

ELECTRONIC PROSPECTING

By (Jimmy Sierra) Normandi



The most exciting new development in gold hunting is Electronic Prospecting or Nugget Shooting, as it is better known. I wanted to give you the best information available and since I have done some nugget shooting, I am not an expert by any means. I have asked James (Jimmy Sierra) Normandi, who qualifies as an expert with any type of metal detector, to help with this chapter.

He has found many treasures and has nugget hunted successfully both here as well as world wide.

He is the author of several books on metal detecting and helped design many of the outstanding metal detectors manufactured by Whites Electronics.

He has allowed us to use excerpts from his book "FINDING

GOLD NUGGET'S WITH A METAL DETECTOR'.

For a more complete understanding of this method of gold prospecting, pick up a copy of his book. It is packed with information told in a way that even the greenest begginer can understand. Let Jimmy tell us how we can find some of that gold that is buried out there.

WHICH DETECTOR IS BEST FOR GOLD PROSPECTING ?

The main characteristic to look for when choosing a detector for prospecting is whether or not it will handle the extreme ground mineralization where most gold is found. This requires the ability to cancel ground minerals and resist the tendency to overload the audio circuit when used in these highly mineralized conditions. Dedicated prospecting detectors accomplish this task. Some better than others. Check with your local detector dealer for advice about what is available. Another valuable asset for a prospecting detector, is the ability to "see" extremely small pieces of gold. Higher frequencies tend to see smaller items than lower frequencies. However, lower frequencies tend to penetrate highly mineralized ground better. Again, higher frequencies are better at seeing low conductivity metals such as gold. It is therefore good to choose a detector which balances these needs to get the best out of them. I guess by now you realize that there is not just one characteristic which makes a good prospecting detector but a number of qualities which blend together to form a "good"

unit. Then, of course, you must pass your coil over the gold before you can find it. That is probably the hardest part of all.

Until recently, most prospecting units required the spinning of knobs to control the ground mineralization, much likened to the shifting of a 4 wheel truck. Now, however, there are a number of units on the market which "cancel" ground mineralization automatically while the coil is moved over the ground. This process is called "tracking" or "automatic ground canceling". The faster the tracking, the easier the detector can accommodate the changes in ground mineralization. There are times when manual ground balancing works better and times when tracking is the only way you can operate. The thing to look for is "how smoothly your detector will operate. That is to say, is the tracking system noisy? Does the operating threshold hum stay smooth and not produce false signals or excessive chatter. When you are making these determinations, be sure you are not running the Gain or Sensitivity level too high. Just as when driving a truck on a curvy road, too much throttle will put you over the cliff not get you there faster. Use enough sensitivity or gain to keep a smooth operating detector. In that way you will hear the tiniest pieces of gold.

Bottom line, is to choose a unit that you feel comfortable with. The best way to choose one is to talk to those who use them. Ask questions. As your local dealer or the local distributor for details about their detectors. Just because the detector is the most

expensive one doesn't make it the best for you. Some will prefer manual some swear by tracking. There are now units which allow you to switch from tracking to manual. This is a very good feature. I believe you should have a way to lock the tracking system for those times when holding the ground tune to one spot just works better.

Some prospecting units have a way to help identify trash items which can be a real pain in the neck while prospecting. The old timers left a lot of iron trash behind them when they searched for gold and it is still out there. Be careful, however, when choosing a prospecting unit, not to depend on a system which utilizes the type of "discrimination" which is found on "coin detectors" This form of discrimination will reject gold in mineralized ground. It might work great in an "air test" or on top of the ground, but in mineralized ground it is bad news. All that you want is some method of identifying iron. You MUST dig every target that you cant be sure is not iron. If you have a doubt DIG. Even the best Iron Identification systems are not perfect. If the mineralization is bad enough, even they may not be dependable. But, some way to eliminate even part of the iron trash will be helpful.

Most recently, a few good "multipurpose" detectors have come on the market which WILL work in high mineralization, will track automatically, have iron identification systems that are not designed for coin hunting and will see small targets. Again, check with your local dealer to find out about these units, if you want to do some coin and jewelry and relic hunting as well as some gold prospecting.

PROSPECTING EQUIPMENT

Now that you have chosen your new prospecting detector or perhaps

your multipurpose unit will do the job, you must gather together some important "tools of the trade."

HEADPHONES:

Although any decent headphone is better than no headphone, the better ones usually sport higher impedance. It is important that the impedance is balanced as well, so that the signal is clean and sharp. I recommend a pair with volume controls on each ear independently. Most of us don't have the same level of hearing in each ear. Comfort is important as well, as a headphone which hurts your ear after a few hours will distract you from hearing those faint targets. Try them on before you buy. Usually the more you pay the better the headphone is, but the best test is to test them yourself.

