Workshop: Creating stencils with Inkscape and Potrace

- Description
- Get the tools
- Process
  - Easy one
    - Selecting a image
    - Load the image into Gimp
    - Remove the background is possible
    - Convert the image to black and white
    - Clean up the image and fixing the walls
    - Save the image as a BMP
    - Convert the image with potrace
    - Load the image in inkscape
  - Hard one
    - Selecting a image
    - Load the image into Gimp
    - Remove the background is possible
    - Convert the image to black and white
    - Adjust the Brightness and contrast.
    - Clean up the image and fixing the walls
    - Fixing problems
    - Save the image as a BMP
    - Convert the image with potrace
    - Load the image in inkscape and fix problems with the image.
- Fixing problems
  - Islands
    - Example #1 - Hello world
    - Example #2 - Reddit robot

Description

In this workshop we will be going through the process of creating stencil from a photo or image. The resulting file can be scaled to any size as a vector image and either printed out and cut with an exacto knife. (Old school!) or cut on a laser cutter (new and shinny way)

Get the tools

Download and install the required tools. In this tutorial we will be using a windows desktop but you should be able to use any of the major three operating systems (Windows, Linux, and Mac).

I have selected free and open source tools because its a good thing to do.

- **Inkscape** (https://inkscape.org/) Inkscape is a free, cross platformed (Windows, Linux, and Mac) application that can be used to create and alter vector graphics. Alternatively you could use Illustrator, CorelDraw, GimPhoto, and others… http://alternativeto.net/software/inkscape/

- **Gimp** (http://www.gimp.org/) Gimp is a free, cross platform (Windows, Linux, and Mac) application that you can use to alter photos, bitmaps and other images. Alternatively you could use Photoshop, or Paint.net (windows only), and others… http://alternativeto.net/software/gimp/

- **Potrace** (http://potrace.sourceforge.net/) potrace is a free, cross platform (Windows, Linux, and Mac) application that can be used to convert Bitmaps to vectors (SVGs). Alternatively you could use http://autotrace.sourceforge.net/

Process

This is the process of taking an image and converting it to a vector. The reason that we are trying to produce a vector image is that it can be scaled to any size without distorting the image. SVG can also be converted into DFX and GCode for the laser cutter.

Easy one

This image has hard lines and borders, mostly a single color, and no island. It should be pretty easy to convert to a stencil.

Selecting a image

For this tutorial I am selecting “Pink fluffy unicorn dancing on rainbows” (or "PFUDOR" for short)
https://www.youtube.com/watch?v=a-xWhG4UU_Y

Load the image into Gimp

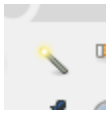
Open GIMP and load the image.

Remove the background is possible

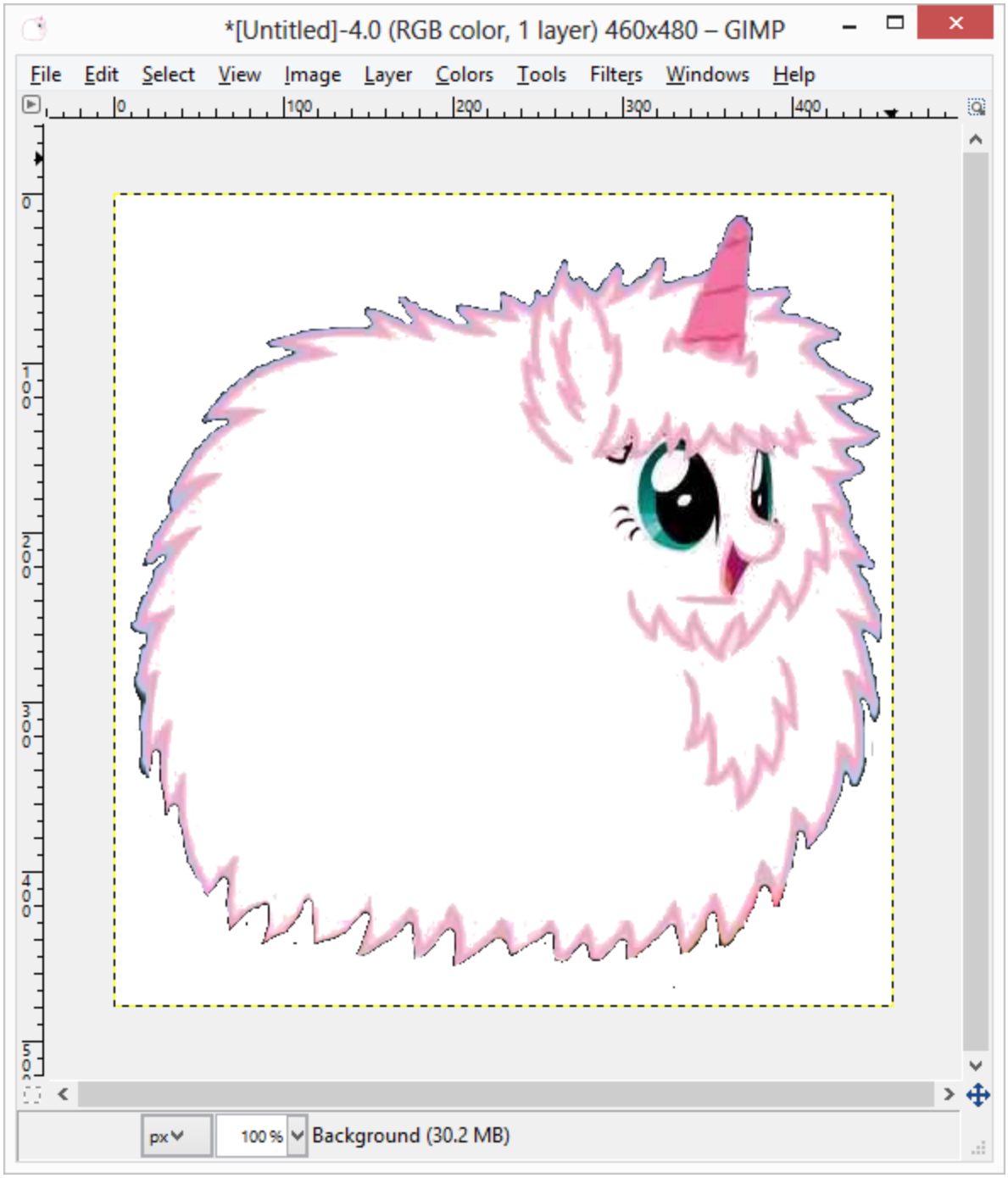
Start by removing as much of the background as possible. You don’t need too accurate as most of the clean up will happen after we convert the image to a vector.

In this case we are also going remove the color in the body.

