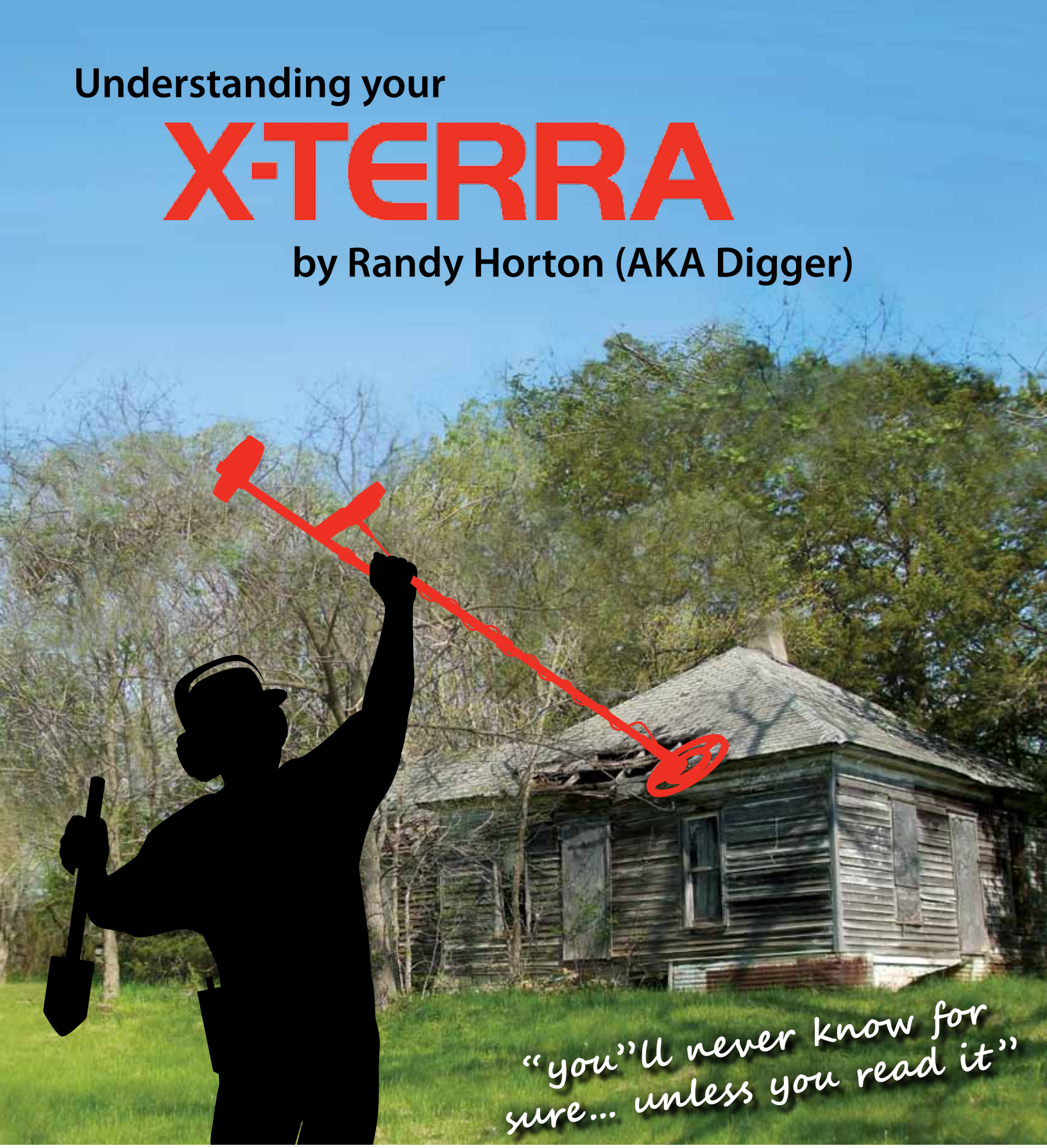
Understanding your

X-TERRA

by Randy Horton (AKA Digger)



VFLEX technology

CONCENTRIC 3kHz

DOUBLE D / CONCENTRIC 7.5kHz

DOUBLE D / CONCENTRIC 18.75kHz

World's Best Metal Detection Technologies

MINELAB
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Contents

@ = When you see this icon click to find out more infromation online.

Introduction ...

Greetings from Digger

Dear Reader,

I was fortunate to be chosen to help field test the first series of Minelab's X-TERRA metal detectors. Since that time, I've spent thousands of hours trying to better understand how to maximize the performance of this truly amazing metal detector. Although the X-TERRA is quite capable of operating as a "turn on - and - go" detector, there are some techniques I've discovered that have improved its performance in the sites I hunt.

I primarily hunt for old coins at old sites. These sites include municipal parks, private lawns, athletic fields, homesteads, old farm sites, ghost towns and abandoned fair grounds. I've used every coil available for the X-TERRA, and made "in the field" comparisons of their effectiveness.

This eBook is not intended to replace the X-TERRA Instruction Manual that comes with the detector. But instead, is intended to help you better understand the X-TERRA's functionality and capabilities, using techniques I've developed.

Randy AKA "Digger"

May 2011

Product Timeline

You can see from the timeline below, that there have been two different generations of X-TERRA metal detectors.

- *The first generation consisted of the X-TERRA 30, X-TERRA 50 & X-TERRA 70.*
- *The second generation consists of the X-TERRA 305, X-TERRA 505, X-TERRA 705 & 705 Gold Pack.*

November 2005

X-TERRA 30

X-TERRA 50

March 2006

X-TERRA 70

X-TERRA 305

X-TERRA 505

April 2009

X-TERRA 705

June 2010

X-TERRA 705
Gold Pack

See the following pages for more details on the differences between each model.

Product Comparison

	X-TERRA 30 	X-TERRA 50 	X-TERRA 70 
Application	Coin, Relic & Jewelry	Coin, Relic & Jewelry	Coin, Relic, Jewelry, Beach & Gold Prospecting
Detect Modes	(1) Coin & Treasure	(1) Coin & Treasure	(2) Coin & Treasure, and Prospecting 2in1
Discrimination	One factory Discrimination Pattern that can be personalized & All Metal. 12 segment Discrimination Scale. 12 TARGET IDs	Two factory Discrimination Patterns that can be personalized & All Metal. 18 segment Discrimination Scale. 18 TARGET IDs	Three factory Discrimination Patterns that can be personalized, All Metal & Iron Mask. 28 segment Discrimination Scale. 28 TARGET IDs
Audio Tones	3	4	1, 2, 3, 4 & Multi (28)
Ground Balance	Factory Preset.	Manual adjustment (0 to 20). 20 GB MANUAL	Manual adjustment (0 to 90), Automatic, Beach & Tracking. 90 GB AUTO + MANUAL
Pinpoint	Audio & visual.	Audio & visual.	Audio & visual.
Sensitivity	Adjustable (1 to 10)	Adjustable (1 to 20)	Adjustable (1 to 30)
Noise Cancel	No	3 channels (-1, 0, 1) Manual	5 Channels (-2, -1, 0, 1, 2), Manual & Automatic
Threshold	No	No	Adjustable (-5 to 25)
Volume	Adjustable (0 to 10)	Adjustable (0 to 20)	Adjustable (0 to 30)
Backlight	No	No	No
Transmission Frequency	7.5 kHz	7.5 & 18.75 kHz - change frequency by changing coils	3, 7.5 & 18.75 kHz - change frequency by changing coils
Coil (standard)	9" Concentric lightweight, waterproof 7.5 kHz	9" Concentric lightweight, waterproof 7.5kHz	9" Concentric lightweight, waterproof 7.5 kHz

	X-TERRA 305	X-TERRA 505	X-TERRA 705 X-TERRA 705 Gold Pack
			
Application	Coin, Relic & Jewelry	Coin, Relic & Jewelry	Coin, Relic, Jewelry, Beach & Gold Prospecting
Detect Modes	(1) Coin & Treasure	(1) Coin & Treasure	(2) Coin & Treasure, and Prospecting 2in1
Discrimination	Two factory Discrimination Patterns that can be personalized & All Metal. 12 segment Discrimination Scale. 12 TARGET IDs	Three factory Discrimination Patterns that can be personalized & All Metal. 19 segment Discrimination Scale. 19 TARGET IDs	Four factory Discrimination Patterns that can be personalized, All Metal & Iron Mask. 28 segment Discrimination Scale. 28 TARGET IDs
Audio Tones	1, 2, 3 & Multi (12)	1, 2, 3, 4 & Multi (19)	1, 2, 3, 4 & Multi (28)
Ground Balance	Manual adjustment (0 to 20). 20 GB MANUAL	Manual adjustment (0 to 50). 50 GB MANUAL	Manual adjustment (0 to 90), Automatic, Beach, Tracking & Tracking Offset. 90 GB AUTO + MANUAL
Pinpoint	Audio & visual.	Audio & visual.	Audio & visual plus two modes: Automatic & Sizing.
Sensitivity	Adjustable (1 to 10)	Adjustable (1 to 20)	Adjustable (1 to 30)
Noise Cancel	3 Channels (-1, 0, 1) Manual	5 channels (-2, -1, 0, 1, 2) Manual	5 Channels (-2, -1, 0, 1, 2), Manual & Automatic
Threshold	Adjustable (-5 to 25)	Adjustable (-5 to 25)	Adjustable (-5 to 25)
Volume	Adjustable (0 to 10)	Adjustable (0 to 30)	Adjustable (0 to 30)
Backlight	No	No	Yes
Transmission Frequency	7.5 & 18.75 kHz - change frequency by changing coils	3, 7.5 & 18.75 kHz - change frequency by changing coils	3, 7.5 & 18.75 kHz - change frequency by changing coils
Coil (standard)	9" Concentric lightweight, waterproof 7.5 kHz	9" Concentric lightweight, waterproof 7.5 kHz	X-TERRA 705 - 9" Concentric lightweight, waterproof 7.5 kHz X-TERRA 705 Gold Pack - 10x5" eliptical lightweight 18.75 kHz

Minelab's Documentation

Don't just read the words!

- My first bit of advice is to read the Instruction Manual thoroughly.
- Don't just read the words.
- Apply what you read to your particular circumstances. It is important to know how to set up the detector for effectively hunting a specific site.
- Gain an understanding of how each of those settings can (and will) affect your hunt.
- Learn when and how to tweak your X-TERRA to best accomplish your task.

I am a contributor to the Treasure Talk blog and moderator of the X-TERRA forum on Find's Treasure Forums.

Current X-TERRA Instruction Manuals

If you wish to find out more, further tips and advice are also available from:

- Minelab's Treasure Talk blog at **www.minelab.com/treasure-talk**
- The X-TERRA forum on Find's Treasure Forums at **www.findmall.com**.

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Getting Started...

Battery Status

The first thing I do after arriving at and analyzing a site is to turn on the detector and make sure I have sufficient battery life.

Some detector makes and models use an unregulated battery voltage for transmission. This results in a loss of detection depth as the battery discharges. Not so with the X-TERRA. The X-TERRAs are capable of using 1.5 volt AA alkaline, 1.5 volt AA carbon, 1.5 volt AA non-rechargeable lithium, 1.2 volt AA NiMH rechargeable or 1.2 volt AA NiCad rechargeable batteries.

Regardless of which type of cells you use, know that the internal voltage of the X-TERRA is regulated all the time. As such, you can keep detecting with your X-TERRA until the batteries are used up, without any loss of performance. However, I've found that the initial reading on the battery indicator does not reflect the true battery life. I suggest you let your X-TERRA operate for a few minutes, then check the indicator again to get a better estimate of the remaining battery life.

When you are out detecting, feel confident that you don't have to change a set of batteries until they run completely out. But as a matter of convenience, I'd recommend carrying a set of four matching AA cells in your pouch for when they do finally run out. Otherwise it could be long walk back to the truck!

I'd recommend carrying a set of four matching AA cells in your pouch !!

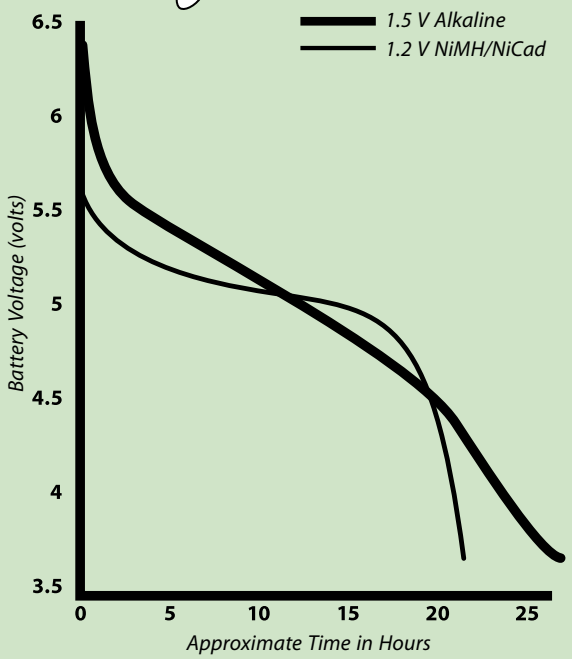
Overvoltage
If the battery voltage is too high (above 8V), the battery icon will flash and the detector will shut down.

Full
Two black segments inside the outline.

Half
One black segment inside the outline.

Low
The icon will begin to flash for a period of time and there will be audio announcements every 60 seconds before the detector finally shuts down.

@ X-TERRA 705 manual p.45



Noise Cancel Channel

While setting the Noise Cancel Channel, make sure you hold the coil away from any large metal objects

When I am confident the batteries are sufficient to maintain operation, I set the Noise Cancel Channel. Some X-TERRA models do this manually and others do it automatically. Refer to your Instruction Manual to learn how this is best accomplished with your particular detector. If your X-TERRA offers Auto Noise Cancel, use it! The Auto modes offered by some models of X-TERRA are far more accurate at obtaining proper operating levels than we are able to accomplish.

Regardless of which model you have, while setting the Noise Cancel Channel, make sure you hold the coil away from any large metal objects. And, hold it in a horizontal position as you would while detecting.

Remember, the coil of your detector acts as an antenna for more than just the target signals. Setting the proper Noise Cancel Channel will minimize the interference you might receive from electrical equipment, power lines or other metal detectors.

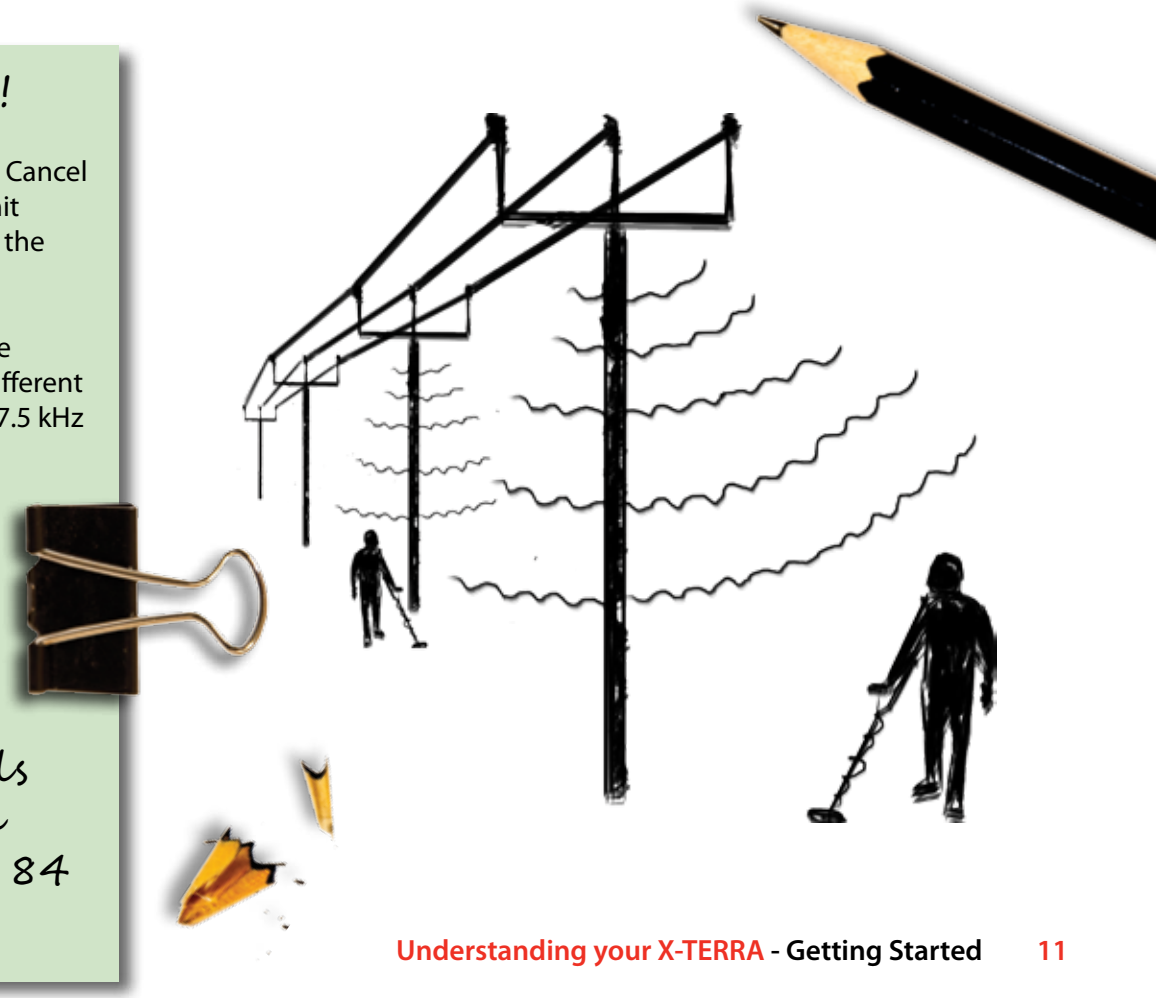
Minelab fact!!!

Did you know that the Noise Cancel adjustment shifts the transmit frequency by 40 Hz steps for the 7.5 kHz coils?

Here's an example of how the frequency changes for the different Noise Cancel Channels for a 7.5 kHz coil on the X-TERRA 705.

+ 2	=	7.580 kHz
+1	=	7.540 kHz
0	=	7.500 kHz
-1	=	7.460 kHz
-2	=	7.420 kHz

For more details see Q & A with Laurence on p. 84

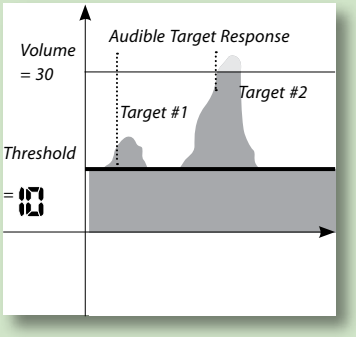


Threshold

Threshold settings range from -5 to 25. Having a proper Threshold setting is very important and should not be taken for granted. Where you set yours will depend on how well you hear tones and where you are hunting. For hunting old coins at old sites, I would discourage anyone from using a negative setting.

My advice is to set your Threshold at a level that is barely audible.

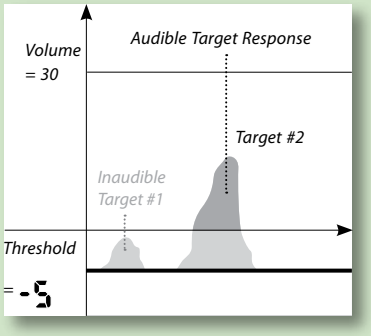
My advice is to set your Threshold at a level that is just barely audible (that's why it is called a threshold). Setting it too loud will be distracting and could result in small/deep targets not producing enough audio signal to overcome the Threshold tone. Setting it too low (e.g. silent search) can also result in small/deep targets not making enough audio tone to reach the level of your Threshold. Remember, the Threshold tone is a starting point where all audio signals begin. If it is set too high, you won't hear those subtle changes.



If the Threshold is set to a positive value, high enough for you to hear the faint hum, the detector will produce target signals and a Threshold sound. It is recommended that you set a Threshold that is still very low; a high Threshold can mask small target signals.

X-TERRA 705 manual p.35

And if it is set too low, you might miss "whisper" signals from those deep old coins (that others have missed).



If the Threshold is set to a negative value, small target signals will not produce a signal big enough to go above the Threshold of audibility.

X-TERRA 705 manual p.34

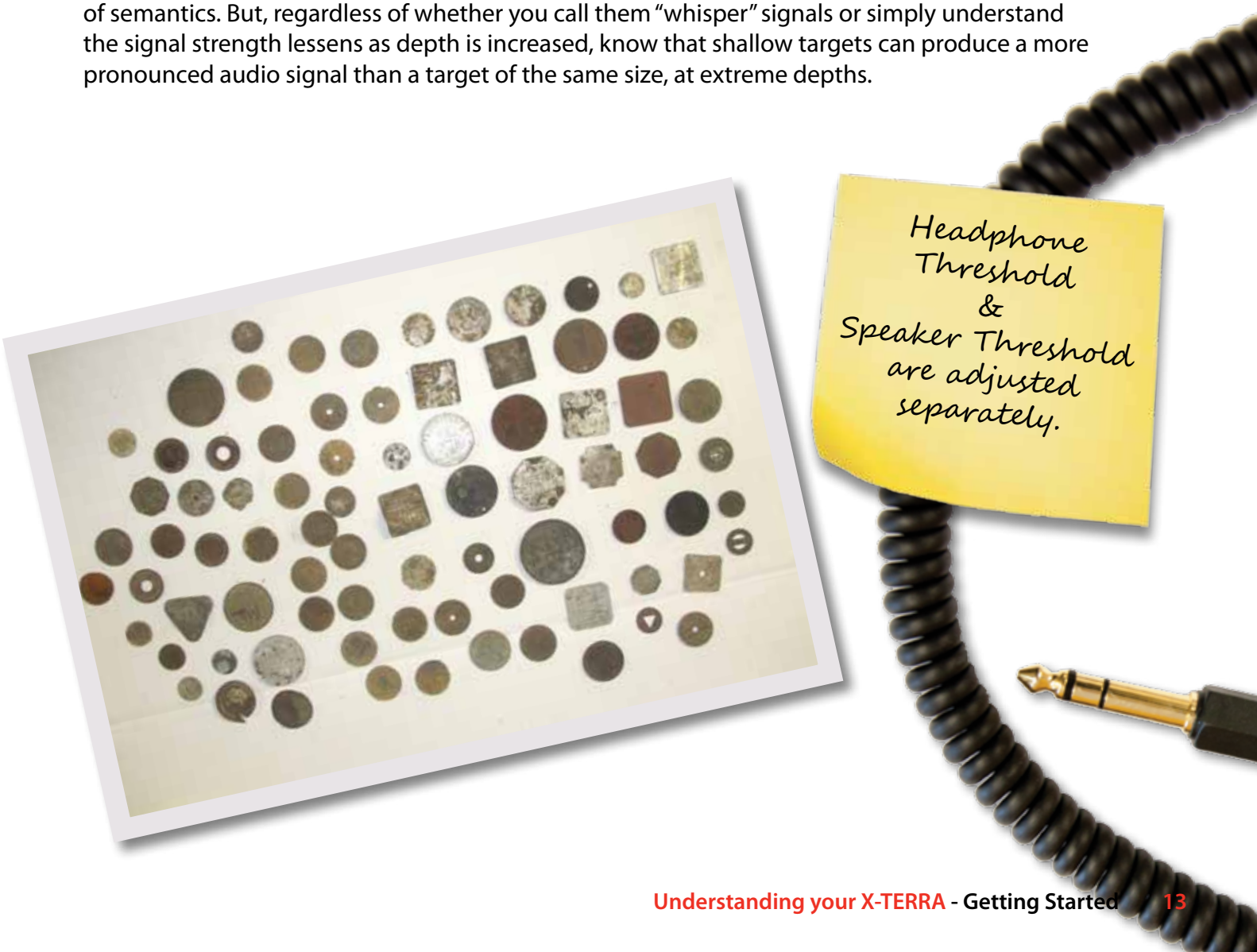
With that said, I should add that a buddy of mine indicates there are a couple sites where he finds hunting with a negative Threshold is beneficial. When he hunts for coins at a picnic area that is heavily infested with aluminum foil, setting a negative Threshold serves as a "surface blanker" against those shallow, small pieces of foil.

Another place where a negative Threshold could come in handy is on wet sand at a saltwater beach. Here, black pebbles of basalt act as little hot rocks. They can sound off like pieces of foil and can be very annoying. Having a negative Threshold helps him in this situation. But understand that doing so can result in missing small gold targets (e.g. jewelry chains) and the signals produced by deeper targets may not be heard.

One final note on Threshold... the pitch of the Threshold tone is not adjustable in the Coin & Treasure Mode. You can, however, adjust the pitch of the Threshold for use in the Prospecting Mode of the X-TERRA 70 and 705.

As a side note, I do not consider the X-TERRA audio produced by small/deep targets to be a "whisper" signal. There may be signals that are "narrower" than others. But I believe the "whisper" signal that we may have heard on analog detectors is different than the "narrow" signals that are produced by digital audio in X-TERRAs.

Maybe I'm just old school, but it is my theory that these narrow signals are simply a result of the detection field being narrower at extreme depths. Whisper? Narrow? Maybe it is just a matter of semantics. But, regardless of whether you call them "whisper" signals or simply understand the signal strength lessens as depth is increased, know that shallow targets can produce a more pronounced audio signal than a target of the same size, at extreme depths.



