

Phil Campbell's World of Trainz

3d Studio Illuminated Numberboard, Transparent Window and backlit alpha number Tutorial

In this tutorial you will learn how to illuminate the numbers on a numberboard for a locomotive and create transparent windows.

Note. To complete this tutorial you will need to have available a model that has already been textured and has an unwrap UVW modifier applied to it. You can get the demonstration files [here](#).

Selective Illumination

1. Sample files

The following screen shot shows the sample .max file pre textured with a diffuse map which sets the main image.



Figure 1 Sample file

2. Opacity

The next thing we need to add is an opacity map. This will allow Trainz to determine which part of the diffuse map to read. Any part of the map that is not black will show up in varying intensity depending on the brightness. For this map white numbers on a black background the same size as the diffuse map is suitable for the numberboard tutorial. By changing the brightness towards the center you can simulate a light bulb behind the numberboard. Set the level of the opacity to 16. If you cannot find the window in Figure 3, change the map from the drop down box above the map settings.

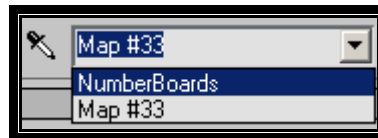


Figure 2 Changing maps

3. Reflection

The last item we need to add is a reflection map. This allows the numbers to glow and also controls the brightness of the glow. You can change the color of the reflection map to simulate any type of light. Set the level of the reflection to 40

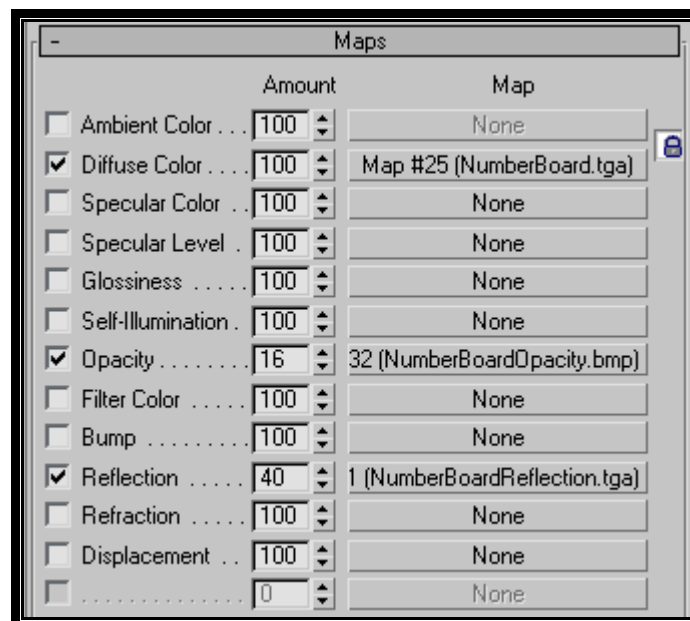


Figure 3 Material map settings

You can change the settings of the reflection and the opacity and also the color used in the bitmaps to obtain different effects.

Transparency

There are several methods to achieve transparency in Trainz this tutorial discusses two methods

Method 1.

Using the opacity settings within 3d Studio

1. Box

The first thing we need to do is create a box to apply the textures to. The dimensions of the box are immaterial for this project.

2. Textures

Now we need to add the textures to the box. For the "Diffuse Color" use the "Opacity.tga" file and leave the "Amount" set at 100. For the "Opacity" Map use the "Opacity.bmp" and set the "Amount" to 50. This is what determines how transparent the final window will be.

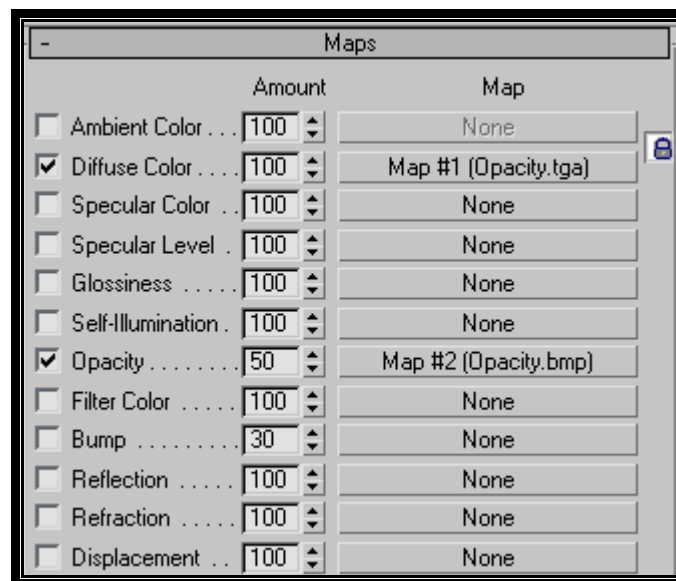


Figure 1 Material map settings

3. Adjustments

Changing the amount of transparency of the window can be done in two different ways. The first is to change the "Amount" in the "Opacity" settings and the other is to change the color of the bitmap. The brighter the color the less transparency. If you paint areas of the bitmap pure white (255,255,255) then that area will no longer be transparent and similarly if you go the other way and paint it pure black (0,0,0) then it will be totally transparent.

