

# SD-400 Metal Detector

## Operator's Manual



## **Brief Introduction**

This unit, the SD-400 Metal Detector, as a result of applying of the advanced technology, refined design and sophisticated foreign units, is of quite depth of detection, accurate identification's capability and convenience of operation. It is a new example of the modern technologies. The metal detector is Primarily used to detect and identify the metal objects buried in the earth; its applicable scope besides in the military affairs as follows:

1. In customs, airports, ports etc for safety check-up.
2. In police stations, courts for detection and search.
3. Checking the metal objects in parcels and luggage.
4. Detecting the metal concealed in the materials, food and fuel.
5. Detecting iron, mine, or in the archaeological search.
6. Detecting wires, tubes beneath the earth.
7. Searching for the jewelry and metal cultural relic, buried beneath the stratum.
8. Recycling the used metal.

While operating the old detector, it would be affected inevitably by the ground: the signal of the instrument will change as the distance between the head and the ground changes. If the earth surface is uneven, the signal will change more greatly. Operator will hear that the signal sounds all over: thus he cannot make sure of the accurate location of the target. It is called effect of mineralization.

The reason for the effect is that various kinds of mineral in the soil cause metal detector to give signal. In the place where the geologic conditions are complex, the very strong effect of mineralization will cause the larger signal than the metal signal. Thus, it's very hard for operator to identify whether the signal is of the metal or of the effect. The SD-400 metal detector has been equipped with advanced ground balance system, and it is very effective in eliminating the effect of mineralization. Thus the instrument will sound the signal only when meeting metal, the depth and precision of detection is enhanced enormously

## **Main Specification**

Maximum depth of detection: 5 M

Operate mode: “ground Balance ”/ “Discriminate ”

Oscillate frequency: 533KHZ+/- 2KHZ

Power consumption: 455HZ+/-10HZ

Power consumption: 2W

Power supply: 12VDC

Weight: 4kg

The depth of detection of the instrument has much to do with the surface area, shape and quantity of the target detected. Generally, the larger area is and more quantity is, the deeper depth of detection is. The maximum depth of detection mentioned above is in regard to a aluminum plate  $60 \times 60 \times 1$ (cm) buried in dry soil.

## **Explanation of Controls**

### **1. Tuner Button**

Beneath meter there is a push button, which may be called memory button.

As long as press it once, the memory circuit will be activated, and put down the environmental conditions of the place being searched. For example, when search head is over soil, the instrument will give the soil's signal, if depress the push button at the moment, the signal will be eliminated. It is thus clear that this button should not be touched near metal object, for fear that the instrument would fail to detect metal in case it comes across another metal object again. Were the button pressed and held in, the unit would always be in a state of memory, therefore, there would be no response to anything.

Before any control is adjusted, the push button should be depressed and held in till the adjustment is finished. Owing to change of environment, meter needle may be deviated from zero position. If you press and release the button once at the moment, the needle will return to the zero point. While searching the push button is always pressed and released from time to time.

Whenever the button is depressed, two battery indicator lamps will glow brightly if the strength of the batteries is good. In the event that either indicator lamp is dim or dark, it is necessary to replace the old cells with the new ones.

