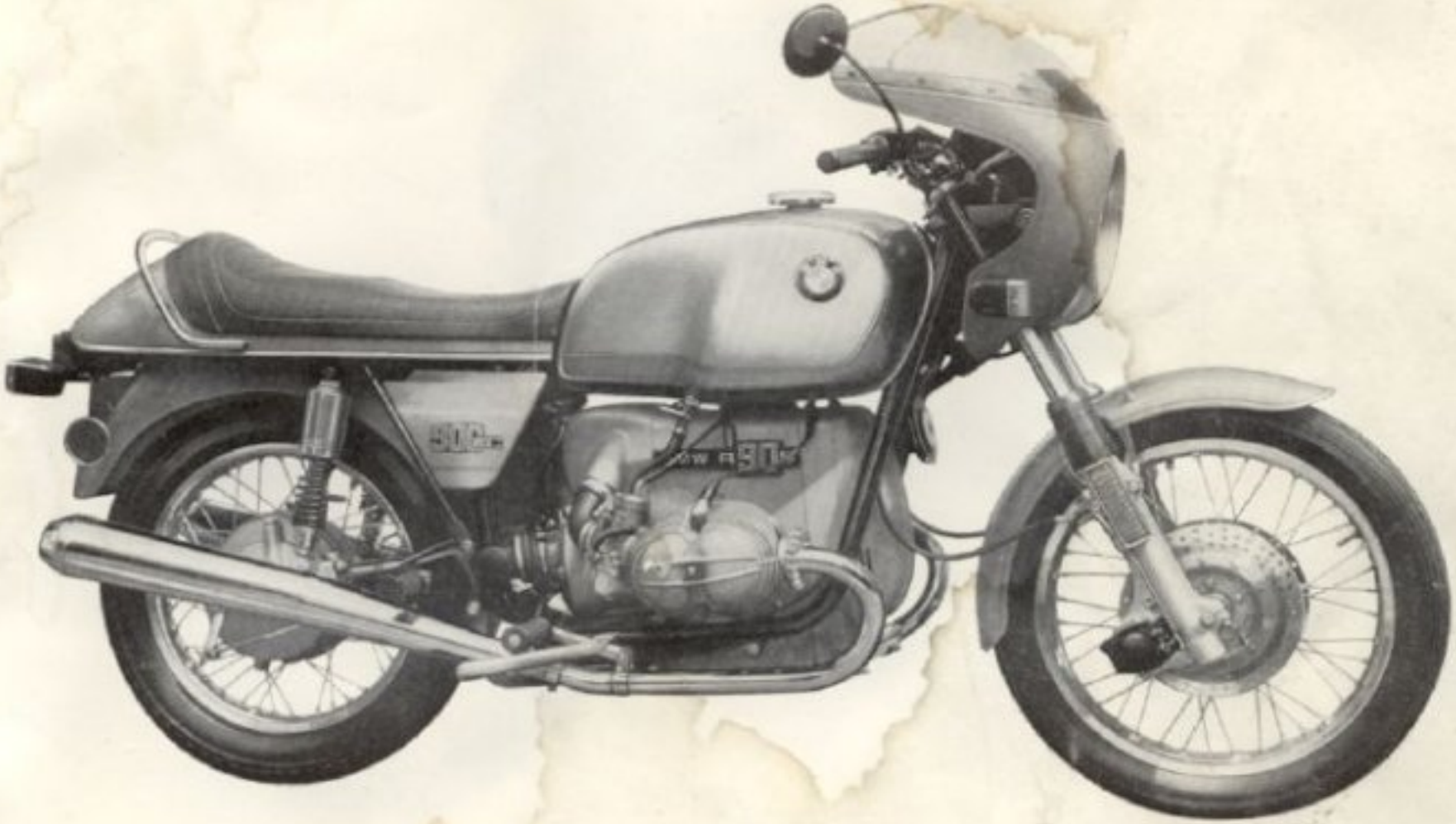
Owner's Manual
US Models

R 60/6
R 75/6
R 90/6
R 90s

BMW



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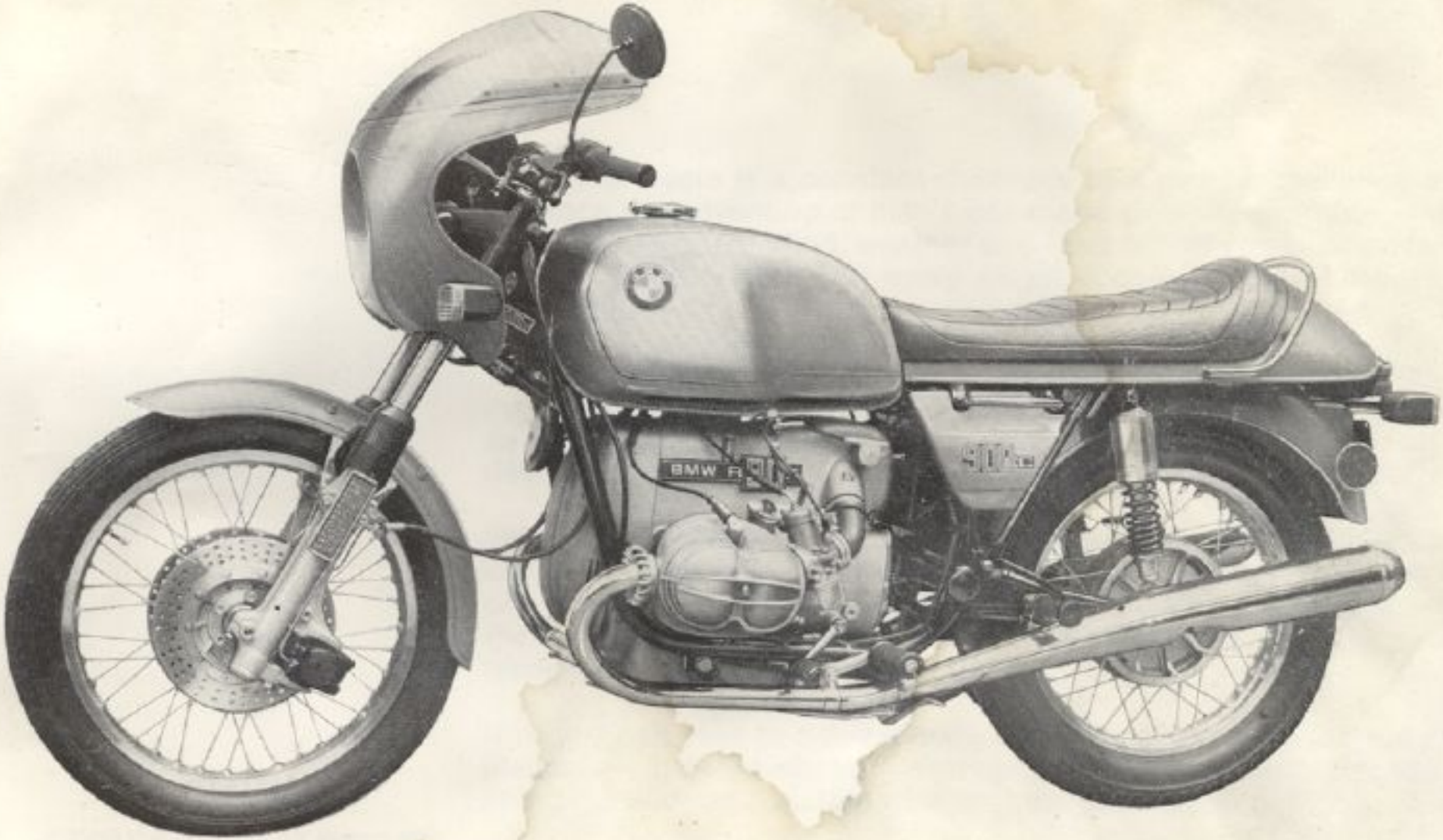

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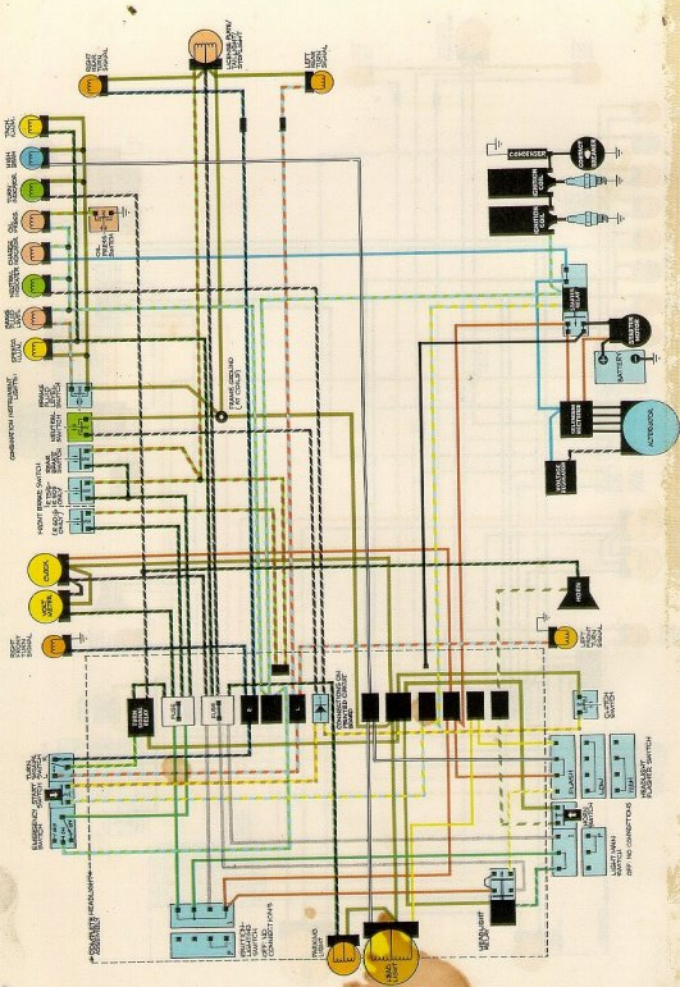
1975-1976 R60/6—R90S



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Operation and Layout of Controls

Controls

1. Clutch lever
2. Ignition/light switch
3. Instruments with separate speedometer and revolution counter, mileage recorder, trip recorder and telltale lights for brake system, neutral indicator, battery charge, oil pressure and turn indicators
5. Main light control switch, headlight dimmer switch, horn button
6. Adjuster for hydraulic steering damper
7. Steering lock – key also locks dual seat
8. Fuel filler cap
9. Directional switch, kill button
10. Tension screw for throttle twist grip
11. Throttle twist grip

Fig. 1

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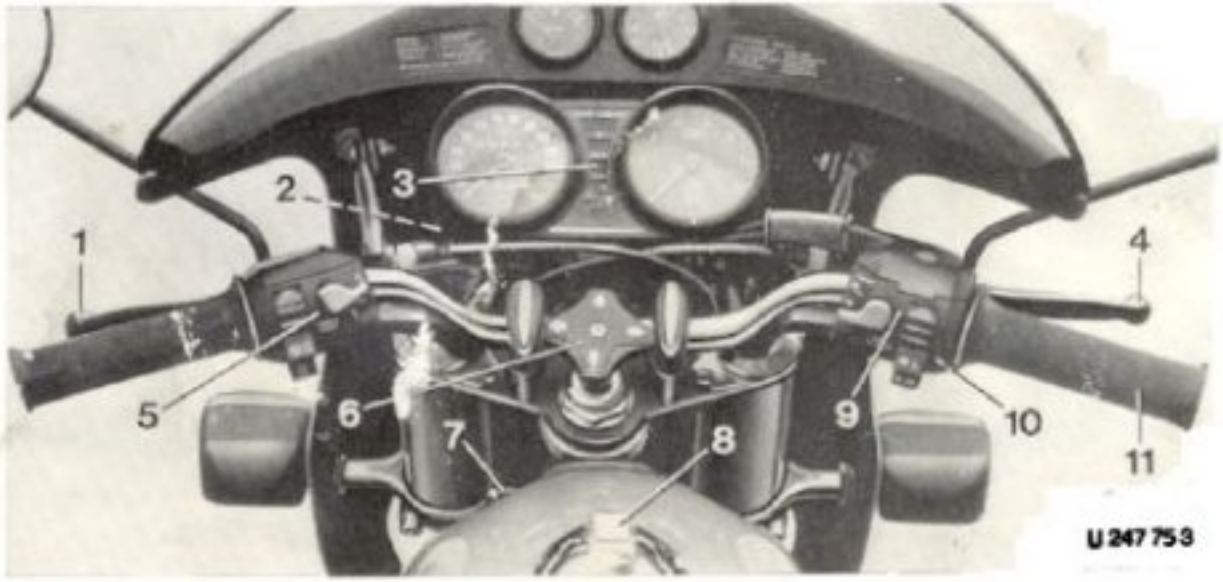
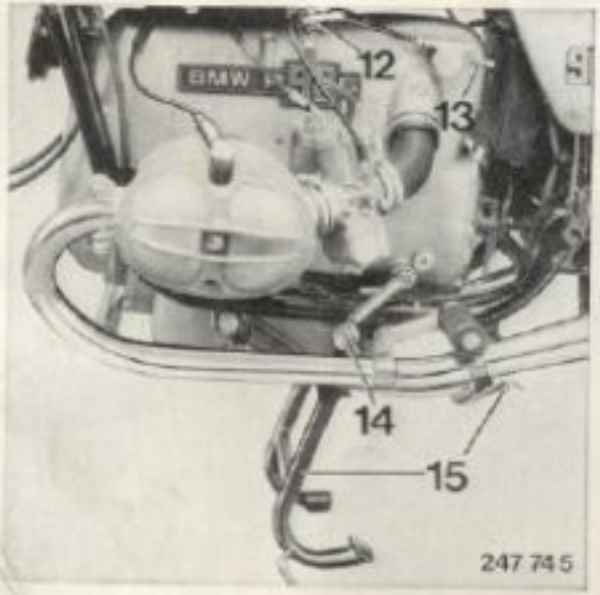


12. Fuel tap
13. Cold start (choke) lever
14. Gear shift pedal
15. Center stand – side stand
16. Foot brake (rear wheel)
17. Lifting handle
18. Dual seat lock
19. Dual seat release button
20. Rear spring – shock absorber adjusting lever
21. Folding, adjustable passenger footrests
22. Hook for helmet

Figs. 2–4

2



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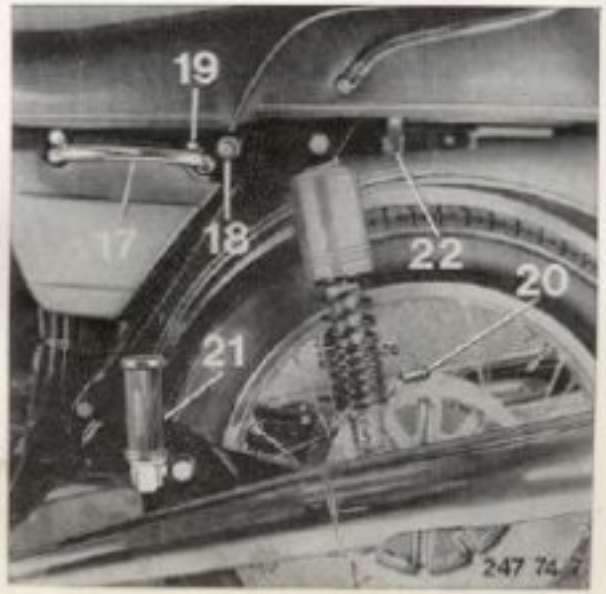

Instruments

1. Speedometer with mileage and trip recorders
2. Brake telltale light, red
3. Neutral indicator, green
4. Battery charge telltale light, red
5. Oil pressure telltale light, orange
6. Turn indicator telltale light, yellow
7. Headlight high beam telltale light, blue
8. Revolution counter
9. Clock (only on R 90 S, at R 60/6 – R 90/6 optional extra)
10. Voltmeter (only on R 90 S, at R 60/6 – R 90/6 optional extra)

Fig. 5

5

Ignition/light switch

Key positions:

1: Power disconnected, key can be removed
2: Parking light, key can be removed
3: Ignition and all electric circuits under current, charge and oil pressure telltale lights should come on

Fig. 6

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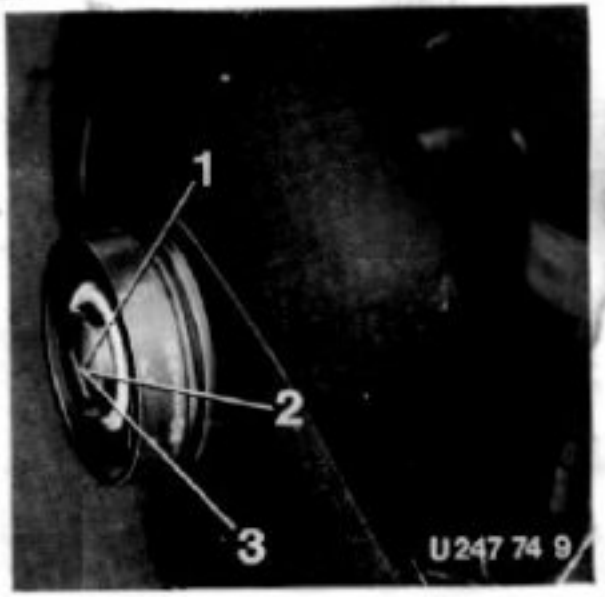


Main light control switch, headlight dimmer switch, horn button

Position 1: Light switched off
Position 2: Parking light
Position 3: All lights on

Position 4: High beam
Position 5: Low beam
Position 6: High beam flasher – switch returns automatically to position 5
Figure 7: Horn button

Fig. 7

Directional switch, kill button, starter button

Position 1: Left turn indicated
Position 2: Right turn indicated

Figure 3: In an emergency, you will be able to stop engine by moving switch to either one of the "OFF" positions.

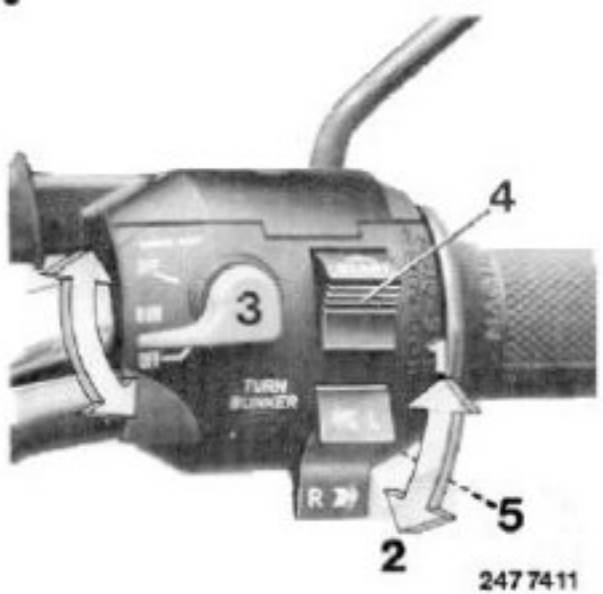
Figure 4: Depress to operate starter.

Fig. 8

Tension screw for throttle twist grip

The carburetor throttle closes automatically when the twist grip is released; by turning the tension screw 5 to the right, the closing speed can be continuously varied until the throttle remains open.

Fig. 8



Hydraulic steering damper

Position 0: Disconnected – for town driving
Position 1: For high speed highways and good road surfaces
Position 2: For winding roads and poor surfaces

Fig. 9

Fuel tap

Position 1: Fuel tap open
Position 2: Fuel tap closed
Position 3: Fuel tap set to "Reserve"

Fig. 10

Rear suspension unit adjusting levers

Position 1: For solo riding
Position 2: For very heavy solo riders with baggage
Position 3: For 2-up riding

Fig. 11

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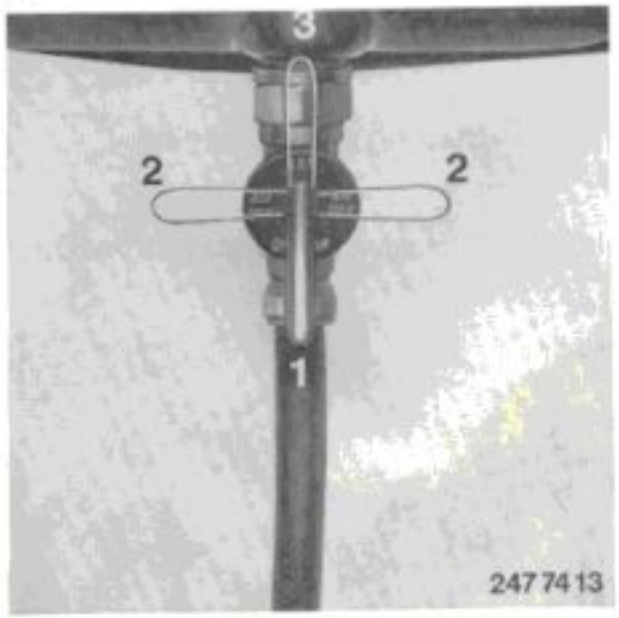

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Before you ride the machine

Before the machine is started it should be positioned upright with the fuel taps open and the gear shift in neutral; the kill button must be in position "RUN".

Starting a cold engine

Pull out the choke fully, switch on the ignition – the red, green and orange telltale lights should come on.
Keep the throttle twist grip closed and press the starter button. If necessary, open the throttle slightly when the engine begins to fire.
When the engine has started, push back the choke as far as the warm-up position when the engine begins to run unevenly.
When driving with cold motor temperature, bring choke to middle position (click stop).

Starting a warm engine

Do not operate the choke. Switch on the ignition and press the starter button. Open the throttle twist grip slightly (max. ¼ open).

A clutch operated switch prevents accidental starting of the engine with a gear engaged. In this case, the starter can only be operated if the clutch lever is pulled to disengage the clutch.

Always avoid re-starting the engine before it has stopped completely, or else the flywheel gear ring or starter pinion teeth may be damaged.

When the engine has started and is running at a fast idle speed, the oil pressure (orange) and charge (red) telltale lights in the combined instrument should go out. If the oil pressure telltale light comes on while the machine is being ridden, de-clutch **immediately** and switch off the ignition. Check engine oil level: if the engine contains sufficient oil, consult your nearest BMW dealer.

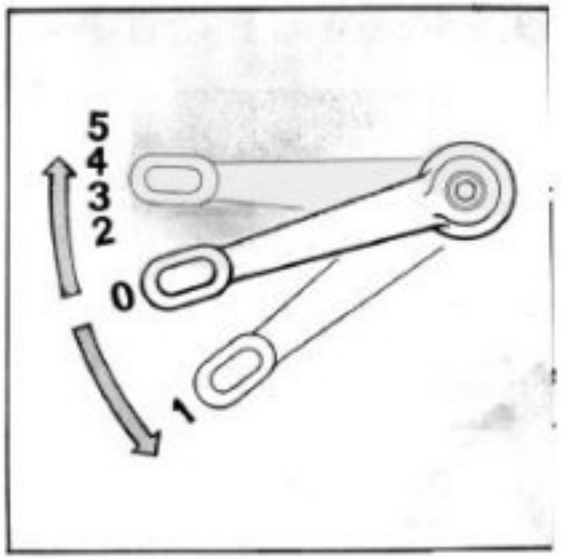
If the battery charge telltale light remains on when the machine is being ridden, consult your BMW dealer as soon as convenient, or else the battery may go flat.

Letting a warm engine idle for extended periods in neutral is harmful, since the engine is normally cooled by air flowing past the cylinders.

To move away from a standstill, de-clutch by squeezing the clutch lever, press down the gear shift lever with the left foot (the green neutral indicator light will go out), slowly release the clutch and at the same time slightly open the throttle. Careful treatment of the clutch will increase its operating life, so try to avoid sudden engagement at high engine speeds.

To shift up from 1st into 2nd, 3rd, 4th and 5th gears, de-clutch again, at the same time closing the throttle. Pull the gear lever up once with the toe of the left shoe for each upward shift, then let in the clutch again and open the throttle as needed.

12



To shift down from 5th to 4th, 3rd, 2nd and 1st gears, de-clutch and press the pedal down once per gear, then let in the clutch again smoothly.

To select neutral with the motor cycle standing still: De-clutch and shift to 1st gear from 5th, 4th, 3rd or 2nd gear by pressing down the pedal the correct number of times. After this, lift the pedal slightly (the green neutral indicator light will come on).

A useful hint: letting the clutch drag slightly by partly releasing the lever will simplify down shifts when the motor cycle is standing still.

Fig. 12

To lift the motorcycle on the center stand, push down on the access bracket with your right foot. Apply your entire weight with your right foot on the pad plate of the center stand and pull the motor cycle upwards and to the rear by means of the grab handle. To keep the machine balanced and guide it on to the stand, hold the handlebar with the left hand.

247 75 16

Break-in instructions

Even the most carefully machined rotating and sliding components of the motor cycle can only develop their final ultra-smooth finish during the initial break-in period. It is largely up to you whether this break-in period is used to increase the operating life of your machine, by careful and expert breaking-in. The best way to achieve this objective is to vary engine speeds and loads in the various gears without exceeding the maximum specified speeds. Winding roads in hilly country are particularly suitable for breaking-in the machine. On straight, flat roads, it is best to run the machine almost up to the maximum permitted break-in speed, then allow the machine to cover the next section of road with the engine off load.

The specified maximum engine speeds of 4000 rev/min up to 1000 km (600 miles), and 5000 rev/min up to 2000 km 1200 miles) should not be exceeded.

A final word regarding the brakes: until at least 500 km (300 miles) have been covered, avoid repeated violent brake applications, especially from high speed, and do not subject the brakes to continuous high loadings, or else the brake linings will later fail to achieve their best wear and friction rates.

Every day use

Fuel: For correct operation, the engines used in models R 60/6, R 75/6, R 90/6 and R 90 S must be supplied with premium (super) commercial gasoline with a minimum octane rating of 98 by the Research method. If you are forced to run the machine on fuel with a lower octane rating and therefore with reduced knock resistance, you can avoid preignition and detonation in the engine to a large extent by keeping engine speed above 2500 rev/min., shifting down in good time and opening the throttle slowly and carefully.

Engine lubrication: We recommend checking engine oil level regularly. During the break-in period, check oil level every 500 km (300 miles) and add more oil if necessary of the same grade. Fill only to the upper mark on the oil dipstick. Adding too much oil is pointless and may even cause damage. The space between the two marks on the oil dipstick represents 1 liter (1.76 Imp. pts., 2.1 US pts.) of oil. Never allow the oil level to drop below the lower mark on the dipstick. Do not remove the filler cap when the engine is running. To measure oil level correctly, push the dipstick back into its hole after cleaning but do not screw it in.

Fig. 13

Change to another grade of oil only on the occasion of a complete engine oil change, including oil filter.

Our engines are designed to operate with any modern high-grade brand name lubricating oil, and require **no oil additives.** This also applies to the gearbox, final drive and drive shaft housing. For recommended oil grades, see specifications.

Operating economy of your motor cycle is greatly influenced by your style of riding. Just as the fastest sorts of public transport call for payment of a supplementary fee, so high speeds, violent acceleration and sudden heavy braking not only increase fuel and oil consumption but also result in more rapid wear on tires, brakes and all transmission components.

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Driving style

The illustration on page 16 shows the rider in what we consider to be the ideal seated position.

The knees are against the tank, the upper part of the body leans slightly forward and the arms are slightly bent. This riding position ensures maximum safety and freedom from fatigue even on lengthy journeys.

When climbing a long uphill gradient, do not allow the engine speed to drop too low. It is better to shift down to the next lower gear in good time.

On severe downhill gradients the braking effect of the engine can be increased by shifting down to the next lower gear, but the maximum permitted engine speed must not be exceeded. Never coast downhills with the clutch disengaged, the gearbox in neutral or – still more dangerous – with the ignition switched off. For all normal braking, try to use both front and rear brakes to an equal extent and apply the brakes smoothly. Increase the pull on the lever or pressure on the pedal slowly and avoid locking the wheels.

