VectorMagic

Building
A
New Font

A Process to Generate
any form of
Silhouette or Stencil
for your particular
masking purposes

An Introductory Tutorial
by
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Introduction

It was a little more than a year ago that a close friend pointed me to VectorMagic. A very short e-mail. The subject was "Have U Seen" and the content was a link to the once existing VectorMagic site at Stanford. My friend knew I had been playing with vector generation/tracing applications for over 15 years. Both of us had yet to find one that provided a tracing quality that actually saved time as compared to hand tracing using the pen tool. When I saw the term "rotational invariance" on the web site I smiled. I then saw the examples and I knew good things were coming.

At first it was only a web application and very limited in the size of the image that could be uploaded and processed. I put together a set of 20 images of all types and uploaded them to the server, one at a time, over and over, making sure to try each of the settings. These were a varied set of bitmap images of flat color logos, line drawings, litho and intaglio prints, photos, watercolors, and oil paintings. All of the vector output that I downloaded was exceptional.

It has changed the way I work and has greatly enlarged the volume of work I am able to do in the same amount of time. Do not let your clients know that you use this, or how much it helps you to respond to their potentially peripetia prone preferences. (*Peripetia* - noun. A sudden and unexpected change of fortune or reverse of circumstance.)

Using the desktop version of VectorMagic, as well as Photoshop, Illustrator and Fontographer, or their equivalents, this tutorial will show you how to take a scan of an alphabet (a page from a 100-year-old book on font design) and convert it to a usable, if not fully set-up, TrueType font. If you do not have Fontographer, you can still use this procedure to generate vectors from imagery other than letter shapes. The individual letters will still need to be hand kerned at final layout to get optimum results. However, when used for headlines, banners, and short lists, this can be a real time saver and allows access to custom and ancient fonts with reasonable processing and editing time. This tutorial presupposes a familiarity with the computer desktop and basic usage of graphics applications.
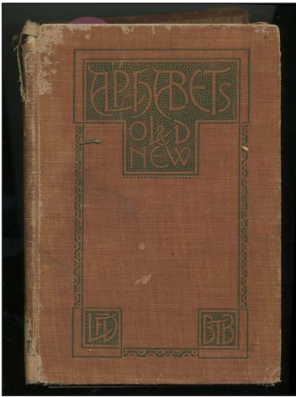
It is my hope that you will find this tutorial to be enjoyable and, possibly, informative.
— **Howard Penner**, *Free-Lance Graphicist*

1. Scanning and Adjusting – Photoshop

ALPHABETS OLD AND NEW: BOOK COVER SCAN

The alphabet that was scanned came from "ALPHABETS OLD AND NEW FOR THE USE OF CRAFTSMEN" by Lewis F. Day, Third edition. Publisher: B.T. Batsford, London. Publication Date: 1910 - 256pp. It has many examples of the evolution of English lettering and copies can be found on the net. There are many books just like this one that have classic examples of type design.


FONT RAW SCAN: NO ADJUSTMENTS

To scan something that you may not have access to again, such as this 100-year-old book, I suggest scanning at 600 dpi. Even though it is much more resolution than required for VectorMagic, it is easy enough to archive this large source scan in case the hi-res version is needed again. I tend to scan with all image adjustments off, with the intention of making my adjustments later in Photoshop. I have used Photoshop to adjust the initial image of the letters, but any program that gives you similar adjustment choices should be fine. Before the scanned image is adjusted, the image size is brought down to 200 dpi, which is plenty for this use. Make sure to rename the file so that you do not loose your higher resolution source scan.


FONT SCAN: COLOR REMOVED
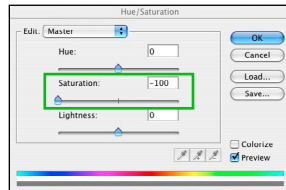
The removal of the color saturation can be done directly to the image by going to **Image / Adjustments / Hue-Sat** and then setting the Saturation to **-100**. It can also be applied as a Hue-Sat adjustment layer. This removes all of the color from the image. While there are other ways to remove color from an image, this method is very quick and will fully suffice for our purposes.

Note: For the remainder of the tutorial, items of interest in the text will be highlighted with a green rectangle, as shown in the image to the left.

FONT SCAN: LEVELS ADJUSTED
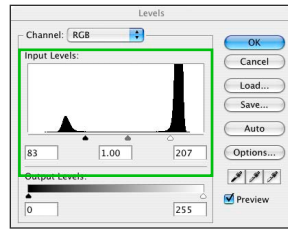
A large amount of the noise and some grey tone in the scan can be removed by applying levels appropriately, but please note that this not an in-depth lesson in the use of levels. Go to **Image / Adjustments / Levels** and then set the values of the white, black and grey points (this can also be applied as a levels adjustment layer.) As the white slider is moved to the left, the value decreases; and as the black slider is moved to the right, the value is increased. The specific numerical settings are not as important as making sure that the new white and black values are between the peaks of information shown in the histogram in the levels window. The white peak ranges from about 200–245, with the setting of 207 at the lower edge of the peak. The black peak ranges from about 40–80, with the setting of 83 at just above the upper edge of the peak.
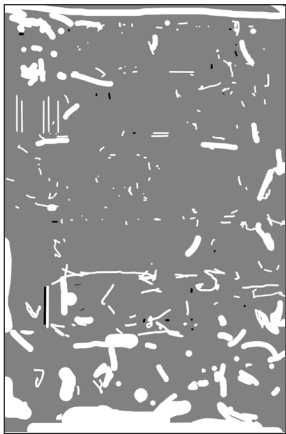
FONT SCAN: CLEAN-UP LAYER

Even with all the noise and grey tones removed through the application of levels, I go through and clean up the image. I create a new layer above the scanned image, zoom in to 200%–800% and slowly proceed to clean up all of the edges of the typeface using white and black brushes. I do not clean to a level of mechanical perfection, but all dust, remaining tonal fades, and other obvious glitches and extraneous details are removed or added as required. The image to the left is the layer of white and black that was added to the leveled image above to further clean it. The grey is present in this version so the white fixes can be viewed against the background color of this tutorial. This type of cleaning takes a bit of time, but it greatly improves the quality of vectorization output. I call the technique "ant-cleans-football-field."


