Discriminating Metal Detector

SIGNUM MFD 7272M
CLASSIK/GT/ICB
Manual (En)

**Attention!
Please read this
manual thoroughly.**

Firmware version 2.06

Contents

GENERAL INFORMATION

Metal detector SIGNUM MFD 7272M GT is designed to search for and identify metal objects in the dielectric (dry sand, wood, etc.) and low conducting media (soil, brick walls, etc.).

The manufacturer of metal detectors, AKA company and the center for repair and maintenance service of metal detectors are located only in Russia. For export, we have developed a more reliable metal detector, specifically for sale to the foreign market.

On the basis of the "Classic version", our specialists released a specially upgraded Signum 7272M GT. This is a more reliable model of the metal detector, with an improved component base. Additional protection against dust and moisture is installed.

DIFFERENCES

from Signum 7272M (classic)
The main difference between the GT version and the standard version is that we modify each device instrumentally, due to this the stability and accuracy of the device have increased, which allows us to record weaker signals. The analogue regulator allows to result the gain in accordance with the ground conditions, also partial dust and moisture protection is added, (it does not provide complete water protection). Thermal stability is improved. High recovery speed (optional).

As a result, we get the following features:

1 Increase of the device sensitivity. 2 Quiet signals are better recorded.

3 Greater performance on hard ground.

4 Work in a heavily littered with large iron place without losing small targets.

5 Wider setting range through the use of a current switch and an analogue regulator.

from Signum 7272M (pro)
1. After conducting a series of studies, we do not set the external speed switch and Normal (factory) mode and made the Fast mode (speed-up) - optional.

2. Own element base.

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3. Enhanced protection against dust and moisture from dropping it.
4. Lighter and more reliable iron bar.

from Signum 7272M (ICB)

ICB- Is simplified version of GT. In ICB only external regulators are absent. (coil current switch and general gain control.)

ICB   GT

APPLICATION

- Criminal;
- Engineering;
- Housing and community services, construction and fire-fighters to search for underground utilities, pipelines, cables, manhole wells etc.
- Archaeology and treasure search.

The device is designed to operate under the following conditions:
- Ambient temperature from -10 up to +40°c (-4 to 122 F);
- Relative humidity up to 98 per cent at temperature of 25°c (77 F);
- Atmospheric pressure from 650 to 800 mm Hg.

Signum MFD 7272M is an eddy current selective metal detector operating on the principle of induction balance. The main distinguishing feature of the model is the use of the original software and hardware multi-frequency technology (MFT) allowing the use of any sensors we produce, regardless of their operating frequency of size. That is, the device itself adjusts to the sensor.

There are two-frequency and three-frequency coils of different sizes in the assortment of the company. Frequency switching is carried out by a toggle switch, which is located on the coil itself. After switching the frequency, it is necessary to re-balance the ground.

The main search mode of the device is dynamic, i.e. object detection occurs only with constant movement of the sensor.

To determine the exact location of the detected object, the device has a static mode of operation.

The device has two types of indication of object detection:
- sound programmable multi-mode
- visual (hodograph, VDI index, rating (level) of the PC signal)

The device implements two independent search channels: RT and ST.

The RT channel (real time, RT) is a detection channel and operates in real time, i.e. sound indication is issued synchronously with the movement of the sensor over the object. The sound indication in this channel is a single-tone signal, the volume and frequency of which can change as the object approaches the sensor. The duration of the sound from the object can be judged on its approximate size.

When the signal from the object in the RT channel exceeds the level of the set threshold value, the ST channel begins to work.

The ST channel (short tone, ST) is an object type identification channel. If the threshold level of the signal from the object is exceeded, it is identified in the ST channel, then a short sound signal of the corresponding tonality is issued, and the hodograph is displayed on the display screen. The frequency of the short tone indicates the type of object (high tones - non- ferrous metal, low tone - ferrous metal). The number of tones is set by the user (by default - 4 tones for non-ferrous metals and 1 tone for ferrous metal).

Each channel has its own independent sensitivity adjustment.

"catch" the object and indicate to the operator that there is something.

The Signum MFD 7272M GT is equipped with a programmable switch mode of operation of the sensor at high current (Turbo), which allows to

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improve the ratio of useful signal / noise and increase the search depth. Also in the device there is the possibility of compiling 4 options for custom search programs.

Also in the device there is the possibility of compiling 4 options for custom search programs. The metal detector is equipped with manual and automatic ground balancing systems with the possibility of programmable speed auto-tracking (AT).

PACKAGE CONTENTS

- The electronic unit with a telescopic pole...1 ea.
- Search coil - eddy current transducer (ECT)...1 ea.
- Magazine for 6 batteries (type AA)*...1 ea.
- Operators Manual...1 ea.

*) batteries sold separately

TECHNICAL SPECIFICATIONS

The maximum detection range of metal objects (air test with coil Ø260mm DD) via RT:
- 25 mm dia. coin - 60 cm;
- Helmet - 150 cm;

Operating frequency range, kHz: -1.5...22
Indication modes:
- sound, 6 modes(RT, RT-M, RT-M99, RT-ST, RTL-ST, ST-P);
- visual (LCD display with a resolution of 128x64 pixels).

Search modes:
- All metals;
- sectored discrimination with 2 ° step

Control modes:
- Dynamic programmable;
- Static with adjustable threshold.

Power Supply: - 6 batteries (type AA (LR6));
Continuous operation time: - 6-7 hours in Turbo mode (Rechargeable batteries 2500 mAh) – - 16-18 hours in normal mode.

Overall dimensions, mm: -   up to 30-40 hours in economy mode
- Telescopic rod - 1200 (max.);
- Electronic unit - 120x70x115;
- Search coils - Ø 260 / Ø 380 / 150*260 / 240*320 / Ø 150

Weight of the device(without batteries): - 1400 g. (telescopic pole)
- 1160 g. (S-shaped pole)

The device allows the ability to work in water depths of up to 2,5 meters, without submerging the control box.

GETTING STARTED

Assemble the metal detector. To do this:
- install the appliance in a metal bar;
- tighten the Collet Chuck;
- install the inner (plastic rod) sensor;
- install the rod with the sensor in a metal bar to desired length, using the tabs and holes in the rod
- tightly and evenly wrap the sensor cable around the rod. Freely hanging cables can Cause falsing;
- connect the sensor connector to the electronic unit
WARNING! Do not over tighten the attachments and fittings for the telescopic shaft. This applies in particular to the plastic bolt for the search coil and shaft collets.

Unlike the classic version (plastic) Thanks to the metal armrest, your metal detector will not only become lighter, but also it will be more reliable in operation.

POWER SUPPLY

The device is powered using 6 AA batteries or 6 rechargeable NIMH. Rechargeable batteries and charger

are not included and must be purchased separately. We recommend that you use NiMH batteries from SANYO, ANS-MANN 2500 capacity-VARTA or 2850 Ma/h. The use of standard alkaline batteries is possible but not cost effective as the rechargeable batteries pay off after 4-5 recharges.

When using batteries, with a capacity of 2500 Ma/h, continuous operation is approximately 16 hours in the main mode, 30-40 hours in economy mode, 6-7 hours in Turbo mode.

The consumption of the device also depends on the operating frequency of installed sensor. At high frequencies, consumption decreases, and at low frequencies, it increases.

Several recommendations on the use of nickel-metal hydride batteries:

- Remember that due to the self-discharge nature of the batter capacity falls (by About 5% per day, so it is advisable to charge batteries before each use.

- **DO NOT** use rechargeable batteries that have different capacities in the same set. **WARNING!**

When connecting the battery magazine to the device connector insure the battery is properly connected (polarity is indicated on the battery cartridge) and insure the voltage source is correct. In the case of incorrect polarity or improper voltage the device can be damaged.

CONTROLS AND CONNECTIONS

The device can be delivered in two design options (Fig. 2). In the first version (in the figure on the left) the option "compactness without disassembly" is implemented due to the displacement of the middle part of the bar into the armrest. The second option (in the figure on the right) has a slightly lower weight and improved mechanical balance. The company reserves the right to change and introduce new options for the design of the device.

Sensor
(coil)

Electronic unit

Grip

Telescopic shaft

Armrest

Socket for headphones

Battery compartment

On the front panel of the device there is a liquid crystal graphic indicator (with a resolution of 128x64 pixels) and 11 control buttons. The manufacturer reserves the right to change the design of the panel and control buttons without prior notification.

On the back panel of the device there are a connector for connecting a sensor, a switch on / off the device and a serial number. Only the GT model has a switch for supplying current to the coil and an additional gain control. (fig. 3).

An additional
gain control

№35071

current switch
to the coil

(fig. 3).

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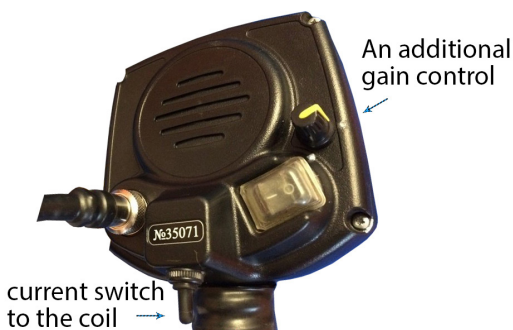
EXTERNAL REGULATOR INSTRUCTION

Only for Signum GT
All controllers are analog, that is, they work regardless of the parameters are set in the menu.

**1) There is a current switch to the coil at the bottom of the control box,
There are two positions. or 6 options for sensor current value:**
a) economy \ economy - 40%
b) norms \ norms - 40%
c) Turbo \ Turbo - 40% Switching.
The " forward" position = current state set in MENU. (economy \ norms \ turbo) The "back" position is approximately minus 40% of the set in the MENU.
The "back" position is applied:
a) The search on litter.
b) Mineralized soils (in combination with the program mode "Economy").
c) For the operational determination of dubious goals.

2) An additional gain control is located on the back of the body. Attention!
Gain control is NOT linear!
All gain values are given from the gain in the MENU of the device.
The minimum value is the position all the way to the left to the bottom white point. About 25% of the Gain.
Lateral white point - 100% gain.
The maximum value when turning all the way to the right. 200% of the gain.
Note.
The gain and device sensitivity are NOT linearly dependent.
Increasing the gain by 2 times - the sensitivity by 2 times will NOT increase! Warning:
Turning the gain control may cause short beeps. This is not a defect.

DISPLAY BUTTONS

Fig. 4

Sets the sensitivity of the ST (short tone) channel

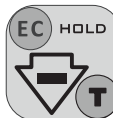Sets the sensitivity of the threshold RT channel (Real Time)

Sets the volume of the audio (short press) and On./Off. illuminations (long press)

Select the Discrimination edit mode

Switch between all metals/discrimination

Button for moving through the menu and changing the value of parameters, On./ Off. Turbo mode, and On./Off. Economy mode (long press)

Move through the menu and change the settings, as well as turn on/off the S Algorithm

Confirms the selected settings. Selects a menu item. In search mode switches between Static and dynamic (Pin-point) modes.

Switches between User Programs if there is a version of the software with a Deep Program - On./Off. Deep Program by a long hold from any other search program.

