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# Performance BIKES

## GSX-R750LC



LIQUID REFRESHMENT

# RAZOR HANDLING

HOW TO GET IT

## 52bhp TDRs

BLESSED  
ARE  
THE  
FREAK





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FEBRUARY 1992

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### BACK ISSUES

To get hold of a back issue just follow these simple steps:

1. Ring 0733 237111 ex 5725 to check which issue you want and whether an actual magazine, or only a photocopy of the specific feature is available.
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# FINS AIN'T WHAT

**I**t is water-cooled but is it any better than the M? It, to give it its full title, is the 1992 GSX-R750WN, and it has got a very hard act to follow. The GSX-R run began in 1985 with what was to become a cheap alternative to the RC30. While the RC stagnated, the GSX-R was developed, gaining in build quality as well as performance. The J was a major improvement, the M was the best yet and arguably the best (and the cheapest) 750 sports bike available in 1991. The liquid-cooled W (for water-cooled, or N for '92) may have the performance to follow the line, but it won't be cheaper. At £6,499 it will be £500 more.

While the original oil-cooled engine avoided the complexity and the mass of water cooling, it obviously had limits. Suzuki have reached those limits, not necessarily in the road bike but certainly in the racers which stem from it. The redesigned engine has the potential for more power; they've stiffened the frame up in proportion; they have also made a list of logical, detail improvements.

Ironically it is probably the frame which will effectively limit engine power — not because of handling but because of weight and the restriction the frame design places on the size and the layout of the airbox.

It is the distinctive frame which defines the GSX-R, and Suzuki are understandably loath to change it. However, they had also done a lot of chassis work up to the M and they have done it so well that it is impossible to make the frame stiffer without making it heavier. There is a better way but it would make the Suzuki look like an EXUP.

So, having reached a peak blend of performance, lightness and cost, it is not easy to make all-round improvements. The W may be better than the M in some respects, but only at the expense of others. A ride at Suzuki's Ryuyo proving ground, on the very fast circuit (average lap speed: 107mph), confirmed that the W at least equals the M in ride and performance.

Ryuyo's start-finish straight is just long enough for the bike to get into sixth as it flashes past the pits, indicating 12,500rpm

when it tips into the left-hand turn 1. This curve is more than wide open on a road bike and the Suzuki doesn't need all of the road, but I try to use it all anyway to avoid scrubbing off too much speed. The indicated 12,500 swings up to 13,000 when the bike banks over and rolls on to the smaller diameter of the tyre's shoulder. The W uses the same rear tyre size as the M and

The engine has been lowered, the rider has been lowered, the dry weight is said to be the same as last year and the performance is up by 3½ horsepower and 500 rpm. The price is raised by £500 and it will be in the shops in February.

**After five years of oil-cooled engines, Suzuki's GSX-R750 gets a water jacket. But when it's already the best-in-class, making it better still gets a bit tricky, not to say unnecessary.**



Right: the test track at Ryuyo leaves you plenty of time flat out in top to nudge the handlebars, listen to the wind in your helmet and ruminate on the meaning of extremely fast right-handers.



