

Beavercreek Bike Maintenance Class

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Preface:

This document includes the notes handout given to persons attending the Bicycle Maintenance and Trekking course co-sponsored by the Beavercreek Bikeway Advisory Committee and the City of Beavercreek Parks and Recreation Department. The notes are intended to supplement the class sessions during which techniques and procedures are explained and demonstrated. The notes could be used as a guide to bicycle maintenance by persons not attending the class. Because some of the procedures are related to safety of the cyclist, persons not mechanically inclined or unsure should have the work done by a professional bicycle shop mechanic. The sources of the notes and the City of Beavercreek are not responsible for accidents, damages, or injuries related to the use of these notes.

Class Notes

Some Suggested Web Sites for Bike Maintenance:

www.parktool.com

“Repair Help” link

“Bike Map”: Mouse click on the desired part of the bike picture.

“Repair How-To’s”: Select a region of the bike and click.

www.sheldonbrown.com/articles.html for articles by Sheldon Brown and others.

www.peterwhitecycles.com/fitting.htm for bike fitting information.

Some Suggested Web Sites for Local Biking Information:

www.miamivalleytrails.org Miami Valley RailTrails

www.bikemiamivalley.org Bike Miami Valley

www.railtrails.org Rails-to-Trails (Choose the State of Ohio)

www.co.greene.oh.us Greene County Parks and Trail Maps

www.metroparks.org Five Rivers MetroParks

www.daytoncyclingclub.org Dayton Cycling Club (Good web site including listing of many rides that you can do as a member or as a guest)

Some Types of Bikes:

- Single speed with coaster brake.
- Mountain bikes with large treaded tires for off-road riding.
- Road bikes with drop handle bars for low air resistance riding on pavement.
- Hybrids for bike trails and general use (cross between road and mountain bikes).

- Recumbents and Tandems.

Bike Parts: Frame, fork, stem/handlebars, seat tube and post, saddle/seat, crank set, chain, rear cassette, front and rear derailleur, wheels, quick release and dropouts, brake surface, caliper brakes, rim/tire/tube and rim strip.

Necessary Items for Independent Bicycling (carry these things on your bike): spare inner tube, patch kit and patches, tire boot material, frame pump, tire tools, wrenches to fit your bike, water bottle, and helmet.

Other Items Which Support Effective Bicycling (minimal suggestions): Chain lubricant, floor pump, cyclocomputer, Tools (bike specific allen wrenches, adjustable wrench, spoke wrench, etc.), and lights if you ride at night. A partial list of clothing would include padded shorts, padded gloves, biking shoes, and a three pocket jersey that wicks perspiration away from the body.

Right Hand Rule:

Most threads on a bike are “right hand threads”. Verify by positioning a bolt facing up and the threads slope up to the right. The “right hand rule” is to point your right thumb in the direction you want a nut or screw to move and the fingers will circle the bolt in the direction you must turn it.

Left Hand Rule:

Some threads on a bike are “left hand threads”. Verify by positioning a bolt facing up and the threads slope up to the left. Examples are the left pedal, which may have an “L” stamped on it, and the right side (drive side) of the bottom bracket. The “left hand rule” is to point your left thumb in the direction you want a nut or screw to move and the fingers will circle the bolt in the direction you must turn it.

Removing the Front Wheel:

- Release the front brake, if necessary, so the brake pads clear the tire and rim.
- Use the quick release (or loosen the wheel nuts on some bikes) until the wheel drops out of the fork. Some are counter bored to prevent accidental dropout.
- Make sure the tire is in the center of the frame tubes upon re-installation.
- Reset the brake release, spin the wheel and try the brake. Pads should be centered.

Removing the Rear Wheel:

- Shift the chain to the outside sprocket for easier removal and re-installation.
- Release the rear brake, if necessary, so the brake pads clear the tire and rim.
- Use the quick release (or loosen the wheel nuts on some bikes).
- Rotate the derailleur “guide pulley and tension pulley” cage until the wheel drops out of the rear fork. These are also known as “Jockey and idler” wheels respectively.
- Rotate the derailleur “guide pulley and tension pulley” cage out of the way to re-install the wheel. Note that the chain should be over the top of the front drive sprocket and over the top of the rear cassette gears.
- Make sure the tire is in the center of the frame tubes upon re-installation.

