

Fixed-Base Precision Approach Radar (FBPAR)

Raytheon's FBPAR uses the same hardware and software as the ATNAVICs PAR, differing only in its use of a pedestal that rotates to cover six predetermined runway approaches. It is contained in a standard ISO, 8 x 20 x 8 foot shelter with a maintenance display. A controller display can be remoted up to 35,000 feet.

A Heritage of Air Traffic Management Systems

In addition to ATNAVICs, Raytheon is the world leader in solid-state air traffic control radars, having sold and delivered more than the combined total of all other manufacturers in the world. Raytheon produces advanced automation systems for Canada, Norway, the Netherlands, Australia, India, Oman, the People's Republic of China, Hong Kong and other nations.

In the United States, Raytheon is providing the Standard Terminal Automation Replacement System (STARS) for the FAA and DoD. Raytheon is also supplying the ASR-11/Digital Airport Surveillance

Radar (DASR) for the DoD and FAA. Raytheon builds Terminal Doppler Weather Radars (TDWRs) and airport surface detection equipment (ASDE) and provides complete airport system support services including site surveys, new or expansion system design, construction, integration and testing, maintenance and warranties, needs analysis, financing studies, performance prediction, installation, operator and maintenance training, and project management.

When supplying systems, Raytheon places great emphasis on meeting your needs. Through system design, adaptation, training, installation and support, we are committed to providing the best service.



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Raytheon

**Air Traffic Navigation, Integration and Coordination System
ATNAVICs (AN/TPN-31)**



A highly-mobile ground-controlled approach system that provides air traffic services where no operational airport control and landing system exists

Benefits

- The most advanced display automation software and secure ground-to-air/ground-to-ground communications
- Highly mobile system
- Transportable in a single C-130 aircraft or CH-47 helicopter
- Sets up in less than 60 minutes by just four people

Raytheon's ATNAVICs system is a critical component in the U.S. Army's worldwide force projection role. This highly mobile system plays a key function in providing air traffic services for the rapid deployment of troops and equipment to remote locations where no operational airport control and landing system exists.

The AN/TPN-31 ATNAVICs is the world's only fully autonomous, ICAO/NAS compliant, ground-controlled approach (GCA) system transportable in a single C-130 aircraft or CH-47 helicopter. Two controller consoles, using the most advanced display automation software and secure ground-to-air/ground-to-ground communications, present surveillance (primary and secondary) and precision approach radar (PAR)

information for controlling and landing all fixed and rotary wing aircraft within a 25 nmi area, with capability of extended range through the use of secondary surveillance radar (SSR) out to 60 nmi. Interfacing National Airspace System (NAS) and Forward Area Air Defense (FAAD) data with the ATNAVICs data provides a true integrated battlefield air traffic management system.

The use of second- and third-generation NDI/COTS subsystems mounted in ruggedized enclosures provides a cost-effective, highly reliable solution able to withstand the demanding environments of worldwide operation.

ATNAVICs is based on a heritage of military landing systems designed and

manufactured for over 35 years, as well as three generations of precision approach systems. Our second-generation system and the world's first high-performance tactical system, the AN/TPN-19, is still performing reliable service more than 20 years after it was introduced.

Our experience is focused to bring you ATNAVICs, a highly mobile ATC system with a simplified setup and the reliable operation needed for rapid deployment, any place in the world. The ATNAVICs configuration is capable of being set up in less than 60 minutes with just four people. ATNAVICs is U.S. Army Milestone III production approved, FAA flight certified and U.S. Army flight tested.

Air Traffic Navigation, Integration and Coordination System

Equipment Layout

- Controller display positions in "cockpit" arrangement possible since generator tunnel is not required
 - Significantly reduces noise and vibration that lead to controller irritation and fatigue
 - Increases space for controller comfort and supervisor access
 - Includes cushioned chairs, with keyboards and trackballs on writing surfaces having surface lighting and controls
- Equipment can be accessed for maintenance with minimum disruption to operators
- Communications and other equipment, including structure, are no wider than LMS wheel well, maximizing available floor area
- Stowage locations are arranged so that "first out" items like fiber-optic cable spools and crank and prime power cable reels are stowed at the entrance and tied down to the floor

