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# MOTORCYCLE ERGONOMICS

*Making your bike fit your body*

**D**O YOUR NECK, BACK, SHOULDERS, OR TAILbone hurt after an hour or so in the saddle? What about your hands, feet, and legs? Do they get cramped or numb? Do you have to stop every 50 miles or so to get off your motorcycle? Though you may be thinking it's because you're getting older, the problem could be the way you interact with your bike.

The American Heritage Dictionary defines ergonomics as "the scientific study of equipment design, as in office furniture or transportation seating, for the purpose of improving efficiency, comfort, or safety." Rather than age, the ergonomics of your motorcycle may be the cause of your problems.

In order to solve the often conflicting issues between your favorite look, comfort, and physical makeup, let's explore what options you have and the positive and negative considerations each change involves. Once you know the facts, you can better decide what you want to do to improve your riding comfort.

## FORM OVER FUNCTION

Let's address the first cause of bad ergonomics: style. Your physical dimensions can sometimes result in a conflict between the look you like and what your body needs. On the other hand, you may not like the looks of what is most comfortable. For example, a motorcycle cop often sits on his motorcycle all day long. Take a close look at that seat next time you see one. It's very wide, sometimes separated from the frame by shocks, and to most of us, very ugly. However, most cops swear by them. Can you see one of those on your bike? Probably not!

The second cause of bad ergonomics is a failure to recognize the primary use of your motorcycle. Do you ride your bike to work every day or go on long cruises? Does the bike's customizing take the lead as to its design, with comfort being a dim second since you only ride around town? It's challenging, if not impossible, for many of us to find one motorcycle that will fill all of our expected uses equally well for our physical makeup. But unless you can afford the perfect bike for each use, you will need to investigate how to achieve the best one-size-fits-all-needs configuration. Should you buy a styled touring bike like a Road King? Is there a different seat that will allow you to ride long distances on your Softail, one you can swap out for a more stylish choice when staying in town? Are you really an Ultra Glide long-tour rider hiding in hot rod Sportster clothing?

## TOUCH DOWN

To do this right, we have to work from the bottom up. The first consideration is if you can place both feet flat on the ground when the

The best arm position is having your hands several inches lower than your shoulders with your elbows slightly bent. This gives you good control of the front end.





## HOW IT WORKS

bike is stopped. If you're up on your toes on level ground, you're sitting too high. Thankfully, there are a number of ways to get you where you need to be, so let's start with the easiest. You can buy a pair of riding boots with thicker soles to increase your reach to the ground, as well as your traction on the street. Your riding shoes can also have a big impact on your safety and riding endurance. True riding boots isolate vibration much better than street shoes or sneakers, provide better protection and don't melt onto exhaust pipes.

Another option is to alter or change the seat to lower your ride height. Having an upholsterer make an alteration to the foam padding in your stock seat may be enough. However, just taking padding out may also make the seat unbearable to sit on after a couple of hours. Or, the problem may just be that the neck of the seat (the portion nearest the tank) is too wide, which makes your legs jut out, wasting valuable leg length. Did you know that if the neck of the seat is too wide and your feet are too low, blood circulation to your

legs can be reduced enough to cause numbness? Seats have other issues you need to be concerned about, which we will discuss in a moment.

A more expensive option is to lower the rear suspension with a lowering kit or shorter shocks. The drawbacks here are that you will also lose some ground clearance, which will affect you in sharp turns. You'll also lose some suspension travel, which may result in a hard jolt when you hit a deep hole or large bump. Dropping just the rear section of the bike also slightly changes how the bike handles, since you're also changing the bike's frame geometry. If you lower both the rear and front suspension, you've eliminated the frame geometry issue, but have also lost some suspension travel up front. Expect a hard jolt front and rear when on a rough road.

### BEST FOOT FORWARD?

Next, and just as important, is the position of your feet with respect to your riding purpose and position. For a great number of people (especially beginners), mid-controls, which have the footpegs and foot controls in the center of the bike, make it easier to handle the