- Reset the brake release, spin the wheel and try the brake. Pads should be centered.

Fixing a Flat Tire:

- Remove the wheel from the bike. (Shift the gears so the chain is to the outside for easier removal and re-installation of the rear wheel).
- Remove all air from the tire.
- Release the tire bead by squeezing beads toward rim center all around both sides of the rim.
- Use bike tire tools for removal of one or both tire beads – do not use a screwdriver or other sharp edged tool which may pinch or cut the tube.
- Push the valve out of the rim and remove the tube.
- Find out what caused the flat. Check inside and outside the tire for a nail, glass, or damage. Remove foreign material. Inflate (low pressure) the tube. Locate escaping air. The position of the tube leak should be used to check the tire for damage/puncture. If the leak is on the inside of tube, check the rim strip. Reposition or replace as necessary. (Fabric rim strip tape is recommended for durability and staying in position.)
- Mark the leak and abrade an area slightly larger than the patch with sand paper or an abrading tool (included in the patch kit).
- Spread patching glue on evenly and let it dry to a blush or dull color.
- Remove the foil back on the patch and apply it to the tube with no air in it. Avoid touching the sticky side of the patch.
- Press and burnish the patch from the center toward the outside to remove all air bubbles.
- Use talcum powder on the tube to make it slippery (zip lock bag with powder).
- A small amount of air (low pressure inflation) gives the tube shape and helps prevent twists and folds in the tube during re-installation.
- With one tire bead on the rim, put the valve stem in first and then tuck the tube in 180 degrees from the valve.
- Tuck the tube into the tire working from the 180 degree position toward the valve on both sides preventing wrinkling of the tube.
- Check that the tube is not pinched between the tire beads and the rim. Inflate the tire. Stop inflation when about half finished to look at the tire beads for proper rim seating. If the beads look good, continue inflating to the pressure indicated on the tire sidewall. Pumps work best when you take complete strokes.
- Larger valves are standard Schrader type encased in rubber, like on American cars.
- Smaller valves with skinny metal stems are Presta type, or high end bike valves.

A Note on Fixing Flats: When you have a flat while riding away from home, it is usually best to replace the tube using the spare tube (previously powdered) from your bike bag. Then after the ride, patch the punctured tube at home and place it back into the tire. The good tube now becomes your spare again.

Pumps and CO₂ Inflation: When available, a floor pump is most effective. A compact (frame) pump carried on the bicycle for use on rides can be effective but require more effort. Cartridges of compressed carbon dioxide (CO₂) can be used with an adapter compatible with the valve. Because the CO₂ cartridge is a “one shot” device, a frame pump is also required to inflate the tube for finding leak location(s) and for multiple flats on the same ride. Practice using the CO₂ method and hardware before having to use then on a ride is recommended. CO₂ inflation is very quick. Rapid expansion of the compressed gas causes the cartridge to become very cold. Prevent freezing of skin by using some material (cloth or glove) between the cartridge and hand(s).

Wheels and Spokes:

- Inspect spoke tension every 200 miles or when the rim does not run true. Hub bearing adjustment should not allow more than slight wobble at the rim. Grab the rim and shake sideways to check bearing adjustment.
- Rims should run true (wobble between brake pads at rim) with runout less than 1/16 inch.
- Check for loose spokes on each side of each wheel by squeezing pairs of spokes that are most nearly parallel.
- Start at the valve stem and move around the rim on both sides.
- You can also strum the spokes for a dead sounding or loose spoke.
- Rear wheel spokes are tighter on the gear side and more straight up and down.
- If necessary, tighten loose spokes. To true the wheel, tighten spokes on the opposite side of the wheel from a “high spot” on the rim which hits a brake pad.
- If spokes get too tight near the “high spot” loosen spokes on the side of the “high spot”.
- Only go 1/4 to 1/2 turn at a time, and then test and repeat if necessary. Be sure that the spoke wrench is a snug fit.
- You can hang your bike using cord and a ceiling hook for truing wheels and other work.
- You can use the brake pad as an alignment gauge instead of a truing stand.
- Take a broken spoke to a bike shop in order to get the proper length replacement.
- When replacing spokes, match the cross pattern for other spokes in the wheel.
- Look for cracks in the rim at spoke holes. The only cure is to replace the rim.

