UNDERWATER
COMMUNICATION & NAVIGATION
LABORATORY
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ZIMA is an ultrashort baseline navigation system (USBL) intended to determine in real time the horizontal angle and distance to underwater objects equipped with hydroacoustic responders Zima-R with the principle of operation based on the use of a phased array antenna ZimaBase.

TASKS:

- **Locating** up to 23 underwater objects in the water area (tracking underwater objects);
  - **Determination of relative location** (Azimuth, distance, depth);
  - **Determination of absolute position** (Latitude, Longitude, Azimuth, Distance, Depth) when connecting external GNSS and compass (or GNSS with compass function);
  - **Mutual navigation -** transmission of the azimuth beacon to the direction-finding antenna and measurement of the distance by the beacon to the antenna (when the beacon is communicating with the carrier and when an external compass or GNSS is connected with the compass function to the console PC);
- **Telecontrol**: transmission of up to 32 code commands to underwater objects (with the information interface of the beacon with the carrier);

DISTINCTIVE FEATURES

- Compactness, long range and maximum ease of use allow using the ZIMA system to work with different TNPA and ANPA, as well as with divers in any combination;

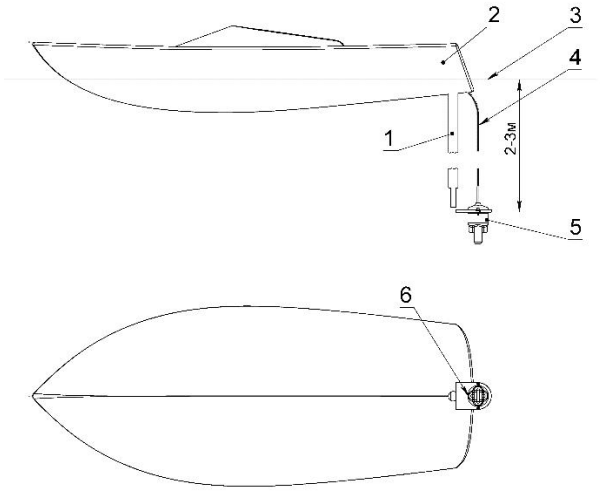
ZIMA-B transmitting direction-finding antenna

The ZIMA-R beacon-responder (in the stand-alone version with a battery compartment)

- The high beacons universalization makes it possible to use them both as a stand-alone version with a separate battery pack, and energetically and informally match them with the carrier, in this case it is possible to transmit up to 32 address code commands of remote control to an underwater object;
- The system supports integration with external sources of navigation data: GNSS and magnetic compass (connected to the console PC). In this case, the system determines the absolute geographic coordinates of underwater objects, allows you to save the track of the underwater

objects and has GPS emulation functions for one of the selected beacons for integration with third-party software (for example, Hypack, SAS.Planet, etc.);

- ZIMA-B is mounted on the rod from almost any vessel:



ZIMA-B installation scheme (1-rod, 2-vessel, 3-water surface, 4-cable, 5-ZIMA-B, 6- antenna's zero)

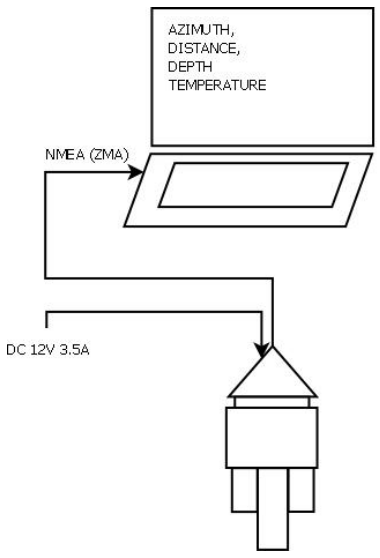
Connected to a 12V / 3.5A power supply and to a remote PC (Windows 7 and higher). In this minimal configuration, the system determines the position of the beacons (azimuth and distance) relative to the antenna;

- When a GNSS receiver (RMC, GGA) and a magnetic compass (HDG) are connected to the console PC, the system determines the geographical coordinates of the beacons and can transmit them (RMC, GGA) to any serial port, thereby emulating the GNSS receiver;
- Instead of a magnetic compass, a GNSS system with multiple antennas (HDT messages) can be used;

