Designing Paper Miniatures Tutorial
or, How I Design My Mini's, by Jim Hartman
(Originally posted at paperworlds.com - June 22nd, 2003)

Introduction:

My goal when designing paper miniatures is to look as much like painted metal miniatures as possible. To do this, I draw the mini with only the details that can be picked out from an arm's length distance. Any more detail and the mini looks too busy, and the time spent drawing it wasted. My minis are designed to fit on to common slotta bases as are metal minis. The way I design the minis fit my personal drawing style. I draw in a very technical style with thin even lines, a very mechanical style. I don't draw perspectives, 3D, or scenes very well at all, so I draw everything in flat planes, portrait, or profile angles. When I design a 3D model, I try to make it fit those flat planes as much as possible, it makes it easier for me to design and simpler to make. When designing your own minis keep in mind your own style. Developing your own style comes with practice and experimentation until you get comfortable and find what you think looks best.

This tutorial is much more of a step-by-step guide and I try to explain why I do it this or that way. Believe me when I say that I'm NOT a professional artist by a long shot. It takes me a lot of practice to get stuff to look right, so don't get discouraged if it takes you a few tries to get anything to look right.

My Design Area

Tools and Equipment

This is probably my favorite topic when it comes to designing and art stuff. Having the right tools and supplies are needed to do a good job. First, I'll cover drawing and art equipment, then I'll get to computer and software.

Main Drawing Tools:
- Paper
- Pencils
- Erasers and Eraser Templates
- Rulers and Straight Edges
- Compass
- Tape
- Light Box

It's not really necessary to have all this stuff to design miniatures, but it sure is nice to have it when you need it.

Paper: I use any old paper for sketches and ink jet paper for pencils drawings. When I am happy with a finished drawing, I will go over it in ink with a technical pen.

Over this I'll place some **Marker Paper** and draw with just a technical pen. I've just recently discovered marker paper, great for use with markers because it doesn't bleed like regular paper. One drawback to marker paper is that if you use any pencil under the marker and later erase the pencil you will lighten the marker lines as well. I use maker paper primarily because I scan the finished drawings.

Pencils: I've come to rely upon technical pencils, as they always have a sharp edge and easy refills. I use two hardness of pencil lead, 2H for light sketching and HB for dark sketching. HB is a really soft lead an is great for working up a design from a rough blob to a more refined drawing by drawing ever darker as I tighten the design. 2H is the standard hardness for most tech pencils,

it's nice for sketch paper but is harder to work with on smoother ink jet paper.

Ink pens: I almost always use technical pens to ink my designs. The pens are the type that come in several sizes or thickness. The sizes of pen I use are 01, 03, 05, and 07. Sometimes, I use only one size of pen for the whole design, but mostly I use 05 for the bulk of the design, and 03 and 01 for the detailed areas. I don't add any shading with the pens, I just use them to make the shape of the design and will use fill colors in my drawing program to add shading, even if it's black shading.

Erasers and eraser templates: I think erasers are self-explanatory. Eraser templates are used when you want to isolate a small area to erase. As you can see from the picture the erasure template has lots of small openings that you place over the area you want to erase, it's great for erasing that nose that never quite looks right.

Rulers, straight edges, and compasses: As you would guess, I use these to make very precise lines and circles. While not pictured, but also useful, are circle templates with varied sizes of circles, very handy.

Tape: Most people just use masking tape, but I've found that a low tack edging tape works better for keeping two pieces of paper together without marring the paper when you take them apart.

Light Box: Finally, my most treasured piece of equipment: the light box. The light box is exactly what the name implies, it's a box with a light in it and a transparent cover so you can trace. I use the light box to refine and clean-up my designs. Also, if I scan photos, I can trace them as well. I just can't say enough how nice it is to have a light box. Any light box bigger than the paper you use is perfect.

My Light Box

Computer Programs

I could not design my miniatures the way I do without a computer and software to draw, color, edit, and ready my designs for the web.

First, I use a Mac to do my design work. All my other equipment, scanner, printer, etc. is all the cheap home quality stuff. I don't plan on doing any real pro work, so no sense to have pro equipment. All of my software was purchased on eBay or is inexpensive shareware.

I have only bought one program new, that's because there was no other way to get it. The main software I use is: Graphic Converter for scanning and picture editing, Canvas 7 for the vector artwork and coloring, Adobe Acrobat for making PDF's, Stuffit for compressing files for the web, and Appleworks for all my page layout and HTML junk. – This is a bit out of date and presently there are many low-cost or free graphics and drawing programs available. Inkscape, GIMP, and Blender are all good apps that are freely available on the internet.

Drawing Books and Manuals

Every artist needs good books on drawing and reference books for the topics you want to design. I have found that my biggest expense is books. I now have quite a collection of drawing books, books on anatomy, books about weapons, books about period costume and dress, and books on armor and weapons. Having all these books makes it easier to design what I want, because I can now just look up what an eagle looks like and have multiple sources for the designs of eagles.

Depending on your natural talent, you may want to start with the very basic drawing books that cover the basics. I find that simply tracing or drawing similar images of the samples shown in the books helps me get the feel for the subject, and after many, many tries later can I get it to look right. On the plus side, these books are just fun to look at and are great for inspiration when you get bored with the current project.

HOW I DESIGN PAPER MINIS

Now let's get to the tutorial of how I go about designing my miniatures. Although with this tutorial, which features the Warrior Bug from Starship Troopers, I started with a sketch on my preprinted eye line sketch paper.

I have printed out several sheets of paper with horizontal lines every 1.25 inches, or about 30 mm. I use the eye line sketch sheet to do my rough sketches and to work out poses. This is mostly for human and humanoid sketches, but it works for everything as it gives me a scale to size the creature I'm working on.

Below is a sample page from my sketches for fantasy fighters.