Wheel Bearings:

- Some bikes have cartridge bearings and you must replace the assembly, if defective.
- Many bikes have loose ball bearings that are held in place by bearing cones and lock nuts threaded on the axle.
- Thin cone wrenches are required to work on this assembly.
- Only need to take nut, washer(s), and cone off one side. Then push the axle through the wheel hub.
- Can use two screwdrivers to pry metal dust seals off (one screwdriver acts as a fulcrum).

- Work over a cloth (like an old towel) to help manage bearing balls and loose parts. A magnetic screwdriver helps catch the ball bearings (usually 9-10, count them).
- Lay parts in order so you can put them back together in the same sequence.
- Clean ball bearings, cones and races (in the hub) with WD-40 and then grease them.
- Use waterproof bearing grease or 705 multi purpose lubricants from an auto parts store.
- The rough side of the outer nut must face “out” to mate with the frame drop out slots.
- Tighten the nuts so there is very little lateral play on the center shaft.
- Spin the wheel. It should roll very smoothly and quietly, or repeat the adjustment.
- If too loose, you get wobble. If too tight, you get a grinding noise and resistance to turning from the bearings.

Pedals:

- The right pedal has a “right hand thread”.
- The left pedal has a “left hand thread” to keep it from unscrewing if it gets loose. It may have an “L” stamped on the bolt or on the wrench flats.
- As a safety measure before removing pedals, shift the chain to the largest sprocket using the front derailleur. It is better to hit the chain with your hand than the sharp sprocket teeth if a wrench slips.
- As an alternate to the “left and right hand” threading rules, imagine a spot on the top of the pedal axle. Turn the pedal axle so that this spot moves toward the rear of the bike to loosen or remove and toward front of the bike to tighten or install.
- Some pedal bearings can be serviced using techniques used on wheel bearings.

Crank Set and Bottom Bracket:

- The crank set consists of left and right crank arms, and chain rings (forward sprockets). The crank arms are threaded for the pedals and are force fit to the bottom bracket spindle (axle). Special tools are required to pull the crank arms from the spindle.
- The bolts (or sometimes nuts) which secure the crank arms to the spindle must be kept tight. These should be periodically checked for tightness. These bolts (nuts) are right hand threaded and may sometimes be covered by a threaded dust cap.
- There should be no side play in the bottom bracket bearings. Verify by flexing the crank arms toward and away from the frame.
- The bottom bracket bearings may be serviceable or a cartridge unit may be replaced. Special tools for crank and bottom bracket removal are required.
- Chain rings (front sprockets) should be kept clean but do not need lubrication. Lubrication which comes from the chain is sufficient.
- Short hollow bolt and nut sets (chain ring bolts) which attach the chain rings to the right crank arm spider assembly should be kept tight and periodically checked for tightness.

Chains:

Cleaning and Lubrication:

- Chains may be cleaned while on the bike using WD-40 or another solvent or a degreaser. Spray, brush, and wipe until the chain is clean. A chain removed from the bike may be immersed and soaked in a solvent or degreaser. Let the chain dry overnight before re-lubricating it.
- Protect tires and rims from solvents and lubricants. A cardboard shield is a good idea.
- Wax (paraffin) is a very good lubricant, which does not attract road grit, and the chain is not messy to handle. A waxed chain is less likely to leave a black stain on your car upholstery, your sock, or your leg. This lubricant may not be as water resistant as oil-based lubricants. Oil based lubricants work well when clean but gather road grit and require more frequent cleaning. WD-40 is a good solvent but not a good lubricant.
- Chains removed from the bike may be waxed by immersing into a vat of molten paraffin. This method is very good because the chain assembly is penetrated. Wipe off excess wax while hot. **WARNING: Molten paraffin is very dangerous! It has a low flash point and should not be near an open flame. Spills can cause serious skin burns.** Spills are also very hard to clean up. Consider waxing the chain on the bike using White Lightning or a similar chain waxing product which can be applied as a cold liquid directly to the chain. Drizzle or drip this liquid on the chain while cranking pedals backward to get some of the liquid into the joint between all links.
- Oil based lubricants may be directly applied. Put plenty of lube on the chain but wipe the excess off because it just attracts dirt. Oil based lubricants like “TriFlow” work very well when clean but attract grit and dirt requiring more frequent cleaning.

