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WARSHIPS & EQUIPMENT

NEW Time-Technology

CONTENT

SURFACE FLEET AND FLOATING DOCKS

RADARS, INTEGRATED FIRE CONTROL SYSTEMS & HYDROACOUSTIC WARFARE

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MARINE EQUIPMENT & SPECIAL SYSTEMS

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FRIGATE "HETMAN SAGAIDACHNYI"

Main particulars

Length, overall	123 m
Length on design WL	113 m
Beam overall	14,2 m
Draught on design WL	4,2 m
Depth to upper deck	9,56 m
Displacement, standart	3150 t
Full load	3750 t

Weapons

- 1-100 mm Medium Calibre Gun
- SAM OSA-MA2 (SA-N-4 mod.)
- 2, CIWS AK 630M (2x6-30 mm)
- 2x4 Torpedo Launcher ChTA-53
- 2, RBU-6000 ASW mortars
- Decoy Launchers

Propulsion/speed

COGAG	30+ kts
Range (speed)	3900 NM at 14 kts
Endurance	30 days

Command and control

- Data highway/Distributed processors
- Data Link System

Communication

Integrated external and internal communication system

Crew

190 persons

Helicopter facilities

- Fixed Hangar for Kamov type helicopter
- ASW weapon: torpedoes, depth bombs, sonobuoys

Sensors

- 3-D Long Range Surveillance radar
- 2, Navigation radars
- Fire Control radar & tracking system for SAM
- 2, Fire Control radars & EO tracking system for Gun&CIWS
- ESM/ECM
- Hull mounted Sonar & VDS
- IFF

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MULTI PURPOSE CORVETTE "MIRAGE"

Main particulars

Length, overall	76,55 m
Beam, overall	10,1 m
Draught on design WL	3,1 m
Depth to upper deck	8 m
Displacement, full load	1150 t

Weapons

- 1 - 76 mm Medium Caliber Gun
- 2x4 SSM MM40 EXOSET
- PDMS BARAK-1 (VLS for 16 SAM)
- CIWS 1x7 - 30 mm GOALKEEPER
- 2x2, Torpedo Launchers
- 2, 2x9 ASW-601 system
- 2, SRBOC Decoy/Chaff Launchers
- 2, 12,7 mm MGs

Propulsion/speed

COGAG	35+ kts
Range (speed)	3500 NM at 14 kts
Endurance	10 days

Command and control

- Data highway/Distributed processors
- CMS -C3I
- Data Link terminal (Link 11 or Link16)

Communication

Integrated external and internal communication system including SATCOM

Crew

59 persons (including 11 officers + 24 CPOs & POs)

Helicopter facilities

- Landing deck for Lynx or Dauphine type helicopter with ASIST
- ASW and ASUW weapon: missiles, torpedoes, depth bombs
- Sonobuoys, Helo crew spaces

Sensors

- MUSHKET multifunction radar system, including 3D surveillance radar
- Over-the-Horizon Targeting radar and EO surveillance & tracking system
- Fire Control for SAM and Gun
- ESM/ECM/EOM, Hull mounted Sonar & VDS
- Navigation radar, IFF

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CORVETTE "ALBATROS" PROJECT 1124M

Main particulars

Displacement, standard	1,030 t
Length, overall	71,1 m
Beam on design WL	10,3 m
Overall draft	3,54 m

Weapons

- 1 x 2 launchers of the "Osa-MA" antiaircraft missile systems
- 1 x 1 x 76 mm AK-176 automatic units
- 2 x 2 x 533 mm torpedo-tube
- 1x12 radar airborne device-6000

Propulsion/speed

Main power plant	2 diesels
Power	2x10000 h.p.
Full speed	32 kts
Range	2500 m

Crew

86 persons

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ANTI SUBMARINE VESSEL "SOCOL"

Product overview

- Unique technical level and tactical features
- High speed and exceptional mobility
- Fast location and neutralization of submarines
- Atack coordination of air and underwater means

Technical characteristics

Dimensions	
Length	50 m
Beam with crenolins	10 m
Full Displacement	500 t
Seaworthiness	
When moving on wings	up to 5
In displacement position	up to 7
Speed	
Maximum	60 kts
Cruising	50 kts
In displacement position	12 kts
Range	
When moving on wings with 50 knots speed	800 m
In displacement position	1200 m
Crew	35 persons
Main power plant (MPP)	
MPP consists of 3 gas-turbine units:	
- one middle cruising turbine	10 000 h.p.
- two board main turbines	20 000 h.p. each
Power electricity plant (PEP)	
PEP consists of 2 diesel-generators	200 kWt each

Armament

- 76 mm automatic gun mount
- 30 mm automatic gun mount
- 2x4 torpedo units
- Portable missile launcher
- Automatic firing control system 1 set
- Hydroacoustic detection station

Navigation system

- Log
- Echo-sonar device
- Magnetic compass
- Dead reckoning tracer
- Automatic radio direction-finder station
- Central gyroscopic system

Accommodation of crew

- One-man captain cabin
- Two double officers cabins
- One six-man midshipmen cabin and one double
- Two crew quarters

Control system

- Automatic combined system for control:
  - main power plant
  - power electricity plant
  - hull systems
  - stabilization of movement

Hull / superstructure material

- Body - Marine grade aluminum alloy
- Material of wings – special alloy

Communication

- Automatic communication system
- All-wave metrological receiver
- Navigational receiver CH - 3101 – for determination of position of vessel, speed, track angle and current time by radio signal CHC Glonas and GPS NAVSTAR

Main technical information of hydro acoustic station

- Detection range 40 - 45 km
- Max. working depth of dipping sonar - up to 200 m
- Not more than 200 m
- Crew 1 person
- Time for operational readiness 5 min

Naval systems

- Draining system
- Domestic water supply
- Deck drain system
- Ventilation
- Conditioning system
- Resistance heating system
- Steam heating
- Cold store system
- Compressed air system
- Degasation system
- Firefighting system

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MULTI PURPOSE FAST SMALL CORVETTE "MUSSON"

Main particulars

Length, overall	60,44 m
Beam, overall	11,8 m
Length on design WL	55 m
Draught on design WL	2,86 m
Displacement, normal	730 t

Weapons

- 1 - 76 mm Main Gun (stealth shield)
- 2x4 SSM URAN-E/EXOCET
- CIWS KASHTAN (2X6-30 mm+32 SAM)
- 2x3Torpedo Launchers B515 type
- 4, Decoy / Chaff Launchers

Propulsion/speed

CODAG/CODAD	up to 36 kts
Range (speed)	3000 NM at 14 kts
Endurance	14 days

Command and control

- C3I
- Data Link terminal

Communication & navigation

- Integrated external and internal communication system including SATCOM
- Navigation Radar

Crew

59 persons (9 officers + 12 CPOs)

Sensors

- 3-D Surveillance phased array radar
- Over-the-Horizon Targeting radar
- Fire Control Radar system & EO trackers for SAM (CIWS) and Main Gun
- ESM / ECM / EOM
- Sonar with hull mounted & VD antennas
- IFF

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OFFSHORE PATROL VESSEL "DOZOR"

Main particulars

Length, overall	73,7 m
Length, on design WL	67 m
Beam, overall	10,98 m
Draught, on design WL	2,7 m
Depth, on upper deck	7,7 m
Displacement, standard/full	890/960 t
Material of hull and superstructure	high-grade shipbuilding steel

Weapons

- 1x76-mm AK-176 Gun mounting
- 1-6x30-mm AK-630M Gun mounting

Propulsion/speed

2, MTU diesels	21 + kts
Range (speed)	3800 NM at 12 kts
Endurance	15 days

Supplementary equipment

Six-seater fast motor craft

Crew

- 56 (9 officers) - in double- and quadruple-berthed cabins with all conveniences

Communications

Integrated external and internal communication system

Sensors

- Fire Control radar / EO tracker
- IFF
- 2, Surface search and navigation radars

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FAST PATROL BOAT "LAN"

Main particulars

Length, overall	54,2 m
Beam, max	9,3 m
Draught, design	2,5 m
Displacement, full	440 t

Weapons and sensors

- 1, 76-mm Gun
- 1, 30-mm Gun
- Portable SAM
- 2, 12,7-14,5 mm MG
- Fast SAR boat

Propulsion/speed

3 diesels	up to 33 kts
Range (speed)	2800 NM at 14 kts
Endurance	20 days

Crew

- Single- and double berth cabins for officers
- Four berth cabins for CPOs
- Crew's quarters - for 43 persons

Sensors, navigation, communication

- Surface / Air Search Radar
- Navigation Radar
- External and Internal communication system
- Surveillance and targeting system

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FAST PATROL BOAT "BUTTERFLY"

Main particulars

Length overall	50 m
Beam overall	9,9 m
Moulded depth	5,5 m
Max. draught	1,8 m
Hull / superstructure material	marine grade aluminium alloy
Full Displacement	335 t
Crew	28
Main engines	2 x MTU kW
Gear box	2 x ZF

Propulsion/speed

Propulsion	2x MJP 850
Speed	24 kts
Range(speed)	1500 NM at 15 kts
Fuel oil	80 m^3
Fresh water	36 m^3

Communication

- Intercom
- Simplex/ semidupleVHF radiotelephone
- MF/HF SSB radio telephone
- Handy maritime VHF

Navigation

- Radar
- Magnetic compass
- Gyrocompass with repeater
- Echo sounder
- Log
- Navigation lights
- Search light

Armament

Two artillery combat modules, each comprising:
- 1x30 mm,1x7,62 mm
- 1x30 mm automatic grenade launcher Arc-17
- 1x nTPK "Kornet"; 2x12,7mm

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OFFSHORE PATROL CATAMARAN "BORA"

Main particulars

Length, overall	35,2 m
Length on design WL	32,3 m
Beam, overall	9,4 m
Draught full	1,65 m
Displacement, full load	130 t
Material of hull	light alloy
Material of superstructure	light alloy

Weapons

- 1-30 mm combat module "Shkval"
- 2; 12,7 mm MGs
- Portable SAM launcher
- UAV

Propulsion/speed

Diesels (2x2100 kW, MTU)	37 kts
Range(speed)	1000 NM at1 4kts
Endurance	10 days

Crew

20 (6 officers)

Communications

Integrated external and internal communication system

Sensors

- Navigation radar
- IFF

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FAST PATROL BOAT "KALMAR"

Product overview

- Protection roles, including anti-smuggling, anti-piracy, fisheries patrols
- Immigration law enforcement, rescue operations

Main particulars

Length / Width / Height	21,5 / 4,8 / 2,25 m
Displacement	40,1 t
Fuel	4 t
Main engine:	
- caterpillar	2 units
- capacity	2x1100 Hp

Propulsion/speed

Maximum speed	32 kts
Economy speed	21 kts
Range	740 km

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FAST PATROL BOAT "GYURZA"

Main particulars

Length, overall	20,34 m
Beam on design WL	4,86 m
Draught on design WL	0,86 m
Displacement, standard	36,4 t

Weapons

- 1- 30-mm double-belt automatic Gun
- 1, ATGM Launchers
- 1-7,62 mm MG - all in AIFV BMP-2 Fighting Compartment
- 1 -14,5-mm Heavy MG
- 1 - 7,62-mm MG - all in BTR-70/80 turret

Propulsion/speed

2, Caterpillar C18 diesels	(2x746 kWt) 28 kts
Range (speed)	450 NM at 11 kts
Endurance	5 days

Crew

- Cabin and crew quarter - 6 beds
- Vital spaces (engine room, wheel house, ammunition stores) are made of special bullet-proof steel

Sensors and communication

- Navigation radar
- External and internal communication equipment

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FAST PATROL CRAFT "GRIF-T"

Main particulars

Length overall	24,4 m
Beam overall	5,2 m
Moulded depth	2,85 m
Max. draught	1,57 m
Hull / superstructure material	Marine grade aluminium alloy
Full Displacement	39 t
Crew	9

Propulsion/speed

Maine engines	2 x MTU 12V2000M90, 2 x 1,000, 2,300 rpm, kW
Gear box	2 x ZF 1900V
Propulsion	2 x propellers
Speed	39-40 kts
Range (15 kn)	500 nm
Fuel oil	5,000 t
Fresh water	0,8 t
Gen Set	2 x Onan/ 2 x 30kW, 50 Hz, 230 V

Navigation

- Radar
- GPS
- Magnetic compass
- Gyrocompass with repeater
- Echo sounder
- Log
- Navigation lights

Communication

- Intercom, Simplex/ semiduplex VHF radio telephone
- MF/HF SSB radio telephone
- Handy maritime VHF

Armament

- 1 x 20 mm naval gun
- 1(2) x 12,7mm MG

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PATROL CRAFT "GRIF" PROJECT 1400M

Main particulars

Length overall	23,8 m
Beam overall	5 m
Moulded depth	2,5 m
Max. draught	1,1
Hull / superstructure material	Marine grade aluminium alloy
Full Displacement	39 t
Crew	9

