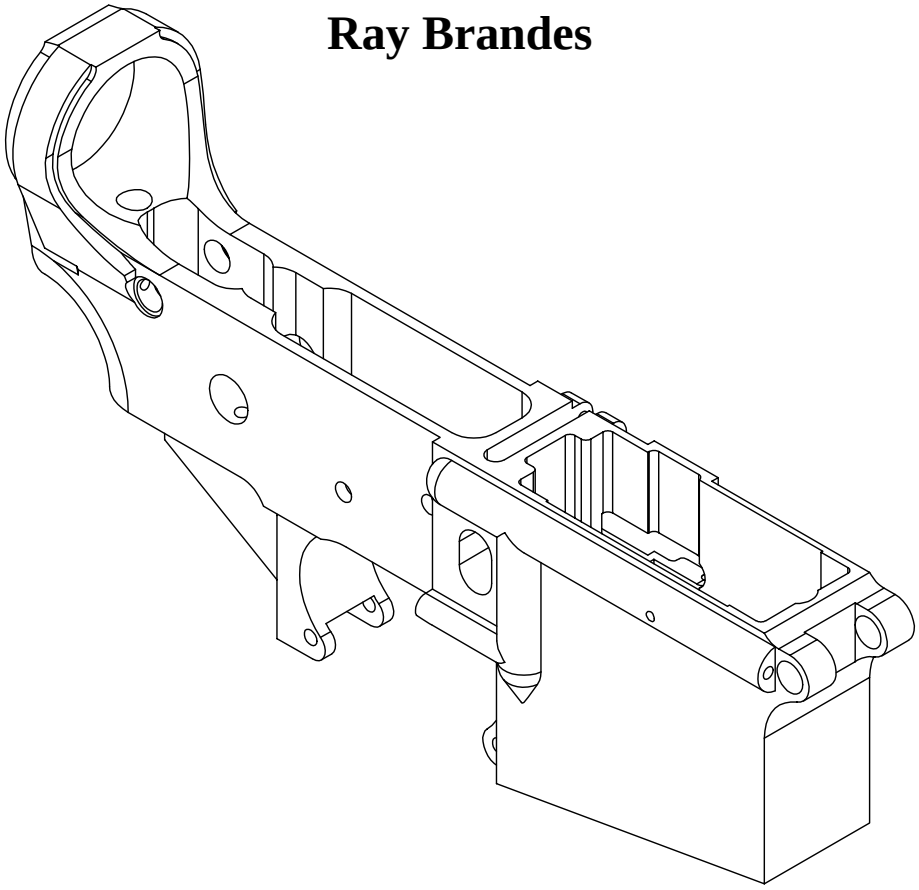
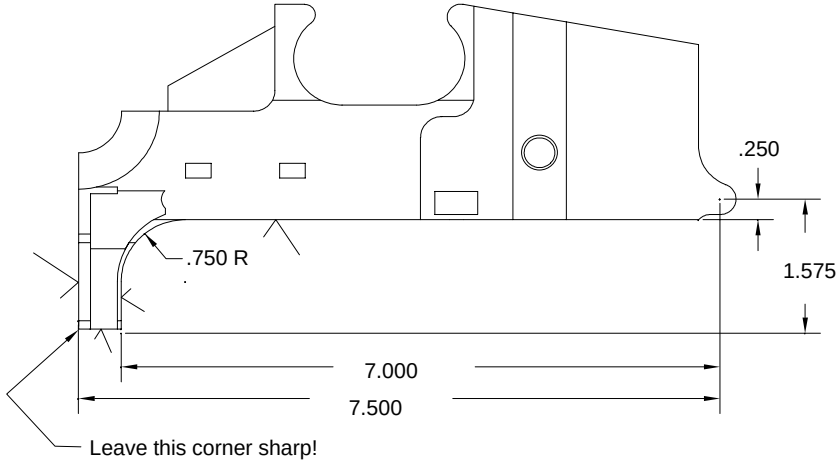
Machining the AR15 Lower Receiver Forging