Access the Ground Balance modes

Button to enter the Main Menu

DISPLAY SCREEN

In search mode the display device displays the Hodograph information of detected objects and information about the current operation modes (Fig. 5)

VDI Number

Signal level

+21 · 07

Battery charge level

T-Turbo mode is enabled (see page 14)

A-enabled auto adjustment ground balance
(see page 17)
C – Static Mode enabled (pinpoint) (see page 13)
S – S-Algorithm enabled (see page. 14)
M – Metal Trash mode is enabled (see page 16)

Number of the current user program 1-4 (see page 14)
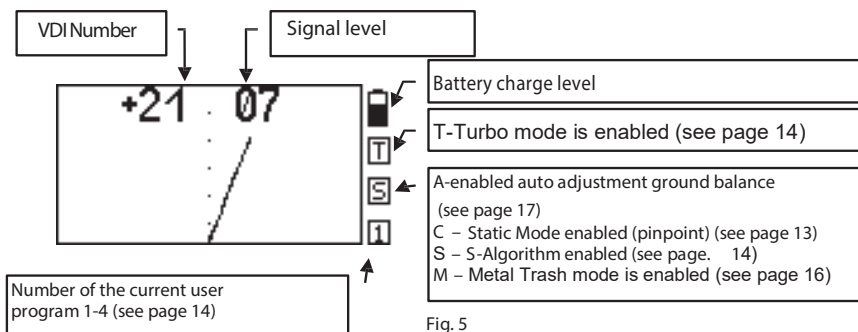
Fig. 5

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VDI-number "Visual Discrimination Indication". This is the index of electrical conductivity of the object or the angle between the vertical axis and the predominant direction of the hodograph (time curve). In this case, hodographs which are on the left side of the screen have a negative VDI, and the right - have a positive VDI number. The amplitude of the signal, from detected objects, is displayed in standard numerical units

LANGUAGE SELECTION

The instrument software allows you to select Russian or English language for displaying information.
In order to change the language of information display, when turning on the device, press and hold the button   until the language selection menu appears. Using the

buttons until the language selection menu appears. Using the

buttons

select the desired language, and press the button to fix your choice.

Remember that when you change the language, the device will automatically return to the factory settings.

ST SENSITIVITY, RT SENSITIVITY / VOLUME

This section introduces the three main parameters that you'll use most often. For each of these settings there is an individual button on the control panel.
SENSITIVITY ST [1..14]. Increasing the value of this parameter allows

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you to identify search objects at a greater depth. It has the value from 1 to 14. Remember that with an increase in the identification sensitivity of the device, not only the search depth increases, but the possibility of
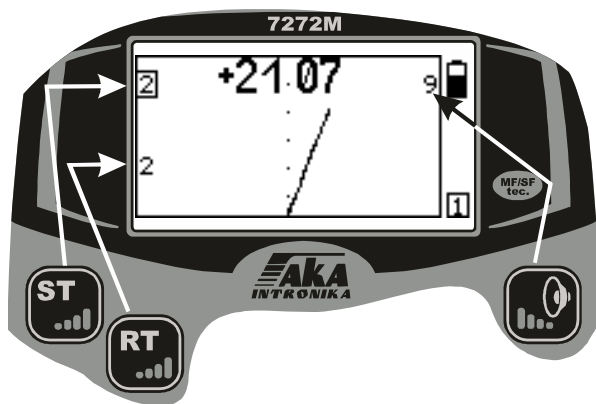
the appearance of interference from power lines and from false alarms from differences in mineralization of the soil, as well as when the coil hits the objects.

SENSITIVITY RT

[0..9]. This option allows you to perform

detection sensitivity) and threshold adjustment (depth of tone of your device. The threshold tone is a signal from the detection channel that Fig. 6 gives you information that the device has detected a metal object. From the moment of detection and along the movement of the coil, the volume of the threshold tone rises, having the highest value above the center of the target. With a gain of experience working with the device, a combination of the threshold tone and the tone of the identification signal, as well as the duration and volume level of the threshold will be able to give you more complete information about the size and relative depth of the target, and even about the presence of two targets with a single identification signal. In most cases, we recommend setting the value to 6-7.

Some recommendations for the sensitivity of the device:

Select the optimal sensitivity at the search location, based on the rule *"the highest value possible for stable operation of the device in this place"*. It is also recommended to reduce the sensitivity of the device in places heavily littered with metal. Due to the strong emitting from a large amount of surface iron, the device is unlikely to be able to detect at maximum sensitivity a useful target located deeper than this iron, despite

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the fact that in a clean place it can easily cope with this task, and even with a margin. At the same time, a small non-ferrous target (for example, a small medieval coin) lying at the same level or slightly higher than iron, the device at maximum sensitivity may simply not distinguish in the general signal received by the coil from these objects. Whereas the device at reduced sensitivity will detect this useful target without being blinded by the iron located near or below it. To reduce the blindness of the device in places with a large amount of metal debris, use to reduce its sensitivity not only adjust the ST and RT channels, but first of all, reduce the current by turning on the "Economy" mode (see below) and reduce the gain in the device menu (see below).

All of the above can be summed up in one phrase: a high level of sensitivity does not always guarantee high search efficiency. Use this adjustment appropriately for the situation and the search task.

VOLUME[1..9]. This setting adjusts the overall volume of the audio response from detected objects. Select the value based upon individual comfort preference.The current values of these parameters are displayed on the screen above the relative buttons (Fig.6).

To change any of these settings press the appropriate button. The value of the selected option is highlighted on the screen with a rectangle around the appropriate value.

Press the button and to set the required value.

In order to exit the parameters simply click the button again. When neither the RT, ST or Volume values are displayed on screen - the buttons

 and will now on / off modes for the Turbo S-al gorithm, (see below)

GROUND BALANCE

Balancing the device to the ground is the single most important part of the device settings for accurate search results. Improper ground balancing can result in decreased responses to targets and may result in instability as well as an increase in false ground signals.

To explain the basic physics behind the ground balance procedure. Every object has its own shape, conductivity and magnetic component, which together are called the VDI (Visual Digital Index). Remember that the VDI is the angular response that is numerically equal to the angle of deflection of the signal vector time curve (hodograph display) on the vertical axis. The soil, or ground, depending on the degree of mineralization (presence of iron oxides) imposes its signal on the target signal thus changing the VDI upscale. This is especially true on small or deep targets, as well as large highly conductive targets (copper, silver, aluminum). This can actually push these high VDI targets up and over into the high negative VDI range known as "VDI wrap around". To minimize this effect, it is crucial to perform a proper and accurate ground balance procedure.

The basic objectives of balancing:

1. Make the soil 'invisible' to the instrument, i.e. exclude false signals from the ground where there is no target.

2. Install the correct (standardized) reference system number for the VDI. When receiving a signal from both the ground and a detected object the detector must subtract mathematically the signal from the ground in order to display a correct VDI indication of the detected target.

Keep in mind that when performing "air tests" inside after the detector has been previously balanced in soil may result in incorrect VDI readings. This is due to the correction factor for the VDI previously set in the last ground balance. This may result in the loss or "invisibility" of large aluminum, silver and copper targets. If the ground setting is too positive the VDI will be offset positive and vice versa if the ground balance is negative. This may also lead to targets air testing as iron, as well as a false increase in sensitivity when air testing.

Remember that for every 1 degree of ground balance offset from the 0 or neutral point we get a corresponding increase or decrease in the

VDI scale for a given target. IE a 1 degree+ ground balance will increase the VDI by +1. For example, if you are air testing a large copper coin that would normally give a VDI of +82 to +84 but is now air testing with a VDI of -86. The result is that the device ground balance is set +10 to +12 degrees too positive for performing an accurate air test.

Balancing with a piece of ferrite is required before performing an "air test" of the device.

Put the device on a non-metal surface, turn on automatic ground balance mode, count to three, then bring the ferrite to the center surface of the coil from a distance of 25-30 cm (10"to12") to complete the balancing procedure. In the absence of ferrite, a piece of red brick or red fired ceramics can be used. In the absence of these items, you can take a CD, and in a search mode, hold them flat in front of the coil. If the CD gives a vertical hodograph and VDI of 0 (+1 or -1), then the device is ready for "air" tests.

If the VDI of the CD differs from these values, then in auto

GB click and adjust the phase of the ground balance in the

desired direction. When the VDI of he CD is at 0 (+1 or − 1) your device is ready for air testing.

BALANCING PROCEDURE

1. Find a metal-free area. You can find it by the threshold tone response in RT mode. On an unbalanced device there will be a response to the clean ground, however the sound will be soft and "diffused", without a strong localization. While the sound would be sharp and with a strong increase in sound above a metal object. Select an area with no localized sharp threshold tone increase while swinging the search coil 5-10 cm to the left and to the right above the ground. If there is no localized sharp threshold tone increase then the area is suitable for balancing.

2. Having found the metal-free area, raise the coil 30-40 cm above the ground press wait for 3 seconds, and move the coil to the ground smoothly but not too slow.

Warning! *Do not move the coil to the ground closer than 10% of the search coil diameter (for the search coil Ø26 cm – 2-3 cm). This is related to the change in the pattern of the search coils physical interaction with the ground in what is called the "Close Zone" and it may impact balancing accuracy resulting in false responses in clean areas with high levels of sensitivity.*

If there is no tone or it does not sound during lowering, but sounds when moving up, repeat the procedure. Follow the ground vector on the screen during the process. Its shape should be a strait, slightly trembling line, on the horizontal axis of the ground scale. If it makes sharp angles or is "chaotic" on the screen, this means that you are trying to balance near a metal object in the ground. In this case, the device may perform a ground balance, however it will be incorrect and you will notice multiple false signals from the ground. If this occurs, simply re-balance the detector in an area clear of any metal targets*.*
Attention! *In automatic balancing mode, do not turn off the device. Otherwise, the balance data will not be stored in the device memory.* Once you have chosen a clean location to balance the detector and have done so, note the value in the lower left hand corner of the ground balance screen Now, should you choose to ground balance again later on and there is a sharp difference between this value now, as compared to the previous ground balance, there is a good reason to suspect that there was metal close by and you will need to ground balance again. If the coil all the same was a metal object, giving an automatic balance (items with VDI close to 0, e.g. foil), the device will give two consecutive tones, similar in tone to that of iron in the search mode, while at the same time the screen will display an exclamation point within a triangle. Accordingly, you will need to ground balance again on a clean

spot of land. After balancing, in the lower left corner of the screen will display a numerical value of balance (phase), this is the amount by which the device will adjust the VDI, excluding the effect of the soil. *It should be noted that the average phase angle ground balance is different for each instance of the device and can also depend on the technological variability in parameters of the coil and the ambient temperature.* However do not forget that your device remains in the automatic balancing mode and at any moment may deem it was time to rebalance to your shovel, boots, or hunting partner. If you want to review the results and values of the current automatic. to enter manual mode and disable automatic balancing. In the upper right corner of the screen will appear **M** instead of the letter **A.**

To exit the ground balancing, click

Switching between modes is as simple as performing successive clicks of

While in the manual balance mode by pressing

and one is able to adjust

the ground balance in the proper direction. Bob the coil vertically above the ground (rising to 20 -30cm / dropping by 3-5cm), making sure that the vector of the soil is along the horizontal axis and that the hum is gone when raising or lowering the coil.

PHASE: +00°   GS: 0007
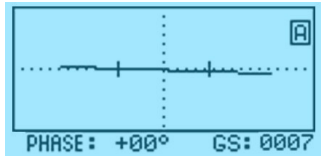
(fig. 7)

- Vector of improperly balanced soil (fig. 7)
- Vector of properly balanced soil (fig. 8)

PHASE : 011°   GS: 0001

(fig. 8)

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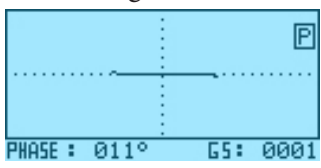
When working on the ground with uneven salinity, such as arable land, it is not always possible to accurately ground balance the unit in automatic mode. This can be due to the uneven or lumpy nature of the soil. This can sometimes lead to false responses from the identification channel. In this situation the phase of the ground balance can vary by more than 3 degrees. If you encounter this problem then perform the ground balance procedure as follows.

Find a clean patch of ground with a width of 60 centimeters. Switch to manual ground balance and making short horizontal search sweeps with a width of 50cm at a height 3-5cm above the ground, you will see a straight line on the ground the screen (if the line jumps, then there is metal present).

In this case, if the balance is wrong, you will hear a buzz from the soil and the soil line on the screen will not be horizontal.

