

Manual

BMW

Motorcycle

R 51/2



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BAYERISCHE MOTOREN WERKE AKTIENGESELLSCHAFT MÜNCHEN 13

It gives us great pleasure to deliver to you, together with this handbook, your new BMW Type 51/2 motorcycle. In designing the R 51/2 we have endeavoured to create a motorcycle combining high efficiency with the best possible riding properties. We hope that this BMW will fulfil your every expectation.

This booklet was written for you, and we urgently advise you to study it carefully in order to become thoroughly acquainted with your BMW Type R 51/2 so that it will be a constant source of pleasure. You will probably say that this handbook does not contain anything you did not know already. But even the man who looks back upon many years of experience in motorcycle riding may commit serious errors in the care and maintenance of a machine of this type. It is the purpose of this booklet

to rule out such possibilities and to show you which parts require special care or regular lubrication. It is to your own advantage to observe these instructions carefully. The service life, driving safety and reliability of your BMW depend on the care you give it. We have endeavoured to treat all the essential factors in a concise and comprehensive manner. By way of introduction we have dealt with all details directly connected with riding. This is followed by a description of the engine and the frame, with full technical details. In conclusion all particulars of importance in regard to upkeep and lubrication are set forth.

Our handbook is not intended to be a book for beginners but a useful guide destined to bring motorcycle riders quickly and safely to their destinations.

Yours for safe and pleasant motorcycle riding!

Munich, April 1950

BAYERISCHE MOTOREN WERKE
Aktiengesellschaft

BMW Service Stations

are organized in the form of a widely distributed net of BMW agencies which are always at your service. The BMW agent is your supplier and your aid and it is his duty to furnish you with supplies and give you advice. With his special technical training he is at all times ready to help you and to keep your motorcycle in good condition for years to come. All shops displaying the sign shown on this page will gladly service and repair your machine. Here you will find personnel specially trained in BMW Service Centres, proper tools and a rich assortment of original BMW spare parts.



BMW Service

Motorcycle riding is a great sport, but never forget that your motorcycle requires regular servicing. The charts 1—4 accompanying the handbook show the checks to be made.

Be sure that Service Card No. 1 is stamped by your agent, filled in and sent to the BMW Kundendienst-Abteilung (Servicing Division), Munich, after you have accepted your motorcycle. To enable us to meet any claims arising from our guarantee, charts 2 and 3 must also be sent in to the factory.

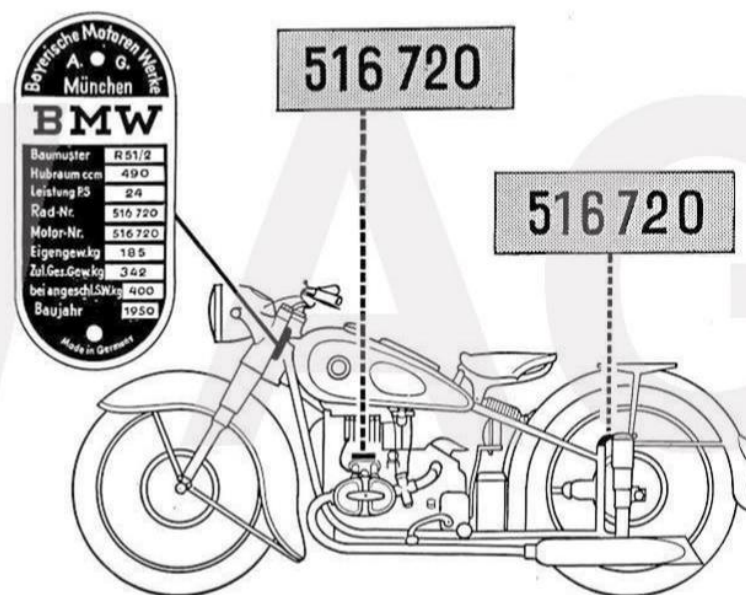
- After 500 km (300 miles) change oil for the first time
" 1,000 km (600 miles) check machine in accordance with chart 2
" 2,000 km (1,200 miles) check machine in accordance with chart 3
" 6,000 km (3,600 miles) check machine in accordance with chart 4

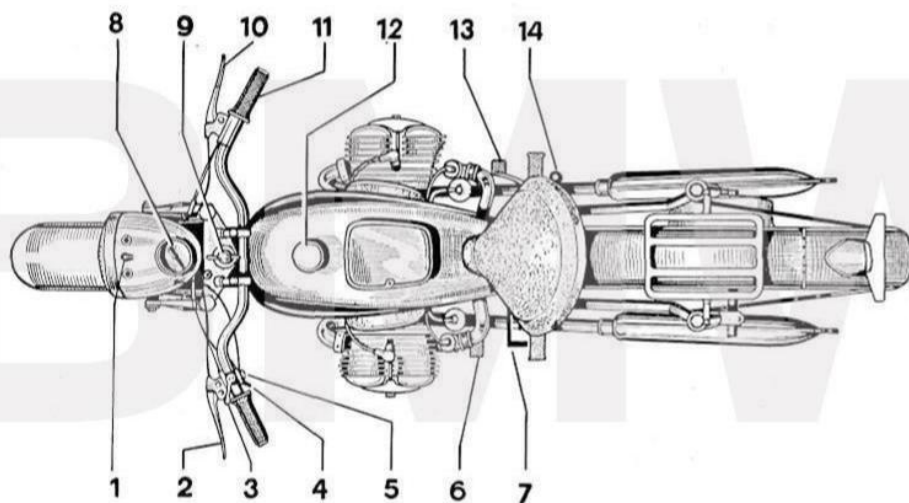
Observation of these service checks is of vital importance

- in avoiding trouble during the running-in period
- in maintaining maximum power and economy of the engine
- in achieving reliable operation
- in keeping your motorcycle in good running order
- in safeguarding the validity of your guarantee.

Servicing jobs No. 2 after 1,000 km (600 miles) and No. 3 after 2,000 km (1,200 miles) are performed without charge by any BMW agent.

Where are the frame and engine numbers?





Arrangement of control levers:

1) Ignition and Lighting:

When the ignition key is inserted, the pilot lamp lights up and the engine can be started. (Pilot lamp must go out at cruising speed.) Turning key to left turns on parking light, turning to right turns on the two-filament head lamp.

2) Clutch:

By actuating clutch engine is disengaged from the transmission.

3) Ignition Lever:

At low speed and if engine pinks, turn ignition lever backwards (retard the spark). At higher speed, push ignition lever forward in driving direction (advance the spark).

The so-called pinking occurs when the engine is overloaded and when the driver fails to change to next lower gear at the proper time. Fuels below an octane rating of 70 have a marked tendency to pink.

4) Anti-dazzle Switch:

Has two positions with the country light or anti-dazzle filament of the Bilux lamp cut-in as desired.

5) Horn Button

6) Foot-operated Gear Shift Pedal:

Automatically returns to its starting position (see page 13).

7) **Kickstarter:**

Before starting make sure that the controls are set for idling speed and retarded spark.

8) **Speedometer**

9) **Steering Damper Mechanism:**

Tighten screw slightly on bad roads and at high speed, loosen screw at low speeds.

10) **Hand Brake:**

Actuates front wheel brake. Manipulate carefully on slippery, wet streets.

11) **Hand-Controlled Accelerator:**

Opens when turned toward driver and closes when turned away from driver.

12) **Fuel Tank Filler Cap:**

Capacity of tank $3\frac{1}{2}$ gallons (of which $1\frac{1}{2}$ quarts constitute reserve fuel sufficient for approx. 20 miles).

13) **Brake Pedal:**

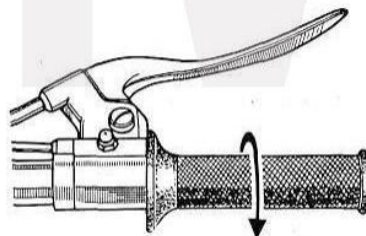
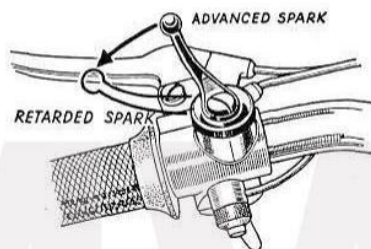
Actuates rear wheel brake.

14) **Auxiliary Pedal:**

Facilitates quick shifting to neutral.

Fuel Cock:

A = open, Z = closed, R = reserve.



Operating Instructions

Before Starting:

Fill fuel tank petrol station fuel (octane rating of at least 70). Capacity of tank $3\frac{1}{2}$ gallons (including approx. $1\frac{1}{2}$ quarts reserve which is sufficient for approx. 20 miles).

