

# ***SD* 2000** **SUPER DETECTOR**

**INSTRUCTION MANUAL**

## **AN IMPORTANT MESSAGE FROM MINELAB**

The SD 2000 is by far the highest performing gold prospecting detector which Minelab has ever developed.

As a consequence, you can expect to be recovering targets at far greater depths than ever before and we would ask YOU, that as a responsible operator, to take all due care regarding the environment.

**Minelab cannot stress enough the importance of being responsible when recovering targets and backfilling holes.**

If care and consideration is taken during and after the removal of targets, especially with respect to the backfilling of holes, then this should ensure the continued access to areas for prospecting. It will also ensure that the pristine condition of our beautiful bushland, forests and dryland areas are maintained with a minimum of impact.

Please remember that this as a very important factor for the future of metal detecting. In the past we have seen dredging legislated against in Australia and the same fate could await metal detecting. It's up to you, the future of metal detecting is in your hands.

Every prospector around the world and the staff of Minelab thank you for your continued effort.

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## 1. QUICK START INSTRUCTIONS

These instructions can be followed by operators who are familiar with the workings and general terminology of detectors. Those not familiar with detecting are advised to proceed to the Operating Instructions chapter 5.

1. Switch the Power Switch to ON.
2. Set the Threshold Control so that the threshold tone is just audible.
3. Set the Tone Control to produce a pitch which suits you.
4. Select Balance I with the Mode Switch and ground balance the SD2000.
5. Select Balance II with the Mode Switch and ground balance the SD2000.
  - Note: Ground balance by listening to the pitch of the tone as well as its volume. The SD2000 will always make the volume go up, not quieten as other detectors do. The pitch of the tone will go both up and down.
6. Select Search position.
7. Start searching.

We do recommend that you take the time to read this manual thoroughly to help you get the most out of your new SD2000.

## **2. INTRODUCTION**

Thank you for purchasing the new Minelab SD2000. We at Minelab are sure that you will find this detector to be the finest available for the detection of metallic objects in highly mineralised environments. This detector can "see" deeper than any other conventional detector available on the market today and its simplicity of operation means it is easy to use for the beginner and professional alike. Its superior ability at cancelling mineralisation not only invites the discovery of new sources of precious metals, but re-opens old fields where hot ground has shielded many a nugget from the prying "eyes" of prospectors.

Minelab has studied the role that mineralisation plays in the obscuration of nuggets and has developed the new Multi Period Sensing (MPS) technique which enables detection of metallic targets, both large and small, even in the hottest ground. Furthermore, it produces Ground Balancing which requires minimal adjustment during operation and is stable over large variations in ground mineralisation.

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

## **3. LIST OF PARTS**

The SD2000 is packed in two boxes, one for the detector and one for the 18" Monoloop Coil. Check that you have the following parts:

- a) 18" Monoloop Coil.
- b) 11" Double "D" Coil with Skid Plate.
- c) SD2000 Control Box with built in Armrest.
- d) Upper Shaft.
- e) Intermediate shaft.
- f) Fibreglass Tube (x2).
- g) Handle, including Wrist Strap.
- h) Backpack.
- i) Battery and Cable assembly.
- j) Headphones.
- k) Nylon Bolts. (x4)
- l) Nylon Wing Nuts. (x4)
- m) Mains Battery Charger.
- n) 12V Battery Charger.
- o) Warranty Card
- p) Shoulder Strap.
- q) Shoulder Strap Shaft Clip
- r) Sheepskin Armrest Cover. (Some markets may have a synthetic sheepskin)

