

Wombat 20cm Mono-Coil

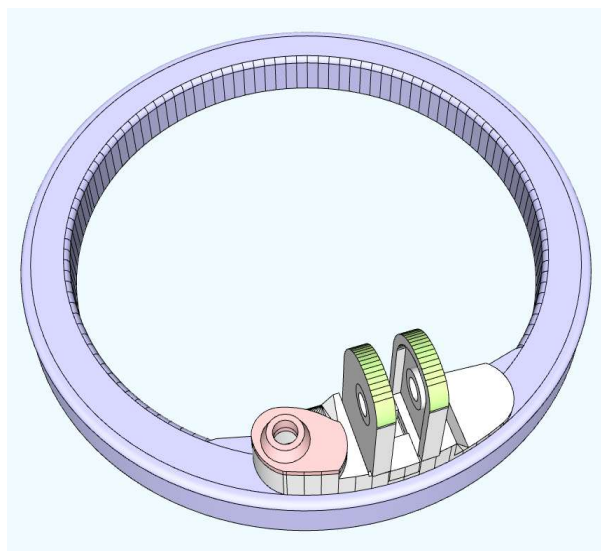


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Specifications

Inductance: 428 μ H
Resistance: 2 ohms

Introduction

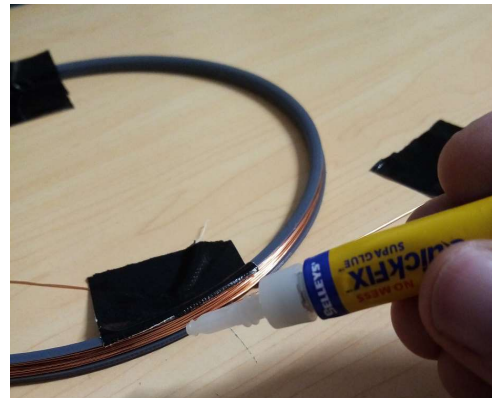
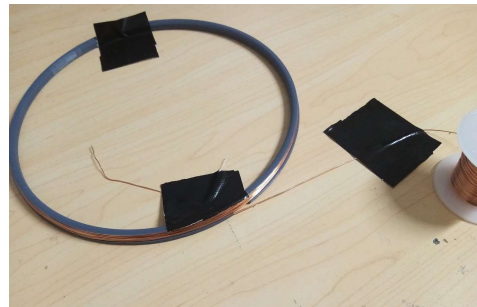
The shell and former of this coil can be printed in one piece on a 3D printer with a 230mm x 230mm bed. i.e Like the Ender-3
It's waterproof and stable in salt and sandy conditions.
PET-G is recommended but ABS or PLA will work.

Wind the Coil

Use 24AWG (0.5mm diam) enamelled copper wire to wind 29 turns around the former.
Tips: Tape the Former in place.
Use Pen and paper to keep track of winding count so you don't lose count !



Use Super Glue to secure the winding.
Apply the glue in various places around the entire coil to help secure the winding.
Wait at least 10 minutes for the glue to dry.



Shielding

The shielding is 5mm adhesive copper tape. Shielding provides a constant capacitance to the coil and a barrier to external charge from the ground and other objects. Ideally, the shielding is not a target and has no eddy currents.

This is why it is thin (5mm) and has the lowest possible metal thickness.

Think of Eddy-currents as small loops of current in the same plane as the coil.

Note the a gap between the each rotation of tape, i.e 1 to 3mm

Tape used Jaycar NM2870 or similar.
~0.03mm thick copper or less.



Tip: Tear off 1.5 Meters and stand up while

applying. Apply with care as the tape is fragile.

The Shielding tape must NOT make a complete ring around the coil.

Use flexible wire to solder to the shield as shown.

This wire then connects to one side of the coil, this is the Shield and Negative side of the coil.

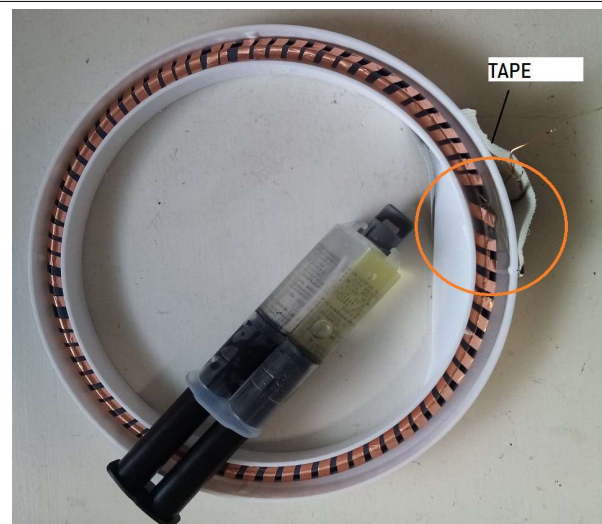


Shell

Lay the coil in the shell and centre it.

Thread wires through the exit hole and seal with tape.

Use quick set Epoxy to cover the hole and wires.



