

An Opinion on Metal Detector Ergonomics

By Lee Wiese

In the U.S. metal detecting market there are six major manufacturers of detectors and these six manufacturers offer more than 59 different models. These multi-functional detector models start at a price of \$200 or less and go to a high of \$1,500 or more, so choosing the right detector can be a challenging task. The intent of this article is to provide guidance on one very important aspect of metal detectors - ergonomics. Ergonomics should be one of most important elements in any decision to purchase a detector since friendly ergonomics will result in the efficient use of the operator's energy and minimize the possibility of sore muscles or injury to the operator over time.

Ergonomics is defined as the science related to man and his work, embodying the anatomic, **physiologic**, and **mechanical principles affecting the efficient use of human energy**.

Detector ergonomics comes down to THREE major issues; the gripping of the detector with your hand, weight / balance of the detector and adjustability of the detector's handle length. Excellent ergonomic design will result in less strain put on the wrist, arm, shoulder, and/or back during the use of the detector.



"L" Shape Handle



"S" Shape Handle

First there are two types of handle designs used by detector manufactures: the "L" shaped handle and "S" shaped handle. In the two photos you can see an example of each of the designs and how they are gripped.

Take a look at the "L" shaped handle in the photo (at the **DOTTED RED ARROW**) and note that the remaining portion of the handle for coil attachment is designed to extend outward below the hand and wrist. This design feature helps to reduce the load on the wrist during the swing of the search coil. An

additional feature of this handle's design is that the electronics is usually mounted on top of the "L" portion of the handle placing the electronics above the hand (see the **BLUE CIRCLE**). Now take another look at the hand gripping the "L" shaped handle in the photo (at the **SOLID RED ARROW**) and you will see the angle on the hand and wrist is in a more natural position with little or no strain on the wrist. Take your own hand and hold it in that position, you will feel no strain.

Now take a look at the "S" shaped handle in the photo (at the **DOTTED RED ARROW**) note that the remaining portion of the handle extends forward and outward above the hand and wrist where the coil and electronics (see the **BLUE CIRCLE**) are attached. Now look at the gripping of the "S" shaped handle in the photo (see the **SOLID RED ARROW**) and you will see that the hand is tipped slightly downward. This slight downward tilt of the hand puts an unnatural strain on the wrist and forearm and will over time extend to the shoulder. Note: some "S" handles may have a greater vertical angle design that will bring the grip closer to the "L" design grip. The mounting of the electronics after the grip will add weight to the swing of the search coil and increase the strain on the wrist. Take your own hand and hold it in that position, you will feel a slight strain in the wrist area.

The second ergonomic issue is the weight of the detector and how the weight is distributed on the detector's handle. One of the specifications of a detector is weight with and without the batteries installed but there is usually no discussion or specification on detector balance. A well balanced detector should have a fulcrum or balance point where the hand grips the handle. This is the point where there is equal weight before and after the grip, the best possible situation for swinging the search coil for a long period of time.

For the "L" shaped handle the electronics are ideally placed directly above the hand grip and usually the batteries are placed under the forearm for added balance to the overall assembly. This brings the balance point very close to the hand grip but still slightly forward of the grip point. This design is approaching the ideal situation.

The “S” shaped handle usually has the electronics placed on the handle after the hand grip position which puts more weight past the gripping position. The placement of the electronics after grip position toward the search coil end will result in a very un-balanced handle. This situation puts a greater load on the wrist and forearm because the balance point is much further forward of the grip position.

The third ergonomic issue of importance is the ability to extend the lower handle to the correct length for good upright posture while swinging the search coil. This adjustment will reduce the strain on the operators shoulder and back. Improper adjustment can cause the operator to bend over while swinging the coil and may result in a lower back stress during the hunt period.

There are a few more ergonomic issues one must be aware of with detectors. First the detector must have an audio volume control & a headphone jack. The audio output should be stereo and the volume control should cover a wide range for good operator comfort and target identification. Also if the detector has an LCD display, the display information should be very readable (Large Characters) in bright sun light and have an excellent back lighted display for night use.

The recommendation is that for new detector purchases there should be a review of the detector’s ergonomics before hitting the BUY button. Make sure the detector is light, well balanced, and has a good grip design that will put less strain on the wrist, the arm, shoulder and back while swinging that search coil for the treasure find of a life time. A side note: some manufactures offer ultra light detector to enhance the ergonomics of their models and this certainly makes a huge difference during their usage. Also there are a number of after market manufactures that offer “L” shaped handles for many of the major manufacturers’ detector models. Their products can be found on the web.