Gold Detecting in Difficult Ground Conditions

Why noise occurs and what you can do about it.

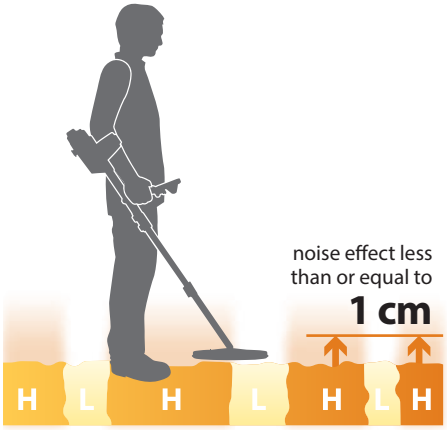
Even after ground balancing, some soils produce un-ground-balanced 'noises' when moving the coil across the ground. This is due to interference from different chemicals or 'minerals' in the ground, and no metal detector can ever completely be immune to them. Commonly used terms to describe such 'noisy' soils are: 'difficult', 'mineralised', 'hot', 'salty', 'variable,' or 'saturable.' The problem is that this un-ground-balanced 'ground noise' may obscure the fainter signals from deeper gold nuggets. However, it is possible to reduce this ground noise to better hear the fainter nugget signals by selecting suitable detector control settings, and by the way you swing the coil, in particular; how high above the soil's surface you swing the coil, and how fast.

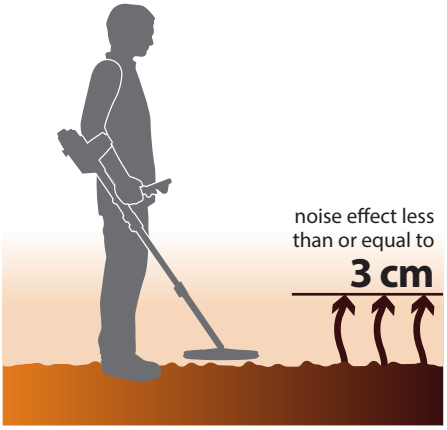
General Advice.

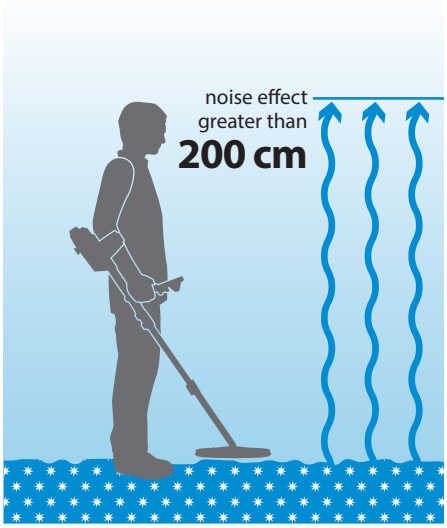
In all soils that produce ground noise use the ferrite that is available from Minelab for the GPZ 7000 to ground balance. The method of ground balancing with the ferrite is given in KBA 26 'Tips for Better Ground Balance.' In noisy soils, the first thing to try is both ground balancing and swinging the coil at least a few centimetres above the soil, and when doing so check whether this clearly reduces the ground noise or not. The specifics are given below.

The greatest absolute depths are possible in Normal, followed by Difficult, followed by Severe. Always try to use the deeper setting, but, in noisy soils, you will probably find more nuggets using Difficult or in extremely noisy soils, using Severe, because these reduce the ground noise relative to the fainter nugget signals.

Identifying Types of Difficult Ground







Variable (Hot) Ground

This term has 2 different meanings. One meaning is the ground balance requires a different ground balance adjustment from one patch of soil to another relatively close patch of soil. The other meaning is variable hot ground has alternating patches of low (L) and high (H) concentrations of soil signal interference that produces noise, and such soils are often red and/or black in colour. In either case, when the detector coil is moved across the ground, the ground balance required for optimal adjustment changes often, and sometimes fairly abruptly. In this type of ground, use the Difficult Gold modes and use the ferrite every time you ground balance (see KBA 26), and after ground balancing, use either Auto or Manual Ground Balance depending on which seems to work best for that particular soil. It may pay to swing the coil at least a centimetres above the more noisy patches.

Saturable Ground

Some soils can 'saturate,' which means that whilst it is possible to get near zero signal when the coil is raised and lowered down to several centimetres above the ground surface, lowering the coil below a certain height produces an un-ground-balanced signal. Refer to KBA 24 'Basics of the GPZ 7000 Technology: Zero Voltage Transmission (ZVT)' for further details on saturation and Viscous Remanent Magnetism.

(Remember though, do not ground balance moving the coil up and down; only use this up-and-down coil movement to check what type of noisy soil you happen to be detecting in.)

In saturable (or severe) soils, the height below which an un-ground-balanced signal occurs is dependent on the soil's chemistry and detector settings. In such soils, this saturation noise 'threshold height' is usually, but not always, less that about 3 cm above the soil surface for the Difficult setting, and usually a bit less than this for the Severe setting, but maybe as high as 15 cm for the General setting.

