



SPETS  
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EXPORT

# BUKOVEL

## ELECTRONIC WARFARE SYSTEM



## BUKOVEL-AD

Bukovel-AD is an effective electronic warfare system to counter a wide range of UAVs



<b>Detection RF bands</b>	320-6000 MHz
<b>Suppression RF bands</b>	320-6000 MHz
<b>Detection range</b>	3-50 km
<b>Effective suppression range</b>	Up to 3-4 km
<b>Suppression GNSS</b>	Yes
<b>Suppression DataLink UAV-GS</b>	Yes
<b>Number of simultaneously jammed channels</b>	7
<b>Crew</b>	1
<b>Transport base</b>	No
<b>Weather conditions</b>	All-weather
<b>Transport-combat position</b>	Fixed application
<b>UAV type</b>	Any container trailer

## BUKOVEL-AD/B-C

**Bukovel-AD/B-C** series is a high-power EW C-UAV system for fixed applications. Protection of large industrial and critical infrastructure areas with 24/7 operation



<b>Detection RF bands</b>	225-6000 MHz
<b>Suppression RF bands</b>	290-6000 MHz
<b>Detection range</b>	Up to 80 km
<b>Effective suppression range</b>	Up to 20-25 km
<b>Suppression GNSS</b>	Yes
<b>Suppression DataLink UAV-GS</b>	Yes
<b>Number of simultaneously jammed channels</b>	11
<b>Transport base</b> (20' Container size) Weather condition	1
<b>Weather conditions</b>	All-weather
<b>Transport-combat position transition time UAV type</b>	Any container trailer
<b>Transport-combat position</b>	7 min
<b>UAV type</b>	Nano, Micro, CR, MR, SR, Loitering munitions



## BUKOVEL-MINI-FX



Cost-effective anti-drone system for fixed application. For a defense of small areas within a few square kilometers

<b>Detection RF bands</b>	320-6000 MHz
<b>Suppression RF bands</b>	320-6000 MHz
<b>Detection range</b>	3-50 km
<b>Effective suppression range</b>	Up to 3-4 km
<b>Suppression GNSS</b>	Yes
<b>Suppression DataLink UAV-GS</b>	Yes
<b>Number of simultaneously jammed channels</b>	7
<b>Crew</b>	1
<b>Transport base</b>	No
<b>Weather conditions</b>	All-weather
<b>Transport-combat position transition time</b>	Fixed application
<b>UAV type</b>	Nano, Micro, CR