Sensitivity

Next, I check my Sensitivity setting. Sensitivity determines how strongly the receive circuit of a detector responds to anything under the coil. By anything, I mean the soil as well as any targets.

Sensitivity parameters vary with the model of X-TERRA you are using. The 305 range is 1 - 10, the 505 has a range of 1 - 20 and the 705 can be set anywhere from 1 to 30. The difference being is that the more setting options available, the more "precisely" you can set your detector for your application.

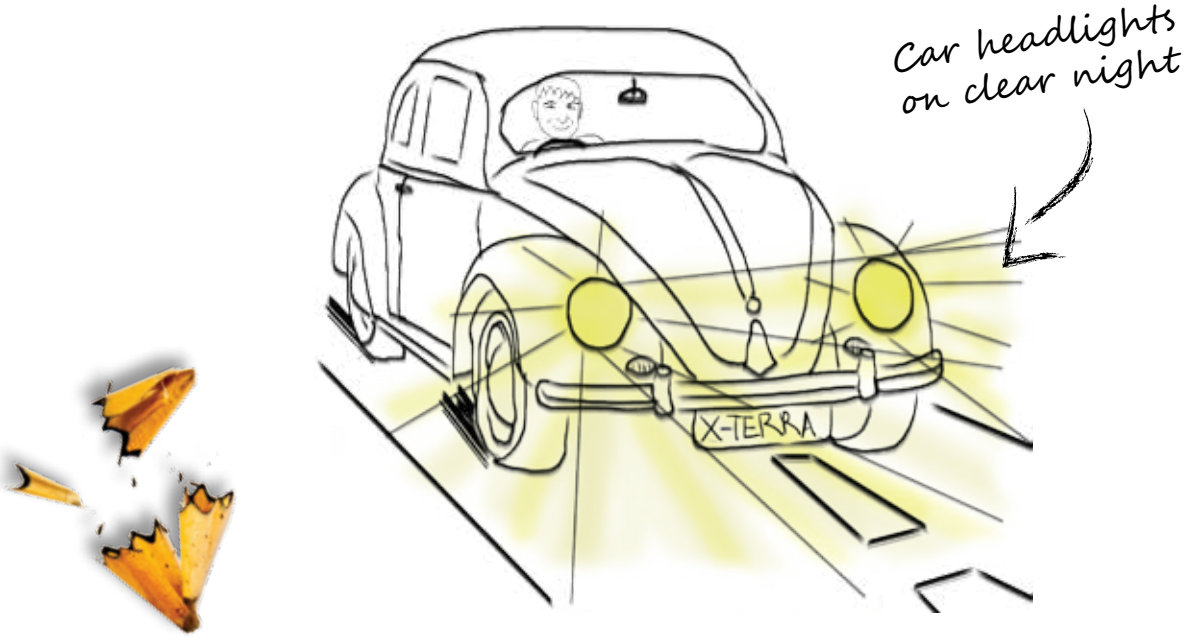
I like to run my Sensitivity up as high as I can, without causing false signals.

Regardless of the model, if I am going to be detecting in a wide open area with relatively few targets, I like to run my Sensitivity up as high as I can, without causing false signals. These false signals are more apparent as the sweep speed is increased or when switching directions with the coil. But running it on the brink of being "too hot" allows me to obtain the maximum depth of detection.

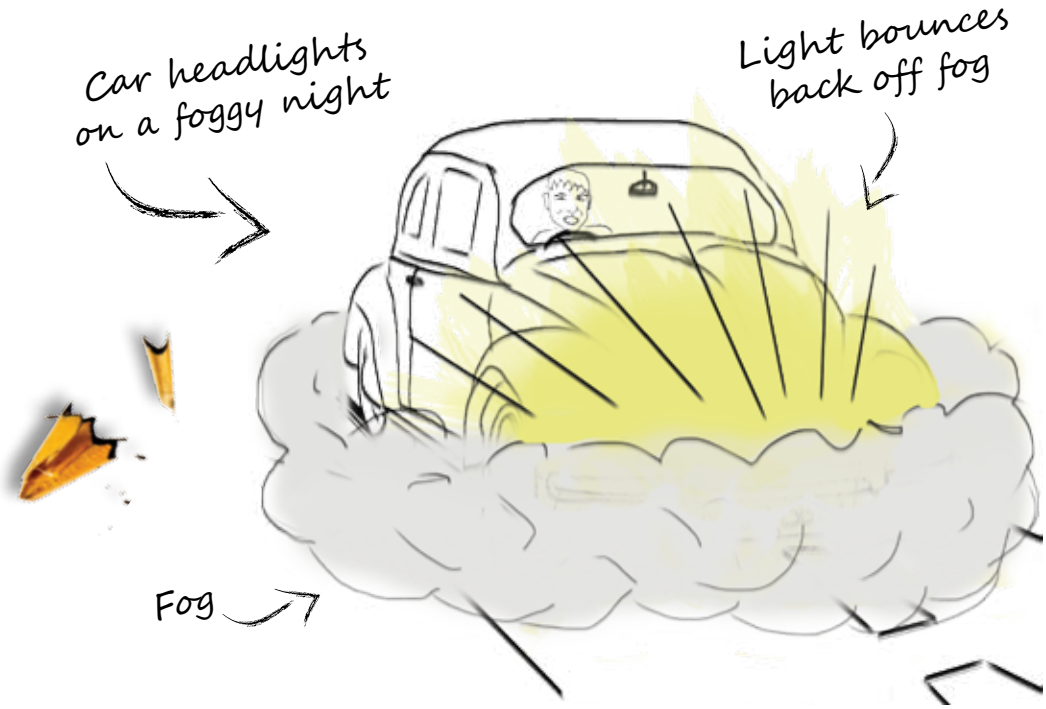
However, do not be misled into thinking that a higher Sensitivity always results in more depth. In areas congested with adjacent targets, or areas with high levels of mineralization, running a high Sensitivity can have an adverse effect on the depth of detection.

Comparing Sensitivity to car headlights

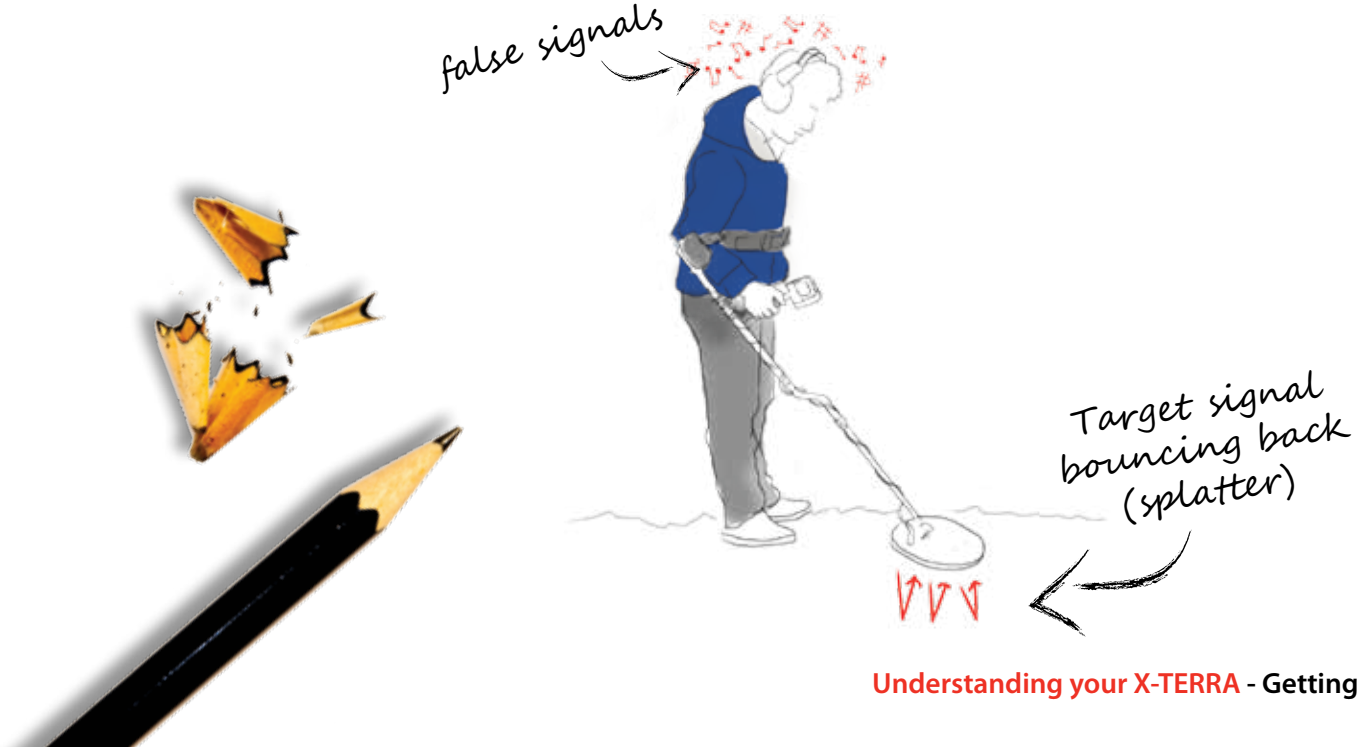
I like to compare the Sensitivity of a detector to the headlights on a car. On nights when the skies are clear and visibility is not obstructed, you are best served with your high beams. They penetrate deep into the night, allowing you to see everything that may cross your path.



On the other hand, when you are driving in foggy conditions and your view is obstructed, low beams provide a clearer line of sight. If you were to turn on the high beams in fog, you will find that the light bounces back toward you, making visibility very difficult.



Similarly, if you are hunting in an area where there are multiple targets in each sweep, or the mineralization is extreme, having your Sensitivity too high will cause the target signal to "splatter" or bounce back toward the coil. This results in false signals and loss of depth because good target signals can be hidden by the false signals.



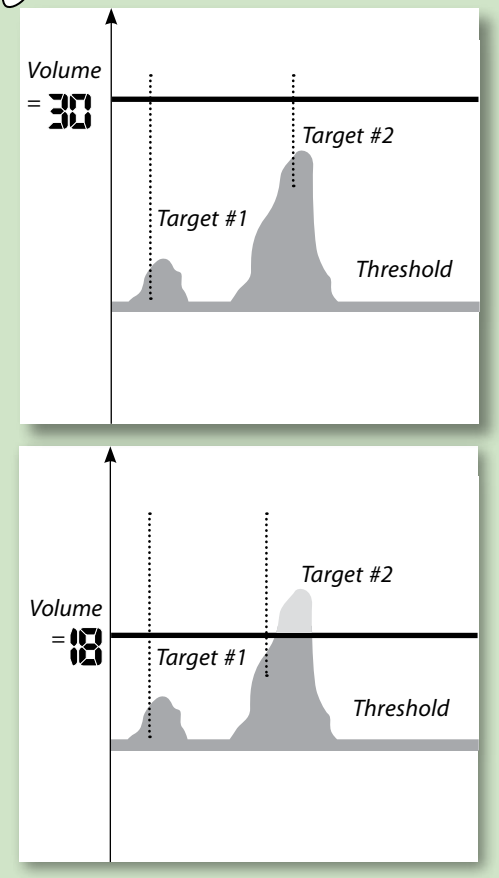
Volume

One X-TERRA setting that I never change is my Volume, which is always left at the maximum setting. My headphones have volume controls. So if I ever want to turn down the audio, I can do it easily on the headphones.

A couple of things I would like to mention are that the different models of X-TERRA have different parameters for audio volume settings. For example, the 305 adjusts from 0 to 10, whereas the 505 and 705 adjust from 0 to 30. The minimum volume and maximum volume are virtually the same for each model. But the amount of variance with each incremental setting is based on the total number available on that model of X-TERRA.

The other thing to note is that the Volume setting for use with headphones is a separate function than the Volume setting for use without headphones (using the built in speaker). As such, you need to make sure you have properly adjusted the Volume for how you monitor the audio of your X-TERRA.

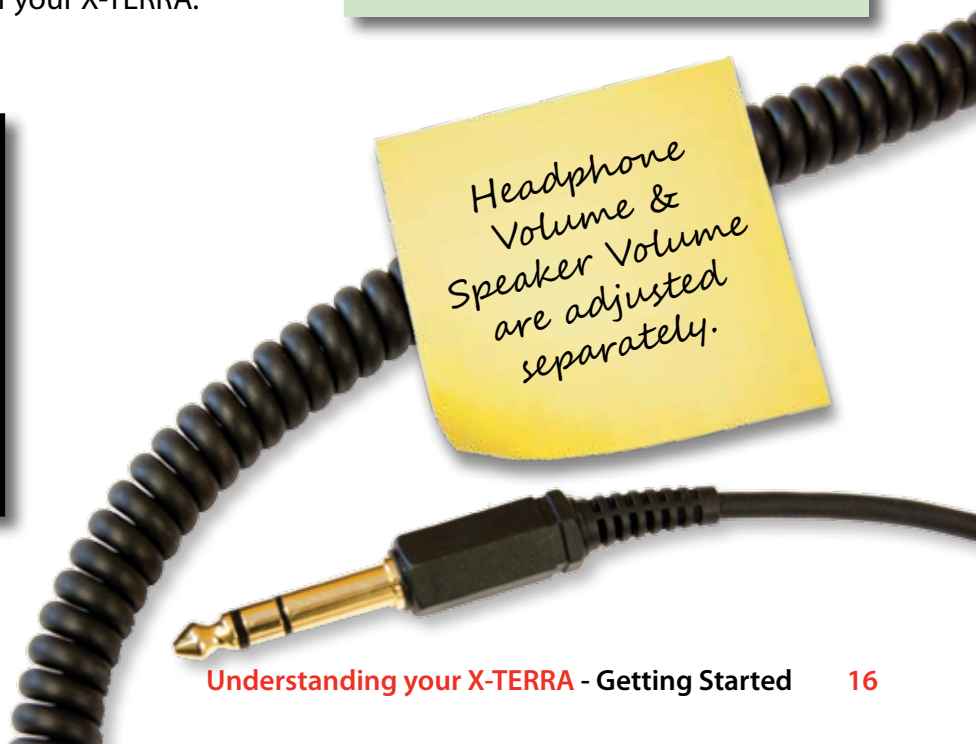
@ X-TERRA 705 manual p.37



Volume is the level of sound emitted by the detector when a target is detected. The Volume control limits the maximum volume of target signals.

MINELAB WARNING!!!!

When using headphones, it is recommended that the Volume be set so that a loud target signal will not damage your hearing!



Ground Balance...

Manual Ground Balance

After adjusting my Sensitivity setting, I establish the proper Ground Balance (GB). Once again, each model (with the exception of the X-TERRA 30, which has a factory preset GB) has a different degree of "fine tuning" for Ground Balance.

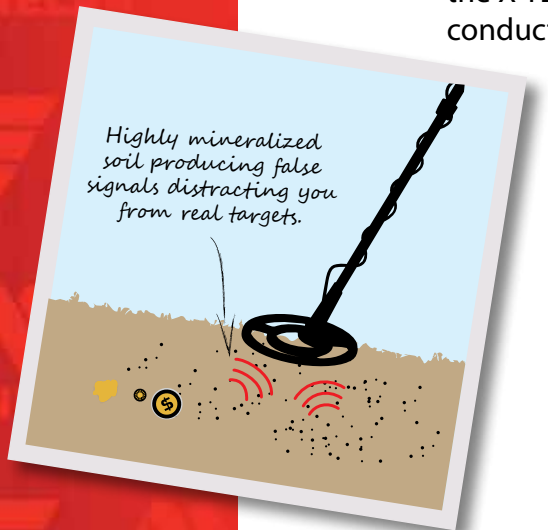
The 50 and 305 offer Manual Ground Balance with settings ranging from 0 to 20. The 505 offers Manual Ground Balance with settings ranging from 0 to 50. And the 70 and 705 offer Manual Ground Balance with settings ranging from 0 to 90. The 70 and 705 offer the ability to set your Ground Balance automatically and operate in either a Tracking or Beach Tracking. The 705 also allows the user to offset the Ground Balance setting while in Tracking .

Note that the X-TERRA has the ability to operate effectively in both magnetic and conductive ground.

Ground Balance Settings

X-TERRA Model	Settings Range
X-TERRA 30	Factory Preset
X-TERRA 50 X-TERRA 305	20 GB MANUAL
X-TERRA 505	50 GB MANUAL
X-TERRA 70 X-TERRA 705	90 GB AUTO + MANUAL

Ground Balance is the simplest form of discrimination in that it allows you to adjust the ground phase of your detector to compensate for the level of ground mineralization. In other words, you are setting your detector in an effort to discriminate out the adverse effects of the ground. Note that the X-TERRA has the ability to operate effectively in both magnetic and conductive ground.

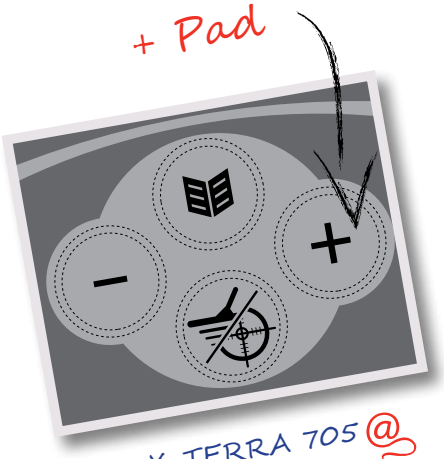


X-TERRA 705 @ manual p.17

Ground Balance pad

The theory behind manually ground balancing your detector is the same, regardless of model. Your objective is to "tune the ground phase" of your detector to a setting that compensates for the mineralization at a particular site. In other words, you are trying to neutralize the effects of mineralization. This is accomplished by pressing the Ground Balance pad and "bobbing" the coil a few inches off the ground.

+ Pad



X-TERRA 705 @ manual p.8

- Pad

I like to set my Ground Balance with my X-TERRA in All Metal so I know that I am not setting the GB over anything metal. You can set up in a Discrimination Pattern. But if you happen to have the coil over a target that is set to reject, you'll get an incorrect GB setting. Regardless, make sure you don't actually touch the ground on the down stroke. As the coil is lowered to the ground you will hear a change of tone. If that tone has a low pitch, the current GB setting is numerically lower than the site requires.

Another way of looking at it is that you are setting the ground phase too low, over-compensating for that particular site's "mineralization". When this happens, increase the ground phase setting by pressing the + pad. If, on the other hand, the tone is high, the ground is more mineralized than your detector is currently set for. Thus, you'll need to decrease the ground phase setting by pressing the - pad. Continue bobbing the coil and make the appropriate adjustments.

Pinpoint/Detect pad

Your objective is to find a setting that allows for the least pitch variation when lowering the coil. Once you have a proper setting, press the Pinpoint/Detect pad (or press the GB pad again) and you're ready to hunt.

Detectorist performing ground balance

Bobbing the coil: moving the detector coil up & down

Auto Ground Balance

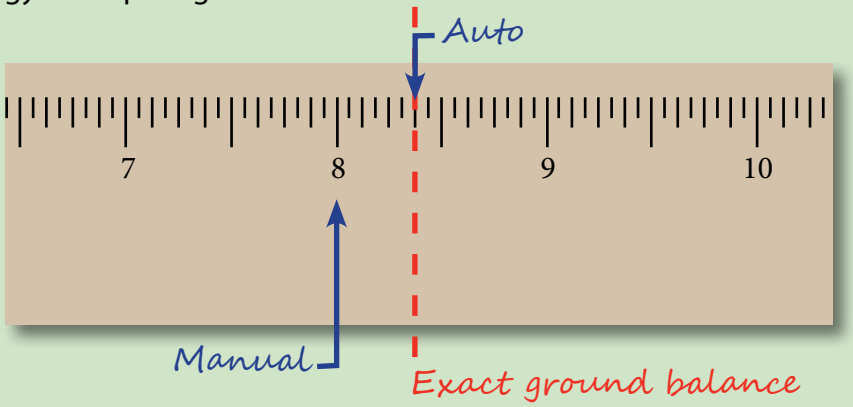
If I am running with a fixed GB, I like to check it every few minutes.

If your X-TERRA has the Auto GB function (X-TERRA 70 & 705), you can accomplish a proper Ground Balance by pressing the Ground Balance pad, then pressing the Mode pad while bobbing the coil a few inches off the ground. The letters AU will appear on the display, and within a few seconds, your X-TERRA will have set the Ground Balance for you by using the software parameters established within the electronics.

Just as when you set the Ground Balance manually, the Auto GB value will remain until you physically change it. All you've done differently by using Auto GB is to allow the detector to select the proper ground phase setting for the earth below the spot where you were suspending the coil. And for those of you who have an X-TERRA that offers Auto GB, remember...

Auto Ground Balance and Tracking are >10 times more accurate than Manual Ground Balance!

Minelab analogy - Comparing Auto and Manual Ground Balance



(Manual Ground Balance can be compared to the inch scale on a ruler in that it only changes in whole inches, whereas Auto Ground Balance (and Tracking) are set in fractions of inches.)

If you do want to update this "locked in" Ground Balance (ground phase setting), you can by following the same steps as when you initially set it. If I am running with a fixed GB, I like to check it every few minutes, just to make sure I am running with optimized settings. If you've not checked yours while you are hunting, I'd encourage you to do so. You might be surprised at how much variation there is in the earth's mineralization, within any given site.

Tracking

For those models with Tracking Ground Balance, know that Tracking allows your detector to constantly update the ground phase setting, on the fly. That means you don't have to set your Ground Balance before hunting as it will "set itself" within a couple sweeps. After a few sweeps, you can either lock in the current ground phase setting by pressing the Tracking pad again, or you can continue to hunt in Tracking.

If you ground balance to a target, it could actually discriminate that target out.

Be aware that while in Tracking, repeated X-ing over a target might result in your detector thinking that the target is part of the ground matrix. If that happens, it could Ground Balance to the target instead of the ground. Remember when I said Ground Balance was the simplest form of discrimination? If you Ground Balance to a target, it could actually discriminate that target out.

Now, with that said, once you start sweeping the coil, it will reset and adjust itself to the "new matrix", but you may have passed up a keeper in the process.

Tracking Ground Balance Offset

Personally, in most of the sites I hunt, I like to run my X-TERRA with a slight positive Ground Balance.

A feature unique to the 705 is Tracking Ground Balance Offset. In simple terms, this allows the user to run in Tracking and at the same time, maintain a Ground Balance setting that varies from the one "recommended" by the electronics of the X-TERRA.

On the 705, you can adjust this offset to be anywhere from +1 to +15 or from -1 to -15. There has been some discussion as to whether lowering the ground phase number makes the GB of the X-TERRA more positive or more negative. I think the use of the word "Offset" is what makes this confusing. Setting a + number into the Tracking GB Offset will provide a more negative ground phase than the number the detector has chosen as "neutral".

For example, if you are hunting an area in Tracking, and let's say the X-TERRA has determined at a given time the proper GB setting is 35. That means the 705 software is going to set its ground phase at 35 in an effort to best neutralize the effects of that soil. If you had programmed your 705 with Tracking Ground Balance Offset of +5, your X-TERRA will actually indicate a 40 on the display. In this situation, the 40 that you see on the screen is the sum of what the X-TERRA software has determined to be required (remember it was 35 in this example), plus the +5 Offset that you programmed into it. By setting a +5 in your program, you have told the 705 that you want to run a negative Offset of 5, in combination with what it determines to be the proper setting.

After pressing the Ground Balance button , press the Accept/Reject button to enter Tracking GB Offset.

On the other hand, if you want to run a positive Offset, you'll need to enter a negative number. For example, if you want to track with a positive Offset of three, you would need to enter a -3 into the procedure. If, as in the situation above, the 705 determines that the perfect setting would be 35, your positive GB offset of -3 would actually make the display indicate a 32. Personally, in most of the sites I hunt, I like to run my X-TERRA with a slight positive Ground Balance (ground phase setting).

Press the + or - buttons to adjust the Offset.

For more information see X-TERRA 705 manual p.44

If I am manually setting the GB on my X-TERRAs, I will properly Ground Balance the detector and then lower the ground phase number by a few clicks of the - pad. Now, with the Offset Tracking functionality of the 705, if I want to maintain Tracking and keep it a bit positive, I can insert a -3 (or whatever level I determine I want) into the mix. That allows me to track and maintain a Ground Balance that is 3 points on the positive side of what the 705 has determined to be neutral. In my mind, I'm simply "fooling the detector" into thinking the ground is more mineralized than it actually is.

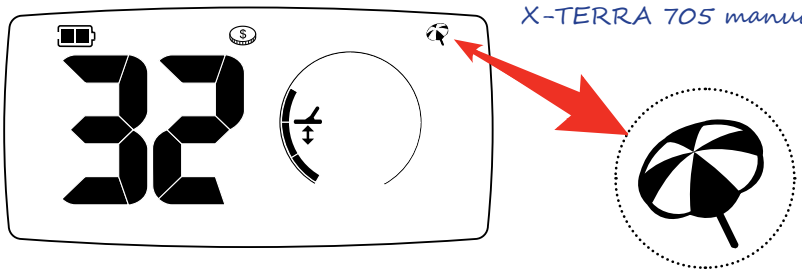
I'm convinced that, in my moderately mineralized soil, running a slight positive Ground Balance allows me to hear a sharper audio response on deeply buried targets. Don't be surprised if you notice an increase in the Threshold volume as you lower the coil, when hunting with the GB a bit positive. And be aware that running too much of a positive Offset in trashy areas can create false signals, loss of depth and instability of operation.

