LTD. «TAGART-UKRAINE»

ACOUSTO-MAGNETIC EAS SYSTEMS
INSTALATION AND SETUP GUIDE

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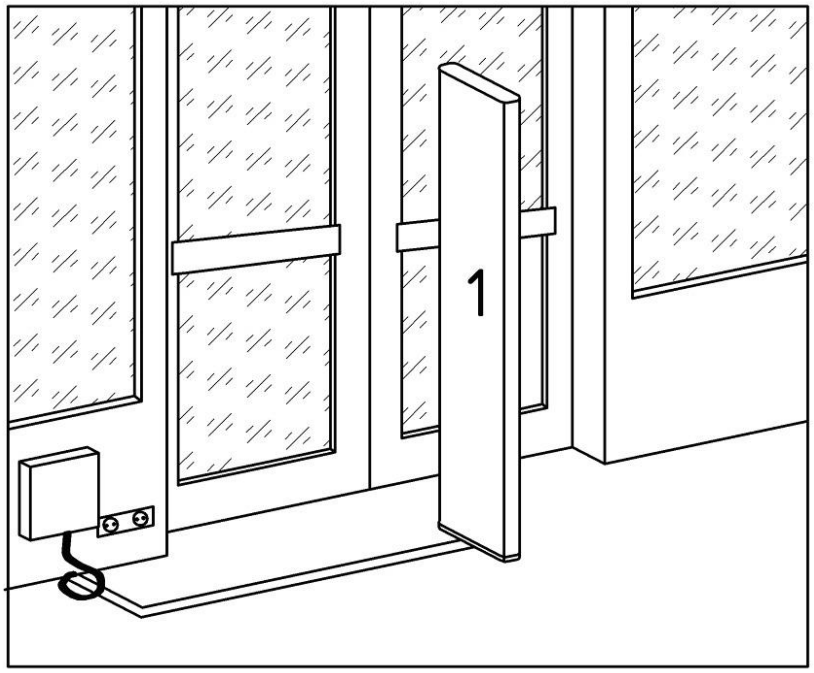
1. System configuration

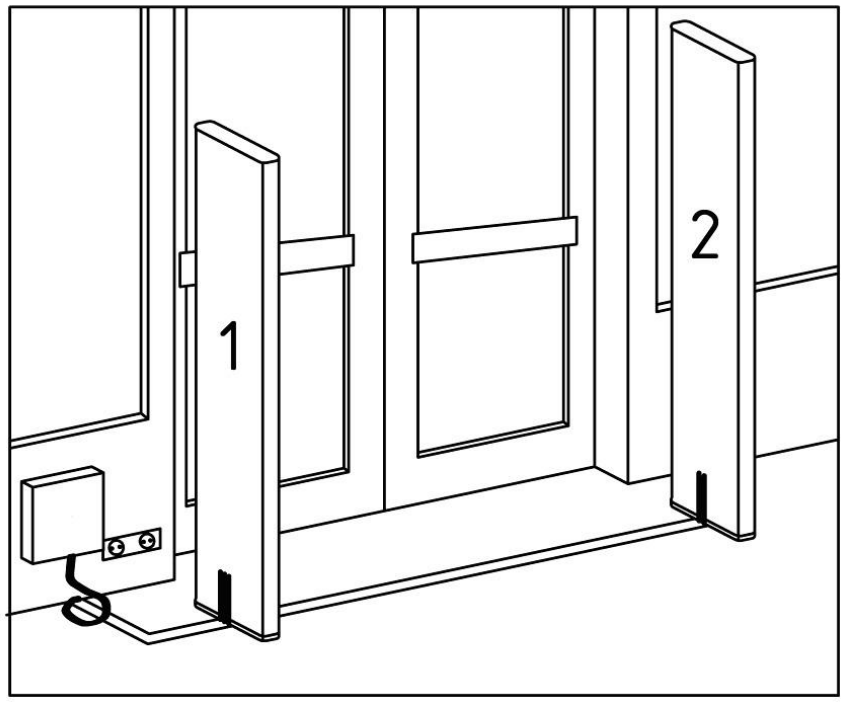
System configuration depends on width of pass which needs to be protected with the acousto-magnetic systems.

Possible configurations of acousto-magnetic systems:

1) Single pedestal: provides up to 0,8 m of coverage from each side of pedestal;



2) Dual pedestal: protection of an exit up to 1,8 m wide between pedestals and up to 0,8 m from each side of pedestal;



2. Equipment set

Check completeness of the equipment according to Table 1.

Table 1

System configuration	Electronic unit, pcs	Antenna pedestal, pcs	Antenna cable, pcs	Signal cable, pcs	Power supply cord, pcs
1 rack-mount	1	1	2	1	1
2 rack-mount	1	2	4	1	1
3 rack-mount	1	3	6	1	1

Note *Completeness of the equipment is specified with a condition of setting of one indicator pedestal, parallel connection of several indicator pedestals though is possible, but it is not supposed in a standard configuration.*

- Antenna and signal cables in length of 6 meters;


- Power supply cord;

- USB A-B cable for system adjustment;

Use shielded and filtered short USB cable to avoid electromagnetic disturbances.

- Four (or two, according to configuration) anchors for mounting of each antenna pedestal;

- Installation tools.

For the setup process you will need:

- Portable computer with installed software (see *Software Installation* - Appendix 1);

- Several activated acousto-magnetic labels.

3. Choice of installation site

Choice of installation location is defined by requirements of the object itself, however there are details inattention to which may result in additional costs in time, money and nerves of the customer.

STRONGLY RECOMMENDED test the system without rack-mount antennas before mounting and only after that start their installation.

The choice of an installation site of pedestals is defined by following requirements:

1) Pedestals should be located one opposite to another.
2) Distance between pedestals should not be bigger than specified for selected configuration (see item 1)

Presence of background noise reduces detection area, therefore mounting of pedestals without verifying system serviceability ***is not recommended.***

3) Location of antenna pedestals should protect all possible ways out.
4) Indication pedestal should be located in a visible place for guard.
5) Pedestals should be placed as far from the source of electromagnetic interference, such as power supply, PC system unit, ATM, payment terminal, etc.
6) All goods on counters and stands, protected by labels, should be located outside the detection area of the system (at least 1.5 meters from the nearest pedestal).
7) Whenever possible, stands should be carried out for an exit line.

8) Surfaces under the pedestal's base must be smooth, otherwise it is recommended to align the base by means of the additional materials enclosed under the base.

At a choice of an installation site for the electronic unit it is important to provide following restrictions:

1) Distance from electronic unit to antenna's pedestals is limited by a length of antenna and signal cables (should not exceed 6 m)
2) Power outlet should be located on a distance that does not exceed the length of a power supply cord near by the electronic unit. The socket should be protected from casual switch-off.

3) Access to the electronic unit should be left free.
4) It is necessary to provide bringing of cable from antenna pedestals. If the cable of greater length than it should, cable should be stowed compactly.

Do not change the length of the antenna and signal cables, otherwise the system sensitivity can be significantly reduced. If the change cable length is necessary, use the Table of switching of resonance capacities which is on each antenna pedestal or consult a technician by phone listed on the site www.tagartworks.com, or send a request to the address mail@tagartworks.com.

The table of switching of resonance capacities is located near a resonance board of the antenna from each resonance battery of condensers. In the right column the lengths of a cable of switching is specified in meters.

An example of a Table of switching of resonance capacities

						1.5
						3.0
						4.5
						6.0

There is a probability of false alarm of the system at casual hit of a label on a coil of an antenna cable.

5) Electronic unit and cables should not hinder staff.

4. Connection of the electronic unit

For connection of the electronic unit to antenna cable it is necessary to fulfill following actions:

1) Unreel the antenna and indication cables.
2) Locate the antenna and indicator cables along the stacking line.
3) Install the connectors of the antenna cable into the antenna plugs, and the connectors of the indicating cable into the indicating plugs of the electronic unit. Connection of the antenna's windings should be consistent, for example, lower winding of pedestal 1, upper winding of pedestal 1, lower winding of pedestal 2, upper winding of pedestal 2.This will simplify the subsequent adjustment of antennas.
4) Connect USB A-B cable in USB-port of the electronic unit and USB-port of the personal computer.
5) Connect the power supply cord to the power connector of the electronic unit.
6) Connect a supply cord to a network. The LED should light up in the electronic unit.

5. Connection of antenna pedestals

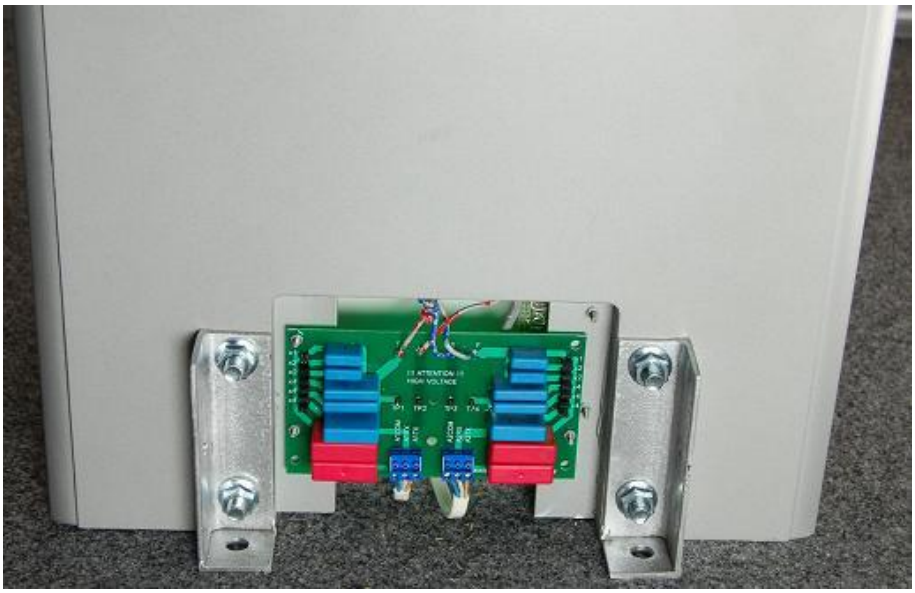
For connection of Aquarelle antenna pedestals to antenna cable it is necessary to fulfill following actions:

1) Using a hexahedron unscrew the upper acrylic cover of the pedestal.
2) Determine the direction of the capacitor unit at the bottom of the pedestal and remove the plastic sheet at the side the connectors of the capacitor unit through the top of the pedestal.
3) Place the acrylic cover to its original place to prevent the violation of the design in the process of adjustment and installation.

4) Pass connectors of antenna cable through a hole in the base.
5) Connect connectors of antenna cable to connectors on a capacitor board.
6) Connect the indicating cable for the indicator pedestal.
7) Install antennas in a mounting place.

For connection of an antenna stand to an antenna cable it is necessary to fulfill following actions:

1) Using a screw-driver remove a side cover.
2) Connect connectors of antenna cable to connectors on a capacitor board.
3) Connect the indicating cable for the indicator pedestal.
4) Install antennas in a mounting place.