## ING 4317



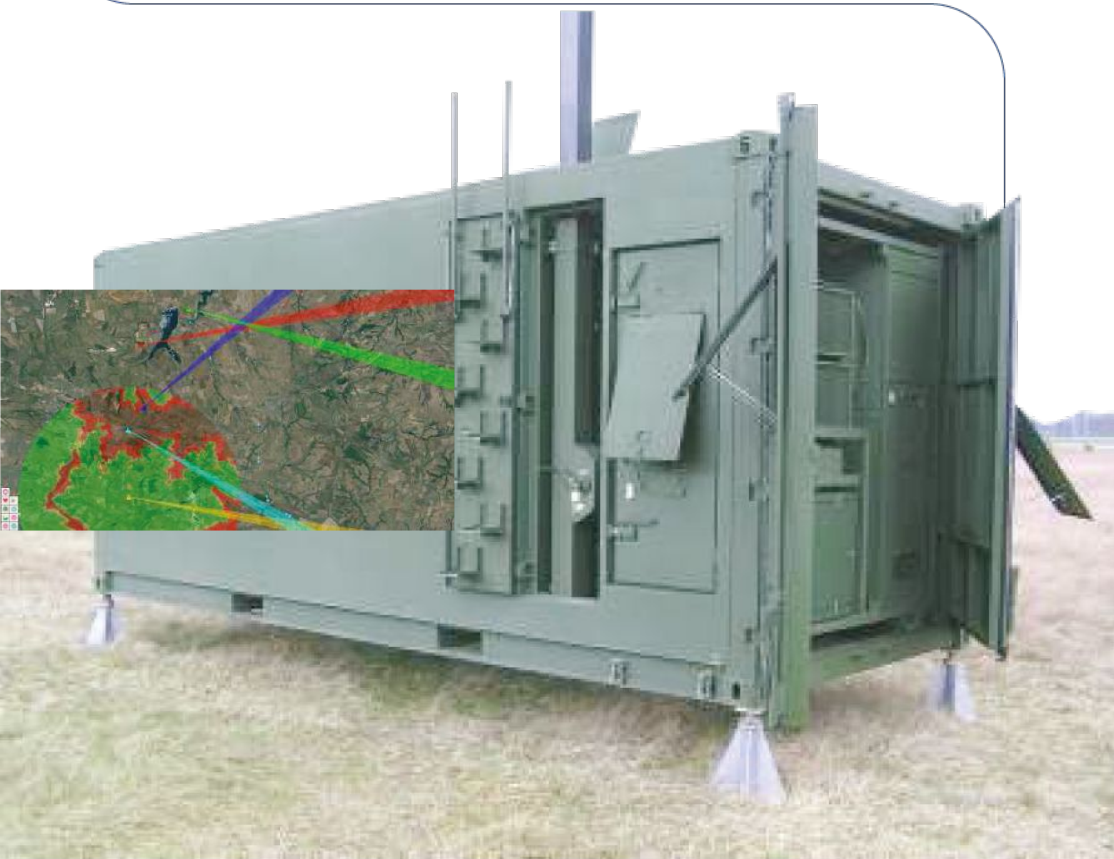
GPS/GLONASS Spoofing system

Warfare application: Spoofing  
Naval GNSS or UAV GNSS

<b>RF bands</b>	L1, L2
<b>GNSS</b>	GPS, Glonass
<b>Effective range</b>	1-60 km
<b>RF Output Power</b>	0.05 – 12 W
<b>Suppression GNSS</b>	Yes
<b>Spoofing GNSS</b>	Yes
<b>Coordinate spoofing type</b>	Dynamic synchronous
<b>Crew</b>	1
<b>Transport base</b>	No
<b>Weather condition</b>	All-weather
<b>Weight</b>	12 kg
<b>Maximum number of simulated satellites</b>	32
<b>Control interface</b>	100/1000 Base T

## BUKOVEL-CPR

The control post allows to combine up to 9 Bukovel-AD complexes into a single system to counter UAVs in a wide area of combat operations (front 350-400 km). In addition, it has a co-functional functionality for detecting, RF information processing, and recording purposes. It is equipped with systems to direct EW counteraction – such as GNSS spoofing and control channel/data link spoofing



<b>Number of supported systems</b>	9
<b>Detection of UAVs</b>	Yes
<b>Tracking of UAVs</b>	Yes
<b>GNSS spoofing</b>	Yes
<b>RC and Data Link spoofing</b>	Yes
<b>Spoofing GNSS</b>	Yes
<b>Log database and analyst RF sps UAVs</b>	Yes
<b>Interconnect to Active Radars subsystem</b>	Yes
<b>Crew</b>	4
<b>Transport Base</b>	Container 20F
<b>Weather condition</b>	All-weather
<b>Weight</b>	3900 kg





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# MANDAT-B1

AUTOMATED JAMMING COMPLEX



## MANDAT-B1E R-330UM







Complex Mandat-B1E R-330UM is intended for cancellation of ground communication channels with both fixed and programmable frequency-hopping, regardless of the type of modulation used, with speed up to 1000 hops per second within HF and UHF frequency bands





Selective jamming (both on time and frequency) as well as barrage jamming is used to disrupt and jam all previously detected frequencies



## MAIN SPECIFICATIONS

NAME OF ARTICLE	R-330RDME	R-330KV1ME	R-330UV1ME	R-330UV2ME
				
	Automated control and reconnaissance station (HF and UHF bands) 1 pcs	Automated intelligence and jamming station (HF band) 2 pcs	Automated intelligence and jamming station (UHF1 band) 2 pcs	Automated intelligence and jamming station (UHF2 band) 2 pcs
Operating frequency range	1.5-1000 MHz	1.5-30 MHz	30-230 MHz	225-1000 MHz
Response time from signal appearance till jamming signal radiation (within swath)	-	2 ms	0.3 ms	0.3 ms
Simultaneous bandwidth	-	28.5 MHz	80 MHz	80 MHz
Radio source coordinates definition accuracy	5 - 10% of the range			
Jamming signal strength	-	1.0 kW	2.0 kW	2.0 kW

## MAIN SPECIFICATIONS

NAME OF ARTICLE	R-330RDME	R-330KV1ME	R-330UV1ME	R-330UV2ME
				
Coverage area (front)	Up to 90 km			
Coverage area (depth)	Up to 60 km			
Communication range between units of the complex	Up to 30 km			
Situational awareness display	Available			
Navigation system	NAVSTAR GPS, GLONASS			
Power supply system	Autonomous electric power station, industrial power supply system 380V, 50 Hz			

# CLOUD-3

# GRIF-1

INTEGRATED  
RADIO-ELECTRONIC  
WARFARE SYSTEMS





# GRIF-1

INTEGRATED RADIO-ELECTRONIC  
WARFARE SYSTEM



## INTEGRATED RADIO-ELECTRONIC WARFARE SYSTEM



Designed for search, direction-finding, technical analysis  
and positioning of fixed-frequency and frequency-hopping  
VHF and UHF-band radio emission sources

## MAIN ADVANTAGES

### ANTI-UAV VEHICLE

- Jammer, RF-Inhibitor 300 MHz - 6000 MHz
- Radiofrequency monitoring unit 300 - 6000 MHz installed on mast (12 m) and tethered drone (up to 75 m)
- K<sub>u</sub> band Radar ARSENAL (Ukraine)
- Optical-electronic device KVANT (Ukraine)
- Armored truck
- Internal design - 20 mt. container - box truck
- Software

#### Self-learning system:

it allows to support and to process databases of radio-electronic signals and counteract them in automatic mode

