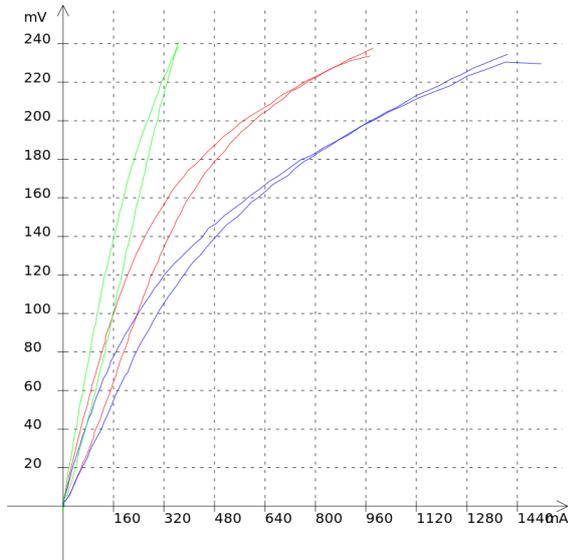
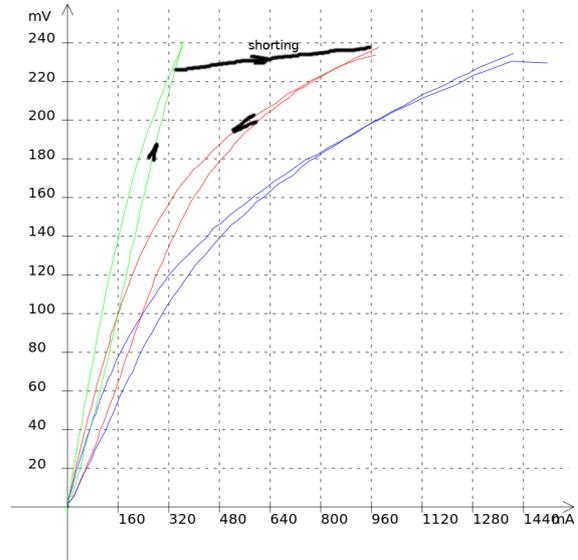


## Blue pill tracer upgrade for shorting coils

A while ago I got this this curves (pic.1) showing how permanent magnet affects BH curve. Since then I was thinking how to use it to create CW BH loop and extract energy from ambient heat.

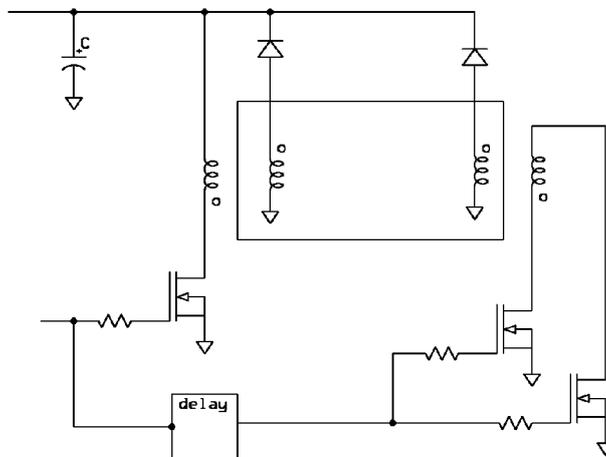


Pic.1 Effect of permanent magnet on BH curve  
green - no magnet, red - against magnet, blue - with magnet

