highspeed drive® by schlumpf innovations



english

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The latest release of this manual can be downloaded from our website (pdf-file).

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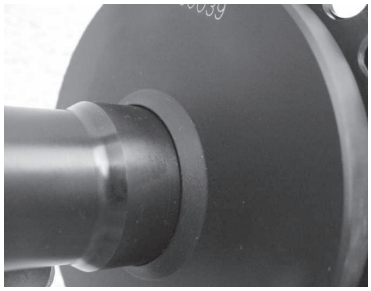
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Where can *high-speed-drive* be installed?

Standard frames

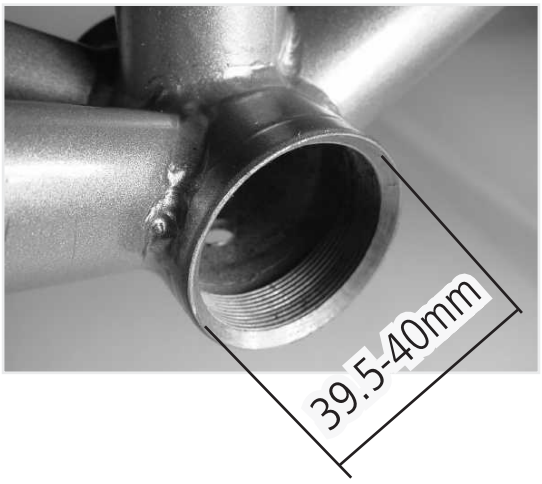
Frames with BSA bottom brackets (inner diameter of 33.6 - 34mm)

First chamfer the bottom bracket with a milling cutter.
The tool is available as an accessory or on a rental basis (we have a tool-rental service in most countries).
The cone option requires that you follow our instructions carefully for good results.
Chamfering and tensioning must be performed very precisely.

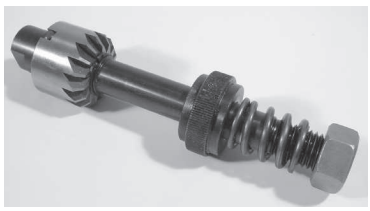


With the conical shape of the housing, you can't clamp any parts (trouser guard, chain holders, etc.) between gear housing and b.b. shell.

Important: ***high-speed-drive*** comes with an aluminum housing, that is ideal for installation into steel frames. For aluminum frames, we deliver a special Loctite compound.



Tighten with the box spanner (-> tool set "Installation + Maintenance") to a tension of 140 - 160Nm (100 - 115 lbft).



Large-diameter bottom brackets

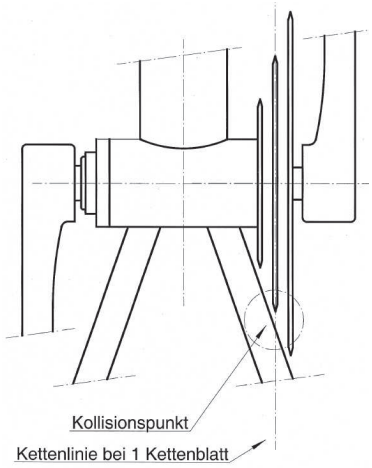
(larger than 34mm, as in Thompson and Fauber bottom brackets)

No ***high-speed-drives*** are available for b.b. shells others than BSA.



Replacing a triple chainring

It´t never a problem to install a ***high-speed-drive*** on a frame designed for a triple chainring as it sometimes is with the ***mountain-drive*** due to its large chainring.



Double chainrings

It isn't possible to mount two chainrings on a ***high-speed-drive*** spider.

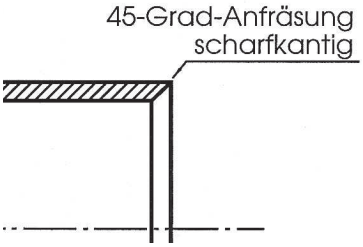
Extra-wide bottom brackets (wider than 73mm) and wide chainlines

The standard ***high-speed-drive*** is designed for bottom bracket widths of 67.5-73mm.
For special bottom brackets wider than 73mm, we offer a version with an axle 10mm longer. Also the gear housing attached the bottom bracket, is 10mm longer.

When ordering the version for wide bottom brackets, please mention your bottom bracket's exact width so that we can include a pair of spacers as needed.

Brompton

The Brompton version comes with a 6.5mm wider gear housing to allow folding the bike.



The Brompton bicycle has an extremely thin-walled bottom bracket shell. It´s therefore very important that you follow our instructions carefully for good results.

You must chamfer the bottom bracket up to a sharp edge as seen on the right.

Please notice, that the combination of ***high-speed-drive*** with internal hubs sometimes creates some roughness in the first gear of internal hubs.

The Brompton version also needs a special nut on the left side to compensate for the wider housing on the right side.



Left-hand installation

The ***high-speed-drive's*** clutch is only designed to operate in one direction (clockwise, with the chainring on the right side). For a left-hand installation, please use the mirror-image version.

Fixed-gear bikes

The ***high-speed-drive*** mechanism is not designed to withstand high-torque pedaling in both directions.



Single-speed

It is no problem to install a ***high-speed-drive*** in a single speed bike. Indeed, the step of 2.5 may be too high, so often ***speed-drive*** is the better choice.

Clamped chainguard holder

Please note, that no chainguard holder, chain tensioner or other item may be clamped between bottom bracket shell and gear housing!

Chainring

Standard ***high-speed-drive*** comes with a 27t. chainring with integrated trouser guard, both made of strong 7075 aluminum. A 27t. chainring acts in high gear like a 67t. chainring!





We have high polished and chrome plated chainring / trouser guards available for ***high-speed-drive.***



Larger chainrings

We have an adapter available that allows to mount steel chainrings of 30 (equals 75t. in high gear mode) and 34t. (equals 85t. in high gear mode). The same adapter allows to mount a spider with BCD 130mm, which is good for chainrings of 38t. or larger.
38t. means: 95t. in high gear mode!





Trouser guards

For 30 and 34t. chainrings we also offer aluminum trouser guards, hold by a circlip.



Spiders for BCD 130

The photo shows this special spider, hold by two circlips.





Special versions of our gearing systems

We offer many special versions for extraordinary applications, such as the backpacker airplane "Flyke". This trike needs a much stronger (and therefore wider) bottom bracket shell in order to allow safe landing!

Ask us, if you have special needs!



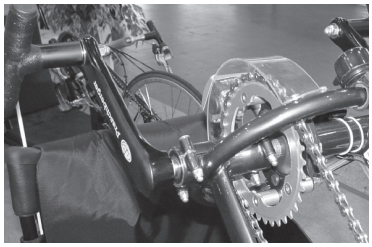






Handbikes

Nearly all handbike makers offer their handbikes with our gearing systems.The first choice for a handbike is often ***mountain-drive***, as it creates the lowest gear range possible.

