

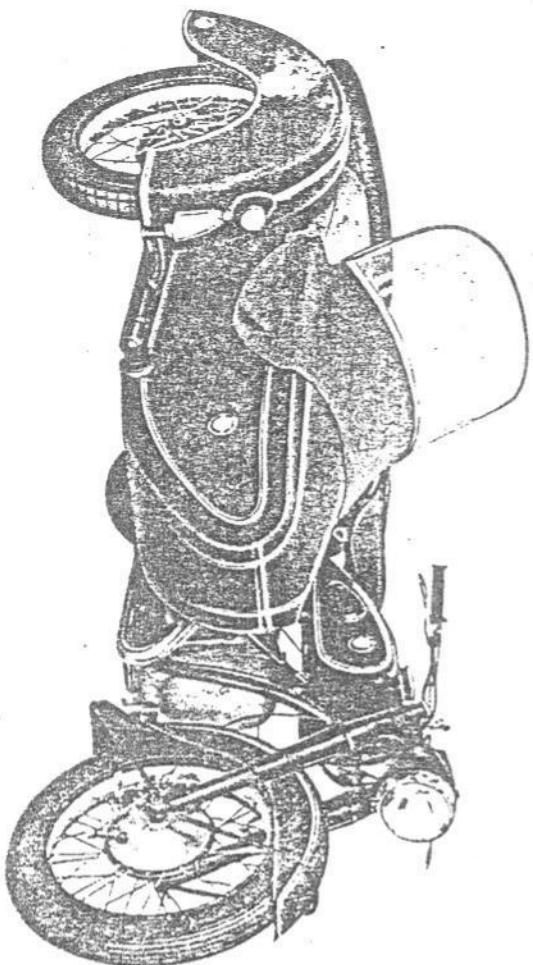
Manual

BMW

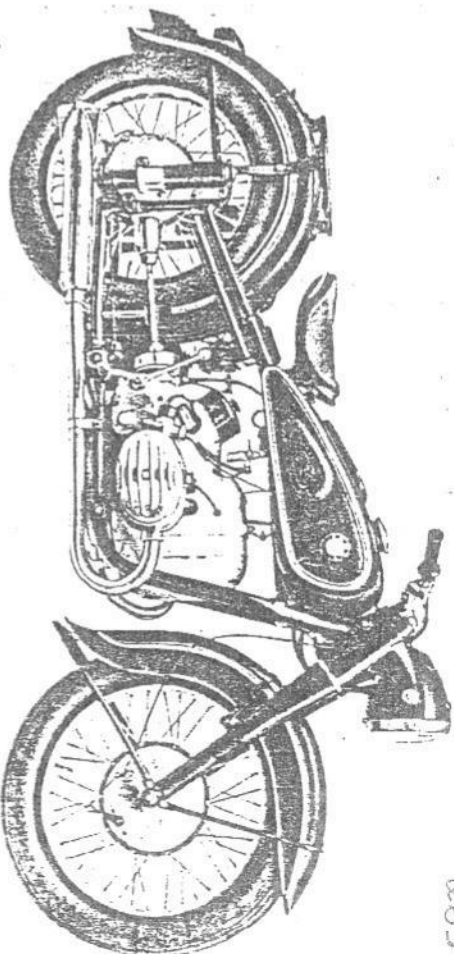
Motorcycle

R 51/3 · R 67

BAYERISCHE MOTOREN WERKE AKTIENGESELLSCHAFT · MÜNCHEN 13



BMW R 67 with side car



BMW R 51/3

Introduction

Many factors must be taken into consideration when purchasing a new motorcycle. Undoubtedly, your decision to choose a BMW was also reached only after a detailed inquiry into a number of points. We do not know whether this is your first motorcycle or whether you are an old veteran who has already travelled thousands of miles on motorcycles of all types. Perhaps you are an old member of the ever increasing legion of satisfied BMW riders who always choose a machine of the same make.

Notwithstanding these probabilities, your new BMW will enable you to get more joy out of life. It has been our endeavour to help you attain this goal. We have developed and built a motorcycle which in regard to progressive design, good riding qualities and capacity represents, to a high degree, a peak achievement of engineering ability. The traditional reliability of BMW motorcycles and their long years of service life have been accepted as standing facts for over 25 years. But this motorcycle cannot give satisfactory service on its reputation alone. You too

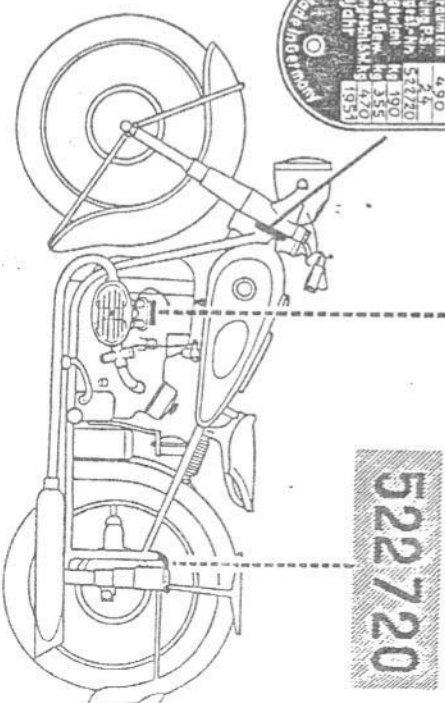
You will soon realize that it contains many valuable details and gives numerous worth while pointers to enrichen your motorcycle knowledge, irrespective of whether you are a novice or an old experienced motorcycle rider. Take the time to read this little book because, beside giving a general knowledge of the machine it also describes the parts requiring regular servicing. We only ask one thing of you — follow the instructions contained here! You may rest assured that the minor effort required in reading this book and in observing the rules laid down, therein will be repaid many times in form of increased riding safety, reliability and long service life. We have written this manual in generally understandable language, it is not a dry list of instructions but an operator's handbook which you should always carry with you. Should you require any information or advice which cannot be gained from the following pages, do not hesitate to apply to your BMW agent or directly to us. Our wish coincides with yours — namely that you be satisfied with your BMW motorcycle.

BAYERISCHE MOTOREN WERKE
Aktiengesellschaft

Motorcycle riding is a great sport, but never forget that your motorcycle requires regular servicing. Be sure that the service works indicated on pages 70 to 76, especially the oil level checks cited in the lubricating plan and the lubricating works be carried out periodically and carefully.

in avoiding trouble during 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 claim.

are organized in the form of a widely distributed net of BMW agencies and are always at your service. The BMW agent as seller of your motorcycle will advise you in all technical details and show you how to keep your machine in good running order for years to come. All shops displaying the sign shown on this page will gladly service and repair your machine. You will find personnel specially trained in BMW Service Centres, proper tools and a rich assortment of original BMW spare parts.



gear box oil capacity
rear wheel drive oil
capacity
front wheel fork oil
capacity
fuel consumption
oil consumption per
100 miles

" 0.7 qts. (U.S.) = 0.5 lmf gal.
" 8 to 8 1/2 cu. in.
" 8 cu. in.
see page 79
approx. 10-11 cu. in.

Speeds:
maximum speed of run-
in motorcycles:

depends on the octane number of the fuel consumed
and the resistance of the air encountered due to size,
position and clothing of the rider. (See "Running-In the
Motorcycle", pages 27 and 28 for maximum speeds in
the various gears and for running-in.)

solo, normal sitting posi-
tion
solo, driver crouched low
with tight clothing
with side car
average speed over 1 km
with standing start, rider
in normal sitting position:
solo rider weighing
165 lbs.
with one person on pillion
seat, weighing 165 lbs.
with side car and two
persons

R 51/3	75-80 miles p. h.	R 67	78-85 miles p. h.
84 m. p. h.	56-60 m. p. h.	88 m. p. h.	60-63 m. p. h.
63 m. p. h.	60 m. p. h.	65 m. p. h.	63 m. p. h.
46 m. p. h.	53 m. p. h.		

Operation and Control

1. Ignition and lighting switch on the head lamp:

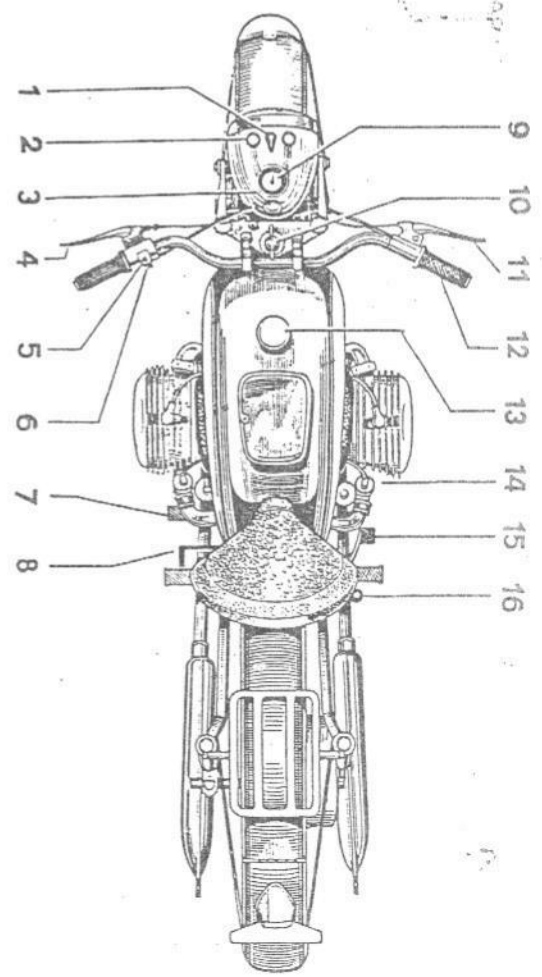
- Ignition key in middle position closes the ignition circuit. If battery is charged, the red pilot light lights up. Engine can be started when green light showing neutral position is burning. The Bosch horn is ready to operate.
- Ignition key turned to left, switches on the Bilux lamp with anti-dazzle switch, the tail light with license plate illumination and the speedometer light.
- Ignition key turned to right switches on the city light (parking light, and tail light with license plate illumination).
- Ignition key turned to right and withdrawn switches on parking light (parking light and tail light). Simultaneously ignition, battery control, neutral indicator, speedometer light and horn are cut out.
- Ignition key turned to middle position and withdrawn, short circuits the ignition and switches off the battery. Advance and retard spark are controlled automatically by a regulator on the magneto.

