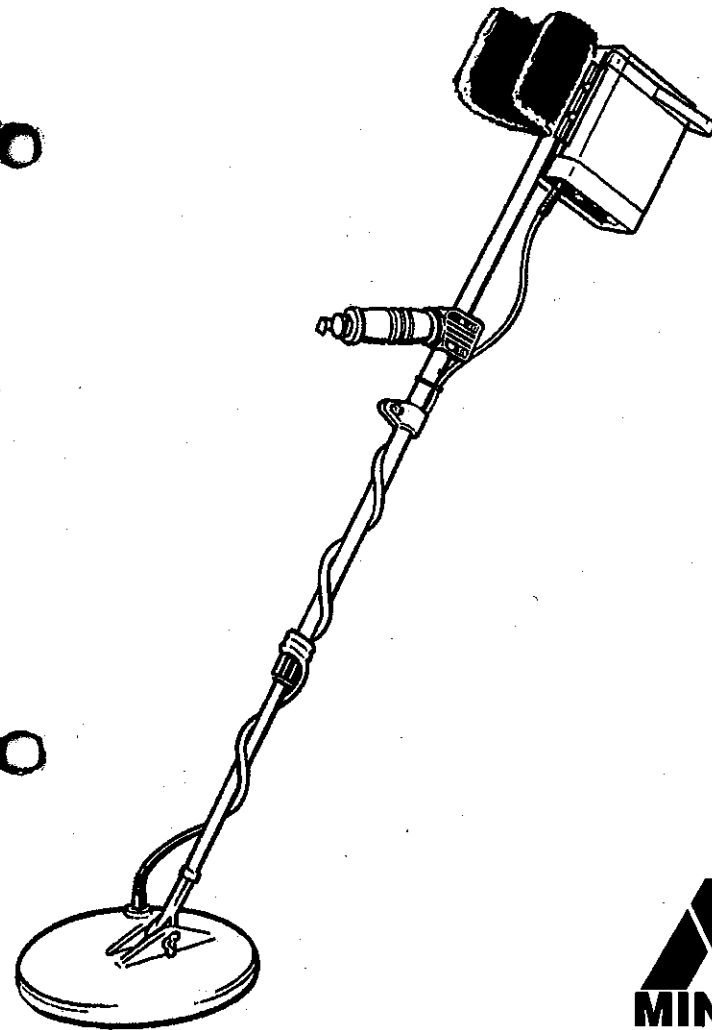


The Minelab *SD 2200D*

With Discrimination



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INSTRUCTION MANUAL

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WARNING

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1. Introduction

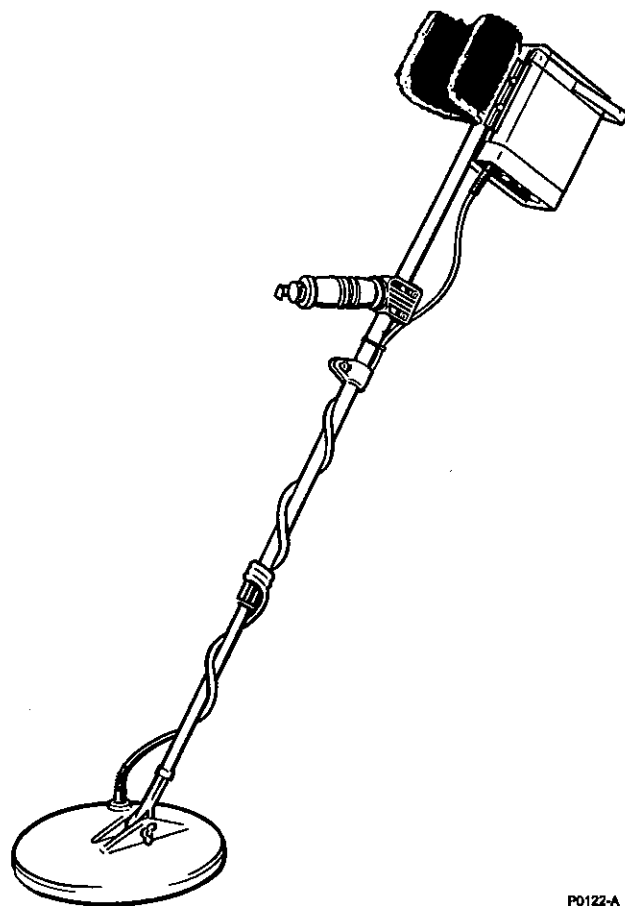
The *SD 2200D* has been developed by improving and redesigning the SD2100 technology to incorporate a number of new functions including two discrimination settings, automatic ground balance, audio boost control and auto tuning control. Minelab is confident that you will find this detector to be the finest available for the detection of metallic objects in highly mineralised environments.

The *SD 2200D* can 'see' deeper than any conventional detector available on the market. Its simple operation means that the beginner and professional will find it easy to use. Its superior ability to cancel mineralisation using automatic ground balance, as well as discriminating between ferrous and non-ferrous items, makes this machine easier and faster to use than ever before. It will re-open old gold fields where mineralised (or 'hot') ground and too much rubbish have shielded many nuggets from the prying 'eyes' of other detector operators.

Minelab has studied the role that magnetic soil chemistry or so-called mineralisation plays in obscuring nuggets and has developed Multi-Period Sensing (MPS) technology. MPS technology enables detection of metallic targets, both large and small, even in the most mineralised or 'hottest' ground. The unit also provides an automatic ground balancing facility, which makes maintaining optimum ground balance a simple operation in a variety of ground types.

Included into the circuitry of the *SD 2200D* are memory chips which allow the detector to remember the last ground balance and tune settings when switched off. These memory functions also assist in the accurate discrimination of ferrous targets in highly mineralised soil plus assist the audio booster built into the machine.

We trust you will find this detector a pleasure to use with its stable and effective ground balancing, superior depth capability and sensitivity.



P0122-A

Figure 1 – The SD 2200D Metal Detector

2. Specification

Length	Maximum	1.3 m
	Minimum	1.1 m
Weight	Complete (excluding battery)	2.4 kg
Configuration	Shaftmount	Yes
	Hipmount	No
Transmission	Multi Period Sensing	
Ground Rejection	Dual ground balance	
Search Mode	Motion	
Controls	Power On/Off	2 Pos. Switch
	Threshold	1 Turn
	Audio (<i>Shallow, Normal and Deep</i>)	3 Pos. Switch
	Tone	1 Turn
	Auto tune (push button switch)	1 Touch
	Channel (<i>Ch1, Ch2 and Both</i>)	3 Pos. Switch
	Search (<i>Fixed and Tracking</i>)	2 Pos. Switch
	Iron Discriminate	3 Pos. Switch
	(<i>Disc, Disc+ID and All Metal</i>)	
	Level Adjust (for Iron Discriminate)	1 Turn
Audio O/P	Loudspeaker	No
	¼' Headphone jack	Stereo/Mono
Search Coil	11" Round	Double D
	Weight	720 g
Accessory coils	8", 11" and 18"	Monoloop
Batteries	6V 10 A/hr rechargeable	
	Duration of operation	10 – 12 hrs
Patents	Patents apply	

NOTE:

In the interest of product improvement, Minelab reserves the right to make changes to this specification without notice.

