HOW TO DISASSEMBLE, ASSEMBLE, AND MAINTAIN A VERSION III AIRSOFT GEARBOX
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Disassembly and reassembly of your version III airsoft gearbox may be necessary for a variety of reasons. Most likely, you are experiencing a mechanical failure or need to reapply grease and lubricant to maintain full functionality. Frequency of maintenance depends entirely on use of your gearbox and can vary from once every few months to every few years. If you notice performance in your rifle drop, it is a good time to maintain your gearbox. A gearbox is a mechanical engine, and like all other engines, it requires maintenance and occasional repairs to continue functioning. Additionally, if you are experiencing a mechanical failure and you isolate the problem, almost all parts within your gearbox are available for individual purchase.

This guide does not cover how to remove the gearbox from your rifle. See “Trouble Shooting,” page 14, for more information.

Requirements

While disassembling and maintaining are relatively simple procedures, reassembling a gearbox require persistence and patience above all else. Familiarity with tools will aid your progress, but anyone can perform the steps in this guide with dedication. Before beginning, allow for:

- **Adequate time for the process:** Assembling a gearbox takes around 1 to 2 hours for a first time attempt. However, once you successfully complete the process you will find it far less time consuming.
- **Room to spread out:** Give yourself plenty of room to lay out the internal parts of the gearbox. During a repair, plan on the parts remaining out for a week in case a new part needs to be ordered.
- **The will to succeed:** Take the process as a learning experience and approach it with a positive attitude, but brace for potential frustration. Remember, the gearbox is designed to come apart. Your effort will be rewarded as you become better with each repetition!
Equipment

Because there are various manufacturers, all version III airsoft gearboxes have slight differences. Typically, this difference is most notable in the body screws of the gearbox. Be sure to check the type of screw used on your gearbox before beginning. Also, if you need to remove the motor for replacement, check to see if the wires can pull off or are soldered.

- Small flathead screwdriver
- Large Phillips, slotted (flathead), hex key (Allen wrench), or star (Torx) screwdriver
- 2 plastic bins, 1 for greasy and 1 for non-greasy parts,
- Paper towels
- Needle nose pliers or tweezers
- Safety goggles
- Soldering Iron (special circumstances stated above)
- Airsoft gear grease (for maintenance only)
- Airsoft piston lubricant (for maintenance only)
- Fine sandpaper (for maintenance only)

If you do not have a star screwdriver, try using a small flathead screwdriver instead
Disassembling the Gearbox

**WARNING:** Main spring has very high tension. Follow directions closely and where safety goggles until instructed otherwise.

**WARNING:** Always disconnect the battery from the gearbox before handling. Failure to remove the battery could lead to injury while handling gears and internals.

Removing the Motor Cage

Typically, one does not need to disassemble the motor cage. While it still must be removed, the motor cage can be kept as a unit unless the motor needs to be replaced.

*If your motor does not need to be replaced, perform step 1 and then proceed to the next section, “Opening the Gearbox.”*

**Motor Assembly**

a. Motor Cage  
b. Motor Spring  
c. Motor Plate  
d. Round Head Screws  
e. Lock Washers  

1. Remove the two long screws connecting the motor cage to the gearbox frame (A).

*Skip to next section “Opening the Gearbox” if your motor functions*

2. Remove the two shorter screws located at the bottom of the motor cage (B). Note that each screw has a small lock washer.

3. Open the motor cage by pressing firmly on the front half of the shell. Separate the cage in two by rotating the back half away from the motor.

4. To completely extract motor, first check to see if the attached wires can be pulled off. If not, use a soldering iron to heat up the joints and remove the wires.
Opening the Gearbox

The main difficulty of opening the gearbox is fighting the powerful spring within the gearbox. If the spring does not decompress gently, parts may fly everywhere. If this does happen, don’t panic, just locate the parts and follow through the rest of the instructions as best you can.

*If your motor needs to be replaced, opening the gearbox is unnecessary. Skip to step 19 of “Assembling the Gearbox” on page 13 once you obtain a replacement motor.*

1. Use a flathead screwdriver to push the top side off (A).
2. Pull out the gear protector located directly behind the trigger (B).
3. Take out all screws. Place the screws in a non-greasy plastic container (C).
4. Gently peel apart the gearbox using a flathead screwdriver starting at the front. Work your way to the back. Use a small flathead to press down on the spring guide at position (D).
5. Lift off the top cover completely. Immediately after opening, release the tension from the main spring by lift the spring guide located at the tip of the screwdriver (D).

