The background of the slide features a faded, grayscale image of bicycle gears, showing the teeth and circular shapes of the sprockets.

Bicycle Mechanics and Repair Decal

Mechanical Engineering 98/198

Spring 11

Lecture 6

Aleksey Shepelev

Jim Gao

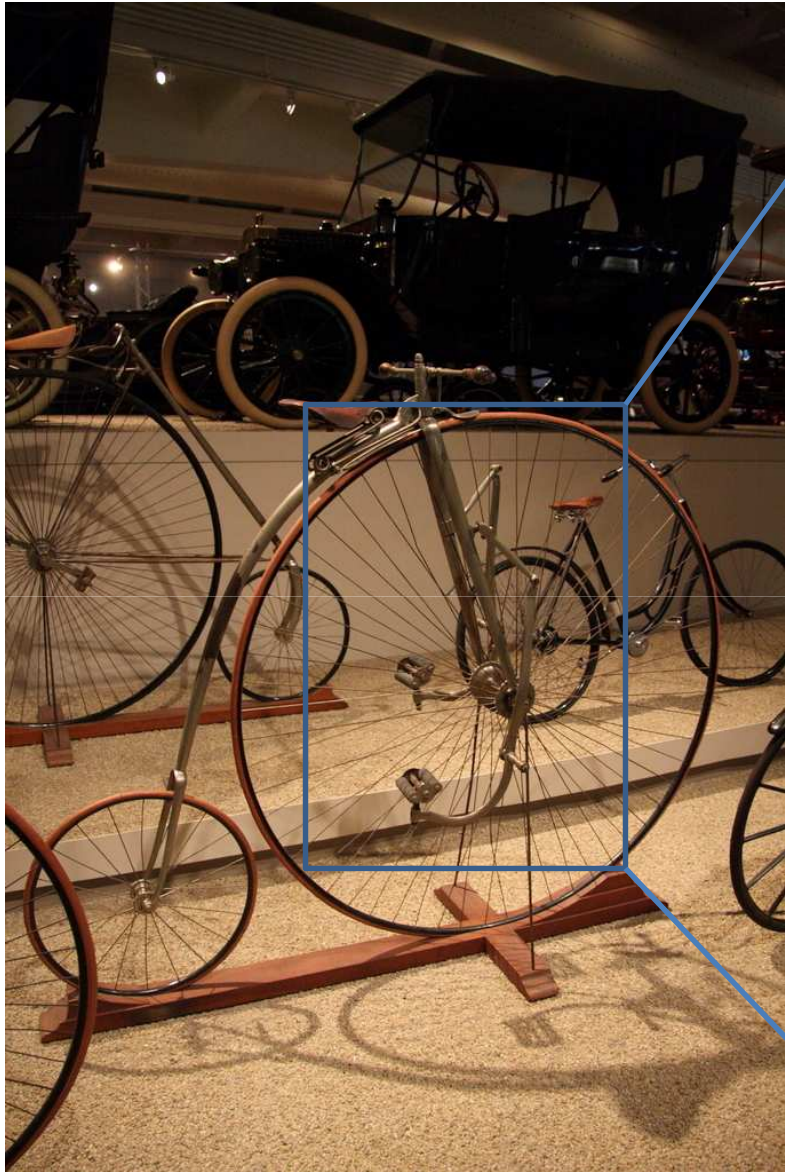
Nick Koo

Henry Yi

Allen Gurdus

Weird Bikes





















Do You Agree? Which isn't always true?

Bicycle Safety *Safe Riding Tips*

- Always ride with traffic and follow lane markings
- Signal your turns and moves.
- Do not ride in prohibited areas (sidewalks, areas designated for pedestrians only)
- Ride in a straight line, to the right of faster-moving traffic.
- Use bicycle lanes and paths where available.
- **Stay as close as possible to the curb or the edge of the road.**
- Use caution when passing parked cars, as doors may open without warning.
- Use safety equipment. Always wear a helmet and light-colored, reflective clothing is recommended. For night riding, use a headlight, a red rear reflector, two side reflectors on each wheel and reflector pedals.

Essays! Due April 18th

- Topics

- Improving bicycle infrastructure in Berkeley
- Bicycle of the future
- Encouraging bicycle commuting
- Why do so few students bike on campus?
- Any other topic approved by us

