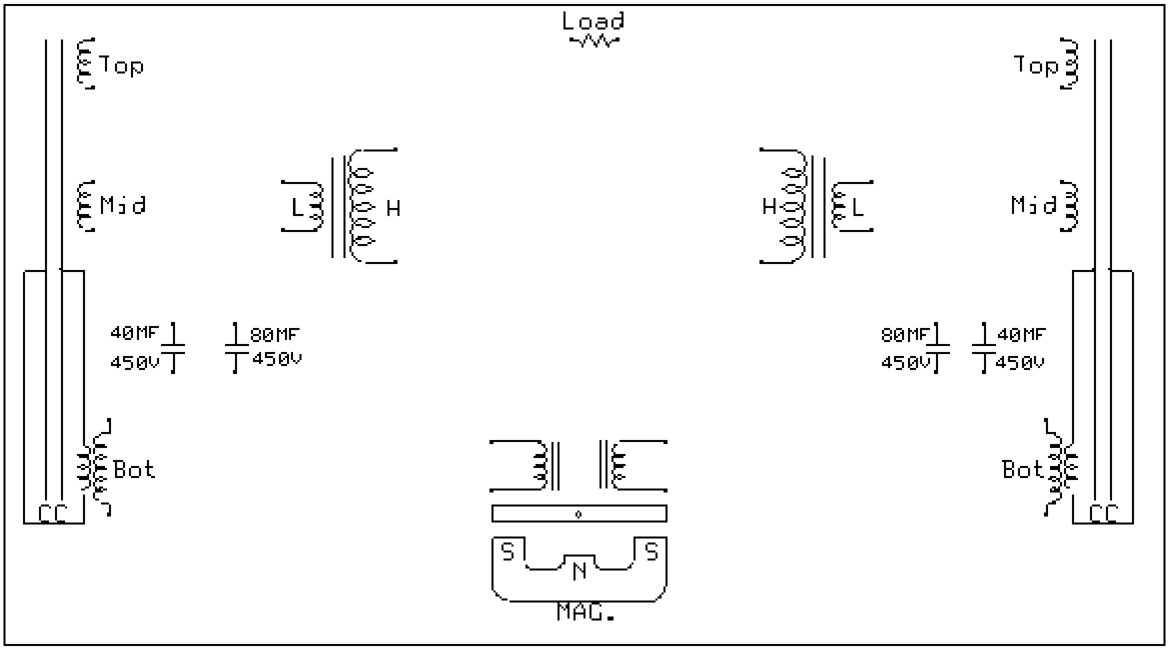
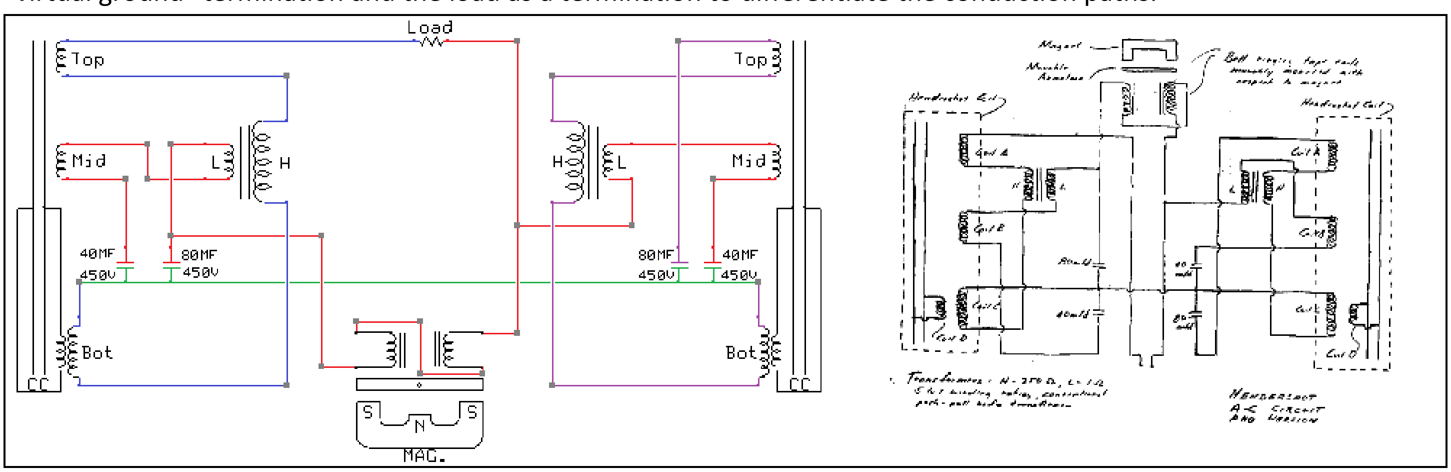
This document shows the Arthur Aho schematic adapted to a magnetic amplifier schematic.