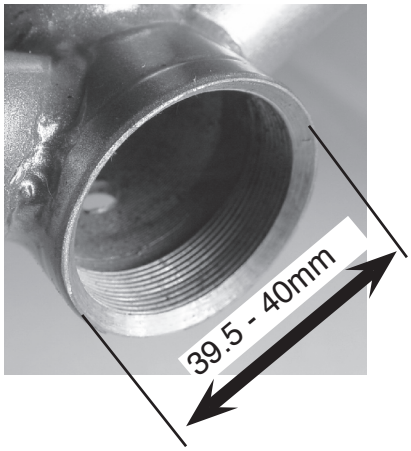




Installation

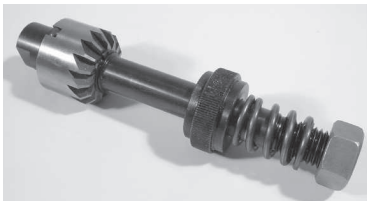
Chamfering the bottom bracket

To install the conically shaped gear housing of the ***high-speed-drive,*** you must mill a 45° bevel into both of the bottom bracket's faces. The outer diameter of this conical part must be between 39.5 and 40mm. This is very important, as it creates additional surface area, so that there is enough friction to counter the torque of the planetary system.



Do not chamfer up to an outer diameter of more than 40.5mm, as this will allow the conical part of the housing to "swim" within the chamfered part with no load on the surface, even with correct tightening.

Use some cutting oil for lubrication while chamfering.
For installation, the conical areas must be completely dry and clean! No grease!



Please note: In most countries, the 45° milling cutter can also be rented.

Wider bottom bracket shells

We have a 10mm wider axle available, in case that the b.b. shell is wider than 73mm or if you need a special chainline.



Installation into steel and aluminum frames

The ***high-speed-drive*** housing made of aluminum is designed for steel frames. For the installation into an aluminum frame, we deliver a special Loctite product: Activator (in the bottle) to moisten the conical areas on the right side, and Loctite (in the syringe) to put some drops on both cone areas. This gives very high strength against spinning under load. But it also allows to dismantle the housing easily if ever necessary.



Please proceed as follows:
- All parts must be clean and dry.
- Moisten the cone areas only of the right side with the activator Nr. 7471 (bottle)



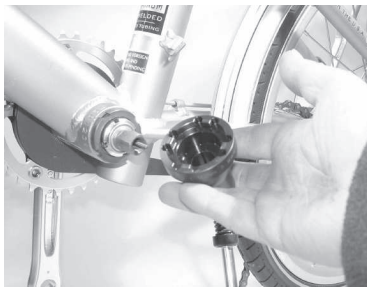
- Put some Loctie Nr. 638 to the same cone areas, after the Activator has dried out.
- Mount the ***high-speed-drive*** and tighten it with a torque of 140-160Nm within 4 minutes
- Please note, that this Loctite product needs up to 12 hours to give full strength.

Important: Never use Loctite for the nut on the left side!!

Tightening

The black nut on the left side must be tightened to the correct torque for correct operation.

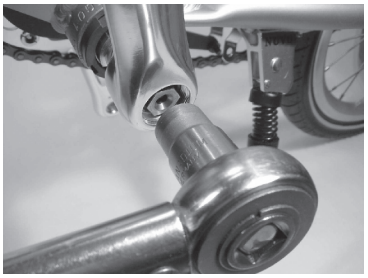
If available, always use a torque wrench for tightening (torque: 140-160Nm / 100-115 lb ft).
Important: The ***high-speed-drive*** nut has a right hand thread!!





Axle bolts

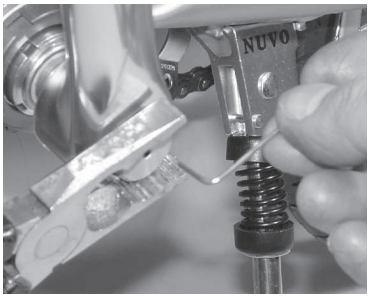
Put some grease to the thread and tighten the bolt with 50-55Nm (35-39 lbft).





Gear-shift button

One of the most important adjustments is the correct positioning of the gear shift button.
Please spend a few moments reading this to understand why this is so important:



- If a **gear shift push button** is screwed on too much, the clutch, which has to transmit the high torques from the axle to the sunwheel or planet carrier, can´t engage correctly. The load on the teeth of the clutch increases and the clutch can be damaged by excessive pressure.
It is most important, that there is still some inward play on the button, even when it is in its depressed position! It isn´t important how much travel the button still has.
If using our original crankarms, the position of the button is correct, when the push button is flush with the surface of the crank.
If **using your own crankarms,** please check the cranks before of assembling them. Hold the crankarm in your hand and put an axle bolt and gear-shift button in the hole of the crank. Now you can see, whether the button is too high. Its surface should be below the surface of the crankarm.

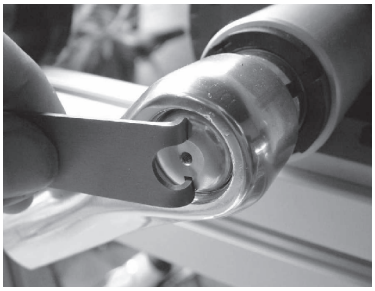


- The gear shift button must be tightened with a torque of 110 cNm. It may be difficult to find such a low-torque torque wrench. That´s why we include a high-quality 1.5 mm hex bit for tightening the gear shift button.
Hold the gear-shift button with the special wrench (for older buttons: use a pair of pliers) while tightening very firmly.
Finally attempt to unscrew them by hand. If you can, you will lose the button soon. Tighten it again!
Never use thread-locking compounds. If the button is tightened correctly, you´ll never lose it.



New gear shift buttons (since October 2004)

The new designed gear shift buttons allow easier tightening.



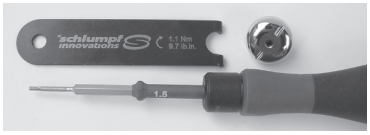
The button must be approximately flush with the surface of the crank, when being pushed. It can protrude up to 1mm (especially in combination with easy-shift kick plates).

Then tighten the small Allen screw M3x5 within the button by holding the button with the special wrench, that comes with every tool set.



Use a 1.5mm Allen wrench or the 1.5mm bit of our tool sets.

For easy-shift levers, the gear shift button can protrude up to 1 mm to make shifting quick and safe.



Mass installation of gear shift buttons

If you will regularly be installing our gearing systems, we recommend using a torque wrench, that can mesure a torque of 110cNm (1.1Nm).

A torque screw driver, preadjusted to 1.1Nm, is available as accessory.



Maintenance

Lubrication

A labyrinth seal plus a plastic cover protects the ***high-speed-drive*** against dust and spray. The cover exerts no sealing pressure in order to minimize friction losses, and therefore cannot retain an oil-bath.

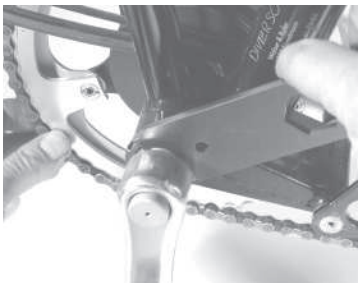
The original lubrication is done with a special low temperature grease, which is a good compromise between oil and grease lubrication charateristics, and is also an effective long-term lubrication in case, the rider never does any maintenance.
5ml syringes of this special lube are available as an accessory. This provides enough lubrication for 3'000-4'000 miles.

