

Battle Krauser

An enterprising starship

by Mike Scott

If you are the sort of motorbike rider — and who isn't these days? — who has to debate whether to buy a new clutch cable or a second-hand silencer this week, not being able to afford both, then the rest of this road test is purely for your dreams.

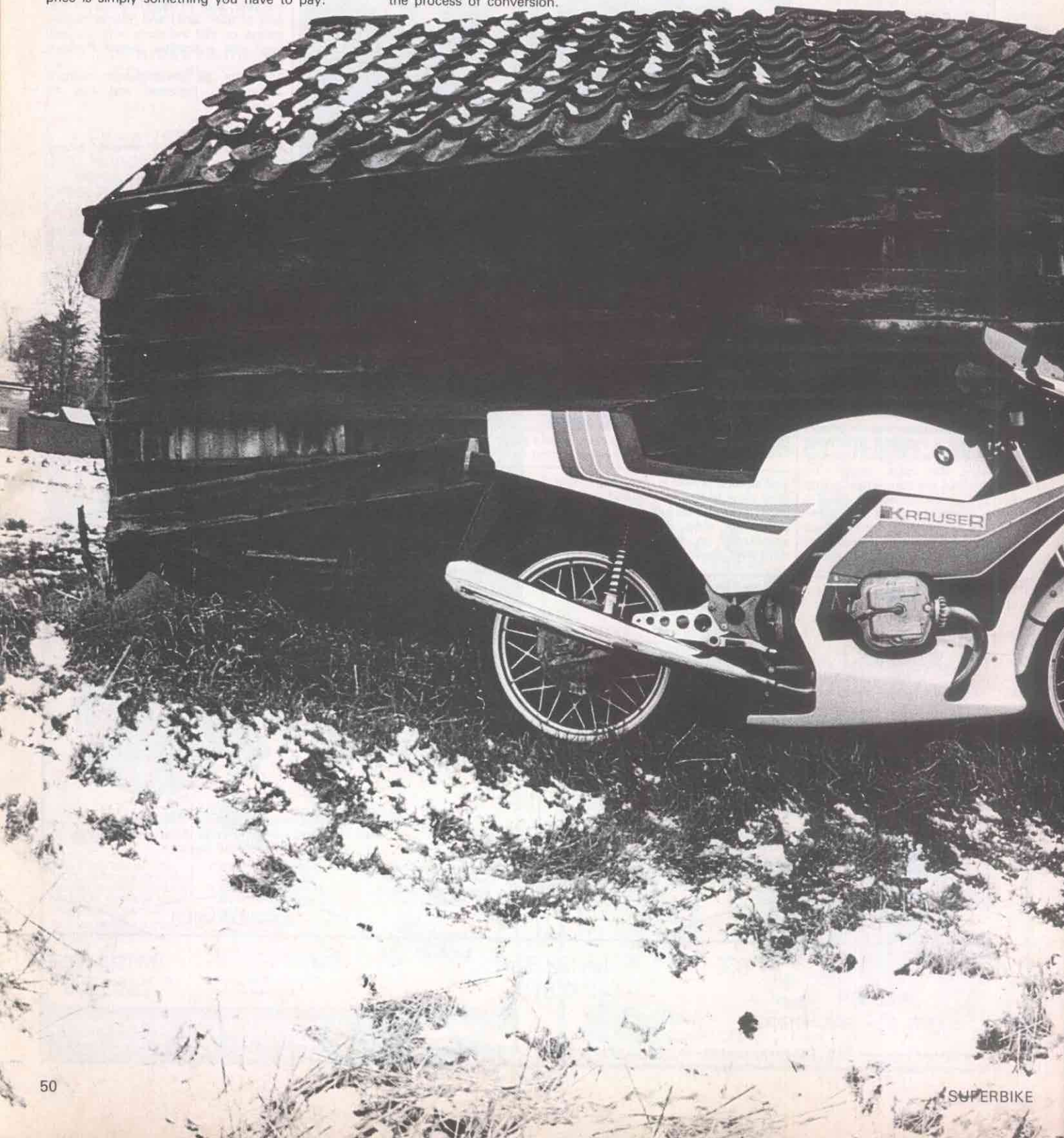
The sort of man who will seriously debate buying a Krauser BMW MKM1000 is a different and very rare breed. To him, money is the last consideration. Only excellence is important. The price is simply something you have to pay.

