

Photography by Dave Dewhurst (USA) and Kel Edge (UK)

Wayne Gardner's RS850R (top two pics) and Fast Freddie's VF750 Superbike (lower two pics)

WIN

SOME

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Honda's VF750F was designed with racing uppermost in the engineers' minds but the V4's track record last year wasn't quite what Honda expected. Alan Cathcart blagged himself a ride on the VF750 Superbike that Freddie Spencer rode to victory at Daytona and then piloted Wayne Gardner's Honda Britain RS850R V4 at Snetterton

STRANGE how things often don't work out the way you expect. 1983's racing season belonged to Honda's vees: Fast Freddie's V3 NS500 took the 500cc GP crown, Honda Britain's RS850 V4s beat Suzuki for the World TT Formula One title and Raymond Roche and his co-pilots romped home at the Bol d'Or on a 920cc version. Yet in the one series where no one expected Honda to lose out — the US Superbike championship — things went horribly wrong.

They started well enough, though. A crushing 1-2-3 win at Daytona, spearheaded by Spencer, seemed to put the VF750F-based racers well on target. Halfway through the season Honda's team of 11 bikes, 16 engines and up to eight riders had won six out of six races. But after a series of crashes and injuries, including one fateful day at Willow Springs which saw three Hondas destroyed, the Interceptors had to cede overall victory to Wayne Rainey's Kawasaki, which was running on a fraction of Honda's budget and had been completely outclassed at the start of the series. It was one of the most surprising tur-

narounds in recent racing history.

Conversely, Honda appeared to have little hope of retaining their TTF1 crown on this side of the Atlantic — or of holding off the Suzukis in the British Championship, or of doing much in endurance racing.

Against the opposition's 1000cc racers, Honda entered mere 850cc versions of the 750 V4 motor in the hope that, when installed in suitably state-of-the-art racing chassis, they'd prove competitive. Of course, using essentially the same motor they'll be fielding as a 750 in F1 and endurance this year would provide useful development data, too.

At first it seemed to be a horrible miscalculation: First the bikes were late arriving in Britain, then it became apparent that much development needed to be done. Spares were in short supply as well: Honda Britain had to revert to their old in-line fours for a couple of meetings and the works alloy framed versions entered in the Le Mans 24-hour in April retired after experiencing numerous problems. A bad start for the vees.

Then everything clicked. Hon-

da won the Formula One Isle of Man TT and shortly before Joey Dunlop was trapped at 171mph at the North West 200 — the speed deficiency allegedly evident at Le Mans was obviously no longer a problem. Wayne Gardner was scoring a string of successes, culminating in a nail biting victory at Silverstone after a fairing bashing duel with the works Suzukis of Grant and McElnea. In winning, Gardner clinched the British F1 championship and showed that the RS850R could give away 150cc, a fair bit of power and, probably, a couple of pounds to the opposition and still win. Joey clinched the world F1 title in Ulster and Honda stormed the Bol in September. Six months before it had all seemed so unlikely.

These are the bikes. At the IoM TT I had an exclusive look inside the RS850R and later in the year I rode Spencer's Daytona winning 750cc Superbike at Willow Springs (where Honda's AMA Superbike championship hopes had ended) and Gardner's RS850L at Snetterton. This is how the world's largest motorcycle manufacturer goes out racing with production-based machines.

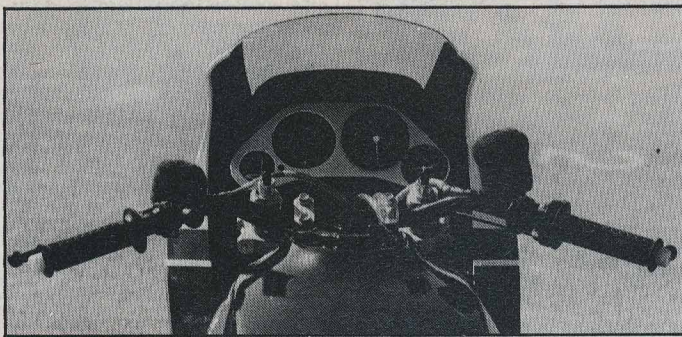
LAST year's in-line Honda Superbikes looked like stock FZ900s from 20 yards away, then lost five per cent of that similarity with every step you took towards them. Close to, they looked what they were: unabashed, tricked-out racing motorcycles based somewhat tenuously on their street ancestors.

