

Motocross riders are always screaming for more low-end torque, wheel travel and suspension quality. Let them holler—Yamaha's YZ465 has enough of each to silence a whole pack of malcontents. If it's peak horsepower they're after, one lap behind the 465 will quiet them.

# YAMAHA YZ465G

● MOTOCROSS TECHNOLOGY HAS GONE forward like a runaway pogostick. The systems which make up these racing bikes have not made progress together in a neat, orderly fashion. A few years ago, motocross bikes had short-travel suspension components. Those short-legged critters might have bounced you into the next county; but at least they had low seats and low centers of gravity. As suspensions improved bit by bit, horsepower took a jump, and, before long, engine designers gave us knob-burning top-end horsepower at the expense of low-end grunt. Horsepower got a jump ahead, or to the side of, suspension development.

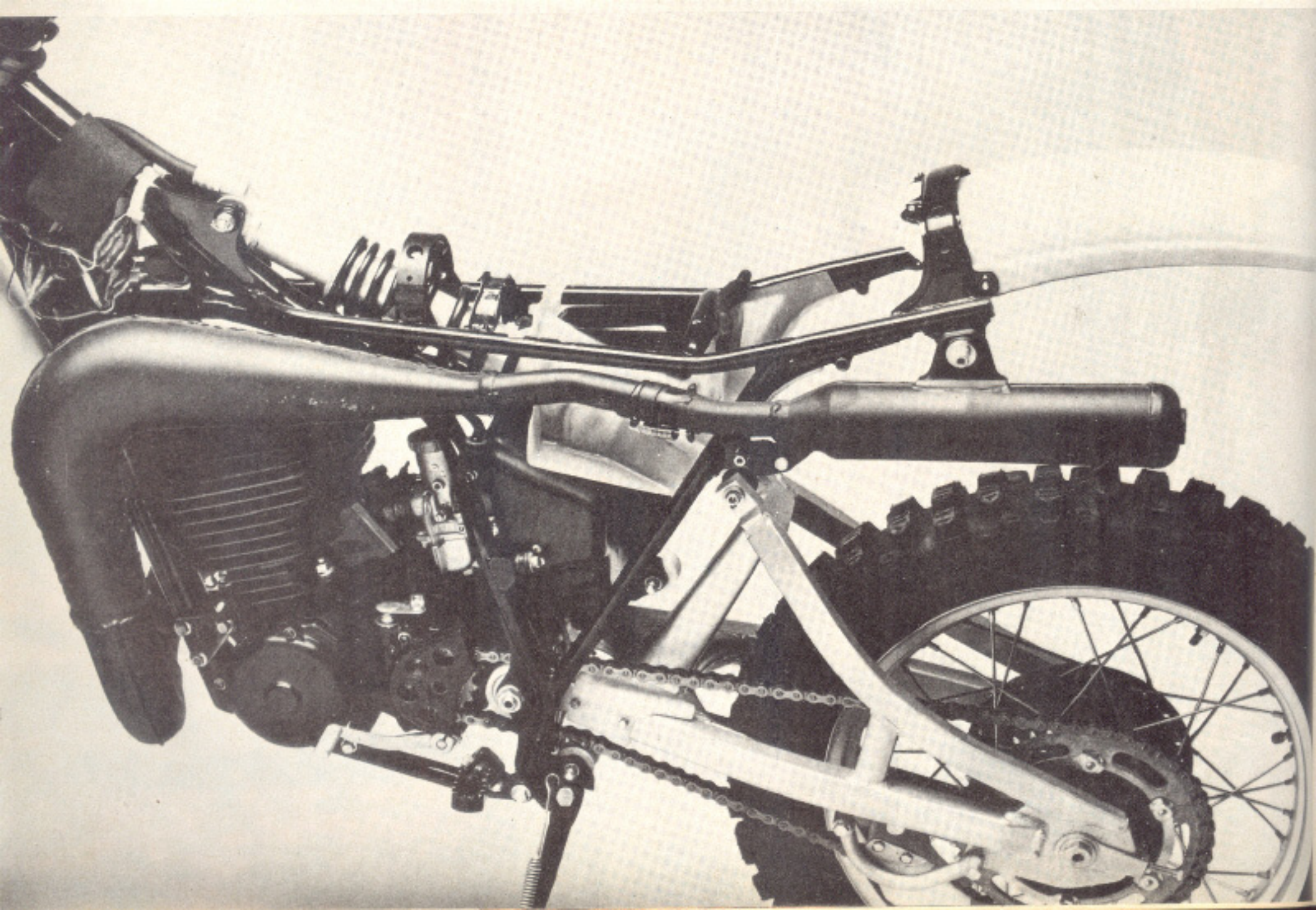
Then the era of the-more-travel-the-better began in earnest; but when riders got more, the results were often less than terrific. Ideas got ahead of solid engineering. Shocks faded and broke, and pretzeled front ends became as plentiful as Stetsons at an Angora goat auction.

