



YAMAHA

YZF-R7 INTRODUCTION

SUP



Getting your hands on one of these won't be easy, but the lucky few who do can proudly lay claim to owning a machine which is probably more at home on the track than on the streets



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If you can ever get your hands on one of these consider yourself very lucky indeed. It's not the price which may put you off (although it's certainly not cheap) but the scarcity of the R7s.

Yamaha is only producing a few hundred worldwide, which means a handful for each country. Dealers have had would-be R7 owners names down since their first sniff of it.

This is a racer which is also street legal. Don't confuse it with a true sports bike – this is a racer which you can ride on the road, but most definitely a racer first and a road bike second and the first of its kind to be built in such a manner.

You don't have to spend a lot of money on this one if you want to go racing – almost everything's there. It's a racer with lights and indicators.

Every inch a racer

A lot of money has been invested by Yamaha in the R7 and all to win the World Superbike title and most agree that not only does it look every inch the racer, but a GP racer at that. Not surprising as the frame has been developed directly from the 500 GP machines and those who have tested it say the chassis feels almost perfect.

It was designed to be a competitive machine almost straight out of the box and for about one and a half grand more you can have the race kit to put a potent bike on the track. The sort of power championship-winners have had.

Presumably it'll be privateers who will try to get them but we may see one or two on the road. ■

YAMAHA YZF-R7 AT A GLANCE

- Introduced 1999
- 749cc in-line four cylinder
- 106 bhp @ 11,000 rpm (claimed)
- 185 mph top speed (claimed)
- 0-60 figure not available
- Insurance group not available
- £21,449





INTRODUCTION

IN 1990 Yamaha was standing on the edge of a very deep pool, and wondering whether to jump in and taste the waters of race rep 750dom, or hang around at the edge, keeping their genitals covered with both hands! They had been relying for too long on the, now old, FZ750 to keep them in the hunt, it could not compete with the ZXR750 Kawasaki or the VFR 750 Honda's. They answered the race rep challenge with the OWO1 but it was a homologated World Superbike machine, and beyond the pocket of mortal man. Yamaha desperately needed a top bike in it's line-up, because they were in grave danger of being sidelined, a bike which was affordable and would appeal to the relatively new race replica market. The answer was the all new YZF750.

Overnight success

With it's launch in 1993, the all new Yamaha, was an overnight success. With a twin spar Deltabox frame and Exup exhaust system, the new 750 was very closely based on the OWO1, but none of the parts were interchangeable, The YZF was a completely new development from Yamaha's innovative stable. The designers had used all the work they'd done on the race bike and transferred it to the new YZF, not easy when you remember the YZF needed to be half the price. The new Yamaha sportster was hailed as a masterpiece by the motorcycling press, The quick steering seven-fifty had race track pretensions and could offer the road rider something that other 750cc machines could not, blistering performance in a frame that weighed the same as most 600cc road bikes.

A limited edition YZF 750sp version was built for the race track showing that Yamaha had race aspirations for it's new baby. It came with a close-ratio gearbox, stiffer multi-adjustable suspension, a single seat unit and oversized carburetors. The good thing to come of this was that it left the owners of normal YZF's somewhere to put a pillion and a much better behaved engine. The only item they were jealous of was the SP's adjustable suspension, Yamaha listened and only a year later the road version was blessed with a set of Ohlins shocks, front and rear.

YZF's have evolved now, going through several stages including the thundercat range, into the awesome YZF1000R1, YZF600R6 and the true successor to the YZF750EXUP, the YZF750 OWO2. If you get the chance to ride any of these bikes produced by Yamaha over the last decade, you'd be a fool to turn it down!

ROAD TEST

THE YZF750 has a reputation as an out and out sports bike that precedes it. And to look at it, in it's pink and grey livery, you could be forgiven for thinking that the predecessor of the Thundercat is a bit of a pussycat. To ride it is a totally different matter. James Davis has a pristine YZF of 1994 vintage and was kind enough to lend it to me for a bit of race and chase around the North West, so long as I lent him my R1 so he could keep an eye on his pride and joy. No problem!

To begin at the beginning, the weather forecast was decidedly dodgy, but because we'd both been looking forward to it for a couple of weeks we decided to go ahead anyway. So what if blizzard conditions were due to hit the Lake District that afternoon, if everything went to plan and the YZF was as good as promised, it wouldn't matter! We met at a very northern sounding services near Grimeford on the M61, gave each other's machines the once over and headed off to get north of the urban industrial sprawl as soon as possible.

My first impressions were of a fairly small bike with a comfortable saddle and easy reach to the bars, my legs were not doubled up and the pegs seemed to be in an excellent position for someone over six feet tall. A little more comfortable than the R1 if anything. I'd soon find out how comfortable it really was after a couple of hours in the saddle.

The Motorway section was a breeze, with a short blast up towards the twisties in the Lakes, it gave me time to get comfortable with the acceleration and handling characteristics of the YZF. You instantly get a feel for the machines racing heritage as the light steering can take you by surprise. As the roads became quieter and more twisty the YZF began to show it's true colours. This bike is seriously quick, no one had warned me that a bike which ought to be obsolete after nearly ten years on the road could be so competitive with up to the minute equipment. The 750 is a sweet thing in the bends but also

comfortable (after a couple of hours I'm feeling fine) and this must be down to the suspension. The introduction of multi adjustable suspension to the front and rear at the start of 1994 had turned a well behaved road bike into a corner devouring monster but with the added benefit of remaining fairly soft, keeping comfort to a maximum.

EXUP

The YZF engine was beginning to show itself to be a real gem. The further we went the more the roads could drain a rider, constantly changing gear and riding styles to suit the conditions. The benefit of this motor, unlike the competition, was the Exhaust Ultimate Powervalve because it allowed the motor to pull from relatively low revs. The way it worked was to trick the engine into believing the exhaust had been specifically tuned to that rev range by opening a special valve in the exhaust more or less depending on the throttle position. When you ride the bike you can feel the difference it makes, to





what should be a sports bike delivering its power at the top end with a bang, this just pulls from way low down making riding demanding roads a veritable pleasure.

The brakes are possibly the best to have been fitted to any production bike of the nineties, with twin 320mm disks and six pot calipers they effortlessly stop the bike from any speed, even the claimed top end of 160mph. The back 245mm disk seems to be more for show as I can't seem to get any feedback from it, it could be the suspension set up is throwing too much weight to the front and I keep locking it up! If you owned one of these it would be worth spending a weekend playing with the suspension settings and customising them to you own preferences.

The blizzards hit at about 2.30pm as promised but we'd had a great mornings riding, we found a small hostelry near Coniston Water where the landlord assured us we'd be able to sit out the snow storm for as long as we liked.

BUYERS GUIDE

YOU MAY want to look very carefully at the EXUP before deciding to buy a Blade or ZXR. There are plenty of them about at very reasonable money and even finding low mileage examples is not too hard. I saw one recently advertised on a 94 L with only 13,500m on the clock for just £2,450. That's a whole lot of bike for under two and a half grand! There is not a lot that goes wrong with these engines, and so long as it hasn't done similar miles to the Starship Enterprise you should be alright. The shocks and forks should be checked for leaks as should the crank cases. These were the nutter bikes of their day so make sure you check the paperwork thoroughly.

ENGINE

THE OWO1 from Yamaha was hailed as a super sports world-beater. Much of this reputation stemmed from the engine that in many respects found it's way into the new YZF750. There were several features of this motor, which held it above the other in-line fours of the time, notably the five valves per cylinder but more importantly the EXUP system.

Like many engines of the early nineties the YZF was a four cylinder in-line water cooled transverse unit with electronic ignition and a wet clutch, nothing unusual in that apart from the valve layout. Each cylinder had three inlet valves but two exhaust valves allowing efficient flow of carburated gasses, especially when using four big 38mm Mikunis, you need as much space as possible to get the fuel air mix into the combustion chambers.

The motor was allowed to rev freely owing to a relatively short stroke of 46mm. The EXUP system opens a small valve in the exhaust pipes relative to the throttle position, and it effectively tunes the exhaust to the rev cycle of the engine. This combined with the efficiency of the five valve combustion chambers creates a smooth tractable spread of power and torque right up through the rev range, making for effortless riding. The 749cc unit produces a claimed 102bhp at 12,000rpm very respectable for a road going 750 even now. The engine will red line at 13,500rpm which in sixth gear would give a theoretical top speed of 175mph.