Approach a V4 Superbike the same way, and 20 steps later you'll still be amazed how close it looks to the stocker. That's partly because of a general tightening-up in the AMA rules and partly because all the good stuff's already on the road bike.

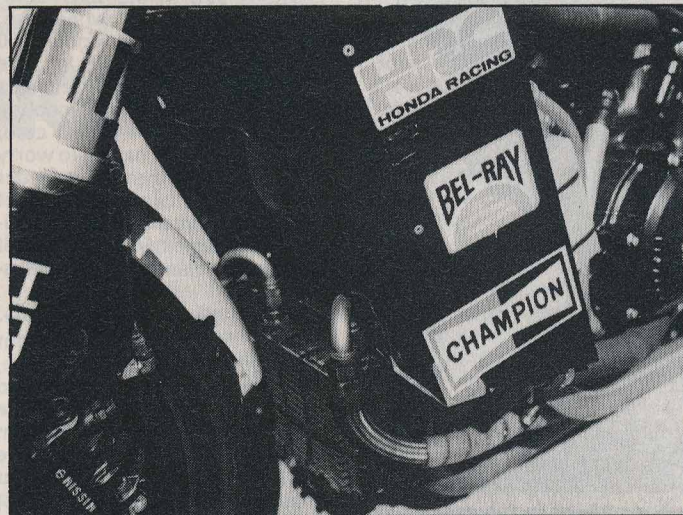
USA team manager Udo Geitl's men use the same square-tube steel chassis as the road bike, shorn of a few unnecessary lugs and the side-stand. They also use the stock swing arm: they tried making special ones, but the standard one was better! The Pro-Link rear suspension employs a special Showa unit designed for the racing Interceptor and based on the design for the RS500 GP bike; naturally, it's adjustable for both compression and rebound damping as well as for ride height and spring preload. Front forks similarly are based on Showa's RS500 design, measuring 41.3mm in diameter, except these are much longer to suit the taller road chassis. Again, they're two-way adjustable and are fitted with hydraulic anti-dive with external spring adjuster, coupled with a fork brace incorporating the mud-guard mounting and carefully shimmed up so as not to load up the suspension. Steering head angle is 27° — steeper than on the road bike by 2.2°. The 16in front wheel carries massive twin 310mm diameter discs, made from meonite after it was found that steel warped too quickly due to insufficient cooling at high speed. The rear steel disc has been progressively reduced in size to only 190mm: the riders claim they hardly need to use it. Front calipers are the excellent twin-piston Nissins as fitted to the GP bikes.

Wheels are extruded alloy Comstar-type bolted-up wheels with magnesium hubs; wheel-base is standard, at 58.5in. 'We tried carbon-fibre wheels,' says Geitl, 'but we really don't need them. The minimum weight for Superbike is 390lbs, we generally weigh 398-400 with water and oil but no gas, and so we're very close. We can be lower yet, but since for most of the season we had a considerable horsepower advantage, it wasn't worthwhile.' How much horsepower? 'That we shouldn't discuss, but a lot.' More than 120bhp, given that Oshiro san's charts showed the RS850 to be producing 132bhp? 'Yes!' OK — thanks!

Once mechanics Mike Velasco and Phil McDonald had bumped the engine into life, the lazy-sounding flat burble of the 90° V4 began echoing across the Mojave Desert. On a hot 90° day it didn't take long for the temperature gauge to hit the 85°



Flat bars in special yokes replace the road bike's clip-ons



Oil cooler replaces second radiator for the VF750F racer

SPENCER'S SUPERBIKE

mark considered optimum for racing. 95 degrees is bad news but unlike the RS850R I would try a couple of weeks later in much cooler conditions idling the engine didn't seem to cause the needle to start climbing off the clock.

