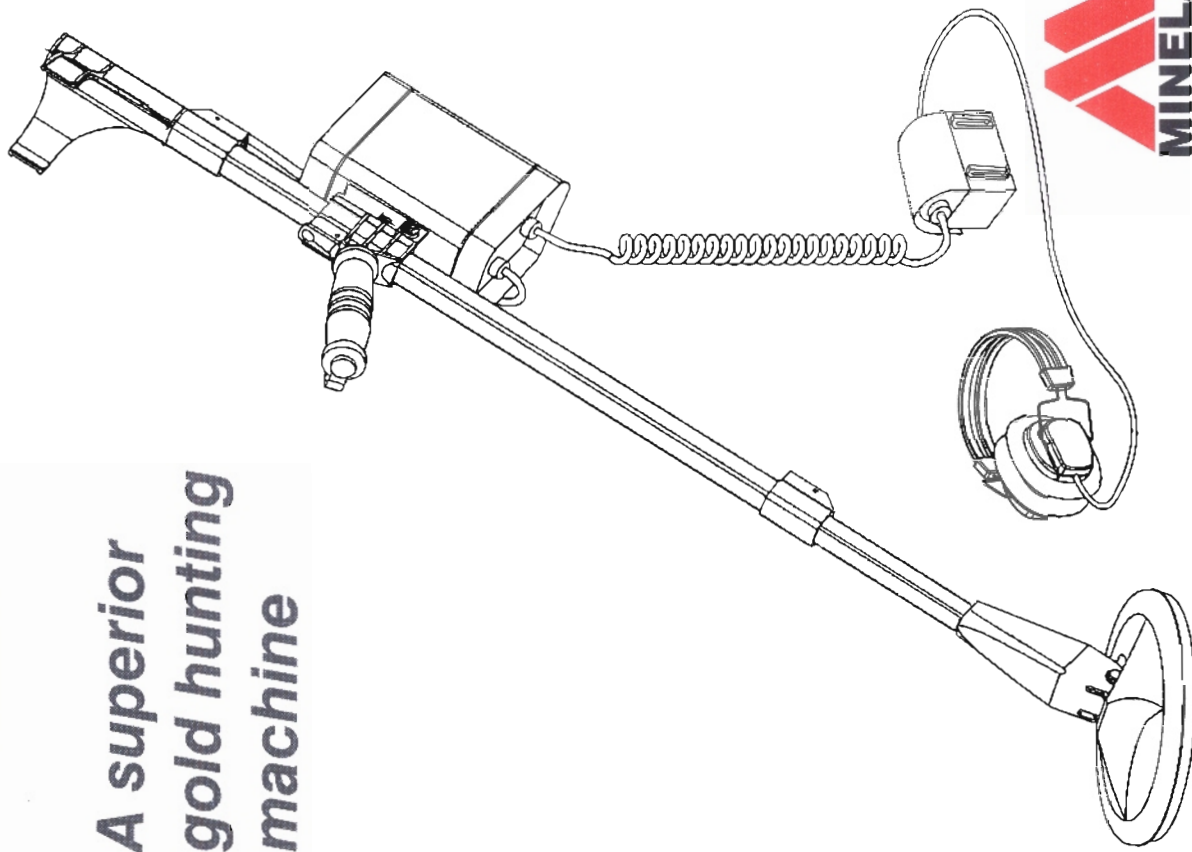


The Minelab Golden Hawk Gold Detector

*A superior
gold hunting
machine*



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MINELAB GOLDEN HAWK INSTRUCTION MANUAL

CONTENTS

	Page
1. Introduction	3
2. Specifications	5
3. Parts List	7
4. Unpacking and Assembly	9
4.1 Shaft Assembly	9
4.2 Control Box	11
4.3 Armrest	13
4.4 Battery Pack	14
4.5 Mains Battery Charger	15
4.6 Comfort Adjustments	16
5. The Golden Hawk Controls	17
5.1 QuickStart Operating Instructions	24
5.2 Operating Instructions — Fundamentals	27
6. Detecting Techniques	30
7. Prospecting Tips	37
8. The Coil and its Skid Plate	40
9. Environmental Concerns	41
10. Care of the Golden Hawk Detector	42
10.1 Trouble-shooting Guide	43
11. Warranty and Service	44
Minelab Service Repair Form	45
FCC Compliance and EC Conformity NOTES	46

1. Introduction

Congratulations on purchasing Minelab's Golden Hawk gold detector.

The Golden Hawk can constantly and automatically adjust the Ground Balance to keep it at the correct setting. This will ensure that the detector is always operating to its optimum strength, reducing operator fatigue and allowing more ground to be covered in a day's detecting.

For sensitivity to a range of targets, the Golden Hawk has a choice of three operating frequencies:

- 6.4 kHz,
- 20 kHz, and
- 60 kHz.

Further refinements include target detection with pitch variation, better signal-to-noise ratio in the electronics, and an 8" (20 cm) 'Double D' coil as standard equipment.

This manual has been arranged with QuickStart instructions for experienced users near the centre of the book. More detailed notes about assembling the detector, how its controls work, and methods of detecting are also included.

As always at Minelab Electronics, we strive to provide you with the best metal detection equipment possible. With that in mind we present the **Golden Hawk — the best continuous wave detector available today**. If you have any questions or comments we would like to hear from you. Please contact your local Authorised Minelab Dealer or write to us direct.

We wish you every success in your treasure hunting.

WARNING

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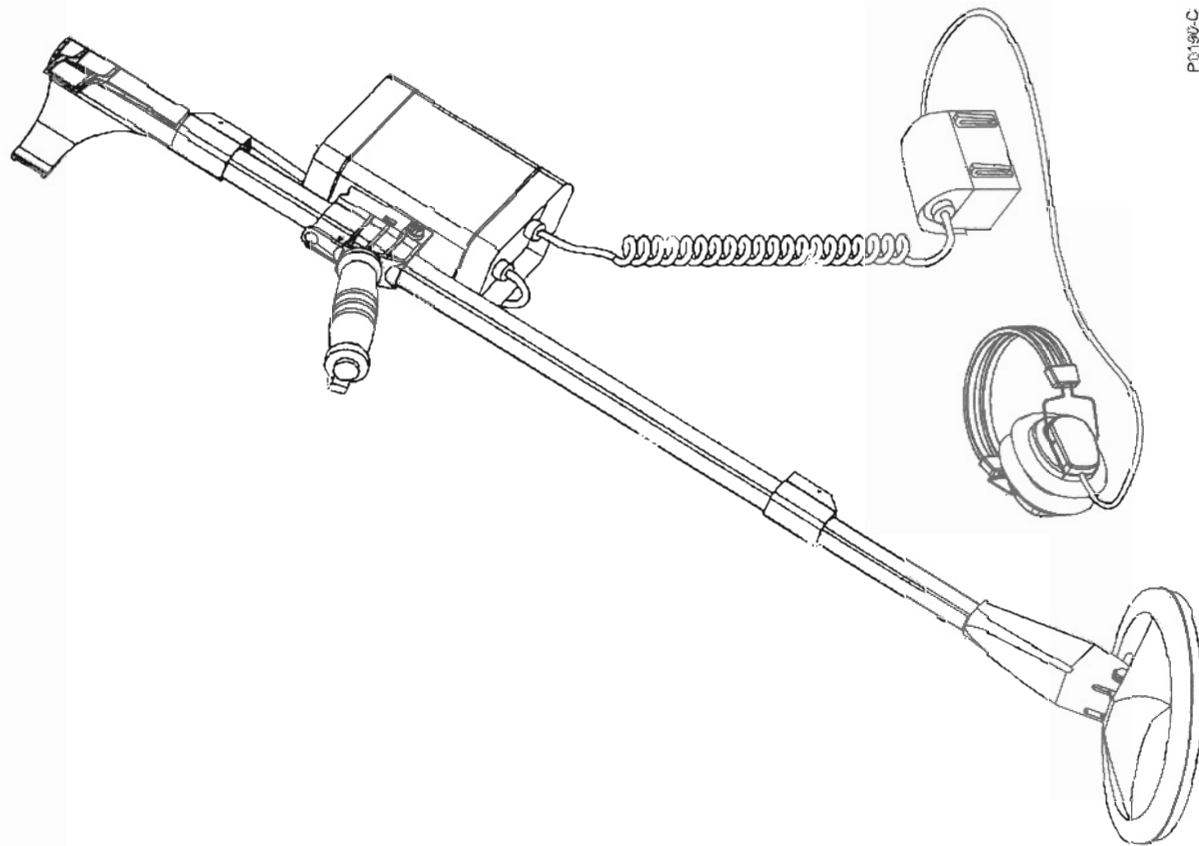
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2. Specifications

