

Hub Service Manual for Shop Mechanics

Part #17990 rev.11/14

**Complete instructions for servicing
Chris King ISO and Classic hubs.**

**Includes answers to common technical questions
and use of the Chris King hub service tool.**

CHRIS KING[®]
PRECISION COMPONENTS

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For technical questions, call 800.523.6008
www.chrisking.com

CHRIS KING®

PRECISION COMPONENTS

HUBSETS

This manual is intended for the mechanic who already possesses a familiarity with hubset adjustment techniques and who are interested in the learning how to completely overhaul their Chris King Classic or ISO hubsets.

FEATURES

- Classic, High Flange, ISO Disc, single speed, and tandem hubs available
- Exclusive patented RingDrive™ engagement system offers 72 points of instant and positive engagement and extremely high torque carrying capacity ideal for hard racing, tandems, etc.
- Bearings are fully serviceable and are available in either steel or ceramic options
- Strong and stiff 19.5mm axles
- In-house design and manufacturing - 100% made by Chris King in the USA
- Unparalleled quality and reliability
- Responsibly lightweight

SET-UP

GETTING STARTED AND CAUTIONS

The following issues that are important to review before servicing and/or trouble shooting your Chris King hub:

Adjust the preload on the bearings directly after building the wheel

Spoke tension pulling out on the flanges can slightly loosen the preload adjustment on the bearings. The hub(s) come pre-adjusted from the factory anticipating both spoke tension and skewer compression. However, because of variations in wheel-building practices, a minor adjustment should always be performed upon completion of the wheel build. Please see the appropriate "adjustment" section and check the hub before using.

Chris King hubs feature adjustable bearing preload

The bearings should be kept in proper adjustment for optimum product performance. Do not allow the adjustment to become loose, as this may cause a loss of performance that could lead to damage to the hubs.

Use steel quick releases for maximum rigidity

Our 19.5mm axle is one of the stiffest available. However, performance will be maximized with the stiffest possible attachment to the frame or fork. Some Chris King hubs are designed to be used in conjunction with quick-release skewers. It is recommended that the skewer develop a minimum of 1100 lb. of clamping force when set. For best performance, use a steel skewer. Titanium skewers are not recommended.

Use only the recommended bolts with our bolt-on hubs

Never use thread locking or mounting compounds

Thread locking compounds are not an acceptably reliable substitution for loose threads or press fits in high performance componentry. All Chris King components are precisely engineered to exacting tolerances to eliminate the need for thread locking compounds.

Use “spidered” cassettes with our aluminum driveshells

The aluminum driveshells of the rear hubs are softer than the steel driveshells, and we recommend the use of “spidered”-style cassettes. Avoid using “individual”-style cog sets with the aluminum driveshells. Normal notching from individual cog wear should be knocked down with a file.

General cautions

When using any Chris King product in conjunction with other manufacturers' parts, be sure to follow all manufacturers' instructions and recommendations.

Do not attempt to modify your hub to accept any type of bolt-on retention device outside of available Chris King axle systems.

BREAK-IN & WHEEL BUILDING

Break-in

Once your new hub is placed in service, some settling will occur. Check adjustment by clamping wheel into frame or fork. Ride for 5-10 minutes, check for play or binding, and readjust if necessary. Recheck after the first 5-10 miles of riding. Check cog lock ring on rear hubs after their first use, and tighten if necessary. Continue monitoring for the first 60 hours of use.

During the first 60 hours of use, expect some break-in drag. This is normal as the seals break in, and will soon diminish. If this causes chain sag in the rear while back-pedaling, increase the p-tension (cage tension) on the rear derailleur.

The bearing grease is intentionally over packed and excess grease may seep at the bearing seals during the break-in period.

Frame preparation

All Chris King hubs are designed to work with specific fork and drop out spacing. Do not attempt to modify your hub to work with a spacing other than for which it was intended. Aftermarket axles and conversion kits are available through your nearest Chris King dealer or online through our webstore at www.chrisking.com.

Check fork and frame drop outs to ensure they are parallel to each other. Use an appropriate tool such as those made by Park™ or Campagnolo™. Unparallel drop outs may be unsafe and/or compromise the performance of your Chris King hub.

Wheel building - hubs

Chris King hubs are designed to work with 14 or 15 gauge spokes. Disc brake wheels must be laced using at least a 2-cross lacing pattern. As the torque generated by driving the cassette requires a crossed spokes, so does the additional torque on the non-drive side flange generated by the braking action. **Radial lacing your ISO and Classic hub is considered outside of the intended use and will void your warranty.** King Cycle Group will not be responsible for damaged or destroyed hubs, any consequential damages, or any resulting labor costs due to radial lacing your ISO or Classic hub.

Because of the additional torque caused by the braking action on the front ISO hub we recommend that the hub be laced using a specific crossed lacing pattern. The front ISO should be laced at least 2-cross with the rotor (left) side pulling spokes (braking direction) heads out/elbows in. The final cross of the pulling spoke needs to be on the outside. As braking force is applied, increased pulling spoke tension will pull the crossed spokes towards the center of the hub and away from the caliper. Please use best wheel building practice or see an experienced wheel builder.

ISO Lefty® LD and ISO Lefty® SuperMax wheel builds will require the use of a truing stand Lefty® hub adapter tool such as Park's® TS-TA or Cannondale's® Lefty® wheel-truing dummy axle.

See Table on pages 40 and 41 for build specs.

Installation and removal of the brake rotor adaptor

Mount the brake rotor according to manufacturer's instructions.

Adapter installation (See figure 6)

1. Before installation, thoroughly clean both the brake rotor adaptor and the splines on the hub shell. Any debris on the splines may not allow the rotor to run true, inhibiting the performance of the brake.

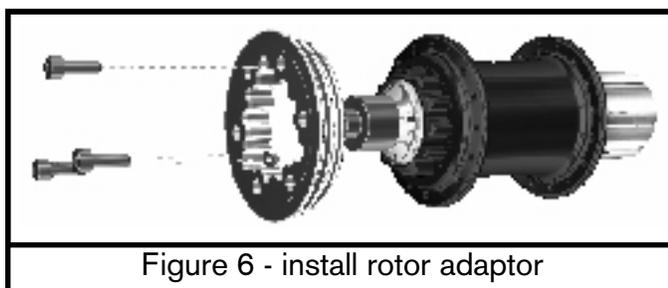


Figure 6 - install rotor adaptor

2. Place the adaptor onto the splines. When snug, the adaptor should leave an even gap approximately the width of a piece of paper between the hub and the adaptor.
3. Insert the three bolts provided. In an alternating pattern, hand tighten adaptor bolts to pull adaptor down evenly.
4. Finish torque to 28 in.-lb or 3.16Nm. Do not over tighten.

Adaptor removal

1. Remove the disc brake rotor if it covers the three mounting bolts.
2. Remove the three adaptor fixing bolts.
3. To remove the rotor adaptor from the tapered splines, pry between the adaptor and the hub using two opposing plastic tire levers.(it should pop off easily). Do not use metal objects, such as screw drivers, to release the adaptor.

Wheel building - BMX

Cautions

Chris King BMX hubs are supplied with 3/8"-16 x 1" socket cap axle bolts. Replacements can be purchased at most high quality hardware stores. Use a bolt of grade 8 or equivalent. Under no circumstance, should a quick release skewer be substituted for the axle bolts.

Do not use cogs other than BMX cogs. The driveshell of the rear hub has a unique symmetrical spline, and incompatible with some Shimano, and other after market cogs. Use of other cogs may cause chain slippage, or derailment, which could lead to bodily injury.

Installation and removal of the Cog

Chris king BMX hubs use a cassette style cog mounting system. Special splines and lock rings have been designed to accept premium quality steel cogs. Cogs are available in sizes from 12t to 20t. Using standard cassette tools you can easily remove and change your cogs.

Cog installation

1. Select desired tooth-count Cog.
2. Slide cog onto driveshell spline. Cogs are symmetrical, and can be installed with either side out.
3. Thread lock ring onto driveshell over cog.
4. Insert Shimano HG™-style tool into lock ring, and tighten to 20 ft.-lb or 27.12Nm.

Cog removal

1. Using a chain whip, hold cog stationary from counterclockwise rotation.
2. Insert Shimano HG™-style cassette tool into lock ring.
3. Loosen and remove lock ring by rotating it until it is free from driveshell.
4. Slide cog off of spline.

HUB SERVICE

MAINTENANCE SCHEDULE

Chris King Hubs are designed to provide long life and high performance. Beyond an occasional adjustment, the only maintenance necessary is cleaning, lubricating the RingDrive™ (see “Maintenance of the RingDrive™ & driveshell”, page 6), and re-lubricating the bearings (see “Bearing service”, page 9). Riding conditions will determine how often to maintain your hubs. As a beginning guideline, your hubs should be maintained every 6-12 months in normal and dry conditions and every 3 months in wet or muddy conditions.

The bearings in your new Chris King hubs are of the highest quality available. However, all bearings will settle and eventually wear with use. Since looseness or “play” in the bearing assembly can develop as a result of wear, Chris King hubs have been designed with an adjustable bearing preload mechanism and any normal play can be eliminated (see the appropriate “...Adjustment” section).

RingDrive™ maintenance

Normal preventative maintenance of the RingDrive™ is simple and can be performed using basic tools. (See “Maintenance of RingDrive™ & driveshell”, page 6.) In many cases, a minor cleaning and reapplication of lubricant is all that may be necessary. Judging when to perform this basic maintenance is determined by riding style and conditions. As a beginning guideline, your hubs should be maintained every 6-12 months in normal and dry conditions and every 3 months in wet or muddy conditions.

Lubrication

Normal conditions

In normal riding conditions (0°-43°C), our RingDrive™ lube is recommended for the bearings and the RingDrive™. **Do not substitute other brands of lube, as they may be too sticky for the helix of the RingDrive™ inhibiting proper engagement.**

Cold conditions

To ensure proper engagement in sub-freezing conditions, first be sure that there is no water or moisture inside the hubshell. The hub may require an overhaul to ensure that the hub interior is completely water-free. Then mix the grease in the RingDrive™ area, especially on the helical splines of the driveshell, with 5-10 drops of PTFE (e.g. TriFlow™) . If you expect to be riding in temperatures that are consistently at or below freezing replace all internal lube with a quality 10w synthetic oil. Do not over fill. We recommend using a siliconal oil (Pedros® SynLube or Mobil 1®)

Wet conditions

Riding in wet conditions necessitates more frequent service. Often this is as simple as removing the axle and driveshell from the hub, removing any moisture from inside the hub shell, and applying more grease to the needle bearing. This should not replace periodic complete disassembly and maintenance, especially in extreme or prolonged wet conditions.

Note: Since it is nearly impossible to seal a hub from water and still have it spin freely, we have designed our hubs to be able to operate normally with some water intrusion. Although the bearings are stainless steel and will resist water induced corrosion, the lubricant will eventually deteriorate, leading to premature bearing wear and possible failure. High-pressure spray washing, transporting or riding the bicycle in the rain, or submersion in water while riding can all lead to lubricant contamination by water. Be aware of these situations and service more frequently when they occur.

In a pinch...

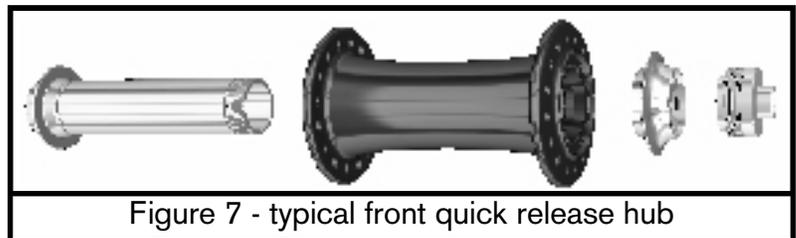
If Chris King RingDrive™ lube is not available, a quality 10w synthetic oil may be substituted. **Do not substitute other brands of grease, as they may be too sticky for the helix of the RingDrive™.** Running the hub on oil will cause the RingDrive™ to be more audible, yet functionally no different.

If you have any additional questions, please call our Technical Services Department at 800.523.6008.

