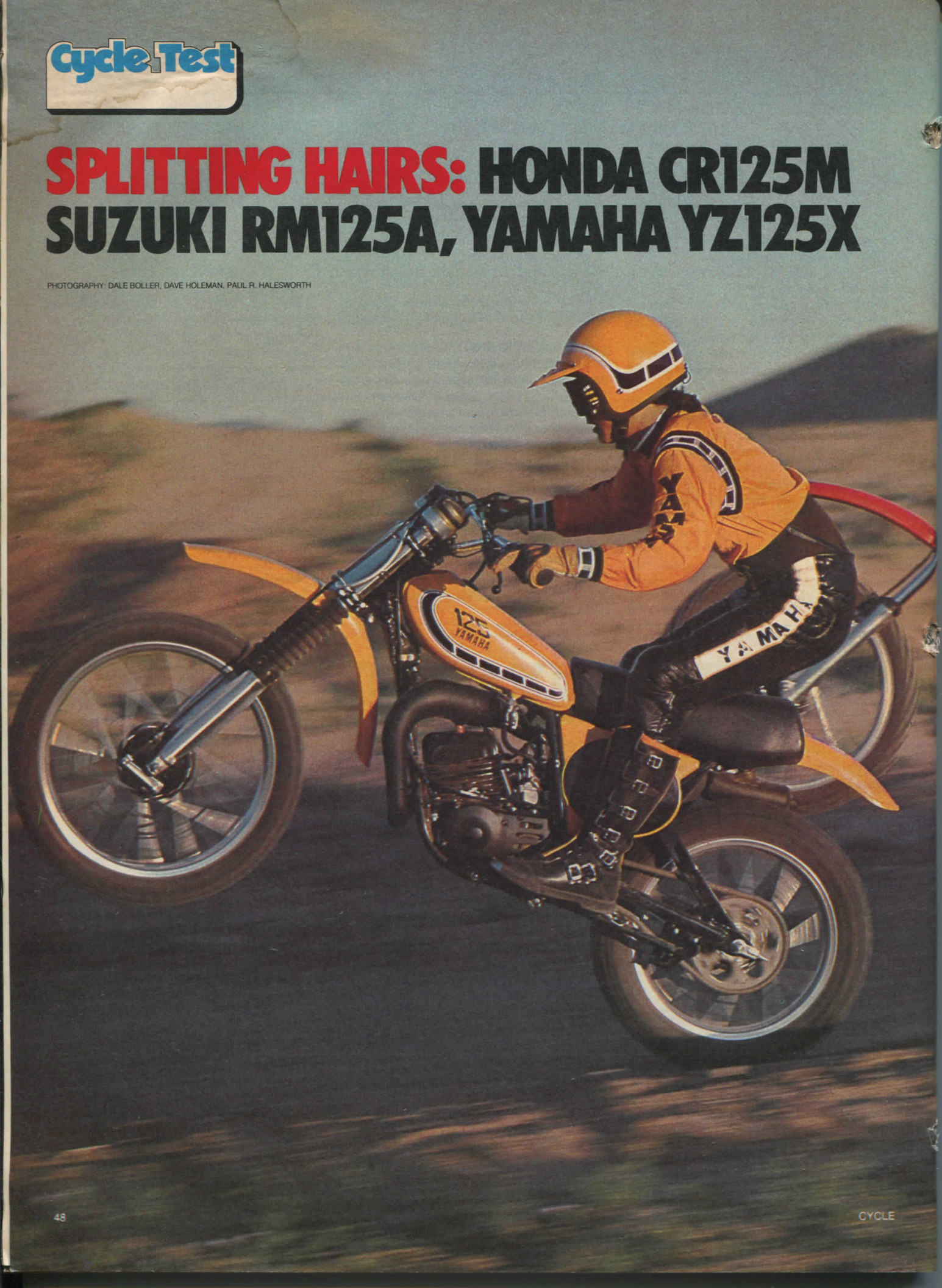
Cycle Test

SPLITTING HAIRS: HONDA CR125M SUZUKI RM125A, YAMAHA YZ125X

PHOTOGRAPHY: DALE BOLLER, DAVE HOLEMAN, PAUL R. HALESWORTH



● This comparison test is going to sound like a cop-out and there's nothing we can do. Our standard-format comparison procedures, applied to unmodified motorcycles, produced a solitary winner: the Suzuki RM125A. But in the real world of 125 motocross, out where there's no such thing as a stocker, the 125 Honda Elsinore must also be declared a winner because of its proven potential for modification. And the third bike, the Yamaha YZ125X, which isn't a "winner" in either class, lost both by less than the width of a cooling fin and ended up with the fastest single lap turned at our test track. Choosing between these three bikes is like choosing between Faye Dunaway, Candice Bergen and Miss NGK. Each is an individual in looks and dress, but they all get the job done. As a buyer you can't make the wrong decision because there isn't a loser in the bunch.

How close are they? All have 56 x 50mm engine dimensions; compression is 7.4, 7.5 and 7.6 to 1; weight is within 11 pounds; rake and trail varies only 1 degree and ⅜ inch. All have the same front tire. Differing induction systems, rear suspension, carburetion, etc., offer some variation technically. Performance is another story. Less than one second separates the fastest lap time of each. In more than 20 starting-line drag races, no clear-cut winner emerged. Pitted against our toughest measuring tool, the Webco dynamometer, the trio further confounded our search for

On the dyno all three 125s make more than 20 horsepower and 10 pounds of torque. On the track it's just as close--- less than one second separates the lap times.

a performance difference by producing peak horsepower and torque readings within .85 hp and .62 lbs./ft. of each other.

All three bikes are vastly modified and improved over last year's models. In the Suzuki's case, we can't recall that any motorcycle has ever been changed so drastically so soon after it appeared as a new model. We did not include Kawasaki's KX125 because its 16 horsepower and standard-travel suspension simply isn't competitive with the long-legged 21-horsepower Suzuki, Honda and Yamaha. It was impossible to include any other new 125s, such as the Montesa, Bultaco, Can-Am, Husky or Penton, because there wasn't time to gather them all after the new Suzuki's unexpected arrival suddenly gave life to the test. With the Japanese distributors, a phone call produces a test bike in a couple of days. With most European brands it takes weeks.

Besides, the inclusion of other motorcycles with these three would have been a bit superfluous. Japanese 125s have captured the U.S. market almost completely. They have done it for many reasons, but mainly through sheer numbers. These three bikes will win at least 80 percent of all the 125 races run in America during the year primarily because their availability and pricing clobbers the Europeans, with the result that they are racing against each at most tracks. A total of 4500 dealers sell the three test bikes for an average of $975, which is $426 *less* than the average price for eight European 125s available through fewer dealers. Also, because there are more Japanese-brand dealerships to sponsor local hot-shoes, the winning riders will likely end up on CRs, RMs or YZs. Aftermarket accessory companies concentrate on the big sellers, so it's easier for a private owner to hop-up one of these three than a Bultaco, KTM or Montesa. Sales become self-generating when the bikes are constantly winning at local tracks. In the major leagues Honda has Marty Smith, who alone has influenced several million Elsinore sales.

Don't discount quality as a reason for Japanese supremacy in 125 motocross. The materials in certain European bikes may be of higher quality and the Hercules may have a 7-speed gearbox, but overall Japanese performance is state-of-the-art.

THE CONTENDERS

Honda CR125M Elsinore
List Price: $905
1976 Debut: March 10

History: Honda's first 125cc racer was released three years ago and instantly transmuted the fledgling 125 class from a kiddie training ground to an exciting, well-respected division with national races, national heros and motorcycles glittering with exotic technology. Through 1973 and 1974 the Elsinore didn't have to change. But last year a new cylinder, piston and pipe was necessary to stave off the fast-gaining competition. Ironically, it was Yamaha's YZ and Suzuki's RM which made Honda move to incorporate features from Marty Smith's RC racer into the CR125M, a red-framed beauty which will probably continue to be the most winning bike in all of motocross.