The “Fuzzy selector tool” helps a lot



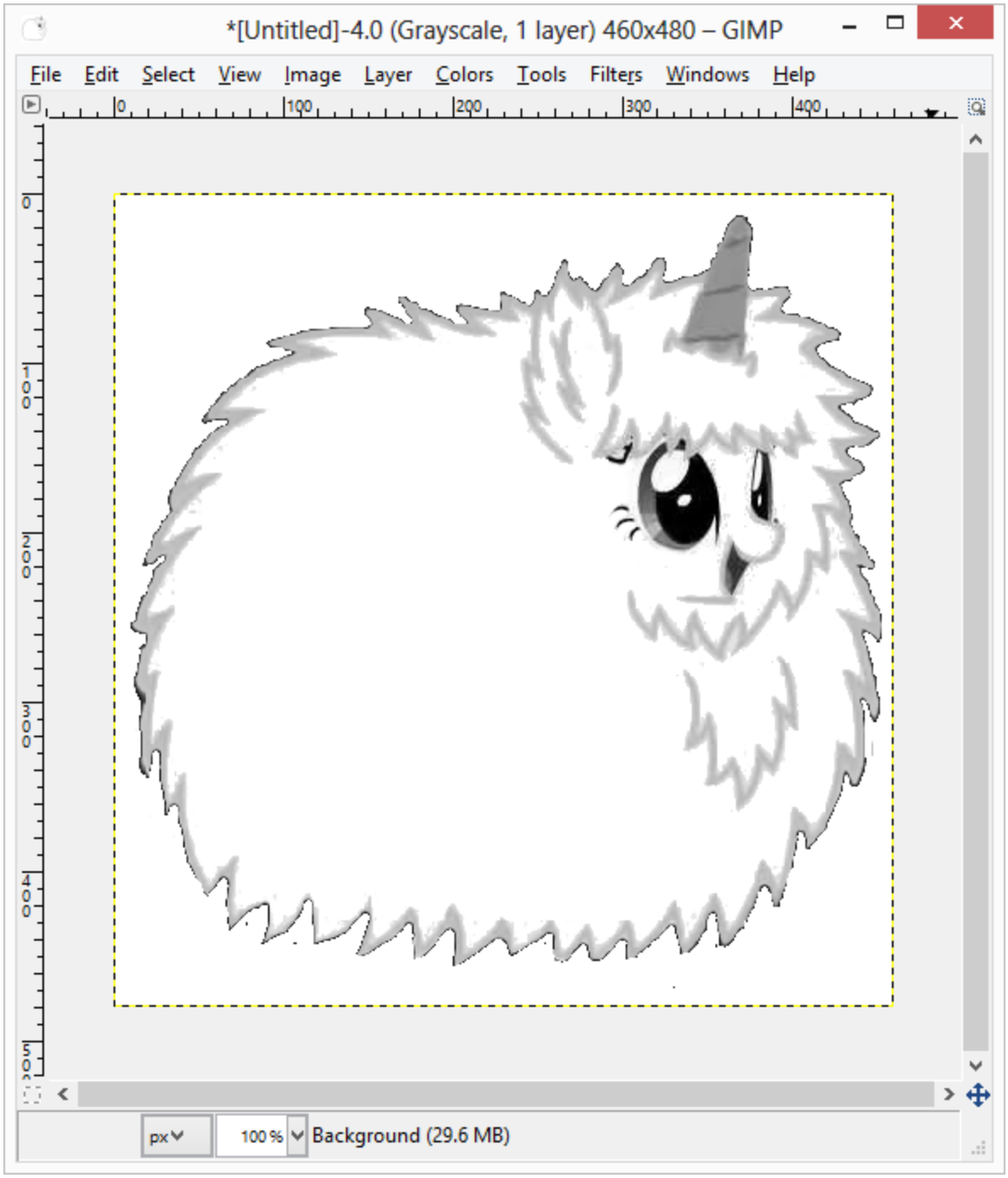
It should look something like this when you are done.



Convert the image to black and white

Next we are going to remove the color from the image.

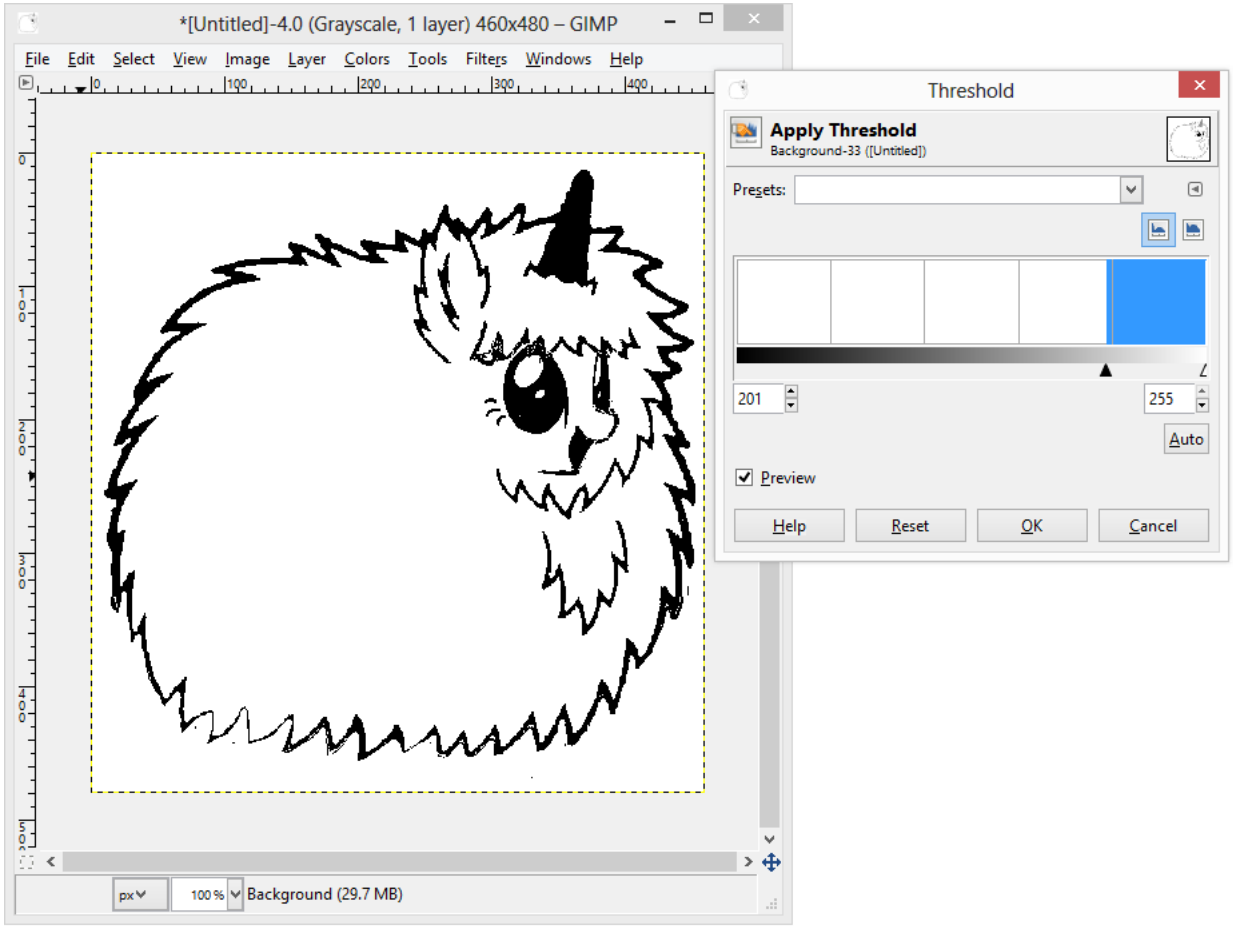
[Image] => [Mode] => [Grayscale]