CONNECTION SCHEMES

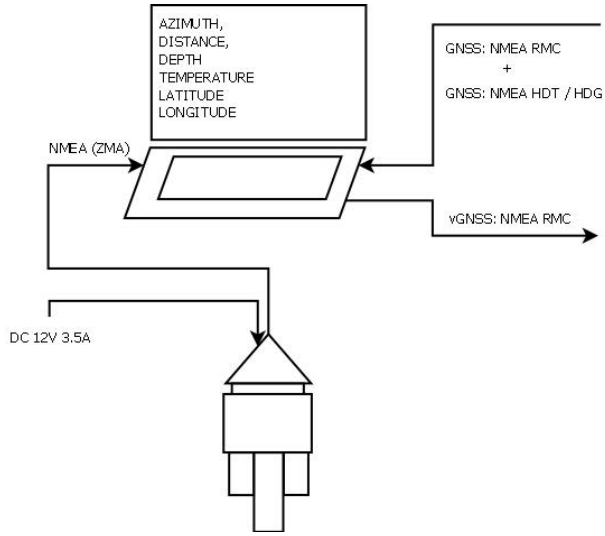
In order to determine the **relative location** of the beacon-responders, the antenna is connected to a PC on which the specialized ZimaHost remote software is installed (distributed with open source code). The antenna is connected to a DC power source with a voltage of 12 volts and a maximum permissible current of at least 3.5 A. In this case, the user can access data and functions:

- **Bearing angle** to the responders;
- **Distance** to the responders;
- **Depths** of the responders;
- Possibility of **address transmission up to 32 code commands** per each beacon (for information connection of beacons with a carrier);



The scheme of connection at work in relative coordinates

To determine the **absolute location** of the responders, the antenna is mapped to a PC on which a specialized ZimaHost remote software is installed (distributed with open source code). The antenna is connected to a DC power source with a voltage of 12 volts and a maximum permissible current of at least 3.5 Amperes. An external GNSS system and a magnetic compass using the NMEA 0183 protocol (RMC and HDG messages) or an external GNSS system with compass function using NMEA 0183 protocol (RMC and HDT messages) are additionally connected to the Remote PC.



Connection scheme when working in absolute coordinates

In this case, the following data and functions are available to the user:

- Absolute geographical coordinates of beacons and depth;
- Azimuth (relative to the direction to the north);
- Distance;
- Ability to address up to 32 code commands per beacon (information connection of beacons with a carrier);
- Record a track of the motion of underwater objects with the possibility of subsequent saving in Google KML format.

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SPECIFICATIONS

PARAMETER	*VALUE*
ZIMA-B	
DIMENSIONS	Φ64x128 mm
WEIGHT (DRY)	0.44 kg
ACOUSTIC RANGE (ENERGETIC)	8000 m
NOMINAL ACCURACY OF DETERMINING THE HORIZONTAL ANGLE	1°
MAX NUMBER OF RESPONDERS	23
MAX NUMBER OF COMMANDS	32
DEPTH RATING	40 m
RELATIVE VELOCITY	+/- 1.8 м/с
POWER SUPPLY	12 V
POWER CONSUMPTION (RX/TX)	0.3/25 W
DATA LINE VOLTAGE	0..3 V
INTERFACE	UART 9600
PROTOCOL	NMEA 0183 + PZMA

PARAMETER	*VALUE*
ZIMA-R	
DIMENTIONS (WITHOUT BATTERY PACK)	Φ64x62 mm
BATTERY PACK DIMENSIONS	Φ50x165 mm
WEIGHT (DRY, WITHOUT BATTERY PACK)	0.3 kg
BATTERY PACK WEIGHT (DRY)	0.58 kg
ACOUSTIC RANGE (ENERGETIC)	8000 m
MAX NUMBER OF RESPONDERS	23
MAX NUMBER OF COMMANDS	32
DEPTH RATING	300 m
RELATIVE VELOCITY	+/- 1.8 м/с
POWER SUPPLY	12 V
POWER CONSUMPTION (RX/TX)	0.3/25 W
DATA LINE VOLTAGE	0..3 V
INTERFACE	UART 9600
PROTOCOL	NMEA 0183 + PZMA
OPERATION TIME WITH STANDART BATTERY PACK (RECEIVING MODE)	Up to 70 hours
OPERATION TIME WITH STANDART BATTERY PACK (1 RESPONSE PER 3 SEC)	Up to 8 hours