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Auf dem Sprung:
Die zweite GS-Generation

Leaping into the Future:
The Second GS Generation

Un bond en avant –
la 2e génération GS

Un salto die qualità:
la II generazione GS

En marcha:
La segunda generación GS

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CONTENTS

Short story about the new models in the 1988 BMW motorcycle range

Ongoing success:
The new BMW R 80 GS and R 100 GS enduro generation

Having written motorcycle history, it now faces a bright future: In its 7 successful years as the first big-bike enduro, the BMW R 80 G/S started a new trend towards the adventure and long-distance travelling machine. In competition trim it won the Paris-Dakar Rally, the world's toughest endurance race, no less than four times. In the Federal Republic of Germany this 800-cc flat-twin was voted Enduro of the Year no less than 6 times and Tourer of the Year on three occasions. Its worldwide sales amounted to more than 20,000 units.

Now BMW is entering the 1988 model year with a second generation of this successful machine: The even larger and more powerful R 100 GS with 1000 cc and 60 bhp, and the R 80 GS with a somewhat smaller and less powerful (800 cc/50 bhp) engine but otherwise exactly the same features.

Just like the R 80 G/S introduced the BMW Monolever (the single swinging arm now to be found on all BMW models) in 1980, the new GS models again pave the way into the future with an outstanding innovation: For the first time they feature the newly developed BMW Paralever, the double-joint swinging arm patented worldwide. The Paralever system eliminates any effects from the drive shaft and reactions caused by changing loads, thus providing an even higher standard of riding safety and suspension comfort. Indeed, the suspension of the new GS models has been dramatically refined and improved: In addition to the reinforced frame there is a new front wheel fork and stabilizer by Marzocchi, with an overall tube diameter of 40 mm or 1.57" (as opposed to the old tube with a diameter of 36 mm/1.42"). Spring travel has also been increased to 225 mm/8.86" (previously 200 mm/7.87") at the front and 180 mm/7.09" (previously 170 mm/6.69") at the rear. The diameter of the single-disc brake has been increased to 285 mm/11.22" (previously 260 mm/10.23"), making it even more reliable and efficient.

Developing the wheels for the second GS generation, BMW's engineers had another new idea: the cross-spoke principle. Running through the rim horn, the spokes provide a fully enclosed rim base and thus allow the use of tubeless tyres which are just as easy to change as the spokes themselves. The crosswise arrangement of the spokes gives the wheel superior torsional rigidity quite comparable to that of the very best cast wheels. The seat with its integral luggage rack is longer and wider, but relatively low for an enduro at 850 mm/33.5". The capacity of the fuel tank has been increased from 19.5 to 26 litres (4.3 to 5.7 Imp gals).

BMW's main objective in introducing the new GS models was to offer the enthusiast first-class enduro riding. Handling and riding stability, for example, are further enhanced by the various improvements of the suspension. Indeed, it was these improvements, among other things, that provided the prerequisites for using the 60 bhp one-litre engine with a top speed of 180 km/h (112 mph) and - as an even more important feature - supreme torque at low engine speeds (76 Nm/56 ft-lb at 3750 rpm). Even in road trim, the R 100 GS - the world's largest enduro in terms of engine size - weighs a mere 210 kg (463 lb). This is precisely the load it is allowed to carry - meaning that in this respect, too, the R 100 GS provides ideal conditions for touring with a passenger and a lot of luggage. The R 100 GS is available in Avus-black with a black and yellow seat, the R 80 GS comes in Marrakech-red with a black seat; in addition, both models are available in Alpine-white with a blue and white seat. The R 100 GS is also fitted with a small windshield.

Following the successful launch of the K 100 and K 75 four- and three-cylinder series in the last four years, the flat-twin series therefore plays the leading role in BMW's 1988 model range. This is also underlined by the fact that the R 100 RT, the classic full-fairing tourer with its 60-bhp one-litre engine, is now celebrating its come-back side-by-side with the R 100 RS re-introduced a year ago.

There is also some interesting information on the K Series: To accommodate somewhat shorter riders, BMW now offers the "basic" no-fairing K 75 and K 100 models with a new, lower seat which simply clips on to the machine (with a seat height of either 760 mm/29.9" or 800 mm/31.5", respectively). The K 100 has also been attractively re-styled and features new high-rising handlebars. The special range of equipment for the K 100 LT luxury tourer comprises even more goodies for the motorcycle enthusiast, including for example a modified windshield with an additional instrument panel and a larger topcase.

The 7 successful years of the BMW R 80 G/S

It really wrote motorcycle history and scored one success after the other during its 7-year production cycle: The BMW R 80 G/S started setting new standards immediately upon its introduction in autumn 1980. With its 800-cc flat-twin, an output of 50 bhp and shaft drive, it remains the largest enduro in the world market to this very day. Although it admittedly came a bit late, the R 80 G/S was indeed the logical and bold result of BMW's more than 50-year history of off-road racing. BMW's first off-road street machine to enter standard production, the R 80 G/S followed directly in the footsteps of BMW's success in the European Off-Road Championships and international Six Days in the 70's.

The R 80 G/S was also the first BMW to feature a single swinging arm with spring strut, also referred to as the Monolever and Monoshock. This BMW patent, which excels above all by riding characteristics, low weight and absolute ease in changing the rear wheel, was subsequently introduced on the new K Series and the other R-models.

Immediately after the launch of the R 80 G/S Hubert Auriol won the Paris-Dakar Rally on a competition version in January 1981. In 1983 this outstanding French rider repeated his triumph in the same event, which quite rightly is regarded as the world's toughest endurance race. In 1984 and 1985 Gaston Rahier from Belgium took over as the "desert king", naturally also scoring his victories on the BMW R 80 G/S.

In 1983 the standard R 80 G/S, which had remained virtually unchanged throughout its entire production life, was joined by the Paris-Dakar special model featuring a 32-litre (7-gal) fuel tank. Still, it was not just racing fame that made the R 80 G/S a continuing success in the market, particularly in the Alpine countries. As a trail bike simply ideal for riding off the beaten track the G/S also became a classic long-distance touring machine taking riders from Munich to China, through Africa and Australia and from Alaska to Patagonia.

The R 80 G/S emanated precisely the features that major cigarette manufacturers try to create in their advertising: a flair of adventure, power and freedom. So it is no surprise that the readers of MOTORRAD, Europe's largest motorcycle magazine, voted this BMW the Enduro of the Year no less than six times. Sturdy and robust, but also agile and easy to service, the R 80 G/S possesses outstanding all-round qualities - whether for sporty excursions on winding mountain roads or on long-distance tours with a passenger and luggage.

This positive opinion on the R 80 G/S was obviously shared by the readers of the German motorcycle journal TOURENFAHRER, who in summer 1987 chose the R 80 G/S - just before its "retirement" as their Tourer of the Year with an overwhelming majority for the third time running. Last but certainly not least, a most impressive figure confirms and concludes the story of success of the BMW R 80 G/S: In 7 years of production, more than 20,000 units of this magnificent machine came off the production line at BMW's motorcycle factory in Berlin-Spandau.

The new R 80 GS and R 100 GS: Continuing on the road to success

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

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

The suspension certainly features the most dramatic and eye-catching modifications. The frame has also been 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 has also been 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 new 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, the BMW Paralever is described in its development and function in two separate sections (4 and 5) 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 between 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.

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 that can easily be exchanged using normal tyre-changing tools. 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 inherently 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 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). It goes without saying that such a wider tyre is 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 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 and oil cooler, just like the R 100 RS and R 100 RT fairing models.

Another new feature of the engine 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 less expensive model developing 50 bhp like its predecessor.

The new GS generation also offers a wide range of other useful and highly practical features. Experienced riders and touring enthusiasts themselves,

BMW's motorcycle engineers realized that with the fuel tank - like in so many other areas - the truth comes right in the middle: between the 19.5 litres (4.3 Imp gals) of the previous G/S and the 32 litres (7.0 Imp gals) of the Paris-Dakar version. The new tank therefore has a capacity of 26 litres (5.7 Imp gals) with a reserve of 4.7 litres (1.03 Imp gals).

Without fuel, oil and tools the new R 80 GS and R 100 GS weigh 187 kg (412 lb); their weight in road trim is 210 kg (463 lb). This is also the maximum load they are allowed to carry, as 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 foam 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 a change 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.

The history of BMW shaft drive:
From the simple shaft to the Paralever

Right from the beginning the history of the motorcycle drive shaft was written in Munich. It started in 1896 - 91 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 standard-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 enthusiasts 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 revolutionized 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 in 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.

With this refinement of the drive shaft concept the BMW enduro is once again able to cope with even more engine power. Indeed, precisely this was the prerequisite for the BMW R 100 GS, by far the largest standard-production enduro in the world market.

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 occupies 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 BMW FLAT-TWIN MODELS:
Come-back of the big boxers:
Following the R 100 RS comes the R 100 RT and, for the first time, the R 100 GS

Despite the overwhelming success of the BMW K-generation, the BMW flat-twin built since 1923 has maintained its superior position in the market. Just to brush up your memory: When the K 100 Series was launched in autumn 1983 the R 100 Series was withdrawn in order to provide room for BMW's new top models. With exhaust emission and noise standards becoming stricter all the time, BMW felt that in future the boxer would only serve for a power range up to 60 bhp.

Initially, 800 cc and 50 bhp were the new upper limit for the flat-twin series. Two modernised 800-cc models, the R 80 and R 80 RT, were introduced in 1984. When the K 75 three-cylinder series was launched in 1985, the boxer range was rounded off at the bottom end by a new achiever's model, the R 65. And when supporters of the big boxer called for the re-introduction of the one-litre model, BMW presented a limited 1,000 unit edition of the modernised 60-bhp R 100 RS at the International Bicycle and Motorcycle Exhibition in Cologne in autumn 1986. When the R 100 RS proved to be most successful the world over (with more than 300 purchasers in Japan alone), BMW decided to reinstate this model on a permanent basis and to add the R 100 RT to the existing model range. Without doubt, however, the completely new R 100 GS represents the highlight of this renaissance of the big boxer, continuing together with the new R 80 GS the successful 7-year history of the old R 80 G/S.

R 65: an attractive model for achievers

The new model for achievers launched in 1985 is virtually identical with the R 80 in terms of both looks and technical features. The sturdy 650-cc engine develops 48 bhp (35 kW) and excels through its torque curve: The maximum torque of 47.8 Nm (35.2 ft/lb) comes at just 3500 rpm. providing an equally relaxed and dynamic style of riding.

The engine of the R 65 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 65 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 an 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, all flat-twin models now offer 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 65 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 205 kg (452 lb) with full tank, the R 65 is a lightweight in its class. With a maximum permissible weight of 440 kg (970 lb) and a maximum load of 235 kg (518 lb), this BMW flat-twin is really ideal for touring.

The 800-cc flat-twins: always the right choice

The three 800-cc models with their 50 bhp (37 kW) engines provide even higher torque.

R 80: the classic sports machine

The R 80 without fairing is a classic sports machine for supporters of an active but nevertheless relaxed style of riding. Enthusiasts who really like to enjoy their tours.

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 tour 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. Additional folding headlights and further instruments may also be fitted on request. The R 80 RT weighs only 227 kg (500 lb) with full tank - very little for a touring machine.

The new R 80 GS: with the exception of the engine, the same supreme standard as the R 100 GS

With the exception of the engine the new R 80 GS is virtually identical with the new R 100 GS. Its 800-cc power unit develops 50 bhp at 6500 rpm and generates its maximum torque of 61 Nm (45 ft/lb) at just 3750 rpm. The R 80 GS is available in Alpine-white with a blue-and-white seat or in Marrakech-red with a black seat.

The new R 100 GS: the world's largest enduro

All the relevant information on the new R 80 GS and R 100 GS is to be found in Sections 1-5 of this press folder. The R 100 GS comes in Alpine-white with a blue-and-white seat and in Avus-black with a black-and-yellow seat, and also has a small windshield.

R 100 RS: come-back of a classic

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 of flat-twin enthusiasts for the one-litre flat-twin engine. Now this model has become a regular member of the range in the 1988 model year. 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 limits taking effect in 1988. In all other respects, the 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 optimized 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.

In all other respects the new R 100 RS has the same up-to-date technical features as the other flat-twin models, ranging from the Monolever swinging arm to the reinforced telescopic fork with stabilizer and the light-alloy wheels in Y-design. The R 100 RS comes in two different styles of finish: in mother-of-pearl-white metallic with blue stripes or in henna red with black stripes and black-painted fairing base.

R 100 RT: the large touring boxer rides again

Launched in 1977 one year after the R 100 RS, the R 100 RT is now also experiencing its come-back exactly 10 years after its 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 RT and LT.

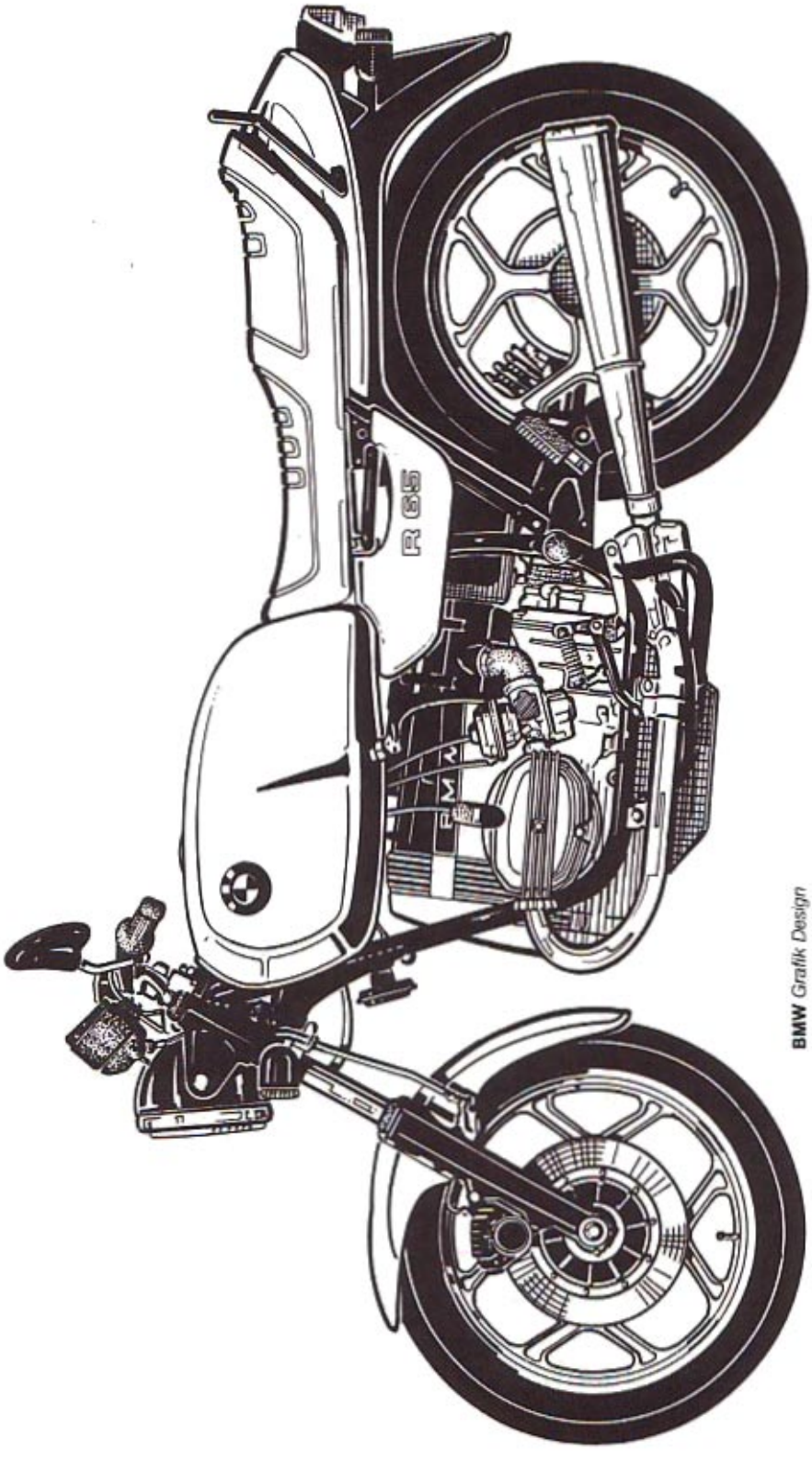
The engine and suspension of the new R 100 RT are identical with that of the new R 100 RS. Particularly touring riders out on a long trip with a pillion and luggage will appreciate the extra performance and higher torque over the R 80 RT. The R 100 RT, which offers remarkable handling for a large tourer, 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. The R 100 RT comes in Bermuda-blue paintwork with dual silver lines and a black seat.

	SPECIFICATIONS BMW MOTORCYCLES		R 65	R 80	R 80 RT	R 80 GS
Engine	Cubic capacity	cc	650	798	798	798
	Bore/stroke	mm	82/61.5	84/70.6	84/70.6	84.8/70.6
	Max output	kW/bhp	35/48	37/50	37/50	37/50
	at	rpm	7250	6500	6500	6500
	Max torque	Nm	47.8	58.0	58.0	61
	at	rpm	3500	4000	4000	3750
	Design		flat-twin	flat-twin	flat-twin	flat-twin
	No of cylinders		2	2	2	2
	Compression ratio/fuel grade (also unleaded)		8.7 N	8.2 N	8.2 N	8.2 N
	Valve control		OHV	OHV	OHV	OHV
	Valves per cylinder		2	2	2	2
	Intake/outlet dia	mm	40/36	42/38	42/38	42/40
	Fuel supply		Bing carburettors	Bing carburettors	Bing carburettors	Bing carburettors
	No of carburettors/dia		2/32	2/32	2/32	2/32
Electrical system	Ignition		contactless transistorized coil ignition			
	Alternator	W	280	280	280	280
	Battery	V/Ah	12/25	12/25	12/25	12/25
	Headlight	W	H 4 55/60 dia 180 mm	H 4 55/60 dia 180 mm	H 4 55/60 dia 180 mm	H 4 55/60 dia 140 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	4.40/3.36	4.40/3.20	4.40/3.20	4.40/3.09
		II	2.86/3.36	2.86/3.20	2.86/3.20	2.86/3.09
		III	2.07/3.36	2.07/3.20	2.07/3.20	2.07/3.09
		IV	1.67/3.36	1.67/3.20	1.67/3.20	1.67/3.09
		V	1.50/3.36	1.50/3.20	1.50/3.20	1.50/3.09
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	175/121	225/180
	Wheel castor	mm	120	120	120	101
	Wheelbase	mm	1447	1447	1447	1513
	Brakes	Front:	single-disc fixed-calliper brake, dia 285 mm			
		Rear:	drum brake, dia 200 mm			
	Wheels		Cast light-alloy 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	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	MTH 2 2.50 x 18 E	2.50 – 17 MT
	Tyres front		90/90 - 18 H	90/90 - 18 H	90/90 - 18 H	90/90 – 21 T
	rear		120/90 - 18 H	120/90 - 18 H	120/90 - 18 H	130/80 – 17 T
			low-profile	low-profile	low-profile	low-profile
Dimensions and weights	Length, overall	mm	2175	2175	2175	2290
	Width with mirrors	mm	800	800	960	1000
	Handlebar width without mirrors	mm	635	635	714	830
	Seat height	mm	807	807	807	850
	Weight, unladen with full tank	kg	205	210	227	210
	Max permissible weight	kg	440	440	440	420
	Fuel tank/reserve	ltr	22/2	22/2	22/2	26/4.7
Performance	Fuel consumption					
	90 km/h (56 mph)	ltr	4.6	4.6	4.8	4.7
	120 km/h (75 mph)	ltr	6.4	6.3	7.2	6.6
	Acceleration					
	0–100 km/h (62 mph)	sec	6.8	6.0	6.4	6.0
	standing-start km	sec	29.5	27.6	29.0	28.3
	Top speed	km/h	173	178	170	168
Model features	Fairing				Full fairing fixed positively to frame, adjustable windshield and integral stowage boxes (glass-fibre-reinforced plastic)	
	Standard features		Toolkit, repair kit	Toolkit, repair kit	Toolkit, repair kit	Toolkit, repair kit, luggage rack

BMW AG Presse

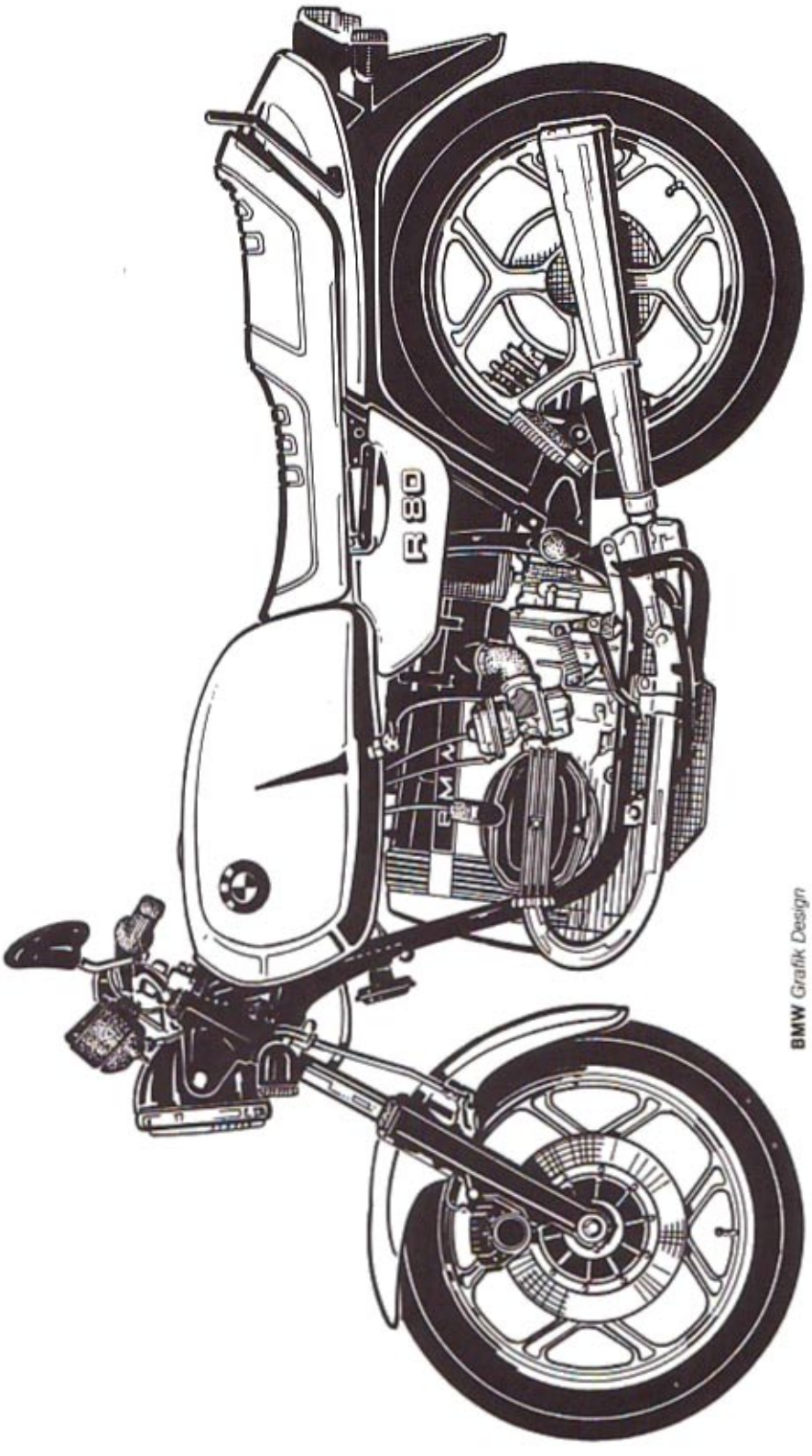
	SPECIFICATIONS BMW MOTORCYCLES		R 100 GS	R 100 RS	R 100 RT
Engine	Cubic capacity	cc	980	980	980
	Bore/stroke	mm	94/70.6	94/70.6	94/70.6
	Max output	kW/bhp	44/60	44/60	44/60
	at	rpm	6500	6500	6500
	Max torque	Nm	76	74	74
	at	rpm	3750	3500	3500
	Design		Flat-twin	Flat-twin	Flat-twin
	No of cylinders		2	2	2
	Compression ratio/fuel grade		8.5 N	8.45 N	8.45 N
	Valve control		OHV	OHV	OHV
	Valves per cylinder		2	2	2
	Intake/outlet dia	mm	42/40	42/40	42/40
	Fuel supply		Bing carburettors	Bing carburettors	Bing carburettors
	No of carburettors/dia		2/40	2/32	2/32
Electrical system	Ignition		contactless transistorized coil ignition		
	Alternator	W	280	280	280
	Battery	V/Ah	12/25	12/30	12/30
	Headlight	W	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
Power transmission, Gearbox	Gearbox		5-speed gearbox with dog-type shift		
	Gear ratios	I	4.40/3.20	4.40/3.0	4.40/3.09
		II	2.86/3.20	2.86/3.0	2.86/3.09
		III	2.07/3.20	2.07/3.0	2.07/3.09
		IV	1.67/3.20	1.67/3.0	1.67/3.09
		V	1.50/3.20	1.50/3.0	1.50/3.09
Suspension	Rear-wheel drive		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	175/121	175/121
	Wheel castor	mm	101	120	120
	Wheelbase	mm	1513	1447	1447
	Brakes	Front:	single-disc brake; dia 280 mm	dual-disc brake; dia 285 mm	
		Rear:	drum brake, dia 200 mm		
	Wheels		Cross-spokes	Cast light-alloy wheels	Cast light alloy wheels
		front	1.85 – 21 MT	MTH 2.50 x 18 E	MTH 2.50 x 18 E
		rear	2.50 – 17 MT	MTH 2.50 x 18 E	MTH 2.50 x 18 E
	Tyres	front	90/90 – 21 T	90/90 – 18 H	90/90 – 18 H
		rear	130/80 – 17 T low-profile	120/90 – 18 H low-profile	120/90 – 18 H low-profile
Dimensions and weights	Length, overall	mm	2290	2175	2175
	Width with mirrors	mm	1000	800	960
	Handlebar width without mirrors	mm	830	580	714
	Seat height	mm	850	807	807
	Weight, unladen with full tank	kg	210	229	234
	Max permissible weight	kg	420	440	440
	Fuel tank/reserve	ltr	26/4.7	22/2	22/2
Performance	Fuel consumption				
	90 km/h (56 mph)	ltr	4.9	4.3	4.4
	120 km/h (75 mph)	ltr	6.9	6.1	6.6
	Acceleration				
	0–100 km/h (62 mph)	sec	4.8	5.0	5.0
	standing-start km	sec	26.5	26.0	26.0
	Top speed	km/h	181	185	185
Model features	Fairing			Glass-fibre-reinforced plastic sports fairing	Glass-fibre-reinforced tourer fairing
	Standard features		Toolkit, repair kit, luggage rack, oil cooler, windshield	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 65	R 86/5