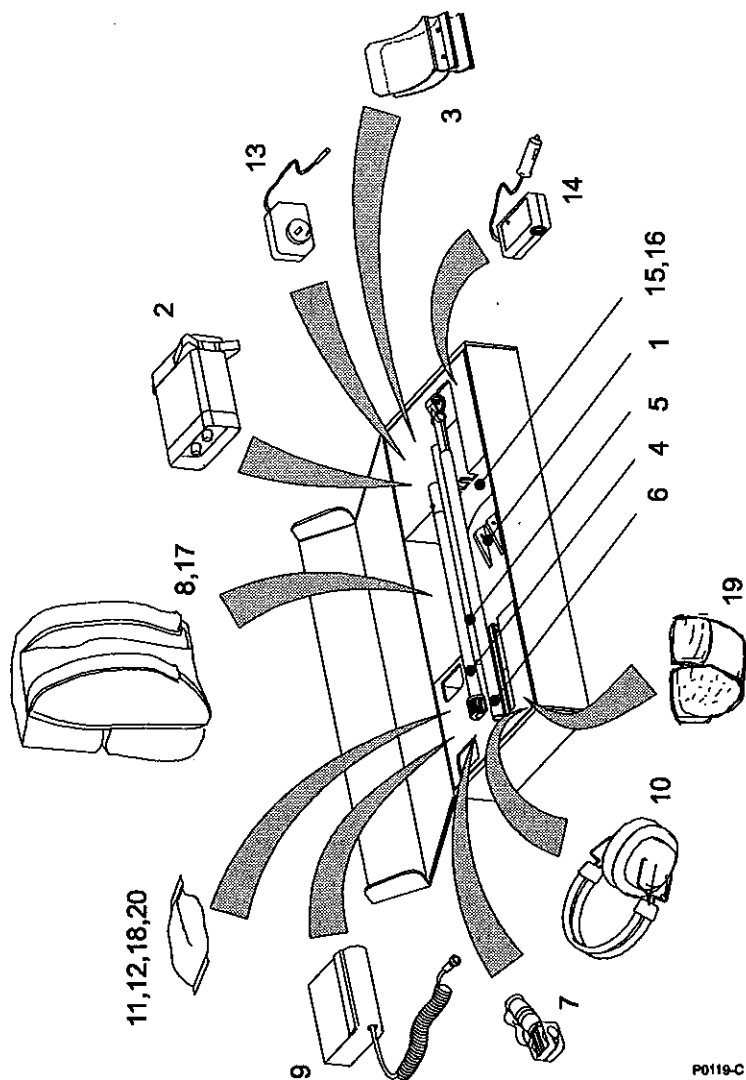


Figure 2 – The SD 2200D shipping container and parts assembly

3. List of Parts

The **SD 2200D** is packed in a single box containing all the components. Check that the following parts are included (see Figure 2):

1. 11" Double D Coil with Skid plate attached
2. SD 2200D Control box
3. Armrest (2 parts)
4. Upper shaft
5. Intermediate shaft
6. Fibreglass Lower shaft
7. Handle, including wrist strap
8. Back-pack
9. Battery and cable assembly
10. Headphones
11. Nylon bolts (quantity 3)
12. Nylon wing-nuts (quantity 3)
13. Mains battery charger
14. 12V Vehicle battery charger
15. Warranty card
16. Instruction manual
17. Bungee cord
18. Bungee cord knuckle
19. Neoprene Armrest cover
20. Velcro cable straps (quantity 3)

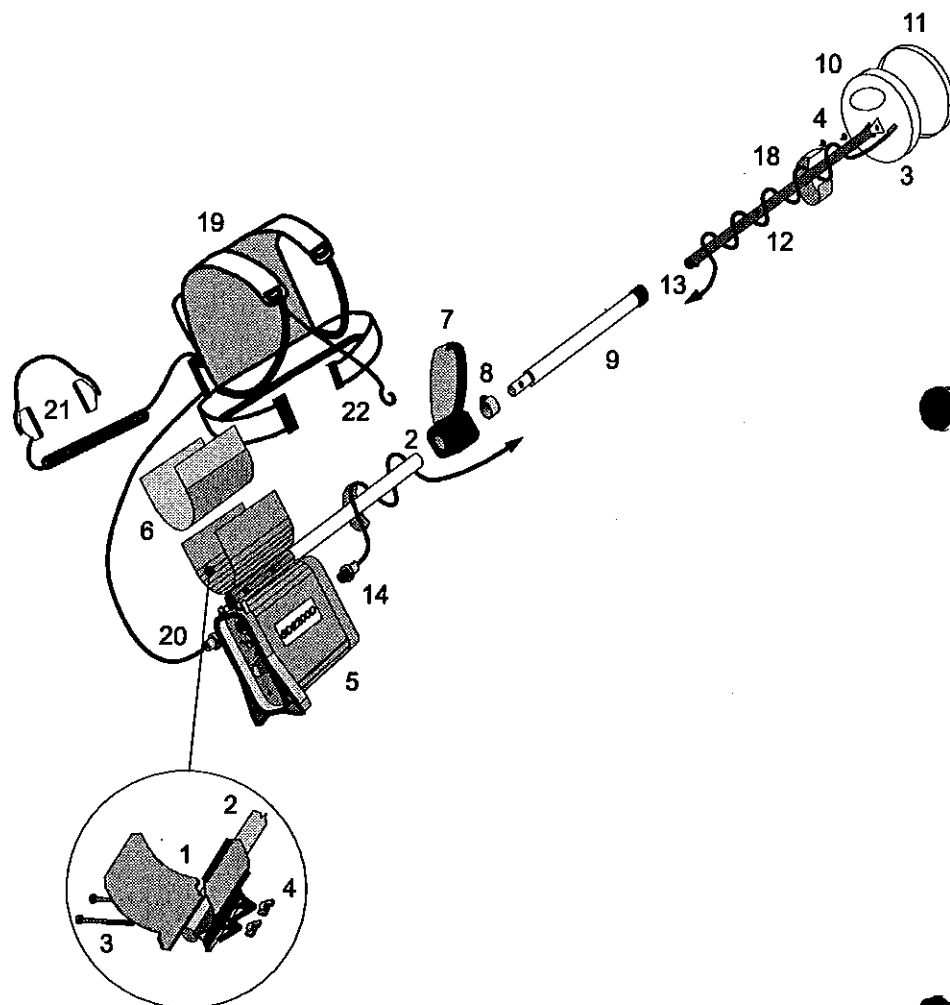


Figure 3 – The SD 2200D components assembly

4. Unpacking and Assembly (see Figure 3)

- a) Place the two *Armrest* halves (1) on either side of the *Upper shaft* (2) and ensure that the bolt holes line up.
- b) Slide the two Nylon bolts (3) through the bolt holes and screw the Nylon wing nuts (4) onto the bolts by a couple of turns.
- c) Slide the 'T' section on the top of the *Control box* (5) into the *Armrest* with the detector stand at the rear. Tighten the Nylon wing nuts by hand.
- d) Push the *Armrest cover* (6) over the assembled *Armrest* (1).
- e) Slide the *Handle* (7) onto the other end of the *Upper shaft* (2) and set it to a comfortable position. Tighten the two screws with a small flat tipped screwdriver to hold the *Handle* in place.
- f) Slide the bungy cord knuckle (8) onto the *Intermediate shaft* (9).
- g) Slide the *Intermediate shaft* (9) into the end of the *Upper shaft* (2) and snap it into place.
- h) Ensure that the 11" *Coil* (10) has a *Skid plate* (11) attached.
- i) Ensure that the coil pivot end of the fibreglass *Lower shaft* (12) has two teardrop rubber washers installed. They should always be full thickness and replaced regularly as they wear out. Push the fibreglass *Lower shaft* into the mounting bracket on the *Coil* and ensure that the spring clip (13) faces the rear of the *Coil*.
- j) Line up the holes in the coil mounting bracket with the pivot end of the fibreglass tube. Push the Nylon bolt (3) through the holes and fit the Nylon wing nut (4) which should be tightened by hand. **DO NOT** over-tighten as the coil housing might be damaged.
- k) Slide the fibreglass *Lower shaft* (12) into the *Intermediate shaft* (9).

- l) Adjust shaft lengths and coil angle for a comfortable position. Minelab recommends that the shaft length be set to give a comfortable sweep length of approximately 2 metres. (See Section 8 for more details on detecting techniques.)
- m) Wind the coil cable around the shaft and plug the coil connector (14) into the coil socket on the *Control box*. Ensure that the cable is firmly attached to the shaft, without strain, and cannot move around, especially near the *Coil*. Fasten the cable to the shaft with the supplied Velcro straps (15). Leave enough slack at the bottom of the cable near the *Coil* to allow for adjusting the angle of the *Coil* without placing strain on the coil cable. If the cable is able to move around, especially near the *Coil*, it will be 'seen' by the detector and cause random noises which can be very confusing.

