



The Truth about Chains

by [Sheldon “Reformed Chain Smoker” Brown](#)

revised by [John “Chain Male” Allen](#)

A Religious Question

Chain maintenance is one of the most controversial aspects of bicycle mechanics. Chain durability is affected by riding style, gear choice, whether the bicycle is ridden in rain or snow, type of soil in the local terrain, type of lubricant, lubrication techniques, and the sizes and condition of the bicycle’s sprockets. Because there are so many variables, it has not been possible to do controlled experiments under real-world conditions. As a result, everybody’s advice about chain maintenance is based on anecdotal “evidence” and experience. Experts disagree on this subject, sometimes bitterly. This is sometimes considered a “religious” matter in the bicycle community, and much vituperative invective has been uttered in this regard between different schismatic cults.

This article is based on my personal and professional experience and my own theories. If you disagree with them, I won’t call you a fool or a villain, you may be right. I hope you will extend me the same courtesy.

[And a comment from John Allen: the problem becomes religious because it addresses mysteries of existence, life and death (of chains...) to which there is no clear and obvious answer -- as long as the chain is exposed to dirt.

On the other hand...the Sunbeam oil-bath full chain case solved this problem in 1908. High-end Raleigh Industries three-speeds were available with a full chain case as late as the 1950s,

and their chain life was impressive. In the 21st century we are beginning to see chain cases again: high-impact molded plastic ones, rather than complicated sheet-metal assemblies.

Chain cases have only ever been marketed for single-sprocket utility bicycles, they are an extra-cost item and they add weight and complication. All derailleur chains and most single-sprocket chains run bare, exposed to dirt. [Belt drive](#) is sometimes put forward as a solution, but it has its own serious problems and limitations.

Name your poison, as the saying goes. I might as well finish here with a quote from a philosopher whose writings helped spark the French Revolution.]

Man is born free but everywhere he is in chains.

Jean-Jacques Rousseau

Chains: Old And New

The past fifteen years [as of Sheldon’s writing, in 1996] have seen many revolutions in bicycle design. Some of them have been conspicuously visible, such as the development of mountain bikes, disc wheels, new handlebar designs. Some have been less visible, but just as important, including clipless pedals, cyclecomputers, indexed shifting.

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Cateye Totals

Member	June	YTD
Maddock, Daniel	1,168	3,563
Maddock, Tina	1,040	3,118
Panek, Carl	337	2,815
Ballard, Ralph	491	2,348
Cicerchi, Ron	828	2,325
Trost, Bill	324	1,811
Panek, Carol	318	1,772
Krebs, Dave	181	1,667
Hendrickson, Joel	646	1,456
Petro, Arthur	450	1,441
Linneman, Ray	0	1,373
Hohn, Clyde	615	1,200
Riggs, David	0	1,168
Hubbard, Dennis	0	1,109
Wilbur, Frank	280	944
Carruthers, Mary	390	883
Riggs, Diane	507	846
Zagorsky, Ben	405	773
Chriss, George	470	695
Bachman, John W.	410	682
Keiser, Lynn	410	682
Moennich, Debbie	255	596
Moennich, Jim	232	537
Weber, Dave	277	458
Trost, Mary Ann	117	424
Galis, Larry	400	400
Chaill, Susan	370	370
Hubbard, Karla	0	318
Linneman, Ralene	0	240
Wilbur, Betty	0	178
Page, Louise	108	143
Seman, Thomas	118	118
Stacklin, Jeff	42	42
Totals	11,189	36,495



Well, not really! I have a 55 cm (center to center) Columbus SL steel frame with Italian threads and threaded headset that needs a good home. Sooo, it's really a freebie! The frame is WITHOUT a fork or headset but comes with a Campy square taper sealed BB. The rear is 126mm but I measured it and it measures 125mm and it would be a stretch to put a 130mm wheel in it. If you're really gutsy, you might try the instructions in the July *Tracks* and cold set the rear triangle to 130 mm.

If you're interested, drop me an e-mail at dave@lorainwheelmen.org.

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There has also been an invisible and little noted revolution in the construction of bicycle chains. People don't pay much attention to bicycle chains. After all, they all look basically alike. [Derailleurs](#) are much more interesting to look at and talk about, but it is still the chain that has to do the shifting.