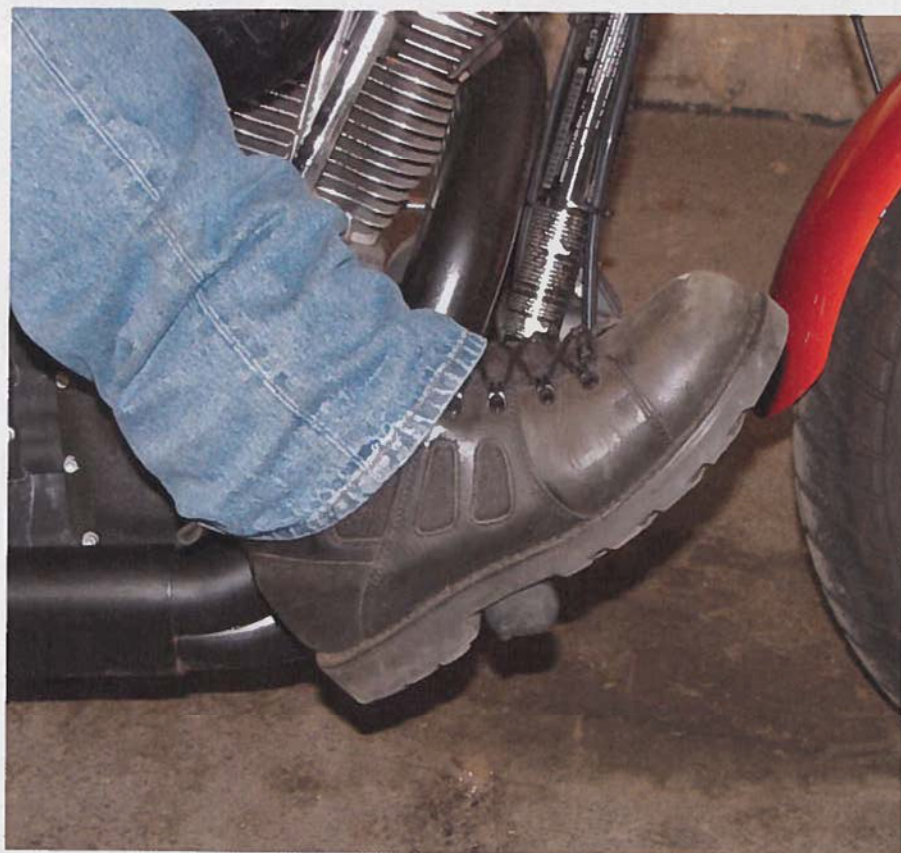
bike. With these, the top of your leg is horizontal, and your knee is slightly bent just like when you're sitting in a chair. Many riders believe mid-controls provide the best comfort and safety you can get out of one riding position. On most models you can add a set of highway pegs on engine guards or in a forward control position to allow you to stretch your legs when riding long distances.

Another choice is forward controls, or extended forward controls for longer-legged riders, which many riders also find comfortable and cooler looking than mid-controls. Forwards allow you to stretch your legs out in front of you. However, proper foot position is more critical with forwards than any other foot position. With your butt fully back in the seat, which is where the wind is going to push you, your foot's instep should be what is on the forward control footpeg with a slight bend in your knee. If you're touching the pegs with the balls of your feet, you are too far away from the forward controls. The simple fix is to get a seat that has additional padding behind your butt to push you forward the inch or two you need. A good tip I heard recently is to roll up a towel and put it behind you while going for a ride. Make the roll larger or smaller to see where it is that you like to sit on the seat and have the custom padding done accordingly.

In between these two options are floorboards (footboards). These allow your feet to move around and allow for an average knee bend. They don't allow you to go through curves as well as mid- or forward controls, since they reduce ground clearance in a turn. You also have to lift your feet off the board to work the rear brake pedal or downshift the transmission, which increases your reaction time. You can also buy guards for floorboards to keep from melting your shoes on your pipes.

The last option is rearsets, which are used mostly on café and road racers. These only appear on the XR1200X, as far as Harleys are concerned.

No matter what foot position you select, you also have comfort and styling options concerning which pegs or boards you use. Some offerings have varying degrees of padding on them to isolate your feet from the engine's vibrations. Others value bling more than comfort, so they may choose a billet and chrome set, which will send more of the bike's vibrations into your leg. However, as we



With your butt fully back in the seat, your instep should be on the forward control footpeg with a slight bend in your knee.



## HOW IT WORKS

said earlier, real riding boots isolate vibration much better than street shoes or sneakers, so these can help out, too.

### THE BUTT BUCKET

The next consideration is the all-important seat. Few people realize that your footpeg position often influences the best seat design for you. For the most comfort, you want a seat that, like the ones found on old full dressers and or cop bikes, is wide enough to properly support your weight on your gluteus maximus. A too small or poorly padded seat can cause pain in your groin, tailbone, and/or your hip bones, since they will be supporting most of your body weight. Of course, if you're leaning too far forward or backward, you'll also have pain in these areas, but we'll deal with that in the handlebar section.

There are numerous theories about the proper material to stuff your seat with, and that seems to be a personal preference that ranges from implanted gel pads to sheep skin seat covers. The shape of the seat, however, is what you're looking for when selecting the proper ergonomics as a starting point. There are numerous options for seat design with backrests, padding thickness, and padding shape. You need to test your options by trying out the seats of other bikes, going to vendor booths at shows and rallies, and considering where your hands and feet will be when selecting the seat.

