

# ED Bike Maintenance Course

## ***Topics Covered***

- Pre Ride Check List
- Fixing a Flat
- Repairing a Tube
- Adjusting Brakes
- Adjusting Gears
- Cleaning and Oiling a Chain
- Removing the Pedals
- Tools on the Bike
- Tools at Home

## ***Safety First***

Be aware that while a bicycle is a relatively simple machine, there is still enough that can go wrong with it that, under certain circumstances, can cause an accident. While badly adjusted gears will typically only be annoying, they can still cause an accident if you are standing up on flat pedals.

This is especially true when adjusting the brakes, if the brakes are going to fail under heavy load, or not work properly in the first place then the bike should not be ridden.

This course is designed to stop you from visiting the bike shop every 5 minutes, and to allow you to do minor repairs/adjustments yourself. However, if at any point you are unsure if what you have done is correct, or you cannot get something working as it should, take it to a bike shop, tell them what you have done and when they return it to you, ask about where you went wrong.

## ***Pre Ride Check List***

Before riding your bike, you should make sure that it is safe to ride. This isn't an exhaustive list, but it is something you should be aware of before throwing a leg over the bike. If the bike hasn't been ridden for a while, then there are more checks that should be performed. If the bike is ridden regularly, then you are usually aware of the state of the bike and this check list can sometimes be omitted.

### **1. Check the Quick Release Skewers**

Make sure that the wheels are tight in the frame, and that the skewers are fully closed. The levers should be flush with the frame, this reduces the risk that they will get caught on something.

### **2. Check the Brake Lever Pull**

Pull on both brake levers and ensure that the pads are contacting with the rim. Also ensure that the levers are not contacting with the handle bar. If either of these are a problem then the brakes will need to be adjusted.

### 3. Check the Tyre Pressure

Simply press a thumb against both tyres to ensure that they haven't lost too much pressure since they were last inflated. If they are too soft, inflate them to your usual pressure.

### 4. Check the Chain

Make sure that the chain has no stiff links (turn the cranks backwards and ensure that it isn't catching on the cassette or the jockey wheels). Check to make sure that the chain has sufficient lubrication, and if necessary apply some more. If there is any visible rust on the chain then it will need to be lubricated.

### ***Fixing a Flat***

A flat tyre is the most common mechanical situation that you will have to deal with on the bike. Because of this it is always worthwhile to be in a position to be able to fix one.

When riding, there are 4 ways to deal with the flat

1. Repair the tube
2. Replace the tube
3. Hitch a lift
4. Walk

While the last two will get you to where you want to go, they aren't the idea behind this course. Your best bet, is to replace the tube when on the road, and then patch the tube when you are back home.

Before you can replace the tube, you need to first remove the wheel. Here are the instructions for removing the wheel with quick-release skewers.

#### 1. Release the Brake

On most Mountain/Hybrid bikes, the brakes are released at the callipers (on the wheel). This is achieved by squeezing the callipers together by hand, and then pull the cable noodle back and up to release it from the brake arm link. It may be possible to remove a wheel without releasing the brakes with a fully deflated tyre, but it is near impossible to replace a fully inflated wheel without releasing the brake.

#### 2. Remove the Wheel

If you need to remove the rear wheel, first shift it to the most outward position (the smallest cog or the hardest gear). Now it is necessary to release the wheel from the frame. If you have quick release skewers. This is as simple as pulling the lever outward to open it. In some cases, the wheel is then able to be removed, but on others it may be necessary to unscrew the skewer to allow more space. If you do not have quick release skewers and instead have axle nuts, it is necessary to unscrew these, usually with a 15mm spanner, it usually isn't necessary to completely unscrew the nuts to remove the wheel.

At this point, a front wheel can be lifted out of the fork, a rear wheel requires a bit more effort. When you push the wheel out, you will need to move the chain out of the way. This manoeuvre is usually a matter of grabbing the rear derailleur and pulling it back so that the jockey wheels move out of the way, while you push forward on the quick release or axle nuts with your thumbs and let the wheel fall as you hold the bike up. If the bottom half of the chain catches the wheel as it falls, lift the wheel and jiggle it upward to free it.

### 3. Remove the Tyre

Depending on the type of flat, there may still be air in the tyre, if this is the case, then it will be necessary to remove as much as possible before the tyre can be removed. If you have a Presta Valve on the tube, then this is simply a matter of unscrewing the valve and pressing it until most of the air has been released. For Schrader, you will have to insert something into the valve stem to release the valve.