My best advice, when attempting to utilize Tracking Ground Balance Offset is to try different combinations for the type of hunting you do. Spend time in your test garden, tweaking the various settings. Knowing what settings are appropriate for your sites and style of hunting will dramatically increase the effectiveness of your X-TERRA.

Out practicing in my own test garden

Beach Ground Balance

For salt water beach hunting, the X-TERRA 70 and X-TERRA 705 incorporate functionality referred to as Ground Balance Beach. Manual, Auto, Tracking & Tracking offset Ground Balance options are all available in Ground Balance Beach. Ground Balance Beach is capable of minimizing the affects of both magnetic and conductive mineralization in the sand. When combined with a Double-D coil, the negative effects of highly mineralized black sand can be greatly reduced. To activate Ground Balance Beach, press and hold the GB pad for three seconds. When the functionality is implemented, a small beach umbrella icon will appear at the top right corner of your display.



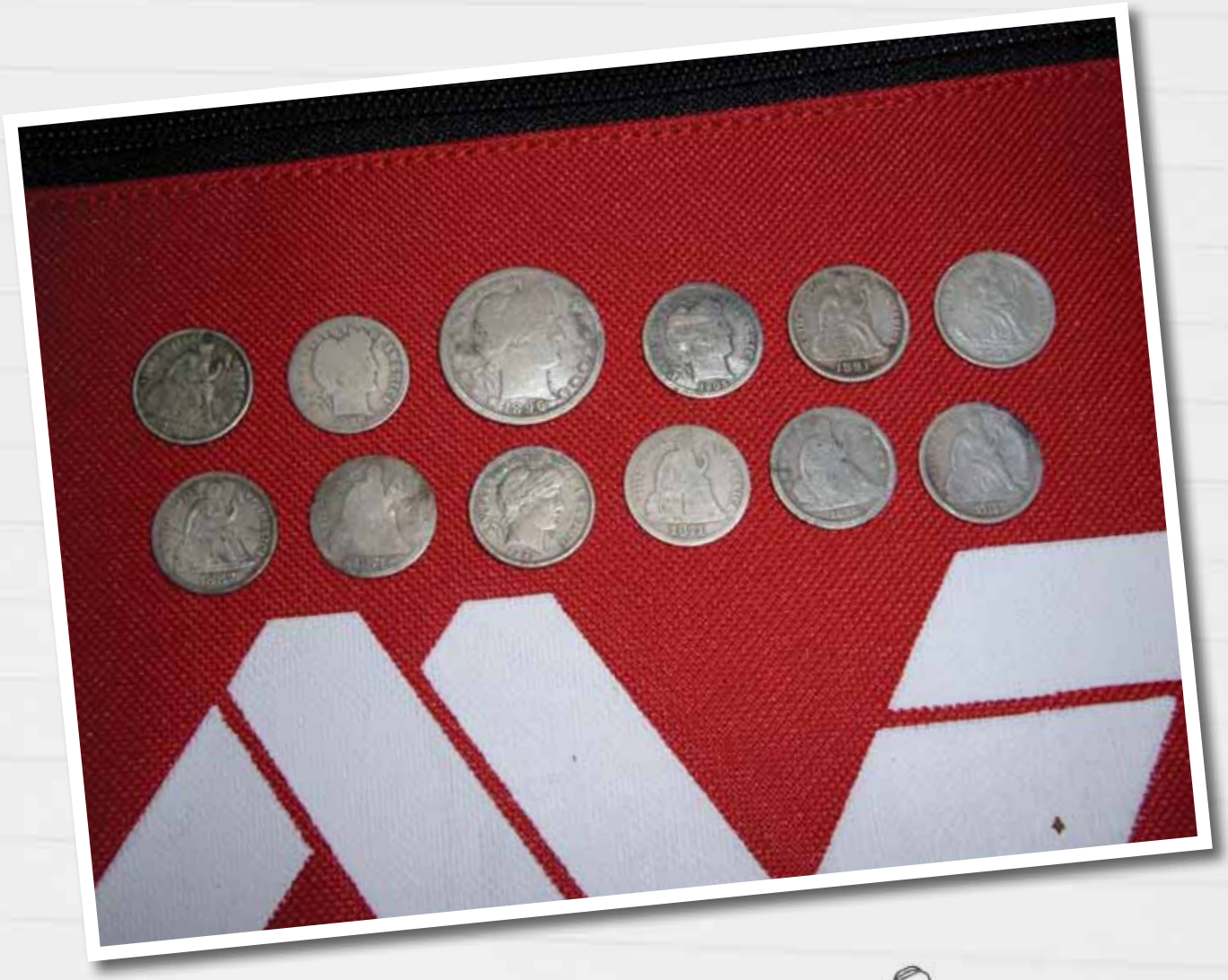
X-TERRA 705 manual p.41

Typically, as you near the water's edge, mineralization levels will increase, causing a "drop" in your ground phase reading (check your ground phase reading by momentarily pressing the GB pad). As you near the water's edge, set your Sensitivity as high as you can tolerate, without causing undue falsing. You will likely be able to increase that level of Sensitivity as you enter areas of dry sand. But on the other hand, hitting pockets of "hot rocks" or black sand will likely result in more false signals, due to the increased mineralization. You can reduce these false signals and effectively hunt those areas by lowering your Sensitivity level or by slowing down your sweep speed.

Just as I refer to "normal Tracking" as being " Ground Balance on the fly", you can expect Ground Balance Beach Tracking to quickly compensate for those mineralization changes you encounter when moving around the beach. And at an even faster "update" than by using "normal" Tracking. However, I primarily recommend that Ground Balance Beach Tracking be used in areas where you don't have multiple targets under the coil at one time.

Operating in Beach Tracking can also sometimes "over-compensate" for the mineralization levels, resulting in some ferrous and low conductive targets being ignored (balanced out). To help overcome this, slow down your sweep speed, implement Pinpoint for isolating targets, and don't over-drive your Sensitivity settings.

Discrimination...



Discrimination Patterns

Once the Volume, Threshold, Sensitivity and Ground Balance are set, it is time to decide whether you want to hunt in a Discrimination Pattern or in All Metal.

Discrimination Pattern is the term used on the X-TERRA to describe notch discrimination. The X-TERRA offers multiple Pattern options. The number of available Patterns depends on which model you have. Each X-TERRA offers a "factory preset" for the notch segments that are either accepted or rejected. But rest assured that each of the Patterns is easily changed to accept or reject any notch segments you desire. This is done by simply scrolling (+/- pad) to the number representing that specific notch segment, and clicking on the accept/reject pad.

Speaking of notch segments, each model has a different number of these notch segments ("categories") where targets of different conductive and ferrous properties are placed.

12 TARGET IDs
- The X-TERRA 30 and X-TERRA 305 have 12 notch segments with each segment representing a spread of 4 TID digits.

18 TARGET IDs
- The X-TERRA 50 has 18 notch segments, with each segment representing a spread of 3 TID digits.

19 TARGET IDs
- The X-TERRA 505 has 19 notch segments with each segment representing a spread of 3 TID digits.

28 TARGET IDs
- The X-TERRA 70 and X-TERRA 705 have 28 notch segments with each segment representing a spread of 2 TID digits.

See table on next page for X-TERRA 705 Patterns

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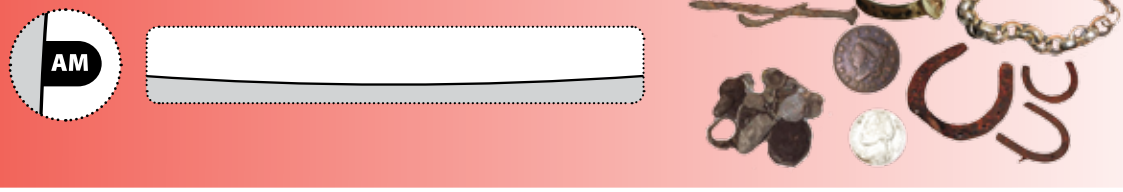
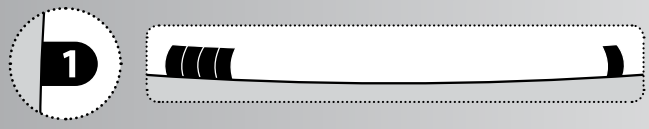
X-TERRA 705 Discrimination Patterns (28 segments)

Examples of accepted targets for each Pattern

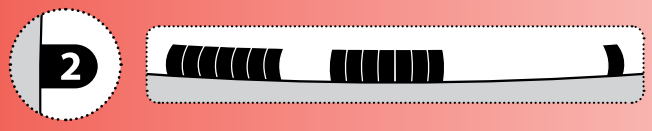
All Metal Pattern



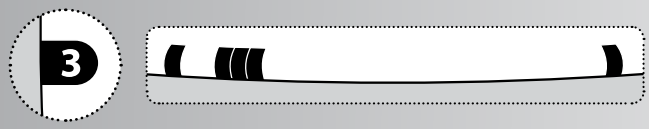
Pattern 1



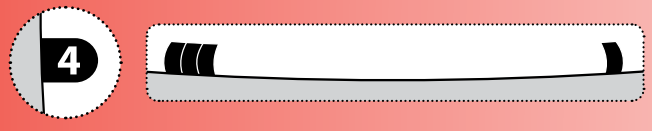
Pattern 2



Pattern 3



Pattern 4



X-TERRA 705 manual p.23

Discrimination Patterns

Definitions !!!

Ferrous:

Ferrous objects/targets contain iron and therefore are attracted to a magnet.

Conductivity:

Conductivity refers to how well a target allows electrical current to flow through it. In other words a highly conductive target has low electrical resistance and therefore allows current to flow more easily. Conversely, a target with low conductivity has high electrical resistance and does not allow current to flow easily.

Ferrous targets are categorized in the negative notch segments. And conductive targets will be found in the positive notch segments.

The term notch segment relates to where the target is placed, in regard to how ferrous or non-ferrous (conductive) it is. Each notch segment on the X-TERRA is preprogrammed to accept targets within a specific range of ferrous and/or conductive properties. Those notches below zero represent ferrous targets. Those notch segments above zero represent non-ferrous (conductive) properties. For example, a U.S. nickel typically provides a Target ID (TID) of 12 on all X-TERRA models.

The TID is the same on all models of X-TERRA because all three detectors have the number 12 represented on their scales (12 is divisible by 2, 3 and 4, representing the number of notch segments on each model). For a U.S. silver three-cent piece, all three detectors will likely register a TID of 24 (again, 24 is divisible by 2, 3 and 4). And silver dimes can register a 36 on each of the models (same thing in that 36 is divisible by 2, 3 and 4).

The thing to remember is that all three models have a maximum and minimum range of conductivity. Again ferrous targets are categorized in the negative notch segments. And conductive targets will be found in the positive notch segments. The difference between the X-TERRA models is the number of notch segments assigned to each model (see page 26).

As I mentioned, the 30 and 305 have 12 of those segments, meaning all targets will be identified as having one of twelve possible TID values. Each of those notch segments represents a four digit range of numbers (counting by 4's) -4, +4, +8, +12, +16, +20, +24, +28, +32, +36, +40, +44.

The 505 has 19 segments, meaning all targets will have one of nineteen possible TID values. Each of the 505 segments represents a three digit range of numbers (counting by 3's) -9, -6, -3, +3, +6, +9, +12, +15, +18, +21, +24, +27, +30, +33, +36, +39, +42, +45, +48 (the X-TERRA 50 is similar, with the exception of not having the +48 notch segment).

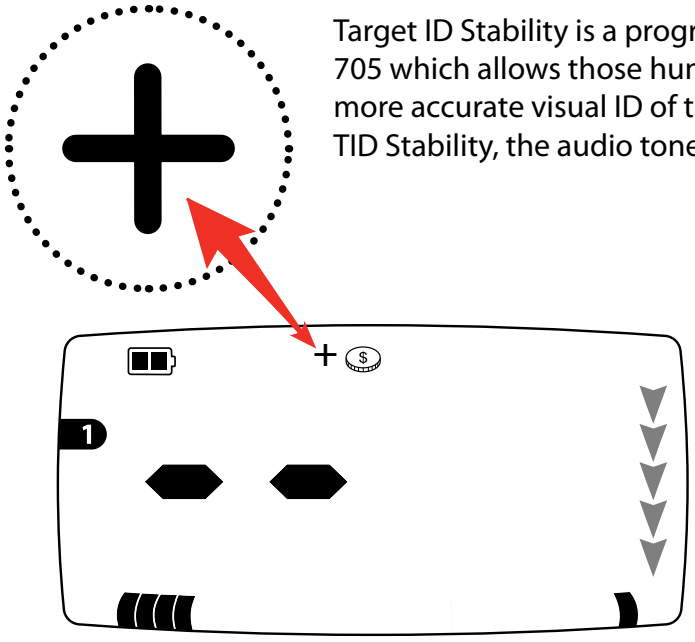
The more notch segments available, the more specific the target identification.

Also, both the 70 and 705, with 28 segments, will put all targets into one of 28 TID segments. Those 28 segments represent two digit notches. (Counting by two's from -8 through +48).

So again, the difference between the three models of the X-TERRA, as far as TID is concerned, is the degree in which they can categorize targets.

The more notch segments available, the more specific the target identification. If a Seated Liberty dime reads a 38 on the 705, what would it read on the 505 or 305? Well, since neither the 305 nor the 505 have a TID of 38 on their scale, it can't read a 38. Since the 305 has four digit notches, (numbers divisible by 4) I'd bet that same dime will read either a 36 or 40 on it (kind of a toss-up since 38 is halfway between 36 and 40). Considering the 505 has three digit notches (numbers divisible by 3), I'd bet this dime will read a 39 on it. It might read a 36. But since it didn't read 36 on the 705, and was "categorized" into the number 38 notch on the 705, I'd bet that this specific Seated dime will come in as a 39 on the 505 (38 is closer to 39 than 36).

Target ID Stability



@ X-TERRA 705 manual p.20

Target ID Stability is a program incorporated into the functionality of the 705 which allows those hunting in highly mineralized soil to choose a more accurate visual ID of the target. However, be aware that when using TID Stability, the audio tone may not match your stabilized TID.

Please see next page for the U.S. coin chart that I have developed for the X-TERRA lineup

X-TERRA TID Chart of U.S. Coins

- These TID numbers were obtained by airtest with coins lying flat.
- Depending on many factors, your in-field results may vary.
- However, as a general rule, your numbers should be within one notch segment.

Pictures of coins I have aquired while detecting

(Coins are not to scale)

TARGET	30 & 305 TID	50 & 505 TID	70 & 705 TID	
U.S. large cent	44	45	44	
Flying Eagle cent	20	21	20,22	
Indian Head cent	24, 28, 32*	24, 27, 30, 33*	24, 28, 30, 32*	
Wheat cent	32, 36	33, 36	34, 36, 38*	

TARGET	30 & 305 TID	50 & 505 TID	70 & 705 TID	
Zinc cent	32	30	32	
Two-cent	40, 44	42	42	
Nickel three-cent	4, 8	6	6	
Silver three-cent	24	24	24	
U.S. nickle	12	9, 12	10, 12	
40% Silver nickle	12, 16	15	12, 14, 16*	

X-TERRA TID Chart of U.S. Coins

TARGET	30 & 305 TID	50 & 505 TID	70 & 705 TID	
Silver half-dime	28, 32	27, 30	30	
Silver dime	36, 40	36, 39	36, 38, 40*	
Clad dime	36	36	36	
Silver quarter	40	42	40, 42	
Clad quarter	40	42	42	
Silver half dollar	44	45	44	

TARGET	30 & 305 TID	50 & 505 TID	70 & 705 TID	
Clad half dollar	44	45	44	
Silver dollar	44	45	46	
$5 Gold	28	27	26	
$10 Gold	32	33	34	Still to find
$20 Gold	36	36	38	Still to find

Some silver coins from the 1900s

* The reason for wide TID variances is due to their metallic composition changing during the years they were minted. Also the change in metallic composition, wear and corrosion (aka patina) also contributes to a wide TID range.

Notch Discrimination on the X-TERRA

Ever wonder what you're missing?

Part one: Friday, September 24, 2010

A guide for U.S. coin-shooters

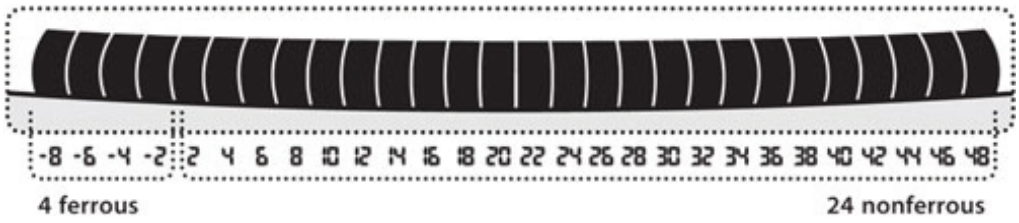
A metal detector does exactly what the name implies. It detects metals. Set to accept everything, you will find nails, foil, pull tabs, jewelry, coins, tokens, relics etc. Anything that is metal. In order to avoid digging those targets you don't want to dig, we implement a feature known as discrimination. Metal detector discrimination is basically the same for all makes and models. Some may do it better than others, but the theory is universal. Simply put, discrimination is the ability to adjust your detector so that it accepts most of the targets you want to dig and rejects most of those targets you don't want to dig.

Some detector models use a variable discrimination (such as Minelab's Sovereign GT). When you set a variable discriminator (potentiometer) to reject a certain item, every item with a lower conductivity value will also be rejected. For example, if you set your detector to reject a certain pull tab with variable discrimination, you will also be rejecting U.S. nickels.

Discrimination control on the Soverign GT

Discrimination on the X-TERRA is comprised of notch segments. Notch discrimination allows the user to accept or reject specific ranges of targets, based on their conductivity. You can reject individual notch segments, groups of notches or randomly select those segments you want to reject. With notch discrimination, you can chose to reject the notch representing pull tabs, and set the notch representing nickels to be accepted. For many, notch discrimination allows you to cherry pick a site more thoroughly than variable discrimination. But don't think for a minute that you are not missing "goodies" with either type of discrimination.

For the sake of discussion, I will make reference to the Target Identification (TID) scale of the X-TERRA 70 and 705. I will also be using the factory values of Pattern 2, to demonstrate my thoughts. Although the X-TERRA 30, 305, 50 and 505 are similar, the notch segments do have a slightly different value. So, if you are using the X-TERRA 30, 305, 50 or 505, adjust the numbers I'm going to provide, to match your notch segments and TID scale.



Discrimination scale on the X-TERRA 705

The X-TERRA 70 and 705 have 28 pre-determined notch segments. Each notch segment is represented by an even number ranging from a low of -8, to a high of +48. These numbers represent the conductive properties of your targets. The lowest number, -8, represents the least conductive (most ferrous) targets you will encounter. In turn, the highest number, +48, represents the most conductive targets (least ferrous) that you will encounter. Ferrous targets are those targets with high levels of iron. Large, deeply buried ferrous targets can (and will) occasionally provide a target response similar to a highly conductive target. I've found, by implementing the multiple tone mode on my X-TERRA, and slowly dragging the coil away from the target while X-ing over it, I am able to hear changing harmonic tones (and bouncing TID numbers) as the target leaves the field of detection. If you are using a single tone for all ferrous targets, -8, -6, -4 and -2 will sound the same, making the identification of those deep ferrous targets difficult to differentiate.

In Part Two, I'll provide examples of gold and silver targets you may be walking over, by using too much discrimination.

Randy Horton (Digger)
You'll never know for sure... unless you dig it!

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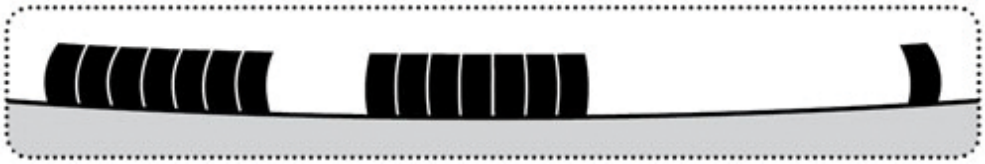
Notch Discrimination on the X-TERRA

Ever wonder what you're missing?

Part two: Wednesday, October 06, 2010

Now that I've outlined how the ferrous vs. conductive properties are represented by the visual and audio TID, let's evaluate some targets. If you turn your X-TERRA 70 or 705 to the Coin/Treasure Mode, and set it to hunt in factory preset Pattern 2, you will be rejecting notch segments -8, -6, -4, -2, +2, +4, +6, +14, +16, +18, +20, +22, +24, +26 and +48. You will be accepting notch segments 8, 10, 12, 28, 30, 32, 34, 36, 38, 40, 42, 44 and 46. Those of you who have performed TID tests with your X-TERRA know that this setting will accept U.S. pennies, nickels, dimes, quarters, half dollars and dollar coins. A Coin hunters dream? Not necessarily. Although repeated tests indicate that modern U.S. coins will TID within the ranges set by Pattern 2, there are many variables that can affect the TID information provided to the user. Some of these variables include coins on edge, adjacent trash that distorts the information sent to the processor, multiple coins in close proximity, target depth, soil conditions, ground balance settings etc. There are simply too many variables to guarantee that one TID number will always represent a specific target for every site.

Coins wear thin; jewelry can be of many different metallic compositions, shapes and sizes. And, the mineralization of the site can fluctuate dramatically. Hopefully, what I am about to share with you will help you find more treasures. You will likely have to dig more trash while finding it. But if you understand what your discrimination setting is doing for you (or to you), you're bound to find more good stuff!



X-TERRA 705 Pattern 2

To get a better idea of what you might be passing over as trash, let's check out the conductive properties of various items some might "skip over" while detecting. Again, these numbers are based on the X-TERRA 70 and 705 TID, using the parameters of factory preset Pattern 2. Remember, as I mentioned above, TID numbers are not cast in stone.

If you are passing over targets represented by the X-TERRA 70 and the 705 with a numeric TID of +2, +4 and +6, you risk missing rose gold rings, platinum rings, white gold rings and some foreign coins.

If you are passing over targets represented with a TID of +6, +8 and +10, you risk missing more white gold rings, more platinum rings, thin yellow gold rings, lead and brass shells and the U.S. nickel three-cent piece.

If you set your detector to reject TID numbers +14 and +16, you will risk missing very thin silver coins, the $1.00 U.S. Gold coin, thin yellow gold rings, Shield nickels, Liberty V nickels, 40% silver War nickels, many wedding bands, 10kt class rings, tokens and more foreign coins.

If you set your notches to reject +16, +18 and +20, you will risk missing gold rings, tokens, various gold jewelry, 14kt rings, brass, the U.S. $2.50 gold piece, Indian Head cents, Flying Eagle cents, more foreign coins and even large 10kt class rings.

If you rejected notch segments +20, +22, +24 and +26, you risk missing more Indian Head pennies, the U.S. silver three-cent piece, the U.S. $5 Gold piece, large gold rings, small silver pieces, gold jewelry and medallions, and still more old tokens.

So there you have it. A few of the items that some of you might be passing over, in an attempt to not dig foil, pull tabs and other "trash" items. I realize that each of us has our own preferences for setting the discrimination on our detectors. I suppose you could say we are all creatures of habit. But the next time you hit that old park or picnic ground, you might want to ask yourself if you're rejecting notch segments that include targets that you wouldn't mind digging.

Enjoy the Hunt!

Randy Horton (Digger)
You'll never know for sure... unless you dig it!