## 4. ASSEMBLY OF THE SD 2000

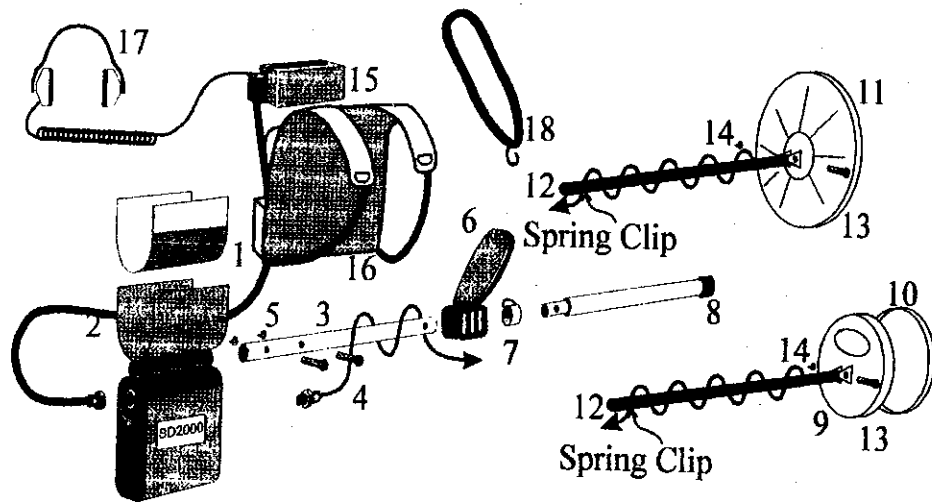


Figure 1: SD 2000 Assembly Diagram

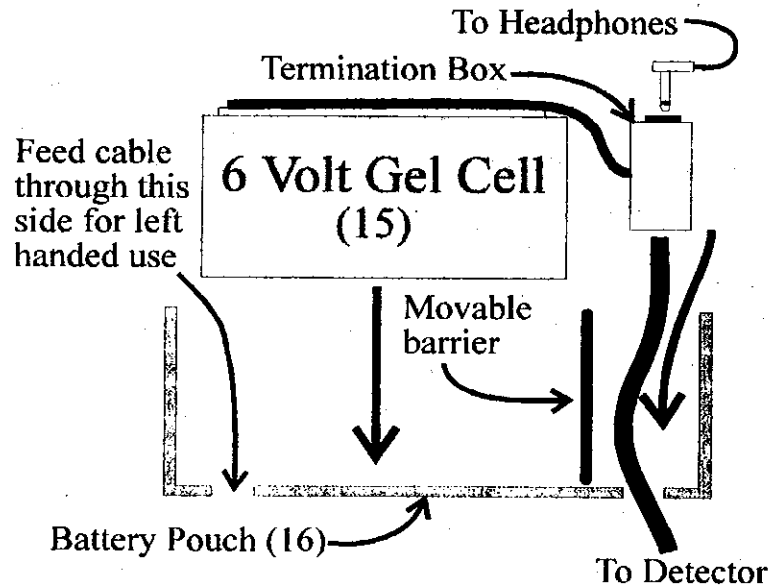
To assemble your SD2000:

- a) Slide the Sheepskin Armrest Cover (1) over the Armrest of the Control Box (2).
- b) Slide the Armrest of the Control Box (2) onto the end of the Upper Shaft (3) with two holes. Ensure the Upper Shaft (3) goes through the hole in the Armrest Cover flap (1). Align the two holes in the shaft with the two holes in the armrest.
- c) Slide the two Nylon Bolts (4) through the holes; screw the Nylon Wing Nuts (5) on to the bolts. Tighten the wing nuts by hand.
- d) Slide the Handle (6) on the other end of the Upper Shaft (3) and set to a comfortable position. Tighten the two screws

with a small flat tipped screwdriver to hold the handle in place.

- e) Slide the Shoulder Strap Shaft Clip (7) onto the Intermediate Shaft (8).
- f) Slide the Intermediate Shaft (8) into the end of the Upper Shaft (3) and snap it into place.
- g) Ensure that the 11" Coil (9) has a Skid plate (10) attached. Push the end of the Fibreglass Tube (12) that has the rubber washers attached into the mounting bracket of the Coil and ensure that the spring clip in the other end of the Fibreglass tube faces the rear of the Coil. Note: There is one Fibreglass Tube for each Coil to allow quick changing of Coils. Line up the holes in the Coil Mounting Bracket and the Fibreglass Tube (12) then push a Nylon Bolt (13) through the holes and fit a Nylon Wing Nut (14) which should be tightened by hand.
- h) Choose the Coil you wish to search with. Slide the Fibreglass tube (12) into the Intermediate Shaft (8).
- i) Adjust the Shaft lengths and Coil angle for a comfortable position.
- j) Wind the Coil Cable around the shaft and plug the Coil connector 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. Leave enough slack at the bottom of the cable near the coil to allow for adjusting the coil angle without placing strain on the coil cable.