Eyeline sketch sheet, with fantasy fighter types
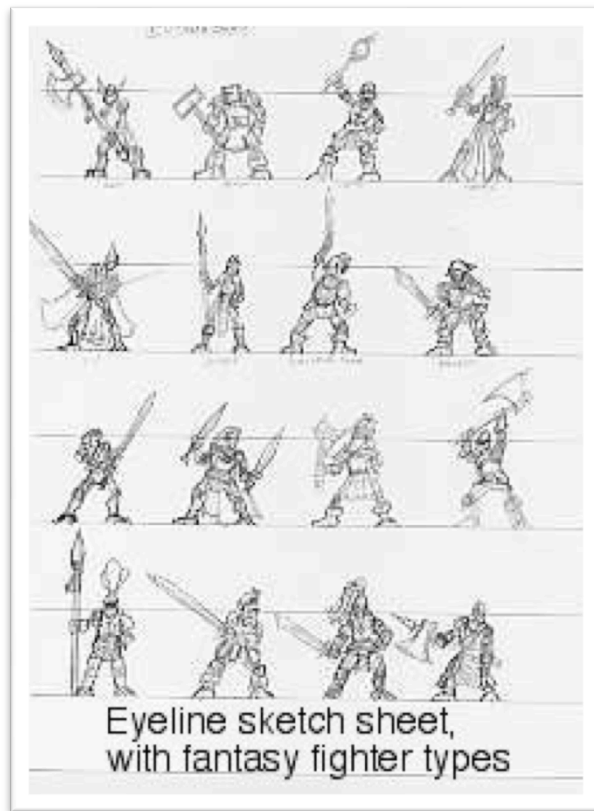
This is a quick run-through of each step.

With these sketches, I will scan and double the size of the sketches I like to do more developed sketches to work out clothing, armor, facial details and the like.

Once this sketch is done, I'll trace it in pencil to further refine the design and make it look cleaner. I'll then take this clean pencil art and marker it in. From there, I'll trace it with marker paper only tracing the marker lines on the final art. With the final marker art on marker paper, I will trace the design reversed to design the backside of the miniature. I will pencil in only those parts that are different from the front.

Once done, I'll marker in the penciled art. Now, carefully checking on both my front art and back art, I will make a final design on marker paper of the backside of the miniature. Now, I have a front and back side that match up, I hope!

I'll take these marker designs and scan it in 2 bit black and white at 600 dpi. I'll take this scan art and open it in my vector drawing program and convert it to editable curves. From here, I'll color it in with gradients and outlines.

Before I color, I scale the miniature to actual size so that all of the color gradients are accurate. Sometimes if you scale a drawing down after coloring you lose some of your blends. After coloring, I add my heavy black outline to make it easier to trim the miniature.

Next I flip the backside to reverse and upside down to mirror the upper front design. I'll save the design as a 144 dpi TIFF image that will look good when printed 50%. And that's it.

Now on to the step-by-step breakdown of each procedure.

Keep in mind that I'm trying to be as complete as possible so that some of you who are just getting started can see all the things, I consider at each step...

Step 1: Research Materials

Unless I'm designing something truly original, I need reference material. The one thing I noticed by gathering up all the photos for the bug was that each designer had a little different take on the design.

I try to find as many views of the subject as possible, sometimes though, it's only one picture. Even with all the reference in the world, I still need to doodle and sketch until I can work up the design's shapes and proportions. Now with all my research material in hand, I'll draw up my sketch.

STEP 2, the sketch   How I design mini's, by Jim Hartman
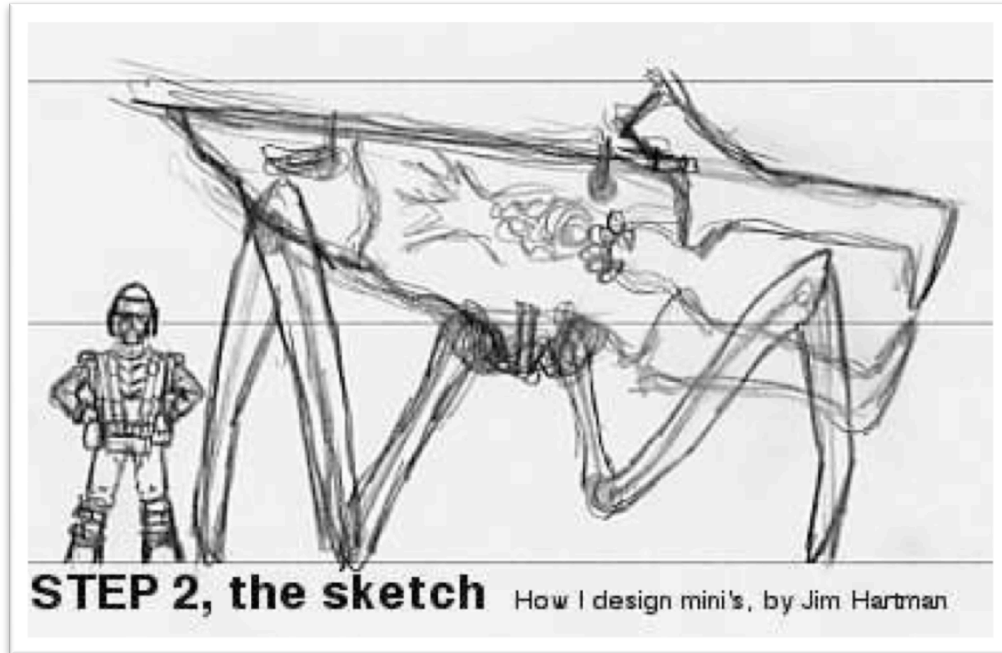
Step 2: The Sketch

I am lucky that I found good reference art, I got the look I wanted with one sketch. Usually, it will take me several sketches, if not tracing some original art just to get the shapes to look right.