I use a standardized schematic to compare all the different Hendershot schematics made by various people. Those schematics have various orientations of components and various labels. By naming the components in a generic manner rather that in the typical schematic convention using letters and numbers the different schematics can be standardized. By starting with the generic layout and names and then drawing the connections between those components shown in any given schematic a method of comparing schematics is obtained.

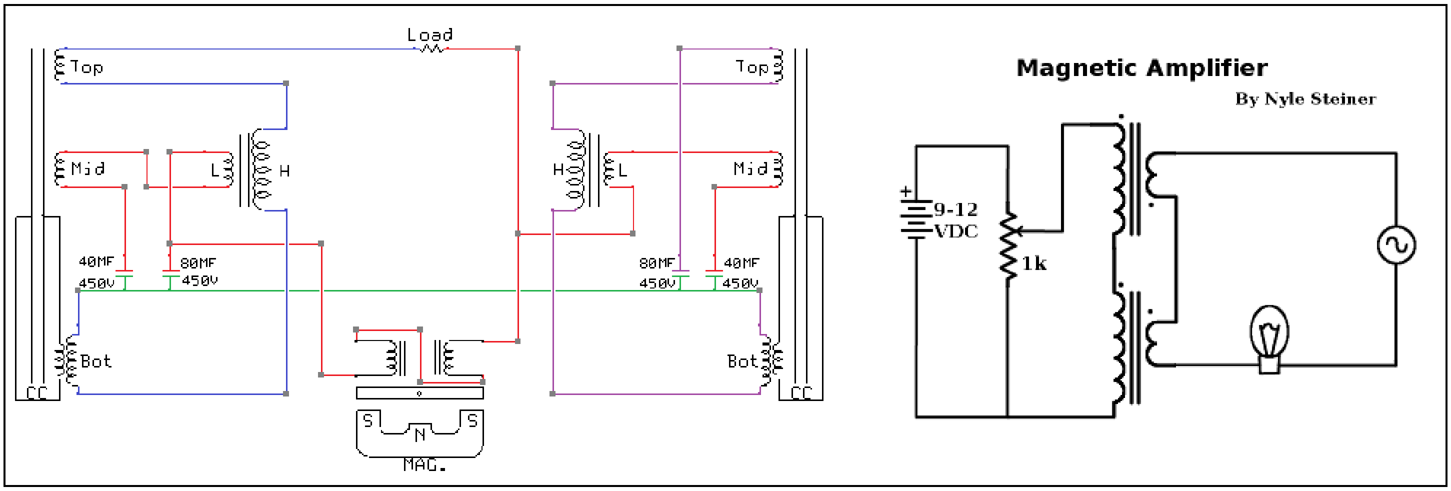
This is the generic schematic. Notice that it does away with L1, L2, etc. The combination capacitor coil is labeled CC.