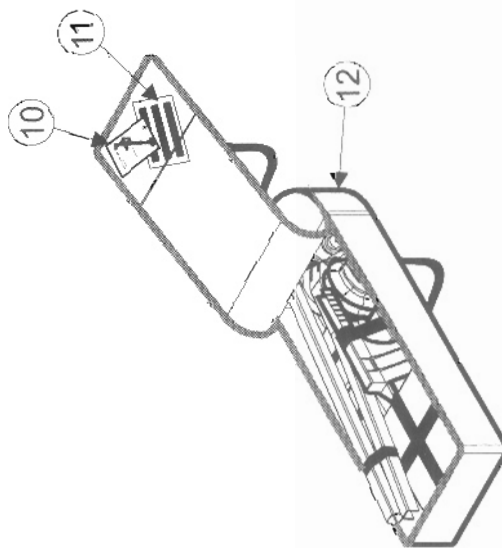
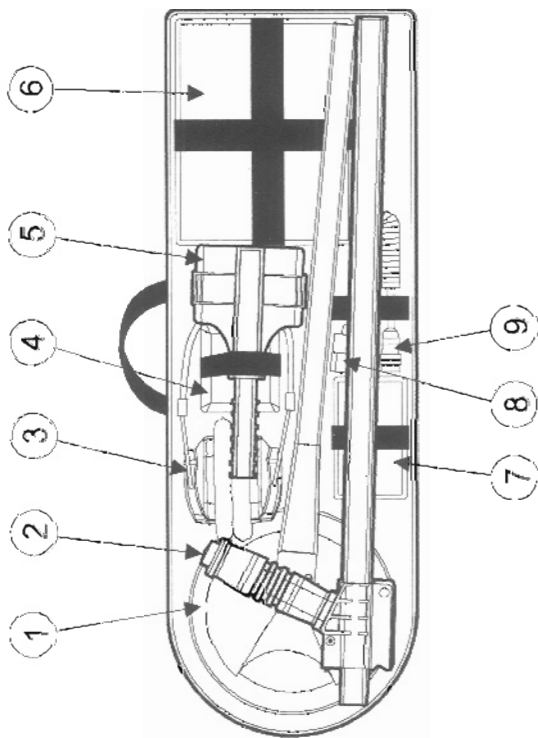
These specifications are subject to change without notice.

Length	Packed length Operating length (min) (max)	710 mm 1200 mm 1450 mm
Weight	Control Box Complete unit (excluding battery)	800g 2.2kg
Batteries	Rechargeable Lead Acid Battery Pack	12V, 1.2Ah/20hr $\approx$
Coil	8" 'Double D' with Skid Plate	
Headphones	Impedance Jack - Stereo / Mono	8 Ω 1/4"
Frequency	Transmission, sine	6.4, 20 and 60 kHz
Ground Balance	Automatic, with no loss of sensitivity	
Search Modes	Motion Detector Balance Discrimination	Always Track 1, Fixed and Track 2 All Metal Discriminate (Reject Iron)
Controls	Power (On / Off) Volume Threshold Sensitivity Tone Discriminate Signal Soil Recovery Balance	Switch 2 Pos. Control 1 turn Control 1 turn Control 1 turn Control 1 turn Switch 2 Pos. Switch 3 Pos. Switch 2 Pos. Switch 3 Pos. Switch 3 Pos.
Charger	110/240V Mains charger for rechargeable battery	
Warranty	Control Box Coil	2 years 1 year
Patents	Patents apply	



PD190-C

Figure 1 -- The Golden Hawk Detector



P0191-B

Figure 2 – Golden Hawk Backpack (incl. packing layout)

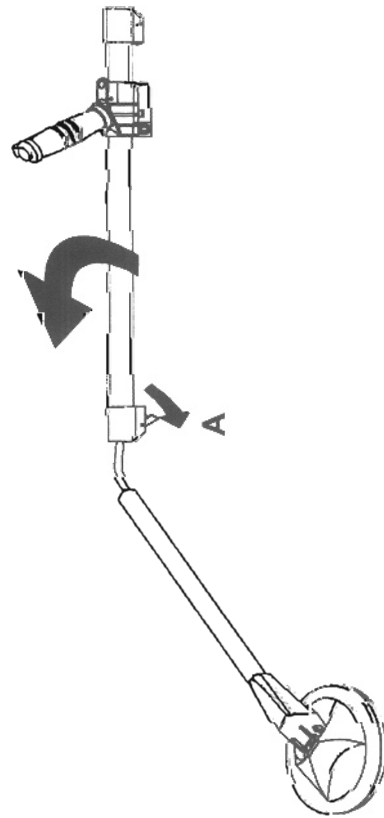
3. Parts List

The box in which your Golden Hawk detector is shipped should contain the following items. When you first receive your detector, please check that all of these items are in the box:

Item No.	Description
1.	8" Coil with Lower Shaft attached
2.	Upper Shaft with Handle attached
3.	Headphones
4.	Battery Charger
5.	Armrest
6.	Control Box (in Control Bag)
7.	Rechargeable Lead-Acid Battery (in Belt Pouch)
8.	Mains Lead for Battery Charger
9.	Battery Cable
10.	Instruction Manual
11.	Field Guide
12.	Backpack

NOTE:

A spare strap is attached to the base of the Backpack to secure a battery cable, spare battery or other accessory.



4. Unpacking and Assembly

- Open the Backpack and check all components (as listed in Section 3) are present and undamaged.
- Remove the components and assemble the Detector in the following sequence.

4.1 Shaft Assembly (see Figure 3)

- Remove the Upper Shaft (including the Handle) and Lower Shaft (including the Coil) from their restraints in the Backpack.
- The two shaft assemblies are connected by the coil cable that runs through the inside of these hollow components.
- Release the locking lever (A) on the bottom end of the Upper Shaft, position the small end of the Lower Shaft inside the Upper Shaft and clamp these components together using the locking lever (A).
- Before attaching the Armrest, decide how the Control Box is to be positioned (see the diagrams in section 4.3 for more details on the correct positioning of the coil cable). Release the locking lever (B) at the top end of the Upper Shaft (the locking lever is part of an assembly known as a 'camlock'). Position the selected grommet (G) on the coil cable through the keyway in the upper locking lever, place the end of the armrest inside the Upper Shaft and clamp these two components together with the locking lever.

NOTE:

It is not necessary to remove the cable from the shafts during normal use and storage. However, if the cable is removed from the shafts, twisting the coiled section of the cable to 'tighten' the coil will make reinsertion easier. This technique simplifies shaft reassembly.

To repack the Detector in its Backpack, replace the components in the following sequence:

- Coil, attached to the Lower Shaft
- Upper Shaft, with Handle attached
- Armrest (slides over the two shafts), and Control Box.

