HUSQVARNA 390 CR

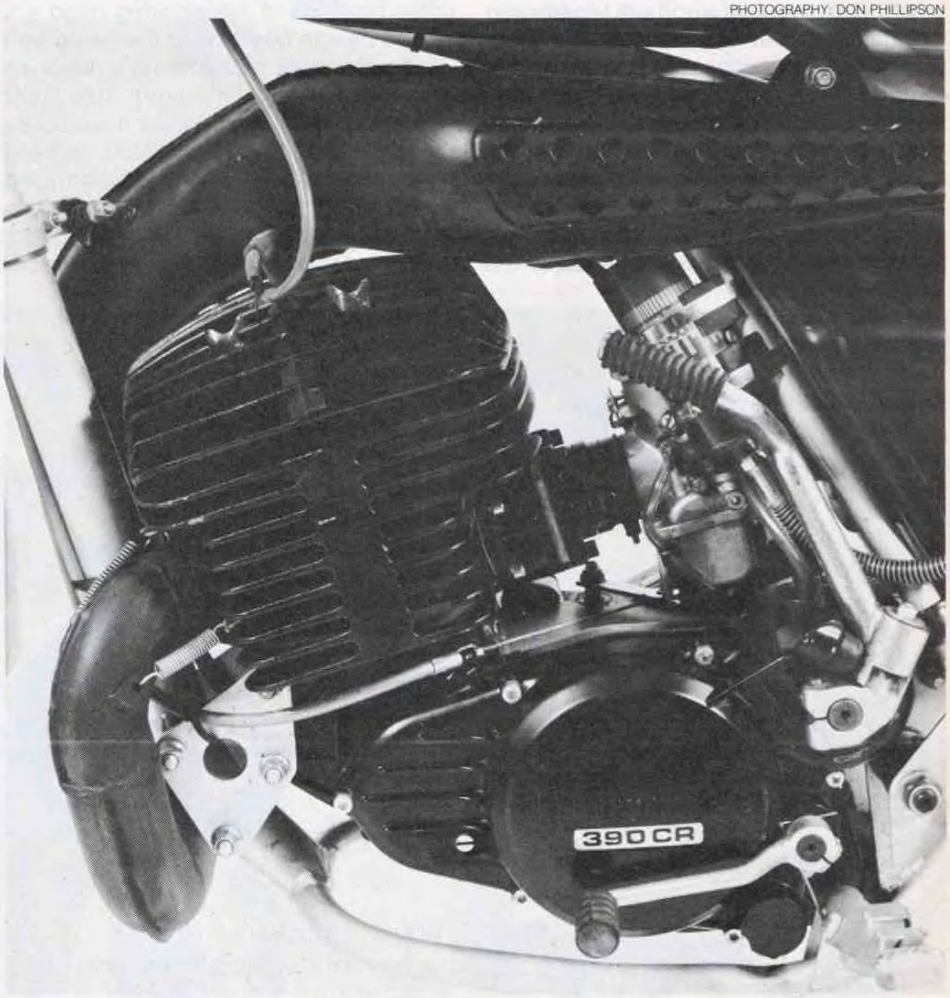
CYCLE DIRT TEST

● IT'S NO SECRET THAT WE LIVE IN AN AGE OF specialization. Off-road bikes in particular are products of our time, and in the last few years different kinds of dirt bikes have become single-function machines. But no one should bemoan the fact that motocross bikes no longer transform easily into good enduro bikes because motocrossers—with only one function to fulfill—are better than ever.

With its new 390 CR, Husqvarna has carried specialization one step further: not only is the CR solely for motocross, but it's also strictly for intermediate to expert riders. Novices won't find the Husky threatening. On the contrary, the 390 has a smooth and predictable power band with a stupendous midrange, and it handles as precisely as any open-class motocrosser. Only one characteristic limits it to advanced riders: the seat's lowest point is 38 inches above *terra firma*, a result of the bike's extra long-travel suspension. Husqvarna believes the benefit of extraordinary suspension overrides the disadvantage of added height, and that belief is correct. But the bike's center of gravity is correspondingly in the stratosphere, and this makes the 390 CR a handful when hitting berms, which is one of the things a motocrosser is supposed to do especially well. In fact, the Husqvarna—and every tall motocross bike with a high c.g.–tends to stand upright when slammed into a berm. Consequently, less skilled motocrossers may appreciate the 390's exceptionally good power and suspension; they may even love the entire bike, but they may not be able to go as fast on it around any given track as on another good motocrosser with a lower center of gravity. Experts, of course, practically ignore the Husqvarna's extra height and take advantage of the 390's other many likable traits.