2. Charging control lamp on the head lamp:

Red pilot lamp lights up when battery is delivering current. At higher speed red pilot light goes out. This is a sign that battery is being charged.

3. Neutral indicator on head lamp:

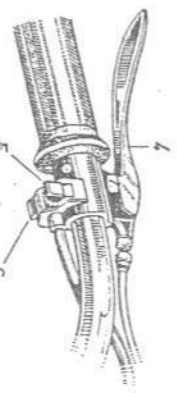
Green lamp lights up when gear shift lever is at neutral position.



Operation and Control

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4. Clutch on left handlebar grip:
By actuating clutch engine is disengaged from the transmission.



5. Anti-dazzle switch on left handlebar grip:
At top position, country light is switched on; at bottom position the anti-dazzle filament of Bilux lamp is switched on.

left handlebar grip

6. Horn button on anti-dazzle switch:
Actuating this button cuts in electric circuit for horn.

7. Gear shift pedal on left hand side of transmission:
Depressing pedal shifts to next slower gear, raising pedal shifts to next faster gear or to neutral. Pedal automatically returns to its starting position after each operation. Neutral position is between 1st and 2nd gear.

8. Kickstarter on left hand side of transmission:
Only operate kickstarter with gears in neutral. For cranking engine switch off ignition; cut in ignition to start engine.

9. Speedometer:
Pointer and dial show speed at which motorcycle is travelling in miles per hour and integrator shows total sum of miles travelled. Coloured markings I, II, III on dial show maximum permissible speed for first, second and third gear of a run-in motorcycle.

Technical Data

Engine:

type of engine

four stroke, inclined, with overhead valves

motorcycle type

R 51/3

R 67

rated continuous power

24 h. p., 5,800 r. p. m.

26 h. p., 5,500 r. p. m.

cylinder arrangement

2

2

bore

68 mm = 2.68"

72 mm = 2.83"

stroke

68 mm = 2.68"

73 mm = 2.8"

piston displacement

490 c.c.

590 c.c.

compression ratio

1 : 6.3

1 : 5.6

valve timing measured at

2 mm = .079"

of R 51/3 and R 67

intake valve opens after top dead centre

40° - 90°

intake valve closes after bottom dead centre

30° - 35°

exhaust valve opens before bottom dead centre

31° - 35°

exhaust valve closes before top dead centre

50° - 10°

operating valve clearance

on a cold engine:

intake

0.15 mm = .006"

exhaust

0.20 mm = .008"

lubricating system:

force feed lubrication, oil stored in lower part of engine housing

Drive:

clutch

single-disc dry clutch

transmission

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

shifting mechanism

rack-and-pinion type foot-operated shifting mechanism with hand-operated auxiliary shifting lever

speed reduction

3.6 : 1

1st gear

2.28 : 1

2nd gear

1.7 : 1

3rd gear

1.3 : 1

4th gear

1.3 : 1

power transmission from gears to rear wheel

fully enclosed propeller shaft drive with elastic coupling and helical bevel gears

speed reduction between transmission and rear wheel:

3.6 : 1

solo driving

for R 51/3

for R 67

side car driving

3.89 : 1 (series type)
(No. of teeth 9/35)

3.56 : 1
(No. of teeth 9/32)

tires

4.57 : 1
(No. of teeth 7/32)

4.38 : 1 (series type)
(No. of teeth 8/35)

drop-centre safety rims

3 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 type suspension internal shoe brakes, dia. of drum 200 mm = 7.87"

Carburettor:

type

2 inclined carburettors, air feed from joint air filter with starter slide

motorcycle model type

R 51/3

R 67

left carburettor

Bing 1/22/39

Bing 1/24/15

right carburettor

Bing 1/22/40

Bing 1/24/16

carburettor passage

22 mm = .865"

24 mm = .945"

main jet

100

100*

needle jet

40

40

mixing chamber cap

12/08

12/08

jet needle

5

5

needle adjustment

1

No. 2

idling air screw opened

1 - 2 turns

1 - 2 turns

Ignition:

magneto ignition

Norris M Z ad/R

Norris M Z ad/R

max. spark advance

37° - 40° before top dead centre

35° - 38° before top dead centre

spark retard

for R 51/3 and R 67

20° - 6° before top dead centre

spark plugs

Bosch W 240 T 1

Bosch W 240 T 1

electrode gap

0.6 mm (.024 in.)

0.6 mm (.024 in.)

dynamo

Noris 6 volts L 45/60 L

* For solo sports riding of R 67 a main jet 105 can be used.

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Dimensions:

overall width

approx. 31"

with solo handlebar

34.5"

with side car handlebar

84"

overall length

28"

height from saddle to ground

5"

ground clearance

5"

Weight:

net weight, ready for operation:¹⁾

418 lbs.

R 51/3

422 lbs.

maximum permissible load:²⁾

781 lbs.

a) solo

1,034 lbs.

b) increase of load on motorcycle through side car connection

1,320 lbs.

of motorcycle with side car

1,320 lbs.

Fuel and Lubrication:

fuel

gasoline of at least 70 octane

lubricants

see Lubricating Plan

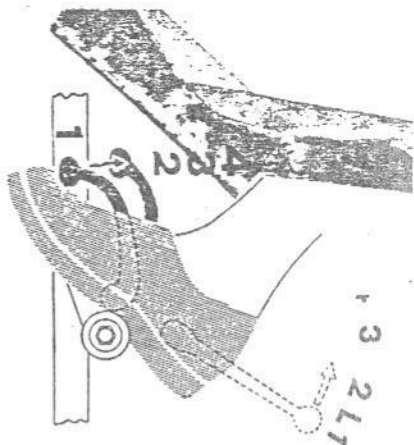
capacity of fuel tank

approx. 4.5 U.S. gall. = 3.75 imp. gall.

reserve fuel tank

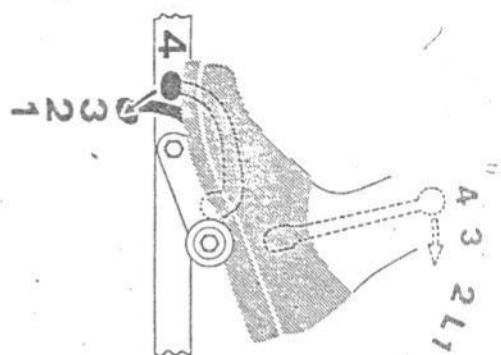
1.5 qts. (U.S.) = 0.33 imp. gall. (sufficient for approx. 20 miles)

¹⁾ net weight = wt. of motorcycle ready for operation, including lubrication, fuel, tools.
²⁾ permissible total load = net weight + passengers + baggage load and + side car load if attached.



Shifting the gears by "lifting"

from first to fourth
by one gear at a time



Shifting the gears by "depressing"

from fourth to first
by one gear at a time

Go into neutral from 3rd and 4th gear by depressing pedal several times to 1st gear and a short lift into neutral.

Table R 67

sp	rear wheel transmission for	miles per hour in			
		1st gear	2nd gear	3rd gear	4th gear
0 to 600	solo riding	12	20	30	40
600 to 1,200	side car riding	12	20	28	35
	solo riding	15	28	40	53
	side car riding	15	25	35	46
	solo riding	28	50	68	
over 1,200	side car riding	25	40	55	

Running the Engine in Properly

is of vital importance for the useful life and the reliable operation of your motor-cycle because even those parts which have been subjected to most accurate machining and lapping must yet attain the ultimate smoothness which only running-in can give. For the benefit of your engine, take great care that the above listed maximum permissible speeds are never exceeded during the running-in period up

Maximum speeds in the individual gears must not be exceeded.

a) Motorcycle type R 51/3

miles registered on speedometer	rear wheel transmission for	miles per hour in			
		1st gear	2nd gear	3rd gear	4th gear
0 to 600	solo riding	10	15	30	38
	side car riding	10	15	28	30
600 to 1,200	solo riding	12	25	38	53
	side car riding	12	20	30	43
	solo riding	28	45	60	
over 1,200	side car riding	20	38	53	

ed to mean that
ary, the engine
and load wil
On level road

to 600 miles and from 600 to 1,200 miles. This is not to be construed to mean that the engine must run at the maximum speed at all times, on the contrary, the engine, gearing and rear wheel drive are best run in under varying speed and load with much gear shifting as is required on hilly roads with many curves. On level roads drive at maximum speed for no more than 500 yards and then let the motorcycle coast. In this manner all sliding and revolving parts will be properly run in.

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 or the gearing.

Do not drive full speed over long stretches as soon as your motorcycle reaches the 1,200 mile limit. We recommend a gradual increase of speed until 1,800 miles have been travelled.

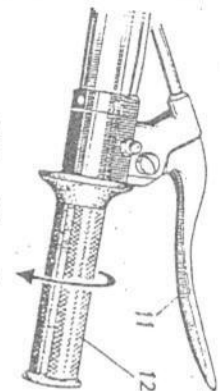
Attention!

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

Unauthorized tampering with the speedometer seal invalidates all guarantee claims.

10. Steering damper mechanism on top of fork:
On bad roads, for high speed, and side car driving, tighten damper screw a little bit, and loosen again for slow solo riding.

11. Hand brake lever on right handlebar grip:
Actuates front wheel brake.



right handlebar grip

12. Hand-controlled accelerator on right handlebar grip:
Turning clockwise closes, turning anti-clockwise opens throttle in carburetors.

13. Fuel tank filler gap:
Capacity of fuel tank approx. 4.5 U.S. gallons = 3.75 Imp. gall. (of which 1 1/2 quarts constitute reserve fuel sufficient for approx. 20 miles).

