

Notice the shape of the magazine that is made by following the scribe lines of template #2. I suggest studying the opening of an actual Mauser receiver before you begin milling

After I have opened up the cartridge feed lips with the 1/4 inch ball mill, I level the receiver in the vise, using a level placed on the receiver flat.



I switch to a 3/16 inch ball end mill, and finish cutting the radius, and the height of the magazine lips. Remember to adjust the vise base to the proper angle.



After I have finished putting the final cut on the magazine lips, I take advantage of having the receiver setting flat in the vise and cut the rear hold down lug.

Using the measurement from drawing #1, I mark the hole for the hold down lug. I form the rear hold down lug, and mill the receiver tang flat with a 1 ¼ inch pilot less counter bore.

You must center the counter bore before milling or you will form an off set lug. The 1 ¼ counter bore is a big tool go slow, I use a speed of around 200 RPMs. Use plenty of cutting oil.



The 1 ¼ inch counter bore is a load for a Mill/Drill, you must go slow and use plenty of cutting oil.

When I first started milling the hold down lug I found that it was real easy to start off center. To correct the problem I made a pointed arbor that fit into the hole of the counter bore, that allowed me to align the cutter. Once aligned I then removed the arbor before I began milling

I also drill and tap for the hold down bolts front and rear. Since I am building for myself I use ¼ inch 28 thread socket head cap screws, 7/8 inch long for the front and 1 ½ inch long for the rear. 4140 pre-hard is hard, I use a good USA made HSS tap, and plenty of cutting oil, and I go slow and easy.

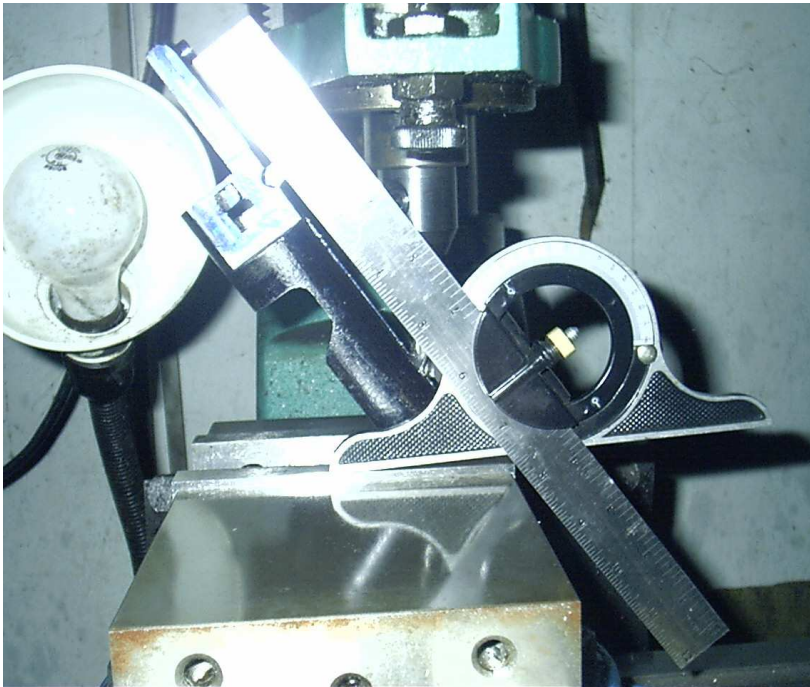
If I were tapping an old Mauser receive I would use a carbon tap, but since this is pre-hard I use the best tap I can find.

No magazine well opening is complete until the cartridge feed ramp is added, that's up next.

The Mauser cartridge feed ramp appears to be made up of many different profiles and therefore very difficult to copy, fortunately that's not true. I start by making sure the vise is set parallel to the cutter.

I then place the receiver in the vise front ring down with the magazine well opening facing the cutter. Using a combination square I set the angle of the receiver bottom to an angle of 55 degrees.

I install an extra long 7/16 inch center cutting end mill in the mill.



The flat bottom area of the receiver must face toward the spindle and set square to the spindles plane. The combination square base sets flat when setting the receiver to angle. When I was taking the picture it kept falling off the vise that is why the base shows a slight tilt.



This shows the end mill at full depth in the feed ramp.

The ramp is cut using the longitudinal feed screw of the mill.

Once to full depth, the bell bottom shape is then cut using the cross feed screw.

You must get the receiver tilt at an angle of 55 degrees.



The end mill must be centered. Do not make a plunge cut, plunge cuts leave grooves that interfere with feeding. Side mill only, use plenty of oil. GO SLOW!

