

Converting an FSX Model to P3Dv4.4 – 6 to use PBR Textures

Introduction

PBR paintwork is really necessary for later versions of P3D because the FSX alpha channel/specular file method of giving shine and reflection simply don't work, especially for metal and glass/perspex. You'll need a model with a good paint kit where panel lines and rivets are separate layers, and a painting programme that enables you to select and replace the red, green, blue and alpha channels of a texture file. I use Photoshop on subscription – expensive but this my hobby...! And of course you'll need ModelConverter X (MCX).

I have always stuck to just converting the exterior model and the exterior of the interior model; I've generally shied away from doing the vc but only because I'm a lazy sod at heart and can't be bothered! I can still enjoy flying the model even if the interiors are a bit dark sometimes

Changing the model

I'm currently working to convert my collection of A2A bubble-top Thunderbolts to PBR. I converted them from the original FS2004 to FSX many years ago so they're really old models but they are reasonably accurate, easy enough to work with and the paint kit is by John Terrell (Bomber12th).

Import the model into MCX and open the Materials Editor (Fig. 1). Note that I've clicked on the 'Highlight Selected' tab to see what I'm converting, in this case the front fuselage.

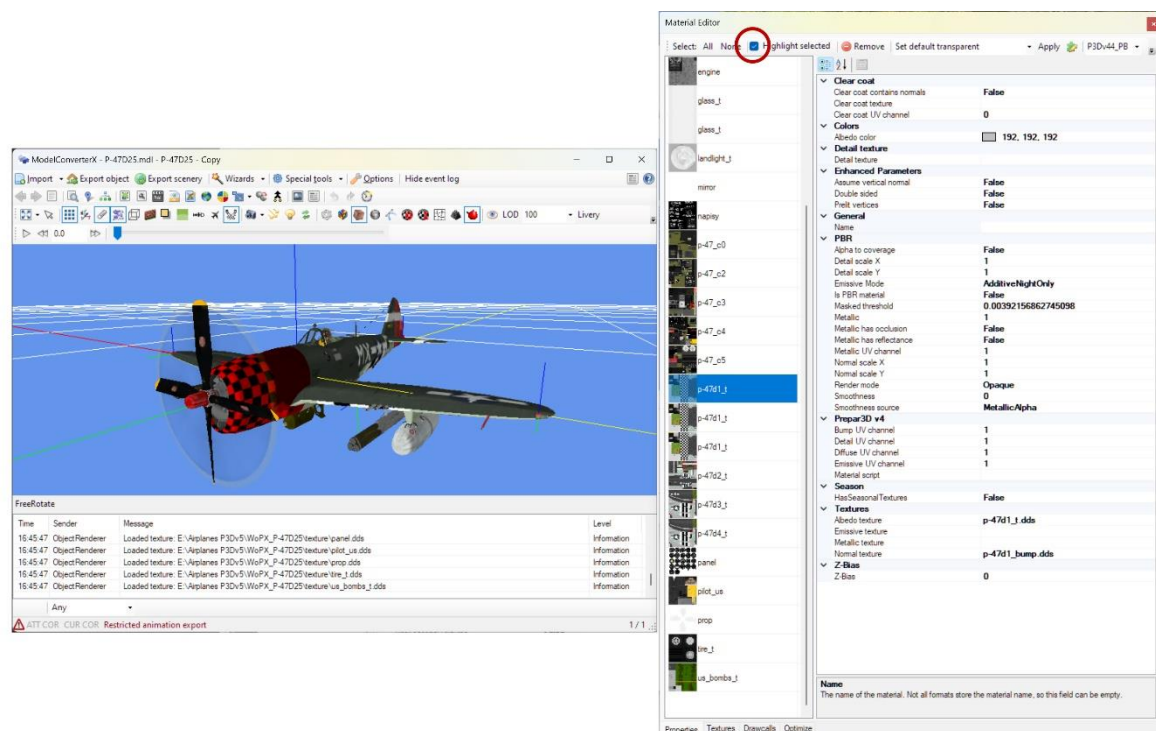


Fig 1

Firstly, all PBR textures should have a base albedo colour of 255, 255, 255 (white)

