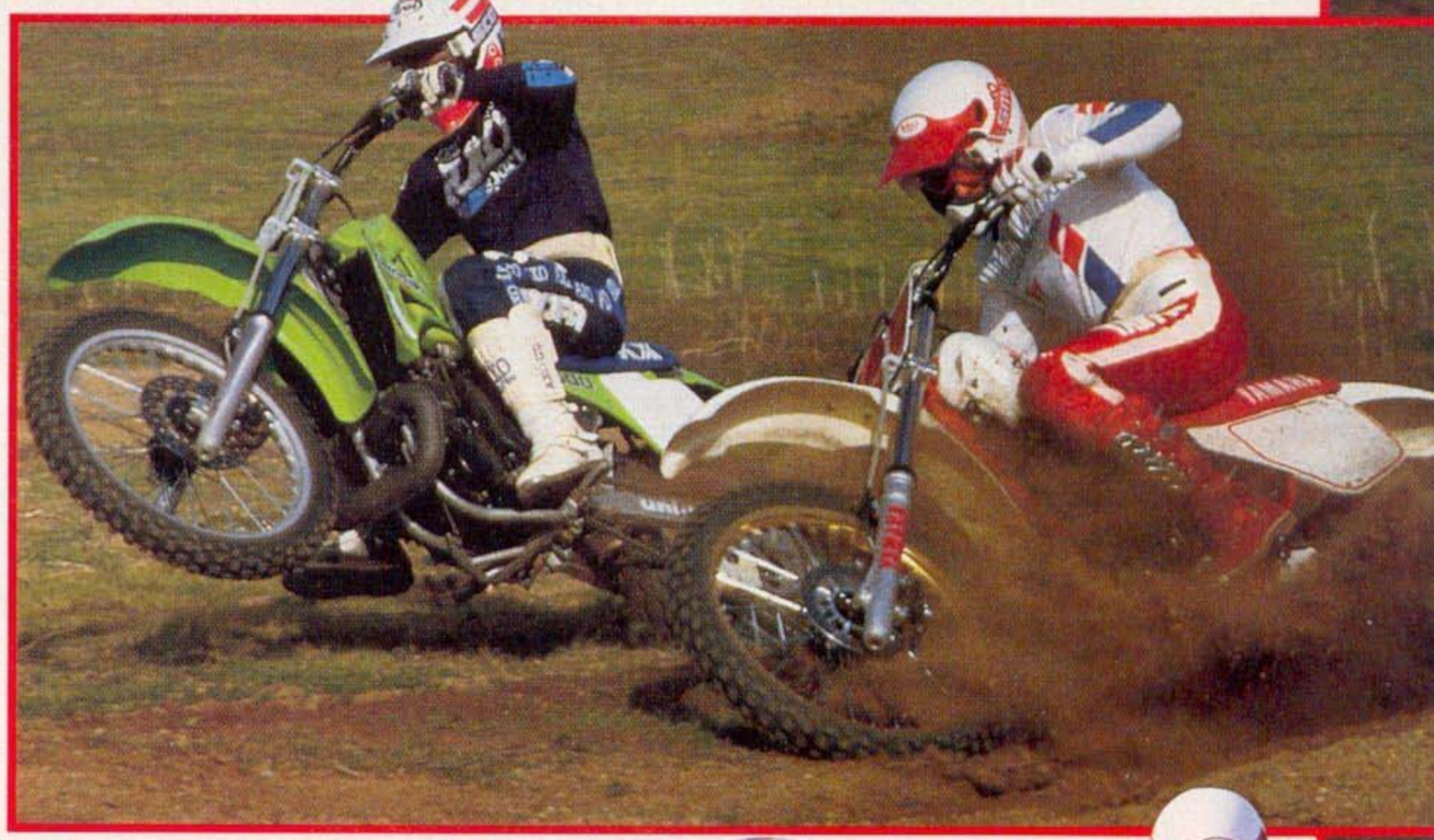
Determining the winner of this brute-force contest between the Yamaha's traditional approach and the high-tech Kawasaki KX500 was serious business. We grabbed CMC Trans-Cal 500cc Pro champion Willy Simons to set off seismographs on the KX, while former Utah number-one Open Pro Terry McGinnis moved mountains on the YZ. Mark Kariya and Karel Kramer recorded the slices of frozen time.