Primary drive is via a helical cut gear from the crank via a slave gear onto a wet type clutch and on into a six gear wide ratio box. The final drive is chain and sprocket from the left hand side of the motor. The engine is finished in a silver lacquer.

CHASSIS

IF THE reputation of the OWO1 was partly built on it's engine then the other reason must be the frame. As rigid as any modern sport bike frame, the Deltabox twin spar aluminium perimeter chassis was designed for the racetrack. Small and light and with a minimum of fuss, the two beams support the engine as a stressed member giving great rigidity using the smallest amount of materials, and thus saving weight. The rear subframe supports the electrics, battery and the two tier saddle. The perimeter frame encompasses the surprisingly narrow engine leaving room between the massive twin spars for the carburetors and airbox, the graceful 5 gallon tank sits above it all.

Up front the forks are of the upsidedown type made by Kayaba with a rake and trail of 24° and 4.25 inches respectively. They have a tube diameter of 41mm, on a par with today's machines, and are fully adjustable with 12 rebound damping settings, 10 compression damping settings and fully adjustable spring preload. The front wheel travel is 4.72 inches. At the back the rear suspension is handled by a single rising rate shock which is fully adjustable with 13 rebound damping settings, 20 compression damping settings and a fully adjustable spring preload.

Fab brakes

The braking on this machine is fantastic. The front engests the lions share as usual with huge 320mm twin floating disks with six pot callipers. The six piston callipers were unheard of on road going bikes when first introduced, and only a couple of Triumph's and Ducati's have them as standard equipment now. The back end is well served by the 245mm single rear disk.

The front wheel was very wisely a 3.50 17 inch fitment. This tended to give a very user friendly feel to th machine, unlike riders of the blade who suffered for nearly eight years with an over steering 16 inch offering, the 17 inch wheel is much more road friendly.

A full fairing encloses the bike in acres of polycarbonate creating a very small pocket of still air at very low speeds, the fairing works a lot better at speeds above 80mph. The switch gear is easy to use, but no more than you'd expect from a major manufacturer. The clocks are easy to read and are foam mounted to protect them from vibration. The foxeye headlights are extremely good and even the mirrors do what they are meant to.

VERDICT

YAMAHA may have been on the verge of being left behind in the early 90's but the introduction of the YZF750 pulled them back into the arena once more. Since then they have never looked back, with only a slight glitch when the Thundercats threatened to drag them down, someone at Yamaha dropped the range like hot coals and again looked at the racing pedigree they had fought so hard for. The YZF1000R1 is a direct descendant of the original YZF750 and is a fine testamen to such a great bike.



INTRODUCTION

MAKE NO mistake about the R7: although this is a fully road legal motorcycle which (if it's not sold out) you can buy at your local Yamaha dealer, it differs from the vast majority of apparently Japanese machines in not being intended for road use. There are two reasons for the existence of the R7 – one is for a minimum number to be sold so that Yamaha's World Superbike race machines can be homologated for use in that competition. The second is that the basic road bike can act as a basis for racers to create their own race bikes. So its road manners, comfort, fuel consumption and so on were completely irrelevant as far as Yamaha was concerned when it produced the machine.

In fact, testing the R7 in full road trim means riding it in a condition it was never really meant to be ridden – the silencers for example are designed to let the bike pass noise regulations which don't apply in its true environment, where it will be fitted with a race can and the fuel injection altered to suit.

Any R7s which do find their way onto the roads will no doubt also be subjected to similar modifications.

ERGONOMICS & STYLE

SO WHAT do you expect? Long distance touring comfort? Of course not, the R7 is built only for one thing, and that's for going around a race track as quickly as possible, so comfort is irrelevant. What does matter is how easy it is for the rider to be able to control the machine, and the forward leaning, low bar and high footrest set-up is perfect for this, allowing the rider to climb all over the bike to haul through a series of corners, The screen is definitely on the low side however – taller riders find it difficult to tuck in behind it to squeeze the last few mph out of the bike, and many will be looking for higher screens to help them with this.

Finish quality is the same as any other Yamaha, even though you'd expect things such as corrosion resistance not to be of great importance on a race bike. But no doubt it's easier for Yamaha to finish the R7 in the same way as its other machines rather than give it special treatment, whether or not that involved using lower quality paints and so on.

As for the style, this is definitely a handsome machine, although some might prefer the whole R family of sporting Yamahas to be a little easier to distinguish – the R6, R7 and R1 do sometimes need a double take to discern which is which. Having said that, at least they're not practically identical like Suzuki's GSX-R series



ENGINE

IT WILL come as no surprise to anyone who's ridden other Japanese homologation specials that the R7 is not a particularly pleasant bike to ride, at least when the revs are on the low side and the throttle isn't being nailed against the stop. In normal use, the fuel injection has a very sudden power pick-up – dive into a corner on a trailing throttle, then open it up again mid-bend and the power snaps back with enough force to unhook the rear tyre should you be leaning far enough. Mostly this does no more than make the bike twitch, but it could conceivably cause it to lose grip altogether and highside the bike.

This trait is fairly typical of fuel injection systems, but on the R7 in road trim it's worse than most, and it's compounded by a hesitation and fluffiness that suggests the bike is not set up properly for this anyway. The throttle response is quite lethargic too, the engine spinning quite reluctantly, and altogether it's quite hard work.

So find an open piece of road (with no speed limits...) spin it hard and you get more of a taste of what the R7 is all about. The engine screams round to 13,000rpm pulling the bike forward with real ferocity, although you still get the sensation that it could do with breathing more freely (it could...).

There are a few buzzy vibes which come through the bars and footrests, but on this bike they simply add to the raw, untamed feel of the machine – you're not going to be cruising down motorways on it anyway, are you?

The gearchange feels a lot better than on many Yamahas, slipping up through the ratios with quiet precision and no need to touch the clutch lever. But you do still get a hint of a clunk through the transmission which is reminiscent of the R6's change – that can unsettle the bike if it's leaning hard at the time, but the R7's doesn't seem to do that.

The ratios themselves are very close together, as befits a race bike, but this does mean you can't launch it particularly hard off the line as first is very tall. The clutch is quite heavy, too, so leave traffic light sprinting to machines more suited to it.

CHASSIS

THE CHASSIS takes to the road much better than the engine, although you'll appreciate it most if it's a smooth surface you're riding on. The quality of the suspension is quite astounding – every tiny blemish in the road is fed back faithfully to the rider, so much so that you can practically read the name on manhole covers as you ride over them. This means you can really stretch the chassis to its staggering limits, sliding the tyres and feeding power or brakes to the rear and front while balancing the rubber right on the edge of its grip – there's so much information sent back to the rider about how everything is coping with this that it's far less dangerous or demanding than it sounds. But ride the bike for a long distance and the relentless movement and chatter through the bars can actually become quite tiring – you start to feel the need for some sort of information filter to let you rest for a bit!

The bike steers very quickly, although maybe not quite as manically as you might expect – it is possible to adjust the geometry to quicken the steering further should you feel the need, but for road use it's already rather twitchy. Give the bike some throttle coming out of a third gear turn, hit a series of bumps and the bars will flap wildly in your hands. There are plenty of slower, more softly sprung machines which on real world roads would outpace an R7 for this reason.

But what it does offer you is amazing accuracy – you can choose your line round a turn to within a millimetre and the R7 will track it with pinpoint precision, then change direction with just a touch or pressure on the bars should you wish it.

You can soften the suspension to some extent for better road suitability as the bike does of course have the full range of adjustability front and rear, and it's far more effective than on most bikes.

But what a waste...

BRAKING POWER

PREPARE to have your mind expanded... The combination of immensely powerful brakes with that staggeringly effective front suspension means the R7 can have its nose pinned down at 150mph or more and slew to a tyre-scrubbing halt seemingly only moments later – it's almost enough to make your nose bleed! The feedback is sensational – you can play your favourite tune on the front tyre so delicate is the control, even with just two fingers on the lever. As for fade, come on, be serious...

The back brake feels utterly feeble in comparison to what the front is capable of, but as it's so easy to lift the rear wheel off the ground in heavy braking, anything else would be a liability. On this type of bike, the rear brake is often used to control the amount of power reaching the back wheel with the throttle still open rather than for mundane purposes such as merely lowing down.

These are the best stoppers available on a road bike, made better still by that superb suspension.

