

Gunsmithing the AR-15



BONUS LESSON

MODERN
GUN
S C H O O L

PRECISION • PERFORMANCE • QUALITY • CRAFTSMANSHIP

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Modern Gun School

Introduction

Congratulations on your success so far in your program, we are proud of you. Your progress shows you have the determination to achieve your goals. We suggest that you stick with your study schedule and maintain good study habits. We know you are excited to start a new lesson.

Below, we provide our contact information as well as the information on completing examinations and submitting your examinations to the school. For information on our grading system, retesting, payments, change of address and how to study, please refer to the course introduction section you received in your first shipment of the course.

Contact Information

Sometimes even the best students need help. Our staff tries to anticipate when you might have trouble and provides a little extra support within the study materials. In spite of these efforts, we know that you may need to reach us to help you over a difficult spot.

There are four ways to reach our staff:

1. You may reach us by email at info@moderngunrepair.com. Tell us what lesson you are studying, the page number, and how we can help. Please include your student ID number. Responses generated from our staff are usually sent by the next business day.
2. You may call the school Monday-Friday during the hours of 8:30 a.m-4:30 p.m. (EST). If you call after hours please leave a message with your name, student ID number, the lesson and the page number where you are having trouble. Also, let us know the best time to call you back. We will get in touch with you as quickly as we can. You can reach us toll free at 800-493-4114.
3. If you choose to mail your questions, please submit one of our Request for Consultation forms, located at the end of each Unit. Mail to our address at:

Modern Gun School
Student Service Center
P.O. Box 3773
Allentown, PA 18106
4. You can Fax your request for help to: 610-871-0034. Our staff is here to help you!



Examinations

Since you schedule your own examinations, you should not feel any pressure. You should take your exams when you are ready. We suggest following these simple steps:

1. Review your notes, diagrams, and self-checks.
2. Follow the directions carefully. Be sure you understand what you are asked in each question.
3. All of your exams are “open book.” You can refer back to your lesson material to look up any answers to questions you do not know. Open book exams help you learn and remember the material you have studied.
4. When you feel confident about your answers, neatly and carefully copy them onto the answer sheet provided with the exam.
5. Make a copy of your answer sheet. Although it is unlikely, an assignment can be misplaced or lost in the mail. MGS cannot be responsible for exams lost in the mail.
6. Mail your answer sheet to us in a course exam return envelope.
7. It will take MGS about 7-10 business days to receive your examination and return your grade results to you.
8. When you receive your Grade Report, make sure you take the time to review any questions you may have answered incorrectly. This exercise will help reinforce your learning.

Mailing Instructions for Examination Answer Sheets

Before submitting an Examination Answer Sheet, make sure that it has the following:

1. Your answers to all the examination questions
2. Your Name, Student ID Number, and Address.

To Mail:

1. Use the return envelope provided (more than one exam or assignment may be sent in an envelope) and mail to:

**Modern Gun School
Student Service Center
P.O. Box 3773
Allentown, PA 18106**

2. Make a copy of the answer sheet to keep for your records.
3. It is very important that you complete the return address information on each envelope. This includes your name and address.
4. Mail each exam as soon as it is completed using first-class postage.



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BONUS LESSON

The AR-15

History and Usage, Pros and Cons, Field service manuals, Disassembly and reassembly, Checklist of failures and corrections.

The AR-15 was developed by Robert Fremont and James Sullivan from the AR-10 design which was invented by Eugene Stoner (1922-1997) in 1955. The AR-10 fired the .308 Winchester round... known in the military by its NATO designation of 7.62x51. The US Military was looking for a lighter alternative to the M-14 and had decided to seek a battle rifle that used smaller ammunition. The smaller ammunition would allow a soldier to carry more ammo without increasing the weight of his battle load. There were two cartridges in contention, the .223 Remington and the .222 Remington Magnum. The .223 Remington prevailed and was designated the 5.56x45 NATO.