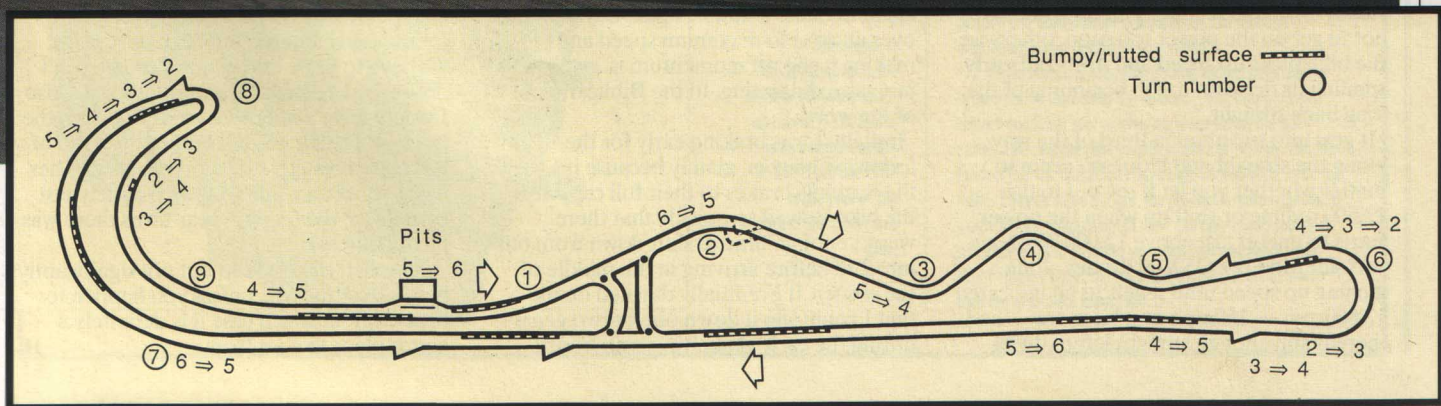
# THEY USED TO BE

if the tacho is accurate, this translates to 163mph; if, as seems more likely, there is some tacho error then it is slower. A true speed of 11,500rpm (where peak power is) would give 150mph — I can't see the tacho being further out than that, so we can assume the W is as quick or quicker than the M (149.5mph, July '91 issue).

The left is followed by a right, and the

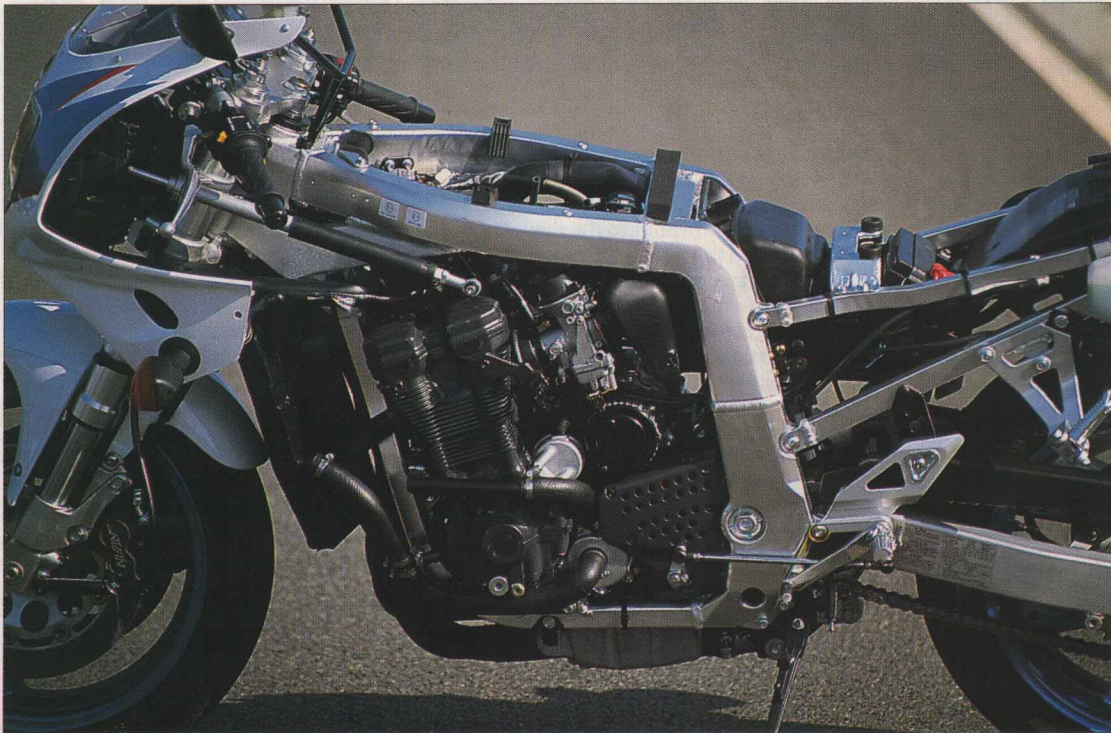
bike needs to be pulled back across the track to line up for it. Each lap a gust of sidewind through a gap in the trees blows the bike a few feet further to the left, to the very edge of the track. A touch of brake and back one gear into fifth is all it takes for this deceptively fast curve. The bike is pulling peak revs in top and at this velocity it loses speed easily; just sitting up and

