Bayerische Motoren Werke
Aktiengesellschaft

BMW AG Presse

BMW Motorradprogramm
BMW Motorcycle Range
Gamme motos BMW
Programma motociclette BMW
Programa de motos BMW

ABS

Erstmals Anti-Blockier-System im Motorradbau

Unprecedented: motorcycle anti-lock braking system

Pour la première fois: le système antiblocage dans la construction des motos

Per la prima volta il sistema antibloccaggio su una motocicletta

Sistema de antibloqueo por primera vez en la construcción de motocicletas

1987

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SHORT STORY

From the K 75 achievers' models to the come-back of the R 100 RS: The largest model range in the history of BMW

At the IFMA International Bicycle and Motorcycle Show in Cologne in September 1986 BMW will be presenting the largest and most versatile model range in its history: the 1987 motorcycle range. Using the technical modules of the proven 2,3 and 4-cylinder engines, BMW has created new models different from the technically identical basic versions above all through their styling and model features. These new machines therefore fulfill the increasing demand on the part of customers for even more individual style.

The new model for achievers moving up to the 3-cylinder series is particularly attractive in terms of its price and styling: the classic K 75 without fairing. With its black paintwork and red piping, red seat, black painted engine block with polished fins, uncovered coils and red spark plug leads, this machine looks really attractive and provides an appealing contrast to the polished fork tubes and chrome-plated components: the headlight housing, handlebar, exhaust cover and luggage rack fitted as standard.

As before, the customer opting for the K 75 C can choose between the small but efficient cockpit fairing and the high, transparent windshield particularly suitable for touring. The K 75 S launched in summer 1986, which excels through its slender but highly efficient sports fairing and a firm, sports-tuned suspension, is now also available with an engine spoiler as an optional extra. This spoiler blends harmoniously with the overall styling of the K 75 S awarded a special prize in 1986 by the Stuttgart Design Center.

The two new special versions of the K 75 S are particularly attractive: The Special in onyx-black paintwork has a pearl-beige seat, the Special in brilliant-silver has a black seat. Both special models are fitted as standard with the new engine spoiler, the wheels and engine block are painted black and have polished fins. With the brilliant-silver version the power train and footrests are also finished in black.

The 4-cylinder K 100 LT is a new luxury tourer with all refinements. Its special bahamabronzite-metallic paintwork and pearl-beige high-comfort seat show quite clearly that this is a luxury version of the K 100 RT. The wide range of standard features including the painted topcase and panniers also comprises a radio installation kid with loudspeakers, aerial and suppression, soft rubber handles, self-levelling and hazard warning flashers.

There is also good news in the still successful flat-twin range: the come-back of the classic R 100 RS. Limited for the time being to 1,000 units, this new edition of BMW's former top model built up to 1983 fulfills the wish of many flat-twin enthusiasts to re-experience the 1000-cc engine, particularly in conjunction with the sporty touring fairing. The new low-emission and low-noise one-litre engine now develops 60 bhp and a maximum torque of 74 Nm (55 ft/lb) at just 3500 rpm. The new R 100 RS with the same engine and suspension features as BMW's current 800-cc models comes in mother-of-pearl white-metallic or henna red with black bottom fairing.

The ever-successful R 80 G/S also comes in new, youthful and fresh colours: The mudguards and cockpit in alpine white are now complemented by the fuel tank and seat in either henna red or tuareg blue.

SHORT STORY

Braking all out without the risk of falling:
BMW introduces the first motorcycle ABS

"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. Now the grand premiere is here at the international Bicycle and Motorcycle Show in Cologne in September 1986: As the world's first motorcycle manufacturer, BMW is presenting an electronic/hydraulic ABS anti-lock braking system for motorcycles.

Commissioned by BMW and developed in cooperation with FAG Kugelfischer, a manufacturer of hydraulic brake systems also based in Bavaria, this brand new motorcycle ABS will probably be available in early summer 1987 - to begin with in the K 100 RS, K 100 RT and K 100 LT fairing models, which will feature ABS 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 applying the brakes. 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 wheel 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 the 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 antilock 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 wheel - 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 foot-rests 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 approximatley 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 substantually 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 1987: ABS available as an option for the K 100 fairing models

The BMW anti-lock braking system will presumably be available from early summer 1987, initially as an option for the K 100 RS, K 100 RT and K 100 LT fairing 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.

Motorrad Anti-Blockier-System

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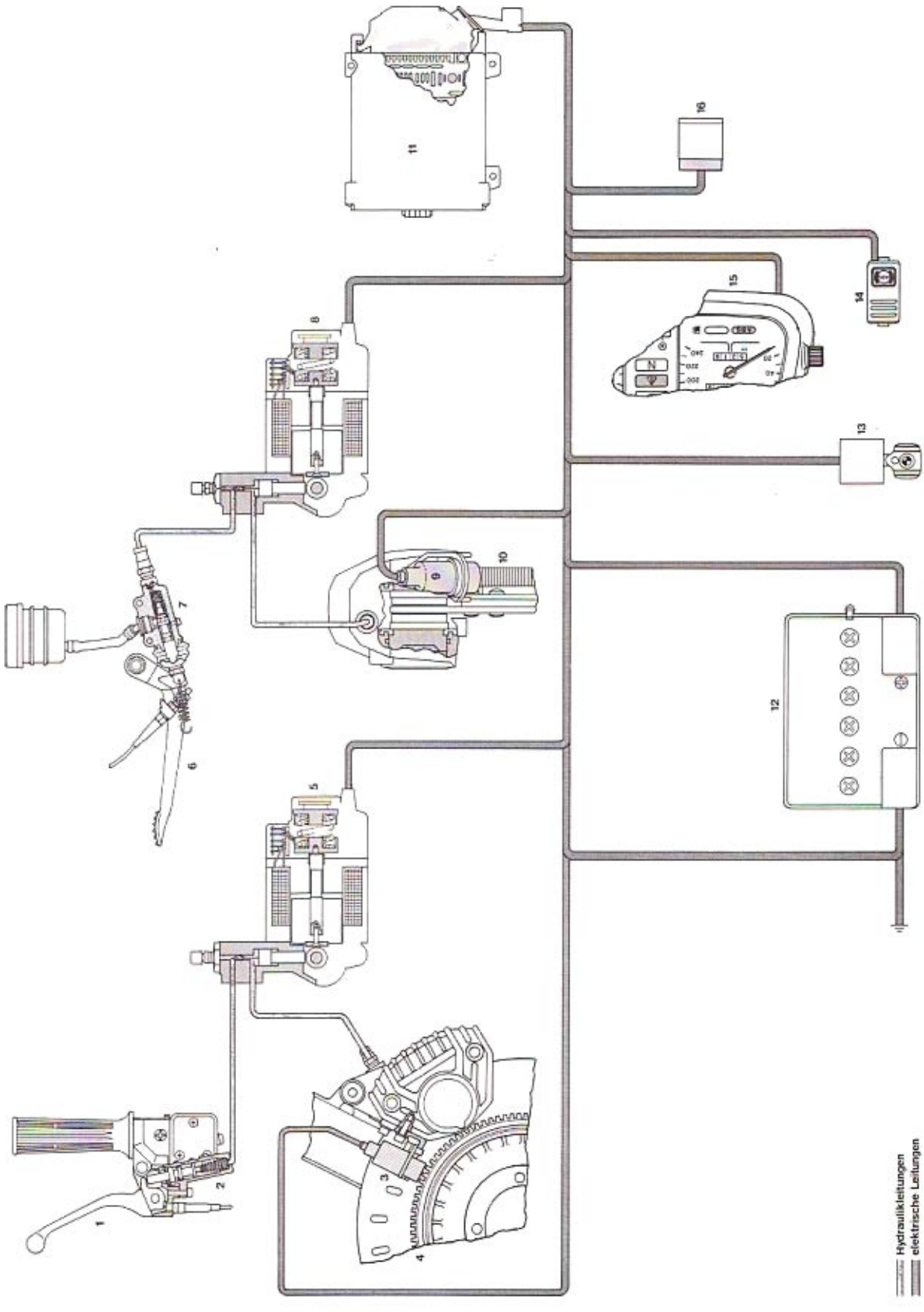


Motorrad Anti-Blockier-System

1 Handbremshebel
2 Bremszylinder vorn
3 Sensor vorn
4 Drehzahlgeber vorn
5 Druckmodulator Vorderrad
6 Fußbremshebel
7 Bremszylinder hinten
8 Druckmodulator Hinterrad
9 Sensor hinten
10 Drehzahlgeber hinten
11 ABS-Steuergerät
12 Batterie
13 Zündschloß
14 Quittierung
15 ABS-Kontroll-Leuchte
16 ABS-Sicherheitsrelais

Systeme Antiblocage pour Motos

1 Levier de frein avant
2 Maître-cylindre avant
3 Capteur avant
4 Générateur d'impulsions avant
5 Modulateur de pression roue avant
6 Pédale de frein arrière
7 Maître-cylindre arrière
8 Modulateur de pression arrière
9 Capteur arrière
10 Générateur d'impulsions arrière
11 Unité de commande ABS
12 Batterie
13 Serrure de la clé de contact
14 Accusé de réception
15 Témoin de contrôle ABS
16 Relais de sécurité ABS

Motorcycle Anti-Lock Braking System

1 Handbrake lever
2 Brake cylinder, front
3 Sensor, front
4 Speed impulse generator, front
5 Pressure modulator, front wheel
6 Footbrake lever
7 Brake cylinder, rear
8 Pressure modulator, rear wheel
9 Sensor, rear
10 Speed impulse generator, rear
11 ABS control unit
12 Battery
13 Ignition lock
14 Cancellation button
15 ABS telltale
16 ABS safety relay

Sistema antibloccaggio per motociclette

1 Leva freno a mano
2 Cilindretto freno anteriore
3 Sensore anteriore
4 Datore impulsi di velocità anteriore
5 Modulatore pressione alla ruota anteriore
6 Pedale del freno
7 Cilindretto freno posteriore
8 Modulatore pressione alla ruota posteriore
9 Sensore posteriore
10 Datore impulsi di velocità posteriore
11 Centralina ABS
12 Batteria
13 Serratura dell'accensione
14 Conferma
15 Spia ABS
16 Relè di sicurezza ABS

THE 3-CYLINDER K 75 SERIES:
A new motorcycle for achievers and two special models

One year after the premiere of the K 75, BMW's latest motorcycle series, the 3-cylinder range in the 1987 model year comes in 6 different versions to meet all demands and individual requirements. All these models are nevertheless identical in their engine output, suspension and basic features (see section on features, engine and suspension).

K 75: an attractive new model for achievers
With good looks and at a low price

Now there is a no-fairing basic model also in the 3-cylinder range: In terms of both its price and styling, the new K 75 is a very attractive model for achievers moving into the BMW K Series. With its black paintwork featuring red piping, red seat (also available in black on request), black-painted engine block with polished fins and uncovered ignition coils with red spark plug leads, this new model offers an attractive contrast to the polished fork tubes and stabilizer as well as the chrome-plated headlight housing, handlebar, exhaust cover and luggage rack fitted as standard.

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.

K 75 S: sporty suspension and looks

The sporty version of the K 75 has been available since summer 1986. It features a shorter, sportier handlebar (reduced in length by 10 cm/3.9") and 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 available as an option and for retrofitting blends very harmoniously with the overall styling of the K 75 S awarded a special price in 1986 by the Stuttgart Design Center.

However, 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 Special: two special models for the individualist

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

The Special in onyx-black paintwork features a pearl-beige seat, while the Special in brilliant-silver has a black seat. Both models come as standard with engine spoiler, the wheels and engine block are painted black and have polished fins. On the brilliant-silver model the drive train and footrests are also 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 breakedown 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, luggage rack or the new topcase. 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 arithmetic 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 auxiliary 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 crakshaft 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, 20 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 C, for example, has a drum brake with 200 mm (7.87") diameter integrated in the light-alloy wheel. The somewhat faster K 75 S features a slightly heavier and more expensive disc brake at the rear.

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, 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.

THE 4-CYLINDER K 100 SERIES

Sports tuning for the K 100 RS and a luxury tourer

Ever since they were launched in 1983 the BMW K 100 models have been best-sellers in the motorcycle market. Within just three years, worldwide sales of this 4-cylinder have exceeded 50,000 units. Accordingly, BMW's top models are entering their fourth model year with the same engine output and suspension and virtually the same technical features. However, the K 100, K 100 RS and K 100 RT "3 Series" is now supplemented by a new addition to the range: the K 100 LT luxury tourer.

K 100: the classic motorcycle

The K 100 is the basic model, the classic motorcycle without fairing for enthusiasts who really want to feel the wind blowing in their hair. Special equipment such as a wind deflector or touring windshield is nevertheless available to give the rider an individual motorcycle of his choice.

K 100 RS: the sports model

The sports model in the K 100 range has already become a kind of legend. In 1985, for example, the readers of MOTORRAD, Europe's largest motorcycle journal, elected the K 100 RS the Motorcycle of the Year for the third time running, creating an unprecedented example in the 10 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 1987 K 100 RS is available with a solo seat in black or read (like all K-models with the exception of the K 100 RT).

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.

K 100 RT: the long-distance tourer

The multi-piece touring fairing of the K 100 RT is fastened by a multiarm 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 as well as lockable side boxes in the fairing are featured as standard on this model, emphasizing its particular qualities as a refined but nevertheless very agile long-distance touring machine.

K 100 LT: the new luxury tourer with all refinements

With its special Bahama-bronzit-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-bronzit-metallic. The highcomfort seat in pearl-beige 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, softrubber handlebar grips, automatic rear axle self-levelling, hazard warning flashers and an additional socket in the handlebar impact boss.

As an option, the K 100 RT and LT are now available with an exhaust spoiler to be fitted at the side of the fairing for even better discharge of hot air from the engine, thus providing a pleasant effect on hot summer days.

Special equipment (ex factory)

	K 75	K 75 C	K 75 S	Special equipment, retrofittable
Hazard warning lights	x	x	x	xx
Digital clock	x	x	o	xx
Dual-tone fanfare	-	x	x	xx
30 Ah battery	x	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
Single seat in red red or black	-	x	x	xx
Engine protection bars[1]	x	x	x	xx
Engine spoiler	-	x	x[2]	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	-[3]	xx

	K 75	K 75 C	K 75 S	Special equipment, retrofittable
Luggage rack	o	x	x	xx
Set of integral cases with supports	x	x	x	xx
Set of city cases with supports	x	x	x	
Topcase[4]	x	x	x	xx
Knee-padding	-	x	x	xx
Super toolkit	x	x	x	xx[5]
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] = not in conjunction with spoiler

[2] = standard on K 75 S special models

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

[4] = only in conjunction with luggage rack

[5] = supplementary toolkit

Special equipment (ex factory)

	K 100	K 100 RS	K 100 RT	K 100 LT	Special equipment, retrofittable
Temperature and fuel indicator	-	x	x	x	xx
Hazard warning lights	x	x	x	o	xx
Digital clock	x	o	o	o	xx
Dual- tone fanfare	x	o	o	o	xx
30 Ah battery	x	x	x	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
High handlebar	x	-	o	o	xx
Splashguard at rear	x	x	x	x	xx
High-comfort seat	x	-	x	o	xx
Single seat	x	x	-	-	xx
Engine protection bars	x	x	x	x	xx
Side-stand, automatic	x	x	x	x	xx
Windshield	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
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[1]	x	x	x	o	xx
Knee-padding	x	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 = only in conjuncion with luggage rack
2 = supplementary toolkit

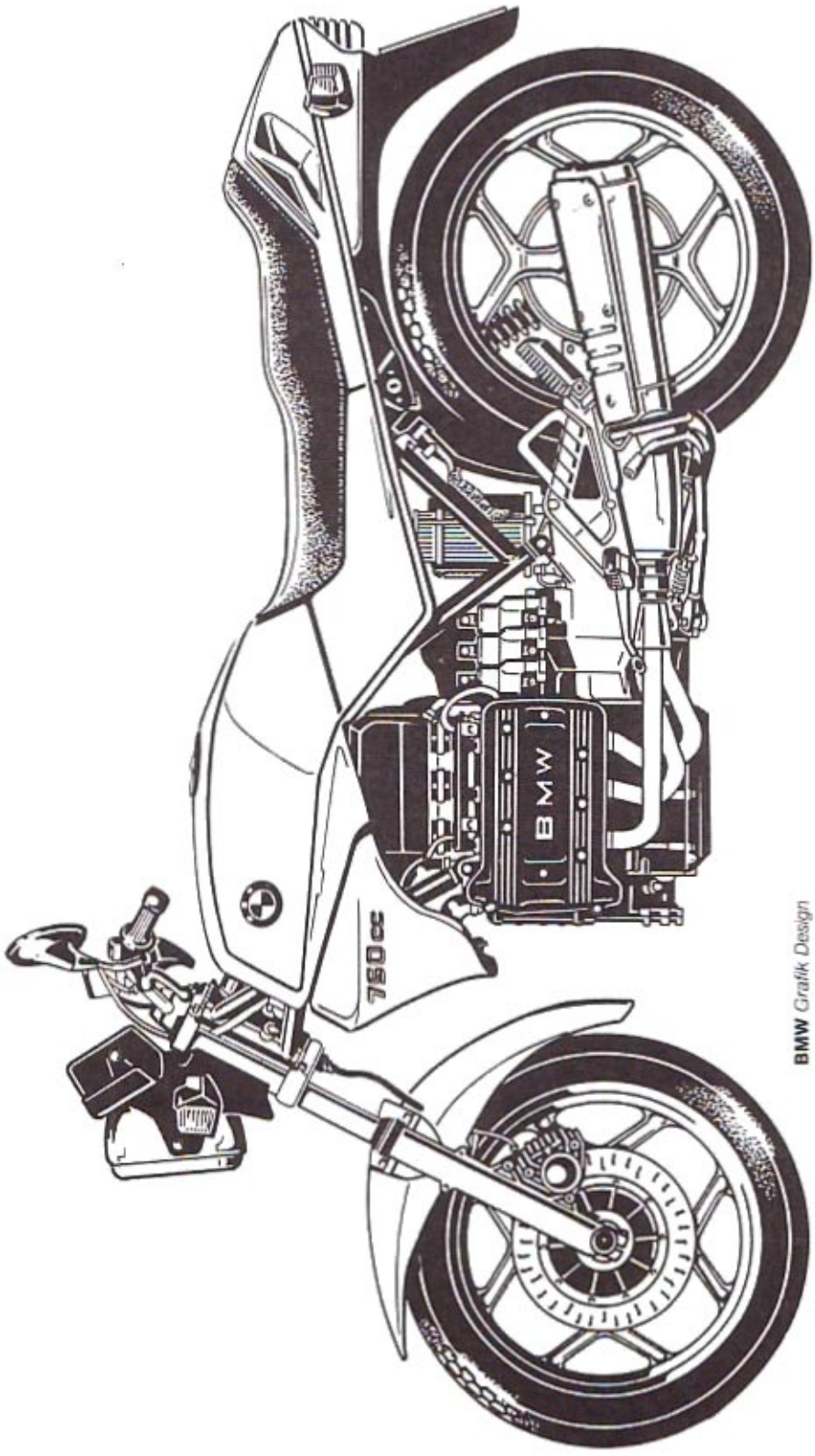
Other special equipment for all K 75 and K 100 models

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)
Set of city cases with supports	
Luggage roll	
Multivario K tank bag	
Citybag	

	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	12/20	12/20		
	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	620		
	Seat height	mm	810	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		
	Standard features		Repair kit, toolkit K 75: luggage rack	Repair kit, toolkit, digital clock		