Propulsion/speed

Maine engines	2 x MTU /CAT; 2 x 1,000@ 2,300 rpm, kW
Gear box	2 x ZF
Propulsion	2 x propellers
Speed	30 kts
Range (15 kn)	450 nm
Fuel oil	3,700 t
Fresh water	1,02 t
Gen Set	2 25kW, 50 Hz, 230 V

Navigation

- Radar
- Magnetic compass
- Gyrocompass with repeater
- Echo sounder
- Log
- Navigation lights
- Search light

Communication

- Intercom, Simplex/ semiduplex VHF radio telephone
- MF/HF SSB radio telephone
- Handy maritime VHF

Armament

- 2 x 12,7 mm

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FAST PATROL BOAT "KALKAN-M"

Main particulars

Length overall	13,8 m
Beam overall	3,78 m
Depth midships	1,91 m
Midship draught	0,86
Hull / superstructure material	Marine grade aluminium alloy
Full Displacement	13,3 t
Crew	2
Passengers	6 -10

Propulsion/speed

Maine engines	2 x 331kW Volvo Penta TAMD 74C EDC, kW
Propulsion	2 x Water-jet "KaMeWa" K-28
Speed	35 kts
Range	270 nm
Fresh water	0,12 t
Gen Set	6,4kW, 50 Hz, 220 V

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FAST PATROL BOAT "SAYGAK"

Main particulars

Length, overall	36,3 m
Beam, max	8 m
Draught on design WL	1,5 m
Displacement (full)	145 t

Weapons

- Fighting Module "SHKVAL" including:
  - 2 ATGM Launcher
  - 30-mm Double belts automatic Gun
  - 30-mm automatic Granade Launcher
  - 7,62-mm MG
- Two MG (12,7-mm)

Crew

- One or Double berth cabins for officers, four berth cabins for
- CPOs (POs), crew cabins -total 19 beds

Sensors, navigation, communications

- Surface search radar
- Navigation Radar
- External and Internal communication system
- Surveillance and targeting system (optronic)

Propulsion/speed

3 diesel engines	up to 40 kts
Range (speed)	1400 NM at 14 kts
Endurance	7 days

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MULTIPURPOSE CRAFT "KAFA 1350"

Main particulars

Length overall	13,8 m
Beam overall	3,78 m
Depth midships	1,91 m
Midship draught	0,86
Hull / superstructure material	Marine grade aluminium alloy
Full Displacement	13,3 t
Crew	2
Passengers	6 -10

Propulsion/speed

Main engine	2 x 331kW Volvo Penta TAMD 74C EDC
Propulsion	2 x Water-jet "KaMeWa" K-28
Speed	35 kts
Range	270 nm
Fresh water	0.12 t
Gen Set	6,4kW, 50 Hz, 220 V

Navigation

- Radar
- GPS
- Magnetic compass
- Echo sounder
- Log
- Navigation lights

Communication

- Intercom, Simplex/ semiduplex VHF radio telephone
- MF/HF SSB radio telephone
- Handy maritime VHF

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PATROL BOAT “KASATKA-12”

Main particulars

Length, overall	14 m
Beam	4,7 m
Draught	0,8 m
Displacement	19 t

Weapons

- 2-12,7 mm HGs

Propulsion/speed

Speed	30+ kts
Range(speed)	200 NM at 20 kts

Accommodation

Crew: 4 persons
Endurance: 3 days

Communications

- Integrated external and internal communication system

Communications & navigation

- Navigation Radar
- FLIR

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MOTOR-BOAT “KONAN 750”

Product overview

- Securing of coastal waters
- Hull material - GRP
- Aluminium bullet-proof protection

- Full armoured protection of all crew
- Deck-house is made from bullet-proof glass and has ceramic or aluminium bulletproof plating

Main particulars

Length (with engine)	8 m
Breadth	2,7 m
Draft	0,6 m
Outboard engine capacity	1x315 h.p.
Maximum speed	40-43 kts
Passenger capacity	6 persons
Boat weight	2400 kg
Cargo capacity	1200 kg
Endurance at maximum speed	130 m
Endurance at economic speed	250 m

Weapons

- 12,7mm machine gun

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RIGID INFLATABLE BOAT RIB-SERIES

Product overview

- Glass-fibre-reinforced plastic hull
- High carrying capacity
- Excellent navigability

Technical characteristics

Name	RIB-300	RIB-400	RIB-500	RIB-570
Length, m	3,2	3,9	4,9	5,6
Width, m	1,5	1,75	2,3	2,3
Balloon diameter, m	0,4	0,45	0,5	0,5
Carrying capacity, kg	400	750	900	1100
Passenger capacity, person	2	5	6	8
Engine capacity, hp, max	15	40	90	115
Weight, kg	70	100	290	450
HWD, m	3,2-1,5	4-1,75	5-2,3	5,7-2,3

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Rigid inflatable boat 7,4 m

Length / Width / Height	7,4 / 2,8 / 2,7 m
Length (hull)	6,5 m
Width (hull)	2,25 m
The inflatable bulb diameter	0,55 m
The inflatable bulb sections quantity	6 pcs
Weight (without engines)	1050 kg
Carrying capacity	1100 kg
Passenger capacity	10 persons
Fuel tank	220 litres
Engine type	stationary / outboard
Power (min.)	150 h.p.
Power (max.)	280 h.p.
Max.engine weight	400 kg

Rigid inflatable boat 8,2 m

Length / Width / Height	8,2 / 3,1 / 2,7 m
Length (hull)	8 m
Width (hull)	2,5 m
The inflatable bulb diameter	0,6 m
The inflatable bulb sections quantity	6 pieces
Weight (without engines)	2000 kg
Carrying capacity	1200 kg
Passenger capacity	12 persons
Fuel tank	400 litres
Engine type	stationary / outboard
Power (min.)	250 h.p.
Power (max.)	350 h.p.
Max.engine weight	450 kg

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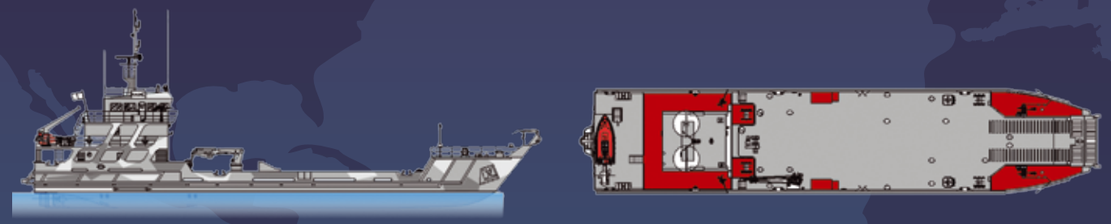
LANDING CRAFT/MILITARY TRANSPORT "BOBR-53"



Main particulars

Length, overall	53 m
Molded beam	10 m
Draught, max	1,9 m
Displacement, full load	700 t

Weapons

- Two MG- 12,7 mm

Propulsion/speed

Three DG-sets	3x150 kW
Two marine diesels (CAT)	2x450 kW
Range (speed)	1800 NM at 10 kts
Endurance	8 days

Accommodation

Crew : 14 persons
Rescue Rafts (2x20)
Service boat: 6 persons

Military lift and cargo capacity

- Deadweight - 3501 (3 MBT T-84 type or 6 APC BTR-60/70 or 13 20-feets containers)
- Living spaces for 42 marines
- Cargoes: fuel - 140 m^3, fresh water - 60 m^3 holds - up to 60 m^3

Sensors and communication

- Two navigation Radars with ARPA
- FLIR system
- Communication and navigation equipment according to
- SOLAS requirements

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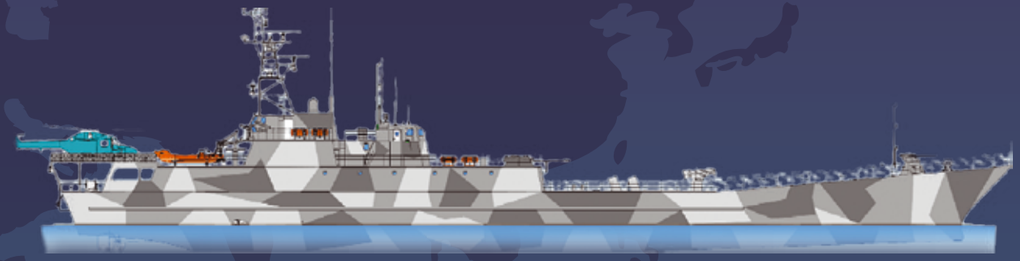
SUPPORT VESSEL "TRITON"



Main particulars

Length, overall	87,9 m
Width, overall	10 m
Draught, max	2,55 m
Displacement, full	1390 t

Weapons

- One 122-mm gun
- Two MBLS, BM-21 type
- One 30-mm gun
- Two SAM, Gibka type

Propulsion/speed

2 marine diesels	2x2100 kW
Range (speed)	3500 NM at 12 kts
Endurance	15 days

Crew

38 (+8 spare) persons

Special equipment

Landing Deck for 7 t helicopter

Communication and navigation

- Two Radars (x,s)
- FLIR
- 2, High speed RHIB (10-12)

Military lift and cargo capacity

- Landing cargo capacity - 300 t (5 MBT T-72 type)
- Living space for marines - 36 persons + 70 removable bunks
- Landing deck for medium class (7 t) helicopter

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SEARCH & RESCUE SHIP "ARGO-2000"

Main particulars

Length, overall	83,2 m
Beam, max	12,95 m
Draught (with propellers)	4 m
Displacement, full	2000 t

Weapons

- 30-40-mm Gun (at the choice of the Customer)
- 2; 12,7 mm MGs
- Portable SAM

Accommodation

Crew - 58 persons
Single-, double-, fourth- berth cabins, total - 73 places

Propulsion/speed

Two marine diesels (WARTSILA)	2x3900 kW
Range (speed)	4500 NM at 14 kts
Endurance	30 days

Communication & navigation

- Optronic (day/night) Sight
- Internal and External Communication
- Navigation equipment
- Integrated Bridge
- Helicopter Landing Deck for 12 t helicopter (Ka-31/Mi-17 type)
- Radar, Navigation Radar (with ARPA)

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AIR-CUSHION ASSAULT-SHIP "ZUBR"

Product overview

Designed for loading naval landing troops and equipment, personnel from equipped or non equipped shore, their transportation by sea, landing on non equipped coast and fire support

Main particulars

Length	57,3 m
Width	25,6 m
Height, on air cushion	21,9 m
Full displacement, not over	554 t

Weapons

- 2 x 140,3 mm MS-227 batch type launchers
- Two AK-630M gun mounts, fire control system
- MR-123-01 detection and targeting station
- MS-227 - 66 shells
- AK-630M 3,000 cartridges

Propulsion/speed

Full speed with 131 tons cargo on still water	60 kts
Cruising range:	
- with 131 tons cargo on still water	300 miles
- without cargo (haul)	1,000 miles
Floodability	two-partition
Passability	possible to move on land, overcome obstacles with up to 5 deg inclination (like revetment) of up to 1,6 m height
Self-sufficiency by fuel reserve, days	5
Power plant	two delivery and three traction gas turbine engines of 7,360 kW each
Power unit	four GTG-100K gas turbogenerators of 100kW, 220 V, 400 Hz each 50 Hz, 220 V and 60 Hz, 115 V, 27 V converters

Crew

Crew	27
Paratroopers (with no cargo)	500

Navigation

- **Navigation system**
  - radar with up to 50 objects lock-on at distances from 0.2 to 30 miles
- **Navigation equipment**
  - gyro course indicator, magnetic compass, drift log, radio direction finder, gyrostabilization system, satellite navigation system, navigation receiver

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SMALL HOVERCRAFT

Product overview

Landing hovercraft is designed to execute landing tasks at low depth sea and river areas at the range up to 50 miles. Low pressure air cushion allows to hover over the water / land surface practically without making any pressure to the surface

Main advantages:

- Possibility to pass mine fields and land the troops
- Composite materials of hull allow to pass mine fields with magnetic fuse type
- Special low noise motion system allows to pass mine fields with acoustic fuse type
- Operation at temperature range from -20°C up to +55°C

Technical characteristics

Length/ Width / Height (including air cushion)	8,10/4,56/2,75 m
Height of air cushion	1,91 m
Length / Width of hull	7,0 / 3,2 m
Light displacement	1796 kg
Submerged displacement	3000 kg
Payload	
crew, passengers, cargo	910 kg
fuel	240 kg
Range	650 km
Maximum speed on water	75 km/h
Cruising speed on water	45 km/h
Clearance	0,5 m
Main engine	
diesel STEYR Marine Engine MO114K33	2 units
Capacity	2x110 Hp

Propulsion and steering system	
Diameter	1,3 m
Number of blades / flaps	4 Pcs
Number of propellers	2 Pcs
Number of vertical steering / rudders on 1 propeller	3 Pcs
Reverse	+
Lifting complex	
Propeller type	Axel
Quantity	4 Pcs
Rotor diameter	0,5 m
Number of flaps / blades	12 Pcs
Air cushion parameters	
Area of air cushion	24 m^2
Air cushion pressure	1225 Pa
Pressure drop coefficient / rate	1,15

