

BIKE MAINTENANCE OVERVIEW

Qualities of a Good Mechanic

- Creativity
- Knowledge
- Confidence
- Experience
- Diligence

And most importantly: **Consistency**. Build good habits and wrench correctly, every time.

Tools for home maintenance (in order of importance):

1. Floor Pump	6. Y-wrench: 4/5/6 mm
2. Lubes for various riding conditions	7. Chain scrubber and solvent
3. Degreaser	8. Allen wrenches (optional 8/10 for crankbolts)
4. Tire levers	9. Chain tool
5. Shop rags	10. Soft brushes for bike, cassette

Maintenance Resources

Park Tool Blog: Solid advice from a major toolmaker

<http://www.parktool.com/blog/repair-help>

Repair tips and specifications for old/eclectic bikes.

<http://www.sheldonbrown.com/repair/index.html>

Best Maintenance Book for the Money:

Zinn & the Art of Road Bike Maintenance. Leonard Zinn. VeloPress, 1830 N. 55th Street. Boulder, CO, 80301. (\$21.95)

Manufacturers websites (Shimano, SRAM, Campagnolo etc.) have tech support documents covering most parts manufactured in the last decade.

Before EVERY Ride:

- Check tire pressure
- Check brake attachment and operation
- Ensure that wheels are secure
- Pedals and cranks feel tight
- Drivetrain free of debris
- Pack rescue tools, spare tube, air source, water supply
- Check to make sure your keys aren't locked in the front door. So embarrassing.

Inflating Your Tires

Proper inflation will eliminate the majority of flats.

Lower pressures: better for loose conditions

- (+) Bigger contact patch = better traction for technical/ wet conditions.
- (+) Comfier ride
- (-) More rolling resistance also means slower
- (-) More prone to pinch flatting

Higher pressures: More efficient for good road conditions

- (+) Reduce your risk of pinch flatting
- (+) Offer better protection for your rims
- (+/-) Lower rolling resistance, but also less traction

More on pressure:

- Dropping 10 psi or more below minimum recommended pressures can greatly increase pinch flats
- **Pro-tip:** You can run 2-3 pounds less in your front wheel, since it has less weight over it. (Lower pressure mean better traction for steering.)
- Run higher pressure (5-10 psi) when riding with a backpack or other cargo. Stay below the recommended max!

BASIC MAINTENANCE

Three tiers of Bike Maintenance

1. Shop maintenance (most time, most tools and parts, most experience)
2. Home maintenance
3. Roadside rescue maintenance (least time, least tools, least options)

A few points to remember:

- Any problems that go unsolved in tiers 1 and 2 get solved on the road.
- No one knows your bike like you do. Over time, you'll build confidence in what you can/can't fix
- **Cardinal rule when out of the road:** it's usually a better idea to ignore small, inconsequential mechanicals problem if an attempted fix could cause greater damage and jeopardize your ability to get home.

Cleaning the Bike

Tools: Shop rags, cassette brush, dish soap, bristle brush, bike polish

Clean the bike before cleaning/lubing the drivetrain.

Dry wash: Allow caked on mud to dry, then remove it with a dry brush or cloth. Tip: If you have a workstand or somewhere else to hang the frame, you can clean the frame much faster by removing the wheels. Wipe the frame down using a damp cloth, bike polish, or even a mild detergent.

Advantages of a dry wash: lesser chance of contaminating hubs, bottom bracket, cable housing with mud or water. (Spraying water on mud tends to make it spread into "sealed" areas.). You can also do a dry wash almost anywhere.

Wet wash: If possible, try to remove the bulk of mud from the frame/components before washing. Using low-pressure water, a nylon bristle brush, and dishwashing liquid, wash the frame from the top down. Even with low pressure, avoid spraying directly into bottom bracket, wheel hubs, and headset. Do not spray water into cable housings. Allow to air dry, heat drying will cause grease to melt out of sealed areas. Never use a power washer or any high-pressure water on your bike. After a wet wash, thoroughly dry exposed cables and the chain; these parts are steel and will start rusting immediately. You'll also need to relube the chain and all pivots.