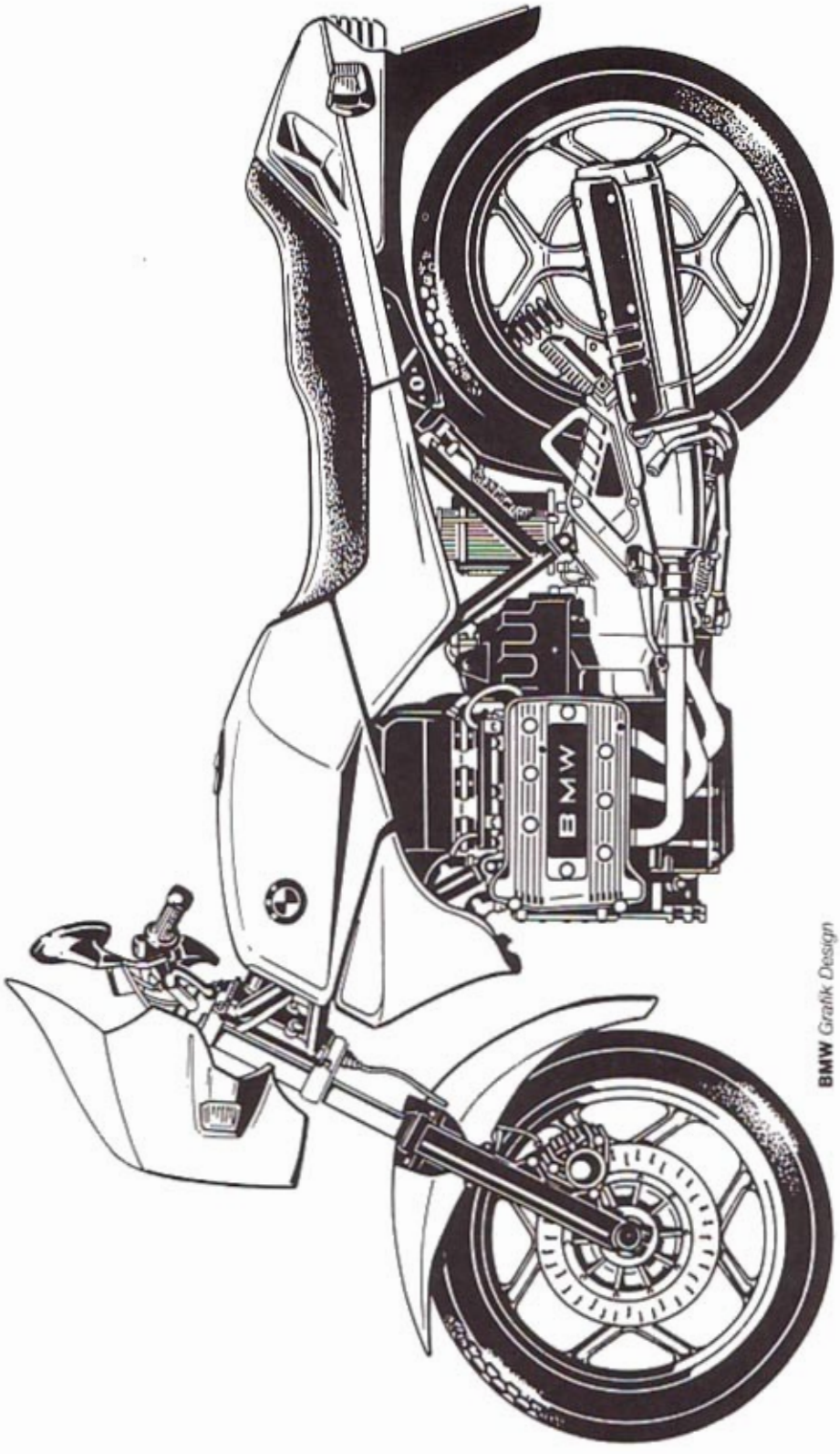
	SPECIFICATIONS BMW MOTORCYCLES		K 100	K 100 RS	K 100 RT and K 100 LT	
Engine	Cubic capacity	cc	987	987	987	
	Bore/stroke	mm	67/70	67/70	67/70	
	Max output	kW/bhp	66/90	66/90	66/90	
	at	rpm	8000	8000	8000	
	Max torque	Nm	86	86	86	
	at	rpm	6000	6000	6000	
	Design		inline	inline	inline	
	No of cylinders		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	34/30	34/30	34/30	
	Fuel supply		LE-Jetronic	LE-Jetronic	LE-Jetronic	
Electrical system	Ignition		VZ-51 L digital ignition			
	Alternator	W	460	460	460	
	Battery	V/Ah	12/20	12/20	12/20	
	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			
	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	730	690	770	
	Seat height	mm	810	810	810	
	Weight, unladen with full tank	kg	239	253	263	
	Max permissible weight	kg	480	480	480	
	Fuel tank	ltr	22	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 aerodynamically optimized sports fairing (glass-fibre-reinforced plastic)	Multi-piece aerodynamically optimized 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 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



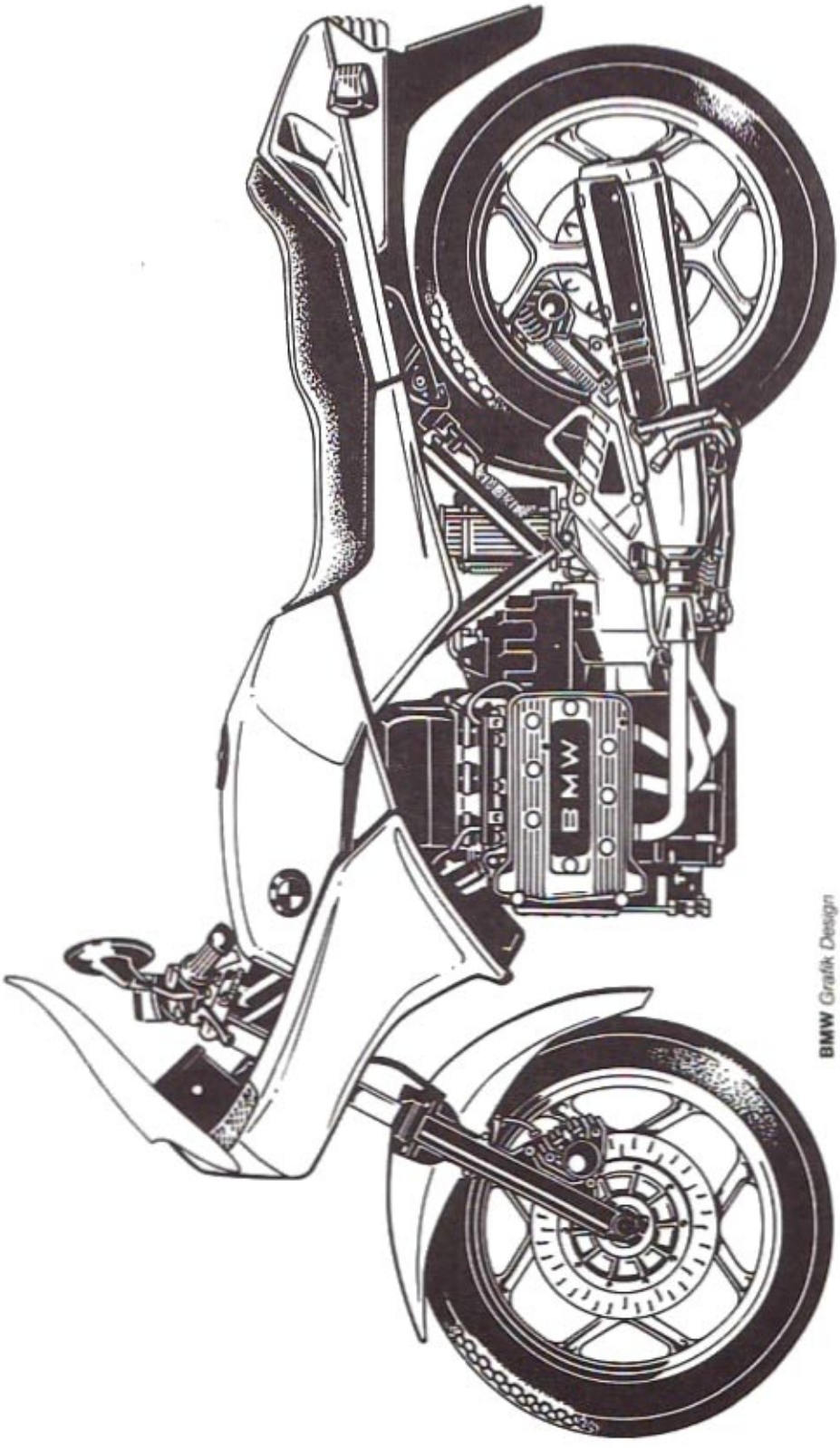
BMW *Grafik Design*

BMW K 75 C	R 86/2



BMW Grafik Design

BMW K 75 S	R 86/3



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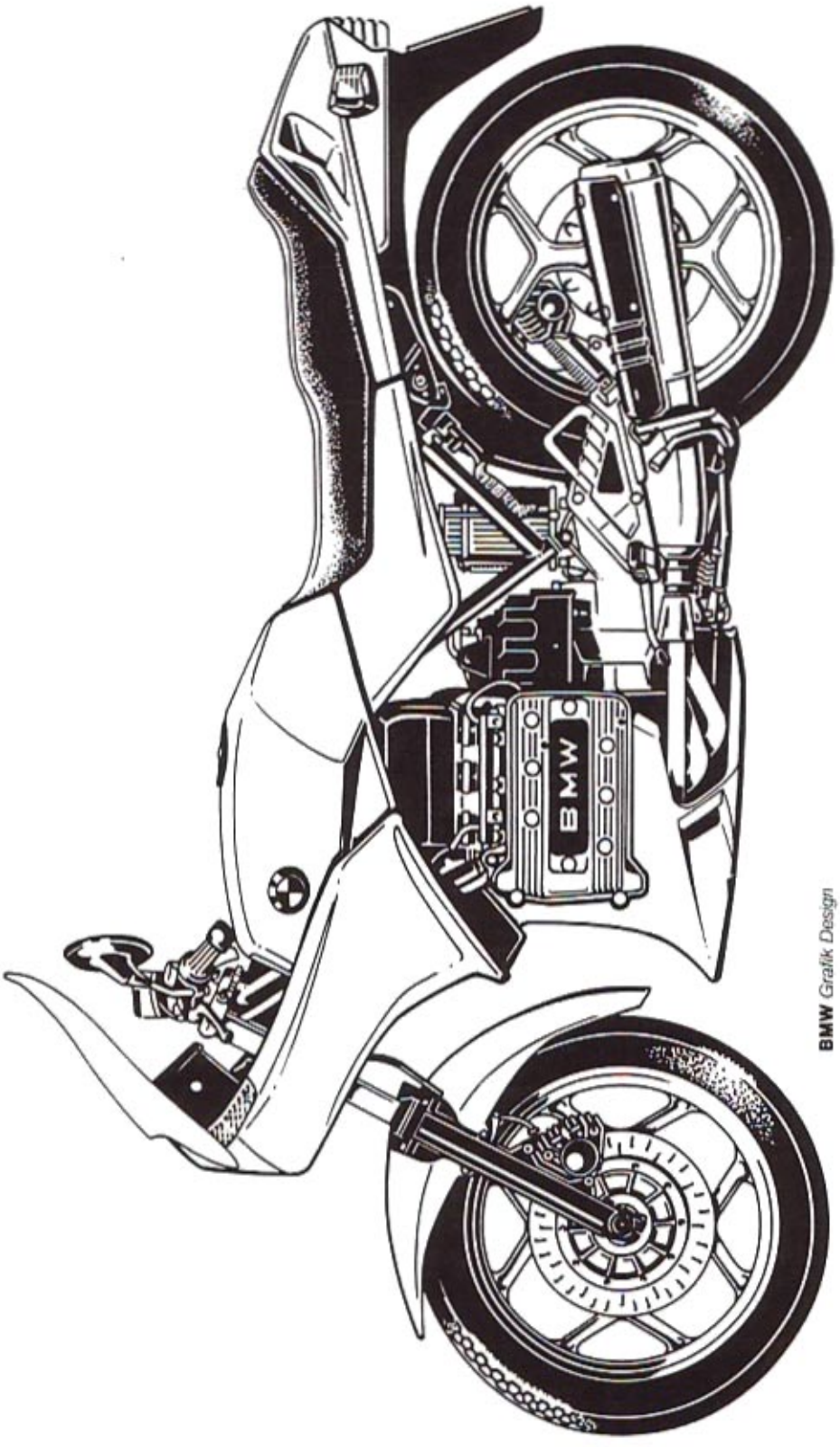
BMW K 75 S	R 86/4



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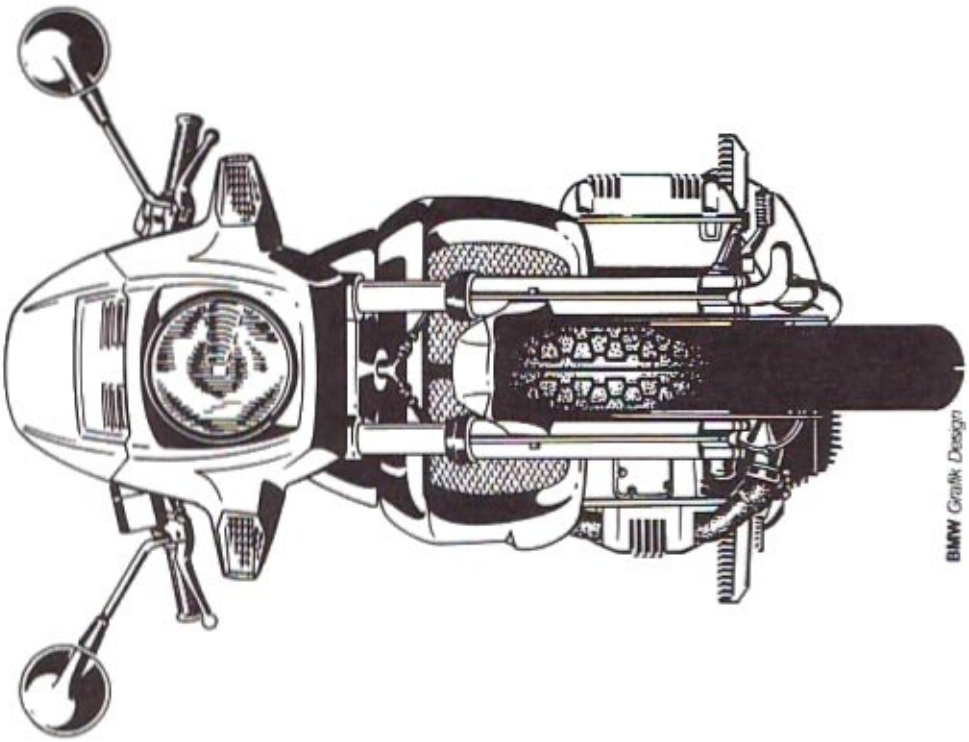
BMW K 75 C	R 85/3



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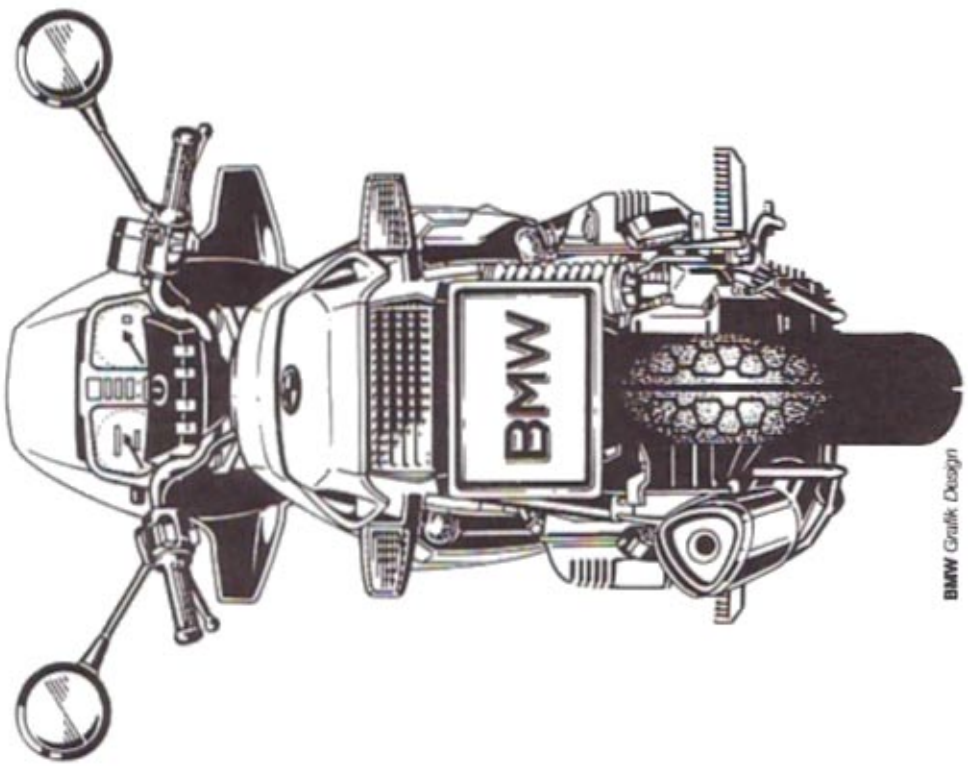

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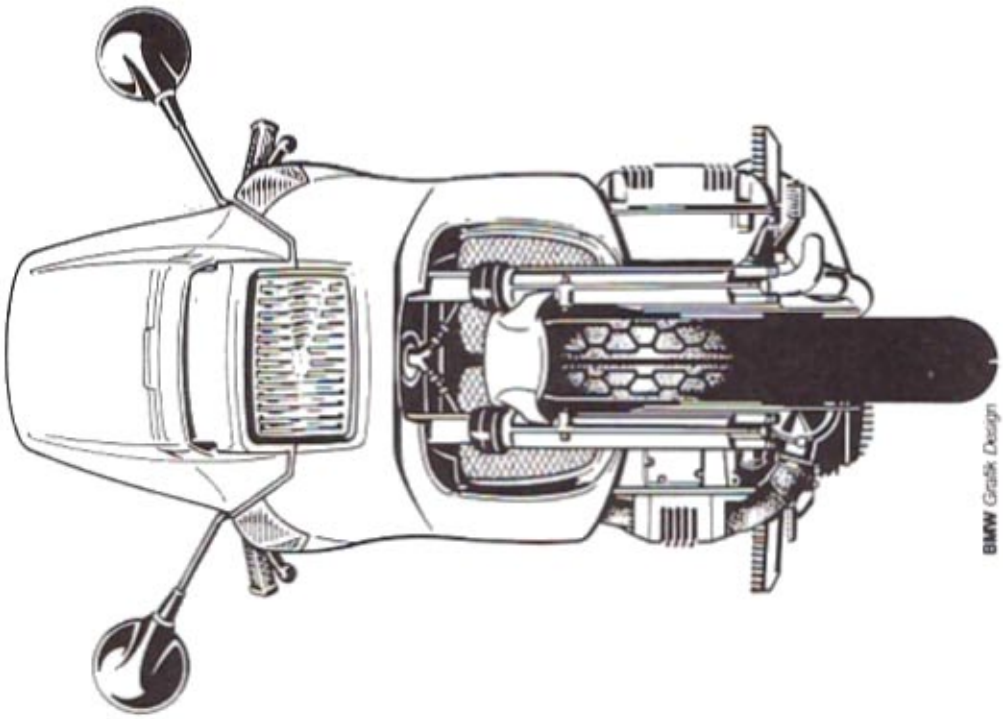

