Handling 256 Colors Bitmaps in Designer and UniOP

This document explains how Designer and UniOP handle colors images.

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1. Introduction

The final result of color pictures displayed on the UniOP screen is the result of a multi-step process that depends on several different factors.
The most important aspects of the process can be summarized by the following points:

- nature of the image: how many different colors are used? is it a drawing or a photograph?
- number of colors of the original image
- number of colors configured for the video card adapter of the PC running Designer
- imaging process applied to the picture before importing it in Designer
- colors supported by UniOP

Each step has equal importance in the contribution to the final result.

2. High Colors Images in Designer and uniOP

Most of the times, preparing a bmp and converting its colors to the 256 standard Windows palette, gives good results, but sometime Designer works better if the image imported is originally made with the highest possible number of colors.

The main issue is the need, in Designer, to convert the high color bitmap images to the corresponding 256 colors version. The set of these 256 colors is the one supported by the UniOP Firmware.
In case the original image is made of only 16 colors, Designer does not apply any conversion when importing it; concerning 16 colors images it is important to note that Designer represents the 16 colors objects using the 16 Windows standard colors instead of using the corresponding 16 colors contained in the 256 colors palette of the panel.

Consider, as an example, the handling of the light gray and dark gray.
Let's assume to have Designer installed on a PC equipped with a video card working in True Color Mode (16 million colors).
Let's assume to use a UniOP panel with TFT display using the 256 colors support.

The Designer touch cells are created and represented in the computer using the standard Windows 16 colors palette.
In this standard representation the light gray is a specific combination of 4 bits (light gray = 0111, dark gray = 1000); when Designer uses the Windows mechanism/algorithms to represent the light gray, it converts the combination of 4 bits in the corresponding RGB combination. For the light gray the combination is: 192.192.192

When Designer prepares the project for the panel, the information passed to the firmware is not the RGB combination, but instead the 4 bit string. Since the color palette used by the panel and the one used by Windows are different, the combination of 4 bits is converted by the firmware is a different RGB combination; it actually is 145.145.170.
The 256 colors palette implemented in the panel does not include, in fact, the color represented by 192.192.192

If Designer passes to the firmware the combination 192.192.192, the firmware converts this color in the RGB combination 218.218.255
Designer is using the RGB combination to send information to the panel only when the object to represent is a bitmap image.

This is the reason why if a bitmap is prepared using the RGB color 192.192.192, it appears on the panel different from the light gray of the touch cells. In other words, the touch cells color is made starting from a 4 bit combination, while the bitmaps are made starting from an RGB combination.

Let's consider now a bitmap made using the RGB combination 192.192.192 and imported in Designer.
When importing the bitmap, Designer applies a kind of conversion trying to represent the image in the project page as close as possible to the appearence it will have later on the panel.
Since the color 192.192.192 does not exist in the panel color palette, Designer converts it to the nearest matching color; this color is 218.218.255.
In order to obtain in the panel a bitmap where the gray appears like the light gray of the touch cells, it is necessary to create this bitmap using the same color used by the panel to represent the touch cells; as discussed before, this color is 145.145.170.
Such bitmap appears in Designer with a color different from the touch cells light gray!

The following table presents the conversion applied:

Original Image Properties		**Designer (Windows) representation**	**UniOP Representation**
0111 (Light Gray)		192.192.192	145.145.170
192.192.192	conversion ⇒	218.218.255	218.218.255
145.145.170	conversion ⇒	145.145.170	145.145.170 (Light Gray)
1000 (Dark Gray)		128.128.128	72.72.85
128.128.128	conversion ⇒	145.145.170	145.145.170 (Light Gray)
72.72.85	conversion ⇒	72.72.85	72.72.85 (Dark Gray)

The best results in importing bitmap image can be obtained if the original bitmap uses the highest possible number of colors.
Reducing the color number to 256 using an image processor, will result in a bmp that does not use the set of colors available in the hardware palette of the panel and Designer does not have any way to convert the colors to the most suitable set.

If the image uses a wider set of colors, Designer will select between them the best fit that will be well represented on UniOP.

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