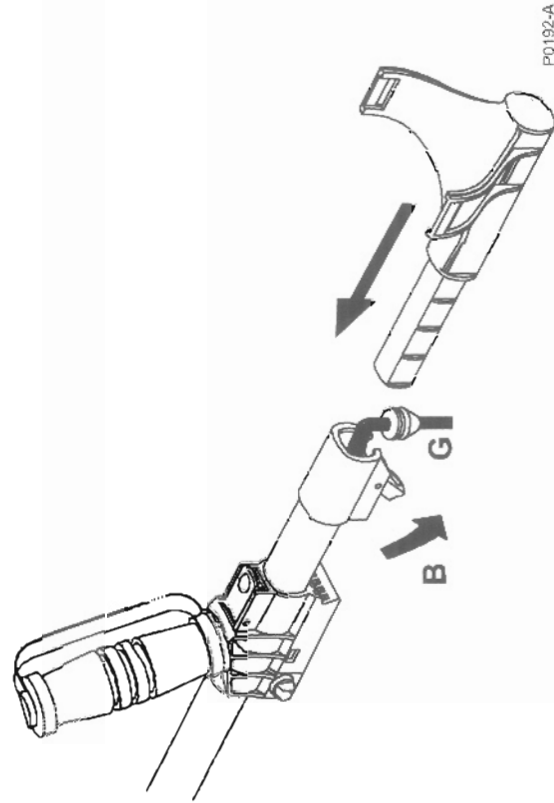


Figure 3 - The Golden Hawk Shaft Assembly

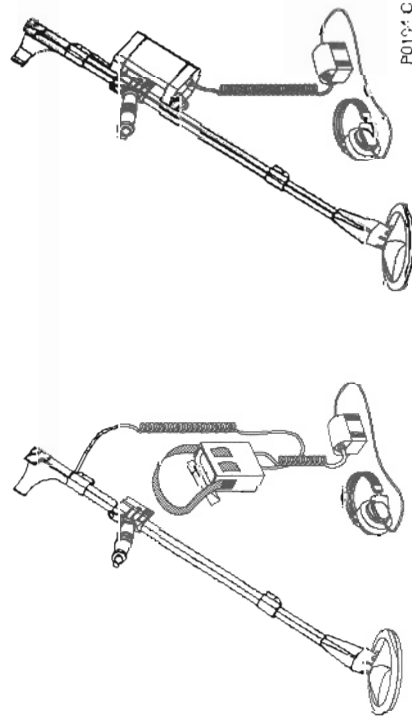


Figure 4 - Control Box Configurations

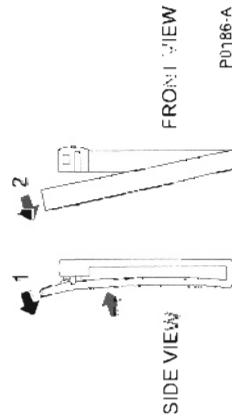


Figure 5 - Golden Hawk belt clips

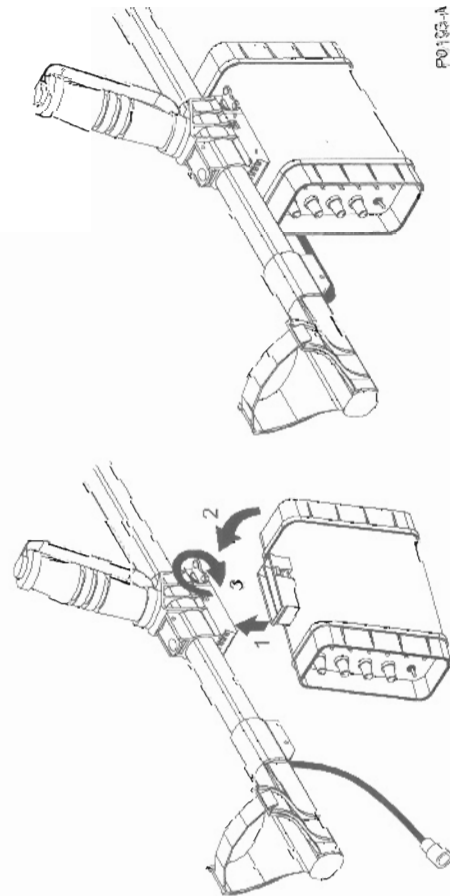


Figure 6 - Mounting the Control Box on the Shaft

4.2 Control Box

Position the Control Box in one of the following locations (see Figure 4):

- It can be placed in its Control Bag which is attached to the operator's waist via two belt clips (see Figure 5),
- When the webbing strap is used, the Control Bag can hang around the operator's neck, or be worn over the shoulder, or
- It can be attached to the Upper Shaft via a locking bracket located beneath the handle.

- a. If the Control Bag is to be used to carry the Control Box (either worn on the belt or as a shoulder pack), position the grommet (G1) (located between the two curled sections of the coil cable) into the keyway beneath the locking lever at the top end of the Upper Shaft. The plug end of the coil cable is then connected to the socket marked 'Coil' on the Control Panel (see the diagrams in section 4.3 for more details on the positioning of the coil cable).

Place the Control Box into the bag with the Control Panel facing upward and toward you. The 'Coil' and 'Power' sockets should face the bottom of the bag. Once the box is in the bag you can attach the Coil and Power cables to the sockets through cutouts in the underside of the bag. The plug end of the coil cable is connected to the 'Coil' socket, and the Military plug on the end of the battery cable is connected to the 'Power' socket.

- b. If the Control Box is to be mounted on the Upper Shaft, the mounting block on the Control Box is pushed into the locking bracket immediately beneath the Handle (see Step (1) then (2) on Figure 6). Rectangular lugs on the mounting block snap into rectangular holes on the sides of the locking bracket to hold the Control Box loosely in position. To lock the bracket, turn the locking pin at the front end of the bracket clockwise until it stops (Step (3)). The plug end of the coil cable is then connected to the 'Coil' socket on the Control Panel and the Military plug on the end of the battery cable is connected to the 'Power' socket.
- c. To remove the Control Box when it is attached to the underside of the shaft it is necessary to release the locking pin and disengage the mounting block on the Control Box from the locking bracket beneath the shaft.

4.3 Armrest (see Figure 7)

- Insert the pointed end of the retaining strap through one of the slots at the base of the Armrest, then through the slots at the top of the wings of the Armrest. When the operator's arm is in the Armrest, the protruding part of the "Velcro™" strap should be fixed to make a firm fit.
- Decide whether the Control Box is to be attached to the shaft assembly or housed in the Control Bag, as this will determine what length of coil should protrude from the Upper Shaft above the Handle.
- If the Control Box is to be attached to the shaft, position the cable grommet (G2) (closest to the plug end of the coil cable) into the keyway beneath the locking lever at the top end of the Upper Shaft (surplus coil cable is stored inside the hollow Upper Shaft).
- Alternatively, if the Control Box is to be carried in its Control Bag, position the grommet (G1) (located between the two curled sections of the coil cable) into the keyway beneath the locking lever at the top end of the Upper Shaft.
- When the appropriate grommet is positioned in the keyway, push the end of the armrest assembly into the camlock on the top end of the Upper Shaft and clamp using the locking lever.

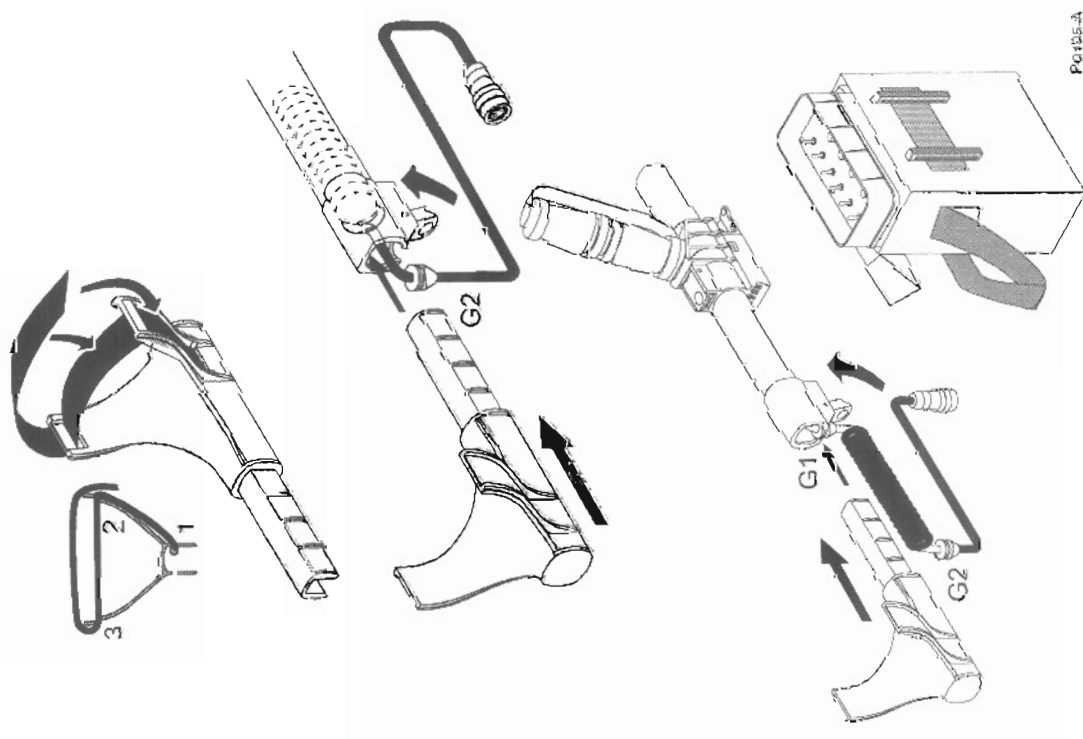


Figure 7 - Armrest and Cable Length Configurations

4.5 Mains Battery Charger (see Figure 9)

The Minelab 12V Lead Acid Battery pack can be recharged using the mains-powered charger:

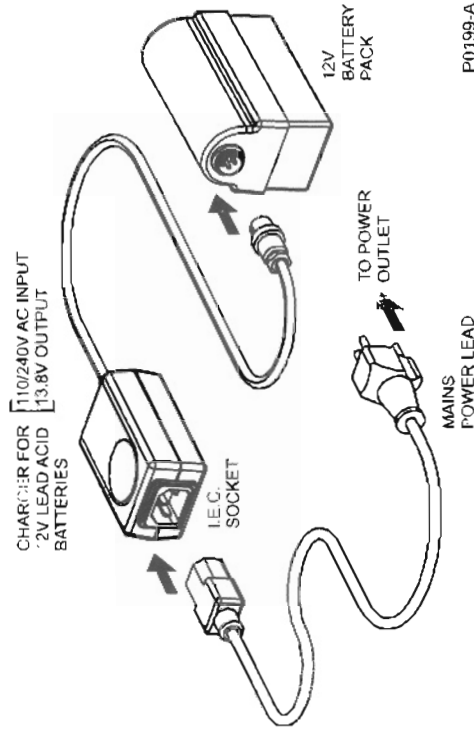


Figure 9 - Relic Hawk Mains Battery Charger Connections

To recharge the battery:

- Disconnect the curly cable from the side of the battery cap by unscrewing the locking ring on the 5-pin plug. Then gently pull the plug out of the socket.
- Connect the Charger's 5-pin plug to the 5-pin socket in the battery cap and tighten the locking ring to ensure good electrical contact.
- Connect the supplied mains power lead into the battery charger's I.E.C. socket.
- Connect the power lead to a mains power outlet and switch on. Leave the charger switched on with the battery attached for a minimum of 6 hours to fully recharge the battery.