TROWELS

The most common digging tool is the common trowel. These come in a variety of sizes and shapes and your dealer will give you a good choice, I am sure. If he doesn't have one you like, just visit the local nursery or hardware store. A stainless steel trowel is a good investment as it will not rust and will give you a lifetime of use. Some have a serrated edge to cut roots when you have to dig around the base of a tree.

THE SIERRA CUP

A cup made of plastic that cannot be detected by the detector as material is swept over the detector coil. This type of cup aids in the material after it has be dug up.

MAGNETIC HOE

My favorite tool is the hoe style pick. It has a claw head on one side and a flat pick mattock head on the other. It is not as good for removing dirt from a hole as the trowel, but is very valuable if the soil is hard or rocky.

ROCK PICK-CHISEL CREVICER

If you are working bedrock crevices, this can be invaluable. It is pretty hard to break heavy bedrock with a mayhoe or trowel. This tool is heavy itself and should only be carried when you expect to work in non-decomposed bed rock. Decomposed rock will break apart more easily with light tools. A small crevice tool also comes in handy for pulling out those tiny pieces of gold.

DIGGING POUCH

Most prospectors carry some sort of pouch to put their digging equipment in as well as to carry home the assorted pieces of trash they accumulate There are a multitude of digging pouches available in every shape and material. Merely choose the one that suits you.

HOW DO I FIND THE GOLD NUGGET?

Alright, you have the right detector, a good set of headphones, something to dig with and a pouch to place the trash items you have collected. Now you think you have a gold nugget located. But where is it? It must be small, because it keeps moving around in the ground as you try to locate it. If it were larger you would surely see it and you could be on your way. This is where the skill will come in. Some hunters use a small plastic gold pan or they use a small plastic cup, commonly referred to as the "Sierra Cup". Some will just trickle the soil on the top of the loop.

WHAT SHOULD I PUT THE NUGGET IN?

Finally, you need something to put the gold into. The most practical container I have come across is a plastic 35mm film canister. It has a large opening. I wasted much time looking for small pieces of gold which

missed the opening of my gold vial before I discovered the film canister. In addition, stay away from glass containers. Gold, even small pieces, will break the bottom out of a glass vial in time. If you find a piece of gold larger than will fit into a film canister, you have my permission to put it into your digging pouch or pocket.

IS A HIP MOUNT KIT ESSENTIAL?

Most gold prospecting units today are compact and light enough to operate in the standard hand held configuration. That is, with the control box mounted directly on the rod which is connected to the loop. The entire unit is, thus, in one piece. Some of us find this heavier than we would like, particularly when swinging it all day long. There are usually alternative mounting options supplied with all brands of detectors. The most common is the hip or belt mount. In this configuration, the control box is mounted on a belt around the waist and only the arm piece connected to the loop is swung over the ground.

Multipurpose detectors are usually more bulky and heavier and are more frequently adapted with hip mount kits to give more comfortable operation. Most of these kits are reasonably priced and are well worth the investment

Well, we have our detector, understand its use and hopefully practiced with it for a while. We have packed our vehicle with all the necessary gear and supplies we need for our trip and have chosen a place to try our luck. I mentioned earlier that most of the detectors acceptable for prospecting are very similar in their controls and operation. The specific operating instructions should be acquired from the factory manual and the dealer you purchased the detector from.

I told you that there were basical-



Jimmy (Sierra) Normandi using a Hip Mount Detector to check for gold in the banks of a stream

ly two types of detectors used. The first type is the specialized prospecting detector. These can also come with manual ground balancing or automatic tracking ground balancing. Some of these can have a form of discrimination to eliminate iron trash. These usually have a higher frequency and more effective ground canceling controls.

The second type has a all purpose discrimination only and some with a meter or screen to help identify discriminated targets

Let us start with the first time I went prospecting with a metal detector. At the time, there were no detectors specialized for prospecting only. Oh, there were a few which had names given to them by the manufacturers which were made to indicate that they were to be used for prospecting. But, in reality, they were really what I have been referring to as

multi purpose detectors. They were originally designed for coin hunting and because of their ability to cancel mineralized ground, found double use as prospecting tools. I would never attempt to discredit this gender of detector. They have always produced ample quantities of gold and in fact still do. In fact, most of the large nugget's I know of were found over the years with this type of detector both here and in Australia. ~

Fortunately, I went with my good friend and mentor in the field of prospecting, Jim Williams of Rancho Cordova, California.