BASIC SERVICE

Front hubs

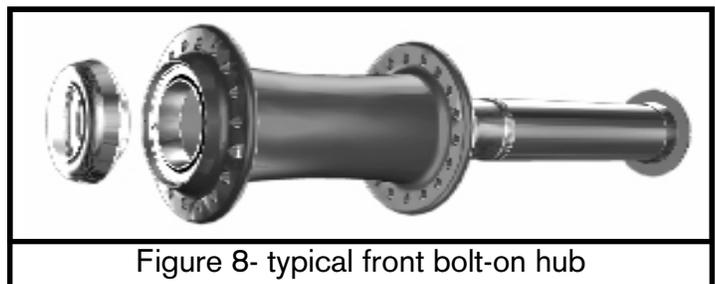
Disassembly of the front two piece axle hub (See figure 7)



1. Insert 5 mm hex wrenches into both ends of axle assembly. ***Pro Tip: Use a bench vice to hold one of the 5mm hex wrenches.**
2. Hold left hand stationary and turn right hand counterclockwise 1/4 turn until assembly is loose.
3. Loosen and unscrew adjusting cone and axle end until they are free from main axle.
4. Slide out main axle.
5. Both hub shell bearing assemblies can now be accessed.

Further disassembly requires specialized tools. Refer to "Complete Assembly".

Disassembly of the front one piece axle hub (See figure 8)



1. Insert a 2.5mm hex wrench into the adjusting clamp pinch bolt, and loosen.
2. With adjusting cone facing towards you, hold opposite end of axle stationary, and rotate cone in a counter clockwise direction. After one complete revolution the adjusting cone should be free from the axle.

3. Slide out axle.
4. Both hub shell bearing assemblies can now be accessed

Further disassembly requires specialized tools. Refer to "Complete Assembly".

Service of the bearings

We offer our bearings with either quality steel or ceramic balls, so short term water intrusion should not lead to any substantial damage. Judging when to service the bearings is completely dependent on the riding style and conditions.

1. Chris King sealed bearings have removable snap rings that hold the rubber seals in place. (See figure 9.)
2. Carefully, using a small screwdriver, pick, or penknife, remove the snap ring by inserting tool into split of snap ring. Gently work one end of the snap ring toward bearing center until it is out of its groove. Follow the ring around with the tool until the snap ring is completely dislodged.
3. Lift and remove exposed rubber seal to access the interior of the bearing.
4. Thoroughly flush the bearing with a light spray lubricant (e.g. WD-40™) and blow dry. Avoid using caustic cleaners and citrus based detergents.
5. Wipe dirt and other contaminants from the seals and snap rings. Avoid cleaning the seals with solvent, which could cause deterioration.

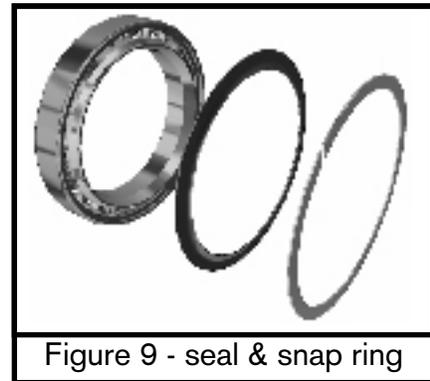


Figure 9 - seal & snap ring

Note: some solvents, synthetic lubricants, and greases with high-pressure additives may attack and damage seals and other nonmetallic materials. Minimize exposure to these substances and thoroughly dry hub after cleaning.

6. Lay a bead of our RingDrive™ grease, filling the gap between the inner and outer races 1/3 for steel balls or 1/4 for ceramic around the large bearing and 3/4 for steel or 1/3 for ceramic around the small bearing. Then rotate the inner race to work grease throughout the ball area.
7. Replace rubber seal between inner and outer bearing race.
8. Insert one edge of snap ring into groove of outer bearing race. Press along entire groove until snap ring is fully seated; a small gap should be visible between both ends of the snap ring.
9. Turn inner race of bearing by hand to test for binding. If bearings do not run smooth, repeat steps 1-9. Binding is often a result of improperly seated seals and/or snap rings.

Used snap rings and seals can be reinstalled unless warped, punctured, or otherwise damaged. If damaged, replacement seals and snap rings are available from your local bike shop or directly from Chris King precision components at www.chrisking.com or 800-533-6008.

Reassembly of the front quick-release hub

1. Lightly oil main axle o-rings with lightweight, low viscosity oil, with PTFE (e.g. TriFlow™).
2. Insert main axle into hub shell.
3. Thread adjusting cone along axle end until a small gap at the beginning of the threads shows.

Grease the adjusting cone threads with waterproof grease (See figure 10 on the following page.)

4. Thread axle end and adjusting cone onto the protruding threads of main axle.
5. Lightly snug axle end and adjusting cone up to bearing.
6. Thread axle end into adjusting cone until it stops.
7. Proceed to "Adjustment of the front two piece axle hub" (below).

Reassembly of the front bolt-on hub

1. Insert main axle into hub shell.
2. Thread adjusting clamp onto the protruding threads of axle.
3. Snug adjusting cone up to bearing.
4. Proceed to "Adjustment of the front bolt-on hub" (below).



Figure 10 - adjusting cone

Adjustment of the front two piece axle hub

1. Insert 5 mm hex wrenches into both ends of axle assembly.
2. Hold left hand stationary and turn right hand counterclockwise 1/4 turn until assembly is loose. ***Pro Tip: Use a bench vice to hold one of the 5mm hex wrenches.**
3. Hold hex wrenches stationary and adjust bearing preload with adjusting cone.
4. Advance adjusting cone until it just contacts bearing, then back off approximately 1/16 turn (this allows for axle compression while under skewer clamp pressure).
5. Once preload is set, tighten axle assembly to 110 in.-lb. or 12.43Nm
6. Double check adjustment by clamping wheel into fork with quick-release. Check for play or binding, and readjust if needed.

Adjustment of the front one piece axle hub

1. Front one piece axle hubs feature adjusting clamps which minimize over tightening or over preloading of the bearings. Normal adjustment is accomplished by finger tightening adjusting ring onto axle until it stops against bearing. With adjusting clamp facing towards you, hold opposite end of axle stationary, and rotate clamp in a counter clockwise direction to unscrew it from the axle. If adjusting clamp is difficult to position, insert a 2.5mm hex key into "helper hole" on adjusting clamp adjacent to 2.5mm hex bolt. Use the hex key as a lever to preload adjusting clamp
2. Once adjusting clamp is in position, tighten adjusting ring pinch bolt to 10in.-lb. or 1.13Nm.
3. Double check adjustment by bolting wheel into fork. Check for play or binding, and readjust if needed. Adjustment may be accomplished while bolted into fork.

Rear hubs

Disassembly of the rear two piece axle hub

The following instructions assume that the driveshell is facing to the right:

1. Remove cog using a chain whip, and standard Shimano HG-style freewheel tool.
2. Insert 5 mm hex wrenches into both ends of axle assembly. (See figure 11 on the following page.)

3. Hold left hand stationary and turn right hand counterclockwise 1/4 turn until assembly is loose.
4. Loosen and unscrew adjusting cone and axle end until they are free from the main axle.
5. Remove main axle by pulling on drive side end of main axle.
6. Hold hub or wheel in one hand and pull driveshell out with the other.
7. Both hub shell and driveshell bearing assemblies can now be accessed.

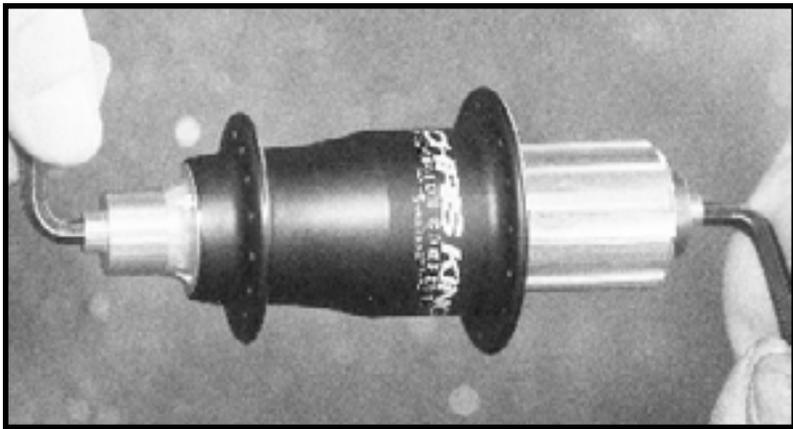


Figure 11 - disassemble main axle

Further disassembly requires specialized tools. Refer to "Complete Assembly".

Disassembly of the rear one piece axle hub

The following instructions assume that the driveshell is facing to the right:

1. Remove cog using a chain whip, and standard Shimano HG-style freewheel tool.
2. Insert a 2.5mm hex wrench into adjusting clamp pinch bolt, and loosen.
3. With adjusting clamp facing towards you, hold opposite end of axle stationary, and rotate cone in a counter clockwise direction. After one complete revolution the adjusting cone should be free from the axle. If adjusting clamp is difficult to position, insert a 2.5mm hex key into "helper hole" on adjusting clamp adjacent to 2.5mm hex bolt. Use the hex key as a lever to unscrew adjusting clamp
4. Slide out axle.
5. hold hub or wheel in one hand and pull driveshell with other.
6. Both hub shell and driveshell bearing assemblies can now be accessed.

Further disassembly requires specialized tools. Refer to "Complete Assembly".

Service of the bearings

We offer our bearings with either quality steel or ceramic balls, so short term water intrusion should not lead to any substantial damage. Judging when to service the bearings is completely dependent on the riding style and conditions.

1. Chris King sealed bearings have removable snap rings that hold the rubber seals in place.
2. Carefully, using a small screwdriver, pick, or penknife, remove the snap ring by inserting tool into split of snap ring. Gently work one end of



Figure 12 - remove snap ring

the snap ring toward bearing center until it is out of its groove. Follow the ring around with the tool until the snap ring is completely dislodged. (see figure 12.)

3. Lift and remove exposed rubber seal to access the interior of the bearing.
4. Thoroughly flush the bearing with a light spray lubricant (e.g. WD-40™) and blow dry with an air compressor.
5. Wipe dirt and other contaminants from the seals and snap rings. Avoid cleaning the seals with solvent, which could cause deterioration.

NOTE: Some solvents, synthetic lubricants, and greases with high-pressure additives may attack and damage seals and other nonmetallic materials. Minimize exposure to these substances and thoroughly dry hub after cleaning. Avoid the use of caustic and acidic degreasers like citrus cleaners.

6. Lay a bead of our RingDrive™ grease, filling the gap between the inner and outer races 1/3 for steel balls or 1/4 for ceramic around the large bearing and 3/4 for steel or 1/3 for ceramic around the small bearing. Then rotate the inner race to work grease throughout the ball area.
7. Replace rubber seal between inner and outer bearing race. *** When installing old seal be sure to install seal in its original orientation.**
8. Insert one edge of snap ring into groove of outer bearing race. Press along entire groove until snap ring is fully seated; a small gap should be visible between both ends of the snap ring.
9. Turn inner race of bearing by hand to test for binding. If bearings do not run smooth, repeat steps 1-9. Binding is often a result of improperly seated seals and/or snap rings.

***Used snap rings and seals can be reinstalled unless warped, punctured, or otherwise damaged. If damaged, replacement seals and snap rings are available from your local bike shop or directly from Chris King precision components.**

Maintenance of RingDrive™ & driveshell

Inspection

Having removed the axle and driveshell (as instructed above), the RingDrive™ is accessible through the large side of the hub shell. Visually inspect the hub's interior. Under normal conditions the grease should look moist and may have darkened slightly. A modest film should coat the moving parts.

As with the rest of the hub, the RingDrive™ is designed to operate with some water contamination. Water intrusion can usually be remedied with basic maintenance.

However, if foreign debris is detectable in the grease and/or the grease looks hard or dry, then a complete removal and servicing of the RingDrive™ is necessary.

Basic maintenance

1. Take a clean, lint free rag and wipe any spent lubricant from inside the hub shell. Be careful not to drag any dirt or debris from outside the hub into the interior area.

2. Once the interior is clean in appearance, locate the helical splines of the drive ring about an inch inside the large bearing.
3. Using a soft toothbrush, pull the bristles across the helix in an outward direction. Work your way all the way around the inner circumference to remove any small particles that may be in the spline grooves.
4. Once completed, wipe the area directly in front of the helix to remove any debris. This method should be used to clean the helix on the drive shell as well. (If compressed air is available, blow across the helixes in line with the spline grooves to remove any debris.)