Since the Swedish factory knows that frame and suspension development are coupled together, they've made all parts of the chassis larger in the past years to match increased wheel travel. For 1979, there are so many changes that it's effectively a new chassis. Its frame is still made of chrome-molybdenum, but its similarity to previous frames ends there. There's an extra backbone tube for added rigidity, and there's another brace running from approximately the rear motor mount to the middle-rear of the backbone, an arrangement which is necessary to accommodate the new air box. Husqvarna has also changed the wall thickness of the frame tubes in an effort to save weight and increase frame strength—though

PHOTOGRAPHY: DON PHILLIPSON



A motocross machine is only as good as its numbers indicate. The 390 CR has 11.8 inches of suspension travel front and rear and produces 37 horsepower. But try this for size: the Husky also has a 38-inch seat height.

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short of cutting the frame up, it's impossible to tell where these subtle changes in wall thickness have been made.

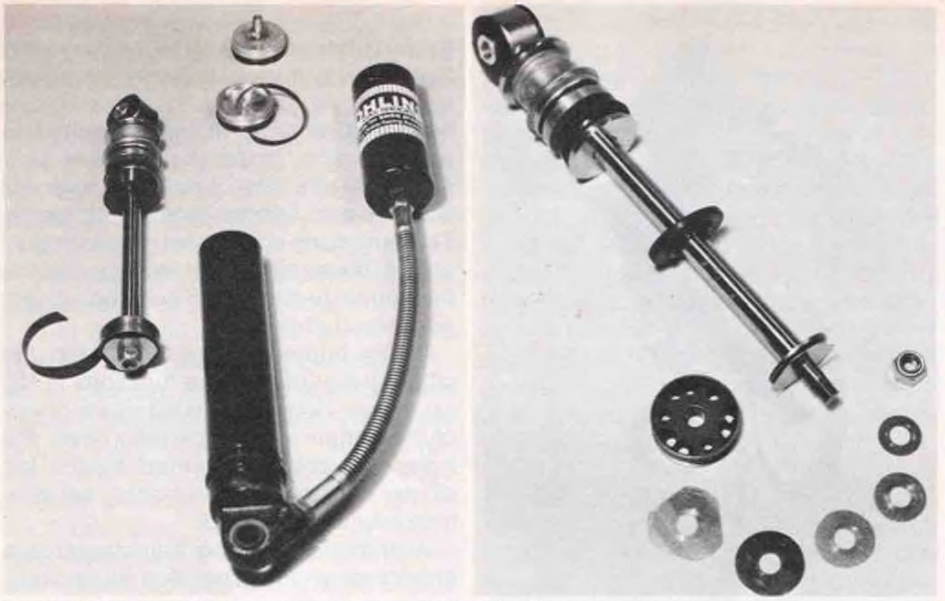
An enlarged swing arm accompanies the new frame. It is 10mm wider at the mounting points, and its arms are straighter than their '78 counterparts in order to increase swing-arm rigidity. It is also tucked in close to the engine so that there is only 91mm (3.6 in.) between the centers of the swing-arm pivot and the countershaft. Consequently, chain tensioning variations are not enormous, allowing the Husky to use a simple system of fixed-mount block-type chain tensioners.

The enlarged swing arm combines with the updated frame to produce some rather drastic changes in chassis dimensions. The 390 now has a nominal 58.9-inch wheelbase—though *Cycle*'s particular test bike, with the axle in about the middle of the chain-adjusting slots, had a 58.1-inch wheelbase. Husqvarna traditionally has used a lot of rake; the 1977 and '78 390s departed from that practice by having less than 30 degrees of head angle. The new 390 CR, though, has once again been extended: its rake is 30.5 degrees with 150mm (5.9 inches) of trail. A side benefit of the general enlarging of the bike is its enormous ground clearance—335mm (13.2 inches). Other minor but important features of the Husky have remained unchanged, such as the use of roller bearings in the steering head and sealed needle bearings in the swing arm.