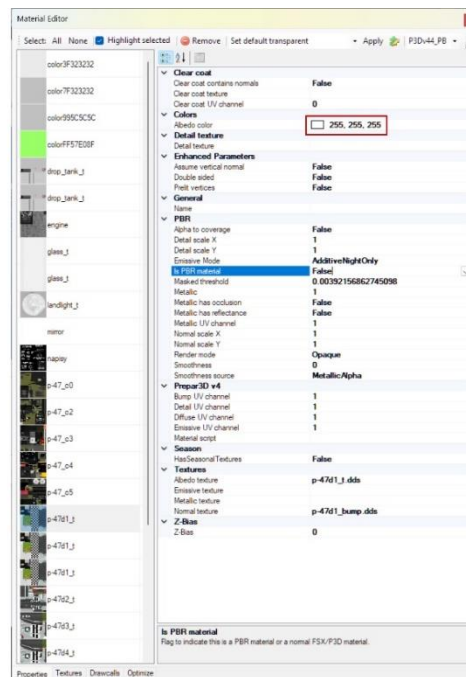


Fig 2

Next, change the 'Is PBR material' to 'True'. You can then choose to give the metallic texture file ambient occlusion (enhanced shadow properties) and reflectance. These are optional but I now use both, though a natural metal effect can be achieved without.

Note that the default smoothness source is the metallic texture file alpha. The smoothness source is roughly the same as the FSX specular file.

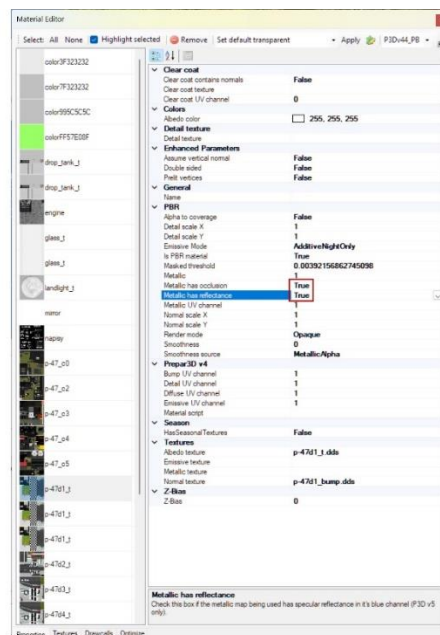


Fig 3

Lastly you need to set up a metallic file. This file will contain red, green, blue and alpha channels. I started by using the old spec file and modifying it as I went but you can define it how you like. Here I've defined it as 'p-47d1_s.dds'.

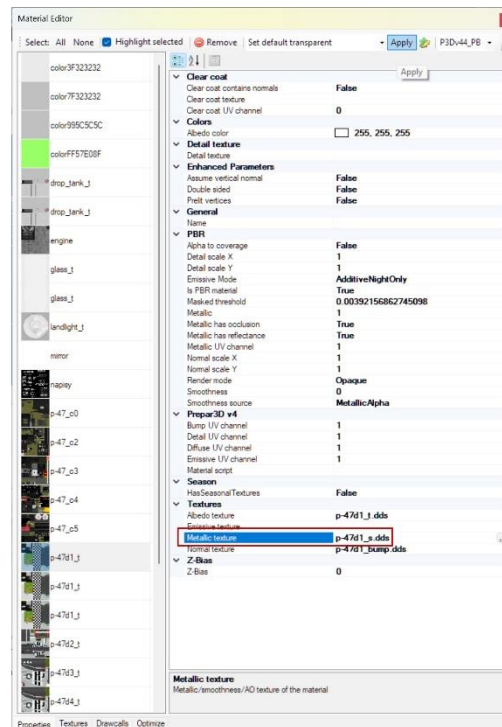


Fig 4

All that remains to do now is to repeat this procedure with all the other external texture files so that you have a complete external model with PBR materials set. You can include things like undercarriage and weapons, and then repeat with the external textures for the interior model.