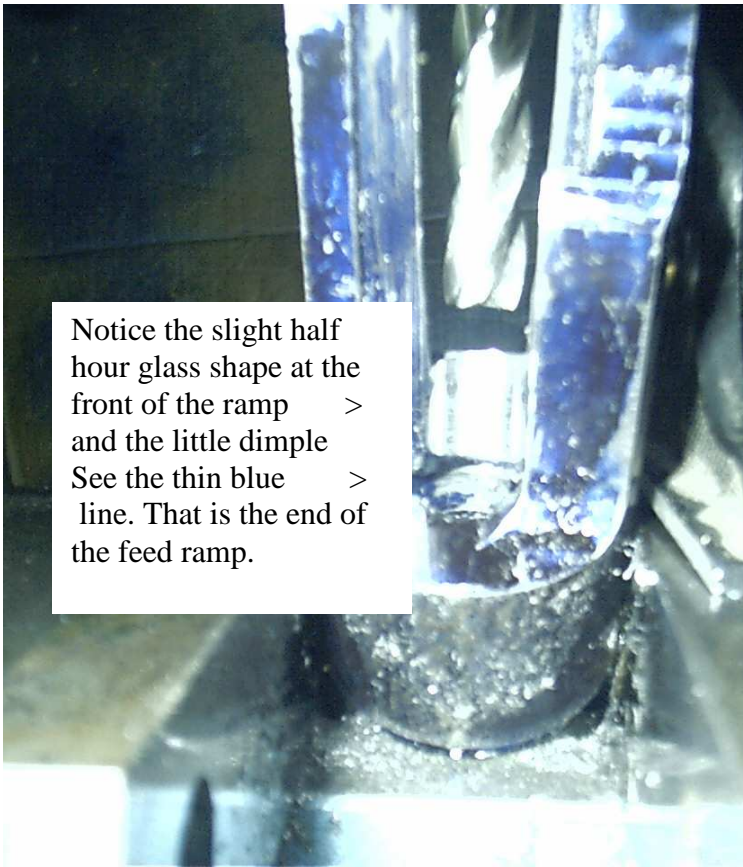
I then center the end mill in the magazine opening, and lower the end mill past the corresponding locking lug; I do not make a plunge cut.

I then SLOWLY begin making a side milling cut into the receiver, using lots of oil. Now make absolutely certain that the receiver is mounted securely in the vise, before you start or you will have a disaster.

I stop cutting just about .030 inches before I cut into the very top of the lower locking lug. The top of the lower receiver lug does not have a groove cut into it, so do not over cut. I suggest that you look at a Mauser cartridge feed ramp before you make the cut on your receiver's ramp.

Once you have made the side mill cut, I leave the mill running, and set the cross feed screw dial indicator to "0", I lock the table longitudinal leaf screws, making sure I have a ridged set-up.

I then screw the cross feed screw inward .070 inches, I return to "0" and, feed outward .070 inches. This creates the half hour glass shape that's the inside of the receiver profile, and also creates the bell bottom shape on the bottom of the feed ramp.



Notice the slight half hour glass shape at the front of the ramp >
and the little dimple >
See the thin blue >
line. That is the end of the feed ramp.