NOTE:

Minelab advise detector owners to observe the following procedure to ensure their warranty and to extend battery life. Whenever the detector is not in use the battery should be connected to the charger with the power switched on. This procedure will not harm the battery or charger as an automatic cut-off is activated when the battery is fully charged.

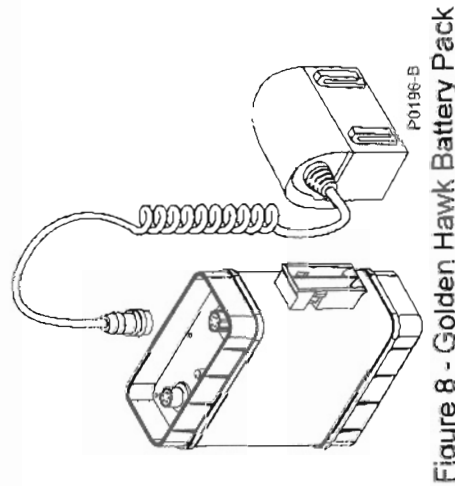


Figure 8 - Golden Hawk Battery Pack

4.4 Battery Pack (see Figure 8)

The detector can only be powered by the supplied battery pack. Before connecting or disconnecting the battery pack ensure that the unit is switched Off at the Control Panel.

- To provide power to your detector from the battery pack it is necessary to connect the 5-pin plug at one end of the battery cable to the 5-pin socket in the battery cap.
- The other end of the cable is connected to the 'Power' socket located on the base of the Control Box.
- Place the battery into the belt mounted battery pouch and secure the flap. Attach the battery pouch to your belt using the plastic belt clips.
- The belt clips used on the battery pack are identical to those used on the Control Bag (see Figure 5 for details of clip operation).
- You can remove the battery from the pouch any time for recharging or to check connections without removing the pouch from your belt.
- The detector can now be switched On and operations commenced.

NOTE:

The battery pack also provides the Audio output for the Detector from a headphone socket at the opposite end of the battery cap (see page 23).

The 'Low Battery' alarm is an audible beep that is emitted through the headphones every 12 seconds.

4.6 Comfort Adjustments (see Figure 10)

- Releasing the locking lever at the top end of the Upper Shaft permits up to 50 mm adjustment of the position of the armrest assembly, relative to the handle position.
- Releasing the locking lever at the base of the Handle allows the handgrip to be repositioned along the length of the Upper Shaft.
- Releasing the locking lever at the bottom end of the Upper Shaft enables the effective length of the Lower Shaft to be altered.
- The hand strap can be changed from right to left handed use by slipping the loop through the retaining lock and re-inserting the strap from the other side.
- The coil angle can be adjusted without adjusting the coil clamping nut.

CAUTION

Ensure the clamping nut is not over tightened.

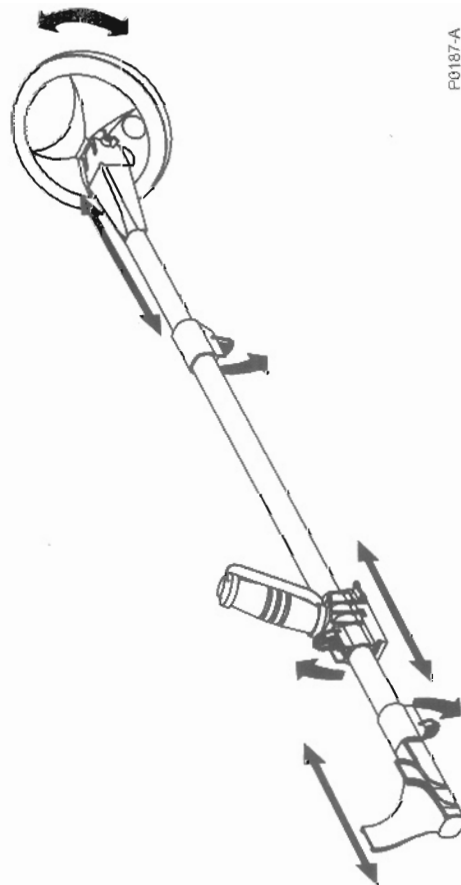


Figure 10 - Comfort Adjustments

5. The Golden Hawk Controls

This section gives detailed descriptions of the controls of the Golden Hawk detector and its functionality. Having knowledge of these controls means that you will be able to achieve the best performance from your detector. As you gain experience with your detector it may be useful to refer back to this section.

FOR QUICKSTART INSTRUCTIONS REFER TO PAGE 24

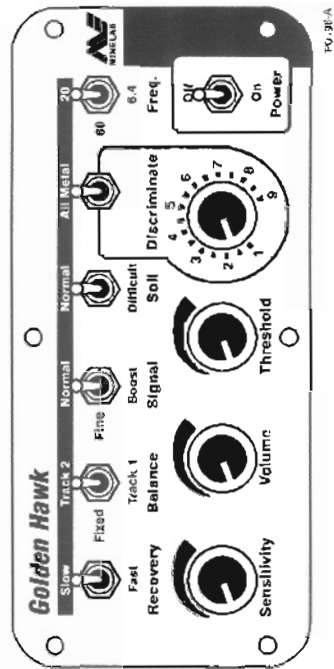


Figure 11 - The Golden Hawk Control Panel

The Control Panel of the Golden Hawk has been carefully designed, especially the placement of the controls, so those you will need to use most frequently are at your finger tips (see Figure 11).

The most commonly used switch positions have been indicated with a gold panel enabling you to 'set up' your detector in seconds.

Volume Control



The **Volume** control sets a maximum limit on the loudness of the audio signal obtained from various targets. If the Volume is set close to the maximum, the audio signal is proportional to the target signal level (see Figure 12). However, if the Volume control is turned down, the audio signal remains the same for a small target but is limited for a bigger target. This control is a volume limiter which is a useful feature when using headphones, as audio signals which would otherwise be uncomfortably loud can be limited while maintaining full response to small signals.

NOTE:

The Volume control does not behave like a conventional volume control on a television set or radio.

Additional independent volume controls are located on the headphones.

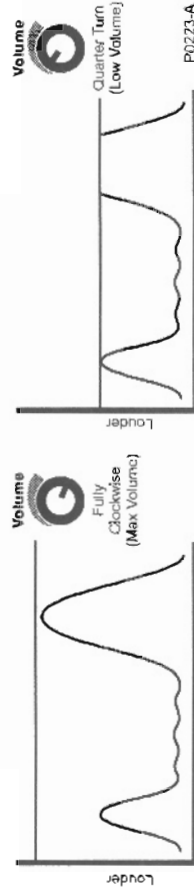


Figure 12 — Volume control
(The maximum audio output (volume) can be limited)

Threshold Control

The Threshold control is used to set the continuous 'hum' audio signal or 'threshold level'. The Threshold control should be set so the threshold level is just audible, but not too loud. Prolonged use at a loud level could be irritating to the operator, and could mask a faint signal.



It is important to know that small targets or large deep targets may not produce a distinct audio signal but rather cause only a slight deviation from the threshold level. If the threshold level is set too high or too low, the very small variations in audio signal which indicate very small or deep targets can be missed.

NOTE:

Whilst detecting the threshold control may require occasional readjustment.

Sensitivity Control

The Sensitivity control affects the strength of all signals, small shallow targets, large deep targets, mineralisation and other interferences. The Sensitivity control also affects the level of sound produced by the detector for a particular target. However, unlike the Volume control, it affects both small and large targets alike.



It is recommended that in most ground the Sensitivity control should be set to the maximum sensitivity, which is obtained by turning the control fully clockwise.

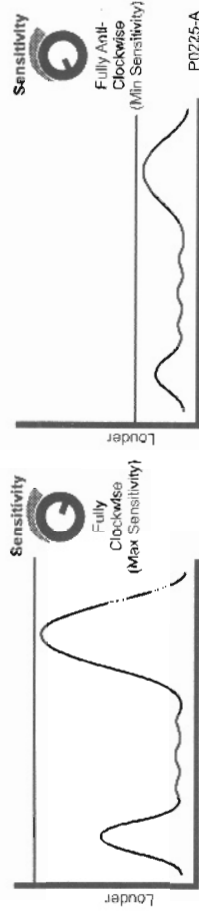


Figure 13 – Sensitivity control
(The audio output is amplified according to the Sensitivity setting)

The Sensitivity control should only be decreased in case of electrical interference or poor ground conditions such as heavy mineralisation or heavy ironstone. The sensitivity should be decreased just enough to make the detector usable.