Suzuki RM125A
List Price: $995
1976 Debut: March 29

History: Suzuki built a 125 motocrosser for the first time in 1973 and called it the TM-125 Challenger. It was a good bike, and a year later *Cycle* picked it as one of the Ten Best Buys in Motorcycling. But it was battling the Elsinore (also one of the Ten Best Buys) and was overlooked in the marketplace. It was overlooked at the factory too, because the TM remained unchanged for three years. Little did we know that the factory was taking the TM's basic engine cases and developing last year's fabulous RM125. And now comes the RM125A, for all practical purposes another all-new model. Such extravagence is necessary to keep pace in the class, and Suzuki certainly has the technology in Gaston Rahier's World Championship 125. It's nice that they're willing to use it, considering all those years that the public never even got a bolt from Roger DeCoster's GP bike.

Yamaha YZ125X
List Price: $1027
1976 Debut: March 1

History: In 1969 Yamaha pioneered Japanese involvement in competition dirt bikes with their first 125 "motocrosser," the AT1-M, an exquisitely bad machine by today's standards. For $539 you got an enduro with knobby tires, an expansion chamber and no lights. Paint and styling changes sufficed for improvements until reed valves and a 21-inch front wheel arrived in 1973—not enough to threaten the newly released Elsinore. Yamaha responded in 1974 with the first YZ125—a bike unfortunately too closely linked to the ill-fated $1800 250 YZ, which laid a big egg. Early in 1975 Yamaha released the monoshock YZ-C, sire of the YZ125X, and its 20.16 hp marked the first time a production 125 had cracked the 20-horsepower barrier. Combined with 7 inches of travel up front and a 6-inch-travel monoshock, the YZ-C quickly sent Suzuki and Honda scurrying to their slide-rules. In spite of being the best stocker on the market last year, the YZ-C wasn't a big seller. Such was the mystique of the Elsinore. In fact Yamaha won more cross country races with their 125 than motocross races. This year the new YZ-X has more power, more travel—more of everything—plus the Kayaba air fork.

CHANGES AND IMPROVEMENTS

Honda:

- To make the most horsepower of all the bikes—21.53 at 11,000 revs—the '76 engine has strengthened crankcases, new port timing, larger cooling fins, an improved combustion chamber, larger rod slots for better oiling, a new exhaust-side piston profile (to combat seizure), a 30mm carb in place of the old 28, and a larger expansion chamber.
- Increased gear width and dog diameter make the transmission stronger and less prone to slipping out of gear.
- Tires change from 2.75 to 3.00 in front, and from 3.50 to 4.10 in back.
- An added inch of fork travel makes the total just under 8 inches. Stanchions now measure 35mm, up from 31mm, with attendent alterations to the steering stem and triple crown for strength and a slight reduction of trail—5.5 to 5.4 inches.

- A new pressed-steel swing arm using 43mm tubing (compared to 29mm last year) was necessary to accommodate the Elsinore's first set of genuine gas-filled forward-mount shocks. Axle travel is 7 inches.
- Other new items include the front fender, rims, axles, handlebar, seat, CDI waterproofing, air box and the entire rear frame section.
- In a clever marketing move, Honda has painted the whole motorcycle red so it looks like Marty Smith's RC125 works racer.

Suzuki:

- This motorcycle is almost 90 percent new. Obsolescence in the 125 class currently occurs in eight-to-ten months, and although last year's RM was excellent, it needed the extensive updating found in this model to stay competitive.
- The engine has a new head which relocates the stud pattern for better spark plug cooling; provides a new mating system with the cylinder to maintain exact alignment of the squish band; and employs a smaller copper head gasket that eliminates any chance of gas leakage.
- A redesigned cylinder still has six transfer ports but eliminates separate passages for each by switching from a double to single bridge in the transfer channel. This increases flow and inlet area. In addition, the new cylinder now has Suzuki's "Power Reed," a two-petal valve which allows charge to enter the crankcase after the piston closes the standard intake port.
- To serve the added breathing capacity, there is a 30-percent-bigger air cleaner and a 32mm Mikuni carburetor—up from 28mm.
- An up-pipe replaces the 1975 downswept pipe.
- A much-needed sixth speed was added to the transmission along with a switch from pin-actuated shifting to a much more positive and durable gear-controlled mechanism.
- Two extra plates strengthen the clutch.
- To make the frame lighter and stronger, Suzuki has made the expensive switch from carbon steel to Japanese chrome moly. Last year's 29-degree rake angle is now 30 degrees, which adds 5/16-inch to trail and slows the steering slightly.
- Front fork travel increases ⅜-inch to 7-⅞ inches, same as the Honda.
- Cylinder diameter of the Kayaba gas shocks is ⅜-inch greater to stabilize damping through increased oil capacity. More radical lay-down mounting (36 degrees to 42 degrees) increases axle travel ½-inch, to 8⅜ inches.
- A longer, boxed swing arm of high-tensile steel replaces the old mild-steel tubular arm. The extra 1½-inch accommodates the new shock position and improves straight-line stability, especially over whoops.
- Spring-loaded, self-cleaning pegs with sawtooth cleats replace last year's non-springed button-cleated pegs.

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- The new aluminum tank is lighter than the old steel one.
- Slots in the sidecovers direct cooling across the shock bodies.
- Improved fenders and grips complete the changes to this year's RM.

Yamaha:

- A completely new cylinder was necessary to narrow the main transfers and fifth port. These and other porting relocations coordinate with the new 34mm Mikuni carburetor, up from 30mm last year.
- The piston-skirt cutout has been rounded to prevent cracking at the angular junctions of the old design.
- New plate material toughens the clutch.
- To strengthen the final drive system, chain size was increased from ½- to ⅝-inch pitch. But the 14-tooth countershaft sprocket, necessary for proper gearing, wouldn't clear the cases. So Yamaha fitted a 12-tooth countershaft sprocket and adjusted the primary ratio from 3.9 to 3.2:1.
- The CDI unit now has a cast-in pulser for more reliability than last year's separate pulser. To work better with the larger carburetor, the ignition advance is now a gradual curve instead of the old all-or-nothing advance/retard system.
- Additional gusseting in the frame adds strength.
- Longer wheelbase (an extra inch in the swing arm) steadies high-speed handling.
- Revisions to the monoshock unit add another ¾-inch of travel to the rear axle for a total of almost 7¾ inches. A new spring has less preload, oil capacity is up to 310cc from 275cc and gas volume is up 10 percent.
- An air fork is the most radical change on the new YZ. Its travel is just under 7¾ inches.
- Modifications to the top triple crown and handlebar were needed to clear the air-fork cannisters.
- YZ rims are now D.I.D.'s top grade.

BASIC CHASSIS DESIGN

Honda: The CR has a nicely executed single-downtube frame of Japanese chrome moly, which is lighter and stronger than the mild steel used in street-bike frames, but not the same specification as American 4130 chrome moly. The swing arm pivots on bushings which are greased through a Zerk fitting. Because of a leading axle fork, triple crown offset is minimal and the fork stanchions bump the handlebar when raised to change steering characteristics. There is about an inch of movement, however—enough to adapt the Honda to most tracks. Both alloy wheels contain excellent brakes and are laced to D.I.D. rims with spokes that require the usual amount of attention when new. The Honda's spokes are the lightest gauge of the group.

In front, a standard fork provides just

under 8 inches of travel and carries 180cc of oil. Its leading-axle design utilizes space below the axle to get the extra fork length necessary for long travel. Added length above the axle would raise the bike and change geometry. A leaking seal on the right leg marred an otherwise perfect performance by the fork.

