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Falcon Edge IEWS

Outlook

- Countries such as Israel, Norway, and Greece could be interested in the Block 60 F-16, but the aircraft is competing against more modern systems
- Production of Falcon Edge IEWS nearing an end; no new orders since UAE signed contract with Northrop Grumman for system
- Major delays or cost overruns of the JSF program could encourage nations to order F-16E/F fighters, boosting sales of Falcon Edge
- The Falcon Edge could be included on the F-16E/F as part of a bid for India's MMRCA competition

Orientation

Description. The Falcon Edge Integrated Electronic Warfare System (IEWS) is a fully integrated EW suite designed for F-16 Block 60 fighters ordered by the United Arab Emirates (UAE). It is an internal system that combines active jamming, passive receiving, and dispensable countermeasures capabilities.

Sponsor. The Falcon Edge was developed by Northrop Grumman to compete for the UAE F-16 EW suite requirement.

Status. The IEWS is in production for deployment on UAE F-16E/Fs.

Application. F-16E/F (Block 60).

Price Range. Based on contract information from 1998, a production system is estimated to cost between \$1 million and \$3 million.

Contractors

Prime

Northrop Grumman Electronic Systems

<http://www.es.northropgrumman.com>, 1580-A W Nursery Rd, Linthicum, MD 21090 United States, Tel: + 1 (800) 443-9219, Email: ES_Communications@ngc.com, Prime

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Falcon Edge IEWS

Technical Data

Dimensions

Weight	TBD
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Characteristics

Tactical Radar Receiver	
Growth	0.5 to 18 GHz
Jam	
Growth	0.5 to 18 GHz 0.1 to 0.5 & 18 to 40 GHz

Capabilities

Receiver	Full radar signal processing Precision DF via Phase Interferometry Emitter geolocation (with GPS/INS data) in < 3 sec <50 MCEP
Jammer	Full ECM waveform generation Coherent repeater Transponder Noise CW Pulse Pulse Doppler

Design Features. The EW suite is mounted internally and features an active high-power RF jammer and passive EW suite. It can also deploy chaff and flares. The fully integrated suite can collect raw pulse data and make precision RF angle-of-arrival measurements that provide location information on threat emitters. It replicates HARM Targeting System functions, and provides passive detection of air-to-air and air-to-ground emitters.

An onboard EW simulator negates the need for an external electronic combat range. The radar warning receiver (RWR) has greater accuracy and sensitivity than the ALR-56M. It features extensive common technology to facilitate higher levels of interoperability. It is based on technology developed for the Tactical Radar Electronic Combat System (T-RECS) to be used on the Hunter unmanned air vehicle (UAV).

Designers capitalized on digital technology and experience with the B-2 electronic support measures (ESM) system, which uses a modular open architecture with software-driven receivers and jammers that were designed with future enhancements in mind. A tactical radar jammer and tactical radar receiver interface via a main system chassis. The ESM and ELINT receivers are real-time programmable and real-time controllable. Their modular design is lightweight, but features

advanced capabilities, including geolocation, using GPS and INS enhanced Suppression of Enemy Air Defenses (SEAD) targeting. The system was designed to be both accurate and timely.

The tactical jammer provides both self-protection and standoff electronic countermeasures (ECM). Like the receivers, it is real-time controllable and programmable. Jamming is effective from 5 kilometers, a capability demonstrated at the China Lake Naval Test Range, and is multiple-threat capable.

Operational Characteristics. The EW suite is part of an advanced avionics system developed for the newest F-16, the Block 60. It is integrated with many systems, including the APG-80(V) Agile Beam radar, an Active Electronically Scanned Array (AESA) radar designed specifically for this new-generation F-16.

All threat information, radar data, and a moving map are combined onto one of three display screens for a "God's eye view" of the tactical situation. Pilots can perform simultaneous air-to-air, search-and-track, and air-to-ground targeting and terrain following, thanks to the advanced Agile Beam radar. These demanding missions require a capable and flexible EW capability, something designed into the new EW suite. Digitization makes many new capabilities possible.

Falcon Edge IEWS



The IEWS will significantly upgrade the F-16E/F's self-protection capability.

Source: Lockheed Martin

Program Review

High-Demand, High-Stakes Competition

The United Arab Emirates began a planned acquisition of a new fighter in the mid-1990s. A series of negotiations began when the UAE decided on the F-16 in 1998. The customer was demanding and the competition fierce for the 80-aircraft buy, valued at \$6.4 billion. The UAE threatened to pull out of the deal if advanced capabilities were not included. Although U.S. congressmen and the Israeli government were apprehensive about sending high-technology components to the Emirates, the White House and Lockheed Martin were able to overcome these misgivings and sign the contract.

