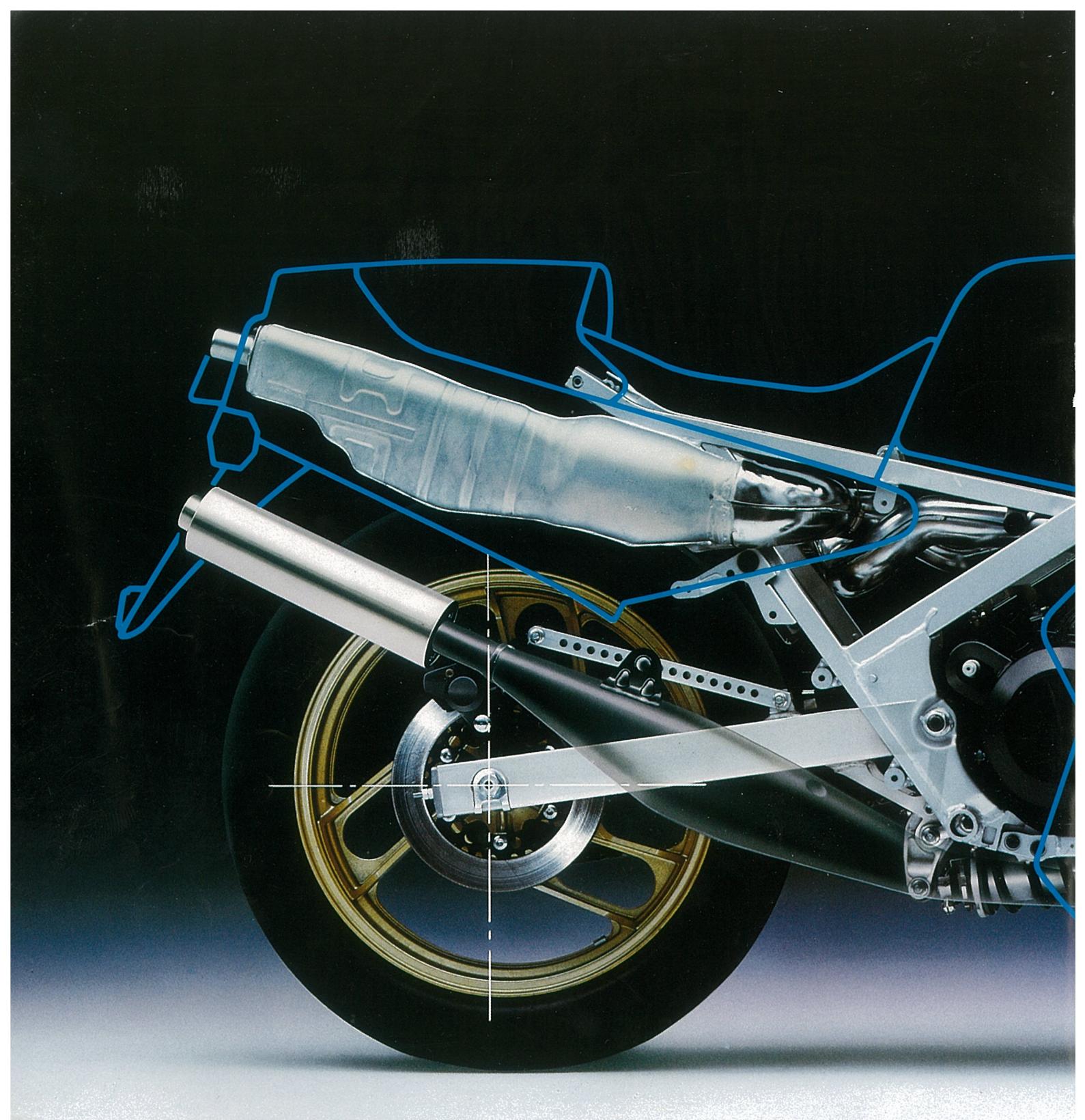




# RZ500



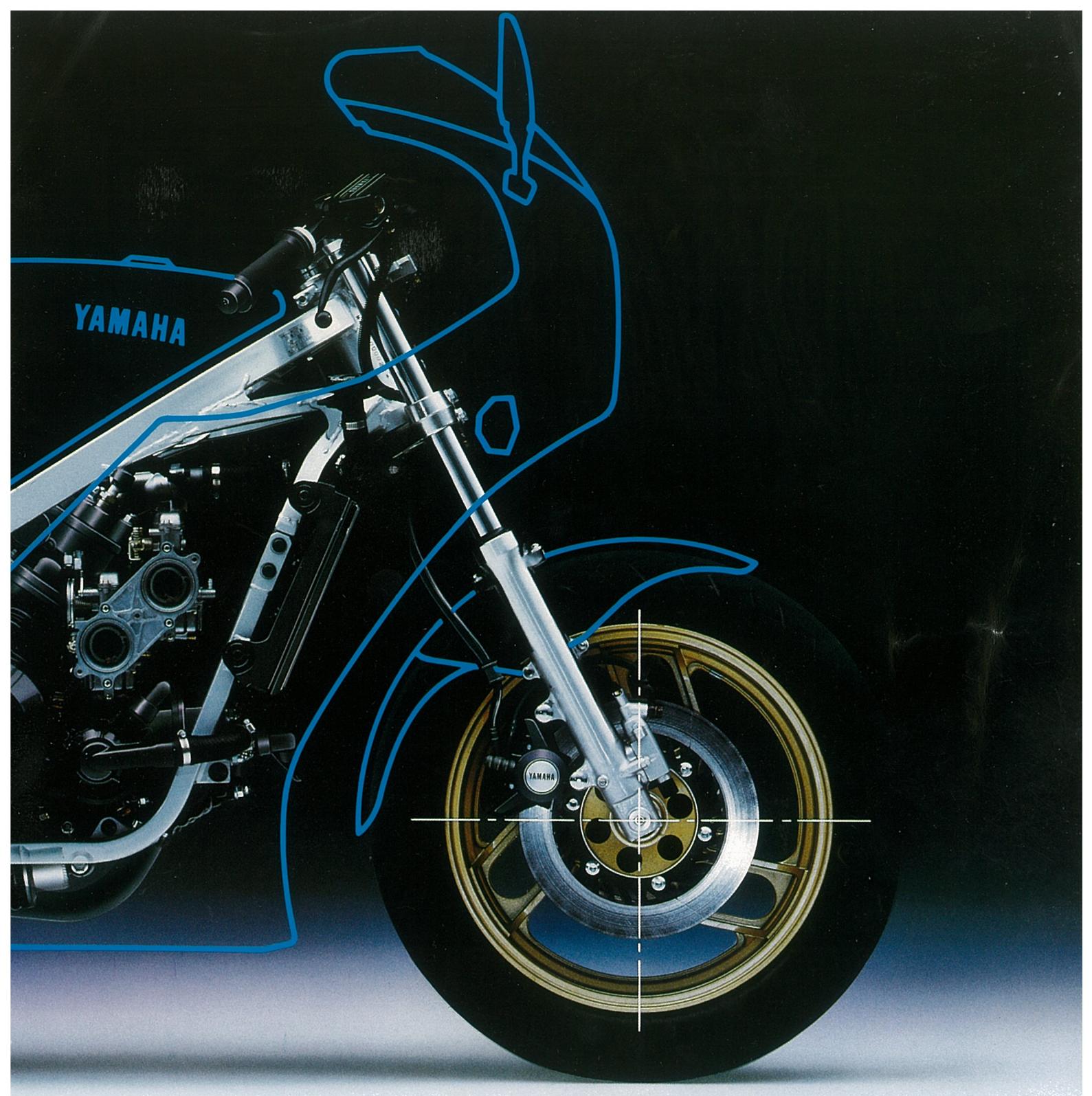


## EMPHASISING THE EXCELLENCE OF YAMAHA ENGINEERING— THE SENSATIONAL RZ500.

Little more than a year ago, most people would have laughed at the very idea of taking a near-replica of a current Grand Prix road racing machine and putting it on the road.

Now, nobody's laughing. Yamaha have done just that with the sensational RZ500 and — once again — the opposition are scrambling to catch up! When we first announced our plans for the Yamaha RZ500, some people simply asked the question "why?". Our answers to that basic query are still the same . . . and to judge by the overwhelmingly enthusiastic reaction of both press and public, these answers are the right ones!