Sitting on the bike you'd swear you were on a roadster, even down to the dashful of instruments in front of you (the speedo is disconnected). Flat, one-piece bars bolt to the top of the special yokes, contrasting with the street bike's adjustable clip-ons (or bolt-ons, actually). In fact Spencer used the bike at Daytona with CB1100R clip-ons fitted, but his team-mate Fred Merkel, who has ridden it since then, prefers more leverage and had them changed after he took the bike over. The standard steel fuel tank is retained, by order of the AMA, complete with lockable filler cap, which caused some excitement at Aldana's fuel stop in the Daytona 100-miler when he forgot he was supposed to unlock it with the key.

The svelte standard instrument fairing is used, but no headlight fitted. Top speed is 159mph on Daytona gearing. To go any faster would require an awful lot of extra power thanks to the substantial frontal area.

Within 100 yards of accelerating on to the track I knew I was

riding an exceptional racing bike. I had to pinch myself mentally to remember it was a racer at all. The racing VF's powerband is unbelievably wide, with usable power as low as 6,500, then a strong surge from 7,500rpm up. A period of roughness at 7,000rpm, which feels like the engine's suddenly turned into a power drill but is in fact a sign that the camshafts are starting to work, tells you the power's turning on. Then everything smooths out and lovely, liquid power runs right up to the usual rev limit of 12,700rpm, though the engine is safe to as high as 13,500. There's no point screaming it to more than 12,000 because the closely-spaced gears keep you well in the powerband, even if you change at 11,500, and because the torque curve is so flat. Incredible.

This immense tractability was particularly useful at Willow Springs. It was the first time I'd ever been round the track and all I can say is that if you think it's difficult to find the quick line round Silverstone's featureless wasteland, wait till you try to navigate through Turns Eight and Nine at Willow. On and off the throttle (on when I remembered the line) and stroking it into Nine's tight apex before cracking it hard open for the run down the finishing straight, the

V4 engine took all this and more in its stride. No need to clutch it, just open the taps and let the power pour out.

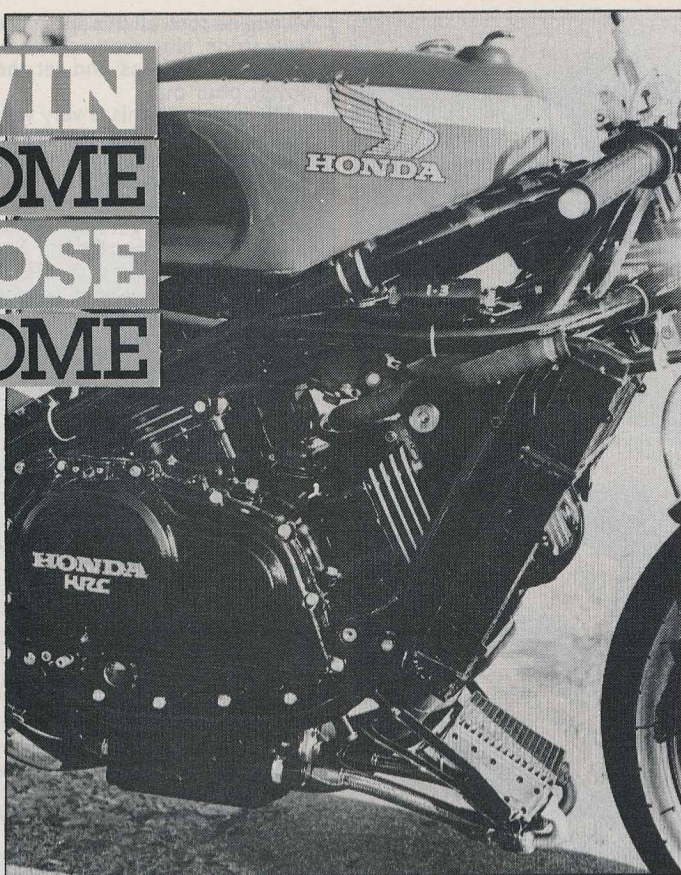
Of course, all this is very well if you just want to potter round and pick up place money, but these bikes were designed to go out there and win. On the part of the track I did get the hang of quickly, I was able to find out how well they fulfil that role. A combination of w-i-d-e torque spread, pinpoint handling and superb front brakes makes the Interceptor one of the easiest bikes on which to learn fast corners I've ever sampled.