NOTE:

Always ensure that the *Control box* is turned off completely before connecting or disconnecting the *Coil*.

- n) Fit the *Battery pack* (16) into the lower pouch (17) of the *Back-pack* (see Figure 4).

CAUTION

Only use 6-Volt battery as supplied.

- o) Insert the headphone plug (18) into the socket in the cap of the *Battery pack* (16).

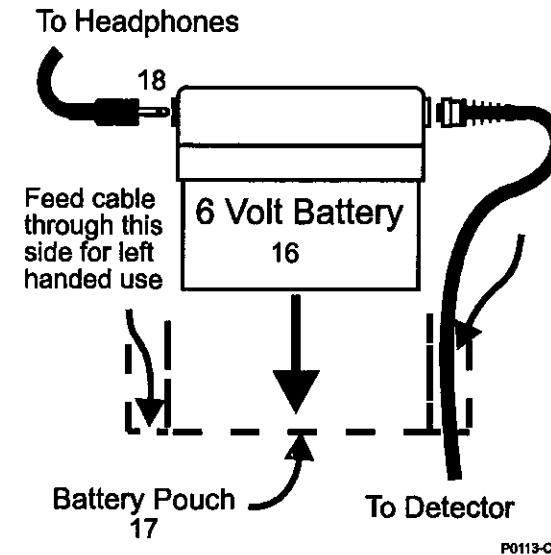


Figure 4 – The SD 2200 battery assembly

- p) Put on the *Back-pack* (19). Ensure that the *Power On/Off* switch on the *Control box* is set to *Off*. Plug the connector (20) on the back-pack cable into the *Power* connector on the *Control box*. This cable connects the *Battery* (16) and *Headphones* (21) to the detector. The bungy cord (22) can be attached to the knuckle (8) on the shaft to take some of the weight when prospecting. An adjustable hand strap on the handle allows you to relax and flex your fingers without putting the detector down.

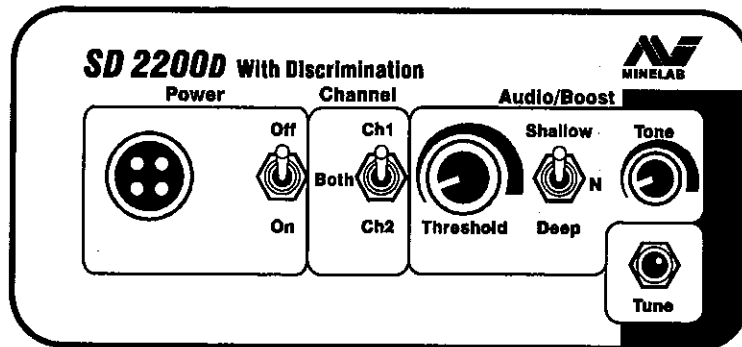
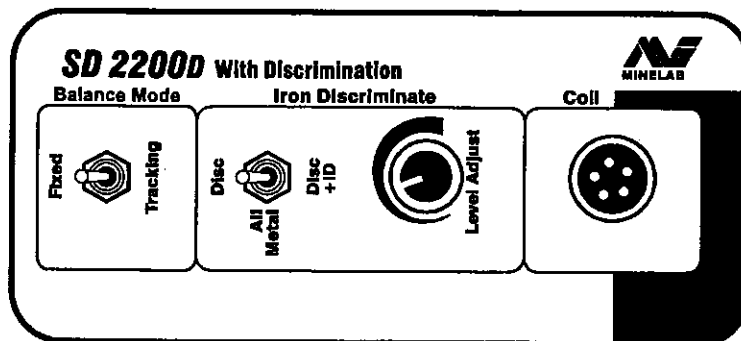


Figure 5 – Rear panel controls



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Figure 6 – Front panel controls

5. Control Box

5.1 Rear Panel Controls (see Figure 5)

5.1.1 Power switch

The Power *On/Off* switch turns the power from the *Battery* to the detector *On* and *Off*. Always switch the detector *Off* before connecting or disconnecting the *Coil* or *Battery pack*, and when not in use.

5.1.2 Channel switch (*Ch1*, *Ch2* or *Both*)

The *Channel* switch selects the channel used for searching: *Ch1*, *Ch2* or *Both*. Searching is usually done in the *Both* position, which gives the maximum sensitivity to the greatest range of targets. When detecting in highly noisy ground, the selection of *Ch1* rather than *Both* might stabilise the threshold. However, sensitivity to certain types of targets is reduced when using *Ch1* and is not recommended.

5.1.3 Threshold

The *Threshold* is used to control the loudness of background sound. Minelab recommends a soft audible headphone signal which is comfortable to listen to for extended periods.

5.1.4 Boost switch (*Shallow*, *N* [normal] or *Deep*)

The *Boost* switch can be used to enhance the signals produced by different types of targets.

In the *Shallow* position, signals from small targets close to the surface the ground will be amplified, allowing easier detection of such targets. This option is best suited for quiet ground. For normal detecting conditions use the *N* position which responds to all signals without boosting. The *Deep* position is recommended when looking for big targets at greater depth in noisy ground. Random soil signals are smoothed, making small changes in the audio signal from large deep targets easier to hear. However, it may mask some signals from very small targets near the surface.

5.1.5 Tone

The pitch of the background threshold can be adjusted to suit your preference using the *Tone* control.

5.1.6 Tune

The *Tune* control is used to lower the effects of electromagnetic interference from sources such as power lines, radio transmitters and other metal detectors. The *Tune* control is engaged by pressing the push button switch. If electromagnetic interference is experienced when using the detector, simply press the *Tune* button once to automatically select the best detection frequency.

5.2 Front Panel Controls (see Figure 6)

5.2.1 Ground Balance mode (*Fixed* or *Tracking*)

To get the best from your *SD 2200d*, it is important to know how different ground conditions affect the detecting process. Ground contains not only sand, but also many different chemicals, minerals and salts. These extra components are referred to as ground mineralisation and will often produce a sound from the detector, known as 'ground noise'.

The *SD 2200d* has the ability to cancel out the effects of ground mineralisation so that it minimises ground noise, while retaining maximum sensitivity to metal targets. Cancelling out the effects of ground mineralisation is referred to as 'ground balancing'. This ensures that welcome signals from objects such as gold are not confused with unwelcome ground noise. The *SD 2200d* has automatic ground balance which adjusts itself to minimise the effects of ground mineralisation when set in *Tracking* mode.

5.2.2 Iron Discriminate switch

This switch allows you to select between simple discrimination (*Disc* mode) and discrimination with tone identification (*Disc+ID* mode), or to turn off the discrimination altogether (*All Metal* mode).

In the case of *All Metal* mode, the detector will give varying volume and pitch signals but this information does not indicate the type of metal in the object.

In *Disc* mode, a strong signal from a ferrous (iron) object will cause the threshold to be 'blanked' or silenced.

Disc + ID mode, a strong signal from a ferrous object will cause the threshold to be 'blanked', just as it does in *Disc* mode. In addition, a signal of medium strength will trigger the *ID* mode. In this mode, non-ferrous objects usually produce a tone with a steady pitch while a ferrous object will usually produce a tone with a varying pitch. Repeated sweeps across the target might be required to confirm whether the tone is steady or varying. Note, however, in this mode some non-ferrous objects can also produce a tone with varying pitch, making the operator more likely to mistake a non-ferrous object for a ferrous object. This mode of discrimination should not be trusted until the operator has a lot of experience with listening to the tones produced and comparing them with the objects detected.

If the signals are too weak for accurate discrimination in either of the discriminating modes, the detector will return to the *All Metal* mode signal. While in the *Disc+ID* mode, a signal which is too strong to be discriminated will produce a rapidly pulsing signal with constant pitch. This is called an overload signal. A target producing this sound should not be interpreted as being a ferrous target. It should be investigated.

5.2.3 Discrimination Level Adjust

The *Discrimination Level Adjust* control gives the operator the ability to select the sensitivity and likelihood of a target being ferrous or non-ferrous. The same control also affects how the detector recognises mineral effects in the ground as opposed to metal targets, when ground tracking.

