

BLISSTOOL

BLISSTOOL LTC64X



USER GUIDE

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CONTENTS

1. FEATURES.....	3
2. INTRODUCTION.....	4
3. PRESENTATION.....	4
4. VERSIONS.....	6
5. STANDARD PACKAGE.....	7
6. OPTIONAL ACCESSORIES.....	8
6.1. ARMY BACKPACKS (KITBAG).....	8
6.2. ADAPTER TO CHARGE FROM CAR BLISSTOOL CL12V2.....	8
6.3. PROTECTIVE COVER OF DUST, MOISTURE AND RAIN BLISSTOOL PTC4R.....	9
6.4. STEREO HEADPHONES.....	10
7. STRUCTURE OF THE METAL DETECTOR.....	11
8. ASSEMBLING AND DISASSEMBLING OF THE METAL DETECTOR.....	13
9. SETTING, INDICATION AND MAINTENANCE BODIES.....	14
9.1. VOLUME POTENTIOMETER.....	14
9.2. FREQUENCY POTENTIOMETER.....	15
9.3. GROUND MODE SWITCH.....	15
9.4. AUTO ZONES SWITCH.....	16
9.5. GROUND RUDELY POTENTIOMETER.....	17
9.6. GROUND FINELY POTENTIOMETER.....	18
9.7. THRESHOLD POTENTIOMETER.....	18
9.8. SILENCER POTENTIOMETER.....	19
9.9. DISCRIMINATOR SWITCH.....	20
9.10. DISCR LEVEL POTENTIOMETER.....	21
9.11. DISCR DEPTH POTENTIOMETER.....	22
9.12. LOUDSPEAKER.....	24
9.13. PHONES CONNECTOR.....	25
9.14. COIL CONNECTOR.....	25
9.15. BAT LOW LED.....	25
9.16. CHARGE CONNECTOR.....	25
9.17. GAIN POTENTIOMETER.....	26
9.18. TONE POTENTIOMETER.....	26
10. SETTING UP OF THE METAL DETECTOR AND PREPARATION FOR WORK...	28
11. METHOD OF SEARCH WITH THE METAL DETECTOR.....	28
12. BATTERY. BATTERY CHARGING.....	30
13. PRACTICAL ADVICES.....	31
14. WARRANTY SUPPORT AND SERVICE.....	33
15. LEGISLATION.....	33
16. BLISSTOOL.....	33
17. CONTACT INFORMATION.....	33

1. FEATURES

- Base Technologies:
 - Induction Balance (IB)
 - Very Low Frequency (VLF)
 - SuperB Depth = Super BLISSTOOL Depth (SBD) ^{new}
- One of the best deep detecting metal detectors in the world
- Base operating frequency: v1 - 8.5KHz; v2, v2i and v3 - 8.0KHz ^{new}
- Adjustable operating frequency (+-60Hz) ^{new}
- Operating mode: motion
- Sound discrimination of the metals
- Designed to work on all types of terrains
- High efficiency even in highly mineralized terrains, terrains with a high content of ore, terrains dotted with ceramics and terrains dotted with stone plates
- Standard 28cm (11") DD search coil
- Additional 38cm (15") DD search coil ^{new}
- Built-in LiPo battery 11.1V, 2200mAh with high quality and long life ^{new}
- Automatic LiPo battery charger ^{new}
- Manual and Automatic ground balance mode
- Coarse and fine settings in manual ground balance mode ^{new}
- Switch with three auto ground zones
- High detection speed
- High recovery speed
- Adaptable behavior: can be "noisy" or completely "silent"
- Adjustable input AC amplification of the signal from the detected object ^{new}
- Adjustable frequency of the sound ^{new}
- Adjustable silencer of the background sound ^{new}
- Adjustable audio threshold
- Adjustable audio volume control
- Discriminator with three independent modes of discrimination ^{new}
- Adjustable detection/rejection level of iron, tin-foil and low-grade non-ferrous metals (usually pollutants)
- Adjustable depth of discrimination
- LED low battery indicator
- 6.35mm (1/4") Stereo headphones outlet ^{new}
- Single charge operating time: up to 30 working hours
- Consumption: min: 35mA, max: 100mA
- Detachable and adjustable carrier construction made from aluminum and carbon
- Robust and comfortable handle and armrest
- Electronic block from light and robust box made from ABS and aluminum
- Electronic block located under the armrest ^{new}
- Electronics fully shielded against electromagnetic interference
- Double shielded against electromagnetic interference cable for the search coil
- Connectors for the search coil with gold-plated pins ^{new}
- Connectors for battery charging with gold-plated pins ^{new}
- Weight in a complete and ready to use condition: 1.78kg ^{new}
- RoHS compliant
- Developed and manufactured in Bulgaria
- 3 Year Worldwide Warranty

2. INTRODUCTION

Metal detectors BLISSTOOL LTC64 and BLISSTOOL LTC64X are representatives of the new generation BLISSTOOL metal detectors from series LTC.

BLISSTOOL LTC64 and BLISSTOOL LTC64X are extended and improved version of the model BLISSTOOL LTC48X, so that entirely replaces and supplemented it. Their improvements, compared to BLISSTOOL LTC48X are in any direction, including: design, electronics, depth of detection, discrimination, stability and sensitivity, setting, indication and maintenance bodies.

In BLISSTOOL LTC64 and BLISSTOOL LTC64X, was implemented the first fully completed version of the BLISSTOOL technology SuperB Depth = Super BLISSTOOL Depth (SBD), whose basis was implemented in BLISSTOOL LTC48X, it provides excellent depth of detection, and has already developed and improved in BLISSTOOL LTC64 and BLISSTOOL LTC64X.

BLISSTOOL LTC64 is the base model of this generation, and BLISSTOOL LTC64X is its extended version. BLISSTOOL LTC64X contains GAIN and TONE potentiometers, which in BLISSTOOL LTC64 are not available. GAIN potentiometer is used to adjust the input AC amplification of the signal from the detected object, and through TONE potentiometer the user can adjust the frequency of the output sound of the metal detector as desired and adjust the most audible and pleasant sound to him. The presence of the GAIN potentiometer for BLISSTOOL LTC64X provide the user with fine-tune of the behavior of the metal detector, which generally permits BLISSTOOL LTC64X to achieve greater depth of detection, especially in terrains with, from low to medium mineralization, and opportunity to increase the stability of the metal detector in high mineralized terrains and terrains with a high content of ore.

3. PRESENTATION

BLISSTOOL LTC64X is a modern professional metal detector, designed to work on all types of terrains, including highly mineralized terrains, terrains with a high content of ore and highly contaminated terrains. Has perfect depth and discrimination and is outstanding for its high quality, easy user's adjustment and minimal maintenance need. This makes it equally suitable for beginners and experienced searchers.

As a concept, BLISSTOOL LTC64X is designed:

- to have excellent depth of detection in all conditions!;
- to be used on any type of terrains;
- to can change its behavior: whether to be "noisy" or completely "silent"; ^{new}
- to have expanded opportunities for setting of the discrimination and ground balance; ^{new}
- to successfully detect coin placed into ceramics, stones and rocks;
- to successfully detect coins in highly mineralized terrains;
- to have good depth of detection, not only to copper but also to silver and gold objects;
- to have high detection speed and high recovery speed and at the same time to have good stability. ^{new}

Real, metal detector BLISSTOOL LTC64X is one of the best deep detecting metal detectors in the world, especially when it comes to metal detectors type induction balance.

BLISSTOOL LTC64X is made of high quality, RoHS compliant and fully shielded against electromagnetic interference electronics, and high quality components such as: light and robust detachable carrier construction made of aluminum and carbon; electronic block contained in a light and robust box made from ABS and aluminum; standard 28 cm (11") DD waterproof search coil, double shielded against electromagnetic interference cable for the search coil; connectors for the search coil with gold-plated pins; connectors for battery charging with gold-plated pins. All this ensures its smooth operation regardless of the temperature changes and the other environmental characteristics, and durability lined with a 3 year worldwide warranty.

Its electronics and rechargeable battery, are installed in the electronic block located under the armrest. This design allows for improved mass balance to handle, and allows for continuous use without significant user fatigue. In a complete, ready to use condition, BLISSTOOL LTC64X is weighing 1.78kg.

Standard, BLISSTOOL LTC64X is equipped with a LiPo battery 11.1V, 2200mAh, which is characterized by high quality, low weight and long life. In order to recharge it, in the metal detector standard package is included an automatic LiPo battery charger.

BLISSTOOL LTC64X is available in four versions: v1 - standard version, v2 - version specially adapted for heavy field conditions, v2i - improved version of v2, and v3 – top version with extreme performance.

Its operating frequency, by potentiometer FREQUENCY, can be adjusted (+-60Hz), to avoid external interferences such as: interference from other close working metal detector with the same or similar operating frequency; and powerful industrial interferences. Adjustable by potentiometer TONE, is the frequency of the output sound of the metal detector.

Given its professional character, BLISSTOOL LTC64X has many options for adjust to the realization of its universality and getting the most of its opportunities. If the user is a beginner and do not understand for what serve the appropriate potentiometer or switch, it is sufficient to maintain it in the recommended, in the user guide, level, whereby relatively easy to make the metal detector in the regime close to optimal, but later, when the user gain experience in working with the metal detector, to optimize its behavior to a specific terrains by fine adjustment of the respective potentiometers and switches.

Its behavior can be fully configured according to the wishes of the user and the characteristics of the terrain. BLISSTOOL LTC64X can be "noisy" or completely "silent." Particular behavior is set by appropriate adjustment of the metal detector, notably through appropriate adjustment of the potentiometers which largely determine its sensitivity: potentiometer GAIN which serving for setup of the input AC amplification of the signal from the detected object; potentiometer THRESHOLD which serving for setup of the sound threshold; potentiometer SILENCER which serving for setup of degree of suppression of the background sound and for stabilization of the audio threshold.

BLISSTOOL LTC64X has high detection speed and high recovery speed. This ensures its stability regardless of the speed of search and allows the efficient detection of deeper objects located near to the iron.

It features manual and automatic ground balance mode, as in automatic mode is available additional switch with three auto ground zones for soils with low, medium and high mineralization. These preset zones make use of the metal detector easily and effectively.

Its discrimination is adjusts by: DISCRIMINATOR switch that provides three independent modes of discrimination and allow optimization of its behavior, and potentiometers DISCR LEVEL and DISCR DEPTH, which enable: set of detection/rejection level of iron, tin-foil and low-grade non-ferrous metals (usually pollutants) and set the depth of discrimination. All this allows to achieve optimum setting of the metal detector at contaminated terrains, terrains with hot rocks and mineralized terrains, and are a prerequisite for even better results.