14. Fuel cock on lower right hand side of fuel tank:
A = open, Z = closed, R = reserve.

15. Brake pedal on right side:
Actuates rear wheel brake when depressed.

16. Auxiliary hand shift lever on right side of transmission:
Facilitates quick shifting to neutral.

Starting Engine:

- | | |
|---|--|
| open fuel ¹ cock
give gas:
for cold engine
for warm engine
turn over the engine
start engine
allow engine to warm up | turn cock to "A" (open)
open hand-controlled accelerator, tickle both carburetors uniformly. Close starter slide on filter.
open hand-controlled accelerator. Do not tickle carburetors. Do not close starter slide on filter.
with ignition cut out and gears shifted to neutral (red and green lamps are out) by actuating kickstarter twice.
cut in ignition (red and green lamps light up). Give kickstarter a short, powerful kick. When engine starts open starter slide once more.
at medium speed, never race your engine (if engine is cold warm up for at least 2 minutes). This is of great importance as it prevents excessive wear of cylinders. |
|---|--|

Before Starting:

Fill fuel tank

Check oil in engine

Check oil in gear box

Check oil in rear wheel drive

Check tire pressure:

driver alone
driver and passenger
driver with occupied side car
driver with passenger and side car

Riding:

disengage clutch
shift to first gear
engage clutch
shifting from 1st over neutral to 2nd, 3rd and 4th gear
shifting from 4th to 3rd and 2nd gear and over neutral to first
speed
riding downhill

stopping

turning off engine

Operating Instructions

petrol station fuel of at least 70 octane. Capacity of tank approx. 4.5 U.S. gallons = 3.75 Imp. gall. of which 1 1/2 quarts constitute reserve fuel sufficient for approx. 20 miles.

as summer lubricating oil use SAE 40 as winter lubricating oil use SAE 20 (only use service-tested lubricants recommended by BMW agents)

Oil should reach to top mark on dip stick. To measure, only insert stick, do not screw it on. Never fill in too much oil.

fill in oil up to lower threads of filling gap, same as in engine.

use gear oil type SAE 90 (only use recommended lubricants), fill up to lower threads of filling gap.

front wheel	rear wheel	side car wheel
20 lbs.	20 lbs.	—
20 lbs.	27 lbs.	—
27 lbs.	27 lbs.	27 lbs.
27 lbs.	37 lbs.	27 lbs.

pull on handlebar clutch
depress foot change (green light goes out)
slowly release handlebar clutch and open throttle
always disengage clutch before shifting and close throttle. Lift shifting pedal, then engage clutch and open throttle as required.
always disengage clutch before shifting, leaving throttle a bit open, depress shifting pedal, then engage clutch and open throttle as required.
never exceed maximum speeds listed on page 27 and 28.
shift to next lower gear and, if necessary, shift once more.

A good rule: In general, ride up and downhill in the same gear.

close throttle. When speed has slowed down sufficiently, declutch and apply brake slowly. Shift to neutral with foot change.

cut out ignition. Never have ignition turned on for any length of time if engine is standing still. Shut fuel cock (turn to Z = closed).

on the end of the camshaft spur gear serves to unscrewly remove the camshaft housing.

7) Lubrication Pump and Oil Circulation

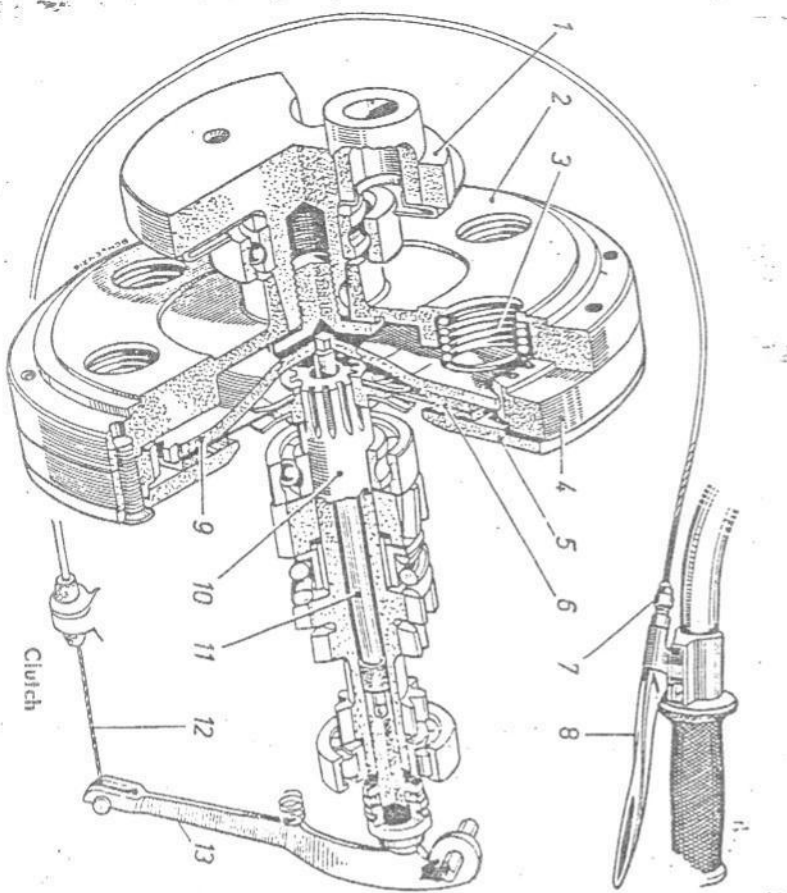
The engine has an oil pressure circulation lubricating system and draws oil from the oil sump in the crank case.

Lubrication pump is designed as a gear pump and is driven by the crankshaft over a pair of spur gears.

It sucks oil from the sump over a fine mesh strainer and presses it through passageways in the crankshaft housing to the two splash-lubricating rings on the crankshaft, to an oil injecting nozzle on front crankshaft bearing cover for the spur gear drives, and to a bore on left cylinder flange for an additional lubrication of the left cylinder.

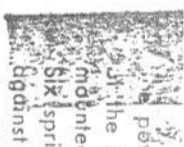
The oil splashed by the crankshaft and connecting rods splashes directly on the pistons, cylinders, camshaft and bearings as well as on the tappets. Sufficient oil passes through tappets, hollow push rods and push rod protection tubes to the rocker arms and valves. Excessive oil in rocker arm chambers flows through bores in the cylinder heads and oil return tubes in cylinders back to the crank case from which all splash oil passes through a coarse strainer into the oil sump.

After every 6,000 miles demount oil sump, remove the fine oil strainer in bottom of crank case and wash strainer thoroughly in gasoline.



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The power output of the engine is transmitted to the transmission by means of the single-disc dry clutch. Its driving element is the flywheel (2) which is mounted on the conical journal of the crankshaft by means of a key and screw. Six springs (3) arranged in holes in the flywheel press the pressure plate (9) against the double-lined driven disc (6) which in turn is pressed onto pressure ring (5). Pressure ring (5) is connected to flywheel by means of the internal gear tooth ring (4) to which it is connected by countersunk screws. By means of its external gear tooth ring, pressure plate (9) is slidably mounted in the internal gear tooth ring. Driven disc (6) is mounted on grooved end of the gear drive shaft; so that it slides but does not revolve. Thus the torque of the engine is transmitted to the gears by flywheel (2) or pressure ring (5) and pressure plate (9) through the friction of clutch disc (6).

To declutch, pressure plate (9) is released from friction clutch disc (6) whereby power transmission from engine to gears is interrupted. Declutching is done at left handlebar grip through clutch lever (8), cable and conduit (12), throw-out lever (13), thrust bearing and shaft (11) which engages a square bearing in pressure plate (9) and runs in hollow gear driving shaft (10).

Cable and conduit adjusting screw (7) on left handlebar clutch lever enables clutch adjustment.

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9) Valve Adjustment

Check valve clearance every 1,200 miles, when engine is cold:

1) Unscrew nuts (1) and (2) from cover (3) on cylinder heads and remove cover, nuts and washers. Be careful not to damage the cork gaskets.

2) Crank engine until the air is compressed in the cylinder where adjustment is to be made and remove spark plug on the opposite cylinder. (Noticeable resistance on kickstarter.) Both valves are now closed. Now gage and adjust valves with a feeler gage (engine cold) as follows:

intake valve clearance 0.10 - 0.15 mm = .004" - .006"
exhaust valve clearance 0.15 - 0.20 mm = .006" - .008"

3) If clearance varies, loosen check nut on rocker arm and set at proper clearance by turning adjusting screw.

4) Hold adjusting screw tight and tighten check nut.

5) After adjusting clearance of both valves replace cover, washers and tighten nuts.

6) Adjust second cylinder in the same manner.

It is advisable to have the adjustment checked by a BMW agent.

To remove right hand cylinder head cover if a side car is attached, tip motor-cycle to left after removing the bolts of the two upper braces. This obviates the necessity of readjusting camber and toe-in.

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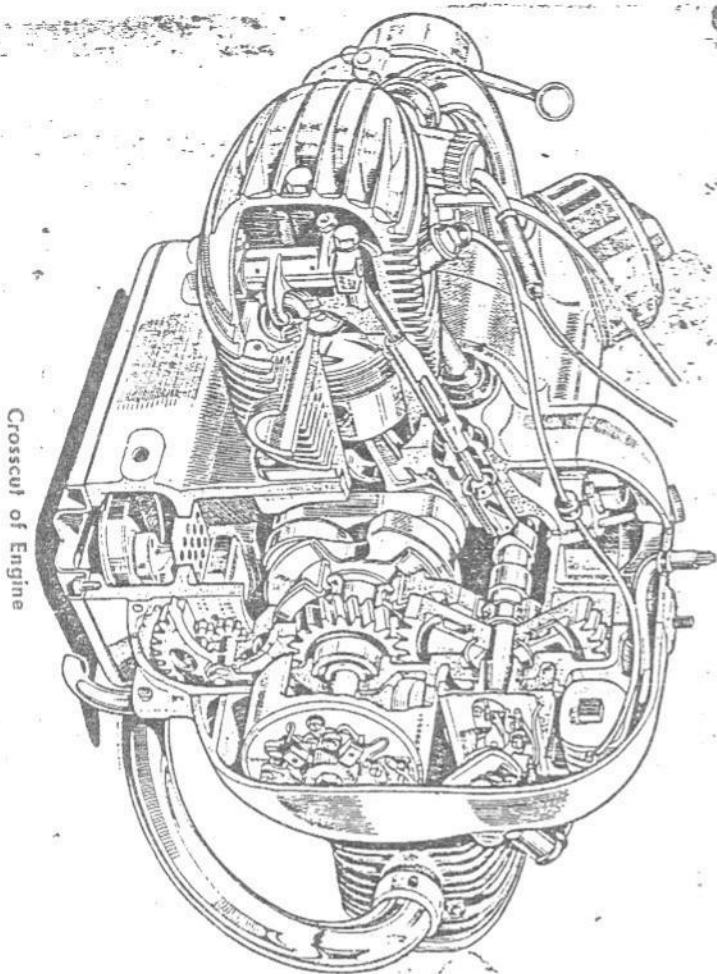
A. Engine

The engines of motorcycle type R 51/3 with a piston displacement of 500 c. c. and the R 67 with a piston displacement of 600 c. c. are identical in construction. They have been developed out of the R 51/2, which gave such excellent and reliable service. Type 67 was introduced for motorcycles with side car, to provide an engine with ample power reserve. The small compression ratio of this engine makes it especially robust and not susceptible to octane fluctuations. Latest development is principally characterized by the arrangement of an ignition magneto with automatic ignition timing adjustment and an independent generator. With its smoother form, the entire engine housing has become more slender and has a speedy appearance. Electric units such as Norris dynamo magneto are arranged under an inspection plate with forced ventilation. Camshaft, ignition magneto and oil pump are driven by helically-toothed, almost silent spur gears which assure an operation of unprecedented smoothness.