## 2. Tuner Dial

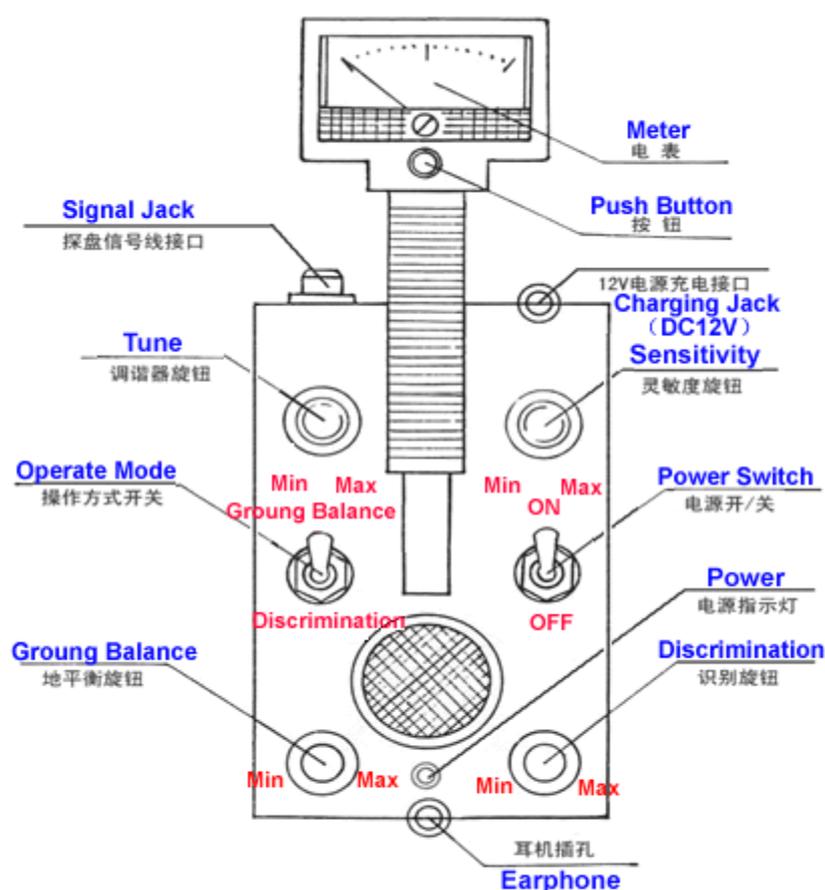
When detecting, tuner control should be set properly. If the dial is turned clockwise, the sound of instrument will increase gradually from silence to sound and from weak to strong. While searching, a slight background sound should be heard continuously. The slight background sound is commonly called “threshold”. What we are going to do is to adjust the dial for a very faint, barely audible hum. Generally, the lower the threshold sound level can be set while still hearing a slight hum, the better. The detector will present its maximum operating sensitivity only if it is adjusted to thus faint threshold sound.

When adjusting threshold, the push button must be pressed and held in till the optimum point.

Whenever any of change of threshold sound happens while searching, press and release the push button immediately to reset the threshold.

## 3. Sensitivity Dial

The dial can control the sensitivity of the instrument. By turning the dial counterclockwise to the end, the sensitivity is reduced to the lowest; depth of detection is also shallow. If the dial is turned clockwise, the sensitivity



will increase gradually, at the right end the sensitivity is highest, the depth of detection is also maximum.

Certainly we always hope the detector has a more depth capability, however, be sure not to neglect the effects of mineralization. In heavily mineralized ground, if the sensitivity is increased, it will cause a false signal, the instrument sounds everywhere, as a result nothing can be detected. When coming across such situation, we should decrease the sensitivity properly so as to reduce the effects of mineralized ground on the instrument. In the place where the soil condition is homogeneous and there are no junk items, the sensitivity may be set to the highest and so the instrument would achieve its maximum depth of detection.

Note: whenever the sensitivity dial is adjusted, remember to press and release the push button.

#### **4. Ground Balance Dial**

Owing to the effect of mineralization, as long as the search head is close to the ground, the old detector will cause a signal; and when it sweeps over an uneven ground, the variation of the spacing between the search head and ground may also make the change of the threshold tone, consequently, operator can't distinguish the metal signal from the effect of mineralization. In order to solve this problem, a circuit of ground balance to neutralize the effect of mineralization has been designed for the SD-400 metal detector.

When you want to search using ground balance mode, first turn the operate mode selector switch to the ground balance position, then adjust the ground balance dial.

