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Postanschrift
Postfach 40 02 40
D-8000 München 40

Hausanschrift
Petuelring 130, BMW Haus

Telefon
(089) 3895-36 62
51 70

Telefax
(089) 389 36 32

Telex Presse
5 28 6 927 bmw d

C O N T E N T S

9. The four-cylinder K 100 Series:
   Four-valve engines with fully-controlled catalytic converter
   Two-valve engines with standard catalytic converter
   Special Limited Edition K 100 LT

10. K model specifications and graphs

11. The 1991 colour range
    R and K models

SUMMARY OF NEW MODELS AND INNOVATIONS IN 1991

BMW's offensive for the environment: Reduction of exhaust emissions on all models

Anniversary of the GS: Giving all of BMW's enduro models a new look

BMW dedicates the 1991 model year entirely to the cause of environmental protection. Accordingly, BMW is the world's first motorcycle manufacturer to present three different technologies for reducing exhaust emissions on all models throughout the range. These technologies will be shown for the first time at the International Bicycle and Motorcycle Show in Cologne in September 1990.

As of the beginning of September 1990, all flat-twin models in the R Series are available with SAS (secondary air system) as an option. Applying the principle of exhaust emission afterburning, SAS ensures optimum efficiency in emission control.

From May 1991 the four-valve K 1 and K 100 RS four-cylinder models will be available with fully-controlled three-way catalytic converter and oxygen probe fitted as special equipment. This is made possible by the sophisticated Digital Motor Electronics featured by these machines - the most efficient type of emission management to this very day. Presumably by the end of 1991, BMW will also provide standard catalytic converters for retrofitting all two-valve K models built since 1983 (more than 100,000 units).

A trendsetter also in environmental protection

Although BMW machines comply with all emission control regulations currently in force anywhere in the world even without requiring a catalytic converter, BMW has decided to make this trendsetting move towards catalyst technology. Like in 1988, when BMW became the absolute pioneer in active safety by introducing the world's first motor-

cycle ABS for all K models (which remains unique to this very day), BMW now once again takes up the challenge of today's world - this time to the benefit of the environment. This decision clearly reflects BMW's philosophy that sensible progress must benefit mankind and the environment in particular.

Ten years of the GS: the original in a new range

The other highlight in BMW's 1991 model range is the comprehensive update of the very successful GS models. This big event coincides with the 10th anniversary of this unique model with which BMW introduced the immensely popular trend towards the large long-distance enduro when launching the R 80 G/S back in 1980. Sales of this long-distance adventure bike acknowledged as the original in its class amount to approximately 50,000 units so far.

New cockpit fairing, controls and instruments on the GS models

The 1991 R 80 GS and R 100 GS come with entirely new looks. More specifically, they both now feature a special cockpit fairing fitted directly to the frame plus the high-power rectangular headlight of the K 75 S, in this way bearing a strong resemblance to the R 100 GS Paris - Dakar launched in 1989. Offering very good protection from wind and weather, the cockpit is supplemented by a small windshield adjustable for angle in accordance with the size of the rider. Within the cockpit, new, extra-large instruments - speedometer and rev counter - offer even greater clarity, while the conveniently styled handlebar controls adopted from the K models ensure superior ease of control and operation. Other features also worth mentioning are the lockable fuel tank filler cap flush with the surface of the tank, the seat specially padded for even greater comfort, and the single-disc brake on the front wheel in floating design.

New spring strut now individually adjustable

The all-new spring strut provides genuine progress in suspension technology. It cannot only be pre-tensioned to four different settings, but also has 10-fold adjustment of the expansion stroke. The result is perfect fine-tuning to all roads and load conditions. Another significant improvement is the new tail muffler now made of stainless steel. And it almost goes without saying that all these innovations are also fitted on the R 100 GS Paris - Dakar (wherever they had not been fitted before, anyway).

K 75 RT with large tourer fairing

Important news from the K Series, too: The K 75 and K 75 S are now supplemented by the K 75 RT. Featuring the large tourer fairing of the K 100 LT, this agile and nimble model which debuted so successfully in the USA and Spain in 1990 offers a really attractive alternative for the motorcycle connoisseur.

Special Limited Edition K 100 LT

The K 100 LT, now the last four-cylinder model with two-valve engine following the phase-out of the K 100 grass-roots machine, will also be available in a special Limited Edition in 1991. The most important features of this unique model versus the standard version of this luxury tourer are pearl-green metallic paintwork, engine spoiler and sports suspension.

The K 1 and K 100 RS top models in new colours

The K 1, BMW's super sports model at the top end of the range, which truly hit the headlines when launched at the Cologne Show in autumn 1988 and has been voted Motorcycle of the Year worldwide no less than 8 times in the meantime, also comes in sophisticated classic black metallic paintwork as of 1991, supplementing the eye-catching marrakech red available so far.

Launched only a short while ago in early 1990, BMW's second model with the 100 bhp 16-valve power unit, the new K 100 RS, has become a tremendous success right from the start. This sports tourer is available in no less than four different metallic colours: pearl silver, bermuda blue, red and classic black. The cockpit windshield is now also painted black.

BMW starts successfully into the 90's: Production up by 15 per cent

BMW has entered the 90's in grand style. Thanks to great worldwide demand and delivery periods on some models (such as the new K 100 RS and GS machines), production at BMW's motorcycle factory in Berlin was increased in spring 1990 up to the capacity limit of 150 units a day. Following a production volume of 26,000 motorcycles last year, the production forecast for 1990 is more than 30,000 units.

BMW'S ENVIRONMENTAL OFFENSIVE IN THREE STEPS:
Emission control technology for all models

Studies, data, facts and figures clearly prove that widespread interest in the motorcycle remains undaunted into the 90's. But to ensure their freedom and sheer riding pleasure on two wheels also in future, conscientious motorcyclists now give increasing attention to the cause of safety and the environment.

Although motorcycles account for less than 2 per cent of the total volume of exhaust emissions generated by all road users (due to the relatively small number of motorcycles and their greater fuel economy), a representative survey conducted in Germany in 1988 showed that even then one out of five riders regarded the catalytic converter or alternative emission management systems as "a particularly important and meaningful technical innovation". As we now see from recent reports in motorcycle journals and other technical publications, this environmental awareness among motorcycle riders is continuing to increase.

Even though BMW motorcycles currently fulfill all emission control regulations worldwide even without requiring a catalytic converter, BMW moved to the forefront of the environmental protection campaign as far back as in 1988 at the Cologne Bicycle and Motorcycle Show, and was the world's first motorcycle manufacturer to announce the introduction of fully-controlled catalytic converter technology for the motorcycle at the 1990 Show. In other words, BMW has taken these steps not under pressure from lawmakers, but rather in full recognition of the fact that action of this kind is necessary and meaningful. Which was also the case when BMW introduced motorcycle ABS in spring 1988, thus taking on a pioneering role in the area of safety, too.

The announcement first made at the 1988 Motorcycle Show has now developed into a full-scale campaign: BMW's offensive to protect the environment. Three major innovations to become reality by the end of 1991 allow the reduction of exhaust emissions on all BMW motorcycles by applying different technological solutions: The fully-controlled three-way catalytic converter as an option on the 16-valve K 1 and K 100 RS, retrofittable standard catalytic converters on all other K models, and the SAS emission afterburning system as special equipment for all R models with flat-twin power plant.

Technology and timetable

1. Fully-controlled three-way catalytic converter

Starting in May 1991 the K 1 and K 100 RS four-cylinder models will be available as an option with fully-controlled three-way catalytic converter. This is made possible by the Digital Motor Electronics featured by these 16-valve power units as the prerequisite for the most efficient type of emission management possible today. First, exact maintenance of all engine tuning data guarantees absolute efficiency in the process of catalytic conversion; second, engine tuning remains stable and consistent throughout a long running life, the adaptive control system largely compensating any general ageing effects such as engine wear. Not even fuel consumption changes noticeably throughout the entire service life of the catalytic converter.

Since the technical requirements to be fulfilled by a catalytic converter on a motorcycle differ substantially in some cases from the technical requirements to be fulfilled by a catalytic converter on an automobile, various

problems had to be considered and solved in developing a suitable motorcycle technology. Examples are the space available and installation requirements, the question of catalyst endurance and service life considering the greater vibrations coming from the power plant and the rigidly fastened exhaust system, as well as the exposure to much higher temperatures and gas pulse effects. Seeking to solve all these problems, BMW's specialists opted for a metal-base catalytic converter with relatively compact dimensions (length 75 mm (2.95")/diameter 85 mm (3.35")) fitting exactly into the standard exhaust without even touching its outer skin. The air layer thus formed between the catalytic converter and outer skin acts as an insulator not allowing any additional heat to escape and warm up the rider's or passenger's legs.

The "heart" of the catalytic converter is the oxygen sensor. For reasons of space, the sensor is not fitted upstream of the catalytic converter (as in automobiles), but rather immediately behind the catalyst. Measuring the amount of oxygen remaining in the exhaust emissions, the oxygen sensor generates an exactly defined voltage signal then processed by the control unit within the Digital Motor Electronics. This ensures that the fuel/air mixture never becomes too rich or too lean, but rather remains at an optimum ratio of 14:1 (lambda = 1) at which it is ignited and burnt.

The degree of accuracy achieved by the oxygen sensor depends on its own temperature and the temperature of the exhaust emissions. If the sensor is too far away from the engine it will take relatively long to warm up to its optimum operating temperature. If it is too close to the engine, on the other hand, it may well overheat particularly when riding long distances full-throttle. To avoid

these drawbacks, the oxygen sensor in the BMW motorcycle catalyst is heated and thus achieves its optimum operating temperature even while the engine itself is still warming up.

BMW's fully-controlled three-way catalytic converter achieves roughly the following levels of efficiency with the most critical emission components:

HC down by approx 70 per cent
NOx down by approx 80 per cent
CO down by approx 60 per cent

While engine power remains unchanged at 100 bhp (at 8000 rpm) despite the introduction of the catalytic converter, the maximum torque of 100 Nm (74 ft/lb) at 6750 rpm is down by about 5 Nm. This slight decrease in torque is however set off by the shorter final drive ratio (K 1 without catalytic converter 2.75/with catalytic converter 2.81; K 100 RS without catalytic converter 2.81/with catalytic converter 2.91). This modification reduces the top speed of the motorcycle by a fraction, but this decrease is so small that the rider will hardly even notice it. Fuel consumption also remains virtually unchanged.

2. Standard (non-controlled) three-way catalytic converter

Presumably by the end of 1991 a non-controlled three-way catalytic converter will be available for retrofitting on all K 100 models with two-valve power units (K 100, former version of the K 100 RS, K 100 RT, K 100 LT). Technically speaking, this catalyst is identical to the fully-controlled catalytic converter described above. The only difference is that it does not have an oxygen sensor. Since this catalytic converter cannot be fitted subsequently in-

to an existing exhaust system, it is only available in conjunction with a new tail-end muffler. Precisely the looks of this improved muffler may however provide a further incentive in favour of the catalytic converter, since it is no longer in conventional square design, but rather has the same round shape as the mufflers on the K 1 and the new K 100 RS (and is also made of the same superior material, high-grade stainless steel).

The non-controlled catalytic converter also achieves an impressive standard of all-round efficiency. Its catalytic conversion rates are approx 50 per cent for HC, approx 80 per cent with NOx, and approx 45 per cent for CO.

A non-controlled, retrofittable catalytic converter for the K 75, K 75 S and K 75 RT three-cylinder models will presumably also be available by the end of 1991.

3. SAS for all flat-twin models

As of September 1990 all BMW R models are available with BMW's brand-new SAS secondary air system. Applying the principle of exhaust emission afterburning, this unique technology reduces HC emissions by about 30, CO emissions by roughly 40 per cent. And it has absolutely no influence whatsoever on engine power, torque or fuel consumption. It cannot be fitted subsequently, however, since this would be too complicated in technical terms.

Already used successfully by BMW in the USA and Switzerland in order to fulfill local emission standards, SAS uses the pressure pulses generated in the exhaust system of the flat-twin engine by the four-stroke combustion process. These pressure pulses move two diaphragm valves in the air filter housing, drawing in fresh air when open.

Air flows to the two cylinder heads via steel tubes, entering the exhaust system directly behind the outlet valve. The air surplus generated in this way together with the high temperature of the exhaust emissions ensures direct combustion of HC and CO.

Misfiring from the exhaust is avoided by interrupting the secondary air supply whenever the machine is coasting. For this purpose the left-hand SAS valve features an additional valve for controlling pressure in the intake manifold and switching off the air supply whenever necessary. Since the right-hand valve draws in fresh air through a connection hose from the left-hand valve, the supply of air to both SAS valves is interrupted as long as the motorcycle is coasting without engine power.

THE 10 SUCCESSFUL YEARS OF THE GS:
From the introduction of a new model name to the creation of a legend
BMW enduros as the originals in a new range

When presented to the international motorcycle press in the Pope's Palace of Avignon in the South of France in autumn 1980, it caused quite a stir and received a lot of recognition: The BMW R 80 G/S, the "youngest child" in the BMW flat-twin family, was the logical but nevertheless bold result of more than 50 years of BMW history in off-road motorsport. The first standard-production BMW road machine also suitable for off-road riding followed directly in the footsteps of BMW's success in the European Off-Road Championships and various international six-days events in the 70's. In the abbreviation G/S, the "G" stands for "Gelände" (off-road), the "S" for "Straße" (road), thus symbolising the dual purpose of this revolutionary machine.

In the early 70's Honda launched their new XL 250 single-cylinder machine and achieved a breakthrough in a completely new market segment - the enduro class. Yamaha followed in 1976 with the legendary XT 500 "steamhammer", setting the engine size limit at 500 cc.

At the time market strategists in the motorcycle industry did not find it appropriate or worthwhile to increase engine size any further in the enduro category. After all, an increase in engine size and a larger number of cylinders not only means more performance, but also more weight - which is exactly what you do not want on an off-road machine. Hence, enduro machines were considered at the time to be lean and light motorcycles remaining strictly within definite limits.

Despite this restriction, BMW's Motorcycle Development Department was proud to present an "off-road workhorse machine" to their colleagues in Marketing in 1978, a motorcycle they had built as a kind of "side-product". The new Top Management of BMW Motorrad GmbH with Dr Eberhard C Sarfert and Karl Gerlinger in control decided to take the plunge and try their luck: In early 1979 they gave the go-ahead not only for developing the new K generation, but also for the R 80 G/S project masterminded by suspension engineer Rüdiger Gutsche who had already built himself his own private enduro based on an R 75/5 back in 1975. In 1978 Rüdiger appeared on the scene with an improved machine that caused quite a stir when he rode it as a marshal in the 1979 Six Days. At the time a number of his colleagues in Development had also built their own private enduros for participating in the traditional Dolomite Rally in the Italian Alps.

Meanwhile development of the R 80 G/S was proceeding at full swing. The technical highlight of the new machine was the single-lever swinging arm at the back, the BMW Monolever now patented all over the world and originally conceived for the K models. But even before the K generation was to come along, BMW's engineers decided to introduce the Monolever for the first time on the R 80 G/S. Low weight, greater torsional rigidity, reduction of the concept to one spring strut and very easy changing of the rear wheel are the advantages of the BMW Monolever introduced on one BMW motorcycle after the other throughout the entire range.

The tyre experts from Metzeler had an equally difficult task at the time and therefore faced the same challenge as BMW's suspension and running gear specialists. After all, there was a fundamental contradiction in terms between the

two objectives the R 80 G/S was supposed to reach - good road-running characteristics on the one hand, equally good off-road riding on the other. Weighing 200 kg or 441 lb, developing an output of 50 bhp and achieving a top speed of 170 km/h (105 mph), the R 80 G/S suitable for off-road riding but destined for road use 80 per cent of the time could simply not make do with the enduro tyres available back then, which were limited to a top speed of 150 km/h (93 mph). But again, the motorcycle and tyre specialists were equally successful in solving this problem, too.

After a development period of only 21 months the R 80 G/S debuted in autumn 1980. Being more powerful and heavier, this new BMW caused a few raised eyebrows at the beginning, some people simply not being able to see this new machine as an enduro in the conventional sense of the word. But unlike many a new motorcycle that has disappeared from the market on account of inadequate customer response, the R 80 G/S quickly proceeded along the road to success, subduing even the slightest doubts.

Shortly after its successful launch it showed the astounded experts what potential it has to offer. In 1981 and 1983 French rider Hubert Auriol won the Paris - Dakar Rally on a competition version of the R 80 G/S. In 1984 and 1985 Belgian rider Gaston Rahier followed in his footsteps, again winning this toughest endurance race in the world and thus becoming the "King of the Desert" on his BMW. And even after BMW had withdrawn from the race, Munich rider Eddy Hau proved in the marathon class for private riders in 1988 that you can win the race and reliably reach the finish line in Dakar on a machine still quite similar to its production counterpart.

But the R 80 G/S quickly made a great name for itself not only through successful participation in motorsport events. For an increasing number of riders soon found out that it was the ideal machine for long-distance adventure journeys, too. Strong and robust, rugged and undemanding, reliable and easy to handle even in the event of a defect, fully suitable for taking along a passenger and a lot of luggage, and simply ideal for all kinds of roads, tracks and even the roughest terrain, the R 80 G/S quickly became a genuine multi-purpose bike or a "bike for all seasons", as the Americans would say. Whether it was used for crossing African deserts or the Brazilian rain forest, for ultra-long tours from Alaska to Tierra del Fuego or for crossing passes in the Himalaya all the way to China, BMW's flat-twin enduro did not take long to become first choice among motorcycle globetrotters in the 80's.