Components

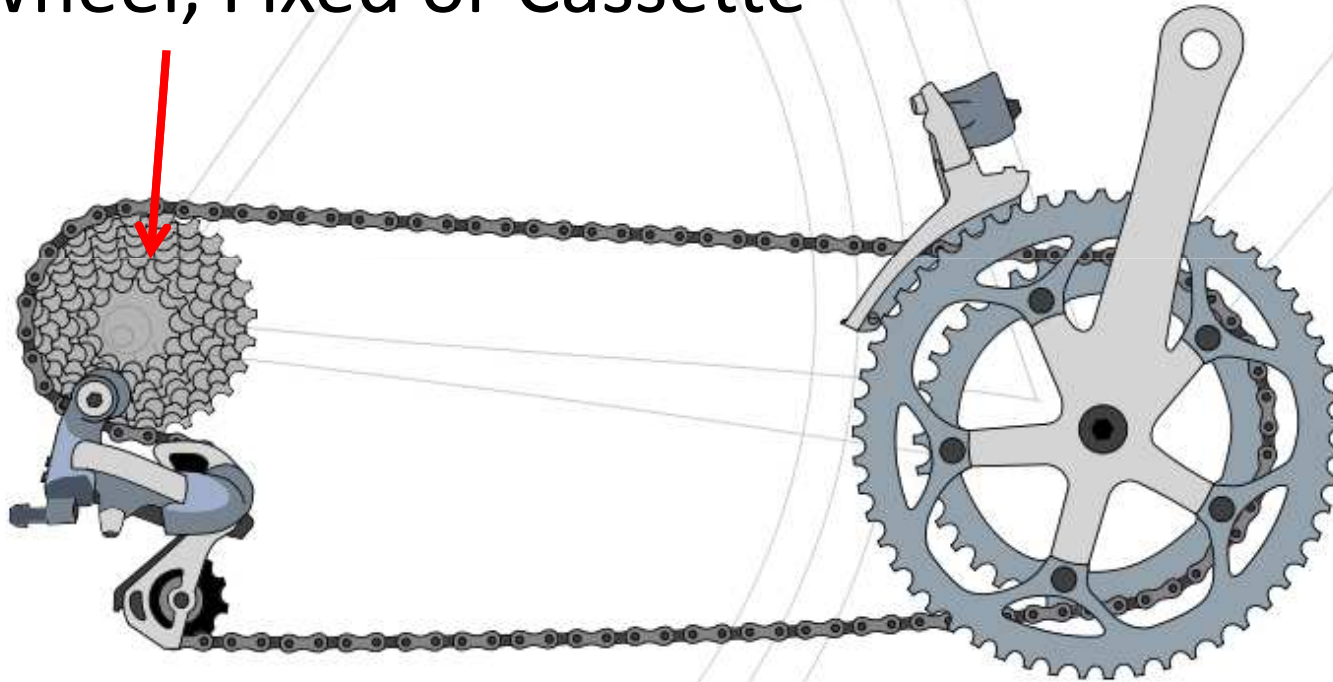


Cassette (Freewheel or Fixed on some bikes)

Chain

The Drivetrain

Freewheel, Fixed or Cassette



Why use a chain?