6. Operation

These instructions can be followed by operators who are familiar with the workings and general terminology of detectors. However, Minelab recommends that, as the **SD 2200D** has new features and some of the functions can differ from similar functions of other detectors, all operators should read the operating instructions in Section 6.2.

6.1 Quick Start Instructions

- a) Switch the *Power On/Off* switch to *On*.
- b) Set the *Threshold* control so that sound can be heard in the *Headphones*.
- c) Hold the detector at waist height with the shaft horizontal, so that the *Coil* is vertical. Keeping the *Coil* vertical, slowly move it around your body through a half-circle until the noise from interference is loudest. Hold this position, keeping the *Coil* motionless, and push the *Tune* button once to start the tuning function. Tuning takes approximately one minute. A series of three 'beeps' indicates that the best frequency has been selected.
- d) Rotate the *Tone* control to produce a threshold pitch that suits your hearing.
- e) Set the *Channel* switch to *Both* and the *Audio/Boost* switch to either *Shallow* for small shallow targets, *Deep* for large, deep targets or *N* (Normal) for general detecting (see Section 6.2.6).
- f) Set the *Iron Discriminate* switch to the *Disc* position and turn the *Level Adjust* to the middle of its range.
- g) Ground balance the detector by pulsing the *Coil* up and down and, while *Coil* is in motion, flick the *Balance Mode* switch from *Fixed* to *Track*.
- h) Your detector is now ready to be used.

Minelab recommends that you take time to read this manual thoroughly to help get the most out of your new **SD 2200D**.

6.2 Operating Instructions

This section gives a detailed description of how to operate the **SD 2200D** detector. The 'Detector sounds' section contains definitions of some terms with which the beginner should be acquainted.

6.2.1 Detector sounds

Threshold: This is the background sound produced by the detector. The loudness of the background sound is set with the *Threshold* control. Set this control so that the background sound can just be heard. The pitch of the threshold sound can be set to your preference using the *Tone* control.

Object signal: This is an abrupt change of the pitch and volume of the threshold sound. If the pitch drops first, then rises as the *Coil* is passed over a target, this generally (but not always) indicates a small target. If the pitch rises first then falls as the *Coil* is passed over a target, this generally indicates a large target. The pitch variations can be different when operating in *Disc + ID* mode (see Section 6.2.9).

Ground noise: These are irregular noises that are difficult or impossible to pin-point when moving the *Coil* over the ground. They are caused by changing chemistry or 'mineralisation' of the ground. While the detector is in *Tracking* mode these effects are minimised.

6.2.2 Turn the **SD 2200D** On

Hold the *Coil* away from the ground and metal objects and switch the *Power On/Off* switch to *On*.

NOTE:

When the **SD 2200D** is turned off, it saves important information (like tuning and ground balance settings) in its internal memory. If detection is started in the same spot, the operator should not have to re-tune or re-ground balance the detector.

6.2.3 Set the Threshold Control

The *Threshold* control should be set so that background tone is barely audible. It is important to note that small surface objects, as well as large deep objects, will produce very small changes in the threshold sound. It is therefore important to set the *Threshold* control correctly to ensure that these targets are heard. We suggest that you experiment with known targets to assist in setting this and the other controls to suit your hearing.

6.2.4 Set the Tone Control

Carefully adjust the *Tone* control until the threshold sound is at a comfortable pitch for your hearing. Note that interpretation of the detection signals involves understanding the difference between the rising and falling pitch of the threshold. Again, we suggest you take time to experiment with known targets. Generally, setting the *Tone* control at a high pitch is more fatiguing but better for identifying the faintest signals.

6.2.5 Set Tune Control

With the **SD 2200D** operating and the *Threshold* and *Tone* controls set:

- Hold the detector at waist height with the *Coil* vertical.
- Keeping the *Coil* vertical, slowly move it through a half-circle around your body. Listen for an increase in interference as you move the *Coil*. When the interference is loudest, stop moving the detector, hold it motionless in that position and momentarily press the *Tune* button.
- The detector will now scan through its range of transmission frequencies and automatically select the frequency that offers a minimum of interference. The end of the search (which takes about one minute) is announced by three 'beeps'.

IMPORTANT:

While the detector is selecting the preferred frequency, the *Coil* must be kept motionless and clear of metal objects.

- In some cases it may not be possible to remove the interference completely, but the effect will be greatly reduced.

- Once this control has been set for the location you are in, it should not require readjustment unless conditions change or new interference is introduced such as other detectors operating in the vicinity.

6.2.6 Boost switch (*Shallow, N [normal] or Deep*)

This switch is used to select the type of sound made by the detector in response to different target types.

In the *Shallow* position, signals from small targets close to the surface are boosted. This makes it easier to hear these target signals. This setting will also tend to boost ground noise, so this setting is best used in quiet ground.

The *Deep* position is recommended when looking for big targets at depth. It smoothes out background sound and signals from small targets, making small changes in audio signal easier to hear.

For normal detecting conditions use the *N* (normal) position, which does not boost any signals.

Select whichever position best suits the conditions of the area you are detecting. Each time the switch is changed, the threshold will also need to be changed.

External amplifiers may be used in addition to the boost switch, provided they have loudness limiters built in. This prevents loud signals becoming unpleasant or dangerous to hearing.

6.2.7 Channel switch (*Ch1, Both, Ch2*)

In almost all circumstances, this switch should be set to *Both*. There are very few circumstances in which it is beneficial to use either of the other settings and to do so **will reduce sensitivity** to certain types of targets. The function of this switch is to select which of the channels the detector uses to generate signals. Each of the channels has a sensitivity to its own range of target types and sizes and each channel complements the other.

When set to *Both*, the detector uses the best channel for a particular target to generate the signal. It is for this reason that Minelab recommends the use of *Both* in almost all circumstances.

Selecting *Ch1* can help reduce ground noise from very noisy ground. It can sometimes stabilise the threshold which will assist in hearing faint targets in such conditions. As a result of excessive ground noise, Minelab does not recommend the use of *Ch2* by itself. Setting the *Channel* switch to *Ch1* does not affect the blanking of sounds due to ferrous targets while in *Disc* or *Disc+ID*. Note that in general, however, the signal pitch and volume in *Disc+ID* mode for a target will be altered.

Note that the *Channel* switch does not affect the way in which the automatic ground balance operates.

6.2.8 Ground Balancing

One of the great new features of the **SD 2200D** is its automatic ground balancing. This feature is active whenever the detector is in *Tracking* mode. In this mode, the detector continuously measures the effect of ground mineralisation and automatically adjusts the ground balance to compensate.

Introduction

The **SD 2200D** can be operated with automatic ground balancing (in *Tracking* mode) or with the ground balance fixed (in *Fixed* mode).

When the *Balance Mode* switch is switched to *Fixed* mode, the ground balance is held at its current level.

When switched from *Fixed* to *Tracking* mode, the detector begins to automatically ground balance through a two-stage process. The first stage is a very rapid adjustment to the ground mineralisation. This stage lasts for five seconds after the switch is thrown. The second stage continues to adjust to the ground mineralisation, but at a greatly reduced speed. Adjustment continues for as long as the detector is kept in *Tracking* mode.

It may be of use to repeat the ground balance function when ground conditions change rapidly.

If the detector is switched to *Fixed* mode at any time, it will no longer adjust itself to changes in soil mineralisation, but will stay fixed at the level it last reached while in *Tracking* mode.

While in *Tracking* mode, the detector usually stops ground balancing when it detects a target. However, a weak target signal may not be recognised as a target and, if the *Coil* is repeatedly passed over it, the target could be tracked out. It is therefore recommended to switch from *Tracking* to *Fixed* when pinpointing a potential target (see also *Discrimination level control* on pages 25 and 26).

For best results, use *Tracking* mode in areas with high ground noise.

SD2000 and SD2100 users must note that setting the *Channel* switch does **not** affect the operation of the automatic ground balance.

Ground Balance Procedure

Ground balance both channels at once by setting the *Channel* switch to *Both*. Move the *Coil* up and down between 2 cm and 10 cm above the ground (see Figure 7) and, while moving the *Coil*, set the *Balance Mode* switch from *Fixed* to *Tracking*. The fast ground balance lasts for only five seconds after switching to *Tracking*. Therefore, it is important to be moving the *Coil* as the switch is thrown.

