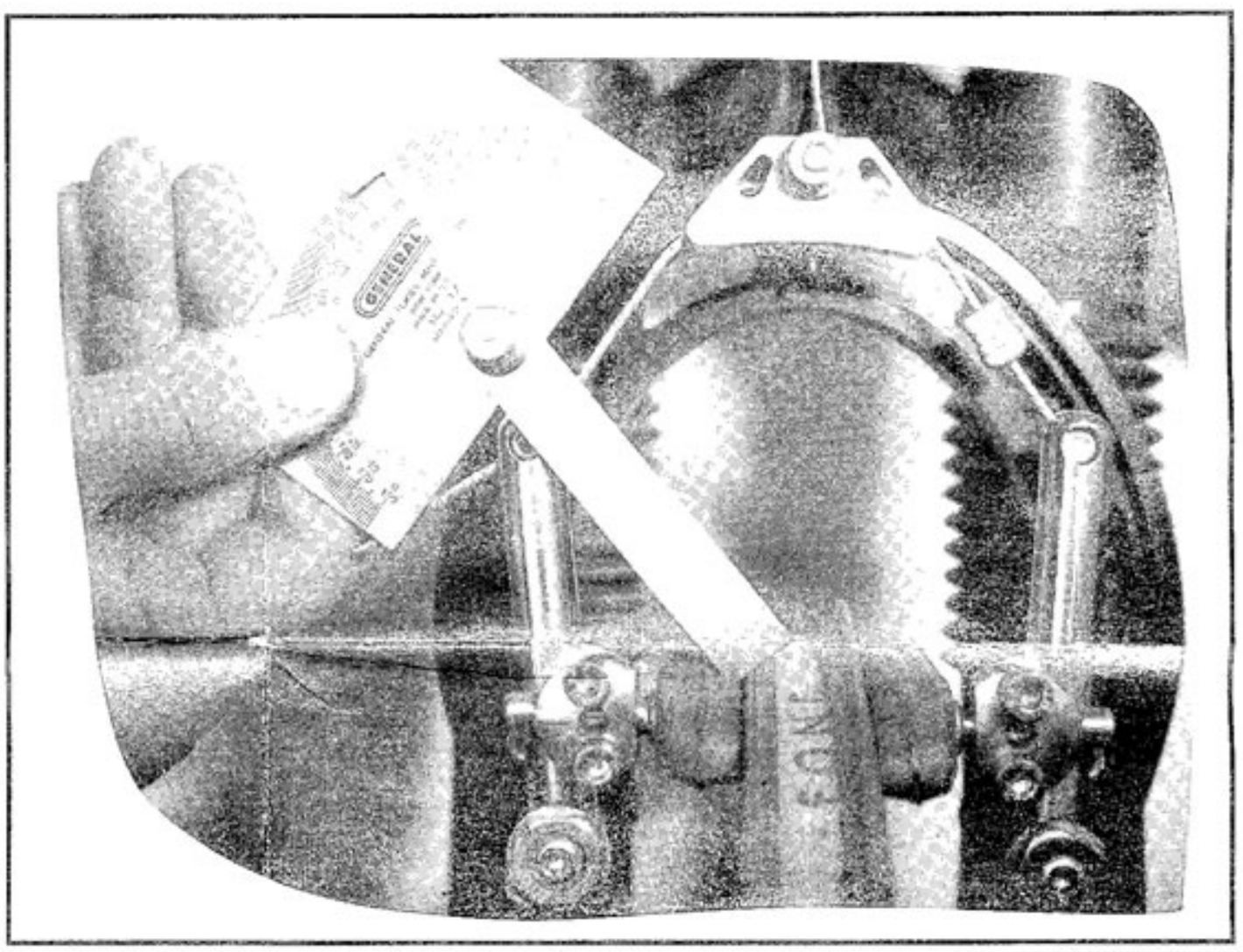
HOW TO ADJUST YOUR BRAKES

Slowing down necessitates a personal touch

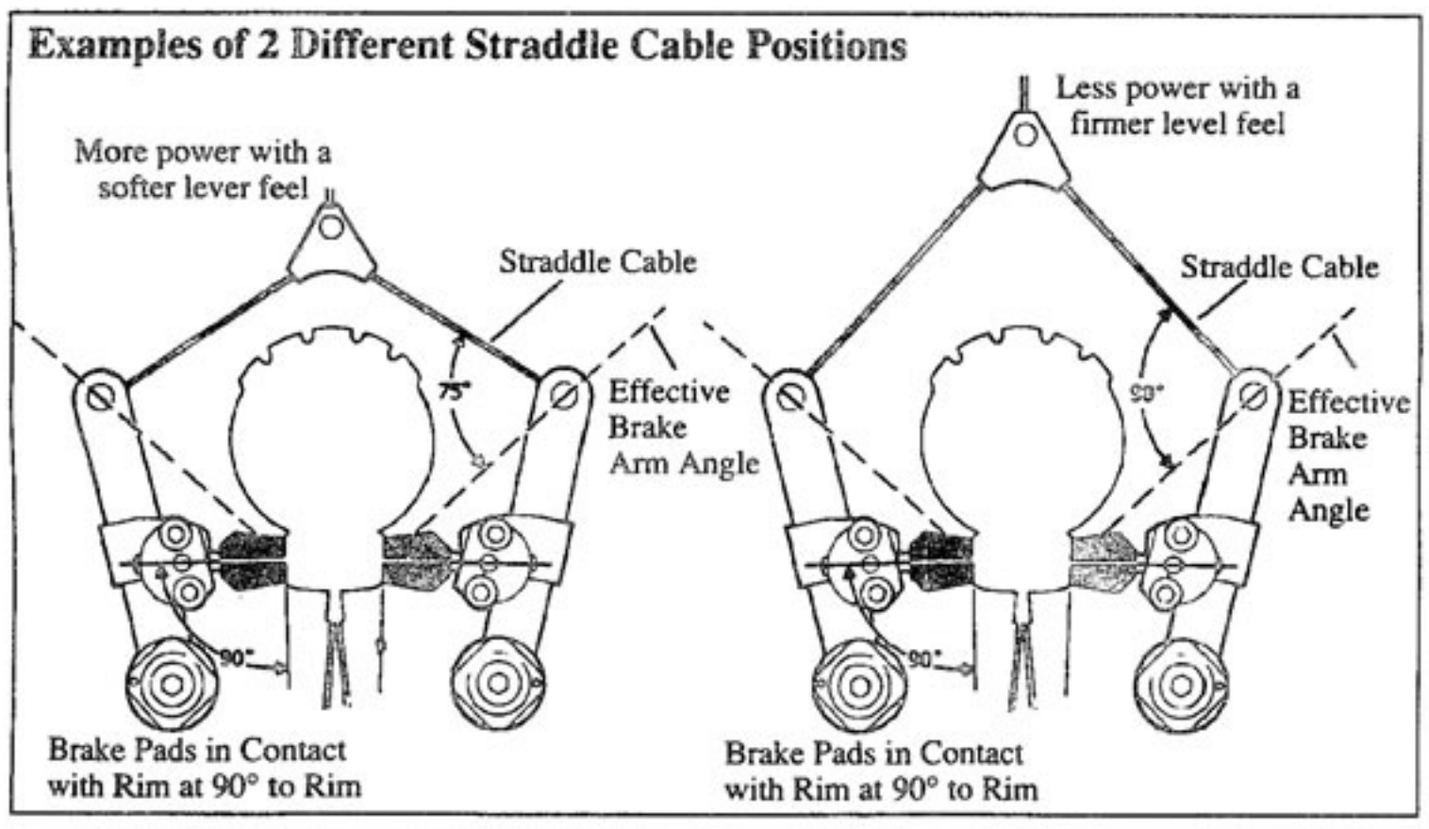
It's 11:00 p.m. on Saturday night as you frantically try to install a new set of brake pads. Your forehead is beading up with sweat and thoughts of uncertainty and doubt whisk through your mind. You are not sure if you will be able to install the new pads in time for the big ride early tomorrow morning.

Working on bikes isn't your forte, and the thought of all your buddies being there without you is unnerving. The bike shop closed before you could make it, so now you are stuck with doing it yourself. Are you going to sit there and whimper or are you going be self-reliant in true mountain bike fashion? Well, of course you will do it yourself! The wrecking crew asked Wayne Lumpkin from Avid Enterprises, makers of Tri-Align brakes, to help us out with some of the finer points of brake adjustment and basic principles that he has developed over the years.

"What's with cantilever brakes, anyway?" we asked Wayne, who spends every waking hour working on bicycle brakes. "Is there some mysterious force at work here or are we missing something?" Here's what he came up with.



Effective angles: If you really want to be particular about your effective brake-arm angle, you can buy a protractor at the local hardware store. Wider straddle-cable hangers (yokes) such as this one simulate a higher straddle-cable position. This straddle cable is set at 105° to the effective brake-arm angle - A very firm feel.



Let's get technical: Wayne Lumpkin from Avid Enterprises sent us this diagram representing effective brake arm angles. The angle is measured between the straddle cable and the imaginary line that extends from the brake pad/rim-contact area to the straddle cable hook-up point. This measurement directly affects the feel of your brakes.

WHAT WAYNE HAS TO SAY

"Let's face it—everybody wants powerful brakes. However, brakes can be set up to cover the whole spectrum of feel, from the softest, most modulative to the firmest forearm-pumping wheel-lockers. Since people's taste in brake feel varies as much as their choice of burrito stuffing, let's first establish that there is no one correct way to set up brakes, only user preference. So how do you get the exact feel at the levers that you want every time?