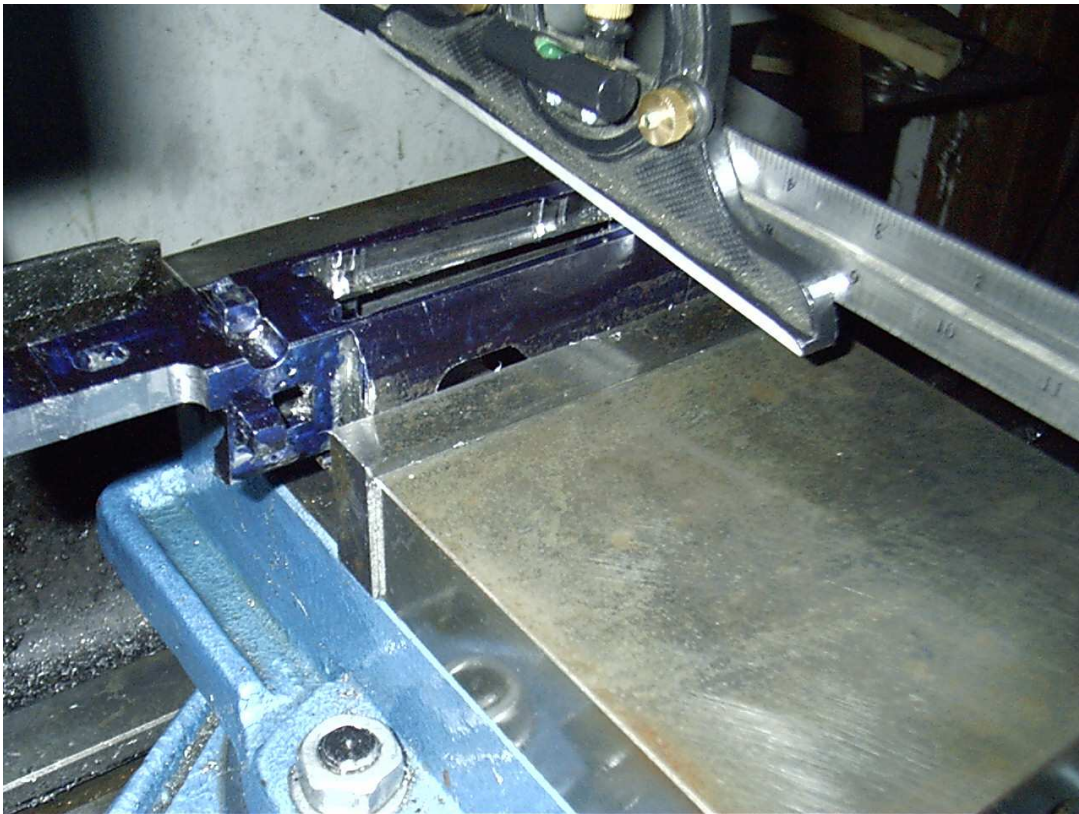
This is the shape of the cartridge feed ramp. It is made by feeding the cross feed screw forward and backwards .070 inches from a center position.

All cutting is made as side milling.

The bell bottom shape can only be cut after the feed ramp cut has been made to maximum depth.

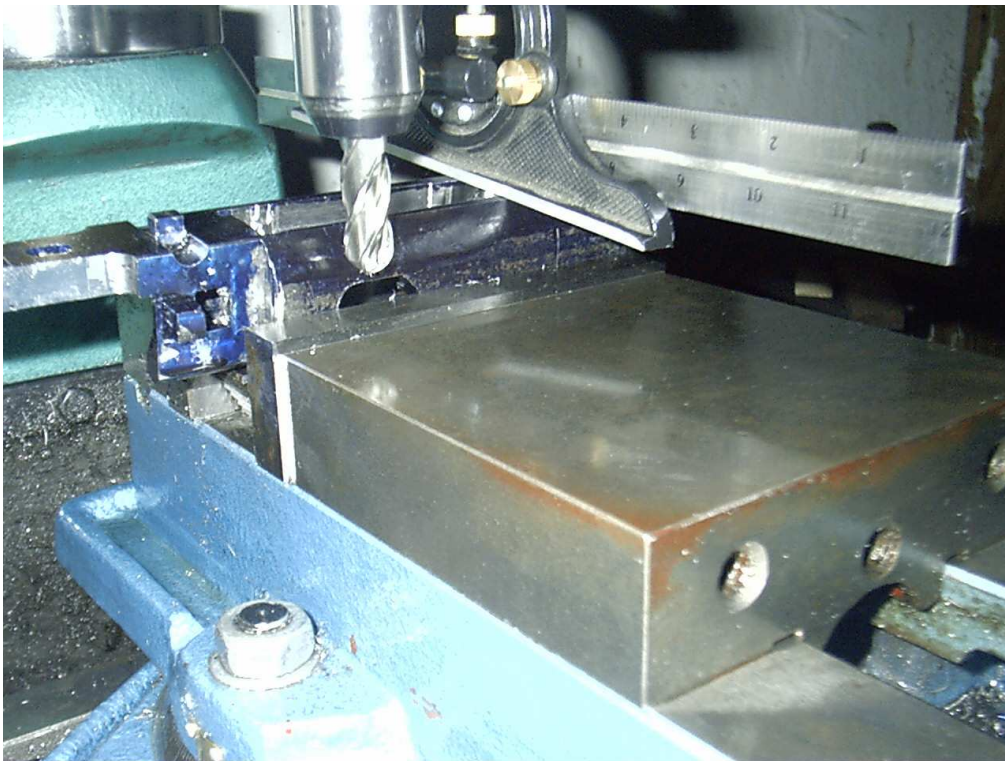
Milling the receiver to Profile

I place the receiver bottom up in a milling vise that has already had the jaws set parallel to the cutter. I place a combination square set to an angle of 5 degrees on the bottom (flat) of the receiver, and tilt the receiver to that angle, and then secure.



I install a ½ inch cobalt or carbide Ball end mill in the mill, and then lower the end mill to the receiver side, stopping the bottom of the end mill about .050 inches above the thumb slot.

