The characteristic of the control card for the LED display ver. 2.2

Inputs:

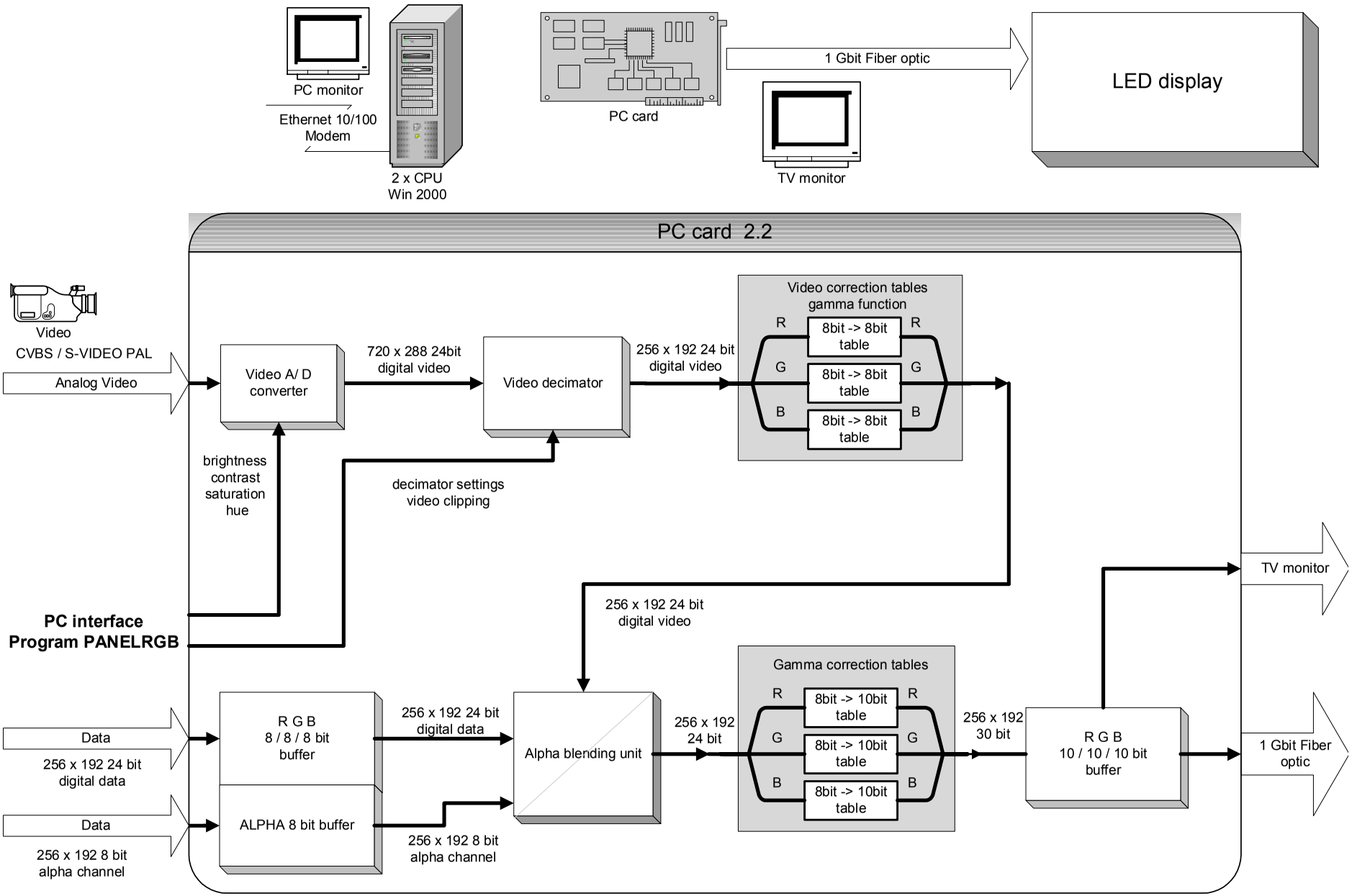
- Analog video signal PAL/NTSC
  - S-VIDEO input
  - CVBS (composite)

- Image data from PC by program PANELRGB
  - AVI files (Video for Windows), uses all installed video codecs
  - The BMP graphic with the possibility to define "transparent colors"
  - Texts, moving subtitles, uses standard True Type and raster fonts Windows as well
  - Lines, ellipses, rectangles, colorful bars and transition effects, ...(simple programming language)
  - The indicator of actual time
  - The data for the Alpha channel for the video blending with computer image

- Settings from PC by program PANELRGB
  - Brightness, contrast, color saturation and hue control for the input video signal
  - Clipping and resizing of video in image decimator
  - Correction tables for the input video signal (gamma function)
  - Correction tables for the whole image on the display (gamma function)

Outputs:

- 1 Gigabit fiber optic link (with back channel) - 2 x SC connector
- RGBS output to the control monitor (gives the image in much better quality than CVBS)
- CVBS – PAL output to the control monitor



The block schema of control card - the example for the configuration of panel 256 x 192 points.

