

RadioShack Guide to Metal Detectors

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Most folks happily walk the surface of the earth, unaware of the valuable objects and artifacts that lie just beneath, left behind by past generations. Modern-day treasure hunters, on the other hand, head outdoors on evenings and weekends with their metal detectors to enjoy a relaxing, active hobby that, often enough, provides the thrill of discovery. As you learn to use your detector, you could find gold and jewelry, silver coins, Civil War artifacts and remnants of pioneer life. With the proper permission, search yards, farms, parks and beaches. Join a club, share your finds, and compete in "seeded" treasure hunts. This guide will get you started.

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What kind of detector is right for me?

Hoping to find gold nuggets, vintage buffalo nickels or just a cache of bottle caps? When you choose a metal detector, you'll want to consider a number of factors—your budget, the type of terrain you plan to cover, and, perhaps most important, the treasure you plan to pull from the ground. Here are the three main detector types:

▮ Metal detector types:

[Very low frequency \(VLF\)](#) | [Pulse induction \(PI\)](#) | [Beat-frequency oscillation \(BFO\)](#)

▮ Very low frequency (VLF)



Very Low Frequency (VLF) detectors are the most versatile and widely used of the popular metal detector types, based on the range of metallic objects you can find with them and the variations of terrain you can cover. As with most detectors, the VLF detector consists of four main parts—an armrest, a control box, an adjustable stem and a round or elliptical search coil. The VLF detector uniquely combines two coils in one. The outer coil acts as a transmitter, using alternating current to create a magnetic field on or beneath the surface of the ground that is easily distorted by a valuable metallic object such as an ancient Greek coin or gold nugget—or a worthless item, such as a soda can pull-tab. The detector's inner coil acts as a receiver, reading the secondary magnetic field created by the conductive object, amplifying it and sending it back to the control box. You, the treasure-hunter, hear an identifying tone through the device's speaker and study the response on your LED display. Further steps help you "pinpoint"—to use a



common detectorists' term—the object's location. Then, all you have to do is dig.

Electronic circuits in VLF metal detectors called phase demodulators help "discriminate" among types of objects. You'll want to "ground-balance" the unit to adjust for naturally occurring minerals in the earth. Adjust the "threshold" to raise or lower the unit's alert level, and use "notching"—pre-set filters—to eliminate an item or range of items from the field of view. But be careful as you attempt to tune out the trash. You might miss some valuable items as well.

▶ Pulse induction (PI)



Pulse Induction (PI) metal detectors are popular among gold nugget prospectors, primarily because of their ability to detect objects buried deep underground and filter out the presence of "black sand," or magnetite. Beachcombers also find PI detectors can cut through electromagnetic interference caused by wet salts that typically confuses VLF detectors. Deep-sea treasure-hunters use industrial-sized pulse units, and walk-through airport metal detectors are also based on pulse induction. PI detectors made just for nugget hunters will often feature elliptical search coils that negotiate more easily into tight, rocky spaces. But while PI detectors are more sensitive than VLF detectors, they're less able to discriminate between trash and treasure.

Some PI detectors use one search coil as transmitter and receiver. Others employ up to three coils to do the same job. Here's how pulse induction works: The control box sends repeated pulses of electrical current to the search coil, producing a magnetic field. The coil transmits a pulse toward the ground, generating an answering pulse from the target—which, again, could be a precious gold necklace or a vintage pop bottle cap. A sampling circuit measures the pulse and sends it to an integrator circuit, which transmits an audio alert to the treasure-hunter. Time to start digging for gold.

▶ Beat-frequency oscillation (BFO)



Beat-frequency oscillation (BFO) represents the most basic metal detector technology. Budget-minded consumers, beginning hobbyists or parents shopping for a child's first detector may start with BFO, and move on to other types as interest grows. The BFO detector uses two coils—a larger one in the search head and a smaller coil in the control box. Each coil is connected to an oscillator that generates a steady pulse, or frequency. The frequencies vary slightly between the coils, generating radio waves. Tune your detector until you hear an audible beat, or tone. Any metal or mineral in range of the search coil will interfere with the frequency of the radio waves it emits. This, in turn, will cause a change in the duration and tone of the beat frequency. Learn to tune properly, and soon you'll be pulling a treasure trove of coins and chewing gum wrappers from your back yard.

Next page: [Trash or treasure: What can I find?](#)

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