Note that if the front disc brake is not used for a lengthy period in heavy rain, the braking effect may be initially a little less than normal. For this reason, make a practice of applying the front brake lever gently at intervals.

After stopping, always select neutral and do not ride the clutch for long periods. Keeping the clutch disengaged or allowing it to slip can cause local overheating and unnecessary wear.
Always stop the engine by switching off the ignition. When parking the machine, remember to close the fuel taps.

Important safety notes

For your own safetiness we advise you to **switch on the headlight even during the daytime** so that other drivers can see you in time.
It is also important to wear **bright, flashy motorcycle clothing** – especially as concerns the color of your helmet.

In addition to regular maintenance of your motorcycle, pay special attention to the **condition of the tires** (use only BMW-approved makes, minimum thread depth 0,12" recommended by BMW) and observe **Tire Pressure Specifications** (see last page of Owner's Manual), as these items affect the roadability considerably.

If you intend to install accessories on your motorcycle (your BMW dealer will advise you), please note the following: First of all use a **tank luggage bag.** Tighten **saddlebags** firmly (maximum load per saddlebag 11 lb, maximum total weight of one saddlebag 15,4 lb). Stow only light luggage on the **luggage carrier** behind the bench seat – no trunks or heavy objects.

Do not exceed maximum permissible gross weight (877 lb) and maximum rear axle load (595 lb).

Install only BMW-approved fairings.

Preparing for a journey

For long journeys, in particular abroad, we recommend taking the following spare parts with you:
1 air cleaner element, 1 oil filter, 1 set spark plugs and light bulbs, 1 cylinder head gasket, 1 cylinder base gasket, a number of screws and 2 nuts of sizes M 6 and M 8 mm, spring washers, wire for temporary repairs, rubber bands (approx. 0.2 in. wide, for instance sections cut out of old motor cycle or car inner tubes) and 1 new inner tube; replace patched inner tubes before starting a long journey.

If your motor cycle has already covered a considerable mileage, we suggest informing your BMW dealer of the intended journey and allowing him to check over your machine thoroughly. Correct operation and good condition of the lighting and ignition systems, cylinder head, cylinders, pistons, clutch, brakes, control cables, carburetors, wheels and tires should be most carefully checked and these items replaced if necessary.

If you plan a trip lasting several months through countries where riding conditions are difficult, we recommend adding the following spare parts to those already mentioned: 1 set breaker points, 1 centrifugal spark advance mechanism and 1 set control cables; these cables can be attached parallel to the cables in use on the motor cycle by means of adhesive tape.
Many foreign countries still require the international identification plate of the licensing country to be attached at the rear of the motor cycle, but some countries have additional regulations which should be studied before the journey is undertaken. You can obtain the necessary information from automobile clubs, consulates etc.

General care of the motor cycle

Cleaning

The engine-transmission block and the final drive housing are best cleaned with a special cold cleaner liquid. All other painted or chromium plated parts have to be cleaned by water and a branded car shampoo.
Carburetors, muffler ends, instruments, clutch and brake lever have to be covered by plastic foil.
Road dirt and dust contain a number of chemical elements which can damage the paint finish if not removed promptly. For this reason, your motor cycle should be washed as often as possible, especially when the paint is still new.
Tar stains, dead insects or minor paint damage caused by flying stones should be removed or rectified as soon as possible, in order to prevent paint discoloration and areas of rust.

Tar stains should not be removed with a sharp tool such as a knife blade, but treated with a commercial grade of tar remover. Rubber components should be cleaned only with water, and may also be given a protective coating of glycerine.

Maintenance

Maintenance work should be carried out by an authorized BMW service agent, because good mechanical knowledge, BMW special tools and a repair manual are essential to perform this kind of work.
Standard tool kit:

Fig. 14

14

Maintenance schedule	Minor service (every 7500 km – 5000 miles)	Major service (every 15 000 km – 10 000 miles)
Change engine oil [21]	x[1]	x
Renew oil filter element [21]	x	x
Check gearbox oil level [22]	x	
Change gearbox oil [22]		x[2]
Check oil level in drive shaft housing [22]	x	
Change oil in drive shaft housing [23]		x
Check oil level in final drive [23]	x	
Change oil in final drive [23]		x
Change oil in telescopic fork [24]		x[2]
Grease rear swinging arm bearing, check play and adjust, if necessary [26]		x
Grease brake and clutch pivots and throttle twist grip [27]	x	x
Check battery acid level [28]	x[3]	x[3]
Check battery terminals, clean and grease*, if necessary [28]		x
Clean intake air cleaner [28]	x	
Renew intake air cleaner [28]		x
Check steering play, adjust*, if necessary [25]	x	x
Check wheel bearing play, adjust*, if necessary [25]		x
Adjust clutch [40]	x	x
Adjust free travel of front and rear wheel brake [29, 32]	x	x
Check brake fluid level (R 75/6 – R 90 S) [31]		x

Maintenance schedule

	Minor service (every 7500 km – 5000 miles)	Major service (every 15 000 km – 10 000 miles)
Check brake linings, renew*, if necessary [29]	x	x
Check drum and disc brakes and operating levers [32]		x
Check brake system for leaks (R 75/6 – R 90 S) [30]		
Adjust carburetor, clean*, if necessary	x	x
Check clearance of cables, adjust, if necessary [33–36]		
Clean fuel taps [36]	x	
Check spark plug gap [37]		x
Renew spark plugs [37]		
Check contact breaker gap and ignition timing, adjust, if necessary [37, 38]	x	x
Grease pivot pin for centrifugal advance unit [37]		x
Check tightening torque of cylinder head nuts [39]	x	x
Check valve clearance, adjust, if necessary [39]	x	
Check wheel spokes, tighten*, if necessary [40]		x
Check rims [40]		x
Tighten nuts and bolts [41]	x	x
Trial run and final inspection [40]	x	x

[ ] Number in brackets: Page in Owner's Manual giving information
* Charged separately.
¹ At least every 6 months; if motor cycle is ridden only **for short distances**, or at outside temperatures below 0° C (32° F), change oil every 3 months or after a maximum of 2000 miles
² At least once a year.
³ At least once a month.

Change engine oil and renew filter element

Change engine oil only when the engine is at normal operating temperature. Oil changes are needed every 7500 km (5000 miles), or not later than every 6 months. If the machine is ridden only for short distances, or at outside temperatures below 0° C (32° F), change the oil every 3 months or after a maximum of 3000 km (2000 miles).
Remove the drain plug (8 mm internal hexagon), allow the old oil to drain out and replace the drain plug tightly. Check that the gasket is in good condition. If the oil filter is to be renewed during the oil change, remove the filter before draining the oil. **Fig. 15**

Total oil capacity: 2.0 liters (4.2 US pts.) + 0.25 liters (0.53 US pt.) if the oil filter is changed.

Oil level up to the upper mark on the dipstick, but never higher than this. See **fig. 13**

Oil grade: See specifications

Filter element:
Renew the element every 7500 km (5000 miles) during an engine oil change. Take out the 3 10 mm hexagon screws and remove the end cover. Remove the 17 mm hexagon screw and lay aside together with the filter cover and O ring. Pull out the filter element using a thin wire hook and insert the new element, making sure that the gaskets are in good condition. **Fig. 16**

Oil pan:

After the first 1000 km (600 miles), remove the 10 mm hexagon screws and take off the oil pan. Clean the oil pan thoroughly together with the oil mesh strainer and check condition of gasket before re-attaching to the engine block.

Fig. 17

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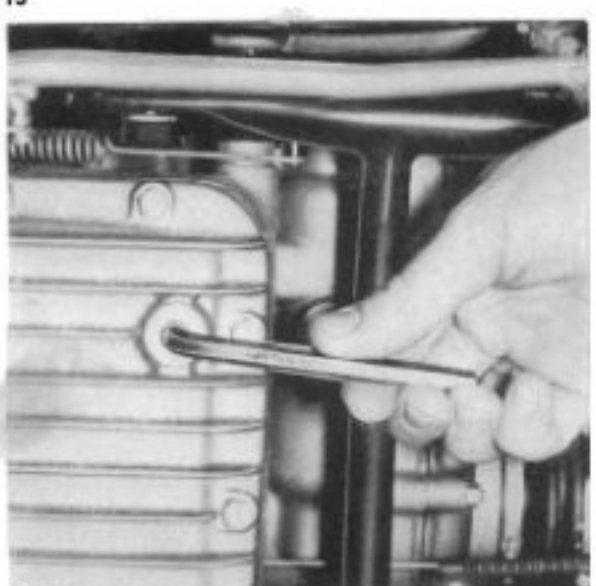

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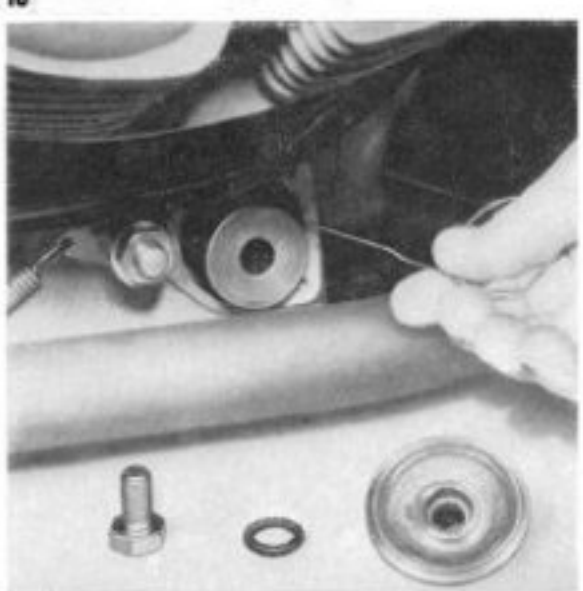

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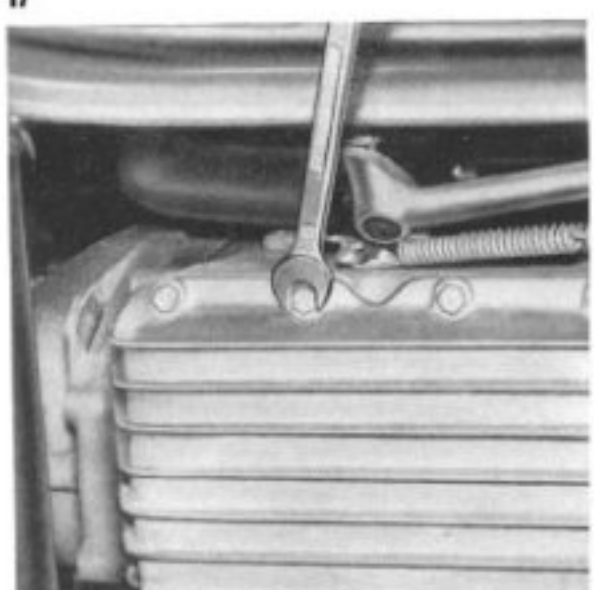


Gearbox oil change and oil level

Check oil level every 7500 km (5000 miles). If necessary, add a brand-name oil of the same grade as originally used until the level reaches the lowest turn of the thread in the filler opening; first remove the filler plug (8 mm wrench) with an Allen key and retighten firmly after adding the oil.

Fig. 18

Change gearbox oil only when the motor cycle is at normal operating temperature and at least every 15 000 km (10 000 miles) or once a year. Remove the oil drain plug (19 mm wrench) followed by the oil filler plug (8 mm wrench). After the old oil has drained out, replace the drain plug and tighten firmly. Add new oil via the filler plug.

Fig. 19

Oil capacity: approx. 0.8 liter (1.7 US pts.)

Oil level up to lowest thread in filler opening

Oil grade: See specifications.

Rear wheel drive oil level and oil change

Check oil level with the machine on its stand, every 7500 km (5000 miles). To check level, insert a suitable rod **vertically** into the filler opening and allow it to rest on the clutch housing. The oil level should be 2 mm (0.08 inch) up the measuring rod. If necessary, add a brand-name oil of the same grade as that previously used, and retighten the filler plug (17 mm wrench) firmly.

Fig. 20

18

19

20

Change oil in the drive shaft housing only when at normal operating temperature, every 15 000 km (10 000 miles) or at least once a year. Remove the oil drain plug followed by the oil filler plug (both 17 mm wrench). After the old oil has drained out, insert the drain plug and retighten firmly. Add new oil through the filler opening.

Fig. 21

Oil capacity: approx. 0.15 liter (0.32 US pt.)

Oil level: 2 mm (0.08 inch) above clutch housing with the machine on its stand.

Oil grade: See specifications.

Final drive oil level and oil change

Check oil level every 7500 km (5000 miles) and if necessary add a brand-name oil of the same grade previously used until the level reaches the lowest thread in the filler opening. Retighten the filler plug (8 mm) with an Allen key.

Fig. 22

Change the oil in the final drive only when at normal operating temperature, every 15 000 km (10 000 miles) or at least once a year. Remove the oil drain plug (19 mm wrench) followed by the oil filler plug (8 mm Allen key). After allowing the old oil to escape, replace the drain plug tightly. Fill with new oil.

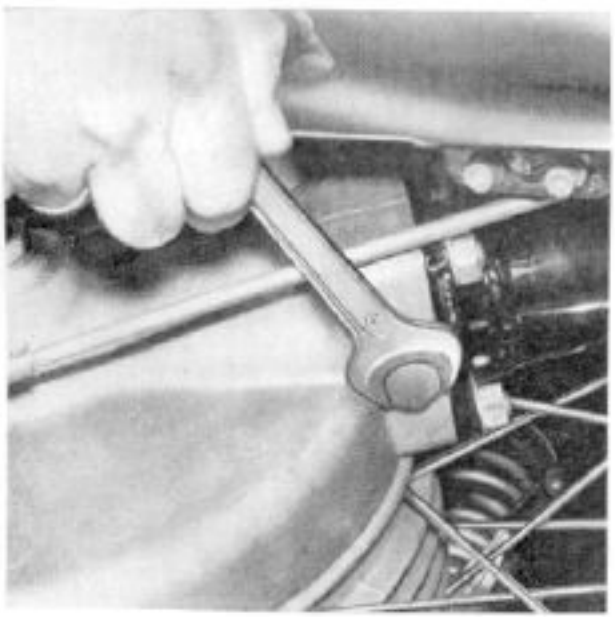
Fig. 23

Oil capacity: Approx. 0.25 liter (0.53 US pt.)

Oil level: up to lowest thread in filler opening

Oil grade: See specifications.

21



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Telescopic fork — oil level and oil change

Check oil level by placing the machine on its center stand and allowing the fork to extend fully. Remove the upper end caps. With the aid of a piece of 5 mm (0.2 inch) diameter welding rod 1 m (40 inch) long, check that the oil level is not more than 437 mm (17.2 inch) below the flat face of the hexagon on the upper spring mounting.

Oil change every 15 000 km (10 000 miles), or at least once a year.

To change the oil, allow the telescopic fork to extend fully while the machine is on its stand. Remove the rubber caps from the bottom plugs of the tubular fork sliders and unscrew the hexagon nuts (13 mm wrench) while holding the internal hexagon (4 mm key) on the damper tube ends to prevent turning.
Fig. 24

Unscrew caps at top of fork tubes with a pin wrench (from tool kit) to vent the tubes.
Fig. 25

Pull both sliders down and allow the oil to escape. Screw the bottom plugs back in and add fresh oil.

Total capacity of each fork leg 280 cm³ (approx. 9.5 fl. oz.)

Refill capacity per fork leg, when changing oil: 265 cm³ (approx. 9 fl. oz.)

Oil grades: See Specifications

24

25

Steering and wheel bearing play

Check steering play after the first 1000 km (600 miles), then every 7500 km (5000 miles). Put the motor cycle on its center stand and push and pull the fork legs vigorously. There should be no play – if play is detected, readjust the steering head bearings.

Fig. 26

Adjust the steering head bearings by removing the domed head screw on the star handle and lifting off the handle. Loosen the 4 hexagon nuts of the handlebar clamps so far (13 mm wrench) that the ring wrench (included in the tool kit) can be fitted onto the centering nut. Loosen the centering nut and adjust the bearing at the slotted nut until no play is detected, then preload by approx. 1/8 turn (use the hook spanner from the tool kit).

Fig. 27

Reassemble in reverse order. Prevent the slotted nut from moving when tightening the centering nut to approx. 12 mkp (87 ft.lb.).
Check play again; when properly adjusted, the fork should fall to the left or right full lock position by its own weight (steering damper disengaged).

The precise degree of steering bearing preload can only be adjusted by an authorized BMW dealer, using a friction measuring gauge.

Check wheel bearing play after the first 1000 km (600 miles), then every 15 000 km (10 000 miles) by putting the machine on its center stand with the wheel off the ground and pulling and pushing the wheels vigorously in a sideways direction. No play should be noticeable.

Fig. 28

Wheel bearings should be adjusted only by an authorized BMW dealer.
Every 30 000 km (20 000 miles), check grease content of wheel hub bearings and repack with grease if necessary. For details of the proper grease, see specifications. This work should also be performed only by an authorized BMW workshop.

26

27

28

Rear swinging arm bearings

Check for absence of play at the rear wheel swinging arm bearing every 15 000 km (10 000 miles) by pulling and pushing the complete swinging arm while holding the machine firm at the handgrip on the main frame.

Fig. 29

If necessary, readjust. Take off the plastic cap, loosen the lock nut with the ring wrench included in the motor cycle tool kit, pre-load both bearing pins to a torque of 2 + 0.2 mkp (14.4 + 1.4 ft.lb.) with a suitable Allen key and release again. Finally, tighten to 1 + 0.2 mkp (7.2 + 1.4 ft.lb.) and retighten the lock nut (approx. 10 mkp/72 ft.lb.).

Fig. 30

Lubricate the rear wheel swinging arm bearings with the grease gun, using a taper nozzle.

Fig. 31

29

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31

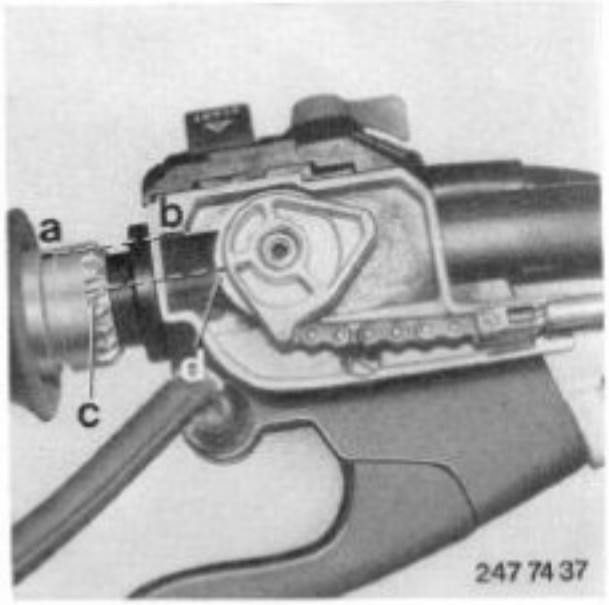
Throttle twist grip, brake and clutch lever pivots

Check the throttle twist grip every 7500 km (5000 miles) for free movement; if necessary, push back the waterproof cap, unscrew and remove the cover, loosen tension screw and pull off the grip. Lubricate the inner grip, gear drive and chain. Note when reassembling that the slotted end "a" in the twist grip should be in line with the end of cutout "b" in the housing. Put the lower wire cable into the double nipple and insert cam and chain in that way that the mark "c" on the toothed end of the grip is in one line with the mark "d" on the cam.
Unless this precaution is taken, movement of the throttle cables will be restricted. Place the upper throttle cable into the double nipple, mount the cover and at the same time pull back the upper outer cable until the end sleeve on the outer cable can engage in the cutout on the cover. Tighten the cover and push on the waterproof cap.
Fig. 32

Grease the pivots on the foot brake (item 5) and the clutch lever (item 16) every 7500 km (5000 miles), using a grease gun (see pages 42, 43). Grease the pivot points for the clutch and front wheel brake cable nipples every 7500 km (5000 miles). Disconnect the clutch cable at the clutch throwout arm and loosen the brake adjusting screw (at R 60/6 on the front brake, at R 75/6 – R 90 S on the master brake cylinder). Loosen the lock nuts on the clutch and brake lever pivot shafts, unscrew the shafts and pull the levers out of the pivot blocks. Disconnect the wire cables, allow a few drops of lubricating oil to penetrate the outer cables and grease the nipple retaining cutouts. Reassemble in reverse order. Make sure that the wire cables are not bent sharply. **Fig. 33**

Master brake cylinder operating lever
Remove the brake pressure pin and grease lightly at both ends with Molykote BR 2. Oil the lever pivot slightly every 7500 km (5000 miles).
Warning: No grease or oil must penetrate the master brake cylinder.
Fig. 34

32



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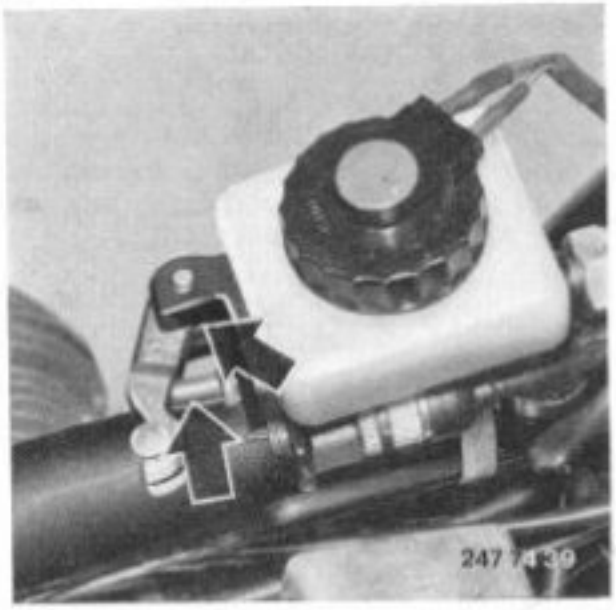


Battery

Check the battery acid level every 7500 km (5000 miles), at least once a month. Take off the 6 plugs. The acid level should be approx. 5 mm (0.2 inch.) above the top of the plates in each cell. If acid level is too low, top up with distilled water (not acid). Keep the top of the battery clean and dry. Protect the terminal posts and clips against corrosion by applying a thin coat of special acid resistant grease.

Warning: Never allow battery acid or lead oxide from the terminals to get on to your clothing. Do not inspect battery acid level with a naked flame, or a dangerous explosion may result.
If the motor cycle is out of service for a lengthy period, recharge the battery once a month in order to prevent sulphate formation on the plates. For battery capacity, see specifications.

Warning: Before recharging the battery, always switch off the engine and disconnect the terminals, or else peak voltages produced in the charger may destroy the ignition system diodes.

Intake air cleaner

Remove the **air filter element** every 7500 km (5000 miles) – more often if the air contains a high proportion of dust. Carefully knock the element to remove loose dust, and blow through from the inside with a compressed air jet containing no oil.
If the air cleaner element is severely contaminated, and in any case after every 15 000 km (10 000 miles), renew the element.
Running the engine with a blocked air cleaner element will increase fuel consumption and will reduce engine power.

To remove air filter element, take off the left hand air intake tube and remove housing allen head screw (do not detach choke control). Pull housing outward and turn sideways. Remove element.

When installing the air cleaner element, place it over the 3 pins in the rear half of the housing, then place the left filter housing half against the lower and side gearbox housing joints and push into position. Support the cylinder head screw with the left hand to simplify insertion.

Fig. 35

35

Brakes

Check the efficiency and lever travel of the brakes at regular intervals, or at least every 7500 km (5000 miles). Brake lining wear can be checked visually as follows:

On drum brakes, trough inspection holes on left side of hub; on disc brakes by looking down on to inner brake pad.

To prevent damages, worn brake shoes and pads must always be renewed in good time (min. lining thickness 1,5 mm (0,06 inch).

Adjusting front brake:

R 60/6

If free travel at the lever is too great, turn knurled screw 1 after loosening lock nut 2 until free movement at the lever is 8–15 mm (¼–½ inch).

36

247 75 41

Fig. 36

Loosen lock nut 2 (13 mm wrench) on adjusting cam 1, turn the internal hexagon fully to the left with an Allen key, then turn it back until the lower brake lever has 4 mm (0.16 inch) of free movement measured at the front of the cable pivot pin 3. In this position, lock the adjusting cam. Adjust free movement at the upper brake lever to approx. 4 mm (0.16 inch) by turning adjusting screw 4 (10 mm wrench) on the end of the lower cable, while holding the sleeve with a pair of flat nose pliers to prevent it from turning.

Fig. 37

37

247 74 42

Adjusting front brake:

R 75/6, R 90/6, R 90 S

If cable stretch has led to excessive handbrake lever movement, the lever must be adjusted. This can only be carried out at the master brake cylinder after the fuel tank has been removed.

Take off the dust cap and check play with a feeler gauge (from toolkit).

Adjust by loosening the adjusting screw lock nut, inserting the feeler gauge and turning the adjusting screw to the right if more play is required or to the left to reduce play. At the correct setting the feeler gauge should just be capable of free movement; after this, tighten the lock nut and install the dust cap.

Fig. 38

38

247 74 43

Renewing brake pads, adjusting brake caliper:

The brake caliper must be removed to renew the brake pads. Take off the end cap on the eccentric pin and extract the pin with a long 8 mm screw (to be screwed in by several complete turns), see Fig. 39. Next, pull the brake caliper to the rear, remove the inner pad retaining spring and take both brake pads out of the caliper.

Before inserting new pads, push the piston back into the wheel brake cylinder with a screw clamp. Lightly grease the guide pin for the outer brake pad (with 'Molykote BR 2'), then install the O-ring and the outer pad. Secure the inner brake pad with the retaining spring, the angled end of which must face down (Fig. 39a). Install the brake caliper, grease and insert the eccentric pin.

To adjust the brake pads, turn the pin with a screwdriver until the inner pad is parallel to the inner face of the brake disc (pull the brake caliper slightly outwards).

Apply one or two heavy marks with a felt-tipped pen to the inside of the brake disc, working from the inside to the outside edge. Turn the front wheel and pull the brake caliper outwards. Examine the ink marks to ensure that the full area of the inner brake pad is touching the disc.

The outer pad is operated by the brake cylinder piston and is aligned automatically.

Grease the spring, replace the end cap and tighten to 6 + 0.5 mkp (43 + 3.6 ft.lb.).

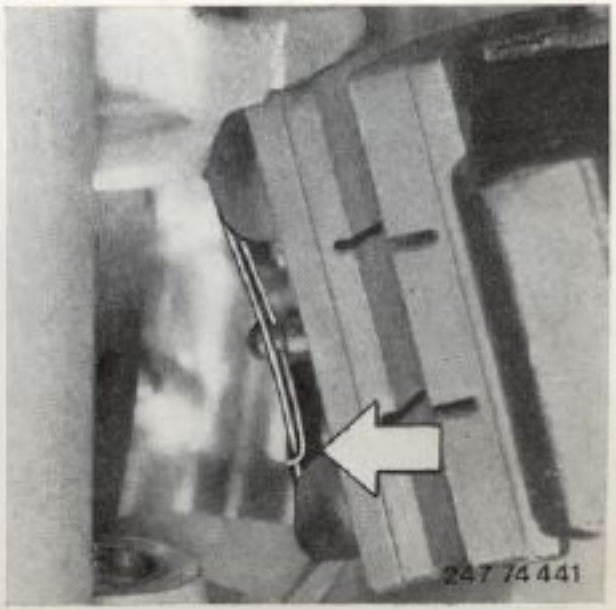
Figs.: 39 and 39a

When the front wheel is removed the handbrake lever must not be operated, or else the brake piston will be pressed out and brake fluid will escape.

If pressure exerted at the handbrake lever is too low, the brake system must be bled and checked for leakage.