by

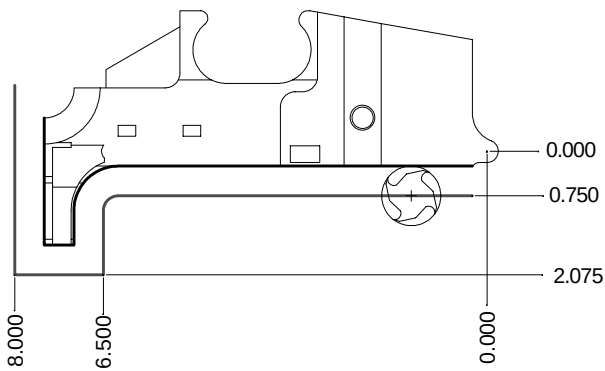
Ray Brandes





Above are the five surfaces to finish in the first set-up or hold. I use a 1” endmill because it makes for easy math. For the 3/4” radius I x-y it with the 1” endmill in 18 steps (5 degrees each) and it comes out very smooth.

Nothing more needs be said for experienced machinests. However, I will add somethings for the benifit of the beginners. Since you will be working close to the table, set your spindle stop to keep the cutter from hitting the table. Don’t try to take off all the metal in one cut. Take rough cuts and leave about .010 for the final cut. A light final cut will deflect the cutter less and give you a better finish. When you think you are finished cutting, clean all the chips away and take a look at your work.

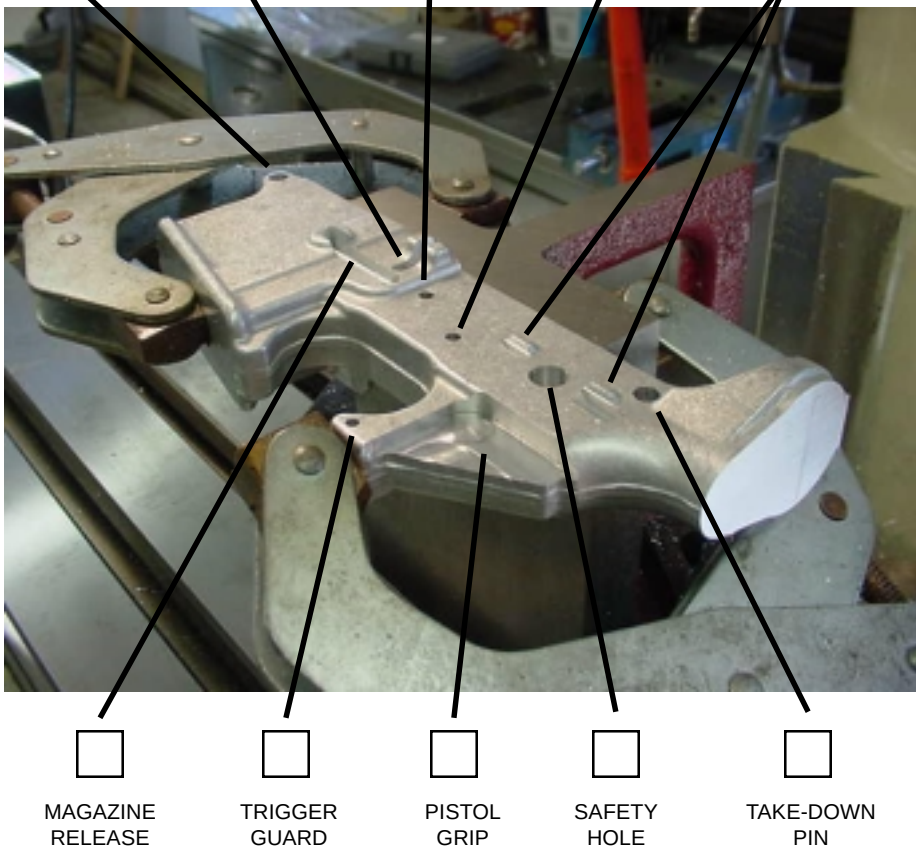


X	Y
-6.250	-0.750
-6.270	-0.750
-6.291	-0.753
-6.311	-0.757
-6.331	-0.763
-6.350	-0.771
-6.368	-0.780
-6.386	-0.790
-6.403	-0.802
-6.419	-0.816
-6.433	-0.830
-6.447	-0.846
-6.459	-0.863
-6.469	-0.881
-6.478	-0.899
-6.486	-0.918
-6.492	-0.938
-6.496	-0.958
-6.499	-0.979
-6.500	-1.000