FONT SCAN: CLEANED AND READY FOR VECTORIZING

Once the scan is completely adjusted and cleaned, it should look as it does in the image on the left. Because it was not overly cleaned, the image still has minor imperfections that give the lines unpredictable variation, which will re-enforce the "Old-Timey" look. It can now be flattened and saved, and is ready for VectorMagic. I usually save in PSD format (Photoshop), but I have found that the PNG format also works well. This same process could also be used on any scanned image where the intent is to end up with a purely black and white image, such as a hand-drawn font, logo, or even an animation drawing.

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2. Generating Outlines – VectorMagic

BASIC MODE: LEAVE SIZE UNCHANGED

This part of the process is quite easy. The image being vectorized can be dragged into the open VectorMagic window. It can also be pasted from the clipboard, or opened using **File / Open**. The program may suggest downscaling the image (see lower left corner of this image), but leave the size unchanged and click "Next."
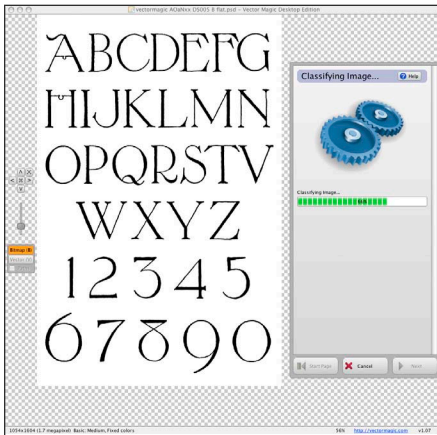
CLASSIFYING IMAGE TYPE

Now you should see the green progress bar and the image of gears as the program decides whether the image you have presented it with is a photograph, a logo with blended edges (or anti-aliased), or a logo with unblended edges (also called aliased, or hard-edged images.)

CHOOSE "LOGO WITH BLENDED EDGES"

The program should automatically select **Blended edges**, so just click **Next** again.

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START WITH LOW QUALITY INPUT

This first time processing, try the **LOW** quality setting to see if this is a sufficient quality for your output. You can always go back and try another of these settings without having to re-load or re-classify the image. Of course, if you do want to re-classify the image, you can do that as well.
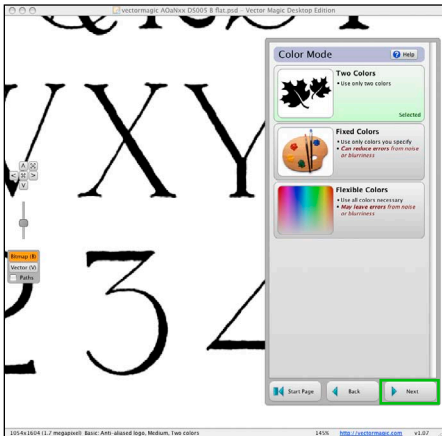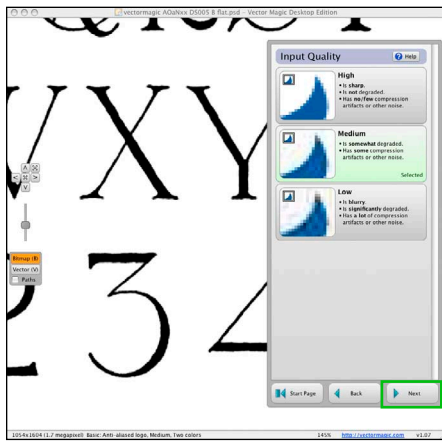

COLOR MODE: TWO COLORS

In this case, it is pretty easy to see that only two colors are required for this conversion.

Note: When working with multi-colored images, the fixed colors palette can be very useful for generating stencils for use with silk-screen printing, vinyl decal cutting, or any other number of graphic processes that may require scaling without loss of image quality.
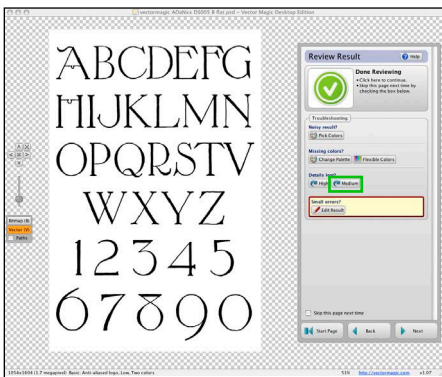
REVIEW VECTOR RESULT

After the outlines have been rendered, zoom in and pan around and check out the quality of the render. In this case, I thought the edges were not quite smooth enough, so I clicked on **Details Lost / Medium.**
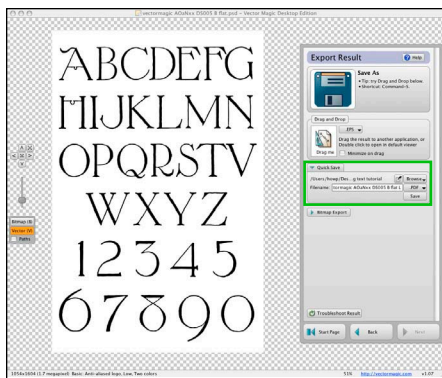
With **Medium** quality now chosen, just click **Next** again and the image will be re-processed.

