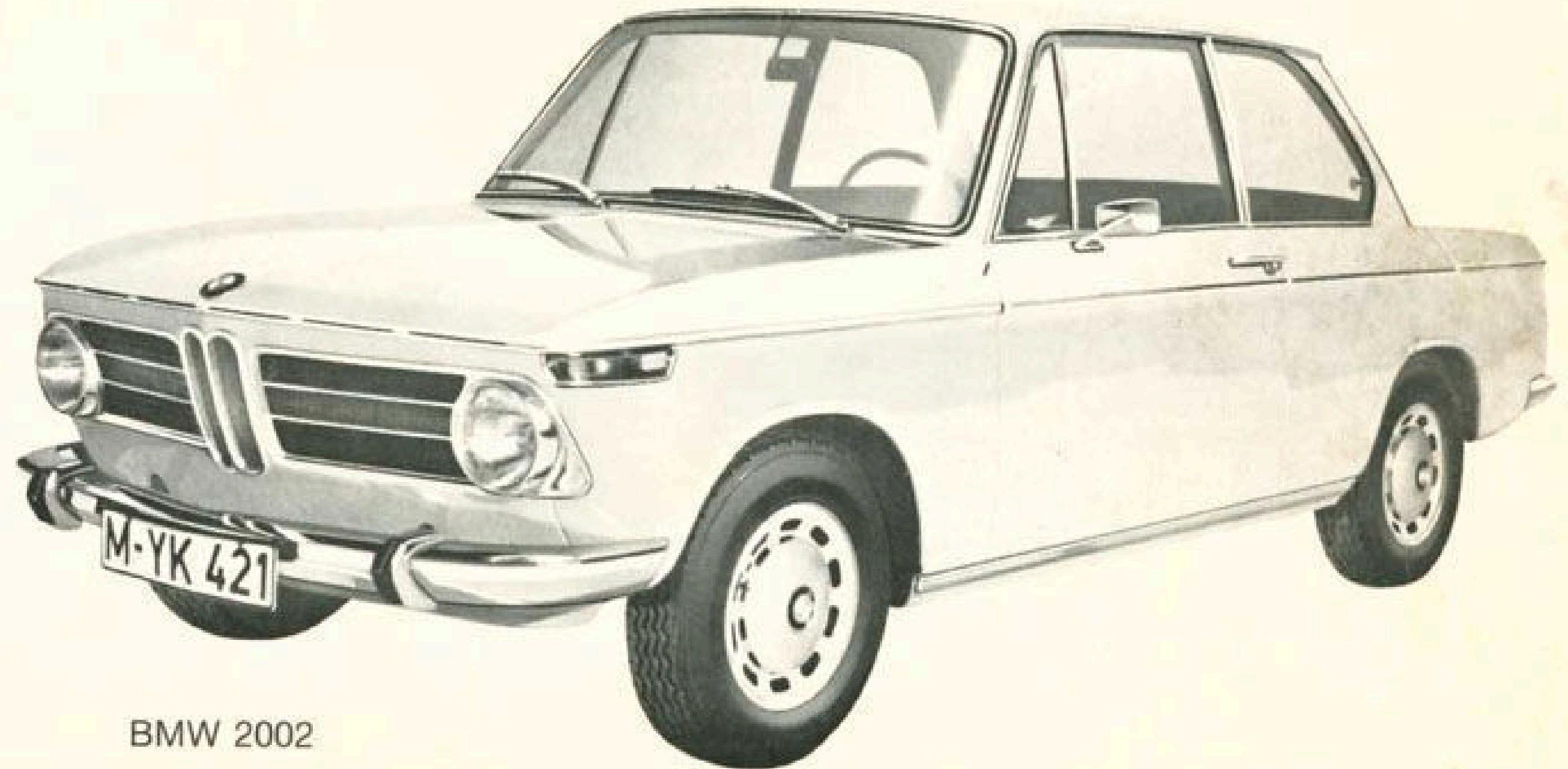


Owner's handbook

**2002
1600**





BMW 2002

Dear BMW enthusiast,

The engineers who develop BMW cars are enthusiasts too. Now you have taken delivery of a BMW, and with it go our congratulations and good wishes.