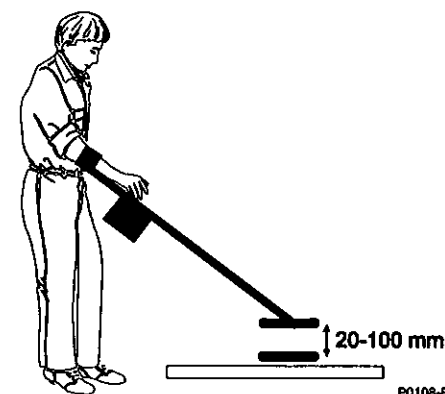


Figure 7 – Setting ground balance

Keep moving the *Coil* until all ground noise has stopped. A persistent signal probably indicates a target in the ground. In this case, move the *Coil* to a new location and repeat the procedure.

When there is no longer a change in the threshold while the *Coil* is being raised and lowered, the detector is said to be 'ground balanced'.

Once the detector is ground balanced, you can then decide to detect in either *Tracking* or *Fixed* mode. If the ground is mineralised or variable, use *Tracking*. If the ground is very mild, use *Fixed* mode and switch back to *Tracking* temporarily if the threshold becomes noisy. Do not test a target by switching to *Tracking* when the *Coil* is above it.

6.2.9 Iron Discrimination

Discrimination is the ability of a detector to distinguish between different types of metal targets and to assist the operator in identifying a target.

Some goldfields are littered with 'junk', i.e. metal objects which are of little value and are an annoyance to detector operators. The **SD 2200D** is capable of rejecting a number of iron objects while still detecting non-ferrous metals. The ability of the **SD 2200D** to discriminate ferrous targets means that while working these goldfields, much of the iron junk can be ignored with little fear of ignoring valuable targets.

Iron Discrimination switch

The main means of iron discrimination of the **SD 2200D** is the 'blanking' (silencing) of the threshold which occurs when the detector determines a target is of ferrous metal (magnetic). This form of iron discrimination operates when the *Iron Discrimination* switch is in the *Disc* position and the detector is fitted with the supplied 11" *Double 'D' (wound) Coil*.

Targets must produce sufficiently strong signals for the **SD 2200D** to successfully discriminate iron objects. Fortunately, most iron junk is located near the surface and much of it can produce the required signal strength.

NOTE:

When used in *Disc* mode, deeper or small targets, whether ferrous or non-ferrous, will produce the normal target audio signal.

When the **SD2200D** is operated in the *Disc+ID* mode, the same audio blanking will operate as it did in *Disc* mode for strong signals. However, there is an additional mode of iron discrimination which can operate with weaker signals. In this case, the detector will jump into the *ID* audio signal mode.

In *Disc+ID* mode, the operator needs to monitor the pitch of the signal as the *Coil* is swept over the buried metal target. Most ferrous targets will produce a changing pitch signal as the *Coil* is moved back and forth across the target. Non-ferrous targets will produce a signal with a steadier pitch.

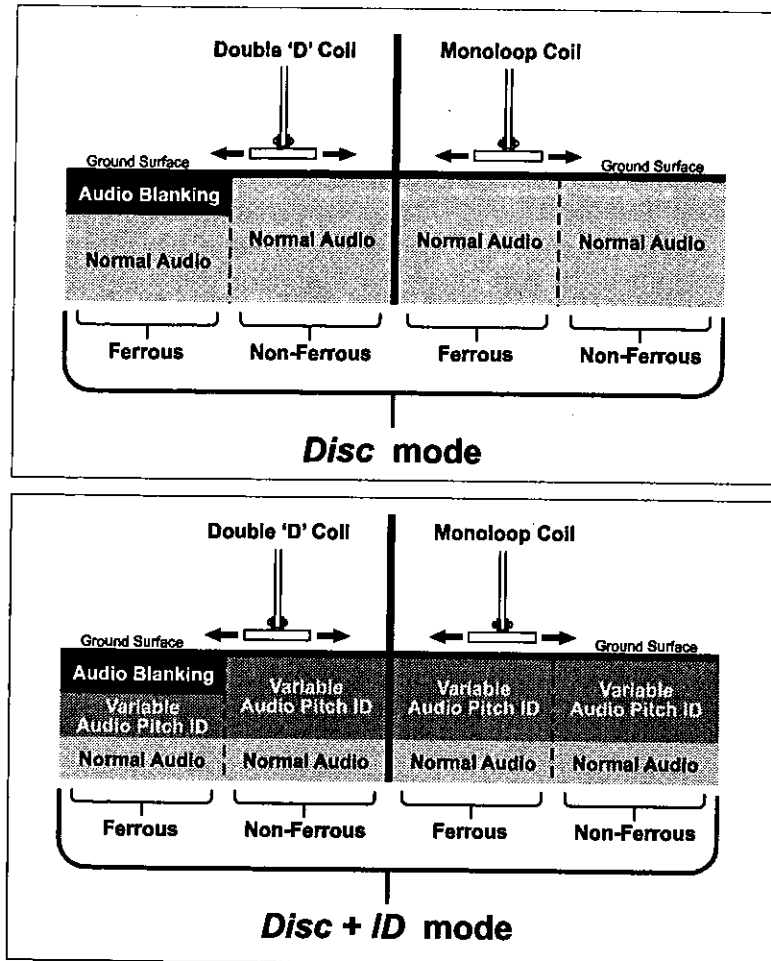
Some ferrous targets, particularly thin nail-like targets, can also produce steady pitches just like non-ferrous targets. Some gold will also produce a variable pitch, particularly specimen gold or gold containing a matrix of quartz and/or ironstone. Therefore, only signals with highly variable pitch can be trusted to indicating ferrous targets in the *+ID* mode.

The *+ID* target mode of recognition requires considerable operator experience. It is recommended that the operator investigate most targets detected in the *+ID* mode and learn to distinguish the signals.

Audio blanking on ferrous targets is the most useful form of discrimination, but this will only operate if a *Double 'D' Coil* is used.

The central position of the *Iron Discrimination* switch activates *All Metal* mode. There is no discrimination in this mode. Targets will cause pitch and volume of signals to vary, but these variations convey no consistent information about the type of metal.

If a target signal is too weak for the detector to discriminate when it is set in one of the discriminating modes, it will revert to *All Metal* mode. As soon as the signals become strong enough, the detector will resume discrimination.



Pitch ID: Ferrous: Pitch less steady as coil passes over target
 Non-Ferrous: Pitch more steady as coil passes over target

NOTE:
 The above zoning is a stylistic example of how the various Discrimination modes work. The above areas are not determined by depth but by the strength of signal.

P0130-A

Figure 8 – Discrimination levels

It is not advisable to pin-point in *Disc+ID* mode because the duration of the signal is too long (i.e. too 'broad' a signal). Pin-pointing is best performed in *All Metal* mode.

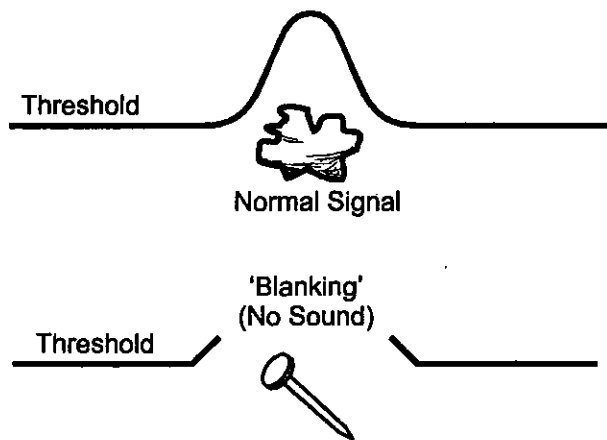
It is recommended that once a target has been located and the operator is using the discriminator, the *Coil* should be rapidly passed back and forth over the target centre several times. Remember to switch back to *Fixed* balance for this.