**RE-PROCESS WITH MEDIUM QUALITY INPUT**

After the outlines have been re-rendered at medium quality, make sure to zoom in and pan around one more time and reassess the quality of the render. In this case, the medium quality setting looks quite nice, so click **Next** again.
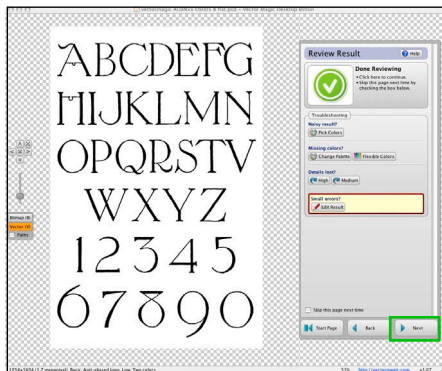
REVIEW, THEN APPROVE QUALITY BY PRESSING "NEXT"

With the quality of the outlines approved, you now have multiple ways you can save the file. I have found that "Quick Save" is very fast—it lets you rename if needed—and will leave the file in the same file as the source image. I use the PDF format for output because it will open in Acrobat or Illustrator, depending on whether you want to preview or edit the vectors. It is also a handy format to e-mail to others for approval or for sharing generated content.

QUICK SAVE RESULT AS A PDF

3. Gathering and Preparing Outlines – Illustrator
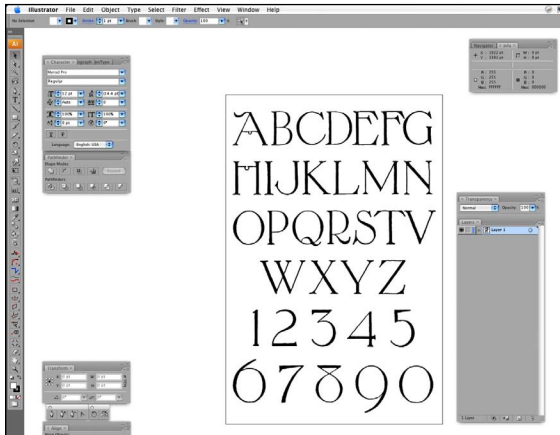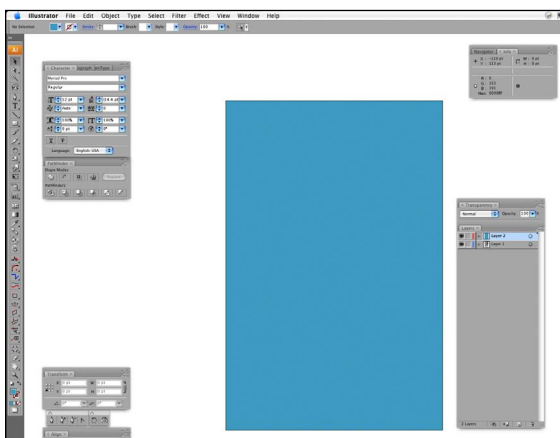

OPEN PDF IN ILLUSTRATOR

Once you have opened in Illustrator the PDF file you just generated in VectorMagic, you should see something like the image on the left. It is likely that your tools and window layout will be somewhat different.
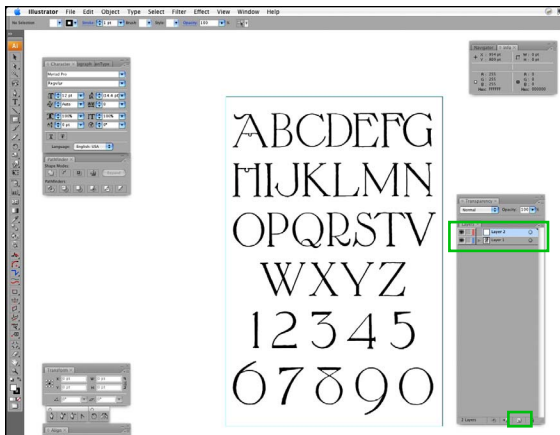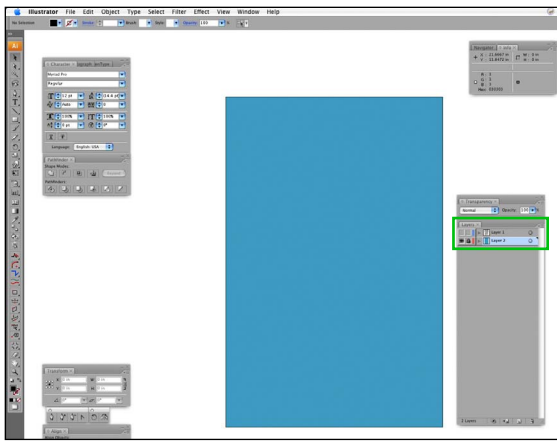

CREATE SECOND LAYER

Create a second layer. It will appear above the first layer that contains the generated art.

