

GARRETT® GOLDMASTER® *24k*

USER MANUAL

GARRETT

white's®

Original *GM24k* detector

Goldmaster 24k Contents

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Introduction

The *Garrett Goldmaster® 24*k (originally produced by White's Electronics) is a high-frequency induction-balance gold nugget detector. The *GM24k* features a 54% increase in coil voltage over the prior White's *GMT* model, resulting in increased sensitivity to small nuggets.

While testing this machine in Brazil, this was shown in a tiny, 0.4 grain crystalline nugget found encased in quartz. In some cases this much power can be challenging in areas with heavily mineralized soil. Even at lower gain settings, the *GM24k* is an extremely "hot" machine on small gold and specimen nuggets.

Experienced prospectors know more sensitivity is not the only answer to increasing the odds of success. A machine's ability to track and cancel the ground is often the biggest challenge faced in the search for gold. That's why the *Goldmaster® 24k* features a special ground tracking system called "XGB" (Xtreme Ground Balance). It works with multiple ground points to ensure stable operation. The *GM24k* also features Iron/Hot-Rock cancellation in both audio modes, which expands the ground range even more for quiet operation in the most challenging ground.

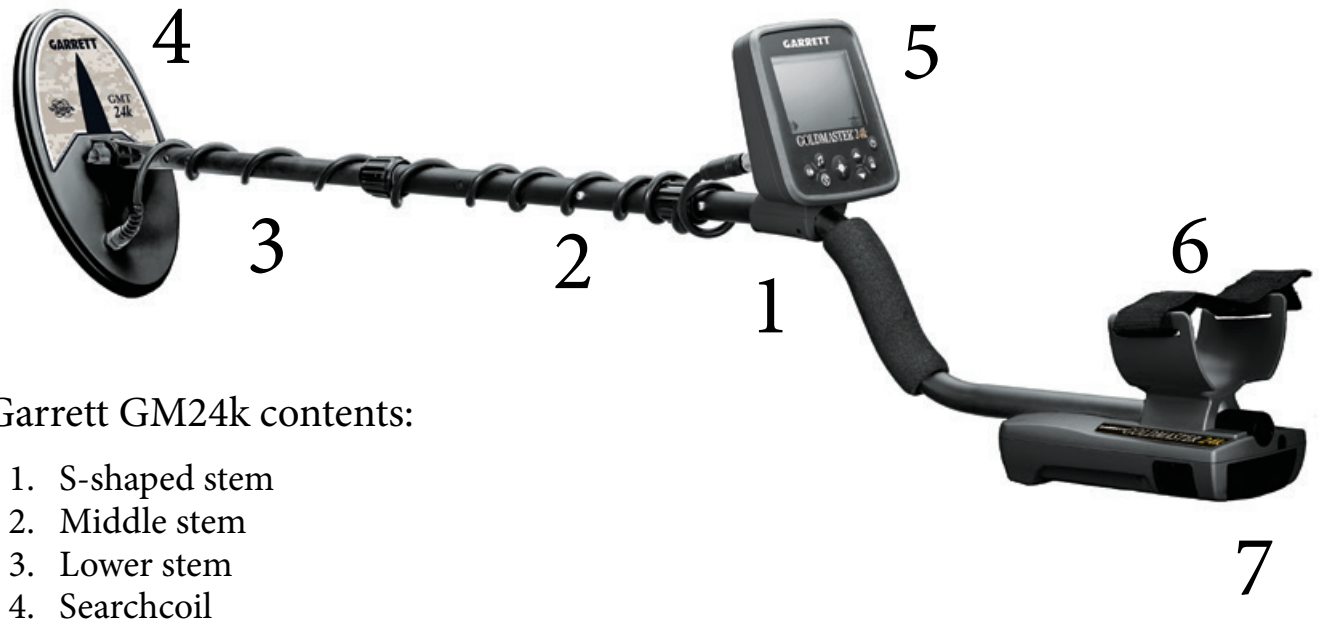
When the nuggets are few and far between, prospectors sometimes have more success at sluicing, panning, or dry washing. The *GM24k* Ground Scan feature can help successfully track and mark black sand or other mineral deposits in stream beds, washes, or even under ground (where the backlight comes in handy).

Other key features such as Variable Self-Adjusting Threshold (vSAT), Ground-Sync, TracLock, and adjustable audio options help users to set up the machine as desired, based on ground conditions and personal preference. Garrett believes in giving the ability to adjust a machine for a wider variety of conditions, hopefully resulting in more gold in your pouch.

Reading this guide is a great way to get started with your *GM24k*, but there truly is no substitute for time spent out in the field with the machine. Maximize your success by learning the features of the detector and also its language. With a combination of patience, research, and a little luck, you'll get your *GM24k*'s coil over gold.

Good luck and happy hunting!

Assembly



Garrett GM24k contents:

1. S-shaped stem
2. Middle stem
3. Lower stem
4. Searchcoil
5. Control box
6. Armrest with armrest strap
7. 8x AA holder

Assembly Instructions

1. Remove all parts from the shipping carton and check the image on the next page to make sure all parts are present.

2. Unlock "S" stem camlock and insert the reduced end of the middle stem into curved "S" stem so that stainless steel spring clip buttons line up and lock into the holes in the curved "S" stem. Turn camlock to secure.

3. Fit the rubber washers between the lower stem and searchcoil ears. Use only non-metallic washers, fiber bolt, and thumb nut, to secure loop to the lower stem. Then insert into middle stem so that stainless steel spring buttons line up and lock into one of the adjustment holes in the middle stem. Turn camlock to secure.



Detail on Step 3

GM24k Assembly



4. Unravel the cable and wind it around the stem assembly. The first revolution should be OVER the top of the stem with a small amount of slack. This is done so that the searchcoil can be paddled backwards toward the stem without putting a strain on the cable. Wind cable firmly all the way to the connector on the back of the control box. Then plug connector into control box and turn lock ring to secure. To secure cable, wrap Velcro cable retainers around stem and cable, one near the searchcoil and one near the handle.
Optional: prevent scraping your detector box by adhering the included pair of peel and stick rubber feet to bottom side of box.

5. Grip the detector by the handle, with your arm in the elbow cup with strap secure, and sweep the coil over the floor. If the detector fit feels uncomfortable, adjust the elbow cup by removing and repositioning the bolt and installing in one of the optional positions. If necessary, readjust clevis/lower stem length with the spring clip buttons so that the search coil can be held near the floor without requiring stooping over.

6. Adjust the elbow cup strap so that it is loose enough for you to slide your arm in and out without loosening each time you want to set the detector down.

7. Install battery with plastic tab and steel contacts facing toward inside of battery compartment. The 24k ships with a set of eight rechargeable batteries that may require charging before use.

8. The detector may not work as expected indoors due to the high degree of metals (nails, pipes, etc.) used in modern construction and the presence of electrical interference. It is best to tune and practice outdoors to ensure stable and more predictable results.

Batteries

Rechargeable vs Alkaline

1. The standard battery holder holds eight "AA" cell batteries. Garrett includes eight NiMH rechargeable batteries and a recharger with the GM24k. During normal searching conditions, you can expect about 45 hours of hunting time from fully charged batteries.

2. Alkaline batteries can also be used in this holder. During normal searching conditions, you can also expect about 45 hours of hunting time from one set of eight alkaline batteries.

3. Headphone use prolongs all battery life. Battery life will vary a great deal with temperature, number of target signals, battery type, brand, and shelf life. When traveling far from home it is always a good idea to carry eight (8) extra AA alkaline batteries, plus an extra empty battery holder.

4. Four bars on the battery icon *(see above, right)* indicates fully charged batteries. Replace the batteries when there is only one bar remaining. The *GM24k* detector will maintain full performance with only one bar remaining, but when the voltage remaining becomes too low for proper operation, the battery icon will begin flashing. Once the batteries get to 8 volts, the machine will turn itself off to keep from over-discharging the cells.