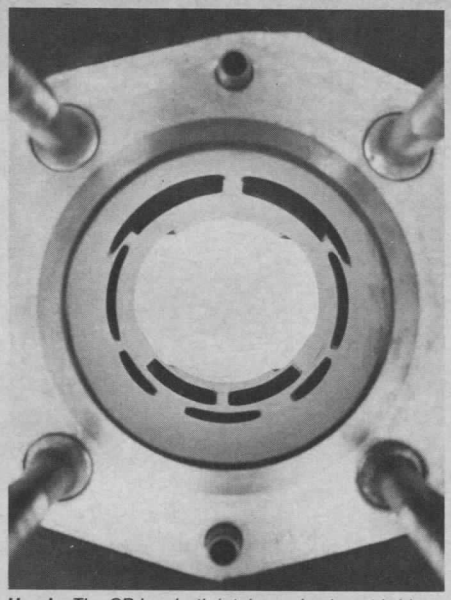
The new Showa shocks are not as good. They use a principle Girling has employed successfully for two years—that of pre-foaming—and its theory is this: if damping is designed to work in a mixture of nitrogen gas and oil, then any further aeration or emulsification that occurs will not affect damping. Thus the shock is a single tube with the piston rod operating in a slimy sauce of tiny nitrogen bubbles mixed with oil. The Girling gas-charged shocks are sealed, non-rebuildable, consistent, perhaps the longest-lasting of all the new-era cushions—and they work. The Showas are valved for adjusting nitrogen pressure, rebuildable, inconsistent, have no proven life expectancy—and they don't work well enough.

As on the RM and YZ, other items of running gear are either satisfactory or first rate. Exclusive features include the neatest forged-aluminum shift and rear-brake levers in motocross—as opposed to stamped-and-welded tire-iron stock on the others. The Honda's lever-action choke is far better than the clumsy sliding rod on the RM and YZ. A spark-arrester/silencer is supplied to make the CR cross-country legal, but all it does is make the CR uncompetitive.

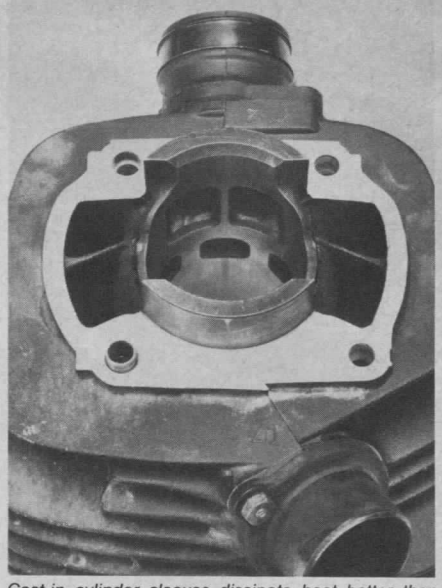
Criticisms: Fork maintenance is complicated by handlebar position. The grips are too small. The low pipe is vulnerable. A steel tank, sprocket and lower triple clamp add weight not found on the Yamaha and Suzuki (theirs are alloy). Swing-arm pivot-to-countershaft distance on the Honda is greatest, yet it has no chain tensioner. There are no fork guards. The variable pitch tire in back has to go; anyone racing seriously must spend the money to have the right tire for a specific track, so a compromise skin with half mud knobs and half dry-pack knobs isn't doing anyone a favor. The filler neck is too small so it's impossible to see the gas level rising until it begins spilling. You've read this complaint before; you'll see it twice more here.

Suzuki: The RM's chrome-moly frame is also a single-downtube design that cannot be faulted, except for lack of a grease fitting on the swing-arm pivot. An alloy triple crown employs huge pinch bolts to grip 35mm stanchions. Suzuki is the only one to use Takasago rims, which didn't bend, pinch a tube or let the tire slip; nor did they minimize spoke maintenance. Both brakes are housed in alloy hubs. The Suzuki's rear brake has the most progressive action and feel of all.

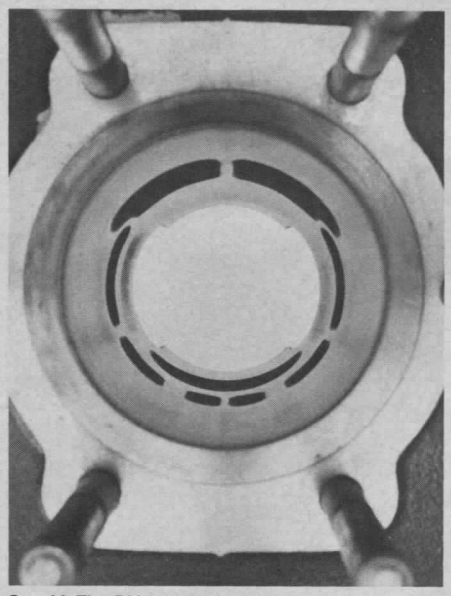
The same can be said for its suspension. Here is the RM's major edge as a stocker. You won't have to fiddle with either end to get soft, progressive, matched action that doesn't insulate the



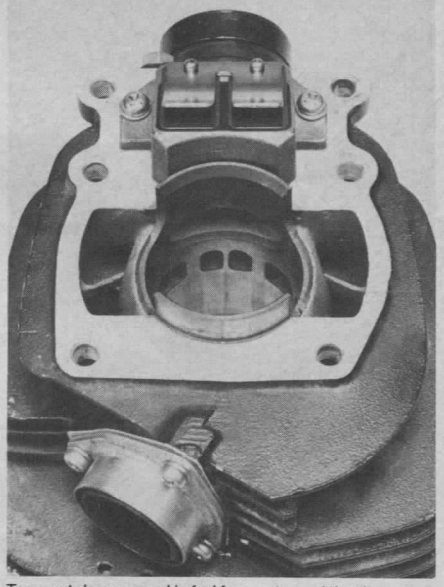
Honda: *The CR has both intake and exhaust bridges. Boost port (6 o'clock) serves both side transfers.*



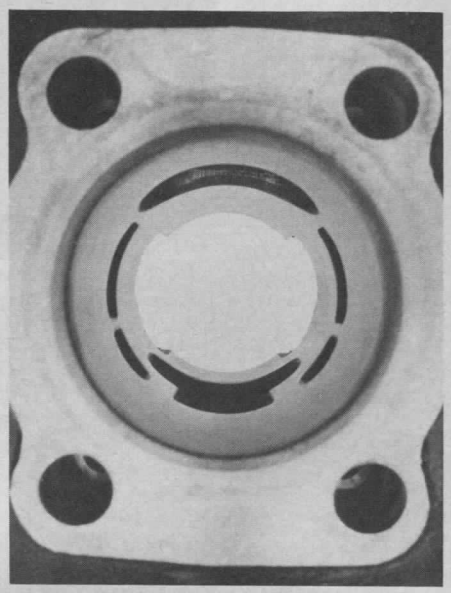
Cast-in cylinder sleeves dissipate heat better than press-fit liners. All bikes have the cast-in type.



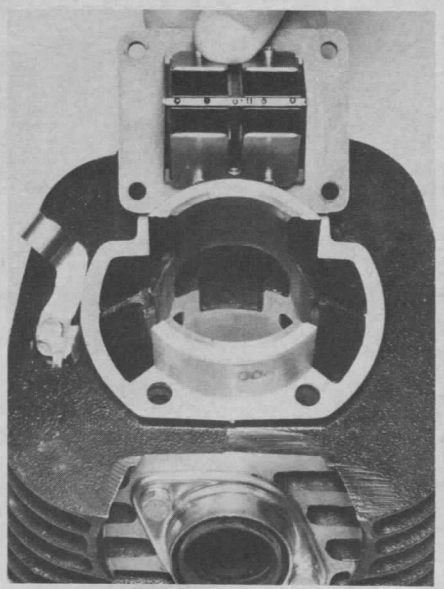
Suzuki: *The RM bridges its boost port to control the ring so a bridged intake won't interrupt flow.*



Two-petal case reed is fed from a tunnel that branches off the inlet tract. Six studs insure a seal.



