



**ROYAL
ANALYZER**



**IMAGING SYSTEM
USER MANUAL**

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Dear customer, thank you for your purchase of our product. It is recommended that you read this user manual carefully to understand how the products are working and then to test it for gaining experience. This is a scientific and electronic device and it is required to follow all the instructions in the user manual.

We wish you success in your work.

ATTENTION! MUST READ IT BEFORE USING THE PRODUCTS

The information in this manual can be changed without any notice.

It is strictly forbidden to reproduce, copy, and distribute this user manual without the permission of the company BR SYSTEMS Detector.

General Information

ROYAL ANALYZER products should be used with great care as in electronic devices. It is required to pay attention to scanning head, main unit, and scanning sensor, to avoid impacts and hard objects, and not to use excessive power on the connectors.

Injury

When operated properly, Royal Analyzer products do not cause any injury or health problems. Royal Analyzer products, generally, do not pose any threat to the human body. Keep it away from children as you do for electronic devices.

Maintenance

All maintenances arisen from technical malfunctions are free for two(2) years starting from the date you purchased the product. For your service inquiry and questions, contact your seller. The unit is examined by a qualified technician and repaired, if necessary. The repairs after two years are charged.

In case you damaged or unbox the product, the warranty shall become invalid.



Your product is delivered to you in the mounted condition as shown below. Device main unit, Tablet PC belonged to the device, headphone, and charging adapter are given as part of delivery.



DEVICE CONTROL BUTTONS



With the help of the buttons on the joystick placed on the main hand-arm of the device, you can make choice in the menu.

ON/ OFF: Allows you to on / off the device.

BACK : In the main menu of the device, it allows you to go back to the previous menu.

OK : Allows you to do menu choice

DIRECTION KEYS : Allows you to change between menus with the direction keys.

START KEY Allows you to start an automatic scan and to sending signal continuously in manual scan

1 – OPERATION MODES

1.1 3D GROUND SCAN AUTO (3D SCAN AUTO)

You can scan 3D Ground Scan Auto mode in the main menu with instant data transmission in the PC program.

In order to prepare the device for automatic data receive, first, run the 3D Ground Monitoring Program.

Click the Program Connection Settings Button.



It will be asked from you to enter information about the field you will scan in the opened window.

In the part The Field to Be Scanned

1- Scan Order

= You are required to enter the number of lines to be scanned.

2- Step Count

= Enter Sample Number Enter a number based on the size of the field to be scanned.

3-Port Settings

= Choose the network port to be used in the Bluetooth connection with the Device

4- Operation Mode

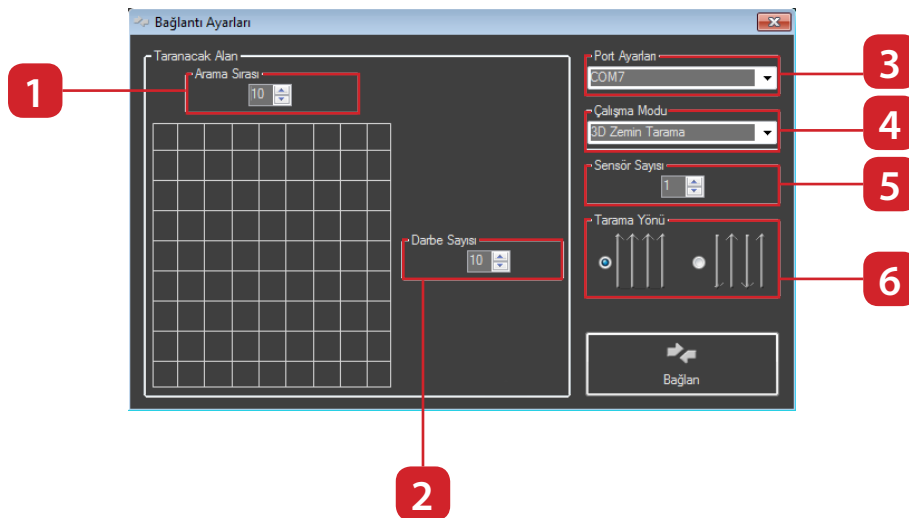
= You need to do your auto or manual scan in 3D Ground Scan mode.

5- Sensor Count

= Choose 1 as Scan Sensor count.

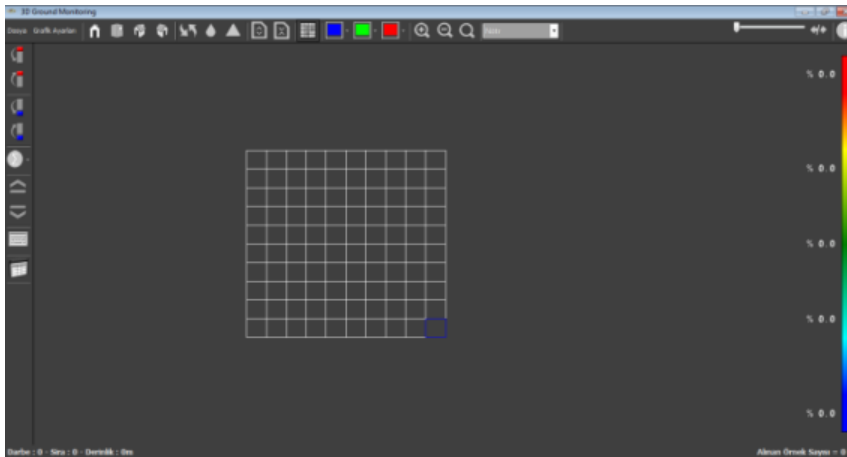
6- Scanning Direction

= Choose the direction you want to scan as PARALLEL OR ZIGZAG.

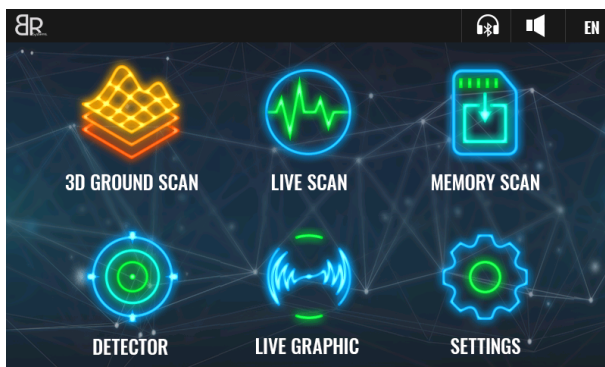


When you have adjusted the settings choose the CONNECT option. When the connection is made with the device, the screen below will be shown. The program will wait as ready to scan.

