

KeenEye-X

UAV's Synthetic Aperture Radar (SAR)

SAR Imaging with precision targeting

NEXT-GENERATION SURVEILLANCE RADAR

KeenEye-X

UAV's Synthetic Aperture Radar (SAR)

Your text here 1

Specifications

Frequency: X-Band with 300 MHz bandwidth

SAR Resolution up to 300 x 300 mm

SAR Range up to 1500 m

Swath Width Range up to 1000 m

Size: 220 x 80 x 75 mm

Weight: 800 g

Input Power: 20 W with 12 V DC

Transmit Power: 10 W



KeenEye-X

UAV's Synthetic Aperture Radar (SAR)



Fly along the River

SAR imaging for Anti-Jamming Navigations

Frequency: X-Band

SAR Resolution up to 300 x 300 mm

SAR Range up to 1500 m

Swath Width Range up to 1000 m

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NavGate-3M1

Anti-Jamming & Anti-Spoofing FOG-based INS for UAVs



Weight up to 2200 g

It is the smallest and lightest navigation-grade FOG-based INS in its specific class

Heading: 0.2 ° RMS

NavGate-3M1

NavGate-3M1 Inertial Navigation System (INS) is a highly compact, lightweight unit. Designed for precision military and civil applications, it utilizes advanced fiber-optic gyro (FOG) technology to provide continuous 3-axis position, velocity, and attitude data.

NavGate-3M1 Specifications

Position Accuracy (free inertial): 349 m/hr CEP with Velocity 100 km/hr

Position Accuracy: (GNSS Aided): 5m SEP

Position Accuracy: (Sensor Aided): 0.6% for Distance Travelled

Heading: 0.2° RMS

Heading: 0.06°/h RMS

Pitch and Roll: 0.06° RMS

Angular Rate: 400°/sec

Output Rate: up to 610 Hz

Temperature: -40° C + 55° C

Cooling: Passive

Input/output interface: Ethernet/RS232

Size: 170 x 115 x 105 mm

Weight: 2200 g

Power: 25W with 24V

MTBF: 15,000 hr



NavGate-3M1

Anti-jamming & Anti-spoofing Navigation System

**8-Array Anti-Jamming CRPA
with GPS/GNSS Receiver**

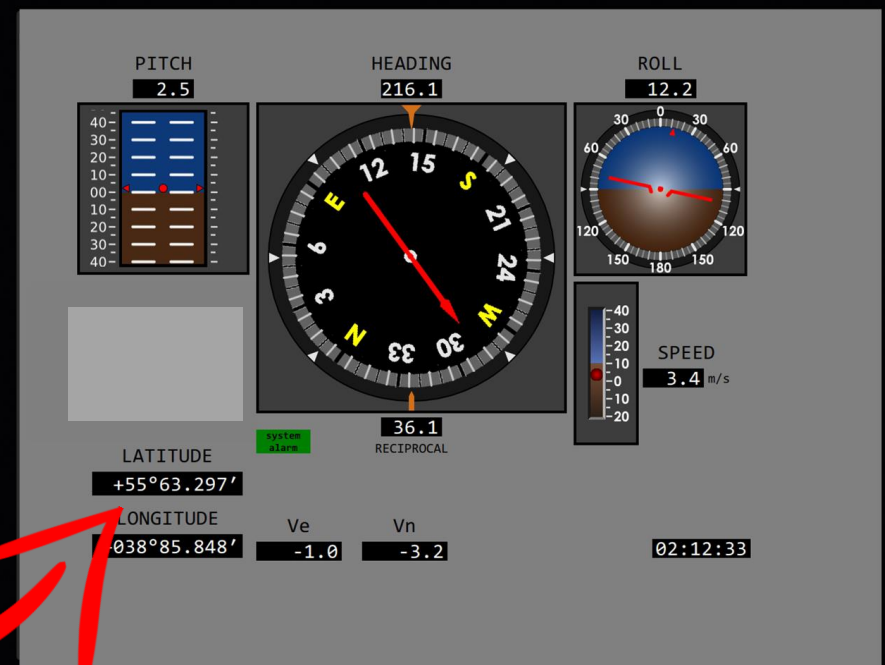
FOG-based INS

Rugged Tablet with NavSoft

RS-232/NMEA0183

RS-232

Navigation Software (NavSoft) used to display, analyze, and monitor FOG-based Inertial Navigation System and GPS/GNSS Receiver during Electronic Warfare attacks. NavSoft computes position, velocity, and orientation using onboard sensors like gyroscopes and accelerometers



