SCHEDELEAKS

Tutto ciò che avreste voluto sapere sulle schede telefoniche

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ospitata da:

Schede Telefoniche .org

4th - Decoding and translation of codes

2nd - The magnetic strip and its reading

Last revised: 01/08/2017 12:32

Decoding and translation of codes

2- The magnetic strip and its reading

With the help of electronics it is possible to go into a more detailed level of analysis of magnetism allowing, in conclusion, the extrapolation of the single bits of information.

The card must be read by means of a head (similar to that of the old Walkman) that has such dimensions and characteristics as to be able to read the entire central track and two halves of the external tracks (equal to each other).

The signal is given by the reading of the three traces, each of which in isolation does not represent anything significant for the purposes of decoding; only through the simultaneous reading of the vertical sections of the traces is an electrical output that can be converted, as we will see later, into digital information.

Why three separate tracks and not just one?

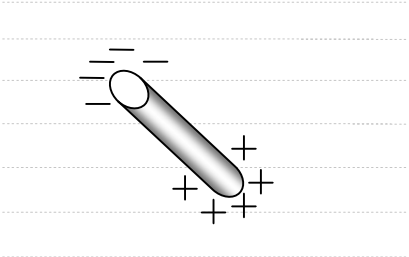
2.1 A little bit of physics!

From Wikipedia (https://it.wikipedia.org/wiki/Banda_magnetica):

The magnetic strip is generally made up of a single layer of PVC and many magnetic particles of resin, where the data that are thermally impressed using the most varied micro-printing techniques can be stored. The data is read through the magnetic strip, while a magnetic field is applied near the strip to imprint it. It has applications such as credit cards, ATMs, tax codes and other recognition / authentication systems etc.

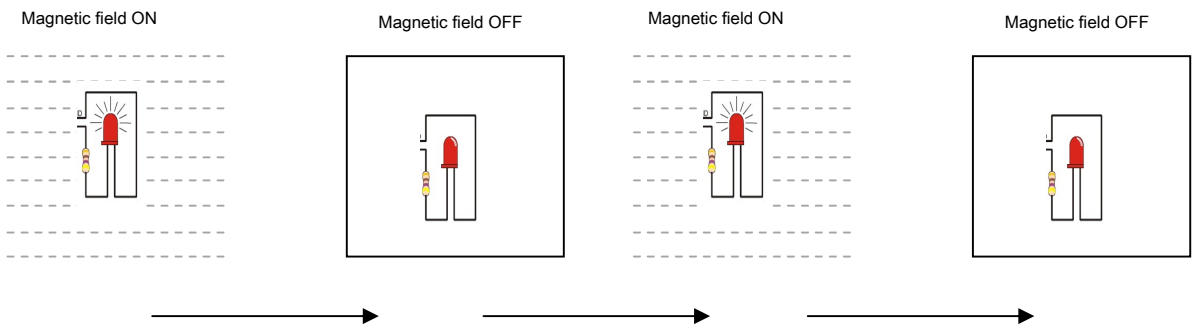
The possibility of being able to magnetize single micro sectors of the magnetic band allows to exploit one of the principles of second magnetism

which by placing a metal element inside a magnetic field, a potential difference will be generated at its ends, i.e. part of the electrons that make up the metal element will tend to move towards one of the two ends creating a greater concentration of electrons (signs -), while on the other there will be a decrease in the concentration of electrons (+ signs):

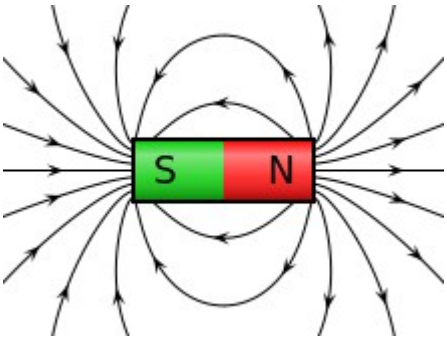


Ideally the above metal element, placed inside a magnetic field, turns into a small “electric battery”, in fact if we connected the two ends by means of an electric conductor, electric current would pass through it.

In more practical terms, assuming to connect the two ends of the metal element by means of an LED (placing everything inside a magnetic field of adequate power), the LED light will turn on for an instant. By repeatedly turning off and on the magnetic field, the LED light will turn on intermittently



I have talked about the magnetic field so far, what generates it? In the simplest form the magnetic field is generated by a magnet:



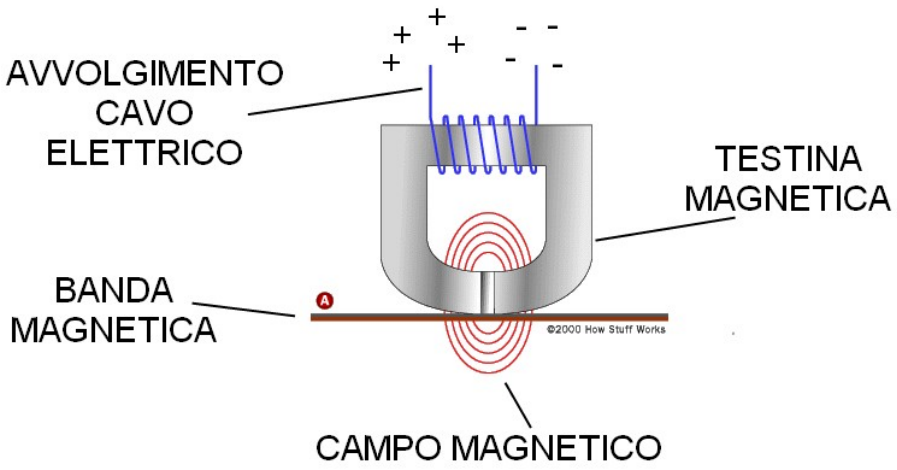
The lines around the magnet indicate the zone of action of the magnetic field and the direction towards which a metallic element would be attracted (attraction or repulsion).