Press and until the line is horizontal and the buzz disappears.

Your device is fine-tuned to the ground.

For a small increase in the depth of the identification of large silver and copper coins (kettles, basins and other large pieces of highly conductive metals) it is possible, after performing automatic ground balancing, to enter the manual balance mode and set the GB point from -1 to -2 from the automatic GB reference point.

Care should be taken when setting the ground balance point either negative or positive. When set negative it increases the possibility of receiving false positive responses when bumping the coil on vegetation or the ground. When set positive you risk the chance of losing sensitivity to large silver or copper coins that will either become "invisible" or ID as iron.

In the event that a "clean" patch of ground is not found you can excavate a small amount of local soil (1-1.5 kg), removing all metal objects, and place in a bag for convenience. Now lean the detector with the coil facing up against a bush or tree with the coil at least 40-50cm off the ground.

With the bag of soil in hand you can now and press

the GB button and count 1,2,3. Then smooth and slow, (start

ing from a distance of 30-40 cm) present the soil to coil. (As if doing auto balance on the ground in the normal mode, but now you are moving the soil to the coil instead of vice versa).

To place the device for such balancing on the ground is undesirable. If you could not find a clean place, then there are a lot of metal objects in the ground. Metal may be in the coil field of the device and the balance will go wrong.

Attention! If the signal from the ground is too small (such as quartz sand) and the auto balance cannot be performed then the balancing procedure can be performed either by using a piece of ferrite (after that, manually adjust the received balance value by -4 degrees to" minus")or a piece of red brick. These can be placed on the ground and the auto balance procedure performed. In principle, using the procedure for balancing for "an air test" will also work and you may set the balance point 1 or 2 degrees negative if you are searching for large objects.

Sharp temperature changes on the search coil may impact balancing accuracy, the balance may shift and become incorrect with such changes. That is why, if you take the device from a heated car and start working in a low temperature conditions (early spring, late Fall), rebalance one or two times while the coil adapts to the ambient temperature.

In case of large temperature drops of more, than 15C (compared to a normal air temp of 20C), we recommend that you perform electronic module and search coil adaptation procedure one more time (see Search coil Replacement). In this case the processor of your detector will choose the optimum frequency of the excitation current for the current temperature conditions. At the same time, all the main indicators of the device, including the current consumption, will be guaranteed to be saved.

In saltwater beach operations and other complicated soils with high conductivity we recommend you use the " Gain" option or enable the "Economy" mode for better ground balance accuracy. Sometimes decreasing sensitivity will allow for a more accurate ground balance especially on beaches.

In rare cases, such as after replacement of the coil or attempting to balance on a metal object, a situation may arise when you cannot perform an automatic ground balance. This occurs because the current value of the phase vector moves out of the locked system acquisition sheet (such as a significant change in ambient temperature).

You can solve the problem by balancing in manual mode. To do this,

while in the automatic balancing press the to go to the manual

mode and using the buttons and

get the vector of the ground signal moving from left to right in strictly the horizontal direction. After that, the balancing procedure will operate normally.

Advice on ground balance witch AKA devices in various conditions from an experienced searcher:

If the soil vector on the screen loops (in the absence of metal of course), then this is a strong signal from the soil + dampness with a conductive medium (electrolyte). Accordingly, the greater the current, gain, amplitude of the swing at the balance, the more difficult it will be for the device. This is equivalent to screaming a phrase to a person directly in the ear. He will go deaf and understand nothing.

Consequently:

1. Economy mode.

2. Decrease in gain, usually 6-7 is enough.

3. **DO NOT MAKE BIG SWINGS** during GB!

It is better to do the movements of the coil during GB in this way: Keep the coil 10 centimeters off the ground. Turn on the GB, and gradually begin to approach and move away the coil with an amplitude of 5 centimeters . The "louder" the soil (the longer the vector on the screen), the smoother and with lower amplitude the movements of the coil should be. Sort of smoothly "chasing" the soil vector along the axis.

It is not necessary to wait for the GB signal. You can switch to manual mode, and continuing the movement, use the +/- buttons to put the

vector on the horizon. For more comfort, you can slightly tilt the vector clockwise by a degree, two is a maximum (and do not forget, in such places, to turn on the FSF filter in the additional menu by 7-8, no more). And yet, the lower the frequency of the coil, the better for searching in such places.

If there is almost no soil vector on the screen, then you are lucky, the soil is "quiet", almost without mineralization, which means that it will allow you to search deeply. The current is norm, the gain is 8, the FSF is 1-3. You can balance in the same way, "driving" the vector with smooth movements, but with a larger amplitude. Moreover, do not wait for the signal in the automatic, but in the manual mode, lay the weak vector horizontally, or 1-2 degrees counterclockwise, to slightly increase the depth, especially on large coins (the ground is quiet, it will not give a false signal).

DISCRIMINATION SEARCH MODE AND SETUP

Discrimination is the ability of the device to respond to certain types of objects and ignore the others. For example, you can configure the appliance so that it will respond only to objects of non-ferrous metals while ignoring everything else. In some cases, this allows you to increase the comfort of the search.

Be aware, however, that the more discrimination that is used there is an increased risk in missing valuable objects. In any event, the choice is yours.
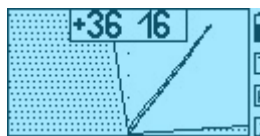
Fig. 9.

The discrimination range is set to the position and width of the search sector. The metal detector will respond only to those objects that have travel time curves (Hodographs) which fall between the

left and Right border sector. For example, to search for non-ferrous objects your sector search screen may look like that in Fig. 9.

Pressing Button **AM** allows the user to quickly switch between modes "All Metal" and "Discrimination" and then back again. The sector on the screen indicates that you are in a discriminatory setup. An Audio response will occur only on

those objects that fall in the clear Hodograph area while targets that fall within the hatched area will not generate an audio response.

Attention! When using the RT-ST sound indication type in discrimination mode for discriminated targets (hodographs from which fall into the shaded area), the device will respond with the sound of only the detection channel (RT). If at the same time the sound of the RT interferes, then to implement the "silent search" mode, set the type of sound indication of the RTL-ST, reducing the sensitivity of the RT to a comfortable value.

To configure the discrimination, click the left and right edges of the search desired area (level) of discrimination. Now, by positioning sector you can set the

At the top left and top right of the screen are the current values of the search sector. These are in degrees of inclination relative to the vertical axis of the screen.
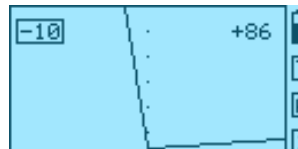
The currently selected border sector is highlighted by a rectangular frame (fig. 10)

Fig. 10

To change the position of the border sector use the search buttons

and To set up another border sector click

As already noted in the discrimination mode, due to the influence of the soil, there is a risk of missing objects if the search sector borders are set too narrow. We do not recommend setting it at 20-25 degrees

To exit discrimination click

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SEARCH MODE "All Metal"

Using the search mode "all metal "as opposed to "discrimination" mode you can detect any metal objects whether they be ferrous or non-ferrous. Which mode is best to use is a personal preference.

However, it should be noted that searching in the discrimination setup can miss some of the weaker signals from good targets. This is due to the effect of the soil on the vector signal of the target and causes the signal to go beyond the search vector boundary.

The disadvantages of the "all metal "mode can include difficulty working in trashy areas due to the extreme amount of signals and sounds received.

Since the sector boundaries in the "all metal" mode are fully open, it may be full of signals from so called "hot rocks". The detector will issue high-pitched signals from these objects. This is useful for finding stones of meteorite origin. Identifying these "hot rocks" can be done by noting the high ratings from the VDI (+86) and the stretching of the signal. The combination of the sound of the ST and RT channels for such stones is similar to "pulling and releasing the elastic" according to the figurative description of experienced operators.

This will act much the same as "all metal" accept with the elimination of the "hot rocks". You may also use the algorithm suppression "Disc. of Hot rocks "(see next). But remember that turning on this algorithm for the sake of comfort can lead to missing some useful targets.

DYNAMIC AND STATIC MODES

Dynamic mode is the main mode of operation of the detector. It is characterized in that the processor constantly adjusts to relatively slow changes in ground conditions.

Therefore, in this mode, the instrument responds to the desired objects only when moving the coil. If the coil is stationary over an object, then after a while the sound will disappear. This is the primary mode your detector is in every time you turn it on.

Static mode is used as an additional and serves mainly to clarify the location of the found object (Pinpoint). Unlike dynamic mode there is no

constant adjusting and therefore, it is not intended for a lengthy search. To switch the appliance from the basic search mode to static mode (Pinpoint)

Click ✓ In the right-hand side of the Scr een there will appear the letter "C", and on the left the value of the gain for the static mode along with the ability to change this

(fig. 11)
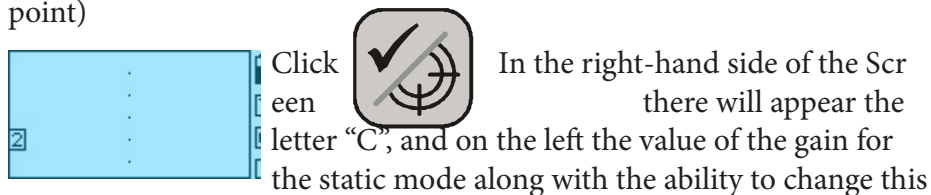
using the buttons [EC HOLD] and [S] (fig. 11)
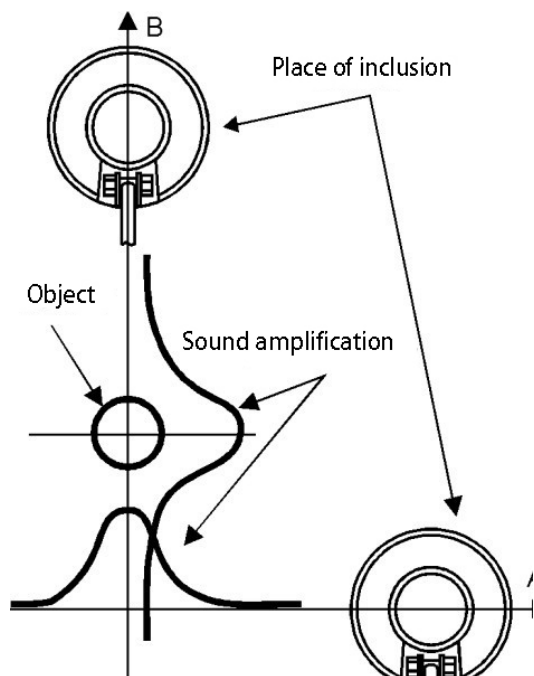
Fig. 12

The gain of the static mode is selected experimentally de pending on the specific conditions. The choice of this parameter will depend on the relief of the ground, littered area, temperature changes, etc. As already mentioned, the active mode (pinpoint) is used to determine the exact location of the object. Let us give some practical tips on how to use this mode. After locating an object, in the static mode, and deciding it is worth digging it is time to de fine its exact location. To do this, move the search coil off of the approximate center of the target either left or right (line A see Figure 12).

Then turn on the static mode (Pinpoint).

As accurately as possible, while maintaining the distance between the ground and the coil, scan the object backwards. Determine on line A the location (coordinate) where the tone of the sound was the highest.

This retraction of the coil in this direction must pass through the original coordinate. Reenable the static mode. Scan the object along the line as accurately as possible **keeping a minimum distance between the ground and the sensor.** The recorded coordinate of the maximum frequency tones sound on line B, will determine the exact location of the object.

To return to the dynamic mode press the button again

MODE "TURBO"

In the "Turbo" mode the search coil operates at the forced excitation current.
This mode allows you to increase the sensitivity of the device and to improve the immunity of the device from external electromagnetic interference.
Attention! The "Turbo" mode greatly increases current consumption and as such battery operating time is greatly reduced! The identification of shallow deep targets also become worse due to an increase in the ground signal.

