

## Marauder Airgun Tuning, Modifications, & Recommendations by RayK (C 2013)

[https://docs.google.com/document/d/1Jn0RFfnH9YnFaEbT5ynizTnlyJ9DG6u5htJ\\_65R9P5g/edit?usp=sharing](https://docs.google.com/document/d/1Jn0RFfnH9YnFaEbT5ynizTnlyJ9DG6u5htJ_65R9P5g/edit?usp=sharing)  
[Abbreviations used on Marauder Airrifle Forum](#)

### How to Tune a Marauder PCP

- A-Team Tuning, the usual way to tune using hammer spring preload tension, hammer throw, and valve metering screw (AKA velocity screw).
  - Full version (with explanations and example)  
<https://docs.google.com/document/d/1WFDife1EqVkkDQPEwRZFU6Kawki2sCi0x5KdFarO86U/edit?usp=sharing>
  - Short version (without all the explanations)  
<https://docs.google.com/document/d/11mHCJZoZaYuQTCoUdrhVXB5bMNEvBe282k7B0TJMp2o/edit?usp=sharing>
- Bstaley Hammer Buffer (BHB) with O-rings AKA The Poor Man's Regulator, greatly simplifies tuning and gives longer flatter shot strings, but at a lower than max possible power.
  - [https://docs.google.com/document/d/1wsnl6\\_GJHqhD13YGlihlBpQzb\\_X91qmCsdCxT4iQtMA/e/dit?usp=sharing](https://docs.google.com/document/d/1wsnl6_GJHqhD13YGlihlBpQzb_X91qmCsdCxT4iQtMA/e/dit?usp=sharing)
- Read about the BLT (Brian's Lowpressure Tune) if you are filling from a hand pump or from a 3000 psi SCUBA tank for lots of good shots from a lower pressure 2500 psi fill.
  - <http://www.marauderairrifle.com/forum/viewtopic.php?f=24&t=7328>
- Extreme spread for tight groups: 30 yards - 4%, 50 yards - 3%, 75 yards - 2%, 100 yards - 1%.

### Ways to fill your PCP Marauders

- Hand pump - best is Hill, Benjamin is ok but 007 o-ring tends to fail unless replaced by polyurathane, some have great results boosting hand pump with about 20 PSI from an oil-less shop compressor  
<http://www.marauderairrifle.com/forum/viewtopic.php?f=17&t=5085>
- SCBA 4500 PSI tanks are great, but you need a way to fill them (SCUBA shop, Fire Department, Paintball shop or your own compressor)
- SCUBA 3500 PSI tanks are ok, but heavy and usually don't give as many fills in 3000 psi gun
- Shoebox Compressor - slow, but gives 4500 psi fills
- 6000 PSI Nitrogen tanks, great, only available in some areas, regulator/fill hose can be expensive

### Cheap and Valuable Modifications for the Marauder Rifles

- Disassembly/assembly video with some preparation work  
<http://www.youtube.com/watch?v=wuVGN8JgEBk>
- Remove Lawyer Spring <http://www.youtube.com/watch?v=f6NjoQ7bzMc>
- Install Depinger <http://www.youtube.com/watch?v=iUE3c9GxkHU> but this one works better and is not expensive <http://citrusairguns.com/marauder-rifle-and-pistol-parts.html>
- Constrain barrel/shroud assembly <http://www.marauderairrifle.com/forum/viewtopic.php?f=30&t=6477>
- Drill out the muzzle shroud spacer holes (there are six 1/8" holes that you can drill to 3/16" which will allow more air to escape into your shroud reducing the shot noise.  
<http://www.network54.com/Forum/275684/thread/1334177565/Marauder+Pistol+Shroud+mod>  
<http://www.marauderairrifle.com/forum/viewtopic.php?f=28&t=3848>
- Add baffles to the stock shroud by moving the rear shroud mount forward by the length of the baffles you add. I've added 2 baffles to my 25 Marader with good results. I got a delrin rod spacer to fill the gap made by moving the rear shroud mount forward. You can alternatively add a shroud extension to the front <http://marmotmilitia.com/rifle-marauder-m-rod.html>
- Fix broken magazines <http://www.youtube.com/watch?v=QR-4epSVp5Q>

- Recalibrate erroneous gauge <http://www.marauderairrifle.com/forum/viewtopic.php?f=14&t=5593>
- Modify the stock or get an after-market bolt-on stock <http://discosrus.net/marauder/>

### **Cheap and Valuable Modifications for the Marauder Pistol**

- Install BHB (described in link above) to give longer, flatter shot string.
- To eliminate the annoying plastic carbine stock wobble, super-glue a #10 flat washer to plastic stock where it meets the rear of the pistol. Alternative, you can put a tiny (maybe 007) o-ring there when attaching the butt stock.
- Install heater pipe insulation around top of plastic stock to allow better cheek weld.
- Install Marmot Malitia shroud extension to reduce shot noise  
<http://www.marmotmilitia.com/pistol-marauder-p-rod.html>