Our Owner's Handbook contains all you need to know for lasting driving pleasure, and also full details of the service work necessary to keep your car in as-new condition. After reading through the handbook, you will soon feel entirely at home with every aspect of your car.

And now it's time for you to start enjoying pure driving pleasure – on crowded city roads, through the tight corners of steep mountain passes, or over the endless concrete strip of the inter-city highway.

Sincerely yours
BAYERISCHE MOTOREN WERKE AG

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We reserve the right to make alterations to the design, equipment or accessories in the interests of further development. Dimensions, weights and performance data are quoted subject to normal tolerance limits. No liability can be accepted for the appearance of errors.

Before you start –
Where is everything?



Daddy says
I'm too young to understand –
grown ups!

6 Gearbox layout, maker's plate, chassis and engine numbers

The **maker's plate, chassis and engine numbers** are the means of identifying your car. The entries in the logbook should always agree exactly with the markings on the car. The workshop will need these numbers if it becomes necessary to order spare parts, but you should also know where to locate them in case licensing or customs authorities require to see them.

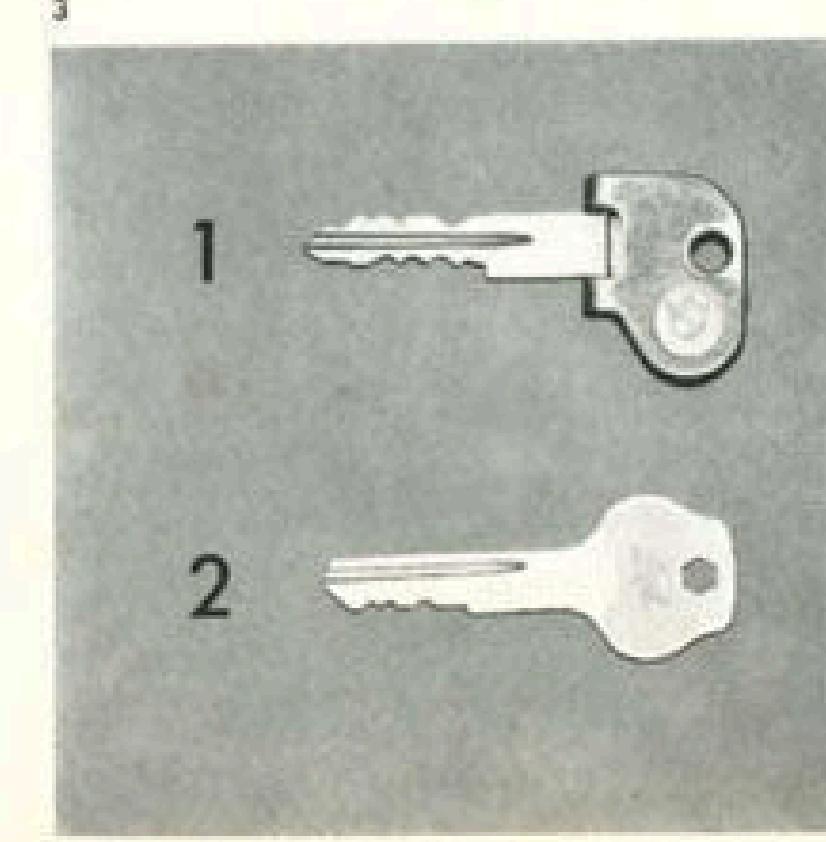
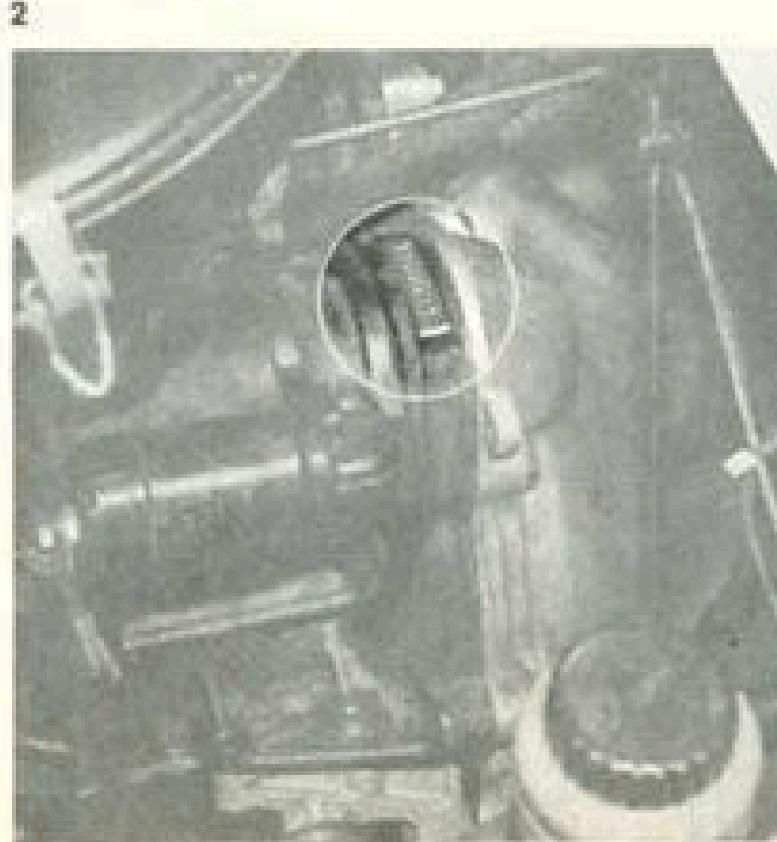
Manufacturer's plate: in the engine compartment, at the back on the right (looking forward). **Fig. 1**