I stress the financial considerations not because the MKM1000 is expensive, but because it is *very* expensive.

The frame conversion kit for Germany's only exported special retails for only a little less than three grand. A figure, I suppose, that one could learn to cope with — until you remember that you also need to have a whole BMW to start with, preferably a R100RS, top of the range; and that you are going to throw lots of that BMW away in the process of conversion.

Or consider the lazy rich man's route: buying a complete MKM1000. That'll be £6541, thank you sir. And if you'd like eight valves as well, that'll be £761.30 on the side.

The name Krauser needs little introduction to high-rolling bikers. This bike is just the logical current staging point in boss-man Mike Krauser's programme of improvement for the staid Bavarian flat twins, which started with hard-plastic pannier cases on neat alloy frames, BMW declined to accept the panniers as a catalogue part — to everyone's benefit, since they are now available in a variety of sizes to fit a variety of bikes — but it didn't stop Krauser carrying on. He is now involved in a similar battle to get the factory to accept his four-valve cylinder head conversion, but has — I understand — given up on the frame kit and bodywork for the MKM1000, preferring to make it himself in strictly limited numbers to



preserve exclusivity. (BMW are a bit stuffy about accepting new-fangled ideas — little-known after-market suppliers, like Dunlop tyres, being among those failing to achieve official factory approval for many years).

The MKM1000 is a remarkable piece of work, sharing only the use of steel tubing with normal motorcycle convention. It departs radically from standard practice at the earliest opportunity, and is built on space-frame principles, popular with racing cars before monocoque frames became *de rigeur*, but owing more to aircraft design than anything. Not surprising, since it was designed and built at the Messerschmidt aero works.

Let us begin with the conventional bits. The Krauser bounces (or, rather, fails to bounce) on BMW suspension — the standard pivoted fork at the rear, with the stock Boge spring-shocks (a good choice), and on modified BMW forks up front. The changes are aimed toward curbing the

forks' natural tendency towards obeseant genuflection whenever you hit the brakes. The desired anti-dive has been achieved by the simple expedient of reducing available fork travel from eight-odd, by around 1.6 inches, and by firming up their ride.

Also standard are the wheels and brakes, along with the controls and brake hydraulic systems.

All the rest is mighty different.

I didn't count them, having better things to do during my tenancy of the MKM1000, but the brochure boasts of 52 straight and just four curved pieces of tubing, cut and welded into a tirade of triangles, which you can count for yourself if you must. The triangle is the strongest self-supporting shape in engineering (as anyone who has ever built a bridge knows). It is rather surprising to observe that there is one untriangulated square on the frame, right at the crucial swing-arm pivot area. I'll assume Messerschmidt know more about coping with stress than I do, phlegmatic though I am, and certainly there is nothing about the bike's roadholding to suggest that they have made any mistakes.

It is very light, for a road frame capable of carrying two people (I have yet to see the dual-seat version, but I bet it's ugly), clocking in at just over 25lb for the bare frame. The wheelbase is slightly stretched over standard, at 54.4ins, and trail is also a touch longer, at 3.9ins.

A BMW motor slots straight in — preferably a R100RS, for the extra power, though any of the stroke-series motors will do. Anticipating rather more forceful angles of lean than do the factory, the engine is mounted almost an inch higher than standard, to lift the rocker covers clear of the road. You are, naturally, stuck with shaft drive, and the major attendant disadvantage is the difficulty of changing final-drive gearing. The test bike, as recommended, has the crown-wheel-and-pinion from the CS (or old S) model, highest-g geared of the range. As we shall see, it is still not quite high enough. Short of having a gear-set specially made, which you might well be able to afford if you are seriously contemplating purchasing a Krauser, it is not a problem you are going to be able to solve.

Detail work is to a high standard. The electrics, for instance, are tastefully arranged in a tray beneath the fuel tank, accessible, yet well-protected from the elements. The footrests and pedals are equally attractive — not the artistry found on a Bimota, but an altogether more matter-of-fact Germanic set of controls, beautifully made nevertheless.