The R 80 ST road version launched in 1982 was supplemented in 1984 by the special Paris-Dakar model featuring a 32-litre (7 Imp gal) fuel tank. Sales of the R 80 G/S (including the R 80 ST and Paris-Dakar) were between 3,156 and 5,213 units a year from 1981 to 1986, the main markets being the European Alpine countries. During this period the R 80 G/S came in a class of its own in the real sense of the word, since it had no competition in the enduro market in terms of both engine size and the number of cylinders.

And when BMW's competitors eventually came in, enlarging the size of their single-cylinder models and also upgrading their machines in some cases to two cylinders, an entirely new market segment was established: the large long-distance enduro market.

Again BMW responded right away to this new challenge: In autumn 1987 the R 80 G/S produced and sold almost 28,000

times within 7 years, was replaced by a new generation of GS models - this time without the stroke between the letters "G" and "S". This time the new R 80 GS and R 100 GS models were proudly presented by BMW in Florence. The most outstanding innovations were the double-lever articulated swinging arm referred to as the BMW Paralever (see Section 5) and the all-new cross-spoke wheels now allowing the use of tubeless tyres. With a view to the increased output and top speed of the R 100 GS, the suspension and tyre specialists also faced a new challenge once again.

Despite increasing competition, the market success of the new GS models surpassed all expectations. Together with the R 65 GS, the 27-bhp version of the old R 80 G/S sold only in Germany due to the new two-level driver's licence, and the R 100 GS Paris - Dakar launched in 1989, sales amounted to approximately 16,000 units by the end of 1989. In 1988 and 1989 the one-litre GS was indeed the best-selling motorcycle throughout the entire German market. Adding the 6,000 models which will be sold in 1990, the GS can proudly boast a total sales volume of approximately 50,000 units in the 10 years from 1980 to 1990.

The GS model designation is now widely acknowledged as the expression of a new motorcycle philosophy. It stands for travelling in style instead of speeding without style - it emanates the flair the great wide world of motorcycling, the irresistible appeal of adventure and yearning for far-away countries. Indeed, the letters GS have developed from a "mere" model designation into a genuine myth. The G/S may be rightly regarded as the trendsetter creating a new class of large long-distance travelling enduros. Voted Enduro of the Year time and again in its home country throughout the 80's, the GS would actually deserve an honorary title for its 10th birthday: Enduro of the Decade.

THE SUCCESS OF A PIONEERING ACHIEVEMENT BY BMW.
70 per cent of all K 100 models now fitted with ABS
ABS also available for the K 75 models as of 1990

Experts call it a "technical revolution" and a "revolutionary milestone" in the second centennial of the motorcycle. In spring 1988 BMW become the world's first manufacturer to introduce an electronic/hydraulic anti-lock brake system (ABS) for motorcycles, available as an option for all K 100 models.

At the 1986 Cologne International Bicycle and Motorcycle Show (IFMA), BMW first presented the ABS prototype developed in cooperation with FAG Kugelfischer. Due to delays in the subsequent endurance tests, BMW then decided in the interest of absolute riding safety to postpone the production start of the new system originally scheduled for early summer 1987.

BMW motorcycle ABS has not only been lauded by the media all over the world, but has also become a great success in the market: In 1989, for example, 70 per cent of all purchasers of the K 100 ordered their machine with ABS, thus proving that extra safety is really worth the money. Given this overwhelming success, BMW has decided to offer ABS also for the K 75 models as of 1990.

ABS can achieve more than even the best rider

While the technical standard of motorcycle brakes, running gear and tyres has certainly been able to keep up with the increasing output of modern motorcycles in the last 20 years, the human factor has remained the weak point in the

brake/control system. To this very day, driving schools rarely teach young riders how to apply the brakes properly in an emergency - and it goes without saying that riders will hardly want to "try out" such an emergency on public roads. Whereas applying the brakes all-out on a dry road is relatively easy in an automobile even for a beginner, applying the brakes all-out on a motorcycle presents far greater risks for physical reasons alone.

Since a single-track vehicle is not balanced in itself, it only remains stable at low speeds due to the force exerted by the rider holding the handlebar, and at higher speeds due to the gyroscopic effect of the two wheels - above all the front wheel. Accordingly, whenever the wheels stop turning for more than 0.5 seconds the motorcycle will suddenly become unstable.

Often when the rear wheel stops turning - and almost always when the front wheel stops -, the rider will take a nasty (and perhaps even a very severe) fall. Accordingly, it takes a lot of practice and feeling on the part of the rider to "dose" brake power properly. Indeed, just how difficult it is for the rider to apply the brakes all-out in an optimum manner, is underlined by the fact that the rider has to brake the front wheel by hand and the rear wheel by foot at the same time. And, as mentioned, he must do this with a lot of feeling.

Studies have shown that roughly one out of ten riders fall off their machines due to over-braking. And the number of accidents attributable to the fact that the rider failed to apply the brakes all-out and thus required a longer stopping distance, is unknown - but it's certainly a substantial number.

Now ABS adds optimum brake safety to the high degree of efficiency already achieved by modern brake systems in

minimising the stopping distance required. In simple terms, ABS now allows the rider - as long as he is riding straight ahead - to apply the brakes as hard as he can without running the slightest risk of the wheels (or one wheel) locking. This enables even the relatively inexperienced rider to achieve the shortest possible stopping distance.

On roads with a low frictional coefficient - such as wet roads, gravel, dirt, sand or oil - ABS is far superior to even the most skilled and experienced rider. Particularly on surfaces with a sudden change in frictional coefficients - such as dry/wet - no human being could ever hope to react quickly enough to cope with the situation. ABS, on the other hand, responds quickly and safely without giving up any stopping distance.

ABS does not allow full application of the brakes in bends

Even ABS cannot override certain laws of physics. Braking in bends always presents a problem due to the complex interplay of longitudinal and transverse acceleration. A wheel subject to maximum lateral stability forces cannot convey longitudinal forces - and, accordingly, brake forces - at the same time.

When the motorcycle is at an angle in a bend, the tyre/road contact point will move over from the middle of the tyre. Should the rider brake in such a situation, the motorcycle will automatically move upwards from its inclined position and thus start to run straight ahead. Hence, the rider cannot apply the brakes all-out when riding at an extreme angle under maximum transverse forces. For even ABS cannot change the laws of physics.

With or without ABS, therefore, the brakes cannot be fully applied in bends. While an automobile equipped with ABS still responds to the steering when the brakes are applied all-out, a motorcycle does not.

ABS checks itself

Here's how motorcycle ABS works: Monitoring the 100-tooth impulse generator gears on the front and rear wheel, a sensor compares their speed of rotation and informs the control unit fitted in the rear section when a wheel is about to lock. Within fractions of a second the electronic control unit will then activate one of the two pressure modulators fitted at the side above the footrests. The pressure modulator, in turn, will reduce the hydraulic pressure in the wheel brake cylinder until there is no further risk of locking, then increasing brake pressure once again. This process is repeated up to 7 times a second, as long as the rider maintains the necessary brake pressure and road speed does not drop below 4 km/h (2.5 mph). Unlike ABS on a car, motorcycle ABS operates without any noticeable effect on the brake lever or pedal, as a valve interrupts the reflow of brake fluid.

The aim to build a system with optimum safety is also reflected by the electronic control unit supplied by Hella in Lippstadt, West Germany. The two control lines for the front and rear wheel, for example, are both fitted twice for absolute redundancy. Operating alternatively in 10-second cycles, one control line monitors or controls the system while the other is supervised for proper operation by a central processor. In the event of a deficiency ABS switches off automatically and a warning system comes on: Two red flashlights in the cockpit will inform the rider immediately that while his "normal" brakes still work, he will have to do without ABS until

the deficiency is repaired (and must therefore modify his style of riding accordingly). Even before the rider starts out, the electronic control unit checks ABS to make sure it is working and shows via the two red lamps in the cockpit that all systems are operating properly.

Riders must get used to ABS

Unlike automobile ABS, the control process generated by motorcycle ABS makes both the front and rear wheel respond far more significantly, with the rider literally being able to hear and feel ABS in operation. While this feeling is quite harmless, it is something the ABS novice must first get used to. It is therefore advisable - for example in an empty car park - to make oneself acquainted in peace and quiet with the automatic "pumping" of ABS brakes. Riders who get used to ABS this way will not make mistakes when they really have to apply the brakes in an emergency, while the inexperienced rider without the right "feeling" for ABS might possibly release the brakes in such a situation and thus require a longer stopping distance. Particulary on wet and slippery surfaces, riders can therefore overcome their natural inhibitions about applying the brakes all-out, thus gaining confidence in the additional safety potential ABS has to offer.

Braking in an emergency with a "safety net"

Even on an ABS-equipped motorcycle, riders should ride with due care on public roads, always considering the current situation and trying to avoid the need of braking in an emergency. But when such an emergency arises and the

rider has to instinctively - or even in panic - apply the brakes all-out within fractions of a second, ABS provides the "safety net" that can save the rider from a nasty fall when riding straight ahead. In many cases ABS can even help to avoid a crash, since the rider trusting in his anti-lock brakes can apply full brake pressure right from the start, reducing the stopping distance required to an absolute minimum.

A safety factor to be appreciated and not wasted

ABS enables the rider, as the "weak link" in the man/machine system, to make full use of the substantial efficiency offered by modern brakes. However, this extra safety offered by ABS should not induce riders to ride too fast or apply the brakes too late, thus foolishly wasting the extra safety they now have. In particular, the rider must still consider that stopping distances are much longer on wet and slippery surfaces. ABS cannot work miracles. But it can increase the active safety offered by a motorcycle - and, accordingly, the sheer riding pleasure you can experience on the road.

FROM A SIMPLE SHAFT TO THE SOPHISTICATED PARALEVER:
The history of shaft drive at BMW

Right from the beginning the history of the motorcycle drive shaft was written in Munich. It started in 1896 - 92 years ago - long before the foundation of Bayerische Motoren Werke. Indeed, not even the term "motorcycle" was known at the time, since Alois Wolfmüller from Munich only thought of this term a year later, when he had it patented by the authorities. It was one of his employees, however, who had the idea to use a drive shaft: Ludwig Rüb, a part-time employee of the Hildebrand & Wolfmüller Motorcycle Works, provided the first design of a motorcycle with drive shaft in 1896 and completed a second design in 1897, paving the way for BMW's subsequent designs with a longitudinally fitted drive shaft.

Rüb's designs, which never went any further than the drawing board, were obviously based on the Belgian FN shaft-drive bicycles. Indeed, at the beginning of this century FN became the first manufacturer to successfully apply the shaft drive concept (which had never really made it with the bicycle) to motorcycles.

In 1922 the drive shaft concept returned to Munich, the city where it had originally been born. Director General Franz Josef Popp of Bayerische Motoren Werke had taken the historical decision to build more than "just" horizontally-opposed engines for aircraft, small cars and motorcycles. Having experienced complaints from annoyed customers, he decided to take over motorcycle production entirely: Engineer Max Friz was given the order to design the first BMW machine. In response, Friz wrote motorcycle

history on the drawing board, developing the immortal concept of the BMW flat-twin with shaft drive and the idea of the straight drive train with the crankshaft, transmission shaft and propeller shaft all aligned in one row facing towards the rear-wheel drive.

This early drive concept was referred to as the "cardan drive" on account of its shaft to the rear wheel. Originally inspired by Italian scholar Geronimo Cardano (1501 - 1576), this power transmission was initially not even considered in the context of the motorcycle. For Cardano had invented the so-called cardan suspension for compasses, the principle of which was subsequently used for drive shaft joints. BMW's early machines such as the R 32 nevertheless did not require such joints. They had rigid frames without any rear-wheel suspension, meaning that the drive shaft to the rear wheel did not need the cardan joint invented shortly after the days of Columbus. Instead, a rubber disc (Hardy disc) was quite sufficient as a shock absorber.

It was only 14 years after the R 32 that the flow of power to the rear wheel required the use of a joint. BMW's racing machines already featured the vertical shaft engine with compressor which had become so powerful in the course of time that it could no longer be tamed even by a skilled rider without the help of a genuine rear-wheel suspension. In 1937, therefore, BMW's works racing machines were fitted with a suspension featuring straight guide sleeves on vertical tubes. The drive shaft now required for the rear wheel was equipped for the first time with a universal joint. In 1938 BMW introduced this rear-wheel suspension also on the R 51, R 61, R 66 and R 71 production models. This design principle with straight guide sleeves and short spring travel was then retained

until 1955, at least with BMW's standard-production machines.

The first ideas for further refining the BMW concept evolved in design offices in the early 50's. At the time the trend in motorcycle engineering was to move away from the wear-prone straight-travel rear-wheel suspension towards the swinging arm offering not only less friction but also longer spring travel. Even then, however, BMW's engineers realised that this principle applied very successfully with chain-drive machines is subject to physical limits when combined with a drive shaft. The reason is simply that the drive forces create a certain lifting action when starting off and accelerating, causing the rear wheel to move up and hardening the suspension. Quite logically, this effect becomes greater with increasing engine power and spring travel.

In 1954 Alex von Falkenhausen, a motorcycle rider by passion, the designer of the first rear-wheel suspension in 1936 and later the creator of BMW's successful car engines, took up a proposal made by motorcycle specialist Helmut Werner Bönsch: He patented a pivoted rear-wheel drive housing with a driving force support. Soon von Falkenhausen's idea became reality where it proved absolutely essential, on BMW's racing machines. The works version of the BMW RS used by Walter Zeller in the World Championships from 1955 had a correspondingly modified drive system with two drive shafts for conveying the power of the RS engine.

As of 1955 BMW's standard-production machines were equipped with a swinging arm suspension based on that of the RS racing machine: The housing of the drive shaft leading to the rear wheel was fitted positively to the

swinging arm. With engine power still being quite modest at the time (the R 69 S developed 42 bhp) and with spring travel on the rear wheel being relatively short (80 mm/ 3.15"), there was no reason to make any efforts.

Providing more power and longer spring travel, the next generation of BMW motorcycles launched in 1969 started to show a greater reaction of the drive shaft than before. Applying full throttle on the 50-bhp R 75 and later on the 70-bhp R 100, the rider really had the feeling that he was going up a lift: BMW's machines rose up a bit when accelerating, even though most riders regarded this more as a typical characteristic than as a shortcoming. Experts even advised other riders to simply give a bit of gas in bends for more ground clearance whenever their BMW touched the surface.

Off-road riders, however, did not feel so happy about this "lift action", while they certainly appreciated the long spring travel and soon also the superior power of BMW's enduros. The problem in their case was that the rear wheel rising up largely eliminated the spring travel whenever the rider really opened up the throttle.

When BMW launched the first white-and-blue standard-production enduro in 1980, the R 80 G/S, the existing concept with one joint started approaching its limit, although the remaining margin was still quite sufficient. While the 50-bhp of the standard model still allowed a reasonable compromise, it was obvious that any further increase in engine output would start to create problems. And precisely this was the experience of those enthusiats who, more or less secretly, converted their R 80 G/S into a 1000-cc machine. BMW also had to learn this lesson with the competition machines raced in the Paris-Dakar Rally:

Despite their longer swinging arm they presented certain problems with the physically induced lift forces, although this did not stop them from winning the Rally no less than four times.

The first plans to introduce a new and even better concept date back to 1981, inevitably resulting in the reinstatement of the pivoted swinging arm. Now, however, conditions were different from what they had been 30 years before with von Falkenhausen's design. For with the introduction of the R 80 G/S BMW had once again revolutionised the drive shaft concept, introducing the Monolever single swinging arm. Now the task was to fit the swinging arm with a joint able to work efficiently without play and distortion even under the toughest off-road conditions.

Developments carried out along these lines by BMW suspension engineers René Hinsberg and Horst Brenner were reflected by a patent registered in November 1983. The final design was then a direct consequence of this development: The Paralever double-joint swinging arm is made of cast aluminium, as on the K 100. Despite its more sophisticated design it is therefore hardly heavier than the former steel-tube version.

The new, refined version of the drive shaft concept then debuted in 1987: Just like the R 80 G/S became BMW's first model with the Monolever in 1980, the new enduro models R 80 GS and R 100 GS again became pacemakers in technology with the new Paralever. The K 1 was the first K-model to feature this unique technology, and is now followed by the K 100 RS.

The BMW Paralever: idea and effect.

Drive forces conveyed to the wheels inevitably cause a certain reaction of the vehicle. This applies both to motorcycles and to cars. An effect of this kind will always occur when all the wheels are unsprung, in which case it causes a dynamic shift in wheel load. Sprung wheels, on the other hand, react additionally to the drive forces, the extent of this reaction depending on the geometric arrangement of the suspension components. It is therefore possible both in theory and in practice to compensate both drive and brake forces either in full or in part.

With motorcycles this reaction of the suspension depends of the type of drive system. Machines with chain drive tend to move down at the rear on the sprung wheel when starting off. Machines with a drive shaft, on the other hand, show exactly the opposite reaction: the rear wheel will move up.

The simplest and most obvious way of compensating this effect is to use a longer rear-wheel swinging arm. But even this solution only provides a partial improvement. With a BMW, for example, the swinging arm required to fully compensate such reactions would have to be longer than the bike's wheelbase - to be precise exactly 1700 mm or 66.9". A double-joint swinging arm, on the other hand, provides the same effect as an extremely long single unit, but takes up much less space. This is simply because the parallelogram arrangement increases the radius of the wheel elevation curve.

BMW's Paralever provides the same effect as a swinging arm measuring 1400 mm or 55.1" in length, thus providing a compensation of 70 per cent. This is sufficient to reduce the effects of acceleration forces to an insignificant minimum and also ensures that when decelerating there is no significant brake dive. Indeed, the Paralever substantially improves the motorcycle's braking characteristics, totally eliminating the otherwise hardly avoidable judder effect of the rear wheel when braking hard or shifting down suddenly.