Chain Removal and Replacement:

- Use a chain tool to press a “pin” nearly through, but not completely out of the other side of the chain. When the pin has been pushed to the proper position the links can be separated by bending the chain sideways at this link. Remove the tool and try this before the pin is pushed completely through. If the chain does not separate, reapply the tool. It is very difficult to re-install a pin that has been totally removed from a back link plate.
- After carefully threading the chain through the derailleurs and over cogs and chain wheels, reattach the chain ends. Reverse the sideways motion used to separate the chain and then use the chain tool to press the pin back into position. This action results in a “tight link” which must be loosened. Use the chain tool, with the chain properly positioned in the tool, for this purpose. Press the tight pin slightly to free the link.
- As an alternate to the chain tool, a special link can be fitted to permit easy removal of the chain. These “Power Links” or “Quick Links” can be purchased separately or some new chains include them. A chain tool will be required for initial installation. The width of these links must match the chain.

Chain Inspection and Troubleshooting:

- Most chain problems are skipping over cog teeth and/or noisy and unsmooth operation. Assuming the chain is clean and well lubricated, these symptoms indicate either a worn chain or tight chain link(s). If the chain shifts off the outside cogs or chain wheels, or if the chain rattles in a given gear, the problem is related to derailleur adjustment.
- Check for a worn chain with an accurate ruler or steel tape by verifying the center-to-center distance of pins over 12 inches. A 12- 1/16 inch “stretch” is acceptable but you need to replace the chain soon. If 12- 1/8 inch of “stretch” is measured, the chain will cause gear skipping and damage the cogs under heavy load. Replace it! A measurement greater than 12- 1/8 inches may indicate that both cogs and the chain are worn. In this case, a new chain may skip on the old cogs which may also have to be replaced.
- Tight links make a clunking noise, cause skipping especially on small cogs, and erratic motion of the derailleur cage. Check for tight links by observing the rear derailleur cage and lower pulley while slowly cranking the pedals backward. Bend the chain back and forth sideways quite hard until the tight link gets loose, or use the chain tool to adjust it.

Cables:

- Cables consisting of an outer casing and an inner wire are used to control many bicycle functions including braking and shifting gears.
- The inner wire (flexible braided wire cable) connects control levers to brakes and derailleurs. The casing is used to route the inner wire and to control tension.
- Inner wires are attached by pinch bolts at the brake or derailleur. Gross adjustment is done by repositioning the wire under the pinch bolt.
- Cable casing is held at one end by a socket like cable stop. The other end of the casing is usually held by an adjustment barrel. Adjustment barrels are threaded devices which are used to make fine adjustments to inner wire tension. Adjustment barrels may have locking nuts to hold adjustments.
- When adjusting cables by moving the inner wire in the pinch bolt, the adjustment barrel should be in its mid adjustment range.
- Cable casings are often divided into two or more segments with exposed inner wire between them.
- Loose ends of inner wires should be protected from fraying by a cable end cap.

Brakes:

- The notes here apply mostly to rim brakes. Disk brakes need adjustment specific to the design and manufacturer. Coaster brakes (brake by cranking pedals backward) need little or no adjustment. Coaster brake arms must be securely fastened to the bike frame.
- Brake pads must hit the rim only, and must not rub on the tire.
- Position brake pads so the front ends contact the rim first. To accomplish this, “toe” the pad in toward the rim by positioning the rear end away from the rim by

- about 1/16 th of an inch when the front end just touches the rim. A screeching brake sound is sometimes caused by brake pads which are not “toed” in.
- Brake cables must be adjusted so that brake levers don’t go all the way to the handlebars for adequate braking and so that the brake pads do not drag on the rim when the brake levers are released.
 - The rim should be approximately centered between the brake pads and the pads should return to this position after the braking.
 - Centering brakes is specific to brake type and design. Caliper brakes are locked in position by a bolt through the bike frame (brake bridge or front fork). Cantilever and “V” brakes are centered by adjustment return springs at the brake arm pivots.
 - An adjustment barrel is usually provided for each brake cable for fine adjustment.
 - Brake levers on bikes with flat handlebars (mountain and cross bikes) may have slotted adjustment barrels which provide for easy removal of brake cables.
 - Brakes must not be released when cable adjustments are made.
 - Adjustment barrels should be moved to the center of their adjustment travel when adjustments are made at the inner wire pinch bolt.
 - Inspect brake pads with the wheel removed or with the brake released. Remove any imbedded dirt or grit.
 - Brake pads should be replaced if grooves are not visible in the pad friction face.