Jim pointed out some likely spots where he had found pieces of gold on the earlier trips and turned me loose. No instructions, of course, as I had been detecting for years and he didn't feel I needed any special advice. In retrospect, I am sure he just wanted me to learn the hard way, like he had.

I set the detector in the all metal(non-motion mode of operation) and the discriminator dial set to just reject nails. I set the sensitivity at a level where there were no false or spurious noises when I moved the loop over the ground while searching. With the threshold hum at a faint level and the volume control on the headphones set to give a strong, but not ear shattering response to a target and the detector ground balanced I was ready to start hunting. I was using a 4" coil on my detector as Jim had warned me that pieces of gold were small. I tried the tops of ridges, the steep banks, gullies, everywhere I thought a nugget might be hiding. I ground balanced the detector each time the ground started to get louder or softer. Ground balancing is essential.

I searched and searched until lunch time and had not found anything except for a few large lead rifle slugs. I could hear Jim yell every once in a while that he had found another piece. I had worked faster and faster hoping to get a piece before lunch. No such luck. What was I doing wrong? I had decided earlier that he had cleaned the place out and was letting me work the old areas while working the virgin territory himself but I asked him anyway. He answered straight away. "Your moving too fast...take your time...the targets are small ...real small and they don't sound like coins... slow down your swing, almost crawl across the ground. Remember you are listening for a faint increase in the threshold hum. It will sound like a coin but much fainter". After lunch using his advise my luck changed and I found my first small piece of gold.

If there is no discriminat,or target identifier on the unit you are using you must dig all the targets if you want all the gold. After a while some



Jimmy (Sierra) Normandi

Detecting fine gold in the desert of Arizona

prospectors say they can tell the difference between iron and non iron by the sound. Nugget's seem to have a sharper peak and softer sound, iron targets seem to have a flatter or broader peak and sound harsher. And of course, the telltale double beep of a nail laying straight out is a clue for everyone using a non discriminating detector for either coin hunting or prospecting. Tracing the size of the target is also a clue, but some nugget's can be awfully large and you wouldn't want to walk away from a big one. In this non motion, all metal mode, you can also try the trick of seeing how large an area of the loop is sensitive to the target. For example, a non iron target is usually detected only within the diameter (an area no wider than the loop), while an iron target is usually detected well beyond the edges of the loop. If you have no discriminator, learn to interpret targets; if you have one, learn its limitations. When in doubt, dig !

I mentioned that I had not attempted to use the discriminating capability of my unit in the excitement of my first find. Had I done it, I would still have had to dig the target because it was lead. If attempting to discriminate, the electronic prospector must dig all targets made of lead, brass, copper, aluminum and silver as they are all potentially able to be a

piece of gold. Iron is the only type of trash one can chance to ignore. I have also mentioned in the beginning of this book, while describing different detectors, that no discriminator is infallible.

The size of the target, the depth of the target and the degree of mineralization in the ground can all confuse even the best discriminator. In this particular location, the discriminators worked with predictable dependability. The ground was modest and a little practice made the identification of iron pretty accurate. One has to weigh the value of leaving some small pieces of gold behind in this instance against digging a barrel full of nails and trash. I think most would agree that if the ground is too mineralized, the toss should go for digging everything. To find out if you can depend upon the discriminator, just use a few test nugget's in the ground.

I worked on top of the ridges and mounds where the winter and spring rains had washed some of the overburden off. I worked the banks which the water runoff had eroded. I worked the places where the bedrock was crumbly and you could see the cracks and crevices. All of these places produced gold. I noticed that I got pieces hidden under the limbs of bushes where others had ignored. This is the advantage of using a small loop. After



Jimmy (Sierra) Normandi

searching gold in high bench tailings in Northern California the trip I felt that I had come back a little more of an expert.

It was only a matter of time after the modern gold rush started in Australia in the early 1980s before we would see metal detectors marketed for gold prospecting exclusively. They had the necessary features and capabilities and with time acquired names applied by marketing departments to enhance their sales. Some were better than others, but all found gold.

Little by little, certain features were changed and enhanced. Each bringing us a little better performance. Loops were developed to find smaller targets, to detect targets deeper, and to scan larger areas. Discriminators were modified for improved target identification. Operating frequencies were changed to achieve improved sensitivity to gold in mineralized ground. Thus, a new age was born, detectors designed especially for the gold market. The metal detector industry

would never be the same.

All these gold detectors seem to share common traits: higher transmitting frequencies than multipurpose models, extensive ground balance capabilities, and steps to avoid overload in highly mineralized ground. It wasn't long before every manufacturer had their own favorite entry into this growing field.