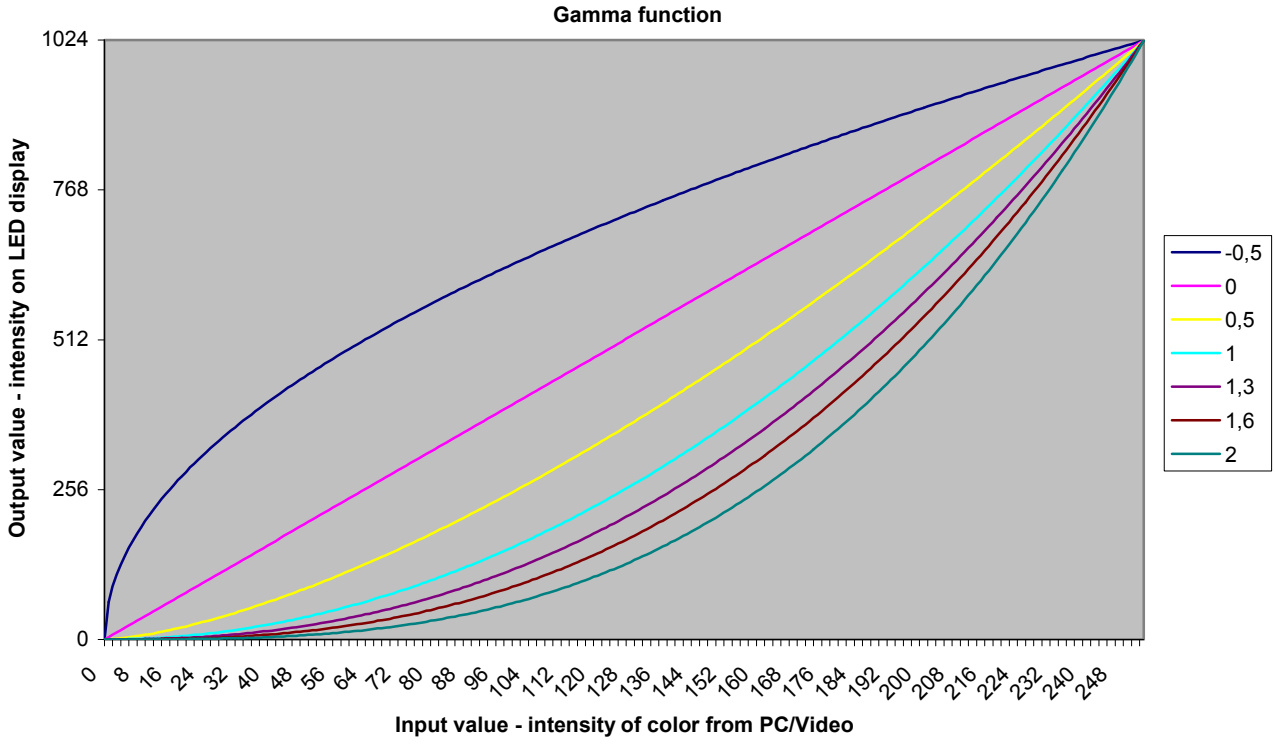
Gamma correction tables

1) The main correction table

It processes the complete data for a display (video signal blended with computer image). Image is on the side of computer as well as digitized video RGB with 8 bits per color (values 0 to 255). The display accepts data with 10 bits per color which it figures with linear brightness. Because a human eye doesn't perceive the brightness linearly it's necessary to make the gamma correction. There is a translation table for each color and contains 256 rows (for each input intensity) with a value 0 to 1023 (10 bits color for a display). The table is managed by 3 parameters in the main program from which the content of the table is automatically counted. The values 0 to 255 from the input are mapped to the values *min-max* by the function *output = input^gamma* normalized such a way that it takes inputs and gives outputs in the required range of values.

The recommended gamma values for the normal use are between 1.0 and 1.5.
A minimum value (min) 0 (or 1 if you want to suppress a big difference in the brightness between a black and the less powerful color).
A maximum value (max) 1023 (use lower value if you want to suppress maximum intensity of color)

Example of correction curves for min = 0, max = 1023 and chosen values of gamma.



