

Perfect Pix

INSTRUCTION MANUAL

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1. INTRODUCTION

Perfect Pix is a set of graphic tools for Amstrad CPC with 3 extended video modes to get images of an unusual quality on a 8-bit machine.

Before you begin, we recommend that you read this manual to understand the concepts and ensure that gives the right steps to make possible almost any image on your CPC.

The set includes source code examples to show images. Include high-quality graphics in your productions is very easy!

2. GETTING STARTED

2.1 SYSTEM REQUIREMENTS

You need:

- * Amstrad CPC or CPC+ with 128KB of RAM and disk drive.
- * Color monitor CTM640/644/CM14.
- * Windows with Java installed.

2.2 INSTALLATION

Unzip the zip file to the desired location on your hard drive. Inside you will find the following folders:

- * “converter” - with the converter tool.
- * “paint” – with the paint tool and examples.
- * “source” – with source code examples.

Transfer the .dsk files from “source” and “paint” folders to 3.5 "disks, SD card, etc ... to use them on your CPC.

2.3 SEE EXAMPLE IMAGES

To get a quick idea of what you can do with Perfect Pix, insert the disk "ppix.dsk" in your CPC and type run "ppp. Then enter one of the disks with example images and press [L]. Then, type the name of the image you want to load and, from the main menu, press [V]. To see more images, back to the main menu with [ESC] and repeat the process.

3. EXTENDED VIDEO MODES

3.1 MODE R

The mode R supports up to 384x272 pixels and 16 freely selectable colors from a palette of 27. It basically involves an approximation to the interlace mode in mode 0 and horizontal, with the peculiarity that the half-pixel scroll used in interlace modes, is alternatively applied to the odd and even lines in a same frame (due to CRTC limitations). The scroll effect, coupled with the switching 50hz of even and odd frames, produces the mixture of colors in adjacent pixels, so as a result more than 16 colors are obtained.

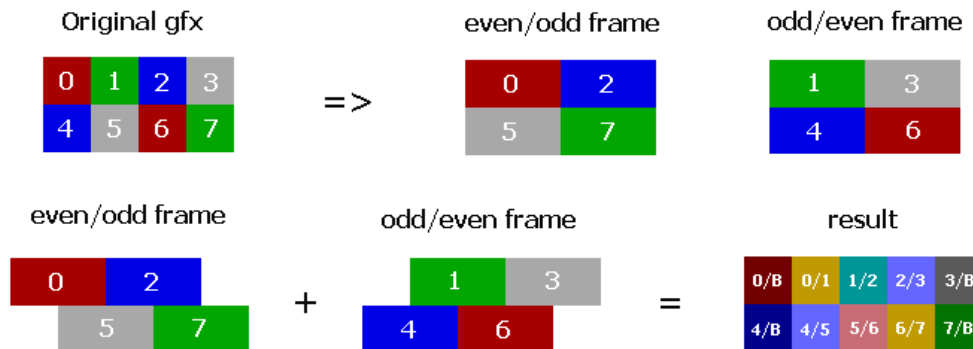


Figure 3.1: Mode R description.

The main drawback of mode R is that consumes many CPU resources, so its application is limited to static images, such as splash screens and covers.



Figure 3.1.2: Mode R image included in the example dsks.

3.2 MODE B0

The mode B0 supports up to 192x272 pixels and 136 colors from a palette of 378. It consists of switching 2 frames in mode 0 at 50hz, producing the color mixing.

Depending on the colors are mixed, the result may cause a flickering effect. This effect will be greater the greater the difference in brightness between the colors are mixed. To reduce flickering in large areas of a same color, both the converter and the paint tool, implements a pixel by pixel mesh to achieve a similar average brightness in both frames.

The CPU usage of mode B0 is negligible, because it is only necessary to change the video page once every 50hz. This can be implemented by interruptions for automatic representation. These features make possible to implement in software of all kinds. Although its main drawback is that the images consume twice as much memory than usual.



Figure 3.2: Images in mode B0 included in the example disks.

