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APS-133(V) - Archived 01/2008

Outlook

- USAF has switched favor to a militarized version of the RDR-4000 for C-17s. The RDR-4000 is a lighter radar that uses a variety of advanced radar and processing techniques to provide a much clearer, comprehensive image of the weather
- The APS-133 still serves on a wide variety of aircraft and will support a large spare and repair market for years to come, but could be replaced in the future
- This report will be archived in 2008

Orientation

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

Sponsor

U.S. Air Force
Warner Robins Air Logistics Center
Robins AFB, GA 31098
USA
Tel: + 1 (912) 468-1001
Web site: <http://www.robins.af.mil>

Status. In service, ongoing logistics support.

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 \$100,000 to \$125,000 each.

Contractors

Prime

Honeywell Aerospace, Defense & Space Electronic Systems

<http://www.honeywell.com>, 13350 US Highway 19 North, Clearwater, FL 33764-7290 United States, Tel: + 1 (727) 539-4801, Prime

Comprehensive information on Contractors can be found in Forecast International's "International Contractors" series. For a detailed description, go to www.forecastinternational.com (see Products & Samples/Governments & Industries) or call + 1 (203) 426-0800.

Contractors are invited to submit updated information to Editor, International Contractors, Forecast International, 22 Commerce Road, Newtown, CT 06470, USA; rich.pettibone@forecast1.com

Technical Data

	<u>Metric</u>	<u>U.S.</u>
Dimensions		
Weight	54 kg	120 lb
Antenna dish diameter	76.2 cm	30 in
	55.8 cm	22 in

APS-133(V)

Characteristics

Frequencies	9,375 MHz \pm 5 MHz (weather/map) 9,310 \pm 5 MHz (beacon)
Power output	65 kW peak (nominal)
Pulse width	
Weather	5.0 μ sec
Map	5.0 or 4.0 μ sec
Beacon	2.35 μ 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-in or 22-in) 2.9 deg or 4.4 deg horizontal Cos ² fan beacon 2.9 deg or 4.4 deg pencil
Scan	30 deg, 120 deg, 180 deg (variable) Variable sweep (sector scan) and azimuth position
Center of scan	\pm 75 deg steerable
Scan rate	15 LPM (45°/sec)
Manual tilt	\pm 14 deg vertical
Stabilization	Split axis
Roll	\pm 43.5 deg @ 30 deg /sec
Pitch	\pm 25 deg @ 60 deg /sec
Accuracy	\pm 0.5 deg
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-in dia
External interfaces	INS VLF/Omega 360 IFF Performance management (A/A-24J) APN-169C station-keeping equipment
Modes	Standby Test Map 1 (no STC) Map 2 (with STC) Wx Beacon

APS-133(V)

Design Features. The APS-133(V) digital color radar was derived from the RDF-1F radar used by many 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; or red, yellow, and blue in the map mode.

Weather Avoidance Mode. This mode provides weather information that helps an aircraft 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 12mm per hour is shown in red, a rate of precipitation between 4mm and 12mm per hour is shown in yellow, and rainfall amounts less

than 4mm 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 Mode. 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 five-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.



The C-17 is the last platform to be equipped with the APS-133

Source: U.S. Department of Defense

Variants/Upgrades

Improved Land Mapping Version. The U.S. Marine Corps purchased an upgraded APS-133(V) for its C-130 and KC-130 aircraft. The Improved Land Mapping (ILM) APS-133(V) was designed specifically for the Marines; it is 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 pulse repetition frequency, shorter pulse widths, and an enhanced computing capability. Selectable scan sectors improve low-level radar-assisted navigation, and provide improved reliability. It interfaces with inertial and Omega navigation systems and has an Identification Friend or Foe (IFF) interrogator. Data from these systems are presented on color displays developed in a cooperative effort with the Marines.

APS-133(V)

Program Review

APS-133 for C-17

In 1988, the APS-133 was chosen for the C-17 transport. It would be an improved version of the original RDR-1FB 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 \$14 billion. The merger was completed in December 1999, with the combined company called Honeywell.

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

The U.S. Air Force decided to switch to a militarized version of the Honeywell RDR-4000 “3-D volumetric scanning” weather radar in 2003. The new radar has been given the military nomenclature APS-150.

RDR-4000 to Replace APS-133

The new, lighter radar uses a variety of advanced radar and processing techniques to provide a much clearer, comprehensive image of the weather out to 320 nautical miles ahead of the aircraft. The RDR-4000 entered service in 2006.

The APS-150 adds high-resolution ground map and skin paint modes.

Contracts/Orders & Options

(Over \$5 million)

<u>Contractor</u>	<u>Award (\$ millions)</u>	<u>Date/Description</u>
Honeywell	8.4	Mar 2003 – FFP contract mod for multiple spare parts for the APS-133(V) color weather radar. (F09603-02-C-0424-PZ0002)

Timetable

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
	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 Improved Land Mapping APS-133(V) for the Marine Corps
	1987	C-17 weather radar contract awarded
	1993	APN-241(V) fielded, selected for C-130H/J
Sep	1994	FAA certification of AlliedSignal RDR-4B windshear radar
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
Oct	1999	Multiyear procurement of 60 additional C-17s approved by Congress
Oct	2000	GE announces plan to acquire Honeywell
	2002	60 additional C-17s approved
	2003	RDR-4000M selected for the C-17
	2006	RDR-4000 entered service on C-17s

Worldwide Distribution/Inventories

The APS-133(V) radar system is employed by U.S. transports, such as the C-5A, C-17, 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 C-130 operators.

Forecast Rationale

APS-133 Serves on a Wide Variety of Aircraft

The APS-133 serves on a wide variety of military transports, tankers, and surveillance aircraft around the world, including C-17s, KC-10s, and E-3 Sentry AWACS. It has been a valuable system for the United States and its allies. The radar was originally chosen to equip the C-17 based on superior performance in comparison to other systems at the time. Since that time, though, newer systems have come to market that eclipse the APS-133's capabilities. Honeywell's own RDR-4000, its first completely new radar developed in 30 years, has begun to replace the APS-133. The remaining C-17s to be produced will be equipped with Honeywell's new radar, and future aircraft will most likely be equipped with the RDR-4000, or another modern weather and windshear radar.

The C-130 Avionics Modernization Program (AMP) replacement radar requirement eliminated the APS-133 from consideration since it is not a coherent radar and could not be adapted for windshear detection. The APN-241 was selected for the program.

Modern Systems May Replace the APS-133 in Older Systems

The APS-133 will remain in service for many years to come, supporting a large spare and repair market. But as more modern systems gain popularity, retrofits may occur to replace Honeywell's older radar. The C-17 fleet may be a prime example for these retrofits in the future to bring older examples up to par with newer ones, as well as to increase fleet compatibility.

Ten-Year Outlook

The Air Force switched to the RDR-4000M for new-production C-17 aircraft. Since there is no production of the APS-133, this report will be archived as of 2008.

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