For riding in very low temperatures, oil lubrication gives better results than grease. Insert a few drops 1-2 times a year or after 2'000-3'000 miles. Too much oil can cause leakage.

If the ***high-speed-drive*** starts running noisily, this is probably due to a lack of oil on the planet bearings. Insert some lube at the slot screw on the back side of the housing.

Grease and oil each have their benefits. Grease damps noise much more effectively than oil. Oil causes less friction losses, especially at low temperatures.

Be careful if using a different lubricant than the original one. Wrong viscosity may let the gears run with increased friction losses.



Adjusting the gearing play

The axle has three cartridge bearings. Their life expectancy is at least 20,000-30,000 km. These are of standard size (6903 2RS) and commonly available.

The bearings for the planetary system are 3 ball races with balls of 4.00 mm diameter (not 5/32", which is a very similar size).

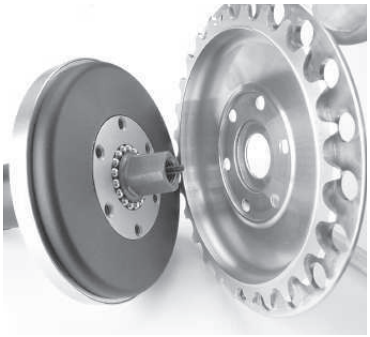
Please note: the adjustment of the gearing play is made at the factory with painstaking accuracy. Do not change the position of the self-locking nut at the left end of the axle without a good reason.

Only adjust the gearing play, if the chainring has play along the axis of the spindle. Slightly tighten up the self-locking nut on the left end of the axle (only a few degrees). Never tighten the nut too firmly. Preload on the gearing system may damage the bearings.

Please note, that some play between the cranks and chainring in the direction of rotation is normal and necessary for proper engagement of the gears after switching.

To check a potentially incorrect adjustment, proceed as follows:
- Unscrew the self-locking nut on the axle 1/4 - 1/2 turns.
- Move the chainring in the direction of the spindle to feel the play.

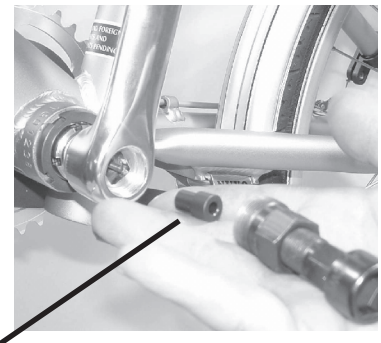
- Slowly tighten the nut while moving the chainring at the same time.
- Feel the play decreasing.



Swapping chainrings

The chainring / trouser guard unit can be exchanged.
First dismount gear shift button and crankarm, then unscrew six torx screws, and you can lift the chainring off.

Removing cranks

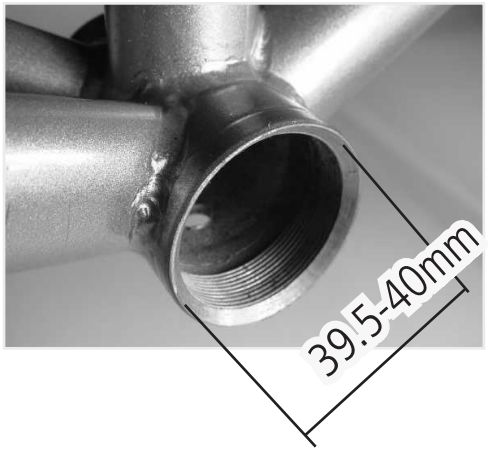


To remove a crank, proceed as follows:
- Hold the gear shift button with pliers and unscrew the tiny Allen screw M3 with an 1.5-mm hex bit or Allen wrench.
- Unscrew the button.
- Remove the axle bolt with a 14mm box spanner. Check, to make sure that the washer underneath the bolt didn't remain in the axle hole.
- Insert the small tube from our tool set before using a standard puller to remove the crank. (an M6-nut may do the job as well, if you don't have the original tool set).

Very important: If not using the small tube or an M6 nut, you will destroy the shifting shaft when pushing with a standard puller!

If using a different crankarm not provided by the manufacturer, make sure the hole for the axle bolt has a depth of at least 8mm.

Please also make sure that the right-side crankarm is not wider than 25mm, to prevent it from touching the spider when being tightened.



Trouble-shooting

Gear housing is slipping under load in high gear

- The bottom bracket wasn't chamfered correctly to the diameter given in our installation instructions (outer diameter of the conical part has to be between 39.5 and 40mm).
- The cone area wasn't completely clean and dry.
- The nut on the left side wasn't tightened with the appropriate torque (140-160Nm / 100-115 lb ft).
- You didn't use our Loctite compound for an installation into aluminum frame.

-> We recommend completely removing the unit from the bottom bracket if it is spinning under load..
-> Check the chamfered part of the bottom bracket, clean it and roughen the surface of both the beveled region and cone ring.
-> Use Loctite for an installation into aluminum frame
-> Use our box spanner with a torque wrench for tightening.
Please note: all ***high-speed-drives*** just come with a conically shaped nut on the left. The material of this nut is of no importance in terms of friction, which is only required on the right side to counter the torque of the planetary gearing system.

Noise

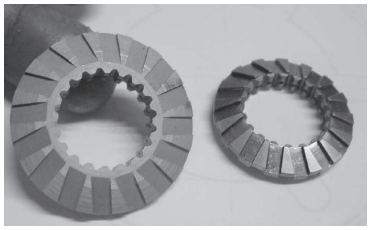
At the beginning, some noise is normal due to manufacturing tolerances and does not affect effenciency. Gears normally run smoother after some break-in time.

Gear housing is lose, but nut can't be tightened nor screwed off

The bottom bracket shell may have a width of less than 67.5mm. The black nut of the ***high-speed-drive*** came to the end of the thread before it clamped the housing. Please contact us to give you an advice.

Skipping

Please check whether this is occuring in the front or the rear gearing system. If this occurs in direct-drive mode, mark the position of the crank in relation to the spider. If it is the ***high-speed-drive*** that skips, the relative position of crank to spider will change. If, after the skipping has occurred, the position is still the same, the rear gearing system is at fault, due to a worn-out free-wheel mechanism, for example.
Always check the gear-shift buttons for correct position. After pushing the button and engaging the gear, the button should be approximately flush with the surface of the crankarm. It is important that you still can push the button a little, meaning there must be some play between gear shift button and axle bolt!



If the ***high-speed-drive*** has been operated for a long time in an incorrect gear-shift button position, the clutch may be damaged. This would be due to overload of the clutch teeth caused by excessive pressure. If correcting the push-buttons doesn't help, the clutch and the two parts where the clutch engages, may need to be replaced.
BTW: The clutch parts never wear out when correctly adjusted.

Skipping can be caused by excessive play in the chainwheel along the axis of the spindle. This can be caused by mis-adjustment of the self-locking nut on the left end of the axle.

Accessories

Adapter for internal hubs

We offer adapters, that allow to fit a BCD74 or BCD110mm chainring on a Shimano, SRAM or Sturmey Archer (SunRace) hub (Please note: the new SunRace 8-speed-hub uses a different flange pattern). This allows to get smaller gears without reducing the front chainring too much!
If you want to get very low speeds, it is better to increase the size of the rear cog than to reduce the size of the chainring. This reduces load on the parts and gives longer lifetime of all components.