VERDICT

THIS IS a fabulous race bike which is like a fish out of water when used on the road. A Suzuki GSX-R750 would not only be quicker in the majority of circumstances, it's also a far more pleasant and easy bike to use. But if you're buying an R7 for any of those reasons, back out of the deal right now – it's not meant to do normal road bike things, and compared with purpose-built road bikes, it doesn't, at least not to great effect.

Buy it because you're going racing or want to use the bike as a regular track day machine, and with the right tuning done to the engine you're on one of the best three-quarter litre supersports bikes ever built. Just go in with your eyes open.

RATINGS

Engine	✓✓✓
Transmission/Clutch	✓✓✓✓
Ergonomics	✓✓✓✓✓
Chassis	✓✓✓✓✓
Braking power	✓✓✓✓✓
Desirability	✓✓✓✓✓
Overall	✓✓✓✓✓



JOSH WILKINSON MOTORCYCLE RACER

'The Yamaha original body is amazing'

“I've never use my R7 on the road, in fact I've never used any bike on the road (not so I'd admit it...) as I don't have a licence!”

But Josh has been racing for five years, and for the last season bought himself an R7, which he immediately had stripped down, tuned and set up for the season. But it wasn't easy going at first:

“Like a lot of guys we had plenty of crankshaft problems – don't forget you have no warranty comeback on race bikes – but Yamaha did help us out as much as they could, until eventually we got a new spec crank and bearings. Talk about one extreme to the other! That's now lasted for a whole season and to be honest, looks like it could stretch to the next one comfortably.”

Josh's only other incidents with the bike have been the usual crash ones. He came off three times in the season, but each time the bike's damage was only superficial, and anyway he replaced the original bodywork before ever venturing out on the track with cheaper aftermarket stuff.

“Usually with the aftermarket bodywork you reckon on saving a couple of kilos or even more, but that Yamaha original body is amazing – it's really tough and it fits beautifully, but it's also actually lighter than the thin crappy stuff we put on for racing! It also goes back on and comes off much more easily. I'm tempted to use it at some point, but that'd just be asking for trouble – I'd be bound to come off at the first corner the moment I put it on, and it costs a fortune!”

Josh hasn't had much to do on the bike apart from routine maintenance, and even this is very easy, including changes gear ratios which can be done quickly with the engine in situ. Second and third gears did show some signs of wear early on, but they've been replaced and the new ones seem to be a lot better.

Oh yes, and not forgetting, it's very, very fast! “I can't believe how good that bike was straight out of the box, dodgy crank aside,” he says. “It was so easy to ride, I felt at home on it straight away, which I proved with a third in my first race on it. Since then I've had a couple of wins and generally reckon on top five positions, which is better than the top eights I was doing before, so I guess I've got the R7 to thank for that...”



STEVE KNIGHT REFUSER COLLECTOR

'It's so bloody fast it scares the b*ll*cks off me'

“Steve bought his R7 after a premium bond win and had simply wanted the ultimate road bike, but he's not convinced he did the right thing. He used to have an old Honda Revere before which he used mostly for getting to the depot where he worked as a refuse collector (didn't they used to be called dustmen?), and he says he's ended up still using the Honda for other journeys as well.”

“To be honest, the Honda is the nicer bike to ride most of the time. The R7 has a very woolly throttle response and I'm never quite sure what it's going to do next. People say the handling is fantastic, but maybe I'm not riding it hard enough or something – it just feels weird to me. The suspension's really hard, and if I start to lean it a bit the handlebars can move from side to side, which is scary. The only time the engine seems happy is if I give it a handful of throttle, and only then when it's revving hard too. And I've

only managed that two or three times because it's so bloody fast it scares the b*ll*cks off me. And I don't think my licence would last very long if I did that much.

“I don't know how much it costs to service or anything because I've only done about 1,000 miles on it. I just nip down to Box Hill or some other biker meeting place and let people see me on the bike. Thing is, lots of them don't recognise it, and think it's an R6 or an R1 or something.”

“I think come next year I'll probably sell it and buy a Honda VFR800 or something.”

Which just goes to show that buying a true race bike for the road is not a formula for going much faster or having a better time. Steve admits that's what he thought and has now decided a fast road bike is going to be quicker and more enjoyable on the road than a fast track bike, which is simply a machine in the wrong circumstances on the crowded A and B-roads of Surrey!





THE usual rules when buying a used bike don't apply with the R7. For example, where we'd normally say with some types of machine that it's worth checking them out to see if they've been raced, you should be very surprised if an R7 you're looking at *hasn't* been raced! There are some road-only examples out there but nothing like as many as raced ones, and those that have been raced will by now have had the notorious weak crankshaft sorted out. This was a problem on most R7s for most of the bike's first season and it took Yamaha a lot of effort to sort it. Not any bike which was racing for the first season – any bikes new since then will have the new cranks fitted – ironically, the under-used road bikes which you might expect to be in better condition are much more likely to have the problematic original crank still in place.

There are no fixed or dependable prices for R7s either – in this case we have simply left off our usual price listing because there aren't enough road bikes to have any significance while with race bikes it's the whole package which comes with the bike which you should be studying carefully, and which has a huge impact on the final price. For example, a good, recently rebuilt bike with no spares is worth much less than a completely worn out machine with eight sets of wheels, a complete spares package and any of the many other extras which might come along – you could be paying £50,000 for the worn out bike because of what comes with it but only £15,000 for the excellent condition bike on its own. After all, a few races on the good bike and it will rapidly become a worn out bike anyway!

For the same reason the year the bike was made is irrelevant too – all that counts is that the bike is complete with no hidden and expensive problems such as cracked crankcases or a bent frame, and how easily you will be able to go racing with it. You need to see what spares come with the bike and compare those with what you already have.

Strong chassis

Note by the way that the R7 frame is immensely strong and capable of taking quite a few knocks in its spars without going out of alignment. Indeed, one problem cited by several racers is that the frame is so strong and stiff that many frame straightening jigs are incapable of correcting any misalignment – the jigs themselves bend instead of the frame!

So run over the bike carefully to convince yourself all of the major components are in good condition – checking for frame straightness is not easy and it's worth taking an expert with you if at all possible. But you can look carefully over the crankcases and cast an eye over the forks to see that they're straight (check their action is smooth by bouncing them up and down a few times). The bike should of course start easily, and ideally you should try and get a brief excursion on it on a track, but this is not always possible.

Check the spares inventory, as mentioned, but also ask for a list of results – this will give some idea of how well the bike has been set up and you can also see if there have been a lot of DNFs (Did Not Finish). This will indicate crashes or breakdowns, neither of which are a good thing.

But the bottom line is, you're buying a race bike – it will almost certainly have been crashed, it will have been thrashed as hard as possible and it will have no warranty. You're taking a risk and you have to accept that.

“ It's the whole package which you should be studying carefully ”



It's a tough ol' world when you have to try to choose between three bikes such as these, but SUSIE GRANIC and CROSBY P rode them day in, day out just for you...

YAMAHA YZF-R7

SUSIE GRANIC: What can I say? All of these bikes are excellent, but the R7... It's just more. More, more and more. Of everything. We all know it's really a racer and it has to be the ultimate bike for many a sports bike fan. Tops for me.

CROSBY P: Anyone who owns one of these, beware, because I'd almost kill for one. All three of these bikes are excellent, no doubt about it. But the R7 just outclasses them. Really it's not fair to pit it against these two great bikes because they have to lose.

PERFORMANCE	
Top Speed	158.4 mph
FUEL CONSUMPTION	
Average	32.5 mpg
Best	37.0 mpg
Range	196 miles
PRICE	
Price	£21,689
Insurance Group	17
WEIGHTS AND CAPACITIES	
Wheelbase	1,400mm (54.6in)
Dry Weight	176 kg (388 lb)
Seat Height	805mm (31.3in)
Rake/Trail	N/A
Fuel Tank	24 litres (5.28 galls)

KAWASAKI ZX-7R

SUSIE GRANIC: Amazing bike in my opinion and out of the whole ZX-R range it's my personal favourite. Cornering on this is superb and handling is stable all the time – tipping into corners, braking, poor road surfaces... You name it, the ZX-7R will handle it.

CROSBY P: Forget what anybody says about the weight of this bike – it's no problem at all. It goes like a bat out of hell, brakes sharply and handles well. You really have to RIDE this bike, not let it take you for a ride, but that's most of the pleasure. And it looks so mean.