### **Reminders and other References**

- Most of the weight of the Marauder rifles is in the metal parts, not the stock. If you really want to improve the balance of your rifle, try a light-weight scope or a bullpup kit.
- A dry fire on a springer airgun or a compound bow can/will damage them, however, it is not harmful to dry fire your PCP airgun. (A dry fire is a shot with no loaded pellet.)
- It is also fine to leave your magazine in your Marauder, but you should not leave the hammer cocked as the hammer spring can take a set to a shorter length which will change your tune.
- It is fine to leave your gun cocked for short periods of time (like for the day while you're hunting).
- Be sure to store your gun in the fired position as leaving it cocked keeps the hammer spring compressed and, over time, it will take a set that will change your tune. You can de-cock your gun either 1) by dry firing it or 2) by cocking back the hammer, holding onto the bolt, pulling the trigger, then slowly lower the hammer by allowing the bolt to move forward. The second does not allow the hammer to hit the valve with enough force to open it, so it does not release any air from the air tube.
- It is safe and beneficial to store your Marauder with air pressure in the air tube up to the max recommended by the manufacturer. If you transport your fill tanks or airguns in a car, beware that the high heat generated by the sun will cause the air pressure to rise which can cause damage.
- An easy way to degas your Marauder if your fill tank pressure is higher than your gun pressure.
  - Connect your fill tank line to your airgun as if you were going to fill with the valve closed
  - Orient your airgun so muzzle is pointing up
  - Open your fill tank valve just a crack as though to fill your gun very slowly
  - When the gun gauge stops (because it matches the gun pressure) you will also hear the check valve click in your gun fill assembly as it opens to allow air into your airgun
  - As soon as you hear the check valve open, close your fill tank valve.
  - Now crack open the bleed screw on your fill hose to let air slowly leak out.
  - The gun fill check valve will stay open unless there is a sudden rush of air out of it.
  - Watch your fill gauge as air pressure slowly decreases.
  - You may need to open the bleed screw a little more as the gun air tube pressure gets low.
  - To ensure your airgun is fully empty, dry fire your Marauder. There should be very little air discharge per shot. It is now safe to disassemble your air gun.
- You can change your air tube o-rings every 4 or 5 years as preventative maintenance or you can wait for a leak to develop then change them. Rifles use four 118 o-rings and P-rods use four 113 o-rings for the air tube. There is one on the valve body, one on the fill assembly, and two on the gauge block. P-rods also have one size 111 o-ring inside the valve.
- Be sure to burnish your o-rings with a quality silicone grease. Trident Divers Lube works well  
[http://www.amazon.com/Silicone-Grease-Lubricant-Scuba-Regulators/dp/B006QMZFM0/ref=sr\\_1\\_2?ie=UTF8&qid=1376505702&sr=8-2&keywords=scuba+silicone+grease](http://www.amazon.com/Silicone-Grease-Lubricant-Scuba-Regulators/dp/B006QMZFM0/ref=sr_1_2?ie=UTF8&qid=1376505702&sr=8-2&keywords=scuba+silicone+grease).

- Here is video that shows how to disassemble your Marauder rifle  
<http://www.youtube.com/watch?v=VlxXklpS3ok>
- Here is a pictorial of how to disassemble your Marauder pistol  
<http://www.network54.com/Forum/275684/thread/1303422779/STRIP+DOWN+GUIDE+FOR+BENJAMIN+MARAUDER+PISTOL>
- Harbor Freight LED lights can be set on top of your chrony diffusers to get a cheap solution to a light kit  
<http://www.marauderairrifle.com/forum/viewtopic.php?f=2&t=7792&p=46080#p46080>  
<http://www.harborfreight.com/led-worklightflashlight-27-led-portable-69567.html>
- Use Vibra-tite VC-3 Threadmate on all three screw adjustments to keep them from moving, but to allow adjustment. <http://www.vibra-tite.com/products/vibra-tite-vc-3-threadmate> I recommend never use loctite because if you ever change your adjustments (very likely), it loses its hold and is difficult to clean off.

