MARTIN LAMPKIN Joins Team DBR...First Tests Inside

DIRTBIKE RIDER

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SSDT REPORT
One Man's Challenge

British 500 GP Preview
Plus 250 GP Action

D.I.Y.
Project XL250

WILLIE SIMPSON
Against The Odds

DYNO-MIGHT
500cc Power Secrets Revealed!

TESTS
Suzuki RM250 · Italjet Duo · Kawasaki Tecate

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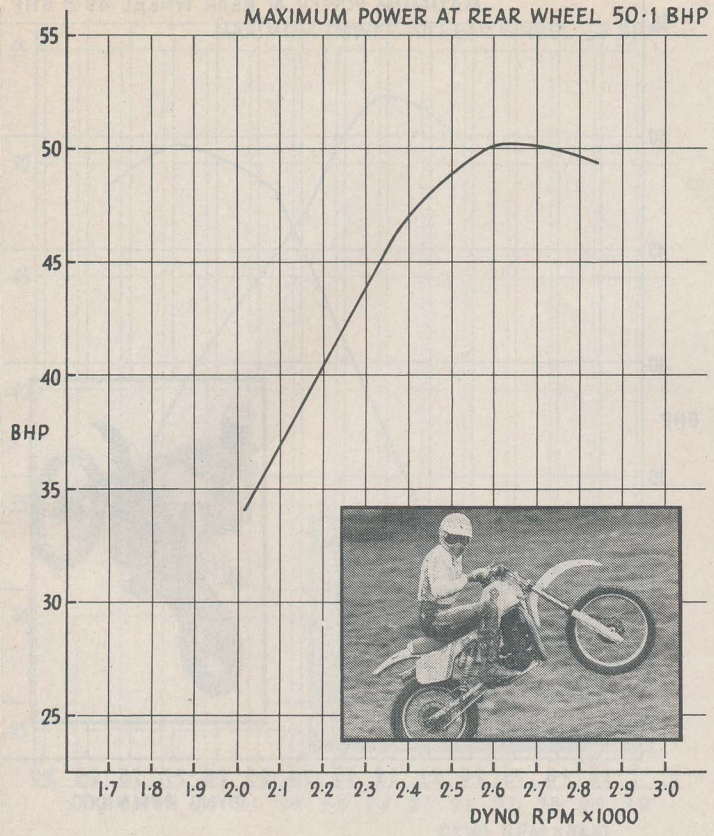
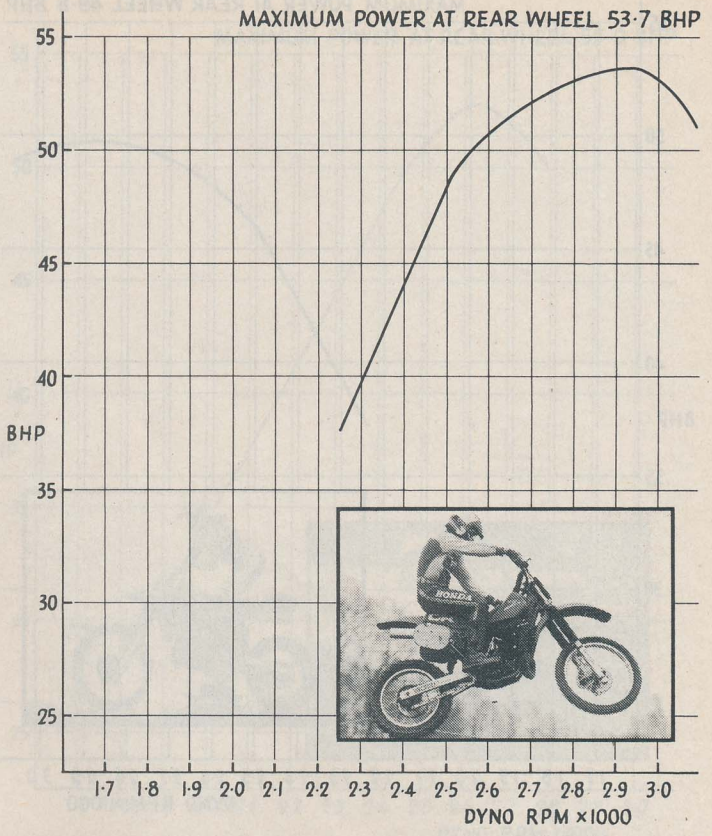
Power Games...