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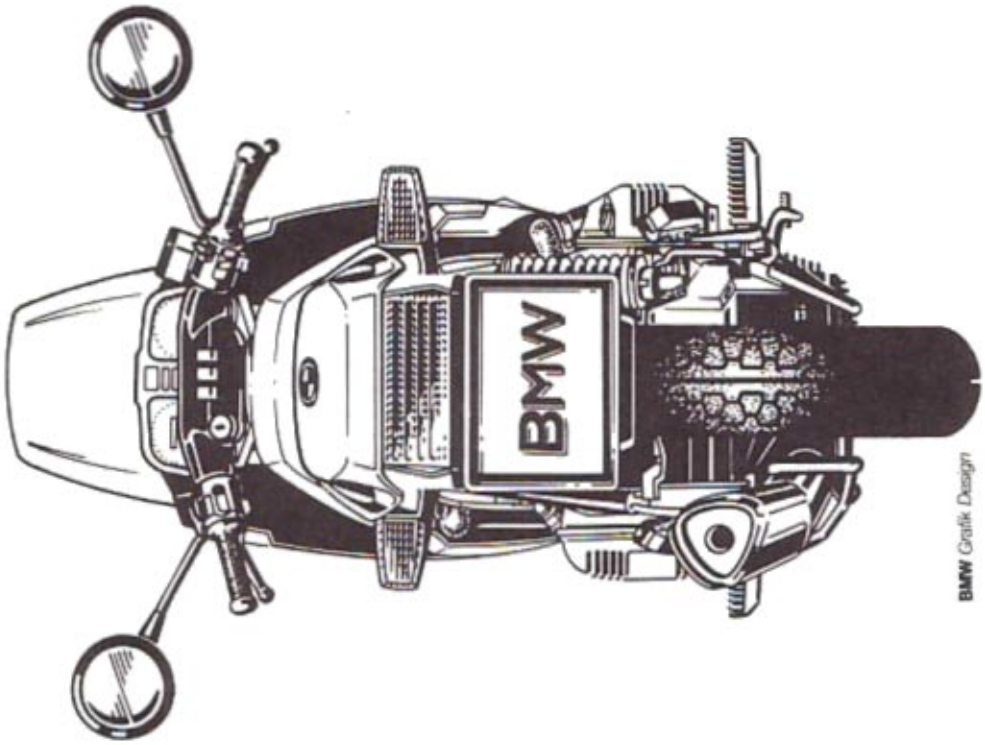
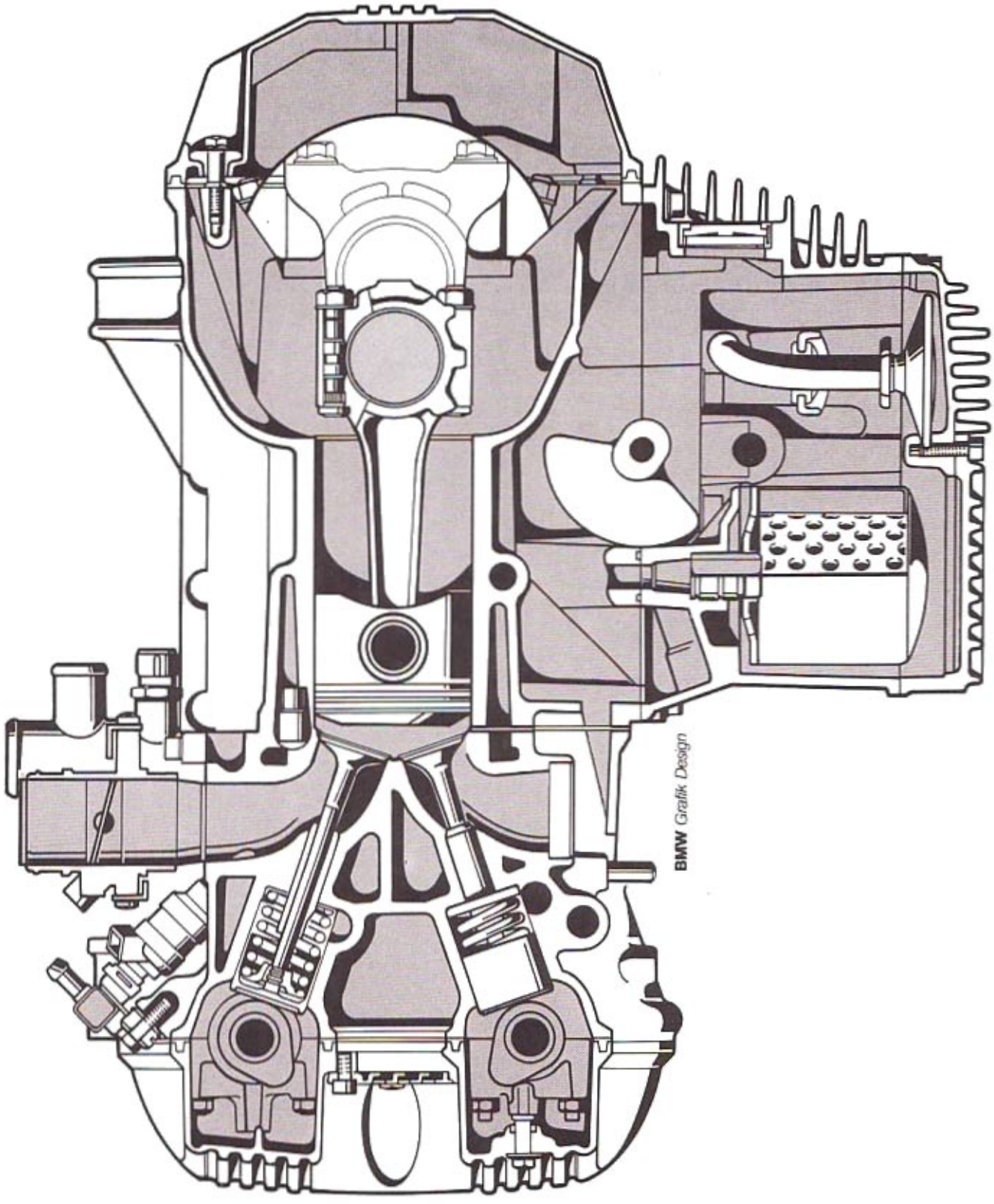


BMW Grafik Design

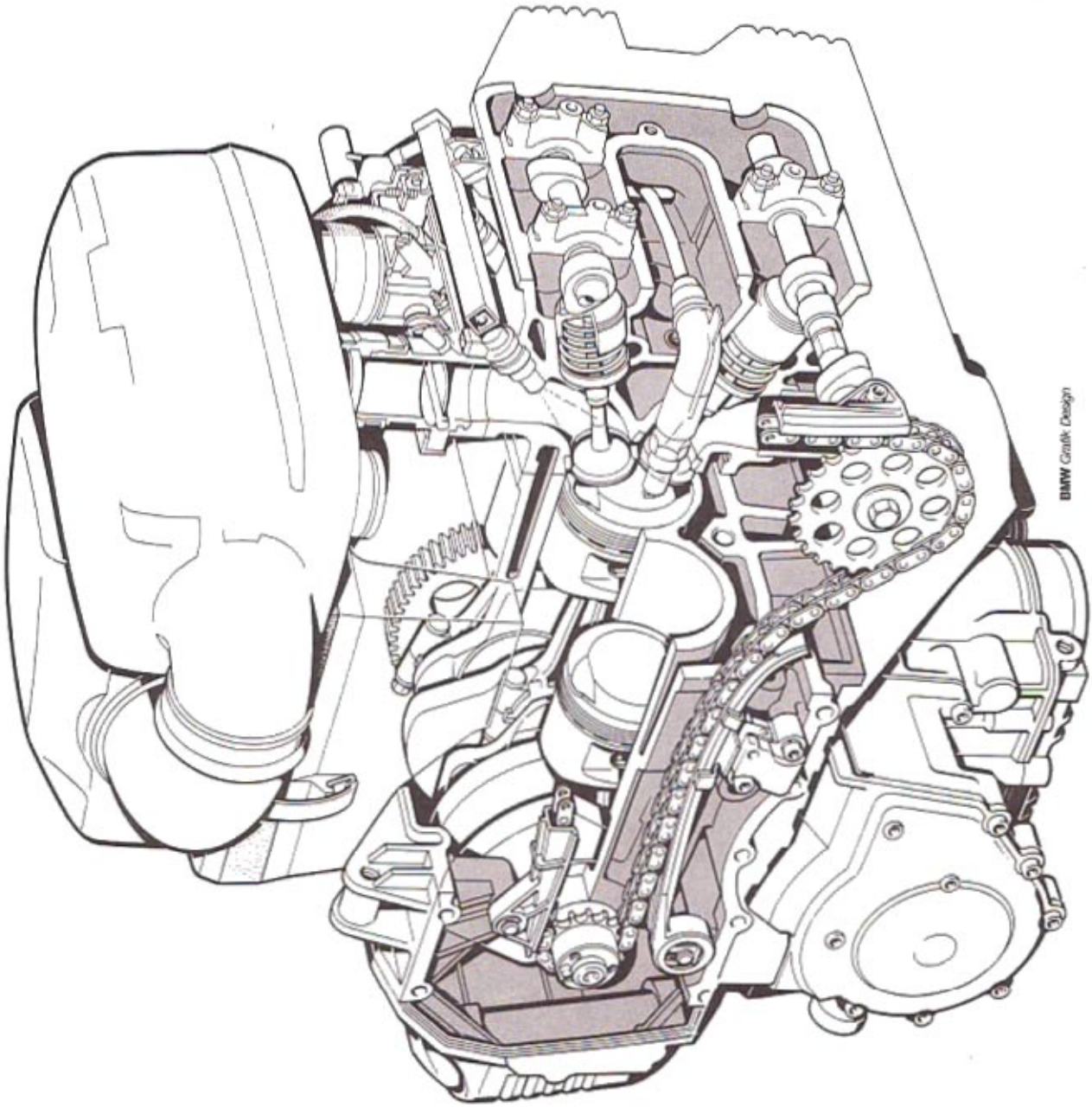
BMW K 75
Motorquerschnitt (von vorn)

R 85/5



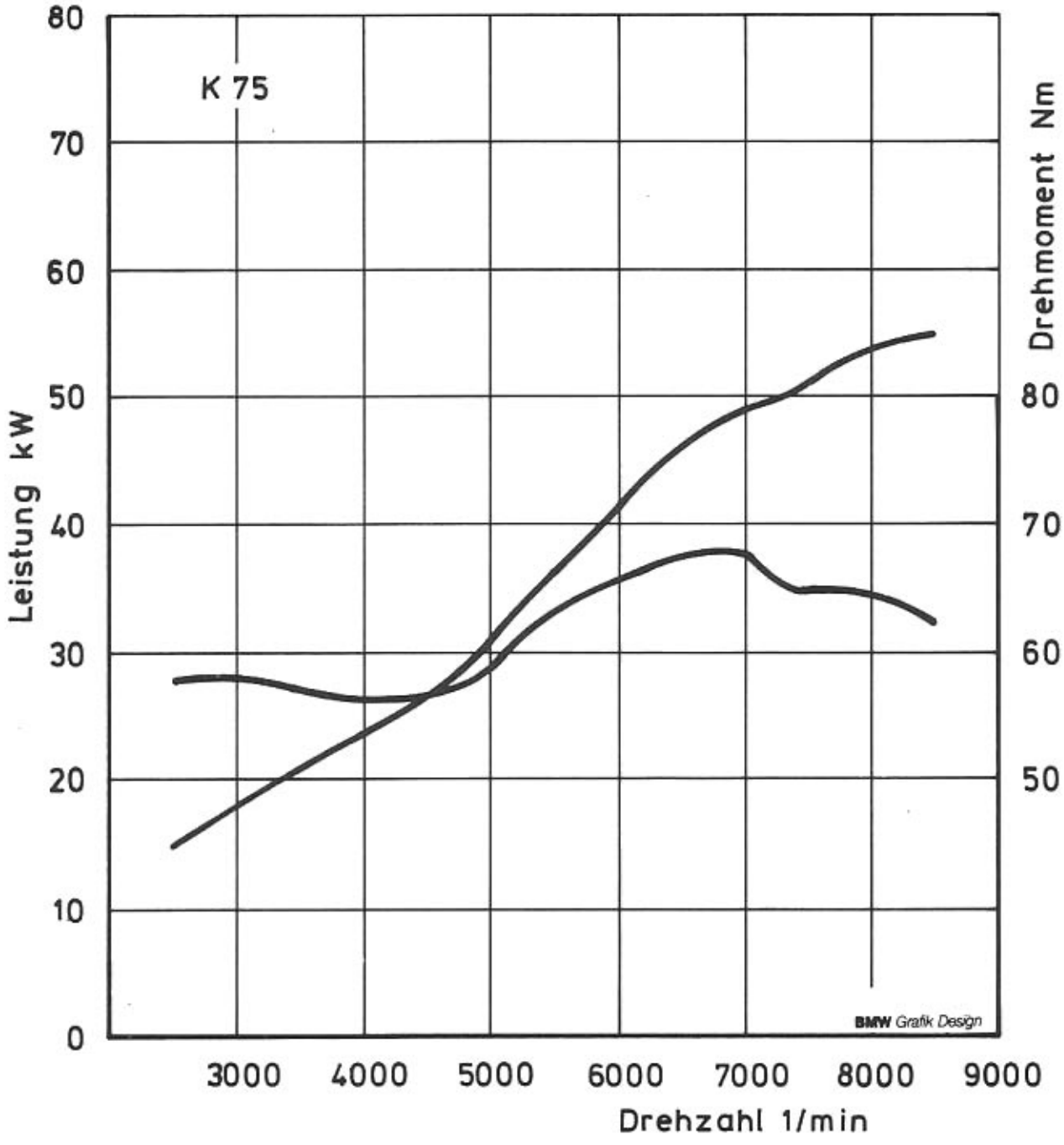
BMW K 75
Motorquerschnitt (von hinten)

R 85/6



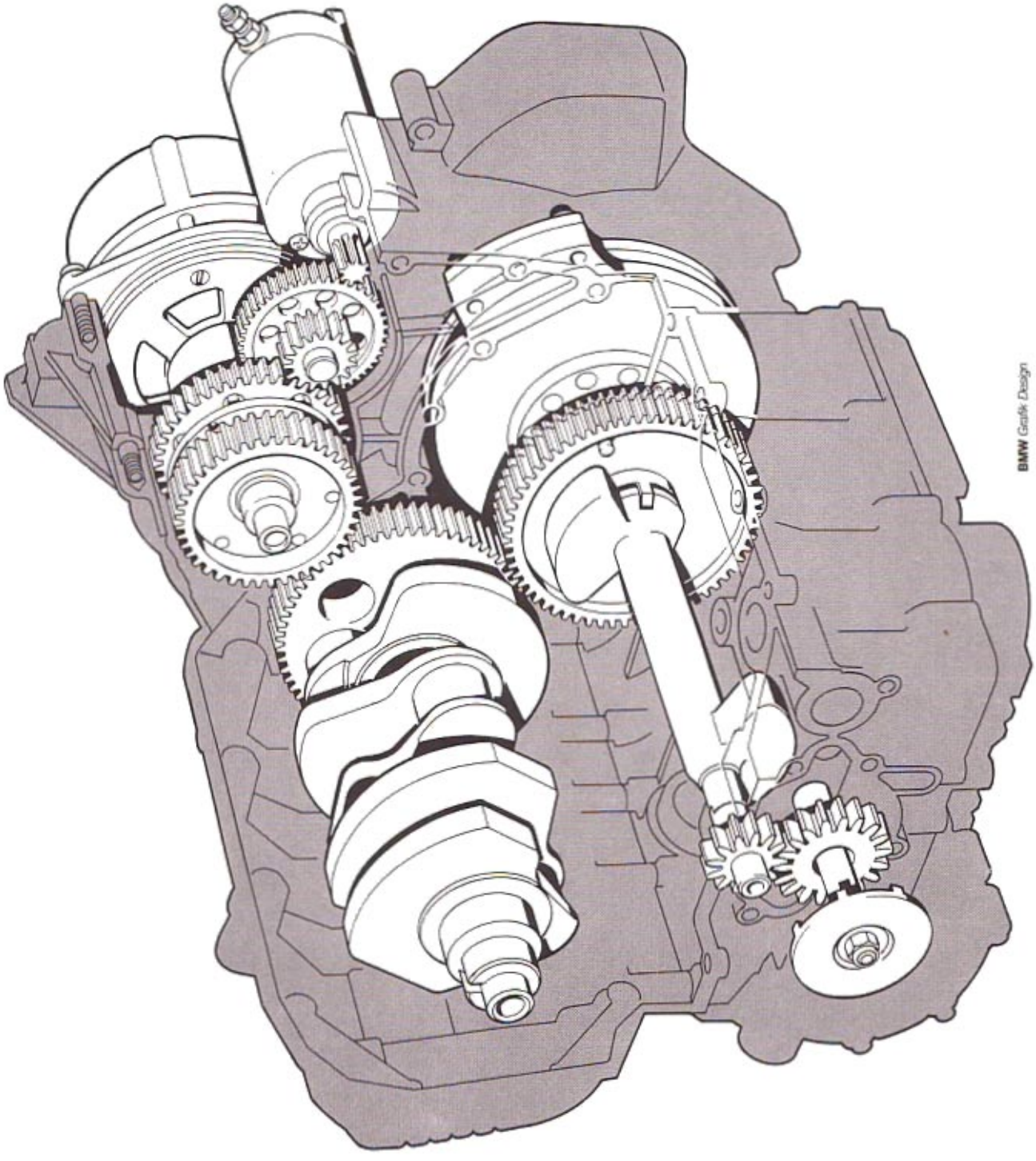
BMW K 75
Leistungs- und Drehmomentdiagramm

R 85/7



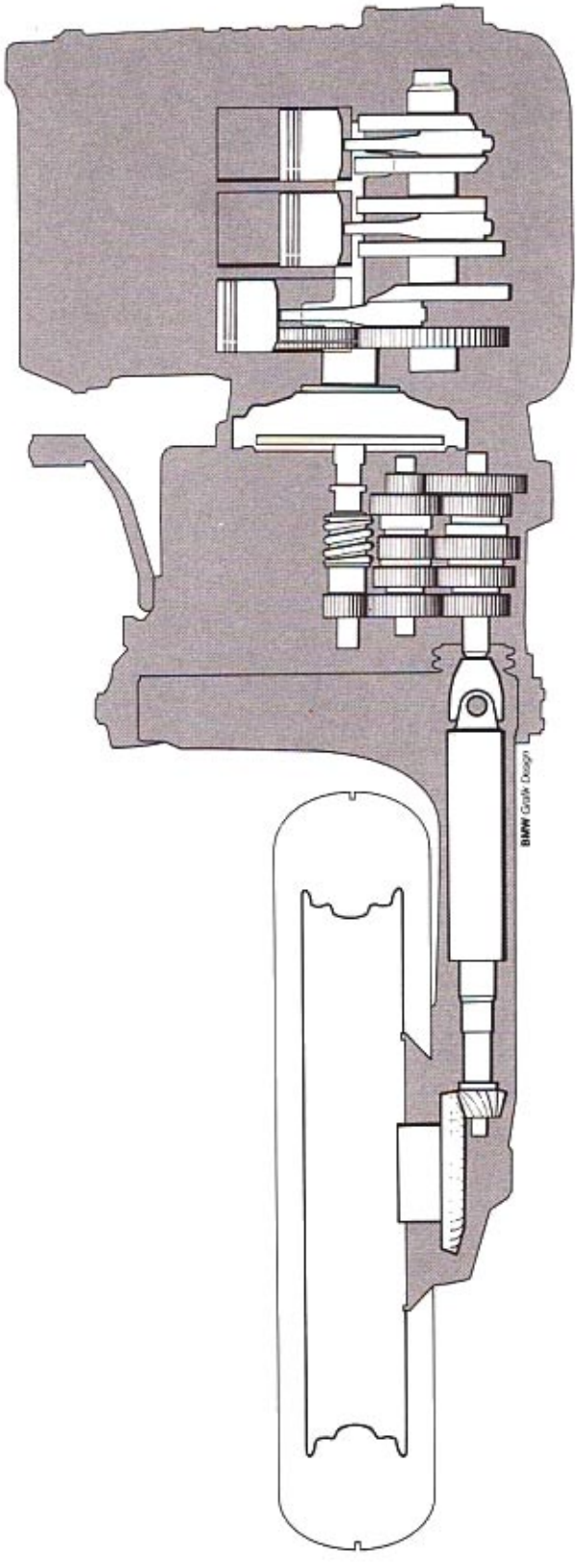
BMW K 75
Motor (Kurbelwelle, Abtriebswelle, Anlasser und Lichtmaschine)