Sample: a bike with 700C rear wheel and ***high-speed-drive*** can be equipped with a chainring and rear cog of same size! And still gives a much wider gear range than any derailleur system can offer!







Easy-shift kickplates

Easy shifting even with small shoes and/or clik in pedal systems.

The levers can be retrofitted. They are clamped between crankarm and pedal. The gear shift button remains the same.

Important: Easy-shift levers only fit straight 170mm crankarms.





Installation:

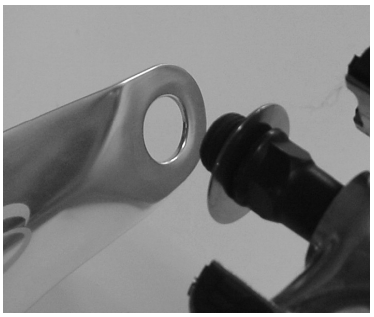
- Put the lever to the outside of the crankarm.
- The washer between pedal and kickplate with its concave side towards the kickplate!
- Tighten the pedal.



Please note: if the lever rattles when pedaling, unscrew the pedal again and slightly bend the lever towards the crankarm to give more tension.



Brompton folding bike: no washer at the folding pedal!



Finish: high polished or black anodized aluminum.

We offer levers with your own logo (starting at 10 pairs at no extra cost).

Please ask us.

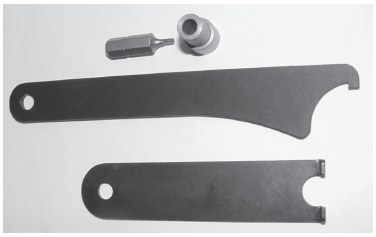


Tool sets



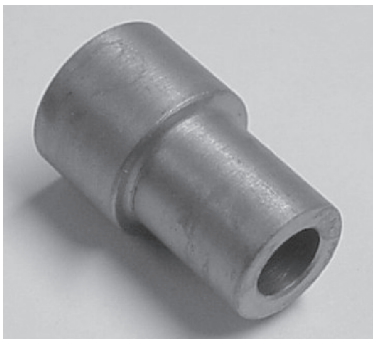
Tool set "Installation + Maintenance"
For easy installation, the box spanner is indispensable. It can be combined with a 1/2" ratchet or better with a 1/2" torque wrench.
Tightening torque for ***high-speed-drive*** is 140-160Nm (100-115 lbft).

Please use the small tube for pulling off the crankarm with a standard puller. It avoids any damage to the thin shifting shaft!

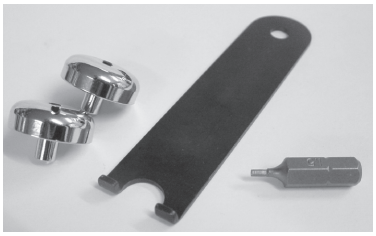


A 1.5mm hex bit and a special wrench makes tightening of the gear shift button easy and safe.

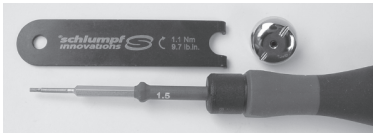
Content of the tool set "Installation + Maintenance":
- box spanner 1/2"
- C-spanner for adjusting an eventual gearing play
- 1.5mm hex bit
- tube for pulling off crankarm with standard puller
- special wrench for tightening new designed gear shift buttons



Tool set "Maintenance"
Same content except box spanner:
- C-spanner for adjusting an eventual gearing play
- 1.5mm hex bit
- tube for pulling off crankarm with standard puller
- special wrench for tightening new designed gear shift buttons



Torque wrench for gear shift buttons
This tool is preadjusted to 1.1Nm (110cNm) and tightens gear shift button to the appropriate torque. You'll never lose a gear shift button!



Crankarms



Standard crank 170mm, straight shape.
The standard crankarm is a cold forged, hand polished high quality crankarm.

Offset crankarms 102, 114, 127, 140, 152, 160, 165, 170, 172.5 and 175mm

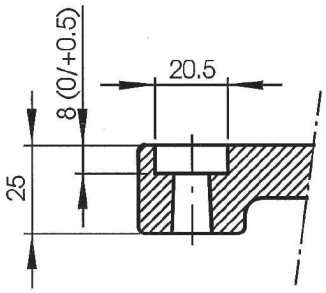


Please note, that these crankarms, all with offset shape, cannot be combined with the easy-shift kickplates!

All crankarms are available either with high polished aluminum or black anodized finish.



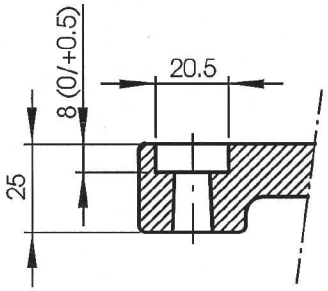
Size of crankarm



If using another than an original ***Schlumpf*** crankarm, please first check width and depth of the hole and the total width of the crank!

The whole for the gear shift button should have a depth of at least 8mm, and the total width of the crank shouldn't much exceed 25mm.

FAQ



Can I use any crankarms I want?

Theoretically yes.
Please consider that on the right side, the crank is not connected to a spider. It looks exactly like a left-hand crank, but has a right-hand thread for the pedal. You may take one from a tandem captain's cranks, which usually has the correct type of crankarm on the right.
Also make sure that there is enough space for the axle bolt and gear-shift button (depth of 8mm) and that the right crankarm is not wider than 25mm.

Can I use any chainrings?



No. The ***high-speed-drive*** chainrings don't come with a certain bolt circle diameter, because they are just integrated in the housing.

Indeed, all of the chainrings can be exchanged. The standard 27t. chainring / trouser guard unit is mounted with 6 Torx screws, the larger 30 and 34. chainrings are hold by a circlip and are therefore very easy to exchange.

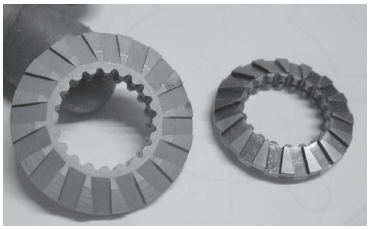
What types of internal hubs can be used with *high-speed-drive?*





Theoretically, ***high-speed-drive*** due to its small chainring creates a 2.5 times higher torque on the rear transmission.
This is just theory and is true only if you ascend a given gradient 2.5 times faster.
With other words: if your speed is the same at the same slope, ***high-speed-drive*** reduces the force on your knees by increasing the number of revolutions of the pedals. The load on the rear component, either an internal hub or a derailleur, remains the same!
Load increases, if you use ***high-speed-drive*** on a tandem, or if you add a trailer with heavy load. In this case, load on the rear component can exceed the value, which is guaranteed by the hub maker.
The past 12 years, combining our gearing systems with internal hubs such as Shimano Nexus 4-, 7- and 8-speed hubs, SRAM (former Sachs) 3-, 5-, 7-speed hubs and Sturmey-Archer hubs have shown, that these combinations work absolutely perfect.
For heavy duty applications, there are some products designed for tandems, like the SRAM 5-speed-hub "Cargo", which is equipped with milled planet gears instead of powder metal parts like in most other gearing systems.
Other applications, especially user-installed ones, may work, but will not be covered by the hub manufacturer's warranty.





