This small project illustrates the Diffuse Transmission material type added to ElectricImage™ version 2.8. The basic idea is to texture map a U.S. Dollar bill so that one side of the map will project through the other when bright backlighting is provided.
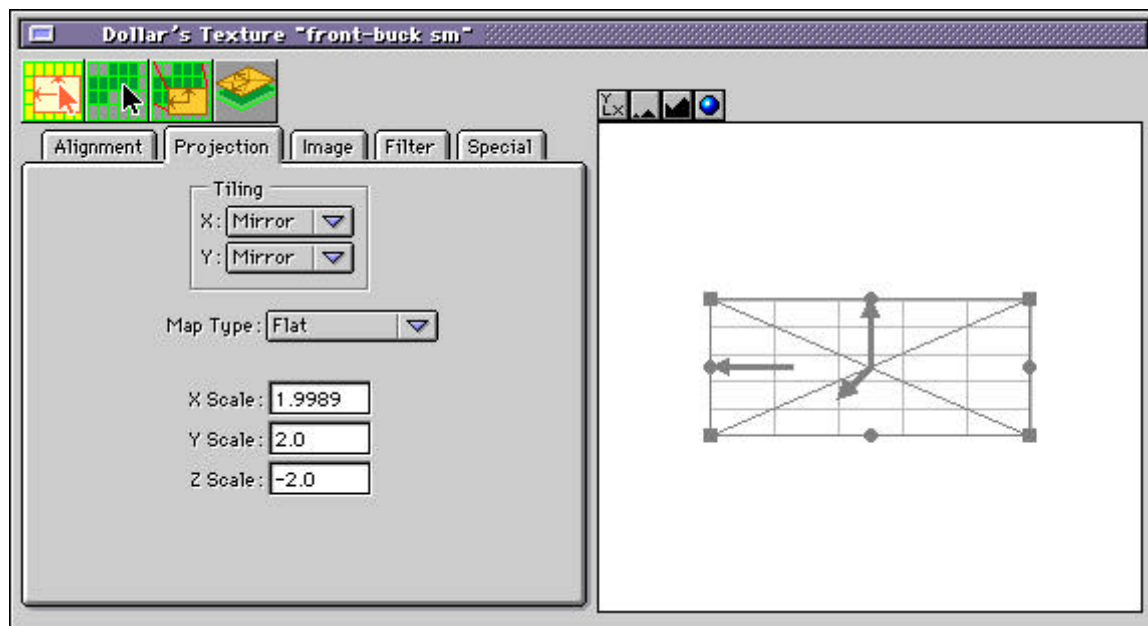
First, I scanned a Dollar bill front and back. I then modified the Treasury Seal so that it was brown instead of green --Several people I had showed this project to complained that I shouldn't scan a Dollar bill without modifying it in some way. They were concerned about the legalities of it. I thought that this was nonsense, but I decided that I really didn't want lots of e-mail arguing the point.

The geometry of the bill is a Standard Shape Cube with its dimensions (w,l,h) set to 1, 1855, 778. This matches the aspect ratio of my scanned Dollar. I didn't use a Standard Shape Plane because you can't texture map both sides of a plane.