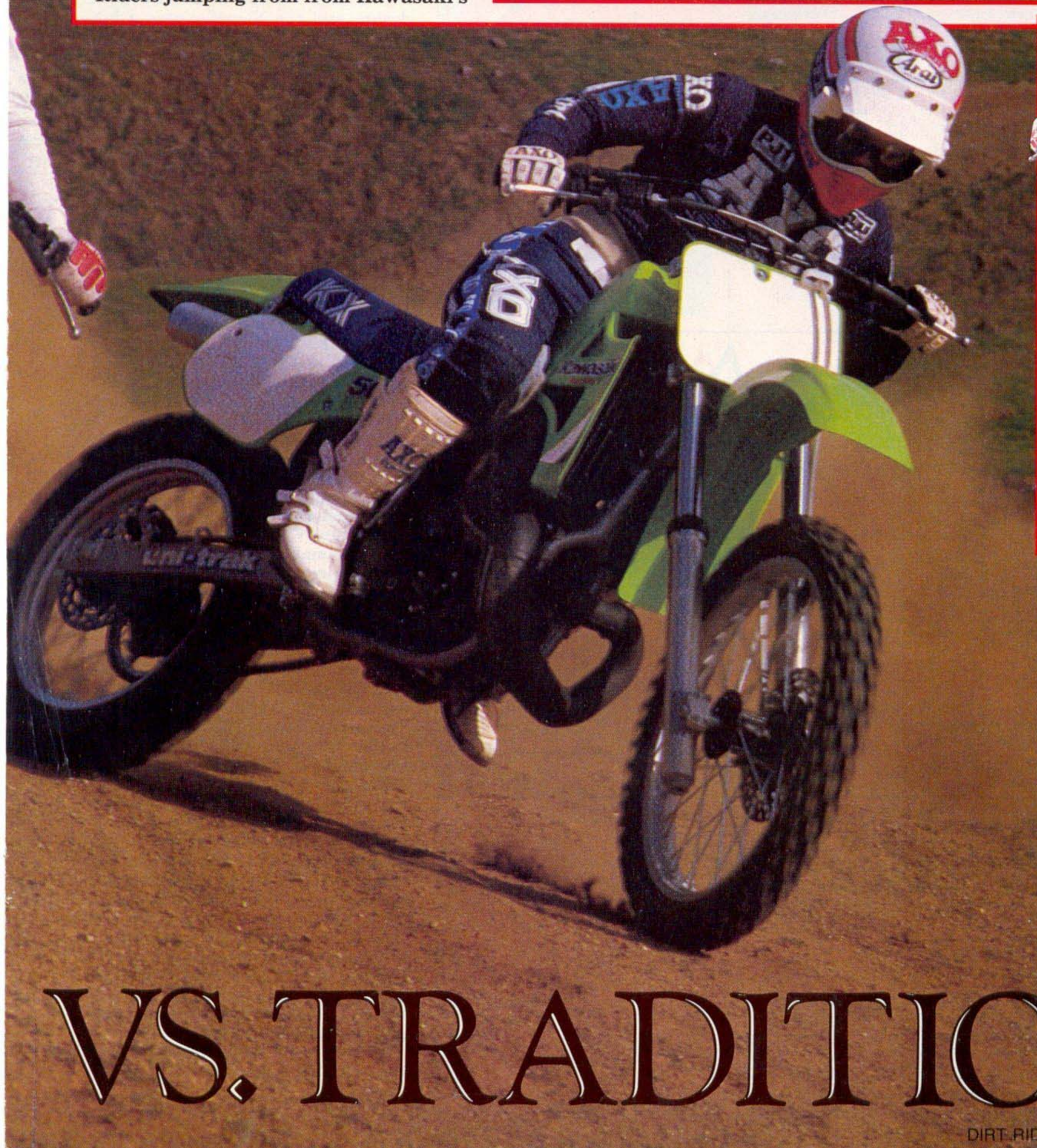
KAWASAKI KX500-B2 VS. YAMAHA YZ490S TECHNOLOGY

Thinking about modern motorcycle development labs conjures up images of Japanese engineers in white lab coats, seated at computer terminals or cloistered in surgically clean dyno rooms and machine shops. The *truly* creative might even picture a ninja-esque corporate spy, stealing competitors' secrets to stay ahead of the game.

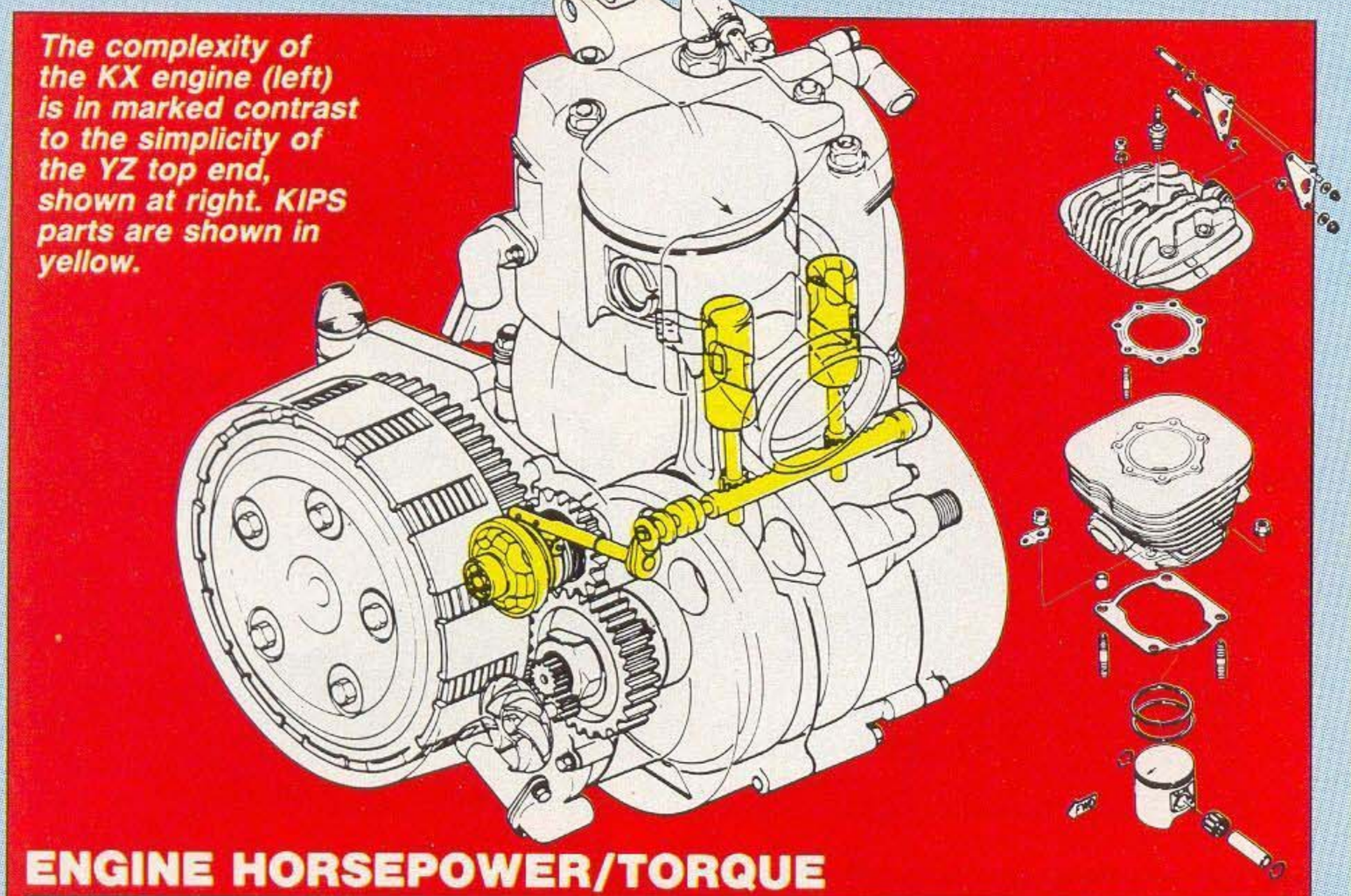
Well, either Kawasaki and Yamaha don't watch each other very closely or they simply don't care what the other is doing—because in trying to create the ultimate Open-class motocrosser, each company has come up with a completely different machine.

