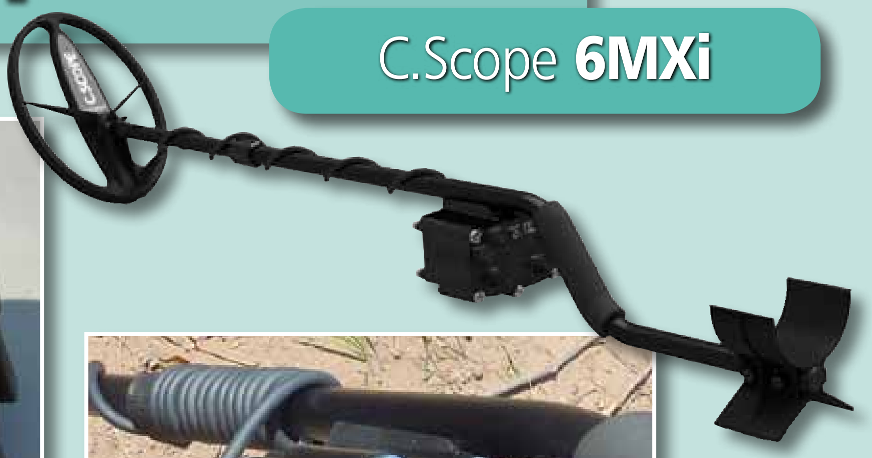
Matt Renshaw

Field Test Report

C.Scope 6MXi



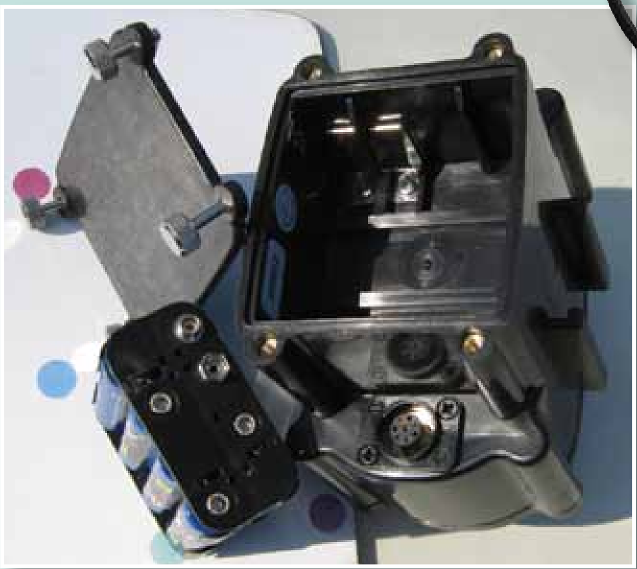


Fig.1. The opened control box.

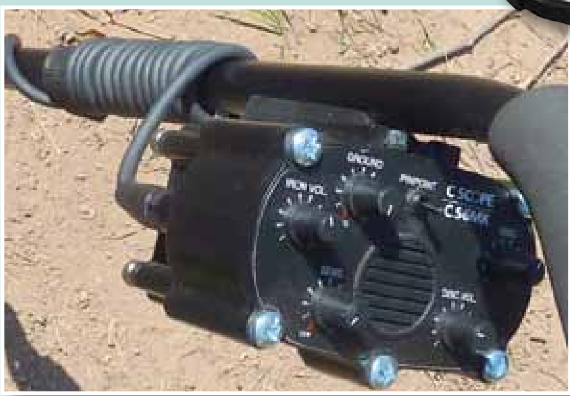


Fig.2. Control panel and wrapped lead.

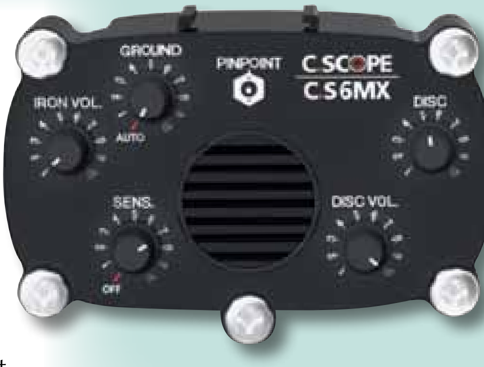


Fig.3. The control panel of the C.Scope 6MXi.