39

39a



Brake fluid:

If brake fluid level drops an electric warning device in the brake fluid reservoir causes the telltale light in the combined instrument to come on.
Sudden violent braking may affect fluid level and cause the float to move up and down, so that the telltale light flickers.
If the brake fluid telltale light remains on, more brake fluid should be added. Remove the fuel tank and unscrew the brake fluid reservoir cap. Fill as far as the upper "max." marking. Do not overfill, or else the fluid may overflow when the float is inserted and damage the motor cycle's paintwork.
Brake fluid is hygroscopic, and is thus capable of absorbing moisture from the atmosphere over a considerable period of time. To ensure that the brake system remains fully reliable, the **brake fluid must be replaced once a year by an authorized BMW workshop.**

Bleeding the brake system

If the action of the brake lever feels "soft", the brake system should be bled. First remove the tank, then add fluid to the correct level in the brake fluid reservoir. After this, remove the cap protecting the bleed screw, mount the bleed hose and immerse it in a vessel containing brake fluid. Apply the handbrake lever a number of times until braking pressure is detected. Hold the lever applied against this pressure and open the bleed screw, at the same time pulling firmly on the lever. Do not release the lever until the bleed has been closed.

Repeat this process until brake fluid emerges from the hose into the vessel entirely free from air bubbles. Tighten bleed screw.

Warning: Do not pump the brake fluid reservoir dry, or else air will again penetrate the brake system.

Figs.: 40 and 41

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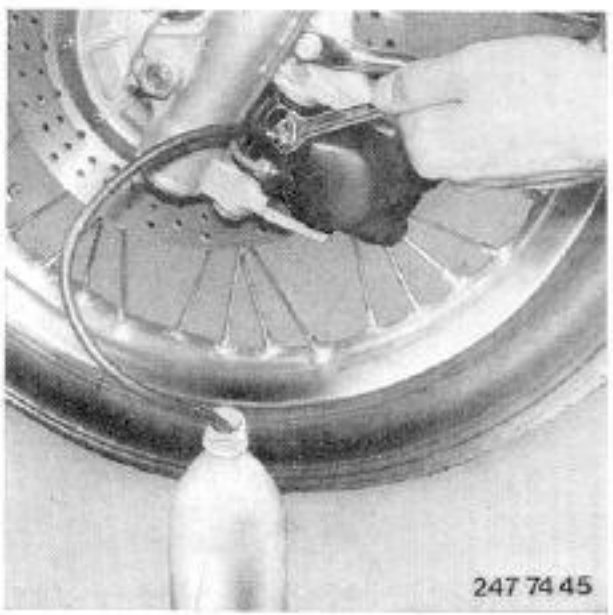

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Rear wheel brake

Adjust the **foot brake** by turning the wing nut on the end of the pull rod until the rear wheel brake just begins to bite. Then turn the wing nut back by 3 to 4 turns.

Warning: If there is too little free movement, the brake may lock while the machine is being ridden.

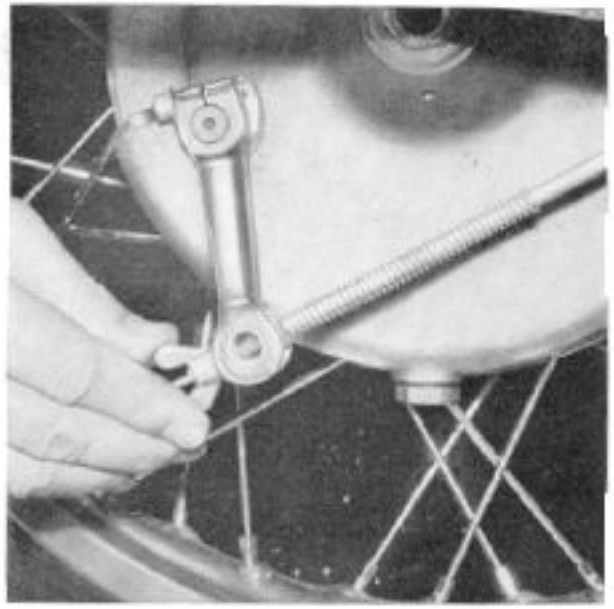
Fig. 42

Check all braking components every 15 000 km (10 000 miles);
clean brake drums and -shoes; grease brake cams (at R 60/6 front and rear; at R 75/6 – R 90 S rear).
Do not sand away the shiny surface of the brake pads or taper off the edges.

Check movableness of brake saddle and condition of discs (R 75/6 – R 90 S).

All work on the brake system should be carried out only by a BMW service workshop.

42

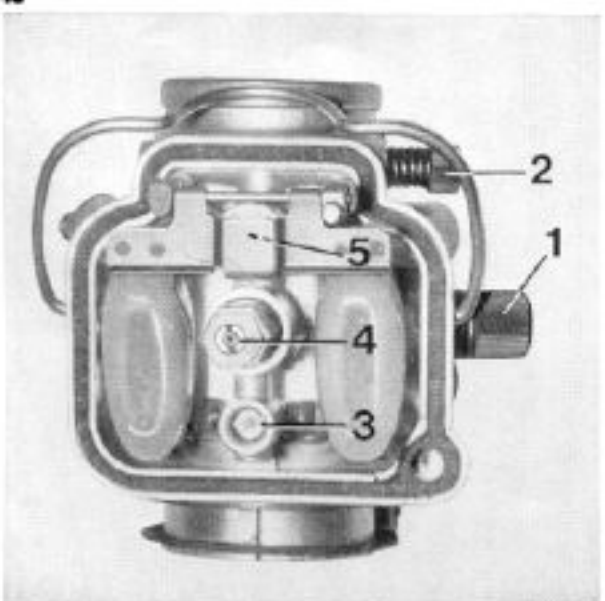


Carburetors

The carburetor cleaning should be carried out by an authorized BMW workshop, if possible.
In an emergency, the carburetors used on all models can be removed and all fuel and air passages together with float needle valve 5, main jet 4 and idle jet 3 blown through with compressed air. Clean the float housing at the same time, making sure that the throttle slide or throttle stop screw 1 is not disturbed. After reassembling the carburetor, screw in the idle air or idle mixture regulating screw 2 as far as possible, then unscrew as follows to obtain the basic setting for the various types of carburetor:

¼ to 1¼	turns (R 60/6)	**Fig. 43**
½ to 1	turn (R 75/6)	**Fig. 44**
1	turn (R 90/6)	**Fig. 44**
1–1½	turns (R 90 S)	**Fig. 45**

43



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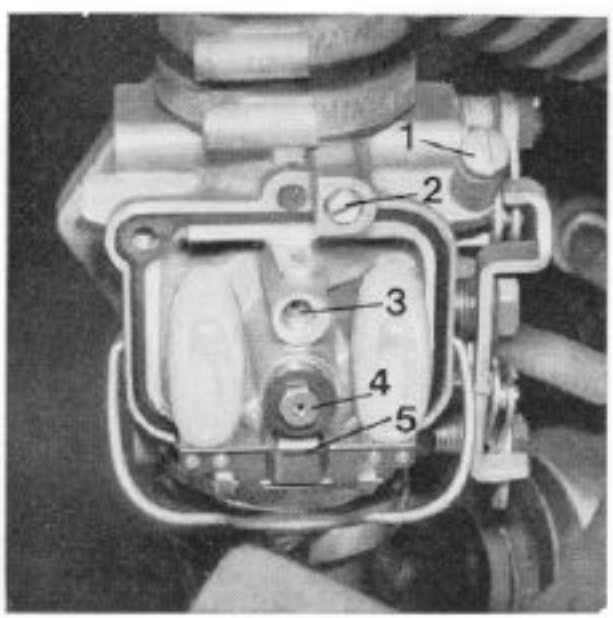

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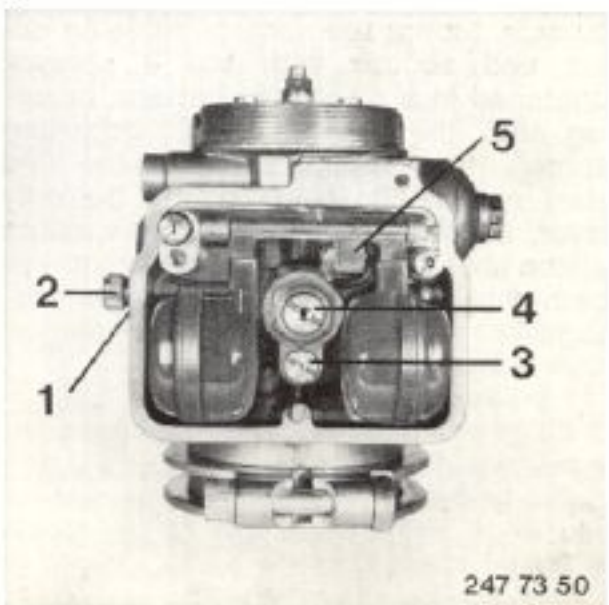

Insert the throttle slide (R 60/6) in a dry condition, and tighten the cover screw firmly by hand (without using pliers). Make sure that the locating lug on the cover is correctly engaged in the housing.

The throttle slide (R 90 S) and cover (right and left) must not be interchanged, or else the predetermined quantity of fuel injected within the carburetor may be altered.

The vacuum piston (R 75/6, R 90/6) with diaphragm and jet needle should be inserted dry, with the locating lug on the diaphragm pressed into the cutout in the sealing groove on the upper part of the carburetor. This will ensure that pressure equalizing passages in the vacuum piston are on the throttle butterfly side. Mount the vacuum housing cover and secure with the 4 screws, tightened in a crosswise pattern, ensuring that the throttle cable adjusting screws are on the same side as the cold start mechanism and throttle butterfly lever. If correctly installed, the vacuum piston should move by its own weight to both limit positions in the guide passage.

Connect the throttle cables and check free movement with the twist grip fully closed (0.5 to 1 mm/0.02 to 0.04 inch). If necessary, loosen lock nut 1 (9 mm wrench) and turn the throttle cable adjusting screw to the right to increase free play or to the left to reduce play. This basic setting of the throttle cable must in all cases be identical on the left and right sides of the engine.

Fig. 46

Adjust engine idle speed when the engine is at its normal operating temperature and with the twist grip fully closed. Insert an adaptor (Beru EP 1 suppressor unit) into the spark plug cap and connect to the ignition lead. This will prevent the waterproof cap from burning out when the spark plug lead is tested by allowing sparks to jump from the cap to the cylinder.
Correct idle speed is **between 600 and 800 rev/min.** If the engine idles at **this** speed, check by removing each plug cap **in turn** and consulting the revolution **counter** to ensure that both cylinders **are working uniformly.**

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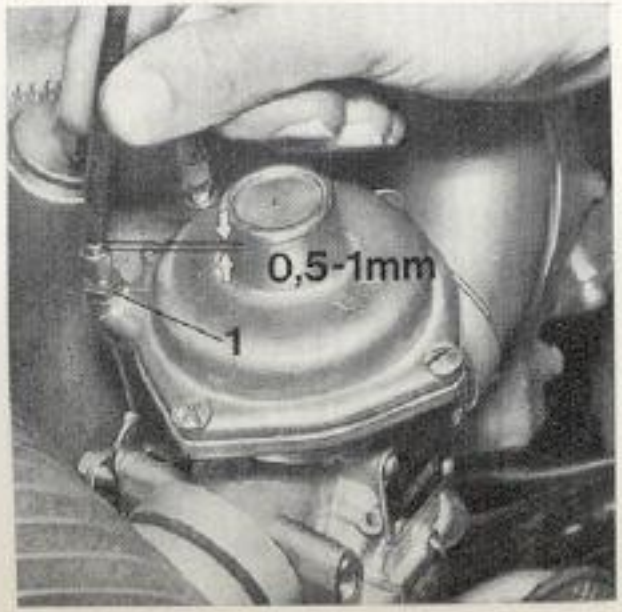

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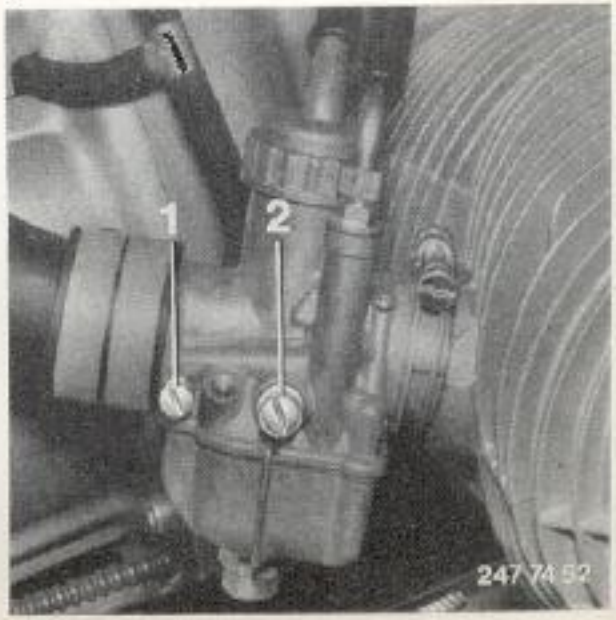

If the cylinders are not operating evenly or the idle speed is higher or lower than the specified value, adjust the carburetors as follows:

Types R 60/6, R 90 S

Adjust the running speed of the cylinder which deviates most from the specified idle speed until it matches the other cylinder. This is done by turning the throttle slide stop screw 2 to the right (to speed up the engine) or to the left (to slow down the engine). In order to obtain the most favorable mixture setting turn the idle air adjusting screw (on the R 90 S, the idle mixture adjusting screw) 1 carefully in either direction and check that engine speed rises slightly. When the central setting has been found, the mixture is correctly adjusted. Repeat this procedure on the second carburetor.

Figs. 47 and 48

If engine speed is now outside the permitted limit of 600 to 800 rev/min, turn both throttle stop screws 2 to the left by an equal amount to reduce engine speed or to the right if engine speed needs to be increased. Repeat the final adjustment at the idle air regulating screw (on the R 90 S, idle mixture regulating screw).

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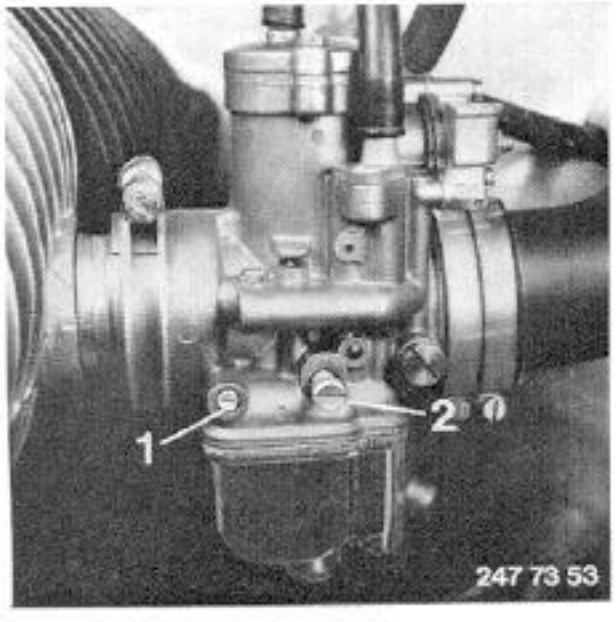

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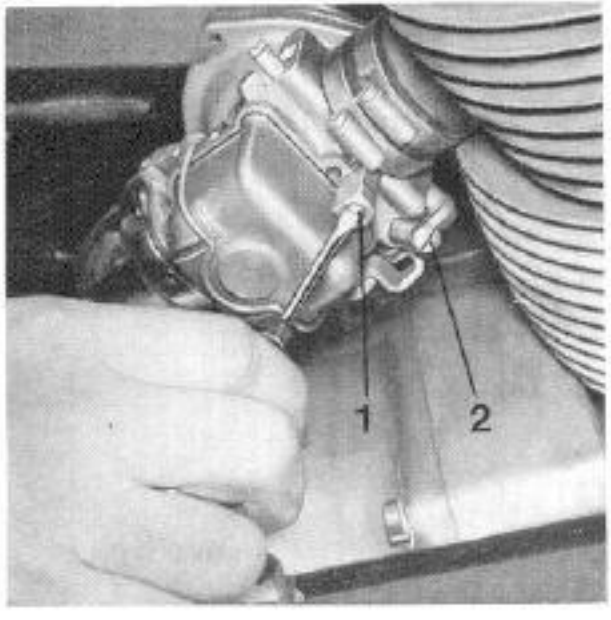

Types R 75/6, R 90/6

Adjust the cables of the cold start device until tension is uniform (play in cable 0.5 to 1 mm/0.02 to 0.04 inch). Unscrew the cable adjusting screws on both carburetors completely, so that the throttle butterfly levers are not suspended on the throttle cables.

Fig. 49

Move the idle mixture regulating screw 1 and throttle butterfly stop screw 2 on both carburators to their basic settings: in the case of the idle mixture regulating screw, tighten fully and unscrew by 1 turn. Tighten the throttle stop screw until it just touches the stop on the throttle lever, then screw in by 1 further turn. Run the engine until warm, operating the choke if necessary when starting. Turn the idle mixture regulating screws on both carburetors to the left and right until the most suitable mixture setting is obtained (indicated by engine speed reaching its maximum value).

Continue carburetor adjustment alternately on the left and right carburetors. Unscrew the throttle stop screw step by step, and locate the best setting of the idle mixture regulating screw again after each movement. Repeat this entire procedure until the cylinder being adjusted ceases to fire after a few turns of the engine when working alone (spark plug cap on opposite cylinder removed).

To adjust transition from idle speed to part load, open the twist grip slightly so that engine idle speed is increased. Remove the spark plug caps in turn to check that both cylinders are operating evenly. If necessary, adjust the throttle cable of the cylinder which picks up slower so that less free movement is present. This is done by turning the adjusting screw to the left and locking with the hex. nut (9 mm wrench).

Warning: Do not run the engine at idle speed for more than 10 minutes.

Fuel tap

Every 15 000 km (10 000 miles), remove the **mesh screen filter** in the fuel tap for cleaning.

1. Close the fuel tap.
2. Unscrew the collar nut (17 mm wrench).
3. Take off hose union and screen, and clean the screen in gasoline.
4. Do not re-use gasket if damaged. Reassemble screen.

Removal of the complete fuel tap

1. Drain the fuel tank.
2. The quick-locking nut (24 mm wrench) has a normal right-hand thread on the fuel tank side and a left-hand thread on the fuel tap side. Hold the fuel tap and turn the nut to the left, then remove fuel tap and nut.
3. When reassembling, do not re-use gasket unless in perfect condition. The wider end of nut faces upwards. Engage both threads on nut with the threads on the fuel tank and fuel tap simultaneously.

Spark plugs

Check the **spark plug electrode gap** with a feeler gauge every 7500 km (5000 miles) and also when installing new spark plugs. If necessary, bend the side (ground) electrode to the specified gap of a = 0.6 + 0.1 mm (0.024 + 0.004 inch).

Fig. 50

Clean spark plugs by dipping in gasoline and brushing, but do not use a metal brush. Before screwing the plug into the cylinder, apply graphite grease to the threads.

Replace spark plugs after every 15 000 km (10 000 miles).

50

Breaker points gap, breaker lubricating felt, ignition timing

Check breaker gap every 7500 km (5000 miles): disconnect the **battery,** remove the 3 Allen screws (5 mm wrench) and take off the generator cover. If no dwell angle meter is available, unscrew the spark plugs and turn the engine clockwise, looking from the front, by means of the Allen screw (6 mm wrench) holding the distributor rotor. Continue to turn until the breaker arm lifts off fully. Replace burnt breaker points. Measure breaker points gap with a feeler gauge (0.35 to 0.40 mm/0.014 to 0.016 inch). To adjust the breaker points gap: loosen the set screw slightly, insert a screwdriver blade between the 2 small pins and into the slot on the breaker plate and turn the screwdriver slightly until a gap of 0.35 to 0.40 mm (0.014 to 0.016 inch) is obtained. Tighten the set screw and check that the gap has not altered.

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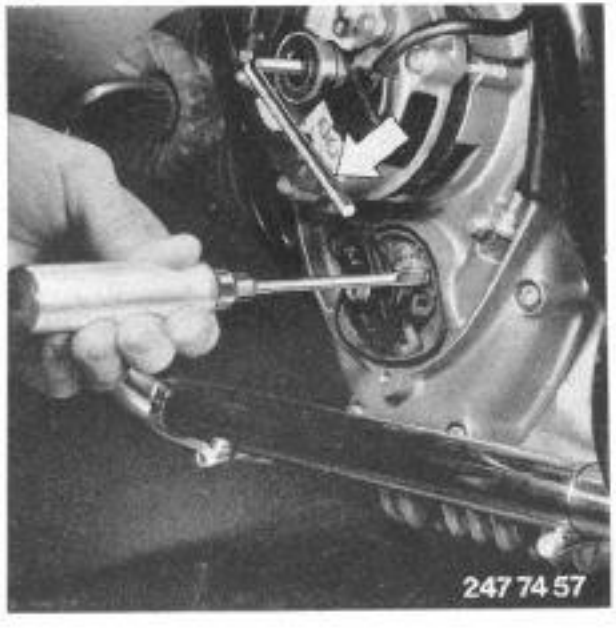

Fig. 51

Rub a small quantity of Bosch Ft 1 v 4 grease into the **lubricating felt** every 15 000 km (10 000 miles), and check that the felt is resting correctly on the cam. Every 12 000 km (8000 miles), loosen the hexagon nut (10 mm wrench) and take off the **centrifugal advance unit.** Grease the pivot pin for the centrifugal advance unit lightly with Bosch Ft 1 v 26 grease. Check for proper spring action.

Check **ignition timing** every 7500 km (5000 miles) or whenever the breaker points gap is reset.

a) Connect one terminal of a **test lamp** to the condenser, the other to ground with the ignition switched on.

Fig. 52

The test lamp must light up when the "S" mark on the flywheel is in line with the mark in the inspection hole as the engine is turned clockwise (normal direction of engine rotation). The centrifugal advance weights must not be set in motion.

Fig. 53

Ignition is timed to take place at 9° before TDC. The difference between the firing points of the left and right cylinders should not exceed ± 3° (note marks over and under "S").

b) Connect a **strobe timing light** between the spark plug cap and the plug and direct the light on to the flywheel rim through the inspection hole while the engine is running.

At engine idle speed (600–800 rev/min) the "S" flywheel mark (ignition retarded) should appear as a bright line in the inspection hole. If the line is above center, the igntion is too far advanced; if below center, the ignition is too far retarded. As engine speed increases the "S" mark will move upwards out of the inspection hole (movement starts at approx. 1550 rev/min). If engine speed is increased still further, the "F" flywheel mark (ignition advanced) will appear at the bottom of the inspection hole, and should reach the mark in the inspection hole at an engine speed of 3000 rev/min (full centrifugal advance).

Retiming the ignition: Loosen the two screws 1 on the contact breaker base plate. Turning the base plate in the same direction as engine rotation will retard the ignition, and turning it against the direction of engine rotation will advance the ignition (the engine crankshaft and camshaft rotate in the same direction). Retighten the 2 screws firmly when the adjustment has been completed.

When checking ignition timing with a test lamp, turn the engine through 45° against the normal direction of rotation (the test lamp will go out). This will ensure that when the engine is turned in its normal direction of rotation, any possible lost motion will be eliminated. Re-check ignition timing with the test lamp.

Timing the ignition with the strobe light: if ignition advance is incorrect, check runout on the drive shaft (max. 0.02 mm/0.0008 inch) and free movement of the centrifugal advance cam on the shaft.

Fig. 54

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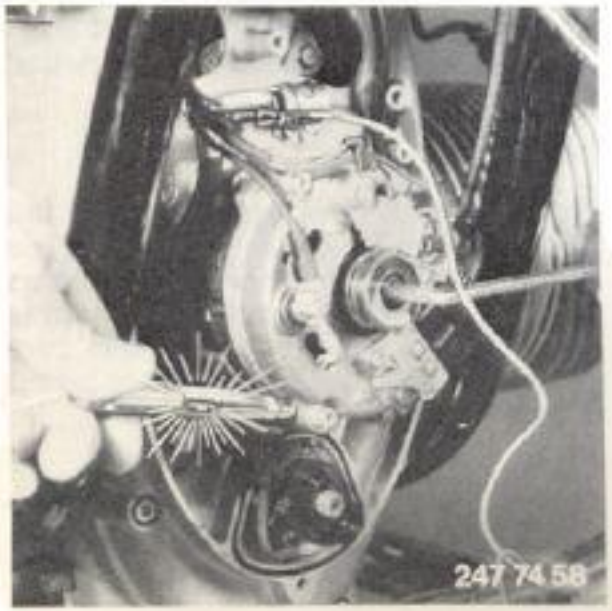

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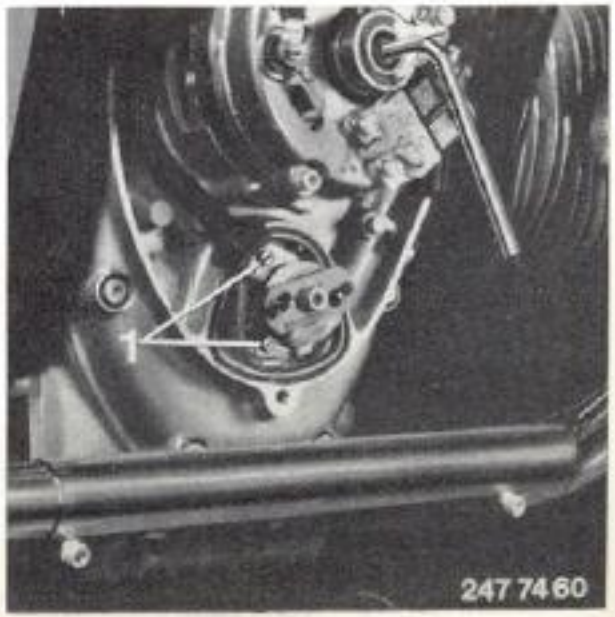

Cylinder head nuts, valve clearances

Every 7500 km (5000 miles), check the tightening torques of the nuts on the 4 through bolts and the 2 cylinder head retaining nuts. Remove the rocker cover by loosening the cap nut (13 mm wrench) and the 2 side nuts (10 mm wrench).

Fig. 55

If necessary, tighten the nuts with a torque wrench in accordance with the tightening sequence shown here (3.5 + 0.4 mkp/25 + 2.8 ft.lb.).

Fig. 56

Check valve clearances – this work has to be carried out each time the cylinder through bolt or cylinder head nuts are retightened – with the engine stopped and cold, using a feeler gauge inserted between the valve stem and the rocker. Unscrew the spark plugs and turn the engine with an Allen key (6 mm) at the alternator rotor attachment screw until the cylinder on which valve clearance is being adjusted is at top dead center on the compression stroke. Both valves will then be closed. If necessary, adjust valve operating clearances by loosening the lock nut (12 mm wrench) and turning the adjusting screw (12 mm wrench). Afterwards, tighten the lock nut firmly and recheck valve operating clearance.