Salty Ground (Conductive Soils)

The presence of 'salty' (or 'saline' or 'conductive') soil is easy to determine. If an un-ground-balanced signal occurs when you raise and lower the coil between 50 cm and a metre (or more) above the soil surface, the soil is conductive. Unfortunately, the ground balance required for the conductive soil component is different to the 'usual' magnetic ground signal component, and both are not properly balanced out simultaneously; hence the ground noise from conductive soils.

Combinations

It is possible to have any combination of any of the above; that is, variable, saturable, and conductive (saline) soils.

How best to operate your detector for these different noisy soils:

Electromagnetic Interference (EMI)

If the detector happens to be noisy when the coil is being held still; and therefore this noise is not caused by a signal from the soil; this noise is probably caused by Electromagnetic interference (EMI); the source being from the mains electricity or signals from lightning; the latter maybe even thousands of kilometres away. Use either Manual or Auto Noise Cancel to minimise this noise.

Default settings and Quick Start method

The GPZ 7000 default settings have been designed for use in typical mineralised goldfields soils and it is recommended that you start with these. But, you may well find more gold using different settings and by changing how you swing the coil, especially in noisy soils. Below are tips for noisy soil conditions.

Variable Hot Ground

For these soils, regularly use the recommended side-to-side ground balancing technique preferably using the ferrite (see KBA 26). It may be advantageous to raise the coil at least to 1 cm above the surface for patches of ground that produce more ground noise for this sort of soil.

Saturable (Severe) Ground

The important controls for prospecting in saturable soils are the Ground Type selected settings, and swinging the coil at approximately (or a bit above) the threshold height below which saturation noise signals significantly occur. Further, it is important always to ground balance (with Quick-Trak) using the ferrite and with the coil swung at this threshold height. It may also help to set the detector to Manual Ground Balance (which fixes the ground balance setting) after each ground balancing.

Select the Ground Type as a compromise between tolerable saturation noise signals and Ground Type, that is to say; if Normal is impractically noisy, then try Difficult, but if this is also impractical, select Severe.

Conductive (Saline) Ground

In these soils, High Yield produces the most ground noise, and General less, and Extra-Deep yet less still. Many conductive soils also produce substantially more ground noise when Normal is used (often from 'hot rocks'), and for these soils, it is better to use Difficult.

In conductive (saline) soils, ground balance using the ferrite as instructed in KBA 26, and thereafter, set the detector's ground balance to Fixed using the Manual Ground Balance mode. It is important to swing the coil at a consistent height and slower sweep speed to help reduce the soil generated noise level. As a rule salty ground tends to be shallow, and because the GPZ 7000 is designed mainly for bigger targets at depth, you may be better off prospecting in deeper ground away from the salty areas.

Adjusting other detector controls

For any of the above conditions, there is the option of making further adjustments to the detector controls. The Sensitivity control can be adjusted lower than the default setting of 9 and the Audio Smoothing control can be changed from Low to High to assist reduce noisy soil ground signals to a more practical level.

Expert Tips from Jonathan Porter

Jonathan Porter is a well known Australian professional prospector with over twenty five years of gold detecting experience. He has been sharing valuable knowledge via the Minelab Treasure Talk blog since 2010.

Jonathan worked in close association with Minelab to evaluate and field test the GPZ 7000. Here he brings you his top detecting tips to help you get the most out of your GPZ 7000 in difficult ground.

Jonathan describes the steps he takes in salty and saturable soils to achieve and maintain a good ground balance:

1. If you don't have a dust iron ferrite, perform a walk-and-sweep ground balance at start up or after a 'Reset Audio and Detection Settings' via Quick Start. I highly recommend you perform this in ground that is not too noisy (i.e. low level of 'waa waa' sound) and keep the coil at least 3 cm above the ground to avoid saturation signals.
2. If you have a dust iron ferrite and the area you are in is salty, perform the octopus-sweep ground balance technique over the ferrite placed on the ground, but limit the speed of the sweep to reduce salt signals and also minimise the amount of sweep distance (tighten the sweep up to ensure that signals from the ferrite are frequently sensed by the coil).
3. Once the above procedures have been performed go into the Ground Balance Mode menu and select Manual. This will lock the ground balance so that saturation and salt signals do not affect the ground balance setting after that point. You can configure the User Button to take you directly to the Ground Balance Mode menu option to save on time.
4. Go detecting, just like you would with a GPX 5000 in Fixed mode when using Fine Gold or Enhance. If you feel the need to ground balance, place the dust iron ferrite on the ground and perform the octopus-sweep ground balance for 3 to 5 seconds or until the unit is quiet (this should be checked regularly). There should be minimal or no noise over the ferrite, but you need the ferrite there once the Quick-Trak button is pressed to get a good ground balance. Even if the ferrite part of the ground balance is good (i.e. quiet when swept over the ferrite), all further ground balancing in the same area should use the ferrite.
5. For those without a ferrite you should do a mini walk-and-sweep ground balance holding the Quick-Trak button, preferably where the noisy salt signal ('waa waa' noise) is less, keeping the coil at least 3 cm above the ground to avoid saturation signals.

To read Treasure Talk blogs by Jonathan Porter, Visit www.minelab.com/treasure-talk?author=24957

Click here to see KBA 26 'GPZ 7000 Tips for Better Ground Balance' for more information on ground balancing the GPZ 7000 using the walk-and-sweep or ferrite-assisted ground balance methods.