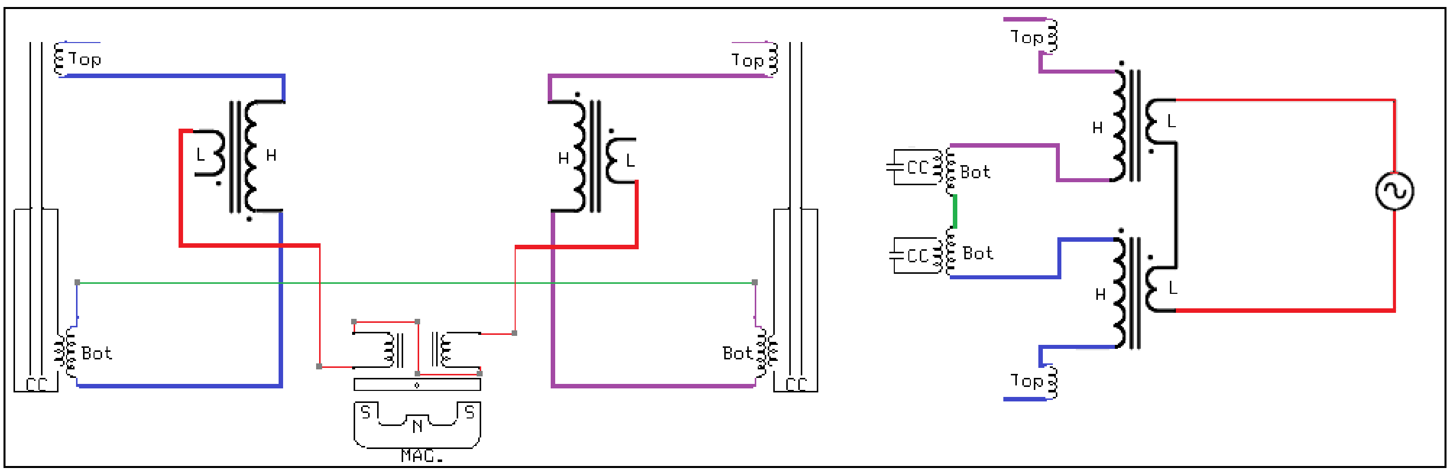
The following image shows the Aho schematic adapted to the generic layout. Note that the high and low sides of the transformers are reversed from the Aho schematic but the connections are the same. The colored lines are used in the following schematics to show conduction paths, using the common conduction path between the capacitors (green) as a "virtual ground" termination and the load as a termination to differentiate the conduction paths.



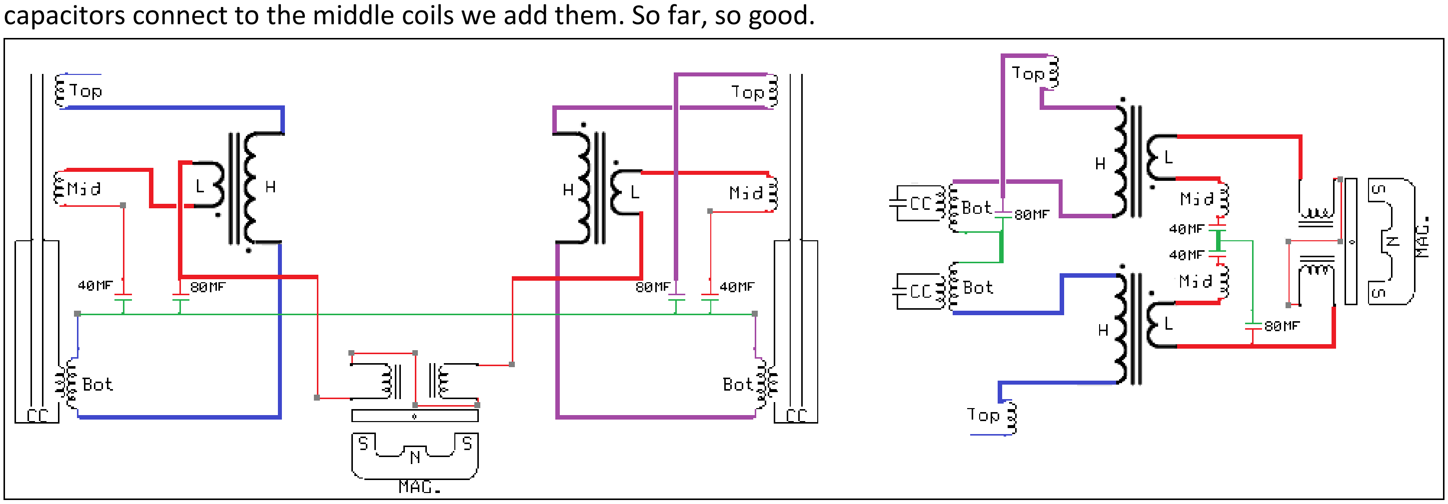
The following image shows the generic Aho schematic compared to the series magnetic amplifier circuit found at [Homemade Magnetic Amplifiers](#).



