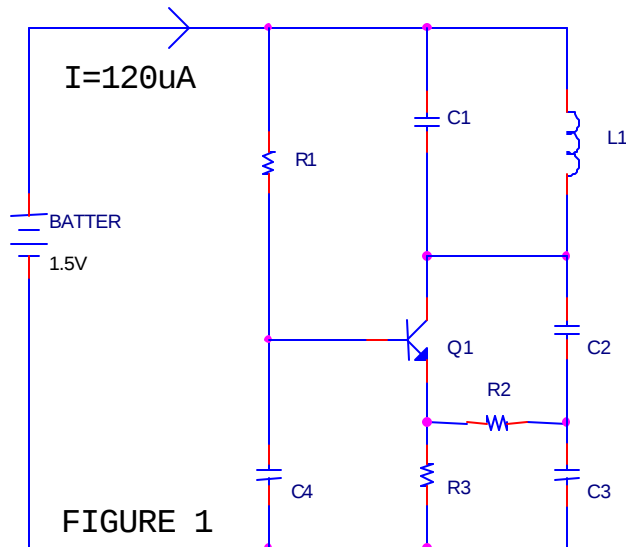


EMI of Wireless Pen

Figure 1 below represents the working circuit in our wireless pen. In Figure 1, L1 is an oscillating component, whose function is similar to a location oscillator in a normal radio receiver or the horizontal oscillator in a TV receiver. The only difference is in its working frequency.



The Component L1 is composed of a Ferrite rod (core), a ledge of coil, and a coil. See figure 2 below.

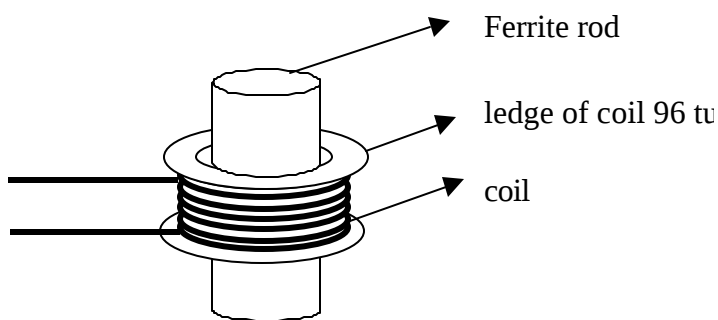


Figure 2

Ferrite rod (core) in this circuit is used mainly for two functions:

1. Tuning: moving the ferrite rod adjusts the coil to required inductance value (L).
When inductance value (L) is changed we get different frequency to decide the value of pressure.
2. EMI suppression: the ferrite rod (core) can suppress certain EMI transmissions.

Figure 3 below depicts the working principles of our wireless pen. In working mode, the Wireless Pen operates like a magnet, with its magnetic force line going from the North Pole to the South Pole. By the nature of magnetic field, the line of magnetic force always form a closed loop.

The energy level of magnetic force line will taper off along the distance in space. (This can be considered as a transformer with such a long distance between the input side and output side, it becomes non-conductive.)

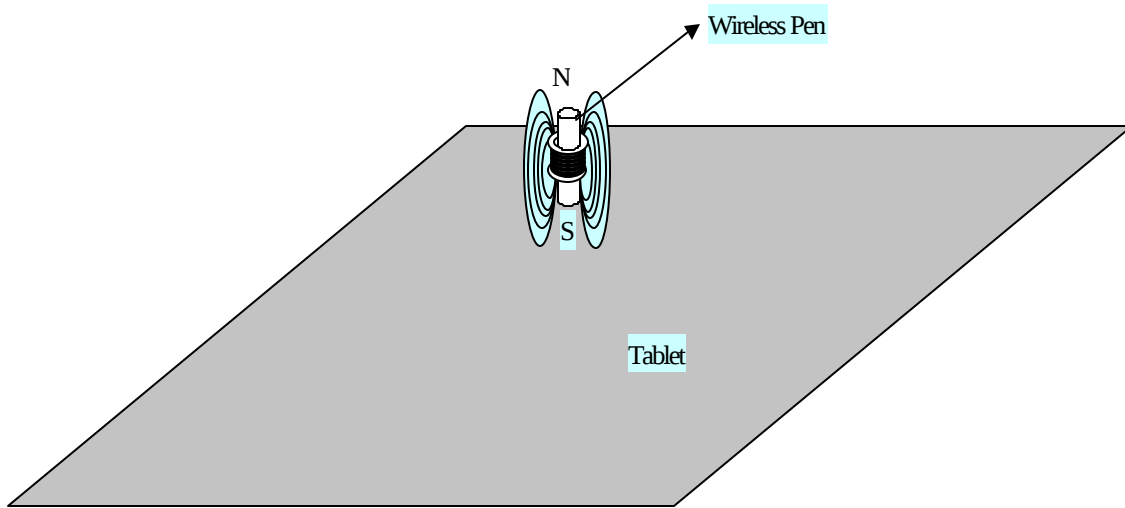


Figure 3

When the wireless pen is working the line of magnetic force will induce a current on the grid of tablet, and the tablet can then use this induced current to determine the position of the pen.

If we ignore the effect of the Ferrite Rod (It will reduce EMI), we can calculate the maximum intensity H of the magnetic field generated by the Wireless Pen as follows.

$$H = (NI)/L = 96 \times 120 \text{ uA}/6\text{mm} = 1.92 \text{ uA}/\text{M} = 0.00000192 \text{ A}/\text{M} \quad (\text{MKSA}),$$

Where

N = number of coil turns.

I = current on coil, and

L = length of from the beginning of the first coil turn to the end of the last coil turn.

In conclusion the intensity of the induced magnetic field is less than 1.92×10^{-7} , which is similar to a static magnetic field, and not a time-varying magnetic field. This, I believe, is why the lab could not detect the presence of a working Wireless Pen.