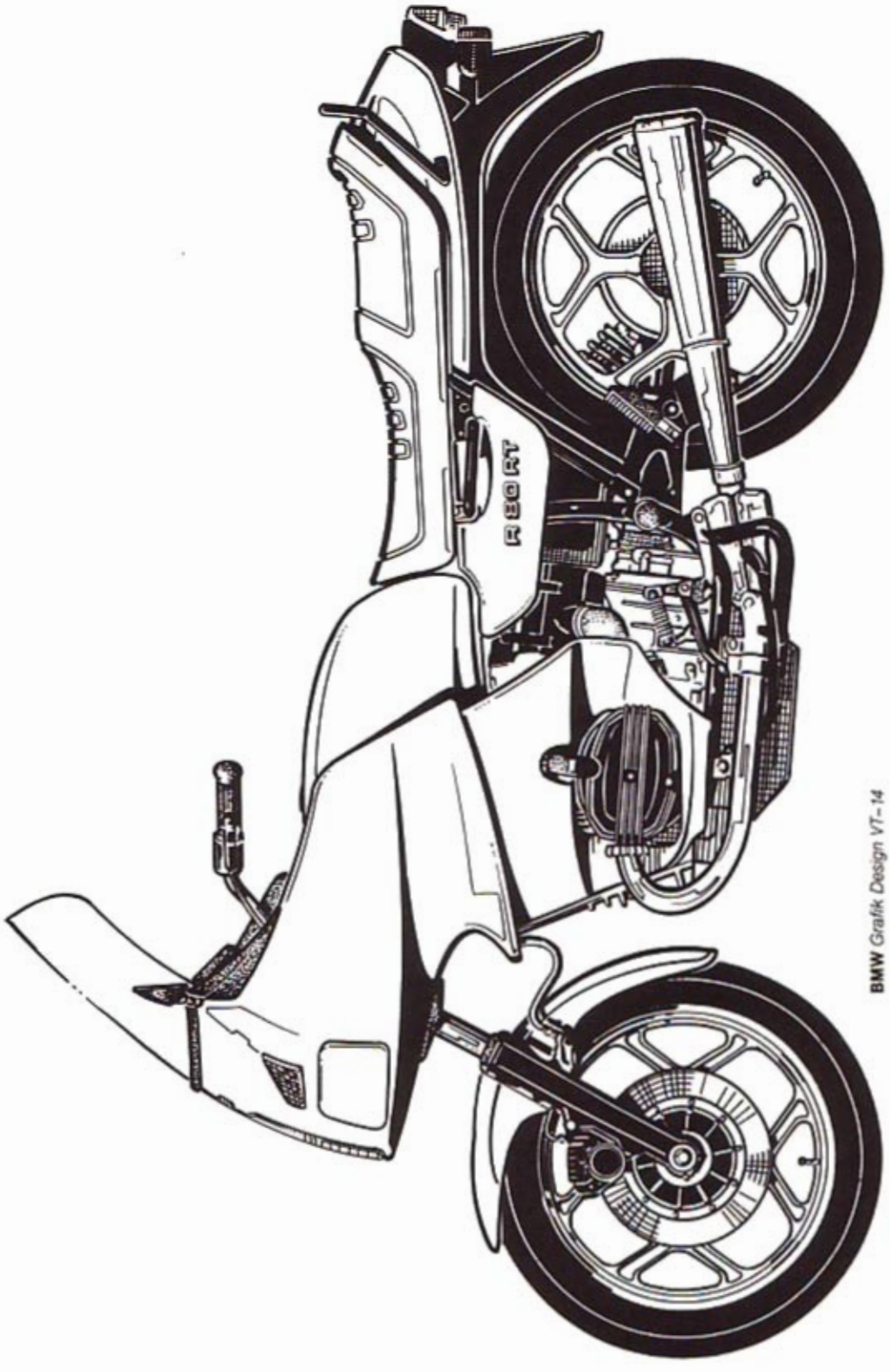
BMW *Grafik Design*

BMW R 80	R 86/6



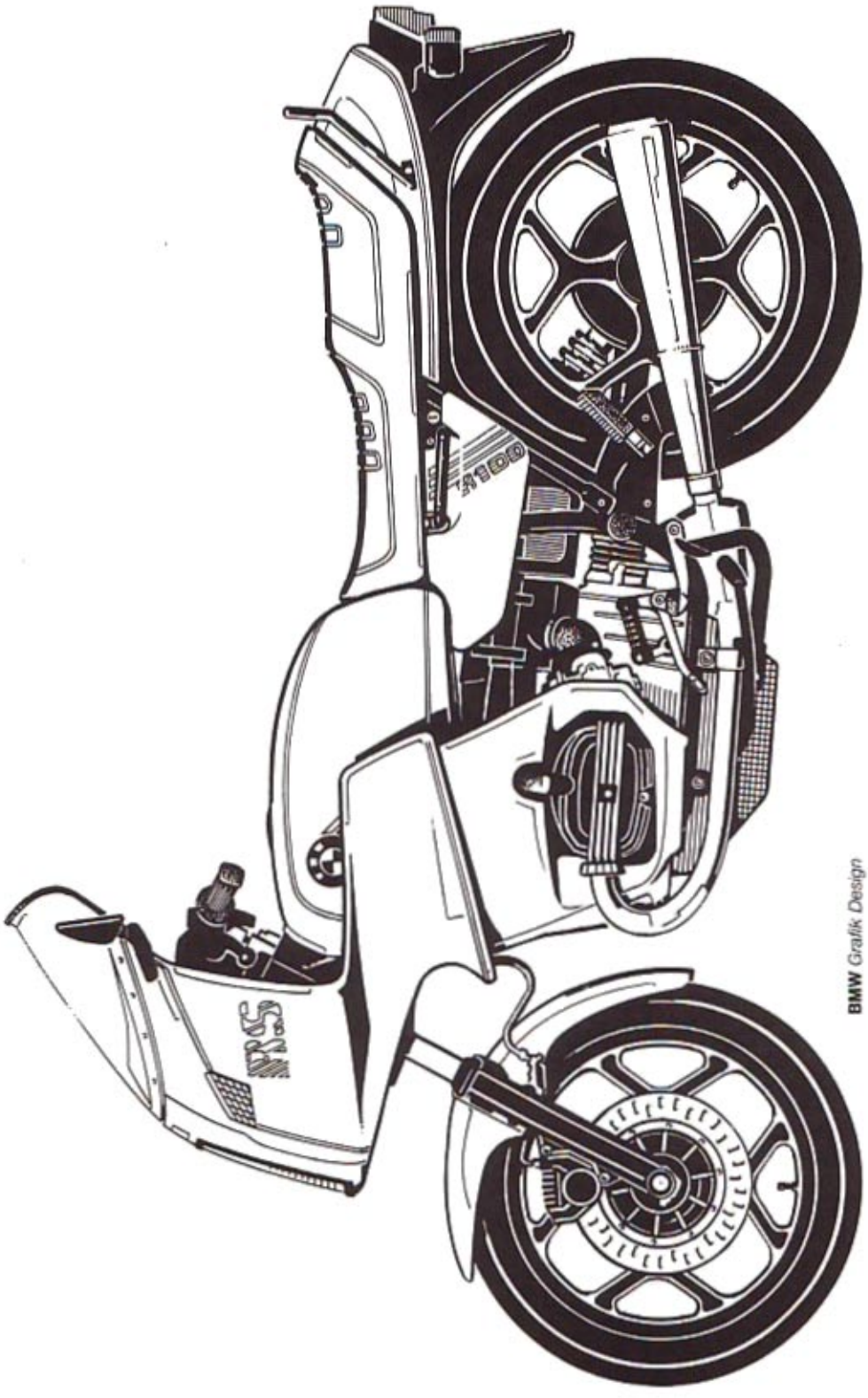
BMW *Grafik Design*

BMW R 80 RT	R 86/7



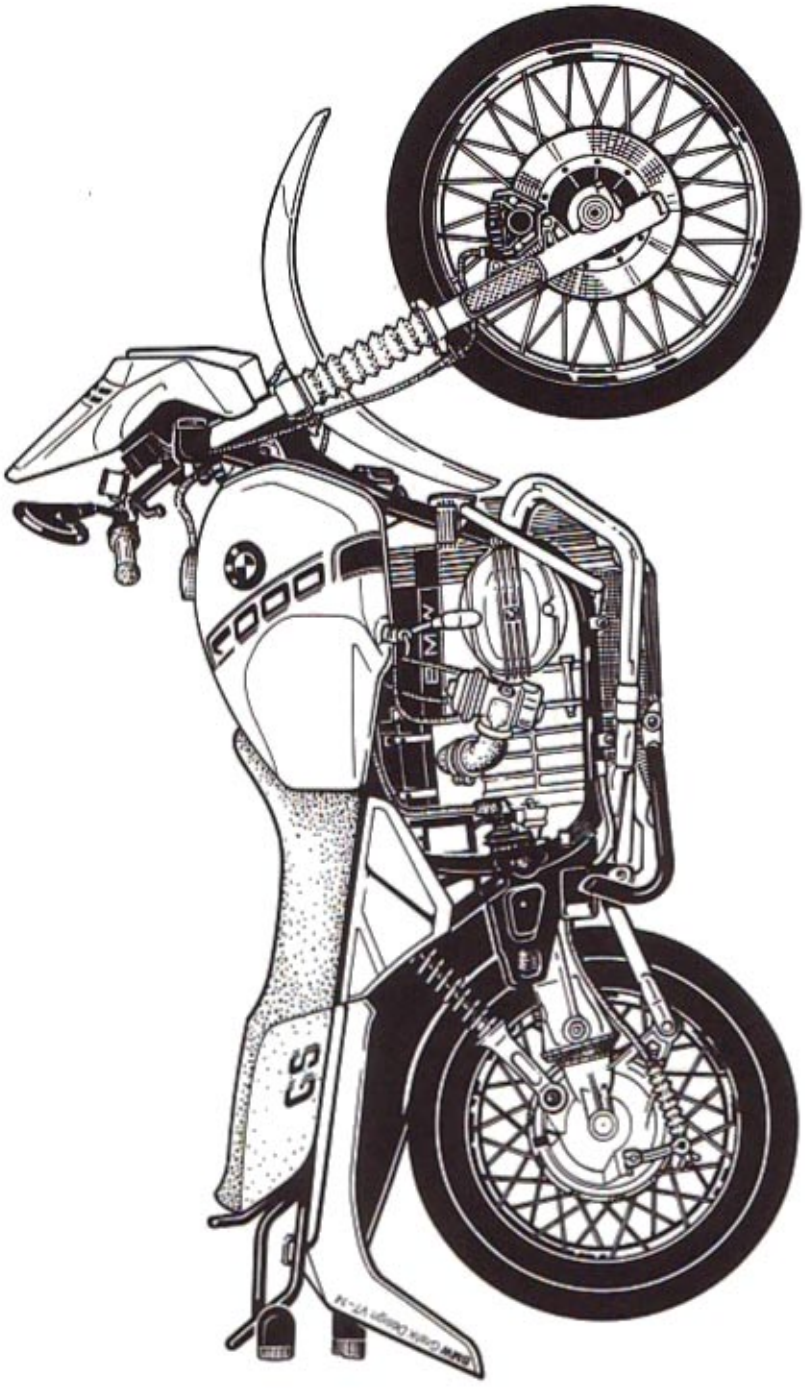
BMW *Grafik Design VT-14*

R 100 RS	R 86/9



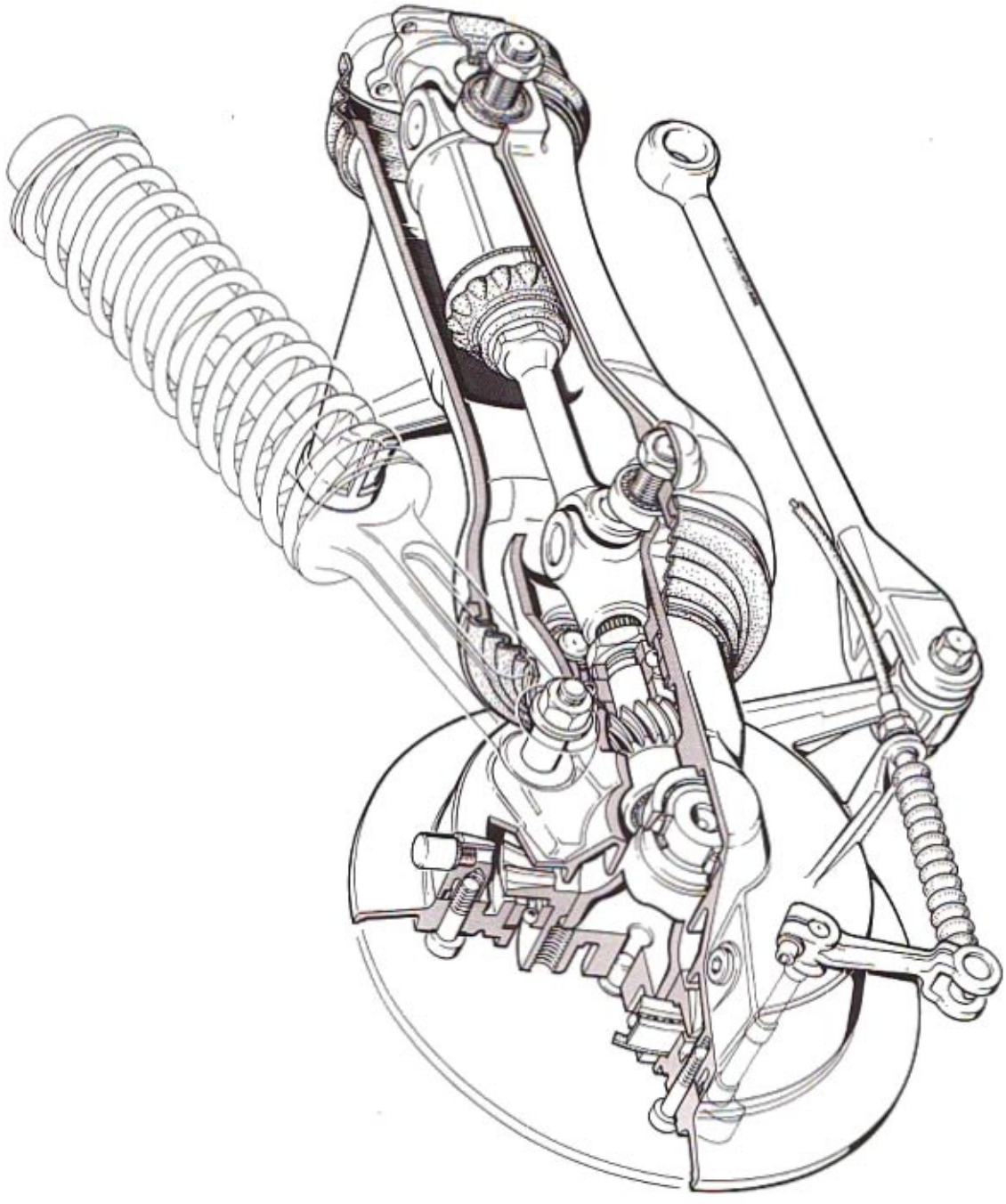
BMW *Grafik Design*

BMW R 100 GS	R 87/1



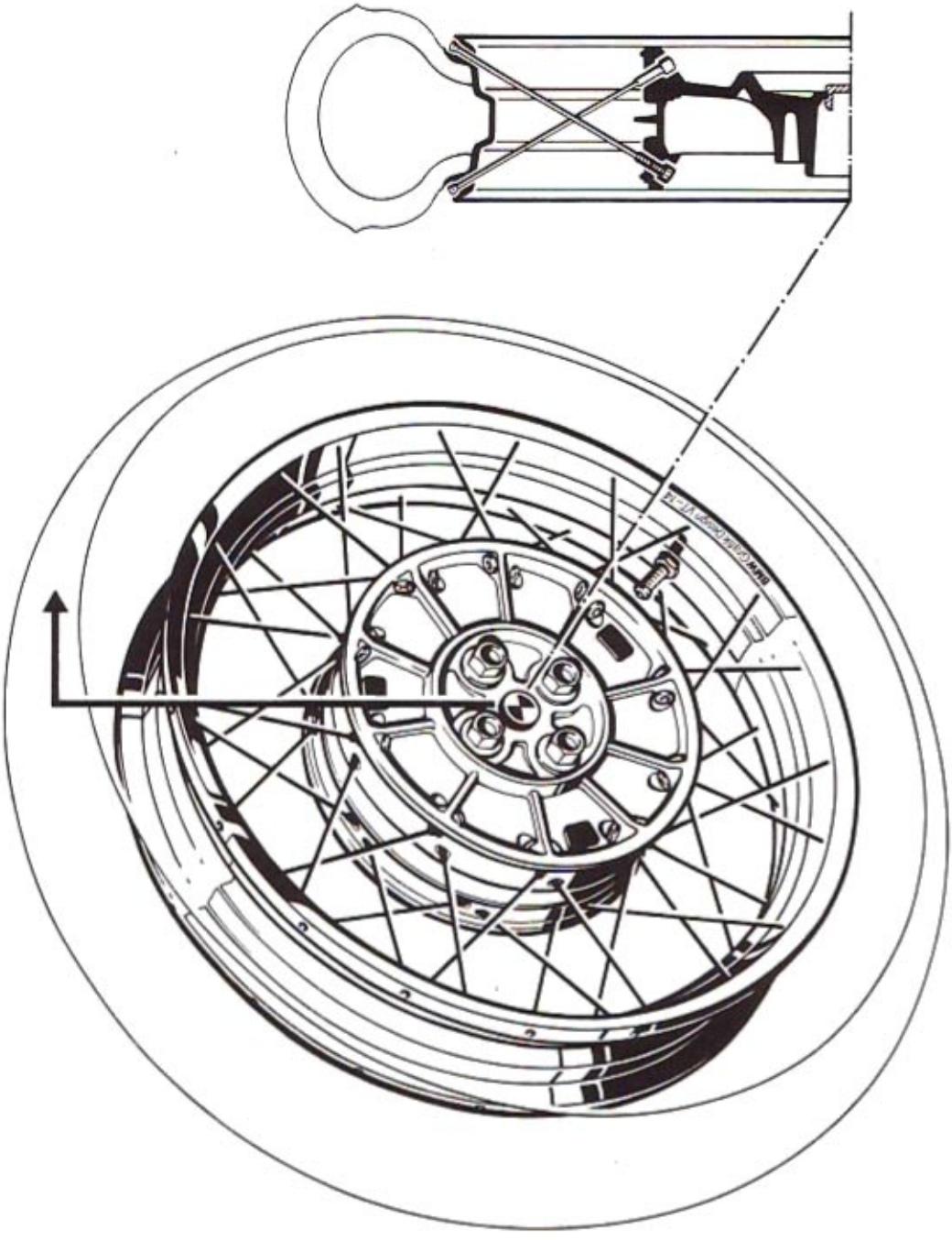
BMW R 80 GS und R 100 GS
BMW Paralever-System

R 87/2



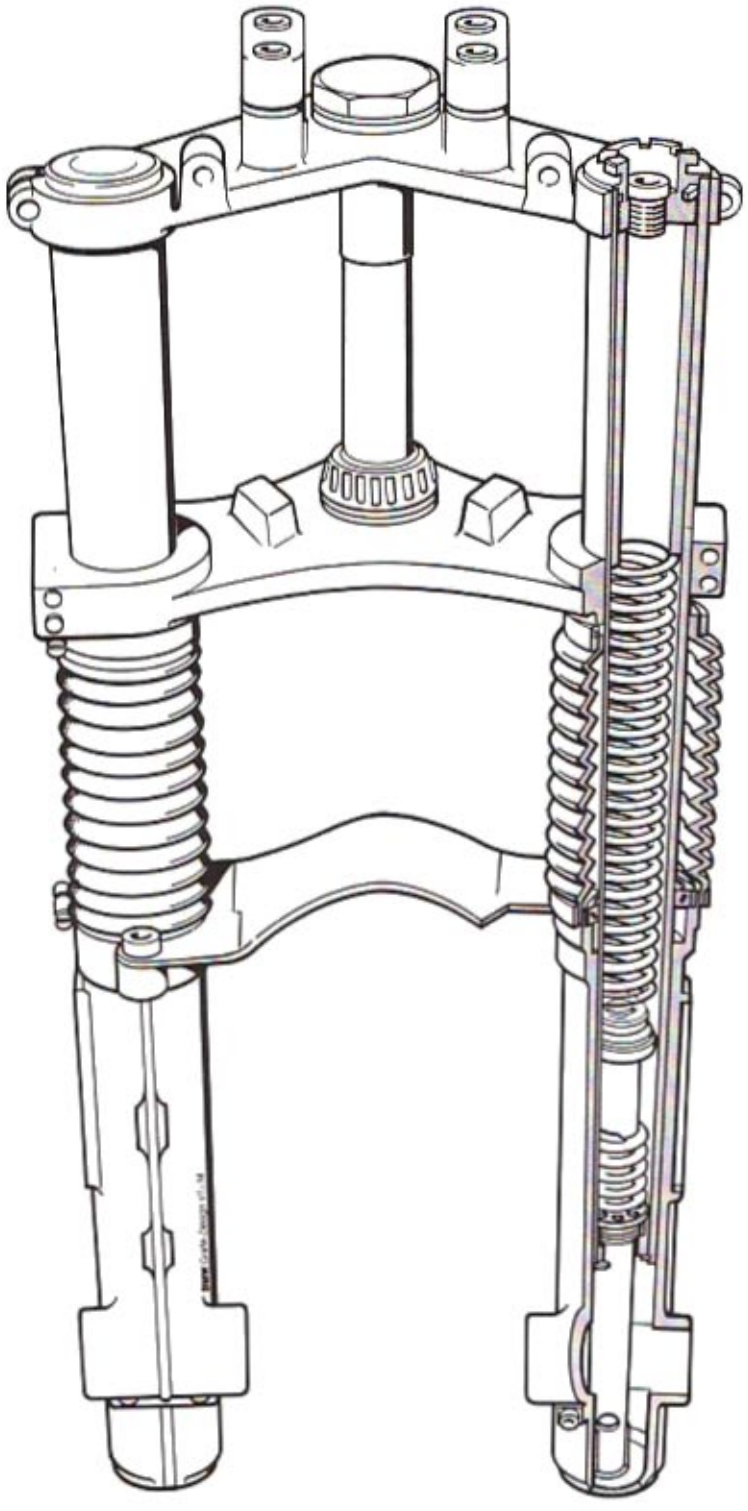
BMW R 80 GS und R 100 GS
Kreuzspeichenrad