3.3 MODE B1

The mode B1 supports up to 384x272 pixels and 307 colors, divided into color 0 + up to 34 palettes of 9 colors per line. Results from the application of the same technique used in B0 to the mode 1. Which, in principle, only produces 10 colors, but thanks to the application of rasters, you can change the palette (except color 0) up to 34 times in the desired lines.

Without rasters, CPU consumption of mode B1 is the same as in

mode B0, that is, negligible. However, using rasters, and depending on which lines are applied, CPU consumption will be increased to a greater or lesser extent.



Figure 3.3: Mode B1 with rasters image included in the example dsk.

4. FILE TYPES

Perfect Pix introduces new file types for image management and palettes in extended video modes. It also supports some standard file types to facilitate the use of external tools. Here are the most important file types:

4.1 PPH

Files with the .PPH (Perfect Pix Header) extension are the CPC image header files for extended video modes. They are used to load / save images from the paint tool and the converter. They are complemented with .ODD and .EVE files, which include linear raw data format for each frame of an image.

4.2 PALETTE FILES

Files with the .PCT extension (Perfect Color Table) are CPC palette files used by the paint tool and the converter. When you create a color palette with the paint tool, you can export in PCT format, and then import it for reuse in another image. The converter allows you to convert a PCT palette to the following standard palette formats for use with external tools:

- * ACT (Adobe Color Table), used in Photoshop.
- * PAL (Microsoft), used in PaintShop Pro and others.
- * GPL, used in GIMP, mtPaint and others.

4.3 RAW FILES

There are several options for using the images made with Perfect Pix in your own developments:

- * If you need raw linear format (one line after the other), you can

directly use the .EVE / .ODD files that accompany the .PPH files.

* For other formats, for example, lines distributed in the order of the CPC screen, you can use the converter. Files obtained thus have the .RWE and .RWO extension for even and odd frames respectively.

In the dsk included with the source code, within the "source" folder, you can see examples of using .RWE and .RWO files generated with the converter to show images in extended video modes on your CPC.

5. CONVERTER

In the “converter” folder, you find the converter tool "ppc.jar" that will allow, among other things, convert PC images to CPC in extended video modes.

To run it, open a command line window, go to the “converter” folder and type:

```
java -jar ppc.jar
```

Below you can see instructions and practical examples. If you find any error, you may need to install Java on your computer or include the path of the folder with the Java binaries in the PATH system variable. In any case see the Java support to fix it.

Before using the converter it is necessary some prior steps.

5.1 PRIOR STEPS

To make a good conversion, it is necessary to make some preliminary adjustments to the image you want to convert, such as adjust the size, color saturation, brightness, contrast, etc ...

As a rule, it is good to saturate the colors of the original image, so that the colors be similar to those which will have in its CPC version.

You can use any external tool to make these adjustments, such as Photoshop, PaintShop Pro, GIMP, mtPaint, etc.

5.2 CHOOSING PALETTE

To convert an image to mode B0 or B1, choosing the right palette is a very important step.

Once you have the original image ready, run the paint tool in ppix.dsk on the emulator or preferably on the CPC. For this, type run "ppp. Then press [N] to create a new image, enter the screen mode, size, and select edit the palette.

From the palette editor, use the cursor up / down to select the color and left / right to change it.

In the right box "Mix result", you can see the result of mixing colors. Have the original image you want to convert from your PC and ensure that the colors of the "Mix result" box are as close as possible to those used in the original image.

For mode B0 and B1, below the last color, you will find the "Flick tolerance" parameter. This parameter can reduce the flickering by excluding the more flickering color mixtures, thus reducing the flickering at the expense of reducing the number of colors. You can change its value with left / right cursor and see how some colors from the "Mix result" box appear and disappear accordingly. The value range of "Flick tolerance" parameter is from 0 (no flickering) to 255.

When you have the color palette defined and the "Flick tolerance" parameter set, export the palette as .PCT and exit the paint tool.

5.3 CONVERT IMAGE

You can convert the original image using the converter tool or an external tool like Photoshop, PaintShop Pro, GIMP, mtPaint, etc. compatible with any of the standard palette formats supported (act/pal/gpl).

