

# BROOXES BETTER GEAR GUIDE

## BBGG instructions

*for Conrad (orange) or Canada (black) gears and metric hardware*

You have a choice between a 1:5 or a 2:4 reduction. Use the 10 and 50 teeth gears or the 20 and 40 teeth gears.

These instructions are written for the use of the BBGG together with the BBKK and the BCPC (Picavet cross).

The BBGG needs a servo that is modified for endless rotation. See the BBKK instructions or the Basics section of [www.KAPER.us](http://www.KAPER.us).



Parts	Tools
1 Bracket	7 mm spanner
1 Gear set	flat screwdriver
1 M4 T-nut	2 pliers
1 Machine screw M4x40	3 mm drill bit
4 Machine screw M4x10	4 mm drill bit
7 Lock washer M4	8 mm drill bit
3 M4 nylon washer	pop rivet tool
5 M4 nut	
1 M4 lock nut	
2 5mm spacer	
2 wire tie	

## Assembly

- 1 Remove the BCPC from the pan servo.
- 2 Remove the pan servo from the BBKK.
- 3 Fix the smallest gear (10 or 20 teeth) on top of the servo:  
Press the little black insert into the heart of the gear. As it fits very tight this might look impossible. Make sure the insert stands straight up.  
Enlarge the center hole to 3mm. Make sure the drill stand perpendicular to the gear.  
Lock the gear onto the servo using the lock nut.



- 4 Modify the T-nut. Use 2 pliers and bend the teeth of the T-nut to the other side of it at an angle of 30 to 60 degrees. Make sure all teeth are bend equally.



- 5 Enlarge the top hole of the BBGG bracket to 8 mm using an 8 mm drill bit.

- 6 Enlarge the hole in the middle of the outer U-frame of the BBKK to 4 mm.



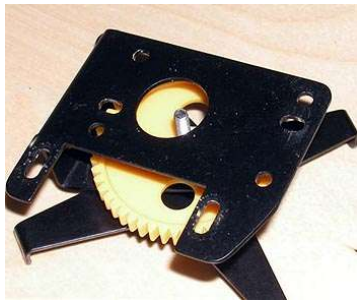
- 7 Put a M4x10 screw from the inside of the bracket in the ovale hole closest to the vertical part of the bracket. Secure it temporarily by a nut.



- 8** Take the long M4x40 screw. Put a lock washer and then the BCPC (or your Picavet) in it.



- 9** Put a lock washer and a 5mm long spacer on the screw.



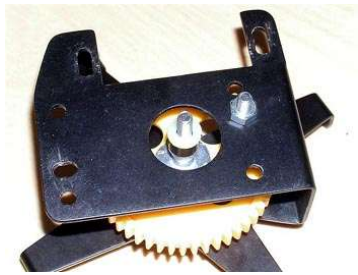
- 10** Put this assembly in the enlarged hole of the BBGG.

- 11** Put another lock washer and the big gear on the screw.



- 12** Next comes the modified T-nut. Tighten the T-nut so that the gear is fixed but not damaged and the BCPC is fixed in position.

- 13** Secure the T-nut with a M4 nut.



**14** Slide a 5 mm spacer over the screw.

**15** Hold this assembly and put the servo in position.

**16** Check if both gears are more or less at the same level. You might want to move up the big gear a bit. This can be done by adding 1 or 2 nylon washer between the M4 nut and the spacer.

**17** Remove the earlier mounted nut from the M4x10 screw (hold the screw), put the BBGG on top of the outer U of the BBKK and put on the nut again, this time with a lock washer.

**18** Check if the gear/BCPC still turns smoothly. To check this, use a nylon washer and a M4 nut to keep it all together.



**19** If you are satisfied, remove the M4 nut and replace it by the M4 lock nut.

**Note:** use this lock nut only once to keep the fixation secure. So don't use it until you are sure you don't have to take it off again.

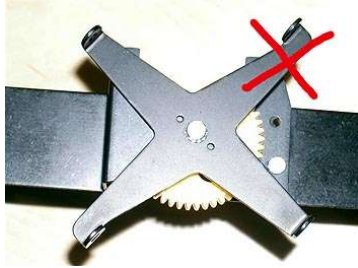


**20** Tighten the nut so that the assembly still turns.

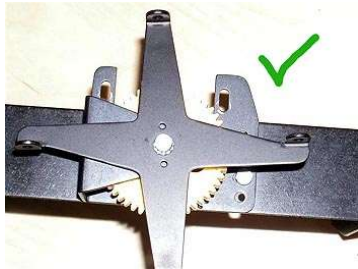
**21** Fix the other side of the BBGG loosely onto the BBKK using a M4x10, lock washer and nut in the ovale hole.



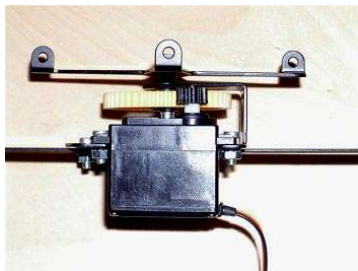
**22** Now put this assembly up side down on the table and slowly turn the outer U. The arms of the outer U should stay in a vertical position. If not, slide the BBGG over the outer U until the arms stay vertical. Now tighten the two nuts of the two M4x10 screws.



**23** Turn the BCPC so that the servo mounting holes aren't covered.



**24** Mount the servo with the gear using 2 M4x10 screws, 2 lock washers and 2 M4 nuts. Make sure there is a little play between the gears.



**25** Secure the servo lead so that it wouldn't be caught by the gears.

**26** A drop of oil on both ends of the big gear axle might be helpfull.

December 17, 2004

Peter Bults

Questions, suggestions: [info@bults.biz](mailto:info@bults.biz)