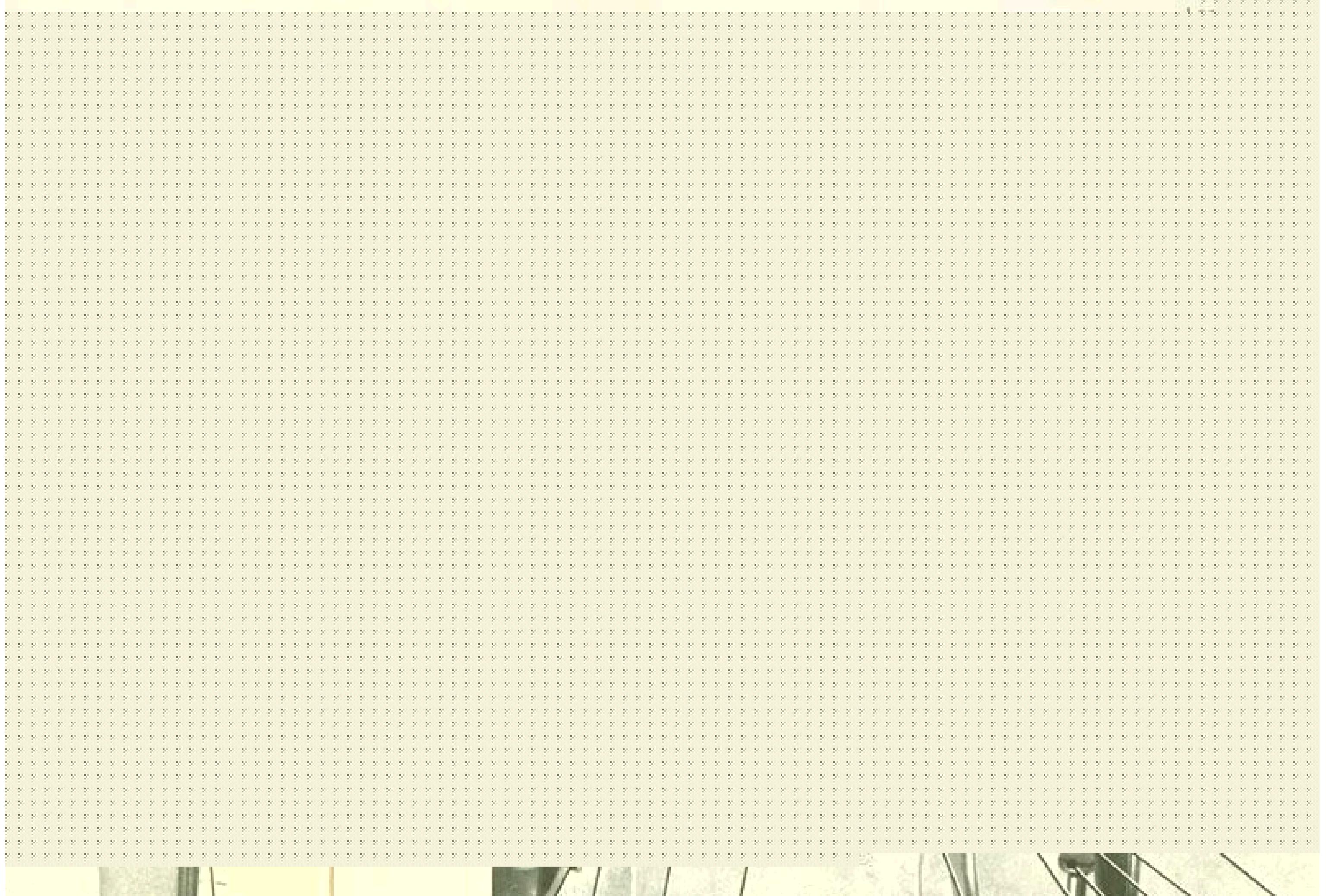
Chassis No.: in the engine compartment on the right of the bulkhead (looking forward) next to the lock. **Fig. 1**

