

Deciding what to Build

Before buying your first part, you need to decide what kind of rifle you want – one for shooting varmints, using in a match, plinking? Once you make this decision, you know what type of upper receiver and barrel you will use. The upper receiver and barrel you choose will determine the remaining parts needed.

Here are several types of stripped upper receivers, each with different features for different applications.

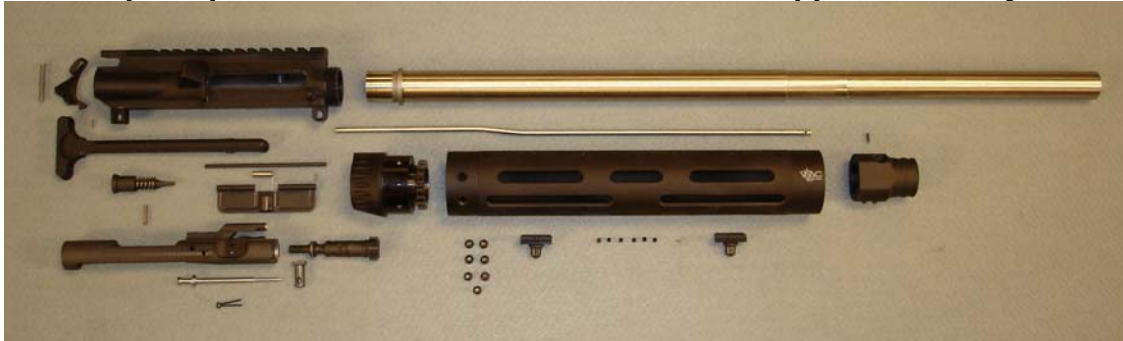
1. AR-15 A1 – Has fixed carry handle, shell deflector and requires the installation of the forward assist assembly, ejection port cover assembly and the A1 sight assembly that allows only for windage adjustment. This upper is ideal to build a “Retro” civilian version of the Vietnam era M-16 Rifle.
2. AR-15 A2 – Has fixed carry handle, shell deflector and requires the installation of the forward assist assembly, ejection port cover assembly and the A2 sight assembly that allows for windage and elevation adjustments. This is a popular upper to use for building a rifle for use in shooting matches.
3. AR-15 A3 – Has flattop with picatinny rail, shell deflector and requires the installation of the forward assist assembly and ejection port cover assembly. This is the current military upper and is used to build a civilian copy of the M4 (carbine with 16” barrel) or M-16 A4 (rifle with 20” barrel). Also great for building any type of Varmint or Target Carbine/Rifle since any type of optic can be mounted to the Flattop.
4. AR-15 Flattop – There are several configurations of “Flattop” upper receivers that have various heights of picatinny rails and are designed to have scopes mounted. These generally do not accommodate the forward assists assembly or ejection port cover assembly. These are often referred to as “Slick-Sided” uppers. Great for building any type of Varmint or Target Carbine/Rifle since any type of optic can be mounted to the Flattop.

For our project, we decided to build a Varmint Rifle in 204 Ruger. Since we want to scope our rifle, we do not want an upper receiver with a carry handle, nor do we need open sights. That rules out the A1 and A2. Therefore, either the A3 or the Flattop will do. We chose the A3 because of its versatility. In addition, since

Purchasing Parts

Now that we have selected the type of upper receiver (A3), we know we need the forward assist assembly and ejection port cover assembly. These parts would not be required had we selected a Flattop. In addition, since we are using a bull barrel with a free-float handguard and without sights, we need a gas block but do not need a flash hider. Had we decided to use open sights, our front sight would have had the gas block built in. Also, the free-float handguard does not require the use of a delta pack or handguard cap, as these are integral to the Free Float Tube Handguard.

A. Complete parts list for our AR-15 Varmint Rifle Upper Assembly.



Note: See schematic on page five for parts identification.

Product Number

Description

410780	Model 1 Upper Receiver Stripped AR-15 A3 Flattop Matte
787744	DPMS Forward Assist Assembly Round (also available in teardrop shape) AR-15 Matte
888007	DPMS Ejection Port Cover Assembly AR-15 Matte
618453	DPMS Bolt Carrier and Key with Screws AR-15 Matte
287973	DPMS Bolt Cam Pin AR-15 Matte
670435	AR-Stoner Firing Pin and Retaining Pin AR-15 Stainless Steel
917812	DPMS Charging Handle Stripped AR-15 Matte
111442	DPMS Charging Handle Latch Spring AR-15
919466	DPMS Charging Handle Latch Roll Pin AR-15
713034	Badger Ordnance Tactical Charging Handle Latch AR-15 Matte (Note: This upgraded latch is a nice feature with scopes as the extended latch makes operating the charging handle much easier.)
163884	Shilen Drop-In Match Barrel with Bolt AR-15 204 Ruger 920 Diameter 1 in 9" Twist 24" Stainless Steel (Note: This barrel comes with a matched bolt (complete) that is headspaced and numbered to the barrel by the factory.)
147862	DPMS Gas Block AR-15 Bull Barrel .936" Inside Diameter Matte
395110	DPMS Gas Tube Rifle AR-15
384068	DPMS Gas Tube Roll Pin AR-15
930104	JP Enterprises Modular Free Float Tube Handguard