Complementing the frame's major refinements, the suspension has been vastly reworked. The standard air/spring fork has longer tubes to extend its travel to 300mm (11.8 inches). Unchanged, however, are the smallish 35mm tubes. More important than the fork modification is the addition of a new brand of shocks:

390 leads the way in technological development with Ohlins shocks, a 17-inch wheel and a full-floating brake.

Though Husqvarna has a tradition of continually refining its machines, this year they've gone beyond mere updates. The 390 has a new frame and swing arm, a longer-travel fork and new shocks, different gear ratios and a new exhaust system. And for the first time in two decades, the Husqvarna has a new air box. Despite its Spartan-like lines, the CR weighs 248 pounds full of gas.



Disassembled shock (left) reveals positioning of internals; floating piston with ring fits into reservoir and separates oil from nitrogen. Flexible washers (right) automatically vary damping characteristics.

Swedish-made Ohlins. These shocks have become the hottest item on the National and International motocross circuits in the past year. Up to eight out of the top 10 finishers in several Nationals have been using the new units.

The Ohlins combine many clever and unique ideas to produce state-of-the-art equipment. Borrowing from Formula One car technology, the shocks have "bump foams," which are thick compressible rings attached to the shock shaft. In the shocks' last few millimeters of compression travel, the bump foams collapse and reduce the harshness of bottoming. The foam rings are available in two different densities and three thicknesses (35, 45 and 55mm), all of which can be used to vary pre-bottoming characteristics. Another innovative item is a 20 percent-teflon/80 percent-bronze ring around the top of the shock piston. Designed to expand at the same rate as the shock body,

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this highly heat-sensitive ring maintains a tight seal and prevents blow-by.

Most important of all, the Ohlins employ flexible washers which automatically vary the damping by effectively changing the size of the damping orifices. There is a standard shock piston mounted on the shock shaft. Three sets of holes—each a set of two—and three individual holes extend through the piston; these are damping orifices. As with most normal shocks, oil travels through the orifices as the shock compresses and extends. But the Ohlins have an added feature: two clusters of thin, flexible washers—one set above the piston, the other below—partially cover the piston's holes. The washer in direct contact with the piston is triangular; the other washers which brace the first triangular one are round. The top cluster of washers which are placed over the holes controls the damping during shock compression; the oil flexes the edges of the triangular washer as it

passes through the orifices. Viscous, thick oil flexes the washer to the extent that the oil can travel through the orifices at a set rate of speed. As the shock oil heats and becomes thinner, it exerts less pressure and flexes the washers less. Thus, the oil's rate of travel through the washers and orifices remains the same. This automatic adjustment results in consistent damping characteristics despite the normal heating of oil and consequent viscosity changes.

On the bottom of the shock piston, the other cluster of washers functions in the same way. However, the triangular points of the bottom washer partially cover the holes that are *not covered* by the top cluster of washers. This bottom set controls rebound damping.

Automatic damping adjustment is a breakthrough in suspension technology, but it wouldn't be entirely practical without a method of varying the baseline from which automatic adjustments are made. The Ohlins have that capability. Variations

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Make and model	Husqvarna 390 CR
Price, suggested retail	$2195

ENGINE

Type	Two-stroke, reed-valve inducted, single cylinder
Bore and stroke	83.0 x 71.0mm
Piston displacement	384cc (23.4 cu. in.)
Compression ratio	11.5:1 (full stroke)
Carburetion	(1) 38mm Mikuni
Exhaust system	Upswept expansion chamber with silencer
Ignition	Motoplat capacitor-discharge ignition
Air filtration	Oiled, washable foam
Oil capacity	N/A
Bhp @ rpm	37.46 @ 7000
Torque @ rpm	29.44 @ 6000