Check oil in engine Oil should reach to top mark on dip stick.

Never fill in oil in excess of this mark. To measure oil level insert stick without screwing it in.

Use standard grades of oils of the following viscosity:

Summer: 10—14° E at 50° C, e. g. Mobiloil AF

SHELL Auto Oil 3 X Special

Winter: 6—8° E at 50° C, e. g. Mobiloil Arctic

SHELL Auto Oil X Special

	front	rear	side car tyre
Check tyre pressure driver alone	20 lbs.	20 lbs.	—
driver and passenger	20 lbs.	27 lbs.	—
side car	27 lbs.	27 lbs.	27 lbs.
side car and pillion seat	27 lbs.	39 lbs.	27 lbs.

Starting:

Open fuel cock Turn cock to "A" (= on)

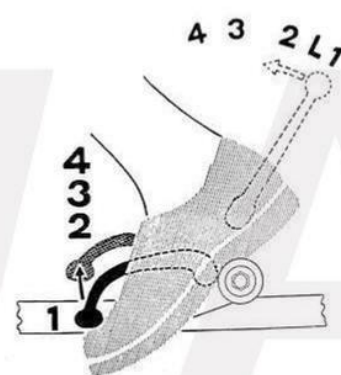
Adjust ignition handle Always set at retarded spark when starting (see illustration page 10).

Adjust hand-controlled accelerator When engine is cold: open accelerator slightly, tickle both carburettor needles. Close starter slide on filter.

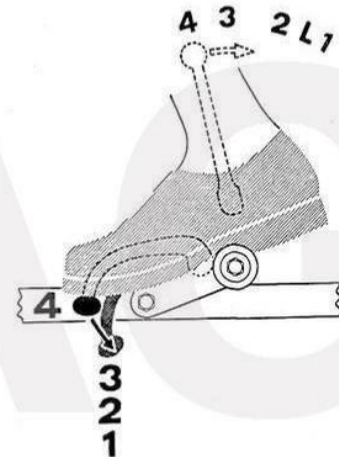
When engine is warm: open accelerator slightly, do not tickle carburettor needles. Keep the starter slide on filter open.

Start engine Actuate kickstarter slowly twice with the ignition off, then cut in ignition (red lamp lights up), give starter a short, powerful kick. After starting, reopen starter slide fully.

Allow the engine to warm up This is of great importance as it prevents excessive wear of cylinders. Use medium speed, never race your engine. Make sure to cut ignition out when engine is not running.



Shifting the gears
from first to fourth



Shifting the gears
from fourth to first

Riding:

Disengaging the clutch Pull on clutch fixed to handle-bar.

Shifting to first gear Depress foot clutch.

Adjust ignition The greater the speed, the more advanced the spark should be. Push ignition lever forward. From 30 miles upward, the spark can be advanced. Retard the spark when motorcycle goes uphill at low speed or during pinking. Driving with advanced spark saves fuel and keeps engine from getting too hot.

Engaging the clutch Slowly release clutch on handle-bar and open throttle.

Shifting from first to second,
to third and to fourth gear . . Lift foot shifting pedal with toe at each gear, closing throttle (see page 13).

Shifting from fourth to third,
to second and to first gear . . Depress foot shifting pedal at each speed. whenever

Actuate
clutch
shifting.
whenever

Never exceed the allowable maximum speeds, which are . For a run-in machine

	1st	2nd	3rd
solo type	45 (28	75 45	100 km/hr 62 miles/hr
with side car	35 (20	60 37	85 km/hr 50 miles/hr

Maximum speeds are marked in red on speedometer.

Riding downhill Shift into next lower gear, if necessary shift once more.

A good rule:

In general ride up and downhill in the same gear.

Stopping:

Take away gas When speed has slowed down sufficiently, declutch and apply brake slowly. Shift to neutral with foot clutch or with auxiliary clutch. Turn off engine by removing ignition key, close fuel cock (turn to "Z").

Running the Engine in Properly

is of vital importance for the useful life and the reliable operation of your motorcycle. Observe the following instructions carefully for the benefit of your engine:

Solo type	(0—600 miles)		(600—1,200 miles)	
	1st gear	15 km per hour (9 miles)	1st gear	20 km per hour (12 miles)
	2nd gear	25 km per hour (16 miles)	2nd gear	40 km per hour (25 miles)
	3rd gear	40 km per hour (25 miles)	3rd gear	60 km per hour (25 miles)
	4th gear	60 km per hour (35 miles)	4th gear	85 km per hour (53 miles)

Do not attach a side car before the running-in period is over. Unauthorized damaging of speedometer seal invalidates any claim arising from our guarantee.

The above instructions are not to be construed to mean that the maximum speeds must always be reached; on the contrary, the engine is best run in when speed and load are varied, i. e. drive a short distance (500 m = 545 yds.) at maximum speed and then let the motorcycle coast. Thus all moving parts of the engine are run in the best manner possible.

It is advisable not to ride full speed over long distances directly after the 2,000 km (1,250 mile) mark has been reached, but to slowly increase the speed until the 3,000 km (1,875 mile) mark is passed.

Never race your engine with the gears in neutral. Shift gears at the proper moment when riding uphill, to avoid overloading the engine. Shift to next lower gear before speed drops off too much, because driving over longer distances in the lower gears does not harm the engine nor the gearing.

Attention:

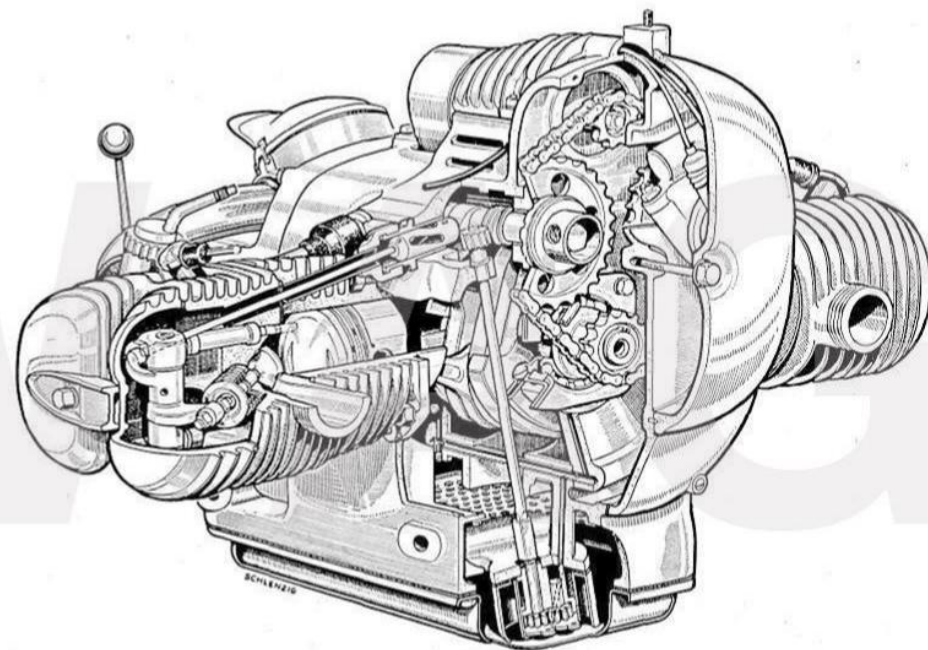
The carburetors are not sealed to enable better running-in conditions. For this reason it is of great importance to run the motorcycle in accordance with instructions on page 16. You must get the feel of it.

Lubrication:

Special attention must be paid to the lubrication during the breaking-in period. After the first five hundred kilometres (300 miles) drain oil completely while engine is still warm by removing the drain plug on oil sump, flush engine with washing oil and fill with new oil up to top mark of dip stick. Drain and renew oil in gear casing and rear axle housing after the first thousand kilometres (600 miles). Proper lubrication is assured when the new oil reaches up to the lower threads at bottom of oil hole.

Lubricating plan on page 58 gives instructions on the lubricants to be employed.

Mixing different oils must be strictly avoided (e. g. during refilling).



Section through a BMW engine Type R 51/2

Engine:

The R 51/2 is powered by a two-cylinder opposed-cylinder-type engine which has been developed to a high degree of perfection and is widely known for its outstanding qualities. The R 51/2 has been improved in a number of points compared to its former model number 1.

1) Engine Housing and Cylinders:

The engine housing and gear box are made of a highly wear-resistant light metal alloy. The grey iron cylinders have deep fins and removable light metal heads which, together with the fins, assure adequate cooling. The light metal pistons have two piston rings and one oil seal ring. The floating hardened and ground piston pin is mounted in the connecting rod and two piston eyes and secured by lock rings.