At all times (particularly when discriminating or *ID*-ing a target), the *Coil* must be passed smoothly over the ground surface while maintaining the coil height above the ground.

The form of ferrous discrimination which blanks the signal will not work if a *Monoloop Coil* is used instead of the recommended *Double 'D'*. In that case, the *Disc* mode will be identical in response to the *All Metal* mode. The *Disc+ID* mode will operate in the *+ID* mode giving pitch discrimination, but will still not blank ferrous signals.

Operation of the *Disc+ID* mode is affected by signals which are too strong. If the signal is too strong in *+ID* mode, the detector will emit a rapidly pulsing signal of constant pitch. This is to guard against erroneous interpretation indicating an overload of signal. Lift the *Coil* slightly higher above the ground and the discrimination functions will return.

Disc mode discrimination will only blank a ferrous signal when a target gives a strong signal when passing across a piece of iron, a target response will be heard until the **SD 2200D** identifies that the target is indeed iron. At this point, the signal will 'blank' (see Figure 9). The target strength required for this to occur can be adjusted using the *Discrimination Level Adjust* control.



Disc Ferrous Response Blanking

P0150-B

Figure 9 – Discrimination Audio Signal



Level Adjust
P0128-A

CONTROL ROTATION

Anti-clockwise

Clockwise

Most iron objects are discriminated but a few small iron objects will be accepted as non-ferrous	Almost all iron objects are discriminated however a few small non-ferrous items will also be ignored
Dig more junk but less likely to cancel a gold nugget	Dig less junk but may mistake a nugget for ferrous junk
+ID function requires stronger signals to operate	+ID function requires less strong signals to operate
Suggested for areas with a lot of ferrous junk	Suggested for areas with small amounts of junk
Only fairly strong target signals will trigger discrimination action	Strong and medium target signals will trigger discrimination action
Ground track is more likely to balance out targets	Ground track is less likely to balance out some weak signals
Medium to strong signal required to pause the Tracking mode	Weak signal will pause the Tracking mode

6.2.10 Level Adjust control

There is usually some overlap between signals from useful targets and some types of iron junk. Because of this, the operator has to use the *Level Adjust* control to select the amount of discrimination between two extremes: no useful target missed, but some iron getting through (anti-clockwise); or unlikely any iron detected, but some small non-ferrous targets possibly missed (clockwise). (See page 27.)

The *Level Adjust* control gives an operator the ability to select the sensitivity and likelihood of a target being discriminated as ferrous. The same control also affects how the detector recognises ground mineralisation as opposed to metal targets.

Turning the control anti-clockwise increases the strength of a signal required for iron discrimination to be activated. Turning the control clockwise has the opposite affect, but non-ferrous targets are more likely to be mistaken for iron.

The *Level Adjust* control has exactly the same effect in both *Disc* and *Disc+ID* positions. In the *All Metal* position it affects only *Tracking* mode. Set fully clockwise there is little danger of *Tracking* mode cancelling out genuine targets, however some ground may also give a false signal. With the *Level Adjust* control set fully anti-clockwise most ground signals will be *Tracked* effectively but some faint, weak target signals may be missed.

Minelab recommends that it is usually best to dig out all targets and only use the discriminator in areas where the unreasonable abundance of trash makes the digging of everything impractical.

NOTE:

Discrimination functions will work only on strong, positive signals. Weak signals will give normal 'All Metal'-type signals. The shape or profile of the object may also influence the *ID* tone on occasions. Check by passing the *Coil* across the target several times and from a variety of directions.

7. Auxiliary Parts

7.1 Battery

The 6-volt rechargeable *Battery* supplied with your *SD 2200D* will give power to operate the detector for 10-12 hours after being fully charged.

These *Batteries* may be recharged at any time during their discharge cycle. It is very important to fully charge the *Batteries* before storage. **DO NOT** leave a *Battery* fully discharged for longer than 1 day.

CAUTION

Only use 6-volt batteries as supplied. Never use a 12-volt battery as this will damage the detector. This damage is not covered by warranty

7.2 Battery Chargers

Two types of battery chargers (*Mains* and *12V vehicle charger*) are supplied with the *SD 2200D*.

7.2.1 Charging batteries

- Turn the *SD 2200D Off* before disconnecting the *Battery*.
- Disconnect the battery cable from the detector and plug into the appropriate charger. When charging, the *Battery* must be kept in an upright position.

7.2.2 Mains charger

- The supplied mains charger will charge the *Battery* from the local mains (AC) power.
- Plug the mains charger into a mains outlet. Switch the mains outlet on. Check the charger nameplate; it will be rated at 1000mA or 500mA. The 1000mA charger will recharge a completely flat *Battery* in approximately 10 hours while the 500mA charger will take approximately 20 hours.
- Partially discharged *Batteries* require a shorter period to recharge.

CAUTION

DO NOT leave partially discharged batteries charging overnight. *DO NOT* leave the mains charger on for extended periods as reduced battery life can result.

7.2.3 Vehicle battery charger

- The vehicle battery charger supplied with the *SD 2200d* will charge the detector *Battery* from the cigarette lighter socket in a vehicle.
- Plug the charger into the cigarette lighter socket and turn the ignition switch to Accessories to supply 12V power to the cigarette lighter socket. This voltage is reduced by the charger to 6V output to charge the detector battery.
- A red LED will flash while the *Battery* is charging. When the *Battery* is flat the LED may flash fast enough so as to appear constantly on, as the *Battery* charges the LED will flash at a slower rate. Leave the *Battery* to charge for approximately 10 hours using this charger.
- If the battery voltage of your vehicle drops below 11V, the charger will stop charging. This stops the battery charger from flattening the vehicle battery. Make sure that your vehicle battery is in good condition before camping in remote areas.

- Run your engine above idle speed for at least 30 minutes each day to keep your vehicle battery charged.

CAUTION

The 12V charger is designed for use with vehicles which have a negative earth electrical system. Most cars made after 1970 will have a negative earth electrical system. If you plug the charger into a vehicle with a positive earth system, the fuse in the cigarette lighter plug will blow and the LED will not light.

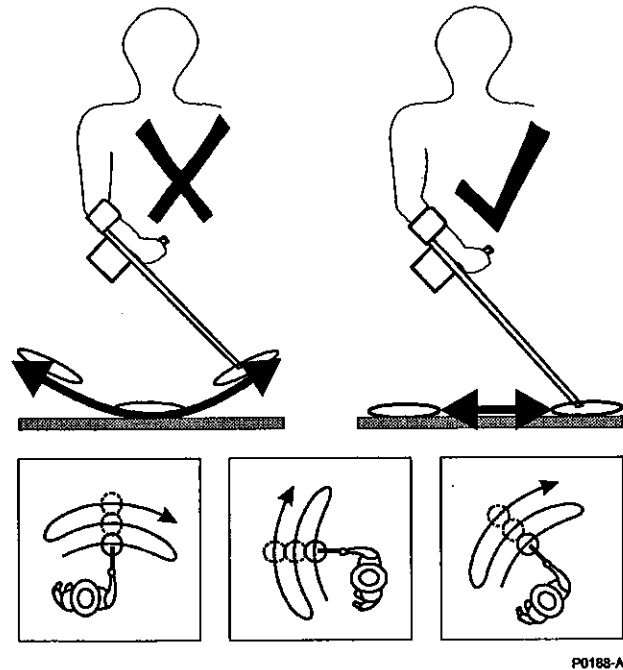


Figure 10 – Parallel sweep and motion detect procedure

8. Detecting Techniques

8.1 Searching

The *SD 2200D* is a 'motion' detector, which means that it must be moving over a target in order to detect it.

The *Battery* should be worn in the back-pack supplied. This places the *Battery* at the furthest distance from the *Coil*.

Ensure that you do not set your shaft length too short. If the *Coil* is too close to your body it might detect your pick, the *Battery* or any other metal that you are carrying.

NOTE:

DO NOT wear steel cap boots or shoes with metal eyelets!

If you are getting false signals as you sweep the *Coil*, check that they are not produced by any metal you are carrying. Move the *Coil* closer, then further away from your body to see if the signals are coming from items such as your pick or the *Battery*. If they are, you must increase the distance between the *Coil* and these items.