THE R SERIES FLAT-TWINS
Commemorating 10 years of outstanding success: GS models further updated for the future
SAS emission control on all flat-twins

Despite the overwhelming success of the BMW K generation since 1983, the BMW flat-twin Boxer built since 1923 with basically the same concept has succeeded in maintaining its superior position in the motorcycle market. Particularly the GS models have established a new trend in the enduro market and are extremely popular (see Section 3).

Three years after their introduction the highly successful R 80 GS and R 100 GS are now being thoroughly revised to ensure their success also in future. All Boxer models in the 1991 model year, which largely remain unchanged apart from the enduros just mentioned, are now available as an option with SAS emission control (see Section 2) as part of BMW's offensive to protect the environment.

Improved front-wheel brake on single-disc brake systems

A significant improvement is the single-disc front brake on all GS models, the R 80 and R 80 RT (fitted as standard with a dual-disc brake only in Germany).

While the brake calliper remains unchanged, the brake disc and brake disc support have been thoroughly revised. The brake disc now "floats" via rollers on the brake disc carrier, the advantage of this floating suspension being that any squeaking noise is largely eliminated. A further advantage is that the brake disc and brake lining have matching surfaces, meaning that the full area of the brake lining can always be used for braking and thus guarantees maximum efficiency.

All R 80 models also available with 27 bhp as an option

As of the end of 1990 the R 80, R 80 GS and R 80 RT will also be available as an option with engine power reduced to 27 bhp. This reduction in output is intended first and foremost for the two-tiered driver's licence regulations in Germany. It is relatively easy to subsequently upgrade such reduced-output engines to 50 horsepower. The 27 bhp R 65 remains in the model line-up exclusively for the German market, while the R 65 GS has been dropped from the range.

The enduro models:
R 80 GS and R 100 GS with a new look
Cockpit fairing with rectangular headlight and new instruments

The most important innovation featured by the upgraded GS models is obvious at first sight: the new look of the machines. Like the R 100 GS Paris-Dakar launched in 1989, the R 80 GS and R 100 GS now have a new cockpit fairing fitted directly to the frame. The "heart" of the fairing is the tubular spaceframe serving as the support element. In conjunction with the newly designed windshield the fairing offers very good protection from wind and weather, the windshield itself being adjustable for angle as a function of rider size. Like the R 100 GS Paris-Dakar, the new models now also feature the high-intensity rectangular headlight of the K 75 S. In the cockpit itself there are two new, extra-large dials: The speedometer on the left, the rev counter on the right. The warning lights and telltales are located at the top centre beneath a glass cover.

Same handlebar controls as on the K Series

The handlebar controls taken directly from the K Series ensure an even higher standard of comfort and superior ease of operation. The only feature not adopted from the K models is the automatic direction indicator return, as the GS models do not have an electronic speedometer.

Handlebar centre bearing with fine-thread adjustment

The handlebar-centre bearing now has the same fine-thread adjustment as on the K 75 models allowing far more precise and consistent setting of bearing play.

Fuel tank filler cap recessed and lockable

The fuel tank filler cap is now recessed flush with the tank itself and can be locked for extra security. Fitting a tank bag does not present any problems at all.

Seat even more comfortable than before

Use of a new upholstery material ensuring the same superior comfort and seat contours throughout a long running life guarantees even greater riding comfort on road and track.

New individually adjustable spring strut

The rear wheel features an all-new spring strut developed together with Bilstein. Apart from being able to pre-tension the spring to four different settings, the rider can now also adjust the expansion - ie, damping - stroke to no less than 10 different positions. This means individual adjustment to all loads, riding conditions and road surfaces.

Stainless-steel muffler

The tail-end muffler is now made of polished stainless steel.

Lowered front-wheel mudguard

The front-wheel mudguard has been lowered closer to the tyre, but is also available as an option at its former, elevated position.

Front-wheel brake disc in floating arrangement, emission control by SAS and 27-bhp version of the R 80 GS. All these innovations have already been mentioned at the beginning of this Chapter.

The only difference between the R 100 GS and the R 80 GS is the larger engine with extra power, the oil cooler and the cylinder protection bars with integral side-stand fitted as standard.

The following innovations introduced for the R 80 GS and R 100 GS are also featured by the R 100 GS Paris-Dakar: adjustable windshield, instruments, handlebar controls, handlebar centre bearing, spring strut and tail-end muffler.

Sports suspension for the GS models as a conversion kit

Special accessories for really tough off-road riding have been available as a brand-new feature from spring 1990. With these accessories the genuine enthusiast can convert all new GS models to a sophisticated sports suspension developed jointly by BMW and the Dutch company, White Power. This conversion kit consists of a complete set of long, progressive-action telescopic springs with improved load-bearing capacity plus a sports-tuned rear-wheel spring strut adjustable to several different settings.

The R 100 GS: the world's largest enduro

BMW's second enduro generation, the R 80 GS and R 100 GS, took over one all-important task in late 1987: to continue the successful career of the former model. Just about everything on these motorcycles was new at the time - you can count the unchanged components taken over from the "old" model on the fingers of one hand. Two examples were the headlight with all its interior fittings and the handlebar including the levers and switches.

One item dropped in the model designation was the stroke between the letters G and S. Following the example set by BMW's other model designations, the new enduros have since been called the R 80 GS and R 100 GS.

The suspension certainly featured the most dramatic and eye-catching modifications back in 1987. The frame was also modified with the oval tubes inside the tank tunnel being reinforced for even greater rigidity. The rear frame section supporting the seat and the built-in luggage rack were also made even stronger than before.

You will see at first sight that the front wheel fork is brand-new. It is made by Marzocchi, the Italian specialist for off-road suspension components that already provided the wheel forks for the Paris-Dakar racing machines. The new fork was nevertheless carefully developed by BMW and Marzocchi together before the final decision was made to fit this fork on BMW's new off-road machine. Among other things, the fork features a particularly hard-wearing anti-friction surface between the inner and outer tubes. This surface consists of sleeves with a multi-layer metal bearing and teflon coating providing perfect conditions for smooth and consistent action of the light-alloy tube.

Spring travel of the Marzocchi fork is 225 mm/8.86" (previously 200 mm/7.87"), the diameter of the main tube is 40 mm/1.57" (previously 36 mm/1.41"). The damper units inside the fork operate with a larger oil volume, a higher oil throughput and larger holes and cross-sections. This ensures an active damping effect even under tough off- road conditions.

The fork is fitted as standard with a stabilising bridge between the sliding tubes (fork stabiliser). The front axle has the same dimensions as the K-models (diameter 25 mm/0.98") and is hollow in order to save weight.

Being much stronger and sturdier, the wheel fork prevents the machine from pulling to one side when braking, even though the forces acting at the front are larger than before. The diameter of the brake disc has been increased to 285 mm/11.22" (previously 260 mm/10.24") and the Brembo brake calliper is now one size larger than on the R 80. The hydraulic transmission of the brake has been modified to ensure lower operating forces. Now the rider only requires a moderate effort on the road to brake the machine up to the point where the wheels will lock. Off-road the rider only needs one or two fingers to apply the brakes smoothly and efficiently.

The rear swinging arm is really brand-new. Patented as the BMW Paralever, it replaces the well-known Monolever. Being the most significant innovation featured by the new GS models and now also on the K 1 and the new K 100 RS, the BMW Paralever is described in its development and function in a separate section of this press folder. It is made of a light alloy cast under low pressure and naturally retains the proven bevel roller bearing re-adjustable to virtually every position. Two further bevel needle bearings of this type are fitted in the joint bet-

ween the swinging arm and the drive housing and are also adjustable.

The use of light alloy helps to reduce the weight of the Paralever. Torsional stability was further increased by calculating the profile of the Paralever by way of the finite-element method. Despite its more sophisticated design involving two bevel roller bearings and an additional joint, the Paralever weighs only 1.6 kg more than the old swinging arm. To keep unsprung masses at a minimum the GS models feature the lighter drum brake (with a diameter of 200 mm/7.87") on the rear wheel. For kinematic reasons, this rear-wheel brake is no longer operated via a linkage bar, but rather by a cable.

Like the front wheel, the rear wheel also has longer spring travel now increased to 180 mm/7.09" (previously 170 mm/6.69"). The inclined Monoshock featuring a Boge gas pressure shock absorber provides a slightly progressive response, is adjustable to four different settings and now rests directly on the final drive housing. A softer spring strut has been fitted since autumn 1988, but the spring strut previously used remains available as special equipment.

The wheels of the second GS generation stand out immediately through their completely new cross-spoke styling. This new, patented solution offers numerous benefits: The position of the spokes running through the rim hump provides a closed, self-contained rim base and, accordingly, allows the use of tubeless tyres. Another advantage is that the threaded end of the spokes is on the hub, allowing the spokes to be replaced both with the tyre and the wheel fitted in position. Last but not least, the crosswise arrangement of the spokes enhances the torsional rigidity of the wheel, giving it the same strength and stability as even the very best cast wheels.

Being less wide at the junction point of the spokes, the wheel provides extra space that is really very helpful - for example for the larger brake callipers at the front and also at the rear for the wider Paralever mounts extending out towards the wheel. With a conventional spoke wheel this would have considerably reduced the width of the spoke base, thus inevitably making the rear wheel unstable. Applying an entirely new concept, BMW's engineers have solved this problem and re-invented the wheel, as it were. Another advantage of this new design is that a 130/80-17 tyre can be fitted on the wider rear rim (instead of the 4.00-18 tyre fitted so far), such a wider tyre obviously being able to cope with more substantial drive forces. An advantage of the old wheel retained with the new one is that the rear wheel is extremely easy to change - the only difference being that now you have four bolts to undo instead of three.

The model designation alone - R 100 GS - signifies that BMW's new top enduro moves up to a much higher class in terms of engine size and output. Now the enthusiast can ride off-road or even tour the world with a whole litre of engine capacity, enjoying an ample 60 bhp (44 kW) at a moderate engine speed of just 6500 rpm. The torque of 76 Nm (56 ft/lb) at 3750 rpm provides an even better description of the outstanding character of this machine.

On its way to becoming an enduro, the 1000-cc flat-twin re-born in 1986 in the R 100 RS had the benefit of various design improvements. It now breathes even more freely through the two Bing constant-depression carburettors with a cross-section of 40 mm/1.57" (previously 32 mm/1.26". These are precisely the carburettors that already proved their value in BMW's Paris-Dakar machines.

With an improved rocker arm guide, the valve drive of the flat-twin has become even smoother and more reliable. Reflecting the signs of the times, modifications to the valve seats enable the engine to run permanently on unleaded fuel, which is however not obligatory. Although the R 100 GS does not have quite the same top speed as the other one-litre boxers and will probably not be used that often for covering long distances at high speeds (due to the wide handlebar and the absence of a large fairing), the enduro model naturally comes with an oil cooler, just like the R 100 RS and R 100 RT fairing models.

Another new feature of the engine - which is now also available on all Boxer models - is the starter. As with the K-models, this is a so-called layshaft starter weighing 2 kg less thanks to its smaller electric motor, but nevertheless providing the same torque by way of the intermediate transmission. And while the starter requires less power when starting the engine, the GS is now fitted with a higher-output 25 Ah battery.

The pre-silencer beneath the gearbox is much larger but hardly heavier than before. With an increase in volume from 1.5 to 3.8 litres it not only reduces the noise level but also serves to improve the torque curve.

It goes without saying that all these features and improvements have also gone into the smaller BMW R 80 GS.

The new GS generation also offers a wide range of other useful and highly practical features. With a capacity of 24 litres (5.3 Imp gals) and a reserve of 4.7 litres (1.03 Imp gals), the new tank provides excellent conditions for long-distance riding.

Without fuel, oil and tools the new R 80 GS and R 100 GS weigh 187 kg (412 lb) and, respectively, 192 kg (423 lb); their weight in road trim is 210 kg (463 lb) and, respectively, 215 kg (474 lb). The maximum permissible weight of BMW's enduros has been increased from 398 to 420 kg (878 to 926 lb). Clearly, this offers ideal conditions for touring with a passenger and a lot of luggage.

The seat has not only been re-styled but also offers new inherent qualities. Having become longer and wider, it is also more comfortable. Despite the longer spring travel, the seat height of 850 mm (33.5") is quite acceptable for an enduro. The quality of the seat upholstery has been substantially improved by using polyurethane and latex foam in sandwich arrangement. A higher seat (880 mm/ 34.6") is also available for the taller BMW rider. A smaller windshield encompassing the cockpit and efficiently reducing wind pressure at speed is standard on the R 100 GS and available as a retrofittable option on the R 80 GS.

BMW's objective in developing the new GS models was to offer the enthusiast first-class enduro riding. The Paralever system eliminates undesired effects of the drive shaft and its reaction to changes in load, thus providing an even higher standard of riding safety and suspension comfort. The reinforced frame, the new forks and wheels, and the new generation of tyres certified for speeds up to 190 km/h (118 mph) underline these virtues and ensure supreme directional stability at all speeds, eliminating the last difference between road machines and enduros.

Last but not least, the one-litre engine opens up two entirely new perspectives for an enduro: First, it gives the fast rider a top speed of 181 km/h (112 mph) (R 80 GS: 168 km/h/104 mph), whisking him along like an express from one place to another; second, it offers superior torque at low engine speeds for riders who wish to travel to distant countries with a passenger and lots of luggage.

**Based on vast experience in tough racing:
Retrofittable Paris - Dakar kit for the R 80 GS and
R 100 GS and the special R 100 GS Paris - Dakar model**

The Paris - Dakar Rally, the world's toughest endurance race, has always been one of the absolute highlights in the successful 10-year history of BMW's enduro models. The competition version of the BMW R 80 G/S won the motorcycle category no less than four times - with Frenchman Hubert Auriol in the saddle in 1981 and 1983, and with Belgian Gaston Rahier taking over in 1984 and 1985. This obviously gave BMW sufficient reason to introduce a special Paris - Dakar model with a 32-litre tank in 1984 (the tank was also retrofittable on the standard R 80 G/S).

The supreme performance and endurance of BMW's flat-twin motorcycles was then proven once again early in 1988: Munich rider Eddy Hau won the marathon category for private riders in the Paris - Dakar Rally, riding a BMW R 80 G/S modified by the Bavarian tuning company HPN and available to enthusiasts in a small, special series of limited-edition models. Unlike the overall rating, the marathon category for private riders is far stricter, prohibiting the replacement of virtually all essential motorcycle components.

In the light of this racing success and in view of the experience gained in the process, it was an obvious decision by BMW to develop another Paris - Dakar kit for the new GS generation. This new machine is intended above all to meet the greater requirements made of a long-distance adventure motorcycle, efficiently protecting the rider from wind and weather, keeping the engine out of harm's way (stone-throw, etc), providing a longer range thanks to the larger tank and offering a larger luggage rack.

The new Paris - Dakar kit, which is also available in individual components, has been available since 1989 for conversion of the new R 80 GS and R 100 GS models. The kit will also be available in modified form for installation on the old R 80 G/S model and the R 65 GS.
Also since spring 1989, the R 100 GS Paris - Dakar model has been in production in Berlin.

The Paris - Dakar kit consists of the following features:

1. The fuel tank

The 36-litre (7.9 Imp gal) fuel tank made of a special plastic for subsequent painting is based on the Paris - Dakar competition tank and offers optimum ergonomics for the rider. It also features a lockable stowage box with a capacity of 5 litres (0.18 cu ft).

2. The fairing

The fairing is mounted on the handlebar centrepoint by a four-bolt connection piece and to the frame by a two-bolt connection. Unlike conventional fairing supports hidden behind the fairing and not visible from outside, the new tubular fairing support featured by the BMW Paris - Dakar kit is visually integrated in the fairing as an outstanding functional and styling highlight (form follows function). This new concept offers three practical advantages: It protects the fairing from damage in the event of an accident, facilitates transportation and lifting up of the motorcycle thanks to the clearly defined fastening and holding points, and keeps the fairing free of vibrations while on the road.

The standard instruments and warning lights of the GS models are fitted in the central fairing section, together with additional instruments such as the rev counter and quartz clock (which will be standard on the R 100 GS Paris - Dakar model). The central section of the fairing also accommodates the high-intensity rectangular headlight already featured on the K 75 S. In accordance with the general nature of this machine and its specific requirements, the direction indicators are mounted on rubber bushes. The side sections of the fairing provide a direct connection to the fuel tank, while the adjustable windshield on the fairing protects the rider from wind and weather.

3. Engine protection, engine housing and flared mudguard

This new machine not only seeks to protect the rider from wind and weather, but also keeps the engine and oil sump out of harm's way when riding under tough off-road conditions. The extremely stable aluminium engine protector is fastened to the oil sump from below by means of silent blocks and also covers the underside of the frame and the exhaust manifold. The engine housing made of impact-proof plastic fitted on to the cylinder protection bars serves to keep the rider's feet and legs dry, at the same time adding to the overall visual impression of the machine.

The wider mudguard also serves to keep the rider and his machine clean in rain and on muddy terrain - it is simply bolted on to the standard front-wheel mudguard and efficiently copes even with heavy pieces of dirt thanks to the aluminium reinforcement on the bottom of the mudguard.

When featuring the Paris - Dakar kit, the R 80 GS and R 80 G/S models also need the oil cooler fitted as standard on the R 100 GS, since the fairing makes such a modification necessary.

4. Solo seat with large luggage rack

The large solo seat offers extra comfort particularly on long trips, while the longer luggage rack provides ample space even for heavy luggage. The R 100 GS Paris - Dakar is nevertheless also available with the normal GS double seat with the smaller luggage rack at the back.