2) Crankshaft:

Correctly determined counterweights and a carefully balanced transmission gearing warrant vibrationless crankshaft operation. The sectional steel crankshaft with hardened journals runs in two strong ball bearings. In conjunction with correspon-

ding oil channels, the holes provided in the journals and oil channels ensure proper lubrication of all bearings, pistons, piston pins, cams, tappets, etc. The roller bearings of the connecting rods are pressure lubricated.

3) Valves:

The valves are of the overhead type and are actuated by guided valve lifters operated by rocker arms running on floating bushings.

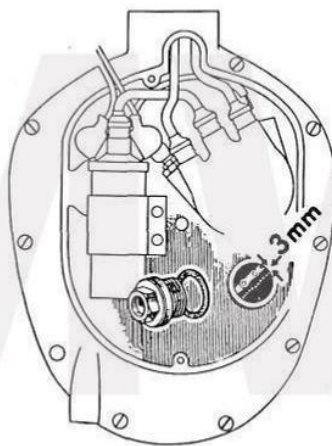
The valve lifters are actuated by cams provided on crankshaft. The rocker arms in the cylinder heads are mounted on rods extending through the cylinder. This construction protects the rocker arm rod from expanding when the cylinder head becomes hot, which assures uniform valve action at all temperatures.

4) Camshaft Drive:

The two camshafts running on pressure lubricated plain bearings are located above the crankshaft, each having a sprocket wheel keyed on their front end. The left camshaft extends towards the front and actuates the contact breakers. The rotary valve is connected to the gear mounted on the right camshaft and actuates the crank case ventilation. The camshafts are driven by the sprocket wheel mounted on the crankshaft through a sheet-roller chain which operates simultaneously the dynamo sprocket wheel located above the chain.

A special oil line serves to constantly lubricate the timing chain.

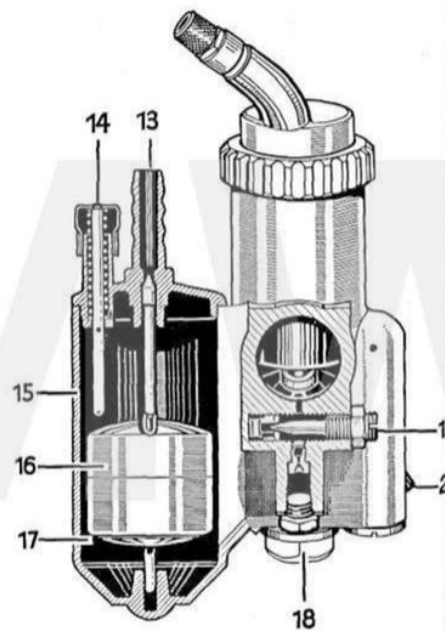
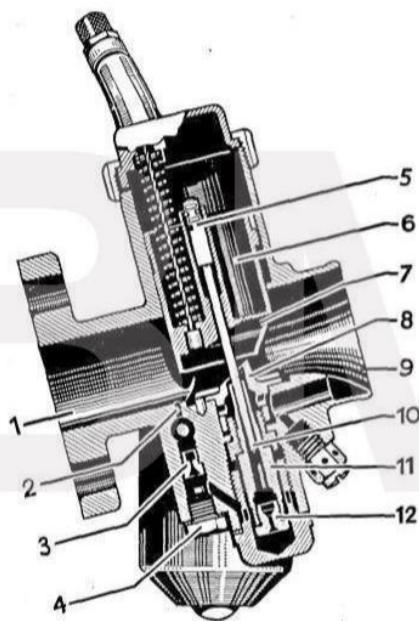
As the dynamo sprocket wheel is eccentrically mounted, tightening of the timing chain is very simple. Remove cover mounted on front of the engine and unscrew the hexagon plug. Through the sight hole which is then uncovered, the tension of the chains can be tested. If retightening of the chain becomes necessary, loosen screws of dynamo cover and tighten chain by turning these screws. A chain which is too tight will howl during operation and cause premature wear. After chain has been properly tightened the dynamo fixing screws must be screwed up tight as the chain will otherwise lose its tension.



5) Circulation of Oil:

The gear-type oil pump accommodated in the engine housing warrants adequate lubrication under all operating conditions. It is actuated by a helical gear mounted on the camshaft and draws oil from the oil sump through a strainer. Through proper channels, the oil is forced to the ball bearings of the crankshaft. From the front bearing another pressure line leads through the two hollow camshafts to the camshaft bearings and to the chain. Connecting rod bearings are splash lubricated from the oil pressure lines by means of oil-control rings to the hollow crankpin. In addition, the oil-control splash rings serve to collect the sludge and must be carefully cleaned when repairs are made. Pistons and piston pins are splash lubricated by the crankpins. Left cylinder is provided with an additional force feed lubrication system.

Through the hollow tappet and the valve push rod bushings, oil is passed to the cylinder head and lubricates tappets, valve rod heads and rocker arm bearings. From there the oil flows back through tubes located in the cylinders.



Carburettor:

The Bing carburettors (Type 1/22/29 mounted to the left, Type 1/22/30 mounted to the right) are specially designed piston slide carburettors with the float chamber cast integral with the carburettor housing. The main axis of the latter is arranged at an angle of 15 degrees from the vertical. The carburettors fixed to the engine by means of a flange have a system of jets; the main jet is provided with a needle control, the needle being operated by a piston slide. A compensating chamber serves to maintain a proper fuel mixture compensating the effects of a lowered level in the float chamber produced by the action of the centrifugal forces when riding through curves.

Design and operation of the Bing carburettor is now described in some detail (see illustrations).

The fuel entering the float chamber (15) through the hose connection (13) arranged on top is kept at a constant level by the float mechanism. The float is provided with a damper ring (17) to avoid irregular flow of fuel due to vibrations or shocks. The level in the float chamber can be raised for a short period when starting the engine by depressing the tickler (14) so as to provide a richer mixture. From the float chamber the fuel passes through passages in the plug (18) to the main jet (12) and the idling jet (3). The first one is fitted into a needle controlled jet (11); the fuel is flowing through the annular space around the tapered needle (10) to the mixing

chamber cap (8), the annular space being varied by raising or lowering the needle. The air coming from the filter connection 9 passes the cap and produces a preliminary atomization at the jet opening, while the main air current passing the upper portion of the bevelled top of the cap effects a complete atomization before the mixture enters the combustion chamber of the engine.

This arrangement with the jet opening controlled by the needle (10) and the latter operated by the piston slide (6) insures a uniform ratio of fuel and air, both for the lower and higher speed ranges of the engine.

The fuel drawn in through the detachable idling jet arranged above the plug (4) is mixed with air entering through the filter connection and the idling air passage (2) and passes into the suction channel (1) directly behind the piston slide. Fine adjustment of the idling speed is made by means of the air adjusting screw (19). Turning the screw in will produce a richer mixture, turning it out a leaner mixture. Coarse adjustment of idling speed is made by means of the pistontype valve adjusting screw (20).

If carburettor is drowned by excessive tickling, the fuel will not run into the cylinder but pass to the outside.

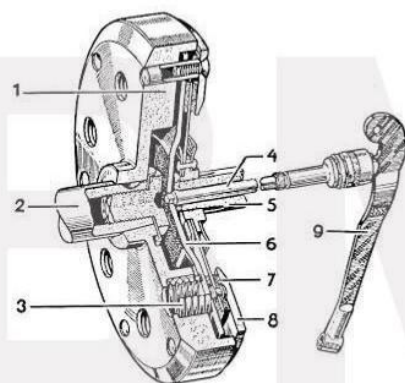
Carburettors are adjusted in the factory for the commercial types of fuel. Only in special cases will a re-adjustment of jets and needles be required and this should be done by a trained mechanic.

Clutch:

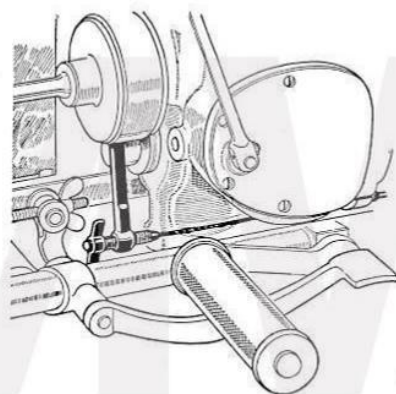
The engine power is transmitted to the transmission by means of the single-disc dry clutch with the flywheel mounted on the conical journal of the crankshaft by means of a key and screw being the driven plate.