Enough so that this was the most difficult shootout we have attempted. Riders jumping from from Kawasaki's





VS. TRADITION

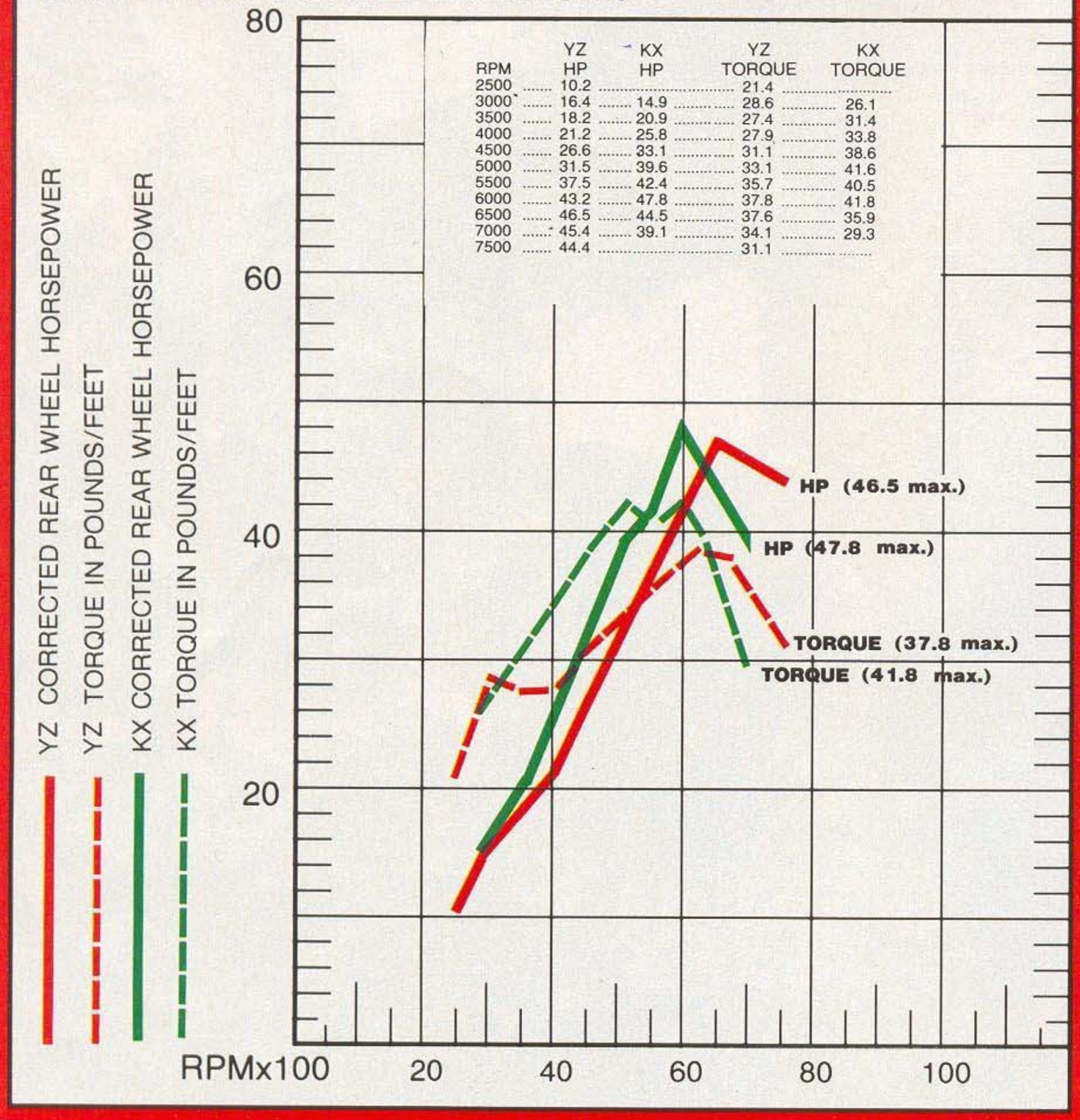


The complexity of the KX engine (left) is in marked contrast to the simplicity of the YZ top end, shown at right. KIPS parts are shown in yellow.

ENGINE HORSEPOWER/TORQUE

TESTED FOR *DIRT RIDER* ON THE KERKER DYNO

RPM	YZ HP	KX HP	YZ TORQUE	KX TORQUE
2500	10.2		21.4	
3000	16.4	14.9	28.6	26.1
3500	18.2	20.9	27.4	31.4
4000	21.2	25.8	27.9	33.8
4500	26.6	33.1	31.1	38.6
5000	31.5	39.6	33.1	41.6
5500	37.5	42.4	35.7	40.5
6000	43.2	47.8	37.8	41.8
6500	46.5	44.5	37.6	35.9
7000	45.4	39.1	34.1	29.3
7500	44.4		31.1	



REDLINE REPORT

Our seat-of-the-pants impressions of the two Open-class contenders' power output were right on the money. The Yamaha *is* easier to ride than the Kawasaki, since its air-cooled engine starts generating power at 2500 rpm and builds smoothly to 7500 rpm. The YZ has a solid, high-rpm rush and builds power for 500 rpm before the KX and 500 rpm after the KX signs off. We were also right about how strong the Kawasaki engine is. It produces a shade more peak horsepower than the YZ, peaks at 500 rpm lower, and simply kills the YZ in the midrange. (At one point in the midrange, the KX generates roughly nine more horsepower than the YZ.) For racing motocross, the Kawasaki engine is king, but the Yamaha is a better all-around ride.

high-tech KX500 to Yamaha's refined, traditional YZ490 took at least half an hour to become accustomed to each bike. We're talking about experienced testers, used to switching bikes at a moment's notice.

