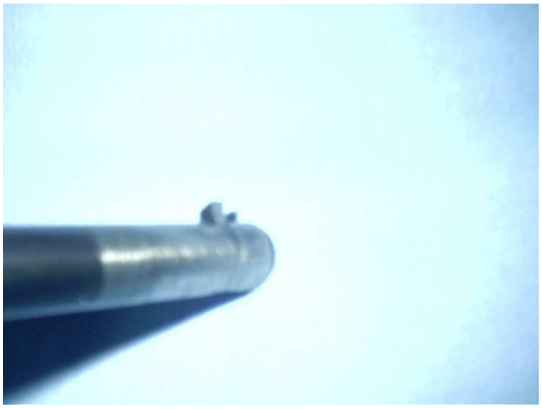
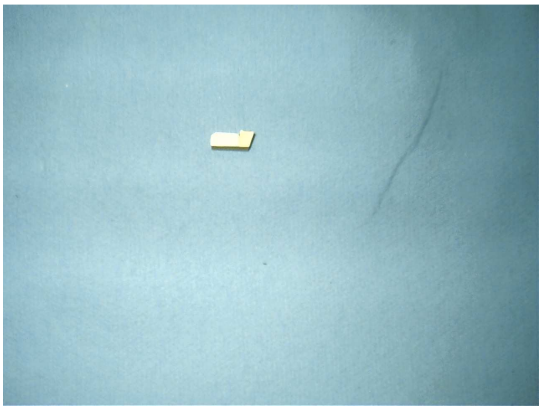
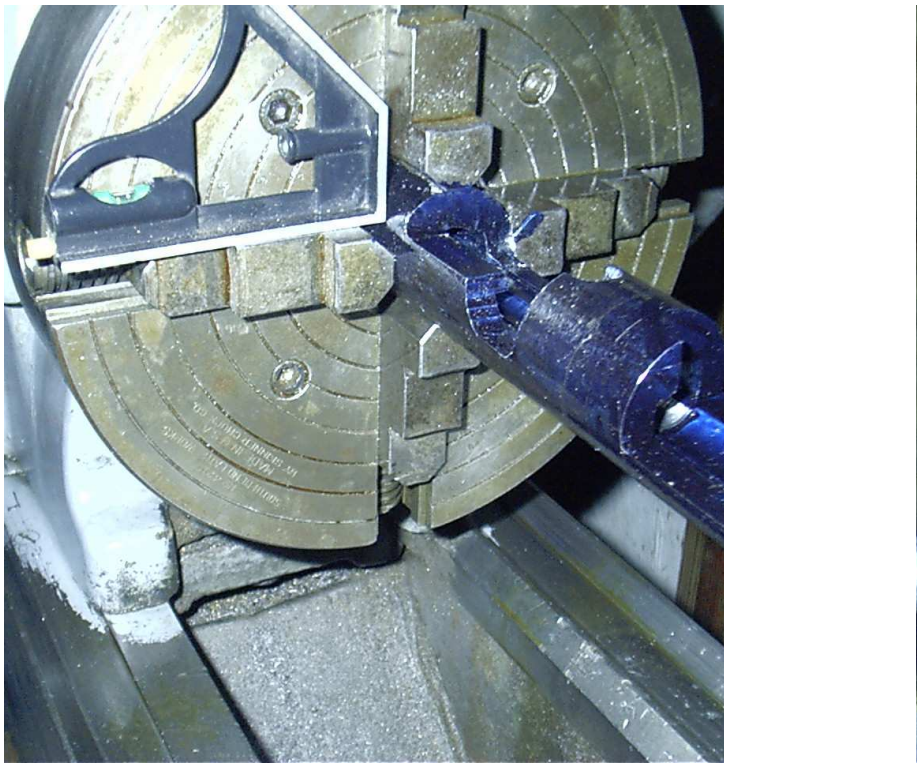




The picture on the left shows the shape of the cutter that I ground. The picture on the right shows a picture of a cut off tool replaceable cutting bit that I used as a pattern to grind my own cutter.



The above picture shows the receiver mounted in the chuck with the 4 independent jaws. The level is to help determine the proper position of the receiver when I start to set the receiver for the eccentric cut.

Notice the position of the chuck in the picture and how the receiver is positioned in the chuck. Think of the 4 jaw chuck as shown in the picture as having two planes, one vertical and one horizontal.

In the picture the receiver raceways run along the same horizontal plane as the horizontal jaws of the chuck. I use the level to level the chuck and to level the receiver.