If the ground balance dial is set to "10", lift the search head off ground and adjust the detector to its threshold, then lower the search head to the ground again, volume of the instrument would increase. If you set the dial to "0" and repeat the procedure mentioned above, volume of the instrument would decrease. It indicates within the full scale of the ground balance dial the volume would be enhanced at one end and weakened at the other. It is thus evident that there must be a scale reading at which the threshold sound wouldn't change between air and ground. This is the

ground balance point, which we want to. Procedure as follows:

- a) Set the operate mode selector switch to ground balance position.
- b) Raise the search head approximate 60cm from ground, adjust the tuner dial to the threshold sound.
- c) Lower the search head approximate 20cm off ground. If the threshold tone increases, then raise the search head (approximate 60cm) and turn the ground balance dial slightly counterclockwise, lower again the search head to the ground while listening to the threshold hum. If the threshold tone still increases, repeat this procedure till the threshold tone remains unchanged, whether the search head is raised or lowered. If the threshold tone decreases, turn the ground balance dial clockwise and try again. This procedure needs to be repeated till the tone changes little or not at all.
- d) If you have any trouble adjusting the ground balance dial to a constant threshold, you may be over some metal. Move to another spot and repeat the above steps.
- e) Remember to press and release the push button whenever the search head is lifted and the ground balance dial is corrected.

After the ground balance dial is set properly in the manner described above, the signal caused by mineralized ground will be cancelled largely. Therefore, the search head may move along the ground at will and gives no longer signal except meeting with a metal object.

## **5. Discrimination Dial**

The dial works in conjunction with discrimination mode. Before it is set, the operate mode selector switch should be turned to discrimination position.

The discrimination control allows the user to selectively interpret targets within the range of the dial from “1” to “10”. Setting the dial at different scale can choose different target signal. With the characteristic we can distinguish ferrous metal from nonferrous metal and also can tell the large from the small in the same kind of metal.

If the dial is set to the left of “2”, the threshold sound will increase for ferrous metals and decrease for nonferrous metals. If the dial is turned to the right of “7”, then nonferrous metals will get the threshold increase and

ferrous metals decrease.

If the target discriminated is an iron plate, then following phenomenon will appear: when the search head is drawn to the edge of the plate, the response of the detector is the same as a ferrous metal object, however, once the search head is over the target, the response is similar to a nonferrous metal object. In this case you can not only determine it is an iron plate, but also estimate its size.

Another function of the discrimination dial is that in the same kind of metal it can distinguish between the large and the small. For example, there is a five fen coin buried in the ground and we use the discrimination mode to look for it, first we turn the discrimination dial clockwise from left to right (remember press and release the push button), then move the search head over the coin to get a signal sound. After several times correcting, we would find a point on the discrimination dial at which the signal sound is faint barely heard. This point is the coin's detection point. If the discrimination dial is set to the point, any nonferrous metal target, which is larger than the coin, will produce a sound, and all that smaller will be eliminated.

Note: Remember press and release the push button each time the discrimination dial is corrected.

## **6. Operate Mode Selector Switch**

The mode switch has two positions, ground balance position and discrimination position.

In the ground balance mode the instrument responds to all metals and gives sound. True, the ground balance mode has no function of discrimination, but it can eliminate the effect of mineralized ground. The instrument will have adequate see-through capability, work stable and indicate accurately, on condition that the unit had been ground balance already. Therefore, at beginning to detect somewhere, we used to use the ground balance mode.

Discrimination mode is used in cooperation with the ground balance mode. Normally, we use the ground balance mode at first, once a metal is found, we replace the mode with discrimination mode to identify the kind

of the target, or to select the large and valuable object in some place where there are a lot of junk items.

### **7. Power Switch**

After detecting, Remember turn off the power button, then turn off the power.

### **8. Charging Jack (DC12V)**

When charging battery, the charging light on device will lighting. First charging time over 12 hours is better, after, charging time is 6-8 hours. when the charging light changed from RED to GREEN, means charging is finished.

### **9. Earphone Socket**

The SD-400 metal detector is fitted with an earphone socket. Once the earphone is inserted into the socket, speaker of the unit will be automatically turned off. Operator can hear the signal sound from earphone so as to detect in ambient noise or in the night.