The fuel tank is a steel affair, holding a worthy 4.6 gallons, and quite unashamedly ugly. I nearly said "functional", then I remembered the fuel taps. There are two, standard BMW items, and one of them is rather difficult to reach. Much worse is the fact that the taps are mounted in wells projecting down from the floor of the tank. Good for collecting the last drops, but the BMW



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reserve system (like most of them) relies on the fuel pick-up sticking up some distance from the bottom of the tank. Since this isn't the case here, there is very little reserve capacity, hence a long and dreary push through London late on the night that I collected the bike.

For reasons that must escape anybody with a modicum of good taste, Krauser chose to paint the frame metallic puke purple. It's not as though such a high-profile design requires much attention drawn to it. Thankfully, most of the frame is concealed beneath the large one-piece bodywork moulding, that serves the purpose of tank, seat and side panels. Fit and quality are excellent, though another lapse of taste has smeared the pristine white flanks with garish striping. It's nothing that a good spray-painter couldn't cure. Or perhaps it's just me.

Anyway. The bodywork is quickly detachable — simply remove the stock BMW filler cap, and remove two bolts in the useful toolbox/stash space in the seat hump, not forgetting to disconnect the multi-pin connector for the tail-light and indicators. Then lift off carefully.

Revealed beneath is the purple monster, surmounted by the unpainted tank, which is itself quickly detachable. Accessibility is good, but since many of the BMW's important bits stick out sideways, this is only to be expected.

To reveal the frame in all its garish glory, one must also remove the fairing, which is a slightly more difficult task. Even then, simplicity is the key. The outer shell is composed of just three pieces. The belly pan attaches both ahead of and behind the cylinders, providing comprehensive cover beneath. The lines of the main shell echo those of the R100RS (as well as swiping that bike's integral indicator lenses), and the screen is a cut-down RS item as well. As are the mirrors.

The third moulded item is the chest-piece, which is sealed but for a slit for the oil cooler and a scoop at the bottom to pass cooling air along the finned oil sump. It keeps the engine clean even in the slush of late winter — a real bonus.

Even the less observant among you will have noticed that the test bike, personal property of Simon Hill, supremo at Krauser Imports UK, has something rather different in the way of cylinder heads. They are the long-awaited Krauser four-valvers, of which much more elsewhere. The cylinder heads make a major contribution to the

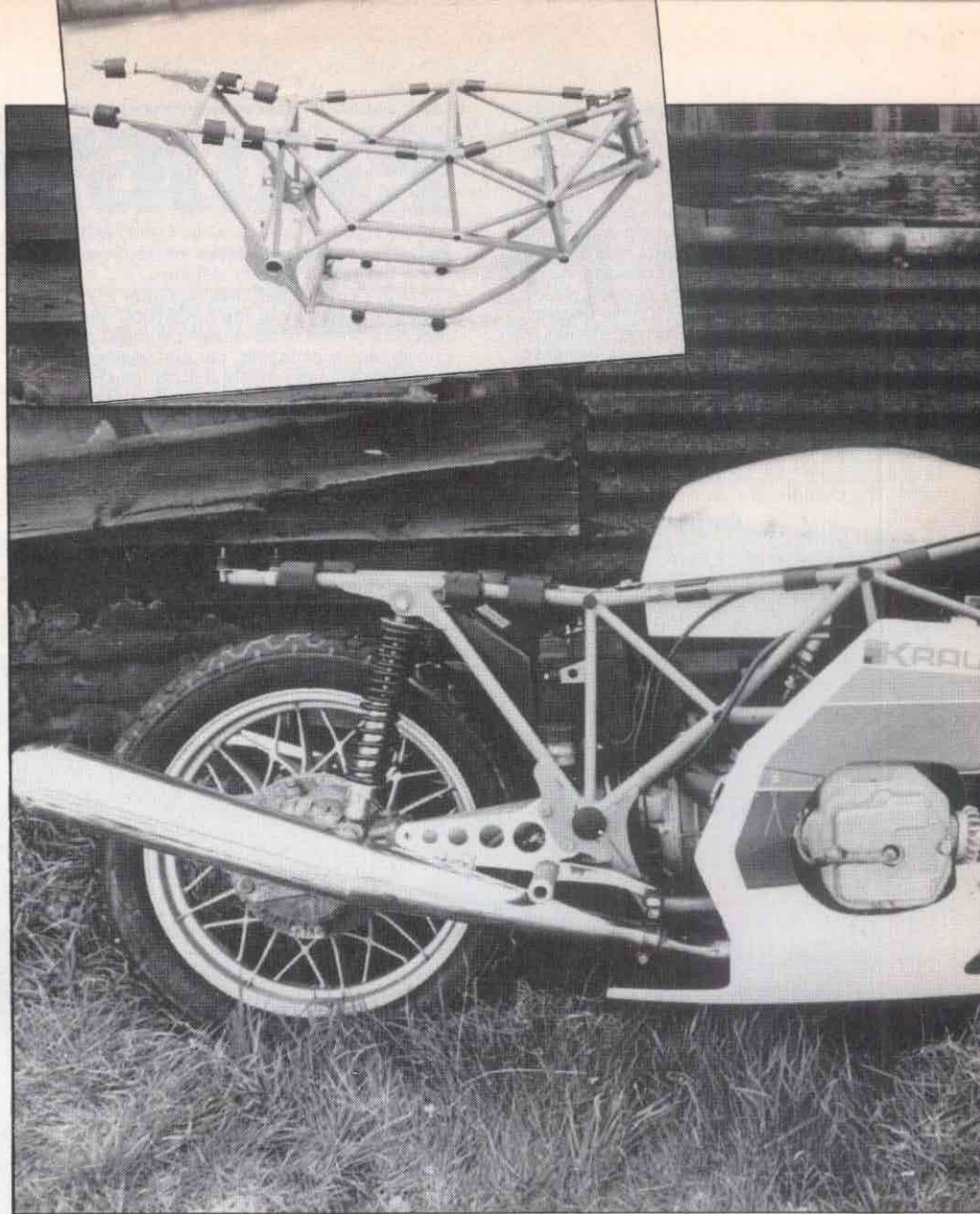
"if one idling BMW sounds like a tractor, this one sounds like two . . ."