6. Configuring the software

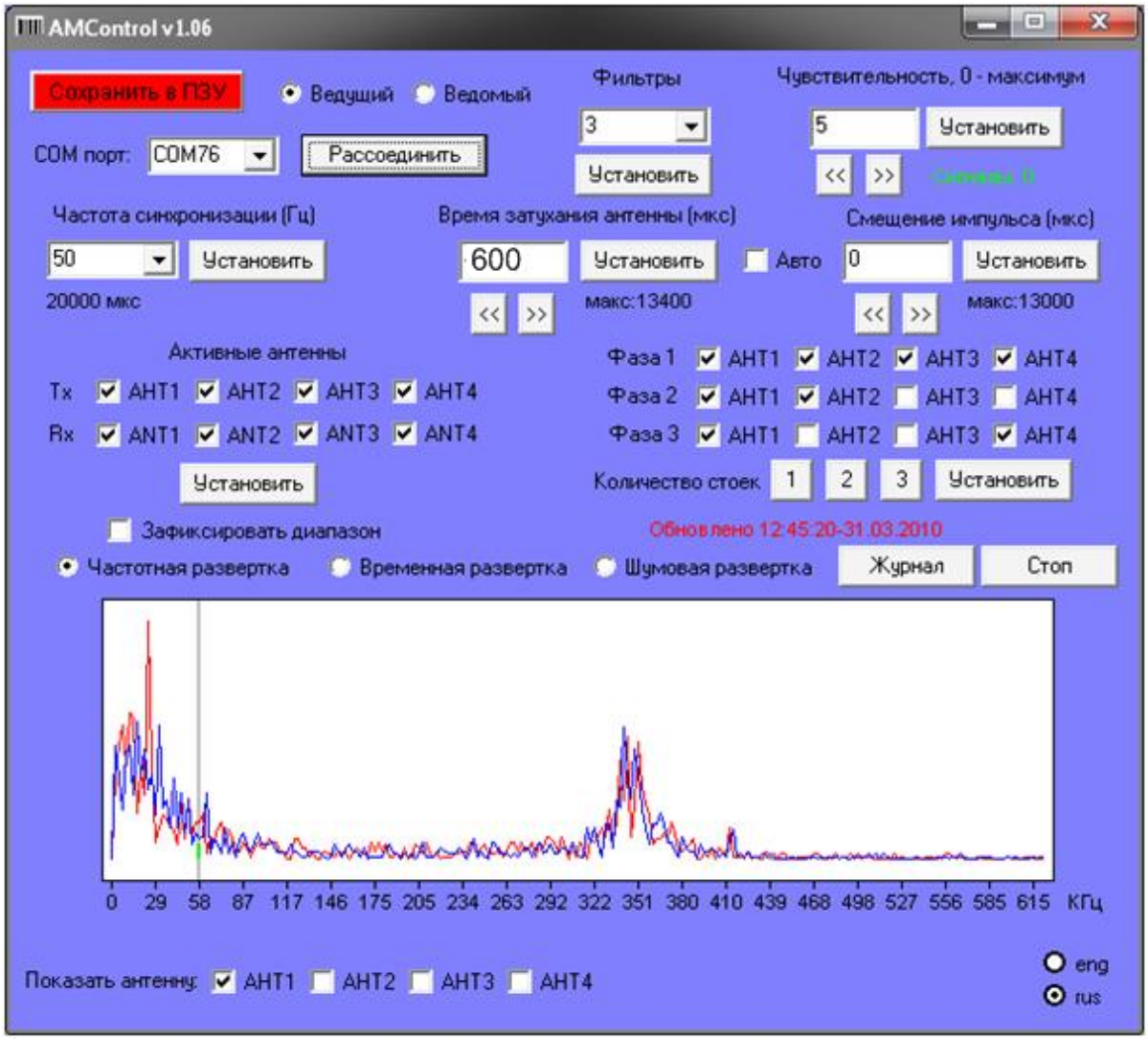
Accumulator transducers of certain models of portable computers can cause interference at frequencies close to 58 kHz, so it is desirable to set the computer for adjusting at a distance more than 1.5 meter to the nearest pedestal.

6.1. COM-port choice

1) Launch the program AMControl.exe
2) Select active COM port on which the connected electronic unit works.

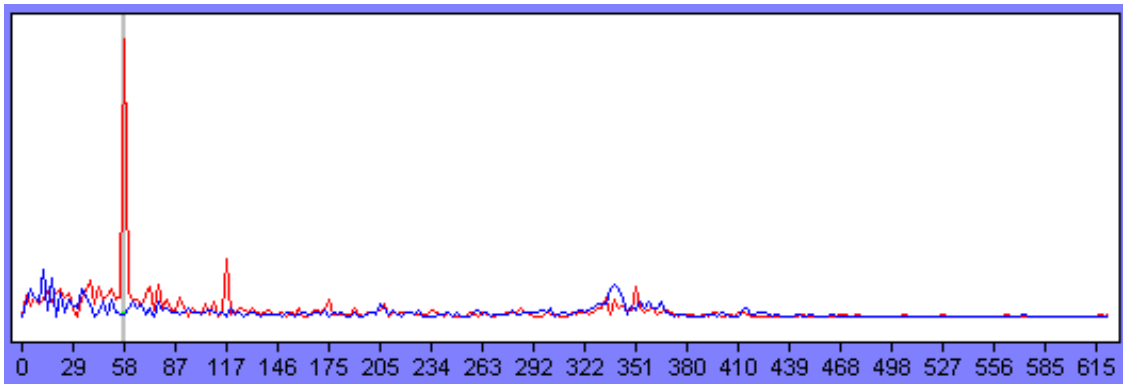
3) Push the button *Connect*.

In the configuration window shall appear red and blue curves corresponding to the spectral characteristics of the active (red line) and background (blue) signals. At the first connection all settings will be installed on default values.

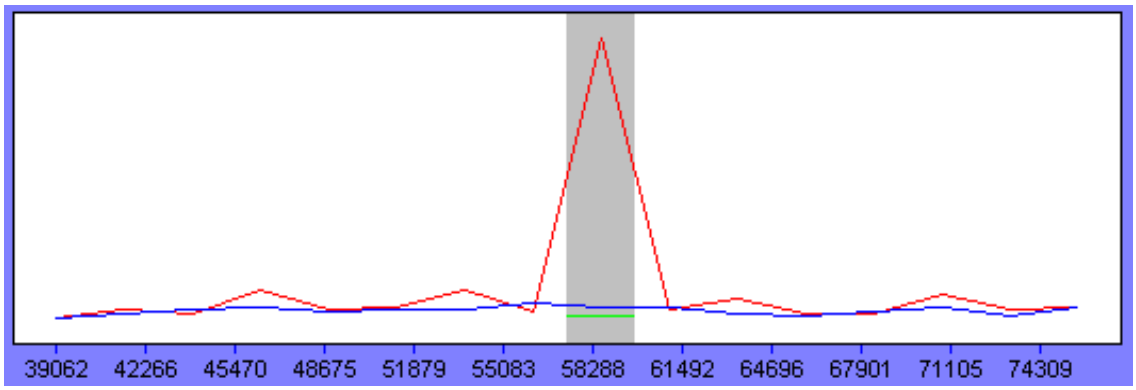


Double click by the left button of a mouse in an analysis window in modes of the frequency or time base changes detailing of the deduced data.

The frequency sweep without detailing is shown below:

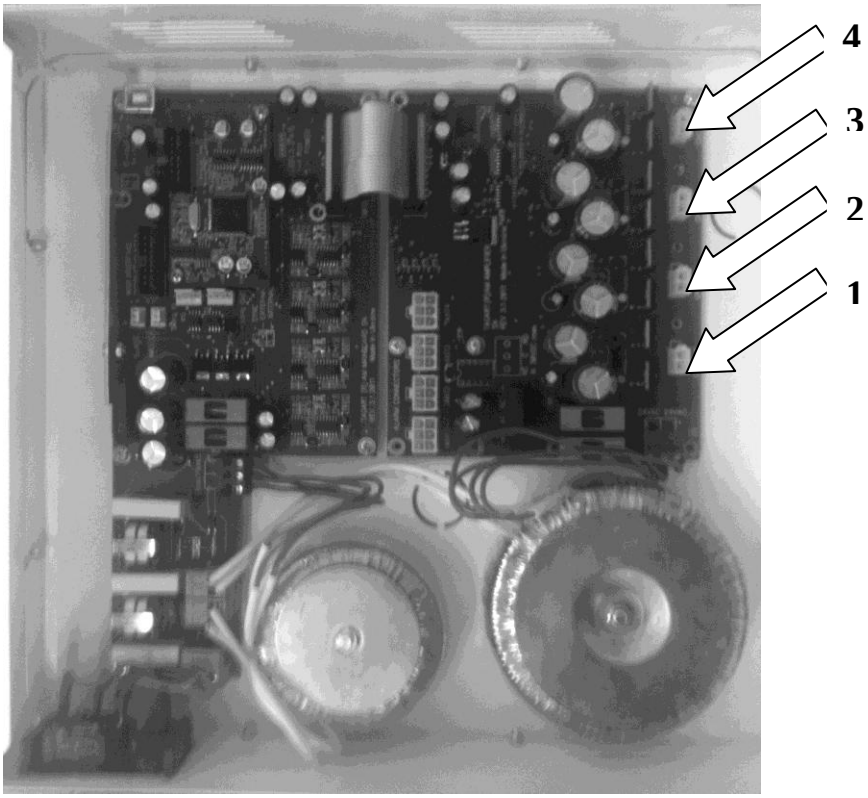


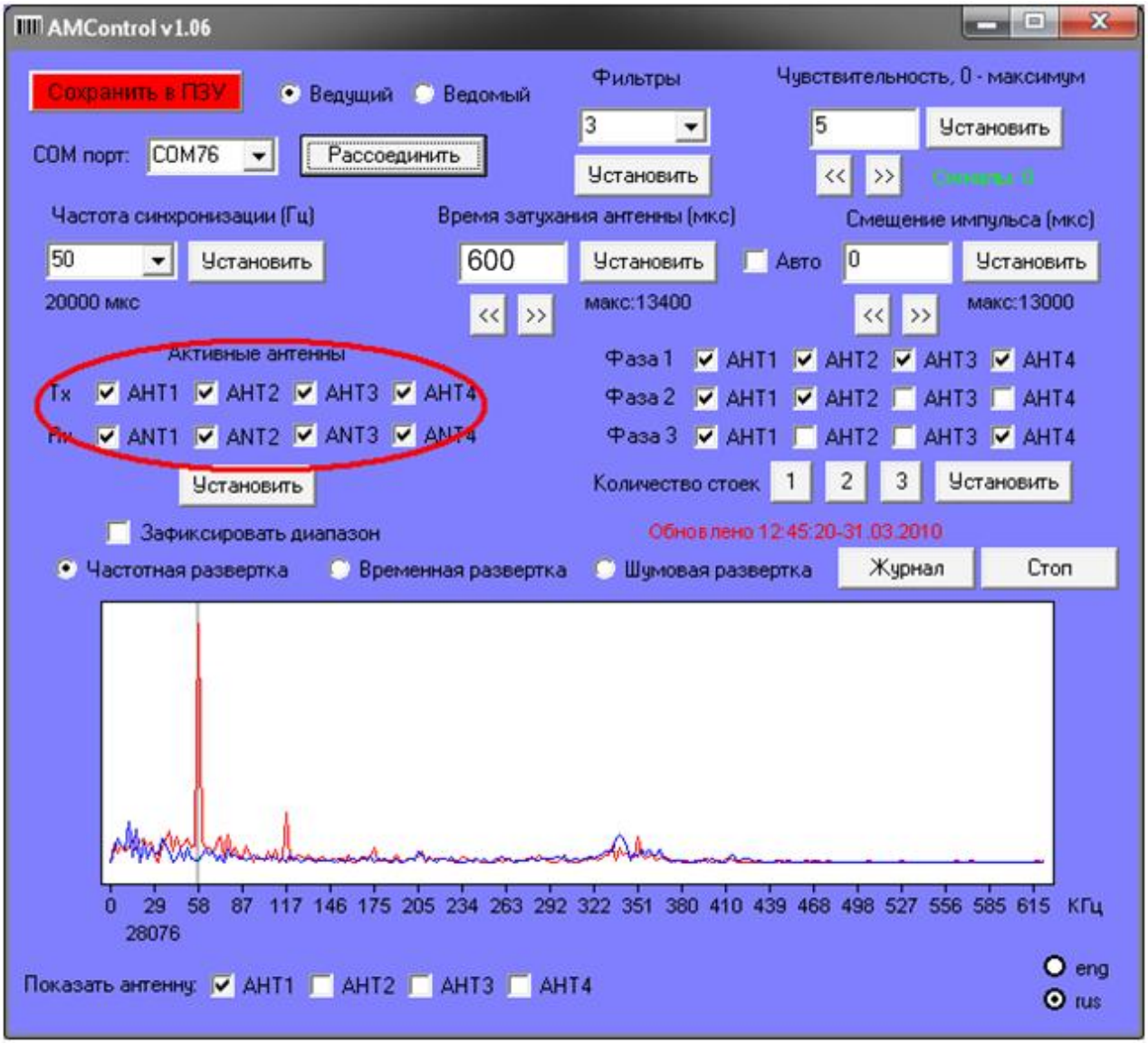
Increased detailing:



6.2. Selection of active antennas

Correspondence of antennas in the software and in the electronic unit it is shown below.





