

What to know about searchcoils

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This essay pertains to induction balance searchcoils ("loops") of the types most commonly used on hand-held hobby-type metal detectors.

Searchcoil shape

Most searchcoils are round, but some are elliptical. This refers to the overall shape, not to the type of coil construction. In general, elliptical coils provide a broader sweep pattern over the ground, and narrower target response for better pinpointing. Round coils are easier to design and less expensive to manufacture, which is why they're the most common.

Searchcoil type of construction

The words "concentric" and "DD" (or "double-D") refer to the type of internal coil construction.

Most searchcoils (whether round or elliptical) are of concentric construction. A concentric searchcoil has a large transmitter coil, and a smaller receiver coil in the center, usually in the same plane.

This coil arrangement is relatively easy to manufacture and its symmetry helps to minimize electrical drift due to time and temperature. It also provides good discrimination on shallow targets.

Some searchcoils (whether round or elliptical) are of DD construction. Double-D's comprise two overlapping D-shaped coils of approximately the same size, one being the transmitter and the other the receiver. The advantages of the DD are greater depth in mineralized soil, a broad sweep pattern, and narrower target response. Its primary disadvantages from a user's point of view are multiple responses on shallow targets and poor discrimination of flat iron objects. Designing and manufacturing them is more difficult because their lack of radial symmetry makes them prone to drift which the design and the manufacturing process must minimize. Manufacturing cost is higher because the coils cannot be wound on high-speed winding equipment.

Searchcoil size

Most standard searchcoils are approximately 8 inches (20 cm)

in diameter if round, or approximately 10 inches (25 cm) in length if elliptical. Larger searchcoils allow covering more area with each sweep, and offer a slight increase in depth on medium and



Fisher Research Labs group of engineers, Left to Right: Mark Krieger, John Gardiner, David Johnson, Jorge Anton Saad

large size targets. Unfortunately they are heavier, more difficult to pinpoint with, tend to lose small targets, and provide poor target separation. Small searchcoils provide superior target separation (important in trashy areas) and the ability to detect smaller targets (important in gold prospecting). Of course they don't cover as much ground as a standard size coil. However (and this may surprise you) small searchcoils usually have nearly as much depth capability as standard size searchcoils.

What's on the market and why

The least expensive metal detectors usually come equipped with a round concentric searchcoil. The more expensive recent models often come equipped with an elliptical and/or DD searchcoil. Older models, even expensive ones, frequently don't have a DD searchcoil available because DD's fell out of favor during the 1980's and 1990's as the knowledge of how to make DD's did not advance fast enough to keep up with the demands of higher performance circuit designs. Nowadays there seems to be a trend toward DD's as manufacturers have gained more confidence in their ability to design and make them.

What users tend to prefer

Double-D's are usually preferred for relic hunting and gold prospecting. Concentrics are usually preferred when searching for modern coins in an area where there is also iron and aluminum trash.