### **Affordable Scopes Appropriate for the Marauders**

- I have tested a wide variety of optics including swarovski, leica, and zeiss, but those scopes are not appropriate for airgun use mainly because the minimum focus distance is 50 yards or more while most of our airgun shooting is 50 yards or less.
- I like the following features for my Marauder scopes:
  - thin mil-dot reticle - for precise aiming and windage/elevation hold-over,
  - side focus - able to focus down to shorter ranges like 10 yards or less,
  - clear optics - even when cranked up to max for target shooting or sniping,
  - low to high variable mag - low good for hunting, high good for punching paper or sniping,
  - light-weight - important if you are going to carry in the field.
- The Simmons 44 Mag 6-21X44 is an excellent all-around compromise and my current favorite for carbine and/or rifle and it is usually around \$140 shipped. Leapers/UTG and Hawke scopes in general gets lots of use and recommendations for airguns. I have several Leapers which have the features I like, but the optics quality are appropriate for their lower price and at this stage, I really value clear optics. Leupold makes some great scopes, but their models with the features I like are over \$1500 which is beyond what I am willing to spend for them.
- This device allows easy alignment of your scope with your reticle which is critical for using mildot holdover. I hang a rope pendulum from a tree at 50 yards and align my vertical cross hair with the rope while the gun is level in a gun vice, then tighten down the scope rings.
  - [http://www.pyramydair.com/s/a/Hawke\\_Sport\\_Optics\\_Bubble\\_Level\\_Fits\\_9\\_11mm\\_Dovetails/4240](http://www.pyramydair.com/s/a/Hawke_Sport_Optics_Bubble_Level_Fits_9_11mm_Dovetails/4240)
- I like BKL scope rings. Whatever you get, make sure they are for 11mm rail and that the scope rings are the appropriate size for your scope tube - either 1" or 30mm
  - 1" [http://www.pyramydair.com/s/a/BKL\\_1\\_Rings\\_3\\_8\\_or\\_11mm\\_Dovetail\\_Matte\\_Black/2890](http://www.pyramydair.com/s/a/BKL_1_Rings_3_8_or_11mm_Dovetail_Matte_Black/2890)
  - 30 mm  
[http://www.pyramydair.com/s/a/BKL\\_30mm\\_Rings\\_3\\_8\\_or\\_11mm\\_Dovetail\\_Matte\\_Black/2905](http://www.pyramydair.com/s/a/BKL_30mm_Rings_3_8_or_11mm_Dovetail_Matte_Black/2905)
- Scope for Marauder Pistol
  - <http://www.midwayusa.com/product/785343/simmons-prohunter-pistol-scope-2-6x-32mm-truplex-reticle-matte> (Has extra-long eye-relief for pistol-style shooting, duplex reticle not mildot) I use mine on 6X most of the time, but 2X gives a wider field of view which can be good for hunting.
- Scope for Marauder Pistol set-up as a Carbine
  - <http://www.midwayusa.com/product/974439/simmons-44-mag-rifle-scope-6-21x-44mm-side-focus-target-turrets-mil-dot-reticle-matte> (light, good, inexpensive, 7 yard focus)
  - <http://www.midwayusa.com/product/253051/tasco-varmint-rifle-scope-25-10x-42mm-adjustable-objective-mil-dot-reticle-matte> (usually very inexpensive like \$60, light-weight, clear, mil-dot, very

short focus of 7 yards)

- Scope for Marauder Rifle
  - <http://www.midwayusa.com/product/974439/simmons-44-mag-rifle-scope-6-21x-44mm-side-focus-target-turrets-mil-dot-reticle-matte> (light-weight, good features, inexpensive, 7 yard focus)
  - <http://www.midwayusa.com/product/959813/nikko-stirling-platinum-nighteater-rifle-scope-30mm-tube-6-24x-56mm-side-focus-with-large-wheel-extended-mil-dot-reticle-matte> (clear, high-magnification, extended mil-dot for long range, heavy, 11 yard focus)
  - <http://www.midwayusa.com/product/187319/hawke-sidewinder-tactical-rifle-scope-30mm-tube-6-5-20x-42mm-side-focus-red-and-green-illuminated-1-2-mil-dot-reticle-matte> (comparable to the Nikko, but much more expensive, thinnest reticle with ½ mildot gradations - actually too thin for me, 10 yard focus)

### **Recommended Pellets:**

Good accuracy usually requires quality pellets matched to your airgun barrel. Some barrels (e.g., 22 M-rod) are more pellet picky than others (e.g., 25 M-rod). Some good pellet brands to try in your gun are JSB, H&N, and Crosman/Benjamin. Different manufacturers use different formulas for their alloy (e.g., JSB pellets are very soft where Crosman are very hard). When you switch from one type/brand of pellet to another, it is a good idea to clean your barrel then season it by shooting some pellets through it.