Cleaning / Lubing Drivetrain

Tools: shop rags, degreaser (Finish Line Citrus degreaser, Pedro's Bio Degreaser or Citrus Degreaser, or Simple Green 50/50 with water), chain scrubber tool (Park Cyclone or Pedro's) and chain solvent, cassette brush, dry and wet chain lubes

Cleaning and lubing your drivetrain regularly is the best way to eliminate mechanicals and is often the first thing a mechanic does when diagnosing a shifting problem. In addition to impairing shifting and causing excessive parts wear, excessive dirt on a drivetrain is a major cause of chainsuck.

VERY IMPORTANT: Do not allow lubes or grease to contact disc brake rotors or disc brake pads. Disc brake pads absorb oil and will be ruined if contaminated by lube. If lube contacts a rotor, carefully remove the wheel and immediately clean the rotor with alcohol, using caution not to contaminate the pads. If lube contacts a rim brake pad or a rim, use alcohol or a degreaser to clean the affected parts.

Cleaning:

- Use a cassette brush to remove large debris from the cogs.
- Gently spray degreaser onto the cassette spindle. Avoid spraying into the freehub body, which contains grease and bearings.
- Using a towel, "floss" between each cog in the cassette to remove dirt and debris.
- Use the same procedure to clean the front chainrings. Avoid spraying degreaser into the bottom bracket area.
- Periodically, use a chain scrubber tool to degrease the chain.
- In the absence of a chain scrubber or for everyday cleaning, apply degreaser to the chain and remove dirt and debris by holding a shop rag to the chain while you turn the cranks with your other hand.
- Hold a rag against the derailleur pulleys while turning the cranks to remove dirt from the pulleys.
- Spray a rag with degreaser and gently wipe the derailleur bodies.
- If necessary, spray degreaser directly onto the derailleurs; in this case, you will have to re-lube the derailleur pivots.

Lubing Derailleur Pivots and Cables:

Periodic lubing of the pivots and cables will make your shifting silky smooth.

- Use a dry lube, such as Finish Line Dry (red cap) or Triflow on derailleur pivots and on cables and housing, if desired.
- Work the lube into pivots by shifting the derailleurs up and down, then wipe excess lube off the derailleur body.
- WD40 is not a lube; if it is used to penetrate frozen parts, clean it off thoroughly and then relube with a dry style lubricant.

Choosing a Chain Lube:

(My new favorite: Rock and Roll. Clean, durable, all conditions, wet or dry. You can also use it on cables/derailleur pivots: <http://www.rocklube.com/>)

Select the appropriate dry or wet lube to match your riding conditions. Dry lubes (FL Dry, Triflow, White Lightening) are the cleanest lubes -- they do not build up or have a sticky residue to attract dirt -- but they are also the least resistant to rain, mud, and temperature. Run a dry lube for dry or dusty conditions, short rides, road rides, or any other ride where you will have a chance to periodically re-lube. Choose a wet lube (Finish Line Wet [Green Cap], Pedro's Syn Lube, Ice Wax, RaceDay) for wet or raining conditions, mud, extreme temperatures, or extended riding without re-lubing. Synthetic oil-based lubes are messier and will require you to clean the drivetrain much more often.

- Apply lube to each roller in the chain while turning the cranks to work the lube into the inside of the cranks.
- Using a shop rag, remove all of the lube from the outside of the chain.
- The chain should be relatively dry to the touch. Remember, you want lube inside the chain, not on the outside.
- Excess lube attracts dirt that will degrade your drivetrain parts.

Removing/Reinstalling Wheels

Removing Wheels:

- If running direct pull brakes (V-brakes), use one hand to squeeze the calipers together. Use the other hand to pull the brake noodle outward, then up out of the caliper quick release. (It's the same for cantilever brakes, but instead of a noodle, use your second hand to unhook the pulley mount.)
- If you're running road brakes, simply open the caliper quick release.
- If removing the back wheel, shift into the highest gear (smallest cog) on your rear cassette. When you put the wheel back on, it's easier to put it on the little cog. (If you forget to shift, you can do it after you take the wheel off).
- Open the quick release, loosen, and remove the wheel.