PLACE A COLORED RECTANGLE ON SECOND LAYER

In the second layer, place a rectangular shape of any color that fills the artboard area to completely cover the lettering art. It should make a bit more sense on the next few pages.
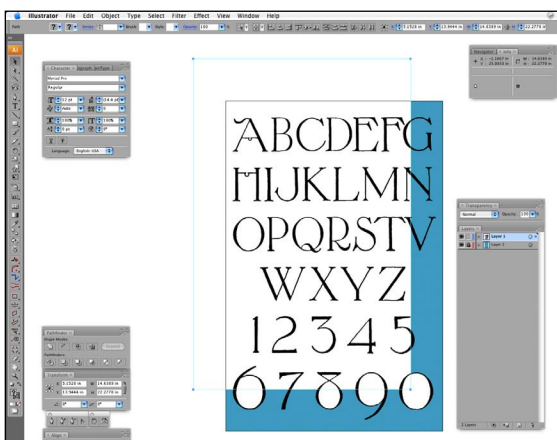
MOVE SECOND LAYER BELOW FIRST LAYER

In the image on the left, the first layer has been made invisible by clicking on the "Eye" icon, and the second layer has been moved to the lower position and locked.
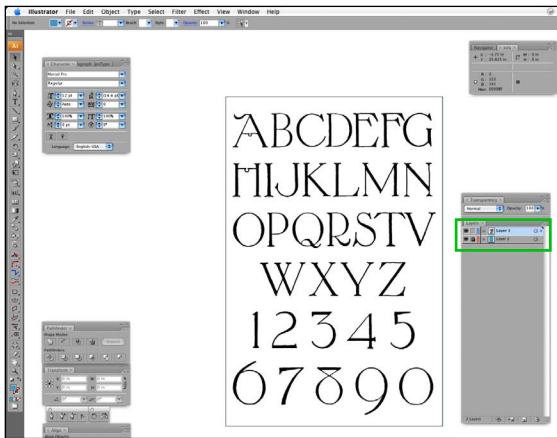

COLORED RECTANGLE IS BELOW VISIBLE ART

Make layer one, now above layer two, visible by clicking on the "Eye" icon.


PARTIALLY REMOVES WHITE BACKGROUND

By clicking and dragging on any white area outside of the letters but still on the artboard, you will see that there is a white background behind all of the letters. This white area needs to be deleted.

At the bottom of the image, in the numbers in particular, you will see the remaining white areas that will be used to punch holes in the black shapes of the letters to complete the letter and number shapes.

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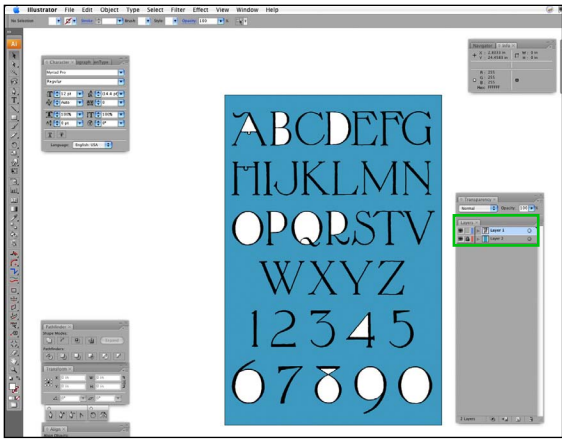
WHITE BACKGROUND REMOVED AND LAYER 2 LOCKED

When the white area is deleted, it makes all of the white areas remaining inside the letters fully visible. The letters are B, D, O, P, Q, and R, as well as the numbers 4, 6, 8, 9, and 0.
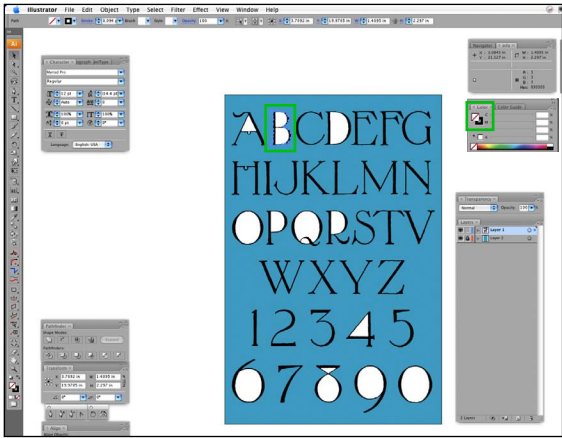

GRAB ANY OBJECT WITH NO FILL

Now click on the edge of one of the letters—for example, letter "B"— and notice in the **COLOR** panel a black stroke with an empty fill. If you accidently clicked inside the letter, then the panel would show a black fill with no stroke—something you want to avoid.
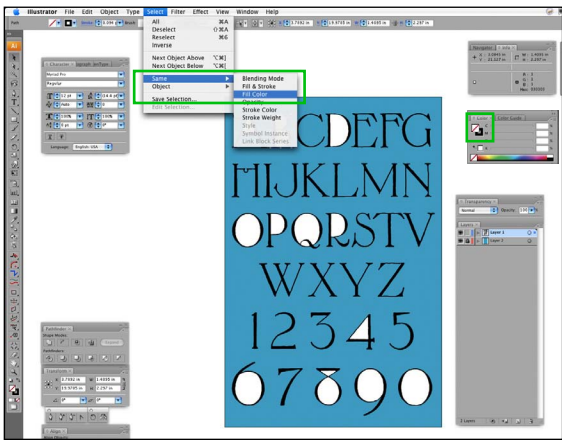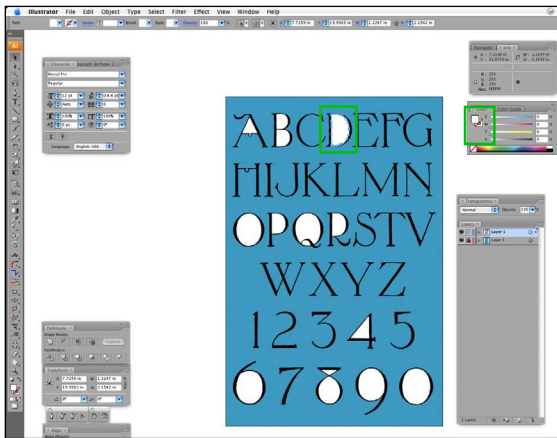

