

# Cycle

**Honda V-4  
Tech Analysis**

**Honda V-4 Racer**

APRIL 1982 • \$1.25 90P

## **Suzuki GS1100EZ**

**Undisputed Superbike King**

**Honda Nighthawk  
CB750 Cruiser**

**Yamaha YZ490J  
New Tricks!**







# **YAMAHA YZ490J**

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*Leave the techno-tricks to  
Yamaha's lightweight YZs.  
With more displacement than  
ever and genuinely improved  
suspension, the new 490  
means business.*

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● ALTHOUGH SINGLE-SHOCK REAR SUSPENSIONS have been around for years in one form or another, it was Yamaha that brought them into prominence with the introduction of its 1975 motocrossers. The basic Monocross design, which Yamaha bought from Belgian designer Lucien Tilkin, offered two distinct advantages over the common twin-shock setup: longer travel and the opportunity to build a stronger chassis. The chassis

improvements were a direct product of the gusseting and swing-arm triangulation required by the new shock position under the fuel tank. Over the next five years, Yamaha refined the system with stronger and lighter swing arms and aluminum-bodied shocks with adjustable rebound damping. With this constant improvement, Yamaha was able to stay even with or ahead of its competitors in suspension technology.

In 1980, Kawasaki introduced its own single-shock system, called Uni-Trak. It differs from the Yamaha Monocross in that the shock mounts vertically and is compressed by a link-rod arrangement. In 1981, however, merely having a single-shock setup wasn't enough. Both Honda and Suzuki introduced *rising-rate* single-shockers, and those threatened to make everything else obsolete. Although Honda and Suzuki approached rising-





PHOTOGRAPHY: STEVE BROADDUS, ROBIN RIGGS

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rate in different ways and came up with different results, the trend-conscious motocross consumer was quickly convinced that rising-rate was the way to go; and in fact the rising-rate design offers some crucial advantages, in particular the chance to use lighter springing without fear of excessive bottoming. Now 1982 is upon us, and again there are changes: Honda has recalibrated its Pro-Link with linkage pieces of different lengths, Suzuki has made its RM-series bikes lighter, and Yamaha has introduced its own rising-rate rear suspension system.

Although Yamaha continues to mount the '82 shock beneath the fuel tank, there the similarity to '81's rear suspension ends. The first part of the new YZ's suspension that catches the eye is the massive swing arm. The stout arm is necessary to carry the high loads fed into the linkage pivot, and ultimately the shock, via the single push lever located in the center of the arm, just ahead of the rear wheel. The complete rear suspension linkage consists of four main parts: swing arm, push lever, pivot and shock. The push lever stands vertically between the arm and the pivot—a distance of 117.5mm. The pivot and all other rear suspension pieces are light aluminum alloy.

At full extension, the one-piece pivot arm has a short vertical segment and a longer horizontal segment extending toward the front of the bike; it looks like a capital "L" with a long horizontal leg. At

the top of the "L" the pivot bolts to the shock; at the right angle of the "L" the pivot attaches to the push lever; and the end of the pivot's horizontal segment bolts to the frame. At the frame attachment points the pivot runs on needle and thrust bearings; all other moving parts rely on bushings. All three pivot points have zerks fittings to simplify maintenance.

Complementing the rising-rate suspension is a new shock. Its preload, nitrogen pressure, rebound and compression damping are all adjustable, which means the Yamaha offers the most tunable single shock on the market. The large nitrogen reservoir is located on the right side of the front downtube as before.

Externally, the 490's fork is the same as last year's. The large 43mm tubes are essentially free from flex. Each tube is held in the triple clamps by four pinch bolts, which ensure that neither tube twists. Black rubber fork gaiters keep the majority of sand and grit from the seals, prolonging service life. Although the top of each tube has an air cap, Yamaha suggests not using air; instead, they suggest relying on oil level to slow compression speed. Raising the oil five millimeters gives much the same result as adding two and one-half pounds of air. Yamaha provides air caps most likely because Everyone Else's motocrosser has them. Internally, Yamaha has modified the dampers to give 10 percent less compression damping and 10 percent more rebound damping.

The powerplant engineers weren't on holiday while the chassis guys were





doing their thing. If the 465 lacked any power, the 490 doesn't now. Yamaha enlarged the bore two millimeters, bringing total displacement to 487cc from 465cc. Yamaha also added YEIS to increase low-end response. The canister mounts under the right side of the tank with a rubber strap. The dimensions of the canister are such that its frequency resonance offsets the natural resonance found in the intake tract, smoothing fuel delivery at low rpm.