Once you have the palette in a .PCT file within a .dsk, copy the .dsk file to the "converter" folder in your PC and use the converter to extract an act/pal/gpl file from the .PCT depending on the tool you will use to convert the image. To do it, type:

```
java -jar ppc.jar -p <file.dsk\file.pct> <file.act/pal/gpl>
```

If you choose to use the converter tool instead of an external tool to convert the image, extract the palette in act format, and then use the following command to convert the image:

```
java -jar ppc.jar -i -<src_format> -<des_format> <src_file>  
<act_file> <des_file> -<color_difference_method> -<dithering>
```

Possible parameters for -<src_format> are: -gif, -png, -jpg or -bmp.

Possible parameters for -<des_format> are -gif or -png.

Possible parameters for -<color_difference_method> are:

-ce = Euclidean

-cc = CIEDE 2000

-cm<x.xx> = CIEDE 2000 mixed with Euclidean, where <x.xx> is the ratio between 0 and 1 with decimals (eg -cm0.5 to a mixture of 50% between both methods)

The CIEDE 2000 method is more faithful to the color range than the Euclidean, and the mixture of both methods is usually better than just CIEDE 2000. However, we always recommend converting the image with different color modes and compare results.

Possible parameters for -<dithering> are:

-dn = None.

-dd<x.xx> = Diffusion (with dithering ratio between 0 and 1 with decimals, for example, -dd0.3 to 30%).

-do<x.xx> = ordered (with ratio between 0 and 1 with decimals, for example, -do0.2 to 20%).

IMPORTANT! The combination of the mesh used in the color mixture with some patterns of dithering, may result in an increased very significantly in some areas of the image flickering, so it is recommended to use dithering in low proportions, and even not use it in some cases. Note also that due to the same problem, the diffusion dithering usually give better results than ordered. However, we always recommend converting the image with different types and proportions of dithering and compare results on CPC. It is also

possible to obtain a better result by composing the final image manually with an external tool from the best areas resulting from the different conversions.

Once you have the image converted to the color palette in png or gif format, you must convert it to .PPH format within a dsk file to see the result and retouch it on your CPC. For this, use the command:

```
java -jar ppc.jar -i -<gif/png> -pph -<mb0/mb1/mr> <src_file>  
<act/pal_file> <file.dsk\des_file>
```

If the conversion is successful, .PPH, .EVE and .ODD files are generated in the dsk. EVE and .ODD files also are generated on your hard drive, along with a text file ending in "_pal.txt" to easily include the CPC palette in your source code.

To see practical examples of the converter commands, type:

```
java -jar ppc.jar
```

5.4 RETOUCH IMAGE

Although the direct result of the conversion can be good in many cases, it can improve quite by retouching the result with the paint tool. This is necessary to do it on real hardware, because you will see the true result of mixed colors and you can fix flickering and other conversion defects .

Details about the use of the paint tool are in Chapter 6.

5.5 EXPORT FINAL IMAGE

Once you have an image finished, you can use it in your own development without much effort. You can use directly the .EVE / .ODD files if you need raw linear (one line below the other), or convert it to standard CPC screen format with the converter. For this, type:

```
java -jar ppc.jar -i -pph -raw -<raw_mode> -<offx> <file.dsk\src_file>
<des_file>
```

Possible parameters for -<raw_mode> are:

-s = Standar CPC screen (for images of 16kb or less per frame with lines sorted in CPC screen format).

-f = Fragments (divided into fragments up to 2048 bytes to optimize memory usage). Necessary for overscan images.

Optional parameters:

-off<x> = In overscan screens, indicates the offset you want for the first video page in both frames, where <x> is the offset value. For example, -off64.

If the export was successful, you will get .rwe and .rwo files that you can include directly in your source code with the palette defined in the "_pal.txt" generated when the image was converted.

In the "source" folder, you will find example source code in assembler to show the extended video modes and about the use of raw files, as well as a .dsk to see the examples on your CPC.

5.6 CONVERT TO MODE R AND B1 WITH RASTERS

Converting an image to mode R is simpler than mode B0 or B1. Once the prior steps to adjust size, saturation, etc, if you use an external tool like Photoshop, you can use the "cpc.act" file in the "converter" folder to convert the image with auto color reduction from 27 to the 16 colors with more presence in the image.

