

Technical Service Manual for Shop Mechanics

rev. 10/04

**Complete instructions for servicing all
Chris King headsets and hubs.**

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

CHRIS KING[®]
PRECISION COMPONENTS

King Cycle Group
2801 NW Nela Street; Portland, Oregon 97210
For technical questions, call 800.523.6008
www.chrisking.com

CHRIS KING®

PRECISION COMPONENTS

HEADSETS

This manual is intended for the mechanic who already possesses a familiarity with headset installation technique and who is interested in the finer points of both proper headset set-up and troubleshooting for best headset performance.

FEATURES

- Ten year warranty
- Unparalleled quality, reliability, and reputation
- In-house design and manufacturing - 100% made by Chris King in the USA
- Available in all standard sizes and our new and exclusive Devolution™ size (to adapt 1-1/8" forks to 1-1/4" frames).
- Unique modular design offers affordable upgrades and outlasts changing fork trends
- Exceptionally lightweight
- Over 24 years of experience

PREPARATION AND INSTALLATION

FRAME PREPARATION

Head tube preparation is one of the most important and most often overlooked elements in headset setup and performance. Especially with high end frames, it is often assumed that if a frame is new or already has a headset installed that the frame must have been properly prepared at the factory. This is very often not the case. We recommend a careful inspection of the headtube facing and reaming before installation.

1. Ream and face the head tube as necessary to ensure that the head tube is faced square and bored to the proper dimensions. (See table 1 - next page.)
2. Using a small file, sand paper, or deburring tool, carefully remove any sharp edges or burrs and slightly round the inside edges of the head tube at the top and bottom to prevent shearing metal from the cups during installation. (See figure 1.)



Figure 1 - deburr headtube

3. Clean to remove any chips, shavings, and/or cutting oil.
4. The proper press fit should be with no more than .1mm (.004") of interference. See table 1 for correct headtube bore size.

	Head tube bore	Crown seat OD
1"	30.1mm	26.5mm
1" BMX	32.7mm	26.5mm
1-1/8"	33.9mm	30.1mm
1-1/4"	36.9mm	33.1mm
1-1/4" Devolution™	36.9mm	30.1mm

table 1 - frame prep specs

Facing tolerances

We recommend that the variation in parallelness of the end faces of the headtube not exceed .075mm (.003"). Because facing tolerance is actually more complicated than just having the faces parallel, there is really no accurate way for the average bike shop to measure it. We recommend inking the faces of the headtube with a marker and using the facing tool to see that it removes the ink evenly and completely all the way around. Be sure to use the center guide in the opposing bore to ensure proper alignment. Cut metal as necessary until all of the ink is removed.

Bore sizing

Most reamers are .2mm under the nominal cup size and we recommend that the head tube bore be cut to .1mm under. The use of these reamers will produce varying finished bore sizes depending on the properties of the material being cut, and how much reaming is performed. With many materials you may net the correct bore size, however, on materials such as titanium or hard aluminum, the reamer may cut a clean bore in its exact size or smaller. On the other hand, if you face a lot of material while the reamer is in the bore, the reamed bore may become oversized. Some manufacturers have included bushings that take the place of the reamer to prevent continued reaming while facing. If these are available, they should be used.

Because the equipment necessary to determine exact bore sizes is not commonly found in most bicycle shops, attentively pressing the cups is the most practical test. It shouldn't be necessary to "reef" on the press;— an exceedingly difficult cup press is an indication that the head tube bore is undersized. If the bore is still undersized after reaming, it may be necessary to use another method to achieve the proper size. (One trick we have used is to first press cheap steel headset cups to smooth and stretch the bore slightly. Then, remove and press our cups.) If the cups press in with little resistance or the bore otherwise appears oversized, oversized cups are available directly from King Cycle Group.

Additional notes on head tube preparation

One aspect of preparation that is often overlooked is the chamfer on the inside of the head tube bore (top and bottom) and the removal of any sharp edges or burrs. (See figure 1 - last page.) We recommend a chamfer width of .25mm (.010"). A clean chamfer allows the cup to be pressed without shaving metal and to sit flat against the tube face without cutting into the small radius in the corner of the cup skirt. A cut in this area of the cup may cause cracks to form over time.

FORK PREPARATION

1. Reaming and facing of the fork may be necessary, but is not critical unless it is grossly out of square or oversize. The crown race seat should be square to the steerer tube and its outer diameter should not exceed .1mm larger than the inner diameter of the base plate. Most available reamers/facers are adequate for these tolerances.
2. Clean to remove any chips, shavings, and/or cutting oil.
3. The proper press fit should be with no more than .1mm (.004") of interference. See table 1 above for correct crown race seat size.
4. Slide the base plate, conical side up, onto the steerer tube. With the beveled side of the base plate installation adaptor against the base plate, use a crown race setting tool to set the base plate. The base plate installation adaptor helps to protect the conical bearing contact surface on the base plate from damage due to impact from the crown race installation tool. (See figure 2.)



Figure 2 - setting the baseplate

Threadless forks - NoThreadSet™

Cut steerer tube and install star-nut

1. Insert fork into frame.
2. Remove o-ring from bearing cap and slide bearing cap, then any spacers, and the stem over steerer tube. Scribe a line flush with top of stem.
3. Remove stem and mark another line 3mm below the first. Cut on the lower line with a hacksaw. **Do not use a pipe cutter.** A pipe cutter will swell the end of the tube, making installation of the bearing cap and other tight fitting parts difficult.

When sizing the steerer tube it is important to make sure it extends into the stem as far as possible without colliding with the stem cap. In fact, the steerer tube may extend through the stem as long as adequate spacers are placed between the stem and stem cap. This method has been very popular and effective in BMX installations.

4. Remove all sharp edges from inside and outside of steerer tube. With a small file or sandpaper, round outside edge of tube to avoid shearing the o-ring upon installation.
5. Thread star-nut onto installation tool.
6. With a soft hammer or mallet, drive star-nut straight into steerer tube until tool contacts top of steerer tube. (See figure 3.)



Figure 3 - starnut installation tool

7. Unscrew tool from star-nut.
8. If installation tool is not available, thread bolt well into star-nut and use it to drive the star-nut 10-15mm below the top of the steerer tube.
9. Use extreme caution when cutting steerer tube and installing star-nut to avoid injury.

Threaded forks - GripNut™

Size and cut steerer

1. Insert fork into frame. Steerer tube should protrude 11-14mm above top of bearing cup.
2. Cut steerer tube if needed.
3. Remove all sharp edges from inside and outside of steerer tube.
4. Clean the steerer tube removing all metal chips, burrs and grease.

Threaded forks - 2Nut™

Size and cut the steerer tube

1. Insert fork into frame.
2. Thread adjusting nut onto fork. Advance down threads until it just touches the bearing.
3. To size the steerer tube length, make sure there are at least 5 full threads above the adjusting nut available for the lock nut.
4. Cut steerer tube if needed.
5. Remove all sharp edges from inside and outside of steerer tube.
6. Clean the steerer tube removing all metal chips, burrs and grease.

INSTALLATION

Press the cups

We recommend using our headset installation adaptors on the headset press. These adaptors help ensure that pressure is applied evenly across the top of the cup and not on the bearing and that the cups press straight into the frame without damage from the tool.

We do not recommend for or against using anti-sieze, grease, or Loc-tite™ while pressing in cups or base plates—we leave this choice to the discretion of the mechanic installing the headset.

Once the cups are pressed in, they should be seated flatly against the head tube. If they do not sit flat, the chamfer on the head tube bore may be inadequate and/or may have sheered metal from the cup skirt. Remove cups and properly prepare the frame according to the above instructions.