1) Engine Housing

The engine housing consists of a one-piece, reinforced crank case with integrally cast oil sump, a front crank case bearing cover, gear box cover, cover for ignition magneto and dynamo and a protective cover for the cooling air line

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Crosscut of Engine

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from generator chamber to air filter chamber. All housing parts are cast of a highly resistant light metal alloy.

2) Crankshaft and Connecting Rod

The sectional steel crankshaft with carefully balanced counterweights ensures vibrationless operation. It runs on hardened journals in two strong ball bearings. The hardened connecting rods run on roller bearings. They are generously lubricated by two oil splash rings on crankshaft. The piston, piston pin, cams, push rods, rocker arms and valves are also splash-lubricated.

3) Pistons

The pistons are made of special light metal alloy. Three compression rings and one oil ring ensure an efficient seal and proper lubrication. The flooring gudgeon pins are secured on both sides by lock washers.

4) Cylinders

The grey iron cylinders with high fins are maximum precision ground and honed. Two protective tubes with rubber muffts connected to engine housing care for oil-tight push rod operation. An incorporated oil tube returns oil from the rocker arm chambers.

The light metal cylinder heads also have very high fins so that adequate cooling is warranted. Intake and exhaust valves have bronze guides and steel inserts

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are shrunk in for the valve seatings steel washers. Four bolts connect the rocker arm to cylinder head and prevent the thermal expansion of cylinder head from influencing valve clearance.

The light metal cylinder head covers are very amply dimensioned and connected by 3 bolts. These cylinder head covers with a cork gasket give the rocker arm chambers an oil-tight seal and, to a certain degree, act as silencers.

5) Valves

Valves are of the V-overhead type and are pressed to their seats by 2 valve springs each. The valve spring washers are joined to valve by a cone and collar.

6) Valve Control

Valve control is by means of a common camshaft arranged in middle of crankshaft housing and timed to revolve at half of crankshaft speed, by helically-toothed gears on the crankshaft.

There is one cam on the camshaft for each valve which actuates the valve over a valve lifter, oil-tight push rod and a rocker arm. In the rocker arm above the push rod is an adjusting screw for adjusting valve clearance.

Rocker arms are mounted in floating bushings. Rocker arm brackets are mounted on washers and held by the cylinder head bolts. A rotary slide valve

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B. Transmission

Transmission and engine housing comprise one unit. Four different speeds enable full utilization of power in any kind of terrain. The four gears are obtained with constant mesh pinions giving easy gear-changing.

The transmission is equipped with a so-called ratchet shift for foot operation and an auxiliary hand shift lever. When the shift pedal is operated, a cam is turned by a toothed segment. This cam has two milled, curved grooves which engage the carrier pins of two gear shifting forks. In accordance with the position of the curved grooves the gear shifting forks are shifted by turning the cam and engage or disengage the spur gear pairs being shifted. A locking device and a ratchet holder enable proper selection when shifting to next higher or lower speed when actuating shift pedal.

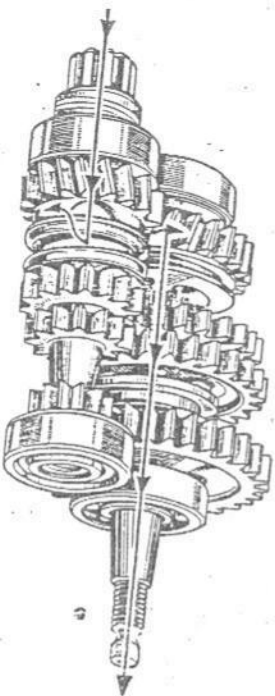
Shifting should be done by pedal only so that both hands can remain on the handlebar during shifting which greatly increases riding safety.

Lifting shift pedal shifts to next higher speed or to neutral; depressing pedal shifts to next lower speed or neutral.

An auxiliary hand shift lever on right side of transmission enables quick shifting to neutral from any speed under certain conditions.

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The driving element of 4th gear is operated by a spring-cushioned driving shaft which ensures smooth riding for the most-used gear with the smallest transmission ratio. This arrangement reduces the load on the individual gear parts and increases the service life of the transmission.



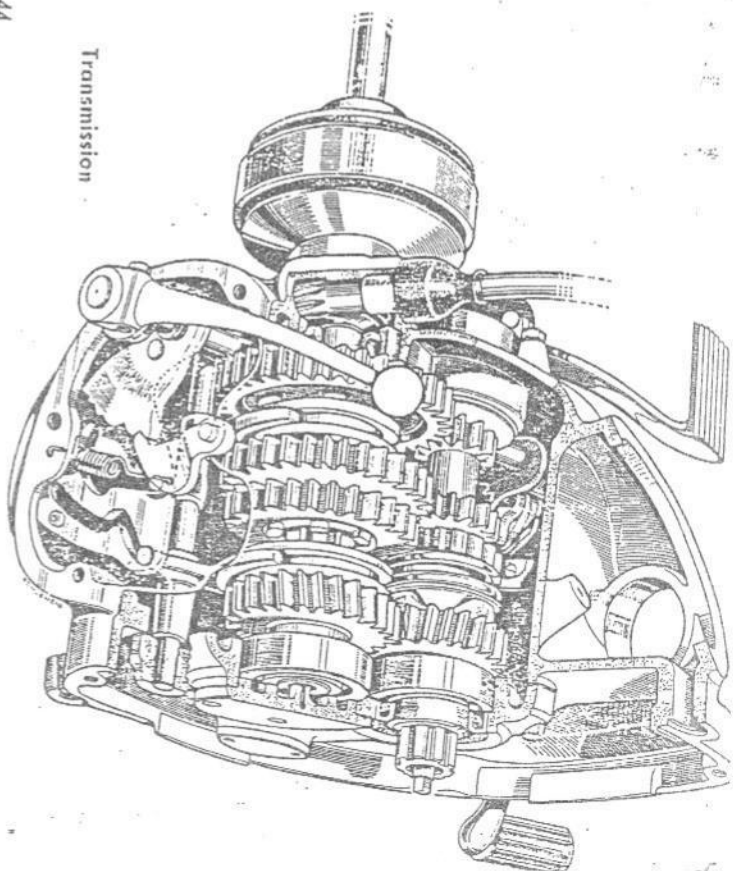
Power flow through the spring-cushioned drive shaft in fourth gear

An electric contact in the transmission switches on a green light on head lamp to indicate neutral gear.

Transmission has its own lubricating oil cap at which gear lubricant can be tested and replenished as per lubricating plan.

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Transmission



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C. Rear Wheel Drive

The R 51/3 and R 67 BMW motorcycles have the same type of rear wheel propeller shaft drive with which all BMW motorcycles are equipped.

The propeller shaft running from the transmission to the rear wheel has an elastic rubber coupling on the front end as connection between the shock absorber flanges of the transmission and the propeller shaft. This greatly reduces power transmission vibrations and compensates for changes in length of the propeller shaft during operation.

At the rear end of the propeller shaft is a universal joint with an easily removable dust-proof bell shaped cover.

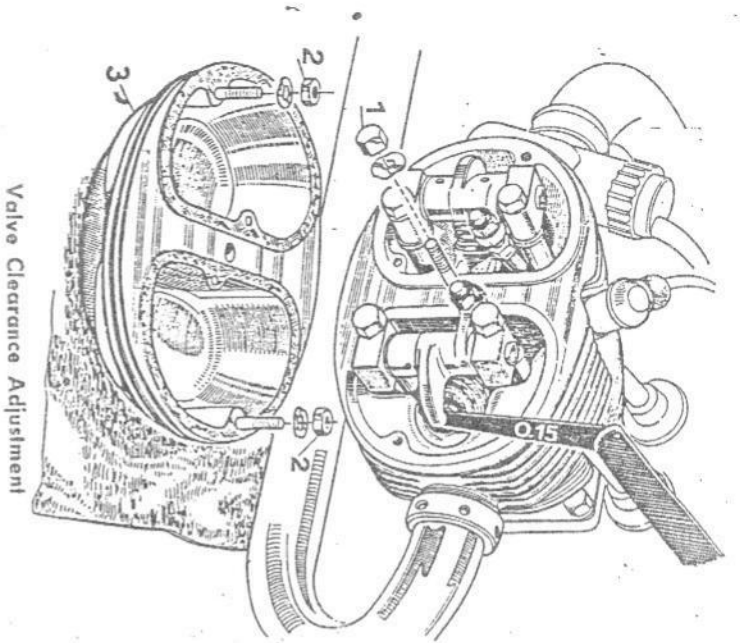
This arrangement assures absolutely reliable, uniform power transmission from the engine to the rear wheel drive.

The driving end of the universal joint engages the keyed shaft end of the rear wheel driving gear which is sturdily mounted in rear wheel housing and runs on ball or needle bearings.