HUSQVARNA 500CR

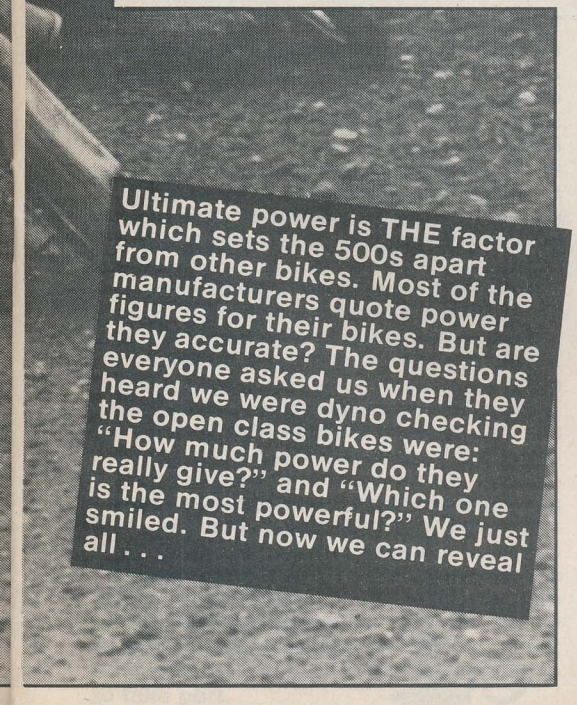
Bore	86mm
Stroke	84mm
Capacity	488cm^3
Compression ratio	9.5:1
Maximum power	50.1bhp @ 6100rpm (rear wheel power)
Torque	44lbf.ft @ 5500rpm

QUITE honestly, we didn't expect the Husky to produce the amount of power it did. However, when held on full power the engine quickly faded, a fault which we attributed to carburettor flooding. Running on a chassis dyno allows those sort of problems to be easily sorted; it being possible to closely inspect each part of the bike while running it at full noise. The bike ran cleanly enough, though it could only be held on full throttle for about 10 seconds before the fade occurred. But on a motocross circuit 10 seconds on full throttle is a long way!

HONDA CR500R

Bore	89mm
Stroke	79mm
Capacity	491.4cm^3
Compression ratio	6.7:1
Maximum power	53.7bhp @ 6500rpm (rear wheel power)
Torque	46.3lbf.ft @ 5500rpm

IN our race against the dyno the Honda proved to be the strongest puller. The 53.7bhp figure is an awesome power output for a bike which only weighs 225lb. In raw terms it is akin to the strength of one average horse moving two bags of sugar! (1-bhp/4lb). Even though the Honda came out as the most powerful it is only about four per cent more powerful than the Husqvarna. Now who would have put those two that close in a power comparison? Although we have measured maximum power recorded with the throttle in the Wide Full Open position, the bikes also produce a lot of power on part throttle which, in all honesty, is where they are ridden for a good deal of the time.



Ultimate power is THE factor which sets the 500s apart from other bikes. Most of the manufacturers quote power figures for their bikes. But are they accurate? The questions everyone asked us when they heard we were dyno checking the open class bikes were: "How much power do they really give?" and "Which one is the most powerful?" We just smiled. But now we can reveal all . . .

OUR first move was to gain access to a specially adapted Heenan and Froude dynomometer. The device allows motorcycles to the run by attaching the spindle location in the swing arm to a special framework. With the rear wheel removed the dynomometer is driven by the bike's own final drive chain. There is no chance of slippage occurring – which is not the case with a rolling road-type power measuring instrument – and the power measured is very close to that actually available on the race track.

The test procedure involved mounting each bike on the dyno and positioning a large fan to blow cooling air over its engine. After warming up the engine, top gear was selected and the engine run on full throttle while winding on the dyno's resisting load to slow the engine down.