R 85/8



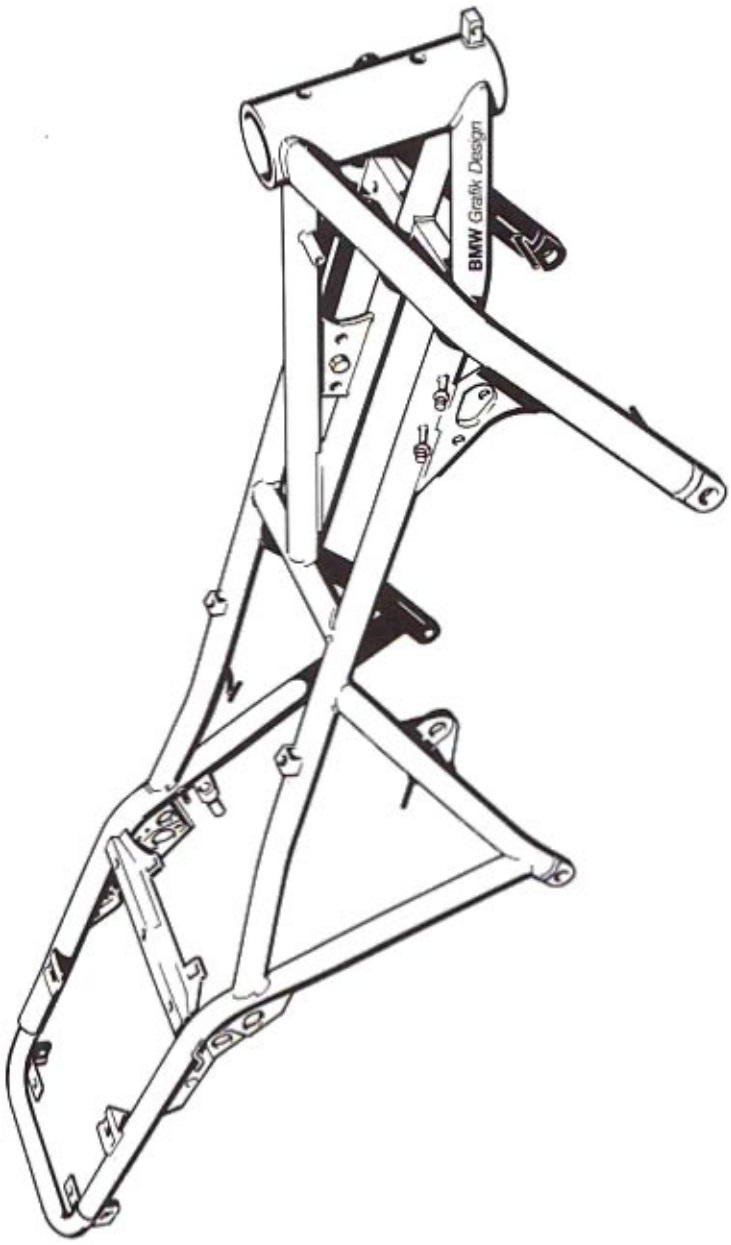
BMW K 75
BMW Compact-Drive System

R 85/9



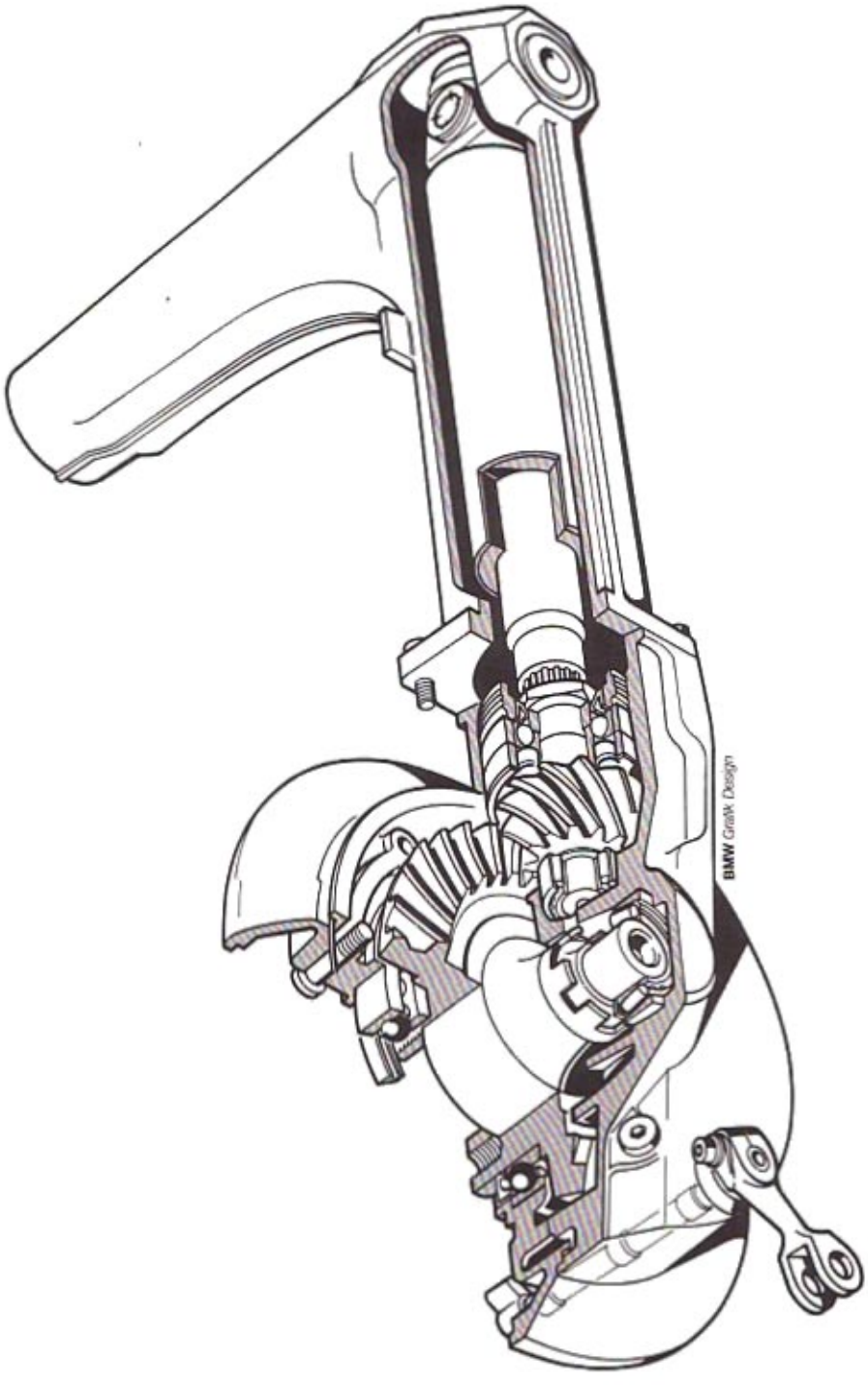
BMW K 75
Brückenrahmen in Fachwerkkonstruktion

R 85/10



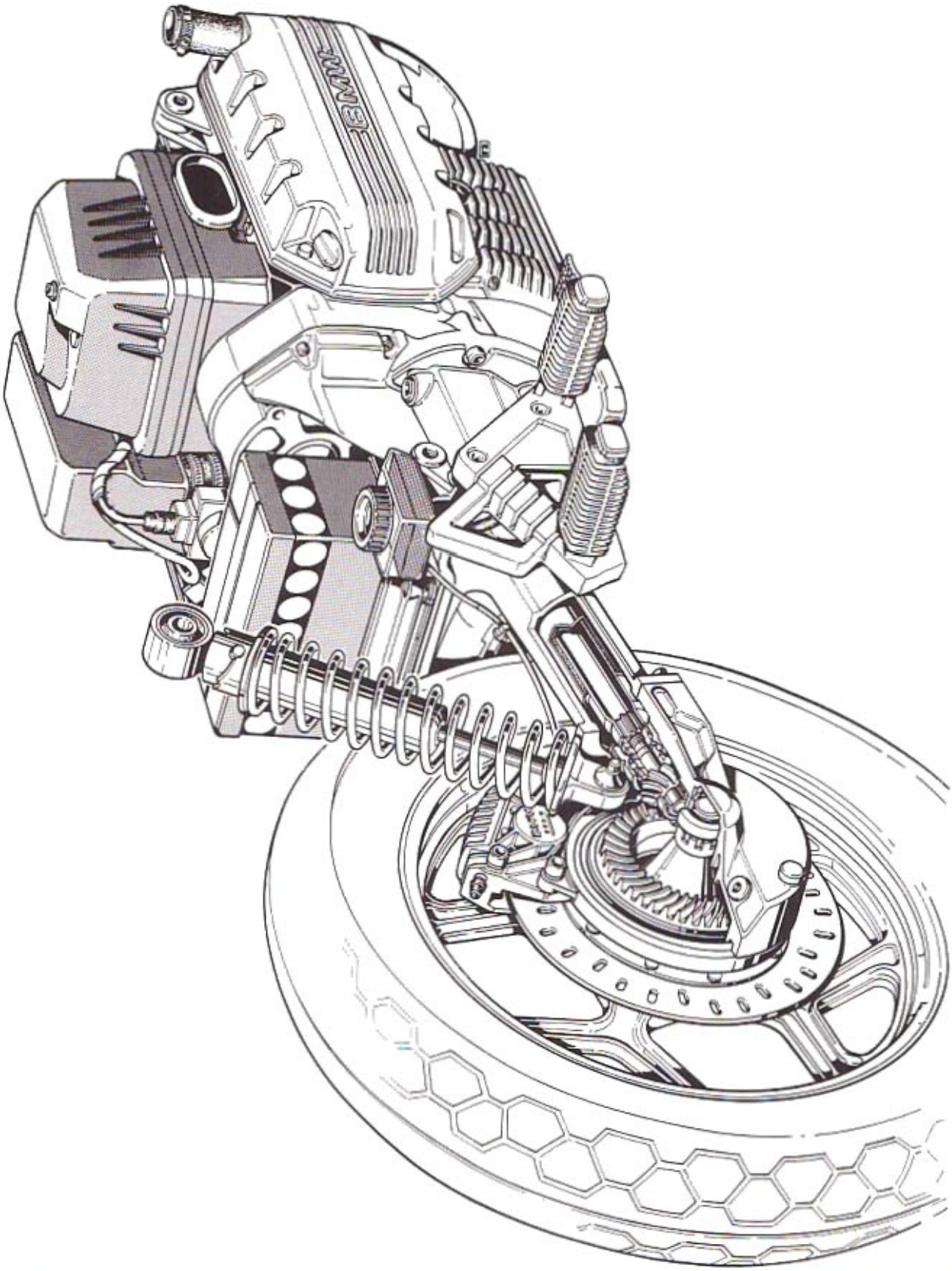
BMW K 75
Einarmschwinge (BMW Monolever) mit Hinterradantrieb

R 85/11

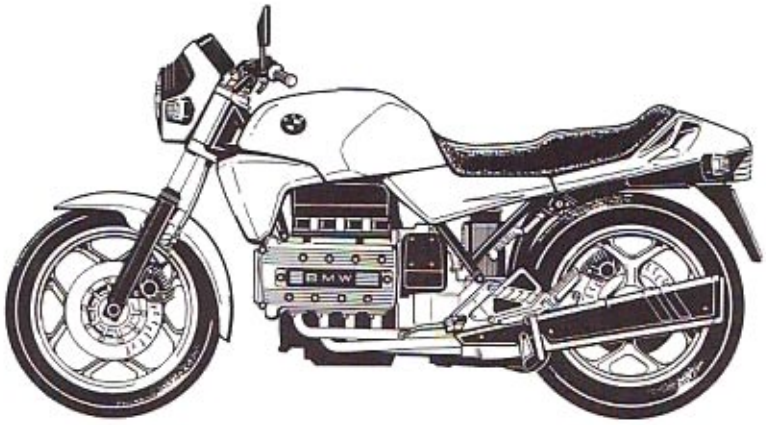


BMW K 75
Compact Drive System (Schnitt)

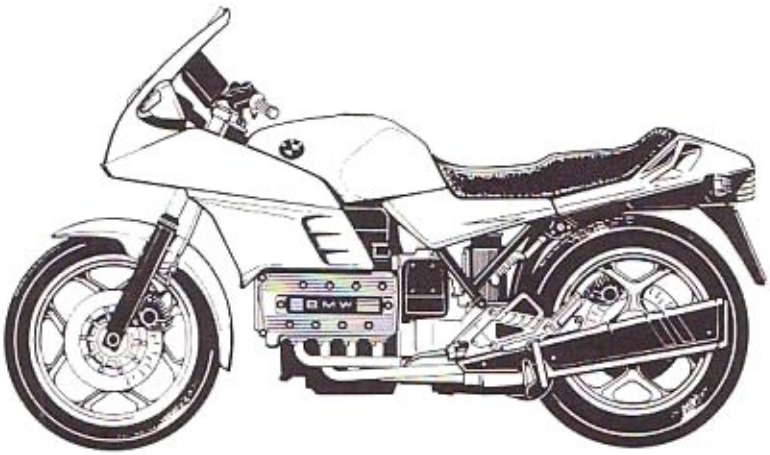
R 85/12



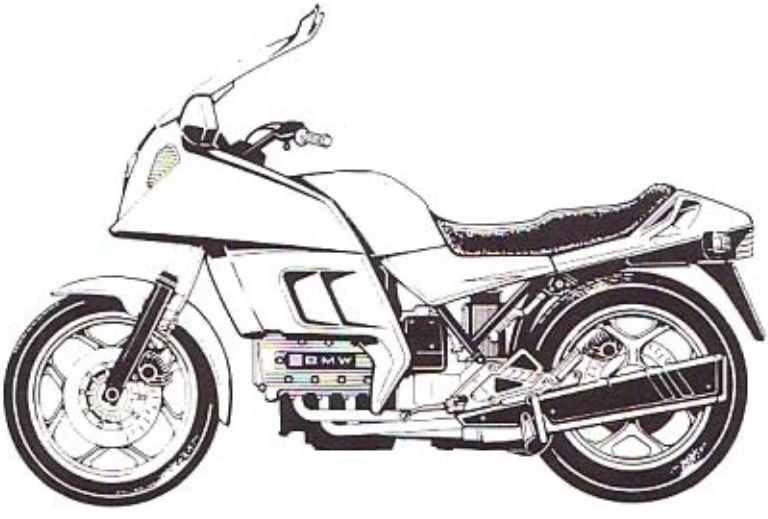
BMW Motorräder K 100 / KS 100 RS / K 100 RT	R 85/13



K 100



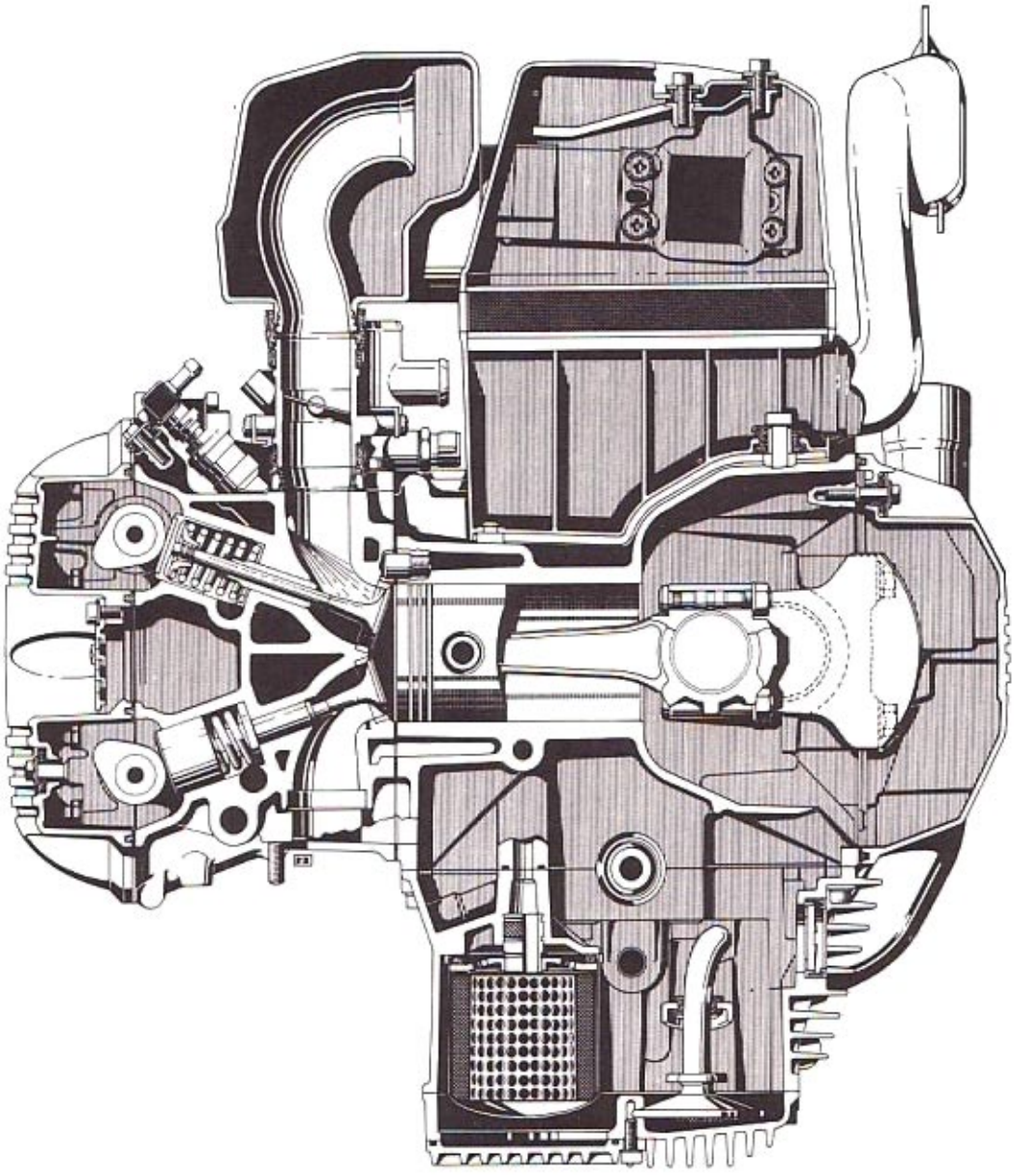
K 100 RS



K 100 RT

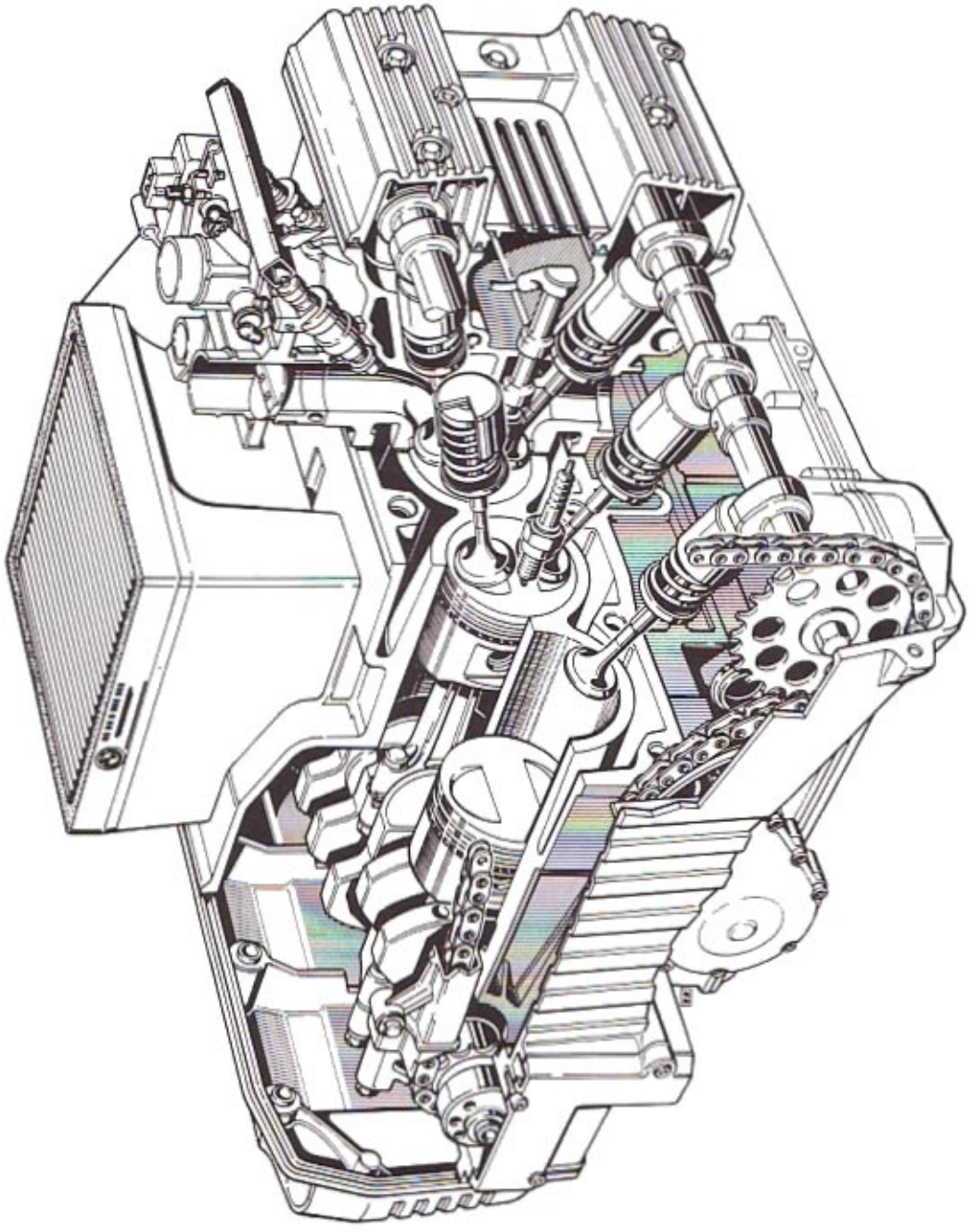
BMW K 100
Motorquerschnitt (Ansicht von hinten)