SELECTING ALL OBJECTS WITH NO FILL

Go to **Select / Same / Fill color** from the top menu area. This will simultaneously select all of the shapes that have no fill. You could also shift-click each item one at time, but using **Select / Same / Fill color** is much faster and easier, and it ensures that you do not miss any shapes.
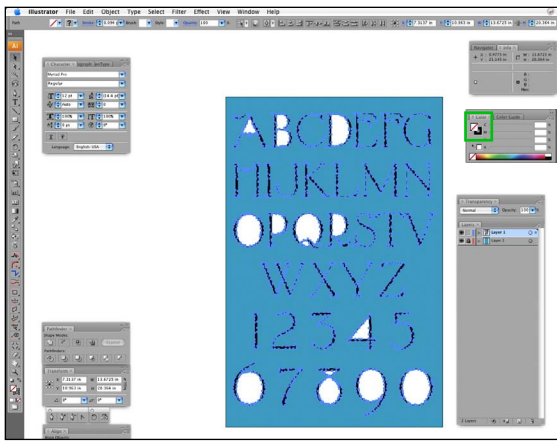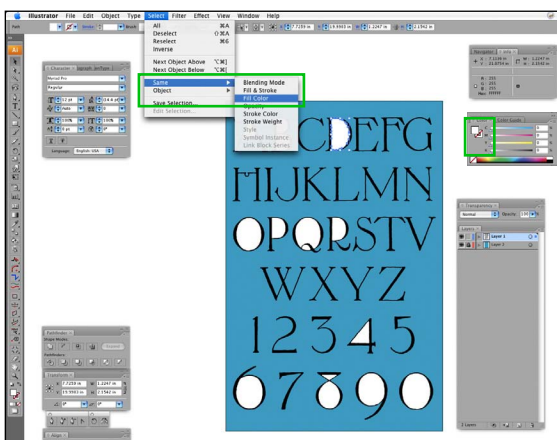
ALL OBJECTS WITH NO FILL SELECTED

Selecting all of the items with no fill will give you a window that looks like the one to the left with all of the letters and numbers outlined with the highlight color corresponding to the specific layer. In this case, as a highlight of light blue. Delete these empty shapes.


SELECT AN OBJECT WITH WHITE FILL

Now select a white shape that is inside any of the letters. Again, the specific letter you pick is not important.

SELECTING ALL OBJECTS WITH WHITE FILL

Use **Select / Same / Fill color** again from the top menu area and this will allow you to simultaneously select all of the shapes that have a white fill. Do not delete these shapes—you are only grabbing all of them to see how they help make up the letters.
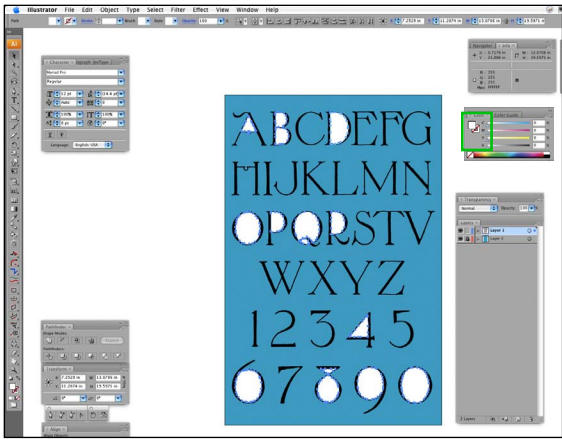
ALL WHITE FILL OBJECTS SELECTED

The image on the left shows all the selected objects with a white fill.


WHITE FILLED OBJECTS OFFSET

By moving the white-filled shapes an inch or so from their original position you will see that the letters are made of black shapes with white areas representing the cut-out of the letters. Also, you will not see the blue area behind the letters. This means that these shapes cannot be used yet as a font or even as a stencil shape. Use undo to put them back in their original positions.

We are now going to use the Pathfinder panel and Boolean transformations, which are extremely powerful and should be a part of your vector arsenal. The Pathfinder panel uses Booleans to make new shapes from two or more source shapes. If geometric Boolean operations are new to you, please look them up in a search engine and become familiar with them. Their use will pay you back many times over.
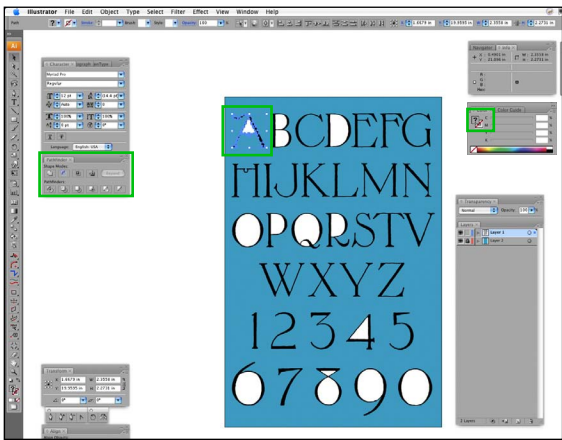
BLACK AND WHITE ELEMENTS OF LETTER "A" SELECTED

