How to Build a Suppressor

By Major Rob Robinette, edited 7/18/2017

Warning: **You must have a BATFE Form 1 with tax stamp *before* you start to legally build a suppressor.** National Firearms Act (NFA) rules apply and you can do hard prison time for violating the law.

The first step in manufacturing a suppressor is getting permission from the Bureau of Alcohol Tobacco Firearms and Explosives (BATFE) by filling out a Form 1 and sending in $200 for a tax stamp. It will take 5 to 8 months to get the tax stamp so send it in early.

9mm Tavor X95 With Suppressor

The 9mm Tavor uses an odd 1/2x36 barrel thread.

My homemade .22 suppressors are Hollywood quiet--quieter than a pellet gun--but many people are surprised how loud suppressed 9mm and 45ACP is. It's not like in the movies when all you hear is brass hitting the floor. My 300 Blackout suppressor is very comparable to my Silencerco Osprey 45 commercial suppressor but they're much louder than a suppressed .22. Something else Hollywood gets very wrong is the sound of the bullet striking flesh--it's loud. When hunting with a suppressed rifle the reduction in muzzle blast allows you to hear the bullet strike. A shot to an animal's chest with a subsonic 300 Blackout round sounds like a two-by-four smack. Hollywood really does need to pick up on this for a little extra realism.

Here's a short high quality stereo .mp3 sound file of a suppressed 300 Blackout shot where you can hear the muzzle blast, bullet whizzing by and the target impact. It was a 100 yard shot with the microphone about 70 yards downrange. The impact is as loud as the muzzle blast.

Since I have a Grizzly combo lathe/mill at home that I use for making race car parts I already had everything I needed to make a suppressor. By the way, I have been asked about my lathe/mill but I cannot recommend the Chinese made Grizzly combo lathe/mill because its tolerances are a little sloppy and I'm not familiar enough with any other lathes and mills to make a recommendation.

I decided to go with an all aluminum "monolithic baffle" design for a 300 Blackout suppressor as my first suppressor build. 300 Blackout uses standard .308 size bullets and has fast spin rifling to stabilize heavy subsonic bullets. It's very good at sending heavy 220 or 240 grain bullets at subsonic speeds downrange accurately. 300 Blackout can also be loaded for supersonic and makes an excellent home defense and deer rifle.

If I were building a suppressor for .308 *super*sonic loads I would use at the very minimum steel for the blast baffle (first baffle the bullet encounters). An all aluminum suppressor should only be used with subsonic ammunition. The fast moving gas from supersonic rounds will quickly wear away the aluminum baffles. 9mm ammo with 147gr bullets and standard 230gr 45ACP are subsonic. 180gr .40 cal bullets will also be subsonic.

I have used this suppressor on several .308 rifles using subsonic 175 grain Sierra MatchKing bullets and Trail Boss powder. Subsonic .308 loads are very mild and a thick aluminum blast baffle is fully adequate. I used 175 grain bullets because standard .308 barrels do not have the fast rifling needed to stabilize heavier bullets.

*****A note about pistol suppressors: Most semi-auto pistols are recoil operated (locked breech) and need a spring mechanism to decouple the barrel and suppressor to allow the pistol to cycle. A spring and piston decoupler or "booster" allows the barrel to move back and cycle the pistol without the suppressor moving with it. Because of this the non-booster suppressors on this page will not work with them. *Blow-back pistols, like most .22 pistols, do not need a booster so the suppressors on this webpage will work with them*. There are also 9mm blow back pistols that will work with these suppressors.**

Pistol caliber carbine rifles are a great fit for homemade non-booster suppressors because they function by blow back and their longer barrels allow fast burning pistol powder to completely burn for less muzzle blast. They also make excellent home defense weapons. I absolutely love my Tavor X95 bullpup in 9mm with a homemade suppressor.