5. The battery compartment opens by pressing on the two buttons on the side of the battery box, releasing the catch and hinging open the door.





Above: battery icon

Left: battery holder

Using the Battery Holder

1. Slide open the battery holder lid (decal side of battery holder) by applying gentle upward pressure on the tab of the door so that it unlocks. Slide the door away from the battery box exposing the battery positions.

2. Remove batteries from the holder. Note the (+) and (-) positions of each cell and the (+) and (-) for each position marked inside the cell tray. Use the charger shipped with the GM24k to recharge the eight AA batteries, or install new alkaline AA batteries.

Carefully note the correct (+) and (-) positions when installing AA batteries. If the batteries are installed incorrectly, the detector may require service by an Authorized Service Center.

3. Slide the door closed so that it snaps securely.

4. Insert the battery holder into the detector with enough force to hear the double "click" from the battery retention clips inside.

GM24k Interface



Target ID #
Higher number,
Better chance of gold

Visual Target ID
Ground strength in
Ground Scan mode

Beep Mode On

Backlight On

Iron Cancel On

TracLock On

Volume Level
SAT/Threshold Level

Sensitivity

Audio Mode
SAT +/-

Power On/*Off*
Backlight

Volume +/-
Threshold +/-

TracLock
Ground Scan

Iron Cancel
Disc LO/HI

Sensitivity
Adjust other settings

Battery Condition Indicator

Ground-Sync/Exit Setting Selection
Pinpoint (non-motion)

NOTE: Regular text = button TAP, *Italic text = button HOLD*

Quick Start Instructions

With the *GM24k* properly assembled and the batteries installed, follow the instructions below to start finding nuggets.

1. Turn the *GM24*k on by pressing the POWER button.
2. Set the VOLUME to your preference (tap Speaker icon, use Up and Down buttons).
3. Set the **THRESHOLD** to a faint hum (hold Speaker icon, use Up and Down buttons). For silent search, turn this all the way down.
4. Set the SENSITIVITY to a level that ensures smooth operation (Up and Down buttons).
5. Set the **SAT (Self Adjusting Threshold)** to get a stable threshold (hold Music button, use Up and Down buttons).
6. Select your preferred **AUDIO** mode (tap Music button). With the Music icon displayed you are in Beep mode. With no icon, you are in Zip mode.
7. Enable IRON CANCEL if you experience difficult ground conditions, hot and cold rocks, or iron trash (tap Nail button).
8. **Lower the search coil** to the ground, then **"pump" the coil up and down** a couple of times and **XGB (Xtreme Ground Balance)** will automatically balance or track out the ground mineralization. Or you can Lock the tracking (Lock button) and perform a Ground-Sync (Bullseye button).
9. Start **swinging the search coil** in wide sweeps that overlap each other.
10. If you experience **false signals or constant beeping or popping**, turn **SENSITIVITY** down a bit, adjust the SAT up, or enable IRON CANCEL.

* SPECIAL NOTICE

If you attempt to demonstrate or test the *GM24k* by waving targets in the air in front of the search coil, it is ESSENTIAL to have the GROUND BALANCE toggle in the LOCKED setting.

This is necessary, for when the *GM24k* is in the XGB setting, the searchcoil must *SEE* ground while it is passing over the target or it will think that the target *IS* ground and will attempt to track it out. This is the case whether you are demonstrating with or without Iron Cancel.

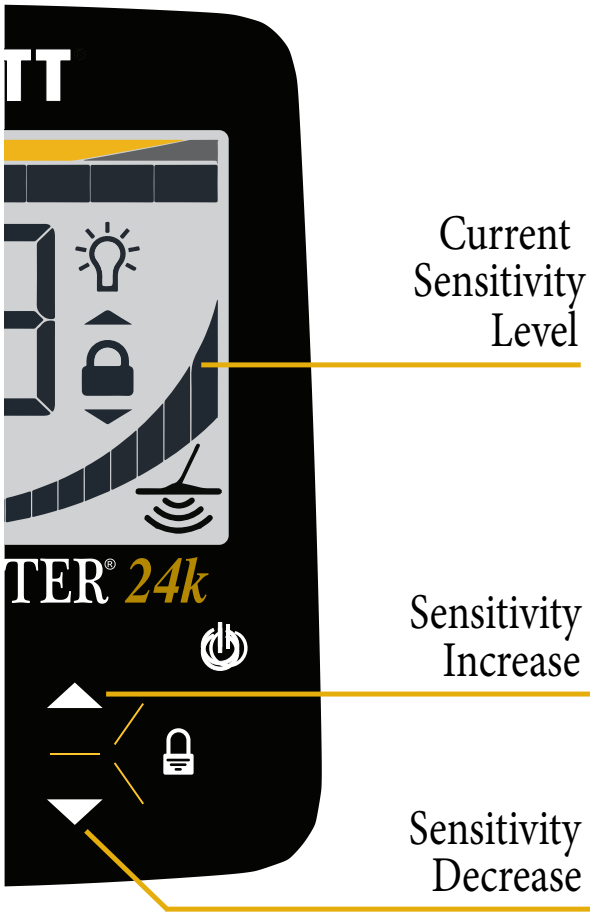
You may, however, demonstrate the fast ground balancing feature of XGB or GRAB by waving or pumping a mineralized rock in the air in front of the search coil.

Thus, testing the *GM24k* with targets while in XGB mode must be done in or on the ground.

Factory Reset

Hold ▼ when turning on the detector. Press and hold ⌖ button when "Fd" is on screen to reset the machine to factory default.

Controls



Sensitivity Control

With the SENSITIVITY control, you increase the signal strength coming from the ground. You might expect increased signal strength to always find more nuggets at greater depths. However, high ground mineralization will "bounce" the signal back and mask good targets. Therefore, adjust SENSITIVITY to give the maximum allowable sensitivity without masking targets or overloading the circuit. At the same time, this allows you to operate the detector with a constant threshold hum so that faint signals can be detected.

This is where the *GM24k* can help you out. When ground mineralization is too high for the current SENSITIVITY control setting, the display **shows you a series of lines** along with an audible "alert". Reduce the SENSITIVITY until the overload warning ceases. On occasion, while searching, you might go over a very large or very shallow target. This will result in the same type of behaviour. Lifting the coil higher may reveal some information on the target. You still might want to dig it up!

Sensitivity Adjustment

1. The UP and DOWN buttons control the SENSITIVITY. Each press on the UP button increases from a minimum level of "0" to a maximum level of "10". Please note that levels 0-9 adjust the system gain, and that setting 10 enables an Audio Boost for maximum sensitivity.

2. Average ground conditions will generally allow for settings of 5-7 on the SENSITIVITY setting. In mild ground you may be able to run as high as 10. In extreme ground, you may need to lower the sensitivity to under 5. If the *GM24k* overloads, your sensitivity is set too high.

3. One way to look at the SENSITIVITY control is like the accelerator in your car. Sometimes you have to ease off for better control, and other times you can go "full throttle" for maximum performance.

Sensitivity Adjustment (cont'd)

5. The object of increasing the SENSITIVITY is to get the maximum available depth from the detector WITHOUT causing the overload message to appear, which indicates an overload of the circuit.

6. In addition, any increase in SENSITIVITY adjustment should NOT BE at the expense of maintaining a smooth and constant THRESHOLD "hum". False signals, beeps and bops from bits of mineralization, erratic behavior, and lapses in THRESHOLD all can be results of running with too much SENSITIVITY.



With the right combination of sensitivity, SAT, and patience, your GM24k can find gold down to the sub-grain size .