TECHNICALLY SPEAKING

As different as these two bikes feel on the race track, they diverge even more on the drawing board. While both feature single-shock linkages and single downtube frames into full cradles, the Kawasaki uses the rocker arm version of the Uni-Trak design and the Yamaha uses a bottom-link Monocross. (The linkage under the swingarm produces a lower center of gravity.)

Kawasaki chose a KYB remote-reservoir, gas-charged rear shock with 13 clicks of low-speed compression damping and four clicks of high-speed adjustment. At the top of the shock body, a knob controls the rebound damping with 20 clicks of adjustment.

The YZ490 uses a gas-charged, piggyback-reservoir shock—built by Showa, modeled on an Ohlins and designed by themselves—which has a steel body and Ohlins-type damping.

Both bikes have identical front suspension, with a 43mm stanchion-tubed KYB fork rotating in tapered bearings at the front of the frame. Both feature adjustable compression damping valves in the bottom of the fork legs, but only the Yamaha's fork sliders have an Alumite coating to reduce friction and retard oil deterioration caused by aluminum oxide contamination.

The Yamaha uses a contemporary damping rod inside the fork; the Kawasaki features a simple, position-sensitive compression damping valve (Travel Control Valve) in the rod, as well as a three-position spring preload adjustment at the top of each fork leg. The TCV is actuated by fork-spring pressure, so installing a stiffer spring requires backing off the valve in the bottom of the fork legs to compensate.

Despite its complexity, the KX fork never worked as well for us as the Yamaha one. The rear shock adjustments on both bikes yielded noticeable differences for the riders, but it's much easier to adjust the spring preload on the Yamaha. In addition, the KX has more shock adjustments than the YZ, and although riders could tell the difference with only a one-click change in compression or rebound damping on either bike, it was harder to feel a change in the low-speed compression adjustment on the KX.

Wheels, brakes and plastic parts on the two bikes are similar and not

PURE POWER VS. SMOOTH DELIVERY

The Kawasaki's powerband hits hard off the bottom, then builds rapidly but smoothly through the midrange. High-rpm power is plentiful but not as arm-stretching as the lower rpm. In addition to the hair-trigger engine, the Kawasaki has hair-trigger brakes. Both are excellent, and the rear brake is a real standout.

The KX is on the cramped side for big riders but comfortable for smaller ones (even those who used to think they were too small for an Open-class bike).

In their test riding, novices and in- →

really noteworthy other than the Kawasaki's excellent rear disc. This year, the Yamaha has a smaller disc in the front for less weight.

Engines are always the big news in the Open class, and this is particularly true in this comparison. The Yamaha is still an air-cooled 487cc single with a boreable steel cylinder sleeve. The transfer ports were changed this year for increased performance at low- and mid-rpm. Since the cylinder casting was changed, Yamaha also strengthened the lower part of the YZ's cylinder to eliminate cracking around the stud holes and to provide better base-gasket sealing.

The YZ engine breathes in through a 40mm Mikuni and phenolic reeds (like those in the 1985 YZ250) and out through the same stamped-steel exhaust pipe. The biggest change is an all-new five-speed transmission. The new trans is unrelated to the older five-speed and has shown none of the unreliability of the past, either. The ratios were derived by the racing department after considerable input from Broc Glover. The five-speed will fit into older cases but must be used in its entirety—including all the gears and shafts. Conversely, the older IT wide-ratio five-speeds will fit the new cases, but also must be installed complete.

Minor changes to the Yamaha engine include a new ignition advance curve and a 3mm longer clutch-actuating arm for a lighter clutch pull.

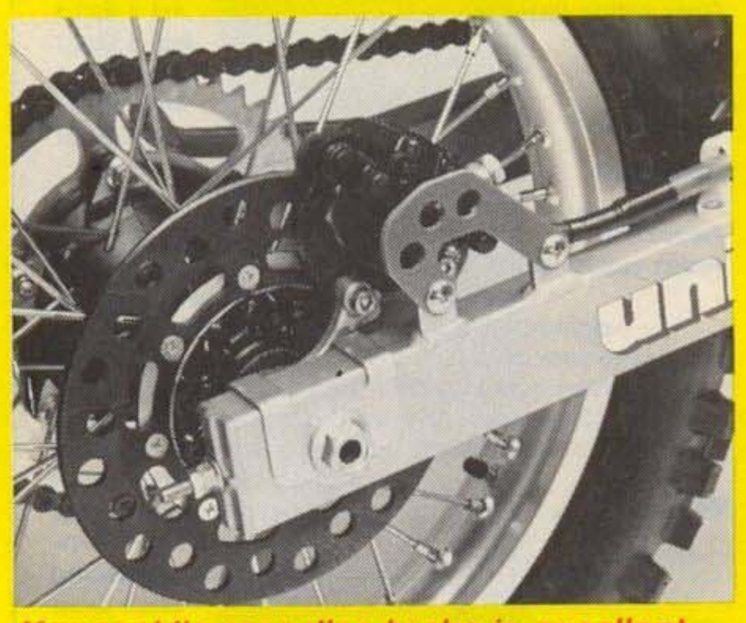
Kawasaki made substantial engine changes to their liquid-cooled single by adding their Kawasaki Integrated Power-valve System (KIPS). (They are the first manufacturer to offer a power valve Open classer to the public.) The KIPS system has round valves—like rods with holes bored through them—that stand at a 90-degree angle to the base gasket surface. A centrifugally-controlled mechanism pulls a toothed rod through the upper front part of the engine case. That rotates the two valves until the holes open and create additional port area at the side of the exhaust port at higher rpm. The valves also close a passage to a chamber above the exhaust port that acts like the Honda ATAC system to change the exhaust head-pipe volume for a better powerband. Though the cylinder is, by necessity, quite different, it still uses the Electrofusion coating in place of a boreable liner.