Easy Maintenance/Repair

- Continuous online monitoring of all equipment
- Extensive built-in fault isolation functionality to quickly locate and identify failed LRUs

Features

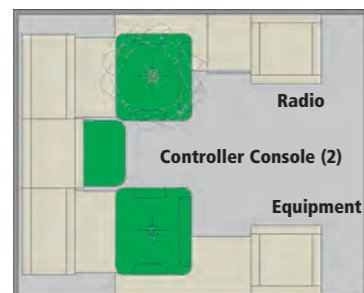
- Sensor HMMWV
- Antennas
 - Integrated ASR S-band/SSR L-band feed with a single common reflector
 - PAR antenna with solid-state X-band transmit/receive modules
- Electronics
 - S-band primary surveillance radar provides superior detection in rainy environment
 - L-band AN/TPX-56 SSR/IFF provides surveillance coverage out to 60 nmi
 - X-band PAR provides ICAO Annex 10-compliant accuracy
 - Graceful degradation and fail-safe operations
 - Separate, ruggedized enclosures for ASR and PAR

Operations HMMWV

- Shelter
 - Two controller consoles designed to minimize controller fatigue
 - Secure G/A and G/G radio and voice communications
 - Interior designed for comfortable operation with two controllers and one supervisor
 - Displays: 19-inch color CRTs, full X-windows
 - Software: AutoTrac 2000

Power Generator Trailers (2)

- Two 10 kW
 - Tactical Quiet Generators (TQGs) with fuel and cabling
 - Personnel gear and camouflage storage/transport



OPS shelter layout

Performance Parameters

	ASR	SSR/IFF	PAR
Range coverage	25 nm	> 60 nm	15 nm
Azimuth coverage	360°	360°	±15°
Elevation coverage	10,000 ft	—	-1° to ±6°
Processing	Adaptive Moving Target Detection	—	Adaptive Moving Target Detection
Update rate	4 seconds	—	1 second
Mode	—	1, 2, 3A, C and secure Mode 4 operation	—
Accuracy			
Azimuth	1.8°	0.8°	0.34°
Elevation	—	—	0.23°
Range	360 ft	350 ft	88 ft
Probability of detection	90% (3 m2 target at 25 nmi in rain)	99% (at 25 nmi in rain)	90% (1 m2 target at 10 nmi in rain)
System MTBCF	>980 hours	—	—
System MTTR	30 minutes	—	—
System availability	97%	—	—