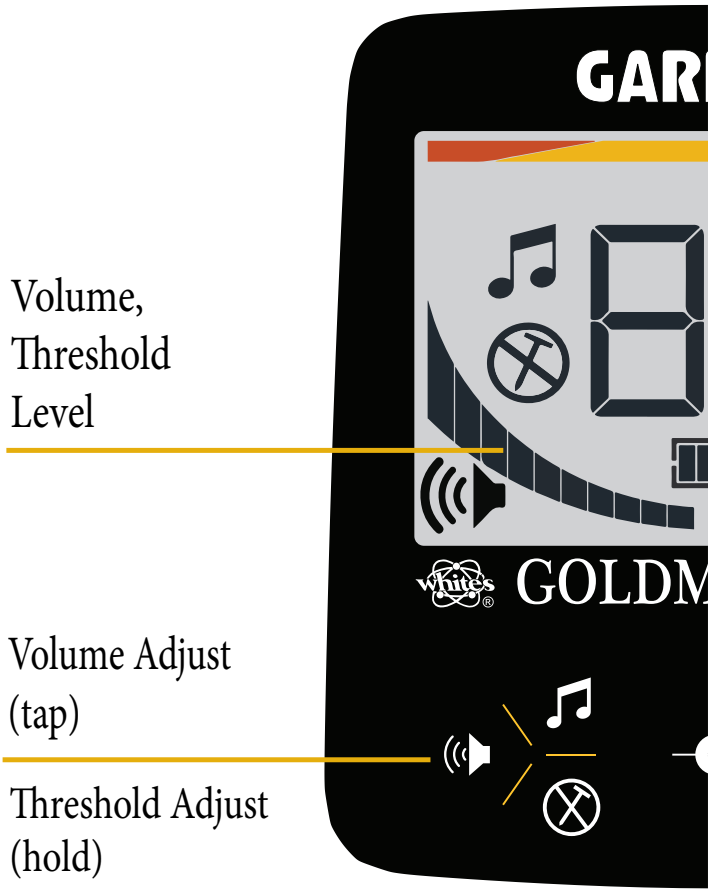
7. The use of the VSAT (Variable Self-Adjusting Threshold) control will also help to maintain a smooth THRESHOLD "hum" and will be covered in a later section.

8. While using a steady slow searchcoil sweep speed, advance the control towards "10" while maintaining a quiet smooth background THRESHOLD "hum". If ground noises are still a problem, reduce SENSITIVITY.

9. The TARGET ID capability of the *GM24k* functions more accurately when the SENSITIVITY is set at a level which allows for smooth operation. Too much gain can cause bad ground to distort the proper identification of iron and non-iron targets.

10. Just as a slow, broad searchcoil speed will maintain smooth threshold, it will also allow the searchcoil to get clear off of the target with each pass, insuring that the *GM24k* "sees" ground as well as target. This is essential for the accurate operation of Target ID.

Volume/Threshold Adjustment



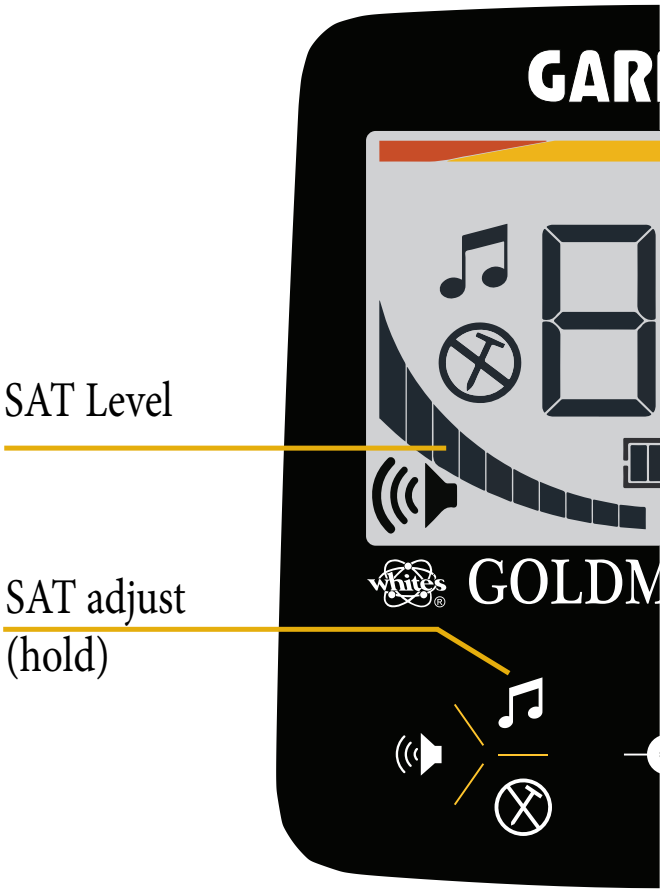
The VOLUME control on your *GM24k* only adjusts the sound level of target sounds and confirmation beeps. It is used in conjunction with the THRESHOLD to give you the most control over the dynamic range of your detector. This control is adjusted by tapping the SPEAKER icon and then using the UP and DOWN buttons to adjust it louder or quieter. Note that holding the SPEAKER button adjusts the threshold, which will display the letters "th" on screen. Adjust the THRESHOLD so you can hear a faint hum. This allows for best performance on small targets.

For example, with a low THRESHOLD and a high VOLUME, there is a large range of signals you might hear. Some will be just above the threshold; others will bang out loud and clear. You can adjust VOLUME and THRESHOLD to your preference, but in general the best range of target sounds will be available with a high volume and low threshold. At volume levels 9 and 10, you will see "b1" and "b2" on the display as these two levels enable consecutive audio boosts for low signals.

External Speaker or Headphones?

There are advantages to running your *GM24k* with headphones. Battery life will be increased and it will be much easier to hear the faintest signals. Wind especially can cause issues with using the external speaker on a gold detector, as the buffeting in your ears can mask small target sounds.

However, in snake country or in hot and humid conditions, headphones may not be an option. The *GM24k* has independent volume settings, meaning that you can adjust the volume for the external speaker as well as the headphones. These settings are saved when you power the machine down. The *GM24k* automatically senses when headphones are plugged in, and the machine will switch to the saved headphone volume level. It then returns to the saved speaker volume level when the headphones are removed.



SAT Speed Control

The variable **SAT** (Self Adjusting Threshold) speed control adjusts the speed that the *GM24k* recovers its threshold hum when the searchcoil passes over changes in mineralization. This setting is adjusted by holding the MUSIC button and then adjusting the SAT up or down between 0 (off), 1 (medium), or 2 (fast). The letters "Sa" will display when adjusting SAT.

SAT Adjustment

The Initial Setting is **1** (medium), appropriate for mild-to-moderate ground mineralization. When you encounter fast changes in ground mineralization or deeper, larger hot rocks, you may either get false signals (positive ground) or lapses in the THRESHOLD hum (negative ground). Increasing the SAT control setting to **2** will speed up the auto adjustment of the THRESHOLD "hum" and reduce this interference. At the same time, you should slow down your sweep speed to help SAT do its job to maintain a smooth threshold.

Remember, overall depth will be diminished with a faster SAT speed, but if the ground is too noisy to separate a good target from a false signal, it is better to operate with a little more SAT speed than to lose a target altogether. This is the same logic that was used in describing the SENSITIVITY control. Lowering the gain will reduce overall depth, but by doing so you can also improve your performance and find more nuggets in the long run. For best results, set your SAT speed JUST high enough to cancel out false signals from ground mineralization and set the SENSITIVITY control JUST high enough to maintain maximum depth without having false or erratic behavior.