#### Module structure:

it allows increasing functionality and frequency ranges

#### Tested in combat areas



**Fully autonomous system with all the support subsystems:**  
it allows providing long missions

**Operational models:**  
automatic, semi-automatic and manual

**Various sets allow meeting various customers requirements**



## GRIF-1 ELECTRONIC WARFARE SYSTEM



The GRIF system in transport position

### MAXIMUM ELEVATION OF RECEIVING ANTENNAS SYSTEM

K<sub>u</sub> band Radar:  
up to 25 km

Jammer:  
up to 200 km

Air conditioning

RF-monitoring:  
up to 55 km

With tethered '75 m

Optical-electronic  
device 7 km

With mast  
12 m

20 feet container  
– box truck  
4 persons



## MAIN CHARACTERISTICS

### OVERALL DIMENSIONS

900 x 900 x 400 mm

### RECEIVING ANTENNA TYPE

Digital antenna array

### SIMULTANEOUS OBSERVATION AREA

16° x 16°

### OBSERVATION AREA

Azimuth coverage

360°

Elevation coverage

From -50° to +850°

### TRANSMITTER TYPE

Solid-state

### INSTRUMENTED RANGE

35 km

### DETECTION RANGE

Target with a radar cross section (3 m)

25 km

Target with a radar cross section (1 m)

20 km

Target with a radar cross section (0,1 m)

10 km

### TRACKING RANGE

Target with a radar cross section (3 m)

15 km

Target with a radar cross section (1 m)

7 km

### STANDARD DEVIATION IN MEASURING

Range

5.0 mm

Angular coordinates

0.1°

Velocity

0.1 m/s

### CONSUMED POWER

Up to 250 W



## THE UAV CONTRACTION ALGORITHM

### DETECTION

#### **Integrated radar detection system**

It is effective for detection of big UAVs with inertial navigation system

#### **RF-monitoring and direction finding system**

It is effective for detection of small drones

### IDENTIFICATION

#### **High-resolution optical-electronic device**

"Friend-or-foe" target verification, target tracking

Automatic comparison of intercepted signal with master database (RF-monitoring)

### JAMMING

#### **GRIF-1**

Is effective for jamming of any type of radio signals, including control channels of attack drones, remotely controlled bombs, fire control radio channels, trunking communication

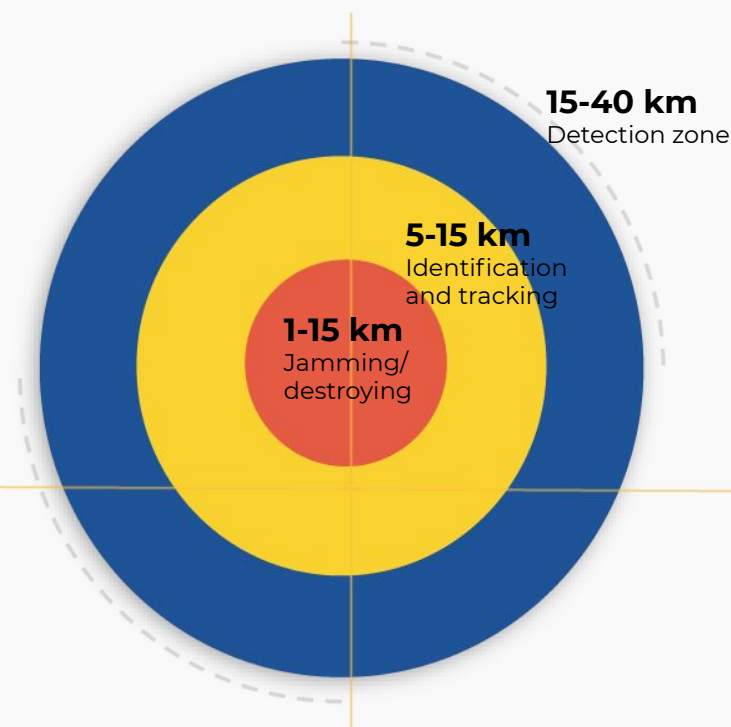
### TARGET TRACKING

Target destination to air defense system

### DESTROYING

It is effective for fully automated UAVs or targets, controlled via satellite communications