R 87/3



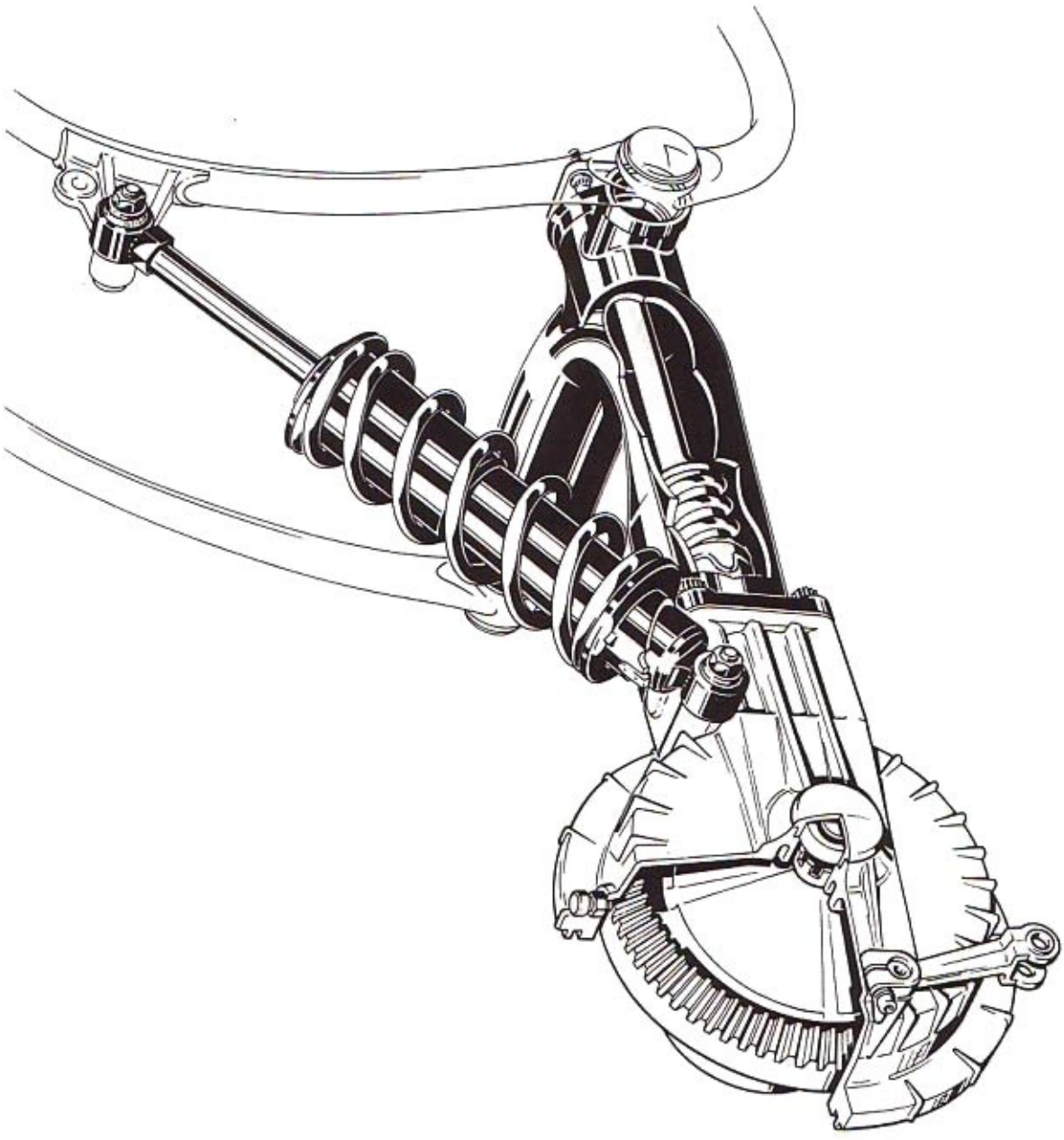
BMW R 80 GS und R 100 GS
Telegabel

R 87/4



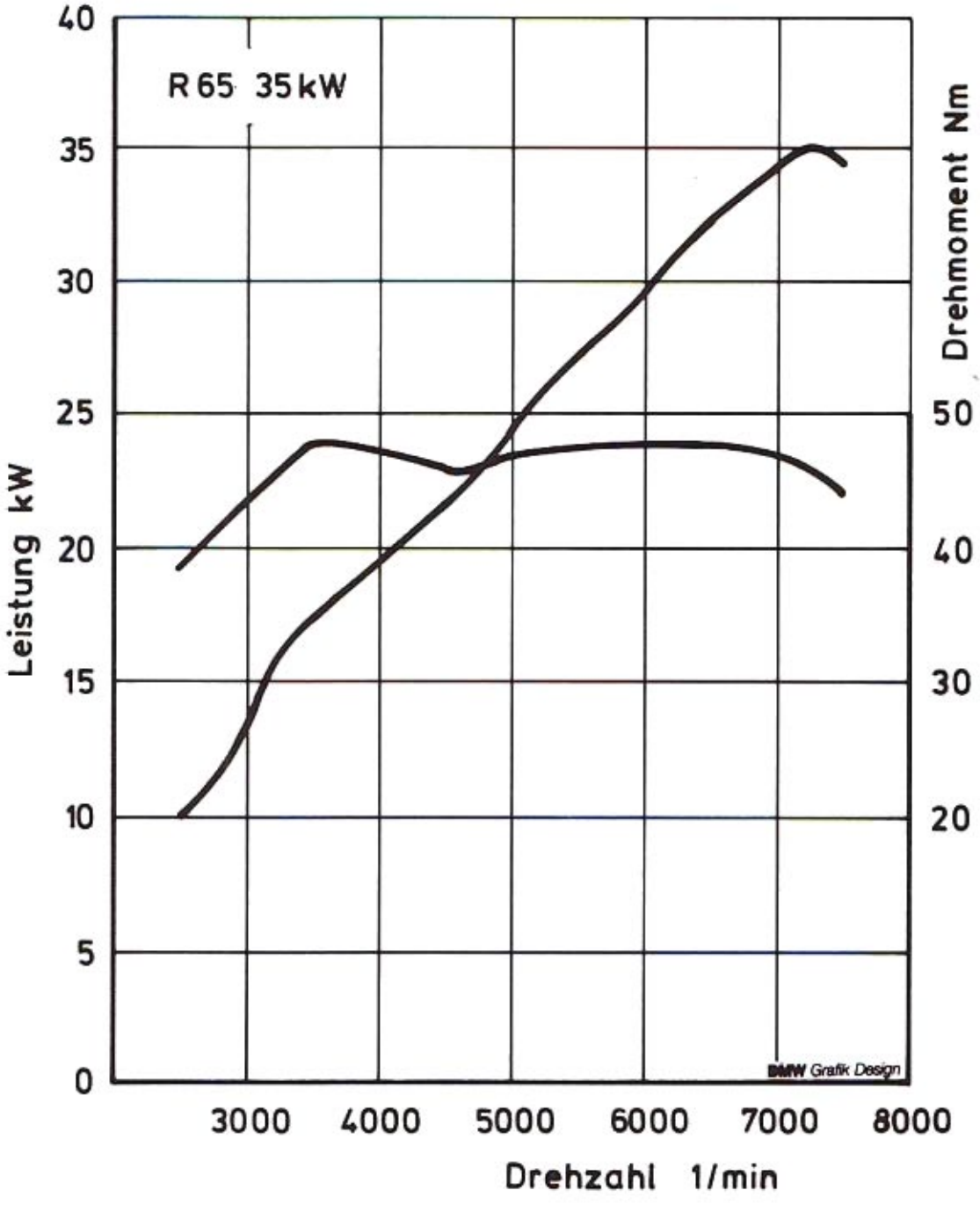
BMW R-Modelle
Einarmschwinge (BMW Monolever-System)

R 84/21



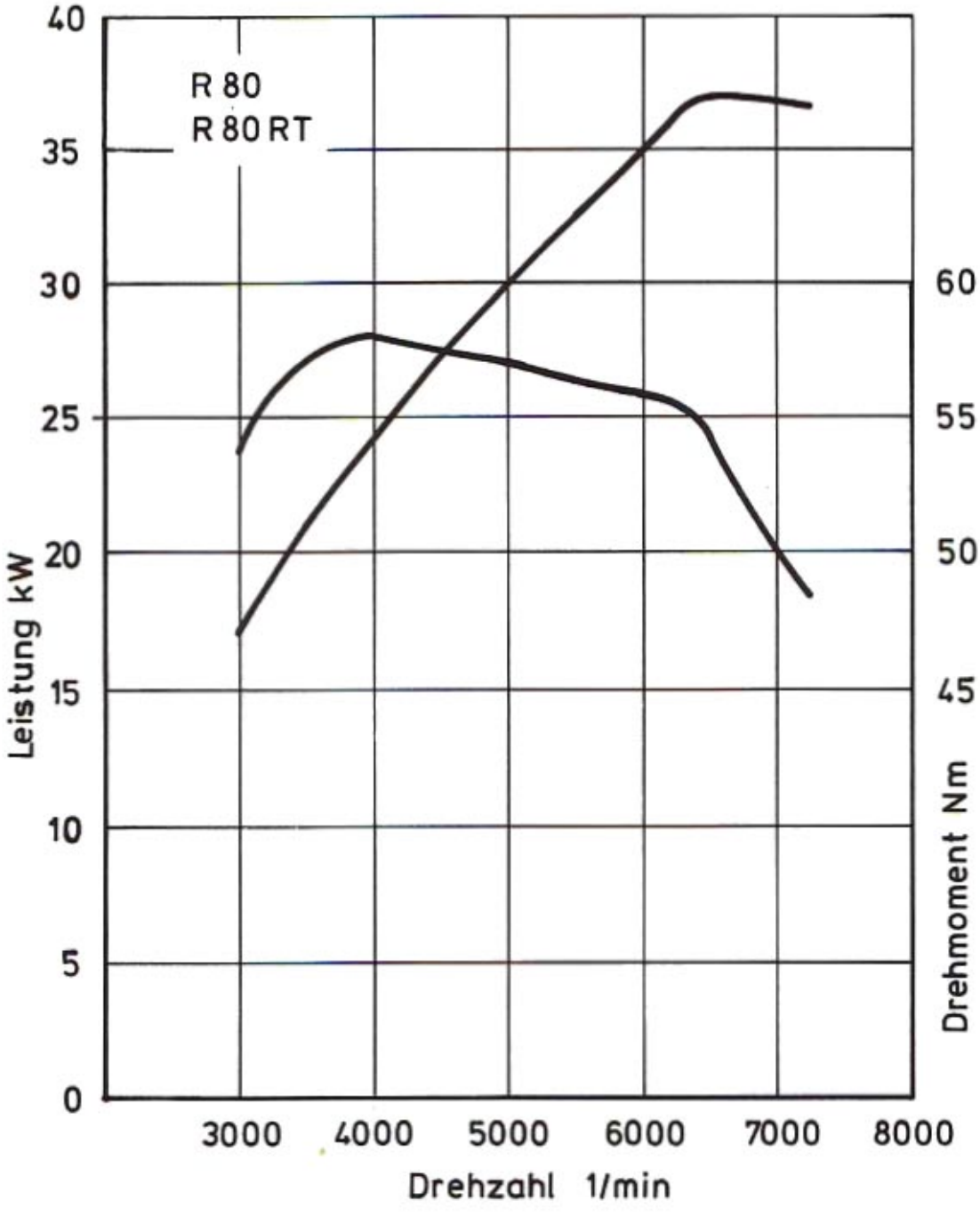
BMW R 65
Leistungs- und Drehmomentdiagramm

R 85/18



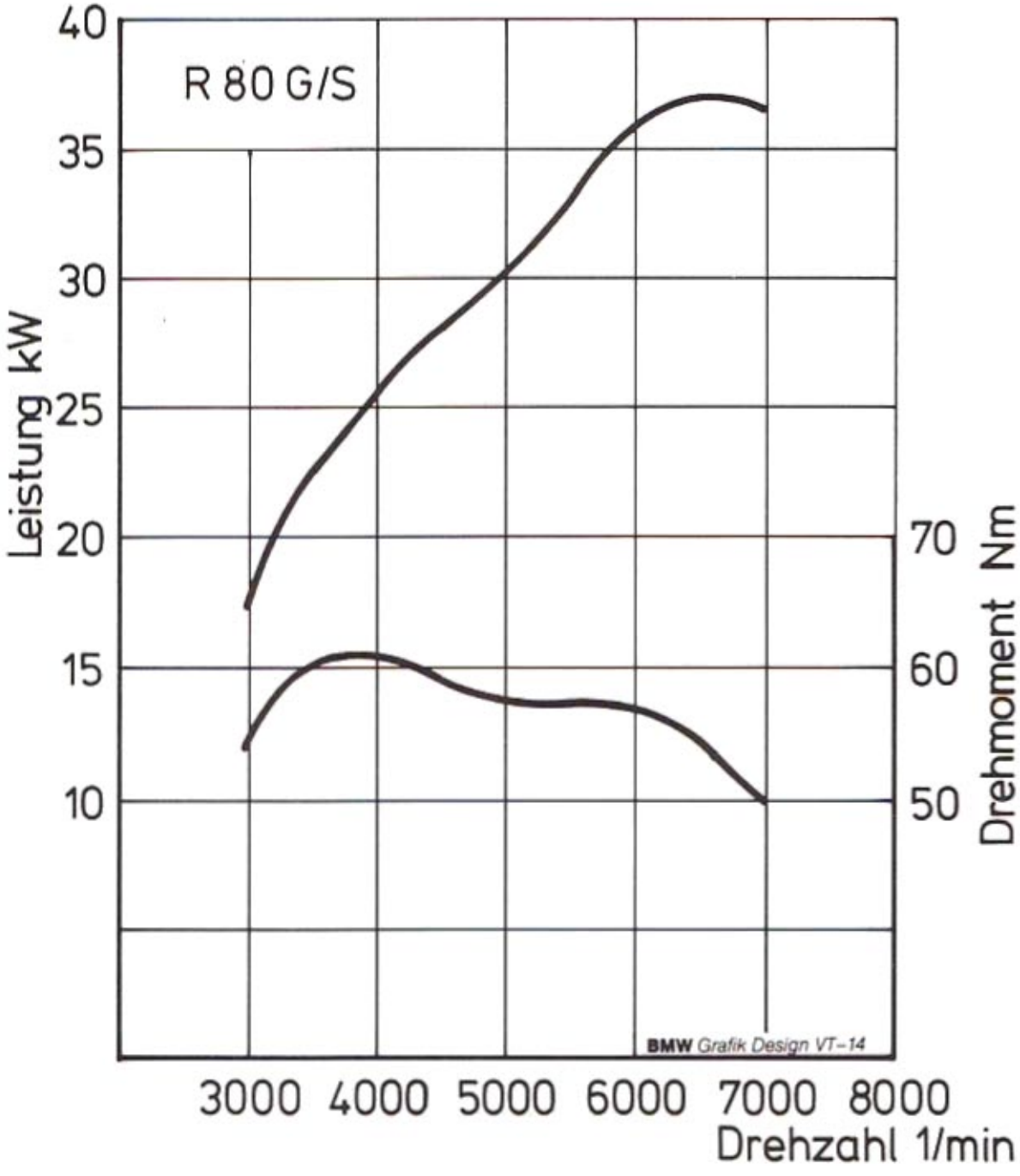
BMW R 80 und R 80 RT
Leistungs- und Drehmomentdiagramm

R 84/22



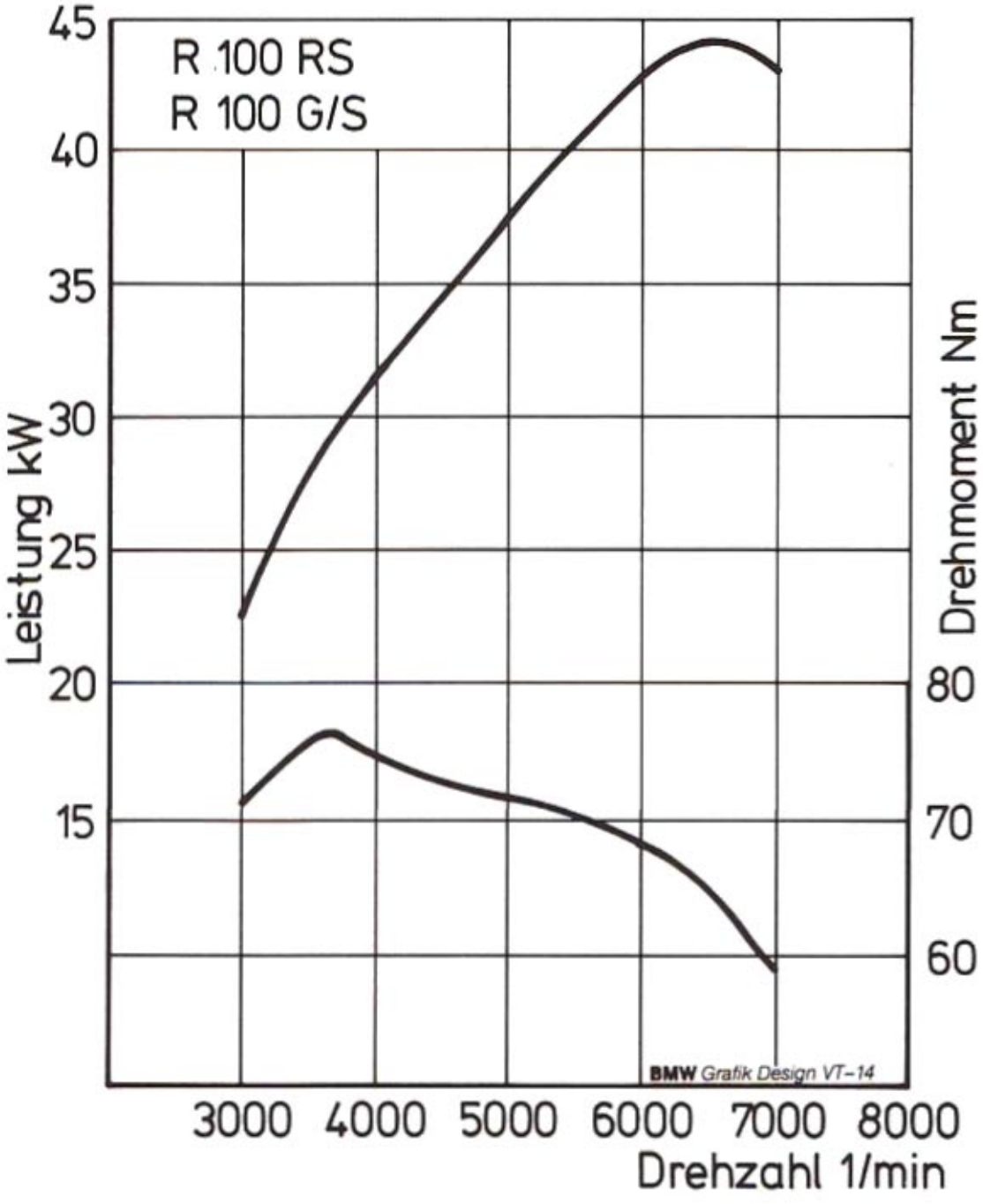
BMW R 80 GS
Leistungs- und Drehmomentdiagramm

R 87/5



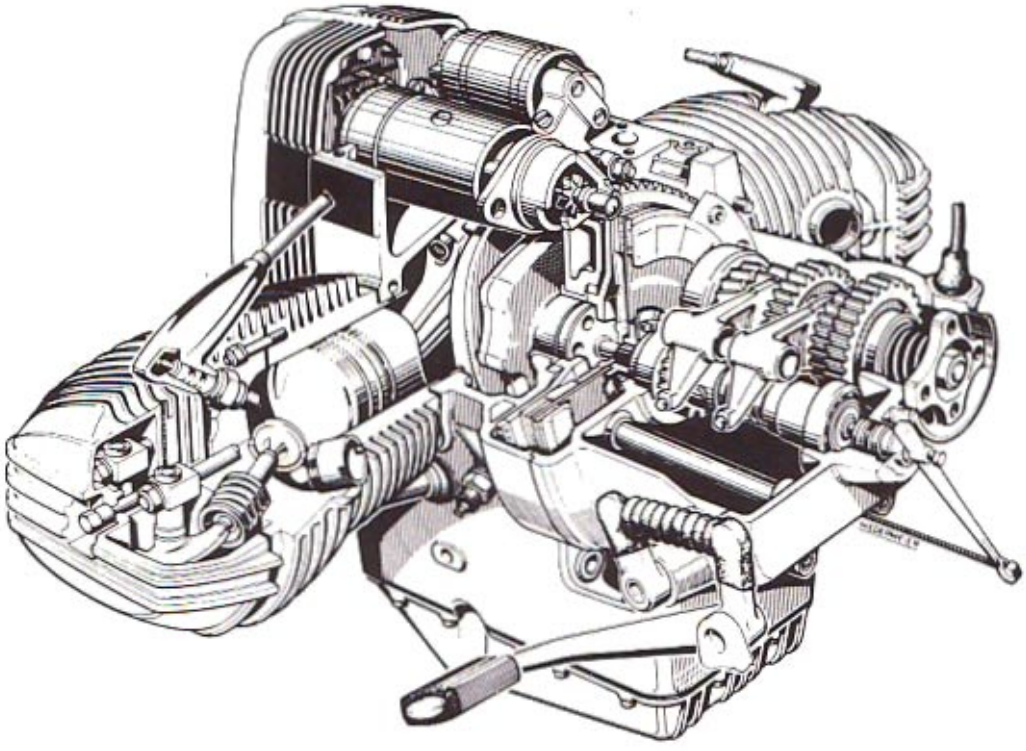
BMW R 100 RS/R100 GS
Leistungs- und Drehmomentdiagramm

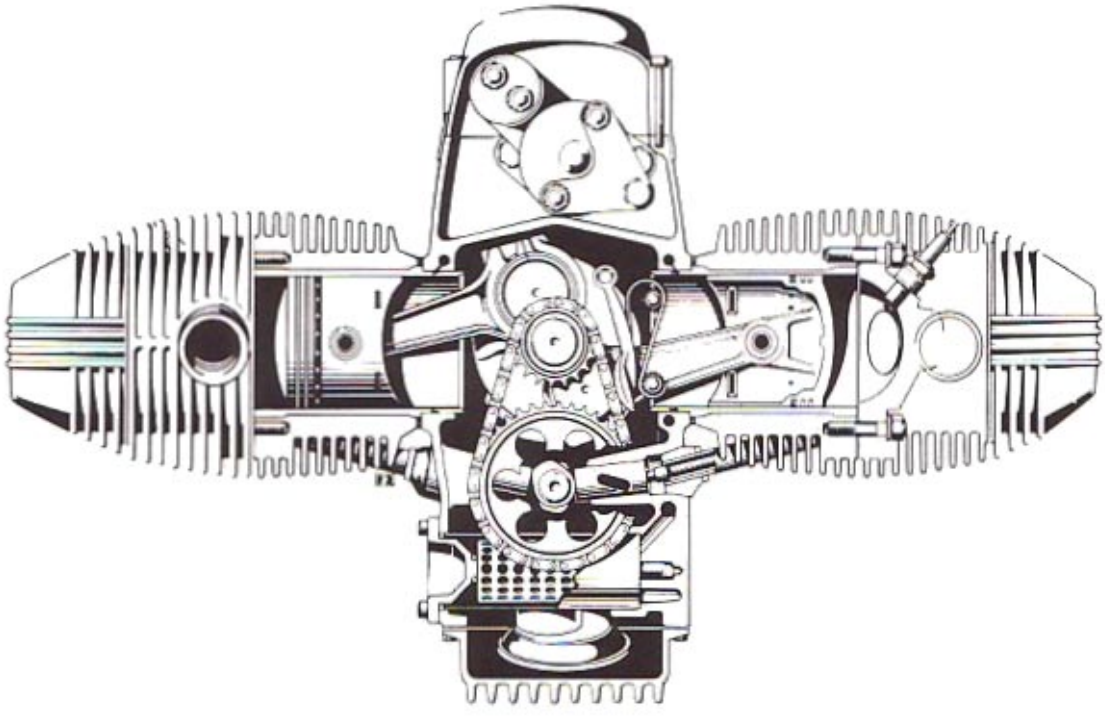
R 87/6



BMW Motorräder
Motorschnittbild (800 cm³)