Figure 4 - press adaptors

If the frame has been properly prepared and the cups still do not sit flat, a more serious problem could be that the head tube cup bores may not be parallel to the head tube axis. Short of reworking the frame, little can be done in this case.

FINAL ASSEMBLY

Threadless Systems - NoThreadSet™

Final assembly and adjustment

1. Prior to installing the bearing cap on a threadless steerer tube, round off the top of the steerer tube to avoid shearing the o-ring on the inside of the bearing cap.
2. Re-install o-ring into bearing cap if it had been removed previously.
3. Apply a small amount of anti-seize to conical bearing contact surface on base plate.
4. Insert fork into frame.
5. Taking care not to shear o-ring, slide bearing cap (**do not hammer**), any spacers, and then stem over steerer tube. Place any additional spacers, then stem cap on top of stem. Apply a small amount of anti-seize to screw and insert screw through cap. Thread into star nut, tighten to approx. 4-10 in.-lb. (max. 15 in.-lb.) to preload the bearing. This assumes no resistance from the stem. If the stem is tight, add the torque necessary to move the stem to the preload torque value.
6. Adjust alignment of stem and secure according to stem manufacturer's specifications.
7. Check for a gap of approximately .4mm (.015") between bearing cap and cup. This gap should be even all of the way around. If the gap is uneven refer to the notes below and the trouble shooting section "My headset seem to be adjusted correctly, but binds when the bars are turned" below.
8. Check headset for proper adjustment. When properly adjusted, the fork will rotate smoothly without play or restriction. Some settling may occur after 1st few rides; readjust if necessary.

NOTE: New seals will produce some resistance in rotation for the first 50-100 hours of use. Avoid confusing this with rubbing or binding that may result from improper installation or stems that are not properly faced.

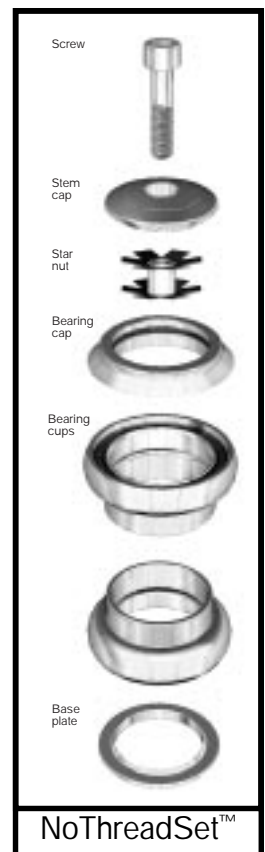
Notes on threadless stems

- We recommend using stems with a split clamp and either one or (preferably) two bolts.
- It is important to check the bottom face of all threadless stems. Many are not square to the steerer tube and may cause the bearing cap to sit unevenly or rub on the cups.

Threaded Systems - GripNut™

Assembly of GripNut™

1. Make sure the thread on the lock ring and the inside thread of the adjusting ring are lubricated thoroughly with anti-seize compound or heavy grease. Also apply grease to the tapered surfaces of the thread collet and lock ring. **Do not apply grease to fork threads.**



2. Place the thread collet into the threaded hole of the adjusting ring, positioning the key on the collet in the corresponding slot.
3. Screw the lock ring into the adjusting ring/collet assembly until the collet has very little float inside the assembly.

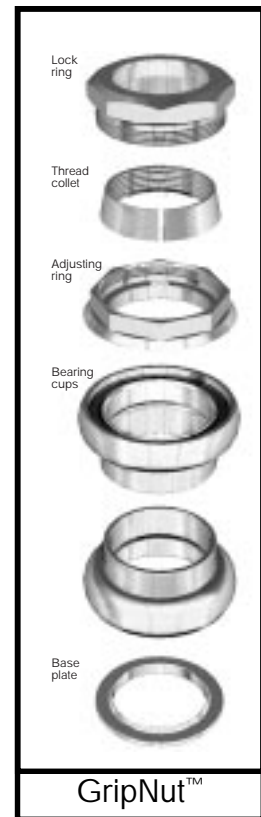
Final assembly and adjustment

1. Thread complete GripNut™ assembly onto fork about 4-5 turns or at the most an 1/8" prior to contacting the bearing.
2. Once the GripNut™ is positioned on the steerer tube, tighten the lock ring into the adjusting ring until it feels as though the GripNut™ is dragging as it turns on the threads of the fork.
3. Once you feel this drag, advance the entire GripNut™ as a unit down to touch the bearing. Use headset wrenches on both the lock and adjusting ring as necessary.
4. Adjust the preload on the bearing. Finish by holding the adjusting ring in place and tightening the GripNut™ lock ring to 130-150 in.-lb.

TEST: Using both wrenches, try to turn the GripNut™ as a unit in the loosening direction. It should be extremely difficult, if not impossible, to turn. If it turns easily, continue to turn the entire unit 1/4 turn in the loosening direction and re-torque. Test again.

5. Check headset for proper adjustment. When properly adjusted, the fork will rotate smoothly without play or restriction. Some settling may occur after 1st few rides; readjust if necessary.

NOTE: New seals will produce some resistance in rotation for the first 50-100 hours of use. Avoid confusing this with rubbing or binding that may result from improper installation.



Threaded Systems - 2Nut™

Final assembly and adjustment

1. Advance adjusting nut to preload bearing.
2. Thread lock nut down to just touch adjusting nut.
3. Holding the lock nut in position, back tighten the adjusting nut into the lock nut.
4. Finish torque lock nut to 130-150 in.-lb.
5. Check headset for proper adjustment. When properly adjusted, the fork will rotate smoothly without play or restriction. Some settling may occur after 1st few rides; readjust if necessary.

NOTE: new seals will produce some resistance in rotation for the first 50-100 hours of use. Avoid confusing this with rubbing or binding that may result from improper installation.

HEADSET SERVICE

In general, headset service should be done at least every two years. In dry climates, service intervals may be longer. In wet climates, service may be necessary as often as every 6 months.

You may service your Chris King headset while in the frame using a light solvent-based lubricant (e.g., Bullshot™ aerosol or WD-40™,) to flush the bearings. However, for those of you with the correct tools for the proper removal and reinstallation of Chris King bearing cups, we have found it easier and more effective to remove the cups and use a solvent tank.

Removal of the snap ring and seal

Take a pointed instrument, such as a penknife or dental tool, insert it at the split in the snap ring, and lift the pointed end out. (See figure 5.) Once the pointed end is free, the remainder of the ring can be removed easily. Lift out the inner seal. (See figure 6.) At this point the bearing will be exposed.

Clean and re-grease the bearings and replace the seal and snap ring

With a small brush (e.g., a tooth brush) clean the bearing while rinsing with solvent. If the bearing has been neglected and is frozen, let it soak for a few minutes. Then, rotate the inner race back and forth to work it free. Rinse in solvent and blow dry with an air hose to remove any excess solvent. Test the bearing for smoothness. If the bearing was frozen for too long it may have become damaged or may be too rough and need replacement. However, if the bearing has lost only some of its silky smoothness, it may not be evident at the handlebar once re-greased and reassembled. If bearing replacement is necessary return cup(s) to us to have a new bearing(s) installed.

Re-grease the bearings using Bullshot™ or any other high quality waterproof grease. Carefully wipe off the inner seal and re-install. Our seals are flat and symmetrical and can be inserted either side up. Finally, insert the pointed end of the snap ring into the snap ring groove, working it around the bearing until the other end seats and a small gap is noticed. Inspect the rest of the parts for any wear. At this time, you are ready to reassemble the headset and adjust.