Typical Integration Block Diagram

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Autonomous UAV's Guidance System

Application Note

Wall E16 Anti-Jamming CRPA with GNSS Receiver



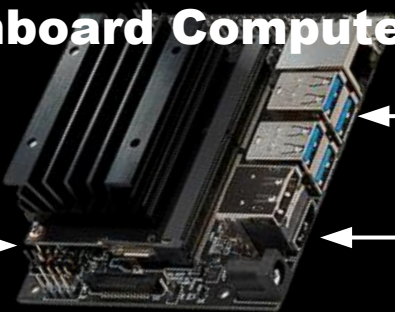
RS-232 / NMEA0183

NavGate-3M1 FOG-based INS



Heading (rms) 0.2°

Onboard Computer



Ethernet

Position 5m SEP GNSS Aided
Gyrocompass

Terrain Contour Matching
(TERCOM)

Digital Scene Matching Area Correlator
(DSMAC)

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For more information, please contact:
BSS Materiel Limited, India
www.bssm.limited
e-mail: email@bssm.limited

Needle-500

Airborne Radio Modem



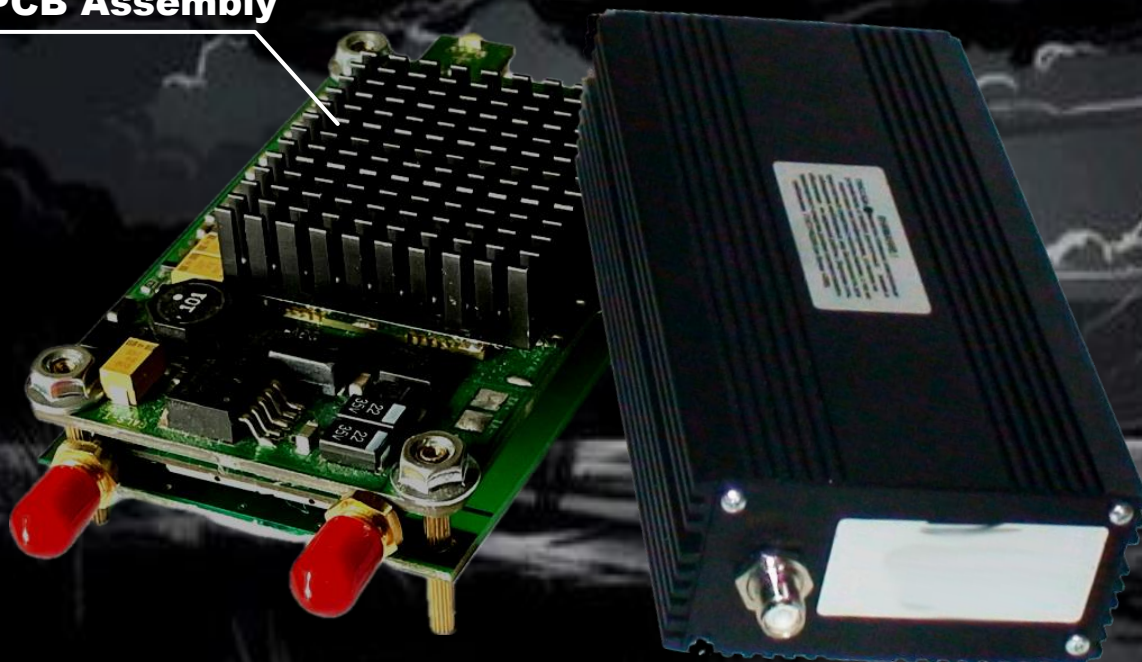
First Person View (FPV) Drone Pilot

Needle-500

Anti-Jamming Tactical Data Link Terminal

For today's military, situational awareness is a critical component to the success of their mission. Threat actors readily stand by to monitor, exploit or intercept communications for malicious intent. To mitigate this threat, RIMCO has provided enhanced transmission security capabilities within our firmware for Needle-500 Data Link System.