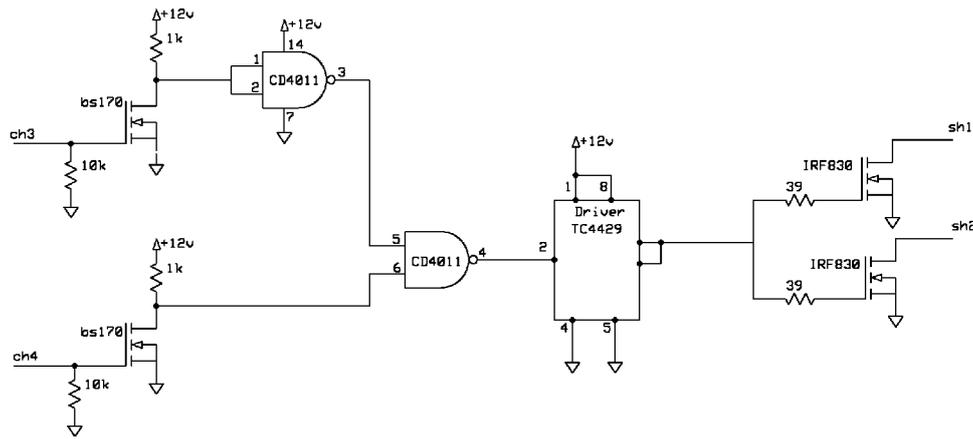


Pic.2 Attempt to create CW BH curve using coil shorting

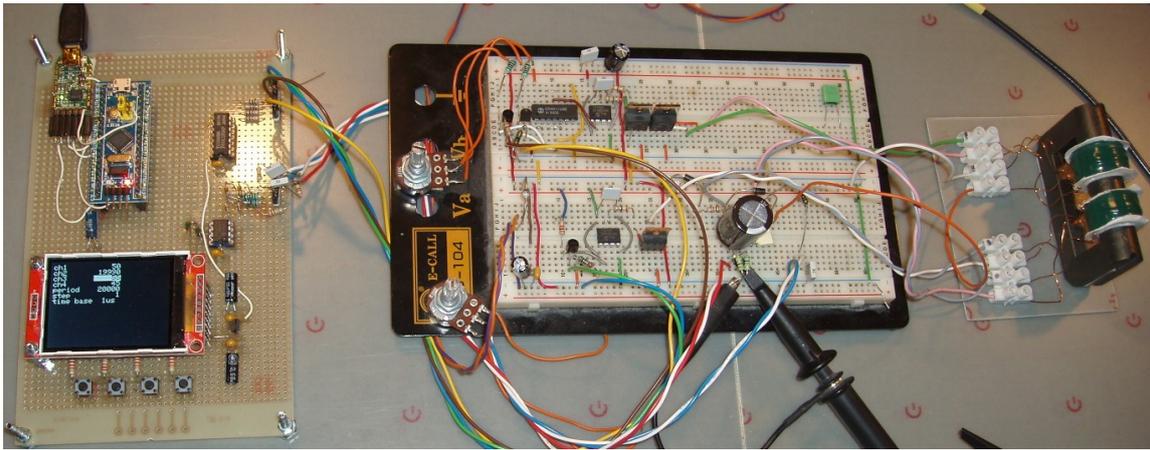
Recently I got an idea that coil shorting could help. If we short secondary coil it produce strong opposing field to primary winding field. This create big current spike. Theoretically resulting curve could look like one on pic.2 – combination of two regular curves. I decided to try this with my core tracer to see if it actually work.



pic. Test setup. Can shorting produce CW BH curve ?

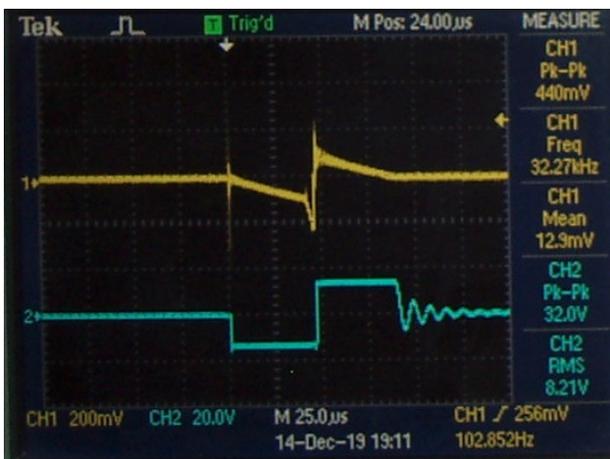


pic. Shorting circuit



pic. Blue pill based tracer with shorting

I added special shorting circuit to the Blue pill tracer, so that I can control when shorting starts and ends. Let's see what happened. I use MEG C core for tests.