It was a cold March Monday morning as I reluctantly tumbled out of bed to answer the doorbell. It was the postman. I'm not sure if he was smiling at the sight of me half asleep in my pyjamas or pleased at the sudden change in my demeanour as I spotted the parcel standing on the step before him. It was a big carton that had a picture of a metal detector on its side.

Once the door was closed I headed for the warmth of the kitchen. While the kettle was boiling, I opened the box and retrieved the handbook. It didn't take more than a few minutes to find eight rechargeable AA batteries and install then.

At the rear of the control box are four sensibly designed, self-retaining "thumb" screws, which allow easy access to the removable battery holder. Also at the rear are the headphones and search coil sockets, their placement minimising the possibility of rainwater ingress. The search coil's push-and-clip-lock plug offers easier change of search heads rather than the screw collar type.

Subjecting the lead to reasonably realistic tugging, it remained steadfastly secure. Overall, the total assembly looks and feels like a well engineered unit, giving you the confidence that it should survive the rigours of anything the hobbyist might subject it to in any normal day's detecting.

Next was a quick functionality check to see if the C.Scope was okay. Utilising a small all-plastic table that I keep for such tasks, I placed the search head on that and the control unit on the breakfast bar.

This detector's control panel is well presented, allowing any competent detectorist to exercise its basic capabilities and interactive control functions. Some 15 minutes of subjecting it to various artefacts confirmed that all seemed normal.

Full assembly only took a few minutes longer. One point worth mentioning is to wrap the long search head lead in a neat form at the top of the stem and close to the control box. This improves the physical balance point of the whole system. A single Velcro strap helps keep that arrangement neat.

It was time to tidy up the box etc, before my wife arrived downstairs to reclaim the kitchen. Soon it was 9.30am and I phoned C.Scope to confirm receipt of the unit.

Controls

Power On/Off and **Sensitivity** level control needs no explanation.

Iron Volume Control. This serves to mute the iron channel's audio when at position 1 or, when increased, adjust the loudness of the tone assigned to indicate detection of any ferrous objects. That iron tone is the lowest pitched audio of the three tones used.

Disc Control. Moving over to the upper right hand side of the control panel there is the Disc control, and below its associated Disc Volume control. The variable Disc control covers the conductivity range equivalency represented by coke, silver paper, 5p, 20p, and up to a modern 50p piece. Also represented by that range are the class of low conductive items such as gold rings, pull tabs etc.

Please don't confuse any of the mentioned coins with their steel-cored replacements now being issued (dated 2011 onwards).

Adjustment of the Disc knob determines which part of the selected range between 1 and 10 (i.e. left of pointer's

Fig.4. Disc knob.


Fig.5. 8 inch concentric polo search head.

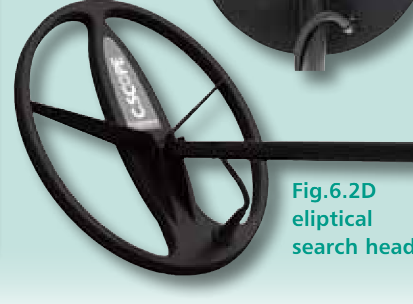


Fig.6.2D eliptical search head.

chosen position, is assigned the Medium Tone (yellow in image on right).

Any target's conductivity which is covered by the Disc control's "upper" settings (orange in image), or extending beyond the variable Disc control's level 10, is automatically assigned the highest tone, in the three-tone system.

(The image's colours are added for reference purposes only).

Disc Volume. This is where the subtleties of interplay between the Disc Volume and Disc setting comes into play.

The Disc Volume only controls the loudness of the Medium tone. At minimum setting 1 of the Disc Volume control the Medium tone is silenced.

This means that whatever targets the "left hand side" of the Disc pointer represents, (wherever it's positioned) their audio is muted. (Audibly discriminated at Disc Volume level 1).

The targets representative of those to the right of the pointer come through as a High tone, and at maximum volume (i.e. not affected by the Disc volume control).

When the Disc Volume is increased above 1, the Medium tone will become audible and progressively louder. At position 10 it will equal the High tone's constant, maximum volume.