PERFORMANCE	
Top Speed	165.11 mph
FUEL CONSUMPTION	
Average	31.5 mpg
Best	37.0 mpg
Range	144 miles
PRICE	
Price	£7,120
Insurance Group	15
WEIGHTS AND CAPACITIES	
Wheelbase	1,435mm (56.5in)
Dry Weight	203 kg (446.6 lb)
Seat Height	790mm (31.1in)
Rake/Trail	25°/99mm
Fuel Tank	18 litres (3.96 galls)

HONDA RC45

SUSIE GRANIC: Another race bike just legal for the road. For me, it's such a close call between this and the R7 and if the Yamaha wasn't around this'd be tops. It has a great engine, brakes are plenty powerful and the chassis is so responsive – every move is felt.

CROSBY P: Like Susie, it's a close call for me but the Yamaha would win by a twitch of the throttle. The RC45 demands a good rider; those not experienced enough won't like it. I do. It turns into corners so quickly, and is always stable. Brakes very well too.

PERFORMANCE	
Top Speed	159.4 mph
FUEL CONSUMPTION	
Average	32 mpg
Best	37 mpg
Range	146 miles
PRICE	
Price	N/A
Insurance Group	17
WEIGHTS AND CAPACITIES	
Wheelbase	1,410mm (55.5in)
Dry Weight	189 kg (415.8 lb)
Seat Height	770mm (30.3in)
Rake/Trail	24°/92mm
Fuel Tank	18 litres (3.96 galls)



YAMAHA YZF-R7

ENGINE	
Type	4-stroke
Layout	in-line four
Capacity	749cc
Bore/Stroke	72mm/46mm
Valves	5 per cylinder
Valve Gear	DOHC
Fuel System	dual electronic fuel injection
Cooling	liquid
Power	102.4 bhp @ 10,950 rpm
Torque	44.1 lb ft @ 9,000 rpm

TRANSMISSION	
Gearbox	6-speed
Final Drive	chain

CYCLE PARTS	
Frame	GP-type aluminium
Front Suspension	Öhlins upside-down forks
Adjustments	preload, rebound and compression damping
Rear Suspension	Öhlins shock
Adjustments	preload, rebound and compression damping

TYRES	
Front	120/70 x 17
Rear	180/55 x 17

BRAKES	
Front	320mm dual discs one-piece aliper
Rear	single disc, single caliper

RATINGS	SUSIE	CROSBY P
Engine	●●●●●	●●●●●
Handling	●●●●●	●●●●●
Braking	●●●●●	●●●●●
Rider Comfort	●●●●●	●●●●●
Pillion Comfort	●●●●●	●●●●●
Overall	●●●●●	●●●●●

KAWASAKI ZX-7R

ENGINE	
4-stroke	
in-line four	
748cc	
73mm/44.7mm	
4 per cylinder	
DOHC	
4 x Keihin CVK-D38 carburettors	
liquid	
126.1 bhp @ 11,199 rpm	
62.22 lb ft @ 8,890 rpm	

TRANSMISSION	
6-speed	
chain	

CYCLE PARTS	
aluminium beam	
43mm inverted telescopic forks	
preload, plus compression and rebound damping	
Uni-Trak (monoshock)	
preload, plus compression and rebound damping	

TYRES	
120/70 x ZR17	
190/50 x ZR17	

BRAKES	
2 x 293mm discs, opposed 6-piston calipers	
single 197mm disc, 1-piston caliper	

RATINGS	SUSIE	CROSBY P
	●●●●●	●●●●●
	●●●●●	●●●●●
	●●●●●	●●●●●
	●●●●●	●●●●●
	●●●●●	●●●●●
	●●●●●	●●●●●

HONDA RC45

ENGINE	
4-stroke	
90 degree V-four	
749.2cc	
72mm/46mm	
4 per cylinder	
DOHC	
injection, one injector per cylinder	
water	
106.9 bhp @ 12,000 rpm	
52.8 lb ft @ 10,000 rpm	

TRANSMISSION	
6-speed	
sealed O-ring chain	

CYCLE PARTS	
aluminium twin spar	
41mm Showa upside-down forks	
compression and rebound damping, plus preload	
Showa rising rate monoshock	
compression and rebound damping, plus preload	

TYRES	
130/70-16	
190/50-17	

BRAKES	
twin 4-piston calipers, 310mm discs	
single 2-piston caliper, 220mm disc	

RATINGS	SUSIE	CROSBY P
	●●●●●	●●●●●
	●●●●●	●●●●●
	●●●●●	●●●●●
	●●●●●	●●●●●
	●●●●●	●●●●●
	●●●●●	●●●●●





Height: 1,190mm (46.4in)



Length: 2,060mm (80.3in)

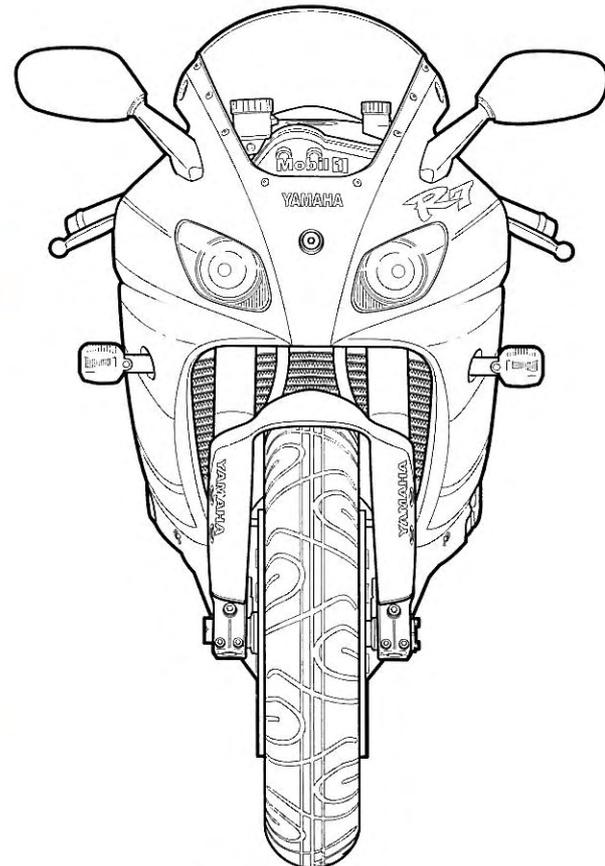
THE biking world waited to see the R7 with probably the most eager anticipation since news of the R1 leaked out – nobody was disappointed. Marketed purely to be eligible for superbike racing, the R7 is produced in limited numbers with a price-tag which will limit it further! But this is THE bike for committed road racers and is the only road bike around today which has such pure race specs. It has the most powerful engine Yamaha has ever made available to the public and a chassis based on the GP bikes – the YZF-R7 is one of the most mouth-watering bikes in the world. No exaggeration.

ENGINE

Type	4-stroke
Layout	in-line four
Total displacement	749cc
Bore	72mm
Stroke	46mm
Compression ratio	N/A
Valves	5 per cylinder
Fuel system	dual electronic fuel injection
Ignition	electric
Cooling	liquid
Maximum power	102.4 bhp @ 10,950 rpm
Maximum torque	44.1 lb ft @ 9,000 rpm