Switch to TURBO and back by using the button

while in search mode. It is necessary to ensure that the settings ST/RT sensitivity and volume on the display screen are not displayed.
Turbo mode is enabled separately for each program.
Advice from an experienced searcher:
Remember that turning on the Turbo dramatically increases the energy consumption of the device. And if the batteries or accumulators of your device are discharged, after turning on the Turbo the device may display the inscription "Battery is low" and stop working. Turning it on and off will not help, since the device will continue to turn on in the program with Turbo turned on, and it will not have enough voltage to work. If you do not have spare batteries or accumulators with you, there are two ways to solve the problem:

1. Disconnect the sensor from the device and turn it on without the sensor. The device will first display "Sensor is not adapted" and, after a pause, the operating screen will load. Turn off the Turbo, turn off the device, connect the sensor, and turn on the device

2. Turn on the device with the button   pressed. The factory parameters will be loaded,   it will be written on the screen. The device will turn on at   the factory program number 1.

MODE"ECONOMY"

In the "Economy" the sensor operates at the minimum excitation current. This mode allows you to improve the comfort of your search on soils with a complex and variable salinity (for example in the surf of the beach), or at locations with extreme iron debris.

Attention! After switching to "Economy" mode it is advised to ground balance the device.
For reference, the detection range in this mode, when air testing a large 43cm copper coin, such as a Victorian Penny, is approximately 35cm (10" DD coil 6,5-7 kHz).

Thanks to the significant reduction in the consumption of power in this mode you can run up to 40 hours on a set of fully charged batteries. Switching to the turbo is made through the "Add" Menu, section "Add

Settings" or by a long press of a button
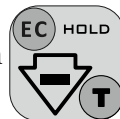
Advice from an experienced searcher:
The "Economy" mode should be considered as the main mode of operation of the device, since in this mode the device works perfectly in almost all search conditions. Increase of current in "Norm" (and even more so in "Turbo") should be done if conditions (dry, not salted soil) allow to do it without increasing phantom responses of the device and deteriorating target identification. At the same time, with each step of increasing the current to the sensor, the depth increases on average by

10%. That is, if the device detects a coin at 30 cm depth in the "Econo-my" mode, then in the "Norm" current mode there is a chance to detect it from 33 cm. According to the place and search conditions, choose whether increasing the depth of extra phantom signals (if they appear with increase of current) and a possible deterioration in the identification of shallow deep targets. However, when searching for very small gold jewelry on a freshwater beach, especially thin gold chains using small high-frequency sensors, use the "Norm" mode. A decrease in current reduces sensitivity to similar specific objects.

MODE S ALGORITHM

From our experience we know that the majority of metal detectors react to flat iron objects as nonferrous. To assist in solving this problem the specially developed S algorithm is used to assist in properly identifying these targets.

The most effective use of this algorithm is in identifying small flat iron objects (15 cm2), such as beer caps, rusted pieces roof tin, etc., with a signal rating greater than 10.

If the device detects an object with a "questionable" non-ferrous signal (high tone) and it has a rating over 10 then using the S-Algorithm can help to identify these type targets.

There is no need to use this algorithm for a definitive low-pitched signal, i.e. when the subject is clearly iron. Remember though, to monitor the signal rating level of the target.

It should be pointed out that this mode does not apply to general searching, but only to help clarify the type of metal of a non-ferrous response and to decide on the need to dig.

The S Algorithm has virtually no effect on the hodograph display of non-ferrous targets.

It should also be noted that when increasing the surface area of iron objects the effectiveness of the S-algorithm decreases.

Important! When using the S-algorithm, the sensor wiring over the target should be wide, covering the entire sensitivity zone to this target. Only in this case will the correct operation of the algorithm be ensured. In this regard, the use of the S- algorithm in littered areas is problematic.

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To switch to this mode, use the button
parameters RT and ST sensitivity and
displayed.

the values of the
volume should be

To return to the main search mode press the button again

MULTI-FREQUENCY

You may be interested to know that most of the detectors manufactured in the world will have a comparable sensitivity, for example, a brass disk with a diameter Ø25 mm and copper disc at Ø50 mm, despite the fact that the second object is much larger. It is also known that small targets (coins) are detected better at higher coil excitation frequencies.

The fact is that by the virtue of certain physical laws each target class has its own optimal frequency at which the sensitivity to these targets are maximized. . In order to give the unit the opportunity to search effectively for both large and small targets, many manufacturers produce 2, 3 or 4-frequency metal detectors. Signum MFT 7272M allows you to work with coils with the operating frequencies from 1 to 30 kHz, thus maintaining acceptable sensitivity to almost any type of target.

The metal detector can be equipped with the following sensors: 15DD -3 (7) kHz, 9.5 x12, 5DD - 7 (3, 14) kHz, 10DD - 7 (3) kHz 6h10DD - 7 (14) KHz. As well as a sensor with any other frequency in the range of 1.5-22 kHz with the possibility of its custom manufacturing. For example, custom 13DD 12kHz and 10x6DD 20kHz sensors are popular. of its custom manufacturing. For example, custom 13DD 12kHz and 10x6DD 20kHz sensors are popular. So there are two and three-frequency sensors 9.5x12.5DD (3, 7, 13kHz), 13DD (3, 7, 12kHz) and 15DD (3, 7KHz), allowing you to select the desired operating frequency using the switch. What could be the practical guidelines for choosing a coil with a different operating frequency?

3 kHz can be successfully used on non-trashy areas to search for both

ferrous and non-ferrous targets as well as the spoils of war.

7 kHz –Is the average universal frequency for a wide range of applications. You can search for both medium and small coins as well as the spoils of war. This frequency is convenient for terrain reconnaissance.

14 kHz - Frequency optimized for small and medium-sized coins especially when the latter are located on edge. This frequency is the best choice for hunting on the saltwater beach.

20 kHz - the frequency is very "tenacious" to small jewelry, which means it is well suited for beach searches.

PARAMETER MENU

By pressing the button you have access to a number of additional parameters, which are divided into 3 groups

(Fig. 13). Navigating the menu By using the buttons

The value in the upper-right corner of the screen indicates the user program number that you are currently editing.

```
    MAIN   MENU    [1]

  DETECT SETTINGS

  DISPLAY SETTINGS

  SOUND SETTINGS
```

```
 DETECT SETTINGS    [1]

 Search mode    AF 2
 Disc. H rocks  Off
 Autotracking   2
 Gain           07
 Freq. shift    13605
```

```
 DISPLAY SETTINGS  [1]

 Backlight      ▪▪▪▪▪▪▪
 Contrast       ▪▪▪▪▪▪
 Accumulation   1
 Zoom WS        1:4
```

```
 SOUND SETTINGS    [1]

 Sound mode     RT-ST
 Num. of tones  5
 LT bound       -14
 Volume WS      6
 LT volume      9
```
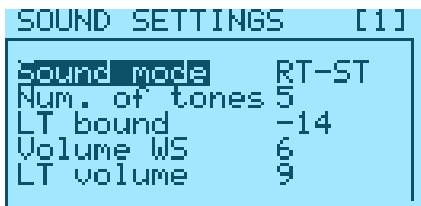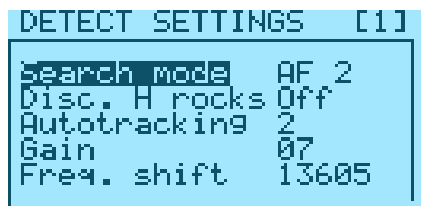
* SEARCH OPTIONS

Conv. Search. [Normal. (Normal), MM (metal trash), AF1 (Filtering algorithm), AF2, AF3] These options are designed to optimize the operation of the device under normal conditions, under various degrees of trash within the search area, as well as under various amounts of electromagnetic interference. Trashy is defined as an area where the distance between small metal objects (nails) is 1/2 the diameter of the coil.
To work in these areas use the MM. Otherwise, we recommend you use the mode "Normal."
Mode MM is characterized by a fast algorithm for the signal processing without loss of detection depth, however, due to the accelerated processing of signals from objects, an increase in the number of unnecessary excavations is possible due to incorrect identification of deeply lying plane targets made of iron (beer corks, pieces of tin and etc.).
When searching in areas of tall vegetation or in plowed fields with an uneven surface it is inevitable that bumping of the coil will occur. In these situations, it is recommended that you use the search modes "AF1, AF2, AF3", where "AF" indicates the presence of an additional filtering algorithm of the signal. These modes can also be useful in areas with high levels of electromagnetic interference (EMI). However, it should be remembered that such filters may slow down the detector process speed.
Advice from an experienced searcher:
MM mode with a speed of 1-2 is very well suited as the main one for finding small targets. For example, small medieval coins. Yes, it is mistaken for a little "non-ferrousing" part of the iron. But at the same time, it is also mistaken in the "right direction", voicing in color those deep small non-ferrous targets that in other modes can sound like iron. **DHR (Discrimination of "hot rocks") [On. / Off.].** This option includes the ability to suppress the sound response in the (ST) channel to the hot rocks (HR). We can describe these as rocks with a high ferrous content. Because of the physical features of the interaction of the Coil with the "HR", the reaction to them is often confused with the reaction to large copper or silver coins. This algorithm helps to distinguish between these two types of responses and to eliminate the audio response to the Hot

Rocks. Optionally the software can be switched off. The inclusion of DHR is reflected on the screen in the form of an inscription of "HR" in the upper right-hand corner under the low-battery indicator. Reaction to these in the RT channel remains.

Attention! *The algorithm is turned off automatically in the program "MM"*
Advice from an experienced searcher:

This algorithm is one that for the sake of comfort too increases the risk of missing some useful targets. I recommend to do without turning it on, especially when searching on a plowed field.

Speed AT (Autotrak) [off/1 .. 6]. This option allows you to set the speed limit of the auto tracking of the ground (not to be confused with balancing on a ground). Auto tracking allows the device to automatically adjust to the slow changes of temperature and salinity of the soil. It should be noted that this action should in no way replace the procedure for ground balancing, and only adjusts the balance of soil in small amounts during the search. In some cases (large amounts of metal trash or a cluster of hot stones) AT may not work properly. In these circumstances, you should disable the AT.

Attention! *If the device has not been used for a long time, for correct operation of auto tracking it is necessary to ground balance.*

Gain [1..10]. This parameter is used to set the sensitivity of the device in the Real Time and Identification channels at the same time. In most cases, we recommend that this value is not set to more than 7. Smaller values can be useful, for example, to search for large objects that are not deep or in trashy areas.
Shift Frequency This parameter regulates the shift of the operating frequency. It has 10 "steps" in the direction of decreasing and increasing the operating frequency of the device.
First 5 "steps" (1, 2, 3, 4, 5 clicking in any direction of the offset)- this parameter reduces the effect of the mutual influence of devices operating in close proximity to each other. By adjusting this parameter, on

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both instruments, the users can achieve a minimum influence on each other and improve the comfort of working together at close distances without significant loss of sensitivity and identification.

For a more effective suppression of the mutual influence of two nearby detectors it is recommended to spread their operating frequencies Always remember that nearby operating instruments can significantly reduce the search depth.

It is best to choose the level of difference between the operating frequencies experimentally by setting the distance between the devices and testing the sensitivity of the devices.

Remember that the detectors must be located in the same plane, which corresponds to their actual relative position during the search. When choosing an operating frequency to suppress industrial noise, try to select values with final digits close to 25 Hz or 75 Hz. These are the best 50 Hz power frequency suppression conditions.

