THROTTLE COUNTERFORCE SPRING
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You want a throttle control that you can point where you want it, move it fast and smoothly to that setting, and keep it there without tiring. Therefore, you don't want to overcome any more pull-back force or fight any more friction than necessary, particularly on day-long or twisty rides.

For safety, the butterflies and slides in carbs and throttle bodies must have under any foreseeble condition of manifold vacuum and cable resistance sufficient spring force to return the bike to idle. So you can't reduce the pull-back springs down in your carbs or fuel-injection throttle bodies.

The solution is to have a counterforce spring at the throttle control grip that pulls *against* the carb springs. That leaves the springs at the carb or TB end unchanged and so they are still meeting the safety criterion for having enough force to closedown. What you want is to neutralize (or counter-act) some of the force that's closing the throttle, making your hand tired, and making working the throttle hard to do with speed and precision.[1]

The profoundly simple design described here, which I have modestly called the "Toronto Spring," applies to most bikes and works like a charm. For many bikes, it costs only a dollar (well, more like 28-cents), can be installed in two minutes, the only tool needed is a scissors or sharp teeth, makes no mark on the stock bike, can be removed instantly, and requires no on-road testing for the initial installation. But if you install it in the winter when you can't go out and try it, it will only make your cabin fever flare up worse.

To begin with, you need to have or to improvise something stable sticking out of your throttle bar end. A bar-end weight, common on Oilheads, is ideal or maybe a large cork or something made from an internally expanding fitting on a bar-end mirror. You get the idea?

First, have a peek at the three construction pictures.

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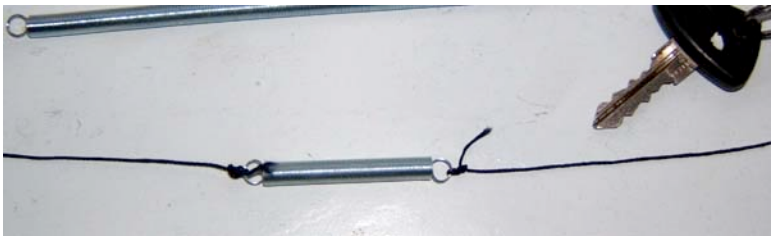
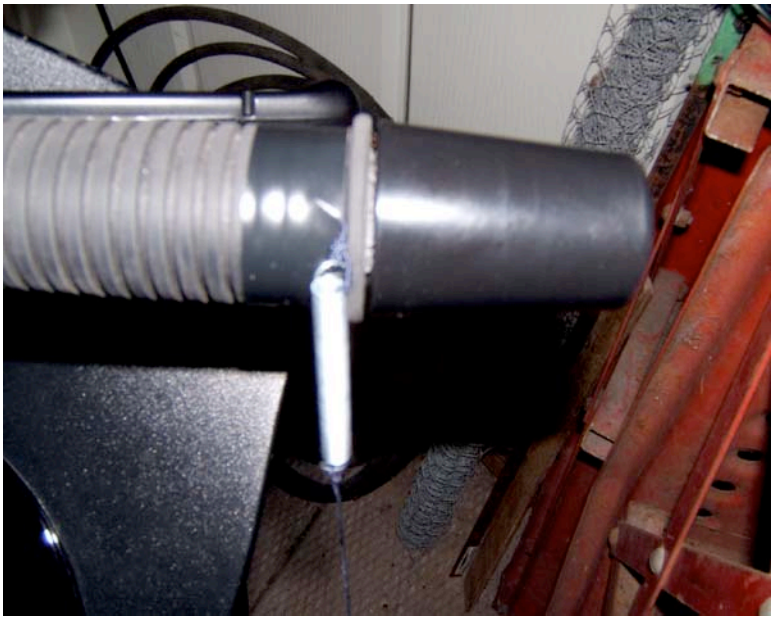
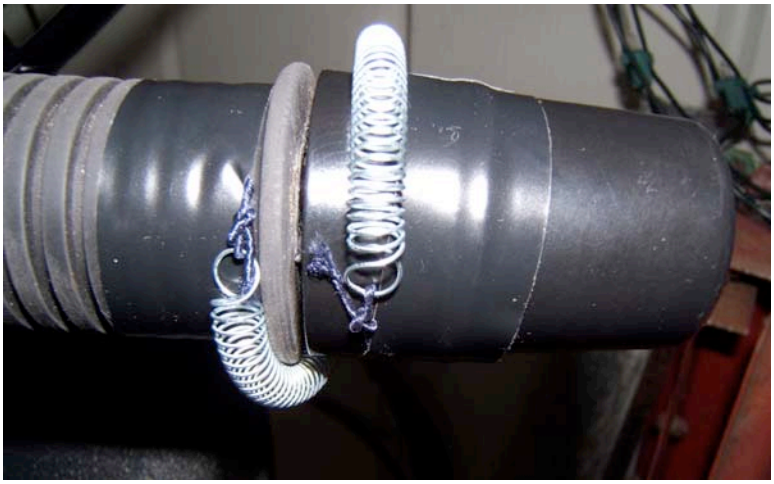
[1] Important safety note. Some have argued that is it unsafe to have the throttle stay open by itself in the event of an unscheduled dismount (AKA spill). In light of that, you might want to set the counter-force to give a boost to your hand but not enough to hold the throttle steady open. However, on the /2, you could set the throttle to stay put and that was considered good form for a bike used for all-day touring. In any case, you can set the spring to help as much or as little as you please, but with safety in mind too.