Yamaha: *Four studs sandwich cylinder between head and cases. Boost port wedges upward from the intake.*



Four-petal reed block fits between carburetor and cylinder and helps give the Yamaha great midrange.

SPLITTING HAIRS

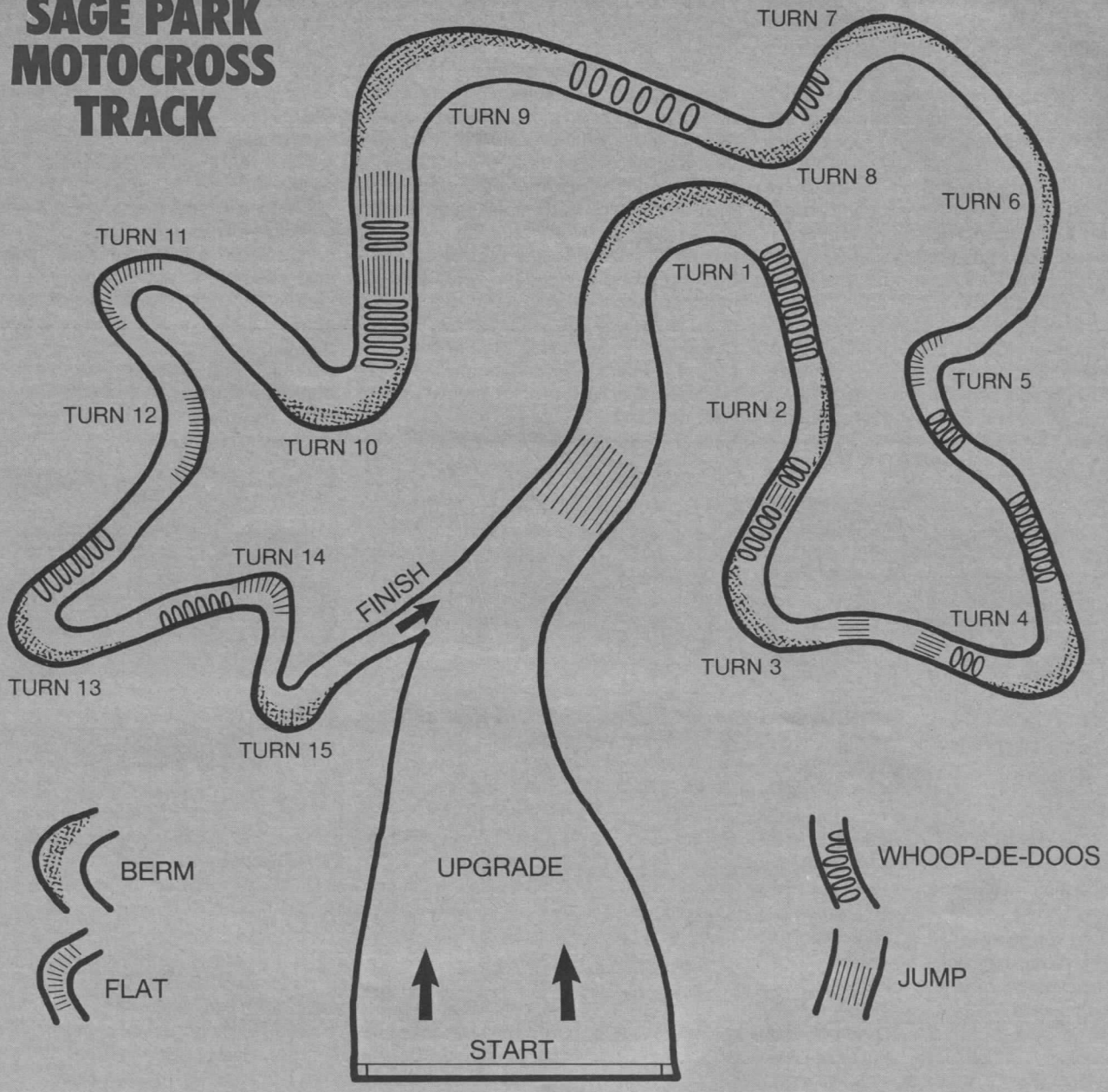
rider from the feel of the track surface or fade as the moto progresses. The fork offers just under 8 inches of travel from a standard design that employs 223cc of oil. It is protected by plastic rock guards taped to the sliders. Kayaba DeCarbon-design gas shocks are a single tube incorporating a floating piston to separate pressurized nitrogen from the damping oil. This system eliminates aeration completely and effects rapid heat dissipation because the oil is contained by a surface exposed directly to outside air. Since the shocks are sealed, they are not rebuildable and damping rates are fixed. Spring preload is also fixed, but the rate satisfied both our 160- and 195-pound riders.

An exclusive feature on the RM is its unique system of front-brake cable routing, a normally insignificant detail which reflects how hard Suzuki has worked on their motocrossers. The cable climbs from the hub through a guiding hole molded in the fork protector and arches through two wire-wicket guides securely fastened to the number plate with double nuts. Unlike similar wickets on the Honda and Yamaha, the RM guides are angled so they don't interfere with stick-on numbers. Even more clever are tiny plastic bushings which rotate on each wicket to provide a perfect bearing surface as the cable moves up and down with the fork. Ultra trick. Also, at 197 pounds with a full tank of gas, the RM is lightest of the three; the Honda weighs 205, the Yamaha 208.

Criticisms: Rear wheel traction suffers from the same variable pitch tire as the Honda. It's too easy to get your boot caught between the brake lever and clutch cover. Small diameter grips similar to those on the Honda don't work on the Suzuki either. The sliding-rod choke, besides being awkward to operate, sometimes causes the mixture to go rich by not seating fully. A better chain tensioning system would be advisable. The black paint on the sidecovers will rub off in an hour. Once again, the filler neck is a spiller neck.

Yamaha: Because of monoshock rear suspension, the Yamaha's frame is entirely different from the Honda's and Suzuki's. Its double downtubes loop around to join a backbone covered with gas-tank and monoshock support brackets. Numerous struts brace the aft section, which pivots at the monoshock dome and behind the engine in the usual location. The distance to the countershaft sprocket from the pivot point is the least of any, yet Yamaha fits both an excellent spring-loaded chain tensioner and rear chain guide. A Zerk fitting lubricates the aft-section pivot point. Yamaha's air fork does not prevent the stanchions from being moved up or down in the triple clamps. D.I.D. rims surround a full-width alloy hub in back. The rear tire, a Dunlop

