



FS Future Series<sup>®</sup>

# Black Hawk<sup>R3</sup>



## User's Manual

Any information contained in these operating instructions may be changed without prior notice.

OKM does not make any warranty for this document. This also applies without limitation to implied assurances of merchantability and fitness for a specific purpose. OKM does not assume any responsibility for errors in this manual or for any incidental or consequential damage or loss associated with the delivery, exploitation or usage of this material.

This documentation is available "as presented" and without any kind of warranty. In no circumstances OKM takes responsibility for lost profits, usage or data losses, interruption of business activities or all kind of other indirectly damages, which developed because of errors in this documentation. This instruction manual and all other stored media, which are delivered with this package should only be used for this product. Program copies are allowed only for security and safety purposes. The resale of these programs, in original or changed form, is absolutely forbidden.

This manual may not be copied, duplicated or translated into another language, neither in part nor completely, over the copyright matters without the prior written consent of OKM.

Copyright ©2002 – 2013 OKM GmbH. All rights reserved.

---

# Table of Contents

<a href="#">1 Introduction</a>	<a href="#">7</a>
<a href="#">1.1 Preface</a>	<a href="#">8</a>
<a href="#">1.2 Important Notes</a>	<a href="#">9</a>
<a href="#">1.2.1 General Notes</a>	<a href="#">9</a>
<a href="#">1.2.2 Possible Health Hazards</a>	<a href="#">9</a>
<a href="#">1.2.3 Surrounding Area</a>	<a href="#">9</a>
<a href="#">1.2.4 Voltage</a>	<a href="#">9</a>
<a href="#">1.2.5 Data Correctness</a>	<a href="#">10</a>
<a href="#">1.3 Maintenance and Services</a>	<a href="#">10</a>
<a href="#">1.4 Danger of Explosion during Excavation</a>	<a href="#">10</a>
<a href="#">1.5 Care and Use</a>	<a href="#">11</a>
<a href="#">1.6 Protecting Your Investment</a>	<a href="#">12</a>
<a href="#">2 Technical Specifications</a>	<a href="#">13</a>
<a href="#">2.1 Control Unit</a>	<a href="#">14</a>
<a href="#">2.2 Search Coil</a>	<a href="#">14</a>
<a href="#">2.3 Power Pack</a>	<a href="#">14</a>
<a href="#">3 Scope of Delivery</a>	<a href="#">15</a>
<a href="#">4 Assembly</a>	<a href="#">17</a>
<a href="#">4.1 Mounting the Main Unit</a>	<a href="#">19</a>
<a href="#">4.2 Mounting the Search Coil</a>	<a href="#">20</a>
<a href="#">4.3 Assembling the optional Frame Coil</a>	<a href="#">20</a>
<a href="#">5 Control Elements</a>	<a href="#">24</a>
<a href="#">5.1 General Controls</a>	<a href="#">25</a>
<a href="#">5.1.1 On / Off / Volume</a>	<a href="#">26</a>
<a href="#">5.1.2 Display Brightness / LED Light</a>	<a href="#">27</a>
<a href="#">5.1.3 Monitor Display</a>	<a href="#">27</a>
<a href="#">5.2 Search Controls</a>	<a href="#">27</a>
<a href="#">5.2.1 Delay</a>	<a href="#">28</a>
<a href="#">5.2.2 Interference</a>	<a href="#">28</a>
<a href="#">5.2.3 Threshold</a>	<a href="#">28</a>
<a href="#">5.2.4 Sensitivity</a>	<a href="#">28</a>
<a href="#">5.2.5 Calibration Button</a>	<a href="#">29</a>
<a href="#">5.2.5.1 Calibration of Metal Discrimination and Ground Balance</a>	<a href="#">29</a>
<a href="#">5.2.5.2 Clearing paired Bluetooth Headphones</a>	<a href="#">29</a>
<a href="#">5.3 Bluetooth Headphones</a>	<a href="#">30</a>
<a href="#">6 Field Procedure</a>	<a href="#">31</a>
<a href="#">6.1 Detection Depth</a>	<a href="#">32</a>
<a href="#">6.2 Ground Balancing</a>	<a href="#">32</a>
<a href="#">6.3 Calibration of Discrimination</a>	<a href="#">33</a>
<a href="#">6.4 Operation</a>	<a href="#">33</a>

[6.5 Pin Pointing](#) ..... [34](#)

[7 Optional Equipment](#) ..... [35](#)

[8 Troubleshooting](#) ..... [38](#)

---

## Illustration Index

Illustration 4.1: Telescopic Rod to mount the search coils and main unit .....	18
Illustration 4.2: Rod Shaft Lock in the unlocked position .....	18
Illustration 4.3: Rod Shaft Lock in the locked position .....	18
Illustration 4.4: Align bracket to control unit .....	19
Illustration 4.5: Both brackets must connect firmly .....	19
Illustration 4.6: Rotate the control unit to fasten it .....	19
Illustration 4.7: Properly attached control unit .....	19
Illustration 4.8: Telescopic Rod end .....	20
Illustration 4.9: Search Coil mounted to Telescopic Rod .....	20
Illustration 4.10: All parts unpacked .....	20
Illustration 4.11: Preparation of the frame coil .....	20
Illustration 4.12: Push belt clip over coil segment .....	21
Illustration 4.13: Avoid damaging the mark-up indicator .....	21
Illustration 4.14: Corner ready for assembly .....	21
Illustration 4.15: Corner assembled .....	21
Illustration 4.16: Assembling the straight segments .....	22
Illustration 4.17: Completely assembled frame coil .....	22
Illustration 4.18: Mounting the straps .....	22
Illustration 4.19: The frame coil can be assembled in different sizes .....	23
Illustration 4.20: The frame coil can also be carried by 2 people .....	23
Illustration 5.1: Complete View .....	25
Illustration 5.2: Bottom of unit showing the mounting bracket .....	25
Illustration 5.3: Rear of unit showing battery and coil connectors .....	26
Illustration 5.4: Right side unit controls .....	26
Illustration 5.5: Main Screen .....	27
Illustration 5.6: Left side of the control unit .....	27
Illustration 5.7: Delay Screen .....	28
Illustration 5.8: Interference Screen .....	28
Illustration 5.9: Threshold Screen .....	28
Illustration 5.10: Sensitivity Screen .....	28
Illustration 5.11: Front of control unit .....	29
Illustration 5.12: Bluetooth headphones with accessories .....	30
Illustration 6.1: Procedure for swinging unit from side to side .....	33
Illustration 6.2: Example of how to properly pin point a target .....	34

# CHAPTER 1

## **Introduction**

## 1.1 Preface

Dear customer,

all of the engineers, sales, training and support staff at OKM GmbH would like to thank you for your purchase of the Black Hawk metal detector.