After riding 'proper' race bikes with fairings and clip-ons and suchlike, it felt strange to be sitting up behind the high, flat bars. But the illusion of being a bit higher off the ground than usual on a racetrack soon disappeared and I began to feel complete confidence in the bike. Two places exemplified this. Turn Two is a long uphill horseshoe with just a touch of off-camber. You go in fast, lean the bike hard over to the right, and leave it there for what seems like an age while waiting for the right moment to snap the throttle open without having the back end step out.

The other place was just a bit further on, the Three/Four complex that swoops up the side of a hill, turns sharp right, then drops downhill again. Here the benefits of the 16in front wheel became readily apparent because while braking hard for Three you have to turn quickly and start climbing the hill without losing momentum; all the while trying not to run off the edge where the road flattens out. Then at the top of the hill you have to flick over to the right to drop down again to Five. And, under braking for Three, the anti-dive really retained road feel and movement, rather than freezing the suspension as on other race bikes I've tried.

Anything I didn't like? Well, the front end felt a bit stiff (probably set up for Daytona's banking), and at the end of the day I really didn't care that much for the riding position in race terms, but that's a question of personal preference. Without another bike there to compare with, I'm not sure about the Interceptor's acceleration against the opposition, but to have made a bike beladen with watercooling so close to the class weight limit is a feat Honda should be proud of, especially since they've done it without too much exotic metallurgy. And the VF's power output was certainly well ahead of the rest till Kawasaki caught up at the end of the season. But now the Green Meanies have closed their race shop, put riders and engineers on the unemployment line, and we'll never know if Honda would have got their own back in '84. Though it's rumoured that Yamaha and Suzuki will have Superbike teams in 1985, that leaves next season with the makings of a Honda benefit: you know — a racing certainty. ■

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Wayne Gardner's RS850R has motor tipped back in tubular frame to allow steeper head angle

GARDNER'S RS850R

IF THERE'S one sad thing about the Japanese manufacturers' racing policy, it's their attitude towards obsolete machinery. Championship-winning machines aren't retired to factory museums or loaned out for display elsewhere; they're just destroyed.

By the time you read this, Wayne Gardner's RS850R will be no more. Two weeks after I rode it at Snetterton on a crisp, sunny afternoon, the engine was on its way back to Japan to be destroyed and the chassis put up for sale. Okay, so the 850 had fulfilled its task — but what a shame that no one will be able to see and appreciate it in 15 years time. Shame.

What makes it even more regrettable is that Gardner's machine is/was the finest racing motorcycle I've had the privilege of riding. Such a sweeping statement has much to do with my own preference for four-strokes but, viewed subjectively, the RS850R was the most confidence inspiring bike I've ever sat on.

I rode it as hard as if I was on one of my own racers, just because it invited it, and was repaid with a 1 min 13 secs lap, seemingly without trying. I'd say this bike could be ridden fast by more riders who aren't in the

top rank of racers than any other I know: it very nearly doesn't have a single vice. Its engine, like the 750cc Superbike, has a vast power band but with even more torque, and the handling is almost perfect.

With its steel tubular chassis and wet clutch engine, the RS850R weighs 376lb dry. The alloy frame used in the world F1 championship and at the Bol d'Or saves around 12lb, but only three of the 25 RS750/850/920Rs made for 1983 boasted this feature. The small batch of 750s being made for sale to private teams for '84 will have it but, at around £20,000 each, the relatively impecunious teams that make up the bulk of the TT F1 fields haven't rushed to sign cheques.