The squares on this screen are prepared based on your choice of blow count and scan count. Every square is equal to a signal.

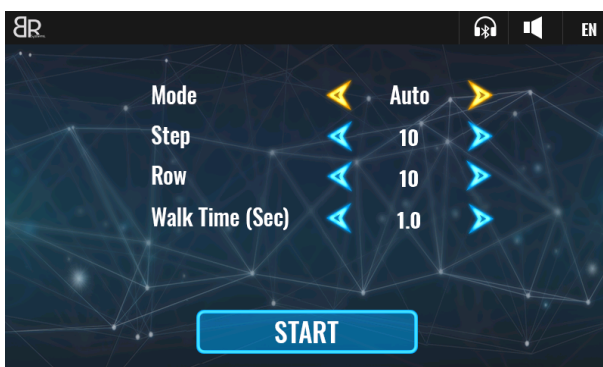


Select 3D Ground Scan from the operation modes in the main menu of the device.



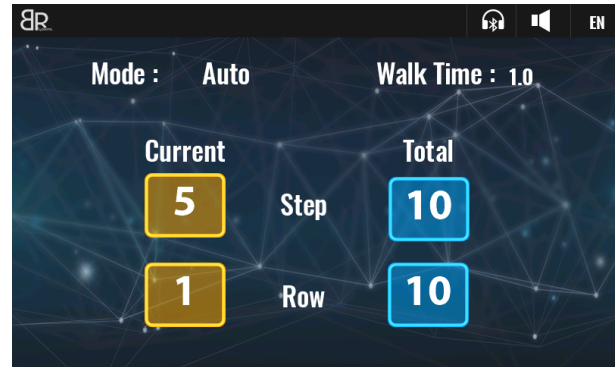
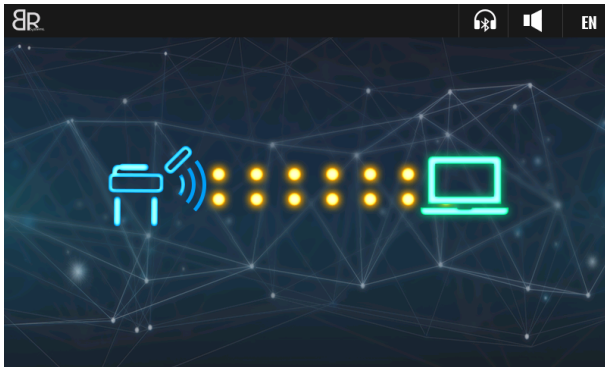
!! Select 3D Ground Scan from operation modes in the main menu of the device and click OK on the joystick.

If you select 3D Ground Scan, the screen below will be shown. In this screen, you will be asked to adjust scan mode (Auto or Manual), how many signals will be measured, how many lines will be scanned, and how many seconds will take the waiting time.



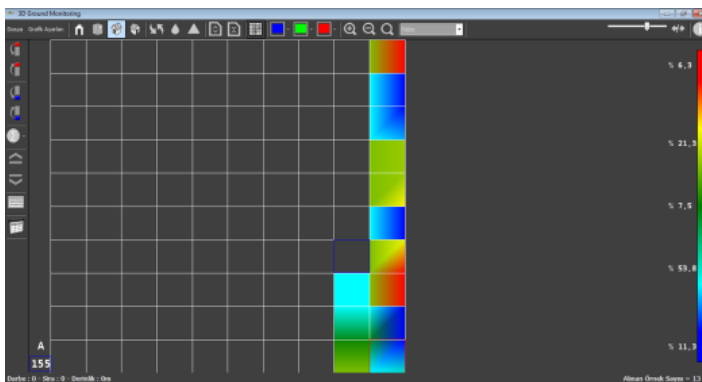
After you adjusted all the settings, select START and click OK.

PC and device will be connected. When the connection is done, click the START button from the joystick. Data transmission will start.

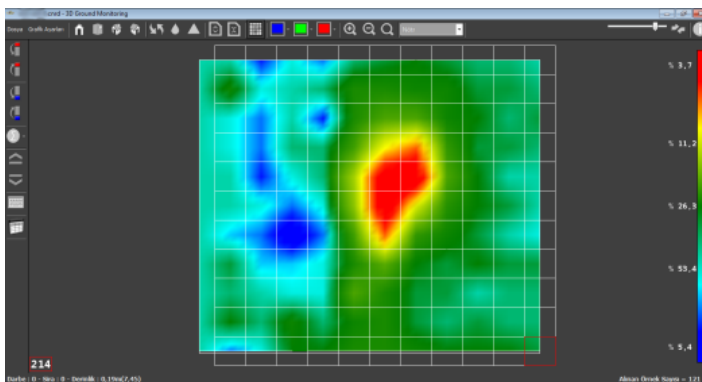


In the connection screen, you will be asked to click the Start Button. When you clicked START, data transmission will start automatically and data receive will continue in every signal beep as it is shown in the picture below.

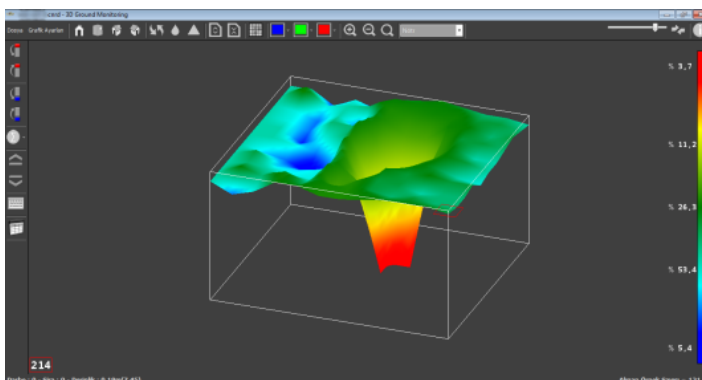
As is seen in the screen below, data will be acquired as grid. Data receive will stop when the order and blow count are met and all squares are filled with graphics. Then, our program will be 3D automatically.



First, graphics are acquired in the grid format.



When data receive is done, the software will make it 3D automatically. You can review the image below.



When you stop data receive, you can review data in 3D. For analysis of the data acquired, review the Graphic analysis part.