R 83/3

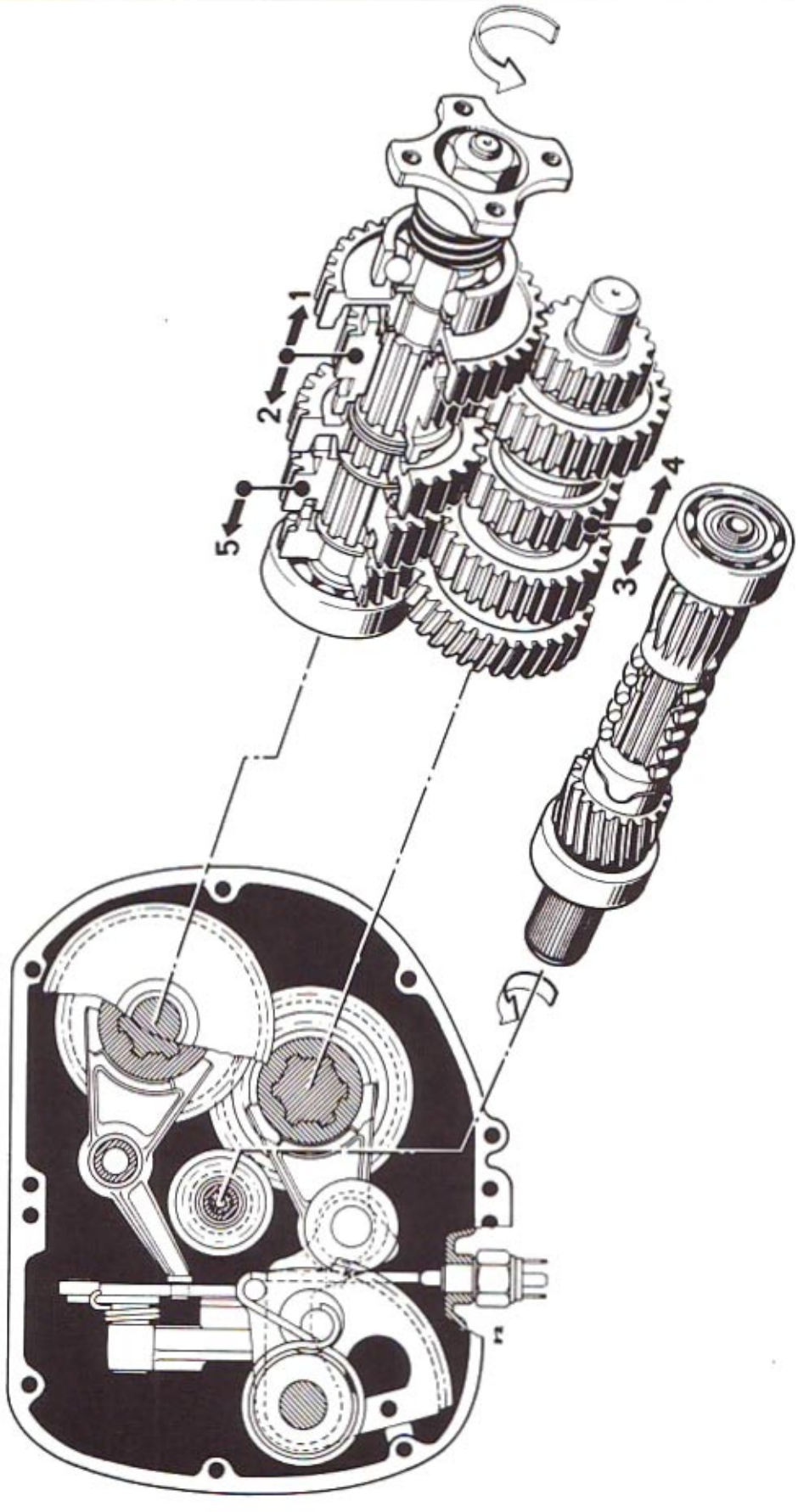




BMW 5-Gang-Schaltgetriebe

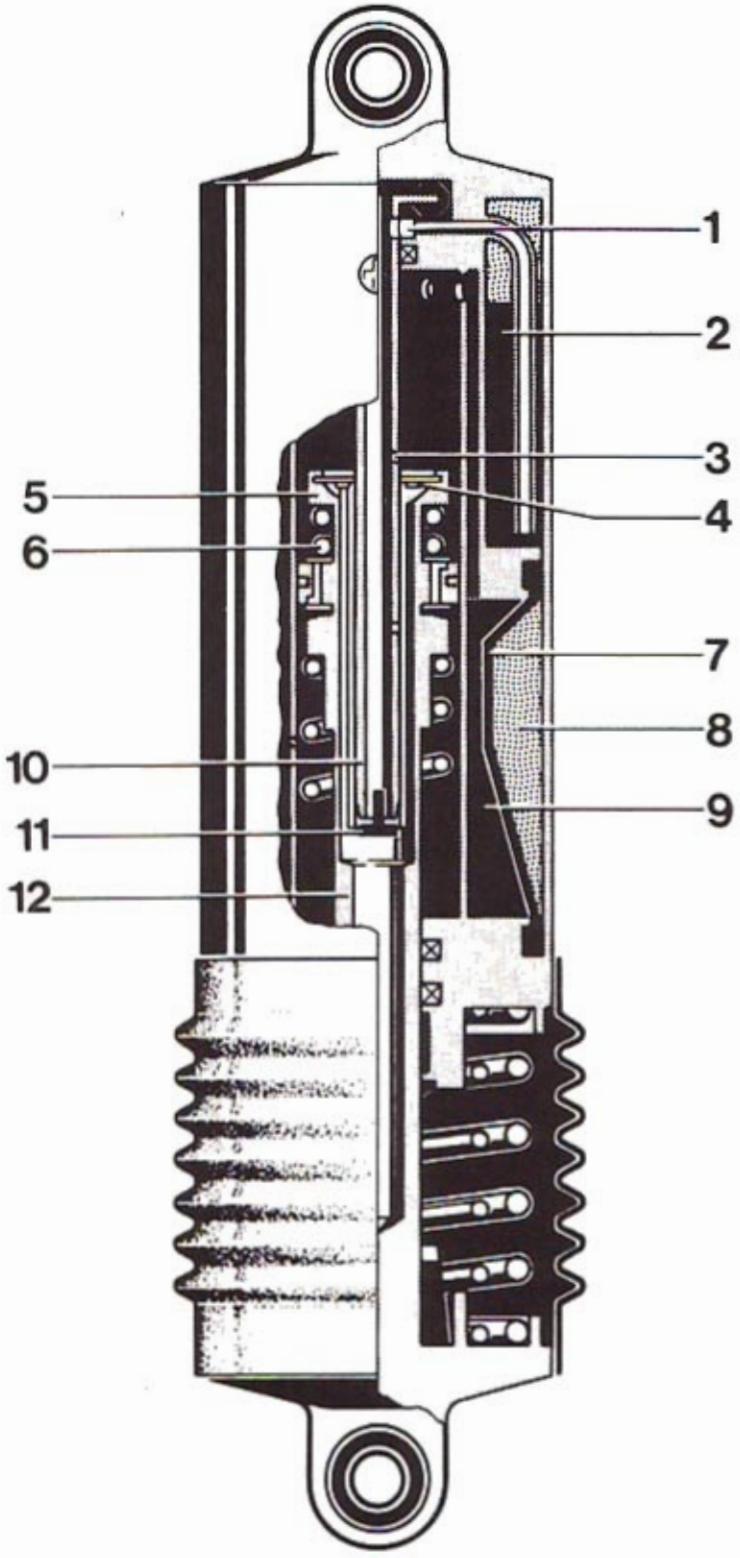
Gesamtprogramm

R 83/7



BMW NIVOMAT – Motorräder
Schnittzeichnung

R 83/8



Special equipment (ex factory)

	R 65	R65GS	R 80	R80GS	R80RT	Special equipment, retrofittable
Voltmeter with quartz clock	-	-	-	-	-	xx
Voltmeter with quartz clock and support	x	-	x	-	-	xx
Hazard warning flashers	x	-	x	-	x	xx
2 folding headlights	-	-	-	-	x	xx
Quartz clock	-	x	-	x	-	xx
Rev counter	o	x	o	x	o	xx
Dual-tone fanfare	x	-	x	-	x	xx
Socket	x	x	x	x	x	xx
Heatable grips	x	x	x	x	x	xx
High handlebar	x	-	x	-	o	xx
Self-levelling	x	-	x	-	x	xx
Dual disc brakes	x	-	x	-	x	-
Kickstarter	-	x	-	x	-	xx
Splashguard at rear	x	x	x	-	x	xx
Windshield	x	-	x	-	-	xx
GS windshield$_1$	-	-	-	-	-	xx
Luggage rack	x	x	x	o	x	xx
Topcase, small$_2$	x	-	x	-	-	xx
Set of integral cases with supports	x	-	x	x	x	xx
Set of touring cases with supports and luggage rack	-	x	-	-	-	xx
Set of touring cases with supports	-	-	-	x	-	xx

	R 65	R65 GS	R 80	R80GS	R80RT	Special equipment, retrofittable
High seat (880 mm/34.6")	-	-	-	x	-	xx
Low seat	x	x	x	-	x	xx
Cylinder protection bars	x	-	x	-	x	xx
Cylinder protection bars with built-in side-stand	-	x	-	x	-	xx
Super toolkit	x	x	x	-	x	xx$_3$
First-aid kit	x	x	x	x	x	xx

x = available as special equipment ex factory

xx = available as retrofittable special equipment

- = not available

o = standard

. = optional at no extra charge

$_1$ = GS windshield from 1988

$_2$ = only in conjunction with luggage rack

$_3$ = supplementary toolkit

Special Equipment (ex factory)

	R 100 GS	R 100 RS	R 100 RT	Special equipment, retrofittable
Hazard warning flashers	-	x	x	xx
2 folding headlights	-	-	x	xx
Quartz clock	x	o	o	xx
Rev counter	x	o	o	xx
Socket	x	x	x	xx
Heatable handles	x	x	x	xx
Self-levelling	-	x	x	xx
Kickstarter	x	-	-	xx
Rear splashguard	-	x	x	xx
Luggage rack	o	x	x	xx
Topcase, small[1]	-	x	x	xx
Set of integral cases with supports	-	x	o	xx
Set of touring cases with supports	x	-	-	xx
High seat (880 mm/34.6")	x	-	.	xx
Low seat	-	x	x	xx
Cylinder protection bars	-	x	x	xx
Cylinder protection bars with built-in side-stand	x	-	-	xx
Super toolkit	-	x	x	xx[2]
First-aid kit	x	x	x	xx

x = available as special equipment ex factory

xx = available as retrofittable special equipment

- = not available

o = standard

. = optional at no extra charge

1 = only in conjunction with luggage rack

2 = supplementary toolkit

THE 4-CYLINDER K 100 SERIES

New look for the K 100 - even greater comfort with the K 100 LT

Ever since they were launched in 1983 the BMW K 100 models have been best-sellers in the motorcycle market. Within four years, more than 60,000 units of this 4-cylinder have been produced in Berlin-Spandau. Now, BMW's top models are entering their fifth model year with the same engine output and suspension. However, the 1988 K 100 comes in a "new look" and the K 100 LT luxury tourer offers an even wider range of features.

K 100: higher handlebar and lower seat

The K 100 has always been a "grassroots" motorcycle - the down-to-earth no-fairing model clearly standing out from the sports fairing K 100 RS and the K 100 RT and LT with their large touring fairing.

After sales of fairing models had constantly increased in the past in the big bike segment above 750 cc (not only with BMW), purchasers have shown a growing interest recently in "basic" machines without a fairing. The genuine enthusiast riding a chopper, cruiser or muscle bike wants to feel the wind racing past and see the technical features his motorcycle has to offer.

BMW takes this trend into account with the new K 100, which nevertheless remains a really unique motorcycle of its own. The facelift comprises various changes: The radiator cover (kidney) and the headlight cover have both been dropped, the headlight itself now being chrome-plated just like the exhaust cover and the front brake line sleeves. The engine cover, wheels and footrest plates are painted black, the edges and fins are polished. Finished in Marrakech-red, the K 100 now features the 21-litre fuel tank of the K 75 with integrated knee-pads and side covers. It also comes as standard with a high handlebar and, last but not least, it provides ideal conditions for somewhat smaller riders (just like the new K 75): The brand-new black seat is available alternatively with a height of 760 or 800 mm (29.9 or 31.5"), as opposed to the old seat which measured 810 mm

(31.9") in height. Another feature is that the new seat is no longer mounted on hinges, but is rather fitted on clips.

Making the K 100 appear more slender and stretched, this new styling is sure to appeal to the connoisseur of classic motorcycles. Handling of the new K 100, which will presumably be available from January 1988, has been further improved by the lower seat.

K 100 RS: the sports model

The K 100 RS sports model is already regarded as one of the most successful motorcycles of the 80's. In 1987, for example, the readers of MOTORRAD, Europe's largest motorcycle journal, elected the K 100 RS the Motorcycle of the Year for the fourth time running, creating an unprecedented example in the 11 years of this readers' survey.

As of the 1987 model year riders who prefer an even sportier style can also have the K 100 RS with the sports-tuned suspension of the K 75 S, spring travel reduced to 135 mm (5.31") at the front, a fork stabilizer and a different spring strut at the rear. Also as an option, the K 100 RS is available with a solo seat in black or red.

The cockpit of the K 100 RS with its more slender handlebar for sporty riding at high speeds and over long distances is designed for a slightly forward-leaning posture on the part of the rider. The multi-piece sports fairing optimized in the wind tunnel is fastened by a multi-arm support to the middle of the handlebar and rests on vibration dampers. It also incorporates rear-view mirror housings serving to protect the rider's hands, integral direction indicators and a knee-guard made of integral foam plastic on the rear edges of the fairing. An adjustable spoiler in front of the upper edge of the fairing provides a defined flow of air over the rider's helmet.

The exemplary fairing of the K 100 RS offers not only good protection from wind and weather but also increases the top speed by about 10 km/h (6 mph) over the K 100 thanks to its excellent streamlining. Even more importantly, it helps to minimize lift on the front axle, thus providing optimum stability at high speeds and, ultimately, even greater riding safety. The paintwork colours for the 1988 model year are brilliant-silver, red-metallic and avus-black. An engine spoiler is now also avialable as an option.

K 100 RT: the long-distance tourer

The multi-piece touring fairing of the K 100 RT is fastened by a multi-arm support to the handlebar centrepiece and rests on vibration dampers. With the detachable windshield plus spoiler extended 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. Integral cases also designed in the wind tunnel are featured as standard on this model, with one key for the ignition, handlebar, fuel tank, seat and integral case locks. The K 100 RT comes in red-metallic, Bermuda-blue (with grey seat) and stratos-grey.

K 100 LT: the new luxury tourer with all refinements

With its special Bahama-bronzite-metallic paintwork with accentuating piping, the new K 100 LT clearly stands out as a refined luxury version of the K 100 RT. The case covers and the cover of the topcase fitted as standard are also finished in Bahama-bronzite-metallic. The high-comfort beige seat as well as the engine block and footrests painted black with polished fins provide a discreet but sophisticated colour contrast.

The wide range of standard equipment featured by the K 100 LT includes a radio installation kit with loudspeakers, aerial and suppressor, soft-rubber handlebar grips, automatic rear axle self-levelling, hazard warning flashers and an additional socket in the handlebar impact boss. Since mid-1987 a special Clarion cassette radio has been available for this model with a specially designed control panel on the left-hand handlebar.

A special range of options available specifically for the K 100 LT offers even more riding comfort and "luxury": Instead of the conventional windshield (as on the K 100 RT), this model is also available with a higher windshield (560 mm/22") 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. Last but certainly not least, a larger topcase accommodating, for example, two helmets and also serving as a backrest for the passenger is available instead of the small topcase fitted as standard.

THE 3-CYLINDER K 75 SERIES:
Entering the third year with three models

Two years after the premiere of the K 75, BMW's 3-cylinder range comes in 3 different versions in the 1988 model year to meet all demands and individual requirements. All these models are nevertheless identical in their basic engine features.

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

In terms of both price and styling, the "basic" K 75 without fairing is an attractive model for achievers moving into the BMW K Series. With its black paintwork featuring dual silver piping, the new extra-low black seat fitted on with clips and measuring either 760 or 800 mm (29.9 or 31.5") in height (as on the new K 100), the black-painted engine block with polished fins and uncovered coils with blue lead plugs, it offers an attracitve contrast to the polished fork tubes and stabilizer as well as the chrome-plated headlight housing, handlebar and exhaust cover. The new K 75 will presumably be available from February 1988.

K 75 C: the all-round motorcycle with cockpit fairing or windshield

As before, purchasers opting for the K 75 C all-round motorcycle have the choice between the small but very efficient cockpit fairing with integral direction indicators fitted to the handlebar and the high, transparent windshield optimized in BMW's wind tunnel and particularly suitable for touring. The K 75 C is now available in Avus-black or henna-red.

K 75 S: sporty suspension and looks

The sporty 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) faster than the top speed of the K 75 and K 75 C, both of which are capable of about 200 km (124 mph).

The engine spoiler now 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 (ie, from September 1987) the short, sporty handlebar is 3 cm wider, further improving the handling of the K 75 S.

Not only the styling of this motorcycle has a sportier touch. The K 75 S also has a sportier and firmer suspension achieved by reducing spring travel on the front wheel from 185 to 135 mm (7.28 - 5.31") and using a new monoshock (rear spring strut). As an option the K 75 S is nevertheless also available with the more comfort-oriented suspension of the K 75 and K 75 C.

K 75 S available in three colour versions

Following the overwhelming success of the K 100 RS special series, BMW now offers customers looking for a really individual machine with particularly sophisticated styling three special versions of the K 75 S:

These three colours are Marrakech-red or brilliant-silver with a black seat, as well as onyx-black with a beige seat. All three models come as standard with engine spoiler, the wheels, engine block and footrests are painted black and the fins are polished. On the brilliant-silver and Marrakech-red models the drive train is also painted black.

FEATURES OF THE K 75 SERIES

With the same high standard as the K 100

The K 75 models have the same wide range of features as the K 100. They have the same intelligently designed cockpit instruments including direction indicator cancellation as a function of time (10 seconds) and travel (210 metres/689 ft). Another identical feature is the large and clearly arranged instrument cluster with electronic analog-display speedometer and rev counter as well as a gear display. Only the liquid-crystal display digital clock comes as an extra for the K 75 and K 75 C. Incidentally, the fuel tank reserve indicator for all K-models was already modified in 1985: One warning light (instead of two) has proved to be more suitable for the fuel reserve of 5 litres (1.1 Imp gals).

It goes without saying that the small K-model offers all typical BMW features such as one key for the ignition, handlebar, fuel tank cap and seat. And beneath the comfortable seat you will find the same ample space for the exemplary toolkit with breakdown repair set. Additional stowage space of 9 litres (0.3 cu ft) is available in the tail section, keeping all valuable and essential items under lock and key. It hardly needs emphasizing that all K 75 models feature an H 4 halogen headlight. With the K 75 and K 75 C the headlight is of classic round design, while on the K 75 S a rectangular reflector fits harmoniously into the fairing.

Like the K 100, the K 75 is not designed to save features and riding comfort, but rather to save weight. As a result, consistent and lightweight engineering without any compromises in stability or reliability and the use of top-quality light alloy for the engine block and gearbox housing, the monolever, wheels and tank make the K 75 a really light motorcycle with handling to match: With full tank and in road trim, the K 75 C weighs a mere 228 kg (503 lb), the K 75 S 235 kg (518 lb).

All models in the K 75 Series possess outstanding all-round riding features. They offer excellent handling in bends, maintain a high standard of riding stability and ensure superior safety at high speeds. Accordingly, they are well-suited not only for a sporty style of riding but also for leisure tours and comfortable long-distance journeys.

Sheer riding pleasure - also with a passenger

Like a real BMW, the K 75 is naturally the ideal motorcycle for sheer riding pleasure - also with a passenger sitting behind you. Indeed, the passenger in this case has a comfortable, top-quality seat with grab handles integrated in the rear section and well-designed footrests for relaxed and fatigue-free riding.

With a maximum permissible weight of 450 kg (992 lb), the K 75 can carry a substantial load of more than 200 kg (441 lb), thus enabling the rider to take along a lot of luggage on long tours. A wide range of cases and panniers developed in the wind tunnel is available for this purpose: The integral cases, tank bag and luggage rack. Needless to say, BMW's wide range of accessories and special equipment is also available for the K 75 Series.

ENGINE

K 75: BMW's first 3-cylinder motorcycle

In autumn 1985 BMW launched an engine with 3 cylinders. This was the first power unit of its kind in the history of the Company, all previous motorcycle engines having one, two or 4 cylinders. At first sight the decision to choose this kind of engine would appear very unusual, considering that 3 cylinders have always been somewhat exotic in engine design. BMW's progress in engine design in more than 60 years would indeed appear to be based on a different concept.

In reality, however, the choice of a 3-cylinder is quite typical of BMW's development strategy which started in 1923 with the R 32 designed and built by Max Friz. Since then the golden rule of every BMW designer has been to achieve an optimum result with straightforward technical features and without unnecessary mechanical gimmicks. Obviously, this rule also applies to the K 75.

BMW's flat-twin models have represented this logical approach for more than 60 years. And this concept is expressed even more clearly and consistently by the K Series: Even before the very first drawing of this engine, BMW had decided to build units with 3 and 4 cylinders in order to provide tailor-made power for different requirements, in each case not doing more than was required to meet the rider's specific objectives and demands.

Even better handling than the K 100

The 3-cylinder concept of the K 75 also represents a clearly different identity and does not attempt to be simply a downgraded version of the K 100. Indeed, this emancipation and clear distinction from the K 75's bigger sister is not limited to the 3-cylinder enginge alone. Rather, the

specific character of the K 75 also results from the reduction in weight by approximately 11 kg (24 lb). This gives the K 75 even better handling, making it an interesting alternative to BMW's sporty 4-cylinder touring machines. The result, therefore, is a blend of flat-twin handling and modern engine technology, providing a motorcycle which reaffirms its Alpine origin in every bend.

Featuring the advantages of the Compact Drive System

The K 75 features the Compact Drive System conceived by BMW engineer Josef Fritzenwenger, patented worldwide and introduced in 1983 in the K 100. The horizontally arranged liquid-cooled inline engine (in this case with 3 cylinders, each of which has 250 cc), the gearbox and the monolever swinging arm accommodating the drive shaft all form one functional unit as the power train and a load-bearing component of the suspension. The advantages offered by this concept go far beyond a very considerable reduction of weight:

- The low centre of gravity guarantees excellent handling and easy control.
- Arranged in the direction of travel, the crankshaft provides direct power to the drive shaft without any loss of power otherwise caused by joints, pivots, etc.
- The horizontal arrangement of the compact engine simplifies service and maintenance, providing easy and direct access to all essential parts and components. Without having to remove the fuel tank or engine components, the mechanic has quick access to the valves, spark plugs and injection nozzles on the left-hand side. Indeed, he can even replace all the crankshaft bearings, pistons and connecting rods on the right-hand side without taking the engine out of the frame.

Over and above these additional benefits of the Compact Drive System already offered by the K 100, the K 75 provides the additional advantage of

greater economy: Incorporating a large number of standard parts, the production of a second model series is more economical and the supply of spare parts remains simple despite the larger model range.

Superior torque at low engine speeds

The engine of the K 75 is not only based on the same design principle but also offers typical BMW running features. Because in this case extreme performance is not the name of the game. Developing 75 bhp (55 kW), the 3-cylinder remains clearly behind the 90-bhp (66-kW) 4-cylinder. For this 750-cc machine does not seek to prove that it is just as fast as a 1000-cc motorcycle.

The strongest point of the new 3-cylinder, therefore, is the way it develops its power. BMW's first and foremost design objective (based on personal experience) was to build a machine with strong pulling force through ample torque even at very low engine speeds. The result is a motorcycle ideal for fast riding in relaxed style and without hectic gear-shifts. This concept has inevitably led to another result also of importance in BMW's opinion: Giving up a bit of peak power provides much greater reliability and a longer running life. The objective, therefore, is to have a motorcycle for 100,000 km without the need of an overhaul.