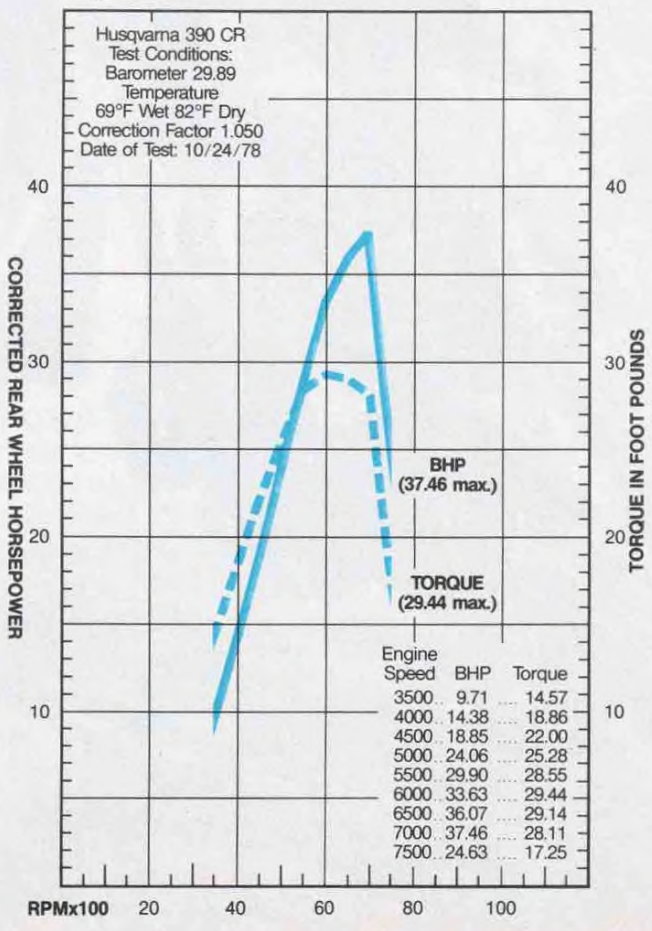
TRANSMISSION

Type	Six-speed with wet alloy-plate clutch
Primary drive	Straight-cut gears, 30/68, 2.27:1
Final drive	Renold chain, 13/53 sprockets, 4.08:1
Gear ratios (at transmission)	(1) 2.35 (2) 1.71 (3) 1.30 (4) 1.04 (5) 0.87 (6) 0.78

CHASSIS

Type	Single-downtube, full-cradle chrome-moly frame; tubular swing arm
Suspension, front	Air-charged, oil-damped, 300mm-travel fork with forward-mounted axle
rear	Nitrogen-charged Ohlins shocks
Wheelbase	1495mm (58.9 in.)
Rake/Trail	30.5°/150mm (5.9 in.)
Brake, front	Conical drum with double 160mm shoes
rear	Rod-actuated conical drum with 160mm shoes
Wheel, front	21-inch alloy rim with rim spikes
rear	17-inch alloy rim with rim spikes
Tire, front	Trelleborg Motocross 644 3.50 x 21
rear	Trelleborg Motocross 544 5.00 x 17
Seat height	967mm (38.1 in.)
Ground clearance	335mm (13.2 in.)
Fuel capacity	7.8 liters (2.1 gallons)
Curb weight, full tank	112.4 kg (248 lbs.)
Test weight	189.6 kg (418 lbs.)

CUSTOMER SERVICE CONTACT
Husqvarna Motor Corp. West
4935 Mercury St.
San Diego CA 92111



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in the baseline can be made by installing different-sized washers: they are available in different diameters and thicknesses. Various diameters of the triangular washer cover up the piston orifices to different extents, and different thicknesses of all the washers resist flexing to a greater or lesser degree.

Additionally, the number of washers installed can be varied. Normally, at least three washers are used. The bottom washer controls low-speed damping action, the middle washer controls medium-speed damping and the top controls high-speed. For very fine suspension tuning, up to eight washers can be installed. All washers, moreover, can be varied in thickness and width. These separate clusters also provide an obvious advantage over normal shocks. Standard units use the same orifices to control compression and rebound damping. Altering one function necessarily (and often detrimentally) affects the other one. In contrast, the compression and rebound damping in Ohlins can be adjusted separately.

The Ohlins variable damping system does seem so simple in theory that someone might ask why it hasn't been used before. The design has existed, but until now the problem has been finding a metal or alloy which could form a washer thin enough to react differently to all viscosities and one which would also be strong and flexible enough to bend millions of times without breaking. In short, it's simple in theory, but extraordinarily complicated from a practical point of view.

Finally, add to all of the above the variability produced by adjusting the nitrogen charge (from 150 to 190 psi), and the Ohlins offer a wider range of suspension tunability with greater tuning precision than most people will want, or need. It's nice to know, however, that all Husqvarna dealers should be equipped to service the shocks and that the stock settings offer outstanding performance.