1.2 3D LIVE SEARCH

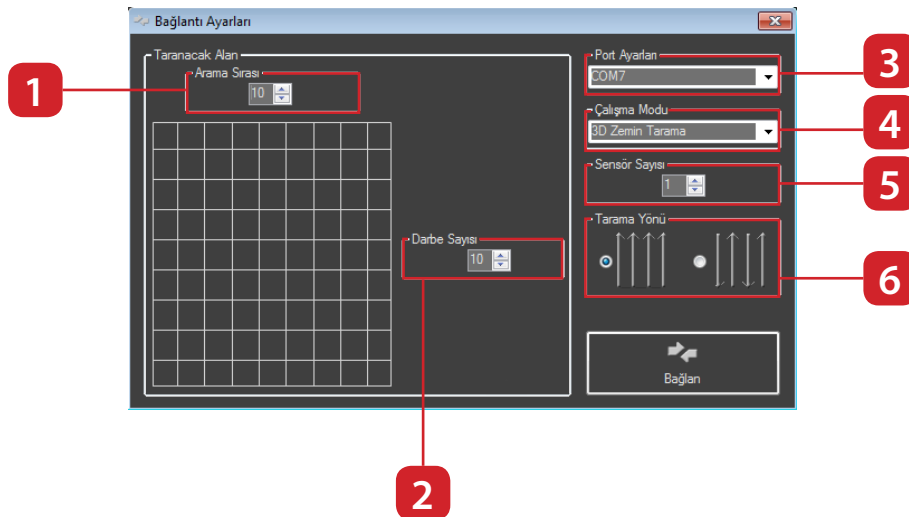
You can scan Live Search mode in the main menu with instant data transmission in the PC program. In order to perform the live search, the device battery must be at least 20%.

In order to prepare the device for manual data receive, first, run the 3D Ground Monitoring Program.

Click the Program Connection Settings Button.



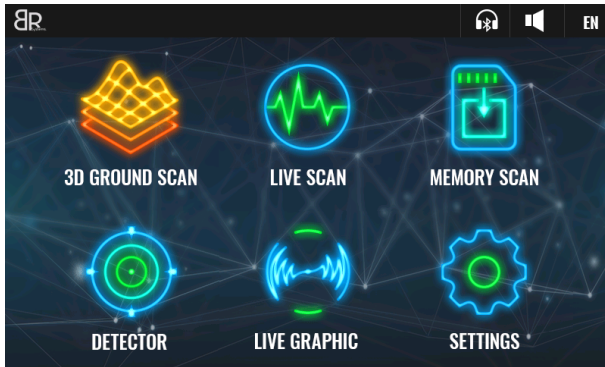
It will be asked from you to enter information about the field you will scan in the opened window.



In The Part Where The Field to Be Scanned

- 1- Scan Order = In live search mode it is in the passive state.
- 2- Step Count = Enter Sample Number. In order to get more frequent data in the live search mode, enter higher values.
- 3- Port Settings = Choose the network port to be used in the Bluetooth connection with the Device
- 4- Operation Mode = You need to do your auto or manual scan in Horizontal Live Scan mode.
- 5- Sensor Count = Choose 1 as Scan Sensor count.
- 6- Scanning Direction= Scan direction is selected as PARALLEL in accordance with your request.

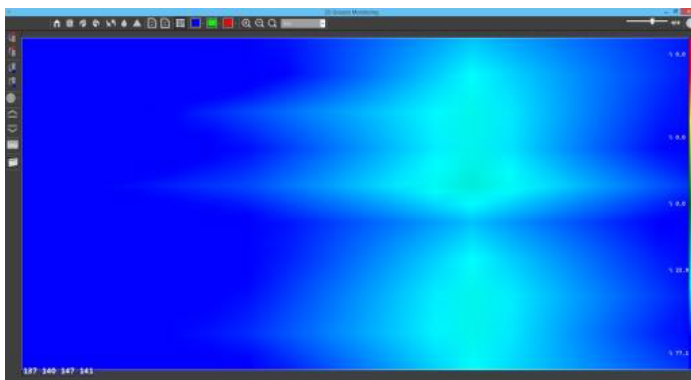
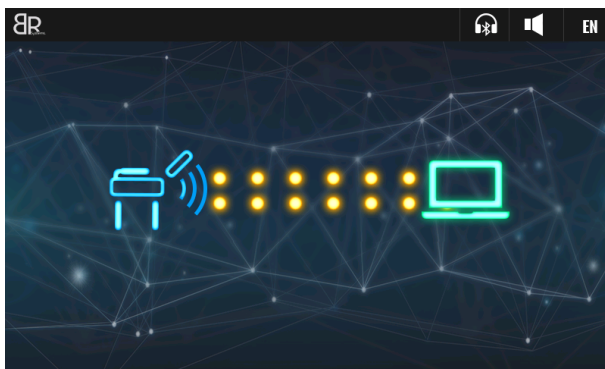
When you have adjusted the settings choose the CONNECT option. When the connection is made with the device, the screen below will be shown. The program will wait as ready to scan.



Select Live Scan from the operation modes in the main menu of the device.

!! Select Live Scan from operation modes in the main menu of the device and click OK on the joystick.

If you select Live Scan, the screen below will be shown. PC and device will be connected on this screen. Data transmission will start after the connection is made. In the Live Scan mode, data flow down continuously.

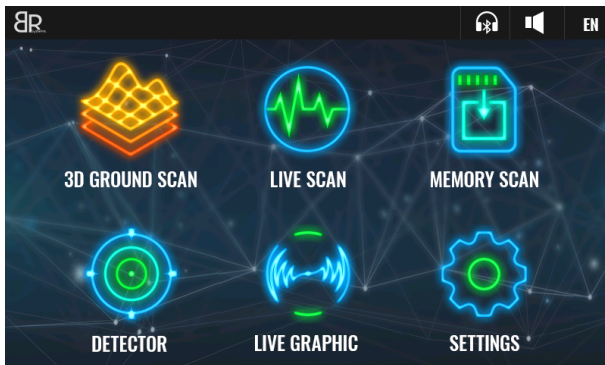


In the Live Scan mode, the graphic continuously flows. When you hold down the back button, the device goes back to the main menu and graphic transfer will stop.



