Headset Revolution

Are threads soon to be history?

By Sheldon Brown

There's a revolution going on in bicycle headsets. The battle of the mountain bike is pretty much over, and the battle of the road/touring bike is just beginning.

Most newer mountain bikes use "threadless" headsets and matching stems. At present, most bicycles intended for road use still use threaded headsets, but the trend toward threadless designs is likely to persist. For this reason, even the hard-core road rider should be aware of this alternative design, which becomes more pervasive every year.

A further complication is created by the fact that many bikes now come with "oversized" forks, so there are now six different types of headsets in fairly common use: 1" threaded, 1 1/8" threaded, 1 1/4" threaded, 1" threadless, 1 1/8" threadless, and 1 1/4" threadless! (The most common size is still 1" threaded, but the 1 1/8" threadless size is rapidly gaining on it.) In this article I will try to demystify the bewildering variety of headset systems, and explain how to adjust them.

There is such a confusing array of headsets available, it takes a table to sort it all out.

HEADSETS & STEMS

Size Steerer O.D	Stem diameter (Steerer I.D.)	Crown race (1.) Inside diameter	Cup (2.) Outside diameter	Threads per inch
1" Standard (25.4mm)	7/8"(22.2 mm)	26.4 mm	30.2 mm	24
1" J.I.S. (3.) (25.4mm)	7/8"(22.2 mm)	27.0 mm	30.0 mm	24
1 1/8" (28.6mm)	1" (25.4 mm)	30.0 mm	34.0 mm	26
1 1/4" (31.8mm)	1 1/8" (28.6 mm)	33.0mm	37.0 mm	26

(1.) This is the fit of the bottom race on the fork crown.
(2.) This is the fit of the races that press into the head tube of the frame.
(3.) J.I.S. headsets are used on most older and some current bikes from Asia. Frames and forks intended for J.I.S. headsets can be modified to take standard 1" headsets. If you want to replace one headset with another, you must take into account the stack height of the new headset.

A headset consists of four races, plus associated parts, listed from the bottom up:

1. The crown race (pressed on to the bottom of the fork steerer, just above the crown.)

2. A row of ball or roller bearings.

3. The lower head race (pressed into the bottom of the head tube.)

4. The upper head race (pressed into the top of the head tube.)

5. Another row of ball or roller bearings.

6. The adjustable race (attached to the steerer.)

The adjustable race is secured by one of the following:

7a. A keyed washer and lock nut, for threaded headsets.

7b. A clamp-on "threadless" stem, star fangled nut and cap.

7c. Compression rings, in the case of some threadless headsets.

There are two fundamentally different systems for attaching, adjusting and securing the adjustable race of headsets:

Threaded

Traditional threaded headsets fit forks with threaded steerers. The adjustable race screws on to the steerer, and a locknut screws on after the adjustable race to secure it. There is normally a keyed, non-rotating washer between the adjustable race and the locknut for extra security. Virtually all bicycles made before the 1990s used threaded headsets.

Bicycles with threaded headsets use handlebar stems that fit inside the steerer tube, and are secured by a wedge or expander nut, operated by a long bolt running down the middle of the stem.

Threadless

Threadless headsets have an adjustable race that slips over an un-threaded steerer. There are three distinct types of threadless headsets, each of which adjusts differently:

1. "Aheadset™" style threadless headsets, the most common type, require a threaded fastener, such as a star fangled nut, to be installed inside the steerer.

This type of headset requires a special handlebar stem that clamps on to the outside of the steerer, either with one or more binder bolts, or other means. The stem is further secured by a plastic or metal cap, which is bolted to the star nut.

To adjust an "Aheadset"-type headset, loosen the stem binder, then tighten the bolt that runs through the cap to the starnut. This cap presses the stem down against the tapered bushing that fits inside the adjustable cup, and takes up the slack in the system.

Once the slack is out of the system, align the stem with the front wheel and tighten the stem's binder bolts. The stem's clamping to the top of the steerer is what holds the whole system together. Once the stem binder bolts have been tightened, the adjusting bolt that goes to the star nut is under no significant stress, and may even be removed.