R 83/10



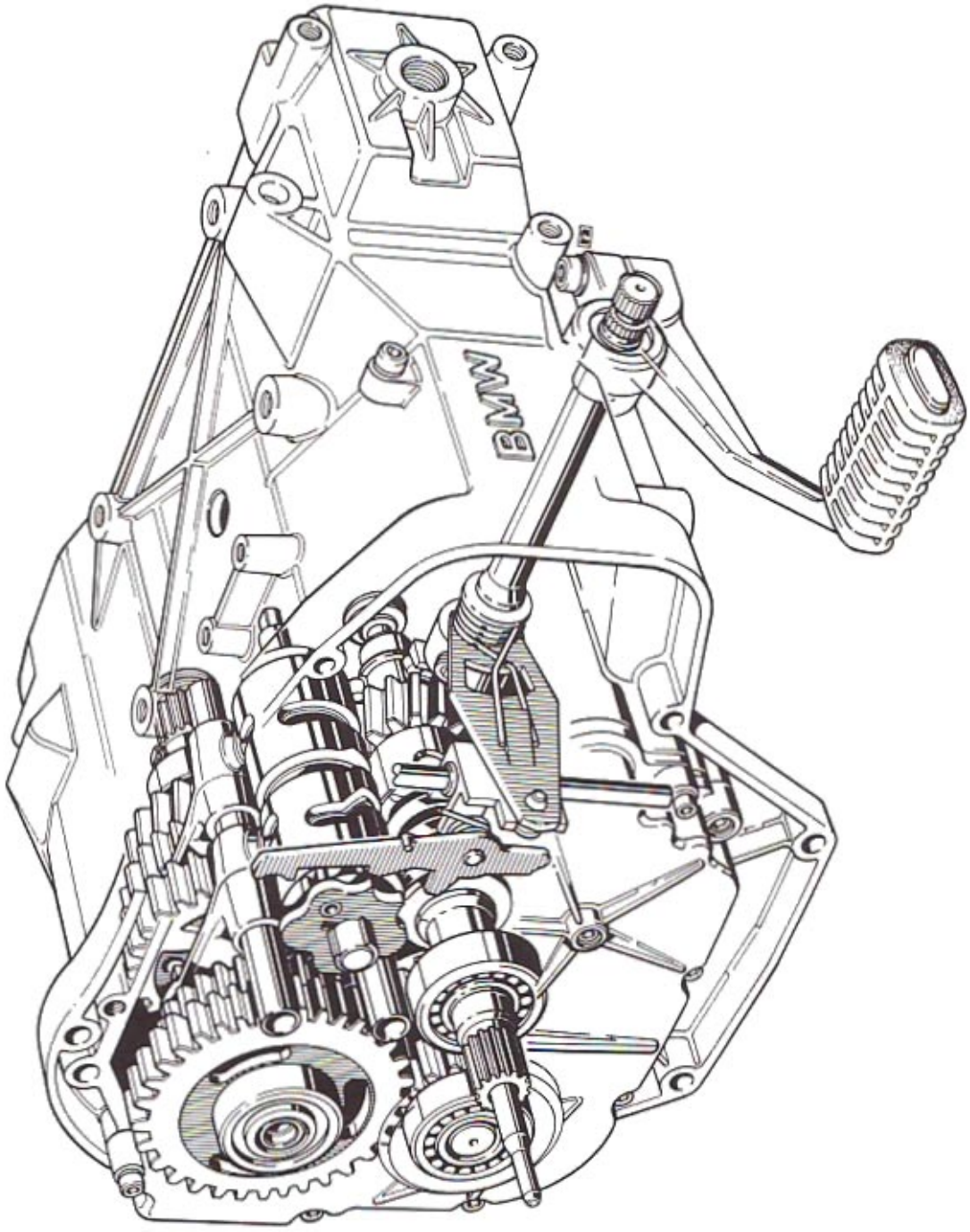
BMW K 100
Motorschnittbild

R 83/11



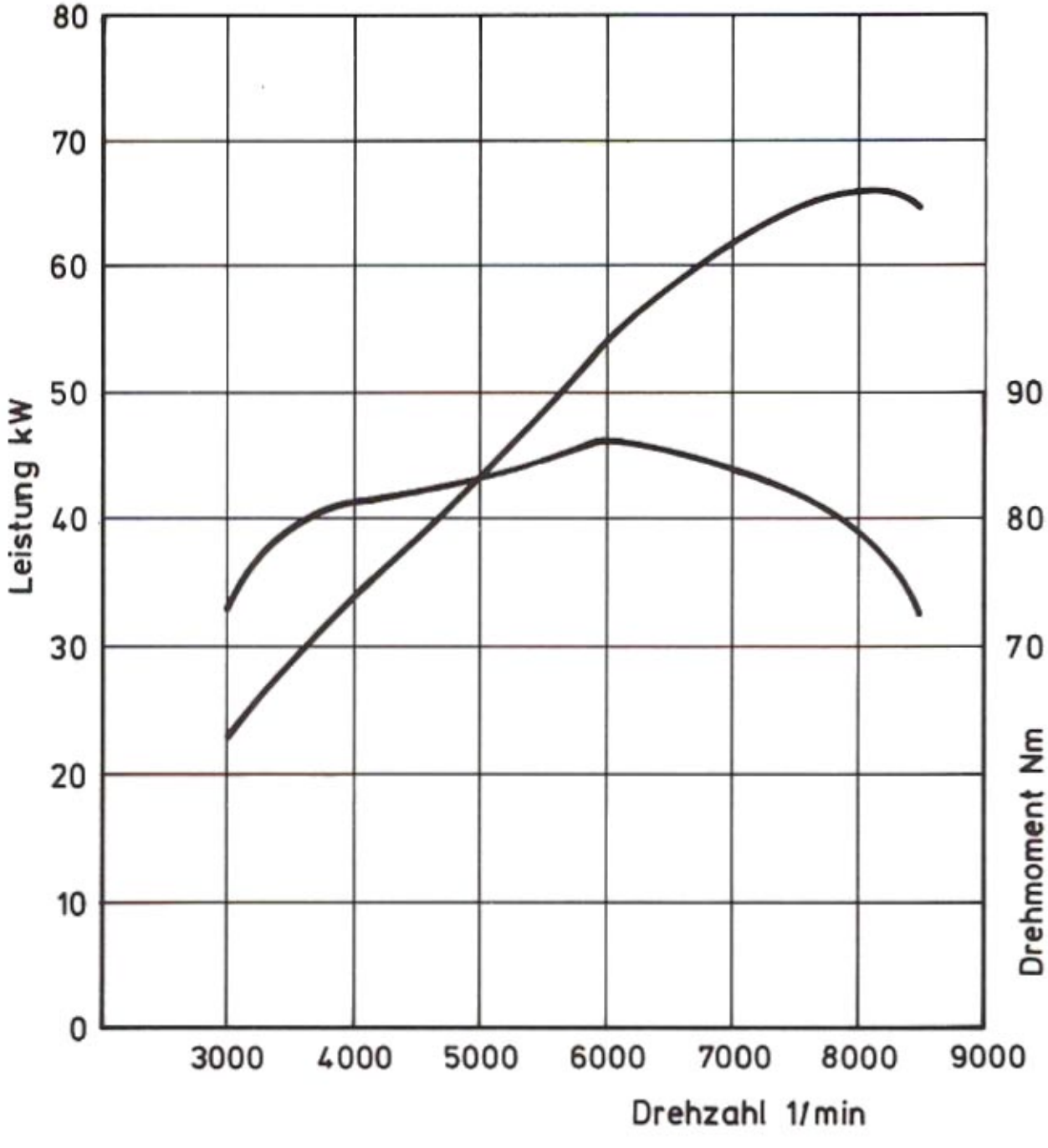
BMW K 100 und K 75
5-Gang-Schaltgetriebe

R 83/12



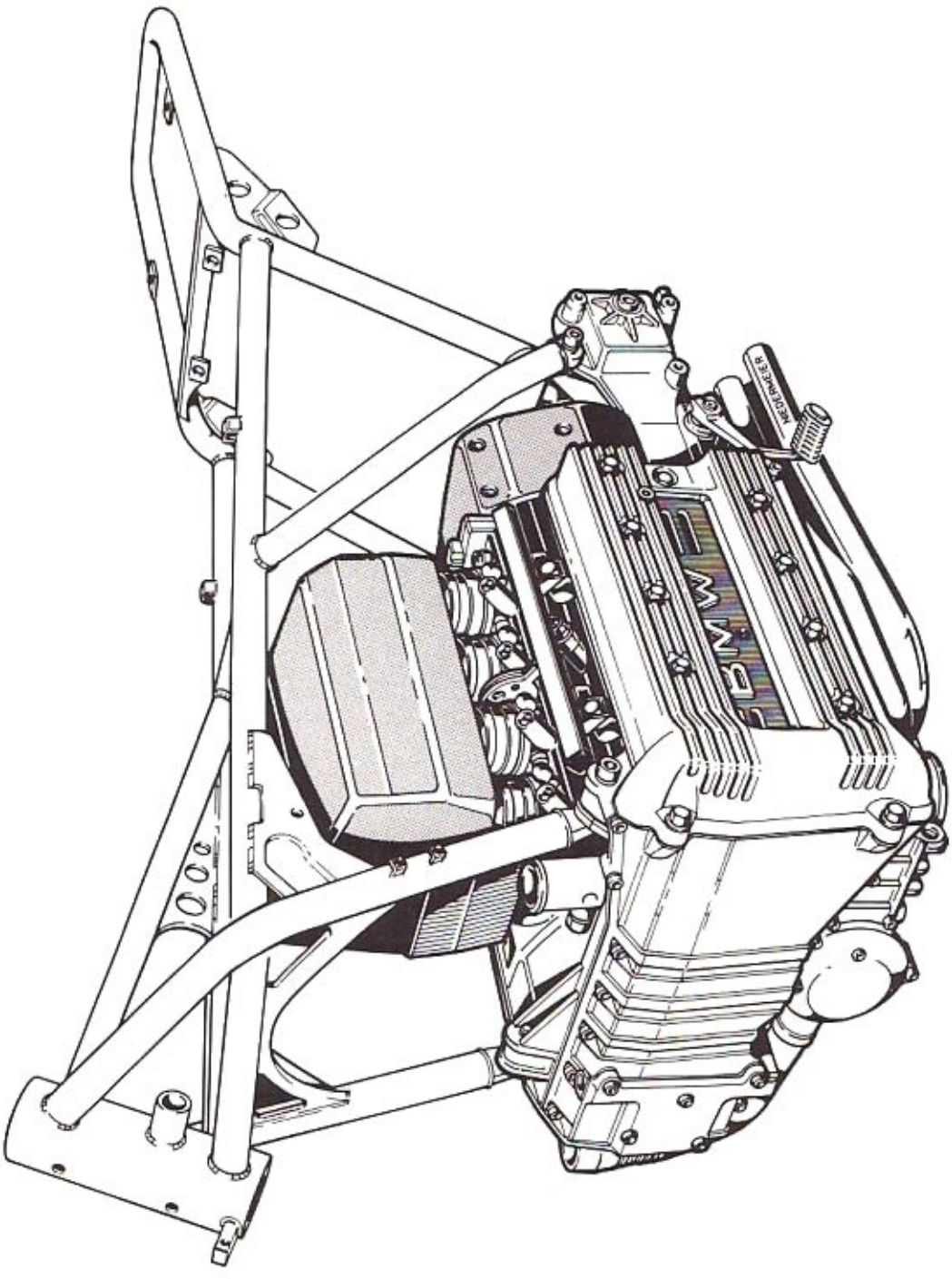
BMW K 100
Leistungs- und Drehmomentdiagramm

R 83/13



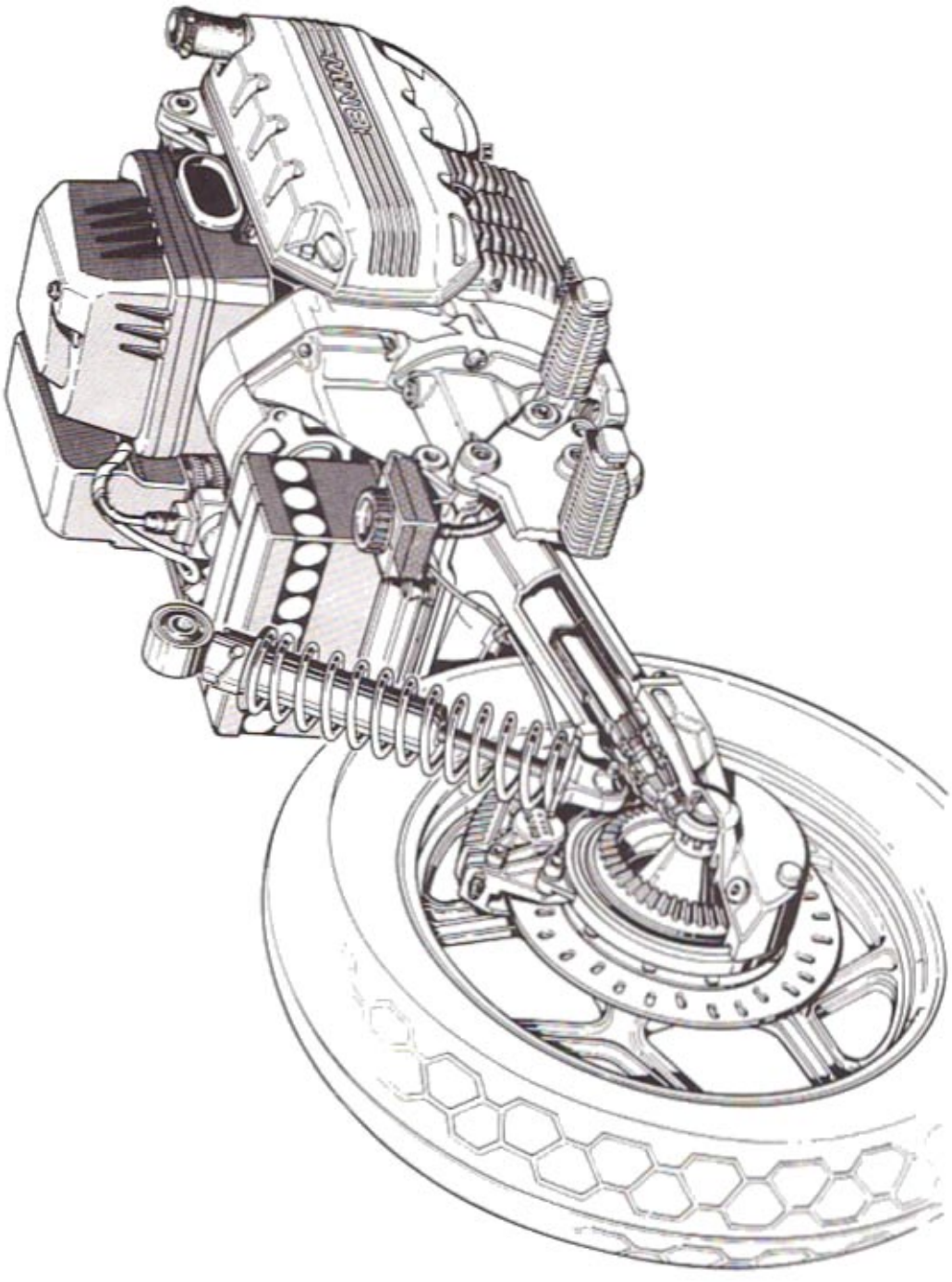
BMW K 100
Brückenrahmen in Fachwerkkonstruktion mit Motor und Antriebsblock als mittragendes Element

R 83/14



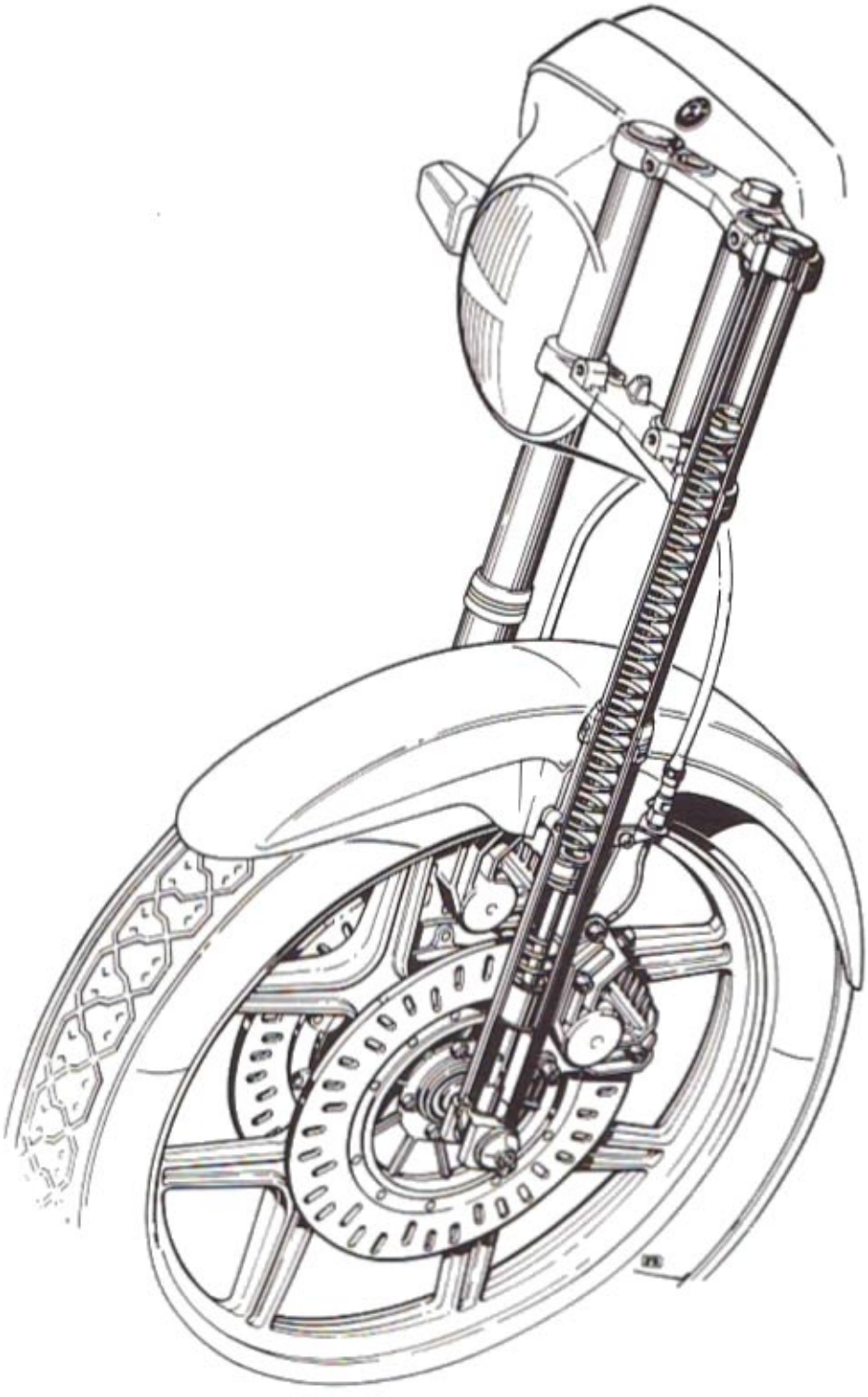
BMW K 100
Compact Drive System

R 83/15



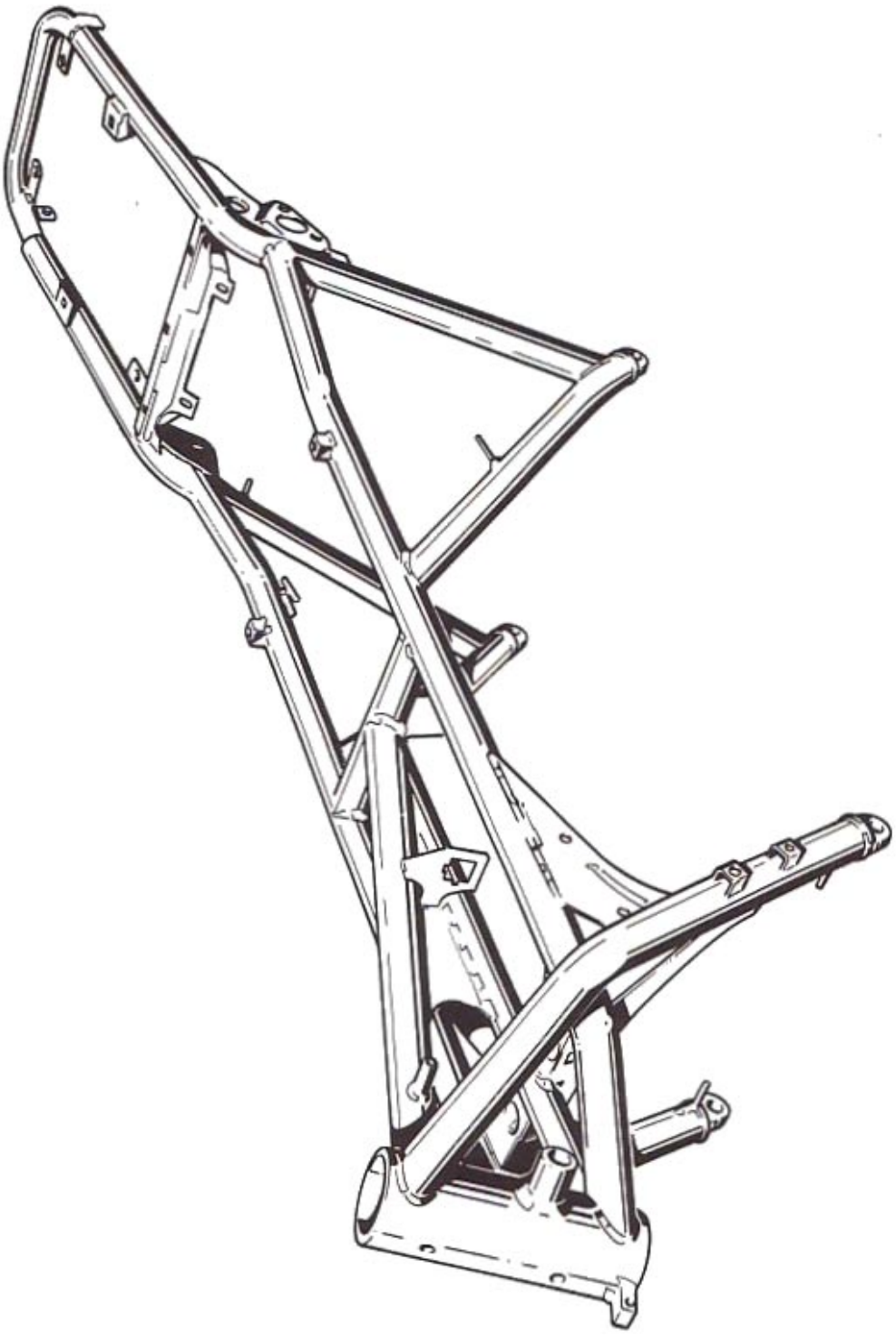
BMW K 100
Vorderrad mit Teleskopgabel

R 83/16



BMW K 100
Brückenrahmen in Fachwerkkonstruktion

R 83/17



THE R SERIES FLAT-TWIN MODELS

Come-back of a classic: R 100 RS

While the BMW K-generation has already proved to be an overwhelming success in the market, the proven but still young-at-heart BMW flattwin has certainly been able to hold its own. Just to brush up your memory the R 100 series had to make way for BMW's new top models when the K 100 series premiered in autumn 1983. From that time onwards, 800 cc and 50 bhp were the limit in the flat-twin range. Two modernized 800 cc models, the R 80 and R 80 RT, were then launched in 1984, featuring a monolever swinging arm like the R 80 G/S and K 100 models. In 1985 the flat-twin range was then supplemented at the bottom end by a new model for achievers, the R 65. Now the flat-twin family welcomes a new "king" in the 1987 model year: the R 100 RS.