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Audio Tones

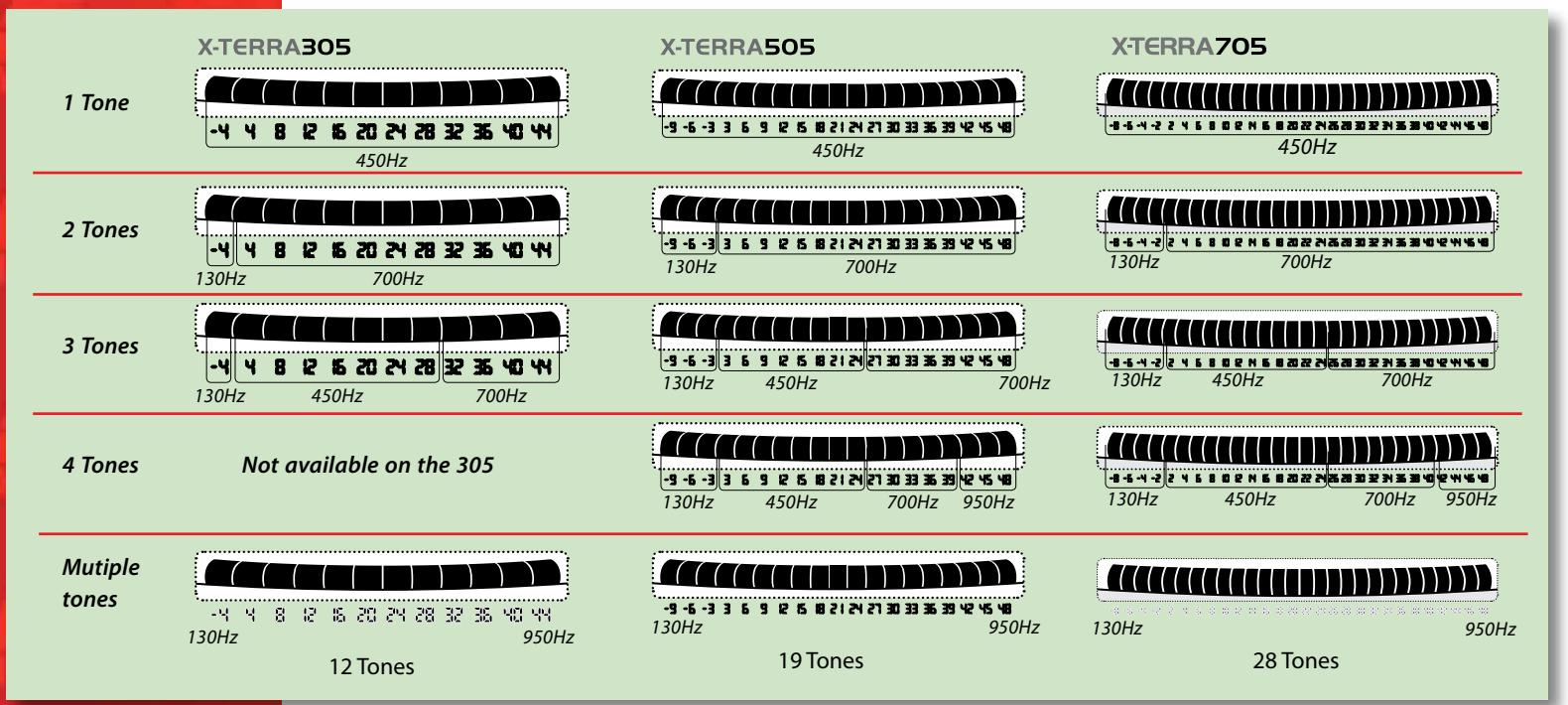
If I can determine the ferrous or conductive property values of a particular target, simply by hearing a tone... I maximize my hunt time by not having to glance down and look at the display.

The next setting to analyze is the number of tones you want to hear. This is simply a matter of preference. And depending on the X-TERRA model you are using, the number of available tones varies.

The 305 offers the flexibility to hunt with one tone, two tones, three tones or multiple (12) tones. The 505 and 705 each offer one tone, two tones, three tones, four tones or multiple (19 & 28 respectively) tones. One tone means that all accepted targets will produce the same tone. Two tones break all targets into one of two tone groups; three tones break all the targets into one of three tone groups; four tones puts each target into one of four tones. And in the multiple tones, each notch segment will produce a separate tone.

Some folks like to dig when their detector beeps, and don't care what sound it makes. Just as long as it makes one. And there are those, such as myself, who enjoy coin hunting "by ear". If I can determine the ferrous or conductive property values of a particular target, simply by hearing a tone assigned to the notch segment that target is associated with, I maximize my hunt time by not having to glance down and look at the display.

The number of TID tones are shown in this chart.



Again, the number of tones you set for your X-TERRA is simply a matter of personal preference. If you chose single tone, all targets will provide an audio report at 450 Hz. Regardless of whether you chose two tones, three tones or four tones, targets with a negative TID (ferrous targets) will produce an audio report of 130 Hz. With the exception of the single tone setting, once you get into the positive side of the notch segments, the pitch of the audio response will increase as the conductivity value of the target increases.

The tone assigned to each target value will vary by the model of your detector, due to each model having a different number of notch segments. Therefore, check your Instruction Manual for the specifics of your detector. On a side note... although Minelab display the multiple tones as 99, there aren't 99 tones. There is actually one tone for each notch segment, as shown in the chart on page 38.

My first 1877 Indian Head cent found November 11, 2009

Second 1877 Indian Head cent found July 14th, 2010

The 1877 Indian Head cent is the most treasured of all Indian cents. I have had the good fortune of finding three of these rare coins. All found with Minelabs and all found within a 12 month period of time.

Third 1877 Indian Head cent found November 1st, 2010

Hunting by ear...

Audio tones on the X-TERRA

Monday, December 06, 2010

With "old" being a relative term, I hunt for old coins at old sites. The part of the world that I live in wasn't settled until the mid 1850's. So finding coins older than 1900 is considered to be a good hunt.

Many of my favorite spots to detect are old homesteads and farm sites. With the houses and out buildings long gone, to the passerby, most of these places look like any other corn field in this part of the country.

Pieces of brick, stone, glass and pottery are some of the things that I look for when wandering across these corn fields. And when I start hearing the low tones produced by nails and other "farm trash", I know I'm getting close to where I want to be. Unfortunately, even though these pieces of deeply buried iron are a good indicator of where the buildings once stood, their occasional "wrap around" high tones can cause a lot frustration. I'd venture to say that there isn't one among us who hasn't dug a piece of deeply buried iron or an old rusty nail, expecting it to be a coin.

Now, I'm not going to tell you that the method I use to help eliminate these targets will keep you from digging all of them. But I will tell you that the X-TERRA has the ability to identify most of these "trashy" targets, even when providing an initial "keeper" tone. It's just a matter of properly setting up your X-TERRA, knowing how to work the coil and listening to what the detector is telling you. And it is for those "wrap around" targets that I have written this short article.

This process is fairly simple… but to implement it, your X-TERRA must be capable of operating in the Multiple Tone mode (X-TERRA 305, X-TERRA 505, X-TERRA 70, or X-TERRA 705). And you must be using zero discrimination (or All Metal mode). Although I've found that the 9-inch Concentric coil at 3kHz provides the most easily distinguishable low tones on deeply buried iron, all of the coils will do it to a certain degree.

When you first get the "hit" on what sounds like a good target, slowly "X" over the target from several directions. Much of the deep iron will produce broken or choppy signals when working your coil around the target. If the audio response locks on a high tone, make a mental note as to where the strongest target signal is coming from so you can center the target under the coil. Once you get the target centered under the coil, continue wiggling the coil back and forth over the target while slowly working the coil closer toward you. As the target leaves the front edge of the field of detection, listen even more intently to the tones. If the audio tone is high and drops off suddenly, get out your digging tool and retrieve your coin.

If the audio tone starts out high, then transforms into a blended harmonic of low tones when the target leaves the detection field, I'd bet the ranch that it is going to be a piece of iron.

By design, the Double-D coil will not lose the target signal until the target "slips past" the front tip of the coil. Whereas the concentric coils may lose the audio signal prior to passing under the front edge of the coil, depending on the depth of the target.

Regardless of which coil is your coil of choice, make sure you center the target under the coil before working the coil toward you. And remember, for this method to work effectively, you must have all notches set to accept. Rejected notches create target blanking and audio tones will not be provided for those notch segments. And since all ferrous targets produce the same sound in anything less than multiple tone mode, you wouldn't hear harmonic (blended) low tones if you are using one, two, three or four tone modes either. You must use multiple tone audio mode with zero discrimination for this procedure to work properly.

Next time you're out hunting a site where deeply buried iron is giving you the "wrap around effect", give this procedure a try. If you hunt the kind of places I hunt, you'll find using this procedure will result in your digging a lot less iron.

Randy Horton (Digger)
You'll never know for sure... unless you dig it!

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MINELAB

Coils...

Coil Options

The X-TERRA is a unique detector in that it can literally switch operational frequencies by simply changing to a different frequency coil.

The X-TERRA range is a unique series of metal detectors in that they can literally switch operational frequencies by simply changing to a different frequency coil. In the previous model series, the X-TERRA 30 was capable of using the 7.5 kHz coils. The X-TERRA 50 could utilize either the 7.5 kHz or the 18.75 kHz coils. And the X-TERRA 70 could utilize the 7.5 kHz, 18.75 kHz or the 3 kHz coils. The newer released 305 can utilize the 7.5 kHz or the 18.75 kHz coils. And both the 505 and 705 can use all three frequencies.

Currently there are eight coils available for the X-TERRA. Five are waterproof and three are water resistant.

Water resistant: May be splashed, washed, used in drizzling rain, or moved through wet grass. Must not be submersed under water.

Waterproof: Submersible to one meter. Ideal for shallow water wading and gold prospecting in shallow streams .

From Minelab's Coil Selection Guide

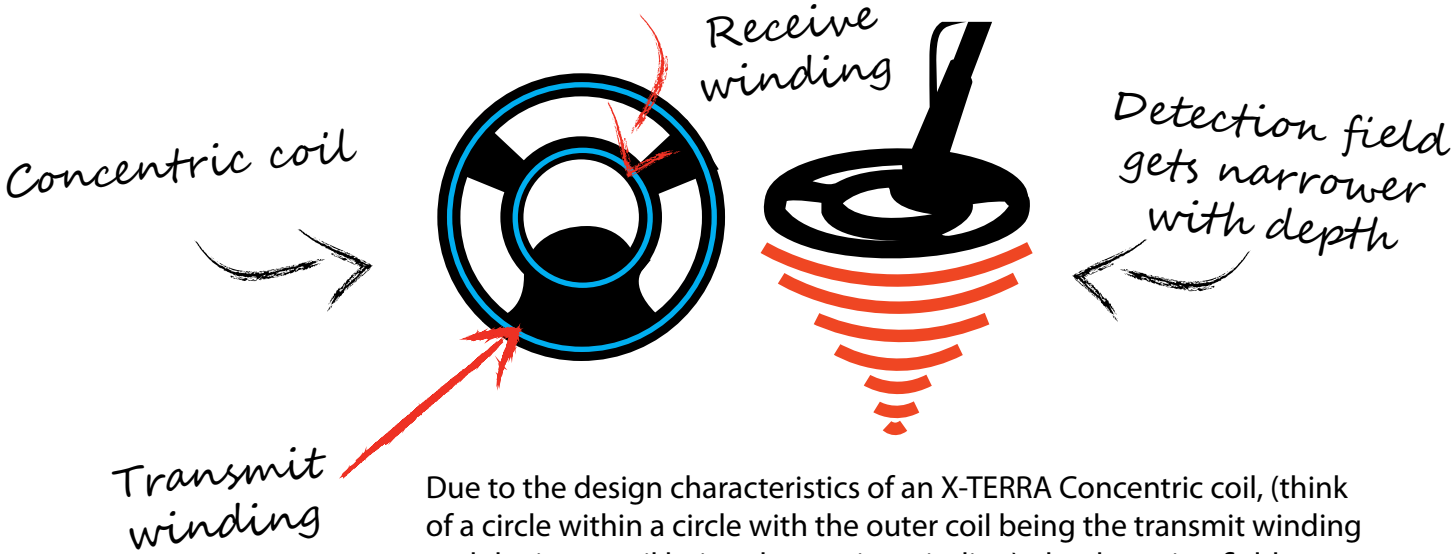
- The stock coil (except for the 705 Gold Pack) is a waterproof 9-inch Concentric, at 7.5 kHz. Also available in the waterproof 9-inch Concentric is a high frequency 18.75 kHz and low frequency 3 kHz.
- There are two waterproof 6-inch coils available. A small Concentric at 7.5 kHz and a small Double-D at 18.75 kHz.
- The stock coil in the 705 Gold Pack, is the 18.75 kHz water resistant elliptical Double-D, measuring 5" x 10".
- And there are two water resistant 10.5-inch Double-D coils. One at 7.5 kHz and the other at 18.75 kHz.

A Concentric coil will hunt deeper than a comparably sized Double-D coil, in moderately mineralized soil.

In a nutshell, larger coils will detect larger targets deeper than a smaller coil, but smaller coils are more sensitive to small objects. Higher frequencies are better suited for lower conductive targets, such as gold. And lower frequencies are better suited for higher conductive targets such as silver and copper. A Concentric coil will hunt deeper than a comparably sized Double-D coil, in moderately mineralized soil. But due to the design characteristics, Double-D coils are the best application for highly mineralized soil. And, a Double-D coil separates targets better than a comparably sized Concentric.

X-TERRA coils comparison table

	Freq.	Type	Size	Small targets	Medium targets	Large/deep targets	Best pinpointing	Best ground coverage	Waterproof	Water resistant
(not compatible with X-TERRA 305)	3 kHz	Concentric	9″	★	★★	★★★	★★	★★	✔	
	7.5 kHz	Concentric	9″	★★	★★	★★	★★	★★	✔	
	18.75 kHz	Concentric	9″	★★★	★★	★	★★	★★	✔	
	7.5 kHz	Double-D	10.5″	★★	★★	★★	★	★★★		✔
	18.75 kHz	Double-D	10.5″	★★★	★★	★	★	★★★		✔
	18.75 kHz	Double-D	10″ x 5″	★★★★	★★	★	★	★★★		✔
	7.5 kHz	Concentric	6″	★★	★★	★	★★★	★	✔	
	18.75 kHz	Double-D	6″	★★★★	★★	★	★★★	★	✔	



Due to the design characteristics of an X-TERRA Concentric coil, (think of a circle within a circle with the outer coil being the transmit winding and the inner coil being the receive winding), the detection field near the surface is much broader than the Double-D coil. However, as the detection field of a Concentric coil penetrates the earth, it narrows from all directions. Because of this, I try to overlap my sweeps by at least a half when using a Concentric coil.

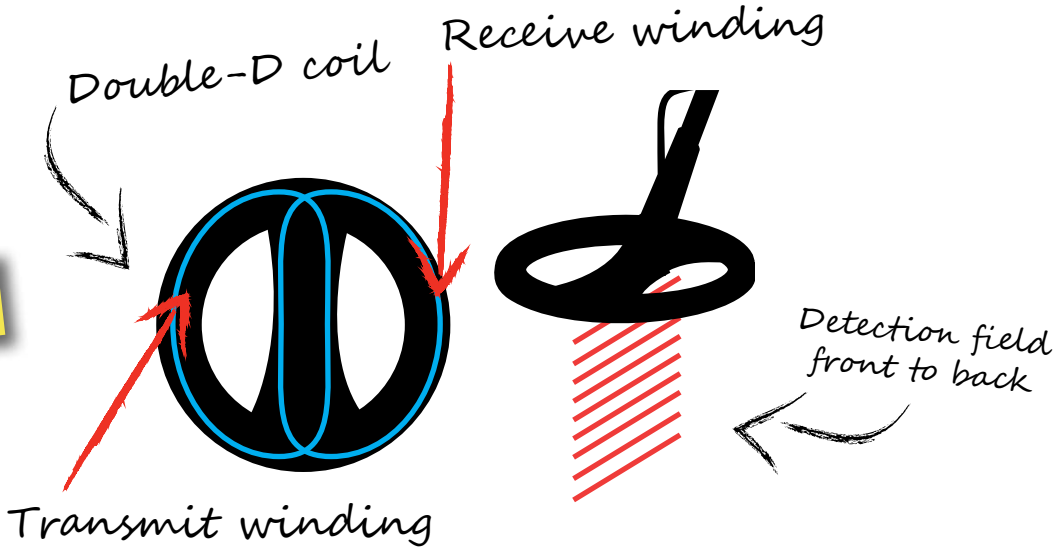
Coil Options

6'' Concentric

10 x 5'' Double-D

9'' Concentric

10.5'' Round Double-D



With the Double-D coil, one "D" is the transmit wire winding and the other "D" is the receive wire winding. This is easier to understand when you think of the coil as being two capital letter D's, with the right side facing properly and the left side reversed. The detection field on a Double-D coil is down the center of the coil, front tip to back tip, at a fairly consistent depth. This detection field does not diminish in the same regard as the Concentric coils. But all coil designs have a diminishing detection field, the farther they penetrate into the earth.

Even though the detection field of the Double-D doesn't diminish as quickly as the Concentric coil, I still like to overlap the swaths on a Double-D coil by at least 1/3. Now, with all that said, let me reiterate that ALL X-TERRA coils are capable of finding ALL metals. Some just do it better than others. It all depends on the site you are hunting and the targets you are looking for.

...ALL X-TERRA coils are capable of finding ALL metals.

Coil Applications

Here are some of the applications I use each specific coil for:

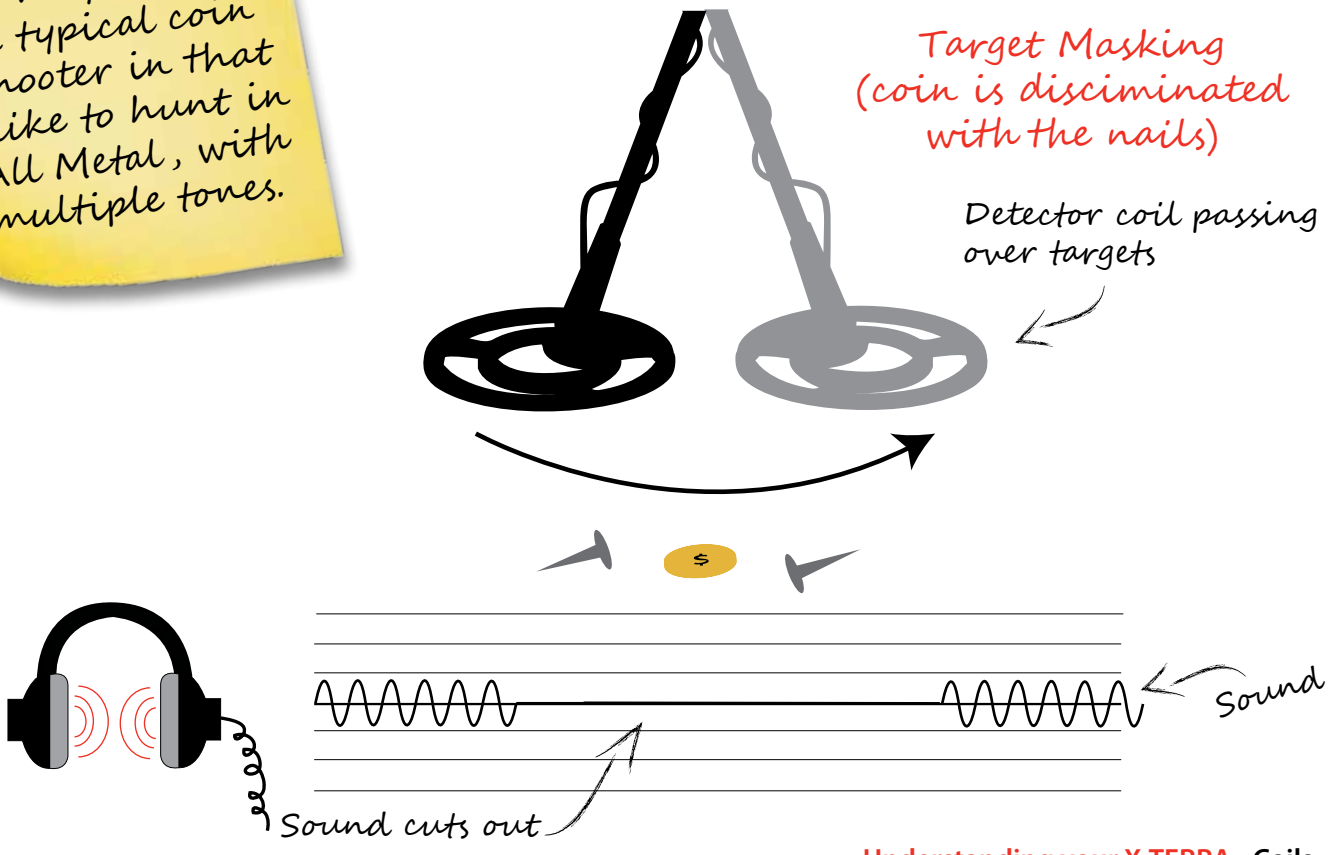
9-Inch 7.5 kHz Concentric Coil

9'' Concentric

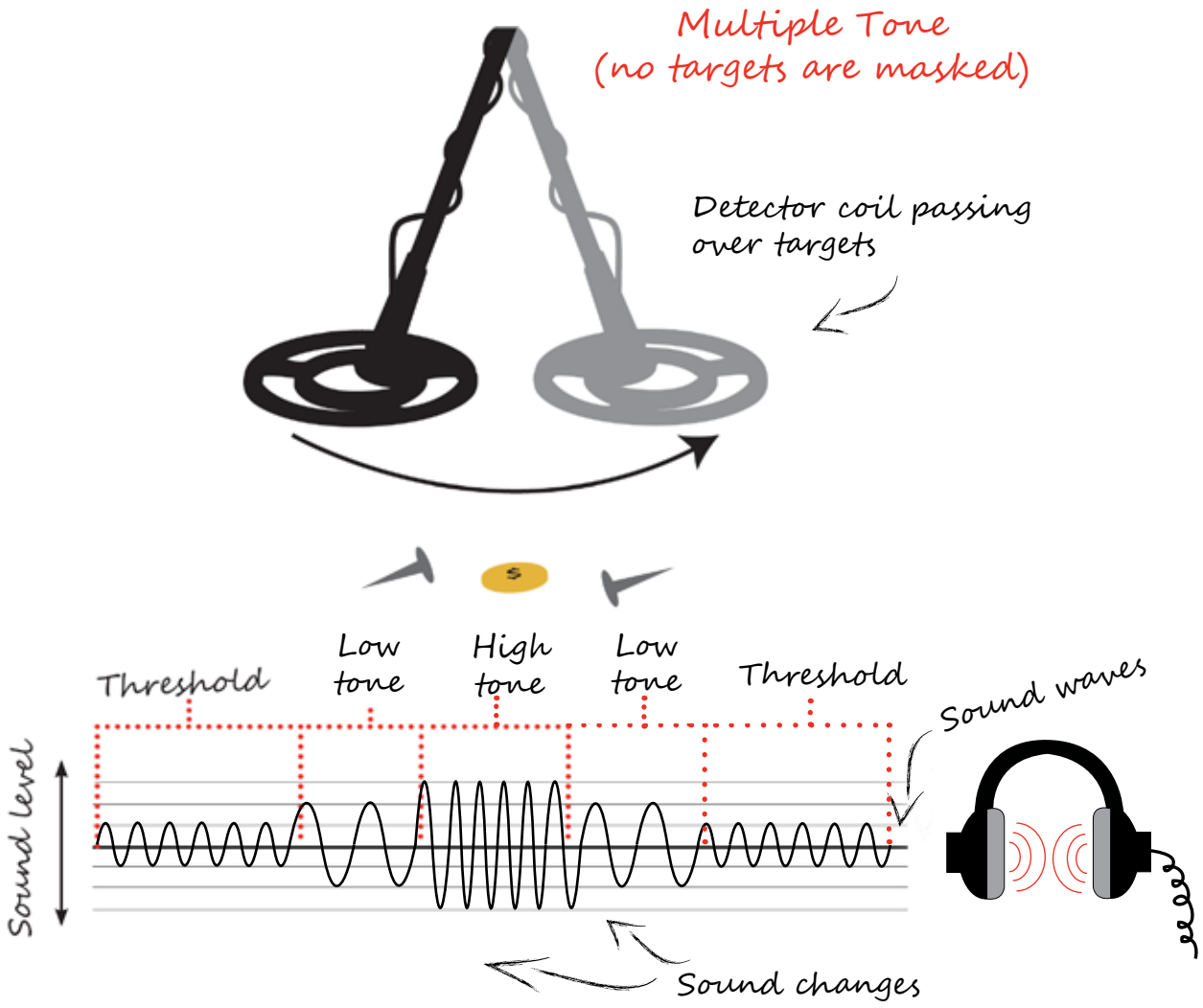
The stock 9-inch 7.5 kHz Concentric coil is an excellent "all-around" coil. It is good for coin shooting, relic hunting and general detecting. It offers excellent depth in moderately mineralized soils. And, it provides excellent target response on targets of all conductive levels. So, if you've only got the 9-inch Concentric at 7.5 kHz, don't feel you have to run out and buy more coils. However, I believe the 9-inch Concentric coil at 3 kHz provides more audio information for the types of targets I hunt, and the places I hunt them.

I may not be a typical coin shooter in that I like to hunt in All Metal, with multiple tones. Actually, I usually hunt in a Discrimination Pattern without any notch segments rejected, as in zero-discrimination. I didn't always hunt like this. But I have proven to myself that I was missing targets by not hearing everything that passed under the coil. For example, if I am running a Discrimination Pattern that rejects ferrous targets, the detector will blank out every time the coil passes over one of them. Then if there happens to be a coin laying between two nails, I am more likely to miss it (target masking) when the Threshold blanks out on both nails, as opposed to the Threshold being replaced by the low tone of a nail, followed by the high tone of the coin, followed by another low tone nail.

I may not be a typical coin shooter in that I like to hunt in All Metal, with multiple tones.



Coil Applications



Part of missing target audio response can be due to a fairly fast sweep. But I am able to maintain a fairly quick sweep speed in All Metal (zero-discrimination), multiple tone, and remain confident I am hearing everything under the coil. When the Threshold blanks out in a Discrimination Pattern, I don't have any idea how many rejected targets I'm passing over. That is because the Threshold is replaced by silence while those rejected targets are still within detection range. In All Metal, multiple tone, the Threshold goes away. But instead of silence on rejected targets, I hear a tone for everything. Again, this is another one of those "personal preference" settings. Back to the coils...

9-Inch 3 kHz Concentric Coil

As I said, I like the 9-Inch 3 kHz Concentric coil. Not only because it is theoretically better with higher conductive silver and copper. But being better suited for higher conductive targets results in it being not as well suited for lower conductive targets (like deep iron).

