

Adjusting for Size

The most important feature of a bike is how it fits the rider. Performance, comfort, and the risk of injury can be affected by variations, sometimes as little as 5 mm ($\frac{1}{4}$ in), in your riding position, so be meticulous about establishing your bike size and your cycling position. The methods for doing this are well-founded, although not infallible. Physically we are each unique, so make any adjustments that will work best for your own physique and type of riding. Once you do work out your bike size and riding position, stick with it, even if initially it may feel inefficient and uncomfortable. Body muscles all need time to adjust to new patterns of movement, and your reward will be riding a bicycle that moves when you do.

FITTING THE BIKE TO THE RIDER

For mountain biking and racing, a rider should use the smallest frame that fits. Small frames save weight and are stiffer and more responsive. For touring, a larger frame provides more stability on descents and on corners. Using the fitting machine (below and right) to measure both a taller and a shorter rider illustrates that while angles will hardly change, the seat tube and top tube length will vary quite considerably.

SADDLE HEIGHT: Stand with your feet 10.2cm (4 in) apart with your back against a wall. Measure your inseam leg length from your crotch to the floor. Multiply this sum by 0.885, adding on 3 mm (0.1181 inch) if you have large feet for your height.

This is the distance that should be set between the top of the saddle and centre of the bottom bracket axle.



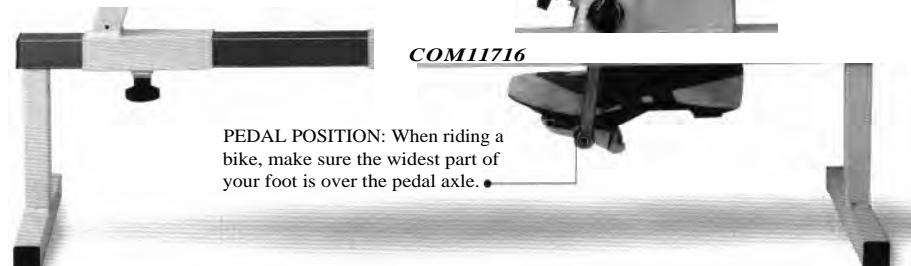
TOP TUBE LENGTH: The combined top tube and stem length should ideally position the handlebar so that in a normal riding position, the front hub axle is blocked from view by the handlebars.

CLEARANCE: You should straddle the bike with a clearance between the crotch and the top tube of 2.5-6 cm (1-2 in) on racers; 2.5 cm (1 in) on touring bikes, and 7.6 cm (3 in) or more on mountain and hybrid bikes.

HEAD ANGLE: This results from the frame size, seat angle, top tube length, front wheel clearance, and the quickness of steering.

SEAT POST: Exposure should be 8.9-12.7 cm (3 1/2-5 in) for racing, 7.6-10.2 cm (3-4 in) for touring, and 15.2-20.3 cm (6-8 in) or more for mountain bikes.

SEAT ANGLES: These range from 68°-75°, with 72°-74° most common. Smaller bikes have steeper seat angles.

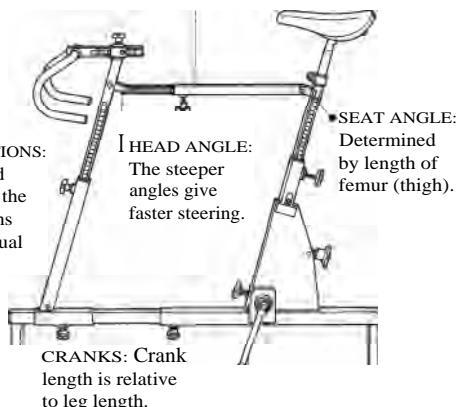


PEDAL POSITION: When riding a bike, make sure the widest part of your foot is over the pedal axle.

TAILORING A BIKE

Machines such as the Elite (right), the Fit Kit, and *Serotta Size-Cycle*, and specialized computer programmes such as ProBikeFit, assess every aspect necessary for fitting a bike to a rider. The machines allow a custom frame builder to adjust all the related factors in bicycle sizing in order to measure up a bike that will complement the cyclist perfectly. The *ProBikeFit* programme includes data on practically every bicycle and component currently available, and can quickly match a rider's measurements with an off-the-shelf bicycle that will give the best fit. The vital factors in sizing are: saddle height; the length of the top tube; the amount of seat post exposed when the saddle height is correct; and the clearance between your crotch and the top tube. These factors will vary, depending on whether the bike is for racing, touring, or mountain biking, and on your own physique. You should be able to ride with a straight back for easy breathing, a relaxed body, and arms slightly bent to absorb shock.

