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Wheelmen Tracks

July 2011

Bicycle frame/Hub Spacing

by Sheldon "Cold Set" Brown

Old Frames/New Parts

Over the last 40 years, bicycle drivetrains have improved immensely. Indexing has taken much of the guesswork out of shifting; integrated brake/shifters, such as Campagnolo's Ergo and Shimano's STI have brought the ability to shift without removing your hand from the handlebars; more, lower gears help older riders get up the tough hills that didn't bother them when they were younger.

While drivetrains have improved, frames have not, and in many ways, they've changed for the worse! Older frames designed for touring or recreational riding are often considerably more comfortable and pleasant to ride than many modern frames that have been optimized to appeal to racers. Older frames have room for wider tires, and for fenders, making them more practical for those who are not just fair-weather cyclists.

Then again, you may have an older bike that you've just become sentimentally attached to... it's not hard to bond to a bike that has carried you for thousands of happy miles.

If you have a beloved older bike, but are not enjoying its antiquated shifting system, it isn't unreasonable to upgrade it with a new rear wheel, derailleurs and shifters. There's one fly in the ointment, however...will the new wheel fit into the old frame? Often, the answer is "no," because newer hubs are wider, with longer axles, than the older ones.

..But you don't need to take no for an answer! Older frames, assuming they're made of some sort of steel, can be modified to fit. The process is commonly referred to as "cold setting" which is a fancy way of saying bending the rear frame apart so that it is wider. This article tells you how.



If you're not sure whether your frame is steel or not, the easy way to tell is to see if a magnet sticks to it. If it does, the frame is steel, and can be cold set.

Spacing

A bicycle frame and fork should match the wheels that are to be used in it. Older bicycles used narrower spacing, but older frames can often be spread out to match more modern wheels.

The spacing of a frame/fork is measured from the inside surfaces of the fork ends (drop outs), where they come into contact with the locknuts of the wheel's axle.

The spacing of a hub is measured from the outside faces of the cone locknuts, where they come into contact with the frame's fork ends. (Most cartridge-bearing type hubs don't have locknuts, so the spacing is measured from the equivalent shoulder surface of the axle ends.) The spacing dimension is commonly referred to as the "O.L.D." (Over-Lock-nut Distance)

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Frame continued from page 1

120 mm Rear 5-speed, Ultra 6 & newer track hubs.

126 mm Rear 6- and 7-speed (road).

130 mm Rear 7-speed (MTB) & 8- 9- and 10-speed (road).

135 mm Rear 7- 8- & 9-speed (MTB)

140 mm Rear tandem.

Overall axle length for quick release hubs is commonly 11 mm longer than the over-lock-nut distance listed, 5.5 mm on each side.

In practice, the axle can be quite a bit shorter than this...even 1-2 mm protrusion past the lock nuts will suffice to locate the axle properly, so, when converting a hub to the next wider spacing, it is usually un-necessary to replace the axle.

Axle Spacing Adjustment

Add spacing by adding spacer washers, preferably between the cones and the locknuts. Hubs with conventional threaded axles can be adjusted for wider

For single-sprocket wheels, including fixed-gears and internal-geared hubs, it is generally best to add equal spacers to each side. This way, the rim remains centered in the frame.

If you are increasing the spacing of a derailleur-type wheel for the purpose of increasing the number of sprockets, you'll generally be adding space to the right side only. If you do this, you'll need to "re-dish" the wheel, by pulling the rim to the right. This is done by tightening the spokes on the right side of the wheel and/or loosening those on the left side. If you don't have experience with wheel truing, this may be a job you're not yet ready for.


The downside of this is that pulling the rim to the right increases the tension difference between the left and right spokes, resulting in a somewhat weaker wheel.

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Cateye Totals

Member	May	YTD
Panek, Carl	407	2,460
Maddock, Daniel	1014	2,395
Ballard, Ralph	590	1,857
Trost, Bill	541	1,487
Krebs, Dave	198	1,486
Panek, Carol	229	1,454
Linneman, Ray	563	1,373
Riggs, David	485	1,168
Maddock, Tina	1014	1,064
Petro, Arthur	346	991
Hubbard, Dennis	0	814
Hendrickson, Joel	316	810
Hohn, Clyde	382	585
Zagorsky, Ben	190	368
Riggs, Diane	101	339
Hubbard, Karla	200	318
Trost, Mary Ann	0	307
Wilbur, Frank	0	288
Bachman, John W.	178	272
Keiser, Lynn	178	272
Moennich, Debbie	270	270
Moennich, Jim	240	240
Linneman, Ralene	0	240
Weber, Dave	26	181
Page, Louise	30	30
Totals	7,498	21,069

WHEELMAN

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Conversely, if you're installing a derailleur-type wheel in a wider frame than it was meant for, you should add the spacers to the left side. This will allow you to increase the strength of the wheel by moving the rim to the left.