The second 5 "steps" (6, 7, 8, 9, 10 pressing in any direction of the bias) are designed to leave the resonant operating frequency of the device. If during the first 5 presses the frequency change is minimal (by a few tens of Hertz depending on the operating frequency), then with the next 5 presses, the frequency change step increases sharply (tens to hundreds of Hertz). With such a strong change in the operating frequency from the resonant frequency of the sensor, the device loses sensitivity and reduces current consumption. The effect is approximately the same as from a simultaneous decrease in gain and current from the menu (Economy), but in contrast to them, it is not the signal perception by the device that decreases, but the signal itself from the sensor. The device works more "softly" and is not overloaded with unnecessary strong signals. Decreasing the sensitivity of the device's sensor by moving away from the resonant frequency can be beneficial when working on a very heavily littered with large metal area, searching in the close proximity to large metal structures, searching in areas with a high content of magnetite in the soil (soils of volcanic origin).

Attention! After adjusting the frequency shift of the device remember to perform the ground balance procedure.

* DISPLAY SETTINGS

Backlight. Allows you to change the brightness of the screen. The far left light indicator corresponds to the complete shutdown of the backlight. Remember that too much backlight level reduces the operating time of the battery life.

Contrast. Sets the desired level of contrast of the display.

Accumulation [1..4]. Option allows you to store the display from 1 to 4 hodograph images simultaneously. Displaying multiple hodographs may be useful, for example, in the analysis of responses from the same target while scanning from different angles or directions.

Zoom WS (Zoom weak signals) [1:2/1:4/1:7]. This option was designed to increase the capabilities of visual hodographic identification. It allows to increase sizes of weak signal hodographs as well as to evaluate the signal level by the size of the hodographic picture. For instance, setting to the 1:2 scale you can increase and thoroughly examine a low-signal hodo-graph. Scaling 1:7 you can evaluate signal levels in a wider range by the size of the picture respectively.

* SOUND SETTINGS

Sound Mode [RT/RT-M/RT-M99 /RTL-ST/RT-ST/ST-P} There are 6 types of sound modes.

RT [Real Time}. In this mode the audio output is in sync with the movement of the coil. As the coil approaches the target the audio rises and as it leaves the audio falls respectively. This type of display allows for a maximum depth of detection without any type of audio of the type of the object (all targets of a single tone). Real-Time is used when you want to search for deep targets, for example to search for military items.

RT-M [Real time-Multifrequency]. This mode differs from the RT mode by the presence of multi-frequency identification of object types. The number of identification tones is set by the parameter Number of tones and can be from 2 to 5. This mode is radically different from all others in that it not only changes the sound of the device, but also affects its main search characteristics. When this mode is turned on, the main

identification SFT algorithm of the device is turned off, which serves to improve the identification of deep targets. The device operates in real time, almost completely simulating the operation of analog devices. It might appeal to those who like to output the signal from the target in real time without delays or unnecessary processing. But it should be remembered that it often makes mistakes in identifying deep targets with high mineralization of the soil. True, like analog devices, this mode is capable of making mistakes in the "right direction", by sounding a good target with non-ferrous, which in "smarter" modes the device will consider as iron, having all the signs of ferrous metal for the identification algorithm. In places with high metal debris, this mode is perhaps less "acute" emphasizes weak signals from targets lying close to large iron debris than the MM mode. It may be easier to understand the picture of what is under the sensor of your device. That is, it can be summarized as follows: this mode, which imitates the operation of an analog device, simultaneously has all the pros and cons of an analog device.

It should be remembered that when this mode is working, the hodograph on the screen continues to be processed by the SFT algorithm. That is, it is output after the sound, and may not match the tone. That is, a situation may arise when a real- time sound will voice the target with a non-ferrous signal, and the hodograph that has passed the mathematical processing will show iron. And vice versa. Who of them to believe at a particular moment is up to you to decide based on experience and intuition.

RT-M99 [Real time - Multi-frequency multi-tone]. It is similar in characteristics to the RT-M mode. Distinguished by rich sound coloring of the signal, and the presence of multi-tone scoring of the non-ferrous metal sector in increments of 1 degree.

RT-ST [Real-Time - Short tone]. This is the preferred sound setting. Sound indication of the object occurs in 2 stages. Real time sound appears first (RT) with a medium tone, and then, after the object is identified the RT threshold tone is replaced by the ST tone of an appropriate frequency. The duration of the tone can be changed using the Duration ST.

RTL-ST [Real time before the threshold - Short tone]. Along with RT-ST this is the other main type of sound indication. Different from the

RT-ST this setting is characterized by the fact that when the ST tone is generated the RT tone drops out.

ST-P {Short Tone Polyphonic}. Ability to give both a low tone and high tones at the same time. For example, when giving a signal from the small flat iron targets (beer bottle caps, small pieces of sheet metal, etc.)

Num. of tones [2, 3, 4, 5]. Sets the number of tones for audio identification.

LT Boundary (The boundary for the low tone (iron)). This option allows the user to set the boundary for the low tone. In areas of mineralized soil as well as areas with small iron nails, targets such as small shallow gold and other low VDI targets will indicate a negative VDI. Usually these give a signal between the medium-large iron VDI range and foil VDI range. Medium wrought iron targets such as wrought iron nails will have a VDI vector of -45 to -40. Foil will have a VDI vector of 0 or close to this. Therefore those targets with a VDI from 0 to -35 are considered "suspicious" and subject to research when looking for small gold jewelry, small medieval daggers or coins within debris. When setting the boundary of the LT remember these facts in order to not miss valuable targets when searching under these conditions. So, if we receive a good tone, even if the hodo-graph indicates a loop, with 95% confidence we can say that this is possibly a good non ferrous target. Together with the separation rate of the MM search mode this setting will increase your chances of not missing a non ferrous target mixed in the iron. Try to set the border for these lower tones appropriately. If you perform a search in places where the medium/large iron can be interesting (Arrowheads, knives, medieval items etc.) you can move the nonferrous tone to the sector border where the majority of large iron indicates at -45 (-50 possible maximum). **Volume WS (Volume of weak signals) [1..15].** Adjusting this parameter allows you to change the volume of the ST from weak signals from small or deep targets. Smaller values of this parameter can control the level of the volume signal for a wider range of target depths. However, at very low settings signals from small or extremely deep objects can be too quiet. Very high settings will reduce the differential volume level between deep and shallow targets. Therefore, the value of this parameter is selected experimentally, to individual user preferences.

Volume LT [1..9]. Parameter adjusts the volume of targets within the setting of the LT border (iron). Sometimes it is useful to reduce the volume or even mute the sound from iron in order to make the search more comfortable. This parameter value is selected based on the personal preference of the user. The value of Fe-9 Volume adjusts the volume levels of iron and non-ferrous objects.

In the case of overloading the electronic circuit due to large or shallow targets under the coil the device will issue an audible and visual alarm overload.

ADDITIONAL MENU (ADD. Menu)

The menu is in addition to the main options menu, this sub-menu extends the capabilities of the sound and the display options as well as an option to adjust the autotuning of the balance to the soil.

To enter the sub-menu, press and hold down

Navigate the sub menu options by using the buttons

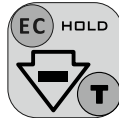Selecting a menu item and enter the submenu by pressing the button

To change the values in the selected parameter use buttons

The submenu parameter is selected using the button

You can change the parameter selected in the submenu using the buttons   and

o exit the sub menu and from the menu to   the search mode press a button

* MENU OPTIONS

1. Tones Settings RT (Border 2, Border 3, Border 4, Freq. RT);
2. Tones Settings ST (Frequency LT, Freq. 2, Freq. 3, Freq. 4, Freq. 5);
3. Other Settings (Duration ST, Economy Mode, GS Filter, Rate MM,EMI Filter MM);
4. GS filtering settings (Filter GS, GS zone)
5. Deep settings (Filter T, Filter H)

To configure the parameters that work separately for each of the 4 search programs, you need to enable the Additional menu from a specific custom program. For example, if you decide to set the length of the ST for program №2, you need to first enable program №2, then enter the Additional menu for settings.

* TONE SETTINGS

In this menu you can adjust the audio VDI boundaries for the RT tones to suit your particular needs. By narrowing or expanding the boundaries of tones, you can achieve the fact that the groups of goals that are characteristic of the region of your searches will differ in sound. Also in this submenu, you can enable an additional tone in voicing iron targets. (**Add. Fe tone**) Two tones in the ferrous sector help to more clearly distinguish the difference in the sound of large and small iron, and it is also better to distinguish the presence of a "ferrous component" in high-tone signals for large and flat iron.
Additional Tone Fe is turned on for all types of sound indication at the same time.

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* TONE SETTINGS ST

In this menu you can change the frequency of the ST border tones to fit your personal preferences. The higher the number, the higher the pitch. The lowest tone corresponds to iron, while the highest to the highly conductive metals. Please consider when changing the lower ST tone, that the tone of the channel RT has its own distinct value (adjustable via menu "SETTING TONE ").It is recommended to try and not set the ST tones to the same or similar value as the RT tone as it will become indistinguishable from the latter.

Advice from an experienced searcher:
Reducing the tone of iron and the tone of the RT can significantly facilitate the perception of multiple signals when working in a littered place, especially in the RT-ST mode.

* OTHER SETTINGS

Duration ST. This parameter sets the level of the duration of the tone bursts in the Sound Modes RT-ST and RTL-ST. The far left position corresponds to the shortest tone duration. **It is configured separately for each program.**

Volume RT. Adjusts the sound volume of the RT through the detection channel. There are 9 gradations, where 3 is standard volume of RT for AKA devices without processing. From this value, the volume of the RT can be either reduced or increased. **It is configured separately for each program.**

Economy Mode [On. / Off.] This parameter switches the current excitation level in the coil and allows you to adjust the sensitivity and power consumption to fit different search conditions (see above) **It is configured separately for each program.**

MM speed [1..5] Adjusts the recovery speed of the detection threshold by the identification channel (ST) in MM mode. The higher the littering of the area, the more preferable the higher speed values. In general, the parameter is selected according to the conditions of a particular search location.

This parameter affects the operation of the device only if MM search mode is enabled in the program involved.

GS FILTER [OFF., 1..15]. Switching to the "MM" operating mode, the device begins to process signals according to an accelerated, but significantly complicated algorithm. Here often the effect of the so-called "fragmentation" of signals from the target (not to be confused with the fragmentation of the signal in the nearest zone) may arise, i.e. one target can give several sound signals, especially in conditions of electromagnetic interference (EMI). This option is used to minimize this effect. Again, the value of this parameter is selected experimentally, for a specific search location. **The default filtering level is 6. This parameter affects the operation of the device only if MM search mode is enabled in the program involved.**

* GS FILTER SETTINGS

GS Filter [Off / 1..80]. is a filter of false ground signals. It is based on a mathematical algorithm that, according to a number of physical attributes, separates the signals of metal targets, filtering them for sounding, and the signals of the difference in soil mineralization, which are not sounded. This is necessary when working on wet salted soils (for example, spring arable land saturated with fertilizers).

The filter is especially effective when using large sensors (10 'and 12.5'x9.5') operating at high frequencies (14-20 kHz). This is due to the peculiarities of the interaction of such sensors with highly conductive soils.

The discreteness of this filter is calculated as follows: 4 filter units = 1 degree of the instrument scale. That is, in order to set the GS filter at 3 degrees (in the VDI sector +89, +88, +87), the filter value must be 12. The filter is configured separately for each program.

Features of the GS Filter in various search modes.

In all search modes, except the Deep Program, even if the GS Filter value is set to Off, it continues to affect the RT signal in the zone of 3 degrees from the ground balance, that is, the RT signals in sectors - / + 89, 88, 87 VDI. In this case, the ST signal is not affected.

When the filter is turned on, it begins to cut off the voicing of false

ground signals on the ST channel, without affecting the signal on the RT channel in VDI sectors less than +87.

When you set the GS filter to Off in DP mode, unlike other search modes, the filter is turned off completely through both sounding channels. When setting any other value, it works on both channels (RT and ST), regardless of the set value.