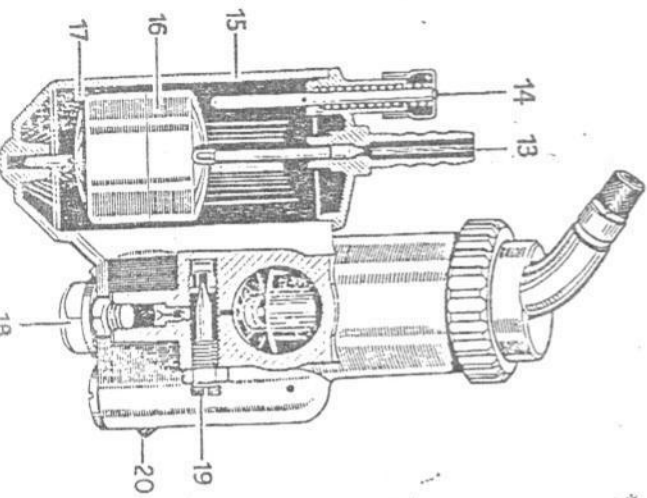
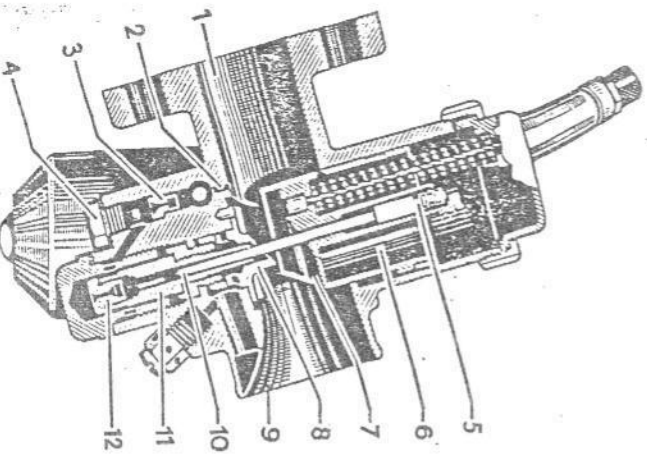
Driving pinion and disc gear are helically-toothed and run quite silently in an oil bath.

Disc gear is bilaterally equipped with bearings. In the rear wheel driving unit it runs on needle bearings, in the housing cover it runs on ball bearings.

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Valve Clearance Adjustment



10) Carburetors

The Big Special Carburetors with a 22 mm = .865" passage for the R 51/3 and a 24 mm = .945" passage for the R 67 are piston slide carburetors with the float chamber cast integral with the carburetor housing. The carburetors are arranged at an angle of 15° from the vertical and are flanged to the engine. They have a system of jets, the main jet being 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 centrifugal force when riding through curves.

Design and operation of the carburetors:

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 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 main jet (12) is fitted into a needle controlled jet (11); the fuel flows through the annular space around the tapered needle (10) to the mixing chamber cap (9), the annular space being varied by raising or lowering the needle. The air, coming from the filter connection (7) 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 (8), 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 passages (2) and passes into suction channel (1) directly behind the piston slide. Coarse adjustment of idling speed is made by means of the piston type valve adjusting screw (20).

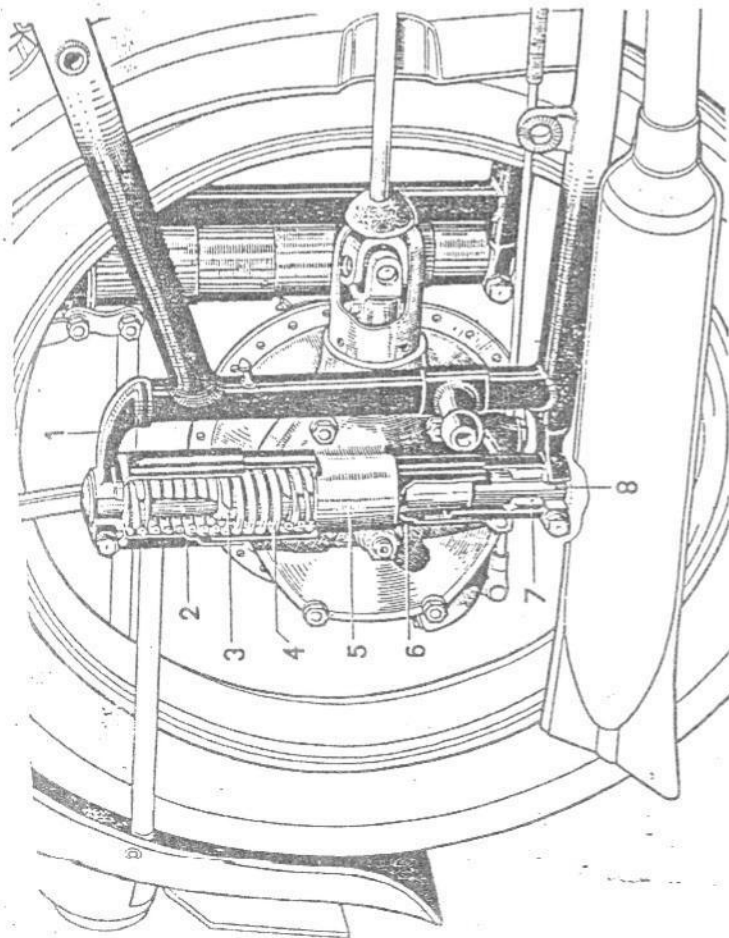
Fine adjustment of the idling speed is made by means of the air adjusting screw (19). Turning the screw in will produce a richer mixture, turning it out, a leaner mixture.

Adjust each carburetor individually to the same idling speed; when doing so, remove cable from spark plug of opposite cylinder.

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

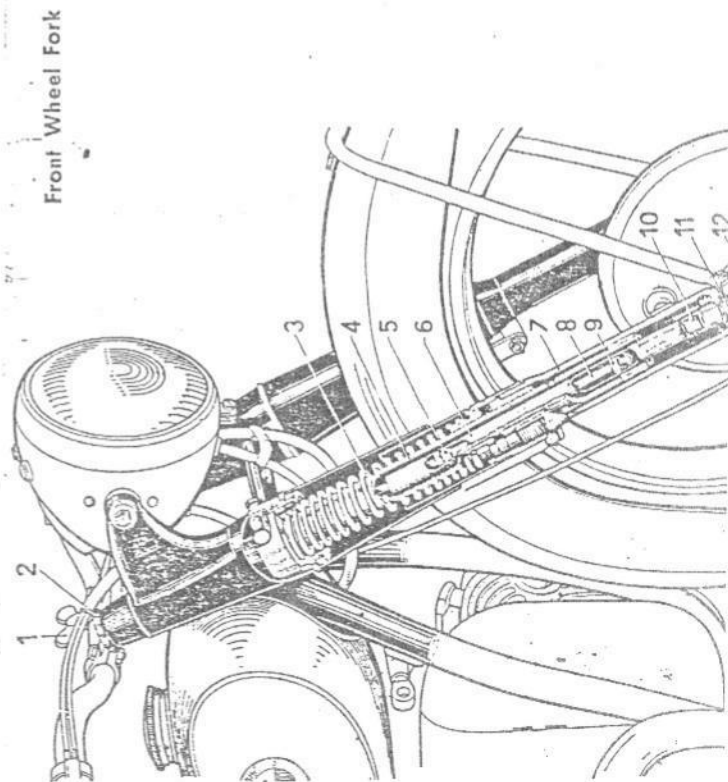
Carburetors are adjusted in the factory for the commercial types of fuel.

Only in special cases will a re-adjustment of jets and needles be required, and this should be done by a trained mechanic.



Rear Wheel Spring Suspension

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Front Wheel Fork

Front Wheel Fork

The front wheel is sprung and supported by the well proved BMW telescope-type fork with built-in hydraulic shock absorbers.

The slidable fork ends (7) glide on tubes (4) mounted in the fixed fork guiding part. Resilient connection between the fixed and movable fork parts is achieved by a helical spring of progressive action on each tube (4). These springs have screw connection at each end. Each prong of the fork has a double-acting hydraulic shock absorber of a type heretofore only applied in high class, modern automobiles.

Each shock absorber installed in the fork consists of a shock absorber tube (6) and a pressure rod (8) screwed to the fixed fork tube (4). At bottom of shock absorber tube is an oil feed valve (10) and at the top a nozzle (5) for pressure rod, held by a clamping spring and designed as a guide. The pressure rod has an oil passage valve (9) at its lower end and a milled groove along its entire length to feed nozzle (5).

If the wheel receives a jolt when travelling on the road, the feed valve closes, and the oil in shock absorber tube is pressed out through the discharge valve and the milled groove in the pressure rod. Towards the end of the jolt, the oil flow is restricted due to the narrowing of the groove which assures the desired progressive shock absorption.

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When the spring again exerts pressure, the wheel returns to its original position, the oil discharge valve closes and oil returns to shock absorber tube through the feed valve. Each prong contains approx. 130 c.c. (approx. 8 cu. in) of engine oil.

Oil filling of front wheel fork is per lubricating plan for summer and winter with winter engine oil SAE 20. Should springing become too hard during cold weather, it is advisable to mix 1 part of kerosene with 3 parts of winter oil.

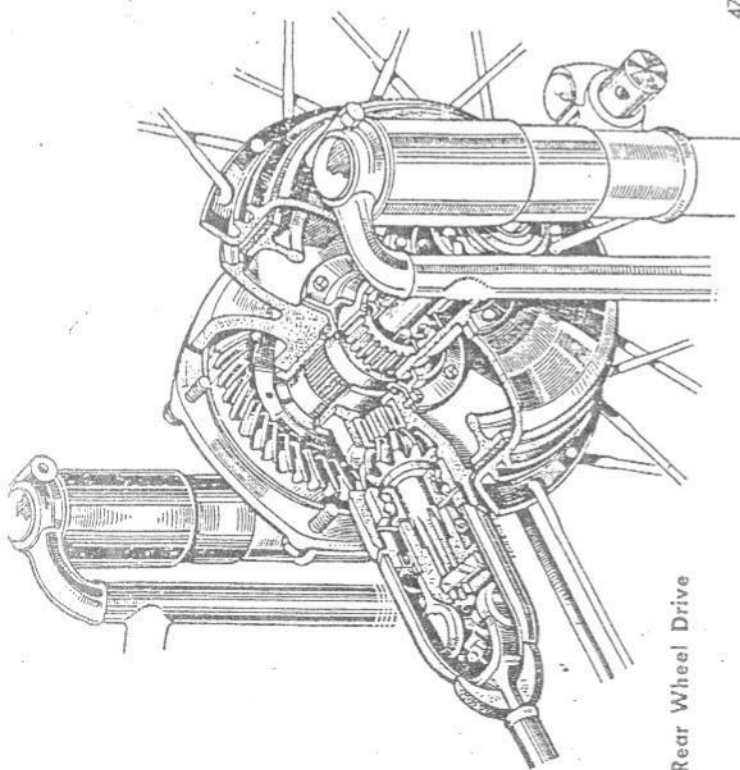
To drain old oil, open cap screw (2) and oil drain screw (12) at ends of fork. Fill in fresh oil through top opening.