On the track, we quickly came to understand why the top motocrossers are using Ohlins. On fast straightaways, the shocks react very quickly to bumps of all sizes. Over a rapid series of sharp bumps the wheel hugs the ground, which shows that the compression-to-rebound damping ratio is really right. Though Husqvarna didn't have spring-rate figures available at press time, the stock dual springs are excellent for 170-pound riders. During hard braking over rough ground the rear suspension combines with the full-floating brake to offer optimum traction; there is a surprising lack of wheel hop even during downhill stops. In every other condition—from landing hard off jumps to hitting berms—the shocks are precise, fade-free and smooth.

Unlike the shocks, nothing is tricky about the fork. It's a by-the-book air-as-

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sisted/oil-damped unit. However, the performance of the no-frills fork matches that of the shocks. In every case, it is progressive and smooth, allowing the rider to go as fast as his confidence permits. Off the dealer's floor, the 300mm (11.8-inch) travel fork comes with 20-weight oil. For the average motocross track, the stock oil and low air pressure (from three to six pounds) is recommended. In actual use, too, this combination provides the best results. The fork is smooth almost beyond belief; its damping action is easily the equal of any fork made. For very fast tracks (those with a fifth or sixth-gear straight), experience shows that more air pressure and a lighter oil works better. The particular combination which performed very well in *Cycle*'s test bike was 12 psi air pressure and 10-weight oil. Some comfort and responsiveness at low speeds is lost, but increased stability at high speeds is gained.

Though the chassis dimensions indicate that the 390 might be slow-handling and heavy-steering, such is not the case. It steers precisely; when the rider has his knees into the gas tank, the bike can be made to dart through corners like a much smaller bike. Slides are a specialty of the CR, and during a prolonged slide it's hard to notice the extra height of the bike. A plausible explanation for this is found in the soft suspension. When set up light for quick action, the suspension compresses several inches during the initial moments of a slide; then the bike feels natural.

Trelleborg tires are fitted front and rear, and they especially help the bike's handling in soft terrain. On a moderately muddy or on a sandy track the tires are very good. On a hard, slippery course—even allowing for tougher conditions—they do not offer comparable traction. The 3.50 front tire may seem too large to some riders. In fact, no difference can be felt between it and a normal 3.00–3.20 tire.

Chuck Sun, Husky's factory rider, uses the 3.50 except in very muddy conditions, where he feels a smaller tire cuts through the bog more easily.

Husky-made alloy rims with rim spikes are mounted on both ends. The rims proved to be strong, and tire slippage was not a problem. However, in the first outing on the 390, we had some difficulty with the front spokes: 10 of them broke after about 15 hard jumps landing on ground hard as concrete; rubber skid marks were actually apparent on the adobe. It's probable that one spoke broke initially, and the weakened assembly then fell apart quickly. It seemed apparent that the spokes broke simply because their tensile strength was exceeded. We didn't have any stock Husqvarna spokes for replacements, so we reinstalled a stronger set of zinc-steel spokes. There were no further problems with the front wheel, and there were no problems at all with the rear wheel.

In all conditions, the brakes are strong and progressive. The front brake activates smoothly and does not require excessive pressure at the lever. It is comparable to the best Japanese front brakes. The rear floating brake works with the rear suspension to function superbly.

While it's true that the better a rider is the more he likes the Husky's handling, it's equally true that *everyone* loves the 390's power. The engine has changed

only moderately from last year's design, but its few refinements make a drastic improvement. The aluminum cylinder with iron liner uses the 1978 five-port design. There is a very large exhaust port and two standard transfers. The intake ports, however, are unusual by virtue of their distorted L-shape; this configuration is necessary to match the vertical-mounted reed-valves. Although this unusual design allows for a large amount of breathing area, it also mandates two windows in the piston which extend upward to within 10mm of the single piston ring, which increases the likelihood of blow-by.

Other aspects of the engine's construction are generally first-rate. The cylinder-to-liner mating is very good. The piston has long skirts both front and rear to resist any rocking motion, and it rides on a needle bearing.

The 390 has a newly designed expansion chamber, and the engine's performance on the dyno indicates that the engineers had their slide rules going at top speed.