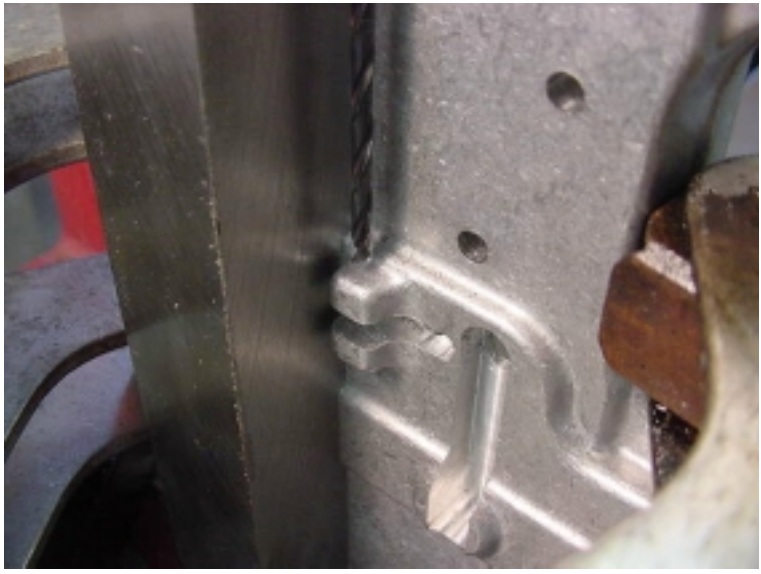
Above is the tool path for a 1” dia cutter. On the right is the table of the 18 steps around the 3/4” radius. The first and last coordinates are the ends of the straight tool paths.

Check List

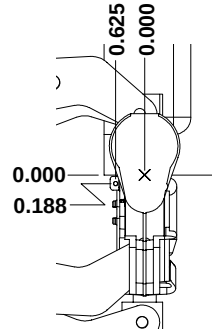
Before breaking the setup, double check that all the opperations for this setup have been completed.