With the interior wiped down and the helixes brushed clean, a fresh application of lubricant should be applied. The RingDrive™ is designed to work with our specially formulated low shear RingDrive™ grease. **Do not substitute other brands of grease, as they may be too sticky for the helix of the RingDrive™.**

5. Lubricate by reopening a gap between the drive rings, and laying a bead of RingDrive™ grease on the teeth between them (see figure 13).
6. Let the rings spring back together .
7. Apply a few drops of lightweight, low viscosity oil, with PTFE (e.g. TriFlow™) onto both the helical splines of the movable drive ring and the driveshell (see figure 14).
8. **Before reinserting the driveshell into RingDrive™ area of the hub, the helical splines must be clean of any debris.**
9. Reinsert the driveshell and complete the assembly as per the instructions below.

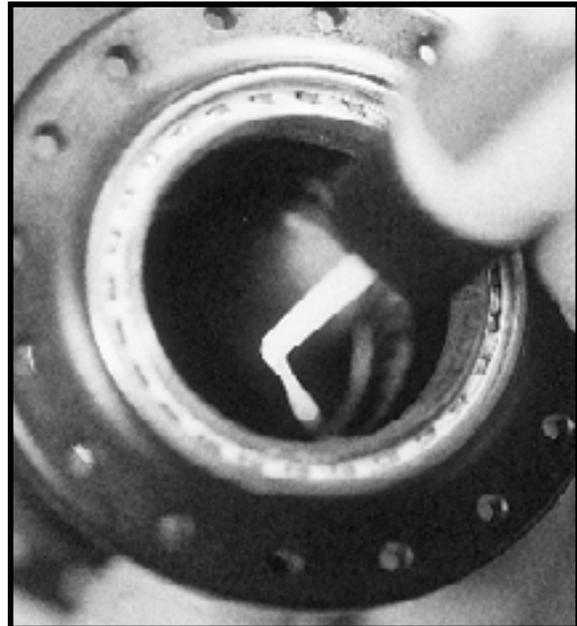


Figure 13 - lube RingDrive™ teeth

RingDrive™ service

In addition to the basic maintenance of the RingDrive™, a complete removal and servicing may be necessary. Complete service requires our Hub Service Tool Kit and, as a basic guideline, should be performed at least once a season. Check with your local Chris King dealer for complete service or you may purchase the tool kit at your dealer or directly from Chris King Precision Components.

In a pinch...

If you need to do a RingDrive™ service and don't have the Hub Service Tool Kit or can't make it to a dealer, this method may be used for temporary results:

1. Remove the axle and driveshell to access the interior RingDrive™ area.

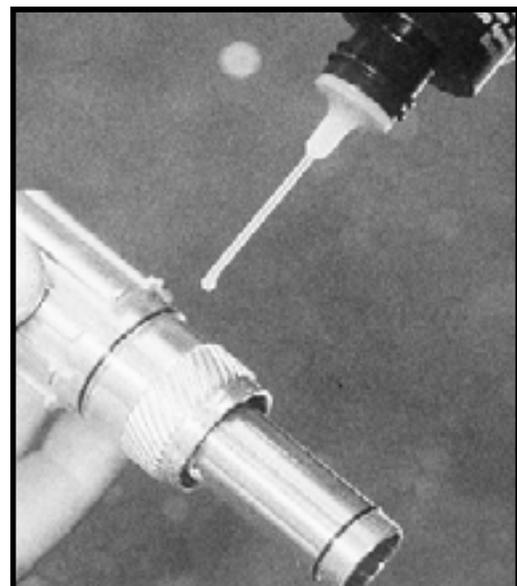


Figure 14 - lube helical splines

2. Push the drive ring with helical splines inward to open a gap, exposing the drive teeth and flush the interior with a light solvent-based spray lubricant (e.g., WD-40™) until the area appears clean. Blow off any remaining solvent until completely dry.
3. If contamination is still apparent, repeat flushing and blow completely dry. A complete service of both hub shell bearings should be performed at the same time.
4. Finish by performing the basic maintenance as instructed above.
5. After assembly, carefully hand test hub for smooth operation of the bearings and consistent, positive engagement of the RingDrive™. If performance is not improved to original quality, a complete RingDrive™ removal service must be performed.

Reinstallation of the driveshell assembly

1. Check the helical splines of the driveshell for any particles or debris before proceeding; **the driveshell must be clean before installing!**
2. Apply several drops of lightweight, low viscosity oil, with PTFE (e.g. TriFlow™) on the helical spline, O-ring, and tapered diameter directly adjacent the O-ring.
3. Insert drive shell into hub shell, slowly. As the driveshell enters the RingDrive™ area, it will want to mesh the helical splines of the drive ring. As it begins to mesh, a slight clockwise turning motion of the driveshell will help pull it into the hub shell. Continue twisting as the drive shell pulls itself into the hub shell. At the bottom of its inward movement, an audible “click” or “pop” sound indicates that it has found home and is fully seated. (The “click” or “pop” is the spring retainer popping onto the driveshell and the driveshell hitting the bearing, indicating the driveshell is fully inserted.)
4. Insert a finger from the non-drive side to ensure proper seating.
5. Test engagement by spinning driveshell in both directions. If it does not engage, remove driveshell, check cleanliness and re-insert. Re-test.
6. The hub is now ready to have the axle installed.

Reassembly of the rear two piece axle hub

The following instructions assume that the driveshell is facing to the right:

1. Lube o-ring and axle sleeve with lightweight, low viscosity oil, with PTFE (e.g. TriFlow™)
2. Insert main axle through drive shell and completely into hub. Axle should protrude slightly through the non drive side bearing. (See figure 15.)
3. Grease the adjusting cone threads with waterproof grease
4. Thread adjusting cone along axle end until a small gap at the beginning of the threads

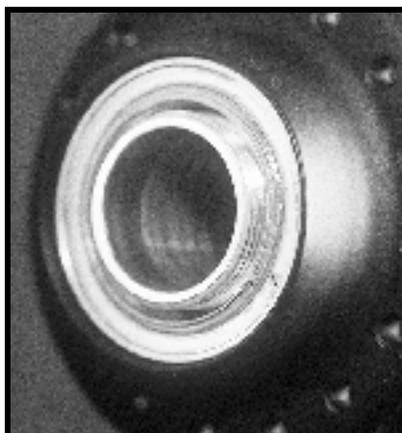


Figure 15 - main axle



Figure 16 - adjusting cone

shows. (See figure 16.)

5. Thread axle end and adjusting cone onto the protruding threads of main axle.
6. Lightly snug axle end and adjusting cone up to bearing.
7. Thread axle end into adjusting cone until it stops.
8. Proceed to "Adjustment of the rear quick-release hub" below.

NOTE: To improve performance, the axles have been precisely matched with the needle bearings in the driveshell. Be sure to combine only like numbered parts, (e.g., #4 axle with #4 needle bearing race).

Reassembly of the rear one piece axle hub

The following instructions assume that the driveshell is facing to the right:

1. Lightly oil all o-rings and bearing contact surfaces with lightweight, low viscosity oil, with PTFE (e.g. TriFlow™).
2. Insert driveshell into the hub shell; turn in a clockwise motion while letting it pull itself in . A distinctive click sound will indicate that the driveshell is firmly seated.
3. Insert main axle, small end first into driveshell. Continue until axle is through the hub and large end is firmly seated in driveshell.
4. Thread adjusting clamp onto the protruding threads of axle.
5. Snug adjusting clamp up to bearing.
6. Proceed to "Adjustment of the rear one piece hub" (below).

Adjustment of the rear two piece axle hub

The following instructions assume that the drive shell is facing to the right:

1. Insert 5 mm hex wrenches into both ends of the axle assembly. ***Pro Tip: Use a bench vice to hold one of the 5mm hex wrenches.**
2. Hold left side stationary and turn right hand counterclockwise 1/4 turn until the assembly is loose.
3. Hold hex wrenches stationary and adjust bearing preload with the adjusting the hub cone adjusting tool.
4. Advance adjusting cone until it contacts bearing. The rear hub takes a slightly higher amount of preload than "no play", since some settling may occur while riding.
5. Once preload is set, tighten axle assembly together to 110in.-lb. or 12.43Nm.
6. Check adjustment by clamping wheel into frame with quick-release. Ride for 5-10 minutes, check for play or binding, and readjust as necessary. Double check adjustment after the first 5-10 miles of riding.

NOTE: Correct adjustment of the rear hub is necessary for proper engagement of the RingDrive™. If the hub is run loose, the RingDrive™ may not engage properly and could lead to permanent damage to the internal parts or hubshell.

Adjustment of the rear one piece hub

1. Rear one piece hubs feature special adjusting clamps which minimize over tightening or over preloading of the bearings. Normal adjustment is accomplished by finger tightening

adjusting ring onto axle until it stops against bearing.

2. Once adjusting clamp is in position, tighten adjusting clamp pinch bolt to 10in.-lb. or 1.13Nm.
3. Double check adjustment by bolting wheel into frame. Check for play or binding, and readjust if needed. Adjustment may be accomplished while bolted into frame.

COMPLETE SERVICE

Introduction to the tool

The hub tool is designed to accommodate complete disassembly and reassembly of the following Chris King hubs.

- Classic and Classic High Flange - front and rear
- Universal Disc - front and rear; all styles
- ISO Disc - front and rear; all styles
- BMX - front and rear
- Single Speed and Single Speed ISO - front and rear.

The tool is made up of the following parts

1. T-handle. This is the main part of the pressing device. It is a long shaft with threads on one end, and a bulbous end with a handlebar through it. It has a steel strike plate in the top of the bulbous end that may be struck with a mallet or ball peen hammer.
2. Extension shaft. Once again a threaded shaft but much shorter. With a knurled section on one end and small threads on the other, it screws into the end of the t-handle.
3. Cone washer. This part is a steel washer with one side shaped like a cone. It goes on the small end of the extension shaft before it is screwed into the t-handle. Its function is to make split rings expand (explained next).
4. Split rings. These are doughnut shaped with an o-ring around the outside. They have been precisely cut in half to allow them to be expanded to a bigger diameter. These are the pieces that get behind the bearings to force them out by their outer races. The big one is for the RingDrive™, large bearing in the rear hubs. We have updated the large split ring to also service the LD front hub. **Only large split rings that are anodized red will work on the LD front hub. Do not attempt to service the LD front hub with the pewter anodized large split ring.** The small one is for all the small axle bearings in both front and rear hubs.
5. Knurled ring. This is the large round part with a threaded hole. It can be threaded onto either the extension shaft or the T-handle. It is used to pull bearings into their respective bores upon assembly or to capture parts as they are being tapped out.
6. Driveshell bushing. This is a tube shaped part with one end bigger than the other. It is used when installing bearings into drive shells and for removing the needle bearing from the BMX drive shell. The driveshell bushing should also be used as a guide when small bearings are not installed
7. Spline driver. This is a socket shaped part with a 3/8" square hole in one end and a special spline on the other. It is used with a ratchet or torque wrench to remove or replace the seal ring in the driveshells.
8. Cog spline wrench. This is a large ring shaped part with a splined hole to match the cog

spline on the outside of the drive shell. It has two flats about the outer diameter so it can be located in a vice. It is used to hold the driveshell while torqueing on it.

9. 2 Red anodized LD adapter bushings. These adapters will be included in with current service tools and will be available as an aftermarket upgrade for existing tools. These adapter bushings will be used when servicing LD front hubs. **Do not attempt to service the LD front hubs with out the red anodized bushings.**

Function of the expanding split rings

1. Slide the large split ring onto the small end of the extension shaft.
2. Follow it by the cone washer, pointed end first, onto the shaft next to the split ring.
3. Take this complete assembly and thread it into the hole in the threaded end of the T-handle.
4. As you screw it together, you will force the cone washer into the split ring. The split ring will begin to expand; continue screwing until the cone has disappeared completely into the split ring. (See figure 17.) ***Use the split ring in the orientation seen in figure 17.** With the cone washer clamping the split ring, fully expanded, against the flange of the extension shaft the tool is ready to drive a bearing. When driving bearings, the split ring should only be used in this fully expanded and clamped position.
5. Release by unscrewing the extension shaft from the T-handle. A hole is provided in the end of the extension shaft for a 4mm hex key in the event it has become too tight to turn with fingers.