No simple task

Practical development of the 3-cylinder engine started back in 1982. And during this time much more had to be done than just reducing the length of the light-alloy engine block by one cylinder unit.

Four minus one is three - this can be a lot more than simple arithmetics for beginners. Particularly when three troublesome factors have a direct influence on the result. Because three things were clear from the very beginning: First, the K 75 was to be a unique motorcycle; second, the objective was to use as many standard parts as possible; third, some room was to be left over for technical progress.

Half of it a new motorcycle

How much work goes into reaching such objectives is shown by the simple fact that one half of the K 75 is a completely new motorcycle while the other half has been inherited, as it were, from the K 100. And indeed, the 3-cylinder has far more technical distinctions than one might think at first sight.

These distinctions start right beneath the skin of the engine. The fact that the engine is one cylinder shorter is most striking on the valve side where the three intake manifolds make it easier to identify the engine. At 67 mm (2.64") and 70 mm (2.76"), respectively, the bore and stroke are exactly the same as on the K 100, as is the basic design of the cylinder head with two overhead camshafts and the valves inclined at an angle of 19^{o} relative to the cylinder axis. Valve timing and the valves themselves are also identical, the diameter on the inlet side being 34 mm (1.43"), on the outlet side 30 mm (1.18") . But that is just about the end of the road: The 3-cylinder, two years younger than the 1000-cc machine, already differs in its combustion chamber profile. A more hemispherical shape allows a higher compression ratio of 11.0:1 instead of 10.2:1. And the new combustion chamber also has new pistons, while the connecting rods have remained the same.

Output per litre up by 10 %

The cylinder head required some refinement to reach the objective of providing a higher output per litre. As the name happens to indicate, the K 75 develops 75 bhp (55 kW). This means about 100 bhp/litre, whilst the K 100 develops "only" 90 bhp (66 kW) and, accordingly, has an output per litre of 90 bhp. This increase in muscle also meant an increase in engine speed: The maximum output of the K 75 comes at 8500 rpm, that of the K 100 at 8000 rpm. However, the torque curve so essential in practice explains the characteristics of the K 75 power unit better than maximum torque: 83 % of the maximum torque is available at just 2500 rpm. Which means that this power is available in 5th gear at a speed of only about 60 km/h.

An equalizing shaft for extra smoothness

From technical data let's return to technical details. The shorter crankcase of the K 75 houses a shorter crankshaft with four main bearings and three connecting rod bearings. Like on the K 100, the last crankweb is designed as a gear, while the other five carry balance weights of various size on account of the special mass compensation required on a straight-three power unit.

Beneath the crankshaft the 3 and 4-cylinder are basically the same. Power is transmitted to the drive shaft at a ratio of 1:1 by a split gear-wheel, the two halves of which are counter-tensioned by a U-spring in order to compensate gear flank tolerance and minimize running noise. The front end of the drive shaft drives the gear-type oil pump and the water pump. With two forged-on balance weights and rotating in the opposite direction to the crankshaft, the drive shaft compensates the first-order free mass momentum and thus acts as an equalizing shaft for maximum running smoothness.

The crankshaft drives the camshaft via a single-piece bush roller chain and also drives the ignition pulse generator.

Computerized control to maintain the same high standard

The engines in the K Series are also closely related in terms of their ancillary units. In both cases the ignition is contact-free and controlled by computer. The only special feature of the K 75 in this context is the asymmetric arrangement of the two induction points on the rotor (at 120^{o} and 240^{o} crankshaft angle). The ignition of the 3-cylinder therefore only requires two control pulses for cylinders one and three, since the control pulse of the second cylinder is determined directly in the computer on the basis of this data. The fully electronic ignition of the K 75 also acts as a speed governor by retarding the advance ignition from 8777 rpm. This effect is enhanced from 8905 rpm by switching off the fuel injection.

The high voltage required for the ignition is provided by three coils. Pre-spark leads are incorporated in the ignition lines to improve operating reliability.

The Bosch LE-Jetronic electronic fuel injection with air volume metering by means of a butterfly is basically the same as on the BMW K 100. The three injection jets inject fuel simultaneously once per crankshaft rotation. The injection volume is determined by the digital control unit in accordance with the engine output curve, depending on engine speed, the position of the air volume meter and the injection period. The coasting cutoff operates at engine speeds down to 2000 rpm, a starter repeat lock being activated from a speed of 711 rpm.

The rest of the electrical system is the same as on the BMW K 100. The high-speed alternator with a transmission ratio of 1:1.5 generates no less than 460 watts and is therefore very powerful for a motorcycle. The torque generated by the starter (with an output of 0.7 kW) is increased 27 times by a four-stage backgear before it reaches the crankshaft. This allows the use of a very compact starter and a relatively small and light starter battery (12 volts, 25 Ah).

The streamlined drive system

At first sight the power transmission of the K 75 looks exactly the same as on the K 100. And this will be confirmed if you count the number of teeth in the gearbox. All five gears have the same transmission ratio - indeed a significant compliment to the 3-cylinder which, despite its smaller displacement, has power and performance characteristics similar to the 4-cylinder. BMW's engineers were therefore only required to modify the final drive by choosing a shorter transmission ratio.

However, since the 3-cylinder presents a completely different situation as regards the balance of masses, it was not sufficient just to compensate the free mass momentum by counterweights on the drive shaft. In addition, the power transmission of the K 75 must tally with the larger firing gaps and the lesser uniformity of the 3-cylinder. There is therefore a rigid connection between the drive shaft and clutch without dampers in between. This made is possible to use a somewhat lighter clutch taken over in modified form from the R 80.

It goes without saying that the three cylinders also required a redesigned exhaust. The somewhat lighter 3-in-1 exhaust system is made of rustproof stainless steel, as on the K 100. Incidentally, the shape of the muffler provides a discreet indication of the number of cylinders: While the K 100 has a square muffler, the muffler of the K 75 has three corners - what else? The throaty and powerful sound of the exhaust also bears witness to the 3-cylinder engine.

RUNNING GEAR

Less weight, better handling

In developing the frame of the K 75 BMW's engineers initially sought to shorten the wheelbase, in this way giving the K 75 the particularly good handling it was designed for from the beginning. Practical tests showed, however, that this was not even necessary. Even with the same wheelbase as the K 100, the K 75 achieves even better handling through the reduction in weight by 11 kg (24 lb) and the smaller share of weight on the front wheel. The tubular space frame open at the bottom and weighing 11.3 kg (25 lb) has remained unchanged apart from one very minor modification: The two front frame supports are angled a bit further to the rear on account of the shorter engine housing which, as usual, serves as a load-bearing component.

The cast light-alloy monolever housing the drive shaft with torsion vibration dampers is one of the building-brick components. Some minor modifications are then to be found once again near the drive unit. The K 75 and K 75 C, for example, have a drum brake with 200 mm (7.87") diameter integrated in the light-alloy wheel. The somewhat faster K 75 S features a disc brake at the rear, like the K 100.

A fork bridge acting as a stabilizer

A new feature currently exclusive to BMW's 3-cylinder models is the telescopic fork which differs from the otherwise identical fork of the K 100 in one important respect: As on the R 80, the two tubes are connected by a very strong fork bridge. Like the K 100, the K 75 has a large dual disc brake at the front with a diameter of 285 mm (11.02").

With a tube diameter of 41.4 mm (1.63"), the telescopic fork is one of the strongest of its kind. And the ample spring travel of 185 mm (7.28") for a road machine provides typical BMW riding comfort further enhanced by 110 mm (4.33") spring travel at the rear. The K 75 S, on the other hand, has a sportier and firmer suspension achieved by reducing front wheel travel to 135 mm (5.31") and using a new monoshock (spring strut) at the rear. As an option, however, the K 75 S is also available with the suspension of the K 75 C.

While seeking to optimize handling, BMW has not indulged in any experiments with small wheels on the K 75. 18" rim diameter therefore remains the standard at the front to ensure stable riding characteristics. However, both the front and the rear wheel provide practice-oriented progress with modern tubeless low-profile tyres. And the rear wheel has special dimensions to provide optimum running characteristics: The K 75 and K 75 C have an 18" rim at the rear with a slightly narrower tyre, the K 75 S has the wider 17" rear wheel of the K 100.

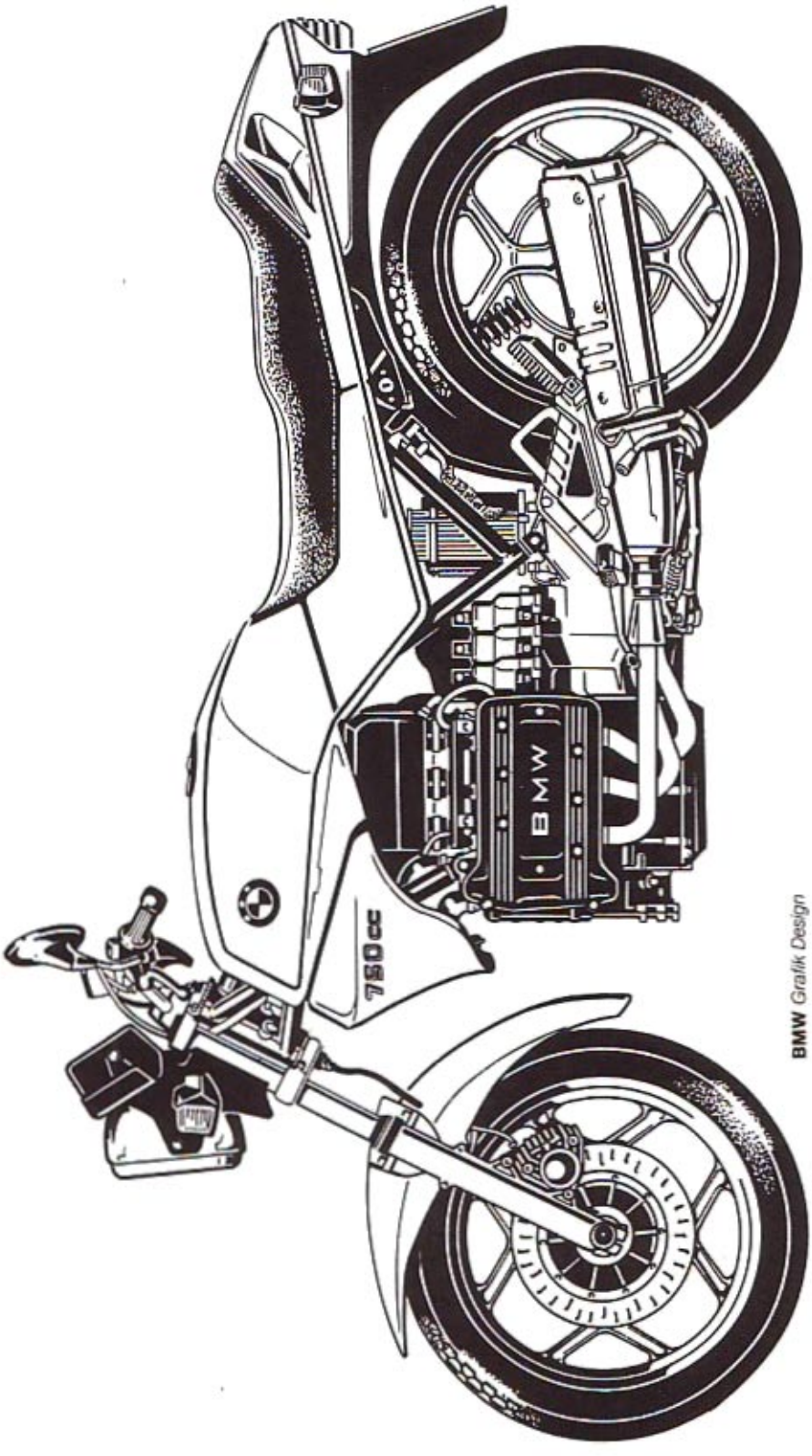
	SPECIFICATIONS BMW MOTORCYCLES		K 75 and K 75 C	K 75 S		
Engine	Cubic capacity	cc	740	740		
	Bore/stroke	mm	67/70	67/70		
	Max output	kW/bhp	55/75	55/75		
	at	rpm	8500	8500		
	Max torque	Nm	68	68		
	at	rpm	6750	6750		
	Design		inline	inline		
	No of cylinders		3	3		
	Compression ratio/fuel grade (also unleaded)		11.0 S	11.0 S		
	Valve control		DOHC	DOHC		
	Valves per cylinder		2	2		
	Intake/outlet dia	mm	34/30	34/30		
	Fuel supply		LE-Jetronic with coasting cut-off			
Electrical system	Ignition		VZ-51 L digital ignition			
	Alternator	W	460	460		
	Battery	V/Ah	12/25	12/25		
	Headlight	W	H 4 55/60	H 4 55/60		
	Starter	kW	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		
		II	2.96/3.20	2.96/3.20		
		III	2.30/3.20	2.30/3.20		
		IV	1.88/3.20	1.88/3.20		
		V	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 frame, engine serving as loadbearing component			
	Spring travel front/rear	mm	185/110	135/110		
	Wheel castor	mm	101	101		
	Wheelbase	mm	1516	1516		
	Brakes (asbestos-free)	Front:	dual-disc brake, dia 285 mm			
		Rear:	drum brake, dia 200 mm	single-disc brake, dia 285 mm		
	Wheels		Light-alloy wheels	Light-alloy wheels		
	front		2.50 – 18 MTH 2	2.50 – 18 MTH 2		
	rear		2.75 – 18 MTH 2	2.75 – 17 MTH 2		
	Tyres front		100/90/H 18	100/90/V 18		
	rear		120/90/H 18 tubeless	130/90/V 17 tubeless		
Dimensions and weights	Length, overall	mm	2220	2220		
	Width with mirrors	mm	900	810		
	Handlebar width without mirrors	mm	710	650		
	Seat height	mm	760*	810		
	Weight, unladen with full tank	kg	228	235		
	Max permissible weight	kg	450	450		
	Fuel tank	ltr	21	21		
Performance	Fuel consumption					
	90 km/h (56 mph)	ltr	4.5	4.3		
	110 km/h (68 mph)	ltr	5.2	5.0		
	Acceleration					
	0–100 km/h (62 mph)	sec	4.6	4.6		
	standing-start km	sec	25.6	25.2		
	Top speed	km/h	200	210		
Model features	Fairing		K 75 C only: glass-fibre-reinforced plastic cockpit fairing fitted to handlebar or high windshield	Glass-fibre-reinforced plastic sports fairing fitted to frame, glass-fibre-reinforced engine spoiler		
	Standard features		Repair kit, toolkit	Repair kit, toolkit, digital clock		

* K 75 C: 810

	SPECIFICATIONS BMW MOTORCYCLES		K 100	K 100 RS	K 100 RT and K 100 LT	
Engine	Cubic capacity	cc	987	987	987	
	Bore/stroke	mm	67/70	67/70	67/70	
	Max output	kW/bhp	66/90	66/90	66/90	
	at	rpm	8000	8000	8000	
	Max torque	Nm	86	86	86	
	at	rpm	6000	6000	6000	
	Design		inline	inline	inline	
	No of cylinders		4	4	4	
	Compression ratio/fuel grade (also unleaded)		10.2 N	10.2 N	10.2 N	
	Valve control		DOHC	DOHC	DOHC	
	Valves per cylinder		2	2	2	
	Intake/outlet dia	mm	34/28	34/28	34/28	
	Fuel supply		LE-Jetronic	LE-Jetronic	LE-Jetronic	
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	4.50/2.91	4.50/2.81	4.50/2.91	
		II	2.96/2.91	2.96/2.81	2.96/2.91	
		III	2.30/2.91	2.30/2.81	2.30/2.91	
		IV	1.88/2.91	1.88/2.81	1.88/2.91	
		V	1.67/2.91	1.67/2.81	1.67/2.91	
Suspension	Rear-wheel drive		Encapsulated drive shaft with universal joint and integrated torsion damper			
	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	185/110	
	Wheel castor	mm	101	101	101	
	Wheelbase	mm	1516	1516	1516	
	Brakes	Front:	dual-disc fixed-calliper brake, dia 285 mm			
		Rear:	integrated fixed-calliper 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 V 18	100/90 V 18	100/90 V 18	
	rear		130/90 V 17 tubeless	130/90 V 17 tubeless	130/90 V 17 tubeless	
Dimensions and weights	Length, overall	mm	2220	2220	2220	
	Width with mirrors	mm	960	800	916	
	Handlebar width	mm	755	690	770	
	Seat height	mm	760	810	810	
	Weight, unladen with full tank	kg	240	253	263	
	Max permissible weight	kg	480	480	480	
	Fuel tank	ltr	21	22	22	
Performance	Fuel consumption					
	90 km/h (56 mph)	ltr	5.0	4.3	4.4	
	110 km/h (68 mph)	ltr	5.7	5.1	5.4	
	Acceleration					
	0–100 km/h (62 mph)	sec	4.0	4.0	4.1	
	standing-start km	sec	23.6	23.5	24.1	
	Top speed	km/h	215	220	215	
Model features	Fairing			Multi-piece aero-dynamically opti-mized sports fairing (glass-fibre-reinforced plastic)	Multi-piece aero-dynamically opti-mized touring fairing (glass-fibre-reinforced plastic)	
	Standard features		Repair kit, toolkit	Repair kit, toolkit, digital clock	Repair kit, toolkit, digital clock, high handlebar, integral cases with support and standard key Additional K 100 LT features: hazard warning flashers, radio installation kit, radio suppression, 30 Ah battery, 2 sockets, soft rubber handlebars, high-comfort seat, self-levelling, luggage rack, topcase	