First of all, we built the RZ500 for one very good reason. We wanted to prove to anybody and everybody that Yamaha could build the most sensational, pure sports, total performance motorcycle that any factory had ever let loose on the public road. If we could do that, then its very



existence would emphasise the excellence of all Yamaha's motorcycle engineering.

So we did it! We know we did it! You know we did it! In fact, you've *told* us we did it with a public reaction that no motorcycle has ever received before! The Yamaha RZ500 — the pure sports motorcycle and tangible proof of Yamaha's commitment to the total performance ethic.

Because "total performance" is what motorcycling is all about. There's more to the Yamaha RZ500, for example, than its awesome V4 500cc two-stroke power pack. Its unprecedented engine performance is matched perfectly by the performance of other vital components. It handles like a Grand Prix racer, too. The type of handling which makes it safe at any speed; able to cope with any normal road-going situations and still leave a margin for error.

Chassis design, with its low centre of gravity and centralised weight mass, owes as much to the Grand Prix

experience as the engine does. Its short wheelbase and 16-inch front wheel mean that the RZ500 is probably the quickest bike on the road to respond to rider commands.

Grand Prix racing machines are fast. But they are also the safest motorcycles in the world in the most important respects of all . . . nothing stops as well as a GP machine; nothing steers as well as a GP machine; no suspension operates as well as that on a GP machine. So when we built our sleek, aerodynamic, thrustingly aggressive "Grand Prix replica for the road" we *knew* that we were building a bike that was as safe as it was fast. It's not a bike for novices . . . and novices will never get a chance to ride it. For those that will, however, the Yamaha RZ500 proves beyond all reasonable doubt that we have built the most perfect combination of power, handling and braking efficiency that ever turned a wheel on the public highway.

Total performance . . . in every respect!



The Yamaha RZ500 uses the world's first (and so far, *only*) liquid-cooled vee-four, two-stroke power unit in a volume production motorcycle. It closely follows the layout of the Grand Prix 500 racer developed by three-time World Champion, Kenny Roberts, and taken to another world title for Yamaha in 1984 by Eddie Lawson.

The two banks of cylinders are set at a 50-degree angle, the close "vee" being employed to achieve a short wheelbase and a good, centralized weight balance. Its narrow crankcase width enables the Yamaha engineers to build it into a compact chassis package with small frontal area and great air penetration.

The use of highly efficient reed valve induction gives the RZ500 a broad, flat torque curve that makes it one of the most flexible machines on the road. Engine flexibility and high-performance two-strokes are not such a common combination but Yamaha have proved that the two can go together! It is the reed valve induction system which gives the clearest indication of how far Yamaha were prepared to go in making the RZ500 the ultimate performance package.

In order to get the most compact engine

block possible (thereby gaining advantages in reduced frontal area, near-perfect weight distribution, etc), the V4 motor has two different types of induction for the separate banks of twin cylinders. Each uses reed valves but while the upper pair of cylinders have intake ports in the cylinder walls, the lower pair have direct crankcase induction! This bit of 'no compromise' engineering was done solely to guarantee that the Yamaha RZ500 V4 motor was every bit as compact as the racing engine it is based upon. A slight widening of the cylinder bank 'vee' would have allowed for identical carburation for all four cylinders. But perfection, not compromise, was what the Yamaha designers were looking for with the RZ500.