Figure 5 - remove snap ring



Figure 6 - remove seal

HEADSET TROUBLESHOOTING

COMMON QUESTIONS AND THE LIKELY SOLUTIONS

Complete installation, service, and maintenance instructions are available on our web site www.chrisking.com. We are also available to answer your technical service questions during

business hours Monday through Friday at 800.523.6008.

My headset always rattles and it won't tighten up when I attempt an adjustment.

1. The steerer tube may be too long and interfering with the stem cap (threadless) or lock nut (threaded).

Solution: Cut the steerer tube or install spacer(s) so that there is the necessary clearance.

My headset won't adjust correctly. It's either too tight or too loose.

1. The bearings may be dirty or frozen.

Solution: Service the bearings.

2. The frame and/or fork may not be properly prepped. This can cause the top or bottom pieces to rub on the cups or the steerer tube to rub on the inside of the bottom cup. This is most commonly found on titanium and hard aluminum frames.

Solution: Properly ream and face the frame and/or fork and check for the proper head tube bore size.

My headset seems to be adjusted correctly, but it binds when the bars are turned.

1. The frame and/or fork may not be properly prepped. This can cause the top or bottom pieces to rub on the cups or the steerer tube to rub on the inside of the bottom cup. This is most commonly found on titanium and hard aluminum frames.

Solution: Properly ream and face the frame and/or fork and check for the proper head tube bore size.

2. If it is a threadless system, the bottom face of the stem may not be perpendicular to the bore thus causing the bearing cap to cock and rub the cup.

Solution: Face the bottom surface of stem square with steer tube.

3. If it is a threaded system, the threads on the steerer tube may not be straight.

Solution: Replace the steerer tube.

4. The bearings may be dirty.

Solution: Service the bearings.

My headset won't stay tight—it just keeps coming loose.

A properly set up Chris King headset shouldn't need adjustment more than once or twice a year (depending on riding style). If your headset needs adjustment more often than once a month, check for the following:

Threadless models - NoThreadSet™

1. The pinch bolt on the stem may not be tight enough or the clamp method may be inadequate. We have found that stems with a split and one or two pinch bolts hold better with less chance of distorting the steerer tube than internal wedge designs.

Solution: Tighten or replace the stem.

2. Steerer tube may not extend far enough into the stem.

Solutions: 1) If spacers are being used to elevate the stem, remove as necessary to lower the stem to within 3mm of the top of the steerer tube; 2) Replace the steerer tube and be sure to cut steerer tube to extend to within 3mm of the top of the stem (steerer tube must not interfere with the stem cap).

3. Steerer tube may be pulling through the crown. This is more common with older suspension forks.

Solution: Contact the fork manufacturer to determine the proper remedy for the steerer tube pulling through the crown.

4. Demanding applications (such as trials, down-hill, and BMX) can generate strong leverage on the handlebars and walk the stem up the steerer tube.

Solution: In this case it is best to extend the steerer tube through and above the stem. Spacers may then be used on top of the stem to allow proper functioning of the stem cap. (We learned this trick from the boys at GT BMX racing.)

Threaded models - GripNut™

1. GripNut™ may not be tight enough or may otherwise be improperly adjusted. If the lock ring was too loose as the GripNut™ was tightened to adjust the preload on the bearing, the collet will not clamp properly as the lock ring is tightened to hold the GripNut™ in place.

Solution: Readjust GripNut™ according to the above instructions.

2. The adjusting ring may be rubbing on top cup due to misalignment of either the cup or the threads on the steerer tube.

Solution: For misaligned cups, face and ream the frame; for misaligned threads, replace the steerer tube.

3. GripNut™ lock ring may be bottoming out on the top of the steerer tube.

Solution: Re-cut the steerer tube so that there is a gap of approximately 1mm below the inner lip of the lock ring.

Threaded models - 2Nut™

1. The lock and adjusting nuts may not be locked together tight enough.

Solution: Tighten lock and adjusting nut together according to the above instructions.

2. Adjusting nut may be rubbing on the top cup due to misalignment of either the cup or the

threads on the steerer.

Solution: For misaligned cups, face and ream the frame; for misaligned threads, replace the steerer tube.

3. The threads on the fork steerer tube may be undersized (in pitch diameter). If this is the case the adjusting nut will fit loosely on the threads.

Solutions: 1) Switch to a GripNut™ top assembly—the GripNut™ will clamp onto undersize threads; 2) Replace steerer tube; 3) Regenerate the threads on the existing steerer tube after wishing metal back.

4. The lock nut may not be threaded far enough onto the steerer tube. It should thread on a minimum of four full turns to hold properly.

Solutions: 1) Switch to a GripNut™—the GripNut™ offers a shorter stack height; 2) Replace steerer tube and cut long enough to allow adequate engagement on the lock nut.

My headset loosens over time.

Check all of the possible causes for "...loosens quickly," as well as:

1. The head tube may be out of parallel. This can cause looseness due to premature wearing of the conical bearing contact surfaces.

Solution: Properly ream and face the frame and/or fork. Check conical bearing contact surfaces for excessive wear and replace if necessary.

2. Cups may be loose in the head tube. This can happen if the head tube bore is oversize or if the material of the head tube is extremely soft and/or stretched out.

Solutions: 1) If the head tube is oversize, we may be able to provide cups with oversize skirts; 2) If the head tube material is soft and/or stretched, contact the frame manufacturer for possible remedies.

3. The skirt of the headset cup or the head tube may be cracked.

Solutions: 1) Contact us to replace a cracked cup. Then, check the head tube bore for proper size and ream if necessary. Additionally, the head tube bore chamfer may be inadequate or absent—cut or file according to above instructions; 2) Contact frame manufacturer regarding a cracked head tube.

My headset creaks and/or makes a ticking noise.

The following components are more often the cause of creaks and ticking noises than headsets:

- suspension fork
- steerer tube and crown - press-fit or clamped
- stanchion tubes
- fork brace bolts
- bars, stem, cables
- cracked head tube

If these components are not the source of the noise, check the following:

1. Improper reaming and/or facing (e.g., cups not parallel) can cause abnormal wear on the

conical bearing contact surfaces which can cause creaking and/or ticking noises.

Solution: check and properly ream and face head tube as necessary and check conical bearing contact surfaces for excessive wear and replace if necessary.

2. The conical bearing contact surfaces on the base plate may be completely dry. If the bike is ridden in extremely wet conditions, ridden or transported in the rain, or washed with high pressure spray, the lubrication on these surfaces may have been washed away.

Solution: Lay a thin layer of antisieze on the conical contact surfaces.

3. The base plate may be loose on the crown race seat. This can result from a stretched base plate or an undersized crown race seat.

Solutions: 1) Replace base plate; 2) Contact us for an undersized base plate.

4. The cup(s) may be loose in the frame.

Solution: Contact us for possible oversize cups.

5. The head tube bore may be "bell-mouthed". The cups then press fit only at the innermost ends.

Solutions: Contact us with an accurate measurement of the head tube and the extent of the "bell" and we may be able to provide oversize cups that work in the head tube. If the degree of bell-mouth is extremely pronounced, you may need to contact the frame manufacturer for possible remedies.

6. The bearings may be dirty or seized.

Solution: Service the bearings.

7. On a NoThreadSet™, the bottom surface of the stem may be sliding on the bearing cap. This can happen if the o-ring is sheared in installation.