Before Getting Started

Please remember these important things:

1. Safety – Always remember to wear safety glasses. Pins and springs can (and probably will) fly across the room. A shop apron is also helpful to protect your clothing.
2. Work Surface – Be sure to work in a well-lit area with plenty of clear, clean workbench area. Place a mat like the Tipton Gun Cleaning and Maintenance Mat over your work area to keep parts from rolling around or getting lost. The mat will also help protect your guns and parts from potential damage.
3. Floor Area – Since we are working with several springs and small pins, it is likely some of these small parts will find their way to the floor. If you have a clean floor or even if you place a white towel or some plain covering on the floor, it will be easier to find these small parts. Nothing is more frustrating than having to delay your project because a \$ 0.99 roll pin vanishes.
4. Tools – There are several tools necessary to do a professional job that you are proud of. Please don't skimp here, as the quality of your work will suffer. Use the right tool for the job. Try and use brass punches whenever possible to reduce the chance of marring the finish.

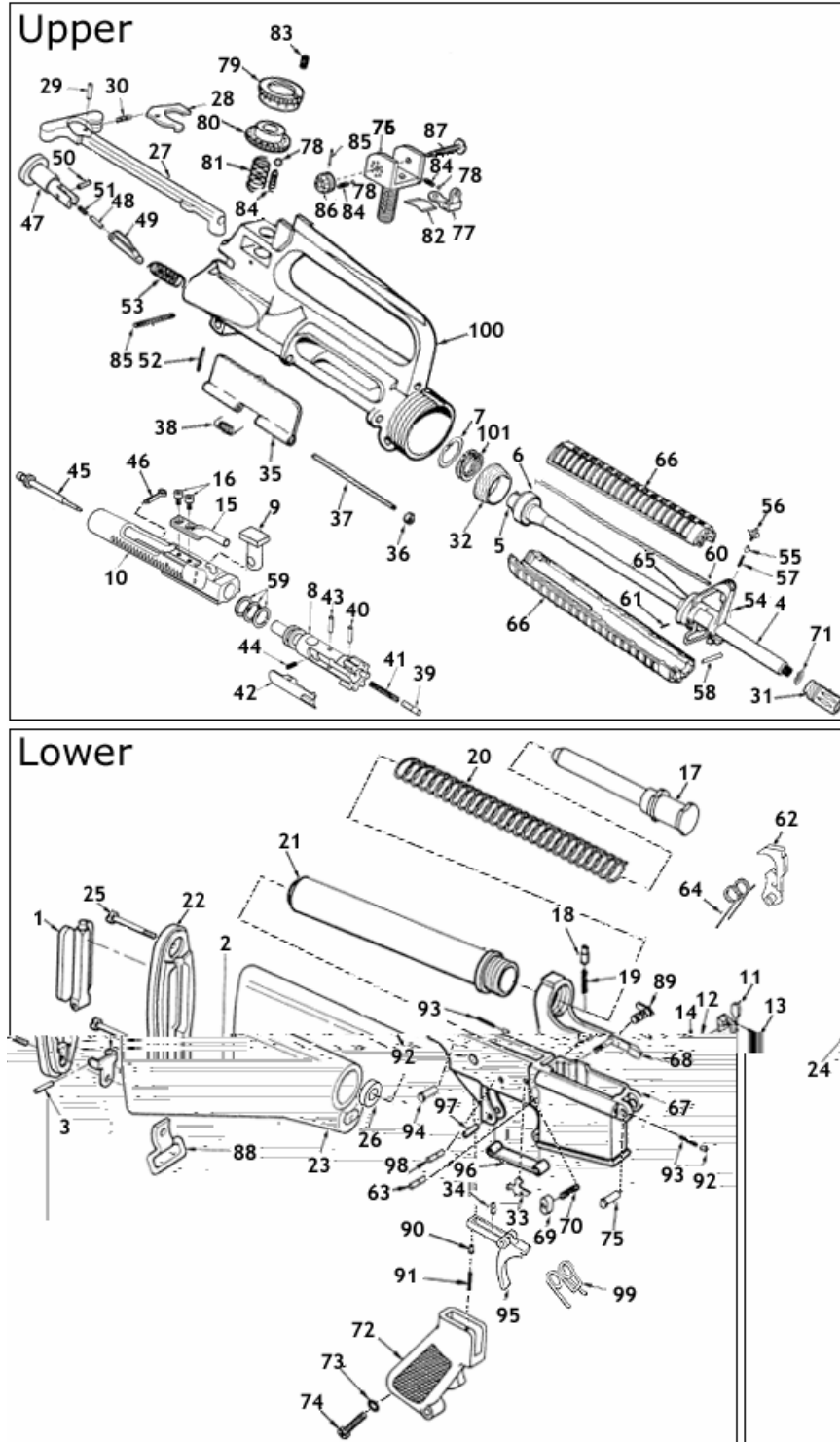
B. Here is a list of all the tools you will need.