Removing the Cylinder Unit

If you are troubleshooting your gearbox, remove and inspect this unit and those that follow individually. Check for broken parts by referencing the images.

**Cylinder Unit Parts**

- a. Spring Guide
- b. Main Spring
- c. Piston
- d. Cylinder
- e. Cylinder Head
- f. Air Nozzle
- g. Tappet Plate
- h. Tappet Spring

*Safe to remove glasses*
1. Using needle nose piers or tweezers, remove the tappet spring from the gearbox frame (A)
2. Remove the bushing and shim (small washer) from the sector gear (B)
3. Grab and extract the entire unit.
4. Place the spring and spring guide in the non-greasy parts bin.
5. Place the air nozzle, tappet plate, and tappet spring in the non-greasy parts bin.

Remove the piston and cylinder head from the cylinder for inspection only. Replace the piston and cylinder head into the cylinder before placing the entire unit in the non-greasy parts bin.

Removing the Gear Assembly

The gear assembly will be greasy, but only wipe off the grease if you have replacement airsoft gear grease. If not, move the gears into the greasy parts bin and minimize contact with the gears.

Gear Assembly Parts

a. Sector Gear
b. Bevel Gear
c. Spur Gear
d. Bushing (x6)
e. Shim (x6)
f. Anti-reversal latch
g. Anti-reversal latch spring

1. Take off the bushing and shim from the top of the bevel and spur gears. Place in a bin dedicated to greasy parts.
2. Remove the gears. If you have replacement gear grease, wipe the gears as you remove them. Otherwise, minimize contact and transfer them to the greasy parts bin.
3. Be sure to collect the three shims and bushings from the bottoms of the gears. Transfer all to the greasy parts container.
Removing Trigger Unit

Even if you are not troubleshooting your electrical component, you should remove the trigger unit to avoid losing parts.

**Trigger Unit Parts**

a. Trigger  
b. Trigger Contact  
c. Trigger Spring  
d. Trigger Lever  
e. Trigger Contact Spring  
f. Wire Assembly

1. Use needle nose pliers to remove the Trigger Contact Spring (A) and transfer it to the non-greasy parts bin.
2. Check for a tiny screw at the top of the trigger unit. Remove it if present (B). Place it in non-greasy bin.
3. Place the trigger, trigger lever, and trigger spring in non-greasy bin.
4. The wires leading into the wire assembly will slip out or require a soldering iron to completely remove. Unless your gun needs a replacement main trigger unit, leave it attached.
5. Inspect the copper contacts on the trigger contact and the wire assembly. If they are blackened or dull, preform the “Clean the Electrical Contacts” section under the next section, “Maintenance” (page 10).

*Congratulations! You have completely disassembled your gearbox.*
## Maintenance

### Greasing the Gears

While clean, shiny gears look nice, grease is an essential part of any mechanized system to maintain optimal performance. Excessive grease is also undesirable, and many gearboxes from the factory suffer from over greasing. This section will cover how and where to apply airsoft gear grease.

*If you do not have airsoft gear grease, skip to next section.*

1. Clean all gears, bushings, shims, and the insides of both gearbox frames with paper towels to remove old grease.
2. Open the gear grease and place it within reach. Also, be sure to have paper towels handy for you to use after you apply the grease.
3. Pinch the bevel gear (A) by the top and bottom of the axle in your left hand.
4. Use your right fingers to evenly spread a thin layer of grease onto the contact points of the gear. This includes the large bottom face of the bevel gear, the first, outermost face of the bevel gear, and all teeth. Also dab the bottom axle in grease.

*Do not worry about the top axle of any of the gears at this point. The gears must be handled and the grease will rub off. Instead, the tops of the axels will be greased as a final finishing touch when assembling the gearbox.*

5. Place the bevel gear in the greasy parts container. Try to minimize contact with the gear from this point forward. Now secure the sector gear (B).
6. Apply an even coating of grease to the sector gear’s bottom and both rows of teeth. Place a small amount on the bottom axle as well.
7. Put the sector gear in the greasy object bin and now remove the spur gear (C).
8. Once more, apply some grease to the contact points. On the spur gear, this includes the entire gear.
9. Wipe and then wash your hands to finish the job!

