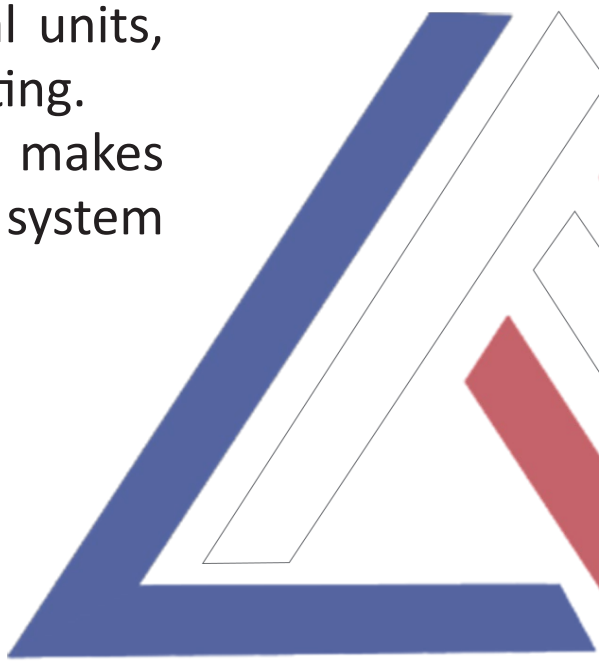
PRODUCTS BROCHURE

ABOUT US

“ATF” is a highly qualified engineering company that develops and manufactures innovative microwave equipment and technologies. Our engineers are developing product from design to production. The process includes the design of electronic and high-frequency components, as well as antenna systems, development of their mechanical and electromechanical units, their production, assembly and final testing.

Our Software engineering team makes possible to complete the full cycle of system development.



RF Systems

Direction Finder “DF-277” (30 MHz - 6 GHz)

MAIN FEATURES

- Operates from 30 to 6000 MHz
- High reception sensitivity to detect extremely weak and distant signals
- Ideal for ultra-wideband monitoring
- Perfect for vehicle mounting
- Provides 360° coverage without mechanical rotation
- Seven coherent receive channels
- Suitable for harsh environments

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OVERVIEW

The DF-277 Direction Finder is a sophisticated instrument engineered to detect, receive, and automatically define the direction of vertically polarized radio emissions across a wide frequency range, from 30 MHz to 6 GHz. This capability makes it highly versatile for a variety of applications requiring precise direction finding.

Designed with adaptability in mind, the DF-277 is suitable for mounting on vehicles, ensuring mobility and ease of deployment in diverse operational scenarios. The robust design of the DF-277 allows it to withstand harsh environments, making it suitable for use in diverse and challenging conditions.

The DF-277 is equipped with seven coherent receive channels, which work in simultaneously to provide precise and reliable direction estimation. This multi-channel capability enhances the system's accuracy and robustness, ensuring consistent performance even in complex signal environments.

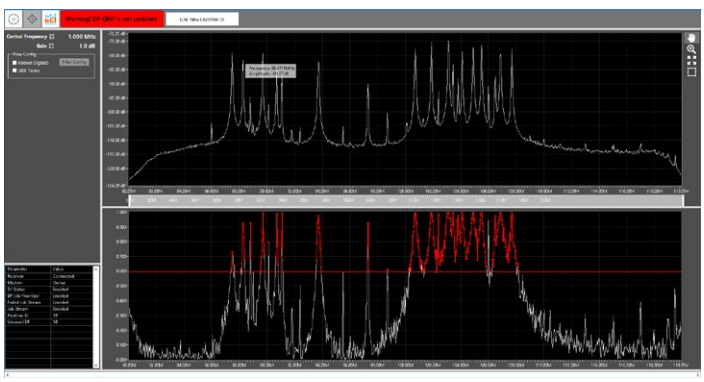
Key in DF-277's functionality is its 7-element antenna array. This array is critical for achieving accurate bearings, as it allows the system to effectively process signals and determine their direction with high precision. Additionally, the direction finder includes an omni-directional antenna used for system self-calibration, ensuring that the system maintains optimal performance and accuracy over time.

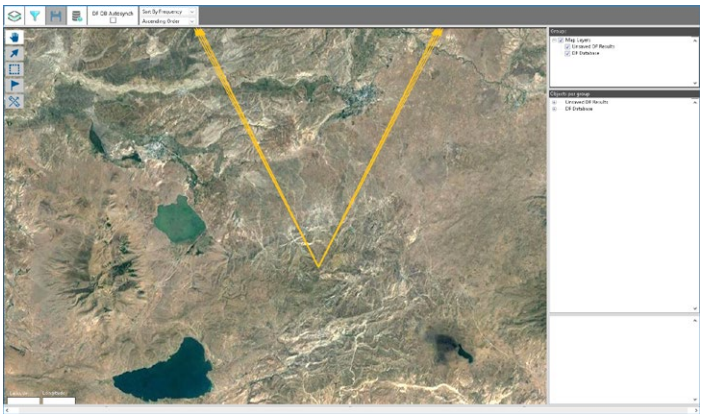
In summary, the DF-277 Direction Finder is a sophisticated and durable system designed for accurate and reliable detection and direction finding of vertically polarized radio emissions across a wide frequency range. Its vehicle-mountable design and ability to operate in harsh environments make it an ideal choice for various field applications, providing robust and precise performance through its advanced multi-channel and antenna array technologies.

SOFTWARE

The DF-277 direction finder is controlled by software designed to:

- Perform direction finding within the frequency range of 30 MHz to 6 GHz
- Plot the spectrum of the scanned range
- Conduct direction finding within a specific (configurable) frequency range

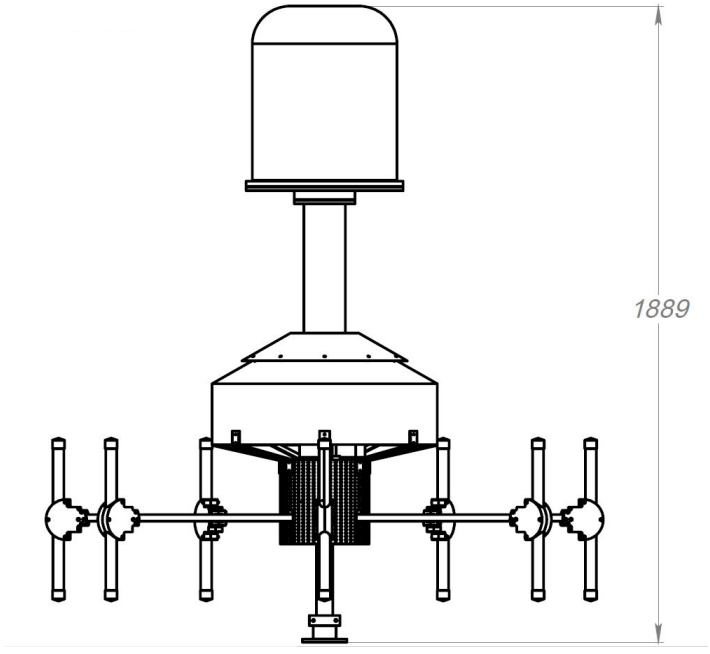




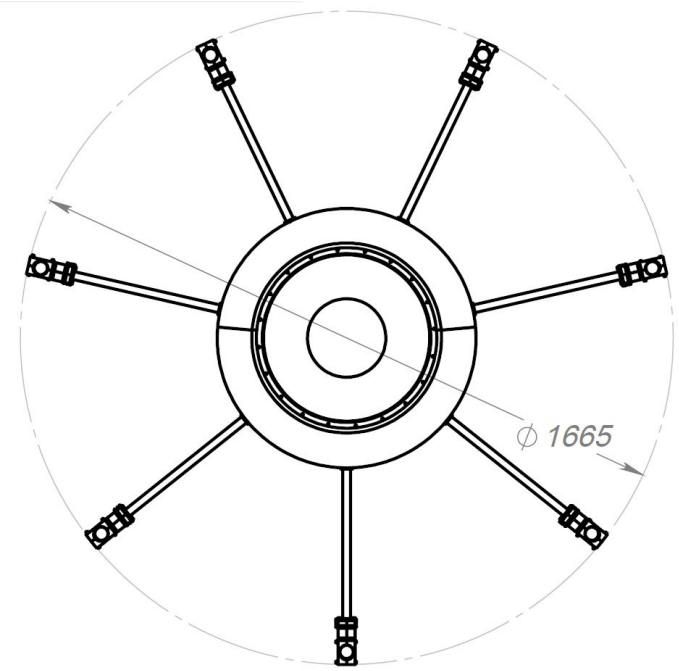
TECHNICAL SPECIFICATIONS

Parameter name	Value
Direction finding in the frequency range	from 30 to 6000 MHz
Signals supported by direction finder	continuous localized signal pulse-repeated localized signal (supports with duty cycle at least 20%)
Bearing accuracy (signal-to-noise ratio not less than 30 dB)	less than 2 degree
Real-time bandwidth for wideband direction finding	up to 200 MHz
DF method	Correlative interferometry
Signal Polarization	Vertical
Operating temperature range	from – 30 to +50 °C
Maximum wind speed	60 km/h

DIMENSIONS



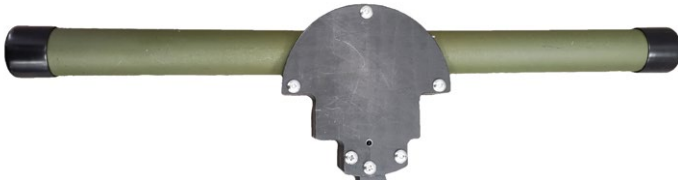
Side view



Top view

COMPONENTS

Lower sub band



Frequency range	30 – 500 MHz
SWR (30-500 MHz)	less than 7
Nominal input impedance	50 Ω
Operating Temperature	-40 °C to +70 °C
Dimensions	51x19x5 cm