Because the engine produces so much smooth power, Kawasaki opted to lighten the crankshaft. The result of these changes is an amazingly tractable and powerful engine that starts as easily as a 250 (most of the time). Many testers complained about stalling the KX until we set the idle a little higher.

The reliability of both bikes was generally good, though we had a small but costly failure on the KX: The nut holding the crankshaft drive gear backed off and pressed against the coolant-pump drive shaft, damaged it and caused the engine to lock up. A new part isn't expensive, but because the gear is a machined part of the crank, the case would need to be split in order to replace the crankshaft end. We haven't heard of any similiar failures, and since the nut has a reverse thread and should tighten with use, we assume our failure was a freak one.

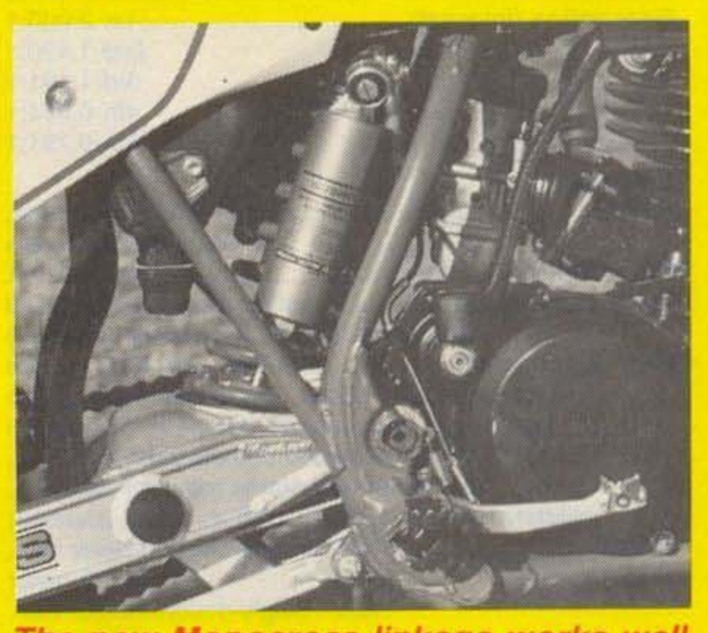
We had no other problems with the KX and none with the Yamaha. The YZ was contrary about starting on cold mornings, but once started, it kicked over easily the rest of the day.

Both bikes are equipped with excellent Bridgestone M22 and M23 tires. There should be no need to replace them unless you live in an extremely sandy area. Also, both machines come with outstanding service and race set-up manuals. Be sure to study them. **DR**



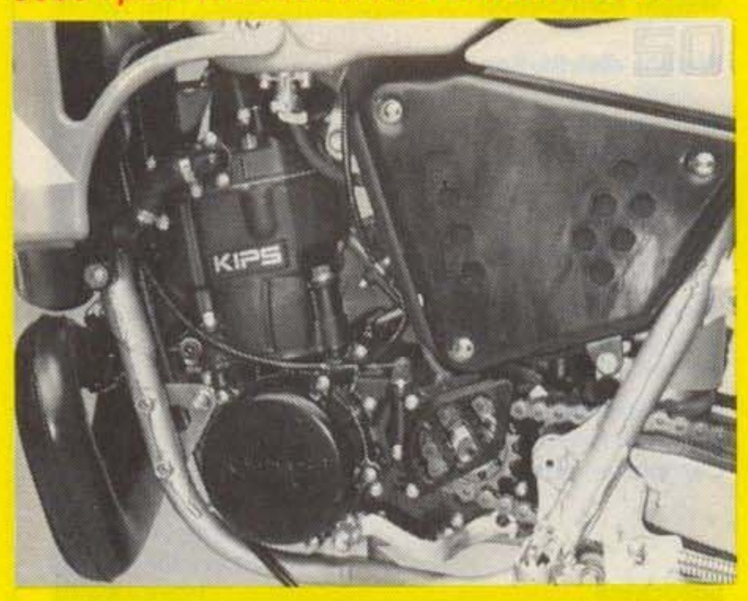
Kawasaki's rear disc brake is excellent. Riders needed time to adjust to the extra stopping power available.

The KIPS in the KX500-B2 cylinder lets the bike rip from 18 to 48 horsepower in 3000 rpm. What a rocket out of a turn!

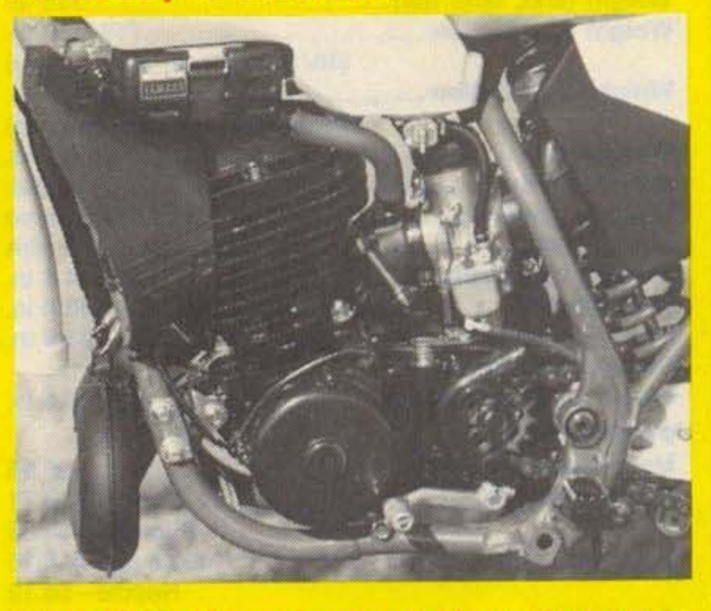


The new Monocross linkage works well enough to provide the best suspension in the Open class . . . stock!

