

•5 Motocrossers

Two-stroke power dominates the racing world of motocross; in no other corner of motorcycling has this domination been so complete for so long. Two-stroke hegemony has made motocross bikes appear as if they follow a standardized design formula: strong, lightweight frames, which ride on sophisticated suspension components, house single-cylinder, two-stroke engines, which vary in displacement according to class (125cc–500cc). The watchwords for motocross are power, strength, lightness, reliability, handling. The two-stroke racer can best balance these characteristics.

But there are differences, as well as common denominators, in motocross racers. Again and again, manufacturers scrutinize the same basic design elements, searching for better performance. Eye-catching innovations do occur, such as tunnel-port disc-valve engines, or forward-mount shocks, or mono-shock rear suspensions. Other differences and refinements are less apparent. Buried deep inside the equipment, these differences only reveal themselves fully on the track, and then only to the rider.

One engine may have its power concentrated in the mid-range of its rpm band, with no low-rpm power at all. By comparison, another maker's engine might be tuned for far greater low-rpm power, less mid-range urge, and more power near the redline. All other things equal, the layout of the motocross course (relatively flat or hilly) and the track surface (mud, sand, hard dirt) could well determine which engine would work best on a given day. So there's nothing simple about "simple" motocross racers.

The growth of small-displacement motocross racing testifies to the American enthusiasm for the sport and to the success of two-stroke technology. Contemporary 125cc motocrossers make enough power to be genuine racers. Several years ago, no one would have taken 125 racers seriously; today, everyone does. For good reason: four 125cc racers are among the ten best motocrossers in the marketplace.



125 Can-Am MX-2

In 1970 no one had ever heard of Can-Am motorcycles. The reason was simple: they didn't exist. By 1974 anyone interested in off-road motorcycles knew the Can-Am name. In that brief period Bombardier Limited, builder of Ski-Doo snowmobiles, assembled a design team, developed 125cc and 175cc enduro and motocross machines, ran up an amazing number of competition victories, and began producing motorcycles.

Can-Am competition motorcycles are not single-dimension bikes. They do many things well, but most of all, they make a lot of horsepower. The 125cc Can-Am has been, since its introduction, the horsepower leader of the 125cc motocross class. When other 125cc bikes delivered 16–17 horsepower, the Can-Am developed 20. As its Japanese competitors broke the 20-horsepower barrier, the newest

Can-Am's reputation was built on the 125/175 MX-1 model, pictured below. The later MX-2 version has forward-mount shocks.

version of the Canadian rocketship had a devastating 23 horsepower.

Yet the Can-Am 125 does not win solely on horsepower. The 125 shares much of its running gear with the larger 175 Can-Am's—which means every component is a first-line piece. Can-Am has resisted the logic of economics: cutting production costs by using lower quality materials in smaller engine sizes.

Like other Can-Am products, the 125 MX-2 benefits directly from the factory's involvement in racing. The MX-2 has forward-mount shock absorbers which connect the swinging arm to the frame at points forward of the traditional mounts. The new system, pioneered on works machines, provides greater wheel travel for better control in the rough.

Can-Am works quickly to upgrade its production bikes by applying race department know-how to production-line models. Speed—that's how Can-Am builds instant legends.



Honda CR-125M

Honda's CR-125M comes as a complete motocross package. The owner/rider need not pick the bike apart upon delivery, stacking usable components in one pile and tossing low-quality parts into another heap. By the time they reach the track, many motocrossers are specials composed equally of the original equipment and accessory-house items. But not the Honda.

The Japanese have built the CR-125M with quality components: chromium-molybdenum frame, self-cleaning alloy rims, malleable clutch and brake levers, magnetically-triggered CDI ignition, Keihin racing carburetor, and a number of lightweight alloy castings.

Not only does this single-purpose racing motorcycle look the part, the bike immediately serves the rider notice of its serious intent. The 56mm x 50mm piston-port, reed-valve engine delivers about 19 horsepower and connects to a six-speed transmission. The engine must be kept spinning hard because the horsepower resides inside a narrow band which begins at 7,000 rpm and ends at 9,000 rpm. Given the sharp bulge in its power curve, the Honda motocrosser needs every one of its six speeds.