Eventually, the metal carnage stopped, and the new long-travel bikes had more suspension than most riders had talent. It was a great hop forward, but not for everyone. Rising seat heights and centers of gravity gave less-than-expert riders problems.

Yamaha's new YZ465G identifies where open-class motocross development presently stands: sophisticated long-travel suspension mated to an engine with overwhelming power everywhere. This YZ sets a new standard for open-class power. With other open-class bikes, you can sense a clear beginning to their power curves. Not the YZ465G. On the racetrack it has omnipresent power.







## YAMAHA YZ465G TEST

Dynamometer figures line up nicely with seat-of-the-pants impressions. The YZ465G has the most horsepower of any production motocrosser that's been on the Webco dyno. The YZ develops a whopping 41.92 rear-wheel horsepower at 7000 rpm, and its torque peak occurs at 6000 rpm where it makes 34.51 pounds-feet. This compares to the YZ400F's maximum power figure of 36.90 and torque peak of 29.10 pounds-feet, at 7000 rpm and 6500 rpm respectively. The nearest thing to the 465 is the Can-Am 370 MX-5, which produced 39.74 horsepower at 7000 rpm and 30.77 pounds-feet torque at 6500 rpm.

Beyond the issue of maximum output is power spread. The 465 makes colossal horsepower from 5000 (27.54) to 8000 rpm (29.36); in 500-rpm steps, here's the rough topography of the 465's high mountain range: 27.5, 34, 39.5, 41, 42, 38.5, 29.5 horsepower. Want to talk about bulldozer torque? At 3500 rpm, there's 23 pounds-feet of torque on tap, and almost 27 at 7500 rpm. The 465 has so much power at any meaningful engine speed that you could just about put the YZ into third gear, toss the shift lever away and still race the bike without undue hardship.

The 465 is a development from the YZ400F. Not a modification of the 400, the 1980 model is a new branch on the same technological tree. The 400F had an 82mm x 75mm bore and stroke; the larger 465G has 85mm x 82mm dimensions. Massive aluminum fins cover the 465's cylinder, and a radially finned head sits atop the cylinder.

The giant lung breathes in through a rubber-mounted 38mm Mikuni carburetor. The intake mixture passes through two three-petal reed plates on its way into the crankcase. Passage upwards occurs through four monster transfers; there's a single boost port fed from the roof of the reed-valve area. The charge is burned in a combustion chamber that's made more compact thanks to a wide (11mm) squish band.

The pressed-together crankshaft runs on ball bearings on both sides, and the connecting rod has a needle-bearing small end and roller-bearing big end. Helical-cut gears carry the power from the crankshaft to the clutch, which is the same unit found on the 400F. The primary gears are actually narrower than those used in 1979 in an effort to make the engine as slim and compact and light as possible.

Following the same reasoning, the 465 has shorter engine cases too. This required the use of smaller-diameter transmission gears. The gear shafts aren't smaller—just the gears. To improve the YZ's shifting characteristics, the gear-dog contact areas now parallel their engaging mates; the 400F had dogs undercut 1.5 degrees. Second, third and fourth gears have three dogs each, instead of the 400F's four. These revisions allow the gears to disengage more easily, yet the gears are not likely to disengage accidentally because the shifting mechanism,

utilizing a ratchet selector and star-wheel detent system, has been reworked.

The 465 has primary kickstarting, so it can be booted into life in any gear. This proves easier in principle than practice. The long forged-steel kickstart-arm is awkward to use when you're astride the bike. Moreover, the engine starts reluctantly while in gear, perhaps the result of clutch drag, which slows the kickstart turnover speed.

Once underway, the YZ465G rider will have all the speed and power he can likely stand. The bike is wheelie-happy, due to its power and high center of gravity. You must make a concentrated effort to keep the front end on the ground coming out of corners where there's a lot of traction. At times you'd swear all the 465 wants to do is hang from the sky by its front wheel.