The next step is to unbead the tyre, depending on the wheel and the tyre, it is sometimes possible to lever the tyre off without using levers. This is preferable as it reduces the risk of damage to the tube. In many cases, it is necessary to use tyre levers. Insert the lever (with its scoop toward you) while making sure that you do not pinch the tube between the lever and the tyre. Pry down on the lever until the tyre bead is pulled out over the rim. If the lever has a hook on the other end, hook it onto the nearest spoke. Otherwise keep holding it down. Place the next lever a few inches away and do the same thing. If needed insert a third lever further along and pry it out, continue sliding this lever around the tyre pulling the bead out as you go. Some people slide their fingers around under the tyre bead, but beware of cutting your fingers on a sharp bead.

Once the bead is off the rim on one side, pull the tube out. It is not necessary to remove the tyre from the rim. If you are patching or replacing the tube, you only need to remove the bead from one side of the rim. If you are replacing the tyre, the other bead should come off easily with your fingers.

### 4. Replace the Tube

Before inserting a new tube, check the tyre for the cause of the puncture, this can be done in three ways. A visual inspection, look at the inside and outside of the tyre, it is sometimes possible to see what caused the puncture, or where it entered the tyre (the cause has sometimes been blown out when the tube punctured). Another way to find the cause is to feel inside the tyre, be careful, as whatever caused the flat can also be sharp enough to cut your fingers. The third option is to inflate the holed tube, and find the leak, then determine where the puncture was on the tyre. This last method is only useful if you haven't removed the tyre, or you know how the tyre was orientated on the rim, this is why it is a good idea to line up the writing on the tyre with the valve stem.

Once you have determined that there is no obstruction in the tyre, you are ready to insert the new tube (or the newly repaired tube). First, put some air into the tube to give it some shape, this shouldn't be a lot, too much and it is near impossible to put the tube in the tyre or the tyre back on the rim, too little, and you are more likely to pinch the tube when putting the tyre back on. This is simply done by putting the tube on your pump and giving a few strokes.

Next, insert the tube under the tyre, and push the valve through the valve hole. Now, working on both sides simultaneously, push the tube into the tyre. The tube should sit within the tyre, if any of the tube is still outside the tyre, or not between the tyre and the rim, push it in until it is. Now, again working from both sides, start pushing the bead back on the rim, when you are about  $\frac{3}{4}$  of the way around, you will find that it is getting tighter. Ideally, you should push the bead back onto the rim without using tyre levers as you are much less likely to pinch or damage the tube. To achieve this, you will have to work in both directions from a starting point. At first, the tyre will re-bead easily, but it will get harder as you get closer to complete. At the end, you will have to roll the tyre back on. It isn't always possible, and sometimes the tyre levers do need to be used. Just be careful when using them to try and avoid damaging the tube.

Once the tyre is back on the rim, check to make sure that the tube isn't pinched between the tyre and the rim. Simply squeeze the tyre bead together, and look between the tyre and the rim, make sure that no tube is visible. You will need to do this on both sides of the tyre.

You are now ready to re-inflate the tyre. Attach the pump, flick up the lever, and inflate to your

desired pressure (or whatever you can squeeze out of the pump).

## 5. Replace the Wheel

The front wheel is very easy to install, simply place the forks astride of the wheel, make sure that it is properly seated in the forks, and then tighten the quick release skewer. Make sure that it is tight enough so that the wheel won't come loose. The lever must be on the left hand side of the bike. If you are unsure, compare to the rear wheel.

The rear wheel can be a bit trickier. The bike should be in the highest gear, this means that the derailleur is furthest from the centre line of the bike. It is necessary to ensure that the chain runs around the cassette correctly. The path is from the top of the chain ring, to the top of the cassette, round the top jockey wheel, round the bottom jockey wheel, and back to the bottom of the chain ring. It is usually necessary to put the cassette within the chain. Because the derailleur is in the highest gear position, put the chain over the smallest gear on the cassette, and then push the wheel into the wheel supports. Before tightening the skewer, it is usually best to ensure that the wheel is correctly seated. The easiest way to do this is to put the bike the right way up, and lift and drop the rear wheel. Then tighten the skewer.

It can sometimes be an interesting exercise trying to tighten the skewer so that the wheel is seated correctly. To do this on the front wheel, it is usually easier to straddle the bike, and hold the frame with your legs, while tightening the front skewer. The rear wheel can be a bit harder, it is possible to support the bike by using your head on the saddle, and then tightening the skewer. Generally, the bike should be right way up when tightening the skewers.

## 6. Reattach the Brake

Do not forget this step. It is very easy to do, and finding out that you are missing the brake when you go to use them is not the time you want to discover it. Simply squeeze the brake callipers together, and reinsert the noodle into the brake arm link. Check to make sure that the wheel turns freely. If it doesn't, it is usually an indication that the wheel is not seated correctly in the frame. Loosen the skewer, and make sure that it is correctly seated before tightening it again.