Ground Control. The handbook simply tells you to first set the Ground control to Auto, and both Volume controls to Max. Then, while pumping the search head over target-free ground, switch the Ground control out of Auto, and slowly increase its setting until any audible evidence of ground "noise" is muted. My clay base lawn required a setting of 2-3, whereas a "tough" pasture field in mid Wales required a setting of level 7! My mate's detector showed a ground reading of 75, where normally most soil are at worst 85. Visibly, the damp soil had a reddish colour, with shale-like stone fragments.

In my opinion, the working of this control is not like the normal ground balancing counterpart found in other detectors. To me, it behaves functionally more like an "auto tune" level device. In practice it works very well, and appears to cope easily with the ground variations that I encountered. I will look forward to other's comments on the subject, as its various users subject it to the wider field of ground conditions around the UK.

The manual doesn't mention a starting level of Sensitivity for start-up ground balancing, but my experiences suggest a level of 5 is initially adequate. The on site condition will ultimately dictate how high you can increase the sensitivity, and further trimming of your ground control.

As with any detector, if you oversensitise your machine then be prepared to suffer the consequences.

It is appropriate at this point to mention the fact that I couldn't initially detect significant differences between Auto or manual Ground settings, on the detector's depth capabilities when testing over several targets at depths up to 7 inches. Only when targets where deeper, or relatively small, were there some noticeable effect on the detectability of them.

I did, incidentally, "discover" a point of interest, worth mentioning, when on a later outing and sweep-searching across a field. The initial manually adjusted Iron Volume setting was now allowing the chatter of soil/iron noise to be irritably apparent. When I changed the ground control from Manual to Auto, the "noise" was immediately suppressed, while targets were still reported from several inches depth.

The "stock" coil, the 8 x 11 inches elliptical double D, is sensibly sized for efficient searching. It provides good coverage longitudinally, and an anticipated surface target's lateral separation of about 3 to 4 inches, narrowing with depth. The balance of the whole system, with the control box mounted on the shaft, is a tad "nose heavy" in my personal opinion. But using it in the field for an average 3 hours continuously, I found it very tolerable. Thoughtfully, C.Scope supply a free plastic belt adapting clip, which allows body mounting of the control box. Here are some figures for weight:-

Box with 8 NiMHs .... 1.5 lbs
Head, cable and shaft .... 2.24 lbs
Total weight .... 3.74 lbs (1.96 kg)

This is slightly heavier than advertised, but probably because of the heavier NiMHs I was using.

I tried the control box and clip, which I'd slipped onto my accessories belt, but for me personally it was too much of an awkward addition to my finds bag, camera pouch, pinpointer and holster. So for now, it is the shaft mounting for me, with the pinpoint switch at my finger tips.

I intend to modify my own belt load arrangement, whereby the supplied plastic clip is riveted to a suitably large aluminium or rigid plastic base plate. That in turn, could be threaded onto a broad belt. The aim is to inhibit the control box from tipping forward, as it did during the original trial.

Additional Search Heads

C.Scope have really made the effort to anticipate their customers' wishes for more coil power beyond the stock 8 x 11 inches 2D elliptical supplied as standard. These take the form of a larger and deeper seeking 11 x 14 inches 2D elliptical, which should take the CS6's detecting powers to at least 12 inches on a coin. Alas, I haven't had one to trial, so can't practically confirm my theoretical assumptions; but I'm willing to take bets on my predictions, and give good odds to boot!

The other coil available is an 8 inch diameter polo/concentric, which should offer slightly better depth in lower mineralised situations, than the stock 8 x 11, but with a more concise or "focused" search pattern at depth and tolerate a faster searching sweep speed (slower giving a better target response).

Initial Impressions

The simplicity of the CS6's adjustments complements the three-tone audio discriminating system. It is all so quick and easy once you have handled this machine. I really do appreciate the