The Black Hawk pulse induction detector works on the principle of a time sensitive oscillator which produces an alternating current that passes through a coil producing an alternating magnetic field. This alternating magnetic field creates an eddy current which can detect electrically conductible metal. It uses the induction of a high voltage energy pulse to identify the presence of metals.

The Black Hawk is able to locate buried objects within various structures and vessels non-intrusively without having to excavate the area. The facile and flexible handling of the Black Hawk can easily and quickly give reproducible results.

With our team of specialists we guarantee that our products are under recurrent control. Our specialists try to implement new developments in terms of further quality improvements for you.

By purchasing or using one of our products, we cannot guarantee that during the course of your research that you will be successful and have a find. The recognition of hidden and buried objects depends on a huge number of factors. As you well may know there are different soil types all over the world with different levels of natural attenuation. Variable soil properties can and will hamper and alter ultimate scan measurements. Areas where there is an extreme amount of ground water, varying clays, sands and wet soils making scanning more difficult and may reduce the maximum depth capabilities of any and all detection equipment, regardless of make or model.

For more information regarding where this equipment has been used and operated, please visit our website. Our equipment is constantly being tested and when improvements or upgrades are available, we will list them also on our website.

It is necessary for our company to protect our developments and all of the information learned during the "Research and Development" phases in creating our technology. We strive to stay within the given framework of legislation, patents and trademark registration.

Please take your time to read this User Manual and familiarize yourself with the operation, functionality and how to utilize the Black Hawk. We also offer training for your equipment in our factory and on-site. We strive to maintain worldwide dealer network for assistance and support. Please visit our web site for more information.

## 1.2 Important Notes

Prior to using the Black Hawk and its accessories, please read these operating instructions carefully. These instructions give information on how to use the detector and potential sources where precautions should be taken.

### 1.2.1 General Notes

Being an electronic device, the Black Hawk has to be treated with caution and treated with care as with any other electronic device. Any failure to observe the safety precautions given or any use for purposes other than the ones it is designed for may result in damage or destruction of the processing unit and/or its accessories or connected components.

The device has a built in anti-tampering module which will destroy the unit if it is improperly opened. There are no end user serviceable parts on the inside of the unit.

### 1.2.2 Possible Health Hazards

If used properly this device normally does not pose any health hazards. According to current scientific knowledge, the high-frequency signals are not harmful to the human body on account of their low power.

### 1.2.3 Surrounding Area

When moving this unit from a cold place to a warmer place, watch out for condensation. Do not operate the unit until possible condensation has evaporated. The unit is not weather or water proof moisture within the electronics can destroy the unit.

Avoid strong magnetic fields, which may occur in places where there are large electric motors or unshielded loudspeakers. Try to avoid using this equipment within 50 meters (150 ft) of this type of equipment.

Metallic objects on the ground such as cans, tin, nails, screws or debris can influence your scan data and present negative results regarding your scan data. Also it is a good habit to remove any metallic objects off of your person like cellular telephones, keys, jewelry, etc... Do not wear steel toe boots.

### 1.2.4 Voltage

The power supply can not be outside the indicated range of values. Use only approved chargers, batteries and rechargeable batteries which are included within the scope of delivery.

**Never use the 115/230 Volt mains supply.**



### 1.2.5 Data Correctness

Data errors can occur if:

- the power supply of the device or the batteries are too low,
- the cables are too long,
- the unit is operating too close to devices which send out disturbances or
- atmospheric conditions (electrical storms, lightning, etc...).

### 1.3 Maintenance and Services

In this section you will learn how to maintain your measuring instrument with all included accessories to keep it in good condition a long time and to get good measuring results.

The following list indicates what you absolutely should avoid:

- penetrating water
- strong dirt and dust deposits
- hard impacts
- strong magnetic fields
- high and long lasting heat effect

To clean your device please use a clean and dry soft rag or cloth. To avoid any damage you should transport the device and accessories always in the appropriate carrying cases.

Prior to using your Black Hawk please be sure that all batteries and accumulators are fully charged. Also do not allow the batteries to completely discharge before recharging them. This way your batteries will have a long and durable life. When the unit is not in use, recharge the batteries every 3 months so that they retain their performance.

**To charge the external batteries use only the approved chargers which are part of our scope of delivery.**

### 1.4 Danger of Explosion during Excavation

Unfortunately, the last two world wars also made the ground in many places of the world a potentially explosive scrap heap. A host of those lethal relics are still buried in the ground. Do not start digging and hacking for an object wildly when you receive a signal of a piece of metal from your device. Firstly, you might indeed cause irreparable damage to a truly rare find, and secondly, there is a chance that the object reacts in an insulted way and strikes back.

Note the color of the ground close to the surface. A red or reddish color of the ground is an indicator of rust traces. As regards to the finds themselves, you should definitely pay attention to their shape. Curved or round objects should be a sign of alarm, especially if buttons, rings or little pegs can be

identified or felt. The same applies to recognizable ammunition or bullets and shells. Leave that stuff where it is, do not touch anything and, most importantly, do not take any of it home with you. The killing machines of war made use of diabolical inventions such as rocker fuses, acid fuses and ball fuses. Those components have been rusting away in the course of time, and the slightest movement may cause parts of them to break and be triggered. Even seemingly harmless objects such as cartridges or large ammunition are anything but that. Explosives may have become crystalline over time, that is, sugar-like crystals have formed.