Solution: Replace the o-ring and file the top of steerer tube to prevent shearing. Upon reinstallation of the bearing cap, insert one of our scuff washers or lay a thin layer of antisieze on the bottom of the stem where it touches the bearing cap.

8. The steerer tube may be undersize. Steerer tubes should be $+.002/-0.001$ mm (.001") of the nominal size. We often see them as much as .25mm (.010") undersize.

Solution: Replace the steerer tube.

9. Bottom surface of stem may not be flat.

Solution: Face bottom of the stem.

CHRIS KING®

PRECISION COMPONENTS

HUBS

FEATURES

- Five year warranty
- Mountain, BMX, road, disc brake, and tandem hubs available
- Exclusive patent pending RingDrive™ engagement system offers instant and positive engagement and extremely high torque carrying capacity ideal for hard racing, tandems, trials, etc.
- Bearings are fully serviceable with just two 5mm hex wrenches
- Strong and stiff 19.5mm axles
- Wide spaced canted flanges for a strong wheel
- In-house design and manufacturing - 100% made by Chris King in the USA
- Unparalleled quality and reliability
- Exceptionally lightweight

SET-UP

GETTING STARTED AND CAUTIONS

This service manual refers to all front hubs and rear hubs of build level 317 and higher. Please contact King Cycle Group's technical service department regarding special instructions for servicing earlier build levels.

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 for use with either front or rear suspension.

Follow all torque recommendations

Follow all instructions and see attached schedule in appendix 3.

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. Please refer to the supplied torque specifications (appendix 3) for problems with chronic loosening.

Use only "spidered" cassettes with our aluminum drive shells

The aluminum drive shells of the rear hubs are softer than the steel shells, and should only be used in conjunction with the newer "spidered"-style cassettes (e.g. Shimano XT™ or XTR™). Avoid using "individual"-style cog sets with the aluminum drive shells.

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(s) to accept any type of bolt-on retention device.

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 the first 20 hours of 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.

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 - Classic hubs

Chris King Classic hubs are designed to work with 14 or 15 gauge spokes. Due to the increased tension required by titanium spokes, titanium spokes should only be laced in a 3 cross pattern.

Dimensions for wheel building

CLASSIC HUBS	Flange diameter (at hole centers)	Center to flange
Wide front (mountain)	40.0mm	37.5mm
Narrow front (road)	40.0mm	34.0mm
Rear 130mm (drive side)	53.0mm	18.5mm
Rear 130mm (non drive)	44.0mm	38.5mm
Rear 135mm (drive side)	53.0mm	21.0mm
Rear 135mm (non drive side)	44.0mm	36.0mm
Rear 140mm (drive side)	53.0mm	23.5mm
Rear 140mm (non drive side)	44.0mm	33.5mm

Table 2 - Classic build specs

Wheel building - DiscGoTech™ hubs

Chris King DiscGoTech™ hubs are designed to work with 14 or 15 gauge spokes. Disc brake wheels must be laced using a 3-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 DiscGoTech™ 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 DiscGoTech™ hub.

The additional torque caused by the braking action on the front DiscGoTech™ hub requires

that the hub be laced using a specific crossed lacing pattern. The front DiscGoTech™ should be laced 3-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. Lace the wheel symmetrically.

Installation and removal of the brake rotor adaptor

Mount the brake rotor according to manufacturer's instructions. Rotor mounting bolts should thread 8mm into the rotor adaptor and must not extend through the brake rotor adaptor or contact the hub.

Rotor adaptors are available for accommodating various disc brake systems. These various adaptors are offered in different widths to correctly position the rotors. Be sure to use the adaptor designed for your brake system. **Do not attempt to modify your adaptor to work with rotors other than those for which they were designed.**

Adaptor installation

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.
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. Do not over tighten.

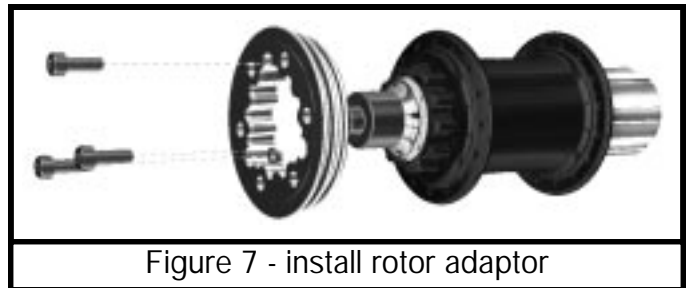


Figure 7 - install rotor adaptor

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.

Dimensions for wheel building

DISCgOTECH™ HUBS	Flange diameter (at hole centers)	Center to flange
Front (drive)	53.0mm	31.5mm
Front (non drive)	53.0mm	23.0mm
Rear 135mm (drive side)	53.0mm	21.0mm
Rear 135mm (non drive)	53.0mm	34.0mm
Rear 140mm (drive side)	53.0mm	23.5mm
Rear 140mm (non drive side)	53.0mm	31.5mm
Rear 145mm (drive side)	53.0mm	26.0mm
Rear 145mm (non drive side)	53.0mm	29.0mm

Table 3 - DiscGoTech™ build specs

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 KingKog™ BMX cogs. The drive shell of the rear hub has a unique symmetrical spline, and is intentionally incompatible with current Shimano, and other after market cogs. Use of other cogs including Shimano Uniglide™, may cause chain slippage, or derailment, which could lead to bodily injury.

Installation and removal of the KingKog™

Chris king BMX hubs use a cassette style cog mounting system. Special splines and lock rings have been designed to accept our premium quality steel or aluminum 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 Chris King KingKog™.
2. Slide cog onto drive shell spline. Cogs are symmetrical, and can be installed with either side out.
3. Thread lock ring onto drive shell over cog.
4. Insert Shimano HG-style tool into lock ring, and tighten to 20 ft.-lb.

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 drive shell.
4. Slide cog off of spline.

Dimensions for wheel building

BMX HUBS	Flange diameter (at hole centers)	Center to flange
Front (drive)	40.0mm	34.0mm
Rear 110mm (drive side)	53.0mm	27.0mm
Rear 110mm (non drive)	44.0mm	30.0mm

Table 4 - BMX build specs

HUB SERVICE

MAINTENANCE SCHEDULE

Chris King Classic 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™ & drive shell**”, 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™ & drive shell”, 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.

Periodically (every one to two years) or if foreign debris is detectable in the grease and/or the grease looks hard or dry, a complete servicing (removal and cleaning) of the RingDrive™ should be performed. Complete service includes the removal of the RingDrive™ engagement mechanism and requires the use of our Hub Service Tool. See your local Chris King dealer for complete service or you may purchase a Hub Tool Service Kit from your dealer or directly from Chris King Precision Components.

Lubrication

Normal conditions

In normal riding conditions (30°-110°F), our RingDrive™ grease is recommended for the bearings and the RingDrive™. **Do not substitute other brands of grease, as they may be too sticky for the helix of the RingDrive™ inhibiting proper engagement.**

Cold conditions

To ensure proper engagement in colder riding conditions (below 30°F) mix the grease in the RingDrive™ area with 5-10 drops of Tri-flow™ or a quality 10w synthetic oil. **Do not over fill.** If you plan to ride in sub-zero conditions, using oil only is the best set-up.