SIZING FRAME: Adjustable for proportional tube lengths.



HANDLEBAR STEMS: Handlebar stems extend your reach. Most riders use 6-10 cm (2.4-3.9 in) extension. The longer the stem, the greater the risk of breakage. If you need longer than 12 cm (4.7 in), the top tube is too short.

HANDLEBAR HEIGHT: For normal riding, the top of the stem should be 2-4 cm (0.8-1.6 in) below the top of the saddle, and for racing, as low as 7.6 cm (3 in).

HANDLEBAR WIDTH: This should be as wide as the shoulders: 38-40 cm (15-15.7 in) for women, 40-42 cm (15.7-16.5 in) for men.

DROP BAR DEPTH: This is related to the size of yours hands: 14 cm (5.5 in) is shallow, 14-15 cm (5.5-5.9 in) is medium, and 15 cm (5.9 in) or more is deep.

BIKE SIZING FOR WOMEN
Relative to height, women generally have shorter torsos and arms than do men. Sizing a woman's bike by inseam length and seat tube size can often result in too long a top tube. The best bet is to have a longer seat post and a smaller bike frame.



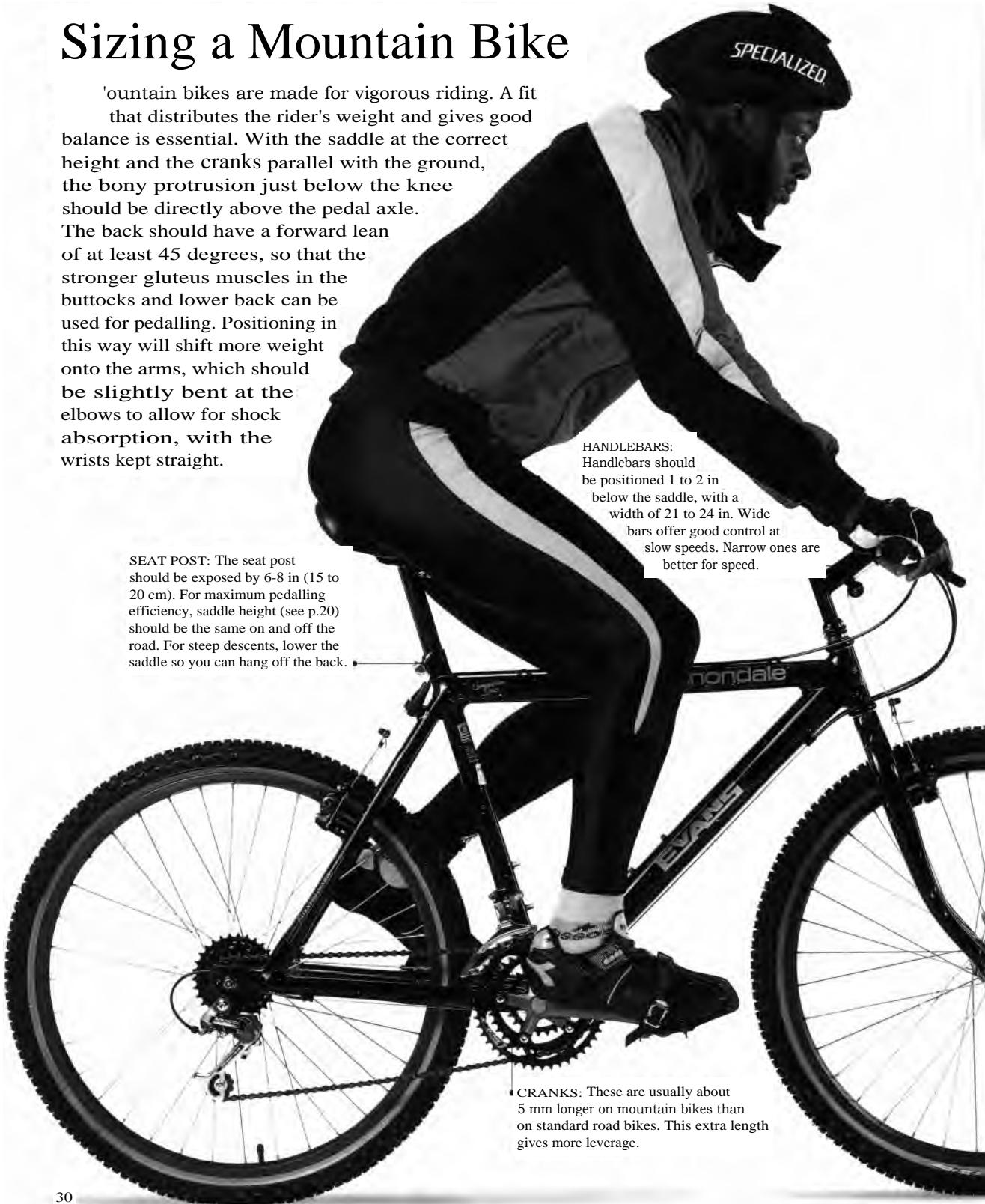
Sizing a Mountain Bike

Mountain bikes are made for vigorous riding. A fit that distributes the rider's weight and gives good balance is essential. With the saddle at the correct height and the cranks parallel with the ground, the bony protrusion just below the knee should be directly above the pedal axle. The back should have a forward lean of at least 45 degrees, so that the stronger gluteus muscles in the buttocks and lower back can be used for pedalling. Positioning in this way will shift more weight onto the arms, which should be slightly bent at the elbows to allow for shock absorption, with the wrists kept straight.

SEAT POST: The seat post should be exposed by 6-8 in (15 to 20 cm). For maximum pedalling efficiency, saddle height (see p.20) should be the same on and off the road. For steep descents, lower the saddle so you can hang off the back.

HANDLEBARS:
Handlebars should be positioned 1 to 2 in below the saddle, with a width of 21 to 24 in. Wide bars offer good control at slow speeds. Narrow ones are better for speed.

CRANKS: These are usually about 5 mm longer on mountain bikes than on standard road bikes. This extra length gives more leverage.



SIZING AND SAFETY

You need to be able to move the bike around underneath you without bruising your thighs, and to have the confidence to take a fall without any serious injury.

CROTCH**CLEARANCE:**

For off-road riding, have at least 3-4 in (8 to 10 cm) clearance from the crotch to the top tube.

**THINK SMALL**

Many first-time mountain-bike riders feel more comfortable on a frame that is actually larger than they need.