Connecting and disconnecting the active antenna it is possible to activate or deactivate the antenna's windings.

It is possible to enable or disable antenna's windings separately for transmission (Tx) and reception (Rx), should be switched off pairwise Tx – 1 and 2; 3 and 4.

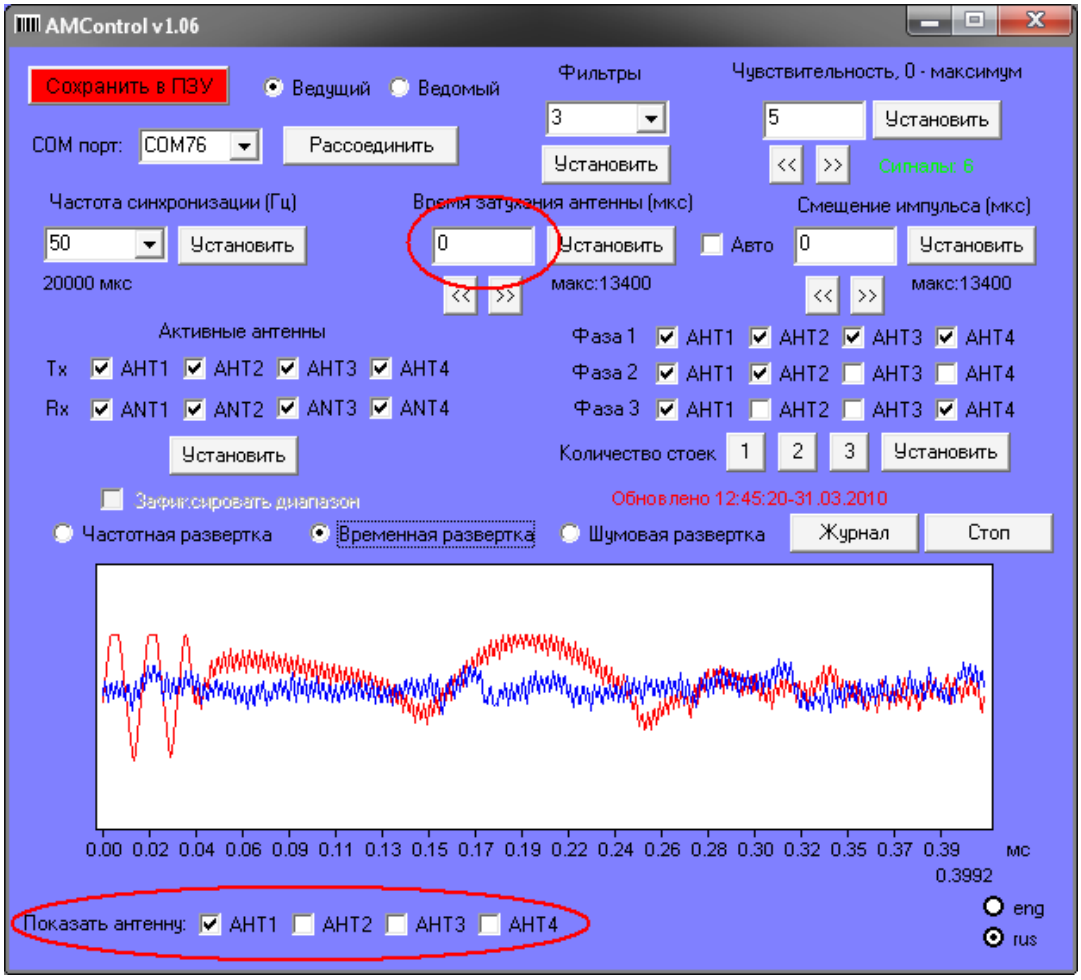
To verify the physical compliance of the winding with a certain number of the antenna, activate the antenna and bring the DR label on the distance of 2-5 cm from the winding - the active winding will "pump up" the label with a typical vibration.

6.3. Set the damping time of the antenna

Select the mode *Time base*.

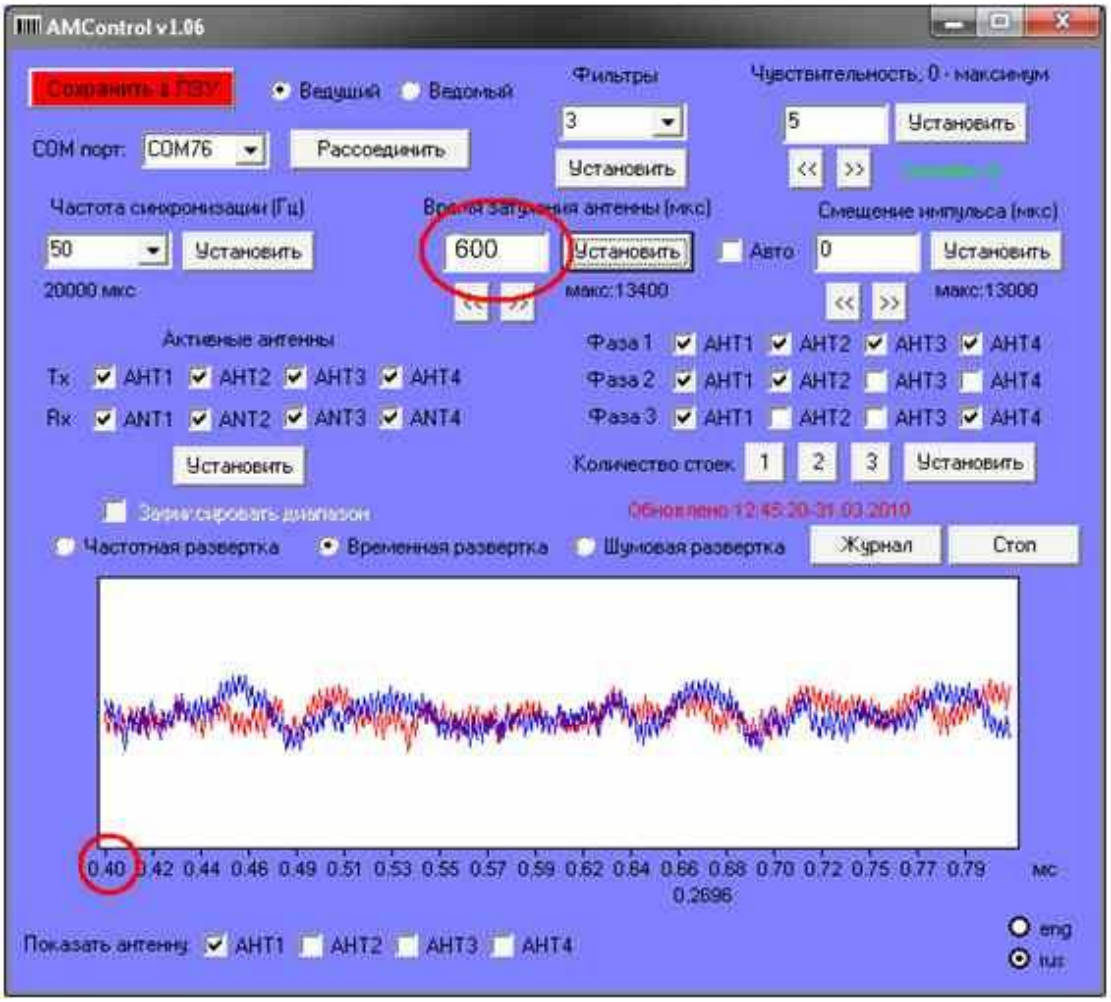
In the configuration window will appear the oscillogram of active (red curve) and background (dark blue curve) signals. In the area *Time of attenuation of the antenna* place number 0 and push to *Apply*.

Switching between all antennas define minimum offset at which red and dark blue curves will be as much as possible close among themselves for all active antennas.



Typically, the offset value is in the range 400-500 microsecond. Set the offset by clicking the right mouse button facing necessary offset, or enter a number in the area Time of attenuation and push the button *Apply*.

Clicking the right mouse button to Time base mode sets the decay time of the antenna equal to the displacement of pointer in the configuration window.



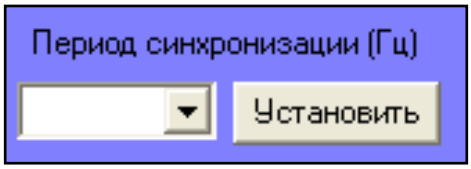
6.4. Setting the synchronization period and offset of pulse

Synchronization of antennas is necessary in following cases:

1) Several acousto-magnetic systems are placed.

If all systems are produced by TagArt, it is possible to use software or hardware synchronization.

Software synchronization assumes setting of parameters the Period of synchronization and Offset of pulse so that each of antennas worked in their proprietary temporal interval and did not hinder the robot of adjacent system.