Reinstalling Wheels: the harder part

- When reinstalling wheels, always place the bike on the ground. The weight of the frame causes the wheel to seat properly in the dropouts.
- Insert the wheel between the brake calipers of the fork (front) or chainstays (rear)
- If installing a rear wheel, maneuver the cassette in between the chain. Since we shifted all the way (up) to the small cog, we're going to wrap the chain around the small cog. So easy!
- Place the dropouts securely onto the wheel axle. (You may need to loosen the quick release a bit to get it right).
- Keeping the quick release lever open, tighten the nut. It's tight enough when you feel significant resistance when the lever is pointing directly through the center of the axel (parallel to the hub). The lever should be difficult -- but not too difficult -- for you to push closed with your palm.
- Spin the wheel to make sure it moves freely between the brake pads. You can also bounce it to make sure it feels solid.
- Reattach the brake lever and check brake function.
- If the brake is rubbing now but wasn't rubbing before, the wheel isn't seated squarely. Open up the quick release, close it, and check the brake again.

Emergency Flat Repair

Tools: tire levers, tube, and air source

Remove the Tire:

- Slip the flat end of a tire lever under the tire bead and try to unseat the bead by moving the lever along the surface of the rim. (You may need to insert a second tire lever for tight beads.)
- Working the lever around the circumference of the rim, unseat the entire tire bead.
- At this point, you can remove the tube; remove the valve stem first, and then pull the tube from inside the tire.
- Remove the other side of the tire bead by either using your hands or using a tire lever and remove the tire from the wheel.

If the cause of the flat is not obvious, you will need to inspect the tube, tire, and wheel to ensure that your next tube does not flat. Starting with the tube, try to locate the puncture.

- A small pinhole on the top or underside of the tube indicates a puncture. Depending on the location, check the rim or the inside of the tire for the source of the puncture. Remove any debris.
- Slit marks (a "snake bite") on the side of the tube indicates a pinch flat.
- An asterisk shaped hole can mean a hole in a tire sidewall, a pinch, or a bad rim strip. Depending on the location, check the rim strip or sidewall for a weak point or opening that caused the tire to rupture.

If you intend to patch the tube, now's the time to do it:

- Your patch kit comes with a small square of sandpaper; use it to roughen up the area around the puncture to enable better adhesion of the patch. You need to abrade an area at least as large as the patch.
- If using a temporary patch, apply it to the puncture site and apply pressure to make it adhere. Temporary patches are clear with an adhesive back -- essentially they're a sticker.
- Vulcanizing patch kits come with rubber patches and a small tube of glue. After roughing up the puncture area, apply an even coating of glue and spread it around. The area covered by glue should be at least as large as the patch.
- Allow the glue to dry for several minutes. Lightly touch the outer edges of the glue (don't touch the puncture area) to make sure it's dry but still tacky.
- Peel the aluminum foil backing off of the patch and firmly apply the patch to the puncture area. Use your thumbs to really work the patch into the glue, ensuring maximum adhesion. Photos: <http://www.parktool.com/blog/repair-help/inner-tube-repair>

Putting the Tire Back On the Wheel:

- Reseat one complete side of the tire bead.
- It is a good practice to always align the tire label with the valve hole of the rim; the next time you flat, you can use these as reference points to help you determine where a puncture may have occurred on the tire.
- Partially inflate the replacement tube, insert the valve stem into the valve hole, and then work the new tube up into the inside of the tire.
- Once you have "stuffed" the tube in the body of the tire, you will begin to work the other tire bead onto the rim.
- If you must use a tire lever to get the last part of the bead seated, do not use a prying technique. This will likely pinch your new tube.

Before inflating the newly installed tube, inspect both tire beads to ensure that the tube is not pinched between the bead and the rim.