To level the receiver I place the level on the receiver's tang. At the same time I make certain that the receiver is centered in the lathe chuck. To center the receiver you will need to use a dial indicator with an appropriate holder.

Before you can continue you must have the receiver properly positioned in the lathe chuck. In the picture you noticed how the top of the receiver was on top; I now want you to rotate the receiver 180 degrees thus putting the receiver in an upside down position. If the receiver is centered in the chuck the readings on the dial indicator should remain the same whether the receiver is upside down or upright. Now if your readings are off only .001-.003 thousandths of an inch this is not enough to change the eccentric cut.

To set the receiver to make the eccentric cut the bottom of the receiver, which is now on top, will now need to be moved down .130 inches. The movement of the receiver is along the vertical plane. Now as you move the receiver down the horizontal readings will change slightly, but DO NOT try to make adjustment until after the receiver has been moved down .130 inches.

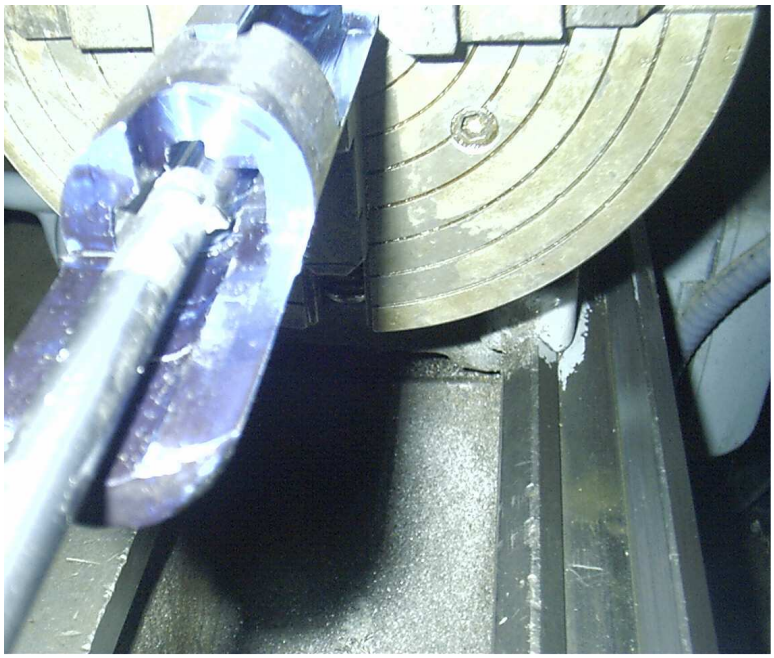
Now I address the horizontal plane, both sides should read the same, adjust the jaws accordingly. Now unless you have never worked with a 4 jaw independent chuck before, setting up for an eccentric cut is not rocket science. With the receiver properly placed and tightened in the chuck, when you rotate the receiver the readings on the horizontal plane should be the same or within a couple of thousandths. The readings for the vertical plane should be .130 of an inch different, if not make the adjustments to correct the readings.

To cut the eccentric slot in the receiver I use a standard ½ inch boring bar and a 3/16 inch bit that I grind to shape. The way that I use the boring bar, is to insert the bar with the tool bit in a horizontal position into the receiver. The tool bit is used like a grooving tool; you make a plunge cut until you reach maximum depth.

Now you are only cutting a groove in the lower half of the receiver, if your

set up is loose, and you don't provide proper clearance for the receiver to move around the tool bar, the bit will catch and you will end up with a full circle groove cut in the receiver.

To determine the placement for the cut I measure from the contact area of the front locking lugs to the front and rear of the safety lug.
I like to lay a dial caliper in the receiver bore with the bottom end of the caliper touching the receiver's lower lug and then mark the location of the safety lug on the receiver with a dental pick.