Hot Rocks

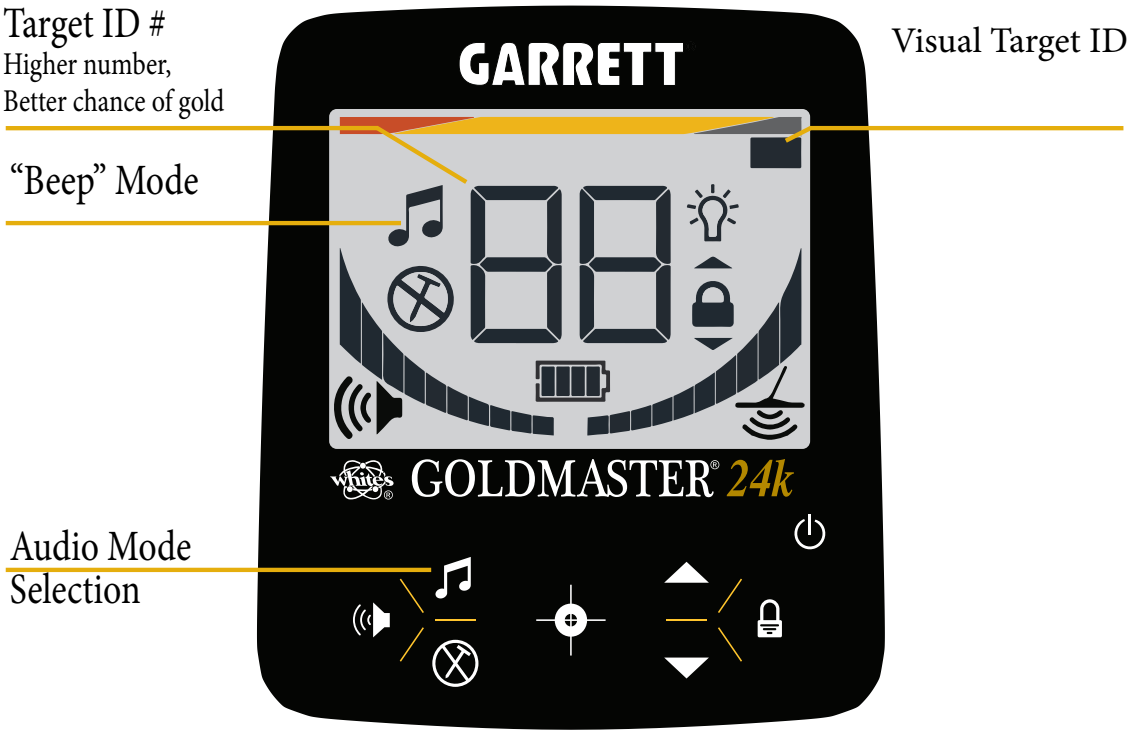
Hot rocks are mineralized rocks that can be heard because they are different in mineralization than the surrounding matrix or body of ground. Negative hot rocks, such as magnetite, tend to give a "boing" sound when the searchcoil is passed over them. The greater the difference between them and the ground, the louder the "boing". Positive hot rocks, such as maghemite tend to sound just like any other metal target, such as a nugget and can give a *zip-zip* sound. Positive hot rocks will test any prospectors patience. The *GM24k* will reduce the effect and help to identify many hot rocks. *(More on page 19)*

Target ID

The *GM24k* features two types of Target ID. The most obvious is the large numbers displayed in the center of the screen when the coil passes over a target. These two digits represent a scale from 0 to 99, with higher numbers equalling a higher chance that the target is non-ferrous.

In challenging ground, or when gold is located in host rock, it's important to dig every questionable signal. Sometimes very small gold can produce a low Target ID number, or in the case of sub-grain-sized nuggets, no number at all. This is why many electronic prospectors hunt mostly based on sound.

In addition to this, the topmost bar of the screen displays a general scale of targets. You can see that gold has a large range, due to the many different sizes, shapes, and consistencies of gold nuggets. When in doubt, dig it out.

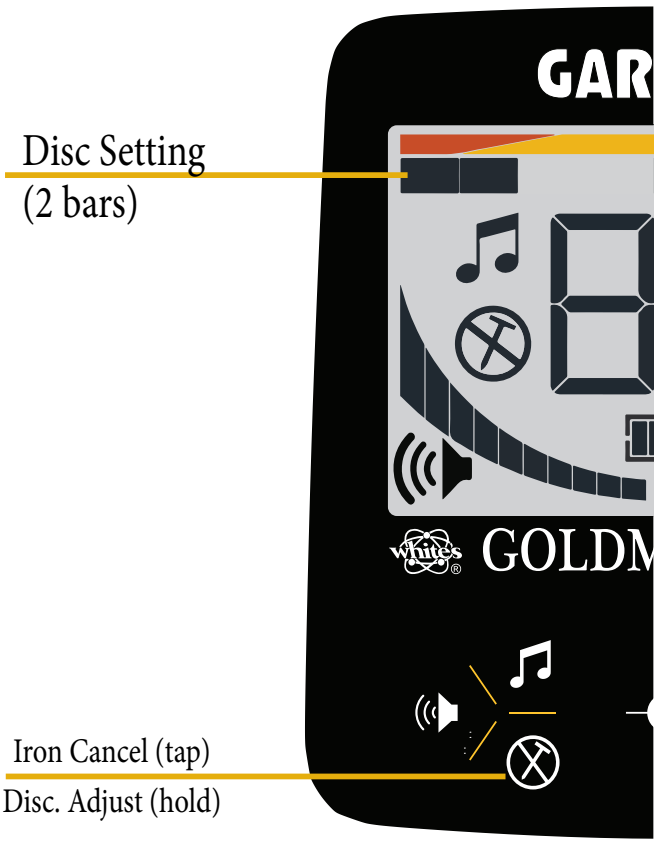


Audio Modes

Tap the Audio Mode button (the music note icon) to toggle between two different audio modes. With the Audio Mode icon ON, the *GM24k* is in "Beep" Mode, meaning it will produce 2 distinct beeps, one high and one low, for different types of targets. The higher tone has a better chance of being a non-ferrous target (gold, aluminum, silver, brass, etc.), and the lower tone has a better chance of being ferrous (iron, hot rocks, etc.).

With the Audio Mode icon OFF (music note icon is not displayed), the *GM24k* will produce a standard VCO (voltage controlled oscillator) "zip" sound on targets, where both audio pitch and volume rise as signal strength increases. This "Zip" mode is generally preferred by experienced prospectors due to the nuances of the sound and perceived sensitivity to small targets.

All settings (SAT, Volume, Threshold, Iron Cancel, etc.) have the same effects in both audio modes. This allows maximum flexibility for different users.



Iron Cancel (Discrimination)

When detecting for gold nuggets, it is often best to "dig it all." Gold can have various sizes, shapes, and be embedded in iron rock, so it is nearly impossible to account for every nugget in the ground and only dig gold. However, in challenging conditions the electronic prospector may need to adjust the *GM24k* to cancel out unwanted targets or heavy ground mineralization.

This is done at the expense of full sensitivity, but in extreme conditions the amount of signals can overwhelm your senses, causing "ear fatigue." In these cases the real battle is in finding good targets, not raw depth. Situations where you might need to use Iron Discrimination are: rapidly changing ground minerals, high concentrations of hot or cold rocks, old mining camps with iron trash, and highly variable ferrous ground conditions.