Make sure that the **Pathfinder** (or Boolean) panel is open (**Window / Pathfinder**). Select the two object elements that make up the letter "A." When both items are selected, the **COLOR** panel will show a fill type as "?", indicating that more than one fill type has been selected. The Boolean operation will punch the white triangular shape on the front out of the black outer shape in the back. Compare the way the letter "A" looks in this image with the way it looks in the very next image: after the front shape has been "punched out" of the back shape, the color of the blue background in the lower layer will now be visible.
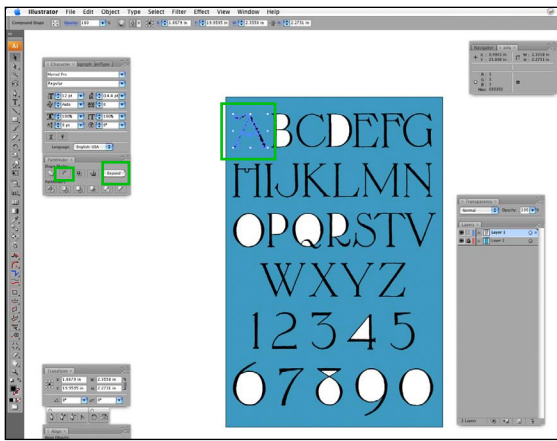
LETTER "A" AFTER BOOLEAN OPERATION

On the **Pathfinder** panel: first click the **Subtract** button, then click the **Expand** button. Both have a green rectangle around them in the image to the left and so should be easy to find. By expanding the shape, it is no longer made of two separate shapes, but is now a single compound path. The **Pathfinder** command in the **Filters** area does not operate in the same way as the **Pathfinder** panel—it will not provide the results we need for this project.

Note: A good way to learn Booleans is to take a filled square and a filled circle, place one above the other, and try each of the Boolean choices one at a time. Undo and repeat as needed.

**APPLY BOOLEAN AND EXPAND EACH LETTER**

Now apply the Boolean **Subtract** and **Expand** to each of the remaining letters and numbers: B, D, O, P, Q, R, 4, 6, 8, 9, and 0. When you are done there will be no more white areas visible.
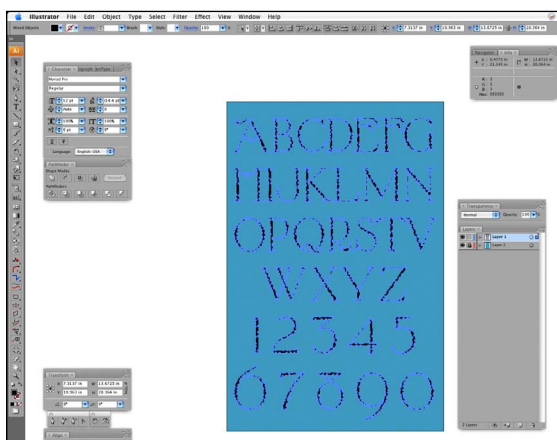
ALL LETTERS SELECTED AFTER PROCESSING

At this point you have an almost complete set of letters, and you should be able to see the colored layer behind each of the layers. You may have noticed that there is no letter "U." Most fonts from this book were intended for display use and probable hand-carving or painting. So they would use a "V" instead of a "U." Luckily, it is easy to combine the top parts of an "H" and the bottom parts of an "O" to create the missing "U." It is a very nice, small side project, and you may even choose to use Booleans. This is one of many ways the missing letter could be built. Once you have generated the missing letter, you will be ready to paste each letter and number into Fontographer.

# 4. Placement and Font Output – Fontographer
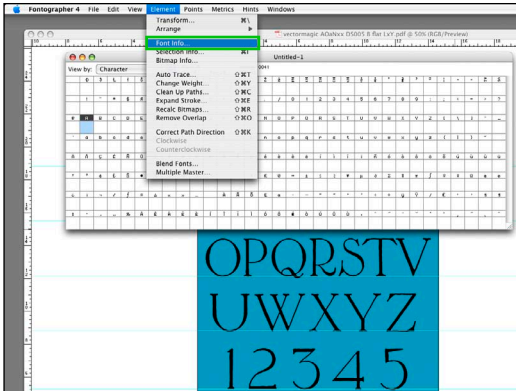
OPEN A NEW FONT FILE AND OPEN FONT INFO WINDOW

Open Fontographer and open a new font. Stretch the font window so that you can see the entire layout without scrolling, if possible. Name the font. If you do not name the font, it will show up as "untitled" in the font list of our application. That will work if there is only one of them without a name, but it will become very confusing if you ever generate more than one.

Go to menu item **Element / Font Info** to open a window to input info about the font you are about to generate.