Here, I did a quick sketch of a starship trooper to the eye line. This helped me get the scaling right. I do most of my sketches at actual size, this way I know how much detail will look right. I think the trooper in this sketch has too many details and will have to be simplified when I get around to designing these guys. Anyway, I got what I was looking for on the first try.

Now I slap this sucker on the scanner, on to the next step...
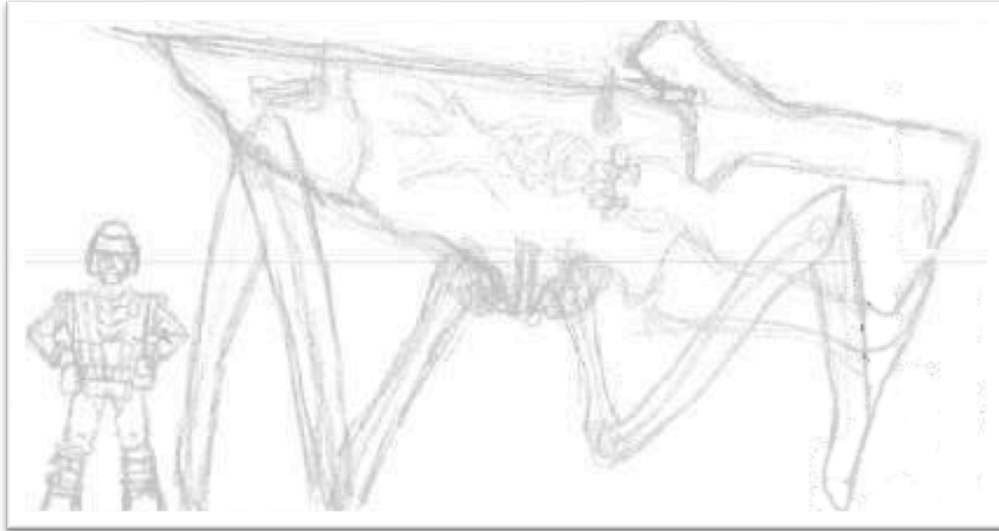
Step 3: Scanning, Scaling, and Adjusting

Scan, Adjust Brightness, Scale 200%

With this step, I want to make my design easy to trace. I scan it in at 150 dpi in gray scale at 200%. Once scanned, I'll use a photo editing program and adjust the brightness up to make the background white. Then, I'll adjust the contrast down to make the sketch appear lighter.

When I'm done with the adjustments, I print it out. With the printout in hand, I'm now ready to trace and make the design more refined and cleaner...

Step 4: Trace and Refine design

With the sketch now at 200% of finished size, I can trace the design and make all my lines clean and neat. Since this is going to be a multipart miniature, I'll concentrate on one part at a time. As I trace, I'll further develop the design to look more organic or mechanical as I think it needs. In this case, I wanted to add more organic shapes to the body and legs to make it look more insect like.

On this step, I also experiment with the details and I may make several tracings to see what looks good. Once I have a nice clean tracing done, I'm ready to ink it...

STEP 5, ink design
How I design mini's by, Jim Hartman
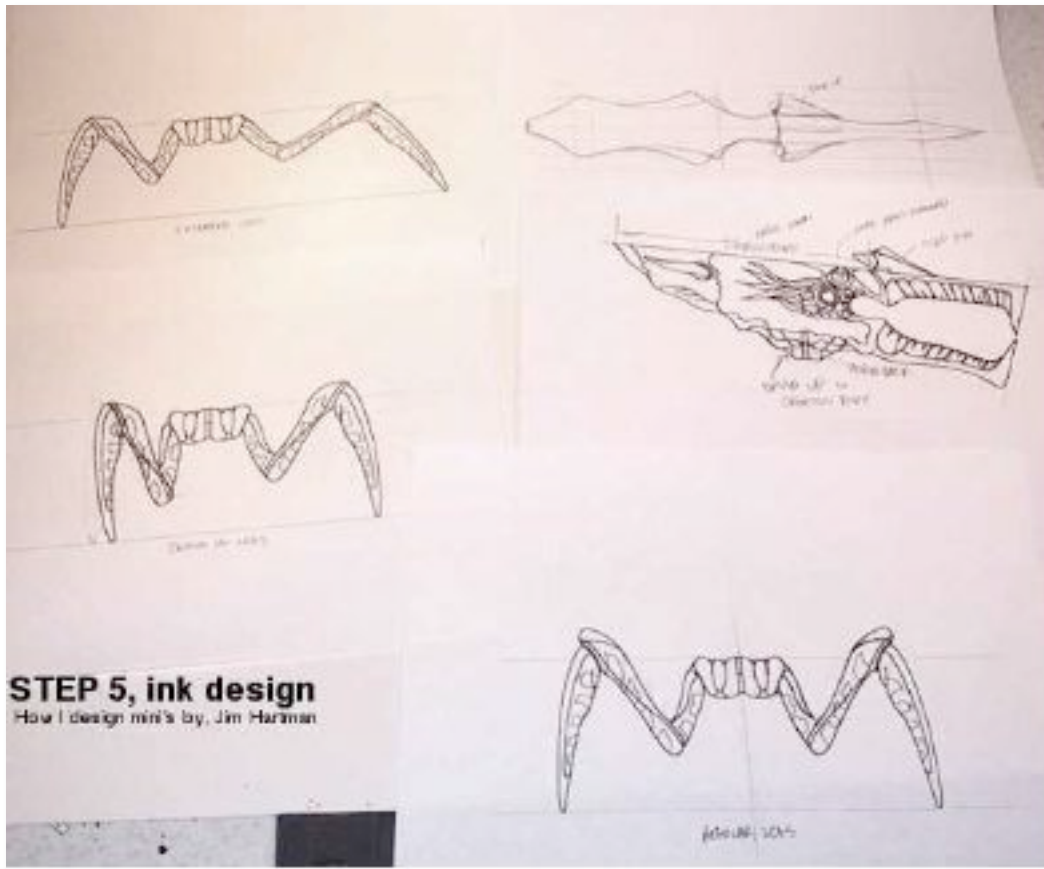
Step 5: Inking the design

Now that I have my clean pencil drawings, I'll go over them with my ink pens. Once the design has been inked, I'll use a large erasure and erase all the pencil marks. I have produced many different designs, especially for the legs since I was unhappy with the way these turned out.