### DECISION MAKING ZONES FOR effective UAVs counteraction

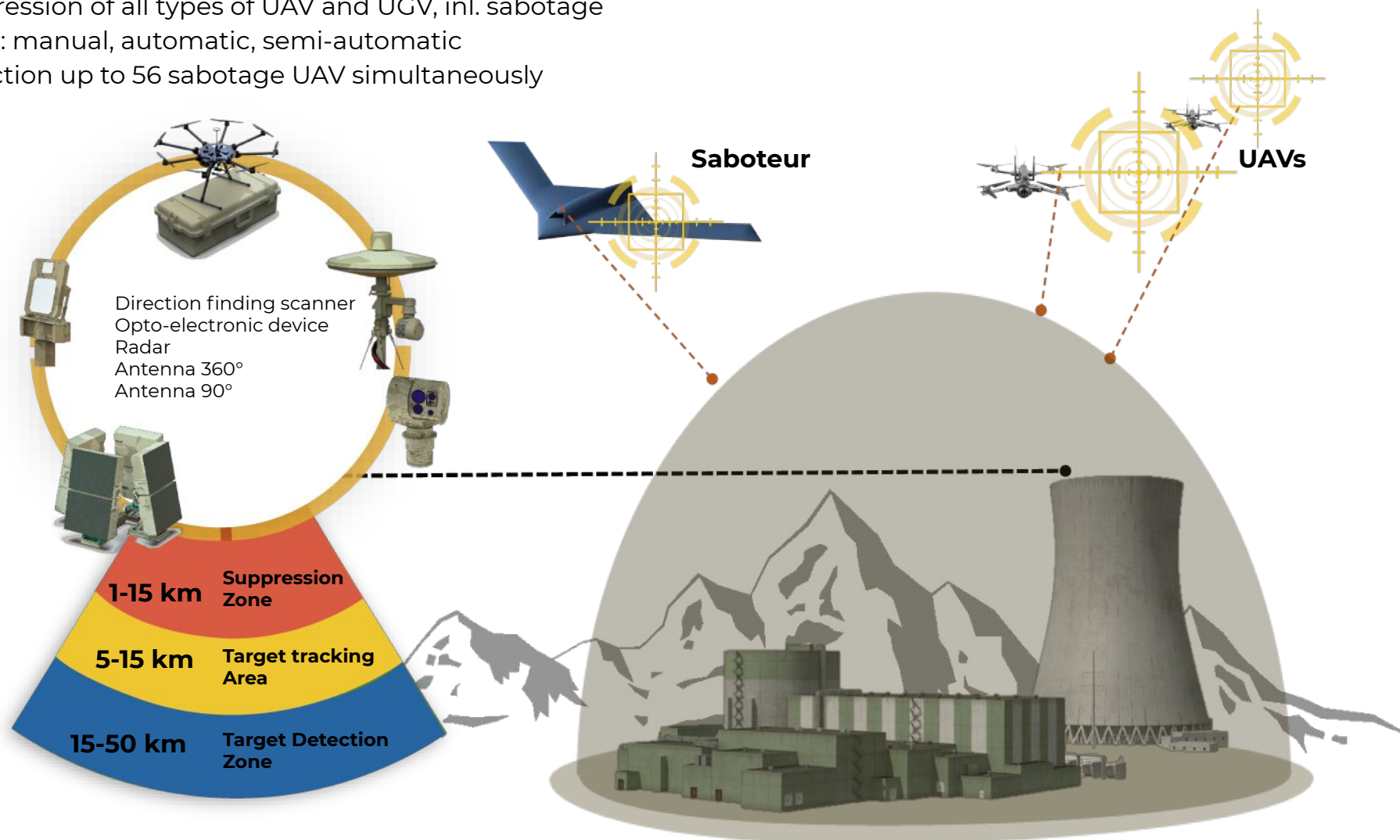




## STATIONARY SET

### DOME PROTECTION OF STATIONARY FACILITIES

- Round-the-clock tracking 360° and 24/7
- Suppression of any kind of communication
- Suppression of all types of UAV and UGV, incl. sabotage
- Mode: manual, automatic, semi-automatic
- Detection up to 56 sabotage UAV simultaneously



It is intended for protection of critical infrastructure objects: oil industry, airports, nuclear objects, military storages

## BORDER GUARD SET

It is intended for near-border areas in places of sluggish conflicts with a low probability of heavy artillery or missile strikes use

- Up to 56 targeted on frequency interferences simultaneously
- Adjustable output signal power – up to 3 kW
- Adjustable interference width from 1 KHz to 200 MHz
- Setting of necessary emission sector from 90° to 360°