5. Paintwork colours

The kit including the tank is finished either in the desired paintwork colour or only with primer for subsequent application of the proud owner's individual colour scheme.

The 1991 model R 100 GS Paris - Dakar

The following innovations introduced for the R 80 GS and R 100 GS also come with the R 100 GS Paris - Dakar: adjustable windshield, instruments, handlebar controls, handlebar centre bearing, spring strut, tail-end muffler.

The road models:
R 80: the classic sports machine

The R 80 without fairing is a classic road machine for the sporting rider - a "grassroots" motorcycle at its very best. The superior 800-cc power unit develops 50 bhp (37 kW) and offers an exceptional torque curve: the maximum torque of 58 Nm (43 ft/lb) comes at an engine speed of just 4000 rpm.

The engine of the R 80 is arranged in the usual way. Via a lightweight clutch and a directly connected 5-speed gearbox power is transmitted directly through the low-maintenance drive shaft to the rear-wheel drive also running in bevel gears (like on the K 100). Like all BMW motorcycles, the R 80 also features the BMW monolever system. The decisive advantages of this suspension are good wheel guidance, low weight and simple removal of the rear wheel.

Featuring 18" cast light-alloy wheels with Y-shaped spokes, tubeless low-profile tyres, a large telescopic fork with a tube diameter of 38.5 mm (1.52") and a integrated fork stabilizer, the highly efficient anti-fading single-disc brake with a disc diameter of 285 mm (11.2") and a reinforced double-loop frame, the R 80 now offers the same high technical standard as the K Series.

Two conventional circular dials for road and engine speed as well as a large 22-ltr (4.8 gal) tank give the R 80 timeless elegance and classic styling. Other features that add to this classic look are the comfortable seat with grab handles for the passenger and the rear section with stowage box.

Weighing a mere 210 kg (463 lb) with full tank, the R 80 is a lightweight in its class. With a maximum permissible weight of 440 kg (970 lb) and a maximum load of 230 kg (507 lb), this BMW flat-twin is really ideal for touring.

R 80 RT: the comfortable tourer

Otherwise identical with the R 80, the R 80 RT features the large touring windshield for optimum protection in wind and weather. This windshield is ideal for comfortable long-distance touring in conjunction with the high-rise touring handlebar.

The multi-piece tourer fairing has a large adjustable windshield extending to the rear, direction indicators integrated in the fairing and two lockable stowage boxes. Air inlet nozzles on both sides with adjustable nozzle openings provide a good supply of fresh air in hot weather.

The R 80 RT weighs only 227 kg (500 lb) with full tank - very little for a touring machine.

R 100 RS: a classic for the connoisseur[1)]

Re-introducing the R 100 RS in a new edition limited initially to 1,000 units, BMW catered in the 1987 model year for the great demand among flat-twin enthusiasts for the one-litre flat-twin engine. This model then became a regular member of the range in 1988. The new version of this engine, incidentally, is also suited for running on unleaded regular-grade fuel. Like all other BMW motorcycles, it fulfills the ECE R 40 European emission limit which took effect in 1988. In all other respects, the

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1) As of 1990 the R 100 RS is no longer available in all countries

engine has also been modified to provide the low noise level of the 650 and 800-cc flat-twins. As an example, it features the two-in-two exhaust system of the R 80 with pre-muffler.

Designed for even better protection of the environment, the one-litre engine of the new R 100 RS develops 60 bhp at 6500 rpm (versus the 70 bhp at 7000 rpm of the old R 100 RS). The maximum torque of 74 Nm (55 ft/lb) now comes at just 3500 rpm (versus 76 Nm or 56 ft/lb at 6000 rpm with the old R 100 RS). Accordingly, the new one-litre engine offers supreme power from low speeds, thus providing a feature which has always made the large flat-twins so fascinating.

The R 100 RS therefore represents the come-back of a classic machine. Originally introduced in 1976, the R 100 RS was the first motorcycle available as standard with a fairing optimised aerodynamically in the wind tunnel. The sporty touring fairing, which protects the rider from wind and weather, is now available again in its proven form.

R 100 RT: the large touring Boxer rides again since 1987

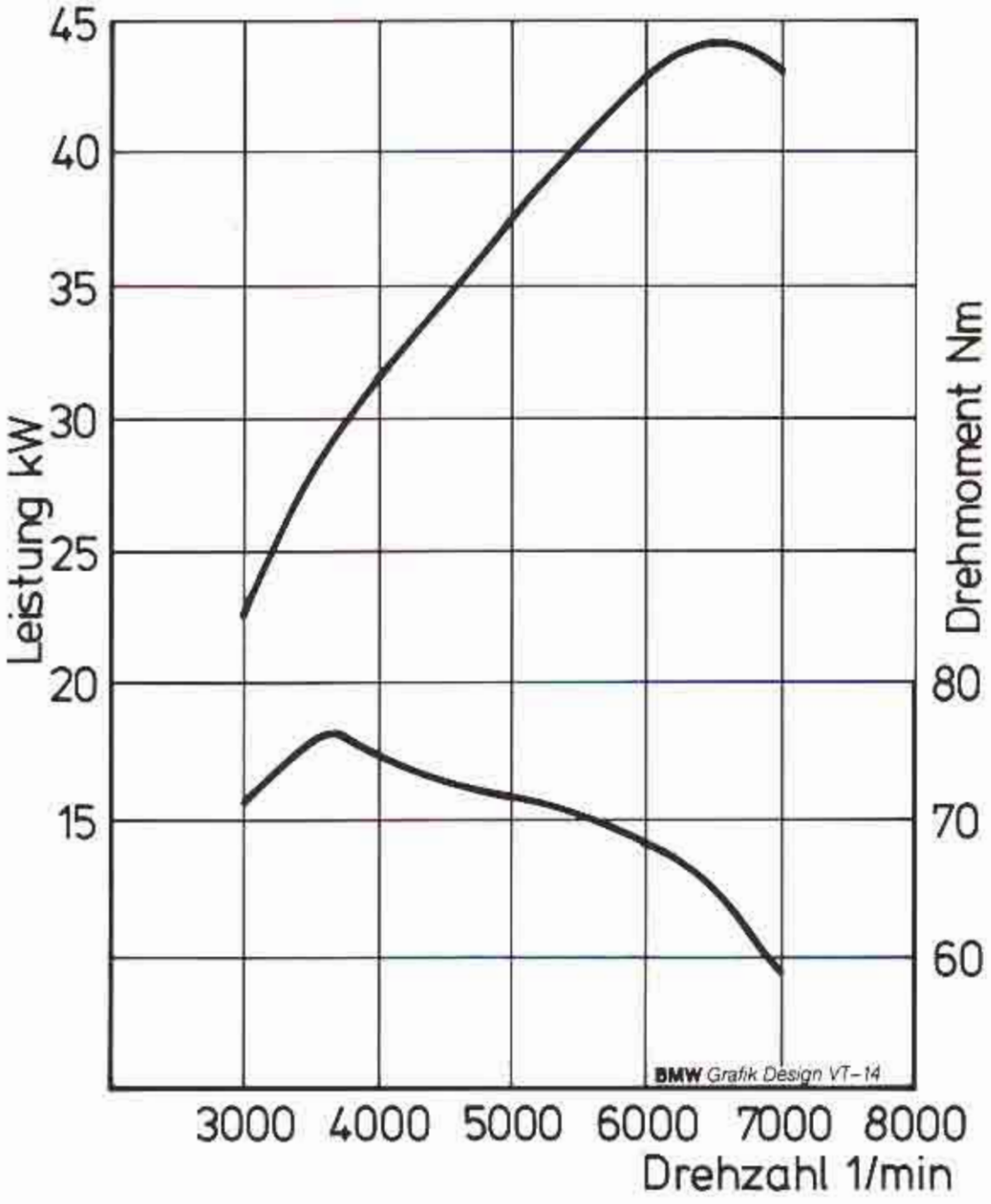
Launched in 1977 one year after the R 100 RS, the R 100 RT also experienced its come-back exactly 10 years after its original premiere and a four-year interruption. Naturally, it has been modernised in the meantime to meet the latest requirements. In 1977 the R 100 RT was the first motorcycle equipped as standard with full touring fairing styled in the wind tunnel. Unlike the sports fairing of the R 100 RS, the fairing of the R 100 RT has remained in use on the R 80 RT without any changes to this very day, even after the discontinuation of the R 100 RT in autumn 1983. The reason is simply that this wind-and-weather-proof fairing is still one of the best in the market, together with the large touring fairing of the K 100 LT.

The engine and suspension of the R 100 RT are identical with that of the R 100 RS. Particularly touring riders out on a long trip with a pillion and luggage will appreciate the extra performance and higher torque versus the R 80 RT. The R 100 RT, which offers remarkable handling for a large tourer, is fitted as standard with an oil cooler, a dual disc brake, quartz clock, voltmeter and touring cases with one standard key for the ignition, handlebar, fuel tank, seat and touring case locks.

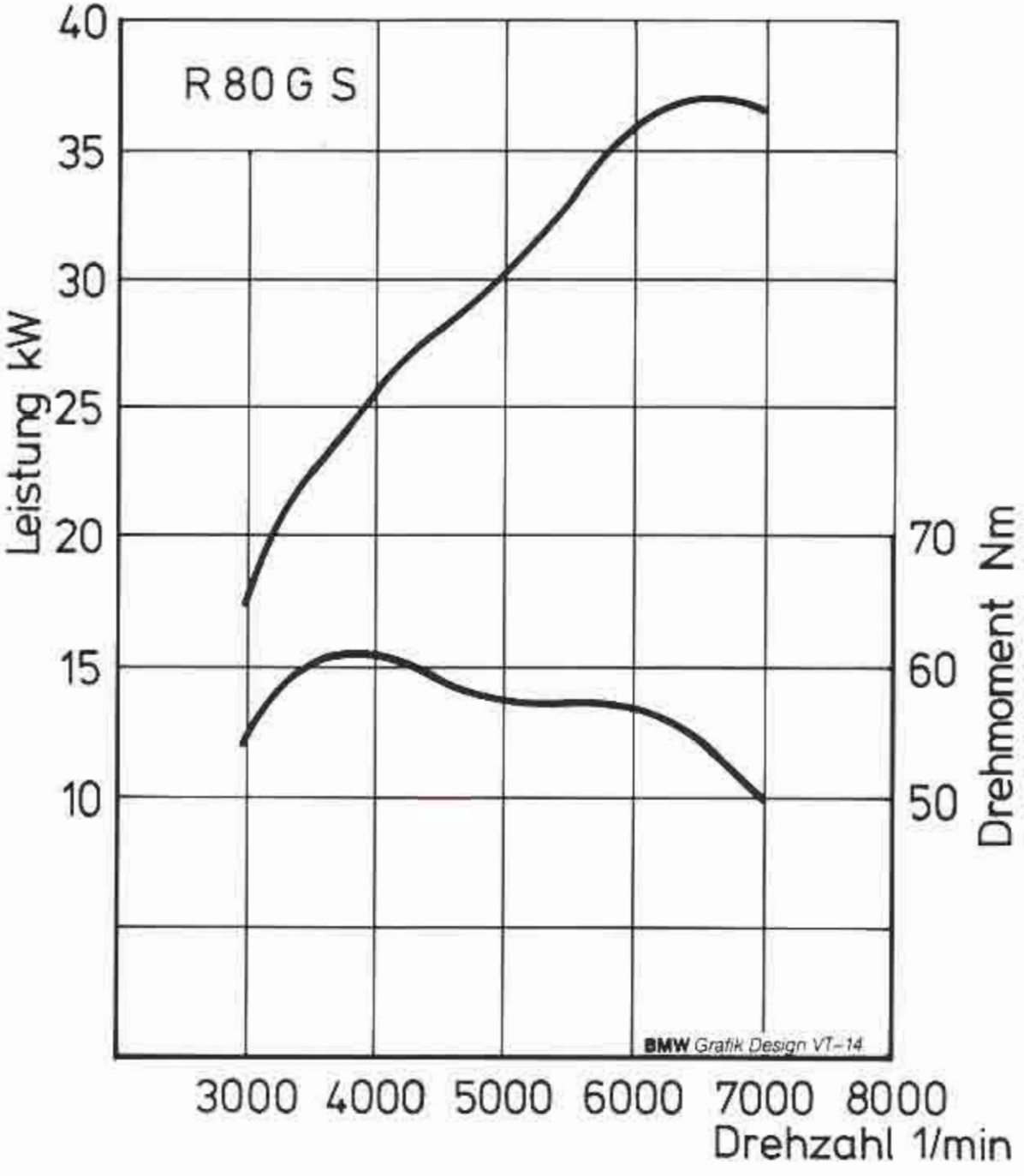
	SPECIFICATIONS BMW MOTORCYCLES		R 80	R 80 RT	R 80 GS	
Engine	Cubic capacity	cc	798	798	798	
	Bore/stroke	mm	84/70,6	84/70.6	84,8 x 70,6	
	Max output	kW/bhp	37/50	37/50	37/50	
	at	/rpm	6500	6500	6500	
	Max torque	Nm	58	58	61	
	at	/rpm	4000	4000	3750	
	Design		flat-twin	flat-twin	flat-twin	
	No of cylinders		2	2	2	
	Compression ratio/fuel grade (also unleaded)		8,2 N	8,2 N	8,2 N	
	Valve control		OHV	OHV	OHV	
	Valves per cylinder		2	2	2	
	Intake/outlet dia	mm	42/38	42/38	42/40	
	Fuel supply		Bing carburettors	Bing carburettors	Bing carburettors	
	No of carburettors/dia		2/32	2/32	2/32	
Electrical system	Ignition		contactless transistorized coil ignition			
	Alternator	W	280	280	280	
	Battery	V/Ah	12/25	12/25	12/25	
	Headlight	W	H 4 55/60 dia 180 mm	H 4 55/60 dia 180 mm	H 4 55/60	
	Starter	kW/	0,7	0,7	0,7	
Power transmission, Gearbox	Gearbox		5-speed gearbox with dog-type shift			
	Gear ratios	I	4,40/3,20	4,40/3,36	4,40/3,20	
		II	2,86/3,20	2,86/3,36	2,86/3,20	
		III	2,07/3,20	2,07/3,36	2,07/3,20	
		IV	1,67/3,20	1,67/3,36	1,67/3,20	
		V	1,50/3,20	1,50/3,36	1,50/3,20	
Suspension	Rear-wheel drive		Encapsulated drive shaft with universal joint and helical-gear follower plate, torsion damper in drive shaft		BMW Paralever	
	Clutch		Single-plate dry clutch with diaphragm springs			
	Type of frame		Double-loop tubular steel frame with bolted-on tail section			
	Spring travel front/rear	mm	175/121	175/121	225/180	
	Wheel castor	mm	120	120	101	
	Wheelbase	mm	1447	1447	1513	
	Brakes	Front:	single-disc fixed-calliper brake, dia 285 mm	dual-disc brake dia 285 mm	single-disc fixed-calliper brake, dia 285 mm	
		Rear:	drum brake, dia 200 mm	drum brake, dia 200 mm	drum brake, dia 200 mm	
	Wheels		Cast light-alloy wheels	Cast light-alloy wheels	Cross-spoke wheels	
		front	MTH 2 2,50 x 18 E	MTH 2 2,50 x 18 E	1,85 - 21 MT	
		rear	MTH 2 2,50 x 18 E	MTH 2 2,50 x 18 E	2,50 - 17 MT	
	Tyres	front	90/90 - 18 H	90/90 - 18 H	90/90 - 21 F	
		rear	120/90 - 18 H low-profile	120/90 - 18 H low-profile	130/80 - 17 T low-profile	
Dimensions and weights	Length, overall	mm	2175	2175	2290	
	Width with mirrors	mm	800	960	1000	
	Handlebar width without mirrors	mm	635	714	830	
	Seat height	mm	807	807	850	
	Weight, unladen with full tank	kg	210	227	215	
	Max permissible weight	kg	440	440	420	
	Fuel tank/reserve	ltr	22/2	22/2	24/4,7	
Performance	Fuel consumption					
	90 km/h (56 mph)	ltr	4,6	4,8	4,7	
	120 km/h (75 mph)	ltr	6,3	7,2	6,6	
	Acceleration					
	0—100 km/h (62 mph)	sec	6,0	6,4	6,0	
	standing-start km	sec	27,6	29,0	28,3	
	Top speed	km/h	178	170	168	
Model features	Fairing			Full fairing fixed positively to frame, adjustable windshield and integral stowage boxes (glass-fibre-reinforced plastic)	Glass-fibre-reinforced fairing	
	Standard features		Toolkit Repair kit	Toolkit, Repair kit	Toolkit, Repair kit Luggage rack	