Glass

Setting up the canopy/windscreen glass material is slightly different. It can also have different properties in different models. This is how I've set up the P-47.

Firstly the albedo colour can be used to set up a tint if desired; setting a grey colour will allow it to be seen. I generally use 128, 128, 128 (grey) for albedo colour and tint the 'glass_t' texture file. The first number (85 in the figure) seems to be variable in effect. In this particular model it has no effect, in others I've worked on it does.

Note that the render mode is set to 'Translucent'. I have called the metallic file 'glass_spec.dds' and the PBR/Metallic setting are as before.

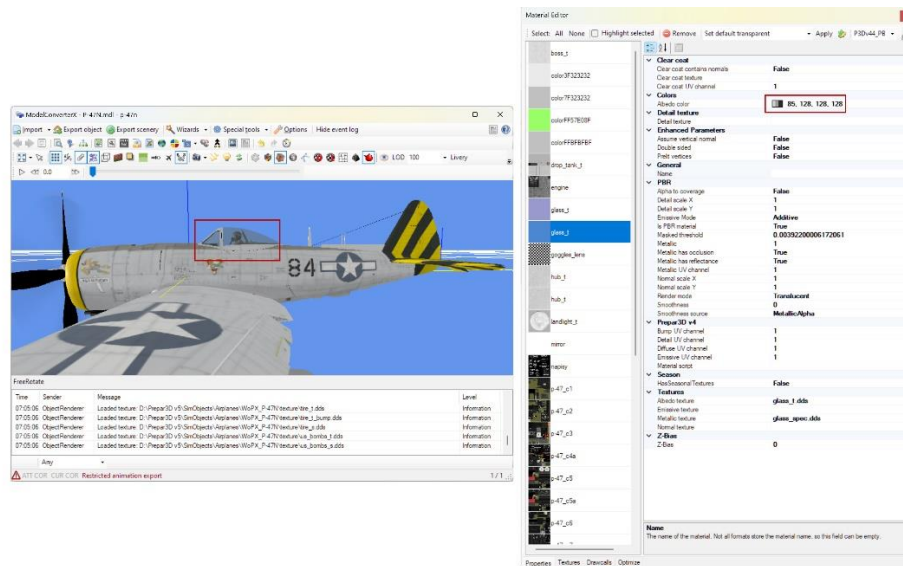


Fig 5

You can, if you wish, set a tint colour. Here I've just used an extreme green as an illustration:

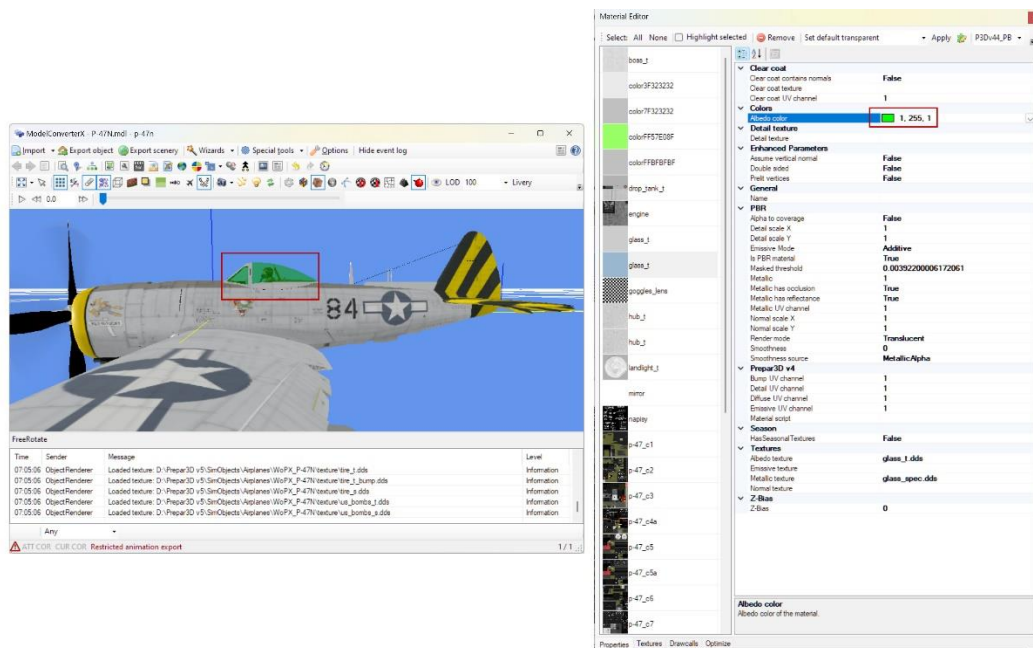


Fig 6

Unlike the opaque main texture files, the alpha channel of the albedo texture (glass_t above) sets the density of the material; black is no density (the glass is impossible to make out), white is totally dense (glass appears opalescent white). I find a pale grey (about 150-175 RGB) to be about right but it's entirely a matter of choice.

The Main Texture file otherwise known as the Albedo File

In general this is the same as for any FSX/FS2004 texture file. It paints the object. However there are a few things to bear in mind. Firstly the colours are generally more true to life; there is no need to adjust them for the simulator; this is especially true of metallic areas. For instance, aluminium has an RGB value of around 245,246,246, though a bit of playing around may be needed depending on how the graphics in the simulator are set up. Secondly there are very few, if any, circumstances I've found where an alpha channel other than white is needed. Indeed, if you're bringing a paint over, I'd advise ditching the alpha channel

Constructing the Metallic File

In P3Dv4.5 and above the metallic file (p-47n1_s.dds in Fig 4 above) is comprised of red, green, blue and alpha channels. The simulator interprets them as follows:-

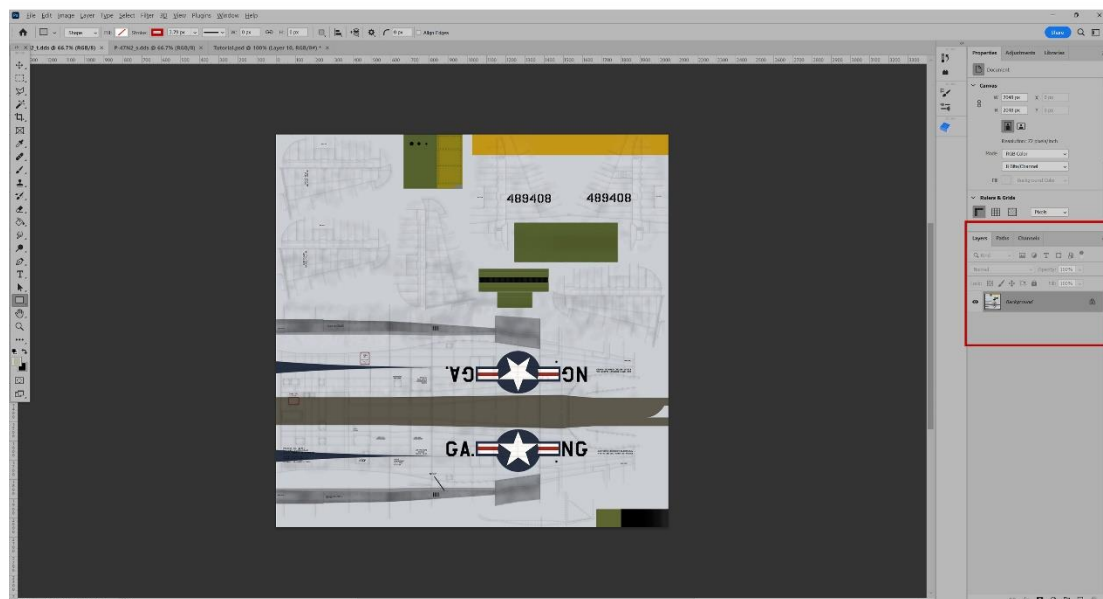
Red – this defines what parts of the texture are seen as metallic. These areas are white. In practice, in my experience, everything not metal is black.