## ***Changing Tyres***

You will wear out tyres on the bike, even hard wearing tyres will wear out. Unless you have a tyre failure, your rear tyre will wear out significantly faster than your front tyre. For riding on the road, I recommend narrow slick tyres, slicks offer a lot less rolling resistance, and narrower tyres are lighter, which means that the wheels will accelerate and roll quicker.

### 1. Swapping Tyres

It is possible to move the front tyre to the rear and then put a new tyre on the front. This ensures that you are changing both tyres on a reasonably frequent basis. The old front tyre (now on the rear) will wear out quicker, as it already has some usage. Never swap the rear tyre to the front. The front tyre is required for steering, and you do not want a heavily worn tyre on the front.

### 2. Lining up the Sticker

When installing a tyre on a rim, try and line the sticker up with the valve hole. This is for two reasons. 1) It looks good, 2) more importantly, if you are trying to track down what caused your puncture, you will probably take the tube out. If you leave the tyre on the rim, then it is possible to track the cause by the valve hole. If you have taken the tyre off the rim, then you have nothing to line it up with, unless you initially lined the sticker up with the valve hole. Also check the tyre for a

rotation direction, not all tyres have this, but it can be important to get it right if it does.

### 3. Tyre Sizing

There are two numbers in relation to size on the sidewall of a tyre. This is usually written in the format of rim size x tyre width. e.g. 26 x 1.5, this means that the tyre is designed to fit on a 26" rim, and is 1.5 inches wide. Some 26" tyres will list their width in fractional sizes (e.g. 2  $\frac{3}{4}$ ) as strange as it sounds, this is different to 2.75". Be aware of tyre width in relation to tube size. Make sure that the tubes and the tyres match. If you are running narrow tyres (up to 1.5" wide) on a 26" rim, then it may be easier to use a 650C tube. 650C is a small road bike standard. If you are running a road bike standard wheel (700C, sometimes also written as 622), then the tyre width is listed in millimetres (e.g. 700x23C). Smaller road bikes run a wheel size of 650C.

### 4. Tyre Inflation

On the sidewall of the tyre, there will be information on the minimum and maximum inflation pressure. The maximum number is usually a compromise between Marketing and Legal, Marketing want it as high as possible, Legal want it as low as possible. When riding on the road, I would recommend running the tyre pressure at the maximum as per the side wall.

## ***Repairing a Tube***

Many people, don't like repairing tubes, they don't feel that a patch is not as good as the original tube. If a patch is applied properly, it will last the life of the tube. Plus, even cheap tubes are about \$5 each, where as a patch kit is only a little bit more (and it usually comes with about 6 patches), and a strip of new patches (6) will only cost a few dollars.

While it is possible to patch on the road, I prefer to patch at home, I have everything that I need and I usually do a batch at a time. I have several spare tubes, so it isn't necessary to patch straight away after swapping out a spare. Depending on how much you want to invest in tubes, you may have to patch more often.

### 1. Patch Kit Contents

Each patch kit will always contain

- Vulcanising Agent (glue)
- Patches
- Scratch Pad/Sandpaper

It may also contain

- Chalk/Crayon
- Rubber Tube

If the patch kit contains a scratch pad rather than sandpaper, replace it with a small piece of sandpaper. It doesn't need to be course, I use 250 grit. If you have been supplied with a course sandpaper, it may be advisable to just replace it anyway. If the kit contains chalk or a crayon, I would also recommend discarding them. They are designed to mark the tube at the location of the hole and for applying to the back of a newly applied patch. They typically disintegrate in the kit, and foul up your patches. The rubber tube is a replacement part for a Dunlop valve, unless you are running this valve type, it again can be discarded.

## 2. Locate the Hole

There are three ways which allow you to locate the hole in the tube.

- Visual Inspection
- Inflating and listening for the leak
- Bucket of Water

The first is only possible when there is a sizable hole in the tube, this isn't normal, as the hole will shrink to very little when there is no air in the tube. One way to assist in this method is to stretch the tube, this will often expose the hole.

The second is the most common way. Simply inflate the tube and locate where the air is escaping, sometimes it is hard as the hole is big enough that the air pretty much escapes as soon as you put it in, sometimes you can feel where the air is escaping, and sometimes you will have to carefully listen for it. If you are unsure if you have located the hole, putting a drop of saliva on the spot often assists as it will bubble if there is air escaping.

Sometimes, the first two methods will still not allow you to locate the hole. This is usually the result of a pin hole puncture, or a slow leak. The only way to locate these holes is to push the tube through a bucket of water and watch for the stream of bubbles. Sometimes this is a very very small stream of bubbles.