- Work around the rim on both sides of the tire and gently push the bead away from the rim. You shouldn't see the tube at all.
- If you see the tube protruding between the bead and rim, try to gently push it up into the rim with a tire lever. You can also slowly inflate the tube to cause it to retract up into the tire.
- When you're confident that the beads are seated and the tube is up inside the tire, finish pumping up the tire.

Torn Tire Sidewall: Tire Booting Procedure

Seat one side of the tire bead. Use a dollar bill or energy bar wrapper as a makeshift tire boot; fold the dollar or wrapper in half, place it inside the tire at the spot of the tear. Insert the new tube, and inflate slightly to hold the boot in place. Seat the other tire bead and inflate the tube. While riding on the booted tire, stop periodically to ensure that the inflated tube is not pushing out through the tire gash.

Chain Repair

Tools: Chain Tool, Master Link (optional)

If you're riding long distance or riding in a remote area, you need to know how to fix your chain. The easiest way to fix a chain (by far) is to fix it with a master link. A master link comes standard on some brand new chains (all SRAM chains) and can also be purchased separately.

When a chain breaks due to a mechanical, you will have to have to remove the damaged links in order to reconnect the chain. First, inspect both open ends of the chain to determine how many links you will need

to remove from each side. An open chain has a "male" and a "female" end. The female end will be bent beyond repair and other links may also be affected.

The New Way: Repair with a Master Link

- Using the "primary teeth" of your chain tool, cut off enough of the chain links on either side of the break so that you're left with male connections at both sides of the chain break. You're not going to use the chain tool to push a pin to reconnect the chain links, so go ahead and cut the old links all the way off!
- Using the master link, connect the male/male ends, pull tight to lock the master link. (To loosen a master link, push squeeze the pins together and move the halves of the link together to unlock it).
- Remember, your chain is a few links shorter now. It's perfectly safe to ride, but DO NOT shift into the big ring with the biggest rear cogs. Running big/big is never a good idea, but with a short chain, you don't have enough slack and you'll pull your rear derailleur into your back wheel. Expensive!

Chain Breaking and Repair - the old school way:

- Insert the chain into the primary teeth of the chain tool (farthest away from the screw pin) and turn the screw clockwise to remove the rivet.
- Be careful not to push the rivet all the way out, you'll need to push it back in later.
- **Tip:** If you didn't have to remove the chain from the bike, you should always position the chain tool so that you are pushing the rivet from the backside of the chain and away from the bicycle. This will make it much easier to reassemble the chain later.

If you carry spare chain links with you, you can use them to replace the links you remove. Add them using the same technique that we are about to describe for reconnecting the links. Obviously, add links before reconnecting the chain.

To reconnect the chain:

- Shift the rear derailleur to the smallest cog and the front derailleur to the smallest chainring. Using the smallest gears will give you the most slack to work with.
- Before you reconnect the chain, make sure it is routed correctly around both rear pulleys, through the rear triangle of the frame, and through the front derailleur. If you're not sure, examine another bike.
- Using the primary teeth (farthest from the screw pin), use the same technique as above to push the rivet back into the chain.
- Once the rivet is in place, check the connection to make sure the link is not tight. To loosen a tight link, work the chain links back and forth with your thumbs, or place the stiff link in the secondary teeth (closest to the screw pin. The secondary teeth fit very tightly) of the chain tool and give the screw a slight turn to free the stiff link.

Before attempting to ride the bike, cycle the chain and the gears to make sure the drivetrain is working properly. Carefully inspect the chain to ensure that there are no other twisted or stiff links. Stiff links can be freed. Twisted and contorted links must be removed.

If you are not adding more links, remember that your chain is too short. You must avoid running your large chainring with the large cogs on the cassette, as the short chain will greatly stress your drivetrain and possibly break your derailleur or hanger. You must replace the chain or add more links at your first opportunity.

ADVANCED MAINTENANCE

Adjustment Basics

A fundamental concept that applies to EVERY barrelhead adjustment knob on your bicycle:
Turning any barrel-head clockwise (tightening it) will loosen that cable. Turning any barrelhead counter-clockwise (unscrewing it) will tighten that cable.