One-litre in limited edition

Re-introducing the R 100 RS in a new edition limited for the time being to 1,000 units, BMW is making allowance for the great demand of flattwin enthusiasts for the one-litre flat-twin engine. The new version of this engine, incidentally, is also suited for running on unleaded regulargrade fuel. Like all other BMW motorcycles, it already fulfills the ECE R 40 European emission limits not to take effect until 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 the 2-cylinder of 74 Nm (55 ft/lb) now comes at just 3500 rpm (versus 52 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.

With the latest technical features

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 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. This provides 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). Compared with the needle bearing used previously, the bevel-gear drive is more reliable and can take a higher load. Like all BMW motorcycles, the R 65 now 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 (35 kW) engines follow BMW's motto of offering "ample power from large displacement" and 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.

R 80 G/S: the adventure bike

The R 80 G/S is the ideal motorcycle for adventure tours. Whether on asphalt roads or off the beaten track, the R 80 G/S always feels at home. Its special on and off-road tyres allow a top speed of 170 km/h (105 mph). This is therefore the ideal machine for individualists in search of their own route.

Launched in 1980, the R 80 G/S was the first BMW motorcycle with monolever. In competition trim the R 80 G/S won the Paris-Dakar Rally, the world's toughest long-distance race, for the fourth time in 1985.

The legend that already surrounds the "evergreen" R 80 G/S is underlined by the fact that the readers of MOTORRAD, Europe's largest motorcycle journal, have chosen this machine as the "Enduro of the Year" no less than 5 times.

Special Paris-Dakar version of the R 80 G/S:
Now available in the third edition

Based on the winning BMW ridden by Gaston Rahier, the Belgian ex-world champion in moto cross, in the 1984 and 1985 Paris-Dakar Rally, BMW has created a special limited-edition version of the R 80 G/S, now followed by the third edition to satisfy the great demand.

This special model differs from the standard R 80 G/S by its 32-ltr (7 gal) fuel tank, Alpine-white paintwork signed by Gaston Rahier, knee-guard padding, Paris-Dakar emblem and two fuel petcocks, a particularly comfortable single seat (in red), a large luggage rack and a chrome-plated exhaust pipe with matt-black cover. It is equipped with Michelin T 61 tyres, cylinder protection bars and side-stand.
Special parts (fuel tank, solo seat, luggage rack) are available either individually or as a kit for retrofitting the R 80 G/S.

Special equipment (ex factory)

	R 65	R80G/S	R 80	R80RT	R100RS	Special equipment, retrofittable
Voltmeter with quartz clock	-	-	-	x	o	xx
Voltmeter with quartz clock and support	x	-	x	-	-	xx
Hazard warning lights	x	-	x	x	x	xx
2 folding headlights	-	-	-	x	-	-
Quartz clock	-	x	-	-	-	xx
Rev counter	o	x	o	o	o	xx
Dual-tone fanfare	x	-	x	x	o	-
30 Ah battery	x	-	x	x	o	xx
Heatable grips	x	x	x	x	x	xx
High handlebar	x	-	x	o	-	xx
Self-levelling	x	-	x	x	x	xx
Dual disc brakes	x	-	x	x	o	xx
Kickstarter	-	x	-	-	-	-
Splashguard at rear	x	x	x	x	x	xx
Windshield	x	-	x	-	-	xx
Luggage rack	x	x	x	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

	R 65	R80G/S	R 80	R80RT	R100RS	Special equipment, retrofittable
Low seat	x	x	x	x	x	xx
Black seat[1]	-	.	-	-	-	-
Cylinder protection bars	x	-	x	x	x	xx
Cylinder protection bars with built-in side-stand	-	x	-	-	-	xx
Super toolkit	x	x	x	x	x	xx[2]
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] = standard seat blue or red

[2] = supplementary toolkit

Other special equipment for the R-models

	R 65	R 80 G/S	R 80	R 80 RT	R 100 RS
Additional headlight	x	-	x	-	-
Reinforced telescopic fork	o	x	o	o	o
Tank cap, lockable	o	x	o	o	o
Sports suspension	-	x	-	-	-
Touring cases	x	x	x	x	x
Classic case	x	-	x	x	x
Multivario tank bag	x	x	x	x	x
Vario tank bag	x	x	x	x	x
Multivario K tank bag	-	x	-	-	-
K tank bag	-	x	-	-	-
Tank bag G/S baseplate	-	x	-	-	-
Luggage roll	x	x	x	x	x
Paris-Dakar conversion kit	-	x	-	-	-
Paris-Dakar fuel tank	-	x	-	-	-
Tyre service set, tubed	x	x	-	-	-
Tyre service set, tubeless	-	-	x	x	x
Supplementary toolkit	x	x	x	x	x

x = available as retrofittable special equipment

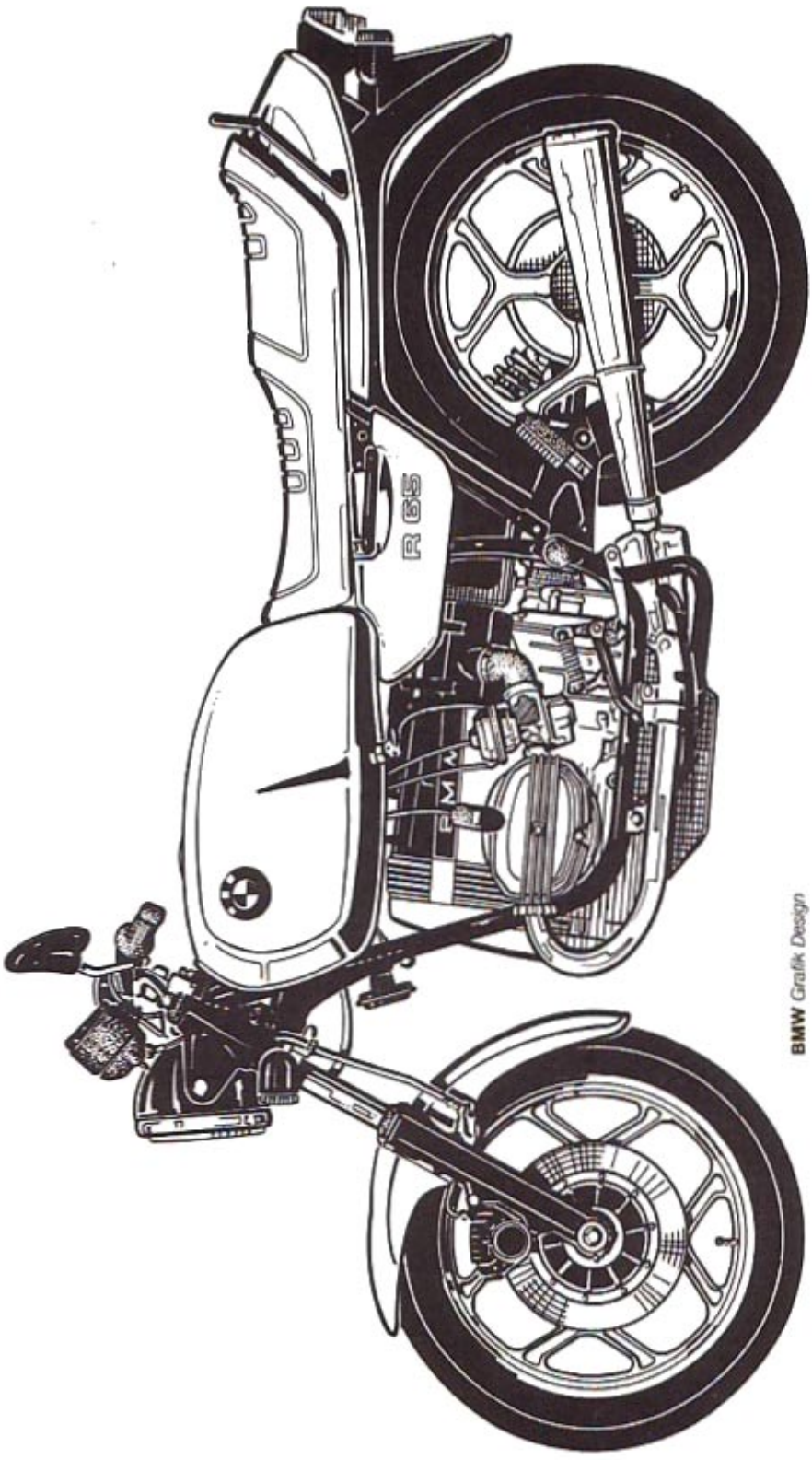
- = not available

o = standard

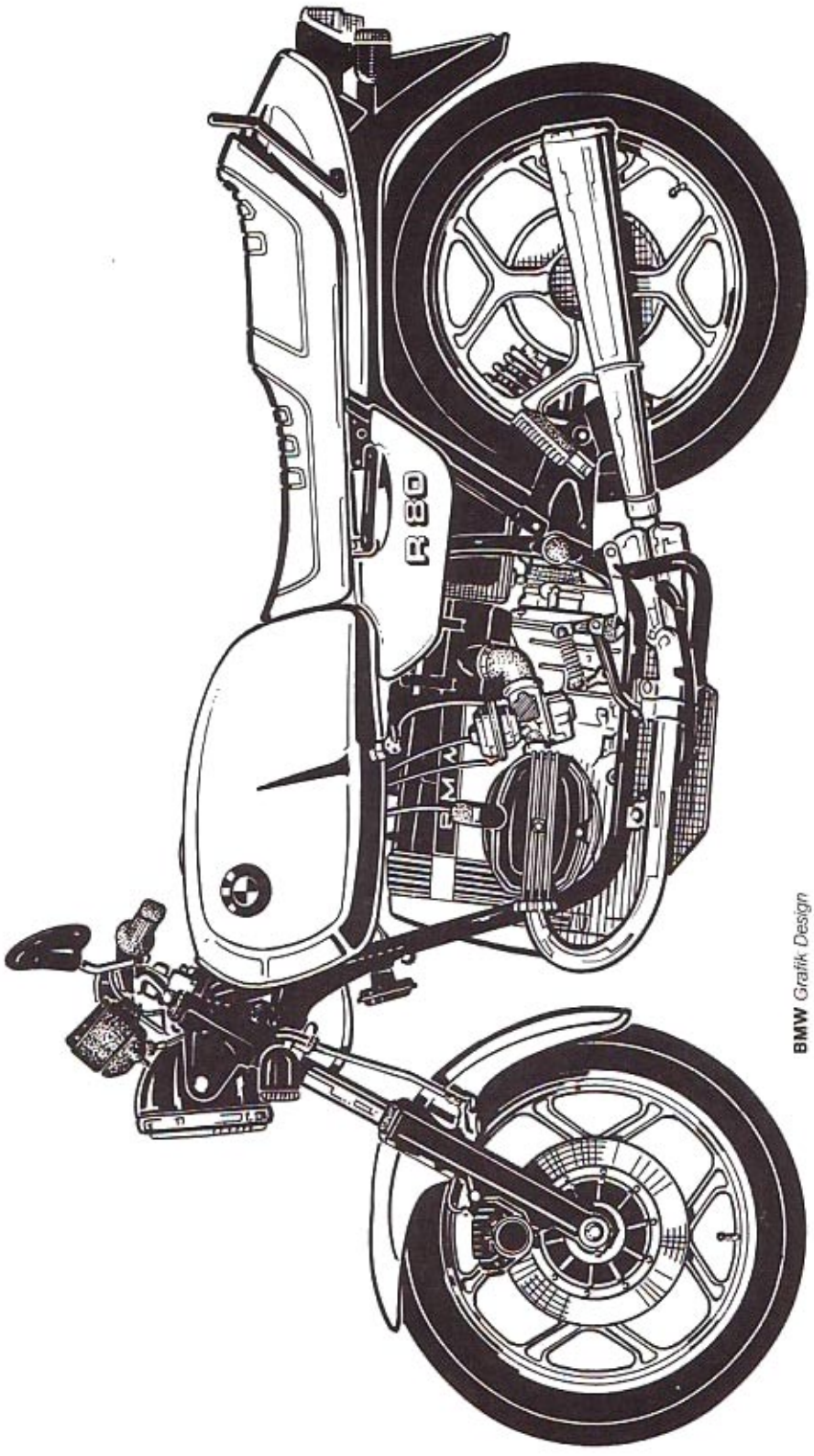
	SPECIFICATIONS BMW MOTORCYCLES		R 65	R 80	R 80 RT	
Engine	Cubic capacity	cc	650	798	798	
	Bore/stroke	mm	82/61.5	84/70.6	84/70.6	
	Max output	kW/bhp	35/48	37/50	37/50	
	at	rpm	7250	6500	6500	
	Max torque	Nm	47.8	58.0	58.0	
	at	rpm	3500	4000	4000	
	Design		flat-twin	flat-twin	flat-twin	
	No of cylinders		2	2	2	
	Compression ratio/fuel grade (also unleaded)		8.7 N	8.2 N	8.2 N	
	Valve control		OHV	OHV	OHV	
	Valves per cylinder		2	2	2	
	Intake/outlet dia	mm	40/36	42/38	42/38	
	Fuel supply		Bing carburettors	Bing carburettors	Bing carburettors	
	No of carburettors/dia		2/32	2/32	2/32	
Electrical system	Ignition		contactless transistorized coil ignition			
	Alternator	W	280	280	280	
	Battery	V/Ah	12/20	12/20	12/20	
	Headlight	W	H 4 55/60 dia 180 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	4.40/3.36	4.40/3.20	4.40/3.20	
		II	2.86/3.36	2.86/3.20	2.86/3.20	
		III	2.07/3.36	2.07/3.20	2.07/3.20	
		IV	1.67/3.36	1.67/3.20	1.67/3.20	
		V	1.50/3.36	1.50/3.20	1.50/3.20	
Suspension	Rear-wheel drive		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	175/121	175/121	175/121	
	Wheel castor	mm	120	120	120	
	Wheelbase	mm	1447	1447	1447	
	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	
	front		MTH 2 2.50 x 18 E	MTH 2 2.50 x 18 E	MTH 2 2.50 x 18 E	
	rear		MTH 2 2.50 x 18 E	MTH 2 2.50 x 18 E	MTH 2 2.50 x 18 E	
	Tyres front		90/90 - 18 H	90/90 - 18 H	90/90 - 18 H	
	rear		120/90 - 18 H low-profile	120/90 - 18 H low-profile	120/90 - 18 H low-profile	
Dimensions and weights	Length, overall	mm	2175	2175	2175	
	Width with mirrors	mm	800	800	960	
	Handlebar width without mirrors	mm	635	635	714	
	Seat height	mm	807	807	807	
	Weight, unladen with full tank	kg	205	210	227	
	Max permissible weight	kg	440	440	440	
	Fuel tank/reserve	ltr	22/2	22/2	22/2	
Performance	Fuel consumption					
	90 km/h (56 mph)	ltr	4.6	4.6	4.8	
	120 km/h (75 mph)	ltr	6.4	6.3	7.2	
	Acceleration					
	0–100 km/h (62 mph)	sec	6.8	6.0	6.4	
	standing-start km	sec	29.5	27.6	29.0	
	Top speed	km/h	173	178	170	
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	

	SPECIFICATIONS BMW MOTORCYCLES		R 80 G/S	R 80 G/S Paris-Dakar (special model)	R 100 RS	
Engine	Cubic capacity	cc	798	798	980	
	Bore/stroke	mm	84/70.6	84/70.6	94/70.6	
	Max output	kW/bhp	37/50	37/50	44/60	
	at	rpm	6500	6500	6500	
	Max torque	Nm	58	58	74	
	at	rpm	4000	4000	3500	
	Design		Flat-twin	Flat-twin	Flat-twin	
	No of cylinders		2	2	2	
	Compression ratio/fuel grade		8.2 N	8.2 N	8.45 N	
	Valve control		OHV	OHV	OHV	
	Valves per cylinder		2	2	2	
	Intake/outlet dia	mm	42/38	42/38	42/40	
	Fuel supply		Bing carburettors	Bing carburettors	Bing carburettors	
	No of carburettors/dia		2/32	2/32	2/32	
Electrical system	Ignition		contactless transistorized coil ignition			
	Alternator	W	280	280	280	
	Battery	V/Ah	12/20	12/20	12/30	
	Headlight	W	H 4 55/60 dia 140 mm	H 4 55/60 dia 140 mm	H 4 55/60 dia 180 mm	
	Starter	kW	0.7	0.7	0.7	
Power transmission, Gearbox	Gearbox		5-speed gearbox with dog-type shift			
	Gear ratios	I	4.40/3.36	4.40/3.36	4.40/3.0	
		II	2.86/3.36	2.86/3.36	2.86/3.0	
		III	2.07/3.36	2.07/3.36	2.07/3.0	
		IV	1.67/3.36	1.67/3.36	1.67/3.0	
		V	1.50/3.36	1.50/3.36	1.50/3.0	
Suspension	Rear-wheel drive		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	200/170	200/170	175/121	
	Wheel castor	mm	115	115	120	
	Wheelbase	mm	1447	1447	1447	
	Brakes	Front:	single-disc fixed-calliper brake; dia 260 mm		dual-disc brake dia 285 mm	
		Rear:	drum brake, dia 200 mm			
	Wheels		Spokes	Spokes	Cast light-alloy wheels	
	front		1.85 B x 21	1.85 B x 21	MTH 2.50 x 18 E	
	rear		2.50 B x 18	2.50 B x 18	MTH 2.50 x 18 E	
	Tyres front		3.00 – 21 R	3.00 – 21 R	90/90 – 18 H	
	rear		4.00 – 18 R	4.00 – 18 R	90/90 – 18 H low-profile	
Dimensions and weights	Length, overall	mm	2230	2230	2175	
	Width with mirrors	mm	746	746	800	
	Handlebar width without mirrors	mm	820	820	580	
	Seat height	mm	860	845	807	
	Weight, unladen with full tank	kg	191	205	229	
	Max permissible weight	kg	398	398	440	
	Fuel tank/reserve	ltr	19.5/2	32/4	22/2	
Performance	Fuel consumption					
	90 km/h (56 mph)	ltr	4.7	4.7	4.3	
	120 km/h (75 mph)	ltr	5.5	5.5	6.1	
	Acceleration					
	0–100 km/h (62 mph)	sec	5.6	5.6	5.0	
	standing-start km	sec	26.5	26.5	26.0	
	Top speed	km/h	168	168	185	
Model features	Fairing				Glass-fibre-reinforced-plastic sports fairing	
	Standard features		Electric starter, toolkit, air pump	Electric starter, toolkit, air pump, solo seat with luggage rack behind seat, cylinder protection bars with side-stand	Toolkit, repair kit, oil cooler, dual-tone fanfare, voltmeter, quartz clock	