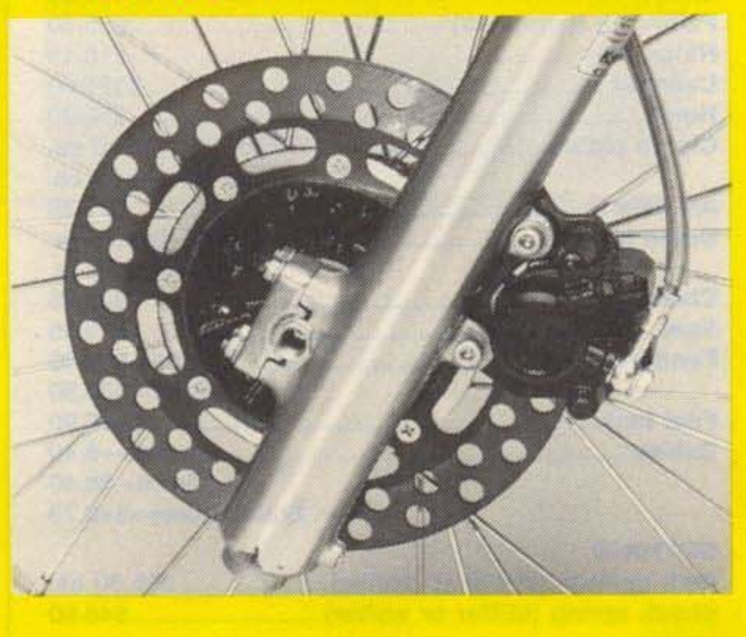
Yamaha's decision to keep the air-cooled engine seems to have paid off. Rideability is excellent.

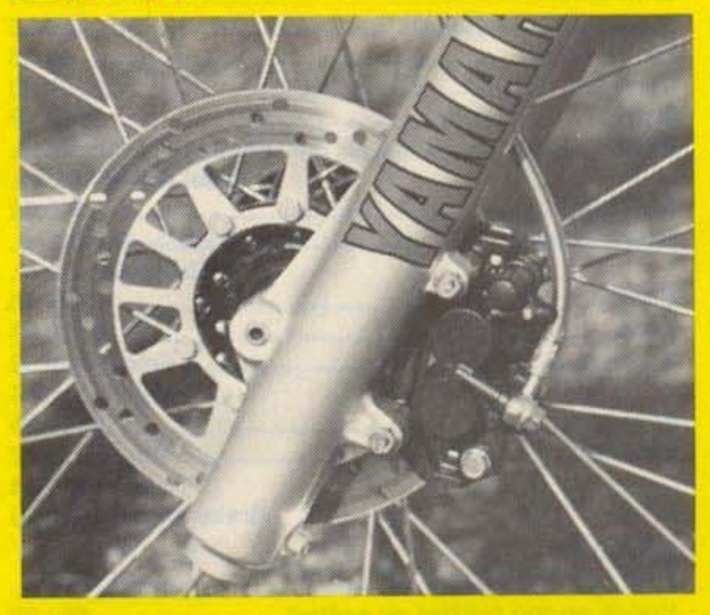


Some riders loved the KX disc; others preferred the more predictable feel of the YZ stopper.



The YZ brake has the feel every tester loves, but some wished for more sheer stopping power. The fork is tops.





KAWASAKI KX500-B2

Serial number	Frame: JKAKXVB146A002176 Engine: KX500B002208
Price	$2749
Number of dealers (U.S.)	1400
Warranty	None
Customer service	Kawasaki Motor Corp. P.O. Box 11447, Santa Ana, CA 92711; 714/540-1600
ENGINE	
Type	Liquid-cooled, two-stroke single with reed valve
Displacement	499cc
Bore x stroke	86 x 86mm
Compression ratio	8.4:1
Horsepower/rpm (measured)	47.8 @ 6000 rpm
Torque/rpm (measured)	41.8 @ 6000 rpm
Carburetion	Mikuni VM40SS
Exhaust	Steel expansion chamber into aluminum silencer
Ignition	CDI
Lubrication	Premix (32:1 recommended)
Air filtration	Oiled polyurethane foam element
DRIVE TRAIN	
Transmission	Five-speed
Primary drive	2.538:1 (gear)
Final drive	3.428:1 (14/48)
Gear ratios (internal)	1st 2.000:1 2nd 1.450:1 3rd 1.181:1 4th 0.954:1 5th 0.791:1
CHASSIS	
Frame	Steel single downtube, semi-double cradle
Rake/trail	28°/4.7 in.
Front suspension	KYB 43mm leading-axle air/spring fork, 11.8 in. travel (claimed)
Rear suspension	Uni-Trak with KYB remote reservoir gas/oil shock, four-position adjustable high-speed compression damping, 12-position adjustable low-speed compression damping, 12-position adjustable rebound damping, infinitely variable preload, 12.8 in. travel (claimed)
Brakes	Front—Single-piston caliper disc, 8.7-in. rotor Rear—Single-piston caliper disc, 7.5-in. rotor
Wheels	Front—1.60-21 D.I.D Rear—2.50-18 D.I.D
Tires	Front—80/100-21 Bridgestone M23 Rear—120/100-18 Bridgestone M22
MEASUREMENTS	
Weight (wet, no fuel)	231 lb.
Weight (wet, tank full)	245 lb.
Weight distribution	113/118 lb. (48/52%)(Fr/rr, wet, no fuel)
Weight distribution	120/125 lb. (49/51%)(Fr/rr, wet, tank full)
Wheelbase	58.7 in.
Fuel capacity	2.5 gal.
Reserve capacity	No reserve
Sound test	105 dbA
Ground clearance	14.8 in.
Seat height	36.0 in.
Swingarm length	23.5 in.
Swingarm pivot to center of countershaft	2.5 in.
PARTS/COST	
Maintenance manual	$6.95
Carburetor jets	Main jet—$3.71 Pilot jet —$3.55 Needle jet—$10.16 Needle—$6.12
Sprockets	Front—$16.96 Rear—$52.00
Handlebar levers	$7.06 ea.
Shift lever	$20.94
Piston kit (complete)	$53.06
Rings only	$8.06
Cylinder	$289.80
Head	$64.98
Clutch plates	Friction (7)—$6.79 ea. Steel (6)—$3.64 ea.
Air filter	$19.32
Brake shoes	Front (pads)—$16.08 ea. Rear—$31.00 pr.
Chain	$35.28
Seat	$136.85
Fenders	Front—$39.53 Rear—$19.64
Fuel tank	$157.95
Cables	Throttle—9.82 Clutch—$10.64 Brake (hose)—$55.33
OPTIONS	
Fork springs (stiffer or softer)	$17.32 ea.
Shock spring (stiffer or softer)	$94.33