Once the hole has been located, it is a good idea to mark it. I recommend a felt tip pen, mark the hole with a set of cross hairs.

## 3. Prepare the Tube

All tubes are created in moulds, and as a result, they have seams running around them. These will need to be levelled out before the tube can be patched. While it is possible to sand these down, it is a lot easier to shave it down with an old safety razor blade head. This is easier if the tube can hold sufficient air to keep its shape, but it can be done with the tube completely deflated. Carefully (as you don't want to create another hole), shave the ridge down until it is smooth with the rest of the tube. Keep in mind the size of the patch, you don't need to remove much more than the patch is going to cover.

Next, the tube will need to be sanded. Contrary to popular belief, it isn't necessary to rough the tube up. When a tube is created in a mould, the inside of the mould is first coated with a substance to stop the rubber from sticking to it, some of this will attach to the outside of the tube. The patch will not stick to this. So, it is necessary to remove it, that is the reason for sanding the tube. Again, be aware of the size of the patch, but ensure that a significantly large area around the edge of the patch is also sanded. If the tube is still holding air when this is done, don't forget that the tube is stretched and will shrink when deflated.

## 4. Apply the Glue

What is often referred to as glue in a patching kit, is actually a vulcanising agent. This means that when a patch is applied to the tube, it will bond at a molecular level, so instead of having patch-glue-tube, you instead end up with patch-tube bonding as one. The longer a patch is left on a tube, the stronger this bond. This is why a patch will last the life of the tube.

If the tube still contains air at this point. Deflate the tube before proceeding. It isn't necessary to remove all of the air, but you don't want the tube deformed because of air within it.

Apply a drop of glue to the patch, and with a clean finger (surprisingly difficult at this stage in the process), spread it out evenly over the tube. Make sure that enough of the tube is covered so that the

entire patch will be covered.

Now, allow the glue to become touch dry, it will usually lose its sheen and go a matte colour.

## 5. Apply the Patch

It is only necessary to use a patch that will completely cover the hole, the patch will often come in a strip, so it is necessary to tear it away from the rest of them. They are typically backed by a foil. Carefully peel this foil away and you are left with a patch stuck on to either plastic or paper. Do not touch this side of the patch. Only handle the patch by the paper to which it is stuck. Being aware of where the hole is, apply the patch so that the hole is as close to the centre of the patch as possible. Then apply firm pressure to the patch.

I prefer to leave the patch alone for several hours at this point, and I usually leave it under pressure this entire time (small tables are really good for this). If however, you need this patch quickly, I would recommend applying decent pressure for a few minutes.

Once the patch has adhered, it is possible to remove the backing paper or plastic. Do this carefully to avoid lifting the edges of the patch. Once removed the tube is ready to be reused (as long as the patch has worked properly). To test the patch, it is possible to either inflate the tube and leave it for a few hours, or simply stretch the tube in both directions to ensure that the patch is not going to part ways with the tube.

## ***Adjusting the Brakes***

When you use the brakes, you slowly wear down the pads. They will wear down even quicker in the wet. This means that there ends up being more and more give in the levers before the pads interfere with the rim. On a new bike, the cables will also stretch, meaning that there is often a lot of give in the brakes after only a few uses.

### 1. Adjusting at the Lever

Most flat bar brake levers have a barrel adjuster where the brake cable enters the body. If this is screwed out, it will effectively lengthen the cable and so tighten the brakes. Be cautious of doing this too much as you don't want the pads interfering with rim unless you are pulling on the levers. After adjusting this, turn the wheel and ensure that it isn't rubbing against the pads. Then squeeze the lever to stop the wheel and then spin it again to ensure that the pads aren't sticking.

### 2. Adjusting at the Callipers

If you are going to adjust the brakes at the callipers, first screw the barrel adjuster at the lever all the way back in.

To adjust the brakes, it is necessary to simply pull the extra cable past the stop. You will need to first loosen the Allen key bolt (usually 5 mm), then pull the cable through and re-tighten the bolt. Be careful of pulling too much cable through, as it is very easy to pull the cable enough so that the pads will always interfere with the rim.

Once again, after doing this, turn the wheel by hand to ensure that the pads aren't rubbing, squeeze the brake, and then spin the wheel again.

Sometimes, the brakes will rub on one side but not the other. It is possible to change the tension in the callipers so that one will return further than the other. On the side of the calliper, there is a screw. By tightening this screw, the tension in the calliper will be increased, so it will sit further away from the rim when in a neutral position (with the lever released), it is also possible to tighten one side, by loosening the other. If you are unable to get the levers to return without rubbing against

the rim, it may be necessary to let out some of the cable to allow the callipers more movement.

