

# ARCHIVED REPORT

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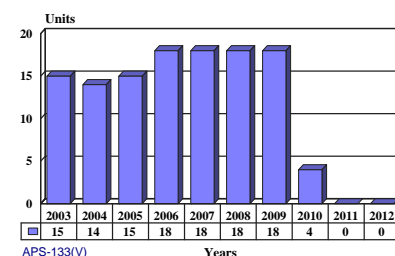
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## APS-133(V) - Archived 1/2004

### Outlook

- In production, in service; ongoing logistics support for tanker/transport aircraft
- Some users moving to windshear-predicting radars
- High-priority, high-visibility aircraft in war on terrorism

10 Year Unit Production Forecast  
2003 - 2012



### Orientation

**Description.** Airborne digital mapping, beacon homing, and color weather radar.

#### Sponsor

US Air Force

Warner Robins Air Logistics Center  
Robins AFB, Georgia (GA) 31098  
USA

Tel: +1 912 468 1001

Web site: <http://www.robins.af.mil>

**Status.** In service, in production, ongoing logistics support.

**Total Produced.** Through 2002, an estimated 711 units had been produced.

**Application.** C-5, C-17, C-130, KC-130, C-141, E-3A AWACS, E-4B, E-6A TACAMO, E-8C JSTARS, and KC-10A aircraft.

**Price Range.** An estimated US\$100,000 each.

#### Contractors

Honeywell Corp

Aerospace Electronic Systems  
Div 2100 NW 62nd Street  
Fort Lauderdale, Florida (FL) 33309  
USA

Tel: +1 305 928 2100

Fax: +1 305 928 3000

<http://www.honeywell.com>

### Technical Data

#### Dimensions

Weight

Antenna dish diameter

#### Metric

54 kg

67 cm

56 cm

#### US

120 lb

30 in

22 in

**Characteristics**

Frequencies	9,375 MHz +/- 5 MHz (weather/map) 9,310 +/- 5 MHz (beacon)
Power output	65 kW peak (nominal)
Pulse width	
Weather	5.0 $\mu$ sec
Map	5.0 or 4.0 $\mu$ sec
Beacon	2.35 $\mu$ sec
Range	
Weather	to 300 nm
Storm conditions	to 250 nm
Significant storms	to 80 nm
Display	Iso-echo (weather contours to evaluate weather intensity using color)
Range scales	7, from 5 to 300 nm Sleuable range markers
Beacon display	to 300 nm (with delay mode)
Ground map	to 250 nm
Coastal terrain	200 nm
Cities	to 100 nm
Display	7 shades of green/black
Radar reflectors	3 nm to 0.5 nm
Skin paint:	to 30+ nm (air-to-air)
Antenna	Parabolic dish (30" or 22") 2.9° or 4.4° horizontal Cos <sup>2</sup> fan beacon 2.9° or 4.4° pencil
Scan	30°, 120°, 180° (variable) Variable sweep (sector scan) and azimuth position
Center of scan	+/- 75° steerable
Scan rate	15 LPM (45°/sec)
Manual tilt	+/- 14° vertical
Stabilization	Split Axis
Roll	+/- 43.5° @ 30°/sec
Pitch	+/- 25° @ 60°/sec
Accuracy	+/- 0.5°
Predicted MTBF	500 hr
Units (5 or 7)	RTA-1/FB(M) receiver-transmitter PPI-1TB(M) multifunction color indicator CON-1SB(M) or COMN-1RB(M) radar control unit CON-1TB(M) sector-scan control panel 1UA-1(M) interface unit CON-1(M) interface control ANT-1TB(M) split-axis antenna ANT-1WB(M) optional 22" diameter
External interfaces	INS VLF/Omega 360 IFF Performance management (A/A-24J) APN-169C station-keeping equipment

**Characteristics** (continued)

## Modes

Standby  
 Test  
 Map 1 (no STC)  
 Map 2 (with STC)  
 Wx  
 Beacon

**Design Features.** The APS-133(V) digital color radar grew out of Bendix's experience in the design and manufacture of commercial weather radar systems. It was derived from the RDF-1F radar used by many of today's commercial widebody aircraft.

The radar has a Built-In Test (BIT) circuit for checking system performance and isolating faults. The antenna is fully stabilized, and the digital color radar can interface with systems such as the Fuel Savings Advisory System (FSAS) and Inertial Navigation System (INS).

**Operational Characteristics.** The system displays data in three discrete colors: red, yellow, and green in the weather mode; red, yellow, and blue in the map mode.

System operational modes:

**Weather Avoidance.** This mode provides easy-to-interpret weather information, enabling the aircraft to avoid areas of intense weather activity.

Signal returns are displayed on a cockpit screen in three colors that represent the severity of detected precipitation. Rainfall of over 12 mm per hour is shown in red, a rate of precipitation between 4 mm and 12 mm

per hour is shown in yellow, and rainfall amounts less than 4 mm per hour are displayed in green. Blue range/bearing marks aid in determining distance, with all colors visible even under conditions of high ambient light.

**Mapping Capability.** The high-power output of the APS-133(V) can be used to map prominent landmarks or shorelines for display on the cockpit screen. Details are discernible with a pencil-beam mode, with either a 5 microsecond pulse available for long-range mapping or a high-powered 0.5 microsecond pulse for improved resolution.

In addition to ground mapping, the same feature can be used to detect and track other aircraft during rendezvous, refueling, or formation flying. Large aircraft can be tracked out to distances ranging from 12 to 20 nautical miles.