The rear tire connects with the ground better when the transmission is in a gear higher than the one which might be used at first. In the lower of two gear choices, sometimes there's so much power available that the traction goes away in obvious wheelspin. In a higher gear, where there's less power at the rear wheel and the pulses are spread out a bit, the knobs get a better bite on the terrain and it's easier to control traction with the throttle. In any event, you'll not be shifting the YZ465G much.

Clutch pull at the lever is moderately high, greater than the norm for motocrossers or other off-road bikes. Yamaha claims the YZ can be shifted full-throttle without using the clutch—and they're right; it can. Our test bike required a significant pull on the gear-change lever to do this, although the YZ would shift like this consistently. The 465G shifts better than the 400F, and we missed no shifts and found no wayward neutrals in the 465's new-style gearbox.

Since this YZ has so much power, it's a good thing the engine has a non-vicious powerband. It's hard to call anything about the 465 gentle, but the YZ does have something of a gentle powerband. No matter how gradual the rise, there's always an amazing amount of power at any point on the curve. Without state-of-the-art running gear, however, its bell-ringing power could be wasted.

In keeping with factory-bike setups, the production YZ465G uses a compact, single front downtube frame built in chrome-moly. The main backbone terminates shortly beyond the point where two rear downtubes drop down to locate the plates for the swing-arm pin, then run forward to cradle the engine and attach to the front downtube. A sub-assembly supports the seat, rear fender and number panels. The monoshock mounts above the main backbone instead of inside it, and this system helps to keep as much weight as possible as low as possible. Tight as the engine fits in the frame, you can remove the cylinder head, cylinder and clutch without unbolting the crankcases.

The swing-arm pivot and countershaft centers are only 2.8 inches apart, thanks to a common swing-arm pivot/rear-engine mount. The swing arm straddles the engine case; the arm is secured between the case

and the frame by the pivot bolt. Steel sleeves in the aluminum engine case protect it from the pivot-bolt loads.

Though no drive-chain tensioners are used, *per se*, two rollers keep the chain in approximate tension when the suspension is fully extended or compressed. In this manner, the lower chassis cross-rail is protected, and so is the airbox. A foolproof nylon-and-steel chain guide keeps the 1/4 x 5/8-inch chain aimed correctly at the rear sprocket.

Yamaha has increased the wheelbase on the 465, though the difference is slight. At 1480mm (58.3 inches) the 465 has a wheelbase 30mm longer than the YZ400F.

Kayaba supplies both the YZ's fork and monoshock. The front fork measures an actual 11.2 inches of travel, fractionally less than Yamaha claims. The topping springs account for the loss; these springs cushion the shock when the bike bounces into the air and the fork suddenly extends.

The fork will take a lot of punishment. The legs have been strengthened with additional material cast in at the axle bosses, and the right leg now has two pinch bolts at the axle rather than one. Thirty-eight-millimeter fork tubes may not be unbendable, but they'll take tremendous abuse before doing so.

A number of adjustments will alter the way the YZ fork works, though no amount of inept fiddling can make the fork work poorly. By changing air pressure, the fork's initial stiffness or softness near full extension can be modulated, and by changing the fork oil level, the quality (hard or soft) of fork action around full compression can be altered. Yamaha recommends zero to 17 pounds-per-square-inch air pressure in the front fork and (with the fork compressed) oil levels ranging from 140mm to 220mm from the top of the tubes. As a standard setting Yamaha specifies 200mm.

To adjust damping quality, the fork oil must be changed, but this isn't an unpleasant job because the caps come off easily and the drain screws can be readily reached. We found the standard 10-weight oil provided excellent damping characteristics.

The fork on our test bike worked best with two psi air pressure in each leg, and with the oil level about 180mm from the tube tops. Set up this way, the fork would respond to small jolts and depressions but would handle large obstacles and whoops with no loss of composure. The basic standard (no air pressure, 200mm oil level) makes a reasonable starting place, but we found this setting too soft at full compression. There won't be much racetrack terrain that will upset the Yamaha fork—it has an abundance of travel, super-wide adjustability and stiction-free movement.