Wet conditions

Riding in wet conditions necessitates more frequent service. Often this is as simple as removing the axle and drive shell 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 quick-release hub (See figure 7)

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.
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 bolt-on hub (See figure 8)

1. Insert a 3/32" hex wrench into the adjusting clamp pinch bolt, and

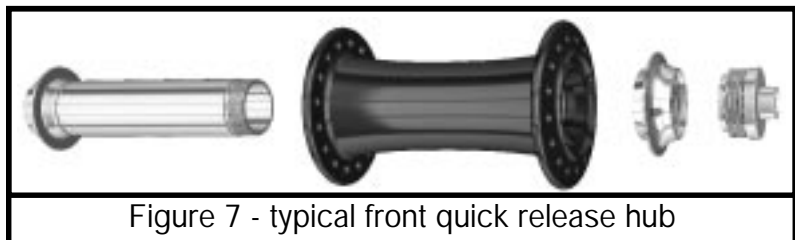


Figure 7 - typical front quick release hub

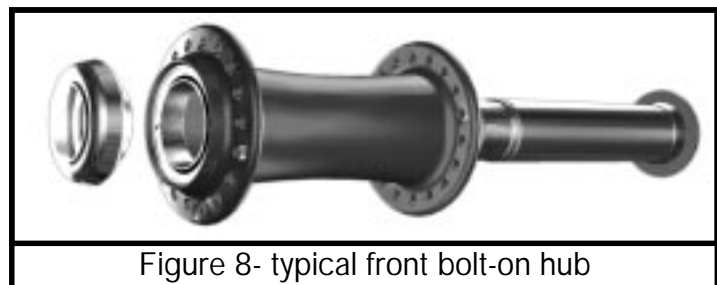


Figure 8- typical front bolt-on hub

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

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. (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., Bullshot™ aerosol or WD-40™) and blow dry.
5. Wipe dirt and other contaminants from the seals and snap rings. Avoid cleaning the seals with solvent, which could cause deterioration.

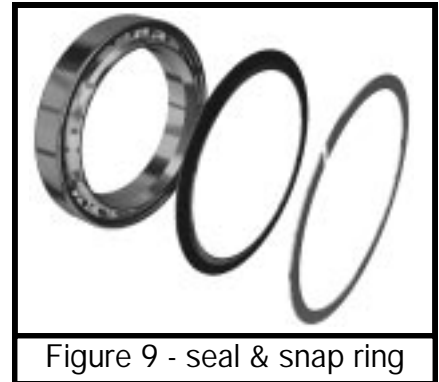


Figure 9 - seal & snap ring

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 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.

Reassembly of the front quick-release hub

1. Lightly grease main axle o-rings.
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. (See figure 10.)
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 quick release hub" (below).



Figure 10 - adjusting cone

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).

Adjustment of the front quick release 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.
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.
6. Double check adjustment by clamping wheel into fork with quick-release. Check for play or binding, and readjust if needed.

NOTE: The back off amount during the adjusting cone setting allows for axle compression generated as the skewer clamps the hub into the fork. It will vary depending on how tight the skewer is set to clamp. Since we're on the subject of skewers, we recommend using a skewer that can generate over 1100 lb. of force and setting it to do so. In this way, the extra large axle of our hub can bring the most benefit to fork stability and steering crispness. Avoid using skewers with titanium shafts if maximizing these benefits is desired.

Adjustment of the front bolt-on 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 inch-pounds.
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 quick-release hub

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

1. Remove cogs per manufacturer's instructions.
2. Insert 5 mm hex wrenches into both ends of axle assembly. (See figure 11.)
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 drive shell out with the other.
7. Both hub shell and drive shell bearing assemblies can now be accessed.



Figure 11 - disassemble main axle

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

Disassembly of the rear bolt-on hub

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

1. Remove cog using a chain whip, and standard Shimano HG-style freewheel tool.
2. Insert a 3/32" 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.
4. Slide out axle.
5. hold hub or wheel in one hand and pull drive shell with other.
6. Both hub shell and drive shell bearing assemblies can now be accessed.

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

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. (see figure 12, next page.)

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., Bullshot™ aerosol or WD-40™) and 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.



Figure 12 - remove snap ring

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.

Maintenance of RingDrive™ & drive shell

Inspection

Having removed the axle and drive shell (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™.**



Figure 13 - lube RingDrive™ teeth

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 and then wipe up any excess grease that squeezes inward.
7. Apply a few drops of Tri-flow™ or a quality 10w synthetic onto both the helical splines of the movable drive ring and the drive shell (see figure 14).
8. **Before reinserting the drive shell into RingDrive™ area of the hub, the helical splines must be clean of any debris.**
9. Reinsert the drive shell and complete the assembly as per the instructions below.

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 every 12 to 24 months. 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.



Figure 14 - lube helical splines

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 drive shell to access the interior RingDrive™ area.
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., Bullshot™ aerosol or 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 drive shell assembly

1. Check the helical splines of the drive shell for any particles or debris before proceeding; **the drive shell must be clean before installing!**
2. Apply several drops of Tri-Flow™ on the helical spline, O-ring, and tapered diameter directly adjacent the O-ring.
3. Insert drive shell into hub shell, slowly. As the drive shell 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 drive shell 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 drive shell and the drive shell hitting the bearing, indicating the drive shell is fully inserted.)
4. Test engagement by spinning drive shell in both directions. If it does not engage, remove drive shell, check cleanliness and re-insert. Re-test.
5. The hub is now ready to have the axle installed.

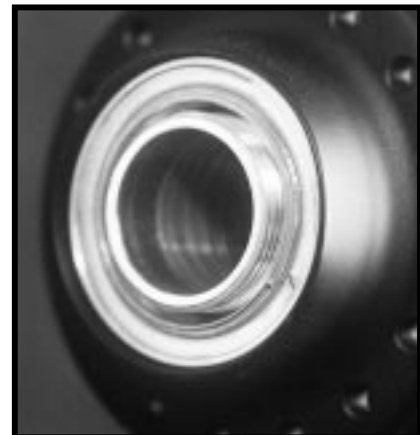


Figure 15 - main axle

Reassembly of the rear quick-release hub

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

1. Insert main axle through drive shell and completely into hub. Axle should protrude slightly through the non drive side bearing. (See figure 15.)
2. Thread adjusting cone along axle end until a small gap at the beginning of the threads shows. (See figure 16.)
3. Thread axle end and adjusting cone onto the protruding threads of main axle.



Figure 16 - adjusting cone

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 the rear quick-release hub" below.

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

Reassembly of the rear bolt-on hub

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

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

Adjustment of the rear quick-release 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.
2. Hold left hand 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 cone. You may use the hub cone adjusting tool if necessary.
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 110 inch-pounds.
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 of the internal parts.

Adjustment of the rear bolt-on hub

1. Rear 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 inch-pounds.
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 Road and Classic Mountain - 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 Disc - front and rear

Note: The hub tool is not designed to work with our 20mm front hub, please contact King Customer Service for assistance.

The tool is made up of 9 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. We fondly call this piece "rosie". It has a steel strike piece in the top of the bulbous end that may be struck with a soft mallet.
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™ and large bearing in the rear hub, 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. Drive shell bushing. This is a tube shaped part with one end bigger than



Figure 17 - function of the split ring

the other. It is used when installing bearings into drive shells and for removing the needle bearing from the BMX drive shell.

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 mtn, road, and disk drive shells.
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 drive shell while torqueing on it.

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.) 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 (5/32") hex key in the event it has become too tight to turn with fingers.

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 quick-release 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.
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 bolt-on hub

1. Insert a 3/32" 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

Removal of the bearings

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. Thread knurled ring, small end first, onto the opposite end of extension shaft all the way, then back off exactly 1/2 turn.

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. Push knurled ring flush with hub shell. This will position the split-ring directly behind the bearing.

6. While keeping extension shaft from rotating, fully expand small expanding split-ring by turning the T-handle. (See figure 18.)