PCB Assembly



Needle-500 with AI-based Equalizer.

The minimum operating signal-to-noise ratio (SNR) is -26 dB, and the Needle-500 system operates significantly below the noise floor, ensuring high secrecy.

This is achieved by cascading spread spectrum with an error-correcting code, as well as wideband synchronization circuits that operate under noise.

Specifications*

Frequency: 50 – 12000 MHz (user selection) Spread Method: DSSS+FHSS+Cognitive Radio Modulation: SR-FQPSK

Duplex Mode: Time-Division Duplexing (TDD)

Link Rate: 10 Mbps or 45 Mbps

Data Link Range (visible):

500 km @ 10 Mbps

300 km @ 25 Mbps

200 km @ 45 Mbps

Sensitivity: - 171 dBm

Bandwidth: 80/40/20/10/5 MHz

Output Power: up to 0.1 - 5 W

Ethernet: 10/100/1000 Mbps (RJ45)

Network Protocols: MAVLink for UART/ Telnet/ SCPI

Operating Modes: Point-to-Point

Input Voltage: 12-14 VDC

Power Supply: 50 W

Environmental: -40°C to +50°C

Weight: Approx. 1400 g

Size: Approx. 189 x 78 x 50 mm

***Specifications subject to change**

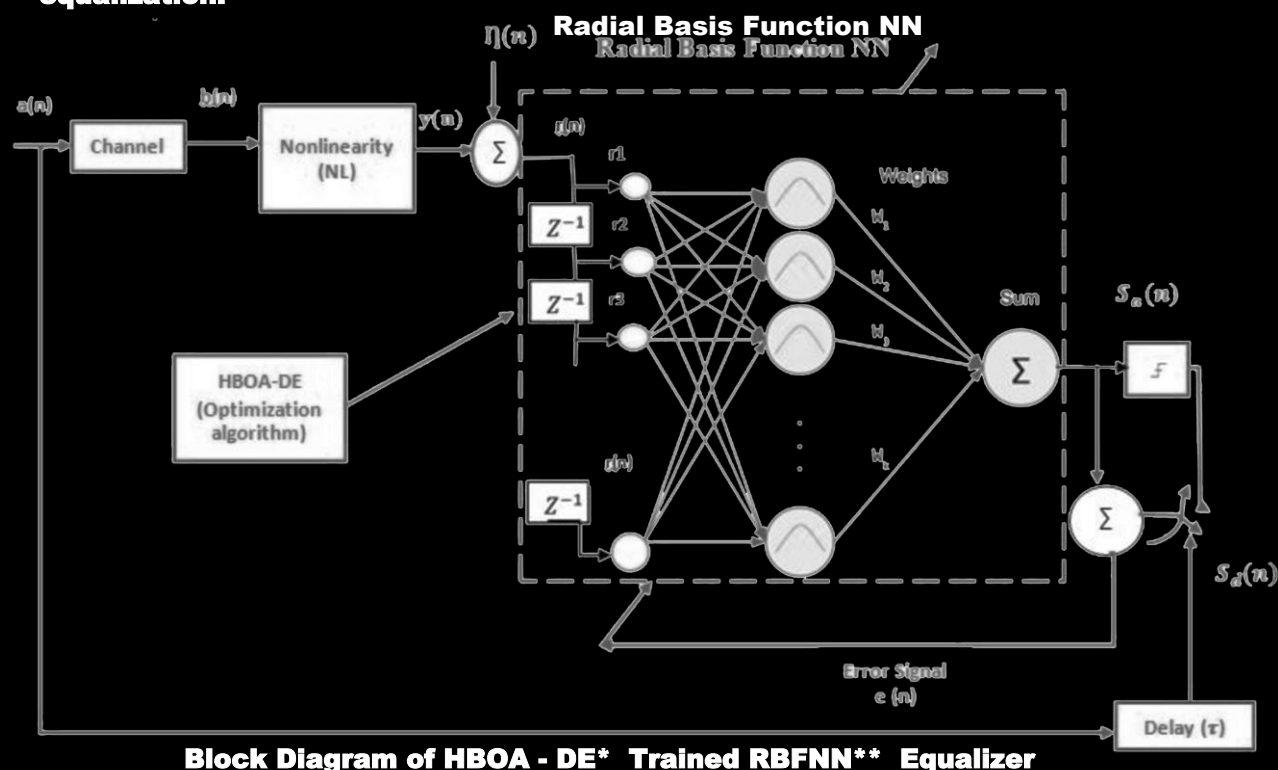
Needle-500 with AI-Technology

RIMCO's Needle-500 Data Link System AI-driven anti-jamming. RIMCO's Needle-500 It can provide users with reliable and secure full IP clear voice, broadband data, high-definition video and visual command FPV drone and other multimedia integrated services under complex application scenarios such as fast movement and non-line-of-sight shielding.

The Needle-500 uses Low Probability of Detection (LPD) and Low Probability of Intercept (LPI) method, are techniques used in tactical communications to reduce the visibility and vulnerability of signals on the battlefield. In contested battlespace, stealth equals survivability and operational success.

Needle-500 with RBF Neural-Network (NN)-Based Equalizer

