

# ARCHIVED REPORT

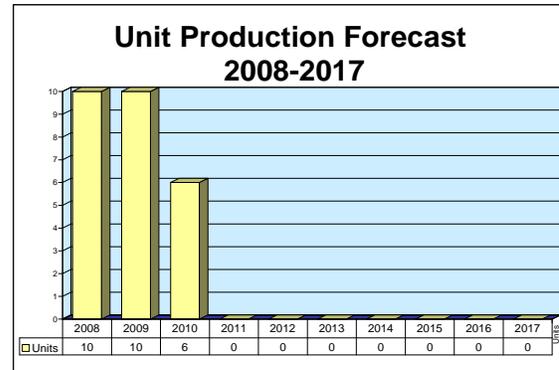
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## TPN-31 ATNAVICS/FPN-67 FBPAR

### Outlook

- While production of the TPN-31 and FPN-67 is expected to end in 2010, the Army and Marine Corps continue to spend money on spares and upgrades
- Production of the TPN-31/FPN-67 continues, with a contract awarded in August 2006
- Procured for U.S. Army and Marine Corps field and fixed installations; U.S. Air Force is choosing a different system



### Orientation

**Description.** The TPN-31(V) Air Traffic Navigation, Integration and Coordination System (ATNAVICS) is a Radar Approach Control (RAPCON) and landing system. It is mounted on two HMMWVs and can be transported by a single C-130 to support operations in remote locations with no infrastructure. The FPN-67 Fixed-Base Precision Approach Radar (FBPAR) is the same radar installed in a fixed shelter.

**Sponsor**

U.S. Army  
 Army Communications-Electronics Command  
 (CECOM)  
 C<sup>4</sup>IEW Acquisition Center  
 Ft. Monmouth, NJ 07703-5000  
 USA  
 Tel: + 1 (201) 532-2534  
 Web site: <http://www.monmouth.army.mil>

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

**Application.** Air traffic control at frontline battlefield locations and fixed-base facilities. It replaces the TSQ-71B.

**Price Range.** The price of a single TPN-31 ranges from \$6 million to \$9 million, depending on installation and ancillary equipment/requirements. The price of a single FPN-67 ranges between \$4 million and \$7 million.

### Contractors

#### Prime

**Raytheon Airspace Management and Homeland Security**

<http://www.raytheon.com/businesses/rncs/businesses/amhs/>, 1001 Boston Post Rd, Marlborough, MA 01752 United States, Tel: + 1 (508) 490-3045, Fax: + 1 (508) 490-3322, Email: [Robert\\_W\\_Meyer@res.raytheon.com](mailto:Robert_W_Meyer@res.raytheon.com), 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](mailto:rich.pettibone@forecast1.com)

## Technical Data

<b>Characteristics</b>	<b>Metric</b>	<b>U.S.</b>
Frequency range	2 to 4 GHz - Surveillance 1,030 and 1,090 MHz - Secondary Surveillance 9 to 9.2 GHz - Precision	
ASR elevation coverage	To 3,048 m	To 10,000 ft
ASR azimuth coverage	360 deg ASR & SSR	
PAR Antenna elevation coverage	-1 deg to +8 deg	
PAR azimuth coverage	± 15 deg	
Range		
Primary/secondary radar	46.3 km	25 nm
Precision approach	18.5 km	10 nm
Helicopter minimums		
Ceiling	30.4 m	100 ft
Visibility	463.5 m	0.25 nm
Fixed-wing minimums		
Ceiling	61 m	200 ft
Visibility	926.6 km	0.5 nm
Probability of detection	ASR: 90% (3 m <sup>2</sup> target @ 25 mi in rain) 99% (@ 25 nm in rain)	
SSR	90% (1 m <sup>2</sup> target @ 10 nm in rain)	
PAR	4 sec ASR 1 sec PAR	
Update rate	90% (1 m <sup>2</sup> target @ 20 nm)	
MTBCF	>980 hr	
MTTR	30 min	
System availability	98%	
Video	Normal (unprocessed) MTI (processed)	
Display	Straight line presentation Variable range 2 to 20 nm, 1/4-nm increments Glide slope Azimuth markers Range marks Enhanced range marks Lower safe limit cursors Adjustable target size	
Other requirements	Independent operation of surveillance and precision modes Integrated positive friendly identification Ability to distinguish small aircraft at low altitudes from ground clutter and adverse weather Self-contained communications Rapid setup Minimal crew requirement for setup and operation Operator simulator training capability	

**Design Features.** The TPN-31 ATNAVICS system provides key air traffic services at U.S. Army terminal airfields and landing sites. The transportable TPN-31(V) is mounted on two High Mobility Multi-purpose Wheeled Vehicles (HMMWVs) and two trailers

in order to provide rapid-response air traffic control services at tactical landing sites.