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FLOATING DOCKS

Product features

- Unique reinforced concrete pontoon resistant to corrosion
- Increased lifetime, minimum 50 years before any repair required
- Low operational and maintenance costs
- Resistant to earthquake and wave effect
- Longitudinal and lateral joining of pontoons

Floating Dock 400 T Lifting Capacity

Specification

Dimensions	
Length (with crinolines)	36,7 m
Length of pontoon	29,7 m
Height of pontoon	1,7 m
Height from BP to Top Deck	7,4 m
Breadth between outer sides	16 m
Breadth between the sidewalls	12 m
Operation depth of pontoon deck	6,1 m

Systems and equipment

- Shore power supply system, AC, U=380V, frequency 50 Hz
- Hallast electric pumps, Q=200 m^3/h, H=0.2 MPa, (20 m of water column)
- Fire-fighting electric pump Q=25 m^3/h, P=0,65 MPa (6.5 kgf/cm^2), shore water supply
- Capstans 2, traction force 1,5 t

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Floating Dock 4 500 T Lifting Capacity

Dimensions	
Length with overall (together with the crinolines)	118 m
Length of pontoon	102 m
Height of pontoon	4,8 m
Height from BP to Top Deck	12,5 m
Breadth between outer sidesm	20,9 m
Breadth between the entry fenders	19,8 m
Operation depth of pontoon deck	7,5 m

Systems and equipment

- Emergency diesel-generator, N=100 kW
- High-voltage transformers
- Electric pumps, Q=2340...1650 m^3/h, H=0,04...0,18 MPa (4... 18 m of water column)
- Fire service electric pump Q=160 m^3/h, P=1,0 MPa (10 kg/cm^2)
- Fire service electric pump Q= 72 m^3/h, P=1,0 MPa (10 kg/cm^2)
- Capstans LLI6, traction force 80 kN (8 t)

Floating Dock 8 500 T Lifting Capacity

Dimensions	
Length with overall (together with the crinolines)	155 m
Length of pontoon	139,5 m
Height of pontoon	4,8 m
Height from BP to Top Deck	12,8 m
Breadth between outer sides	32,4 m
Breadth between the entry fenders	24,5 m
Operation depth of pontoon deck	7,0 m

Systems and equipment

- Emergency diesel-generator, N=100 kW
- High-voltage transformers
- Electric pumps, Q=2340...1650 m^3/h, H=0,04...0,18 MPa 4... 18 m of water column)
- Fire service electric pump Q=160 m^3/h, P=1,0 MPa (10 kg/cm^2)
- Fire service electric pump Q= 72 m^3/h, P=1,0 MPa (10 kg/cm^2)
- Capstans LLI6, traction force 80 kN (8 t)

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Floating Dock 16 500 T Lifting Capacity

Dimensions	
Length with overall (together with the crinolines)	164 m
Length of pontoon	144 m
Height of pontoon	7 m
Height from BP to Top Deck	20 m
Breadth between outer sides	44 m
Breadth between the entry fenders	35,8 m
Operation depth of pontoon deck	9,5 m

Systems and equipment

- High-voltage transformers, U/U1=6,3/0,4kV, N=1000 kW
- Auxiliary diesel generator, N=50 kW
- Ballast electric pumps, Q=2340...1650 m^3/h, H=0,04...0,18 MPa (4... 18 m of water column)
- Fire fighting electric pumps Q=160 m^3/h, P=1,0 MPa (10 kgf/cm^2)
- Fire fighting electric pump Q= 40 m^3/h, P=0,65 MPa (6,5 kgf/cm^2)
- Dock portal cranes with lifting capacity 5..3,2 t at outreach of 15...23 m (optional)
- Capstans 6, traction force 80 kN (8 t)

Floating Dock 25 500 T Lifting Capacity

Dimensions	
Length with overall (together with the crinolines)	207 m
Length of pontoon	177,5 m
Height of pontoon	7,05 m
Height from BP to Top Deck	18,7 m
Breadth between outer sides	50 m
Breadth between the entry fenders	38,8 m
Operation depth of pontoon deck	10 m

Systems and equipment

- High-voltage transformer, U/U1=6,3/0,4 kV, N=1000 kW
- Diesel generators, N=1000 kW
- Auxiliary diesel generator, N=50 kW
- Ballast electric pumps, Q=2340...1650 m^3/h, H=0,04...0,18 MPa (4... 18 m of water column)
- Firefighting electric pumps Q=160 m3/h, P=1,0 MPa (10 kgf/cm^2)
- Electric pump Q= 40 m3/h, P=0,65 MPa (6,5 kgf/cm^2)
- Dock portal cranes with lifting capacity 10...20 t (optional)
- Capstans 6, traction force 80 kN (8 t)

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MULTIFUNCTIONAL RADAR COMPLEX "MINERAL-ME"

Complex destination

The multipurpose radar target designation complex "Mineral-ME" provides long-range over-the-horizon detection of the surface targets, reception and processing surface situation data received from tactical group vessels, equipped with "Mineral" type complexes (systems), and also from aircraft and helicopters that transmit data using regular means of radio communication, develops and presents information on target coordinates to missile weapon of a vessel and tactical group vessels, provides guidance for joint combat actions.

The complex represents multipurpose information-command-and-control system that operates using heterogeneous data detectors (active, passive, remote air and ship observation posts) within the limits of a unified information field and constitutes an independent mean of over-the-horizon target detection and designation

Complex composition

The multipurpose radar target detection complex "Mineral-ME" consists of:

- active radar for surface targets detection and target designation (АРЛС)
- passive radar for surface targets detection and target designation (ПРЛС)
- station of mutual information exchange, mutual vectoring (orientation) and joint surface targets data processing (station ВЗОИ-ВЗОР)

Integration of various means of target information acquisition stations in a single complex and solving a problem of joint information processing allows to increase operation efficiency of both radio-electronic armament and deployed objects altogether

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Integration of various means of target information acquisition stations in a single complex and solving a problem of joint information processing allows to increase operation efficiency of both radio-electronic armament and deployed objects altogether

Technical characteristics

Radar		Active	Passive	MEI-MOR
Frequency band		I	I, G, E/F, D	I
Scanning zone	Through azimuth	360°	360°	360°
	Through range	Up to 250 km	Up to 450 km	Up to 30km
Number of targets tracked	Detection mode	–	Up to 50 targ	–
	Target detection mode	–	Up to 10 targ	–
Number of targets processed		–	–	Up to 200 targ
Number of interacting ships		–	–	Up to 9 ships

Battle tasks

- Detection and coordinates setting of surface targets in active and passive modes of detection for possible use of weapons
- Automated acquisition, processing and an information display from PRS (passive radar), ARS (active radar), vessel remote sources of information acquisition equipped with "Mineral-ME" complexes (systems), and information received via regular radio communication means from air remote observation posts (АВНП)
- Classification of the targets
- Mutual vectoring (orientation) of vessels combined into a tactical group
- Automated information exchange between a flagship (FS) and the group vessels (GV)
- Command and control of joint combat actions (C2JCA) of the vessels

ARS (active radar) ensures

- Detection and tracking of surface targets , their coordinates setting and elemental motions
- Recognition of the state affiliation of tracked targets by means of staff radar identification equipment
- Elaboration and delivery of information on a target designation using information gained via staff radio communication equipment from air remote observation posts
- Classification of detected targets
- Bearing of the jamming vessel
- Elaboration and delivery of information on a target designation to the automated command and control system (AC2Sys)

Besides, ARS (active radar) has special operation mode that makes it able to track surface targets using data of the staff vessel radar

MEI-MOR station ensures

- The individual identification, mutual information exchange and mutual vectoring (orientation) between the tactical group vessels, equipped with "Mineral-ME" type complexes (systems)
- Adaptive information exchange between the tactical group vessels depending on the number of interacting vessels and volume of current information
- Generation on a flagship of a unified information field about surface situation
- Information exchange organization in order to accomplish tasks related to coordinates setting of the radiating surface targets by several vessels
- Accumulation and joint information processing on surface targets by means of a single vessel and by means of the tactical group
- Forming and delivery of details on the tracked targets to the combat information-command-and-control system (ICCS) and information on operation modes and technical state of separate stations of "Mineral-ME" complex
- Solving calculation tasks
- Elaboration and delivery of information on a target designation to the automated command and control system (AC2Sys)

PRS (passive radar) ensures

- Reception, detection, bearing and parameters measurement of impulse signals of radiating radars within the frequency bands I, G, E/F, D
- Classification of received signals on the basis of an aprioristic (transcendental) databank (filled in by a customer)
- Coordinates setting (bearing and range) of radiating radars by means of one maneuvering vessel or a group of two-three vessels interacting through the MEI-MOR station
- Elaboration and delivery of information on a target designation to the automated command and control system (AC2Sys)

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MOBILE COHERENT-PULSE SURVEILLANCE RADAR "DELTA"

Product overview

DELTA is modern mobile two-dimensional pulse coherent solid-state radar for surface and air surveillance with low probability interception of its electromagnetic radiation.

It delivers in a fully automatic way the current coordinates of any target located within its area of detection.

This mobile radar could be installed on transport vehicles (automobiles, armored personnel carriers, infantry combat vehicles etc.) which allows arrange its operation in uplands in order to assure necessary viewing conditions.

DELTA analyzes the space in azimuth by the continuous rotation of its aerial system, which is mechanically driven

Main purpose

- Observation of air and ground situation in the zone of location of particularly important objects
- Monitoring of economic and customs zones with the aim to prevent smuggling and terrorist actions

Radar provides

- Automatic detection and tracking of airplanes, helicopters, deltaplanes, ground and surface targets at any time of day and year, at rain, fog, dust, and sandstorms
- Recording of selected paths of targets and transmission of data on them to police, border, customs, and security agencies as well as generation of an alarm signal

Main features

- Solid-state transceiver
- Digital generation of complex-modulated sounding signals
- Digital processing of signals and information on paths
- High efficiency of detection of moving targets on the background of intensive passive interferences
- Application of nonparametric algorithms of automatic detection, making it possible to get rid of false target blips regardless of the existing interference situation
- Automatic measurement of coordinates and generation of routes of moving targets
- Visual display of radar-derived situation on a liquid-crystal screen
- Automated control of operating modes from a portable computer
- Documenting of operation results

Radar technical features

- Low peak power radiated
- Peak power stepped control
- Coherent pulse train radiated
- Coherent echo signal integration
- Solid-state transmitter
- Serviceability monitoring - fully automatic
- Sounding signal forming - digital on IF
- Sounding signals - pulses with linea frequency modulation
- Mulfunction detection - semi automatic up to plug-in units

Radar charachteristics

Frequency	I band
Bandwidth	150 Mhz
Coverage	up to 96 km - in range; 360° - in azimuth
Resolution:	50...60 m - in range; 1,0...1,5°- in azimuth
Maximum detection range:	
- small air target	8...20 km
- small surface target	up to horizon
Accuracy:	20...40 m - in range; 4…6 mrad - in azimuth
Tracking target number:	up to 50
Noise figure	3 dB
Peak Power	from 8 W up to 80 W
Pulse width	64; 32; 16; 4 sec
Signal bandwidth	about 5 MHz
PRF	about 1,4 2,5 3,8 6,7 kHz
Antenna gain	32 dB
Antenna beamwidth:	0,8...1,2°-in azimuth; about 10° - in elevation
Polarization	horizontal
Rotating rate	20; 10; 5 rpm
Signal processing	digital with PLM
Extracting	automatic digital with CFAR
Data processing	digital with PLM
Serviceabilitty monitoring	fully automatic in work process
Mulfunction detection	semi automatic up to plug-in units
Data registration	up to 50 trajectories
Interface	RS-422; Ethernet; CAN 2.0
Readiness time	up to 2 minutes
Power consumption	up to 500 W (50 Hz, 220 V)
Equipment mass	up to 300 kg

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MULTI-BEAM ACTIVE PHASED ARRAY RADAR "MAARS"

Product overview

MAARS is multimode C-band acquisition radar for surveillance and weapon assignment.

System performs automatic detection, track initiation and tracking of surface and air targets.

Due to its modular design it can easily be adapted to a customer's range, resolution and accuracy requirements using existing components.

Due to flexible communication interfaces to the combat system or when netted to other sensors, MAARS is suitable for integration with a track management system.

The system has multi-beam scanning strategies to satisfy the special requirements of stand-alone radars for corvettes, patrol vessels, minesweepers, minehunters or as the self defense radar on frigates.