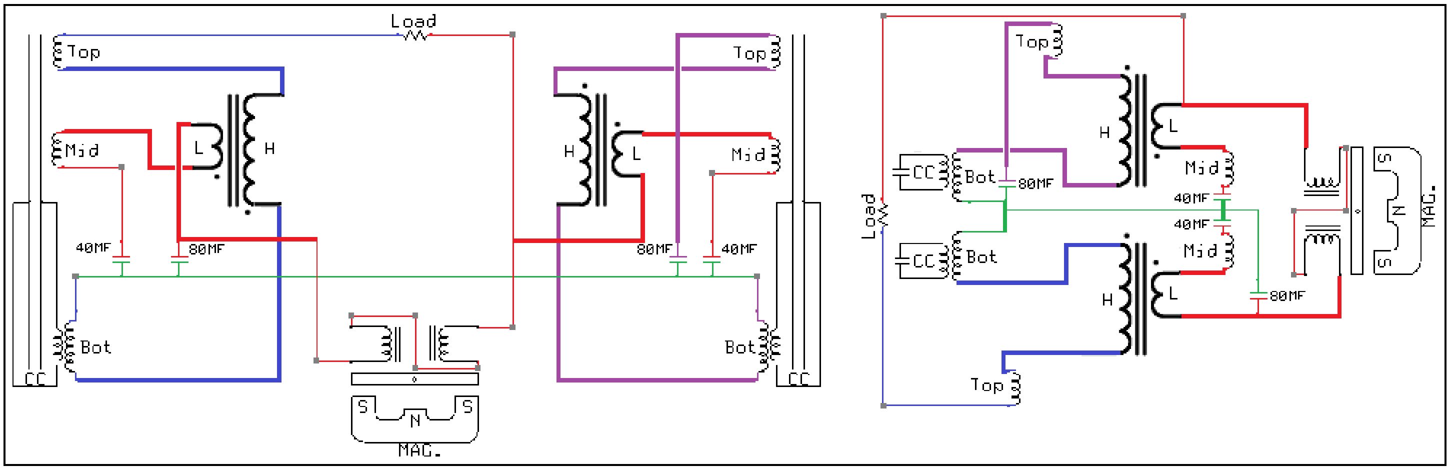
Below we start fitting the Aho schematic into the mag amp schematic. The load is problematic. We will come back to that later. The variable resistor in the mag amp circuit is removed since the Hendershot device does not have a variable component for adjusting the transformer saturation. Here we have substituted the two cap/coils for the battery and added the top basket weave coils. The transformer phasing from the mag amp circuit is added to the generic Aho schematic. Note that the transformer phase markings follow the connections in both drawings and not the orientation of the transformer schematic symbol.



Below we substitute the buzzer for the oscillator and add the capacitors and their connections. And since 40uF capacitors connect to the middle coils we add them. So far, so good.



Now we come back to the output and can see why it is problematic - its connections span both sides of the mag amp circuit. Additionally, the 80uF capacitor on the battery side of the mag amp schematic is not connected to the other capacitors so that connection is added as well. Now we have both sides intimately connected.



Circuit isolation is one of the features of a magnetic amplifier but the Hendershot circuit loses that isolation. On the other hand, it's not an amplifier but a self contained, self oscillating power source while the magnetic amplifier has two external power sources - the oscillator circuit and the battery for adjusting the amplifier.

From dragon post #778: http://www.energeticforum.com/264853-post778.html

"If you have the battery and resistor biasing the core so the light barely lights and put an AC source on the battery side (function generator will work) you'll see the light will go out on one half cycle and get very bright on the other half."

Looking at the magamp schematic, the capacitors connected to the bottom coils is acting as the biasing battery and the CCs, being RLC tank circuits (the R is in the coil wire), are acting as the oscillator. That leaves the buzzer to be the power source which makes sense - the stored power of the magnet.

"Basically what you have is a mag amp being biased on both coils. Similar to a diode with a transistor to release the energy at the appropriate time... by using the transformer you actually get a bit of a boost as the change occurs."

So the critical feature in the Hendershot generator is transformer saturation. That explains why the transformers are specified as "vertical oscillator type". I think those transformers use E and I laminations with a gap between the E and I laminations.

Since the transformers are being fed from both sides, the balance between those feeds must be just right so that one does not override the other. That is where the difficulty lies in tuning the device for sustained operation.

The purpose of the top and middle basket weave coils is not clear to me. Could they be chokes? It's unclear to me how they affect the CCs or the CCs affect the top and middle basket weave coils. I suppose they could be considered chokes since they are somewhat near the metal core that the cap/coils are wrapped upon but that seems a stretch. The aluminum foil of the cap part of the cap/coils would be very close to the top and middle coils but, not being magnetic, could not be considered choke cores.

No one pays much attention to the load but, being an incandescent light bulb, it is actually a variable resistor - the resistance increases as the filament gets hotter and decreases as it cools. It varies from about 9.5 Ohms cold to about 144 Ohms hot or the maximum resistance is 15 times the minimum. Being attached to both sides of the Hendershot generator, it must play a role in tuning also.