Product Number	Description
539742	Silencio Wrap-Around Safety Glasses Clear
666974	Wheeler Engineering Gunsmith Vise
160957	Tipton Gun Cleaning and Maintenance Mat 16" x 54"
265720	Wheeler Engineering Bench Block
439523	Wheeler Engineering 89-Piece Professional-Plus Gunsmithing Screwdriver Set
297752	Wheeler Engineering Nylon/Brass Hammer 8 oz
147183	Wheeler Engineering Punch Set 8-Piece Brass
786472	Wheeler Engineering Punch Set 8-Piece Steel
694883	Schuster AR-15 Roll Pin Starter Punch Steel Package of 2 (Note: Makes starting roll pins extremely easy.)
829522	Model 1 Armorer's Action Block with Lower Receiver Action Block AR-15
847759	AR-Stoner Takedown Wrench AR-15 Steel (Note: Ideal for installing a free-float handguard.)
119975	Wisdom 1/2" Torque Wrench 150 ft lb
131522	Rig Gun Cleaning Brush Stainless Steel
121875	Loctite 271 Threadlocker Red 10 ml (Note: Only for the featured Free Float Tube Handguard, as suggested by Manufacturer.)
723099	Loctite C5-A Anti-Seize Grease Copper 1 oz Tube

Getting Started

1. Make sure you have a good AR-15 schematic to use as a guide in assembling your upper assembly. The schematic is helpful in finding the correct names of parts and determining what they look like. A fantastic schematic can be downloaded free of charge at www.midwayusa.com.





Building the Ultimate AR-15 Varmint Rifle (Upper Assembly)

Spread out your Tipton Gun Cleaning and Maintenance Mat.

1. Arrange all your tools on your workbench so they are easy to access.
2. Arrange all your parts on your mat.
3. Group your parts together by assembly or with related parts. Refer to pictures under items C.1.a, C.2.a, C.3.a, C.4.a, D.8.a, D.9.a and D.10.a to aid you in this grouping process.

C. Upper Assembly (without Barrel Assembly)



1. Install Forward Assist Assembly on Upper Receiver

- a. This assembly consists of the Forward Assist, Forward Assist Spring and Forward Assist (Roll) Pin.



- b. Turn Upper Receiver upside down so the picatinny rail is against the work surface.



- c. Slide the Forward Assist Spring on the Forward Assist (direction does not matter).



- d. Start the Forward Assist Pin into the bottom of the Upper Receiver so it stands on its own (it is always a good idea to drive punches or hammer on the side that is least visible...just in case). Use the Roll Pin Starter Punch to do this as it makes the job MUCH easier!



- e. Insert the Forward Assist Assembly, make sure the pawl is oriented toward the middle of the receiver (see picture - if you take off the spring, you can see a flat side on the Forward Assist - this is where the pin rides).



- f. Slide the Forward Assist Assembly into the Upper Receiver.



- g. While compressing the Forward Assist Assembly, drive the pin through until it is flush with the receiver. Once the pin is firmly started, you should not have to hold the forward assist in place and you can use a large brass punch to drive the pin in until it is barely sticking up. If you find this too awkward, you can use a small punch as a slave pin to keep the Forward Assist Assembly compressed so you can use both hands. You may have to take a small punch and drive the pin a bit further until it is flush or even slightly recessed (just look at both sides to try and center the pin in the Upper Receiver).



- h. Test the Forward Assist to make sure it moves freely in and out when compressed.

- i. Forward Assist Assembly is now installed.

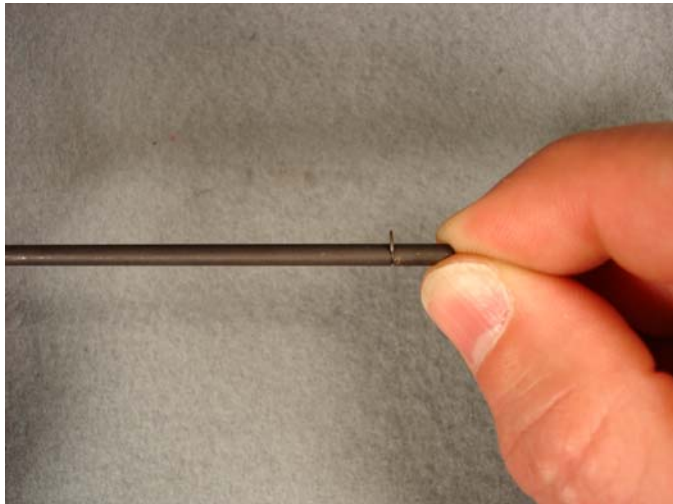


2. Install Ejection Port Cover Assembly on Upper Receiver

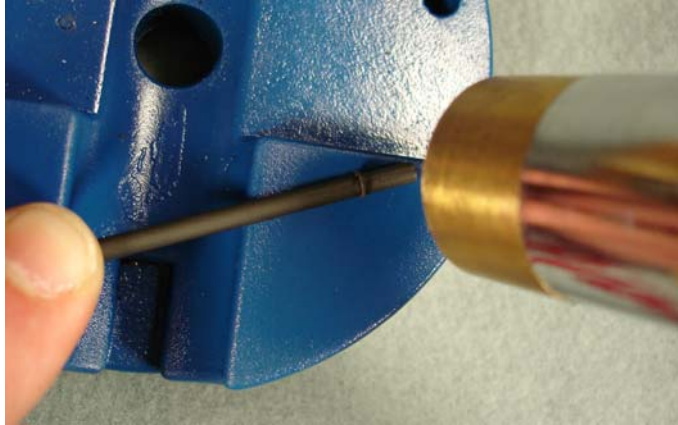
- a. This assembly consists of the Ejection Port Cover, Ejection Port Cover Pin, Ejection Port Cover Pin Snap Ring and Ejection Port Cover Spring.