k) Feed the power cable through one of the holes (left or right) in the bottom of the lower pouch of the backpack. Fit the Battery (15) into the lower pouch (16). **NOTE: Only use 6 Volt Gel Cell Batteries.** Place the Movable Barrier between the battery and the Termination Box. Plug the headphones (17) into the socket on the Termination Box.



**Figure 2: Battery Installation**

1) Put on the Battery Harness. Ensure that the ON/OFF Switch is set to OFF. Plug the cable from the Battery Harness into the power connector on the control box. This cable connects the battery and the headphones to the detector. The Shoulder Strap can be clipped to the Shoulder Strap Clip on the shaft to take some of the weight when prospecting. There is also an adjustable hand strap on the handle which allows you to relax and flex your fingers without putting the detector down.

## **5. OPERATING INSTRUCTIONS**

### **5.1 The Controls**

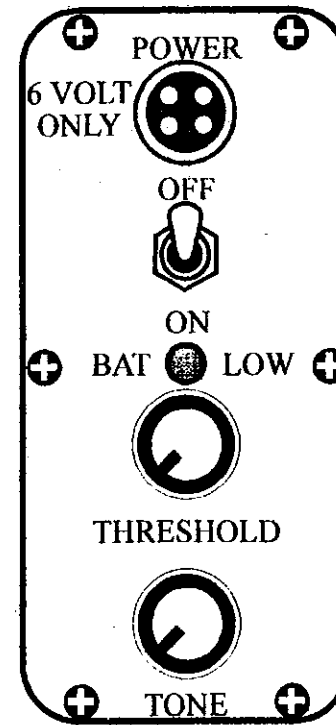
#### **5.1.1 On / Off**

The **On / Off Switch** turns the power from the battery to the detector on and off. Always turn the detector **Off**:

- before connecting and disconnecting the coil or battery pack, and
- when not in use.

#### **5.1.2 Threshold**

The **Threshold Control** is used to control the loudness of the background tone. It should be set to a level which is just barely audible.



**Figure 3 Rear Panel** It is important to know that small surface objects, as well as large deeply situated objects may produce only very small changes in the threshold tone rather than produce a distinct target signal. These targets may not be detected if the background threshold is set either too high or too low.

#### **5.1.2 Tone**

The pitch of the background tone can be adjusted to suit the individual using the **Tone Control**. It should be noted that interpretation of the detection signals will involve discerning the difference between rising pitch and falling pitch.

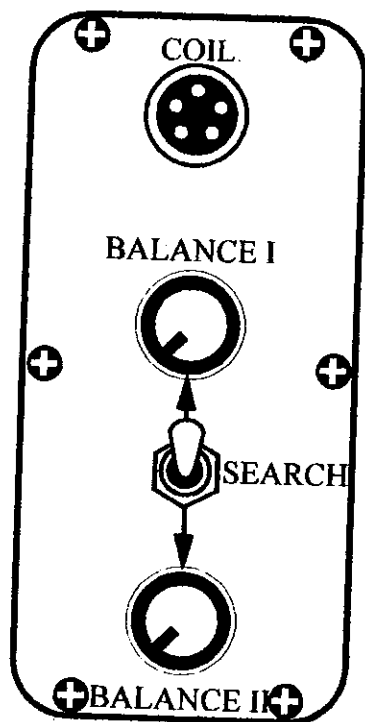


Figure 4 Front Panel

#### 5.1.4 Mode Switch

The Mode Switch is used to select one of the two Ground Balancing modes or the Search Mode. Ground balancing should be carried out at the beginning of each search and when ground noise becomes unacceptable (see Section 5.3). The SD2000 is essentially two detectors in one. Each "half" of the detector must be Ground Balanced separately. After ground balancing has been completed, prospecting is performed with the Mode Switch in the "Search" position. In this central position both "halves" of the detector operate simultaneously.