ATNAVICS is a fully autonomous, ICAO compliant Radar Approach Control (RAPCON) system. With a

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simplified setup, reliable operation, and sturdy enclosures, the system can withstand the most demanding environments, and is ideally suited to rapid deployment anywhere in the world. ATNAVICS is contained in two four-wheel drive HMMWVs and two towed power generator trailers. The vehicles, and hence the system, are airliftable by fixed-wing or rotary-wing aircraft (such as the C-130 or CH-47) and can be rapidly deployed to forward airstrips. It can be set up in less than 60 minutes with just three people.

The system is made up of an S-band air surveillance radar, an L-band secondary surveillance radar/Identification Friend or Foe system, and an X-band precision approach radar, along with Raytheon's AutoTrac air traffic management system. The system provides full surveillance out to 25 nautical miles and precision approach coverage out to 10 nautical miles in all weather conditions. The system architecture is flexible and can be modified to meet other applications.

Advanced display automation software and secure ground-to-air/ground-to-ground communications and precision approach radar were developed to provide the needed information for controlling and landing all fixed- and rotary-wing aircraft within a 25-nautical-mile radius. In addition, the use of secondary surveillance radar data can extend the system's surveillance range out to 60 miles. It can interface with the National Airspace System (NAS), as well as with Forward Area Air Defense (FAAD) systems, to provide a truly integrated battlefield air traffic management system.

The FPN-67(V) fixed-base precision radar can be installed at terminal airfields. It incorporates a remote automation system in which six air traffic control (ATC) operator positions can be located up to 35,000 feet from the unmanned radar units. The FBPAR system can provide traffic control and landing services at Army fixed airfields, and shares common equipment, such as modules and line replaceable units (LRUs), with the transportable version, since the components are built on the same production line.

Developed in conjunction with ATNAVICS and using the same hardware and software, the FBPAR provides a transportable precision aircraft control system where rapid mobility is not required. FBPAR uses a pedestal-mounted antenna that rotates to cover six predetermined runway approaches and a standard ISO container to house the PAR electronics. Remote controller displays can be located up to 35,000 feet away.

The precision approach radar features a phased-array antenna that uses I-band monolithic microwave integrated circuits identical to those provided for the U.S. Army ground-based radar.

The surveillance radars are based on off-the-shelf, solid-state ATC sensors in service with international customers. Second- and third-generation NDI/COTS subsystems mounted in ruggedized enclosures were part of a cost-effective design solution that would both meet performance requirements and be able to operate in various environmental conditions worldwide.

**Operational Characteristics.** The ATNAVICS provides air traffic control and precision approach control capabilities at frontline battlefield locations or fixed-base airfields. It provides departure, approach, and landing services for helicopters and fixed-wing aircraft in both good and adverse weather conditions. The system enables operators to establish separation, sequencing, and IFR/GCA landing operations at unprepared field locations. The fixed-base version will be installed at established Army air fields.

The system is transportable in a single C-130 and can be set up in less than 60 minutes by a crew of four. It eliminates the tedious survey work necessary to properly site current equipment, and is designed to be self-sited accurately and quickly using reflectors set up along the landing strip. The TPN-31(V) can be slung-carried by CH-47 helicopters.

Continuous on-line monitoring and extensive built-in fault monitoring quickly isolate and identify failed LRUs, improving reliability.

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TPN-31(V)

Source: Raytheon Co

## Variants/Upgrades

**FPN-67(V).** This is a fixed-base version of the radar for use in aircraft recovery operations during adverse weather at Army airfields.

**TPN-31(V).** This is the tactical version of the precision approach radar for installation at Army and other airfields.

## Program Review

In 1988, the U.S. Army announced plans to upgrade the air traffic control systems used at both fixed-base and forward locations. The new equipment replaced the TSQ-71B Landing Control Central used at Army airfields and landing areas at the echelon above corps, corps and division levels. The FBR-67(V) replaced the GPN-22(V), FPN-40(V), CR-62, and FPN-63(V).

In June 1993, the Army announced its intention to meet the ATNAVICS and FBPAR requirements with a non-developmental item (NDI) acquisition using a dedicated engineering effort to integrate proven components into ATNAVICS and FBPAR configurations, and to adapt/modify software in order to ensure that the total system meets established requirements with minimum risk and cost.

The transportable TPN-31(V) and FPN-67(V) fixed-base systems were developed to capitalize on state-of-the-art technology in order to provide equipment that can be readily moved to new battlefields or frontline locations.

### *RFP Released*

A Request for Proposals was issued in March 1994, and in May 1995, CECOM awarded Raytheon a preproduction contract to provide one ATNAVICS and one FBPAR system to the U.S. Army Aviation Systems

Command by April 1997. The contract included options for an additional 63 systems to be produced from 1997 to 2003.

In September 1998, Raytheon completed demonstrations that included flight testing the ATNAVICS radar coverage, accuracy, resolution, detection, and tracking. Testing was performed at the Raytheon test facility in Bedford, Massachusetts, adjacent to the active runways at Hanscom AFB. It used aircraft scheduled as part of the test, as well as “targets of opportunity” (aircraft flying in the area of the radar that were not scheduled to be part of the test).