TRANSMISSION

Primary drive	gear
Clutch	racing type
Gearbox	6-speed
Final drive	chain



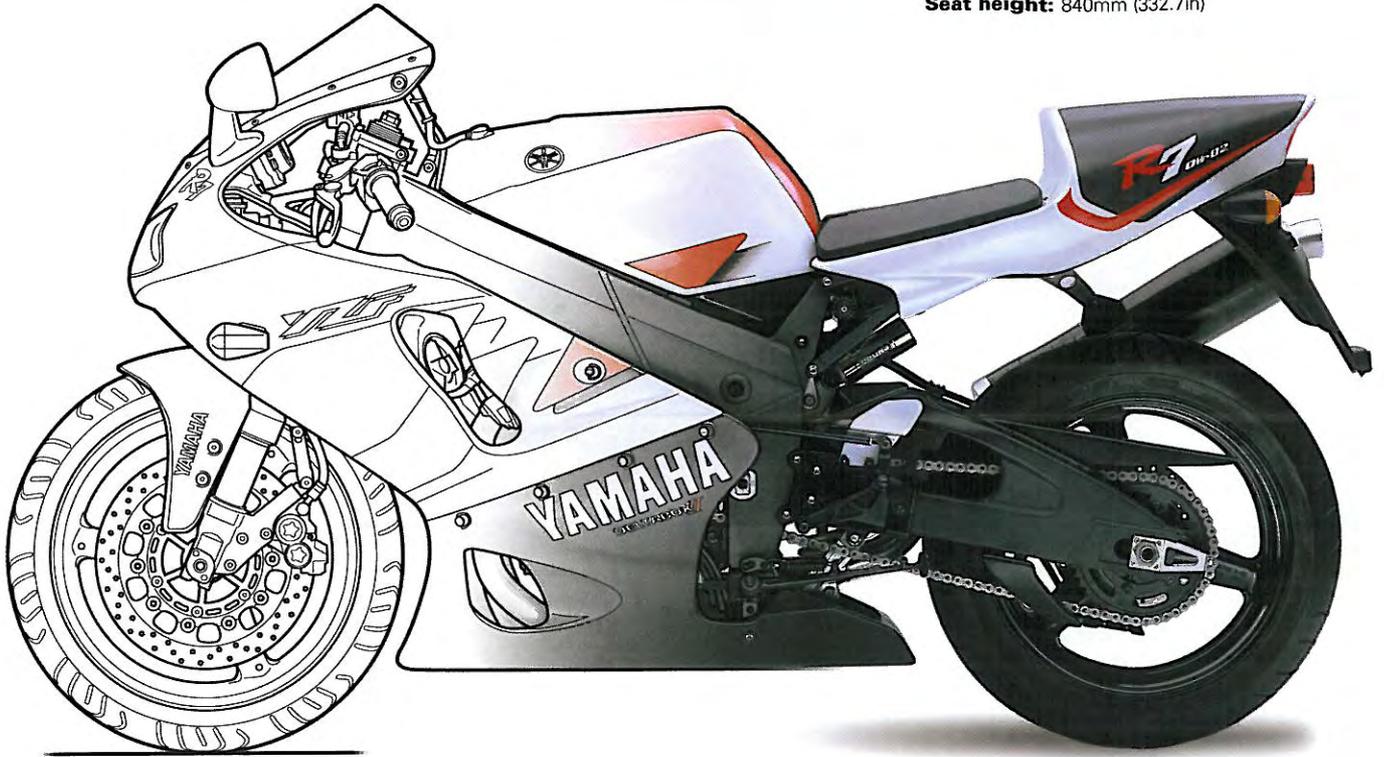
Width: 725mm (28.2in)



YAMAHA

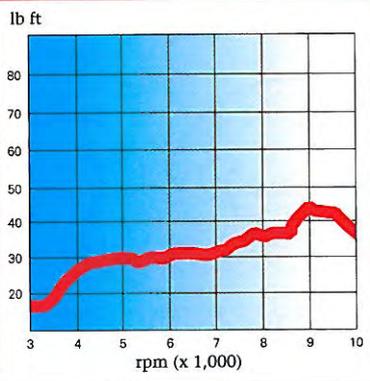
YZF-R7 SPECIFICATION

Seat height: 840mm (332.7in)

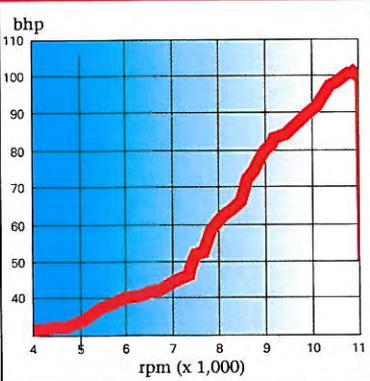


Wheelbase: 1,400mm (54.6in)

TORQUE



POWER



Our own rear wheel dyno test measurements (above) differ from the manufacturer's claimed maximum power and maximum torque figures.

CYCLE PARTS

Frame	GP-type aluminium
Rake/trail	N/A
Front suspension	Ohlins upside-down forks
Travel	N/A
Adjustment	preload, rebound and compression damping
Rear suspension	Ohlins shock
Travel	N/A
Adjustment	preload, rebound and compression damping
Tyres	
— make	Metzeler
— front	120/70 x 17
— rear	180/55 x 17
Brakes	
— make	N/A
— front	320mm dual discs one-piece aliper
— rear	single disc, single caliper

WEIGHTS & CAPACITIES

Tank capacity	24 litres (5.29 galls)
Dry weight	176 kg (388 lb)
Weight distribution	
— front	N/A
— rear	N/A
Wheelbase	1,400mm (54.6in)
Overall length	2,060mm (80.3in)
Overall width	725mm (28.2in)
Overall height	1,190mm (46.4in)
Seat height	840mm (32.7in)

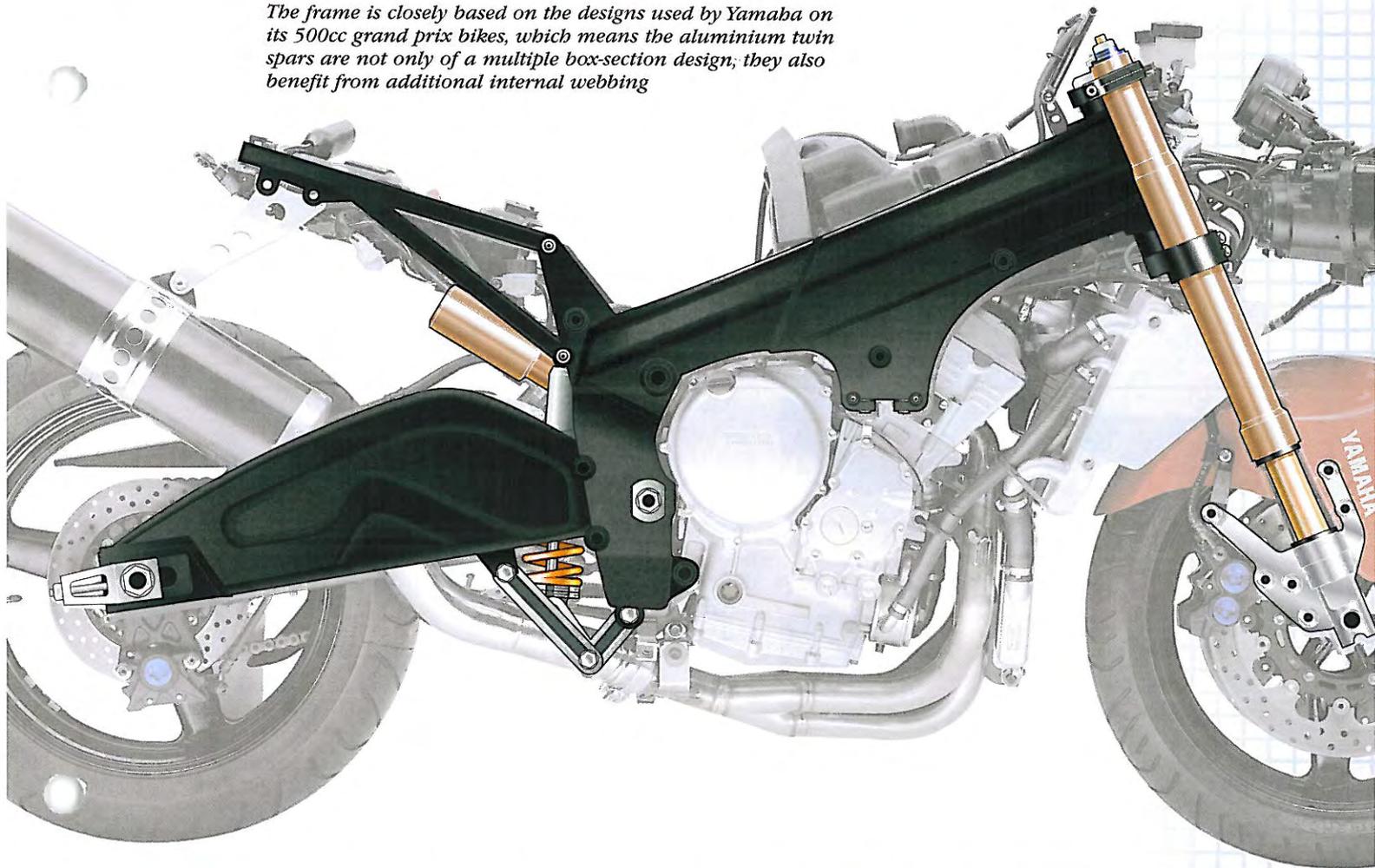




YAMAHA

YZF-R7 CHASSIS

The frame is closely based on the designs used by Yamaha on its 500cc grand prix bikes, which means the aluminium twin spars are not only of a multiple box-section design, they also benefit from additional internal webbing



ALTHOUGH as we've mentioned elsewhere in *Essential Superbike*, the designers of modern motorcycles aim not to make a chassis as stiff as possible but instead to achieve an optimum stiffness level, don't assume that race bike frames are just the same as road bikes'.