Six springs (3) arranged in holes in the flywheel (1), press the flywheel against the double-lined driving disc (7) and against the plate (8) connected to the flywheel. In this manner the driving disc (7) which is slidably arranged on the main gear shaft is turned and thus the movement of the crankshaft (2) transmitted to the main gear shaft (5). The clutch operating lever provided on left handle-bar actuates the clutch release lever located on the gearing by means of a cable and conduit. Power transmission between engine and gearing is interrupted when the clutch lever is operated whereby the pressure plate (6) is lifted from the driven disc (7) by means of push rod (4). The robust single-disc dry clutch needs no maintenance. As proper treatment considerably increases the service life, open the throttle only a little when starting and ease the clutch in slowly. Sudden letting-in of the clutch at high speed will not only cause great wear of the facings, but also highly stress the entire transmission and the tyres.

From time to time re-adjust wing screw on tension cable so that a clearance of 0.5 mm remains between thrust bearing and the clutch release lever.



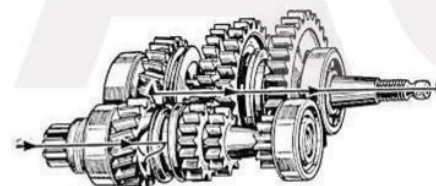
section through clutch



clutch adjustment

Transmission:

The engine power is transmitted to the rear wheel through the transmission and the propeller shaft. Four different speeds enable full utilization of power in any kind of terrain. Shifting of the continuously engaged gears is done by a pedal so that both hands can remain on the handle-bar during shifting, a feature which is of great advantage in the control of the motorcycle and insures greatest riding safety. An auxiliary shifting lever on the right side of the transmission serves to directly shift to neutral from any gear, and, in addition, serves as a gear indicator because every actuation of the shift pedal changes the position of the auxiliary lever. Shifting to neutral should, however, be done by the shift pedal whenever possible. The drive gear of 4th gear is operated by a spring cushioned driving shaft which ensures smooth riding.



Power flow through the spring cushioned drive shaft when riding in fourth gear

Rear Wheel Drive:

The propeller shaft running from the transmission to rear wheel has an elastic rubber coupling on the front end to compensate for changes in length. The propeller shaft is connected to wheel drive by a universal joint.

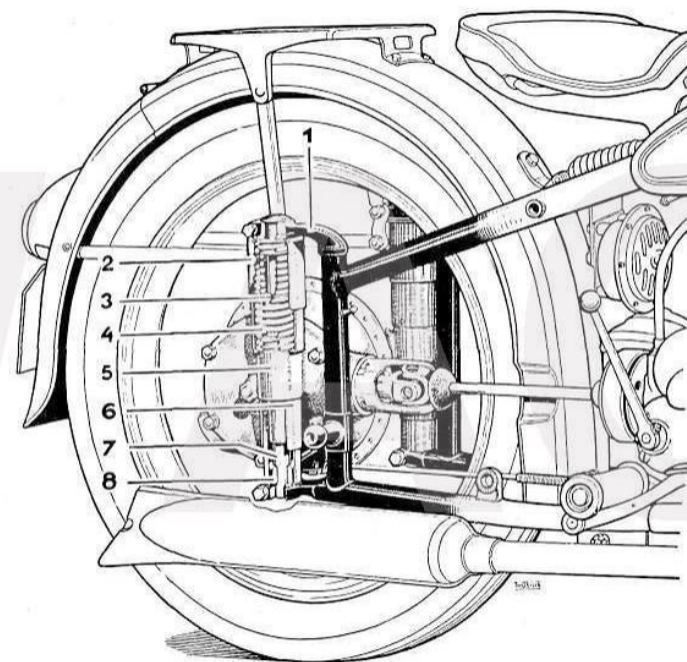
Through silent, helical bevel gears and the splined shaft of the thin bevelled disc and the hub, the power is transmitted to the rear wheel.

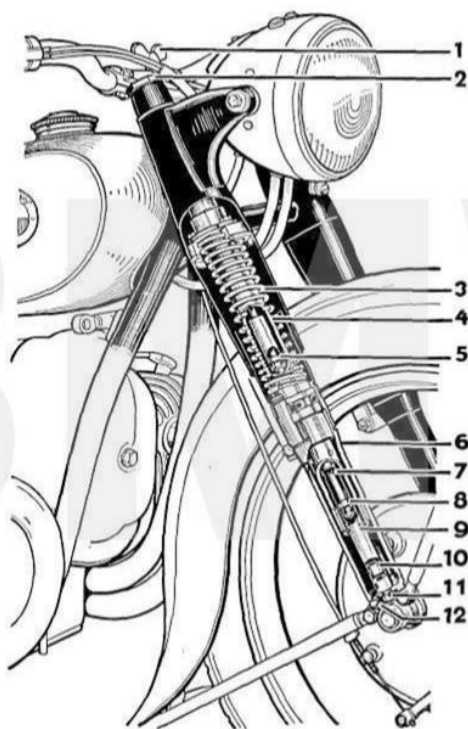
Rear Wheel Spring Suspension:

Rear wheel spring suspension is similar to the front wheel fork; it is likewise designed on the telescope principle.

The entire suspension unit harmonizes well with the general construction of the machine.

The wheel carrier (5) provided with a long guiding sleeve (3) is slidably mounted in a guiding tube (7) clamped to the frame extensions (1). Springing is achieved by a helical spring (4) of progressive action fixed to the upper extension and to the slide. Hard jolts are cushioned by a rubber pad mounted on the lower extension. The entire springing mechanism is housed in dirt- and splash-proof collapsible telescopetype tubes (2 and 6).





Front Wheel Fork:

The front wheel is sprung and supported by the service-proven BMW telescope-type fork with built-in hydraulic shock absorbers. Housed in the swinging wheel carriers (6) are the fixed guiding tubes (4) connected to the handle-bar and the fork guiding part. Resilient connection between the fixed and movable fork parts is achieved by a helical spring (3) fastened at both ends.

Both the BMW rear wheel spring suspension and the front wheel fork have set an example for motorcycle manufacture in general. Additional improvements have been made in the R 51/2: each prong of the fork has a double-acting hydraulic shock absorber of a type heretofore only applied in high class modern automobiles.

The shock absorber installed in the fork tube consists of a shock absorber tube (9) and a pressure rod with piston (7) attached to the upper end of the fixed fork tube. Top section of fork tube acts as a cylinder in which the piston runs and has an intake valve (10) at the bottom. The piston has a built-in straight-way valve (8). There are thus two pressure chambers, one above and one below the piston. When the wheel travels in upward direction the piston rod acts as a plunger, the valve in the piston is opened and the bottom valve in the tube closes.

The oil passes upward through the guide bushing (5). The piston rod has a flat portion on one side to achieve a progressive damping action. The shock absorber automatically adapts itself to the driving speed and the road condition.

The entire shock absorbing unit can easily be removed without disassembling the fork by removing the nut at the lower end of axle carrier (11) and the hexagon-head screw (2) on top of the fork.

Each fork prong is filled with 130 cu. cm of engine winter oil (6—8° E also in summer) which must be replaced by a mixture of 3 parts of motor oil and one part of kerosene during very cold periods. Oil drain plugs (12) are located at the lower fork end; the filler opening is closed by the hexagon-head screw at the upper fork end. Located at the top centre of the fork is the winged nut (1) of the steering damper mechanism, which must be tightened or released, depending on road conditions and travelling speed.

The fork requires no special maintenance.

Mud Guards:

The mud guards are formed so as to give effective protection against dirt and water. The bottom end of rear mud guard is hinged so that it can be raised, which greatly facilitates removal of the rear wheel (see also removal of rear wheel page 39).

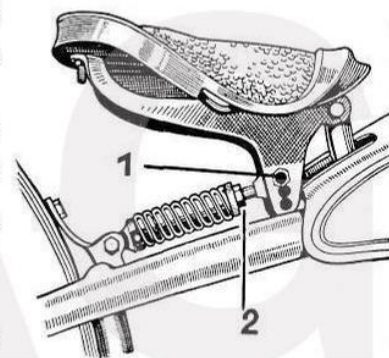
Cushioned Seat:

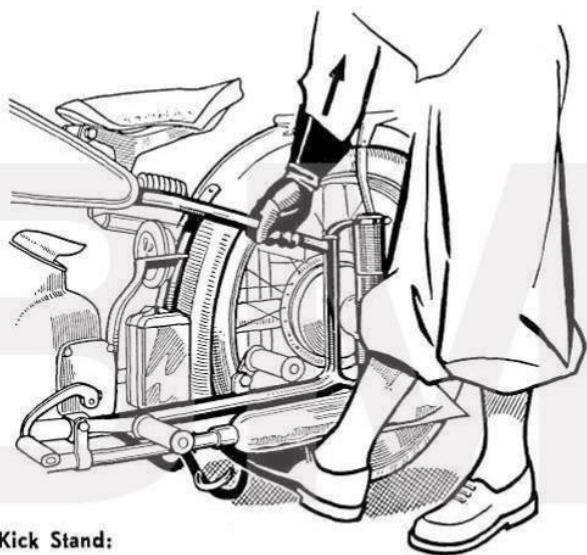
The seat is a well shaped, soft, swinging saddle which, in conjunction with the all-wheel sprung frame, warrants a tireless riding over long distances.