It should be remembered that an excessive increase in the value of the iltration level increases the comfort of the search, but can lead to losing of large and highly conductive targets made of non-ferrous metals.

The value of the filtering level should be selected experimentally for each specific search condition. In this case, it is desirable to keep it as low as possible for a comfortable search.

The GS zone, or "*soil mineralization gap*", is the zone of completely disabling false ground signals through both ST and RT channels, *without filtering for possible target signals and signals from the soil.*

Adjustment of the GS zone is carried out in the range from 00 to 80 in increments of 0.25 degrees, similar to the GS Filter. For example, to set the GS Zone to exclude all signals in the sectors +/- 89.88.87, you need to set its value = 12.

However, it is better to choose a setting according to the situation, gradually increasing the value of the GS Zone to the minimum comfortable operation of the device on this soil.

The GS zone can work both separately and together with the filter of false signals of the soil, complementing it in particularly difficult soil conditions, when the filter does not cope with the selective suppression of false signals from the soil.

* DEEP ALGORITHM SETTING

Filter T [01..22] (works only in the DP mode) is used to cut off "short" signals. With an increase in the value of this filter, the sensitivity of the device to electromagnetic interference, shakes and signals of small targets decreases. This allows you to focus on searching for large items. The default value is suitable for looking for targets starting with a tin can.

Accordingly, when searching for smaller objects, the value of this filter should be reduced. To search for items larger than a tin can, its value can be increased

Filter A [0..4] (works only in the DP mode) reduces the recovery speed of the device after registering the target, which requires some reduction in the wiring speed. At the same time, it increases the sensitivity of the device, especially to large targets. Also, sensitivity to the soil increases, which requires maintaining a certain distance between the soil and the sensor. When searching for individual small objects, and the need to lower the sensor closer to the ground, this parameter should be increased. To increase the sensitivity - the parameter should be lowered.

USER PROGRAMS

The device provides the ability to edit and save 4 independent search programs. In each program, the user may choose to set the value of any of the available options.

To switch between user programs press button The currently selected program is displayed in the lower right hand corner of the display. A long press of this button, switches the Deep Program (DP), and the second long press - exit back to the program from which was DP turned on (For version with DP. Otherwise, you enter the normal program #4).

Options: Backlight, Contrast and Duration ST do not directly affect the search capabilities of the device and can be selected based on the preferences of a particular user.

Attention! **It is not recommended to set too high level of the "Duration ST" when working in littered areas, for a clearer separation of nearby objects.**
Factory values of all parameters are stored in the device memory, and the user can return to them at any time.

To do this, turn on the device holding down the button and keep it pressed until "Factory settings" appears on the screen.

Program 1 is designed for easy and comfortable search, especially at the beginning of the exploration of the device. Moreover, it has a sufficiently

44

high detection depth.

Program 2 is designed to search in littered areas. It has a good response speed, but slightly inferior in sensitivity. Also, in the case of very strong littering by large metal objects, it may be necessary to reduce the gain of the device, which will increase the search efficiency. To reduce blinding of the device in places with too large metal debris, especially at the same time with a large amount of slag and brick, you can also shift the operating frequency from resonance (see Chapter Operating Frequency p. 21)

Program 3 is the main search program for an experienced user, combining sufficient comfort with a very high sensitivity. If necessary, it is possible to increase the sensitivity by increasing the settings of the RT, ST and Gain of the device.

Program 4 - for cases when a search is required at slightly deeper depths, however, it is worth remembering that this reduces the comfort of the search, worsens the identification properties of the device, and also, if the current mode is "Turbo", the operating time from one set of batteries is reduced by 2-3 times.
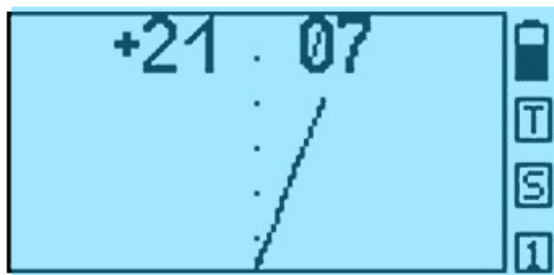
1....4 - Number of the current user program

The factory setting values for all 4 programs are shown in Table 1:

Settings	Prog. 1	Prog. 2	Prog. 3	Prog. 4	4пр. ГП
Sensitivity ST	10	7	11	12	11
Sensitivity RT	7	5	8	9	5
Volume	9	9	9	9	9
Sensor current mode	Economy	Economy	Norm	Norm	Norm
Search mode	AF2	MM	Norm	AF1	ГП
Sound Mode	RT-ST	RT-ST	RT-ST	RT-ST	RT-M
DHR	Off	Off	Off	Off	Off
Speed AT (Autotrak)	2	Off	Off	Off	Off
Gain	7	4	7	7	7
Accumulation	1	3	3	3	3
Scale of the screen	1:4	1:7	1:7	1:2	1:7
Number of tones	5	5	5	5	5
Border LT	-14	-30	-24	-24	-24
Vol. WS	6	6	6	8	8
Volume LT	9	6	9	9	9
Shift Freq	Center	Center	Center	Center	Center
ST length	5	3	5	7	5*
Volume RT	3	2	4	5	6
Speed MM	3*	3	3*	5*	3*
EMI Filter MM	6*	6	6*	6*	6*
Filter T	15*	15*	15*	15*	15
Filter A	2*	2*	2*	2*	2
Filter GS	Off	Off	Off	Off	Off
Zone GS	20	Off	Off	Off	Off

Values marked with * are not used in the program.

Remember that the default settings are not an absolute, but offered only as a starting point to assist your search. Experiment and we hope that in the near future you will make your own comfortable and effective program.

As we gain experience the company reserves the right, without notice, to change the value of the factory settings.

DEEP PROGRAM (DP)

This program is an addition to the Signum software MFD 7272M and must be purchased separately. Or, when purchasing the Signum MFD 7272M version, is included in the software, located on the place of program №4.

The program is designed to search for large objects at a depth in the ground, including in the conditions of littered with small metal objects that screen the signal of the desired targets in a usual search. The search is performed by smooth horizontal wiring of the sensor at a speed of

about 4 seconds per wiring in one direction. Speed can be reduced or increased depending on the situation. Sensor wiring is carried out at a height of 20cm to 1m depending on the вЋњАвЋќ filter settings and the density / magnitude of the surface metal debris under which targets are searched.

The usual scanning height above the ground at the places of late settlements, according to the experience of the operators, is 60-70 cm, smoothly avoiding sharp pushes when starting the back movement of the sensor, as well as significant changes in the scanning height during wiring. If there is a software version with this program, it is located under №4 in the list of factory programs. Also, any program can be configured as a deep one by turning on the DP mode in the Settings Menu> Search Options> Search terms. The transition to program №4 is carried out both by sequentially sorting factory programs by pressing a

button and by holding the button from any other work program. In the second case, a repeated long press of the button returns to the program from which the Deep Program was turned on.

DEEP PROGRAM SETTINGS

Factory preset settings allow you to effectively use DP in the vast majority of relevant search tasks. But with a conscious confidence in the need, they can be adjusted for a specific task. If the operator does not understand the results of the settings adjustment, as in the case of changing any other settings of the device, if you wish, you can restore their factory values by turning off the device and turning it on while holding the

setting button until the inscription "Factory Settings" appears.

* CHANGE SOUND SIGNALS DP

In DP it is possible to use three sound indications: RT, RT-M and RT-M99 The choice of them is in the Parameter menu> Sound settings>

Ind. Sound type.

* CHANGE FILTER PARAMETERS DP

To change parameters of the filters you can in Add. menu. The entrance

is extended by long pressing the button

Navigating through

items by the buttons   Choose the section "Setup.
deep alg. "and enter   it with the

button   In the section there are two filters" Filter T " and"
                    Filter A. The filter for adjustment is selected by
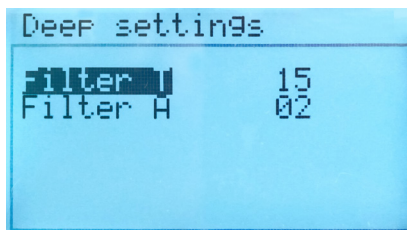
pressing the button   value and filter using the buttons

                                          and

" Filter T "has 22 adjustment values from 01 to 22. This filter is used to
set the cutoff threshold for short signals, that is, the larger the targets are
searched, the greater the value of this filter can be set.
At the same time, the response of the device to shaking, interference and
small metal objects is significantly reduced. A factory value of 15 is suit-
able for finding most items the size of a tin can and larger. If you want

dense collection of small (for example, a treasure of coins).

"Filter A" has 5 adjustment values from 00 to 04. This filter controls the speed of recovery of the ability of the device after registering a signal from a target to register a signal of the next target. The lower the filter value, the slower this restoration, but the greater the sensitivity of the device. With increasing filter value, the sensitivity of the device decreases, but it becomes possible to lower the sensor of the device closer down to the ground surface, because sensitivity to the ground signal is also reduced. The default value is suitable for most in-depth search tasks for relatively large items. If you want to search for individual medium-sized objects at a small distance of the sensor from the ground, it is advisable to increase this parameter.

As in all other programs, the current "economy" and"turbo" modes affect the search depth. But also for increasing or decreasing the number of false (non-target) signals.

As in all other programs, the value of the GS Filter and the GS Zone affect how the program works. For more information about their purpose, see the corresponding section of the manual.

* RECOMMENDATIONS FOR TARGET SIGNALS

The vast majority of large targets for this search mode have fairly pronounced two-way signals (including when cross-checking crosswise), and their hodographs, in the absence of large metal debris over the target, have a shape close to the hodograph of such targets "by air "Because the effect of the soil is greatly reduced. That is, the identification of targets is even more reliable than in the normal search mode with a sensor in the immediate vicinity of the ground. For example, when testing a DP, when a helmet (clay soil) was found at a depth of 1 meter, it gave a swept hodograph with VDI +62 (like in the air), when rechecked in the usual search mode, it was defined as a small iron target with a loop-like narrow hodograph and VDI -78 -82. That is, in the normal mode, a strong signal of ground ferroxides was superimposed on a weak signal of a deep helmet, "transfer" its signal into the sector of small iron targets. There was no surface debris. When scanning in the DP, there was no ground signal and could not affect the true value of the VDI

helmet. Due to a sharp decrease in the influence of soil on the signal, the hodograph looping on large iron targets, such as pieces of roofing, agricultural implements, crumpled buckets, partially broken cast irons, etc., has much greater visibility, which provides an additional identification information for an experienced operator.

The most common variants of false signals when searching in the Deep Program:

1. One-sided clear color signal with arrow hodograph with no signal during the reverse movement of the sensor. When rechecking at 90 degrees (crosswise), the signal is either absent or also one-way. Most often, the fault of such a false signal is a sharp drop in the ground, for example, a small hill or a large gauge, especially in wet conditions.
2. *"Soil lens"*

This is a special type of soil anomaly. It is able to give the target signal in the Deep search mode. It is a local inclusion of a more conductive soil in the composition of a less conductive continental layer. It can be formed as a result of the occurrence of frost cracks and ice wedges of the ice age, later melted and slowly replaced by red clay with a high content of ferrous mineral. It can also be formed as a result of the movement of part of the soil by a glacier or landslide (mountainous areas) and as a result of human activity. One example is the ancient pits excavated and buried in the clay continent centuries ago. Such a ground anomaly can give an explicit target signal, usually with an arrow hodograph and a VDI in the range of +78 +84. That is, a signal similar to, for example, laying large silver or copper coins. In this case, in normal mode, the device practically does not see the target (or sees very weakly). At the beginning of digging in static mode, the device begins to clearly detect a target in the excavation.

Based on the experience of testing DPs, the following methods for identifying such lenses are recommended.