Specific radar applications are sea skimmer detection with target assignment for close-in weapon systems

Main features

- 4D air surveillance
- Digital beamforming of 12 simultaneous receiving beams with electronic stabilization
- Automatic and simultaneous detection and tracking (track-while scan) of:
  - air and surface targets; - fast supersonic missiles; - sea skimmers, even in heavy sea clutter; - pop-up targets (e.g. helicopters)
- Fast target alarm for directly incoming targets
- Effective suppression of sea, rain, ground clutter and chaff
- Flexible adaptation of volumetric scanning and waveforms to the various radar tasks with scenario and environment-adapted operational modes
- Doppler processing - (MTD) Doppler Filter Bank for sea, rain and land clutter suppression with radial velocity measuring
- Separate air and surface target channels, each with adaptive detection thresholds
- Calculation of the required target data and determination of target type
- High ECM resistance
- Built-in test equipment (BITE) for on-line checks and to facilitate fault localization

ECCM characteristics of the MAARS are based on

- Low antenna side lobe levels
- High angular resolution in azimuth against main lobe jamming
- Pulse compression for suppression of broadband pulse jammers
- Pulse-pulse and burst-to-burst agility for:
  - radar frequency; - pulse repetition frequency; - pulse length; - signal coding to reduce deception jamming
- Pseudo-random frequency selection over the frequency band to counter spot jammers
- MTD processing to improve signal-to-clutter ratio and reduce the effects of chaff
- Jam detector for continuously monitoring the RF environment to provide information on jamming activity
- Adaptive Doppler-selective CFAR
- Automatic jammer avoidance circuit (AJAC) to select the least jammed frequencies
- Coherent sidelobe cancellation (CSLC) and sidelobe blanking (SLB)

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Technical characteristics

Frequency band	C-band (NATO G-band)
Elevation coverage	up to 70° (depending on operational mode)
Height coverage	up to 20 km
Operational modes:	
- Extended Long Range mode	instrumental range up to 200 km
- Long Range mode	instrumental range up to 150 km
- Medium Range mode	instrumental range up to 100 km
- Short Range modes	instrumental range up to 60 km
Rotation speed	12; 30; 60 r.p.m., selectable
Beam width (at -3dB):	
- Vertical (elevation) θε	5,7°
- Horizontal θβ	1,6°
Number of elevation phased array beams for reception	12

Typical detection ranges

Operational modes	Antenna rotation time	RCS	Detection range for PD =0.5; PF = 10-6 D, km		
			interference-free conditions	4 mm/h rain length=60 km	10 mm/h rain length=30 km
Extended Long Range ε≤ 60	5 sec	bomber σ =10 2	165	148	130
		surface target (frigate)	Radio horizon under normal refraction; 200 km under superrefraction		
Long Range ε≤ 300	5 sec	missile σ =0,03 2 m2	27	24	21
		fighter σ =2 m2	100	89	80
		attack aircraft σ =5 m2	120	107	95
		bomber σ =10 m2	140	123	110
		surface target (frigate)	Radio horizon under normal refraction; 150 km under superrefraction		
Medium Range ε≤ 700	2 sec	missile σ =0,03 m2	23	20	18
		fighter σ =2 m2	70	63	55
		attack aircraft σ =5 m2	85	75	65
		surface target (frigate)	Radio horizon under normal refraction; 100 km under superrefraction		
Short Range ε≤ 700	1 sec	missile σ =0,03 m2	20	18	17
		fighter σ =2 m2	50	45	40
		surface target (frigate)	Radio horizon under normal refraction; 60 km under superrefraction		

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RADAR STATION “BUREVESTNIK-1”

Product overview

Intended to be installed in sea vessels and river boats, high-speed ships with dynamic holdup mode, in coastal radio engineering posts for monitoring of the above-water surface

Technical characteristics

Maximum detection range, miles

Of average sea buoy	6
Of vessel of 5,000 t draft	40
Of landmark, motorboat	4

Antenna minimum detection range, miles

10 m above the sea level	36

Picture diameter on the all-round surveillance

Indicator (color LCD monitor)	260 mm
Range scales	0,25; 0,5; 1; 2; 4; 8; 16; 32; 64 miles
Transmitter carrier frequency	9,430 MHz
Transmitter pulse power	20 kW
Supply voltage AC, V	170-265; 47-440 Hz; single-phase
Power consumed	1 kW/h

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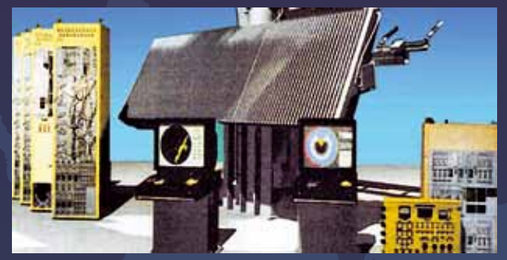
SHIP THREE-COORDINATE RADAR “POZITIV-E”



Product overview

Designed to monitor air and above-water surface, detect and automatically track air, surface and low-flying targets

Technical characteristics

Detection range, km

Of target with SCS = 1 m^2 and flight altitude of 1,000 m	50
Of ASM with SCS = 0,1 m^2 and flight altitude of 15 m	20
Interval between target detection and target designation display	2-5 sec
Number of simultaneously tracked targets	up to 150
Maximum number of consumers	16
Scanning by angle of elevation	frequency/phase
Antenna’s periods of revolution	1; 2; 5; 10 sec

Zone of vision

In azimuth	0-360 deg
In angle of elevation	0-75 deg
In altitude, not over	30 km
In distance, (range)	1-150 km

Maximum time readiness

From off mode	3 min
After transmitter warm-up	2 sec
Time of continuous operation	24 h
Supply voltage AC, V	380, 50 Hz, three-phase
Power consumed	32 kW/h

Weight, kg

Antenna post	600
Underdeck equipment	1200
Operation modes	automatic, semiautomatic
Antenna type	flat phased array antenna

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SHIP NAVIGATION RADAR "ROSAVA"

Product overview

- System provides safety on navigation for high-speed ships at any conditions
- Display of above-water situation
- Automatic location of of sea targets and determination of movement parameters
- Tactical maneuvring against electronic map under natural and intentional interferences

Technical characteristics

Maximum range of objects detection by the radar with SCS = 10 m², with 0,5 probability under normal conditions of wave transmission, not less than	4,5 m
Minimum range of surface targets detection by the radar, with 0.5 probability if the antenna is 10 m above the sea level	up to 15 m
Resolution capacity in azimuth	up to 0,9 deg
Resolution capacity in range	up to 10-15 m
Direction measurement error with 0.8 deg probability	up to 0,5
Distance measurement error with 0.8 probability in all range scales	0,5% from the nominal scale rating value
Average technological lifetime until the first repair	15,000 h

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OPTOELECTRONIC FIRE CONTROL SYSTEM "SARMAT-2"

Main features

- optoelectronic device with high sensitive TV camera and laser rangefinder
- servomotors control device
- system control panel
- IR camera (optional)

Technical characteristics

Parameters	Value
Field of view of transmitting TV camera	
- wide	6° x 8°
- narrow	1° x 1,5°
Detection range of air target (tactical fighter or helicopter) in daylight	≥10 km
Mean square error of aiming	1,5 – 2 mrad
Operating sector:	
- azimuth	±180°
- elevation	–30°...+85°
Power supply, Hz, V	3~50 , 380
Power consumption	≤ 2 kW/h
Total weight	416 kg
Weight of optoelectronic direction unit	217 kg

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OPTOELECTRONIC FIRE CONTROL SYSTEM "SENS-2"

Main purpose

- Measurement of coordinates and distance to the selected target
- Observation of surface and coastal environment
- Control of naval artillery

System provides

- Reception of a target designation from station and hand-operated targets presearch in the field of errors of a preliminary target designation
- Hand-operated capture and automatic support of the targets on angular coordinates and range
- Measurement of angular coordinates and range to the targets
- Definition of target motion parameters
- Meteorological and ballistic preparing of shooting
- The decision of a gunnery problem of a shell on target and development of parameters of homing of a gun (full angles horizontal and an elevation guidance)
- Proof-readings of shooting
- Autonomous hand-operated search of the targets (air, surface, coast) in the sector
- Choice of modes of shooting and the account of a spent ammunition
- Indication of fault reports

Technical characteristics

Working sectors in decked axes:	
- azimuth coverage	±175°
- maximum elevation coverage	-25° to +85°
Retargeting velocity, deg/sec:	
- azimuth	70
- elevation	50
Error of a tracking target coordinates definition :	
- Angular coordinates, not more than	1 mrad
Distances, not more than	5 m
Fields of view of optronical devices:	
TVC:	NFOV 1,5° × 1°; WFOV 28°× 21°
IRC:	NFOV 5° × 3,8°; WFOV 20 ° × 15°
Range measurement	100 -7000 m
Electric power supply	≤ 1 kW
System weight	290 kg
including weight of optoelectronic post SN1.1	200 kg

Main features

Optoelectronic post SN1.1 with television camera (TVC), infrared camera (IRC)	1
Control console SN5.1	1
Set of mounting parts	1

Optoelectronic channel characteristics

- Active (with range measuring) and passive (video surveillance) modes
- Sensors: television camera (TVC); infrared camera (IRC); laser rangefinder (LR)
- Electronic image stabilization
- Automatic target tracking by means of TVC and IRC
- Method of determining of tracking error: contrasting; correlation

Characteristics of drives automatic control channel

The kinematic scheme of rotary support	Rotary support performed on a biaxial pattern of stabilization and pointing the line of sight to the target
Pointing angles (limiting):	
- relative bearing	+ 180°
- elevation bearing	from –35,5° to 85°
Pointing angles (operative) in shipborne system of coordinates	
- relative bearing	+ 178°
- elevation bearing	from –35° to 85°
Servo drive	Gearless drive on the base of low-speed torque motor
Maximal redirecting speed:	
- relative bearing	>150 °/s
- elevation bearing	>120 °/s
Maximal redirecting acceleration :	
- relative bearing	>400 °/s2
- elevation bearing	>300 °/s2
Dynamic errors of directing drives (RMS)	1 mrad
The sensors of the angular position of rotary support axes	Unpacked inductive sensors of angles The maximum error < 80 angular sec

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FIRE CONTROL SYSTEM WITH ACTIVE ARRAY RADAR "STILET-2"

System overview

Optical-radar tracking system "Stilet" in different weather conditions, day and night-time provides:

- detection in a given sector and automatic tracking of air, surface and coastal targets
- shooting management of universal medium-caliber artillery (76 ... 130 mm)

System provides

- Autonomous detection of air, low-flying, surface and coastal targets in sector
- Primary target designation and in autonomous (reserve) mode, including in sectors affected by radio jamming
- Automatic target acquisition, capture and tracking in angular coordinates and range
- Calculation of complete gun guidance angles in the horizontal and vertical planes
- Inertial target tracking in bearing and elevation
- Mapping and documenting of current information
- Observation points falling projectiles and measure deviations for corrections of firing at surface and coastal targets
- Accounting meteorological and ballistic correctives in shooting management
- Generation and display of shooting management information
- Self diagnostics with display of fault reports
- Simulation mode for training of operators on system combat use

Technical characteristics

Frequency band	8,6…9,5 GHz
Autonomous search range:	
- maximum elevation coverage	0° to 360°
- in bearing	0° to +50°
- in elevation in the deck frame	0,25 - 50 km
- in range	0° to 360°
Target designation range:	
- in bearing	0° to 360°
- in elevation (in the deck frame)	0° to +85°
- in range	– 20° to +120°
anti-ship missile with RCS=0,05 m^2	≥ 17 km
aircraft with RCS=1 m^2	≥ 50 km
Instrumental ranges	100; 60; 30; 18; 10; 5 km
Area of the antenna mechanical slewing in the deck frame:	
in bearing	0° to 360°
in elevation	– 10° to +90°
Angle of electric beam deviation with respect to the antenna direction:	
in azimuth	± 30°
in bearing	± 30°
Sector of multibeam (cluster) field of view (bearing x elevation)	12° x 6°
Root-mean-square (RMS) error for R ≤ 25 km:	
of angular tracking	≤ 0,5 mrad
of range tracking	≤ 5 m
Number of simultaneously tracking targets	≥ 10
Time from the beginning of tracking to readiness for shooting	≤ 3 s
Fire transfer time for next target in electric beam scanning sector ± 30° for both coordinates	≤ 1 s

Radar main parameters

Transmitting array beamwidth (bearing x elevation)	12° x 6°
Receiving array beamwidth (bearing x elevation)	1,5° x 1,5°
Number of receiving beams in cluster (bearing x elevation)	8 x 4
Transmitting antenna gain	>25 dB
Receiving antenna gain	>39 dB
Number of spot frequencies	36
Noise figure	3 dB
Transmitted pulse power	3 kW
Transmitted pulse width	1,5 - 120 μs
Compressed pulse width (search; tracking)	0,9 μs; 0,15 μs
Pulse repetition frequency	1 - 28 kHz
Points of complex FFT processing	16 – 128