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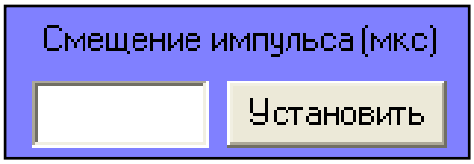
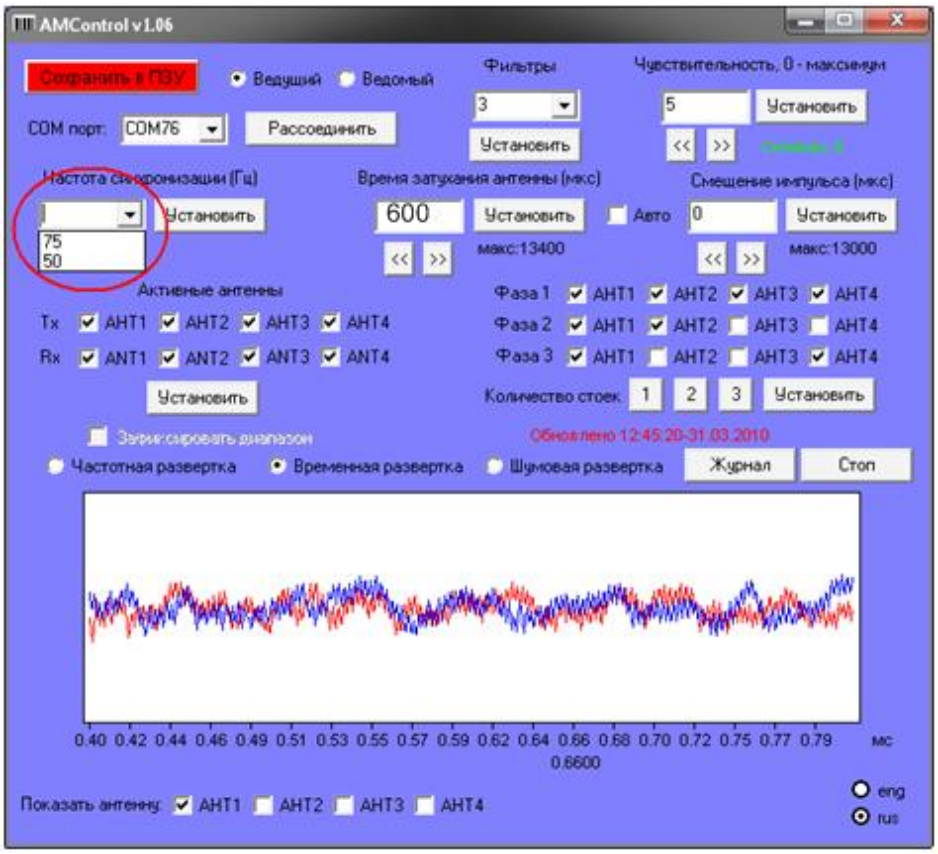


Hardware synchronization assumes connection of electronic units by means of a synchronizing cable, accordingly it is necessary to provide cable conducting. On a board of the electronic unit is situated the synchronizing connector to which joins the synchronization cable. In hardware synchronization one of the systems is assigned conducting (area Master), remaining systems – slave (area Slave). Parameters the Synchronization period and Offset of pulse matter only for Master system.

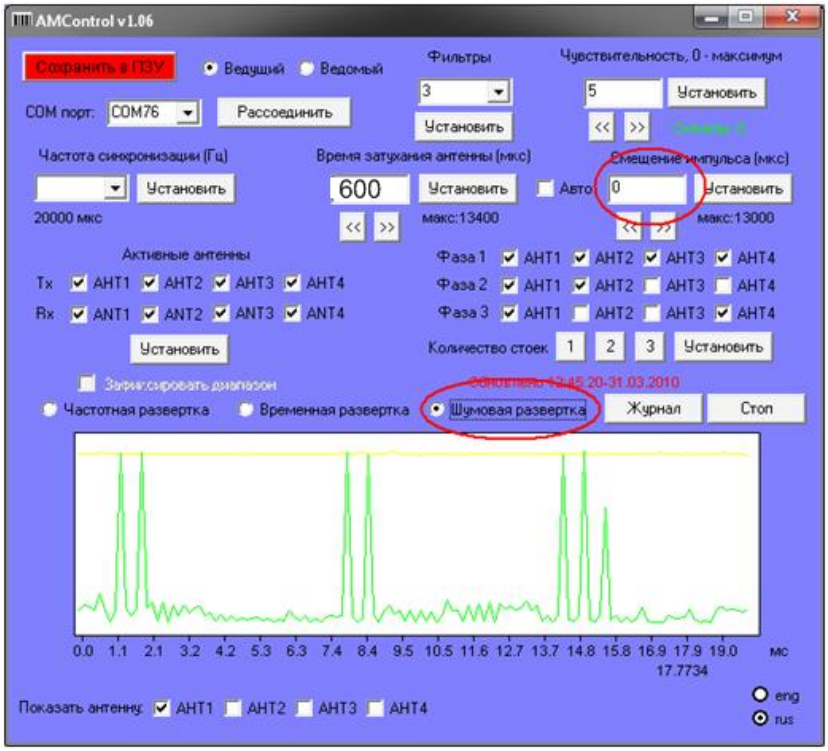
2) Periodic jumps at the analysis band of the frequency sweep are evident (band analysis is highlighted in gray background). Others acousto-magnetic systems, power supplies, lighting instruments etc. can be sources of periodic noises. In most cases, periodic disturbances occur with a frequency of oscillation of 50 Hz alternating current (period is 20000 microseconds), however acousto-magnetic systems of the majority of manufacturers including systems of TagArt, can be synchronized to an additional frequency 37 Hz (period is 13 334 microseconds).

For elimination of periodic noises fulfill following actions:

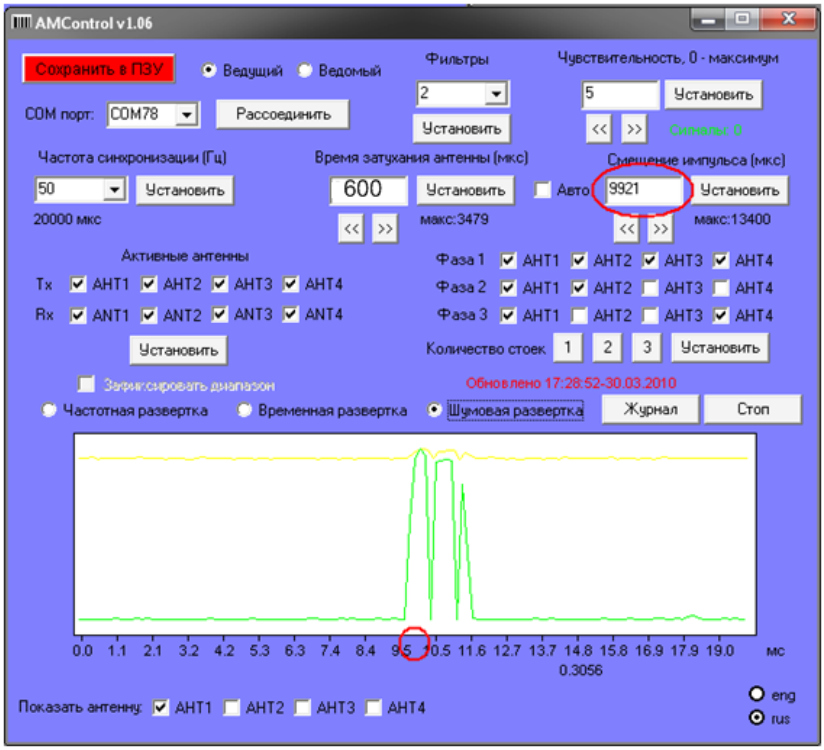
1. Set the Synchronization Period of 50 Hz or 75 Hz.



2. Switch to the mode of *Noise base*. Noise scan shows the noise level during one period of synchronization in the band 57-59 kHz (green curve) and in the band 0-200 kHz (yellow curve).

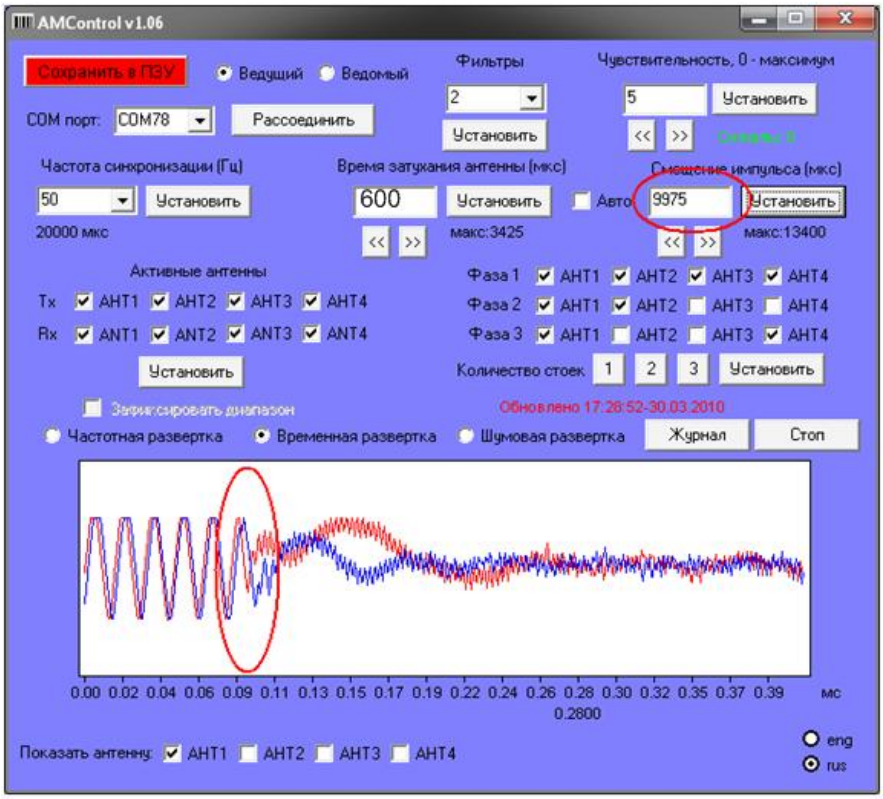


If the noise in a band 57-59 kHz has periodic character and repeats with frequency of 50 Hz or 75 Hz, level of a green curve on some segment will be saved permanently high from a frame to a frame. For elimination of influence of a periodic noise it is necessary to drift the pulse beginning in a point, free from noises. On the schedule of noise scanning select a point in which the amplitude of a green curve is saved minimum throughout several frames, and click by the right button of a mouse in the given point– appropriate value will be copied in the field. Value *Offset of pulse* can be entered manually, thus do not forget to push the button *Apply*.

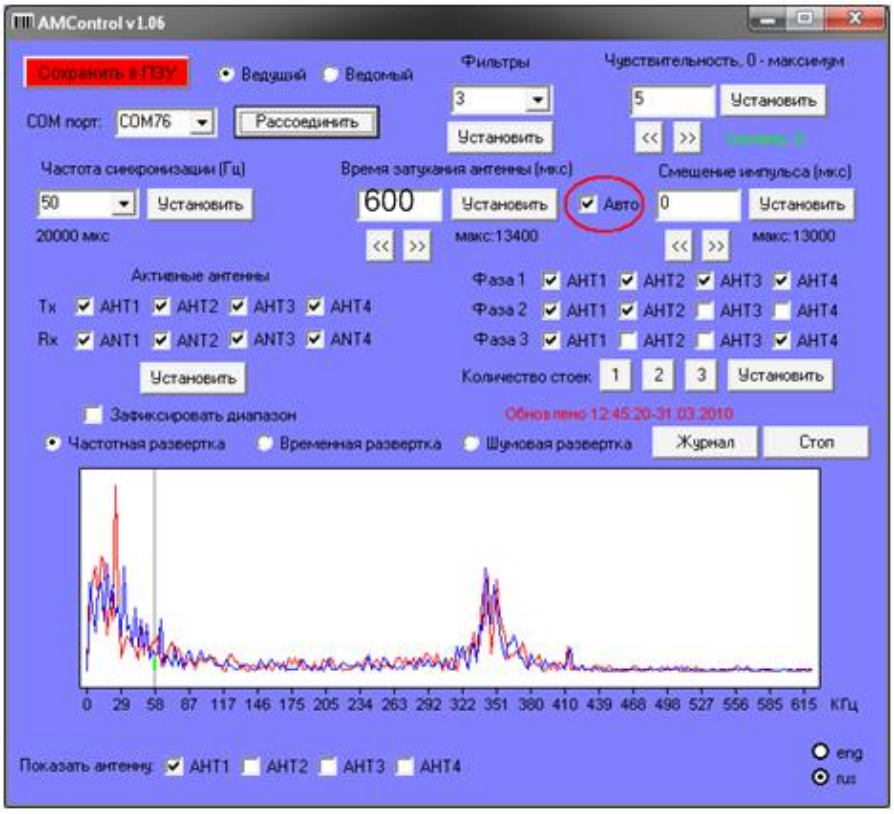


Clicking the right mouse button in the window of noise scanning automatically installs Offset of pulse.