When scanning from a height of 60-70 cm, the signal is clear and clear, but with a decrease in scanning height (but not close to the ground), the signal begins to "blur" and even disappear. At the same time, a metal target, while lowering the scanning height, on the contrary amplifies its

signal, even if changing VDI in the direction of iron due to the possible presence of surface debris.

If, nevertheless, excavation of the signal has begun, raise the sensor of the device above the pit and smoothly, but quickly lower it into the pit and immediately lift it back. If there is a metal target, the hodograph from it for both movements is fixed on the screen. It will be either a hodograph from a sufficiently large iron, or from a non-ferrous target. In the case with the lens, the difference in the hodograph during horizontal scanning and vertical lowering-lifting is very strong. If with horizontal scanning it is a clear target hodograph, like a large non-ferrous target, then when lowering / raising the hodograph is "blurred" over the ground in the non-ferrous and iron sectors. This is a clear sign of a ground lens.

Of course, if you dig not only two-way explicit signals, but also all the bursts, catching every "suspicion", as when searching in the normal mode, then it is possible to dig out something valuable on such a signal. But taking into account the excavations, not by one- two shovels, but by a meter, or even more, the efficiency will be low, and fatigue and disappointment will come very quickly. Remember that in the vast majority of cases, a large target will give a clear noticeable two-way signal. From this and begin your development of DP. When you master it enough to in most cases understand what is in the ground with a particular signal, only then, soberly assessing your strength, perhaps to expand understanding, it is worth experimenting with excavations of "controversial" signals. ***And please bury the dug holes!***

USING THE HODOGRAPH FOR IDENTIFICATION

We have previously mentioned about using the hodograph for identifying targets. But what is the hodograph and what it is for?

Amplitude and phase depend on the electro physical parameters of objects such as conductivity, magnetic permeability, depth, geometry, etc. To accurately describe the nature of the received signal from an object is very difficult, given the variety of influencing factors. However, it is possible to point out some general patterns.

Earlier, we mentioned that the signal is a vector quantity characterized

by amplitude and phase. If you hold any metal object to the coil it is evident that the magnitude of this vector will vary. The end of the vector will describe, on a coordinate plane, some shapes (lines, loops, etc.). These shapes are called Hodographs. The latter most closely describes the complex interactions of the coil with metal objects.

When analyzing the hodographs should be remembered a few general rules:

• hodographs of small and medium-sized ferromagnetic objects are in the left quadrant (i.e. have a negative vector angle);
• hodographs of objects of non-ferrous metals and large ferromagnetic objects lie in the right quadrant (positive vector angle);
• the larger the area of the surface of an object the higher the electrical conductivity, hence the greater the slope of the hodograph to the right;
• travel times of medium and large ferrous objects, as a rule, have the shape of a loop;
• hodographs of non-ferrous metal objects are mainly straight;
• a properly ground balanced unit will have a vector along the horizontal axis.
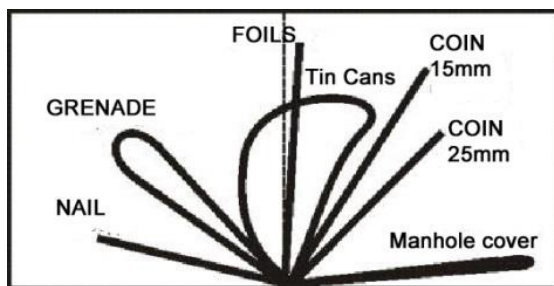
Examples of the hodographs of some objects are shown in Fig. 14   Fig. 14

Thus, analyzing the shape and position of the hodograph, along the coordinate plane, there can be a certain degree of probability as to the identity of the object type.

It should be noted that the hodograph examples given are idealized and do not take into account the effect ground mineralization.

REPLACING THE COIL

Attention! Before you replace the coil, find a clean section of ground, because after a coil replacement a ground balance is required.
Or, if a clean place cannot be found, have a piece of ferrite, or use a piece of red brick. Secure the desired coil on the rod, wrap the wire around the rod and plug the connector into the control box.
Hold the device at a distance of half a meter between the coil and the ground and away from metal objects, turn on the unit while holding

down the button on the instrument panel. Keep the button pressed until the detector stops playing the melody, and the screen for a short time will display the value of the working frequency of the coil.
Attention! The exact frequency displayed can vary depending on the coil and software and is automatically calculated by the device. For example a Coil with a frequency 7.0 kHz, can vary ± 20 Hz.

After this, your device will automatically navigate into the ground balancing mode. (Fig. 15) Perform the auto ground balance on the clean area of ground you located prior to changing the coil. Refer to appropri-ate paragraph under section "Ground Balance". Alternatively if a section of clean ground cannot be located perform the balance proce-dure using piece of ferrite orred brick. Refer to the instruction pertaining to this under the section "Ground Balance"

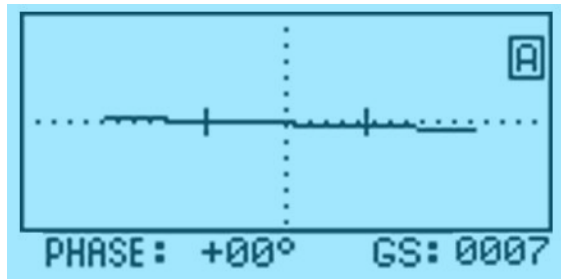Pressing exits the balancing mode to work with the new coil.

Fig. 15

Attention! All of the above procedures are necessary when making changes to the software version (flashing).

Frequency switching of 3 frequency sensors.

In order to switch the operating frequency of a 3-frequency sensor
1. Turn off the device.
2. Switch the frequency switch of the control box to the desired frequency.
3. Turn on the device with the button held down, as described in the Chapter Replacement of the sensor.
4. Carry out ground balance.

If your device is equipped with several periodically used sensors (coils), we recommend that, in case of some interruption (for example, seasonal), restart the detector before starting the search, i.e., to avoid confusion, adapt the control box to the sensor (coil).

SEARCH AND IDENTIFICATION METHODS

When scanning the ground move the coil smoothly over the surface of the ground while maintaining a constant distance of 2-3 cm. This distance is optimal from the viewpoint of suppressing the influence of ground mineralization, and hence, for the proper identification of the metal objects. Avoid touching the ground with the coil. It is important that the distance between the coil and the ground remain constant (see Figure 16).

Keep in mind that the quality of this operation has a direct impact on the correct identification of desired targets. Also try not to make sudden movements of the coil horizontally. Optimal scanning speed is 40-50 cm/s. Each pass of the sensor should overlap the previous one.

Use additional scans to more accurately identify the type of object by centering above the target. Sweep the coil through the maximum signal area as accurately as possible maintaining a constant distance between the coil and ground. For the same reason scan the target with coil in the direction of the least amount of surface change in the ground. In this

case, the effect of soil will be minimal. When the search coil interacts with a metal object there may be a single tone burst or possibly several tone bursts in rapid succession. Therefore one should pay attention to the following.

When the detector responds with a single short high tone and the signal level is rather stable it is a good probability that the targets is not very large and of a non ferrous nature at a depth of more than 5cm.

On the other hand, if the detector gives a series of short high tones (usually 3) then the targets is shallow and in the so called near zone (less than 5cm). The Signal level will also display a value of 50 or greater.

Fig. 16

A series of two short low-pitched sounds indicates that in the area of the coil is an extended ferrous object (like a nail) located along the scanning direction. If the object is located along the perpendicular plane of the scan or the coil, the device will issue a single low-frequency short tone.

 It is important to note that the DD sensor is characterized by a complex pattern when interacting with metal objects close to the coil or the near zone (signal levels greater than 80). Therefore when trying to determine the target ID adjust the coil height to a level that will give a signal strength of 30 to 60 in the Turbo mode and from 15 to 30 in the normal search mode.

In other words, if conditions allow, try to identify objects above the near the zone.

Let"s us discuss some of the challenges with the so-called "**hot rocks**", (VDI greater than +84). In order to better differentiate between "hot rocks" and relatively large flat non ferromagnetic objects (Large copper or silver coins) with a VDI range of +78 to +86, the device uses a special high pitched tone which is different from the usual tone indicated on such non ferrous targets. If you desire the signal from "hot rocks" can be deleted by setting the discriminator sector value with the right edge of the +86. However, the most effective means of suppressing the audible

reaction on hot rocks is to use the DHR algorithm (Disc. of hot rocks). The risk from using discrimination settings to eliminate an audio response to hot rocks is this. Due to effect of the ground valuable targets, whose vector angle is close to that of hot rocks, can being missed. This risk is virtually eliminated by using the algorithm DHR instead. But the best and the most reliable way is to learn to identify such stones by ear, by a specific elongated signal.

Advice of an experienced searcher:

Having unearthed a similar stone, put it on the ground, and next to it, dig a large copper coin. Scanning a stone and a coin in turn, listen to the difference in the signals - they are very different. The signal of a metal object (both RT and ST) seems to be concentrated at the point of location of the object. At the same time, the stone is distinguished by a long elongated RT and belated ST signal after the coil is carried over it. "As if they pulled (RT) and released (ST) the elastic"

As you know, a particular problem for induction metal detectors is the identification of flat ferromagnetic objects such as steel caps/stoppers, lids, cans, etc., objects with a relatively large diameter of the eddy currents. This is largely helped out by using our proprietary development – The Hodograph Display (see Fig. 17).

In the interaction of such objects with the coil (assuming that the level of the signal is above 20) then time curves of these objects, as a rule, are twisted or looped in nature and "scattered" around the screen depending on the direction of the scan. Fig. 17 shows the travel times of these types of signals from an iron bottle cap/stopper.

For the given case, a sign that the ferromagnetic object is the loop-like character of the hodographs and their scatter depending on the scanning direction.
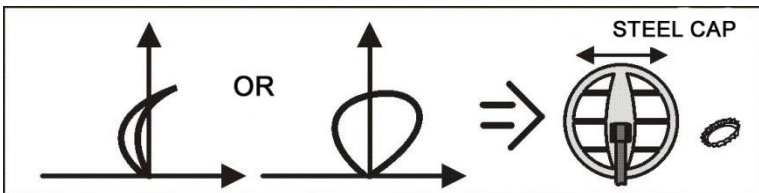
Normal operating mode

Fig. 17

To solve the problem with identifying steel caps/stoppers, you can use the Salgorithm, which greatly simplifies the process of identification of small (up to 40-50 mm) flat iron objects.

If you have received a questionable audio response of an object, check using the Salgorithm to see if it is a cap. Do not forget to monitor the signal level. This algorithm works effectively only when the signal level is 10 or higher.

Analyzing these types of questionable targets is made much easier and does not require as much user experience. The main job of identifying is performed by the processor.