Freq (Frequency)

The Golden Hawk has three operating frequencies: 6.4 kHz, 20 kHz and 60 kHz. Usually 6.4kHz is better suited to larger, deeper gold nuggets while 60kHz is better for smaller nuggets near the surface. The 20kHz setting is best for general purpose detecting, or a happy medium between both these extremes.

After changing the frequency setting, there will be a period of 2 seconds when the detector will not detect any targets. Also, it might be slightly out of ground balance, but the Automatic Ground Balance will quickly readjust itself as you start sweeping the ground. If you want to make sure you don't miss any targets, you can 'pump' the detector as explained in the Operating Instructions (see pages 27-29).

It must be noted that as the frequency of the detector increases the greater the effect of mineralisation and the noisier the detector may become.

Signal



The **Signal** switch provides three levels of audio response: **Normal**, **Fine** and **Boost**.

In the **Normal** position, a target signal is unaffected in its response. A change in the pitch and volume helps to separate target signals from the background threshold tone.

In the **Boost** position, the target signal is further amplified, offering extreme depth penetration in quiet soils or in an area with constant ground mineralisation. You are likely to encounter excessive spurious noise if you search in variable ground using the **Boost** setting. This mode is also useful to pin-point a target which gives a faint signal under normal circumstances. Noisy (i.e. mineralised) ground will become even noisier if used in this position. The signal will become even noisier if used in **60 kHz/Boost**.

The **Fine** position is specially designed to enable the detection of small and medium size targets close to the surface, especially in mineralised ground. It does this by amplifying and filtering the audio signal. This allows the target signals to be amplified without amplifying the background signals as occurs in boost mode. This mode may not amplify larger targets at greater depths but will give greater sensitivity to smaller targets. Excessive numbers of 'hot rocks' could make this mode ineffective in some grounds.

Recovery



The **Recovery** switch alters the rate that the electronics recover from a target and how quickly it returns to steady threshold. In **Fast** mode you will get a short, sharp target signal. In **Slow** mode you will get a longer, drawn out signal.

Fast mode should only be used when searching for shallow targets in mineralised or salty soil. In all other circumstances use **Slow** mode.

Soil



The **Soil** switch is used to adjust the detector for different degrees of ground mineralisation. The **Soil** switch should usually be set to the **Normal** position for ground that is not excessively mineralised.

In heavily mineralised or 'hot' ground, which will be very noisy and produce large variable responses, the **Difficult** setting can be used. It should be noted that in the **Difficult** position the sensitivity of the detector will be reduced.

Only set the **Soil** switch to **Difficult** if a high pitched squeal occurs in **Normal** for a particular patch of soil. At all other times leave the detector in **Normal**, even in heavily mineralised soil.

NOTE:

If the detector produces a high pitched 'squeal' (called an **Overload Signal**), this indicates that the ground is extremely 'hot' or there is a very large target close to the coil. If the **Overload Signal** is caused by 'hot' ground, set the **Soil** switch to **Difficult**.

Discriminate / All Metal Switch

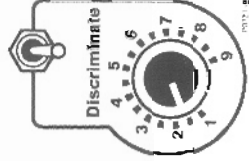


The **Discriminate** switch allows the use of the discriminator built into the Golden Hawk. It has two positions: **All Metal** and **Discriminate**.

In the **All Metal** position, the detector responds to all types of targets with the same target response.

In the **Discriminate** position, the detector discriminates between ferrous and non-ferrous targets. The discriminator generally performs best on loud signals. Its ability to discriminate between ferrous and non-ferrous targets may be affected by the depth and size of a target. Ferrous targets will be signalled by a blanking of the audio threshold. Using the **Golden Hawk** discriminating mode will not sacrifice sensitivity or depth, but it will not necessarily discriminate at the full depth at which the target can be detected.

Discriminate Control



The **Discriminate** control sets the sensitivity to ferrous objects. At the minimum setting small ferrous objects at shallow depths are less likely to be discriminated, while at the maximum setting these objects are more likely to be discriminated. Large ferrous objects should always be discriminated unless they are too deep.

The discriminator is a useful aid to gold prospecting when its limitations are fully appreciated and the operator understands the conditions under which it will work reliably. It requires a proper understanding of the paragraphs referring to discrimination in the Detecting Techniques section (see pages 33-36), as well as skill gained from practice and experience.

Many experienced users recommend that you dig all targets detected.

Balance Switch

The **Balance** switch selects either **Automatic Track 1** or **Automatic Track 2** or the **Fixed** ground balance position.



In the two automatic positions the Golden Hawk is an Automatic Ground Balance detector. This means that the detector continually adjusts itself to maintain ground balance, which will ensure that your detector is searching to its greatest possible depth at all times. **Track 1** causes the ground balance to respond rapidly to changing ground conditions, while the **Track 2** setting responds at about half this rate.

It is important to know that a deep target may be 'balanced' out by continual sweeping over it when pin-pointing in the automatic modes. By balancing next to the target then switching to the **Fixed** mode, the target cannot be balanced out. For the same reason the **Fixed** mode is recommended when testing soil from a hole for the presence of targets.

Tone Control



The Golden Hawk has a **Tone** control which allows the operator to adjust the 'tone' or 'pitch' of the audio signal to suit the operators individual needs. Generally, this should be set to the pitch that you find the easiest to listen to.

The **Tone** control has been positioned on the lower Control Box panel between the Coil and Power Sockets.

Audio Output

The audio output of the Golden Hawk is via a 1/4" stereo headphone jack located in the top of the battery pack. The socket will accept most stereo headphones with a 1/4" jack. Headphones should be of a low impedance. If they have a 'Stereo/Mono' switch, set it to 'Stereo'.

The headphones provided are recommended for serious treasure hunting as they are very sensitive and shield your ears from external noises that can be distracting. Independent volume controls allow the operator to select the most comfortable volume level to suit their own personal needs.

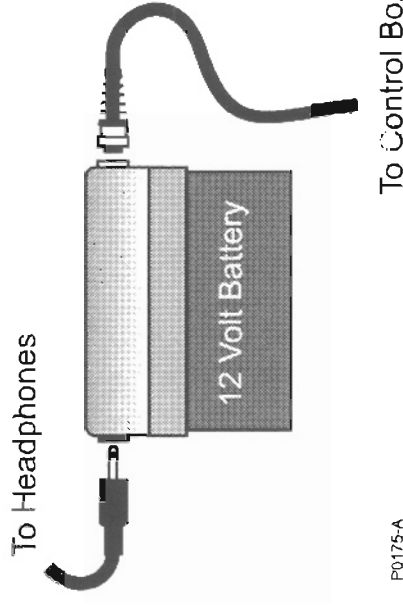


Figure 14 - Headphone Jack in Battery Pack

5.1 QuickStart Operating Instructions for the Golden Hawk

- Switch On the power at the **Power On/Off** switch.
- Set the **Volume** control to $\frac{3}{4}$.
- Set the **Threshold** control so that the audio signal is just audible.
- Set the **Signal** switch to **Normal**.
- Set the **Soil** switch to **Normal**.
- Set the **Freq** switch to **6.4 kHz** for detecting large deep targets, **20 kHz** for average targets through to **60 kHz** for small targets near the surface.
- Set the **Sensitivity** control to maximum. If there is apparent interference while the coil is motionless, reduce the sensitivity just below the level which eliminates the interference.
- Set the **Discriminate** switch to **All Metal**.
- Set the **Balance** switch to either **Track 1** or **Track 2**.
- Ground balance the detector by raising and lowering the coil above soil which is known to be free of targets until changes in the audio signal are reduced.
- Refer to the 'Best Setup Positions' chart on the next page accurately to tailor your detector settings to the specific environment in which you are operating.
- Start searching.

Best Setup Positions for the Golden Hawk

Gold Field Setting

Signal: Boost
Soil: Normal (if possible in most conditions)
Freq: 20 or 60 kHz
Select: All Metals
Threshold: Just audible
Sensitivity: Maximum
Signal Volume: $\frac{3}{4}$
Balance: Track 1 or Track 2

Other Ground Settings

Signal: Boost
Soil: Normal (if possible in most conditions)
Freq: 6.4 kHz
Select: Discriminate
Threshold: Just audible
Sensitivity: Maximum
Signal Volume: $\frac{3}{4}$
Balance: Track 1 or Track 2

NOTE:

The above is only a recommended QuickStart position. It is better to understand each function and select specific settings for your location. These settings will often change through the course of the day.

5.2 Operating Instructions – Fundamentals

The Golden Hawk is a motion detector and must be moving over a target to be able to detect it. If the coil is held still for a few seconds, any signals due to ground or targets will die away. The Golden Hawk is designed to be sensitive to a large range of targets while also having the ability to discriminate between ferrous and non-ferrous targets.