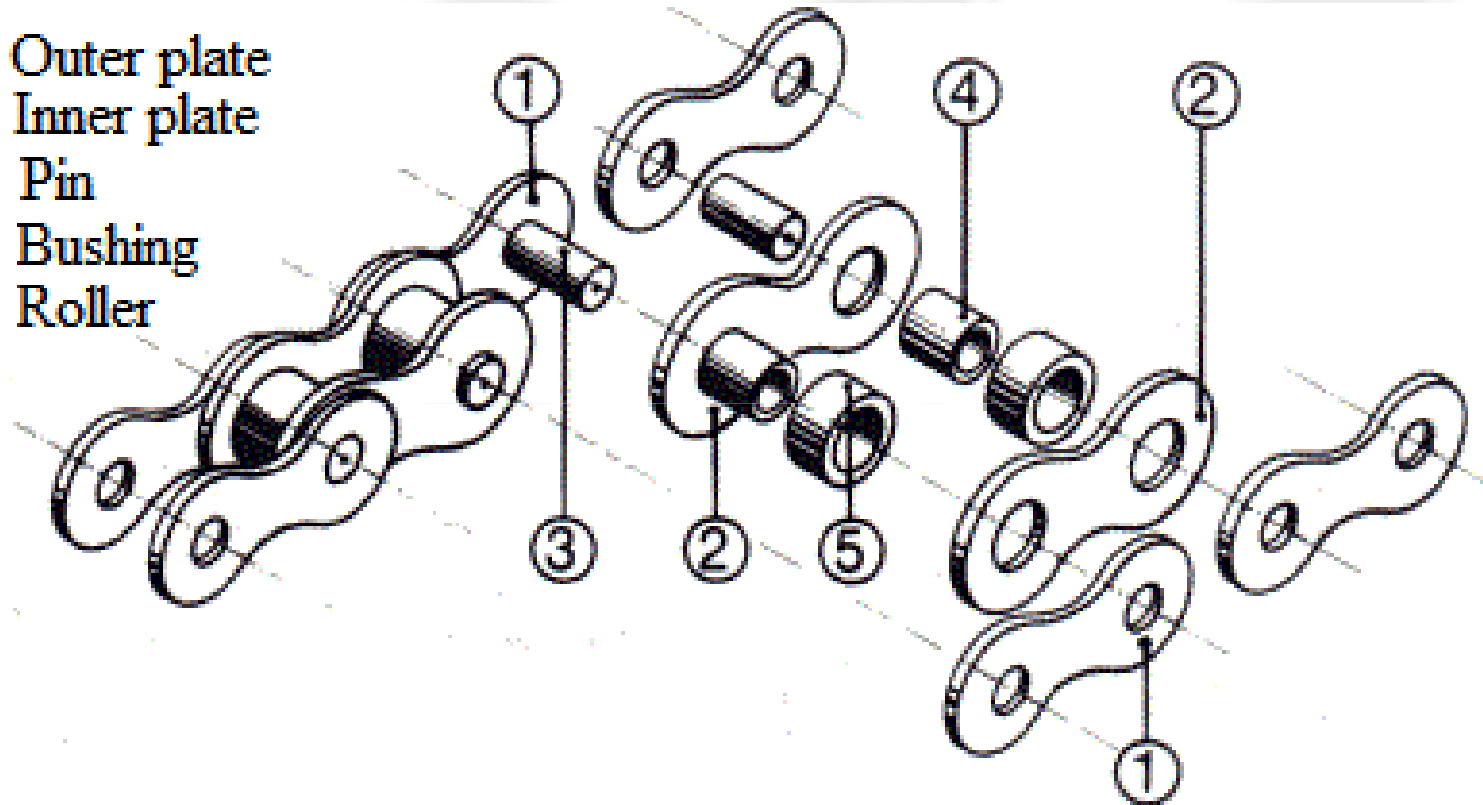


Mechanical advantage:
- Front chainring to rear sprocket

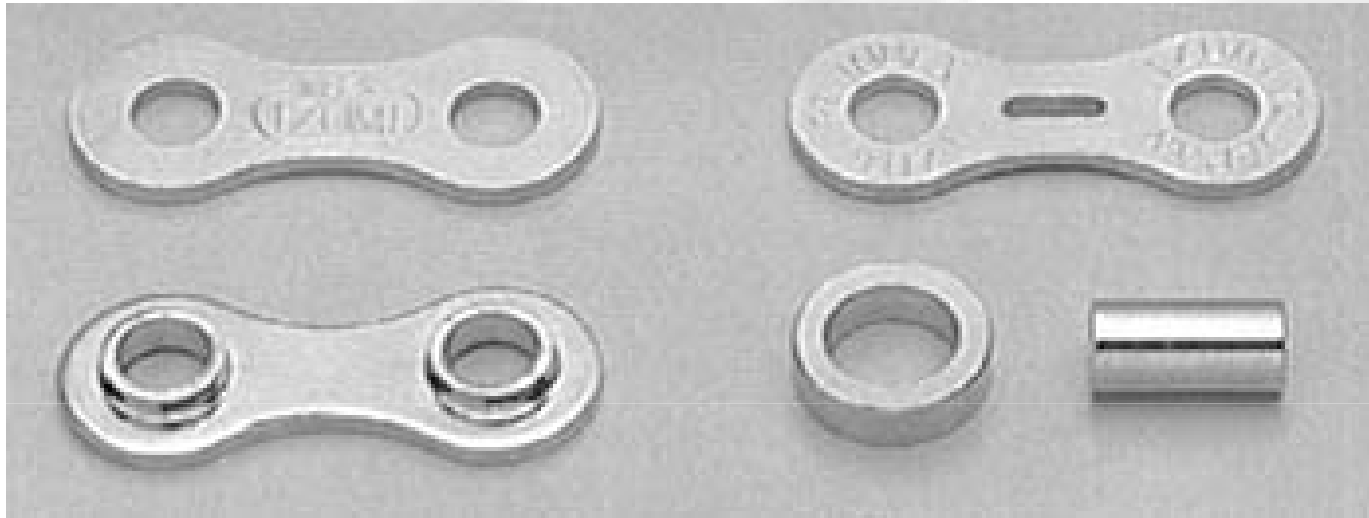


Chain Construction - Bushings

- 1 Outer plate
- 2 Inner plate
- 3 Pin
- 4 Bushing
- 5 Roller



Chain Construction - Bushingless



$$\frac{57 \text{ links}}{\text{chain}} \times \frac{8 \text{ parts}}{\text{link}} = \frac{456 \text{ parts}}{\text{chain}}$$

Advantages:

- More lateral “wobble” room
- Inner beveled edges allow smoother shifting

Chain wear

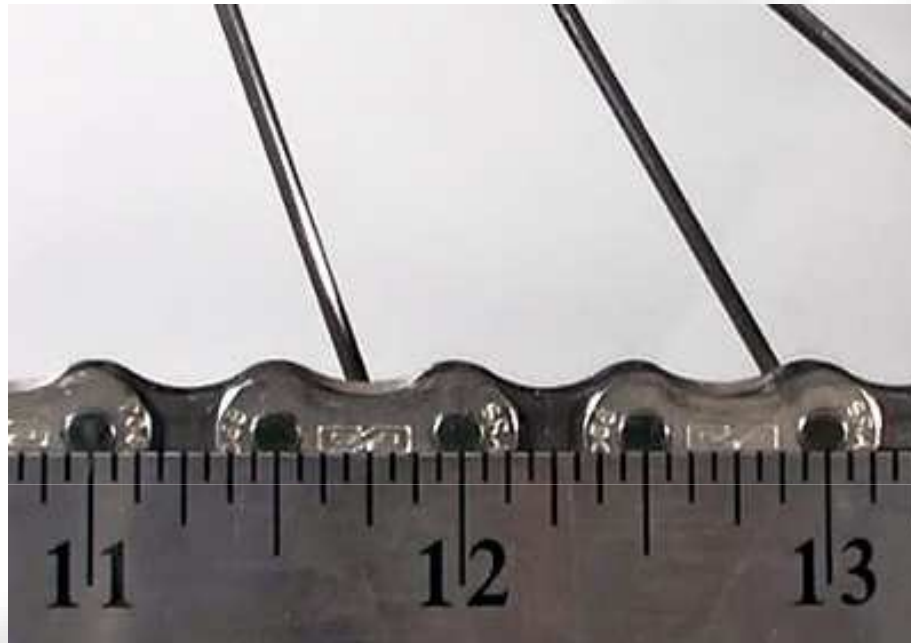


- Pin is notched from side plates
- Roller is misaligned and moves freely



- Roller misalignment is due to worn bushings

Measuring chain wear



- On a new chain, 1 ft = 12 complete links
- If the rivet-to-rivet distance is $> 1/16$ in above 12", replace the chain
- If the elongation is $> 1/8$ in, replace your sprockets too