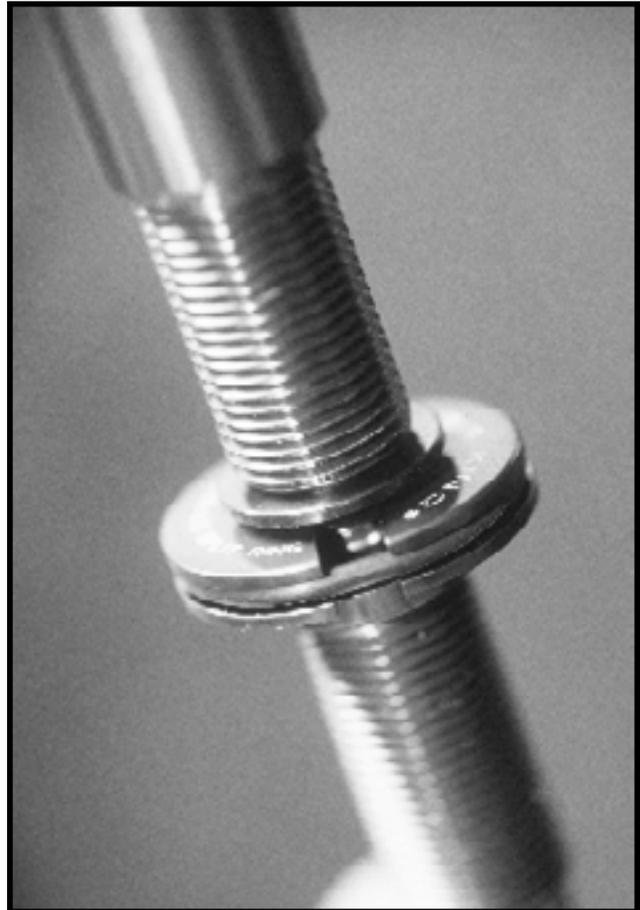


Figure 17 - function of the split ring

Note: This tool set is designed only for working on Chris King hubs. It is not intended to be used with any other parts or on any other hubs. Use other than that for which it is intended may cause damage to the tool, other products, and/or bodily harm.

Front hubs

Disassembly of the front two piece axle hub

1. Insert 5 mm hex wrenches into both ends of axle assembly. ***Pro Tip: Use a bench vice to hold one of the 5mm hex wrenches.**
2. Hold left hand stationary and turn right hand counterclockwise 1/4 turn until assembly is loose.

3. Loosen and unscrew adjusting cone and axle end until they are free from main axle.
4. Slide out main axle.
5. Both hub shell bearing assemblies can now be accessed.

Disassembly of the front one piece axle hub

1. Insert a 2.5mm hex wrench into the adjusting clamp pinch bolt, and loosen.
2. With adjusting cone facing towards you, hold opposite end of axle stationary, and rotate cone in a counter clockwise direction. After one complete revolution the adjusting cone should be free from the axle. If adjusting clamp is difficult to loosen, insert a 2.5mm hex key into "helper hole" on adjusting clamp adjacent to 2.5mm hex bolt. Use the hex key as a lever to loosen adjusting clamp.
3. Slide out axle.
4. Both hub shell bearing assemblies can now be accessed

Removal of the bearings: Classic & ISO SD Hubs

1. Setup extension shaft by placing small expanding split-ring, big end first, on the small threaded end followed by cone washer, tapered end facing split ring.
2. While keeping extension shaft from rotating, fully expand small expanding split-ring by turning the T-handle. (See figure 18.)
3. Push knurled ring flush with hub shell. This will position the split-ring directly behind the bearing.
4. Capture bearing by threading knurled ring until it is snug against hub shell.
5. Using a mallet or ball peen hammer, tap T-handle to remove bearing from the hub shell.
6. Withdraw tool and, if necessary, repeat for the other side.

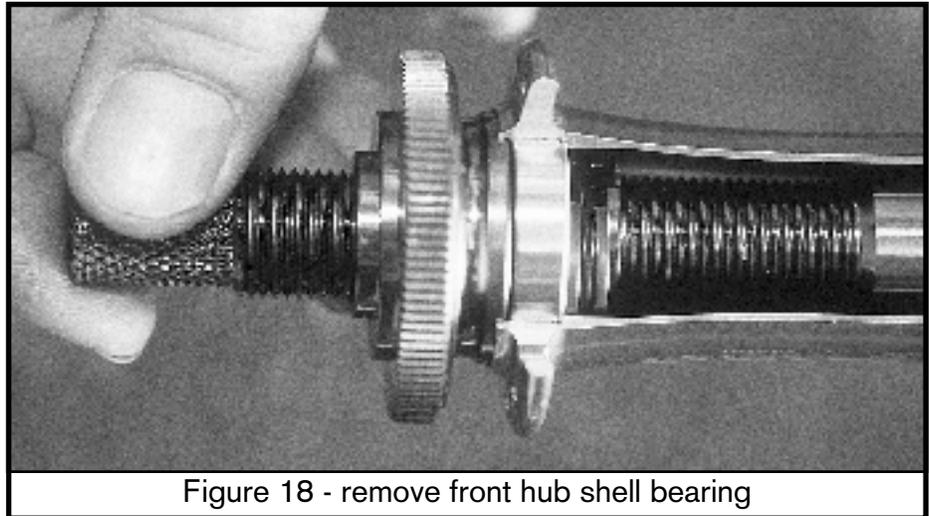


Figure 18 - remove front hub shell bearing

Removal of the bearings: ISO LD Hubs

1. Slide one of the supplied LD Guide bushings onto the T-Handle with the smaller side facing the threaded portion, until it sits flush with the thrust collar.
2. Setup extension shaft by placing the Red Large split-ring, on the small threaded end followed by cone washer, tapered end facing split ring.
3. Insert T-handle through one side of hub shell until threaded end shows.
4. Thread extension shaft into T-handle without expanding split-ring.
5. Position the Red Large Split-Ring behind the bearing you wish to remove, invert the T-Handle

so that the bearing rests on the split-ring. (Tip: when removing both bearings it is best to first remove the disc side bearing.)

6. Expand the Red Large Split-Ring by turning the knurled end of the extension shaft clockwise. Double check the split-rings orientation to ensure it is fully expanded and behind the bearing. (You may insert a 4mm hex key into the extension shaft to ensure the split ring is fully expanded.)
7. Take the second LD Guide Bushing and slide it onto the extension shaft with the smaller end inserting into the bearing's inner race.
8. Capture bearing by threading knurled ring until it is snug against the LD Guide Bushing, with the laser-marked side facing away from the hub.
9. Invert the tool so that the handle is now facing up, allowing the first LD Guide bushing to slide into the others bearing's inner race.
10. Using a mallet or ball peen hammer, tap T-handle's Striker plate to remove bearing from the hub shell.
11. Withdraw tool and, if necessary, repeat for the other side, allow the LD Guide Bushing to take the place of the bearing that was removed.

Removal of Bearings: ISO Lefty® SuperMax

LD GUIDE
BUSHING &
KNURLED
RING
ORIENTATION



LD Guide
Bushing

LD Guide
Bushing
Laser Side

Knurled Ring

Knurled Ring
Laser Side

*REMOVE DISC-SIDE BEARING FIRST

1. Slide one of the supplied LD Guide Bushings onto the T-Handle with the laser side facing the handle, until it sits flush with the Thrust Collar. (See figure 19.)
2. Setup Extension Shaft by placing the Red Large Split-Ring (with the laser marked side facing the knurled end of the Extension Shaft) on the small threaded end followed by the Hub Cone Tool, (with the tapered end facing the split ring). (See figure 20.)
3. Insert the T-Handle through the non-disc-side of hub shell so that the threaded end shows on the opposite side. (See figure 21.)
4. Thread the extension shaft into the T-Handle without expanding the Split-Ring. (See Figure 22.)
5. Position the Red Large Split-Ring behind the disc-side bearing, invert the T-Handle so that the bearing rests on the Split-Ring. (See Figure 23.)
6. Expand the Red Large Split-Ring by turning the knurled end of the Extension Shaft clockwise. Double check the Split-Ring's orientation to ensure that it is fully expanded and behind the bearing. (You may insert a 4mm hex key into the Extension Shaft to ensure that the Split-Ring is fully expanded.) (See figure 24.)
7. Take the second LD Guide Bushing (with the laser marked side facing



Figure 19



Figure 20



Figure 21 and 22



Figure 23 and 24



Figure 25



Figure 26A



Figure 26B



Figure 27 & 28

toward the hub) and slide it onto the Extension Shaft. (See figure 25.)

8. Please see Figure 26A & 26B. Capture the bearing by threading the Knurled Ring (with the laser-marked side facing away from the hub) until it is snug against the LD Guide Bushing. (See figure 26.)
9. Invert the tool so that the handle is now facing up, move the first LD Guide Bushing into the inside of the bearing. (See figure 27.)
10. Using a mallet or ball peen hammer, tap T-Handle's striker plate to remove the bearing from the hub shell. (See figure 28.)

*NON-DISC SIDE BEARING

Use the images from the disc-side bearing removal as a reference. Note the change in the orientation of the LD Guide Bushing at step 26b.

1. Slide one of the supplied LD Guide Bushings onto the T-Handle with the laser side facing the handle, until it sits flush with the thrust collar.
2. Setup extension shaft by placing the Red Large Split-Ring (with the laser marked side facing the knurled end of the Extension Shaft) on the small threaded end followed by the Hub Cone Tool, (with the tapered end facing the Split-Ring).
3. Insert the T-Handle through the Non-Disc side of hub shell so that threaded end shows on the opposite side.
4. Thread the extension shaft into the T-Handle without expanding the Split-Ring.
5. Position the Red Large Split-Ring behind the non-disc-side bearing, invert the T-Handle so that the bearing rests on the Split-Ring.
6. Expand the Red Large Split-Ring by turning the knurled end of the Extension Shaft clockwise.

Double check the Split-Rings orientation to ensure it is fully expanded and behind the bearing. (You may insert a 4mm hex key into the extension shaft to ensure the Split-Ring is fully expanded.)

7. Take the second LD Guide Bushing (with the laser marked side facing away from the hub) and slide it onto the Extension Shaft. The top LD Guide Bushing will take the place of the removed bearing on the disc-side of the hub. (See figure 26B.)
8. Capture the bearing by threading the Knurled Ring (with the laser-marked side facing away from the hub) until it is snug against the LD Guide Bushing.
9. Invert the tool so that the handle is now facing up, move the first LD Guide Bushing into the inside of the bearing.
10. Using a mallet or ball peen hammer, tap T-Handle's striker plate to remove bearing from the hub shell.



Figure 26b

Service of the bearings

All of the bearings are stainless steel, so short term water intrusion should not lead to any substantial damage. Judging when to service the bearings is completely dependent on the riding style and conditions.

1. Chris King sealed bearings have removable snap rings that hold the rubber seals in place.
2. Carefully, using a small screwdriver, pick, or penknife, remove the snap ring by inserting tool into split of snap ring. Gently work one end of the snap ring toward bearing center until it is out of its groove. Follow the ring around with the tool until the snap ring is completely dislodged.
3. Lift and remove exposed rubber seal to access the interior of the bearing.
4. Thoroughly flush the bearing with a light spray lubricant (e.g. WD-40™) and use an air compressor to blow dry.
5. Wipe dirt and other contaminants from the seals and snap rings. Avoid cleaning the seals with solvent, which could cause deterioration.

NOTE: Some solvents, synthetic lubricants, and greases with high-pressure additives may attack and damage seals and other nonmetallic materials. Minimize exposure to these substances and thoroughly dry hub after cleaning. Avoid using caustic cleaners and citrus based detergents.

6. Lay a bead of our RingDrive™ grease, filling the gap between the inner and outer races 3/4 the way around bearing. Rotate the inner race to work grease throughout the ball area.
7. Replace rubber seal between inner and outer bearing race.
8. Insert one edge of snap ring into groove of outer bearing race. Press along entire groove until snap ring is fully seated; a small gap should be visible between both ends of the snap ring.
9. Turn inner race of bearing by hand to test for binding. If bearings do not run smooth, repeat steps 1-9. Binding is often a result of improperly seated seals and/or snap rings.

Used snap rings and seals can be reinstalled unless warped, punctured, or otherwise damaged. If damaged, replacement seals and snap rings are available from your local bike shop or directly from Chris King precision components.

Reinstallation of the bearings: Classic & ISO SD Hubs

1. Insert small inner seal into bearing bore. On ISO hubs install the disc side bearing first.
2. Place small hub bearing, black seal side first, onto bare T-handle.
3. Insert knurled ring, small end first, into opposite side of hub shell.
4. Pass T-handle with bearing through installation side of hub shell and thread into knurled ring. Continue turning T-handle to press bearing until it is firmly seated. (See figure 29.) Loosen T-handle, turn knurled ring 180° and tighten T-handle to press bearing again. (This assures the bearing is seated flatly.)
5. Withdraw tool and, if necessary, repeat for the other side.

