

Adjusting Direct-pull Cantilever Bicycle Brakes (V-Brakes)

About Rim Brakes

Most brake problems result from excessive friction or poor installation of the cables, not poor setup, or poor quality brakes. Also see the article on cables for information on cable selection and adjustment of brake cables and brake levers.

Direct-pull vs Traditional Cantilever Brakes

Traditional cantilever brakes used two cables, a main cable running down the centerline of the bike, and a second, "transverse" cable connecting the cantilever units on each side of the wheel. The main cable would pull upward on the middle of the transverse cable, causing the cantilever units to rotate inward.

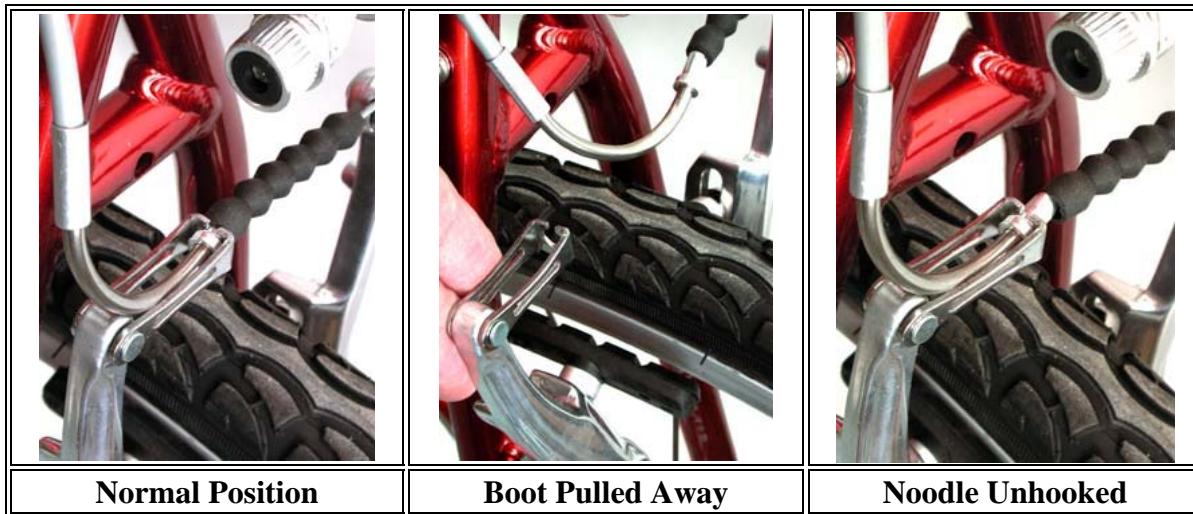
The "direct pull" cantilever, also commonly known as the "linear-pull brake" or under its Shimano trademark name "V-Brake" is a simpler design, using only a single cable. The cable housing connects to one arm, and the inner cable runs across the top of the tire to the opposite arm. When the brake is applied, the housing pushes on one cantilever while the inner cable pulls the other. Since the cable runs straight across the top of the tire, direct-pull cantis need longer arms to get the cable high enough to clear the tire. This increases the mechanical advantage of the system, requiring the use of special matching brake levers.



Quick Release

For wheel removal, the noodle may be unhooked from the arm link. This will allow the brake shoes to open up wide enough to clear even a fat tire. First, pull the boot away from the end of the noodle. Then squeeze the brake arms together with one hand while unhooking the lower end of the noodle from the keyhole-shaped slot in the arm link.

Make sure to hook the brake back up immediately after you re-install the wheel!