Its audio discrimination, thanks to the perfect human abilities through their hearing to perceive and analyze in detail the sound signals, is the ideal solution for instant detection, analysis and recognition even and of the weakest signals by deeply buried objects.

Before using your BLISSTOOL LTC64X for the first time, we recommend you to read detailed this user guide, in order to optimally use all its capabilities.

4. VERSIONS

BLISSTOOL LTC64X is available in four versions:

- version 1 (LTC64X v1, LTC64X version 1);
- version 2 (LTC64X v2, LTC64X version 2);
- version 2i (LTC64X v2i, LTC64X version 2i);
- version 3 (LTC64X v3, LTC64X version 3).

BLISSTOOL LTC64X version is marked on the electronic block, against the model of the metal detector.

LTC64X v1 is the standard version.

LTC64X v2 is a version specially adapted for heavy field conditions.

LTC64X v2i is an improved version of v2.

LTC64X v3 is the top version with extreme performance.

LTC64X v2 is better than v1 with that this LTC64X v2 is optimized to work on:

- highly contaminated terrains;
- highly mineralized terrains;
- terrains with a high content of ore.

Of the above described terrains, LTC64X v1 also works, but LTC64X v2 is additional optimized for such terrains.

LTC64X v2i is better than v2, with that this at LTC64X v2i has improved:

- the depth of detection;
- the sensitivity to very small metal objects.

LTC64X v3 is better than v2i, with that this LTC64X v3 is:

- with extreme improved depth of detection;
- with extreme improved sensitivity to very small metal objects;
- optimized for Gold Nugget prospecting;
- with extended setup of the sensitivity and the behavior;
- with capable of successfully competing with multi-period pulse induction metal detectors. In comparison with them, has a similar depth of detection, greater universality and excellent discrimination.

Which version is right for you to judge yourself according to your specific needs.

Our additional guide recommendations and clarification for you are:

1/ In terms of the depth of detection:

- In practice, when properly adjusted, v1 and v2 have the same depth of detection;
- v2i has better depth of detection of v1 and v2;
- v3 has better depth of detection of v1, v2 and v2i.

2/ In terms of stability:

- At user setup for top performance: LTC64X v2 is more stable than v1, v2i and v3.
- At adequate user setup, according to the field conditions, all versions are equally stable.

3/ In terms of the terrain and the universality:

- All versions are designed to be universal, ie with adequate user setup, all versions work well on any type of terrains.

**BLISSTOOL
LTC64X v1**

**SUPERB
DEPTH**

**BLISSTOOL
LTC64X v2**

5. STANDARD PACKAGE

- 1.** Metal detector BLISSTOOL LTC64X with 28cm (11") DD search coil BLISSTOOL DD28SC2 and LiPo battery 11.1V, 2200mAh
- 2.** Automatic LiPo battery charger
- 3.** User guide
- 4.** Warranty card
- 5.** Invoice
- 6.** Transport and storage box
- 7.** 3 Year Worldwide Warranty

6. OPTIONAL ACCESSORIES

6.1. ARMY BACKPACKS (KITBAG)

The army backpacks is a soft backpack type bag in which can transport metal detector BLISSTOOL LTC64X.

The army backpacks carried as a rucksack on your back.

BLISSTOOL LTC64X be placed in the army backpacks after disassembling. For this purpose, its detachable carrier construction is divided into its three major parts through the unscrewed of the small and large fixing ring.

Dimensions in unfolded state: rectangle with a width of 46 cm and a height of 68 cm.



6.2. ADAPTER TO CHARGE FROM CAR BLISSTOOL CL12V2

BLISSTOOL CL12V2 is an adapter that allows the built LiPo battery of BLISSTOOL LTC64X to be charged by power from the car using a standard 12V car cigarette lighter connector.

To this end:

1/ The input of BLISSTOOL CL12V2 must be included into a standard 12V car cigarette lighter connector, available in each car, and its output includes to the input of the automatic LiPo battery charger, available in the standard package of BLISSTOOL LTC64X, which provided its the necessary power to charge a LiPo battery;

2/ The output of automatic LiPo battery charger, through available in the standard package of BLISSTOOL LTC64X, cable adapter, must be included into the connector CHARGE available on the back panel of the electronic block of BLISSTOOL LTC64X.



Through the use of BLISSTOOL CL12V2, is eliminated the need to use of standard ~220V/DC12V power adapter, used for charging of the LiPo battery through ~220V network, and are achieve greater autonomy at work with BLISSTOOL LTC64X.

In some models cars, to ensure the power supply through 12V car cigarette lighter connector, the cars need to be "of contact". In the presence of power, the green LED of BLISSTOOL CL12V2 lights permanently.

BLISSTOOL CL12V2 has a cable with 2 meters length, which allows in charge, the automatic LiPo battery charger and the metal detector to be located in a safe and comfortable place in the car. The charging can be done and during working car engine and during movement of the car.

6.3. PROTECTIVE COVER OF DUST, MOISTURE AND RAIN BLISSTOOL PTC4R

BLISSTOOL PTC4R is a protective cover of dust, moisture and rain of the electronic block of metal detector BLISSTOOL LTC64X.

For this purpose, BLISSTOOL PTC4R must be put on the box with the electronic block of the metal detector.

To its repeated insertion and removal, some sides (panels) of BLISSTOOL PTC4R are assembled with Velcro tape type.

BLISSTOOL PTC4R is made from strong, flexible and waterproof materials such as leather, and transparent glass-like material that provides visibility into areas in which are available setting, indication and maintenance bodies of the metal detector.

BLISSTOOL PTC4R protects the electronic block of the metal detector from scratch, shock, dust, moisture and rain: on terrains strewn with sharp stones; on sandy terrain; on muddy terrain; in the presence of dew; when rain (drizzle) light rain; in snow conditions; when it rains little snow.

Before insertion of the protective cover BLISSTOOL PTC4R on the box with the electronic block, the user must to set the metal detector to the respective terrain. This is necessary because with fitted protective cover, the user does not have direct access to the potentiometers and the switches to adjust the metal detector.

On the front panel of BLISSTOOL PTC4R, is available hole with cap, which ensures access to the potentiometer VOLUME, to turn-on and to turn-off the metal detector and to set the desired from the user audio volume, without the need of removing the protective cover.

On the back panel of BLISSTOOL PTC4R are available: a hole for plug to connector COIL of the jack of the search coil; a hole with cap for plug to connector PHONES of the jack of the headphones (if the user use any); a hole with cap through which is heard the sound from the loudspeaker.

The putting of BLISSTOOL PTC4R on the box with the electronic block of the metal detector, is made by pulled of the protective cover in the direction from the front to the back panel of the electronic block. For this purpose, BLISSTOOL PTC4R must be in disassembled condition, ie its Velcro tape type, by which are connected its various sides (panels), must be posted in advance.



6.4. STEREO HEADPHONES

6.4.1. STEREO HEADPHONES PHILIPS SHP1900 B

Introduction

PHILIPS SHP1900 B are high quality full-size stereo headphones with lightweight construction and sleek design.

Features

- Frequency range: 20 Hz - 20 000 Hz
- Impedance: 32 Ohm
- Sensitivity: 98 dB
- Maximum power input: 500 mW
- Driver unit: 40 mm
- Plug type: 6.35mm (1/4") stereo ^{new}
- Cable connection: Unilateral
- Cable length: 2 m
- Weight: 195 g
- Volume control: No



6.4.2. STEREO HEADPHONES PLEOMAX PHS-2000 B

Introduction

PLEOMAX PHS-2000 B are high quality stereo headphones with lightweight construction and volume control.

Features

- Frequency range: 20 Hz - 20 000 Hz
- Impedance: 32 Ohm
- Sensitivity: 110 dB
- Maximum power input: 30 mW
- Driver unit: 36 mm
- Plug type: 6.35mm (1/4") stereo ^{new}
- Cable connection: Unilateral
- Cable length: 2 m
- Weight: 75 g
- Volume control: Yes



6.4.3. ADAPTER FOR HEADPHONES BLISSTOOL P635S35

BLISSTOOL P635S35 is a headphones adapter from 6.35mm (1/4") stereo Jack plug to 3.5mm Jack socket.

Through it, to a connector PHONES of BLISSTOOL LTC64X, may be included stereo headphones with 3.5mm stereo Jack plug.



7. STRUCTURE OF THE METAL DETECTOR

BLISSTOOL LTC64X consists of the following basic elements:

1. Electronic block with setting, indication and maintenance bodies
2. Armrest
3. Carrier rod
4. Handle
5. Large fixing ring
6. Intermediate connecting rod
7. Small fixing ring
8. Lower connecting rod
9. Plastic bolt and nut
10. Search coil

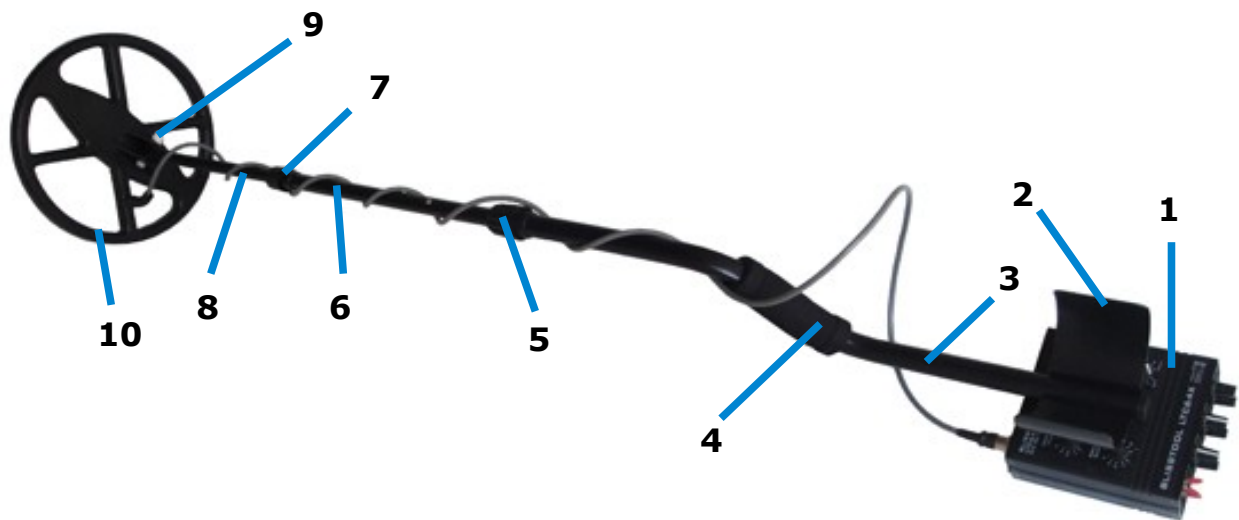


Fig.1 / Construction of metal detector BLISSTOOL LTC64X

For easy assembling and disassembling of the metal detector, in the standard package:

- the carrier rod with the large fixing ring, the electronic block, the handle and the armrest are combined in a single component;
- the small fixing ring is mounted on the intermediate connecting rod;
- the lower connecting rod and the search coil are assembled together with the plastic bolt and nut.