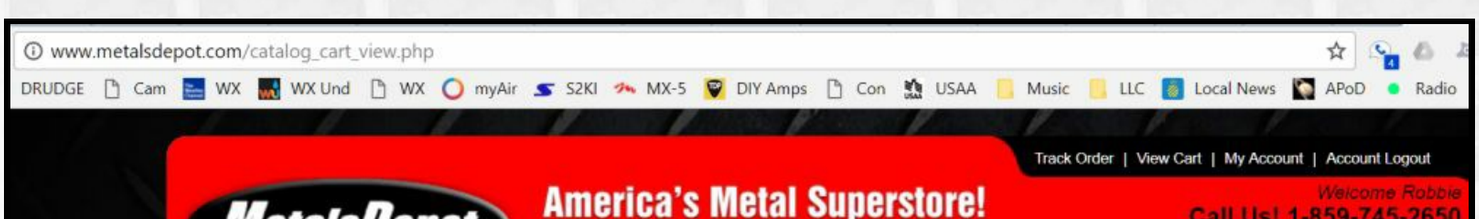
.22 Caliber Suppressor On Sig 1911-22

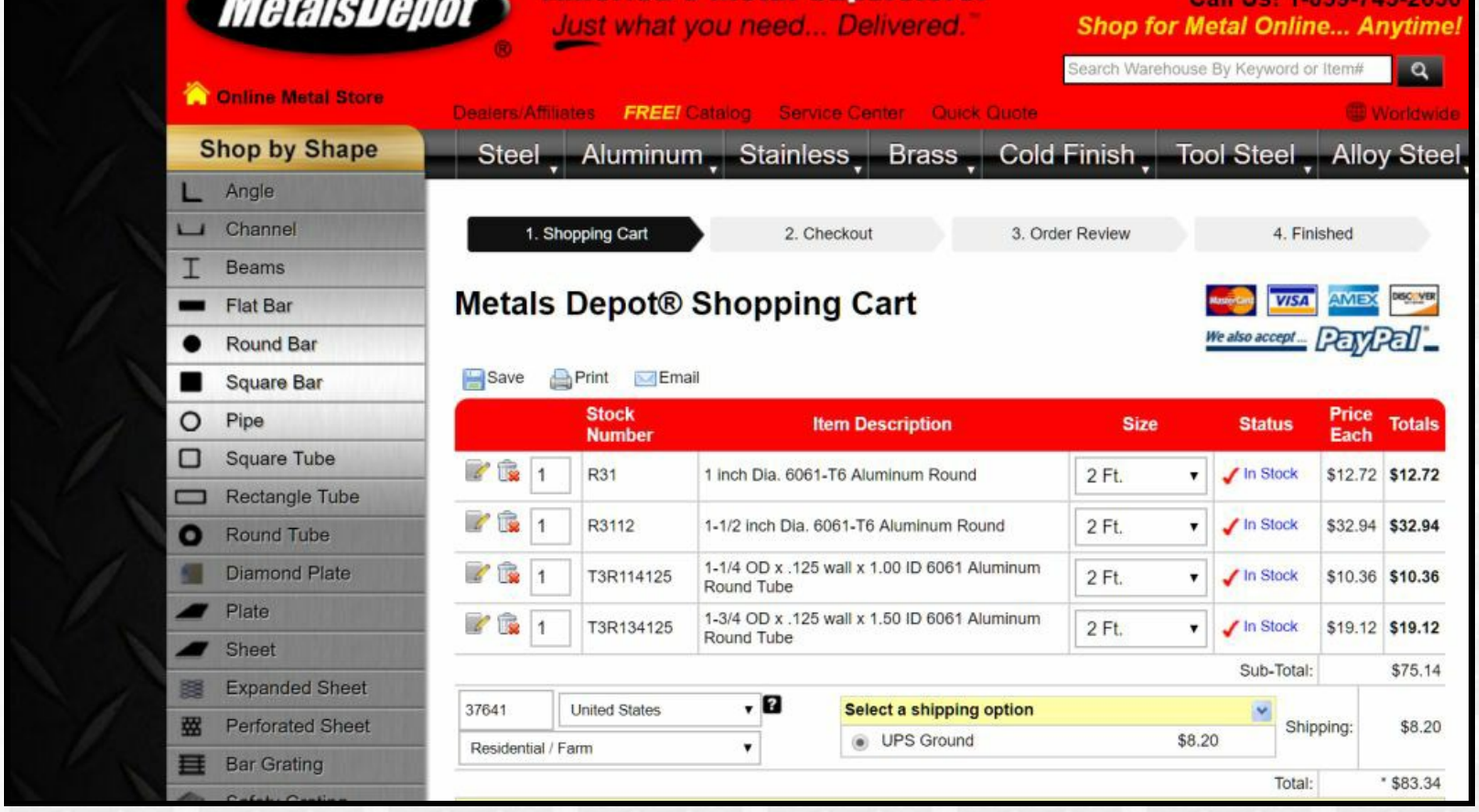
Raw Materials

I used 1 1/2 inch *outside* diameter aluminum round for the 300BLK and 9mm baffles and 1 1/2 inch *inside* diameter aluminum round tube for the baffle covers. The specs on the aluminum round are: 1 1/2 inch diameter 6061 T6 aluminum round Stock # R3112 from www.metalsdepot.com. The 1 foot long bar only costs $17. The 300BLK suppressor is 8 inches long. The tubing for the baffle cover is 1 3/4 x .125 (1.75" diameter with .125" wall and 1.5" inside diameter) 6061 T6 round tube Stock # T3R134125. This size suppressor is what I recommend for all calibers except .22 or .17.

For my .22 caliber suppressors I use a 1 inch outside diameter 6061 T6 aluminum round Stock # R31 and 1 1/4 x .125 (1.25" diameter x .125" wall and 1" inside diameter) round tube Stock # T3R114125. I have built .22 suppressors at 6 and 7 inches long and prefer the extra suppression the 7 inch length gives.

MetalsDepot.com Order





The first and third items are for a 1 1/4" diameter .22 suppressor, the second and fourth items are for a 1 3/4" diameter 300 Black suppressor. 1 foot long round bars are all that is needed to make a suppressor. Note how the outside diameter (OD) of the baffle matches the inside diameter (ID) of the tube.

Building a Suppressor

To manufacture a monolithic baffle suppressor the basic steps are:

Start with a solid round metal bar to make the baffle

Cut the bar to length

Face both ends of the baffle on the lathe

Drill and tap one end of the baffle where the baffle will screw onto the threaded barrel

Drill the bullet path through the baffle

Drill/mill out the gas chambers in the baffle

Clean the bullet path with the bullet path drill bit

Cut the seal tube to length

Face the ends of the seal tube on the lathe

To finish the seal tube you can remove a small amount of material on the lathe or simply polish it up with some steel wool

You may need to remove some material from the outside of the baffle so that it will fit inside the aluminum tube, but don't take too much because you want a nice tight fit.

Insert the completed baffle into the metal tube and seal. If you have difficulty knocking the baffle into the tube with a plastic mallet then remove more metal from the outside of the baffle to slightly reduce its diameter. The seal can be a press fit, welded, epoxied, one or more small screws, or even duct tape. .22 suppressors work fine with a press fit but larger caliber's will need something to keep the outside tube from shifting position under fire. A single small screw works well.

