Unit 13 Replica Technical Service

-Shimming-

Shimming is often forgotten when upgrading/maintaining the replica. Shimming the gears/gearbox is essentially adjusting the distances of the gears relative to each other and the gearbox. Not properly shimming your gearbox can lead to serious damage to the gears. There is also a risk of overloading the wiring due to gears running too stiffly. Perfect shims lead to a long life of your gears, with efficient consumption and ideal rate of fire.

NB!

- Every gearset and every gearbox is different! There is no “default” setting for shimming! When changing gears, it is therefore important that you re-shimmed.

- When installing new gears and/or bushings/bearings it is important that you shimmed again. Re-greasing is also a good idea.

- Shim sets come in different thicknesses. Often there are 2 or 3 different thicknesses in the package. Keep this in mind when shimming.

How To:

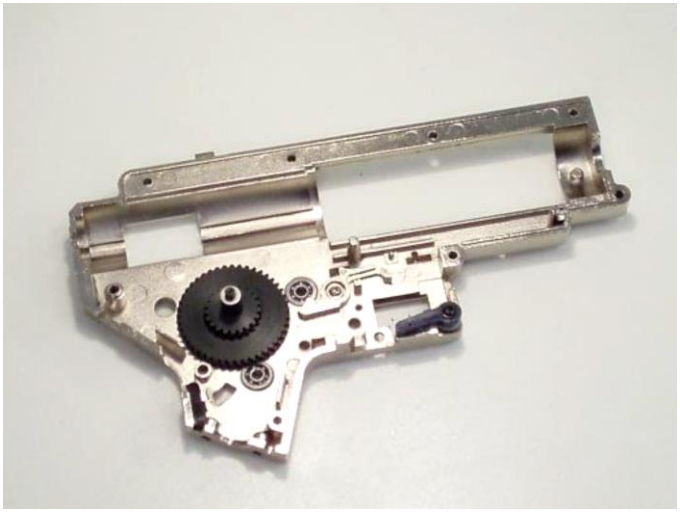
This guide is a basic guide to shim your gears. In the example a Version 2 gearbox is used, but this guide can also be used with other gearbox versions, and other gears.

Parts required:

- Screwdriver for the gearbox (cross or Allen depending on your gearbox)
- Screwdriver for engine adjustment (Flat or Hex depending on your gearbox)
- Shim Set (preferably with 3 different thicknesses)
- Degreaser and gear grease to lubricate the gears again

1: Disassemble the gearbox, and take the left side (side where the selector plate and wiring are attached). To make things easier for yourself, we recommend removing all non-essential parts from your gearbox. The selector plate, spring, springguide, piston, pistonhead, cylinder, cylinder head, nozzle, tappet plate, anti-reversal latch and trigger can all be removed. (possibly also the wiring) Remove all shims from the gearbox! NB! Leave the cut-off liver! (we need these in this guide)	

2a: Place the spur gear in the gearbox. Make sure the spur gear has enough room to turn freely from the gearbox. If this is not the case, the spur gear will hit the gearbox. This can be seen from a circular chafing spot under the gear, on the gearbox.



Tip: **Shimms stay on the gears more easily if you put a little grease on them! That way you won't lose them so quickly!**
Grease the gears well, after or during shims.
The best result is achieved by removing the old grease with degreaser and then re-greasing the gears with gear grease.

2b: Now place the other gearbox half on top. Screw it in with the screws that surround the gears (often 5 or 6 screws). **Tighten it well!**
Now test the distance by pushing the shaft of the gear (which comes through the bushing/bearing) with a small screwdriver. The gear will probably be able to move quite a bit inside the gearbox.
Visually see how much this distance is. You will fill this distance with shimms. Manually rotate the gear and see if it rotates smoothly. If it no longer turns smoothly, you have too many/too thick shimms.
Take off the right gearbox half, and put shimms on

the gear. Repeat this step until the gear moves minimally.

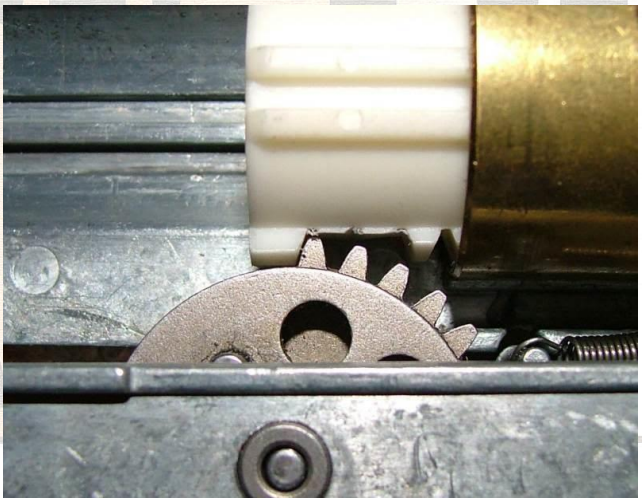
NB! Don't shim the gear too tight! The gear should continue to move smoothly, without excessive play in the gearbox.