Fig.2 / Components of metal detector BLISSTOOL LTC64X

The carrier rod is made from aluminum pipe. The large fixing ring that is mounted on its lower end is used for connecting the pipe with the intermediate connecting rod.

The handle is part of the carrier rod and is coated with soft and solid foam.

For better stability, the armrest is made from aluminum. It has a strap for better fixation to the elbow during a search.

Under the armrest is mounted the electronic block. It consists of a plastic box with aluminum panels, in which are mounted the electronics and the LiPo battery of the metal detector. On the front panel, back panel and the lid of the electronic block are mounted the setting, indication and maintenance bodies.

The intermediate connecting rod is made from aluminum pipe. At its upper end it is connected by the large fixing ring to the carrier rod – it fits into it, while at its lower end it is connected to the lower connecting rod by the small fixing ring.

The lower connecting rod is made from carbon, so that it does not interfere with the normal working mode of the metal detector. At its upper end it is connected by the small fixing ring to the intermediate connecting rod – it fits into it, while at its lower part ends with a plastic nozzle by which is connected to the search coil.

To not affect the intermediate connecting rod on the work of the metal detector, because it is made from aluminum, ie metal, it is recommended that the lower connecting rod to be inserted in the intermediate connecting rod to a situation in which remain at least 20-30 centimeters away from the top of the search coil to the small fixing ring.

To quickly and easily set the desired from the user length of the carrier construction, the fixed mechanisms type bud, available on the lower connecting rod and on the intermediate connecting rod, are inserts respectively on the holes located at a different levels on the intermediate connecting rod and on the carrier rod.

The search coil is connected to the plastic nozzle of lower connecting rod via the plastic bolt and nut. Between the ears of the search coil and the plastic nozzle of the lower connecting rod, put the included in the standard package emollient and fixed rubber type washer, which prevent the ears of the search coil from deformation and breakage when tightening. Thus, the search coil can be installed and removed repeatedly from the lower connecting rod.

The search coil, via the connector of the connecting shielded cable, is connecting to the connector COIL mounted on the back panel of the electronic block.

If necessary to change the position of the search coil to the lower connecting rod (change the working angle during working with the metal detector or folding to carry and transport), is necessary to loose coupling fixing by a plastic bolt and nut and after the new setting, it can be tight to be fix the search coil in the new position.

The changing of the working angle in tight situation can lead to breakage of the ears of the search coil, deformation of the ears and the search coil or a fatal frustration of the search coil and changes of its parameters.

When changing the working angle of the search coil to the lower connecting rod, must be monitored for the presence of an advance of the bottom of the connecting shielded cable of the search coil to keep it stretched too much as this can cause damage its.

Recommended always to provide a small advance of the connecting shielded cable of the search coil in its lower part, just above the nozzle during which it comes out of the search coil.

In order to eliminate false signals and prevent injury, it is advisable, the connecting shielded cable of the search coil, to be fixed to the carrier construction of the metal detector. The fixing of the cable takes place: in its upper part (fixed to the carrier rod above the handle) and in its lower part (fixed to the lower connecting rod).

For fixing the bottom of the connecting shielded cable of the search coil, is used included in the standard package fixing patches type velcro.

8. ASSEMBLING AND DISASSEMBLING OF THE METAL DETECTOR

The metal detector BLISSTOOL LTC64X is assembled in the following sequence:

1. The upper part of the lower connecting rod is attached to the lower part of intermediate connecting rod via the small fixing ring, and adjusted at the appropriate length.

It is recommended that the mounting of the lower connecting rod to the intermediate connecting rod should be carried out, following the sequence below:

- the small fixing ring has to be unscrewed loose from the intermediate connecting rod and put on the lower connecting rod;
- the lower connecting rod is inserted in the intermediate connecting rod at the appropriate length;
- the small fixing ring is tightened until it is fixed.

2. The upper part of the intermediate connecting rod is attached to the carrier rod via the large fixing ring, and adjusted at the appropriate height.

It is recommended that the mounting of the intermediate connecting rod to the carrier rod should be carried out, following the sequence below:

- the large fixing ring has to be unscrewed loose from the carrier rod and put on the intermediate connecting rod;
- the intermediate connecting rod is inserted in the carrier rod at the appropriate length;
- the large fixing ring is tightened until it is fixed.

3. The search coil has to be adjusted horizontally against the ground surface, while the user is in an upright (working) position and is holding the metal detector by the handle.

This adjustment is possible, if the plastic bolt and nut used for assembling the search coil with the lower connecting rod are not tightly fastened.

4. The connecting shielded cable of the search coil is wined evenly and spirally up the lower and intermediate connecting rods and the end connector of the cable is plugged in and tightened on the connector COIL that lies on the back panel of the electronic block.

The cable, at its lower end near the search coil, has to be slightly loose, so that it is not damaged when the search coil has been bent against the lower connecting rod, for example when the device is folded for carrying and transporting.

Additional, the cable can be fixed through patches type velcro included in the standard package.

The coil cable ends with a connector and there is a single correct position for it so that it could be plugged in the connector COIL, which lies on the back panel of the electronic block. In this position, the hollow cursor of the cable connector falls in with flange cursor of the connector COIL, and when inserted, the cable connector enters into the connector COIL at a depth of around 10 mm. After the cable connector is plugged in, it is screwed to the connector COIL by the means of the available metal stopping nut, used as a shield.

The incorrect insertion and/or the application of a brute force while incorrectly inserting the connector of the search coil could lead to damaging of the metal detector.

The plugging in and out of the cable connector is done while the metal detector is switched off (VOLUME potentiometer is turned in "OFF" position (Fig.3)).

The disassembling of the metal detector is carried in a reversed order.

9. SETTING, INDICATION AND MAINTENANCE BODIES

The setting, indication and maintenance bodies are mounted on the front panel, back panel and on the lid of the electronic block (Fig.3) of BLISSTOOL LTC64X.

Setting, indication and maintenance bodies of BLISSTOOL LTC64X

On the front panel of the electronic block:

- VOLUME potentiometer
- FREQUENCY potentiometer ^{new}
- DISCR LEVEL potentiometer
- DISCR DEPTH potentiometer
- GAIN potentiometer ^{new}
- TONE potentiometer ^{new}
- GROUND MODE switch
- AUTO ZONES switch
- DISCRIMINATOR switch ^{new}

On the back panel of the electronic block:

- COIL connector
- CHARGE connector
- Loudspeaker
- BAT LOW LED
- PHONES connector

On the lid of the electronic block:

- THRESHOLD potentiometer
- SILENCER potentiometer ^{new}
- GROUND RUDELY potentiometer ^{new}
- GROUND FINELY potentiometer ^{new}

To optimally use the capabilities of your BLISSTOOL LTC64X, we recommend that you explore in detail all its bodies, using as a basis, a detailed description of them available below.

Given its professional character, BLISSTOOL LTC64X has many options for adjust to the realization of its universality and getting the most of its opportunities.

If the user is a beginner and do not understand for what serve the appropriate potentiometer or switch, it is sufficient to maintain it in the recommended, in the user guide, level, whereby relatively easy to make the metal detector in the regime close to optimal, but later, when the user gain experience in working with the metal detector, to optimize its behavior to a specific terrains by fine adjustment of the respective potentiometers and switches.

Description of the various bodies:

9.1. VOLUME POTENTIOMETER



The VOLUME potentiometer serves as the on/off the metal detector (level "OFF") and to regulate the audio volume (levels from "1" to "MAX").

For optimal performance, should be placed at the level at which the the sound produced by the metal detector is a pleasant for listening, ie is not very loud, nor quiet.

The recommended levels for VOLUME potentiometer are from level „3“ to level „8“.

The use of the metal detector at higher levels of VOLUME potentiometer, provides better audibility of the sound produced by the metal detector, but at the same time increasing the consumption of power from the LiPo battery of the metal detector and wear it for a short time.

9.2. FREQUENCY POTENTIOMETER



The FREQUENCY potentiometer serves to change the operating frequency of the metal detector in range $\pm 60\text{Hz}$, in order to avoid external interferences such as: interference from other close working metal detector with the same or similar operating frequency; and powerful industrial interferences.

The presence of external interferences is expressed as: onset of instability of the audio threshold of the metal detector, marked and continuous increase in its instability, or total collapse of the audio threshold.

The recommended level for FREQUENCY potentiometer is level „MAX“, or levels close to level „MAX“.

In the level "MAX" of the FREQUENCY potentiometer, the system for frequency adjustment is off and the metal detector operate at its base operating frequency.

In the occurrence of instability in the audio threshold, with a character as described above, in order to smooth the audio threshold and stabilization of the metal detector, is required by FREQUENCY potentiometer to change the operating frequency of the metal detector.

The change in the operating frequency of the metal detector is done by adjusting the FREQUENCY potentiometer to any of the levels at level „9“ to level „MIN“. Choose that level at which the audio threshold of the metal detector regains its stability.

Because their primary function, the setting of the FREQUENCY potentiometer affect to the other settings of the metal detector and especially on its ground balance. It is desirable for this setting to be done before the rest of the metal detector settings, or after any change of the FREQUENCY potentiometer, to be done complete setup of the metal detector.

9.3. GROUND MODE SWITCH



The GROUND MODE switch serves for switching between the two working modes of the metal detector:

MAN: Manual ground balance

AUTO: Automatic ground balance

The recommended positions for GROUND MODE switch are: position „AUTO“ for beginners and position „MAN“ for experienced users.

Manual ground balance mode and Automatic ground balance mode relate to the chosen technology for eliminating the ground (terrain) interference on the metal detector's work.

