

GEOMAGNETIC DIAGNOSTIC MODES OF DIGITAL LEVELS

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Problem. Availability of information on the state of electronic geodetic instruments in the field during their calibration between standard and annual calibration tests and studies are extremely important as any factor impact on device (traffic, weather conditions, failure in the electronic system, incorrect use, mechanical and electromagnetic influences, storage) can lead to errors in the measurements, which, in turn, to the distortion of the results of surveying, topographic and geodetic work with unpredictable consequences. Therefore, the issue of electronic geodetic instruments diagnosis is important. This is especially true for field conditions when the service centers of manufacturers are away.

Analysis of research and publications relating to this problem.

Many scientific and industrial research papers devoted to the problems of diagnosis and electronic surveying instruments. Basically the study and diagnosis of electronic devices carried geodetic surveying methods, including: the authorized distributor of geodetic instruments manufacturers, public enterprises Standardization and Metrology Standard Ukraine [1, 2]. Application of geophysical methods for these purposes is not reflected in the scientific literature.

Remaining part of the overall problem. Technical diagnostics according to ISO - the definition of the technical state of the object with a given accuracy. In our case - the definition of the geomagnetic field surveying instruments using quantum magnetometer with a certain mean square error of measurement. Using geomagnetic diagnostics for technical

diagnostics (test, workplace) electronic geodetic instruments has not applied.

Research objectives (problem problems). Check correctness of the assumptions in practice on the use of micro-magnetic work for the diagnosis of modern electronic devices as an example of digital leveling. On the basis of the experimental field of micro-magnetic field experimental work to develop a diagnostic study of modes of electronic geodetic instruments.

The main material problems. Each mode of electronic surveying instruments meet certain electromagnetic pulse. Modern quantum proton magnetometers and this momentum can determine with high accuracy. This raises the question of how it can be used for diagnostic devices. Micro-magnetic survey can be used to install or prevent defects and defects in both the device. Among the advantages of the use of magnetometers [3] for the purpose of diagnosis of electronic geodetic instruments include the same temperature range working with geodetic instruments [4, 5] and the availability and ease of obtaining geomagnetic information and its interpretation surveyors. The benefits should also include the possibility of preventing faulty state geodetic instruments. The disadvantage is that this method is a field. Measurements indoors geomagnetic field is distorted electromagnetic fields utilities buildings and limited use in magnetic disturbances.

Research geomagnetic fields of digital leveling Leica SPRINTER We have created the following modes:

- a) the unit is turned off, no power supply;
- b) the device is turned off, the power supply;

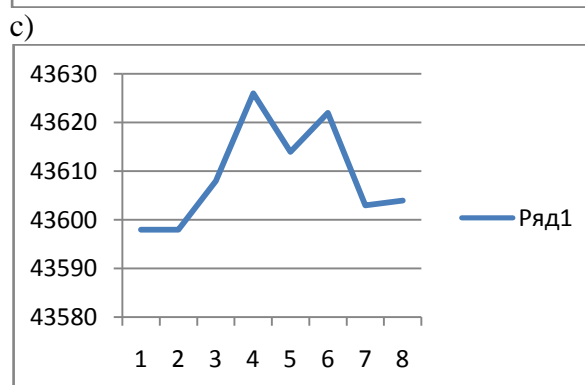
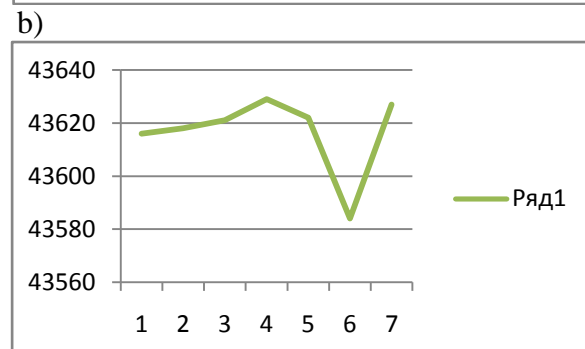
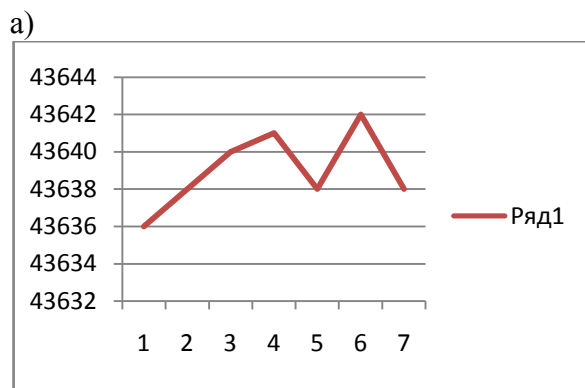
c) the unit is turned on, the regime and the excess length;