SAGE PARK MOTOCROSS TRACK



LAP TIME COMPARISON

Rider/Cycle	*Lap/Time*	*Position*	*Rider/Cycle*	*Lap/Time*	*Position*	*Rider/Cycle*	*Lap/Time*	*Position*
A/Honda	1/1:42.0	–1.8 sec.	B/Honda	1/1:40.2	–0–	C/Honda	1/1:49.8	–1.8 sec.
A/Honda	2/1:33.0	–0.6 sec.	B/Honda	2/1:32.4	–0–	C/Honda	2/1:40.2	–0–
A/Honda	3/1:33.0	–0–	B/Honda	3/1:34.2	–2.1 sec.	C/Honda	3/1:40.5	–0–
Total	4:48.0	–1.2 sec.	Total	4:46.8	–1.5 sec.	Total	5:10.5	–1.2 sec.
A/Suzuki	1/1:40.2	–0–	B/Suzuki	*1/1:42.6	*–2.4 sec.	C/Suzuki	*1/1:48.6	*–0.6 sec.
A/Suzuki	2/1:33.0	–0.6 sec.	B/Suzuki	*2/1:35.4	*–3.0 sec.	C/Suzuki	*2/1:42.0	*–1.8 sec.
A/Suzuki	3/1:33.6	–0.6 sec.	B/Suzuki	*3/1:34.8	*–2.7 sec.	C/Suzuki	*3/1:41.8	*–1.3 sec.
Total	4:46.8	–0–	Total	*4:52.8	*–7.5 sec.	Total	*5:12.4	*–3.1 sec.
A/Yamaha	1/1:41.4	–1.2 sec.	B/Yamaha	1/1:40.2	–0–	C/Yamaha	1/1:48.0	–0–
A/Yamaha	2/1:32.4	–0–	B/Yamaha	2/1:33.0	–0.6 sec.	C/Yamaha	2/1:40.8	–0.6 sec.
A/Yamaha	3/1:33.6	–0.6 sec.	B/Yamaha	3/1:32.1	–0–	C/Yamaha	3/1:40.5	–0–
Total	4:47.4	–0.6 sec.	Total	4:45.3	–0–	Total	5:09.3	–0–

Rider A—Expert, 160 lbs. Rider B—Expert, 195 lbs. Rider C—Junior, 195 lbs.

*Suzuki developed engine misfire lag

SPLITTING HAIRS

Senior with knobs that curl half-way around the casing, contributed greatly to the YZ's dominant lap times.

So did suspension. Once tuned, it's superb. Kayaba's air fork employs a standard piston rod operating in 190cc of oil to control damping, and two separate air chambers above the oil in place of springs. Air is ideal for suspension because of its true progressive character. However, it doesn't compress evenly. As volume halves, pressure doubles. A fork with 8 inches of travel and one chamber filled with 50 pounds of air would compress the air to 100 psi with 4 inches of movement, 200 psi with 6 inches of movement and 400 psi with the next inch. A bump with 800 psi force would be needed to extract the last inch of travel, and not even the Carlsbad downhill offers that. Therefore Kayaba uses two air chambers, one in the stanchion at 35 psi to cover the first 4 inches of travel, and another at 70 psi in the air cannister atop the stanchions. The chambers are separated by a floating piston inside the cannister. It doesn't move until pressure in the lower chamber exceeds that in the upper. The final four inches of travel are controlled by the compression of the total volume of air in the upper and lower chambers. A major benefit of the air fork is that pressure in both chambers may be regulated to match track conditions. A disadvantage is potential air leakage. Heavy strengthening gussets are cast into the front and back of the fork sliders. Don't machine them off, because they're there for safety and to fend off rocks.

Since the monoshock is now two years old and well publicized, we'll avoid a long technical dissertation and reserve subjective comments for the conclusion.

The Yamaha has more exclusive features by far. These include a ⅝-inch-pitch chain, the best grips, a skid plate, socket-head sidecover bolts, no leg interference from the sidecovers, a chain tensioner and excellent gaiters to protect the fork seals.

Criticisms: There was universal dislike of the handlebars. The same choke rod as on the Suzuki has the same inaccessibility and possible seating problems. There should be a rear brake lever adjusting screw. Our kickstarter didn't engage until half-way through its throw. The rubber petticoat that protects the monoshock bulb from mud doesn't fit. The filler neck is a fire hazard.

	HONDA CR-125M	SUZUKI RM-125A	YAMAHA YZ125X
Price, suggested retail	$905	$995	$1027
Tire, front	3.00-21 Bridgestone	3.00-21 Bridgestone	3.00-21 Bridgestone
rear	4.10-18 Bridgestone VP	4.10-18 Bridgestone VP	4.00-18 Dunlop Senior
Brake, front	4.3 x 1 in. (109 x 25.4mm)	5.1 x 1.06 in. (130 x 27mm)	5.1 x .875 in. (130 x 22mm)
rear	4.3 x 1 in. (109 x 25.4mm)	4.3 x 1.06 in. (110 x 27mm)	5.1 x .875 in. (130 x 22mm)
Brake swept area	27.1 sq. in.	31.5 sq. in.	28 sq. in.
Specific brake loading	13.47 lbs./sq. in., at test weight	11.33 lbs./sq. in., at test weight	13.14 lb./sq. in., at test weight
Engine type	Two-stroke piston-port single	Two-stroke case-reed single	Two-stroke reed-valve single
Bore and stroke	56 x 50mm	56 x 50mm	56 x 50mm
Piston displacement	123cc	123cc	123cc
Compression ratio	7.5:1	7.6:1	7.4:1
Carburetion	1; 30mm; Keihen	1; 32mm; Mikuni	1; 34mm; Mikuni
Air filtration	Oiled polyurethane foam	Oiled polyurethane foam	Oiled polyurethane foam
Ignition	Kokusan Denki CDI	Kokusan Denki CDI	Hitachi CDI
Bhp @ rpm	21.53 @ 11,000 (actual)	21.14 @ 10,500 (actual)	20.67 @ 10,500 (actual)
Torque @ rpm	10.28 @ 11,000 (actual)	10.90 @ 10,000 (actual)	10.63 @ 10,000 (actual)
Rake/Trail	31°/5.40 in.	30°/5.1 in.	31°/5.51 in.
Mph/1000 rpm, top gear	5.48 mph	5.15 mph	5.75 mph
Fuel capacity	1.8 gal. (6.8 liter)	1.6 gal. (6.0 liter)	1.5 gal. (5.7 liter)
Oil capacity	Premix	Premix	Premix
Transmission oil capacity	1.1 qt. (1.0 liter)	.85 qt. (.8 liter)	1.4 qt. (1.30 liter)
Primary transmission	Spur gear 4.00:1	Spur gear 3.71:1	Helical gear 3.23:1
Secondary transmission	½ x 5/16 D.I.D. chain 14/53 3.79:1	½ x 5/16 D.I.D. chain 14/57 4.07:1	⅝ x ¼ D.I.D. chain 12/46 3.83:1
Gear ratios, overall	(1) 32.29 (2) 24.39 (3) 19.68 (4) 16.52 (5) 14.50 (6) 13.32	(1) 35.18 (2) 26.40 (3) 21.28 (4) 17.95 (5) 15.77 (6) 14.43	(1) 31.40 (2) 23.92 (3) 19.24 (4) 16.08 (5) 14.14 (6) 12.93
Wheelbase	56 in. (1422mm)	55 in. (1397mm)	55.7 in. (1415mm)
Seat height	35.3 in. (89.7cm)	35.5 in. (90.2cm)	35.2 in. (89.4cm)
Ground clearance	8.3 in. (21.0cm)	11 in. (27.9cm)	11.5 in. (29.2cm)
Curb weight	205 lbs. (93 kg)	197 lbs. (89.4 kg)	208 lbs. (94 kg)
Test weight	365 lbs. (165 kg)	357 lbs. (162 kg)	368 lbs. (166 kg)