I hunt a lot of old farmsteads. As such, many of them are littered with broken pieces of implements and rusty nails from fences and barns. Simply put, I find these ferrous targets produce a very distinct audio response that is more easily distinguished by my using the 3 kHz coil. When I get an "iffy" target, I simply sweep back and forth over it, while dragging the coil back toward my feet. As the target leaves the detection field, if it produces multiple low audio tones, you can bet it is not a coin.

Old house foundations

If I were in a Discrimination Pattern, with specific notches rejected, the detector could "blank" over all of them. And even if I were hunting with all notches accepted or All Metal, using anything less than Multiple Tones will result in the detector only producing the same "one tone" for all the ferrous targets.

For example, if the TID on a piece of iron bounces between -6 and -8 in multiple tone, I will hear one tone when the -6 registers and a different tone when the -8 registers. If in one tone, two tones, three tones or four tones, all ferrous targets provide the same audio tone. As such, I wouldn't be able to hear the different pitches of tones or a "blending of multiple tones" that I do with the multiple tones.

This could result in my not being able to identify the target as iron until I dig it up. These pitch differentiations are best heard with the 3 kHz coil, because the properties of ferrous targets are more easily identified at lower frequencies. As the detector's frequency increases, it becomes more difficult to identify those ferrous properties. By combining the 3 kHz coil with target sizing and other techniques I've learned, I'm able to effectively eliminate most of the deep iron from my hunts.

Coil Applications

9'' Concentric

9-Inch 18.75 kHz Concentric Coil

The 9-inch Concentric at 18.75 kHz is a bit more sensitive to the ground than the other two 9-inch Concentric coils. As such, I've discovered that I have to lower my Sensitivity setting to keep it stable. As well, I find that it is more sensitive to lower conductive targets. That is a good thing for small gold jewelry. But aluminum can slaw ("can slaw" is a term I use for those shreds of aluminum cans, after being hit by a lawn mower) also falls into that category . For the types of places I hunt, I prefer the two lower frequencies of the 9-inch Concentric coils. With that said, if I lived near a beach, I would be using the higher frequency coil as it is very sensitive to gold jewelry.

5 x 10'' Double-D Eliptical

5 x 10-Inch Double-D Coil

The 5 x 10-inch Double-D elliptical at 18.75 kHz is a good coil for beach hunters and prospectors. But I don't live near the water, don't nugget hunt and have moderately mineralized soil conditions. I have used the elliptical several times in picked corn fields and it does allow me to maneuver between the downed stalks with more ease than the Concentric coil, due to the solid bottom of the elliptical compared to the Concentric coil's open web design. But I don't find it has the depth of the Concentric coils in my neck of the woods, due to the Double-D design. And I don't find that the depth of detection is any better than the 6-inch Double-D at 18.75 kHz. Depending on your application, your results may vary!

10.5 " Double-D

10.5-Inch Double-D Coil

Both of the 10.5-inch Double-D coils are excellent choices for those who want to cover a lot of ground and maximize their depth of detection in highly mineralized sites. Coin hunters who are searching for those old silver and copper coins will appreciate the stability of the 7.5 kHz version. Beach hunters will find the 18.75 kHz to be more sensitive to jewelry and small targets than the 7.5 kHz version of this coil. Relic hunters should do well with either frequency. However, I've visited with some relic hunters who swear by the higher frequency coil for old buttons and lead. But again, in my neck of the woods, with moderately mineralized soil, the depth of the larger Double-D coils does not exceed that of the 9-inch Concentric coils.

I keep mentioning my moderately (magnetic) mineralized soil. Let me explain how I determine whether or not I need to hook up a Double-D coil... Keep in mind this is by no means scientific. Just something I've come up with having used all the coils extensively. If I am able to properly ground balance a 9-inch Concentric coil with a ground phase number of 28 or larger, I am confident the Concentric coil will hunt as deep or deeper, operate with more stability, and identify targets better, than a comparable sized Double-D coil.

If, however, when I properly ground balance the Concentric coil and the ground phase number is less than 28, I find the Double-D coil will hunt deeper and provide a more stable operation. The TID when using a Double-D coil is not as accurate as with a Concentric coil. Especially on the more deeply buried targets. But the Double-D design allows for more coverage per sweep than the Concentric coil, allowing me to cover more area in a given period of time.

The biggest "down-side" for me is the weight of the 10.5-inch coils. I'm not as young and athletic as I use to be. As such, the weight and balance of these coils is not conducive to a long day of detecting. I've tried several aftermarket apparatus, with mixed results. But by mid-day, I'll usually resort back to one of the 9-inch Concentric coils or the even smaller 6-inch coils, depending on the site.

6 " Concentric

6-Inch Concentric Coil

As I mentioned, the 6-inch coils come in both Concentric and Double-D versions. The 6-inch Concentric is a 7.5 kHz coil and is extremely hot. In fact, when I was field testing these coils, I commented to Minelab that I thought this one was too hot. The reason I want a small coil is not for extreme depth. It is for target separation in trashy areas. And the 6-inch Concentric coil just didn't let me isolate targets as sharply as I would have liked. But for working in around weeds and stubble in harvested fields, it is an excellent choice.

6 " Double-D

6-Inch Double-D Coil

Fortunately, for extreme target separation, Minelab also produces a 6-inch Double-D coil for the X-TERRA. I can't stress enough that this small Double-D coil is an excellent tool for a serious coin shooter. Surprisingly deep, excellent separation and extremely sensitive to small targets. I've found mine to be a silver dime and Indian Head cent killer.

Handful of Indian Head cents

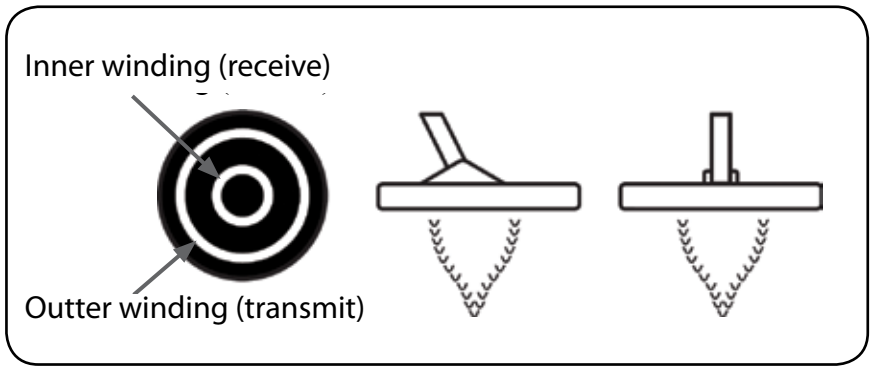
X-TERRA...

Controlling the search coil

Tuesday, January 04, 2011

When it comes to sweep speed, the X-TERRA is a very forgiving detector. You can operate with a relatively quick sweep in wide open areas, and slow down when targets are abundant. But to gain a better understanding of how sweep technique may affect the quantity of our finds, let's first analyze the field of detection for both the X-TERRA Concentric coils and the Double-D coils.

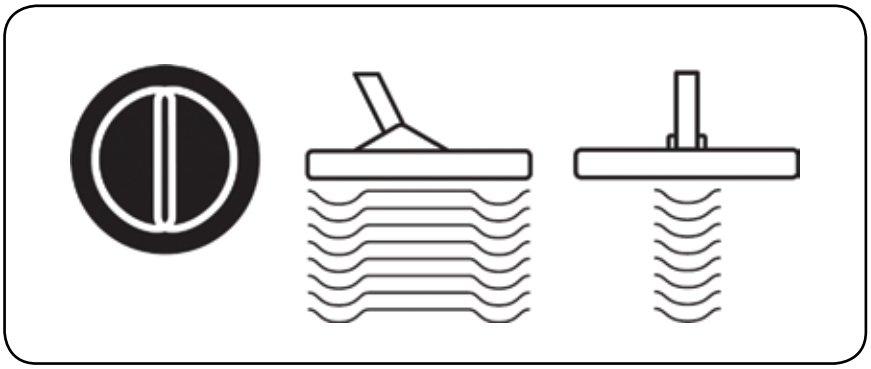
Based on my field analysis, with the center of the coil as the "hot spot", I find the field of detection for a Concentric coil will go "straight down" until you reach approximately 55 - 60% of the maximum depth for a specific target. In other words, if you are capable of detecting a target at maximum of 10 inches, you will find the circular field of detection begins to narrow at the 5.5 to 6 inch depth level (see Concentric diagram). The deeper the target, the more closely centered (under the coil) it must be, to provide a target response. As such, if you are not overlapping your Concentric coil by half the width of the coil, you risk missing those deeper targets that are not directly centered under the coil as you pass over them. By overlapping your swath by half the width of the coil, you've increased the field of detection "coverage" at any given point, maximizing the opportunity for a solid target response.



Concentric coil

Double-D coils are designed to help neutralize the effects of mineralization. Part of those design characteristics place the "hot spot" of the coil directly down the center, from the front tip to the rear heel. Don't be misled into thinking that the field of detection goes straight down, from front to back, until the maximum depth is achieved.

Although not to the degree of Concentric coils, I've found the field of detection from a Double-D coil also gets "more narrow" (front to back) as target depth increases (see Double-D diagram). To ensure that you are not missing those deeper targets, I recommend overlapping the swath of a Double-D coil by third. Again, this allows you to maintain a maximum field of detection during your hunt.



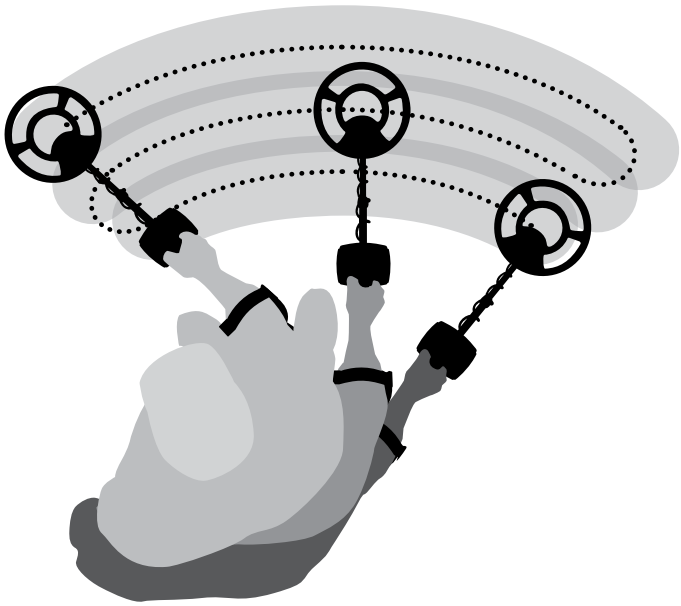
Double-D coil

As to sweep speed… the majority of us have a tendency to sweep more quickly over a wide-open, smooth surface than when working the coil in and around vegetation. Another thing I've noticed is that, when walking uphill or downhill, our swaths don't get overlapped as consistently as when we are walking on flat ground. It's almost as if our arm feels compelled to keep up with our feet in both speed and distance covered! Regardless of whether you are in a field or on a beach, walking uphill, downhill or on level ground, I encourage you to maintain a consistent, even sweep when you work the coil. If you notice that your X-TERRA is chirping as you sweep the coil, and your X-TERRA has been properly set up, you are likely sweeping too quickly.

When that happens, the first instinct of many would be to adjust the Threshold, lower the Sensitivity or set the ground phase a bit more negative. If they were set properly for the site, don't change them. Instead of overcompensating with electronic adjustments, simply slow down your sweep speed and concentrate on working the coil.

By maintaining the proper electronic settings and modifying your sweep speed, you'll find those deep and partially masked targets that others have missed.

If your X-TERRA makes false signals when you change the direction of your sweep, you're probably tipping the edge of your coil. Again, slow down the sweep speed and keep the bottom of the coil parallel to the surface of the ground at all times. As I near the end of each sweep, I'll make a wide, deliberate turn with the coil, to maintain my rhythm. This not only reduces the chance of me tipping the edge of the coil, but allows me to line up with the proper "overlap" for the return sweep (see sweep path diagram).



Each of us have different detecting styles and hunting techniques. Being 6 feet tall, the width of my typical sweep is around 42 inches. Yours may vary, dependent on your stature and physical ability. Regardless, my recommendation is to sweep comfortably, without over-reaching and without lifting the coil from the surface of the ground. When I'm searching an old homestead site, I'll usually begin my hunt with my 3kHz Concentric coil and pace myself at 2 - 2.5 seconds for each swath.

When I get into an abundance of targets, indicating I've reached an area with past activity, I'll switch to the 6-inch Double-D for superior target separation and slow my pace, according to the number of targets per sweep. A fast sweep speed in an area with multiple targets can be overwhelming (and under-achieving).

I've hunted some areas that were so nail infested, proper target separation required a sweep speed of no more than 6 inches per second. As someone who hunts "by ear", using multiple tones and minimal discrimination, I find the slower sweep speed allows me to process the audio response of every single target. And by using a controlled sweep, I am able to maximize my hunt time by minimizing the number of false signals.

Randy Horton (Digger)
You'll never know for sure... unless you dig it!

www.minelab.com/treasure-talk

Did you know that Minelab has a Treasure Talk blog?

Minelab has handpicked its most knowledgeable staff and detectorists to present regular metal detecting blog posts on topics close to their heart. They would like you to join in and make it a conversation.

I am one of the many detectorists regulary contributing to the Treasure Talk blog.
To read more visit **www.minelab.com/treasure-talk**

There are new posts every week!

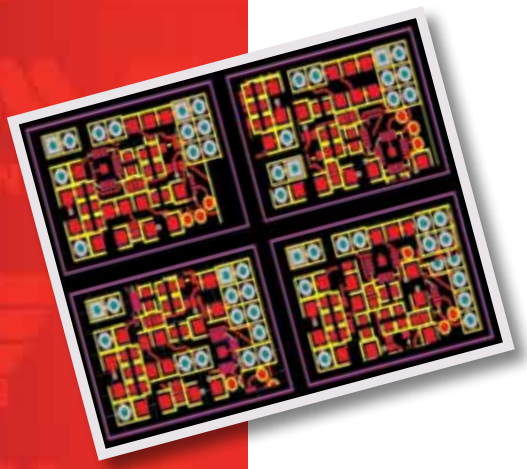
Coil Design & Manufacture

How to design and manufacture an X-TERRA coil

You may think that a coil is just a bunch of wires in a plastic housing, but it is actually a complex and critical component of the overall X-TERRA detection system. Here are some of the details straight from the guys at Minelab about how a coil gets designed and built.

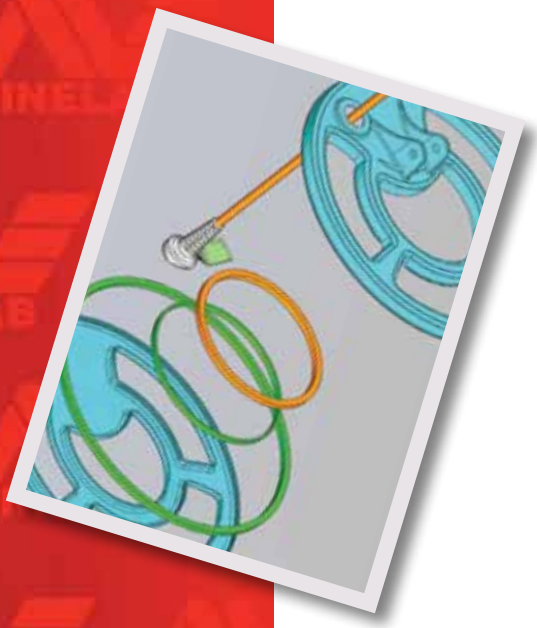
Coil Design

Coil design is a long and complex task that requires many steps to ensure the coil will continue to work correctly for many years. These steps are generally divided into two main teams that initially work independently and then combine their skills to finalize the product. The teams are the electronics designers and the mechanical designers.



Electronic design process includes:

- Calculating and modeling electromagnetic fields
- Designing specifications for wire size, type and number of turns
- Manufacturing prototype templates for windings
- Manufacturing prototype windings and soldering to cable
- Constructing a prototype search coil by attaching windings to the template
- Testing, calibrating and programming the microcontroller with initial software parameters
- Measuring and refining the software parameters for the microcontroller



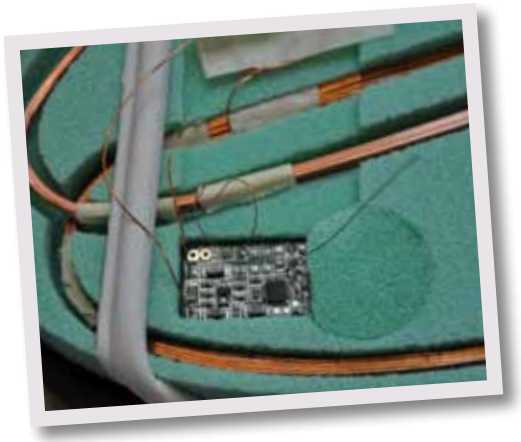
Mechanical design process includes:

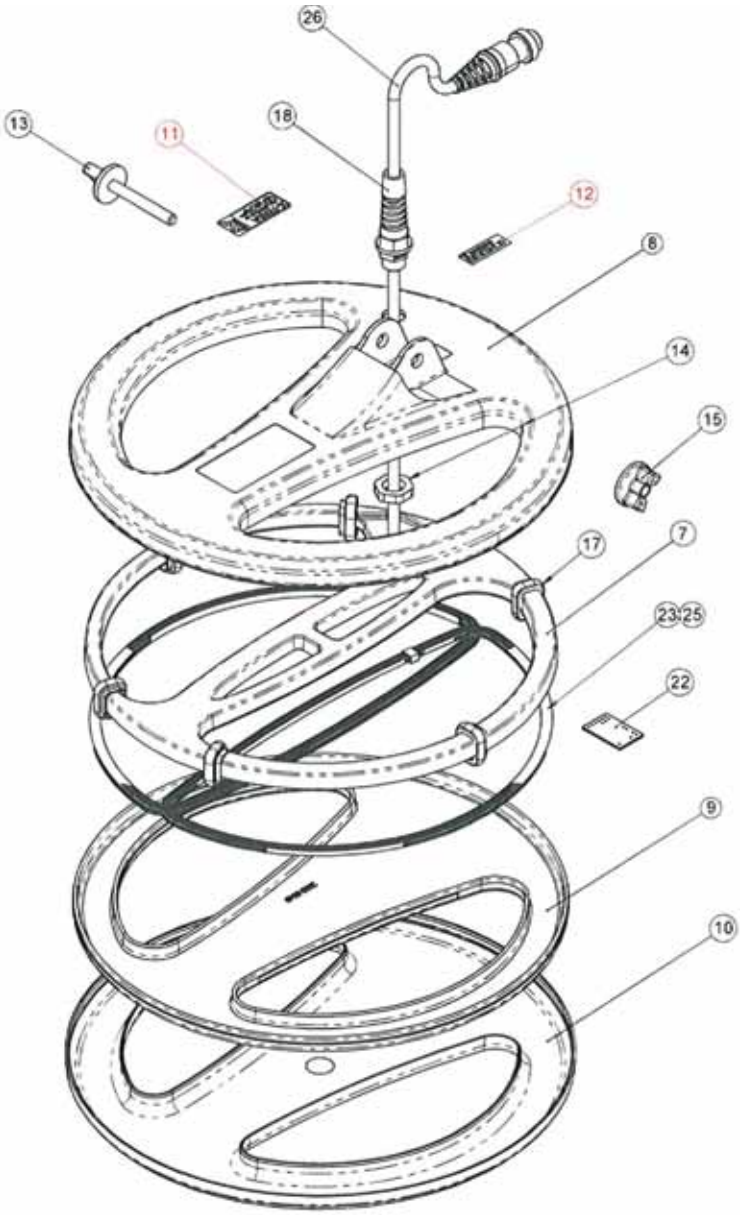
- Designing mechanical CAD (Computer Aided Design) model
- Constructing mould flow and analyzing the structure using specialized mechanical engineering software tools
- Building rapid prototype models of coil housing parts
- Building prototype cables and strain relief
- Building prototype coil using draft electronic specifications
- Field testing the prototype coil

The two design teams then combine resources to assess the prototype coils:

- Manufacturing multiple prototype coils
- Testing and revising electronic specifications
- Mechanical testing, including:
    - Temperature stability cycle testing
    - Cable stretching and bend testing
    - Rubbing, vibration and impact testing
    - Accelerated aging and salt spray testing
- Field testing second prototypes using internal and external field testers from around the world
- Finalizing specifications and drawings

That is not the end of the process! Minelab's manufacturing team then get involved with building prototypes using final off tool parts and then ALL of the engineering tests are repeated to confirm the design.





Coil Design & Manufacture

Coil Manufacture

Due to the wide variation in size, shape, frequency and configuration, each of the eight X-TERRA coils have slightly different manufacturing requirements.

Below is a summary of the overall processes to manufacture a coil:

- Winding coil to specification
- Assembling coil housing and encasing coil windings
- Soldering coil cable to coil circuit board
- Tuning coil windings and fixing to housing
- Testing coil assembly for functional defects
- Pouring epoxy resin over coil windings to hold in place
- Applying shielding material
- Sealing coil housing with glue and/or epoxy (depending on type of coil)
- Calibrating and programming of microcontroller
- Final testing
- Labelling and packing for shipping

Overall, the Minelab philosophy of:

- design, test and test again,
- confirm the design, test and test again
- then manufacture test and test again

is why Minelab coils are so consistent and reliable.

Minelab is a quality accredited ISO 9001 company

Certified System
Quality
ISO 9001
SAI GLOBAL

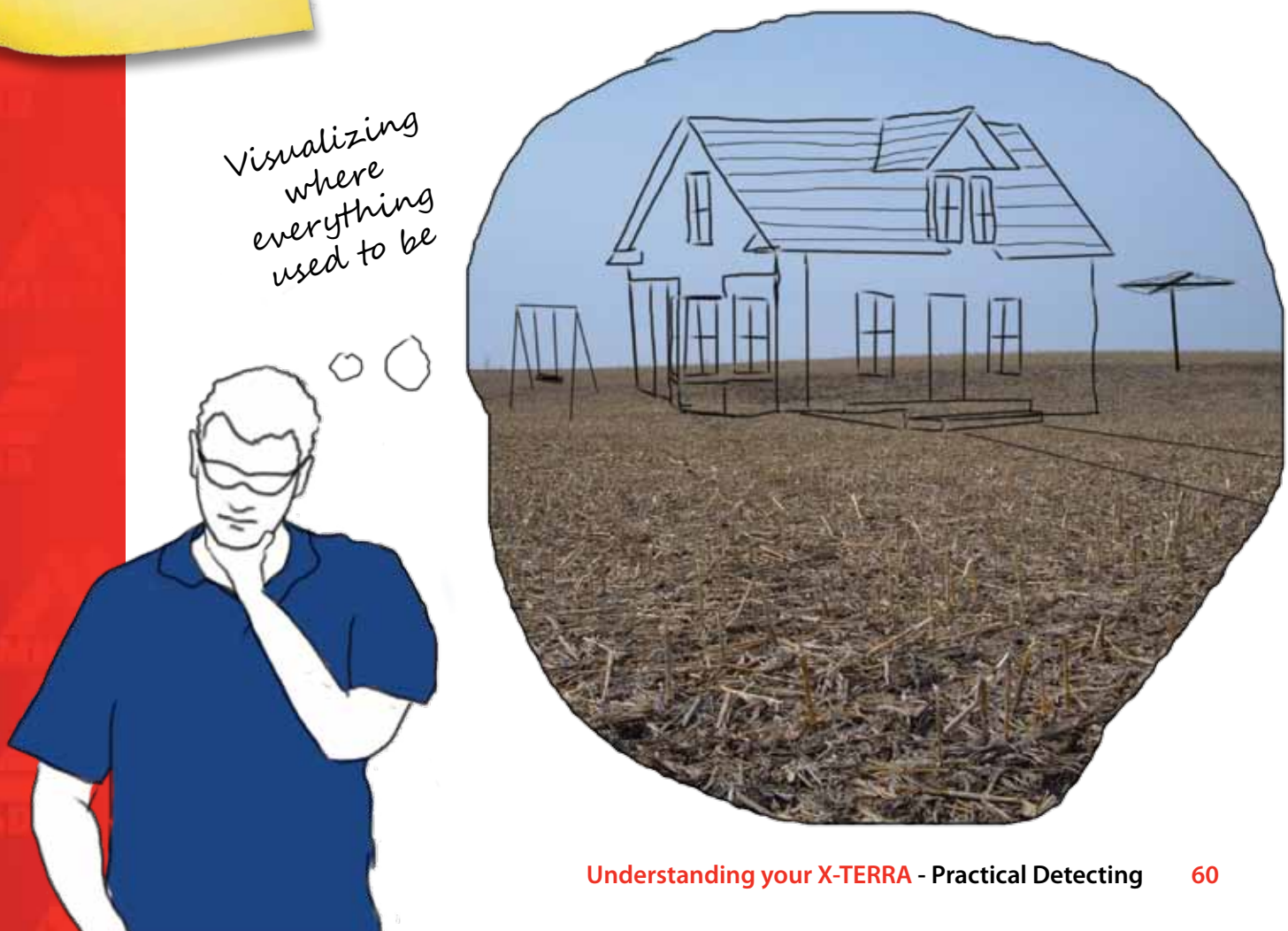
Practical Detecting...