The rider must be prepared to upshift in rapid-fire sequence when the engine is on the boil. A rider who masters the peaky CR-125M will unconsciously up- and down-shift in harmony with the engine speed. His eyes and mind will be fastened on the track undulations ahead.

A fast, tidy line is important on pint-sized motocrossers. The wrong line can entrap the motorcycle and bog the engine. Once the little two-stroker stumbles out of its powerband, the rider must quickly pick a lower gear to bump the rpm-level back up and retrieve the horsepower.

One-two-five motocrossers like the Honda are demanding machines. When the rider errs, he'll know it.



Honda's first two-stroke came in the Elsinore series; carefully prepared CR-125M models can develop 20 horsepower.



Suzuki TM-125 Challenger

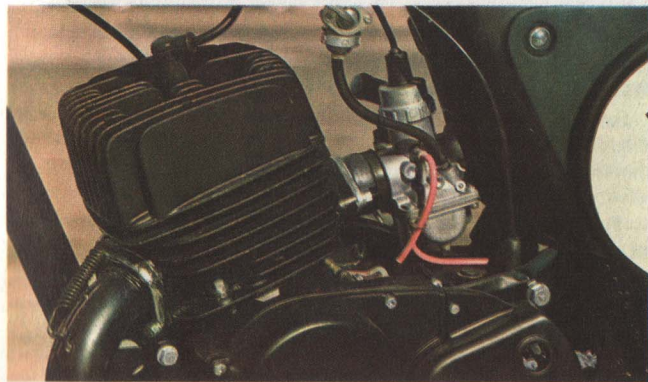
World championship motocross was a game that Suzuki learned to play in Europe. The Japanese company grasped the fundamentals quickly and brought world motocross titles back to Japan. Like all large concerns which field competition machines, Suzuki's racing has a commercial impulse. The TM-125 Suzuki Challenger and three other TM-series machines form the business side of motocross racing.

No longer disposable and low-powered play-racers, the 125cc motocrossers have become pretty exotic hardware. The fantastic growth of motocross racing in the United States has made it profitable for the Japanese to build specialized small-displacement racing bikes. And when one Japanese company discovers a new niche in the market, the other majors all rush in.

There are many similarities between the diminutive Japanese motocrossers. For example, the Suzuki and Honda piston-port two-strokes share the same bore and stroke dimensions and fire the spark plugs with electronic-trigger ignitions.

Yet common approaches should not mask very important differences. The Suzuki TM-125 has a much broader spread of power than the Honda 125 motocrosser. Since the Suzuki doesn't have an on-or-off kind of power, its five-speed transmission suffices, allowing the engine to cope with tough terrain. The less demanding engine makes the Suzuki a bit easier for a beginner to handle than a CR-125M Honda.

The power characteristics of the Suzuki engine translate into a lot of traction in the dirt. The Challenger aviates straight and lands true with a competent pilot at the controls. The excellent front fork is backed up by five-position rear shock absorbers.



Thanks to its generous power spread, the TM-125 is a bit easier for beginners to manipulate than very pipey 125's.



Yamaha YZ-125C

Yamaha's YZ-125C sets new marks in the 125 motocross class. Most 125 motocrossers produce 16 to 17 horsepower, measured at the rear wheel on a dynamometer. At 20 horsepower, the Yamaha can overwhelm its Japanese adversaries—assuming, of course, that the YZ-125 is chiming on its pipe (8,500 rpm to 10,500 rpm) and running in the correct gear.

Fundamentally nothing distinguishes the YZ-125C as a powerplant: it's a basic piston-port, two-stroke single—with enough porting to make the cylinder walls look like Swiss cheese. One trick has been a Yamaha characteristic—the reed valve. The company has made successful use of reed valves to strengthen low-end power in many of their models; in the case of the YZ-125C, a huge six-petal reed valve lives between the cylinder and the enormous 30mm carburetor.