Processing unit

Processor	Intel Core i7 13700K
RAM	64 GB
HDD	1 TB
Operating Temperature	0°C to +40 °C
Dimensions	42x37x12 cm

Upper sub band

Frequency range	0,5 – 6 GHz
SWR (0,5 – 6 GHz)	less than 2.5
Gain	≥ 5 dBi
Nominal input impedance	50 Ω
Operating Temperature	-40 °C to +70 °C
Dimensions	42 cm (D), 52 cm (H)

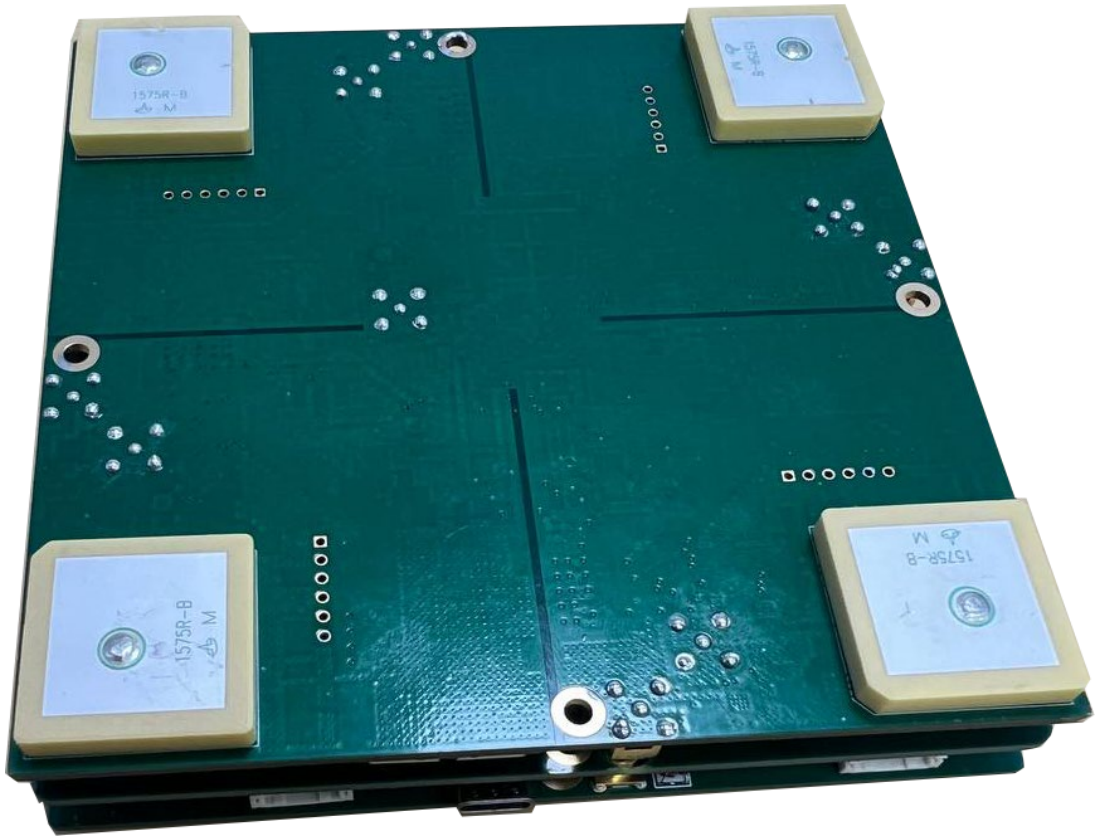
Receiver

Number of physical channels	7
Frequency range	30 MHz - 6 GHz
Instantaneous bandwidth for each channel	200 MHz
Noise figure of RF inputs	less than 10 dB
Operating Temperature	-40 °C to +55 °C

Anti-Jamming GNSS Receiver “Chameleon” (Based on CRPA)

MAIN FEATURES

- Enhanced positioning accuracy
- Jamming detection and localization
- Compatibility with existing receivers (optional)
- Compact and lightweight
- Easy to integrate
- Interference mitigation
- Multipath reduction
- Adaptive antenna pattern
- Resilience to jamming
- Robust navigation



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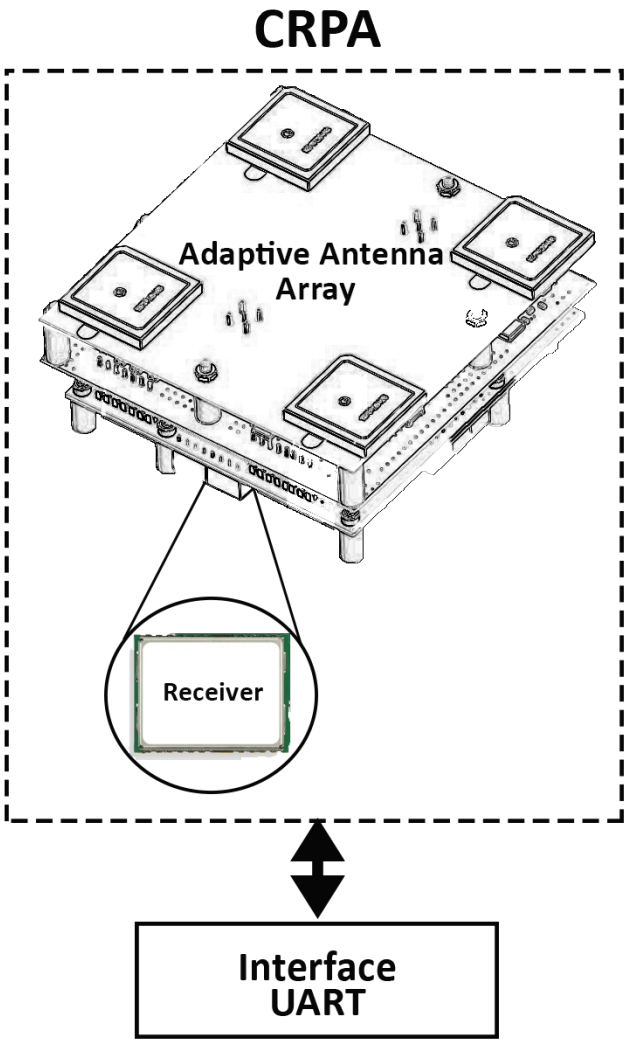
OVERVIEW

An Anti-Jamming GNSS Receiver “Chameleon” dynamically adjusts its reception pattern to optimize signal strength and quality within the existing environment. This adaptability enhances the receiver’s ability to receive and process signals, especially in challenging or changing conditions. The receiver is robust in maintaining accurate navigation and positioning information even when faced with signal degradation or disruptions. The Anti-Jamming GNSS Receiver, specifically designed to mitigate signal jamming and interference. The device consists of four individual antenna elements arranged in a specific configuration to enhance the resilience of satellite navigation and communication systems. The Anti-Jamming GNSS Receiver is used in military and critical applications to counter the threats posed by intentional jamming and interference attempts.

Note:

Controlled Reception Pattern Antennas (CRPAs) are adaptive systems that play a critical role in mitigating the effects of jamming and interference in communication, navigation, and electronic warfare applications. CRPAs are designed to enhance the resilience and accuracy of signal reception, particularly in challenging and jammed environments.

SETUP

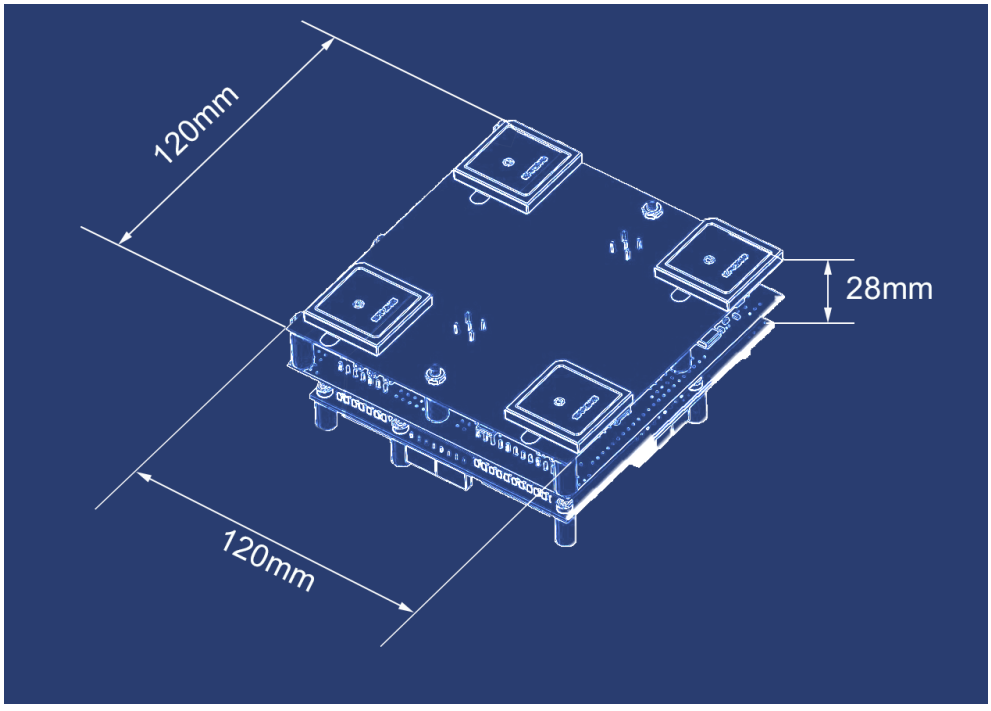


The Antenna uses analog beamforming technique for adaptive adjusting its pattern to mitigate interference and jamming. CRPA antenna can significantly improve the quality of received RF signals and feed the GNSS Receiver.