7. Capture bearing by threading knurled ring until it is snug against hub shell.

8. Using a mallet, tap T-handle to remove bearing from the hub shell.

9. Withdraw tool and, if necessary, repeat for the other side.

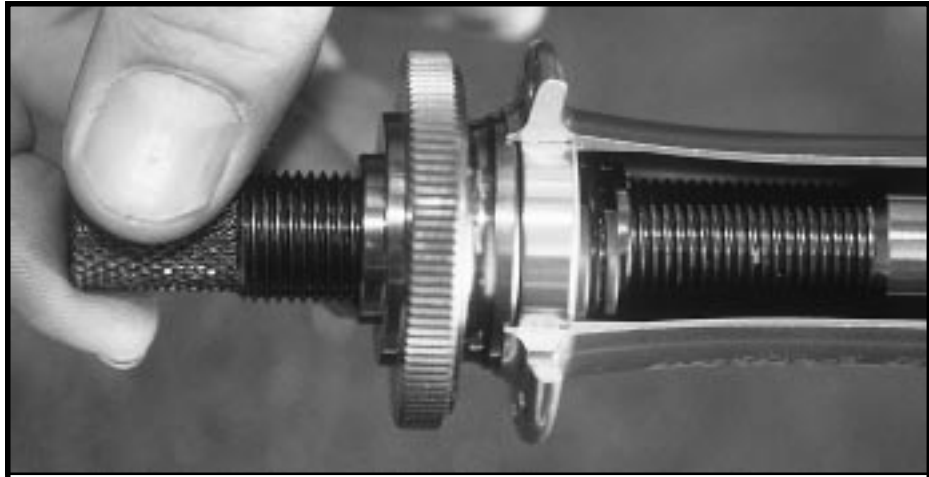


Figure 18 - remove front hub shell bearing

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., Bullshot™ aerosol or WD-40™) and 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.

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.



Figure 19 - press front hub shell bearings

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

1. Insert small inner seal into bearing counterbore.
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 19.) 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 counterbore.)
5. Withdraw tool and, if necessary, repeat for the other side.

Reassembly of the front quick-release hub

1. Lightly grease main axle o-rings.
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. (See figure 20.)
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 quick-release hub" (below).



Figure 20 - adjusting cone

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).

Adjustment of the front quick-release 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.
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.
6. Double check adjustment by clamping wheel into fork with quick-release. Check for play or binding, and readjust if needed.

NOTE: The back off amount during the adjusting cone setting allows for axle compression generated as the skewer clamps the hub into the fork. It will vary depending on how tight the skewer is set to clamp. Since we're on the subject of skewers, we recommend using a skewer that can generate over 1100 lb. of force and setting it to do so. In this way, the extra large axle of our hub can bring the most benefit to fork stability and steering crispness. Avoid using skewers with titanium shafts if maximizing these benefits is desired.

Adjustment of the front bolt-on 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 inch-pounds.
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 quick-release hub

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

1. Remove cogs per manufacturer's instructions.
2. Insert 5 mm hex wrenches into both ends of axle assembly. (See figure 21.)
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.

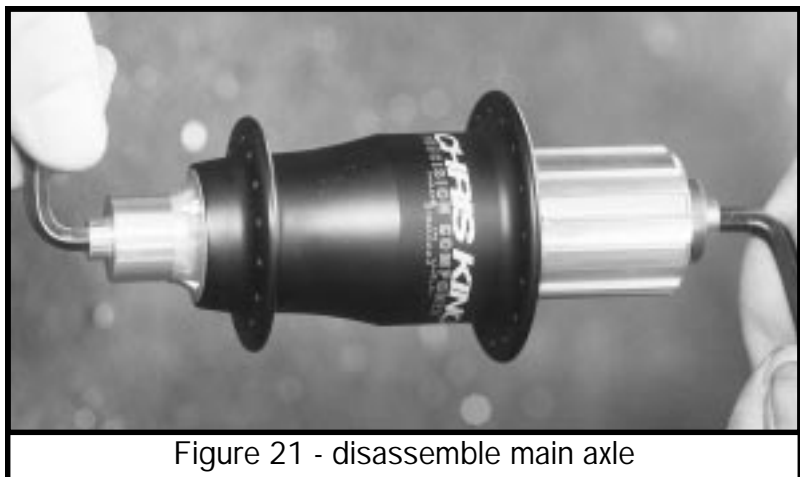


Figure 21 - disassemble main axle

5. Remove main axle by pulling on drive side end of main axle.
6. Hold hub or wheel in one hand and pull drive shell out with the other.
7. Both hub shell and drive shell bearing assemblies can now be accessed.

Disassembly of the rear bolt-on hub

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

1. Remove cog using a chain whip, and standard Shimano HG-style freewheel tool.
2. Insert a 3/32" 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.
4. Slide out axle.
5. Hold hub or wheel in one hand and pull drive shell with other.
6. Both hub shell and drive shell bearing assemblies can now be accessed.

Removal of the RingDrive™ mechanism and drive side bearing

1. Setup extension shaft by placing large expanding split-ring on the small threaded end followed by cone washer, tapered end facing split ring.
2. Thread knurled ring, big end first, on to the opposite end of extension shaft 3 turns.
3. Insert T-handle through the non-drive side of the hub shell until it extends beyond the other side.
4. Thread extension shaft in to T-handle without expanding split-ring.
5. Pull assembled tool towards non-drive side until knurled ring is bottomed in drive side bearing.
6. While keeping the extension shaft from rotating, rotate T-handle to fully expand the large expanding split-ring behind the spring retainer. (See figure 22.)
7. Lightly push tool towards the drive side until it stops, then rotate knurled ring until it again bottoms on the drive side bearing. (This will capture all RingDrive™ parts and bearing on the tool as they are removed from the hub shell.)
8. Using a mallet, tap T-handle to dislodge RingDrive™ and bearing from hub shell. (See figure 23, next page.)



Figure 22 - capture whole RingDrive™ assembly

Disassembly of the 8/9 speed drive shell assembly

1. Remove axle by pulling it out from the seal side of the drive shell.

2. Use cog spline wrench to hold drive shell in vise.
3. Unscrew seal ring with spline driver.
4. Remove capture plate and needle bearing cage.
5. 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.



Figure 23 - remove RingDrive™ assembly

6. Thread knurled ring, small end first, on to the opposite end of extension shaft exactly 2-1/2 turns.
7. Insert the T-handle through drive shell from the helical splined end.
8. Thread extension shaft into T-handle without expanding split-ring.



Figure 24 - remove drive shell bearing

9. Slide drive shell up against knurled ring to position the split-ring just behind the bearing; the step on the ring will center the end of the drive shell
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 24.)
11. Using a mallet, tap T-handle to dislodge the bearing. After about 1/4" of movement, the bearing should slide freely down and out the bore of the drive shell.

Disassembly of the BMX drive shell assembly

1. Remove axle from drive shell.
2. Use cog spline wrench to hold drive shell, 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, small end first, on to the opposite end of extension shaft all the way, then back off exactly 5 turns.
5. Insert T-handle through drive shell from the helical splined end.
6. Thread extension shaft into T-handle without expanding split-ring.
7. Slide drive shell up against knurled ring to position the split-ring just behind the bearing; the step on the ring will center the end of the drive shell.

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. Using a mallet, tap T-handle to dislodge the bearing.
10. Remove extension shaft to remove tool.

Removal of BMX needle bearing

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

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. Thread knurled ring, small end first, onto the opposite end of extension shaft all the way, then back off exactly 1/2 turn.
3. Insert T-handle through large side of the hub shell until threaded end shows.