## **Metal Hunting**

Insert the battery A and battery B into the unit, and then turn on the power switch. Please take notice of meter at beginning of turning on. The meter needle generally isn't at middle but inclined to one side. It may go back to the middle for the moment provided that press and release the push button, but it might again lean off slowly. This indicates the instrument remains unstable and can't be used at once. You may press and release the button again and again; the meter needle will deviate no longer after a while. It is normal. There remains a short preheating time for the unit after it is turned on. During the course of preheating the search head should be lifted off ground and stays in the air till the meter needle reset to zero. Operator should also take notice of power indicator lamps at the moment when the button is depressed. If either of indicator lamps is dim or dark, then replace the battery, which is indicated.

The unit has been provided with two search head, one large, and one small. It works stable and locates accurately but the depth of detection is

shallower when using with the small one. If use with the large one, the instrument may attain to the maximum depth of detection, but stability is poorer.

New hand is apt to seek blindly after the depth of detection. As soon as detection is brought into action, he plugs the large search head, as a result of complex geological structure, the instrument sounds everywhere and on the contrary, nothing can be ascertained. We recommend that the small search head should be used at beginning under general condition, especially in the area where there are quite a lot of junk items. The large search head will be used only if under such conditions as the soil of the area searched is homogeneous, free of junk items in the surface stratum and the target detected was buried all too deep.

The SD-400 detector's operation is like that of engineer detecting a mine, operator holds the handle of detector let search head pass slowly along the ground. While searching, the space separated between search head and ground should always be about 20 cm, as far as possible, don't allow the space to alternate now large and now small. Once a target has been found out, the instrument will sound and meter needle will slope toward one side at same time.

Note: Since the instrument has been installed with automatic tracking system, once a target is found the system will track automatically the signal of the target and make the signal sound die away gradually and meter needle also come back to zero point slowly. Therefore, search head doesn't be staid over the target too long. In order to confirm the target is present once again, operator can move the search head away from the target, press and release the push button to reset the threshold sound, and then detect it once more.

Metal objects carried with operator may affect detection. When searching, operator should remove any ring, watch, or jewelry, metal belt buckle, metal cigarette case and so on you may be carrying with. Besides, operator can't wear leather shoes with nails. It would be best to wear cloth shoes or plastic shoes.

## **1. Ground Balance Mode**

Turn the operate mode selector switch to ground balance position and get the instrument to be set in the ground balance operate mode. In the mode the instrument has ability to neutralize the effect of ground mineralization as well as adequate see-through capability. Therefore, it is often the first choice mode whether indoors or outdoors. Only after some metal had been discovered, was the discrimination mode used to identify the kind of the metal. In ground balance mode the instrument will sound and meter needle will deviate from zero point as soon as the search head is moved over any kind of metal target.

Operation proceed as follows:

- a) Turn on power switch.
- b) Turn operate mode selector switch to ground balance position.
- c) Lift search head about 60cm from ground, press and release push button several times to let instrument preheat for a moment till meter needle resets to zero and no longer deviates.
- d) Adjust tuner dial to its threshold sound.
- e) Properly set ground balance dial as mention above.
- f) Search head should be passed along the ground in smooth even swings, and note to keep the space of about 20cm separated between the search head and ground.

## **2. Discrimination Mode**

The mode can distinguish ferrous metal from nonferrous metal and also can eliminate the small metal object while choose the large one in the same kind of metal. The mode has no function of ground balance; operator must be prudent in using.

Operation proceed as follows:

- a) Turn on power switch.
- b) Turn operate mode selector switch to discrimination position.
- c) Preheating.
- d) Adjust tuner dial to threshold sound.
- e) To distinguish between ferrous metal and nonferrous metal:

Set the discrimination dial to the left of “2”, ferrous metals (iron, steel) will make the threshold sound increase, while nonferrous metals (gold

silver, copper aluminum) decrease. If the dial is set to the right of “7”, then nonferrous metals will make the threshold sound increase, while ferrous metals decrease.