Examples of the hodographs for the same cap/stopper using the S-mode algorithm is shown in Fig. 18.
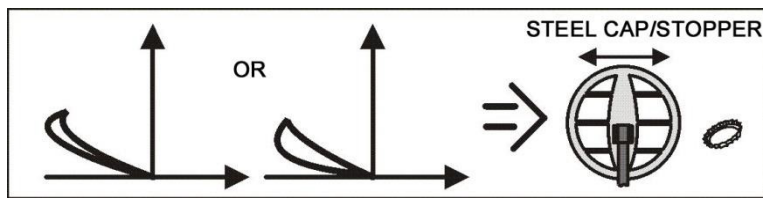
S-Mode Algorithm

Fig. 18

As can be seen in Figure 19, the S-type algorithm curve has hardly changed.
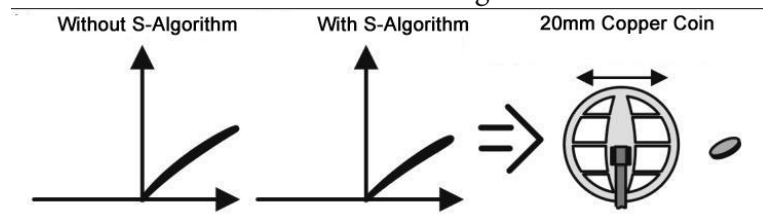

Fig. 19

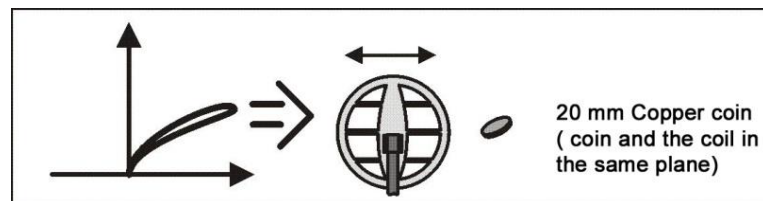Examples of hodographs for some objects are shown in Fig. 20-24
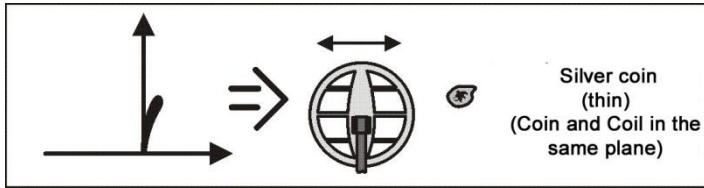

Fig. 20

Silver coin (thin) (Coin and Coil in the same plane) — Fig. 21

50mm diameter steel cap (cap and coil in the same plane) — Fig. 22

Nail lying parralel to the direction of the scan — Fig. 23
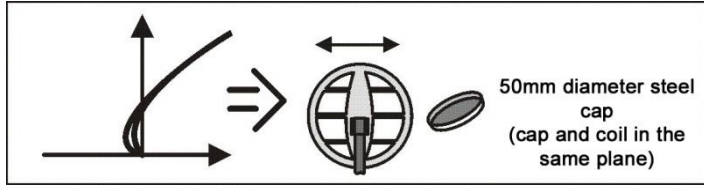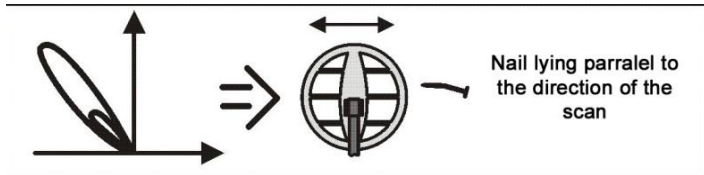
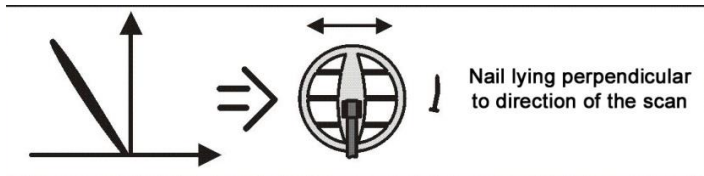Nail lying perpendicular to direction of the scan — Fig. 24

The example in Fig. 25 shows a hodograph for two nearby objects. Dimensions of the Hodograph loops will depend on the ratio of the size of these objects and the distance between them.

20mm Copper Coin (where the coil, coin and nail are in the same plane) — Fig. 25
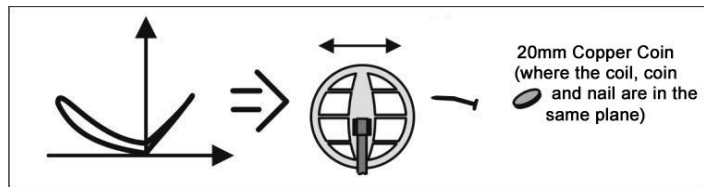
SEARCHING FOR METAL OBJECTS WITH LARGE EDDY CURRENT LOOPS.

These types of objects include, for example, large copper/silver coins, and other large planar objects of non-ferrous metals with a diameter greater than 40 mm.

Due to the particular interaction between the search coil and these types

of targets certain difficulties arise.

This is due to the very narrow difference between the vector angle of these targets and those of the ground signal.
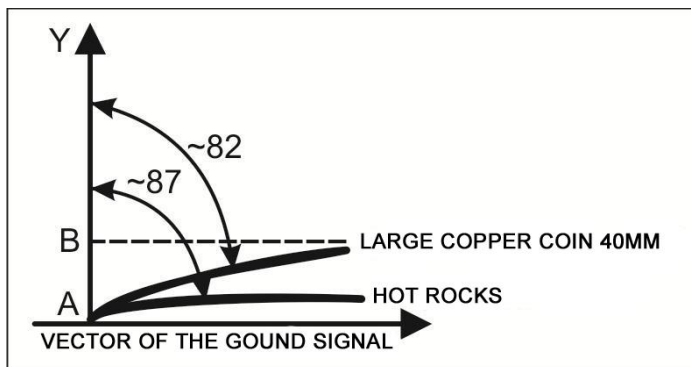
This useful component of the vector is the projection of AB to the vertical Y axis. The smaller the angle difference between the ground signal vector and the vector of the coin the less useful part of the projection of the signal and the less sensitivity. More important is the fact that the angular difference becomes even less with the so-called "hot-stone" (see fig. 26).

In these cases, even a minor incorrect setting of the ground balance can lead to a significant loss of sensitivity to the large copper/silver coins or an undesirable (annoying) response to "hot rocks" if the algorithm DHR is not used.

Note that when setting the ground balance, such as on loam, the angular difference between the signal and the signal of large copper/silver coins is about 7-8 degrees. At the same time, the angular difference between hot rocks is only 4-5 degrees which leads to difficulties in the identification of such targets.

In view of the above, it is possible to give some practical recommendations.

1. As accurately as possible carry out Ground Balance.

2. In areas with little to no metal trash use the AGT.

3. In the presence of hot stones, when not using the DHR algorithm, carefully open up the right border of the sector discrimination to minimize the risk of missing these types of coins.

Try to adjust the vector phase of the soil by 2-3 degrees in the

counterclockwise direction (specific value selected experimentally in Depending on the type of soil). To do this, perform the automatic ground balance procedure.

Then press the button to enter into manual ground balance mode and adjust the balance value 2-3 times
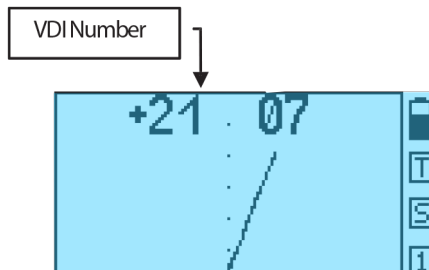
by pressing and then check the response of the detector when scanning area clean. This procedure requires a more careful scanning of the soil. In the case of false positives channel identification (ST) reduce the angle of the phase by

pressing button until their disappearance.

When searching on the wet grass (dew, rain) there is an increased risk of false signals in the ST channel. This effect manifests itself mainly due to the setting of high values of sensitivity in the ST channel and to the presence of a weak electric conductivity in the dew and plant liquids. To a large extent (almost completely), this effect can be eliminated by placing the search coil in a protective plastic case (plastic bag, full-time protection, etc.). In the case of searching in trashy areas it is sufficient to reduce the sensitivity of the ST channel.

EXAMPLES OF SOME COMMON TARGET VDI`s

VDI data are for units with a 7 kHz, Normal mode, Turbo and Economy off and DHR off.

Scale Of VDI	Items
From -90 to -86	Hot rocks, improperly configured ground.
From -86 to -70	small nails and other small iron trash.
From -70 to -50	medium wrought nails, small arrowheads.
From -50 to -35	large wrought nails, medieval knives, flat arrowheads, horseshoes, locks, and other fairly large iron articles.
From -35 to -10	In this sector there is little iron accept those targets that may be "masked" by iron, small objects of irregular shape of the low conductivity of non-ferrous alloys (bronze crosses, thin gold serpentine chain). Pay particular attention to the arrow and narrow loop-travel times in this sector.
From -10 to +10	foil, small crosses of bronze, very small lead, fine gold, small .22 shell casings
От +10 до +30	Hammered short cross silver cut half (+22), Roman minim (+14), some small thin hammered silver coins, US 5 cent nickel,50 pence (+24), etc
From +30 to +50	Hammered short cross silver penny +47, Celtic gold stator +46-+50, larger lead shot(i.e. musket balls, Minnie balls) also lead seals, etc
From +50 to +70	AE antonianus + 64, US copper penny, US zinc Penny, UK pound coin
From +70 to +86	Large copper coins (cartwheel penny, King George coppers, Victorian penny,) UK pound coin, US dime, Quarter, Half dollar and dollars, as well as large Planar or spherical iron objects (helmets, , plows, axes)
From +86 to +90	ground response from an unbalanced device, "hot rocks", as well as very large objects from deep highly conductive metal (e.g. aluminum basin, a large silver tray). "Hot Stone" signals differ in that they sound stretched, while the signal from the metal target is usually concentrated in a small point.

As we can see, even in the good VDI sectors we have targets that are trash. That is, there will always be trash items mixed in with the more desirable targets with very similar characteristics.

Also, do not forget that the purpose of VDI is only true in the area of consistent definition of the instrument and in the absence of other metal objects nearby. For example, a piece of iron underlying a gold ring will cause the normal VDI of +37 to now read 18/22. And at the limit of sensitivity in the ground, it may suddenly sound like a deep copper coin with VDI +85. This is not unique to your device, but for all other devices of this type.

Thus, any decision to dig or not dig a likely trash target is a compromise between comfort verses the loss of valuable finds.

And who knows, maybe 99 times you dig a trash target but on the 100th time the same VDI rated target will turn out to be a valuable find.

Attention! *When using a search coil with a low frequency excitation current VDI readings will have lower values. Conversely, for higher frequency the VDI readings will be higher.*

WARRANTY INFORMATION

Manufacturer guarantees operational capability of the metal detector provided that the consumer follows operation conditions. Warranty period 24 months starting from the sale date.

Manufacturing defects shall be repaired by the Manufacturer during the warranty period free of charge provided that there is no damages in electronic module and searchcoil.

This Operating Manual with the sale date mark should be provided to-gether with the device in case of warranty repair. Warranty period is cal-culated from the date of manufacture in case there is no sale date mark.

For warranty questions, please contact:

Departement of international trade:

Site: https://aka-md.com
Em@il: akadetector@yandex.ru
Tel/WhatsApp: +79037991510
FORUM: https://aka-md.com/forum/

METALDETECTORS_
AKA

WARRANTY FOR SEARCH COILS

Attention! Be careful! When using two-frequency and three-frequency coils, when switching the frequency, do not forget to tighten the protective cap! Any mechanical damage to the frequency switch is not a warranty case.

Frequency Switch Protective Cap

Also, to prevent dust and moisture from entering, use the protection of the connector for connecting the coil to the control box!

Coil connector protection

When disconnecting the search coil from the control box, do not pull on the cable, as this may cause damage to it. In this regard, false signals or a complete sensor shutdown may appear. This failure, also, is not a warranty case.

* Any mechanical damage (impact on a stone, cracks in the case) is not a warranty case.
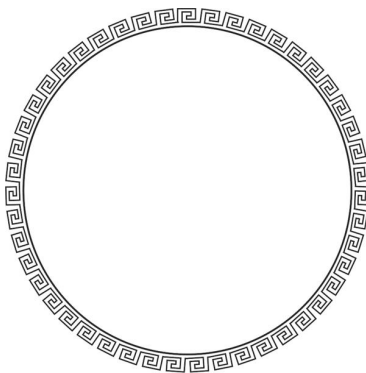
QA/QC certificate

Metal Detector «CLASSIK/GT/ICB», № _____

Date of manufacture «____»_____20____y.

Manufacturer's Stamp

QA/QC Passed _____ Signature. Sale Date

Sale Date   «_____»_____20____y.