- b. Carefully place Ejection Port Cover Pin Snap Ring in the groove on the end of the Ejection Port Cover Pin.



- c. Gently hammer Ejection Port Cover Pin Snap Ring the rest of the way onto the Ejection Port Cover Pin. Be sure to make a direct, downward strike on the snap ring. If you hit it off center, the Ejection Port Cover Pin Snap Ring may fly across the room. This is also a good time to check and make sure your safety glasses are still on.



- d. Lay the Upper Receiver on its side so the Ejection Port is facing up and the Barrel Threads are pointing to the right as you stand over the Upper Receiver. Barely start the Ejection Cover Pin so it stays in place on its own, making sure the end without the snap ring is started first.



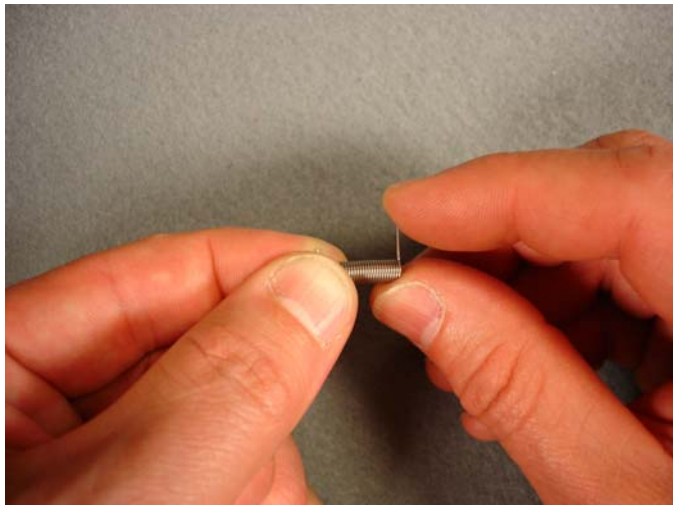
- e. Place the Ejection Port Cover on the Upper Receiver in the open position, making sure the holes in the Ejection Port Cover are lined up with the holes on the Upper Receiver.



- a. Slide the Ejection Port Cover Pin through the hole in the Upper Receiver that is closest to the Barrel Threads, stopping just before the pin emerges in the middle opening of the Ejection Port Cover (this is where the Ejection Port Cover Spring goes).



- b. While Holding the Ejection Port Cover Spring in your left hand (by the end with the short part of the spring sticking out), grab the long part of the spring that sticks out and wind it 1/2 revolution away from your body, stopping when the long part of the spring is pointing toward you.



- c. As you hold the spring under tension, place the long end on the right side of the Ejection Port Cover (closest to the Ejection Port Cover Pin that is part way through the assembly), while still holding on with your left hand, and slide the Ejection Port Cover Pin the rest of the way through, until the Ejection Port Cover Pin Snap Ring stops your progress.



- d. Close the Ejection Port Cover, making sure it snaps shut.



- e. Reach inside the Upper Receiver and push the Ejection Port Cover, making sure it snaps open.



- f. **Ejection Port Assembly is now installed.**

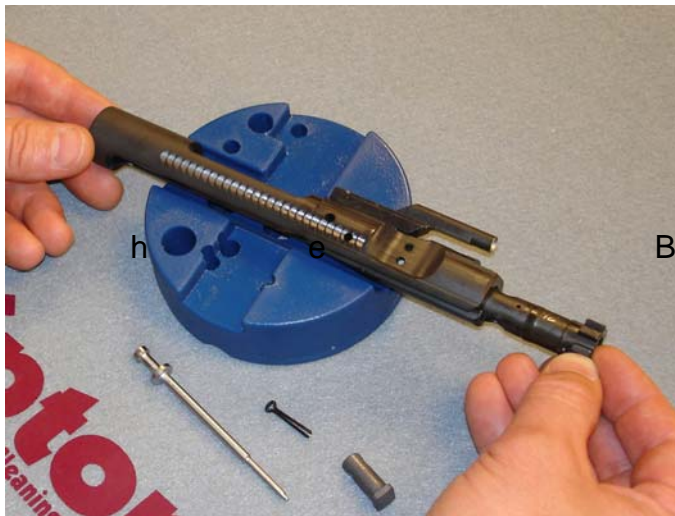
2. Assemble Bolt Carrier Assembly
 - a. The Bolt Carrier Assembly consists of the Bolt, Bolt Carrier, Bolt Cam Pin, Firing Pin and Firing Pin Retaining Pin.



- b. Note that the Bolt is complete and ready to be installed in the Bolt Carrier. The Shilen Barrel we selected is Match quality and the manufacturer headspaces and numbers the Bolt (included with the barrel) to each Barrel.