TECHNICAL SPECIFICATIONS

Parameter name	Value
Operating Bands	GPS L1/Glonass L1/Galileo E1-B,C/Beidou B1
Bandwidth	55 MHz
Number of Antenna elements	4
Antenna element gain	5 dBi
Null	up to 35 dB
BPF Out-of-Band Rejection	more than 70 dB
LNA Gain	35 dB
Noise figure	2 dB typical
Power consumption	15 W
Output Connector	DB-9 male/micro USB (depend of receiver)
Interfaces	UART (standard pinout)
Mechanical/ Environmental	
Operating Temperature	from -40° C to +55° C
Dimensions	120x120x28 mm (WxLxH)

DIMENSION



Autonomous Spectrum Logger

MAIN FEATURES

- Operates from 30 to 6000 MHz
- Automatic spectrum recording
- Display not only the spectrum, but also the waterfall diagram
- View history of previously recorded spectra
- Configurable scanning time 1 to 3 seconds
- Suitable for harsh environments (-30°C to +50°C)

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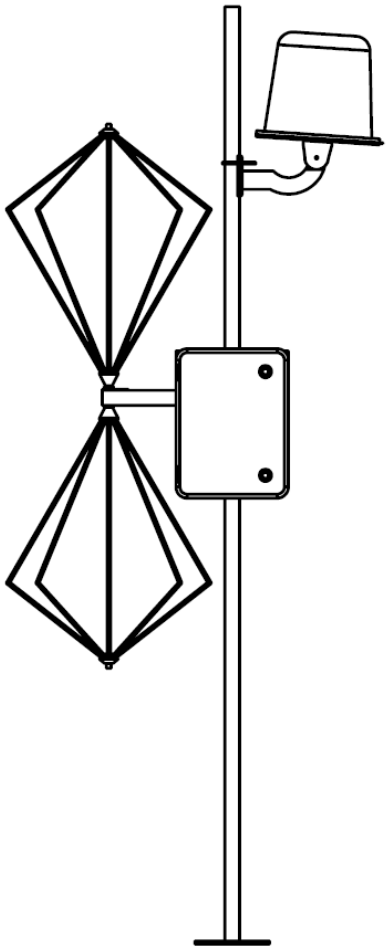
OVERVIEW

The Autonomic Spectrum Logger stands as an advanced signal analysis technology, engineered to seamlessly analyze and visually present the signal spectrum in real-time. Its capabilities extend beyond simple observation, enabling users to record signals for detailed examination and historical review.

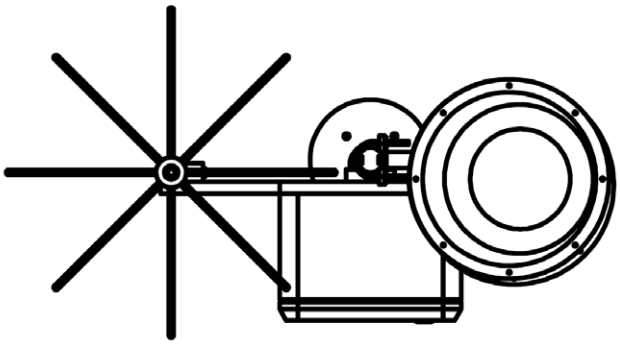
Operating within the frequency range of 30 to 6000 MHz, the Spectrum Logger swiftly scans through this expansive spectrum with remarkable efficiency. Depending on the selected parameters, scanning times range variates from 1 to 3 seconds, ensuring comprehensive coverage and analysis.

The Logger's configuration and operation are seamlessly executed through remote software control, empowering operators with the flexibility to adjust settings and monitor operations from a distance. With the ability to select specific frequency ranges for display on the spectrogram and access previously recorded spectra, users can dive into the details of signal behavior and historical trends with unparalleled precision.

To sustain its operations, the Autonomic Spectrum Logger relies on a stable power supply. For added flexibility and mobility, optional batteries can be seamlessly integrated, ensuring uninterrupted functionality even in remote or off-grid locations.



Side view



Top view

SOFTWARE

The Logger is controlled by software that is designed to:

- scan in the frequency range from 30 MHz to 6 GHz
- automate spectrum recording
- view the history of previously recorded spectra

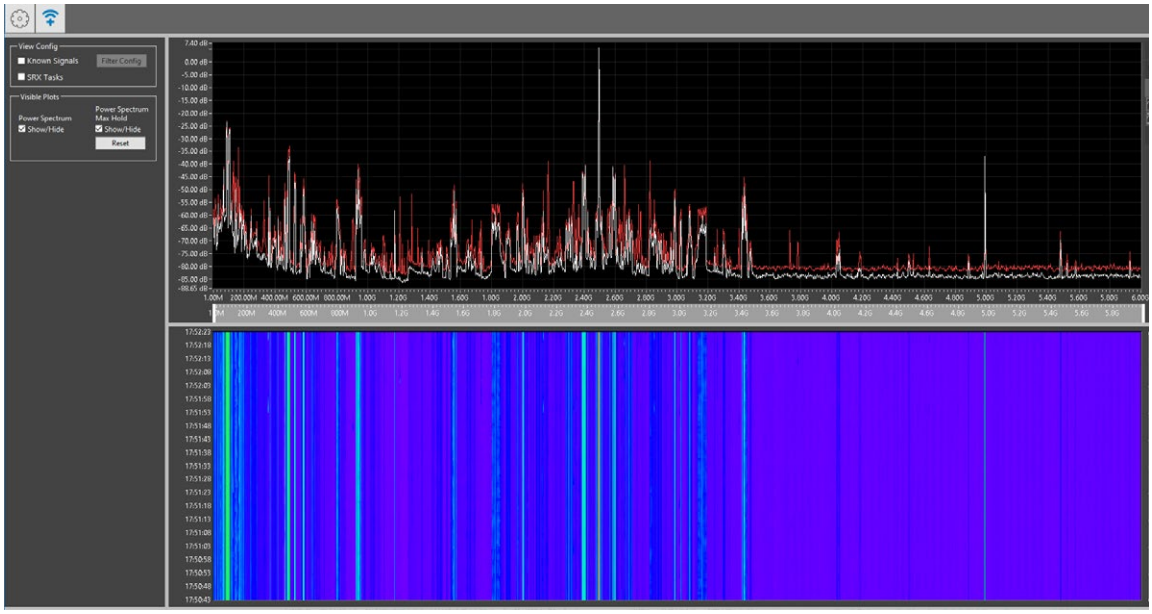
→ p. 2

TECHNICAL SPECIFICATIONS

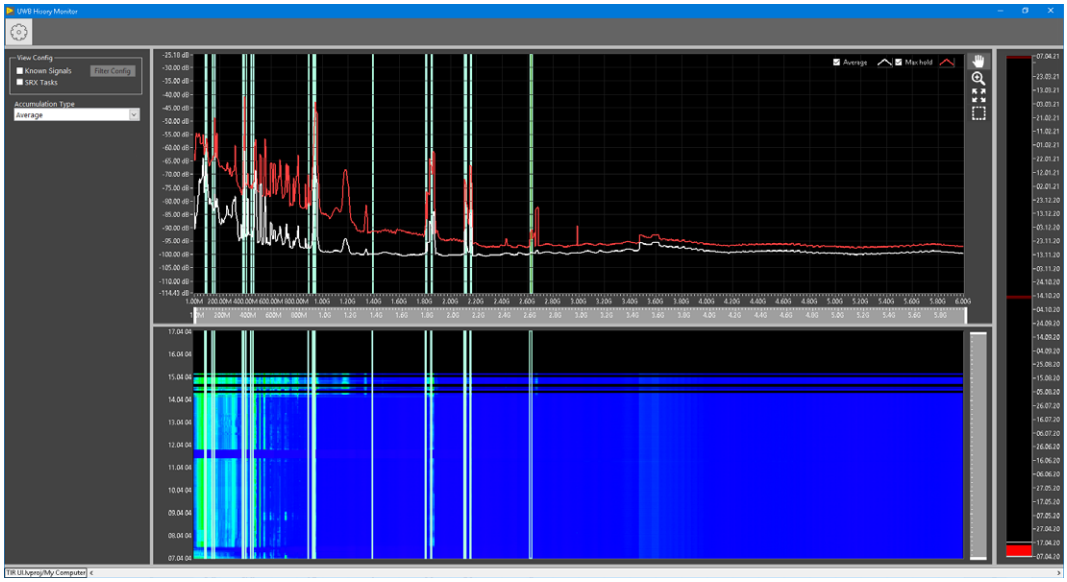
Parameter name	Value
Scanning in the frequency range	from 30 to 6000 MHz
Scanning time	1,5 seconds (discretisation 10 kHz)
Operating temperature range	from – 30 to +50 °C
Maximum wind speed	60 km/h

SOFTWARE

The Autonomic Spectrum Logger software consists of two main windows: “FS” and “FS History”. In the “FS” window, the signal spectra are displayed in live mode.



In the “FS History” window, the history of previously recorded spectra is displayed.