#### 5.1.5 Balance I and II

The Balance Controls allow the detector to be adjusted to suit varying ground mineralisation levels. Each one is adjusted with the Mode Switch in the respective position. If the effects of ground mineralisation are not balanced, signals due to metal objects will be very hard to distinguish from background noises.

#### 5.1.6 Headphones

The SD 2000 does not have an external speaker, all audio is heard through headphones. The headphones plug into the Headphones Socket on the Battery Cable Assembly.

## 5.2 Detector Sounds

- **Threshold:** This is the background tone produced by the detector.

The loudness of the background tone is set with the Threshold Control. It should be set so that it can just be heard and the pitch of the threshold tone can be set to your personal preference using the Tone Control. The volume of the threshold tone of the SD2000 will not decrease below the level set with the Threshold Control.

- **Object Sound:** Abrupt variation of the Threshold tone volume and pitch.

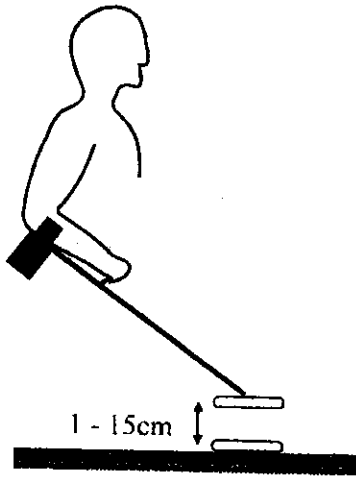
If the pitch drops this generally indicates a small target. Conversely if the pitch rises this generally indicates a large target.

- **Ground Noise:** Slow variation of volume and pitch of the Threshold.

These variations in Threshold Tone can be reduced to a very low level with adjustment of the Balance Controls as described in the "Ground Balancing" section.

## 5.3 Ground Balancing

It is important to "Ground Balance" the SD2000 to the local conditions before commencing a search. Assuming that the detector is operating with the Threshold and Tone set, adjust the Balance Controls using the following procedure:



Set the Mode Switch to the 'Balance I' setting. Move the coil up and down between 1cm to 15cm above the ground. As the coil moves up and down, the volume and the pitch of the Threshold Tone will change if the detector is not ground balanced.

Adjust the Balance I Control so that no variation in volume or pitch is heard as the Coil is moved up and down.

**Figure 5 Ground Balance Action**

When this is achieved the detector is said to be "Balanced" or "Ground Balanced". The greater the change in the volume or pitch of the Threshold Tone as the coil is moved above the ground the further out of adjustment the Balance Controls are.

When the detector is balanced with the Mode Switch in the Balance I position, switch to Balance II and, using the Balance II Control, repeat the process described above. When the detector is balanced in both positions, switch to Search and commence prospecting. If "Ground Noises" become excessive while searching simply re-ground balance the detector using the technique described above.

## 5.4 The Batteries

The 6 Volt Gel Battery supplied with your *SD2000* will last for approximately 16 hours from being fully charged. When the charge of the battery drops to a low level, the BAT LOW light on

the rear control panel will flash. If the *SD2000* is operated when the "BAT LOW" light is flashing it may become unstable.

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

Two different kinds of battery chargers (Mains and 12V) are supplied with the detector to facilitate charging of the battery under various conditions. Gel cells, unlike Nicads do not suffer from memory problems and may be recharged at any time during their discharge cycle. It is very important to fully charge Gel Cells before storage. Do not leave a battery fully discharged for longer than 1 day.

### **Charging Batteries**

Before disconnecting the battery in order to recharge it, turn the *SD2000* OFF. The battery cable may then be disconnected from the detector and plugged into the appropriate charger.