BMW R 65	R 86/5

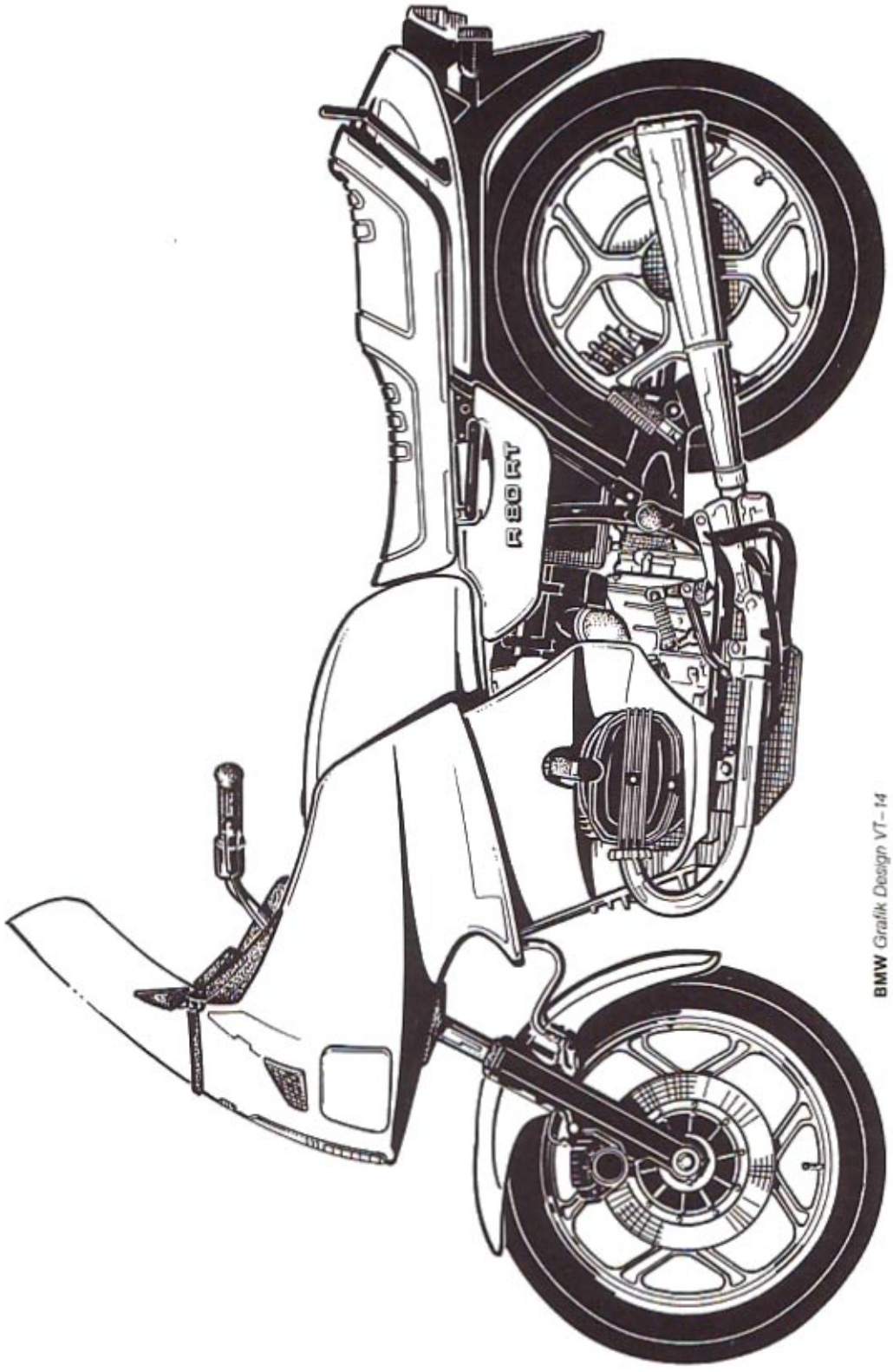


BMW R 80	R 86/6



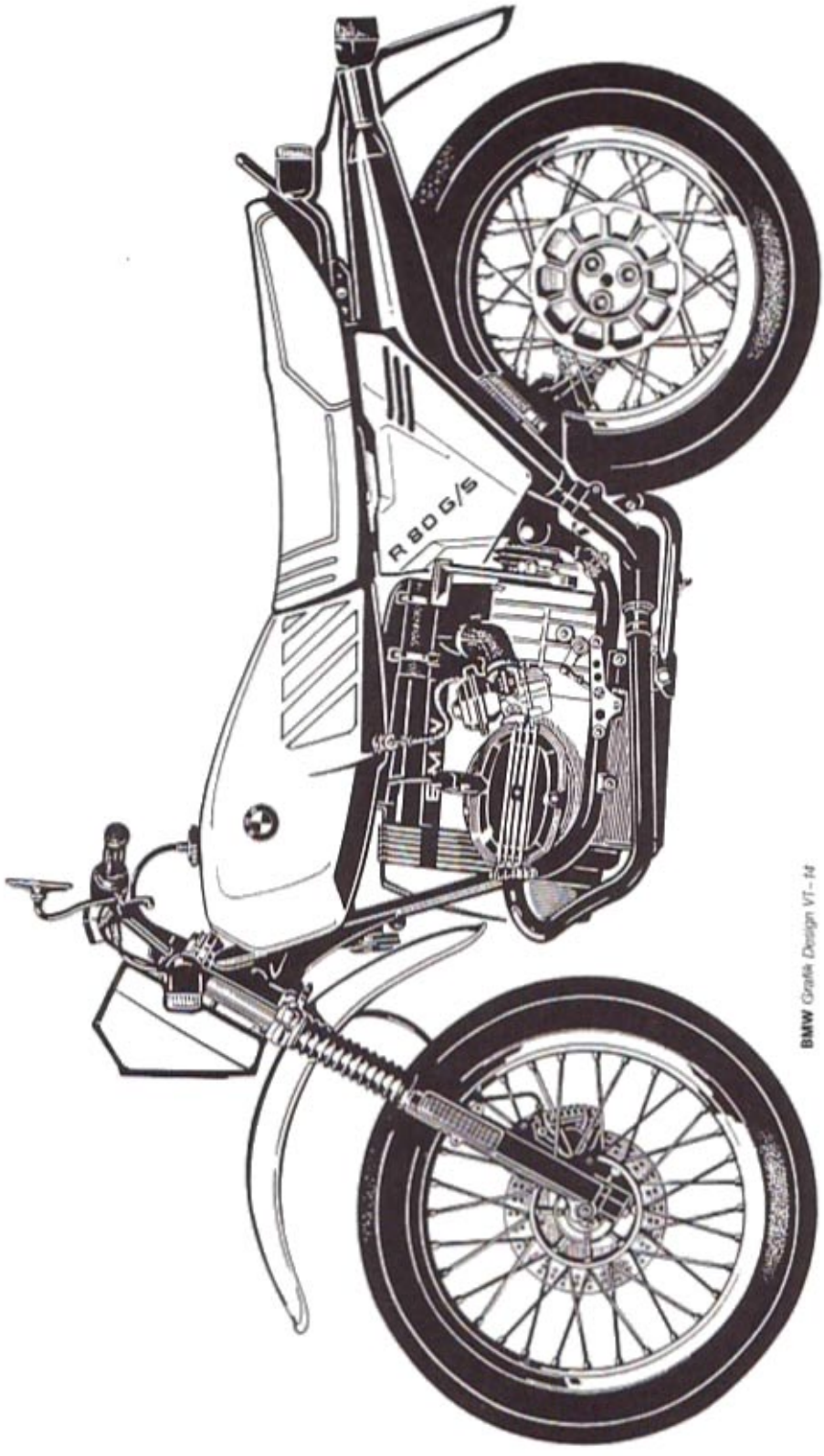
BMW *Grafik Design*

BMW R 80 RT	R 86/7



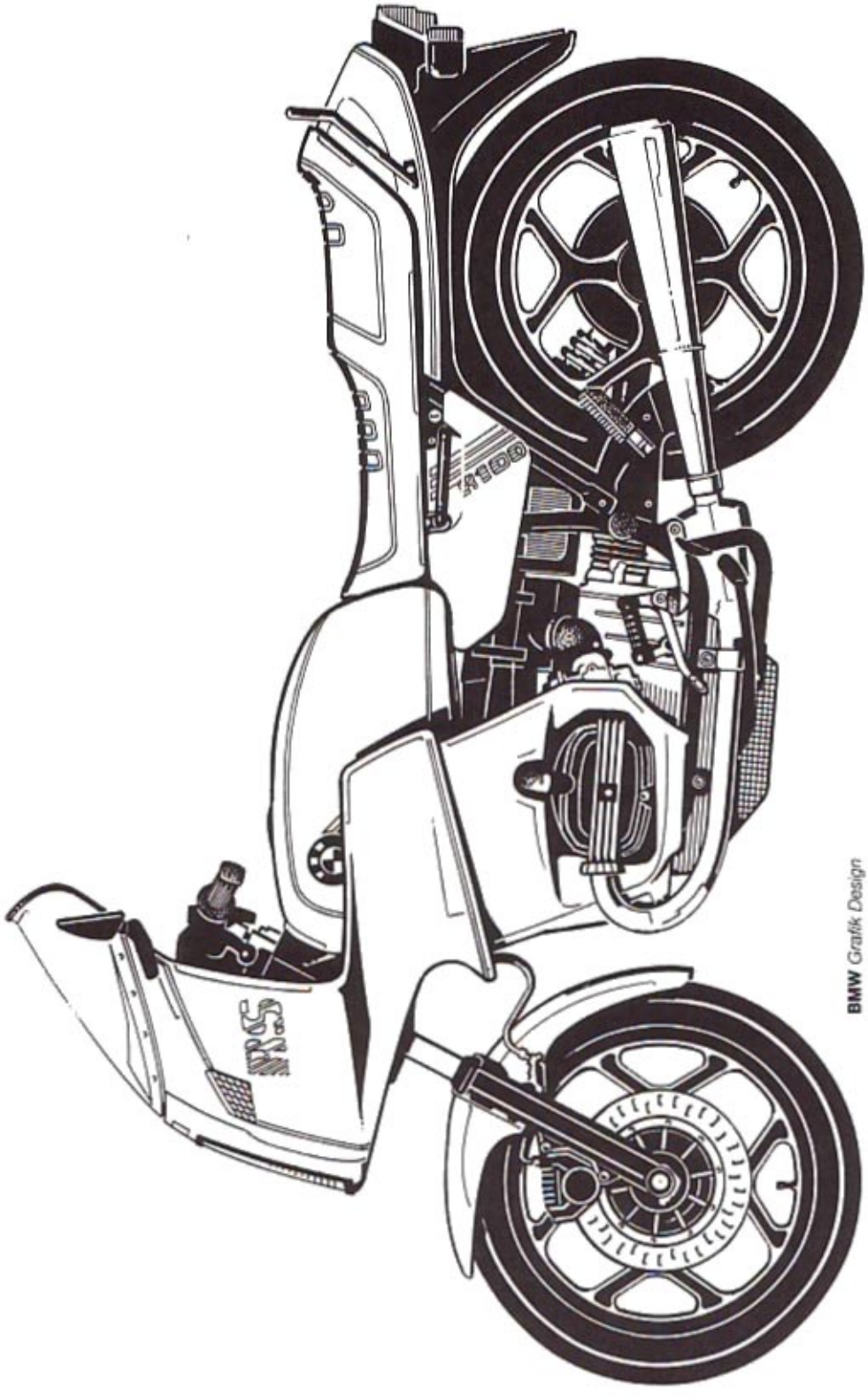
BMW Grafik Design VT-14

BMW R 80 G/S	R 86/8



BMW Grafik Design VT - H

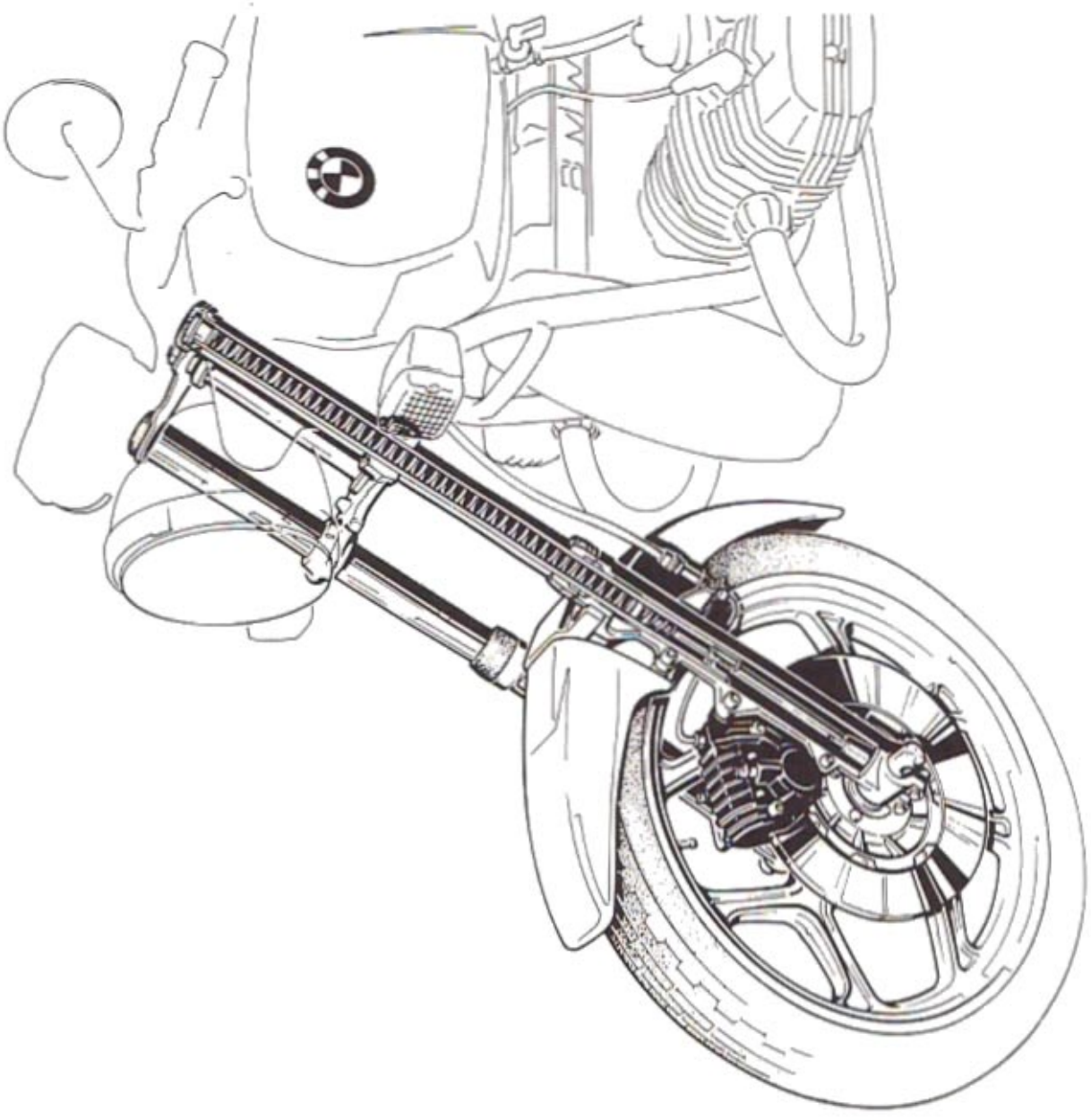
R 100 RS	R 86/9



BMW Grafik Design

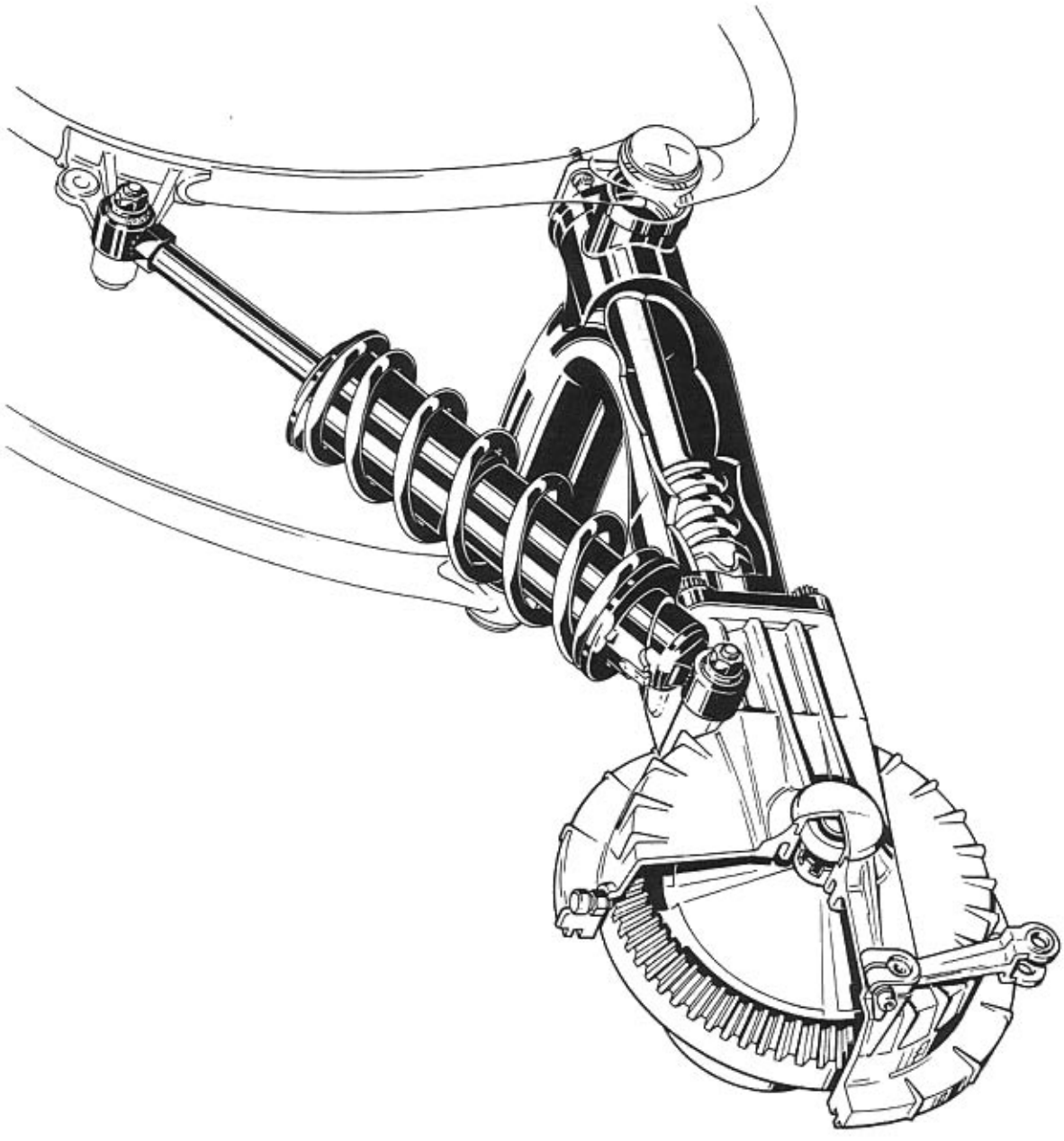
BMW R 80, R 80 RT und R 65
Teleskopgabel mit Gabelstabilisator

R 84/20



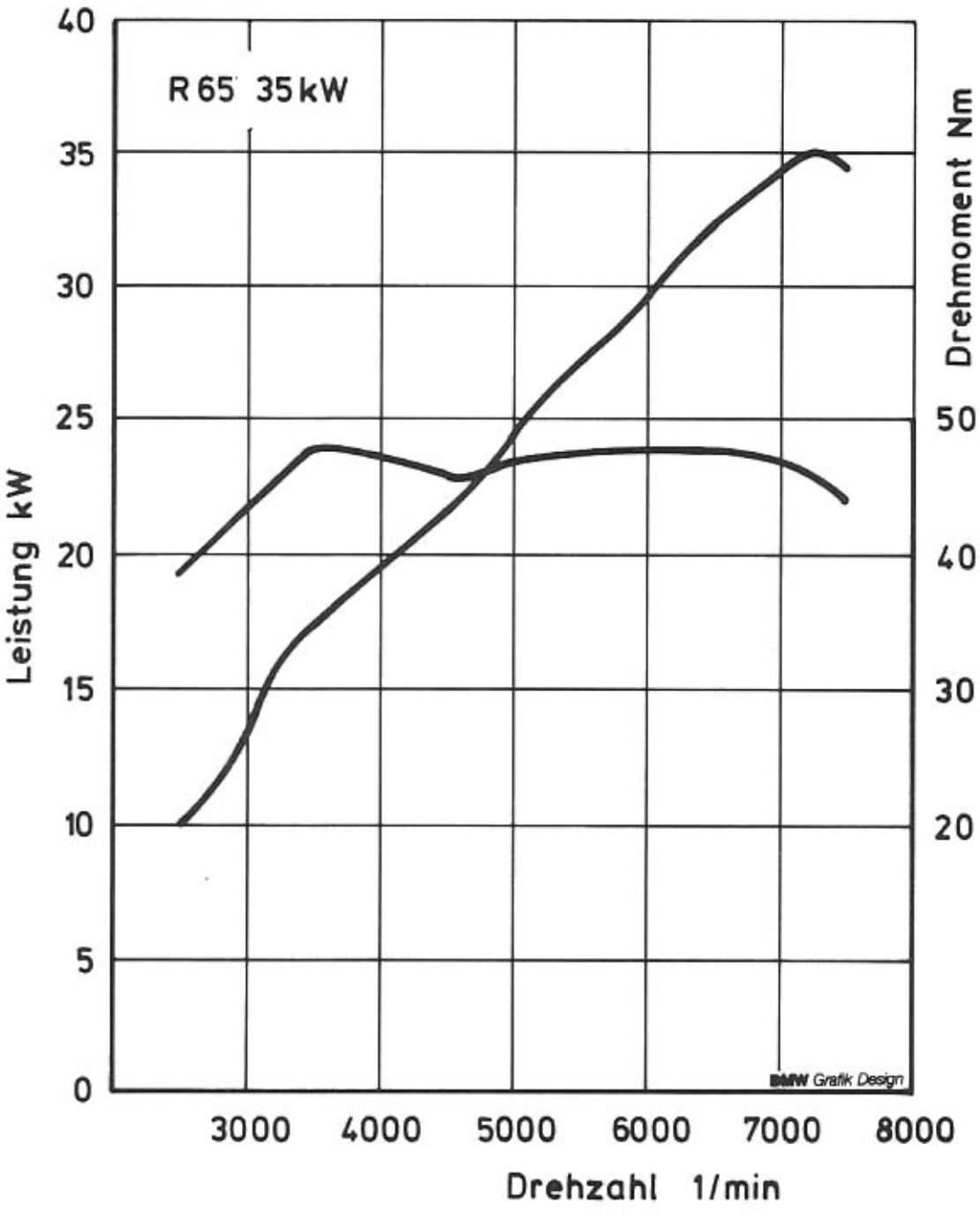
BMW R-Modelle
Einarmschwinge (BMW Monolever-System)