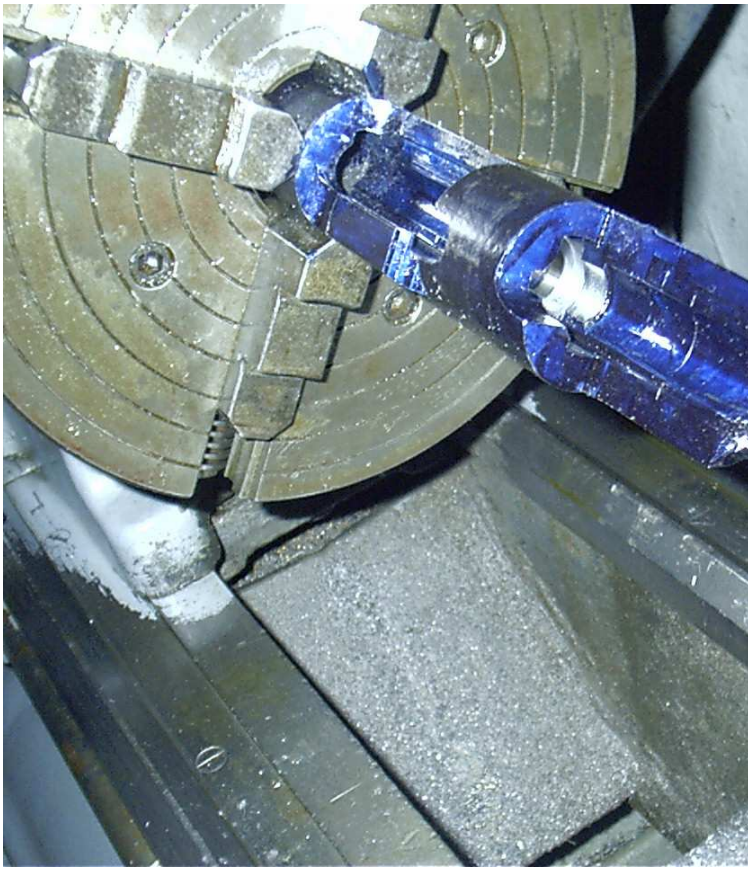
Once I get the boring bar set, I like to rotate the lathe chuck by hand just to make certain I have clearance before I power up the lathe. Hopefully you can see in the picture how I have marked the inside of the receiver for the eccentric turning. The bit needs to extend from the boring bar approximately .140 inches.

There is not a lot of room, you only want to cut the lower part of the receiver, if by accident you get a little metal removed from the top that s not going to effect the performance of the receiver, unless you remove a lot of metal.
If you have trouble check the position of your receiver in the chuck first, is it still approximately .130 inches, also check the length of the bit in the boring bar, adjust it in wards if necessary.

The biggest problem that I had the first time I tried to cut a safety lug slot was lathe speed. I approached it like I was cutting threads with the lathe in back gear, hell every time the receiver rotated around for what should have been a cut the bit was pushed away.

I first thought I had ground my bit wrong, that I needed more relief angle on the cutting face. I was so frustrated I was ready to give up, until I took the lathe out of back gear and changed the lathe speed to 300rpm's, then it cut just fine.

Needless to say the receiver spinning in an eccentric pattern looks dangerous and it can be if you don't have the receiver chucked up tight. Now try different speeds for your turning, 300 RPMs may have worked for me because of the shape of my cutter, yours might be different, so experiment.



This is a completed eccentric turning the little shinny spot in front of the groove is where the boring bar rubbed the layout dye off.

If you find out that the right side of the groove is not cut over far enough to allow the bolts safety lug to enter the groove, you clean up that corner with a rotary tool and a 25/32nd silicon grinding stone. Once the half groove is cut you can deepen or widen the groove if needed with the same sized stone.

Does this chapter seem long or is it just me? There is one more step in the milling of the receiver, its forming the sear pivot lug.

The first thing I do is give the receiver a fresh coat of lay out dye. I then place the receiver top down on the milling table and scribe a line the full distance along the bottom of the receiver at top dead center. I use the rear tang of the receiver as a reference point by placing a small level on flat side of the tang and rotating the tang until level.

That tang sure gets used a lot for reference that's why I said in an earlier chapter to do your best to cut it straight. The line that is being scribed will be the reference point for the hold down screws the sear lug and the center of the magazine, so do your best.

Once I have established a center line down the bottom of the receiver, I then determine the exact position of the sear mounting lug.

In chapter three on Receiver Design, drawing #4, I show a full size Mauser bolt and a measurement of 6.150 inches. This is the length from the contact area of the bolts lug to the contact area of the cocking piece with the bolt in a cocked position as though it's in a receiver with the handle down.

You must have the correct measurement, its possible to get a measurement but not have the bolt handle being in the down position as though it was in a receiver.

Improper sear placement makes for a dangerous condition. On my bolt the measurement is 6.150 inches your may be different go with your measurement NOT mine.

If you are building a receiver to use a bolt from another type of firearm like a Remington or Springfield you must get this measurement correct. Every measurement you take needs to be done correctly, so take your time.