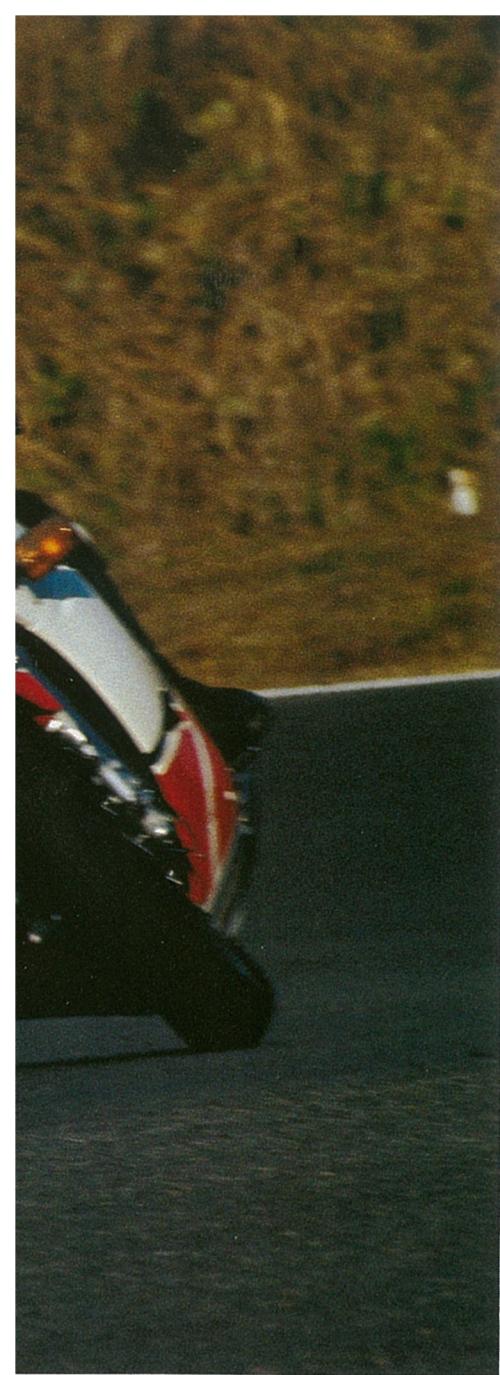
To allow for the atmospheric differences in the two induction methods, upper and lower carburetors have different settings. All four, however, are direct-pull Mikuni VM26SS units with light alloy bodies and synchronising linkage. They fit neatly between the cylinders to keep machine width slim and a large air filter box collects cool air via ducts in the fairing.

Inside the engine, special anti-friction

coating on the cylinder bores allows sustained high-rpm running and the Yamaha Power Valve System (YPVS) provides the best of both worlds in terms of a broad spread of torque combined with high maximum horsepower.

YPVS consists of a cylindrical valve set across the exhaust port. A cutaway in the rotating valve can vary the port height and its movement is controlled by an accurate rpm sensing microcomputer. At low engine speeds, the valve closes down the exhaust port, reduces its height and thereby retards the port timing. As the revs rise, the power valve rotates, and the cutaway exposes more of the exhaust port. At maximum rpm, the cutaway is at its greatest, and exhaust port timing is fully advanced to gain optimum horsepower. This was a Yamaha invention (*another!*) that revolutionised two-stroke engineering. The days of two-stroke 'screamers' with too-narrow power bands are long gone!

The RZ500 engine unit is mounted rigidly in the frame with no anti-vibration bushes. Yamaha feel that, with such a sporting machine, it is important that the rider has a direct 'feel' for what the motor is doing. However, a counterbalance shaft,



geared to the crankshaft, damps out vibration. It smooths out the ride and permits lighter frame construction.

Thermostatically controlled liquid cooling keeps the RZ500 engine temperature constant, even at high rpm. It is a 'sealed' cooling system with a

separate header tank to accommodate the expanded, heated coolant. The alloy, single-core radiator and electric fan are compact and light but effectively dissipate any heat build-up.

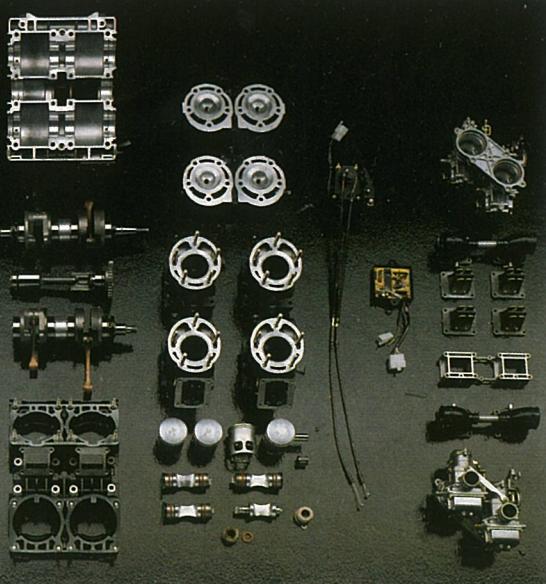
To cope with the high-performance demands of the RZ500, the well-proven

Yamaha Autolube automatic oiling system has been strengthened and improved in terms of output capacity. This oil injection system has a four-outlet oil pump that monitors both engine speed and YPVS servomotor operation and reacts accordingly. It delivers exactly what the engine needs under any conditions. Even 'freak' conditions such as running fast downhill with throttles closed but engine speed still high.

