

# ARCHIVED REPORT

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## APS-130/146 - Archived 01/97

### Orientation

Description. Airborne surveillance and navigation radar.

Sponsor

US Navy

Naval Air Systems Command

Washington, DC 20361-2140

USA

Tel: +1 703 692 3122

(NAVAIR HQ is in the process of moving to the Naval Air Warfare Center, Patuxant River, Maryland)

Contractors

Westinghouse Norden Systems

10 Norden Place, Box 5300

Norwalk, Connecticut (CT)

USA

Tel: +1 203 852 5000

Fax: +1 203 852 7698

Status. In service, in production, ongoing support.

Total Produced. Approximately 180 APS-130 units were produced. Three APS-146 units have been delivered.

Application. EA-6B.

Price Range. Approximately US\$ 400,000.

### Technical Data

Dimensions

Weight:

Antenna size:

Characteristics

APS-130

Frequency:

Peak Power:

Pulse Width:

PRF:

Scan Speeds:

Scan Sector:

Tilt:

Display Ranges:

Display Range Markers:

Metric

173 kg

91 cm x 43 cm

12 - 18 GHz

100 kW

0.4, 1.25, 3.0  $\mu$ sec

300, 800, 2400 pps

Stop, 25°, 50°, 100°/sec

+/- 52° (Maximum Mechanical Scan)

+4 to -12° (Variable)

15, 30, 75, 150 nm

10, 25 intervals

US

382 lb

36 in x 17 in

Built-in Test:	95-percent Fault Detection 90-percent Fault Isolation
Roll Stabilization:	+/- 43°
Pitch Stabilization:	+/- 23°
Range Scales:	15, 30, 75, 150 nm
No. of LRUs:	6
<u>APS-146</u>	
Frequency:	12 - 18 GHz
Peak Power:	60 kW
Pulse Widths:	0.4, 1.25, 3.0 μsec
PRF:	300, 800, 2400 pps
	Higher resolution Ground Maps
Range selection:	10, 20, 50, 125, 75-200 nm
Scan speeds:	25°, 50 °, 100°/sec
Scan options:	Continuous Sector Single Scan (Freeze)
Azimuth Scan Width:	+/- 10° to +/- 45° (variable)
Scan Center:	Rel BRG/ADL
Tilt Control Limits:	+4° to -12° relative to boresight
Stabilization limits:	
Roll	+/- 30°
Pitch	+/- 18° to -12°
MTBF:	400 hrs
Built-in Test:	95-percent Fault Detection 90-percent Fault Isolation
Video format:	TV format (RS-343A, modified)
Operational modes:	Freeze Selectable Pencil/CSC <sup>2</sup> Weather Mode
Units:	Antenna/Receiver Transmitter/Modulator Radar Control Panel Reference Signal Generator Low-Voltage Power Supply Direct View Radar Indicator Pilot's Horizontal Display (available if needed.)

**Design Features.** The APS-130 is a low-cost derivative of the Norden APQ-148/156. It is a basic ALQ-156 without the antenna phase interferometer, which is not needed since the EA-6B does not require the same navigation accuracy as the A-6 did for weapons release. It is used in the US Navy EA-6B Prowler Electronic Countermeasures (ECM) aircraft and provides both mapping and weather detection capability.

A replacement for the EA-6A's original APQ-192 radar, the APS-130 was designed to meet the navigation and weather avoidance requirements of the Prowler. The radar provides continuous real-time mapping for navigation. The platform's position is updated by using prominent radar check points.

Built-in test equipment detects more than 95 percent of the faults that may occur and fault-isolates to the malfunctioning unit more than 90 percent of the time. With completely interchangeable units, no system adjustment or flight line support equipment is necessary.

The APS-146 is an upgrade to the APS-130. The antenna is a compact dual-mode, flat-plate array. To make space for new EW equipment in the radome, the receiver was moved to inside the aircraft. The design maintained the reliability of the APS-130 and added a high-gain pencil beam for weather avoidance and other long-range requirements. An A-6E transmitter provides for improved range resolution.

**Operational Characteristics.** Logical function partitioning, ease of maintenance and a simple system interface optimize system performance for the various Prowler missions. Grumman's EA-6B evolved through the years from the original EA-6A configuration to the future EA-6B ADVCAP for the 1990s and beyond. The APS-130 radar supports all upgrades. Ease of operation is ensured by putting only a few, easily mastered controls on the Radar Control Panel.

The ADVCAP Prowler radar would have featured improved weather avoidance characteristics and longer-range operation.

## Variants/Upgrades

**APS-146.** This is an upgraded version of the APS-130. It features a new flat-plate antenna, and has improved the

weather avoidance and long-range operation of the radar by adding a high-gain pencil beam feature.

## Program Review

**Background.** Norden began developing the APS-130 system in 1976. Three pre-production models were acquired for testing two years later, with a fourth prototype developed and forwarded to the US Navy in early 1980. The first production model was received by the Navy in December of the same year. The APS-130/Navigation Update Program installed the APS-130 on the Navy's EA-6As. The EA-6B was developed as an advanced version of the EA-6A, with aircraft electronics and a crew of four housed in an enlarged cockpit.

A second-generation EA-6B, the EA-6B EXCAP, doubled the Prowler's jamming capability. The third-generation Prowler, the EA-6B ICAP 1, was a further enhanced version and was followed by the fourth-generation EA-6B ICAP 2, which featured even more upgrades. The fifth-generation EA-6B, the EA-6B ADVCAP, was under development by Litton Amecom and would have featured an upgrade to the Prowler's receiver/processor group and other significant improvements to the ECM suite, along with several airframe enhancements. The APS-146 was part of the overall ADVCAP program.