Building the Suppressor

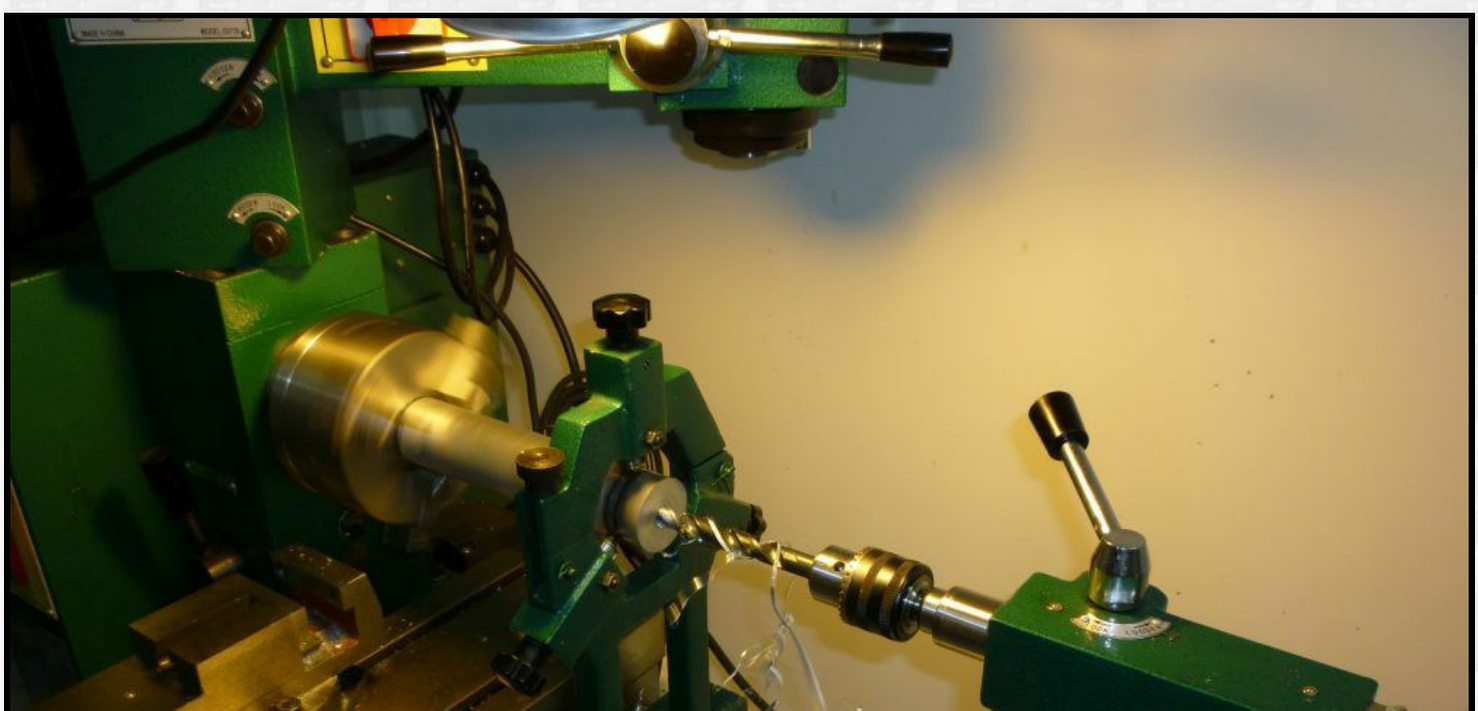
The pictures below show three suppressors being manufactured, an 8" x 1 3/4" 300 Blackout, a 5" x 1 3/4" 9mm and 7" x 1 1/4" .22 caliber. I have Form 1s and tax stamps for all three.

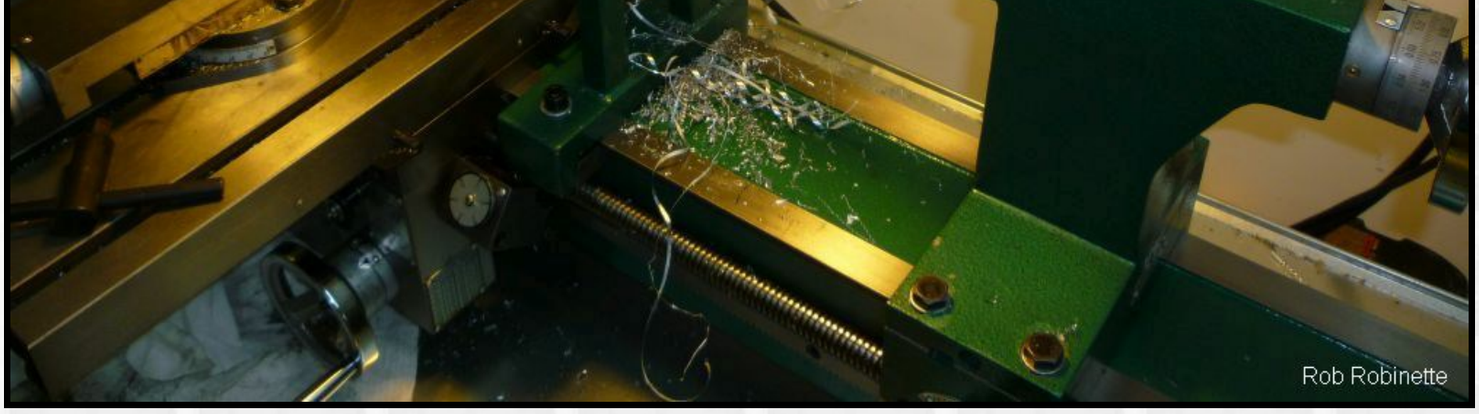
I use a chop saw to cut the round bars and tubes. A vice and hack saw can also be used because facing the bars and tubes in the lathe will true them up.

Facing the Suppressor Baffle On the Lathe

Facing the suppressor baffle ensures a precision fit and alignment when the suppressor is attached to the rifle barrel.

Drill the Barrel Thread Tap Hole





To prepare for tapping the barrel thread I drilled the thread end of the baffle. The depth of this hole isn't critical because it will lead into the large blast baffle but it needs to be deep enough to allow the suppressor to screw onto all the thread offered by your rifle barrel. The tail stock holds the drill bit stationary and in perfect alignment while the lathe turns the baffle round bar.