Fig. 57

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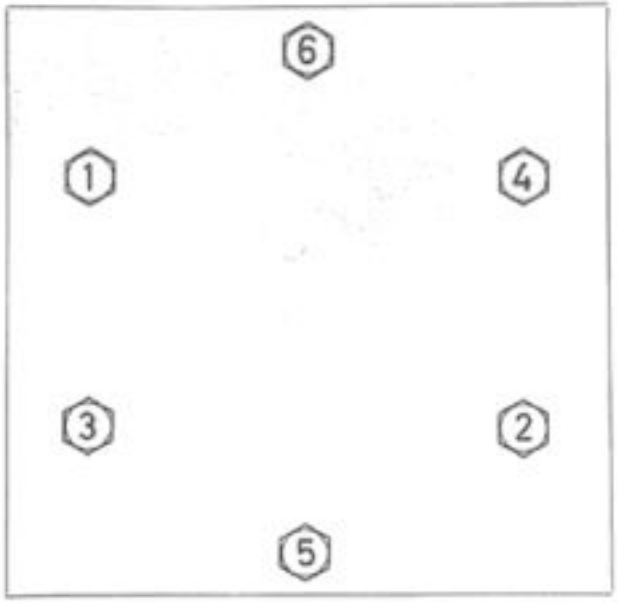

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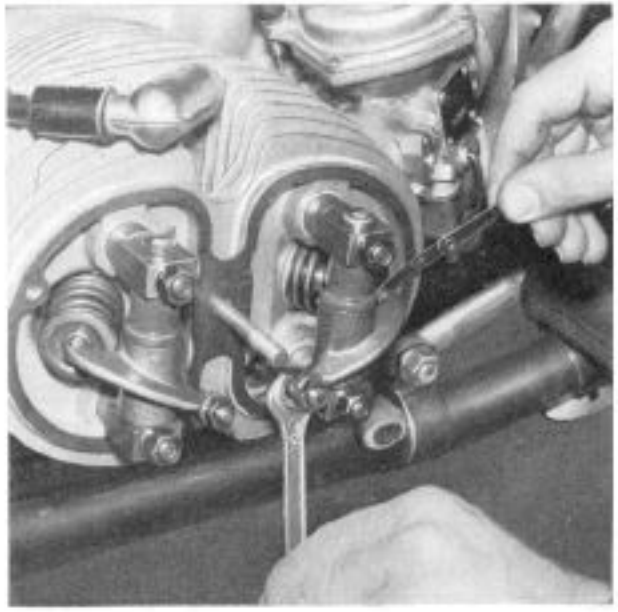

The clutch is correctly adjusted when there is approx. 2 mm (0.08 inch) of play at the clutch throwout lever 3. Play can be increased by screwing in the knurled cable adjuster on the clutch operating lever mounting, or decreased by unscrewing the adjuster. If the range of adjustment provided is insufficient, play can be decreased by loosening lock nut 1 (13 mm wrench) and tightening adjusting screw 2 (10 mm wrench) at the throwout lever. Loosening the screw provides increased play. After adjustment, tighten the locknut on the set screw.

Fig. 58

Wheel spokes, rims

Every 15 000 km (10 000 miles) check the wheel spokes for uniform tension. Strike them with a screwdriver one after the other – a high or low note will indicate excessive or insufficient spoke tension. **Fig. 59**

If spokes are retensioned, always remove the tire, tube and rim tape and file away any spoke ends protruding into the rim well to prevent damage to the tube and thus risk of accident.

If lateral or vertical rim runout is detected, have the wheel centered and rebalanced.

Trial run, final inspection

Carry out a trial run after each inspection to check the safety of the motorcycle. Pay special attention to efficiency of brakes, gearshift, clutch and instruments, and free movement of steering.

During final inspection, check tire condition and pressures, lighting, horn, telltale lamps, and rear view mirrors.

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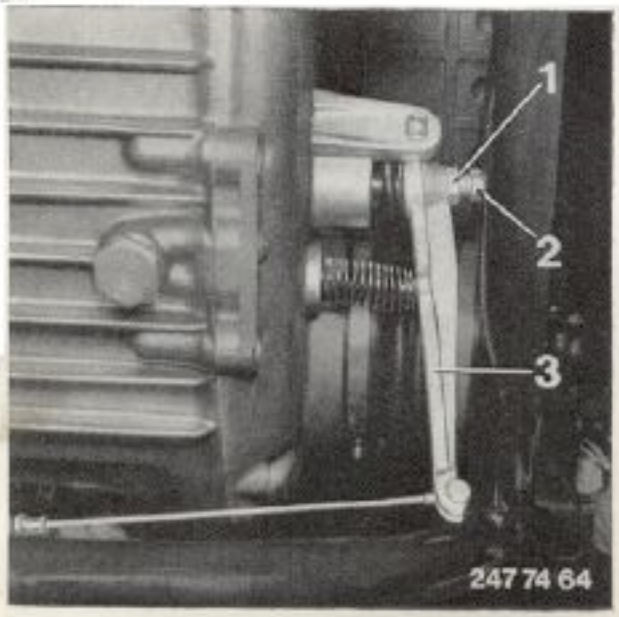

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Tightening nuts and bolts

Check that the following nuts and bolts are firmly tightened every 7500 km (5000 miles):

Location	Wrench size
1. Front and rear axle nuts	22 mm
2. Front and rear engine mounting screws	19 mm
3. Hexagon screws securing center stand to frame	17 mm
4. Carburetor hose clamps	
5. Valve rocker cover attachment 1 cap nut 2 hexagon nuts	 13 mm 10 mm
6. Rear shock absorber mounting (upper and lower)	17 mm
Check at Initial Service only:	
7. Timing chain cover to engine 9 allen head screws 3 internal hexagon nuts	 5 mm 5 mm

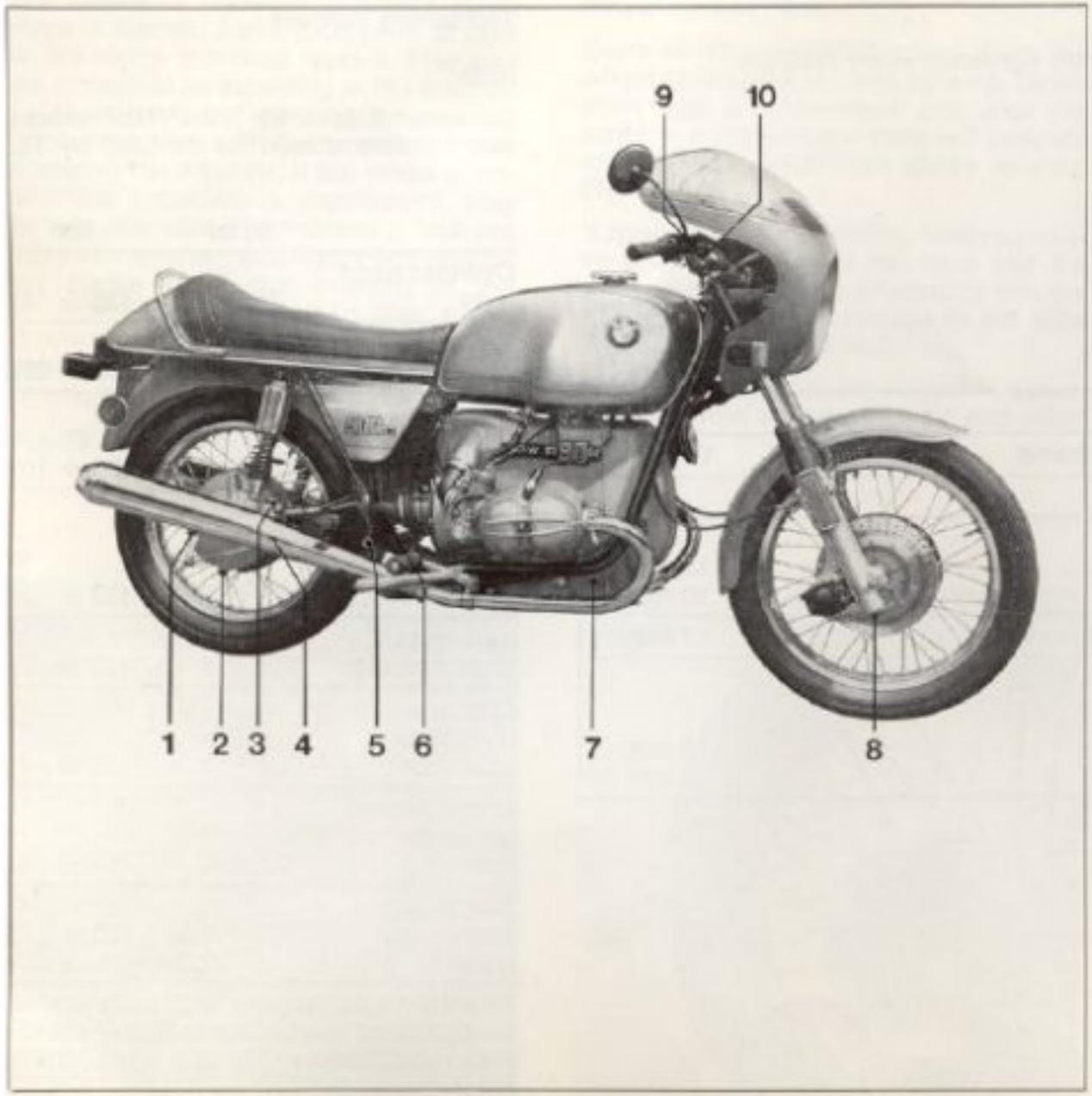
Tightening Torques

Note:

To convert to 'mkp', the 'Nm' values listed below should be devided by 10.

	ft. lb.	Nm
Cylinder head nuts	**25 + 3**	**(35 + 4)**
Finned exhaust pipe nut	**116 + 14**	**(160 + 20)**
Centering nut, telescopic fork	**87 + 7.2**	**(120 + 10)**
Hex. nut for oil drain, telescopic fork	**16.6 + 2**	**(23 + 3)**
Axle nuts, front and rear	**32.5 + 2**	**(45 + 3)**
Clamp screw for wheel axle, front	10.9 + 1.5	(15 + 2)
Clamp screw for wheel axle, rear	10.1 + 3	(14 + 4)
Swing arm bearing pin Nuts	7.2 + 1.5 72.0	(10 + 2) (100)

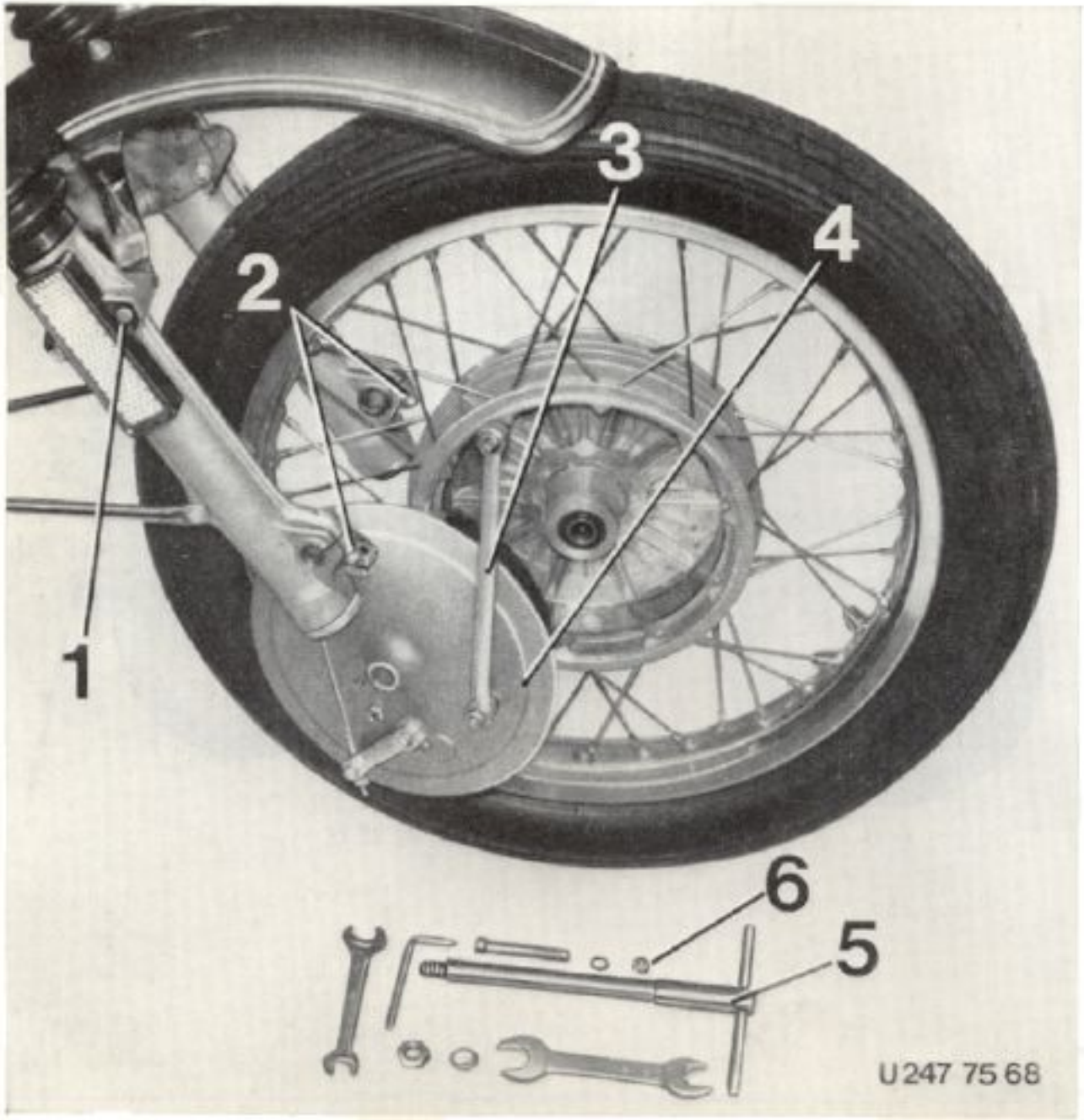
All other nuts, screws and bolts are to be tightened according to BMW standard specification 600 02.0 (see BMW repair manual).



Lubrication chart

1. Filler plug for final drive
2. Drain plug for final drive
3. Filler plug for drive shaft housing
4. Drain plug for drive shaft housing
5. Grease nipple for footbrake linkage
6. Grease nipple for swinging arm bearing
7. Full-flow oil filter
8. Oil drain plug for telescopic fork
9. Throttle cable mechanism
10. Brake lever pivot

11. Engine oil dipstick
12. Engine oil drain plug
13. Gearbox oil drain plug
14. Gearbox oil filler plug
15. Grease nipple for clutch throwout arm
16. Clutch lever pivot
17. Telescopic fork filler plug



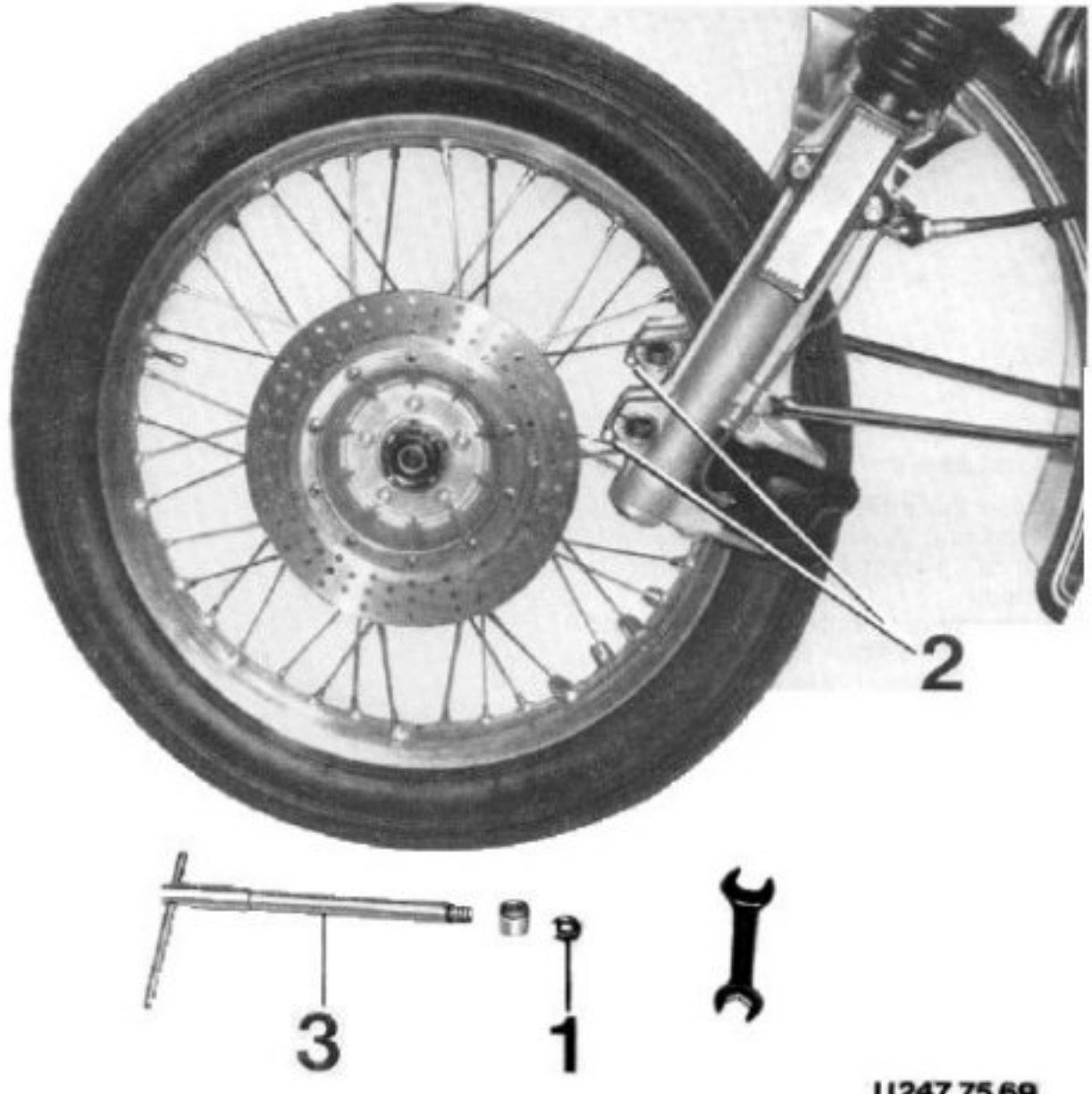
What to do if . . .

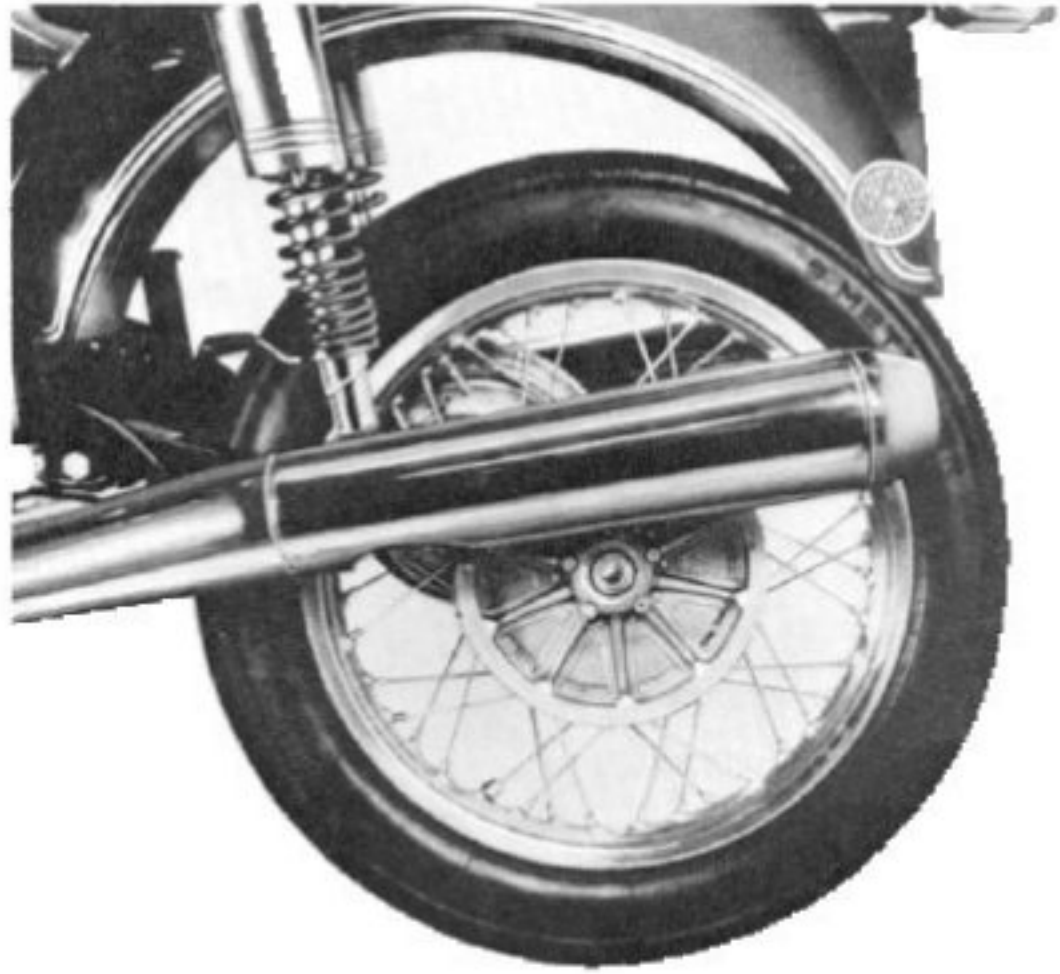
Removal and installation of front wheel (R 60/6)

1. Put the motor cycle on its center stand.
2. Remove the axle nut 7 (22 mm wrench) with washer.
3. Remove the upper stop nut 6 for the brake reaction arm 3 (13 mm wrench), holding the Allen screw 1 (6 mm Allen key) to prevent it from turning. Disconnect the brake reaction arm 3.
4. Loosen axle clamp screws 2 with a 6 mm Allen key and pull out the wheel axle with mandrel 5.
5. Pull the wheel forward slightly, lift brake back plate 4 out of the wheel hub and remove the wheel forwards.
6. Before reassembling, clean and lightly grease the axle. Before tightening axle clamp screws 2, install the brake reaction arm 3, tighten axle nut 7 and compress the telescopic forks firmly several times to prevent distortion of the fork legs. Note correct tightening torques.

Removal and installation of front wheel (R 75/6, R 90/6, R 90 S)

1. Place the motor cycle on its center stand.
2. Remove axle nut 1 (22 mm wrench) with washer.
3. Loosen axle clamp screws 2 with a 6 mm Allen key. Remove wheel axle 3 with mandrel and take out the spacing sleeve.
4. Pull the wheel out forwards.
5. Before reassembling, clean and lightly grease the wheel axle. In order to avoid resetting the self-aligning caliper, ensure that on the R 90 S (with twin disc brake) the direction of rotation of the wheel is the same as when removed. Do not tighten axle clamp screws 2 until axle nut 1 has been tightened and the telescopic fork compressed firmly several times; this will avoid distortion of the fork legs. Note correct tightening torques.





Removal and installation of rear wheel

1. Place the motor cycle on its center stand and move the rear suspension adjusting lever to the 2-up riding position.
2. Unscrew axle nut 2 (22 mm wrench) and put aside together with its washer. Loosen the clamp screw (13 mm wrench), rotate wheel axle 1 with mandrel until it passes over the sloping surface and draw out the axle.
3. Pull the wheel off towards the left swinging arm, then remove to the rear.
4. Reassemble in the reverse order. Clean and lightly greasu the axle, and rotate while inserting into the wheel hub. Tighten the clamp screw last of all. The hole through the end of the axle should again face to the rear. Move the suspension adjusting lever back to the desired setting.
   Note correct tightening torques.

U 247 74 70

Tire change

To remove a tire, deflate completely and press the tire away from the rim all round on one side. Unscrew the valve nut and press the valve into the tire. Push the tire bead into the rim well on the side opposite the safety notches, and lift over the edge of the rim on the opposite side, using 2 tire levers. Remove the inner tube and lift the second bead away from the rim in the same manner. Check condition of rim tape and renew if necessary.

Fig. 65

When fitting a new tire the inner tube and rim tape should be renewed. We recommend to use tires and tubes of the same manufacturer.

To install the tire, press the tire bead into the rim well on the side opposite the safety notches; the red point on the tire should be adjacent to the valve. Ease the tire over the edge of the rim on both sides with tire levers, making sure not to exert excessive force. To simplify mounting of the tire use a commercial sliding component.
Insert the inner tube and secure the valve with valve nut (screw on by only approx. 5 turns). Inflate the tube slightly.
Now push the second bead of the tire into the rim well on the side opposite the safety notches; while doing so, push the valve back as far as its nut will allow. Starting next to the valve, ease the second tire bead over the rim shoulder with tire levers.
Inflate the tire and check that the molded line on the tire wall is the same distance from the rim all round. Have the wheel balanced.

Fig. 66

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66

Changing bulbs, flasher unit and fuses

When changing bulbs or performing other work on the electrical system, always avoid short circuits by leaving the item of equipment concerned switched off or by disconnecting the ground lead from the negative pole on the battery.

Do not handle new bulbs with the fingers, but always use a clean cloth, paper handkerchief or similar.
Lever the **headlight rim** off with a screwdriver when replacing the bulb or headlight unit.

Detach the multi-pin plug and hinge back the spring wire clip to remove the **H 4 bulb, from the reflector.**
Fig. 67

To replace the **parking light bulb** pull the holder out of its socket. Press the bulb in and turn to the left to remove from the bulb holder.
Detach the **flasher unit** from its mounting and pull off the multi-pin plug.
The two **fuses** (8 Amp) are located on the contact plate inside the headlight.
Fig. 68

A blown fuse can be recognised by the melted metal strip. Pull the blown fuse out of the spring clips and insert a new fuse of suitable rating. Never attempt to repair blown fuses with wire or any other similar material (risk of wiring overheating and fire). If a fuse blows repeatedly, the fault should be traced and repaired by a competent workshop.

When reassembling the **headlight unit**, it should be attached to the rim of the headlight housing at the top and pressed in at the bottom after the locating clip has been inserted into its slot. Make sure that the retaining springs have engaged.

67

Telltale lights and instrument lighting

To change bulbs, remove the combined instrument as follows: unscrew the speedometer and revolution counter drive shafts and loosen the 3 hexagon retaining screws. Lift the instrument slightly, remove the Phillips screw holding the multi-pin plug, pull out the plug and lift away the instrument. After removing the outer cover and end cap, all the pin-base bulbs can be removed from their sockets.

68

Removing turn indicator and rear light bulbs

The bulbs for the front and rear turn indicators and the rear light (twin-filament bulb) can be removed from their holders by pressing in and turning to the left after the lense has been detached (2 Phillips head screws).

Fig. 69

When installing the lense glasses, make sure that the 'Top' marking on the turn indicator lenses is as the top and the transparent window for license plate lighting on the rear light glass is at the bottom.

Headlight beam setting

Check tire pressures and correct if necessary. Set the rear suspension to the position for 1-up riding. Place the motor cycle on a flat surface, 5 m (16½ ft) from a light-colored wall. The rider should sit on the machine which should not be on its stand. Measure the distance from the floor to the center line of the headlight glass and mark the same height on the wall with a cross. Mark another cross 5 cm (2 inch) below the first one. Switch on the low beam and align the headlight so that the light-dark boundary passes from the left through the center of the lower cross and rises to the right as far as the center of the upper cross before falling away.