After that, switch to the mode Time base and tune the curves as close as possible to each other (red curve - it is a signal from the customizable system, dark blue - signal from remote system with which it is necessary to be synchronized.

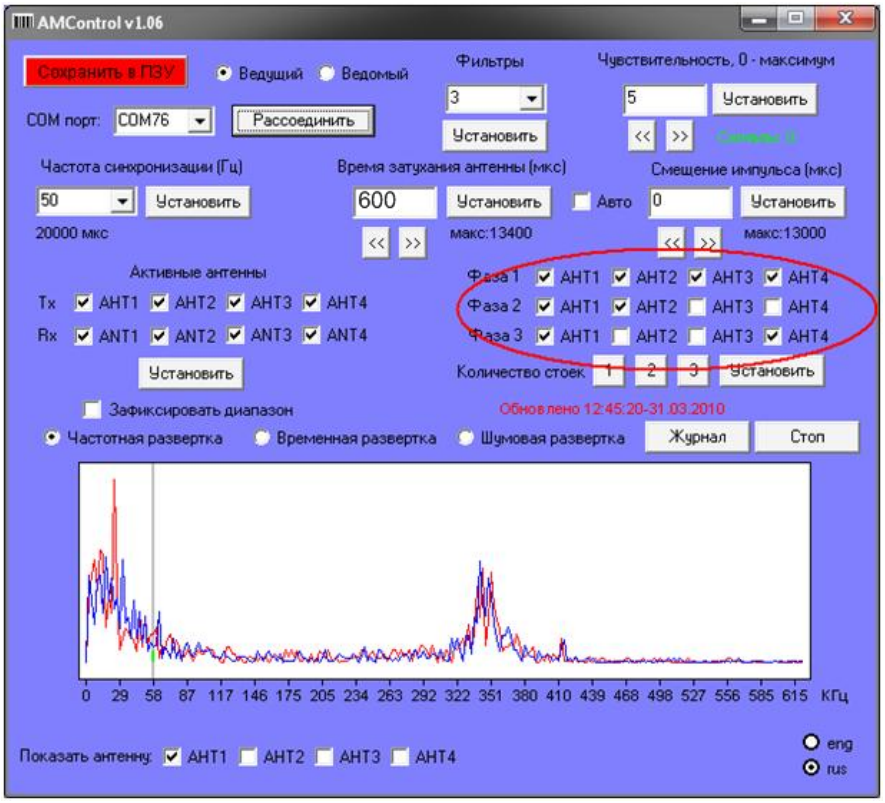


Synchronization of acousto-magnetic systems of different manufacturers is not always possible. If to install synchronization it was not possible or there is a suspicion that periodic noises break quality of system operation, activate the field Auto – in this case the system will define the best place in broadcast automatically. However autotune can worsen operation of adjacent systems, therefore we do not recommend to use this mode if the other acousto-magnetic system are installed nearby.

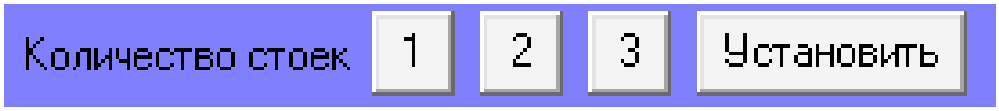


6.5. Antennas pshasing

Antennas phasing leads to addition or subtraction of the magnetic fields formed by currents in windings of antennas. The stronger the magnetic field is, the higher is the probability of detection of tags, deployed along the magnetic field vector. Setting of antenna's phase corresponds to the task of a choice of an optimal configuration of a magnetic field at which the probability to miss a label during its pass through protection system, is minimal.

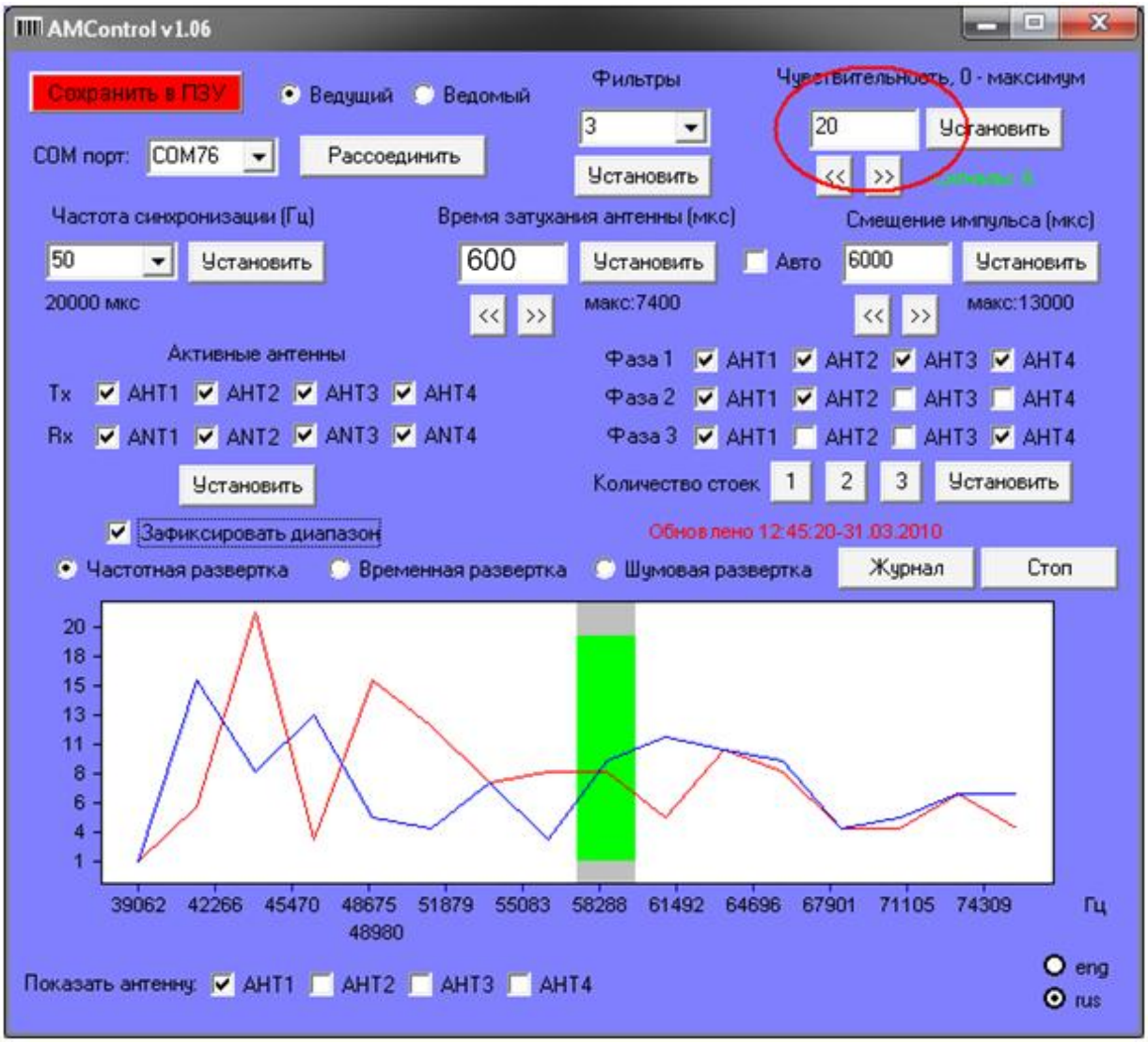


Default setting can be restored by selecting the amount of pedestals.



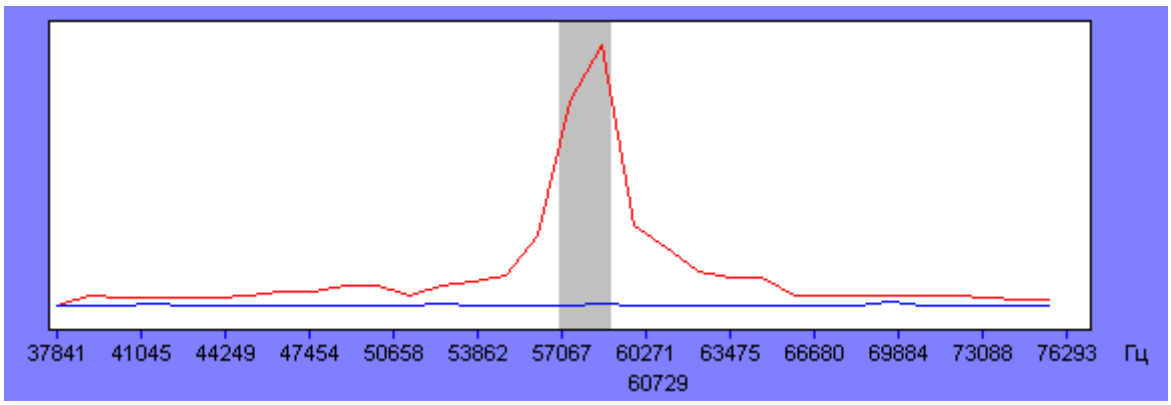
6.6. Change of sensitivity level

Sensitivity of the system can be reduced by means of the field Sensitivity. Thus the signals, which level are below Sensitivity level (green column), will be ignored by system.



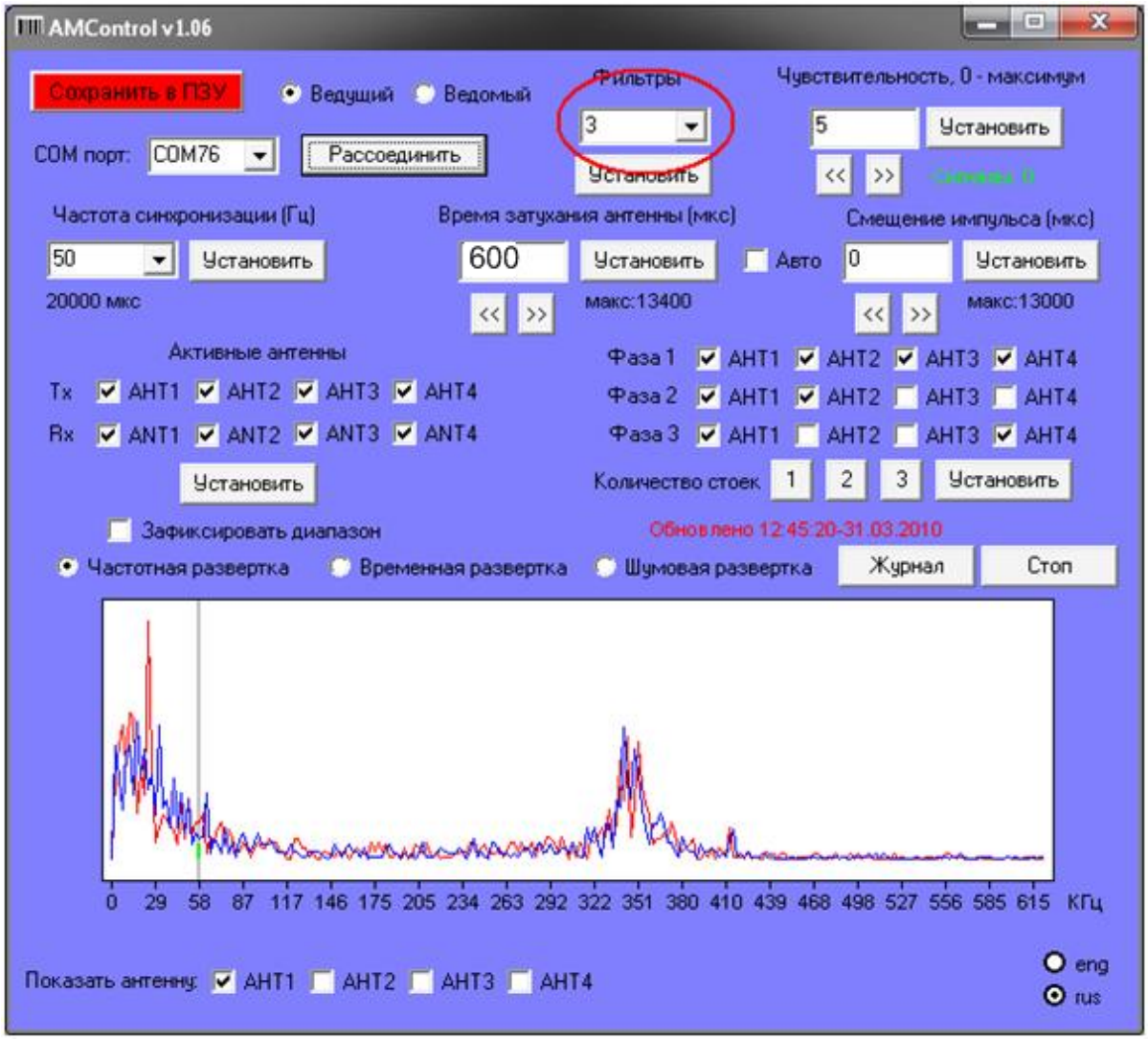
Decrease of sensitivity can be necessary in case if the goods with labels fall at the field of operation of antenna pedestals and their shifting on bigger distance is not possible.