Method 2.

Using the alpha channel in Photoshop or Paint Shop Pro.

1. Plane

The first thing we need to do is create a plane to apply the textures to. The dimensions of the plane are immaterial for this project however you will need to apply an "Unwrap UVW" modifier and map the textures to a specific location. For this tutorial I have used a chain map and applied it to the plane. Figure 1 shows the plane with the chain pattern mapped correctly

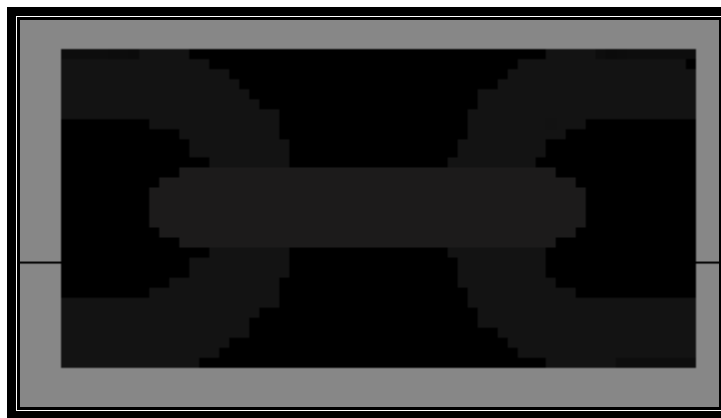


Figure 1 Plane with chain texture applied

2. Alpha channels

The next thing we need to do is create an alpha channel* for the chain. Once you have created an alpha channel and exported the plane you then need to add the following lines to the Chain.texture.txt file

```
Primary=Chain.tga  
Tile=st
```

Hint=Dynamic
Alpha=Chain.tga

The final result should look like figure 2.(Image viewed in Trainz Object Explorer)

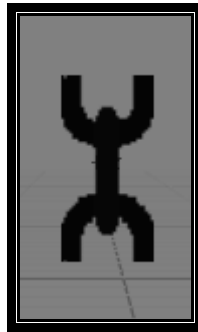


Figure 2 Finished product viewed in Trainz Object Explorer

Once again as with the previous method changing the shade of the alpha channel affects the level of transparency. This method is used quite often for windows on buildings etc.

*Methods used to create alpha channels are discussed in the Photoshop Art File tutorial and the Paint Shop Pro Art File tutorial.

Backlit Alpha Numbers

1. Planes

The first thing that you need to do is create a plane 1 segment x 1 segment with a small 5mm wide lip all around the edge as shown in figure 1. To do this I used another plane 5mm wide and 200mm long with four length segments. I then converted it to editable mesh and used vertex move to position it in the correct location. Make sure the visible face of the plane is facing outwards also make sure that you weld the vertexes when you have the plane in location. This helps prevent the light from showing through. Repeat the procedure for all the alpha numbers on the numberboard.