Standard Barrel Threads & Tap Sizes

.22/.223/5.56 use a 7/16 (.4375) inch drill bit for a 1/2x28 tap. "1/2x28" means 1/2 inch diameter by 28 threads per inch.

The Tavor 9mm uses 1/2x36 tap but still uses a 7/16 drill bit.

The Steyr Aug is M13x1LH (left hand) and needs a 12mm drill bit.

H&K 5.56 is M15x1 and needs a 14mm drill bit.

300BLK and .308 use a 9/16 (.5625) inch drill bit for a 5/8x24 tap.

AK-47 uses M14x1LH (left hand) and needs a 13mm drill bit.

9mm uses a 7/16 (.4375) inch drill bit for a 1/2x28 tap (same as 5.56).

H&K and Sig 9mm use M13.5x1LH (left hand) and needs a 12.5mm drill bit.

Most 338 Laupa Mag use a 9/16 (.5625) inch drill bit for a 5/8x24 tap.

.40 cal uses 9/16x24 and needs a 1/2" (.5") drill bit

H&K .40 uses M14.5x1LH and needs a 13.5MM drill bit.

45ACP uses a .578x28 (37/64x28) and needs a 17/32" (.53125") drill bit.

H&K 45 USP Tactical uses M16x1LH and needs a 15mm drill bit.

H&K Mark 23 Socom uses M16x1RH and needs a 15mm drill bit.

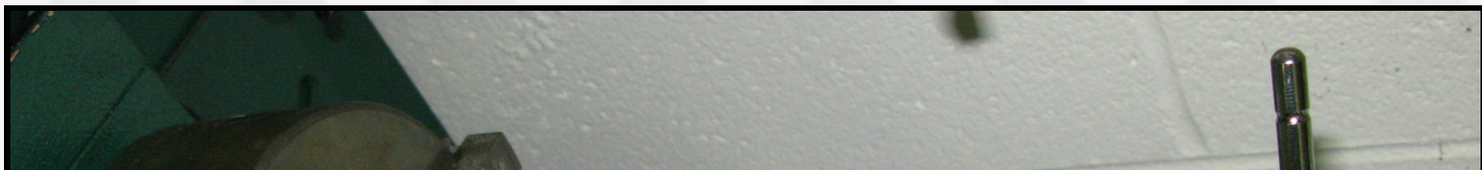
Optional Boring For the Tap

Boring the tap hole to the pre-tap size. This is not necessary if you have the correct size drill bit as listed above.

Tap the Baffle Thread

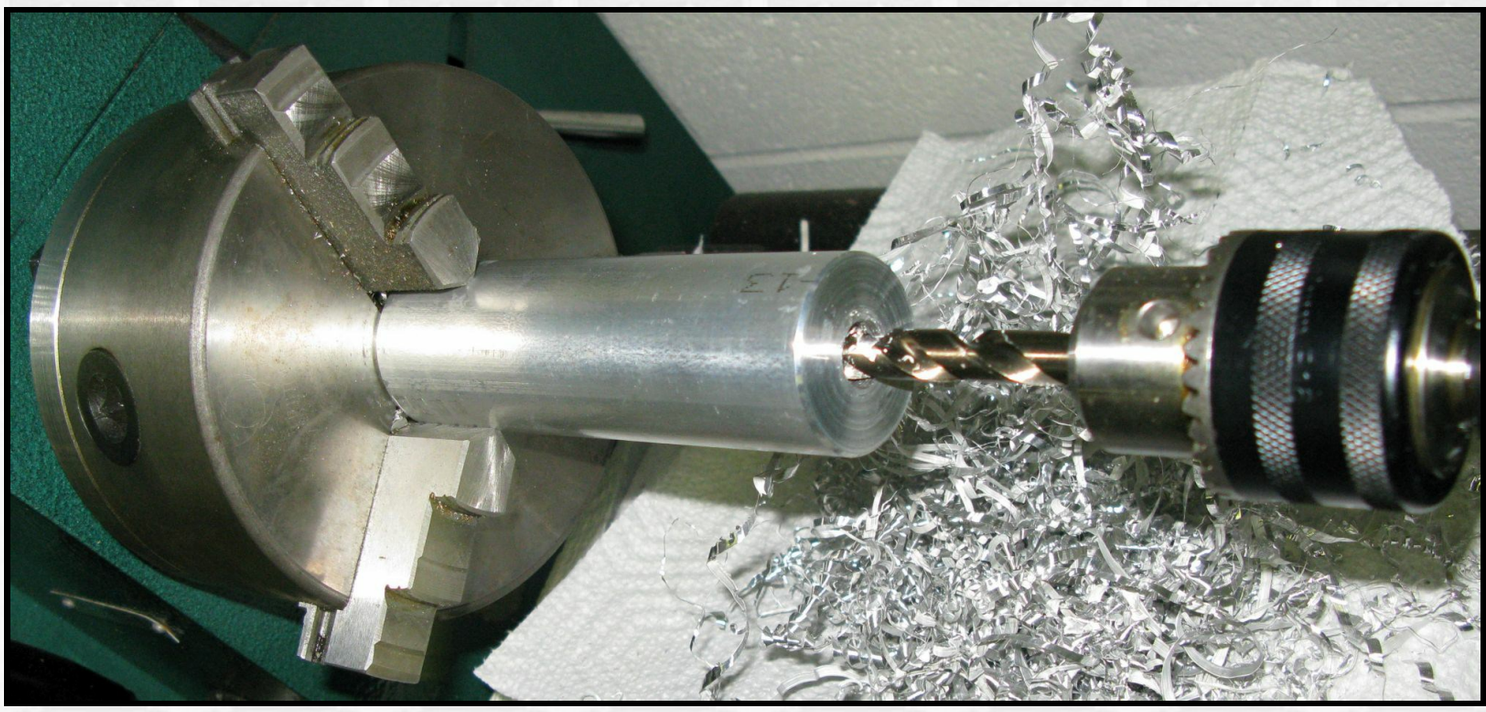
Tapping the baffle--Do not try to use lathe power to do this. I used the tailstock to simply hold the tap for perfect alignment with the bullet path. I pushed inward on the tailstock and turned the lathe chuck by hand to start the tap. I did the last half of the tap using a standard tap hand wrench so I could feel when the tap bottomed out. I used a 5/8x24 threads per inch (tpi) tap to match the thread on my 300 Blackout barrel.