A good example of this was when an R7 racer we know took his bike in to a frame straightening specialist after a (severe) crash – in the attempt to twist it back into shape the frame came close to breaking the straightening jig!

This was the stiffest frame that the experienced operator had ever come across.

Grand prix design

The frame in fact is closely based on the designs used by Yamaha on its 500cc grand prix bikes, which means the aluminium twin spars are not only of a multiple box-section design, they also benefit from additional internal webbing.

A key component of course is the engine, and partly because the upper crankcase and cylinders are cast as a single, solid unit, this is also exceptionally stiff, with the result that the chassis overall is one of the strongest available on any road bike (which is because it's first and foremost a race bike...).

This is even apparent visually, as the upper mounting brackets connecting the engine and frame are bigger than you would normally expect because of the additional loads they have to take. Look closely at the headstock and swingarm pivots and



The Öhlins rear suspension unit is operated by a linkage system from the swingarm



The forks are Öhlins inverted racing items with a very low friction titanium alloy coating, which is the gold finish you see here



The engine on the Yamaha is exceptionally stiff too, with the result that the chassis overall is one of the strongest available on any road bike

you'll see unusual features there too: both are adjustable. By using the selection of different bearing housing inserts available, the position of the swingarm position can be altered, as can the steering head angle and trail figures.

The swingarm itself, as on the R1, R6 and the GP bikes is very long relative to the wheelbase, which is why it is very heavily braced. Instead of having a separate structure above the main section of the arm as its bracing, extra sheets of gusseting material fill in the gaps so that a single triangular structure is created. It has to be exceptionally stiff in order to match the stiffness of the rest of the bike.

The forks are Ohlins inverted racing units with a very low friction titanium alloy coating (the gold finish) which allows them better to deal with small suspension movements, improving grip and feedback to the rider.

Öhlins only makes one type of fork to a higher standard than these, which is the type sold to top level racers for around £5,000 a pair, so the R7 units are clearly extremely high quality. This is manifested as very consistent and accurate machining of the forks and their internal damper units with a wide range of adjustability which can nevertheless be very finely tuned. The basic design is little different to many other forks aside from more complex valving, but they are much better made for more consistent and precise performance.

Linkage system

The same is true of the rear suspension unit, also an Öhlins, which is operated by a linkage system from the swingarm – there is only a small amount of rising rate designed into the system, as the latest thinking has found that linear suspension movement at the rear generally results in better handling performance.

The wheels have three hollow spokes and are made of magnesium, which means they are as light as modern technology can make them. For a road bike, magnesium wheels aren't a good idea as it is not durable enough, but it offers as much strength as aluminium for substantially less weight, so on race bikes it is ideal.

It might surprise some to see the R7 only has a 180 section rear tyre, rather than the widest sports tyre available, a 190 section. But the 180 gives sharper and more responsive handling, and in fact 190 section tyres are chosen by manufacturers more because they look good – many bikes with them actually handle better when a 180 section is fitted instead, while the loss of grip is negligible.

Lightweight

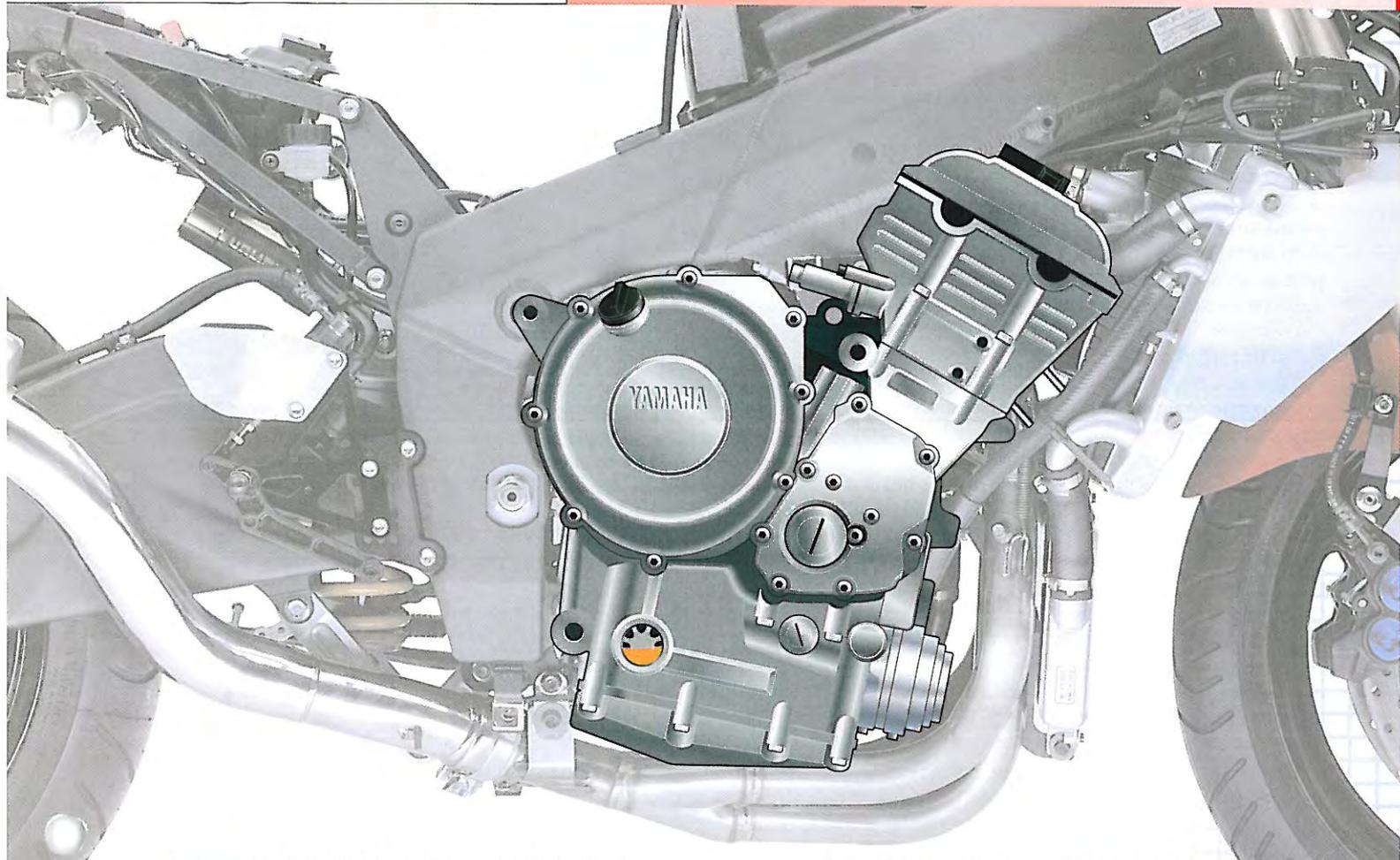
The R7's bodywork is made of injection-moulded plastic, but the company which does it for Yamaha uses a technique which its rivals have yet to be able to match, which results in extremely thin and therefore lightweight panels. The problem

is doing this with the sort of consistency needed for a production bike (even at the low production numbers required for the R7). To date, bodywork manufacturers such as Acerbis in Italy, which supplies many motorcycle companies, can't match the Yamaha bodywork (also used on the R6 and R1) for its exceptionally light weight.

The fuel tank however is aluminium, as it's still not possible to make a plastic tank as light as an aluminium one while still being strong enough. Unusually for a supersports bike, it holds a capacious 22 litres, important for the high consumption of race bikes during competition rather than touring duties of course!

The six-piston front brake calipers, made by Nissin, are machined from a single piece of aluminium, which makes them as rigid as possible which in turn provides the best possible feedback to the rider.

Whatever component of the R7 you care to analyse, you will find nothing better on any other production road bike. It's not a great bike to ride on the road, but it's not meant to be. This is as single purpose as you can get.



IN PRINCIPLE, the R7 engine is built along very similar lines to that of the R6 and R1, the differences being in the materials used and also the life of the engine – as primarily a race power unit, the R7 engine does not have to be able to clock up so many miles, although it is of course expected to withstand continuous high rev and high power usage. The production version of the motor too had to take into account the fact that Yamaha's World Superbike race machine would be based on it.