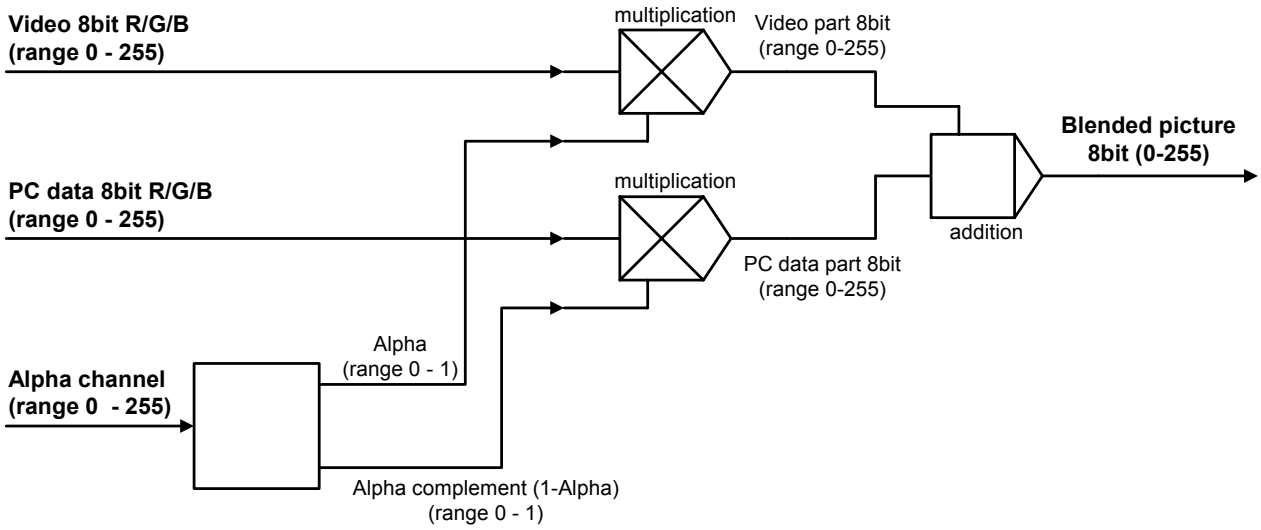
2) The correctional gamma table for the video

It process the digitized video data before blending with a PC figure. 8 bits per color on the input is translated to 8 bits per color on the output. The mechanism of the computation (min, max value and gamma factor) is otherwise the same as in the main table.

The recommended gamma value is 0 or the scale 0 to –0.5 (so called "anti gamma") for the backward correction of TV figure which from the source signal already some gamma correction contains.

Alpha channel

Alpha blending schematic
1 pixel, 1 color component (R/G/B)



Alpha channel is a method known from the television technique, which enables to blend 2 figures to only one if there are given certain proportions. A special case is so called keying where individual points of the figure are chosen only from the first or from the second figure.
Every point of the figure has four 8 bit parts: R, G, B are color components, ALPHA determines the proportion of blending with live video from the video input.
The picture shows the mechanism of the computation of the output color of image for one color component of one image point.
The value ALPHA = 0 means 100 % PC image, ALFA = 255 is 100 % image from video input (it doesn't matter which color has the point determined from PC), the values between 0 and 255 determine the proportion of blending.

The example of use
The insertion of subtitles to the live video image
1) for the whole surface of the display we'll set alpha = 255 (100% video), and black color (0,0,0)
2) as a basis for the subtitles we'll choose the rectangle where we set alpha = 128 (50% video) and black color (0,0,0). By this way we'll suppress the brightness of the video image to 50 % and the subtitles will be better to read.
3) The letters of subtitles will be printed with alpha = 0 so the letters will have exactly the determined color.

Video decimator

Video decimator is a computation unit that provides resizing of digitized video (resolution 720 x 288 points to the frame) to the point resolution on display.
The resultant image is made by the weighted sums from all input points so the unit supports the real number proportions of resizing. This method gives very good visual result because it doesn't lead to the loss of any brightness information. Some easy systems for resizing use only sample points of sample lines and their result is much worse than our method.
The image is always resized to the whole size of the display and that's the reason why for the display in video business is reasonable to choose the proportion of the display sides 4:3.

The constants, which manage running of the decimator, define as well which part of the input image will be used for the resize (it's possible to choose a smaller part of the video image)

After digitalization has the full image from video input 720x288 points for each frame (video half-picture). The constants for the recount at axis X determine the initial point of the section and the number of chosen points. At the axis Y it is the initial row and the number of chosen rows.

Recommended values:
X decimator 3 and 690 (the real image is a bit smaller, 0 is forbidden value)
Y decimator 20 and 260 (because the first lines are service and don't carry picture information)