Finish the Tap By Hand



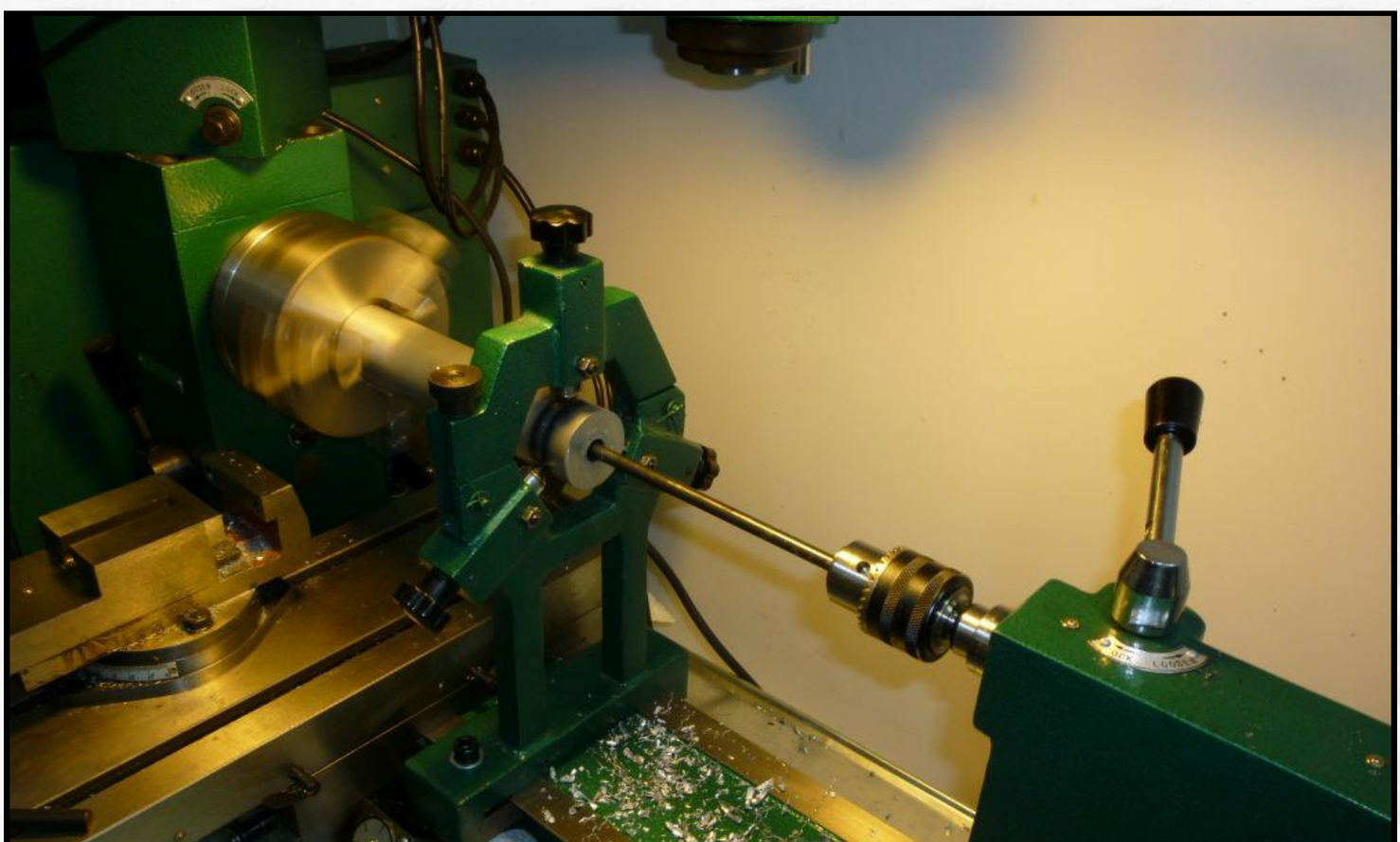
Finish the tap by hand so you can feel the tap bottom out. This suppressor is for my Tavor X95 9mm bullpup rifle so the thread is an odd 1/2" x 36 threads per inch.

Drilling the Bullet Path



You can flip the suppressor baffle around and drill from both ends to keep from having to use a long drill bit. The drill bit is held stationary by the tailstock and the lathe turns the baffle.

Using An Extra Long Bullet Path Drill Bit For Long Suppressors



Drilling the bullet path the full length of the suppressor baffle. Start the bullet path hole with a normal length drill bit for more precision then switch to a long bit when needed. I got the long 11/32" drill bit at Home Depot.

300BLK and .308 bullet diameter is .308 inch so use an 11/32" (.344") drill bit for the bullet path through the baffle.