Green – this channel is what is known as the ambient occlusion (shadow) channel. Parts that are most frequently shaded are shades of grey.

Blue and Alpha – we've defined the alpha channel of p-47n1_s.dds as the smoothness channel. Simply put, the smoother the surface the paler its colour. Matt surfaces are darker. The blue channel from P3D4.5 on, defines reflectiveness. I find that copying the alpha channel into the blue channel and inverting it serves as an effective reflectance channel. To be honest, one weakness of P3D so far seems to be that it does not do reflectiveness as well as MSFS, so don't be disappointed in your result for this.

Below are screenshots of 'p-47n2_t.dds and p-47n2_s.dds in Photoshop

Fig 7 – p-47n2_t.dds



Note the area marked in red which shows the active layer and channel. The metal colour is much paler than usual in FSX, other than that it's as it would be for FSX.

The Metallic File – p-47n2_s.dds

Fig 8 – All Four Channels

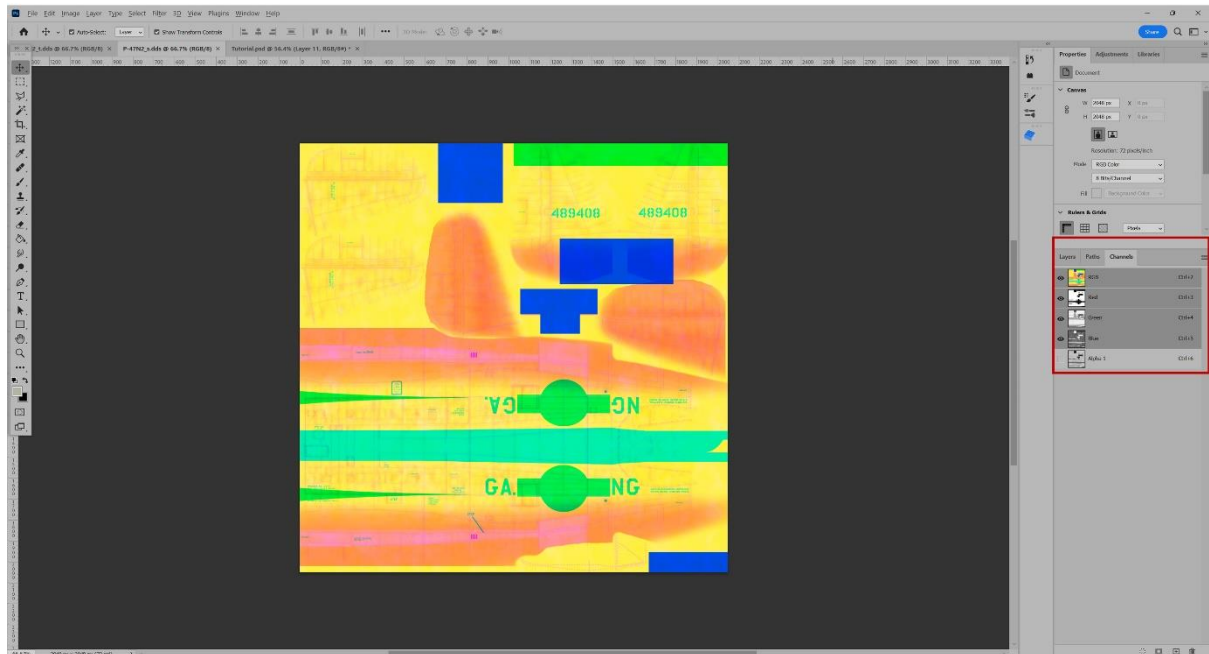
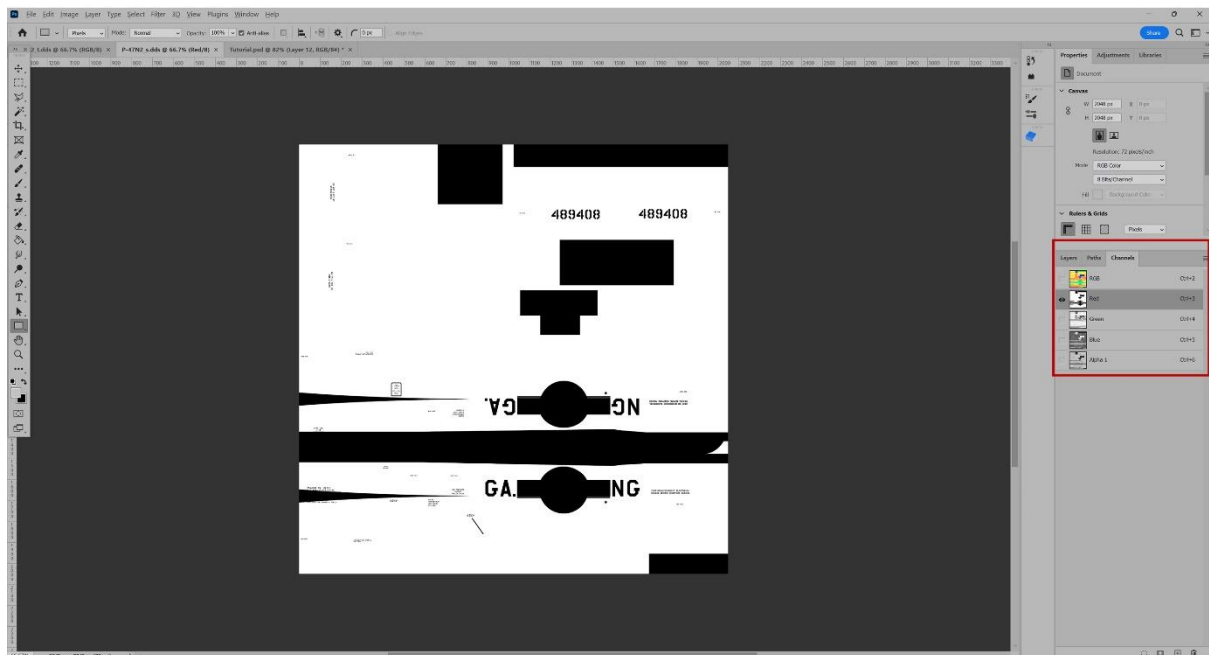
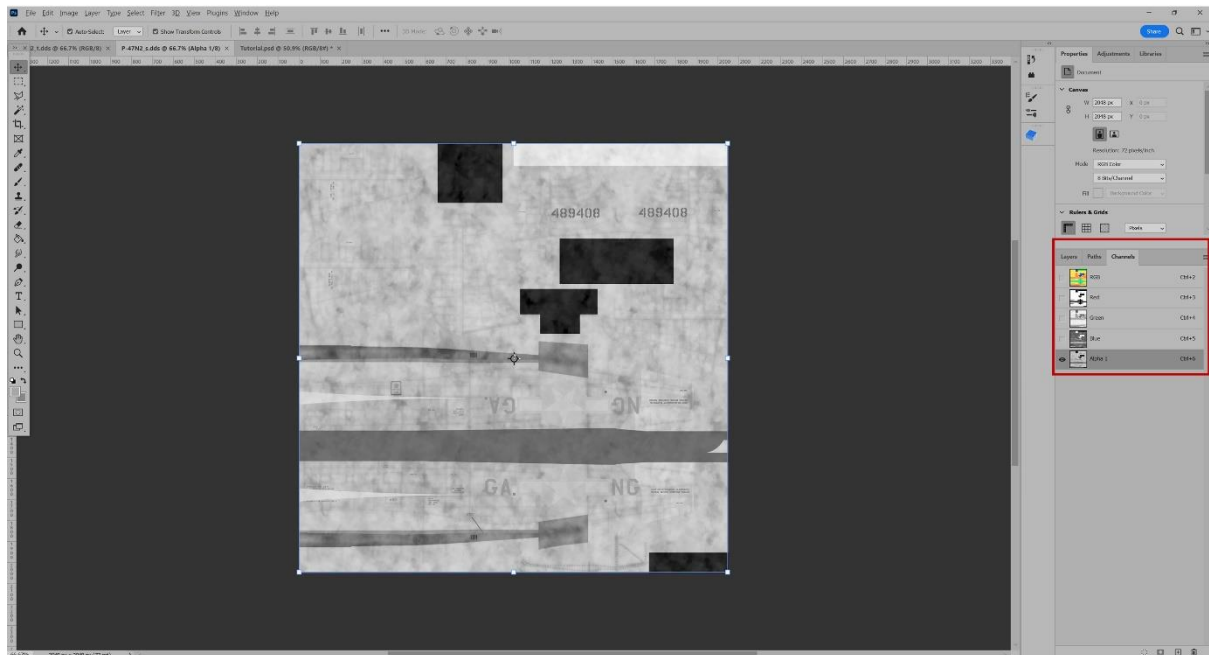