If the target identified is a plate of iron, when search head is drawn to its edge, the response would be the same as the ferrous, however, after the search head has been moved over it, the response would be like the nonferrous.

f) To eliminate the targets undesired:

If the place detected is indoors or ruins, there must have been a lot of abandoned metal miscellaneous things there. In general they are quite useless, and should be eliminated when detecting. For example, when searching on an area where a lot of waste nails are all over, the nails signals are heard from place to place, consequently, it will bring a great inconvenience to the detection. In this case operator can put a nail on the ground, then let search head pass over the nail. If the threshold sound increase, press and hold in the push button, turn the discrimination dial slightly towards right (clockwise), release the button and pass the search head over the nail once again. In the manner like this to adjust the discrimination dial repeatedly till the threshold sound is just unchanged when the search head is passing through the nail. After the instrument is set already in the manner mentioned above, the unit can no longer respond to the nails buried and the ferrous metal objects smaller than the nail, still all the nonferrous metal objects and ferrous metal objects larger than the nail will get the unit to sound.

### **3. Practical Example**

Previously we have presented two operate modes. In actual detection operator should give a choice between the two on the basis of specific circumstance. Sometimes it is necessary to use the two modes alternatively

Far example, you are going to hunt an old house for the buried deeply things left behind by predecessors. It goes without saying that there must also have been a lot of various abandoned scraps (such as nails, copper wire, old locks, scraps of iron pot and so on) in the ground. These things

are generally in the surface, and so they are close to the search head and their signals naturally are strong. In order to eliminate these wastes material while detecting the target buried deeply, which mode should be adopted? It all depends on the accuracy of the information. If it is merely said that there might be something buried there, but it isn't sure, you may use discrimination mode; set the discrimination dial at the point where nail is eliminated, then sweep along the ground grossly. If here is something buried which is ferrous metal object bigger than a nail or nonferrous metal object, the instrument will sound out, but this mode can't eliminate the effect of mineralized soil and so the result of detecting is inadequately accurate. If the information is quite sure and it is even the burial himself or eyewitness who guides operator to the burying scene, the ground balance mode must be used. First of all, we should remove all metal furniture out of the room, then insert small search head, slightly decrease sensitivity and carefully set ground balance control. Whenever a metal object is found while searching, it must be dug out and in this way most waste metal miscellaneous things in the surface will be taken away. Under the circumstance of the surface having been cleared we replace the small search head with the large one to search toward depth. Detection is one of careful and difficult work. Operator is required to be patient, confident and willful. Detector can't show perfectly clearly the metal object buried and merely predict most likely the target position. To pinpoint accurately desirable target, operator also is required to have rich experiences and with the ability to make right judgement on the basis of analysis of instrument's response.

## **Prospecting**

Nugget hunting, that is like coin hunting, is done with ground balance mode. Most gold is found in heavily mineralized areas; therefore, ground balance must be adjusted carefully in advance.

Alluvial gold ore is a mixture of fine grit nugget or flour



gold and sandy soil. It is always accompanied with the deposit of heavy metal ore. The signal produced from the mixture is like that from ferrous metal, however, the mixture's response would be rather weak and give the response over a much large area.

With the SD-400 metal detector we can also sample ore: lay the unit on a non-metal support, adjust to its threshold sound, then bring each of ore samples toward search head and determine its content according to the audio signal intensity. Always remember to press and release the push button after each ore sample is tested. The technique of measuring metal content is very useful for separation of vein gold ore or measurement of tailings left in old mine. Some of miners often only save the ore that contain visible gold and toss the rest aside. In fact some of the abandoned are still contains gold.

With other ore, some signals are strong, some response less. Operator can use a standard ore sample to test, notice how the signal is, thereby differentiating the ore from ordinary rock.

## **Cautions**

1. If the instrument can not run correctly and the sound cant't be decreased after increasing,it shows that the power of the battery is not enough,please recharge it in time.
2. when adjusting the detector, please press the button for some seconds. After finished adjustment, loose the button.
3. Please don't push any button when the detector is above metal. When detecting, please do not press the button.
4. The metal detector is using high quality rechargeable Li battery, lifetime is over 2 years. when changing battery, please pay attention to the power terminator, and make sure the terminator's anode & cathode is correct setting.
5. If the instrument can't keep the "Critical Sound",it shows that the instrument has malfuncation.It is necessary to send it to our company for repair.