A fundamental concept that applies to all screws (standard or Phillips) on your bicycle: If it is not a hex bolt or part of a reflector, it is probably an adjustment screw. Tightening or loosening these screw will drastically alter your shifting or braking. All screws on derailleurs and brakes are adjustment screws.

All hex bolts on your bicycle are metric. Never using standard (measured in inches) wrenches on any bolt.

RESEAT THE WHEELS BEFORE DOING ANY DRIVETRAIN/BRAKE ADJUSTMENTS! Prop the bike upright on a level surface and open/close each quick release. You want all adjustments to be made relative to the proper position of the wheels.

Always start with the easiest, least expensive remedies. First, clean/lube the drivetrain, then inspect or replace cables/housing. Finally, consider replacing expensive drivetrain parts.

Adjusting Brakes

Tools: 5mm Allen wrench, Tool for adjustment screws (either Phillips head, 2mm, or 3mm Allen wrench)
How rim brakes work: actuating the brake lever pulls a cable -- which is held in place by brake housing -- and the cable pulls the lever arms of the brake until the pads contact the rim surface.

- The tightness of the cable dictates the combined distance of both brake pads to the rim. This translates into how "tight" or "loose" the brakes feel when the lever is pulled. Unscrewing the cable bolt allows you to tighten/loosen the brake cable.
- Each brake arm has a wire spring that resists the tension of the brake cable. When the brake lever is released this spring causes the brake arm to rebound, pulling the pad away from the rim.
- Each brake arm also has a tiny adjustment screw to tension the wire spring and center the brake pads on the rim. Tightening the screw on the right brake arm (clockwise) tensions the right brake arm. This moves the right brake arm and brake pad farther away from the rim and simultaneously moves the left brake arm and pad closer to the rim. Loosening the right brake arm screw moves the right brake pad closer to the rim and moves the left brake pad farther away. The adjustment screw on the left brake arm acts the same way.
- Each brake lever has a barrelhead adjuster. Turning the barrelhead clockwise performs the same function as loosening the brake cable and increases the combined distance of the pads to the rim. Turning the barrelhead counter-clockwise is the same as tightening the brake cable.

Tip: when setting up your brakes, make sure you can move each lever's barrelhead several turns in either direction to allow you to adjust the brakes during a ride. If your brakes wear down, you can tighten them (counter-clockwise). If your wheel comes out of true and the brake begins to rub the rim, you can slightly loosen the brake (clockwise) to alleviate the rub.

Installing new pads:

Disconnect the brake by unhooking the brake noodle from the lever arm.

For cartridge style pads:

- Remove the cotter pin with needle nose pliers.
- Slide the old pad out, clean any debris out of the holder, and then install the new pad.
- If the pad is all the way in, the cotter pin will easily insert.
- Finish pushing the cotter pin all the way down by squeezing it gently with pliers.
- You may need to loosen the brake cable to accommodate the new pads.

For full pad installation:

- Remove the old brake pad and install the new one on the first brake arm.
- Roughly position it so that it contacts the rim squarely.
- To finalize the adjustment, unhook the wire tensioning spring on just the side of the adjustment. This will cause the brake arm to be pulled into the rim.
- Finish positioning the brake pad so that the shaft of the brakepad contacts the rim perpendicularly. Ensure that the pad is centered on the rim and is adequate distance away from the tire; a pad that rubs the tire will quickly cut through the tire sidewall.
- Finalize the brake position by tightening the mounting bold with a 5 mm Allen wrench.
- You may need to loosen the brake cable to accommodate the new pads.