ECCM characteristics

- **ECCM from chaff provided by:**
  - high range and angular coordinates resolution
  - high stability of the radar devices parameters
  - using coherent signal processing, Doppler filters
  - using clutter maps
  - using adaptive Doppler-selective CFAR
- **ECCM from active noise jamming provided by:**
  - low antenna pattern sidelobe level
  - using coherent sidelobe jammer nulling
  - using a wide radar operating frequency band
  - automatic analyzing of jamming level and choice the least-jammed carrier frequencies
  - fast pulse-to-pulse frequency agility
  - pseudo-random frequency selection over the frequency band to counter spot jammers
  - jammer bearing and elevation measurement and tracking
  - using adaptive CFAR
- **ECCM from active pulse jamming provided by:**
  - using levels limiting and pulse compression of broadband pulse jammers
  - asynchronous pulse interference suppression in range and Doppler frequency coordinates
  - staggered PRF combined with pulse code agility and frequency agility

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INTEGRATED SELF DEFENSE SYSTEM FOR SMALL SHIPS "KASKAD"

Product overview

Ship Self Defense System is designed for monitoring of the above-water surface and air situation in the ship coverage zone, air/surface target acquisition, threat assessment and formidable target distribution, target designation in the operator control panel and the control system console of 3M-47 "Gibka" type antiaircraft missile system and the support of the fire gun mount AK-630M (AK-306,AK-176) on the selected targets

Main purpose

- Automatic and semi-automatic surface and air target acquisition (airplanes, helicopters, gliders) at any time of day and year, in adverse weather conditions (rain, fog, etc.)
- Registration of the selected target trajectory and data transmission to the target distribution console
- Prepare-to-fire procedure training
- Display of the current situation tracked targets on a video monitor (data from the Radar)
- Indication of the background rates and commands
- Fire control – appointment of the firing modes, depending on the combat mission and the existing munitions, antenna unit guidance, inclusion of the fire circuit, fire order
- Training of the fire control operator with the help of built-in training simulator
- Fire analysis is provided by the data output into the documentation device

Components

- **Solid-coherent Radar "Delta-M", including:**
  - antenna post with RF unit, device DM1.1
  - target acquisition Console, device DM5.1
  - target distribution Console (Commander Control unit), device DM5.2
- **Fire Control unit (FCU), including:**
  - operator Control unit AK-630M (AK-306, AK-176), device KM5.1-1
  - device interfacing with the AK-630M (306, AK-176), KM4.1
  - switchboard, device KM6.2
  - power and Control Panel, device DM7.1

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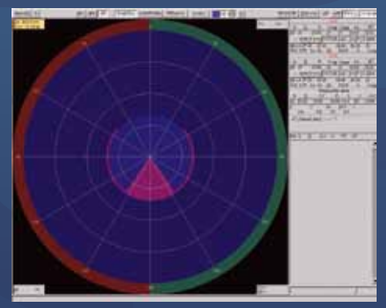
Radar charachteristics

Frequency Range	I band
Coverage	
- range	96 km
- azimuth	0...360°
- height	3 km
Maximum detection range:	
- pinpoint air targets	25….30 km
- surface targets	radio horizon range
Target Location Accuracy:	
- range	15…20 m
- azimuth	3…6 mrad
The number of tracked targets	up to 50
Antenna rotation period	3 s, 6 s, 12 s
Range scales	12 km; 24 km; 48 km; 96 km
Power supply	220 V / 50 Hz
Power consumption	< 1600 W
Weight of equipment	<420 kg
Interface	RS-422; Ethernet; CAN 2.0
Deployment time to complete setting-up procedures	Max 2 min



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HYDROACOUSTIC STATION "TRONKA"

Product overview

Hydroacoustic station (HAS) "TRONKA" is designed for detection of underwater diversionary forces and means (UDFM) to protect:

- the ships at their anchorage in the high sea and on roadstead
- hydraulic structures and important objects in ports and harbours

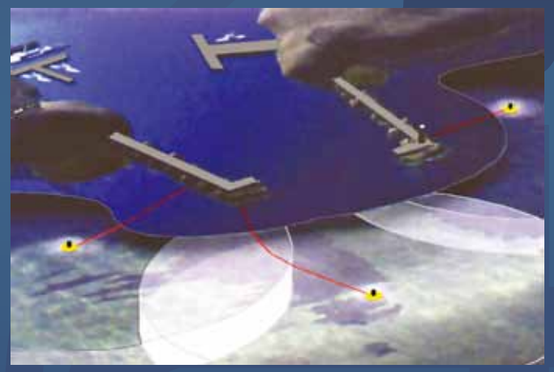
HAS "TRONKA" provides following:

- UDFM automated detection and tracking
- automated definition of coordinates for detected targets and data output to aiming equipment

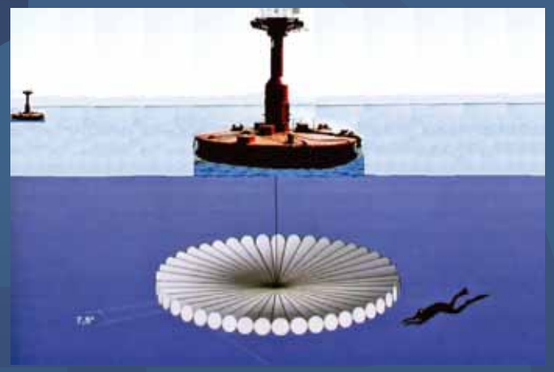
Sonar functionalty:

- data indication on flat color monitor
- sound speed distribution measurement at depth and range forecast
- measurement of noise interferement in sonar operation
- data documentation
- self-diagnosis and self-control of Sonar System

Protection of port

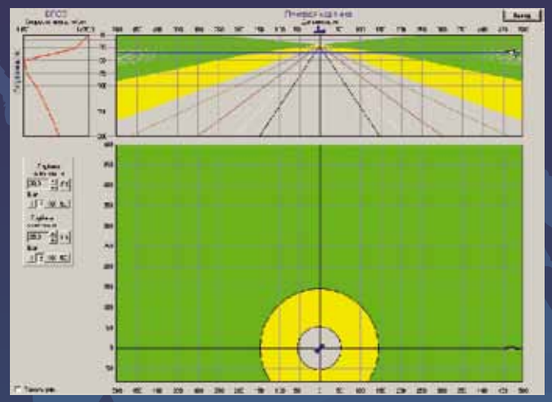


Border line protection

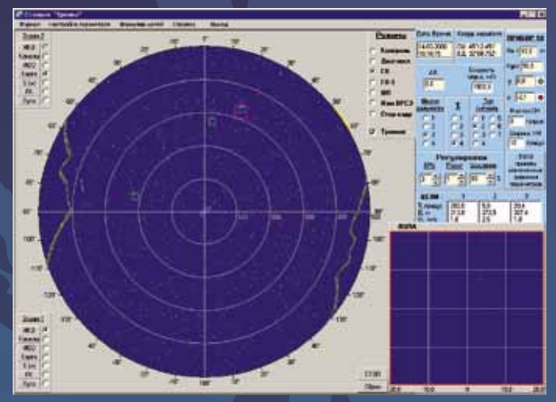


System units for installation on the ship

Detection areas



Operating modes



Technical characteristics

Parameters	Value
Range	up to 500 m
Range accuracy	1,5 %
Azimuth accuracy	2 deg
Quantity of units	4
Weight of outboard equipment	115 kg
Weight of onboard equipment	300 kg
Onboard units dimensions:	
- height	1,5 m
- total area	0,8 m^2
Angular field of horizontal view	360 deg
Angular field of vertical view	30 deg
Antenna depth of immersion	up to 20 m
Sound speed measurement depth	up to 100 m
Power supply:	
- frequency	50 Hz
- voltage	~3ph, 380/220 V
Service life	10 years

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SONAR SYSTEM FOR SECURING OF COASTAL ZONES

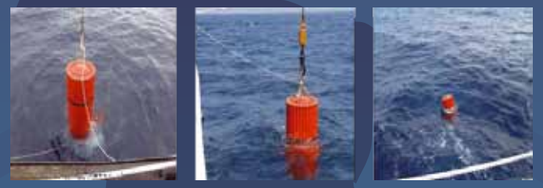
Product overview

Sonar System of coastal zone underwater guarding signalization

The system can detect submarines moving with different speed, provides direction of movement and coordinates

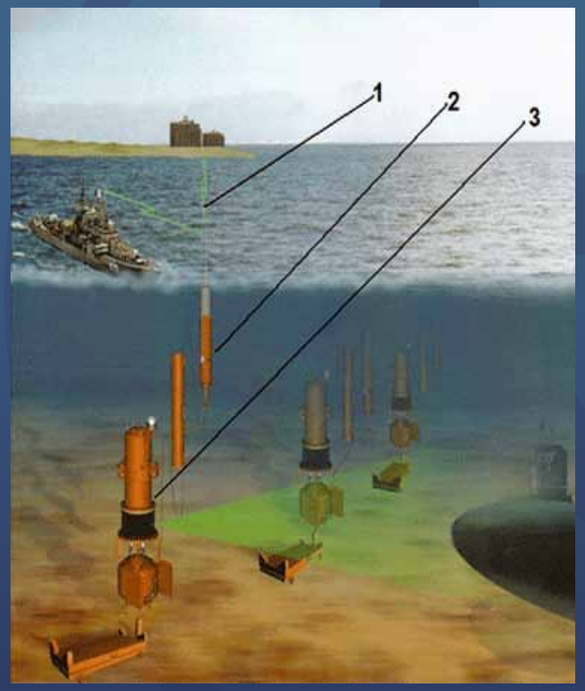
Information about detected moving underwater object is transmitted to coastal post via the desk-size radio buoys of VHF band

Raising of the anchor autonomous station



Consists of

- Radio receiving costal posts
- Anchor passive radiohydroacoustic (sonar) stations (APRHAS)
- Released from under water stations (APRHAS) the desk-size radio buoys of VHF band



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HYDROACOUSTIC STATION FOR DETECTION OF HIGH SPEED TARGETS

Product overview

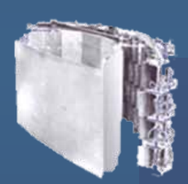
Hydroacoustic (sonar) station for detection of high speed small size target

Designation:

- the station is destinated for protection of ships
- detection of small size highspeed targets (of torpedo type)
- detection of active homing systems signals
- measurement of underwater sound speed and forecasting of distance
- indication of information on the display
- measurement of coordinates and other data about the target
- storage of information
- automatic system functioning control

Composition

Towed antenna



Hull mounted antenna

Power supply control unit

Control panel with display

Technical characteristics

Depth of CDA	up to 400 m
Speed of CDA towing	up to 5 knots
Compartment required for installation and service of the station on the ship, not more	6 m^2
Weight of CDA, not more	200 kg
Weight of equipment, not more	400 kg

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BASE SERIES OF SONARS "BOSFOR"

Product overview

The Sonar is designed to detect, determine coordinates and parameters of object movement including small different targets

Main functions of sonar

- Simultaneous measurement of bearing, range, radial velocity of the target by a single echocontact (monoimpulse location)
- Display up to 8 targets simultaneously
- Data presentation to operator by videochannel on high resolution color display
- Audio informer of special messages
- Inspection of acoustical self ship noise
- Measurement of sound velocity distribution by depth and range forecast
- Automatic testing of serviceability
- Operator training mode

Technical characteristics

Basis asis technical specification	Bosfor 1	Bosfor 2	Bosfor 3
Range scale, km	50	90	120
Operating frequency	$3F_0$	$2F_0$	F_0
Locations accuracy:			
Bearing, degree	1 - 1,5	1- 1,5	1 - 1,5
Range, m	30 - 100	30 - 100	30 - 100
Speed, rn/s	0,1	0,1	0,1
Weight of onboard equipment, kg	700	1500	2700
Array size, mm	Ø = 690, H = 680	Ø=1330, H = 1300	Ø = 2140, H = 1000

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SELF-CONTAINED ANCHORED SONAR

Product overview

It Is designed for detection and bearing of under-water objects

- Automatic setting under moving without emergence
- Transfer of under-water objects detection and bearing data by the radio channel using surfacing radio soundes or by under-water communication channel

Technical characteristics

Parameters	Value
Range of underwater objects detection	5 - 10 km
Depth of setting position	50 - 1500 m
Depth of acoustic array setting	20 - 100 m
Weight	500 kg
Size:	
- diameter	400 mm
- lenght	2850 mm
Uninterrupted working period	up to 12 months

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UNIVERSAL DIRECTIONAL COMMAND ACTIVE SONOBUOY

Product overview

Universal Directional Command Active Sonobuoy Designation:

- detection of submerged submarine and definition of direction of the submarine
- buoy is engaged from the helicopters, planes, ships, can be thrown down with the use of Launch containers (SLC) of the type LAU-111/A or LAU-126/A
- the buoy is combined with onboard equipment DICASS, and also with transmitter of control commands CASS (ASA-79)

Composition

- Parachute
- Radio electronic device
- Power supply unit
- Acoustic array
- Hydroacoustic device

Dimensions	«À» (917 õ 124) mm
Weight	not more 9 kg
VHF Channels	1-31
Operating Depth	4 modifications

Universal Directional Command Active Sonobuoy System - "Udicass"