Iron Cancel Adjustment

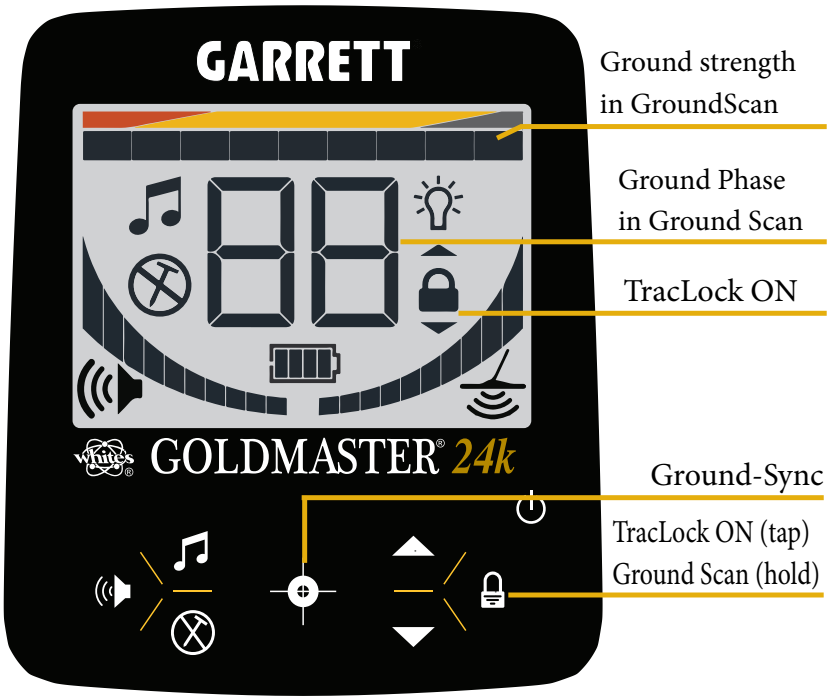
To enable Iron Cancel in either Beep or Zip mode, tap the Nail Icon. This will engage the Iron Cancel feature at the default setting. You can adjust this setting up or down by holding the Nail Icon, then using the Up and Down buttons to set the discrimination range. Best practice is to only use what is required for smooth operation of the *GM24k*, as too high of an Iron Cancel setting will decrease the detector's sensitivity to small gold nuggets. Again, this is a trade off—it is up to the operator to pick the balance between a smooth threshold and maximum sensitivity. If you are getting a lot of high signals from hot rocks, tap the LOCK button while in the Iron Cancel adjustment mode. This will block out a range of signals from 94-99.

Please note that unlike coin detectors, the threshold will not go silent over discriminated targets in the "Zip" (VCO) audio mode. This is to ensure smooth operation and combat ear fatigue. You may find that it is best to detect with Iron Cancel off, and then toggle it on to check a target. Very small gold will often report a very weak Target ID number, or none at all, so this setting is best used as a last resort in only the most challenging conditions.

Ground Balance Controls

Gold is usually found in mineralized ground, and the *GM24k* has XGB enabled by default when the machine is powered on. This makes it easy to get started prospecting, as the machine automatically cancels out unwanted mineralization so you can focus on listening for targets.

However, there are times when you may want the option to LOCK the ground balance control, or even display the ground information on screen. The comprehensive ground options on the *GM24k* allow you to do both of these things quickly and easily, without menu-diving.



XGB

The original *Goldmaster*® featured a revolutionary ground filter system that was quick to respond to mineralization changes. XGB is the automatic ground tracking method used by the *GM24k*, and features an all-new method and algorithm. For users this means that they can use this detector in a wider variety of ground conditions with more stable operation and less ground noise. When coupled with the Iron Cancel and SAT settings, you have a truly versatile set of tools to combat nasty ground.

XGB is the default setting on the *GM24k*, and is recommended for most users in most conditions. It has the ability to track a wide range of ground, from ferrous to alkali, and features an increased tracking speed over previous models without hurting sensitivity to small nuggets. The arrows above and below the LOCK icon indicate whether XGB is tracking up or down in values.

The algorithms used in XGB also give the *GM24k* an edge due to the ability to track multiple ground points simultaneously. In highly variable grounds this is a huge benefit, as you may encounter wide enough swings in ground phase to render other machines almost unusable.

Even though XGB is the suggested ground setting, advanced prospectors know that there are times when more control over the ground settings can equal more gold in your pouch. Details on these settings follow.

TracLock

TracLock on the *GM24k* is the locked, "manual" ground setting. It functions similar to the original GMT.

To LOCK the ground tracking to the current setting, TAP the LOCK button. A padlock will display on the screen. This will put a hold on XGB and lock the current ground phase and strength setting. This can be useful in those cases where you may find extremely tiny gold, or when you have located a faint target. In some cases automatic ground balance has the potential to track out tiny nuggets as you zero-in on your target. You may find it useful to enable XGB while searching, and then LOCK the tracking right after you get a target.

Ground-Sync (Quick Ground Balance)

While the tracking is locked, you can press the CROSS HAIR button to perform a Ground-Sync. This updates the ground setting to what is currently under the coil. With a combination of LOCKED tracking and Ground-Sync, you can easily update the ground balance point as you swing.

When you perform a Ground-Sync, the current ground phase reading will briefly display on the screen. This is a good way to keep track of the type of mineralization you are walking over. More ferrous soils tend to produce a larger ground number, whereas more alkali soils will produce a smaller number.

Ground-Sync will also display the ground phase when the *GM24k* is in XGB (automatic) mode, but does not interrupt the automatic tracking processes.

Ground Scan

Ground Scan is enabled by holding the LOCK button. The display will change to display the ground strength on the top bar, increasing from right to left. Full bars equates to very strong mineralization, and one flashing bar alerts you that no ground information is present.

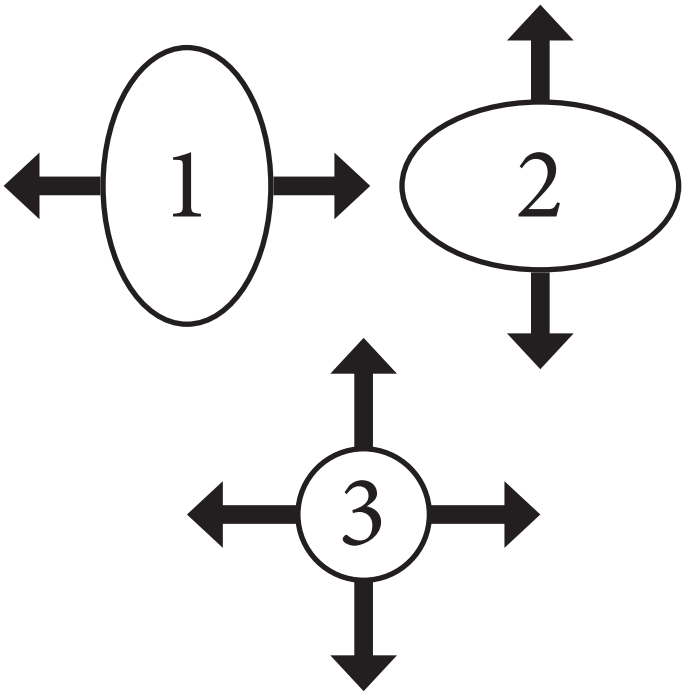
The two-digit numbers displayed are the ground phase. Solid ferrite will read around 81, and alkali will read between 50 and 30, but you may encounter any range of phase numbers depending on the area you are in.

In Ground Scan you can also set a ground offset by using the UP and DOWN arrows. This selection will affect the ground offset in normal search mode whether using XGB or locked settings.

Ground Scan is very useful in prospecting dry washes or creek beds for black sand deposits. One trick you can use is to carry some landscaping flags with you, placing one down where the mineralization is the strongest about every 10 feet. That is where you would want to process material through a sluice or dry washer.

To return back to the regular search mode, tap the LOCK or CROSS HAIRS.

Searching



Pinpoint Technique

Due to the wide scan nature of elliptical searchcoils it can be difficult to locate small targets under the physical center of the loop. Use an "X" marks the spot technique as shown in the diagram to identify the portion of ground the nugget is in. Because most nuggets are too small to isolate to an exact location as in coin or relic hunting, remove the soil under the center of the "X" until the target is no longer in the hole, but in your pile of dirt. Techniques for examining the pile of dirt are discussed later in the manual. (*page 21*)

Again, the procedure is to sweep over the target from side to side noting the side to side center (*see step 1 in diagra*m). Then turn 90 degrees and sweep the coil side to side noting the center from this new direction (*see step 2 in diagram*). "X" marks the spot that you need to dig (*see step 3 in the diagram*). You can practice with a small pieces of lead or gold on top of the ground to become acquainted with the technique. It's a good idea to have a magnet handy, preferably in the handle of your digging pick, to pull iron out of the dirt pile. It will speed up your recovery time. It will work on small almost invisible hot rocks, too.

Non-Motion Pinpoint Mode

In addition to this traditional pinpointing method, the *Goldmaster® 24k* also features a non-motion pinpoint mode. This is engaged by holding the crosshairs button (large button in the middle of the keypad). With this button held down, the detector will sound off on targets whether the searchcoil is in motion or not. Non-motion pinpoint mode disengages the XGB ground tracking, Iron Cancel, and SAT, so in very challenging conditions you may find that this pinpoint mode struggles to counteract mineralization. But it can be very useful in sizing targets under the coil and giving you an idea of their shape. For example, nails can often pinpoint as an oblong shape with a stronger sound on the flat head.

While in non-motion pinpoint mode, the screen will display the signal strength using the two bottom "swoop" segments as well as the two-digit numeric display. The numeric display reads from 0-30, with 0 representing a target close to the surface and 30 a target at the edge of detection. Due to the various size, purity, and mineral content of gold nuggets, this scale is not capable of giving absolute depth readings and should only be used as a reference point for signal strength. It also may give strong readings for extremely large iron items that can surprise you with how deep they really are. The opposite is also true—very small nuggets may read as weak targets. So it is best to look at the readings and sound of the non-motion pinpoint mode as a signal strength, and not a depth reading.



Headphones

The headphone jack on the *GM24k* is located on the rear of the battery box. There is a dust cover for the headphone jack (in your parts kit) that should be used when not running headphones. Most prospectors prefer high quality stereo headphones so the *GM24k* is wired for stereo sound. In addition to the volume control headphones included with your detector, an 1/8" to 1/4" headphone adaptor is included. Plug this adaptor into the headphone jack to allow the use of other 1/4" size headphones.



1/8" to 1/4" headphone adaptor

Headphone jack dust cover

In choosing headphones, make sure they have a VOLUME CONTROL. This is an important comfort and safety issue. Remember that you want the faintest THRESHOLD "hum" possible but a strong comfortable target signal. With headphones you will be able to work with a lower THRESHOLD "hum", hear fainter target signals, avoid bothering others with a "beeping" box, and save on battery life. Many high quality headphones from full ear enclosure to lightweight summer models that offer a bit more safety in snake and bear country are available on the market. Higher impedance headphones (60 Ohms or greater) give the most sensitivity and are better for hearing the tiny targets most likely to be heard while prospecting. Properly balanced impedance is important as well as low distortion.

Headphone Volume

Since the *GM24k* has a volume control (accessed by tapping the speaker button and adjusting the audio volume up or down), certain sets of headphones with in-line volume control offer you added adjustment. This is due to the fact that the *GM24k*'s volume control only affects signal sounds, not the threshold level.

For a maximum range of audio sensitivity, a user would set their *GM24k* volume at the maximum level, and then adjust the in-line headphone volume to suit their preference. This will allow for both very subtle, quiet signals as well as very loud signals, giving you a wide range of target volumes.

For a more moderate range of audio sensitivity, a user would set their *GM24k* volume at a medium level and adjust the in-line headphone volume up. This will make quieter signals seem a bit louder and give less dynamic range, which may aid in target acquisition for some users.

Field Use and Tuning Tips

Putting it all together:
Once you have achieved the initial ground balance, you are ready to start searching. Move the coil just over the ground and listen for the distinct *zip-zip* sound produced by a target. It is wise to plant a nugget just under the soil to practice on in order to learn to recognize what it will sound like. If you don't have a nugget, use a nickel or piece of lead (sinker or bullet). A very shallow bird shot sounds just like a tiny piece of gold.

You can practice with different sized nuggets and at different depths. Remember, planting a target disturbs the ground mineral, which usually reduces the depth it would have been found in undisturbed ground. It will take practice to determine the proper search speed and technique. Do not go too fast. Try to overlap your sweep path so that you won't miss the tiny and deeper nuggets. When you hear a zip-zip, perform the "X" pinpoint technique or use the non-motion pinpoint feature (*page 16*) over the loudest portion and eyeball the center.

Rather than concentrating on all of the controls of the detector, think of the detector's systems as an extension of your senses that are working together to tell you what is below ground. You will be tuning yourself to the search area. The SENSITIVITY, the GROUND BALANCE, the VSAT speed, the THRESHOLD, the IRON CANCEL, all working together at the same time. Soon the detector will not even be noticed and your senses will take over, painting a mental picture of what lies below.

Dig ALL Metal Targets at first then Reject Iron:
At first, dig all targets until you get used to the sound of various items. As with other VLF detectors, a nail or oblong piece of iron laying horizontally will produce a double beep. A "good target" is considered anything that is not IRON. You want to detect lead, brass, copper, aluminum and silver. Any of these metals can simulate the sound of a gold nugget and must be dug. Keep a particular lookout for the tiny lead bird-shot so common in mining areas. If you are detecting these tiny targets, you are doing everything right and will eventually find gold.

Locked GROUND BALANCE tuning for very small nuggets:
While the XGB automatic ground balance makes nugget hunting easy for prospectors of all experience levels, a LOCKED ground balance can greatly improve your odds of finding gold in some situations.

The reason for this is simple—the smallest nuggets can produce only a slight threshold raise, and often vary only a few phase degrees off of the ground due to their tiny size. If small gold is your gold, locking the ground tracking allows those faint variances to push through the ground balance point and create a target signal for the *GM24k*.

However, in challenging ground conditions this is not always an option. This is where using the Ground-Sync feature is useful, as you can manually update the ground balance at any point as you detect.

Another option is to run the *GM24k* in XGB mode, and after hearing a faint target signal, immediately locking the ground balance. Now you can double check the target from different angles without the XGB "tracking out" that target. This provides the best of both worlds—automatic tracking but the option to freeze it after acquiring a signal.

If hot rocks are driving you crazy, you can also ground balance directly over the hot rock, then lock the tracking. If the rest of the ground matrix does not give you a false signal after doing this, you have successfully cancelled not only the ground but also hot rocks!

Backlight and Battery Life

With a short tap of the power button, the *GM24k*'s backlight will turn on, giving increased visibility in low light conditions. In bright sunlight it will not be obvious this backlight is enabled, so there is a light bulb icon to indicate the status as well (icon on = light on). This light consumes extra power, so it is best used only when necessary.

This backlight is on for a few seconds when powering on the *GM24k*, but only to allow for those situations when the unit is turned on in total darkness. It will turn itself off after a few seconds and the icon will disappear until the backlight is enabled or the detector is powered back on again.

Operating *GM24k* in Extreme Mineralization:

Thanks to its XGB ground balance, SAT, and Iron Cancel, the *GM24k* can operate in a wider variety of conditions than many other VLF detectors. However, it takes some knowledge of how to use each setting to combat bad ground, and the differences between types of ground.

In very strong mineralization, such as heavy iron stone or serpentine, it will be necessary to lower the sensitivity. There is enough voltage at the search coil to cause the *GM24k* to overload in bad ground, so take some time to find a good setting for sensitivity before making other adjustments. To check the ground strength you can enable Ground Scan by holding the LOCK button.

Another issue you may run into is highly variable ground mineralization. In these conditions you will not get an overload response, but will have to contend with lots of false signals with your coil sweep. This is a result of the ground phase shifting rapidly under the coil. The first step you should take is to increase your SAT setting by holding the Music Note button, and then tapping the Up button to set the SAT to a higher setting. This will allow the detector to adjust more quickly to the rapid ground changes.

As a last resort, enable the Iron Cancel feature (the crossed-out nail button). This will not allow those low-range signals to break through the threshold in either audio mode. Only in the most extreme conditions should you adjust the Iron Cancel (by holding the crossed-out nail button) to higher settings.

Problems from Low Ground Mineralization:

The *GM24k* is designed to work in an environment of heavy iron mineralization. In some cases, there may be so little mineralization that the search-coil will never go quiet as it approaches the ground. In other words, there never seems to be any change or only a faint increase in hum as the coil is pumped. In this instance, lock the ground balance (lock button) and perform a Ground-Sync before detecting.

Hot Rocks

The ever-present "hot rock" has caused frustration with almost every electronic prospector. Most large ones are on the surface and can be kicked aside when identified. You will soon learn what they sound like. The "overshoot" or "boing" sound will soon become familiar. XGB is really a good option when they are plentiful. We find it best to tune to the majority of the ground matrix and learn what a "hot rock" sounds like. The XGB of the *GM24k* will recover quickly upon leaving the vicinity of a "hot rock" and will remain sensitive to gold nuggets. Since there are different kinds of "hot rocks", it is almost impossible to eliminate all of them with one setting. Some will be identified by the Target I.D. system as if they were iron. In every instance, practice makes perfect.

Field Use & Tuning Tips (cont.)

Negative Hot Rocks:

Negative hot rocks are ones that sit below the ground balance point of the *GM24k*. They actually produce a null or no sound when directly under the coil, making a sound once the coil passes them. This sometimes sounds like a "boing" when the ground mineral and the rock mineral are far apart in mineral TYPE, making them easy to recognize. At any rate, these are usually black or grey in color and usually magnetic. When hunting in LOCKED ground balance, they can often be tuned out by performing a Ground-Sync right over them and then proceeding to search with the *GM24k* "over tuned" to the ground. When using this procedure, be sure to search slowly and keep the coil close to the ground and level. This will eliminate the bother of such "hot rocks."

In some parts of the world these specific types of rocks are called "cold rocks," since they ring up beneath your current ground balance setting. They are usually easy to identify thanks to the "boing" sound and difficulty in pinpointing them. If the ground is littered with these negative hot rocks, not just an occasional one, the XGB will track near the hot rock balance point, lowering the *GM24k*'s response. You may be forced to dial in more SAT speed and/or reduce SENSITIVITY to keep a workable THRESHOLD "hum".

Positive Hot Rocks and Alkali:

Positive hot rocks are usually red or various shades of red to almost black. They sit above your current ground balance point. They are sometimes as small as BB's and sound just like nuggets. These positive "hot rocks" are difficult to tune out and ring up very low on your Target I.D. scale. They actually give a positive signal like metal and that is why they are so hard to differentiate. The XGB will track some of these out automatically. Using a higher SAT setting can also decrease your *GM24k*'s response to these positive hot rocks.

Using a Double D coil on the *GM24k* will allow the detector to operate amongst hot rocks better than a concentric. And as a last resort, the Iron Cancel feature should all but silence any remaining hot rocks.

Wet alkali washes can be extremely difficult to work due to the sensitivity of high frequency gold detectors to conductive dissolved salts and their similarities with the responses of small gold. But you can use the same techniques for alkali as you use for positive hot rocks.

Adjusting SENSITIVITY with XGB:

If while searching with XGB you experience erratic behavior such as false signals or constant beeping and popping, you may be using a SENSITIVITY level which is too high for the ground mineralization. This is often the easiest thing you can do to increase your ability to hear gold in bad ground. Simply tap the down button to lower the sensitivity on your machine. Try searching again. Continue this until you can hunt without having erratic signals. Your detector is cancelling ground mineral as you sweep, so you may notice a slight fluctuation in the threshold hum as the various ground minerals are tracked out.

Even though it may seem counter-intuitive, adjusting the sensitivity down in tough ground conditions can actually increase your chances of finding a nugget. This is due to the fact that your ears are an extension of the metal detector. Hearing one faint signal against a smooth threshold is much easier than hearing a medium signal against hundreds of smaller ones.

Even though the *GM24k* comes with advanced features like SAT, Iron Cancel, and XGB, don't overlook the first step you should take on any outing—finding the right sensitivity level for the ground your are walking over.

Pinpointing or "X" ing the target:
In most cases, pinpointing is easily performed by merely "X-ing" or criss-crossing. You can also use the new non-motion pinpoint mode on the *GM24k*. The loudest part of the target will be under the center of the coil, just as with any detector. After the approximate location of the target is determined, take a handful of soil and check the hole again. Continue this process until the target is no longer in the hole, but in the hand. Try putting the handful of soil in a plastic container (pan, tray, cup, or scoop). Passing the container over the coil will determine if the target is really in it. If so, a series of separations will quickly expose the nugget. This is called "the 50-50" process. You take half the dirt out of the scoop, and pass it over the coil. If the machine beeps, it's in the scoop. Dump the empty dirt and repeat until you have the nugget in hand.

Handful Of Dirt:
Some prefer to pass the handful of dirt across the coil directly. Caution must be exercised if this is done. The *GM24k* is sensitive enough to pick up the salt in your hand and respond with a signal. Try this with nothing in your hand and you will see how close you can come to the coil using this method. One way around this salt sensitivity is to pinch the soil in small amounts and wave only the fingers over the searchcoil. You will find the way best suited to your needs. The condition of the soil—dry, wet, fine, coarse, etc.—will have a lot to do with the best method for you.

SENSITIVITY and VARIABLE SAT (Self Adjusting Threshold) Speed:
XGB compensates for common ground minerals in the area. The V-SAT control compensates for the consistency of that ground mineralization (accessed by holding the Music Note button). The greater the degree of inconsistencies, the more SAT is needed to quiet ground noise. If the THRESHOLD becomes too erratic or noisy, it might be necessary to use the SAT feature and/or reduce the SENSITIVITY control. This noisy behavior will make it difficult to recognize a true target (possible nugget) from pieces of mineral, commonly referred to as "hot rocks."

It is not wise to keep a high level of SENSITIVITY if the detector will not operate smoothly. This is a false sense of security. Recognizing a true target is the most important part of detecting. This is an example of when less SENSITIVITY will produce more nuggets. You must be the best judge of just how much noise you can tolerate and still identify nuggets, as well as the combination of SAT and SENSITIVITY which produces the desired results in your area. Therefore, if you have been operating your *GM24k* at full sensitivity and you determine that this is too high because either the threshold is erratic or the detector is giving false signals; always begin by reducing the sensitivity to a more stable range. If this does not correct the problem, start adding some SAT speed by holding the Music Note button and using the up arrow. If this does not correct the problem, go back to the SENSITIVITY and reduce it a little more.

It is sort of like seasoning a pot of soup. Some salt and some pepper. Remember any drop in SENSITIVITY below (7-8) will result in some loss of depth. Any increase in SAT speed above the default setting of 2 will also reduce overall depth. However, every ground condition has its optimum setting.

Overall depth is not the ultimate goal. Finding nuggets is! Unless your threshold is constant and as smooth as possible, and free from false targets which confuse the picture, you will never be able to tell the ground from the gold. We like to use the analogy of driving on a straight road versus a curvy road. The object is to get from point A to point B. 65 mph might get you there on a straight road, but you will have to slow to 35 mph if the road is curvy, or you will end up off the road. The straight road is like low mineralized ground and the curvy road is like heavy mineralization. High SENSITIVITY and slower SAT will not get you the gold in heavy mineralization.

Field Use & Tuning Tips (cont.)

Overload:
The *GM24k* will overload when the coil is over a large object or extremely heavy iron mineralization. Lowering the SENSITIVITY will usually cure a mineralized area, but will not do much to eliminate a real target. With a little practice you will figure it out. If the overload seems everywhere it is probably mineralization and lowering SENSITIVITY is essential.

Target ID:
The *GM24k* has three different target identification systems. First and foremost is the audio response. In the All-Metal (or ZIP) audio mode, the detector sounds off with a scaled pitch and volume raise over targets. In Beep mode, the detector will give a high tone for mostly good targets like gold, silver, brass, and aluminum, and a lower tone for targets more likely to be iron junk. It also displays a Target ID number, using a scale from 0-99. You might think of this as a "dig percentage" meter, with higher numbers being more likely to be a good target to dig. There is also a Target ID Bar, which gives you a block in the Iron, Gold, or Alloy ranges. Segments farther on the right of the screen are more likely to represent good targets.