Extending your drivetrain life

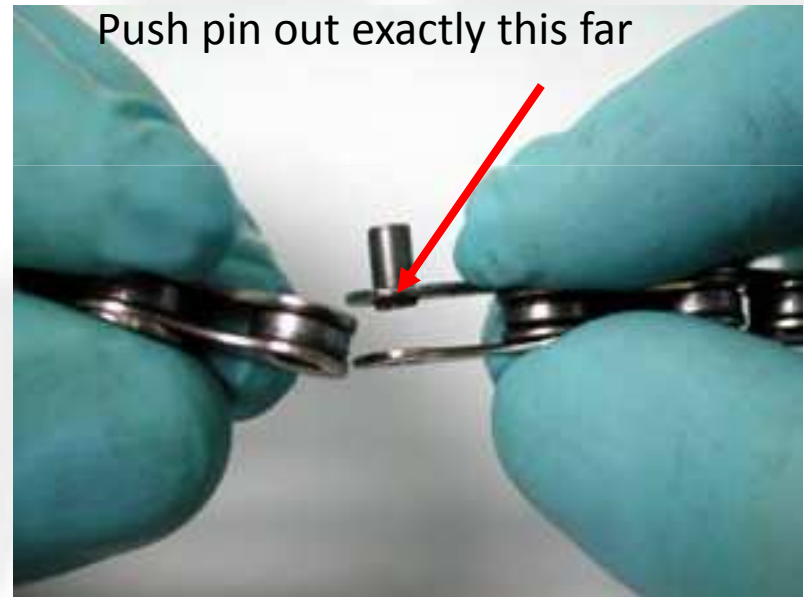
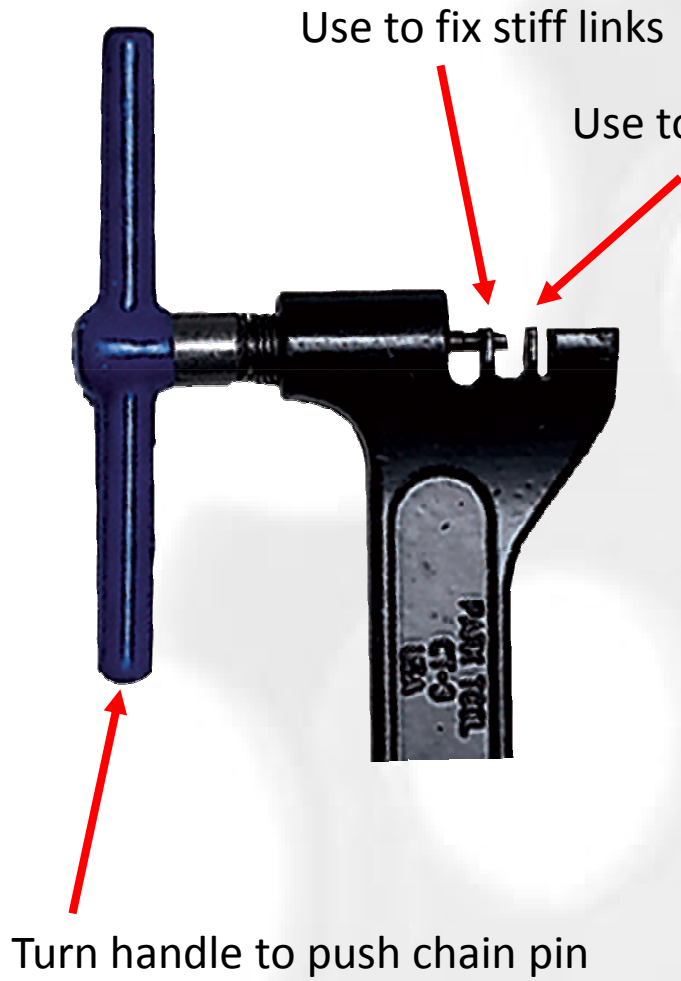
Lubricate, lubricate, lubricate!

1. Clean your chain, front chainring, and sprocket
2. While pedaling backwards, apply a thin line of bike chain lubricant
3. Run through all of your gears and wipe off excess lubricant



Breaking a Chain

Only applies to replaceable rivet chains





Quick Release Chain Link



Allows chain to be disconnected without chain tool

To Remove



Remove with pliers as shown

To Install

Rotate until link is here

Press on brakes



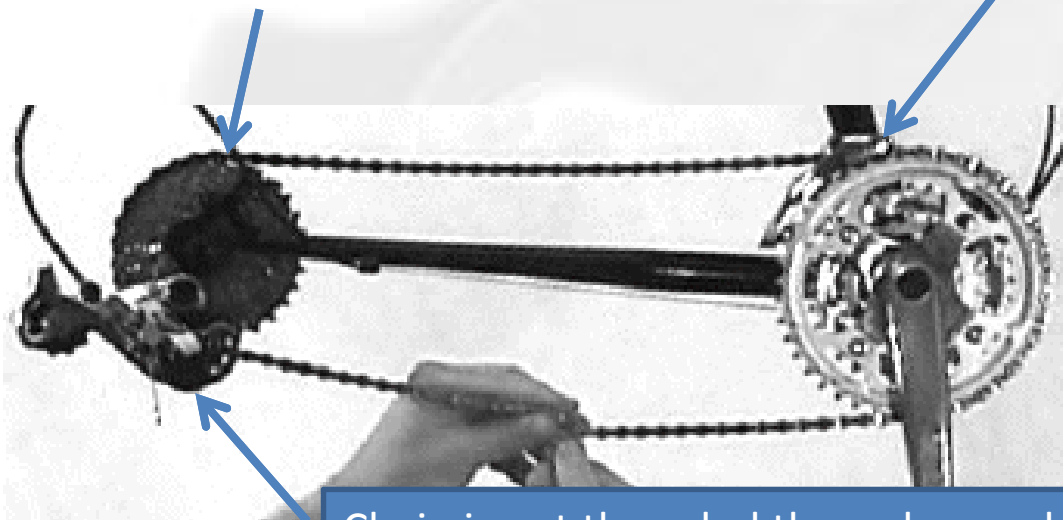
Push down on pedals until link clicks

Determining Chain Length

- Pull the chain tight and **add two links** to where the chain touches. This is the length of your new chain.
- Cut the chain at the determined length, thread through both derailleurs and connect the ends.