On February 7, 1994, the Navy issued notices for the termination of the EA-6B Avionics Improvement Program and Vehicle Enhancement Program, and for transitioning the J52-P-409 aircraft engine from full-scale development to initial production. The Navy said that it was terminating the EA-6B ADVCAP (Advanced Capability Program) for budgetary reasons. The Navy estimated that by terminating these three contracts it would save approximately US\$ 60 million in already obligated funds, and avoid exposing additional funds for government-furnished equipment and government test support.

FY95 and FY96 Congressional action sought to counter the overall ADVCAP termination. Although they did not disagree with the Navy's need to save money, Congress did not approve of turning away from upgrading what they considered a very important weapons system. In FY95, Congress included bill language which would permit the Navy to use prior-year funds to begin non-developmental engineering changes and procure a lower-cost follow-on system and aircraft upgrades. They directed the Navy to give high priority consideration to incor-

porating already developed systems, or systems already under development into the follow-on systems.

In the FY96 Defense Authorization, both Houses added money for EA-6B ECM upgrades and other Fleet enhancements. None of the changes included the new radar.

The Air Force made a decision to retire its EF-111A jamming aircraft, the ECM partner to the Prowler. Although a debate continues, it is likely that additional EA-6Bs will be brought up to the latest version, Block 89 to support the additional mission load.

## Funding

US FUNDING								
	FY94		FY95		FY96 (Req)		FY97 (Req)	
	QTY	AMT	QTY	AMT	QTY	AMT	QTY	AMT
<u>RDT&amp;E</u> (USN)								
PE0604270N								
EW Development								
E0556 EW Counter								
Response	-	31.7	-	24.5	-	3.3	-	2.7
<u>Procurement</u> (USN)								
EA-6B Reman	-	77.6	-	0	-	0	-	0
EA-6B Mods	-	23.1	-	38.5	-	0	-	59.4
<u>RDT&amp;E</u>								
(USN estimate)	QTY	AMT	QTY	AMT	QTY	AMT	QTY	AMT
E0556	-	2.6	-	3.2	-	3.2	-	3.3
<u>Production</u>								
(USN estimate)	QTY	AMT	QTY	AMT	QTY	AMT	QTY	AMT
EA-6B Reman	-	80.7	-	142.1	-	149.8	-	208.0

NOTE: Figures are from the FY96 Program Element Descriptors. Congress added US\$ 140 million to the FY96 Appropriations bill for EA-6B work. The Authorization conference had not been completed, but the Senate was pushing for increases as well.

All US\$ are in millions.

**Analysis.** The APS-130 is used only on the Grumman EA-6B Prowler, a popular and combat-proven aircraft. It supports the Prowler mission well. It is ancillary to the prime electronic warfare mission of the aircraft, and so as long as the Prowler can navigate to and from target points, there has been no major effort to change the radar. When the Prowler serves as an escort jammer, other aircraft provide have the lead on navigation.

A new radar was to be part of the ADVCAP avionics, airframe, and jamming system upgrades. But the Navy is short of cash to fund all of its wants, and needs to find money to fund production of new tactical aircraft, such as

the F/A-18E/F and V-22. The Pentagon (in its first Bottom-Up Review) and Congress have been favorably disposed toward technology solutions to military needs, and Capitol Hill has tended to support the ADVCAP upgrade over other Navy "wish-list" items.

The Navy's termination of the ADVCAP upgrade contracts drew strong reaction from a Congress suspicious of the sea service trying to find money at the expense of EA-6B enhancements. Because of Congress' favorable opinion of the EA-6B, it is not going to allow a full termination of the upgrades. The legislators have been specific in directing the Navy to re-initiate EA-6B

upgrades, although a cutback in the overall program will be permitted.

enhancements to meet Congressional direction to upgrade the Prowler.

The upgraded radar will not be part of the reduced- scale upgrades. It is not as necessary as the jammer

## Recent Contracts

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There Are No Recent contracts over US\$ 5 million recorded.

## Timetable

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	1966	EA-6A design contract
	1969	Initial EA-6B production
	1983	ADVCAP contract awarded
	1988	First ADVCAP delivery
	1989	ADVCAP production start
Nov	1990	APS-146 program began
	1991	Final EA-6B production
	FY93	EA-6B ADVCAP Milestone IIA
Jul	1993	ADVCAP LRIP (original plan)
Dec	1993	Band 2/3 DT-IIIH TECHEVAL
Feb	1994	Navy terminates ADVCAP contracts

## Worldwide Distribution

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Currently the EA-6B is a US-only program.

## Forecast Rationale

Terminating the original ADVCAP program put an end to the APS-146 program. Even though there will be jammer upgrades to the Prowler, and the Navy jammer will assume some of the Air Force's ECM mission when the EF-111A is retired, the EA-6B does not need a new radar to perform its mission.

Although there is some hope that the radar upgrade may be renewed in the future, this does not appear likely. Rumors of a run of new production aircraft surface from time to time; but whether or not new EA-6Bs will be

procured is questionable at this time unless an FMS procurement develops.

The Navy will be flying EA-6B aircraft well into the next century. Plans are for the Prowler to be in the Fleet until 2010 or 2015, so there will be a need for modifications and improvements to keep the Prowler and its EW system abreast of the rapidly changing threat environment. This need, however, may not extend to the radar.

There will be an active logistics support of the APS- 130s in service through the life of the airplane.

## Ten-Year Outlook

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No production is expected.