Top - current  
Bottom - voltage on secondary coil



top - current  
bottom – shorting pulse



top – current  
bottom – driver pulse

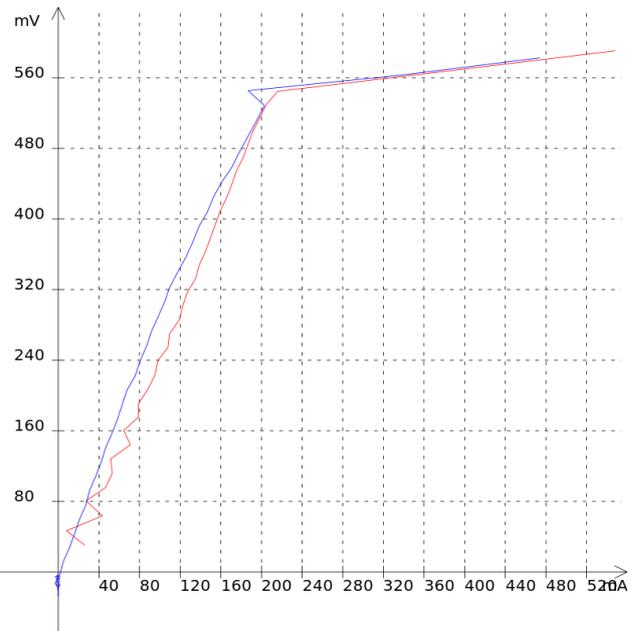
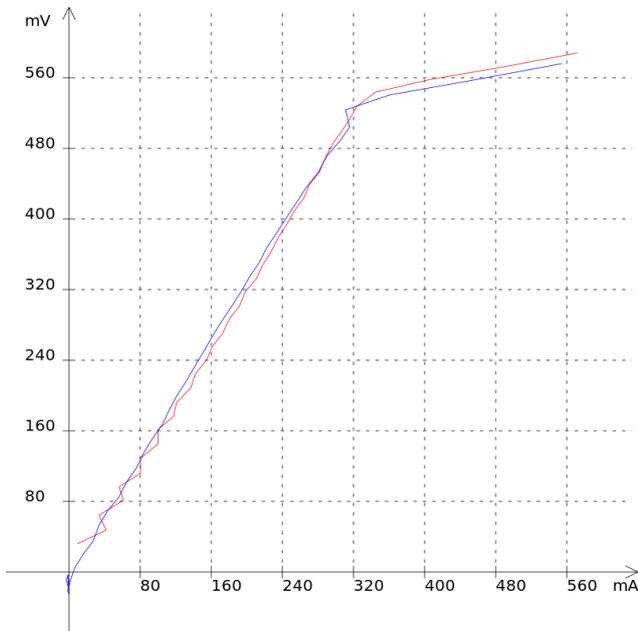
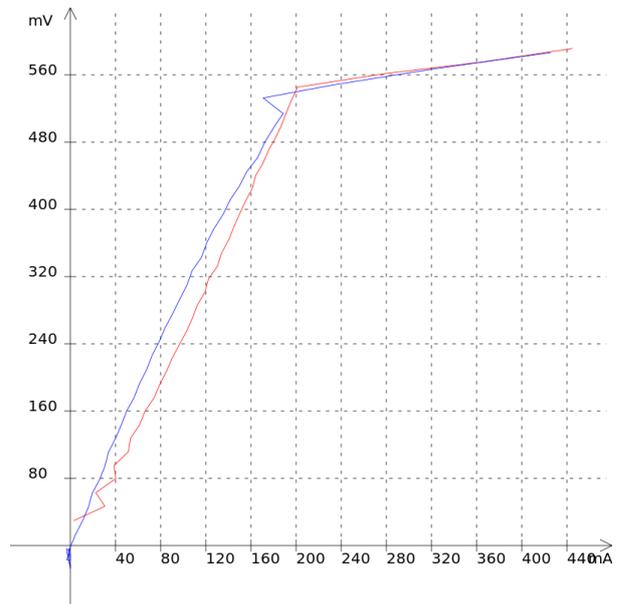
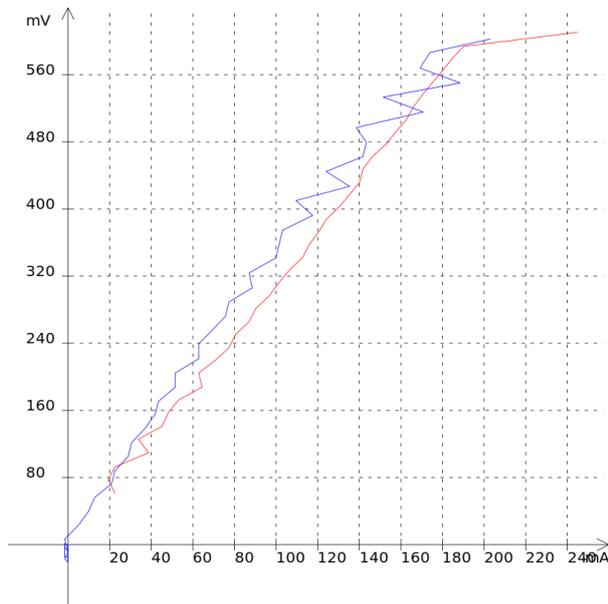
The most effective variant was observed when the shorting pulse located symmetrically relative to the end of the driver pulse, i.e. 48-52us

shorting 48-52us  $T_{drive} = 50\mu s$   
 $E_{in} = -4.7 \mu J$   
 $E_{out} = 3.6 \mu J$   
 $COP = 76.3\%$

shorting 48-52us (small gap introduced in the core)  
 $E_{in} = -5.8 \mu J$   
 $E_{out} = 4.6 \mu J$   
 $COP = 79.9\%$

for comparison same without shorting  
 $E_{in} = -4.7 \mu J$   
 $E_{out} = 3.4 \mu J$   
 $COP = 72.4\%$

Nothing more useful has been found so far, other options reduce efficiency. However there are many “variables” in the test setup which could affect performance. Some pictures actually showing partially CW curves (even it is on the boundary of measurement error of the tracer). I think there is a hope that this can work :)



pic. Example BH curves (red – magnetization, blue - demagnetization)

### References

1. FE R&D group archive #2862 Blue pill tracer (see page 667 [https://ferd041.files.wordpress.com/2016/07/ferd\\_arc\\_2000\\_2999.pdf](https://ferd041.files.wordpress.com/2016/07/ferd_arc_2000_2999.pdf))
2. Rediscovering ZaeV's ferro-kessor <https://ferd041.files.wordpress.com/2016/04/h2e.pdf>