Also reacting perfectly to the engine's demands at any given time is the electronic ignition system. Sensors monitor both engine speed and load so that ignition timing is always correct. In addition, the system even retards the ignition slightly at over 9,500rpm to enable better cylinder filling at peak engine speeds.

As can be expected, the six-speed transmission uses a gearshift mechanism developed for the TZ500 road racers. Lubrication for the entire gear system is pressure-fed to ensure total reliability.

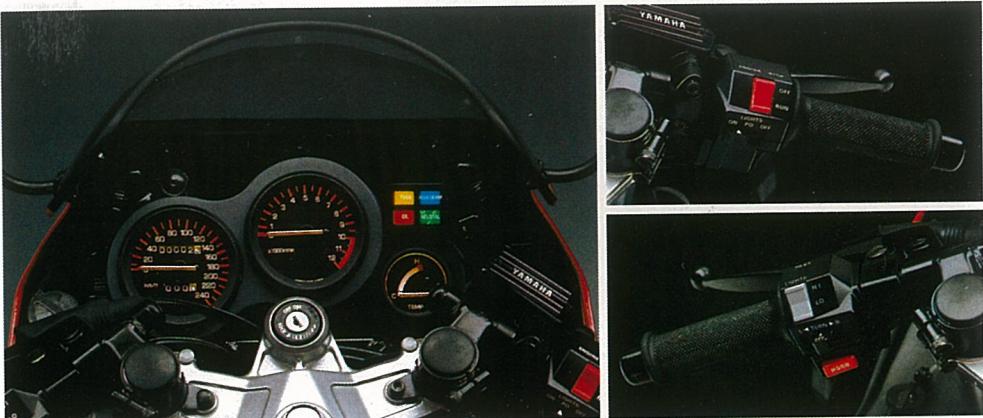
Throughout the RZ500 engine specification, just as with our Grand Prix racers, the aim has been to achieve total performance with the highest possible reliability factor. Racing definitely does improve the breed!



Just like the V4 power unit, the chassis of the RZ500 is derived directly from a design we had previously proved on the Grand Prix circuits. What better place to test the capabilities of chassis and suspension!

The main frame is fabricated in rectangular box-section, high-tensile steel tubing which has two advantages over normal circular tube. First of all, it is structurally much stronger; also its rectangular profile means that the tube layout of the chassis can utilise the "narrow side" of the rectangle to reduce overall width. The top rails of the twin-loop cradle main frame take the most direct route possible between the swinging arm pivot and the steering head, so as to maintain a rigid relationship between these two key points. The frame tubes butt direct to the steering head, rather than wrapping around it, as is the case with our FJ1100. The reason for this is that they do not have to be so widely splayed over the engine of the RZ500, and therefore, the chassis maintains the necessary rigidity to resist lateral and torsional flex but is also kept slim and compact.

Front suspension is by telescopic forks that use sturdy 37mm stanchions plus a cast-alloy fork brace to resist deflection. Braking efficiency is increased by the incorporation of a racing-style "anti-dive" unit which employs the hydraulic pressure induced by brake application to also act on the fork damping and stiffen it at the critical moment. The nose of the RZ500 does not dive sharply under heavy braking and there are several advantages to this. The main one is that the machine maintains a near-level attitude, even under heavy braking. Thus front braking power can be increased in safety, without forward weight transfer causing the wheel to lock up. Front forks will not be as compressed, thereby allowing more control, and the rear wheel will remain in better contact with the ground as there is much less forward weight transfer. This, in turn, means that rear braking pressure can be increased without losing rear wheel adhesion. Harder braking into corners, with better traction front and rear, is the



net result.

