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APN-242 - Archived 10/2010

Outlook

- Barring further developments, this report will be archived in October 2010
- Production of the APN-242 has ended
- APN-242 weather/navigation radar is a form-fit-function replacement for the APN-59
- Production of the APN-242 is fueled by small projects and short-term interim updates to older aircraft
- The U.S. Air Force continues to purchase the APN-241, closing that market to the APN-242

Orientation

Description. Color and weather navigation radar, designed to be a form-fit-function replacement for the APN-59 on C-130s in the FMS market.

Status. In production, logistics support available.

Application. RC-135 and C-130.

Price Range. Based on contracts signed in 2003, the average unit price is about $200,000 to $300,000, depending on contract and support specifics.

Contractors

Prime

Northrop Grumman Sperry Marine	http://www.sperrymarine.northropgrumman.com/, 1070 Seminole Trail, Charlottesville, VA 22901-2827 United States, Tel: + 1 (434) 974-2000, Fax: + 1 (434) 974-2259, Prime

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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

	Metric	U.S.
Dimensions		
Antenna	90.8 x 90.8 x 86.4 cm	35.8 x 35.8 x 34 in
Receiver/Transmitter	38.7 cm (dia) x 38.4 cm (height)	15.3 in (dia) x 15.1 in (height)
Video processor	19.7 x 19.7 x 32.4 cm	7.8 x 7.8 x 12.8 in

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	Metric	U.S.
Pilot's indicator	16.5 x 16.5 x 32.4 cm	6.5 x 6.5 x 12.8 in
Navigator's indicator	21.6 x 25.4 x 32.3 cm	8.5 x 10 x 12.7 in
Weight		
Antenna	31.3 kg	69 lb
Receiver/Transmitter	29.5 kg	65 lb
Video processor	11.3 kg	25 lb
Pilot's indicator	5.4 kg	12 lb
Navigator's indicator	9.5 kg	21 lb
Characteristics		
Frequency		
Radar	9375 ± 10 MHz	
Beacon reception	9310 MHz	
Power	25 kW peak	
Pulse length	0.2, 0.8, 2.35, and 4.2 µsec	
Pulse repetition frequency	0.2 µsec @ 1024 Hz 0.8 µsec @ 350 Hz 2.35 µsec @ 350 Hz 4.5 µsec @180 Hz	
Scanning	360º scan rates; 12 rpm on long-range functions 45 rpm on short-range functions 90º centered about forward position	
Antenna beam	Pencil of fan, 3º azimuth beamwidth, and instantaneous electronic switching	
Antenna stabilization	To existing aircraft reference throughout range of: ± 15º pitch, ±30º roll	
Navigation features	Manual electronic cursor control with lat/long or range/bearing readout Lat/long stabilized for fly to waypoint capability	
Display	Daylight viewable non-fade Color weather contour map Electronic cursor with integrated graphics overlay	
MTBF	> 1,000 hours	
BIT	Standard	
Power consumption	800 W	

Design Features. This is a non-coherent, high-power weather radar. It was designed to be a form-fit-function replacement for the APN-59, not as an alternative to the APN-241.

Antenna Unit. The APN-242 Antenna Unit consists of a flat plate array and mounting pedestal; it uses the existing APN-59 installation and mounting brackets. The array element improves target detection ranges; it is electronically controlled to permit instantaneous fan/ pencil beam switching.

The antenna rotates freely through 360° and is connected to existing aircraft attitude reference systems to provide antenna stabilization throughout the normal range of aircraft maneuvers. High reliability is achieved through the elimination of all gears, improving antenna Mean Time Between Failure (MTBF) by a factor of 50.

Receiver/Transmitter. The APN-242 Receiver/ Transmitter uses a low-power solid-state design, a low-noise receiver, and a three-to-one component reduction to improve system performance and greatly increase reliability. Transmit power is generated by a 10,000-hour service life, state-of-the-art magnetron, with digitally controlled pulse width, pulse repetition rates, intermediate frequency (IF) and video amplification, mode switching, and built-in-test (BIT).

Display Group. The ASN-165 Display Group provides a vivid color or monochrome radar image in ambient lighting. These high-resolution displays are overlaid with aircraft navigation data such as true heading, ground speed, and track angle error. A latitude/longitude stabilized cursor is provided to aid drop zone and waypoint identification.

Depending on the aircraft mission design series, data from the station-keeping equipment (SKE), self-contained navigation system (SCNS), and traffic collision avoidance system (TCAS) can be integrated and displayed. In the

green mode, the displays are night vision goggle compatible.

The radar was designed to eliminate the aircraft maintenance downtime caused by aging APN-59s. It has half the LRUs of the older radar and orders of magnitude improvement in system Mean Time Between Failure. It can be installed using existing cabling, connections, and mounts – without having to send the aircraft to a depot for modification.

Because this is a non-coherent radar, it is not a replacement for any of the windshear detecting radars on the market.