The ground (terrain) interference usually causes instability of the metal detector and false signal registration (during the search while the search coil is moving, the metal detector is making sounds without real to has detected metal object).

When working with a manual ground balance mode (GROUND MODE switch turned to the „MAN“ position), the ground interference is eliminated by manual adjustment of the metal detector by the user, by following the procedure given in the description of the GROUND RUDELY and GROUND FINELY potentiometers, available below.

Manual ground balance mode is appropriate for terrains with homogeneous soil, where the metal detector would reach its full potential by a fine manual adjustment.

When working with an automatic ground balance mode (GROUND MODE switch turned to the „AUTO“ position), the metal detector's electronics automatically eliminates the ground interference and there is no further need for manual balance adjusting by the GROUND RUDELY and GROUND FINELY potentiometers from the user, and it is not important in what levels are set these potentiometers.

Automatic ground balance mode is appropriate for terrains with a heterogeneous soil.

In order to optimize and achieve the best possible balance, the automatic ground balance mode is divided into three ground zones with a small area of correlation. They are selected by an AUTO ZONES switch as described below.

9.4. AUTO ZONES SWITCH



The **AUTO ZONES** switch serves to set one of the three available automatic ground zones at work in automatic ground balance working mode.

The individual zones are numbered as zones „1“, „2“ and „3“, which corresponds to the following soil type:

- Zone „1“: soils with black and/or negative mineralization;
- Zone „2“: not mineralized or weakly mineralized soils;
- Zone „3“: soils with a color and/or positive mineralization.

The recommended position of switch **AUTO ZONES** is the "3" (recommended position for beginners).

Most often works in Zone „1“.

In most cases:

- Zone „1“ is suitable for: terrains strewn with ceramic containing impurities of ferrous metals; terrains dotted with stone plates with negative mineralization; soil, sand, stones and rocks with black and/or negative mineralization;

- Zone „2“ is suitable for: not mineralized or weakly mineralized soils; loose soils with low density; „light“ soils; clean terrains;

- Zone „3“ is suitable for: soil, sand, stones and rocks with color and/or positive mineralization; highly mineralized terrains and terrains with a high content of ore, terrains with a high content of hot rocks, terrains with high content of rusty black metals such as, but not limited to: small heavily corroded irons and steel, small pieces of wire, heavily corroded pieces of sheet metal, small iron nails and steel nails, tack, slag and other ancient and contemporary pollutants.

To determine which of the three zones eliminates the best influence of soil is necessary:

- to be chosen the auto ground balance mode (GROUND MODE switch turned to „AUTO“ position);

- the DISCR LEVEL potentiometer to be set at a level „0“;

- the THRESHOLD potentiometer to be set at a level, just before the level where the metal detector starts slightly zoom sound made (issued torn sound, buzzing, whiz) or one or two levels before the level of zoom (recommended for beginners searchers).

Then is done vertical (up-down) movement of the search coil ranging from 2-3 cm to 20-25 cm above the terrain and simultaneously AUTO ZONES switch, is switches alternately between the three available positions (zones).

Most appropriate for use is the zone, where in the described manner of movement of the search coil, the metal detector does not beeps or issue possible weak sound, or at least the pre-set audio threshold level did not change significantly.

In mineralized terrains, if has a strong responsive signal from the terrain and selection of most appropriate auto ground zone is difficult or the user has small practical experience, is recommended the THRESHOLD potentiometer to return with one or two levels back at the level where the metal detector starts to slightly zoom, then proceeding to the described above method of choice of zone. In addition, in order to reduce the response signal from the ground, can be set in advance desired level of discrimination (DISCR LEVEL potentiometer from level „0“ is placed in the desired operating level) and then performed the described above choice of zone.

Described above, vertical movement of the search coil, to the choice of most appropriate auto ground zone, should be carried at a place, with no metal objects near to the search coil, ie the piece of land on which moves the search coil should not contain metal objects.

Otherwise, they would interfere the selection process of zone, therefore can not be selected most appropriate auto ground zone. Whether the terrain is clean, is easily established, when the search coil is moved horizontally above the terrain, ie without changing its distance

towards the ground. When there are no metal objects, the predefined from the THRESHOLD potentiometer sound would not be changed.

After the choosing of auto ground zone has been finished, the GROUND MODE switch remains in „AUTO“ position (auto ground balance), while the DISCR LEVEL and THRESHOLD potentiometers are turned to the desired from the user levels.

When changing the terrain with another, significantly different from the previous (changing the soil characteristics), to the metal detector remain stable, necessary as described above, again to assess which is most suitable in the case auto ground zone.

9.5. GROUND RUDELY POTENTIOMETER



The GROUND RUDELY potentiometer serves as a coarse (base, fast) setting of the ground balance in a manual ground balance working mode, ie for a base eliminate of the ground effect at work in a manual ground balance working mode.

The GROUND RUDELY potentiometer is used in combination with GROUND FINELY potentiometer.

The recommended level for GROUND RUDELY potentiometer is level „5“ to about level „8“.

Most often works at level around „5“.

For manual adjustment of the ground balance is needed:

- to be chosen the manual ground balance mode (GROUND MODE switch turned to MANⁿ position);
- the DISCR LEVEL potentiometer to be set at a level „0“;
- the THRESHOLD potentiometer to be turned at a level, just before the level where the metal detector starts slightly zoom sound made (issued torn sound, buzzing, whiz) or one or two levels before the level of zoom (recommended for beginners searchers);
- the GROUND FINELY potentiometer, to be set at a middle position, ie at a level „5“.

Then is done vertical (up-down) movement of the search coil ranging from 2-3 cm to 20-25 cm above the terrain, simultaneously with turning the GROUND RUDELY potentiometer. At some levels of the GROUND RUDELY potentiometer, the sound is louder when the search coil is near the ground, while at others the sound is louder when the search coil is high above the ground.

The balancing is actually finding the level (position) of the GROUND RUDELY potentiometer, in which in the described manner of movement of the search coil, the metal detector does not beeps or issue possible weak sound, or at least the pre-set audio threshold level did not change significantly.

After the base balancing by GROUND RUDELY potentiometer, if necessary, the metal detector can be further fine balancing by GROUND FINELY potentiometer and described above vertically (up and down) movement of the search coil.

In mineralized terrains, if has a strong responsive signal from the terrain and the manual balancing is difficult or the user has small practical experience, is recommended the THRESHOLD potentiometer to return with one or two levels back at the level where the metal detector starts to slightly zoom, then proceeding to the descriptions above balancing. In addition, in order to reduce the response signal from the ground, can be set in advance desired level of discrimination (DISCR LEVEL potentiometer from level „0“ is placed in the desired operating level) and then performed the described above balancing of the metal detector.

The balancing should be carried at a place, with no metal objects near to the search coil, ie the piece of land on which is being done the described vertical movement of the search coil, should not contain metal objects.

Otherwise, they would interfere the balancing process and the metal detector can not be balanced or will be balanced incorrectly. Whether the terrain is clean, is easily established, if the GROUND RUDELY potentiometer is turned to a middle position and the search coil is moved horizontally above the terrain, ie without changing its distance towards the ground. When there are no metal objects, the predefined from the THRESHOLD potentiometer sound would not be changed. One other possibility is the chosen balancing terrain to be searched for metal objects in advance while using the automatic ground balance mode (GROUND MODE switch

turned to „AUTO“ position).

After the balancing has been finished, the GROUND MODE switch remains in „MAN“ position (manual ground balance), while the DISCR LEVEL and THRESHOLD potentiometers are set to the desired from the user levels.

When changing the terrain with another, significantly different from the previous (changing the soil characteristics), the metal detector should be balanced again following the above-described way, so that it remains stable.

In most cases, when changing the terrain with another, or change in the characteristics of the terrain, should be made only adjustment of the ground balance by GROUND FINELY potentiometer.

9.6. GROUND FINELY POTENTIOMETER



The GROUND FINELY potentiometer serves as a further fine (precise) setting of the ground balance in a manual ground balance working mode, ie for a fine and complete eliminate of the ground effect at work in a manual ground balance working mode.

The GROUND FINELY potentiometer is used in combination with GROUND RUDELY potentiometer.

The recommended level for GROUND FINELY potentiometer is level „5“. This allows, if required, through it to be made easy adjustment of the ground balance, by turning it on the left (levels from „4“ to „-“) or on the right (levels from „6“ to „+“).

GROUND FINELY potentiometer is used for adjustment of an already set at base level by GROUND RUDELY potentiometer, ground balance, in manual ground balance mode.

Additional information on the process of balancing in manual ground balance mode has in the description of a GROUND RUDELY potentiometer available above.

9.7. THRESHOLD POTENTIOMETER



The THRESHOLD potentiometer serves to define the desired from the user audio threshold and sensitivity of the metal detector.

It is adjusted at absence of metal objects around the search coil of the metal detector and depends on the terrain.

The recommended levels for THRESHOLD potentiometer are from level „4“ to about level „6“.

The best depth for finding metal objects is achieved, when the THRESHOLD potentiometer is turned in a position, corresponding to a quiet zoom sound made by the metal detector in working mode (issued torn sound, buzzing, whiz).

Quiet zoom sound mode is suitable for experienced seekers. The beginners should work at lower levels.

When working in manual ground balance mode, is necessary the final audio threshold level to be set only after the metal detector is balanced.

The maximal audio threshold corresponding to a stable metal detector condition depends on the terrain's characteristics, the metal detector balancing (in manual ground balance mode) and the user search speed.

The proper adjustment of THRESHOLD potentiometer (setting lower levels) is one of the options by which BLISSTOOL LTC64X can be turned into a completely silent (quiet) metal detector.

9.8. SILENCER POTENTIOMETER



The SILENCER potentiometer serves for setting of the degree of suppression of the background sound and for stabilization of the audio threshold.

The recommended levels for SILENCER potentiometer are from level „OFF“ to about level „2“.

Most often works at level „OFF“.

The background sound is a set from defined by THRESHOLD potentiometer audio threshold of the metal detector and imported external noises (the base signal on the ground and other external interferences).

In most cases, the volume of the background sound is equal to the volume of the audio threshold, but its inequality due to imported external noises.

In the level „OFF“ of SILENCER potentiometer, the silencer is turned off and the volume of the background sound is equal to the volume of the sound produced by the metal detector at detection of a metal object.

At levels, from level „1“ to level „FULL“, of a SILENCER potentiometer, the silencer is turned on and with each next level is increased the difference between the volume of the background sound and the volume of the sound produced by the metal detector at detection of a metal object.