When in use, the detector should have the **Threshold** control set so that there is a quiet but audible signal at all times. Any variation in this signal as the coil is moved over ground can indicate the presence of a metallic target. It could also, however, be due to sudden large variations in soil conditions for which the automatic ground balance cannot compensate quickly enough. Such differences can be learned only through experience.

Operating the Golden Hawk

- Remove the detector components from the backpack and assemble the detector.
- Connect the battery and curly cable to the control box and connect the headphones to the battery cap.
- Turn the Golden Hawk On using the **Power On/Off** switch. In the interests of extending battery life, avoid leaving the detector On unnecessarily.
- Adjust the **Threshold** control until the audio signal is just audible when the coil is held motionless. It must be audible as small targets might not produce big enough signals to make any sound if there is not an already audible background sound. However, if the threshold signal is too loud, small variations might also be missed because they are too small compared with the background sound.
- Once the initial turn-on noises have subsided, turn the **Sensitivity** control to maximum then rest the coil on the ground. Once again, after a few seconds, the noises due to the movement will die down. If there are any residual noises, they will be due to electrical interference with the detector. You will need to turn down the **Sensitivity** control until the noises are inaudible, but no further. Reduction of sensitivity reduces the ability to detect targets, so the sensitivity should be reduced as little as possible.

Detector Sounds

There are seven types of sounds that the detector will produce:

- Threshold Signal** — A low-level, constant audio signal which is present even when the coil is held motionless.
- Target Signal** — Small or large variations in the volume and pitch generally indicate metal targets.
- Iron Signal** — When the **Discriminate** switch is set to **Discriminate**, ferrous targets will be signalled by a blanking of the **Threshold** signal.
- Overload Signal** — A high-pitched squeal indicates the presence of a very large target or very highly mineralised ground. To overcome this, raise the coil and test the area again. If mineralised ground is the problem, set the **Soil** switch to **Difficult**.
- Discriminator Overload Signal** — A loud 'bell-ringing' sound indicates that the Golden Hawk has detected a signal too large for the discriminator to process accurately. To overcome this, raise the coil from the ground, set the **Soil** switch to **Difficult**. Then try again.
- Low Battery Signal** — A sharp 'pip' occurs approximately every 12 seconds when the useful charge of the batteries is near its end.
- Ground Noises** — When passing across rapidly changing mineralised ground, 'ground noises' may be heard. These are often more like long growls than the normal short, sharp target signals. They are often heard when the coil passes across the area from one direction only. The sound is often not heard from the reverse sweep.

Ground Balance

Generally speaking, without the ground balance of the detector being set, passing the coil over an area of ground may produce signals whether or not there are targets in the ground. Signals produced without the presence of targets are due to the magnetic and/or mineralised nature of the soil.

To eliminate these unwanted signals the ground balance of the Golden Hawk must be enabled by switching to either **Track 1** or **Track 2**. In these modes the Golden Hawk automatically adjusts its ground balance.

When first turning the detector **On**, switch it to either **Track 1** or **Track 2** and raise and lower the coil repeatedly over the ground until the audio signal is constant.

NOTE:

It is possible for small targets to be balanced out if the detector coil is swept repeatedly across the target. Once a signal is located, the **Balance** switch should be changed back into **Fixed** mode.

f. The **Volume** control is generally turned to maximum. The setting does not affect the threshold level, but sets a limit on the loudest audio signal produced.

Test the volume comfort level by passing a large piece of metal over the coil. Adjust the **Volume** control to a comfortable level.

g. Adjust the **Tone** control (located on the lower panel) to a pitch to which your ears are most sensitive. This again allows you to have the threshold set to as low a level as possible.

h. It is recommended that the **Balance** switch is set to either **Track 1** or **Track 2** for general detecting. The **Fixed** setting can be used to hold the ground balance in localised areas when it is suspected that small targets are being balanced out (see **Balance Switch** on page 22).

Leaving the setting at **Track 1** or **Track 2** while detecting will ensure that the Golden Hawk continuously adjusts itself to the changing ground conditions. Note that sudden changes in the ground conditions may still produce changes in the audio signal and balancing may need to be repeated.

i. Move the coil up and down near the ground surface. This allows the **Automatic Ground Balance** feature to set the balance. Keep 'pumping' the coil until there is no change in the audio signal accompanying the movement (see Figure 15).

j. Start searching by moving the coil slowly over the ground. Periodically check the control settings to correct any change in the detector or soil conditions. Refer to 'Detecting Techniques' (see pages 30-35) for details on finding targets. Refer to the 'Best Setup Positions' chart (on page 25) for recommended detector settings in different environments.

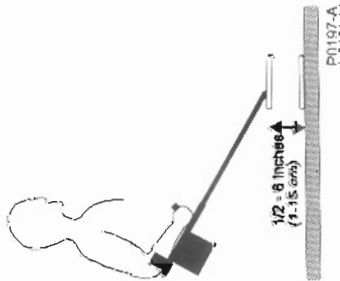


Figure 15 - Raising and Lowering the Search Coil

6. Detecting Techniques

For best results with the Golden Hawk, it is recommended that you learn some basic detecting techniques such as sweeping, pin-pointing and digging targets.

Sweeping

One of the most important detecting techniques, and perhaps one of the hardest to perfect, is the sweeping of the coil across the surface of the ground.

The Golden Hawk is a motion detector which means that in order to detect a target the coil must be moving. It is recommended that you use a sweeping motion for the coil while detecting (see Figure 16). It is essential that the coil sweeps are overlapped in order to ensure that all ground is searched.

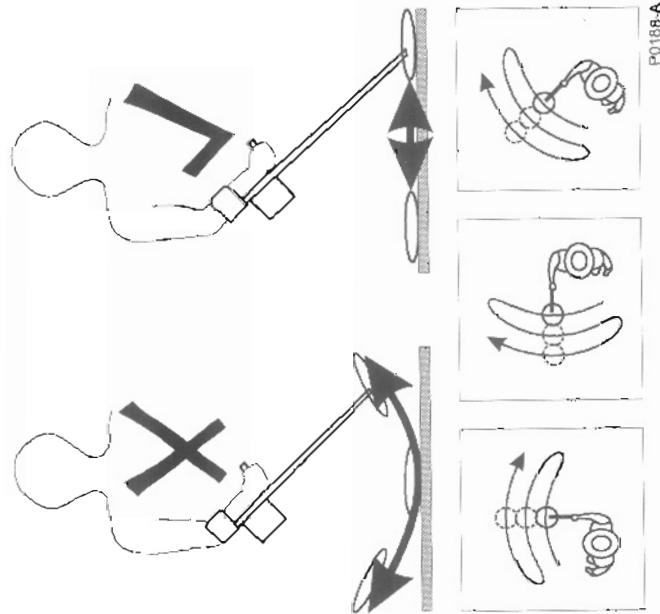


Figure 16 - Sweeping the Coil

NOTE:

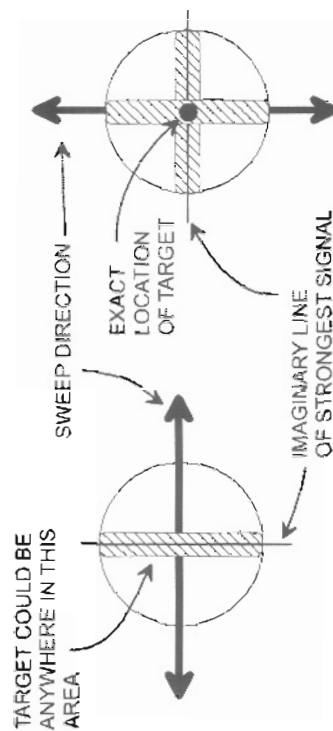
Each sweep of the Coil should overlap the last one. This will ensure good ground coverage.

Sweeping is carried out in a snaking motion along the ground to cover the search area. Keep the coil parallel to the ground at all times and be aware that there is a tendency for the coil to be raised at the end of each sweep across the body (see Figure 16). Each sweep from one side of the body to the other should take between 2 and 4 seconds to complete. This speed will depend on the soil conditions and on the area in which you are operating. Variation in coil height at the end of each swing can cause confusing sounds and will reduce detection depth. Increased noise can also result from hitting rocks, etc. Keeping the coil in contact with the ground will increase detection depth and sensitivity to very small targets.

Pin-pointing the Target

When a target has been detected, it is necessary to accurately determine its position to enable the operator to recover it quickly and minimise any damage to the environment.

You should switch back to Fixed Ground Balance position to pin-point the actual location of the detected target. Sweep the coil over the general area taking note of where the strongest signal is received as the coil is moved over the target. 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 (see Figure 17). The side of your boot can be used to mark the ground along this line.