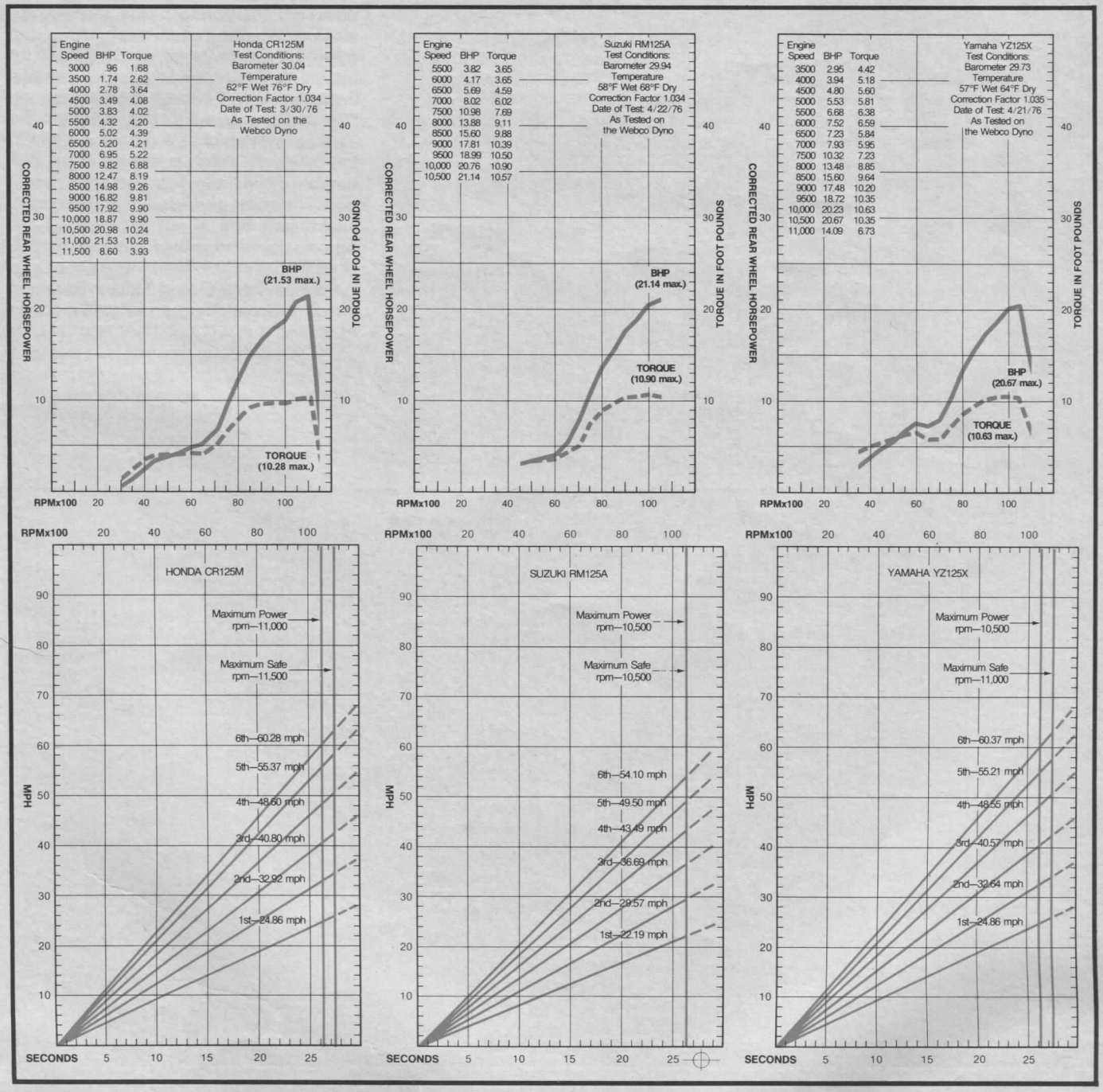
ENGINE DESIGN

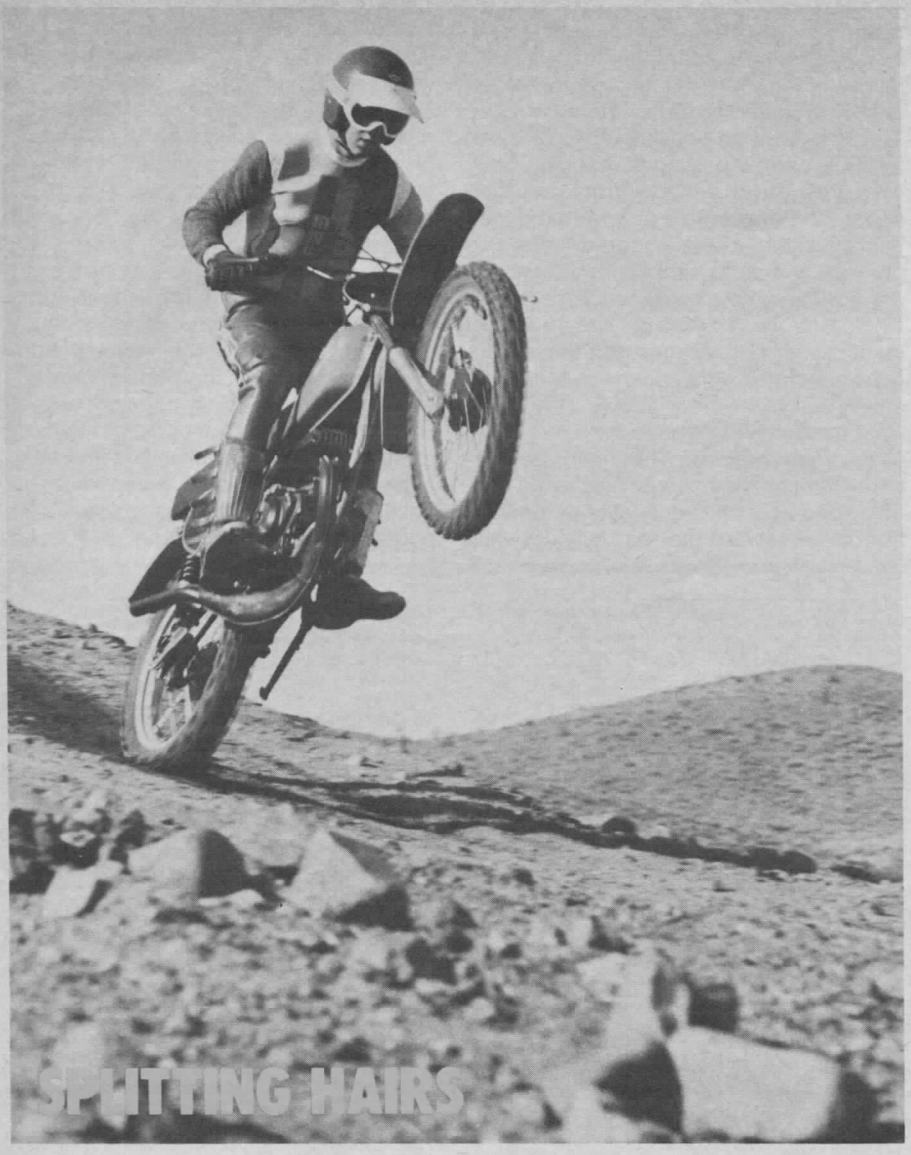
As noted, all three engines have the same 56mm bore and 50mm stroke. Their cranks and crankcases are not identical but do not differ much except in the means provided for cylinder attachment. The Yamaha's cylinder is clamped between the crankcase and its cylinder head, and held with long through-studs and sleeve-nuts; the Honda and Suzuki cylinders are secured by short studs at their bases, and have separate sets of studs to hold their cylinder heads in place. The Yamaha arrangement probably is inherently inferior to that of the Honda and especially the Suzuki (which has six head studs) but in such matters theory is less important than the manner in which the overall design is managed, and Yamaha has made its simple four-stud design work very well.

More significant differences are to be found in the engines' cylinder ports. Honda's Elsinore continues to rely on the same unbridged exhaust and five scavenging (transfer) ports it acquired in 1975. The Honda's fifth scavenging port is fed through narrow passages reaching back over the intake window from the side transfer tunnels, with a rib where the feed passages join. In the Honda cylinder this rib ends at a point back behind the cylinder wall, and the mixture emerges from a single window. The Suzuki has an almost identical set of passages, but these continue separated right into the cylinder and end in two close-set windows.