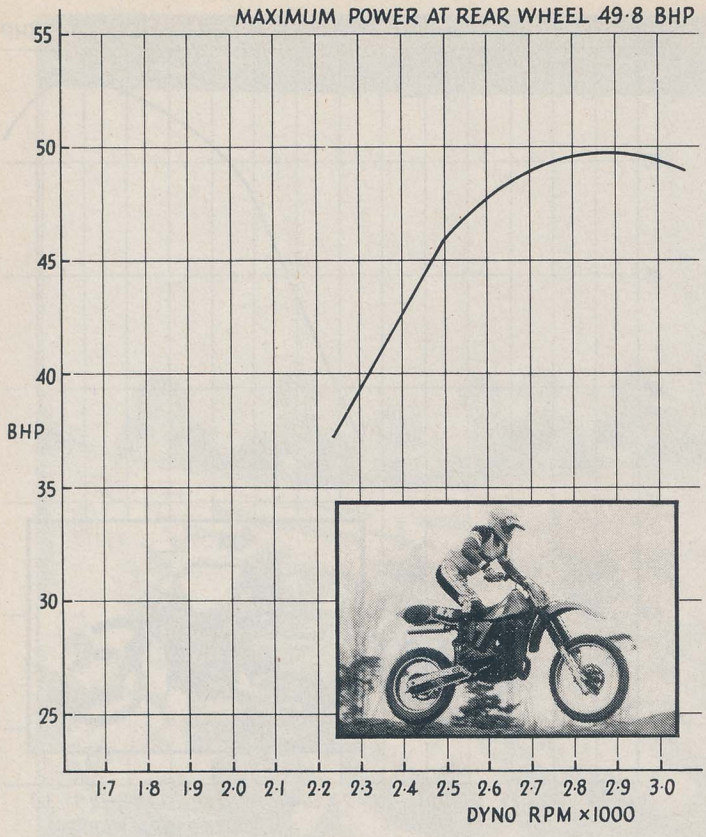
At an engine speed above the top gear stalling speed (the dyno being capable of absorbing far more power than a 500cc engine can produce), the first load reading was taken. The restriction imposed by the dyno was then slightly reduced, allowing the engine speed to rise. After waiting for the prescribed stabilising period to elapse, the next load and speed readings were recorded. The procedure was continued until maximum engine power output was reached.

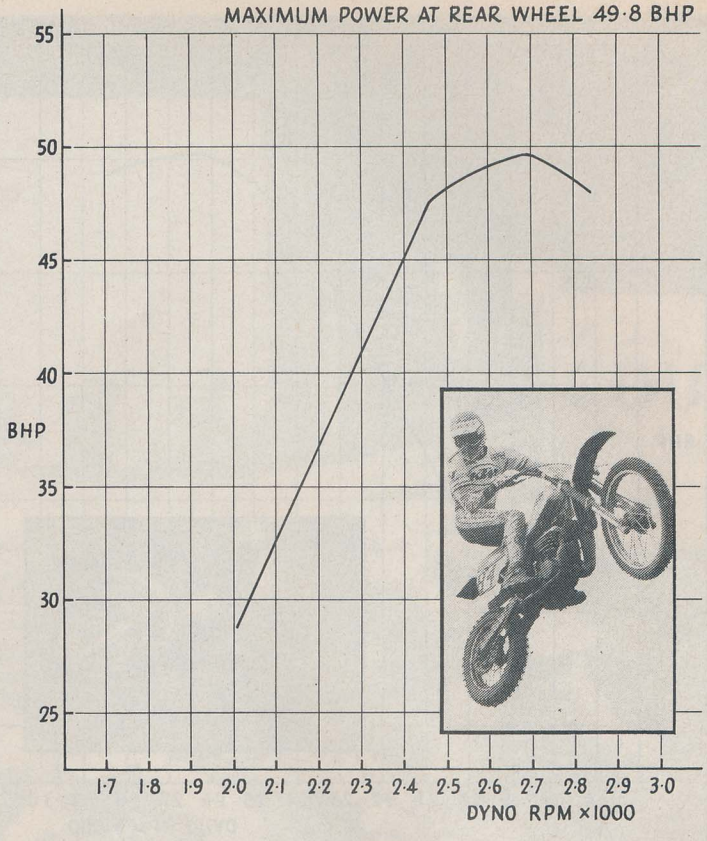
The figures of load and dyno speed were then fed into a microprocessor – which has a printing facility and the power figures for the engine established. Conversion of the dyno speed into engine speed is a simple calculation using the primary and secondary reduction ratios featured in the bike and on the dyno.

All the bikes tested had one thing in common – a rapid rise on to the bottom edge of the power curve. With all the finesse of the average rat trap! It is possible to see riders exploiting this feature of a bike's power delivery by fanning the clutch.

The procedure allows a rider to take a tight slow turn in a high gear. By using a high gear the revs are held down and a fast exit is achieved by dipping the clutch to raise the engine speed. So immediate is the response that the rear wheel spins violently as the power to it increases.