Before we talk about how the Husqvarna *eventually* ran, however, a bit of background on the 390 is necessary. When the CR was first delivered to *Cycle*, it had been ridden—as indicated by worn knobbies, grease on the rear hub and some paint worn off the shock bodies. We assumed it had been ridden enough to be dyno-ready. At this point, its 38mm Mikuni had a #410 main jet installed and the slide needle was in the middle of the five positions—the same jetting as was run in the 1978 390s. The 390 promptly seized on the dyno, and that led everyone to believe that the engine had not been broken in after all.

It went back to Husqvarna for a new top end, and the engine was then thoroughly broken in. A Husqvarna engineer accompanied the 390 to the dyno the second time to help out. Thinking the bike may have been running lean as well as not having been broken in, he installed a #420 main jet. The bike immediately seized again. Without any spare parts and near a tight deadline, we were persuaded to open the running clearances with a file and wet-and-dry paper. Knowing the bike had been broken in properly, we jetted the engine for a *much* richer mixture. A #450 main jet was inserted, and the needle was raised all the way. The bike was put back on the dyno—although everyone was aware that the 390 might not perform to peak potential. It definitely ran rich, but it still produced a very respectable figure of 37.46 horsepower.

Looking back on the series of events, things are pretty clear. First, it's probable that the 390's problems were simply a result of improper jetting. Next, it should have been obvious to us and to the Husqvarna people that it needed a vastly richer fuel mixture. Why? Because the 390 has a new air box. In fact, the '79 air box has a 300 per cent greater volume than the 1978 390, and the new air filter has a 55 per cent greater filter area. More air with the same amount of gas equals a leaner mixture. Though we took into account the larger air cleaner, we did not suspect that it would call for a full four-size jump on the main jet. Since our dyno testing, the Husqvarna factory team racers have gained experience with the new machine. They are all using anywhere from 440 to 460 main jets in their machines, with no problems whatever.

An inspection of the dyno figures reveals several things. Of the open-class motocrossers *Cycle* has tested in the last couple of years, only last year's Yamaha YZ400E and the Can-Am MX-4 370 have produced more peak horsepower—3.57

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and 0.16 more, respectively. But that's not the really impressive part. Get this: at 5000 rpm, the Husky is grunting out 24.06 horsepower (two more than the YZ400E, the next strongest), and 29.90 at 5500 rpm (nearly five more than the YZ at that point). Up until 6500 rpm, the Husky continues to make anywhere from one to three horsepower more than the next strongest machine. If you ride—or conditions demand that you ride—a bike in the 4500–6500 rpm range, the Husky's advantages here are obvious.

The credit, we believe, goes to the new pipe. Two years ago, the Husky 390 CR made good but not spectacular power. The curious thing about the 1977 bike, though, was its peak horsepower characteristics. That machine made about 34 horsepower at 6500 rpm, rose just a bit at 7000, dipped at 7500 and rose again to produce a peak horsepower rating of 34.53 at 8000 rpm. Peaks and valleys in the high-rpm output of any two-stroke hint at a poorly designed pipe. The 1979 CR with its new pipe has no glitch, and it does have sensational power.

The seat-of-the-pants dyno gives equally positive feedback. On the track, the CR pulls right from idle, and the mid-range makes riding the bike easy. Particularly noteworthy is the way the machine puts its power on the ground: the mid-range combines with the 17-inch rear wheel and rear suspension to make the bike leap at the crack of the throttle. Out of corners the front wheel lofts at will, and slides simply require an extra-vigorous turn of the right wrist.

To match the new power traits, the 390 has altered gearbox ratios. First, second and third gears are all lower: from 2.06 to 2.35, from 1.55 to 1.71, and from 1.23 to 1.30. Lower bottom gears allow the rider to get into the upper gears easily and quickly, thus taking advantage of the abundant mid-range. Mechanical actuation of the clutch and gearbox is just fine—smooth and fade-free without any hitches.

One other problem surfaced: the kick-start lever broke in half. However, the factory informs us that our particular machine had a 1978 lever, which was chrome-plated. The chrome levers had a habit of breaking; for 1979, stronger levers are used. The new levers can be identified by their black paint.

Everyone who rode the Husqvarna was impressed by it. Granted, *Cycle*'s particular machine had several rather severe problems, but only the spoke breakage was seemingly unavoidable. The major malfunction—the engine seizures—could have been prevented, and we have no reason to believe it's characteristic of the new 390. The more anyone rides the bike, the better he likes it. For intermediates and experts, the CR 390 is ready to ride, and if jetted and spoked carefully, ready to win. ◉