With the silencer turned on (from level „1“ to level „FULL“ of the SILENCER potentiometer), the volume of the background sound (audio threshold + interference) can be adjusted so that could hardly be heard by the user, while the volume of the sound produced by the metal detector at detection of a metal object to be several times greater, so that when a metal object is detected is obtained „eruption“ of the sound produced by the metal detector.

On the higher level is set the silencer, the more noticeable is the „eruption“ of the sound produced by the metal detector at detection of a metal object.

With the increase of the silencer, not to overdo, since any increase improves the stability of the metal detector, but at the same time makes it less sensitive to weak signals from deep buried metal objects.

Real, the SILENCER potentiometer reveals many opportunities to change the behavior of the metal detector, in order to optimize it.

In terrains with low mineralization and absence of external noise, it is advisable to operate at lower levels of SILENCER potentiometer.

In highly mineralized terrains and in terrains with a high content of ore, SILENCER potentiometer can be set at higher levels, for ignoring at a greater degree of the base signal from the terrain and maintain of the stability of the metal detector.

With the silencer turned on, BLISSTOOL LTC64X can be configured to work with maximum adjusted audio threshold set by THRESHOLD potentiometer, ie with maximum sensitivity and thus the maximum depth of detection, and still be stable.

Furthermore, by examining the detected metal object at different levels of SILENCER potentiometer, can be obtained basic idea of how deep it is.

The proper adjustment of SILENCER potentiometer (setting higher levels) is one of the options by which BLISSTOOL LTC64X can be turned into a completely silent (quiet) metal detector.

9.9. DISCRIMINATOR SWITCH



The DISCRIMINATOR switch serves to define one of the three independent modes of discrimination.

The various modes are conditional numbered as: „I“, „II“ and „III“.

The recommended positions of DISCRIMINATOR switch are:

- mode „I“ for terrains with up to high degree of mineralization, terrains with a high content of ore and slag, and for terrains with hot rocks;*
- mode „II“ for terrains with from medium to high degree of mineralization;*
- mode „III“ for terrains with from low to medium degree of mineralization;*

Most often works at mode „III“. For beginner searchers, the most appropriate is mode „I“, as in this mode choke up in most the ground background and the local heterogeneous clusters.

In the same position of DISCR LEVEL and DISCR DEPTH potentiometers, the discrimination is strongest in the mode „I“, with average value is in mode „II“, and the lowest is in the mode „III“.

The ratio of the individual modes is:

mode „III“ = 1 x mode „III“

mode „II“ = 1.5 x mode „III“

mode „I“ = 2 x mode „III“

Besides a change in the power of discrimination, with the change of the mode, is change and the basic behavior of the metal detector in regard to the ground and the located in it metal objects. Therefore, in practice, through DISCRIMINATOR switch, the user can set three different basic behaviors of the metal detector in terms of its discrimination, ie though having three different metal detectors.

The purpose of using of DISCRIMINATOR switch is, for a particular terrain, the user to find this mode in which the metal detector has the most sinless and therefore the best discrimination. For this purpose, DISCR LEVEL and DISCR DEPTH potentiometers should also be adequately adjusted.

At a clean terrains with low or medium mineralization, usually the most appropriate is mode „III“.

In contaminated terrains with medium or high degree of mineralization, usually the most appropriate is mode „II“.

In terrains with a high content of ore and slag, and in terrains with hot rocks, usually the most appropriate is mode „I“. In this mode, choke up in most the defendant signal caused by the ore and the slag.

When is detected metal object, the consistent switching in different modes of the DISCRIMINATOR switch, allows examination of the detected object at different levels of discrimination and at different behavior of the metal detector. Thus, relatively easily, may become more complete idea for the detected object.

Work in lower discrimination mode, set by the DISCRIMINATOR switch, is recommended only in extreme necessity. So if the terrain allows it, it is recommended always to work under a mode „III“.

The specific behavior of the metal detector at the appropriate mode of the DISCRIMINATOR switch, depends and from the current settings of the DISCR LEVEL and DISCR DEPTH potentiometers. Therefore, the optimal setting of discrimination is different for each terrain and can only be achieved with practice and knowledge of the metal detector and the terrain.

It is recommended to work at possible higher mode of DISCRIMINATOR switch. Working at less than real proper mode of discrimination, selected by DISCRIMINATOR switch, in combination with set at a higher levels DISCR LEVEL and DISCR DEPTH potentiometers, may lead to rejection of signals from small or deeply buried non-ferrous metals, especially when they are at great depth in mineralized terrains, or under mineralized ceramics and/or mineralized stones.

9.10. DISCR LEVEL POTENTIOMETER



The DISCR LEVEL potentiometer serves for adjusting the detection/rejection level of iron, tin-foil and low-grade non-ferrous metals (usually pollutants), and for baseline exclusion of the discrimination (All metals mode) when it is set to level „0“.

The recommended levels for DISCR LEVEL potentiometer are:

- from „3“ to „6“ at DISCRIMINATOR switch in mode „I“;
- from „3“ to „8“ at DISCRIMINATOR switch in mode „II“;
- from „3“ to „10“ at DISCRIMINATOR switch in mode „III“;

Most often works at level around „4“. For beginner searchers is recommended work at higher levels (about level „6“).

In level „0“ the discrimination is excluded, ie the metal detector produced same sound for all metals, ie it does not distinguish them and does not rejected them. For a complete exclusion of the discrimination, may further the DISCR DEPTH potentiometer also to be set at level „0“.

In level „0“ of DISCR LEVEL potentiometer, in combination with level „0“ of DISCR DEPTH potentiometer, the metal detector is in real mode „All metals“. This mode is appropriate when the target is to be detected absolutely all metal objects available in the soil (ferrous and non-ferrous metals). In this mode, is recommended to carry out precision choice of auto ground zone and/or manual balancing of the metal detector, with the aim of achieving the maximal balance for a particular terrain.

When increasing the level of the DISCR LEVEL potentiometer, the metal detector starts to distinguish the metals, and at each successive level betters the discrimination, ie the metal detector rejected to a greater extent iron, tin-foil and low-grade non-ferrous metals.

Upon detection of non-ferrous metals (copper, bronze, silver, gold) is heard a short, dense and uninterrupted single sound with each pass of the search coil over them.

Upon detection of ferrous metals (iron), the sound is interrupted (intermittent), blunted or absent, ie they are completely ignored (rejected). Moreover, in the most cases, especially when they have a long side, the ferrous metals issue dual sound (two sounds one after another) with each pass of the search coil over them.

In a large local inhomogeneity (clusters) on a particular stretch of the terrain, such as topical clustering of irons, in locally scattered small irons, on terrains with a high content of ore and slag, or on terrains whose soil is mixed with small pieces of mineralized ceramics, it is possible the metal detector to produce a sound, that is long and scattered, and sometimes heterogeneous, broken or blunted. By nature, it can remind the sound of ferrous metal or sound of non-ferrous metal, but always apart from them, for example, that it is long and scattered, ie it has not solid area for centering.

At levels from „3“ to „10“, the metal detector rejects at a different level iron objects, tin-foil and low-grade non-ferrous metals, ie when detecting them it is making either no sound or a quiet pop sound.

Upon detection of very weak signal, for its better detection and discrimination, that surface may be slightly cleaning by removing from 1 to 3 cm from the soil layer, to reduce the depth of which is buried the found object.

Upon detection of unresolved (dubious) signal, usually heavily corroded iron, iron with alloys or deeply buried non-ferrous metal, to assess what is the metal, it can be studied at different levels of discrimination. For this purpose, the level of discrimination set by DISCR LEVEL potentiometer can be increased further, or the metal detector to be switched to lower discrimination mode through DISCRIMINATOR switch.

The specific behavior of the metal detector at the selected setting of DISCR LEVEL potentiometer, depends and from the current settings of the DISCRIMINATOR switch and DISCR DEPTH potentiometer. Therefore, the optimal setting of discrimination is different for each terrain and can only be achieved with practice and knowledge of the metal detector and the terrain.

It is recommended to work at possible lower level of DISCR LEVEL potentiometer. Working at a higher than real proper level of DISCR LEVEL potentiometer, in combination with set at a higher level

DISCR DEPTH potentiometer, and set to a lower mode DISCRIMINATOR switch, may lead to rejection of signals from small or deeply buried non-ferrous metals, especially when they are at great depth in mineralized terrains, or under mineralized ceramics and/or mineralized stones.

9.11. DISCR DEPTH POTENTIOMETER



The DISCR DEPTH potentiometer serves for adjusting of a specific depth of discrimination. This is the maximum depth to which the metal detector distinguish the metals, ie the depth to which the metal detector rejects respective ferrous metals and pollutants.

The recommended levels for DISCR DEPTH potentiometer are:

- level „10“ for terrains contaminated with small irons (small heavily corroded iron nails, iron nails with large head, small pieces of wire, small highly corroded irons and steel);*
- from level „7“ to level „9“ for non contaminated with small irons terrains;*
- from level „0“ to level „6“ when search for any type of metal (ferrous and non-ferrous), ie when not intended to ignore ferrous metals.*

Most often works at level „8“. For beginner searchers, and in the presence of small iron, is recommended work at level „10“.

By increasing the level of the DISCR DEPTH potentiometer, set the depth of discrimination begins to grow, and increasing from 0% to 100% of the real potential for the respective metal object.

The depth of the discrimination does not increase linearly with increasing the level of DISCR DEPTH potentiometer, and strongly depend from the dimensions of the respective metal object (sizes, form, uninterrupted flat surface).

In the table available below, are presents indicative data for the function of the DISCR DEPTH potentiometer in respect of metal objects with different flat surface. The depth of discrimination is presented in percentages (%) and in the approximate their equivalent in centimeters (cm) for real search on terrain.

Given that in real the depth of detection is the distance from the metal object to the surface of the search coil, and given that in standard search underway, usually the search coil is located at a distance from 1 to 3-5 cm above the surface of the terrain, ie these centimeters are literally lost in regard to a maximum depth of detection, in the table in bold are presented practically important data for the depth of discrimination, in real field work for the relevant setting (level) of the DISCR DEPTH potentiometer.