All three cylinders have the same basic scavenging pattern. The main transfer ports flanking the exhaust port squirt mixture streams aimed only slightly upward but biased toward the rear cylinder wall. These streams are joined, and deflected upward, by others from the adjacent auxiliary transfer ports, and the finishing touches are applied by boost ports located above the intake port. The Suzuki differs in having an extra-wide, T-shaped bridged exhaust port, and the Yamaha's boost port works in an unusual way, but the scavenging patterns are very much the same.

The major differences are in the engines' intake valving. The Honda has a piston-skirt-controlled port, which opens when the piston moves high enough in the cylinder to uncover the port window and closes when the skirt comes down to block the passage. The port is straight and unobstructed, and its excellent flow characteristics give it a high horsepower capability. Unfortunately, piston-controlled ports open and close the same number of





degrees from top center, which gives the charge drawn into the crankcase a fine opportunity to escape in the period between TDC and the point at which the port closes. The charge is prevented from doing so only by sonic wave and inertia ram-charging effects, which keep the mixture moving toward the crankcase even when the piston is descending. This overriding influence can be effective even when port closing occurs as much as 100 degrees from top center—but only within a very narrow speed range. For this reason piston-port engines generally, and the Honda particularly, tend to be peaky.

Yamaha embraced the reed-valve concept precisely because their piston-port engines could not be made to give a wide spread of power. Reed values don't care what the piston is doing. The reed petals open when there's more pressure on their upstream (carburetor) side than downstream. So the reeds open when the piston is on its upstroke, and they open for the inertia-ram/wave effects in the intake tract. And they'll open if the megaphone part of the engine's expansion chamber exhaust system pulls a partial vacuum in the cylinder—which is what causes mixture to move from the Yamaha's boost port. The boost port is fed directly from the intake port and is not exposed by the piston's upper edge until after the skirt has blocked the intake/crankcase opening.

Fundamentally, reed valves have the effect of broadening an engine's power band and that's good. They also place a partial restriction in the intake tract, which tends to limit maximum power. Suzuki has tried for the peak power obtainable with an unobstructed piston-controlled port, *and* the power spread reed valving promises. They've provided their engine with a

straight, streamlined intake port controlled by the piston, and added a small, two-petal reed valve in a bypass from the intake port floor directly to the crankcase. The main port timing is too short for a high-speed engine, but appropriate for a slogger. And the reed valve provides extra charging during the piston upstroke at low revs, then opens in response to intake tract ram-charging at higher speeds, during the piston's downstroke, and extends the power range at its top end. It's an interesting approach, and one that may—when given enough development time—give Suzuki a competitive edge.

For the moment, other factors offset the differences in these engines' intake systems. Yamaha may use reeds to improve power range, but the requirement in 125cc MX racing is for sheer power. So they've had to add a pure-power expansion chamber, wild port timings and an oversize carburetor—all of which act to narrow the engine's power range no matter what the reeds are trying to do. Honda's piston-port intake system would tend to narrow the power band more than is acceptable even for racing, and they've had to use a smallish carburetor and unpipe-ish pipe to avoid having a road-racing type "wall-switch" engine. Suzuki is working with a hybrid concept that probably has them going in both directions at once, starting with a middling-size carburetor.

How do they work in the field? About the same, and the differences are due much more to development time and to those other factors than what you'd expect from the intake systems. Yamaha's engine is only slightly less peaky than the piston-port Honda, and makes only slightly less maximum power—though it does sign off rather abruptly just past its power peak. Suzuki's engine gives the Honda a slight edge on the peak, and the Yamaha a bit of range. None of the three has any worthwhile edge over the others.

The gearboxes attached to these powerplants all have six-speeds and rotary-drum shifting, but the Yamaha's drum is turned by a less precise ratcheting arm than the RM and CR's gear-actuated mechanism. The Honda and Yamaha ratios are nearly identical, as can be seen by comparing the top speeds attainable in each gear (see shift chart). Both peak out at 60.3 mph. The RM has lower overall gearing (54 mph) and closer internal ratios, which makes shift timing less critical for novice riders and will better match

the transmission to a narrower power-band should the owner modify for peak hp.

RIDING

Both the Honda and Yamaha were delivered new and required break-in time. The Honda was extremely tight, as the distributor warned, and required three tanks of gas before it could take full throttle without trying to tie up. Because so much break-in time was put on the engine at low revs, we had to decarbonize the combustion chamber and de-gum the rings before racing. As suggested by American Honda, we used Bel-Ray MC-1 racing oil mixed 40:1.

The YZ felt crisp and free from the beginning. Nevertheless, after a day of run-in, Yamaha took it back for disassembly and inspection before racing. Following their suggestion we mixed Yamalube R at 32:1.

Suzuki's RM125A was well broken-in when delivered. The only special attention visible was a new rear tire. Suzuki recommended a petroleum-based oil so we used Torco T-2 30-Weight at 20–24:1 ratios. All three bikes endured break-in, three days at the track and a punishing dyno run without an engine failure.

Except for the Yamaha and its half-throw kick crank, the bikes start readily and with little effort. Climbing aboard reveals surprising differences in feel. The CR125M is the most natural and comfortable because of its plush saddle, ideal handlebar bend, perfectly positioned footpegs and depressed gas tank. Its stand-up position is superb. The RM125A is equally comfortable but not quite as natural because the seat tilts forward more than the Honda and the pegs are higher. You have to get used to everything on the Yamaha, and seating position is no exception. Its narrower seat, higher pegs and ultra-wide bar (36 inches) don't add up to a cooperative feel. The bar is the worst offender and may be narrowed for some improvement, but the basic bend—dictated somewhat by the air fork cannisters—just doesn't make it.

Each bike requires the same starting-line technique—wide-open-throttle/pop-the-clutch/fight-to-stay-in-a-straight-line/shift-to-second-as-quick-as-humanly-possible. Once off the line the Yamaha and Suzuki have a clear acceleration advantage on the Honda because of their superior midrange power. One of our photo models was a Class C Expert with several seasons of starting experience at Ascot Park, and he won more of the drag races than anyone else. It didn't seem to matter which bike he was riding.

Our test track, Sage Park near Ridgecrest, Calif., has a 300-yard, slightly uphill, starting area which funnels into a good-sized jump. Traction is dry, but excellent. The Yamaha would usually lead for the first 150 yards, but the RM would accelerate quickest in the final few hundred feet (closer transmission ratios and lower overall gearing) and usually hit the

jump first. Honda's peakier power and therefore less predictable starts usually put it a wheel in back of the other two at the jump. A missed shift on one put the other two 20 yards ahead.

Gearbox operation becomes ultra-critical when you consider these facts: a 125 shifts 43 times per lap at Sage Park; that's 860 times in a 30-minute moto for a race-day total of 2580—not counting practice. The Yamaha regularly missed a shift in two out of three laps when banging the gears and not using the clutch as you would do in a race. Even shifting the YZ carefully didn't always result in the easy, surefire engagement of the other two. The Suzuki is virtually mistake-proof in shifting, and so is the Honda, but without the RM's positive feel through your boot. Sometimes it feels like you missed one on the Honda when you really didn't.

Since all three have such close peak horsepower—CR 21.53; RM 21.14; YZ 20.67—the power spread determines how easy or hard it is to ride the bike. Honda has the most horsepower and the least torque, and that's how the motor feels—peaky. With its excellent transmission ratios, an expert rider with a well-oiled left ankle won't give an inch to anyone—even coming out of turns. Honda built the Elsinore with this powerband purposely—first because all the old Elsinores being modified to win have this type of power, and secondly because most of the youngsters riding 125 motocross today are sophisticated enough to use it. Still, it takes a lot of practice to ride a CR successfully.