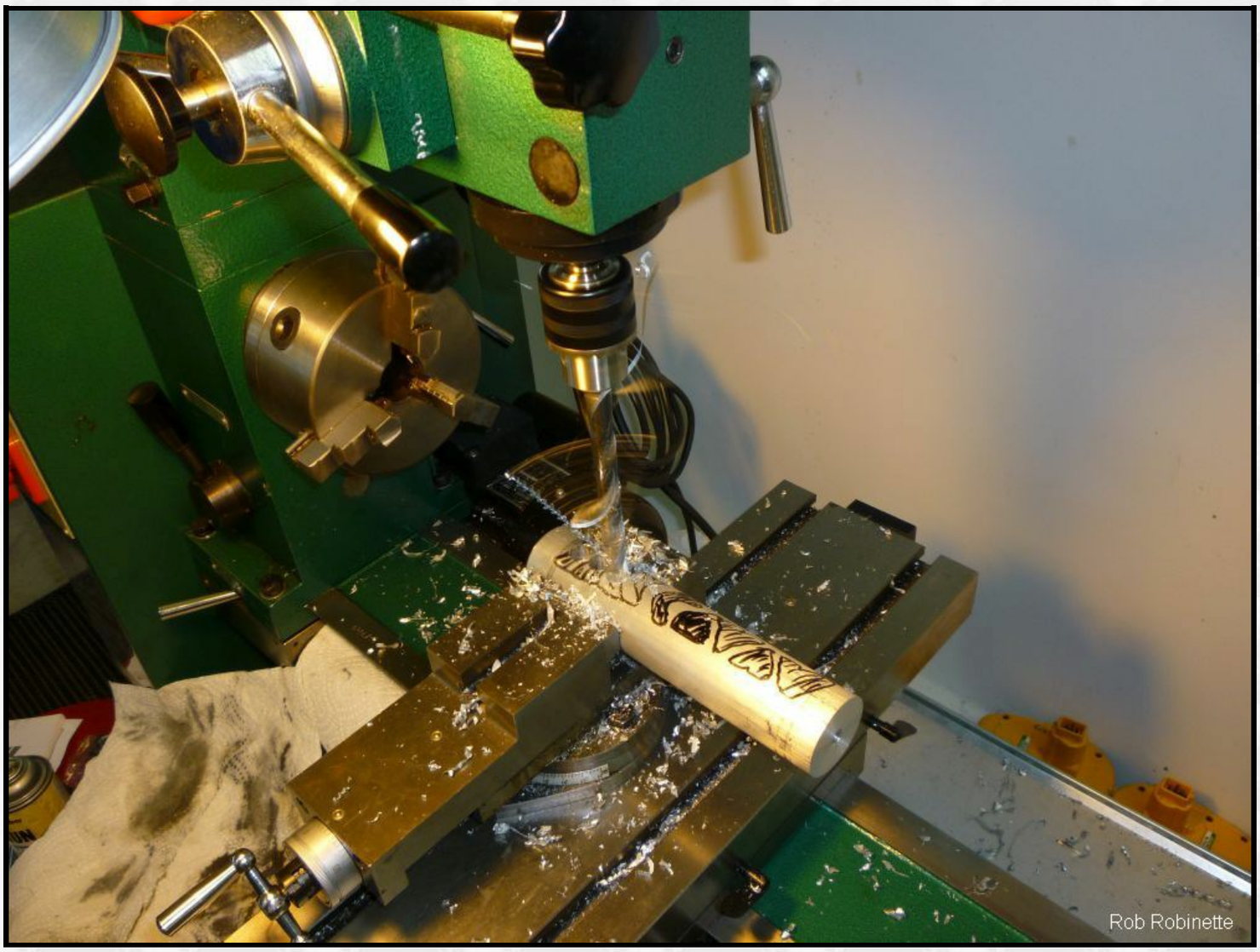
.22 and .223 bullet diameter is .224" so use a 1/4" (.250") drill bit.

9mm bullet diameter is .355 so use 3/8 (.375") bullet path.

.40 cal bullet diameter is .40" so use a 7/16" (.4375") drill bit.

45ACP bullet diameter is .451 so use a 1/2" (.500") drill bit.