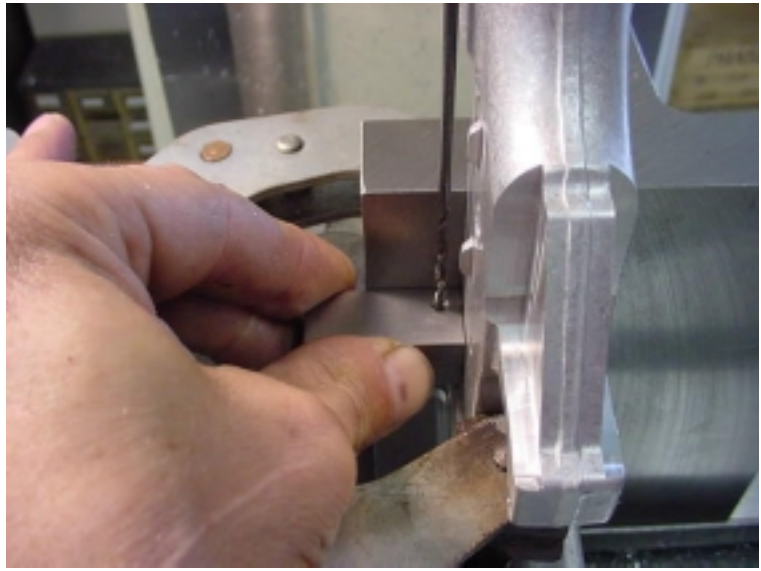


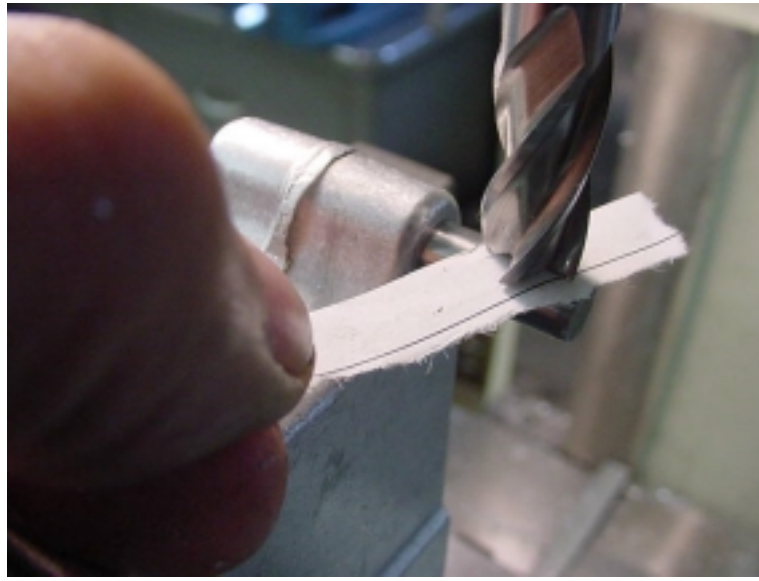
A good habit to get into is this. When you think you are finished, clean off the machine of chips and tools etc. instead of rushing to remove your work-piece. This gives you some time to think about it. Nothing is as frustrating as having to re-setup something because you missed a hole.



Locate the spindle at 0.625-.188 and chuck that long 3/32 drill. Here is where you will use that little block I told you to make in chapter one. Hold the block tightly against the angle plate and the forging. The drill should line up exactly with the hole in the block. Holding the block tightly, drill the hole through the lug on the forging. Drilling this hole any other way will drive you nuts!



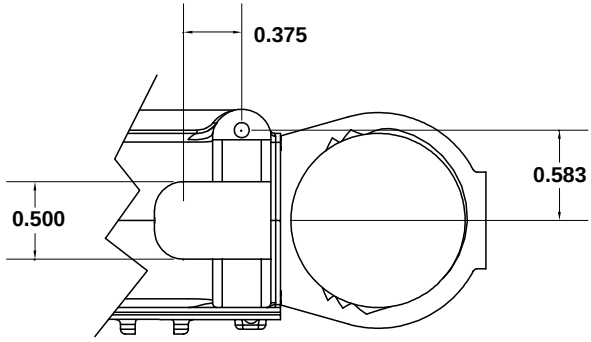




For the slot where the upper and lower meet, chuck a 3/8” end mill. Put a pin in the take-down hole and touch off on the top of the pin. From here you will go down 0.385” to the finished surface.

Mill down along the center-line 3/8” past the pin hole until you are within 0.010” of the finished depth. Then widen the slot equally on both sides to 0.500 +.004 -.000.

To check if you are deep enough, put the pivot pin in the hole and see that a 1/8” dowl pin fits freely between the pivot-pin and the receiver. An even better check is to see if your upper fits.



Chapter 9
The Magazine Well

This chapter deals exclusively with the magazine well. I have done some very minor re-design of the profile here to make it easier to machine in the home shop. This profile works just fine and saves time and heartburn as well! Don't let cutting the mag well freighten you, it is easier than you think! The process is only five steps:

One: Drill 1/8" diameter holes in all the corners. These will create the corner fillets.

Two: Then we will drill rough holes to remove most of the stock that is coming out.

Three: Rough out with a 3/4" end mill.

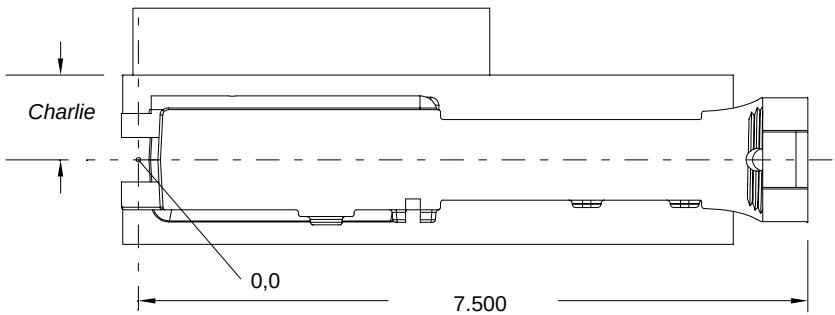
Four: Finish with a 3/8" end mill.

Five: Clean out the corners.

If you plan to stoke out the corners out using a special tool than you will not drill the 1/8" holes, but spot face with a 1/8" endmill instead.