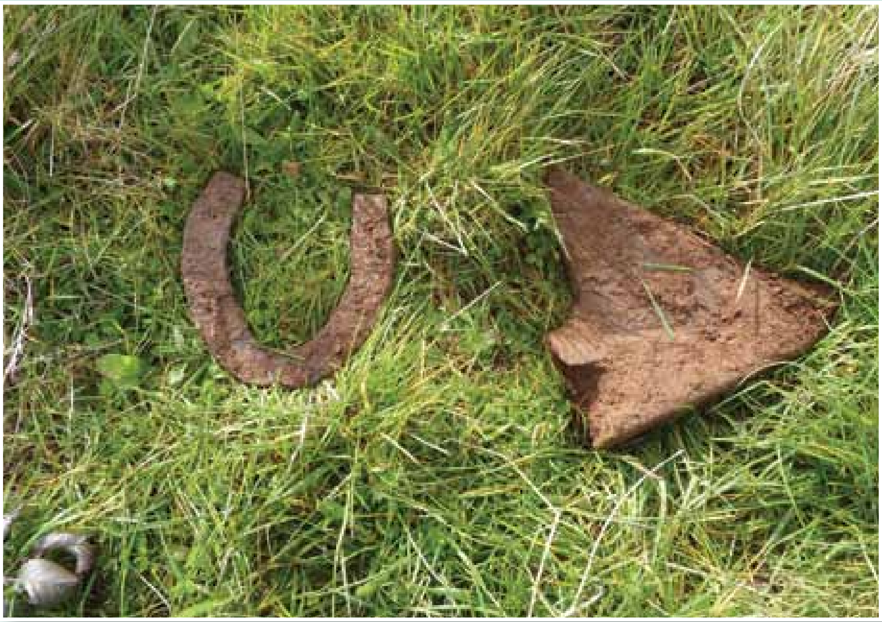


Fig.7. Horse shoe and broken plough share recovered from about a foot deep.

choice of being able to listen or not, to *all* targets, while at the same time having the option to control the low and mid tone volume mixing levels. If you use headphones with their own volume controls, then that can act as the master control for all three tones, especially for the high tone of the detector, which otherwise is constantly at maximum loudness.

The quieter modes are achieved by lowering either or both volume controls, or setting them to 1.

The latter leaves you with a single high tone as the "dig it" signal for *all* non-ferrous targets.

Testing its "speed of recovery" in my garden revealed the excellent target separation capabilities of the CS6. I know most of the "bits" that surround my main established test items, but the C.Scope made me more aware of their precise position and identities in ferrous/non-ferrous terms.

Anticipated Depths

Depth loss in soil is predominantly due to ferro-mineralisation, where the Fe3-O4 component is the worst offender because of its high magnetic permeability factor. Even in relatively "friendly" soils which hardly register on typical Fe graphs such as Fisher/Teknetics etc., ground effect can still account for up to a 10% loss on a low conductive item.

Depths at which you can sense a target is also related to its conductivity and mass, therefore as conductivity or mass decreases, so does the target's detectability. All such factors are totally dependent on the frequency involved. For every target there is an optimum frequency of sensitivity; but that is not necessarily the one to use if you also need to discriminate that target against some other target with different characteristics. Keeping those facts in mind, you then must also be aware of the final barrier, which is the soil and its prohibitive properties. The higher a soil's magnetic mineral components, the more is the pattern distortion suffered by your detector's transmitted signal, and its returning target's response. The total of those individual effects on a detector's depth capabilities is an ever changing factor.

Here are a couple of sensitivity and maximum depth targets figures obtained from testing in my garden's soil:-

Man's plain 9ct gold signet ring:-

Sensitivity at 1.......................6 inches
Sensitivity at 5.......................8 inches
Sensitivity at 8.....................10 inches
Sensitivity at 10..................10 inches

Silver groat:-

Sensitivity at 1.......................7 inches
Sensitivity at 5.......................9 inches
Sensitivity at 8.....................10 inches
Sensitivity at 10..................10 inches

An "established" thin Victorian silver threepenny piece buried 20 years ago at 6 inches depth, belted out its audio even at Sensitivity 1, and also when the search head was raised off the surface!

Recovery Speed

I found the CS6's recovery speed more than adequate, and at times too fast for some "noisy" grounds. A control for "recovery speed" would be a bonus, and maybe a future addition?

Its speed capabilities are easily on a par when compared to other top-line detectors.

Field Trials

The first inland field tested was deliberately selected because my mate with his Deus, and another friend with a Fisher 75, had – on several occasions previously – "worked it over".