SWEEP COIL AT 90 DEG TO PREVIOUS SWEEP

Figure 17 - Pin-pointing the Target

- c. Pick up a handful of soil from the pile and pass it across the coil. If there is no signal then place the soil in a second pile away from the first and grab another handful from the pile. Continue this process until the target is in your hand. Sift through the soil in your hand until you find the target.

Once the target has been recovered it is a good idea to run the detector over the hole again to make sure that there are no other targets to be found. When you have recovered all targets from the hole, it is advisable to search the surrounding area carefully as there is a high chance that more targets will be nearby.

Automatic Ground Balancing

These simplified diagrams (see Figure 18 overleaf) show how Automatic Ground Balancing with the Golden Hawk allows you to detect to its maximum depth at all times.

The top diagram shows normal searching without Automatic Ground Balancing. Ground mineralisation reduces the effective searching depth when you move from where you last ground balanced. The shaded area shows ground which is not properly searched.

The centre diagram shows how a hardworking experienced professional with a manual ground balance machine will reduce this effect to a minimum. The detector is rebalanced more often, and this is very time-consuming.

The bottom diagram shows how genuine Automatic Ground Balancing covers all the ground quickly and effectively. This ensures that the detector with automatic ground balancing will give optimum depth at all times. For this to occur, the detector must balance quickly enough and still retain sensitivity.

Discrimination

Discrimination of Iron Targets

When the **Discriminate** switch is set in the **Discriminate** position, the Golden Hawk is able to discriminate between ferrous (iron) and non-ferrous targets (valuables).

The target could be anywhere along the length of the coil so, in order to pinpoint its exact location, it will be necessary for you to turn at a 90 degree angle and repeat the sweep across the target.

Again take note of the point where the strongest signal is and draw another imaginary line in the ground. Where the two imaginary lines cross is where the target is located. Use the side of your boot to mark this location if necessary.

Digging the Target

Always remember that when digging, the hole should be kept as small as possible to keep the damage done to a minimum.

Dig carefully as a heavy blow can split a nugget, causing a drop in its value. All holes dug must be filled in once the target has been recovered.

It is advisable to have some sort of digging tool when searching. Useful tools are:

- A small strong digging spade.
- A small knife for grassy areas.
- A small hand pick.

Before digging, clear the surface material and check that the signal is still there. If there is no longer a signal, then the target must be amongst the surface material and is usually trash. If the signal is still there, dig down a few centimetres. Dig a dish-shaped hole; any sharp edges of soil might cause a false signal.

If the target is not visible, sweep the coil over the hole. The signal should become louder so continue to dig. If the signal has gone then the target should be in the pile you have just dug. If the target is not clearly visible, you might need to scan the soil which has been dug up, so be sure to pile the soil carefully while digging.

The target can be located in this soil by the following methods:

- a. Sweep the coil over the pile of soil to locate the target. Be sure that there are no targets buried under the soil directly below the pile.
- b. When the target has been removed from the hole, ensure the **Balance** control is set to **Fixed** and lay the detector down with the coil flat on the ground, near the hole.

Thus in 'mild' ground the detector will discriminate accurately at greater depth, while in 'hot' ground the discrimination depth is reduced to maintain reliable discrimination. At all times, however, an audible 'target' sound is heard without loss of sensitivity so that no target can be missed.

Be aware that if the detector coil is held in the air or stationary over the ground for an extended period, the discrimination sensitivity increases to maximum. If it is then used on 'hot' ground false discrimination signals will appear.

It is important to keep the coil swinging in a smooth motion at all times. After a short time, however, the detector will adjust to its new condition and the sensitivity of discrimination will automatically be set correctly.

To obtain the best performance out of your discriminator we suggest you take advantage of the multiple frequency features of the Golden Hawk. The best frequency for discrimination is 6.4kHz, followed by 20kHz and then 60kHz. It is best to:

- Search for gold at 20kHz or 60kHz in Track 1 or Track 2 mode.
- Check out the ferrous nature of a located target in Fixed mode at 6.4kHz.

Discriminating in 'Hot' Ground

If detecting in Track 1 or Track 2 and the detector is in Discriminate mode, there are several techniques that must be followed for accurate discrimination. As mentioned earlier, the Golden Hawk incorporates a unique feature that adjusts the sensitivity of the discrimination, depending on the ground conditions. If the detector is swept across the target more than once in 'hot' ground it is possible that the detector's automatic features will adjust the balance to the target and not discriminate out a ferrous target on subsequent passes. This is normal behaviour for an automatic ground balance detector.

Because of the different speeds of adjustment in the two ground tracking modes there will be a difference in the speed of this automatic adjustment. In Track 1 only the first pass over the target will achieve accurate discrimination. In Track 2 the first two passes are accurate.

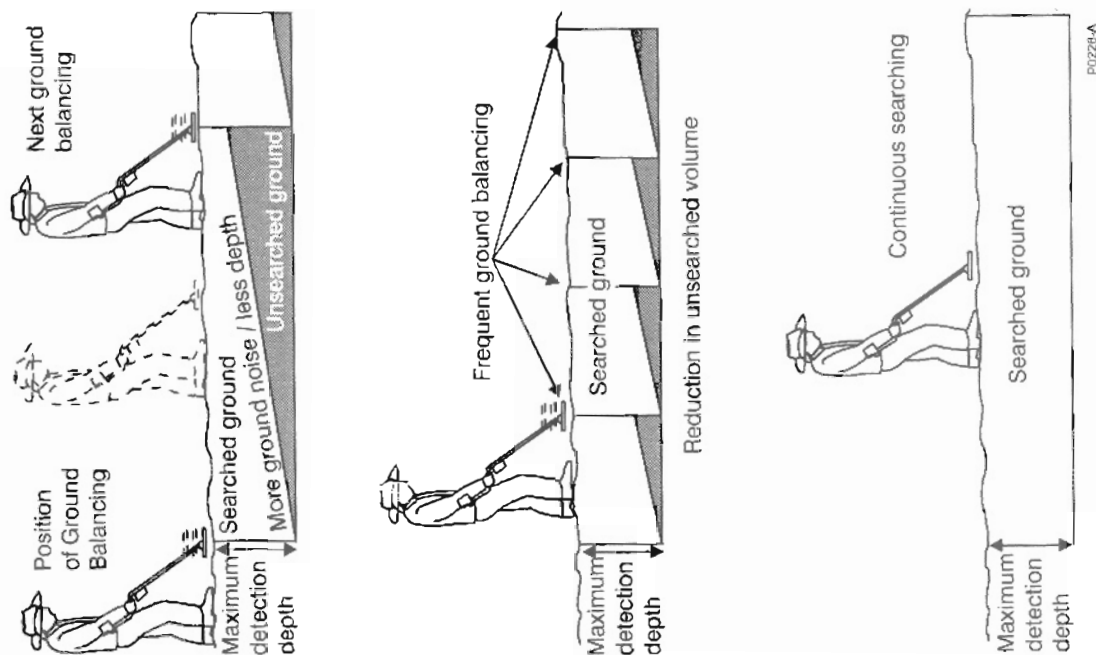


Figure 18 - Automatic Ground Balancing

A unique feature of the discriminator is its ability to read the degree of ground interference during discrimination. The detector automatically adjusts its discriminating power depending on the type of ground present, thereby achieving the maximum reliable discrimination depth.

7. Prospecting Tips

It will take time and practice to learn how to recognise which signal to pay attention to or to ignore.

The Golden Hawk is particularly good at minimising 'ground noises', and this is the reason for the exceptional depth capability. However, even with this detector some ground noises will occur, particularly in heavily mineralised ground.

Mineralisation and Hot Rocks

Typically, heavily mineralised ground can make a detector respond with an indication that there may be a target reasonably deep beneath the surface. The sound is normally rather broad and not very loud, but occasionally crisp and reasonably sharp. Other noises which most affect detectors are 'hot' rocks. These are rocks rich in iron which can produce very strong audio signals. With the strong ones, some detectors have problems in tuning them out, but with the Golden Hawk signals from hot rocks are not as great a problem.

If you find a signal which may be due to mineralisation, but is 'positive' enough to make you suspect a deep target, pass the coil in a circular path around the area, without passing directly over the target. After two or three rotations, pass the coil directly over the centre and listen to the 'positiveness' of the signal. Repeat this procedure but this time sweep at right angles to the previous pass. If both passes result in a significant positive response, then dig!

It is possible for gold nuggets to be entirely encased in rocks, so thorough checking is necessary to ensure no gold is missed. Breaking rocks in two, then passing each section of the rock across coil, one after the other, will determine which piece contains the gold. Sometimes 'negative' hot rocks or ground 'holes' are encountered. In this case the sound from the detector is reduced as it passes over the rock or 'hole'. Nevertheless, the detector, on recovering from this loss of sound, can give an audible signal which to the beginner may be confused with the sound of a target.