Spring tension can be adjusted to rider's weight by adjusting spring clamping pin (1) in the slot of the saddle supporting lever (raised — softer spring action, lowered — harder spring action).

There are three catches provided in the saddle lever for weights of from 60 to 100 kg (130-220 lbs.).

Height of saddle can also be adjusted by screw (2) serving as seat for the spring.





Kick Stand:

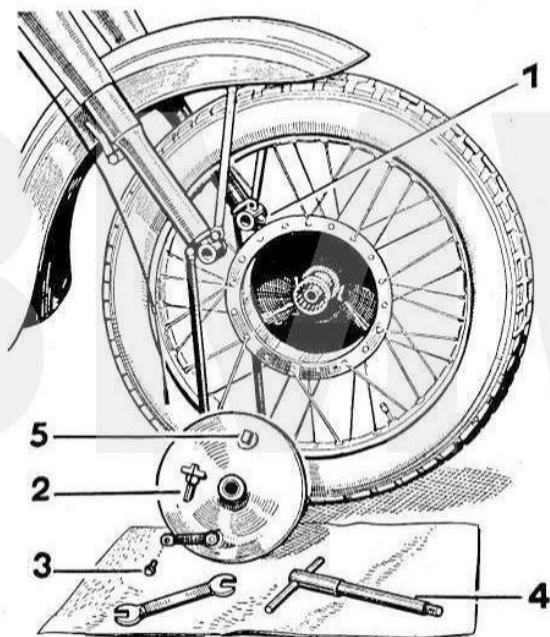
For setting up the motorcycle a kick stand is attached to the centre frame bottom. During riding this stand can be swung up and is then held in place by a spring. A lateral, foot-actuated lever serves to release the stand when required.

Removing and Installing the Front Wheel (see page 38):

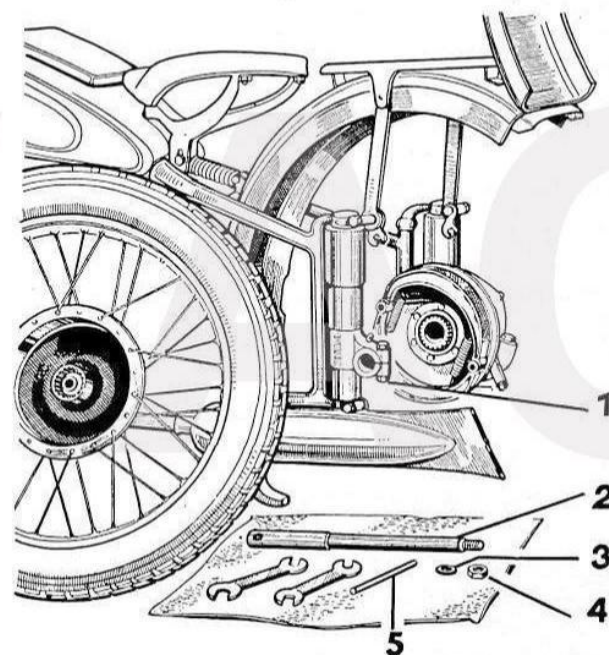
- 1) Stand motorcycle on kick stand, remove screw of front wheel stand attached to front mud guard.
- 2) Turn brake adjusting screw (2) all the way in and set it in such a way that its slit aligns with the slit of the tube in which it rests.
- 3) Raise brake lever and take off cable with clamping screw (3).
- 4) Loosen terminal clamp (1) on prong of fork and screw out the hub spindle (4) (left hand thread).
- 5) Remove front wheel with brake shoe carrier.
- 6) When re-installing wheel take care that the nose (5) fits into the guide on the fork.
- 7) Before tightening terminal screw (1) on left side of the fork compress spring of fork several times to make sure that no parts jam in the telescope guiding mechanism.

Do not lay hub spindle on dirty ground; clean all dirty parts carefully and grease them lightly thereafter.

Removing Front Wheel



Removing Rear Wheel



Removing and Installing the Rear Wheel (see page 39):

- 1) Set up motorcycle on kick stand.
- 2) Unscrew mud guard supports and raise end of rear mud guard.
- 3) Loosen hub spindle nut (4) (right hand thread) on driving side and remove it together with washer.
- 4) Loosen terminal clamp and turn out hub spindle axle by means of pin (5).
- 5) Remove wheel.
- 6) When replacing hub spindle (2) turn same so that it does not jam, insert washer (3), tighten axle nut (4), compress springs several times to make sure no parts of rear spring suspension jam. Finally tighten fixing screw (1).

Do not lay hub spindle on dirty ground; clean all dirty parts carefully and grease them lightly before reassembling.

Tyres:

The wheels are equipped with drop centre safety rims which differ from ordinary rims insofar as these rims have crosswise grooves located opposite the valve. This arrangement prevents the tyres from slipping off the rim after a blow-out. Avoid using excessive force in removing and replacing wirebead tyres.

Removing the Tyre:

Deflate the tyre and push the casing from its seat all the way round. Unscrew rim nut and press valve into tyre. Push tyre bead near the valve into drop-centre and lift tyre off rim flange on opposite side by means of a tyre lever. Do not use a screw-driver! Force tyre bead over rim gradually, remove inner tube. It is now possible to remove the casing by pushing the other tyre bead over rim flange (by means of tyre lever).

Replacing the Tyre:

Lay wheel flat on the ground. Push the tyre beading into the drop centre near at the valve and, beginning on the opposite side, slip tyre beading over rim flange all around by means of tyre lever. Do not use excessive force! Sprinkle talcum powder inside the casing and insert slightly inflated inner tube after first pushing valve through valve hole and tighten rim nut a few turns. Before inserting the other tyre bead push in the valve to the nut so that the first tyre sits well in the drop centre. Then push in the second bead over the rim flange starting opposite the valve.

Inflate tyre and make sure that the circular marking on the tyre is equidistant from rim flange all around. Tighten rim nut and test tyre pressure (see page 11 for proper tyre pressure).

Always ride with proper tyre pressure and with an eye for saving your tyres.

Brakes:

Front and rear wheels are both equipped with internal shoe brakes. Front wheel brake is operated by means of a cable and conduit from the handle-bar; a foot clutch operates the rear wheel brake by means of a shaft.

As the highest degree of safety for rider and machine depends on the condition of the brakes, it need not be emphasized, that the brakes must be subject to constant care and observation.

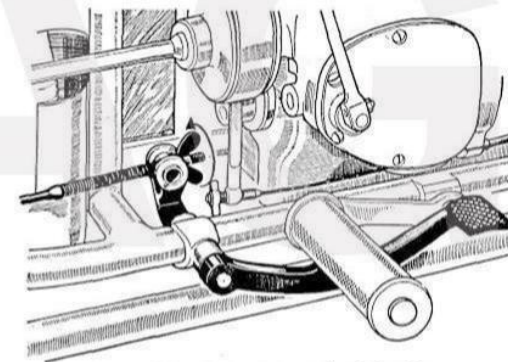
Equalize wear of brake linings by readjusting brakes from time to time. On the front wheel this is done by turning the wing screw (1) in middle of brake cover a few turns in anticlockwise direction. Adjustment of rear wheel brake is done by turning the wing screw on the pull rod in clockwise direction. In adjusting brakes great care should be taken to leave a certain play between the position of rest of the brake lever and the point where the brake applies, as the brakes will otherwise rub, become hot and are subjected to excessive wear. The wheel must turn freely. If the proper braking action cannot be achieved by adjusting the brake, then the linings are worn out and must be renewed. Bright braking surfaces insure of well-

gripping brake linings. When driving downhill for long distances apply front and rear brake alternately so that one brake can always cool off. On steep hills the braking power of the engine in the lower gears should be employed.

Apply brakes gradually, i. e. increase the pressure on the brake slowly and only depress brake so far that wheel does not skid.