The image is now grayscale but not black and white. We need to convert it to a black and white image.

[Colors] => [Threshold]

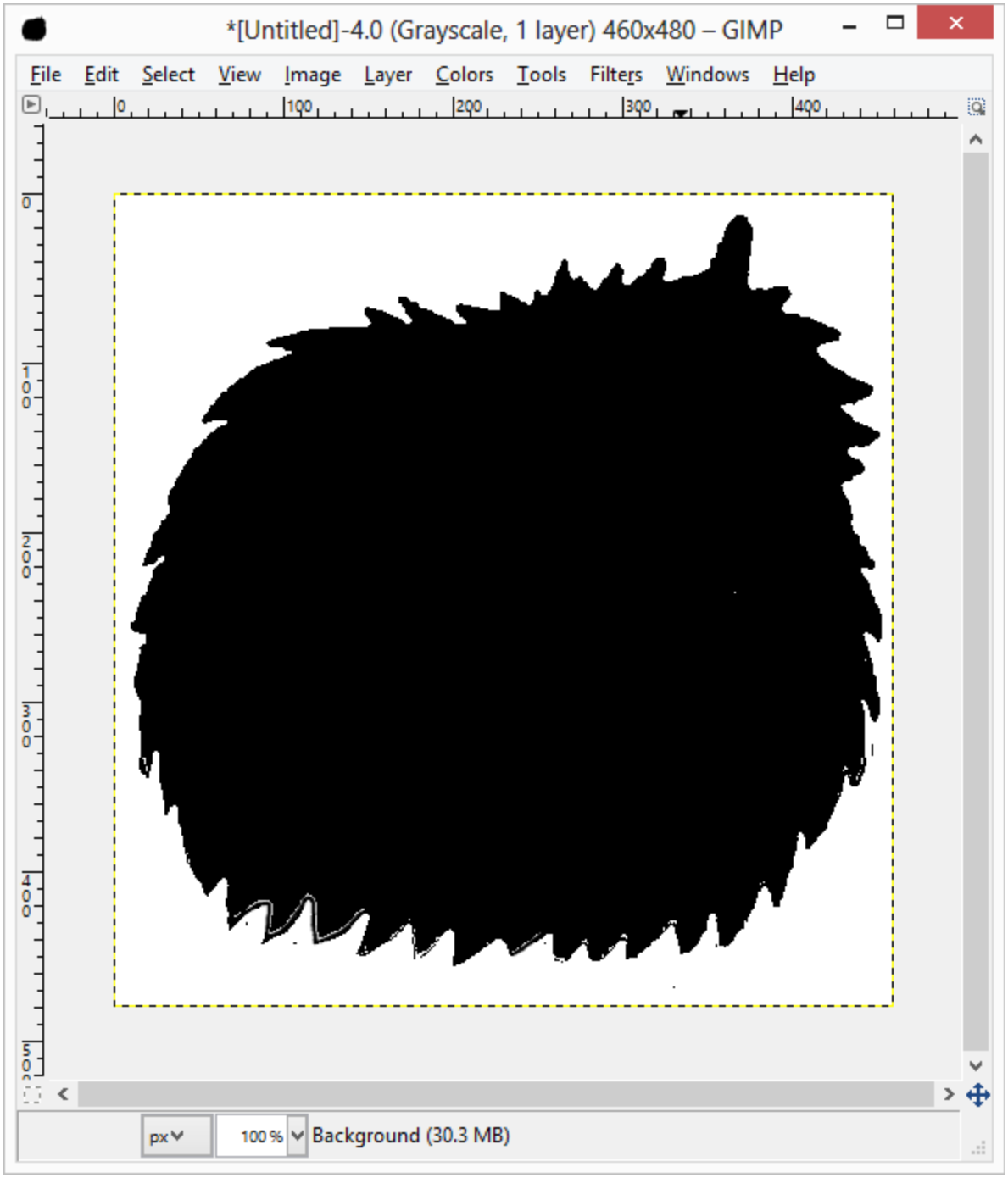
Play with the levels until the right amount of detail can be seen in the image.