Wireless communications are susceptible to various signal distortions during transmission, including inter-symbol interference, adjacent channel interference, and co-channel interference. To make sure the signal is recovered with a minimum bit error rate, equalizers are needed at the front end of the receiver. As an optimization algorithm, a nature-inspired hybrid algorithm is applied, namely BOA/DE, which is a combination of the HBOA and DE. For Needle-500 proposes an algorithm for training RBFNNs that is applied to the problem of channel equalization.



Block Diagram of HBOA - DE* Trained RBFNN Equalizer**

*Hybrid Butterfly optimization algorithm (HBOA) and differential evolution (DE)

** Radial Basis Function Neural Networks (RBFNNs)

* Orthogonal frequency-division multiplexing (OFDM) / Frequency-Hopping Spread Spectrum (FHSS)

Direct Sequence Spread Spectrum (DSSS)

** UHF (300 MHz - 1 GHz) and L/S-bands (1 - 4 GHz) is a critical capability in modern communication systems

LPD/LPI protects the signal itself, including its presence, direction, and vulnerability to tracking. Systems built with directional transmission, beamforming, signal power control, and frequency agility offer significant operational advantages.

Anti-jamming: As a premier anti-jamming drone payload, it utilizes frequency switching from 30 MHz to 12 GHz and high-speed hopping at over 2,000 hops per second to ensure stable links even in electronic warfare environments.

The performance of any radio communication system is affected by several factors such as: interference, and jamming caused by some other parallel networks for the purpose of decreasing the performance of a given system.

DSSS, FHSS and a hybrid approach of both techniques DS/FH are proposed to solve the problem.

Whereas DSSS generates a sequence of bit and sends them over a fixed data rate and spread the spectrum with a spreading sequence, FHSS send the data into different channels with variable data rates, and the hybrid DS/FH approach takes advantage of DSSS and uses it in multiple channels