R 84/21



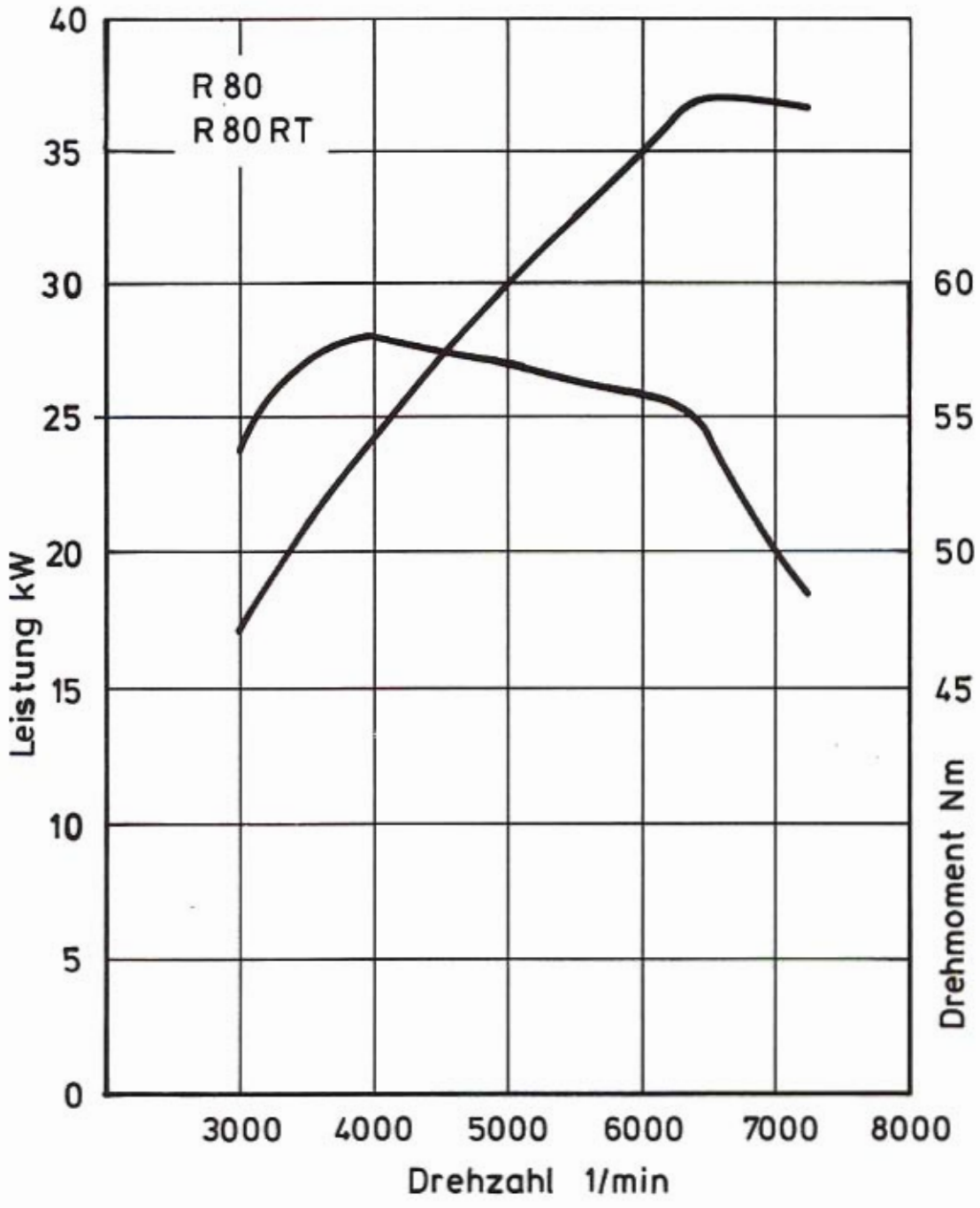
BMW R 65
Leistungs- und Drehmomentdiagramm

R 85/18



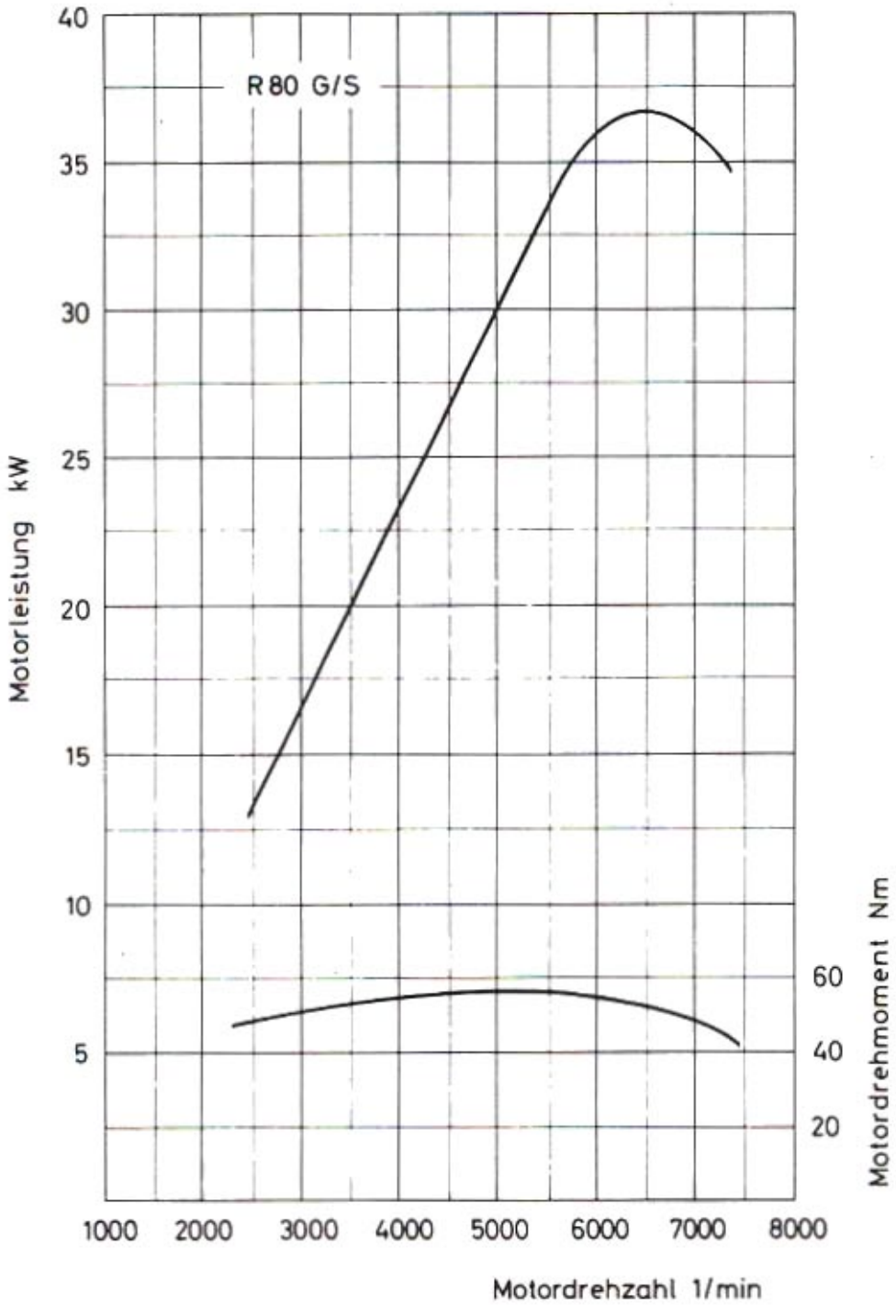
BMW R 80 und R 80 RT
Leistungs- und Drehmomentdiagramm

R 84/22



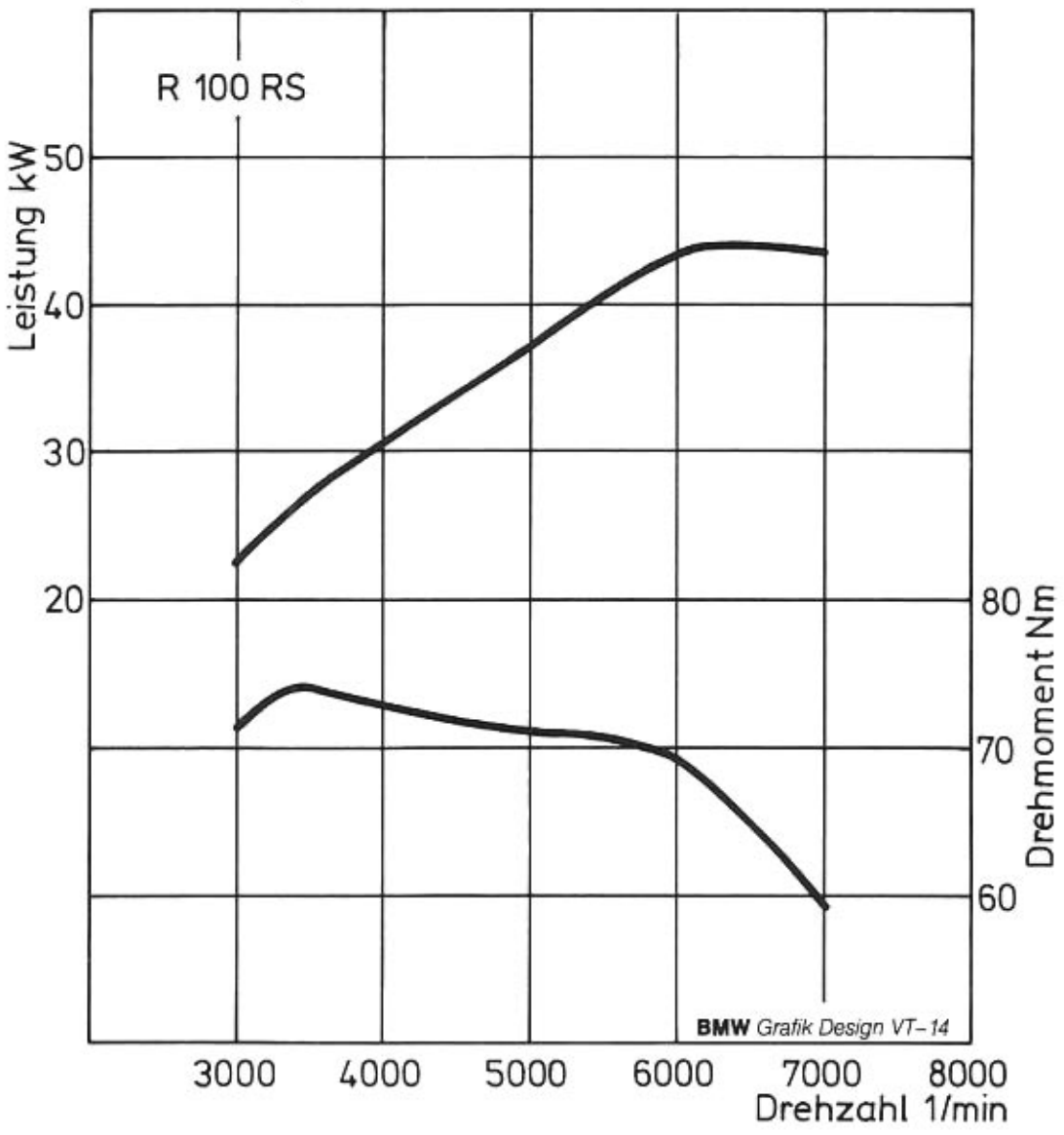
BMW R 80 G/S
Leistungs- und Drehmomentdiagramm

R 85/20



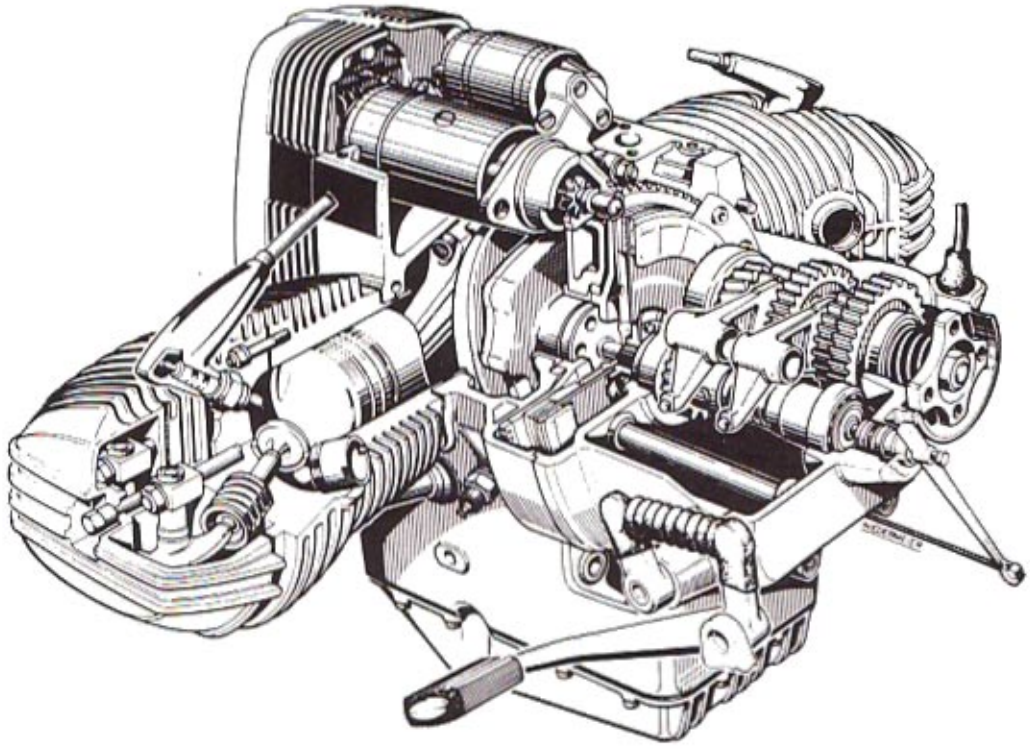
BMW R 100 RS
Leistungs- und Drehmomentdiagramm

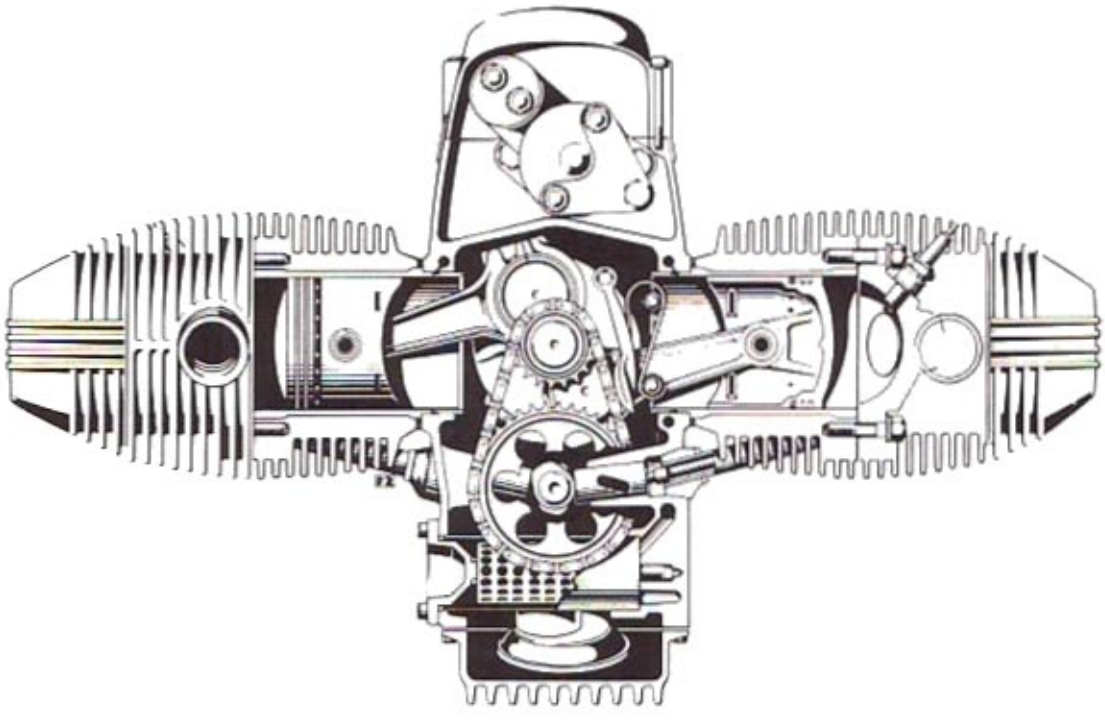
R 86/10



BMW Motorräder
Motorschnittbild (800 cm³)

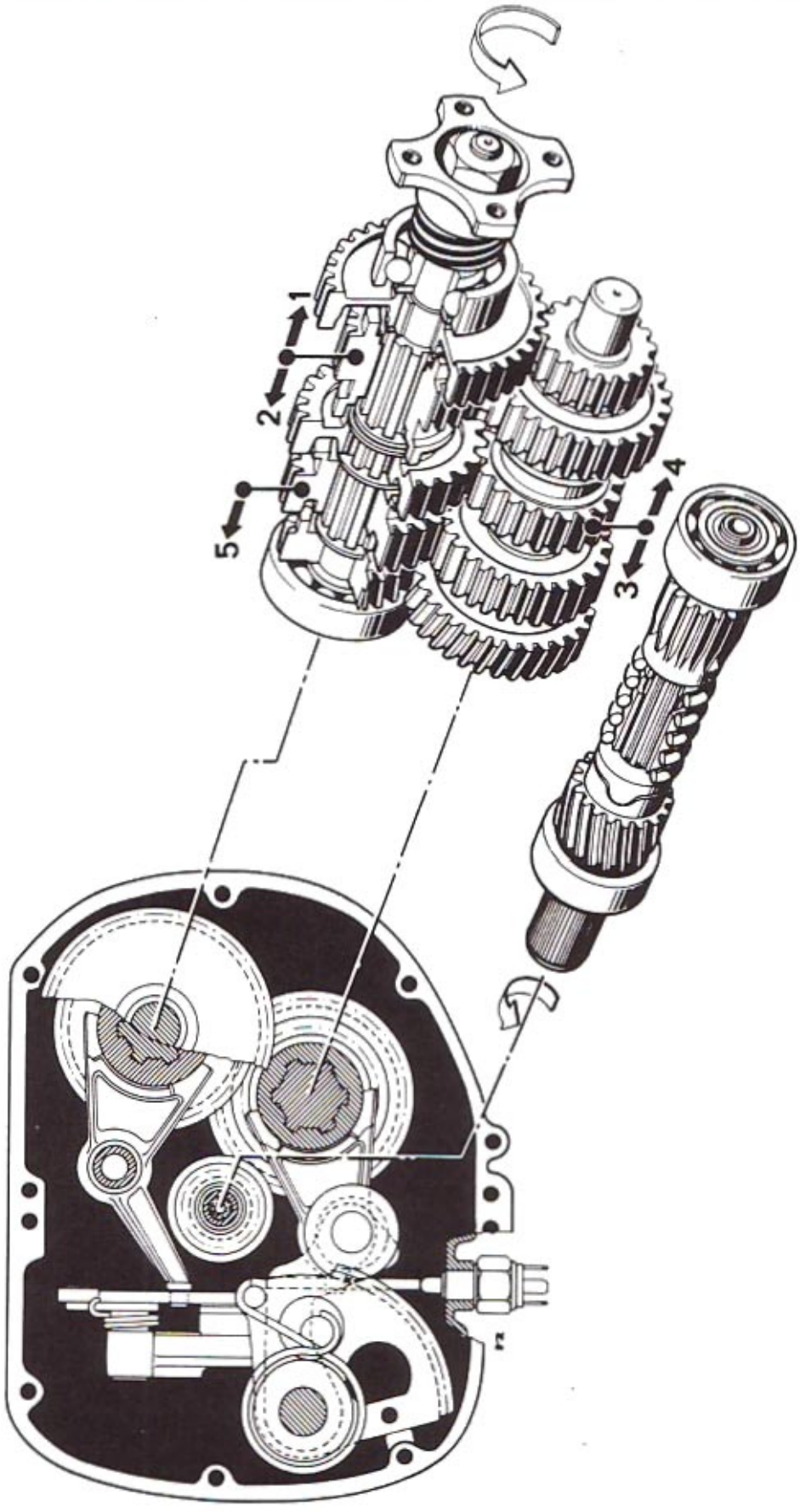
R 83/3





BMW 5-Gang-Schaltgetriebe
Gesamtprogramm

R 83/7



BMW NIVOMAT – Motorräder
Schnittzeichnung

R 83/8