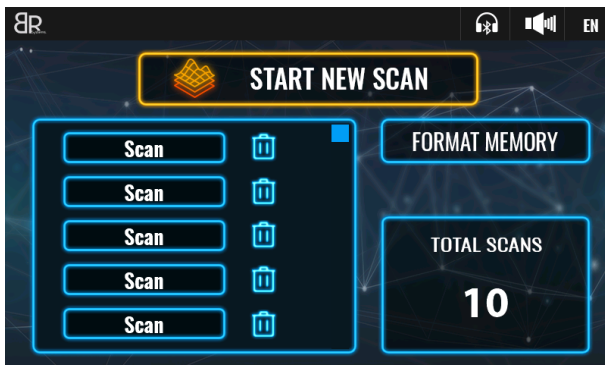
1.4 MEMORY SCAN FUNCTION

With Memory Scan mode in the main menu, you could save the acquired data to the memory without PC. Then, you could transfer the acquired data to the PC program. In order to use this mode, select Memory Scan from the device main menu.



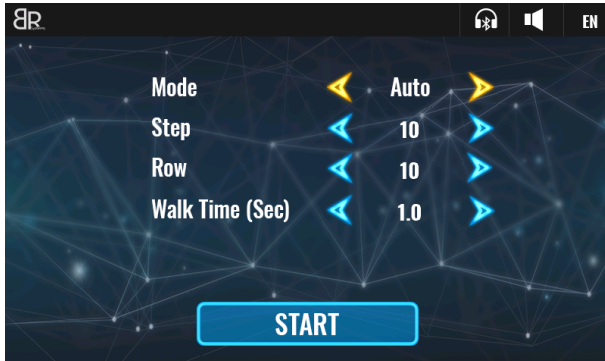
!! Select Memory Scan from operation modes in the main menu of the device and click OK on the joystick.

If you select the Memory Scan, the screen below will be shown. In this screen, you could save new data, transfer your saved data to the PC or delete it. In order to start a new scan, choose "START NEW SCAN" option.

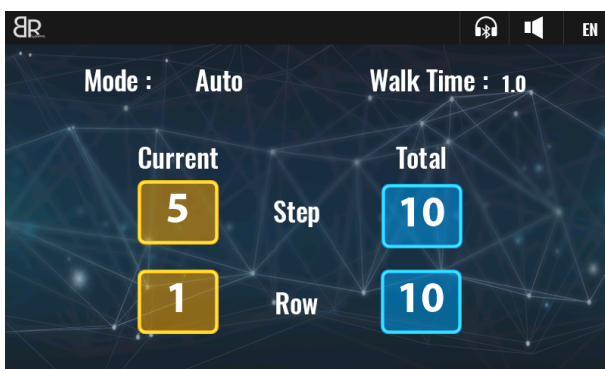




If you select New Scan, the screen below will be shown. In this screen, you will be asked to adjust scan type (Auto or Manual), how many signals will be measured, how many lines will be scanned, and how many seconds will take the waiting time.

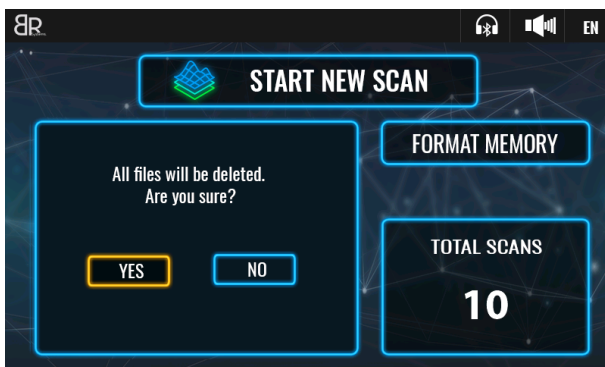


After you adjusted all the settings, select START and click OK.



In order to save data to memory, you could click START and initiate the scan. When the scan is completed or you terminated the scan by clicking the BACK button, the data will be saved to memory automatically.

The data you saved will be stored in the device memory. How much data you have in the memory is written bottom-right corner. Besides, saved data is shown on the left side of the screen.



2 - MEMORY DATA TRANSFER

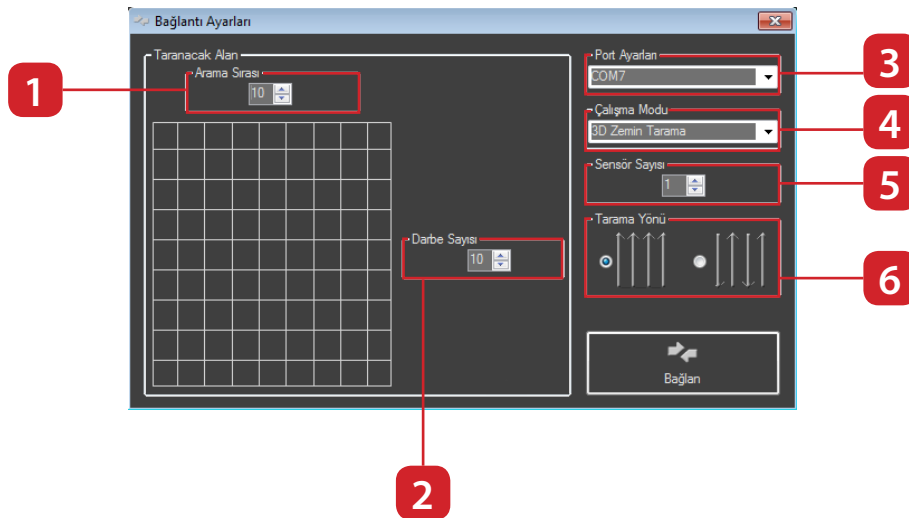
In order to transfer the saved data in the device memory, select the Transfer to PC mode in the device main menu. If you select this mode, the screen below will be shown. The sign (*) is shown across the memory which is full.

In order to prepare the device for data receive from the memory, first, run the 3D Ground Monitoring Program.

Click the Program Connection Settings Button.



It will be asked from you to enter information about the field you will scan in the opened window.



In the part The Field to Be Scanned

Scan Order = You are required to enter the number of lines to be scanned.

Blow Count = Enter Sample Number Enter a number based on the size of the field to be scanned.

