FZR 1000

Yamaha FZR1000 Genesis lays claim to “ultimate road machine“ title

Yamaha‘s line leader for 1987 is a sensational newcomer. The FZR1000 Genesis, a machine that can, quite justifiably, claim to be the most sophisticated, most technologically-advanced motorcycle currently available for road use.
lt is the embodiment of Yamaha‘s progressive thinking that has unequivocally established the company as one of the world‘s leading four-stroke engine manufacturers. A new concept, introduced two years ago with the highly-successful FZ750 Genesis, links engine and chassis development programmes so that each positively affects the other.
Central to this concept is an advanced-specification, steeply inclined, four-stroke engine; this lay-out we call “Genesis“. The weight distribution is such that it actively promotes good handling as well as allowing the use of state-of-the-art chassis engineering by virtue of its configuration.
In the case of the Yamaha FZR1000 Genesis, both the engine and chassis represent the highest level of motorcycle development.
The four-cylinder engine is an enlarged version of the 20-valve FZ750 Genesis unit that has proved its capabilities with worldwide racing success... including the famous Daytona 200.
This well-proven basic power unit is installed in an aluminium “DELTABOX“ chassis originally-developed for Yamaha‘s World Championship-winning Grand Prix machines and the YZF75O “Genesis“ endurance racers. Suspension, wheels and brakes are also constructed to the same Grand Prix standards, so that the obvious horsepower capabilities of the FZR1000 Genesis can be used with the full confidence that handling and safety aspects are totally compatible with the speed potential.
The package is completed by a full fairing with aerodynamics that have been tested and proved to increase both air penetration and machine stability at the high speeds it is capable of. Dual headlights and frontal air intakes in the fairing emphasise the endurance-racer heritage of the FZR1000 Genesis. Yamaha have set out to do one thing with this machine. To prove that the highly-advanced four-stroke engine development with Genesis concept, genuinely marks a new beginning for motorcycle design thinking. Optimum performance from engine, chassis, Suspension and brakes result from the “Genesis concept“ and the Yamaha FZR1000 Genesis is a superb example of what can be achieved.
The successful FZ750 Genesis pointed out a new direction for supersports motorcycling. The Yamaha FZR1000 Genesis confirms that this direction was no dead-end street.

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Yamaha FZR1000 engine close-up:
Base unit for the FZR1000 Genesis engine is the now-familiar FZ750 Genesis 20-valve, parallel four-cylinder, four-stroke. The FZR, however, is far from being just a bored-out version of this double overhead-camshaft motor with its characteristic Genesis lay-out: 45-degree forward inclined cylinder block. There are numerous other modifications to the FZR1000 designed specifically to match its larger capacity. Most obvious difference is still, of course, the increase in size. To arrive at the capacity of 989cc, Yamaha have expanded both bore and stroke of the FZR. Its vital statistics are a 75 mm bore x 56 mm stroke, compared to the 68 x 51,6 mm measurements of the FZ750.

Bigger Valves:
All five valves in each combustion chamber are increased in size, to flow the greater amounts of fuel demanded by the bigger engine. The triple intake valves go up from 21 mm to 23.5 mm in diameter, while the two exhaust valves are expanded from 23 mm to 25 mm.
To maintain the correct combustion chamber shape with these larger valve heads, the valves are set at narrower angles in the cylinder head. The centre intake valve is now set at 9-degrees and the two outer ones at 17-degrees. Exhaust valve angles are 13-degrees.
Both camshafts have modified profiles and are driven by an automatically-tensioned cam-chain.

Big-Bore, Downdraft Carburettors:
Feeding in the fuel/air mixture is a bank of four BDS37 Mikuni carburettors (3 mm larger venturi size than those on the FZ750 Genesis). As on the smaller FZ, the 45^0-inclined cylinder block and well spaced top chassis members allow the use of true downdraft carburetion. The inlet tract is so straight and unobstructed that it is possible to see the piston crown through the carburettor throat when the inlet valves are open! This, plus the gravity effect on the ingoing mixture, makes for the best-possible cylinder filling from a normally-aspirated engine. It's one of the major benefits deriving from Yamaha's "Genesis" design and 5 valve technology.

Lighter Pistons and Con-rods:
Inside the engine, the pistons, rings and connecting rods are all-new and even lighter than last year's 750cc components! This cuts reciprocating weight so allowing the engine to rev quicker with improved throttle response. One thing that is common to both FZ750 Genesis and FZR1000 Genesis is the engine's bore centres. What this means is that the FZR is no wider than its smaller cousin, making it - without doubt - the narrowest bike in the l000cc class. Maintaining the same bore centres was achieved by using "siamesed" bores in the bw pressure alloy cylinder block casting, with inserted cast-iron sleeves. This keeps the block as narrow as possible and minimises heat distortion, and it sits on a new, metal gasket to ensure better sealing with the crankcase.