It's not too big a deal to try out different seats while riding a bike, either, as long as there's one you need in stock. And for sure, if you often have a passenger, take their needs into consideration, too!

### RAISING THE BAR

Handlebars are the most difficult of these components to test out live and the last on the list, since you have to get your feet and butt properly positioned first. Harley-Davidson has tried a Fit Shop concept, but there has to be a variety of motorcycles, bars, and seats to make the test fits valid, and most dealers don't see the benefit-to-cost ratio for providing their riders with all the options to test.

A good home test is to sit on your bike with the front end straight and a friend holding the bike upright. Then put your feet on the pegs, push your butt



There are also handlebars, like these Hellbars, that have moveable joints incorporated in their design so they can be adjusted to a variety of configurations.

fully back in the seat, and position your upper body the way you like to ride: leaning slightly forward, fully upright, whatever. Then put your arms out toward the bars. If your hands don't reach the grips you have another one of those ergonomics vs. style choices to make. The best arm position is having your hands several inches lower than your shoulders with your elbows slightly bent. This gives you good control of the front end while keeping blood in your hands! Sometimes simply loosening the handlebars at the risers and moving the bars up or down is all that's needed to get the positioning correct.

To avoid wrist pain, your hands should be angled slightly down on the pinky side with the knuckles of the pointer and middle fingers in line with your forearm. If you box or do martial arts, you'll recognize this as the same position you want your hand in when you land a punch. Next, see how your fingers meet the levers on the hand controls. Do you need to arch your hand back or forward to actuate the levers? If so, loosen the controls slightly and adjust the entire assembly so your

fingers fall atop the levers naturally.

If you find your present handlebars don't properly position you and/or your hands, note what changes have to be made. Do the ends have to be angled out 10 degrees to put your grips/hands at the right angle? Maybe the grip angle is right, but you have to lean forward and stretch about 3" to reach the grips. You may need bars with more pullback. Are you leaning forward and down to reach the grips. Maybe you need bars with more rise. Also remember what hurts when riding with the bars you currently have. This is an important clue as to what you have to change. Do your wrists and shoulders hurt? Maybe you need to lean back a little so there's no pressure on your shoulders or wrists.

### GET A GRIP

Though the position of your handgrips plays a major part in your comfort, so does their composition and size. Hand grips can make a difference in hand, neck, back, shoulder, and arm fatigue. Grips come in a variety of styles and

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thus composition. Chrome grips, as you can imagine, don't do a very good job of isolating your hands from vibration. However, if vibration is the problem, maybe you need grips with both chrome and padding. Of course, like boots do for feet, a pair of padded gloves may let you keep your bling on the bars and vibration at bay.

The size of the grip (diameter) has a big impact upon your hand comfort. Grips with a lot of padding may be too large for your hand. Thankfully, there are usually lots of grips at dealerships and aftermarket shops, so you can test-fit them in your hand before buying. Padded gloves with the proper size grip will give you additional friction between the glove and the grip, which can make up for a large grip diameter without taxing your hand muscles. Cruise control or hand rests for the throttle can also be helpful.

## CONCLUSION

There is no substitute for ride time on a bike configured like you want yours to be. If you don't have a friend with a bike that fits you well, go to a demo ride event and ride the bikes that have some of the components configured like you want. Make notes about what you liked, as well as how the other components that affect the bike's ergonomics were set up on each bike. It may be that through minor customization, you can get some, or all, of what you really need. Remember to also check how well you can see and reach the gauges and controls without interrupting your concentration on the road. Make sure you can use your mirrors.

An interesting thing I found on the Internet is [www.Cycle-Ergo.com](http://www.Cycle-Ergo.com). On this site you can choose a motorcycle manufacturer, put in your height and inseam, and make adjustments to seat height, seat front to back on some models, and handlebar rise and pullback. You can also place your feet on the ground to check for the correct ride height. The result will be an approximation of your lean angle and knee angle. You can even compare different motorcycles and scroll between them. This is certainly a great place to start your exploration of style vs ergonomics! **AIM**



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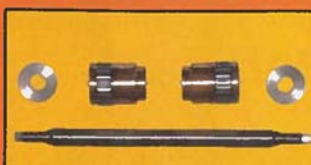
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- \* 1983-1996 Require Longer Handelbar tubes
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- \* \$639.00

Fits: Road King, Road Glide, Softail, Dyna motorcycles.



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##### Specifications:

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- \* 2007 and earlier require brake line change for flexibility.
- \* \$849.00

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