Designation

- Detection of submerged submarine and definition of direction of the vessel in deep sea and in shallow sea, while placement of radio hydro buoys and small size equipment on the ships of any displacement, light helicopters and UAV

Composition

- Small size , multifunctional autonomous onboard equipment
- Throw down radio hydro buoys compatible with onboard equipment of the type DICASS, but having additional capacities as to work in difficult conditions of shallow sea

Onboard equipment weight	not more 8 kg
Mass of every sonobuoy UDICASS - corresponding to size "A" of NATO	not more 8,5 kg

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TRANSDUCERS AND ANTENNAS

Power low-frequency flextensional transducer

Resonance frequency	900 Hz
Radiating power	2000 W
Maximum operating voltage	1000 V
Operating depth	up to 200 m
Weight	170 kg
Constructive size	1070x465x210 mm

Power low-frequency ring transducer

Resonance frequency	1000 Hz
Radiating power	4000 W
Maximum operating voltage	1000 V
Operating depth	up to 600 m
Weight	200 kg
Constructive size	ø800x273 mm

Power low-frequency flextensional transducer

Resonance frequency	525 Hz
Radiating power	3000 W
Maximum operating voltage	1200 V
Operating depth	up to 200 m
Weight	650 kg
Constructive size	1250x830x400 mm

Power piezoelectric rod transducer

Resonance frequency	3500 Hz
Radiating power	1000 W
Maximum operating voltage	1000 V
Operating depth	up to 400 m
Weight	32 kg
Constructive size	390õ212x 212 mm

Antenna array

Resonance frequency	15 Hz
Radiating power	100 W
Maximum operating voltage	200 V
Operating depth	up to 600 m
Weight	25 kg
Constructive size	458x50 mm

Cylindrical array

Frequency	7 kHz
Transmitters	72 pcs
Receivers	18 pcs
Array height	700 mm
Diameter	700 mm

Low-frequency plate piezoceramic transducer

Resonance frequency	270 Hz
Radiating power	50 W
Maximum operating voltage	600 V
Operating depth	up to 80 m
Weight	48 kg
Constructive size	ø490x67 mm

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DIPPING SONAR FOR HELICOPTERS

Product overview

System designed to accomplish the undersea warfare (USW) missions: detection, localization and classification of submarines, as well as acoustic interception and environmental data acquisition

Main advantages

- Low frequency of operation ensures improved deep and shallow water detection ranges
- Expanded search rate capability with reduced time on station
- Multi frequency operations adaptive to changing environmental conditions ensures superior performance against slow/stationary target
- Environmental intelligence gathering

Technical specifications

Frequency	3-5 KHz
Source level	210 dB – (in resonance frequency)
Azimuth coverage	24 beams
Transmission mode	OMNI
Depth range	up to 450 m
Deployment speed	4 m/sec

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HULL MOUNTED SONAR

Product overview

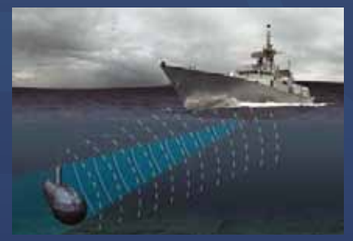
System designed for detection, localization and classification of submarines

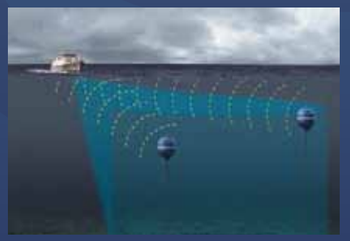
Main advantages

- **Automatic classification of targets :**
  - submarine, surface ship, torpedo, decoy targets
  - detection submarines, surface ships in
  - hydrolocation mode
  - detection of submarines, surface ships and torpedoes in listening passive detection mode
  - coordination with combat management system
  - detection hydro acoustic signals
  - underwater communication and identification
  - noise control
  - measurement hydrology and forecast

Technical specifications

Size	917 x 124 mm
Weight	> 9 kg
Operating depth	12-460 m
Sonar frequency	6,5 - 9,5 kHz
Acoustical pressure	> 199 dB
Quantity of pulses	> 100 dB





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UNDERWATER ACOUSTIC MODEMS

Product overview

Underwater acoustic modems are an efficient and reliable underwater communication devices for a variety of subsea applications.

UAM provides a full-duplex digital communication link using the patented S2C (Sweep-Spread Carrier) Technology, delivering an excellent bitrate performance, resistant to the challenges of a dynamic subsea environment. Self-adaptive algorithms adjust the S2C parameters to maintain the highest bit rate possible in current conditions.

UAM utilizes the communication protocol with multiple data management options. A comprehensive set of commands provides full control over the modem's functionality, modem settings are software-configurable. The modem's firmware supports addressing and networking, moreover, transmissions of commands or high-priority messages do not interrupt the main data flow between modems.

Underwater acoustic modems are available in a variety of configurations. A selection of housings offers depth rating options. Choose between multiple host connection interfaces or their combinations to seamlessly integrate the instrument into any underwater system. An optional Wake-Up module helps optimizing the power consumption for short- or long-term deployments by checking incoming acoustic signals or data on the host interface.

Product features

S2CR 7/17	S2CR 12/24	S2CR 18/34	S2CR 40/80	S2CR 48/78
Reliable data transmissions with S2C Technology – up to 6,9 kbit/s	Reliable data transmissions with S2C Technology – up to 9,2 kbit/s	Reliable high-speed transmissions with S2C Technology – up to 13,9 kbit/s	Reliable high-speed transmissions with S2C Technology – up to 27,7 kbit/s	Reliable high-speed transmissions with S2C Technology – up to 31,2 kbit/s
Hemispherical beam pattern, optimized for long range transmissions in deep waters.	Directional 70° transducer beam pattern, optimized for vertical and slant channels or stationary systems.	Hemispherical beam pattern, optimized for long range transmissions in deep waters.	Directional 70° transducer beam pattern, optimized for vertical and slant channels or stationary systems.	Horizontally omnidirectional beam pattern, optimized for short and medium range transmissions in reverberant shallow waters.

Main technical data

	S2CR 7/17	S2CR 12/24	S2CR 18/34	S2CR 40/80	S2CR 48/78
General					
Operating depth	500 m, Delrin housing	500 m, Delrin housing	500 m, Delrin housing	500 m, Delrin housing	500 m, Delrin housing
	1000 m, Aluminium Alloy housing	1000 m, Aluminium Alloy housing	1000 m, Aluminium Alloy housing	1000 m, Aluminium Alloy housing	1000 m, Aluminium Alloy housing
	3500 m, Stainless Steel housing	2000 m, Stainless Steel housing	2000 m, Stainless Steel housing	2000 m, Stainless Steel housing	2000 m, Stainless Steel housing
	6000 m, Titanium housing	6000 m, Titanium housing			
Operat ing range	8000 m (10000 m in good conditions)	6000 m (8000 m in good conditions)	3500 m	2000 m	1000 m (2000 m in good conditions)
Frequency band	7 - 17 kHz	13 - 24 kHz	18 - 34 kHz	38 - 64 kHz	48 - 78 kHz
Transducer beam pattern	hemispherical	directional, 70°	horizontally mnidirectional	directional, 70°	horizontally mnidirectional
Connection					
Acoustic connection	up to 6,9 kbit/s	up to 9,2 kbit/s	up to 13,9 kbit/s	up to 27,7 kbit/s	up to 31,2 kbit/s
Bit Error Rat e	less than 10^{-10}				
Internal Data Buffer	1 Mb, configurable				
host Interface*	Ethernet, RS-232 (RS-485/422 optional)				
Interface Connector	up to 2 SubConn® Metal Shell1500 Series				

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GPS/GLONASS NAVAL RECEIVER CH-3101

Product overview

GPS/GLONASS marine navigation system is intended for worldwide continuous automatic generation of current coordinates, time and ship ground speed according to standard precision SNS signals irrespective of weather conditions

System features

- built-in receiver of updating information (frequency range from 283,5kHz to 325,0 kHz) of marine differential subsystem
- automated software/hardware system with graphic interface for operation using electronic cartography
- peripheral units interface RS-232 (protocols IEC 61162, RTCM SC-104, BINR)
- receive, processing and data correction in compliance with RTCM SC-104 recommendations

Technical characteristics

14 channels	GPS/GLONASS, L1-range
Algorithm of receiving channel selection	All-in-view
Positional /altitude accuracy:	
- in off-line mode (RMS)	10/15 m
- in differential mode	3/5 m
Operating temperatures:	
- marine navigator receiver	from -10°C to +55°C
- antenna	from -40°C to +65°C
Dimensions	218x178x104 mm
Weigh	3,1 kg
Power supply	DC 9-30 V, AC 110/127/220 V 50/400 Hz
Consumption	9 W
Interface	two input-output ports RS232

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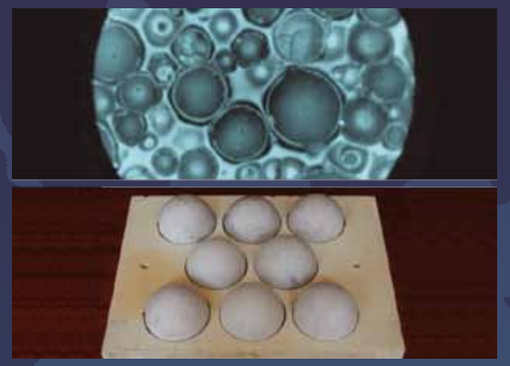
BUOYANT COMPOSITE MATERIALS



Product overview

Buoyant composite materials have low apparent density – 500..700 kg/m^3, and may be used in the submersible technical facilities to provide the zero buoyancy and trimming.

Such materials may be used for submersible technical facilities for securing the coastal territories as well as developing of the mineral and biological resources of the ocean.

Technical characteristics

Characteristics	SDP-1(with additional porosity)	SP-1
apparent density	440..550	580..630
working depth, m		
with density 440 kg/m^3	1500	7000
with density 500 kg/m^3	3000	
with density 550 kg/m^3	4500	
Operating temperature ^{0}C	-70..+70	-70..+70
Number of submersion cycles	10000	1000

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DS SERIES MOBILE DEGAUSSING COMPLEX

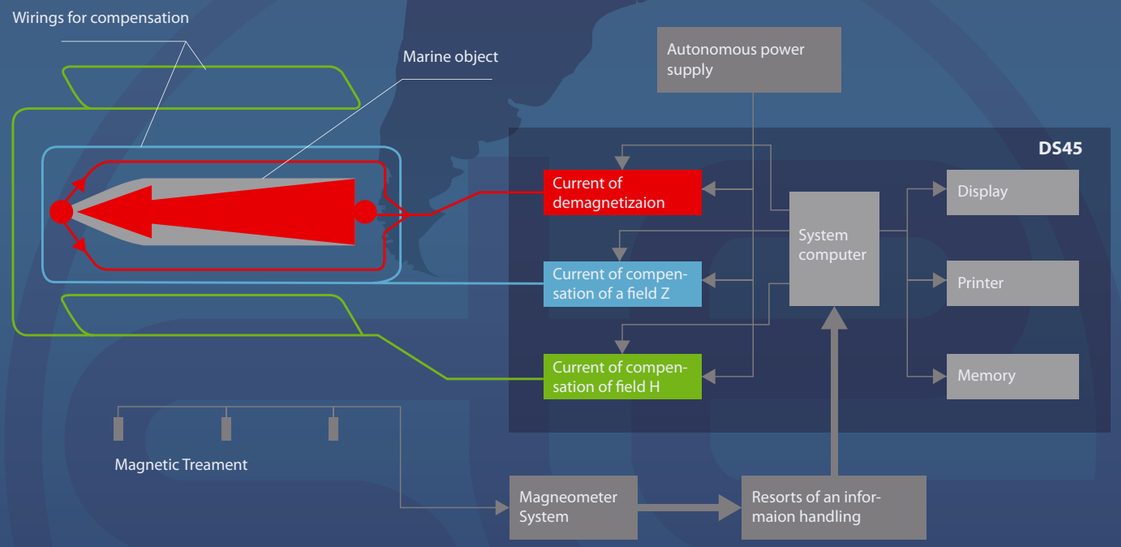
Product overview

The mobile complex is intended for electromagnetic treatment (EMT) of different naval objects with following main tasks:

- decrease of resultant magnetic field up to the demanded range
- directional formation of ship magnetic state
- check ranging of magnetic state of ship

The dynamic uncoiled degaussing of naval objects is implemented by electromagnetic field of electric current running through the object following sequence:

- vessel magnetic field (VMF) measurement by portable system with single axis sensors
- overturning of recovered VMF
- 1st VMF compensation
- 2nd VMF compensation



Main features of EMT with DS stations

- Mobility of the complex
- Allows degaussing without application of coils wrapping around the ship
- Reduced time and energy resources
- Use of autonomous diesel generators
- Possibility of transportation to the place of magnetic treatment by land or sea

Technical characteristics:

	DS20	DS30	DS45
Controlling current source of a demagnetization			
Number of power control units, pc	2	3	4
Maximum amplitude of current, kA	20	30	45
Pulse on-time, sec		3-10	
Time of interval, sec		3-20	
Time of one operation cycle, min		10-20	
Maximum consumed electrical power (in a moment of impulse), kW	800	1200	1800
Voltage, V		up 42	
Power consumptions in one operation cycle, кW•h	16,6	39	93
Controlling current source of compensation			
Number controlling current source, units		2	
Inversion of a current		Automatic	
Maximum range of current, kA		1,0	
Voltage, V		up 55	
Power consumptions in one operation cycle, кW•h	12,5	19,5	31,2
Electronic data processing system		Computer	
Dimensions of station:			
Height, m	1,9	1,9	1,9
Width, m	4,6	5,8	7,0
Length, m	1,2	1,2	1,2
Weight, t	3,5	4,8	6,0
Complete set of a cables and special equipment, Set.	1	1	1

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DEMAGNETIZATION SYSTEM DS10M

Product overview

Demagnetization system DS10M is used for a general or local demagnetization of big volume equipment made from ferromagnetic steels and alloys without using traditional solenoids and special coils.