Also check the alignment of the pads to the rim when the callipers are engaged. They should cover as much of the rim as possible with no over hang. If they are too low, then you are not getting effective braking, if they are too high, then they can interfere with the tyre, and end up wearing a hole in it.

To adjust the pads, again loosen the Allen key bolt (again 5mm) on the back of the pad, and adjust it up or down as necessary. Lining up the pads with the rim can be an interesting challenge. Especially when considering that they also need to be “toed-in”. Toe-in is where the leading edge of the brake pad is closer to the rim than the tailing edge. The easiest way to get the pads to line up is to loosen the bolt connecting the pad to the calliper so that the pad can reach the rim. This is easier if the callipers have already been adjusted. Now, put something under the tail of the brake pad, an elastic bad is good for this. You only want something which is 1mm thick or so. Now, push the pad against the rim with a good alignment. While holding the pad in place, pull on the brake lever to engage the brake. Then while holding the pad and the brake lever, tighten the bolt while ensuring that the pad doesn't turn. You may need some help to do all of this.

If after adjustment your pads are squealing, it is usually a result of toe in (or lack of).

Before riding the bike again, ensure that all bolts that were adjusted have been tightened. You do not want the brake cable to pull back through the retaining bolt when you need to brake suddenly.

After adjusting the brakes (either at the lever or the calliper) you will have significantly harder brakes, this means that the lever will not have to move as much to get sufficient braking. Be aware of this when you next ride the bike, as you will often grab the levers too hard and nearly launch yourself over the handle bars.

## ***Adjusting the Front Gears***

Typically, the front gears will not need to be adjusted. They are usually a set and forget. As a result, they don't have as many adjustment options as the rear derailleur.

### **1. Limit Screws**

On top of the front derailleur, there are two screws. The Limit Screws, these control how far the front derailleur is able to move in either direction. If you find that you are frequently dropping the chain to one side of the chain set, then these are what you will want to play with.

There are two screws, one will adjust the upper limit, and one will adjust the lower limit. They are usually marked with “H” and “L”, the High limit screw is usually the furthest from the frame, if you are dropping the chain to the outside (when you shift to the biggest ring), then tighten this screw to reduce how far the derailleur can move. If you are dropping the chain to the inside of the chain rings (when you try and move to the smallest ring), then tighten the Lower limit screw.

If you are having difficulty getting into one of the extreme chain rings, then loosening these screws will solve the problem.

If at the end of this adjustment there is cable slack when in the smallest chain ring, remove it by turning the barrel adjuster (usually on the shifter), or by loosening the retaining bolt and pulling the cable through. Ensure that the bike is in the smallest chain ring when doing this. After doing this ensure that there is enough cable to allow you to change to all chain rings.

### **2. Fixing a Dropped Chain**

Sometimes when changing between chain rings on the front, it is possible for the chain to either fall between the chain rings and the frame, or over the side of the chain rings. It is sometimes possible



to get the chain back onto the chain rings without getting off the bike, but not always.

While you are still on the bike, try changing to the other chain ring and continue pedalling, sometimes the chain will re-engage the chain rings. Be careful when doing this, especially when the chain falls to the outside of the chain rings (between the crank and the chain rings) as it can damage the chain.

In many cases, you will need to manually put the chain back on. To do this is to stand on the left hand side of the bike (the side without the chain rings). Then lean over the top tube, and with your right hand, push the rear derailleur down, this will generate slack in the chain. Then with your right hand, lift the chain around the chain ring, and place it back onto the chain ring that is currently selected by the front derailleur. It is usually easier to put the chain back onto the smallest or middle chain ring. If you have the largest chain ring selected change gears to select a different chain ring.

You will get your hands dirty doing this. It does take some practice, so don't be surprised if you have difficulty when you first attempt it.

## ***Adjusting the Rear Gears***

The back gears tend to be where most people complain about shifting problems, they tend to have lower tolerances to cable stretch and the shifting system is more complex.

### **1. Limit Screws**

Like the front derailleur, the rear derailleur also has two limit screws. Again, these adjust how far the derailleur is able to push the chain at either end of its range. These are usually a set and forget option. Unless you are having difficulty getting into the highest or lowest gear on the cassette DO NOT PLAY WITH THESE.

Adjusting the Lower Limit screw allows the derailleur to move closer to the wheel, adjusting this too far will allow the chain to fall between the cassette and the wheel. This can result in the damage to the wheel and the chain. Even if the screw isn't adjusted enough to allow this to happen, it is possible for the derailleur to interfere with the spokes, and this can result in either destroying the wheel, or ripping the derailleur from the frame.