rolling off the throttle gets rid of 20mph and if you're not careful the bike will slow too much. This makes it easy to haul over into the right handed turn 2 and hold a tight line over to the right for the slower, left-hand turn 3 with a short burst of hard braking, shifting down into fourth and easing off the brake as the bike goes right over on to its side, struggling to steer in and





# FINS AIN'T WHAT THEY USED TO BE



The distinctive line of the frame is the GSX-R's trademark, which is now in danger of leaving Suzuki hoist by their own extrusions, as it were. Change it and it's no longer a GSX-R. Don't change it and stifle further development.

scrub off enough speed to get in tight to the apex. More often than not I miss the apex by a few feet; the surface is smooth and grippy, yet I can't feel what the tyres are doing. I can sense a big angle of lean, confirmed by something metallic hitting the track, and I know I'm loading the front tyre by trying to tighten up the curve, but I can't feel what's going on. Either the M59X radial is nowhere near its limit, or there is something the Suzuki isn't telling me. For this kind of riding I suspect that bikes like the GSX-R need Hi Sport radials or their equivalent.

I let it pull fourth through the sequence of left-right curves, concentrating on getting the line right and rolling the throttle on and off smoothly. The Suzuki would pull a gear lower everywhere, but it doesn't seem to go any faster, just revving harder. Like the M, there is a noticeable power band, starting around 9,000 and running on well past 12. Even with the minimum of gearshifts, it is easy to keep the motor above 9,000 all the way round.

Turn 5 opens out into a short dash, redlining briefly in fourth before some heavy braking and two downshifts, holding a wide, late entry to the constant-radius, 65mph "hairpin", where the GSX-R pulls a steady 10,000 in second. The trick here is not to get on the power too soon, otherwise the bike picks up speed and drifts out early, spoiling its drive on to the beginning of the long back straight.

It gets into top about a third of the way along the straight and it doesn't seem to matter whether you let it rev out to the 13,500 redline or shift up when the power starts to tail off just above 12,000. With a stiff sidewind the GSX-R drones along, inching up speed until it gets to an indicated 12,600rpm — 150mph or a bit more — and there is still enough straight left to dwell

upon the wind noise and the lift on my helmet and how the new riding position doesn't seem quite so good as the old one.

The most testing part of the circuit is now looming very quickly indeed. The bike is pitched into a long, right hander which I guess is taken at 120 to 130mph but which is long enough not to need the brakes until *after* the bike has peeled off. I tried it once, from just below full speed and I'm convinced the bike could do it but it puts immense stress on the tyres and the nervous system and with the one not putting enough feedback into the other, both the tyres and I were a lot happier braking before the curve, not after it.

There is a deliberately bumpy section running along the apex (this is a proving ground, not a race track) and at relatively gentle speeds the bumps had the Suzuki swaying and moving about. At higher speeds it got better but still felt the bumps a little too strongly. Suzuki's chassis engineers wound the rebound damping up from #3 to #4 (maximum) and this was exactly what the bike needed. It would now hold a steady, smooth line right across the bumps. Or it could apex early and drift out in the middle of the curve, scrubbing off enough speed to let it be turned in again to make a double apex. Laying a bike over at close to maximum speed and making it slip off momentum is... well, let's just say exhilarating. In the Biblical sense of the word.

Initially I was braking early for the following hairpin, mainly because if I used the Suzuki's brakes to their full capacity the bike slowed so quickly that there wasn't enough time to shift down from 6th into 2nd before arriving in the middle of the corner. It eventually dawned on me that I could slip it down one or two gears during the early brake-tip-scrub frenzy.