Recognising the problem, Honda are offering a three-stage kit to transform a street VF750F into a TT F1 racer: the whole package includes new heads, valves, pistons, an oversize radiator, close-ratio gearbox kit, British-made Dymag wheels, a full fairing, 24-litre fuel tank, front and rear suspension (springs only) and other bits and pieces. Prices have yet to be determined, but all this stuff should be available early in the New Year and will be of particu-

lar interest to potential endurance competitors. The use of the Dymags is interesting, because according to Barry Symmons the Comstar-type wheels fitted to the RS cost £1500 a pair and are 'not very robust'!

Like the Superbike, the RS850R's engine is rotated back in the chassis by 8° to allow a steeper head angle and shorter, 56in, wheelbase for more manageable handling. Even so, Wayne would like to bring the front wheel back a bit more, but there just isn't room: the front cambox gets in the way. Compare the Honda's wheelbase, with the 60in of an air-cooled 900 Ducati and the feat of the Japanese designers becomes apparent.

Watercooling obviously helps in this case, though. Without having to worry about placing the rear cylinder where it'll get a good supply of cooling air, you can simply position the engine where it'll result in the best handling characteristics.

Suspension is by a shorter version of the 41.3mm Showa front forks fitted to the US Superbike, and the same nitrogen-damped rear unit. Brakes are the same diameter up front, with a 220mm rear, and all appear to be made out of some esoteric alloy that has more than its fair share of cast iron in it: they rust when wet! Steel nuts and bolts are used throughout, rather than the titanium items in the alloy-framed specials, and the bluff-fronted, wind tunnel-tested bodywork bears a strong family resemblance to the NS/RS500's streamlining.

Instruments are confined to a rev counter and coolant temperature gauge — the latter a vital fixture since much to my surprise it transpired that the engine overheats rapidly at idle, and once it hits 95° you must shut down or risk serious damage like a blown gasket. When the bikes were kept waiting on the grid for the start of the Assen F1 round, Wayne's bike overheated so much the seat actually melted! Cracks about asbestos underwear need not be made...

The riding position's a snug but comfortable fit, with the big 24-litre fuel tank nestling into your chest and providing a useful rest on long fast stretches. Bottom gear is very low, but even so with 11.5:1 compression it needs two pushers to bump-start from cold so forget about using the bike for British club racing!

Once out on the track, I discovered that first is also much too low to use except for getting off the line, even at Snetterton's hairpin: before I managed to work this out I'd stalled the engine twice trying to change into the very notchy bottom gear. Fortunately, it restarted with momentum, but it also illustrated another feature of the engine: the flywheels have surely been reduced in size compared to the road bike, because their effect on engine braking is almost non-existent and the en-

gine dies immediately if you close the throttle. As mechanic Dave Sleat neatly put it, it's an honorary two-stroke. Except for one thing: that incredible power band.

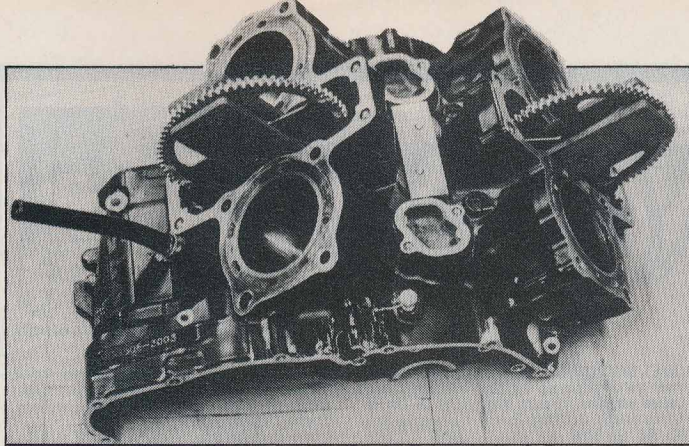
With the extra 110cc and different camshafts, the 859cc engine is even torquier than the 750. Power comes in at 6000rpm, with normal peak revs at 11,500 though the engine is safe to 12,750rpm. The rough patch is there, too, but this time higher up the dial at around 8200rpm. But, with the beautifully matched gear ratios, you never normally encounter it. Second and third are 1700rpm apart, then there's only 1300rpm before fourth, and fifth is very close to fourth — only 1000rpm difference — indeed. Taking the left/right flick of Russells meant just notching fourth on the way in, and driving hard up the hill to the start line before grabbing top for the run to Riches. Then back to fourth before coming down to second for Sear, and off down the straight. The smooth power delivery and exceptional flexibility of the engine really told in minimising the number of time-consuming gearchanges.