The label presence can be checked on the frequency base: if the level of the red curve in the band of analysis (gray background) is significantly higher than background levels (blue line), this indicates the presence of the label..



6.7. Lowering the probability of false operation

To reduce the probability of false operation it is necessary to increase the amount of filters.



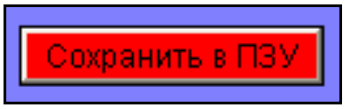
The principle of operation of filters based on the analysis of adjacent frequency bands, so the increase of the filters amount can reduce the sensitivity of the system.

6.8. Event log

The event log stores information about the last 10 operation and the numbers of antenna's windings in which operation occurred.

After disconnecting the power supply from the system the data about operations is not saved.

Do not forget to save the installed parameters by means of the button Save in ROM.



Time of the last update of parameters in ROM is deduced in a program window with red font.

6.9. Verifying the system functionality

Check the functionality of the system in the selected site. After turning on at the indicator antenna pedestal should light up an intermittent green light signal. After depositing acousto-magnetic labels in the system operative range the red LED should light up on the indicator pedestal and the sound signal should ring. Generally, verification of the magnetic field is fulfilled in three positions of a label – horizontal, vertical and longitudinal. Carry in the active label in various positions by turn and define the sensitivity of the system. If sensitivity is comprehensible, it is possible to start system mounting.

If not, the following options to improve system performance are possible:

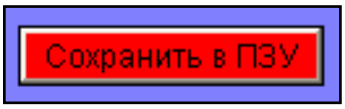
1) If the setup program is launched, push Stop or close the program.
2) Disconnect the computer for conducting setting.
3) Switch in a mode *Noise scanning* and change the *Offset of pulse*.
4) Check up correctness of connection of phases of antennas.

If the sensitivity was not refined:

1) Check up serviceability of a label.
2) Check up that all adjustments have been saved in ROM. For this purpose open the setup program and check up parameters.

3) Check up the operation of antenna windings.
4) Check up level of noises. If noises on frequency 58 kHz are too high (more than 30 units), try to find and eliminate their source.
5) In certain cases the source of noises can be out of a band 58 kHz, however at high level of noise it can lead to muffling of receiving circuits of system. In this case it is necessary to reveal and eliminate a source of noises. In a case if the source of noises is found, try to disconnect, or to replace, or to screen a source of noises.
6) If the zone of nonsensitivity of antennas is in the center between the pedestals, we recommend to drift the pedestals closer to each other. That means that level of indoors noises is too high for the given distance.

After making any changes do not forget to save installed parameters using the button to Save in ROM.



7. Elements of indication

Indication of the system includes three LEDs on the antenna pedestal and sound signal. LEDs on the antenna pedestal have the following meanings:

Green LED - in a normal operating mode should blink with a frequency once every 2 seconds.

Red LED glows in following cases:

- The active label is detected.
- The parameter *Time of attenuation of the antenna* is installed on too small value, that means that antenna accepts its own signal of pump.

Dark blue LED glows in the presence of a constant noise, for example, at attempt of muffling of system.

Sound signal works in following cases:

- The active label is detected.
- The parameter *Time of attenuation of the antenna* is installed on too small value, that means that antenna accepts its own signal of pump.

All signals are triggered when the system is connected to a power source. If any of signals does not work, it is necessary to check up serviceability of the system.

8. Installation of the electronic unit

Before installation, disconnect the electronic unit from the power source.

The electronic unit is packed into metal boxing of standard DSC-4000. Mounting of the electronic unit can be performed both on horizontal and on vertical surfaces. Before installing, please review the limitations specified in paragraph *Choice of installation site*.

9. Installation of antenna pedestals

Before installation, turn off the power supply of antenna pedestals.

If the system's setting process passed successful, you can start assembling the antenna pedestals. Before installing, please review the limitations specified in paragraph *Choice of installation site*.

In the antenna base are allocated two (model Aquarelle) or four (model Sly) anchor holes with a diameter of 12 mm. Define exact layout of antenna pedestals taking into account the track for cabling and by means of a marker or a pencil mark the centers of the future holes. We recommend to markup the centers for all antenna pedestals simultaneously. Be sure to check the symmetry of the holes for all the pedestals.

Before the beginning of drilling and laying of the cable channel, place the antenna pedestals in a remote location to prevent their damage.

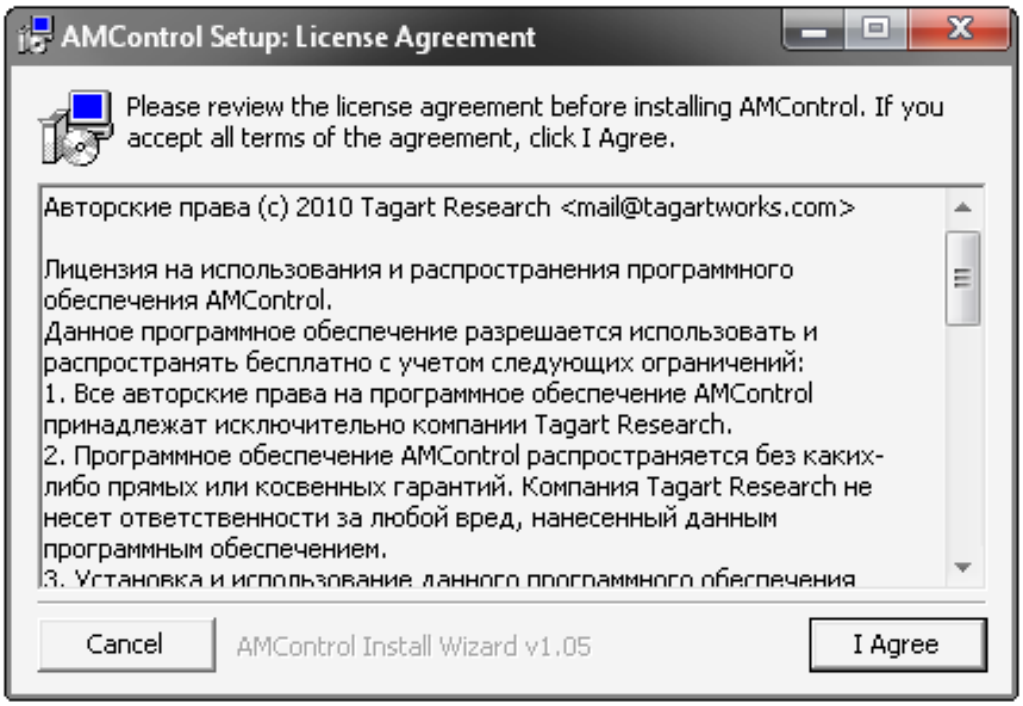
After fastening Aquarelle pedestals by anchors to the floor, install plastic sheeting through the top of the antenna pedestals. Secure the upper acrylic cover, slightly tighten the fixing screws, then thoroughly align the side profiles and tighten the screws more reliably.

SYSTEM IS READY FOR OPERATION

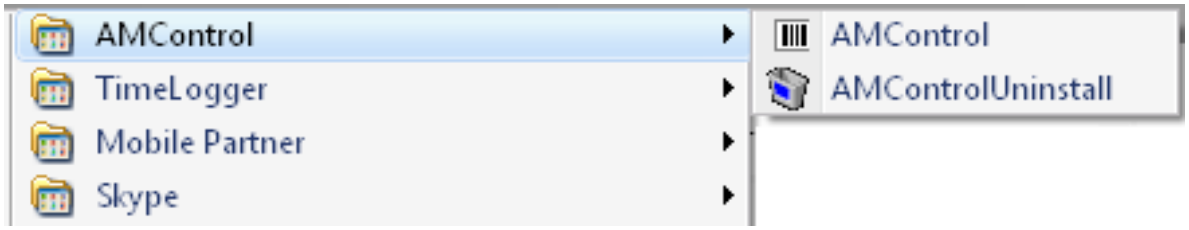
Appendix 1
Software installation

Software is available to operating systems Windows 2000/XP/Vista/7.
Copy and install a file AMControlInstall.exe on your computer.

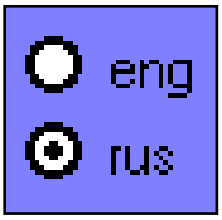
The installation file contains all necessary drivers and shell program AMControl.exe for system adjustment.



Shortcut to the program shell AMControl.exe will be located to the desktop and in the list of installed programs.