Drivetrain Basics

A few tips and common compatibility issues:

- The drivetrain parts 1 or 2 steps down the line from top of the line (i.e. LX, XT, Ultegra, 105) are the best bang for the buck. They're almost as good as top of the line, just not as light.
- SRAM chains are easier to install/remove, more durable, and more consistent than Shimano.
- Not all drivetrain parts in one line work with the parts in others. Many parts also have several specs: BB dimensions and spindle type, F Der. configuration, 7/8/9/10/11 speeds, etc. Before you order online, make sure your parts are compatible. Most of the time, you're better off spending a few dollars more at a shop.
- 8/9/10 speeds all have the same axle width, so rear wheels are compatible across those drivetrains. But the rest of the drivetrain (chain, shifters, derailleurs, cassette) are all specific for 8/9/10 speed. Upgrading one part means upgrading all of them.
- As the number of speeds increases, chains become. In a pinch, you can use a chain that is one speed higher (slightly thinner) than the number of gears you're running. For example, you can run a 9 speed chain on an 8 speed drivetrain.
- 7 speed wheels have a shorter axle than 8/9/10 speed hubs, so frames built for 7 speeds can't run a modern. 8/9/10 speed wheel. As a hack, and ONLY IF YOUR FRAME IS STEEL OR TI, you can bend the rear stays on a 7 speed frame to accommodate an 8/9/10 wheel. Never bend an aluminum frame -- the material will stress and may fail catastrophically.
- As a last resort (if you can't find a 7 speed shifter), an 8 speed shifter and 8 speed rear derailleur will work on a 7 speed bike, but there will be an annoying extra "click" and some of the gears will never shift smoothly
- To reiterate: clean your parts! They last much longer and shift much better.

Basic Derailleur Principles

1. A derailleur is a dumb machine:

- It has a spring that always pulls it in the same direction towards its "rest" position. This is usually towards the smallest ring or cog*.
- It only moves in the other direction when the cable tension pulls it that way. (The cable is also dumb.)
- A derailleur has 2 screws (H/L) which limit the range of motion of the derailleur. The derailleur will never swing lower than the lower limit allows and can never climb higher than the high limit allows.
- Set properly, the limit screws allow the derailleur to hit both the lowest possible gear and the highest possible gear without throwing the chain off the cogs or chainrings.

- Once the limits are set correctly to allow the full range of motion on the gears, everything else is cable tension. (Though you still may have to go back to refine the limit screws occasionally.)

* The small ring is always the “rest” position on a front derailleur. Some rear derailleurs pull the chain towards the innermost cog to the spokes, such as Shimano’s Rapid-Rise derailleur. If you’re not sure, you probably don’t have Rapid-Rise.

2. A shifter is also a dumb machine:

- A shifter has “clicks”, which are measured distances that the shifter pulls or releases the cable. This is called “indexing.”
- When a click pulls the cable (adds tension), the cable moves the corresponding derailleur in the direction that OPPOSES the derailleur spring.
- When a click releases the cable (lessens tension), the derailleur spring moves the derailleur towards its natural resting position.

Setting up a Rear Derailleur: (Why rear? It’s the easiest to setup, and it’s the most used part on the bicycle.)

Tools: 5mm Allen wrench, fine blade screwdriver or Phillips head, pliers (for pulling derailleur cable)

- Shift the derailleur down to its resting position, usually the smallest cog*. Make sure all clicks are released from the shifter.
- Release all cable tension on the derailleur by loosening the cable mounting bolt. You’re now ready to set the first limit.
- The limit screw that corresponds to the smallest cog is the high limit screw, marked “H” (Remember, on the rear sprocket, a smaller cog is a bigger gear!) If the letters are hard to read, the high limit screw is always the one on top, the low is always the one on the bottom.
- Adjust the screw so that the top pulley (the jockey) tooth line is just a hair outside of the tooth line of the smallest cog, between the small cog and the right dropout.
- Tip:** Derailleur limit screws always work the same way: turning the screw clockwise (tightening) always moves the limit towards the center of the cassette. Turning the screw counter-clockwise (loosening) always moves the limit away from the center of the cassette.
- Before you reattach and tighten the cable mounting bolt, make sure both barrelheads allow you to adjust in either direction.
- Reattach the cable, pulling it less taught than a guitar string.
- Shift through the gear range. If derailleur has trouble shifting into the bigger cogs (lower gears), unscrew the barrel adjuster to tighten the cable. If the derailleur has trouble dropping into the smaller cogs, screw the barrel adjuster clockwise to loosen the cable. Pro tip: the easiest way to remember which way to roll the barrel adjuster is to think about rolling it in the direction you want the chain to move. If the chain has trouble climbing into the bigger cogs, roll the barrel towards the biggest cog. If it has trouble dropping it into the little cogs, roll it towards the smallest cog.