Port Settings = Choose the network port to be used in the Bluetooth connection with the Device

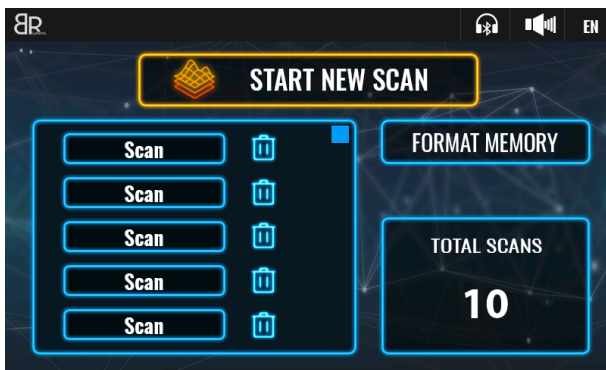
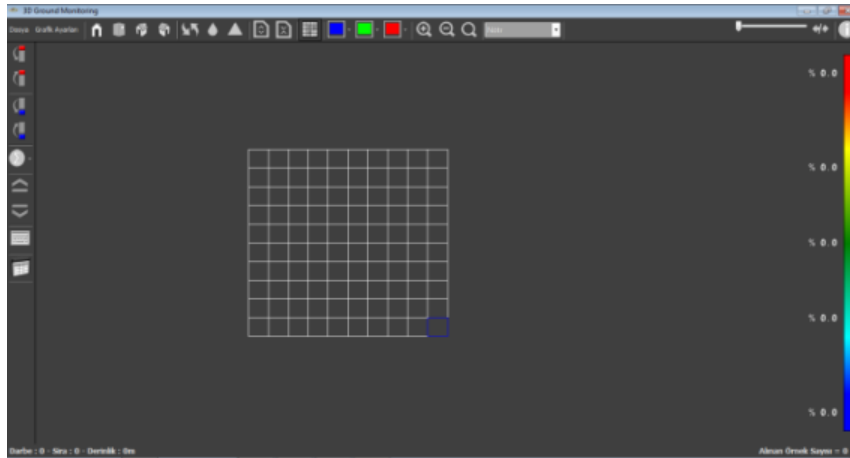
Operation Mode = You need to do your auto or manual scan in 3D Ground Scan mode.

Sensor Count = Choose 1 as Scan Sensor count.

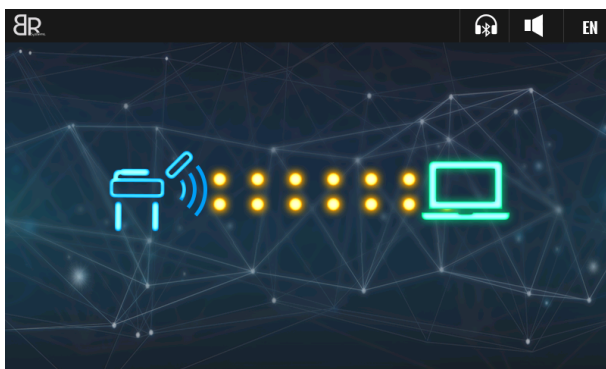
Scanning Direction = Choose the direction you want to scan as PARALLEL OR ZIGZAG.

When you have adjusted the settings choose the CONNECT option. When the connection is made with the device, the screen below will be shown. The program will wait as ready to scan.

The squares on this screen are prepared based on your choice of blow count and scan count. Every square is equal to a signal.

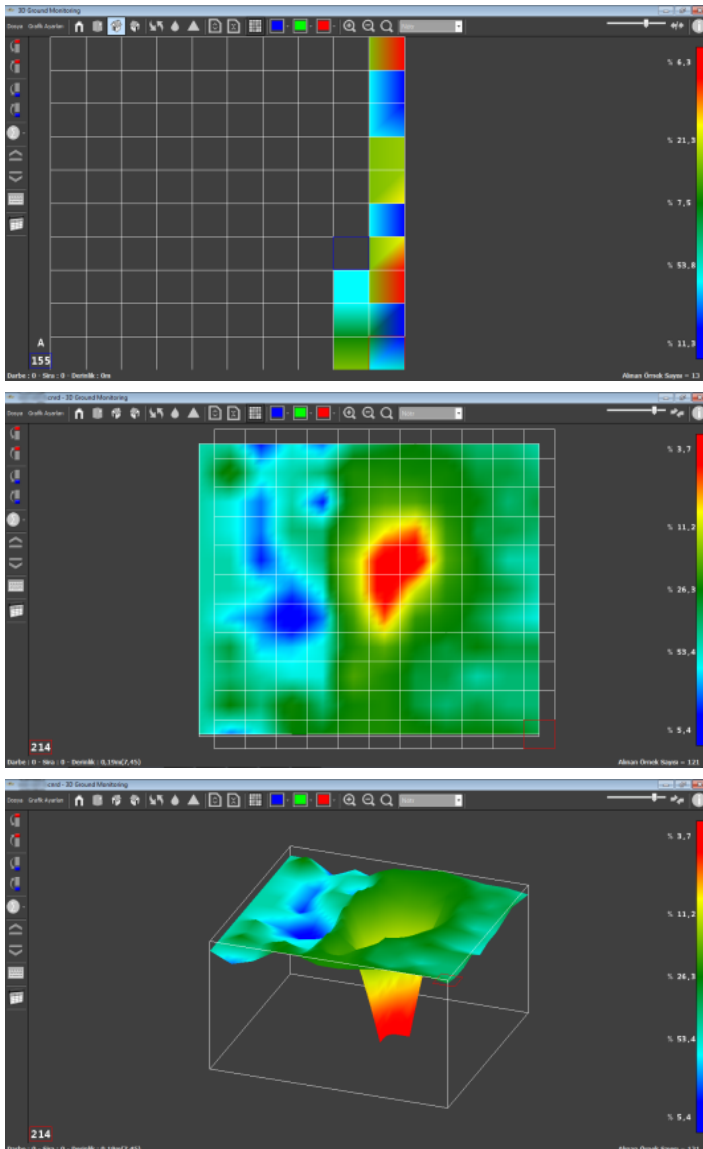


In order to select the data you want to transfer, go saved scans with direction keys on the joystick, select the file you want to transfer, and click the OK button. After the memory you selected, the screen below will be shown.



This will initiate data transfer.

As is seen in the screen below, data will be acquired as grid. Data receive will stop when the order and blow count are met and all squares are filled with graphics. Then, our program will be 3D automatically.



First, graphics are acquired in the grid format.

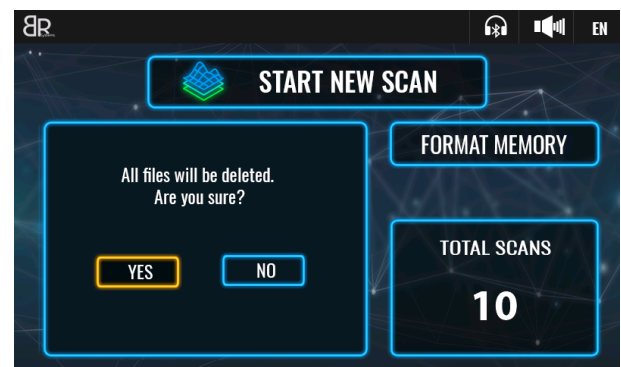
When data receive is done, the software will make it 3D automatically. You can review the image below.