The Lower limit screw is usually the bottom screw on the derailleur. To confirm, adjust the derailleur into the lowest gear (the largest gear) and look through the back of the derailleur to see which screw is stopping it from moving any further. Tightening this screw will reduce how close the derailleur can get to the wheel, while loosening it will allow the derailleur to get closer to the rear wheel.

The High limit screw allows the derailleur to move further from the centre of the bike when shifting into the highest gear (the smallest cog), adjusting this too loose, will allow the chain to fall between the cassette and the frame, usually resulting in the destruction of the chain and potential damage to the frame.

Tightening this screw will reduce how far from the centre line of the bike, while loosening it will allow it to move further away.

### **2. The Barrel Adjuster**

The barrel adjuster allows you to change how well the bike is able to change gears on the cassette. Turning this will effectively lengthen or shorten the cable.

Typically, the rear gears will fail to either change up (into a harder gear, to the smallest cog) or change down (into an easier gear, or to the largest cog). The easiest way to remember which way to turn the adjuster, is if the bike fails to change down, then turn the adjuster so that the top moves

towards the bike, and if it fails to change up, then turn the top of the adjuster away from the bike. This means that the top of the adjuster is always turned in the direction that the bike is failing to shift.

When you are first learning how much to turn the adjuster, stick to only  $\frac{1}{2}$  or  $\frac{1}{4}$  turns each way. It will allow you to fix your errors a lot easier. Whenever you have given it a turn, move the gears through their entire range to see if the problem has been solved. Also check the range on the cassette on all of the chain rings.

If a new cable has been installed, then here is a process to follow to try and adjust the gears the best. First, move the shifter so that the bike should be in the highest gear, if the bike cannot change into this cog, turn the barrel adjuster until the bike changes into this gear. Next, change the bike into the second highest gear (the second smallest cog), if the bike does not shift into this gear, then change the shifter back to the smallest cog, and turn the barrel adjuster. Then try and change into the second highest gear again. Repeat this process until the bike can cleanly change between these two gears.

Now continue to move the bike through it's entire range of gears and fine tune the barrel adjuster for any other issues.

### 3. Bent Derailleur Hanger

The rear derailleur attaches to the bike either on the frame directly, or via a separate part. In either case, it is possible for this to be bent. This usually happens if the bike has taken a hard knock on the right hand side. In some cases it is possible that the hanger has been bent so that the bike isn't rideable. In other cases, it is only obvious by a close inspection, or difficulty in shifting and unable to adjust the gears so that they will shift properly.

If the hanger has been bent, while it is tempting to simply grab the derailleur and try and straight it, do not do this. You will only succeed in damaging the rear derailleur. The rear derailleur needs to be removed and the hanger straightened separately. There is a special tool to do this, and I would recommend taking your bike to a Shop to have it done.

### 4. Frayed Cable

The rear derailleur naturally wants to sit in the highest gear, there is a spring on the inside of the body which is always attempting to pull the derailleur to this gear. The shifter pulls the derailleur towards the bike (and the lower gears). If the cable has been frayed in the cable housing, or in the shifter body itself, then the bike will often have heavy shifting down, and won't shift up cleanly.

As a cable frays slowly, it is often difficult to diagnose that the cable is fraying as the shifting only gets harder gradually. As a result, being aware that the shifting is getting harder and noticing the shifting problems is the most common way of diagnosing the problem. In the end, the cable will snap.

### 5. Broken Cable

When a rear derailleur cable breaks, the derailleur will move to the highest gear. As a result, pedalling does become significantly harder. Obviously the cable will need to be replaced, but in the short term, it is possible to wedge something (usually a piece of wood) into the rear derailleur to hold it in a lower gear.

## ***Cleaning and Lubricating the Drive Chain***

The chain on the bicycle needs to be cleaned on a regular basis. If it isn't cleaned regularly, it will slowly clog up with road muck and slowly abrade and wear out. Some maintenance guides

recommend wiping down and lubricating the chain after every use. I recommend playing this by ear. Lubrication needs to be kept up, but after every ride is probably excessive for most people.

## 1. Cleaning the Chain

Before any serious cleaning can begin, the chain should be wiped down to remove any obvious grime, simply hold a rag to the chain between the lower jockey wheel and the chain ring and turn the cranks backwards. Depending on the amount of muck on the chain, it may sometimes be a good idea to apply a degreaser to the chain first.

Once this is complete, the chain should be degreased. A citrus degreaser is best for this and they are readily available from all bike shops. It is also possible to use a special chain cleaner, these do a good job, but for most people a rag will be sufficient. Simply soak the rag in the degreaser and again, turn the chain through it.

It is often a good idea to also hold the rag where it turns through the jockey wheels, this will expose more of the chain to the rag. Also, clean the jockey wheels directly, this can be done by having a flat bladed screwdriver on the inside of the rag and hold it against the wheel, don't forget to do both sides of the wheels. Once the chain has been degreased, it is best to let it air dry.