Fig. 70

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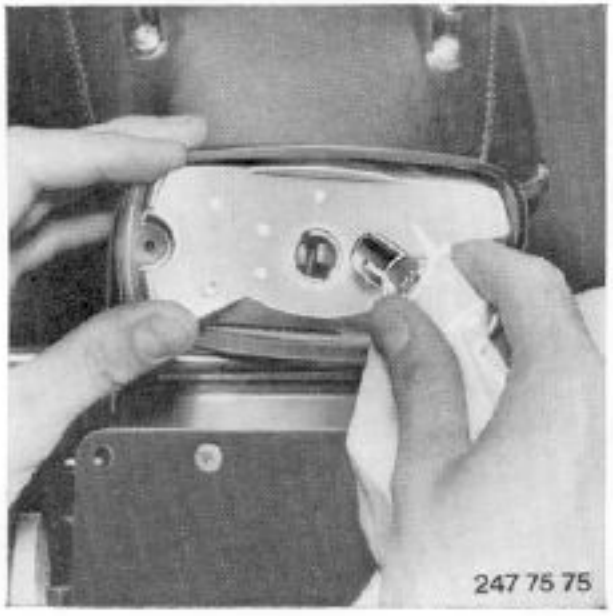

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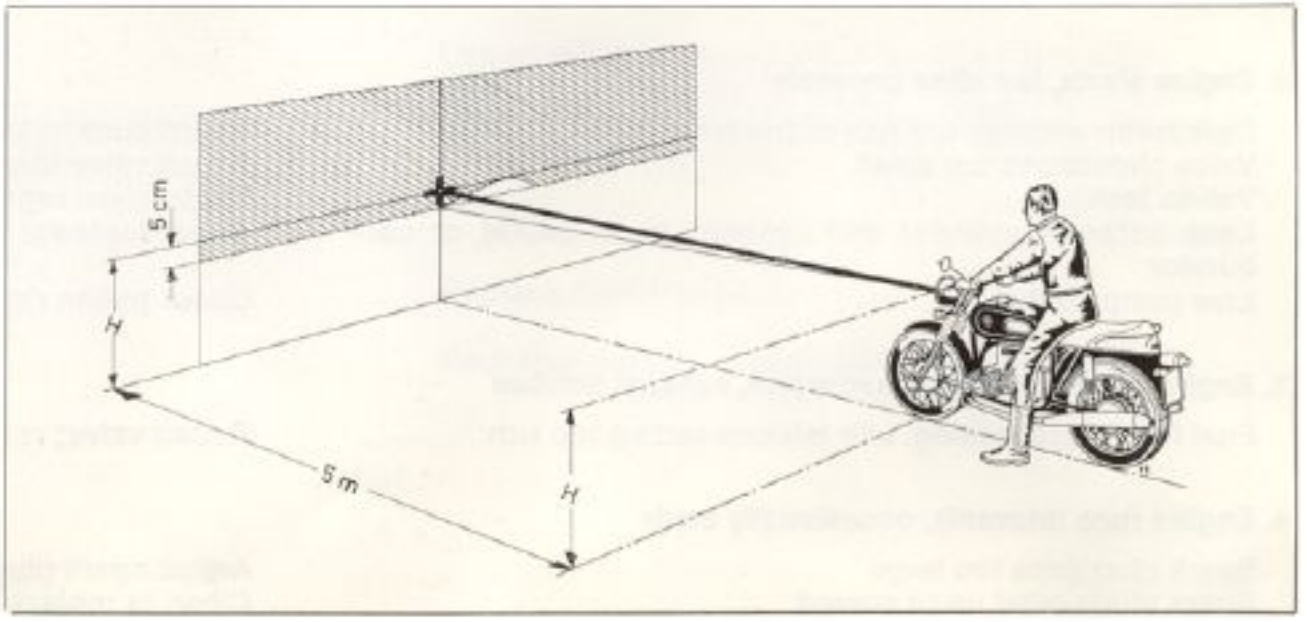


Engine defects and suggested remedies

Cause	Remedy
1. Engine will not start at all or is difficult to start	
Fuel tank empty	Add fuel to tank
Fuel tap closed	Open fuel tap
Twist grip opened too far when engine is cold	Close twist grip
Air cleaner blocked	Clean or replace air cleaner element
Fuel line leaking or blocked	Seal or blow through fuel line
Defective fuel feed valve in float housing	Repair valve
Idle jet blocked	Clean idle jet
Breaker points dirty	Clean points
Loose or defective ignition leads	Check leads, replace if necessary
Spark plugs wet – water condensate or excessive fuel	Dry spark plugs
Breaker points gap or spark plug gaps too large	Adjust to correct gap
Valve sticking open	Decarbonize valves
Dead battery	Have battery recharged in workshop. **Warning:** recharge battery only with both + and – leads removed.
2. Engine starts, but idles unevenly	
Carburetor settings too rich or too lean	Adjust carburetor settings
Valve clearances too small	Adjust valve clearances
Valves leaking	Have valves reground
Leak between cylinder and cylinder head gasket or carburetor	Check for leaks at cylinder and carburetor joints
Low compression	Check piston rings or re-bore cylinders
3. Engine idles unevenly when warm, exhaust smokes	
Fuel feed valve leaking, idle mixture setting too rich	Repair valve; readjust idle mixture settings
4. Engine runs unevenly, occasionally stalls	
Spark plug gaps too large	Adjust spark plug gaps
Spark plugs oiled up or sooted	Clean or replace spark plugs

Cause	Remedy
Ignition leads wet or defective	Dry or replace leads
Spark plug cap short-circuiting (recognizable by sooted burn marks)	Dry or replace spark plug caps
Fault in ignition system	Replace defective parts
Blocked carburetor jets	Clean jets
Blocked fuel line	Clean fuel line
Water condensate in float bowl	Clean float bowl
5. Engine overheats, runs on when ignition is switched off	
Fuel mixture too lean	Check and adjust carburetor settings, check that the correct jets are installed
Ignition timing incorrect	Check and adjust timing
Breaker points gap incorrect	Adjust breaker points gap, check ignition and retime if necessary
Engine cylinder cooling fins blocked with dirt	Clean cooling fins
Thermal rating of spark plugs too low	Use spark plugs according to specification
6. Engine pre-ignites under load	
Fuel octane rating too low	Use only brand-name fuel of the correct quality (see specifications)
Heavy oil carbon residues in combustion chambers	Remove cylinder heads and clean pistons
Ignition advanced too far	Correct ignition timing
7. Starter does not work when button is pressed	
Fault in starter button, or starter relay	Replace defective parts
Dead battery	Recharge battery, if necessary correct acid level

and in Winter?

If the motor cycle is stored for the winter period or even longer, the following steps will protect it against corrosion and harmful climatic effects:

1. Drain oil when engine is hot, clean oil mesh strainer and oil sump.
2. Add corrosion inhibiting oil up to the lower mark on the dipstick (approx. 1 liter/1.76 Imp. pts/2.1 US pts), then run the engine offload for about 1 minute. Remove the oil filter and replace the cap on the filter chamber.
   If the motor cycle is out of service for more than 6 months (up to a maximum of 3 years), drain the oil from the gearbox, drive shaft housing and final drive and add 0.4 liter (0.7 Imp. pt/0.8 US pt) of corrosion inhibiting oil to the gearbox, 0.05 liter (0.09 Imp. pt/0.1 US pt) to the drive shaft housing and 0.1 liter (0.18 Imp. pt/0.21 US pt) to the final drive. Place the machine on its stand, engage 2nd gear and run the engine at a fast idle speed for several seconds.
3. Stop the engine, unscrew the spark plugs and pour 15–20 cm^3 of upper cylinder lubricant preservative into the spark plug hole of each cylinder. Turn the engine over with the starter and move the pistons to top dead center. Screw the spark plugs back in.
4. Clean the carburetor and close the fuel taps.
5. Remove the battery and arrange with your dealer for it to be serviced and stored.
6. Wash and dry the motor cycle thoroughly. Spray the brake and clutch lever pivots and the center stand bearings with 'Caramba' or a similar lubricant.
7. Coat all polished and chromium plated steel parts with an acid-free grease, and spray the complete motor cycle with protective oil.
8. Place the motor cycle on its center stand in a dry place (a room with acid-laden air is not suitable). Support both fork ends and the rear wheel swinging arm with wooden blocks until the wheels are off the ground.

For details of corrosion inhibiting oil, upper cylinder lubricant preservative, acid-free grease and protective oil, see specifications.

Restoring the motor cycle to service

1. Drain off the corrosion inhibiting oil and add new oil in accordance with the specification. Do not forget to install the full flow engine oil filter.
2. Fill the fuel tank.
3. Replace the battery, connect the leads, tighten the nuts and grease the battery terminal posts with acid-resistant grease.
4. Clean the spark plugs, check gaps and correct if necessary. Before screwing back in, lubricate the threads lightly with graphite grease.

Technical description

Engine

The engine used in the type R 60/6, R 75/6, R 90/6 and R 90 S motor cycles is an air-cooled twin cylinder 4 cycle spark ignition unit.

The engine block takes the form of a 1-piece tunnel housing, reinforced by internal webs. It contains the crankshaft and camshaft.

The 1-piece crankshaft is a steel drop forging. Great rigidity is achieved by generously dimensioned main bearing journals and a high degree of overlap with the big-end bearing journals. The main and big-end bearing surfaces are treated for maximum surface hardness and resistance to abrasion.

The crankshaft runs in 4-layer main bearings pressed directly into the crankcase at the flywheel end and into a drop forged light alloy bearing cap at the alternator end. Careful dynamic balancing of the crankshaft ensures a minimum of vibration. The split, drop forged connecting rods run on the crankpin in 4-layer bearings, and have I-section shafts.

The big-end bolts are screwed directly into the positively located big-end bearing caps. The small-end bearing is a pressed-in bronze bushing.

The camshaft is a case hardened phosphatized die casting located below the crankshaft, and running directly in the crankcase at the rear and in a flanged aluminium bearing at the front. The rear end of the camshaft carries the inner rotor of the oil pump, and the front end the drive sprocket, the worm wheel for the revolution counter drive and the centrifugal advance cam for the distributor.

The off-center pistons are of cast aluminium alloy, with 3 piston rings; the top ring is a hard chromed spheroidal graphite ring, the second a cutaway ring and the third a double chamfer oil scraper ring. The piston pin is of ample size and of the fully floating type; it is located in the piston on both sides by spring circlips to prevent axial movement.

The cylinders are made from a combination of materials. A cast iron liner is surrounded by a light alloy finned barrel thus assuring excellent heat dissipation, keeping rubbing surface temperatures low and thus improving oil adhesion. Two pushrod outer tubes are pressed into the base of the cylinder and sealed against the engine block with rubber sleeves; they also act as oil return tubes from the cylinder head.

The cylinders are mounted on the crankcase using a combination aluminium/fiber gasket, and the cylinder head has a metal-asbestos gasket.

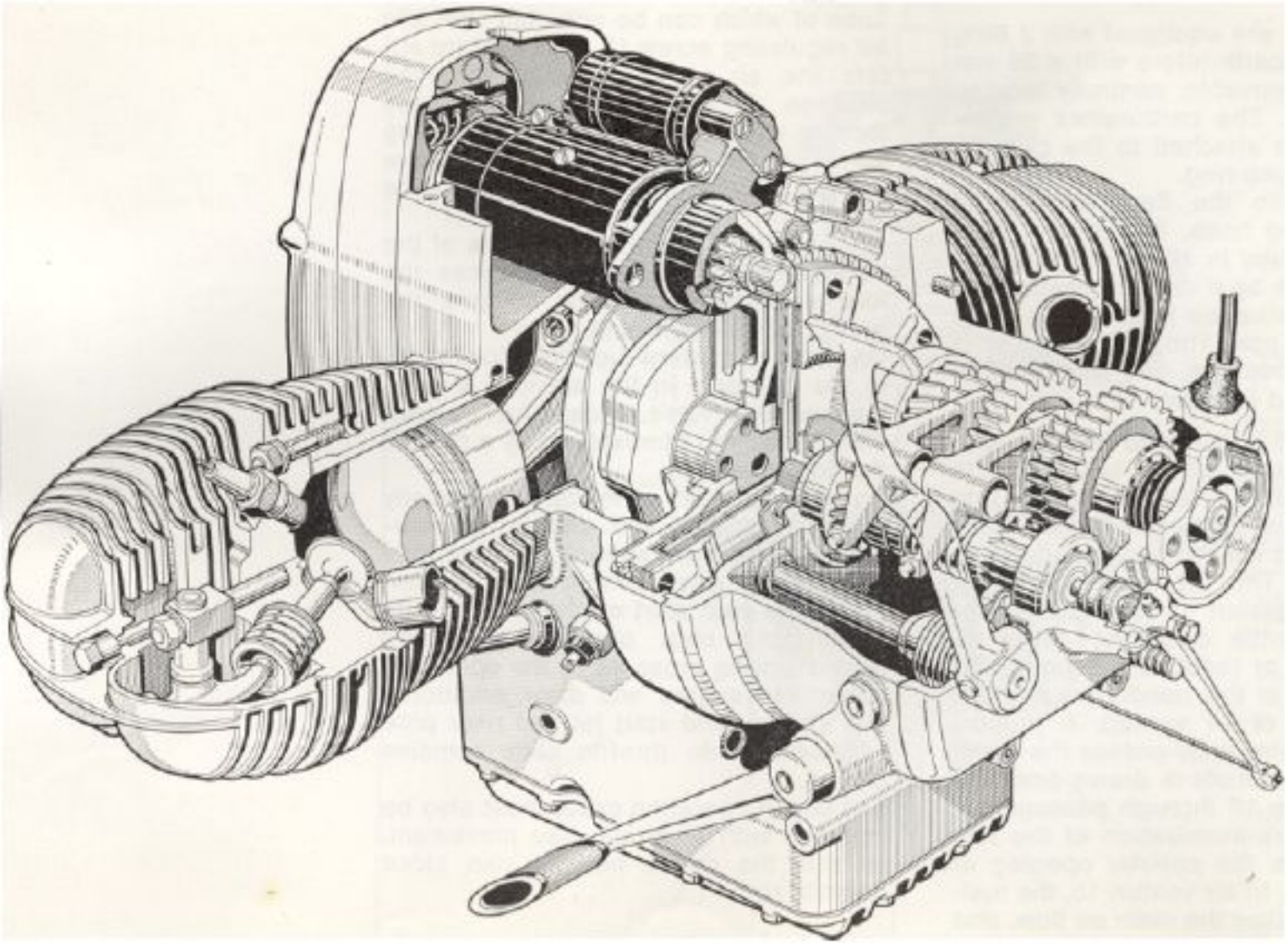
The cylinder heads are of light alloy, with carefully designed fins and shrunk-in valve seats (fine perlitic gray cast iron for the inlet valves, high alloy gray cast iron for the exhaust valves). The valve guides are press fitted.

The cylinder heads are attached to the crankcase by 4 through bolts on each side, which also locate and retain the cylinder barrels. In addition the cylinder head is secured directly to the cylinder barrel by 2 nuts. The through bolts also carry the valve rocker pivot blocks. The rockers themselves are mounted on needle roller bearings.
The use of pressed-in pushrod tubes ensures that cooling air can reach those parts of the cylinder head which are subject to the highest thermal loadings, thus maintaining temperatures at a satisfactorily low level.
The valves are operated from the camshaft by hardened cast tuppets, pushrods and rockers. The camshaft is driven at half engine speed by a duplex chain. Any stretching of the duplex chain is compensated for by a chain tensioner operated by a leaf spring.
The pushrods are manufactured from austenitic tube with approximately the same coefficient of expansion as the cylinder barrels; this prevents alterations in valve operating clearances.
The exhaust valves consist of a highly heat conductive ferritic stem and a high alloy austenitic, scale resistant head; in addition the valve stems are hard chromium plated and the valve seat is armoured. The keeper arrangement permits the valves to rotate during operation.

Lubricating system

The engine employs a high pressure recirculating lubricating system with a full flow oil filter. The lubricating oil pump is an Eaton trochoid gear type pump driven from the camshaft. It draws oil form the oil pan through an immersed dome with perforated metal screen, pumps it through the main lubricating passage to the full flow oil filter and from there to an annular passage in the camshaft bearing flange to the oil gallery in the main bearing cap.
From the annular gallery in the bearing cap the oil first passes through a hole in the left sidewall of the engine block to the rear main bearing, and in addition through 2 upward sloping passages in either crankcase sidewall to the upper tie rod bolts. The holes for the upper cylinder tie rod bolts are used to convey oil to the rocker pedestals and shafts, and thus to lubricate the rocker bearings and other timing gear components.
From the left and right sloping oilways already mentioned, inclined passages lead to the ring grooves in the cylinder liners, from which point the cylinder walls are lubricated.
The connecting rods are lubricated through passages in the crankshaft, using oil drawn from the anular groove, in the front or rear main bearing bushing. The rear camshaft bearing is lubricated by oil leak from the oil pump.
The timing chain dips in the oil sump and has a supplementary lubrication by the oil of the front crankshaft bearing and the excess oil of the pressure relief valve.

Crankcase ventilation is obtained by drawing fumes against the direction of crankshaft rotation through a settling chamber, in which the oil mist is deposited, to a check valve. From this point the fumes are re-introduced into the combustion air intake.



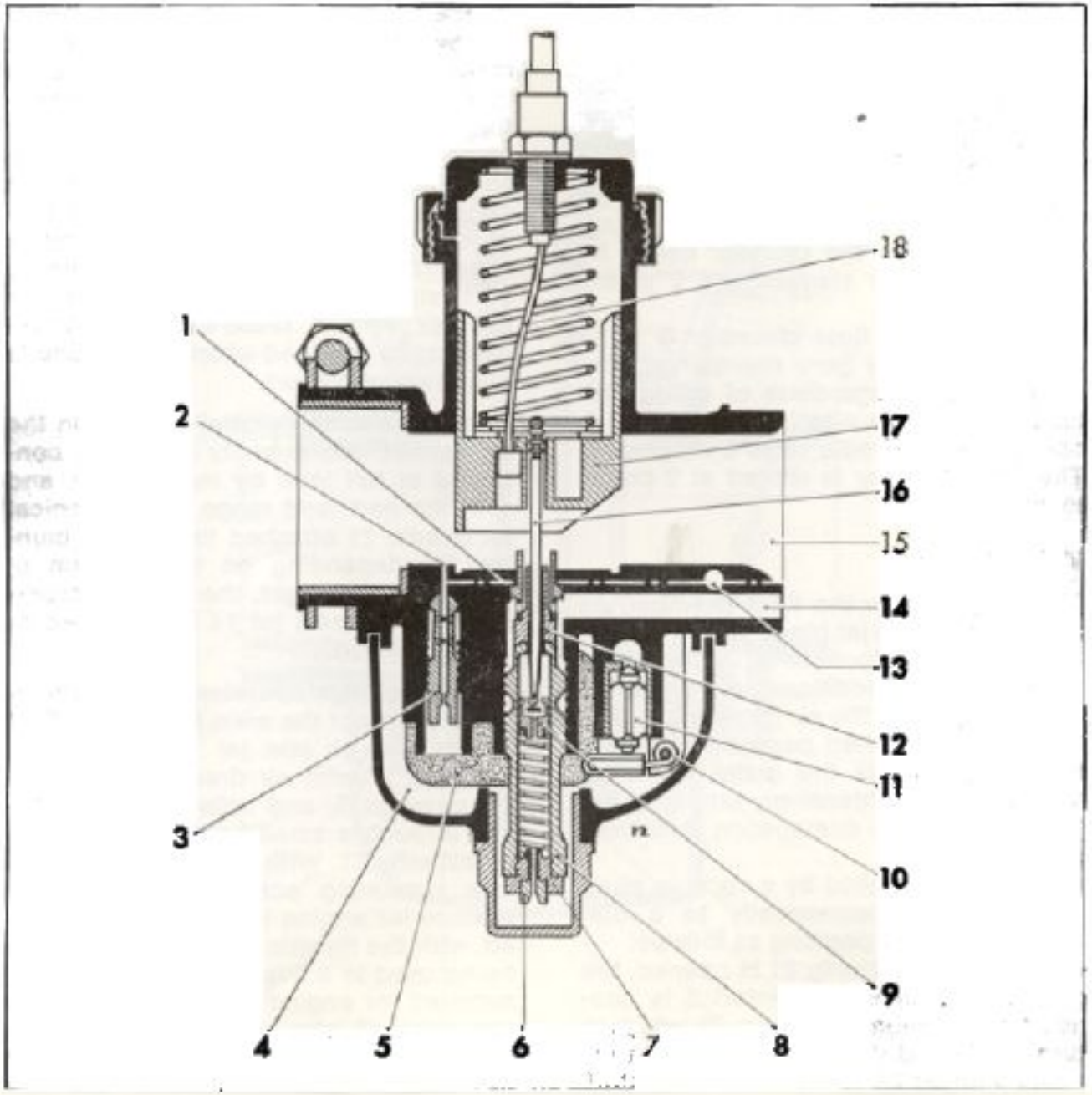
Carburetors

Slide type carburetor — type R 60/6

R 60/6 models are equipped with 2 Bing plunger slide carburetors with a 26 mm throat and removable, centrally located float chamber. The carburetors are inclined and are attached to the cylinder heads by a clamp ring.
Fuel flows into the **float chamber** 4 through a feed hose, the correct level being maintained in all driving attitudes of the machine by a double plastic float 5, which operates the float needle valve 11 via a pivot pen. The float chamber is vented to atmosphere, and supplies fuel to the main and idle jets.

The main jet 6 is screwed into the lower end of mixing tube 8 together with main jet block 7. Needle jet 12, into which a conical jet needle 16 is inserted, is mounted on the upper end of the mixing tube. The jet needle together with plunger piston 17 is raised or lowered by throttle operating cable 18. This enlarges or reduces the fuel outlet cross-section at the needle jet and the cross-section of air venturi. A proportion of the intake air by-passes the needle jet: this air supply is drawn from the air intake pipe 15 through passage 14; and causes pre-atomisation of the fuel emerging from the annular opening of the needle jet. In air venturi 15, the fuel-air mixture strikes the main air flow, and a further intensive atomising process takes place before the mixture passes into the cylinder combustion chamber.

Fuel drawn in from the float chamber through **idle jet** 3 is mixed with air emerging from idle air passage 1, the volume of which can be adjusted with idle air regulating screw 13. This mixture enters the air venturi through a small passage 2 immediately behind the throttle slide. If the idle air regulating screw is screwed fully in, a rich mixture will be obtained; if screwed out, the mixture will be weakened.
Idle speed is regulated by means of the **throttle slide stop screw,** whereas the idle air regulating screw governs the fuel-air mixture strength.
On order to prevent fuel from flowing into the cylinders in the event of a leaking fuel feed valve, excess fuel is conducted away to atmosphere by a pipe in the float chamber.
To provide a richer mixture, especially when starting a cold engine, the carburetor contains a second, considerably smaller and more simple slide system; this is the **cold start or choke unit**. If its slide (cold start plunger) is raised against spring pressure by the operating cable, the engine will draw additional fuel via the cold start jet and riser pipe while the main throttle slide remains closed.
The choke operating cable must also be installed with adequate free movement, so that the choke plunger can close completely.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Constant depression carburetors — types R 75/6, R 90/6

The R 75/6 and R 90/6 models are equipped with 2 Bing constant depression carburetors of 32 mm throat diameter, using a throttle butterfly and removable, centrally located float chamber. These carburetors are inclined and flexibly mounted on the cylinder heads by means of rubber sleeves and 2 clamp straps.
Fuel enters the float chamber 8 via a feed hose and is here maintained at a constant level regardless of riding attitude by a double plastic float 13, which operates float needle valve 9 via pivot 7. The float chamber is vented at 2 points to atmosphere.

Main jet system

Fuel passes from the float chamber via main jet 10, main jet block 12 and needle jet 14 to pre-atomiser 4, where it is pre-mixed with additional air drawn in via passage 6 on the air intake pipe. The fuel-air mixture then passes to air venturi 3 and strikes the main intake air flow, where it is intensively atomised before entering the combustion chambers on the engine.
Air flow is controlled by a vacuum plunger 20 linked permanently to a diaphragm 22, and operating as follows:
When throttle butterfly 21 is opened, the partial vacuum in air venturi 3 is connected to vacuum chambers 23, which in turn are linked via 2 passages 19 in vacuum plunger 20 to the main air venturi. Space 1 below diaphragm 22 is connected by passage 2 directly with the intake manifold; for this reason pressure at this point is higher than in the air venturi. Diaphragm 22 now raises vacuum plunger 20 sufficiently to restore pressure below the vacuum plunger to the original value (constant depression carburetor system). Any change in engine speed or throttle butterfly opening is thus related to a given plunger position and air venturi cross-section, corresponding to the load which the engine is called upon to exert.

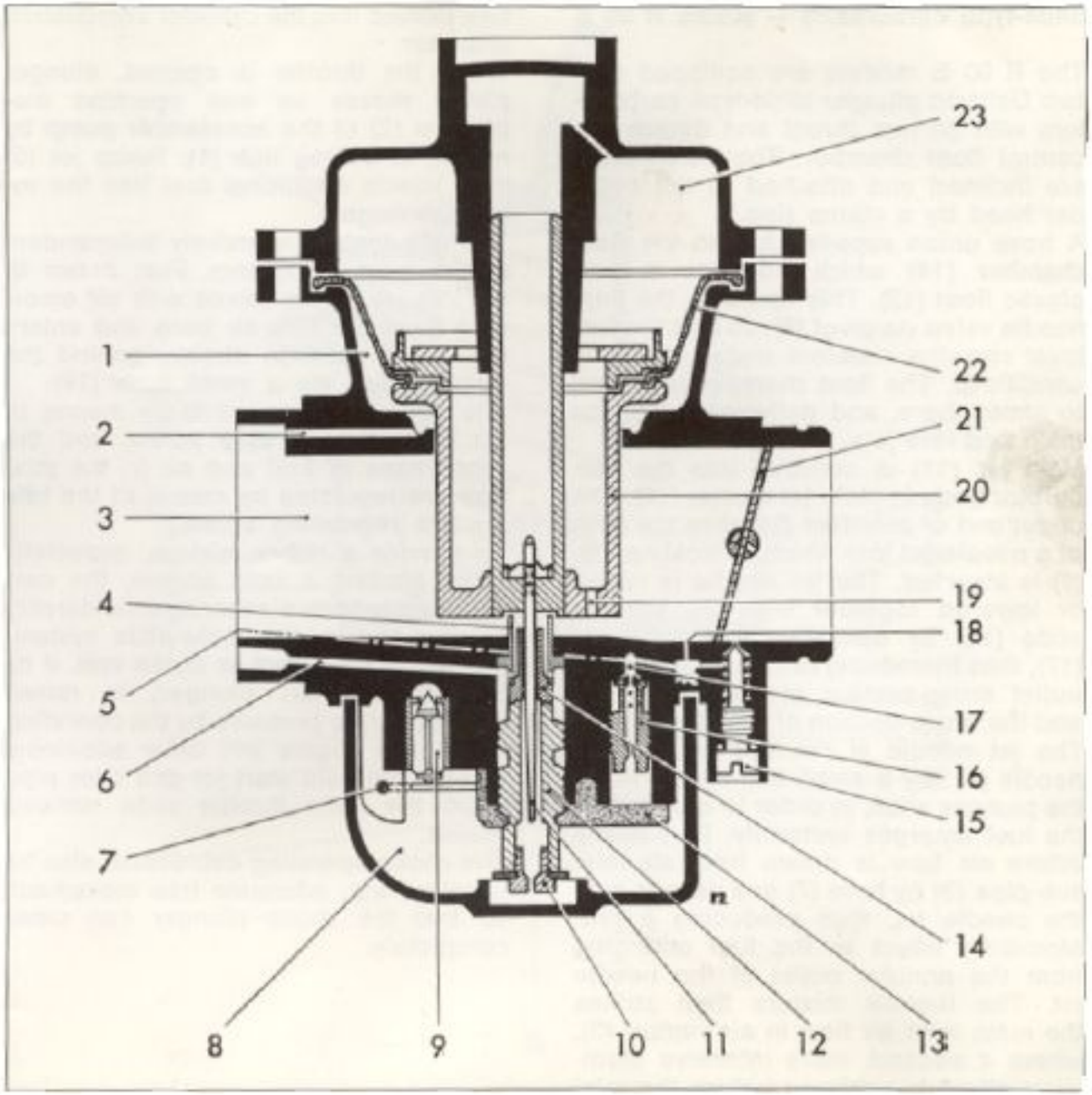
In addition to the partial vacuum in the air venturi, the quantity of fuel is controlled at full load by main jet 10, and over the part load range by the conical jet needle 11 attached to vacuum plunger 20; depending on the position of the vacuum plunger, the annular cross-section of needle jet 14 is increased or reduced.

