

First Texas T2SE - DD Elliptical Searchcoil Field Test

Conducted By Matthew Brown 2014

Here in the UK we have had a very wet start to the year and when I say very wet, I mean large scale flooding. However I haven't let this stop me from getting out there!



I am rather fortunate to live in Oxfordshire and grew up next to the banks of the River Thames in a small village with a lovely Saxon name that translates to Witta's home, associated with the 5th century Saxon King Witta who is referred to in the Anglo-Saxon Chronicles composed during the reign of Alfred The Great who was himself born in the royal palace in Wantage in the 9th century. This is my favourite permission as I grew up there and my parents still live there and many of the villagers know me and my family well, as do the local landowners and farmers.

Needless to say I have found some lovely coins and artefacts over the years. Although as with anything in life there is always some sort of fly in the ointment.

One particular issue with the area I live in and more so in another area I went to field test the DD Elliptical coil (The county of Norfolk) is a result of the 18th century steam mechanisation of agriculture. This produced a high level of what are affectionately known to the metal detecting fraternity as:

"Hot rocks"

These lovely little stones are from the steam powered engines that used coke as fuel and are normally around 4cm in length by around 3 cm deep and sound just like a nice Silver coin if their orientation in the ground is just right (or wrong depending on how you see things).

The audio signal they give is normally that of a small deep silver coin and can be reproducible upon checking the signal in the standard cross over (x marks the spot) that many detectorists use to check a signal or pinpoint should they have a very basic machine. There is however a recognisable jumpy pattern much the same as you would get with large iron, which you can clearly see the display numbers ranging. I have taken the liberty of utilising a portable XRF (X-Ray Fluorescence) scanner I had hanging about to do a full elemental analysis on a couple of these little blighters and this is what I found:

	Rock 1
Calcium	Ca = 2500ppm 0.25%
Titanium	Ti = 2250ppm 0.225%
Iron	Fe = 1.56%
Cobalt	Co = 2000ppm 0.2%
Silver	Ag = 700ppm 0.07%

	Rock 2
Calcium	Ca = 1500ppm 0.15%
Sulphur	S = 7000ppm 0.7%
Titanium	Ti = 1265ppm 0.13%
Iron	Fe = 7000ppm 0.7%
Cobalt	Co = 1000ppm 0.1%
Silver	Ag = 700ppm 0.07%

Rest is light elements (e.g. Carbon) or Al based and invisible to this instrument

The results are rather interesting; I was expecting them to contain Carbon and a slug of Iron (which I suspected would have given me the hit on the detector) with sulphur and hydrogen oxygen and nitrogen.

I did not expect the Iron to be present in a relatively similar quantity to Titanium for example; I can only surmise that the detector is also picking up on these transition metals as well.

Looking at the periodic table in respect to electrical conductivity you can see that the detector coil is most likely to be picking up on firstly the Silver content, all be it a small quantity the conductivity is the highest of the transition metal elements at $6.2 \times 10^7 \text{S/m}$ (higher than that of Copper and Gold), then the Cobalt at a higher concentration but lower electrical conductivity at only $1.7 \times 10^7 \text{S/m}$. Also the transition metal Cobalt as with Iron and Nickel have as we know directional electron spin, this causes its own magnetic field that will not cancel itself out with directional electron spin in the other direction due to the number of electrons in one direction.

This is then finally having the Iron content registered at the lowest conductivity of $1.0 \times 10^7 \text{S/m}$

I do not believe the Titanium is actually a contributory factor (although interesting) as the amount present is, although on par with the Cobalt, very low in conductivity at $2.5 \times 10^6 \text{S/m}$ lower than that of the Iron.

Also due to the fact that I run discrimination at 5 to winkle out those tiny cut quarter hammered silver coins. This normally knocks out the Iron, and would have notched out the Titanium in the process.

Now for the interesting part that we all like to see in a report, **the finds**.

I have not covered atomic mass above, however I do like finding lovely lead musket balls ☺

Fig. 1



I have the pleasure of saying that this coil has knocked two things off my wish list already in the limited time spent using it!

As I live next to a village that is the furthest point from the sea my beach detecting is extremely limited, therefore finds of jewellery are limited, however on my recent holiday to the county of Norfolk here in the UK I managed a nice haul of a few days:

Number one off the list, a nice 22 karat gold ring:

Fig. 2



Number two off the list a 17th Century fob seal:

Fig. 3



All of the above finds were plucked from a field sown with sugar beet; therefore I would say I was losing around 2 inches in ground clearance due to the height of the plants.

However I was extremely impressed with the depth and speed of recovery between the many hot rock signals that were present. The .22 air rifle pellet for example was recovered from the same hole as a hot rock?

I managed to make a trip to the south coast of to do a few hours of beach detecting to compare and contrast some machines with my good friend Luke Mahoney and Pete Harbour from Joan Allen, I let them go off to the wet sand with their machines (a Fisher CZ 21 for Pete and the new Minelab SDC2300 for Luke) while I hit the dry sand and the dunes knowing the issues the T2SE would have in the wet sand, within an hour or so I had around £5 in coinage...by comparison the nearest the other two got in the wet sand was a single penny and two pull-tabs.....! I do love my T2SE with this new coil; the depth was very impressive in the dunes as well as excellent stability with a very clear indication via pin point of the target location. I have to say that I discriminated the majority of the bottle caps out and this also covered the pull-tabs but managed to stay well on target for the coinage.

Fig. 4



As I have said many times on many online forums the T2SE is an awesome bit of kit, even more so with the new DD Elliptical coil in my arsenal.

The speed of recovery was a lot faster than the stock coil with little to no noticeable loss in depth.

I will be recommending this to the T2 users I know on many social networks and forum groups I belong to as a definite find enhancer for trashy, green waste infested and highly mineralised, 'signal busy' sites.

I am absolutely certain that with this coil fields that had been "done to death" will suddenly come alive again.

As a final summing up on the T2SE overall since I have used her, here is a selection of some of the finds she has made covering the history of the Britain.

Fig. 5



General experience in the field

Ploughed – stable, good target id and depth id, fast recovery, slight loss of depth due to “fluffy” soil

Stubble – very well shaped coil, better than the stock coil for stubble bashing, able to get down in there also being of solid build no stubble getting snagged, unlike the stock coil.

Pasture – an absolute pleasure, very good target separation

Green waste contaminated – I hate detecting this stuff, but if you have permissions contaminated with this that you KNOW have good potential then ***this IS THE coil of choice.***

Busy – See green waste above, ***it's a winner!***

Finds

Coins

Medieval hammered silver cut halfpenny

Medieval hammered silver pennies

Small milled silver and copper alloy coins

Roman bronze/ brass coins

Large silver Saxon coin

Artefacts

Small Roman brooch

Viking stirrup mount

Problem Targets

Nail – recovery distance = 5-7cm – discriminate out (set to ~5 will knock most out)

Coke (Hot Rocks) – recovery distance variable – discriminate out not possible due to risk of losing small or cut silver hammered coinage

Ring pull - recovery distance – discriminate out but risk of losing small or cut hammered silver coinage

Final parting tip, of you suspect high mineralisation conduct a ground grab at regular intervals.