The way that I determine the sear pivot lug placement is by adding the measurement from the cocked bolt (6.150") and the measurement from the receiver face to the receivers locking lugs (1.350") and then subtracting the measurement from the sears contact face to the center of the sear mounting hole (1.320"). The 1.320 inch measurement is from a standard military Mauser sear.

What this gives me is a distance of 6.180 inches. I then measure 6.180 inches from the FACE of the receiver to the point that will be the center of the sear pivot lug. To set up for the machine cut I lay the receiver on its side placing a machinist square against the receiver's tang.

Using my favorite scribe/center finder, I locate the scribe mark that I made earlier for the sear lug, I also mark the width of sear lug on the receiver to be used as reference during milling

I now install a new 3/8 inch carbide center cutting end mill in the mill and make the first of two side milling cuts into the receiver. I align the end mill with the marks for the width of the lug and make a side milling cut.

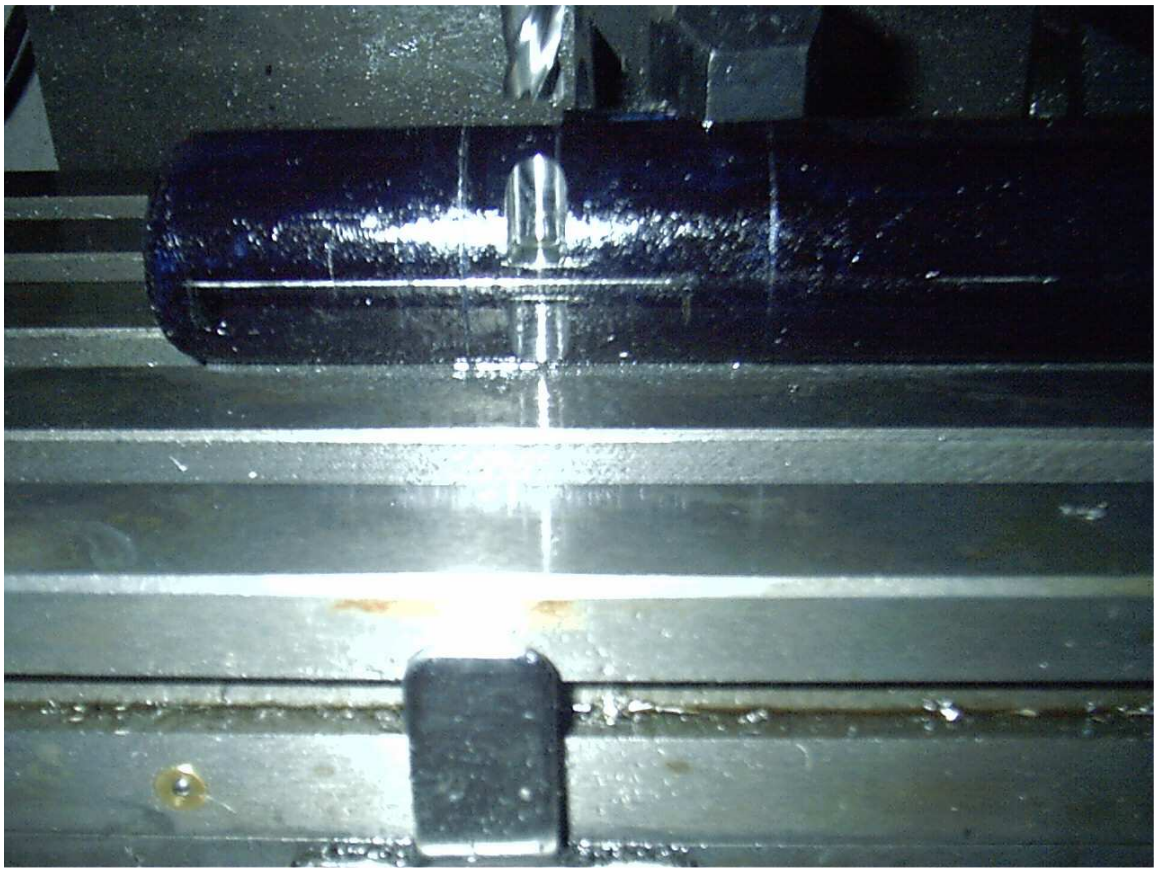
Don’t make a plunge cut here. I bring the end mill to the desired height and just barely let it touch the receiver and then side mill inwards a distance of .340 inches. Go slow and use plenty of cutting oil.