#### Mains Charger

The supplied mains charger will charge the Gel Cell Battery from the local mains (AC) power. Follow the 'Charging Batteries' instructions and plug the battery lead into the charger, then plug the mains charger into a mains outlet. Switch the mains outlet on. Check the charger name plate, it will be rated at 1A/Hr or 0.5A/Hr. The 1A/Hr charger will recharge a completely flat battery in approximately. 10 hours, the 0.5A/Hr charger will take approximately. 20 hours. Partially discharged batteries obviously require a shorter period to recharge. **Do not leave partially discharged batteries on charge overnight. Do not leave the mains charger on for extended periods as reduced battery life may result.**



## Vehicle Battery Charger

The Vehicle Battery Charger supplied with the *SD2000* will charge the Gel Cell Battery from the cigarette lighter socket of your motor vehicle. Follow the 'Charging Batteries' instructions and plug the battery lead into the charger, then plug the charger into the cigarette lighter socket. The engine need not be running for the charger to work, but usually the ignition switch should be set to 'Accessories' to apply power to the cigarette lighter socket.

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 cease charging. This prevents the battery charger from flattening the vehicle battery. However, make sure 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.

Please Note: The 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.

**If the battery is re-connected incorrectly you will damage your detector. This damage is not covered by warranty.**

## **5.5 The Search Coils**

**The SD2000 is supplied with two Coils:**

### **5.5.1 18" Monoloop**

The 18" Monoloop is the coil that will give maximum detection depth for most searching. It will work well in areas that are mildly salty, however it is not recommended for use in very salty areas such as salt lakes.

The Monoloop coil consists of only one coil of wire and gives a detection pattern similar to a Concentric Coil.

**DO NOT PLUG THIS COIL INTO ANY OTHER DETECTOR!**

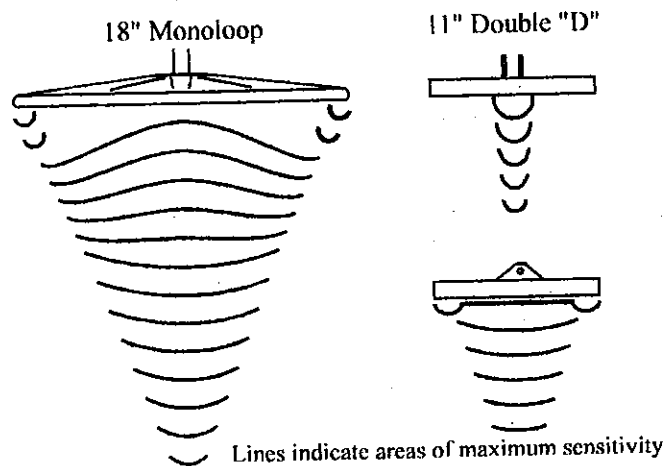
**This action may damage other detectors and the damage is not covered by warranty.**

### **5.5.2 11" Double "D"**

The 11" Double "D" Coil is useful for pinpointing small objects and in environments where space is at a premium. The 11" Double "D" Coil is suitable for use in all salty conditions, but you will still notice some interfering signals from high concentrations of salt. It is also recommended for areas where the mineralisation changes dramatically from one location to the next. These rare areas usually have substantial changes in ground colour which enable them to be identified.

The 18" Monoloop may give "deep object" signals as the coil covers areas of different mineralisation. With the 11" Double "D" these spurious ground signals are fainter and it is possible to learn to distinguish the ground signals from object signals. However in the majority of soil's false signals are rare.

It is important that you do not put any adhesive tape such as duct or electrical/insulation tape around the 11" coil to hold the skid plate in place as this may significantly reduce the performance of the detector.



**Figure 6 Coil Search Patterns**

## **6. DETECTING TECHNIQUES**

### **6.1 Searching**

The SD2000 is a "motion" detector, which means that it must be moving in relation to a target in order to detect it.