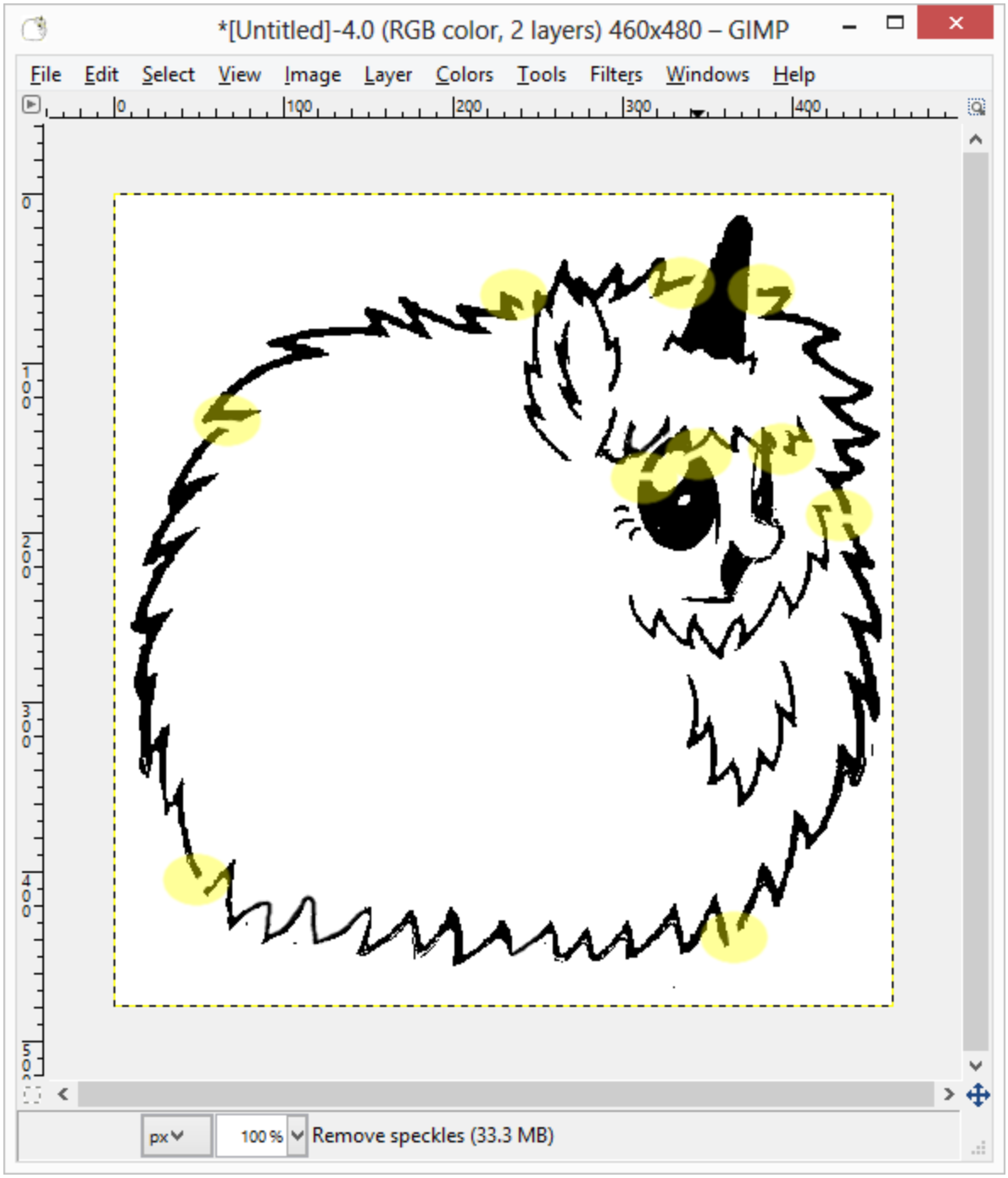
Clean up the image and fixing the walls

You will want to start cleaning up the image the best you can. This will include removing any random speckles, cleaning up the edges, adding bridges as needed..

I am planning on cutting out the black of this image. If I was to cut the image out as is, the body would also be clipped and it would look like this



We need to add bridges to the wall around the outside of the image. I have highlighted the bridges in yellow below. I selected locations that would provide enough strength to the stencil and wouldn't distort the image too much.

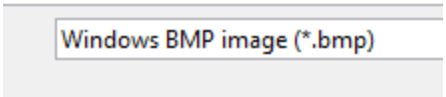


Save the image as a BMP

We are done with GIMP now we need to save the file in a format that potrace can read (Bitmap)

[File] => [Export as]

Change the file type to a Bitmap (BMP)