YAMAHA YZ490S

Serial number	Frame: JYA1LV009GA000586 Engine: 1LV000586
Price	$2649
Number of dealers (U.S.)	1700
Warranty	30-day
Customer service	Yamaha Motor Corp. 6555 Katella Ave., Cypress, CA 90630; 714/761-7439
ENGINE	
Type	Air-cooled, two-stroke single with reed valve
Displacement	487cc
Bore x stroke	87 x 82mm
Compression ratio	6.9:1
Horsepower/rpm (measured)	46.5 @ 6500 rpm
Torque/rpm (measured)	37.8 @ 6000 rpm
Carburetion	Mikuni VM40SS
Exhaust	Single steel expansion chamber into aluminum silencer
Ignition	CDI
Lubrication	Premix (24:1 recommended)
Air filtration	Oiled polyurethane foam element
DRIVE TRAIN	
Transmission	Five-speed
Primary drive	2.625:1 (gear)
Final drive	3.428:1 (14/48)
Gear ratios (internal)	1st 1.933:1 2nd 1.500:1 3rd 1.222:1 4th 1.000:1 5th 0.833:1
CHASSIS	
Frame	Steel semi-double cradle
Rake/trail	28°/4.72 in.
Front suspension	KYB leading-axle air/spring fork, 43mm stanchion tubes, eight-position adjustable compression damping
Rear suspension	Bottom-link Monocross with Ohlins-type piggyback gas/oil shock with BASS, 28-position adjustable compression damping, 25-position adjustable rebound damping, threaded preload adjustment
Brakes	Front—Dual-piston caliper disc, 8.66-in. rotor Rear—Single-leading shoe drum
Wheels	Front—1.60-21 Rear—2.50-18
Tires	Front—80/100-21 Bridgestone M23 Rear—120/100-18 Bridgestone M22
MEASUREMENTS	
Weight (wet, no fuel)	234 lb.
Weight (wet, tank full)	252 lb.
Weight distribution	110/124 lb. (47/53%)(Fr/rr, wet, no fuel)
Weight distribution	124/128 lb. (49/51%)(Fr/rr, wet, tank full)
Wheelbase	57.0 in.
Fuel capacity	2.8 gal.
Reserve capacity	No reserve
Sound test	103 dbA
Ground clearance	14.3 in.
Seat height	37.5 in.
Swingarm length	22.5 in.
Swingarm pivot to center of countershaft	3.0 in.
PARTS/COST	
Maintenance manual	$9.95
Carburetor jets	Main jet—$2.40 Pilot jet —$2.60 Needle jet—$8.60 Needle—$11.00
Sprockets	Front—$9.40 Rear—$32.50
Handlebar levers	Clutch—$5.40 Brake—$8.10
Shift lever	$28.50
Piston kit (complete)	$55.50
Rings only	$18.40
Cylinder	$321.50
Head	$52.30
Clutch plates	Friction (7)—$8.40 ea. Steel (6)—$4.00 ea.
Air filter	$21.30
Brake shoes	Front (pads)—$25.70 pr. Rear—$23.60 pr.
Chain	$36.25
Seat	$79.95
Fenders	Front—$19.80 Rear—$38.50
Fuel tank	$195.90
Cables	Throttle—9.40 Clutch—$8.40 Brake (hose)—$48.75
OPTIONS	
Fork springs (stiffer or softer)	$25.60 ea.
Shock spring (stiffer or softer)	$48.60

termediates had to guard against getting too careless with the throttle—it was too easy for them to make mistakes on the track. Pro riders didn't need such caution: "Wild" Willy Simons put in enormously fast laps at the Petersen Ranch motocross track on the KX.

In comparison, the Yamaha has a smooth, always predictable powerband and delivery. Low-rpm power is better than in previous YZ490 editions, but the Kawasaki (or the Honda, for that matter) still generates more mass wheelspin right from idle with a mere twist of the throttle. The Yamaha simply moves away from a corner with a minimum of fuss. In the midrange, it's more competitive than previous 490s.

High-rpm power is where the Yamaha starts to flex serious muscles. Leave the throttle pinned in third, fourth or fifth gear, and the YZ accelerates with arm-stretching authority. A stable chassis with excellent suspension aids the rider in using that smooth rush of power to his advantage.

The bike is two or three decibels quieter than the KX, and its power peak—at a low 6500 rpm—is 500 rpm less than in past models. These traits make the YZ feel slow, but our testers were consistently able to pull holeshots during race testing.