Note: Fontographer is an incredibly complex application with an immense number of settings. We are only going to use it in a very basic way.
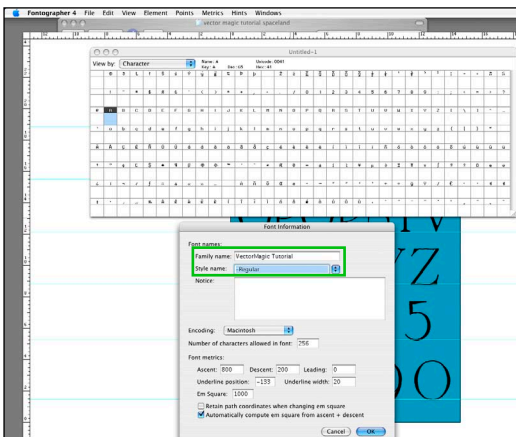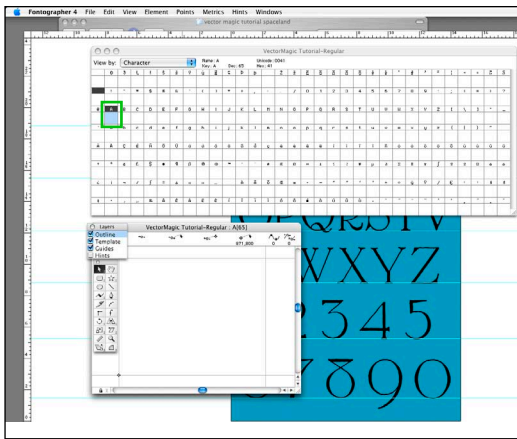

INPUT FONT INFORMATION - NAME IS REQUIRED

Enter the font name you have chosen. For this example, "VectorMagic Tutorial" was chosen as the name and "Regular" as the style classification. I work on a Mac, so I have chosen Mac encoding. If you are on a PC, choose PC encoding. I have not changed any other information in this window. Unless you really know your font settings, I suggest that you just leave everything as it is and click "OK" to finish with this step. Once you have finished, the window will have a name, instead of "Untitled."
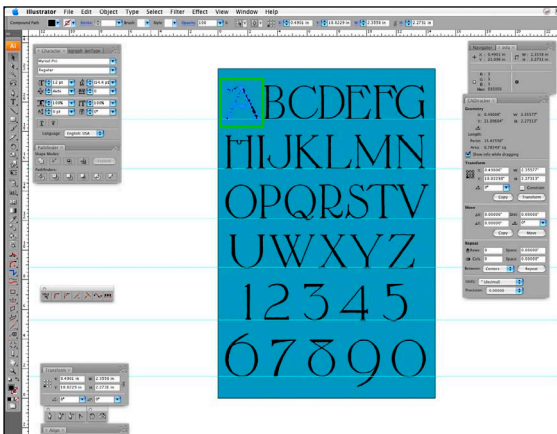

COPY FIRST LETTER, "A"

Go back into Illustrator and copy the letter "A." Do not accidentally copy any other shape or letter elements or they will also end up pasted into Fontographer, and you will alter the final look of the letter in the font.
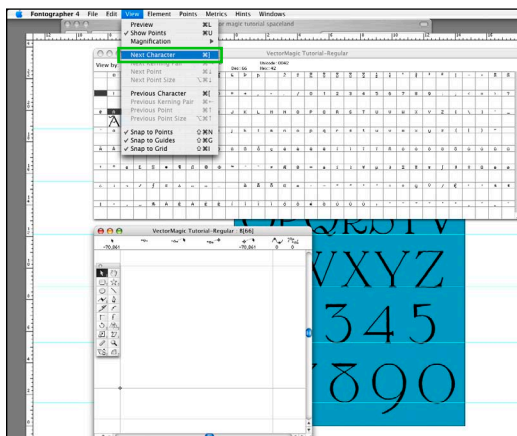
Return to Fontographer and double-click on the "Capital A" preview window in the "VectorMagic Tutorial-Regular" font window. This will open the "Upper Case A" edit window.

DOUBLE CLICK ON "A" TO OPEN THE LETTER "A" WINDOW

Paste the letter "A" into the "Upper Case A" edit window. It should show up as an outline.
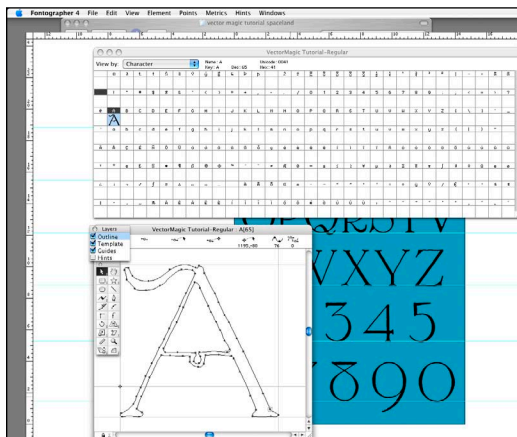
PASTE LETTER "A" SHAPE INTO LETTER "A" WINDOW

Go to menu item **View / Next Character** which will open the "Upper Case B" window. Go back to Illustrator and copy the next letter, "B." Return to Fontographer and paste in the next letter shape, "B." Repeat this for all capital letters and numbers.

MOVE TO NEXT LETTER, PASTE AND REPEAT FOR ALL LETTER SHAPES

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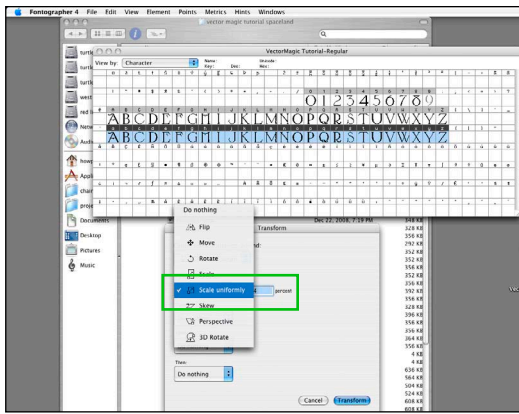
COPY AND SCALE FOR LOWER CASE SET

Once all of the shapes have been entered into their respective edit windows, click on the "Upper Case A" preview window, and double-click on the "Capital Z" preview window. This will select all of the capital letter shapes at once. Then copy. Now highlight the Lower Case letter preview windows from "a" to "z" and then paste. This will paste each letter into its respective edit area from Upper Case to Lower Case and all at once.