Moving such an object may cause those crystals to produce friction, leading to an explosion. If you come across such relics, mark the place and do not fail to report the find to the police. Such objects always pose a danger to the life of hikers, walkers, farmers, children and animals.

## 1.5 Care and Use

The Black Hawk is a sturdy instrument, but it is not designed to withstand abuse. In caring for your Black Hawk, there are several important "**DOs**" and "**DO NOTs**" to remember.

- **DO NOT** use it to beat bushes out-of-the-way, flatten area by swinging wildly or pry rocks loose.
- **DO NOT** drop the machine into water or use it while it is raining or wet.
- **DO NOT** leave it exposed at night where dew could form on it.
- **DO NOT** store it in places that could get extremely hot.
- **DO NOT** leave it in the trunk or boot of a car where high temperatures could build up.
- **DO NOT** spray lubricants, or any type of cleaners, solvents, sealants or other chemicals into or onto the electronic parts, switches or controls.
- **DO NOT** attempt to modify or repair the detector's electronics as this will void your detector's warranty.
- **DO** clean your unit with a soft dry or slightly damp cloth to remove dust and residue from the previous use.
- **DO** use the device within the proper operating guidelines.
- **DO** use the detector with the proper power pack as to not cause damage to the unit.

The warranty does not cover damage resulting from an accident, neglect or abuse.

## 1.6 Protecting Your Investment

Often detector users become disappointed when their new detector slowly becomes less and less responsive and seems to have lost some of its original peak performance. You can help prevent this from happening to your detector by following these basic care and protection guidelines.

- Operate your detector exactly as recommended in this Operator Instruction Manual.
- Use only the OKM Power Pack or other approved power supplies.
- The search coil cable is hard-wired to the search coil and protected by a stress relief. Inspect the stress relief frequently to make sure it is firmly attached and intact.
- Keep cables properly wound around the extension pole and protect them during use. Floppy, pinched, or damaged cables may short, causing unnecessary replacement of the search coil.
- Sweep the search coil carefully, especially when using around rocks and building foundations. Avoid hitting the search coil against hard, solid objects and surfaces.
- Keep your search coil slightly off of the ground during the sweep, especially when using in gravel or hard, rocky dirt.
- The search coil is waterproof and can be submerged in either fresh or salt water. After the search coil is used in salt water, rinse it and the lower stem assembly well with fresh water to prevent corrosion of the metal parts.
- The search coil is waterproof but the electronics are not, so always prevent any moisture or water from entering the control housing and never allow the cable connectors to become submerged in water.
- If working in or near water, or if there is a possibility of rain, use a protective weather resistant pouch or plastic bag to cover the control housing. Make sure it can “breathe” in order to ensure against condensation buildup inside.
- After each use, clean the detector with a soft cloth to remove dust, moisture, or other contaminants.
- When transporting the detector in a car during hot weather, store it on the floor of the passenger compartment if possible. Using a carry bag gives additional protection. In any case, never allow the detector to roll around unprotected in the trunk or back of a pickup truck.
- Protect your detector from dust, moisture, and extreme temperatures during storage.
- When shipping, use the original factory carton or similar heavy-duty container and provide sufficient padding around all parts.
- Treat your detector as you would any sensitive electronic instrument. Though it is designed to withstand the demands of normal treasure hunting, proper care is essential.

# CHAPTER 2

## **Technical Specifications**

The following technical specifications are medial values. During operation slight variations are possible.

## 2.1 Control Unit

Dimensions (H x W x D) .....	80 x 160 x 210 mm
Weight .....	about 1 kg
Voltage .....	12 VDC $\pm$ 5%, 17 W maximal
Safety Class .....	IP40
Operating Time (fully charged Power Pack, 25° C) .....	approximately 4 hours
Display .....	110 mm Diagonal, 400 MCD, 480 x 272 Pixel TFT, Color
Processor.....	OMAP 3530@600MHz, Power VR
Feedback.....	acoustic, visual
Operating Temperature .....	-5° C to +55° C
Storage temperature .....	-20° C to +80° C
Air humidity .....	5 % to 75 %
Waterproof .....	No

## 2.2 Search Coil

Sensor technology .....	SCMI-15-D
Mono Coil .....	475 - 600 Hz High Voltage Pulse Induction

## 2.3 Power Pack

Lithium Polymer Accumulator .....	Output Voltage 12,7 VDC
Output Current.....	max 3 A
Capacity .....	4400 mAh
Weight .....	605 g
Charger.....	Output Voltage 19 VDC / Input 100-240 VAC 50-60 Hz

# CHAPTER 3

## **Scope of Delivery**

In the following section you can find all the standard equipment and shipping. The scope of delivery can be different in some circumstances because of some optional accessories which should not be included in the basic equipment.

	Basic	Professional
Control Unit	1	1
Carrying Strap	1	1
Wireless Bluetooth Headphones	1	1
Telescopic Rod Assembly	1	1
OKM Power Pack & Charger	1	1
International Travel Adapter	1	1
User's Manual	1	1
Shipping Carton	1	2
36 cm Search Coil	1	1
16 cm Search Coil	optional	1
Frame Coil	optional	1
12 V Car Charger	optional	optional
Mounting Kit for Power Pack	optional	optional

*Table 1: Scope of delivery*

In the event that there is an item that is missing within the scope of delivery (a "Packing List" or "Lieferumfang") upon receipt of your Black Hawk, contact the dealer immediately.