bike as a whole. Rather unexpectedly, this is not because of the huge quantities of extra power they release, nor in their ability to rev harder. Instead, it's because they make the engine so much more flexible, willing to potter at much lower revs than the standard rather lumpish RS. The MKM1000 is thus that most refined of sporting carriages, of however many wheels — one with a long range in top gear, from round-town poodling to 125mph cruising without touching the pedal.

Apart from the instruments and their surrounding panel, also stolen straight off the RS, the only thing that is familiar from the seat is the chuffing engine idle. Doubly familiar, with the four-valve head. If one idling BMW sounds like a tractor, this sounds like two — the natural penalty of all those clicking tappets being exposed directly to the ears, instead of being tucked away beneath the tank.

The seating position is quite radically changed. As befits a supersports bike, the Krauser is low and compact. On a standard BMW, you sit above and behind the engine. On the Krauser, you lean forward over it. Your shins don't hit the Bing carburettors. The lean forward to the handlebars is not enough to cause instant clip-on claw, but is enough to make a bit of high-speed wind pressure something of a comfort.

One has to make allowances for a BMW's shaft drive, in real balls-out speeding round corners, as every BM rider knows. One cannot afford to be



Devotees of the Little Red Book — the *Thoughts of Chairman Honda* — will need no reminding of the doctrine of Small and Often.

It relies on a principle of mechanical complexity whereby as many small parts as possible should be made to do the job of one large part. Large numbers of small cylinders, each producing small amounts of power very frequently, add up to a greater whole.

The sons of Pops Honda have themselves been turned away from following only that doctrine, by market forces requiring motorcycles with only a few cylinders — dirt-bike thumpers, for example, or the new, Harley-esque vee-twins. But they have retained one element of the small-and-often creed: that of four valves per cylinder.

The fundamental advantage of four valves is simple: a pair of inlet (or exhaust) valves gives

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greater port size and breathing capacity than a single large valve occupying the same space. A second advantage is that the valve gear components are physically smaller, though twice as numerous. Inertia is handsomely reduced, allowing higher revs without risking valve bounce.

The four-valve concept, as applied to the BMW engine, has yet another advantage. It is slightly shorter, by around half-an-inch, than the standard two-valve set-up; which, on a flat twin engine translates to slightly narrower. It all helps when you're shooting those gaps . . .