Save the file to the potrace install folder as PFUDOR.*bmp*

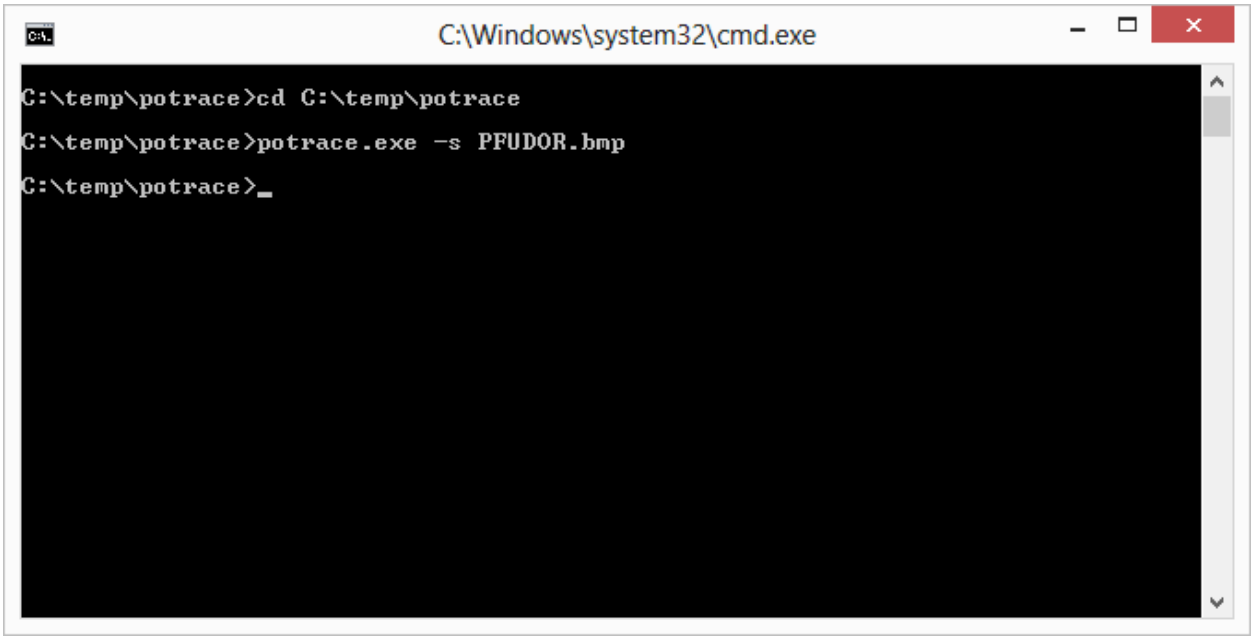
Convert the image with potrace

1. Open a command prompt.
2. Change directory to the potrace install directory

   ```
   cd c:\temp\potrace\
   ```

3. Type the following command

   ```
   potrace.exe -s PFUDOR.bmp
   ```



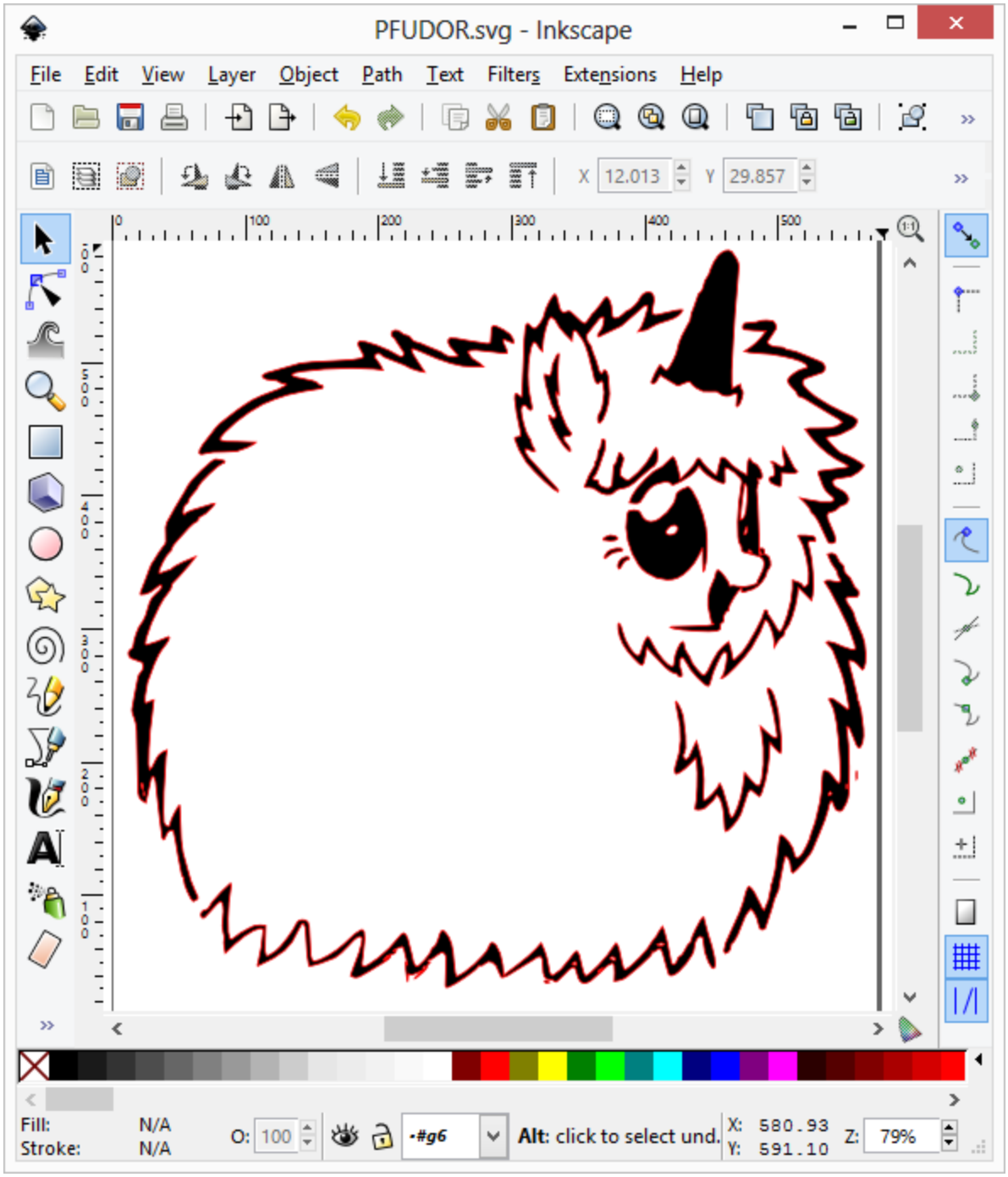
The “-s” flag tells potrace that you want to convert the bitmap to a SVG (Scalable Vector Graphic)

Other command options can be found in the potrace manual

http://potrace.sourceforge.net/#usage

Load the image in inkscape

In this step you can clean up the image if it needed it. In this case the image looks pretty good and doesn't need any more cleaning up.



Hard one

This image is considerably harder to convert a stencil. You will have to do more clean up work before you are able to convert it to a vector file.

Selecting a image

For this tutorial I am going to use Spock as a DJ. This is a harder image as the lines around the image are not well defined and there are islands in his face.

The image has enough complexity in it that it should show you how to fix most problems you will find in other images.

Load the image into Gimp

Open GIMP and load the image.

Remove the background is possible

Start by cropping the image to just the section that you are interested in. Then remove as much of the background as possible. You don't need too accurate as most of the clean up will happen after we convert the image to a vector.

The way I normally do this is create another layer on top of the main image then paint over the edges with a white brush. this way if I make a mistake i can recover the image by erasing parts of the top white later.