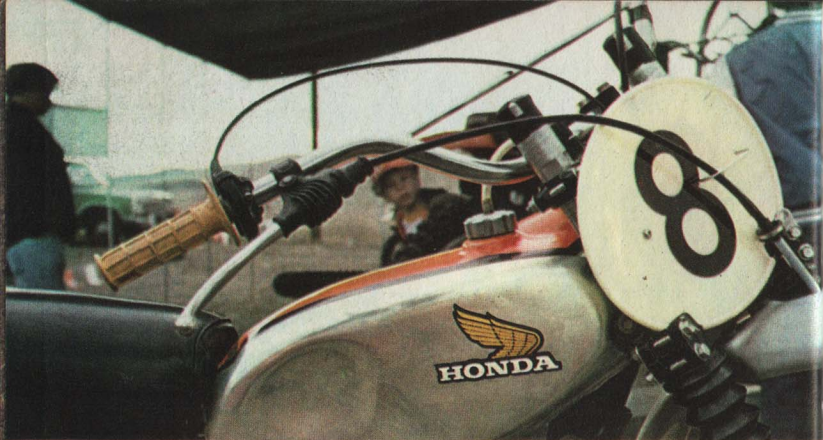


The powerband necessitates a six-speed gearbox; to exploit the engine's outstanding horsepower, the rider must row the gear-change lever at a frenzied clip.

The YZ-125C's most obvious innovation is the "mono-shock" rear suspension. The up-and-down movement of the triangulated swing arm is controlled by a single spring and damper unit located under the gasoline tank. Marvelously complex and effective, the unit employs both nitrogen gas and oil to damp movement in both directions. With knowledge and special tools, it's possible for individual riders to adjust the rear suspension to precise individual tastes. By providing a way to increase substantially rear-wheel travel (six-plus inches), the mono-shock system can, properly set up, give superior control in the rough.

Sophisticated as the chassis may be, most Yamaha riders get their edge elsewhere—with that 20-horsepower engine!

The mono-shock Yamaha appears a bit odd, since the cantilever shock-absorbers are obviously missing.



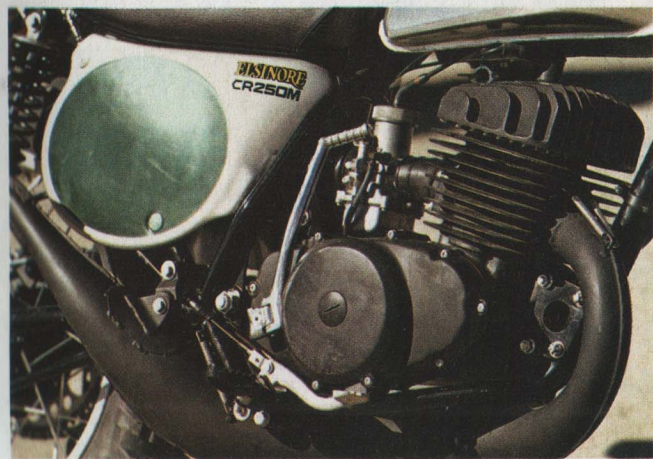
Honda CR-250M

For more than a decade, Honda tied itself to four-stroke technology. All Hondas covered ground with four-stroke power. But major manufacturers relentlessly pursue sales success, and in that pursuit, Honda's exclusive four-stroke loyalty ended. When Honda moved into two-stroke power in 1973, their thrust came in motocross, the strongest preserve of two-stroke machinery.

The introduction of the CR-250M Elsinore demonstrated Honda's determination to carve out an important chunk of the motocross business. The Elsinore 250 hardly amazed the motorcycle world with any great technical innovations. The new bike rested on concepts already battle-tested in other motocrossers. The powerplant was quite orthodox: a high-quality, piston-port engine wedded to a close-ratio transmission. The 29-horsepower engine immediately placed the bike in the front ranks of motocross machinery.

The pricetag of the Elsinore has never fully reflected the quality of its construction. Frame material is 4130 chrome-moly tubing, and the tube-work creates the basis for a very light, strong motorcycle. The engine contains some expensive magnesium castings, while the gas tank has been rendered in aluminum. Weight-conscious construction has produced a 225-pound motocrosser, a figure which draws the envy of competitors.

Motorcycling has many bargains, and the 250 Elsinore certainly qualifies as one. In any sport, buying more for less is always fun.



Elsinore was the first two-stroke Honda seen by American enthusiasts. Many had thought Honda was "four-stroke forever"—wrong!