The Krauser kit is neat and (from without) functional rather than handsome. It comprises a 10.2:1 piston, with indentations for the four valves; a cylinder head with siamesed ports, to

take the stock BM carb and exhaust; and all-new valve gear from the cam-followers outwards. The pushrods are around half the length of the BM knitting-needles. They work on two pairs of forked rockers, with a novel method of adjustment for valve clearances. Instead of the usual screw-and-locknut adjustment, the Krauser uses snail cams as tappets, which can be rotated then locked in position to provide vernier adjustment. It allows for very accurate settings, but cannot prevent the engine from being twice as clatter-prone as a standard BM.

Power is improved right across the range. The engine I tested had the standard RS camshaft, most powerful of BMW's standard cams. A Sport cam is available, which would make even better use of the four-valve head's capacity for deeper breathing. As it is, the improvement over stock BMW performance is immediately noticeable.

This is not at the upper rev range — where the Krauser does offer the expected freer-revving capacity — but right down at normal workaday speeds. The four-valve head makes the BM engine work much better from 2000rpm — perhaps even less — with a significant contribution to bottom-end torque. It also makes for much smoother running. The big engine's tendency to lumpish vibration below 3000rpm is all-but eliminated; while the flat spot around 4800rpm, that seems to haunt all BMs of any size, has completely disappeared.

The Krauser revs on past the BM's recommended maximum of around 6750rpm to its own short-burst red line of 7400rpm, and is safe (says the brochure) for a sustained 7200. All this is rather beyond the point at which the BM engine feels its normal relaxed self, so it is a great pity that one cannot easily up the gearing to take advantage of the engine's torque, rather



indecisive with the throttle — it should preferably be open when you are leaning, and any chopping around with it tends to raise and lower the back end in a manner highly destructive to equilibrium and steering stability. Given care with this aspect, I would put the Krauser's roadholding right in the top drawer. The designers compensated for raising the engine (and with it the centre of gravity) by lengthening the trail, and they have achieved a fine geometric balance. The MKM1000 has that rare combination of rock-steady high-speed stability and the ability to change direction quickly. This is what distinguishes the best of the European bikes from the best of the Japanese, and the Krauser is well up among the former.

It is a rare delight indeed to enjoy the wide range of expression of the frame's abilities while simultaneously listening to the pleasant snuffling rumble of a BMW engine, also capable of a wide range of expression, further extended by the four-valve heads.

To be honest, there is one aspect of the single-seat sports bike experience that is missing — the sheer brute power, the scorching leap off the line that only a well-breathed-on big Jap four engine can provide. It's noticeable at the bottom of the range, it is less so at the top. After all — how often does one really get the chance to go beyond 130mph, which is where the Krauser starts to fall seriously short. It is not so much a lack of power that restricts top speed, but that you are running out of revs. The MKM fairing penetrates at least as well as, maybe better than, BMW's own RS bodywork (and offers similar comprehensive protection for all but shoulders and head), while the four-valve engine makes more power throughout the range, and offers about 500 extra rpm. Even so, the end result is running out of revs before the frame runs out of integrity or you run out of bottle. As I said, this all happens at such elevated speeds that it is only when you are in direct competition with a Harris Magnum or some such that you'll ever notice it.

Personally, I would accept the trade-off between ultimate power and all-up weight. At 435lb dry, the MKM scores fully 100lb on a fully-dressed big Jap four, and it shows . . . when you are stopping, going, or merely standing still. (Not that one can remark about how easy it is to roll the bike onto its centre-stand — only a lop-sided side-stand is fitted. A sturdy workshop stand, however, comes with the frame kit.)

Minor points include the seat's propensity for sponging up water, then releasing it onto your trouser-pants later on — a nasty tendency, due for correction, I understand.

It is only to be expected that a bike this expensive and boasting such design expertise is going to be good. So the Krauser was unsurprising. Even then, long-serving bike hacks do tend to get a big jaded, and there are degrees of goodness. It is possible to find fault even at the top of the tree. In this respect, the Krauser's worst enemy is also its best friend — that faintly agricultural BMW engine. Though I would hesitate to bracket such a sweet-running, smooth and elegantly crafted piece of machinery alongside the cement-mixer chug of a Harley-Davidson engine, I suppose that one should. They both have two air-cooled push-rod cylinders of winning simplicity, and both trace their design principles far back in time. It's possible to apply the same rule of thumb: you either like them or you don't (though those that like BM engines are thinking with their heads, while the Harleyophiles are thinking with another part of their body, possibly their hearts).