Adjusting front wheel brake



Adjusting rear wheel brake

Adjusting the Valves:

Check valve clearance every 2,000 km (1,200 miles) when engine is cold.

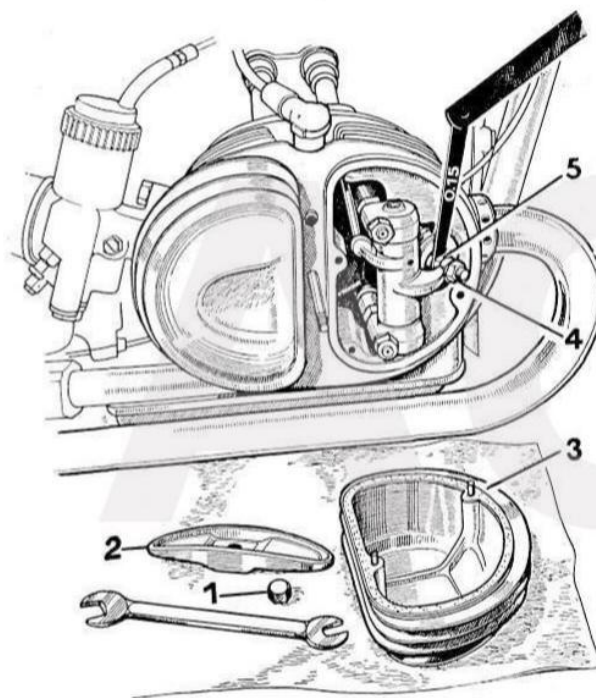
- 1) Remove nut (1) from clamp plate. Remove clamp plate (2) and covers (3).
2. Crank engine until the air in the cylinder where adjustment is to be made is compressed. (Noticeable resistance on the kick starter). Both valves are now closed. Now proceed as follows (engine cold):

intake 0.1 — 0.15 mm

output 0.15 — 0.2 mm

Check with feeler gauge.

- 3) When valve clearance varies, loosen lock nut (4) and adjust to proper clearance by screwing in the adjusting screw (5).
- 4) Hold adjusting screw with screw driver and tighten lock nut.
- 5) Upon completing adjustment of both valves, replace covers, return clamp and washer and tighten the nut.

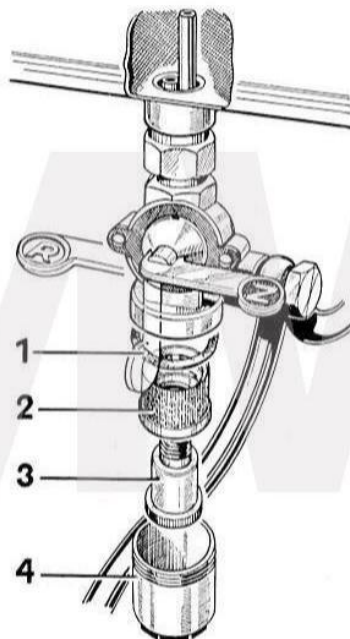


Cleaning the Fuel Cock:

Infiltration of impurities to both carburetors can be prevented by cleaning fuel two-way cock and water separator about every 1,000 km (600 miles) of riding, for instance when you refuel.

- 1) Close fuel two-way cock (position "Z").
- 2) Unscrew the water separator (4) provided with a 17-mm hexagon head.
- 3) Unscrew knurled fixing screw (3) with fuel strainer (2).
- 4) Watch that gasket (1) is not lost.

Clean water separator (4) and fuel strainer (2) with petrol and replace in inverted order.



Head Light:

The fuse for lighting system is located below the slotted plug (4).

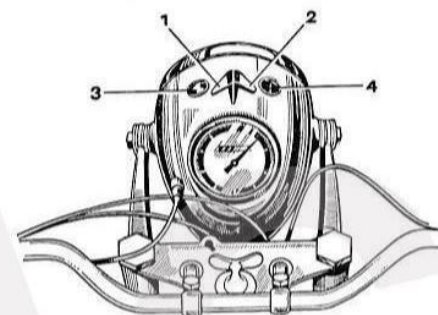
After removing head light reflector unit the pilot lamp (3) is accessible. Position (1) of ignition key gives parking light, position (2) gives country light.

Head light adjustment:

During night riding it is annoying to be blinded by a vehicle coming from the opposite direction. You may often notice that this even occurs with lights that are set at passing beam. For this reason check adjustment of the head light on your motorcycle from time to time. This assures proper illumination of the road, increased security and eliminates hazards to other drivers.

Testing procedure:

Make a cross on a light-coloured wall at a height corresponding to the centre of your head light. The height of the head light is marked with an "H" and amounts 870 mm (35 inches) for model R 51/2 (solo machine). The motorcycle stands on its wheels 5 metres from the wall and is loaded with the driver (see illustration page 48).



Adjusting the country beam:

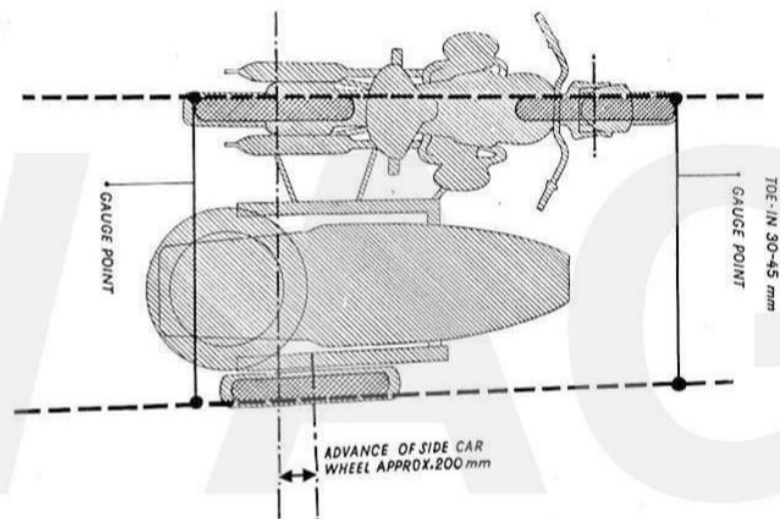
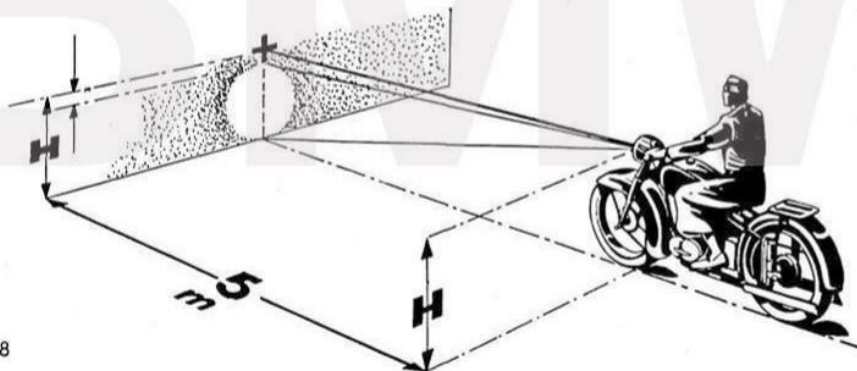
After switching on the country beam, adjust head light so that the centre of the bright spot on the wall coincides with the marking.

Checking the passing beam:

After switching to the passing beam check if the border line between light and dark areas, i. e. the upper border of the brighter illuminated wall is 5 cm (2 inches) or more below the mark. If this distance is less than 5 cm (2 inches), head light must be readjusted.

With side car:

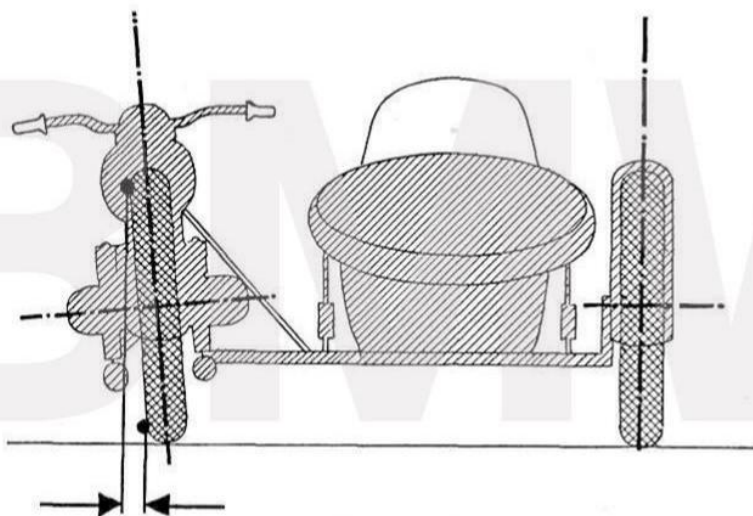
When a side car is attached to the motorcycle, the head light must be readjusted. This is done on line with the above directions but with motorcycle loaded with the rider and one person in the side car.