The entire shock absorbing mechanism can be easily removed, without disassembling the fork when wheel is demounted, by removing nut (11) and top screw cap (2).

At the top end of fork is the winged nut (1) of the steering damper arrangement. Tighten this damper a little bit on poor roads, during high speed and for side car operation. Loosen same for slow solo driving.

The fork requires no special maintenance.

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Rear Wheel Drive

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D. Chassis

Frame

The robust double steel tube frame of torsion-proof, unbreakable construction has front and rear wheel spring suspension. The engine is rigidly anchored in the frame by means of 2 full-length screws at bottom and a screw attachment on top.

Four connection points on the frame according to German Engineering Standard DIN 74031 are arranged for attaching side car.

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 rear wheel.

To remove front wheel, remove fastening screw of lower mud guard brace. This brace then comes down and serves as a stand, thus facilitating removal of the front wheel.

Fuel Tank

The fuel tank with a capacity of 4.5 U.S. gall. = 3.75 Imp. gall. has two drains leading to the fuel cock, of which one is located so high that a reserve of approx. 1.5 qts. of fuel remains in the tank. By switching fuel cock to "R" (Reserve) the motorcycle can travel an additional distance of approx. 20 miles.

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Wedge-shaped grooves on disc gear hub serve to transmit power to the easily removable rear wheel.

Rear wheel drive housing and cover are of a highly wear-resistant light metal alloy and are oil and dust-tight. Protruding shaft ends are equipped with oil seal rings. Should any oil ooze out, it runs off into the open so that the brakes connected to the housing remain free of oil.

Oil level of rear wheel drive, which reaches the lower thread of oil fill cap, must be checked and replenished as per lubrication plan.

After removing the bell-shaped cover (with left hand thread), grease the universal joint as per lubrication plan, until grease oozes out between the four prongs of the universal joint.

To allow for the variation of load, rear wheel drive gear ratios are different for solo driving and for side car driving.

Bevel gear set must be replaced if solo machine is rebuilt for side car drive or vice versa. (See technical data, page 15, and connecting side car, page 67.)

Because of the great care required for proper gear meshing, the installation of a new set of helical bevel gears must be made by a BMW agent.

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Rear Wheel Spring Suspension

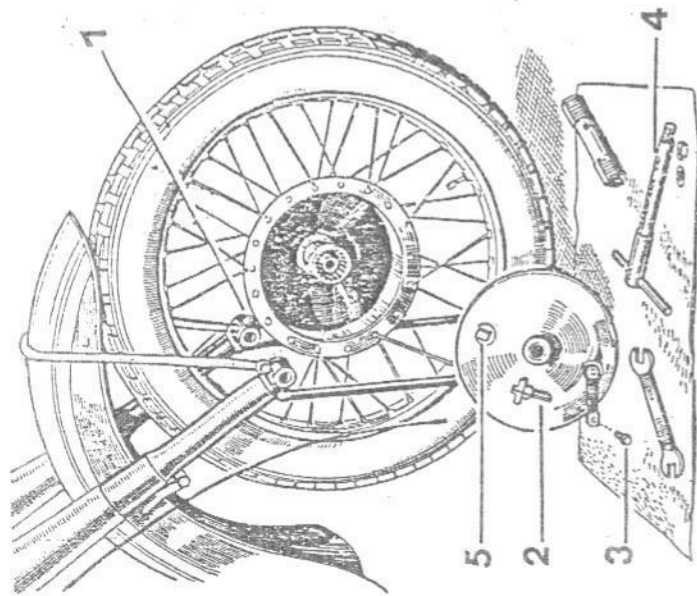
Rear wheel spring suspension is designed on the BMW telescope principle and is in harmony with the general construction of the machine.

The rear wheel carrier (5) provided with a long guiding sleeve (3) is slidably mounted in a guiding tube (7) clamped to the frame extension (1).

Rear wheel carrier and cover of rear wheel drive are joined together by the rear wheel hub spindle. Helical spring (4) which is clamped to upper frame extension, resiliently connects rear wheel carrier to frame. Hard jolts are cushioned by a rubber pad (7) mounted in the lower extension, below the guiding sleeve. The entire springing mechanism is housed in dirt and splash-proof collapsible telescope type tubes (2 and 6).

Lubricate rear wheel by means of lubrication nipples on the wheel carrier and rear wheel drive cover, according to the lubrication plan.

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Removing Rear Wheel

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the other tire bead, push in the valve to the nut so that the first tire bead sits well in the drop-centre. Then push in the second bead over the rim flange starting opposite the valve. Inflate tire and make sure that the circular marking on the tire is equidistant from rim flange all around. Tighten rim nut and test tire pressure (see page 23 for proper tire pressure).

Always ride with proper tire pressure and with an eye for saving your tires.

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 handlebar; a foot pedal 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 be subjected to excessive wear. The wheel must turn freely. If the proper braking action cannot be achieved by adjusting the brake, then the

Wheels

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 tire from slipping off the rim during a blow-out. The wheels have strong 5 mm spokes. Brake drums are re-inforced.

Avoid using excessive force in removing and replacing wire bead tires.

Removing the Tire

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

Replacing the Tire

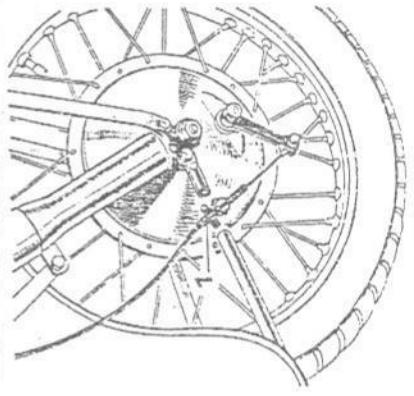
Lay wheel flat on the ground. Push the tire beading into the drop-centre near the valve and, beginning on the opposite side, slip tire beading over rim flange all around by means of tire tool. Do not use excessive force! Sprinkle talcum powder or French chalk inside the casing and insert slightly inflated inner tube after first pushing valve through valve hole and tighten rim nut a few turns. Before inserting

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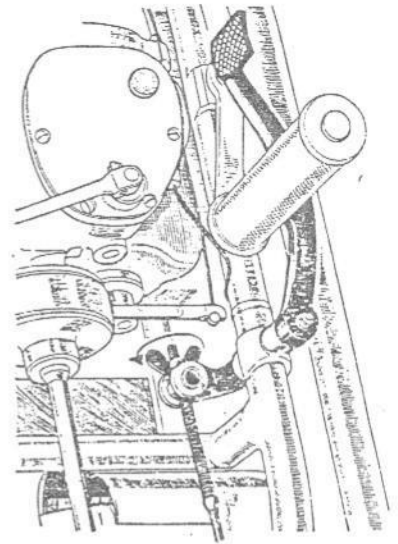
things will be worn out and must be renewed. Bright braking surfaces inside of well-gripping brake linings. When driving downhill for long distances apply front and rear brake alternately so that one brake can always cool off. On steep hills the braking power of the engine in the lower gears should be employed.

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

When braking as a result of weight transfer, there is greater adhesion on the front wheel which enables more effective front wheel braking.



Adjusting front wheel brake with wing screw



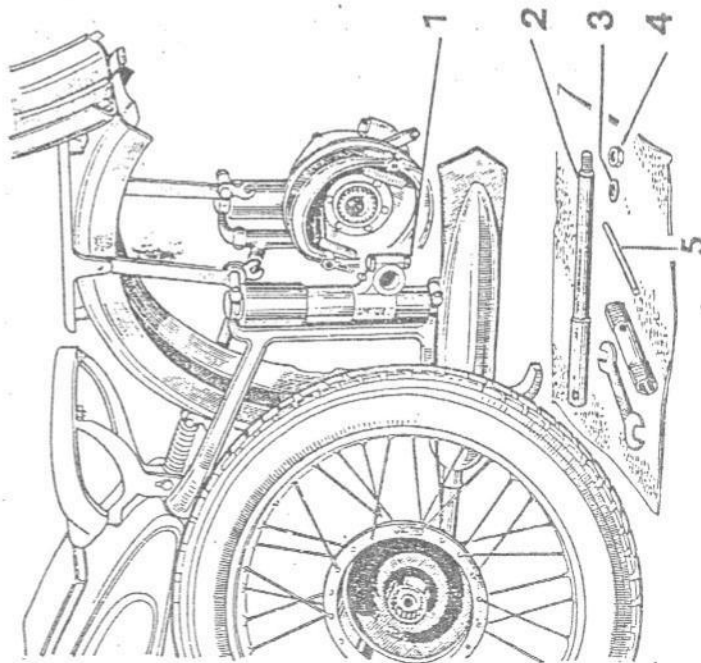
Adjusting rear wheel brake with wing screw



Kickstand

To park the motorcycle, a kickstand is attached to the middle of frame bottom. During riding this stand can be raised and held in place by a spring. A lateral foot-actuated lever serves to release the stand when required. To apply stand, press down stand lever with foot. This affords the leverage necessary to easily pull motorcycle backwards and forwards.

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Removing Front Wheel

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- 1) Stand motorcycle on kickstand. Remove screw of front wheel stand attached to front mudguard.
- 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) Remove nut on hub spindle and take off disc.
- 5) Loosen terminal clamp (1) on prong of fork and screw out the hub spindle (4). Take care that hub spindle is not dirtied.
- 6) Remove front wheel with brake shoe carrier.
- 7) When re-installing wheel take care that the nose (5) on brake housing fits into the guide on the fork. Grease hub spindle lightly.
- 8) 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.
- 9) Return brake cable and readjust brake.