**Beacon Homing.** The APS-133(V) is equipped for 9,375 MHz beacon (I-Band) interrogation and reception. This makes long-range homing on ground stations or rendezvousing aircraft possible.

## Variants/Upgrades

**Improved Land Mapping (ILM) Version.** The US Marine Corps purchased the APS-133(V) for its C-130 and KC-130 aircraft. The radar was upgraded to a new version named the Bendix Improved Land Mapping APS-133(V), designed specifically for the Marines. This system was also installed on Air Force One, SAM2600 and SAM2700, and the E-4B National Emergency Airborne Command Post (NEACP).

The ILM variant features a high PRF (pulse repetition frequency), shorter pulse widths, and an enhanced

computing capability. Selectable scan sectors improve low-level radar-assisted navigation, and provide improved reliability. The new version interfaces with inertial and Omega navigation systems and has an identification friend or foe (IFF) interrogator. Data from these systems are presented on color display screens developed by Bendix in a cooperative effort with the Marines.

## Program Review

**Background.** In 1988, Bendix was chosen to supply the weather radar for the Air Force's C-17 transport. The radar would be an improved version of the original APS-133(V) and have beacon detection, identification and display, blanking pulses, and improved mapping

capabilities added to accommodate special military aircraft requirements.

In June 1999, Honeywell and AlliedSignal agreed to merge in a deal worth US\$14 billion. The merger was

completed in December 1999, and the combined company is called Honeywell.

*Federal Business Opportunities* continues to carry announcements for an active parts/repair requirement.

## Funding

Funding is from the airframe production line. Spare and repair parts are provided under Operations & Maintenance funding.

## Recent Contracts

No recent DoD contracts over US\$5 million are recorded.

## Timetable

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
	1980	Introduction of digital color weather radar, RDR-1FB
	1980	Introduction of military version of the RDR-1FB, the APS-133(V)
	1981	Full-scale production of the APS-133(V)
	1984	Bendix announces the Bendix Improved Land Mapping APS-133(V) for the Marine Corps
	1987	C-17 weather radar contract awarded
	1993	Westinghouse APN-241(V) fielded, selected for C-130H/J
Sep	1994	FAA certification of AlliedSignal RDR-4B windshear radar
Jan	1995	C-17 IOC
Nov	1995	DoD decides to procure full 120 C-17s
Sep	1996	E-8C JSTARS full production approval
Jan	1997	RFP for APN-59(V) radar replacement released
Jun	1999	Honeywell and AlliedSignal merge
Oct	1999	Multiyear procurement of 60 additional C-17s approved by Congress
Oct	2000	GE announces plan to acquire Honeywell

## Worldwide Distribution

The APS-133(V) radar system is employed by **US** transports, such as the C-5A and C-130, and on large, special mission aircraft such as the E-3 AWACS and the new E-6 TACAMO.

Internationally, the radar is operated on the E-3 AWACS of **NATO**, **France**, the **United Kingdom**, and **Saudi Arabia**, and by some unidentified C-130 operators.

## Forecast Rationale

The APS-133(V) radar was selected for the C-17 based on its performance. The commercial version equips at least 70 percent of the widebody aircraft in use, and the military version had become standard for larger transports.

In January 1994, the Air Mobility Command released a draft Operational Requirements Document (ORD) which noted that over 2,000 radars in use by tanker and

transport aircraft no longer met operational or supportability requirements. The Air Force found maintenance costs too high and the capabilities of the radars inadequate for service needs. These findings would be justification to investigate a program to develop a new, common radar which could be used by all tactical and strategic airlift aircraft, as well as tankers and surveillance platforms.

The requirements for the C-130 Replacement Radar Program eliminated the APS-133(V) from consideration for this program; it is not a coherent radar and cannot be adapted for windshear detection. Northrop Grumman has its APN-241(V), and Rockwell Collins came out with its FMR-200X (militarized to the WXR-700X). Moreover, AlliedSignal has fielded its RDR-4B commercial system.

Three options are being considered. One is replacing the APS-133(V) with a modified RDR-4B, and another is adding an RDR-4B to the C-17. The third option is combining the two radars, with a windshear system and standard APS-133(V) operating with a new antenna.

Except for the C-17 and E-8, US deliveries have been completed. The forecast is for the known radar requirement for JSTARS and the C-17. There is a possibility that a switch to a predictive windshear radar will occur sometime in the future. Procurement decisions are pending.

The number of APS-133(V)s in use will support a long-term spare and repair parts market. Although there will be budget changes in the future as a result of the war on terrorism and the need to significantly improve homeland defense, it is not likely that the C-17 will be hit significantly. It is well accepted and has been proven to be useful. Other programs will have to be the bill-payers.

## Ten-Year Outlook

### ESTIMATED CALENDAR YEAR PRODUCTION

Designation	Application	<u>High Confidence</u> <u>Level</u>				<u>Good Confidence</u> <u>Level</u>				<u>Speculative</u>			Total 03-12
		Thru 02	03	04	05	06	07	08	09	10	11	12	
APS-133	Prior Prod'n:	565	0	0	0	0	0	0	0	0	0	0	0
APS-133(V)	C-17 (USAF) (USAF)	93	15	14	15	18	18	18	18	4	0	0	120
APS-133(V)	Prior Prod'n:	53	0	0	0	0	0	0	0	0	0	0	0
Total Production		711	15	14	15	18	18	18	18	4	0	0	120