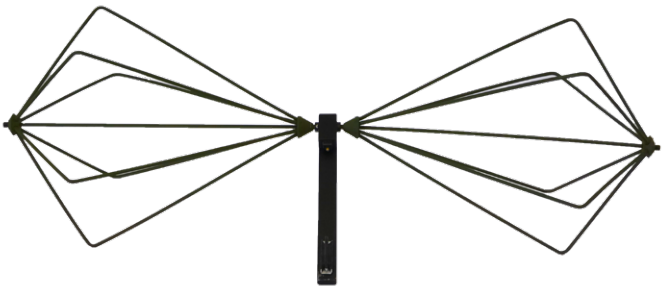


COMPONENTS

Discone antenna

Frequency range	300 – 6000 MHz
SWR	≤ 1.7:1
Gain	6.5 dBi (typical)
Polarization	Linear
Nominal input impedance	50 Ω
Operating Temperature	-40 °C to +70 °C
Dimensions	30 cm (D) and 29 cm (H)

Biconical antenna



Frequency range	30 – 300 MHz
SWR	≤ 2.5 (typical)
Gain	5 dBi (typical)
Polarization	Linear
Nominal input impedance	50 Ω
Operating Temperature	-40 °C to +70 °C

Enclosure

SDR

Embedded PC

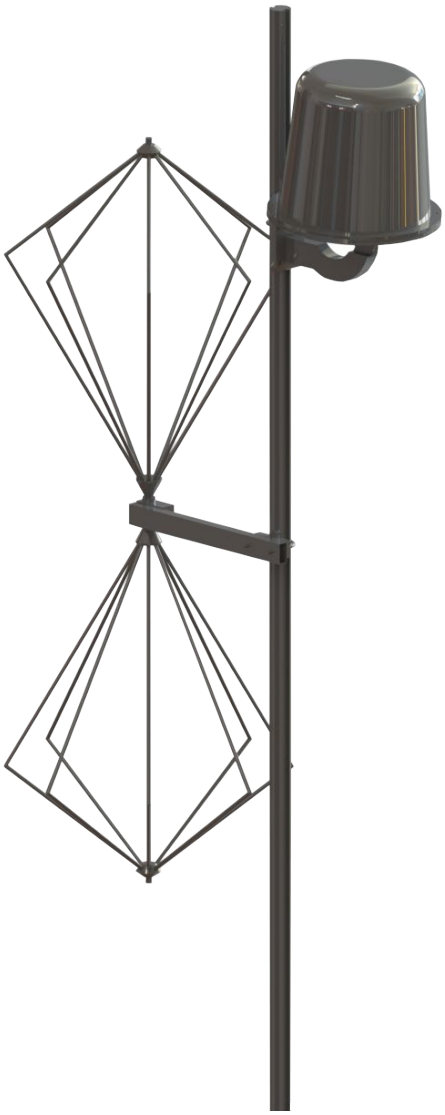
HDD

Climate control system

Radio Monitoring System

MAIN FEATURES

- Operates from 30 to 6000 MHz
- Radio monitoring
- Fast analysis across the entire operating frequency range
- Display not only the spectrum, but also the waterfall diagram
- Suitable for harsh environments (-30°C to +50°C)



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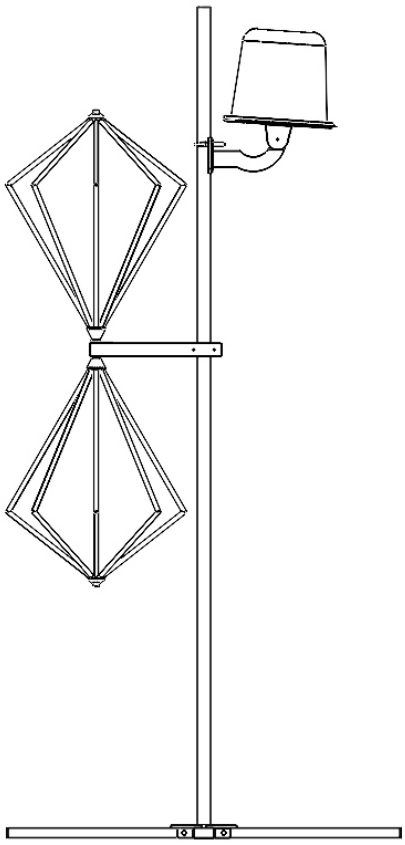
OVERVIEW

The Radio Monitoring System is engineered to scan and analyze a broad frequency range spanning from 30 to 6000 MHz. With its sophisticated capabilities, this system is performes comprehensive radio monitoring of signals without encryption. These include:

- Amplitude-modulated signals
- Frequency-modulated signals
- Phase-modulated signals
- DMR signals

By covering these signal types, the Radio Monitoring System ensures a detailed assessment of the electromagnetic spectrum, enabling users to gather crucial intelligence and insights. Whether in civilian or defense applications, its versatility and precision make it an invaluable tool for monitoring and analyzing radio frequency activities.



Side view

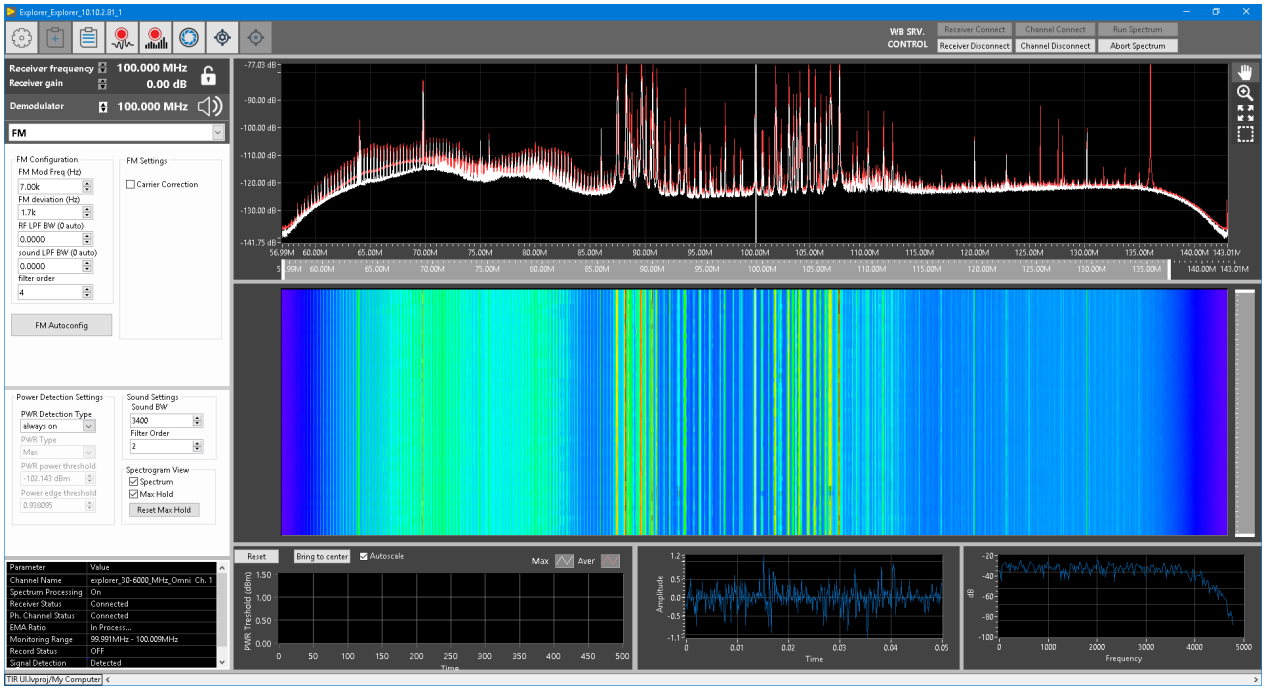
TECHNICAL SPECIFICATIONS

Parameter name	Value
Scanning in the frequency range	from 30 to 6000 MHz
Operating temperature range	from – 30 to +50 °C
Maximum wind speed	60 km/h

SOFTWARE

The system is controlled by software designed to:

- Scan the frequency range from 30 MHz to 3 GHz
- Record demodulated signals
- Create databases and supplement them

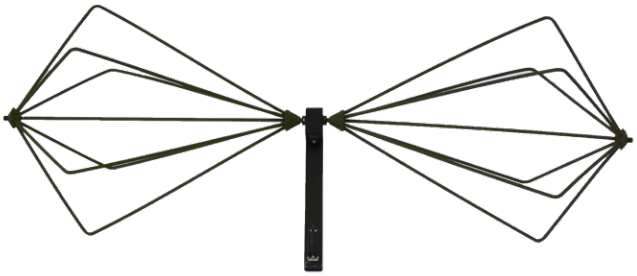


COMPONENTS

Discone antenna

Frequency range	300 – 6000 MHz
SWR	≤ 1.7:1
Gain	6.5 dBi (typical)
Polarization	Linear
Nominal input impedance	50 Ω
Operating Temperature	-40 °C to +70 °C
Dimensions	30 cm (D) and 29 cm (H)