Looking at the various 500cc engine designs shows how it's possible to get many different results from the same





KAWASAKI KX500

Specification

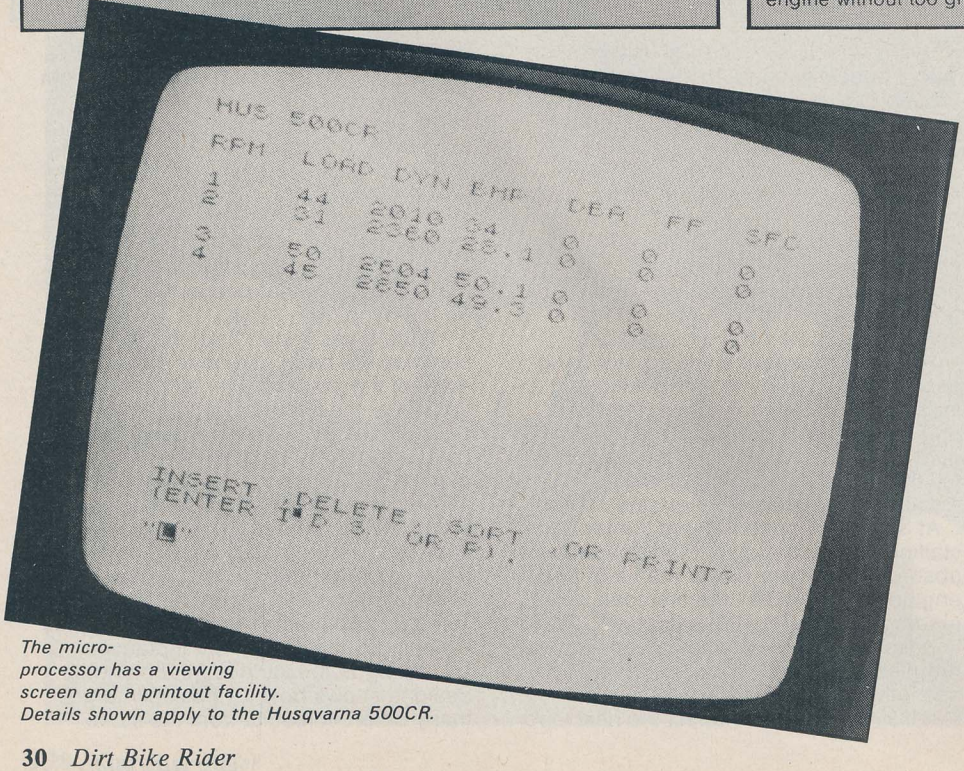
Bore	86mm
Stroke	86mm
Capacity	499cm^3
Compression ratio	6.7:1
Maximum power	49.8bhp @ 6000rpm (rear wheel power)
Torque	45.6lbf.ft @ 5200rpm.

THE KX500 actually nipped-up very slightly when being run. We were able to whip the clutch in quickly enough to prevent any damage and immediately after cooling the engine pulled cleanly to its maximum power output. The Kawasaki could also be pulled down on full throttle to near stalling speed and then quite happily run cleanly to peak power with no sign of misfire.

KTM495

Bore	92.25mm
Stroke	74mm
Capacity	495cm^3
Compression ratio	11.8:1
Maximum power	49.8bhp @ 7100rpm (rear wheel power)
Torque	38.4lbf.ft @ 6540rpm

THE KTM was the biggest surprise. We expected it to produce more power than it did, although 49.8bhp is enough for most people. The biggest problem with the bike was getting it to run smoothly. With such a short stroke – shorter than any of the other open classers – the ports are uncovered so rapidly, due to the high piston speed, that power rises occur very rapidly. The low torque figure can also, in part, be attributed to the engine's aspect ratio (the relationship of bore to stroke). With a different exhaust system fitted it might be possible to extend the rev range of the engine without too great a loss of ultimate power.