Applying What We've Learned (so far!)

OK, so now we've learned the basic functionality of the X-TERRA. We've learned the importance of an accurate setup. I've introduced you to the various coils available. And I've mentioned the importance of hunting where people gathered. Now it is time to talk a little bit about an actual hunt.

The first thing I do when I arrive at a new site is to visually survey the area. If it is an old farm site, can I see any traces of where the buildings were? Is there a creek nearby where the family got their water? How about a grove of trees where children played or grownups rested after a hard day's work? If there are the remains of old buildings, can I see where the clothesline once was? Can I determine where the back door was? The reason I mention the clothesline and backdoor is because these are two of my favorite places to hunt. I've dug quite a few pieces of silverware and several rings that were apparently thrown out with the dishwater. And when the overalls were hung on the line to dry, they were always hung upside down. As such, if there were any coins in the pockets, there is a good chance they fell out when those overalls were blowing in the breeze. These are just a few of the things I think about as I plan my hunt.

The first thing I do when I arrive at a new site is to visually survey the area.



Choosing the Right Coil

The site I'm about to hunt has a definite bearing on the coil I will be starting out with. If it is a wide open area, I'll likely put on a 9-inch Concentric coil so I can cover the area quicker than if I started with a 6-inch coil. For those of you hunting in highly mineralized sites, or those wishing to cover even more area with each swath, you'll likely opt for one of the 10.5-inch Double-D coils. If it is a cultivated field, and I can see all sorts of broken glass and nails, I'll save myself the frustration of target masking and start out with the 6-inch Double-D due to its superior target separation characteristics.

The site I'm about to hunt has a definite bearing on the coil I will be starting out with.

To those who drive by, this looks like any other farm field in the area. But through historical research, I found that a family lived in a house at the edge of this timber, back in the 1870's.

Old church

Old silverware from homestead

The Hunt

X-TERRA Settings

After setting the Noise Cancel Channel, Volume level, Sensitivity, Ground Balance and making sure I'm set up in the proper Discrimination Pattern and with the correct number of tones, I'm good to go.

Sweeping the Coil

As I walk along, I'm careful to overlap my swaths. On Double-D coils I like to overlap by at least 1/3. On Concentric coils, I try to overlap by 1/2. My swath width depends on the circumstances. If I am hunting between rows in a field of corn, I'm limited to the 30-inch row width. If I am in open territory, I have a slightly wider sweep. Yours will depend on your height and arm length. Just make sure you don't get your feet going faster than your arm. In other words, overlap those swaths! And don't be in such a hurry to work an area that you take too wide of swaths. Doing so can cause you to raise the lip of the coil up as you switch directions, causing false signals and missed targets. You're better off making narrower swaths, and taking more passes.

The sweep speed I have depends on the number of targets I am getting in each sweep. As one who hunts in zero discrimination (or All Metal) with multiple tones, I know what is under the coil at any given time. If you choose to hunt in a Discrimination Pattern, with some notches rejected, don't be misled into thinking there is nothing in the ground just because your detector isn't beeping. Those rejected targets also have to be processed. And the blanking effect they produce is important too.

Not all my targets are coins

The best advice I can give anyone on finding the "right" sweep speed is to build yourself a coin garden, and practice, practice, practice!

Target blanking is caused by the detector losing its Threshold while passing over a rejected target. If you are sweeping the coil and your X-TERRA is silent for what seems like seconds at a time, you're going too fast and are likely passing over too many close targets to allow the Threshold to reset. It could be that those rejected targets are adjacent to coins. If you don't slow down, you're going to miss them.

I have a sweep speed of about 12 - 18 inches per second, depending on the soil and site conditions. If I run into multiple targets, I'll slow down so I can better analyze the sounds they produce. If it is a wide open area, with very few targets, I'll hunt a little faster. The best advice I can give anyone on finding the "right" sweep speed is to build yourself a coin garden, and practice, practice, practice!

Hunted for one hour in the evening

Hunted for two hours in the morning

Both finds after washing them off. As you can see, the silver is still silver and the nickels and Indian Head cents are still pretty crusty.

Pinpointing

Each of the X-TERRA models offer visual and audio Pinpointing. When you press the Pinpoint pad, your detector switches to an All Metal, non-motion detector, with a visual display and audio tone with volume modulation.

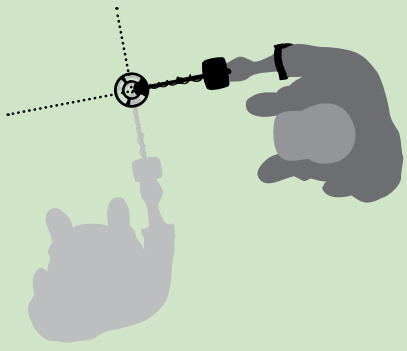
Pinpoint Auto

After getting an initial target signal, press the Pinpoint pad and slowly sweep across the target from multiple directions. The Pinpoint Auto Mode will progressively mask the target response by automatically reducing the Sensitivity with each pass of the coil. This will allow the X-TERRA to create a very narrow target response.

When using a Double-D coil, I prefer to sweep back and forth over the target.

If you take a look at the Pinpoint icon in the display, you will see a circular scale that becomes more complete as the center of the coil passes over the target. When using a Concentric coil, I prefer to sweep the coil in a series of multi-directional X's, slowly reducing the size of my sweep until I am confident that I have centered the target under the coil. When using a Double-D coil, I prefer to sweep back and forth over the target, slowly drag the coil toward my feet, getting farther from the target center with each sweep. When the target audio disappears, the target can generally be located directly off the front tip of the coil.

By the way, although I don't use the functionality, there is a depth gauge on the display. It has five segments that represent the approximate depth of a coin sized target. For those of you who use it successfully, good for you. Personally, since the coins I am after vary in size from a silver three-cent piece to a silver dollar, I know that when I dig straight down after pinpointing, I'll find it.



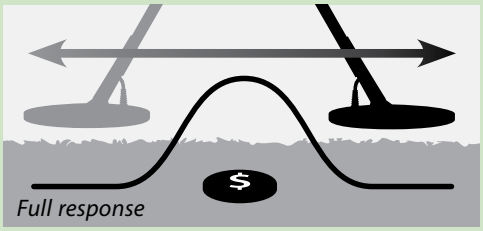
X-TERRA 705 manual pg. 26

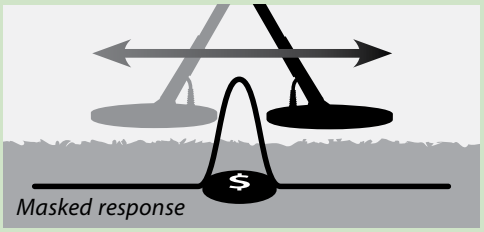
An example of a field I detect in

Pinpoint Sizing - X-TERRA 705

In addition to Pinpoint Auto, the 705 also offers the option of a Pinpoint Sizing Mode. Pinpoint Sizing Mode allows the user to maintain the Sensitivity at a constant level, allowing you to trace the size and general shape of the target. With practice, you will be able to separate coins in areas that are too cluttered for most other detectors.

By activating Pinpoint Sizing Mode near the target, you will be able to mask part of the audio response, similar to the manner in which Auto Pinpoint reduces the Sensitivity. However, in Pinpoint Sizing Mode, you control the degree of masking by how close you are to the target when you set up to Pinpoint.





@ X-TERRA 705 manual pg. 27

If you have a 705, I encourage you to read the Instruction Manual on the two Pinpoint Modes and practice in your test garden. You'll be surprised at the functionality this offers.

From an old fairground

My Three Rules of Consistency

As I have mentioned, I like to hunt in zero discrimination (or All Metal) with multiple tones. And, I've explained why. When I am hunting a site, I live by my three rules of consistency. They are the consistency of location, consistency of sound and consistency of TID.

1. Consistent Location

By consistency of location, I am referring to where a target is located in relationship to some sort of marking on the ground: a reference point. It can be a leaf, a blade of grass, a small pebble or a clod of dirt. Whatever catches your eye. When I first pass over a target, I sweep back and forth over it from a variety of directions. Not just left to right and right to left. I will literally walk around the target, X-ing over it as I rotate around it. All the time, I am listening for that audio tone and watching if it is consistently coming from beneath that same leaf, blade of grass or clod of dirt. Coins and other valuables will not vary in their location. Deeply buried iron will generally give its loudest target response from more than one location, as you sweep it from different directions. If the target produces the same tone when I pass over it from varying directions, it is worth a bit more investigation.

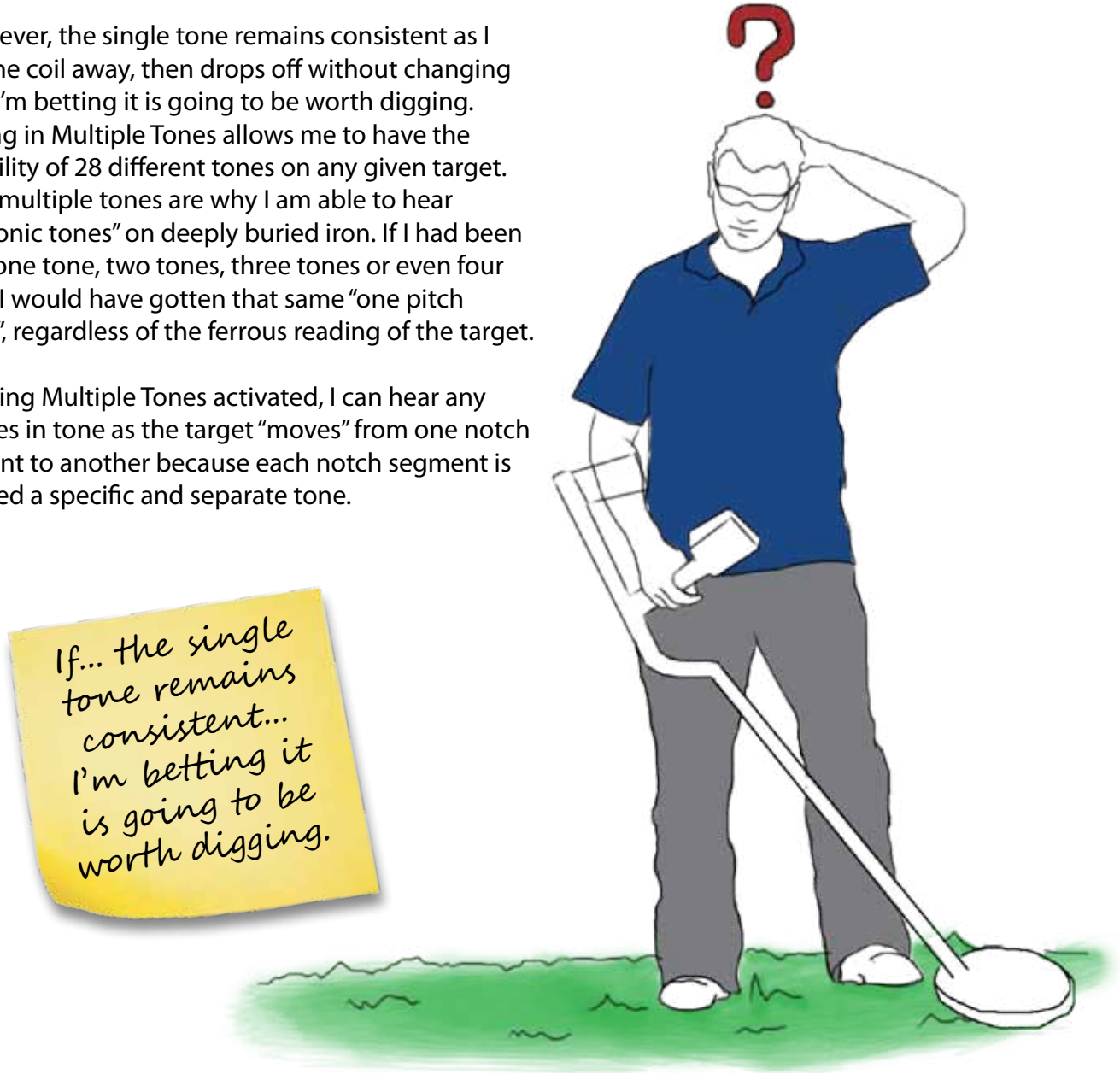
Using a collection of maple leaves as a reference point

2. Consistent Sound

I've learned the X-TERRA has a very forgiving sweep speed which I use to my advantage when determining whether to "dig or not". By varying the sweep speed as I "X" over the target, I am able to work the coil very slowly, while maintaining an accurate TID. On the same token, I will regularly increase my sweep speed while X-ing over a target, trying to make the sound "break up". If it does, it is usually a deep ferrous target. While X-ing over the target, I'll also work the coil back toward my feet, listening intently as the coil crosses the target repeatedly. Already knowing the location of the target (leaf, blade of grass etc) I know when that target is about to leave the field of detection. At that time, if the sound breaks up or I get a blending of more than one tone (I refer to this blending of tones as harmonics), I would almost bet that the target is not a coin.

If, however, the single tone remains consistent as I drag the coil away, then drops off without changing pitch, I'm betting it is going to be worth digging. Hunting in Multiple Tones allows me to have the possibility of 28 different tones on any given target. Those multiple tones are why I am able to hear "harmonic tones" on deeply buried iron. If I had been using one tone, two tones, three tones or even four tones, I would have gotten that same "one pitch sound", regardless of the ferrous reading of the target.

By having Multiple Tones activated, I can hear any changes in tone as the target "moves" from one notch segment to another because each notch segment is assigned a specific and separate tone.



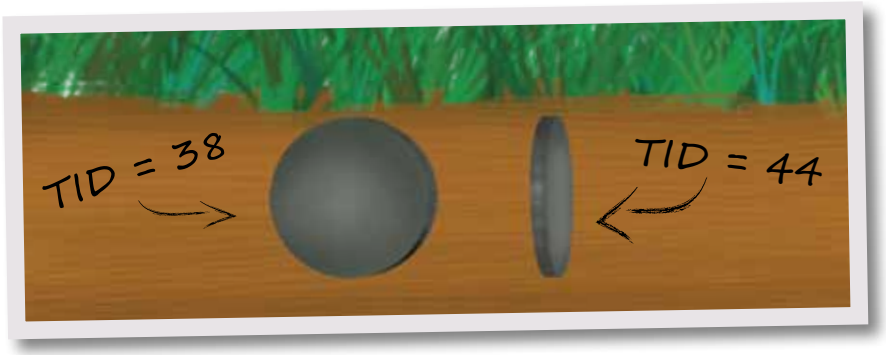
To Dig, or Not to Dig?

3. Consistency of TID

Having located a target with a consistent location and a consistent audio tone, it is time to check the TID. At this point, I already know if I am going to be digging this target, based on the location and sound. But if those two things "pass my test", I'll check the TID primarily to see if it is going to be copper, silver, nickel or gold when it is exposed. As I sweep back and forth across the target again, I take notice of the display.

I know this comment will create some disagreement, but I am convinced that in my moderately mineralized soil, (and when my detector is properly setup) single coin targets, lying flat, will not produce a TID that varies by more than two notch segments. That means if I get a TID of 38 and it occasionally reads a 36 or 40, I'm looking in the hole for a silver dime. Notice I said that the numbers would be consistent IF there are no adjacent targets and the target is laying flat. And I am talking about a part of the country where the mineralization levels are relatively low.

When there are adjacent targets, the TID can become skewed if those adjacent targets are larger than the "desired" target or shallower than the desired target. Even if they are the same size and depth, if they are in close proximity, the TID can be misleading. Typically, a coin on edge will give a strong signal response as you pass the coil in the same direction as the "length" of that edge. But will produce a broken audio, a double tone, or no audio at all, when passing the coil perpendicular to the top edge of that coin. As well, the TID for coins on edge will change when swept from varying directions. The reason for these audio and TID variances is because the detection pattern of a metal detector is penetrating the surface area of the target with its electromagnetic field.



Briefly stated, the eddy currents induced back to the receive circuit on a flat coin are of a much different phase than those from the edge of that same coin. For those that have doubts, try air testing some coins. No mineralization, no adjacent targets and make sure you hold them flat. I guarantee that they will provide a solid tone and a stable TID. But if you don't have your X-TERRA set up properly, all bets are off.

My Recommendation...

Again, practice with coins at home. Listen for the sounds and study the TID for different sweep speeds and varying angles. Once you get an understanding of the language of the X-TERRA, go back to the local park and re-hunt along those sidewalks. Think about it... most of the coins that fell from pockets and hit the concrete, rolled off the edge of the sidewalk. The edge of the sidewalk is vertical, making those coins fall "on edge". Those who may have hunted it before you simply walked down the sidewalk, swinging left to right. Go at it from a variety of directions and I'll bet you find some coins. A friend of mine gave me this tip several years ago and I have dug a lot of coins along the sidewalks at many hunted out locations, by following his advice.

Coin falls out of pocket and rolls off the sidewalk's edge.

Coins found in an old ball field

Gold Prospecting

Prospecting Mode on the X-TERRA 70 and X-TERRA 705 is primarily designed to find metal objects in highly mineralized conditions. Particularly gold nuggets and relics. In Prospecting Mode, there are no TID numbers as found in the Coin/Treasure Mode. Instead, targets are identified by a change in the pitch and volume of the Threshold Tone. The operational pitch of the Threshold Tone can be changed (ranging from 140 Hz to 1010 Hz) by using the Tones menu. Although the display does not provide TID numbers, it does provide a numerical indication of the level at which your Iron Mask is operating. The Iron Mask range is 0 - 20, allowing the user to select the level of iron targets (ferrous properties) that will be rejected. The higher the number selected, the more iron signals you will reject. It also displays a segment bar at the bottom of the screen that indicates the amount of iron signals being rejected by the X-TERRA. When prospecting in areas of high mineralization, keep your Iron Mask setting low. Setting it above a five or six could result in rejecting the smaller gold targets.

Most concentrations of gold deposits are located in areas with high levels of mineralization. As such, Double-D coils are typically chosen for their ability to more effectively neutralize the effects of the ground. When searching for small specimens, the 18.75 kHz Double-D coils will provide the most stability and sensitivity. Many prospectors favor the size and shape of the 18.75 kHz elliptical coil. If you are searching for larger nuggets (one ounce or greater), you will obtain more depth with the 7.5 kHz Double-D coil. And if you find yourself prospecting in an area with moderately mineralized soil, you could improve your chances of finding gold by using the 9-inch Concentric coil at 18.75 kHz.

Many X-TERRA prospectors find that they are best able to compensate for changes in ground mineralization by implementing the Tracking feature. If your ground has minimal variance in mineralization and you chose to use a fixed Ground Balance, pay close attention to your Threshold. If the Threshold suddenly drops out, recheck your ground phase or turn on your Tracking.

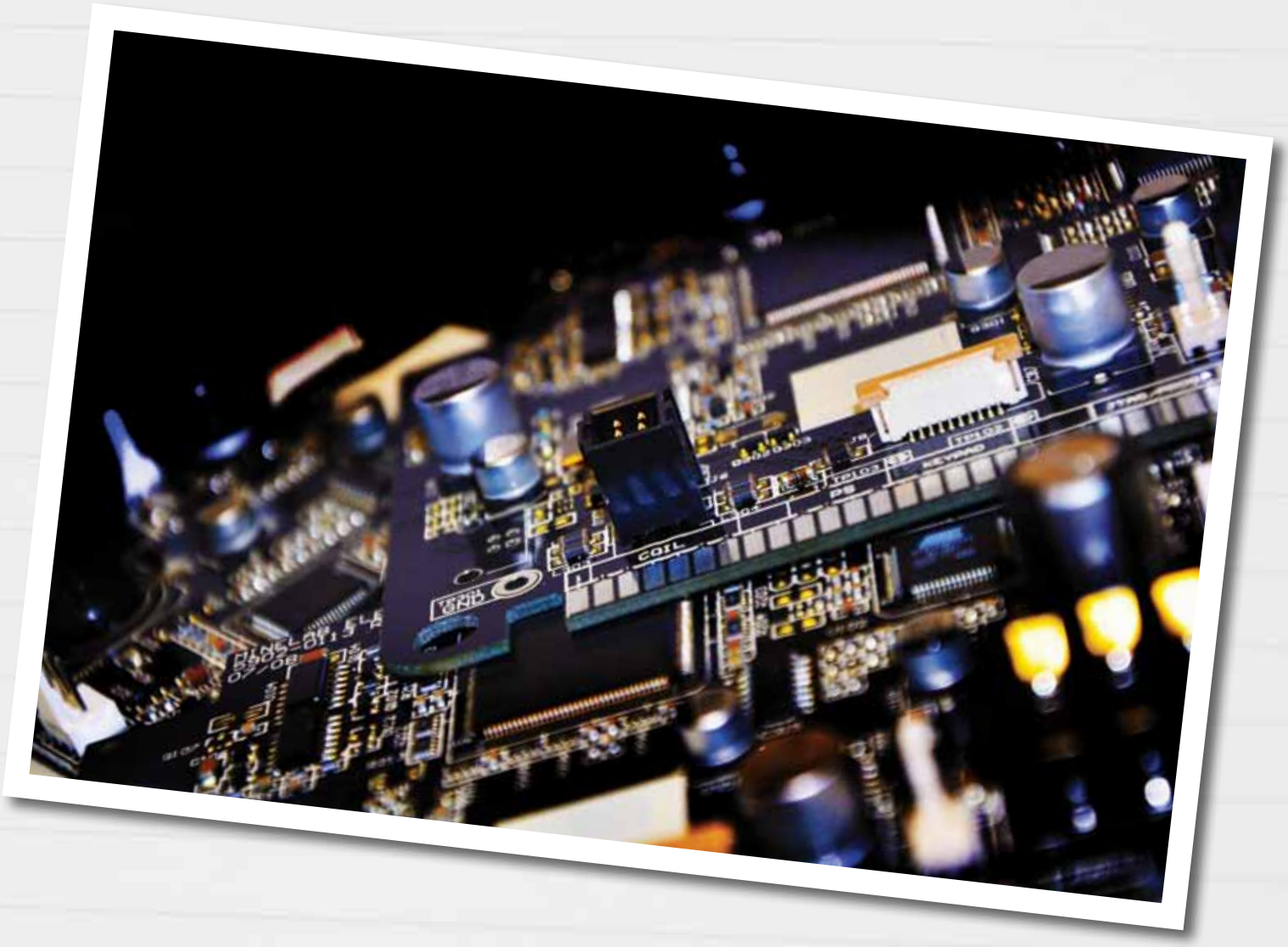
Prospecting Mode is used to find metal such as gold nuggets and relics in highly mineralized, 'difficult' areas.

Targets are identified by audio only. The number on the display is not related to the target; instead, it shows the Iron Mask value, as does the Discrimination Scale. In this mode the detector becomes more sensitive to small target signals.

X-TERRA 705 manual pg. 19

Small specimens such as these, are frequently found using the X-TERRAs Prospecting Mode.

Technology...



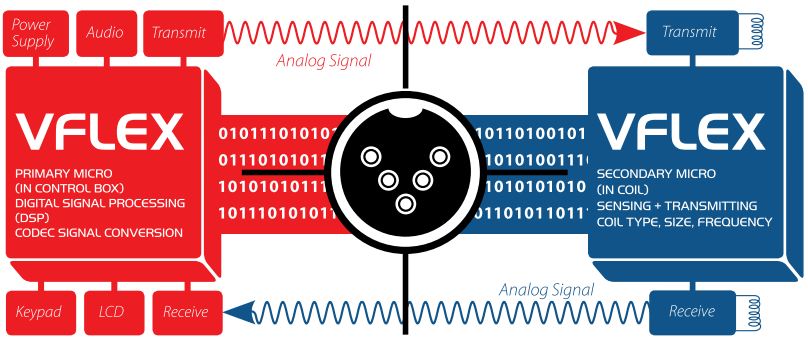
Minelab's VFLEX Technology

VFLEX technology

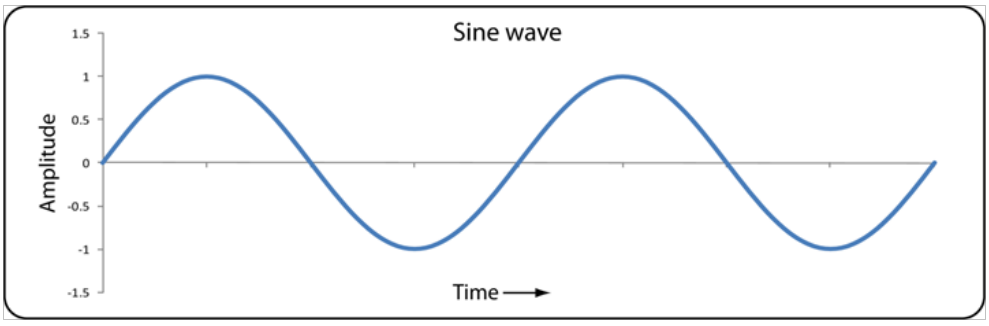
Here is Minelab's official explanation of VFLEX technology

VFLEX technology transforms the common analogue single frequency metal detector into a fully digital machine including a small computer, called a microcontroller, inside the control box and also inside the search coil.