After much suspense, the UAE announced it would purchase the F-16s at the Tridex 2000 Defense Exhibition in Abu Dhabi. Called the Desert Falcon, the Block 60, or the F-16E/F, the fighter has conformal fuel tanks for extended range, new cockpit displays, a new internal sensor suite, a new mission computer, an advanced Agile Beam (active array) radar, and an internal forward-looking infrared (FLIR) and targeting system.

The first F-16E/F flew at the Lockheed Martin Fort Worth (Texas) facility on December 6, 2003. The 80 aircraft were scheduled to be delivered from 2004 through 2008.

Years of Research Result in State-of-the-Art EW System

The Falcon Edge is based on the Tactical Radar Electronic Combat System (T-RECS), which was designed for the Hunter UAV. A third-generation hardware build first flew in 1996, but designers have since been building on the system and inserting digital technology. Experience with the B-2 system was exploited to further improve the design.

Along with other avionics systems, the Falcon Edge forms an essential part of the F-16E/F, the most advanced F-16 to fly to date. It remains a secretive program even though production is projected to end in 2008. Some sources even suggest that the Falcon Edge is more advanced than EW systems being developed for modern warplanes such as the F-22 Raptor and F-35 JSF. The Falcon Edge provides automated detection and location of threats as well as jamming capabilities –possibly to make up for the F-16's lack of stealth technology.

The F-16E/F has been entered by Lockheed Martin into the Indian Air Force Medium Multi-Role Combat Aircraft (MMRCA) competition. It is unknown what EW suite Lockheed Martin's entry will be equipped with; however, it is likely that the Falcon Edge IEWS will form the basis of the aircrafts' self-protection suite.

Falcon Edge IEWS

Timetable

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
	1994	Initial procurement discussions
	1996	T-RECS prototype flown on UAV
May	1998	F-16 selected; procurement negotiations begun
Mar	2000	UAE announces final decision on aircraft buy
Dec	2003	First F-16E/F flight
	2004	Scheduled start of aircraft deliveries
	2008	Scheduled completion of aircraft deliveries

Worldwide Distribution/Inventories

The Falcon Edge IEWS equips advanced F-16E/F Desert Falcons for the **United Arab Emirates**. **Norway**, **Greece**, and **Israel** have also expressed interested in the advanced fighter plane, and the Falcon Edge IEWS along with it. Other countries could upgrade their current F-16s with the Falcon Edge.

Forecast Rationale

The F-16E/F has ended its production run for the United Arab Emirates, its first and only recorded customer. The Falcon Edge was specifically designed for the F-16E/F and thus production is strongly influenced by the success of Lockheed Martin's fighter aircraft. Therefore, the end of production of the F-16 for the UAE also marks the end of production for the Falcon Edge.

So far, only the UAE has purchased the F-16 in its E and F variants, despite recent orders for other variants of the F-16 by countries such as Greece, Chile, Morocco, and Poland. Other countries, including Israel, Norway, and Greece, could be interested in the Block 60 F-16, but the aircraft is competing against a number of other platforms. Aircraft such as the Eurofighter Typhoon, Dassault Rafale, Saab Gripen, and even Lockheed Martin's own F-35 JSF pose fierce competition to the most modern version of the F-16.

This intense competition means there is little opportunity that the F-16E/F will record additional sales. However, the F-16E/F has been entered into the Indian Medium Multi-Role Combat Aircraft (MMRCA) competition. The eventual winner of that competition will be awarded a large contract for 126 aircraft. If the Falcon Edge is included in Lockheed Martin's offer, it will also benefit from increased sales.

Additionally, the Falcon Edge could be offered as an upgrade to countries that operate older F-16s. This would allow the venerable aircraft to remain in service until newer aircraft replace them. However, F-16 operators show little interest in upgrades involving the Falcon Edge at this time.

No production of the Falcon Edge IEWS is currently being forecast over the next 10 years. It is still too early in the Indian MMRCA competition to declare a winner. Therefore, no systems are being projected at this time.

Ten-Year Outlook

No production is being forecast at this time. The Falcon Edge IEWS could be included on the F-16E/F if it wins the Indian Medium Multi-Role Combat Aircraft (MMRCA) competition. If not, the system will most likely not be produced anymore. In that case, this report will be archived.

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