Level of DISCR DEPTH	Depth of discrimination in real field work			
	for very small iron objects	for small iron objects	for medium-sized iron objects	for large iron objects
0	0% ~ = 0 cm	0% ~ = 0 cm	0% ~ = 0 cm	0% ~ = 0 cm
1	0% ~ = 0 cm	0% ~ = 0 cm	0% ~ = 0 cm	0% ~ = 0 cm
2	0% ~ = 0 cm	0% ~ = 0 cm	0% ~ = 0 cm	0% ~ = 0 cm
3	0% ~ = 0 cm	0% ~ = 0 cm	0% ~ = 0 cm	0% ~ = 0 cm
4	0% ~ = 0 cm	0% ~ = 0 cm	0% ~ = 0 cm	0% ~ = 0 cm
5	0% ~ = 0 cm	0% ~ = 0 cm	0% ~ = 0 cm	40% ~ = 16 cm
6	0% ~ = 0 cm	20% ~ = 4 cm	40% ~ = 12 cm	50% ~ = 20 cm
7	10% ~ = 1 cm	40% ~ = 8 cm	50% ~ = 15 cm	60% ~ = 24 cm
8	40% ~ = 4 cm	50% ~ = 10 cm	60% ~ = 18 cm	70% ~ = 28 cm
9	50% ~ = 5 cm	60% ~ = 12 cm	70% ~ = 21 cm	80% ~ = 32 cm
10	100% ~ = 10 cm	100% ~ = 20 cm	100% ~ = 30 cm	100% ~ = 40 cm

The shown in the table percentages (%) and corresponding centimeters, are indicative and refer to the worst case, ie relate to iron objects that are ignored by hard (Group 1) compared to the other (Group 2):

Group 1: iron objects with round, square and/or rectangles form, with ratio of their flat sizes 1:1 or 1:2, ie these are iron objects whose form is similar to the form of coins. The iron objects with such form are the most difficult to ignore, and exactly data about them are available in the table above;

Group 2: iron objects with elongated form, with ratio of their flat sizes 1:3, 1:4, 1:5... 1:10 and so on, ie they are iron objects whose one size many times exceeds the other. Such are various long pieces of wire, various blades, large nails, etc. Iron objects of such form are ignored and/or identified as iron much easier, especially if their long side is located along and across to the surface of the search coil. For such objects, the real percentages (%) and corresponding centimeters, are higher than those described in the table above.

Data from the table can be presented in the form of conclusions:

- at levels from „0“ to „4“, in a practice for a most common sizes of iron objects, the depth of discrimination is practically equal to 0 cm, ie the metal detector produced the same sound (single solid signal) for all metals and consequently do not distinguish and reject them;
- at levels from „4“ to „6“, partial depth of discrimination has partially for medium and large iron objects, therefore, in practice can be assumed that up to level „6“ the metal detector does not distinguish the metals;

- in level „0“ of DISCR DEPTH potentiometer, in combination with level „0“ of DISCR LEVEL potentiometer, the metal detector is in real mode „All metals“. This mode is appropriate when the target is to be detected absolutely all metal objects available in the soil (ferrous and non-ferrous metals). In this mode, is recommended to carry out precision choice of auto ground zone and/or manual balancing of the metal detector, with the aim of achieving the maximal balance for a particular terrain.

- with increase of the level, the set depth of discrimination begins to grow, as with each successive level the depth of discrimination is greater. This in practice is observed at levels from „7“ to „10“. At these levels, on detection of non-ferrous metals (copper, bronze, silver, gold) is heard a dense and uninterrupted sound, and on detection of ferrous metals (iron) the sound is interrupted (intermittent) or absent, ie they are completely ignored (rejected);
- medium and large iron objects are rejected satisfactory at levels „7“ and „8“, and entirely at levels „9“ and „10“;
- small iron objects are rejected satisfactory at level „9“, and entirely at level „10“;

- very small iron objects are rejected satisfactory and entirely only at level „10“.

For this, level „10“ is highly recommended setting for terrains contaminated with small irons (small heavily corroded iron nails, iron nails with large head, small pieces of wire, small highly corroded irons and steel);

- at level „10“, the depth of discrimination is 100%, ie it is most and respectively at this level the metal detector rejects the relevant iron object to the greatest depth. This depth expressed in centimeters, is different for the different iron objects, as it depends heavily from the uninterrupted flat surface of the relevant iron object. The maximum depth of discrimination (depth of discrimination 100%) is: for very small iron objects: ~ 10 cm; for small iron objects: ~ 20 cm; for medium-sized iron objects: ~ 30 cm; and for large iron objects: ~ 40 cm.

It is recommended to work at possible lower level of DISCR DEPTH potentiometer. Working at a higher than real proper level of DISCR DEPTH potentiometer, in combination with set at a higher level DISCR LEVEL potentiometer, and set to a lower mode DISCRIMINATOR switch, may lead to rejection of signals from small or deeply buried non-ferrous metals, especially when they are at great depth in mineralized terrains, or under mineralized ceramics and/or mineralized stones.

The reason for this, is that such terrains are usually with negative mineralization and thus mask (hide) the deep non-ferrous objects as ferrous. So, if under such conditions be set a maximum depth of discrimination (DISCR DEPTH potentiometer set to level „10“), has probability the weaker signals from non-ferrous metals to be rejected as ferrous. To prevent this, is sufficient the DISCR DEPTH potentiometer to be set at a lower level: „9“, „8“ or even at level „7“, if the terrain is not contaminated with very small and small irons.

For optimum performance under such conditions, it is desirable the metal detector to be preset and balanced on the terrain to a specific piece of ceramic and/or stone, as described in points

9.3, 9.4, 9.5 and 9.6 methods (manual and automatic ground balance).

In practice, in discrimination mode, under extreme field conditions, such as contaminated and simultaneously mineralized terrains, the user must make a choice:

Choice 1: to adjust DISCR DEPTH potentiometer at level „10“ to reject the smallest irons, ie any tendency to iron signal, in order not to dig iron, but with risk to miss the weak signals from small or deeply buried non-ferrous metals;

or

Choice 2: to adjust DISCR DEPTH potentiometer at level „8“ to easily detect non-ferrous metals present in greater depth in the relevant mineralized terrain or that are located in mineralized ceramics and/or mineralized stones, but while not entirely to reject many small irons and partly small irons, ie may need to dig some and other irons at the relevant contaminated terrain.

The specific behavior of the metal detector at the selected setting of DISCR DEPTH potentiometer, depends and from the current settings of the DISCRIMINATOR switch and DISCR LEVEL potentiometer. Therefore, the optimal setting of discrimination is different for each terrain and can only be achieved with practice and knowledge of the metal detector and the terrain.

9.12. LOUDSPEAKER



The Loudspeaker serves for producing a sound when the metal detector detect an object. The sound is deep-toned and non-pausing for non-ferrous metals and recurring (repeating) for ferrous metals (iron).

The loudspeaker lies on the back panel of the electronic block.

9.13. PHONES CONNECTOR



The PHONES connector serves for plug to metal detector, if necessary, stereo headphones with 6.35mm (1/4") stereo jack. When the headphones are plugged in, the loudspeaker is switched off automatically and the metal detector's sound is heard only in the headphones.

ATTENTION: To protect your hearing, it is desirable before turning stereo headphones to BLISSTOOL LTC64X, to reduce the volume of the metal detector by VOLUME potentiometer, as put it between levels „2“ and „3“.

The use of stereo headphones with set high volume of the sound by the VOLUME potentiometer can seriously damage your hearing!

In order to protect BLISSTOOL LTC64X from damage, is recommended the inclusion and exclusion of the jack of the stereo headphones to/from the PHONES connector, to be carried in power-off condition of the metal detector!

The use of stereo headphones while using the metal detector has many advantages:

- the stereo headphones block outside noise such as wind and traffic and allow you to hear better, even the weakest signals from deeply buried metal objects;
- through their use, the sound of your metal detector will not interfere with other searchers around you;
- their use, provides reduced power consumption from the LiPo battery of the metal detector, leading to an extension of its life.

When leaving of the metal detector on the ground, care must be taken during the PHONES connector in its electronic block to not enter sand, dust or moisture.

9.14. COIL CONNECTOR



The COIL connector serves for connection of the search coil of the metal detector to its electronic block.

For quality work of the metal detector, connector COIL and the connector of the search coil which includes in it, must be kept from dust, dirt, moistening and wetting.

9.15. BAT LOW LED



The BAT LOW LED shows the available charge in the LiPo battery. When this LED lights up, it is a signal for low battery.

In very low battery, from the loudspeaker of the metal detector began to hear periodic pulled sounds and the metal detector stops working or not working correctly.

The charging of the LiPo battery is carried out according to the description in 12.

9.16. CHARGE CONNECTOR



The CHARGE connector serves for connection of the automatic LiPo battery charger to the built-in LiPo battery of the metal detector. The connection is carried by cable adapter, available in the standard package of BLISSTOOL LTC64X.

The charging of the LiPo battery is carried out according to the description in 12.

The described below GAIN and TONE potentiometers, are only available in BLISSTOOL LTC64X and absent in BLISSTOOL LTC64. Therefore, BLISSTOOL LTC64X is extended version of BLISSTOOL LTC64.

9.17. GAIN POTENTIOMETER



The GAIN potentiometer serves to define the input AC amplification of the signal from the detected object.

The proper adjustment of the GAIN potentiometer provides increased depth of detection.

The recommended level for GAIN potentiometer is about level „5“. This level may vary, depending on the characteristics of the terrain and the external weather conditions. Choose that level at which the metal detector retains its stability.

At terrains with, from low to medium mineralization, GAIN potentiometer may be increased at a level greater than level „5“ to increase the depth of detection. The GAIN potentiometer must be increased to a level where the metal detector maintains desired by the user stability. This increase is only possible in the absence of strong external interference.

At high mineralized terrains and terrains with a high content of ore, usually GAIN potentiometer must be reduced to a level less than level „5“, since in those terrains have much higher background signal and at higher levels of GAIN potentiometer the metal detector is unstable. In such terrains, the setting of a GAIN potentiometer of a smaller levels, stabilize the metal detector, which allows to achieve better depth of detection after adjust the sensitivity and the behavior of the metal detector by THRESHOLD and SILENCER potentiometers.

The GAIN potentiometer must be reduced to a level less than level „5“ and in the presence of strong external interference and/or other factors that cause visible instability of the metal detector.

Because their primary function, the setting of the GAIN potentiometer affect to the other settings of the metal detector and especially on its audio threshold setting by a THRESHOLD potentiometer, and on its ground balance. It is desirable for this setting to be done before the rest of the metal detector settings, or after any change of the GAIN potentiometer, to be done complete setup of the metal detector.