If the chain has a master link (which allows a tool free removal), then it is best to remove the chain and soak it in degreaser for several hours. After this soak, wipe the chain down and let it air dry.

## 2. Cleaning the Cassette

To clean the cassette, first remove the rear wheel from the bike. Soak part of a rag in the degreaser and wipe down the cassette, to clean between the sprockets, fold the rag over and pull it between them. As the cassette will freely turn in one direction, it isn't necessary to turn the wheel to achieve this.

## 2. Lubricating the Chain

There are several chain lubes on the market each with different advantages and disadvantages. The most common type is Wet Lube. As per its name, it keeps the chain wet and so is able to lubricate quite well, on the down side, the chain always looks dirty because the lubrication is causing dirt to stick to it.

Dry Lube is another common type, this has Teflon particles suspended in a liquid. After the lube is applied to the chain, the liquid will evaporate and the Teflon particles will remain. The advantage of this is that the chain will often look very clean at any given time. The problem is that it does not last well in the wet.

There is also a Wax lubricant. This is designed to wax the chain to protect it from the elements. The lube itself does not work under load, and it does increase the friction in the drive chain. Once this has been applied it is pretty much impossible to strip off.

Personally, I use a product by Pro Gold called Pro Link. This is a highly recommended chain lube from several areas. It isn't available in a lot of stores, but it can be found. With a bit of effort it keeps the chain well lubricated, clean and has a reasonable resilience in wet weather.

To correctly lubricate a chain, a drop of lubricant should be applied to each and every rivet. Typically, the outside of the chain attracts the most dirt, so the inside should have the lubricant applied. This is along the return of the chain (between the jockey wheels and the chain rings).

Typically a chain will complete a full revolution for every 3 turns of the chain rings. If you inspect the chain carefully, you will notice that one of the rivets is slightly different, this is usually where the chain was connected. If you can identify this link, then it is a good place to start and finish the

lubrication.

After the lubrication has been applied, it is best to leave the bike for a few hours. Then wipe the chain down again. The chain should be wiped until very little dirt is coming on the rag. Any oil left on the chain will typically attract dirt and then cause abrasion problems.

## ***The Pedals***

Most of the time, you won't need to change the pedals on the bike or remove them. If you do, you need to remember that there is a difference between the two sides.

### **1. The Left Hand Pedal**

The left hand pedal on the bike is left hand thread, this means that it is clockwise to loosen and anti-clockwise to tighten, this is opposite to the majority of threads.

### **2. The Right Hand Pedal**

The right hand pedal is right hand thread, so clockwise to tighten, and anti-clockwise to loosen. This is the normal orientation of threaded screws, nuts and bolts.

### **3. Removing the Pedals**

Because the threads on the pedals are different, and you tend to stand on different sides when trying to loosen the pedals, it is often a mental challenge trying to work out which way to turn the spanner.

The easiest way to do this, is to loosen the pedals, turn the top of the pedal spanner towards the back of the bike. This rule works no matter which side of the bike you are standing on and which pedal you are trying to undo.

You will often have to stand on the cranks to stop them from turning or apply the rear brake when trying to loosen a pedal. When one pedal has been loosened. Don't remove the pedal until the other one has also been loosened.

### **4. Installing the Pedals**

Again, remember that the threads of the pedals are different. Pedals with Toe-Clips and some Clipless pedals can easily be orientated to the correct side. In other cases, you will need to work out which pedal goes on which side. Usually, one pedal (the left typically) is stamped with an "L" to indicate that it is the left hand pedal. In some cases the right hand pedal also has an "R".

If you cannot locate a letter on either pedal, hold the pedal up so that the spindle is vertical. Observe which way the threads slope, if they slope up to the left, then it is left hand thread, and if they slope up to the right, then it is right hand thread. The pedal with left hand thread is the left hand pedal and visa versa.

Before installing the pedals, give the crank threads and the pedal threads a quick clean with a degreaser, and then apply some grease to the pedal threads. This will make any future removal easier as it will reduce the risk of them seizing.

To install the pedals, get them started and then turn the cranks backwards to get the pedals finger tight. To tighten fully, it is the reverse of removing them, the top of the spanner goes towards the front of the bike. As before, this is regardless of the side of the bike you are working on. The pedals need to be tight enough so that they won't unscrew, but you don't need to moor the Titanic when tightening them.

## ***Tools on the Bike***

There are some tools which you should always try and carry on the bike, some of these you will need more often than others, but all of these are useful in emergency situations.