Axle Length

Typical quick-release axles are 11 or 12 mm longer than the spacing of the hub locknuts. This gives 5.5-6 mm of axle protrusion on each side. You don't actually need nearly this much, so for respacing hubs to wider spacing, if you're not adding more than, say, 5-6 mm of spacers, you don't need a new axle. As long as you have 2 or 3 mm sticking out on each side, that's plenty.

One of my own bikes is set up with the axle cut off flush with the locknuts, and even this is no problem in use, though it is slightly trickier to align the wheel when installing it. See my page about my fixed-gear mountain bikes.

Frame Spacing Adjustment

If your frame is made of steel, you can change the spacing to accommodate different hub spacing. This is most commonly done to widen the spacing, to permit the use of a cluster with more sprockets than the frame was built for.

- **Note, if you're not careful, you can do serious damage to your frame this way!**
- **If your frame is made of aluminum or carbon fiber, do not attempt to re-space the frame, these materials are not suitable for "cold setting."**
- **If in doubt, try the magnet test: if a magnet won't stick to it, don't try to re-space it!**

Do You Need To Permanently Spread Your Frame?

Ideally, the frame spacing should exactly match the hub spacing. This makes for easiest wheel replacement. In practice, however, there's a fair amount of latitude in fit. In fact, when the first 130 mm 8-speed hubs were introduced, they had locknuts with beveled sides, so that you could "spring" apart the rear triangle of a frame made for the then-standard 126 mm spacing.

In general, you can safely go up one size in spacing this way, just springing the frame apart. I can't give you an absolute guarantee that this won't cause damage, but the odds are very much in your favor.

If, however, you want to do it right, and your frame is steel, cold setting is the better way to go.

If you're going more than one size, say from 120 to 130, or from 126 to 135, you should definitely cold set the frame.

Spreading the Frame

There are a number of ways to do spread a frame. Probably the easiest way is to use a lever. A piece of 2 x 3 or 2 x 4 lumber, roughly 5-6 feet long works well for this:

Remove the wheels, fenders and any seat-tube mounted bottle cage.

Lay the bicycle on its side with the handlebars turned to face upward.

Insert the lumber through the rear triangle, so that it goes underneath the upper rear fork end, and above the seat tube. The lumber should extend out past the rear end of the frame.

Place the far end of the lumber onto a chair, crate or other raised structure, so that only the head-tube/fork area of the bike is in contact with the floor.

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frame continued from page 3

Press down gently on the lumber where it crosses on top of the seat tube.

Measure the spacing to see if it has changed.

If the spacing hasn't changed, try again, pressing a little bit harder. Repeat until you get a result, applying a bit more force each time, until the spacing has increased by about half the total amount you are seeking.



Turn the bike over, and repeat for the other side.

Checking Alignment (Symmetry)

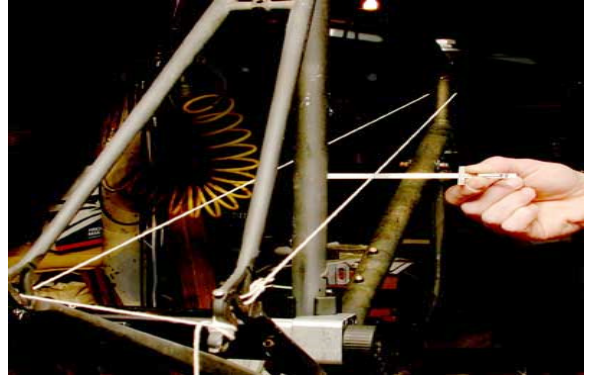
It is important that both fork ends be equally far from the centerline of the frame, otherwise the bicycle won't track properly. Ideally, the frame alignment should be made using a special fixture that clamps the frame by the sides of the bottom bracket shell, and takes those faces as the reference point for all other measurements. This requires special tooling beyond the reach of the home mechanic or small bike shop.

Assuming the bike was built straight to begin with, alignment can be checked by comparison of the rear triangle with the front triangle. Park makes an adjustable gauge for this, the FAG-2, and this is what most bike shops would use.

The usual "home mechanic" technique, however requires nothing more than a piece of string and a ruler. This is a bit slower than using a purpose-built gauge, but gives basically good results, if you are reasonably careful.

The String Method:

Tie a piece of string to one rear fork end so that the string runs along the outside of the



fork end.

Run the string around the front of the head tube and back to the other rear fork end.

Pull the string taut, making sure that it's contacting the same part of each fork end.

Use a ruler to measure the distance from the string to the side of the seat tube where they cross. Take this measurement on both sides, it should be the same on each side.

If the spacing is as desired, and the string test is correct, you're almost done. If not, you'll need to go back to levering with the lumber to correct any error.

If you find that you've over-corrected on one side or the other, the same basic approach can be used, except that you lay the bike down so that the stays that are too far out are facing down. Run the lumber under the bottom fork end, and, again, over the seat tube, then press down as before.