Reverse the receiver on the mill and aligning it on the milling table as before, and make the second cut.

When you mark the lines for the sear lug be as accurate as possible, my sear lug measured .235 inches wide overall or .1175 inches from the center line for each side. The distance of .340 inches is for a piece of round stock that measures 1.750 inches in diameter.

If you are going to make a receiver using my design you can not use a piece of metal less than 1.730 inches in diameter and have enough material to make the front recoil lug and bolt stop lug.

If you are building a receiver to have a flat recoil lug, the metal stock needs to be at least 2” in diameter (preferred 2 ¼ inches). The measurement of .340 inches will have to be increased to accommodate the larger stock.



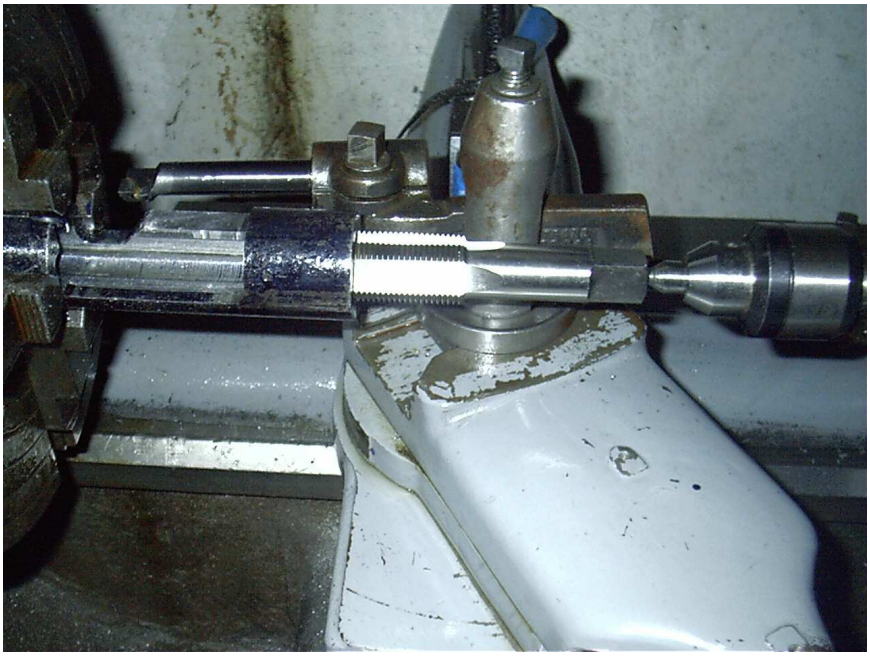
This picture shows the receiver with the side milling cuts. You can also see a faint scribe mark to the right of the machine work, which is the reference line for the sear opening. Remember we measured the sear from the contact area to the center of the mounting hole. The sear contact area is the area where the sear contacts the cocking piece.

Whoops! I thought I was done with this chapter but I have a little more to do.

I now reinsert the receiver back into the lathe, barrel end out. I like to cut the threads on the lathe even if I am using a tap, by hand with power off, it just keeps things straighter.

You can use a 3 jaw self centering chuck for this machine operation or use the 4 jaw independent chuck. I am use to the torture of the 4 jaw chuck and since I'm a perfectionist, I like to keep my clearance levels as low as possible and my 3 jaw chuck can't do better than .0015 inches.

Oh the humanity!



Since I am building to please me and since I broke every one of my cheap ass threading tool bits trying to thread this hard as hell, 4140 pre-hard steel. I decided to thread my receivers for a barrel thread of 1.125 inches instead of the standard 1.100 inches for the Mauser.

Since I had an 1 1/8 inch in diameter, 12 thread/inch tap on hand the decision was easy. Now you can make your receiver anything you want, I encourage you to go with the 1.100 inch barrel threads so you can use over the counter short chambered barrels.

When I talk of barrel thread diameters, I am referring to the diameter of the barrel shank and not the diameter of the receivers barrel bore. A standard Mauser receiver has a barrel bore of 1.00 inches.

Now going with the 1.125 inch barrel shank does give me a little advantage in machine time. Remember that the right raceway on a Mauser receiver is .045 inches wider than the left raceway. The opening for my receiver is 1.046 inches, because I am using a 1 1/8 inch diameter, 12 threads/inch USA tap, this cut's down the amount of material I must remove later for extractor clearance and saves on hand work. Plus cutting with a tap and die is a little more dummy proof.