Attaching the Side Car:

The frame is equipped with a connecting mechanism according to German Engineering Standard DIN 74031 so that a side car can be readily attached.

The Bayerische Motorenwerke A.G. has developed a side car sprung by a torsion bar with swinging arm. The BMW model "Special" side car is highly recommended and gives you an all-wheel sprung vehicle with excellent riding qualities.



Make adjustments at the centre brace, connect front brace so that it is not under tension.

Cleaning:

The motor and transmission are best cleaned with petrol and the lacquered parts washed with a sponge and polished with a chamois skin. Before applying a water hose, be sure the engine has cooled off sufficiently. Avoid using high pressure as this may cause moisture to be forced into the engine, which may cause serious damage. (Do not play the hose directly on the carburettor or the dynamo. Shut the air filter before spraying.)

When the motorcycle is dry, oil the external brake parts and the hinge of rear mud guard to prevent these parts from rusting. Lacquer treating media preserve the lacquer and give it a shiny appearance.

Remove air filter, rinse it in petrol and moisten lightly with oil. When the motorcycle is thoroughly cleaned, lubricate all parts according to lubrication plan.

Servicing:

Observing the servicing rules painstakingly warrants troublefree operation of your R 51/2 and preserves its value. Lubricating the engine and the frame is of great importance and it is in your own interest to carry out these jobs in accordance with the lubrication plan. Special attention should be given to the instructions on running-in the engine on page 15.

Check the oil level of the engine regularly and refill oil if necessary. Use the hexagon-head dip stick attached to the left side of the engine. The oil level of the transmission and the propeller shaft must likewise be frequently checked. In both the oil level should reach the lowest thread of the petrol tank filler opening. Never turn the rear wheel when checking the oil level. Change the oil in accordance with the lubrication plan. The universal joint of the propeller shaft has a dirt- and water-proof cover. The mark "L" indicates that this cover has left hand thread. After every 5,000 km (3,000 miles) fill it with grease until grease appears between the four pins of the universal joint.

Lubricate the wheel hubs every 10,000 km (6,000 miles). Remove wheels for greasing as then surplus grease can be wiped off which would otherwise damage the brake lining.

130 cu.cm of oil are required for each prong of the fork. If the resilience of fork suspension is no longer satisfactory, do not refill oil but drain the old oil, compress the spring several times and fill with fresh oil.

Cable and conduits for clutch, hand brake and ignition are equipped with lubricating nipples to be greased with a gun every 1,000 km (600 miles) according to the lubricating plan.

Servicing the Ignition System:

The operational safety of the engine depends to a high degree on the condition of the ignition system. Checking the battery, the sparking plugs, the contact breaker and the dynamo at regular intervals is of greatest importance.

Battery:

Check acid level of battery every 4 to 6 weeks and, if too low, refill with distilled water. The inner side of battery cover should always be clean and dry. If the vehicle is not in use for over six weeks, battery must be removed and given special care; it must be discharged at least every 6 weeks and charged from a power source.

Sparking Plugs:

The conditions under which sparking plugs must do their work are severe and they are consequently subject to wear, though this is not readily noticeable. If you cannot check sparking plug for proper air gap (0,6 mm) yourself, have your BMW agent perform this job for you at certain intervals. Trained personnel can always accurately judge from the appearance of the sparking plug whether the carburettor adjustment is correct and the engine runs properly.

Interrupter:

Check the interrupter points about every 5,000 km (3,000 miles). The gap should be 0.4 mm and the surface smooth and clean. The ignition coil, the distributor, and the interrupter are located under a hood in front of the engine.

Dynamo:

In general, the dynamo does not require any maintenance, but it is a good plan to have your BMW agent check same about every 10,000 km (6,200 miles).

Before starting any job on the dynamo, remove cable on the positive post of the battery (terminal number 30). Diagram on page 61 shows the entire electric circuit. Make it a rule to have all jobs on the electric system performed by a specialist.

Technical Data:

Type of engine:	Four-stroke engine with overhead valves
Rated continuous power:	24 h.p., 5,800 r.p.m.
Number of cylinders:	2 (opposed-cylinder construction)
Bore:	68 mm
Stroke:	68 mm
Piston displacement:	494 cu. cm
Compression ratio:	1:6.3
Carburettor:	2 inclined draft carburettors, joint air filter with starter slide, covered in gear housing
main jet	No. 85
idling jet	40
needle jet	2.64
mixing chamber cap	5
needle adjustment	1
idling air screw	opened 1½ — 2 turns
Camshaft adjustment (measured with 2 mm valve clearance):	intake open 4-9° after upper dead centre intake closed 30-35° after lower dead centre exhaust open 31-35° before upper dead centre exhaust closed 5-10° before lower dead centre
Operating clearance with cold engine:	intake 0.15 mm exhaust 0.20 mm

Lubricating system: force feed lubrication, oil tank in lower part of housing

Ignition and lighting system: . Bosch battery ignition 6 volts/75 watts

Spark plug: Bosch W 240 T 1

Maximum spark advance: . . 38-41° before upper dead centre

Maximum spark retard: . . . 12° before upper dead centre

Clutch: single-disc dry clutch

Transmission: 4-speed type with gear dog clutch, with the casing bolted to the engine. Shock absorption by resilient drive shaft in 4th gear

Gear Levers: ratchet type foot-operated gear lever and hand-operated auxiliary gear lever

Gear Ratios: 1st gear 3.6:1
 2nd gear 2.28:1
 3rd gear 1.7:1
 4th gear 1.3:1

Speed reduction between transmission and rear wheel: . . . Solo 3.89:1 Number of teeth 9:35
 side car 4.62:1 Number of teeth 7:32

Power transmission, gears — rear wheel: fully enclosed propeller shaft drive with elastic coupling and helical bevel gears

Tyres: 3.50 x 19

Frame: rigidly interconnected double-tube steel frame

Front wheel suspension: telescope fork with double-action hydraulic shock absorber

Rear wheel suspension: dust- and splash-proof telescope rear wheel suspension

Brakes: internal shoe brakes, dia. of drum 200 mm

Oil consumption per 100 km (60 miles): approx. $\frac{1}{10}$ qt.

Overall width: approx. 33 inches

Overall length: approx. 85 inches

Height from saddle to ground: approx. 28 inches

Ground clearance: approx. 5 inches

Weight in operating condition: 400 lbs.

Maximum permissible load: . 880 lbs.

Capacity of fuel tank: approx. 3½ gallons

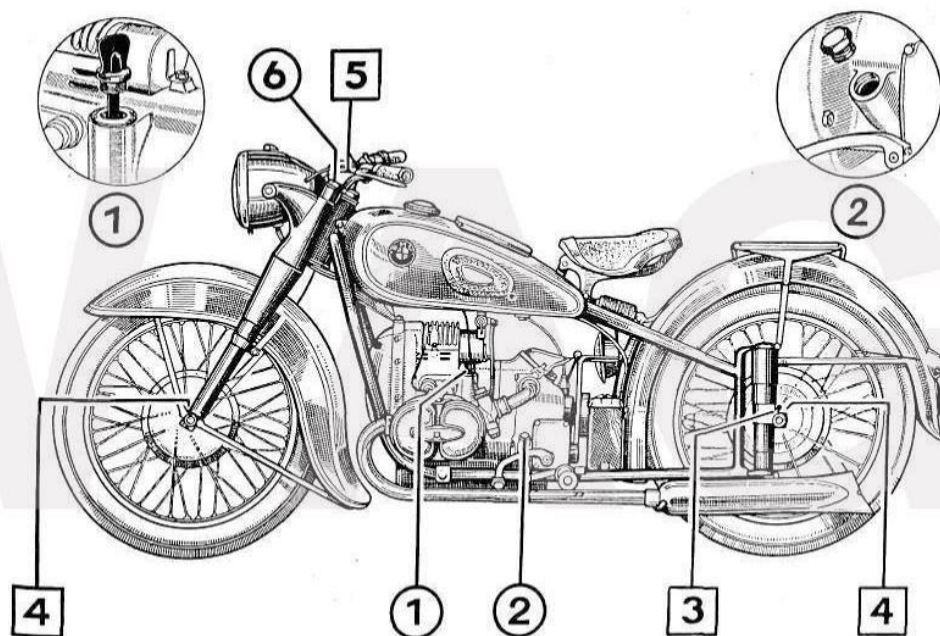
Reserve tank (sufficient for 20 miles): approx. 1½ qts.