Two controller consoles

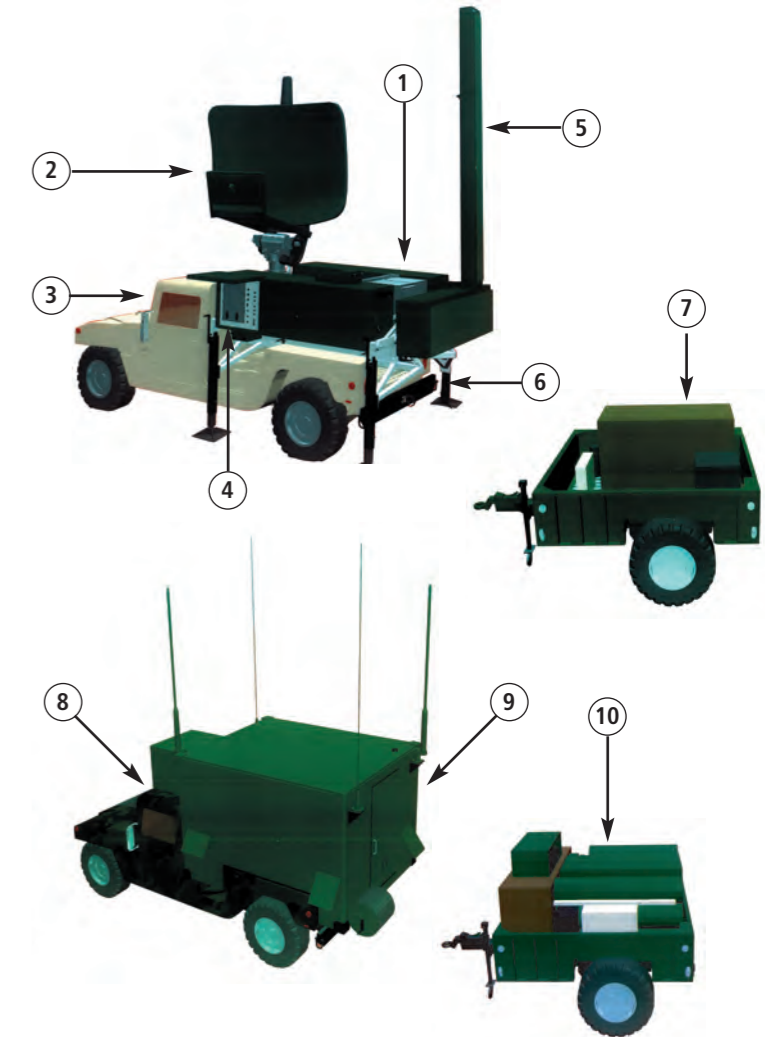


C-130 aircraft and CH-47 helicopter compatibility

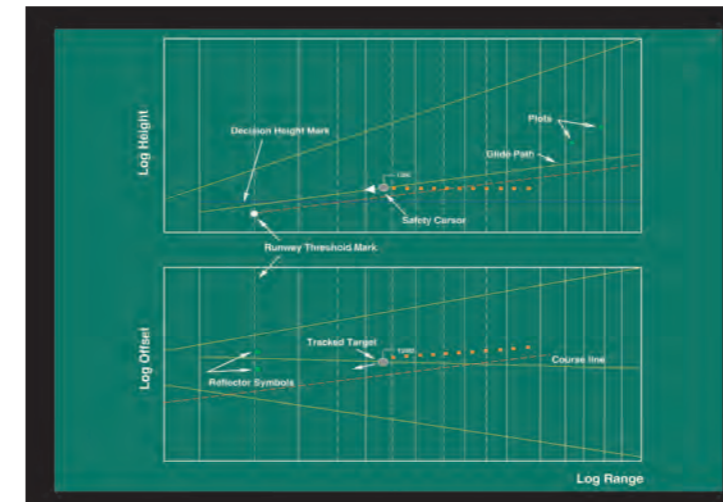
Air Traffic Navigation, Integration and Coordination System

Hardware Description

- ASR/SSR Electronics Enclosure**
Easy access for LRU replacement. Populated by second- and third-generation design and open architecture modules. Closed-air system for temperature, humidity and chemical/biological control.
- ASR/SSR Antenna**
Integrated ASR S-band/SSR L-band antenna feed with a single reflector rotating at 15 rpm. ASR aperture, combined with the solid-state 650 W peak power S-band transmitter and adaptive signal processor, gives high reliability and overcomes clutter and weather. Also features a solid-state SSR/IFF L-band interrogator.
- ATNAVICS Sensor HMMWV**
Contains the ASR, SSR/IFF and PAR sensors, including both antennas and electronic equipment.
- PAR Electronics Enclosure**
Easy access for LRU replacement. Populated by second- and third-generation design and open architecture modules. Closed air system for temperature, humidity and biological control.
- PAR Antenna**
Solid-state transmit/receive modules for superior performance and reliability. Unique inverted "T" design integrates Az and El antenna arrays into one minimum volume assembly.
- Pallet**
No modifications to HMMWV required. Quick release with no tools. Permits simultaneous leveling of both antennas on slopes up to 6 degrees.
- Sensor XM1102 Trailer**
Contains MIL-G-53133/3 10 kW Tactical Quiet Generator (TQG) plus stabilizer jacks for sensor pallet and cables.
- ATNAVICS Operations HMMWV**
Can operate up to 3,000 feet from Sensor HMMWV via fiber-optic link. Contains two NAS compatible controller consoles driven by Raytheon's AutoTrac 2000 automation system and supporting electronics.
- Shelter**
Standard S-788G lightweight, multipurpose shelter with 19.7K BTU ECU, equipment rack mounting, and easy access to displays and controls.
- OPS XM1102 Trailer**
Contains MIL-G-53133/3 10 kW Tactical Quiet Generator (TQG) plus cables and ancillary gear.



Surveillance display



Standard PAR display — Soft-function keys, icons, pop-up menus and click buttons make status and control actions simple and easy to understand. Common control panel functions are implemented on X-window screens to enhance human factors interface and reliability. Configurable display features are adjustable for individual controller preferences.