The *Coil* should be swept over the ground in a side-to-side sweeping motion. As the operator moves forward slowly, the search pattern looks like a snaking path. To ensure that the ground is thoroughly searched, approach the area from three directions (see Figure 10 [bottom]).

While sweeping the *Coil* it is important to keep it parallel to, and at the same height above the ground at all times. The easiest way to achieve this is to have the *Coil* lightly touching the ground. *DO NOT* raise the *Coil* at the ends of each sweep as this will reduce your detection depth (see Figure 10 [top]).

Each sweep of the *Coil* should overlap the area of the previous sweep to ensure a full coverage of the search area. Be aware of the search pattern of your *Coil* and overlap sweeps to take this into account.

8.2 Prospecting Tips

The **SD 2200D** has superior ground balancing and it is possible to find quite large objects near the surface in well-worked areas because other detectors have been unable to cope with the high degree of mineralisation present. You should therefore dig all signals, even in previously detected areas.

Very large changes in the mineralisation of an area can produce a signal in the detector. Typically, you might get a response from a concentration of orange/reddish dyke material or clay. Similarly, in loamy conditions, a pocket of dark orange/reddish colouration may produce a sudden signal change.

It is **NOT** recommended that you try to ground balance the detector in an attempt to 'test' a questionable response. This may cancel weak signals from very deep targets. If in doubt, scrape away some soil above the suspect signal and if the signal gets stronger, it is a target. Dig it!

If the ground is extremely variable and causes the detector to be very noisy, you may try operating with the *Channel* switch set to *Ch1*. This will reduce noise caused by varying mineralisation but some nuggets may not be detected, because the full range of nuggets is not detected in *Ch1* or *Ch2*, only when the *Channel* switch is set to *Both*.

Charcoal can sound loud at times and rather like a metallic object when close to the surface. Charcoal is usually created by farmers burning off tree stumps or by bushfires. Once the charcoal under the surface is removed, the signal will vanish.

8.3 Hints for Maximum Gold Recovery

- Keep the *Coil* as close to the ground as possible.
- Listen very carefully. This is more important than concentrating on looking.
- SLOW DOWN! Do not rush — take your time.

8.4 Identifying Target Signals

Metallic targets will usually give a 'solid' sounding response when the *Coil* is swept across the object from any direction. Ground noises usually give a broad uneven response when the *Coil* is swept from different directions. A metallic target generally sends out a short, sharp and mostly symmetrical response.

If you are not sure whether the sound is ground noise or a target, you need to find out if the signal is valid. Scrape a shallow hole about 7 to 10 cm deep over the suspected target. Sweep the *Coil* over the hole at the original ground level but **DO NOT** dip the *Coil* into the hole. If the signal has decreased in volume or is less defined, it is a ground noise. If the signal remains the same or becomes louder, it is a metallic target. If you are still not sure, make the hole deeper and repeat the process. You will also notice that mineral noises are often experienced from one direction only, on the return swing it is no longer there.

The 'Halo Effect', which is built up around a buried metal object, makes the object appear to be larger to the **SD 2200D** than it actually is. This will be reduced once the target is disturbed from its position in the soil. An example of this is when a small target, detected at a substantial depth with the **SD 2200D**, is barely or not even detectable once recovered from the ground. Even if reburied, the 'Halo Effect' will disappear.

It is not recommended that you try to eliminate what might appear to be faint, isolated ground noise by balancing the **SD 2200D**, as you might balance out the response from a deeply buried metallic target.

8.5 Pin-pointing

To find an object and reduce the size of the hole required to remove it from the ground, it is necessary to pin-point the exact location of the object. The technique described here will be particularly useful with the *Double 'D' Coil*, but it will also work with *Monoloop Coils*.

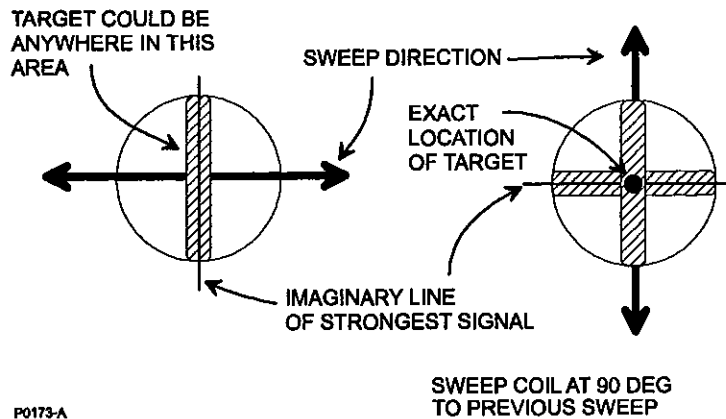


Figure 11 – Pin-pointing procedure

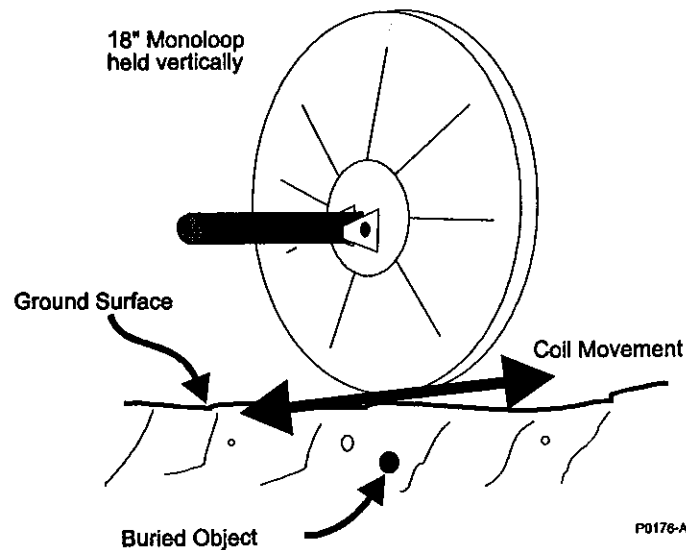


Figure 12– Alternative pin-pointing

If a target signal (or a soft signal) is heard, first confirm it by circling the *Coil* around the target while operating the detector in *Track* mode. While the *Coil* is moving around the target, switch the mode to *Fixed*. This will give a very accurate ground balance on this area. One of the pin-pointing techniques may then be used.

When a likely object is detected, sweep the general area with the *Coil*, taking note of where the strongest signal is received. By shortening the length of the sweep it should be possible to draw an imaginary line in the ground where the strongest signal is located (see Figure 11).

Turn and face the target at 90 degrees from the initial direction and repeat the process. The object is located where the two imaginary lines cross.

If using a *Monoloop Coil*, small shallow nuggets will give a signal near the rim of the *Coil*. Another pin-pointing technique for *Monoloop Coils* is to turn the detector coil onto its side and move the *Coil* while it is vertical, across where you suspect the target to be. This may assist with pin-pointing (see Figure 12).

8.6 Digging the Target

Once you are sure of the location of the target it is necessary to dig a small hole to recover it. In order to preserve the environment, the hole should be as small as possible. Always replace the soil and grass which is removed.

It is essential to carry at least one of the following digging tools with you when searching:

- a small, strong digging spade
- a pick
- a shovel
- a crowbar (for very deep objects in hard ground).

Before digging, clear the area of loose surface material and check that the sound is still there. If it is not, the target must be amongst the surface material.

If the signal is still there, dig down a few inches. If the target cannot be seen, sweep the *Coil* over the hole. If the signal has gone then it must be in the pile just dug. Make sure that there are no objects buried in the soil under the pile. Take care when you dig as damaging a nugget can reduce its value. Start digging approximately 10 cm in front of the target to reduce the chance of damage. Pile the diggings carefully as it may be necessary to search them. It will also be necessary to replace them, once your search ends.

If the target is located in the soil that was removed, sweep the *Coil* over the pile and pin-point where it lies in the dirt. Keep halving the pile which includes the target. If it is still difficult to find the target, lay the detector down with the search coil flat on the ground. Take a handful of the diggings and pass it over the *Coil*. If there is no signal, place the handful carefully in a new pile and repeat with another handful. Your hands and wrists must be free of any metallic jewelry and watches.