	SPECIFICATIONS BMW MOTORCYCLES		R 100 GS	R 100 GS Paris-Dakar	R 100 RS	R 100 RT
Engine	Cubic capacity	cc	980	980	980	980
	Bore/stroke	mm	94 x 70.6	94 x 70.6	94 x 70.6	94 x 70.6
	Max output	kW/bhp	44/60	44/60	44/60	44/60
	at	rpm	6500	6500	6500	6500
	Max torque	Nm	76	76	74	74
	at	rpm	3750	3750	3500	3500
	Design		Flat-twin	Flat-twin	Flat-twin	Flat-twin
	No of cylinders		2	2	2	2
	Compression ratio/fuel grade		8.5 N	8.5 N	8.45 N	8.45 N
	Valve control		OHV	OHV	OHV	OHV
	Valves per cylinder		2	2	2	2
	Intake/outlet dia	mm	42/40	42/40	42/40	42/40
	Fuel supply		Bing carburettors	Bing carburettors	Bing carburettors	Bing carburettors
	No of carburettors/dia		2/40	2/40	2/32	2/32
Electrical system	Ignition		contactless transistorized coil ignition			
	Alternator	W	280	280	280	280
	Battery	V/Ah	12/25	12/25	12/30	12/30
	Headlight	W	H 4 55/60 dia 140 mm	H 4 55/60 dia 140 mm	H 4 55/60 dia 180 mm	H 4 55/60 dia 180 mm
	Starter	kW	0.7	0.7	0.7	0.7
Power transmission, Gearbox	Gearbox		5-speed gearbox with dog-type shift			
	Gear ratios	I	4.40/3.09	4.40/3.09	4.40/3.0	4.40/3.0
		II	2.86/3.09	2.86/3.09	2.86/3.0	2.86/3.0
		III	2.07/3.09	2.07/3.09	2.07/3.0	2.07/3.0
		IV	1.67/3.09	1.67/3.09	1.67/3.0	1.67/3.0
		V	1.50/3.09	1.50/3.09	1.50/3.0	1.50/3.0
Suspension	Rear-wheel drive		BMW Paralever	BMW Paralever	Encapsulated drive shaft with universal joint and helical-gear follower plate, torsion damper in drive shaft	
	Clutch		Single-plate dry clutch with diaphragm springs			
	Type of frame		Double-loop tubular steel frame with bolted-on tail section			
	Spring travel front/rear	mm	225/180	225/180	175/121	175/121
	Wheel castor	mm	101	101	120	120
	Wheelbase	mm	1513	1513	1447	1447
	Brakes	Front:	single-disc brake; dia 280 mm	single-disc brake; dia 280 mm	dual-disc brake; dia 285 mm	dual-disc brake; dia 285 mm
		Rear:	drum brake, dia 200 mm		drum brake, dia 200 mm	
	Wheels		Cross-spokes	Cross-spokes	Cast light-alloy wheels	Cast light-alloy wheels
		front	1.85 - 21 MT	1.85 - 21 MT	MTH 2.50 x 18 E	MTH 2.50 x 18 E
		rear	2.50 - 17 MT	2.50 - 17 MT	MTH 2.50 x 18 E	MTH 2.50 x 18 E
	Tyres	front	90/90 - 21 T	90/90 - 21 T	90/90 - 18 H	90/90 - 18 H
		rear	130/80 - 17 T	130/80 - 17 T	120/90 - 18 H	120/90 - 18 H
			low-profile	low-profile	low-profile	low-profile
Dimensions and weights	Length, overall	mm	2290	2290	2175	2175
	Width with mirrors	mm	1000	1000	800	960
	Handlebar width without mirrors	mm	830	830	580	714
	Seat height	mm	850	850	807	807
	Weight, unladen with full tank	kg	220	236	229	234
	Max permissible weight	kg	420	420	440	440
	Fuel tank/reserve	ltr	24/4.7	35/5	22/2	22/2
Performance	Fuel consumption					
	90 km/h (56 mph)	ltr	4.9	4.9	4.3	4.4
	120 km/h (75 mph)	ltr	6.9	6.9	6.1	6.6
	Acceleration					
	0—100 km/h (62 mph)	sec	4.8	4.8	5.0	5.0
	standing-start km	sec	26.5	26.5	26.0	26.0
	Top speed	km/h	180	180	185	185
Model features	Fairing		Glass-fibre-reinforced fairing	Glass-fibre-reinforced fairing	Glass-fibre-reinforced plastic sports fairing	Glass-fibre-reinforced tourer fairing
	Standard features		Toolkit, repair kit, luggage rack, oil cooler windshield	Flared mudguard, solo seat, large luggage rack, engine protection, revolution indicator, quartz clock	Toolkit, repair kit, oil cooler, dual-tone, fanfare, voltmeter, quartz clock	Toolkit, repair kit, oil cooler, voltmeter, quartz clock, cases with standard lock

BMW R 100 GS, R 100 RS, R 100 RT



BMW R 80 GS


R 80 G S
Leistung kW
40
35
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25
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15
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Drehmoment Nm
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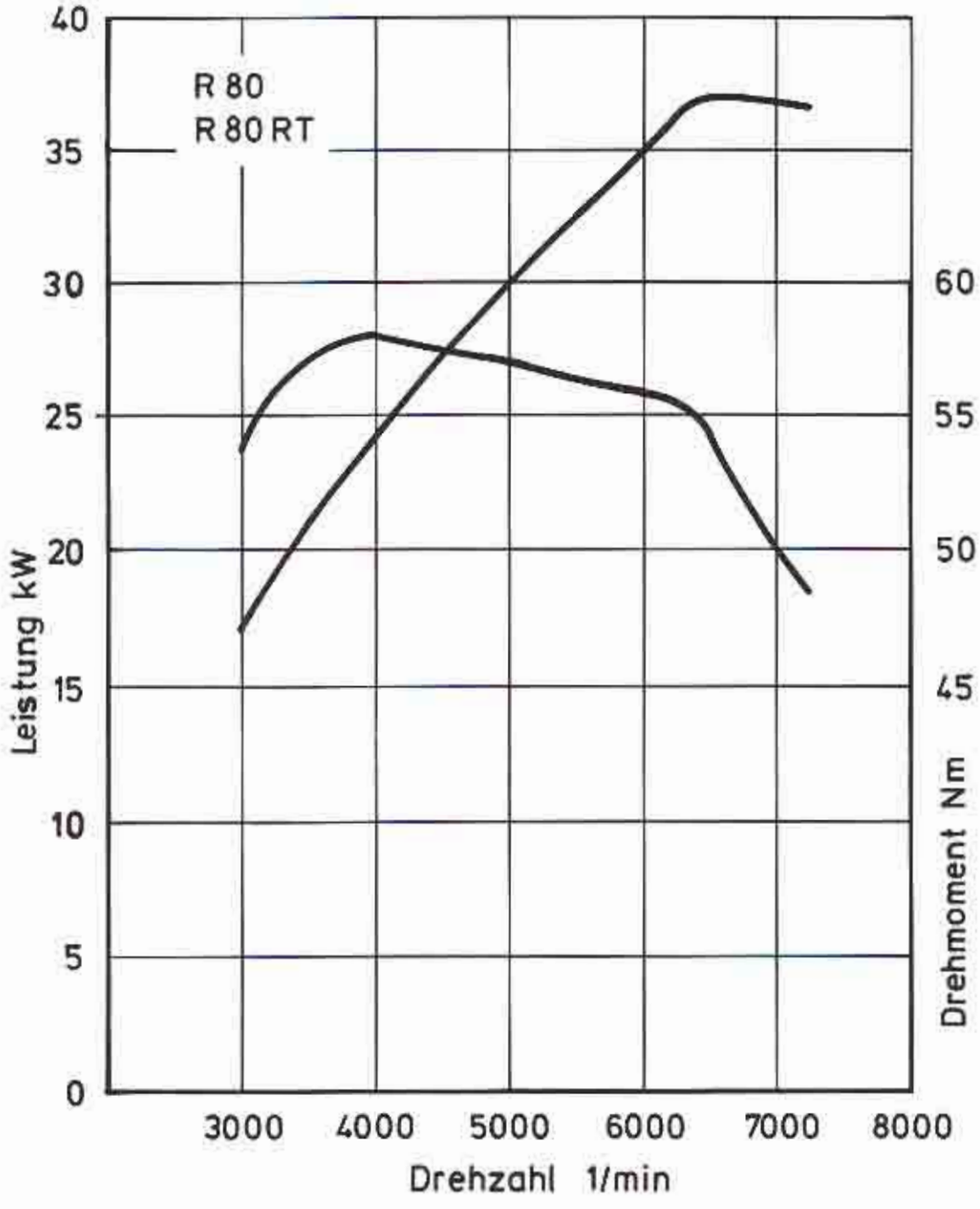
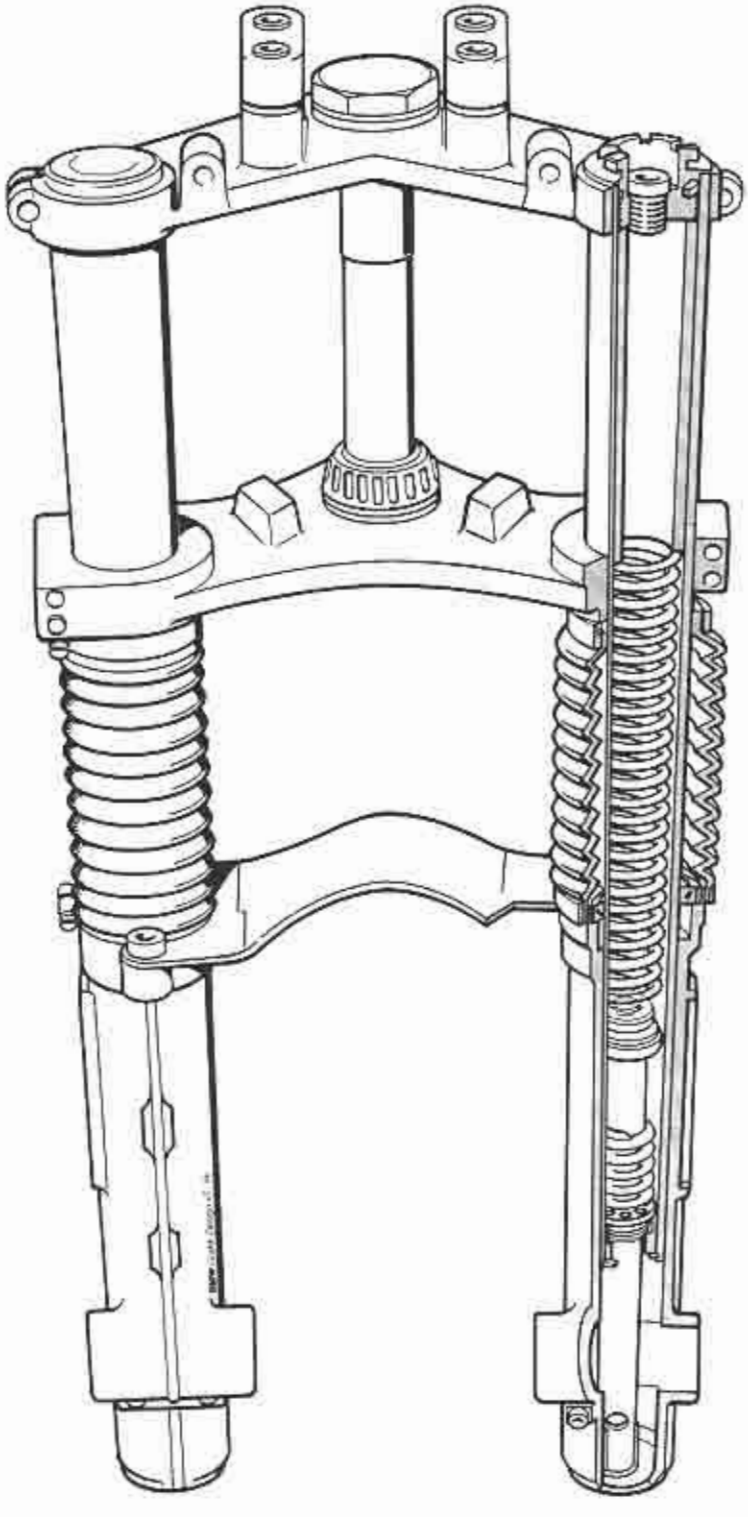
3000 4000 5000 6000 7000 8000
Drehzahl 1/min
BMW Grafik Design VT-14

BMW R 80 und R 80 RT



BMW R 80 GS und R 100 GS



THE THREE-CYLINDER K 75 SERIES:
New: K 75 RT with catalytic converter

Launched in autumn 1985, BMW's three-cylinder K 75 Series has already been sold far more than 30,000 times worldwide. Both models, that is the K 75 and the K 75 S, are available from 1990 with BMW's unique electronic/hydraulic anti-lock brakes (ABS) as an optional extra, thus following in the footsteps of the K 100 Series, which has had this option since 1988. As of the end of 1991 all K 75 models will also be available with non-controlled catalytic converter (see Section 2).
The most important innovation is the worldwide introduction of a third model in the range, the K 75 RT.

K 75: An attractive model for achievers with an extra-low seat

In terms of both price and styling, the "basic" K 75 without fairing is a very attractive model for achievers moving into the BMW K Series. With its seat height of 760 mm (29.9") (optional: 800 mm/31.5") it is also just right for the somewhat smaller rider. Since the 1990 model year, the K 75 has been available with a number of features previously only seen on the K 75 S: First, the front-wheel fork with 135 mm or 5.31" spring travel (previously 185 mm/7.28"), sports tuning and fork stabiliser. Second, the rear-wheel disc brake replacing the old drum brake - and providing the technology required for the use of ABS. This also means that the K 75 has a smaller 17" wheel at the rear (previously 18"), just like the K 75 S, K 100 and K 100 LT.

K 75 S: Sports suspension and dynamic looks

The sports version of the K 75 has been available since summer 1986. It features a sports fairing with integral direction indicators styled in BMW's wind tunnel. The relatively slender but nevertheless efficient fairing offers not only good protection from wind and weather but also increases the dynamic riding characteristics and safety of this machine by considerably reducing lift forces on the front wheel and air resistance. Accordingly, the top speed of the K 75 S is about 10 km/h (6 mph) higher than the top speed of the K 75, which is capable of about 200 km/h (124 mph).

The engine spoiler fitted as standard blends very harmoniously with the overall styling of the K 75 S awarded a special prize in 1986 by the Stuttgart Design Center. From the 1988 model year the short, sporty handlebar has been 3 cm wider, further improving the handling of the K 75 S.

From the 1991 model year the K 75 S comes with silver-painted wheels in three-spoke styling like the K 1 and K 100 RS.

K 75 RT: With all the comfort of a superior touring machine

Now the K 75 Series also features a superior touring model with the same large tourer fairing as the K 100 LT. The silky-smooth refinement of the three-cylinder power unit combined with the superior handling of the K 75 make the new K 75 RT already sold successfully in the USA and Spain since the beginning of the 1990 model year an interesting alternative for the touring enthusiast.

THE FOUR-CYLINDER K 100 SERIES:
Four-valve engines with fully-controlled catalytic converter
Two-valve engines with standard catalytic converter
Special Limited Edition K 100 LT

Ever since they were launched in autumn 1983 BMW's four-cylinder K 100 models have been one of the absolute best-sellers in the motorcycle market. Production at BMW's motorcycle factory in Berlin amounts to approximately 90,000 units in 7 years. In 1989 the two-valve K 100, K 100 RS and K 100 LT models were joined by the K 1 super-sports machine with its 100 bhp four-valve power unit. Receiving great recognition right from the start, the K 1 has been voted Motorcycle of the Year in many countries. In early 1990 the new K 100 RS then also received the same technical innovations as the K 1, that is the four-valve power unit, Paralever, brakes, etc.

BMW will now become the world's first motorcycle manufacturer to offer a fully-controlled catalytic converter for these two models otherwise remaining largely unchanged. The introduction of this revolutionary technology on a motorcycle is made possible by the Digital Motor Electronics featured on the BMW four-valve power unit.

As of May 1991 all two-valve K 100 models will be available with a non-controlled catalytic converter also for retrofitting. The retrofitting kit also comprises the round stainless-steel tail-end muffler already featured on the K 1 and K 100 RS.

With the K 100 grassroots machine being dropped from the range, the K 100 LT is the only two-valve model remaining in the four-cylinder series. In the 1991 model year the unchanged standard version of the K 100 LT will be supplemented by a special Limited Edition model.

Since 1988 all K 100 models have been available as an option with the world's only electronic/hydraulic anti-lock braking system (ABS) (see Section 4).

The K 100 LT: the luxury tourer

Like the sports tourer fairing of the K 100 RS, the multi-piece luxury touring fairing of the K 100 LT is fastened by a multi-arm support to the handlebar centrepiece and rests on vibration dampers. With the detachable windshield plus spoiler extending far to the rear, the fairing gives the rider and passenger optimum protection in wind and weather. It also includes a rear-view mirror housing to protect the rider's hands, while the direction indicators are integrated directly in the fairing itself. As on the K 100 RS, the fork opening is fully sealed and the rear edges of the fairing serve to protect the rider's legs.

Standard features include integral cases also designed in the wind tunnel and a small topcase to be fitted on the luggage rack. Since one key fits alls locks, the rider requires only one and the same key for the ignition, handlebar lock, fuel tank filler cap, seat, topcase and integral case locks. The covers on the integral and top-cases are incidentally finished in the same colour as the motorcycle itself. The standard equipment featured by the K 100 LT includes hazard warning flashers, an additional socket in the handlebar impact boss and soft rubber handles.

A special range of options available specifically for the K 100 LT offers even more riding comfort and, indeed, luxury: Instead of the standard windshield, this model is also available with a higher windshield (530 mm/21") with and without side flaps. In the Federal Republic of Germany only a low version (430 mm/16.9") of this windshield without side flaps is available, since under German law the rider must be able to look over the windshield.

In conjunction with the new windshield (both the high and the low version) there is also an additional instrument panel above the standard controls and instruments. It comprises a fuel and coolant temperature gauge, a map reading light, socket and cigar lighter.

Riders who wish to tune in to traffic reports or enjoy their favourite music while out on a tour may also order the radio installation kit with wide-band loudspeakers and aerial together with a Clarion cassette radio available from their dealer, which fits perfectly into the left-hand stowage box in the fairing. The radio can be operated while riding by special controls on the left-hand handlebar.