Can *high-speed-drive* be used on a rikshaw?

Yes, if you need high speed on your rikshaw!

All ***high-speed-drives*** come with the large "Cargo" clutch, introduced in 2003. There is no part in the gearing system, that can brake even under harshest conditions, if only installation has been done according to our instructions.

There are several customers, who have done more than 50'000 km on our gearing systems. We could check some of those, and there was hardly any wear on any gearing parts visible.

If you have the choice for the rear hub, take the SRAM Cargo 5-speed-hub, which is designed for heavy load, and which gives an evenly spaced 10-speed gear range of not less than 560%!
Please do not adjust this nut without understanding its function!!

Very important: If adjusting the nut on the left end of the axle, take care, that you do not preload the gearing system. There mustn't be any play in the direction of the spindle, but there mustn't be any preload on the system either!

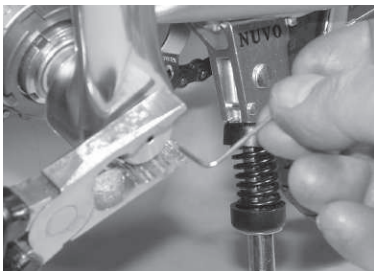
To check the adjustment, proceed as follows:
- Unscrew the self locking nut on the axle 1/4 - 1/2 turns.
- Move the chainring in the direction of the spindle to feel the play.
- Slowly tighten the nut while moving the chainring at the same time.
- Feel the play decreasing.

Turn the crank several times, or ride a few hundred meters and check the play again. The balls sometimes need to be worked a little to find thir final position within the ball race.

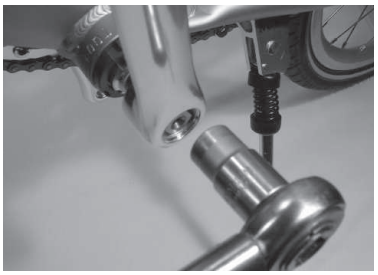
Dismantling gear shift button and crankarm



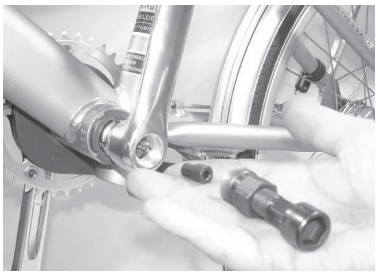
Hold the button with some pliers and unscrew the tiny M3 Allen screw within the button with a 1.5-mm Allen wrench.



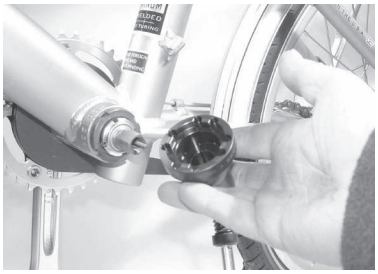
Unscrew the axle bolt with a 14mm box spanner.
Please make sure that the washer underneath the axle bolt has been removed, too.



Very important: Always insert the small tube (part of our tool sets) between axle and puller to prevent the shifting shaft in the center of the axle from being destroyed by the puller.



Removing *high-speed-drive* from the frame and dismantling the unit



Remove the black nut on the left side using a box spanner (from our tool set "Installation + Maintenance").

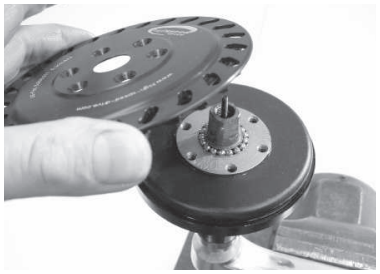


Never remove the gray nut on the axle!
Please note: ***high-speed-drives*** always comes with a right hand thread!

Position a crank in a vise and hold the ***high-speed-drive*** as shown on the right. Unscrew the right gear-shift button and axle bolt, and remove the right crank according to the left one.



Remove the six Torx screws....



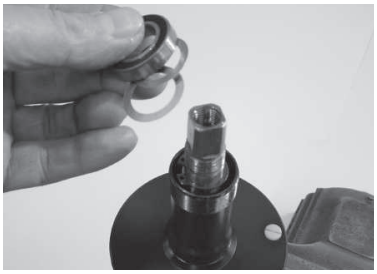
... and take off the chainring.



Lift the plastic cover.



Turn the unit around and unscrew the self-locking nut (right hand thread).

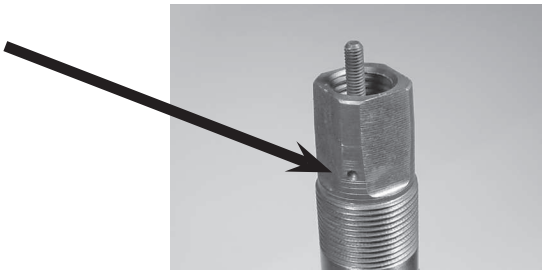


Very important: After having removed the left bearing, count the exact number of 0.1mm spacers between bearing and circlip. Check to see whether any spacers are still sticking to the bearing!
When reassembling, you must use exactly the same number of spacers at this position!

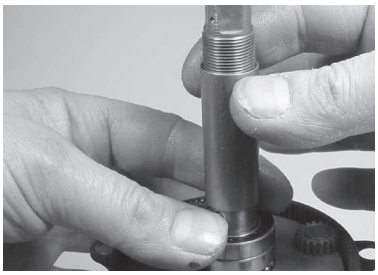


Carefully lift the gear housing. If it sticks and can't be removed without force, hold down the circlip in the center.

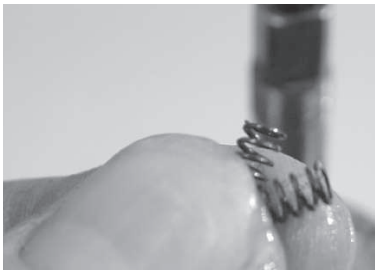
Remove the circlip.



Put the axle on top of the crank in the following way:
The dot marking on the upper end should be facing you.



Hold two fingers as shown in the photo and carefully lift the spacer tube while rotating it slightly. Please note that two small springs are held by this spacer tube. The hole for this springs is oriented in the same direction as the dot marking on the axle.

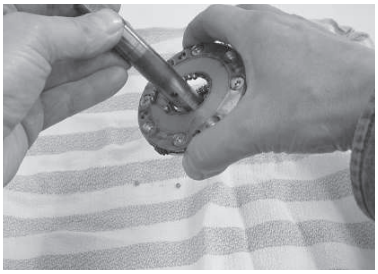


The springs now will have jumped out and you should also set aside two balls (diameter 4.00 mm), which may be still in the hole of the axle.
Take off the right cartridge bearings.

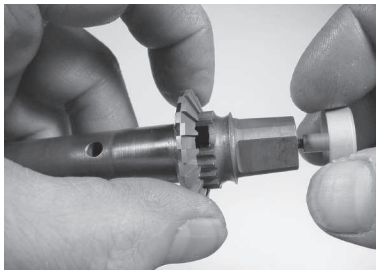


Important: Check again to see whether there are 0.1mm spacers between the right cartridge bearing and the ball bearing's cone ring.