In order to delete the saved memories separately, select the delete icon on the right of the data you want to delete and click OK. The selected data will be deleted.

In order to delete all the memory, select FORMAT MEMORY option.



If you choose to FORMAT MEMORY, a warning about all the data will be deleted is shown.

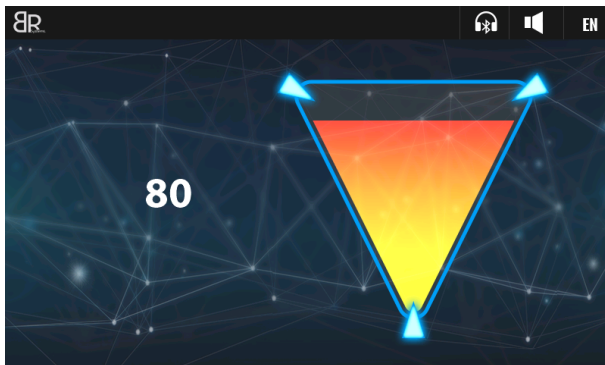


Yes and No options will be shown. If you click Yes, all data will be removed permanently.



3 – DETECTOR SOUND MODE

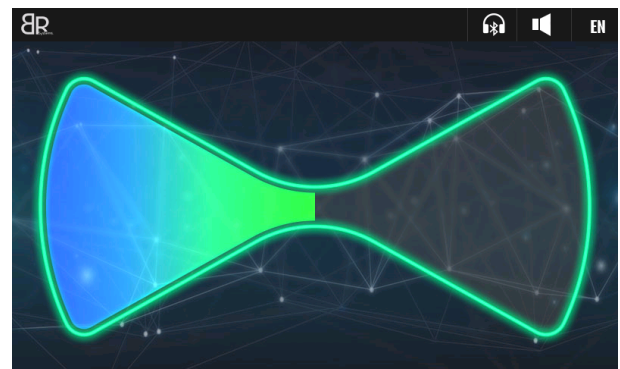
In the detector mode, all the metals are stimulated with sound. It can detect the metals with higher magnetization. If you select this mode, the screen below will be shown.



In this mode, all the metals are stimulated with sound. You could also see it as numeral.

4 – LIVE GRAPHIC MODE

In the live graphic mode, all the metals and structures like hollow, cave and tunnel below the ground are stimulated. If you select this mode, the screen below will be shown.

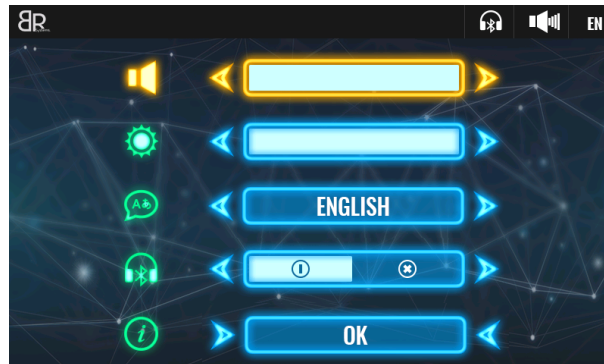


All metals are shown on the right bar. Structures like hollow, cave and tunnel below the ground are also shown in the left bar.



5 – GENERAL SETTINGS

In the general settings section, there are functions like adjusting screen light, general sound levels of the device, language and turning on/off the microphone.



You could adjust settings by selecting the one you want to adjust via right or left direction keys. You could adjust the sound and light of the device. The settings you have adjusted will be kept in the memory. Your device has 8 different language options;

When you select one of the languages among English, German, Spanish, Italian, Turkish, French, Arabic and Farsi, the language of your device menu will be changed. On the upper bar, the abbreviation of the chosen language is shown.

With the wireless headphone on / off function, you could connect a wireless headphone and in that case, the image of wireless headphone will be shown on the upper bar. In order to use the wireless headphone, you should make sure that it has enough battery.

You should turn on the headphone with full battery and wait for a couple minutes. When the connection is made, you will hear a “beep” sound indicating the headphone is connected. Now, all the sounds of your device will be transferred to the headphone.



6. GRAPHIC ANALYSIS AND INTERPRETATION

6.1 SCANNING AND MEASURING PREPARATION

In order for the computer analysis program to scan and analyze the measured values with the best results and least mistake, it is required to do scanning in the indicated way. Otherwise, there may be an analysis problem and your works may misguide you.

In EM Systems which is Electro-Magnetic systems, the products should operate with the working principle north-south. You should do your scanning in the north and south axis.

You should start scanning from the starting point (1) and finish at the ending point (2) as indicated in Image A. You could do your scanning as zig-zag or parallel.

If you finish a scanning line, the next one should be on the left of it. The measuring tool should not be rotated. North direction is recommended.



Image A : Scanning direction should start from 1 and end with 2.

More you repeat your scanning on a possible object, the more accurate results will you get. Thus, you could make your decision more accurately if it is a real object. The heat, other radio transmitters, solar energy, ground minerals, loose-structured ground, salt, water, etc... may affect the measurement results negatively. The sensor should be held in a vertical angle to the ground and not be shaken. Its height from the ground should be around 8 - 9 cm.



6.2 ORDER OF SIGNAL COUNT

There is no specific rule on the signal count. However, there are different views requiring attention. The length of the field you measured and size of the object you search can be given as an example. The most convenient distance between the two signals is 20 cm and 30 cm. Less distance between two signals, more accurate the simulated graphic. If you search for smaller objects, you should choose a small distance; if you search for bigger objects, you should increase the distance.

6.3 ANALYSIS AND THE EVALUATION OF THE MEASUREMENTS

You should gather information on the field you will do the measurement. For example; effective factors such as high-tension line, base station, electromagnetic pollution should be at least 100 m away from the operation field.

If there is an element required gathering the exact values for depth measurement, the object should be at the exact center of the graphic. In order to ensure your works, you should do at least threefold control. The data you acquired from the same place should be the same.