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Oil-Jet Piston Cooling:
To reduce piston temperatures, a new oil-jet system has been incorporated into the crankcase. These jets direct a continuous stream of fresh, cooling oil to the undersides of the pistons.
Oil is circulated through the engine by a dual-rotor pump and an oil-cooler is standard equipment.
Also assisting in maintaining the liquid-cooled FZR Genesis unit at an even temperature is a radiator 25 mm wider than the FZ750 component. Air is directed over it by a thermostatically-controlled, electric fan that is 10 mm larger in diameter than its FZ750 counterpart.

Digital Ignition Control:
The electronic ignition that sparks the FZR1000 Genesis engine is digitally-controlled and operated by a microprocessor. lt delivers a superhot spark, and has a pre-programmed advance control that matches spark timing to the engine's ignition advance requirements. The ignitor box also includes the control unit for the electric fuel pump.
Finally, exhaust efficiency and overall power are both improved by the use of a racing-pattern, 4-into-1 exhaust system.

Strengthened Transmission
The extra power and torque of the big engine are dealt with via a five-speed transmission that has had gear pinion sizes increased to cope with the strain. Nine clutch friction plates (one more than on the FZ750 Genesis) are employed to deal with the FZR1000's massive power on take-off, and a stronger 532 size final drive chain is used.

Summary:
From these details, therefore, it becomes clear that, although the FZR1000 Genesis power unit is a bigger version of the FZ750, Yamaha engineers have taken great care to maintain perfect combustion chamber shape by narrowing the valve angles and have made sure that in both engine and transmission aspects, the reliability of the FZ Genesis engine is in no way compromised by the extra capacity and higher power output.

Yamaha FZR1000 Genesis rolling *chassis* close-up:
The most obvious and significant item as far as the FZR1000's chassis parts are concerned is the "DELTABOX" frame, fabricated from aluminium sheet into an incredibly-strong box-section.
This frame was originally developed for the YZR500 factory Grand Prix road racers and has played a part in Eddie Lawson's two World Championships (1984 and 1986) and countless Grand Prix wins for Lawson and the legendary Kenny Roberts. lt has also been employed for the fearsome YZF75O "Genesis" endurance-racer to which the Yamaha FZR1000 Genesis bears such a striking resemblance.

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Main frame weighs only 12.2 kilos!
The main frame unit weighs only 12.2 kilos and, thanks to its construction, has immense inherent strength around the key suspension pick-up points of steering head and swinging arm pivot.
The forward-inclination of the Genesis engine allows the top beams of the frame to join swinging arm pivot and steering head by the shortest, straightest route and this guarantees the FZR1000 Genesis incredible torsional rigidity. lt is this resistance to twisting and flexing that ensures the good handling so vital to such a powerful machine.
Handling is also enhanced by the near 50/50 weight distribution that the bower, more forward-positioned Genesis engine allows.
The top beams of the FZR chassis are splayed around the cylinder head of the engine to permit true vertical downdraft carburetion and to facilitate work 011 the motor's top end. Another example of how Genesis engine deliberately complements the chassis design.
The rear end of the main frame beams slope down to the swinging arm pivot, allowing this area below the seat and behind the engine to be utilised for fuel tank location. Putting the fuel bad here both bowers the overall centre of gravity and centralises the machine's weight mass for responsive, predictable handling.
The area occupied by the fuel tank on more conventional models is used to locate the carburettor airbox, which is covered by the "dummy" front section of the FZR1000's tank unit. Obviously this is much lighter than the actual fuel bad and has no ill-effect on handling.

Rising Rate Monocross Suspension:
Rear suspension is by Yamaha's totally-proven Monocross system and, again, is near-identical to the Grand Prix and endurance-racer machines.
A box-section, torsionally-rigid alloy swinging arm carries the rear wheel, its movement controlled by a single shock absorber.
The shock is linked to the arm by a system of linkages which exert pressure 011 it in rising rate to wheel movement.
The Yamaha chassis design positions the main weight of these linkages and shock absorber below the centre-line of the bike, which further helps in gaining the handling and steering virtues of low centre of gravity and machine mass centralisation.
The shock absorber is adjustable for spring pre-load while the swinging arm pivot area is a precision-made, high-strength, cast-alloy component.

Flex-free Front Forks:
Front forks have massive 41 mm stanchions that are flex-free under normal road conditions. They have a steep caster angle of 24.670 - which is indicative of the frame's high-rigidity - that translates into quick but precise steering. The forks are adjustable for spring pre-load and provide front-end handling to racing standards.

