



NAVDAT

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NAVDAT

ONBOARD DATA CONTROL AND NAVIGATION SYSTEM FOR AIRBORNE GEOPHYSICAL SURVEYS

NAVDAT is an integrated onboard computing system. It consists of hardware and software components:

- Onboard computer (IBM/PC, Debian GNU/LINUX operating system)
- Set of additional indicators of the pilot
- Software

IT IS USED FOR AIRBORNE GEOPHYSICAL SURVEYS AND EXECUTES OUT THE FOLLOWING OPERATIONS:

DATA REGISTRATION

Thanks to the original system structure, the NAVDAT software allows to register the data from all onboard sources of digital information practically without restrictions on speed of their acquisition. Any standard computer interfaces can be used for interaction.

DATA CONTROL

The NAVDAT software controls not only acquisition of information, but also automatically analyzes structure and quality of received geophysical information, executes automatic control of work of the geophysical equipment.

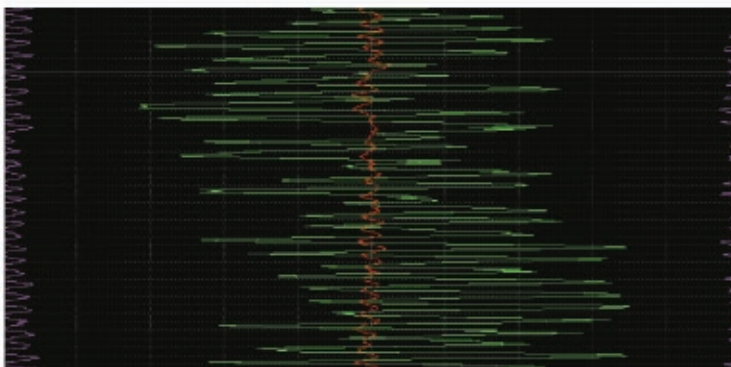
DATA RECORDING

Data are recorded continuously and actions of the operator or the pilot cannot affect the process. Data integrity is guaranteed.

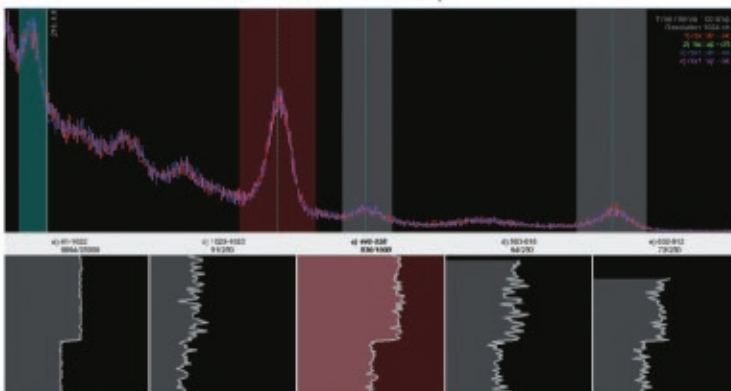
VISUALIZATION OF RECEIVED INFORMATION

All received information is displayed on the computer screen in real time in a way convenient for the operator.

Variable	Value	Choose edge	Scale
visor:dus[0]	0.0199113	CENTER	1
visor:dus[1]	0.00889032	CENTER	0.1
visor:dus[2]	0.0264105	LEFT	1



List and chart of measured parameters

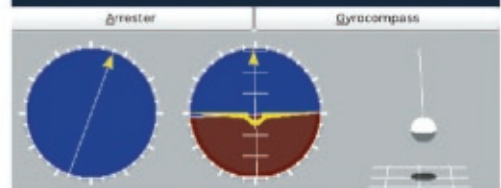


Gamma-ray spectrometer window



Infrared scanner window

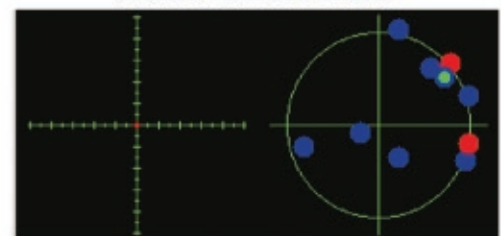
The flexible structure of NAVDAT system allows to execute all updates very quickly and add support of the new devices released not only by Geotechnologies, but also by other manufacturers of the airborne geophysical equipment. There are more than 20 different devices in the list of the supported equipment today.



Gyro system indicator



Indicator of instruments condition



use SAT SN time

<input checked="" type="checkbox"/>	20	37 00:11:33
<input checked="" type="checkbox"/>	25	39 00:11:33
<input checked="" type="checkbox"/>	24	37 00:11:33
<input checked="" type="checkbox"/>	1	37 00:11:33
<input checked="" type="checkbox"/>	13	36 00:11:33
<input checked="" type="checkbox"/>	16	41 00:11:33
<input checked="" type="checkbox"/>	55	38 00:11:33

Lat: 55°46'44,11" Long: 37°21'32,50"
Alt: 0,50 Km Time: 17:52:22

GPS-receiver window

FLIGHT CONTROL

NAVDAT software automatically provides navigation solution in real time. Results of calculations are displayed on special indicators as guidance instructions allowing the pilot to fly precisely and not to waste flight time. The program uses control algorithms, which ensure compliance with the most strict requirements to navigation quality.