Slightly undergeared for the straight, I was seeing 11,900 on the clock before shutting off for the hairpin where the fabulous brakes really came into their own. After 15 laps I was able to brake from over 150 mph within the 200 yard mark (I'm not kidding myself that Wayne doesn't wait till even later). The front discs responded instantly with maximum effect while the anti-dive worked to advantage when negotiating ripples.

Handling is literally awe-inspiring. Though a relatively bulky bike, the Honda changed direction precisely in the corners and steered lightly but positively through the swerves of Russells and the Bombhole: only at the former was there any trace of misbehaviour, with the front wheel starting to flap around as I crammed on the power while still cranked over: tightening up the steering damper a notch or two cured that. By ultra-critical standards the steering could be quicker, even with the 16in front wheel fitted, but there's no way to improve that without steepening the head angle further.

Sadly, after 25 laps or so the front wheel stepped out at Sear and, though I managed not to do a premature job in the crushing department and picked it up before I landed on my ear, playtime was over. The front tyre fitted was only an intermediate and it was cutting up badly on the right side. With no slick on hand, it was time to call it a day after one of the most enjoyable rides I've ever had on any bike.

'I never thought you were going to ride it that hard, else we'd have brought a slick,' said Dave Sleat, while Barry Symmons just looked relieved that he still had a chassis to sell at the end of the day. But the RS850R is that sort of bike: it invites being ridden hard, and lets you do so safely. ■



This is an 850cc engine's top half, showing camshaft drive gears

SPLIT ENGINES

INSTEAD of building a street bike and then sitting down to work out how to go racing with it, Honda engineers stood traditional Japanese design philosophy on its head when they planned their post-1000cc F1 racers. The result is not only a smash hit in the showrooms (try buying a VF750F on either side of the Atlantic and catch the salesman's reaction when you mention the funny word 'discount') but also the basis of a pair of racers surprisingly similar in mechanical detail to the roadster.

The principal difference is that the racing engines have gear drive to the twin overhead camshafts compared to the road bike's chain drive. This necessitates not an *entirely* new crankshaft but one similar to production except for a pinion instead of the chain sprocket in the centre. Both US and F1 rules require the standard stroke to be retained, which means that the only way of increasing the capacity is to overbore the 750's 70 x 48.6mm cylinders to 75 x 48.6mm for 858.83cc, resulting in the RS850R engine. Honda aren't saying how they made the 920 version without cutting into the water jackets. A gallon of coolant is carried in a single radiator, compared to the two rads of the road bike, but a standard water pump is used.

Dry-sump oiling is desirable in competition engines, and so is an oil cooler, but the use of Pro-Link suspension makes fitting a separate oil tank in the conventional position impossible. Moreover, the plain bearing bottom end of the V4 engine requires a constant high-pressure supply of cool oil at 80psi. These factors determined the Honda's unusual twin-pump, twin-sump system, which race engineer Oshiro san calls a 'semi-dry sump' design, but which Udo Geitl insists is a true dry-sump system. The area beneath the engine is divided into two compartments: oil returns by gravity to the front sump, where a scavenge pump transmits it to the oil cooler, mounted low down in place of the second radiator on the road bike. From there, a high-output pressure pump feeds the lubricant to the

engine again, before the whole cycle is repeated. This constant-pressure system ensures an uninterrupted high-pressure feed, permitting very close crankshaft big-end tolerances. The same oil also lubricates the 5-speed gearbox, essentially the same as fitted to the 1025cc FWS V4 of 1982, the rolling testbed for the 1983 bikes.