Potting

Make sure the shell is level.
The fill the shell with potting-epoxy.
Clear-epoxy was used in this example.

The quantity required is approximately
~100ml mixed.

Tip: Tint the epoxy with one drop of food-colouring, or paint. Clear-epoxy is difficult to see !.

Cure for 24 hours.

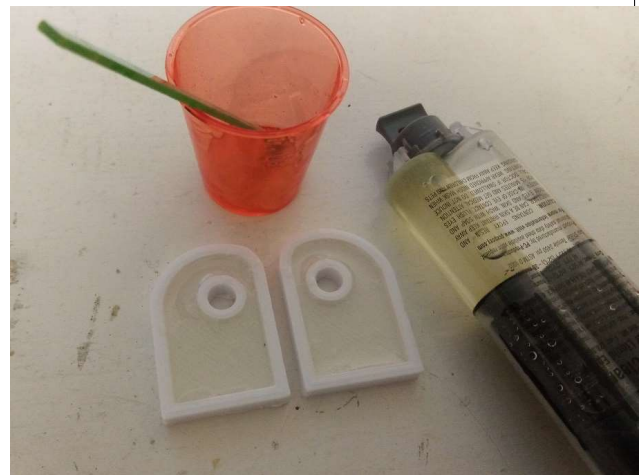


Top plate and Mount Tabs

Epoxy the top plate with quick set epoxy.
Ensure that it is straight and centre on the coil shell.



The mount tabs are strengthened by filling with epoxy as shown.



Final assembly showing Top-plate and tabs
Fill gaps with epoxy and mixing stick.



Cable

COAX Cable ~ 1.2 Meters long

Jaycar WB2012

Note the multi-stranded core for durability.



Connect the cable with a minimum of core and shield, so the Black Sheath is in the well and can be epoxied.
The coil 'Shield-negative' wire is connected to the outer braid (shield).
Positive wire connected to centre core.
Ensure wires do not touch.
Option: Use Glue-lined Heat-shrink for extra durability.

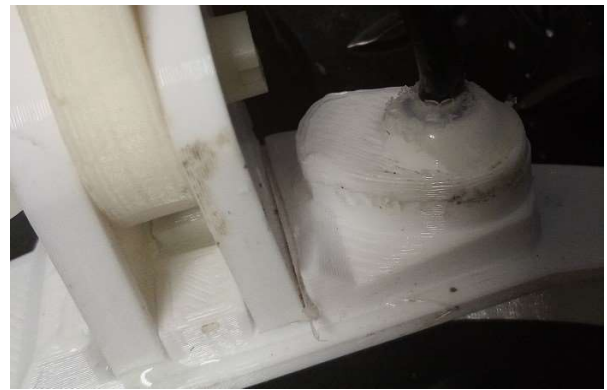
Tape the cable to prevent movement.



Fill the well with quick-set epoxy , almost to top.



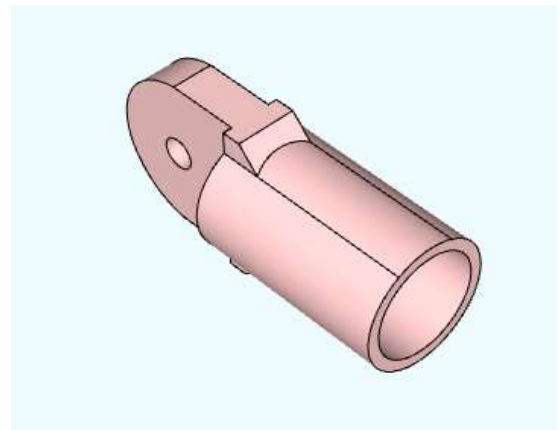
Cable Cap epoxied in place.



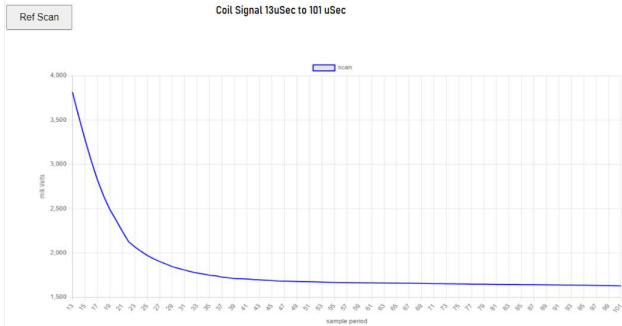


Stem mount

This is to suit '15mm' PVC pipe strengthened with wooden dowel.

Print on its side so the printer layers are vertical , giving added strength.



<p>Nylon bolt and wingnut</p> <p>Diameter 6mm x length 30mm</p>	
<p>Testing</p> <p>Measure the resistance of the coil with a multi-meter. The resistance will be ~ 2 ohms.</p>	
<p>The full response can be seen using the WOMBAT Arduino detector. And the Serial plotter in the Arduino IDE.</p> <p>We can see a typical curve as the coil discharges in 50 micros seconds (uSec).</p> <p>The curve to the right shows the amplified signal from the coil from 13uSec to 100uSec.</p>	

END.