K 100 LT Limited Edition:
built for the genuine individualist

The K 100 LT Limited Edition, a special model for the genuine enthusiast, is available in limited numbers in the 1991 model year.

The unique signs of distinction of this motorcycle visible at first sight are the special paintwork in pearl-green metallic with decals, the knee-pads on the tank painted beige, an engine spoiler and radial-ply tyres. Another important feature of this special model is the sports suspension previously to be found on the two-valve K 100 RS, that is with fork stabiliser and modified telescopic fork.

The new K 100 RS: now even more dynamic and safer

The K 100 RS sports tourer may be regarded as one of the most successful motorcycles of the 80's. The readers of MOTORRAD, Europe's largest motorcycle journal, have voted the K 100 RS Motorcycle of the Year no less than five times running, a truly unique event in the history of this popularity vote.

In other European countries, in America, Australia and even in Japan, the K 100 RS has also received many coveted awards. Selling more than 35,000 units world-wide, it is the best-selling K model. After 6 years of production without major changes, the K 100 RS entered the 1990 model year with some fundamental modifications, in this way meeting the demand for improved performance and sportiness currently to be observed in the sports tourer market, without making any concessions in terms of touring capacity (riding comfort, luggage space and service load). More sportiness in the case of the new K 100 RS also means more engine power and, as a result, even better performance - which, as a consequence, implies greater safety ensured by the optimised suspension and brake system.

All the essential "ingredients" for this higher standard stem from the most dynamic of all BMW motorcycles in recent years, the K 1 launched in 1989. Apart from its role as an image leader, this innovative top-of-the-range model also serves as the technological spearhead in BMW's modular motorcycle components concept.

As of the 1990 model year, the new K 100 RS therefore comes with BMW's four-valve power unit developing 100 bhp and 100 Nm (74 ft/lb) of torque. It features Digital Motor Electronics and the round stainless-steel exhaust

pipe, brakes, front wheel fork (with somewhat more comfort-oriented tuning), Paralever suspension, wheels as well as the central handlebar and ignition lock of the K 1. Accordingly, all of these components are absolutely identical on both models. The suspension geometry as well as the reinforced tubular space-frame of the new K 100 RS are also the same as on the K 1. The technical description of the K 1's engine and running gear in Chapters 3 and 4 of this press folder therefore applies in every respect also to the K 100 RS.
The only exceptions and differences are as follows:

1. Handlebar

Following the example set by the K 1 with its wide handlebar measuring 670 mm or 26.4" from one end to the other, the handlebar of the K 100 RS has also been enlarged in width from 574 mm (22.6") to 610 mm (24.0"). This means even better ergonomics, a more comfortable seating position and improved touring qualities. Yet another advantage is that the wider handlebar ensures even better handling. The optimised handlebar bearing and newly designed foam plastic handles also help to dampen vibrations to a minimum.

This wider handlebar and the central lock for both the handlebar and ignition adopted from the K 1 also required a new impact boss. In addition, the K 100 instruments on the RS now come in a new colour scheme.

To maintain the hand protection function of the rear-view mirrors with integral direction indicators, the mirrors have been adapted accordingly to go together with the wider handlebar, thus once again ensuring optimum visibility to the rear.

2. Rear-wheel spring strut

On the rear wheel the K 100 RS features the modified spring strut of the K 75 S. Spring travel is 120 mm (4.72") and the spring setting is more comfortable than on the K 1.

3. Gearbox ratios and final drive

The new K 100 RS features the proven 5-speed gearbox highlighted on all K models. As on the K 1, however, fifth gear has been adapted to the higher top speed of more than 220 km/h (136 mph) (previously 1.67, now 1.61 as on the K 1). The final drive transmission ratio, on the other hand, remains unchanged at 2.81 (whereas it is 2.75 on the K 1).

4. Vibration damping

Unlike the K 1, the new K 100 RS features rubber dampers on the front connection points between the frame and engine, which have been optimised over the former versions in terms of both riding stability and vibration damping. The exhaust silencer of the K 100 RS is now suspended on the left-hand footrest plate where it cannot transmit any vibrations.

All other modifications versus the former model are detailed changes which became necessary as a result of technical development. Examples are the modified rear wheel cover, the new number plate support, the front wheel mudguard adopted from the K 75 S and the modified footrest plates.

The almost classical sports tourer fairing of the K 100 RS, on the other hand, remains unchanged. Optimised in the wind tunnel, this multi-piece sports tourer fairing is fastened to the handlebar centrepoint by a multi-arm support and rests on vibration dampers. It incorporates rear-view mirrors which also serve to protect the rider's hands, integral direction indicators and leg protection covers made of integral foam around the rear end of the fairing. An adjustable spoiler on the upper edge of the fairing ensures a well defined flow of air above the rider's helmet.

The exemplary fairing of the K 100 RS not only offers very good protection from wind and weather but also provides a very high standard of efficient streamlining as a guarantee for excellent performance, superior fuel economy and reduced front-wheel lift. The final result is optimum stability at high speeds and even greater riding safety.

The hinged seat now comes with even more comfortable upholstery (seat height 800 mm/31.5"). It almost goes without saying that a detachable seat is once again available as an option for smaller riders, reducing seat height to 760 mm (29.9"). Another almost natural feature is that the new K 100 RS again features the wide range of cases and bags available for all K 100 models, the tank bag, pannier cases and luggage rack being fitted in their usual position.

Becoming more powerful and more dynamic, the new K 100 RS has of course also become safer. Ultimately, this means a further improvement of the already excellent all-round qualities of this magnificent machine.

Compared with the striking avantgarde styling of the K 1 sports machine, the new K 100 RS is almost reserved - and definitely very classical - in its appearance.

In addition to the ABS anti-lock brake system, lower seat, luggage rack and case holders already mentioned, the K 100 RS is available ex works with further options such as heated handles, hazard warning flashers, engine spoiler, engine protection bar, anti-theft warning system, temperature gauge and fuel gauge.

THE POWER UNIT OF THE K 1 AND K 100 RS[2)]

Four-valve technology for even better performance and riding culture

The development of an even more dynamic high-performance version of the four-cylinder power unit started back in 1983, the first year of the K 100 on the market. BMW's strategy of progress was clear from the outset: To consistently and logically apply the four-valve concept, a technology acknowledged the world over, for even greater power and performance. Martin Probst, at the time Head of Engine Development at BMW Motorrad GmbH, was definitely the right man to steer the destiny of the Company in this direction, since he was able to look back on years of experience with four-valve engines in his former job with BMW Motorsport GmbH, where BMW's standard-production four-cylinder power unit was ultimately converted into a Formula 1 World Championship winner.

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2) Any differences between the K 100 RS and K 1 are described in the text where applicable.

While supreme power was the overriding objective in the development of the Formula 1 engine, the motorcycle power unit, while based on the same concept, was developed from the outset for BMW's traditional assets of superior motoring refinement, practical everyday value, all-round economy and a long running life. The designers' brief was to revise the engine in such a way so as to provide superior torque and output even better than the two-valve power plant throughout the entire speed range. Given this objective, BMW's engineers naturally increased engine power to the 100 bhp (74 kW) limit voluntarily agreed by all motorcycle manufacturers in the Federal Republic of Germany. A comparison of the output and torque curves of the two-valve K 100 versus the K 1 four-cylinder clearly shows that the new four-cylinder reaches its objective in every respect: Output is up from 90 to 100 bhp (in both cases at 8000 rpm) and torque has been increased from 86 Nm/64 ft-lb (at 6000 rpm) to 100 Nm/74 ft-lb (at 6750 rpm).

The engine of the K 1 refutes the common prejudice that four-valve power units simply have to be unflexible and one-sided. For in this case the more sophisticated technology with twice the usual number of valves serves to provide a more rapid, thorough and efficient charge cycle with a better cylinder charge at low and medium engine speeds. The mean operating pressure often applied as a yardstick for determining the quality of an engine's design amounts to a magnificent 12.7 bar in the power unit of the K 1.

With this new concept and design, BMW's four-cylinder provides even greater refinement and smoothness despite its extra power. Even without constantly using the engine speed available and thus maintaining a cool, calm and collected style of riding, the K 1 ensures high performance at its best.

The modifications made are very impressive even though the cylinder head looks quite similar from the outside. After all, any change in the number of valves also means that they must change in size. Inlet valve diameter is therefore 26.5 mm (1.04") in both cases instead of 34 mm (1.33") on the former single inlet valve, outlet valve diameter is 23 mm (0.91") in either case instead of 30 mm (1.18") with the conventional engine.

The combustion chamber geometry and valve angles have also been modified for the new engine. Thanks to this modification and the central position of the spark plug, it is now possible to increase the compression ratio from 10.2:1 to 11:1 (running on 95 ROM Euro super). This means not only extra power and torque, but also greater efficiency and fuel economy.

BMW's engineers deliberately decided not to change the valve opening times despite the extra power this would have provided at high engine speeds. Accordingly, the four-valve power unit intentionally has the rather conservative valve opening angle of 284° serving to provide extra torque throughout the entire speed range.

Positive experience gained with the valve clearance remaining unchanged even in endurance tests for tens of thousands of kilometres induced BMW's engineers to modify the tappets of the four-valve engine in order to further reduce the volume of moving parts and ensure even greater reliability. Hence, the new engine does not require the valve adjustment spacers still needed for the two-valve unit. Instead, adjustment of valve clearance now called for only in exceptional cases can be carried out by choosing the tappets from a wide range of individual components of pre-defined size.

The K 1 has inherited the light-alloy water-cooled cylinder block of the K 100 without any fundamental modifications. The cylinder bore of 67 mm (2.64") and the stroke of 70 mm (2.76") chosen right from the beginning ensures superior torque thanks to the particular configuration of the engine. It also ensures very compact combustion chambers contributing to the specific qualities of the K 1's engine, thus providing superior fuel economy, a high standard of engine flexibility and exceptional refinement when running under part load, an asset not that common with high-performance engines.

A number of detailed modifications in the engine of the K 1 again spell out genuine progress and an even higher power potential. Benefitting from a new process of calculation based on the Finite Element Method, the weight of the forged crankshaft has been reduced by 1.3 kg (2.87 lb). The same process has also served to optimise the weight of the conrods. Then there are also the new, slightly lighter pistons with a special labyrinth system in the area of the piston rings to prevent oil from being drawn into the combustion chambers whenever the motorcycle is parked on its side stand. As a result, the blue smoke characteristic of BMW in-line engines when restarted after parking now becomes a thing of the past. Incidentally, this modification has also been introduced for all K 100 models in 1989.

Digital Motor Electronics like in all BMW cars

The electronic engine management of the K 1 features a fundamental innovation. While the ignition and fuel injection of the K 100 are operated by separate engine management systems, the K 1 has fundamentally the same Digital Motor Electronics to be found in all of BMW's car engines (petrol models) ranging from the four-cylinder all the way to the V 12.

Another new feature of the K 1 is that it no longer has the conventional butterfly-type air volume meter, which inevitably represents a kind of obstacle in the intake manifold. Instead, Digital Motor Electronics determines engine load via a potentiometer in the throttle butterfly shaft and informs the computer in the control unit of the exact throttle butterfly opening angle. To determine the injection volume required, the engine management system also picks up and processes data on engine speed, intake air temperature, coolant temperature and atmospheric pressure (altitude factor). This new, low-resistance intake system contributes 4 - 5 horsepower to the higher output of the K 1. Comparative measurements have also shown that it helps to reduce fuel consumption.

A further asset of Digital Motor Electronics is the substantial ease of service provided by the built-in defect memory for retrieving defect information in the workshop with the help of the BMW Diagnostic Tester. Superior dependability at all times is ensured by fail-safe functions enabling the engine to keep on running even if certain components should fail to operate.

One look at the exhaust system of the K 1 reveals that here there have been conspicuous changes: The exhaust pipe made of high-grade stainless steel features a round muffler not extended that far to the rear. The extra silencer volume thus required is provided by an expansion chamber beneath the gearbox.

The rest of the K 1's drive train differs from the two-valve K 100 power transmission by various reinforcements catering for the machine's extra power and performance. With most components being strong enough to cope with 100 bhp and 100 Nm (74 ft-lb), the only modifications required were on the final drive and the 5th gear ratio, which is now "longer" than before.

The new K 100 RS also features the five-speed gearbox that has already proven its merits on all K models. But like on the K 1, fifth gear has been modified to suit the higher top speed of more than 220 km/h or 136 mph (previously 1.67, now 1.61 like on the K 1). The final drive transmission ratio, on the other hand, remains unchanged at 2.81 (2.75 on the K 1).

THE RUNNING GEAR AND SUSPENSION OF THE K 1 AND K 100 RS[3)]

The same BMW Paralever as on the GS models

While the suspension and running gear has remained largely unchanged, it has obviously been adapted wherever necessary to the superior performance of the K 1. This progress is most evident on the rear wheel: Although the rear wheel features a single swinging arm as before, it is now BMW's worldwide patented Paralever fitted on the R 80 GS and R 100 GS enduro models since autumn 1987. The smooth balance of forces ensured by this unique component provides significant advantages not only with long spring travel and on rough off-road terrain, but also with a road machine. Even if the spring travel of such a machine is not that long, the Paralever reliably prevents the acceleration reactions otherwise inevitable, particularly with a high-performance engine.

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3) Any differences between the K 100 RS and K 1 are described in the text where applicable.

Strong front-wheel fork and even more efficient brakes

The new wheel fork of the K 1 also shows a resemblance to the enduro models, since both units come from the same manufacturer: Italian specialist Marzocchi. Extra-sturdy with a diameter of 41.7 mm (1.64") and featuring reinforced fork bridges, this telescopic fork ensures optimum torsional rigidity. In cooperation with another specialist supplier, BMW have selected shock absorbers with a highly progressive damper curve under compression for optimum roadholding. On 50 per cent of the spring travel totalling 135 mm (5.31"), that is up to the position of the fully laden motorcycle at rest, these shock absorbers thus have minimum damper action but then become much harder upon further compression of the springs up to the hydraulic stop point. The very sensitive response of the wheel fork ensured in this way is further enhanced by the teflon-coated bushes for minimum friction and wear. Otherwise identical with that of the K 1, the telescopic fork on the new K 100 RS is somewhat softer for extra comfort on the road.

The new fork comes with a Brembo brake system fully capable of handling the K 1's superior performance. The two brake discs are spirally perforated to save weight and measure 305 mm (12.00") in diameter and 5 mm (0.20") in thickness. Applying a technology developed in motor racing, the brake discs are mounted in floating arrangement on roller-shaped supports. Four-piston brake callipers round off this High-Tech brake system. To ensure consistent wear of brake linings, the brake pistons vary in diameter (32 and 34 mm, 1.26" and 1.34", respectively).

Precise application of the front wheel brakes has been improved substantially by optimising the transmission ratio of the hydraulic system (piston diameter in the master cylinder versus piston diameter in the brake calliper) and designing the brake lever with highly ergonomic contours.

The rear wheel of the K 1 features the proven brake of the K 100. To ensure even better thermal stability, however, the brake disc has been increased in thickness from 4 to 5 mm (0.16 to 0.20").

It almost goes without saying that the highly efficient brakes of the K 1 are available as an option with ABS, like all the K 100 models. Given the different suspension geometry, the new front wheel fork and brakes as well as the wider tyres, the anti-lock brake system nevertheless had to be thoroughly adapted to the K 1. To achieve optimum weight distribution and keep the brake lines as short as possible, the ABS pressure modulator for the front-wheel brake has been moved to the front beneath the fairing of the K 1 (not applicable to the K 100 RS).

New spring strut and sports wheels

To ensure optimum roadholding of the rear wheel, the Paralever swinging arm is supported on the frame by a new, specially-rated gas-pressure spring strut (140 mm/ 5.51" spring travel). Two special features of the spring strut are its progressive-action spring and travel-related damping effect. To adjust to the load the motorcycle is carrying, the spring can be set to four different positions by means of the tools in the toolkit, and is easily accessible.

The K 100 RS features the modified spring strut of the K 75 S, providing a somewhat higher standard of riding comfort. Spring travel is 120 mm (4.72").

Featuring new light-alloy wheels in sporting three-spoke design, extra-wide rims and radial-ply tyres (120/70 VR-17 at the front, 160/60 VR-18 at the rear), the K 1 provides a clear visual testimony to its superbike qualities.

Reinforced frame and modified suspension geometry

Since research conducted by BMW's Test Department shows that suspension and running gear loads increase at the squared root of road speed, the frame of the K 100 was modified accordingly to match the greater power and performance of the K 1. All the tubes in the load-bearing centre section are even stronger and wider in diameter. Additional stability is also provided by the extension of the wheelbase by 54 mm (2.13"), which is mainly attributable to the longer Paralever swinging arm and, to a lesser extent, to the modified wheel fork geometry. Since road tests of the K 1 showed right from the beginning that directional stability was very good, handling has been optimised by keeping front wheel castor very short at a mere 90 mm (3.54").

To maintain this superior handling also on winding roads, the K 1 deliberately breaks with the tradition of slender handlebars on high-performance machines. The handlebar grab points are therefore 670 mm (26.38") apart (new K 100 RS: 610 mm/24.02").

K 1 fairing, features and model fitments
Unconventional through and through

Launching the R 100 RS in 1976 and the K 100 RS in 1983, BMW already set new standards in aerodynamic motorcycle styling. Now the Company is continuing this tradition with the K 1. Although the K 1 is designed to a greater

extent for dynamism and performance, the objective was not only to reduce air drag but also to enhance rider comfort. In designing the body of the K 1, BMW's stylists were therefore required to ensure relaxed and fatigue-free riding even at high speeds as well as sensible protection from wind and weather.