The direction of the magnetic field in which we insert the metal element, conditions the direction of the potential difference which can be positive (+ V) or negative (-V), which conditions the direction of the current that can flow from right to left or the other way around.

The magnetic stripe of a card appears as a sequence of magnetized and non-magnetized areas:

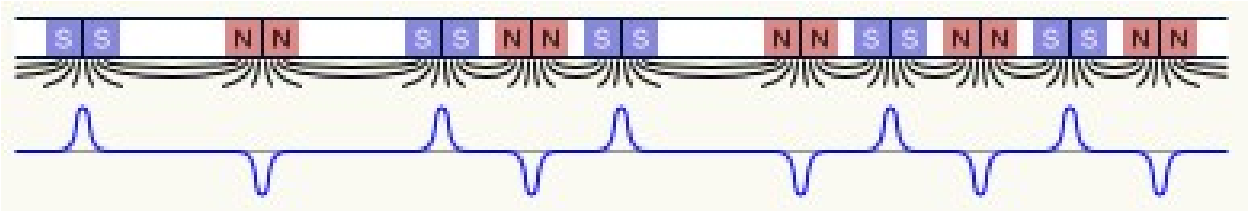
In the magnetic head we find a small coil of electric cable that behaves in the same way as the metal element above and the portion of the magnetized magnetic strip generates the same effect

described above: a potential difference (Volts) will be created at the ends of the coil inside the magnetic head:



Through suitable instruments such as the TESTER, connected to the coil winding cables, every time the head encounters a magnetized portion of the magnetic band, it will see its pointer move indicating the presence of a potential difference (+ V or -V, depending on the direction of the magnetic field). When the head will slide on demagnetized portions of magnetic strip, the tester will signal a potential difference equal to zero: by swiping a telephone card the tester would see its hand go up and down in succession as per the magnetization of the band. Obviously the use of the tester would be insufficient as everything would take place in a few tenths of a second and therefore we are forced to resort to the aid of electronics by means of micro controllers,

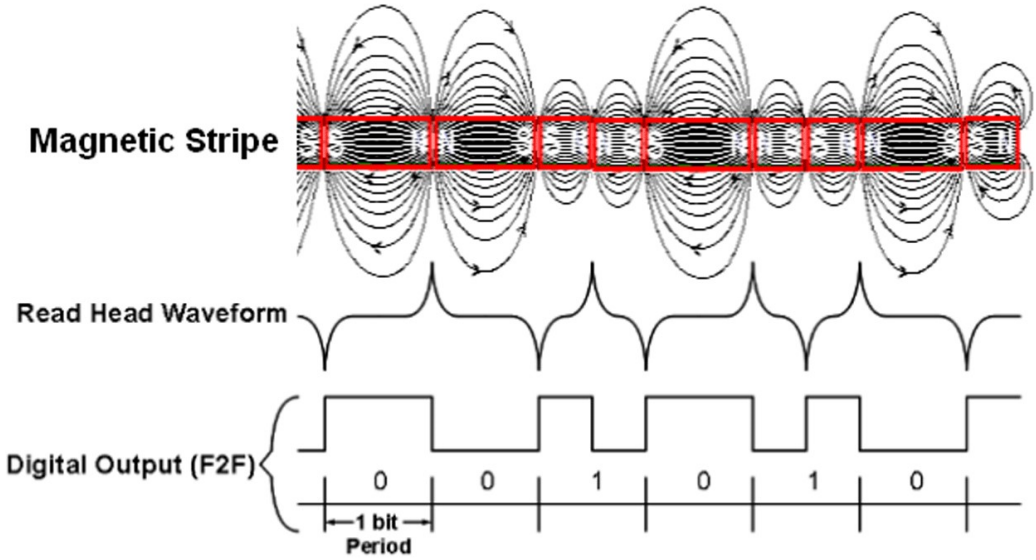
The voltage generated by the head can assume three states: + V (peak up), 0 (flat line) and –V (peak down):



The "trick" of magnetic cards is here: being able to magnetize the card as you wish, I can generate sequences of positive, negative or flat peaks according to a predetermined convention and then record the desired information, a sort of Morse code

2.2 Encoding of magnetic cards

Let's start with common magnetic cards (credit cards, badges, etc.) that record information in a single track according to various standards defined by the ISO, hereinafter any one that serves as an example:



From this image it is possible to see an example of how, starting from the magnetization of the card, we arrive at the sequence of binary numbers that contain the information.

As you can see, the Magnetic Stripe is suitably magnetized into small elements having a specific South-North polarization or vice versa.

Below we see what is the voltage generated at the ends of the head coil when it is crawling on that portion of the magnetic strip. At the union of two segments there is a peak, positive if the two elements are combined with a North-North polarity, negative if South-South. There is zero voltage in the space between magnetic segments.

In the Digital Output (F2F) section there is the transformation from a sine wave into a square wave and subsequent translation into binary, according to the specific translation standard.

TabsLeaks

Everything you ever wanted to know about calling cards

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