If your external tool does not have that option, you can create a new image with the paint tool in mode R and edit the palette to manually select the 16 colors used for the conversion. Then export the palette as .PCT and extract an act file with the 16 colors selected. Then

you can use the converter as described in section 5.3.

To convert an image to mode B1 with rasters (different palettes from selected lines), divide the original image into different parts (each will use a different palette). Then define the palette that best suits each part of the image as indicated in section 5.2, and finally use the converter to compose the image converted from the different parts, each with its palette. For this, use the following command:

```
java -jar ppc.jar -i -<src_format> -pph -mb1 <src_file1>  
<src_file2> ... <act/pal_file1> <act/pal_file2> ... <file.dsk\des_file>
```

Where -<src_format> is -gif or -png depending on the format of the parts of the original image, <src_file1>, <src_file2>, etc. are the files with the different parts of the original image, and <act/pal_file1>, <act/pal_file2>, etc. are the palettes for each part.

6. PAINT

Although Perfect Pix Paint lets you draw from scratch in extended video modes, it is a retouching tool for converted images, so its functionality is limited.

The paint tool is in the "ppix.dsk" file, which should be transferred to disk to run on your CPC. As discussed in section 5.4, you must run the tool on real hardware to see the true visual result and retouch or drawing an image properly.

Run it by typing `run"ppp`.

6.1 MAIN MENU

After run the paint tool, you access directly to the main menu. Options that are not accessible are dimmed. Access each option by pressing the corresponding key.

6.2 CONTROLS

For your convenience, you can completely redefine the controls of the tool according to your taste. Since the controls screen, move the cursor and press "return" to change the controls. If you have a CPC mouse, its use is recommended. AMX / Dk'tronics and compatible as well as the recent MultiPlay are currently supported. You can adjust the pointer speed and acceleration parameters with cursor left / right over the corresponding options. Note that you have auxiliary controls for moving the pointer and buttons, which, if your mouse only has 1 or 2 buttons, you can use to get the functionality that lacks from the auxiliary keys.

After modifying controls, they are stored on disk, so you must have the paint tool disk unprotected.

6.3 PALETTE EDITOR

The basic operation of the palette editor was indicated in section 5.2. However, some additional details and options are explained here.

For reference only, the ID / MC columns indicate the color codes in Basic and hardware, and R G B column indicates the RGB values in hexadecimal.

The "Flick tolerance" option only appears in mode B0 and B1. The latter, also includes options to add additional palettes (up to 34) and define the vertical position of each. You can change these parameters with cursor left / right over the appropriate option. When you add a palette by pressing [A], it is added at the end and start having the same colors as the previous palette.

When you finish editing the palette, press [ESC]. You may return to edit at any time from the main menu.

6.4 PAINT

The paint screen is divided into 3 areas:

In the upper area you can see the current screen area in real size. The bar immediately below indicates the horizontal position of the zoom in the image.

Below is the paint area with zoom x8, where you can use the pointer to paint with pen, paint with paper or pick a color from the image as pen.

In the lower left area, you can see two concentric rectangles, the outer rectangle indicates the selected paper color and the inner rectangle the pen. On the right you can see the color palette available sorted by color ranges. Note that although it could eliminate some colors with the "Flick tolerance" parameter in mode

B0 and B1, this had only effect on the conversion process, and the paint tool offers all colors. In mode B0 and B1, pure colors (without flickering) are highlighted with a mark up color line. Within the color box, there may be the color indicator selected as pen, which can change by moving to "f0" (left). "." Numerical (right) and "f2" (up). You can also click directly with the pointer over a color from the palette to assign to the buttons to draw with pen or paper.

Other keyboard commands while painting:

* [V] - View image.

* [I] - Reverses the order of the mesh of the pen color (only in mode B0 and B1). Reversing the order of the mesh, you can get slight changes between adjacent pixels. As a rule, the order established by default is the one that produces less flickering.

* [CURSOR] - Moves the zoom window. In mode B1 with rasters, according you scroll the screen vertically, the palette that covers most visible area is automatically selected.

* [ESC] - Back to the main menu.

6.5 OTHERS

When saving an image or palette, if you need to free disk space, type "|era", to access all files on disk to select those you want to delete.

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