9.18. TONE POTENTIOMETER



The TONE potentiometer serves to regulate the frequency of the output sound of the metal detector, to ensure stability of the audio threshold for specific conditions.

The recommended levels for TONE potentiometer are from level „MIN“ to about level „5“, but in practice it is desirable the user to set the most audible and pleasant sound to him, without restriction in the choice of level of TONE potentiometer.

In the presence of external interference and/or under specific field conditions, for a particular level of TONE potentiometer, it is possible to get instability of the audio threshold of the metal detector. The instability is removed by adjusting of TONE potentiometer of level different from the current. Select this level, thus achieving maximum stabilization of the audio threshold of the metal detector.

For specific conditions, at a given frequency, can be obtained better sensitivity of the metal detector, than in other frequency (other level of TONE potentiometer).



Fig.3 / Setting, indication and maintenance bodies of BLISSTOOL LTC64X

10. SETTING UP OF THE METAL DETECTOR AND PREPARATION FOR WORK

The metal detector is ready for use when the LiPo battery is charged and undamaged (the BAT LOW LED is not lit up).

Before initial use, please charge the LiPo battery at least 4 hours (from 4 to 12 hours), by the automatic LiPo battery charger available in the standard package, as described in 12. The LiPo battery reaches full capacity and respectively toughness, after at least about 5 cycles of charge-discharge.

To optimally use the capabilities of your BLISSTOOL LTC64X, we recommend that you explore in detail all its setting, indication and maintenance bodies by using the detailed description of them available in 9.

After the metal detector is assembled according to the description in 8, it can be turned on via turning from left (level „OFF“) to right of the VOLUME potentiometer. With this potentiometer is set and the desired audio volume (levels from „1“ to „MAX“).

Before initial use of BLISSTOOL LTC64X, for the beginners users we recommend to set all its switches and potentiometers of the recommended for these levels (positions), available as described in 9.

The choice of manual or automatic mode to eliminate the influence of the ground is done by GROUND MODE switch described in 9.3 and the optimal way of tuning and balance, according to the selected mode, are made according to the description available in 9.3, 9.4, 9.5 and 9.6.

The setting of the desired degree of discrimination (distinction of the metals) is made by DISCR LEVEL potentiometer as description in 9.10. The depth of discrimination is set by DISCR DEPTH potentiometer as description in 9.11. In 9.9 describes the DISCRIMINATOR switch.

If the target is detection of any type of metals is necessary DISCR LEVEL potentiometer to be set at level „0“. For the complete exclusion of the discrimination, DISCR DEPTH potentiometer can also be set at „0“.

In the case of ignoring of the ferrous metals (detection only of non-ferrous metals), ie this is mode of discrimination, is necessary DISCR LEVEL and DISCR DEPTH potentiometers to be set at least of the recommended levels present in their descriptions in 9.10 and 9.11.

The stability and the sensitivity of BLISSTOOL LTC64X is set by GAIN, FREQUENCY, THRESHOLD, SILENCER and TONE potentiometers. They should also be set at least of the recommended levels, available in the description in the points, respectively: 9.17, 9.2, 9.7, 9.8 and 9.18.

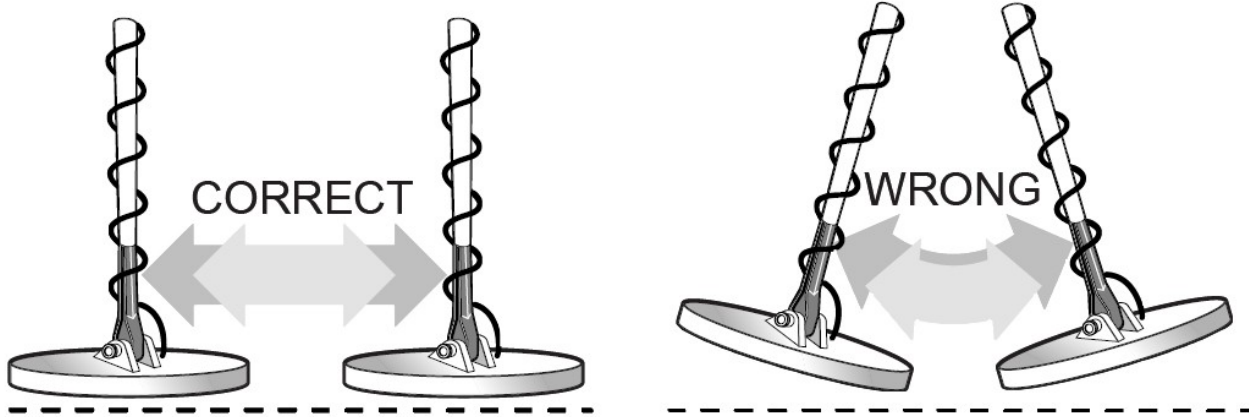
After implementing of the above described steps, the metal detector will be set up and ready for use.

11. METHOD OF SEARCH WITH THE METAL DETECTOR

The metal detector BLISSTOOL LTC64X works in motion mode, ie it reacts to a metal object buried in the ground only when the search coil is swung above it.

The searching of metal objects is actually by moving the search coil above the ground surface.

While doing this, the search coil has to be held parallel towards the ground surface and at a minimum distance above it. The raising reduces the search depth.



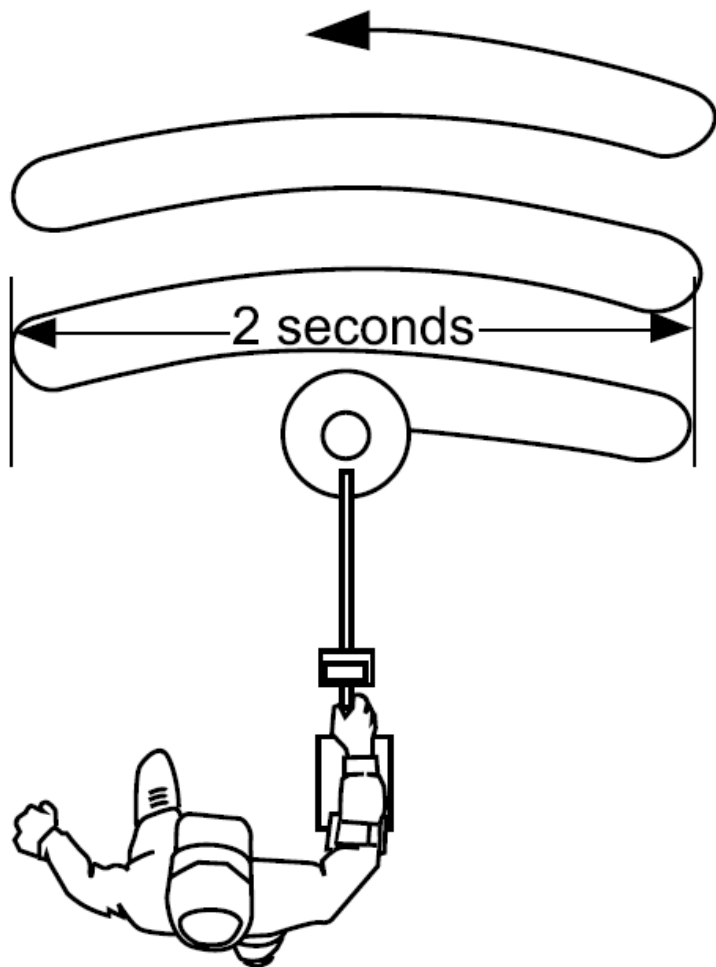
The search consists of a uniform and slow swinging of the coil one side to another, while the user holds the metal detector's handle and uses the armrest for support.

Too fast or too slow moving of the search coil could result in shortening of the depth of detection, especially for deeply buried or small objects.

The search coil path during the search resembles a zigzag movement, which is a result from the uniform and slow swinging of the search coil one side to another while the user is moving forward.

The swing's breadth and the user's speed are chosen from the user, according to the terrain, the sloping and the size of the terrain to be searched.

During swinging the user should avoid hitting the search coil in the available objects on the terrain (stones, roots and parts from tree and shrubs, uneven ground).



The precise location of the detected object (centering of the signal), is determined by moving the search coil in two perpendicular axes, while the user stands still or turns round for detecting the signal from different sides.

To gain an idea for the depth of which is the detected object, the search coil gradually lifted in the air above the ground and monitor height to which the metal detector still detect the object. This, together with specific particular sound (power, duration, purity), is sufficient in most cases to determine whether it is a shallow or deep object, respectively large or small object. For this purpose, helps the already described above centering of the signal to study the area of detection: whether it is narrow or wide.

12. BATTERY. BATTERY CHARGING

Standard, BLISSTOOL LTC64X is equipped with a LiPo battery 11.1V, 2200mAh, which is characterized by high quality, low weight and long life. To recharge it, in the standard package of the metal detector is included automatic LiPo battery charger.

The LiPo battery is located in the electronic block located under the armrest.

The LiPo batteries has about 800 cycles of charge-discharge (battery life), after which its capacitance drops sharply and must be replaced with a new.

The built-in rechargeable LiPo battery, does not need any further maintenance besides being charged.

NOTE: The charge of the LiPo battery should only through the automatic LiPo battery charger available in the standard package. It is optimized for quality and safe charging of the LiPo battery. The use of other chargers may cause rupture or ignition of the LiPo battery and the metal detectors, and/or fire in the room in which they are!

During charging, the metal detector should be switched off. Its switching on while being charged could cause serious damage to the electronic block or to decrease its quality.

For charging of the LiPo battery is needed:

1/ To be assured power of the automatic LiPo battery charger. For the purpose, of its input must be included one of the three devices described below:

- the available in the standard package of BLISSTOOL LTC64X, ~220V/DC12V power adapter, which must be connected to the ~220V network;
- the available in the standard package of BLISSTOOL LTC64X, adapter DC jack / connectors type "crocodile", which must be connected to charged battery with a rated voltage of 12V;

Warning: The red connector must be connected to pole „+“ and the black connector must be connected to the pole „-“;

- the purchased as an additional accessory for BLISSTOOL LTC64X, adapter to charge from car BLISSTOOL CL12V2 (described in 6.2), whose input should be connected to standard connector 12V car cigarette lighter, available in each car.

2/ The output of the automatic LiPo battery charger, through available in the standard package of BLISSTOOL LTC64X, cable adapter, to be connected to the connector CHARGE.

The connector CHARGE is available on the back panel of the electronic block of BLISSTOOL LTC64X.