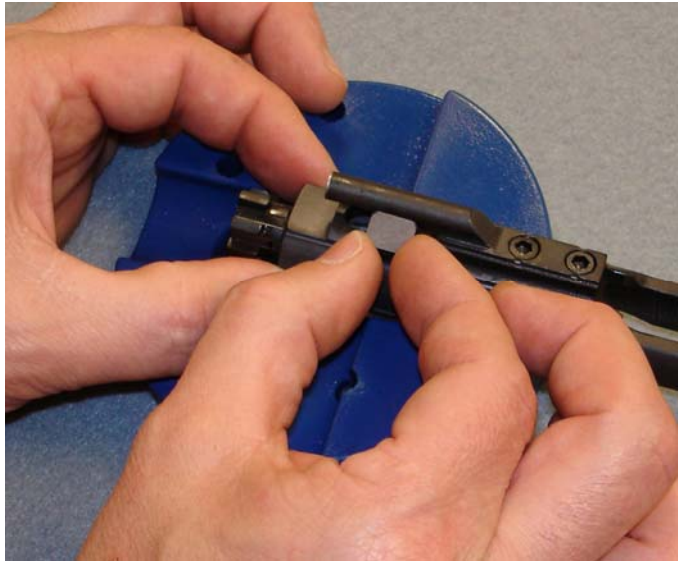
- c. Push the bolt all the way into the end of the Bolt Carrier; making sure the large hole through the middle of the bolt is aligned with the hole in the Bolt Carrier.



- d. Insert the Bolt Cam Pin through the large hole in the Bolt Carrier (just under the Bolt Carrier Key).

The holes in the Bolt Cam Pin will need to be perpendicular to the Bolt Carrier Key in order for the Bolt Cam Pin to clear the Bolt Carrier Key for insertion. If the Bolt Cam Pin will not go into the bolt, check the bolt orientation,

as it may need to be rotated 180 degrees. Once the Bolt Cam Pin is inserted, rotate the Bolt Cam Pin $\frac{1}{4}$ turn so the large holes in the Bolt Cam Pin are lined up with the front and back of the Bolt Carrier and the Firing Pin can slide through.



- e. Slide the Firing Pin through the Bolt Carrier (toward the Bolt) until it stops.



- f. Insert the Firing Pin Retaining Pin through the Bolt Carrier making sure the round end of the pin is nestled all the way into the large recessed side of the Bolt Carrier. Since the Bolt Carrier is hollow, the Firing Pin Retaining Pin needs to go through the hollow part of the inside of the Bolt Carrier and enter the hole on the other side before it emerges on the other side. It can be a little tricky to achieve this alignment and pounding on the pin will not help. Once in proper alignment, this pin should slide in easily.



- g. Test the bolt to make sure it moves in and out of the Bolt Carrier freely.

- h. **Bolt Carrier Assembly is now completed.**



3. Assemble Charging Handle Assembly

- a. The Charging Handle Assembly consists of the Charging Handle, Charging Handle Latch Spring, Charging Handle Latch Roll Pin and Charging Handle Latch.



- b. Insert Charging Handle Latch Spring into Charging Handle.



- c. Start the Charging Handle Latch Roll Pin into the top of the Charging Handle so it stands on its own. Use the Roll Pin Starter Punch to do this as it makes the job MUCH easier!



- a. While compressing the Charging Handle Latch into the Charging Handle, line up the holes and drive the Charging Handle Latch Roll Pin until it is flush.