To fulfill even more demanding objectives, the designers and stylists then had to introduce some unconventional solutions. One particularly striking example is the shape of the front wheel fender designed as an integral part of the new aerodynamic concept and thus standing out clearly from the traditional mudguard design. Air vents for cooling the new brake system obviously became a necessity in the light of this brand-new concept.

Record-breaking streamlining for even greater safety and road comfort

The voluminous and, as seen from above, wedge-shaped contours of the front-wheel fender provide a complete, symmetrical fairing profile and, as a result, a turbulence-free flow of air along the fairing, past the rider's legs and back to the rear end of the tapered tail section. The product of frontal area (A) and drag coefficient (cd) essential to road performance is far below 0.4 cd x A in the case of the K 1 - or, in more precise terms, 0.38 with the rider sitting upright and 0.34 with the rider leaning forward. This outstanding sleekness reduces fuel consumption and increases road performance. The top speed of more than 230 km/h (143 mph) is nevertheless largely a theoretical entity on public roads.

In search for optimum ride stability, BMW's designers and engineers spent weeks of painstaking effort in the wind tunnel, seeking above all to further reduce lift forces on the front wheel. Know-how gained in endurance tests then resulted in the final optimisation measures in early 1989: To provide optimum weight distribution, the coolant reservoir and toolkit storage box were moved to the front beneath the fairing. Air intake openings were furthermore provided in the upper and central sections of the fairing in order to reduce heat dissipation from the engine particularly unpleasant for the rider in hot weather.

Special attention has been given to ensuring optimum ergonomics of the handlebar, seat and footrests, which must all be perfectly matched for absolute rider comfort. Independently mounted to avoid vibrations, the rider's footrests have been moved back some 150 mm (5.91") and up by 20 mm (0.79") versus the K 100. Seat height is 780 mm (30.71") and the seat itself measures 700 mm (27.56") in length.

Not built for touring under all circumstances

Through its striking looks and the rider's seating position alone, the K 1 clearly shows that it does not seek to provide the same touring qualities as all of BMW's motorcycles so far. Indeed, the concept of the K 1 to be more of a sports machine than a tourer is also expressed by the fact that the K 1 is deliberately designed not to carry touring cases.

Passenger comfort, on the other hand, has not been sacrificed to this dynamic style, a comfortable passenger seat behind the rider becoming available after removal of the seat "hump".

And since even the most dynamic machine requires certain practical values, there are two small lockable storage boxes in the wide rear section (with a capacity of 6 litres/0.21 cu ft each) for carrying the most important odds and ends which do not into the BMW tank bag (capacity: 28 litres/0.98 cu ft) that naturally also fits on to the K 1.

Motorcyclists riding without a passenger may also fit the baggage system specially developed for the K 1 with another 42 litres (1.47 cu ft) capacity. Consisting of three bags interconnected by zippers and made from water-repellant nylon, this baggage system is protected even in the worst of weather by a special rain hood. All the rider has to do is remove the seat "hump" and fit the baggage system on to the rear section and passenger grab handle by means of elastic straps. He can even remove the two side bags individually and put them together to form a carrier bag with shoulder strap.

A practical and convenient feature is the new central lock combining the ignition and handlebar lock functions.

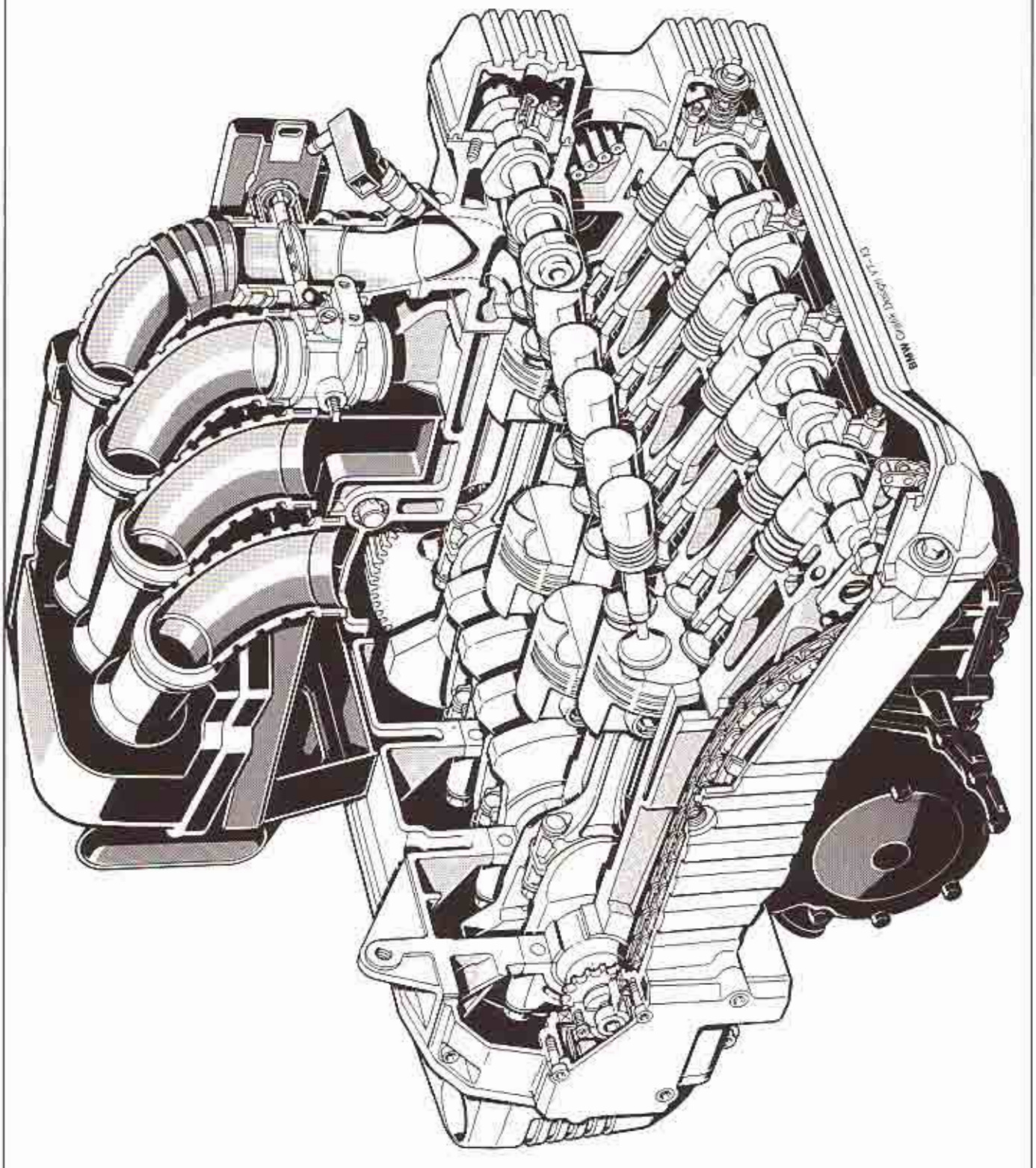
Choosing the colours of this new super sports machine, BMW's designers again expressed their clear commitment: In the 1991 model year the purchaser has the choice of marrakech red or - as a brand-new colour - classic black metallic.

	SPECIFICATIONS BMW MOTORCYCLES		K 75	K 75 S	K 75 RT	
Motor	Cubic capacity	cc^3	740	740	740	
	Bore/stroke	mm	67/70	67/70	67/70	
	Max output	kW/bhp	55/75	55/75	55/75	
	at	/rpm	8500	8500	8500	
	Max torque	Nm	68	68	68	
	at	/min	6750	6750	6750	
	Design		inline	inline	inline	
	No of cylinders		3	3	3	
	Compression ration/fuel grade (also unleaded)		11.0 S	11.0 S	11.0 S	
	Valve control		DOHC	DOHC	DOHC	
	Valves per cylinder		2	2	2	
	Intake/outlet dia	mm	34/30	34/30	34/30	
	Fuel supply		LE-Jetronic with coasting cut-off			
Electrical system	Ignition		VZ-51 L digital ignition			
	Alternator	W	460	460	460	
	Battery	V/Ah	12/25	12/25	12/25	
	Headlight	W	H 4 55/60	H 4 55/60	H 4 55/60	
	Starter	kW/	0.7	0.7	0.7	
Power transmission, Gearbox	Gearbox		5-speed gearbox with dog-type shift			
	Gear ratios	I	4.50/3.20	4.50/3.20	4.50/3.20	
		II	2.96/3.20	2.96/3.20	2.96/3.20	
		III	2.30/3.20	2.30/3.20	2.30/3.20	
		IV	1.88/3.20	1.88/3.20	1.88/3.20	
		V	1.67/3.20	1.67/3.20	1.67/3.20	
Suspension	Rear-wheel drive		Encapsulated drive shaft with universal joint and integrated torsion damper			
	Clutch		Single-plate dry clutch rotating in opposite direction			
	Type of frame		Tubular space, engine serving as loadbearing component			
	Spring travel front/rear	mm	135/110	135/110	135/110	
	Wheel castor	mm	101	101	101	
	Wheelbase	mm	1516	1516	1516	
	Brakes(asbestos-free)	Front:	dual-disc brake, dia 285 mm			
		Rear:	single-disc brake, dia 285 mm			
	Wheels		Light-alloy wheels	Light-alloy wheels	Light-alloy wheels	
	front		2.50 - 18 MTH 2	2.50 - 18 MTH 2	2.50 - 18 MTH 2	
	rear		2.75 - 17 MTH 2	2.75 - 17 MTH 2	2.75 - 17 MTH 2	
	Tyres front		100/90/H 18	100/90/V 18	100/90/V 18	
	rear		130/90/H 18 tubeless	130/90/V 17 tubeless	130/90/V 17 tubeless	
Dimensions and weights	Length, overall	mm	2220	2220	2220	
	Width with mirrors	mm	900	810	916	
	Handlebar width without mirror	mm	710	650	770	
	Seat height	mm	760*	810	810	
	Weight, unladen with full tank	kg	228	235	258	
	Max permissible weight	kg	450	450	480	
	Fuel tank	l	21	21	22	
Performance	Fuel consumption					
	90 km/h (56 mph)	ltr	4.5	4.3	4.5	
	120 km/h (68 mph)	ltr	5.2	5.0	5.2	
	Accerelation					
	0—100 km/h (62 mph)	sec	4.6	4.6	4.6	
	standing-start km	sec	25.6	25.2	25.2	
	Top speed	km/h	200	210	210	
Model features	Fairing			Glass-fibre-reinforced plastic sports fairing fitted to frame, glass-fibre-reinforced engine spoiler	Multi-piece aero-dynamically opti-mized sports-touring fairing	
	Standard features		Repair kit, toolkit digital clock	Repair kit, toolkit, digital clock	Repair kit, toolkit, digital clock	

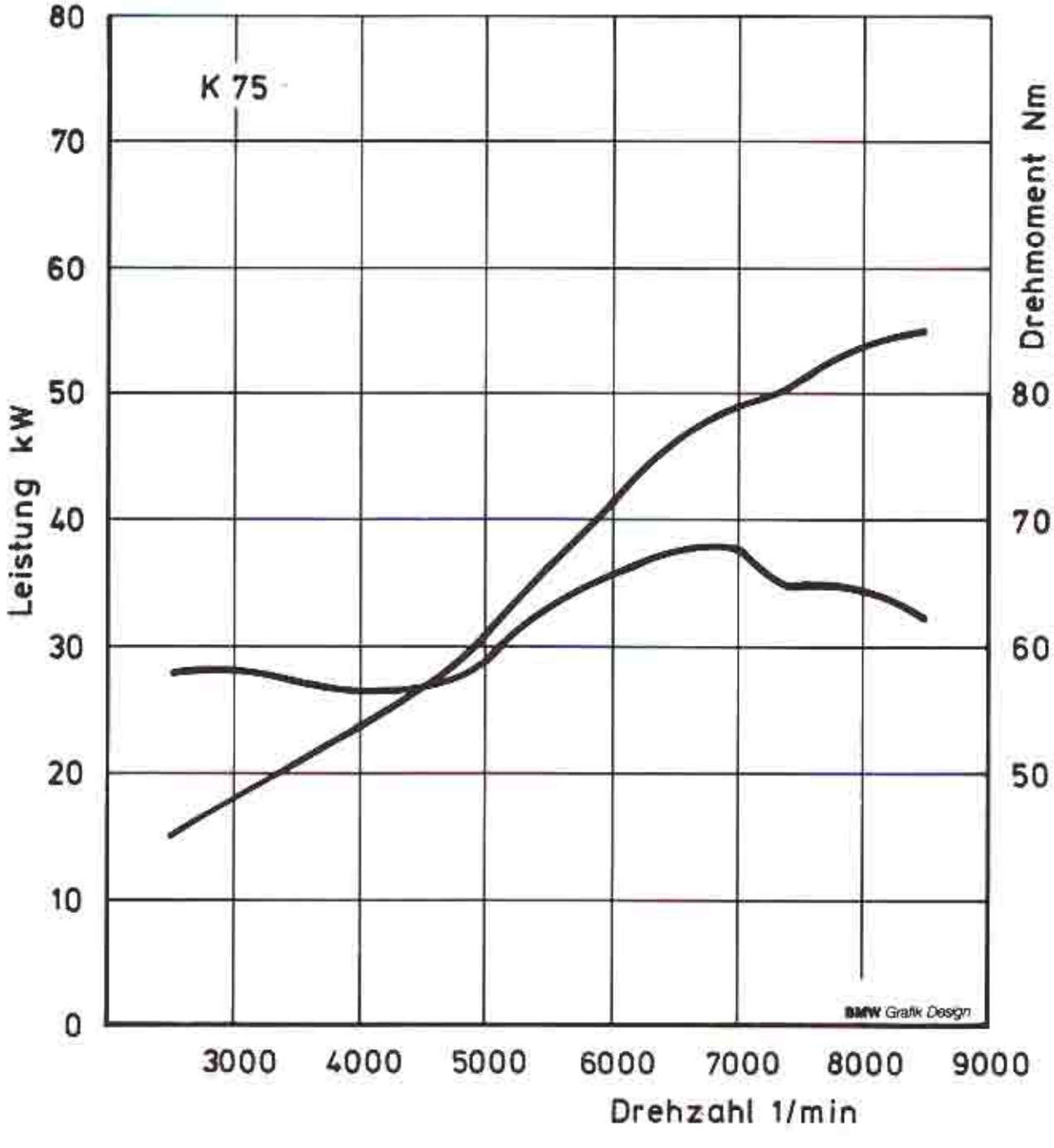
** alternatively 800 mm*

	SPECIFICATIONS BMW MOTORCYCLES		K 100 LT	K 100 LT Limited Edition	K 100 RS	K 1
Engine	Cubic capacity	cc	987	987	987	987
	Bore/stroke	mm	67/70	67/70	67/70	67/70
	Max output	kW/bhp	66/90	66/90	74/100	74/100
	at	rpm	8000	8000	8000	8000
	Max torque	Nm	86	86	100	100
	at	rpm	6000	6000	6750	6750
	Design		inline	inline	inline	inline
	No of cylinders		4	4	4	4
	Compression ratio/fuel grade (also unleaded)		10.2 N	10.2 N	11,0 S	11,0 S
	Valve control		DOHC	DOHC	DOHC	DOHC
	Valves per cylinder		2	2	4	4
	Intake/outlet dia	mm	34/30	34/30	26,5/23	26.5/23
	Fuel supply		LE-Jetronic	LE-Jetronic	Motronic	Motronic
Electrical system	Ignition		VZ-51 L digital ignition	VZ-51 L digital ignition	Motronic	Motronic
	Alternator	W	460	460	460	460
	Battery	V/Ah	12/25	12/25	12/25	12/25
	Headlight	W	H 4 55/60	H 4 55/60	H 4 55/60	H 4 55/60
	Starter	kW	0.7	0.7	0.7	0.7
Power transmission, Gearbox	Gearbox		5-speed gearbox with dog-type shift			
	Gear ratios	I	4.50/2.91	4.50/2.91	4.50/2.81	4.50/2.75
		II	2.96/2.91	2.96/2.91	2.96/2.81	2.96/2.75
		III	2.30/2.91	2.30/2.91	2.30/2.81	2.30/2.75
		IV	1.88/2.91	1.88/2.91	1.88/2.81	1.88/2.75
		V	1.67/2.91	1.67/2.91	1.61/2.81	1.61/2.75
Suspension	Rear-wheel drive		Encapsulated drive shaft with universal joint and integrated torsion damper		BMW Paralever	BMW Paralever
	Clutch		Single-plate dry clutch rotating in opposite direction, dia 180 mm			
	Type of frame		Tubular space frame, engine serving as load-bearing component			
	Spring travel front/rear	mm	185/110	185/110	135/120	135/140
	Wheel castor	mm	101	101	90	90
	Wheelbase	mm	1511	1511	1564	1565
	Brakes	Front:	dual-disc brake, dia 285 mm		∅ 305 mm	∅ 305 mm
		Rear:	disc brake, dia 285 mm		∅ 285 mm	∅ 285 mm
	Wheels		Light-alloy wheels	Light-alloy wheels	Light-alloy wheels	Light-alloy wheels
	front		2.50 - 18 MTH 2	2.50 - 18 MTH 2	3.50 - 17 MTH 2	3.50 - 17 MTH 2
	rear		2.75 - 17 MTH 2	2.75 - 17 MTH 2	4.50 - 18 MTH 2	4.50 - 18 MTH 2
	Tyres front		100/90 V 18	110/80 V 18	120/70 VR 17	120/70 VR 17
	rear		130/90 V 17 tubeless	140/80 V 17 tubeless	160/60 VR 18 tubeless	160/60 VR 18 tubeless
Dimensions and weights	Length, overall	mm	2220	2220	2230	2230
	Width with mirrors	mm	916	916	800	760
	Handlebar width	mm	770	770	610	670
	Seat height	mm	810	810	800	780
	Weight, unladen with full tank	kg	283	283	259	259
	Max permissible weight	kg	480	480	480	480
	Fuel tank	ltr	22	22	22	22
Performance	Fuel consumption					
	90 km/h (56 mph)	ltr	4.4	4.4	4.7	4.2
	120 km/h (75 mph)	ltr	5.4	5.4	5.3	5.0
	Acceleration					
	0—100 km/h (62 mph)	sec	4.1	4.1	3.9	3.9
	standing-start km	sec	24.1	24.1	22.9	22.3
	Top speed	km/h	215	215	more than 220	more than 230
Model features	Fairing		Multi-piece aero-dynamically opti-mized sports-touring fairing	Multi-piece aero-dynamically opti-mized sports-touring fairing	Multi-piece-aero-dynamically opti-mized touring full fairing	Multi-piece-aero-dynamically opti-mized sports fairing
	Standard features		Repair kit, toolkit digital clock, integrad cases with support and standard key Additional K 100 LT features: hazard warning flashers, 2 sockets, soft rubber handlebars, luggage rack, topcase	Repair kit, toolkit, digital clock, integral cases with support and standard key Additional K 100 LT features: hazard warning flashers, 2 sockets, soft rubber handlebars, luggage rack, topcase engine spoiler	Repair kit, toolkit digital clock Central locking	Repair kit, toolkit digital clock Central locking