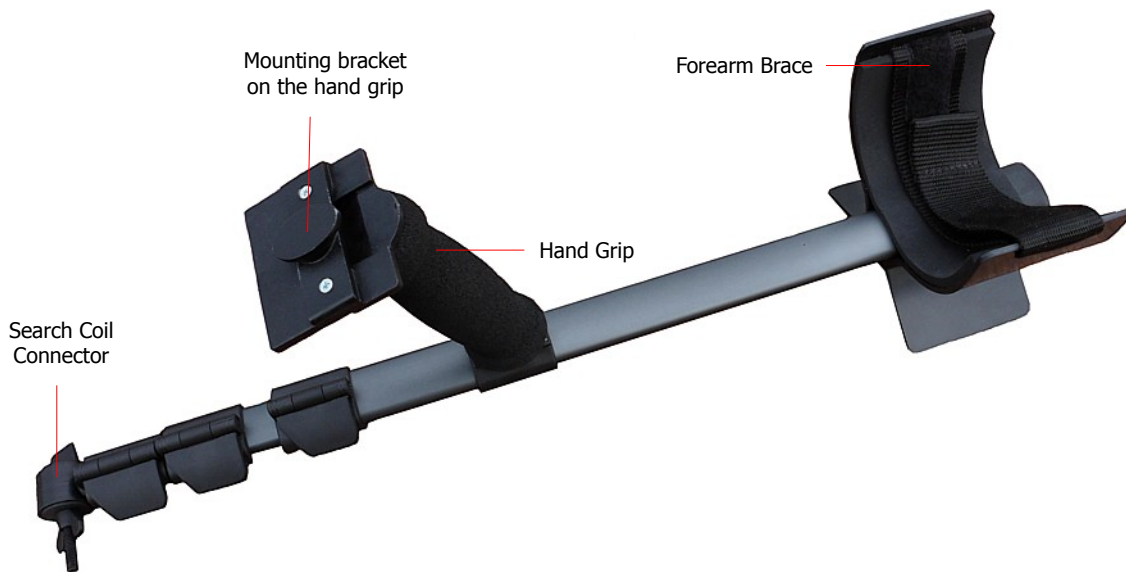
# CHAPTER 4

## **Assembly**

This section explains how to assemble and prepare the Black Hawk unit for operation.



The main unit mounts directly to the mounting bracket on the hand grip and the search coil mounts to the coil connector of the Telescopic Rod Assembly.



*Illustration 4.1: Telescopic Rod to mount the search coils and main unit*

Adjusting the telescopic rod is very important. To avoid straining any muscles and to allow for more comfort while working with the unit, a properly adjusted telescopic rod is essential.



*Illustration 4.2: Rod Shaft Lock in the unlocked position*



*Illustration 4.3: Rod Shaft Lock in the locked position*

To adjust the telescopic rod length or the hand grip the tab locks needs to be opened as in illustration 4.2. Once opened the shaft you can extend or contract the rod to your desired length. Once the desired length is reached, simply lock the lever down as shown in illustration 4.3. Be sure that the hand grip is also properly adjusted for comfort.

## 4.1 Mounting the Main Unit

When the main unit is mounted to the telescopic rod it looks like that as in illustration 4.7.



*Illustration 4.4: Align bracket to control unit*



*Illustration 4.5: Both brackets must connect firmly*

Place the mounting bracket of the Black Hawk control unit directly over the mounting bracket on the hand grip as shown in illustration 4.4 and 4.5.



*Illustration 4.6: Rotate the control unit to fasten it*



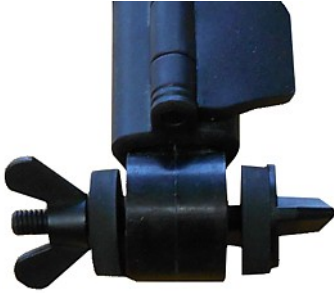
*Illustration 4.7: Properly attached control unit*

After both brackets are firmly attached to each other, start turning the Black Hawk control unit to fasten the control unit completely. Please take note that the control unit can only be turned in one specific direction. So you have to make sure to place it from the right side (see illustrations 4.4 and 4.5).



## 4.2 Mounting the Search Coil

Assembling the search coils to the telescopic rod is very simple. Unscrew the nylon bolt, be sure the rubber washers are seated next to the shaft. Insert the end of the shaft onto the coil, insert the bolt and tighten. Finger tight only so that the coil does not move. Make note that on the end of the telescopic rod there is a nylon bolt with 2 rubber washers, these are important to keep the coil firmly in place.



*Illustration 4.8: Telescopic Rod end*



*Illustration 4.9: Search Coil mounted to Telescopic Rod*

## 4.3 Assembling the optional Frame Coil

To assemble the frame coil first unpack all of the components and lay them on the ground with the wire up and the belt clips up as shown in illustration 4.10.



*Illustration 4.10: All parts unpacked*



*Illustration 4.11: Preparation of the frame coil*

The next step is to lay out your desired frame coil structure (see illustration 4.11). By using the independent segments, different sizes of the search coil can be constructed. By default there is 1 corner segment with a cable, 3 corner segments without cable and 4 straight segments. Each corner segment is equipped with a belt clip to mount the straps. If the belt clips are not mounted, you can simply do it by yourself. You may also change the position of the belt clips for your individual needs.





*Illustration 4.12: Push belt clip over coil segment*



*Illustration 4.13: Avoid damaging the mark-up indicator*

Pay attention to the small mark-up indicators when pushing the belt clips over the coil segments as shown in illustrations 4.12 and 4.13.

As shown in illustration 4.14, you will simply (1.) put the connectors together and (2.) screw it finger tight to complete the assembly of the segments as shown in illustration 4.15. Be sure to turn the screwing ring into the right direction to tighten the single segments. If you are situated inside the frame coil structure (see illustration 4.11 on page 20) then you have to turn it outwards to tighten and inwards to loosen the segments.



*Illustration 4.14: Corner ready for assembly*



*Illustration 4.15: Corner assembled*

When assembling the straight coil segments (see illustration 4.16) be sure that both mark-ups indicators are aligned to each other. Complete the assembly of all corner segments as well as straight segments to get your final frame coil as shown in illustration 4.17.





*Illustration 4.16: Assembling the straight segments*



*Illustration 4.17: Completely assembled frame coil*

The straps to the frame coil must be mounted in order to carry the unit. Before you assemble the frame coil segments you have to push the belt clips over the appropriate segments as already described.



*Illustration 4.18: Mounting the straps*

The straps can be carried by 2 people where each person has a strap or by 1 person by criss-crossing the straps and carry the coil over the shoulder.





*Illustration 4.19: The frame coil can be assembled in different sizes*

In illustration 4.19 you see 2 possible sizes of the frame coil. A small one with only the corner segments assembled and a big one with all segments assembled.