Yamaha wanted to supply a rear suspension with which no one could quarrel, and there have been significant changes from the 400F. First, the shock has been turned around, so its piston attaches to the swing arm and the body mounts to the main backbone as sprung weight. A frame-mounted aluminum nitrogen-pressurized reservoir joins with the aluminum shock

## YAMAHA YZ465G TEST

body by means of a hose.

The shock delivers a little less than the claimed 12.2 inches of rear-wheel travel. The official figure assumes the rear axle in its most aft position, and the greater the distance from the swing-arm pivot, the more travel there is. Furthermore, the rubber bumper that absorbs the bottoming forces can't be compressed flat. The travel you can use certainly should approach 12 inches, and that's a gracious plenty if it's good travel. It is with the YZ.

You can adjust both the shock absorber spring preload and the rebound damping rate by reaching under the rear fender. The progressively wound spring can be preloaded with automotive-type jam nuts instead of a ramp-collar adjuster. The nut system allows the preload to be adjusted in very small increments—smaller ones than would be possible with a ramp-collar. In fact, Yamaha recommends changing the preload

in two-millimeter steps. If you can't dial in enough preload with the nuts, you can pull the spring off and change a single circlip on the shock body; by doing so you can get more (10mm) preload.

Damping can be set at any one of 18 positions by turning a collar on the shock absorber. This turns a screw inside the shock that moves a needle through a jet, thus altering the damping rate. The remote reservoir gets hot, yet we were not able to detect any damping fade.

Given the adjustability of the fork and shock, the ride and handling of the 465 can be changed immensely. Assuming you get lost and go haywire with your adjustments, you can always step back to square-one and begin again. Once you get the units calibrated to the track terrain, you can fly over obstacles with nary a twitch or hop.

The YZ465G has a double-leading-shoe front brake. Normal motocross brakes have one leading and one trailing shoe; when braking, a single cam pushes both brake

shoes into the drum. The cam pushes one shoe at its leading edge, and from this point the shoe is drawn into contact with the brake drum, thanks to the wheel's rotation. The other brake shoe contacts the drum at the shoe's trailing edge, so there's no self-energizing (self-jamming/wedging) action. Since the YZ465G has two "live" brake cams and two leading shoes, the brake produces almost unbelievable stopping with minimal lever pressure. One finger yields dramatic stops. The brake has good cable guides and a sensible cable-route so that the brake doesn't self-actuate when the fork is compressed and the cable housing bent.

In back, an unchanged single-leading-shoe brake is now held steady by a floating torque arm attached at its front through a heim-joint. The brake is plenty effective, yet there's still some wheel hop during sudden stops from high speeds. Happily, the 465 engine has enough flywheel inertia to resist stalling when the rear brake is overused.

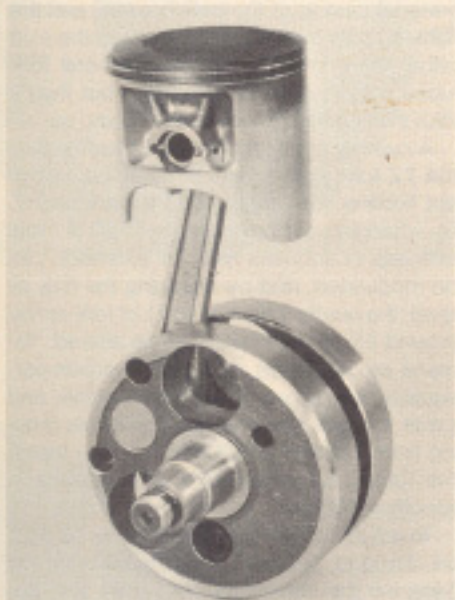
The YZ465G is a full-sized motocrosser; at 244 pounds it's about average for an open-class bike and five pounds heavier than the 400F. Since the 465 has a great deal of suspension travel, you can feel this weight when you're trying to hustle through difficult sections—like transitional corners. The YZ suspension system lets you rip through nasty fast sections without going on a bronco ride. Turning in really rough patches reminds you that the Yamaha is large. The seat measures 37.4 inches high, an important distance unless you're Mike Bell. The bike's height and weight play a low card in the sand, too. If you have to turn sharply there, the front end can plow; it takes deliberate action to work the bike through this type of corner.