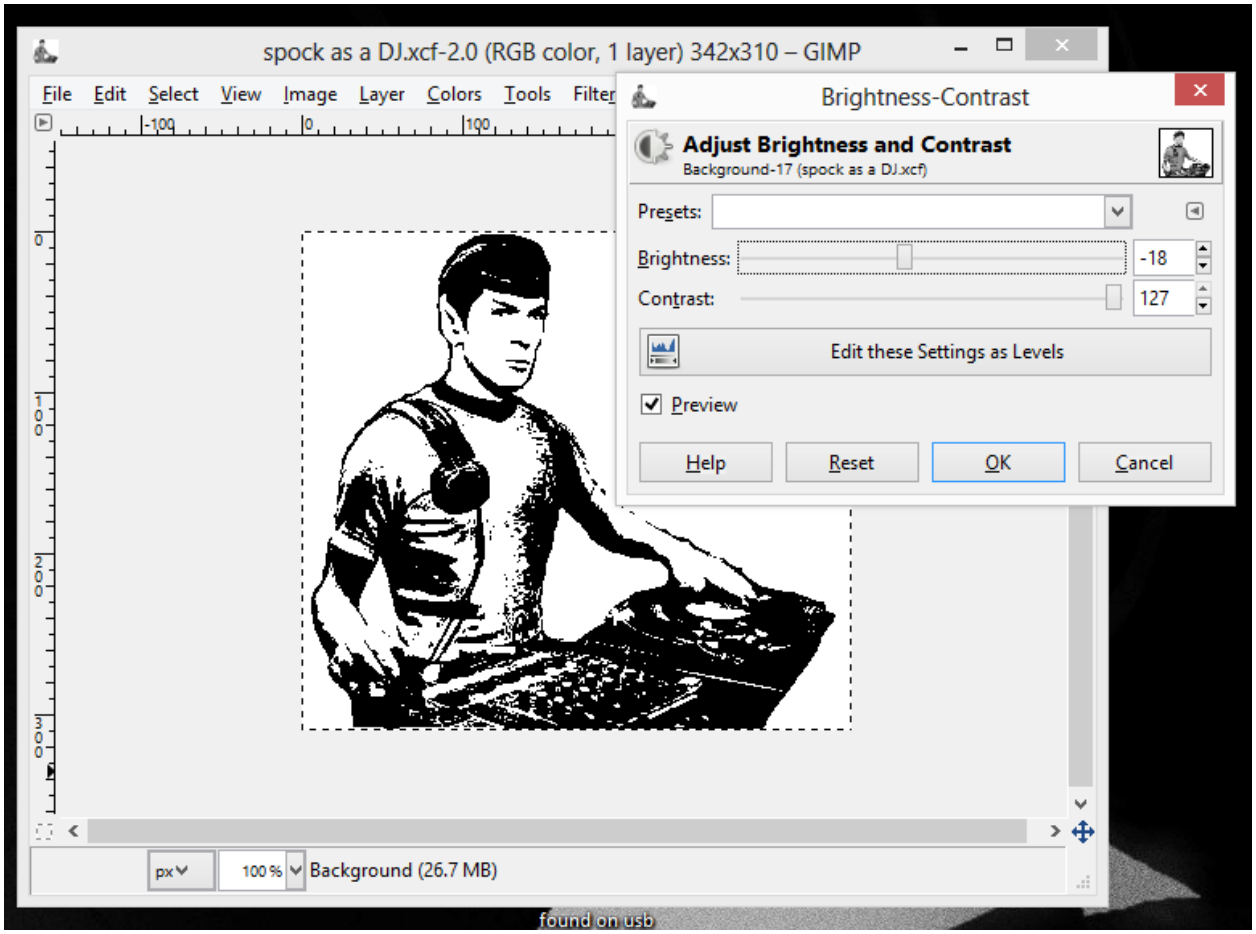
Convert the image to black and white

Convert the image to black and white if its not already done. In this case the source image was black and white.

Adjust the Brightness and contrast.

From the “Color” menu in GIMP, select the “Brightness and contrast” menu item. Drag the contract bar to the far right. This will up the contract and remove any color from the image.

Change the brightness slider until you get the desired amount of detail that you are looking for.



Clean up the image and fixing the walls

You will want to start cleaning up the image the best you can. This will include removing any random speckles, cleaning up the edges, adding accents.

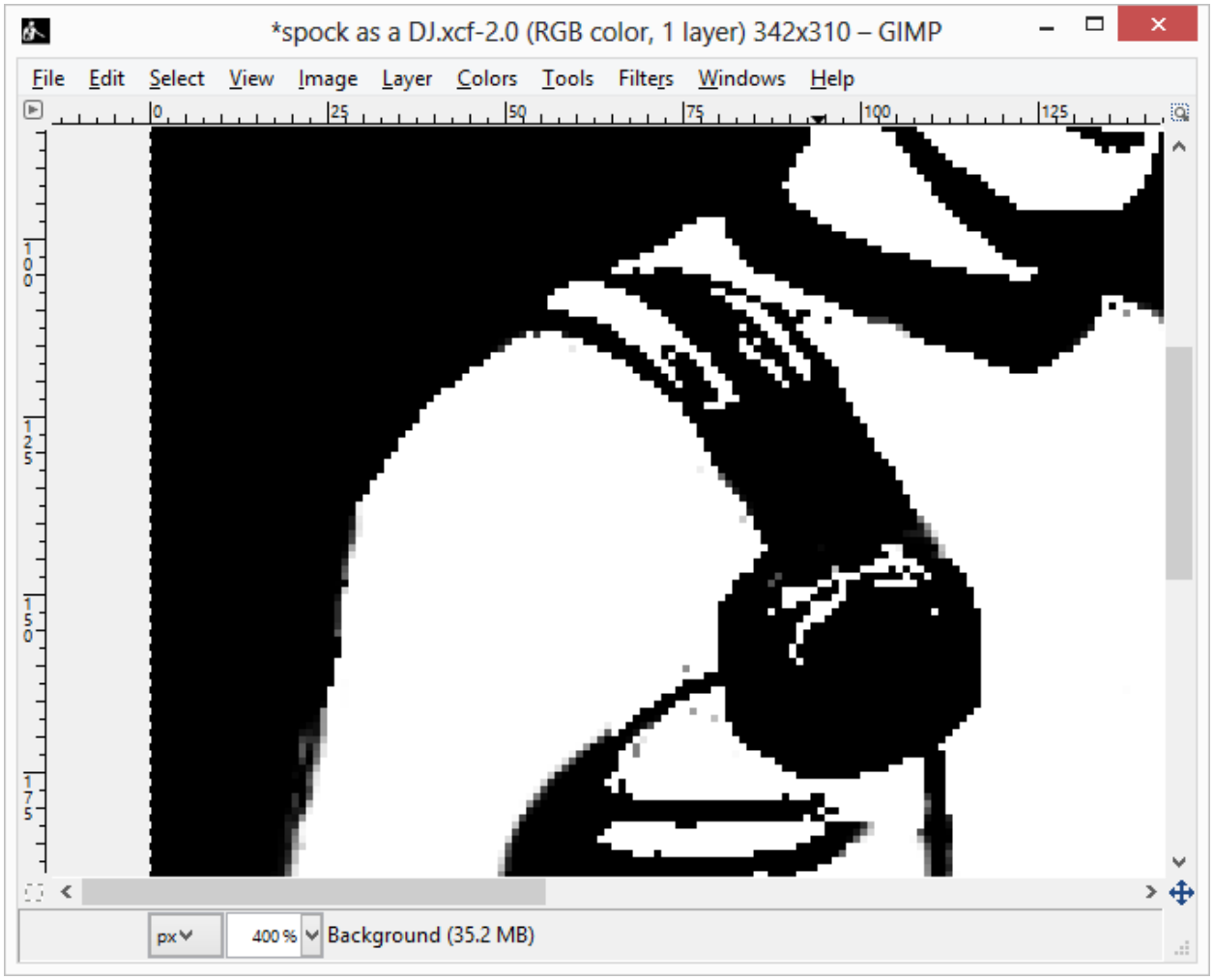
I am planning on cutting out the white of this image. This should give enough detail to see the image when I cut out the stencil.

I need to change the background of the image to black but before I can do that I need to fill in the broken parts of the “wall” in his arms and body.