Power on in second away from the hairpin had the front light enough to twitch itself off the ground as the gearbox went into third. I short-shifted into fourth for turn 9 because once the bike was laid over I couldn't get my toes underneath the gear lever. A good line and a fast exit away from this long corner made a difference of up to 50 yards to the place where the 750 got into top gear along the pit straight.

In terms of performance, there were no noticeable differences between the N and what I can remember of the M. The trouble is that the M was so nice that anything they change runs the risk of making things worse. For instance, the riding position has been altered to make the seat a little lower and bring the rider more upright. It also makes leg joints bend a few more degrees and this caused some pain in my right ankle. A couple of other riders made the same complaint. For road use it could well be OK. The fairing could be better; even when trying to get down behind it there was a lot of wind pressure on the head and shoulders — this would be worse when sitting upright in road conditions.

I suspect that many owners will be grateful for only having four rebound damper settings instead of several trillion. However, the N had used up all its rear adjustment for the fairly smooth but very fast circuit; we have to hope that country roads won't produce any tougher conditions for it. Also I would have liked more feedback from the tyres — I don't know whether this kind of bike simply needs stickier tyres or whether it was simply a result of the extremely fast corners (in the second gear turns there was plenty of feel).

Overall, it's as good as but not significantly better than the M... unless you happen to be a racer, in which case it is definitely a better place to start from. **JR**



# GSX-R FACTS

Given that the object was to be able to make more power, Suzuki's engineers reasoned that this would also make the GSX-R heavier (because a more elaborate cooling system would be needed and because the frame — already the object of several years' worth of optimization — would need to be stiffer to handle the increased performance). Therefore the *real* work was to trim down weight wherever possible, to offset the extra which was about to be received.

The liquid-cooling system itself was kept to a minimum by using an efficient, curved radiator design and fairing ducts developed in wind tunnel tests, plus some of the original oil-cooling features, like the oil jet spray on to the bottoms of the pistons. The intention was to redesign the engine, making it smaller and therefore lighter. This would offset the weight of the coolant and would have the added advantage that a more compact unit can be moved further around in the frame without causing ground clearance problems, so they could lower the centre of gravity to reduce the bike's inertia when it rolls from side to side.

This, plus a stiffer and also heavier frame, lead to completely new geometry: a slightly longer wheelbase, countered by slightly less trail and steeper castor. The changes are small, but when you've got ride and handling as good as the M's, small changes can make big differences and it is a lot easier to make things worse than it is to improve them.

## Engine size

The same  $70 \times 48.7$  bore and stroke are used but the cylinder spacing is reduced by 10mm — permitted by better cooling — and the crank is narrowed to suit, the journals being increased in diameter to maintain their load bearing capacity. After relocating the starter and generator above the gearbox (with the starter driving the generator shaft and the new water pump sitting just forward of the gearbox sprocket), the crankcases come down from 490mm width to 433mm which is slightly more compact than last year's GSX-R400R.

To fit into the new size, the camshafts run in four bearings



The frame is beefed up (fnarr fnarr) and has an utterly new swing arm. In fact, to cut a long story short, the only things that remains the same as last year's M are the tyres.

instead of five and the gearbox shafts are on wider centres, the bigger gear wheel diameters reducing the tooth loading and so permitting thinner wheels. The reduction in size means less metal and less weight; it also means the engine can be moved forwards and down (by 27mm at the crank) and still have the same ground clearance as the M. Suzuki seem to think this is a good idea; as the M had no obvious traction/handling/braking problems, we can only assume that it makes a difference when the motor is tuned to the 130 horsepower level.

## Engine output

The top end is modified to get better cylinder filling and better combustion. The included angle between the valves is reduced from  $40^\circ$  to  $32^\circ$ , providing a more compact combustion chamber and higher compression ratio. There has been much work on airflow, by measuring the different gas

velocities across the intake ports and shaping them to minimize turbulence. The result is a claimed 3.5hp more and a shift of 500rpm up the rev scale.