BMW K 1 und K 100 RS



BMW K 75


K 75
Leistung kW
Drehmoment Nm
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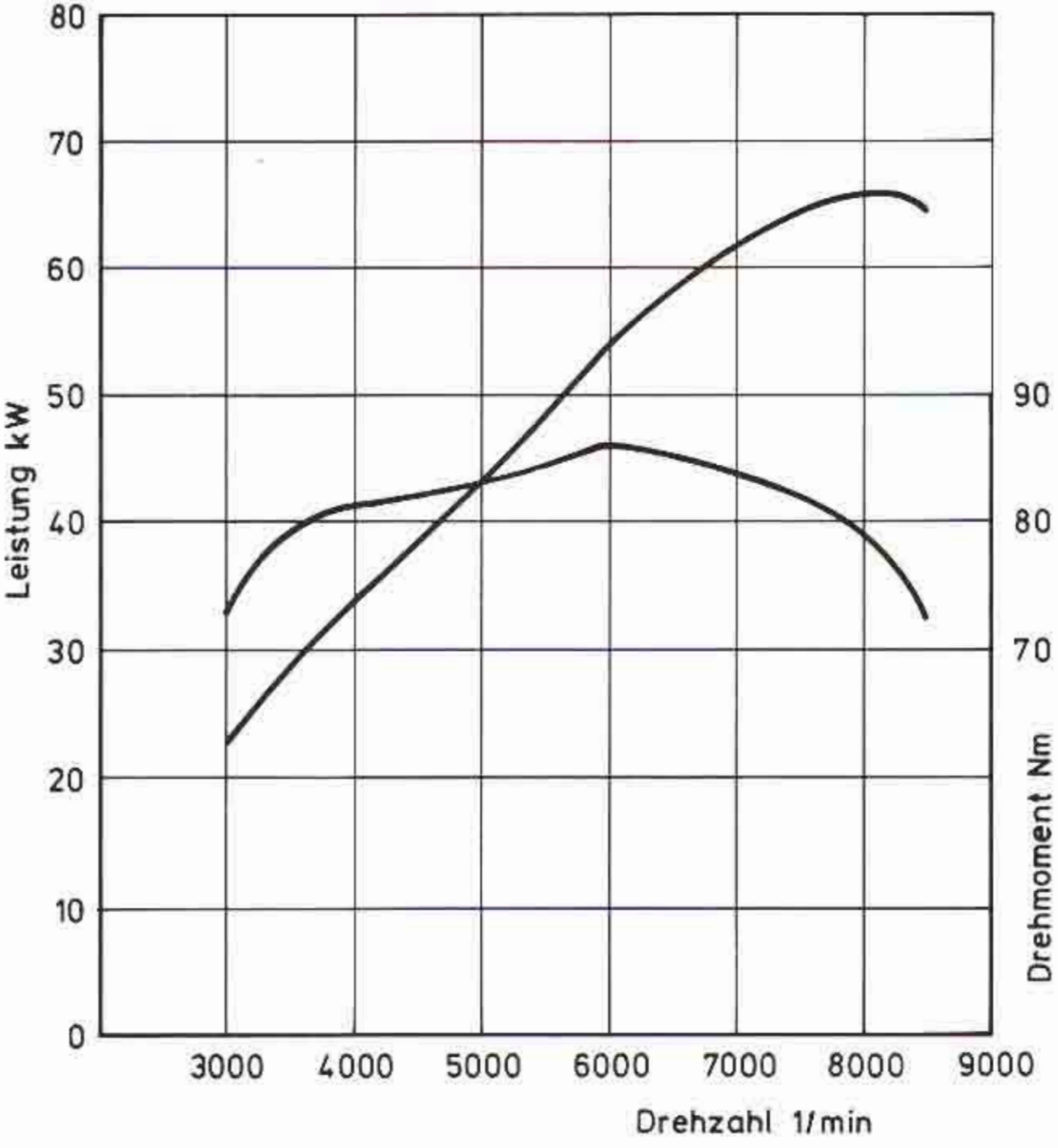
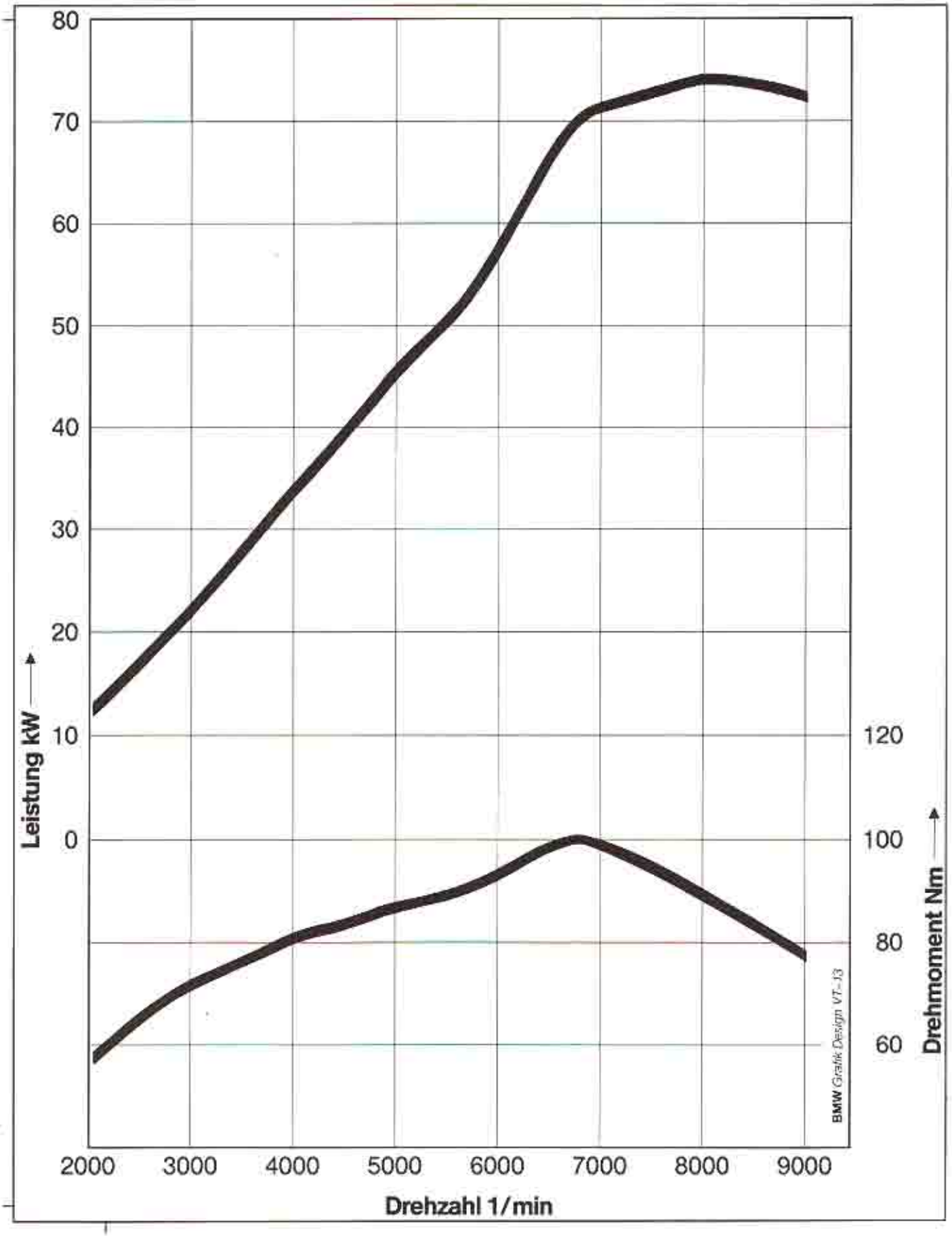
Drehzahl 1/min
BMW Grafik Design

BMW K 100 und K 100 LT



BMW K 1 und K 100 RS



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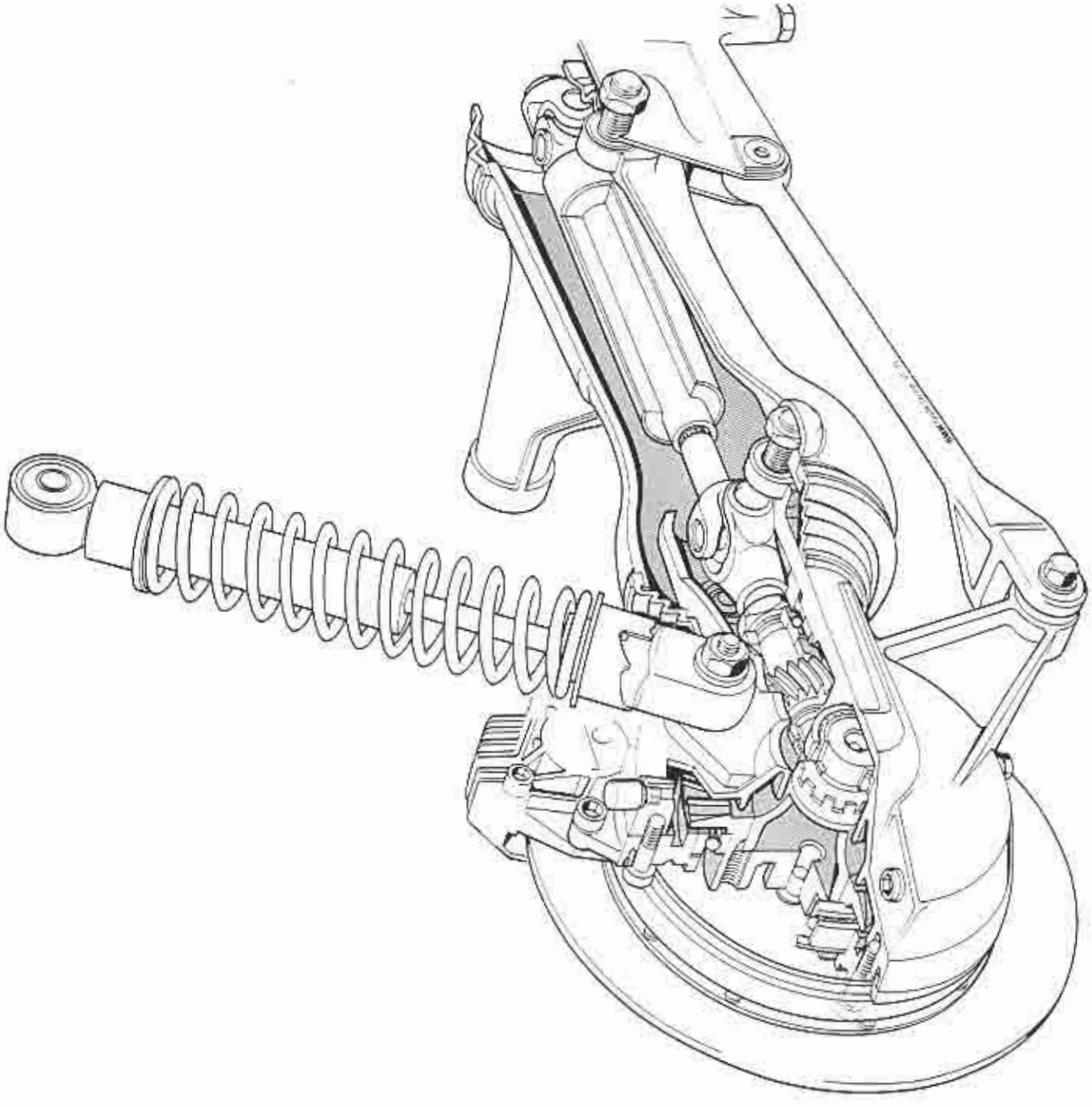
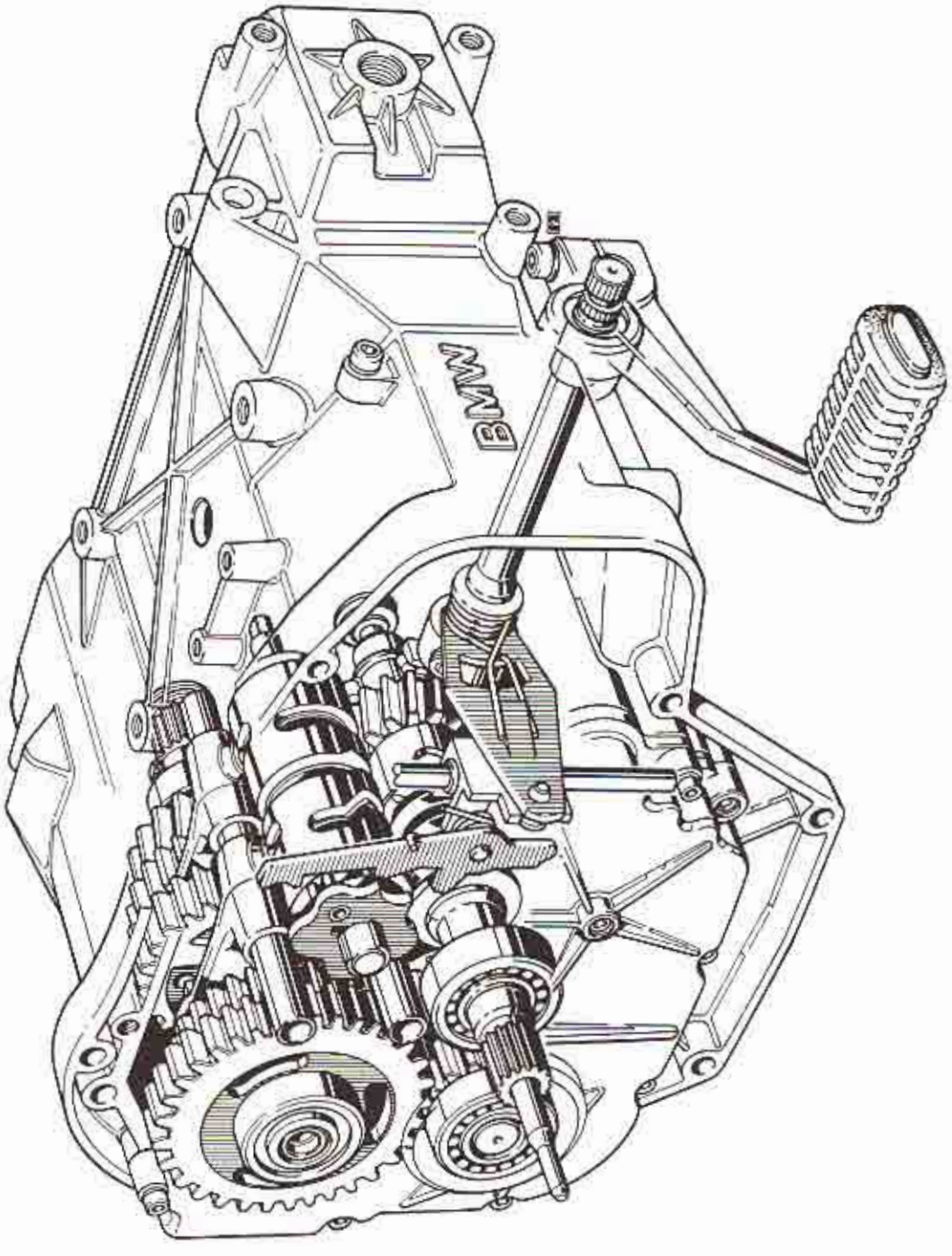


BMW K-Modelle



THE 1991 COLOUR RANGE

R models

The R 65, R 80, R 80 RT, R 100 RS and R 100 RT are available in the following colours: red metallic, topaz red metallic and bermuda blue metallic

The R 80 GS and R 100 GS come in carica blue/avus black, marrakech red and avus black/yellow

The R 100 GS Paris-Dakar is available in alpine white/ marrakech red and avus black/flash green

K models

K 75 and K 75 S: marrakech red and topaz red violet metallic

K 75 RT and K 100 LT: bermuda blue metallic, red metallic, classic black metallic

K 100 LT Limited Edition: pearl green metallic

K 100 RS: pearl silver metallic, bermuda blue metallic, red metallic, classic black metallic

K 1: marrakech red and classic black metallic