Each of the texture maps, Dollar Back.image, and Dollar Front.image, will get used twice; once in the diffuse channel and once in the diffuse transmission channel. I turned off the Negative Z checkbox under the filter tab for each texture. This was done because that checkbox causes the map to be applied along both faces, front and back. I want each instance of the map to be applied to only one face. The maps are all applied with flat projection and the magnitude of their scales was left alone. But to get the maps to look correct on the dollar, the sign of their scales had to be adjusted. Let's take them in the order I applied them.
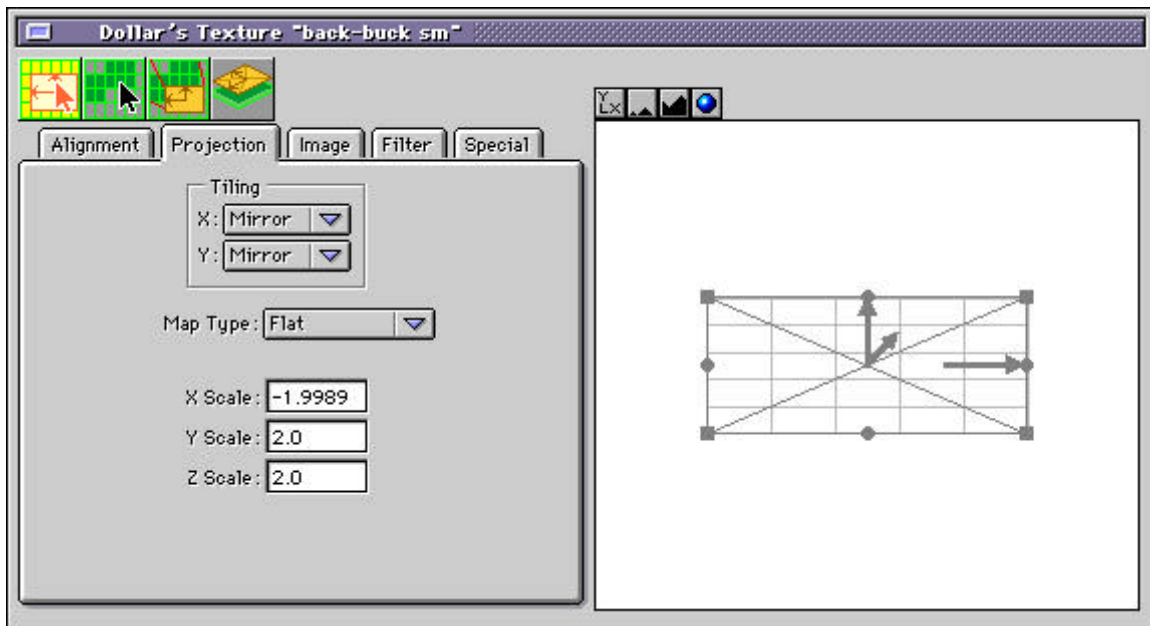
Diffuse Channel, Dollar Front.image
This map was applied and its Z-Scale was set negative. This causes the map to get applied to the front side of the bill. You can see in the Texture Dialog below that the Z Axis arrow is facing outward.
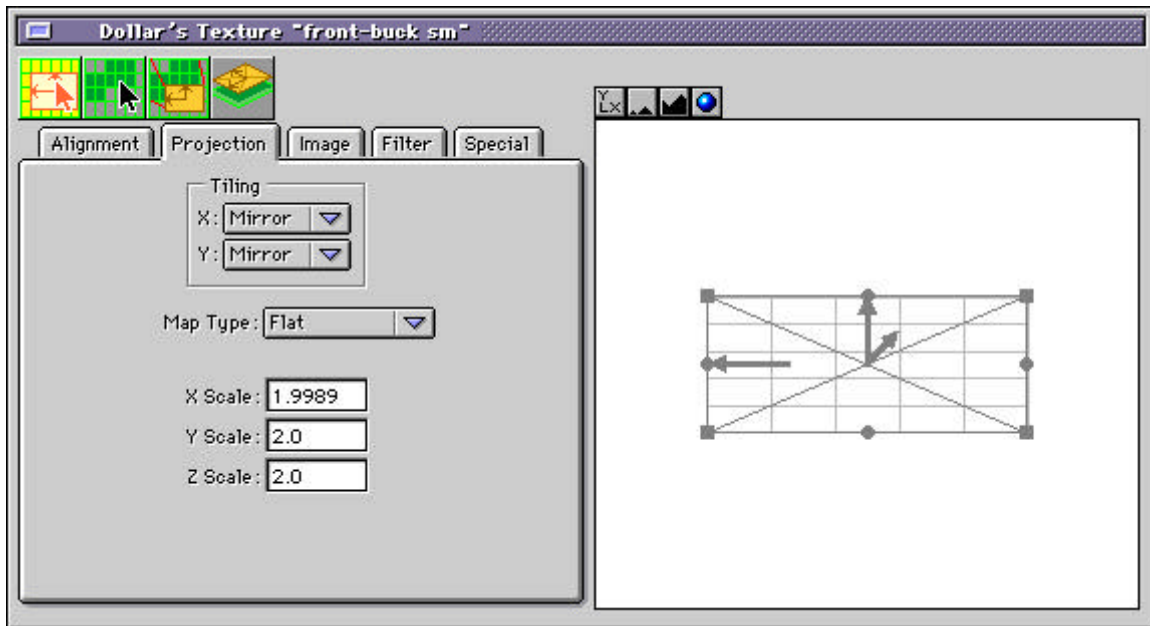
Diffuse Channel, Dollar Back.image