Fork End Alignment (Parallelism)

Spreading the frame will cause a slight change in the angles of the fork ends, so they will no longer be exactly parallel to one another (assuming they started that way.)

For higher-quality frames with forged fork ends, this can theoretically lead to problems if the fork ends aren't re-aligned. In the case of older/cheaper frames with thin, stamped

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Calendar

JULY 2011

3 rd	Amherst	LaGrange	54	The longest route
			42	The shortest route
4 th	Amherst	U show	25ish	Probably to Vermilion
10 th	Wakeman	Savannah	55	A long flat one
		New London	30	
14 th	Meeting	Ralph's House		Picnic & meeting
17 th	Amherst	Valley City	56	A long one to the SE
		Oberlin	30	
24 th	Oberlin Inn	West Salem	59	Another long one
		Wellington	30	

Starting Times & Locations

Oberlin:

The Oberlin start is in the Oberlin Inn parking lot located in the rear of the Inn.

Amherst:

The Amherst start is the City parking area 3 located between Tenney & Park Avenues just east of Church Street.

Wakeman:

The start is in the park on US 20 in the town center.

Weeknight evening rides:

Are in full swing! The Tuesday ride will start from Prospect School at 5:00 PM and the Thursday ride will start from Presti's parking lot at the same time. If there's enough interest & attendance from the Amherst area, the Thursday night will switch to there later.

Weekend & Holiday Starting Times:

Sunday & Holiday rides start at 8:30 AM Eastern Daylight 'till next fall.

Saturday rides will start at 9:00 AM from Prospect School in Oberlin.

Don't forget to turn in your miles to: mymileage@lorainwheelmen.org!

Picnic

frame continued from page 4

July is picnic month! Once a year, Ralph hosts a cookout at his home on meeting night. The picnic will take place on July 14th in place of our regular July meeting. Ralph lives at 128 Sycamore ST in Oberlin. There'll be the usual 5:00 Thursday evening ride but starting from Ralph's house instead of Prestis. The festivities will commence between 7:00 & 7:30 PM. Sausage, hot dogs, chips, pop & beer will be provided. Bring a side dish or dessert to be shared and enjoy an evening with friends.



dropouts, the dropouts are flexible enough that it's not a problem.

Moderate spacing changes make only small changes in the fork-end angles. For instance, spreading a 120 mm frame to 126 mm only changes the angle by half a degree. Spreading a 126 mm frame to 130 only changes the angle by one-third of a degree.

Problems attributed to misaligned fork ends include bent/broken axles. As it happens, the direction that the alignment changes when you spread the rear triangle is such that the alignment error is unlikely to cause this, because the stress it puts on the axle is opposite the stress created by the chain drive. Alignment errors in the opposite direction would be much more likely to cause problems.

There's no easy "home-mechanic" tool for fork end alignment, except for a big adjustable wrench and a good eye. I would advise, if in doubt about the alignment, that you take it to a shop for this purpose, even if you do the frame spreading yourself.

Should You Try This?

This job is one that isn't for everybody, but it's not rocket science either. Many shops are reluctant to undertake this sort of operation, either because of fear of liability or because they want to sell you new bike. Although it seems fairly alarming to deliberately bend your frame, it is really not that cataclysmic an operation, and can be very worthwhile if it allows you to keep riding an old friend, with the advantages of a modern drivetrain.



Pedal Erie Parks

Sunday, July 10

More information:
Call 419 625-7783 - ext. 221
eriemetroparks.org

Bike Rides

10, 20, 30, & 50 miles

Starting at McBride Arboretum, winding through the gentle hills of eastern Erie County and returning to the Arboretum for lunch.

Pre-register by July 5 - \$10.
Family Discount - Pre-register - \$20.
Registration after July 5 - \$15.



Friends of
Erie MetroParks

Sandusky Register 2 col x 2½

Lorain Wheelmen Membership Form

New Renewal

Name _____ Age _____ Other Family Members _____

Address _____ Age _____

City _____ ST _____ ZIP _____ Age _____

Phone () _____ Cell Ph () _____ e-mail _____

Dues (due March 1st) Schedule (1/2 after Oct 1st for **NEW** membership)

Adult/Family \$15.00

Return To:

Lorain Wheelmen
P.O. Box 102
Amherst OH 44001-0102

Waiver

In signing this release for myself or the named member (when the member is under 18), I understand the intent of this release and agree to absolve all of the sponsors, or organizers and associated entities be they individuals or organizations, singly and collectively of all blame for any injury, misadventure, harm, loss or inconvenience suffered as a result of taking part in any Lorain Wheelmen Bicycle Club ride or in connection with any activity associated with or related to said organization. If the member is 18 or over, he/she signs for self. If not, then the parent or legal guardian must sign below.

Date _____

Signature of member or parent/guardian