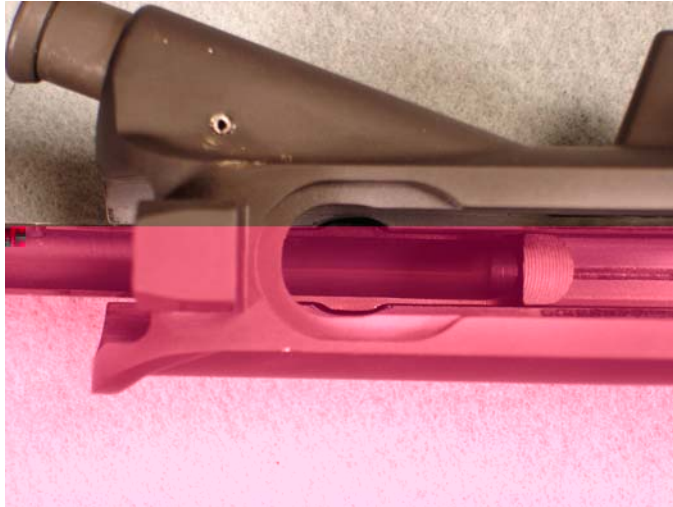


- b. **Charging Handle Assembly is now completed.**

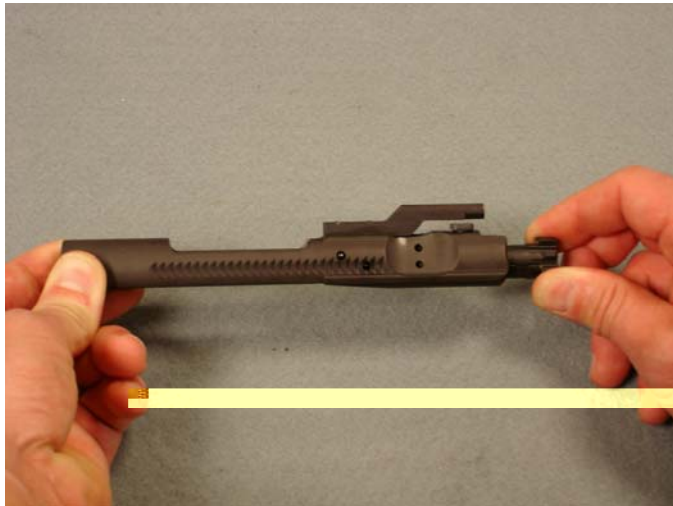


2. Install Charging Handle Assembly and Bolt Carrier Assembly into Upper Receiver.
 - a. To complete the assembly of the Upper Receiver, you can go ahead and install these parts to ensure proper fit. However, you will have to remove these parts to continue with the installation of the Barrel Assembly.

- b. Turn the Upper Receiver upside down so that the Picatinny rail is against the work surface. Insert the Charging Handle Assembly by lining up the tabs on the Charging Handle with the grooves inside the Upper Receiver.



- c. Slide the Charging Handle Assembly in only far enough that it will stay stationary on its own.
- d. Pull Bolt out of Bolt Carrier as far as it will go so the Bolt Cam Pin will not contact the inside of the Upper Receiver. The Bolt Carrier Assembly will not go into the Upper Receiver if the Bolt is not pulled out.



- e. Insert the Bolt Carrier Assembly (with the bolt face pointing toward the barrel threads) into the Charging Handle Assembly so that the Bolt Carrier Key rides in the trough on the underside of the Charging Handle, stopping when the Bolt Carrier Assembly and the Charging Handle Assembly are parallel and even with each other.



- f. Push the Bolt Carrier Assembly and Charging Handle Assembly into the Upper Receiver until they click firmly into place. The Ejection Port Assembly should pop open.



D. Barrel Assembly



3. Installing the Upper Receiver into the Action Block and tightening it in the Vise
 - a. Remove the Charging Handle and Bolt Carrier Assembly from the Upper Receiver.
 - b. Slide the Action Block Insert into the back of the Upper Receiver. When you do this, the Ejection Port Cover will pop open. This insert keeps the Upper Receiver from being crushed when you tighten it into the Vise.



- c. Close the Ejection Port Cover.



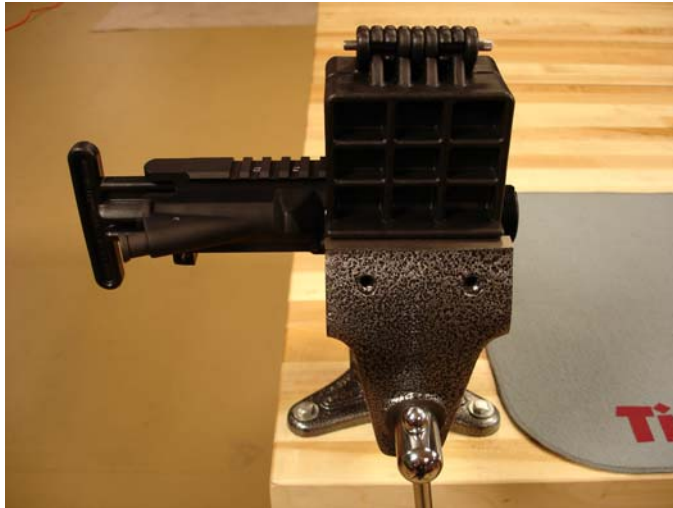
- d. Place the Upper Receiver into the Action Block.



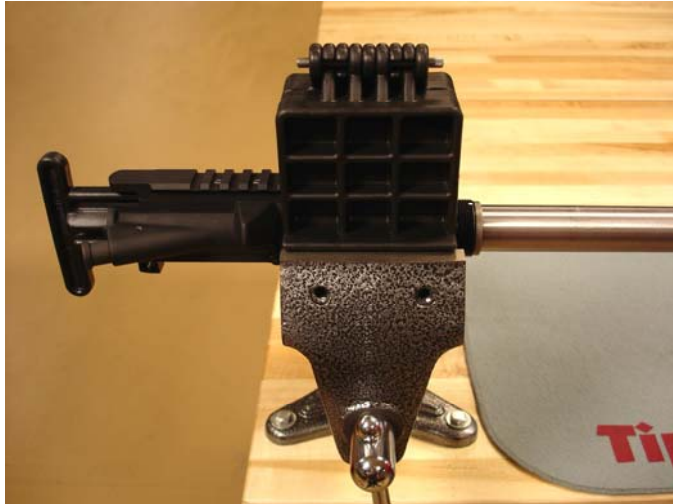
- e. Close Action Block.



- f. Place the Action Block into your Vise and tighten until snug – but do not over-tighten.