Yamaha improved airbox accessibility by designing a new side panel; it doesn't cover the airbox and so needn't be removed for filter maintenance. Access to the filter is strictly a one-screw job, which releases the airbox cover and leaves only two wing nuts holding the filter in place. The filter element consists of two pieces, both of the same foam density. The inner element acts largely as a safety net; we rarely found dirt on it.

To go along with its extra 22cc, the YZ received a new expansion chamber. And to help quell the big-bore growl, Yamaha added a sub-silencer 70mm upstream of the final silencer. Like the 465's, the 490's pipe is well tucked away. The rider touches the vertical to horizontal bend with his left knee, but only when he's sit-

ting on the very front of the seat. With the high vibration levels characteristic of large-bore single-cylinder engines, Yamaha wisely rubber mounted the pipe at all three attachment points. Pipe vibration is well damped; the expansion chamber should not fracture.

Either to trim weight or to follow the trend, Yamaha chose a four-speed gearbox for the YZ490. First gear is rather tall; comparing individual ratios shows that 1982's first gear is actually 1981's second. In fact, gears first through fourth are exactly the same as 1981's second through fifth. Since the gearing seemed tall, we checked the primary and final drive ratios and found the final gearing had been raised; two teeth have been dropped from the rear sprocket.

To enable it to handle the extra load of the more powerful engine and the taller

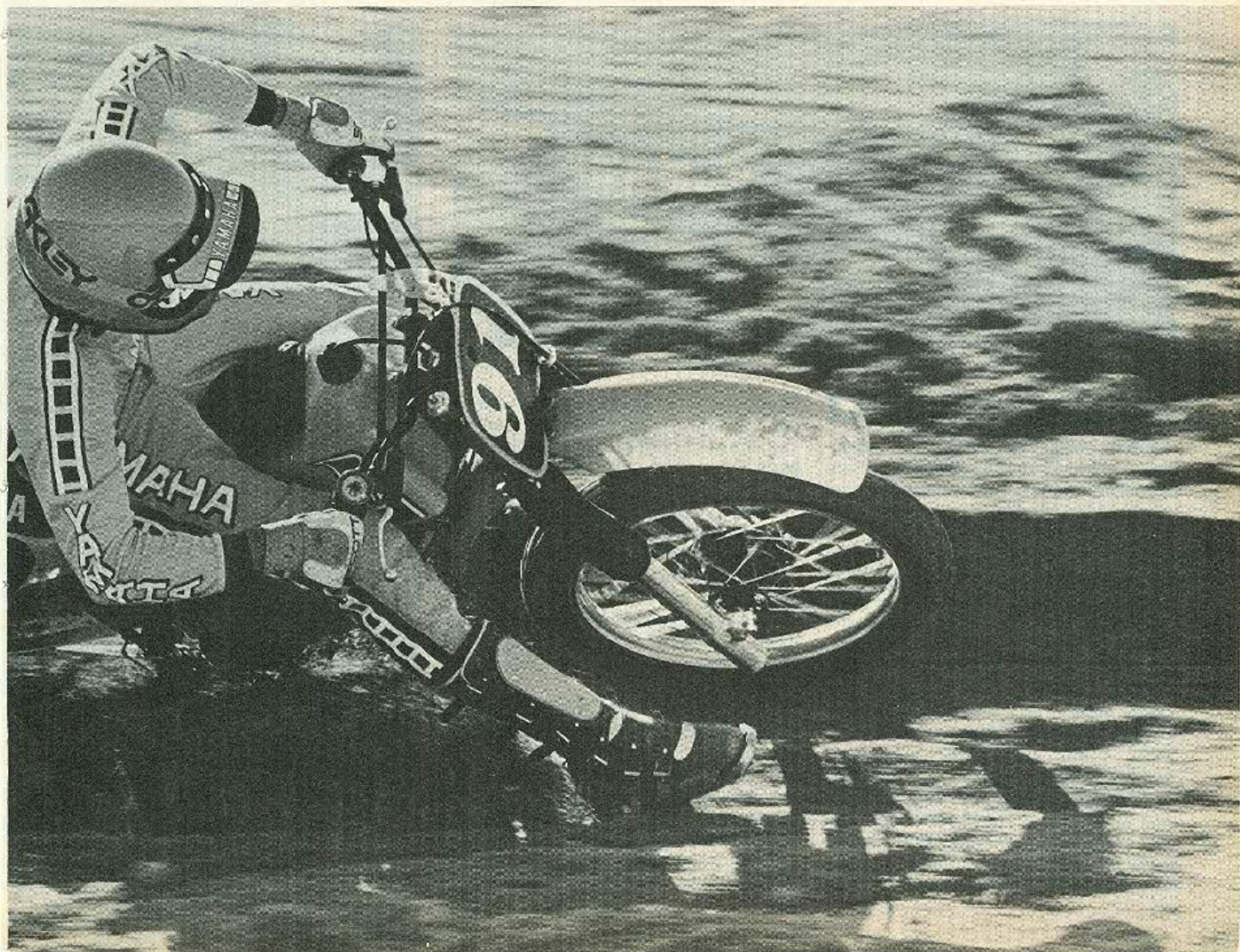
gearing, Yamaha redesigned the clutch hub with a wider primary gear, more engagement tangs for the driven clutch plates and one additional clutch plate. To gain room for an extra clutch plate, Yamaha engineers reduced the metal clutch plates' thickness by 0.7 millimeter. The friction (driven) plates retain their 465 dimensions. Last year's springs are used, giving lever pull that's average for an open-class bike.