Biconical antenna

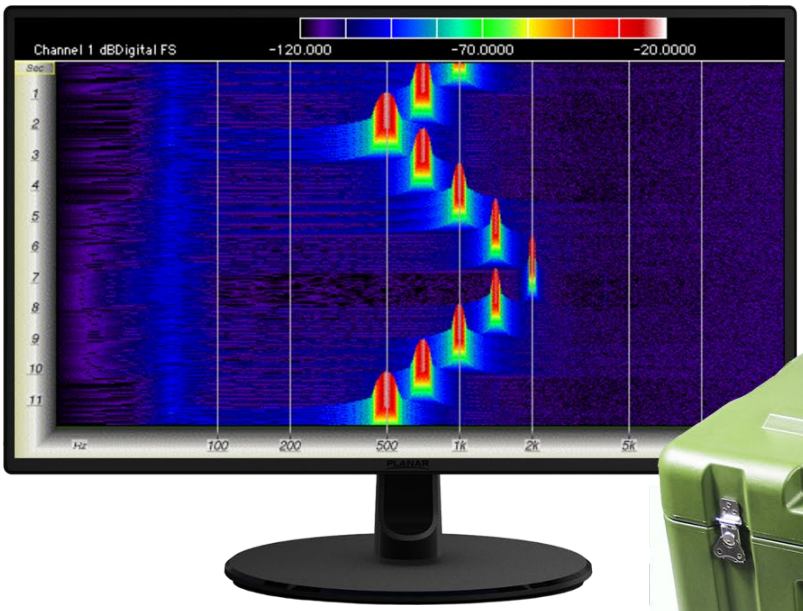


Frequency range	30 – 300 MHz
SWR	≤ 2.5 (typical)
Gain	5 dBi (typical)
Polarization	Linear
Nominal input impedance	50 Ω
Operating Temperature	-40 °C to +70 °C

Passive Smart Jammer

MAIN FEATURES

- WIFI signal jamming
- 3G signal jamming
- GSM signal jamming
- Measurement time up to 1 ms
- FM Radio signal jamming
- Frequency hopping signal jamming



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OVERVIEW

Passive Smart Jammer designed to disable 3G, WIFI, GSM, FM etc.

Traditional RF Jammers generate noise in the whole band. Smart Jammer generates noise in exact part of the band, where external signal was detected.

TECHNICAL SPECIFICATIONS

Parameter name	Value
Measurement time	from 100 µs to 5 ms
Jamming time	unlimited
Silence time	unlimited
Frequency range	from 400 MHz to 4.4 GHz
Instantaneous bandwidth	40 MHz
Output power (maximum)	50 mW to 100 mW (17 dBm to 20 dBm)

GPS/GLONASS Signal Simulator

MAIN FEATURES

- Generates GPS navigation signals
- Generates GLONASS navigation signals
- Generates signals with initial coordinates and initial velocity
- Simulates up to 12 satellites for both GPS or GLONASS
- Trajectory generation from script
- Adding amplitude modulation to pre-generated navigation signal IQ file
- The ability to build a trajectory of movement with selected accelevation

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OVERVIEW

The GPS/GLONASS signal simulator is designed to generate GPS and GLONASS navigation signals in the L1 band. It offers two configurations:

- Simulation of up to 12 GPS or GLONASS satellites in real-time.
- Simulation of 12 GPS and 12 GLONASS satellites from pre-generated IQ files.

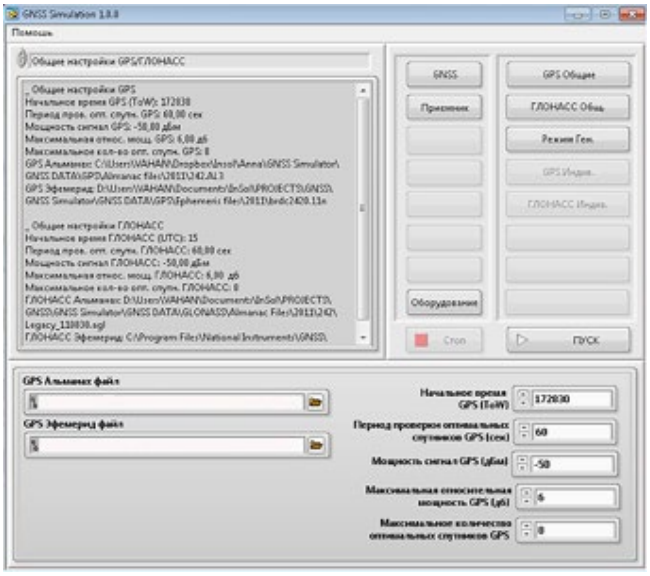
The GPS/GLONASS signal simulator allows for the playback of various scenarios for receiving navigation signals using from 1 to 12 satellites. To simulate a specific scenario, the navigation signal is created based on ephemeris and almanac files in the baseband, which are necessary for transmitting navigation and service information to the receiver.

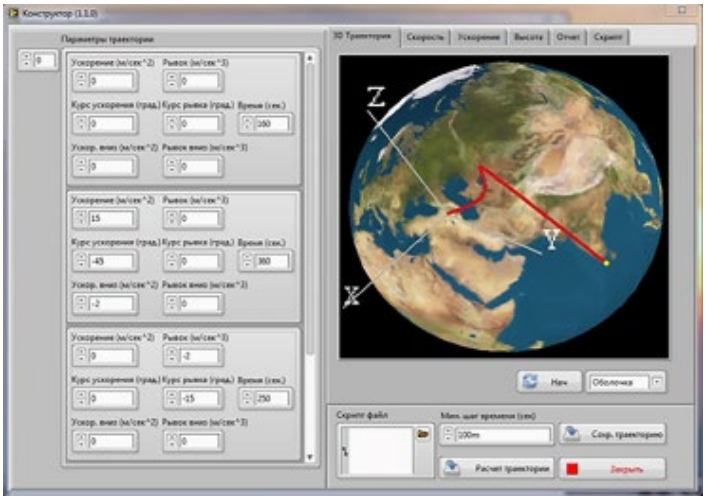
For GPS signal generation, the simulator provides:

- Ranges for generating position code L1.
- Satellite modeling (automatic, based on satellite location files).
- Formation of custom motion trajectories for modeling the operation of mobile devices:
    - Defining own route of movement via script loading.
    - Setting the direction vector for the initial location (latitude, longitude, altitude), and speed.

For GLONASS signal generation, the simulator offers:

- Real-time generation of up to 12 satellite navigation signals of the GLONASS system in the L1 band.
- Creation of a virtual constellation of spacecraft of the GLONASS system.
- Setting the location of the navigation signal receiver.
- Formation of custom motion trajectories for modeling the operation of mobile devices:
    - Defining own route of movement via script loading.
    - Setting the direction vector for the initial location (latitude, longitude, altitude), and speed.