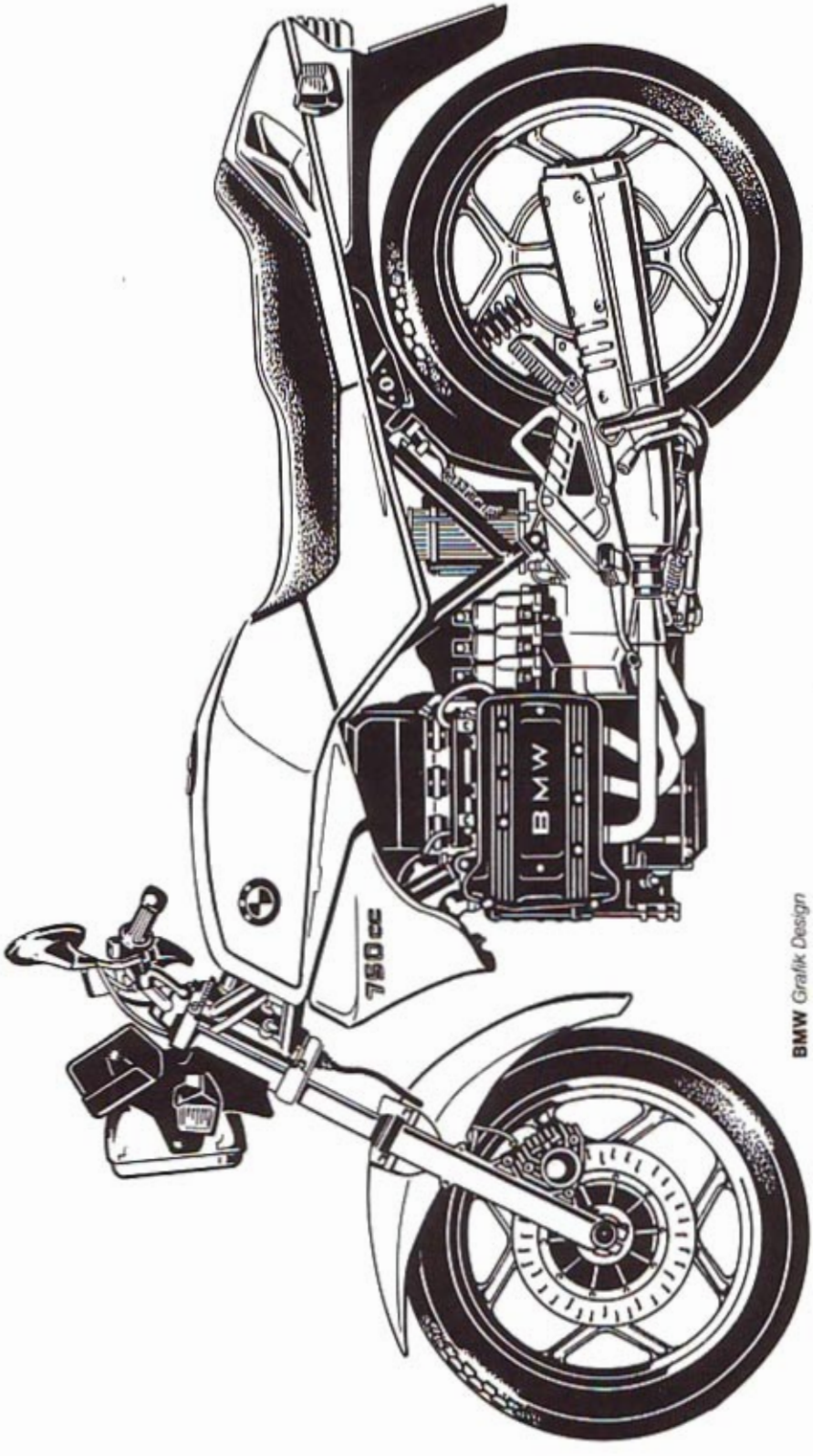
BMW K 75

R 86/1



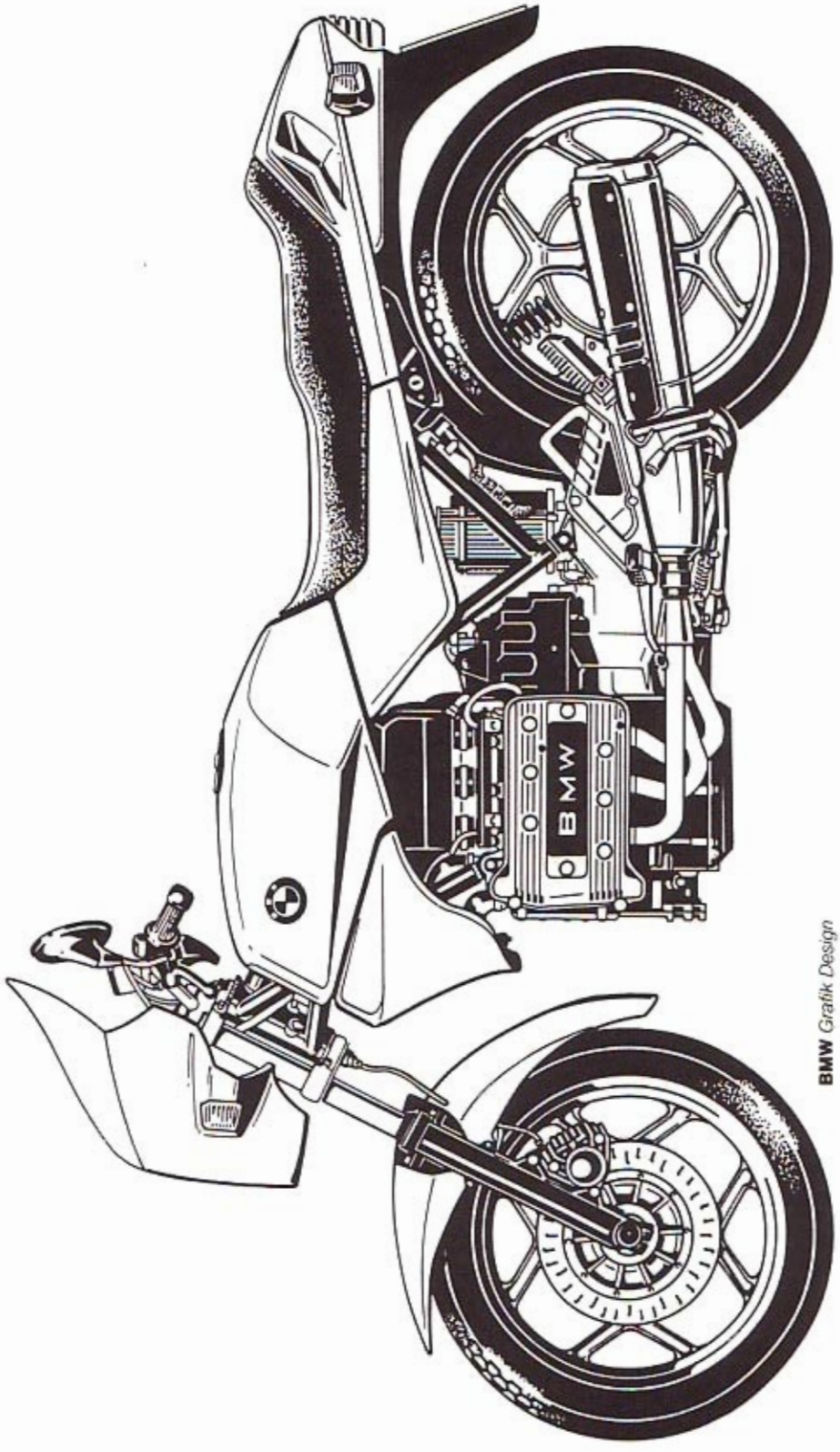
BMW *Grafik Design*

BMW K 75	R 86/1



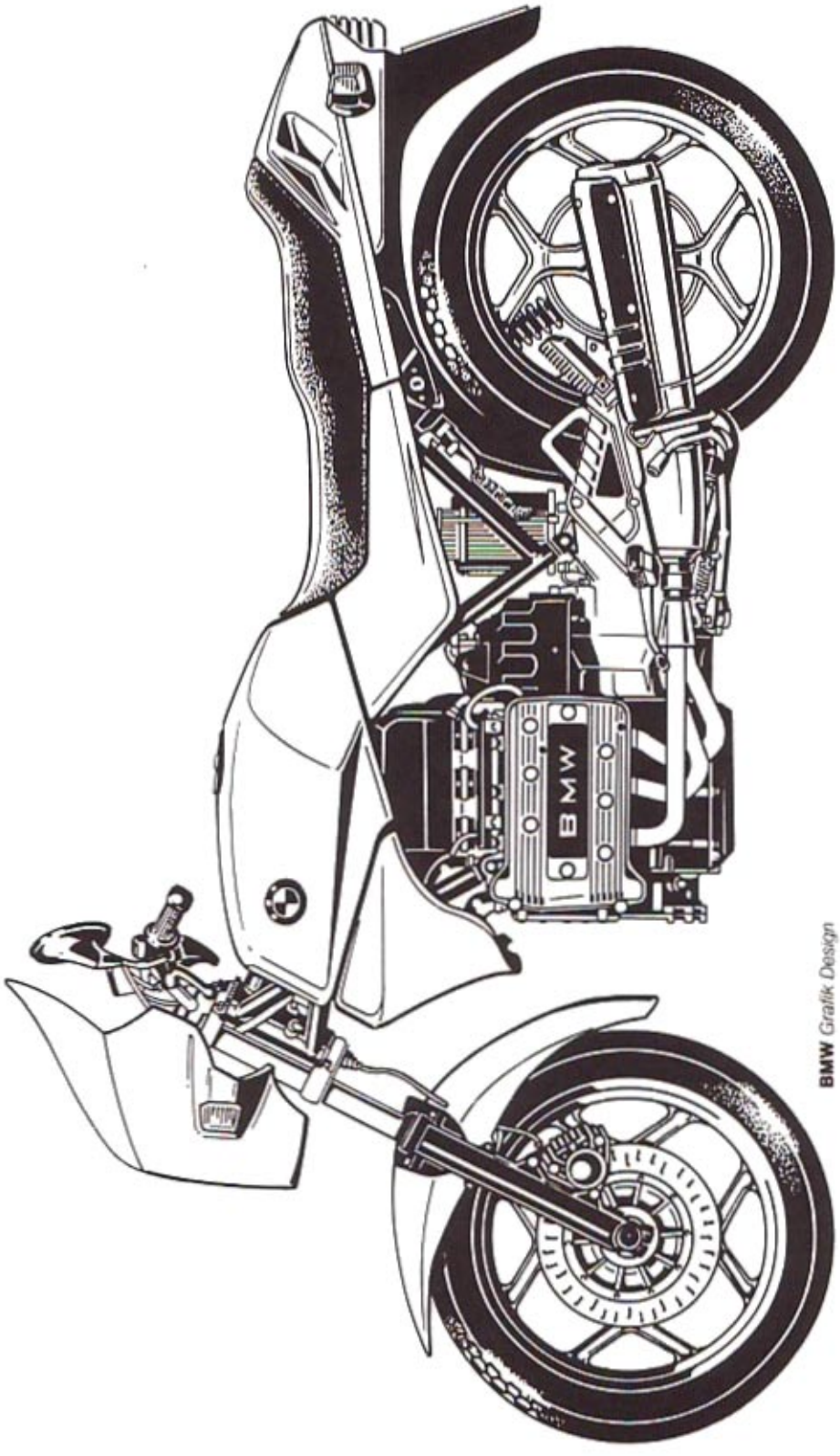
BMW *Grafik Design*

BMW K 75 C	R 86/2



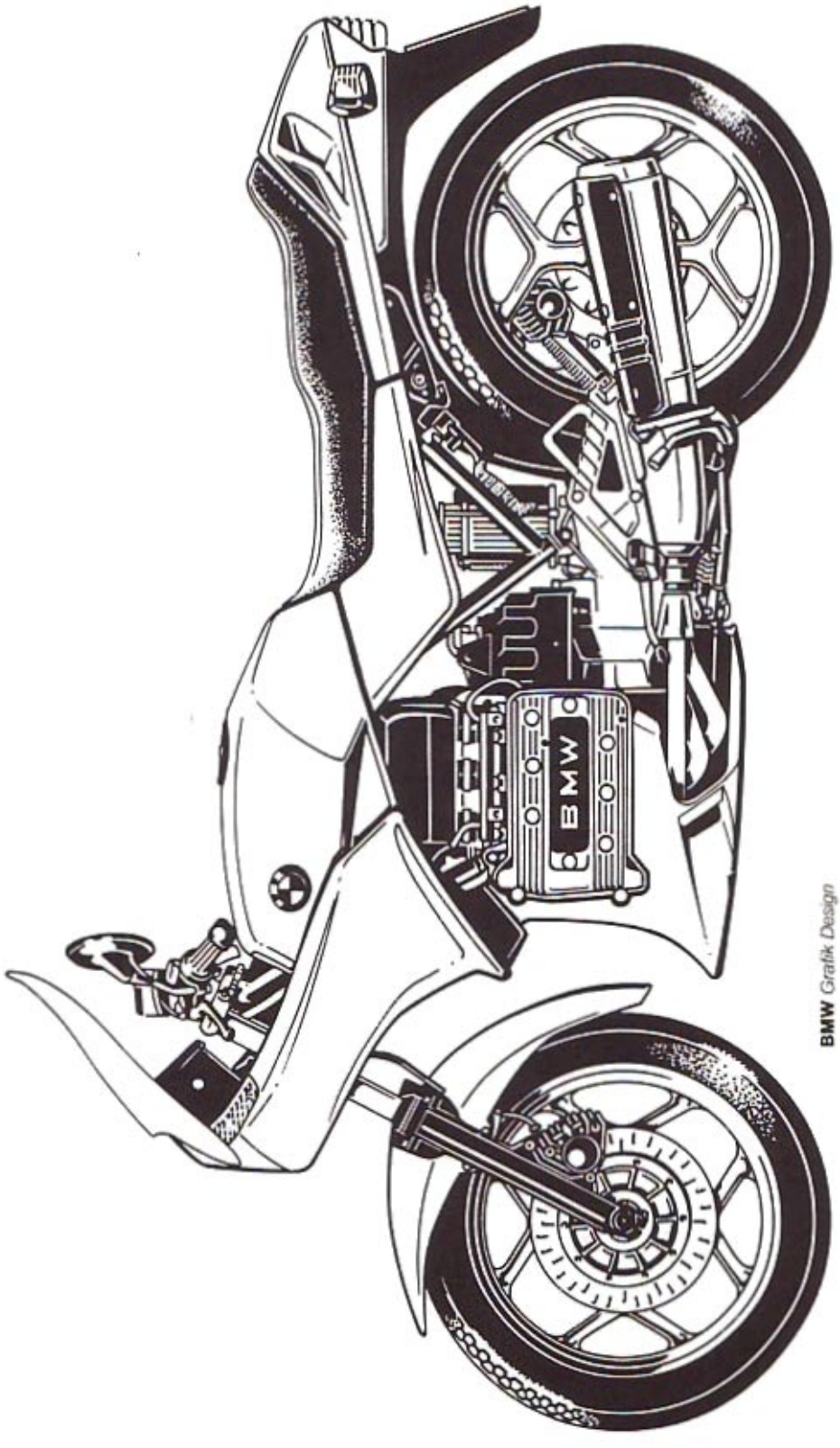
BMW *Grafik Design*

BMW K 75 C	R 86/2



BMW *Grafik Design*

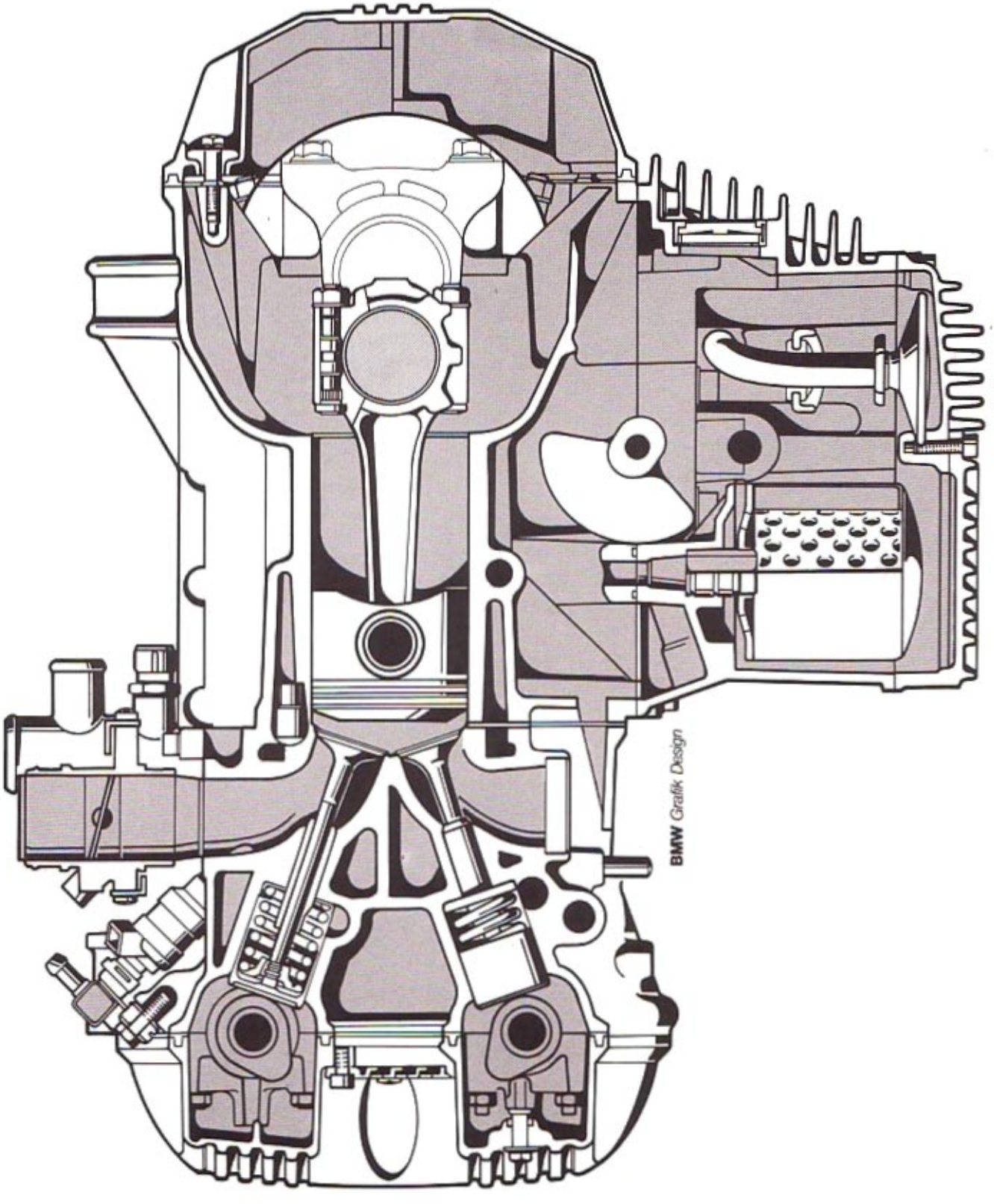
BMW K 75 S	R 86/4



BMW *Grafik Design*

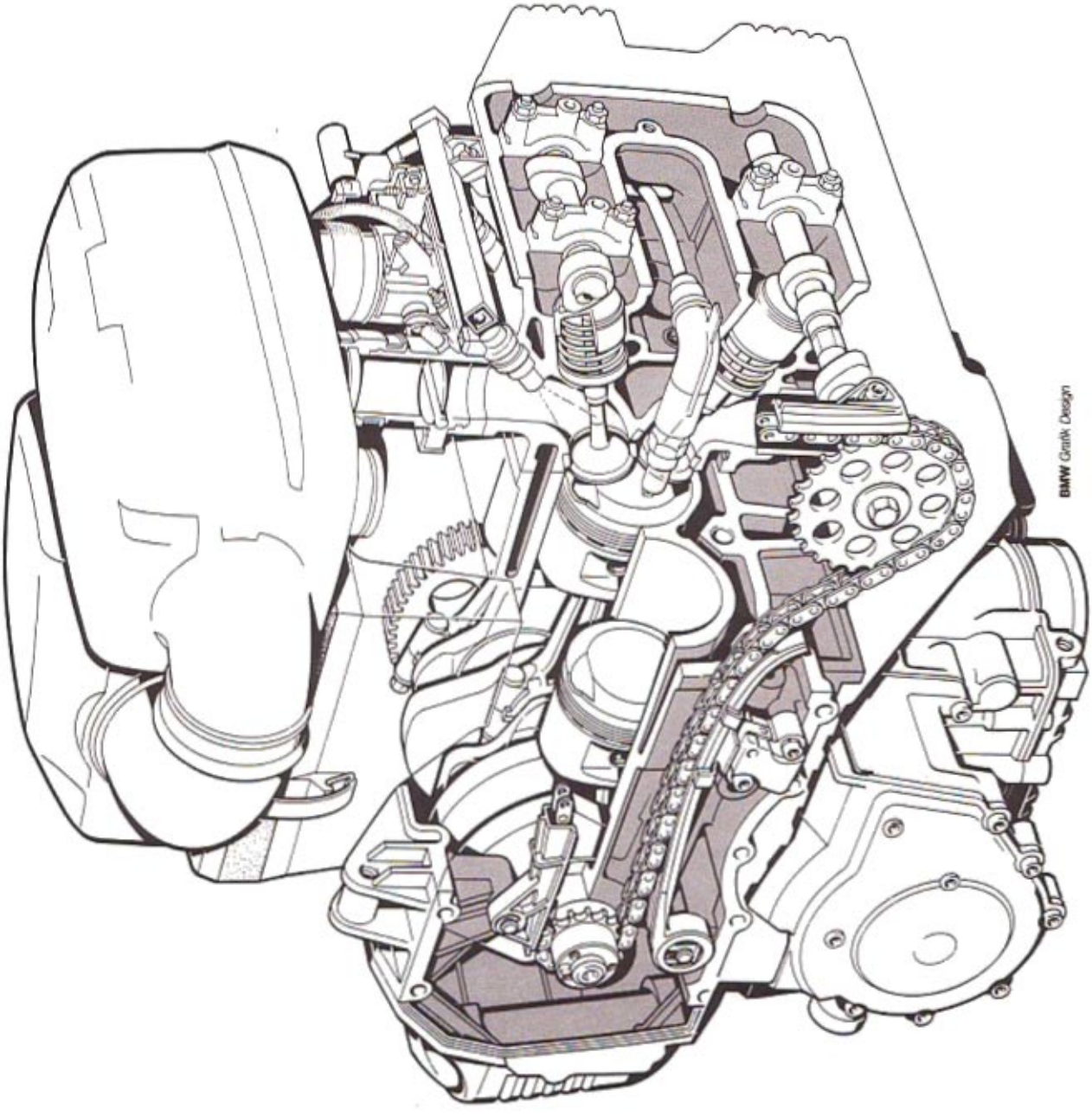
BMW K 75
Motorquerschnitt (von vorn)

R 85/5



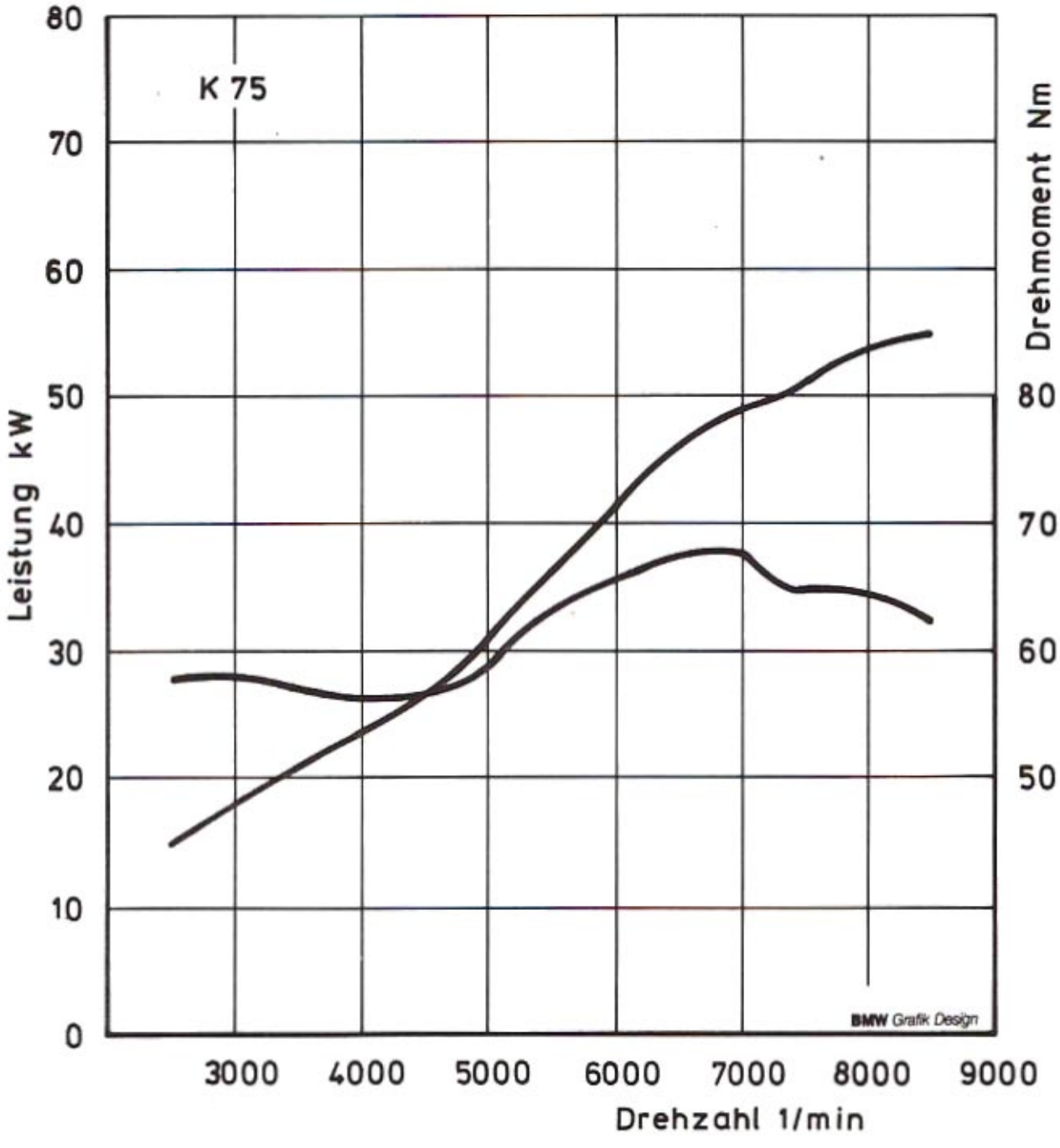
BMW K 75
Motorquerschnitt (von hinten)

R 85/6



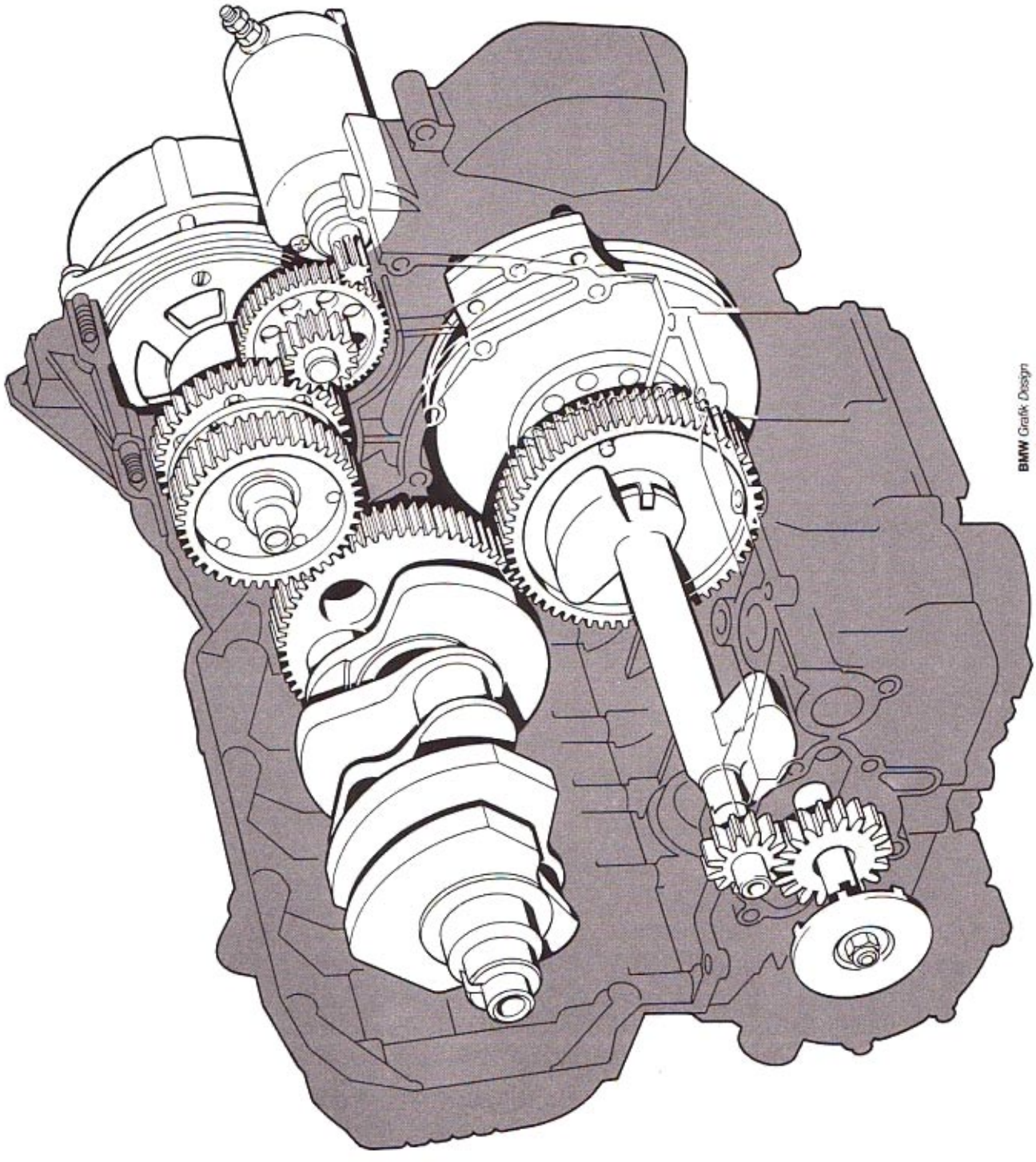
BMW K 75
Leistungs- und Drehmomentdiagramm

R 85/7



BMW K 75
Motor (Kurbelwelle, Abtriebswelle, Anlasser und Lichtmaschine)