The excellent brakes of the G- and H-model YZ465s have been carried over to the 490. The double-leading-shoe front brake can be a one-finger stopper, yet it retains good feel with linear response. The rear brake performs as before, but it's been structurally strengthened with a wider support collar on the backing plate, giving greater surface area to spread the loads transferred from the

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*The '82 YZ490J generates huge amounts of power, more than any motocross bike ever tested by Cycle. Peaking at 48.29 hp at 6500 rpm, the YZ produces a scant 0.38 hp more than '81's Power King, the Maico 490. More important, in the low-end rev range (2500 to 4000 rpm) the YZ is ahead an average 3.25 horsepower.*

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The works-style seat gives the rider more protection. For 1982, Yamaha finally added AMA-legal number plates.

## YAMAHA YZ490J

rear axle. Additionally, both the shoe engagement lever and the torque arm are aluminum, helping offset the additional weight of the stout new swing arm.

All 1982 full-sized YZs carry the works-type extended seat. The new seat reaches up the top of the fuel tank just below the filler neck. The long seat gives two advantages. Obviously, it allows the rider to place his weight far forward on the bike, even though in most circumstances the rider will sit well aft of this "tank area." Dirt bikes respond unfavorably to weight transfer that severe. More often than not, excessive weight on the front wheel causes a horrendous front wheel washout. Still, it's nice to be able to move forward to suit your style. The new seat also provides extra protection against injury, particularly on stadium-type tracks. One trip

through stadium jumps in a semi-out-of-control state will have the rider thanking Yamaha in his normal baritone voice. Perhaps it should be called the *anti-falsetto* seat.

Starting the YZ is difficult only for the short-legged. Test riders five-foot-eight and under liked to place a steadying foot on a milk crate; the extra elevation strengthens the kick. The YZ comes to life in two to four kicks when cold, one to three when hot. Although the 490 responds to a strong kick, it never kicks back.

When you pull away from a standstill for the first time, you'll undoubtedly disengage the clutch and dab at the shift lever to be sure you're *really* in first gear. Yes, the gearing is that tall. Idling along in first moves the YZ at about seven mph.