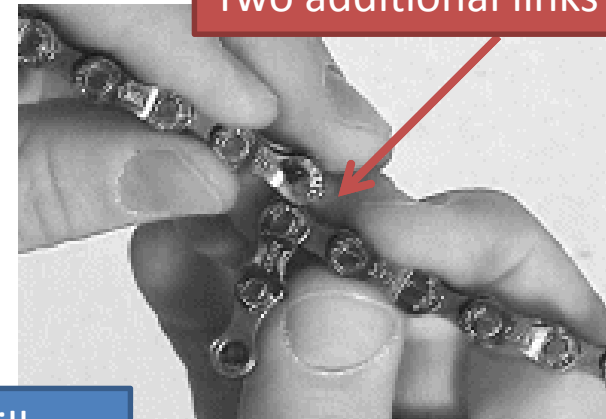
Chain is on largest sprocket

Chain is on largest chain ring and threaded through the front derailleur



Chain is not threaded through rear derailleur

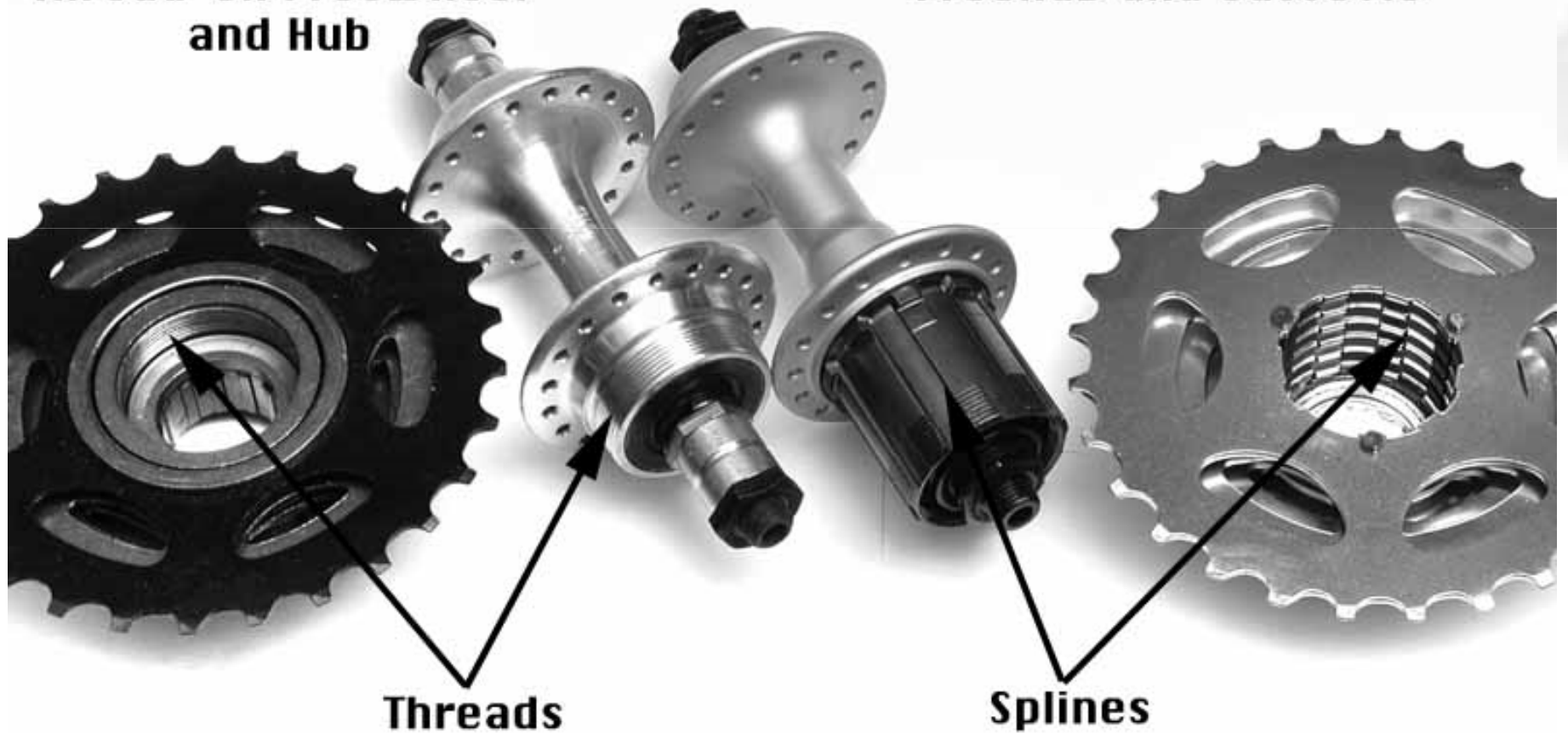
Two additional links



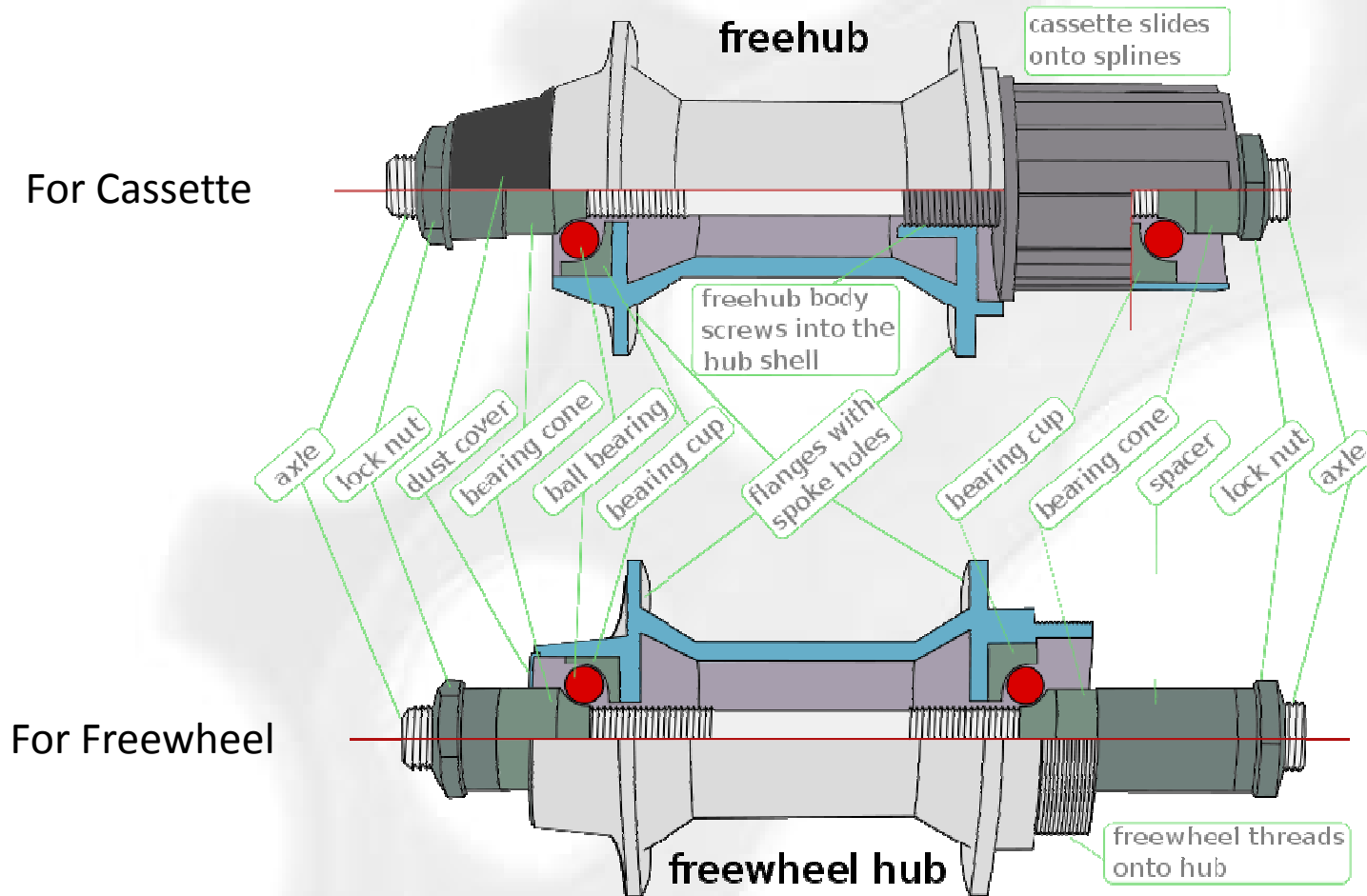
Freewheel vs. Cassette

**Thread-on Freewheel
and Hub**