Montesa 250 Capra VR

Motorcycling is full of "replica racers," some real and others fictitious. When a factory develops a competitive motorcycle in national or international racing, the company often decides to capitalize on the model's success by marketing a replica. Many motorcycles, ostensibly genuine copies of factory competition bikes, roll off the production line as faint shadows of the real thing, or simply victims of strict cost accounting. Occasionally, the genuine article is faithfully replicated, and the result is a motorcycle like the 250 Montesa Capra VR.

As a factory racer, the Montesa did not win a world championship. In 1972 the Spanish concern did make an excellent showing in world class competition with Finnish rider Kalevi Vehkonen. Shortly thereafter, the 250cc Montesa Capra Vehkonen Replica appeared.

The Montesa hasn't an ounce of nonsense on it. Though it weighs in at 230 pounds wet, the most impressive numbers are those figures which come out of the engine. The two-stroke single can sting its competition with an honest 30 horsepower at the rear wheel. That puts the Montesa in the forefront of 250 production motocrossers. The torque curve complements the horsepower chart: a gentle curve runs from 6,000 rpm to 8,000 rpm.

Tough seasons on the grand prix circuit have produced a running gear with outstanding handling. Montesa has tuned the front fork and the cantilever rear suspension perfectly to the stout frame. The motorcycle tracks beautifully and refuses to yaw when squirted wide open.

Skimming over rough terrain in full flight, the Capra VR proves its replica label is no hollow boast.



Capra VR benefits from Montesa's race testing; the works bike shown here has the latest cantilever rear suspension.



250 Can-Am MX-2

Can-Am has aimed their 250cc MX-2 at the serious expert. Everything about this motorcycle—the phenomenal power it produces, the quality of its components, the engineering knowledge inside it, the size of its pricetag—testifies to the earnest intentions of the manufacturer.

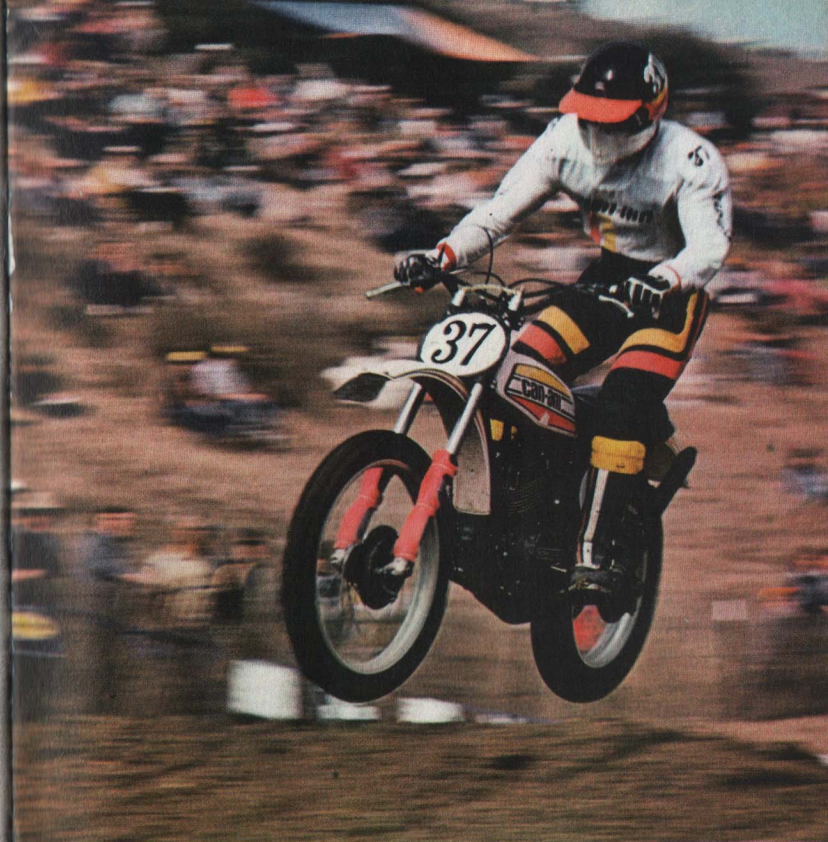
Consider the power output of Can-Am's tunnel-port, rotary-valve, two-stroke engine. Most 250cc motocrossers pick up 50 percent in horsepower over a 2,000–2,500 rpm band. Typically, a strong motocrosser might develop about 20 horsepower at 5,000 rpm and 30 horsepower at 7,500 rpm, and that 50-percent escalation requires a skillful rider.