Needle-500AESA

Anti-Jamming Data Link System



**Needle-500
Tactical Data Link Terminal**

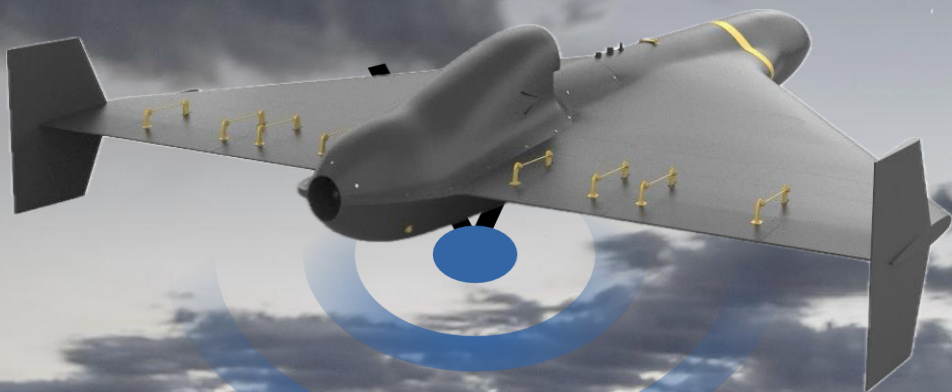


**AESA-500
Active Electronically Scanned Array
(AESA)**

up to 200-500 km @ 50-10 Mbps data link range



RIMCO Needle-500AESA (Kit: Needle-500 & AESA-500) technology is redefining what resilient military communications look like in contested environments. AESA ultra-narrow beams create significant more effect than legacy military radios. In addition, advanced waveforms and state-of-the-art encryption give Needle-500 with AESA Tactical Data Link Terminals unmatched jamming resilience and range. An adversary would need to be directly in the beam or having disproportionate jamming resources to interfere.



Conventional Military Radio

- Radiates Energy in all Directions
- Radio Direction Finding
- Wasting Power
- Reducing Range
- Increasing Interference
- Easy to Detect and Jamming



AWACS



Radio Direction Finding



Needle-500AESA

- Electronically Steered Beam
- Unmatched Jamming Resilience
- Satellite-Free Navigation
- Superior Communication Range

Needle-500AESA



AESA* -500

* Active Electronically Scanned Array (AESA)



Specifications

Type: Circular Antenna Array

Antenna Array (antenna element): 30

Type of polarization: Circular

Range of beam rocking from the normal in azimuth/elevation angle: 360°/0-50°

Beam Switching Time: 30 microseconds

VSWR (Voltage Standing Wave Ratio): 1.5

Interface: Ethernet, RS-485

Power consumption: 55 W

DC Power Supply: 24 V

Weight: 27 kg

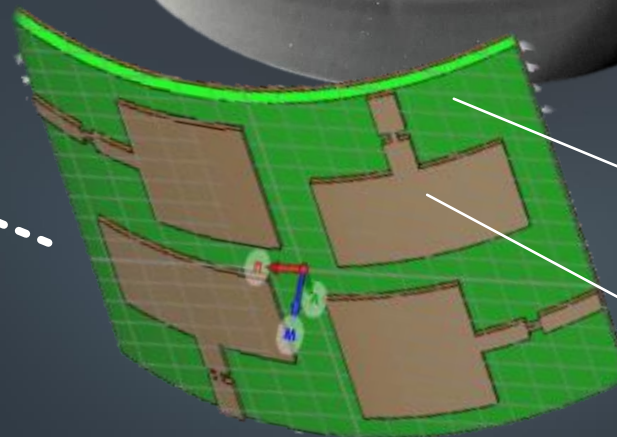
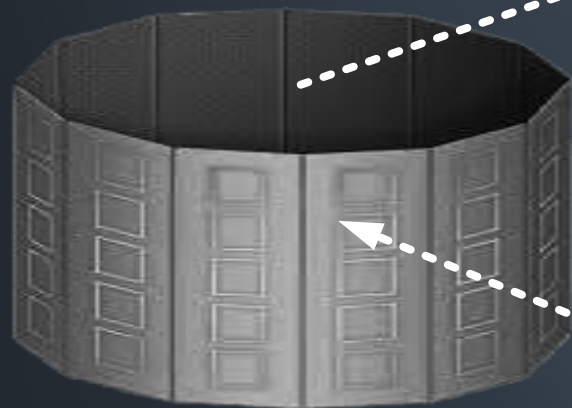
AESA*-500

*** Active Electronically Scanned Array (AESA)**

A Circular Antenna Array (CAA) combined with an AESA architecture provides 360-degree azimuthal beam steering with consistent beamwidth and polarization diversity

REVOLUTIONARY CAPABILITIES FOR MULTIPLE MISSIONS

**Circular Antenna Array (CAA)
for AESA**



**PCB Assembling
Antennas Elements**

Single Antenna Element



Scan Range of beam rocking from the normal in Azimuth Angle up to 0- 360° and Elevation Angle up to 0-50°



