

Derailler* First Aid

Staying mobile in an emergency

By Sheldon Brown

Your bicycle's derailer is certainly the most complicated looking part of the bike, but, in fact, they're a lot simpler than they appear to be. Unlike other types of gear change mechanisms, they're out in the open, where you can see everything. Unfortunately, derailleurs are also more exposed to damage. Even a major derailer ding, however, shouldn't immobilize you on the road, if you know a few simple tricks. You may not have access to all of your gears after an on-the-road mishap, but you should still be mobile.

Before discussing on-the-fly repair techniques, let's go over the three main adjustments to any modern derailer system: Index adjusting barrel, low-gear limit stop and high-gear limit stop.

Index Adjusting Barrel

Your shifters communicate with your derailleurs by way of the shift cable. As the inner cable gets pulled or slacked off, the derailer moves toward larger or smaller sprockets. With modern indexed shift systems, the length of the inner cable has to be adjusted just right so that the click-stops in the shifters will coincide with the correct derailer positions.

The end of the shift cable attaches to the derailer by a pinch bolt that grabs onto it. For major cable adjustments, you can loosen the bolt, pull on the cable, then re-tighten the bolt.

This is, however, a rather coarse adjustment, and it is quite difficult to get the indexing to line up properly this way. That's why there will be one or more "adjusting barrels" on the cable. Adjusting barrels are commonly found on the rear derailer where the loop of cable housing ends and, if you have handlebar-mounted shifters, there will be an adjusting barrel at one end or the other of the cable housings that run from the shifters to the stops on the frame downtube.

Adjusting barrels are counterintuitive, because they adjust the housing length, not the inner cable length. Thus, what seems like "loosening" the adjusting barrel is actually making the inner cable tighter with respect to the housing.

Generally, minor adjustments will involve turning the adjusting barrels counter-clockwise to effectively tighten the

cable. This is often needed on new bikes to compensate for the normal loosening as a new cable gets "broken in." This will generally involve adjustments of half a turn or less.

Generally, if shifts to larger sprockets are sluggish, you need to tighten (counter-clockwise) the adjusting barrel. If shifts to smaller sprockets are slow, loosening (clockwise) the adjusting barrel may help.

If you turn the adjusting barrel much too far, you may wind up with gears that index in the wrong positions, and, typically, will be unable to shift to the smallest sprocket.

Low-gear and High-gear Limit Stop Screws

All modern derailleurs have separate adjusting screws that limit how far the derailer can move. If these screws are too tight, the derailer will not be able to move far enough to reach all of the gears. (This rarely occurs in practice.)

If a limit stop screw is too loose, it may be possible for the derailer to overshoot the last sprocket and get jammed. This is particularly dangerous in the case of the rear derailer's low-gear stop, because if the rear derailer overshoots the largest cog, it can go into the spokes of the moving wheel.

Generally, the limit screws shouldn't need any adjustment after the initial adjustment.

Derailler Bash

One of the most common derailer problems simulates mis-adjusted limit stops: If something bumps into the rear derailer, the derailer mount tab can get bent inward. This moves all of the indexed positions of the rear derailer inward. The first symptom of this may be poor indexing and an inability to shift onto the smallest sprocket. If you just correct the indexing with the adjusting barrel, you risk a catastrophic overshift on the low end, so it is better to stop and check.

When a rear derailer gets bashed, the part that actually bends is generally the hanger tab on the frame dropout. Sometimes desperate cyclists try to fix this by grabbing the derailer cage and yanking outward. This is a mistake, because if you do this, you'll only bend the derailer cage, ruining the previously un-damaged derailer.

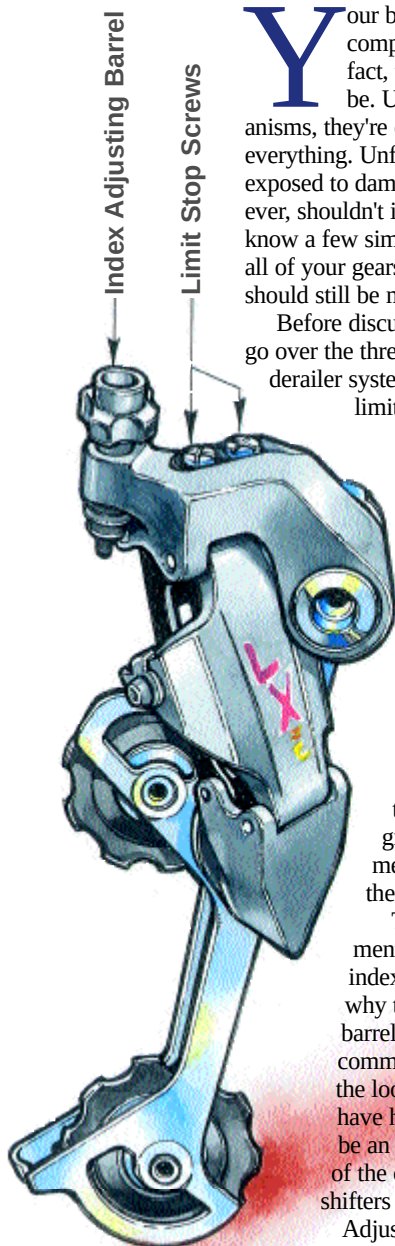
Bike shops have a special tool for straightening and aligning the hanger tab. For an emergency on-the-road repair, it's best to unscrew the derailer from the hanger, then use an adjustable wrench to straighten the hanger. There is some risk in this; if the hanger is very badly bent, you may deform the threads of the hanger. This can make it difficult or impossible to re-attach the derailer, so this sort of repair should only be attempted in an emergency.

For a seriously bashed rear derailer, the last resort is to remove it, shorten the chain and turn your bike into a temporary one-speed.

Broken Cables

Improved designs of modern shift controls have reduced the risk of cable breakage, but it still does happen. Assuming you don't have a spare cable available, you can still keep riding, and still have some reasonable gear choices.

Generally, when you break a gear cable, your derailer immediately shifts to the smallest sprocket/chainwheel. If it's the rear cable, this sticks you in the highest rear gear; if it's the front, you get stuck in your granny ring. The tradi-



The three main adjustments: the index adjusting barrel, and the limit stop screws.

tional solution to this problem is to select a more appropriate gear by tightening the derailleur's limit stop screw.

If it's the front that's *hors-de-combat*, tighten the low-gear limit stop so that the cage moves outward, letting you set the chain on the middle ring. If it's the rear that has shuffled off its mortal coil, you can use the high-gear limit stop screw to move the cage (and chain) in a couple of gears.

With modern gear systems with lots and lots of gears, the rear limit stop screw may not be long enough to get you to a middle sprocket. Here's where the water bottle bolt trick comes in.

The Water-bottle Bolt Trick

Gear cables always break at the control end, so you'll still have most of your cable attached to the derailleur. Loosen up one of the water bottle bolts on your down tube, and lead the broken cable under the bottle cage. Pull the cable until the derailleur is centered over the desired sprocket, then tighten the bottle cage bolt. This will pinch the cable in position and hold the derailleur in a convenient mid-range gear. If the chain doesn't line up perfectly, you can fine tune it with the adjusting barrel.

This trick actually provides a limited amount of shiftability, too: For steep climbs, you can just grab hold of the cable and pull it like a bowstring. This will put you into low gear as long as you hold on to it.

Of course, it's better to carry a spare cable with you, but these tricks can help save your bacon if you forget.

*A note on spelling: I'm leading a movement to adopt this spelling for the part commonly spelled "derailleur." My reasons for this are explained at <http://sheldonbrown.com/derailer.html>. ●

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