I have found that conventional milling works best for these types of cuts. Conventional milling also gives a smoother cut; I found it's also easier on the end mill.



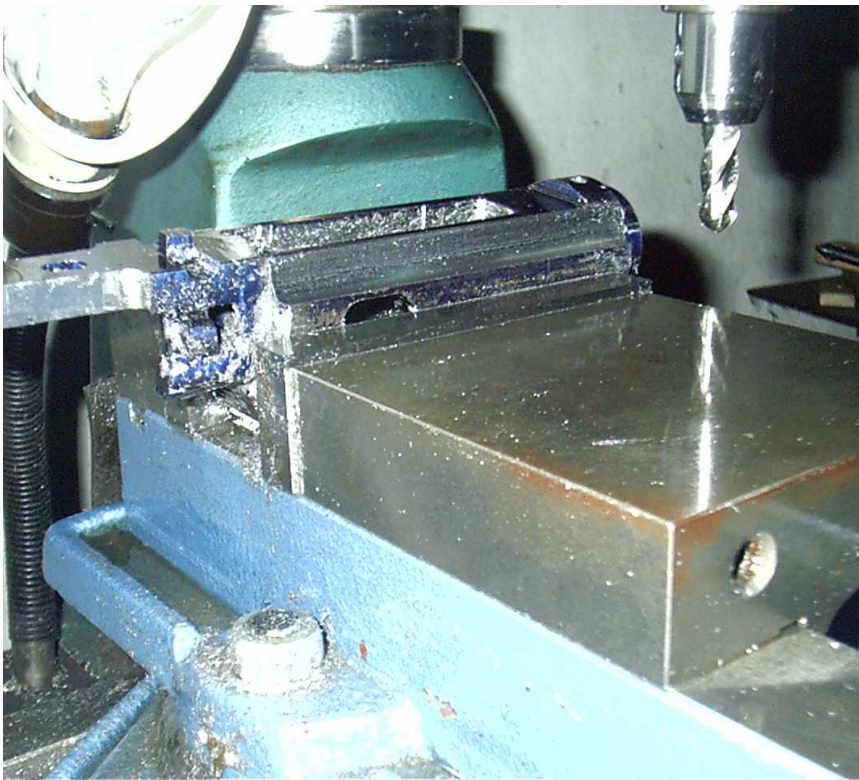
Cut slowly and use plenty of oil. I continue milling until the cut becomes equal the diameter of the front ring. The last few cuts are removing a lot of metal, but don't cut into the front nose of the front ring. Try to make it so your last cut is flush with the nose cut.

If you remember I did leave a few thousandths of extra metal at the nose, but that's for spit and polish not screw-up so be careful.

Some may wonder why I mill a thumb slot, I like using it as a guide to mill the left lower side profile, just another reason I mill the slot.

If you haven't noticed by now there is purpose to my madness of milling certain cuts at certain times in the build process. Indexing off of those features like the rear tang, bottom flat of the receiver or nose of the front ring, this gives uniformity to the build.

Every receiver that I have ever made at first glance mirrors each other, yes there are subtle differences, but they're cosmetic and not functional.



This is how the left lower profile should appear after you have finished the cut. It's very faint in the picture but there is little bright line at the very nose of the front ring, that's the blue layout dye that was removed by the cutter. That how close you need to mill, until you just barely kiss it.

After I finish the left lower profile I then reset the receiver in the vise for the right lower profile cut. I set the receiver at an angle of 5 degrees and secure.

Since I don't have a thumb slot to use as a guide I set the height of the end mill using the right lower raceway. I lower the end .040 inches from the side rail that sets just above the right raceway.

If you over cut the slight raised lip on the top of the raceway, then set the end mill, to where the bottom of the end mill is equal to the top of the bottom of the right raceway.

I have placed forming the rear tang after milling the lower receiver profile. When I milled the rear tang on my receiver I milled it before the lower profile. However you want to do your receiver is up to you. If you follow the steps as laid out in the book you won't have to reset the vise, or even the receiver.

When I milled out my tang I used a template, some how, or another the thing has gotten up and walked out, because I cant find it, but since the rear tang is simple I will just give you dimensions.

The end of the tang measures .560 inches wide just behind the arc on the end of the tang. Then measuring from the end of the tang toward the receiver body 1.940 inches the tang measures .715 inches wide. The receiver tang then arches on both sides stopping at the body of the receiver.

If you have a large ring Mauser receiver, I suggest you make your own template. I do suggest that after you layout the measurements on the rear tang, you rotate the base of the vise so that you can make your cuts straight.