The microcontroller in the control box generates a perfect high quality sine wave. The sine wave is produced in the same way that your digital CD player produces high quality sound. This is important, because perfect sine waves don't have distortions that create harmonic side frequencies. With the removal of harmonic side frequencies maximum power is transferred to the coil and detection depth is greatly improved with increased sensitivity, TID accuracy and immunity to noise.



Due to small variations in the windings, no two search coils will be exactly identical. This means that a search coil tuned to 3 kHz might actually be a 3.0438 kHz coil or a 2.9635 kHz coil. The difference may not sound like very much, however if your detector keeps transmitting at 3 kHz it can mean the difference between missing or finding a valuable target.



Also when the detector's transmit frequency is slightly different to the search coil's tuned frequency, noise and interference will be introduced, reducing sensitivity and detection depth.

VFLEX technology corrects this by adjusting the transmit frequency to exactly match the tuned frequency of the search coil. This is only possible because the microcontroller in the search coil communicates information about the search coil's tuned frequency to the control box. So if the coil is 3.0584 kHz then the transmit frequency from the control box will also be 3.0584 kHz.

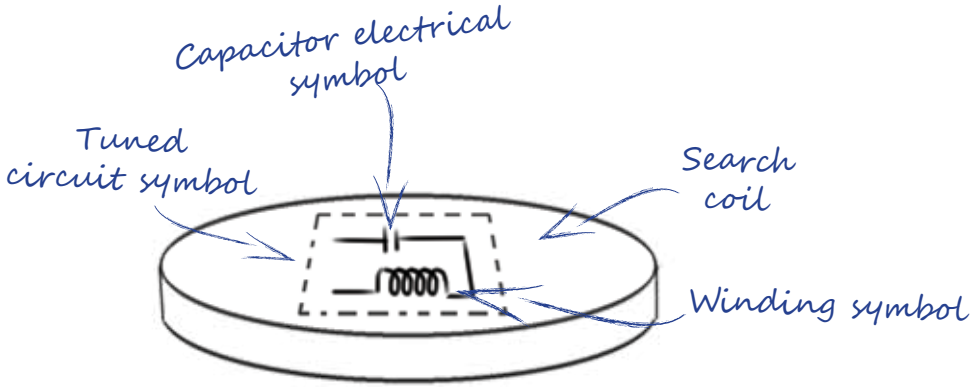
Because the search coil can communicate with the control box there's not just one, but up to three different frequency search coils available: **3 kHz, 7.5 kHz and 18.75 kHz.**

Changing the transmit frequency significantly changes the operation of the detector.

CONCENTRIC 3 kHz	Low frequency option for deep, large, high conductive targets such as silver, copper, large rings and relics.
DOUBLE D / CONCENTRIC 7.5 kHz	Mid frequency option for all-round detecting.
DOUBLE D / CONCENTRIC 18.75 kHz	High frequency option is very sensitive and optimized for jewelry, fine chains and sub gram gold nuggets.

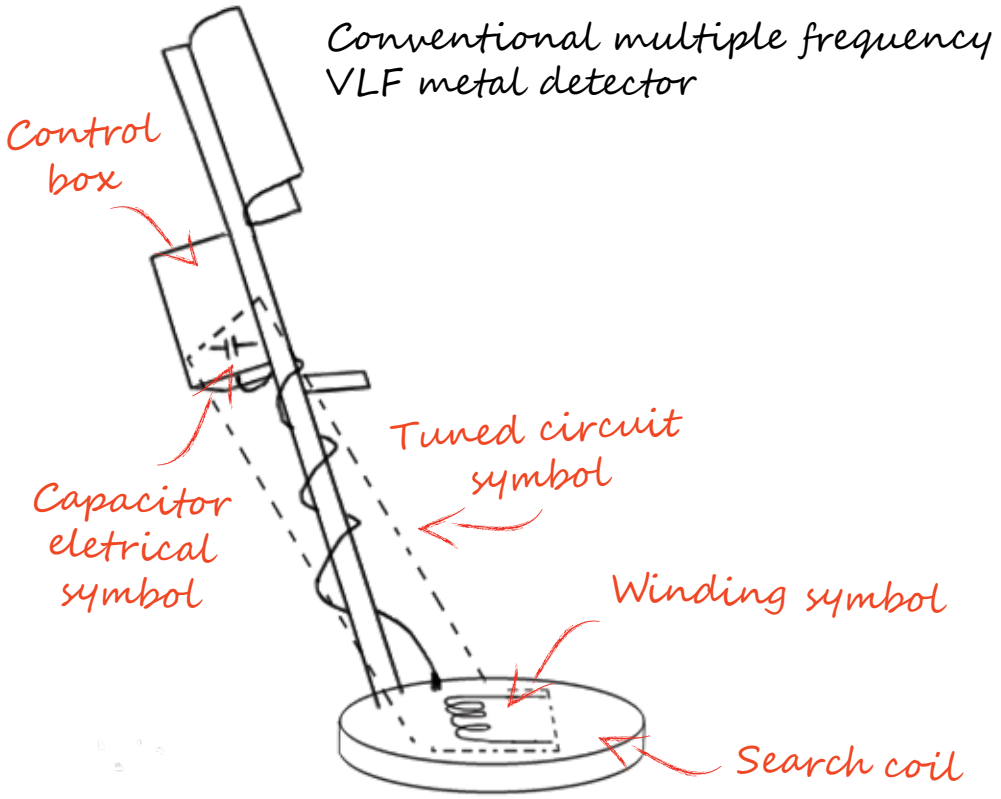
There are other single frequency metal detectors available that have multiple frequency options, however they spread the components that determine the search coil's frequency between the search coil and the control box. This introduces noise and distortion reducing sensitivity and detection depth.

VFLEX has all the components that determine the search coil's tuned frequency located together in the search coil. This ensures that the pure sine wave is transmitted at maximum power into the ground without distortion.



VFLEX – Precision tuned as all the tuning components are contained within the search coil

Minelab's VFLEX Technology



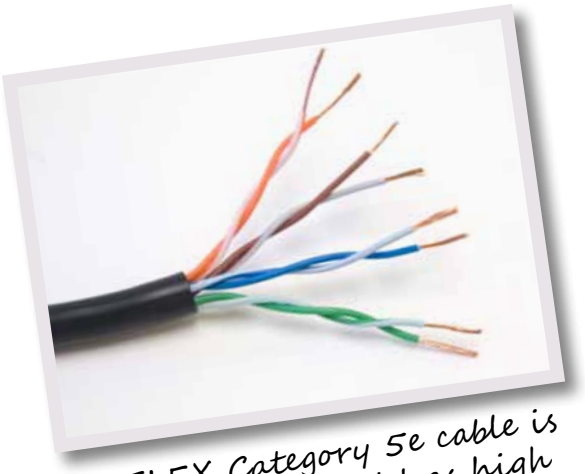
Other multiple frequency VLF metal detectors have the tuning components spread between the search coil and the control box, introducing noise and instability.

As a metal detector's search coil is moved close to mineralized ground the tuned frequency of the search coil is affected. VFLEX continuously monitors the search coil for the effects of ground mineralization and compensates the received signal to achieve maximum depth and consistently accurate TIDs.

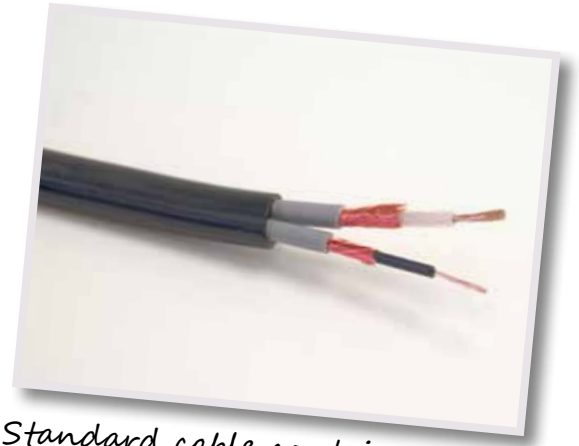
Most metal detectors have the receive winding connected directly to the cable. This means that the very small signals received by the search coil are sent directly up the cable to the control box. Because the signals are so small they need a lot of amplification in the control box and any electromagnetic noise picked up by the cable also gets amplified. This results in false signals and reduced sensitivity.

With VFLEX the search coil contains a preamplifier that boosts the received signal before noise can be introduced through the cable. This significantly reduces false signals and increases the detector's sensitivity, even in noisy environments such as under power lines.

Another benefit of VFLEX's preamplifier and microcontroller in the search coil is that the standard heavy weight twin shielded cable isn't required. The VFLEX coil cable is a light weight 'Category 5e' cable. This is a relatively new cable specification and because of its immunity to noise is widely used for high speed computer networking.



VFLEX Category 5e cable is lightweight and has high noise immunity



Standard cable contains more copper and is therefore heavier and more likely to be detected when bumped

This has two advantages; one, the detector is lighter and two, the much finer wires aren't detected when the cable is bumped. This significantly reduces false signals from bumping the search coil on the ground and allows the detector to be very sensitive without ever detecting the cable.

VFLEX uses little power, so four AA batteries last over 20 hours, with the same performance maintained from charged through to discharged.

VFLEX is a significant advancement of single frequency metal detection technology. VFLEX provides precision digital calibration with the coil, adjustable transmit frequency and continuous ground monitoring, resulting in high performance across a wide range of target types and ground conditions. These technological advancements ensure that VFLEX detects deeper with higher sensitivity than any other single frequency metal detector.

My Circular Discrimination Theory

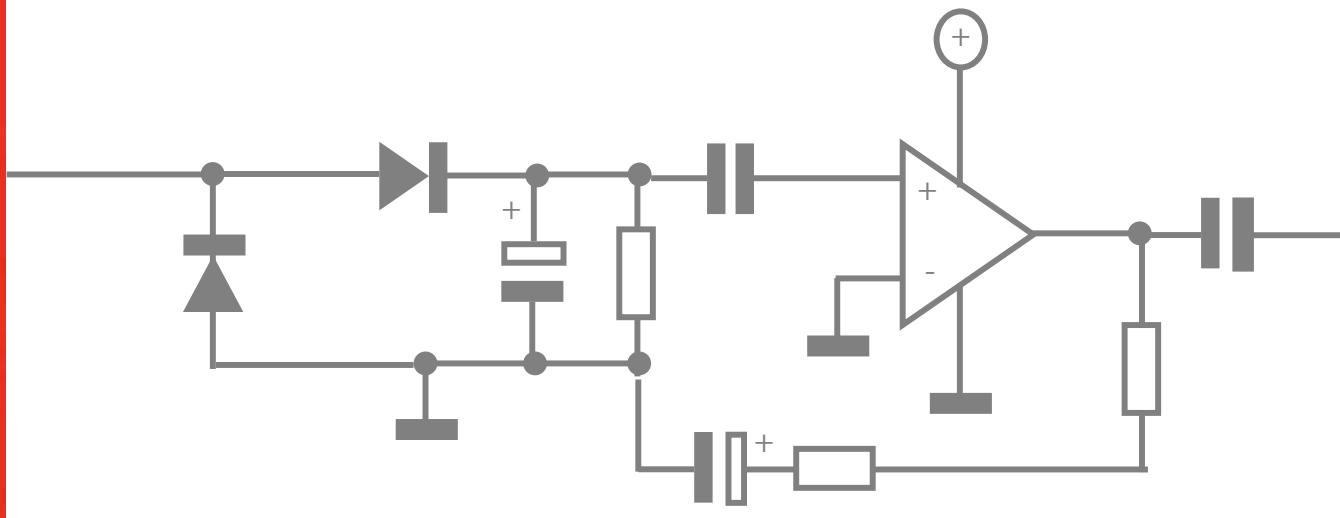
Lowest Ferrous/Highest Conductive

Earlier, I mentioned the discrimination differences between the three models of X-TERRAs. As I pointed out, the TID numbers on the X-TERRA 30 & 305 range from a low of -4 to a high of +44, the X-TERRA 50's TID values range from -9 to +45, the 505's TID values range from -9 to +48 and the X-TERRA 70 and 705 range from -8 to +48. Although I was glad to see the discrimination expanded on the 505 (compared to the X-TERRA 50), I believe these notch segment numbers may be more than simply numbers assigned to the "high end" and "low end" of the available Discrimination Scale. When scanning a coil over a small piece of ferrite, I found the X-TERRA 50 will lock onto a -9 TID reading.

When I passed that same piece of ferrite under the same coil connected to the 505, 70 or 705, none of them will lock onto a stable reading. Instead, the TID of the ferrite target would bounce between -9 and +48 on the 505. And bounce between -8 and +48 on the 70 and 705. Because of this, when I am hunting an old farm site, I usually notch out the +48 segment and leave all the other notches open on these three models.

Doing this allows me to better determine if a target is more than just a piece of deeply buried iron. Is the -9 on the X-TERRA 50 or 505 more than just a number? Or by adding the additional +48 "notch segment" to the 505, is it "allowed" to provide the same "bounce" on the most ferrous targets as the X-TERRA 70 and 705?

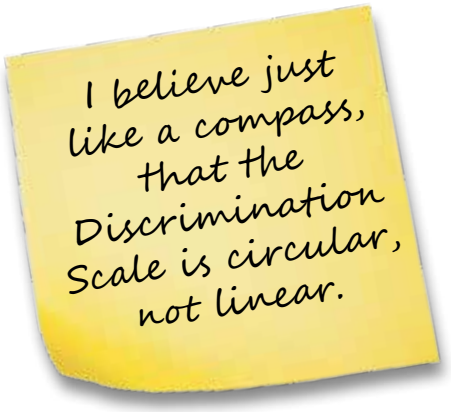
Based on these questions, and my tests in the field, I've come up with what I call my "circular discrimination" theory.

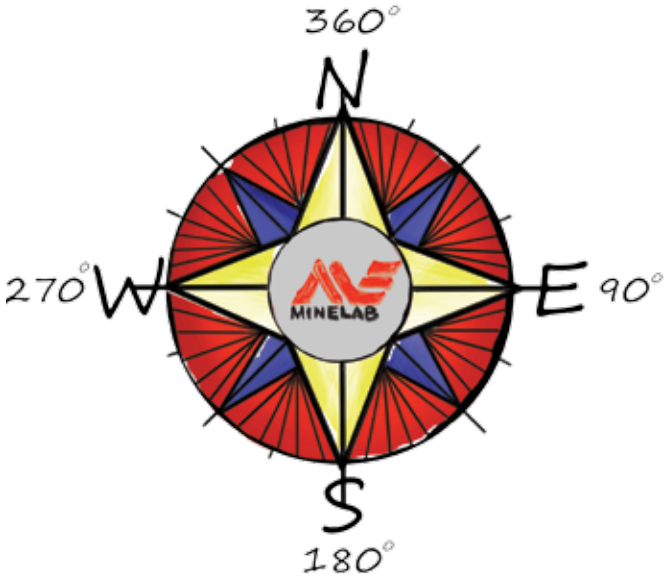


My Circular Discrimination Theory

My circular discrimination theory would likely apply to all VLF detectors with notch discrimination capabilities. But for the sake of explanation, I'll use the 705 as my example.

If I were to ask you what direction, in degrees, that straight North represented, what would you say? Is it 360 degrees? Or is it 0 degrees? Actually, it is both. Take a look at your compass. Many of us think of metal detector discrimination as being linear. In our minds we can visualize a straight line, running horizontally, with the most ferrous targets located on the left end. And the highest conductive targets clear over on the right. In the case of the X-TERRA 70 and 705, there are 28 target notches spaced evenly in between.





The X-TERRA doesn't give any indication that its discrimination arrangement is circular. In fact, the X-TERRA stops scrolling when you try to go lower than the lowest non-conductive number, or higher than the highest conductive number. I submit that is what leads us to think of it as being linear. But I believe, just like a compass, that the Discrimination Scale is circular, not linear.

Follow me along on this... Take that flat line of notch segments and bend them into a circle, like the numbers on a clock. Instead of twelve numbers representing the hours, we have 28 separate notch segments, evenly spaced in a circular pattern. Starting at the top and moving clockwise, they range from a low of -8, to -6, -4, -2, +2, +4 ... on and on, all the way around the dial to the +48. The spacing between each notch segment is the same, including the space between -8 and +48. If you have a target that has a TID that bounces between 36 and 38, you know it is a target with a fairly high conductivity. With a TID of 36 to 38, it is most likely a dime. If you have a target that reads a -4, and jumps down to a -6, you might not know what it is. But it is definitely a target with a low conductivity (or high ferrous) content.

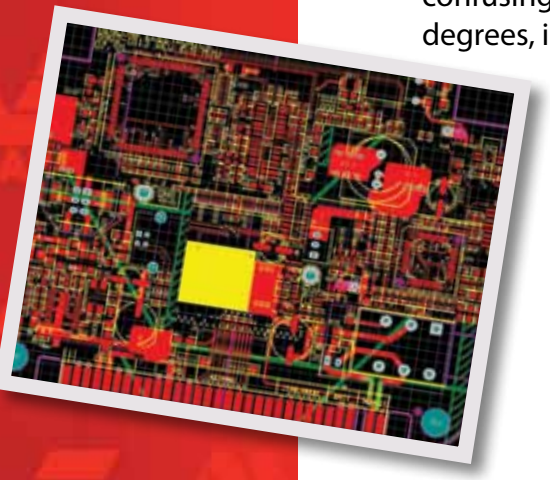
My Circular Discrimination Theory

Now, if you consider that piece of ferrite I mentioned, and think about those deep pieces of iron you dug this summer (anticipating a silver dollar because they read a +48), and toss in this theory of circular discrimination, you get an idea as to how it happened. You dug a piece of iron that provided a TID of +48. Did it read a negative number after it was dug up? Probably. Did the X-TERRA mislead you, making you think it was a highly conductive target when it was still in the ground? Yes, it can be misleading. But based on the information available, the X-TERRA made its "best guess" as to where to position that target in its field of "circular discrimination".

Just as a dime reading 36 can bounce to a 38 under given conditions, a piece of iron can bounce between -8 and +48. And, since the 705 we are discussing does not have any notch segments between the adjacent notches of +48 and -8, the iron will identify with the one it is most closely aligned to. Factor in the ground conditions, and you can see how that deep old iron can fool you into thinking it is a silver dollar.

My theory is, regardless of how many notch segments could be added between the -8 and +48, there will always be targets that "fall" between the most negative TID and the most positive TID. The best solution I have to offer is to use the tips I've tried to provide throughout this eBook, and listen more intently to the audio response made by these wrap around signals. When working the coil over the target, iron tends to provide both high tone and low tone harmonic signals.

From a strictly technical point of view, I don't believe the wrapping of ferrous and non-ferrous is truly circular, or 360 degrees. I believe it to be semi-circular at 180 degrees. However, in an attempt to not make my explanation more confusing, I used the example of a compass, and the terms circular and 360 degrees, instead.



Now that you have heard my theory lets ask some questions of the inventor of VFLEX technology, Dr. Laurence Stamatescu.

Q & A with Laurence

Dr. Laurence Stamatescu

Dr. Laurence Statmatescu is the inventor of VFLEX technology. He worked as a nuclear physicist in a nuclear research institute in Romania, then moved to Australia in 1992.

Laurence completed a PhD in Optics (lasers) gaining experience in electronics and signal processing. He joined Minelab's engineering team in 1996, with the XT 18000 (the predecessor of the Eureka Gold) being his first project.

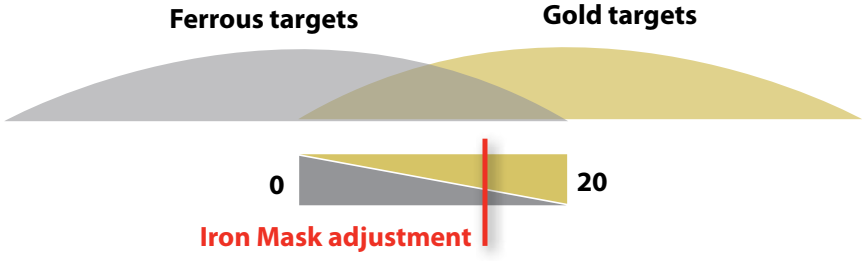
VFLEX technology was Laurence's own design that he started at home as a 'spare time' project. He is a Senior Technical Manager in Minelab's engineering team and responsible for the research and development of new metel detection tetechnologies.

Question. Is there a correlation between target properties when comparing the negative TID numbers (ferrous targets) while using the Coin & Treasure Mode and the Iron Mask numbers while using the Prospecting Mode? Are the Iron Mask settings an extension of the Coin & Treasure Mode's ferrous discrimination scale, but on a more refined level?

Answer. The short answer is no. The long answer is as follows.

TID and Iron Mask have somewhat different purposes: TID aims at giving each target the best ID, while Iron Mask aims at separating the ferrous and non-ferrous targets in conditions of high mineralization. Ferrous/non-ferrous discrimination is difficult in high mineralization conditions, where in fact most of the gold nuggets are. Thus, the Iron Mask feature gives the user a way to adjust where the compromise lies. In other words, the user can choose anywhere between two extremes:

1. "I am prepared to dig each detected target, because I do not want to miss any nuggets"- In this case I set the Iron Mask at minimum (0, All metal).
2. "I do not want to dig ferrous junk, even if I might miss some nuggets"- In this case I set the Iron Mask at maximum (20).



As the mineralization makes identification harder the Iron Mask sets the boundary between what it believes to be a good or a bad target, based on both the user preference and the measurements of the ground interference.

Q & A with Laurence

Question. If most metallic targets have both ferrous and non-ferrous properties, what triggers whether a specific target registers in the ferrous range (negative TID numbers) or the non-ferrous range (positive TID numbers) on the X-TERRA?

Answer. There are three "ingredients" of a target that determin its TID. These are:

1) Conductance
2) Inductance
3) Magnetic response

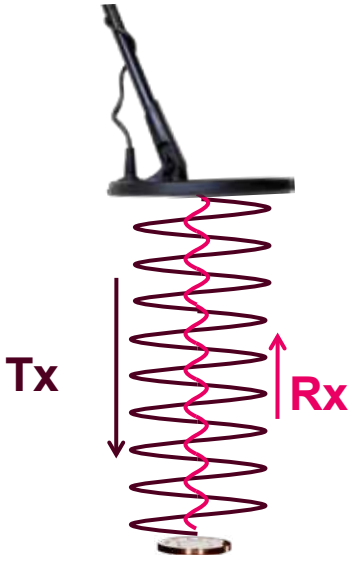
Ferrous Objects

Ferrous objects are very interesting, because they have all three properties:

- they have conductance – current flows through iron but not very well,
- they have inductance – due to their shape, the currents flow along certain paths and cannot vary easily,
- they also have a magnetic response, because iron is a magnetic material and enhances the magnetic field.

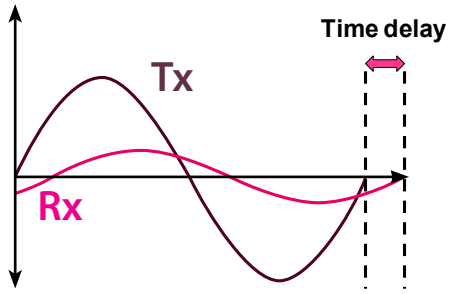
Non-Ferrous Objects

Non-ferrous objects, for example gold rings or coins, lack the third ingredient and thus they only have two properties:



Transmit (Tx) and Receive (Rx) wave forms

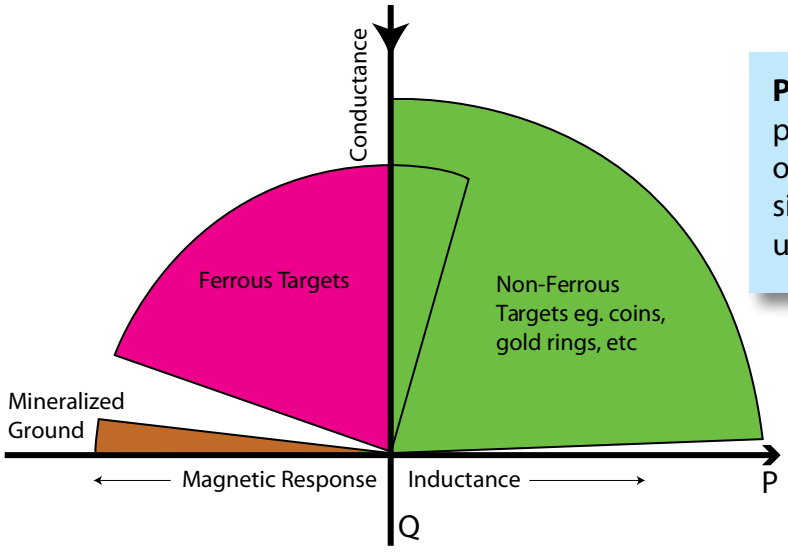
- they have conductance – current flows through them better if they are thick and if they have good conductivity, like copper, aluminium, gold,
- they have inductance – rings and coins in particular have well defined paths for the current due to their symmetry.



Single frequency detectors, like X-TERRA, perform discrimination based on the time delay (phase) of the received (Rx) signal with respect to the transmitted (Tx) signal.

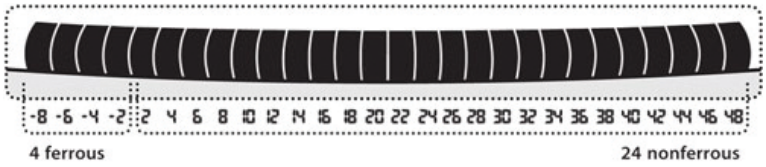
Given the way the signals are processed in electronics and in software, non-ferrous objects can only have positive phase angles. This can be shown on a phase diagram.