The Yamaha is spaciously laid out in terms of rider position with (finally!) a long, relatively flat saddle with seat foam that drew raves from medium to tall testers. Tall riders in particular will love the bike. We couldn't get a majority vote on the brakes: Everyone thought they were progressive with good feel, but some believed the front could have been stronger. At race speeds, two or three fingers are best for stopping in a hurry.

STEERING VS. STABILITY

Our testers' opinions of the bikes were clear-cut in two areas. The steering on the Kawasaki is excellent; the front wheel sticks well anywhere on the track. The KX doesn't rail berms as well as the Yamaha, but it's the Open-class master at using berms the way a billiard ball uses a cushion. Steering the Yamaha takes more effort, though the front wheel sticks well in fast corners. But slow things down, and the YZ demands a little throttle to keep the front wheel where it's needed. The Kawasaki, on the other hand, handles even difficult cambers with ease.

As excellent as the Kawasaki is at turning, the Yamaha demonstrates equal superiority in high-speed stability. Fast straights and sweepers are to the Yamaha's liking. We felt confident launching the Yamaha off fourth- or even fifth-gear jumps. Even the rare times it moved a little sideways off a jump, the landings were always without drama.

Willy and Terry show the different personalities of the two contenders. The KX loves the inside; the YZ is fastest sliding the outside.

PHOTO: MARK KARTA

The YZ tracks well through berms at any speed, yet it's more willing to slide a turn than any other modern, long-travel bike we know of.

Though the Kawasaki has position-sensitive compression damping in the fork and both high- and low-speed compression damping in the shock, the Yamaha's Ohlins-spec Showa shock and rather ordinary KYB fork offers the best suspension out of the box. In addition, the YZ is easy to dial for different riders, and our testers didn't seem to mind if the preload wasn't perfect.

Rear shock preload is more critical on the KX. Test riders had to have it dialed for them before they could feel at ease going fast. Where the Kawasaki excels is in accelerating across small bumps. The bike tracks well under throttle and even handles off-camber sections with good tractability.

PERFORMANCE VS. VARIETY

In stock form, the Kawasaki is a handful on rough straights or sand tracks, and even with the fork preload at its stiffest setting, the KX's front end was too soft. We used stiffer fork springs in both bikes to set them up for racing.

Many riders race the Yamaha with the stock springs, but we preferred the performance of the optional Yamaha 0.4 kg/mm fork springs (approximately 22.5 lb./in.). For the Kawasaki, we used only the primary spring from an ATK heavy-duty 43mm spring kit to give a rate of 23 lb./in.

We left the oil level stock in both bikes, but turned the compression damping valves in the bottom of the KX's fork legs to full soft and replaced the Yamaha's stock 15-weight fork oil with 10-weight. (Don't turn the compression damping that far down on the KX fork unless you change the fork springs. The TCV valves in the fork actuate sooner with the stiffer spring, and the damping must be changed to compensate.)

Getting out of a corner is managed best by the Kawasaki. The Yamaha rider needs to use the clutch and a little muscle to attain the same quickness, but the YZ dominates when entering a turn and Yamaha's much-maligned BASS system lets the rider brake hard with minimum upset in braking bumps. In comparison, the Kawasaki hops and skips into the turn, though the powerful brakes and quick handling almost make up the difference.

Slow jumps with acrobatics are easiest on the Kawasaki, but the Yamaha excels at faster jumps even if they do require a little styling in the air. Giant whoops? Give us a Yamaha.

The other clear-cut difference between the bikes is in using them for purposes other than motocross. All our testers preferred the Yamaha for desert riding, hare scrambles or enduros. Both were good for trail riding, but most riders thought the YZ was easier to set up for other types of racing.

THE VERDICT

When it comes down to the starting line, you're going to see a lot of both green and white motorcycles in 1986. If the dirt-riding public is like our testers, it's going to be split about 50-50 on the question of which bike is best.

If you're looking for an Open-classer, let your decision rest on the bike that best suits your size and riding style. If you're tall, look to the Yamaha. If you value performance at higher speeds and are willing to trade some low-speed nimbleness, look to the Yamaha. But if you're small, and if you believe that races are won in the tight, technical sections, look to the Kawasaki.

The Kawasaki is finely focused for motocross; the Yamaha is a shade more broadminded. Both can win races. The rider who does a little desert racing, the odd grand prix or hare scramble and a lot of motocross would do well on the Yamaha.

In 1983, there was a bumper crop of good Open-class motocrossers. In 1984, the big-bores *were* big bores and the Open class waned. In 1985, things began to look up.

So far, we've tested three very competitive Japanese Open-classers as well as a contender from Europe. We predict a banner year for the 500cc class in 1986! **DR**

DIALING-IN FOR YOUR DOLLARS-WORTH

KAWASAKI KX500-B2

FORK: 23 lb./in. fork springs; 15mm preload; stock oil level; compression damping valve one click out from full light.

SHOCK: Four inches chassis settle with rider aboard; high-speed compression at number two setting; low-speed at five clicks from full light; rebound at eight from full light.

HANDLEBAR: Stock, but reverse clamps to move bar 10mm farther foward.

JETTING: Stock.

YAMAHA YZ490S

FORK: Optional Yamaha 22.5 lb./in. springs; no preload spacer; stock oil level; replace stock 15-weight oil with 10-weight; compression damping valves at stock setting.

SHOCK: Four inches of chassis settle with dressed rider aboard; compression 14 clicks in from full light for hard terrain, 16 to 18 clicks in for rough sand tracks; rebound damping 2 clicks less than stock; BASS used as suggested in manual.

JETTING: Needle clip in top groove; 440 or 450 main for novice/intermediate riders, 460 to 480 for pro riders or extremely cold weather.

HANDLEBAR: Stock for tall riders; stock 1985 Honda bend for shorter riders.

Note: All settings for 150-lb. pro riders and 180 to 190-lb. novice and intermediate riders. **DR**