Each year the factories change valve operation, with lots of good reasons for using finger rockers, buckets and shims or whatever the vogue happens to be... 1992 is the year of the bucket and shim and the reason is that it's a more rigid assembly and safer to high rpm. The pistons are 4% lighter and if all this seems like a lot of trouble for an extra 3.5 horsepower and 500rpm, then the only explanation is that Suzuki have their sights on something a bit bigger than 3.5hp and 500rpm.

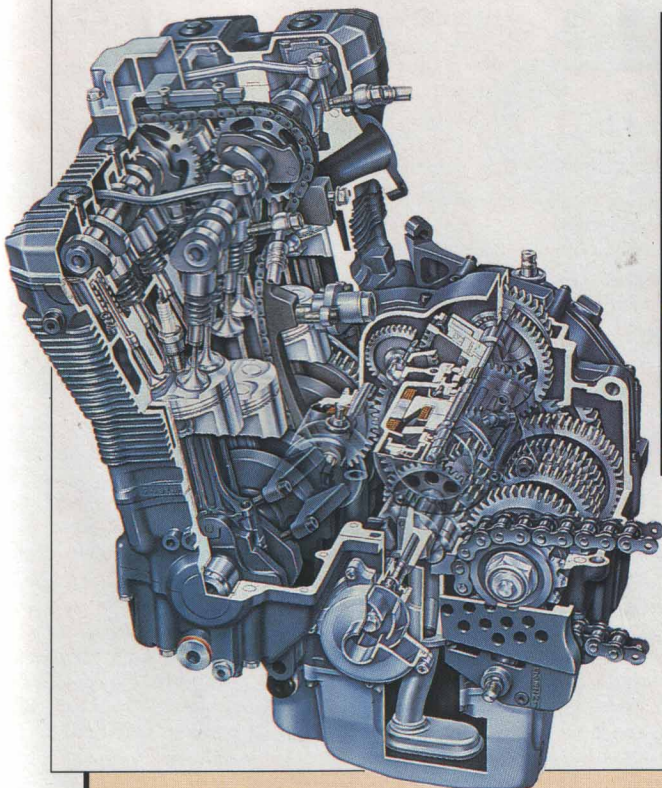
The carbs are still Mikuni BST38s but the limiting factor is, I suspect, the airbox which is dictated largely by the frame design. There are several reasons for thinking this. First, the airbox is 6.7 litres, compared to 8.7 litres on the ZXR750. Second, as an airbox becomes restrictive it richens up carburation and affects the way the slides lift in CV carbs. Suzuki have put in vents to balance the pressure under the diaphragm with outside air pressure, giving faster response than if the carbs were vented to (lower) pressure in the airbox. Third, they have gone to a lot of trouble to shield intake air from engine heat; the side panels moulded around the frame look as if they could become the walls of an air box if need be...

## Chassis

Extra frame stiffness comes from thicker material and a five-sided section in the tank rails, the steering head section is sand cast and the area around the swing arm pivot is forged. The swing arm itself is asymmetric, box section on the left and pressed aluminium on the right, allowing the 4-2-1 exhaust to tuck in as closely as possible (although the front of the can still grounds).

The upside down forks still have stepless adjustment for spring preload, rebound and compression damping. The rear linkage gives the best rising rate characteristics, combining optimum ride with taut handling. The spring unit has stepless preload and bump damping adjustment, but rebound adjustment is now limited to four positions.

All the bodywork is new, with ducting for the watercooling system and to feed air to the intakes. It also incorporates a thinner and lower seat which is narrower across the side panels, allowing the rider to tuck in more effectively. Despite the fact that the handlebars have been moved back, to let the rider's body be more upright, the position is more cramped. It works from a styling point of view, but only a long road test will show whether it makes your legs hurt and keeps wind strain off your body. The track test suggests it will be worse than the M in these areas. ■



The engine is watercooled, so is the oil filter (or is the water oil-cooled?) The motor is as compact as the '91 GSX-R400 and 1992 is the year of the bucket and shim valve gear.