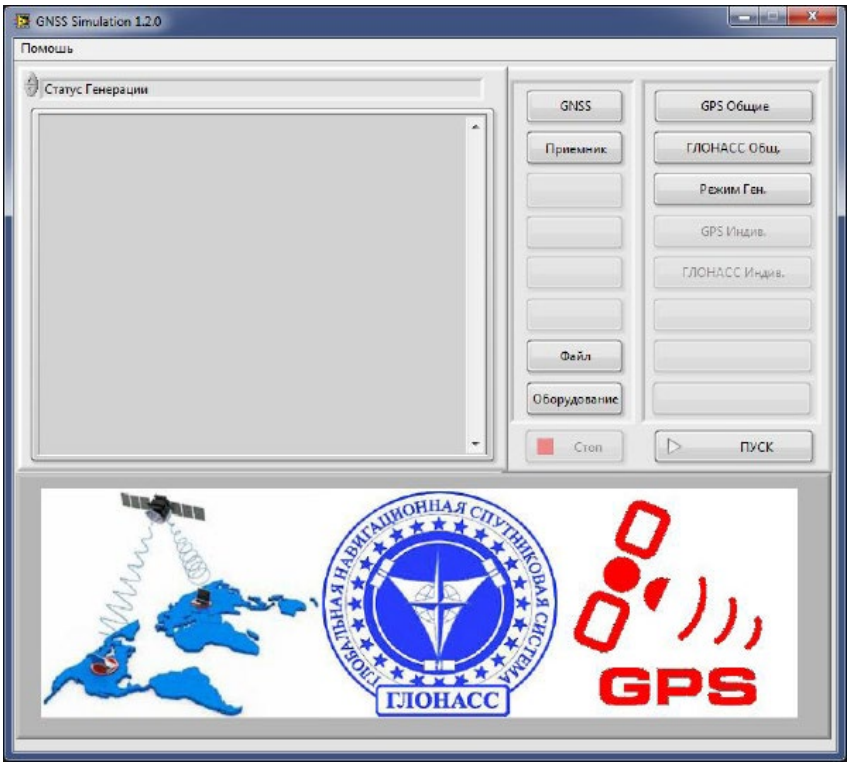


TECHNICAL SPECIFICATIONS

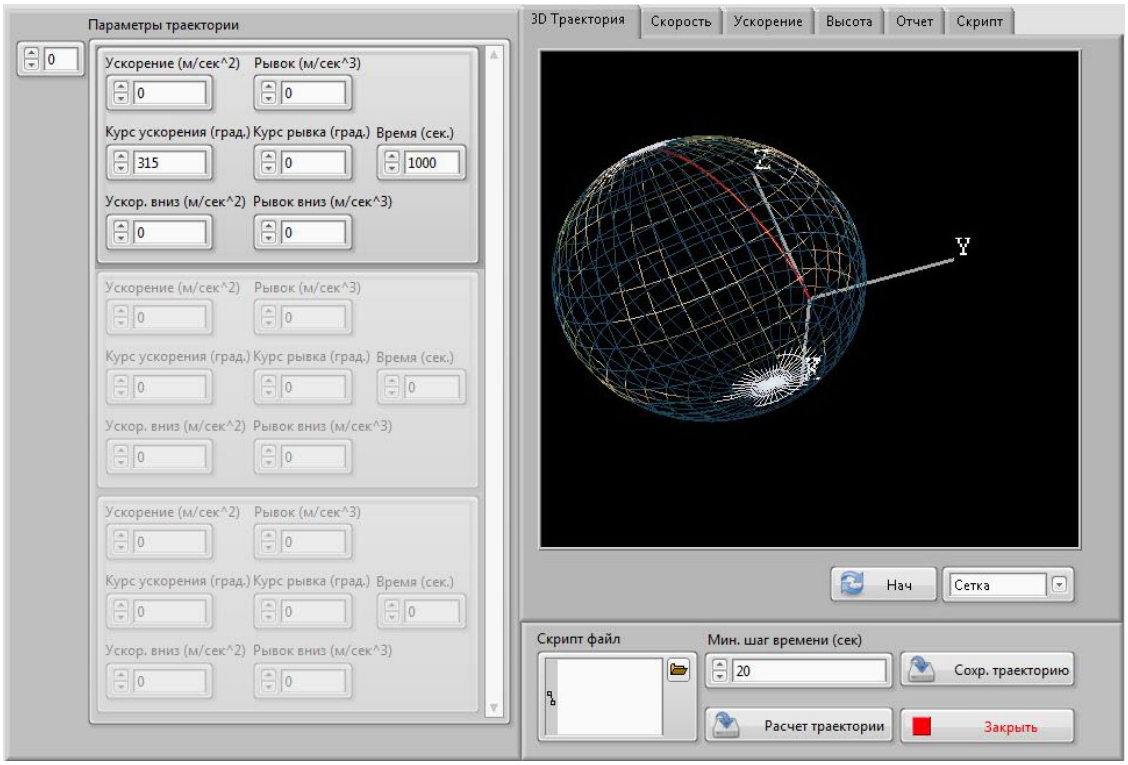
Parameter name	Value
Simulated navigation systems	GPS / GLONASS L1 band
The number of simultaneously generated GPS channels	12
The number of simultaneously generated GLONASS channels	12
Formation of the navigation receiver's trajectory by the user	
Simulated speed	up to 5 000 m/s (tested)
Simulated height	up to 20 km (tested)
Additional options	
Simulated speed	up to 10 000 m/s
Simulated height	up to 50 km
The ability to create high-speed ballistic trajectories using the integrated constructor	Yes
Ability to define acceleration at different parts of the trajectory	Yes

SOFTWARE

The direction finder software comprises two main windows: "Main window" and "Constructor."
In the "Main window," GPS and GLONASS signals are generated.



In the «**Constructor**» window, the movement of the navigation receiver is simulated.



COMPONENTS

PC with RAID

Seven-element DF antenna

Jammer
“Hecate 7BF”

MAIN FEATURES

- Activation of the blocking of the corresponding frequency band
- Database update option (including modified UAVs)
- Change of the UAV operation range for a particular object (at the stage of system deployment) (optional)
- Output power per channel: 4-15 W

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OVERVIEW

Jammer “Hecate 7BF” designed to block control channels and navigation of the UAVs. Jammer works for seven different frequency sub-bands The jammer is fully automated and does not require operator involvement, but has manual mode for choosing the necessary frequency band.

TECHNICAL SPECIFICATIONS

Parameter name	Value
Frequency bands with capacity of jamming	420-450 MHz
	902-928 MHz
	1150-1300 MHz
	1550-1620 MHz
	2400-2525 MHz
	5100-5300 MHz
	5700-5900 MHz
Maximum interference signal power output in each band	10 W
	15 W
	10 W
	10 W
	15 W
	4 W
	4 W
Maximum number of blocked bands	7
Operating temperature range	from - 20°C to + 55°C
Power supply	220V, 50 Hz
Power consumption	not more than 400W
Dimensions	40x77x30 cm
Weight	15 kg

Optical Electronics (Lasers)

Forward Observer System

MAIN FEATURES

- Athermalized Uncooled Thermal Imager (8-12µm)
- High Performance 30x Day Camera
- Long Range Eye-Safe Laser Rangefinder
- GPS/GLONASS/BeiDou/Galileo GNSS Module
- 3D Digital Magnetic Compass
- Advanced Target Management
- Ballistic Calculations (Optional)
- Optics Detection (Optional)
- Intuitive User-Friendly Interface
- Set of accessories, tactical bags, logistic containers, cables, tripod, pan & tilt head

OVERVIEW

Forward Observer Post is design for:

- Reconnaissance
- Surveillance
- Target Detection
- Target Location
- Fire Control

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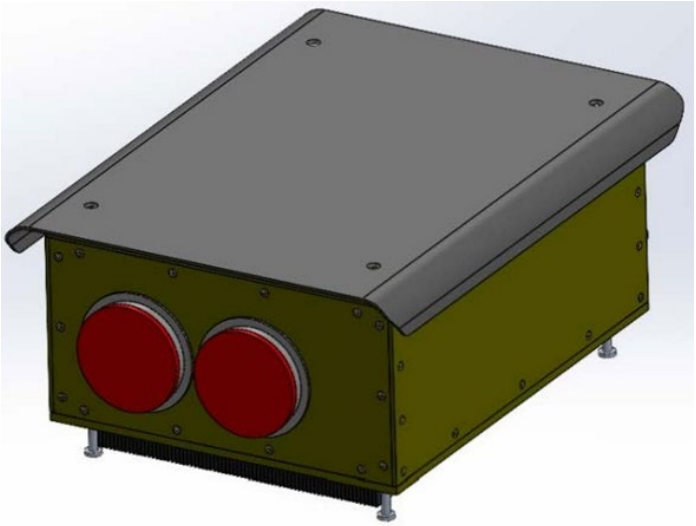
TECHNICAL SPECIFICATIONS

Parameter name	Value
LWIR Camera	
Sensor Type	640 x 512 (VOx)
Spectral Band	8-12 µm
HFOV/VFOV	6.23° x 4.98°
E-Zoom	up to 20 x
Athermalized Lens	F100mm/f1.5
Low Light Camera	
Sensor Type	1/2.8” Sony CMOS Sensor
Resolution	1920x1080
Angle of View	60.5°~2.3°
Optical Zoom	30x
Focal Length	4.7mm~141mm
Minimum Illumination Color	0.005Lux/F1.5; B/W: 0.0005Lux/F1.5
Eye-Safe Laser Rangefinder	
Wavelength	1.5µm
Maximum measurement range	32 000m
Range to standard NATO target (2.3x2.3m)	7 800m
Precision	0.5-1.5m
3D Digital Magnetic Compass	
Heading Accuracy	0.3° RMS (25°C, Tilt Angle<30°)
Pitch and Roll Accuracy	±0.1° (25°C, Full Range)
GNSS module	Internal 72 channel GPS/GLONASS/BeiDou/Galileo
Microdisplay	Imaging & Data OLED Display 800x600
Communication	RS232/422/Wireless Data/Video Communication
Power	
Lithium Ion 14.8V, 5000 mAh, 18650 type Battery Pack	
Operation time	8 hours
Connector for External Power Source	
Weight	3.5 kg
Mounting Quick release mount	
Operating Temperature	-40°C to +50°C

High Energy Laser Rangefinder module

MAIN FEATURES

- High accuracy
- Reliable ranging
- Multiple target detection
- Low false alarm probability



OVERVIEW

High Energy Laser Rangefinder module is a rangefinder module for integration into larger systems such as weapons fire control, thermal sensing or surveillance and tracking stations.

TECHNICAL SPECIFICATIONS

Parameter name	Value
Type of laser	Nd:YAG
Wavelength	1064 nm
Pulse energy	200 mJ
Pulse duration	15 ns
Divergence	1.5 mrad
Pulse repetition rate (continious)	2 Hz
Pulse repetition rate (burst mode)	10 Hz
Type of receiver	silicium APD
Receiver optics diameter	50 mm
1m² object measurement distance	500m – 5000m
Range accuracy	± 5 m
Dimensions	L340xW270xH160
Weight	7.9 kg
Cooling	Internal liquid loop, external convention cooling
Power	24 VDC, 4A
Communication port	RS-422

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Laser Warning System “Cyclops”

MAIN FEATURES

- Compact and rugged
- Alarms (light, sound, and vibration)
- Perfect for personal use and vehicle mounting
- Laser detection and classification
- Detection of the direction
- Alarm activation for the laser rangefinder
- Alarm activation for the laser target designator
- Operates in the 880 to 1700 nm range
- Integrated DIO (for interfacing)