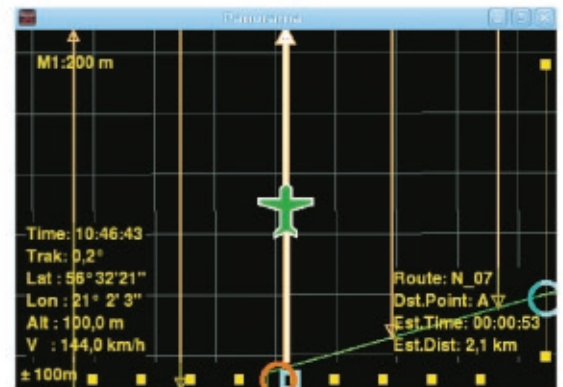
PREFLIGHT PREPARATION

During preparation it is necessary to set only several parameters: allowed values of lateral and vertical deviation, some dynamic characteristics of the aircraft, and to prepare a flight plan in the form of the text file (route list and geographical coordinates of route points). This can be done in Geosoft Oasis Montaj or by special procedure of NAVDAT software.

The pilot can practice to work with NAVDAT indicators using mode of flight emulation. It allows to adjust parameters of flight control algorithm according to pilot's recommendations and to adapt them to his piloting style before real flights.

Name	#	Track	Dist	Time	CurTrack	CurDist	CurTime
+ ▲ dacha	4						
+ ▲ mifi	5						
+ ▲ UNIVER	4						
+ ▲ OSTANK	4						
+ ▲ SHABOL	4						
+ ▲ teplotan	8						
+ ▲ control	2	180.18	11.12	00:00:00			
+ ▲ L_110	2	-0.00	4.13	00:00:00			
+ ▲ L_109	2	180.12	4.13	00:00:00			
+ ▲ L_108	2	179.88	4.13	00:00:00			
+ ▲ L_107	2	359.88	4.13	00:00:00			
+ ▲ L_106	2	179.88	4.13	00:00:00			
+ ▲ L_105	2	359.88	4.13	00:00:00			

Flight plan panel



Flight panorama for a pilot

PILOT'S INFORMATIONAL SUPPORT

In the process of survey the NAVDAT system allows the pilot to orientate easily in the area not distracting him from flight control and not overwhelming him with extra graphic information. The system prompts the pilot with the best trajectory upon transition from one flight route on another, helps to place the route with minimum lateral and course deviations.

NAVDAT can work in two modes during a survey flight.

In the first mode the system tells the pilot the current value of a lateral deviation

from the trajectory. This mode is habitual to many pilots who have an experience

in the surveys. The second option is when the pilot's instructions are based on forecasts that are calculated taking into account current parameters of motion: the linear and angular speed and the course. This mode allows even an unexperienced pilot providing the necessary accuracy of navigation.



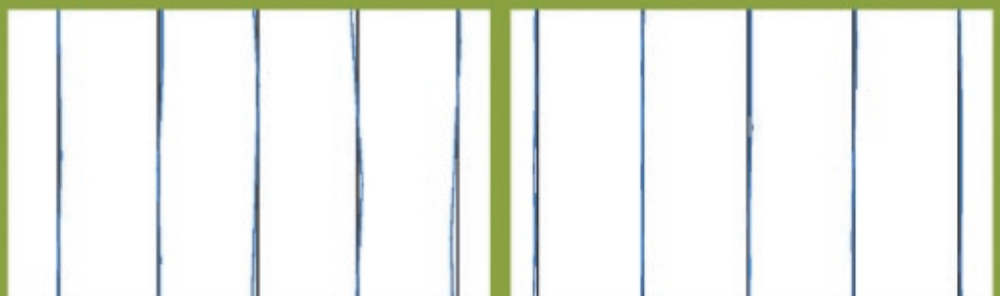
Pilot's indicator in turn mode



Pilot's indicator in route following mode

QUALITY OF NAVIGATION

The same very experienced pilot, the same helicopter (Eurocopter AS350 B3), the same weather and relief.



On the left — path of the flight when first NAVDAT mode was used, standard deviation is 6 meters

On the right — path of the flight when second NAVDAT mode was used, standard deviation is 2 meters. Route distance was 200 meters.

The structure of data exchange in NAVDAT system is arranged in a way that interaction procedures with pilot's and operator's systems are divided. After necessary settings the NAVDAT system is capable of providing interaction with pilot, excluding need of participation of an operator in the survey. In this mode the pilot additionally receives only minimum of messages for decision-making.



Approaching the route.
Pilot's indicator is at the screen on the right from control panel

Technical specifications

Computer	personal computer (laptop)
Operating system	Debian GNU/Linux (Ubuntu), Android
Supported interfaces for data exchange with the equipment	RS-232, USB, Ethernet, WIFI, Bluetooth
Data recording	on a hard drive of the computer
Frequency of updating of navigation information	not less than 10 Hz
Navigation accuracy	2 m (RMS)
Supported GPS-receivers	Javad, Topcon, Novatel
Supported magnetic systems	GT-MAG (airborne), GT-MVS (ground) (Geotechnologies)
Supported airborne electromagnetic systems	EQUATOR, EM4H (Geotechnologies)
Supported airborne gamma-ray spectrometers	RS-500 (Radiation Solution) GRS 410 (Pico Envirotec)
Supported infrared systems	SCAN-T, IKAR (Geotechnologies)
Interaction with the airborne photo equipment	Image georeferencing, Control of exposure moment
Experience of use on helicopters	Mi-8, Mi-2, Ka-26, MBB/Kawasaki BK-117, Eurocopter AS350 B3
Experience of use on fixed-wing aircrafts	An-2, An-3, L410, Cessna-172, Cessna Caravan, Vulcanair P68 Observer
Support & Updates	All Ubuntu apps are downloaded from server, all Android apps - from Google Play. All updates are free.