Do not lay hub spindle on dirty ground; clean all dirty parts carefully before re-installing.

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Removing and Installing Rear Wheel

- 1) Stand motorcycle on kickstand.
- 2) Unscrew mudguard supports and raise end of rear mudguard.
- 3) Loosen hub spindle nut (4) on driving side and remove it together with washer (3).
- 4) Loosen terminal clamp and turn out hub spindle axle by means of pin (5).
- 5) Remove wheel.
- 6) When replacing the lightly greased hub spindle axle (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.

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The frame is equipped with a connecting mechanism according to German Engineering Standard DIN 74 031 so that a side car can readily be attached. For subsequent remodeling from solo to side car operation or vice versa, the following alterations must be made:

- 1) Change helical bevel gear set in rear wheel drive for R 51/3 from 9 : 35 teeth (solo) to 7 : 32 teeth (side car); for R 67 from 8 : 35 teeth (side car) to 9 : 32 teeth (solo).
- 2) Change speedometer adjustment for the different gear ratio for R 51/3 from 1.0 (solo) to 1.15 (side car); for R 67 from 1.10 (side car) to 0.9 (solo).
- 3) Equip front and rear wheel spring suspension with springs for side car or solo driving, as required.
- 4) If motorcycle is equipped with the 790 mm = 31" solo handlebar, change to the 875 mm = 34.5" handlebar if a side car is attached.

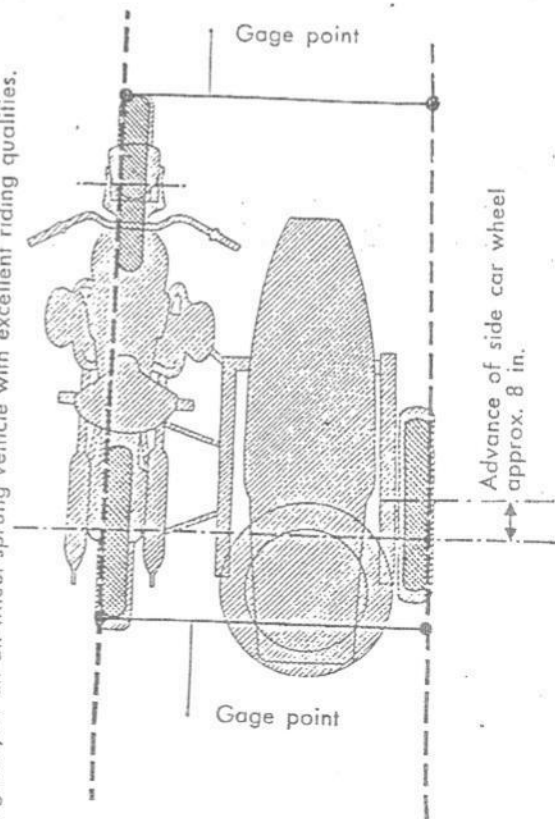
Set motorcycle camber as per illustration on page 68.

Toe-in and advance of side car wheel, which is of great importance for the good riding quality, safety and useful life of motorcycle and tires, must be complied with in accordance to directions for side car attachment.

Camber adjustment is made with the middle brace so that front brace is not under tension.

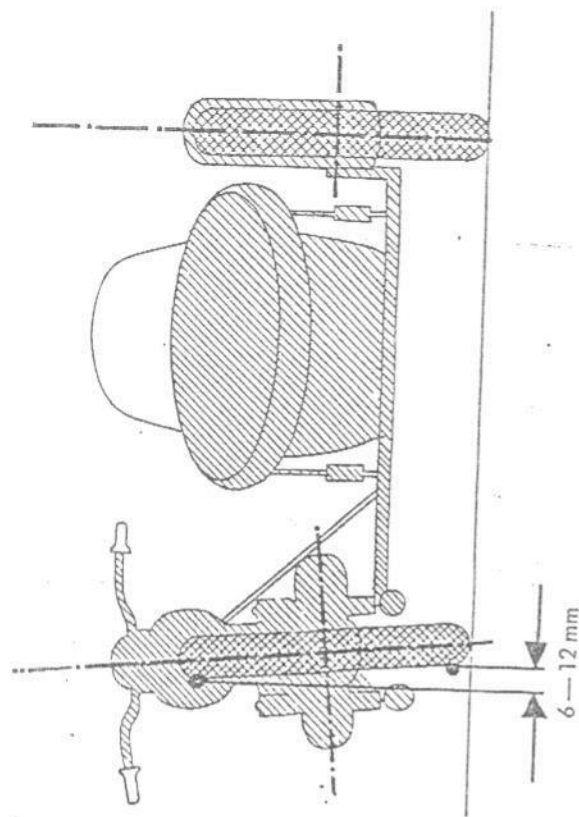
67

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



Adjusting Toe-in for BMW "Spezial" Side Car
Dimension at rear gaging point minus dimension at front gaging point must equal 36 to 45 mm (1 1/2 to 1 3/4 inches).

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Adjusting Camber when connecting a Side Car

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Cleaning and Servicing

A clean, well-serviced motorcycle is a pleasure to the eye. The time and effort consumed for cleaning and servicing pays high dividends in form of trouble-free operation and long service life.

Cleaning

The motor and transmission unit and the rear wheel drive 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 that engine is sufficiently cooled off. Shut air filter before spraying. Avoid using high pressure as this may force moisture into the engine and cause serious damage. Do not play the hose directly on the carburettor or dynamo. When motorcycle is dry, oil the external brake parts and the hinge of rear mudguard to prevent these parts from rusting.

As water may infiltrate into the brake housing during washing, try out brakes carefully in a trial run after cleaning.

Treating the lacquered and chromium parts with commercial polishes preserves these parts and gives them a glossy appearance.

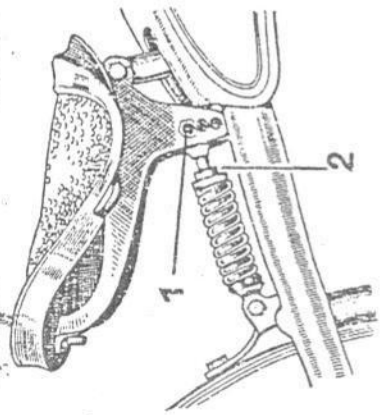
70

Cushioned Seat

The seat is a well-shaped, soft, swinging saddle which, in conjunction with the all-wheel sprung frame and good cushioning, warrants a tireless riding over long distances. To adjust seat to driver's weight, the tension of the spring can be regulated by spring clamping pin (1) in the slot of the saddle supporting lever.

There are four catches provided in the saddle lever for weights of from 130 to 220 lbs. Upper catches give softer spring action, lower catches give harder spring action.

Height of saddle can also be adjusted by screw (2).

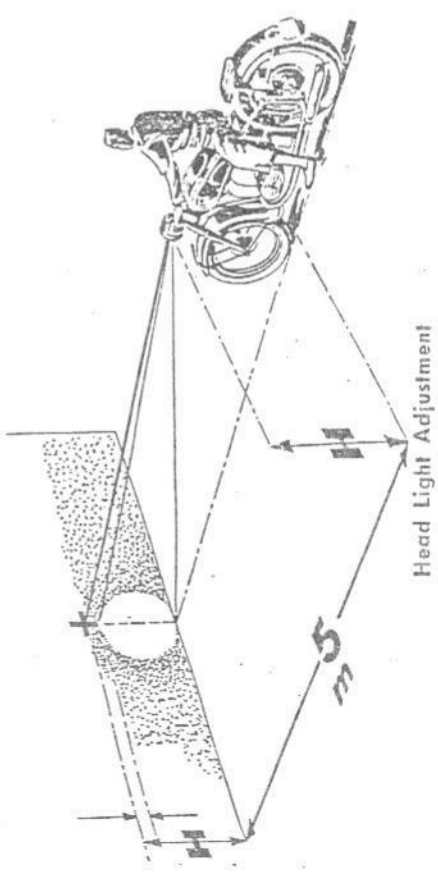


Cushioned seat

Fig. 5 on illustration shows the keyhole of steering lock with handlebar turned to extreme right.

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.



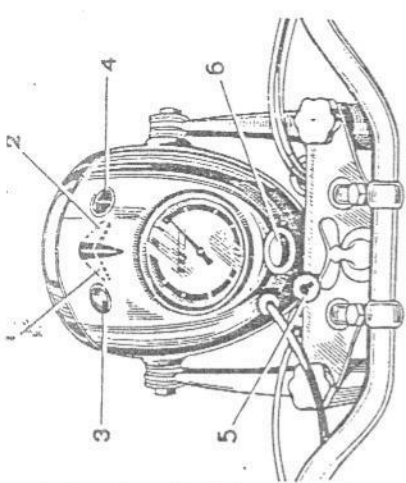
The Bosch head light is mounted in rubber bearings on the head light holder; on front wheel fork by means of two screws. After removing the head light reflector unit the following parts are accessible:

The switch for the entire electric system of the motorcycle, the Bilux lamp for city and country light, parking light, the battery charge control lamp (3) and after removing speedometer, the speedometer light and the green lamp for neutral indicator (6). By unscrewing the slotted screw plug (4), the fuse for the electric lighting system becomes accessible.

To avoid damage, have head light bulbs replaced by an expert.

Ignition key in the middle switches on the electric appliances for day-time driving. In addition hereto country light and speedometer light are switched on at (1). At (2) the city light also is switched on. When ignition key is removed at position (2), parking light is switched on; removed in middle position, the ignition is short-circuited and battery switched off. See also "Operation and Control", page 19.

A standard type socket is provided on the frame below the saddle for connecting a side car light or a search light.



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 to 35 in. for model R 51/3 and model R 67 (solo machines). The motorcycle stands on its wheel 5.45 yds. from the wall and is loaded with the driver.

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 2 in. or more below the mark. If this distance is less than 2 in., 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 in line with the above directions but with motorcycle loaded with the rider and one person in the side car.