The idle system operates completely independently of the main jet system. Fuel drawn through idle jet 16 is mixed in chamber 17 with air drawn in from idle air passage 5, and enters the air venturi through a small hole behind throttle butterfly 21. With the aid of idle mixture regulating screw 15 the correct mixture for engine idling can be obtained, with the throttle butterfly stop screw being used to adjust the quantity of fuel supplied for engine idling. Two by-pass passages 18 also convey fuel-air mixture to the air venturi. This is intended to improve the transition from the idle jet to the main jet system. They act only when throttle butterfly 21 has been opened slightly.

The **cold-start device** on the throttle butterfly type carburetor is an independent rotary valve unit, which operates only during starting and while the engine is still cold. It can be engaged and cancelled by the rider, and is cable operated. Inside the float chamber a space is provided as a cold-start fuel reservoir, with a cold start immersed tube entering from above. The partial vacuum developed during starting acts on the outlet aperture of the cold start system behind the throttle butterfly since the throttle butterfly is almost closed (idle position). In this way, the vacuum also acts on the immersed cold start tube, and fuel in the cold start reservoir space is drawn into the mixing area of the rotary valve housing together with additional fuel supplied from the float chamber as the initial supply is consumed. In the mixing chamber the fuel is converted to an emulsion with the aid of a cold-start air supply entering through a calibrated hole. This extremely rich starting emulsion is then conveyed to the air flow entering through the throttle butterfly gap and forms the starting mixture supply in the air venturi. This process ensures reliable starting even at very low temperatures.

When the engine has started, an initial emulsion is formed by means of a calibrated air hole in the cold start immersed tube, and the starting mixture is in

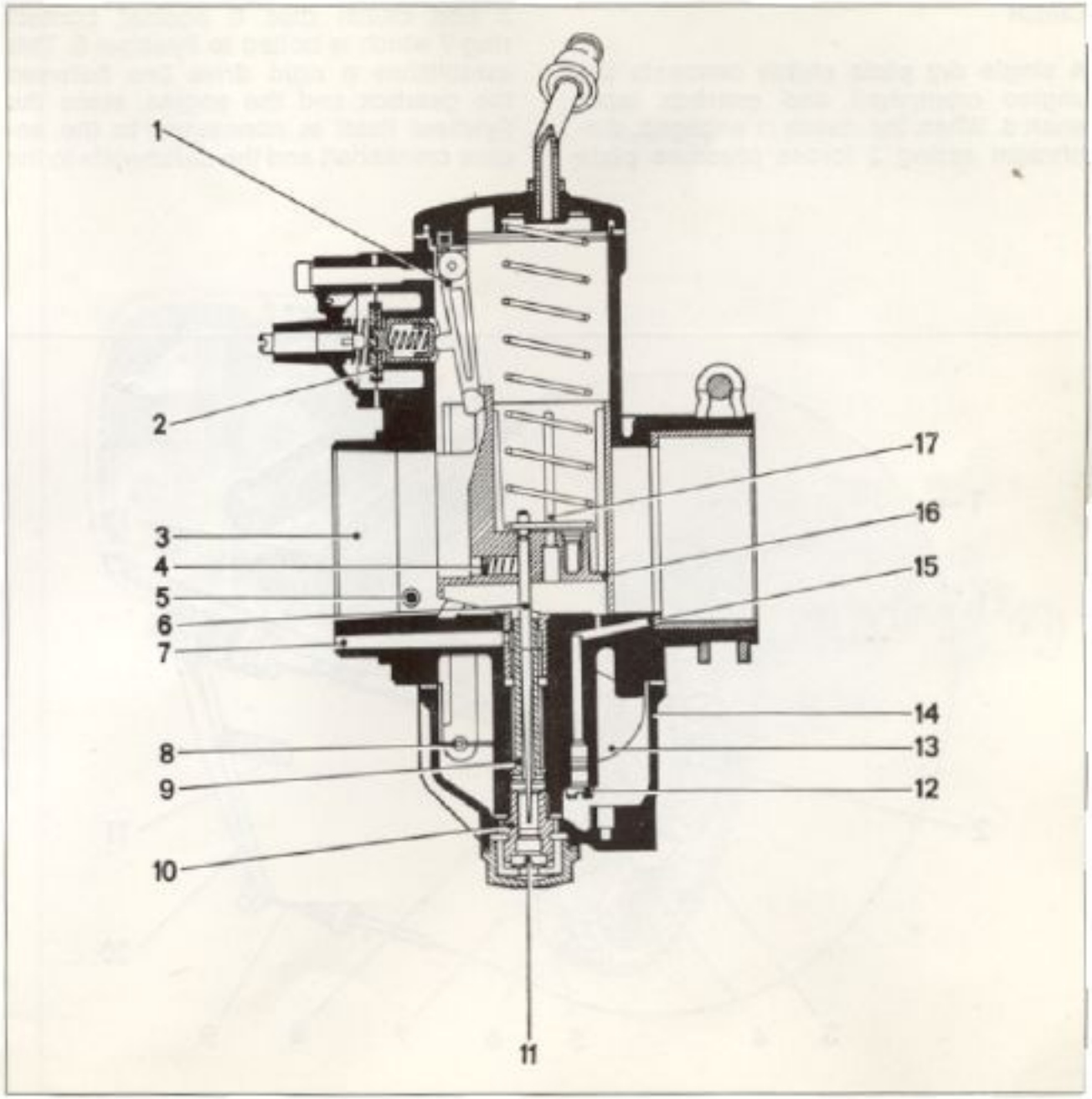
this way weakened so that the engine continues to run smoothly during the intitial riding period.
The cold-start system should be disengaged as soon as possible, in order to prevent excessive fuel consumption and the oil film on the cylinder walls from being washed off.



Slide-type carburetors — Model R 90 S

The R 90 S models are equipped with two Dellorto plunger slide-type carburetors with 38 mm throat and detachable central float chamber. The carburetors are inclined and attached to the cylinder head by a clamp ring.
A hose union supplies fuel to the **float chamber (14)** which contains a twin plastic float (13). This operates the float needle valve via pivot (8), so that the fuel level remains constant under all riding conditions. The float chamber is vented to atmosphere, and delivers fuel to the main and idle jets.
Main jet (11) is screwed into the carburetor body in main jet carrier (10). The upper end of atomiser (9) takes the form of a needle jet into which conical needle (6) is inserted. The jet needle is raised or lowered together with the plunger slide (16) by operating throttle cable (17), thus increasing or reducing the fuel outlet cross-section in the needle jet and the cross-section of the air venturi.
The jet needle is pressed against the needle jet by a small coil spring (4) in the plunger slide, in order to ensure that the fuel emerges uniformly. Part of the intake air flow is drawn from air inlet sub-pipe (3) by bore (7) and passes over the needle jet, thus producing a pre-atomising effect in the fuel emerging from the annular outlet of the needle jet. The fuel-air mixture then strikes the main inlet air flow in air venturi (3), where a second, more intensive atomising effect is achieved before the mixture passes into the cylinder combustion chamber.
When the throttle is opened, plunger piston moves up and operates diaphragm (2) of the **accelerator pump** by means of a drag link (1). Pump jet (5) then injects additional fuel into the intake passage.
The **idle system** is entirely independent of the main jet system. Fuel drawn in via idle jet (12) is mixed with air emerging from the idle air bore and enters the intake passage directly behind the throttle slide via a small bore (15).
Idle speed adjustment is by means of the **throttle slide stop screw,** and the proportions of fuel and air in the mixture are regulated by means of the **idle mixture regulating screw.**
To provide a richer mixture, especially when starting a cold engine, the carburetor contains a second, considerably smaller and more simple slide system; this is the **cold start or choke unit.** If its slide (cold start plunger) is raised against spring pressure by the operating cable, the engine will draw additional fuel via the cold start jet and riser pipe while the main throttle slide remains closed.
The choke operating cable must also be installed with adequate free movement, so that the choke plunger can close completely.

The carburetors are adjusted before leaving the factory to suit standard commercial fuel. Changes to jets or needle settings will be necessary only in exceptional circumstances and should be carried out by a specialist workshop.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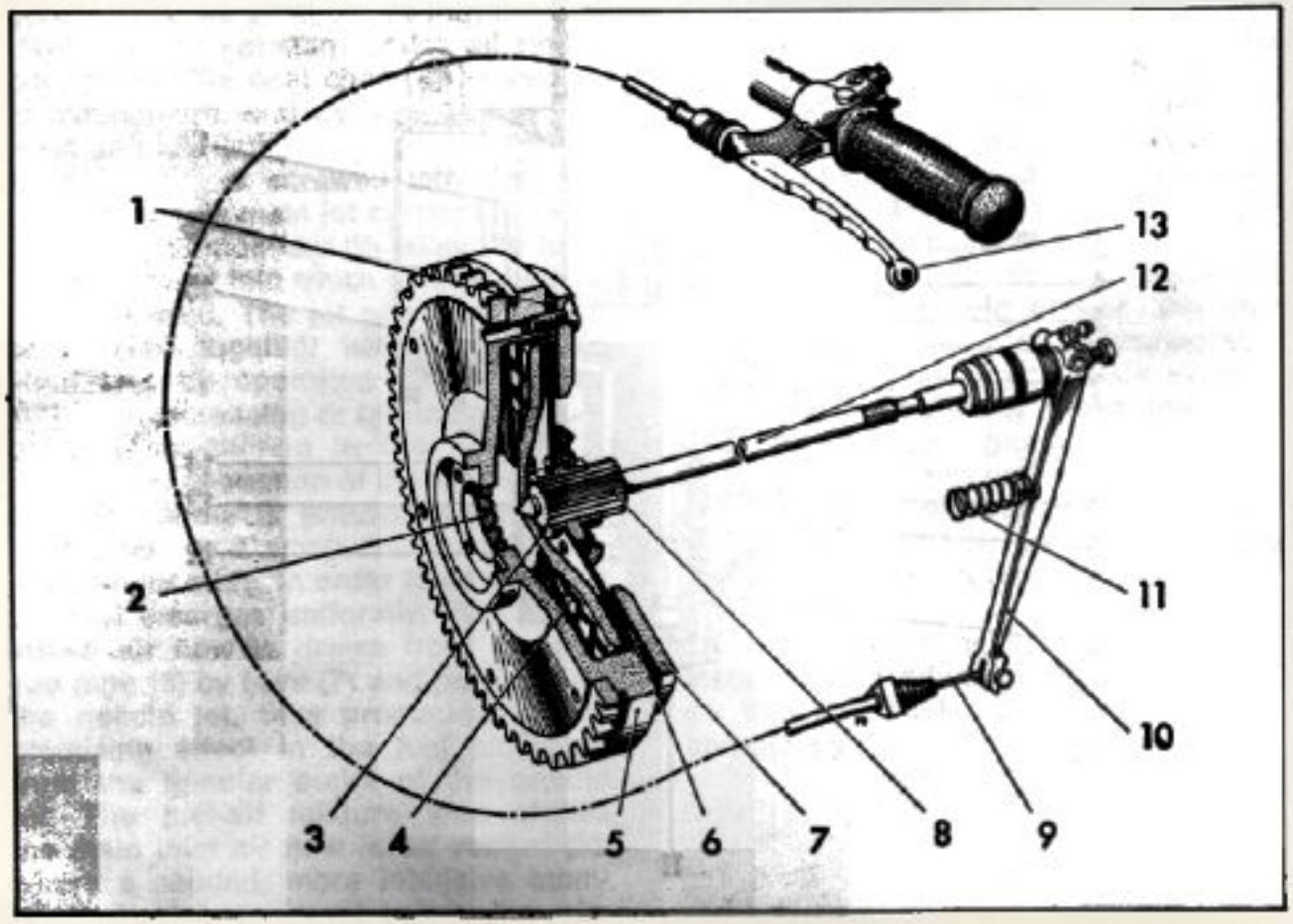
Clutch

A single dry plate clutch connects the engine crankshaft and gearbox input shaft 8. When the clutch is engaged, diaphragm spring 2 forces pressure plate 3 and clutch disc 6 against contact ring 7 which is bolted to flywheel 5. This establishes a rigid drive line between the gearbox and the engine, since the flywheel itself is connected to the engine crankshaft and the clutchplate to the gearbox input shaft. A diaphragm 4 is spot welded to the pressure plate 3 between the flywheel and the contact ring. This diaphragm permits axial movement of the pressure plate and transmits part of the engine torque.

The clutch plate has a bonded friction lining and is mounted on the splines of the gearbox input shaft in such a way as to permit axial movement. Slots are provided between flywheel 5 and contact ring 7, through which dust from the clutch linings can escape; this also assists in keeping the clutch plate cool.

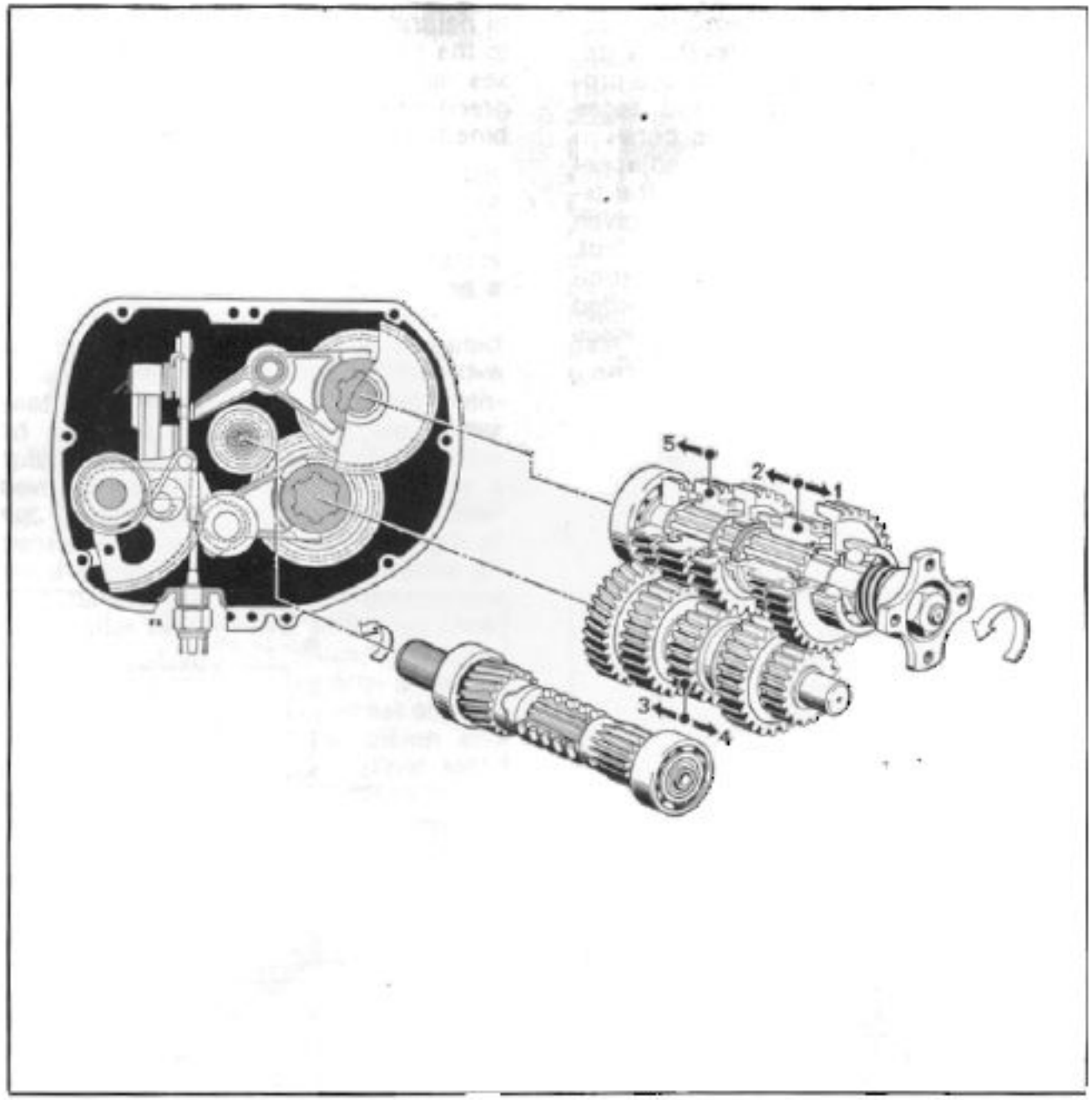
To disengage the engine from the transmission, clutch throwout arm 10 is operated by cable from the clutch lever on the handlebar, and compresses diaphragm spring 2 by means of thrust rod 12 acting on pressure plate 3. This discontinues the friction drive between clutch plate 6 and contact ring 7, and interrupts the drive line from the engine to the gearbox.

The clutch throwout arm pivots on a mounting cast into the gearbox cover. When the clutch lever is released, spring 11 forces the throwout arm back to its initial position.



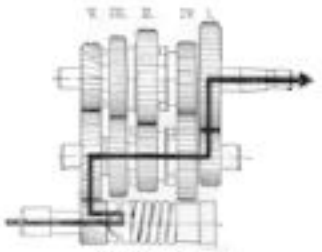
Gearbox

The five-speed gearbox is mounted at the rear of the crankcase to form a single unit. It enables the overall drive ratio to be varied in such a way that the engine can operate under favourable load conditions at all road speeds. The gearbox primarily consists of the input shaft, layshaft and output shaft – all three running in generously dimensioned ball bearings at front and rear – together with the shift mechanism.
The hollow drilled input shaft, in which the clutch thrust rod is located, carries the input pinion at the front. This can be tilted very slightly on the shaft by a spring loaded cam, which absorbs and reduces input shocks from the power unit. The layshaft and output shaft each have 5 paired helical gear wheels in constant mesh.
Gears are selected by pressing down or lifting up the foot shift lever.
When the gearshift lever is moved, a hooked lever rotates 2 cam discs; actuating journals on the 3 selector forks are located in slots stamped in the shift cams, and respond to the degree of movement of the cams.

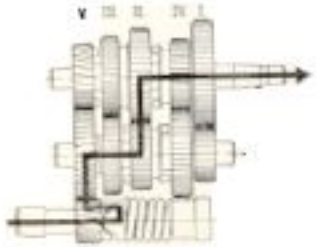


The selector forks in turn move the gear pinions on the output and layshafts (taper shafts). These gear pinions are provided with dogs on their end faces which engage in the recesses between corresponding dogs on the adjacent free-running pinion. In this way, the pinion for the gear selected at any given moment is coupled rigidly to the shaft. The various shift positions are determined by a spring-loaded lever provided with a roller which engages in recesses on the periphery of one selector disc.

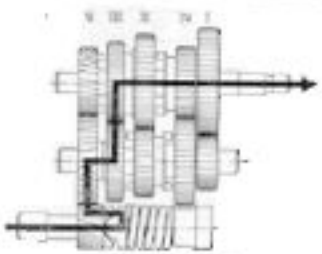
In neutral, a contact switch screwed in to the base of the gearbox housing closes an electric circuit and causes a green neutral indicator light in the combined instrument to come on.



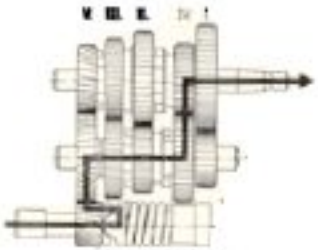
1st gear



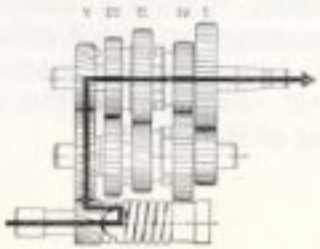
2nd gear



3rd gear



4th gear



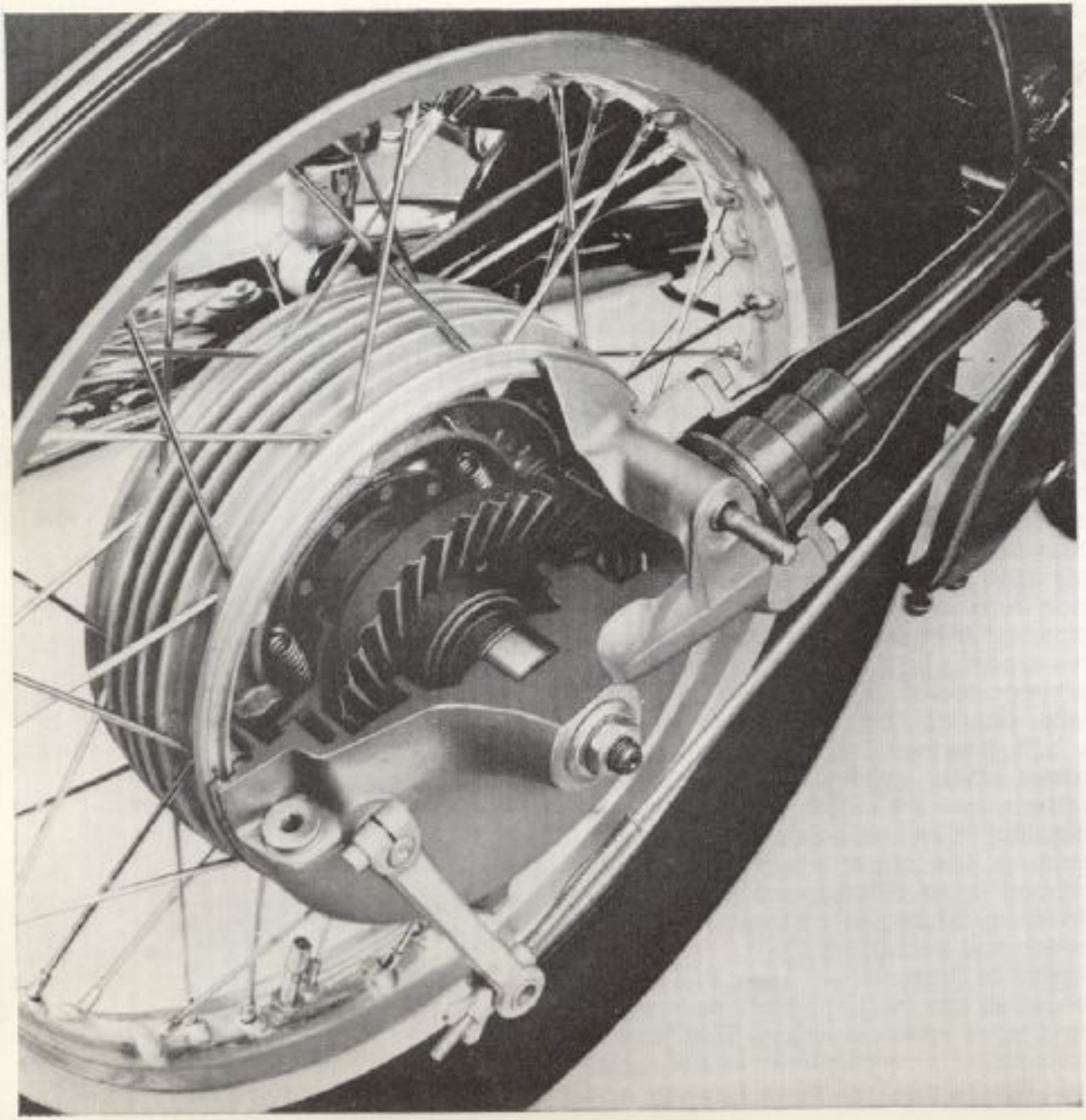
5th gear

Frame

The twin loop tubular frame is manufactured from welded oval section tube of high strength. The cradle tubes cross over the backbone tube just behind the steering head. This provides a degree of longitudinal elasticity at the steering head without affecting the very high torsional rigidity. In addition, the fuel tank center tunnel can be kept very shallow.
The rear section of the frame, a very light triangulated structure, is bolted to the double loop main frame and can easily be removed. The **passenger footrests** can be folded up, and are adjustable to obtain the most comfortable position.
The engine is mounted in the frame by 2 through bolts which also connect the two lower cradle members of the frame.
The fuel tank is mounted at the front on a specially shaped rubber element and at the rear on 2 rubber-metal blocks. In this way, stresses are eliminated and the tank can easily be taken off by removing two wing nuts.
2 fuel taps are screwed directly into the tank and equipped with 2 fuel feed tubes each. The longer tube is in each case designed to trap a reserve supply of approx. 2 liters (0.65 US gal.) in the tank. Fuel level in each half of the tank is kept constant by means of an equalizer line passing through the air cleaner chamber, which acts when both fuel taps are open.
For parking the motor cycle a center stand and a side prop are provided. The frame is not suitable for the attachment of a **side car.**

Rear wheel drive

The rear wheel is driven by a cardan shaft running in an oilbath in the right rear swinging arm. The universal joint on the gearbox end of the drive shaft is bolted to a drive flange mounted on a taper on the gearbox output shaft. An internally splined coupling is mounted on another taper at the rear of the drive shaft, and engages with a helical toothed coupling mounted on the taper splined shaft of the rear wheel drive bevel pinion, and retained axially by a nut. This helical toothed coupling compensates for variations in the length of the drive shaft. The rear wheel drive pinion runs at the front in a double-row taper roller bearing with split inner race; the crown wheel with which it engages is supported on the outside by a needle roller bearing and on the wheel side by a ball bearing. The bevel pinion and crown wheel employ the Palloid tooth pattern, and are carefully broken in and installed to ensure completely noiseless running. The crown wheel is partly immersed in an oilbath, and transfers lubricating oil by this means to the bevel pinion and bearings.
Power is transmitted from the crown wheel to the motor cycle's rear wheel by a taper spline coupling. This form of connection simplifies rear wheel removal. The rear wheel drive housing and the housing cover are manufactured from a high-strength light alloy, and are bolted together to form an oil tight seal. The final drive is vented by way of a labyrinth in a dome cast onto the top of the housing. In order to prevent possible oil leakages through the radial seal ring in the housing cover from reaching the brake linings, excess oil is directed away through a hole next to the oil plug on the final drive housing, and leading to atmosphere. The final drive gear ratio depends on the size of engine installed (see specifications).



Telescopic front fork

The fork stem of the telescopic front fork turns on 2 taper roller bearings in the steering head of the frame, thus ensuring free movement, absence of play and freedom from maintenance. The steel upper fork bridge and forged aluminium lower fork bridge connect the fork guide tube rigidly to the 2 hard chromium-plated heat treated steel fixed fork tubes. A shock absorber nozzle is screwed into the lower end of each fixed fork tube. Aluminium sliding fork tubes are installed over each fixed fork tube, and the bottom screws on these are connected with a damper tube which moves inside the shock absorber nozzle on the fixed fork tube. Fork damping on extension is thus provided by the change in the annular damper nozzle section in each fork, whereas calibrated holes in the damper tube provide telescopic fork damping on compression. An important part is played in this process by the damper chamber located between the hydraulic piston screwed on to the shock absorber tube and the damper nozzle. The damper valve attached below the hydraulic piston closes the damper chamber off on extension of the forks, so that the oil is forced to flow through the damper nozzle. On compression, the damper chamber is opened again, so that the oil can escape via the calibrated holes in the damper tube and return from the spring chamber to the damper chamber. Since the outer diameter of the damper tube expands conically at each end, the damper nozzle provides a hydraulic limit stop at the extreme upper and lower positions of the fork.

A ball valve attached at the lower end of the damper tube prevents the sliding fork tubes from jamming if the fork extends beyond the hydraulic limit stop.

A progressive rate coil spring in each fixed fork tube is supported on a fixed spring plate at the top and rests on the hydraulic piston at the bottom.

The 2 sliding fork tubes are connected by a robust reinforcement hoop to provide the necessary torsional rigidity and support the mudguard. The turning angle of the front fork is 42° in either direction.

Rear wheel suspension

The rear wheel is held in a long, comfortably sprung swinging arm, supported on the main frame by adjustable taper roller bearings designed to operate without play. This type of mounting ensures that the rear wheel can be aligned with the front wheel to close limits.