At the military's request, Fremont and Sullivan began adaptation of the AR-10 to fire the 5.56x45 at Armalite, a division of Fairchild Engine & Airplane Corporation. After the acceptance of the AR-15 by the military (in selective fire version), the rifle was renamed the M16. Armalite eventually sold the manufacturing rights of the AR-15 to Colt Firearms. Though we refer to any rifle of this design as an "AR", Colt has the rights to that title. Note: The versatility of Stoner's initial design enabled a battle rifle receiver to be made from aluminum and still maintain an extremely strong bolt to barrel lock-up because of the strong barrel extension. This lock-up design is very strong and similar to modern pump and semi-auto shotguns.

Pros and Cons

AR-15/M16 rifles are direct gas impingement operating systems. This means they have the potential to become very dirty and malfunction if improper gunpowder is used. Rod type powder is preferable, as it leaves little residue after burning. In short, these operating systems can be finicky. Also, the gas systems must be balanced with the buffer system to assure efficient operation. The extractors are not able to withstand steel case ammo as a steady diet, as can an AK. The stocks are made of plastic and contain the buffer system. Thus, the stocks cannot withstand heavy abuse or hand-to-hand combat situations. On the other hand, these rifles are easy to repair and maintain. Many people are able to work on their rifles without the need of a gunsmith. If the proper tools are in your inventory, maintenance and custom alterations are not much of a challenge to the Ordnance Technician. The accuracy of these rifles is usually about 1.5 MOA, or 1 1/2" groups at 100 yds.



Tools Required:

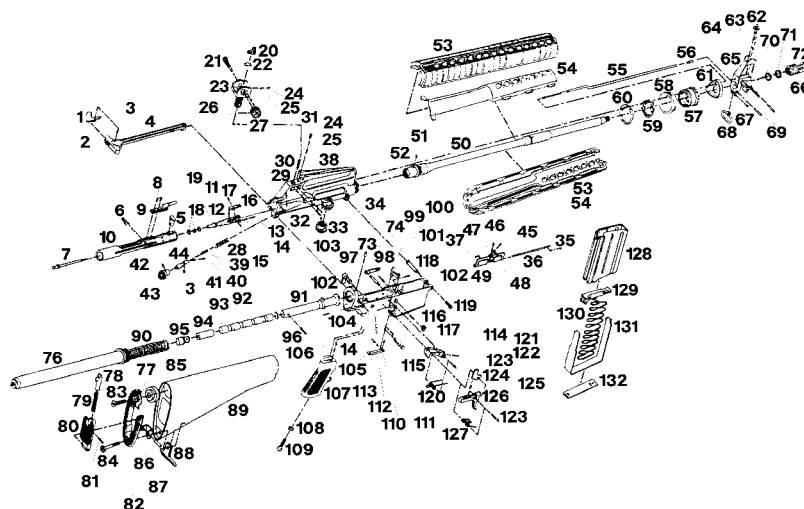
Vise, roll pin punches, drift punches, needle nose pliers, snap ring pliers, castle nut spanner wrench, AR combination wrench, hex wrenches, AR forearm tool, screwdrivers, plastic mallet, AR receiver block, AR magazine well filler block.



From top to bottom: AR combination wrench, castle nut spanner wrench, forearm tool