An old-style bicycle chain has ten parts per link. The typical 57 link chain used on the average multispeed bike had 570 parts, more than the whole rest of the bicycle put together. There were 114 outer plates, 114 inner plates, 114 rollers, 114 rivets, and 114 bushings.

The major revolution in chain design has been the introduction of the bushingless chain. The first of this type was the Sedisport (now made by SRAM), and it has acquired such a good reputation that other manufacturers have copied the design.

Bushingless chains have only eight parts per link. You cannot tell by looking at a chain on a bike whether it is of bushingless design, because the bushings are hidden by other parts of the chain. The bushings can only be seen if you disassemble the chain.

Conventional Chain Construction

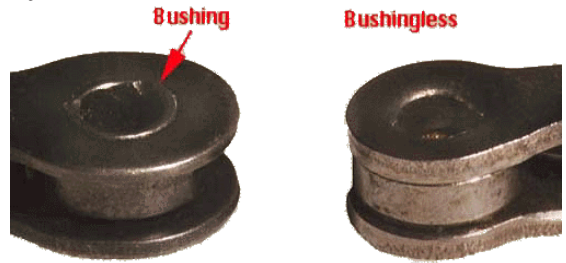
In a conventional chain, the two inner side plates are held together by tubular bushings, which are like hollow rivets. If you open a link of conventional chain, you can see the ends of the bushings flush with the outsides of the inner side plates. When the chain is assembled, the outer side plates hide the ends of the bushings. The middles of the bushings are not visible because they are surrounded by the rollers.

The rivets that hold the chain together run through the middle of the bushings, and the rollers roll around the outside of the

bushings, so both the inside and the outside surfaces of the bushings are subject to wear.

Bushingless Chain Construction

The inner side plates of a bushingless chain are three-dimensional. Instead of having a simple hole at each end with a bushing pressed through it, each inner side plate hole has a protruding shoulder that amounts to half of a bushing. Since the side plates have an inside and an outside determined by the existence of the shoulders, they



can also have bevels on the inside edges without further complicating the manufacturing process. These bevels permit the chain to run more smoothly when it is not perfectly lined up with the sprocket than a conventional chain with flat inner plates. They probably also improve shifting performance.

Since the “bushing” of a bushingless chain is made up of two halves that don't connect directly with each other, this type of chain is more flexible sideways than a conventional chain. This is because the two halves of the “bushing” have a bit of “wobble room” with respect to each other.

Chain “Stretch”

Cyclists often speak of chain “stretch”, as if the side plates of an old chain were pulled out of shape by the repeated stresses of pedaling. This is not actually how chains elongate. The major cause of chain “stretch”

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is wearing away of the metal where the rivet rotates inside of the bushing (or the “bushing” part of the inside plate) as the chain links flex and straighten as the chain goes onto and off of the sprockets. If you take apart an old, worn-out



chain, you can easily see the little notches worn into the sides of the rivets by the inside edges of the bushings. With bushingless chains, the inside edge of the side plate hole that rubs against the rivet has a smooth radius instead of a sharp corner. This probably contributes to the greater durability of bushingless chains.

Lubricant Flow

In my estimation, a major reason for the greater durability of bushingless chains is the improved flow of lubricant to the vulnerable parts of the chain.

There are three points where a chain needs lubrication. First, and most importantly, the rivets need to be lubricated where they move inside the inner links as the chain bends and straightens. Second, the insides of the rollers need lubrication to let them revolve freely around the bushings as they engage and disengage the sprocket teeth. If the rollers don't roll, they slide along the sprocket teeth, causing accelerated sprocket wear. Third, the surface where the outer side plates overlap the inner side plates can benefit from lubrication as well, although this contact surface is much more lightly loaded than the first two.

When a conventional chain is oiled, before oil can reach inside of the bushings to lubricate the rivets, it has to pass between the inner side plates and the outer side

plates. With usual oiling techniques, such as sprays, the oil tries to get into both ends of the bushing at once. Air bubbles can get trapped in the space between the rivets and the bushings, and with oil at both ends of the bushings there is no place for the air bubbles to escape. In addition, the cracks between the inner and outer side plates are highly exposed to road dirt, and are often quite grungy. Thus, even if you are able to get oil into the bushing, it is likely to be contaminated.