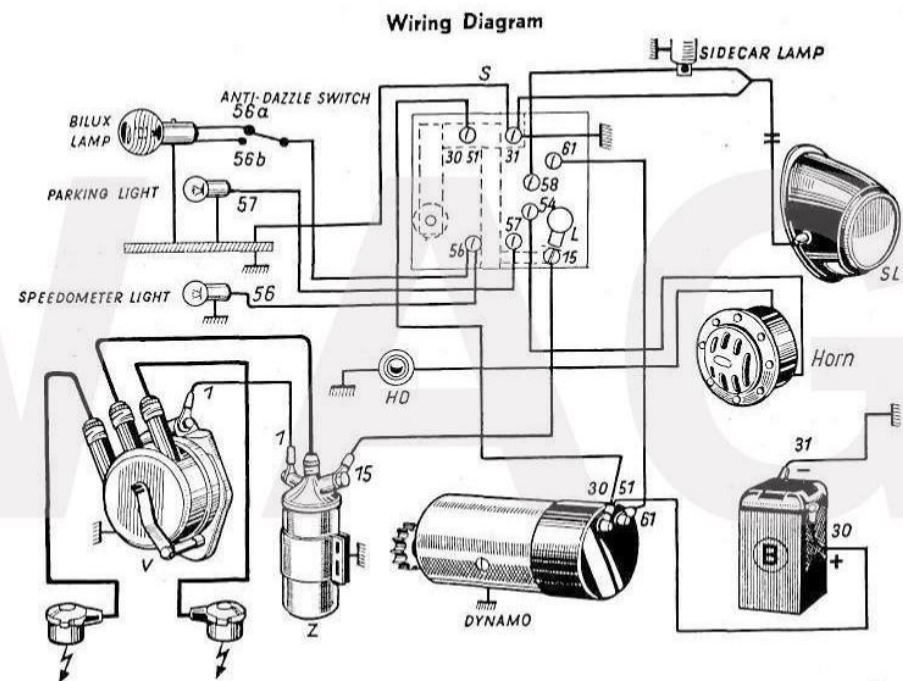
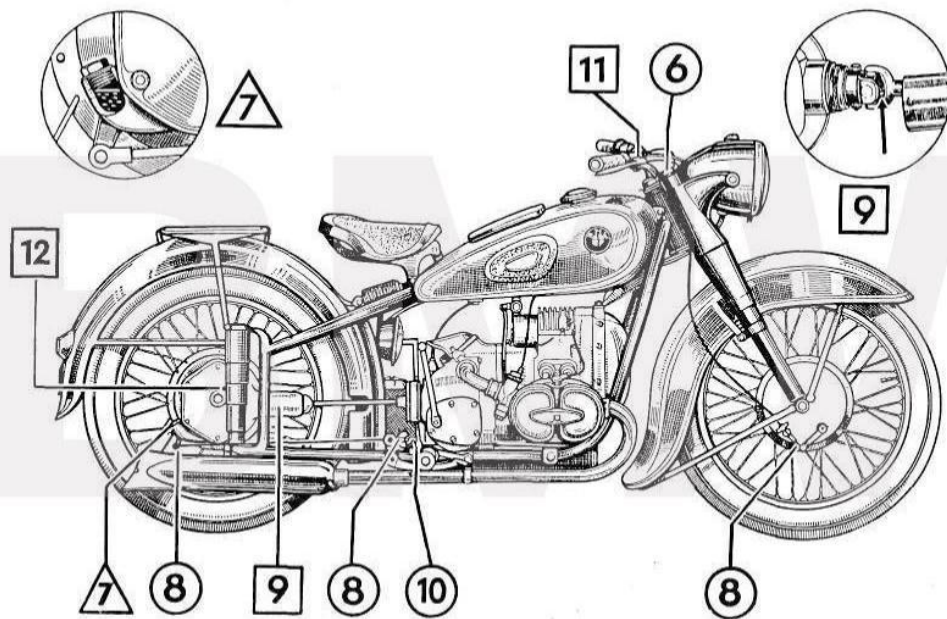
Capacity of oil tank: ½ gallon

Maximum speed: Solo approx. 84 m.p.h.
 with BMW side car 65-70 m.p.h.

LUBRICATING PLAN FOR BMW 51/2

Servicing Jobs (The numbers correspond to the point requiring lubrication)		Lubricate after travelling following distances in kilometres (miles approx.)												Observations
		500 (300)	1,000 (600)	2,000 (1,200)	3,500 (2,100)	5,000 (3,000)	6,500 (4,000)	8,000 (5,000)	9,500 (5,900)	11,000 (6,800)	12,500 (7,500)	14,000 (8,400)		
①	Change oil in engine, quantity required 2.2 qts.	x	x	x	x	x	x	x	x	x	x	x	Legend of the symbols on left margin: ○ Engine Oil Summer: SAE 40-50 e. g. Mobil AF or SHELL X-100 SAE 40 Winter: SAE 20-30 e. g. Mobil Arctic or SHELL X-100 SAE 20 □ Grease e. g. Mobil grease No. 4 or SHELL Retinax RB △ Special oil for propeller shaft Summer: e. g. Mobilube GX 90 or SHELL Spirax 90 EP Winter: e. g. Mobilube GX 90 or SHELL Spirax 90 EP ⑥ Front wheel fork is filled with winter oil all year round SAE 20. During severely cold periods replace this winter oil by a mixture of 3 parts of engine oil and 1 part kerosene.	
②	Check oil level in transmission	x		x	x	x	x	x		x	x	x		
	change oil in transmission, quantity approx. 1 qt.		x						x					
③	Grease left rear wheel suspension		x		x		x		x		x			
④	Grease wheel hubs		x								x			
⑤	Grease cables and conduits for clutch and hand brake		x		x		x		x		x			
⑥	After repairs, refill 130 cu. cm of engine oil in each prong of front wheel fork.			x					x					
△	Check oil in propeller shaft housing	x		x	x	x	x	x		x	x	x		
	change oil in propeller shaft housing, quantity required 0.13 to 0.14 litre (14/100-15/100 qt.)		x						x					
⑧	Oil all joints of braking mechanism	x	x	x	x	x	x	x	x	x	x	x		
⑨	Grease universal joint of propeller shaft		x			x			x			x		
⑩	Oil clutch operating lever		x		x		x		x		x			
⑪	Grease hand controls		x		x				x		x			
⑫	Grease right rear wheel suspension		x		x		x		x		x			





Guarantee:

The seller of this motorcycle assumes the following guarantee obligations toward the buyer: —

The manufacturer guarantees that, under the following conditions, the motorcycle is free from any defects:

- 1) the buyer has accurately observed the prescribed instructions on running-in the motorcycle;
- 2) the prescribed checks have been made by the BMW Service during the running-in period, which must be evidenced by submitting the properly executed Service Cards.

The guarantee is valid exclusively for the initial purchaser of the motorcycle for a period of six months after licensing of the vehicle or until the motorcycle has travelled a distance of 10,000 km (6,000 miles). At the seller's option, fulfillment of the guarantee obligation shall consist of repair or replacement of parts sent in (transportation charges prepaid) which have become defective or useless as a result of a proven defect in the material or in workmanship. Claims of any other kind are not valid under this guarantee. Installation costs shall be reimbursed to the supplier. No guarantee is given for motorcycles participating in motorcycle races or other sporting events nor for motorcycles of special design.

For parts not originally produced by the manufacturer of this motorcycle, such as seat, tyres, ignition system, lighting system, testing instruments, chains, etc., the present guarantee is limited to the transfer of the guarantee claims originally given the BMW by the manufacturers of the respective parts.

If any damage or defect is found or suspected on or in this motorcycle, the repair or replacement of which is claimed under this guarantee then the motorcycle or the defective part thereof shall be sent in to the manufacturer or seller (all transportation charges prepaid) for examination. Where a defective part is replaced free of charge, said defective part shall pass into the property of the seller and shall be scrapped. Damage due to neglect or improper treatment or overloading in any form does not fall within the scope of this guarantee.

This guarantee shall become invalid if repairs or alterations are made on the motorcycle by a third party or if parts are replaced by parts not of BMW origin. This guarantee shall become invalid if repairs or alterations are made on the motorcycle by a third party or if parts are replaced by parts not of BMW origin.

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(Translator's note: The distances given in miles are approximate.)

BMW AG