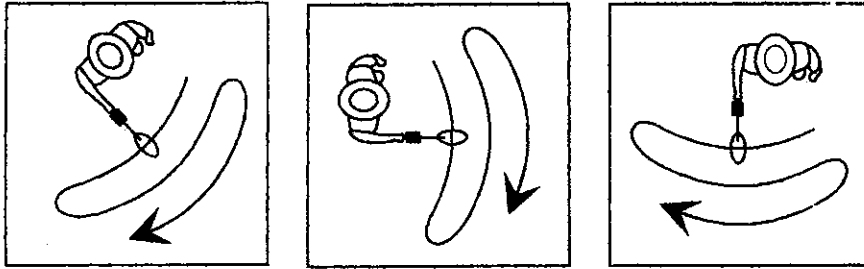
The battery should be worn in the Backpack supplied. This places the battery at the furthest practical distance from the coil. If the battery is worn on your side the 18" Coil will detect it and cause false signals.

Ensure that you do not set your shaft length too short. If the coil is too close to your body it may detect your pick, the battery or any other metal which you may be carrying.

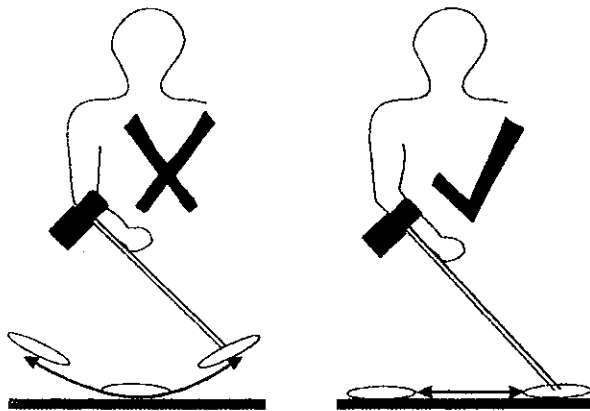
**Do not wear steel cap boots!**

If you find that you are getting false signals as you sweep the coil ensure they are not produced by metal that you are carrying. Move the coil closer and further away from your body to determine if the signals are coming from items such as your pick or battery. If the signals are from these items take steps to increase the distance between the coil and these items.

The Coil should be swept over the ground in a side to side sweeping motion. Coupled with the slow forward motion of the operator, the search pattern resembles a snaking motion. To ensure that the ground is thoroughly searched it is advisable to approach the area from 3 directions using the 11" coil as shown in diagram 7. When using the 18" coil, a single sweep of the coil will cover the ground thoroughly enough.



**Figure 7 Search Pattern**



**Figure 8 Coil Sweep Action**

sweep as this will reduce your detection depth.

Each sweep of the coil should overlap the area covered by the previous sweep to ensure a full coverage of the area being searched.

While sweeping the coil it is important to keep it at a constant parallel height above the ground at all times, and ideally it should be touching the ground. Be aware of any tendency to raise the coil at the ends of each

**Hints for maximum gold recovery:**

- a) Keep the coil as close to the ground as possible.
- b) Listen very carefully. This is more important than concentrating on looking.
- c) Do not rush, take your time.

**6.2 Identifying Target Signals**

A summary of the sounds of the detector is given in the "Detector Sounds" section of the "Operating Instructions" chapter.

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 irregular response when the coil is swept from different directions, whereas responses from a metallic target are generally narrow, sharp and symmetrical.

If you are not sure whether the sound is ground noise or indicates a target, you need to further determine the validity of the signal. Scrape a shallow hole about 7 to 10cm deep over the suspected target. Sweep the coil over the hole at the original ground level; do not dip the coil into the hole. If the signal has decreased in volume and area it is a ground noise. If the signal remains the same or increases, it is a metallic target. If you are still not sure, make the hole deeper and repeat the process.

Be aware that this technique is not entirely reliable and should only be used once you have learned to interpret the various signals. The Halo Effect which is built up around a buried metal object making it appear to be larger to the SD2000 than it actual is will be reduced once the soil has

been moved. This can then cause the strength of the object signal to reduce which may then be mistaken for ground noise.

It is not recommended that you try to eliminate what might appear to be a faint, isolated ground noise by balancing the SD2000; such a response can be from a deeply buried metallic target.

### 6.3 Pin-Pointing

In order to save time in the recovery of an object and to reduce the size of the hole required to extract it from the ground, it is necessary to pin-point the object's exact location. The technique described here will be particularly useful with the Double "D" coil, but will also work with the 18" Monoloop.