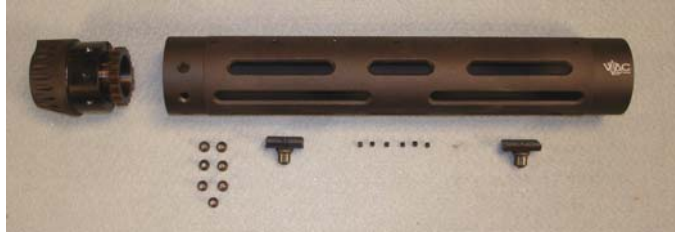


4. Installing the Barrel
 - a. Slide the Barrel into the threaded end of the Upper Receiver. Make sure the pin on the Barrel lines up with the slot in the Upper Receiver. Slide Barrel all the way into the Upper Receiver until the pin hits the back of the slot.

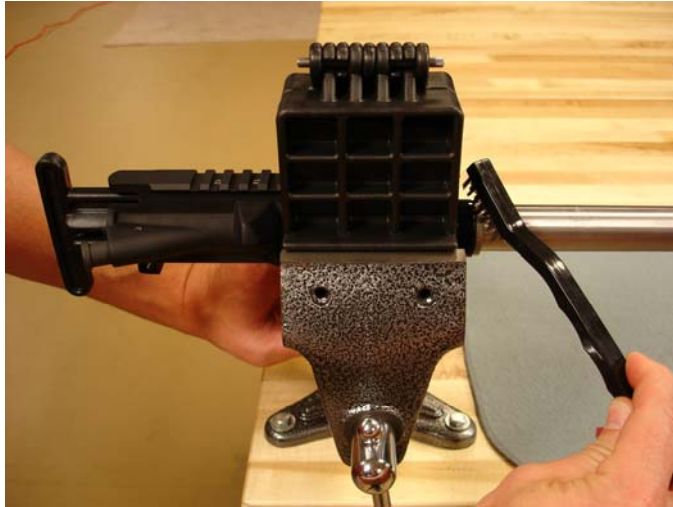


5. Installing Outer Receiver Nut and Inner Barrel Retainer Nut on Upper Receiver barrel threads – Note that these instructions are recommended by the manufacturer of the Free Float Tube Handguard that we chose. If you are installing another type of handguard, instructions may vary.

- a. This assembly consists of the Outer Receiver Nut, Inner Barrel Retainer Nut, Free Float Tube Handguard, 7 Flat Head Handguard Screws, 7 Handguard Plug Screws and 2 adjustable Sling Swivel Studs.



- b. Remove Coating from the threads of the Barrel with a Steel Brush.

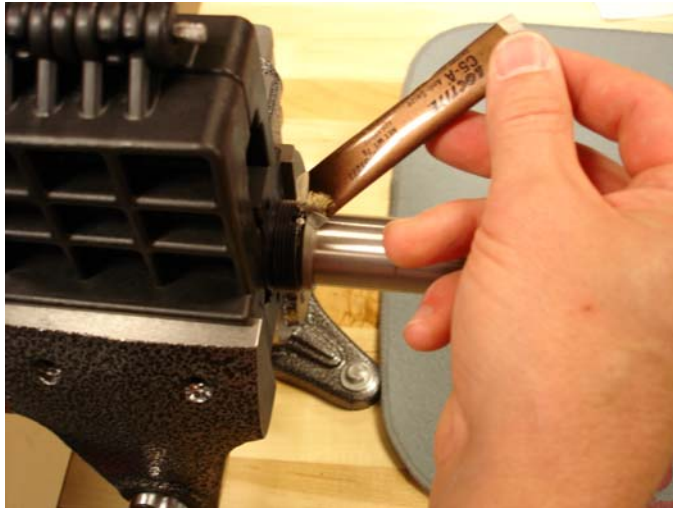


- c. Remove Outer Receiver Nut and Inner Barrel Retainer Nut from Free Float Tube Handguard.

- d. Unscrew and separate the Inner Barrel Retainer Nut from the Outer Receiver Nut.



- a. Coat barrel threads lightly with anti-seize or white lithium grease to keep the threads from galling.



- b. Thread Outer Receiver Nut on Barrel Threads until the Outer Receiver Nut comes in contact with the Ejection Port Cover Pin.



- c. Unscrew the Outer Receiver Nut past one full rotation, stopping when the gas hole on the Outer Receiver Nut is lined up with the gas hole on the Upper Receiver.

- d. Coat Inner Barrel Retainer Nut threads lightly with anti-seize or white lithium grease to keep the threads from galling.



- e. While holding the Outer Receiver Nut with one hand to keep the gas holes in alignment, thread on Inner Barrel Retainer Nut and hand tighten.



Please note that the manufacturer of the Free Float Handguard Tube we chose recommends that you coat the Upper Receiver Threads with Loctite and let it sit over night so the gas holes stay in alignment when you install the Inner Barrel Retainer Nut. We skipped this step, as it will permanently install the Outer Receiver Nut. We were able to hold the Outer Receiver Nut in place while tightening the Inner Barrel Retainer Nut. If you are not able to do this, Loctite will be necessary.



- f. Attach Takedown Wrench to the Inner Barrel Retainer Nut, making sure at least two of the pegs on the wrench are firmly inserted into the gas tube grooves on the Inner Barrel Retainer Nut.