From these finished ink drawings, I went about picking and choosing which details I liked and which I wanted to get rid of. So, with my notes covering each of the inked drawing I need to produce more traced pencil art revisions...

STEP 6, revisions
How I design mini's, by Jim Hartman
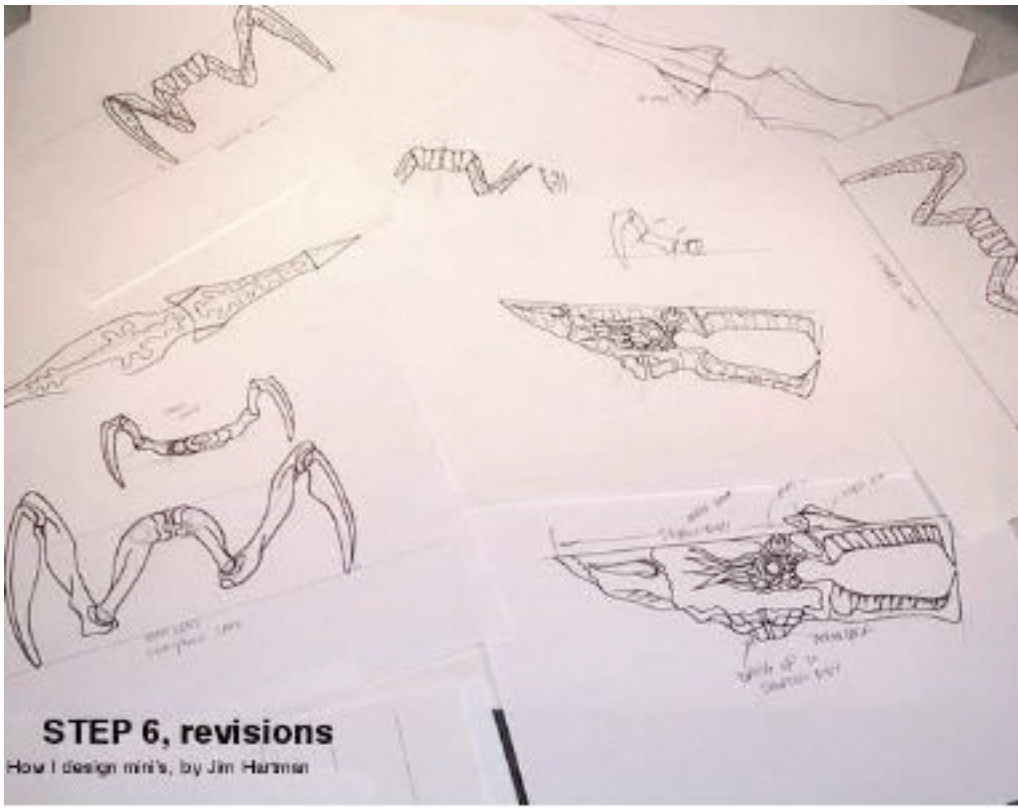
Step 6: Revisions

It took me several design changes and revisions before I was happy with the design. As you can see in the picture above, I ended up making quite a few designs. I would compare my designs with the reference materials to make sure I had the details the way I wanted.
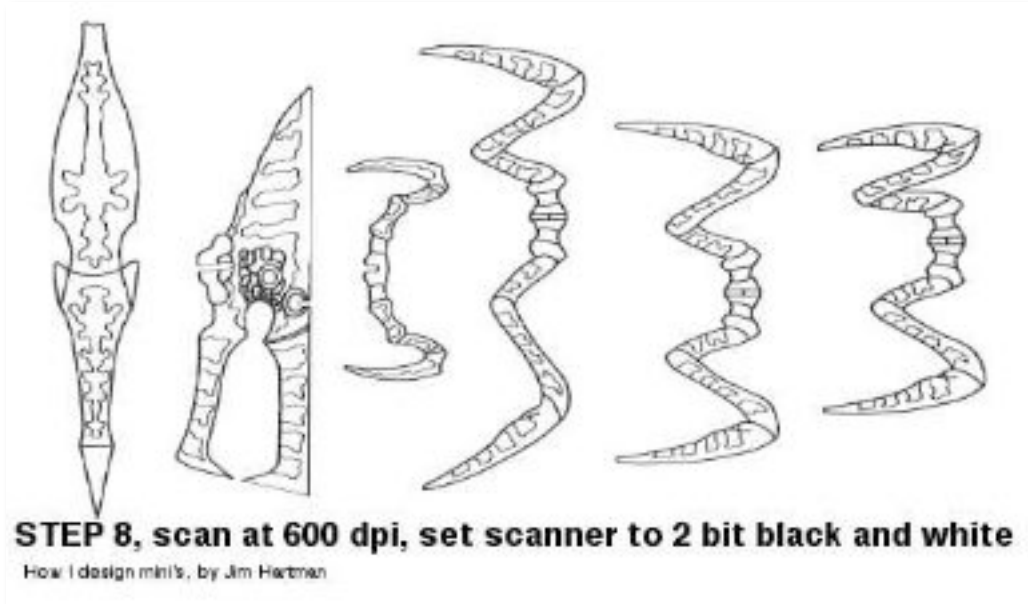
Once I finally settled on a finished design, I was ready to make final ink art of the design on marker paper...