Rear Hub with Cogs:

- A “Free wheel” or a “Free Hub” at the center of rear wheels permit coasting when not pedaling. Small pawls inside these hubs make the clicking sound which is normal.
- A special tool is required to remove free wheels with their cogs or to remove the cogs from a free hub.
- Clean gear cogs with a brush or thick cord. Shoelaces from old sneakers work well. Remove large dirt particles while dry, and then use WD-40 or some other solvent.
- Do not get solvents on wheel rim braking surfaces.
- There is no need to lubricate cogs. Lubrication on the chain is sufficient.

Rear Derailleur:

- The purpose of the rear derailleur is to shift the chain from one rear cog to another when changing gears. The rear derailleur also has a pivoting cage with two pulleys. This cage keeps the chain tight when shifting gears. The top pulley is the “guide pulley or jockey” and the bottom is the “tension pulley or idler”.
- The rear derailleur is pivot bolted to a part of the bike frame called the derailleur hanger. When the bike is held upright and viewed from the rear, the derailleur cage should be vertical. If the cage is positioned in at the bottom, the hanger or the derailleur has been bent. Adjustments for proper shifting may not be possible

- if these parts are bent. Hangers can sometimes be straightened by a bike shop but bent derailleurs usually must be replaced.
- Clean and lubricate the derailleur before adjustments. After wiping the derailleur body clean, apply a drop of oil (motor oil, sewing machine oil, or 3in1 oil) to the ends of pivot pins. Flex the derailleur and wipe off excess oil. This lubrication should be repeated at the beginning of the riding season or about every 500 miles.
 - Two limit screws (sometimes marked with “H” and “L”) are included on the derailleur body.
 - Limit screws keep the derailleur and chain in the proper range. The “low” limit screw controls the inward position of the derailleur and chain. Proper adjustment prevents the derailleur and chain from hitting the spokes but permits shifting to the largest (inside) cog. The “high” limit screw controls derailleur and chain position to the outside or smallest cog. Proper adjustment of the “high” limit screw permits shifting to the smallest cog without shifting beyond it. Adjustments are quite sensitive so turn these screws only about 1/8 turn for each shifting trial.
 - If no adjustment of the limit screws will allow the chain to shift to the largest cog (“Low” limit screw) or to the smallest cog (“High” limit screw), the shift cable tension must be adjusted. Shift to the smallest cog, loosen the cable pinch bolt and remove slack from the cable but do not make the cable tight. Tighten the pinch bolt. The adjustment barrel should be in mid range when the cable is moved in the pinch bolt. Tighten the pinch bolt. Now check shifting at both the large and small cogs and that the chain does not shift beyond these cogs. Readjust the “high” and “low” limit screws if necessary.
 - A third rear derailleur adjustment screw located near the derailleur hanger can be used to adjust derailleur pivot angle. Proper adjustment of this screw positions the jockey pulley (top) near to, but not touching, the largest cog when the derailleur is at its innermost position.
 - Shifting should be checked with the chain on each of the front chain rings. For bikes with triple front chain rings, extreme chain angles (largest front chain ring to largest rear cog and smallest chain ring to smallest rear cog) may not be achieved. These gear combinations should not be used when riding because the same gear ratios can be achieved in other chain ring/cog positions where the chain will not be excessively flexed.
 - If the bike is equipped with indexed shifting (levers or twist grips click with each gear change) and the chain makes a rattling noise or won’t stay on one of the middle cogs, the cable tension should be adjusted using the adjustment barrel. To do this, shift to the center cog and turn the adjustment barrel in or out by 1/4 turns while cranking the pedals until the noise stops or the chain stays on the cog.
 - If the jockey or idler wheels have too much lateral play or worn teeth, they can be replaced.