Then there's the 250 Can-Am. Twenty horsepower arrives at the rear wheel at 6,000 rpm; when the engine peaks at 8,600 rpm, a shattering 34 horsepower reaches the ground. Across 2,600 rpm the power increases 70 percent! With 10 percent more maximum power than other 250 production motocross bikes, the Can-Am catapults forward with an explosive surge. A good dirt jockey will come closer to flying the 250 Can-Am than riding it.

The horsepower propels very little dead weight. Though the Can-Am has built the frame and swinging arm with mild steel rather than chrome-moly, the race-ready weight totals 230 pounds—hardly porky by motocross standards. Magnesium alloy engine cases, clutch and ignition covers, wheel hubs and backing plates help pare down the weight.

The frame and running gear is as highly developed as the engine. Riders can alter the fork angle by using the adjustment system in the steering head. The forward-mount shock absorber system represents the current state of the art; the rear suspension incorporates Can-Am racing lessons from the 1974 season.

Power, handling, and race-breeding—the MX-2 has it all.



The MX-2 has been built on the race-proven premise that the best riders go faster with high-rpm horsepower rather than low-rpm torque.

CZ 400

Almost a decade ago, CZ revolutionized 500cc world championship motocross. In 1966, after two years of development, the Czechoslovakian company snatched the 500 World Championship with a 360cc two-stroke single. Thus began the upheaval in the senior class—and one which drove the four-stroke singles into oblivion.

Production-line motocrossers from CZ have their origins in the firm's grand prix bikes. In the late nineteen-sixties Belgian Joel Robert won two 250cc titles on motorcycles much like CZ's over-the-counter motocrosser, introduced in 1968.

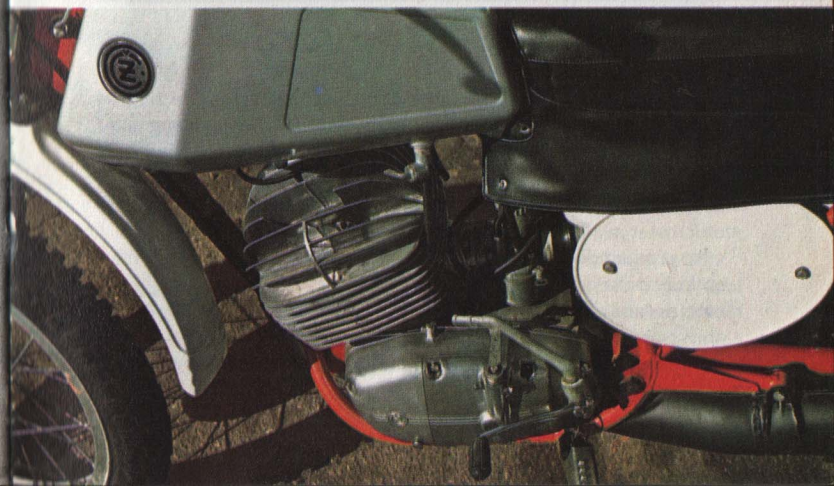
When the CZ company launches a new motocross bike, the machine begins its production run at the cutting edge of technology. In order to keep the machinery competitive with later designs, CZ refines its equipment under a long-range development program. That's unlike the Japanese approach, which hurries a completely new design right in behind an existing model.