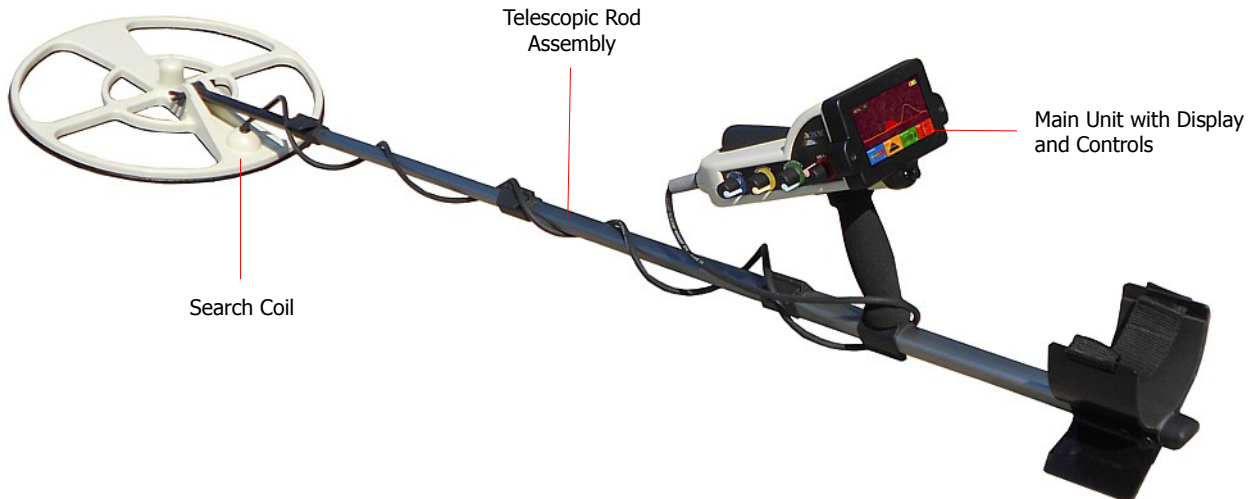
*Illustration 4.20: The frame coil can also be carried by 2 people*

# CHAPTER 5

## Control Elements

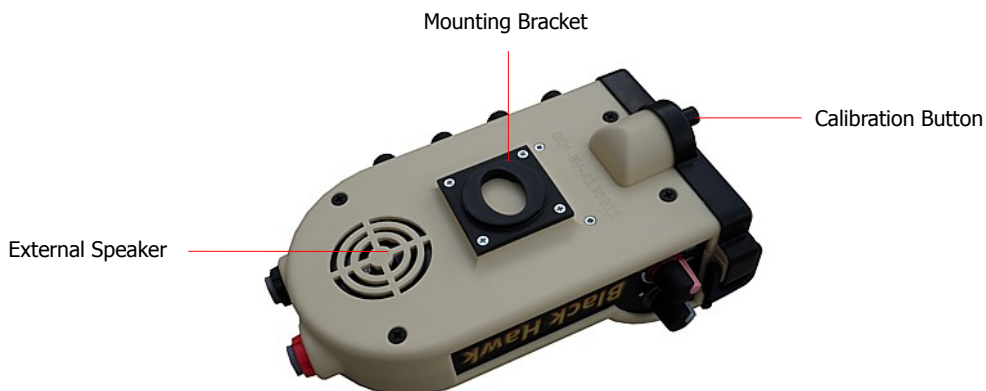
In this section we explain more about the fundamental use of all control elements for the Black Hawk measuring instrument. All connections, inputs and outputs are explained in detail.

First we will explain the various ports and connectors. Understanding the various functions makes it much easier to prepare the unit for operation.



*Illustration 5.1: Complete View*

In illustration 5.2 you can clearly see the mounting bracket which is used to mount the unit to the extension shaft. When mounting the control unit to the telescopic rod, be sure that it locks into place.



*Illustration 5.2: Bottom of unit showing the mounting bracket*

The external speaker shown in illustration 5.2 is controlled by the ON/OFF and Volume control knob. It should be inspected after each use to ensure that there is no debris, sand, water or any other contaminants that may have entered the unit during operation.

## 5.1 General Controls

There are seven controls on the Black Hawk unit. On the right side of the unit there is the ON/OFF and Volume, Brightness and LED light. On the left side of the unit is the Delay, Interference, Threshold and Sensitivity control. On the front of the unit is the Calibration Button.



In illustration 5.3 you see the LED that can illuminate your path in the dark, the battery connector and the search coil connector.



*Illustration 5.3: Rear of unit showing battery and coil connectors*

The battery and search coil connectors are color coded to make for a quick and easy assembly of the unit.



*Illustration 5.4: Right side unit controls*

### 5.1.1 On / Off / Volume

The illustration 5.4 shows the ON/OFF/Volume knob. This control will turn the unit on and off as well as control the volume of the internal speaker. The unit requires between 8 and 10 seconds to start. The wireless headphones can be used. When the unit is turned on and you wish to use the headphones, be sure to keep the volume low. You can still adjust the volume of the headphones separately.

### 5.1.2 Display Brightness / LED Light

The illustration 5.4 shows the Display Brightness knob. Use this control to either dim or brighten the monitor. For working with the unit during the day most will adjust the monitor and make it very bright. During the evening, the monitor can be dimmed. When the unit is dimmed to the low setting, the LED light will illuminate to assist you for night searches. When it is to the lowest setting then all illumination will be turned off (no LED light and no monitor display).

### 5.1.3 Monitor Display

After turning on the detector the Monitor Display will show the main screen accordingly to illustration 5.5. The main screen shows the signal curve as well as all of the sub-screens for the search controls. In a single instance one can see the other settings instantly. When one of the other controls are moved, the screen will automatically change to the setting that is being changed.

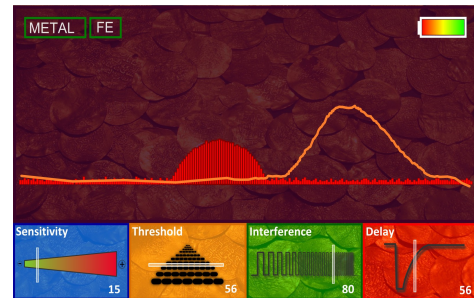


Illustration 5.5: Main Screen

## 5.2 Search Controls

In illustration 5.6, the controls on the left side of the unit are shown. These are your primary controls to ground balancing the unit. Most of the ground balancing process has been automated simplifying the task of ground balancing the unit.