Engine No.: on the rear left-hand side of the crankcase (looking forward) **Fig. 2**

You will have received two pairs of keys for your new BMW. It is a good idea to put the second pair in a safe place straight away so that you can get at them immediately if you should lose the first pair. Of course any BMW dealer will gladly help you out in case of difficulty.

If you should need to buy new keys, always quote the numbers on the keys when ordering. This speeds up the whole process considerably. Check that the key numbers are correctly recorded in the service booklet. **Fig. 3**





The ignition and starter switch is combined with the steering lock, and mounted on the right-hand side of the steering column enclosure. Insert key 1 (swivel head) in the "Halt" position and turn to the right as far as "Garage" position; you will hear the steering lock being withdrawn from the steering column, but if necessary the steering wheel should be moved slightly to assist. The steering is now unlocked, the key may now be withdrawn and the radio (available to special order) will operate. **Fig. 7**

Turn the key further to the right until the "Fahrt" ("Drive") position is reached; this switches on the ignition, so that the battery charge warning lamp (red) and

oil pressure warning lamp (orange) should be illuminated. The fuel gauge will show the correct amount of fuel in the tank. In this position the key cannot be withdrawn.

To lock the steering, turn the key back to "Halt" and pull out. The steering wheel should be moved slightly if the lock does not engage.