Freehub and Cassette



Freewheel vs. Cassette



Removing a Cassette

Tools Required



Cassette cog remover tool



Chain whip / sprocket remover with freewheel tool wrench



Grease – antiseize compounds

The Process

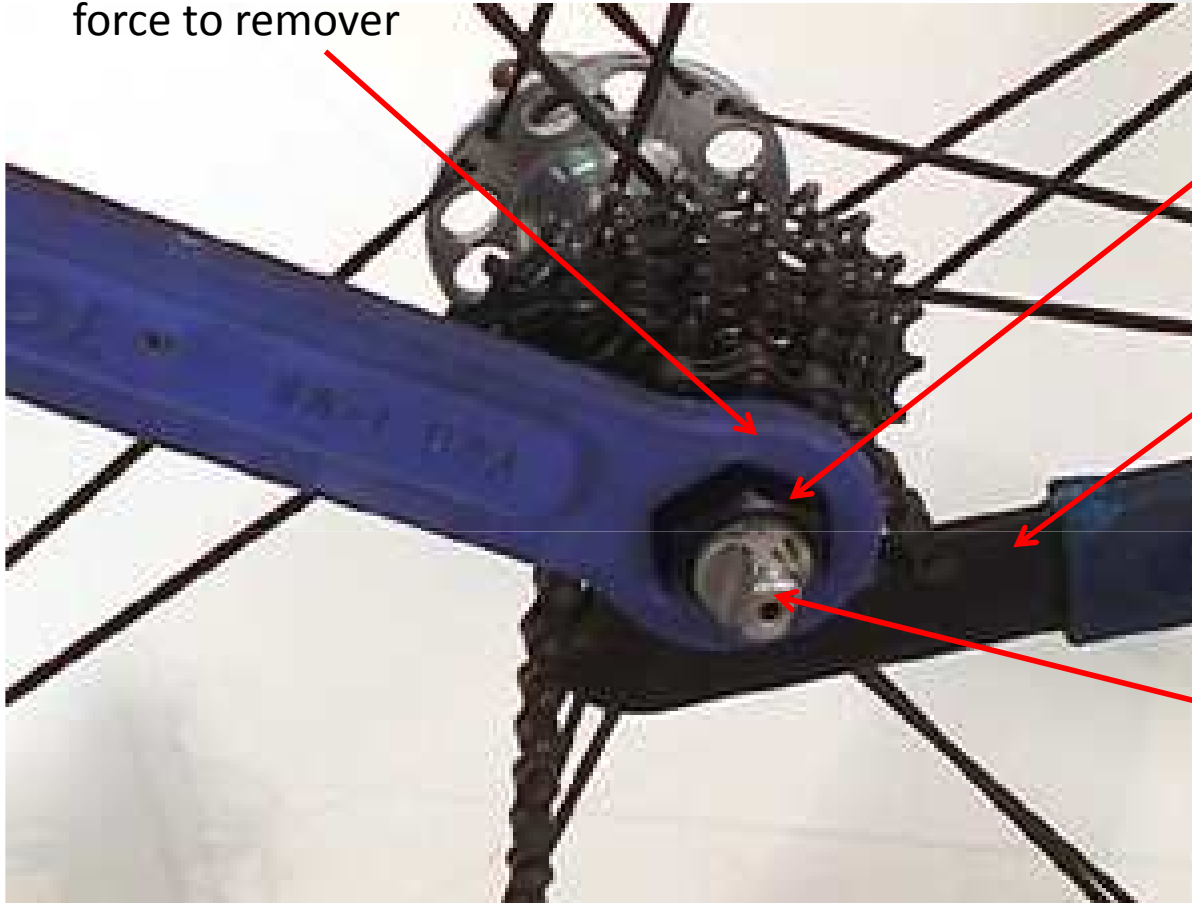
- Remove the rear wheel from the bike and remove the skewer
- Insert the cassette remover into splines/notches