The air bubble problem may also exist with lubricant flow into the inside of the roller to let it turn freely around the bushing, but the shorter length and larger diameter of the roller, compared to the inside of the bushing, probably make this a non-issue. The contamination problem here is also probably less severe, because the sprockets tend to clean the rollers off automatically.

With bushingless chains, the lubricant flow is entirely different. If oil is applied to the rollers, it can easily flow into both sides of the rollers, because air (and oil) can flow through the gap between the “half bushings”. If a bushingless chain is only oiled on the rollers, for instance by a narrow-spout oil can, the oil is able to flow into both sides of the rollers, through the gap and onto the middles of the rivets. The oil then flows out along the rivets to the side-plate junctions. Since the side plates are oiled from the inside, there is a natural self-flushing action that brings dirt and sand out of the chain instead of into it.

The rollers themselves are cleaned by contact with the sprockets.

Stay tuned. I'll continued next month with oiling your chain!

Club Rides



Minutes

Ride participation has been great lately. Last Sunday we had 13 attend the Litchfield ride and 8 attend the shorter (and slower) ride to Wellington. It's fun when you really have a nice group to ride with. It's been a real struggle to get a a group of shorter/slower riders that shows up in any number but we may have a nice start now. Rides in July have been well attended. Maybe it took the free jersey for 1,500 reportable miles to make it happen, I donno, but it has and I'm glad. We even have a nice core of folks that come to the TUE morning ride on the bike path. Keep it up, folks, we're on the right track.

Bike/Ped Funding Threatened

On July 7, John Mica (R-FL), chairman of the Transportation and Infrastructure Committee in the House, announced his proposal for the next surface transportation re-authorization bill. Alarmingly, the proposal eliminates dedicated funding for bicycling and walking, including Transportation Enhancements, Safe Routes to School and the Recreational Trails Program. Meanwhile on the Senate side, James Inhofe (R-OK), the lead Republican negotiator on the transportation bill, declared that one of his TOP THREE priorities for the transportation bill is to eliminate 'frivolous spending for bike trails.

The League and the America Bikes Coalition have launched a critical advocacy alert. Please contact your Members of Congress and tell them to reach out to Senators Inhofe, Boxer, and Congressman Mica to urge them to continue funding for Transportation Enhancements, Safe Routes to School and Recreational Trails. Read more on the [Bike League blog](#).

The meeting of the Lorain Wheelmen was called to order by President John at 7:30p.m. There were about 30+ people who showed up at the picnic at Ralph Ballard's house. Everyone who was there enjoyed themselves and also had enough to eat. The Treasurer's report was handed out to the Club officers.

The only business that was brought forth was about getting a Debit Card which would be used to purchase items for the Club such as Red Flannel food and online payments for our internet service. Dave Krebs made the motion and Ralph Ballard seconded it. It passed by show of hands. Louise will go to First Federal and make an application for one.

The only other item was farewell wishes and good luck to Dave & Diana Riggs. Diana has a year's contract at Pepperdine University in LA. They will move sometime in August. Ralph wished them good luck on behalf of the Club. He (Dave) thanked the club for never leaving him behind in the dust. They were also wished safe travel to California. They will be missed.

Next meeting will be in September 8th at Lorenzo's in Oberlin. Be there as we have to begin planning for the Red Flannel.



Calendar

August 2011

7th	Roast Your Buns	Oberlin Depot An 8:00 Start	72 52 30	A freebie Invitational A medium distance The shortest one
13 th	Spencer Lake	Wooster	58	A long Saturday ride
14 th	Oberlin Inn	Norwalk Wakeman	56 30	Medium long & flat The short R/F route?
21 st	Amherst	The Hill Challenge	32	Climb 9 river valley hills
28 th	Oberlin Inn	Olmsted Falls LaGrange	54 30	Pretty flat to the east Really flat & shorter

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.

Spencer Lake:

From Wellington, go east on SR 18 past SR 301 to Foster RD and make a RIGHT (south). Foster RD becomes River Corners RD south of Smith RD. Continue about 1.7 miles to Spencer Lake RD. There's a small park on your left. That's it! Try 41.11256 N, 82.09425 W on your GPS. You'll be REALLY close.

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. If you're not up to the pace of the Tuesday evening ride, try the morning version. It starts at the Oberlin Depot at 9:00 AM and travels to both ends of the Path (26 miles) at a 15mph pace.

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!

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