### **1. Spare Tube**

Always a good idea, it is a lot easier to change a tube with one which you know is good instead of trying to patch at the side of the road. If you don't get a flat for a reasonable length of time, it is a good idea to confirm the integrity of this tube.

### **2. Tyre Levers**

No point to having a spare tube if you have no way of getting the tyre of the rim to change it. There are many different types of tyre levers, some better than others. Try and get a pair with the hooks on the end, this makes getting the tyre off a lot easier.

### **3. Patch Kit**

A good backup for the spare tube. It isn't ideal having to patch, but it is better than walking. Again, because of its low usage, try and ensure that the glue is still usable and that there are also usable patches.

### **4. Pump**

These are usually frame mounted, so they are easy to keep on the bike. Make sure that whatever pump you have it is able to be used on the valve type on your tubes. Most pumps can have their heads changed to suit either valve type, and some are "auto sensing" meaning they can be used on either valve type with no adjustments. Some pumps are better than others. It is possible to use gas cartridges to inflate a tyre, however, you will need to carry a cartridge for every flat, because of this you will often have to carry a frame pump as well. The only thing that this will save you is time.

### **5. Allen Keys or a Multi Tool**

Most of the bolts on the bike are Allen key bolts, there are only a handful of Allen keys that need to be carried before you can deal with most of the problems you will encounter on the ride. A multi-tool is a Swiss Army knife style tool which is made up of Allen Keys and sometimes some extra tools. In most cases, a cheap one will do the job.

### **6. Tyre Boot**

There are occasions when something will give you a puncture which will also put a hole big enough in the tyre so that the tube will poke through and cause another flat. A tyre boot is something which will go inside of the tyre and stop the tube from protruding through this hole. A piece of plastic is suitable for this (like a food wrapper), or a \$5 note (higher denominations work just as well).

I have made up custom ones which are simply trouser cotton coated with Selley's Liquid Nails on both sides. These have then been cut to 55mm squares, which is designed to go bead to bead on a 23mm tyre. If you are running wider tyres, it may be a good idea to make them larger.

## ***Tools at Home***

When ever you are on the bike, you are simply trying to keep the bike going to get you to your destination. You will typically have other tools at home which allow you to do more work.

## 1. Allen Keys

I recommend having another set of Allen keys at home, there is nothing worse than getting out the set you have on the bike, and then riding off with them still at home. Also, the set that you have on the bike are usually in the multi tool, while at home, you will want a wider range, as well as with a longer handle.

## 2. Screwdrivers

While most bolts on the bike are Allen key bolts, there are some which are going to require a screwdriver.

## 3. Tyre Levers

As per the Allen keys, having a set of tyre levers at home saves you having to get the ones off the bike to do any tyre changes at home.

## 4. Others

There are a multitude of tools which are available for the bike, the amount of maintenance that you do at home will impact which of these tools you are going to own. Because I do a lot of my own maintenance, I own a reasonable number of tools for doing this maintenance. If you are planning on following suit, build up your tool collection slowly, some of the tools are specialised and aren't very cheap.

## ***References/Resources***

If you are planning on doing your own maintenance, you will occasionally run into problems. To resolve these, the following resources may come in handy.

### 1. Zinn and the Art of Road/Mountain Bike Maintenance

This is one of the bibles of bike maintenance. I own a copy of the Road Bike Maintenance, and it is invaluable. It contains a lot of very useful information on everything from changing a flat, to overhauling the bottom bracket. It contains a lot of diagrams and everything is broken down into the different levels of difficulty.

### 2. Your Local Bike Shop

Not all bike shops are equal. Finding a good one is worthwhile, and getting to know the owner/mechanics is a good way to pick up tips when trying to fix your own problems. If you do need to put your bike in for a service, try and give them as much detail about any problems you have as well as any maintenance you may have done yourself in trying to fix the problems.

### 3. Bicycle Forums

There are many bicycle forums on the web where you would be able to ask questions in relation to mechanical problems.

<http://www.bicycles.net.au>

<http://forums.mtbr.com/>

<http://forums.roadbikereview.com/>

<http://www.bikeforums.net/>

#### 4. Sheldon Brown

This is one of the best cycling resources on the web. Unfortunately, Mr Brown passed away in early 2008, so I am unsure how much his site will be updated in the future. In either case, it still contains a lot of good information, as well as many articles about cycling in general.

<http://www.sheldonbrown.com>

#### 5. Park Tools

Park Tools are a bike tool manufacturer. Their website does also have repair tutorials, some of them are fairly advanced, but there are some good photo tutorials of basic repairs as well. They also list the tools that are required to do the work, however, they only list the Park tool. Another brand will also do the job, but you need to ensure that it is equivalent.

<http://www.parktool.com>

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