To me that was like waving a red rag at a bull, and I absolutely relished the challenge. It was not the value or attractiveness of what I might find that mattered, but rather the count of individual non-ferrous bits. Finding hammered silver and gold coins etc., is delightful but in the real world of averages and mundane sites, dream targets are less abundant – especially in my localities.

I was only able to do less than a tenth of the available field, due to cross-checking routines etc being so time consuming.

Right from the start I must tell you that I found more pieces of large iron than I cared to carry. Despite pre-recovery analysis methods to expose their size I dug them, because they responded with a solid high tone, and virtually little iron-buzz. Smaller sized ferrous objects were no problem. On a field test, I dig all targets.

Digging deep iron can be a chore, but also can be informative for it indicates the probable depths worked by the plough. Coins etc. don't carry that authority of probability. See my recoveries of a horseshoe and a broken plough share from about a foot depth. It is rare to get coins at that depth.

In "normal" circumstances I would recover some, and avoid digging the majority of large iron targets; but I am ever mindful of the consequences in terms of "lost" information or possible masked finds.

As with most IB detectors operating at frequencies of tens of kilohertz, iron at depth, especially if it rusty and damp, is sensed as being more conductive rather than magnetic. It is not a "fault" of the detector's functionality, but rather a fact of electro-magnetic reaction, due to the

Fig.8. Targets I recovered using the C.Scope.

Fig.9. The beach used as a test site.

applied frequency and subsequent "skin effect", size and shape of buried targets.

Also, when such targets are of a size which approaches the dimensions of the receiving coil, their effect on the "geometry of the search field" is to grossly distort it. This overwhelms the symmetry necessary to perform as an efficient balanced detector. Normal targets also distort the balanced fields but to a much smaller extent when centralised and measured, and then the effect is symmetrical about the mid point.

The fact that some detectors do cope better than others regarding deep iron is true, but do remember to compare like-for-like. For example, the coil's size and its driving frequency; also, the design mode (i.e. time domain rather than frequency domain).

Back to the field. We located and compared signals, discussing our interpretations of the audio. Both my companion's Deus and the CS6 MXi were operating on frequencies of approximately 17kHz, and both search coils were of comparable size.

At the end of a very pleasant, but relatively short day's detecting, the C.Scope's performance for that location was pleasing. The bottom line was that the C.Scope was able to locate 95% of the worth digging targets! Remember, this test was to ascertain relative capabilities of detecting a target, and to produce an audio sufficient to convince the operator to dig without question. It was not about comparing the ergonomics, bells and whistles, of one against the other.

The image is of the targets I recovered using the C.Scope. Not included are those retrieved by my mate and confirmed as worth digging by the CS6MXi.

Living by the sea allowed me the opportunity to test the CS6MXi in a different location than that associated with plough or pasture.

This beach test was not a straightforward dry sand scenario. Instead, it involved a clay based beach covered with damp sand and a host of stones winnowed out of the overhanging cliffs. I'm not over dramatising the circumstances when I tell you that there are nearly as many nails etc. mixed up in that sand as there are stones. The variety of stones is manifest, and many are magnetic or "hot" to varying degrees.

I must admit that as I descended to the beach I thought I would be on a hiding to nothing. So what was my plan of attack? Well, depth was the last thing on my mind as I worked my way along the shore looking for evidence of a potential hot spot. With the Iron volume now lowered to a tolerable level of 4, the increasing ferrous activity alerted me to what I was seeking. This particular area at the base of the freshly eroded cliffs consists of stratified clay interleaved with layers of gooey sand. That "ferrous fly trap" was also liberally littered with stones of all sizes, adhering to the clay and forming a daunting deterrent against any digging tool. Regardless, I commenced the task with the Sensitivity at a meagre 5.

I carried out the Ground setting "bobbing" ritual, and after several tests I settled for a Ground level of 3. This session was to be a truly exploratory one with this new detector. I set Iron Volume at 4, Disc to 10, and Disc Volume at 5, so that all targets would be audible and generally classified by the three tone system. I worked my way along the section of smallish stones, which formed a cobbled pathway about a metre out from the base of the cliffs.

As luck would have it, my first target was a £1 coin, not freshly lost but an earlier loss as it was firmly embedded within a small boulder of clay recently fallen from the public path above. Eroded by rain, such landslips are pummelled by any high, rough winter tides.