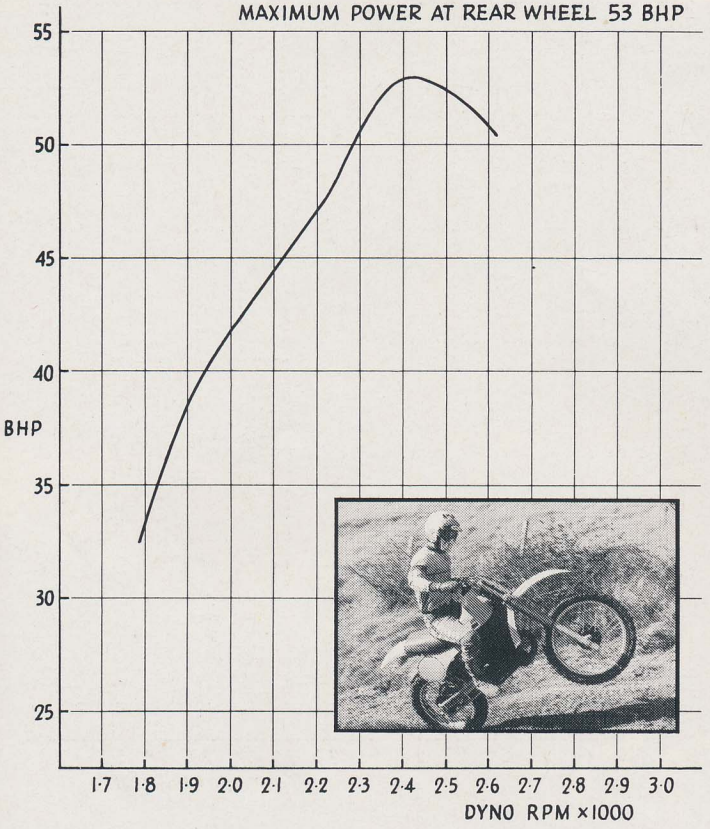


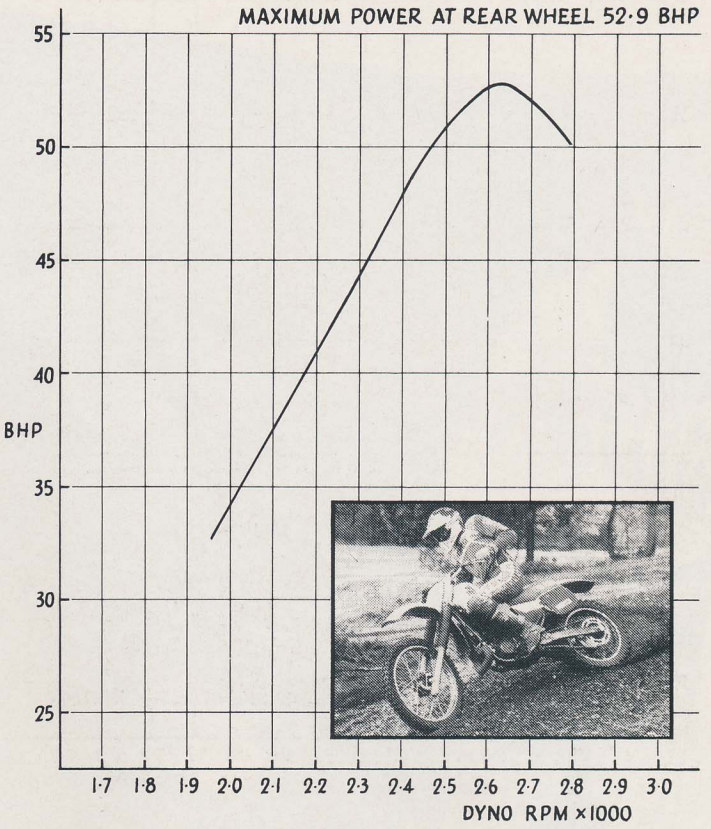
The micro-processor has a viewing screen and a printout facility. Details shown apply to the Husqvarna 500CR.

basic concept. The similarities between the engines are few. While all use reed induction and are all air-cooled, they are otherwise quite different. The longest stroke is seen in the Kawasaki – it's 86mm. The KTM has the shortest stroke at 74mm, and, incidentally, the shortest rev range. The Suzuki makes the best torque figures and is only marginally behind the Honda in the ultimate power contest.

In our test there was only an eight per cent difference between the least powerful and most powerful bike. However, on the track the differences seem far greater.

The KTM, for example, does not feel any less powerful than the RM500, but it is more difficult to ride. It is possible to drive the Suzuki on to its powerband in an almost orderly fashion. After the initial surge from 32bhp to 42bhp – which happens during an increase in engine speed of only 560rpm – the power rises quite gradually at half the initial gain rate. On the KTM the usable power starts around 29bhp. However, during an engine speed rise of only 100rpm the





SUZUKI RM500

Bore	88.5mm
Stroke	80mm
Capacity	492cm^3
Compression ratio	6.2:1
Maximum power	53bhp @ 6400rpm (rear wheel power)
Torque	55lbf.ft @ 6200rpm.

THE Suzuki proved to possess the largest amount of torque. It was also second in the power stakes, just 0.7bhp less powerful than the Honda. The engine did exhibit a slight tendency towards seizure when held on full throttle and full power. This could most probably be attributed to the oil rather than any shortcomings in the engine's design. At the lower end of the power curve there were some very rapid gains in power for slight increases in engine speeds.