Ferrous objects generally have negative phase angles, because the magnetic response is stronger than the effect of the inductance and conductance.



Time delay (phase) diagram

Please note: these phase angles actually overlap but have been simplified for ease of understanding.



The 705 Discrimination Scale is the end result of this digital processing.

Ferrous/non-ferrous discrimination works better at low frequencies. Even though the magnetic response of a target is frequency independent, inductance effect increases as the frequency increases. Therefore, at high frequency, the effect of the inductance can be stronger than the magnetic response resulting in a ferrous object being misclassified as a non-ferrous one.

This is more likely to happen with larger ferrous targets of particular shapes and/or in particular orientations. Although higher frequency detectors have somewhat poorer ferrous discrimination, they have excellent sensitivity for low conductivity objects, so there are advantages and disadvantages for single frequency detectors having one fixed frequency. This is why the X-TERRA detectors were designed with 3 kHz, 7.5 kHz and 18.75 kHz options by changing coils.

Q & A with Laurence

Question.

In sweeping the 3 kHz low frequency (LF) and 7.5 kHz medium frequency (MF) 9-inch Concentric coils over an old U.S. silver dollar (90% silver), the TID displays a value of 48 at distances less than 2-inches from the coil. At distances greater than 2-inches, the TID is 46. When using 18.75 kHz high frequcey (HF) Double-D coils, (6-inch, elliptical and 10.5-inch round) the same U.S. silver dollar registers a 48 regardless of the distance between the target and the coil. What causes this TID variation between coils?

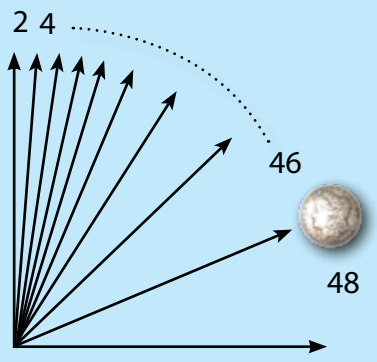
Answer.

This is a somewhat surprising effect, because one would expect the TID from MF and certainly LF to be more stable for a high conductivity target than that from the HF coil. Therefore, the question requires discussion on two fronts before I can offer an answer:

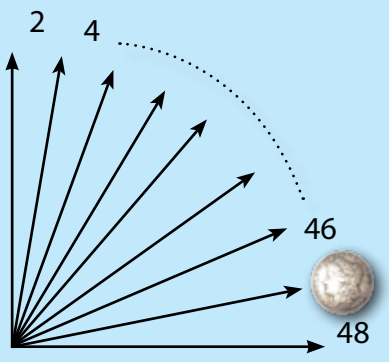
How TID's are affected by coil frequency

As mentioned in the previous answer, the TID is calculated based on the phase angle of the received signal with respect to the transmitted signal. Each TID corresponds to a range of phase angles (a "bin"). For example, the X-TERRA 705 has 24 non-ferrous TID's in 90 degrees, so about 3.75 degrees for each "bin". The accuracy of TID for a particular target is dominated by whether the measured angle is close to the centre of a TID "bin" or if it is close to the boundary between two "bins". If the target phase angle is close to the boundary, its TID is more likely to flicker between two values, depending on orientation, proximity to the coil etc.

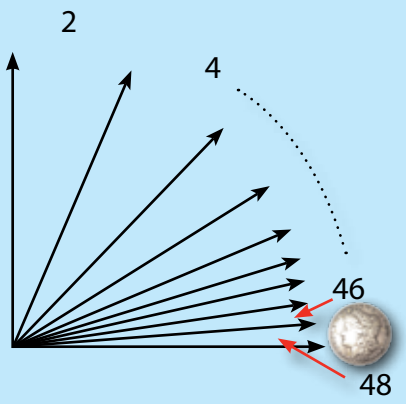
3 kHz - modified TID "bin" separation

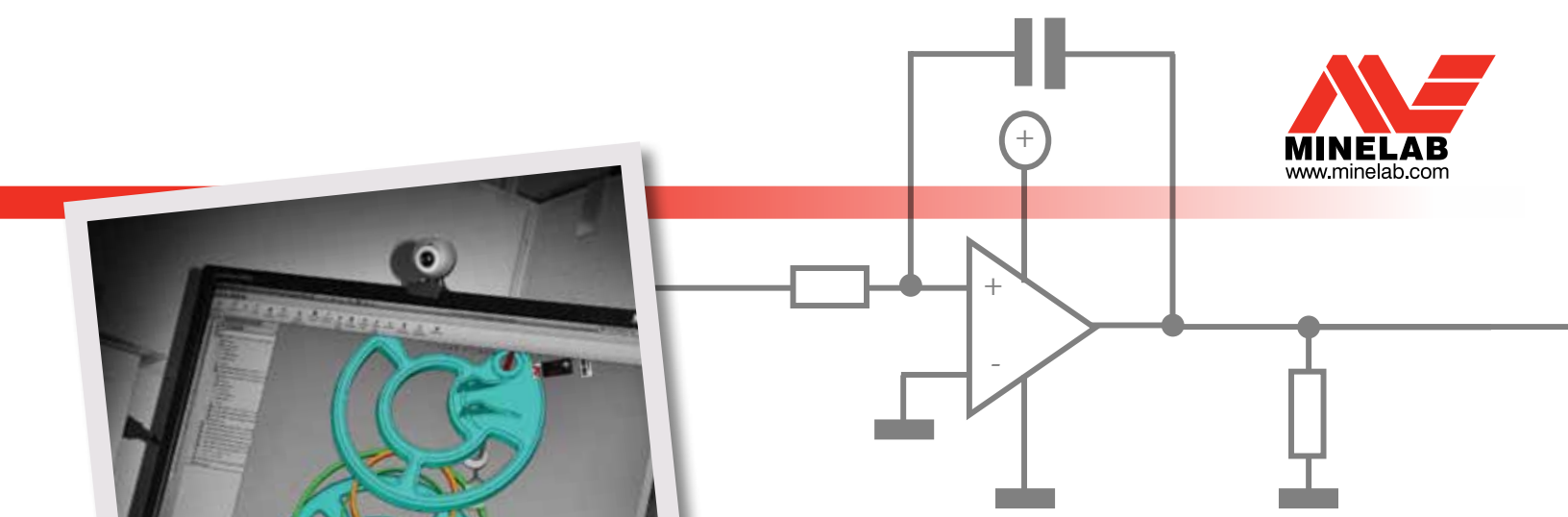


7.5 kHz- standard TID "bin" separation



18.75 kHz - modified TID "bin" separation



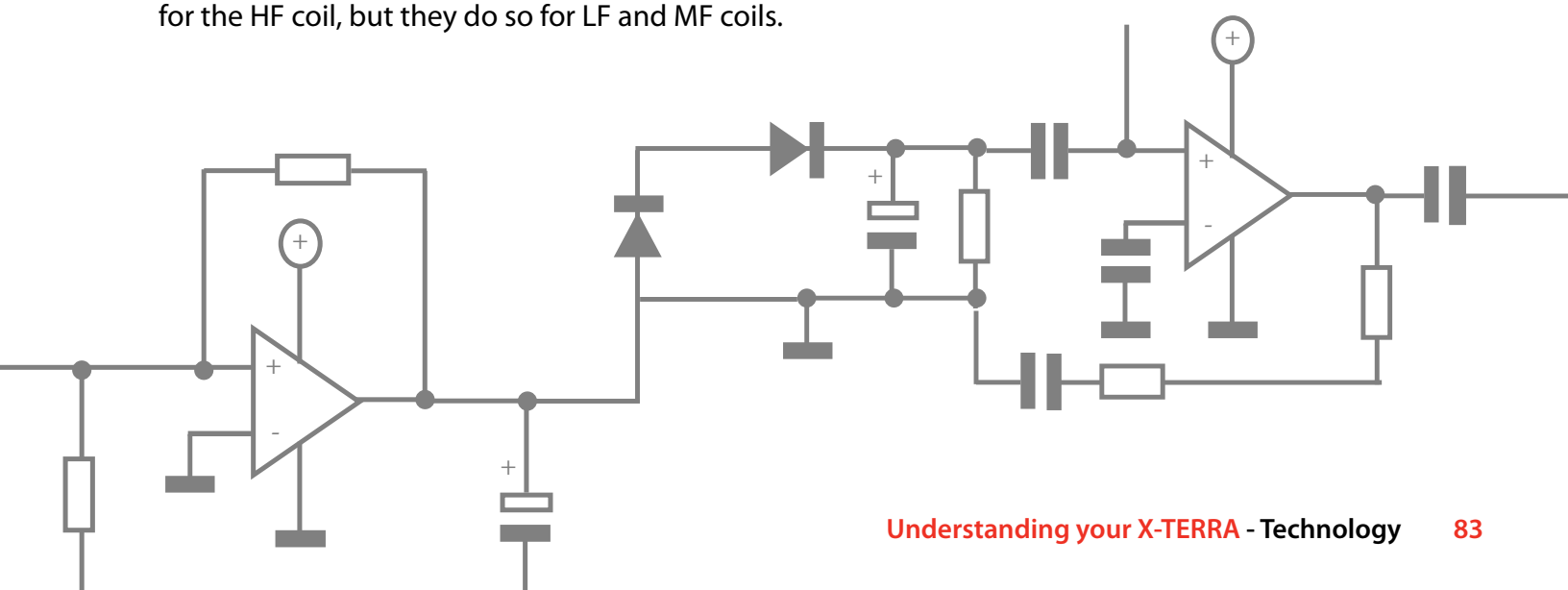


Normally, changing the frequency of the coil by a large amount (e.g. from 7.5 kHz to 3 kHz or 18.75 kHz) would drastically change the TID of a target. However, because we wanted the TID's to be the same regardless of the coil frequency, the correspondence between the phase angles and TID's for the LF and HF coils has been modified (recalculated see illustration on pg. 82) to be similar to those for the standard MF coil. This further distorts the TID "bin" size for LF and HF coils.

How coils identify targets in very close proximity to the windings

It is known that continuous wave metal detectors can be unbalanced (detuned) by targets, in particular higher conductivity and larger mass coins, that are in close proximity to the coil and this can change the target phase angle of the TID sufficiently to push it into the next "bin". Also, close to the windings, the target is seen more like a collection of parts than a whole and this also affects the TID.

Now that we have covered the background theory, the answer in this case is: the recalculated TID of the U.S. silver dollar is closer to the centre of "bin" 48 for the HF coil than it is for the LF or MF coils. Small changes due to proximity to the windings are not enough to make it flip into "bin" 46 for the HF coil, but they do so for LF and MF coils.



Q & A with Laurence

Question. For many metal detectors, implementing Noise Cancel is typically a slight shift in operating frequency. If the Noise Cancel process of the X-TERRA is similar, how much of a frequency shift does each channel of Noise Cancel represent?

Answer. Similar to other metal detectors, the Noise Cancel in X-TERRA changes the operating frequency of the detector by a small amount around the resonant frequency of the coil. This precludes narrow band interfering signals from affecting the operation of the detector. Because X-TERRA uses pure sine waves for demodulation, the interference must be very close to the operating frequency to be a problem. Of course, broadband interference (like that from car ignition, electric welding or thunderstorms) cannot be cured with Noise Cancel, but in this case the very sharp and deep attenuation of the digital filters helps minimize the effects.

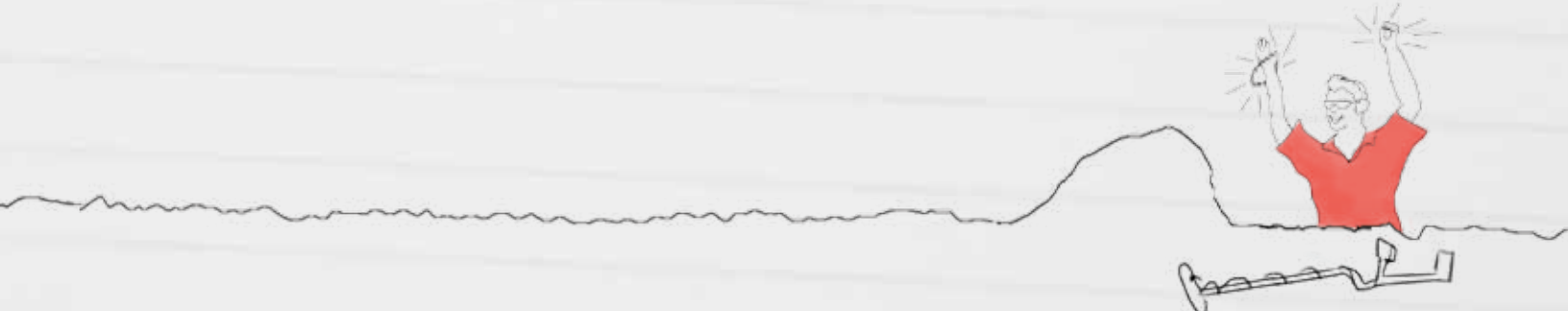
The number of steps (3 or 5) for Noise Cancel depends on the model of detector, with frequency 0 being always the resonant frequency of the coil, as recorded in the coils microcontroller during the calibration at the factory. The steps in frequency depend on the coil frequency, with LF coils having smaller steps and HF coils having the largest steps:

- LF Noise Cancel frequency step: 35 Hz
- MF Noise Cancel frequency step: 40 Hz
- HF Noise Cancel frequency step: 80 Hz

		Noise Cancel Channel				
Detector	**Coil freq.**	**-2**	**-1**	**0**	**1**	**2**
X-TERRA 305	**7.5 kHz**	7.420 kHz	7.460 kHz	7.500 kHz	7.540 kHz	7.580 kHz
	18.75 kHz	18.590 kHz	18.670 kHz	18.750 kHz	18.830 kHz	18.910 kHz
X-TERRA 505	**3 kHz**	2.930 kHz	2.965 kHz	3.000 kHz	3.035 kHz	3.070 kHz
	7.5 kHz	7.420 kHz	7.460 kHz	7.500 kHz	7.540 kHz	7.580 kHz
	18.75 kHz	18.590 kHz	18.670 kHz	18.750 kHz	18.830 kHz	18.910 kHz
X-TERRA 705	**3 kHz**	2.930 kHz	2.965 kHz	3.000 kHz	3.035 kHz	3.070 kHz
	7.5 kHz	7.420 kHz	7.460 kHz	7.500 kHz	7.540 kHz	7.580 kHz
	18.75 kHz	18.590 kHz	18.670 kHz	18.750 kHz	18.830 kHz	18.910 kHz

It should be noted that operating on a frequency different from the resonance of the coil introduces a phase angle shift, but VFLEX technology accurately compensates for this and neither Ground Balance nor TID are affected.

Final Words...



My Settings

When people ask what settings I use, I generally tell them that they should adjust their detector for their site, using the procedure I've outlined in this book. Then I tell them I hunt in All Metal, (zero discrimination), with Multiple Tones. All Metal allows you to hear every metallic target the coil passes over. But if I had to pick one specific setting, I would chose to hunt in a Discrimination Pattern with all the notches set to accept. I refer to this as zero discrimination because it is a Discrimination Pattern that is not rejecting any notch segments.

I like using zero discrimination in a Pattern for two reasons:

Reason one...

Running in a Discrimination Pattern with zero discrimination more accurately identifies deep iron as a ferrous target, compared to the All Metal. In other words, deep iron gives fewer +48 signals in a zero Discrimination Pattern than it does in the All Metal. Again, I believe this reinforces my circular discrimination theory mentioned previously, as properties assigned to a specific notch segment are the only target properties you will detect.

Found in an old country church and a yard

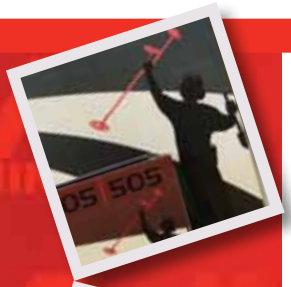
In All Metal, those deep iron targets are more likely to bounce between the most conductive reading of +48 and the most ferrous reading of -8. Having a specific notch segment established to accept the most ferrous property values (-8) results in less TID bouncing (-8 to +48) on deep iron targets. X-TERRA users will find that the higher frequency coils produce more "wrap around" signals than lower frequency coils. This is due to the fact that the higher frequency coils expand the TID range for low conductive targets, but compress the TID range of higher conductive targets. Since the highest notch segment of the X-TERRA 505, 70 and 705 is "tighter" (by design) than the other notch segments, you can greatly reduce the effects of deeply buried iron by rejecting the +48 notch segment.

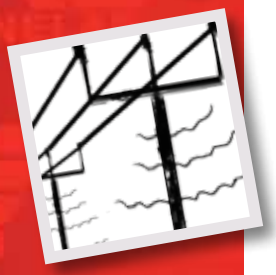
Some silver finds made with my Minelab detector.

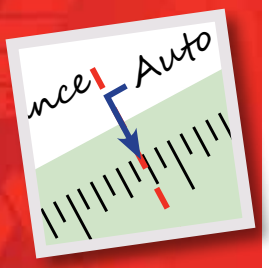
Reason two...

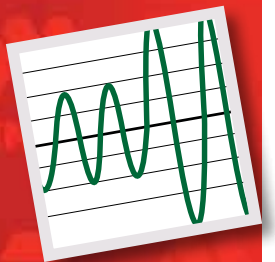
When you turn the X-TERRA on, all the settings you used the last time you hunted are saved, with one exception. It will not turn back on to All Metal. It always sets up in the last Discrimination Pattern you used. So, in order to not have to worry about forgetting to switch to All Metal, I established one of my Discrimination Patterns to accept all notches. This way, when I turn on the detector, it sets up in a Discrimination Pattern with zero discrimination.

Review









Study the Instruction Manual.

Know what functionality is controlled by each setting, and how proper adjustment of those settings will directly impact the success of your hunt.

Always check your Noise Cancel Channel and Ground Balance every time you change sites or switch coils.

Check your Ground Balance every few minutes.

Recognizing that the software application of the X-TERRA is much more precise than our ears, use the Auto features whenever possible.

When you set your Sensitivity, remember the analogy of headlights in the fog. Having the Sensitivity too high can result in missing good targets because they are hidden amongst false signals.

Learn to discern the audio tones. Hearing the audio tones produced by an adjacent piece of trash AND a good target is much more productive than a good target being blanked out by the rejection of the trash.

If you want to find a deep "keeper" that the last person missed, keep discrimination levels low and apply the three rules of consistency; location, sound and TID.

As you approach a hunt site, don't be afraid to think "outside the box". Instead of just walking around the base of that big tree, try hunting that area that is shady during the late afternoon/evening hours.

Analyze the site, plan your hunt and hunt your plan. I've found many coins by hunting over an area from a different direction than my initial instinct told me to hunt.

As you sweep the coil, overlap your swaths accordingly and slow down your sweeps.

Learn how to separate target sounds.

Having metal detected for almost 40 years, I'm convinced there are more old coins left in the ground due to target masking as opposed to being at extreme depth.

Glossary of Terms

Concentric coil

A Concentric coil has an inner circle and an outer circle wire winding. Its search pattern is cone shaped and can be useful for accurately pinpointing a target.

Conductivity

Conductivity refers to how well a target allows electrical current to flow through it. In other words a highly conductive target has low electrical resistance and therefore allows current to flow more easily.

Discrimination

Discrimination is a metal detector function that recognizes the differences between various types of targets. The discrimination feature on Minelab metal detectors measures two target properties: ferrous properties and conductive properties.

Double-D coil

A Double-D coil has two overlapping wire windings in the shape of two D's (one reversed). The characteristics of a Double-D coil are stability (especially in heavily mineralized ground), good depth and sensitivity, and a very thorough search pattern.

Eddy currents

Eddy currents are tiny electrical currents that are induced into targets when a metal detector's electromagnetic field is present. These eddy currents then generate an electromagnetic field around the target which can be received by a metal detector's search coil.

Ferrous

Ferrous objects/targets contain iron and therefore are attracted to a magnet. e.g. horse shoes, nails, tin cans.

Frequency

The frequency of a detector refers to how fast it is sending (transmitting) signals into the ground and receiving them back. Different frequencies find certain targets better than others, e.g. high frequencies find very small targets while low frequencies find deeper/larger targets.

Hot rocks

Hot rocks are rocks that are mineralized differently to their surrounding ground. For example a highly mineralized rock buried in mildly mineralized ground would be considered to be a hot rock. However, a highly mineralized rock in an equally highly mineralized ground would not be considered to be a hot rock.

Ground mineralization

Ground mineralization refers to how magnetic the ground is. This doesn't mean that mineralized ground produces a magnetic field, but it does mean that particles or grains in the soil will be attracted to a magnet.

Noise Cancel

Noise cancel is a metal detector feature that shifts the metal detector's operating frequency or frequencies to reduce the effect of environmental electrical noise, such as power lines, cell phone towers and other metal detectors.

Non-ferrous

Non-ferrous materials do not contain iron and are not attracted to a magnet. e.g. coins, gold & silver rings, copper artefacts.

Signal

Signal refers to both the transmitted magnetic field from the detector's search coil and the received magnetic field from a metal target.

Target

Target refers to any metal object that can be detected by a metal detector. A target can be either valuable coins or junk like bottle tops. The term does not refer to the value of the object.

Target ID (TID)

TID numbers are numbers that identify targets based on their ferrous and/or conductive properties.

Threshold

Threshold is the continuous sound emitted by a metal detector that is used by the operator to monitor for target signals . The Threshold will also blank to indicate that a discriminated target has been detected.

VLF - Very Low Frequency (also known as CW – Continuous Wave)

VLF is a type of metal detection technology. Metal detectors that use VLF technology create an electromagnetic field that is applied to the ground in a continuous wave.

Conclusion

In conclusion:

My definition of "treasure" may be different than yours. The old farm sites and fair grounds that I like to hunt may not be the same type of places you like to hunt. And, although there may be similarities in our hunt style, I'm confident that some of our techniques will vary.

This eBook is a summary of how I set-up and operate my X-TERRA. It is not the "final word" on how to maximize the potential of your X-TERRA. There is no "final word". Not as long as we continue to learn each and every time we go detecting.

My goal in writing this eBook has been to help you make the most of your X-TERRA experience. Hopefully, you'll apply what you've read here, build on those experiences and achieve your own goals.

Enjoy the hunt.
Randy aka "Digger"

Randy AKA "Digger"

May 2011

Awarded Best Finds Of 2009 & 2010. Both finds were 1877 Indian Head cents.

Western & Eastern Treasures Magazine
www.treasurenet.com/westeast/

Success Stories from Minelab

Dear Reader,

We hope you have enjoyed reading "Understanding your X-TERRA" by Randy Horton. Here are some more Success Stories submitted to **www.minelab.com** by other successful X-TERRA detectorists from around the world.

Regards from the Minelab Team

" I was daydreaming of how nice it would be to find a coin from the early 1800's or 1700's but that will never happen to me because I live in Montana. And WHAM! The next day I find a 1758 penny. I absolutely love my X-TERRA 705 for both coin hunting and gold nugget shooting."

Reese Townes – Montana, USA
X-TERRA 705

"I dug down and a hexagonal shaped object popped out. After a clean with some water I found out that it was a Western Australia dog registration tag dated 1909"

Max Fusco (11 years old) – WA, Australia
X-TERRA 705

"Thirty two coins from 1946-1948. They have not a big charge, but for beginner and moreover by Good Friday it is a big adventure."

Paul Tresl - Czech Republic
X-TERRA 70

"I found a 1953 silver quarter, a silver heart shaped pendent, a 1973 dime, a 1965 penny and a lot of iron targets as well... There's just no better metal detector than a Minelab as far as I am concerned."

Martin Boersma – Michigan, USA
X-TERRA 505

"With metal detector X-TERRA 705 I found these old objects. They are from 3rd century (ROM-EMPIRE) 3 coins, 1 silver bracelet, 1 old key, 1 old padlock. The big coin is from Gaius Aurelius Valerius Diocletianus, was a roman emperor from 284 to 305."

Stojan - Macedonia
X-TERRA 705

"HOLY CATS MAN its a STANDING LIBERTY QUARTER. WOW, I was so stoked. I jumped to my feet and held that awesome Quarter towards Heaven and thanked God out loud."

Jeff Pearson - WA, USA
X-TERRA 705

"After only an hour of hunting I dug a 10k gold ring. In all the hours I had put in on my old detector I had never found any gold items... Every day I can't wait to get out and use the detector again."

Travis Cole – Indiana, USA
X-TERRA 305

"This coin hoard was found with the X-TERRA 705 in "La Media Luna" in Jalisco, Mexico. We were following a family history about an old man who buried this cache of coins... 98 coins were found, from silver to copper, from 1920 to 1950."

Ignacio Moreno Nava - Mexico
X-TERRA 705

Doc name: RHUYXT2011

About the Author

Randy (or Digger as he's known) has been metal detecting in the Central US for nearly 40 years and has a passion for finding old coins at old sites. In addition to performing field tests for several manufacturers (including the Minelab X-TERRA series), he also serves as Moderator on the X-TERRA forum at Find's Treasure Forums. Digger has written several articles, and enjoys sharing his thoughts and tips on various aspects of the hobby. His detectors of choice include the X-TERRA, E-TRAC and Musketeer Advantage.

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