- Re-insert the skewer and attach the skewer nut to the outside of the remover
- Use the chain whip tool to hold the cogs stationary while turning the remover counter-clockwise with a large wrench



Wrench applies force to remover



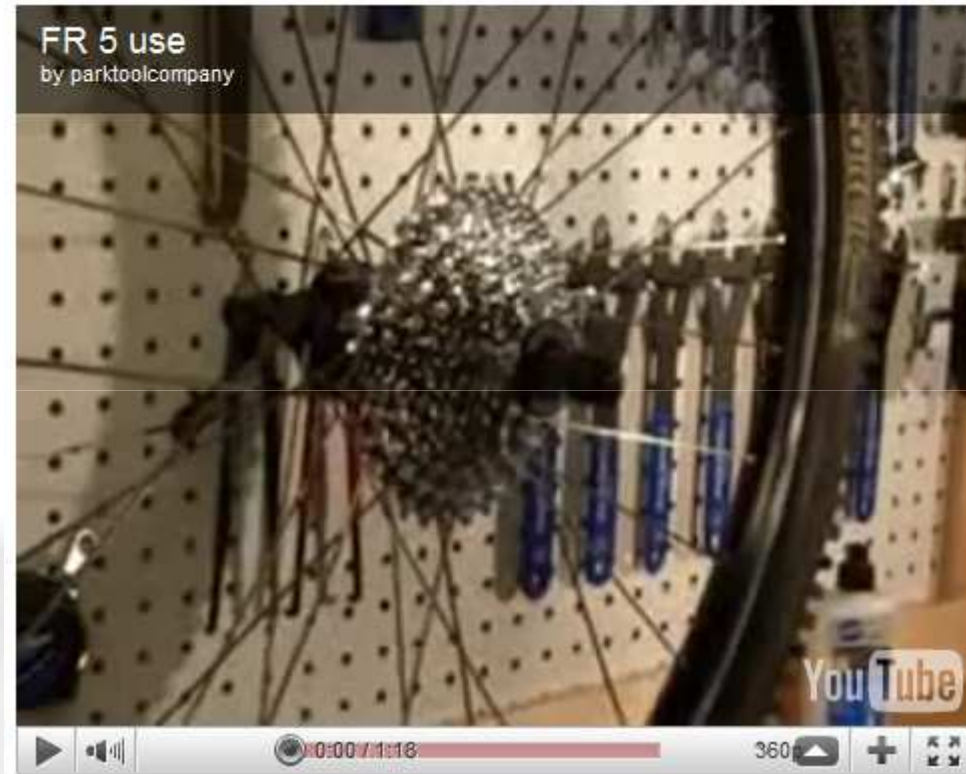
Cassette cog remover

Usually chain whip holds the largest cog

Skewer nut holds cog remover

A loud clicking noise caused by the lockring separating from its teeth will let you know when you are done!