System provides neutralization of residual magnetization after manufacturing of equipment, based on conduction of impulses of electric current varied according to the certain law through material. The technology is most effective for a demagnetization of local elements, when usage of special benches is not possible.

The demagnetization in magnetic field of the Earth provides a decrease of magnetic fields of equipment to 0.02-0.05mTl. High quality demagnetization is reached with compensation of an external magnetic field

Systems prevents following negative effects

- Appearance of additional electromagnetic force during electric arc welding and "magnetic blow-out" with metal splatter
- Trajectory bending of electron beam during welding of thick-wall steel details that may cause irreversible defects of welding joints
- Adhering of metal shavings during metal-working of equipment that leads to fast runout of mold tools and low quality of machining

Technical characteristics

Range of amplitude modifications of unipolar current impulses	from 0,1 up 10 kA
Voltage of operating current, no more	30 V
Automatic control of a modes	8
Accuracy of maintenance of the current	3-5 %
Power consumption of the maximal unipolar pulse of a current	270 kVA
Consumed power per cycle	3,5 kW/h
Main voltage ~3, 50 Hz	380 ± 20 V
Dimensions - length - width - height	 900 mm 1200 mm 1930 mm
Weight (without cable)	960 kg

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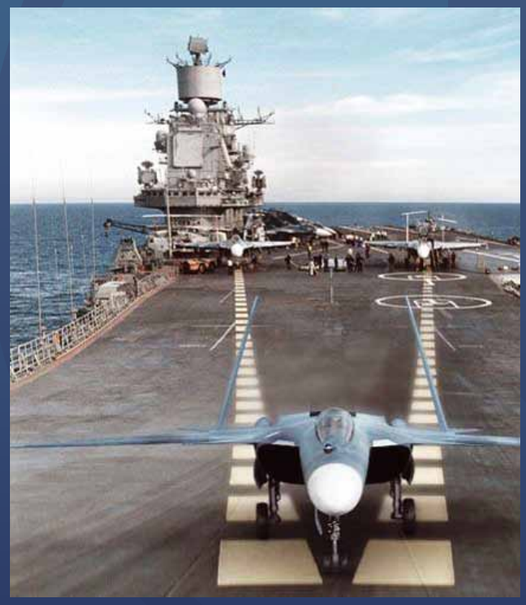
AIRCRAFT AUTOMATED CONTROL SYSTEM

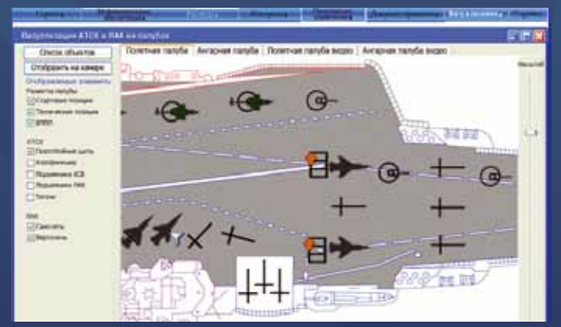
Product overview

System is designed to increase the effectiveness of the ship borne aircraft control by automation of data receiving, processing, planning and information-analytic support

System provides

- Automation of tasks and continuous centralized control of training and fight actions of aviation;
- Direct flights control in zone of aircraft carrier ship responsibility
- Modeling processes of engineering-navigational support of shipborne aircraft flights
- Planning, documentation and graphic visualization
- Engineering-navigational and operative calculations





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TORPEDOE ARMAMENT CONTROL DEVICES

K-10 Shkval control equipment complex

Designation

To receive the data of yaw, pitch, roll, selected depth, selected distance and single commands that input from the carrier, in order to form controlling signals on the underwater missile steering gears according to the selected movement control algorithm

It provides

- Finalizing selected yaw angle
- Compensating pitch and roll initial conditions
- Missile delivery to the designated point

Application

High-speed cavitation underwater missile

K-81 Medvedka control equipment complex

Designation

To control MPT-1U combat torpedo of small-size missile anti-submarine system mounted on surface vessels including dynamic support ships

It provides

- Receiving input depth data in a five bit parallel code
- Finalizing torpedo movement parameters:
  - by depth
  - by roll
  - by pitch
  - angular rates

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B-80 Automatic pilot

Designation

To receive search depth data, input from the carrier on-board circuit, to form control laws by yawing channels ψ, pitch θ and roll γ; to transmit information on automatic pilot readiness to on-board circuit

- Missile control in the air, in cavern, in target searching and aiming modes
- Finalizing the target bearing by yaw in aiming mode
- Finalizing the target bearing by pitch in aiming mode
- Reaching the missile application depth
- Automatic pilot output signals limiting on selected level as well as signal formation For priority finalization of roll angles when heavy turbulence on missile (“floating limitation”)

Airborne anti-submarine missile (standard missiles are dropped from anti-submarine aircrafts and helicopters during their flight or hovering by initial target designation data

K39-02 Lyutik control equipment complex

Designation

To receive the data of yaw ψ, pitch θ, selected depth H, roll γ, balance parameters δ∞ of rudder deviation angles on channels ψ, θ, γ, input from the carrier, to form controlling signals on the torpedo steering gears according to the approved control laws

It provides

- Gyroscope impulse start
- Cinematic parameters measurement:
  - by yaw
  - by pitch
  - by roll
  - by depth
  - angular rates

Application

Electric-powered torpedo (carriers – submarines and surface vessels)

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TORPEDOE ARMAMENT CONTROL DEVICES

Giroscopic yawing sensor DK26

Designation

To transform device body turning angle into the electrical signal relative to external axis of gimbal suspension

Application

DK26 gyroscopic yawing sensor is used as a part of the torpedo control system equipment as well as other objects

External gimbal deflection from celestial axis per 10 min, angular min, within, not more	± 100
Duration of uncaging, sec, not more	0,2
Duration of caging from any gimbals position with gyro-motor switched-off, sec, not more	15
Duration of gyro-motor rotor acceleration, sec, not more	120
Power supply:	
- three-phase current (36±2) V, frequency Hz	1000±10
- sinusoidal single phase current (6,5±0,65) V frequency Hz	1000±10
- DC voltage, V	28±2
Range of turn's working angles:	
- relative to external axis of gimbal suspension, angular degree	No limitations
- relative to transverse axis of gimbal suspension, angular degree, within	± 80
- weight, kg, not more	1,6
Dimensions, mm	Ø90 x 150

K-78 Sirena-M control equipment complex

Designation

To form steering commands to the steering gear of self-propelled device by yaw channels and depth H, to convey the data on current changes in yaw and depth parameters to on-board circuit

Application

Autonomous self-propelled underwater vehicle to transport two light-weight divers and different cargo, with automatic stabilization (hovering mode) of selected depth in the "stand still" mode with correction of vehicle's buoyancy close to zero

It provides

- Monitoring the carrier's current depth
- Monitoring the yaw current value
- Reaching the carrier's selected depth

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PK Yawing device

Designation

To form operating commands to the steering machine

Principle of operation

Electric steering commands to the steering machine are formed relatively to launch direction that is memorized by the gyroscopic sensor depending on initial program settings and search system command

Functional peculiarities

- Relay control law, yawing device operates on three-position steering machine
- Steering commands are taken from induction-type sensors
- Pneumatic gyromotors launch

It provides

- Monitoring the carrier's current depth
- Monitoring the yaw current value
- Reaching the carrier's selected depth

Application

- Antiship torpedo SAET-60

Readiness time – not more, sec	0,5
Gyro deflection per 1 min of yawing device operation – not more ± 3 arc min.	± 2,5

PK Yawing device

Designation

To form operating commands to the steering machine

Principle of operation

Electric steering commands to the steering machine are formed relatively to launch direction that is memorized by the gyroscopic sensor depending on initial program settings and search system command

Functional peculiarities

- Relay control law, yawing device operates on three-position steering machine
- Steering commands are taken from induction-type sensors
- P neumatic gyromotors launch

It provides

- Monitoring the carrier's current depth
- Monitoring the yaw current value
- Reaching the carrier's selected depth

Application

- SET-65 anti-submarine torpedo

Readiness time – not more, sec	0,5
Gyro deflection per 1 min of yawing device operation – not more ± 3 arc min.	± 3

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TURBOGENERATOR AND GAS TURBINE ENGINES

GTG-100-KGAS Turbogenerator

Used in electric power plants of amphibious hovercraft as an autonomous power-supply source

Rated power	100 kW
Efficiency	11,4 %
Air consumption	1,36 kg/sec
Gas temperature of the gas outlet	500 °C
Fuel	diesel
Fuel consumption	80 kg/h
Dimensions	1,850x755x1,170 mm
Weight	520 kg
Specific life	8,000 h

UGT-3000 GAS Turbine engine

Used in M15 main gas turbine power plants in "Tarantul" class ships

Rated power	3 MW
Efficiency	30 %
Reversible and non-reversible arrangement	

UGT-6000 GAS Turbine engine

Used in M7, M15, M16, M20, M21, M27, M35 and MT70 MGTUs in "Tarantul", "Pomornik", "Slava", "Murena", "Krivak", "Sokol-2", "Balkom-8" and "Muravey" classes ships

Rated power	6 MW
Efficiency	31-33 %
Reversible and non-reversible arrangement	

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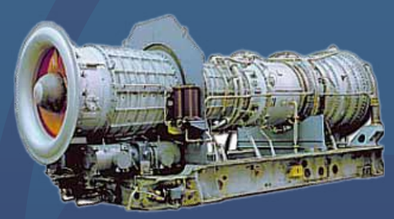
UGT-15000 GAS Turbine engine

Used in M27, M44 and M9B MGTUs in "Udaloy", "Mustang" and "Balkom-8" classes ships

Rated power	14,7 MW
Efficiency	33 %
Reversible and non-reversible arrangement	

UGT-16000 GAS Turbine engine

Used in M3, M5, M7, M8, M9, M12, M21, M25 and M36 MGTUs in "Kashin", "Kara", «Slava", "Delhi" (India), "Udaloy", "Roy M. Wheet" (USA), "Krivak", "Ivan Rogov" and "Grisha" classes ships



Rated power	16 MW
Efficiency	31 %
Reversible and non-reversible arrangement	

UGT-25000 GAS Turbine engine

Rated power	25 MW
Efficiency	36 %
Reversible and non-reversible arrangement	

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AUTOMATED UNDERWATER VEHICLES (AUV)

Main purpose

- Remote exploration of the sea bottom and underwater structures
- Underwater monitoring of coastal waters by means of video, hydroacoustic and magnetometric equipment
- Counter-terrrist and counter-diversion missions
- Neutralization of potentially dangerous objects by means of manipulators
- Underwater inspection of ship's hull

Project "Offshore Safety"

Search, inspection underwater works. On-line moni toring of underwater situation of coastal waters of the country by video-, hydroacoustic- and magnetometrec methods. Counter- terrorist and counter-diversion missions. Neutralization of potentially dangerous objects with the use of manipulators. In spection of underwater part of ship's hull etc

Working depth	500 m
Speed (max)	6 knots
Dimensions (L x D x H)	2,5x0,6x0,75 m
Weight	360 kg



Project "BL-50"

Search, inspection underwater works



Working depth	50 m
Speed (max)	1 knots
Dimensions (L x D x H)	0,62x0,44x0,32 m
Weight	30 kg

"Searcher" type

Search, inspection underwater works

Working depth	550 m
Speed (max)	4 knots
Dimensions (L x D x H)	0,97x0,53x0,6 m
Weight	65 kg


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"Inspector" type

Working depth	100 m
Speed (max)	2 knots
Dimensions (L x D x H)	0,97x0,6x0,45 m
Weight	35 kg

Carus-1

Research and monitoring of rift zones of Atlantic ocean

Working depth	4000 m
Dimensions (L x D x H)	3,9x1,1x2 m
Payload: - photocomplex - video system - set of sensors TDS - special technical equipment	
Weight	2000 kg
Autonomous operation	8 hours