STEP 7, final art, inked on marker paper
How I design mini's, by Jim Hartman
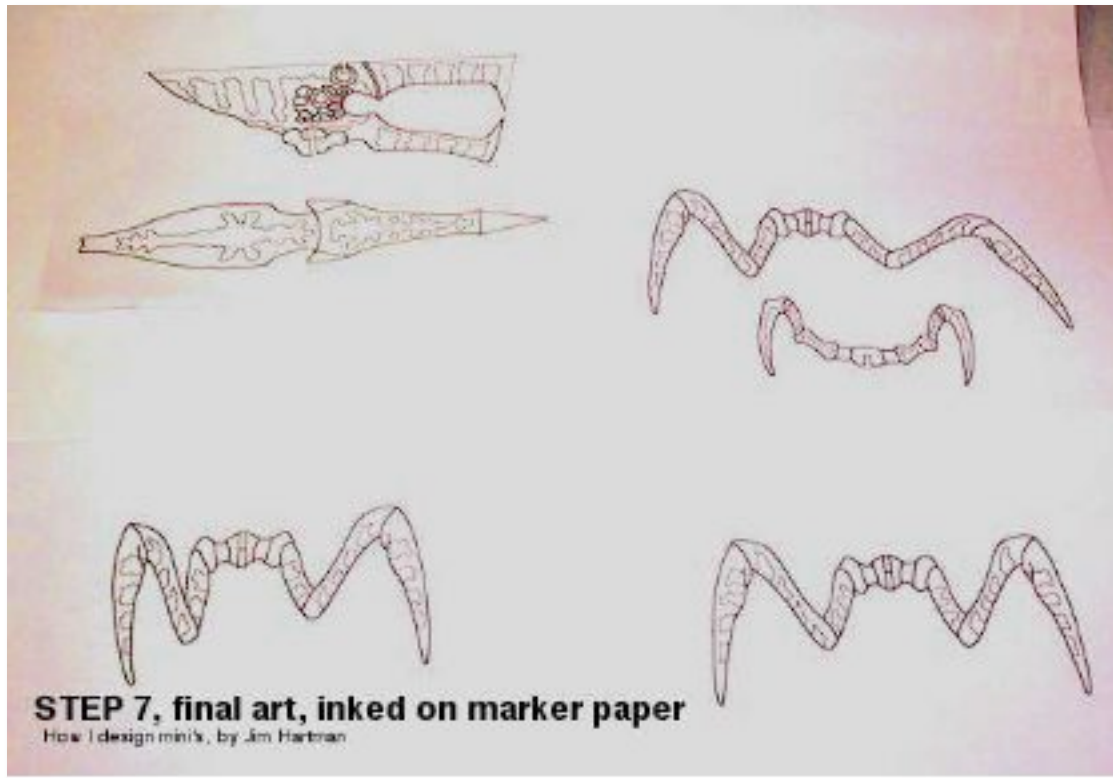
Step 7: Final Art, on Marker Paper

When I finish the art on marker paper, I pay careful attention to the size of marker I'm using and also make sure all the lines are crisp and dark. I will be using these inked designs for scanning, so I also make sure to close all the lines and shapes, this will make it easier when I check it in the photo editing program.

Once all the designs have been transferred to marker paper, I'm ready to scan them...

STEP 8, scan at 600 dpi, set scanner to 2 bit black and white

How I design mini's, by Jim Hartman

Step 8: Scanning and Editing

I scan all my finished designs at 100%, 600 dpi, 2 bit black and white. This will give me very clean and easy to edit images. I work on one piece of the miniature at a time. I open each image in my photo editor and use the eraser and pen tools to clean up any rough edges and to fill in any short lines.

Once the image is cleaned up, I save it as a TIFF file, this format will retain the images original size when I import it into my drawing program. I go over every line on all the pieces to make sure they are as clean as possible. Once done they are ready to be imported into my drawing program...

STEP 9, convert to vector graphics.

How I design mini's, by Jim Hartman
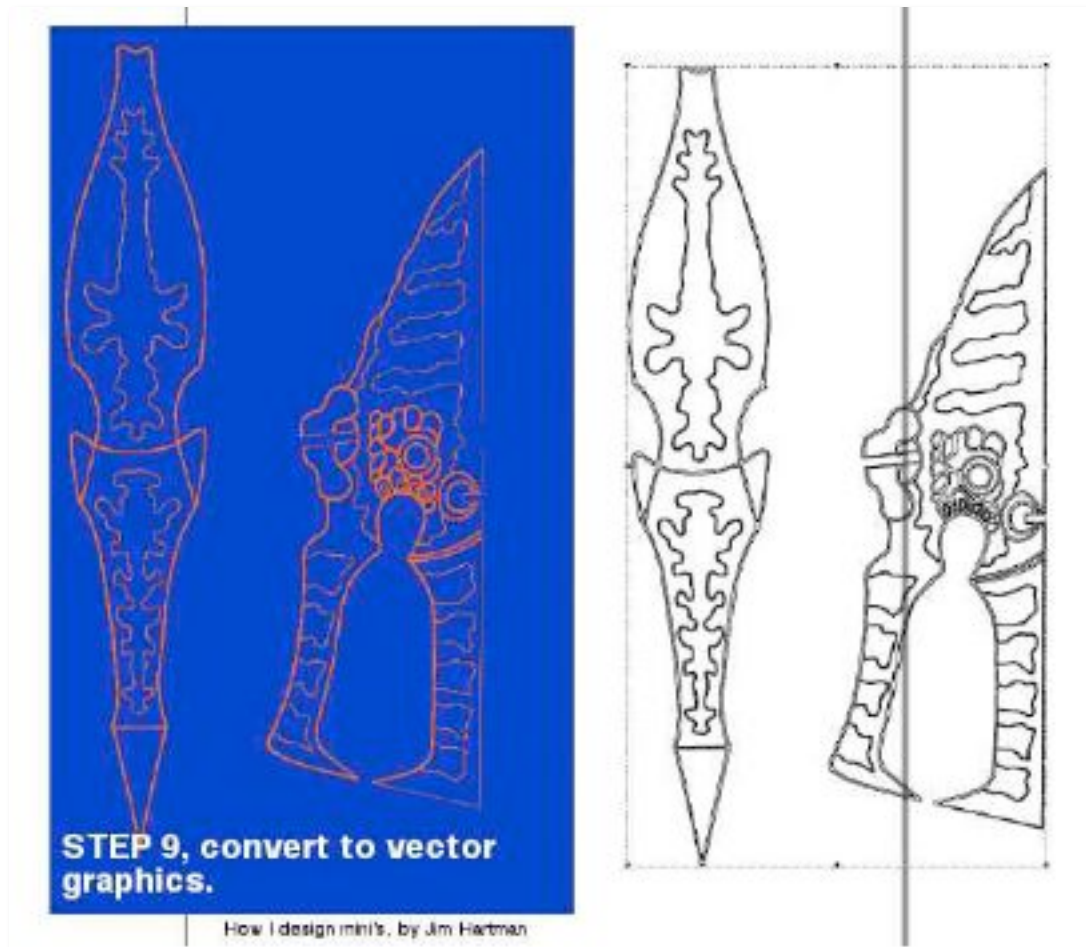
Step 9: Convert to Vector Art