In any case, along with what must nowadays be described as some mechanical quaintness, the BM engine does also endow the bike with unobtrusive long legs, light weight, and the low centre of gravity of which it makes such good use.

My own view is predictable. I think the flat twin's good points far outweigh any drawbacks in mechanical noise and lack of superfluous power — especially when enhanced by an extra ration of valves. Indeed, the MKM1000 is anything but a slow bike — it's only when compared with the very fastest of specials that it falls short in any way, and nor would I be at all surprised if — over the course of a two- or three-day ride — the Krauser might not return a better *average* speed than a bike like the less comfortable Harris Magnum.

It is a modern masterpiece, and the only news worse than the prohibitive price tag is that Mike Krauser apparently intends to stand firm in his intention to build just 200 of them. At the last count, 180 had been completed. If you haven't started saving already, I guess you're too late.

Fanning the flames of the Krauser on board the rolling road

by Dave Minton

Dynamometer testing a shaft-drive motorcycle is inconvenient. There are two popular methods of motorcycle-type dynamometers. The first is most usual in the R&D shops of manufacturers and involves a jig-mounted engine. Because of the problems associated with modern ancillary part tuning, such as induction and exhaust systems and the necessity to balance them perfectly, these are of little value to the non-specialist engine tester.

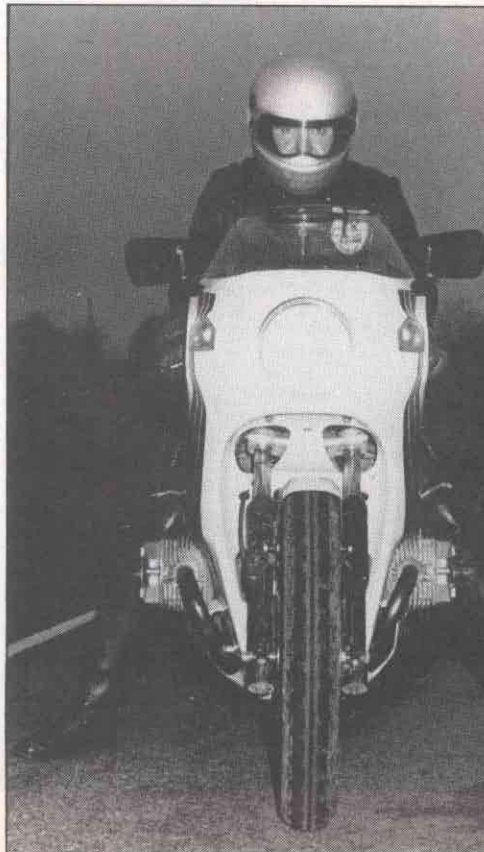
Much more popular is the Heenan & Froud DPX-type dynamometer. This only requires that the test machine's rear wheel is removed to facilitate fitment of its own transmission chain around the test bike's gearbox sprocket. While this certainly solves the problem of securely fitting all engine ancillaries — because they are left in place, of course, it doesn't much help shaft drive motorcycles.

There is a third type of dynamometer, generally known as a rolling road. Its operation is simplicity itself. The rear wheel is placed over a pair of rollers, the front one is clamped in a jig, or more usually jammed up against a wall, and the in-gear rear wheel is driven against the resistance of the rollers, which is both variable and measurable. In some instances this is electrically controlled.

A dynamometer records torque (turning force), and from this, power is estimated. This is where trouble comes because most of us think we know what power is — bhp, right? Then you tell me why a Kawasaki Z1000J engine could no more haul a lorry, normally equipped with a Ford 5948cc diesel six, than it could slingshot a space shuttle. Both engines develop 102bhp.

Everything depends on what sort of bhp you are talking about. For instance, that quoted by most Japanese manufacturers and most German conforms to DIN standards, which require not

Beam me up, Scotty. Exclusivity comes to town with no change out of £7000



than being forced to exploit a rev range that you'd rather not.

Clearly, this must be Mike Krauser's next BMW accessory — a high-ratio crown-wheel and pinion set. The test bike was on the CS gearing, highest of those offered by the factory. It could easily have pulled a taller ratio, and would have been a better bike for it. Roll on the Krauser back end.

Meantime, the four-valve kit is a good start. I wonder if some of BMW's lack of alacrity in accepting it as a catalogue part is not fuelled by pique, that they did not think of it first.

