

# ARCHIVED REPORT

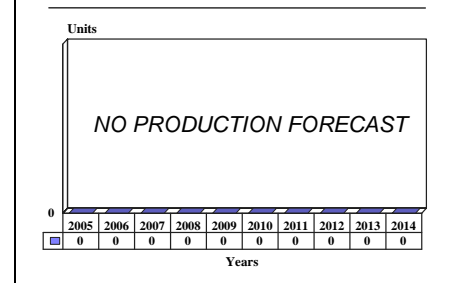
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## APX-109(V) – Archived 7/2006

### Outlook

- Production ended for ROK F-16
- APX-111(V) selected by most other users that are updating their IFF/SIF systems

10 Year Unit Production Forecast  
2005 - 2014



### Orientation

**Description.** The APX-109(V) is a single-unit airborne Combination IFF Interrogator/Transponder (CIT).

#### Sponsor

Northrop Grumman Corp  
 Electronic Systems Sector  
 5500 Canoga Avenue  
 Woodland Hills, California (CA) 91367  
 USA  
 Tel: + 1 (818) 715-4040  
 Fax: + 1 (818) 715-3368  
 Web site: <http://www.northropgrumman.com>

**Status.** In service, production ending, ongoing logistics support continues.

**Total Produced.** Through 2004, an estimated 242 units had been produced.

**Application.** F-16 (FMS).

**Price Range.** Cost ranges from \$225,000 to \$500,000.

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.

### Contractors

Northrop Grumman Navigation & Space Sensors Division, <http://www.nsd.es.northropgrumman.com>, 21240 Burbank Bld, M/S W8, Woodland Hills, CA 91367-6698 United States, Tel: + 1 (818) 715-2470, Fax: + 1 (818) 715-3368, Prime

### Technical Data

#### Dimensions

APX-109(V)3

Dimensions  
 Weight (includes COMSEC appliqué)

#### Metric

21.28 x 15.24 x 36.83 cm  
 15.5 kg

#### U.S.

8.38 x 6.0 x 14.50 in  
 34 lb

**Characteristics**

Design Specifications	DoD-AIMS-65-1000B NATO STANAG 4193 International ATC RTCA/DO-181 (Mode S)
Frequency	
Transmitter	1,030 MHz (interrogator) $\pm$ 0.5 MHz 1,090 MHz (transponder) $\pm$ 0.5 MHz
Receiver	1,030 MHz (interrogator) $\pm$ 0.5 MHz 1,090 MHz (transponder) $\pm$ 0.2 MHz
Power Output	
Interrogator	Up to 1.5 kW
Transponder	500 W (+3, -2 dB @1% duty cycle)
Sensitivity	- 83 dBm - 75 dBm $\pm$ 3 dBm
Detection Range	>100 nm
Sector Coverage	$\pm$ 60° Az/EI
Azimuth Accuracy	2°
Range Resolution	500 ft
Altitude	Up to 70,000 ft
Interrogation Rate	450 Hz
Transponder Reply Rate Limit	1,500/sec
In-beam Targets	32
Antenna Elements	4
Modes	1, 2, 3/A, C, and 4
Planned Growth	Mk XV and Mode S
COMSEC Appliqué	Eliminated KIT and KIR-1A/TSEC Computers Uses electronic key-fill
MTBF	>1,800 hr
Interface	1553B Mux bus compatible

**Design Features.** The APX-109(V) combines interrogator and transponder capabilities in a small unit. It replaced up to seven units and featured the newest IFF/SIF and ATC (air traffic control) capabilities. AIMS (Aircraft Identification Monitoring System) and STANAG (Standard NATO Agreement) requirements are met in production hardware. A COMSEC Appliqué eliminated KIT and KIT-1A/TSEC computers and made electronic key-fill possible.

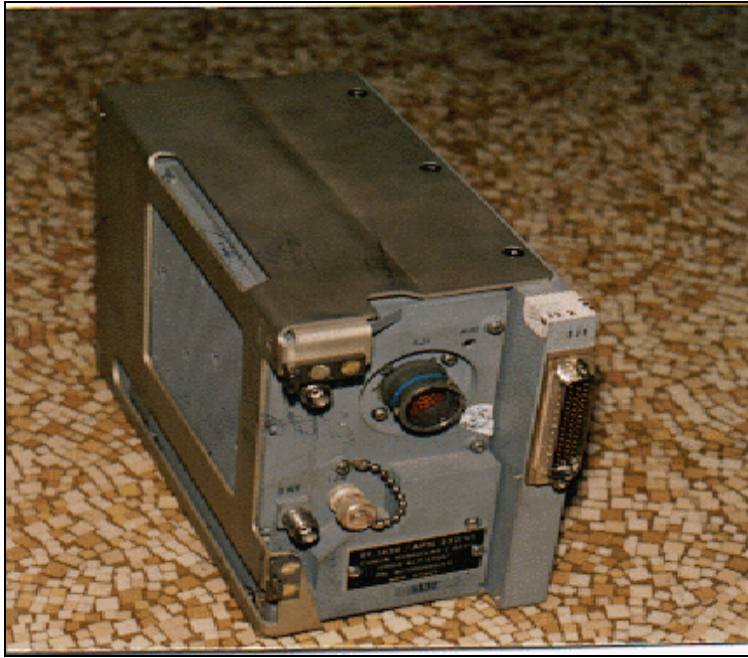
The OX-72/APX-109(V) CIT was designed to meet the Mk XII Identification Friend or Foe (IFF) standard. The CIT offered enhanced performance that replaced both the APX-76(V) interrogator and the APX-100(V) or APX-101(V) transponders.