Workholding: Use both clamp plates and clamp the passenger side against the angle plate and indicate the deck true.

Location: Pick-up the butt face, move 7.500" and set your X axis zero directly above the pivot pin hole. The Y axis zero is the forging centerline. Pick up the angle plate surface and move out distance *Charley.* This will be Y zero.



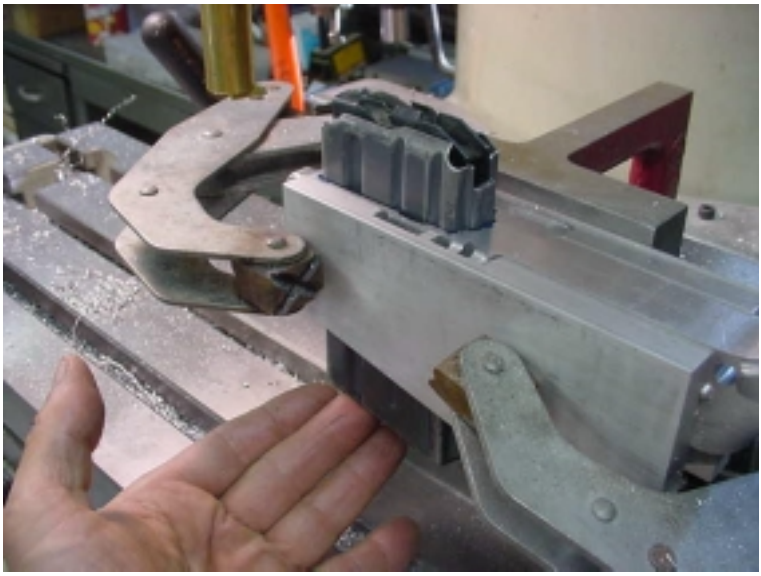
While stroking the quill up and down, move the tool towards the corner with the table locked at Y zero. Once you see the tool is taking a chip you only want to advance the table when the tool is up and out, and then advance no more than 0.005” per stroke. Keep going until you reach X 0.017.

Now move to the area where you set X zero and locking the table at X zero, repeat the operation while moving along the Y axis until you reach Y 0.017.

One last little stroke at X 0.005, Y0.005 and you are finished with that corner. The opposite front corner is cleaned out in the same fashion after re-positioning the tool.

For the four corners at the other end, you will only be able to get a zero for one axis. Move out from that zero 0.017” and then procede towards the corner along the zeroed axis. Stop when you just cut tangent in the 1/8” spot face and set this point zero for the other axis. Then complete the corner as you did with the first two.

Finally, for the two corners near the magazine catch, just do these by eye using the 1/8” spotface as a guide.

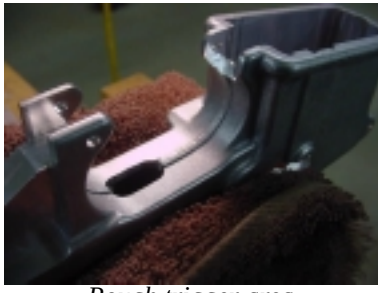


Check your magazines for fit. They should be slightly loose. If they won’t fall free then things are too tight somewhere. Look for the tight spot and see if you have a bent mag before cutting any more on your lower forging.

Chapter 12
Finishing Up

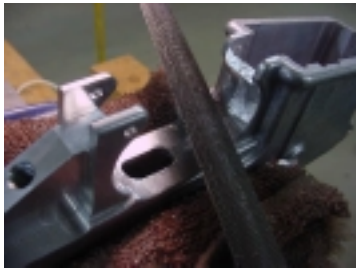
Now that you have a working lower receiver, you will want to do some final finishing. Removing forging seams and smoothing sharp edges will take your lower from “home-job” to “nice job!”

You will want to file and sand smooth the forging seams inside the trigger area, front of the mag well and on the curve between the pistol grip and the buttstock.



Rough trigger area

Hold your lower in a bench vise using a rag to prevent the vise jaws from marring the surfaces. Be careful not to overtighten!



Trigger area filed

A half-round bastard file works well for taking down the forging seams.

Trigger area polished

Finish with 240 grit emory paper on the file to take out scratches and file marks.