The North Star

Search, inspection underwater works in north hydro-meteorologic conditions

Working depth	150 m
Speed (max)	3,9 knots
Dimensions (L x D x H)	1,13x0,62x0,47 m
Weight	65 kg

"Sofokl" type

Working depth	500 m
Speed (max)	2 knots
Dimensions (L x D x H)	0,97x0,6x0,45 m
Weight	80 kg

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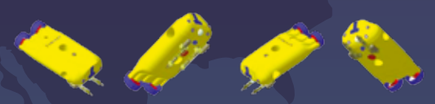
REMOTELY OPERATED TETHERED AUV "ARCHIMED"



Main purpose

System allows remote exploration of sea bottom and underwater structure and objects by means of video camera, hydroacoustic sonar and magnetic instruments

Basic parameters

Maximum Operational Depth Range	500 m
Dimensions	2200×1100×590
Speed	3 knots
Cable Length	up to 1000 m
Weight	400 kg
Power supply	3×380 V, 50 (60) Hz, 20 kW
Air temperature	-20 - +40 C
Wind speed	up to 10 m/sec

Control panel

Weight	400 kg
Dimensions:	
- length	0,8 m
- width	1,2 m
- height	1,7 m
Power supply	3×380 V, 50 (60) Hz, 20 kW, 1×50 Hz, 220 V, 1,2 kW

Winch

Capacity, (not less than)	6,0 (600) kN
Braking force, (not less than)	8,0 (800) kN
Speed of Cable lift and sink:	
- high	1,3 0,3 m/sec
- low	0,4 0,15 m/sec
Barrel Diameter	600 mm
Barrel Capacity of cable	550 m
Winch drive	Electric Motor with Disc Brake
Power supply	50 Hz, 3×380 V, 12,4 kW

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Hydroacoustic system

Provides: search of distant objects, revealing of objects hidden at bottom stratum, operation in low clarity waters

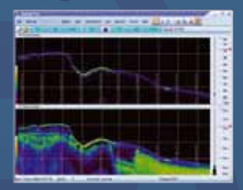
Super SeaKing DST Scanning Sonar

Provides search of sunk objects, located at sea bottom in radius up to 300 meters

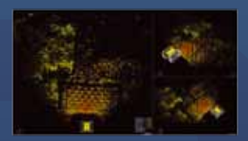
Operating Frequency	
- low	250...350 kHz
- high	620...720 kHz
Width of the beam (for low / high frequency)	
- vertical plane:	20/40 degree
- horizontal plane:	3/1,5 degree
Range:	
- maximum (for low / high frequency)	300/100 m
- minimum	0,4 m
Resolution (in range)	5...400 mm

Profilograph (surface analyzer)

Operating Frequency	
- low	20 kHz
- high	200 kHz
Beam width (for low and high frequency), degree	
Resolution (in range)	4,5/4 mm



Multi Beam Sonar – Multibeam Eclipse



Meat for search and survey of sunk objects at in low clarity waters conditions

Underwater video camera OE14-122

Resolution, TV lines	450
Optical zoom	10
Sensitivity	0,02 Lux

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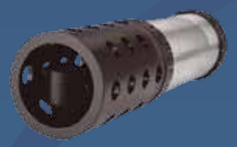
Output signal format	PAL 1V 75 Ом
Diaphragm operation / control	Automatic and manual
Focusing	10 mm … ∞
Taking angle	4° - 44°
View angle, subject to turn:	
- horizontal	±85 (170) degree
- vertical	±90 (180) degree

Oceanological system Sea King 704

The Complex of bathymetric and oceanographic sensors provides measurement of temperature, hydrostatic pressure and water electrical conduction



Hydrostatic pressure sensor	
Measurement range	10 MPa
Mistake	0,015 %
Operating temperature	-10...+35 °C
Storage temperature	-20…+50 °C
Temperature sensor	
Measurement range	-5...+35 °C
Accuracy	0,05 °C
Water electrical conduction sensor	
Measurement range	0...6,5 См/м
Accuracy	0,0025 См/м

Gyroscope transmitter

- **Orientation, degree -** 360
- **Angular Velocity, degree / sec -** ±300
- **Angular resolution, degree** - <0,1
- **Typical error, degree -** 1
- **Temperature drift, %°C -** ±0,025
- **Nonlinearity, % -** 0,23
- **Sensor's ranges:**
  - gyroscope, degree / sec - ±300
  - accelerometer - ±5
  - magnetometer, Гаус - ±1

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Main purpose

- Bathymetric surveys
- Inspection of pipelines
- Environmental surveys
- Pre-build and post build surveys of pipelines and platforms

System features

- Self-contained underwater survey system
- Operation from any kind of vessel
- Mobility of complex
- No calibration of peripherals required
- Low operating costs
- Graphical interface for control, self diagnostics and data synchronization
- Hdd based integrated platform
- Swappable battery modules
- Front and rear video cameras

Main characteristics

Depth range	up to 200 m
Speed:	up to 3 knots
Payload	8 kg (10 kg with additional buoyancy)
Dimensions	2000x210x210 mm
Weight	65 kg
Material	fiberglass hull; aluminium joints; stainless steel fittings

Propulsion

Forward thruster with a bow jet nozzles. Horizontal and vertical rudders thruster equipped with a brushless motor and ECD

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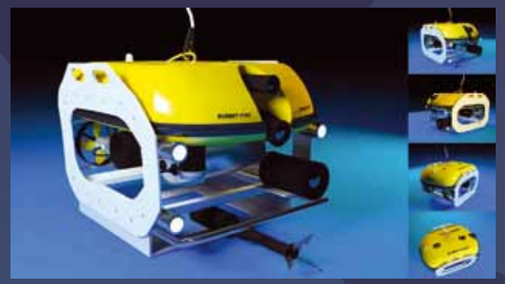
MULTIPURPOSE AUV "BURBOT H300"



Main purpose

System designed for autonomous remote inspection of underwater environment

Main characteristics

Depth range	up to 400 m
Speed	up to 4 knots
Payload	8 kg (10 kg with additional buoyancy)
Dimensions	950x600x500 mm
Weight	67 kg
Material	fiberglass frame; aluminium casing; stainless steel fittings

Propulsion

- **Horizontal:** 2 thrusters, forward thrust: 36kg
- **Vertical:** 2 thrusters, thrust: 34kg
- **Lateral:** 1 thruster, thrust: 16kg

System features

- Inspection video camera: 10x zoom; 2,5-25mm / F1.8
- Navigation video camera: 3,6/ F1,6
- Two 50W halogen headlights and two diode lights
- 3 axis megnetomer sensor
- Piezoresistive depth sensor
- Navigation and profiling sonar
- Electric manipulator arm
- LBL / USBL positioning system
- Hdd based integrated platform
- Graphical interface for control, self diagnostics and data synchronization

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SUPPORT AND MODERNIZATION OF NAVAL SYSTEMS

Ukraine have modern well-developed and unique ship-building facilities repair and manufacture, interceptor crafts, off-shore patrol vessels, hovercrafts, fast patrol boats, landing ships and submarines.

Ukrainian state plants for more than 40 years has been engaged in automatization of marine machinery and producing of automatic control facilities for displacement type ships and vessels on the air-cushion ships, yachts, docks, marine drilling platforms.

We are pleased to offer the modernization of control systems type ORION-M1SE and ORION-M1SE/1 based on up-to-date microprocessor element base

New centralized integrated complex processor control system of the ship (CCS TES) allows to:

- automatically maintain indicated ship speed and carry out routing
- interactively produce recommendations for decision making in constant and emergency modes
- automatically keep records and reports
- execute functions 5CACA
- run technical diagnostics which increase equipment reliability and decrease repair and running costs
- integrate gas turbine control system functions and thus decrease the equipment costs
- decrease number of operators

List of main equipment and aggregates for supply/overhaul for the surface fleet

Diesel engines type 3(D)6, 3(D)12, 7(D)6, 7(D)12:

- pistons, connecting rods, piston rings
- cylinder blocks, cylinder sleeves
- fuel/oil/water pumps
- sealing rings, gasket/inserts, mechanical rubber

Power electric equipment:

- alternating current electromotor type AOM, (D)M, (D) M(SH), A(I)P, 4AM
- starter type (P)MM, (P)MM-(D), (P)(P), (P)(P)(R)
- converter type ATO-1-40, ATT-4-400, ATT-8-400, AM(G)-52M
- current rectifier type BACK-1-40, BACK-2,75-230, BAK(E)(P)22-28,5

Accessory equipment:

- pump type (E)(C)H, (E)(S)H, (E)MH, (SH)(F), (C)B(S), 1B, 2BB, 3B, H(C)B, H(C)BC
- electric compressor type (E)K3C, (E)K10, (E)K10-2, K2-150, (E)K2-150
- diesel compressor type (D)K2, (D)K10;
- refrigeration compressor type (F)B6, 1(F)YY80P, (F) Y(B)C12
- oil-water and water coolers for diesel engines MX(D), BX(D)
- coolers for gas turbines OK(P)-17-420, OK(P)-58-600, OK(P)-90-700
- fine purification filters (F)HT-40/10, (F)HT-80/10, (F) HT-125/10

Ventilation, conditioning, piping, hydraulic equipment, stop valves:

- valves flanged, nippled for high pressure;
- sluice valves, Kingston
- flanges (stainless steel, special alloys, bronze);
- connectors flanged/welded
- hoses for pressure up to 400 KGF/CM2
- nipple joints (stainless steel, special alloys, bronze)

Loud-speaking communication system (P)-400 (KASHTAN):

- amplifier-commutation blocks YK(B)
- commutation panels type K-3, K-5, K-10, K-20
- amplifiers TY-25, TY-50, TY-100
- connectors type BP-1, BP-3
- microphones M(F)-3, M(F)-7, loudspeakers (G)P, regulators P(G), P(G)-(B)

Radio stations P-619, P-638, P-634:

- receivers, transmitters
- prime amplifiers, intermediate-frequency amplifiers
- connector elements
- antenna elements

General mechanical rubber goods:

- rings packing (MPTY38-5-6075-67)
- armed collars (GOST 8752-79)
- glands, cords, plates

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Our Company has a wide experience in supply/ overhaul of equipment and aggregates for submarines 877EKM (KILO class); frigates project 1159.2 (KONI class); corvettes project 1234 (NANUCHKA II), 1241RE (TARANTUL I), 1241.2 (PAUK); missile crafts project 205 (OSA II); amphibious warfare vessels project 771 (POLNOCHNY B class); destroyers class 61ME (KASHIN II); frigates 159 (PETYA II), 1135.6 (KRIVAK II); ocean/inshore mine sweepers 266ME (NATYA I), 1258 (YEVGENYA); guided missile frigates 1135.6 (KRIVAK III)

List of 877EKM class submarines main equipment and aggregates for supply/ overhaul

Power electric equipment:

- DC electromotors type (P)-11M72 OM5,
- (P)82M72 OM5
- Starter type (P)(P)P, magnetic controller
- type CM(E)
- Converters type (P)O-20-50, (P)O-20-400,AM(G)-52M, A(P)O-8-400, A(P)(P)-4

Accessory equipment:

- Pump type H(C)B-40/15, H(C)B-100/30, (C)BC-3/40, (E)CH-2/II, (E)CH-10/II, 1B1.6/5-1.5/2, 3B0.6/63-1/25(B)2, 3B-63/25-1-50/4B-2, (E)(C)H-1.5/20, B(C) H-65Y, (E)BH-5/5, (C)H-23.6MBx2
- Electric compressor type (E)K-10-3, (E)K(P)A-2/150, dehumidification blocks for electric compressor type (B)O1
- Refrigerating machines type C(P)MXM60, KX(G)140-1, compressors type (F)B6, 1(F)YY80P
- Air conditioning plant AMK-10(P)C

Hydraulic equipment:

- valves flanged, nippled for high pressure
- air reducer (P)Y-1
- sluice valves, Kingston
- pneumatic hydraulic accumulator type (P)(G)A-60-1
- air-cooling unit type BOM-4, BOM-8, BO(P)-4, 10MB-(P)C, 35MBOO-(P)C
- radial fan type PCC2.5/10…PCC63/40

Piping of ventilation, conditioning, fuel, ballast systems:

- flanges, connectors
- hoses for pressure up to 400 KGF/CM2
- nipple joints

Elements of loud-speaking communication (P)-400:

- amplifier-commutation blocks YK(B)
- commutation panels type K-3, K-5, K-10, K-20
- amplifiers TY-25, TY-50, TY-100
- connectors type BP-1, BP-3

Radio stations P-619, P-638, P-634:

- receivers, transmitters
- prime amplifiers, intermediate-frequency amplifiers
- connector elements
- antenna elements

Navigation equipment:

- gyro tracer (G)KY-1
- gyrocompass KYPC-10
- log type (L)(G)P

General mechanical rubber goods:

- rings packing (MPTY38-5-6075-67)
- armed collars (GOST 8752-79)
- collars for pneumatic hydraulic accu-mulator (GOST 14896-75, GOST 6969-75)
- glands, cords, plates

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