Front Derailleur:

- The front derailleur shifts the chain from one chain ring (front sprocket) to another to change the range of gearing. The front derailleur is attached to the frame above the chain rings and can be moved up and down and rotated.
- Proper up and down position is 1/16 inch (2 mm) above the large chain ring when the front derailleur is in its outside position. When in this position, the proper rotation places the outside cage plate parallel to the large chain ring.
- “High” and “Low” limit screws are used to adjust the travel of the front derailleur. Proper adjustment allows the chain to be shifted to the smallest and largest chain ring without shifting the chain beyond the chain rings and off.
- If no adjustment of the limit screws will allow the chain to shift to the largest (“High” limit screw) or to the smallest chain ring (“Low” limit screw), the shift cable tension must be adjusted. Shift to the smallest chain ring, loosen the cable pinch bolt, and remove slack from the cable but do not make the cable tight. Tighten the pinch bolt.
- After adjustments, try shifting the front derailleur with the chain in each of the rear cogs. Readjustment of limit screws may be necessary for some rear cog positions.

Headset:

- Bearings between the top of the front fork (steering tube) and the bike frame (head tube) are referred to as the “headset”. The handlebar is connected to the steering tube via the stem and the head set bearings provide smooth and free turning of the handlebars.
- Headset bearings are checked for proper adjustment by holding the front brake and rocking the bike in a forward and back motion. Little play should be felt. If the handlebar and fork shake, the bearing cones should be adjusted. While holding the wheel off the ground or floor, turning the handlebar left and right in a steering motion should be smooth and free. If resistance (other than bending of brake and shifter cables) is felt, the bearing adjustment may be too tight. Roughness in this motion may be an indication that the bearings are damaged or that cleaning and lubrication is needed.
- For bikes with older quill type stems, the steering tube which is part of the fork is threaded. This arrangement can be identified by the presence of a large locking nut located where the stem goes into the steering tube at the top of the frame head tube. Headset bearings are adjusted by loosening the lock nut located at the top of the head tube, adjusting the bearing cone (nut) which is directly below the lock nut, and then locking the cone and nut by holding the cone and tightening the locking nut. The cone and locking nut are usually separated by a washer. The cone requires a large (usually 32 mm) thin wrench and the locking nut can be tightened by a large adjustable wrench.
- Newer bikes may have threadless (the steering tube is not threaded) headsets. This arrangement can be identified by its larger diameter stem and a bolted clamp which attaches the stem/handlebar directly to the steering tube. To adjust these head set bearings, loosen the bolt(s) which attach the stem to the steering tube, tighten or loosen (this usually requires an allen wrench) the bolt in center of a cap at the top of the steering tube. Make small adjustments and bearing checks until

- the bearings are properly adjusted. Then tighten the bolts which clamp the stem/handlebar while holding the handlebar perpendicular to the front wheel.
- Cleaning and lubricating or replacing the headset bearings requires removal of front brake cables (and readjustment of the front brake), removal of the fork, and the bearings. Although this operation can be accomplished by the home bike mechanic, it is considered beyond the scope of this course. Instructions for doing this can be found in most bicycle repair manuals or on line at the locations mentioned at the beginning of these notes.

Saddle Adjustment/Fitting:

- The saddle adjusts up and down, tilts, and moves forward and backward with easy adjustments. Place your elbow on the nose of the saddle and verify that your extended fingers clear the handle bars by about an inch, for approximate fore and aft adjustment.
- Your knee should be slightly bent at full extension at the bottom of the stroke if the seat is at the proper height. This is with the balls of your feet on the pedals.
- The seat is too high if your hips rock up and down to reach the bottom of the stroke.
- The seat is too low if your knees are always severely bent and you also lack a power stroke.
- Start with the saddle level and go in small tilt increments for personal comfort.
- If too much pressure is on the hands, move the saddle backward or level the saddle if it is tilted downward.
- Grease the seat post once per year to prevent seizing.

Periodic Bike Checks

(Beginning of the Season and at 500 Mile Intervals)

Clean the Bike First:

- Wipe painted surfaces with a damp cloth. Use cleaners and degreasers as required but don't get them into locations that should have some form of lubrication.
- Don't use cleaners, other than water, on braking surfaces of the rims.
- Don't spray water or WD-40 into the bearings.
- WD-40 is a good solvent for cleaning chains, sprockets, and derailleurs during maintenance but is not an acceptable lubricant for bikes. WD-40 can also damage the decals and finish on your bike so use it carefully.