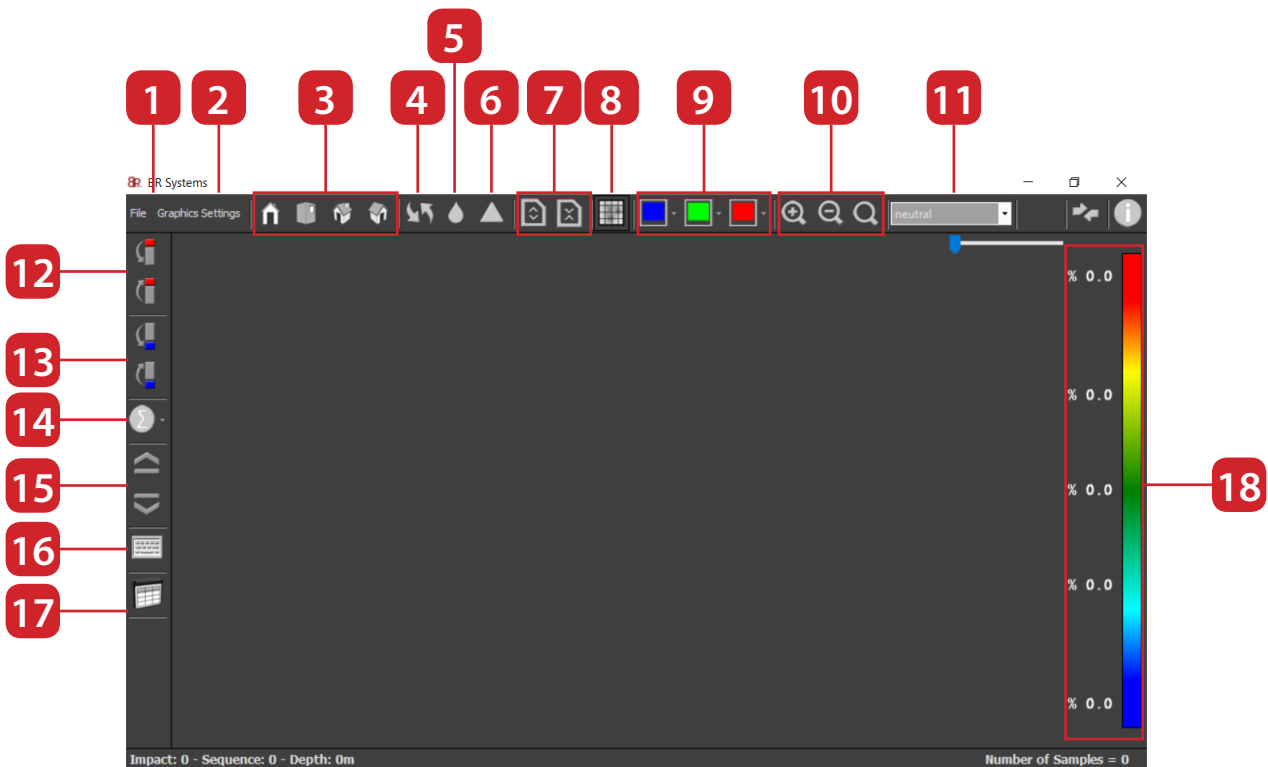
6.3.1 GENERAL INFORMATION ON 3D GROUND MONITORING PROGRAM

The minimum system requirements for 3D Ground Monitoring are listed below:

Operation System	:	Windows Xp,Windows 7,Windows 8
RAM	:	Min. 512 MB
Graphics Card	:	Min. 256 MB (OpenGL Compatible)
Disk Space	:	Min. 300 MB
Information Transfer(Interface)	:	USB, RS232, BLUETOOTH



6.3.2 MENU AND BUTTONS



- 1- Folder Menu. You could reach to New Connection, Saving, Changing Program Language, changing background color features on this menu.
- 2- On the Graphics Settings menu, you could adjust different graphic toning, graphic view, different color options like grid or raw data, filter options, and amplitude settings.
- 3- The buttons you could change the graphic view.
- 4- The button helps you to restore the changes made on the graphic.
- 5- The button blurs the graphic and erases the complications among the data.
- 6- The button sharpens the graphic and erases the complications among the data
- 7- The buttons for increasing and decreasing the amplitude of the graphic.
- 8- The button is used to view graphic in cage and grid.
- 9- The button helps you to put away Cavity, Earth, Metal data and to review them as one data.
- 10- The buttons help you to shrink, enlarge or restore the graphic to its normal size.
- 11- Earth menu where you can select earth type.
- 12- The buttons help you to increase or decrease the clarity of the tones in the metal data.
- 13- The buttons help you to increase or decrease the clarity of the tones in the cavity data.
- 14- Interpolation use button
- 15- The buttons let you move depth line up and down.
- 16- Virtual keyboard button
- 17- The button for reading numerical values.
- 18- The color bar on right helps you to see the values of the graphic in percentage. It represents metal, mineral, soil, hard soil and cavity percentages top to bottom.

6.3.3 EVALUATION OF THE MEASUREMENTS

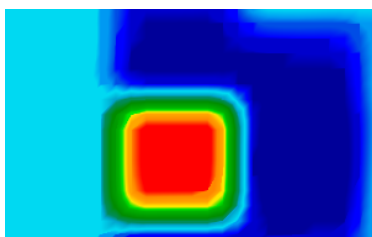
The meanings of the color when used standard colors:

Red	Metal
Blue	Cavity
Green	Soil
Orange and Yellow	Mineral

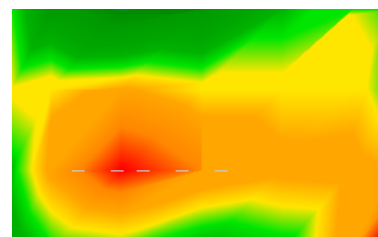
This information depends on the different color choices. At first glance, it may be hard to distinguish metal and mineral. In some measurements, you could also see the minerals as red. However, there are some differences between metal and minerals, the analysis reveals these differences. Some of the differences.

Indicating a special shape refers to the metal data (as square, rectangle, and circle) If there are significant orange and yellow toning around the object, it probably belongs to a mineral data. If the depth of the object is like 10 or 30 cm, the probability for it to belong a mineral is high. You need to gather and verify the same data on the repetitive controlling measurements. The samples for metal and mineral images are shown in the graphic below.