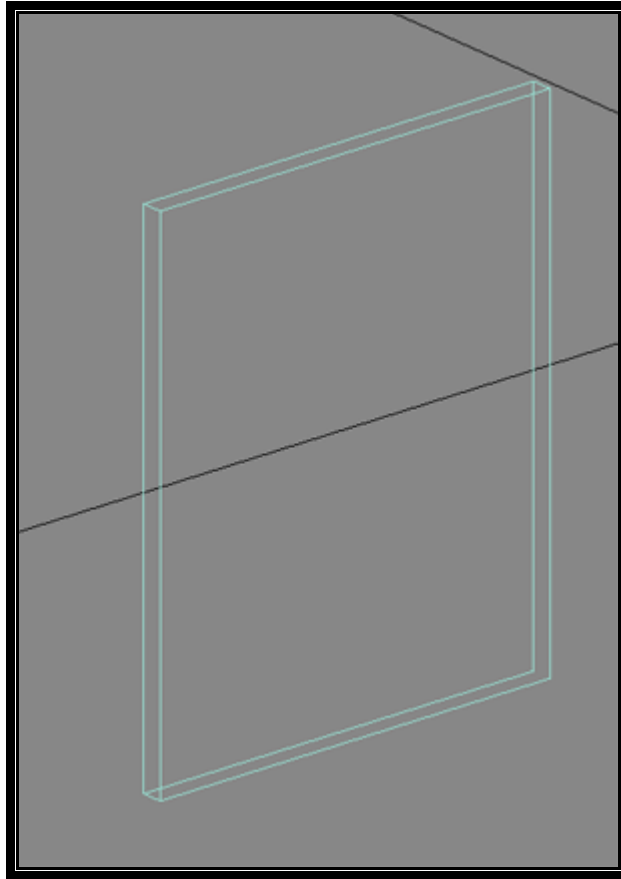


Figure 1 Alpha number showing outside lip

2. Number cut out

The next thing you need to do is cut out an area the size of the number planes from the actual numberboard. To do this I created a box the size of the (In this case) four numbers and placed it in location with the numberboard. I then selected the numberboard and then added a Boolean to the object. Make sure you set the "Operation" to "Cut" as I have found this is the only method that does not remove any faces on less complex objects. Select the "Pick Operand B" and select the new box. There should now be a new line on the numberboard. Convert the numberboard to editable mesh and then select polygon and the centre area should be highlighted, if it isn't then you will need to select it. Once you have it hi-lighted press the delete button to delete the polygons.

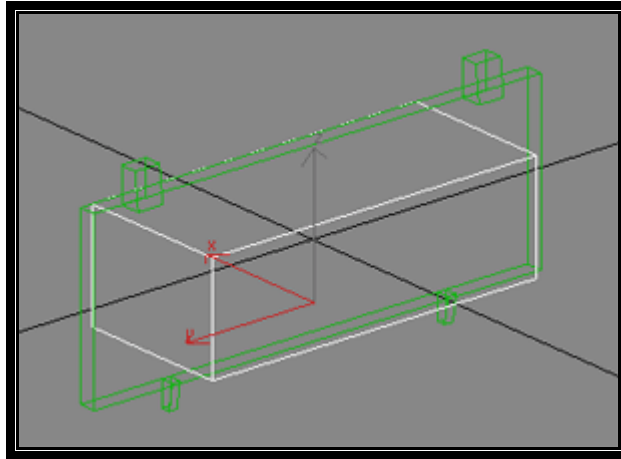


Figure 2 Box in the correct location

Now we need to add a lip around the new cutout area similar to the number planes only this time the visible face needs to be facing towards the centre.

3. Lights

Now that we have the cut out in the numbeboard and all the lips installed we need to add a light to the numberboard. Once again a plane is used for this purpose. Create a plane one length segment x one width segment the size of the cut out and move it to the rear of the lip on the numberboard. (You will need to rotate it)

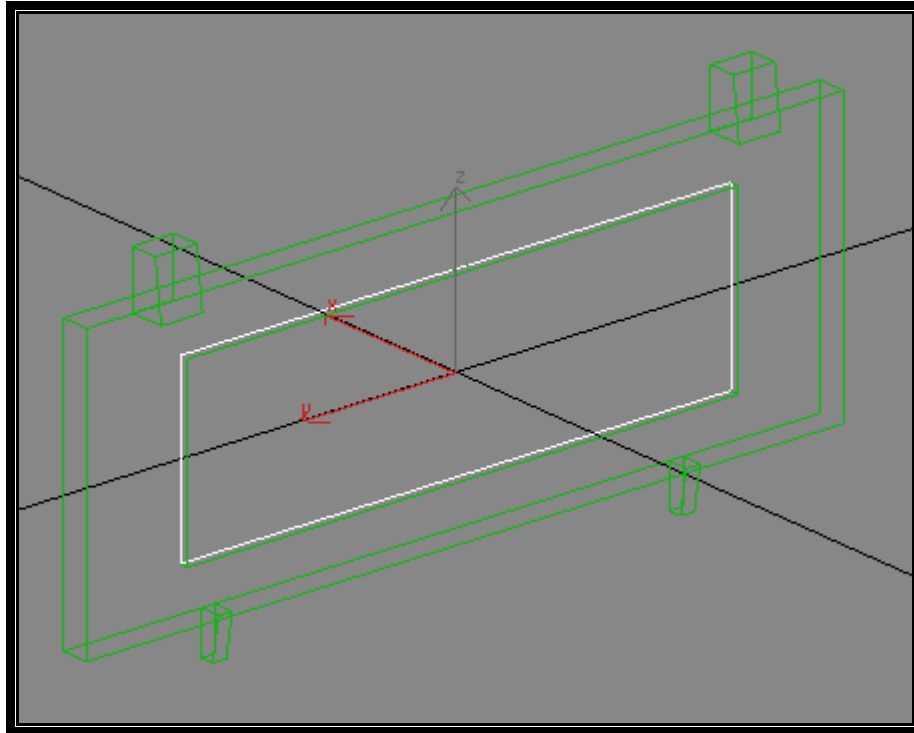


Figure 3 Light in location

4. Light texturing

Once you have all the meshes edited and located correctly we need to texture the numbers and the light. To texture the light we need to setup a reflective texture. Using the textures included in the demonstration files add them to a material editor globe using the settings as shown in figure 4. This will give us a light or reflective texture. Drag the texture to the light and add an Unwrap UVW to the stack for the light.