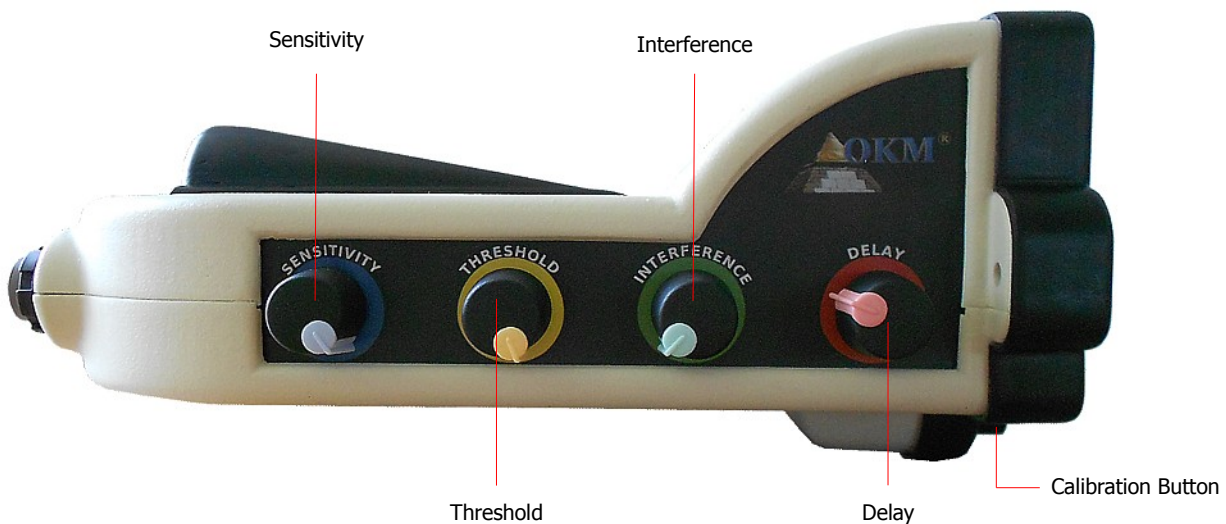


Illustration 5.6: Left side of the control unit

By using these controls you will adjust the search coils to specific soil conditions.

### 5.2.1 Delay

The Delay knob as shown in illustration 5.6, controls the sampling instance of the receiving signal. The higher this value the later it will be sampled, which results in more sensitivity but also more interference. The size of the coil will determine where the Sensitivity needs to be set. The recommended default value at the beginning is "50" for all standard search coils and "0" for the frame coil.

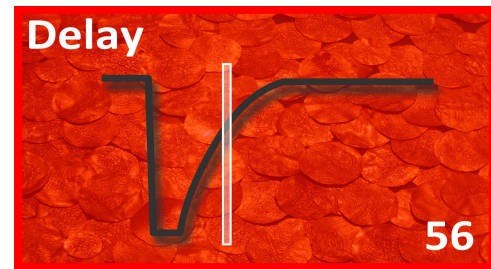


Illustration 5.7: Delay Screen

### 5.2.2 Interference

The Interference knob as shown in illustration 5.6, controls the sampling rate of the signal. By using this setting you can reduce sources of periodic interference like electric power lines and electric motors. Thus these kind of disturbances can be prevented. The recommended default value at the beginning is "0".

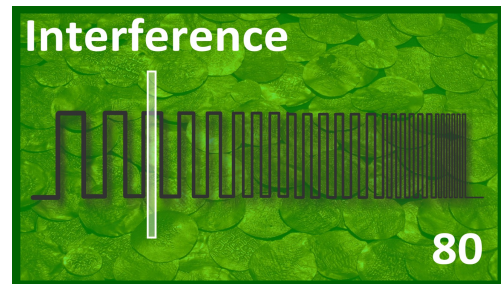


Illustration 5.8: Interference Screen

### 5.2.3 Threshold

The Threshold knob as shown in illustration 5.6, controls the object size filter. The neutral position is at "20". While setting it to a higher value the detector only responds to larger metal objects and skips the smaller ones. For all settings beneath "20" a base tone will be added to the receiving signal to better recognize very low signals. The recommended default value at the beginning is "17".

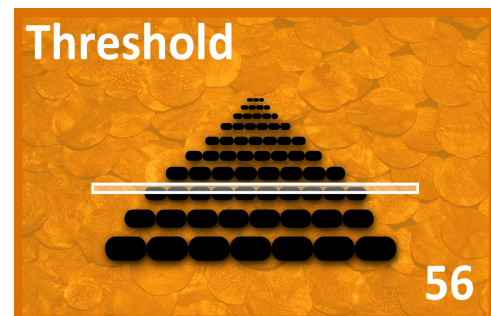


Illustration 5.9: Threshold Screen

### 5.2.4 Sensitivity

The Sensitivity knob as shown in illustration 5.6, is used to either increase or decrease the sensitivity of the search coil. The recommended default value at the beginning is "99". In case of too much disturbances you should first adjust the Delay setting before changing the Sensitivity.

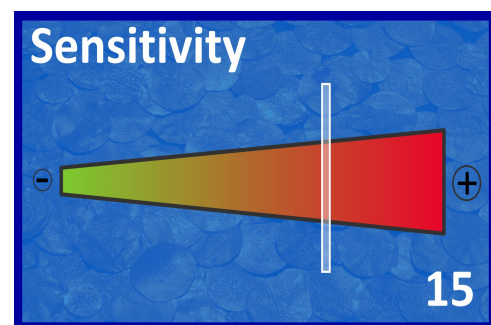


Illustration 5.10: Sensitivity Screen

## 5.2.5 Calibration Button

The Calibration Button can be used for different operations depending on the current state of the Black Hawk.

