

Performance Testing for Nail Infested Sites

A quick study of target masking from iron nail trash.

Let me start by saying that target masking is one of the more misunderstood topics related to metal detecting. Part of the problem might be due to the fact that most hobbyists do not know how a metal detector “detects” in the first place! I will not go into a technical discussion of that here, except to say that most metal detectors for hobby use operate on the Transmit/Receive principle which generates an electromagnetic field that radiates about the search coil. The detector senses changes to this induced field and responds to them. If the discrimination is set to ignore certain metal conductivities, and if we’re using a Threshold-based model, then we might hear the change. If the detector operates on the ‘silent-search’ principle, we don’t hear the rejected response. However, if the object is an “accepted target” we hear the audio response from that change in the electromagnetic field.

There are two general classes of metal that affect the generated electromagnetic field, and their effects are different. The two types, or classes, are iron and non-iron, or ferrous and non-ferrous. A ferrous target will enhance the electromagnet field, producing a larger change. We seldom hear this reaction, however, because we are using discrimination and the change is rejected audibly. If you checked an iron target and non-iron target of the same size, shape, and thickness using a Threshold-based All Metal mode, you would usually see that the iron target causes a wider or larger response and is generally able to be detected deeper as well.

What does this have to do with hunting in iron nail-strewn sites? Just this, iron causes a stronger or larger or bigger signal than does non-iron, and therefore target masking will be greater ... especially if you use much discrimination!

Most people who know me, hear my presentations in seminars, or read many of my postings on various forums, know that I prefer to use a very low level of discrimination. Only enough, as a rule, to deal with the most annoying trash at a site and, in old ghost towns, renovation work, or similar sites, I like to use “*just enough*” rejection to kick out a surface nail. Not a lot more, only “*just enough*.” A lot of the time I search in the Discriminate mode while accepting ALL metal targets, but when I do decide I’ve had enough of the noise, it’s only iron nails that I knock out.

Every detectorist will, at some time, do some simple “air testing” and that’s fine. It has its purpose. However, to really understand what a detector is capable of, it is always best to have the test target laying on the ground and the search coil in motion. This adds the all-important factor of “ground signal” for the detector’s circuitry to have to deal with along with the target signal. Thus, I always prefer to compare detectors and/or search coils in the “real world”. If not, then I’ll use a scenario that duplicates a challenging in-the-field situation. This brings me to my ‘**Nail Board**.’

My **Nail Board** is simply a thick piece of cardboard with four nails secured to it. Marked on the **Nail Board** are two coin-sized circles representing test positions. In the case of my nail board, the nails are of the size and position ‘as found.’ As found? Yes, and here is how my ‘**Nail Board**’ came to be.

I was on my way from NW Oregon to Prescott, Arizona in May of ‘94 to give a week-long class at the college on “Recreational Metal Detecting.” I met up with some friends and club members in the ghost

town of Frisco, Utah that Memorial Day Weekend, having several detectors with me for evaluation. One newer unit that I felt had limitations in dense iron junk, even with an assortment of search coils, and I also had my personal White's 5900 Di Pro SL along with 6½", 8" and 9½" coils, which also worked on the XLT. Also along was a trusty Tesoro Bandido w/7" coil, a Silver Sabre II w/8" coil, an early White's Classic w/8" coil, and several others, including the newer unit I was evaluating.

I could only carry and shuffle a few detectors and coils as I hunted and compared detectors and coils as I worked up and onto the barren hilltop where the school house once stood. I was pleased to see nails scattered everywhere! Pleased, I say, because I wanted a tough test to evaluate detectors and coils for target masking in iron trash.

As I progressed on top of the hill detecting, I spied a disc-shaped object laying on the surface (common in these western ghost towns and many other older sites) bordered by nails. I bent over and brushed the dust off of an Indian Head cent. This was going to be the perfect comparison! I felt comfortable knowing which model(s) would and would-not detect the penny, and I called several friends over to "try their luck" with the detector and coil they regularly used. You should have been there to see the shocked and surprised expressions!

High-dollar detectors combined with big coils and improper adjustments left the owners pondering what they might have been walking right over. I knew which detectors would handle the nail trash well and summoned three friends to the top of the hill. Set to just kick out the iron nails, they all sounded off brilliantly on the coin! I then moved the coin over (to what is shown as position #2 on my '**Nail Board**') next to one of the nails.