Once the object has been dug up, it is a good idea to sweep the hole again to ensure that there are no other targets. If you find an object in a particular hole, search the surrounding area very carefully as it is likely that there are more objects nearby. If you hear a target, keep searching until you find it — it is there and might be valuable.

NOTE:

Always refill the hole before leaving and scatter leaves, etc., as you found it.

8.6.1 Digging deep targets

The *SD 2200d* has depth capabilities which will surprise experienced and new prospectors alike. If the target appears to be buried deeply, will help to use the following technique:

- Use the cross sweeping method to locate the target accurately. Scrape a hole about 10 cm deep and large enough to take the *Coil*. Keep testing the target location as you dig deeper. Take care that the target is not in the wall of the hole and you dig past it.

- If using a *Monoloop Coil*, turn the detector coil onto its edge, making it vertical. Probe different sections of the hole listening for the loudest reading. Once the target is recovered, and you find it is not valuable, please take it with you and dispose of it in the proper manner. Removing rubbish and refilling holes will help metal detector operators gain a good reputation. This will lead to more areas being opened up for prospecting.

8.7 Salty Environments

The *SD 2200d* will find objects at great depth in salty environments. However, the interfering signals caused by highly concentrated salt cannot be completely 'balanced out.' The 11" *Double D Coil* will give best results in salty conditions.

9. Maintenance

The **SD 2200d** is a high quality electronic instrument. It is finely engineered and housed in a durable container. Take care of it in the following way:

- It is **vitally important** to keep the connectors dry and clean.
- **DO NOT** expose the detector to high temperatures or leave in the sun longer than necessary. Shading will help protect it. Avoid leaving it in a closed vehicle, especially in the sun.
- The search coil housing will wear through if you scrub the ground with it while searching. Minelab recommends that you use replaceable *Skid plate* on *Coils* to protect them.
- To prevent dirt entering between the *Coil* and *Skid plate*, you can use silk tape such as Leukosilk®, which is available from chemists. Using some other tapes (such as insulation tape) can result in loss of performance.
- The *Control box* is not waterproof, even though it has been designed to be water-resistant. Avoid getting it wet.
- *Coils* are not waterproof. They are water-resistant and may be used in rain or wet conditions. **DO NOT immerse in water.**
- The *Control box* and *Coils* must not come into contact with petrol or other oil-based liquids.
- If any part of the detector comes into contact with corrosive substances, including salt or salt water, it must be washed with fresh water. Keep the unit dry and clean. To clean the detector use a damp cloth with mild soap detergent. **DO NOT** use solvents.

10. Troubleshooting

Use the following table to check for possible problems:

Fault	Suggestion
No sound	Turn <i>Threshold</i> control fully clockwise. Check cable connections. Check <i>Headphones</i> . Check <i>Battery</i> .
Threshold tone but no object detection	Check coil connection. Try testing different coils.
Random noises	Charge <i>Battery</i> .
<i>Battery</i> will not charge from vehicle battery	Check for power to cigarette lighter socket. Check 10 amp fuse in plug.
<i>Battery</i> not holding charge	Try alternative charger. Test power lead.
Very noisy threshold	Check for interference and re-tune. Try in a new location.
Random noises similar to target	Re-ground balance. Check for thunderstorm build-up.

If you need to return your detector to Minelab for service, please supply as many details as possible about the fault. This will enable our service engineers to rectify the fault quickly and efficiently. Return the detector in a cardboard box for protection.

DO NOT forget to supply your name, address and phone number plus purchase date and serial number when sending in detector parts for repair.

11. Warranty

The **SD 2200d Control box** has a two-year warranty covering parts and labour. Search coils have a warranty for one year against malfunction. Refer to your warranty card for details.

In all instances, refer to your supplier or Minelab for service, either in or out of warranty.

NOTE:

This warranty is not transferable or valid unless the enclosed warranty registration card is returned to Minelab Electronics Pty. Ltd. or an authorised Minelab Electronics Pty. Ltd. regional distributor within 14 days of the original purchase. The commencement of the warranty is the date of purchase.

The Minelab warranty does not cover damage caused by accident, misuse, neglect, alteration, modifications or unauthorised service. For specific details of the Minelab warranty please refer to the Product Warranty card.

It is the responsibility of the owner to pay all transport costs for the detector to Minelab. The repaired detector will be returned to the owner freight free.

12. Accessories

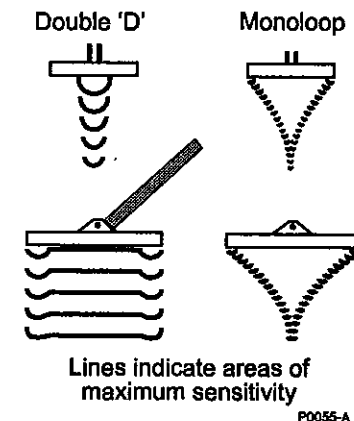


Figure 13 – Coil search patterns

12.1 Search Coils



DO NOT PLUG ANY SD SERIES COILS INTO ANY OTHER DETECTOR!

This action can damage other detectors and such damage is not covered by warranty.

The **SD 2200d** is supplied with an 11" *Double 'D'* as its preferred *Coil*. Coils supplied on the SD2000 are not suitable for use with the **SD 2200d**. Coils supplied with the SD2100, will operate on the **SD 2200d**.

NOTE:

Monoloop Coils are not recommended for use with 'Iron Discrimination' technology, but they will operate perfectly in the *All Metal* mode and can be used in *Disc+ID* mode by experienced operators.

Monoloop Coils consist of only one coil of wire and give a detection pattern similar to a Concentric Coil. *Double 'D' Coils* contain two 'D' shaped coils of wire, which overlap and produce a 'blade' like detection pattern (see Figure 13).

The following table describes the characteristics of each *Coil* for use in the **SD2200D**:

<i>Coil</i>	Average mineralisation	Highly variable mineralisation (hot rocks)	High salt content	Discrimination
<i>8" Monoloop</i>	Greatest depth on very small nuggets	Can be adversely affected by some variable mineralisation	Good	Tone Discrimination only
<i>11" Double 'D'</i>	Very good on most targets	Very stable	Very good	Excellent iron discrimination
<i>11" Monoloop</i>	Very versatile for most items	Can be adversely affected by some variable mineralisation	Good	Tone Discrimination only
<i>18" Monoloop</i>	Greatest depth on large and medium sized nuggets	Can be adversely affected by some variable mineralisation	Poor	Tone Discrimination only

12.2 Batteries

As well as the 10A/hr battery, Minelab has a smaller lightweight battery available. This is 4.5A/hr which gives approximately 4 to 5 hours running time per charge. The total weight of this small battery is only 968 grams.

12.3 Corporate Clothing

Minelab also has a range of good quality clothing such as caps, T-shirts and jackets available. Ask your local dealer for details.

AN IMPORTANT MESSAGE FROM MINELAB

The **SD** series metal detectors are by far the most efficient gold prospecting and treasure hunting tools that Minelab has ever developed. We ask **YOU**, as a responsible detector operator, to take all due care regarding the environment.

Minelab cannot stress enough the importance of being responsible when recovering targets. Backfill every hole you dig.

If care and consideration is taken during and after the removal of targets, especially with respect to the back filling of holes, this should ensure the continued access to areas for prospecting and treasure hunting. It will also ensure that the pristine condition of our beautiful bushland, forests and dry land areas is maintained with a minimum of damage.

Minelab is working with you towards preserving our natural environment so that the benefits of gold prospecting and treasure hunting can continue to be enjoyed in the years to come.

Every prospector and treasure hunter around the world and the staff of Minelab thank you for your continued efforts to protect the environment.

DO THE RIGHT THING — FILL IN YOUR HOLES!

FCC Compliance

NOTE:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Re-orient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Consult the dealer or an experienced radio/TV technician for help.

EC Conformity

NOTE:

This product complies with the essential requirements of EMC Directive 89/336/EEC.

NOTES: