



The name that means Treasure

µMAX Diablo OPERATOR INSTRUCTION MANUAL

CONGRATULATIONS!

Your new Tesoro µMAX Diablo Metal Detector is part of a new series of detectors designed to provide you with many happy hours of gold nugget prospecting. Ahead of you lie fascinating and exciting experiences as you take pleasure in the great outdoors searching for the most beautiful of all precious metals. I wish we could share these experiences with you, and all of us at Tesoro wish you the best of success.

Your Tesoro µMAX Diablo is capable of meeting your needs in a wide range of gold prospecting situations. As with any other metal detector, familiarity with this instrument is probably the limiting factor in determining how successful you can be. I recommend that you read this manual and understand fully how to operate this detector before attempting to use it in the field. As you become more familiar with your detector through practice, your rate of success will increase dramatically.

The µMAX Diablo is a precision electronic instrument that will last for years if properly cared for. Treat it right and it won't let you down.

Good Hunting! Jack Gifford

INTRODUCTION

To be successful in gold prospecting with a detector you must:

- Use a high-performance metal detector designed specifically for gold prospecting.
- Learn how to use your metal detector properly.
- Search where there is gold to be found.
- Be persistent.

The MicroMAX (µMAX) Diablo is designed for gold prospecting. It will find both large and small gold nuggets. It will find nuggets smaller than a BB under good conditions. It will not find gold dust. Because it is sensitive to all metals, and not just gold, it can be used to find other buried metal objects such as coins, jewelry, etc.

This OPERATOR INSTRUCTION MANUAL is designed to help you learn to operate the detector properly for maximum performance in various search conditions. Complete instructions on how to operate the MicroMAX Diablo are found in the two main sections: GETTING STARTED and OPERATING TECHNIQUES. Additional information on gold prospecting and mineralization typically encountered during gold prospecting is found in the APPENDIX.

If you are new to gold prospecting with a metal detector, we highly recommend reading and following the entire GETTING STARTED section to develop the "feel" of your detector. Then, study and practice the OPERATING TECHNIQUES section to get the best performance from your detector.

If you are an experienced detectorist and are familiar with the concepts of metal detecting, you may want to go directly to the OPERATING TECHNIQUES section. Whatever your prior detecting experience is, the more skilled you will become at operating this detector, the more rewarding your results will be.

Please keep this in mind: If there is no gold where you are searching, it won't matter how good your metal detector is or how skilled and persistent you are. To learn more about where to search for gold, see your dealer for magazines and books on the subject.

PRODUCT DESCRIPTION

The MicroMAX Diablo is an ultra-lightweight detector with the performance and features of a full size, heavier detector. State-of-the-art circuitry and advanced design make the MicroMax Diablo one of the finest gold nugget metal detectors available.

The MicroMAX Diablo is a Transmitter-Receiver (TR) type of detector that operates in the Very Low Frequency (VLF) portion of the Radio Frequency (RF) spectrum. The MicroMAX Diablo uses four control knobs, one toggle switch and one push-button to provide full VLF capabilities with fingertip adjustment of all controls.

The performance of this detector will satisfy the requirements of the serious gold nugget prospector, whether experienced or novice. At the heart of the MicroMAX Diablo is a totally new circuit board developed from Surface Mount Technology. This MicroMAX circuit board helps provide ultra-smooth operation in the most difficult soil conditions along with greater depth and sensitivity to smaller gold nuggets.

The MicroMAX Diablo's features make its power easy to use. Through simple and fast operator adjusted "ground balancing," the ground rejection circuitry will allow operation in even the most challenging ground mineralization conditions. The Tuning Mode is Fast Auto Tune that will readjust the threshold quickly after encountering a target. The operating Mode is All Metal; motion is required so the searchcoil will detect a target located directly under it. The PINPOINT push-button helps indentify a target's exact location by switching to a No-Motion All Metal Mode without autotune.

Advanced design permits the complex, powerful circuitry of the MicroMAX Diablo detector to fit into a very small space resulting in a detector so incredibly light there is no need to body mount the control housing. This exclusive design feature adds to the MicroMAX Diablo's ease of use

and makes those longer searches more enjoyable. The 3-peice knockdown pole design allows the unit to fit into an optional compact carry bag perfect for travel and convenient storage.

The MicroMAX Diablo comes standard with a 10" elliptical wide scan searchcoil for best all-around performance with good rejection of ground mineralization - a most important feature for gold prospecting.

GETTING STARTED - UNPACKING THE BOX

Your MicroMAX Diablo was shipped with these parts:

1 Upper Pole Assembly

Fully assembled, including upper pole stem with handle grip, padded arm bracket and control housing.

1 Lower Pole Assembly

Fully assembled, including middle pole stem with knurled nut, lower pole stem, and nylon pole tip complete with two thick friction washers, mounting screw, lock washer and thumb nut.

1 10" eliptical, wide scan searchcoil with 3' cable

1 9 Volt Alkaline Battery

1 Extra set of two thin friction washers

1 OPERATOR INSTRUCTION MANUAL

1 Tesoro Warranty Card

If any of these items are missing, contact the Tesoro Authorized Dealer where you purchased your detector *immediately*.

Assembly of the MicroMAX Diablo is simple and requires no special tools. Just install the battery, mount the searchcoil on the lower pole assembly, connect the two pole assemblies together, wrap the excess cable around the pole and plug the cable into the control housing. Finally, adjust the pole length and searchcoil angle and you're ready!

INSTALL THE BATTERY

Your MicroMAX Diablo is equipped with a special battery circuit so that you can always be sure you are getting top performance from the detector.

To install or replace the battery, first make sure the SENSITIVITY control is set to POW OFF - turned completely counterclockwise past the "click".

Remove the battery door from the back of the control housing. Do this by pressing your thumb firmly on the louvered square - at the bottom of the battery door - and sliding the battery door upward (in the direction of the arrow) while pushing.

Connect a fresh single 9 volt alkaline battery to the battery lead terminals. Make certain the polarity snaps to fit properly. A poor connection may cause the detector to act erratically or fail to operate completely.

Place the battery into the battery compartment without pulling or stretching the battery lead wires. Replace the battery door by sliding it into place making sure the upper mount slots are in line and the lock tongue is snapped into place.

ASSEMBLING YOUR DETECTOR

1. On the lower pole assembly, grasp the pole tip firmly in one hand. With the other hand, fully depress the two spring buttons on the opposite end of the assembly.
2. Pull the middle stem out far enough for the spring buttons to click into the first set of the adjustment holes - locking the assembly into place again.
3. Remove the mounting screw and thumb nut from the black nylon pole tip.
4. Insert the pole tip between the mounting ears and the searchcoil and align the holes of the pole tip and washers with those of the mounting ears.

Note: the pole tip should fit very snugly into the mounting ears, however, it may be necessary to use the thin friction washers instead.

5. Insert the mounting screw through the holes in the mounting ears and pole tip - entering from the side opposite the cable connection.
6. Install the thumb nut on the mounting screw and tighten by hand.

Note: Do not over tighten the thumb nut. It should be snug, but not too difficult to loosen up.

7. On the upper pole assembly, depress the two spring buttons and slide the upper assembly into the lower pole assembly until the spring buttons click into the holes - locking the two assemblies into place. Tighten the knurled nut to secure the two assemblies together.

Note: The knurled nut must be loosened in order to connect or detach the two pole pieces. Turning the knurled nut so it moves toward the lower pole as it turns loosens it and vice versa.

8. Wrap the cable around the pole leaving enough slack near the searchcoil to permit searchcoil adjustment.

Note: Do not allow the cable to flop loosely over the search coil. Since the detector is sensitive enough to "see" the tiny wires in the cable, a floppy cable can cause false signals as the searchcoil senses the moving wires.

9. Plug the male cable end into the female connector on the control housing and tighten the cable thumb nut. You are finished!

Note: You will want to adjust the pole length and searchcoil angle to your preference.

ADJUSTING THE POLE & SEARCHCOIL



The pole length should be adjusted so that the detector does not become uncomfortable or tiring after long periods of use. The detector grip should rest in your hand with your arm relaxed, your elbow straight but not locked, with the pole extending out in front of you at the approximate angle shown in the photo.

You should be able to swing the detector back and forth in front of you—using relaxed *shoulder movement*—while keeping the searchcoil as close to the ground as possible. This swinging movement is often called a "sweep."

The searchcoil should not touch the ground during your sweep. The pole length should be adjusted to allow this without having to lift the detector with your elbow or shoulder. The searchcoil should rest about one inch above the ground while you are standing erect. The angle of the searchcoil should allow the bottom to be parallel to the ground.

The pole length is adjusted by depressing the spring buttons and extending or shortening the pole until the spring buttons click into the set of holes that give you the most comfortable pole length.

To adjust the searchcoil angle, simply loosen the searchcoil thumb nut slightly and move the searchcoil into the desired position. Tighten the searchcoil thumb nut by hand so that the searchcoil will hold in place.

QUICKSTART - SELF GUIDED TUTORIAL

The QuickStart is designed to help you use your new MicroMAX Diablo metal detector right away, even if you have never used a metal detector before. Just follow each easy step carefully and you'll quickly see how the basic detector functions work. You'll also be introduced to some important concepts on the way.

1. **Set the controls as follows:**
   Set the THRESHOLD knob full counterclockwise.
   Set the Mode Selection Switch to NORMAL GROUND.
   Turn the GROUND knob clockwise 4 full turns, or until you feel an increase in resistance ("drag").

   Turn the detector on by turning the SENSITIVITY knob clockwise from POW OFF to 1.
   Wait several seconds for the circuitry to stabilize.
   Set the SENSITIVITY knob to 5.
   (Ignore HOT ROCK ADJUST knob and PINPOINT push-button.)
2. **Hold the searchcoil up in the air**
   about 10 inches above the soil surface and at least 5 feet away from any large masses of metal.
3. **Slowly rotate the THRESHOLD knob clockwise**
   until you hear a steady background hum, then stop. You want it to be clearly audible, but not loud.
4. **Gently "bob" the searchcoil up and down**
   1 to 4 inches above the ground surface in a spot that looks typical, and where there is probably no buried metal. Keep the searchcoil level and parallel to the surface of the ground as you raise and lower it.
5. **Listen carefully to the audio tone**
   as you continue to bob the searchcoil and you will "hear" the iron minerals in the ground that the machine "sees" - louder on the downstroke, quieter on the upstroke.
6. **Slowly rotate the GROUND knob counterclockwise**
   searching for the "null zone" as you continue to bob the searchcoil. As you approach the null zone (where the detector ignores the iron minerals) the sounds from the soil ("ground noise") will get quieter. As you enter the null zone, the sound will become irregular, and you'll probably hear the sounds on both the downstroke and the upstroke. This is usually the best setting for the GROUND knob.
7. **Continue turning the GROUND knob counterclockwise**
   and you'll hear the sound get louder on the upstroke, quieter on the downstroke. Also the sounds will get louder as you continue to rotate the knob counterclockwise out of the null zone.
8. **Repeat steps 4 through 7 several times**
   until you are familiar with the sound and feel of the null zone.
   Then set the GROUND knob in the middle of the null zone. You are ready to begin searching.
   NOTE: You MUST use the GROUND knob correctly or you will hear the sounds of the ground everywhere. For more information refer to the GROUND BALANCING section.
9. **Sweet the searchcoil back and forth**
   In a slow and comfortable manner, maintaining the searchcoil 1 - 2 inches (2.5 - 5.0 cm) above the ground surface. *Don't hurry!* If you're hearing too much annoying ground noise, reduce the sensitivity setting.
10. **Toss a coin on the ground and sweep over it.**
    You should hear an abrupt "zip" sound as the searchcoil passes over the coin, even if you lift the searchcoil 4 - 6 inches (10 - 15 cm) above the coin. That is what a gold nugget will sound like, though it probably won't be nearly as loud. When you hear a sound like that, dig it.

Summary

The searchcoil must remain in motion to find anything. If you stop over a spot that "sounds off" the sound will vanish.

Your MicroMAX Diablo can "see" all metals, and the magnetic iron minerals that occur in most soils. The purpose of the GROUND knob is to make the machine blind to the iron minerals so it can "see through" them to find the gold nuggets.

There will be a narrow "null zone" someplace on the GROUND knob that will quiet the ground noise and allow the machine to "see through" the type of iron minerals present where you're searching.

You must use the GROUND knob correctly, or you will hear "ground noise" everywhere. The ground noise can drown out the subtle sound made by small metal objects such as typical gold nuggets.

If ground noise starts to get louder as you search, you may have moved into ground with different soil minerals. Check your GROUND knob setting and readjust it if necessary.

The GROUND knob has 3 3/4 turns of effective rotation. Although the knob will continue to turn, you will feel a slight increase in resistance once you get past 3 3/4 turns.

In many areas there will be bits of trash metal and "hot rocks" containing iron minerals that will cause the metal detector to "sound off" like gold. In the beginning you'll have to dig most of these sounds. By following tips in the manual - especially learning how to use HOT ROCK mode - and through experience in hearing the sounds and seeing the "hot rocks", you will learn to ignore or quickly indentify most of these annoying objects.

There are a few areas where the procedure outlined about will not work, because of unusual minerals in the ground. If you can't find the "null zone" on the GROUND knob, you may be in such an area. For advice on how to deal with this, see the manual section GROUND BALANCING.

TO TURN YOUR DETECTOR OFF:

- **TURN THE SENSITIVITY CONTROL TO POWER OFF**

Counterclockwise past the "click".

TO TURN YOUR DETECTOR ON:

- **TURN THE SENSITIVITY CONTROL TO MIN**

Clockwise past the "click".

OPERATING TECHNIQUES - CONTROLS

The MicroMAX Diablo has only five controls, all mounted on the front panel of the housing for fingertip adjustment. How these controls should be set for peak performance will depend on the type of metal you are searching for, search site conditions, mineral content of the soil and so forth. Use the information in this section as a basis for setting the controls on your detector. Using your detector in the field will allow you to learn the detector's responses to various conditions and will guide you in fine tuning the detector's operating controls.

SENSITIVITY - ON/OFF Sensitivity Level Control Knob

This switch turns the machine on and off and sets the level of sensitivity. Turning the SENSITIVITY knob clockwise increases the detector's Sensitivity Level. The level from 1 up to 10 is the normal range. This range corresponds with the normal Sensitivity on standard detectors. Turning the SENSITIVITY knob past 10 into the orange area puts the Sensitivity into the MAXBoost range found only the MicroMAX detectors.

In lightly to moderately mineralized ground, you can usually set the SENSITIVITY knob to 10 (normal maximum). In highly mineralized ground, noise form ground minerals will cover up sounds made from small or deeply buried nuggets if the SENSITIVITY knob is at 10. So, you will use a lower SENSITIVITY setting. A lower SENSITIVITY setting cuts back on nugget signals a little, but it cuts back on ground noise a lot more, allowing the nuggets to poke their heads above ground noise so you can hear them.

THESHOLD - Threshold Level Control Knob

This control sets the loudness of the background hum. Most users prefer this background hum to be just barely audible, in lightly mineralized ground, or a little louder in moderate to heavy mineralization. A knob slightly below the threshold of audibility, but this will cause loss of some nuggets that would otherwise have been heard. The best setting is usually between 4 and 7.

PINPOINT - Pinpoint Push-Button

When the PINPOINT button is not depressed (i.e., in normal searching) signals are not heard unless the searchcoil is in motion. So, if you stop over a gold nugget sound, the sound will vanish. Electronic circuits that work this way are more stable and make it easier to hear nugget signals through ground mineral noise, but they make it difficult to pinpoint the exact location of a nugget that has already been detected.

Depressing the PINPOINT button keeps the signal from disappear if you slow down or stop over the nugget, making its exact location easier to pinpoint so you can dig it up quickly.

HOT ROCK - NORMAL GROUND - BLACK SAND

Mode Selection Switch

NORMAL GROUND - This is the mode you'll probably operate in over 95% of the time. In this mode, the GROUND knob controls response to ground minerals.

BLACK SAND - This mode is similar to the NORMAL GROUND mode, but the sensitivity is reduced in order to accommodate extremely high concentrations of iron minerals such as magnetite black sand. The NORMAL GROUND mode will handle all but the most extreme conditions, and most users will never need to switch to the BLACK SAND mode. But it is there if you need it, and it will handle the mean stuff that blows other machines off the air.

HOT ROCK - This mode is similar to the NORMAL GROUND mode, except that control of mineral response is transferred from the GROUND knob to the HOT ROCK ADJUST knob.

GROUND - Ground Balance Control Knob

This knob controls response to ground minerals. This control serves the same function as controls on other machines called "Ground compensation" or "ground adjustment" controls. It has 3 3/4 turns of effect rotation, past which you can feel an increase in resistance to turning that tells you it is at the end of effective rotation. Rotating the knob past this point will not damage the control - no matter how many times you continue to turn the knob you will remain at the "end" of the effective range. Once this point is reached (in either direction) turning the knob in the opposite direction immediately enters you back into the effective range.

NOTE: *If you find it difficult to feel the "drag" there is a simple method to find either end of the effective range. Just turn the knob in the desired direction four complete turns. You are now at the end of the effective range. Likewise, to find the middle of the effective range, turn the knob in one direction four complete turns followed by two complete turns in the opposite direction. You are now in the middle.*

HOT ROCK ADJUST - Hot Rock Adjust Control Knob

This 1-turn knob controls response to minerals. It covers a wider range of minerals than the ground adjust knob. The way it works is similar to the GROUND Knob. IT is used primarily for identifying and "Seeing through" "hot rocks", which are rocks that have a mineral composition different from the ground in which they found.

TUNING YOUR DETECTOR

Every detector must be properly tuned in order to perform at its peak and provide maximum depth. In fact, the more powerful a detector is, the more critical the tuning becomes. Less powerful detectors are more tolerant of improper tuning, but are also not capable of the depth of a properly tuned high power detector such as the MicroMAX Diablo. To achieve peak performance from your MicroMAX Diablo, be sure to properly adjust the GROUND control. Remember: improper tuning will reduce performance and can also cause "false" and erroneous "ghosting signals".

Tuning your MicroMAX Diablo can be done in 4 simple steps:

1. Set the Sensitivity level using the SENSITIVITY control.
2. Set the operating mode using the Mode Selection switch.
3. Set the Threshold using the THRESHOLD control.
4. Ground Balance the detector using the GROUND control.

SELECTING THE PROPER OPERATING MODE

The MicroMAX Diablo offers three All Metal operating modes: HOT ROCK, NORMAL GROUND and BLACK SAND. An All Metal Mode must be used for gold nugget hunting, since the response to small gold items is so close to iron. For most nugget hunting, the NORMAL GROUND All Metal Mode will prove the best performance. The HOT ROCK and BLACK SAND modes are used to deal with these more extreme conditions.

Each of these All Metal Modes requires motion. The detector will emit a continuous "Threshold sound" until it encounters a metal target at which time the sound will noticeably increase. The All Metal Tuning, however, is Fast Auto, meaning that the detector's threshold will

automatically retune very quickly after encountering a target. After the detector retunes continued motion will be required to produce a target response sound. If you want to override the auto tune just press and hold the PINPOINT push-button. This will stop the retuning and allow a complete "no-motion" operation.

The All Metal Mode, as the name implies, will detect all types of metal targets. When operating in this mode you will find unwanted "trash" metal objects such as nails, foil, pull tabs, etc., just as you would with any high-performance detector.

Ground Balancing - Overview

Metal detectors work on the principle of detecting changes in alternating magnetic field that surrounds the searchcoil. Nearly all ground contains iron minerals which distort this field, causing signals that interfere with the detection of metals. These unwanted signals are variously referred to as "ground pickup", "ground noise", "ground interference", "false signals", "falsing", etc. The GROUND knob can be rotated to a position that will "compensate", "balance", or "null out" these unwanted signals so that they are reduced or eliminated.

In any given ground there will normally be a position of this knob which quiets the ground nose. The further the knob is adjusted either clockwise or counterclockwise from this quiet "null zone", the louder the ground noise will be, and the more difficult it will be to hear sounds from gold nuggets. To get maximum depth and sensitivity from your metal detector, it is necessary to set this knob properly, and to readjust it whenever increased ground nose indicates a change in the mineral composition of the soil.

GOUND BALANCING - Procedure

SET THE CONTROLS as follows: sensitivity knob at 10, audio threshold knob set for an audible (but not loud) steady background hum, mode switch in normal soil mode. Turn the 3 3/4 turn GROUND knob clockwise until you feel the slight increase in resistance (drag) that tells you it's at the end of its travel. (Rotating it past this point produces no further change in electrical response, but will not damage the control mechanism).

BOB THE SEACHCOIL up and down over the ground in a spot well away from any metal. About 2 inches (10 cm) up-and-down motion is adequate. On the downstroke the searchcoil should come within about an inch (2.5 cm) of the ground surface. Unless the ground is free of iron minerals (a rarity) you will hear an increase in the sound volume on the downstroke and decrease in sound volume on the upstroke.

As you continue to bob the searchcoil, slowly rotate the GROUND knob counterclockwise. You will eventually reach a region on the knob where the ground noise diminishes, and as you continue to rotate the knob clockwise there will be a zone where ground noise is minimized or even inaudible. As you continue past this zone ground noise will increase again, with sound volume increasing on the upstroke and decreasing on the downstroke - the opposite of what you heard before you entered and passed through the null zone. No "backtrack", rotating the knob clockwise into the null zone.

GROUND BALANCING - Helpful Hints

There is a distinct difference in the sound you get on one side of the null zone versus the other size. Some people describe the sound to the right (clockwise) of the nullzone as being a "forward sound", or "pushing the sound down into the ground". To the left (counterclockwise) of the null zone they describe the sound as being a "backward sound" or "pulling the sound up out of the ground".

Usually there will be some audible ground noise in the null zone, but it will be erratic or will increase in volume on both the upstroke and downstroke giving a "double blip" effect. Theoretically it is best to set the control in the middle of this null zone, but many users prefer to set the knob slightly clockwise near the edge of the null zone.

In some ground conditions the best setting of the GROUND knob may vary slightly with the height of the searchcoil above the ground. Under these conditions, it is usually best to do your searching with the searchcoil lifted a little higher above the ground than you normally would, and be careful to keep the searchcoil at a constant height above the ground as you search.

In some ground conditions the best setting for the GROUND knob when sweeping the searchcoil horizontally is slightly different from when bobbing. If there is more ground noise when sweeping horizontally than when bobbing, try changing the knob position slightly to see if a quieter position can be found.

In ground that contains high concentrations of magnetite rock or magnetite black sand, there may seem to be no null zone, and then ground noise may be irregular and loud with sudden bursts as the searchcoil comes within an inch or two (2.5 - 5.0 cm) of the ground surface. In such ground you will usually be able to see the black sand. You will probably never encounter iron mineralization this extreme, but if you do, switch to BLACK SAND mode. This mode lowers sensitivity but allows the electronics to handle the very strong signals that such heavy mineralization produces.

If the ground you are working in is low in iron mineralization, high in salt or alkali, and wet from seepage or recent rains, the null zone may not fall within the range of the ground adjustment. In such a case, the sound of ground noise will increase on the downstroke at all settings of the GROUND knob. You will probably never encourage a "wet alkali" soil condition this extreme. If you do, try switching to the HOT ROCK mode, then adjust the HOT ROCK ADJUST knob using the same procedure as you would for the GROUND knob. The HOT ROC ADJUST knob is functionally similar to the GROUND knob, but has a wider range which may be able to "reach" the null zone of the wet alkali soil. If you still can't find a null zone, search in the in the HOT ROCK mode with the HOT ROCK ADJUST knob set to zero, and the sensitivity knob set to 1. This will probably not entirely eliminate ground noise, but should at least make the machine usable.

The ground in some areas has a mineral composition or moisture content that varies markedly with depth and over very short horizontal distances. Such conditions are most common on rocky hillsides in semiarid and desert climates where the soil contains substantial amounts of clay, and the ground is moist from recent rains. In these conditions the null zone may be broad with plenty of ground noise even in the null zone, and soil conditions may vary so much even in a single sweep of the searchcoil that it's impossible to find an maintain a good spot in the null zone. Under these conditions, reduce the SENSITIVITY knob setting to less than 5, going as low as 1 if that is what's needed. This will allow you to find nuggets deeper, since reducing the SENSITIVITY setting *cuts back on ground noise more than it does nugget signals.* Frequently check your ground adjustment setting to see if ground conditions have changed enough to make a different setting worthwhile.

In general, sandy and gravelly soils will have a null zone that is one or two turns from full clockwise.

The null zone of red clay soils of tropical and warm temperature climates will usually fall two to three turns from full clockwise toward the counterclockwise end of the knob rotation.

If you have difficulty finding the null zone when you first try, you may be over a piece of metal or over a rock with unusual mineral content ("hot rock"). Move to a spot several feet (a meter or so) away and try again.

The MicroMAX Diablo comes standard with a 10" inch (25 cm) elliptical "wide scan" (also known as a "double-D") searchcoil. If you are accustomed to using a concentric searchcoil, you will probably notice the null zone you get with a wide scan is broader and more irregular than is customary with a concentric. For best results, learn the slightly different sounds the wide scan makes, and do not attempt to duplicate what you would hear with a concentric.

HOT ROCK MODE - Overview

In most areas where gold is found, there are rocks which due to their magnetic and electrical properties cause a metal detector to "sound off" as though there were a metal object present. Such rocks are popularly referred to as "hot rocks". Expect to spend some of your time chasing signals that prove to be worthless rocks rather than gold nuggets.

Some metal detectors have a "motion discriminator" circuit adapted for coin hunting type machines that will silence some of these hot rocks. Motion discriminators are very useful for hunting coins while silencing iron and aluminum trash in ordinary ground. However, motion discriminators get very confused by iron minerals in the ground, and the geologic conditions that produce gold usually produce soils high in iron minerals. Most gold nuggets (and many hot rocks) are a lot smaller than a coin, and do not register a signal strong enough to overcome the iron mineral confusion in the discriminator. Therefore motion discriminators are of very limited usefulness in gold prospecting.

The MicroMAX Diablo tackles the hot rocks problem by providing a mode specifically designed to deal with hot rocks that is not adapted from "coinshooting" machines. Effective use of this mode requires some skill and practice, and no matter how proficient you get you will still dig some

hot rocks. Beginners should become thoroughly familiar with searching in the NORMAL GROUND mode before attempting to master the HOT ROCK mode.

HOT ROCK MODE - The only "discriminator" that really works

It's not a clever electronic circuit, it is a good magnet - Alnico cow magnets work very well, and most prospecting supply shops sell them. A magnet will pull to itself any metallic iron, and many hot rocks. A magnet is especially good for ferreting out tiny, high iron content hot rocks that are otherwise difficult to locate and indentify. Of course, you'll have to get your hands dirty to use this kind of "discriminator".

HOT ROCK MODE - Using the HOT ROCK Mode

The HOT ROCK position on the Mode Selection Switch transfers control of the mineral response (magnetic loss angle adjustment) from the GROUND knob to the HOT ROCK ADJUST knob. This knob does the same sort of thing that the GROUND knob does, but covers a wider range and, since it covers this wider range in only one turn, it is more difficult to set precisely. The HOT ROC mode has two primary uses: "seeing through" (nulling out) hot rocks, and identifying hot rocks. These procedures will be discussed separately. Neither procedure is 100% effective. They don't substitute for learning what hot rocks look like, nor do they make the magnet unnecessary. Refer to the HOT ROCKS section of the APPENDIX for more detailed information.

HOT ROCK MODE - Identifying hot rocks in the ground

This method allows identification of strong signals as to whether the object producing the signal is a hot rock or is metal.

1. Set the Mode Selection Switch to the HOT ROCK mode.
2. Set the HOT ROCK ADJSUT knob to zero. At this setting, all nonconductive hot rocks have a "negative" response, and all metals (except some iron metal) have a "positive" response.
3. Set the searchcoil on the ground beside the spot that sounded off.
4. Push the PINPOINT button and hold it in.
5. Lift the searchcoil about an inch (2.5 cm) from the ground surface. As you raise the searchcoil the audio tone will become louder.
6. Move the searchcoil over the top of the object you're checking. If they audio tone vanishes, the object is a heavily mineralized hot rock. If the audio tone does not vanish, the object is not yet identified.
7. Release the PINPOINT button. Lift the searchcoil about 4 inches (10 cm) above the object.
8. Push the PINPOINT button and hold it in, and lower the searchcoil to the spot where the object is. If, as you approach the object, you hear the audio tone get louder, the object is metal, possibly gold. IF the audio tone vanishes as the searchcoil approaches the object, the object is not yet indentified.

Although this method will not tell you whether a weak signal is metal or a hot rock, if you get an identification of hot rock in step 6 or an identification of metal in step 9, that identification is almost certain.

Those who have been using metal detectors for many years will recognize this method as a variant of the "TR reverse discrimination" technique. With a little practice, this technique can do about as well as a motion discriminator in separating metal from rock, and, unlike a motion discriminator, this method doesn't produce guesses.

FIELD USE

Handling your detector

The detector should be held in a position that is comfortable for you as shown in the ADJUSTING THE POLE & SEARCHCOIL section. Swing the detector from side to side in about a three foot arc, overlapping succeeding strokes well. This motion is called a "sweep." The MicroMAX Diablo was designed to get maximum depth without the frantic pace required of earlier motion detectors, so go at a pace that is comfortable for you. In fact, trying to hunt too fast may even cause a loss of depth in heavily mineralized locations.

Regardless of which mode you are using, try to keep your searchcoil height constant and close to the ground. Most people tend to raise the coil at the end of a sweep - much like a pendulum - especially if they are hurrying. Try to avoid this as any increase in height from the ground will cause a corresponding loss of depth.

In areas with well kept lawns, the easiest way to maintain a constant searchcoil height is to allow the coil to rest on the grass as you sweep from side to side. In rough and rocky areas it is best not to "scrub" the coil on the ground, as the rocks will act like abrasives, and wear away the coil bottom (an optional coil scuff cover will protect against this.) Sweep the coil as close to the ground as possible without touching. Hitting the ground or rocks may cause a false signal much like a desired target would. Sweeping the coil too high above the ground results in a loss of depth.

Pinpointing a Target

When an object that may be gold is detected, you'll often want to determine if it is actually something worthless before you dig. With experience you will learn the different sounds the machine makes, and become skilled in the use of the HOT ROCK mode. If the object is shallow, and happens to be iron metal or iron mineral, a magnet may pick it right up without the need for any digging. If you detect something that seems large and deep, you may be tempted to say "probably just an old beer can". Better dig it anyway - a gold nugget large enough to masquerade as a beer can is worth thousands of dollars!

After you have determined that the object might be gold, you need to determine its location as precisely as possible, dig it up, remove it from the dirt, and indentify it.

Sweep back and forth over it left and right, then step around at a right angle from your first position and sweep back and forth again. You have now swept an "X" pattern over the object and can probably tell about where it is. If its location is still a bit fuzzy, as it probably will be with a large, deep object, crisscross the object again in pinpoint mode.

If the signal is very loud, position the searchcoil a bit to the side of the object, release the PINPOINT button, press the button again, and hold it as you sweep back over the object. This will narrow the response zone and make it more "crisp". If the object is very shallow, within 2 inches (5 cm) of the surface, pinpointing the exact location of the object may be easier if you raise the searchcoil up away from the surface an inch or two. Also, the position of a shallow object can often be determined more accurately if you kick away loose rocks or even move the dirt around a bit.

RECOVERING A TARGET

Dig it

If it is deep, you'll use a rock pick or other large, sturdy metal digging tool. If it is shallow and the soil is soft, a plastic trowel can be handier than a metal one because it's invisible to the metal detector. As you dig, occasionally check the hole to see if you have moved the object or already dug it. Some people like to just dig a big hole and spread the dirt around on the surface before checking it again with the metal detector. Another technique is to dig handful by handful and pass the handful of dirt past the searchcoil to see if the object is already in your hand. (The metal detector will probably "see" your hand faintly: you will have to mentally correct for the "hand effect".)

Remove it

Buried objects are usually dirty, and often covered with iron stains or otherwise discolored so that they are difficult to recognize. Sometimes a gold nugget comes out of the ground bright and yellow, but most often it will be difficult to recognize even when in plain sight.

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If the object is a piece of iron or a "hot rock", a magnet will usually pull it out from any dirt you have dug. When you extract something worthless from the dirt, check the dirt again with a metal detector. What you removed may not have been what you detected. There may still be gold there.

If you haven't been able to remove the object from the soil by finding it with your eyes or a magnet, take a handful of dirt and slowly dribble it onto the searchcoil while listening and watching carefully. When the object falls to the searchcoil the metal detector will sound off. If you were paying attention, you'll probably see the object (which may look like a worthless stone or lump of dirt). If the object seems to have vanished, sweep over the spot with the metal detector to see if you can relocate the object.

Identify it

Once you have the object removed from the dirt, rub it a little, feel its "heft", hold it in the tips of your fingers and sweep it past the searchcoil with the mode switch in the HOT ROCK position and the HOT ROCK ADJUST knob set to zero. What do you see, feel, hear? Gold is yellow, heavy, and gives a "zip" sound when the HOT ROCK ADJUST knob is set to zero. The only other material that fits all three criteria is brass, but brass is recognizable by its shape, being a manufactured item. But the color of gold is often concealed by iron or clay coatings, or the gold maybe embedded in rock (esp. float gold). And if it's small or embedded in rock, you can't ell its weight by "hefting" it. If you are not able to positive indentify the object as being worthless, keep it and take it home. Once you get home, clean it up with a toothbrush and examine it further. If you still have doubt, ask someone more knowledgeable than yourself (someone you trust) to identify it. Until you are sure it's not gold, don't throw it out.

IDENTIFYING ROCKS IN THE AIR

This method is used to determine whether a rock which as been dug up contains gold.

1. Set the Mode Selection Switch to HOT ROCK mode.
2. Set the HOT ROCK ADJUST knob to zero; or, if you know the lowest dial setting that is ever required for nulling hot rocks that occur in your area, set it slightly lower than that setting.
3. Sweep the rock past the searchcoil about 2 inches from the coil surface. If you get a positive "zip" sound, you probably have gold. If you get a negative "boing" sound, you have a hot rock that almost certainly contains no gold.

This method is far more reliable than any test that could be performed on a buried object before it's dug up, because this method doesn't have ground noise to overcome. Conductive hot rocks such as some types of pyrites will pass this test. The only way to distinguish conductive pyrite from gold embedded in a rock is to break the rock open till you find the whatever-it-is and identify it visually. But note: the most common pyrite, iron pyrite, which is common in many gold areas, is rarely conductive enough to cause a metal detector to sound off. If you break open a rock and find iron pyrite (a pale, slightly grayish brassy color) scan the pieces of the rock to see which piece has the conductive stuff in it and keep at it till you find it.

If you get your hand close enough to the searchcoil, it'll "see" the electrical conductivity of your hand. In order to keep your hand from confusing the machine, hold specimens you are testing in the tips of your fingers with the palm of your hand well away from the searchcoil.

WHEN TO CHANGE THE BATTERY

Your MicroMAX Diablo is equipped with an automatic circuit so that you can always be sure you are getting top performance from it.

This special circuit ensures that the detector quits making noise before the detection circuits are degraded by the lowered battery voltage. When your MicroMAX Diablo no longer beeps at obvious targets, it is time to change the battery. If the detector beeps at large targets the battery is still OK.

If you prefer, a rechargeable Nickel-Cadmium (Ni-Cad) battery can be substituted for the standard 9 volt alkaline battery. Individual 9 volt sized Ni-Cad cells, as well as the chargers for them, are readily available at most electronic supply stores. They are installed into your detector in the same manner as non-rechargeable batteries. The sound on a Ni-Cad will be weaker than an alkaline in the beginning, but will not weaken as much with use.

CONTROLLING AUDIO VOLUME

The speaker in the MicroMAX Diablo does not have a volume control. The volume should be sufficient to accurately hear the target response sound in most environments. If more or less volume is required in your particular situation we recommend using a set of good quality headphones with built-in volume control.

Many headphones have a volume control. If the sound when passing over a large shallow metal object is uncomfortably loud, you may want to reduce the volume setting on your headset. However, if ground noise is annoyingly loud after you have adjusted the GROUND knob into the null zone, reduce the noise by setting the SENSITIVITY knob to a lower setting, not by reducing the headset volume which will be less effective.

NOTE: *Headphones are optional and do not come standard with the MicroMAX Diablo.*

Target recovery

If the target is shallow and the soil is soft, you may be able to "probe" and find the exact location of the target before you dig it. Since filling all holes after you recover the target is so important, digging a small precise hole is best.

If the target is deep, you may need to dig a larger hole. As you dig, occasionally check the hole with your detector to see if you have moved the object, can probe it, or have already dug it. Be sure to fill all holes after you recover the target.

Be sure to fill all holes after you recover the target. Your dealer should be able to explain the preferred methods of digging in your area. Two methods are shown on the next two pages that work most everywhere. Be sure to protect your hobby by leaving the site cleaner than you found it and with *all the holes filled*.

RECOMMENDED RECOVERY METHODS

GENERAL INFORMATION - CARE AND USE

Basic Care

The MicroMAX Diablo is a sturdy instrument but it is not designed to withstand abuse. In caring for your MicroMAX Diablo there are several important "DO NOTs" to remember. DO NOT use it to pry rocks loose or to beat bushes out of the way. DO NOT drop the machine into water. DO NOT use it unprotected in the rain. DO NOT leave it exposed at night where dew could form on it. DO NOT store it in places that could get extremely hot (next to a woodstove, in an attic). DO NOT leave it in the trunk of a car or in the back of a hatchback style car where high temperatures could build up. DO NOT store it with the battery installed as batteries may leak. DO NOT spray lubricants such as WD-40, or any type of cleaners, solvents, sealants or other chemicals into or onto the electronic parts, switches or controls. And finally: DO NOT attempt to modify or repair the detector's electronics as this will void your detector's warranty.

THE WARRANTY DOES NOT COVER DAMAGE RESULTING FROM ACCIDENT, NEGLECT OR ABUSE

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Protecting your investment

Often detectorists are disappointed when their new detector slowly becomes less and less responsive and seems to have lost some of its original performance. You can help avoid this from happening to your detector by following these basic care and protection guidelines.

- Operate your detector exactly as recommended in this OPERATOR INSTRUCTION MANUAL.
- Use only high-quality alkaline batteries of the correct voltage. Never substitute a different voltage. When using a Ni-Cad battery always use a separate convertible pack with the proper voltage output for the detector's design.
- Remove the battery from the detector after each use. This will prevent damage to the detector if the battery leaks. Never store the detector with the battery installed.
- The searchcoil cable is hard wired to the searchcoil and protected by a strain relief. It is very important that the strain relief remains intact and should never be adjusted or tampered with.
- Keep cables properly wound around the pole stems and protect them during use. Floppy, pinched, or cables that become snagged during use may short, causing erratic noises or unnecessary replacement of the searchcoil.
- Sweep the searchcoil carefully, especially when using around rocks and building foundation and avoid hitting the searchcoil against hard, solid objects and surfaces.
- Keep your searchcoil off of the ground slightly during the sweep especially when using in gravel or hard, rocky dirt.
- Always use a properly designed protective scuff cover on the searchcoil. (See OPTIONAL ACCESSORIES.)
- Remove and clean out scuff covers periodically to avoid build up of mineralized dirt particles which will affect performance.
- The searchcoil is waterproof and can be submerged in either fresh or salt water. After the searchcoil is used in salt water, rinse it and the lower stem assembly well with fresh water to prevent corrosion of the metal parts.
- The searchcoil is waterproof but the electronics are not, so always prevent any moisture or water from entering the control housing and never allow the cable connectors to become submerged in water.
- If working in or near water, or if there is a possibility of rain, use a protective weather resistant pouch or plastic bag to cover the control housing. Make sure it can "breathe" in order to ensure against condensation buildup inside.
- After each use, clean the detector with a soft cloth.
- When transporting the detector in a car during hot weather, store it on the floor of the passenger compartment if possible. Using a carry bag gives additional protection. In any case, never allow the detector to roll around unprotected in the trunk or back of a pickup truck.
- Protect your detector from dust, moisture, and extreme temperatures during storage.
- When shipping, use the original factory carton or similar heavy-duty container, and provide a minimum one inch of padding around all parts.
- reat your detector as you would any sensitive electronic instrument. Though ruggedly constructed and designed to withstand the demands of normal treasure hunting, proper care is essential.

OPTIONAL ACCESSORIES

Tesoro Metal Detectors and genuine Tesoro Accessories are sold only through independent Tesoro Authorized Dealers, who are almost always metal detectorists themselves. They can answer your questions about your Tesoro detector, what accessories may be helpful and about metal detecting in general.

See your Tesoro Authorized Dealer for more information and prices on optional accessories.

Scuff Covers

We highly recommend using a scuff cover to protect your searchcoil at all times. The scuff cover for the MicroMAX Diablo fitted with the 10" elliptical searchcoil is Tesoro Part # SCUFF-10E.

Searchcoils

The 10" elliptical wide scan searchcoil provided with the MicroMAX Diablo is designed for best all-around performance. Wide scan searchcoils ignore ground mineralization better than concentric searchcoils and may offer improved performance in extreme ground conditions.

Optional searchcoils may add to your detector's performance. Selecting the right optional searchcoil depends on factors such as search site conditions. Optional interchangeable searchcoils will be available for the MicroMAX Diablo in the near future.

Headphones

Most metal detectorists prefer to use headphones instead of the detector's built-in speaker. Headphones help block out background noise (such as wind) and make it easier to hear faint signals. Headphones with a built-in volume control will allow you to adjust the sound volume to your preference.

µMAX DIABLO FEATURES

- **All-new Electronics-**circuitry designed specifically for greater depth, sensitivity and smoother operation in heavy mineralization.
- **Ultra-light Weight and Good Balance—**you can search for hours without fatigue. No need for clumsy hip-mounts or arm straps.
- **3 piece Knockdown Pole—**compact for storage and travel.
- **Economical Use—**typically 20 to 30 hours on a single battery.
- **17.8 kHz Operating Frequency-**delivers high sensitivity to gold nuggets in the most important size range - several grains to several pennyweight.
- **All-new High-sensitivity Searchcoil—**a 10 inch elliptical wide scan type for broad sweep, good pinpointing and deep ground penetration. (Optional searchcoils will be available.
- **3 3/4 turn GROUND Knob-**allows for quick and easy ground balance adjustment.
- **BLACK SAND Mode-**lets you find gold in heavy black sand that other machines just can't handle.
- **Special Cable Design-**eliminates annoying "cable chatter".
- **No-motion PINPOINT Mode-**for quick and easy pinpointing of the exact location of your gold target.
- **Exclusive HOT ROCK ADJUST Mode-**identifies and "sees through" iron-bearing rocks.
- **Variable Response Speed SENSITIVITY Control-**gives you maximum ground penetration in heavy iron mineralization and wet alkali ground conditions.
- **Virtually Instantaneous Recovery From Signal Overload-**caused by chunks of iron metal or magnetite rocks. No annoying squealing or "ambulance" sounds.
- **Virtually No Crosstalk-**with other makes and models of metal detectors.
- **Exclusive Tesoro Lifetime Warranty—**best in the industry.

The simplicity and tractable response of the MicroMAX Diablo make it ideal for the beginner who wants a machine he or she will never outgrow.

Superior depth in highly mineralized ground and the exclusive HOT ROCK ADJUST mode make it the best choice for the full-time prospector as well.

as well.

WHAT IT DOESN'T HAVE

Super hot response to tiny nuggets in air.
Tiny nuggets disappear when they are concealed by ground mineralization. What is important is to find buried nuggets in the size ranges that are valuable, reasonably common, and capable of being found. Amazingly, the MicroMAX Diablo will often find small nuggets the "hot on tiny nuggets" machines miss because of its superior ability to "see through" ground minerals!

Automatic computerized ground adjustment.
This would have made the machine more costly, heavier, and harder on batteries. And, like an automatic transmission in a car, it would deprive you of the control you need to get best performance when the going gets tough. Automatic computerized ground adjustment has its place in the world, but not on a MicroMAX Diablo.

A hip mount, arm strap or battery recharging system.
These kinds of "built-in accessories" are simply unnecessary in a Tesoro MicroMAX detector.

A big, heavy, high-powered speaker.
A small, lightweight machine like the MicroMAX has no room for a big, heavy speaker. A machine that gets good life out of a single 9 volt battery does not have lots of extra battery power to blast you with sound. The MicroMAX Diablo speaker is loud enough, but won't be mistaken for a truck horn. Nearly everyone who uses a metal detector uses headphones. The MicroMAX Diablo will drive headphones loud without eating batteries.

A discriminator.
Discriminators are great for "coinshooting" metal detectors, where the objects to be found are at least as big as a coin and the soil is usually not heavily mineralized. But discriminators ignore most gold in the heavily mineralized ground that is typical of gold mining areas. The only "discriminator" that really works for gold prospecting is a good magnet.

Specifications

Operating Frequency	17.8 kHz
Searchcoil Type	Elliptical, wide scan
Searchcoil Size	10" diameter (length)
Cable Length	Approx. 3'
Audio Frequency	Approx. 300 Hz to 550 Hz
Audio Output	1½" speaker and headphone jack
Headphone Compatibility	¼" stereo plug
Weight (may vary slightly)	2.2 lbs.
Battery Requirement	One 9 volt DC (alkaline)
Battery Life (typical)	20 to 30 hours
Optimum Temperature Range	30° to 100° F
Optimum Humidity	0 to 75% R.H.
Tuning Mode	Fast Auto Tune
Operating Modes	All Metal AutoTune, motion required
Pinpoint Mode	No-Motion All Metal, with no Auto Tune

Specifications

METAL DETECTORS

Principle of Operation

The searchcoil of a metal detector transmits a magnet field that energizes any electrically conductive (esp. metal) or magnetic (esp. iron oxide mineral) materials in the immediate vicinity, causing these materials to radiate their own magnetic field in response. The searchcoil detects the magnetic field radiate their own magnetic field in response. The searchcoil detects the magnetic field radiated by these minerals, producing an electrical signal that is analyzed electronically and converted to an audio tone which you hear from the speaker or headphones. This audio tone has a loudness, pitch, and duration that correspond to certain characteristics of the signal, telling you something about the size, depth, and character of the material you have found. Since the signal from iron oxide minerals is often much stronger than that of metal objects (gold) you wish to find, the electronic circuitry has provision to null out or cancel signals having the characteristics of iron oxide minerals, while allowing signals from metal objects to still be heard. That's what the GROUND knob is for.

Electrical Interference

All metal detectors are subject to electrical interference from electric power lines, fluorescent lamps, computers, telephone lines carrying computer data, military submarine communications systems, longwave radionavigation signals (LORAN, OMEGA), other metal detectors, high-powered radio and radar signals, lightning storms, and other sources. Since different models of metal detectors operate at different frequencies, it is possible under a given set of conditions for one metal detector to be free of interference while another experiences sever interference. This same situation can occur with two MicroMAX Diablo detectors, since their operating frequencies vary slightly from unit to unit.

Most metal detectors will experience some electrical interference in commercial buildings, and residential homes with their proliferation of computerized electronic equipment can be just as bad. Don't judge a metal detector's sensitivity under these conditions. Once you get away from power lines and electronic equipment, interference problems will usually vanish or become a minor nuisance at worst. In those rare cases where the source of interference is more distant (sub communications, radionavigation) the problem can be minimized by keeping the searchcoil held horizontally, being careful not to tilt it.

PROSPECTING FOR GOLD

Many books have been written about gold prospecting, and there are popular magazines on the subject too. The dealer who sold you your metal detector probably has some good books or can tell you where to get them.

Learn. Read books and magazines. Talk to prospectors. Join a gold prospecting club or association. Clubs and associations know good places to go prospecting. We can't tell you everything you need to know here but we can cover some of the more important points.

- "Gold is where you find." Do your prospecting in areas where gold has already been found before.

- Many gold areas have been claimed. Learn to recognize claim markers and stay off claims unless you have the owner's permission to prospect there. Some government-owned areas (National Parks, for example) are off limits to metal detectors. The safest approach is to stay out of areas where you don't have the landowner's permission to be.
- Gold makes people crazy. Some claim owners defend their claims "very aggressively", to put it politely, so stay out of places you don't belong. Keep quiet about your gold finds. Don't lose your head over gold: it will make you the perfect victim of a con artist. Learn to recognize fool's gold, and be wise enough to know when real gold is fool's gold.
- In gold prospecting, as in most other enterprises, the road to success is paved by hard work, persistence, skill, knowledge, and enjoyment of the journey down the road. Don't expect to find a 3-ounce nugget your first weekend out prospecting. It's fine to think it COULD happen if that helps keep you motivated.
- Be safe. Learn to avoid outdoor hazards like snakes, ticks, poison oak, and dehydration. And be aware of hazards that are particular to gold mining, like poisons (mercury, cyanide), and unstable rock shafts: underground mining is dangerous business even when done commercially with proper safety equipment and procedures and no rotten timbers.

What size of gold can I find?

Metal detectors designed for gold prospecting can find nuggets about the size of a BB or smaller, on up to the huge nuggets such as the "Hand of Faith" nugget found in Australia. Metal detectors cannot find gold dust in the ground even if there is a lot of it. Most of the nuggets you find will be small ones, less than a pennyweight (1.55 weight to an ounce) because they're heavier, and because they fetch up to several times gold spot price due to their value as mineral specimens and attractiveness for natural gold jewelry. Nuggets over an ounce (31 grams) are sufficiently rare that they won't make up a large part of the gold value you dig unless you get lucky, keep at it for years, or are hunting in certain areas of Australia where large nuggets are more common.

How deep can I find gold?

The depth to which you can detect a nugget varies greatly with ground mineral conditions, and to a lesser extent your machine and your skill level. Little nuggets of several grains or less (1 grain=.064 gram) usually can't be detected deeper than 2 - 4 inches (5 - 10 cm). In some heavily mineralized areas they may not be detected even lying on the surface.

Pennyweight size nuggets can be detected up to several inches deep in most areas, and can usually be detected lying on the surface even in black sand if you're using a MicroMAX Diablo. (Other brands, not much chance).

One ounce size nuggets are detectable to a depth of several inches in nearly all ground, and in lightly mineralized ground may be detected to a depth of more than a foot (30 cm).

Where have metal detectors proven best?

Where the gold is coarse, in settings where other mining methods have not been practical or efficient (meaning the gold is still there). Most of the gold being found by metal detectors is from float gold deposits, desert gravel placer deposits, and mine dump rock piles.

Where do I search for gold?

The best places to search are areas where nugget gold has previously been found. Metal detector users have been especially successful searching for "float" (eluvial) gold on hillsides below hardrock mine locations, because prior to the invention of the metal detector there was no practical way to locate and remove float gold. Placer deposits, both ancient and recent, offer good potential if they are known to contain nugget gold and not just gold dust. Wherever you search, make sure that the area is unclaimed: or, if it is claimed, obtain permission of the claim owner first. The National Gold Prospectors' Association and some other clubs own claims where their members are allowed to search. Metal detectors are not allowed in some government-owned areas such as National Parks. The safest rule is: don't search in an area unless you have obtained permission from the landowner to search there.

TYPES OF GOLD DEPOSITS

1. **DISSEMINATED (MICRON) GOLD.** Usually pit mined and extracted with cyanide. These deposits usually don't contain detectable nuggets.
2. **HARDROCK (VEIN) GOLD.** Usually mined by digging shafts and tunnels to follow the veins underground. In operating mines, metal detectors can be used to direct tunneling operations by locating gold which can't be seen because it's embedded in the rock. In non-operating mines, metal detectors have proven useful for scanning mine dumps (mullock heaps) for gold in rocks that were discarded by the old-time miners because they couldn't see any gold in them, rock being so opaque and whatnot. Some big gold-in-quartz specimens have been found this way.
3. **FLOAT (ELUVIAL) GOLD.** This is gold that has been released from a hardrock ore by weathering of the rock. The gold is now in the soil below where the ore was as it was weathering, or gradually moving downhill in the soil. (If the gold reaches a stream or gully where it can be transported by water, it is no longer float gold, but placer gold - see next section.) Float gold is in the form of nuggets and gold-in-quartz large enough to be detected, and obviously no deeper than the soil itself (which is often very shallow in gold mining areas). Natural soil churning processes that occur on most hill and mountain slopes keep float gold from settling to bedrock and staying there, so even in deeper soils some gold will be close enough to the surface to be detected. Still, the larger nuggets will tend to be deeper, where you need a machine like the float gold deposits is to search around and downhill from a hardrock mine. Another common method is to search upslope from a stream at a point in the stream where very coarse gold has been found or where gold has been found downstream but not upstream.
4. **PLACER (ALLUVIAL) GOLD.** This is gold that has been transported by water in a gully or stream. Water does several things to gold as it transports it, and knowing these things will help guide you to the best places to swing your metal detector. These are not necessarily the same places as have proven good for panning or sluicing. - Water moves gold downstream from the point it entered the stream channel. It transports tiny gold farthest and quickest. Large nuggets it moves more slowly. - Water tumbles gold together wit gravel and sand along the best of the stream, smashing large pieces into smaller pieces and wearing them down by abrasion. - Water tends to concentrate gold and other dense, heavy materials (magnetite black sand, irons crap metal, heavy gem minerals like garnet) in certain spots where water changes velocity. A sudden decrease in the velocity of the water causes the heavier materials to fall out of suspension and settle to the bottom. A sudden increase in velocity erodes lighter material from bottom sediments, leaving the heavier materials concentrated on the bottom. The place where these events occurred during high water when the most sediment is moved, are usually not the same places where those processes are happening now. - Water sorts sediments (alluvial material) by size as well as density. Good-sized nuggets are found almost exclusively in gravel, rarely in sand and silt deposits. - Water during floods tends to remove smaller and less dense materials from cracks, holes and crevices in the bedrock of the streambed, allowing larger and more dense materials (large rocks, gold nuggets) to drop in and stay. - Water during flood often moves coarse, heavy sediments out of the bottom of the stream channel and onto stream banks. Not all the gold is found in the low spots.