### *FAA Certification Received*

As part of the demonstration, the Federal Aviation Administration performed a flight inspection of the precision approach radar using FAA aircraft and found its performance met or exceeded all requirements. This FAA flight check validated the equipment to be commissioned into formal air traffic control service. FAA flight certification was issued in December 1999.

The Army has begun a series of modernization efforts for ATNAVICS that will run through FY11. Upgrades will add the capability to interface with other ATC equipment and Army systems. Integration of the Air Defense Integrator will make it possible for

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ATNAVICS to share data with field artillery and air defense systems. Ultimately, ATNAVICS will feed positioning and identification data on friendly air vehicles (fixed-wing, rotary-wing, and UAVs) into the Single Integrated Air Picture (SIAP) for improved situational awareness, track continuity, airspace deconfliction, and fratricide prevention.

In August 2006, Raytheon was awarded a contract with a potential value of \$200 million for 30 TPN-31s and 9 FPN-67s. This follows an initial contract in which

Raytheon provided the U.S. Army with 24 ATNAVICS and 18 FBPAR systems. Under the new procurement, the U.S. Navy and U.S. Marine Corps plan to procure 12 ATNAVICS for Marine Expeditionary Force use.

The U.S. Army continues to spend money on spares and upgrades for its TPN-31 and FPN-67 radars. In November 2007, the Army released a solicitation for spare parts for the two systems. The solicitation notice also stipulates that changes to the existing software may be needed.

## Contracts/Orders & Options

<u>Contractor</u>	<u>Award (\$ millions)</u>	<u>Date/Description</u>
Raytheon	20.8	Apr 2002 – Option to a previously awarded contract for production of two TPN-31(V) ATNAVICS and six FPN-67(V) FBPAR systems.
Raytheon	16.9	Mar 2003 – Mod to FFP contract for three Air Traffic Control and Landing Systems (ATCALS) and six fixed-base precision approach radar systems. Completed Apr 2004. (DAAB07-95-C-B001)
Raytheon	2.1	Sep 2003 – Contract for production of spare parts. (NDAAB07-95-C-B001)
Raytheon	200	Aug 2006 – Contract to provide the U.S. Army and Marines with 30 TPN-31s and nine FPN-67s. Currently, \$36 million has been awarded for four TPN-31s. The contract is expected to be completed by 2011.

## Timetable

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
Sep	1988	Draft Operational and Organizational Plan released
Sep	1991	Operational and Organizational Plan approved
Sep	1992	Draft specification
Mar	1993	RFP announced
Apr	1995	Pre-production development contract awarded
Apr	1997	Pre-production development scheduled for completion
Sep	1998	Flight test demonstration, FAA certification
Oct	1998	First delivery planned
Dec	1999	FBPAR flight tests completed
2-4Q	FY99	ATNAVICS developmental/operational testing completed
3-4Q	FY99	Close out of ATNAVICS EMD, transition to production
Mar	2000	Milestone III production decision
1Q	FY02	Start of P <sup>3</sup> I
	2005	Production ends
2Q-4Q	FY07-11	Modernization

## Worldwide Distribution/Inventories

This is currently a U.S.-only program. International interest is possible, but strong competition from Euro-produced systems will impact marketing.

## TPN-31 ATNAVICS/FPN-67 FBPAR

## Forecast Rationale

A contract awarded to Raytheon in 2006 breathed new life into the TPN-31/FPN-67 program. Prior to the award, production had been expected end. With the contract, production is now expected to continue through 2010.

***Systems Serve U.S. Army and Marines***

Other than the Army and the Marine Corps, no service has expressed interest in the system. The U.S. Air Force is using its MPN-25 MACS to fill a similar role. Internationally, competition in this market is fierce. Although Foreign Military Sales are possible, no nation

outside the U.S. has openly expressed interest in the system.

While production of the TPN-31 and FPN-67 is expected to end in 2010, the Army and Marine Corps continue to spend money on spares and upgrades. These systems will continue to serve the U.S. military for the foreseeable future and will generate a number of contracts for spare parts and maintenance.

Through 2010, 20 TPN-31s and six FPN-67s are expected to be produced. At this time, it is believed that the U.S. military will accept all options.

## Ten-Year Outlook

ESTIMATED CALENDAR YEAR UNIT PRODUCTION												
Designation or Program	High Confidence					Good Confidence			Speculative			Total
	Thru 2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	
<b>Raytheon Airspace Management and Homeland Security</b>												
<b>FPN-67 &lt;&gt; United States &lt;&gt; Army and Marine Corps</b>												
	21	2	2	2	0	0	0	0	0	0	0	6
<b>TPN-31 &lt;&gt; United States &lt;&gt; Army and Marine Corps</b>												
	34	8	8	4	0	0	0	0	0	0	0	20
<b>Subtotal</b>	55	10	10	6	0	0	0	0	0	0	0	26
<b>Total</b>	55	10	10	6	0	0	0	0	0	0	0	26