### 5.2.5.1 Calibration of Metal Discrimination and Ground Balance

This function will perform the automatic ground balance of the built in magnetometer enabling the unit to discriminate between ferrous and non-ferrous metals as well as ground balancing the detector.



*Illustration 5.11: Front of control unit*

For the person who is only looking for non-ferrous metals, discrimination is very important. When the unit is not calibrated the detection of non-ferrous metals still takes place. The only difference is that ferrous metals will not have the "FE" sign show up in the main display screen. After calibrating the Black Hawk the function of discrimination is automatic. Please make note that some soil conditions may make it difficult to discriminate some metals.

By pressing the Calibration Button the Black Hawk will also apply a new ground balance. In case the automatic ground balance takes too long during metal detecting you just need to press the Calibration Button to ground balance the Black Hawk.

### 5.2.5.2 Clearing paired Bluetooth Headphones

If you hold the Calibration Button pressed while powering on the Black Hawk metal detector and releasing it after the Black Hawk welcome screen appears, you will clear all paired Bluetooth headphones from the internal memory. Follow these steps to clear all Bluetooth pairings:

1. Black Hawk control unit must be powered off
2. Hold the Calibration Button pressed
3. Power on the Black Hawk control unit
4. The welcome screen "Black Hawk" appears

## 5. Release the Calibration Button

Now all paired Bluetooth headphones are cleared from the internal memory.

### 5.3 Bluetooth Headphones

The Black Hawk can be operated with any Bluetooth headphone available on the market. Your Black Hawk comes with preconfigured Bluetooth Headphones as shown in figure 5.12.



*Illustration 5.12: Bluetooth headphones with accessories*

To operate the Black Hawk with any other wireless Bluetooth headphones you must pair your new headphones with the control unit. The original Bluetooth headphones, which belongs to the scope of delivery of your Black Hawk, are already paired. In case you need to repeat this pairing or you want to pair new headphones, please follow these steps:

1. Make sure no other Bluetooth headphones are powered on
2. Hold the Power On/Off button pressed until the LED indicator blinks blue/white
3. Power on the Black Hawk control unit
4. After a short time you should hear the sound signal via headphones

**It is always recommended to first power on your headphones and after that the control unit.**

# CHAPTER 6

## Field Procedure

This chapter gives practical instructions about the general procedure of scanning an area. The different scanning methods and procedures will be explained in detail.

In this section you will learn more about the different operating modes of the Black Hawk. Every function is explained in the following subsections.



The Black Hawk metal detector is actually a dual detector. Besides the pulse induction metal detector, there is also a built in magnetometer which enables the unit to discriminate between ferrous and non-ferrous metals. When a ferrous metal is detected there is a notification which will appear on the display notifying you that the metal detected is ferrous. It will show up on the top left portion of the screen as "FE".

The Black Hawk is fully automatic in terms of knowing which detector coil is attached. So whether it is the small coil or the large coil the unit knows where to set many of the automated processes.

The process of detection is done by using an eddy current. An eddy current uses an electromagnetic induction to create a reaction within metals. This reaction within the metals creates electrical conductivity or an anomaly which actually disturbs the flow of the current. When this disturbance is realized, the detector then reports the anomaly. The surface of the material being detected must be accessible to the current. Various finishes and coverings may cause bad or weak readings.

An alternating current in the coil generates a changing magnetic field. The larger the coil, the larger the field is. With a large field only larger items can be found. When using a smaller coil the field is also smaller enabling the detection of smaller items. All of this is done by reporting the variations within the magnetic field which is created by the coils. After an item is detected, allow for a recovery time or enough time for the creation of another magnetic field.

## 6.1 Detection Depth

In theory, the larger the item is and the longer it has been in the ground, the deeper it can be detected. With a pulse induction detector, there is a high voltage surge sent into the ground creating a large magnetic field. Items with an electrical conductance will distort the magnetic field causing the detector to react. The Delay function initializes the recurrence of the pulse. This in combination with the size of the coil will affect the ultimate possible depth.

Varying soils and layers within the soil will also affect the ultimate depth of the detector. Using a pulse induction metal detector enables you to search in soils with a higher magnetic permeability (highly mineralized) or susceptibility than other soils. Although in such highly mineralized soils, determining if an object is ferrous or non-ferrous becomes exponentially more difficult depending on the amount of mineralization.

Air tests typically will be able to detect a metallic object twice the distance as the size of the coil.

## 6.2 Ground Balancing

Ground balancing the Black Hawk detector is mandatory for the proper operation of the unit. Most of the initial balancing is done automatically, the rest by making a few simple adjustments:

1. Connect a fully charged Power Pack to the Black Hawk unit.
2. Hold the unit 5 to 10 cm above the ground.
3. Turn on the unit and after 8 to 10 seconds the display will turn on.
4. Set the volume to the desired level or set to low and turn on the wireless headphones.

5. Set the value to "0" for the Interference.
6. Set the value to "17" for the Threshold.
7. Set the value to "99" for the Sensitivity.
8. Set the value to "50" for the Delay. ("0" if the Frame Coil is used)
9. Slowly turn the Delay knob until the high frequency pitch becomes quiet. You may decide how "quiet" you like the base tone of the detector.
10. If the Delay is fully increased or decreased then you can use the Sensitivity knob to reduce further noise and disturbances

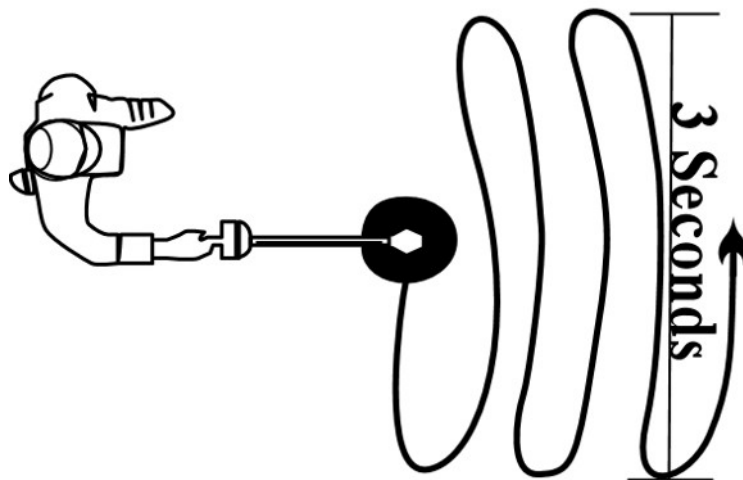
### 6.3 Calibration of Discrimination

After the unit has been ground balanced, the unit must be calibrated to discriminate between ferrous and non-ferrous metals. This is a very simple procedure:

1. Find a clear area that does not have metallic objects.
2. Push the "Calibration" button.
3. During the calibration process the monitor shows "Calibration".
4. Swing the unit level to the ground left and right until the monitor returns to normal.
5. Go over a piece of ferrous metal to see the "FE" indication on the screen.