Therefore it was soon realized by most manufacturers that higher transmitting frequencies saw smaller targets, and with gold areas being worked harder and harder, every target, no matter how small, was fair game. Of course, frequency isn't everything and the detector must fulfill all of the earlier mentioned qualities. Most of the entries in the market utilize manual ground canceling techniques, however there are some auto tracking units available. There are advantages to both styles. The choice is yours.

WHAT ABOUT HOT ROCKS?

This is about the nastiest word an Electronic Prospector can think of and one which can mean something different to almost everyone. I know there are technical definitions of hot rocks which I could conjure up but which wouldn't really do much to solve the problems they cause. I will try to put the whole issue into perspective and attempt to take away some of the fear of their presence'

The common denominator of all of these is the fact that they all make a noise when the detector loop is passed over them, thus misleading the operator into thinking that they are metal targets. I prefer to describe them as small or large concentrations of mineralization, usually in rock form, hotter than the surrounding ground in which they are found. By "hotter", I mean more heavily mineralized

The thing you have to overcome in learning to deal with hot rocks is to put aside any fear you might have of them and to forget the idea that you must eliminate them. What you must do is learn to identify them. That is, you must be good at telling the difference between a hot rock and a real metal target. I would be suspicious of any detector that never heard a hot rock under any circumstances. A particular rock can be considered a hot rock in one area and not be one in another area. By now, you should be getting the point; a hot rock is considered hot depending upon its relationship to the ground it is found in. The greater the degree of difference in mineralization, the "hotter" the rock. Therefore, the fact that the rock makes a noise is due to the change in mineralization. Some hot rocks are so mineralized, that they not only give a metal like signal, but they can overload the audio of the detector and neutralize the effectiveness of the loop. In other words, they kill the

detector's ability to detect any target.

Some of these hot rocks are on the surface of the ground and are much easier to identify. Some are deeper in the ground and some are as small as BB's. Since they exist partly due to their relationship with the surrounding ground, they present a somewhat different problem everywhere you encounter them. There are, therefore, many more hot rocks than you hear at any location. Some are too deep and some too small and some not mineralized enough in relationship to the ground. Thus, you will hear some and not hear others. You can obviously ignore the ones you do not hear.

Always tune or ground balance your detector to the general matrix of the ground. That is, to the average ground you are working in. Remember, the bulk of the gold nugget's you will retrieve will be found in the general matrix, and not necessarily under a hot rock. Now with the detector balanced, start to search. If you are going to have a problem with hot rocks, you will know about it in a short time, for you will hear noises you cannot seem to isolate. If you have a signal, that you can't seem to find because it moves around, be persistent. Isolate it. You must decide whether or not you are going to be bothered by hot rocks early on or you will be walking away from possible gold targets.

A few facts to think about: Very large hot rocks tend to give a sort of overshoot sound, like a "boing boing" with a sort of void in the middle, as the loop approaches and leaves the target. These are the easiest to isolate as they are usually on top of the ground and large. Just move them or walk around them. The same kind of rock, if found on top of the ground,



Jimmy (Sierra) Normandi

searching for coins and artifacts in the ruins of an old cabin will appear under the ground as well. If they are deep enough, you won't hear them at all. Hot rocks lose their

bang very rapidly as they get farther from the loop. Metal targets get gradually softer as they get farther from the loop. Smaller hot rocks are obviously harder to find. They sound more like targets as they don't give the overshoot or "boing" sound. The little red ones are the worst. The best advice I can give you is that they tend to have a broader peak sound and not as sharp a peak to the "zip-zip" of a good nugget target. If this sounds awfully confusing, I don't blame you. It is until you experience it yourself.'

.Since all hot rocks are a different size and quality, you might have to balance of a few more till you get the right amount of control. If you have to go too far off of the original ground balance to smooth out the hot rocks, the ground will start giving you a signal. This can obscure the good targets and could be worse than trying to adjust the ground control to ignore the hot rocks. Notice I said "ignore". This may be what you will have to do rather than adjust your detector to do it. That is, you may opt to train your ear to differentiate the different sound of a hot rock from the peaked zip of a

nugget. You will learn in time which system is best for the particular area you are hunting..

Some prospectors who work with multi purpose detectors utilize the rule that hot rocks that are detected on the all metal mode, will not be detected on the discriminate mode and vice versa. Therefore, because prospecting is done in the all metal mode, switching to the discriminate mode momentarily while passing over the target with the loop, could identify a hot rock. Thus, a hot rock which sounds off on all metal, will go blank on discriminate. The only weakness in this test, is that a small piece of gold in mineralized ground could also cause the sound to go blank as it was not a good enough signal to react. It works well in moderate ground and for larger than grain size nugget's.