Fixing a Broken Rear Derailleur

Sometimes, a derailleur hanger (the replaceable metal mounting piece to which the rear derailleur attaches) bends so severely that shifting is impaired. Many times, the hanger can simply be bent back to restore most of the shifting function. In other cases, a derailleur may simply shear off, leaving you no other options than to either walk home or get creative.

First, untangle the chain if it has become ensnared in the gears or between the chainrings and stays. Sometimes, the only way to dislodge a stuck chain is to break it.

If there is no hope of salvaging the derailleur, you’ll have to turn your bike into a single speed.

- Choose one chainring and one cog in the rear. Typically, you’ll choose the middle ring and a cog halfway down the rear cassette. Important: the chainline you choose must be almost parallel to the vertical plane of the frame.
- Reconnect the chain, bypassing both the front and rear derailleurs. Stretch the chain as tight as possible, you don’t have a rear derailleur to take up the slack.

- You may need to tie the damaged derailleur out of the way using the cable or any other available material.
- Finally, you open up the rear quick release and play with the position of the rear wheel in the dropouts to achieve slightly more tension on the chain.
- You can't do this with most full suspension bikes! The chain on most full-suspensions stretches tight and slackens as the suspension moves. If your rear shock has a lockout, lock it before you turn your bike into a single speed.

If this happens in a race, you may want to either put your strongest rider on the single speed, or tow the person riding the single speed.

Fixing a Broken Front Derailleur

This is far less of a problem than a broken rear derailleur. In fact, if you address this mechanical properly, you may notice very little inconvenience at all.

If the front derailleur breaks and leaves your chain in a convenient front ring, you may be able to ride it as is, though you are unable to shift.

If the front derailleur cage interferes with the chain, you may have to remove it.

- Unscrew the 5mm mounting bolt on the derailleur clamp. This will detach the derailleur from the seat tube.
- The derailleur cage has a screw that can be used to open up the cage. You can disentangle the derailleur from the chain without breaking the chain.
- You now have a "manual transmission." Because the rear derailleur takes up all the chain slack, you are free to reach down and place the chain onto whichever chainring you choose! (DO NOT DO THIS WHILE YOU ARE RIDING THE BIKE!)

Fixing a Sheared Shift Cable

- When a derailleur cable breaks, nothing prevents the derailleur from failing all the way down to the rest state -- usually the small ring on either the front or rear derailleur. That's not always the gear you want to ride home in. Here's a quick fix to get you home in a more comfortable gear.
- If the cable breaks (or becomes unattached) at the cable mounting bolt, you can simply reattach it. Your cable is probably shorter now, so your shifting may be off a few sequences. Screw the barrel heads all the way in to give yourself maximum slack.
- More likely though, your cable sheared at the head, inside your shifter. This is a harder problem.
- We're going to use our hands to move the derailleur into our preferred gear, and then use a water bottle mounting bold to screw it into place.
- Unscrew a water bottle mounting bolt enough to accommodate the cable diameter.
- Leave the cable attached to the derailleur mounting bolt and still routed through the housing on the rear triangle.
- Move the problem derailleur (front or back) into a comfortable gear.
- Pull the cable taut and wrap it around the water bottle bolt. Screw it down.
- Check your handiwork. If you're hacking a rear derailleur, you can still use the barrel adjustment to fine tune the tension of the cable to keep it in the right gear.
- Remove the cable housing from the shifter down to front triangle.-- you're not using it anymore and you don't want it falling into your spokes or drivetrain.