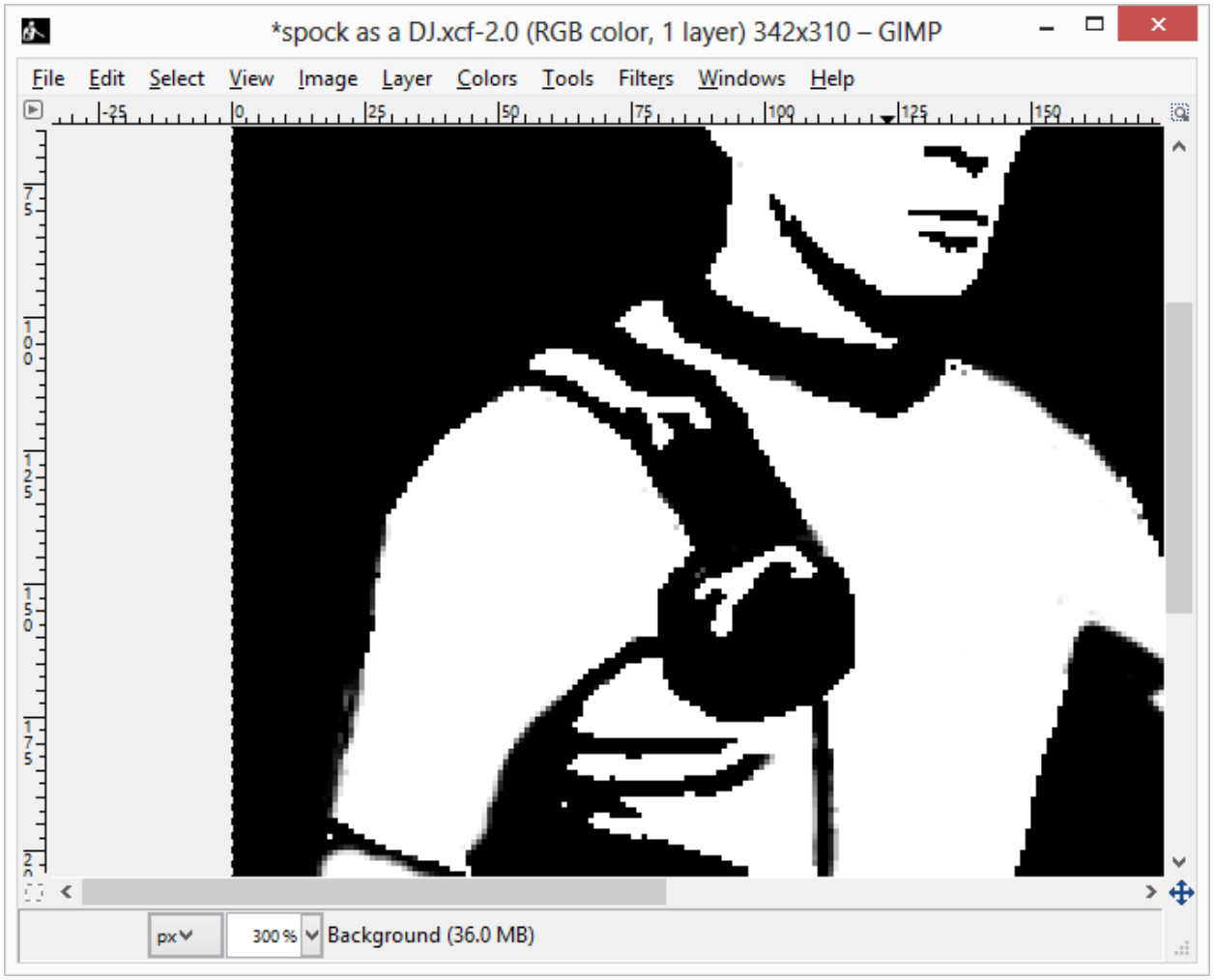
At this stage I decided to remove the DJ tables as they probably wouldn't show up very well in the end result. I changed the background to black and started to clean up more of sections. I am a little worried about his hands but I think i can fix it in the next section.

The earphones have very small white sections that will be hard to cut out. instead expand the white lines to make the easier to cut later on.

Before:


*spock as a DJ.xcf-2.0 (RGB color, 1 layer) 342x310 – GIMP
File Edit Select View Image Layer Colors Tools Filters Windows Help
0 25 50 75 100 125
100 125 150 175
px
400 %
Background (35.2 MB)

After:



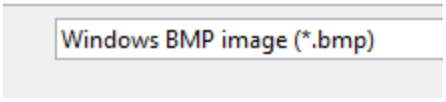
Fixing problems

Check out the “Fixing problems” section for more tips on cleaning up the image.

There was several islands in this image including. Ears, Eyes, Nose, Mouth, and eyebrows. Even though the Eye and the Nose bridges look weird when you spray paint it, this detail should disappear..

Save the image as a BMP

From the “file” menu, select “Export as”
Change the file type to a Bitmap (BMP) and save the file to a temp directory.



Save the file to the potrace install folder as *spock.bmp*

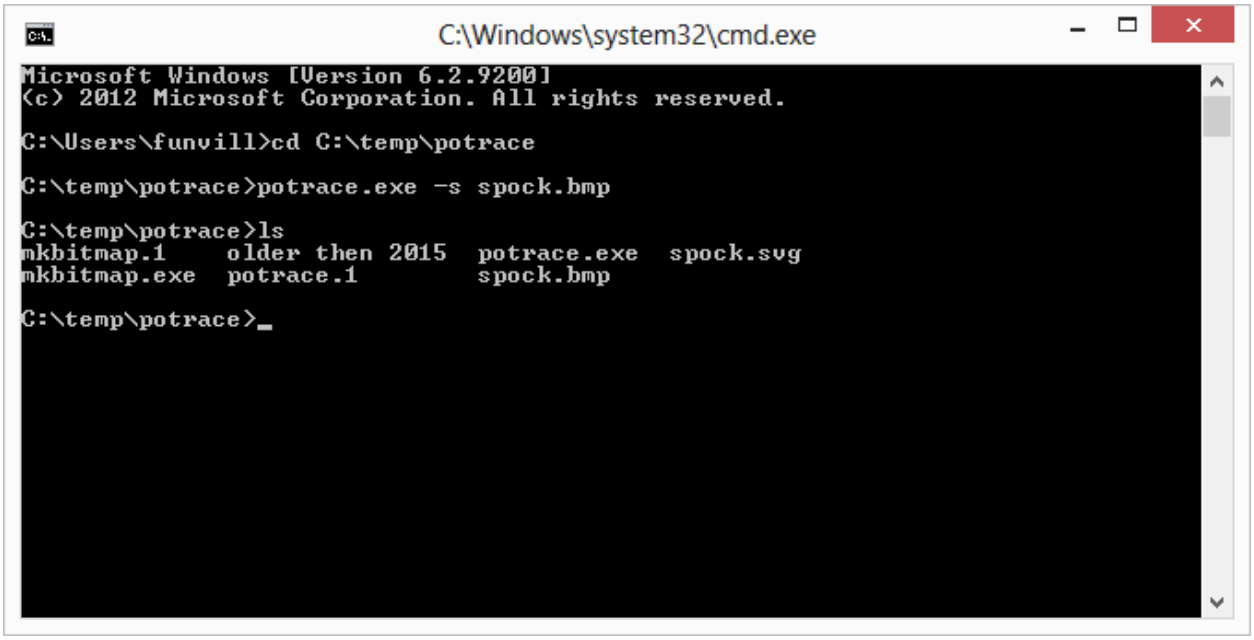
Convert the image with potrace

4. Open a command prompt.
5. Change directory to the potrace install directory

```
cd c:\temp\potrace\
```

6. Type the following command

```
potrace.exe -s spock.bmp
```



The “-s” flag tells potrace that you want to convert the bitmap to a SVG (Scalable Vector Graphic)

Load the image in inkscape and fix problems with the image.