When a likely object is detected, sweep the general area, taking note of where the strongest signal is received as the coil is moved over the object. By decreasing the length of the sweep it should be possible to draw an imaginary line in the ground where the strongest signal is located.

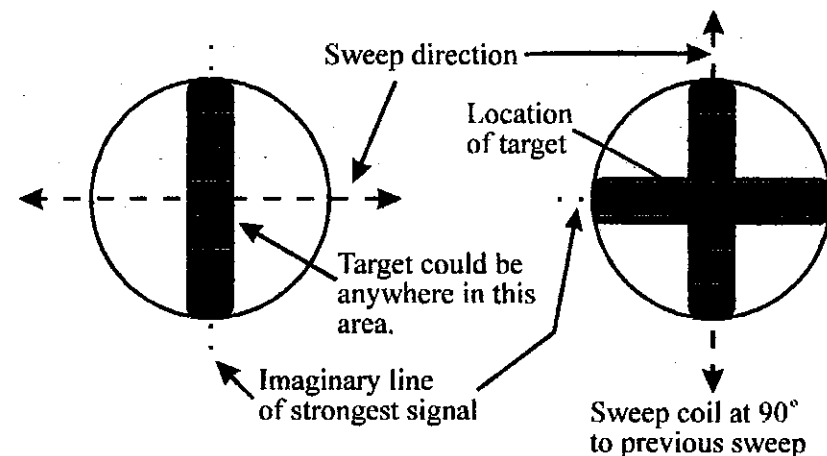


Figure 9 Pin-Pointing

Now, move around the target so that you are facing the target at 90° to the initial direction and repeat the process. Where the two imaginary lines cross is where the object is located. Small shallow nuggets will give a signal near the rim of the 18" Monoloop. Turning the detector on it's side and moving the coil while it is vertical may assist in pinpointing.

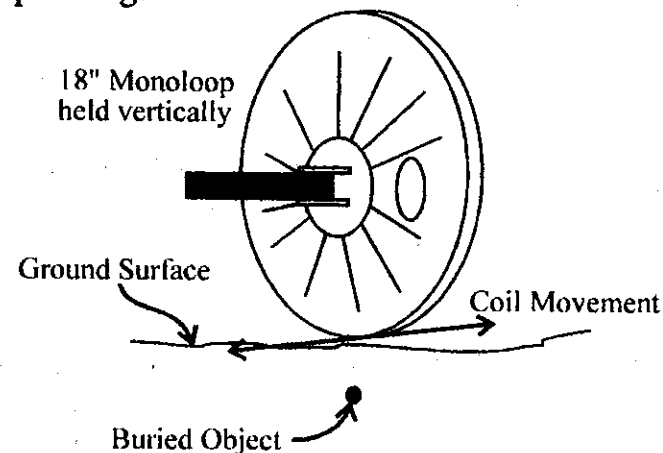


Figure 10 Vertical Coil Pin-Pointing

## 6.4 Digging the Target

Once you have established the location of the target it is necessary to dig a small hole to recover it. In order to preserve the environment, it is essential to make the hole as small as possible and always replace the soil or grass which is removed.

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

- a small, strong digging spade.
- a small 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 is not visible, sweep over the hole. If the signal has gone then it must be in the pile just dug. Take care when you dig as damaging a nugget can reduce its value. Also, pile the diggings carefully as it might be necessary to search them systematically and it will also be necessary to replace them, just as they were dug, once your search ends.

If it becomes evident that the target is located in the dug pile, sweep the coil over the pile. Be sure that there are no objects buried in the soil beneath the pile. Use the method of progressively halving the pile which has the target within it. 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 away from the pile and repeat with another handful. Of course, your hands and wrists must be free of any metallic jewellery and watches.

Once the object has been recovered it is a good idea to sweep the hole again to ensure that there are no other targets to be detected. When you have found an object in a particular hole, search the surrounding area very carefully as it very likely that there are more objects nearby. **Fill in the holes.**

## 6.5 Digging Deep Targets

The SD2000 has unparalleled depth capabilities which will surprise experienced and new prospectors alike. If the target appears to be deeply buried it will help to follow the following technique.