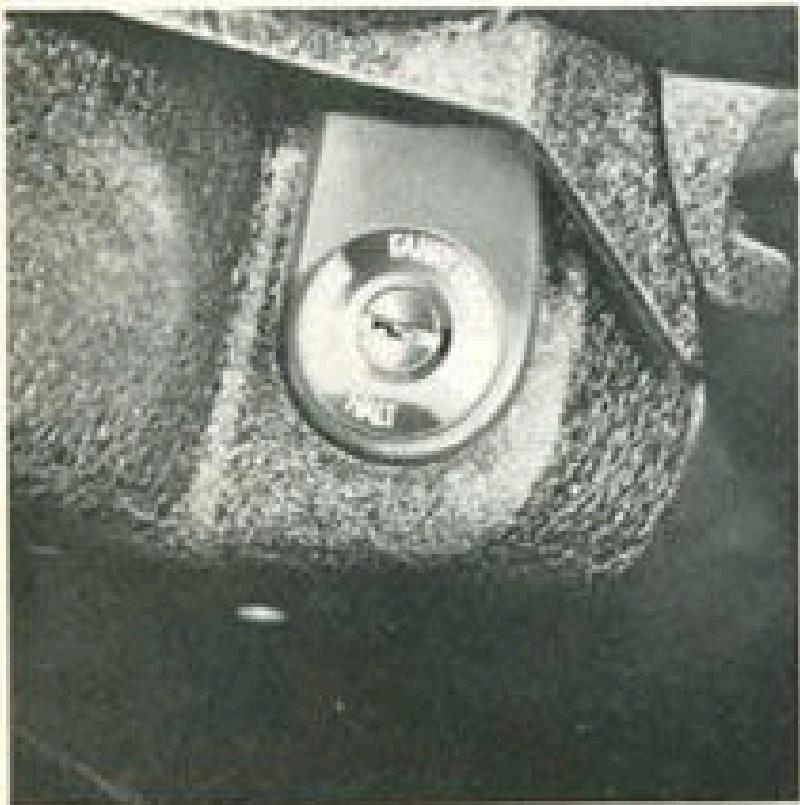
**2-position headlamp and light switch
(Fig. 8):**

Position 1 – parking lights
Position 2 – headlights

The intensity of the instrument panel lighting can be continuously adjusted by turning the light switch knob in its pulled-out position.

The dip lever to the left of the steering column can be finger-tip operated while both hands are holding the steering wheel (**Fig. 9**). When the lever is set to main beam (upper position) a blue warning lamp in the combination instrument is illuminated. To flash the headlights, pull the lever towards the steering wheel.

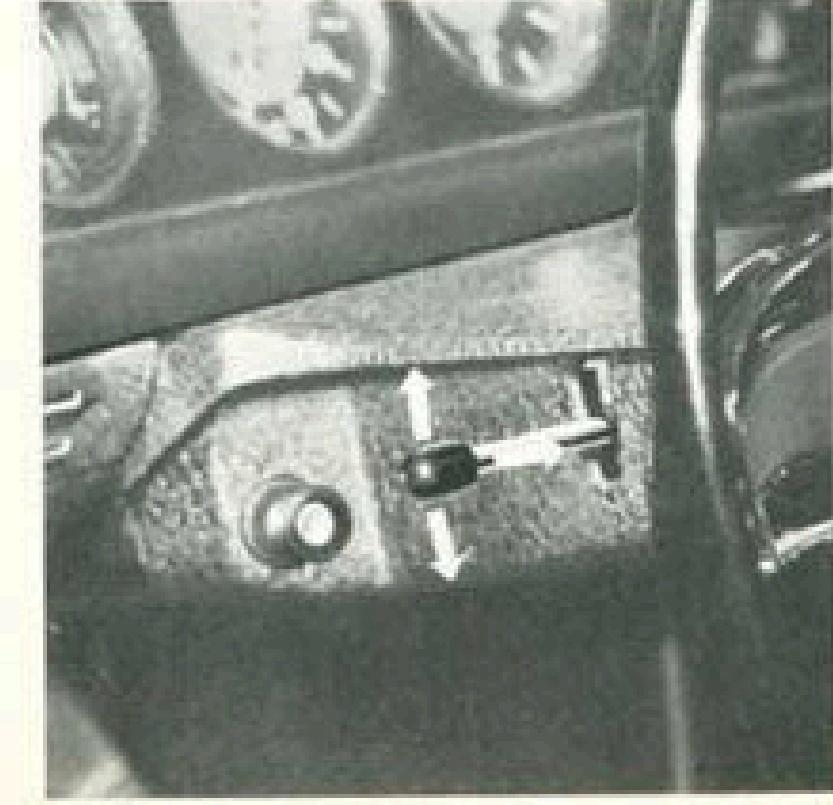
7



8



9



The **turn indicator lever** beneath the steering wheel on the righthand side of the steering column operates the appropriate flashing indicators when moved to correspond with the movement of the steering wheel. **Fig. 10**

A regular ticking sound and illumination of the green warning light in the combination instrument tells you that the flasher unit is operating correctly.