At this point you can load the image into inkscape and fix any other problems that you may have had. This image looks pretty good as most of the problems where fixed in the bitmap stage.

Fixing problems

When selecting an image to convert to a stencil you want to select an image with a few possible problems. Some images are better than others but most images will have a few problems that you will need to fix up. If an image has too many problems, fixing all the problems might distort the image beyond recognition.

Islands

An island is a section of the image that does not connect to any other part of the image. Islands “fall out” of the image after they are cut. Letters like “e”, “o”, “b”, “d”, “q”, “p” tend to have this problem. and images of people will almost always have issues with the face (ears, nose, mouth, etc..)

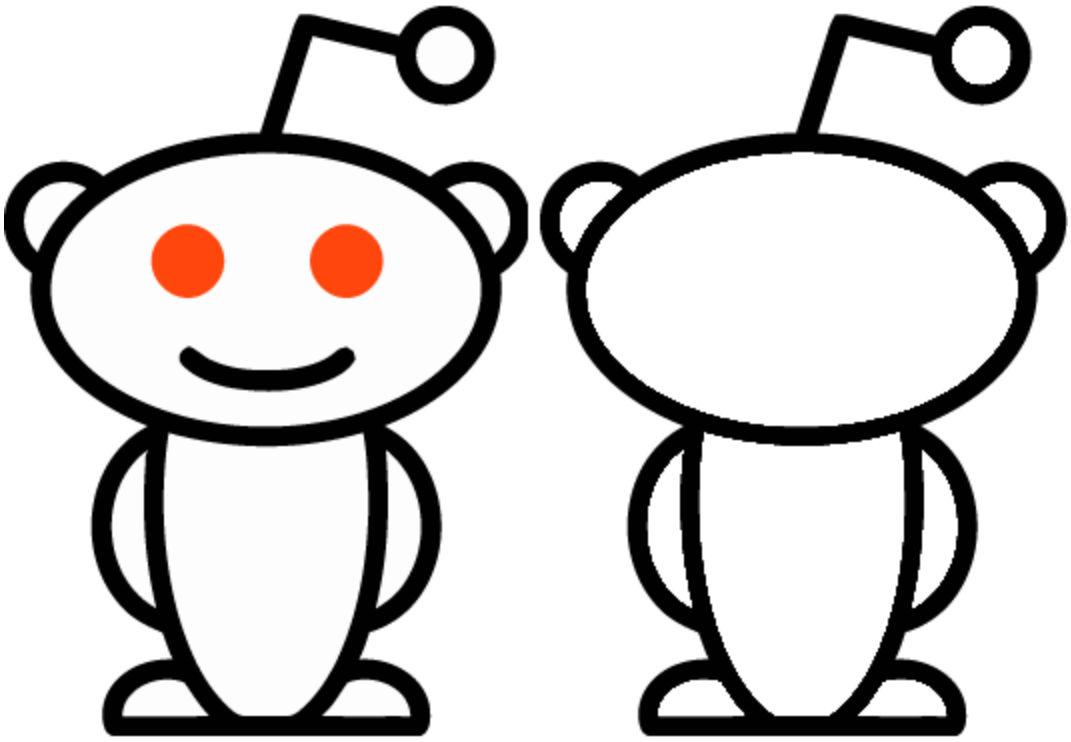
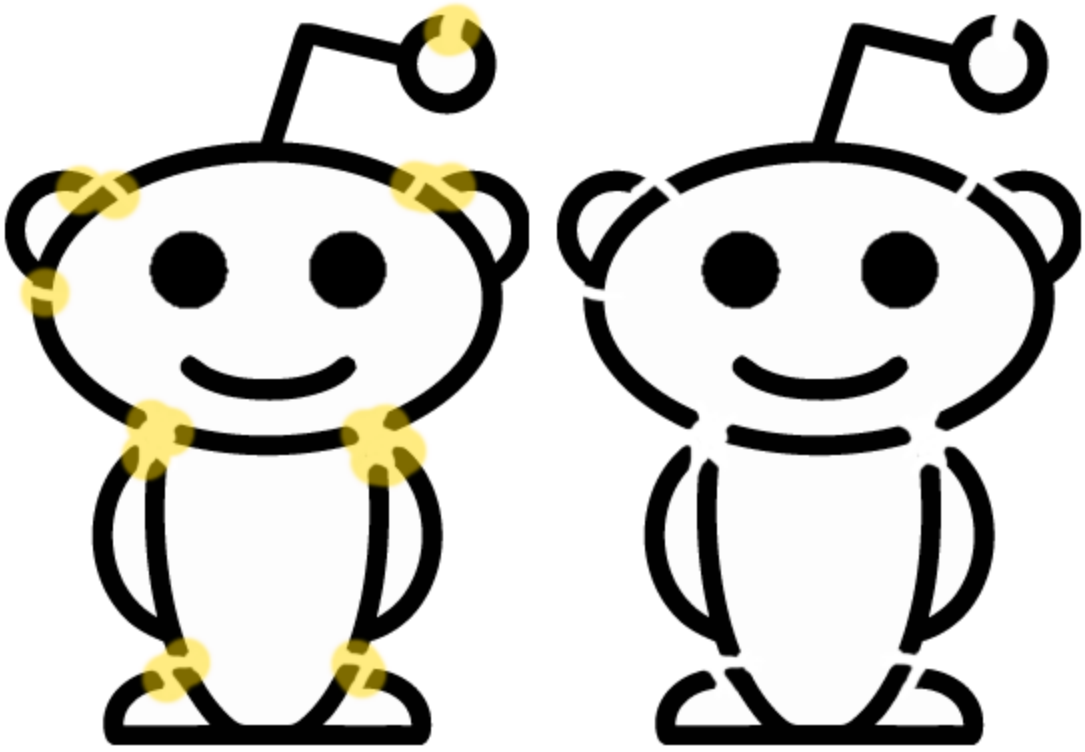
Example #1 - Hello world

In this “Hello World” image, the island in the “e”, “o”, and “d” are fall out of the image after its cut.

To resolve this issue with the islands in the letters you can add “via”, “trails”, “paths” or bridges into the islands to connect them to the rest of the image.

Example #2 - Reddit robot

In the reddit robot the eyes, and mouth of the robot is not connected to anything else in the image. When you cut out the white sections of this image, the inside of the reddit robots face the eyes and mount will fall out of the image.



To resolve this issue you will need to cut out the black instead of the white of the image. This will create a negative space stencil. Then add bridges to the walls of the robot to create a single image.