I toiled to retrieve about 50 targets during the next 2 hours. That total turned out to be the most I've ever pulled from this spot during any previous session. It was a learning curve as much about what sounds not to dig, as well as what sounds to dig. The stones intermingled with ferrous caused lots of positive but less wholesome signals (spiky), which if carelessly monitored and dug often proved to be bad. Pinpointing wasn't easy under such circumstances. Eventually, to improve my finds rate, I focused on more open areas of sand and clay, and only tackled rock-surrounded-signals that persisted after booting clear as many stones as possible.

As time progressed and the day's session was nearing its end, I decide to reduce the tones to one by setting the Disc control and the Iron Volume to

Figs.10 & 11. Wet sand, clay, "hot" stones and ferrous items conspired to mislead.

Fig.12. Beach finds.

minimum. Then it was a case of ignoring the chatter caused by the erratic effects of wet sand, clay and stones etc. The rest was down to refined sweeping and assessment of the single tone's completeness. After a few hours, the sun disappeared and the cold wind convinced me to leave. Once in the warmth of my car, I was comforted by the satisfaction of a rewarding beach test. This was in the sense of what I had learned about the tackling such a tough environment, and how to interpret the C.Scope's "terrier-like" responses. It didn't miss a target, but by the nature of things, wet sand, clay, "hot" stones and ferrous items all conspired to mislead.

So what was the lesson for today? It was a confirmation that in such an environment, one is best served by your detector's audio, and most specifically its quality of "completeness". I've used several other detectors here, and can honestly say that their numeric IDs are generally too erratic, and distracting. On the more open sand, okay, but not here among stones etc. In such a complex matrix, you are more likely to identify targets worthy of digging, if you adapt to the "continuum" of the sound they generate. The basic audio principles and versatility of this machine were well demonstrated in today's test.

The CS6's concepts and functionalities are all focused on simplicity. The adjustment needed to detect in your own preferential way are right there at your fingertips. With a sparkling recovery speed, choice of tonal discriminating and controllability, it should appeal to both newcomers and veterans alike.

So congratulations, C.Scope, on producing a solid unit both physically and functionally.

As a postscript to this article may I add that in my opinion there is a beneficial effect on the target's response when the Sensitivity is kept between 5 and 7. Any fear of depth loss is compensated for by the clean sound quality of what is detectable at those sensitivities (7 inches on a normal sized coin!). Comfortable searching promotes a better mental attentiveness to low level signals if the brain is not being "backed-off" by drip feeding it with unrequited pip-squeak responses, principally those originating from ferrous minutia, but also from marginal transitions between Disc levels. The latter contributions can be counteracted to some extent by setting Ground to Auto. The ultimate depth capability of the CS6MXi is determined principally by its operator discovering just what the right sweep speed is.

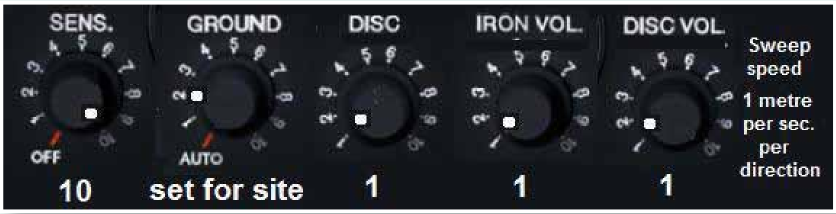


Fig.12. The "hot" settings used testing in my garden.

My estimation of that is approximately *1 metre per second per direction* when using the stock elliptical search head. Other head sizes will require their own individual assessment.

In my garden, I found one group of "hot" settings that gave me best depth and a smooth response on known targets:-

Sensitivity 10
Ground .... 2 (to suit)
Disc 1
Iron Vol................................. 1
Disc Vol................................. 1

So in this instance, I was running the unit at maximum gain, with no Iron tone, or Mid Conductive tone, simply depending on the third highest tone to signal all non-ferrous targets. (Disc at 1).

Generally, under trashy ground conditions and running with all three tones active, SENS above 8 gains little extra perceptible depth. If you are able to tolerate noise, then by all means "turn up the heat". The fact is that each detecting session and situation is different, and one person's observations must only be part of a continuous appraisal of any new detector. TH