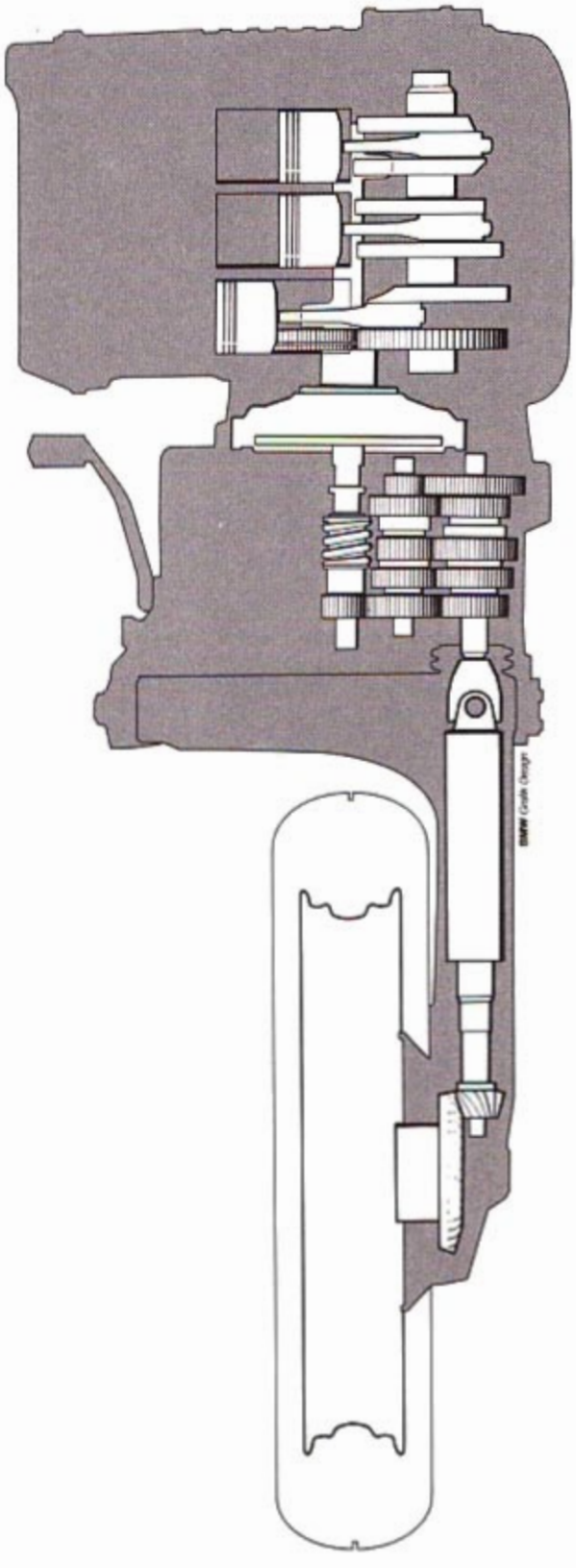
R 85/8



BMW Grafik Design

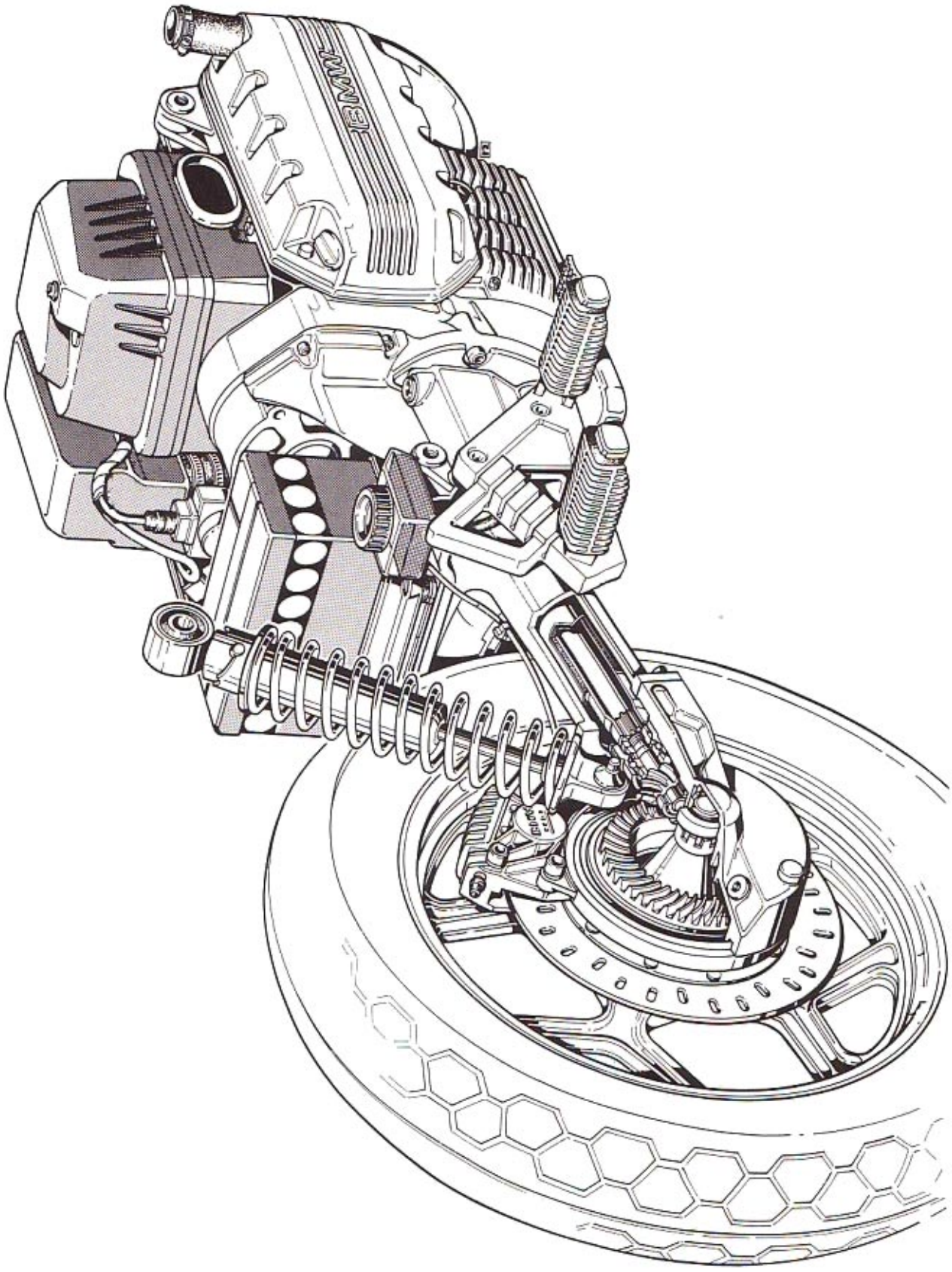
BMW K 75
BMW Compact-Drive System

R 85/9

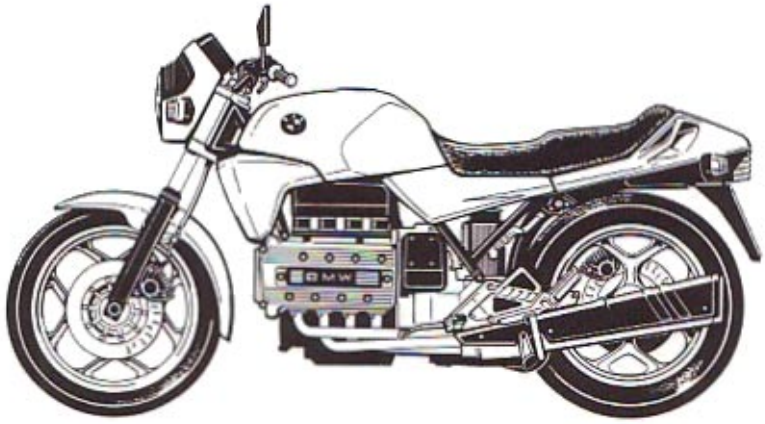


BMW K 75
Compact Drive System (Schnitt)

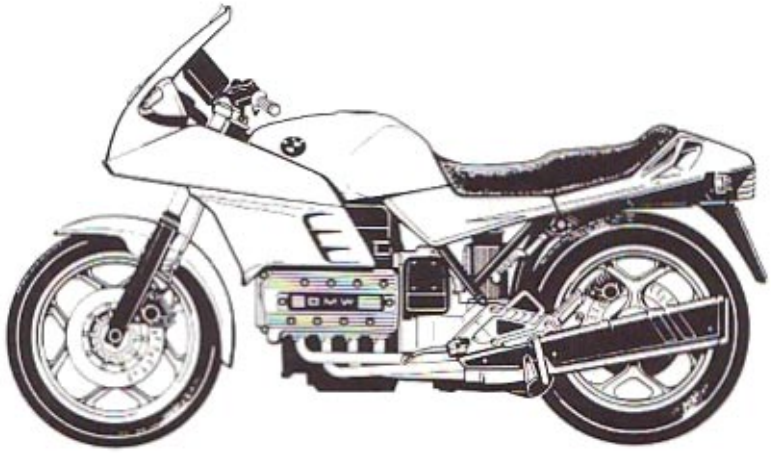
R 85/12



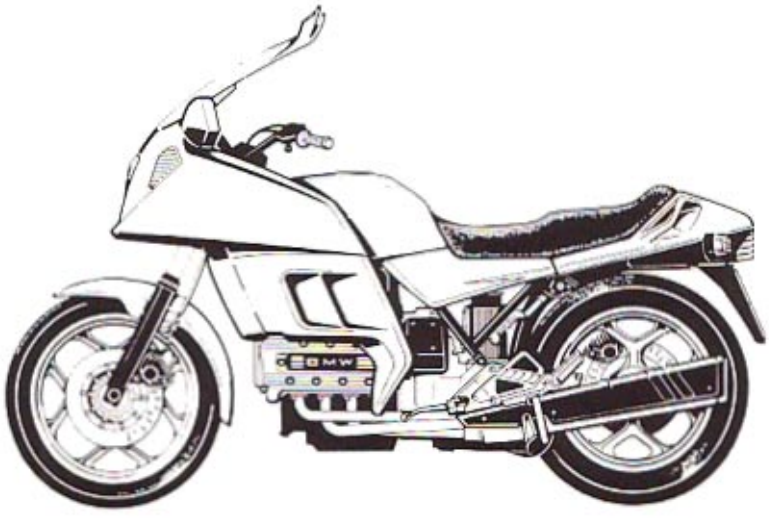
BMW Motorräder K 100 / KS 100 RS / K 100 RT	R 85/13



K 100



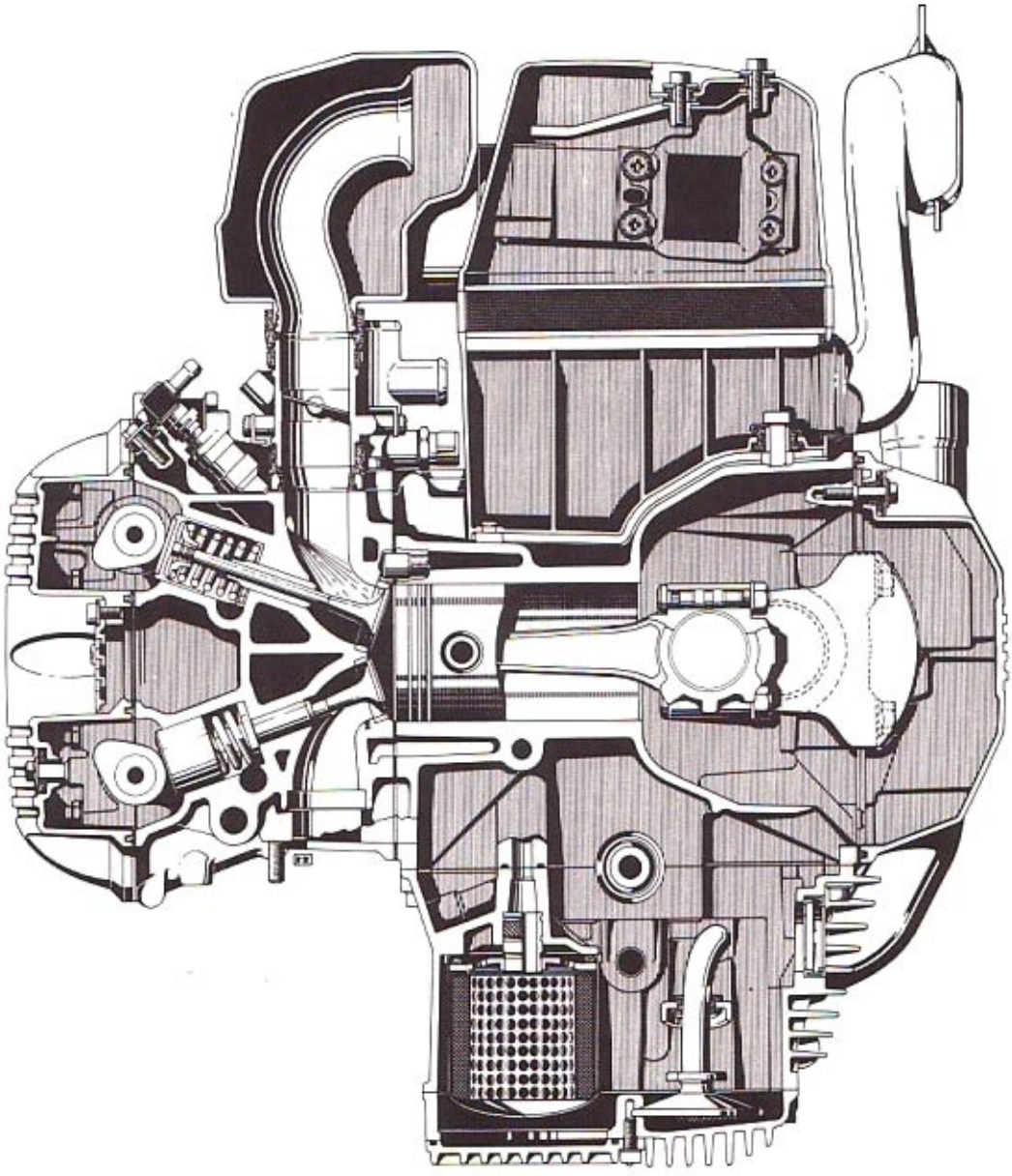
K 100 RS



K 100 RT

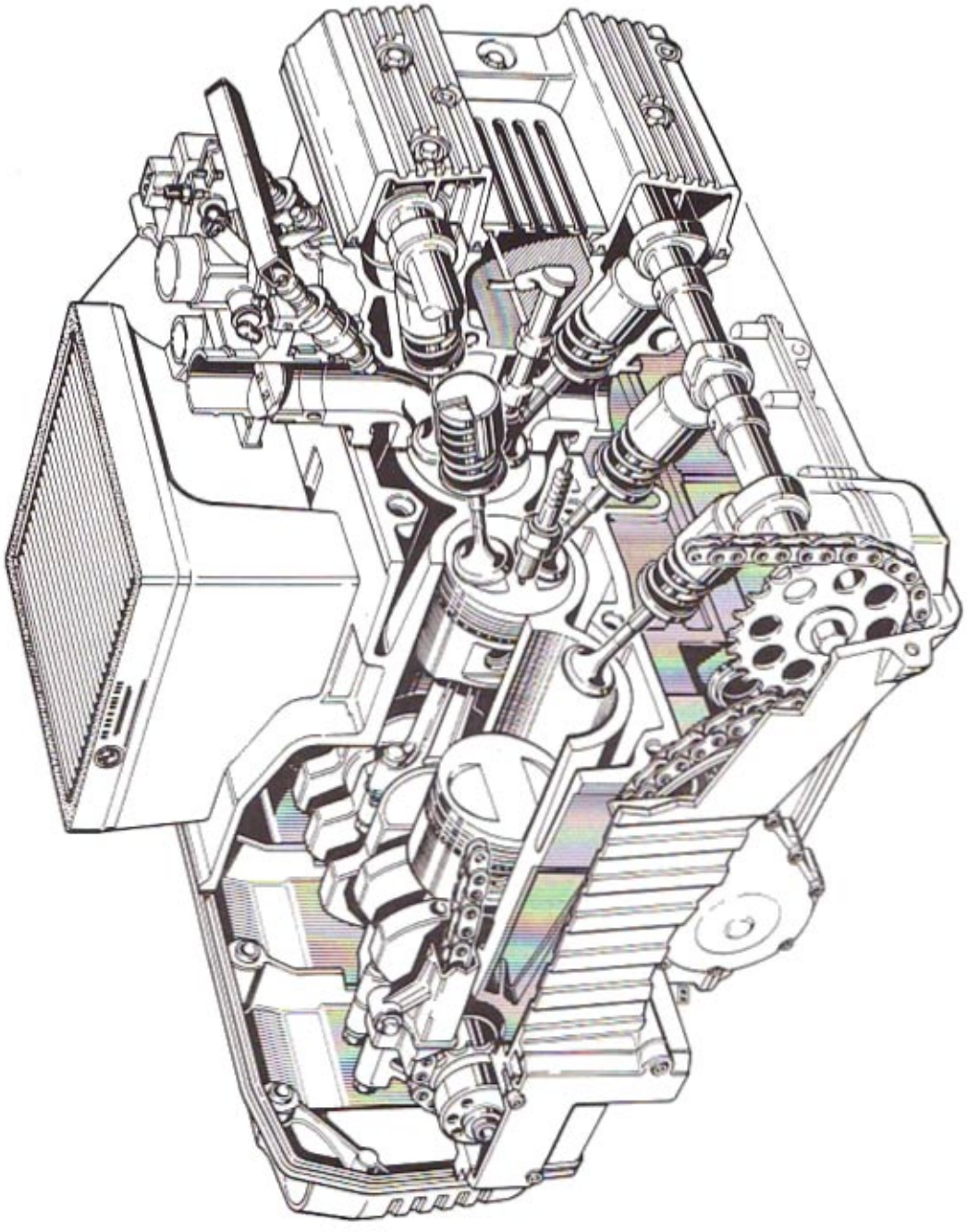
BMW K 100
Motorquerschnitt (Ansicht von hinten)

R 83/10



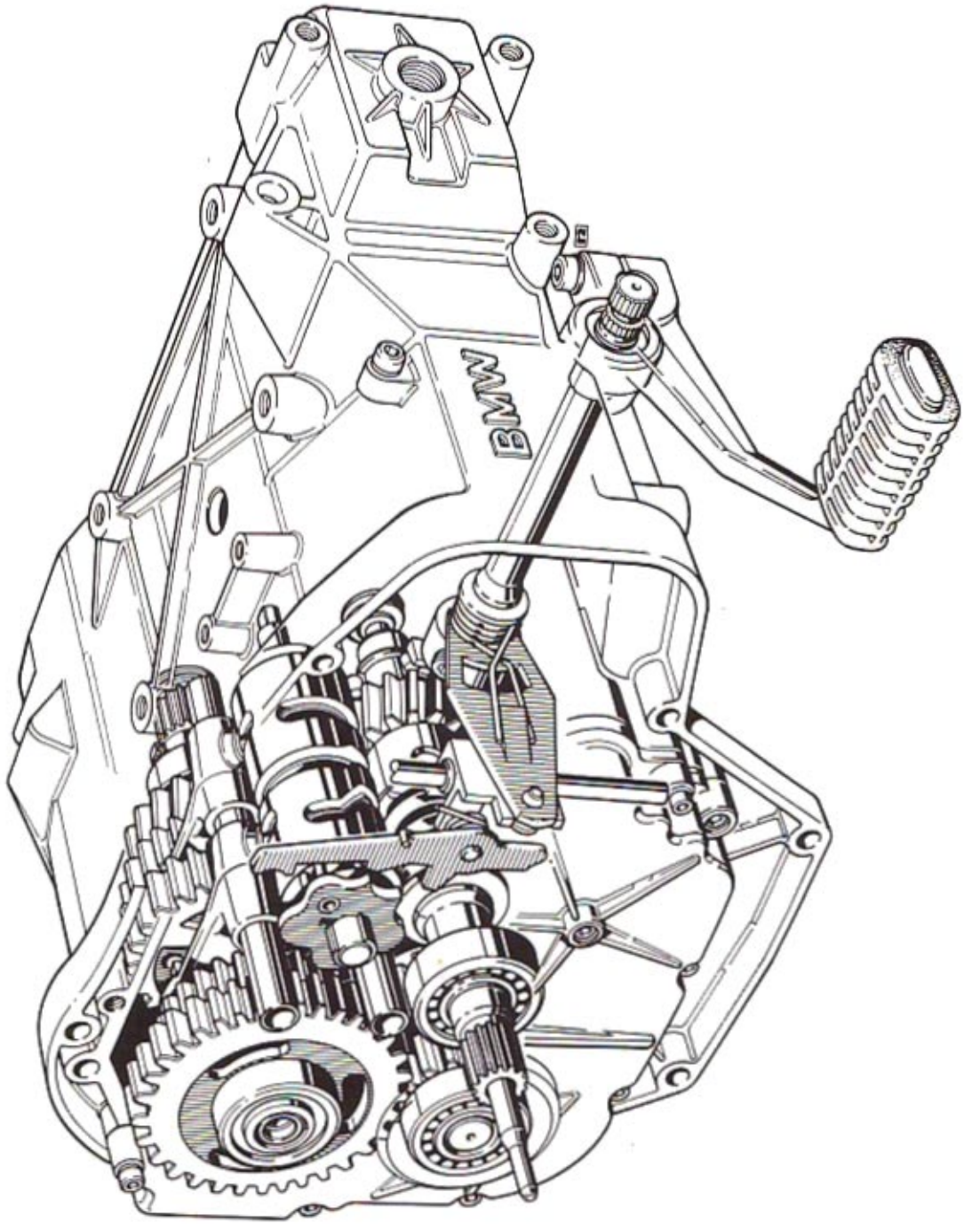
BMW K 100
Motorschnittbild

R 83/11



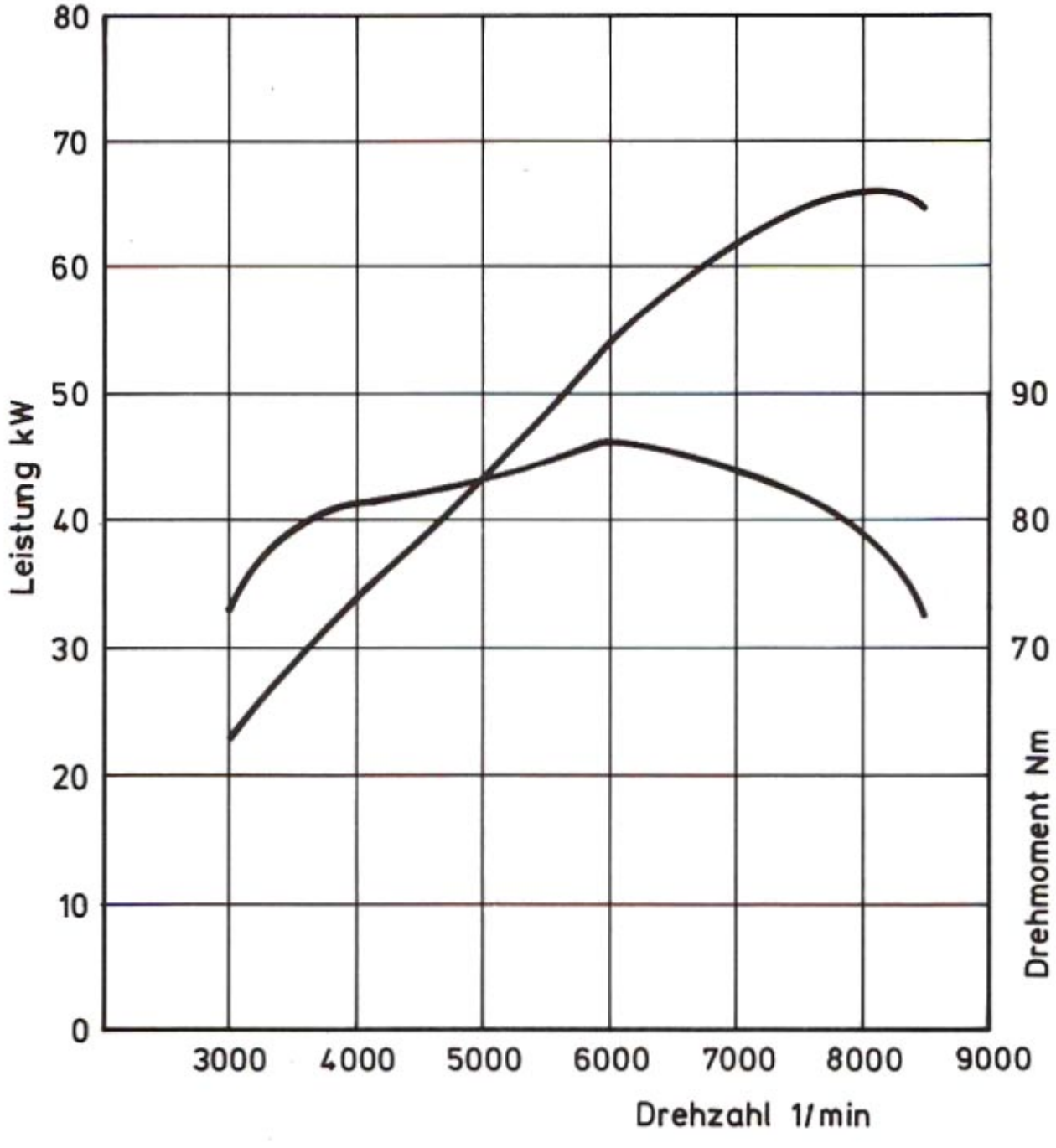
BMW K 100 und K 75
5-Gang-Schaltgetriebe