## MILITARY SET

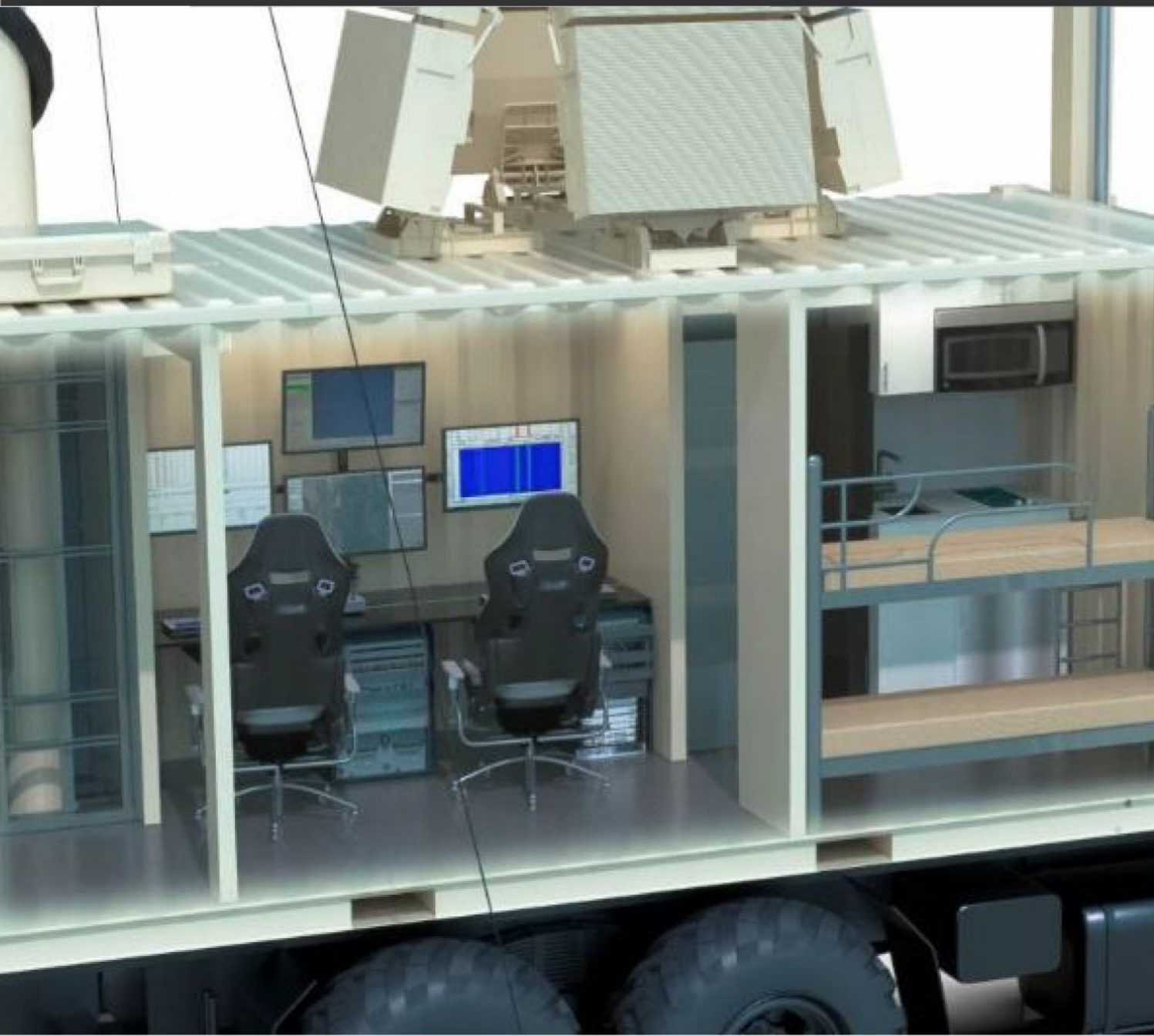
It is intended for protection of troops and equipment locations in areas of active hostilities with a high probability of heavy artillery or missile strikes use



- up to 56 targeted on frequency interferences simultaneously
- adjustable output signal power – up to 3 kW
- adjustable interference width from 1 KHz to 200 MHz
- setting of necessary emission sector from 90° to 360°



## INTERNAL DESIGN OF THE SYSTEM



### **FREQUENCY COVERAGE 300 MHz – 6000 MHz, IN 7 FREQUENCY RANGES:**

500 MHz	–	500 MHz
500 MHz	–	800 MHz
800 MHz	–	1300 MHz
1300 MHz	–	2000 MHz
2000 MHz	–	3000 MHz
3000 MHz	–	4200 MHz
4200 MHz	–	6000 MHz

# CLOUD-3

INTEGRATED RADIO-ELECTRONIC  
WARFARE SYSTEM



## MAIN ADVANTAGES

### ANTI-UAV VEHICLE

- Jammer, RF-Inhibitor
- Radio frequency monitoring unit 300 - 6000 MHz installed on mast (6 m) and tethered drone (up to 75 m)
- K<sub>u</sub> band Radar PROGRESS (Ukraine)
- Optical-electronic device PROGRESS (Ukraine)
- Armored truck
- Internal design
- Software

#### **Self-learning system:**

it allows to support and to process databases of radio electronic signals and counteract them in automatic mode

