Resin Casting for the Hobbyist

The following is the process that I use for casting parts. If you don't agree with the process that I use, feel free to do it however it works best for you.

Casting is a four part process. Making the master, making the mold box, making the mold, and casting the item. It is not my intent to explain how to make a master or pattern to be used for duplication in the casting process.

Mold Box

A mold box is the best way I have found to make molds. The master or pattern is glued or otherwise attached to a flat portable surface such as a piece of Plexiglass. Walls are then built around the master approx. 3/8 inch away from the closest part of the master on each side. The height of the walls should be approx 3/8 inch above the highest part of the master. (These figures are for a small part. Larger parts require more space.) The mold box should not leak because it is going to hold liquid RTV that will leak and seep out of cracks. The mold box should be firm when completed. That is it should not flex in any direction. If it does, use thicker materials next time.
**** I use 1/4 inch Plexiglass for the bottom, and Lego blocks to build temporary mold boxes with. There is a slight seepage of RTV, but not enough to worry about, unless your Legos come apart. I weight the mold box so it won't do this.

Molds

Molds are generally made from RTV, which is available from different sources such as Alumilite, Smooth-On, Micro Mark, and others. Follow the directions when mixing.
Once the RTV is mixed, I degas it to remove the air that was incorporated in the RTV during the mixing process. De-gassing is done by a vacuum process where you put the RTV in a vacuum chamber and bring the vacuum up (or down) to approx. 29hg. The mixture will rise to two or three times its original volume, then collapse. At this point, I reduce the vacuum to 25hg. and leave it for 15 minutes to complete the process. Reduce the vacuum to the normal air pressure, remove the RTV and pour it into the mold box slowly from one end. As soon as it cures, you may remove the RTV and now you have a mold.
**** I use a vacuum pump from Alumilite and a Desicator as my vacuum chamber (from Krackeler Scientific).

Casting

Most items are cast with some type of two part resin. One to one part mixes are best. Resin is available from Alumilite, Smooth-On, Micro Mark, and others. A mold release may be used but is not required all of the time. Mix the resin according to the directions and them pour into the mold.
**** To mix my resin, I put part A into one cup, and part B into another cup. Then add Part A to part B and stir. If the resin is thick, I then pour the mix from the part B cup into a clean cup and mix some more, then pour into the mold.
To eliminate bubbles, you can now place the mold into a pressure pot and pressurize it to 40 - 60 psi. Once the resin is cured, you may de-pressurize the pot and remove the part from the mold.
**** I use a Paint Pot as my pressure chamber and a standard shop 6 gal. air compressor. I had to

remove the paint pipe from inside the paint pot and plug the hole.

Other Stuff

When casting, make sure you are working on a flat surface. Do not lay the mold on anything that may cause it to distort, or you will get distorted castings.
**** I use cookie sheets as my flat surface work areas. They will contain resin and RTV spills and can be replaced or cleaned up. When my castings first come out of the molds, I lay them on the cookie sheets also, until they are fully cured so they won't warp.

To make the back of your castings flat, you can "flat-plate" them. That is, applying a flat plate such as a piece of Plexiglass on the mold after you pour the resin in the mold. If you then apply a weight to them, the flashing will be thinner and your parts will be closer to the original. Apply the flat-plate as if you were rolling it on from one end of the mold. Do not be skimpy with pouring the resin in a mold you are going to flat-plate or you will make a large air pocket in the casting.
**** I use Smooth-on's universal mold release on my flat-plates so they won't stick to the resin part.

If you do not vacuum the RTV, the mold will contain small air bubbles that will show up on your castings as small marbles. If you don't pressurize the casting as it cures, you may have bubbles in it.

If resin is allowed to absorb moisture, it will produce air bubbles in the casing as it cures, if not under pressure.
**** I buy my resin in two gallon kits and then pour it into poly bottles as I get ready to use it. I use Smooth-On's "Extend-it" to put a dry gas blanket on the resin while it is still in the gallon containers, once they have been opened. I also use plastic mixing cups and a metal art spatula to keep from introducing moisture into the resin as it is mixed.

The closer the correct mixing ratios are, the better your castings and molds will be.
**** I use a gram scale for measuring my RTV. I mark my plastic mixing cups using a Sharpie to get the volume of resin (parts A & B) right.

WARNING

Do not try and make your own vacuum chamber or pressure pot. They are dangerous items and can explode causing you serious harm. Alumilite sells a simple vacuum chamber also. Paint pots can be used as pressure chambers. Get a good one from Sears or other paint supplier and do not exceed the recommended maximum pressure. Stay away from cheap pressure pots offered by Harbor Freight Company. People on the Casting Group at Yahoo have been having trouble with them.