Go to menu item **Element / Transform** which will open the window shown on the left. Then set first scaling to **Scale Uniformly**. This simple scaling will do just fine in giving us a nice lower case set of letters.
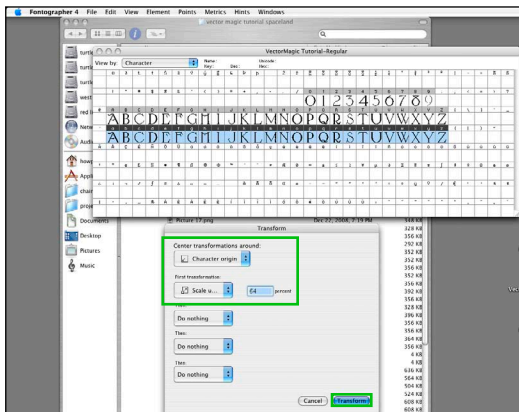

MAKE SURE TO SCALE AROUND CHARACTER ORIGIN

Make sure **Center Transformations Around** is set to **Character Origin** and then change the value of the transformation to 64%. After applying the transformation, the lower case letters will look smaller than the upper case letters in the letter preview windows.
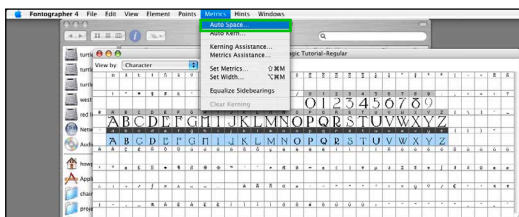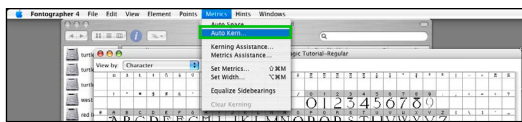

"AUTO SPACE" MENU ITEM

Apply menu item **Metrics / Auto Space**. This will create uniform spacing between each letter.
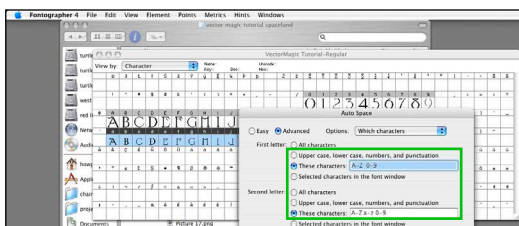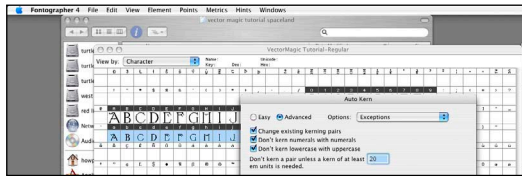

"AUTO SPACE" SETTINGS

In **Auto Space**, click on *Advanced Settings*. In **First Character** and in **Second Character**, place this text "A-Z a-z 0-9." Then click on **SPACE**. In the example shown, I missed the "a-z" in the **First Character**. I hope you do not.
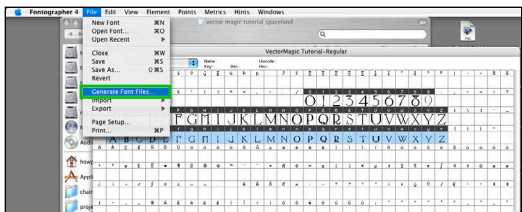
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"AUTO KERN" MENU ITEM

Apply menu item **Metrics / Auto Kern**. This will create kerning amounts between each letter.
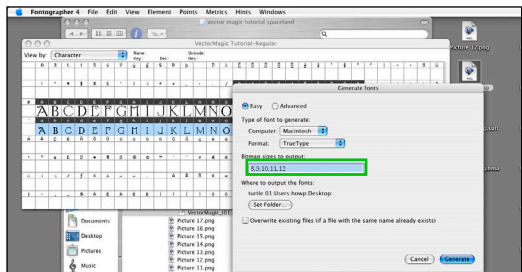

"AUTO KERN" SETTINGS

Do not change any of these settings unless you know the effect they will have. Simply approving these settings will generate what is needed. Now, and just for safety's sake, save the Fontographer design file.

"GENERATE FONT FILES" MENU ITEM

Use menu item **File / Generate Fonts**.

"GENERATE FONT FILES" SETTINGS

Set this to **Easy**. Again choose your machine type, Mac or PC, for the font encoding. I have chosen TrueType for this output, but PostScript is available if desired. Finally, bitmaps of the fonts at 8, 9, 10, 11, and 12 point sizes were chosen. Two font files will be generated and saved to the desktop. They are "VectoMagTutReg.suit" and "VectoMagTutReg.bmap" The folder will be called "VectorMagicTutorial_Reg" and the font is now ready for installation.

AND NOW

THERE EXISTS

AN ALMOST NEW

AND YET STILL WONDERFUL FONT –

BUT REMEMBER TO KERN THE FINAL TEXT!

Although VectorMagic
is great for
Black and White Artwork,

It is also quite nice with
photographic images!