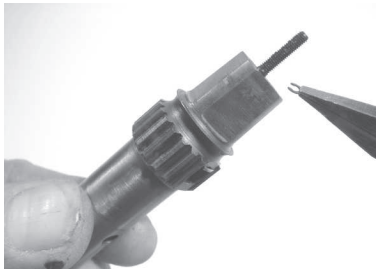
Remove the bearing cone.



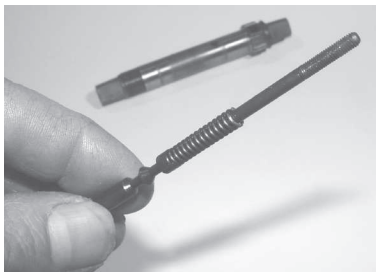
Take a clean piece of fabric and take the last pieces apart.
Important: ***high-speed-drive*** uses balls of metric size 4.00 mm and not the similar inch size 5/32"!



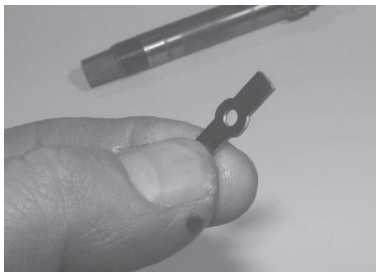
Screw on a gear-shift button on the left side and push the shifting shaft towards the right side. With thin pliers, remove the tiny circlip near the right end of the shifting shaft.
Note: Never use a circlip twice!



After removing the shifting shaft, you will find two spring-steel pieces in the cross-hole of the axle.

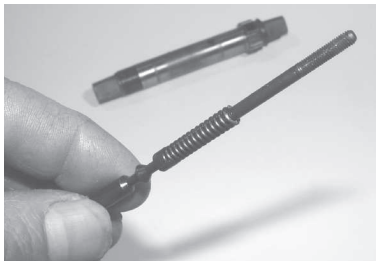


Check for two long springs (approximately 14 mm long) and two shorter ones (approximately 5.5 mm long).

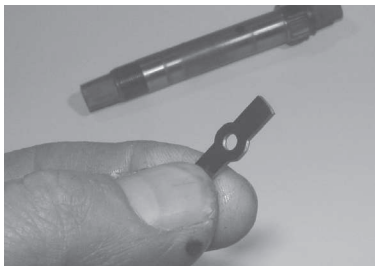


Assembling

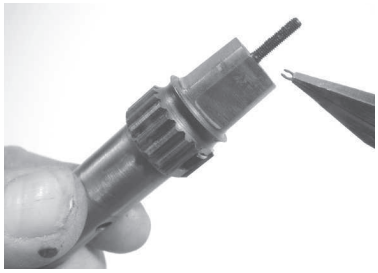
Put one of the longer springs on the shifting shaft.



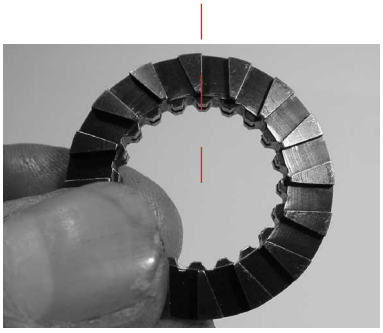
Insert the two spring-steel pieces into the axle's cross-hole.



Again, screw on a gear-shift button to the left side of the shifting shaft. Push the shifting shaft to the right side and put on the second spring and the circlip 1.5 mm.
Check to make sure the circlip has snapped on correctly.

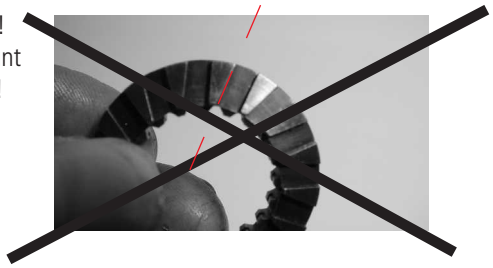


The next step is critical to proper functioning.
The teeth of the clutch must be oriented as seen in the picture to the right (as viewed from the right side). In other words, the leading edge of the teeth should match with radial lines extending from the center of the axle.



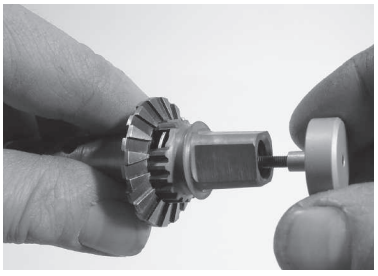
This is the right way! The leading edges of the teeth match with radial lines from the centre of the axle.

This is the wrong orientation!

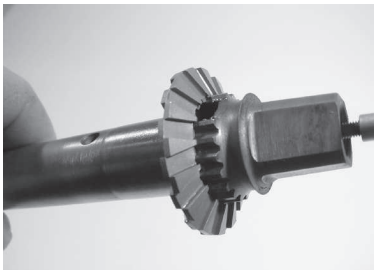


Wrong way! Do not mount it this way!!

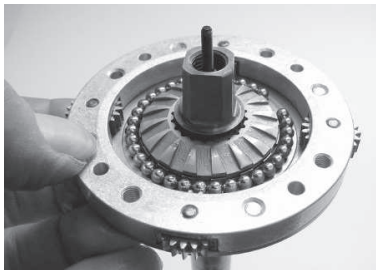
There is a groove on the inner diameter of the clutch. Try to snap the clutch on one side of the spring-steel pieces. Then push the clutch to the right side and push with the screwed on button from the right side to the left, until the clutch has audibly engaged.



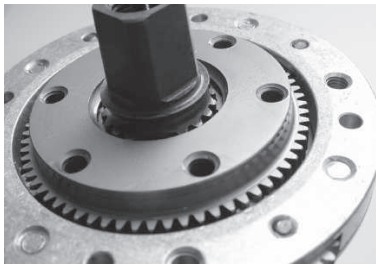
Please check: With newer cranks (with right-angled cross hole in the axle), the travel of the clutch is 5mm. With older cranks (oval cross hole in the axle) the clutch travel is about 3.5mm.



Now fill in balls to the race of the planet carrier and finally take two balls out of the race. Put some grease to the ball race.

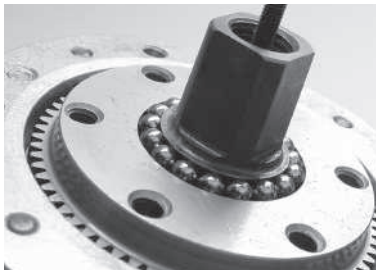


Hold the planet carrier as shown on the right and mount the axle.

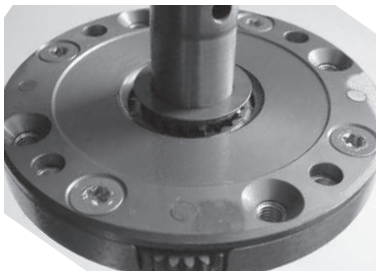


Put on the sunwheel.