Wheels:

- **Spoke Tension** – All front wheel spokes should be the same. In rear wheels, spokes on the drive (cog) side will be tighter but all spokes on the same side should be evenly tensioned. Squeeze pairs of spokes that are most nearly parallel to check for broken or loose spokes or strum them and listen for a dead sound.
- **Runout** – This is lateral wobble of the rim while turning and requires truing, by adjustment of the spokes, if the runout is greater than 1/16 inch, or if the rim rubs on properly adjusted brakes.
- **Bearings** – Excessive lateral play (sideways) will make a clunking noise. They should feel smooth and free wheeling. A grinding noise means they may be adjusted too tight, need lubrication, or the bearing cones may be pitted or damaged.
- **Rims** – Check for dents. If there are cracks around the spoke holes, the only cure is to replace the rim. The braking surfaces should be smooth.
- **Tires** – Check for cuts, debris in the tread, and the general condition like cracking or bumps.

Brakes:

- **Levers must not bottom** – Squeeze the brake levers and make sure they don't touch the handle bar for adequate braking.
- **Pad Wear** – The grooves should be visible or replace the brake pads.
- **Pad Alignment** – Make sure the pads hit the rim and not the tire. The front of the pad should contact the rim first for a slight "toe-in".
- **Centered** – There should be equal pad travel on each side of the rim, if possible.
- **Cables** – Must move freely. When brake levers are released they should spring back to their original position. Cables (inner wires) should not have broken strands, should have end caps to prevent fraying, and not be rusted or corroded.

Headset:

- **Check Bearings for Looseness** – Test by holding only the front brake and rocking the bike back and forth while listening for a clunking sound or watching for excessive play.
- **Check for Smooth Turning** – With the front wheel off the ground/floor, steering motion should be free and smooth.

Drive Train:

➤ **Chain:**

- **Check for Wear** – Measure pin-to-pin over 12 inches. Up to 12- 1/16 inch is acceptable. Consider replacing the chain if more than 12-1/16 inches.
- **Clean and Lubricate** – Clean with WD-40 and let dry. Use wax (paraffin) for a clean chain that does not attract road grit. If oily lubricant is used, clean more often. Wipe off excess lubricant.
- **Check for Tight Links** – They don't bend freely at the normal pivot points. Tight links can be identified as they pass over the derailleur pulleys while pedaling slowly backward. Bend the chain back and forth laterally or use a chain tool to correct the problem link.

➤ **Bottom Bracket:**

- **Bearing Play** – Should be quite tight and no noises.
- **Tightness of Crank Arm Attach Bolts** – These should be very tight using an appropriate metric socket or allen wrench.

➤ **Chain Wheels:**

- **Bent Teeth** – Inspect.
- **Runout** – Inspect.
- **Tightness of Chain Ring Bolts** – Verify that all are tight.

➤ **Free Hub (Free Wheel):**

- **Coasts (freewheels) Smoothly** – Verify.
- **Pawls** – Clicking during coasting is normal.
- **Tooth Wear** – Check while test riding. The chain will skip under heavy load if teeth are worn excessively.

➤ **Derailleurs:**

- **Vertical Rear Derailleur Cage** – Verify there is no lateral slant to this unit that has been caused by accidental damage.
- **Jockey Wheels** – Check for tooth wear and that the center bearing or bushing is free running. A light lubricant may be used on the bearings.
- **Clean and Oil Pivots** – There are 4 pins so both ends equal 8 points that need cleaned with WD 40 and oiled with a petroleum based lube. Wipe off the excess to prevent attracting too much dirt.
- **Shifting Effectiveness** – Verify crisp shifts up and down and that the chain does not shift beyond (off) the small or large cogs and chain rings.

- **Cables** – Verify they move freely (both up and down shifting is crisp) with no rust, corrosion, or fraying.
- **Pedals:**
 - **Pedals** – Verify that each turns freely and quietly with little bearing play. Pedal axles should not be bent. Some pedals have bearings that can be cleaned, lubricated, and adjusted. Less expensive pedals must be replaced if defective.

Check Before Each Ride

Tire Pressure

- Inflate to the pressure, or range, printed on the tire sidewall

Wheels:

- Quick releases are closed (or axel nuts are tight)
- Wheels are properly aligned in the frame tubes
- Roll freely, smoothly, and quietly
- Have minimal runout

Brakes:

- Levers do not bottom
- Pads hit the rims – not the tires

Trail Etiquette

- Share the trail with other users
- Bikers yield to ALL other users
- Keep right except to pass
- Announce passing to others
- Move off paved trail when stopped
- Obey all rules and regulations