AR15-A2 Autoloading Rifle



1	Charging Handle Latch	45	Cover Latch Retaining Pin	89	Buttstock
2	Charging Handle Latch Spring	46	Cover Latch	90	Action Spring
3	Charging Handle Latch Roll Pin	47	Cover Latch Spring	91	Buffer Body
4	Charging Handle	48	Cover Latch Housing	92	Buffer Disc
5	Cam Pin	49	Ejection Slot Cover	93	Buffer Weight
6	Firing Pin Retaining Pin	50	Barrel	94	Buffer Spacer
7	Firing Pin	51	Barrel Extension	95	Buffer Bumper
8	Socket Head Cap Screws	52	Barrel Indexing Pin	96	Buffer Bumper Pin
9	Bolt Carrier Key	53	Handguard	97	Magazine Catch Plate
10	Bolt Carrier	54	Handguard Liner	98	Magazine Catch Shaft
11	Extractor Spring Insert	55	Gas Tube	99	Bolt Catch Plunger
12	Extractor Spring	56	Gas Tube Plug	100	Bolt Catch Spring
13	Ejector	57	Barrel Nut	101	Bolt Catch
14	Ejector and Safety Detent Spring	58	Handguard Slip Ring	102	Bolt Catch Roll Pin
15	Ejector Roll Pin	59	Handguard	103	Safety Selector Lever
16	Extractor	60	Handguard Snap Ring	104	Takedown Pin Detent
17	Bolt Ring	61	Handguard Cap	105	Takedown Pin Spring Detent
18	Extractor Pins	62	Front Sight Post	106	Safety Detent
19	Bolt	63	Front Sight Detent	107	Pistol Grip
20	Rear Sight Aperture	64	Front Sight Detent Spring	108	Lock Washer
21	Rear Sight Windage Screw	65	Front Sight	109	Pistol Grip Screw
22	Rear Sight Flat Spring	66	Gas Tube Roll Pin	110	Trigger Guard
23	Rear Sight Base	67	Front Sling Swivel Rivet	111	Roll Pin
24	Rear Sight Ball Bearings	68	Front Sling Swivel	112	Trigger Guard Plunger
25	Rear Sight Helical Springs	69	Front Sight Taper Pins	113	Trigger Guard Spring
26	Rear Sight Windage Knob Spring Pin	70	Compensator Spacer	114	Trigger Guard Pivot Pin Roll Pin
27	Rear Sight Windage Knob	71	Compensator Spacer	115	Takedown Pin
28	Forward Assist Assembly Spring	72	Flash Suppressor	116	Magazine Catch Spring
29	Forward Assist Spring Pin	73	Buffer Retainer	117	Magazine Release Button
30	Rear Sight Elevation Spring	74	Buffer Retainer Spring	118	Receiver Pivot Pin
31	Index Screw	75	Lower Receiver	119	Receiver Pivot Pin Screw
32	Rear Sight Elevation Spring Pin	76	Receiver Extension	120	Hammer Spring
33	Rear Sight Elevation Knob	77	Buttplate Insert	121	Hammer
34	Rear Sight Elevation Index	78	Door Assembly Plunger	122	Hammer Pin Retainer
35	Cover Hinge Pin Snap Ring	79	Door Assembly Plunger Spring	123	Hammer and Trigger Pin
36	Cover Hinge Pin	80	Door Assembly Door	124	Disconnecter
37	Cover Spring	81	Door Assembly Door Pin	125	Disconnecter Spring
38	Upper Receiver	82	Buttcap	126	Trigger
39	Forward Assist Pawl	83	Buttcap Screw	127	Trigger Spring
40	Forward Assist Pawl Detent	84	Rear Swivel Screw	128	Magazine Box
41	Forward Assist Detent Spring	85	Buttcap Spacer	129	Magazine Follower
42	Forward Assist Cap Pin	86	Swivel Hinge	130	Magazine Spring
43	Forward Assist Cap	87	Rear Swivel Pin	131	Magazine Spacer
44	Forward Assist Plunger	88	Rear Sling Swivel	132	Magazine Bottom Plate



CAUTIONS BEFORE YOU BEGIN

1. There are small springs and plungers that will “go away” if you are not careful!
 - A. Buffer tube retainer plunger and spring in the rear of the lower receiver.
 - B. Safety detent spring and plunger under pistol grip on the bottom of the lower receiver.
 - C. Buffer tube spring inside the buffer tube (this spring is not easily lost, but it can fly out)
 - D. Take-down pin spring and plunger located under buffer tube lock collar/but stock at the rear of the lower receiver
 - E. Hinge pin spring and plunger located at the front of the lower receiver.
2. The receiver is made of aluminum. Do not clamp in a vise without proper precautions to avoid distortion. Use receiver blocks whenever possible. Remember, the strength of this system is in the barrel extension/bolt lock up... not in the receiver itself!
3. As always, if something does not fit, DO NOT USE FORCE! Most likely, something is not oriented properly or it is improperly aligned.