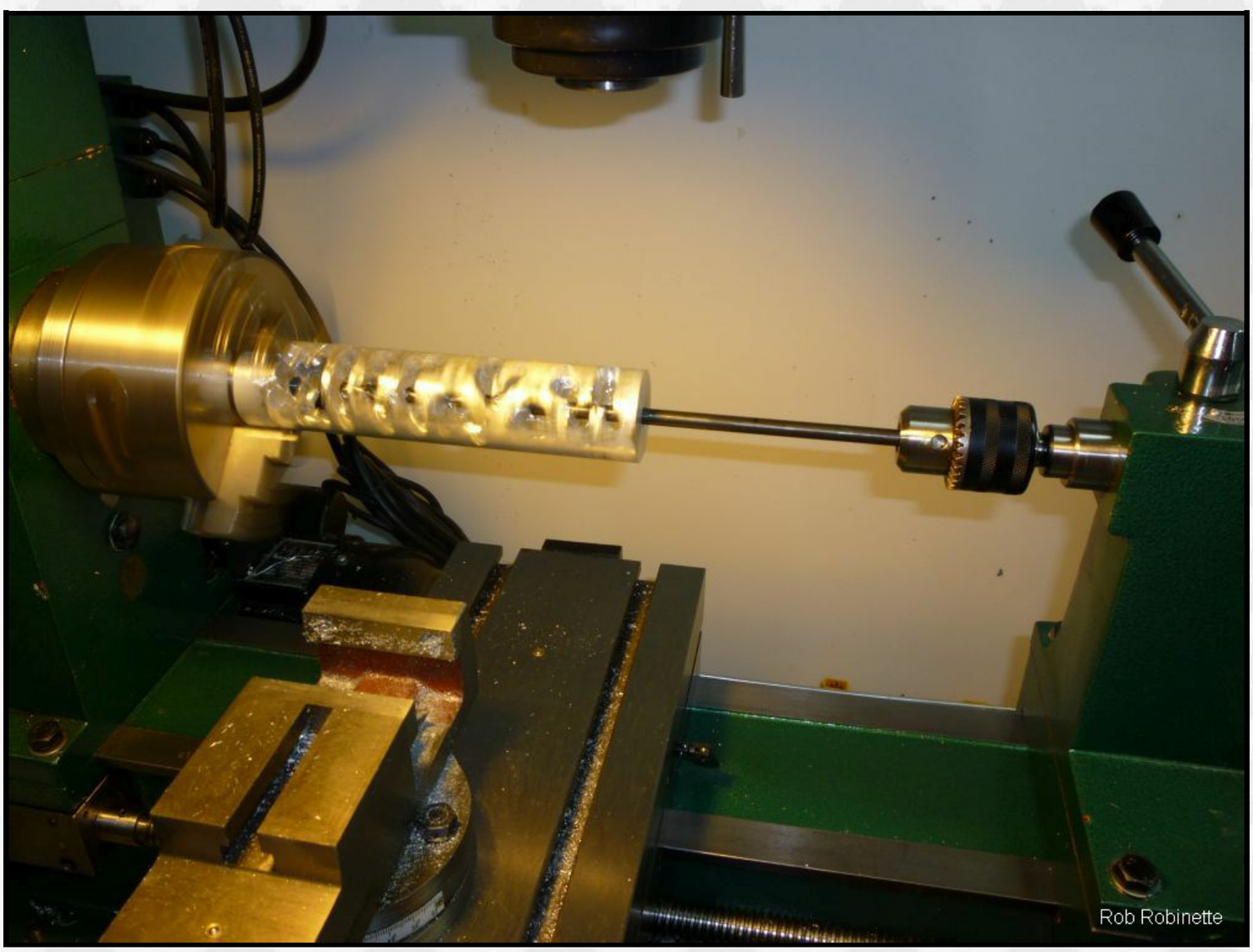
Drill the Baffle Gas Chambers



Drilling the baffle chambers. Note the marked baffles to be milled out. I started with a drill bit then finished up with an end mill (below) to finalize the baffle chamber shapes. You must leave enough metal from the barrel end of the suppressor to the blast chamber (first chamber) to allow the suppressor to screw onto the entire length of thread on the end of your barrel. In other words, don't cut the blast baffle too close to the end of the suppressor.

Milling the Baffle Gas Chambers

Clean the Bullet Path



Cleaning up the bullet path after milling using the bullet path drill bit.

The Finished Baffle

The finished baffle. I had to turn the baffle in the lathe to remove about 15 thousandths from its diameter to make it fit easily into the tube. I intentionally left the baffle chambers odd shapes to disrupt the gas's path through the baffle. I now recommend heart shaped baffle chambers like in the .22 suppressor shown at the bottom of this page because of how well that shape worked in controlling the gas. I also recommend leaving much less metal between the chambers to make the gas chambers as large as possible and also make the suppressor lighter.

Welded Tube-to-Baffle Seal

I slid the completed baffle into the aluminum tube and welded both ends to seal the suppressor. It's now ready to be screwed onto a rifle, inspected for barrel alignment and test fired. Please forgive the crude welding, I'm an amateur aluminum welder. You'll need an AC TIG welder to do this kind of work. If I need to open the suppressor I can use the lathe to cut the welds to remove the tube cover. If I were to do another 300BLK suppressor I would go with a press fit like the .22 suppressor shown below in the next section.

Mounted 300BLK Suppressor

The suppressor wrapped and installed on the 300 Blackout upper. The wrap helps reduce noise too.

The BATFE requires you to inscribe or engrave the exterior of the suppressor with:

Serial # (must match the Form 1)

Model # (must match the Form 1)

Manufacturer (your name or trust name as shown on the Form 1)

Manufacturer's city & state (as shown on the Form 1)

I used a Dremmel tool with a fine bit to engrave the suppressor information.

Building a .22 Suppressor

Finished .22 Baffle

A .22 baffle made of 1 inch solid round aluminum bar. Note the large square blast baffle at the

bottom and the heart shaped gas chambers. This suppressor worked out very well and is quieter than a commercial .22 suppressor I purchased later. The baffle is 7 inches long.

For the suppressor barrel thread I used a 7/16 inch drill bit to drill the hole and then used a 1/2x28 tap.

.22 bullet diameter is .224" so I used a 1/4" (.250") drill bit to drill the bullet path through the baffle.

Baffle Ready For Insertion

The 1 inch diameter .22 baffle next to it's outer seal tube made from aluminum tube with a 1 inch inside diameter.

Completed .22 Suppressor

The .22 baffle inserted into the tube seal with a nice tight press fit. This thing is as quiet as a pellet gun when used on a bolt action .22. Seriously.

SBR 10/22 & Suppressor

This is a shorter 6 inch long .22 suppressor I made (with Form 1 tax stamp) mounted on my NFA registered Short Barreled Rifle Ruger 10/22 with a nice Keystone Sporting Arms Revolution Yukon Laminate Thumbhole Stock. I shortened the stock to fit the 8 inch barrel. This is a really great shooting suppressed .22 with the EOTech 510 red dot sight. Barrel is an 8 inch Tacticallnc.com stainless pistol barrel. Since a suppressed bullet only needs to accelerate to 1000 feet per second a short barrel like this works great. Anything longer is a waste for subsonic shooting. Another benefit of the 8 inch barrel is standard velocity .22 ammo will be subsonic so I can use cheaper ammo. Standard velocity ammo also functions more reliably than subsonic ammo. I install a Volquartsen Target Hammer in all my 10/22s for a huge improvement in trigger pull and break. I also installed a JG Bolt Lock on this rifle to allow single action silence by flipping a lever. The bolt lock holds the bolt and keeps it from cycling to minimize noise. Your rifle must be registered as a short barreled rifle with a Form 1 to legally install a barrel shorter than 16 inches.

Another Ruger 10/22 with Suppressor

The .22 suppressor installed on my Ruger 10/22 with threaded 16" bull barrel. This rifle also has a Volquartsen Target Hammer and JG Bolt Lock.