http://www.youtube.com/watch?v=cJCKm6DG-NQ&feature=player_embedded



Removing a Freewheel

- Identify your Hub and Cog Model

FR-1

Shimano® freewheel
12 splines, approx. 23mm diameter



FR-2

Older Suntour® two notched, 25mm across



FR-3

Suntour® four notched, 24mm across



FR-4

Atom® and Regina®
20 splines, approx dia. 21.6mm



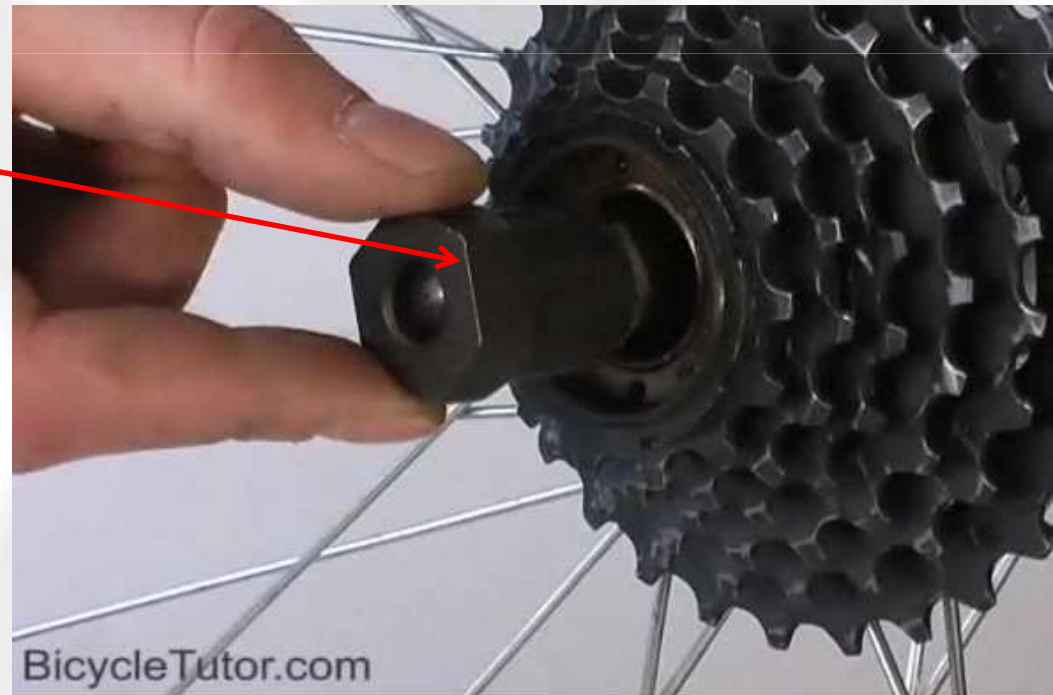
- There are many types!
 - Each type has a corresponding tool
 - Older types may be impossible to remove since the removal tool may not be sold anymore or hard to find

The Process

- Essentially the same as removing a cassette!
 - You need the correct free wheel remover and slip it into the inner slot of the free wheel

Free wheel remover

- Using a wrench, loosen the remover by turning counter-clockwise
- Chain whip not required



More Freewheels



Single Speed and Fixed

Fixed Gear Cog and
Lockring Threads

Single Speed
Freewheel Threads



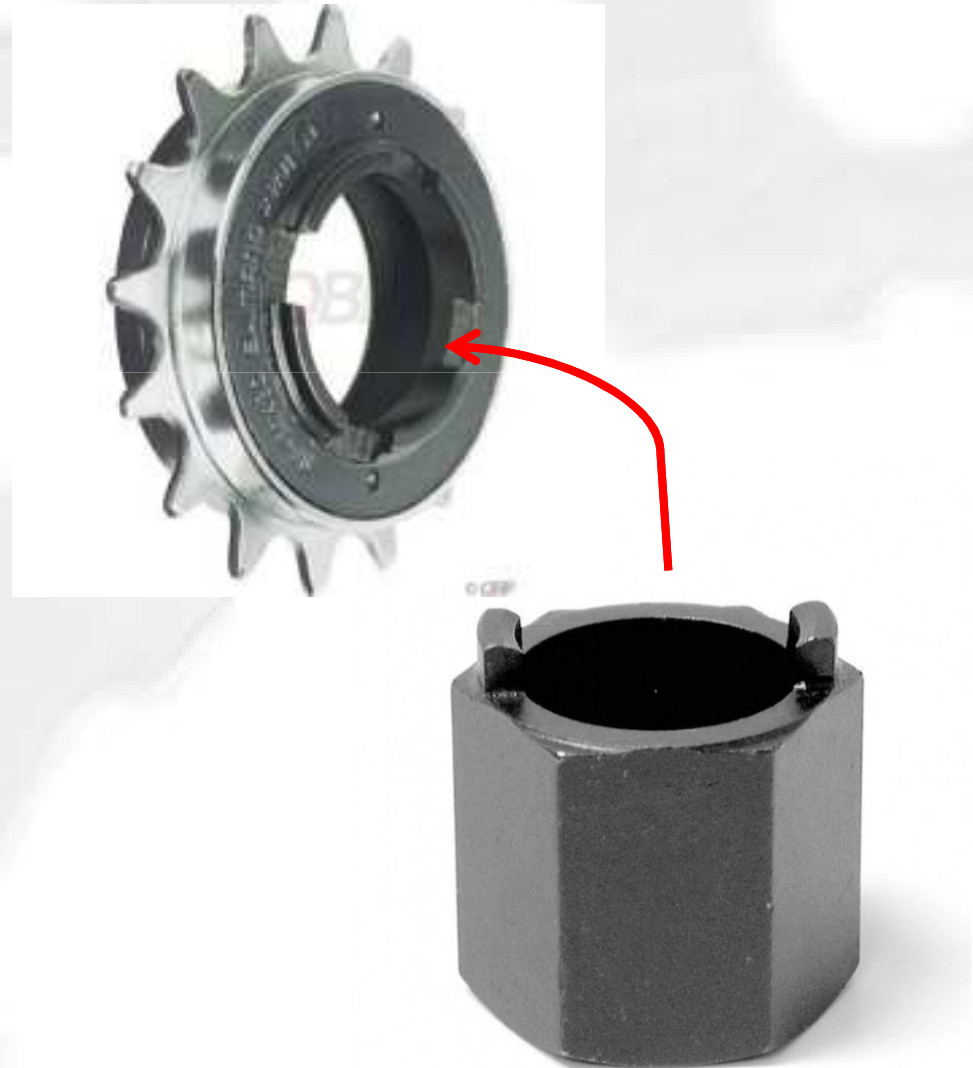
Fixed Gears require a lockring
Single Speed freewheels are self-locking through pedaling

Installing and Removing Single Speed Freewheels

Remove obstructive cone nuts

Fit in SS tool to freewheel

Righty-tighty, lefty-loosey



Fixed

Fixed Gear Cog and
Lockring Threads



Installing and Removing Fixed Cogs and Lockrings

Thread cog normally with
a chainwhip

REVERSE THREAD lockring
with a lockring tool



Tightening

Cog → Righty-Tighty



Lockring → Reverse-Thread