Experience will soon enable the operator to recognise this characteristic sound which is in fact quite different from a target. Setting the **Signal** switch to **Fine** may reduce this problem.

To ensure that you are not digging ferrous targets it is best to carry out the following procedure once you suspect a target has been discriminated:

- Move the detector off the target and balance the detector over metal-free soil.
- Set the detector in Fixed balance mode.
- You can now pass the Coil over the target as many times as you like and the discrimination will be accurate.

Discriminating within Holes

The discriminator must not be used to test a target by pumping the coil up and down the hole. Always pass the coil smoothly across the top of the hole. Moving the detector coil within the hole will often produce a 'non-ferrous type' target signal when the target is really ferrous.

Similarly, the discriminator should not be used to test a target within the pile of soil which has been taken from this hole as again 'non-ferrous type' signals are likely to occur, particularly in highly mineralised ground. The discriminator will give the most reliable result when the target is tested while it is on or within undisturbed ground.

When the search coil is passed over large targets near the surface, the discriminator electronics may sometimes overload. This is indicated by a high pitch 'chirp' or 'bell-ringing' sound. Either sweep the search coil further from the target or set the **Soil** switch to **Difficult**.

Clay Domes

A common occurrence in nugget-bearing country is soil mineralisation commonly known as 'clay domes'. These are regions of rather broad sound which could be confused with the sound which would come from a large deep nugget.

The following procedure will quickly establish whether or not the sound comes from clay or a metal target:

- a. Pinpoint the target as best you can.
- b. Remove about 4 cm (1.5") depth of soil from over the target response. Dish the hole so that there are no sharp edges around the hole.
- c. Sweep the coil across the target from a few directions, keeping the coil as low as possible. Listen to the signal and note if it is:
 - Any louder or more defined. By bringing the coil closer to a metal target the signal should become louder.
 - Note if the signal seems to come from one direction only (a mineral signal will often come from one direction only, or at least be less defined from the return sweep).
- d. If you are still not sure, continue to dig deeper and again, note the points above.
- e. Be sure to dish the hole when digging to ensure there are no sharp edges. Sweeping the coil across the sharp edge of a hole can cause false spurious signals due to the change in distance between the ground and the coil.

Charcoal

Charcoal can sound loud and rather like a metallic target 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. Again, experience will teach the operator how to read the ground efficiently and gain understanding of the detector's response to the ground.

An indication of charcoal is that the sound seems very spread out and becomes patchier as the ground is dug. Inexperienced operators should continue to dig until the reason for the signal becomes clear.

Gold Lore

To have a good chance of detecting gold, it is necessary to search out areas where 'coarse gold' is known to have been found, or other areas where it is likely to occur. The term 'coarse gold' refers to gold ranging in size from a grain of wheat to many grams, and in some cases hundreds of grams.

Many nugget-bearing areas are the result of broken-down gold reefs containing quartz and ironstone. Experienced prospectors learn to 'read the ground' and look for tell-tale signs indicating potential gold-bearing fields. It is a fascinating and exciting hobby to learn some of these skills and apply them in your search for gold.

The modern metal detector has given today's prospector enormous advantages over the prospectors of old. The ground can be rapidly scanned until a small piece of gold is found and then a study of the area made to decide where other gold nuggets are likely to be located. It is then best to make a systematic search of the area.

The main problem encountered while using metal detectors is the presence of heavy concentrations of ironstone. This is particularly the case in some of the richest known fields in Australia or the 'black sands' areas of North America. It appears that gold nuggets and ironstone often go together, and in fact many gold nuggets have ironstone embedded in them or are encased in ironstone and others show strong ironstone staining. Some of these fields have only been superficially worked because of the interference to the detector caused by the ironstone. Usually only the most persistent professional is prepared to spend the time and energy necessary to cope with these conditions and then only partially.

8. The Coil and its Skid Plate

Over a long time the Search Coil Skid Plate could wear if the ground is scrubbed continuously while searching. Minelab agents can supply a replaceable skid plate for the Coil. This can be fitted by levering off the existing plate and pushing on the replacement skid plate (see Figure 19).

Skidplates are very inexpensive and it is recommended that you protect your coil by regularly replacing the skidplate.

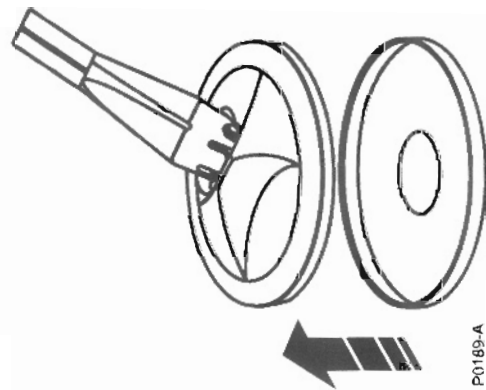


Figure 19 - Use a Skid Plate to protect the Coil

9. Environmental Concerns

Firstly, it should be pointed out that gold prospecting and treasure hunting with a metal detector is the most environmentally friendly way to recover nuggets, coins, rings, and other treasure items. However, it is important to leave an area that you have searched in the same condition as you found it.

All holes that have been dug must be properly refilled. Not only is it environmentally unacceptable to not fill in your holes, it is also very dangerous. There are special tools to enable you to recover targets easily from grassed areas without digging large holes.

Take away and properly dispose of any junk that you find or produce, such as nails and tin cans. Leaving an area 'scarred' can result in action being taken to prevent the use of metal detectors, which spoils this fascinating hobby for others as well as yourself.

10. Care of the Golden Hawk Detector

The Golden Hawk is a high-quality electronic instrument, finely engineered and packaged in a durable housing. Proper care and maintenance will ensure long-term reliability of the detector.

Please observe the following precautions:

- **Do not leave the battery connected to the Control Box when the detector is not in use.**
- If temperatures are very high, do not leave the detector in the sun for longer than necessary. Covering it when not in use will help protect it. Try to avoid leaving it in a closed trunk or in the car sitting in sunlight.
- While the Control Box has been designed to be water-resistant, it is not waterproof. Avoid wetting it unnecessarily. **Never allow the box to come into contact with gasoline or other oil-based liquids.**
- **Keep the unit (especially all connectors) clean and dry**, and avoid getting sand and grit into the shafts or the locking levers. Do not use solvents to clean the detector. Use a damp cloth with mild soap detergent.
- **Batteries.** Flat or faulty batteries cause many detector problems. Ensure that you use only Minelab rechargeable 12V lead acid batteries and that they are recharged as soon as the 'Low Battery' warning signal is heard through the Headphones. **Lead acid batteries can be damaged if they are left in a discharged condition.**
- Ensure that you only use Minelab's 12V lead acid battery charger as per previous instructions.
- **Cables.** Ensure the coil cable is in good condition and not subject to undue stress. The coil connector at the base of the cable must be firmly tightened.
- If any part of the detector comes into contact with corrosive substances (including salt or salt water), **wash it with fresh water.**
- The 'Coil' and 'Power' connectors on the Control Box have **rubber covers which should be used to protect the sockets** when the cables are disconnected.
- **Repack your detector into its backpack when it is not in use** (see Figure 2 on page 6 for the recommended packing layout).

The Control Bag is designed to protect the Control Box, especially from dust, mist and rain. It will also cushion potentially damaging knocks. **Use the Control bag where possible.**

- **Interference.** The Golden Hawk is a very sensitive VLF radio receiver. There are many external sources of noise that may affect the performance of the detector, including another detector in close proximity, high power transmitters, power lines and electric fences.
- **Do not open the control box or attempt to alter the detector in any way.** Doing so will void your warranty.

10.1 Trouble-shooting Guide

Fault	Solution
No Sound	Check battery and battery connections Check Headphones and their connection
Erratic Noises	Check battery charge and battery connections Ensure coil plug is tightened firmly Reduce the sensitivity by turning counter-clockwise Switch out of 'Fixed' ground balance position Check and adjust the ground balance Check Headphones and their connection Check for sand or grit between skid plate and Coil
No Target Response	Ensure unit is turned 'On' Check battery charge and battery connections Check coil connection Check Headphones and their connection

In the unfortunate circumstance that you need to return your detector to Minelab for service, please fill out a copy of the Minelab Service Repair Form on page 45 and enclose it with the detector. Please supply as much detail as possible about the fault and warranty details as this will assist our service engineers to rectify the problem quickly and efficiently.

Minelab Service Repair Form

There is a two-year parts and labour warranty for the Golden Hawk electronic Control Box. The Coil, Shafts, etc., are warranted for one year. Refer to your Warranty Card for further details. Always 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.

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'.

Today's Date:
 Detector Model: Serial No.:

Purchased From:

Purchase Date:

Faulty Part(s):

Description of Fault:

.....

.....

.....

.....

Owner's Name:

Address:

.....

Phone: Day () Home ()

Fax: () Email:

NOTES

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