R 83/12



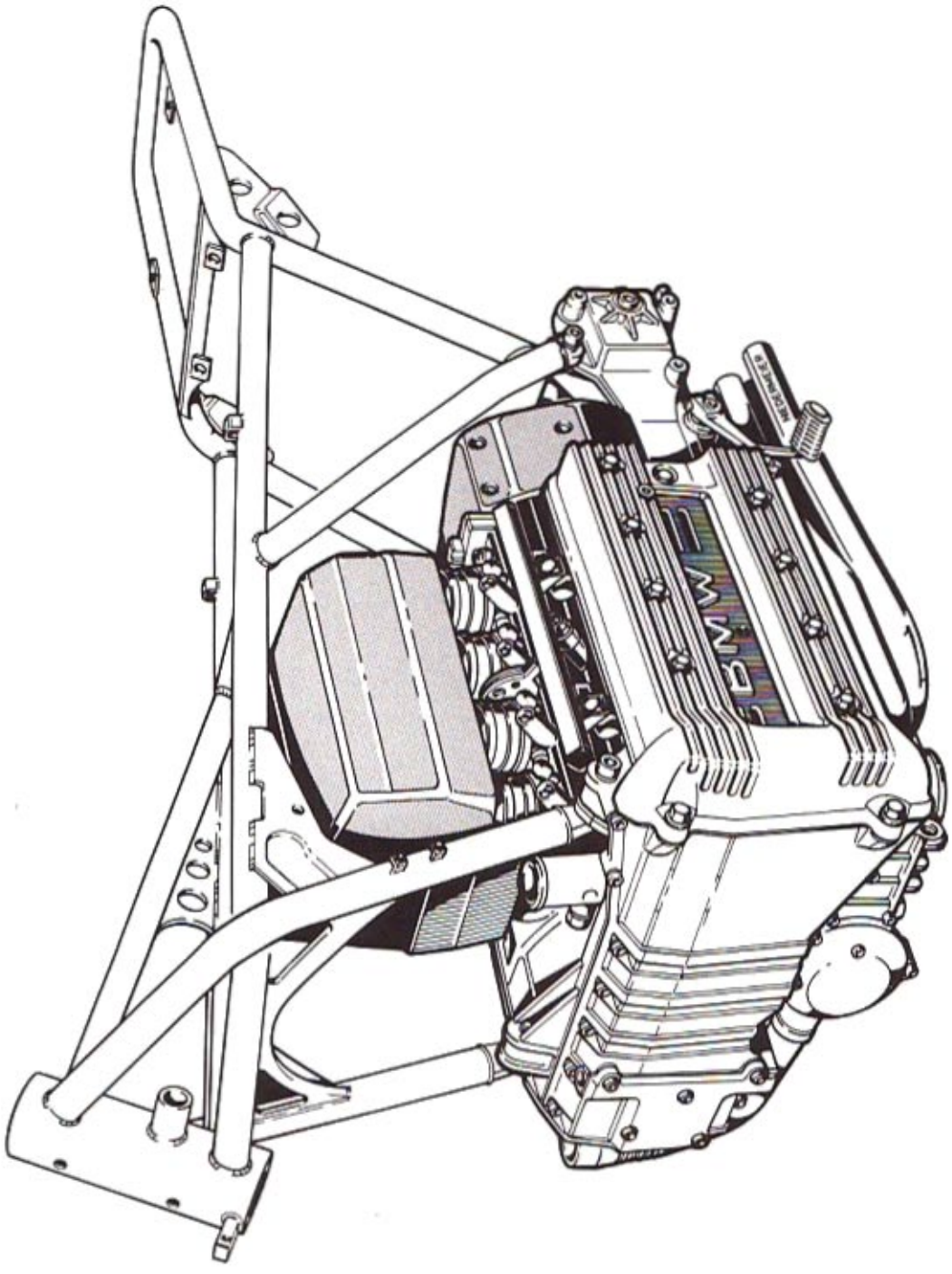
BMW K 100
Leistungs- und Drehmomentdiagramm

R 83/13



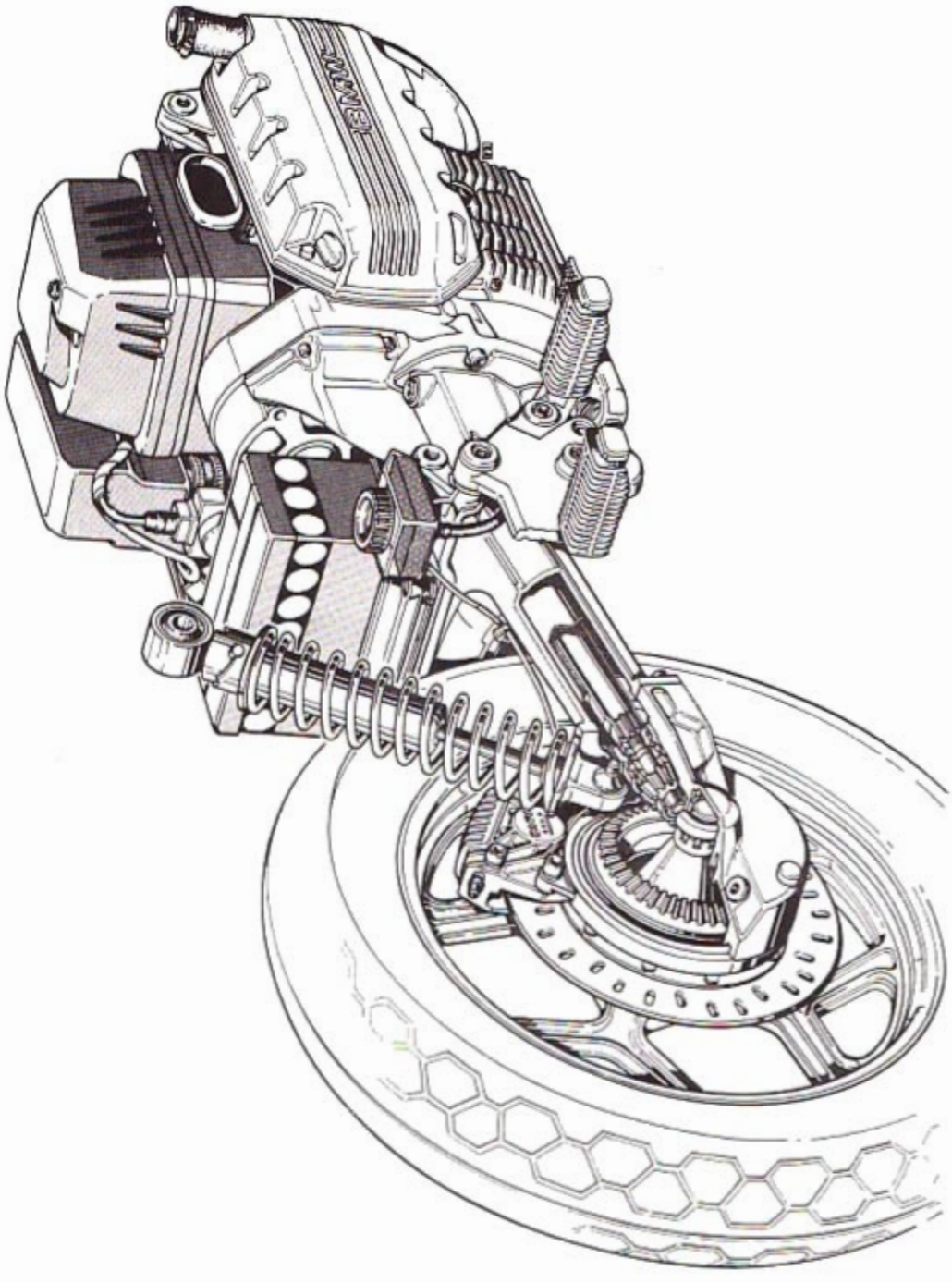
BMW K 100
Brückenrahmen in Fachwerkkonstruktion mit Motor und Antriebsblock als mittragendes Element

R 83/14



BMW K 100
Compact Drive System

R 83/15



Special equipment (ex factory)

	K 75	K 75 C	K 75 S	Special equipment, retrofittable
Hazard warning flashers	x	x	x	xx
Digital clock	x	x	o	xx
Dual-tone fanfare	-	x	x	xx
Socket	x	x	x	xx
Heatable grips	x	x	x	xx
Anti-theft alarm	x	x	x	xx
High handlebar	x	x	-	xx
Splashguard at rear	x	x	x	xx
High-comfort seat	-	x	-	xx
High seat (800 mm/31.5")				
with grab strap	.	-	-	xx
without grap strap	.	-	-	xx
Solo seat				
in red or black	-	x	x	xx
Engine protection bars	x	x	-	xx
Engine spoiler	-	x	o	xx
Side-stand, automatic	x	x	x	xx
Windshield instead of cockpit fairing	-	.	-	-
High-comfort suspension	o	o	.	-
Sports suspension	-	-	o	-
Self-levelling	x	x	-[1]	xx

	K 75	K 75 C	K 75 S	Special equipment, retrofittable
Luggage rack	x	x	x	xx
Set of integral cases with supports	x	x	x	xx
Set of city cases with supports	x	x	x	xx
Topcase, small[2]	x	x	x	xx
Knee-padding	-	x	x	xx
Super toolkit	x	x	x	xx[3]
First-aid kit	x	x	x	xx

x = available as special equipment ex factory

xx = available as retrofittable special equipment

- = not available

o = standard

. = optional at no extra charge

[1] = only in conjunction with high-comfort suspension

[2] = only in conjunction with luggage rack

[3] = supplementary toolkit

Special equipment (ex factory)

	K 100	K 100 RS	K 100 RT	K 100 LT	Special equipment, retrofittable
ABS_1	x	x	x	x	-
Temperature and fuel gauge	-	x	x	x	xx
Hazard warning flashers	x	x	x	o	xx
Digital clock	x	o	o	o	xx
Dual-tone fanfare	x	o	o	o	xx
Socket	x	x	x	o	xx
Additional socket	-	-	x	o	xx
Heatable grips	x	x	x	-	xx
Anti-theft alarm	x	x	x	x	xx
Low handlebar	x	-	-	-	xx
High seat (80 mm/31.5")					
with grab strap	.	-	-	-	xx
without grab strap	.	-	-	-	xx
Splashguard at rear	x	x	x	x	xx
Longer splashguard at rear	-	-	-	x	xx
Solo seat	-	x	-	-	xx
Engine protection bars	x	x	x	x	xx
Engine spoiler	-	x	-	-	xx
Side-stand, automatic	x	x	x	x	xx
Windshield (with 800 mm seat only)	x	-	-	-	xx
Self-levelling	x	x	x	o	xx
Sports suspension	-	x	-	-	-

	K 100	K 100 RS	K 100 RT	K 100 LT	Special equipment, retrofittable
Low windshield (430 mm/16.9")$_4$	-	-	-	x	xx
High windshield (560 mm/22.0")$_5$	-	-	-	x	xx
High windshield with side flaps	-	-	-	x	xx
Additional instrument panel with low and high windshield	-	-	-	x	xx
Luggage rack	x	x	x	o	xx
Set of integral cases with supports	x	x	o	o	xx
Set of city cases with supports	x	x	-	-	xx
Topcase, small$_2$	x	x	x	o	xx
Topcase, large$_2$	-	-	-	x	xx
Knee-padding	-	x	x	x	xx
Radio installation kit	-	-	x	o	xx
Radio suppressor	-	-	x	o	xx
Fresh-air duct fork opening	-	.	.	.	-
Exhaust spoiler	-	-	x	x	xx
Super toolkit	x	x	x	x	xx$_2$
First-aid kit	x	x	x	x	xx

x = available as special equipment ex factory

xx = available as retrofittable special equipment

- = not available

o = standard

. = optional at no extra charge

1 = presumably from spring 1988

2 = only in conjunction with luggage rack

3 = supplementary toolkit

4 = in the Federal Republic of Germany only

5 = not allowed in the Federal Republic of Germany

Other special equipment for all K 75 and K 100 models

Soft rubber handlebar grips	(standard on the K 100 LT; not available with heatable grips)
Wind deflector	(K 100 only)
Cockpit fairing	(K 100 only)
Additional headlight	(K 100 only)
Luggage roll	
Multivario K tank bag	
Citybag	

Short story on BMW motorcycle ABS:
Braking all out without the risk of falling

"This is the greatest improvement in active riding safety ever since the introduction of the disc brake 20 years ago." Comments like this were made by virtually all the experts who had the opportunity to test one of the prototypes with ABS during development.

Commissioned by BMW and developed in cooperation with FAG Kugelfischer, a manufacturer of hydraulic brake systems also based in Bavaria, this brand-new electro-hydraulic motorcycle ABS will presumably be available in spring 1988, following long-term tests that have lasted longer than was originally planned. To begin with ABS will come in the K 100 models as an option at an extra charge of about DM 2,000.-. This motorcycle ABS means genuine progress and innovation, since it is not just a mere gimmick or fashion trend as is so often the case, but rather pursues probably the most important objective on the road: to increase riding safety.

During several years of painstaking development it soon became clear that a motorcycle ABS has to meet much greater requirements than the same system on a car (where BMW was also one of the pioneers, introducing car ABS back in 1978). The reason for this is that motorcycles have a far lower standard of inherent stability and behave quite differently when the brakes are applied. While a car will not topple over even when the front wheels are locked and no longer respond to the steering, a locked front wheel on a motorcycle will almost inevitably cause a crash.

Riding a machine with ABS, the motorcycle rider can now slam on the hand-operated front brake and foot pedal-operated rear brake without having to worry about the wheels locking, thus not running any risk as long as he is moving straight ahead. Even the relatively inexperienced rider can therefore keep his stopping distance at an absolute minimum. And even on suddenly changing road surfaces such as dry/wet, gravel, sand or oil, which may be too much even for the best rider, ABS responds quickly enough to prevent a wheel from locking.

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 the 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. 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. 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).

In principle this also applies to braking on a motorcycle in bends, since the physical and dynamic laws applicable to a motorcycle cannot be overcome by ABS. Powerful application of the brakes in a bend will make the motorcycle move up from its inclined position, thus losing its lateral stability. This fact of life cannot be changed by ABS, all the more so as it only cuts in when the brakes are applied with full power. So while a car fitted with ABS can still be steered even when the driver pushes the brake pedal down to the floor, a motorcycle does not have this advantage.

Even if his machine is equipped with the ABS anti-lock braking system, therefore, the rider must still ride carefully and intelligently, appreciating that he is travelling on two wheels and not on four. Accordingly, BMW does not regard motorcycle ABS as an aid for fast riding thanks to shorter stopping distances. Rather, this innovation is first and foremost a safety reserve for - -hopefully rare - emergency situations.

HISTORY AND TECHNICAL FEATURES OF THE BMW MOTORCYCLE ANTI-LOCK BRAKING SYSTEM

With its particular riding characteristics, the motorcycle requires an even more sophisticated ABS than the automobile

The first ABS anti-lock braking system for cars entered standard production in 1978. Indeed, BMW was one of the pioneers in this area. Even then, however, BMW's motorcycle development engineers were studying anti-lock braking systems for motorcycles. It nevertheless became evident from the very beginning that this technology is far more demanding on the motorcycle than on the automobile: Given the smaller inherent stability of a motorcycle, an anti-lock braking system must inevitably have much better and more sophisticated control functions. Another factor is that dynamic riding conditions when applying the brakes on a motorcycle are not only different, but rather completely the opposite of what they usually are.

When the front wheels of an automobile are locked, the vehicle will no longer respond to the steering. And when the rear wheels are locked it will swerve and spin. This will hardly happen in practice, however, as all cars nowadays have an exact distribution of brake power making the front wheels lock first. And even if the car should spin, it will hardly roll over or topple onto one side.

When the front wheel locks on a motorcycle, however, the consequences are usually most severe. The motorcycle will immediately lose its stability and the rider will hardly be able to avoid a - bad - fall. On the other hand, locking of the rear wheel does not present any major risks and can be controlled by the experienced rider (provided there are no lateral forces acting on the machine at the same time). Still, it is naturally even better to avoid this risk from the very beginning.

The objectives, therefore, were clear: To achieve absolute anti-locking safety on both wheels (100% ABS) and, accordingly, to minimize stopping distances particularly on varying road surfaces. Given this aim it was clear that a motorcycle ABS would require very sophisticated control qualities and a completely different concept.

BMW checked out several systems

The first step was to examine the obvious possibility of adjusting the anti-lock braking system on BMW cars to the particular requirements of a motorcycle. The test machine used at the time was an R 100 RS. In conducting this experiment BMW accepted the disadvantage that automobile ABS requires more hydraulic components and a far larger brake fluid volume. This, in turn, would have required a far larger system and, in particular, modifications of the BMW motorcycle brakes used so far.

Test rides also showed that the severe pulsation transmitted to the handbrake lever and footbrake pedal was irritating and, indeed, hardly tolerable. It also became evident that pressure control in individual stages and the associated change in brake power - ie, a staggered change in brake efficiency - was not compatible with the sensitive behaviour of a motorcycle.

The next step was to examine the first specimens of a hydro-mechanical anti-lock braking system developed in Great Britain. Although these studies lasted for several years, the result was not satisfactory in comparison with the next alternative: Right from the beginning, the ALD anti-lock device developed by FAG Kugelfischer since 1983 showed the most encouraging results. While being relatively expensive, this electronic/hydraulic control unit conceived by the Bavarian manufacturer of hydraulic brake systems

offered ideal prerequisites for a motorcycle. Unlike mechanical ABS, this system does not require the additional mechanical drive of a hydraulic pump and does not unduly increase the unsprung masses around the anti-lock device on the wheels connected directly to the brake. A further consideration was that the mechanical system can serve to control brake power only down to road speeds of approximately 10 km/h (6mph). The FAG Kugelfischer anti-lock braking system, on the other hand, was relatively easy to connect to the conventional BMW brake system without requiring any modifications.

Safety: the No 1 objective in developing motorcycle ABS

The relatively high cost of the fundamentally simple and straightforward Kugelfischer ABS is a result of the very high and uncompromising quality and reliability standards. Because one of the basic lessons learnt in the first phase of testing was that failure of the anti-lock braking system on a motorcycle can have far more significant consequences than on a car.

The wheel speed sensors which compare changes in speed within a certain period and enable the electronic control unit to determine the degree of wheel deceleration are a good example of how motorcycle ABS works: By scanning impulse sensor gears with 100 teeth each, the inductive sensors provide 200 data for each revolution of the wheel. At a road speed of 200 km/h (124 mph), this is 6,000 data per second passed on to the electronic computer. Unlike automobile ABS, the sensors operate without a permanent magnet as induction coils: Since these units are inevitably less efficiently protected on the motorcycle, they must not be susceptible to deficiencies caused by contamination with magnetic dust particles. Accordingly, the sensors are magnetically excited only when the ignition is switched on.

The sensor therefore informs the control unit when the wheel is about to lock. Within fractions of a second the electronic unit will activate the pressure modulator, continuously reducing the hydraulic pressure in the wheel brake cylinder until the risk of locking has been eliminated. This process is repeated up to 7 times a second as long as the rider generates the requisite brake pressure through the pedal or brake lever and road speed does not drop below 4 km/h (2.5 mph). In controlling the rear brake curcuit, the system also evaluates the data provided by the front wheel. This ensures that any retardation of the rear wheel caused by reducing gas or shifting gears is not interpreted by the computer as braking action.

The two electric-motor pressure modulators - one for the front wheel, one for the rear - are not extremely light at a weight of 3.8 kg (8.4 lb) each, but nevertheless weigh a lot less and are much smaller than the original versions. They are located at the side above the footrests near the motorcycle's centre of gravity - that is in a position very good for optimum riding characteristics. Nobody at BMW wanted to go too far, saving too much weight and, accordingly, reducing the safety reserve. After all, the spring-loaded step piston acting as the control unit must reliably handle differences in pressure between 70 and 0 bar. As already mentioned, the linear motor serves to move the piston up to 7 times per second against the maximum spring force in the pressure modulator. The resulting change in volume in the hydraulic cylinder causes a change of pressure in the brake calliper. This control function is performed without any effect on the brake lever or pedal, since a valve prevents the reflow of brake fluid.

Perfect system supervision - with switch-off and alarm in the event of a defect

Perhaps the best example of this safety-first concept is the electronic control unit developed and manufactured by Hella in Lippstadt. Housed in the tail section of the motorcycle, this electronic control unit features two separate control lines for both the front and rear wheel. These lines operate intermittently in intervals of 10 seconds: While one control line is working - ie, checking or controlling the brakes - the other is supervised for its function by a central processor unit. This permanent supervision also includes the electronic system voltage, sensors and pressure modulators. In the event of a defect the ABS will switch off automatically and a warning system will come on: Two red flashlights in the cockpit will inform the rider that while his "normal" brakes are still working properly, he must do without ABS until the defect is remedied. Following this message the rider can switch over the red flashlights to a permanent red light which will not distract him from the road.

This ABS anti-lock braking system also exceeds even the most demanding standards by its wide range of operation: It ensures safe application of the brakes without locking both on extremely rough asphalt with a high frictional coefficient of my = 1.3 (due to the mesh effect on the surface) and on water-flooded black ice with a frictional coefficient my of approximately 0.1 (the kind of road you can hardly walk on, let alone ride a motorcycle).

Very easy service

In striving to achieve optimum safety, the engineers have also given due consideration to service and proper maintenance of this motorcycle ABS. Using a test light, the BMW dealer can detect any deficiency in the system and determine through a blinker code whether the defect concerns one of the two sensors, pressure modulators or the electronic control unit. All he then has to do is replace the unit concerned.

"This is the greatest increase in active riding safety since the introduction of the disc brake two decades ago". Comments like these were made by the experts who had the opportunity to test this anti-lock braking system during development. This is therefore genuine progress dedicated to the all-important cause of riding safety - and not just a kind of toy or fashion trend.

Having refused from the very beginning to participate in the power race in the international motorcycle market, Bayerische Motoren Werke does not regard this new motorcycle ABS as an aid for riding at maximum speed on public roads thanks to the shorter stopping distances the system is able to provide. Applying the brakes in the last fraction of a second and riding all-out to the limit should rather remain the domain of racing riders on the race-track.

What really counts with ABS is the greater safety in emergencies, which is particularly important for the motorcycle rider. The first and foremost task of ABS is therefore to ensure absolute safety without the wheels locking irrespective of road conditions. And precisely this objective has been reached far beyond the requirements of the average rider. While a top-notch rider might just about be able to apply the brakes with the same efficiency on dry asphalt, ABS can efficiently cope with road surfaces varying rapidly and very substantially in their frictional coefficient,

controlling the brakes at a speed far superior to human reflexes. Even if puddles, gravel, sand or oil suddenly appear on a hard and dry surface, ABS will respond quickly enough to prevent the wheels from locking. As long as he is riding in a straight line, the rider can therefore apply ABS brakes in full without the slightest fear of a wheel locking, thus achieving minimum stopping distances even if he is not very experienced. Particularly on slippery roads the rider can achieve a retardation that even experienced test riders previously regarded as almost impossible.

Even ABS does not allow full application of the brakes in bends

Through its very concept, however, the motorcycle also limits the potential of an anti-lock braking system. Applying the brakes forcefully in a bend will make the motorcycle move up from its inclined position and will accordingly reduce lateral stability. Not even ABS can change this, all the more so as it only performs its control function when applying the brakes with full power. For physical reasons, therefore, a motorcycle loses its steering and directional potential when applying the brakes in a bend even with ABS, whilst a car equipped with ABS will respond to the steering almost perfectly.

Even a motorcycle equipped with anti-lock brakes therefore requires a suitable style of riding and applying the brakes. Needless to say, this also means riding carefully and with an eye on the traffic around you. BMW regards the anti-lock braking system primarily as a safety reserve for - hopefully rare - emergencies.

Starting in 1988: ABS available as an option for the K 100 models

The BMW anti-lock braking system will presumably be available from spring 1988, initially as an option for the K 100 models at an extra charge of approximately DM 2,000.-. For the time being at least, there are no plans for retrofitting ABS, since this would be technically complicated and more expensive.