METAL	CAVITY	MINERAL
It has a specific shape	It has a specific shape	It does not have shape, scattered in the graphic
There are top-bottom structures in the graphic	There are top-bottom structures in the graphic	There is no top-bottom structure
Its color is red in the graphic	Its color is navy in the graphic	Its color is orange in the graphic
The graphic apparently continues downward, creating a plane	The graphic apparently continues downward, creating a plan	The graphic is generally scattered, does not create a plane
There is BLUE reflection in the graphic	There is GREEN reflection in the graphic	There is no reflection in the graphic



Metal Data

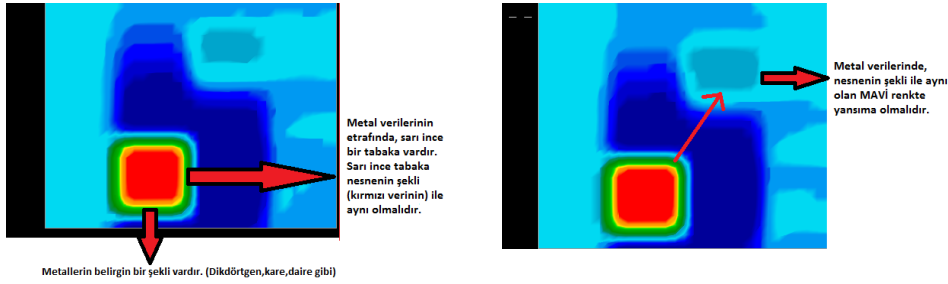


Mineral Data

METAL GRAPHIC

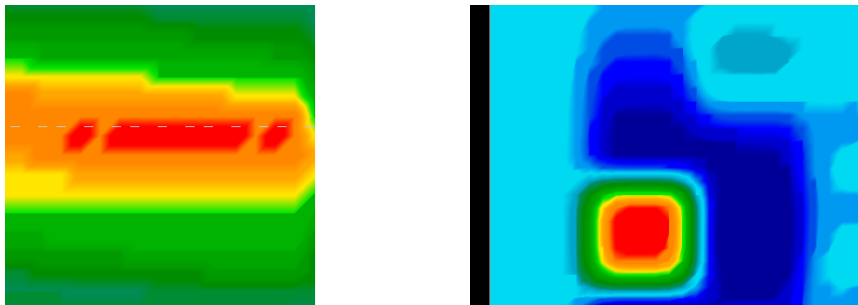
The sample graphic below is a graphic which was created as a sample, indicating a precious metal data found in the cavity. The information about the precious metals within a square-shaped metal box is given.

The real metal objects represent a specific shape. These shapes are the most important feature distinguishing metals from the minerals. In the adjacent graphic, the metal in a cavity is seen and it is square-shaped. There is a thin yellow layer encircling the red square, this should be present all the metal data. The yellow layer should give the same shape of the object in red.



When metal inquiry with F7 and cavity inquiry with F6 was done, there should be a reflection in BLUE representing the metal object (The data is acquired with north and south magnetic poles) There is no reflection in the minerals.

In order to distinguish precious and worthless metals; Both precious and worthless metals have the same features shown in the graphic (reflection, cavitation, thin yellow layer, top-bottom structure). The precious metals preserve their red color and there is nothing more than a yellow layer encircling them.

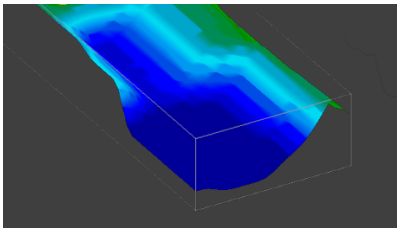


Precious Metal

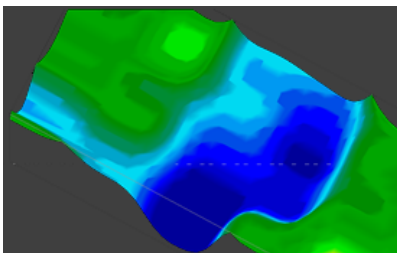


CAVITY DATA GRAPHIC

All features explained until now are the features of the metal data. The cavity data also has the same specifications. In the cavity data, the graphic should move up and down (cavitation), and there should be top-bottom structure. However, the color of cavities (room, grave, tunnel, etc.) is BLUE. When the graphic is examined, it is seen that there is a THIN LIGHT BLUE layer whose shape is the same as the BLUE layer. In addition, when north-south pole is taken, it (its reflection) is GREEN.



In the adjacent graphic, there is an image of a room. As it was explained above, there is a thin LIGHT BLUE layer determining the shape of the cavity. It creates TOP and BOTTOM structure. The graphic continues towards the bottom (cavitation).



In this graphic, there is a cavity image again. On the left, the reflection of the cavity is seen in green shapes.

The cavity data is the same as those of metal objects. They have the same specifications. While there is a thin yellow layer around the metal object, cavity data has a thin light blue layer around it. The reflection of metal is blue, while cavity data's is green. In cavity data, it is possible to define the cavity by measuring depth, width, and height (as grave, room, tunnel). Since the metal data was explained in detail and the cavity data has the same features, it is not required to explain it more. For the subjects you find insufficient in terms of explanation, please contact our experts.



DEPTH MEASURING IN THE GRAPHIC

In order to do depth measuring in the graphic, the data belong to the object you are searching must be at the center of the graphic. If there is data on edges, you should center it and do a control scan again. There is a slight margin of error in the depth measuring (like 0.50 cm). In order to minimize the errors, you are required to know the soil type where you conduct research. You are required to choose soil type from the soil options menu.

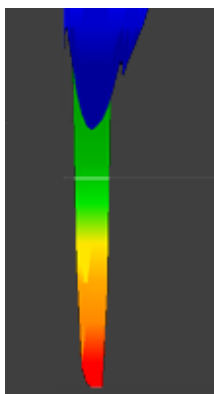


Soil type choice menu

If you do not know the exact type of the soil being measured, you should do depth calculation before saving the graphic data you gathered. Stop the data receive from your device and do the necessary analysis. After the analysis, change your visual to the air view. With right - left / up - down direction keys on the keyboard, place the depth measurement lines at the very center of the object on the screen. You could see the depth from the depth indicator bar.

Detailed Depth Measurement of The Object

In order to get the detailed depth measurement of the object in the graphic, use the lower the depth line button in the program by changing the graphic to the horizontal position. Using up-down depth button, you could acquire the total measurement of the object between top - bottom structure.



In case you use the lower the depth line button, the depth line will move downward. The bar showing the depth (Depth) will give the meter numerically. When you are on the starting point of the object (the point where red color starts) you have reached the top of the object which is embedded. When you move the depth line bottom of the object, you would learn the total measure of the object.

