Grady's aircraft. The missile was fired from inside the pod's cone of silence. The need for constant vigilance must be re-emphasized. Safety during "non-combat" operations cannot be assumed, and missile warning additions are important.

Missile warning system modifications will be the major market opportunity in the future. Estimates are that around 200 pods could be upgraded for use by A-10 and other tactical aircraft. FMS procurement supports a production run for a spare and repair parts market, as well as upgrades.

Several aircraft that can carry the pod are being retired, discouraging new pod developments, and supporting the longevity of and upgrades to the existing ALQ-131(V) and other operational pods. Support will continue as long as pods remain in the fleets of the world.

Ten-Year Outlook

No significant new production expected. Upgrade and support continues.

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