Rear suspension is via a special version of Yamaha's successful Monocross system. Carrying the rear wheel is a box-section, alloy swinging arm, pivoting smoothly on needle-roller bearings. This is connected, via a series of forged-alloy linkages (also pivoting on needle-rollers) to a gas/oil shock absorber located horizontally *beneath* the engine. The linkages promote a rising rate cushioning effect, exerting extra pressure as the shock absorber nears the end of its travel. Spring rate thus rises in proportion to wheel travel. The system gives consistent rear wheel traction, even on bumpy surfaces, and for suspension "fine-tuning" the shock absorber is adjustable for both damper and spring pre-load settings.

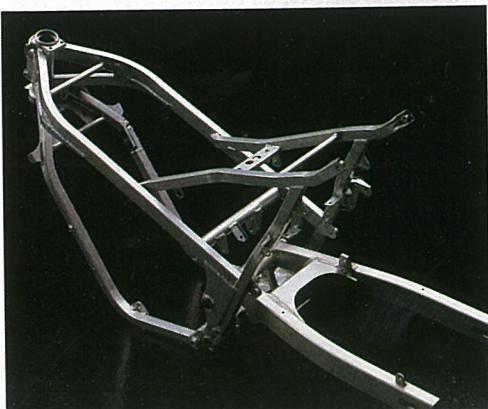
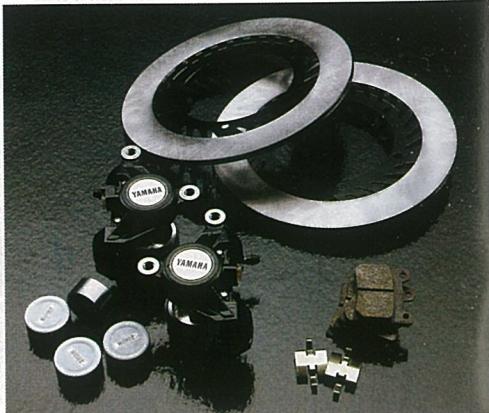
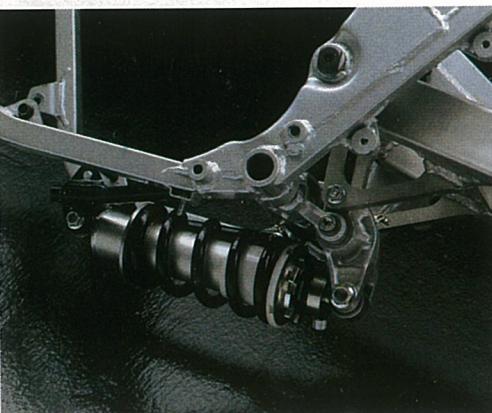
Wheels and brakes of the Yamaha RZ500 are also up to racing standards. The triple spoke pattern 16-inch front and 18-inch rear wheels are made from lightweight, high-density, cast alloy and are fitted with wide, low-profile, V-rated tyres. The 16-inch front wheel gives increased braking efficiency and quicker handling response. Superb steering geometry, however, ensures that it is totally-stable in high speed corners. The triple disc brakes are ventilated through their cores to quickly dissipate the heat generated by hard and frequent application. This maintains braking efficiency and prevents disc distortion. Both the dual front brakes and the rear unit utilise opposed-piston calipers for maximum braking force. They are all