The charging continues from 2 to 12 hours, depending on the level of discharge of the LiPo battery. It is not necessary to follow the process of charge, as the charger is automatic and then charge of the battery it goes into trickle charge mode, which protects the battery from over-charging.

The automatic LiPo battery charger is available in two versions. Detailed information on the importance of its indicators has in its user guide.

If the LED indicators A, B and C of the automatic LiPo battery charger, in off condition, are with colors white or yellow:

- During the charge, indicators A, B and C light in red;
- After completing the process of charge, indicators A, B and C light in green.

If the LED indicators A, B and C of the automatic LiPo battery charger, in off condition, are with colors red for A, red for B and green for C:

- During the charge, indicators A and B light in red, and C not light;
- After completing the process of charge, A light in red, B not light, and C light with green color.

13. PRACTICAL ADVICES

The metal detector BLISSTOOL LTC64X is designed to find metal objects buried in the ground. It does not work well in residential areas and rich urban environment because it is highly sensitive electronic device and is troubled by surrounding electric devices, systems with electricity and metal objects (metal parts of the structure of the property, equipment and furnishings of the property). Therefore, when working in residential areas, the metal detector may be unstable, nervous, to give false signals. Typically in such conditions can not be demonstrated and measured its maximum parameters. If you want to measure the maximum parameters of your metal detector, do the test in terrain outside the settlement, ie where you will search for buried metal objects. There, the metal detector has maximum appropriate behavior and parameters.

When working with the metal detector near another metal detector, they can interfere with each other. This is inevitable in cases where the metal detectors operate on the same or similar operating frequency. Such are the metal detectors from the same brand and model, but not limited, because at the same operating frequency able to work and other than their metal detectors. Disturbance is expressed in the issuing of periodicals, evenly and pulled sounds from the metal detector.

You can limit or completely eliminate this interference by appropriate adjustment of FREQUENCY potentiometer, as described in 9.2.

If during work with the metal detector, you on the call via mobile phone or your mobile phone rings, is possible the metal detector to be troubled by it. Usually the metal detector does not interfere with mobile phone in standby mode, except where the terrain on which you are, a mobile operator's signal is weak or lost. In this case, even in standby mode, your mobile phone periodically tries to connect to the nearest mobile cell of the used by you mobile operator, with the result that it can cause a periodic disturbance of the metal detector.

One of the most important components of the metal detector is the search coil, which to a great extent determines its sensitivity.

When the metal detector is carried, for example in a rucksack or a traveling bag, an exceptional care should be taken to avoid the bending of the coil cable near the nozzle at the base of the search coil, because that may result in tearing the cable connecting cores and damaging of the search coil and the metal detector.

When necessary, the search coil and the box of the electronic block, can be cleaned with wet cloth. Do not use detergents, as they may damage the plastic parts or the inscription on the front panel, back panel and on the lid of the electronic block.

The electronic block and the search coil are very sensitive towards sudden environmental temperature alterations. When there is a sudden temperature change, the user should wait usually 20-30 minutes before switching on the metal detector.

The power on of non air-conditioned and non tempered metal detector can cause its damage.

Signs of non tempering are: frustration, inability to regulate or evenness of the sound threshold; a general lack of sound. In the presence of at least one of these signs, to prevent injury, it is necessary metal detector immediately be power off and left off a few minutes to temper and/or air conditioning (in high humidity, the transition from warm to cold and vice versa).

While working with the metal detector, the search coil should be protected from damage (hit).

The usage of the metal detector during rain may result its damage.

The metal detector could be safely and properly used, if there is morning dew (because of the watertight search coil). An extensive care should be taken, if the detector is put on the ground, especially on a wet grass, as the water should not be allowed to get inside the box of the electronic block (as in connector PHONES). The electronic block is not watertight and a serious damage would be caused to the metal detector, if water gets inside it.

At mineralized terrains, terrains with moist, wet or clay soil, it is possible the metal detector to has the hole effect.

The hole effect is expressed by the detection from the metal detector of false signal such as from metal object, in a search over the blank, usually freshly dug hole.

The hole effect is due to the dependence of the metal detector from the balance to the ground, and consequently of the drastic difference between the earthy balance over the hole (excavated section

from the terrain) and on the side of the hole (not excavated section from the terrain).

When working with the metal detector on a particular terrain, the user balance the metal detector to it, and to the ground, the metal detector does not issue false signals caused by the ground. When on this terrain be excavated hole, it has a different ground balance compared to the balance of the terrain to which the metal detector is set, ie to hole the metal detector is not balanced. For this, when search over her and in her, the metal detector can issue false signals.

The greater difference in the ground balance between the terrain and the hole, the stronger is the false signal. For this, the hole effect usually occurs visible only on mineralized terrains, terrains with moist, wet or clay soil.

The hole effect is increased, when in the deep the hole covers different in composition and mineralization ground layers, to which, accordingly, the metal detector has a different ground balance.

In practice, the user recourse to search over hole, when he is detected a signal, dug a hole and examined the excavated soil from the hole, for the presence of the detected metal object. In the case where the metal object is not in the excavated soil, should that user have not dug it, because it is of greater depth, or because it is dig in the wrong place. For this, in practice is evident the need, the user to search over already excavated hole to center again the signal, ie to decide whether to continue to dig in the same place in depth, or somewhere sideways.

To reduce and eliminate the hole effect are apply the following methods:

- ***search over the hole with a slow and careful swings of the search coil. If the swings are fast, the hole effect will manifest itself dramatically;***
- ***in advance for specific terrain, the user to dig a hole, to balance the metal detector to it and to remember these settings. Accordingly, in every hole which he should check, to set of the metal detector these settings, but after checking the hole, to set of the metal detector the default settings, through which the metal detector is balanced not to the hole, but to the terrain;***
- ***the user to switch the metal detector to one of the other modes of the DISCRIMINATOR switch. For example, if he currently search in mode „III“, to switch to mode „II“ or to mode „I“;***
- ***on terrains where the hole effect visible occurs, the user to comply with it, ie after first detected and centered well the signal, and dug a hole to find the buried metal object, not to verify that the metal is still in the hole, but to continue to dig until he detect the metal object in the excavated from the hole soil.***

False signal than over a blank hole, can be registered and in greater local heterogeneity (clusters) on a particular section from the terrain, especially on terrains with a high content of ore and slag, or on terrains whose soil is mixed with small pieces of mineralized ceramics.

In practice, such false signals, are not a serious problem, especially for experienced searchers who through his experience, detect relatively easily the difference in the sound, at signal from real metal object and at false signal due to the excavated hole or heterogeneity (clustering).

The sound in detecting of a signal from a metal object is a solid, brief and uninterrupted, and can be easily centered, and in most cases, the sound of a false signal is long and scattered, sometimes heterogeneous, interrupted or blunted.

If you are searching in areas, where ammunitions or other explosive substances may be detected, be extremely careful when excavating, because we do not carry the responsibility for your actions and behavior.

Do not open the box of the electronic block, because otherwise you will lose the warranty of your metal detector. If this is necessary, please contact us, using the contact information, given in 17, to ensure adequate support and service.

14. WARRANTY SUPPORT AND SERVICE

The metal detector BLISSTOOL LTC64X has a 3 Year Worldwide Warranty for the quality of the produced components and in case of any factory flaws.

If open the electronic block and/or breach the integrity of the seals placed on the lid of the electronic block, the warranty is not valid.

The warranty excludes the battery and the battery charger, and is not valid for mechanical damages of the respective components and for damages done by an incorrect usage or unauthorized access and repair (opening the electronic block; wearing, force opening or damaging of the carrier construction, the search coil, the cable or the connector for the coil; incorrect plugging of the search coil; damaging due to connecting of incompatible search coils, batteries, battery chargers and headphones).

To be a subject of a repair under warranty, the metal detector should be delivered to any of our authorized service support offices. The customer must pay all delivery and transport expenses.

In order to protect the metal detector from a damage, it is desirable its transportation to carry out in its original purchase box (included in the standard package), since it is optimized for a safe storage and transport.

The serial number and the purchase date, written on the warranty card, verify the warranty.

For further details and information about warranty and after warranty support and service, please contact us, by using the contact information, given in 17.

15. LEGISLATION

The possession of a metal detector is completely legal as long as they comply with existing legislative framework. For this purpose, please check the specific laws that relate to metal detecting in your country.

16. BLISSTOOL

BLISSTOOL is a Bulgarian manufacturer of professional metal detectors and metal detecting accessories.

BLISSTOOL produces one of the best deep detecting metal detectors in the world.

All BLISSTOOL metal detectors are developed, tested and manufactured in Bulgaria, in close cooperation with professional treasure hunters, and have a 3 Year Worldwide Warranty for the quality of the produced components and in case of any factory flaws.

The BLISSTOOL team has years of experience in metal detecting and design of metal detectors. BLISSTOOL thoroughly test each metal detector before send it to the final customer and is confident in the quality of its products.

BLISSTOOL offer professional products at an affordable price.

17. CONTACT INFORMATION

BLISSTOOL

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GSM: +359883450667

Skype: blisstool



BLISSTOOL LTC64X is RoHS compliant

When RoHS compliant symbol is marked on your product means that it is compatible with European Directive 2002/95/EC (RoHS, Restriction of Hazardous Substances Directive).

With this directive, the EU recommended limiting the use and incorporation of harmful materials, such as lead, in the manufacture of electrical and electronic products.

In order RoHS compliance, in the electronics of BLISSTOOL LTC64X are used high quality electronic components, unleaded tino for soldering and pcb board with a final coating nickel-gold. These green technologies ensure of your metal detector high quality and a long life. For comparison, the standard and cheaper technology that is not RoHS compliant, includes the use of tino with a high content of lead and pcb board with a final coating tin-lead.



BLISSTOOL LTC64X falls under the WEEE directive

When this crossed-out wheeled bin symbol is attached to a product it means the product is covered by the European Directive 2002/96/EC (WEEE, Waste Electrical and Electronic Equipment).

This EU directive governs matters relating to the collection, storage and recycling of waste from electrical and electronic products.

BLISSTOOL LTC64X is designed and manufactured with high quality materials and components, which can be recycled and reused.

Please inform yourself about the local separate collection system for electrical and electronic products.

Please act according to your local rules and do not dispose of your old products with your normal household waste. The correct disposal of your old product will help prevent potential negative consequences for the environment and human health.

In order to improve the product, BLISSTOOL reserves the right to make changes without notice.

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