### 6.4 Operation

The unit needs to swing slowly over the ground or area to be scanned. It is important not to change the height of the coil during the scanning procedure. If the unit is too close to the ground it is possible that the coil will receive feedback from the ground itself. If this happens, simply swing the coil a little higher above the ground.



*Illustration 6.1: Procedure for swinging unit from side to side*



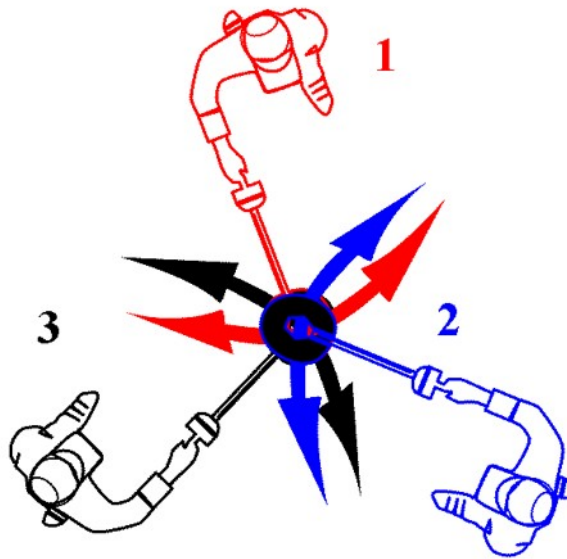
In illustration 6.1 is a description showing the approximate time required to sweep from one side to the next side.

Practice a smooth sweep of the search coil from side-to-side keeping the coil close to the ground throughout the swing. Each pass of the coil should take approximately 3 seconds from right to left, 3 seconds to return from left to right. Walk forward slowly. Take small steps no greater than half of a normal stride. Make sure each pass of the coil overlaps the last by at least half the length of the loop. Do not lift the coil at the end of each swing. Keep it close to the ground and at the same height at all times.

To become comfortable sweeping the loop does take some practice. Relax, loosen up and find a comfortable grip on the handle. Premature fatigue may result from gripping the handle too tightly, an improperly adjusted rod or elbow support, and limited body movement. Hold the handle loosely. Adjust the rod and elbow support for comfort and keep the elbow strap loose. Use your arm, shoulder and even your back a little to allow for a smooth even sweep of the coil.

## 6.5 Pin Pointing

Once an object has been found, move the coil off to one side of the target area and slowly swing the coil over the area until it beeps directly over the target. Make notes of the area where it begins to give an audio signal and where the signal begins to fade. Where the signal becomes stronger that is the point of where the edge of the anomaly is and where the signal begins to fade is the other side.



*Illustration 6.2: Example of how to properly pin point a target*

In illustration 6.2 we are showing the different positions that are necessary to properly pin point an anomaly. From "Position 1" sweep the detector over the anomaly, then go to "Position 2", repeat the process and then at "Position 3" again. When this is done from three different sides then you will know exactly how long and wide the anomaly is.

# CHAPTER 7

## **Optional Equipment**

Here you can find additional information on accessories that can compliment the basic kit. Keep in mind that the mentioned accessories are not included in the normal scope of delivery.

**16 cm Search Coil**



**Frame Coil**



**OKM Power Pack with charger  
and travel adapter**



**Auto Charger for  
OKM Power Pack**



### **Mounting Kit for Power Pack**



Please contact OKM or an authorized dealer for more information, accessories or support.

# CHAPTER 8

## Troubleshooting

In this chapter we will discuss frequently asked questions.

The most common problem is that the battery is low or in need of a charge. In every case, please ensure that the battery is fully charged.

Questions	Answers
Why do I have to constantly change the delay?	<ul style="list-style-type: none"> <li>• Changing the delay usually occurs after a strong signal is received or you accidentally change the setting.</li> <li>• There could be an area with higher mineralization causing the delay to be reset.</li> <li>• When the unit was balanced to the ground, it was either too low or too high above the ground.</li> </ul>
Why is it so hard to balance the unit?	<ul style="list-style-type: none"> <li>• The coil is directly on the ground as you are setting the delay and threshold.</li> <li>• You may be too close to an electrical appliance or motor.</li> <li>• Be sure your area where you are balancing the unit is clean.</li> </ul>
Why does it beep and there is no target?	<ul style="list-style-type: none"> <li>• Your coil is too close to the ground and it is receiving feedback.</li> </ul>
There is a target, then it goes away, why?	<ul style="list-style-type: none"> <li>• Check your ground balance, most likely you adjusted it in the field and have reset the unit and balanced it out.</li> <li>• The size of the item may be extremely small or it may lie just within the range of the detector.</li> </ul>
I hear a target, then I can't find it again, why?	<ul style="list-style-type: none"> <li>• The coil may be touching or just about to touch the ground and give a signal that there is an anomaly.</li> </ul>
I don't see anything in the display	<ul style="list-style-type: none"> <li>• Adjust the brightness of the monitor. If in direct sunlight put hand over display to shade it.</li> </ul>
I don't hear any tones	<ul style="list-style-type: none"> <li>• Check to make sure that the volume is loud enough and that there is a coil attached. If there is no coil then the unit will remain silent.</li> <li>• Check the coil to ensure that there are no tears in cable.</li> <li>• You need to ground balance the unit again, perhaps an adjustment knob was accidentally turned.</li> </ul>