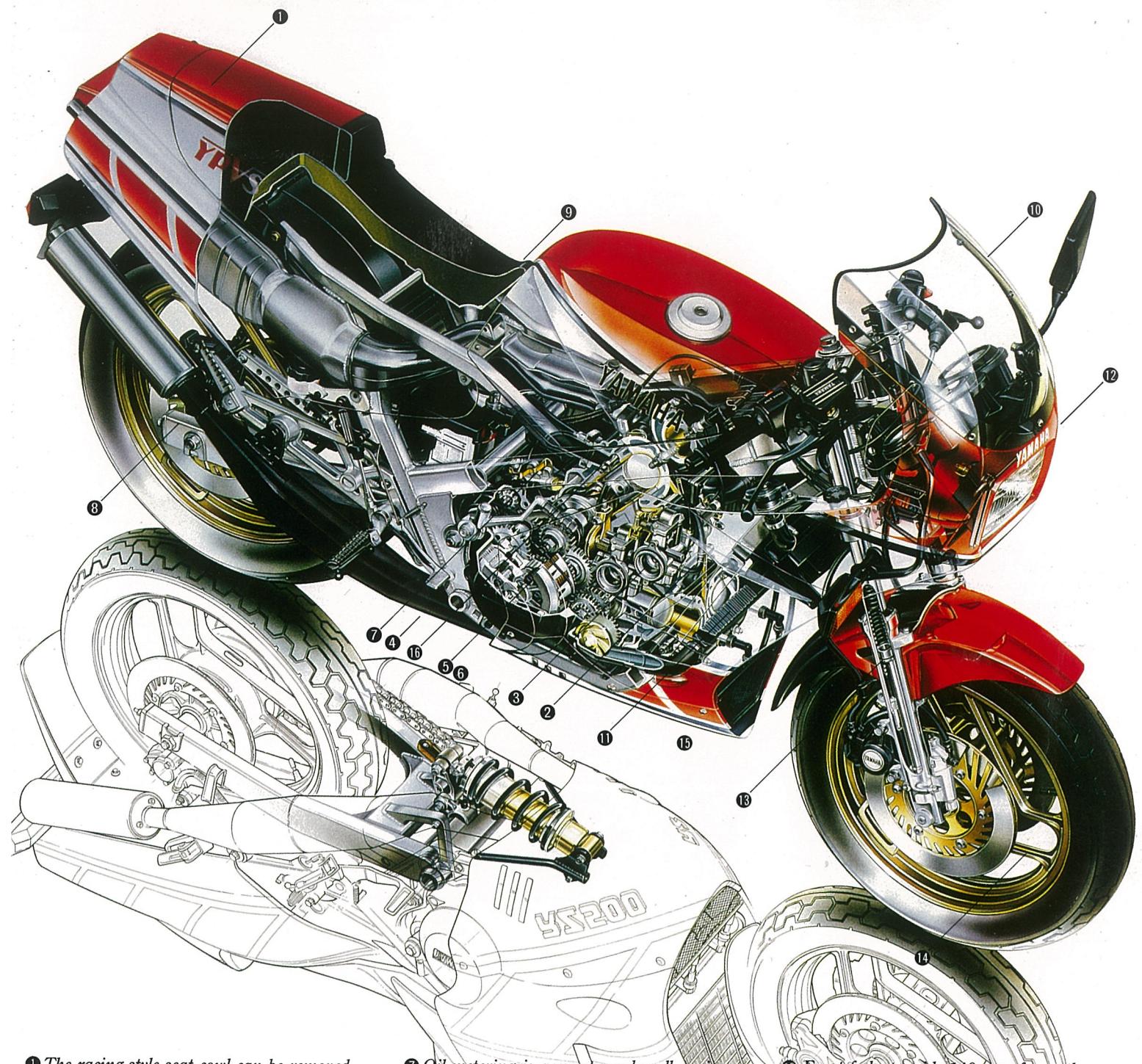
equipped with semi-metallic pads that operate well in any weather.

Obviously, the Yamaha RZ500 is a machine that demands a sporting riding position and our engineers have achieved a perfect compromise between comfort and the forward-leaning "sports" style. The contoured seat locates the rider perfectly, aided by a detachable cowl that converts the pad to a racing-style single seat with a 'bump pad' to hold the rider steady under hard acceleration. It is set in perfect relationship to the low, narrow, clip-on bars and the rearset footrests. The layout is designed to achieve the best aerodynamic riding position coupled with maximum steering control and minimum fatigue on long runs.

The fully equipped instrument panel has all relevant information meters or warning lights but is deliberately uncomplicated and fitted with meters that are easy to read at any speed and under any lighting conditions. Neatly designed operating switches are all positioned within a finger's reach of the handlebars.

Wrapping all this up is a fairing that has been wind-tunnel designed with the accent on air penetration and performance rather than total rider protection from the elements. It is of four-piece design, which allows the lower panels to be removed for easy engine servicing. NASA ducts direct cool air to the carburettors. The fairing is an integral part of the RZ500's total performance package as well as being an eye-catching focal point for a sensational street machine.