#### **Module structure:**

it allows to increase functionality and frequency ranges

#### **Tested in combat areas**



#### **Fully autonomous system with all the support subsystems:**

it allows to provide long missions

#### **Operational models:**

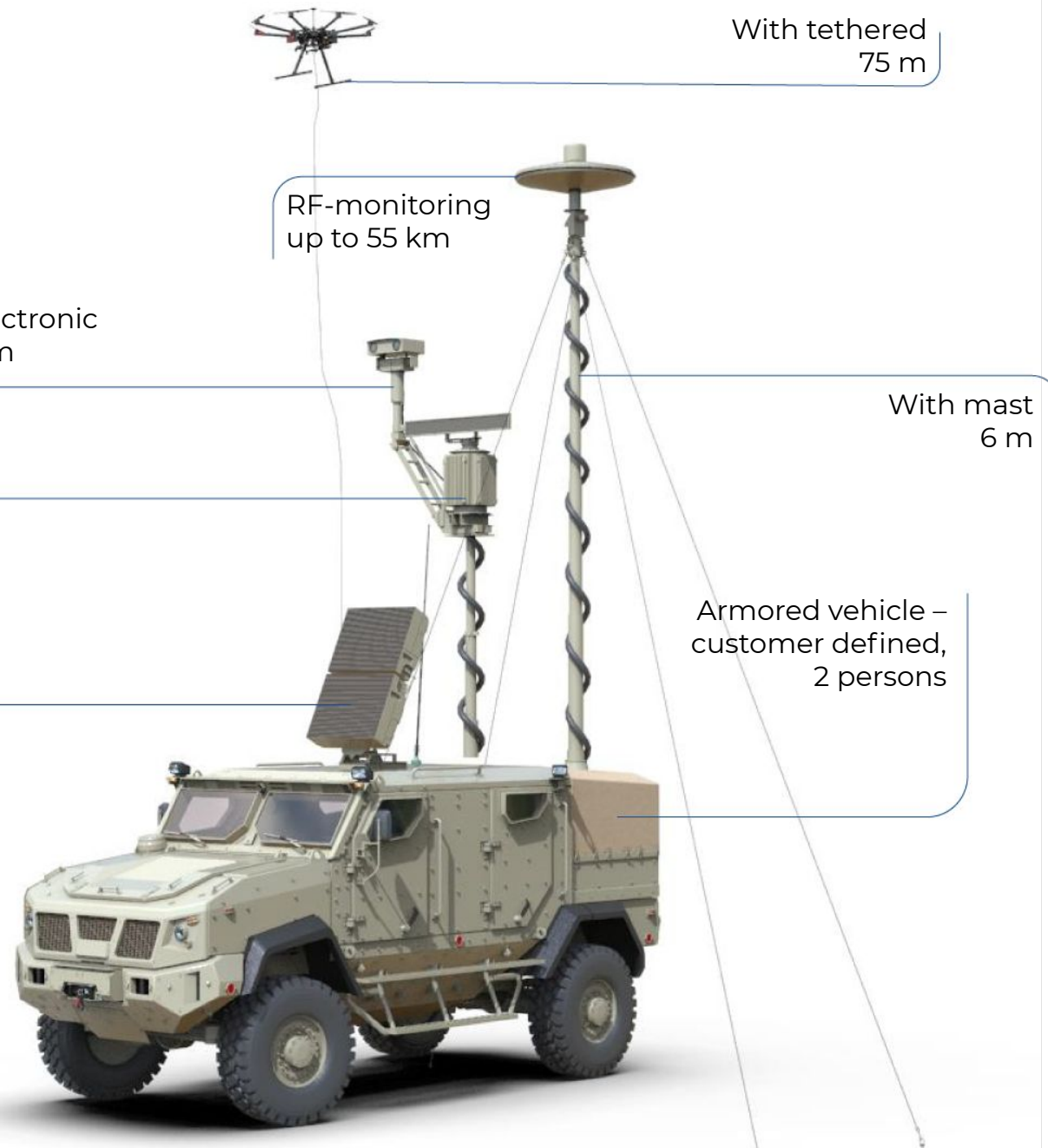
automatic, semi-automatic and manual

#### **Various sets allow to meet various customers requirements**



## CLOUD-3 ELECTRONIC WARFARE SYSTEM

### MAXIMUM ELEVATION OF RECEIVING ANTENNAS SYSTEM



## THE UAV CONTRACTION ALGORITHM

### DETECTION

#### **Integrated radar detection system**

It is effective for detection of big UAVs with inertial navigation system

#### **RF-monitoring and direction finding system**

It is effective for detection of small drones

### IDENTIFICATION

#### **High-resolution optical-electronic device**

"Friend-or-foe" target verification, target tracking

Automatic comparison of intercepted signal with master database (RF-monitoring)

### JAMMING

#### **Cloud-3**

Is effective jamming of air and ground targets which use any common frequency ranges

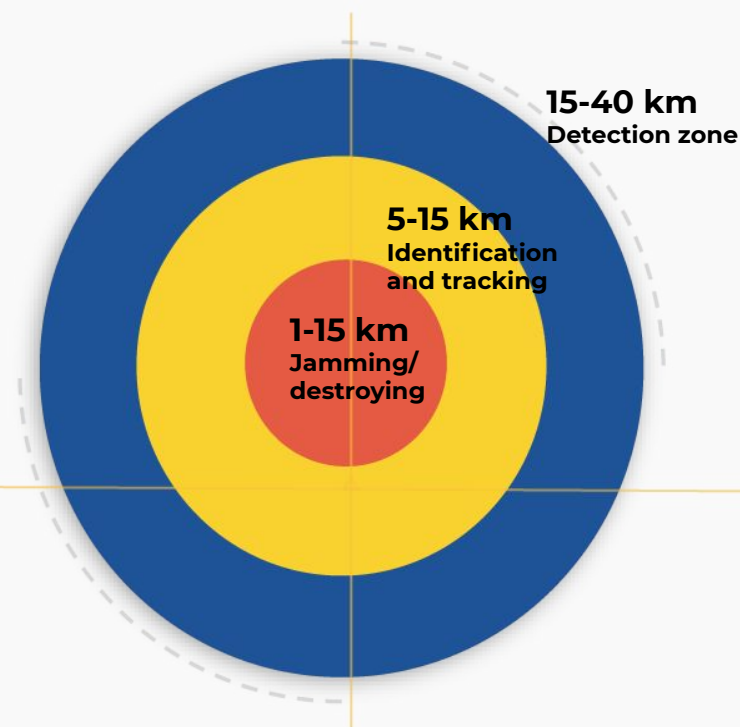
### TARGET TRACKING

Target destination to air defense system

### DESTROYING

It is effective for fully automated UAVs or targets, controlled via satellite communications