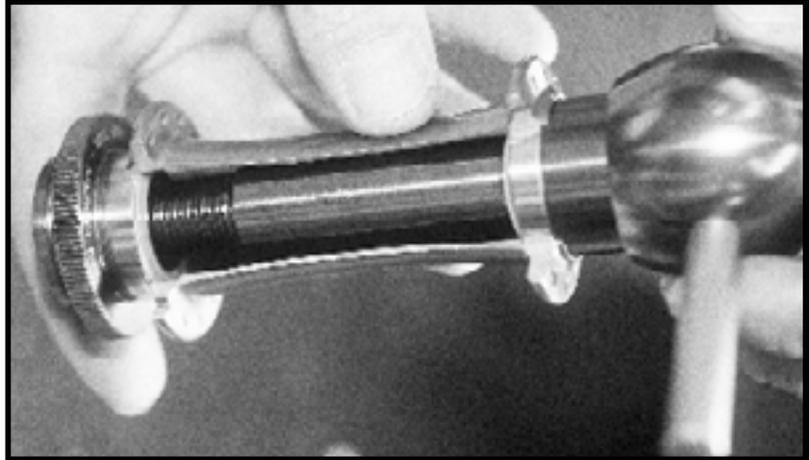


Figure 29 - press front hub shell bearings

Reinstallation of the bearings: ISO LD Hubs

1. Insert LD Hub inner seal into the hubshell's bearing bore.
2. Slide LD Guide Bushing onto the T-Handle flush with the thrust collar with the larger side against the thrust collar.
- 3 Place the sealed LD hub bearing, seal/snap-ring side facing the LD Guide bushing on the T-Handle.
3. Insert the small end of the LD Guide Bushing along with knurled ring, with the laser marked side facing in, into opposite side of hub shell.
4. Pass T-handle with bearing through installation side of hub shell and thread into knurled ring. Continue turning T-handle to press bearing until it is firmly seated. Loosen T-handle, turn knurled ring 180° and tighten T-handle to press bearing again. (This assures the bearing is seated flat)
5. Withdraw tool and, if necessary, repeat for the other side.

Reinstallation of the bearings: ISO Lefty® SuperMax Hubs

*INSTALL DISC-SIDE BEARING FIRST

1. Insert bearing hub inner seal into the hub shell's bearing bore. (See figure 30.)
2. Slide LD Guide Bushing onto the T-Handle flush with the laser side facing the handle, until it sits flush with the Thrust Collar. (See figure 31.)
- 3 Place the sealed hub bearing, with the seal/snap-ring side facing the LD Guide Bushing on the T-Handle. (See figure 32.)
4. Insert the small end of the LD Guide Bushing along with Knurled Ring, (with the laser marked side facing in) into opposite side of hub shell. (See figure 33.)



Figure 30



Figure 31



Figure 32



Figure 33



Figure 34



Figure 35



Figure 36



Figure 37



Figure 38



Figure 39



Figure 40

5. Pass T-Handle with bearing through disc side of the hub shell and thread into Knurled Ring. (Make sure that the laser marked side of the Knurled Ring faces towards the hub). Continue turning T-Handle to press bearing until it is firmly seated. Loosen T-Handle, rotate the Knurled ring 90° and then tighten T-Handle to continue pressing bearing. (This assures that the bearing is seated flat) (See figure 34.)
6. Remove the Knurled Ring and the LD Guide Bushing and insert the non-disc-side hub inner seal into the hubshell's bore. (See figure 35.)
7. Set bearing in bore. *Make sure that seal/snap ring side is facing the LD guide bushing. (See figures 36 and 37.)
8. Insert the small end of the LD Guide Bushing, make sure that the laser marked side of the LD guide bushing faces away from the hub. (See figure 38.)
9. Thread on the Knurled Ring. * Make sure that the laser marked side of the Knurled Ring

faces towards the hub. (See figure 39.)

10. Continue turning T-Handle to press the bearing until it is firmly seated. Loosen T-Handle, rotate the Knurled Ring 90° and tighten the T-Handle to press the bearing again. (This assures the bearing is seated flat) (See figure 40)

Reassembly of the front two piece axle hub

1. Lubricate the main axle o-rings with lightweight, low viscosity oil, with PTFE (e.g. TriFlow™).
2. Insert main axle into hub shell. One ISO and Uni hubs insert axle from the disc side.
3. Lightly grease threads on the adjusting cone.
4. Thread adjusting cone along axle end until a small gap at the beginning of the threads shows. (See figure 41.)
5. Thread axle end and adjusting cone onto the protruding threads of main axle.
6. Lightly snug axle end and adjusting cone up to bearing.
7. Thread axle end into adjusting cone until it stops.
8. Proceed to "Adjustment of the front quick-release hub" (below).



Figure 41 - adjusting cone

Reassembly of the front one piece axle hub

1. Insert main axle into hub shell.
2. Thread adjusting clamp onto the protruding threads of axle.
3. Snug adjusting cone up to bearing.
4. Proceed to "Adjustment of the front bolt-on hub" (below).

Adjustment of the front two piece axle hub

1. Insert 5 mm hex wrenches into both ends of axle assembly. ***Pro Tip: Use a bench vice to hold one of the 5mm hex wrenches.**
2. Hold left hand stationary and turn right hand counterclockwise 1/4 turn until assembly is loose.
3. Hold hex wrenches stationary and adjust bearing preload with adjusting cone.
4. Advance adjusting cone until it just contacts bearing, then back off approximately 1/16 turn.
5. Once preload is set, tighten axle assembly to 110 in.-lb or 12.4Nm.
6. Double check adjustment by clamping wheel into fork with quick-release. Check for play or binding, and readjust if needed.

Adjustment of the front one piece axle hub

1. Front bolt-on hubs feature special adjusting clamps which minimize over tightening or over preloading of the bearings. Normal adjustment is accomplished by finger tightening adjusting ring onto axle until it stops against bearing.
2. Once adjusting clamp is in position, tighten adjusting ring pinch bolt to 10 in.-lb or 1.13Nm.
3. Double check adjustment by bolting wheel into fork. Check for play or binding, and readjust if needed. Adjustment may be accomplished while bolted into fork.

Rear hubs

Disassembly of the rear two piece axle hub

The following instructions assume that the drive shell is facing to the right:

1. Remove cassette per manufacturer's instructions.
2. Insert 5 mm hex wrenches into both ends of axle assembly. (See figure 42.)
***Pro Tip: Use a bench vice to hold one of the 5mm hex wrenches.**

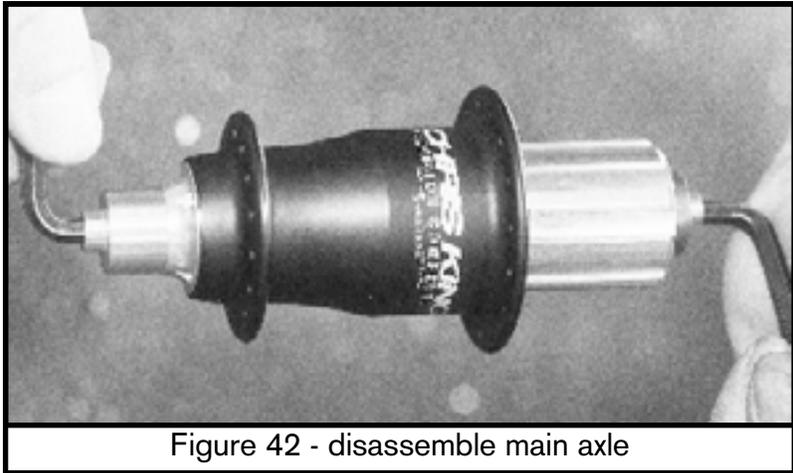


Figure 42 - disassemble main axle

3. Hold left hand stationary and turn right hand counterclockwise 1/4 turn until assembly is loose.
4. Loosen and unscrew adjusting cone and axle end until they are free from the main axle.
5. Remove main axle by pulling on drive side end of main axle.
6. Hold hub or wheel in one hand and pull driveshell out with the other.
7. Both hub shell and drive shell bearing assemblies can now be accessed.

Disassembly of the rear one piece axle hub

The following instructions assume that the drive shell is facing to the right:

1. Remove cassette per manufacturer's instructions.
2. Insert a 2.5mm hex wrench into adjusting clamp pinch bolt, and loosen.
3. With adjusting clamp facing towards you, hold opposite end of axle stationary, and rotate cone in a counter clockwise direction. After one complete revolution the adjusting cone should be free from the axle. If adjusting clamp is difficult to position, insert a 2.5mm hex key into "helper hole" on adjusting clamp adjacent to 2.5mm hex bolt. Use the hex key as a lever to loosen adjusting clamp
4. Slide out axle.
5. Hold hub or wheel in one hand and pull driveshell with other.
6. Both hub shell and driveshell bearing assemblies can now be accessed.

Removal of the non-drive side hub bearing

1. Setup extension shaft by placing small expanding split-ring, big end first, on the small threaded end followed by cone washer, tapered end facing split ring.
2. Insert T-handle through large side of the hub shell until threaded end shows.
3. Thread extension shaft into T-handle without expanding split-ring.
4. Position the split-ring directly behind the bearing. Completely thread knurled ring, small end first, the laser mark facing outward, onto the extension shaft, then back off exactly 1/2 turn.
5. While keeping extension shaft from rotating, fully expand small expanding split-ring by turning T-handle.
6. Capture bearing by advancing knurled ring until it is snug against hub shell.

- Using a ball peen hammer, tap T-handle to remove bearing from hub shell. (See figure 43.)

Removal of the RingDrive™ mechanism and drive side bearing

- Setup extension shaft by placing large expanding split-ring on the small threaded end followed by cone washer, tapered end facing split ring. ***If the non-drive side bearing has already been removed, slide driveshell bushing tool on to T-handle with the wide side facing the thrust collar.**
- Insert T-handle through the non-drive side of the hub shell until it extends beyond the other side.
- Thread extension shaft in to T-handle without expanding split-ring.
- Pull assembled tool towards non-drive side until knurled ring is bottomed in drive side bearing.
- While keeping the extension shaft from rotating, rotate T-handle to fully expand the large expanding split-ring behind the spring retainer. (See figure 44.)
- Lightly push tool towards the driveside until it stops, then thread knurled ring with the laser mark facing outward. Rotate knurled ring until it again bottoms on the driveside bearing. (This will capture all RingDrive™ parts and bearing on the tool as they are removed from the hub shell.) ***Never attempt to remove the driveside bearing independantly of the RingDrive™ internals.**

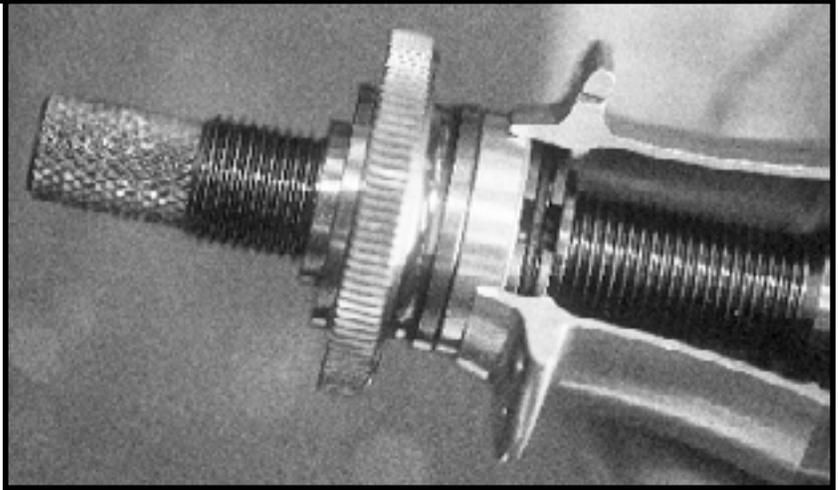


Figure 43 - remove non-drive side bearing

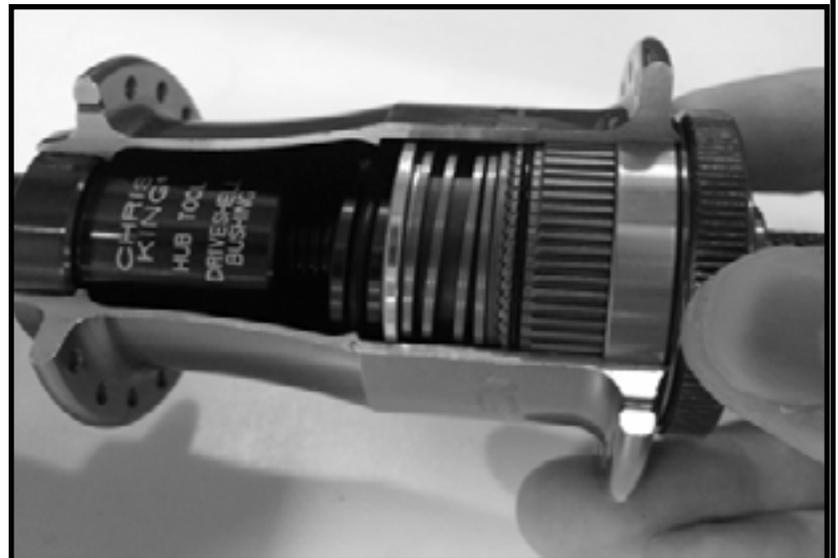


Figure 44 - capture whole RingDrive™ assembly



Figure 45 - remove RingDrive™ assembly

8. Using a mallet, tap strike plate to dislodge RingDrive™ and bearing from hub shell. (See figure 45 on the previous page.)