Smaller frames are much more manoeuvrable, lighter, and safer. Select the smallest frame that gives you a good overall fit.

**Too BIG**

A high top tube is fine for town riding and smooth road touring, but you will still need at least 1 in (2.5 cm) of clearance. A top tube that fits too snugly might lead to a painful accident!

**Too SMALL**

A very low top tube means that it is easier to perform stunts and tricks on the bike. However, unless you are small, the reach will be too short, and the ride very uncomfortable.

SIZING – SOME TIPS

The standard advice on sizing a mountain bike recommends that the bike is 2 to 4 in (5 - 10 cm) smaller than your road frame size. However, mountain bikes are measured in several different ways, and many models have sloping top tubes, so try out several different bikes first to get a feel for what suits you best. Important factors are general fit and reach. In good-quality mountain bikes, each frame size is proportional; frame angles and tube lengths are adjusted so that larger sizes have more reach, smaller sizes have less reach. With the saddle at the correct height, you want plenty of seat post and distance from the top tube. Your knee should be over the forward pedal with a level crank, and you should have a sufficiently comfortable reach down to the handlebars to incline your back at a 45-degree angle, with slightly bent arms.

Sizing for Women

Women usually have a shorter reach, and need more seat post and a shorter top tube. A rough guide to measuring the size of a frame for a woman (in inches), is as follows:

$$\text{FLOOR-TO-CROTCH DISTANCE} \times 0.52 = \text{SIZE}$$

This is only a rough estimate, but it should provide a basic guideline. Always test-ride several bikes for size before you finally decide to go ahead and buy one.

Adjustments for Comfort

etting up the most efficient and comfortable 'riding position can involve a whole series of inter-related measurements and adjustments. If one setting changes, so must all the others. For example, when you increase your saddle height, then the distance between the saddle and the handlebars will increase. To maintain a comfortable position, it may be necessary to move the saddle forward – or if your saddle is already as far forward as it can go, to use a stem with a shorter reach. The system given here is methodical, and if at some point you make a change in the bike, such as installing longer or shorter cranks, or raising or lowering the height of your handlebars, start the adjustment process afresh from step one. The changed set-up may feel awkward at first, but give it a fair trial, 80 kilometres (50 miles) or so, as it takes your body time to adjust to a new position.