Suppressor On Sig 1911-22

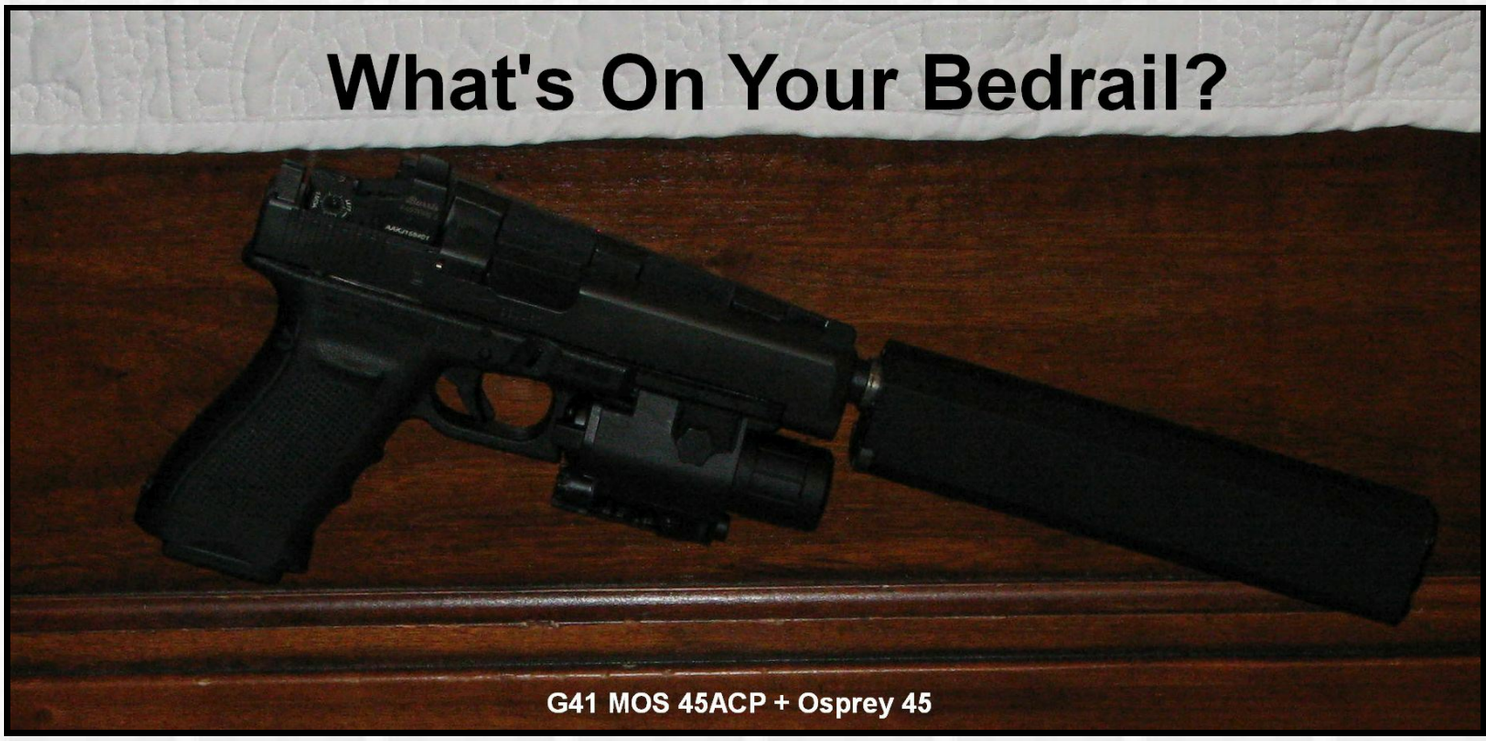
Since this .22 pistol uses blow back to function it will cycle with this no-booster suppressor mounted. Most semi-auto pistols are recoil operated and require a spring & piston "booster" to decouple the suppressor from the barrel to function. A pistol with its short barrel is typically louder than a rifle of the same caliber so I run my longer 7" suppressor on pistols.

Bullet Diameters in Inches and MM

Cartridge	Diameter Inch	MM	Other Cartridges
.22LR	222	5.64	
.223 & 5.56	.224	5.69	
.243 & 6mm	.243	6.17	
25-20 & 257 Roberts	.257	6.53	
6.5 Grendel	.264	6.7	6.5 Carcano, 6.5 Japanese, 264 Win Mag
270 Win	.277	7.04	6.8 SPC
280 Rem	.284	7.21	7mm-08 Rem, 284 Win, 7mm x57 Mauser
308 Win	.308	7.82	7.5mm Swiss (AK .310, 303 Savage .311)
32 ACP	.312	7.93	(32-40 .324)
325 Win Short Mag	.323	8.2	8mm x 57, 8mm Rem Mag
338 Laupa Mag	.338	8.59	340 Wby Mag, 338 Win Mag
375 H&H Mag	.375	9.53	
9mm & 380 Auto	.355	9.02	357 Sig
38 Special	.359	9.12	357 Mag
40 S&W	.400	10.16	10mm
416 Rigby	.416	10.57	
44-40 Win	.428	10.87	
44 Mag	.430	10.92	
45 ACP	.451	11.46	
45-70	.458	11.63	458 Win Mag, 450 Marlin, 460 Wby Mag

470 Nitro Express	**.475**	**12.07**	
500 S&W Mag	**.500**	**12.7**	
50 BMG	**.510**	**12.95**	**50 Alaskan**

What's On Your Bed Rail?



Long slide Glock G41 MOS (modular optic system) 45ACP with Osprey 45 suppressor, Burris micro red dot sight, Tru-Glow tall see-over-the-suppressor co-witness night sights and combo flashlight/green laser. The pistol is held to the bed rail by a plastic covered gun magnet. A suppressed weapon is ideal for home defense because firing an unsupressed weapon inside your home without hearing protection will freakin' hurt. Standard velocity 45ACP 230gr hollow point ammo is subsonic--you don't need to buy expensive "subsonic" ammo.

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