Raising the fork tubes really makes a difference in the way the bike tracks through slow corners. The YZ has enough extra tire/fender clearance so that the fork tubes can be raised in the triple clamps, decreasing rake and trail. As delivered, the fork tubes extend 50mm beyond the steering crown. Pulling the tubes up to 55mm or 60mm sharpens up the bike's response to rider input. On the other hand, the fork angle can be increased slightly, adding steering trail, by dropping the fork tubes in the triple clamps. This adds to the high-speed stability of the 465, but at the expense of some slow-speed turning capabilities.

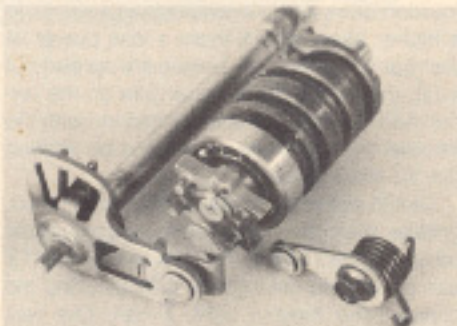
The Yamaha's magnificent power makes the bike easy to broadside. Because there's so much well-behaved power, you can induce stability just about anywhere you can open the throttle slide.

Last year the open-class YZ came with IRC treads; our 1980 G-bike had Bridgestones, 3.00 x 21-inch up front and a low-profile 5.10 x 18-incher in back. Cycle's testers found 12 psi air pressure worked best in the tires, but of course the pressures would vary from track to track.

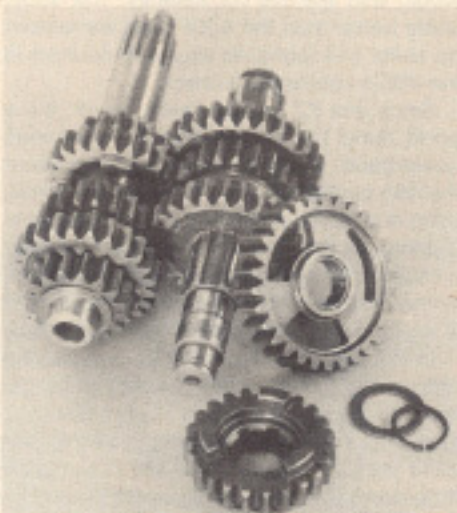
Obviously you can't win a 40-minute moto if your bike won't run that long on a tank of gas; consequently the YZ465G tank holds 2.4 gallons. That's enough, Yamaha figures,



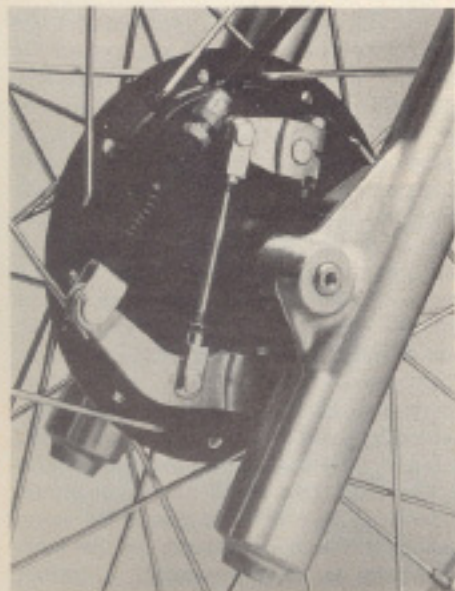
Motocross Power Punch ingredients: Chevrolet-sized 85mm piston; Swiss-cheese 82mm-stroke crankshaft.



The biggest YZ shifts positively, thanks partly to its reworked, better-leverage gear selector components.



Second, third and fourth gears have three instead of four engagements dogs; no "locking" dog undercut.



This miniature twin-leading-shoe brake allows incredibly quick stops; and needs minimal lever pressure.



No tensioners clutter the YZ's final drive, because the countershaft and swing-arm centers are nearby.

for a works rider to run 50 to 55 minutes. Slower riders often won't need that much fuel, and they'll always notice the size of the bulky tank. Yamaha would be well advised to offer a slimmer tank for those who want extra leg room beneath the handlebar or a narrower fuel cell between their legs. There are no easy solutions here because the YZ's frame and monoshock unit occupy a significant amount of space under the tank, and this largely dictates the final tank shape.

The rubber-mounted cross-braced handlebar is wide enough to let your leg underneath while cornering, but the YZ would be better equipped with a side-pull throttle on the bar's right end. As it is, the throttle cable flaps in the open, just waiting to be caught by a competitor's handgrip. And the YZ465G is the wrong bike to be on if that happens.