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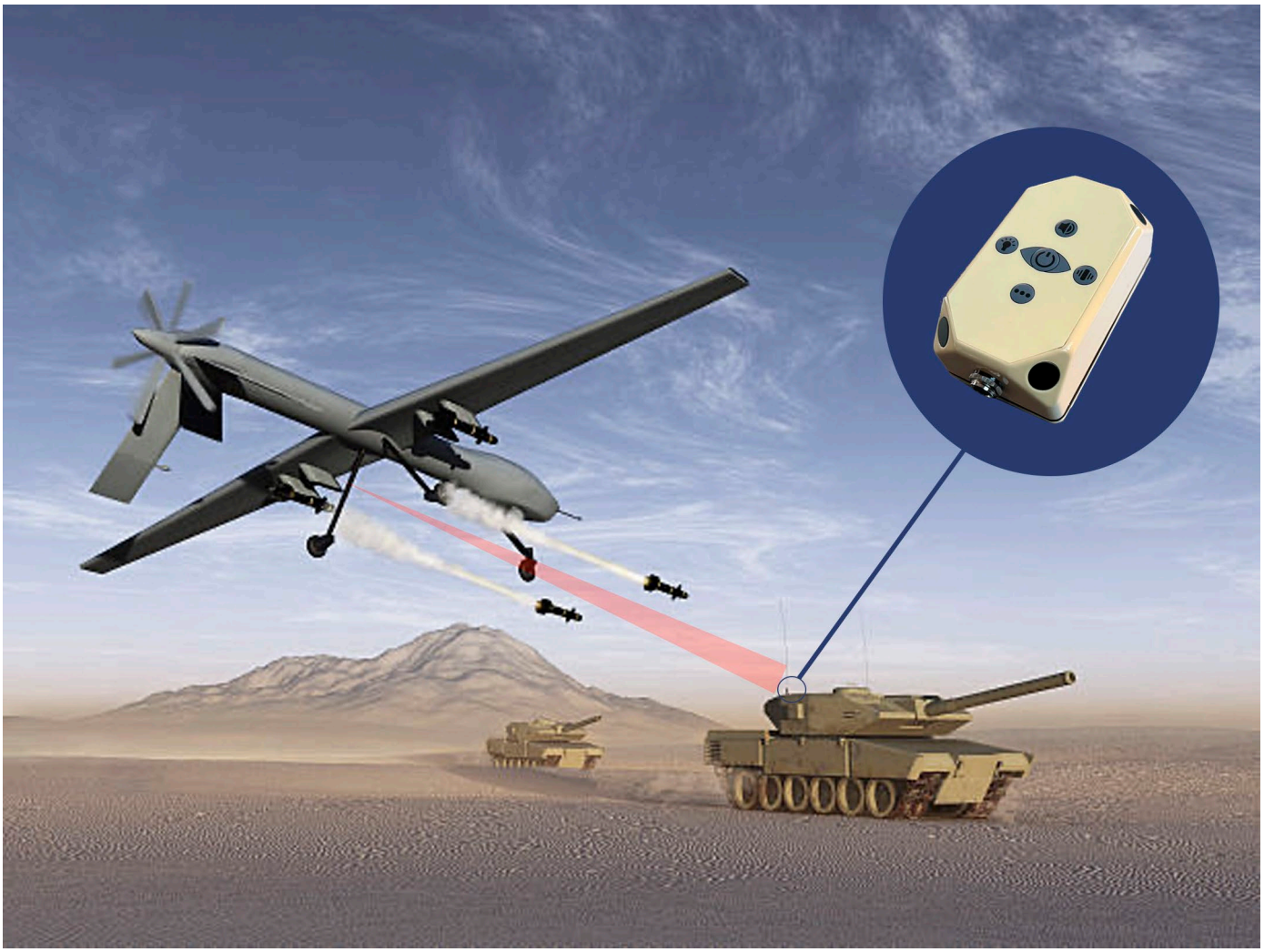
OVERVIEW

The Laser Warning System (LWS) "Cyclops" is an advanced detector for laser rangefinders and laser designators. This innovative device combines robustness and versatility, making it ideal for various applications. It is specifically designed as a personal safety tool for soldiers but can also be mounted on armored vehicles.

The LWS detects incoming laser beams from laser rangefinders or designators operating in the 880–1700 nm range. It is equipped with four detectors, providing 360-degree horizontal and 120-degree vertical coverage. When an infrared laser is detected, the device alerts the user through light, vibration, and sound, ensuring timely warnings and enhancing safety.

Laser detection systems are crucial in military applications. These systems do not emit laser beams; instead, they detect incoming laser signals. Such devices are used to alert users when they are being targeted by laser designators or measured by laser rangefinders, making them essential for personal security and situational awareness.



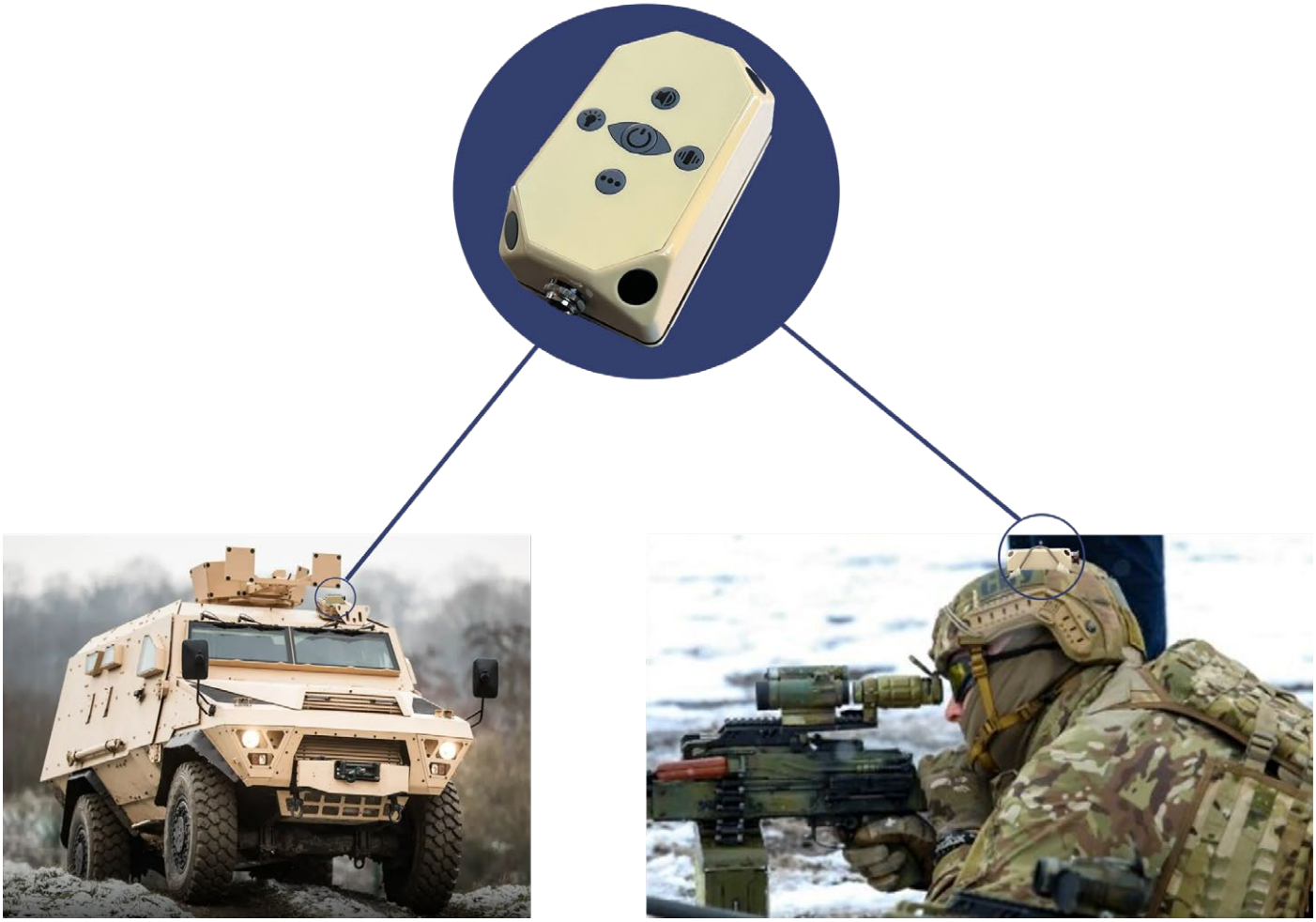
TECHNICAL SPECIFICATIONS

Parameter name	Value
Spectral response	880-1700 nm
Field of view for each detector	Cone 120° (LWS cover 360°)
External power source	5 V
Integrated sound alarm	Yes
Integrated vibration alarm	Yes
Integrated light alarm	Yes
Ability to classify detected signals	Rangefinder and Target Designator
Batteries	2800 mAh
Autonomous operation	up to 6 hours
Temperature range	-5 ^{o}C to +50 ^{o}C -20 ^{o}C to +50 ^{o}C (with external power source)
False alarm triggering rate	Not more than once per 24 hours
Weight	215 g
Dimensions	85x50x35 mm

APPLICATIONS

Laser rangefinders are utilized by enemy forces to accurately determine distances. Laser warning systems are designed to detect these laser rangefinders, alerting you to potential surveillance or targeting activities conducted by the enemy. Upon detection, the system issues an alert, notifying you of possible reconnaissance or surveillance efforts. By analyzing the detected laser's direction and wavelength, valuable insights into the enemy's tactics, behavior, and potential areas of focus can be gained. Armed with this information, defensive strategies and operational plans accordingly can be adjusted.