**DECISION MAKING ZONES FOR**  
effective UAVs counteraction



## MAIN CHARACTERISTICS

### DETECTION RANGE

Target with a radar cross section (10 m)	28 km
Target with a radar cross section (1 m)	18 km
Target with a radar cross section (0,1 m)	6 km

### TARGET DETECTION RANGE (BASED ON RF-MONITORING)

15–50 km

### ACCURACY OF TARGET AZIMUTHAL ANGLE MEASUREMENT

$\pm 2^\circ$

### MAXIMUM ELEVATION OF RECEIVING ANTENNAS SYSTEM:

With tethered UAV	75 m
With mast	12 m

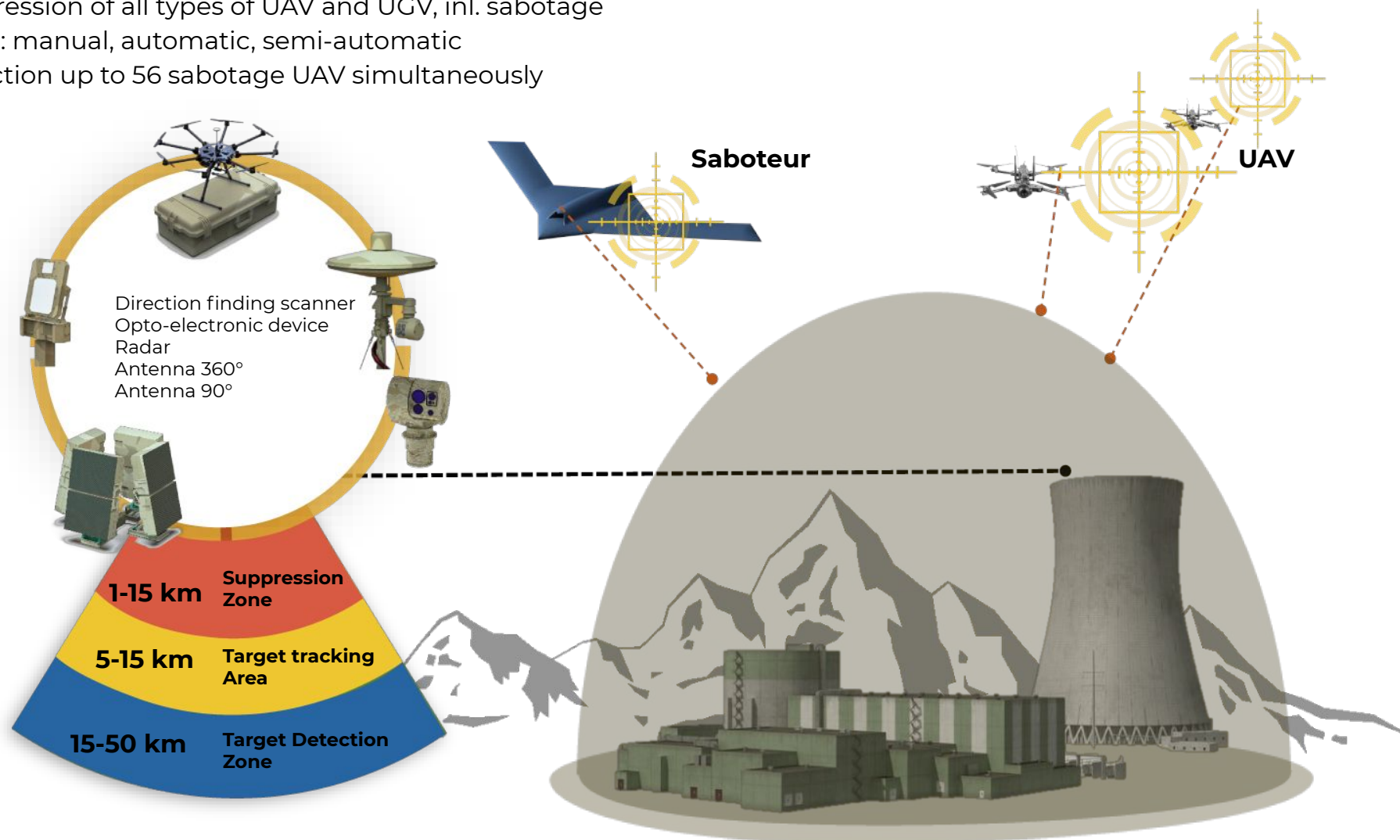




## STATIONARY SET

### DOME PROTECTION OF STATIONARY FACILITIES

- Round-the-clock tracking 360° and 24/7
- Suppression of any kind of communication
- Suppression of all types of UAV and UGV, incl. sabotage
- Mode: manual, automatic, semi-automatic
- Detection up to 56 sabotage UAV simultaneously



It is intended for protection of critical infrastructure objects: oil industry, airports, nuclear objects, military storages

## BORDER GUARD SET

It is intended for near-border areas in places of sluggish conflicts with a low probability of heavy artillery or missile strikes

- Up to 56 targeted interferences on frequency simultaneously
- Adjustable output signal power – up to 3 kW
- Adjustable interference width from 1 KHz to 200 MHz
- Setting of necessary emission sector from 90° to 360°