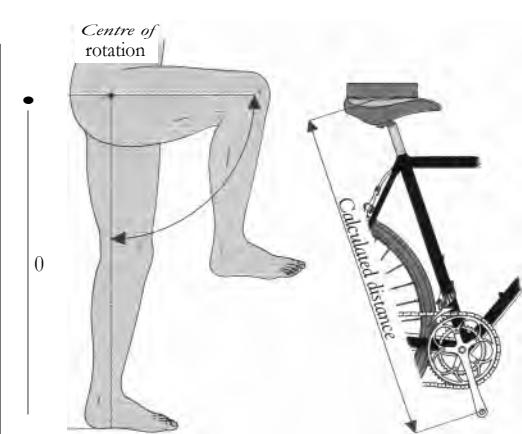


CHECKING FRAME SIZE

A rough guide that the frame size is correct is: with the correct saddle height, the amount of seat post exposed should be 8.9-12.7 cm (311.5 in) for racing bikes, 7.6-10.2 cm (3-4 in) for touring bikes, and 15.2-20.3 cm (6-8 in) or more for mountain bikes. The clearance between your crotch and the top tube should be 2.5-5.1 cm (1-2 in) for racing bikes, 2.5 cm (1 in) for touring bikes, and 7.6 cm (in) or more for mountain bikes and other hybrid bicycles.

QUICK CHECKS

In addition to the more precise methods of adjustment detailed above, there are several standard checks that reveal at a glance whether your saddle is at the right height. Seated on the saddle with the ball of your foot on the pedal and the pedal down, your knee should be slightly bent (left). If your hips rock from side to side when you pedal, your saddle is too high (right). Another check: with the pedal down and leg fully extended, your heel should not quite reach the pedal. A clearance of 3 mm (0.1 in) should be fine. For conventional cleats, give a 3-5 mm (0.1-0.2 in) clearance. Lock-type clipless pedals should have a 5-8 mm (0.2-0.3 in) clearance.



SADDLE HEIGHT

To work out your correct saddle height, multiply your inseam length (stand against a wall with bare feet, and measure from the floor to your crotch) by 0.885, and add on the thickness of your shoe soles and cleats. If your feet are large for your height, add an extra 3 mm (0.1 in). The result is the distance you need between the top of the saddle and the centre of the bottom bracket axle. A more precise method is to stand barefoot against a wall and mark the centre of rotation of your upper femur (the most outward bump on the hip above the hip socket). As you lift your thigh up parallel with the floor, it should stay in line with the mark. Measure each leg from the mark to the floor three times (in mm), average each measurement, and multiply by 0.95. Add on your shoe sole and cleat thickness, and the height of the pedal cage above the pedal axle. The result is the distance needed between the pedal hole, and a point halfway between the top of the saddle and a straight edge.



SADDLE ADJUSTMENTS



Saddle Fore and Aft

Sit with cranks level, and drop a line from the knee protrusion to the pedal axle in front. Set the saddle 1 cm (0.4 in) forward for a high cadence rate, 1-2 cm (0.4-0.8 in) back for power.



Saddle Tilt

To alter the tilt of the saddle, adjust the angle of the seat bolt clamp. Conventional saddles (above left) are adjusted using spanners, while micro-adjust seat clamps (above right) use a



6 mm hex key. Starting with the saddle completely level (above), lower the nose slightly if you feel uncomfortable. Too far down will strain your arms and back. Too high up will hurt in time.



PEDALS

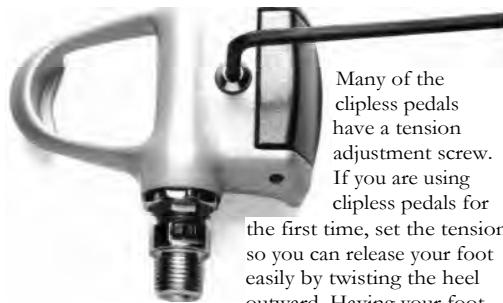
Always pedal with the widest part of your foot over the pedal axle for the most comfortable and powerful riding. The pedal is essentially a platform for your foot as it pushes against the crank. If you use toe clips, make sure there is a gap of at least 5 mm (0.2 in) between the tips of the shoes and the clips.



SLOTTED CLEATS

Align the *slotted cleats* with the natural rotation of your foot. Slightly loosen the mounting bolt so that the cleat moves as your foot twists on the pedal. Ride in various positions, spinning fast. When you feel comfortable, stop and undo the strap. Lift the cleat off without altering its position and tighten the bolt.

PEDAL TENSION



Many of the clipless pedals have a tension adjustment screw. If you are using clipless pedals for the first time, set the tension so you can release your foot easily by twisting the heel outward. Having your foot

locked to the pedal may be somewhat intimidating at first, but in fact clipless pedals are easier and safer to use than cage pedals and cleats. Increase the tension once you have become used to the pedals.



CLIPLESS STEP-IN PEDALS

Most clipless step-in pedals allow up to 10° of rotational play or twist for the foot, but should still be aligned using the loosen-ride-tighten method for slotted cleats, above. You'll need a friend to tighten the mounting bolts, because you won't be able to free your foot from the pedal without disturbing the cleat.