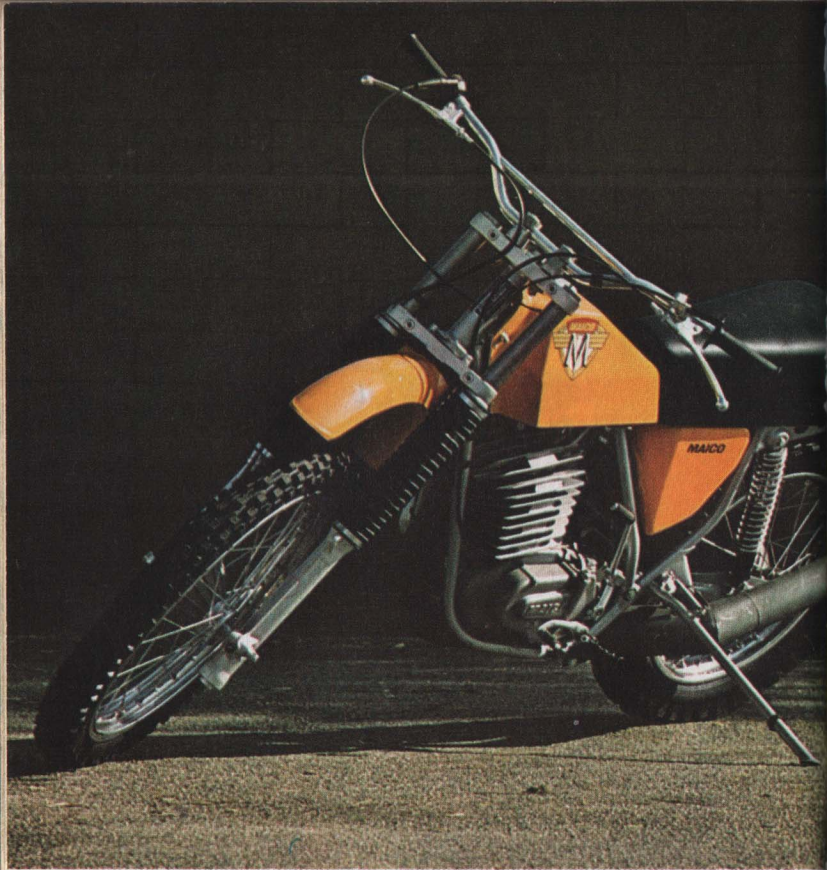
Three current CZ motocrossers—125, 250, and 400—share the same basic running gear; the engines, though similar, are quite distinct units. At 250 pounds wet, the smaller-displacement bikes have gradually become "heavy" motocrossers as their newer competitors have shed weight. But CZ's 381cc two-stroke single carries its 250 pounds without difficulty. Sometimes, if manufacturers can't slim down a motorcycle, they can slip in a larger engine. The stronger an engine, the more gracefully it bears weight. And so for many riders the 400 CZ works better than its 250 counterpart.

The gradual increase in horsepower and displacement over the years has dictated suspension and chassis modifications. Detail changes, for example, have slowed down the traditional steering-quickness of CZ motocrossers.

Thanks to constant refinement, the manufacturer that started the two-stroke revolution in big-bore motocross still reaps the commercial benefits.

As direct descendants of world championship winning machinery, CZ motocrossers are tough, brutal bikes programmed to win.





Maico 400 MX

Raw specifications, spelled out on blueprint paper, can deceive. Maicos are confounding motorcycles; they befuddle those who think engineering trickery automatically produces first-place trophies. On paper, the Maico 400cc motocrosser is almost unassuming; yet, on the track, the bike can be unbeatable. Many enthusiasts believe it is the finest big-bore motocrosser available to private competition riders.

No production motocrosser outhandles the 400cc Maico; nevertheless, Maico uses one basic chrome-moly frame for all the company's motocross and enduro bikes in every displacement category. Logic says a universal frame shouldn't work, but in the Maico case it does. Maico forks, recognized as *the* standard, hold no intricate secrets in valving,

damping, or springing. Fork superiority rests on materials and assembly.

The brutishly powerful 400cc motocrosser has an absolutely diminutive four-speed gearbox, originally designed for the first 125cc Maico long ago. Yet this transmission still serves well in the super-power Maico motocrossers. In a day when two-stroke technology includes booster ports, reed valves, electronic ignition, disc valves, and hundreds of little touches, the Maico remains embarrassingly simple—and produces awesome power over a wide powerband.

Maico motorcycles are the products of a small German factory which specializes in competition mounts. Like any other Maico machine, the 400cc motocrosser is poorly finished by Japanese standards. Rough-hewn the Maico may be, but there's nothing at all crude about winning.

Maico hasn't been styled into a rugged, angular appearance; it's just the result of functional engineering.