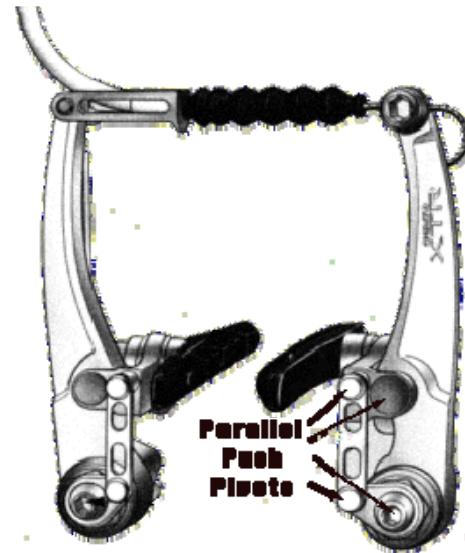


Parallel-Push Linkage

Shimano's XTR and XT V-Brakes feature a special parallelogram linkage. This serves two purposes:

- It causes the brake shoes to remain at the same angle to the rim throughout the stroke, and throughout the service life of the pad.
- It causes the direction of motion of the brake shoes to be close to horizontal, rather than the usual slanted arc centered on the pivot boss. This is a major advantage with very fat tires on narrow rims, because it prevents the shoe from rising up and damaging the sidewall of the tire on release, and also prevents having the brake shoes dive under the rim as they wear down.

Unfortunately, the extra pivots considerably complicate the mechanism, and this has caused maintenance problems and excessive squeal in practice.



Direct-pull Brake Adjustment

First, remove the arms from the studs, and make sure the studs are free of rust. Coat the studs liberally with grease (this is VERY important!)

Install the arms with them at their maximum spread and tighten the bolts that hold them to the frame. This is how you set the springs.

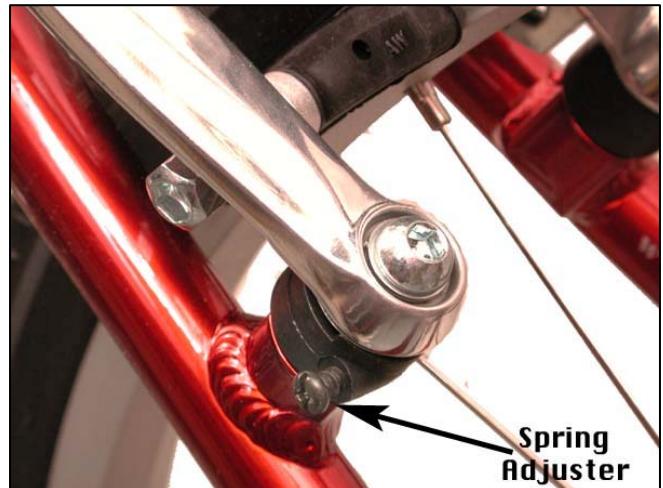
Shoe adjustment is covered in the article about rim brakes, but there are a few special things about direct-pull brakes:

- Most direct-pull brakes use threaded-stud type brake shoes. Use the kind with spherical washers to allow full adjustability.
- The brake shoes only need to be extended inward from the brake arms if the brake arms are too close together at the top, interfering with the tire or allowing too little cable travel.
- Unless the brakes have a Parallel-Push linkage, adjust the shoes initially so they are near the top of the rim's braking surface, to allow them to migrate farther downward before risking a dive under the rim.
- If your brakes use the Parallel-Push linkage, the pivots may need servicing. There are special kits for this.

Centering

When the brake is released, the brake shoes retract away from the rim. Ideally, the shoes on both sides should back off by the same amount. If they don't, the brake is not properly centered. In extreme cases, one of the shoes may not retract, and may rub on the rim even when the brake is not being applied.

If a brake appears off-center, check first that the wheel is installed straight in the frame/fork. If the wheel is crooked, and you maladjust the brake to compensate, you are creating two problems where there was only one before.



Spring Adjustment

If your wheels are centered, and your brakes are not, and, if the pivots are properly lubricated and free-moving, the brake shoes should be centered. If they are not, you probably need to adjust the spring tension on one or both of the cantilevers.

Most direct-pull cantilevers have adjustable spring tension. The adjustment will be a small screw with the head facing outward to the side of the bike. The screw is generally located near the bottom of the cantilever, below the pivot point. Sometimes it works with a Phillips screwdriver; other times, a small Allen wrench may be needed.

Tightening this screw tightens the spring, so you want to tighten the spring of whichever arm is too close to the rim. This will make it spring back farther.