The solid-state design incorporated surface-mount technology and featured CMOS large-scale integration (LSI) gates to reduce the size and complexity of the system. It uses a four-channel air operations center (AOC), an adaptive received video threshold, and monopulse processing. It was designed to perform in a jamming environment.

The MIL-STD-1750A processor supported a built-in defruiter and statistical reply evaluator. It also ensured operational flexibility, which made it possible to optimize system parameters based on mission requirements. With Built-In Test capabilities, the system can report up to 97 percent of its internal failures.

The system can be interfaced to either a mechanically or electronically scanned antenna.

**Operational Characteristics.** The APX-109(V) made it possible for an aircraft to interrogate other aircraft as well as respond to IFF/SIF queries. The sophisticated military Mk XII system specifically identifies military aircraft and is currently the main way combat forces can distinguish friend from foe. By cryptologically establishing the ID codes, identity can be established with better confidence. The system meets all international air traffic control requirements as well as AIMS and STANAG standards.



APX-109(V)3

Source: ROKAF

## Variants/Upgrades

APX-109(V)3. This version is in use by Korea, Turkey, and Singapore.

## Program Review

**Background.** In the late 1980s, manufacturers developed advanced replacements for older IFF/SIF equipment. The APX-109(V) was originally selected by the USAF for its now-defunct F-16 Air Defense Fighter requirement. Delays in the development of a follow-on identification system opened up markets for new ID systems that could function in the Mk XII mode and had the capability to accommodate new ATC approaches such as Mode S.

The U.S. and NATO selected the APX-111(V) CIT for their aircraft. South Korea and Turkey selected the

The APX-109(V) Plus, a competing system which also featured a combined interrogator/transponder design. The APX-109(V) has not attracted any sizable orders among FMS operators of the F-16 beyond these two buyers.

In April 2001, (then) Litton Systems received an FMS contract for 20 APX-109(V)3 Advanced IFF systems for South Korea's F-16 aircraft. The effort was expected to run through March 2004.

## Funding

Funding is from procurement and maintenance lines for FMS F-16s; no specific funding identified.

## Recent Contracts

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(Contracts over \$5 million.)

<u>Contractor</u>	<u>Award (\$ millions)</u>	<u>Date/Description</u>
Litton Systems	19.0	Apr 2001 – Modification to an FFP contract for 20 APX-109(V)3 Advanced Identification Friend or Foe systems for F-16 aircraft. FMS to Korea. To be completed 2004. (F33657-00/C-2187)
Lockheed Martin	12.9	May 2001 – FFP contract for a fleet upgrade to 22 F-16 aircraft. Upgrade includes incorporation of interface software for the AMRAAM and AIFF system. Completed 2003. (F33657-00-C-0062)

## Timetable

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<u>Month</u>	<u>Year</u>	<u>Major Development</u>
Oct	1993	Solicitation issued
Nov	1994	Negotiations completed
Mar	2004	Last contract deliveries to be completed

## Worldwide Distribution

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**South Korea** and **Turkey** are installing the system on their F-16s.

## Forecast Rationale

The USAF selected the APX-109(V) for its Air Defense Fighter requirement, but when this program died, so did much of the pending market for the APX-109(V). The APX-111(V) was selected for a U.S. Navy retrofit program, as well as by Greece (F-16), Taiwan (F-16A/B), Japan (F-2), Kuwait (F/A-18), Finland (F-18), Switzerland (F/A-18C/D), and the U.K. (Sea King HAS.5/6). Only South Korea and Turkey acquired the APX-109(V).

A combination transponder/interrogator is important to the air-to-air mission, as fighter pilots must have positive, cooperative identification of aircraft to engage

hostile aircraft BVR (beyond visual range). The end of the Cold War and the demise of communist governments in the former USSR and Eastern Europe caused some to believe that BVR tactics were no longer important. But the Persian Gulf War and its casualties from friendly fire prompted the services to re-evaluate the need for a next-generation IFF/SIF system.

South Korea decided to continue with the APX-109(V)3 for its F-16 fleet in lieu of switching to one of the new IFF units on the market. This extended the production line a few more years. Logistics support will continue for the large number of systems in service.

## Ten-Year Outlook

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No further production expected, except for logistics support.

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