When the steering lock is engaged, the turn indicator lever is used instead to switch on the **parking lights** on the appropriate side of the car.

Lever up – left front and rear

Lever down – right front and rear

The **wiper knob** can be pulled out to select either of 2 operating speeds.

Fig. 12

Pulling the tip of the turn indicator lever to the right of the steering column towards the wheel will operate the **automatic washer unit**. The electric pump and the wipers are both set in motion simultaneously. When the lever is released, a relay prevents the wipers from switching off immediately.

Warning: The automatic washer unit

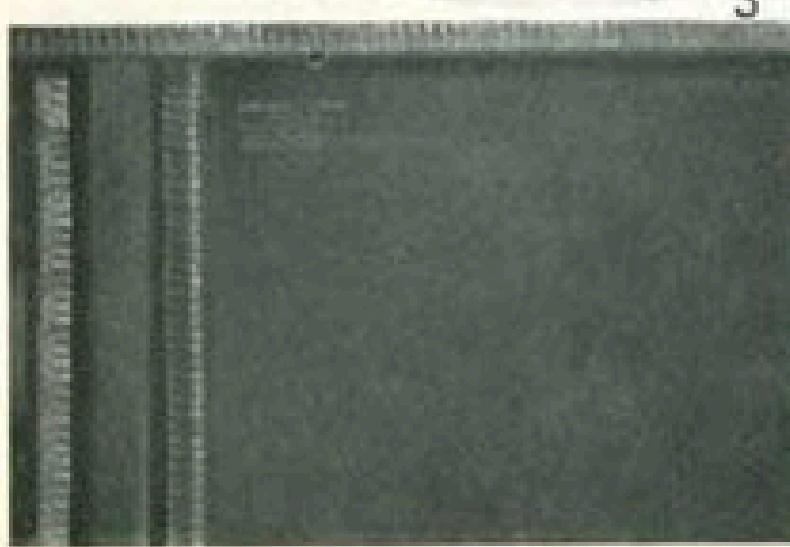
The interior light switch has 3 positions:

Position 1: permanently on

Position 2: permanently off

Position 3: Light is switched on when door is open (door contact switch)