3a: Once the spur gear is shimmed, we grab the Sector Gear, cylinder, cylinderhead and piston.

Leave the spur gear in the gearbox.

Place the cylinder head in the cylinder and slide the piston in. Install it (temporarily) in the correct position in the gearbox.

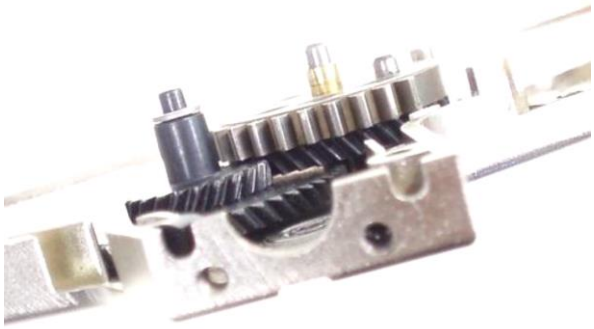
Tip: Also check Angle Of Engagement. This is the angle at which the sector gear engages the piston. As pictured here on the right is correct. This often requires one or two teeth to be adjusted, or the piston to be extended.



3b: Put the sector gear in place. Check that the sector gear is not touching the spur gear, and that the cut off lever is not touching. Also check that the teeth of the sector gear are aligned with the teeth of the piston.

If the sector gear hits the cut off lever and/or the spur gear, put more shimms under the sector gear. Please note that the teeth of the sector gear still retain maximum contact surface with the teeth of the spur gear! Remove the piston and cylinder parts again after this is done.

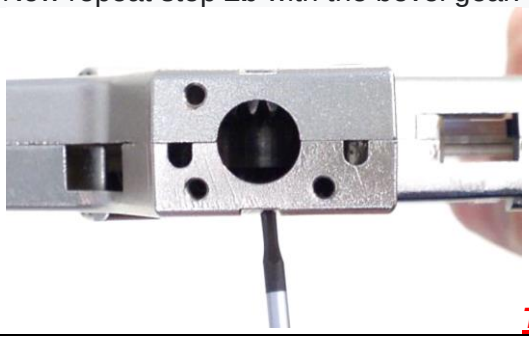
Now repeat step **2b** with the sector gear.



4: Last is the Bevel Gear. Put it on its side and check if it touches the spur gear and has maximum contact surface with the teeth of the spur gear.

Make sure the height of the bevel gear is correct. (See pictures)

Now repeat step **2b** with the bevel gear.



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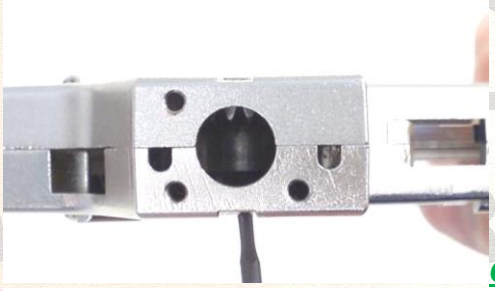

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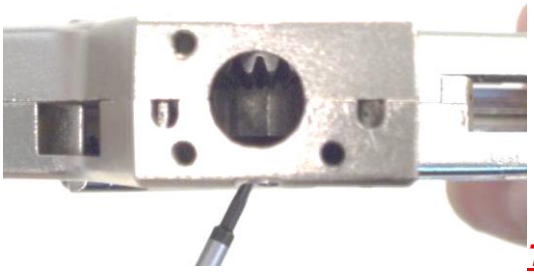

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5: Now that all the gears are shimmed, test again if you can turn the gears freely. (Gearbox screwed shut) If there is too much play in the gears, or the gears don't turn smoothly, you need to shim your gears again.

If everything is well put together, you can put everything back together. You then only have to adjust the engine. You can do this with an adjusting screw that is often located behind the motor. Try to adjust it so that the gearbox no longer makes a "screaming" noise.

Tip: Adjust this roughly by shooting on single shot, and fine tune it on full auto. This is how you hear best when you're sitting well!