HOT ROCKS

Hot rocks sound off because they have a magnetic loss angle different from the soil in which they are embedded, which the ground adjustment knob is set to ignore. (You don't have to understand what magnetic loss angle means: the metal detector knows what it means, and that's all that's necessary.) There is a wide variety of hot rocks. However, nearly all will fall within one of three main categories- positive hot rocks, negative hot rocks, and electrically conductive hot rocks.

Positive hot rocks have a magnetic loss angle greater than that of the soil in which they are embedded. As you pass over them, they give a "zip" sound like that of metal - all metals have a loss angle greater than that of soil. Positive hot rocks are usually red or brown, usually near the surface, and they usually have a granular surface texture. They owe their color and magnetic properties to highly oxidized iron minerals, most often maghemite. Maghemite is a naturally occurring form of red rust, and is responsible for the red coloration and magnetic properties of most red tropical and subtropical clay soils.

tropical and subtropical clay soils.

Negative hot rocks have a magnetic loss angle less than that of the surrounding soil. They give a "boing" sound as you pass over them. When you sweep back and forth over a negative hot rock trying to discern it's location it will seem to move around and not be in a specific spot. If you switch to pinpoint mode in an attempt to locate its position, it will usually disappear. Negative hot rocks are usually black or bluish-black in color, may be shallow or deep, and their texture may or may not be granular. They owe their color and magnetic properties to oxygen-reduced iron minerals, of which usually dominates the magnetic properties. Their ion content is often so high that they feel distinctly heavy when you pick then up.

In some areas you will find electrically conductive hot rocks which have a high magnetic loss angle just as metals do. They always give a positive response ("zip" sound). Commonly encountered conductive minerals include copper pyrite, pyrrhotite, galena, graphite, graphitic schist, meteorites, and charcoal. Some of these may have value as mineral specimens, and some rare conductive minerals (for instance gold telluride0 are valuable ores. You may occasionally find a hot rock that seems not to fit neatly into any of these categories. Burn pyroxenite looks like a negative hot rock but can be a positive hot rock. Magnetite sometimes has sufficient electrical conductivity to act a little differently from normal.

Note that it is the response of the rock relative to the spoil in which it is found that determines whether the rock response negatively or positively. A rock which is negative in red clay soil may be positive when in a sandy gravel soil.

Positive and conductive hot rocks are usually a bigger problem than negative hot rocks, because the negative hot rocks can usually be indentified by their "boing" sound and ignored. The rocks that response positively ("zip") sound like a gold nugget and can't be ignored.

After you work a particular area for a while, you'll become familiar with the hot rocks common on that site and learn to recognize them by their appearance. Then you'll be able to ignore them or kick them out of the way.

Some sites have only negative hot rocks. Some have only positive hot rocks. Some have both.

It is rare for a hot rock to actually contain gold, but it does occasionally happen. If the signal you get from a hot rock seems louder and more "metallic" sounding than the appearance of the hot rock would seem to warrant, investigate the matter further. One very common trick is to break the rock in two roughly equal pieces and see if one piece gives a much more distinctive sound than the other. If both pieces act about the same and you don't see gold, it probably contains no gold.

There is a popular impression that hot rocks are "hot" because of brighter mineral content than the surrounding soil. There is another common belief that the ground adjust knob corrects for variations in the amount of mineralization in the soil. These ideas are incorrect. It's the type of mineral, not the amount, that determines whether or not you'll hear a hot rock, and where the GROUND knob will have to be set to silence the soil. However, the loudness of the sounds you'll hear does depend to some extent on the amount of mineralization.

"SEEING THROUGH" HOT ROCKS

Suppose you find a spot where the machine gives a "zip" sound that may be a nugget or a positive hot rock. You don't see an obvious hot rock, but you want to check things out a bit more before digging. One thing you might do is sweep back and forth over the spot, gradually rotating the GROUND knob counterclockwise until the "zip" sound disappears, and you hear the ground since you're no longer adjusted to the null of the soil. You just determined that the sound was probably a positive hot rock, since you succeeded in nulling it out. If it were a nugget or indeed any kind of meta, you wouldn't have been able to null it out since the null setting for metal doesn't fall within the range of the control. Or, if it were a nugget underneath a hot rock, you would not have been able to find a null setting to consistently ignore them both. That spot would sound off regardless of the GROUND setting.

On any machine besides a MicroMAX Diablo, you would have to readjust the knob in order to resume searching with the soil nulled - the whole procedure is so cumbersome that even those who know how to do it rarely bother. The MicroMAX Diablo makes this procedure much easier, because you can null the hot rock out using the HOT ROCK ADJUST knob without disturbing the GROUND adjustment! What's more, in many areas most of the hot rocks are the same HOT ROCK ADJUST setting once you've nulled one hot rock, the knob is already set to null out the next one at the flip of the mode switch.

Since this procedure requires using the machine at a setting that is not fully nulled for the ground, there will be some ground noise. You have to learn to move the searchcoil evenly at a constant height to minimize the ground noise, and watch as you listen. Sometimes it helps to raise the audio threshold setting slightly and reduce the sensitivity setting.

No method is entirely foolproof. Although it is not possible to null out a nugget using either the GROUND or HOT ROCK ADJUST knob, it is possible for the sound of a nugget to be obscured by ground noise. Where the amount of iron mineral in the soil is moderate and the null setting for the hot rock is fairly close to the null setting for the soil itself, there will only be a little ground noise. With experience you'll be able to hear all but the tiniest nuggets through it. In heavily mineralized soil and with hot rock null settings that are markedly different from the soil null setting, there may be a lot of ground noise and there is greater risk of losing the sound of a gold nugget in the ground noise.

The first time you try this procedure it may seem confusing and useless. With a little practice you will get much better at it, and it will save you digging many a worthless hot rock. What's more, it may enable you to find a nugget underneath a hot rock that everyone else has missed because they had no way to see through the hot rock.

WARRANTY SERVICE

Your Tesoro metal detector is covered by a **Limited Lifetime Warranty**, the terms of which are listed below. If your metal detector should require service, you may return it to the Tesoro factory at the address below.

LIMITED LIFETIME WARRANTY

This warranty gives you specific legal rights, and you may have other rights which vary from state to state.

This instrument is warranted to be free of defects in material and workmanship as long as it is owned by the original consumer purchaser. This warranty is not transferable and is valid only if the warranty registration card has been completed and mailed within 10 days of purchase.

TESORO will, at its option, repair or replace any instrument covered by this warranty, without charge, except for transportation charges, at its factory in Prescott, Arizona.

This warranty excludes batteries, damage caused by leaky batteries, cable breakage due to flexing on body mount units, and wear of the searchcoil housing. Also excluded are instruments which have been abused, altered, or repaired by an unauthorized party.

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