Pellets per caliber:

- The 25 Marauders consistently like 25.4 grain JSB Kings (best) and 27 grain Benjamin Domes (second best).
- The 177 Marauders tend to like the 10.5 grain Crosman Premier Heavy Domes and 10.34 grain AA or JSB Heavy.
- The 22 caliber guns (M-rod and P-rod) tend to be very pellet picky. Some have luck with H&N Barracuda Match or Field Target Trophy. H&N makes their pellets in different head size (4.5mm or 4.52 in 177 and 5.50mm, 5.51, 5.52, 5.53, 5.54, 5.55 in 22 caliber). The 18.1 grain JSB are a good match for the Marauder if they shoot well out of your barrel.

If you like hunting, the Predator Polymag pellets are amazing because they expand on impact and transfer more energy to your target. Polymag weights are 25 cal - 26 grains, 22 cal - 16 grains, 177 cal - 8 grains. You can tune your gun and dial in your scope using the comparable weight JSB pellet then switch to the more expensive Polymag for hunting as they tend to fly the same arc and hit the same points of impact, but you can adjust your POI if they do not.

Air Arms (AA) pellets are very similar to JSB pellets and may be made by JSB although they are different. Some lucky Marauder owners get good accuracy with Crosman hollowpoint pellets from Walmart, but they did not group tightly out of my 22 or 177 Marauders. Crosman Premier Ultra Magnum (in the tin) are a good value, but not as consistent as the top brands. I use them for tuning and plinking, then use the premier (boxed) pellets for precision shooting in my guns that shoot that pellet well.

Some specific brands of pellets to avoid: Gamo, Daisy, and Benjamin Destroyers.

### **How to boost power:**

For the P-rod, do the following:

- Increase your fill pressure (I usually use 2800 psi for P-rod, but 3000 psi would be great if you can get it).
- Install a stiffer hammer spring. A good one is .30" OD 1.5" long and .041" diameter wire. Here is one

<https://www.mscdirect.com/product/06811111>

- Drill the transfer port to .109" which is a 7/64" drill bit. A 1/8" drill bit works too. Here is a great video <http://www.youtube.com/watch?v=qoJnSwFiX8w>
- This guy has maxed out a P-rod <http://www.youtube.com/watch?v=x0ZvxPZ0Mh4> then installed the BHB to get a decent number of good shots within an acceptable extreme spread.

For the M-rod, do the following:

- Increase your fill pressure (I use 3200 psi for M-rods)
- Install a stiffer hammer spring. Note that if you install the 10 pound spring, you will probably have to fill to a higher fill pressure (like 3200 psi). For most tunes, the stock hammer spring works just fine, but it is difficult to tune above 45 FPE with the stock hammer spring. A good one is .48" OD 2.5" long and .055" diameter wire. Here is one <https://www.mscdirect.com/product/06812143> Here is another <http://www.mcmaster.com/#9657k417/=t4iqfi>
- Open up the valve metering screw to max (usually 5.5 turns from closed), but often the best shot strings are achieved with the transport valve constricted somewhat from full open - especially on smaller calibers.
- (this mod takes skill) Flow and port (open up and smooth out) the entire air path from air tube to pellet. This includes the pressure gage block, the valve cap, the valve stem, the valve port, the transfer port, the barrel inleede, and the bolt probe (on the 25).
- Smoothing out the bolt probe tip (that redirects air to the pellet skirt) on the 25 Marauder for smoother air flow.
- You can install a valve hop-up kit and smooth flow valve stem to improve valve cap and stem [PakProtector](#) has modified Marauders for ultra-high power and this is what he says » Wed Apr 30, 2014 1:30 am "The 10# spring is adequate for opening a stock valve. IFF you make the valve throat larger (increasing the area and therefore the pressure holding it closed), a 15# spring may be of use. Start with a silver 1763 valve, pull its sleeve, and take its throat to .265 and its exhaust to .18. Run poly tubing properly cut to length and square for the transfer sleeve, and do not neglect to make the barrel port larger as well. That should put you near 80 FPE for a clip worth. cheers, Douglas"

### **Some Cool Modification on the Horizon**

- 500 cc bottle for Marauder rifles from PakProtector <http://www.network54.com/Forum/79537/thread/1337596323/Marauder+500CC> <http://www.marauderairrifle.com/forum/viewtopic.php?f=28&t=4090>
- Bullpup kits for Marauders <http://www.maddogriflestocks.com/MDRL-Marauder-Bull-Pup-Kit-MDRL-Kit.htm>
- Air Regulator (note a regulator reduces peak power, but gives a very flat shot string).
- Light-weight hammers from Motorhead
- LDCs from Neil Clague or TKO22

### **Getting a PCP to shoot well requires:**

1. A good quality barrel - know the twist rate and what pellet brand/pellet head size it prefers.
2. A consistent blast of air from the valve - regulated or unregulated.
3. Good quality consistent pellets, e.g., JSB, H&N, or Crosman Premier
4. Take yourself and wind out of the equation. Shoot from a fully supported bench or gun vice and only test groups on windless days or indoors.