Fig 9 – The Red Channel



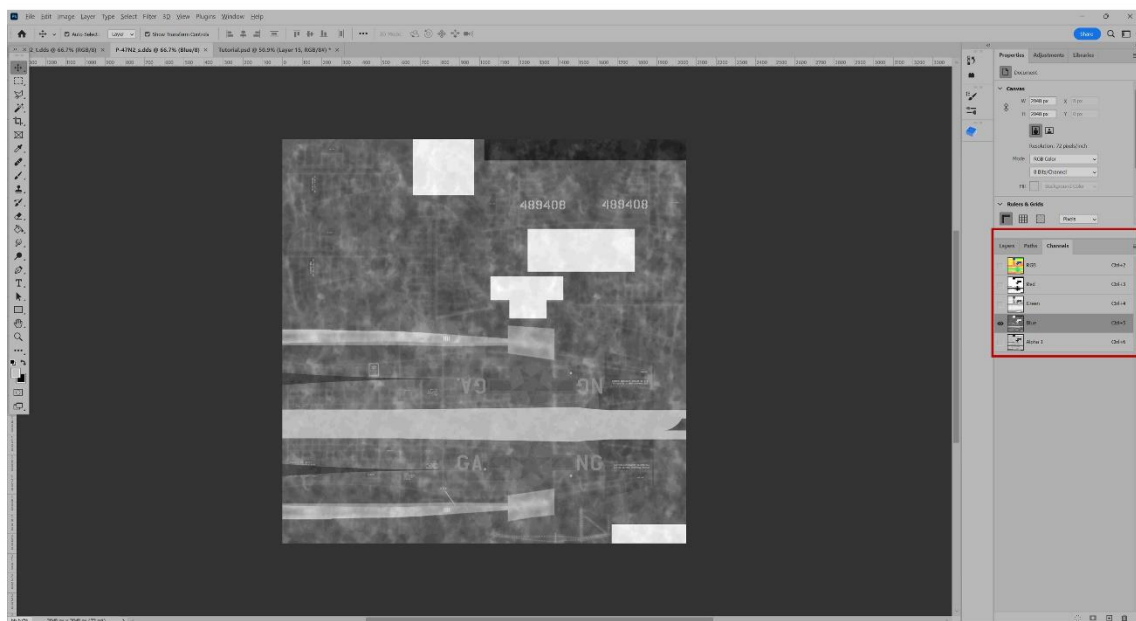
The paintwork, national insignia and serials are paint and therefore black.