Wheel Problems

Broken Spokes

Stop riding immediately. You need to manage the broken spoke so that it doesn't get caught in the drivetrain and cause an accident. If you can complete remove the broken spoke from the hub and unscrew it from the nipple, this is your best option. When a spoke on the rear wheel breaks (where most do occur), you may not be able to remove the broken spoke from the hub. Instead, take dangling broken end of the spoke and wrap it around a neighboring spoke several times. If you have a piece of spare tape, you can use the tape to secure the broken spoken. This is only a temporary fix, your wheel will need shop attention before your next ride.

Wheel that Rubs a Brake

Wheel truing is one of the more difficult adjustments to make in a shop, and it is even harder on the trail. Before you try to true a wheel, first try to reseat the wheels to make sure the wheel is square in the dropouts. Your next option is to slightly loosen the brake. The easiest way to do this is to screw the barrel adjuster clockwise; you may also ease brake cable tension by slightly loosening the cable using the cable mounting bolt.

If this does not alleviate the problem, you can attempt to true the wheel. If you are not confident of your truing abilities, do not attempt this repair. You can easily make the wheel worse.

- Make sure the wheel is in the dropouts squarely before truing.
- Turn the bike upside down so that the bike is resting on its bars and saddle.
- Select the smallest spoke wrench that will fit on the nipples. A wrench that is slightly too large will strip the nipples.
- Now spin the wheel and observe where it hits the brake pads. Find the 2 or 3 spokes closest to the rub. These are the spokes you will adjust.
- Select the closest spoke(s) that pulls from the opposite side of the rub: if the rub occurs on the right side of the rim, find the closest spoke that pulls from the left side of the hub.
- Check this spoke. Does it seem loose? (Check the neighboring spokes that also pull from this side. One of them is probably the culprit.)

Truing theory:

Slightly TIGHTENING the spokes on the OPPOSITE side of the rub and slightly LOOSENING the spokes on the SAME side of the rub will move the rim back into true. In the case of a trailside accident, it's safe to assume that the spokes didn't tighten themselves, therefore one or more spokes probably got looser.

VERY IMPORTANT: spoke nipples are threaded righty-tighty, lefty-loosey. But the bike is upside down and we are working from the inside out. Therefore, directions are reversed: **clockwise turns loosen the spokes, counter-clockwise turns tighten the spokes.**

Starting with the spoke that we selected above, we begin our true.

- Using the spoke wrench, slightly tighten the spokes opposite the rub by turning the wrench 1/8 – 1/4 turn **counter-clockwise**. Do not over adjust the spokes; always work in small increments. You may immediately notice that the rim is moving away from the rub.
- Spin the wheel. Did you alleviate the rub?
- If not, slightly loosen the spokes on the same side of the rub by turning the wrench wrench 1/8 – 1/4 turn **clockwise**.
- Spin the wheel again? Is the rub gone?
- Repeat this process until you have improved the wheel to rideable condition.
- Quit while you're ahead. Ride home and take the wheel into the shop for proper truing and tensioning.

Bent or Taco'ed Rim

Truing won't help a rim that is bent beyond hope. Your last resort is to try to beat the wheel back into true. Doing this will further destroy your rim, so don't attempt this unless it's your only option to get home. You'll need to purchase a new wheel before riding again.

- Hold the rim with the bent/protruding area in the 12 o'clock position. The concave side should be facing you, the convex part of the rim is facing away from you.
- Smack the area of the bent rim against the ground.
- Check the wheel to see if you have improved its condition.
- Smack and repeat.

Another technique is useful when the wheel is shaped like a pringle.

- Hold the wheel like a steering wheel (9 o'clock and 3 o'clock positions) with one hand over each of the bent areas. The convex part of the bend should be facing you, the concave side facing away.
- Put the wheel down on the ground so that it rests on its hub.
- Using your weight, force the bent areas of the rim downward.
- Check your progress. Can you ride home? Congratulations!
- If not, sit down and have an energy bar. It's a long walk home.