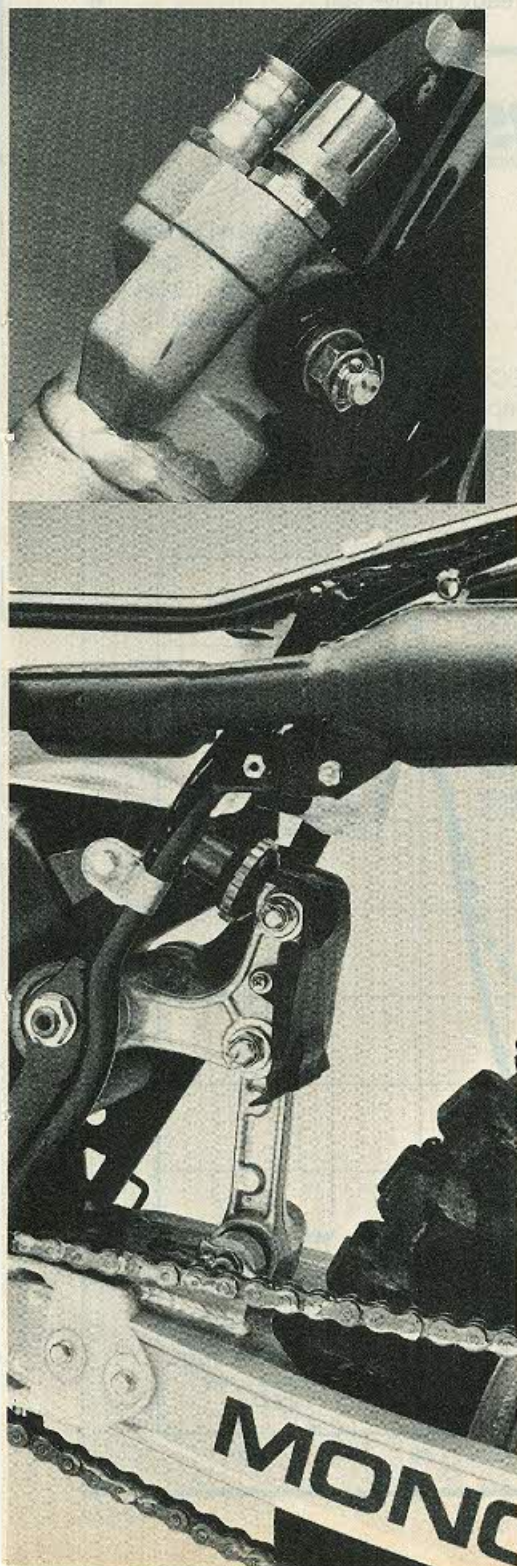
Open-class bikes are known for their low-end stump-pulling grunt, and the YZ is no exception. Despite first gear being





Major changes have dramatically improved the performance of the Monocross system.

Compression damping is now adjustable at the top of the shock, while rebound damping and preload are adjusted at the rear as in 1981. All pivots have zerk fittings to ease servicing of vital suspension parts.



considerably taller than it was in 1981, the majority of hearty first-gear throttlework ends up in wheel spin. Second gear is a long jump from first, and the engine frequently bogs momentarily when exiting slow second-gear turns. As soon as the engine gathers a few revs, things start passing by in the customary open-class blur. Instant power is the name of the open-class game; to cope with the tall gearing our expert riders fanned the clutch out of slow turns to get in touch with the YZ's power quickly.

Changing the gearing would be a good alternative to fanning the clutch. We spotted a Yamaha support rider's bike

pressing rapidly enough over the whoops with the throttle off and the brakes on, which in turn causes the rear of the bike to pitch up. Rebound damping that's too light exaggerates this by allowing the shock to extend too quickly, in effect allowing the rear end to jump off the ground like a pogo stick. Once the problem is identified, tuning is a matter of small adjustments to reach the correct combination. We stress *small adjustments* because even slight changes greatly alter the characteristics of the motorcycle. For the conditions at our test track, we set compression damping one click lighter and rebound two clicks heavier than



with a 50-tooth rear sprocket in place of the stock 44-tooth unit. The factory mechanic indicated that the new gearing had already worked well on three tracks, and he believed it would for the majority of tracks they would visit. If sprockets are not immediately available, note that the clutch on our test unit never protested moderate fanning and worked perfectly throughout the test.

Once you're out on the track, the first message from the 490 (other than *power!*) is suppleness. Gone is the stiffly sprung feeling of the 465. Although our test riders initially believed the 490's suspension to be much better than that of the 1981 YZ, a 30-minute ride indicated that the factory-specified suspension settings are just a starting point: different tracks and riders require competent and complete suspension tuning to get the best performance the YZ has to offer.

With the stock settings, our 490 kicked the back end up decelerating over whoops, pushed the front end in the sand, and bottomed the fork too frequently when landing from fairly high jumps. With the adjustability built in to the new Monocross suspension, we were able to fine tune problems away. Ultimately the YZ functioned extremely well. To fine tune, however, takes time and an understanding of what the motorcycle is doing and why.

For instance, excessive compression damping prevents the shock from com-

stock. Just three clicks eliminated a fairly major quirk.

To stop the front end from pushing in the sand requires unweighting the front wheel to prevent it from digging in. We reduced shock spring preload two millimeters, which produced a slightly lower ride height in the rear of the bike. If the front is unweighted too much, though, the bike "stands up" and straightens out too early when exiting turns. Balancing the weight bias of the motorcycle for your particular riding style is imperative, especially on sand tracks. Raising the fork oil level five millimeters made the fork bottom only once every couple of laps. Once the bike is properly set up, the rider feels ready to use the enormous power.