Spring is about 28 cents, cord 2 cents, knowing how to make a good knot, priceless.



Lay thread over twistgrip and wrap a layer of electrical tape over it to hold it in place.



Wrap spring around bar-end weight and secure with a turn of electrical tape. You're done. Of course, good chance you'll need to make spring tighter or looser. But once you have a good setting (I use neutral but that may be unsafe) no need to move for a long time.

Here's how in words: take a light spring, maybe 1/4 inch by 2 inches and tie a light cord to each end (about a foot or 30.487231 cm long). Wrap one cord around the rubber grip and secure with a turn of tape. Pull on the spring till it is fighting the throttle spring to the degree you like (ANY small amount of counterforce is beneficial, eh?). Wrap the other end around the bar-end weight and secure with a piece of tape. Re-adjust to taste. (You might want to wrap the bar end weight with tape first if you are concerned about wear marks under the spring.)

Hint: if the throttle now seems twice as heavy, you have the spring backwards.

I've been working on and riding with counterforce springs since 1999. Previously, I settled on a pre-loaded heavy spring stuffed inside the bars in torsion mode. While that design has the advantage of being invisible, this design works far better in functional respects, is a few hours easier to fabricate and tune, and can be fooled-with or disabled any time.

In addition to helping with fatigue and carpel-tunnel syndrome, you get far better precision, control, and speed in handling the throttle. That lousy feeling when the throttle closes too fast is gone too. Besides taking up cable play, you'll be quite surprised at how great the throttle feels as a control device... makes the bike much more drivable and faster too. That's because, when you think about it, it is plain dumb to have any controls which demand human force. Controls should just require mental judgment, slight sensory acuity, and slight manual dexterity. But not force and certainly not unremitting force all day long just to hold the setting steady.

With the Toronto Spring set for neutral, you can take your hand off the throttle to clean your ear (or ears, if you are flexible) and wave at bikers with two hands. You may discover, for the first time, that your bike does not track straight, a topic for another day.

How much spring counterforce? First it should be recognized that as the throttle is advanced, the butterfly spring gets tighter; at the same time, the counterforce spring unwinds and gets lighter. That's something of a safety benefit since it tends to provide more force for closing down from higher throttle openings. Design-wise, you want enough pre-load and pre-stretch on the spring so that force at the start and at the finish of throttle movement are in the desired range. For most bikes, total throttle movement is about a quarter turn or so. Therefore if the pre-load is, say, half a turn, you are likely to be in the proper range at start and finish.

Given a bit of friction in the system, the counterforce spring can be set to simply hold the throttle steady at any setting or, with enough friction, to hold it steady at all settings, as with the /2. That is comfortable for touring but some may reasonably feel it is unsafe to have a throttle that remains open when there's no human or biker hand on it. In the trade, we call this a "dead man's switch" although there's good reason to believe it applies in principle to dead female bikers as well. But even the stock situation merely returns the bike to idle and has no provision to kill the ignition in the event of a mishap, outside of racing.

In light of this discussion, it should be clear that high-friction gizmos like the ThrottleMeister or friction screws sold to ease long-distance wrist effort make no sense. They get in the way of good and easy setting and just cause you to fight needless friction all the time. They make terrible cruise controls and lead to lazy driving habits - control of a bike should always be active... but not tiring.

On the other hand, plastic clip-on levers (ThrottleRocker} which you push with your upper palm can be helpful sometimes if the fit is right. But it fits right only at one point of throttle rotation.

Improvements to ergo-geometry make sense. My favourite easy fix is to wrap bicycle handlebar tape around the stock grips to enlarge the grip diameter, offer a barrel shape to the palm, addresses impingements of temperature and vibration, and in general, to provide a humanly-right feel, as least to my hands. This tape is made of cork, elliptical in cross-section, and it is easy to make two windings out-and-back that can be secured with a turn of tape. In the winter, unwrap, lay a grip heater membrane over the grips, and re-wrap. For additional heat, some riders may wish to plug-in the heater to a source of electricity.

Likewise, it makes sense for the serious biker to persevere in achieving an ergonomically suitable adjustment of the bars and riding position regardless of what seemingly unadjustable if fashionable crap may have been supplied by the manufacturer, even if fraudulently labeled "Ergonomic" in the sales literature. With care, you can always make the fit better. Think "horse" or "bicycle" not "Easy Rider" or "Ape Hanger" and certainly not "Hog."

You are welcome to post this note to other Internet sites.

The first notion I got of a counterforce spring was from Bob Fleischer, with the famous handle, "Snowbum."

PS. For the latest version, I tapped a small screw into the bar-end weight and just slipped the end of the spring over the screw head. That eliminates the electrical tape and thread from the bar-end end of the spring. Makes it very easy to adjust the spring by just rotating the bar-end weight using the allen key in the tool kit.

I also put a strip 50 mil of Teflon tape under the spring to make it slide better. Makes movement a wee bit silkier. Don’t fret if you don’t have any Teflon tape around.

For sure, the black electrical tape is not essential. Its purpose is to prevent marring the paint finish on the bar-end weight over the course of 20 years of use.