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January 2003

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

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

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

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.

Technical Data

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Metric</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>54 kg</td>
<td>120 lb</td>
</tr>
<tr>
<td>Antenna dish diameter</td>
<td>67 cm</td>
<td>30 in</td>
</tr>
<tr>
<td></td>
<td>56 cm</td>
<td>22 in</td>
</tr>
</tbody>
</table>
### Characteristics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Details</th>
</tr>
</thead>
</table>
| **Frequencies** | 9,375 MHz +/- 5 MHz (weather/map)  
9,310 +/- 5 MHz (beacon) |
| **Power output** | 65 kW peak (nominal) |
| **Pulse width** |  
- Weather: 5.0 µsec  
- Map: 5.0 or 4.0 µsec  
- Beacon: 2.35 µsec |
| **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  
Slewable range markers |
| **Beacon display** | to 300 nm (with delay mode) |
| **Ground map** | to 250 nm |
| **Coastal terrain** | to 200 nm |
| **Cities** | to 100 nm |
| **Display** |  
- Radar reflectors: 3 nm to 0.5 nm  
- Skin paint: to 30+ nm (air-to-air)  
- Parabolic dish (30" or 22")  
- 2.9° or 4.4° horizontal  
- Cos² fan beacon  
- 2.9° or 4.4° pencil  
- 30°, 120°, 180° (variable)  
Variable sweep (sector scan) and azimuth position |
| **Scan** | +/- 75° steerable  
15 LPM (45°/sec)  
+/- 14° vertical |
| **Stabilization** |  
- 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  
INS  
VLF/Omega  
360 IFF  
Performance management (A/A-24J)  
APN-169C station-keeping equipment |

January 2003
Characteristics (continued)

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

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

<table>
<thead>
<tr>
<th>Designation</th>
<th>Application</th>
<th>High Confidence</th>
<th>Good Confidence</th>
<th>Speculative</th>
<th>Total 03-12</th>
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<td></td>
<td></td>
<td>Thru 02</td>
<td>03</td>
<td>04</td>
<td>05</td>
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<tr>
<td>APS-133</td>
<td>Prior Prod'ln.</td>
<td>565</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>APS-133(V)</td>
<td>C-17 (USAF) (USAF)</td>
<td>93</td>
<td>15</td>
<td>14</td>
<td>15</td>
</tr>
<tr>
<td>APS-133(V)</td>
<td>Prior Prod'ln.</td>
<td>53</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total Production</td>
<td></td>
<td>711</td>
<td>15</td>
<td>14</td>
<td>15</td>
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