RIMCO.RU

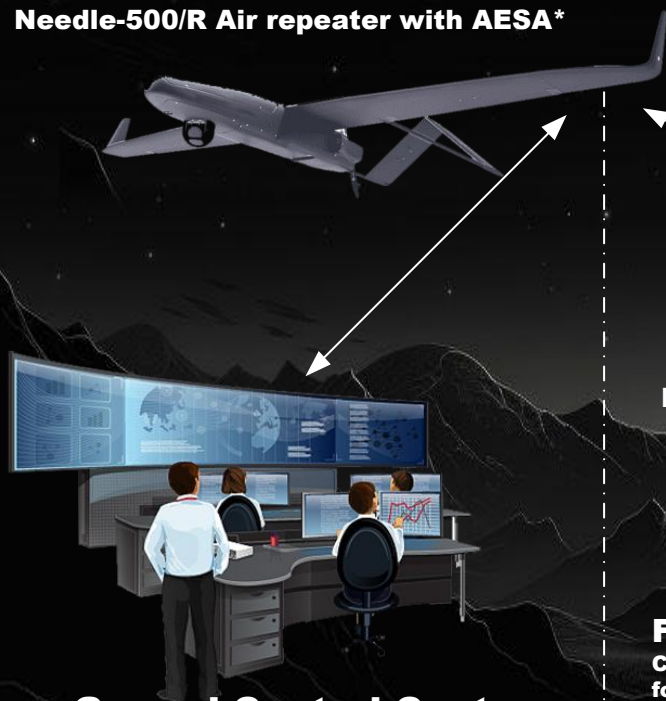
RIMCO's Needle-500/N Tactical Data Link Network

The Needle-500/N uses Low Probability of Detection and Low Probability of Intercept method, are techniques used in tactical communications to reduce the visibility and vulnerability of signals on the battlefield. In contested battlespace, stealth equals survivability and operational success.

Needle-500/N structure:

- Needle-500/R Air Repeater
- Needle-500AESA Tactical Data Link Terminal with AESA-500 up to 25 UAV's

Needle-500/R Air repeater with AESA*



Ground Control Center



300 Km @ 25 Mbps

Needle-500AESA



Remotely Piloted Aircraft System
with Day & Night Visibility

Needle-500AESA



KeenEye-X UAV's Synthetic Aperture Radar (SAR)

Frequency: UHF/L/S/Ku - Bands

Needle-500AESA



One-Way Attack Drone



500 km @ 10 Mbps

Facilitates C4ISR

C4ISR is a defense and strategic management acronym standing for Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance

* Active Electronically Scanned Array (AESA)

RIMCO JSC delivers secure air-based voice, video and data applications with and anytime and anywhere connectivity in the air, at sea, and on land.

RIMCO advanced UAV solutions are used for critical ISR, airborne, maritime and communications to support force protection, logistics, situational awareness, disaster recovery and emergency response.

RIMCO's specialized technology includes transmission security, Communication Signal Interference Removal (CSIR™) anti-jam technology.

All Defense-grade products sold by RIMCO are designed, developed, assembled, programmed and verified within the Russian federation.

For India, SAARC Region (Excluding Pakistan) Contact

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Wall-Ex

4/8/16/32-Array CRPA GPS/GNSS anti-jamming system



World's Smallest Anti Jam System

The Wall-E32 32-element CRPA antenna

The purpose of using the Wall-E32 anti-jamming antenna or Controlled Reception Pattern Antenna (CRPA) is to ensure stable reception of the GNSS navigation signal in conditions of CW or AWGN jamming from Electronic Warfare Systems (EWS). The Wall-E32 is connected to the GNSS Receiver (recommended JAVAD TR-2S) via a RF connector. The Wall-E32 CRPA has a embedded GNSS Receiver that can be connected to the Drone's autopilot via the UART interface.

Advantages

- 32 Array CRPA Antenna
- Supports 31 simultaneous street beams for jamming immunity
- Embedded GNSS Receiver
- Plug and Play
- ITAR Free

Specification

Receive GNSS:
GLONASS L1 + GALILEO E1 + GPS L1 + BDS B1
Interference Rejection:
GALILEO E1 + GPS L1 + BDS B1
Antenna Array: 32
Nulling Directions: 31
Anti-Jamming:
JSR 110 dB for 1 jammer AWGN with GNSS Receiver
75 dB for 31 jammer AWGN with GNSS Receiver
Power Supply: 12-24 V
Power Consumption: 85 W
RF Connector: TNC
Power Connector: MS3112E14-19P
Weight: App. 5000 g
Size: 400 x 400 x 50 mm
Temperature: -40°C to +70°C
Reliability: MTBF 2000 h
EMI/EMC: MIL-STD-461F
Environmental Tests: MIL-STD-810G