The YZ has very neutral steering, which makes handling predictable and route planning easy. The softer ride and springing in the early part of the suspension travel work to good advantage over medium to small bumps, and keep the rear wheel on the ground when the 490 is accelerating out of turns.

Medium-sized bumps raised a few questions about the rate of progressiveness in the rear suspension. Continual adjustments never rid the YZ of a harsh feeling in one- to two-foot whoops—we felt a big step in the spring rate about halfway through rear-wheel travel. Checking wheel travel in relation to shock travel confirmed our suspicions: the ratio of shock travel to wheel travel



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nearly doubles at 180mm of rear-wheel movement. For each 40mm increment of wheel travel up to 140mm, the shock moves an average of 7.4mm. At 180mm of rear wheel travel (RWT), the shock travel doubles to over 15mm per 40mm of RWT.

The rather large step in shock travel to RWT shows up only on a track with many mid-sized whoops. If things get severe enough, which they often do midway through the first moto, the bike works its suspension through its entire operating range with nary a hitch. The suspension absorbs high-elevation landings without

bottoming harshly, and the bike runs true and straight in practically all conditions.

Engine flywheel effect on Yamaha's big-bore is middle of the road. It doesn't give the smooth power buildup of the open-class Husqvarna or Maico, but it is much less abrupt than 1981's Honda CR450R. Carburetion is precise, giving the rider an additional tool to hone his speed and direction.

The new 490 is a substantial improvement over 1981's YZ465. The new rising-rate suspension adds all-new character to the Yamaha YZ series, allowing the rider to turn faster laps with considerably less fatigue. The 22cc displacement increase allows the 490 to go head to head

with anything on the track—without giving away power.

All in all, the updated YZ is an excellent machine. It offers tons of power, excellent suspension and steering, and powerful brakes. The only drawback to the new Yamaha is the expertise required to get the best out of it. The YZ490 is extremely sensitive to chassis setup; a click here and a click there with the rear suspension damper adjusters can turn a bike that works against you into one that works with you, and vice versa. Read the manual, experiment, and learn what makes the motorcycle work. When you do get the bike fine tuned—watch out. It's ready to move fast.

## Cycle TEST SPECIFICATIONS

Make and model ..... Yamaha YZ490J  
Price, suggested retail (as of 1/28/82) ..... \$2340

### ENGINE

Type ..... Two-stroke, reed-valve-inducted, air-cooled, single cylinder  
Bore and stroke ..... 87.0 x 82.0mm (3.43 x 3.23 in.)  
Piston displacement ..... 487cc (29.7 cu. in.)  
Compression ratio ..... 7.0:1  
Carburetion ..... (1) 38mm Mikuni  
Exhaust system ..... Upswept expansion chamber with sub and final silencers  
Ignition ..... Magnetically triggered CDI  
Air filtration ..... Oiled foam  
Oil capacity ..... 0.79 liter (0.80 qt.)  
Bhp @ rpm ..... 48.29 @ 6500  
Torque @ rpm ..... 39.91 @ 6000

### TRANSMISSION

Type ..... Four-speed, constant-mesh, wet clutch  
Primary drive ..... Straight-cut gears; 2.63:1  
Final drive ..... 1/4 x 5/8 chain, 14/44 sprockets, 3.143:1  
Gear ratios (at transmission) ..... (1) 1.750 (2) 1.315 (3) 1.045 (4) 0.833

### CHASSIS

Type ..... Single-downtube, partial cradle, chrome-moly frame  
Suspension, front ..... Leading-axle, air/spring fork with 300mm (11.8 in.) of travel  
rear ..... (1) Nitrogen-filled shock with adjustable preload, compression and rebound damping with 320mm (12.6 in.) travel  
Wheelbase ..... 1500mm (59.1 in.)  
Rake/trail ..... 28.5° / 120mm (4.72 in.)  
Brake, front ..... Double-leading-shoe drum  
rear ..... Single-leading-shoe drum  
Wheel, front ..... DID 1.60 x 21 rim with (1) rim lock  
rear ..... DID 2.50 x 18 rim with (2) rim locks  
Tire, front ..... 3.00 x 21 IRC Motocross Z-Mark-II  
rear ..... 140/90 x 18 IRC Motocross Z-Mark-II  
Seat height ..... 950mm (37.4 in.)

Ground clearance ..... 320mm (12.6 in.)  
Fuel capacity ..... 10 liters (2.6 gals.)  
Curb weight, full tank ..... 115.2 kg (254.0 lbs.)  
Test weight ..... 183.3 kg (404.0 lbs.)

### CUSTOMER SERVICE CONTACT

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