Bolt (stripped)





Bolt Complete with Carrier/Gas Key and charging handle



Upper Receiver, Barrel, Gas System components





Lower Receiver



Trigger / Fire Control Group / Hinge pin



Note the orientation of the torsion springs. The improper installation of the springs is a common error during re-assembly.

Operating System Buffer & Tube in Buttstock:



AR upper receiver in a receiver vise block



Procedure for Disassembly of Lower and Upper Receiver

Lower Receiver:

1. As always, make certain the weapon is unloaded and safe.
2. Mount the magazine well filler block in the vise and place the rifle on the block.
3. Make certain the bolt is in the forward position and push the take down pin out to the right. Allow the upper to rotate about the hinge pin in the front of the receiver, exposing the rear of the bolt.
4. Remove the hinge pin and separate the upper and lower receivers. Set the upper aside for now.
5. Depress the buffer spring plunger and remove the buffer and the buffer spring from the buffer spring tube located in the buttstock. Whether the rifle has a fixed or collapsible stock, and what manufacturer's stock is on the rifle, the next step is to remove the stock and get down to the buffer tube on which the buttstock is mounted. Be aware that there are many different variations of buttstocks, and removal is logical.
6. Using the castle nut spanner wrench, Loosen the spanner nut counter-clockwise as you hold the buffer tube to keep the tube from turning with the castle nut. The castle nut is usually staked in place to keep it from loosening, so additional force may be required to loosen. Note: There is a take-down spring and plunger located under the buffer tube lock collar (if so equipped) or the stock itself (if the rifle has an integral lock collar).
7. With the castle nut loose, depress the buffer tube retaining plunger and turn the buffer tube counter-clockwise until the buffer retaining plunger is free and remove the plunger and its spring from the receiver. As you hold the buffer tube lock collar in place (to retain the take-down pin spring and plunger in the receiver), rotate the buffer tube until it is free of the lower receiver. Then, remove the take-down pin spring, plunger and the take-down pin. The buffer system is now removed and the rear of the lower receiver is empty.
8. The pistol grip is retained by a single bolt running up through the bottom of the grip. Remove this bolt. Be aware that the safety spring extends into a hole in the top of the grip and the spring may easily be bent or lost during removal of the grip. Additionally, the safety plunger is held in place, in the receiver, by the spring housed within the grip. It is also easily lost, so be careful.
9. After the grip, safety spring and plunger are removed; the safety is easily removed from the left side of the lower receiver.
10. Remove the hammer pin and remove the hammer and hammer spring. Take note of the spring orientation. The pins in the fire control group have grooves which serve to retain the pins by spring pressure. Note the orientation of the pin grooves.



11. Remove the trigger/sear pin. The disconnecter is situated above the trigger and is actuated by the disconnect spring directly beneath it, on the trigger/sear. Remove the disconnecter and the disconnecter spring.

12. Remove the trigger/sear and the trigger spring. Take note of the spring orientation.

13. To remove the Magazine release, simply press the magazine release button inward as far as possible and unscrew the magazine catch (on the opposite side of the lower receiver) counter-clockwise until it is released from the magazine release button. The magazine catch is easily removed with its spring.

14. The bolt release is removed by driving out the roll pin on which the release pivots. The roll pin hole is very close to the outer wall of the lower receiver. Be careful not to damage the receiver during the removal of this pin. When the pin is removed, the bolt release, plunger and its spring may be removed.

15. The trigger guard plate is held in place with a roll pin at the rear of the plate and a captured plunger at the front. Remove the roll pin and press the plunger, the trigger guard plate can then be removed.

16. The hinge pin is removed by using a small straight blade screwdriver between the flat portion of the hinge pin head and the hinge pin plunger and depressing the plunger so the hinge pin can be freed and removed. Be careful, as the plunger and spring may be lost easily.

This completes the disassembly of the lower receiver. Re-assembly is in reverse order.