YAMAHA YZ490

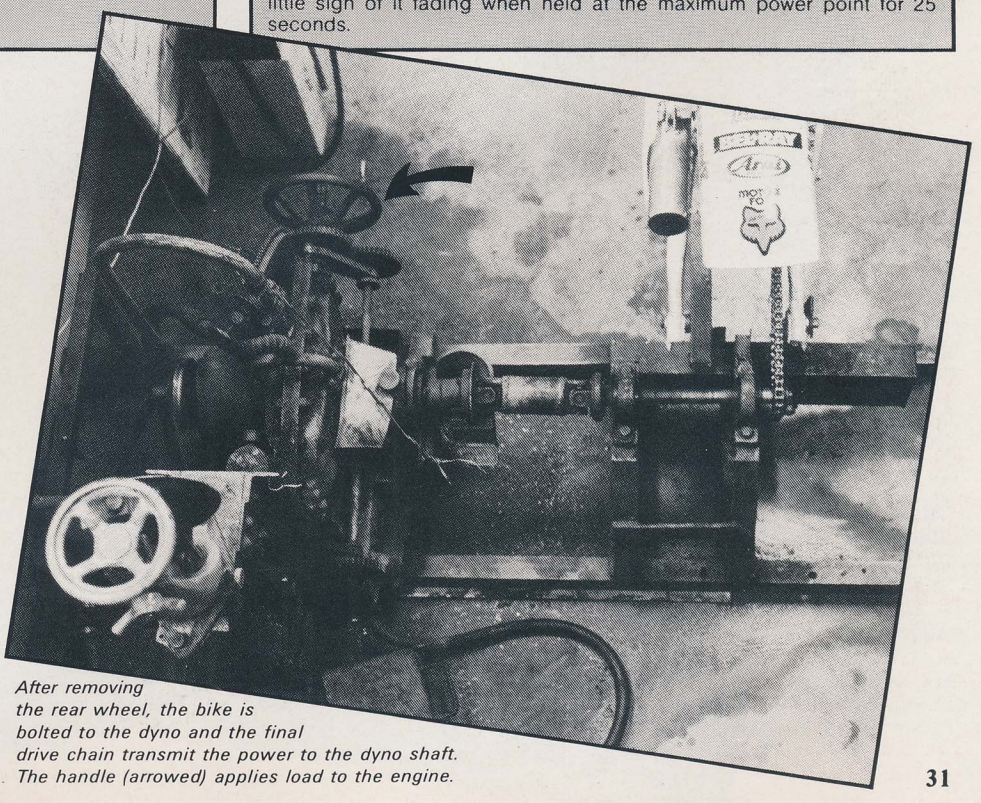
Bore	87mm
Stroke	82mm
Capacity	487cm^3
Compression ratio	6.9:1
Maximum power	52.9bhp @ 6000rpm (rear wheel power)
Torque	50.8lbf.ft @ 6000rpm

WHEN we decided to run the open class bikes on the dyno the YZ490 was the first to be bolted up. We were surprised by the amount of power the engine delivered and the smoothness of the power curve. As with all the bikes we ran, there was a sudden increase in power above the lower engine speed at which we started the test. In fact we were able to run the Yamaha down to only 3200rpm in top gear on full throttle – with no sign of stalling. The power dropped off rapidly once it peaked at 52.9bhp, but there was little sign of it fading when held at the maximum power point for 25 seconds.

power output leaps 19.2bhp from 26.8bhp at 5460rpm to 47.8bhp at 6534rpm. No wonder the 495 feels lively to ride!

So what about the trend towards liquid-cooling of open class bikes? The reasons are simple. By adopting liquid-cooling it's possible to reduce the piston to cylinder wall skirt clearance and thus reduce the losses caused by piston ring blow-by. More importantly it's possible to increase cylinder head compression ratio and thus reduce detonation and therefore improve engine efficiency. In this way it's possible to utilise slightly milder port timing and achieve the same ultimate power output but with a wider spread of power.

●Our thanks to those who helped make this feature possible: Pro Circuit Husqvarna, Honda UK, Mitsui Yamaha, Kawasaki UK, Suzuki GB and P&S Motorcycles (KTM). Maico importer Bill Brown Motorcycles declined our invitation to take part.



After removing the rear wheel, the bike is bolted to the dyno and the final drive chain transmit the power to the dyno shaft. The handle (arrowed) applies load to the engine.