Recently a lot of attention has been paid to dealing with these "so called" hot rocks. I have spent a good deal of time going further into detail trying to explain them in my most recent book "Finding Gold Nuggets 11" Briefly, we now try to look at hot rocks as coming in two varieties... positive and negative as they relate the ground matrix. Negative hot rocks (some times

referred to as "cold rocks") are usually magnetite and the "mother" of blacksand, the same type sand found in areas of rivers where gold is usually found. It is heavy and collects with gold. If large enough, they can overload a detector and these are the ones that give the "boing" when passed over. A good tracking system will handle them as long as the detector is adjusted properly. Without a tracking system, the best thing to do is to ground balance to one of them rather than the matrix and hunt slowly. The worst culprits are the positive hot rocks. These are usually magnetite or related minerals and are much harder to cancel out. Tracking systems and DID designed search coils give the best results when trying to deal with them. Again, read your detector manual or check out ZIP-ZIP, a book written by Larry Sallee, which covers in detail various methods of gold prospecting.

PUT IT IN THE SACK AND GO HOME !

Well, you bought your detector, stayed awake for the long drive to the gold fields, fought the mosquitoes, snakes, bears and hot rocks and finally are sure you have located a nugget. Now you must get it into your film canister.

The first and oldest method is merely to grab a handful of dirt and wave it over the loop. When your handful makes a sound, open your hand and look for the target. This works fine if the target is large and the loop is not so sensitive that it actually can pick up the salt in your body. The high frequency instruments are notorious for this and particularly White's Goldmaster II which operates at 50 KHZ. With these units, you should test the palm of your hand first. If the detector picks it up with a positive signal, then try your fingers. If

this works, you can take pinches of dirt instead of a handful. As I said, this method works best when you are fairly sure you have a larger target.

The second method is called the sprinkle method. This is where the handful of dirt which is suspected of containing the nugget is sprinkled slowly in a stream on the TOP of the loop. If you are using this method, be sure that the loop is flat (horizontal) on the ground so that the nugget does not slide off of the loop back onto the ground. Even a small flake of gold will stay when it lands on the loop. When the piece of gold hits the loop, you can hear the signal it causes. Sprinkle the soil a little at a time and tip the tested soil off of the loop before sprinkling a little more. I forgot to mention that the detector is obviously left on during this procedure and preferably with headphones on as well. This will work with both small and larger nuggets as they will both sound off when they bounce on the loop. A variation of this is merely to take handfuls of dirt progressively as you check the hole to see when the target disappears from the ground. When you are sure that the target is in your hand, just dump the dirt into your pouch. After the day's searching, take all of the accumulated dirt and throw it into a pan and pan out the nuggets.

The third method is the one I prefer in the gritty or soft soil of the mountain areas. In this method the dirt is scooped into a plastic gold pan a small amount at a time. The pan is shaken to move the gold to the bottom; remember the density of gold will make it drop to the bottom through gravity. Then the pan is passed over the loop to ascertain whether or not the target is in it. If no signal is heard, test the pile to see if the target is still there and then toss the soil in the pan aside.

Notice I said to check the pile again first. The nugget could be small and not worked its way down to the bottom of the pan. If it is still in the pile you are alright. Take another scoop and continue the procedure. When you finally have the signal in the pan, remove some of the dirt to one side of the pan and check both piles. Keep this up till you have the pile small enough to blow the overburden off and leave the piece of gold exposed. This process is sometimes done on a rock if no pan is available. Just add dirt and separate into two piles progressively. I said I prefer this method, but I developed a special pan to make the process go more smoothly and efficiently. It is rectangular with a beveled shovel side and three raised edges.

It can be used as a shovel to scoop the dirt from the pile and even to dig a small depression on shallower nuggets. A small pocket or trap in the far end of the tray is helpful in trapping the piece of gold when the tray is shaken. The tray is passed over the loop as above and progressively soil is wiped off of the tray till the target is in the trap or at least near it. The dirt is then blown off of the piece of gold. Be careful, in areas where very tiny subgrain nuggets are found, you can actually blow the nugget out of the tray. This tray is called the Sierra Gold Tray and sells for \$5.95 at most dealers. This works fine even when the soil is heavy. If the soil is muddy, you will probably have to use the pinch method and just put the collected target and dirt aside in your pouch to separate later.

Look carefully, it will be there. Put your nugget into your container, pat yourself on the back and shout **EUREKA !**