Even with all of this information presented by the *GM24k*, it is generally a good practice to dig everything in gold country. Very small gold nuggets can fool any discrimination system, especially where the gold is encased in host rock. Still, in challenging areas like mining camps the Target ID system can give you more information about targets—it's up to you to dig it or leave it.

Misclassifying Iron:

The Target ID will consistently identify some types of Iron and Steel objects as non-ferrous, particularly flat thin steel such as a can lid, very large pieces of iron, and small solid pieces of iron like heavy washers. Because this is a gold detector, it was essential to design it so that it would tend to call doubtful targets "non-ferrous" or "possible gold". In this way, eliminating the possibility of mistaking gold for iron.

Ground Scan mode tips:
Prospecting takes patience. With a metal detector, it requires even more. There are certain areas where the gold is so fine that metal detecting is not an efficient recovery technique. For these areas you can use the *GM24k*'s Ground Scan mode to track mineral deposits.

This feature is excellent for dry washes, creek beds, and old channels where you might want to process the dirt using a sluice, dry washer, or even just a simple gold pan.

Hold the Padlock button on your *GM24k* and the screen will show you the ground phase (two digit number) and strength (top Target ID bar). Find an area likely to contain black sand (and therefore more likely to have gold) and sweep the coil over the stream bed normally. Wherever the concentration of minerals are the strongest (Target ID bar fullest), drop a marker.

As you continue down your path you will end up mapping the pay streak with your markers, giving you a lane to work with your recovery equipment. The sensitivity control works in this mode as well. If there is no ground present, the first Target ID segment will flash

Frequency Shift:
If you find yourself detecting with others, or underneath power lines, you may encounter EMI (electro-magnetic interference). Turn your *GM24k* off and hold the Iron Cancel button while powering it back on. Select a different frequency, using the ▲ and ▼ buttons. Select the frequency with the least interference. To beging hunting again, simply press the crosshairs (pinpoint) button to exit the settings selection. Your new frequency selection will be retained when the GM24k is powered off.

Information

Proper care

I. Cleaning

A. Both the coil and rod are waterproof and can be cleaned with fresh water and mild soap. The battery box and control box are not water proof, but are water resistant. **Never** lift a wet coil above the height of the control box as water can run down the inside of the rod damaging the electronics. A damp cotton cloth can be used to wipe off a dirty control box.

II. Weather

A. Do not expose your detector to the conditions of a car trunk during winter and/or summer extremes.

B. Protect it from direct sunlight during storage.

C. The control box is rain resistant. However, it must be protected from heavy rain.

III. Storage

A. When the detector is not in use, make sure it is turned OFF.

B. If you plan on storing your detector for long, remove the battery holder from the detector and remove the batteries from the holder.

C. Store the detector indoors, in an area where it will be protected from abuse. Over the years White's has noted more service repairs and physical damage, on units in storage than those experiencing daily use.

IV. Additional Precautions

A. Avoid dropping your detector while attempting to set it down to dig.

B. Avoid using your detector for leverage when standing up from a dig.

C. Do not use any lubricants, such as WD-40, on any part of your detector.

D. Do not modify your detector during its warranty period.

FCC Compliance

This device complies with part 15 of the FCC Rules. Operation is subject to the following conditions.

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

CAUTION: Changes or modifications not expressly approved by Garrett Electronics could void your warranty on this product.

Warranty

In the event you encounter problems with your *GM24k* detector, please read through this Owner's Manual carefully to ensure the detector is not inoperable due to manual adjustments. Hold ▼ when turning on the detector. Press and hold ⌖ button when "Fd" is on screen to reset the machine to factory default.

You should also make certain you have checked your battery charge and connections. A low battery is the most common cause of detector "failure."

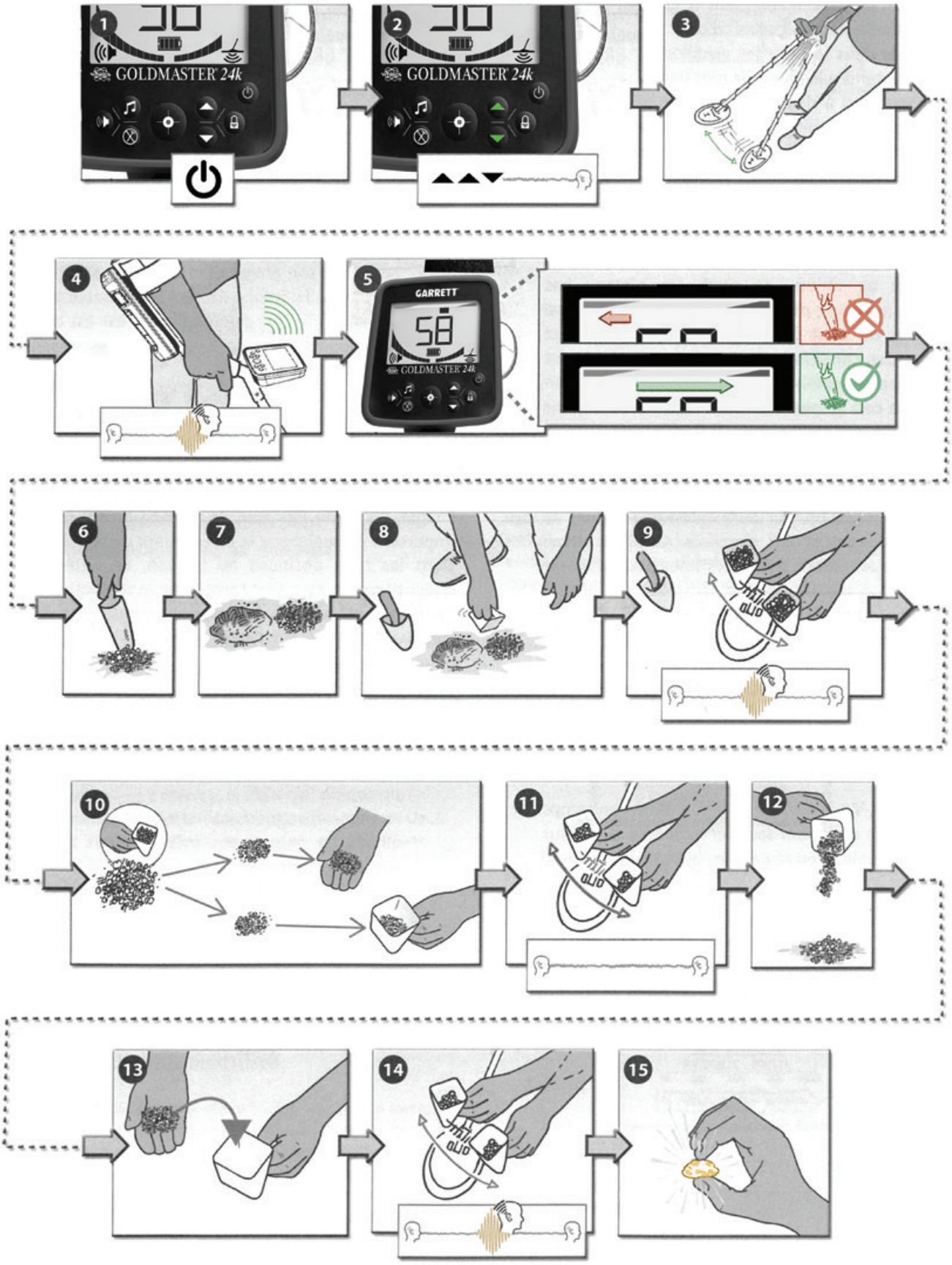
Register your Garrett detector online.

garrett.com/sport/warranty-registration

Scan here to get started



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2
GOLDMASTER 24k
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