*Note: The sector and spur gears are upside down in these images*
Lubricating the Cylinder Unit

Maximum performance from your airsoft gun demands a good seal in the piston. Special airsoft piston lubrication allows for a tight seal that can still slide rapidly within the cylinder.

*If you do not have airsoft piston lubrication, proceed to the next section.*

1. Use paper towels to wipe off the current lubricant from the piston, cylinder, and cylinder head.
2. Open the piston lubricant and place within reach. Also, keep paper towels nearby during the process.
3. Apply a medium coat of piston lubricant to the O-ring on the cylinder head (A).
4. Fit the cylinder head back into the cylinder. The bottom cutout section of the cylinder head should be flush with the edge of the cylinder and O-ring should be just far enough into the cylinder to be obscured.
5. Apply a medium coat of piston lubricant to the piston and insert into the cylinder O-ring first (B).
6. Slide the piston up and down a few times to distribute lubricant. If the sliding seems stiff, remove the piston and apply a second thin layer of lubricant.
7. Pull the piston partially out and work some piston lubricant into the groove on both sides of the piston (C).
8. Push the piston back into the cylinder.
9. Wipe and then wash your hands to finish the job!

Cleaning the Electric Contacts

Maintaining good electric contacts is an essential to the function of your gearbox. This simple procedure is an important precautionary measure for the function of your weapon.

1. Gently rub the sides of the copper wedge on the trigger contact with sandpaper (A).
2. Sand the insides of the prongs on the wire assembly (B).

*Congratulations! You have finished maintaining your gearbox.*
Assembling the Gearbox

**WARNING:** Check that the battery is still disconnected.

Assembling the gearbox essentially reverses the disassembly process. However, this process is better performed in a specific order to minimize frustration with several more difficult steps.

1. Replace the three bushings on the bottom half of the frame.
2. Put the trigger, trigger spring, and trigger lever back in place. The shorter end of the trigger spring will point down and fit into a pin-sized hole up and to the right of the trigger axel hole (A). The longer end of the spring will fit behind the trigger and the spring will wrap around the trigger’s axel. Once these three parts are in place, they should be relatively stable. However, take caution not to disturb these parts for the duration of the assembly to avoid repeating this step.

*This is the most difficult step. Getting all three units back in place can be frustrating due to the powerful trigger spring. If you are struggling, try practicing with only the trigger and the trigger spring before also including the trigger lever. Once you can do this, try again with all parts.*

3. Replace the main trigger unit. Do not screw down the unit at this time.
4. Replace the trigger contact, and trigger contact spring. The trigger contact spring’s front loop should be in the down orientation over the post on the boat and its back loop should be towards you and surround a post on the frame.
5. Screw down the main trigger unit to the frame. (Note that not all gearboxes will have a screw)
6. Place the bevel gear in the rearmost top bushing flat side down. Don’t forget to include a shim under the axel.
7. Set the sector gear back in position with a shim under the bottom axel. Gently spin the sector gear back and forth to distribute grease between the gears. Then, rotate the sector gear so the top facing teeth point down.
8. Assemble the front of the cylinder unit. Fit the cylinder head just far enough into the cylinder so the O-ring is hidden. Push the air nozzle onto the cylinder head. Then, slide the front, semicircular cutout on the tappet plate into the slot on the back of the air nozzle.
9. Set the entire unit in place. Start with the tappet spring lying over the appropriate post on the frame (A). Then, move the entire unit back to stretch the spring and seat the unit in place. The downward facing circular hole in the cylinder head will fit onto a small post on the frame and you will feel the cylinder lock firmly in place.

10. Slide the piston, main spring, and spring guide back into the cylinder without removing the cylinder. DO NOT compress the main spring.

11. Place the anti-reversal latch, anti-reversal spring, and spur gear back. To make things easier, place a shim on the bottom (skinny side) of the spur gear. The grease should hold it in place. Put the spring on the latch by placing the spring’s loop on the shorter, bottom axel. The spring should fit nicely around the latch. Next, put the unit in bottom left whole. The spring will butt up against the wall of the frame (A). Pull the spring latch back and hold it with tweezers or needle nose pliers (B). Fit the spur gear in place and release the anti-reversal latch.