d) the unit is turned on, the mode exceeded.

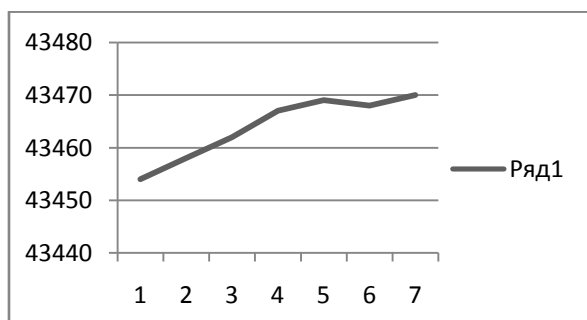
In the first phase installed digital magnetometer and leveling the base point (Pic. 1). During the second phase of the geomagnetic field measured for different modes. For measurements used pedestrian (field portable) magnetometer MM-60. Examples of research results are presented in Table and Pic 2.



Pic. 1 Installing digital magnetometer and leveling the base point



d)



Pic. 2 Visualization research results geomagnetic field digital leveling for different modes of operation (a, b, c, d). Along the axis Ox delay time in minutes, Oy – value of the geomagnetic field, nT,

Example results of measurements of the geomagnetic field quantum magnetometer MM-60 for different modes of operation of digital leveling

№ of measurement	Modes of digital leveling							
	a		б		B		Г	
	Time h., min.	Countdown, nanoTesl (nT)	Time h., min.	Countdown, (nT)	Time h., min.	Countdown, (nT)	Time h., min.	Countdown, (nT)
1	11, 55	43454	12, 03	43636	12, 23	43598	12, 32	43616
2	11, 56	43458	12, 04	43638	12, 24	43598	12, 33	43618
3	11, 57	43462	12, 05	43640	12, 25	43608	12, 34	43621
4	11, 58	43467	12, 06	43641	12, 26	43626	12, 35	43629
5	11, 59	43469	12, 07	43638	12, 27	43614	12, 36	43622
6	12, 00	43768	12, 08	43642	12, 28	43622	12, 37	43584
7	12, 01	43470	12, 09	43638	12, 29	43603	12, 38	43627
average		43464		43639		43609		43617

In reference authors understand the results obtained measurements of geomagnetic fields on the basic points, which perform research and verification devices, or place of manufacture geodetic instruments, with known geophysical, geographical and geodetic data.

Performing similar measurements over time, they can be compared with reference data obtained on the base point, in this case the table. 1 and Pic. 2. If it is found differences in the values of the geomagnetic field device, it is necessary to perform calibration of the device and its research and test electronic system. That geomagnetic field control device may be an additional diagnostic tool operational. The problems requires further research, and plan to do the authors.

Conclusions. The investigations have shown the possibility of using quantum magnetometer foot to previous technical diagnostics modes of digital leveling and therefore other electronic surveying instruments. Submitted geomagnetic diagnosis is a subsidiary and precautionary in nature, namely discrepancy results of magnetic diagnostic reference would mean that

electromagnetic processes in digital electronic assemblies geodetic instruments are in crisis.

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A field experiment and proved the applicability of pedestrian quantum magnetometer MM-60 (MMP-304) for geomagnetic diagnostic modes of digital leveli