Road shocks are absorbed and damped by 2 spring damper units mounted by means of silentblock bushings to the rear section of the frame at the top, and to the final drive housing and swinging arm at the bottom.

A progressive rate coil spring in each unit is supported at the top by the outer tube and al the bottom by the adjusting sleeve. The lower spring unit connecting lugs are welded to the outer tubes of the hydraulic shock absorbers, but the upper lugs are screwed to the shock absorber piston rod.

The limit stop for compression movement of the suspension is formed by a double taper rubber buffer between the upper spring unit mounting lug and the shock absorber. The limit stop for extension movement of the suspension is provided by a plastic buffer within the double-acting hydraulic shock absorber.

Pre-load of the progressive rate coil springs can be adjusted to 3 positions with the aid of an adjusting sleeve attached to each spring unit and acting on a cam.

Hydraulic steering damper

A 3-position adjustable hydraulic steering damper ensures that the handlebars always remain steady while the machine is moving. The rear of the damper cylinder is pivot-mounted to the main frame, and the piston rod attached to the fork at a point outside its axis of rotation, so that the damper is extended and retracted as the steering is turned. The cylinder is filled with shock absorber fluid to slow down movement of the piston and thus of the telescopic fork. The more rapid the movement of the forks, the more powerful the retarding effect of the damper.
The hydraulic damper can be disconnected by turning the adjusting grip anticlockwise to the O position. This brings the pivot point of the piston rod into line with the axis of rotation of the fork, so that the piston rod is no longer extended or retracted as the steering is turned.

Dual seat

The dual seat hinges up at one side and can be locked with the same key used for the steering lock. The removable tool box and tire inflator are kept beneath the dual seat. In addition, the R 90 S has an additional storage compartment for goggles and gloves at the rear of the dual seat.
The dual seat is not separately sprung, so as not to interfere with the carefully balanced, long-travel front and rear suspension. Instead, it is provided with thick foam-rubber padding.

Road wheels

The road wheels employ light-alloy safety well base rims of a pattern designed to prevent the tire form flying off in the event of rapid deflation. Each rim is connected to the wheel hub by 40 straight spokes. Each wheel runs on 2 accurately pre-set, adjustable taper roller bearings providing free running without axial play. The bearings employ multi-lip special shaft sealing rings to keep out dust and water.

Brakes

Front wheel brake — R 60/6

Both front and rear wheels are equipped with large area ribbed light-alloy full width brake drums with cast-in gray cast iron rings.
The front wheel brake is of the two leading shoe type, in which each of the brake shoes is applied to the drum by its own brake lever. The two brake levers are moved apart by a single cable, so that they are applied with equal force regardless of the effort exerted by the rider. Return springs of differing strength ensure that the 2 brake shoes can be adjusted to give uniform results.

Front wheel brake — R 75/6, R 90/6, R 90 S

The front brake used on the R 75/6 and R 90/6 models is of the single disc type, and that used on the R 90 S of the twin disc type. It is possible for either the R 75/6 or R 90/6 to be equipped subsequently with the twin disc brake unit. The master brake cylinder and right sliding telescopic fork tube must be exchanged and certain additional components installed.
The disc brake employs a swinging caliper which is operated hydraulically via a distributor block and brake pipes. Disc diameter is 260 mm (10.37 inch).
The brake master cylinder with contact switch for the brake fluid level indicator is mounted under the fuel tank on the frame and operated by cable.

Rear wheel brake — R 60/6, R 75/6, R 90/6 and R 90 S

The rear wheel is equipped with a leading and trailing shoe drum brake operated by a linkage from the brake pedal. The brake linings are bonded to the shoes and consist of a material with a coefficient of friction which does not decrease with heat.

All brake levers are aluminium forgings.
When either the front or rear brake is applied, a switch illuminates the stop light in the rear light unit.

Electrical system

The electrical system consists of an alternator 3 driven from the crankshaft, a centrifugal spark advance unit with contact breaker 4, driven from the camshaft, a diode board 1 mounted above the alternator, the ignition condensor 2 and the electrical components housed beneath the tank: starter relay 5, voltage regulator 6, starter 7 and 2 ignition coils 8; in addition, the battery is located beneath the tool box, and 2 spark plugs together with the lighting, signal and monitor equipment complete the electrical system.

Figs. 71 and 72

The alternator consists of a claw-pole rotor running in the stator housing and mounted on a taper at the front end of the crankshaft. Exciter current is supplied to the alternator by 2 sliprings. The cast front stator ring carries the carbon brush holder with 2 plug connections. Opposite this is a plug board with 3 connections for 3-phase current takeoff. The alternator begins to deliver current at a fast idle speed, so that ample power is available even if a very high load is placed on the battery. The current flowing through the **battery charge indicator light** ist used for pre-excitation of the alternator; if the electrical system is operating correctly the charge indicator light should go out as engine speed reaches a fast idle.

The diodes on diode board 1 rectify the 3-phase current produced by the alternator.
The voltage regulator 6 is of the mechanical contact type, and is attached to the frame backbone below the fuel tank.
The centrifugal ignition advance mechanism advances the spark as engine speed increases.
The contact breaker interrupts the primary current circuit in the coils at a given moment on each engine revolution. This induces a high voltage (8500 to 13 000 V) in the secondary winding of the **coils,** so that the spark plugs can ignite the fuel-air mixture.

The ignition condenser is primarily intended to reduce sparking and erosion at the breaker points.
The starter consists of a series-wound motor with starter pinion and engaging system.
The gearbox and clutch-operated switch prevent the starter from being accidentally operated if a gear is selected and the clutch not disengaged.
The 12-volt starter battery of 25 Amp/hour capacity is mounted on a flexible battery tray. It is required for starting the engine and also supplies the energy consumed by the electrical system when the engine is idling or at a standstill.

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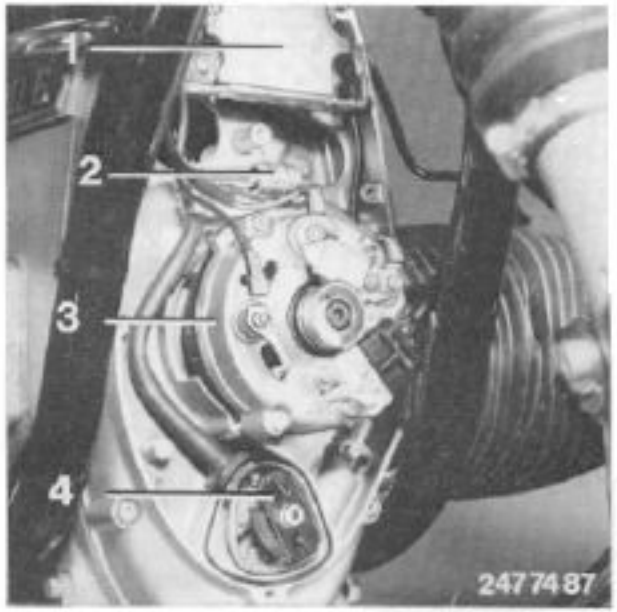

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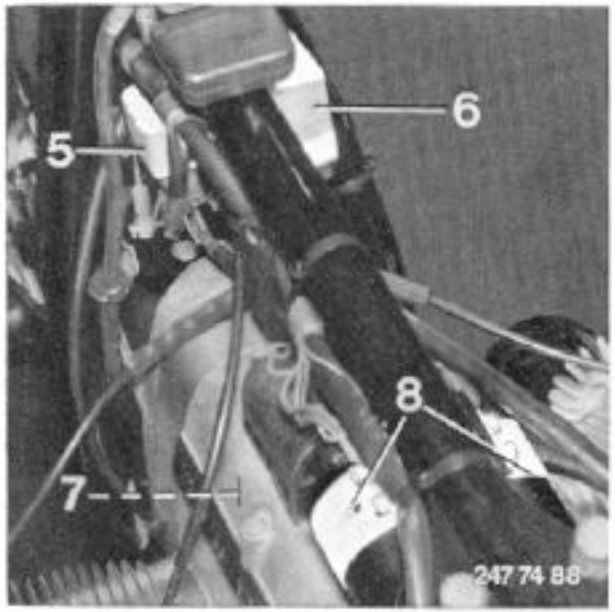


Specifications

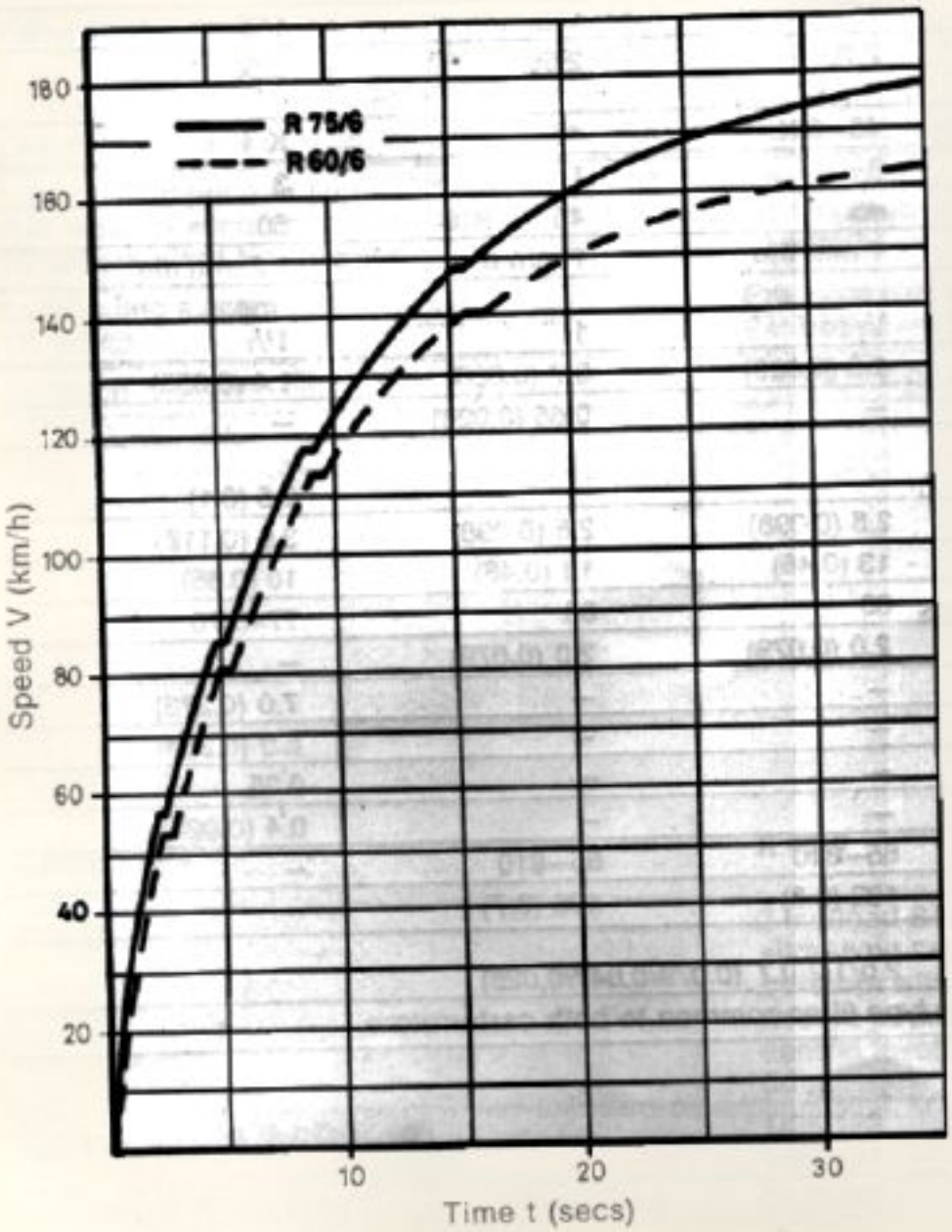
Engine		R 60/6	R 75/6	R 90/6	R 90 S
		Horizontally opposed 4-cycle, with overhead valves in hemispherical combustion chambers.			
Max. permissible engine speed	rev/min	7000	7000	7000	7300
Max. continuous engine speed	rev/min	6500	6500	6500	7000
Idle speed	rev/min	600–800	600–800	600–800	600–800
Max. engine speed during break-in period					
up to 1000 km (600 miles)	rev/min	4000	4000	4000	4000
up to 2000 km (1200 miles)	rev/min	5000	5000	5000	5000
Mean piston speed m/sec (ft/min) at	rev/min	15.1 (2972) at 6400	14.6 (2874) at 6200	15.3 (3012) at 6500	16.5 (3248) at 7000
No. of cylinders		2	2	2	2
Cylinder arrangement			horizontally opposed		
Cylinder bore	mm (inch)	73.5 (2.894)	82 (3.228)	90 (3.543)	90 (3.543)
Piston stroke	mm (inch)	70.6 (2.780)	70.6 (2.780)	70.6 (2.780)	70.6 (2.780)
Effective displacement	cm³ (inch³)	599 (36.55)	745 (45.46)	898 (54.80)	898 (54.80)
Capacity for tax purposes	cm³ (inch³)	595 (36.31)	740 (45.16)	892 (53.52)	892 (53.52)
Compression ratio		9.2 : 1	9.0 : 1	9.0 : 1	9.5 : 1
Breaker dwell angle			78 ± 1°		
Valve timing at 2 mm (0.08 inch) valve clearance (Tolerance ± 2.5°)					
Inlet opens		TDC		10° before TDC	
Inlet closes		40° after BDC		50° after BDC	
Exhaust opens		40° before BDC		50° before BDC	
Exhaust closes		TDC		10° after TDC	

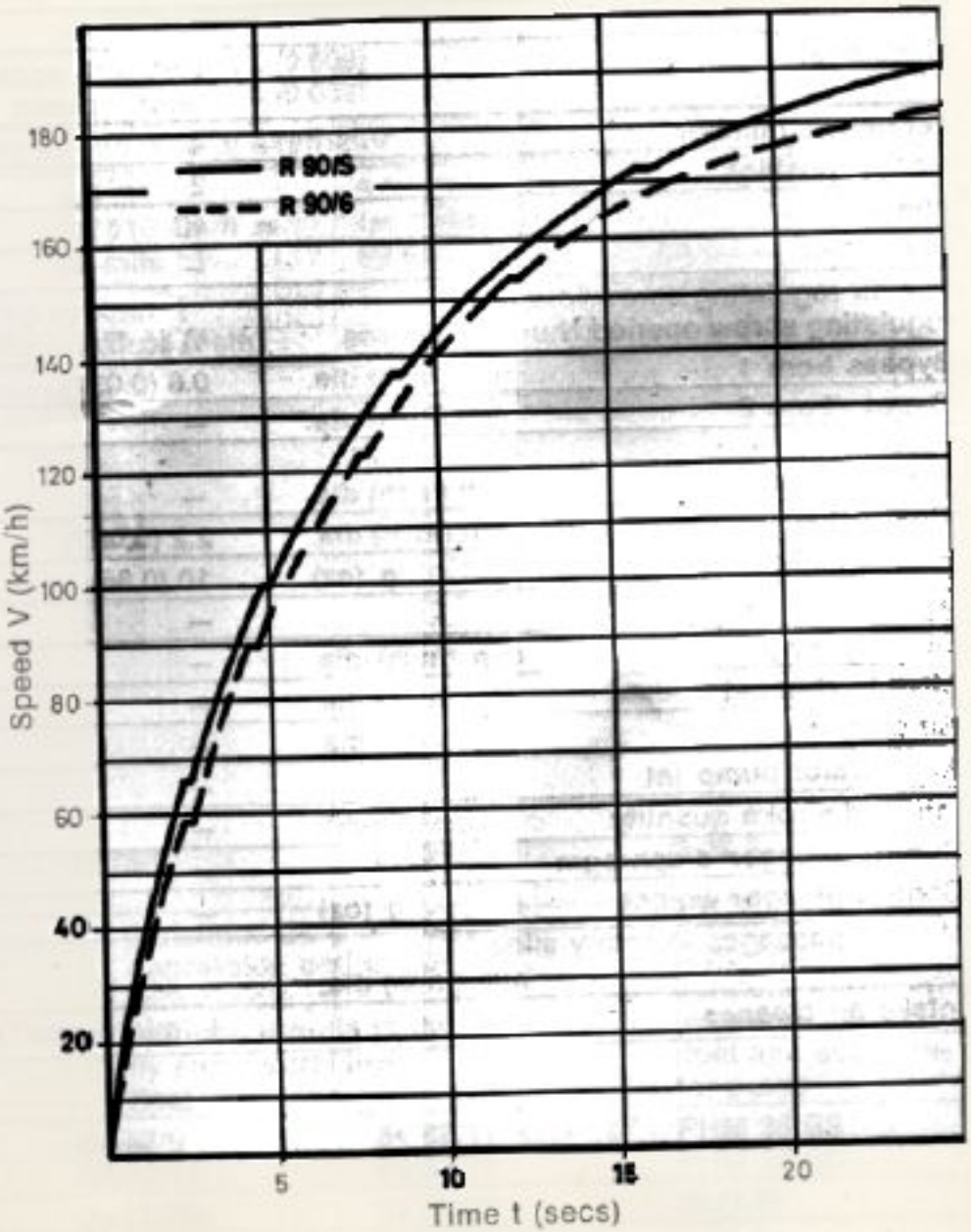
Engine	R 60/6	R 75/6	R 90/6	R 90 S
	0.15 (0.006) 0.20 (0.008)			
	clockwise, looking at end face of alternator			
	5.5 (42.3) (at 110 km/h = 69 mile/h)	4.5 (52.3) (at 110 km/h = 69 mile/h)	5.0 (47.3) (at 110 km/h = 69 mile/h)	5.0 (47.3) (at 110 km/h = 69 mile/h)
	Pressure wet sump system Eaton system (hypotrochoid teeth)			
	On engine oil filler pipe			

Carburetors	R 60/6	R 75/6	R 90/6	R 90 S
Design	2 inclined Bing slide-type carburetors with needle jet and central lever float	2 inclined Bing constant depression carburetors with needle jet, vacuum plunger, throttle butterfly and central lever float		2 inclined Dellorto slide-type carburetors with needle jet, central lever float and accelerator pump
Carburetor type number, left right	1/26/123 1/26/124	64/32/9 64/32/10	64/32/11 64/32/12	PHM 38 BS PHM 38 BD
Carburetor throat dia. mm (inch)	26 (1.02)	32 (1.26)	32 (1.26)	38 (1.5)

Carburetors		R 60/6	R 75/6	R 90/6	R 90 S
Main jet		140	135	150	155
Needle jet		2.68 with accelerator pump	2.70	2.68	2.60
Jet needle number		4	46–241	46–241	K 4
Needle position		2	3	1	3
Idle jet		40	45	45	60
Idle air jet		–	1 mm dia.	1 mm dia.	1.2 mm dia.
Idle air regulating screw/idle mixture regulating screw opened Number of turns		¼ to 1¼	½ to 1	1	1½
Bypass bore 1	mm (inch) dia.	0.8 (0.031)	1.0 (0.039)	0.7 (0.028)	1.4 (0.055)
Bypass bore 2	mm (inch) dia.	–	–	0.65 (0.026)	–
Float chamber					
ventilating bore	mm (inch) dia			–	2.5 (0.1)
Float valve	mm (inch) dia.	2.2 (0.087)	2.5 (0.098)	2.5 (0.098)	3.0 (0.118)
Float weight	g (oz)	10 (0.35)	13 (0.46)	13 (0.46)	10 (0.35)
Starting jet		–	60	60	7746/70
Starting air jet	mm (inch) dia.	–	2.0 (0.079)	2.0 (0.079)	–
Mixture channel	mm (inch) dia.	–	–	–	7.0 (0.273)
Air channel	mm (inch) dia.	–	–	–	6.0 (0.234)
Accelerator pump jet		–	–	–	0.35
Injected stroke quantity	cm³ (inch³)	–	–	–	0.4 (0.024)
Control plunger diaphragm		–	65–810	65–810	–
Control plunger weight	g (oz)	–	102 (3.6)	106 (3.7)	–
Mixture passages in rotary slide	mm (inch) dia.	–	2.0/1.2/0.7 (0.079/0.047/0.028)		
Intake air cleaner		1 "micro-star" dry type filter common to both carburetors			

Acceleration through gears





Transmission	**R 60/6**	**R 75/6**	**R 90/6**	**R 90 S**
Clutch	**Single dry plate, with diaphragm spring**			
	5-speed gearbox with claw-type shift, flange mounted to engine. Shock damping of drive torque in all gears, hooked lever shift.			
Gearbox ratios	**1st gear**	**4.4 : 1**		
	2nd gear	**2.86 : 1**		
	3rd gear	**2.07 : 1**		
	4th gear	**1.67 : 1**		
	5th gear	1.50 : 1		
Transmission from gearbox to rearwheel	Enclosed cardan shaft in right swinging arm, universal joint at gearbox end, helical splined coupling at final drive end.			
Final drive	Palloid pattern crown wheel and pinion.			
Final drive ratio	1 : 3.36	1 : 3.2	1 : 3.09	1 : 3.0
No. of teeth	11/37	10/32	11/34	11/33

Frame	R 60/6	R 75/6	R 90/6	R 90 S
	Duplex steel tube cradle frame, manufactured from welded oval section tube, with bolted-on rear section; not suitable for sidecar attachment.			
Suspension, front wheel	Telescopic fork with large capacity double-acting hydraulic shock absorbers, 200 mm (7,9 inch) travel.			
rear wheel	Swinging arm with 3-position spring struts and double-acting hydraulic shock absorbers, 125 mm (4.9 inch) travel.			
Max. steering lock	42°			
mm (inch)				

Brakes	Full width light alloy hubs with cast-in perlitic cast iron rings	Front: hydraulic disc brakes with swinging caliper Rear: full width light alloy hubs with cast-in perlitic cast iron rings		
Front wheel	2 leading shoe brake	Single disc brake	Single disc brake	Twin disc brake
Rear wheel	Leading and trailing shoe brake			
	200 mm (7.9 inch) 260 mm (10.2 inch)			
cm² (inch²)	Front 214 (33.2) Rear 214 (33.2)	40 (6.2) 214 (33.2)	40 (6.2) 214 (33.2)	80 (12.4) 214 (33.2)
Rims, front rear	1.85 B x 19 2.15 B x 18			
Tires, front rear	3.25 S 19 4.00 S 18		3.25 H 19 4.00 H 18	
Max. tire imbalance, measured at inside dia. of rim corresponding to cmp g (oz)	170 8–9 (0.28–0.32)			
Location of manufacturer's plate Location of frame number	at front of steering head on right of steering head			

Frame

Tire pressures in atm (lb/in²), up to 80 mph	
front wheel solo	**1.9 (27)**
with passenger	**2.1 (30)**
rear wheel, solo	**1.8 (25)**
with passenger	**2.1 (30)**
Increase pressures when tires are hot by up to 0.3 atm (4 lb/in²)	

When driving at maximum speed for lengthy periods, it is best to increase tire pressures by 0.2 atm (3 lb/in²).

Exhaust system

Muffler diameter	**mm (inch)**	**87 (3.4)**
Exhaust pipe diameter	**mm (inch)**	**38 x 1.5 (1.5 x 0.05)**

Fuels and lubricants

Fuel		**Super (premium), min. octane number 98 (RM)**			
Tank capacity	**liters (US gals.)**	**18 (4.8)**	**18 (4.8)**	**18 (4.8)**	**24 (6.3)**
including reserve	**liters (US gals.)**	**2.0 (0.53)**	**2.0 (0.53)**	**2.0 (0.53)**	**2.0 (0.53)**
Engine oil		**Brand-name HD spark ignition engine oil**			
for outside temperatures					
mostly above	**+30° C (86° F)**	**SAE 40, SAE 20 W 50**			
all the year round above	**0° C (32° F)**	**SAE 20 W 40, SAE 20 W 50**			
mostly below	**0° C (32° F)**	**SAE 10 W 30, SAE 10 W 40, SAE 10 W 50**			

Fuels and lubricants		R 60/6	R 75/6	R 90/6	R 90 S
	liters (US pts)		2 (4.2)		
	liters (US pts)		2.25 (4.7)		
		0.8 (1.7)	Brand-name Hypoid gear oil	above 5° C (41° F) SAE 90	below 5° C (41° F) SAE 80
	liters (US pts)	0.15 (0.32)			
	liters (US pts)	0.25 (0.53)			
		Shell 4001 shock absorber oil, Shell Aero Fluid 4, Castrol DB Hydraulic Fluid, Castrol Shock Absorber 1–318, BP Aero Hydraulic 1			
Capacity per fork leg	liters (US pts)	0.28 (0.59)			
Breaker felt lubricating pad and centrifugal advance mechanism		Bosch Ft 1 v 4 grease			
Centrifugal advance pivot shaft		Bosch Ft 1 v 26 grease			
Brake pressure studs on master cylinder		Molykote BR 2			
Wheel bearings and all other greasing points		Brand-name multi-purpose grease with 180° C (356° F) drip point			
Corrosion inhibiting oil		SAE 20 engine corrosion inhibiting oil			
		Upper cylinder preservative for 4-cycle spark ignition engines			
		Corrosion inhibiting grease			
		External vehicle bodywork preservative, must not attack paintwork, rubber components or plastics and must be easy to remove.			