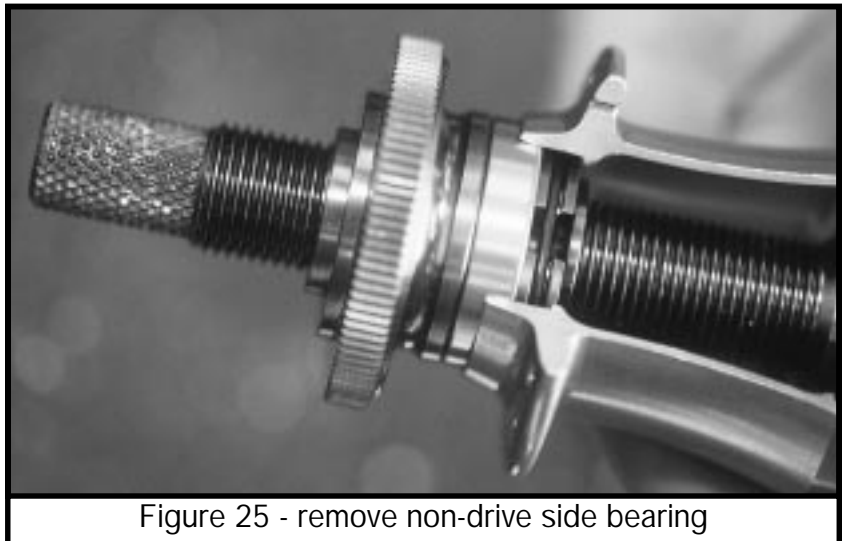


Figure 25 - remove non-drive side bearing

4. Thread extension shaft into T-handle without expanding split-ring.
5. Push knurled ring flush with hub shell. This will position the split-ring directly behind the bearing.
6. While keeping extension shaft from rotating, fully expand small expanding split-ring by turning T-handle.
7. Capture bearing by advancing knurled ring until it is snug against hub shell.
8. Using a mallet, tap T-handle to remove bearing from hub shell. (See figure 25.)

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. (See figure 26.)
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., Bullshot™ aerosol or WD-40™) and blow dry.
5. Wipe dirt and other contaminants from the seals and snap rings. Avoid cleaning the seals with solvent, which could cause deterioration.



Figure 26 - remove 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 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.



Figure 27 - install non-drive side bearing

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 non drive side bearing

1. Insert small inner seal into non-drive side bearing counterbore.
2. Place small hub bearing, black seal side first, onto bare T-handle.
3. Insert knurled ring, big end first, into drive side of hub shell.
4. Pass T-handle with bearing through non-drive side of hub shell and thread into knurled

ring. Continue turning T-handle to press bearing until it is firmly seated. (See figure 27, last page.) 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 counterbore.)

Reinstallation of the RingDrive™ mechanism and drive side bearing

1. The non-drive side bearing should be in place before proceeding to install the RingDrive™ and bearing. (The tool operates best in this condition)
2. Insert spring retainer in hub shell with square stepped edge facing out. (See figure 29.) Make sure the spring retainer has an o-ring installed before inserting. (See figure 28 - last page.)
3. Insert drive spring. (See figure 30.)
4. Insert drive ring with the teeth facing out. (See figure 31.)
5. Lay a bead of RingDrive™ Grease onto ratchet face of drive ring.
6. Insert driven ring into the hub shell with the teeth facing the drive ring. 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 counterbore for the bearing. (See figure 32.)



Figure 28 - o-ring



Figure 29 - spring retainer



Figure 30 - drive spring



Figure 31 - drive ring



Figure 32 - driven ring



Figure 33 - press drive side bearing

7. Place the inner seal in the bearing counterbore 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 big hub bearing, black seal side first, onto big end 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 counterbore until firmly seated. (See figure 33, last page.) 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.
11. Using finger, push on spring retainer to squish grease out from between the drive rings.
12. Wipe excess grease from the helical splines of the drive ring. The hub shell is now ready for installation of the drive shell assembly.



Figure 34 - drive shell seal & bearing

Reassembly of the 8/9 speed drive shell mechanism

1. Insert small inner seal into big end of drive shell.
2. Insert drive shell bearing into drive shell, tapered side out. It should slide most of the way down the bore. (See figure 34.)
3. Place drive shell bushing, small end first, onto bare T-handle.
4. Pass T-handle with bushing through big end of drive shell until it contacts the bearing.
5. Thread knurled ring, big end first, onto T-handle. Advance down until the small end of the drive shell nests into the counterbore in the end of the knurled ring. Be careful not to damage the small end of the drive shell. (See figure 35.)
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 drive shell and tighten T-handle to press bearing again. (This assures the bearing is seated flatly against the shoulder of the counterbore). If the knurled ring is too difficult to hold, the cog spline wrench may be placed on the drive shell 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.

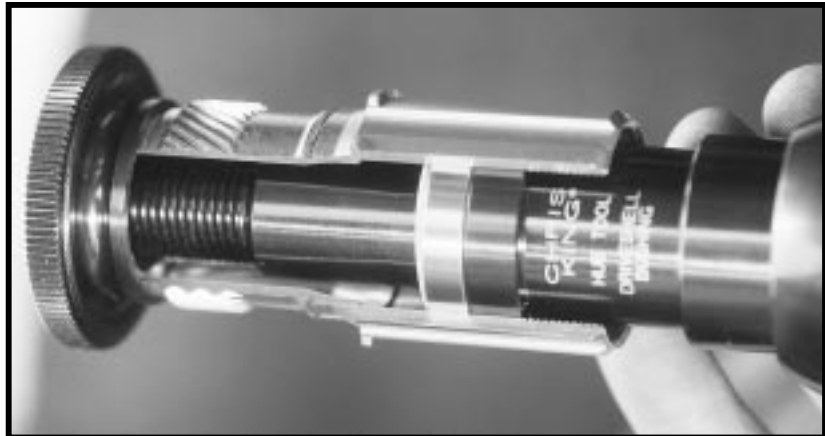


Figure 35 - press drive shell bearing



Figure 36 - needle bearing & capture plate

7. Remove tools and insert capture sleeve, flat face out.
8. Insert needle race.
9. Insert needle bearing cage.
10. Insert capture plate. (See figure 36, last page.)
11. Thread seal ring in to drive shell.
12. Insert drive shell into cog spline wrench and hold in vice. Using the spline driver, torque seal ring to 100 in-lb.

Reassembly of the BMX drive shell mechanism

1. Insert small inner seal into big end of drive shell.
2. Insert drive shell bearing into drive shell, tapered side out. It should slide most of the way down the bore.
3. Place drive shell bushing, small end first, onto bare T-handle.
4. Pass T-handle with bushing through big end of drive shell until it contacts the bearing.
5. Thread knurled ring, big end first, onto T-handle. Advance down until the small end of the drive shell nests into the counterbore in the end of the knurled ring. Be careful not to damage the small end of the drive shell.
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 counterbore.)
7. Remove drive shell from tool. Leave drive shell bushing in place, small end on first.
8. Place complete needle bearing onto T-handle shaft and slide down until it stops on the drive shell bushing.
9. Place the drive shell, small end first, 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 drive shell 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 drive shell. If the knurled is too difficult to hold, the cog spline wrench may be placed on the drive shell 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 drive shell assembly

1. Check the helical splines of the drive shell for any particles or debris before proceeding; the drive shell must be clean before installing!
2. Apply several drops of Tri-Flow™ on the helical spline, O-ring, and tapered diameter directly adjacent the O-ring.
3. Insert drive shell into hub shell, slowly. As the drive shell 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 drive shell 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 drive shell and the drive shell hitting the bearing, indicating the drive shell is fully inserted. Some pushing pressure on the drive shell may be necessary to pop the spring retainer onto the end of the drive shell.)