- g. Tighten Inner Barrel Retainer Nut with Takedown Wrench until snug. Do not over tighten. If you are not using Loctite, make sure you hold onto the Outer Receiver Nut so the gas holes stay in alignment.

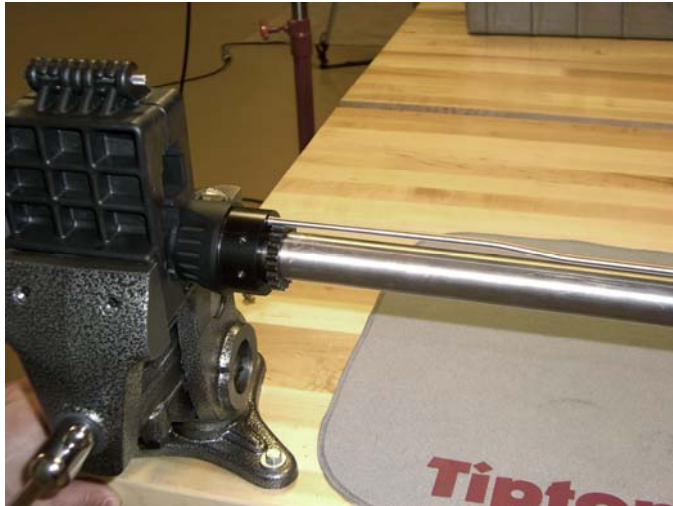


- h. Install Torque Wrench into slot in the Takedown Wrench.



- i. Seat the Threads (recommended in the U.S. Marine Corps Technical Manual). If you are not using Loctite, make sure you hold onto the Outer Receiver Nut so the gas holes stay in alignment.
Torque to 35 ft-lbs.
Loosen.
Torque to 35 ft-lbs.
Loosen.
Torque past 35 ft-lbs until gas holes are in alignment, making sure not to exceed 80 lbs.
Note: With this particular handguard, if you cannot line up the gas holes within the torque range of 35 to 80 ft-lbs, loosen the Inner Barrel Retainer Nut and loosen the Outer Receiver Nut another full revolution and try again. You cannot do this if you used Loctite.

- a. Check to make sure Gas Tube slides freely through gas holes.



- b. Remove Upper Assembly from Vise and Action Block.

2. Installing the Gas Tube and Gas Block

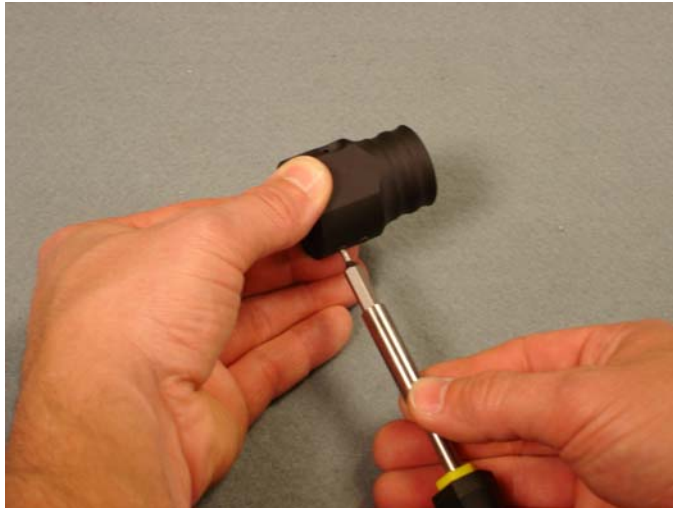
- a. This assembly consists of the Gas Tube, Gas Block and Gas Tube Roll Pin.



- b. Insert Gas Tube into gas holes on Inner Barrel Retainer Nut, Outer Receiver Nut and Upper Receiver. Make sure the end with the three holes (these are for the Gas Tube Roll Pin and gas hole going into Barrel) is on the end where the Gas Block will be.



- c. Loosen set screws on the bottom of Gas Block so it will slide over Barrel.



- d. Slide Gas Block all the way onto Barrel as far as it will go, guiding Gas Tube into hole in Gas Block. Note: You may have to polish the Barrel where the Gas Block goes and polish the inside of the Gas Block with 600 grit paper so it easily slides in place. This only takes a minute or two.



- e. Barely tighten set screws on the Gas Block so it will stay in place, but you can still rotate it by hand.



- f. Orient the Gas Block so the gas hole in the Gas Tube and the gas hole in the Barrel are perfectly aligned.
- g. Tighten set screws.
- h. Drive Gas Tube Roll Pin through Gas Block and Gas Tube.



3. Install Free Float Tube Handguard.

- a. Install 6-32 x 1/8" Plug Screws (7) in the top of the Free Float Tube Handguard.



- b. Install Sling Swivel Studs into Free Float Tube Handguard. To do this, remove Sling Swivel Stud from retainer nut. Place the Retainer nut inside the Free Float Tube Handguard track. Screw Sling Swivel Studs into retainer nut.



- c. Line up screw holes in Free Float Tube Handguard with the screw holes in the Outer Receiver Nut and install 6-32 x 5/16" Flat Head Screws (7).



4. Upper Receiver Assembly is now ready to be attached to your Lower Receiver Assembly.



END OF INSTRUCTIONS