

The main topics are:

current PAL Macrovision
old NTSC Macrovision

REQUEST: If anyone can analyze the rumored new NTSC Macrovision and send the data to me, I'd be very grateful. It's pretty hard to get NTSC tapes here.

Tapes that I used were Disney's Beauty and the Beast (PAL) and 101 Dalmatians (NTSC).

NB: From here, it gets very technical. A basic knowledge of what video signal looks like is required.

First, some basics. A television picture consists of 25/30 (PAL/NTSC) frames. Every frame contains a total of 625/525 lines. Not all are visible, though).

Frames are interlaced, i.e. they are divided into two fields that are drawn on top of another in such a way that the first field scans every alternate line and the second field 'fills in' the missing lines. The scanning is from top to bottom and from left to right.

The fields are separated by vertical synchronization pulses. The lines are separated by horizontal synchronization pulses. Both PAL and NTSC standards specify that those approximately 20 lines that follow a vertical sync are not to be used in forming the picture. These lines are not visible in properly adjusted TVs, so they can e.g. carry TeleText data, or, in our case, Macrovision copy protection signals (see pictures 1 and 2). The vertical sync and invisible lines form the vertical blanking region.

o, Macrovision

So, what is the trick with Macrovision? In order to understand that, some knowledge of VHS AGC circuits is needed (AGC==Automatic Gain Control). The AGC circuits adjust the amplitude of the video (luminance) signal by measuring the voltage difference between the bottom of the horizontal sync and the back (rear) porch (see picture 3). Chrominance AGC is measured from the color burst.

What Macrovision does is to introduce false synchronization pulses followed by false back porches at a very high voltage level (~15% over white level). The VHS VCR looks at the signal and thinks that it is fed with an extremely high-amplitude signal and adjusts the gain control to minimum --> the real picture gets very dim (see pictures 4 and 5).

The AGC response must be like this:

Reset fast (in a few lines time) to an apparent increase in amplitude by attenuating the signal.