As with the R1, Yamaha did consider other types of engine including the V-twin, but for the reasons covered in the R1 engine section decided that four-cylinders would be best. And once the decision had been made for the R1, then the R6 and R7 would necessarily follow the same format in order to spread out the development costs.

Relationship

It would have been prohibitively expensive to design, say, a V-twin 1000cc bike, a three-cylinder 900 and a four-cylinder 600 as each type of engine, so as soon as the R1 was going to be a four, so would the R7 and R6.

The relationship between them is clear in the general configuration of the R7, which closely matches the R1. The cylinder head has Yamaha's trademark five valves per cylinder, with the same improvements over older versions seen on the R1, such as the reshaped intake ports, narrow valve stems and very compact combustion chamber.

The main difference made to enhance the motor's race potential is the use of titanium instead of steel alloy for the valves. Titanium offers considerably more strength for a given weight than steel, which means in the case of the valves they can be much lighter while doing the same job. This is very important because as a result the valve springs can be weaker, which means there is less energy lost as internal friction in the



The R7 is equipped with large capacity and very efficient radiators to help keep the (considerable) temperature of the engine down



engine (more goes to the back wheel). At the same time, the cam profiles can be steeper and the engine can rev higher before there's a danger of the valves floating off the cam face – in simple terms, the lighter the valves, the wider the camshafts can be, which means more power.

The pistons are forged rather than cast, which means they are effectively stamped into shape out of solid metal slugs rather than the more common process of liquid metal being poured into a mould. This is a more expensive method, but at a microscopic level the crystalline structure of the metal in forged components is smaller and stronger. For pistons, this means they can be lighter while offering the same strength as cast ones, a very important benefit because of the huge loads they generate on the conrods and crank bearings.

It's also worth noting that the cylinder head features more machining than the R1's, where most of the port shape is arrived at purely from the original castings. On the R7, additional machining refines the ports to a more efficient shape which can't be achieved by casting alone, and the finish of the ports is smoothed out too to improve gas flow.

Titanium is also used for the conrods, the other components in an engine which are subjected to particularly severe acceleration forces. Typically, a conrod at the top of the piston's stroke will be dealing with a tension force of around 10 tonnes, while at the bottom of the stroke it is being compressed by a similar amount. That's alternative compression and tension of 10 tonnes with every revolution of the crankshaft, which in an engine that revs to 17,000 rpm (as the R7 can do), is 570 times a second!

Strong and light

The strength therefore has to be considerable, but the conrods themselves contribute to the forces being endured by the big and small end bearings as well as the engine's vibration (especially the buzzy secondary vibration of an in-line four-cylinder engine) so even though they have to be immensely strong, they also need to be as light as possible.

Titanium does the job much better than steel, but it's not used more commonly for two reasons. One is obvious – it's considerably more expensive, important on any mass produced machine. Secondly, it is a lot more difficult to machine than steel, blunting machine tools far more quickly than steel, which again makes it unsuitable for mass production. The layout of the engine overall follows Yamaha's innovative tri-axis design, where the two gearbox shafts are positioned one above the other with the input shaft below the output shaft rather than behind it as on conventional gearboxes. This shortens the overall engine length which allows the use of a longer swingarm within the confines of the short wheelbase required of a modern supersports and race bike, long swingarms generally improving stability compared with shorter ones.

The third component of the tri-axis is the crankshaft, which very unusually features main bearings with smaller diameters than the big ends. This is in the interests once again of minimising internal friction, and although it was held responsible for a spate of crankshaft failures on early models, eventually these turned out to be due to the wrong specification of bearing shell material being used. Since that was corrected, the failures stopped.

The crankcases themselves, like the R6's and R1's, are split along two near-horizontal planes to facilitate the tri-axis layout, while the cylinders and upper crankcase are cast as a single item. This improves the engine's strength as a load bearing component of the chassis considerably, as the forces don't have to be transmitted across a gasket joint.

Fuelling is dealt with by fuel injection, unlike the R6 and R1 which use carburettors, but although there are two injectors per cylinder (for improved fuelling accuracy) only one is used on the road bike. The system needs to have a wiring modification made for the second injectors to start working, the reason for this being that with one injector per cylinder the bike is able to pass emissions laws (which it needs to be road legal), but with two it's able to work to its full potential. At the same time, a higher pressure fuel pump is needed plus a new pressure regulator, which both come in the race kit along with a different exhaust end can and other components, although there is much less in the R7 race kit than Kawasaki's or Suzuki's as the R7 was originally aimed at proposed Superbike rules which limited the costs of factory race kits – this is why the bike itself is to such a high specification.



The engine on the R7 has the input shaft below the output shaft rather than behind it as on conventional gearboxes. This shortens the overall engine length



The R7 differs from the R1 and R6 in its fuelling – the R7 is equipped with fuel injection (rather than carbs) which sits just below the airbox



IT might surprise a few people, but despite the R7's status as a homologation special machine designed primarily for track use, the majority of examples end up on the road. For every machine that's raced some six or seven are registered as road bikes, although undoubtedly many of these are used as track day machines anyway.

Even so, tuning the R7 is entirely different to almost any other road bike – unlike even the majority of other homologation specials, the R7 is fitted with the full kit of race components as it comes out of the crate. The titanium conrods, forged pistons, lightweight crankshaft, the crankcases, cylinders, cylinder heads and even the valves and camshafts are all those used on the race bikes, so none of them needs to be changed. On most homologation machines this reads more like a list of what needs to be changed before a bike can become a competitive racer.

However, that's not to say the R7 is a rip-snorting track bike straight from the showroom floor, far from it. As standard, in order to meet emissions and type approval regulations around the world, including those markets where there are upper horsepower limits, all standard R7s are restricted to a maximum output of 105bhp.

To find out exactly what needs to be done to the R7 we couldn't take our usual route of speaking to specialist tuners as a lot of the information is confidential, so no names are mentioned in this instance. But we found out anyway...

Overriding the restrictions

Releasing the bike's full potential is achieved in several ways: in the exhaust can there is a restriction designed partly to help silence the bike and partly to limit the peak power, while in a more simple measure the standard twistgrip doesn't open the throttle butterflies fully. The wiring loom is also set up in its original condition so that the second of the two fuel injectors per cylinder doesn't come into operation, which in turn means that it was necessary only to fit a lower pressure fuel pump with a pressure regulator adjusted to suit.

The idea of this was not only to meet various legal requirements, but in typical Japanese fashion to come up with a bike which is perfectly tractable and easy to ride.

Tuning work therefore involves replacing very few components with aftermarket items. Instead, you should be looking at correcting these various restrictions in order to allow the bike to function as the designers intended.

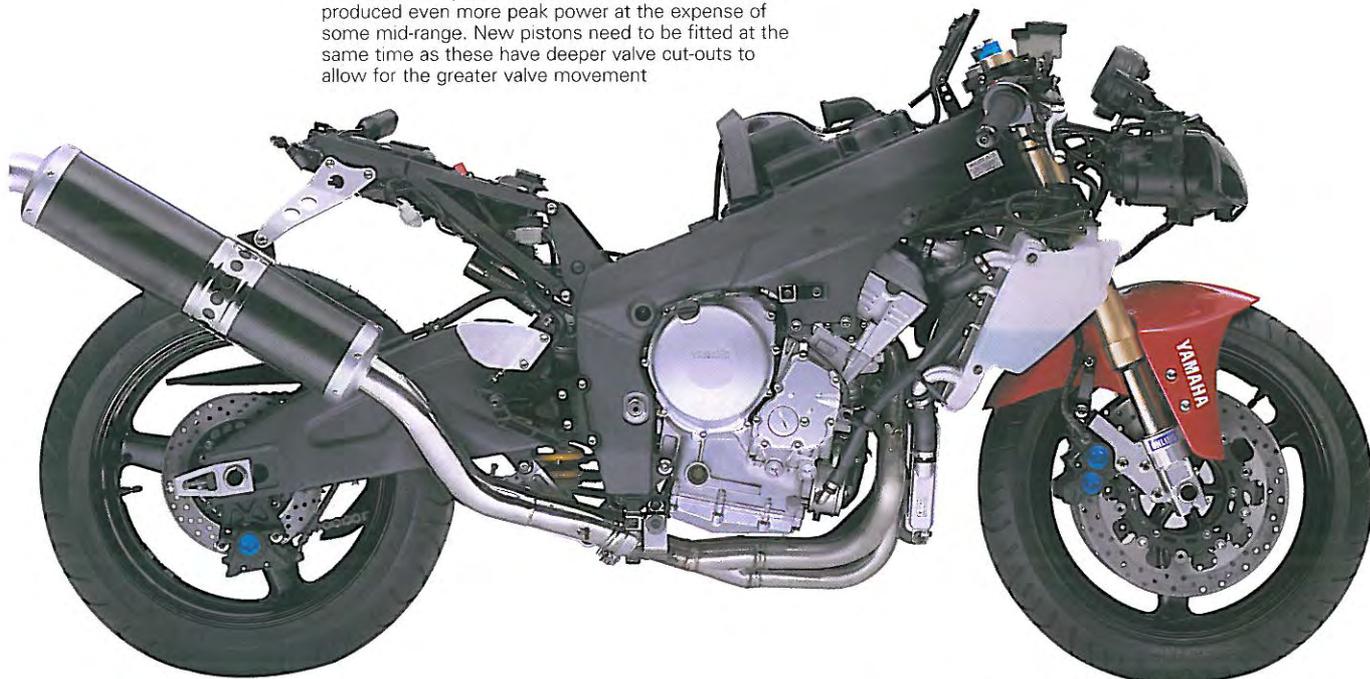
Changing the end can on its own for example releases an additional 7bhp, and it's worth noting that the exhaust system from the exhaust ports right up to the can