4. Test engagement by spinning drive shell in both directions. If it does not engage, remove drive shell, check cleanliness and re-insert. Re-test.
5. The hub is now ready to have the axle installed.

Reassembly of the rear quick-release rear hub

1. Insert main axle through drive shell 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 37.)
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 37 - adjusting cone

Reassembly of the rear bolt-on hub

1. Insert main axle, small end first, through drive shell into hub. Continue until axle is through the hub and large end is firmly seated in drive shell.
2. Thread adjusting cone onto the protruding threads of axle.
3. Snug adjusting cone up to bearing finger tight.
4. Proceed to "Adjustment of rear bolt-on hub" below

Adjustment of the rear quick-release 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.
2. Hold left hand 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 cone. You may use the hub cone adjusting tool if necessary.
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 110 in-lb.
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 of the internal parts.

Adjustment of the rear bolt-on hub

1. Rear 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.
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.

BUILD LEVELS AND THE PURSUIT OF PERFECTION

Hub upgrades

Due to experience gained from riders and racers in the field our hubs have undergone several minor revisions that have continued to improve their performance. Each significant improvement is referred to as a new build level. The build level, or version, is designated by the first three numbers of the serial number (e.g., A hub with a serial number 310xxxx is considered a version 310 hub.) Technical improvements added in each new build level are made available to all Chris King customers where ever possible

HUB TROUBLE SHOOTING

COMMON QUESTIONS AND THE LIKELY SOLUTIONS:

Complete installation, service, and maintenance instructions are available on our web site at www.chrisking.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:

When an adjustment is made, the axle end must be torqued to 110 in-lb. 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.

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 drive shells. 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 drive shell 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 drive shell. This required having tapered bearing contact surfaces. These surfaces can go dry and may then make noise under heavy load.

Solution: Check and apply grease or antisieze to the drive shell on the bearing contact taper adjacent to the o-ring (about the middle of the outside of the drive shell.) And on the adjusting cone on the bearing contact taper.

5. 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 ring drive 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 drive shell. 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 just two 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.

2. With our first build version, 310, running the hub with loose preload can occasionally cause internal rubbing, keeping the RingDrive™ from engaging properly.

Solution: Improved main axles (identified by a stepped diameter near the bearing contact area,) are available through our upgrade program.

- On versions 310, 311, and 312, large variations in spring pressure were discovered. A weak spring will make the RingDrive™ more sensitive to contamination. If in doubt, replace the spring.

Solution: Upgraded springs are available through our upgrade program.

- Beginning with version 314, the RingDrive™ was improved to run a special RingDrive™ grease instead of oil. This makes it quieter and coast quicker; it also gives it a much wider working temperature range (down to -20°f) In certain rare conditions, hard water or stream water intrusion into the hubs may cause early versions of the RingDrive™ grease to thicken or break down. This will impair the movement of the drive ring on the helical spline.

Solution: Clean and re-grease with our most current RingDrive™ grease formula if used in extremely wet conditions. Further improvements of our current RingDrive™ grease will be available early to mid 1998. (Note: 20w non-detergent or synthetic oil may be substituted in all versions in the RingDrive™ area.)

NOTE: In an ongoing effort to improve the water resistance of our hubs, versions beginning with 316 are using stainless steel drive rings. These little gems have allowed for stiffer springs and less sensitivity to different grease formulations. This upgrade is available through our upgrade program.

SPECIFICATIONS

CLASSIC HUBS

Cassette compatibility: Shimano 7, 8, and 9 speed (for 7-speed use 4.5 mm spacer available from Chris King Precision Components)

Total weight (front): 112g

Total weight (rear): Alloy drive shell: 263g; Steel drive shell: 311g

Axle diameter: 19.5 mm

Axle width (front): 100mm

Axle width (rear): 130mm, 135 mm, 140mm, or 145mm

Spoke hole diameter: 2.5 mm

Available hole drilling: 28, 32, and 36 — other drilling is available upon request

CLASSIC HUBS	Flange diameter (at hole centers)	Center to flange
Wide front (mountain)	40.0mm	37.5mm
Narrow front (road)	40.0mm	34.0mm
Rear 130mm (drive side)	53.0mm	18.5mm
Rear 130mm (non drive)	44.0mm	38.5mm
Rear 135mm (drive side)	53.0mm	21.0mm
Rear 135mm (non drive side)	44.0mm	36.0mm
Rear 140mm (drive side)	53.0mm	23.5mm
Rear 140mm (non drive side)	44.0mm	33.5mm

Table 2 - Classic build specs

DISCGOTECH™

Cassette compatibility: Shimano 7, 8, and 9 speed (for 7-speed use 4.5 mm spacer).
 Rotor compatibility: Coda/Cannondale, Hayes, Formula, Magura, and Sachs. Please call for future updates on new compatibility.

Total weight w/o rotor adaptor (front): 148g

Total weight w/o rotor adaptor (rear): Alloy body: 277g; Steel body: 325g

Axle diameter: 19.5 mm

Axle width (front): 100 mm and 110mm; quick release, boly-on, or through-axle

Axle width (rear): 135 mm, 140mm, and 145mm

Spoke hole diameter: 2.5 mm

Available hole drilling: 28, 32, 36, 40 — other drilling is available upon request.

DISCGOTECH™ HUBS	Flange diameter (at hole centers)	Center to flange
Front (drive)	53.0mm	31.5mm
Front (non drive)	53.0mm	23.0mm
Rear 135mm (drive side)	53.0mm	21.0mm
Rear 135mm (non drive)	53.0mm	34.0mm
Rear 140mm (drive side)	53.0mm	23.5mm
Rear 140mm (non drive side)	53.0mm	31.5mm
Rear 145mm (drive side)	53.0mm	26.0mm
Rear 145mm (non drive side)	53.0mm	29.0mm

Table 3 - DiscGoTech™ build specs

BMX HUBS	Flange diameter (at hole centers)	Center to flange
Front (drive)	40.0mm	34.0mm
Rear 110mm (drive side)	53.0mm	27.0mm
Rear 110mm (non drive)	44.0mm	30.0mm

Table 4 - BMX build specs

BMX

Cassette compatibility: Chris King's 12t-20t aluminum or stainless KingKogs™
Total weight w/o axle bolts (front): 120g
Total weight w/o axle bolts (rear): Alloy cog: 298g; Steel cog: 314g
Axle diameter: 19.5 mm
Axle width (front): 100mm
Axle width (rear): 110mm
Spoke hole diameter: 2.5 mm
Available hole drilling: 28, 32, 36, and 40 — other drilling is available upon request.

TORQUE SPECS

HEADSETS

NoThreadSet™

1. Stem cap bolt = 4-10 in.-lb. (max. 15 in.-lb.)

GripNut™

1. Lock and adjusting rings = 130-150 in.-lb.

2Nut™

1. Lock and adjusting nuts = 130-150 in.-lb.

HUBS

Classic

1. Adjusting cones = 110 in.-lb.

DiscGoTech™

1. Rotor adaptor screws = 28 in.-lb.
2. Adjusting cones = 110 in.-lb.

BMX

1. Cog lock ring = 20 ft.-lb
2. Adjusting clamp bolt = 10 in.-lb.

Service tool

1. Drive shell seal ring = 100 in.-lb.