"Most brake setup misunderstandings center around a lowly two-dollar piece of cable," said Wayne. "If you want your brakes to 'feel right,' you need to set the height [or angle] of the straddle cable to the angle of the brake arm. Here's the rub: To do this you have to understand what a brake arm is.

"A cantilever brake arm is a simple lever and fulcrum. As the arm pivots, the

pad is brought into contact with the rim. At this point the pad becomes a fulcrum, creating a line of force from the pad/rim contact point to the cable attachment point at the top of the arm. This line of force is the Effective Brake Arm Angle and must be noted before accurate and repeatable setup can occur. By finding the angle at which the center of the brake pad intersects the cable attachment point, you will be able to take measurements up to the brake straddle cable. It is the relationship of the straddle cable to the Effective Brake Arm Angle that determines braking power, feel and modulation. This principle works using any brand of brakes, regardless of the shape of the brake arms themselves. You need to hold the pad in contact with the rim as you do these measurements."

HAVE IT YOUR WAY

"Adjusting the feel of your brakes simply means adjusting the brake lever travel at the handlebar. To accomplish this, you need to control the amount of cable the lever pulls throughout the stroke. This is done by raising or lowering the straddle cable. A good starting point is 90 degrees to the effective brake arm angle [with pads contacting the rim]. This will usually produce a medium feel at the lever. If you lower the straddle cable—75 degrees, for example—more cable pull will be required to effect braking, hence, longer lever travel and therefore greater mechanical advantage with a softer feel at the lever. By raising the straddle cable—105 degrees, for example—you will pull less cable, have less leverage and lever feel will be firmer.

"Don't confuse a higher amount of pressure at the lever with more powerful brakes; it isn't so. The lower the straddle cable, the more force is directed into the brakes. A higher straddle cable will require more hand force, for the same force directed to the rim, than with a lower straddle cable position. Some riders prefer the sensation of pulling on the brakes with more hand force [which produces less modulation] as opposed to the low straddle cable which provides more power with less hand effort. It's the rider's choice. Additionally, by setting the straddle cable too low, you can exceed the usable travel of the brake lever, rendering this system rather ineffective [spongy feel]. Keep in mind that a long brake arm travels in a longer arc at the tip which necessitates a longer pull of the cable. The relationship of lever travel to brake arm movement is a ratio that can always be controlled."

ALTERNATE METHODS

"You can bring about similar changes in feel and performance by spreading the brake arms farther apart or bringing them closer together [with a corresponding pad adjustment], thereby altering the effective brake arm angle. By the way, this is the only method of tuning Shimano brakes with the pre-set straddle cable links.

"Another factor in this equation is the

YOUR BRAKES

amount of cable different brake levers pull throughout their arc. There is enough variance from brand to brand to require changes in straddle cable position to achieve the exact feel you seek.

"Some of the most recent lever designs have cam mechanisms that pull less and less cable as they progress through their stroke. This can increase leverage while at the same time causing a softer feel, particularly if your setup brings the pads into rim contact deep into the stroke. Brake setup with these levers can be a bit fussy, so Shimano supplies your dealer with little plastic gizmos that preset the straddle cable length. These devices, called Pro-Set tools, work well for the Shimano brakes they're made for; however, they totally erase any individual preference you might want to incorporate into your own setup."

OTHER STUFF WORTH KNOWING

"Most complaints about brakes center around a lack of power, for which there could be several causes. First and foremost is poor setup of the straddle cable and effective brake arm angle. Other not-so-obvious causes can be excessive boss flex which translates as too much flex in the fork or seat stays, soft pad compound [mushy feel], too much toe-in [fore/aft pad angle in relation to the rim], dirty rims or glazed over pads.

"Fixes for the above include installation of an anti-flex brace, high-quality pads in good condition and clean rims.

"Unavoidable or difficult-to-fix problems can arise from incorrect placement of bosses on the frame or fork. On some bikes, bosses are mounted either too high, too low or too far apart. With brake bosses that are too high, the positioning can actually cause short brake arms to simulate long ones, and vice versa for the low-placed mounts. When the brake bosses are mounted too far apart, you're usually forced to run the brake pads all the way inboard, leaving little room for adjustment. This dramatically affects the characteristics of cantilever brakes and really makes brake adjustment from bike to bike more difficult than necessary. To help address these types of problems, a bike's ideal brake arm length must be identified before solid braking performance can be achieved.

"Bike, fork and brake manufacturers need to get their acts together and select a standard brake boss placement [that works with all brands of brakes]. Brake bosses show up in so many different positions that it appears that 'pin the tail on the donkey' is the prevalent method."

"If you wrench on your bike yourself or have it blessed by the local bike shop guys, good-performing equipment makes all the difference. Having fun, not frustration, is what it's all about." ❑

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