Remarks

end of the symbols on left margin:

engine oil*)

ne and transmission:

mmr SAE 40

nter SAE 20

wheel fork:

mmr and

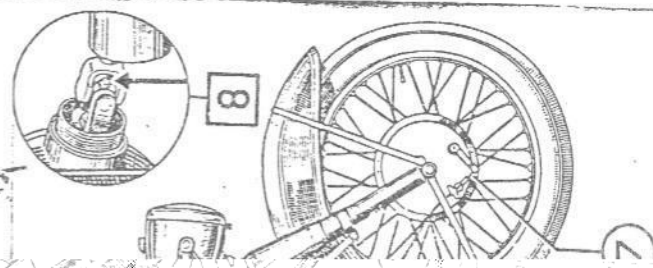
nter SAE 20

ery cold weather mix
rt kerosene (paraffin)
3 parts of lark oil.

ear wheel drive lu-
ricating oil*) SAE 90

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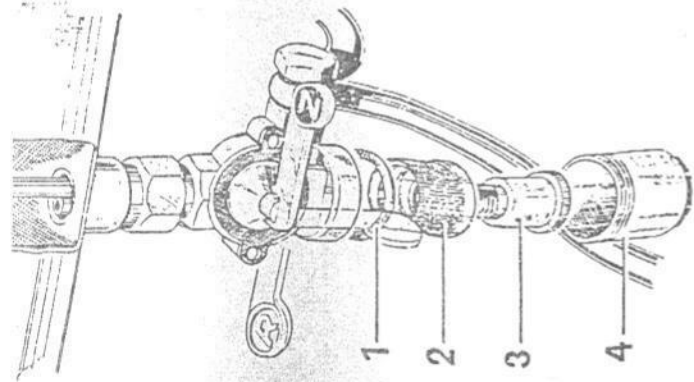
ly use service-proven
ants; they preserve
eful life of your mo-
le considerably.
BMW agents will
recommend job-le-
abricants.



cleaned to prevent the infiltration of impurities into both carburetors.

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

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



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If the springing effect of the front wheel fork weakens or if springing is too hard, drain oil and depress fork several times so that all oil drains off. Then refill new oil as per lubrication plan. In very cold weather mix 1 part of kerosene (paraffin) with 3 parts of SAE 20 engine oil.

The universal joint on the propeller shaft, which is made dirt and water-proof by a bell-shaped, left hand thread cover (marked L), must be greased until the grease oozes out between the four universal joint prongs. No grease nipples are arranged on the hubs to prevent excessive greasing of hubs with subsequent infiltration into brakes. The hub greasing required every 3000 miles is best done by a BMW agent.

Grease the hubs with the wheels and ball bearings demounted. Take care that no grease gets into brake lining as this would prejudice brake operation.

Rear wheel suspension is greased through the grease nipples on left axle holder and on cover of rear wheel drive. Brake pedal and accelerator to be lubricated through the proper nipples.

From time to time put a few drops of oil on brake lever joints, clutch levers and saddle lever, unless these parts are equipped with grease nipples.

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kerosene (paraffin). When the cleaned filter is dry, moisten same with engine oil and sling off excess oil. Dirty filters cause high fuel consumption and abrasion of pistons.

Oil pump fine strainer, which is accessible after removing oil sump under engine housing, must be flushed in petrol after every 6,000 miles. It is a good plan to do this when changing oil.

Lubrication of engine and frame is of great importance. It is to your own advantage to observe the lubricating plan carefully and to make oil level checks, replenishments, oil renewals and to grease all bearings as prescribed.

Only use service-proven, recommended lubricants. Your BMW agent will gladly give expert advice on this point.

Oil level in engine must be checked at regular intervals and replenished if necessary. For checking use the dip stick on screw cap at left side of engine. Only insert dip stick up to mark, do not screw it in. The transmission with engine oil filling and the rear wheel drive with gear oil SAE 90 must likewise be checked at regular intervals. In both cases oil level must reach the lower threads of filler gap. Oil level checks to be made about 10 minutes after turning off engine, as long as engine is still warm. Do not turn the rear wheel during an oil check.

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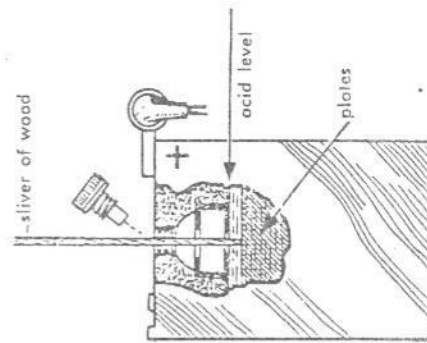
Checking the Ignition System

The operational safety of the engine depends to a high degree on the condition of the ignition system. Checking the battery, spark plugs, contact breaker and dynamo at regular intervals is of primary importance. Should any defects develop in the ignition system during the guarantee period, please resort directly to a Noris agency for the ignition magneto and the dynamo and to a Bosch agency for the head light and horn. A list of all our suppliers accompanies each motorcycle and the respective address will be found there.

Battery

Check acid level of battery every four to six weeks and, if too low, refill with distilled water. The acid level must reach the bottom of the built-in splash protection box. To introduce distilled water, a clean sliver of wood or glass rod can be used to guide the water without making a mess. The correct level is up to the splash protection platform.

The inside of the battery cover should always be clean and dry. If the vehicle is not in use for over 6 weeks, the battery must be removed



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Speed in Miles per hour	Miles per Imp. gallon approx.	
	R 51/3	R 67 Solo
30	100	105
40	85	92
50	70	73
60	58	55

Speed in Miles per hour	Miles per Imp. gallon approx.		
	R 51/3	R 67 Solo	R 67 with Side Car
30	100	105	86
40	85	92	65
50	70	73	47
60	58	55	36

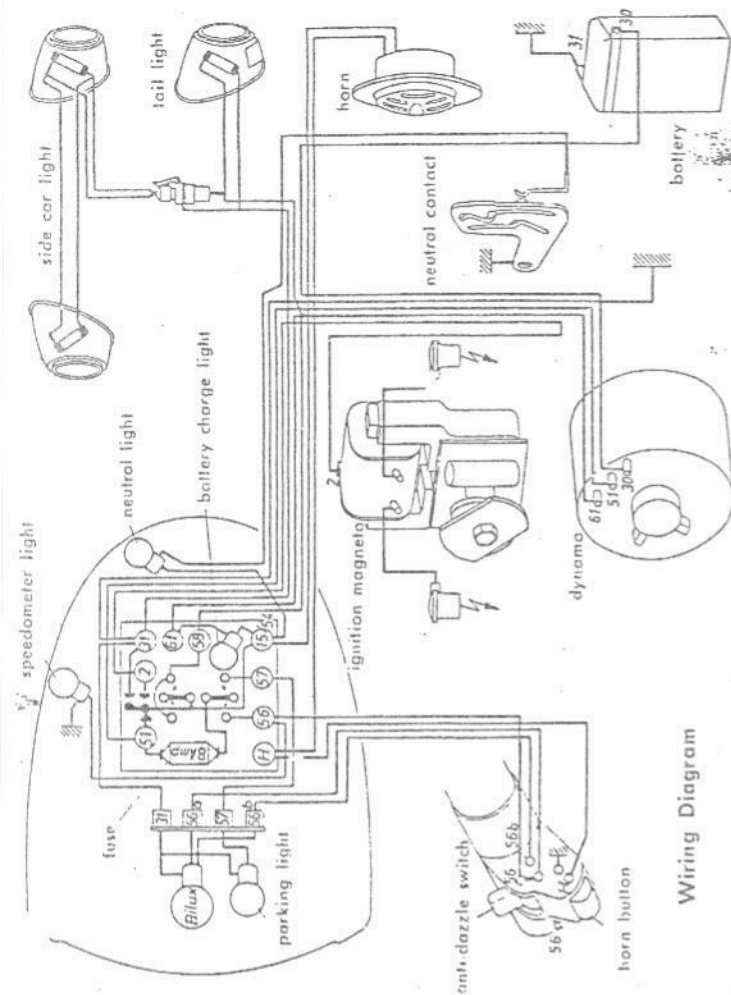
Guarantee

The manufacturer guarantees that the motorcycle is free from any defects on condition that the buyer has accurately observed the prescribed instructions for the running-in and maintenance of the motorcycle.

This guarantee is valid exclusively for the initial purchaser of the machine and warrants that the material, workmanship and design are not defective. Guarantee is valid until the motorcycle has been driven 6,000 miles or not longer than six months after it has been licensed.

Fulfilment of guarantee obligations shall be contingent upon the manufacturer's findings and, at manufacturer's option, shall consist of repair or replacement of the defective parts which st. It be sent to manufacturer with all postal or freight charges prepaid. If deemed necessary, the manufacturer can demand that the motorcycle be sent in to the factory. Only such part or parts shall be replaced which have become defective or useless due to a proven defect in material or workmanship. Return shipment shall be charged to the owner of the motorcycle.

The motorcycle shall be returned to the owner c. o. d. Where a defective part has been replaced, title to such defective part shall pass to the manufacturer who may scrap same at his option. Replacement shall not be made for any direct or indirect damage.



Wiring Diagram

No guarantee is given for racing models or for motorcycles of special design. For parts not originally produced by the manufacturer of this motorcycle, such as ball bearings, saddle, tires, electrical system, etc., the present guarantee is limited to the transfer of the guarantee claims originally given the BMW by the manufacturers of the respective parts.

No guarantee is given for the enamel or chromium finish. A defect in the object of this contract or a repair or replacement within the scope of this guarantee shall in no manner justify a rescission of the order, reduction of purchase price or assertion of a claim to damages of any kind.

The manufacturer shall be reimbursed for all expenses incurred in replacement jobs or for sending a travelling maintenance mechanic to the owner of the motorcycle. The manufacturer shall not be responsible for any errors committed by his maintenance mechanic outside the factory workshop. Complaint due to a defect must be expressly asserted directly it has become evident; ordering of a replacement part or similar measure shall not constitute a complaint.

This guarantee shall become invalid if repairs are made by any other party than the manufacturer or his authorized agent, or parts replaced by parts not of BMW origin or if alterations have been made in or on the motorcycle by third parties, except in cases of extreme urgency.

This guarantee shall not apply to any damage due to negligent or careless treatment or to overloading.

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