Fig 10 – The Alpha and Blue Channels



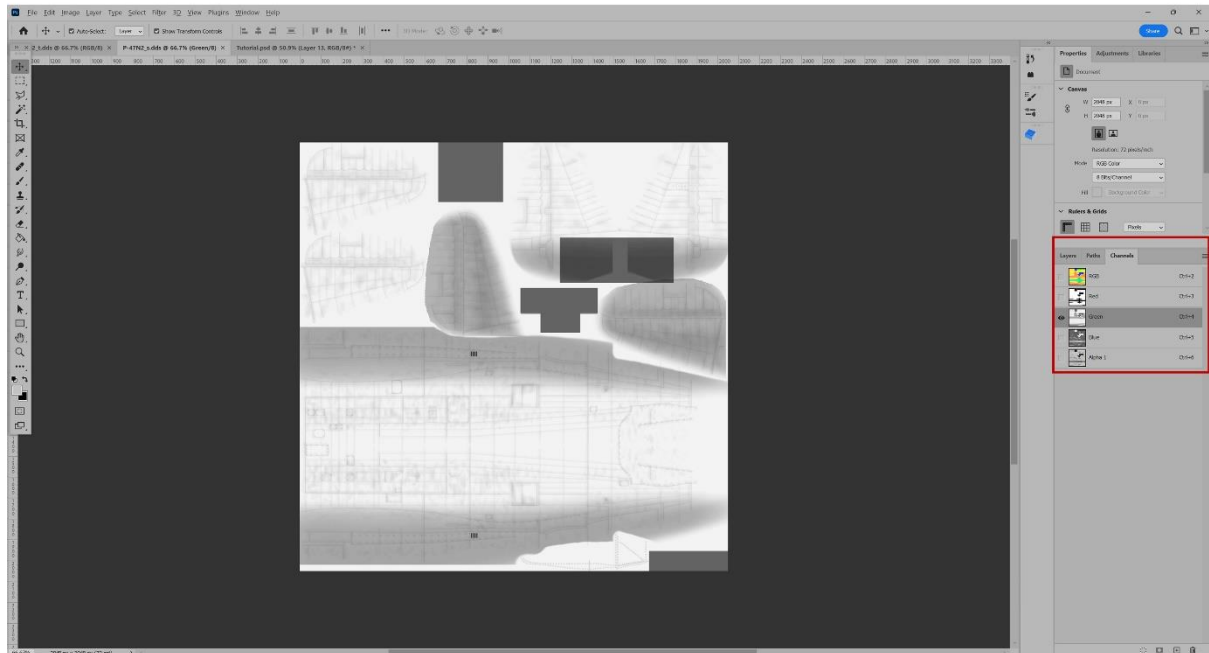
Note the blue flash and the top of the fin are pale; this will allow them to appear as a semi-gloss paint whereas the serials are darker so will appear more matt. The natural metal is pale; to make it appear more 'worn' it can be darkened; for a polished finish the weathering can be removed, and the background made nearly white. Metal panels can be varied as required; the heat-resistant panels from the exhaust stubs are given a duller appearance.

Fig 11 – The Blue Reflectance Channel



I use the reverse of the alpha channel. It works for me as it gives better results than black or white.

Fig 12 – The Green Channel - Ambient Occlusion (AO)



One bonus hang-over from FS2004 is that many paint kits had shading of the under surfaces. These can be re-purposed as part of the AO channel, as here from John's original paint kit. Other bits are added by me and the panel lines are also included. Again to be honest this is the channel that I'm not so good at, but where a real artist can create a great paint when time and effort is put into accurately mapping parts normally in shade.

Finally, this is what this paint looks like in P3Dv5.3



Republic P-47N-25-Re 44-89409 of the 128th Fighter Squadron, Georgia Air National Guard, around 1948