As I mentioned before I use a drawing program called Canvas 7. This is a very versatile program with drawing, photo editing, and page layout all in one, I use it mostly for drawing. In the drawing program, I will open each of the images of the scans and convert them to vector art, editable curves.

This will allow me to easily add color and outlining and special effects to the design and always be editable, and scalable. An added benefit of doing it this way is that if I'm designing a lot of one type of troop type, once I set the colors for the first one it's as simple as copying those colors to the other designs.

Now that I have everything in vector format, I will scale everything down to actual size and print it out...
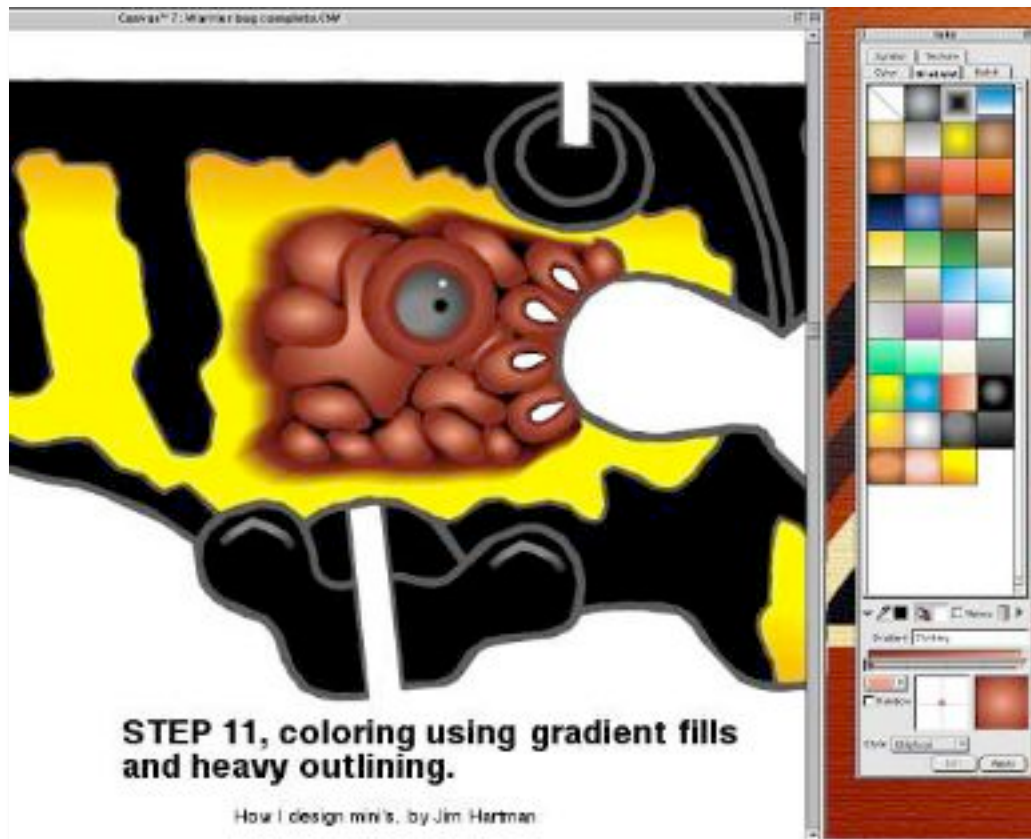
STEP 10.print and test build final design before coloring.
How I design mini's, by Jim Hartman

Step 10: Test-Build of the Miniature

With my finished vector art printed out, I'll cut out the parts and make sure everything scaled right and the parts all fit together. I was lucky and all the parts were right, and the overall look was better than I expected.

Now is the time to take a quick shot of and post it to the groups as a teaser for your finished miniature.