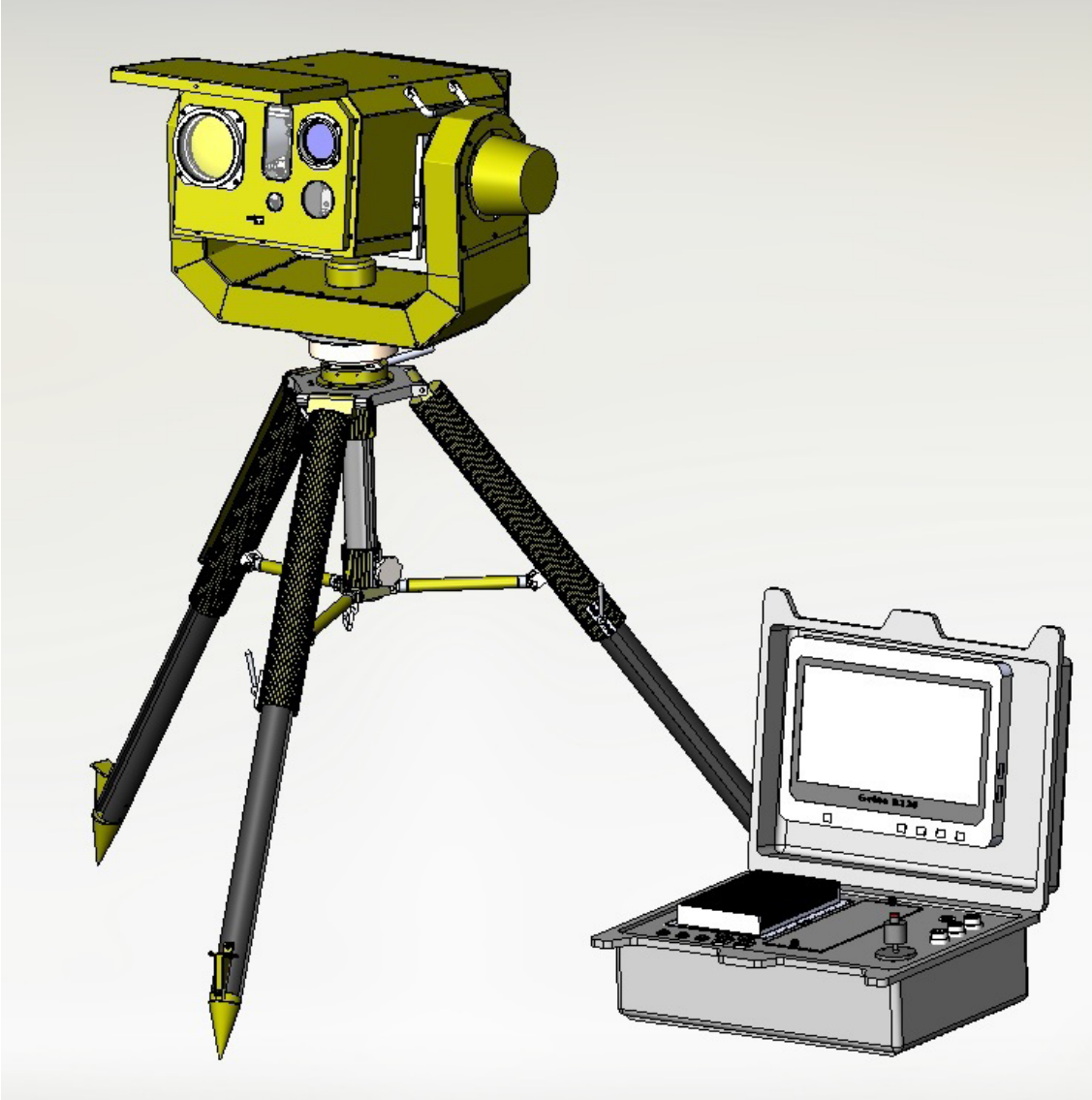
- Helmet-mounted Laser Warning System: mounting a laser warning system on a helmet enhances individual soldiers' situational awareness and provides protection against laser threats.
- Vehicle-mounted Laser Warning System: installed on tanks or car, laser warning systems offer early detection of laser threats, enabling crews to take preventive actions or activate defensive measures using integrated digital outputs.
- Command posts: equipped with information from the laser warning system, command post personnel can implement appropriate countermeasures, such as activating smoke screens, deploying anti-laser materials, or adjusting personnel and equipment positioning to mitigate laser-based threats.



Electrooptic Countermeasure System (ODYSSEUS)

MAIN FEATURES

- Observation of terrain during the day
- Observation in low-light conditions
- Surveillance of terrain during the day
- Surveillance in low-light conditions



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OVERVIEW

The Electrooptic Countermeasure System (Odysseus) is a portable land-based system designed to perform the following functions:

- Observation and surveillance of terrain during the day and in low-light conditions
- Detection and allocation of targets (using optical and electro-optical devices for observation, surveillance, and targeting).
- Automatic or manual suppression of selected targets (obscuring the field of view with powerful laser radiation), such as optical sights, CCD and CMOS cameras, and night vision devices.

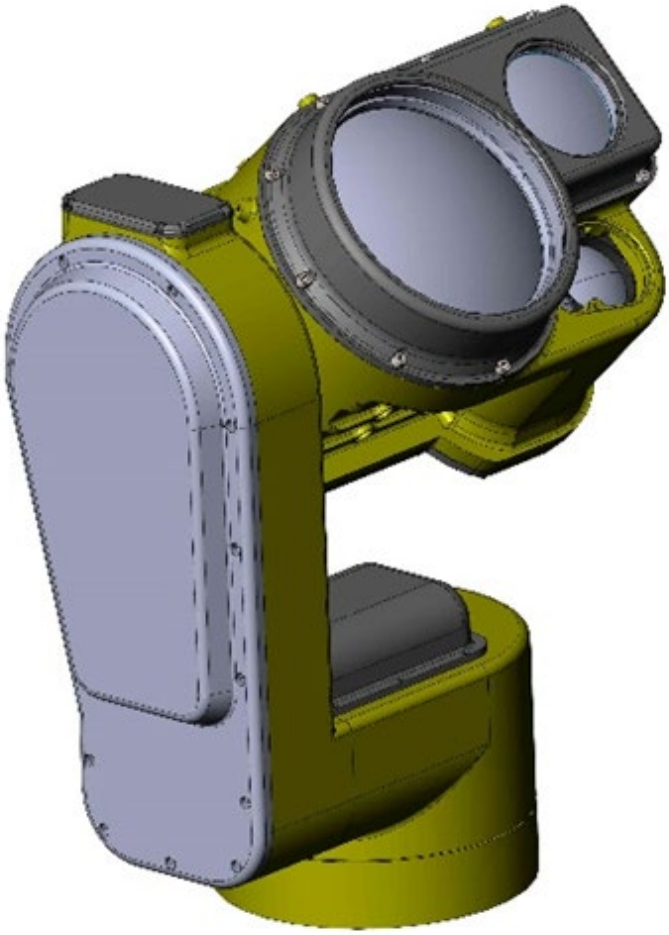
TECHNICAL SPECIFICATIONS

Parameter name	Value
SYSTEM BODY	
Target explorer laser unit	
Divergence of probe laser	$60^{o} \div 0.8^{o}$
Field of view CMOS camera	$60^{o} \div 2^{o}$
Typical target detection distance	≥ 3 km
Trigger laser unit	
Divergence of trigger laser	≤ 0.5 mrad
Triggering repetition rate	5 kHz
High power laser unit	
Radiation pulse energy	≥ 1.8 J
Pulse structure	Bunch
Wavelength	IR & Visible
Divergence	≤ 0.3 mrad
Typical target suppression distance	≥ 2 km
OPERATOR'S CONSOLE	
Manual suppression of selected targets	
Automatic suppression of selected targets	Optional
ROTARY SUPPORT PLATFORM	
Azimuth	$\pm 180^{o}$
Elevation	$\pm 20^{o}$
TRIPOD	Rigid support on the ground
Weight of deployed system	≤ 50 kg

Forward Observer Post

MAIN FEATURES

- Uncooled Dual field-of-view LWIR Thermal Imager
- High Performance 90x Day Camera
- Long Range Eye-Safe Laser Rangefinder
- GPS/GLONASS/BeiDou/Galileo GNSS Module
- 3D Digital Magnetic Compass
- Pan and tilt mounting device (electronic goniometer)
- Remote Control Unit
- Advanced Target Management
- Ballistic Calculations, fire data preparation
- Intuitive User-Friendly Interface
- Voice and digital command and data exchange
- Set of accessories, logistic containers, cables, tripod



OVERVIEW

Forward Observer Post is design for:

- Reconnaissance
- Surveillance
- Target Detection
- Target Location
- Fire Control

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TECHNICAL SPECIFICATIONS

Parameter name	Value
Thermal Imager	
Sensor Type	640 x 512 (VOx)
Spectral Band	8-14µm
Motorized Dual FOV Lens	FL= 40mm/160mm (F# 0.95/1.25)
Horizontal FOV	15.49° / 3.89°
Low Light Camera	
Sensor Type	1/1.8” Sony Exmor CMOS Sensor
Resolution	1920x1080
Angle of View	59°~0.8°
Optical Zoom	90x
Focal Length	6.0mm~540mm
Minimum Illumination Color	0.1Lux/F1.4; B/W: 0.001Lux/F1.4
Eye-Safe Laser Rangefinder	
Wavelength	1.5µm
Maximum measurement range	32 000m
Range to standard NATO target (2.3x2.3m)	7 800m
Precision	0.5-1.5m
3D Digital Magnetic Compass	
Heading Accuracy	0.3° RMS (25°C, Tilt Angle<30°)
Pitch and Roll Accuracy	±0.1° (25°C, Full Range)
GNSS module	Internal 72 channel GPS/GLONASS/Bei-Dou/Galileo
Pan and Tilt Mounting Device (Electronic Goniometer)	
Range of rotation: azimuth elevation	 ±180° ±30°
Precision	± 0-01 (± 3.6’)
RS232/422/Wireless Data/Video Communica-tion	
Lithium Ion 14.8V Battery Pack	
Operation time	8 hours
Connector for External Power Source	
Sensor Head Weight	6.5 kg
Mounting Quick release mount	
Operating Temperature	-40°C to +50°C

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