Ignition is provided by a Kokusan-Denko CDI generator, firing a single 12mm plug per four-valve cylinder. Induction is provided on both bikes by a set of four specially-made CV Mikuni carburetors, made in weight-saving magnesium but otherwise similar to the street bike units: thanks to the curious World (meaning British) F1 carburettor rule, Gardner's bike must run the same 32mm size throat as on the VF750, while the US Superbike opts for 34mm. Valves are titanium and use multi-rate steel springs after titanium ones gave trouble.

Unlike the road bike, where clearances are set by threaded adjusters, the RS's valve clearances are altered by fitting different-thickness caps over the end of each stem.

Pistons are supplied to the American team as unmachined blanks from Japan, which enables them to employ different compression ratios for different circuits varying from 10.8:1 up to as high as 12.2:1. Honda Britain on the other hand employ 11.5:1 for the 850 regardless, using Avgas. Conrods are titanium, and surprisingly enough are manufactured in the USA to Geitl's specification for use in all racing V4 engines the world over: the Japanese accepted that doing it this way would result in a superior product.

You can even ride it like a road engine, as the Honda Britain mechanics proved at the TT. Udo Geitl did much the same at Daytona last March. How so? Well, Freddie's race bike needed a bit of running-in, you see, and the Daytona Speedway was closed, so ...

Well, anyway, he got caught on Volusia Avenue by the local gendarmes — slick tyres, race exhausts and all. What got them interested in the look-alike racer? No licence plate. ■

TEAM BIKE TEST

RACER TEST

'Aye,' said Roger Marshall getting off the Team Bike Honda, 'I can see how you came fifth at the Bol.' Not a bad compliment that, coming from a four-times British champion who's spent his last year on the Honda RS850R that Alan Cathcart waxes lyrical about in the rest of this feature. While we were up at Snetterton snapping the works machinery it seemed like a good idea to put a works rider on the Team's racer and get an unbiased opinion.

The first doubts about the wisdom of a guest test entered Howard's mind when Roger announced that the gear change was on the wrong side for him. Oh well, never mind. Roger departed from the pits with his right foot well away from the rear brake.

This year six different riders have raced endurance with Howard and the one thing they've all been agreed on is that the brakes are definitely the business. Roger Marshall made that unanimous. 'A1. They're so good I can stay on them right into a corner then think about what to do with my feet.' There's a testimonial for Brembo Gold Line equipment, from a man who has spent a season using the trickiest-of-trick Nissin four-piston calipers.

He was pretty nice about the rest of the bike, too. Roger originally thought the frame might be whipping going into corners but later decided that this was because he was getting the back wheel extremely light under braking and was having to modify his normal style. Roger usually uses the back brake a lot but, because of the controls being the wrong way round for him, he was keeping well away from the Team Honda's pedal. He also reckoned the clip-ons were a little too radical for him. Nevertheless he was getting round bloody quickly and reckoned he'd have been two seconds quicker with his normal set-up.

It's a tribute to Howard's bike-building that Roger mostly talked about how he'd like the bike set up for himself — not about the thing being underpowered or a pig to get round corners. In fact Roger reckoned the bike was: 'Phenomenal, seeing as what it's done.' That being the Bol, the Italian World Endurance round at Mugello and the F1 race at the Brands Hatch end of season international since the engine was last touched. He didn't find the bike heavy: 'Very easy to flick around — no problem,' and was pleasantly surprised to find the motor had lots of grunt. But he did miss anti-dive and would have liked the rear suspension harder — back to personal preferences.

So, he liked it. The bike's down on top end compared to a works bike, obviously, but apart from that we now have an expert witness who says the Team Bike Honda is as good as we always thought. Race fans will also be pleased to hear that Roger is in the Honda UK team for next season and will be riding F1 on the new RS750 and will also have an RS500 for the British Championship, TV races and some major national and international meetings.

Julian Ryder