Disassembly of the driveshell assembly

1. Make sure that the T-Handle driveshell bushing installed with the wide side facing the thrust collar.
2. Remove axle by pulling it out from the seal side of the driveshell.
3. Use cog spline wrench to hold driveshell in vise.
4. Unscrew seal ring with spline driver.
5. Remove capture plate and needle bearing cage.
6. Setup extension shaft by placing small expanding split-ring, big end first, on the small threaded end followed by cone washer, tapered end facing split-ring.
7. Insert the T-handle through driveshell from the helical splined end.
8. Thread extension shaft into T-handle without expanding split-ring.

9. Slide driveshell up against knurled ring to position the split-ring just behind the bearing; thread knurled ring with the laser mark facing inward on to the opposite end of extension shaft exactly 2-1/2 turns. The step on the ring will center the end of the driveshell.

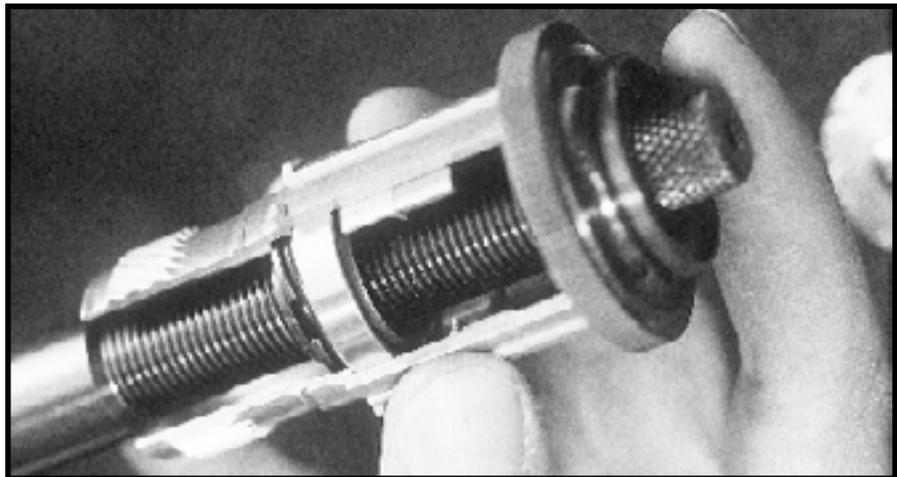


Figure 46 - remove drive shell bearing

10. Holding extension shaft stationary, screw T-handle into extension shaft to fully expand split-ring. Then slide it up against the bearing and advance knurled ring to hold everything snug. (See figure 46.)
11. Hold the T-Handle while turning the knurled ring clockwise until the internals become dislodged. ***If the press seems tight or when removing the internals from a stainless steel driveshell it may be necessary to use a ball peen hammer to apply several blows to the strike plate.**

Disassembly of the XD Driveshell Assembly

1. (Figure 47) You will need a Chris King Hub Service Tool. Setup your tool as shown with small split ring and extension shaft.
2. (Figure 48) Insert T-Handle with the Small Split Ring installed from the non-driveside of the XD Driveshell and expand the Small Split Ring behind the Driveshell bearing.
3. (Figure 49) The Small Split-Ring should rest on the Driveshell bearing, be sure that the Small Split-Ring is fully expanded. Next slide the Driveshell Bushing down the T-Handle shaft as a guide.
4. (Figure 50) Insert the combined Driveshell assembly and T-Handle into the Cog Spline Wrench mounted on the bench vise. Thread the Knurled Ring (laser marked side out) until



Fig 47



Fig 48



Fig 49



Fig 50



Fig 51



Fig 52

it is snug against the XD Driveshell End Cap (do not over tighten). ***Do not over tighten the Cog Spline Wrench in your vise, overtightening can cause damage to the XD Driveshell Assembly.**

5. (Figure 51) Strike the top of the T-Handle (Strike Plate) with a hammer to remove the XD Driveshell internals.
6. (Figure 52) Remove the Cog Spline Wrench from the vise and unthread the Knurled Ring to release all Driveshell internals. *** The inner race of the XD Driveshell bearing can at times become partially dislodged and cause the bearing to temporarily seize. If this is the case, gently tap the inner race of the bearing with a ball peen hammer until the bearing sits evenly and spins freely.**

Disassembly of the BMX driveshell assembly

1. Remove axle from driveshell.
2. Use cog spline wrench to hold driveshell, helical spline side up, in vise.
3. Set up extension shaft by placing small expanding split-ring, big end first, on the small threaded end followed by cone washer, tapered end facing split-ring.
4. Thread knurled ring with the laser marked side facing inward completely on to the opposite end of extension shaft.
5. Insert T-handle through driveshell from the helical splined end past the BMX needle bearings.
6. Thread extension shaft into T-handle without expanding split-ring.
7. Slide driveshell up against knurled ring to position the split-ring just behind the bearing; the step on the ring will center the end of the driveshell.
8. Holding the extension shaft stationary, screw T-handle into extension shaft to fully expand split-ring. Then slide it up against bearing and advance knurled ring to hold everything snug.
9. Hold the T-Handle while turning the knurled ring clockwise until the internals become dislodged. ***If the press seems tight it may be necessary to use a ball peen hammer to apply several blows to the strike plate.**
10. Remove extension shaft to remove tool.

Removal of BMX needle bearing

1. Slide driveshell bushing, big end first, onto shaft of T-handle.
2. Slide driveshell, needle bearing end first, onto shaft.
3. Thread knurled ring, small end first, onto shaft.
4. Continue threading T-handle into knurled ring to push needle into center of driveshell. After the bearing moves about 1/2", it should become free to move all the way through the driveshell.

Service of the bearings

We offer our bearings with either quality steel or ceramic balls, so short term water intrusion should not lead to any substantial damage. Judging when to service the bearings is completely dependent on the riding style and conditions

1. Chris King sealed bearings have removable snap rings that hold the rubber seals in place.
2. Carefully, using a small screwdriver, pick, or penknife, remove the snap ring by inserting tool into split of snap ring. Gently work one end of the snap ring toward bearing center until it is out of its groove. Follow the ring around with the tool until the snap ring is completely dislodged. (see figure 53.)
3. Lift and remove exposed rubber seal to access



Figure 53 - remove snap ring

the interior of the bearing.

4. Thoroughly flush the bearing with a light spray lubricant (e.g. WD-40™) and blow dry with an air compressor.
5. Wipe dirt and other contaminants from the seals and snap rings. Avoid cleaning the seals with solvent, which could cause deterioration.

NOTE: Some solvents, synthetic lubricants, and greases with high-pressure additives may attack and damage seals and other nonmetallic materials. Minimize exposure to these substances and thoroughly dry hub after cleaning. Avoid the use of caustic and acidic degreasers like citrus cleaners.

6. Lay a bead of our RingDrive™ grease, filling the gap between the inner and outer races 1/3 for steel balls or 1/4 for ceramic around the large bearing and 3/4 for steel or 1/3 for ceramic around the small bearing. Then rotate the inner race to work grease throughout the ball area.
7. Replace rubber seal between inner and outer bearing race.
8. Insert one edge of snap ring into groove of outer bearing race. Press along entire groove until snap ring is fully seated; a small gap should be visible between both ends of the snap ring.
9. Turn inner race of bearing by hand to test for binding. If bearings do not run smooth, repeat steps 1-9. Binding is often a result of improperly seated seals and/or snap rings.

***Used snap rings and seals can be reinstalled unless warped, punctured, or otherwise damaged. If damaged, replacement seals and snap rings are available from your local bike shop or directly from Chris King precision components.**

Reinstallation of the RingDrive™ mechanism and driveside bearing

1. The non-driveside adapter bushing should be in place before proceeding to install the RingDrive™ and bearing.
2. Insert spring retainer in hub shell with square stepped edge facing out. (See figure 55.) Make sure the spring retainer has an o-ring installed before inserting. (See figure 54.)
3. Insert drive spring. (See figure 56.)
4. Insert drive ring with the teeth facing out. (See figure 57.)
5. Lay a bead of RingDrive™ lube onto ratchet face of drive ring.

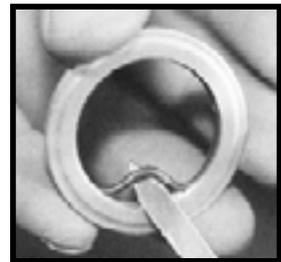


Figure 54 - o-ring



Figure 55 - spring retainer



Figure 56 - drive spring



Figure 57 - drive ring



Figure 58 - driven ring

6. Insert driven ring into the hub shell with the teeth facing the drive ring. Be sure to lubricate the o-ring with lightweight, low viscosity oil, with PTFE (e.g. TriFlow™). The splines on the outside of driven ring will engage the matching splines of the hub shell as it is pushed in to expose the bore for the bearing. (See figure 58.)

7. Place the inner seal in the bearing bore on top of driven ring.

8. Insert T-handle into hub shell from non-drive side until it is bottomed on hub shell.

9. Place large hub bearing, black seal side first, onto the non-laser side marked side of knurled ring. Thread onto T-handle, bearing facing in, until the bearing just starts into the counterbore. Continue by turning the T-handle to pull the knurled ring and bearing into the bore until firmly seated. (See figure 59.) Loosen T-handle, turn knurled ring 180° on bearing and tighten T-handle to press bearing again. (This assures the bearing is seated flatly against the shoulder of the counterbore.)

10. Remove tool.



Figure 59 - press drive side bearing

Reinstallation of the non-driveside bearing

1. Insert small inner seal into non-driveside bearing bore.

2. Place small hub bearing, black seal side first, onto bare T-handle.

3. Insert knurled ring laser side facign out, into driveside of hub shell.

4. Pass T-handle with bearing through non-driveside of hub shell and thread into knurled ring. Continue turning T-handle to press bearing until it is firmly seated. (See figure 60.) Loosen T-handle, turn knurled ring 180° and tighten T-handle to press bearing again. (This assures the bearing is seated flatly against the shoulder of the bore.)