Yamaha engineers did what they could to keep the seat height down. While the seat is amply padded in front, part of the rear section

feels glaringly thin, especially if you get your tail paddled over some desperado whoops.

A combination owner/service manual is included with the 465, along with an air pressure gauge, rear shock spring preload tool, and spoke and spark plug wrenches. The manual includes tips on setting up the suspension, and it has complete teardown information and specifications for just about every moving part. Options include front and rear sprockets, monoshock and fork springs, carb jets and special tools.

Manuals and tools are wonderful aids; they should always complement vigilant eyes and ears. Our test bike exhibited a slight ignition rattle in the mid-range under moderate loads. Enriching the low- and mid-ranges suppressed the rattle somewhat but softened the engine's crispness. The slight detonation should have been dealt with at its source: retarding the ignition timing.

Big two-stroke singles generate a lot of

heat, and in such cases prudence dictates the careful approach, even down to the selection of gasoline. Big open-class bikes don't like to run mis-timed or mis-jetted, or with the wrong lubricant or bad gasoline. If they get hot, they get temperamental. At the very end of our testing, the YZ465G seized lightly on its intake side, pointing to insufficient lubrication, even though we used the specified oil at the specified ratio: Yamalube-R/32:1.

At \$1998 the YZ465G is a privateer's dream. True, it's necessarily big, and the bike is awkward in slow sections. And the wide tank and thin rear seat section serve to disqualify it as a limousine. But the 465 has factory-type suspension quality and virtually a works engine. It's rocket-fast, supremely stable over the worst terrain and has the best front brake we've tried.

And the YZ465G is available from dealers without a lot of tall tales. None are needed. \*

Make and Model ..... Yamaha YZ465G  
Price, suggested retail (as of 11/16/79) ..... \$1998

#### ENGINE

Type ..... Two-stroke single, air-cooled with reed-valve induction  
Bore and stroke ..... 85mm x 82mm (3.35 x 3.23 in.)  
Piston displacement ..... 465cc (28.4 cu. in.)  
Compression ratio ..... 7.0:1 (corrected)  
Carburetion ..... (1) 38mm slide-throttle Mikuni  
Exhaust system ..... Upswept with auxiliary silencer  
Ignition ..... Magnetically triggered capacitor discharge  
Air filtration ..... Oiled foam  
Oil capacity (gearbox) ..... 0.8 liters (0.9 US qts.)  
Bhp @ rpm ..... 41.92 @ 7000  
Torque @ rpm ..... 34.51 @ 6000

#### TRANSMISSION

Type ..... Five-speed, constant-mesh, wet-plate clutch  
Primary drive ..... Helical-cut gear, 24/63, 2.63:1  
Final drive ..... 1/4 x 5/8 in. chain,  
14/46 sprockets, 3.29:1  
Gear ratios (at transmission) ..... (1) 5.63, (2) 4.60,  
(3) 3.46, (4) 2.75, (5) 2.19:1

#### CHASSIS

Type ..... Single front, dual rear downtube, partial-cradle, chrome-molybdenum steel  
Suspension, front ..... Leading-axis, coil/air-spring Kayaba fork  
rear ..... Swing arm with (1) nitrogen/coil spring, DeCarbon-type Kayaba shock  
Wheelbase ..... 1480mm (58.3 in.)  
Rake/trail ..... 30°/130mm (5.1 in.)  
Brake, front ..... Cable-actuated, 130mm x 22mm (5.1 x 0.9 in.) drum, twin-leading-shoe  
rear ..... Rod-actuated, 160mm x 25mm (6.3 x 1.0 in.) drum, single-leading-shoe  
Wheel, front ..... Wire, 36-spoke, DID aluminum alloy, 1.60 x 21 in., (1) rim lock  
rear ..... Wire, 36-spoke, DID aluminum alloy, 2.50 x 18 in., (2) rim lock  
Tire, front ..... 3.00-21 Bridgestone Motocross-M21  
rear ..... 5.10-18 Bridgestone Motocross-M20

Seat height ..... 949mm (37.4 in.)  
Ground clearance ..... 332mm (13.1 in.)  
Fuel capacity ..... 9.0 liters (2.4 US gal.), no reserve  
Curb weight, full tank ..... 110.7 kg (244 lbs.)  
Test weight ..... 183.2 kg (404 lbs.)

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