Wall-E32 (top)

Wall-E32 (bottom)

Supports 31 simultaneous street beams

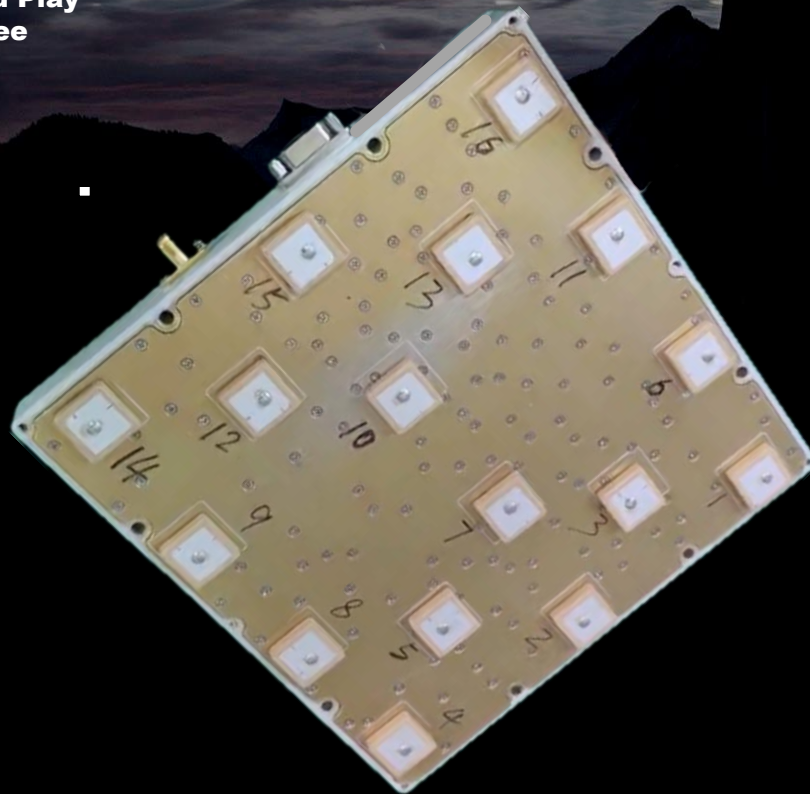
The Wall-E16 16-element CRPA antenna

The purpose of using the Wall-E16 anti-jamming antenna or Controlled Reception Pattern Antenna (CRPA) is to ensure stable reception of the GNSS navigation signal in conditions of CW or AWGN jamming from Electronic Warfare Systems (EWS). The Wall-E16 is connected to the GNSS Receiver (recommended JAVAD TR-2S) via a RF connector. The Wall-E16 CRPA has a embedded GNSS Receiver that can be connected to the Drone's autopilot via the UART interface.

Advantages

- Embedded GNSS Receiver
- Very Little Weight up to 760 g
- Low Power Consumption up to 20 W
- Plug and Play
- ITAR Free

Low power consumption in drones is crucial for extending flight time, typically achieved through CRPA lightweight designs, efficient autopilots, and aerodynamic optimization.



Specification

Receive GNSS:

GLONASS L1 + GALILEO E1 + GPS L1 + BDS B1

Interference Rejection:

GALILEO E1 + GPS L1 + BDS B1

Antenna Array: 16

Nulling Directions: 15

Anti-Jamming:

JSR 110 dB for 1 jammer AWGN with GNSS Receiver

75 dB for 14 jammer AWGN with GNSS Receiver

Data Rate: 38400/1 Hz

Interfaces: UART

Data Output Format: NMEA 0183

Power Supply: 12-24 V

Power Consumption: 20 W

RF Connector: SMA-KF

Power Connector: J30J-9ZKP

Weight: 760 g

Size: 165 x 165 x 35 mm

Temperature: -40°C to +85°C

Reliability: MTBF 2000 h

EMI/EMC: MIL-STD-461F

Environmental Tests: MIL-STD-810G

up to Weight 760 g

The Wall-E8 8-element CRPA antenna

The purpose of using the Wall-E8 anti-jamming antenna or Controlled Reception Pattern Antenna (CRPA) is to ensure stable reception of the GNSS navigation signal in conditions of CW or AWGN jamming from Electronic Warfare Systems (EWS). The Wall-E8 is connected to the GNSS Receiver (recommended uBlox ZED-X20P or JAVAD TR-2S) via a RF connector. The Wall-E8 CRPA has an embedded GNSS Receiver that can be connected to the Drone's autopilot via the UART interface.