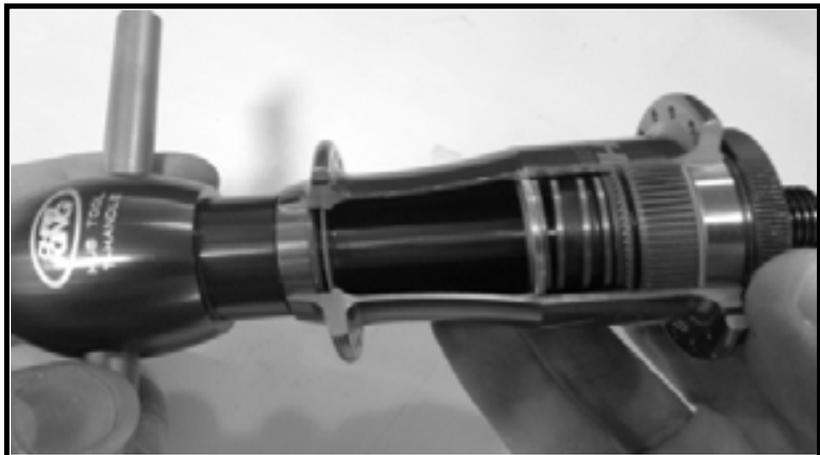


Figure 60 - install non-drive side bearing

Reassembly of the driveshell mechanism



Figure 61 - drive shell seal & bearing

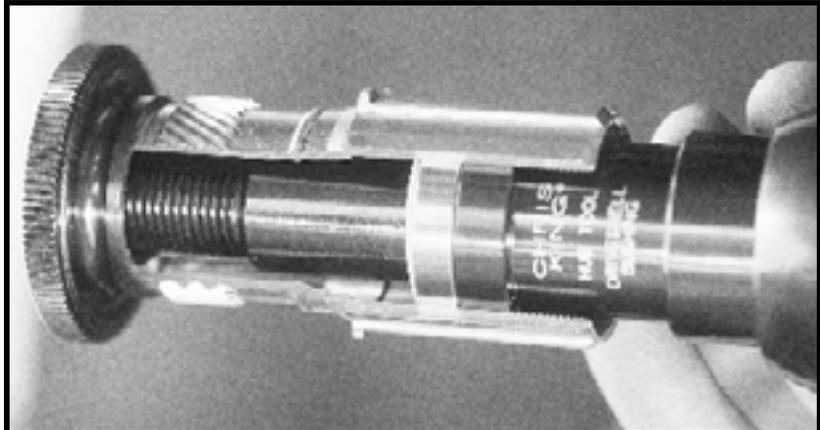


Figure 62 - press drive shell bearing

1. Insert small inner seal into big end of driveshell.
2. Insert driveshell bearing into driveshell, tapered side out. This bearing doesn't have a snapping or outer seal. Grease the bearing with RingDrive™ lube. Be sure that the white retainer side of the bearing sits against the inner seal. It should slide most of the way down the bore. (See figure 61.)
3. Place driveshell bushing, small end first, onto bare T-handle.
4. Pass T-handle with bushing through big end of driveshell until it contacts the bearing.
5. Thread knurled ring, laser side out, onto T-handle. Advance down until the small end of the driveshell nests into the bore in the end of the knurled ring. Be careful not to damage the small end of the driveshell. (See figure 62.)
6. Continue by holding the knurled ring and turning T-handle to press bearing until it is firmly seated. Loosen T-handle, turn knurled ring 180° on driveshell and tighten T-handle to press bearing again. (This assures the bearing is seated flatly). If the knurled ring is too difficult to hold, the cog spline wrench may be placed on the driveshell before the knurled ring is threaded onto the T-handle in step 5. Place the cog spline wrench in a vice and continue with step 6.
7. Remove tools and insert capture sleeve, flat face out.
8. Add a light layer of RingDrive™ lube to the needle race and insert.
9. Insert needle bearing cage.
10. Insert capture plate.
11. Thread seal ring in to drive shell. Be sure to grease threads with RingDrive™ lube before installing.
12. Insert driveshell into cog spline wrench and hold in vice. Using the spline driver, torque seal ring to 100 in-lb or 11.3Nm.

Reassembly of the XD Driveshell Assembly



Fig 63



Fig 64



Fig 65



Fig 66



Fig 67



Fig 68

1. (Figure 63) Drop inner seal into XD Driveshell. ***NOTE: The Inner Seal and the Capture Seal are NOT interchangeable. The Inner Seal has a wider band with a smaller inner diameter than the Capture Seal.**
2. (Figure 64 and Figure 65) Place bearing (greased) with the open ball side facing towards the outside of hub and slide the Driveshell onto the T-handle. Be sure the T-Handle is equipped with Driveshell bushing with the large side facing the bearing. Thread Knurled Ring (laser marked side out) on to T-Handle until the bearing is seated.
3. (Figure 66) Drop in the capture sleeve. The capture sleeve ledge should be oriented towards the outside of the XD Driveshell.
4. (Figure 67) Install needle bearing race. *Note the laser marked number on the needle bearing race. Be sure that this number is the same number marked on your axle. If not contact your Chris King Authorized dealer, or online at www.chrisking.com for a replacement axle in the



Fig 69



Fig 70



Fig 71

correct size.

5. Apply a thin layer of RingDrive Lube™ onto the installed needle bearing race. (Not shown)
6. (Figure 68) Install the needle bearing inside the needle bearing race.
7. (Figure 69) Install the capture seal. ***NOTE: The Inner Seal and the Capture Seal are NOT interchangeable. The Inner Seal has a wider band with a smaller inner diameter than the Capture Seal.**
8. (Figure 70) Place XD Driveshell End Cap on top of the Driveshell assembly.
9. (Figure 71) Slide assembly on the T-Handle with the End Cap facing the Thrust Collar. Thread Knurled Ring, laser side out, on to the T-Handle until a definitive click is heard and the End Cap is securely installed.

Reassembly of the BMX driveshell mechanism

1. Insert small inner seal into big end of driveshell.
2. Insert driveshell bearing into drive shell, tapered side out. It should slide most of the way down the bore.
3. Place driveshell bushing, small end first, onto bare T-handle.
4. Pass T-handle with bushing through big end of driveshell until it contacts the bearing.
5. Thread knurled ring, laser side out, onto T-handle. Advance down until the small end of the driveshell nests into the end of the knurled ring. Be careful not to damage the small end of the driveshell.
6. Continue by turning T-handle to press bearing until it is firmly seated. Loosen T-handle, turn knurled ring 180° on drive shell and tighten T-handle to press bearing again. (This assures the bearing is seated flatly against the shoulder of the bore.)
7. Remove driveshell from tool. Leave driveshell bushing in place, small end on first.
8. Place complete needle bearing onto T-handle shaft and slide down until it stops on the driveshell bushing.
9. Place the driveshell, laser side in, onto the T-handle shaft. Locate the bore over the needle bearing.
10. Thread knurled ring, small end first, onto the T-handle. Advance down until it locates the big end of the driveshell on it's stepped face.
11. Continue by holding the knurled ring and turning T-handle to press bearing until the drive

shell bushing meets the driveshell. If the knurled is too difficult to hold, the cog spline wrench may be placed on the driveshell before the knurled ring is threaded onto the T-handle in step 10. Place the cog spline wrench in a vice and continue with step 11.

12. Remove tools.

Reinstallation of the driveshell assembly

1. Check the helical splines of the driveshell for any particles or debris before proceeding; the driveshell must be clean before installing!
2. Apply several drops of lightweight, low viscosity oil, with PTFE (e.g. TriFlow™) on the O-ring. Add a layer of RingDrive™ lube to the helical splines.
3. Insert driveshell into hub shell, slowly. As the driveshell enters the RingDrive™ area, it will want to mesh the helical splines of the drive ring. As it begins to mesh, a slight clockwise turning motion of the driveshell will help pull it into the hub shell. Continue twisting as the driveshell pulls itself into the hub shell. At the bottom of its inward movement, an audible “click” or “pop” sound indicates that it has found home and is fully seated. (The “click” or “pop” is the spring retainer popping onto the driveshell and the driveshell hitting the bearing, indicating the driveshell is fully inserted. Some pushing pressure on the drive shell may be necessary to pop the spring retainer onto the end of the driveshell.)
4. Test engagement by spinning driveshell in both directions. If it does not engage, remove deiveshell, check cleanliness and re-insert. Re-test.
5. The hub is now ready to have the axle installed.

Reassembly of the two piece rear hub

1. Insert main axle through driveshell and completely into hub. A click indicates that the main axle is in place.
2. Thread adjusting cone along axle end until a small gap at the beginning of the threads shows. (See figure 72.)
3. Thread axle end and adjusting cone onto the protruding threads of main axle.
4. Lightly snug axle end and adjusting cone up to bearing.
5. Thread axle end into adjusting cone until it stops.
6. Proceed to “Adjustment of rear quick-release hub” below.

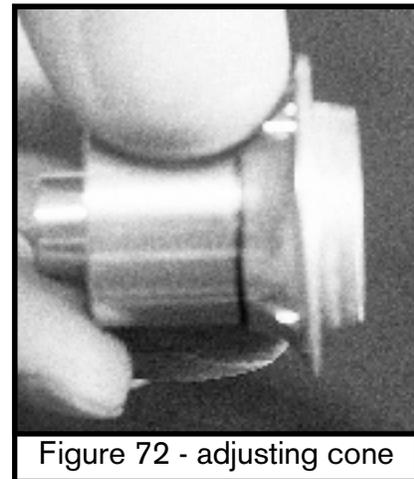


Figure 72 - adjusting cone

Reassembly of the rear one piece hub

1. Insert main axle, small end first, through driveshell into hub. Continue until axle is through the hub and large end is firmly seated in drive shell. Be sure to add of lightweight, low viscosity oil, with PTFE (e.g. TriFlow™) to the O-ring and sleeve.
2. Thread adjusting cone onto the protruding threads of axle. Be sure to grease the adjusting cone threads with waterproof grease.
3. Snug adjusting cone up to bearing finger tight.
4. Proceed to “Adjustment of rear bolt-on hub” below

Adjustment of the rear two piece axle hub

The following instructions assume that the driveshell is facing to the right:

1. Insert 5 mm hex wrenches into both ends of the axle assembly. ***Pro Tip: Use a bench vice to hold one of the 5mm hex wrenches.**
2. Hold left side stationary and turn right hand counterclockwise 1/4 turn until the assembly is loose.
3. Hold hex wrenches stationary and adjust bearing preload with the adjusting the hub cone adjusting tool.
4. Advance adjusting cone until it contacts bearing. The rear hub takes a slightly higher amount of preload than “no play”, since some settling may occur while riding.
5. Once preload is set, tighten axle assembly together to 110in.-lb or 12.43Nm.
6. Check adjustment by clamping wheel into frame with quick-release. Ride for 5-10 minutes, check for play or binding, and readjust as necessary. Double check adjustment after the first 5-10 miles of riding.

NOTE: Correct adjustment of the rear hub is necessary for proper engagement of the RingDrive™. If the hub is run loose, the RingDrive™ may not engage properly and could lead to permanent damage to the internal parts or hubshell.

Adjustment of the rear one piece hub

1. Rear one piece hubs feature special adjusting clamps which minimize over tightening or over preloading of the bearings. Normal adjustment is accomplished by finger tightening adjusting ring onto axle until it stops against bearing.
2. Once adjusting clamp is in position, tighten adjusting clamp pinch bolt to 10in.-lb or 1.13Nm.
3. Double check adjustment by bolting wheel into frame. Check for play or binding, and readjust if needed. Adjustment may be accomplished while bolted into frame.

HUB TROUBLE SHOOTING

COMMON QUESTIONS AND THE LIKELY SOLUTIONS:

Complete installation, service, and maintenance instructions are available on our web site at www.chrinking.com™. We are also available to answer your technical service questions during business hours Monday through Friday at 800.523.6008.

Hub will not stay adjusted.

Front and rear two piece hubs:

When an adjustment is made, the axle end must be torqued to 110in.-lb or 12.43Nm to lock the adjusting cone's position correctly. With less torque, the hub may seem locked, however, when clamped in, the lock may loosen slightly allowing the adjusting cone to move.

Front and rear one piece hubs:

When an adjustment is made, the adjustment clamp must be torqued to 10in.-lb or 1.13Nm to lock the adjusting clamps position correctly. With less torque, the hub may seem locked, however, when clamped in, the clamp may loosen slightly allowing the adjusting clamp to move.

Rear:

Break-in is a normal function of the rear hub. As the angular contact bearings settle in, this causes a loosening effect on the preload setting. Expect to adjust preload directly after the wheel build and a few more times as necessary to complete the break-in period. After that it should be smooth sailing for months... If the axle lock is torqued correctly and loosening persists, contact our technical service department for further help.

My hub creaks.

Due to the ability of noise to travel throughout a hollow frame, hub creaks are often confused with bottom bracket and other creaks. Isolating the true source of the noise is essential to effective trouble shooting.

1. The hub quick release may not be tight enough allowing the axle end to move in the dropout. In some cases, even if everything is properly tight, the axle may still move slightly in the frame. A little anti-seize on the drop-out faces may help.

Solution: Inspect and tighten the quick release.

2. Some splined cog carriers fit loosely on our driveshells. Since both are made of aluminum, they may creak under certain riding conditions (e.g., Water and dry dust.) Additionally, if the lock ring is not tight enough, the cogs may move under load.

Solution: Apply a thin layer of grease or anti-seize to splines on the driveshell and check lock ring and torque to manufacturers specifications.

3. We have found that on some carriers the cogs (e.g., XTR™ titanium,) creak at their attachment points to the spider.

Solution: Apply a light oil to the rivets fixing the cogs to the spider.

4. The hub has been designed to allow the easy removal of the axle and driveshell. This required having tapered bearing contact surfaces. These surfaces can go dry and may then make noise under heavy load.

Solution: Check and apply RingDrive™ lube to the driveshell on the bearing contact taper adjacent to the o-ring (about the middle of the outside of the driveshell.) And on the adjusting cone on the bearing contact taper.

5. The spoke tension on our wheels should be no more than 120Kgf or 1200N. In rare cases, when the wheel has been built at very high tension, the large drive side bearing can become loose and cause creaking.