ENGINE & CHASSIS MODIFICATIONS

Camshaft

Yamaha list an alternative inlet camshaft for the 2000 season, which provides increased valve lift and which produced even more peak power at the expense of some mid-range. New pistons need to be fitted at the same time as these have deeper valve cut-outs to allow for the greater valve movement



Wheels

Fitting lighter magnesium alloy wheels will give a noticeable improvement. Yamaha use aluminium ones because these are far more suitable for road use but track day riders might want to consider mag wheels instead. Note though that the suspension will need to be set up again to suit the reduced unsprung weight, and the bike will be more prone to wobbles and instability than before

Airbox lid

The standard airbox lid should be replaced with the R7 race one, which is made of carbon fibre and which has no inlet holes in. When this is done, the big rubber plug on the underside of the airbox should be removed and the kit air scoop fitted, which passes forward through the radiator to source cool air from the front of the bike

is an exact replica of those on the original works R7 race bikes, so few aftermarket systems will give any improvement. Only one name crops up as an alternative complete system and that's Akrapovic, although this will cost around £1,500 as it's fabricated entirely from titanium. A Promoto end can costs around £400 and is recommended by several racers.

The other restrictions need to be dealt with at the same time, so a full action throttle assembly must be fitted, along with a high pressure fuel pump and regulator so that when the wiring is modified to bring the second injector into play there is sufficient pressure for it to work properly.

Changing the airbox lid to the R7 race one requires the radiator to be modified – in fact, a lot of riders fit a larger capacity or more efficient radiator to the R7 as the original is only just up to the job and in certain circumstances the bike can overheat, so this would be a good time to do that.

The wiring change is something of a secret, although some of the better known R7 tuners will have access to the information – they might also be able to supply the fuel pump and regulator, which will cost around £500, although these are in very short supply.

Thinner head gasket

The power output will now have escalated to around 137bhp, but there's more to come. The original head gasket is comparatively thick, so a much thinner one should be fitted to increase the compression ratio. At the same time the camshafts should be dialled in properly (adjusted so that the valve timing accurately matches the specified race version figures) – the engine power will soar again, and now be around 147bhp. And because of the very light engine internals, it will spin up to high revs with breathtaking speed, far more quickly than the one litre R1 road bike which produces similar peak power.

There's not really much a tuner can do to the inlet or exhaust ports in the cylinder head (usually a favourite area for extracting power gains by improving gas flow) as instead of these being cast and possibly mildly machined, on the R7 very expensive three-axis CNC (Computer Numeric Controlled) machining is carried out which ensures every cylinder's ports and combustion chamber is identical and exactly as the designer intended.

As for the chassis, the story is much the same, except that there's even less you can do to improve on how the bike comes as standard. The suspension for example is race quality Ohlins front and rear with full adjustability – you could possibly go for some of Ohlins highest possible specification forks to improve on the R7 ones, but these alone would set you back around £6,000.



Clocks are strictly business with analogue rev counter and liquid crystal displays for everything else



The rear suspension, along with an extended swingarm, features a fully adjustable piggyback type Ohlins shock absorber

Styling

Almost makes the R1 look dated. This is most definitely a bike for the track

Forks

The Ohlins inverted, flex-resistant 43mm forks have a special coating to enable smooth compression and rebound action over bumps

Valves

The three intake and two exhaust valves are made from titanium – reducing weight even further

Clutch

For the road the R7 has a wet clutch. It also has a back torque limiter so if the rider downchanges too early with the revs still too high, the clutch automatically slips preventing the back wheel from locking up



YZF-R7

What you're looking at here is little more than a full on, factory built race bike with headlights and indicators. It is the result of the need for Yamaha to build a small number of machines for public sale in order to qualify its racers for the World Superbike championship. The R7 is expensive, exclusive and packed with cutting edge technology



The tail light and rear indicators look like afterthoughts simply stuck on, which is exactly what they are – necessary for the road but not the track



The Deltabox II frame is of a lightweight, rigid design with the engine acting as a stressed member, something we now expect from this family of bikes

**Fuel injection**

Two injectors per cylinder controlled by a multi-functional Electronic Control Unit (ECU) which is responsible for ensuring top performance throughout the engine's rev range. It controls ignition timing, injection timing and the amount of fuel which is injected into the motor

Engine

The 749cc liquid cooled, 20-valve four is slanted forward helping air flow from the airbox into the fuel injection system as well as throwing some weight over the front end for better balance and grip. It's also a stressed member of the frame

Swingarm

As on the R1 the swingarm is longer than usual, the idea behind this being that a long swingarm and a short chassis brings the swingarm pivot closer to the bike's middle point thus reducing rear-end weight and helping to improve balance at the front

ESSENTIAL
SUPERBIKE



YZF-R7

YAMAHA
File 9
Section 3



*“Your heart’s
pounding, veins
throbbing, arms
pumped up”*

CHALLENGING ‘THE HATCH’

When KEVIN ASH took off on our R7 he headed straight for Brands Hatch – the circuit for the fearless with its unnerving climbs, dives and curves – where you too can feel the buzz of riding in World Superbike Championships – if you dare!

SO this is how Haga must feel! You’ve been doing track days the whole summer now, and although you say so yourself, you are getting pretty damn good. The bike’s sorted: proper four-into-one race system, free breathing filters, injection system remapped, suspension set up how you like it, some very grippy Dunlop race tyres – okay, so it wasn’t legal technically to ride the bike to Brands Hatch, but how many police would spot the ‘not for road use’ stamped on the sidewalls. They might hear the exhaust, mind... Still, it’s quiet enough when you back off the throttle.

Turn one, the drop to the right down Paddock Bend – you still remember how your stomach churned first time, then you thumped against the tank as the bike came up the other side. Now you know what to expect, and the R7 peels over onto the line you can’t yet see, brakes still dragging as you heel it over. Hit that bump mid-corner, the bike doesn’t mind. Then power it up the hill, engine howling like a real WSB machine, bike hauling in the hairpin called Druids. The bike snakes and squirms, tyre lifting slightly, as those fabulous brakes pin the nose down. Okay, so Haga’s machine is still swaying violently as he lays the bike down, but you did a good impression. Not bad at all, especially as that GSX-R disappeared behind you.

Out again, back end sliding, looking for grip as you fire the R7 down Graham Hill, round to the left, throttle on really early, a brief pause, a dab of the brakes then left and... FLICK, over to the right, running to the far side of the track before sweeping round Clearways, now teasing the back tyre with some delicate, testing throttle control. The bike’s over hard on its right hand side, accelerating, pulling, twitching, telling you everything, loving it, it’s built for this... and gradually, up another gear, standing it up while pulling the twistgrip back to the stop, and up a gear again as you straighten out, in front of the grandstand. The crowds would be cheering, waving their programmes. If the stand wasn’t empty.

But you don’t care... Your heart’s pounding, veins throbbing, arms pumped up, eyes wide and bright – this, THIS, is what it’s all about.

A fabulous race bike, a fabulous track. And you.