Advantages

- Embedded GNSS Receiver
- Hardware and Software (Firmware) made in Russia
- RU Patent # 230 964
- Low power consumption up to 9 W
- Plug and Play
- ITAR Free

Low power consumption in drones is crucial for extending flight time, typically achieved through CRPA lightweight designs, efficient autopilots, and aerodynamic optimization.



Specification

Receive GNSS:

GLONASS L1 + GALILEO E1 + GPS L1 + BDS B1

Interference Rejection:

GALILEO E1 + GPS L1 + BDS B1

Antenna Array: 8

Nulling Directions: 7

Anti-Jamming:

JSR 110 dB for 1 jammer AWGN with GNSS Receiver

75 dB for 7 jammer AWGN with GNSS Receiver

Data Rate: 38400/1 Hz

Interfaces: UART

Data Output Format: NMEA 0183

Power Supply: 12-24 V

Power Consumption: 9 W

RF Connector: SMA-KF

Power Connector: J30J-9ZKP

Weight: 330 g

Size: 110 x 100 x 25 mm

Temperature: -40°C to +85°C

Reliability: MTBF 2000 h

EMI/EMC: MIL-STD-461F

Environmental Tests: MIL-STD-810G

up to Weight 330 g

The Wall-E4 Anti-Jamming GNSS CRPA

The purpose of using the Wall-E4 anti-jamming antenna or Controlled Reception Pattern Antenna (CRPA) is to ensure stable reception of the GNSS navigation signal in conditions of CW or AWGN jamming from Electronic Warfare Systems (EWS). The Wall-E4 is connected to the GNSS Receiver (recommended uBlox ZED-X20P or JAVAD TR-2S) via a RF connector. The Wall-E4 CRPA has a embedded GNSS Receiver that can be connected to the Drone's autopilot via the UART interface.

Advantages

- Embedded GNSS Receiver
- Hardware and Software (Firmware) make in Russia
- RU Patent # 179 926
- Plug and Play
- ITAR Free



Specification

Receive GNSS:

GLONASS L1 + GALILEO E1 + GPS L1 + BDS B1

Interference Rejection:

GALILEO E1 + GPS L1 + BDS B1

Antenna Array: 4

Nulling Directions: 3

Anti-Jamming:

JSR 95 dB for 1 jammer AWGN with GNSS Receiver

80 dB for 3 jammer AWGN with GNSS Receiver

Data Rate: 38400/1 Hz

Interfaces: UART

Data Output Format: NMEA 0183

Power Supply: 12-24 V

Power Consumption: 5 W

RF Connector: SMA

Power Connector: J30J-9ZKP

Weight: 80 g

Size: 55 x 55 x 15 mm

Temperature: -40°C to +85°C

Reliability: MTBF 2000 h

Autonomous UAV's Guidance System

Application Note

Wall E16 Anti-Jamming CRPA with GNSS Receiver



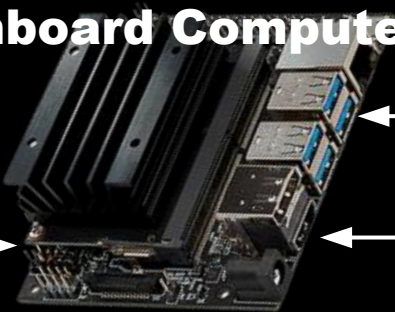
RS-232 / NMEA0183

NavGate-3M1 FOG-based INS



Heading (rms) 0.2°

Onboard Computer



Ethernet

Position 5m SEP GNSS Aided
Gyrocompass

Terrain Contour Matching
(TERCOM)

Digital Scene Matching Area Correlator
(DSMAC)

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