1 The racing-style seat cowl can be removed for occasional two-up riding.

2 The size of airbox and air filters has been specially calculated to give maximum breathing efficiency while still cutting down intake noise.

3 The four 26mm, alloy-body carburetors are linked for perfect synchronisation. Settings differ between upper and lower units as lower cylinders have crankcase reed valve induction while upper pair have reed valve inlet tracts into the barrels.

4 Exhaust system is laid out just like the Grand Prix 500. Upper pipes cross over and run through the seat fairing, lower pair sweep up to permit a 52-degree cornering angle!

5 Pressure-fed lubrication reduces frictional losses in the six-speed transmission and increases reliability. Gearshift mechanism is developed from the TZ road racers for positive changes. Large, multiplate, wet clutch easily handles the awesome engine power.

6 Electronic ignition automatically adjusts timing throughout the entire rpm range. It even retards the timing slightly above 9,500rpm to get better cylinder filling and combustion efficiency for optimum horsepower.

7 Oil metering is accurate under all engine speeds or load conditions as the four-outlet pump's supply is governed by a combination of engine speed and YPVS servomotor action.

8 Sealed "O-ring" chain retains its lubricant for added durability. Racing-type chain pullers inside the box-section swinging arm are quickly adjustable and calibrated for accuracy of wheel alignment.

9 The 22-litre fuel tank and contoured seat blend perfectly for a comfortable yet sporting riding position.

10 The wind tunnel-proved fairing even has streamlined mirror mounts to maintain aerodynamic efficiency. Performance rather than weather protection was the design criterium for this low-drag cowling.

11 Cooling system uses a light, single-core alloy radiator and an ultra-thin electric fan, thermostatically controlled to maintain an always-constant temperature, whether in traffic or at high speed.

12 The wide-beam, rectangular headlamp has a super-bright quartz-halogen bulb. High-visibility tail and brake light unit has a double-bulb 'failsafe' system.

13 Front forks provide 140mm of smooth wheel movement with an anti-dive mechanism to keep the bike level under braking. The 37mm stanchions and alloy fork brace resist lateral deflections for predictable handling at high speed.

14 Triple-spoke, alloy wheels are shod with wide-section, low-profile, high speed-rated tyres. The 16-inch front wheel gives quick steering response at low speeds and reduces frontal area overall.

15 As can be expected, the race-bred RZ500 offers unequalled angles of cornering lean ... no less than 52 degrees from the vertical!

16 Variable exhaust port timing is provided by the YPVS system. It is microcomputer-controlled to retard exhaust timing for more torque at low and mid-range speeds, then automatically advance for maximum power at peak rpm.



#### RZ500 SPECIFICATIONS

##### ENGINE

Type....2-stroke, liquid-cooled, reed valve, V-four with YPVS

Displacement..... 499 cc

Bore and stroke.... 56.4 × 50.0 mm

Compression ratio ..... 6.6:1

Max. power (DIN)..... 87.0 PS  
(63.9 kW) @9,500 rpm

Max. torque (DIN)..... 6.9 kg-m  
(67.5 Nm) @8,500 rpm

Lubrication ..... Autolube

Carburation ..... VM26SS (4)

Ignition..... CDI

Starter system..... Kick

Fuel tank capacity..... 22.0 l

Oil capacity..... 2.0 l

Transmission..... 6-speed

Final transmission ..... Chain drive

##### CHASSIS

Overall length ..... 2,085 mm

Overall width..... 705 mm

Overall height..... 1,145 mm

Seat height..... 780 mm

Wheelbase ..... 1,375 mm

Ground clearance ..... 145 mm

Dry weight..... 180 kg

Suspension

Front..... Telescopic forks

Rear..... Monocross suspension

##### Brakes

Front..... Hydraulic double disc

Rear..... Hydraulic disc

##### Tyres

Front..... 120/80V-16

Rear..... 130/80V-18

*Specifications and appearance of Yamaha motorcycles shown here may vary according to requirements and conditions and are subject to change without notice.*

*For further details, please consult your Yamaha dealer.*

*Always wear a helmet and eye protection.*



**YAMAHA**

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