Upper Receiver:

17. Pull backward on the charging handle to withdraw the bolt carrier assembly from the upper receiver. Remove the bolt carrier assembly. When the charging handle is at its most rearward position, pull the handle down and it will be free of its race in the top of the upper receiver.

18. Bolt carrier disassembly is begun by removing the firing pin retaining pin and removing the firing pin.

19. Push the bolt into the bolt carrier as far as it will go and rotate the cam pin 90 degrees. Remove the cam pin. The bolt can now be removed from the bolt carrier.

20. There are 3 gas rings at the rear of the bolt. These gas rings are a vital part of the gas system and need to be replaced periodically. Remove the gas rings and be careful they do not become distorted. When re-assembling, stagger the gaps of the gas rings so there is no gas loss.

21. A roll pin retains the extractor and extractor spring. Remove the extractor pin, extractor and spring.



22. The ejector and ejector spring are also retained by a pin. Depress the ejector and remove the ejector pin, being careful to control the spring behind the ejector after the ejector is removed.
23. The bolt carrier key (sometimes called a gas key) is located on the top of the bolt carrier. It is mounted to the carrier using 2 socket head screws that are usually staked in place to prevent loosening under fire. These screws will be difficult to loosen and will need to be re-staked at re-assembly. This carrier key accepts the hot, high pressure gas from the gas block via the gas tube, to make the system function. This carrier key must be mated properly to the gas tube to avoid malfunctions.
24. The forward assist assembly (if equipped) is retained by a roll pin. Remove the pin and remove the assembly. The assembly itself is held together by a pin and is easily taken apart. Again, a spring is contained in the assembly, so be careful.
25. The dust cover is held in place with a long pin which is kept in place by a small c-clip at the front of the upper receiver, above the hinge pin mounting hole. Remove this c-clip and remove the dust cover pin. The dust cover will come off, but make note of the dust cover spring orientation prior to removal. Re-assembly can be tedious, but it is accomplished in reverse order.
26. The forearm is comprised of two halves, held together by the Delta ring or “D-ring” at the front of the upper receiver. The ring must be retracted backward (compressing the D-ring spring), toward the receiver to release the rear part of the forearm halves for removal. A forearm tool is very handy for this, as it only requires one person to complete this task. The “foot” of the tool is put into the magazine well and the “arms” enable the use of leverage to retract the D-ring. Without this tool, most people need an assistant to help with this step.
27. With the barrel held firmly in padded vise jaws, use the combination tool to remove the flash hider and crush washer (if so equipped). The gas block will not come off of the barrel with the flash hider in place. When reassembling, the crush washer enables tightening until the flasher is indexed properly. Usually, a crush washer cannot be used twice.
28. Removal of the gas block is accomplished by removal of the 2 taper pins in the lower portion of the gas block. Push these pins out from the small end of the pin. Pinned gas blocks usually have the front sight assembly, bayonet lug and sling swivel as part of the gas block. After pin removal, tap the gas block toward the muzzle with a plastic mallet. Remove the gas block/gas tube assembly from the barrel.
29. A roll pin holds the gas tube to the gas block. Remove this roll pin and separate the tube from the block. Note: The gas tube can be removed without removing the gas block if only changing out the gas tube.
30. To remove the barrel, the Upper receiver MUST be properly held in a receiver block, in a vise. Use the AR Combination wrench to loosen the barrel nut and remove the barrel. When the barrel is removed you will notice the barrel has a cut in it that will align the



barrel in the upper receiver. When re-assembling, tighten the barrel nut as snug as possible without twisting the receiver. Remember, the strength of this system is in the bolt to barrel extension lock-up... not in the receiver!

31. Remove the snap ring, D-ring and D-ring spring.

32. Assembly is in reverse order of disassembly.

There are many different sighting systems available for the AR platform. Sight systems have specialized tools for disassembly, available from military supply companies and sight manufacturers. Springs and plungers are contained in these sights. Stay alert.

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• **Bench Notes:** Congratulations on finishing this Bonus Lesson, you are one •
• step closer to becoming a better gun-pro! •
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• •