Adjustments for Comfort II

After correctly positioning the saddle, the next step is to adjust the reach to the handlebars so that the rider's back inclines forward at an angle of 45 degrees to the hips, with the arms slightly bent to absorb road shock. Reach is determined by the extension length of the stem. Road bike (drop handlebar) stems extend straight forward, so finding the

correct size is simple. Mountain bike stems, however, extend forward and rise, and the handlebars can be straight, or swept rearward up to about 12 degrees. With this number of variables, finding the right combination often requires experimentation. One way to do this is to temporarily fit an adjustable stem. Another method is to use a frame fitting machine.



HANDLEBAR POSITION

The stem should be at such a height that it positions the handlebars 2.5-7.6 cm (1-3 in) below the saddle. A lower handlebar position is suitable for long arms and torso, and fierce riding; a higher position suits short arms and torso, and more relaxed riding.



HEIGHT ADJUSTMENT

Loosen the stem bolt and tap it with a hammer and wooden block to remove it. Grease the stem and replace it, tightening the stem bolt firmly. The handlebars should be secure, but able to move if the bike falls. Test by holding front wheel between your knees and twisting the handlebars.



MAXIMUM EXTENSION

There should be at least 6.3 cm (2 1/2 in) inside the steerer tube. Most stems have a mark of the maximum safe extension. Stem extensions range from 5-14 cm (2-5.5 in), measured from the centre of the bolt to the centre of the handlebars. The safe limit is 12 cm (4.7 in).

DROP HANDLEBAR EXTENSIONS



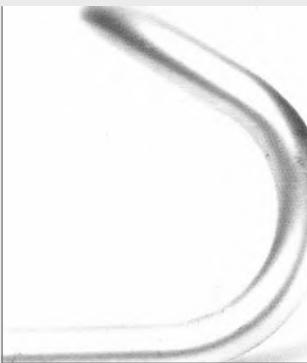
Short Extension

Too short an extension causes the back to arch, compressing the diaphragm and impairing aerobic cycling performance. Note: with hands on drops and forearms parallel to the road, knees should overlap elbows at the top of the pedal stroke.



Long Extension

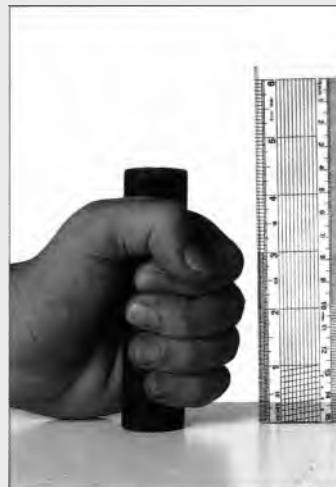
Too long an extension results in locked elbows, and back strain. You may want an additional 1-2 cm (0.4-0.8 in) of extension later. Your handlebars should obscure the front hub if you ride with your hands on the brake lever hoods.

**HANDLEBAR DROP**

The depth of the drop, left, is very much dependent on your hand size. A depth of 14 cm (5.5 in) is shallow, 14–15 cm (5.5–5.9 in) is medium, and over 15 cm (5.9 in) is large. Position the handlebar ends parallel with the ground, or raked to a maximum of 10°.

HAND MEASUREMENT

To measure your hands, right, grasp a tubular object with the same diameter as the handlebars in your fist. Put your fist on a table with the tube horizontal. Measure the fist height. Under 7 cm (2 1/2 in) is shallow, 7–8.9 cm (2 7/43–3 1/22 in) is medium, over 8.9 cm (3 1/2 in) is large.

**BRAKE LEVERS**

On drop handlebars, the brake lever, left, should be mounted so that the tip of the lever just touches a straight edge laid along the handlebar end.

BRAKE LEVER ADJUSTMENT

The mounting bolt, right, is inside the brake hood. Depress the brake lever to gain access with a hex key.

**HANDLEBAR ADJUSTMENTS****Handlebar Width**

Handlebar widths range from 21 to 24 in, and should be at least as wide as your shoulders. Wider bars give better slow-speed control: narrower bars suit racing, and squeezing through tight gaps in urban traffic.

**Handlebar Position**

A straight wrist is the key to both the correct handlebar and brake lever position. Keep your thumb, pinkie and ring fingers around the handlebar grip, and middle and index fingers on the brake lever.

**Lever Adjustment**

Most brake levers have an adjusting screw to set their distance from the handlebar. Tighten the mounting bolt firmly enough so that the levers stay in place, but can move in case of a fall.