With wider spreads of greater torque both the Suzuki and Yamaha accelerate harder out of turns. If your foot is busy propping up the motorcycle in a hard left-hander and you can't shift, the motor will pull you out. Turn 11 (see track diagram) was second gear on the RM and YZ while the Honda rider was fighting wheelspin in first, which he had to grab just before pitching left. There's no question that the Yamaha turned the fastest individual and overall lap times because its torquier power gave better traction and acceleration. A week on the Honda isn't enough to get it down pat.

The Yamaha pulled significantly harder than the Suzuki at midrange revs because the RM's carburetion wasn't dialed perfectly. A rich condition made it blubber below 8000 revs and the Yamaha was gone in the time it took to downshift the RM back to life. Half-way through our lap-time tests the Suzuki developed a high-rev misfire which was eventually traced to an ailing CDI. While it was running crisp, the RM felt to have the most power on tap because of its slightly closer gear ratios. It was easier to dog someone from behind and wear him down with constant pressure because ready power was always there. Everyone agreed that the Suzuki was easiest to ride. However, with its tighter gearing you had to be more careful of over-revving, which drops power dras-

(Continued on page 89)

tically on all three bikes.

Frame geometry and steering are excellent on each machine. Each has the same front tire, and it feels the same on the track, so handling irregularities may be traced directly to forks, shocks and those silly variable pitch rear tires on the Honda and Suzuki.

Our test track had two sets of whoops that extracted the limit from forks—the ones after Turn 2 and before Turn 10. Neither the Honda nor Suzuki had a problem in either place, but the Yamaha fork bottomed on these whoops and was too soft everywhere else. Diddling with our $50 air bottle and $30 check gauge eventually established 40 pounds of pressure in the lower chamber, up from 25, and 75 pounds on top, an increase of 10 pounds. No more YZ front-end problems.

Rear suspension got its toughest test after the big berm on Turn 1 and on the straights between Turns 4 and 5, and 8 and 9. We had no tools to adjust the monoshock, so we were stuck with a YZ rear end which worked fine on really harsh bumps but felt stiff on the little stuff. The Suzuki rear end wasn't adjustable either, but didn't need to be for our 160-pounder, who said the shocks were spot-on. With 195-pound riders the dampers would usually bottom once or twice per lap, which meant near-maximum travel was being utilized everywhere.

The Honda's shocks were poor mates for its excellent fork. The spring rate and compression damping were fine, but rebound damping was soft at first and downright sloppy as the shocks got hot. We installed a pair of freon-celled S & W shocks with 80-pound springs and immediately noticed a marked improvement in traction. However, the spring proved to be too soft because the tire began rubbing the fender on harsher bumps. Smoother and more consistent damping still provided a better ride than with the stock shocks, so we left the S & Ws on for lap-time runs.

These were made at the end of our test week so the riders would be familiar with the bikes and the track. For our results to reflect that all-important equalizer of 125 motocross, the start, we timed the three-lap runs from the starting gate.

Rider A is the most typical of 125 racers in size and weight. His best overall time and best starting lap was on the Suzuki, mainly because it pulls so hard off the line and because he never missed a shift. Gearing was a little short for his weight and he had to shift two more times per lap compared to the Yamaha, on which he set his fastest lap. Two YZ missed shifts, one on the first lap and one on the third, probably cost the Yamaha Rider A's quickest total. He preferred the Honda because of its natural feel and consistency, but a slow start placed it third.

Rider B is a more experienced Expert than the first tester but is 35 pounds heavier. Unfortunately, the Suzuki developed its misfire on his first lap and never recovered. RM times for both Rider B and C are therefore not true reflections of the performance Rider A proved it has. Rider B posted his best individual and overall times on the Yamaha and tied with the Honda on the standing-start lap. The YZ gave him an absolutely perfect start, and his more experienced shifting technique led to flawless gear changes. Well-matched tires permitted him to take advantage of his strength to manhandle the bike deep into turns while still on the power. His third lap Yamaha time of 1:32.1 was quickest of all. The Honda, on which he also got a perfect start, slipped out twice on the last lap (rear tire failure) and lost its elapsed-time lead. He personally preferred the feel of the Suzuki, sputtering engine and all, but raved about the Yamaha's powerband.

Rider C is an experienced but not Expert class competitor weighing 195 pounds. Again, the Yamaha's mid-range grunt proved advantageous for a heavier person as it gave Rider C his fastest three-lap total. His starting technique was not as polished as the Experts, so he lost a second with the tricky Honda and benefited from the Yamaha's muscular mid-range. His fastest lap was set on the Honda, but he still preferred the Suzuki's feel.

A series of short motos with all three bikes confirmed that rider ability is the final separator. No bike has a weakness that would keep a superior rider from winning; nor is any one so good that it will carry a squid past the other two.

CONCLUSION

The Suzuki is the overall winner in the box-stock class because it will be competitive at most tracks without benefit of fix, fiddle or cheat. It has superb suspension, and the engine is easy for a Novice to control and an Expert to exploit. Shortcomings on the other bikes contribute as much to the Suzuki victory as its own overall excellence. The Honda can't win because its engine has an Experts-only powerband and its shocks simply don't cut it. Almost offsetting these criticisms and making it the winner is pricing $90 below the Suzuki—which pays for new shocks. But the class is box-stock, and changes don't count.

Yamaha indirectly prices itself out of contention. The initial $32 and $122 above the Suzuki and Honda are significant to teenage budgets, but what really powders your wallet are the special tools *absolutely necessary* to maintain the suspension units. Here's what you need for the monoshock:

Regulator assembly
Part No. 90890910-28-00 ..... $103.93
Check gauge
Part No. 90890910-31-00 ..... 7.91
Adapter
Part No. 90890910-29-00 ..... 6.19

(Continued on page 90)

Injector needle
Part No. 90890011-53-00 ..... 8.50
Nitrogen bottle
Not available through Yamaha..... $30.00
And for the air fork:
Service gauge
Part No. ACC 11080-01-40..... $29.95
Air bottle
Not available through Yamaha..... $40.00

The whole retinue totals $226.48 before sales tax. You say your dealer can service the suspension. Is his shop at the track?

If you're serious you'll spend the extra bucks, but Yamaha's suspension will still be a liability until you figure it out. Even armed with exact knowledge of the mono-shock and air fork design and a basic understanding of the physics involved, the sorting-out job will take a month or more. Nevertheless, there will be hundreds of local riders who will turn the adaptability of the YZ suspension into a tremendous asset. They will learn to match the Yamaha to the race track and to their style, and many will win because of it—if for no other reason than the self-confidence they get from tailor-made supension. Air is probably the way of the future, simply because when it works right, no steel spring can touch it.

But for right now, it's too expensive and too new to unseat the RM125A Suzuki as the best stocker of the three.

Out in the real world of 125 motocross, stockers do not dominate. Tricked-out

Elsinores do. The Honda wins the real world class because it can be hopped-up successfully with proven and readily available components easier than the Suzuki and Yamaha. FMF can put two horsepower in an Elsinore with a pipe and carburetor. S & W can supply freon-cell shocks with damping and springs built especially for the CR. Add a new tire and a decent rider will flatten a stocker. At this point the whole Suzuki engine is new, so no hop-up parts exist for the A model. A few goodies for Yamaha's engine are already around, but they didn't make it a winner last year. For the next few months, Honda's CR125M is certain to rule.

Let us not forget the most important influence on winning—you. Marty Smith could dominate every local race in America on a two-year-old bike, so don't expect a hot Elsinore to win for you, and don't expect to lose if you ride a stocker well. Natural ability, exercise, experience and proper state of mind are more important than an FMF pipe or S & W shocks.

Former World Champion Paul Friedrichs used to practice on his CZ with the seat removed so he'd have to stand the whole time. Smoke poured through his leathers from burning leg muscles; callouses tore away from his hands; even his boots were soggy from sweat, yet he kept riding until a full gas tank was empty.

Practice half that hard and you'll be able to win on either of these three. ◉