2. "Diatech™" threadsets from Dia Compe use a special pair of collars, usually mounted just below the stem and above the top race. The lower collar has a beveled, conical

PHOTO BY GREG SIPLE

The AheadSet and its star fangled nut started the threadless revolution.

top surface, which fits inside of a matching bevel on the inner circumference of the upper collar.

The upper collar has a gap at one point, with a binder bolt to squeeze the gap together. (This upper collar may also include a cable stop for the front brake, if the bicycle has a rigid fork and conventional cantilever brakes.)

To adjust a Diatech headset, slide the handlebar stem down until it bumps up against the upper collar. Clamp the handlebar stem tightly to the steerer, preventing the upper collar from moving upward. There will still probably be a bit of slack in the headset.

Tighten the binder bolt of the upper collar to remove the play from the system. As the upper collar is compressed by the binder bolt it squeezes the lower collar downward, taking up any slack in the headset bearings.

3. The YST "GeForce" headset has a collar that slips over the steerer, and is clamped to it with a binder bolt near the top of the collar. The outside of this collar is threaded, and the upper bearing race screws onto these threads. The upper race assembly is fitted with a binder bolt that clamps it tight onto these threads when the desired adjustment has been attained.

To adjust a GeForce headset, slide the top unit down firmly and tighten the upper binder bolt, securing the top unit to the steerer. Then, turn the lower section of the top unit to make fine adjustment to the bearing play. Once the adjustment is good, tighten the lower binder bolt to clamp the fine adjustment threads down.

The GeForce is the only threadless headset that doesn't use the handlebar stem as part of the adjustment. These headsets may be used with any stem, either external clamping or internal expander/wedge type. The GeForce is also the only threadless headset that allows you to adjust the stem without having to re-adjust the headset bearings.

Sizing confusion

It is very common for people to order wrong-sized stems or headset parts due to the confusing array of sizes in use. A leading cause of this is that the headset nominal size is based on the outside diameter of the steerer, but the steerer is completely hidden from view. In the case of threaded stems, the diameter of the stem is 1/8-inch less than the nominal size, i.e., the stem used with a 1 1/8-inch headset is 1 inch in diameter. The table on the previous page lists headset dimensions you may run across.

Why the change to threadless design?

Oversized and threadless headsets have a number of benefits, some of them to the rider, others to the manufacturer. Let's look at the advantages of doing without threads.

Oversized headsets make for stronger forks and stems. This is primarily an issue for mountain bikers, who tend to crash a lot, and need stronger parts to hold up to the stress.

Threadless headsets can generally be adjusted with only a 5mm Allen wrench, while threaded headsets normally require two large, bulky open-end wrench.

The 1-inch size is adequate and safe for forks with steel steerers, but oversized forks can be made with lighter materials, such as aluminum and carbon fiber, reducing weight. Even when made with the same materials, the combination of threadless fork and matching stem will generally be lighter than a threaded system, due to the elimination of the stem's quill, expander bolt and wedge.

The very fine threads used on threaded steerers are tricky and expensive to make. It is substantially cheaper to make a threadless steerer.

Threaded forks have to be provided in multiple lengths to fit different frame sizes of the same model of bicycle. By contrast, threadless forks are made in only one (long) steerer length, which can easily be cut down to fit a particular frame size. This offers a reduction in the number of stock-keeping units for repair forks, and also for aftermarket forks.

The down side:

The major disadvantage of threadless headsets is that there's less height adjustment available without replacing parts. While you may be able to make minor height adjustments by interchanging spacing washers, significant changes in handlebar height will require that you buy a different handlebar stem or adaptor.

While traditionalists may bemoan the change, it appears that the move to threadless headsets is inexorable, since they offer so many advantages to the manufacturer — and even a few to the rider. ●

Adventure Cycling member Sheldon Brown's column appears regularly in Adventure Cyclist. Visit his Web site at http://www.sheldonbrown. com/harris