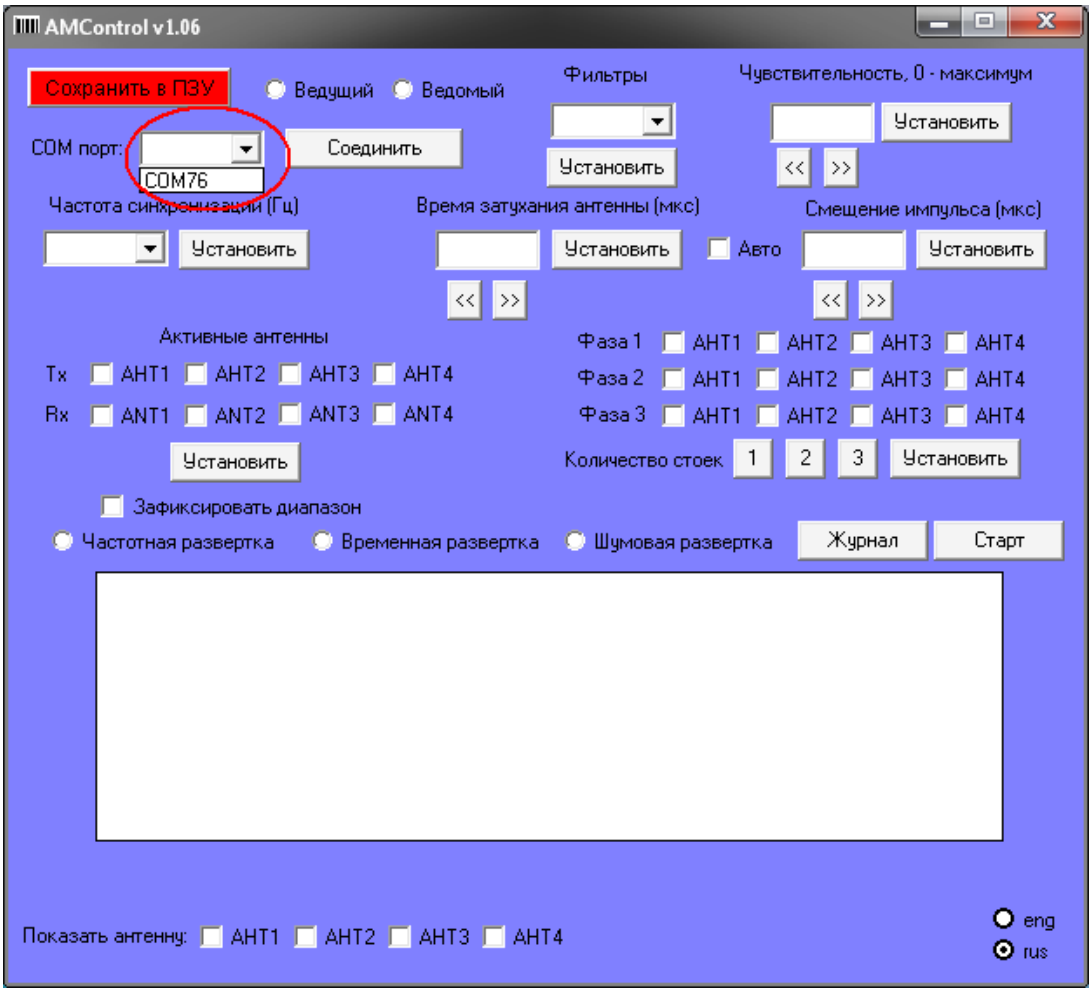
Into the list of installed programs will also be added uninstaller AMControlUninstall.exe.
Use a control item located in lower right corner of program' window for changing language.



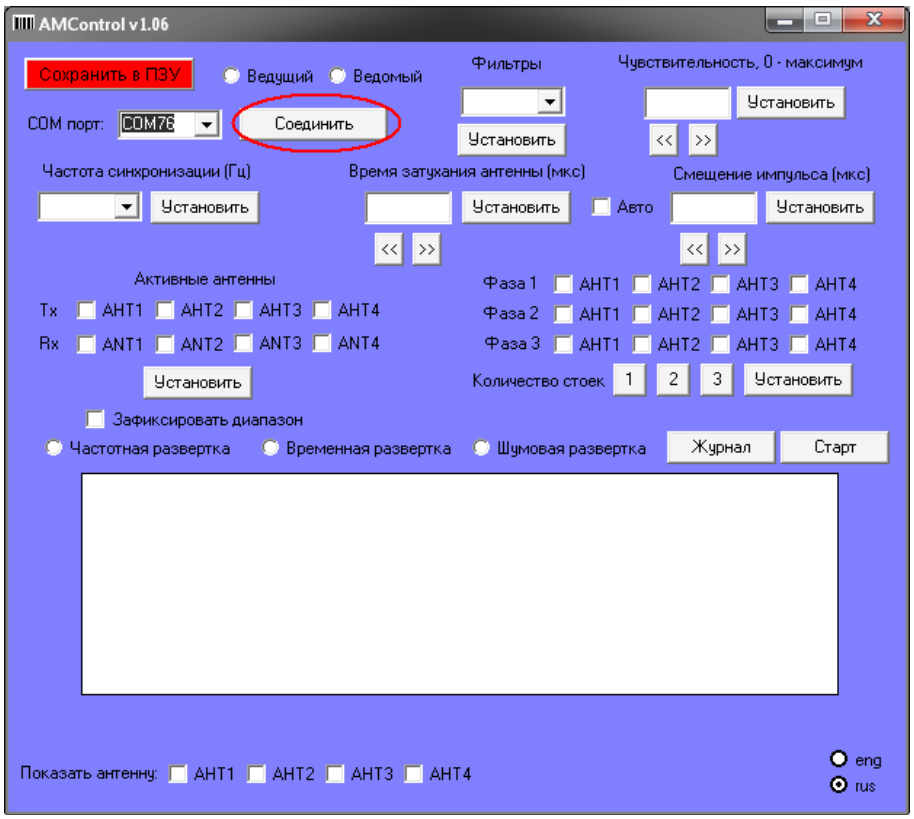
It is supposed that frequency of an alternating current in a network makes 50 Hz, therefore all parameters of synchronization are specified, proceeding from the given value.
For sanity check of the installed software fulfill following actions:

1) Connect USB-port of computer and USB-port of control box using USB cable.
2) Connect the electronic unit to 220V using the power supply cord .
3) Launch the program AMControl.exe.

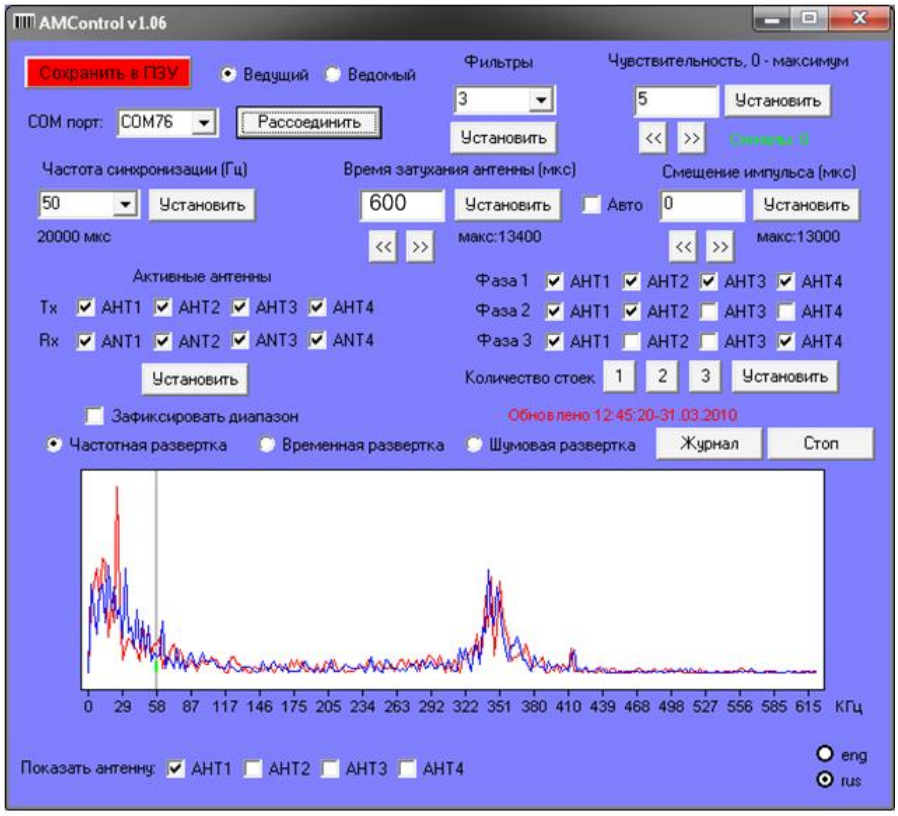
4) Select active COM port on which the connected electronic unit works.



5) Push the button “Connect”



If USB cable is too close to antenna cable, noises created by antenna cable can hinder program operation. If the program "hangs up", locate USB cable as far as possible from an antenna cable.

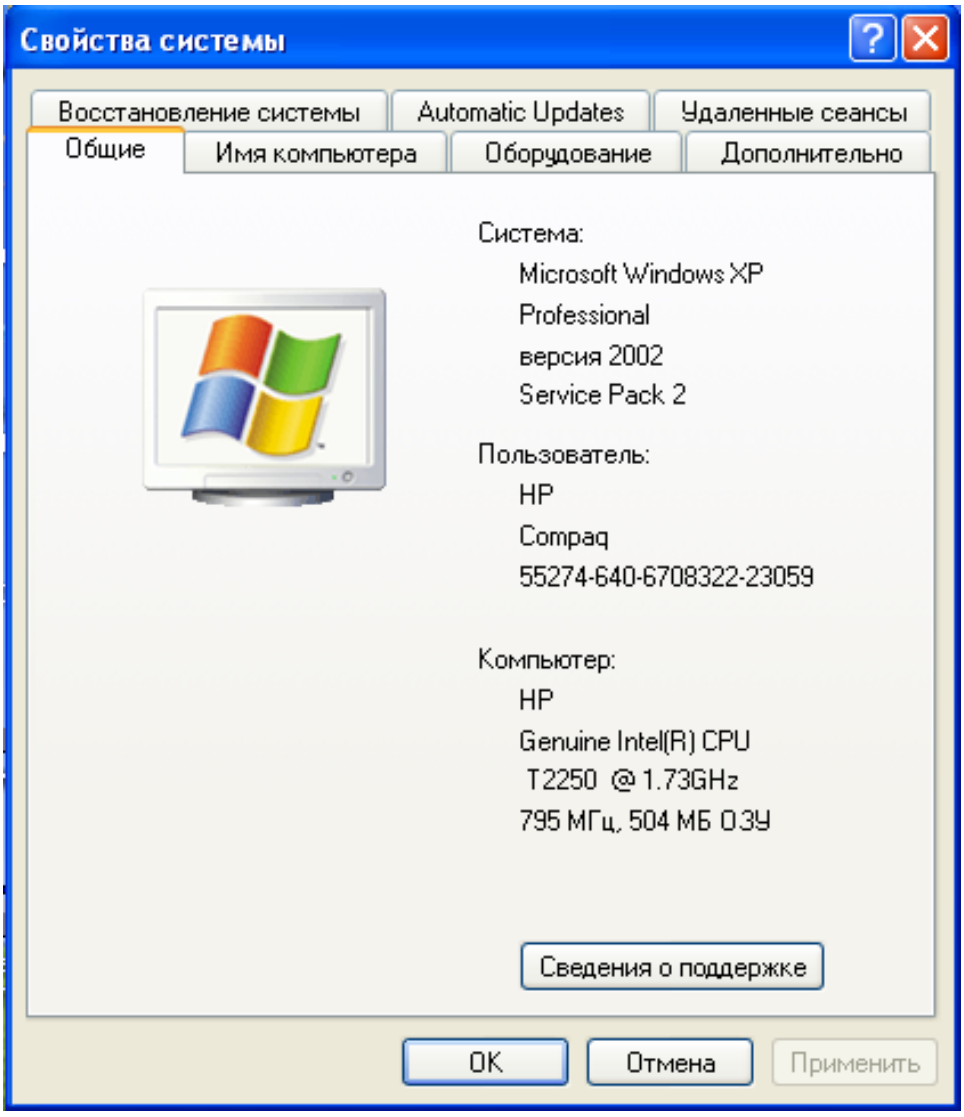


If the software is installed correctly and selected COM-port corresponds to the given electronic unit, in setup window should appear two curves - red and dark blue.