This map was applied and its X Scale was set negative. This was done to prevent a mirror-image of the map from appearing on the back side of the bill. Remember, the map is still applied from the front even though the Z Scale is now positive. Imagine taking this texture map and pushing it through the bill from the front to the back. When rendered, it will appear on the back side of the bill, but will looked reversed (flipped about its Y axis).
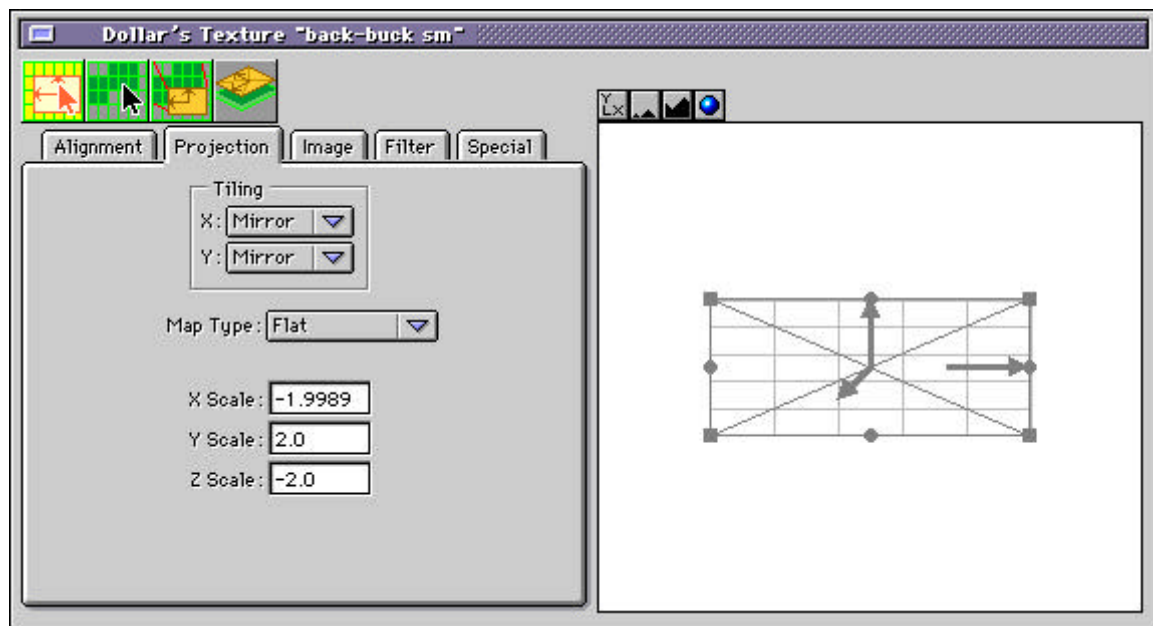
Diffuse Transmission Channel, Dollar Front.image
This map was applied and its scales were left alone. Hmm, why is that? Well, we want the front of the bill to diffuse through to the back. Therefore, we apply the diffuse transmission map to the back side of the bill. That is why the Z Scale is not negative. When the image of the front appears on the back, we <u>want</u> the image to be reversed. That is why the X scale is not reversed.

Diffuse Channel, Dollar Back.image
This map was applied and its X and Z Scales were set negative. The Z scale is negative because we want the diffuse transmission map that corresponds to the back of the bill to be visible on the bill's front. As you can see by the Z Axis arrow sticking out of the screen, the map has been applied to the front side of the bill.

The X Scale has been negated because we want the mirror image (flipped about the Y axis) of the back side to appear on the front side.

Lighting
I decided to render from the back side of the Dollar bill, believing it would be more dramatic if Washington's head diffused through rather than just the large N in the word ONE. I placed the camera at the back of the bill and put a radial light with an intensity of 0.5 nearby. The radial light provides the lighting for the back of the bill. Without it, the back of the bill would appear black except where the front diffuses through.

I placed a spotlight on the front side of the bill and narrowed its spotlight cone so that it covered about 50% of the surface area of the bill.

I then rendered. That's all there is to it. The effect is perfect. Hold up a real Dollar bill over a light source that has been constricted to a small circle. Compare the effect to the rendered image. You will be hard-pressed to tell one from the other.

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