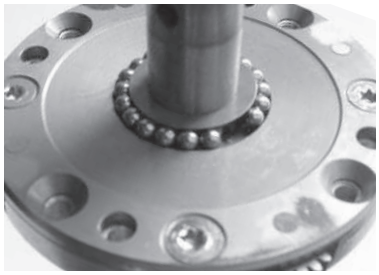
Now hold the sunwheel with two fingers and press the axle slightly upwards. This allowes you to fill balls into the outer ball race. Remove one ball.



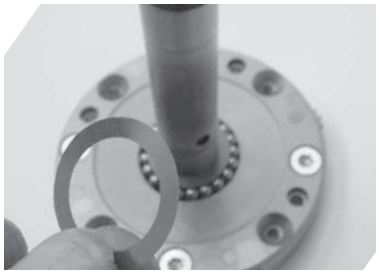
Press the whole package together again and turn it over.
Put it onto the crank in your vice again. Fill the left ball race with balls and remove one ball. This is easier, if you first mount the bearing cone and insert the balls afterwards.



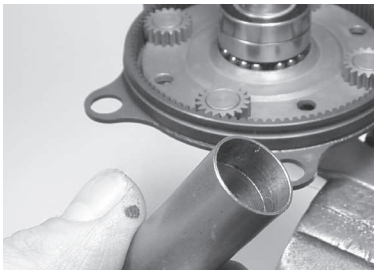
Slip on the same number of 0.1mm spacers as you had removed before. Add some grease to the balls.



Finally slip on the cartridge bearings (add some grease to the bearings, too).



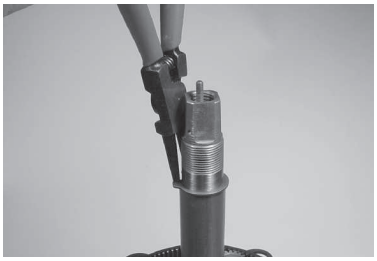
Press some grease into the cross hole of the axle and insert 2 balls and the two short springs from each side.
Carefully slip the spacer tube with its larger diameter ahead on the axle.



Press the springs towards the axle and slip on the tube.



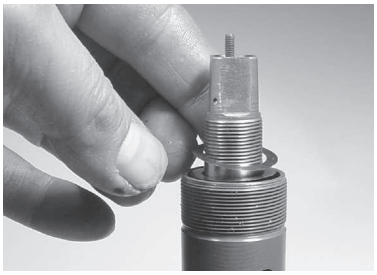
Mount the circlip.



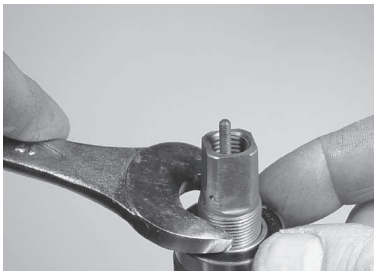
Slip on the housing.



Add exactly the same number of 0.1mm spacers as had been removed before.



The left bearing must be in contact with the parts lying below it on its inner and outer diameter. If you press with a tube or with a 17mm wrench on top of the inner ring of the bearing, you should be able to just turn the outer ring without too much friction between outer bearing ring and gear housing tube.
This step is very important, as too few spacers may leave the left bearing misadjusted, which can cause excessive load on the left bearing in the direction of the spindle. If needed, add one 0.1mm spacer between the circlip and left cartridge bearing.



Mount the self locking nut.
Tighten it to the point where the left cartridge bearing can't be moved vertically any longer. Then unscrew the nut 1/4 revolution.
Size of the nut: M17x1



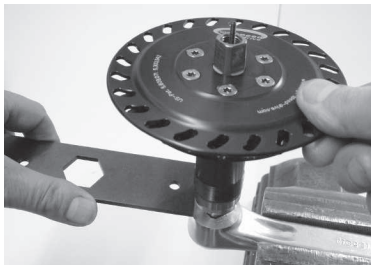
Turn over the unit and mount the plastic cover.
Put some lithium water resistant grease to the outer ball bearing.



Carefully mount the chainring / trouser guard unit and tighten the 6 Torx screws with a torque wrench.

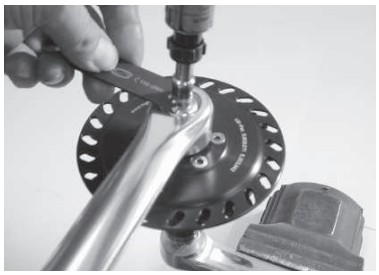


Now adjust the gearing play. The easiest way is to move the spider up and down and to slowly tighten the self-locking nut at the same time. The adjustment is perfect , when there is no longer any play on the spider but also no load on the bearings due to excessive tightening.



Mount the right crank and gear-shift button.





Check the gearing play again after riding a few hundred meters.



Assembly Instructions

1. Bottom bracket dimensions

Please check first for correct dimensions of the b.b. shell: standard ***high-speed-drive*** fits bottom brackets with width from 67.5 up to 73mm. If the b.b. shell is shorter, please ask for a wider gear housing or, in case of a longer shell, use the 10mm longer version, that is available.
Diameter: the unit is designed for BSA diameter (1.37"x24), but doesn't need the threads.

2. Cone installation

Please note: ***high-speed- and speed-drive*** use right-handed threading, ***mountain-drive*** uses left-handed threading.
Important: For installation, unscrew only the black nut, never the gray one!!

You must prepare the bottom bracket tube as shown in Fig. 2. It is very important that the diameter of the conical part is 39.5 - 40mm. To tighten the lockring, use the special box spanner and combine it with a torque wrench. Tighten this down very hard! Torque: 100-115 lb/ft (140-160Nm).
Do not install a ***high-speed-drive*** into a very thin walled aluminum bottom bracket shell. The conical part exert considerable force that could damage the shell.
Ask for a portion of Loctite compound, if you want to install a ***high-speed-drive*** into an aluminum b.b. shell.

3. Crank Assembly

The right side crank is usually preassembled by the manufacturer. For tightening the left crankarm, please use a torque wrench and tighten with a torque of 50-55Nm (35-40 lbft).
Very important: When disassembling a crankarm, always use the small tube (part of the tool sets) in combination with a standard puller to avoid damaging the thin shifting shaft!

3. Gearshift button

- Screw in the gearshift button about two full turns.
- Push the button.
- Important: Turn the crank slightly, until the switch engages.
- Turn the gearshift button until it is flush with the crank. It is very important that there is some play between the axle nut and the gearshift button.
- Adjust the button and tighten Allen set-screw very firmly with the 1.5mm hex bit of the tool sets.

In combination with easy-shift levers, the gear shift button can protrude about 1mm in order to give safe and fast shifting performance.



Fig. 1: Standard housing of the ***high-speed-drive*** with cone area at the inner diameter.

