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# MOTORCYCLING

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#### RIDING STYLE

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Goggles: Scott VoltageX

Jersey: Axo Sport

Gloves: Axo Ride

Pants: Axo Nickle

Boots: Axo RC6





# Transfer of Power

Christini Honda CRF250X AWD » Breaking the code



It feels as if  
an invisible  
pair of hands is  
pulling the bike  
by the forks.

**By Don Williams »** Although two-wheel-drive motorcycles are nothing new—Rokon has been offering its Trail-Breaker go-anywhere machine for decades—a high-performance motorcycle with two driven wheels has until now been an unattainable Holy Grail. Yamaha tried it recently, but its hydraulic system's performance was more theoretical than practical. The bike disappeared quickly, never making it to the United States.

The Da Vinci Code of two-wheel-drive motorcycles, however, has been broken by Steve Christini, an engineer who designed an all-mechanical AWD mountain bike as his senior project at Villanova in 1995. Christini eventually took the mountain bike to market, but only 50 of the AWD bicycles were sold. Ultimately, the increased weight and slight power loss were insurmountable obstacles for riders of a self-powered vehicle.

The experience turned Christini's attention to off-road motorcycles, where the prodigious benefits of 2WD benefits stood to far outweigh the system's nominal liabilities. Rather than build an entire motorcycle from scratch, Christini made the decision to modify existing machines—the Honda CRF250X, initially, followed by the 450X and 250R, and, soon, various KTMs.

The patent-laden Christini Technologies system is simply ingenious. It is easy to understand, yet contains enough engineering tricks to thoroughly impress. It is a remarkable sleight of hand that the system dissipates a mere 1/10th hp and adds only 15 pounds, according to the company.

To start the transfer of power, a second sprocket is piggybacked with the countershaft sprocket, which runs a chain up to a sprocket in the Christini-modified frame. A clutch-damped shaft transmits the power to the head tube, where counter-rotating bevel gears move the power to the lower triple clamp. Two chain-and-sprocket pairings then send the power to the trickiest items on the bike—telescopic driveshafts with linear ball spline bearings. The counter-rotating driveshafts run parallel to the forks into the fork gearboxes, then into a modified Talon hub containing one-way clutches to drive the front wheel at 75-percent of the speed of the rear.

This last piece of information is critical. Rather than a full-time two-wheel-drive system that powers the front wheel fulltime, the Christini is an on-demand AWD system that only propels the front wheel when the rear wheel spins. Once the front wheel matches the rear in speed, it returns to freewheeling.

As with any new technology, the proof is in the riding, and the Christini absolutely delivers. Although Christini has revolutionized the motorcycle drive method, the effect of the system is startling in its transparency. No special techniques are required to ride the bike effectively. The design simply does what it is supposed to do—act as a traction control device and the clutch systems preempt any abrupt introduction of power to the front wheel, eliminating fatiguing and control-threatening jolts.

Not surprisingly, the AWD effect is most noticeable in mud. With the front wheel pulling, the Christini makes



## For many riders, it turns an impossible hillclimb into a cakewalk.

child's play of bogs that would sink a conventional motorcycle in its track. There is a limit, certainly, but even if you do get stuck, the Christini is impressively easy to free from the muck. Similar performance is evident in deep sand, so the Christini is a natural for riding dunes, where the front wheel would be almost constantly engaged.

Hillclimbs are another place the bike shines. Here, a little counterintuitive technique is involved. Traditionally, as the rear tire breaks loose, you have to either back off the throttle or slip the clutch to reacquire traction. On the Christini, you welcome the slipping rear wheel by increasing throttle and moving your body forward to add weight

to the now-driving front wheel. The slicker the hill, the more pronounced the effect. For many riders, it turns an impossible hillclimb into a cakewalk. It feels as though an invisible pair of hands is pulling the bike by the forks up the hill for you—amazing.

Flat ground is not immune to the charms of the Christini either. On flat or off-camber turns, the front end pulls the rider through the turn as the rear starts to drift. Cornering is both faster and safer, once you adjust yourself the bike's subtle desire to stand you up, sending you quickly on your way. One unexpected effect of the counter-rotating fork-mounted driveshafts is that they act as a speed-variable steering damper.

Wheelies and lofting over obstacles is more challenging due to the additional weight up front, and there is a tendency for the front tire to drive rather than lift.

Rocky, slick, and loose trails are given a whole new level of accessibility—traction loss seems almost impossible. Again, you quickly learn to add throttle where you might have previously chopped it, and if you ride the bike in the traditional manner, it behaves in the traditional manner. Also, the flip of a lever disengages the system entirely.

For all its mechanical wizardry, the Christini AWD is most adept at making you a faster, better, more confident, and safer rider. That seems like a lot to ask of a series of sprockets, chains, shafts, and clutches, but the magic of the bike is undeniable. Welcome to the future.

[www.christini.com](http://www.christini.com) | 215.351.9895