The kit as it stands also poses the question: Why not an overhead cam kit while you're at it? Bevel drive could always be arranged. The answer is twofold. First, such an arrangement would be hard to contrive without adding significantly to engine width, already something of a problem. Second, dear God, think of the expense.

Already, the Krauser bits bear price tags that wouldn't be amiss even in BMW's lofty spares list. The kit as tested for the one-litre engine retails at £761.30. Pheew.

For the present, the four-valve kit is available only for the big engine (the heads are interchangeable, but the piston is obviously one-size only, and the new plated aluminium bores cannot be simply bored out). A version to suit the 800cc engine is in the pipeline, followed (one hopes) in the fullness of time with a kit for the 650cc engine — an interesting proposition indeed.

This is very expensive gear. It is also the only tackle of its kind to fit a BMW, and is made to very high standards. And it does endow the engine with an immediately noticeable improved mid-range performance, along with better fuel efficiency and/or more top speed. It is thus money well spent.

"few engine tuners with a dynamometer keep to any standards but their own"

simply the retention of all road equipment on the engine but also that strict temperature and atmospheric conditions are maintained, too. SAE standards are much less demanding, while few engine tuners with a dynamometer keep to any standards but their own. Then there's the metric PS horsepower definition, or the latest internationally agreed kW. All very confusing.

To complicate matters further, rolling roads are notoriously unreliable because they measure power through the rear tyre. Rear tyres absorb a lot of power in themselves and, depending on their quality and that of the rollers and their compatibility, power variations can be high. In my experience I have yet to discover a rolling road able to cope with the power of a big bike without requiring that the rear wheel be loaded — usually in the form of a pillion rider — without wheelspin simultaneously burning the tyre and falsifying the record.

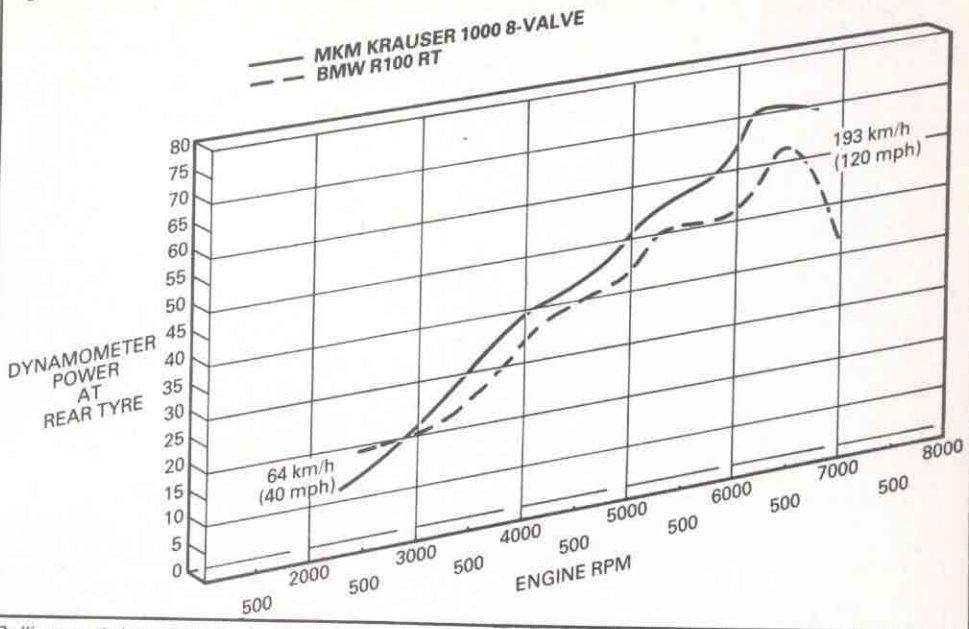
So when I explain that we have measured the power of the Krauser MKM 1000 8-valver, you should understand just how imprecise the exercise was and how potentially misleading the figures are. It hurts to admit it, but Krauser's figures are undoubtedly more accurate than our own. So why bother? Because we decided upon a comparative test between a standard BMW of the same engine size and the Krauser. Therefore the same conditions would prevail for both bikes and give related figures, although none that would be of much absolute value.