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Floating Brake Discs, Hollow-Spoked Wheels:
The new-design cast alloy wheels for the FZR Genesis are again based on Yamaha's racing machines, featuring hollow spokes that achieve maximum strength plus minimum weight. Wheel sizes are MT3.50 x 17-inch front and MT4.50 x 18-inch rear. They are shod with ultra-wide, low-profile radial tyres a 120/70-VR17 V270 front and 160/60-VR18 V270 at the back. The use of a 17-inch front tyre lessens the tendency to "turn in" too quickly that some 16-inch front wheel machines suffer from but still bowers the overall profile of the FZR1000. The weight distribution of the FZR, in fact, makes it quick to react to steering without the assistance of a 16-inch wheel.
Braking systems have deliberately been built to racing standards, in keeping with the performance potential of the machine.
At the front there are two 320 mm stainless steel discs, drilled for lightness. They "float" on their mountings so that they automatically centre themselves under use and always maintain maximum disc to pad contact. Four-pot hydraulic disc callipers with opposed pistons generate optimum braking force via semi-metallic pads.
At the rear, a single 267 mm drilled disc is used in conjunction with a two-pot, opposed piston calliper.

Aerodynamics Aid Speed and Stability:
The full fairing shows evidence of Yamaha's endurance racing experience with its dual headlights (a single headlight in Switzerland). It is aerodynamically tested to improve both performance and stability at high speed.
Air intakes above the headlights direct cool, dense air around the airbox, to achieve better cylinder filling. The ducting, however, does not run direct into the airbox as the downdraft carburettors need to draw still, rather than turbulent, air.
The bower fairing includes heat shields and ducting that keep hot air, that has flowed past the radiator, away from the rider's legs.
Finally, clip-on handlebars located below the fork's top clamps combine with rearset footrests to give a natural, forward-leaning riding position that keeps the rider tucked down behind the fairing.

Summary:
In terms of chassis, suspension and braking components, therefore, the Yamaha FZR1000 Genesis is more than well-equipped to deal with both the power output of its advanced engine and any road or speed conditions. It is the epitome of Yamaha's "Genesis" engine and chassis technology and of large-capacity "pure sports" machine of today's roads has closer links with World Championship-winning Grand Prix engineering.

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TECHNICAL SPECIFICATIONS FZR1000

Engine

Type		Liquid-cooled, D.O.H.C., **45°** forward inclined, 5 valves per cylinder, parallel 4-cylinder, 4-stroke
Displacement		989cm^3
Bore & Stroke		75.0 x 56.0 mm
Compression ratio		11.2:1
Maximum power (DIN)		135 PS (99.3 Kw)/10.000 rpm
Maximum torque		10.4 Kg.m/8.500 rpm
Starting system		electric
Carburetion		4 x BDS37 Mikuni
Lubrication		wet sump
Oil pump type		double-rotor trochoid
Engine oil capacity		3.7 L
Transmission type		5-speed, constant mesh
Primary reduction ratio		68/41 (1.659)
Secondary reduction ratio		46/16 (2.875)
Clutch type/operation		wet, multiplate disc/ hydraulic
Gear ratio	(1st)	36/14 (2.571)
	(2nd)	32/18 (1.778)
	(3rd)	29/21 (1.381)
	(4th) .	27/23 (1.174)
	(5th)	28/27 (1.037)
Ignition system		Digital Transistor Controlled Ignition (Digital T.C.I.)
Generator		A.C. Generator Battery 12V i4Ah

Chassis

Overall length .	2210 mm
Overall width .	730 mm
Overall height	1220 mm
Seat height	790 mm
Wheelbase	1470 mm
Min. ground clearance	150 mm
Dry weight	204 kg
Wet weight	229 kg
Frame type.	Double cradle aluminium DELTABOX
Caster .	24.670
Trail .	96mm
Fuel tank capacity	20 L (manual fuel cock)
Fuel reserve amount	4.5 L
Steering head bearing type	Taper roller
Front suspension	Pre-load adjustable centre axle telescopic forks
Fork stroke	130 mm
Fork tube outer diameter	41 mm

Rear suspension	Pre-load adjustable gas/oil monoshock
Rear shock stroke	50 mm
Pivot shaft bearing type	Taper roller
Wheel travel - front	130 mm
-rear.	130 mm
Tyre – front	120/70-VR17 V270 Pirelli MP7S tubeless radial
- rear	160/60-VR 18 V270 Pirelli MP7S tubeless radial
Rim - front	MT 3.50 x 17 (cast aluminium)
- rear	MT 4.50 x 18 (cast aluminium)
Brakes - front	Dual 320 mm floating type, drilled discs
caliper type	4-pot opposed piston
- rear	single 267 mm 0 solid disc
caliper type	opposed piston
Drive chain	532 ‘O‘-ring type