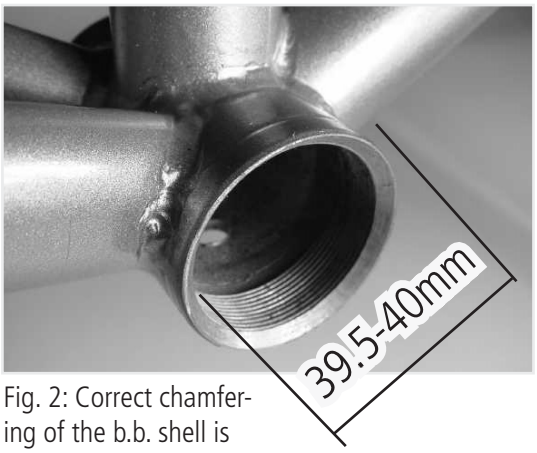


Fig. 2: Correct chamfering of the b.b. shell is very important!



Fig. 3: Put the plastic slot screw to a position, that allows inserting lube easily.



Fig. 4: For installation into an alumium frame, use our Activator and Loctite thread-compound.

4. Some maintenance information

- Lubrication: Periodically (once or twice a year) remove the plastic slot screw on the back side of the housing and insert about 1/3 of the content of the syringe with special lube. Standard bicycle oil may do the job as well, but it won't last as long time as the special grease due to the only little pressure of the sealing.

- Bearing play: After the first few hundred miles of use, check for bearing play. The chainring must not have any play along the spindle axis. If there is any play, slightly tighten the self-locking nut on the left end of the axle. Never tighten the nut too firmly. Some play between the cranks and chainring in the direction of crank rotation is normal and necessary for proper engagement of the gears after switching.



Fig. 5: Use the box wrench in combination with a torque wrench.



Fig. 6: Hold the gear shift button with the small wrench and tighten it with the 1.5mm hex bit.

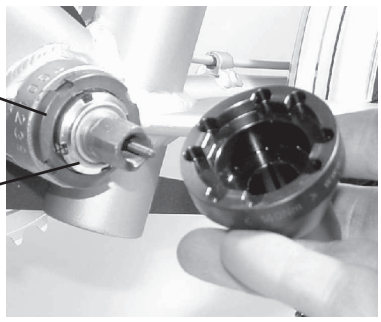


Fig. 8: Adjusting of gearing play. No preload!

Technical data

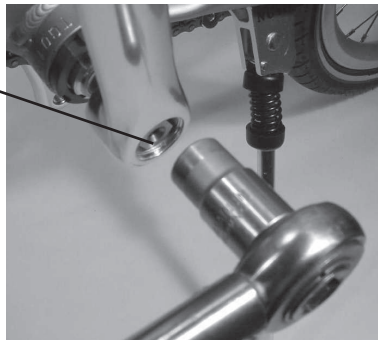
Tightening torques

- Black nut on the left side 140 - 160 Nm (100 - 115 lbft)



- Grey nut for adjusting gearing play 0 Nm (0 lbft)
  No preload!!

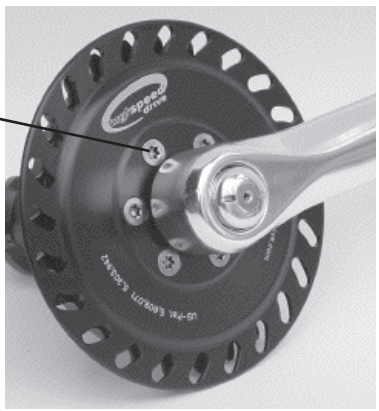
- Axle bolt 50 - 55 Nm (35 - 38 lbft)

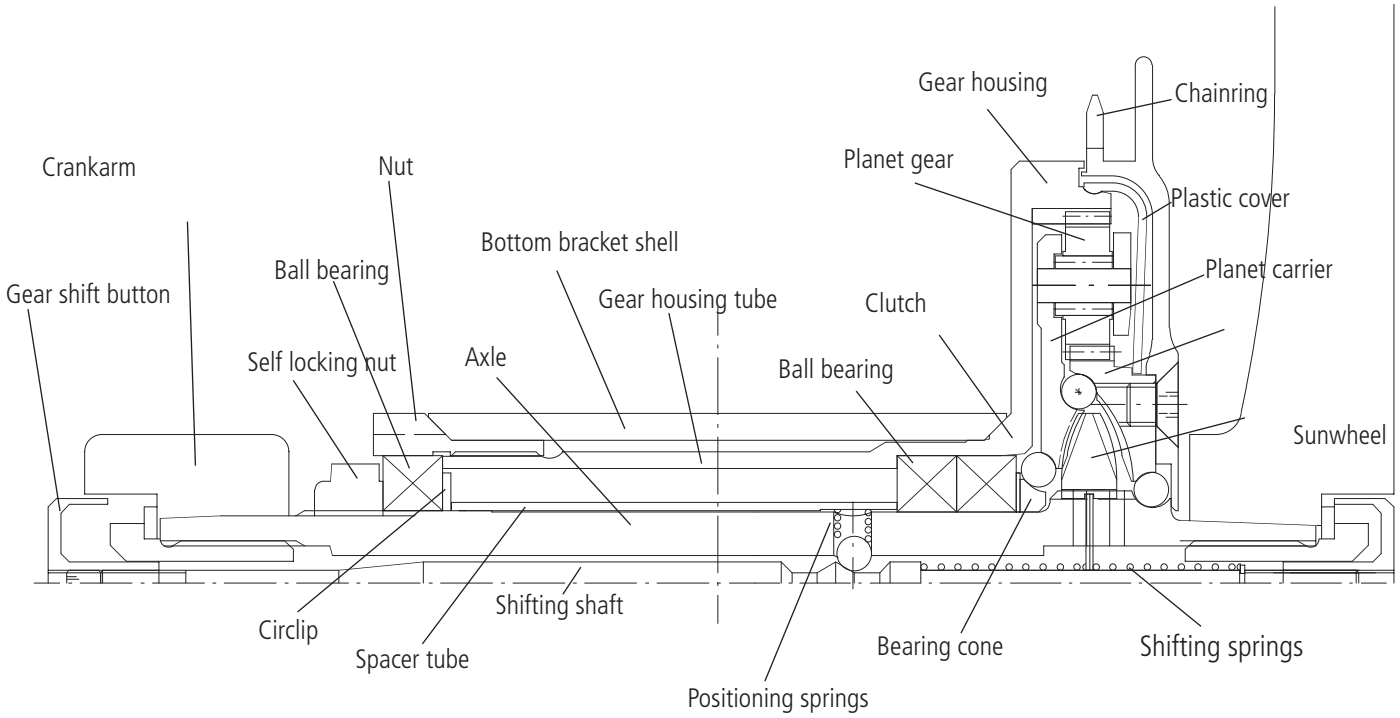


- Gear shift button 110 cNm (0.8 lbft)



- Chainring / trouser guard unit 8 Nm (5.5 lbft)





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Check list for ordering

- for aluminum or steel bottom bracket shell ?

- tooth count of the chainring ? (Standard is 27, equals 67 in high gear)

- b.b. shell of standard BSA size (inner diameter 33.6 - 34mm, width 67.5 to 73mm) ?

- standard crankarms 170mm ?

- with easy - shift kick plates (for 170mm cranks available only) ?

- tool set ?

- do you have a 45°milling cutter for chamfering the b.b. shell ?

- if not: buying or renting (we have a rental service in most countries) ?

- shipping: by standard economy or priority post service or with private carrier like FedEx or UPS (more expensive) ?

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