North Leicester Motors have one of the finest rolling road dynamometers available. It is manufactured by Krypton-Heenan Froud and measures torque by resisting the turned rollers against water pressure. Purely as a matter of interest, NLM use their "brake" (nick-name for a dynamometer) mainly as a means of measuring engine service quality and for the location of in-use faults. As Morini freaks, they also know more about good Morini tuning than anyone else — as proved by their TT success, they love Ducatis and they are becoming increasingly respectful of Kawasakis. This is not a commercially inspired opinion by the way, but one that the dynamometer has taught them (along with other factors such as reliability).

Unfortunately, the NLM brake, being a rolling road, records nothing above 120mph. After each of the two machines had been put through one run each, a water pipe fractured and precluded the chance of an intermediate gear faster run. Thus, the Krauser is cut short.

If you study the graph, you will notice that the Krauser appears to suffer from a serious "hole" in its power development around 5500rpm (97mph in top gear). In practice it does not exist to any appreciable degree. As proof of this, during my return from Leicestershire I met the German driver

Fig 1



Rolling road dyno figures reveal a hole at 5500rpm for both Krauser and stock RT. Eight valve power advantage is considerable at the top. Max power is 72bhp at 6250rpm.

of an Audi Quattro. These things have a turbocharged 2.2 litre five cylinder engine, a top speed of 137mph and will cover 0-100mph in 24 seconds. They are formidable cars and only owned by committed buffs who know what fast driving's all about. He was curious about the Krauser's top end speed, for we both agreed that below 90mph his car was disadvantaged. So, at 80mph in top gear we twice turned up the wick together. Each time, the bike hauled past the car so fast it was laughable. But he did not mind because it was a German motorcycle.

"in practice power came in hard all the way up to the speedometer recorded top speed of 138mph"

In all probability the power dip was the responsibility of a minor ignition timing or carburation fault that only revealed itself through overheating on the undercooled, overstressed dynamometer test, because severe "pinking" occurred, despite the use of 4-star petrol. However, further study of the graph will reveal that the BMW, too, suffers from a similar, but milder, power dip at around the same engine speed.

Perhaps significantly, Krauser's own graphed power curve shows a hint of a fall-off at the same speed, but, as mentioned previously, in practice it

simply doesn't show up at all. It might also account for the sharp power decline from 6250rpm, unless, of course, power improved once again immediately beyond the dynamometer-imposed 120mph. In practice power came in hard all the way up to the speedometer-recorded top speed of 220k/mh (138mph). As engine revs were 7800 at this point, it seems sensible to assume that the practical top speed would be around 140mph with raised gearing.

The BMW was owned by Rob Hull who, by his own admittance, is not the sort of rider who spends his time riding at high revs. This was made apparent when during the dynamometer test his RT began billowing clouds of oily smoke from its silencers as the rare heat burned off the soft carbon. In all probability further testing would have lifted the top end power of the RT as the engine was cleared of its carbon deposits. Rob was a brave man, however. It takes a lot of courage to stand idly by as other people wring your precious motorcycle to extreme limits.

Overall, the Krauser proved to be 13percent more powerful than the BMW across the rev range. At the extreme top end of the scale, however (120mph), the Krauser turned in 40percent more power for 250rpm less. Krauser claim a maximum increase of only 20percent, so in all probability the test gap is explained by the BMW's slightly carbon-choked state. If, indeed, that's what the trouble was.

Because I have put in many miles now on both BMW and 8-valve engined Krauser machines, I might respectfully add my own brief comments to MS's road test report. As compared to the BMW engined model, this Krauser was a fearfully noisy beast. Although a BMW camshaft is retained, the exhaust note is a little louder than the original, but 90percent of the increase issues from mechanical clatter, which is appalling. Krauser claim that in fact valve gear sound levels within the rocker cover are no higher than BMW's. He has simply reduced rocker cover wall thickness by 75percent. Maybe so, but it wearied me. The increased compression ratio has slightly coarsened the feel of the engine, which generates faint, very faint, vibration that I do not recollect on the BMW-powered Krauser. It is never sufficient to intrude and causes no discomfort, but there it is.

And the increased power allows higher speeds that have revealed some mild aerodynamic instability in the fairing. Because the MKM 1000 will now cruise at over 120mph I became conscious of those funny little lateral shudders that don't quite influence machine stability during the transition of slight cross-breezes and other vehicle turbulence. It was never serious, never picked up by the frame or suspension, but just enough to make me stop to inspect tyre pressures.