Brake fluid		R 60/6	R 75/6	R 90/6	R 90 S
		DOT No. 3 disc brake fluid			
	liters (US pts)	–	0.15 (0.32)	0.15 (0.32)	0.20 (0.42)

Dimensions

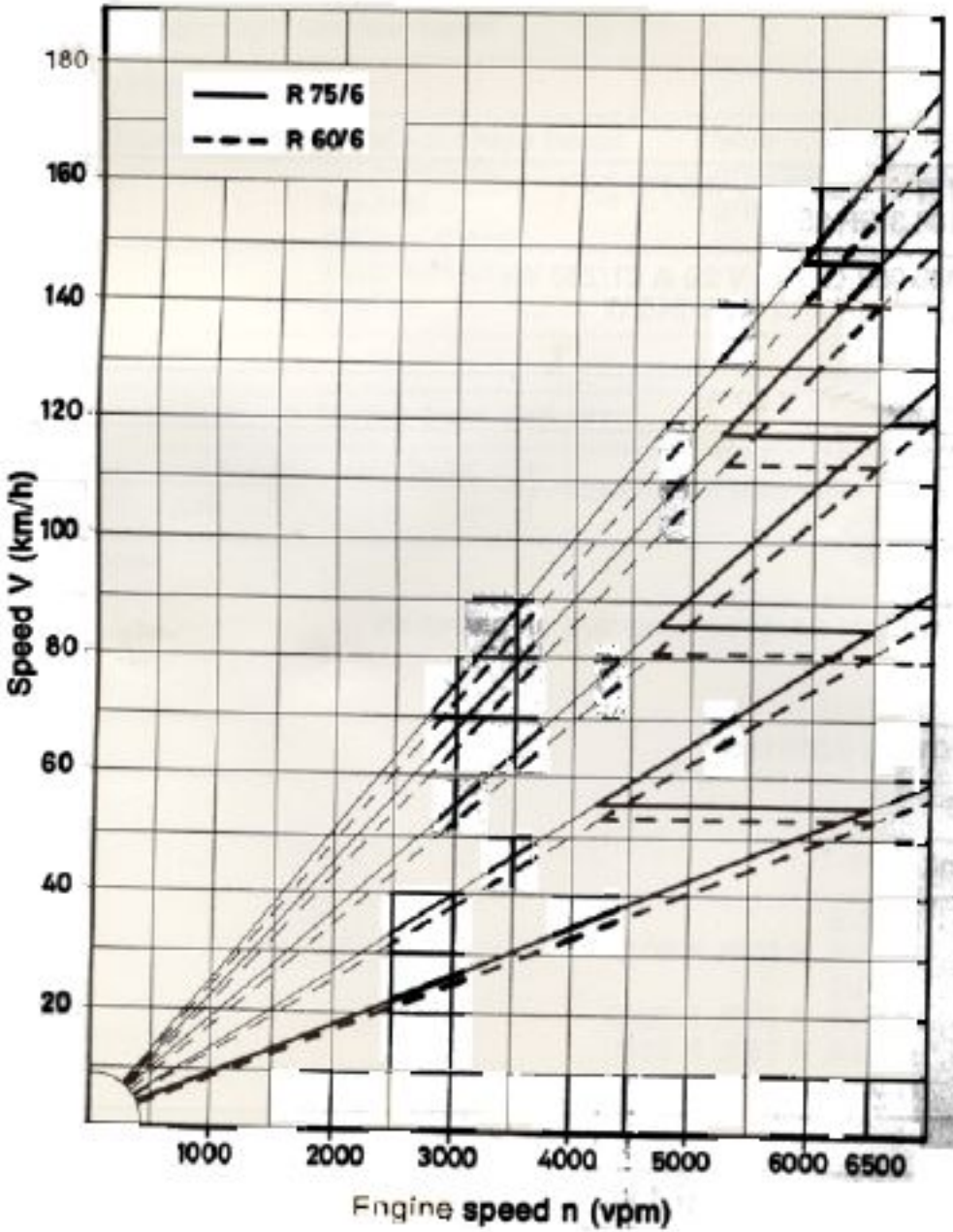
Overall width (engine)	mm (inch)	740 (29.1)	740 (29.1)	740 (29.1)	740 (29.1)
Overall height without mirror (motor cycle unladen)	mm (inch)	1080 (42.5)	1080 (42.5)	1080 (42.5)	1210 (47.6)
Seat height, unladen	mm (inch)	810 (31.9)	810 (31.9)	810 (31.9)	820 (32.3)
Overall length	mm (inch)	2180 (85.8)	2180 (85.8)	2180 (85.8)	2180 (85.8)
Wheel base, with rider weighing 75 kg (165 lb)	mm (inch)	1465 (57.7)	1465 (57.7)	1465 (57.7)	1465 (57.7)
Ground clearance, with rider weighing 75 kg (165 lb)	mm (inch)	165 (6.5)	165 (6.5)	165 (6.5)	165 (6.5)

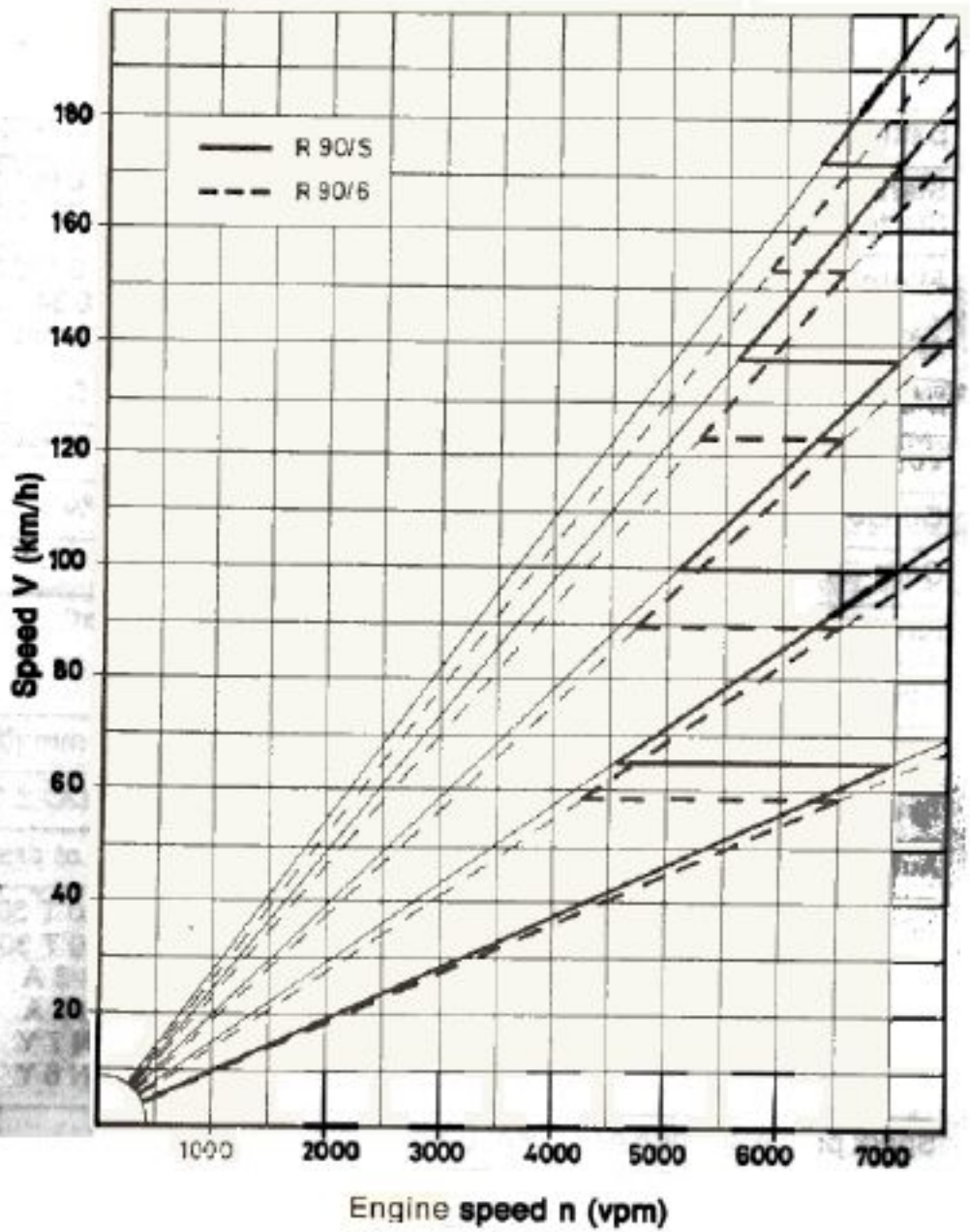
Weights

Unladen weight with lubricants but fuel or tools	kg (lb)	200 (441)	200 (441)	200 (441)	205 (452)
Unladen weight with lubricants, 17 liters (4.5 US gal) fuel and tools	kg (lb)	210 (463)	210 (463)	210 (463)	215 (474)
Permissible gross weight = unladen weight + total of rider, passenger and baggage	kg (lb)	398 (877)	398 (877)	398 (877)	398 (877)
Permissible wheel loads, solo					
front, at 1.9 atm (27 psi) tire pressure	kg (lb)		160 (353)		
rear, at 2.0 atm (29 psi) tire pressure	kg (lb)		245 (540)		
Permissible wheel loads with passenger					
front, at 2.0 atm (29 psi) tire pressure	kg (lb)		178 (392)		
rear, at 2.25 atm (32 psi) tire pressure	kg (lb)		270 (595)		
Max. No. of persons including rider			2		

Performance	R 60/6	R 75/6	R 90/6	R 90 S
The top speed actually attained by the motor cycle after breaking in depends to a large extent on the wind resistance offered by the driver as a result of his size, riding attitude and clothing, and also road and weather conditions.				
Top speed, rider seated km/h (mile/h)	155 (97)	175 (102)	178 (111)	195 (121)
Top speed, rider crouched km/h (mile/h) app.	167 (104)	177 (110)	188 (117)	over 200 (124)
Acceleration				
from 0 to 50 km/h (31 mile/h) sec	**2.2**	**2.0**	**1.6**	**1.6**
from 0 to 80 km/h (50 mile/h) sec	**5.0**	**4.4**	**3.7**	**3.5**
from 0 to 100 km/h (62 mile/h) sec	**7.7**	**6.4**	**5.2**	**4.8**
from 0 to 120 km/h (75 mile/h) sec	**10.8**	**9.1**	**7.4**	**6.9**
from 0 to 140 km/h (87 mile/h) sec	**16.0**	**12.7**	**10.3**	**9.0**
from 0 to 160 km/h (99 mile/h) sec	**27.5**	**19.8**	**14.0**	**12.6**
Standing start kilometer sec			**26.1**	
Average speed thereby attained km/h (mile h)			**138 (86)**	
Speedometer gear ratio (km)				
(miles)				

Road speed — engine speed

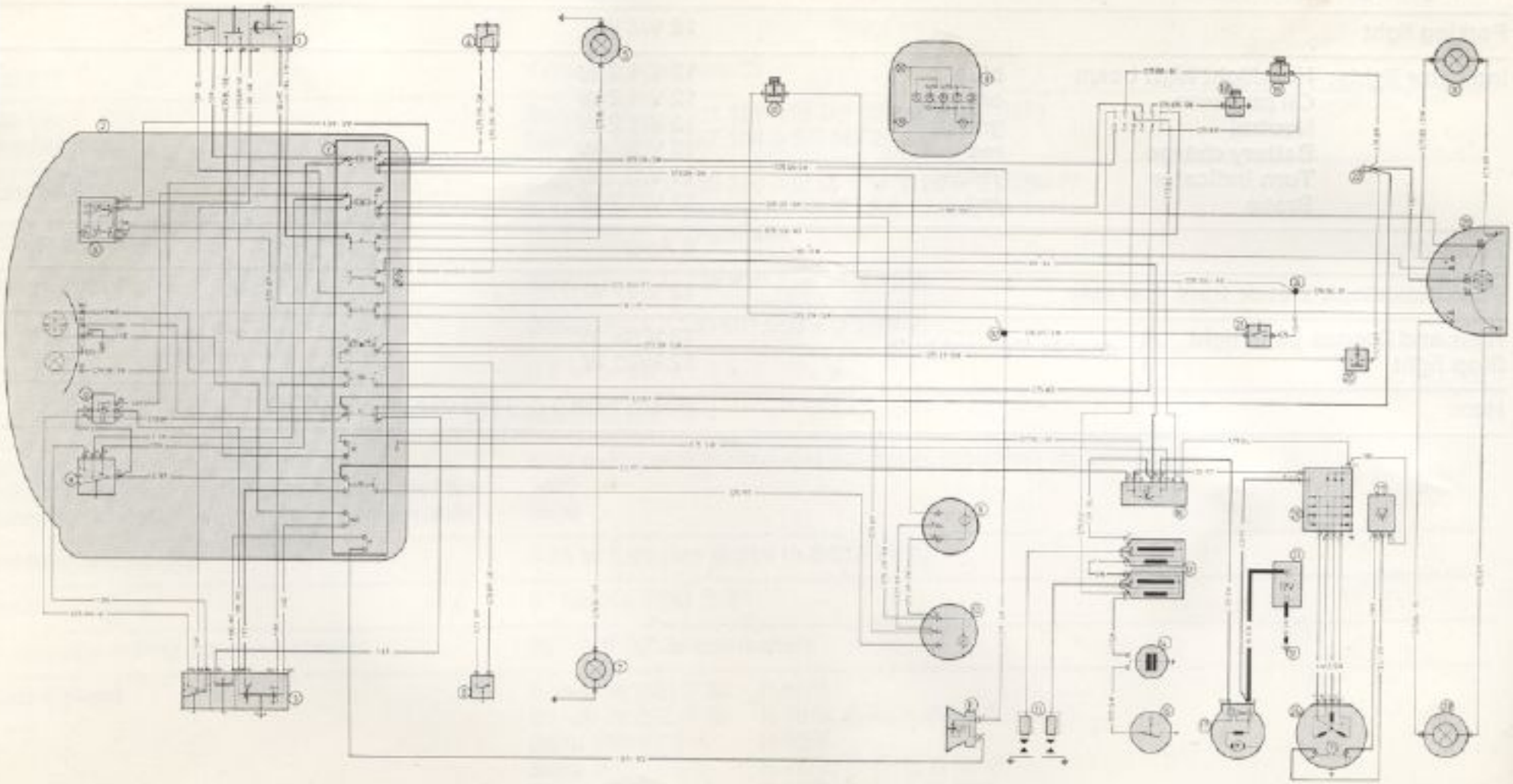




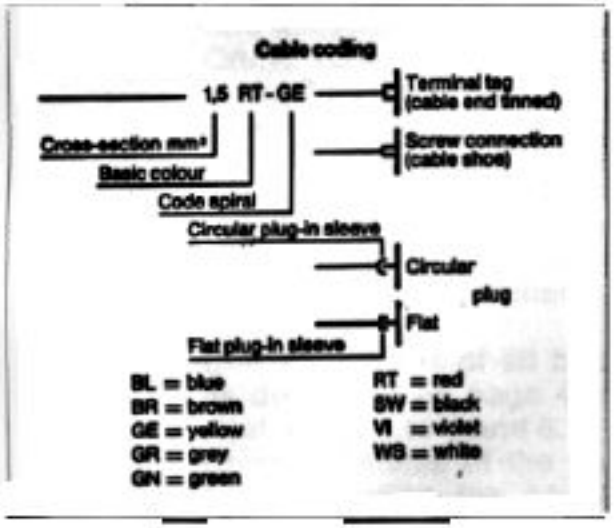
Electrical system

Battery	Varta, 12 V 25 Amp/h
	Bosch, type 0 001 157 015 DF 12 V 0.6 PS (HP) Stribel, type 1357 104.3 SR 9572
	Bosch, type 0 120 340 002 G 1 14 V 20 A 21/280 W; R 90 S: 0 120 340 003 61 14 V 17 A 22/240 W Direct from crankshaft
	Bosch type D 120 915 158 14 V 20 A
	Bosch type 0 190 601 009 AD 1/14 V
	0.2 μF – 25%
Ignition contact breaker Adjustment begins at engine speed rev/min Adustment ends at engine speed rev/min	with automatic centrifugal advance, mounted on camshaft 1550 3000
Breaker points gap	0.35 to 0.40 mm (0.014 to 0.016 inch)
	9° before TDC ± 3°
	25° ± 2°30′ at crankshaft
	Bosch W 230 T 30 R 60/6 Bosch W 200 T 30 R 75/6, R 90/6, R 90 S Beru 230/14/3 A R 60/6 Beru 200/14/3 A R 75/6, R 90/6, R 90 S Champion N 7 Y R 60/6, R 75/6, R 90/6 Champion N 6 Y R 90 S
Spark plug electrode gap mm (inch)	0.7 (0.028)
Headlight	Bosch type 0 303 850 100, 180 mm (7.1 inch) diameter

Turn indicator flasher unit			**Hella TBB 26 1–4 x 21 W — 12 V**
Headlight high and low beam			H 4 Halogen double filament bulb, 60/55 W
Parking light			12 V/4 W
Indicator lights:	**Headlight high beam**	**blue**	
	Oil pressure	**orange**	
	Neutral	**green**	
	Battery charge	**red**	
	Turn indicator	**yellow**	
	Brake	**red**	
Fuses (2)			
Turn indicators, 2 each front and rear			
Rear and license plate light **Stop light**	**double filament bulb**		
Horn			Bosch type 0 320 143 025, 12 V, 400 Hz



Key to wiring diagram



1 Turn indicator switch with starter button
2 Headlight
   a) Flasher unit
   b) High beam
   c) Low beam
   d) Parking light
   e) Ignition/light switch
   f) Contact plate with fuses
   g) Light relay
3 Main light control switch with dimmer switch, high beam flasher and horn button
4 Mech. operated front brake stop switch (only R 60/6)
5 Front right turn indicator
6 Clutch operated switch
7 Front left turn indicator
8 Combined instrument
   a) Speedometer illumination
   b) Revolution counter illumination
   c) Brake fluid level telltale (red)
   d) Neutral indicator (green)
   e) Charge indicator (red)
   f) Oil pressure telltale (orange)
   g) Turn indicator repeater (yellow)
   h) Headlight high beam indicator (blue)
   j) Connection to combined instrument
9 Voltmeter } on R 90 S only, otherwise
10 Clock } special equipment
11 Horn
12 Coils
13 Spark plugs with caps
14 Condenser
15 Contact breaker
16 Starter relay with D + terminal
17 Starter
18 Oil pressure switch
19 Break fluid level switch
20 Neutral indicator switch
21 Brake pedal stoplight switch
22 Ground on frame at coils
23 Battery
24 Connection 54 in wiring harness
25 Alternator
26 Diode board
27 Voltage regulator
28 Rear left turn indicator
29 Rear light
   a) Rear and license plate light
   b) Stop light
30 Rear right turn indicator
31 Ground at gearbox
32 Connection 15 in wiring harness
33 Hydr. operated front brake stop switch (only R 75/6, R 90/6, R 90 S

Servicing

Please have all the specified servicing operations described in the Owner's Manual on pages 19 and 20 carried out regularly by an authorized BMW dealer, and ensure that the work done is confirmed by rubber stamp and signature in the appropriate space on pages 91 and 92. These details are required in the event of a warranty claim.
Before you receive your motor cycle from the dealer he will have carried out a **free pre-delivery check.** A schedule describing this work is to be found on page 89. Confirmation that the check has been performed will appear on page 90.
After the **initial service** at 1000 km (600 miles), alternate minor and major service procedures should be carried out at 7500 km (5000 miles) intervals, starting at speedometer reading 7500 km (5000 miles).
In order to obtain maximum reliability and long service life from your motor cycle, we recommend that at least **2 services per year** be carried out, even if the prescribed mileage shown on the servicing schedule on pages 19, 20 has not been covered.
We have established **work time rates** as a guide to all service operations, and BMW importers or their authorized dealers will bill you at the rates current in your country, using the official times as a guide.

All lubricants, gaskets, etc. used during servicing, and any cleaning work needed will be shown separately on the invoice.

Please keep this Owner's Manual in th toolbox of your motor cycle at all time The Service Voucher section of this m nual is not transferable.

Free pre-delivery check

1. Check oil level in engine, gearbox, final drive, rear wheel drive housing and telescopic fork.
   On R 75/6, R 90/6, R 90 S check brake fluid level
2. Check operation of headlight high and low beam, parking lights, brake, license plate and turn indicator lights, headlight high beam, battery charge, neutral indicator, brake fluid and oil pressure telltale lamps and horn.
3. Check tightness of all bolts and nuts as described on page 41 of this manual, items 1 to 4 and 6.
   Check tightness of the four 12-sided bolts, securing the cardan shaft to the gearbox output shaft flange 3,8 + 0,4 mkp, 18 ± 0,7 ft.lb.).
   Check tightness of front and rear wheel pull-out clamp screws and caps of the telescopic fork.
4. Test ride the motor cycle, check operation of clutch, gear shift, speedometer, steering, foot and hand brakes. Check engine idle settings.
5. Check external appearance of motor cycle.

Initial service

at 1000 km (600 miles)

1. Change engine oil at normal operating temperature, renew oil filter element, clean oil sump and mesh strainer.
2. Change oil in gearbox.
3. Change oil in rear wheel drive housing.
4. Change oil in final drive.
5. Service the battery.
6. Check steering and wheel bearings and adjust if necessary.
7. R 60/6: Adjust brakes and clutch
   R 75/6 – R 90 S: Adjust brakes, bleed, if necessary (charged separately)
   Adjust clutch.
8. Check throttle cable settings, adjust if necessary.
9. Check ignition timing and adjust if necessary.
10. Tighten cylinder head nuts to correct torque of 3.5 mkp (25 ft.lb.), then adjust valve clearances when engine is cold.
11. Tighten all nuts and screws if necessary (see page 41).
12. Check wheel spokes, tighten, if necessary (charged separately).
13. Test ride the motor cycle.

Free Pre-delivery Check correctly carried out

on

at miles (km)

Stamp and signature

600 mile (1000 km) Initial service correctly carried out

on

at miles (km)

Stamp and signature

5 000 miles (7 500 km) Minor Service Date Mileage Stamp and signature	10 000 miles (15 000 km) Major Service Date Mileage Stamp and signature	15 000 miles (22 500 km) Minor Service Date Mileage Stamp and signature
20 000 miles (30 000 km) Major Service Date Mileage Stamp and signature	25 000 miles (37 500 km) Minor Service Date Mileage Stamp and signature	30 000 miles (45 000 km) Major Service Date Mileage Stamp and signature
35 000 miles (52 500 km) Minor Service Date Mileage Stamp and signature	40 000 miles (60 000 km) Major Service Date Mileage Stamp and signature	45 000 miles (67 500 km) Minor Service Date Mileage Stamp and signature
50 000 miles (75 000 km) Major Service Date Mileage Stamp and signature	55 000 miles (82 500 km) Minor Service Date Mileage Stamp and signature	60 000 miles (90 000 km) Major Service Date Mileage Stamp and signature

65 000 miles Minor Service (97 500 km) Date Mileage Stamp and signature	70 000 miles Major Service (105 000 km) Date Mileage Stamp and signature	75 000 miles Minor Service (112 500 km) Date Mileage Stamp and signature
80 000 miles Major Service (120 000 km) Date Mileage Stamp and signature	85 000 miles Minor Service (127 500 km) Date Mileage Stamp and signature	90 000 miles Major Service (135 000 km) Date Mileage Stamp and signature
95 000 miles Minor Service (142 500 km) Date Mileage Stamp and signature	100 000 miles Major Service (150 000 km) Date Mileage Stamp and signature	105 000 miles Minor Service (157 500 km) Date Mileage Stamp and signature
110 000 miles Major Service (165 000 km) Date Mileage Stamp and signature	115 000 miles Minor Service (172 500 km) Date Mileage Stamp and signature	120 000 miles Major Service (180 000 km) Date Mileage Stamp and signature

Warranty

1. The vendor guarantees that the new article leaves the factory free from defects in materials or workmanship in accordance with the current level of engineering techniques. The warranty remains in force for a travelled distance of 10 000 km (6000 miles) or a maximum of 6 months, whichever comes first, starting with the day on which the BMW motorcycle is officially licensed for the first time. No claims under warranty will be recognized unless submitted to an authorized BMW dealer immediately upon detection of the alleged fault, together with issue for the necessary repair order at the same time.

2. The warranty liability of the vendor shall also include parts not manufactured by BMW. Bulbs and spark plugs are excluded from the terms of this warranty.

3. Natural wear and tear damage attributable to negligent or improper treatment shall be excluded from the vendor's liability under this warranty.

4. The vendor shall be permitted to fulfil the terms of the warranty either by repair of the purchased article or by replacement of defective parts. The vendor shall determine the place at which the warranty work is to be carried out, taking the interests of the purchaser into account.

5. If the vendor accepts a claim under this warranty, he shall bear the cost of return carriage by the most economical method and reasonable installation costs, provided that the repair is carried out by an authorized BMW dealer in accordance with the instructions issued by the BMW factory. Parts exhibiting defects in materials or workmanship will be replaced, together with parts damaged as direct result of the failure of said parts. Parts removed from the purchased article become the property of BMW and have to be handed over to the BMW dealer, who has carried out the work.
   Defects of tires and batteries are only covered by warranty in so far as the vendor surrenders to the purchaser any warranty claims which may be established against BMW or the manufacturers of these products.

6. No claims for the reimbursement of direct or indirect damages or claims for changes of the purchase contract or reduction of the purchase price will be entertained.

7. The warranty claim shall be invalid if
   a) the purchased article to which the warranty applies has been modified by outside parties or by the installation of alien parts;
   b) the purchaser has failed to comply with the instructions given in the BMW Owner's Handbook, or has not had the inspection work as specified in the BMW Service Instructions performed correctly;
   c) the purchased article will be sold after it has been licensed;
   d) the purchaser uses the purchased article in competitive events.

Important note

Every authorized BMW dealer is requested to carry out work under warranty, free of charge, on BMW vehicles.
It will be appreciated that on long journeys or abroad it may not always be possible to carry out work immediately in accordance with your requirements. However, you may reasonably expect any authorized BMW dealer to give priority to urgent repair work affecting the road safety or operational readiness of your BMW.

Fair deal servicing

High quality engineering inspires confidence. You will have noticed this after riding your new BMW only a short distance.
However, a high-quality motor cycle needs to be serviced and maintained with expert care, so that the sheer riding pleasure it brings remains undiminished for years to come.
Try to have your BMW serviced and repaired by an authorized BMW dealer or workshop at all times. They possess the necessary BMW special tools, and are obliged by contract with the factory to install only genuine BMW spare parts on your machine.
You are entitled to be suspicious if you are offered spare parts from another source. Since we are unable to supervise the quality of these parts, we cannot always meet warranty claims which subsequently arise.
In extreme cases, you may even encounter difficulties with your insurers or become involved in legal proceedings if your BMW is equipped with unsuitable and non-standard components.
Genuine BMW spare parts protect you against problems of this kind and reduce the risk which the motorcyclist incurs in today's traffic. Genuine BMW parts are more than just a replacement designed to keep the machine going: on the contrary, they are fully identical with the original components fitted to your new BMW motor cycle.

This means: Replacement of an original component by a genuine BMW spare part ensures that all the BMW factory's engineering and design superiority is available to you as a guarantee for the unchanging performance and basic safety of your BMW machine.

Every BMW authorized dealer undertakes to keep the following genuine BMW parts in stock:

BMW parts frequently required as spares or for exchange purposes
Genuine BMW accessories (the full selection offered by the factory)
Other genuine BMW motor cycle parts which are required very rarely – and please do not forget that the complete list contains many thousands of parts – will be obtained by the smaller BMW dealer abroad from a larger colleague or from the BMW importer. The term 'genuine BMW parts' comprises all parts, assemblies and accessories supplied by the Bayerische Motoren Werke AG, regardless of whether these parts were manufactured by BMW or obtained from an approved sub-contractor.
In the interest of your own safety we recommend only original BMW accessories.

Quality guarantee

Genuine BMW parts are completely identical with the corresponding parts on new BMW vehicles.

The Bayerische Motoren Werke AG hereby guarantees that these parts are genuine and free from defects in materials or workmanship.

BMW – perfection in detail

Original BMW Teile

Look for this sign!

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At a glance

Tire pressures atm (lb/in² up to 80 mph) with tires cold	**R 60/6 – R 90 S**
front wheel solo	1.9 (27)
with passenger	2.1 (30)
rear wheel solo	1.8 (25)
with passenger	2.1 (30)
Location of engine No.	on engine oil filler pipe
Location of frame No.	on right of steering head

Valve clearances with engine cold
Inlet 0.15 mm (0.006 inch)
Exhaust 0.20 mm (0.008 inch)

Spark plugs	Bosch W 230 T 30 R 60/6 Bosch W 200 T 30 R 75/6 – R 90 S **Beru 230/14/3 A** R 60/6 Beru 200/14/3 A R 75/6 – R 90 S Champion N 7 Y R 60/6 – R 90/6 Champion N 6 Y R 90 S
Electrode gap mm (inch)	0.7 (0.028)
Ignition timing	0° [illegible] TDC
Breaker points gap mm (inch)	0.35 to 0.40 (0.014 to 0.016)
Dwell angle	78 ± 1°

Capacities

Fuel tank	R 60/6, R 75/6, R 90/6 – 18 liters (4.8 US gal); R 90 S – 24 liters (6.3 US gal)	**Super** (premium) fuel
Engine oil	2 liters (4.2 US pints) plus 0.25 liters (0.53 US pints) if filter is changed	Brand-name HD oil for spark ignition engines For oil grades, see page 79
Gearbox	0.8 liter (1.68 US pints)	Brand-name hypoid gear oil
Rear wheel drive housing	0.15 liter (0.32 US pint)	above 5° C (41° F) SAE 90
Final drive	0.25 liter (0.53 US pint)	below 5° C (41° F) SAE 80
Telescopic forks	0.28 liter (0.6 US pint) per fork leg	Shock absorber oil see page 80
Brake system	150 cm³ (0.90 cu. in) R 75/6, R 90/6 200 cm³ (1.20 cu. in) R 90 S	DOT No. 3 disc brake fluid
Breather lubricating felt / centrifugal advance mechanism		Bosch Ft 1 v 4 grease
Centrifugal advance unit bearing shaft		Bosch Ft 1 v 26 grease
Wheel bearings and all other greasing pints		Brand-name multi-purpose grease with drip point 180° C (355° F)

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