Operational Characteristics. This radar was designed to provide weather detection and avoidance. Full color, black-and-white, or green displays give a picture of the location of storms out to a range of 240 nautical miles.

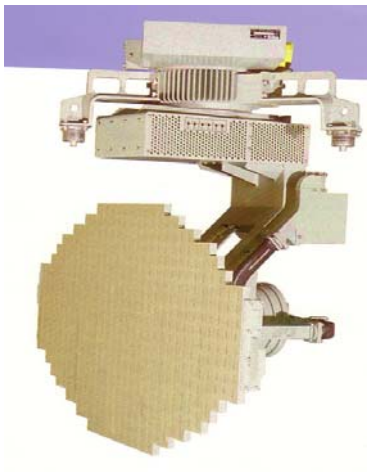
The Terrain Mapping and Navigation mode generates high-resolution maps of the ground with a latitude/ longitude stabilized electronic cursor that provides pilots with range and azimuth information for a bearing to waypoints.

Skin paints at extended ranges through intervening rain showers can operate concurrently with other operating modes to ensure detection and awareness of nearby aircraft. Other aircraft and ground beacons can be interrogated, with IFF operating out to 100 nautical miles.

Planners consider the APN-242 as an APN-59 replacement until the C-130 Avionics Modernization Program delays are overcome or as an alternative for those C-130 users who cannot afford the windshear detecting radar.

APN-242 Display Group and Receiver/Transmitter

Source: Northrop Grumman Sperry Marine



APN-242 Antenna Unit

Source: Northrop Grumman Sperry Marine

APN-242

Program Review

The APN-59 weather radar was designed in the 1960s, becoming ubiquitous at the U.S. Air Force. It served well until age and technology caught up with it, making the APN-59 one of the most maintenance-intense systems on the aircraft carrying it, causing many missed missions.

Technological advances made it possible to design radars that can detect dangerous windshear, which led to the development of the sophisticated APN-241, widely chosen as the replacement for the APN-59.

The APN-242 is a less-expensive, less-sophisticated replacement for the APN-59. Essentially, the APN-242 is based on the APN-59; however, the APN-242 uses more up-to-date technology and fewer parts, making it more reliable. Platforms that do not need a sophisticated windshear detector, such as the RC-135, have upgraded to the APN-242.

The USAF selected the APN-241 for the C-130 Avionics Modernization Program (AMP). However, Lockheed Martin protested the award based on top Air Force acquisition official Darlene Druyun's mishandling of contracts with the Boeing Company, which landed her in jail. It was decided that the Boeing award would be modified. Boeing would complete an upgrade kit design, and then the upgrade work would be re-bid. The re-bid is not likely to change the APN-241's selection, but it will significantly delay the program, which may increase the APN-242s appeal as an interim solution until the APN-241 becomes widely available.

APN-242 Equips USAF RC-135s. Northrop Grumman Sperry Marine supplied APN-242s to USAF RC-135s under a $4.2 million contract beginning in November 2003 and ending in May 2004.

The APN-242 is now offered on the international market for users needing an APN-59 replacement but would be affected by delays in the APN-241 program. The APN-242 is a less-expensive, less-sophisticated sensor that has become a major improvement to the aged radars.

In late 2004 and early 2005, Sperry Marine marketing increased the pace and visibility of its offering with a significant display at the 2005 Sea-Air-Space Naval Conference and Exposition in Washington, D.C.

Timetable

Month	Year	Major Development
Nov	2003	RC-135 deliveries begin
May	2004	RC-135 deliveries completed
	2005	C-130 AMP contract award protested; international C-130 radar marketing effort intensified

Worldwide Distribution/Inventories

The APN-242 radar is installed on **U.S. Air Force** RC-135s. It is being offered on the international market to C-130 and C-135 users.

Forecast Rationale

Production of the APN-242 has ended. No new contracts have been recorded, and older contracts have run out. The radar is cheaper than more sophisticated systems, such as the APN-241. It can also be easily added to an aircraft, and integration can be done in the field rather than at a maintenance depot, greatly decreasing down time. However, no customers have ordered the system; therefore production has ceased.

The U.S. Air Force continues to purchase the more sophisticated APN-241 rather than the simpler APN 242. This has closed the U.S. Air Force as a market for the APN-242. As production nears an end, it becomes more unlikely that the U.S. will order the system. The major advantage of the APN-242 is its relatively low cost. However, if the production line needed to be restarted, it would negate that advantage.

While no production is expected over the next 10 years, the APN-242 has a number of advantages when compared to other, more advanced radars. The APN-242's low cost when compared to the APN-241 may make it appealing to lower budget militaries. The system would also be available quickly and can be integrated onto older aircraft in the field. This makes it appealing to countries looking for quick upgrades to their transport aircraft fleet.

Even though the APN-242 has a number of appealing features, sales opportunities around the world are diminishing for the radar system. Production has ended. Unless new sales opportunities arise, this report will be archived in 2010.

Ten-Year Outlook

Barring any further developments, this report will be archived in October 2010.

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