Again, puzzled faces. Even those who could "sort of" get an occasional hit on the coin in Position #1 were out of luck on the Indian Head cent when in Position #2. The winners? Tesoro's, and White's Classic models out of those which were present at the time.

So, I used a piece of note paper to mark the position of the nails and coin, and then recovered the nails ... and the Indian Head. ☺ I then could make the 'nail board' by using the nails from the site, and the positions of these different-sized nails, and placing them in the same orientation as what I encountered in the field. This is what you see represented on the included paper.

So that people from different parts of the country can compare results with various makes and models of detectors and coils ... while keeping the test sample the same, I made up the "**Nail Board**." The only difference other, than operator control and detector set-up, is the ground mineralization. Yes, the mineral conditions can have an effect, but this way all other factors are the same in comparing an iron-masking situation, as long as you match up the size and shape/position of the nails chosen.

Search for some nails to place on the '**Nail Board**' in the appropriate positions. You might want to affix them to a thin cardboard piece for your own evaluations. This is simply comparing responsiveness to a desired target laying flat and positioned on the same plane as four iron nails as shown.

Here's another 'test' you can try using four nails. Some might say this isn't a practical comparison, but it is an interesting one anyway. Two friends & I were at the home of one of them who, at the time, was a Tesoro dealer. It was late '97 and he hunted mostly with the Silver Sabre II and Bandido µMAX and had just received a shipment that included the new Bandido II µMAX. After assembly and a little testing in

his display room, we were going to step out into his front yard and compare the performance of the new model with his unit, also with my 'original' Bandido and Pantera.

We stepped onto his covered front deck just as the rain began to really pour! After a moment, he decided to just toss a nickel (US 5¢) down on the deck and do what he thought would be a simple "air test," since the deck was about a foot above the ground.

He turned on the new Bandido II μ MAX and swept the 8" coil about 3" over the 5¢, but got nothing solid. Just noisy 'ticks' and 'clicks.' It was my turn to get a laugh because I could see that the coin had slid to a stop almost dead-center between the four nails that held the decking down where the ends butted. I think they were 2X4's. The then-new "low-noise/high-gain" circuitry just didn't handle the iron nail rejection very well, thus the iron nails ('on end' in this situation) caused a lot of good-target masking.

My Bandido w/8" white coil and Pantera w/7" coil sounded off quite nicely, and so did his Silver Sabre II and Bandido μ MAX, but not the newest and supposedly better Bandido II μ MAX model.

So, just for fun, take four decent-sized nails, like you would use to nail down a couple of 2X4 (maybe it was a 2X6) boards as if butted together, and poke them through a piece of cardboard or something in a position as described. Straight down. You could even stick them in the ground with the nail heads all flush with the ground. Nails in this position have a somewhat different effect on the electromagnetic field. Anyway, with them stuck thru some cardboard and then into the ground, so the heads are all flush, adjust for the lowest discrimination setting that just barely rejects the iron nails. Next, lay a 5¢ coin dead center between the nail heads.

The goal here is to just barely reject the nails, but still get a good audio response from the coin. Forget visual Target ID or audio Tone ID as I haven't seen a TID model yet that can pass the **Nail Board** and **4-Nail** tests and still give a decent Visual or Tone ID. Target masking, especially masking from iron trash, takes a toll on ALL Target ID circuits. When you're hunting in iron nail infested sites (or any trashy environment) the goal is to simply hear a possibly good target. Just try to get a 'beep' to prompt you to recover a target.

**** Remember, this is a *simple* comparison of a good target on the same plane as four ugly nails so it isn't really a 'fair' test of what to expect if an old coin is 3" or 4" deep and a nail or two are located only 1"-2" deep and directly above the good target, or very close to it. Nothing is 'perfect' in the world of detecting but learning our detector and coils and how they might deal with common challenges is important.**

In the past few years, when hunting sites with very similar iron nail challenges, I have relied on 4" to 7" coils, most of the time, and had some of my best personal success with these 'tests' using a few models from Teknetics, White's and Tesoro.

Enjoy playing with the **Nail Board** and nails. It would be interesting to know which model detectors and coils you use that will work, and not work, and I welcome any E-mail regarding **your** tests. You can reach me at: monte@ahrps.org

Happy Hunting in iron nail infested sites! ☺