Solution: Check to see if the bearing will slide out by hand. If this happens, we can supply an oversized replacement bearing.

The rear hub has an engagement problem.

The RingDrive™ is a high performance engagement system capable of high load and extremely rapid engagement. It relies on the fine movement of the drive ring sliding on the helical spline

of the driveshell. It is important that this area remain clean and properly lubricated. Dirt, debris, and/or drying lubricant may prevent it from functioning properly. Our hub is easy to inspect and service using only 5mm and 2.5mm hex wrenches. Recent improvements have been made to minimize abnormal sensitivity to engagement problems. Check the following for possible causes of misengagement:

1. Is the hub preload adjusted correctly? A loose hub may cause the drive rings to not engage properly.

Solution: Check and properly adjust hub as necessary.

SPECIFICATIONS

TORQUE SPECS

HEADSETS

NoThreadSet™

Stem cap bolt = 15in.-lb or 1.7Nm

GripNut™

Lock and adjusting rings = 130-150 in.-lb or 14.7Nm- 16.9Nm

2Nut™

Lock and adjusting nuts = 130-150 in.-lb or 14.7Nm- 16.9Nm

HUBS

General

Adjusting cones = 110 in.-lb or 12.4Nm

Cog lock ring = 20 ft.-lb or 27Nm

Adjusting clamp bolt = 10 in.-lb or 1.13Nm

Cassette Lockring = 30 ft.-lb or 40Nm

Universal Disc

Rotor adaptor screws = 28 in.-lb or 3.16Nm

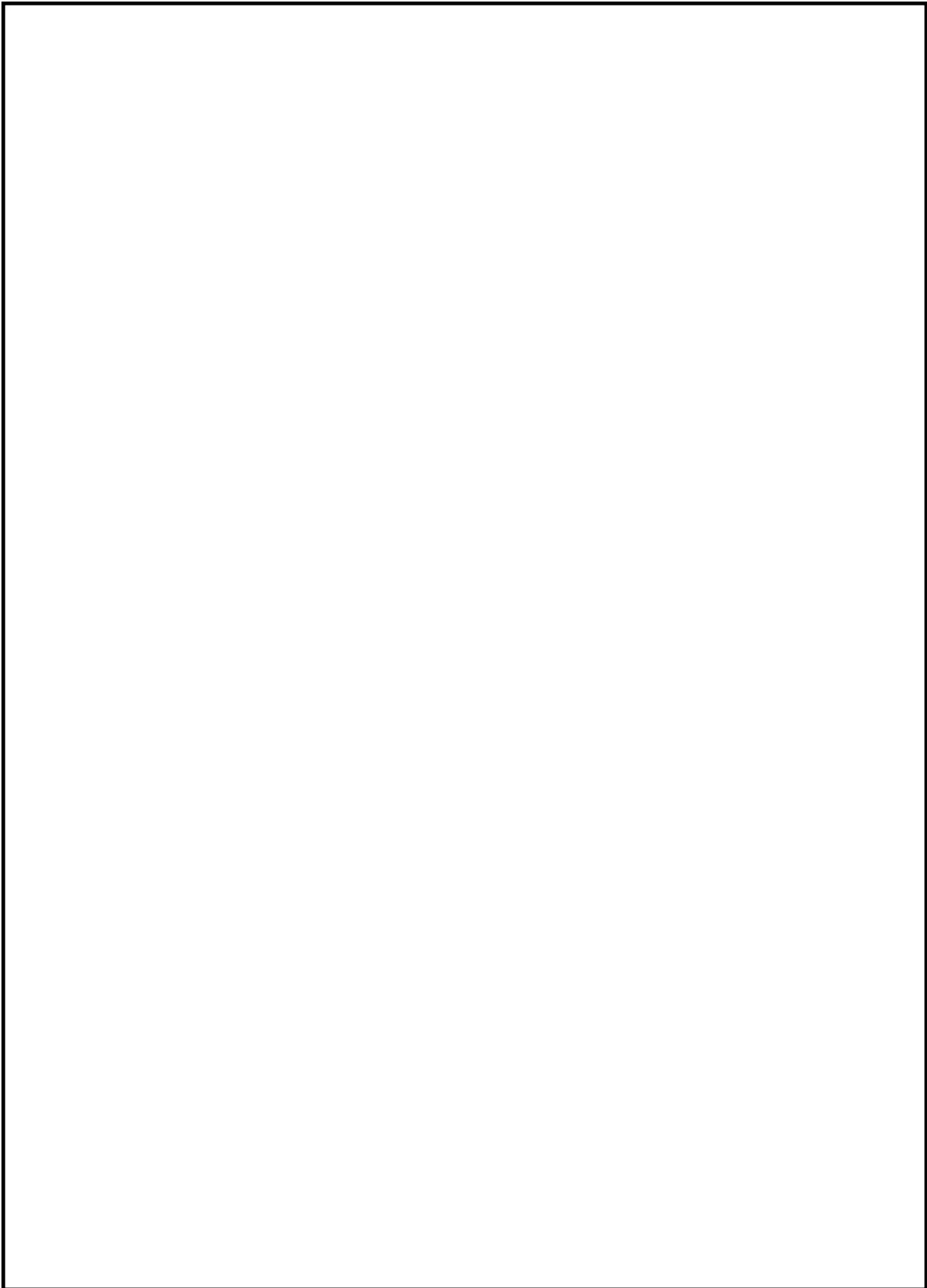
Adjusting cones = 110 in.-lb or 12.4Nm

FubBolts = 25 in.-lb or 34Nm

Service tool

Driveshell seal ring = 100 in.-lb or 11.3Nm

NOTES



ISO hub specifications and wheel building information

Hub Type	Axle Type	Axle Width (mm)	Flange Diameter Drive Side & non-Drive Side (mm)	Center to Flange Drive Side (mm)	Center to Flange non-Drive Side (mm)	Frame Attachment Options	Available Spoke Hole Drilling	Upgrade & Conversion Options	Weight* (grams)	Weight** (grams)
ISO OR SD front	two piece	100	57.4	31.3	22.2	OR	28, 32, 36	4	166	163
ISO 15mm SD front	one piece	100	57.4	31.3	22.2	15mm TA	28, 32, 36	4	164	161
ISO 15mm LD front	one piece	100	57.4	31.6	23.3	15mm TA	28, 32, 36	5	197	193
ISO 20mm LD front	one piece	110	57.4	31.6	23.3	20mm TA	28, 32, 36	5	207	203
ISO 24mm front	one piece	110	57.4	26.5	27.8	24mm	28, 32, 36	6	240	-
ISO Lefty® SuperMax	one piece	Lefty	57.4	35.4	26.6	Lefty®	28, 32	-	215****	211****
ISO Lefty® LD	one piece	Lefty	57.4	35.4	19.6	Lefty®	28, 32, 36	5	200*****	196*****
ISO 135 rear	one piece	135	57.4	20.1	33.9	OR/FB	28, 32, 36	1, 3	336	331
ISO 135 x 10/12mm rear	one piece	135	57.4	20.1	33.9	10/12mm TA	28, 32, 36	1, 3	320**	315**
ISO 142 x 12mm rear	one piece	142	57.4	20.1	33.9	12mm TA	28, 32, 36	1, 3	325	320
ISO DH G1 150 x 10/12mm rear	one piece	150	57.4	25.0	38.5	10/12mm TA	32, 36	3	336**	-
ISO DH G2 150 x 10/12mm rear	one piece	150	57.4	28.5	39.6	10/12mm TA	32, 36	3	338	333
ISO DH G2 157 x 12mm rear	one piece	157	57.4	28.5	39.6	12mm TA	32, 36	3	344	339
ISO Single Speed rear	one piece	135	57.4	32.3	31.0	OR/FB	28, 32, 36	-	411***	406***
Universal Disc front	two piece	100	53.0	31.5	23.0	OR	32, 36	-	150	-
Universal Disc rear	one piece	135	53.0	21.0	34.0	OR/FB	32, 36	1, 3	282	-
Universal Disc Single Speed rear	one piece	135	53.0	32.0	34.2	OR/FB	32, 36	-	427***	-
Universal Disc rear tandem	two piece	140	53.0	23.5	31.5	OR	32, 36	2, 3	284	-
Universal Disc rear tandem	one piece	145	53.0	26.0	29.0	OR/FB	32, 36	3	366	-
Universal Disc rear tandem	one piece	160	53.0	33.7	33.7	OR/FB	32, 36	3	388	-

Upgrade & Conversion Options

G1: Generation One - Serial # begins with 1910
G2: Generation Two - Serial # begins with 2910

Frame Attachment Options

OR: Quick release only
TA: Thru-axle only

OR/FB: Quick release or FunBolts (FunBolts only compatible with rear one piece axle)

Small Parts Weights

* Add 48g if hub features a stainless steel driveshell
** Add 27g if hub features a XD Driveshell
** Add 5g if using 10mm thru axle
*** Weight includes 18t stainless steel cog (37g), single speed cog spacers (6g) single speed cog lock ring (4g) and FunBolts (42g)
**** Weight includes Cannondale® axle bolt (4g)
***** Weight includes 1mm disc spacer (8g), Cannondale® axle bolt (4g)

Wheel Building Specifications

Spoke Gauge: 13, 14, or 15 gauge
Spoke Lacing Pattern: 2-or-more cross
Spoke Hole Diameter: 2.5mm
Max Spoke Tension: 120 kgf 1200Nm

Classic and BMX hub specifications and wheel building information

Hub Type	Axle Type	Axle Width (mm)	Flange Diameter Drive Side	Flange Diameter Non-Drive Side	Center to Flange Drive Side (mm)	Center to Flange non-Drive Side (mm)	Frame Attachment Options	Available Spoke Hole Drilling	Upgrade & Conversion Options	Weight* (grams)
Classic high flange front	two piece	100	53.0	53.0	34.3	34.3	QR	28, 32, 36	-	136
Classic high flange 130 front	two piece	130	53.0	53.0	17.2	37.3	QR	28, 32, 36	1, 2, 3	276
Classic high flange 135 rear	one piece	135	53.0	53.0	21.0	33.5	QR/FB	28, 32, 36	1, 2, 3	302
Classic low flange front	two piece	100	40.0	40.0	34.0	34.0	QR	28, 32, 36	-	112
Classic low flange 130 rear	two piece	130	53.0	44.0	18.5	38.5	QR	28, 32, 36	1, 2, 3	264
Classic low flange 135 rear	two piece	135	53.0	44.0	21.0	36.0	QR	28, 32, 36	1, 2, 3	266
Single Speed 130 rear	one piece	130	53.0	53.0	31.2	36.2	QR/FB	28, 32, 36	1	370a
Single Speed 135 rear	one piece	135	53.0	53.0	33.7	33.7	QR/FB	28, 32, 36	1	375a
BMX high flange front	one piece	100	53.0	53.0	34.3	34.3	BO	28, 32, 36	-	216b
BMX high flange rear	one piece	110	53.0	53.0	27.3	27.3	BO	28, 32, 36	-	388c
BMX low flange front	one piece	100	40.0	40.0	34.0	34.0	BO	28, 32, 36	-	194b
BMX low flange rear	one piece	110	53.0	44.0	27.0	30.0	BO	28, 32, 36	-	376c
Classic Tandem 140 rear	two piece	140	53.0	53.0	31.5	23.5	QR	28, 32, 36	1, 2, 3	282
Classic Tandem 145 rear	one piece	145	53.0	53.0	29.0	26.0	QR/FB	28, 32, 36	1, 2, 3	342d
Classic Tandem 160 rear	one piece	160	53.0	53.0	33.7	33.7	QR/FB	28, 32, 36	3	352d
<p>Frame Attachment Options QR: Quick release only QR/FB: Quick release or FunBolts (FunBolts only compatible with rear one piece axle)</p> <p>Wheel Building Specifications Spoke Gauge: 13, 14, or 15 gauge Spoke Lacing Pattern: 3-or-more cross Spoke Hole Diameter: 2.5mm</p>										
<p>Upgrade & Conversion Options Convertible to 135mm QR/FB axle, and 135mm two piece QR axle Convertible to 130mm, 135mm, and 140mm axle widths when using a two piece axle Convertible to stainless steel driveshell Convertible to QR and 15mm thru axle</p> <p>Small Parts Weights * Add 48g if hub features a stainless steel driveshell ** Weight includes 18t stainless steel cog (37g), single speed cog spacers (6g) single speed cog lock ring (4g) and FunBolts (42g)</p>										