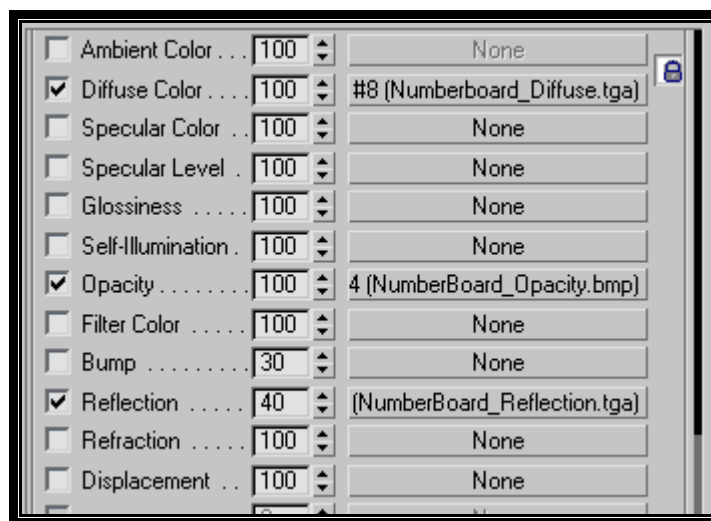


Figure 4 Light texture settings

5. Alpha number digit textures and mapping

Once you have the light textured then we can add the textures to the alpha numbers planes. You will need to create suitable sized digit textures for each number you have on the locomotive. In this example I have used 32 x32 pixel tga images. For example if you have six numbers then you will need to have digit_1.tga to digit_6.tga. If you have more than one set of numbers on the locomotive that are not identical then you will need to have digit_1a.tga to digit_6a.tga for the first set and digit_1b.tga to digit_6b.tga for the second set etc.

Unless each number set is different then you don't need to have a different number for each numberboard. For example the two sets on the front of the locomotive can use the same alpha number and the numbers on the sides of the cab can use another. The maximum running numbers available in Trainz is six from digit_1.tga to digit_6.tga but if you only have four numbers you will only need digit_3.tga to digit_6.tga.



Figure 5 Correctly mapped alpha numbers

When I created the textures for the numbers I used a number that represented the actual size of the numbers that I wanted displayed on the numberboard. That way I could see how the numbers would look and check the alignment before I exported the mesh.

Number 1 is digit_3.tga

Number 2 is digit_4.tga

Number 3 is digit_5.tga

Number 4 is digit_6.tga

The digit_x.tga's are never used within Trainz but for TRS2004 you will need to include them in the package as missing textures can cause problems on some systems. Once you have all the mesh and mapping complete you can then export the mesh.

5. Alpha number files

Now you need to create the actual alphanumbers. These can be any size as long as they match the `digi_x.tga`'s size. For example if you have 32 x 32 pixel tga digits on the cab side and only 16 x 16 pixel tga digits on the numberboards then the alphanumbers will need to match these dimensions. For each different alpha number set you will need ten alpha numbers 0 - 9. For example if you have three different numbers on the locomotive then you will need thirty alphanumbers. 0 - 9 for each different size or color. The alpha numbers will need an alpha channel showing the area that you want lit up. For the numbers above it is the actual numbers that are lit up therefore the black area of the alpha channel will be the same as the numbers however if you want the area around the numbers to be lit up then the white area of the alpha channel will be the same as the numbers.

6. Config entries

The final task required to get the alpha number setup to work is to edit the `config.txt` file. You will need to add the following to the config file

fonts 3	Change this number to suit the number of different fonts on your locomotive
running-numbers { rn-0 #8405 rn-0 #8406 rn-0 #8407 rn-0 #8408 }	Change these numbers to the numbers you want displayed on the locomotive. I am not real sure what purpose this serves in TRS2004 but it is still listed in the CCG.

7. Conclusion

Although this method adds a few extra polygons to the mesh I think that it is worth it to be able to select your own running number from within surveyor. This method also allows you to only have one version instead of several for each running number you require.