## NATIONAL GUARD SET

It is intended for support of special forces, military and police missions for prevention of terrorist threats, convoys protection, VIP-person protection

- jamming up to 20 fixed frequencies simultaneously
- adjustable interference width from 1 MHz to 100 MHz
- power of transmitted interference 200 W - 3000 W

Antennas radiation pattern:

- horizontal: 30°-50° (motor driven rotation  $\pm 180^\circ$ )
- vertical: 40° - 60°





## INTERNAL DESIGN OF THE SYSTEM



### **SUPPRESSED FREQUENCY RANGES:**

GPS L1; GPS L2  
GPS L5  
GLONASS L1  
GLONASS L2  
Galileo E1  
Galileo E6  
Galileo E5  
Galileo E5a; Galileo E5b  
Beidou  
GSM-900-downlink  
GSM-1800-downlink  
3G-downlink  
CDMA 450  
CDMA 800  
WI-FI 2,4  
WI-FI 5,5



EST. 1998

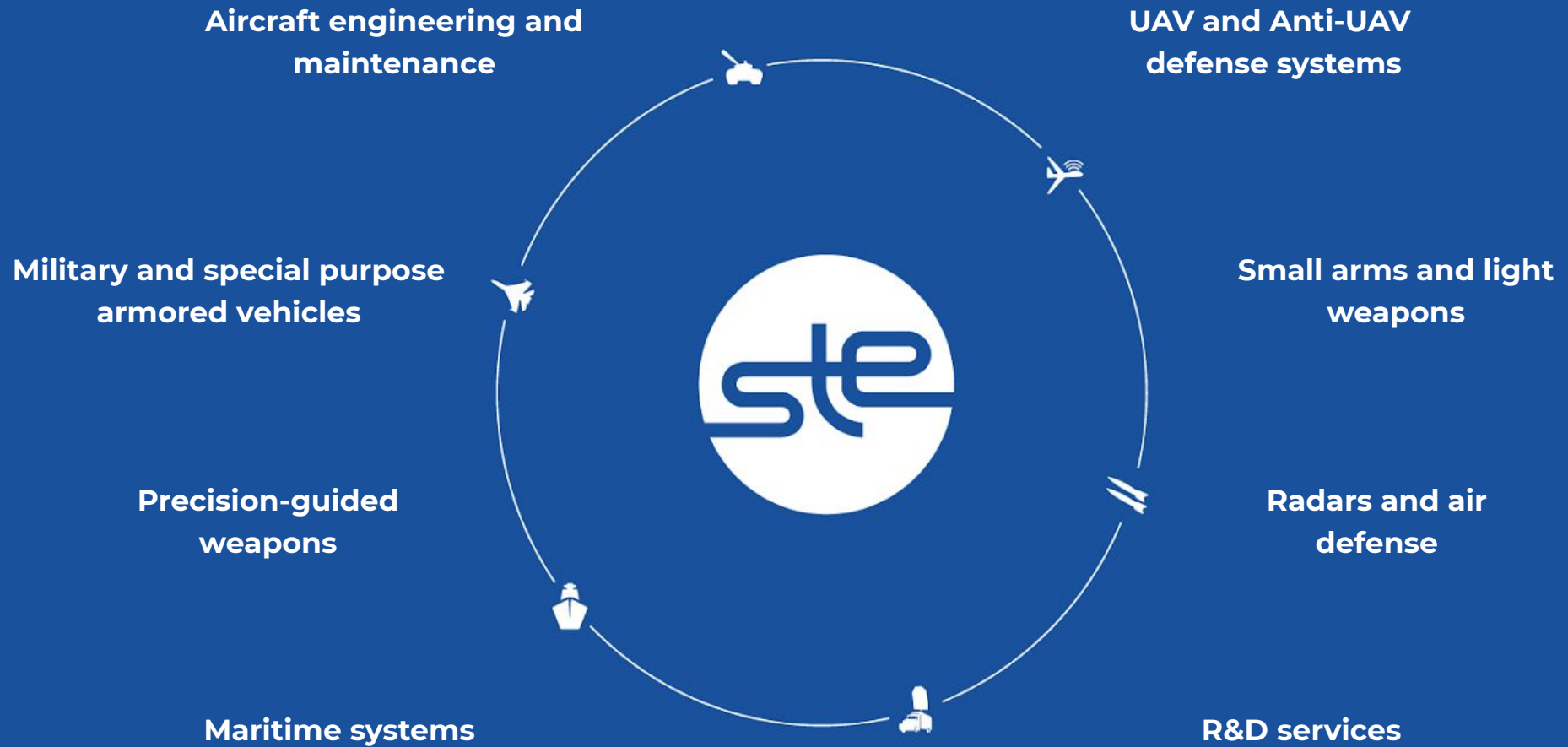
## SPETSTECHNOEXPORT

A major Ukrainian state-owned foreign trade enterprise, which specializes in export and import of military and dual-use products and services globally, as well as on promoting innovations, transfer of technology and military-technical cooperation

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20	30	170	30
years of experience	partner countries	state and private producers	research centers and design bureaus

# OUR EXPERTISE







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