Now that everything has tested out good, I'm ready to go back to the drawing program and add some coloring...
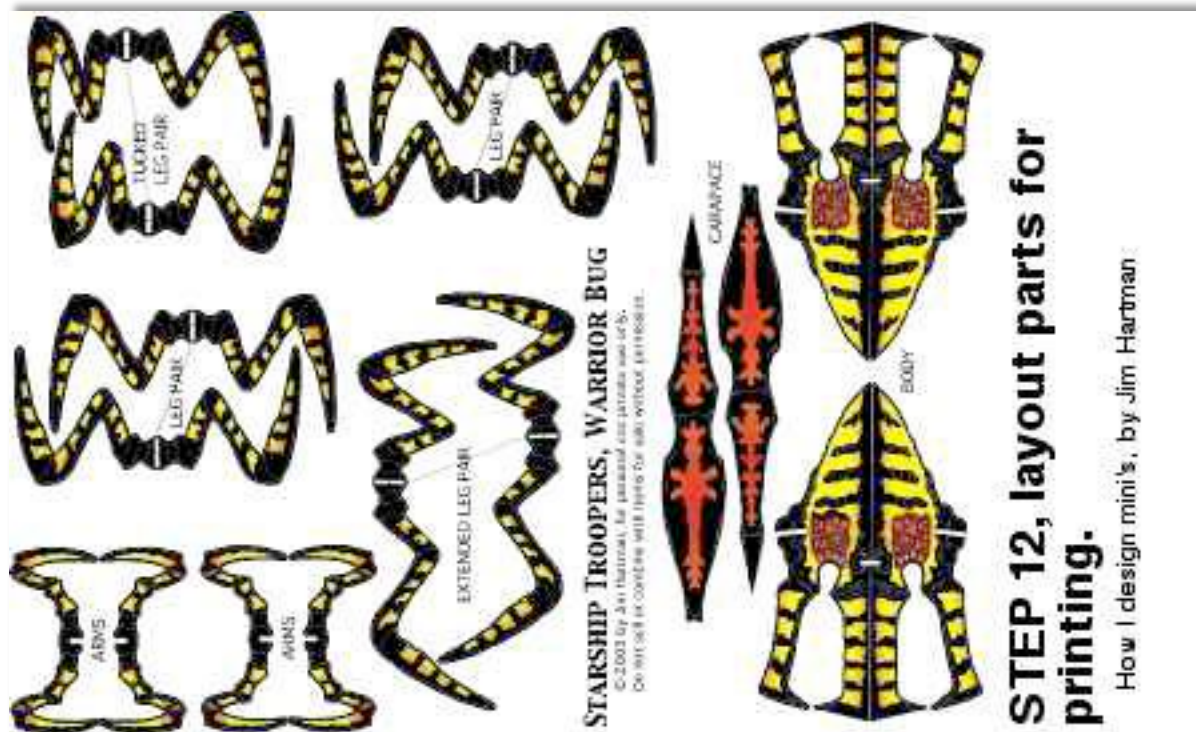
STEP 11, coloring using gradient fills
and heavy outlining.

How I design mini's, by Jim Hartman

Step 11: Coloring, Outlining, and Special Effects

Once again using my reference art, I'll go about filling the mini with color. I love using gradients with outlines, this gives it a nice 3D look and colorful. I'll add special effects like highlights and multiple gradients, as seen in the eye of the picture above. I will use whatever layering and outlining, and whatever else to get the ideal look. Every so often, I'll print up a quick copy to see how it looks printed, to make sure the colors aren't too dark or too gaudy.

I would like to point out that I work in process color mode, meaning that I work in the four colors that printers produce so that my designs come out of the printer as close as possible to the screen image.

I'll work on one part at a time, if I need to check for color continuity then I will open a copy of a completed item for comparison, but I will always delete it and save each part individually.

Once all the parts are colored, I'm ready to layout a printable page for the PDF…

STARSHIP TROOPERS, WARRIOR BUG

STEP 12, layout parts for printing.

How I design mini's, by Jim Hartman

Step 12: Parts Layout and Final Printout

When I layout a final design I try to fill up the space as much as possible, I try to fit as many copies as reasonable. I was able to fit enough parts to make two bugs. I had also created three unique leg sets and just put a copy of the standard legs to make enough for the two bugs.

Once the parts are all laid out, I'll print out a copy onto high quality photo paper for the final build of the miniature. I design my miniatures to be printed on heavy photo paper or 110 lb./200g card stock...

STEP 13, final build
How I design mini's, by Jim Hartman
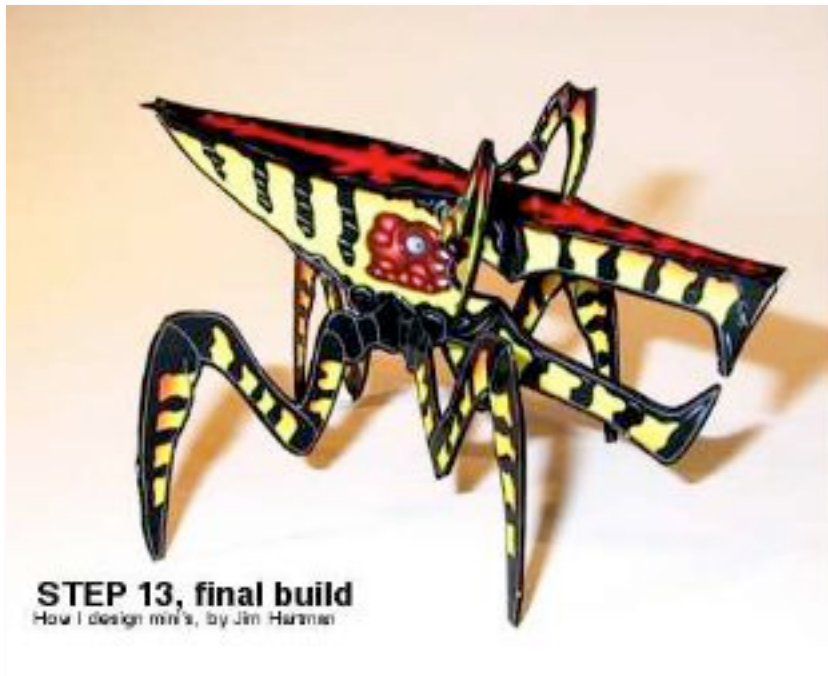
Step 13: Final Build

When I build the final version of the miniature, I check again to make sure all the parts fit the way they were designed to. I take special care to note any trouble spots that need to be clarified for the instructions.