This is the probably the second most difficult step. While easier to put in than other parts, the anti-reversal latch is not as stable and can be easily disturbed. Be as careful as possible not to touch the part once it is in and repeat this step if it pops out of its socket.

12. If available, use your finger to gently dab each gear’s top axel with gear grease.

13. Place one shim and then one bushing on each axel with the rim side down.

14. Checklist: Before compressing the main spring, it is wise to perform a last minute check on several problem areas. Check:
   - The trigger is in socket
   - The piston moves on track
   - The anti-reversal latch is in socket
   - All springs are present

15. Put on safety glasses. Now, read through the next two steps before continuing. These steps will be an effort of fitting all components together and it helps to know what to expect before reaching a step.

16. Firmly grip the cylinder with your right hand and compress the spring and slide the tab on the spring guide into the slot on the frame using your left.
17. Replace the top frame. While evenly pressing down on the top frame, push the back of the spring guide to set the back in place. Then, use a flat head screwdriver to manipulate the bushings into place by reaching through the holes in the top frame. Lastly, pull the trigger slightly as you if you were shooting to get the notch on the trigger into the slot on the top frame.

18. Replace all screws.

If your motor cage is still assembled, skip to step 24.

19. Place the motor spring on the neck of the motor.
20. Place the small metal motor plate on the bottom, semicircular section of the front motor cage piece. This is the section with the screw hole in the bottom.
21. Put the front motor cage piece under around the motor so the spring is under the semicircular cutout for the motor’s shaft without dropping the motor plate.
22. Surround the motor with the other, rear section of the motor cage. In one step, press down on the front motor cage, up on the motor, and push the rear section into position. Release the assembly and the motor spring will lock the cage together.
23. Screw the two round-head, medium size screws into the bottom of the gear box with a lock washer on each.
24. Use the two longest screws to fasten the motor cage back to the gearbox.
25. Lastly, slide the top slide back onto the top rib of the gearbox.

Your assembly is now complete. Well done!

Disassembling and reassembling a gearbox is no small feat, especially for a first time attempt. Every repetition will strengthen your ability to complete the task more quickly in the future. Thank you for your persistence with this endeavor, and enjoy your newly repaired or refreshed airsoft rifle.
Troubleshooting

Disassembly

<table>
<thead>
<tr>
<th>Issue</th>
<th>Possible Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannot extract gearbox from airsoft rifle</td>
<td>Look for disassembly guides online. As there are numerous airsoft rifle types and manufactures using the version III design, all manuals cannot be listed here.</td>
</tr>
<tr>
<td>Difficulty removing body screws</td>
<td>Try using a larger handled screwdriver to apply more torque. Some screws may be glued in but proper leverage should solve the problem.</td>
</tr>
<tr>
<td>Gear protector will not come out</td>
<td>Use two flathead screw drivers to pry the protector from both sides at once.</td>
</tr>
</tbody>
</table>

Reassembly

<table>
<thead>
<tr>
<th>Issue</th>
<th>Possible Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>The gear box does not shut</td>
<td>Carefully reopen the gear box and check all problem points. Try to figure out what is preventing the gearbox from closing. Pay special attention to the problem points listed on page 9, step 14.</td>
</tr>
<tr>
<td>The gearbox closes but does not function</td>
<td>Unfortunately, something must have gone wrong in the assembly process. Before opening the gearbox again, check electric connections and the motor by unfastening the motor cage, attaching the battery, and pull the trigger using gloves to see if the motor is bad. If it is not, open the gearbox and check for possible problems.</td>
</tr>
<tr>
<td>Airsoft rifle preforms worse after maintenance</td>
<td>Make sure that specific airsoft gear grease and piston lubricant were used. Also, the gears or cylinder may be over greased and clogged. Conversely, a scarcity of grease or lubricant could likewise affect performance. Open the gearbox and apply grease in moderation.</td>
</tr>
</tbody>
</table>

If you are still struggling with the reassembly process, here is an address to a YouTube video created by Evike that illustrates the steps:  [http://www.youtube.com/watch?v=aSTQ3awxJVs](http://www.youtube.com/watch?v=aSTQ3awxJVs)

Retailers for Parts, Grease, and More

Here are some popular airsoft websites to purchase parts, grease, and more. Check out the prices at each site for the best deal.

Works Cited


   <http://www.youtube.com/watch?v=aSTQ3awxJVs>