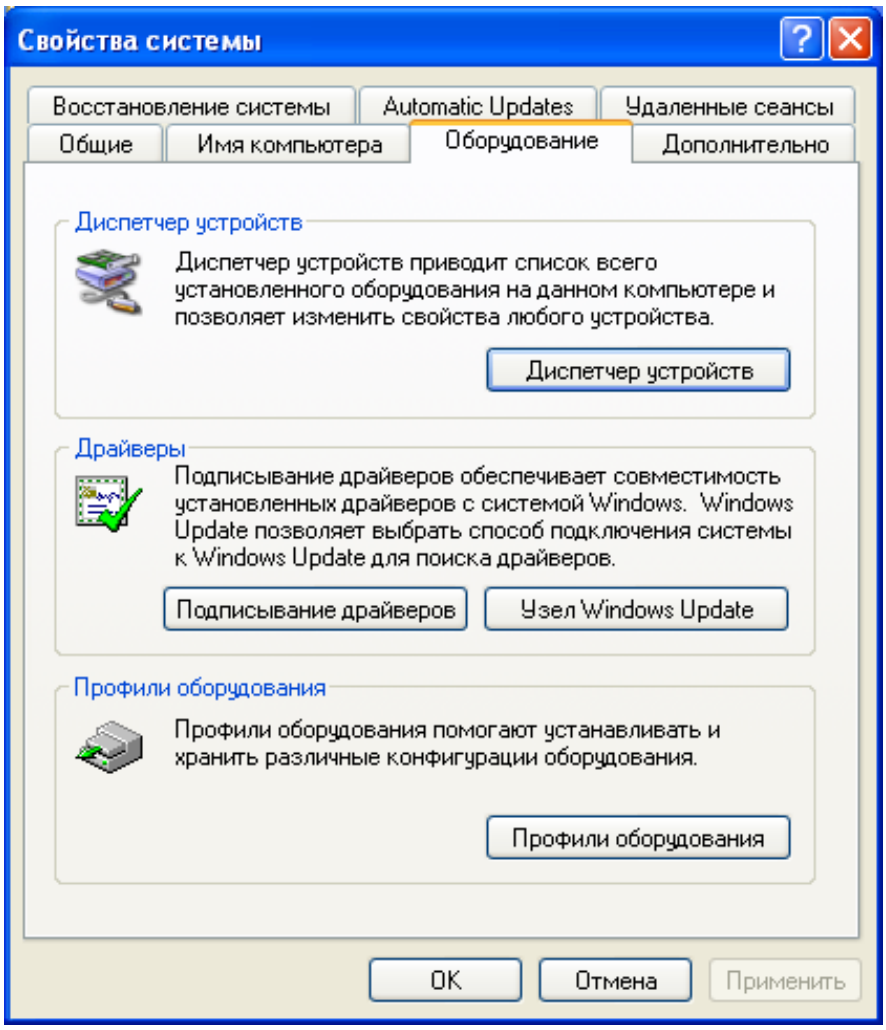
The operating system creates virtual COM-port providing data transmission by USB-channel at connection of the new electronic unit. The amount of virtual COM-ports will increase at magnification of amount of the installed systems at the computer.

If is necessary to remove the virtual COM port should be performed several actions:

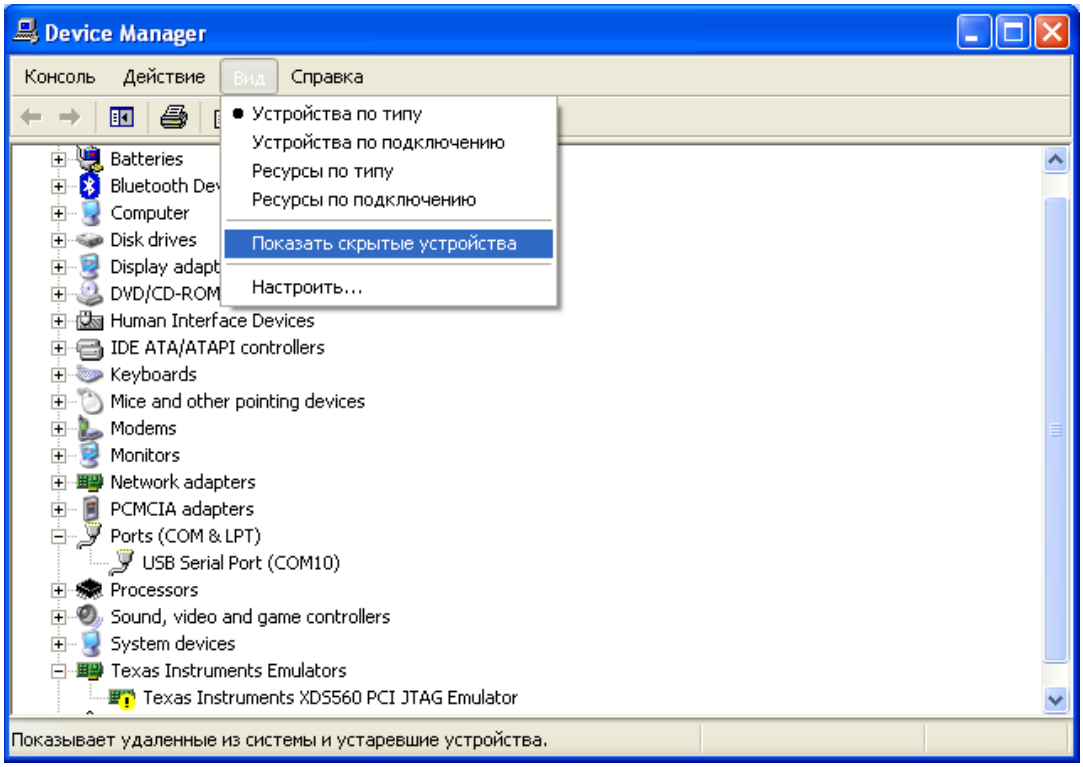
1. Connect any of electronic units.
2. Open the *System Properties* window.



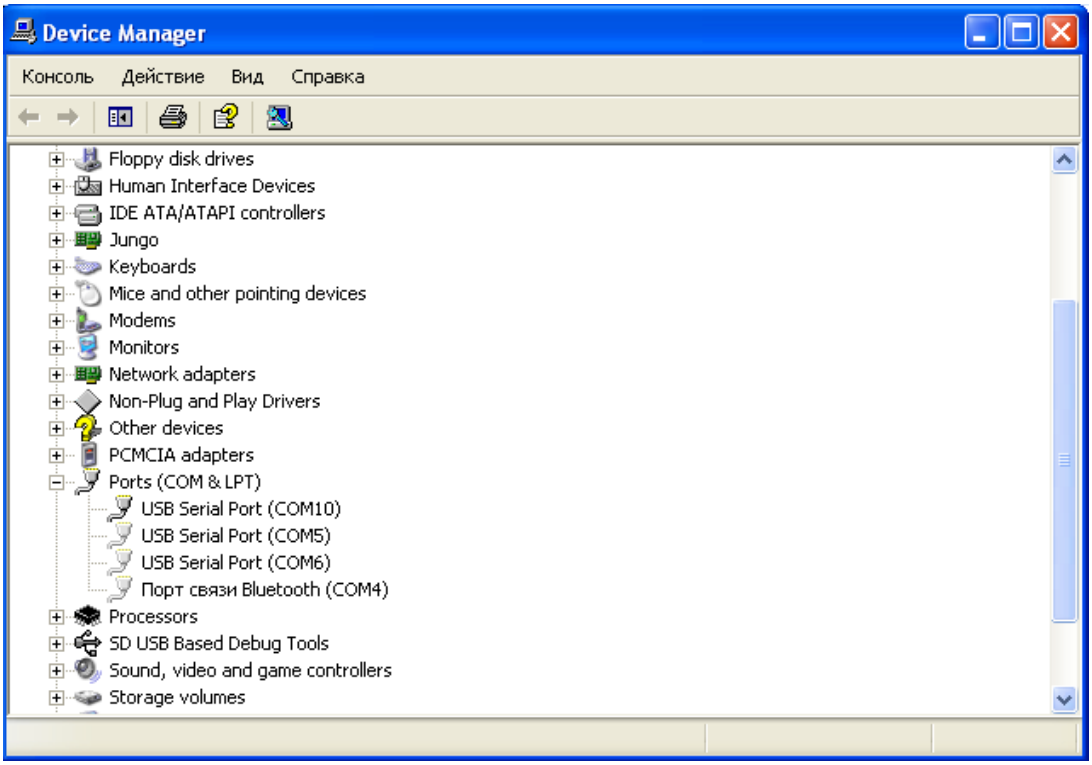
3. Select the bookmark *Equipment.*



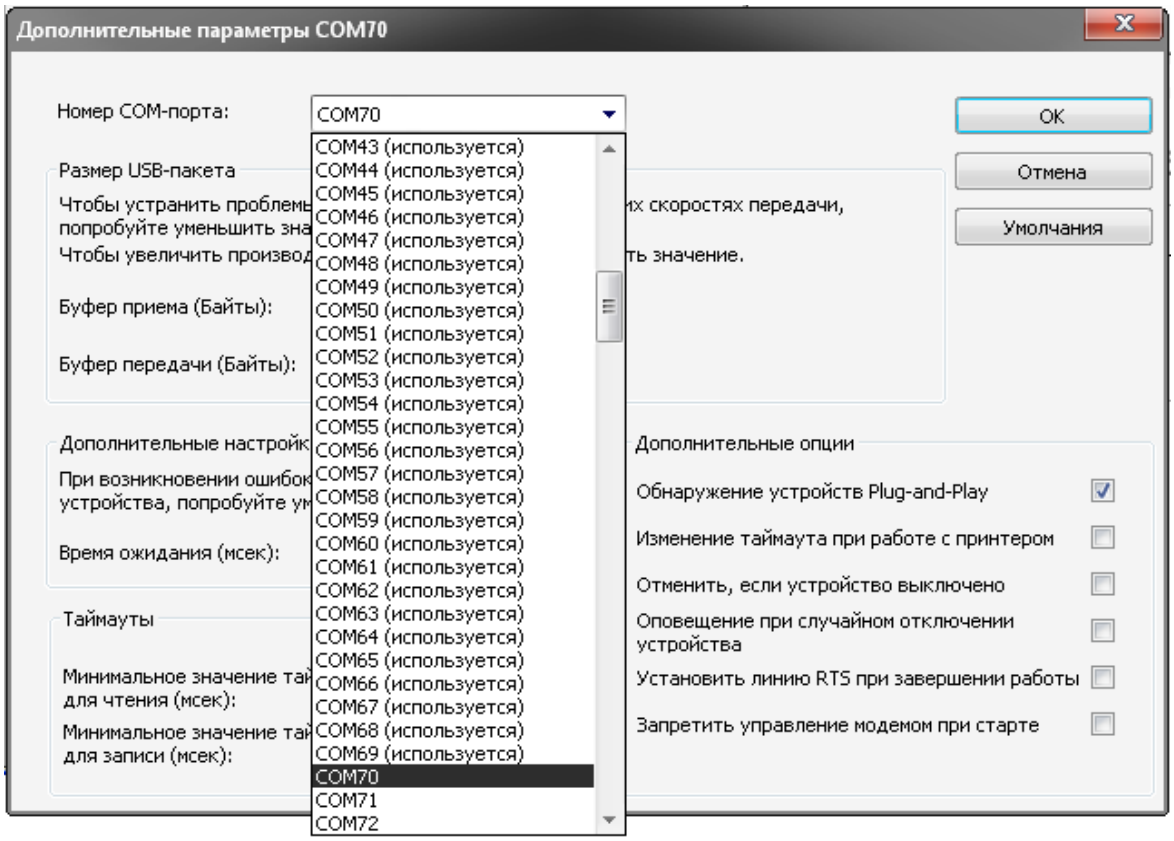
4. Open the *Manager of devices.*
5. Push *Type → Show hidden devices.*



6. Open the list of available COM ports.



7. Select any COM port.
8. Click the right mouse button and select *Properties*.
9. In the *Properties* window, select *Port Settings* → *Advanced*.



10. Select the port that you want to delete and click OK.