I do a good job of assembling and finishing the miniature. I make the extra effort to cover up the white edges of the paper with black paint and do a final touchup when it is all assembled.

For assembly, I use mostly thick super glue because I hate to wait for glue to dry. Now that the final bug is put together, I can take a nice picture of it and again post it to the groups for all to enjoy.

Now armed with my construction notes I begin the work on the instructions...

STEP 14, design assembly instruction art.
How I design mini's, by Jim Hartman
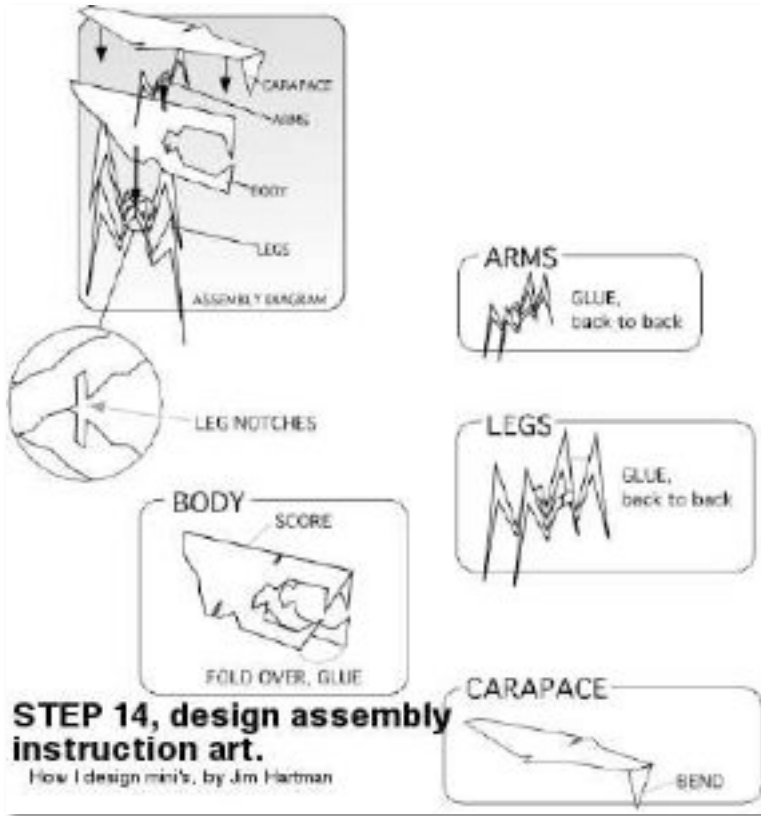
Step 14: Instruction Art and text

It should be noted, that on a fairly complicated miniature, that it takes as long to make the instructions as it does to make the miniature design in the first place. I've kept my instruction art simple, because I simply did not want to spend all the time necessary to make it look good.

That aside, I'm happy with the way the instructions shaped up. It even forced me to learn how to use the drawing programs features. I drew up art for each major assembly and matching text to explain the steps.

All I had to do now was to finish the instructions and I was done, whew!...
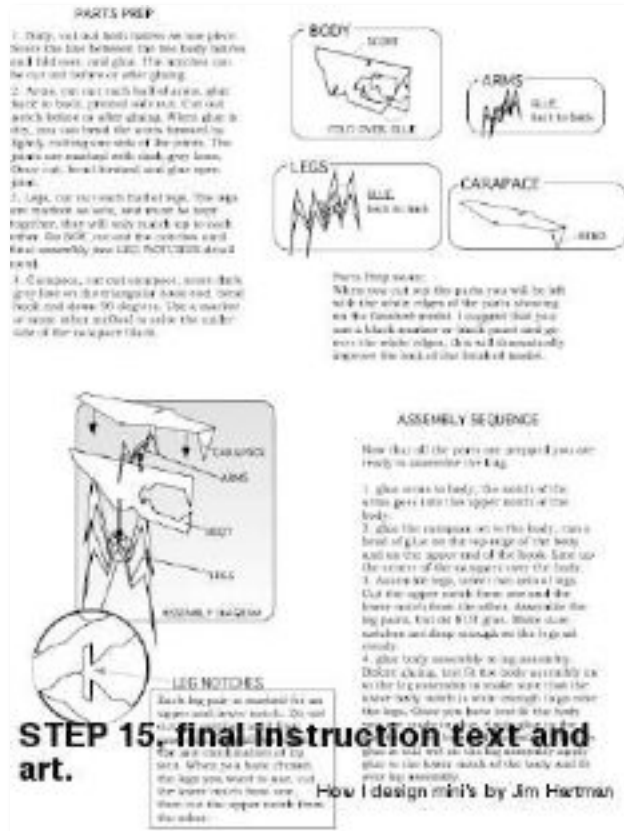
Step 15: Final Instructions and Convert files to PDF

Finally, everything is done. I opened the bug art files and saved a copy as 100% 150 dpi TIFF image. Then, I opened these files with Acrobat and saved them as separate PDF's.

The only thing left is to upload them or put them in a folder and compress the folder for uploading. I just decided to upload the files, I'm not that experienced at working with compressed files and wanted to be sure there would be no loss of quality.

I'm pretty happy with the way it turned out. I keep learning new techniques and shortcuts every time I design something.

Hopefully I've given you some ideas for designing your own miniatures.

Thanks for reading my article.

Jim Hartman
June 22nd, 2003