Use the cross sweeping method to locate the target as accurately as you can. Scrape a hole about 15x30 cm and about 10 cm deep.

**Turn the detector coil onto its edge, making it vertical, and probe various sections of the hole listening for the loudest reading. The 18" Monoloop is responsive at all parts of its edge. The Double "D" is better for precisely locating an object. Once the target is recovered: Fill in the hole.**

## 6.6 Salty Environments

The SD2000 will find objects at great depth in salty environments, however the interfering signals caused by the

saturated salt or highly concentrated salt can not be completely "balanced out." The 11" Double "D" coil will give best results in salty conditions.

## **7. PROSPECTING TIPS**

### **7.1 The SD2000**

The SD2000 has superior ground cancelling and it is possible to find quite large objects near the surface in well worked areas simply because other detectors have been unable to cope with the high degree of mineralisation. In light of this, you should not ignore what can seem to be 'unlikely' responses. In other words: Dig loud signals even in "thrashed" areas.

Very large variations in the mineralisation of an area can produce a signal in the detector. Typically in the Victorian goldfields you might get a response from a concentration of orange/reddish dyke material or clay. Similarly in the loamy conditions of Western Australia a pocket of dark orange/reddish colouration might produce a sudden signal variation. However, it is not recommended that you try to ground balance the detector in an attempt to cancel a questionable response. This can produce cancellation of weak signals from very deep targets.

### **7.2 Charcoal**

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. The growth is burnt below the ground level, so it is not always obvious what the sounds are until you have actually dug up

the causes of these noises a few times. Charcoal can be identified by following the instructions in section 6.3 "Identifying Target Signals". Once the charcoal is removed from the ground the signal will vanish.

## **8. MAINTENANCE**

### **8.1 Care of Your SD2000**

The SD2000 is a high quality electronic instrument which is finely engineered and housed in a durable container. Taking care of it is mostly common sense.

- It is very important to keep the connectors clean and **vitaly important to keep them dry.**
- Do not expose the detector in high temperatures or in the sun longer than necessary. Shading it 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. We recommend that you use a replaceable skid plate on the 11" coil to protect it.
- The Control Box is not waterproof, even though it has been designed to be water resistant. Avoid getting it wet.
- 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. Do not use solvents to clean the detector; use a damp cloth with mild soap detergent.

## 9. TROUBLESHOOTING

Use the following table to check for problems which can be diagnosed by you:-

Fault	Suggestion
No Sound	Turn Threshold control fully clockwise. Check cable connections Check Headphones Check battery
Threshold tone but no object detection	Check coil connection
Random noises	Charge battery
Battery will not charge from vehicle battery	Check for power to cigarette lighter socket.

## 10. WARRANTY

There is a two year parts and labour warranty on the SD2000. Refer to your Warranty Card for details. The Search Coils are warranted for one year. Refer to your supplier or Minelab for service, either in or out of warranty.

NOTE: This warranty is not transferable, nor is it 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, for the purpose of recording the date, which is the actual commencement of the warranty.

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 machine's 'Product Warranty Card'.

# 11. SPECIFICATIONS

(subject to change without notice.)

Length	Max	1.3m
	Min	1.1m
Weight	Complete (Exc. Batt)	2.4kg
Configuration	Shaftmount	Yes
	Hipmount	No
Transmission	Multi Period Sensing	
Ground Rejection	Dual Ground Balance	
Search Mode	Motion	
Controls	On/Off	2 Pos Sw
	Threshold	1 Turn
	Balance I	10 Turn
	Balance II	10 Turn
	Tone	1 Turn
	Search	3 Pos Sw
Audio O/P	Loudspeaker	No
	1/4" Headphone Jack	Stereo
Batteries	6V 10 A/Hr Gel Cell	
	Duration	16 Hrs+
Search Coils	11" Round	
		Windings DD
	Weight	720gm
	Cable Length	1.2m
	18" Round	
	Windings	Mono loop
	Weight	850gm
	Cable Length	1.2m
Patents	AUS 602132, AUS 633536 US4890064, others pending.	