Fig. 19



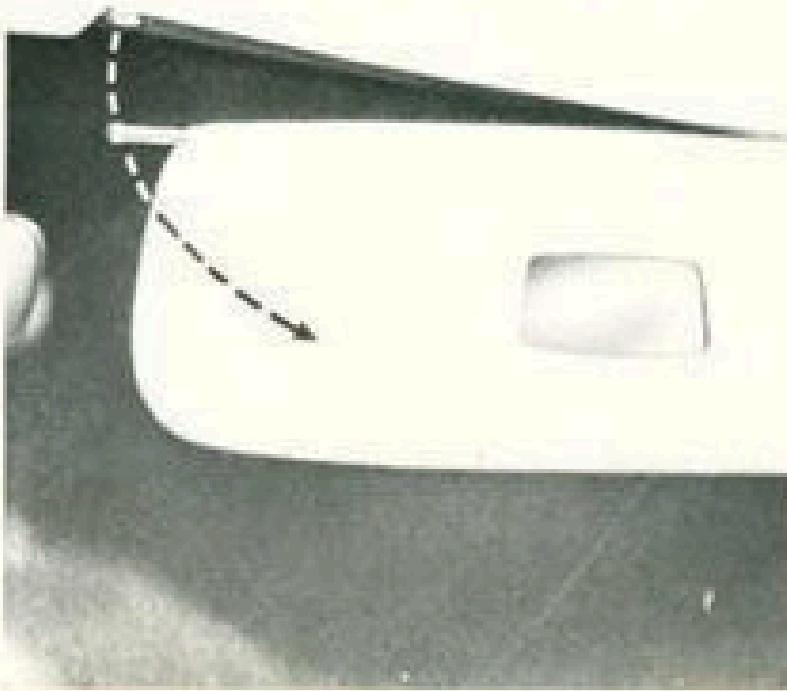
19

Either sun visor may be swung sideways to cover the side window if the sun is dazzling from that direction.

Fig. 20

The combined instrument contains water temperature gauge, fuel gauge and warning lights for: oil pressure (O) orange, battery charge (L)-red, turn indicators (B)-green, headlight main beam (F)-blue. Fig. 21

20



The cooling water thermometer is divided into 3 colour zones:

Blue: engine is running too cold. If the thermometer needle is in this region the car's speed and engine revolutions must be kept low.

White: normal operating temperature range.

Red: engine is too hot. No anxiety need be felt if the needle reaches the red zone or enters it for a short period if the engine is working very hard or the outside temperature is extremely high. However, if the needle tends to remain in the red zone for longer periods, then the engine is definitely in need of attention (see procedure described on page 32).

21



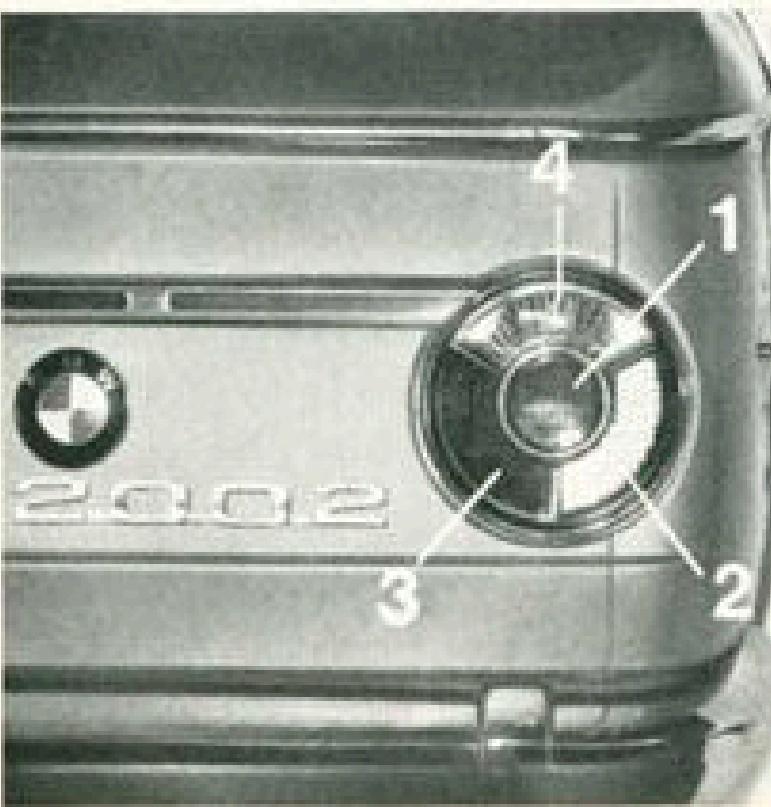
When the ignition is switched on, the fuel level can be seen from the gauge. If the needle is indicating "R" (reserve), fill up as soon as possible, although the tank still contains enough fuel for about another 30 miles, depending on how you drive.

The **fuel filler cap** is located on the right side of the car at the rear.

Fig. 22 shows the layout of the rearlight cluster:

1. Turn indicator light (yellow)
2. Rear light and reflector (red)
3. Brake light (red)
4. Reversing light (white)

22

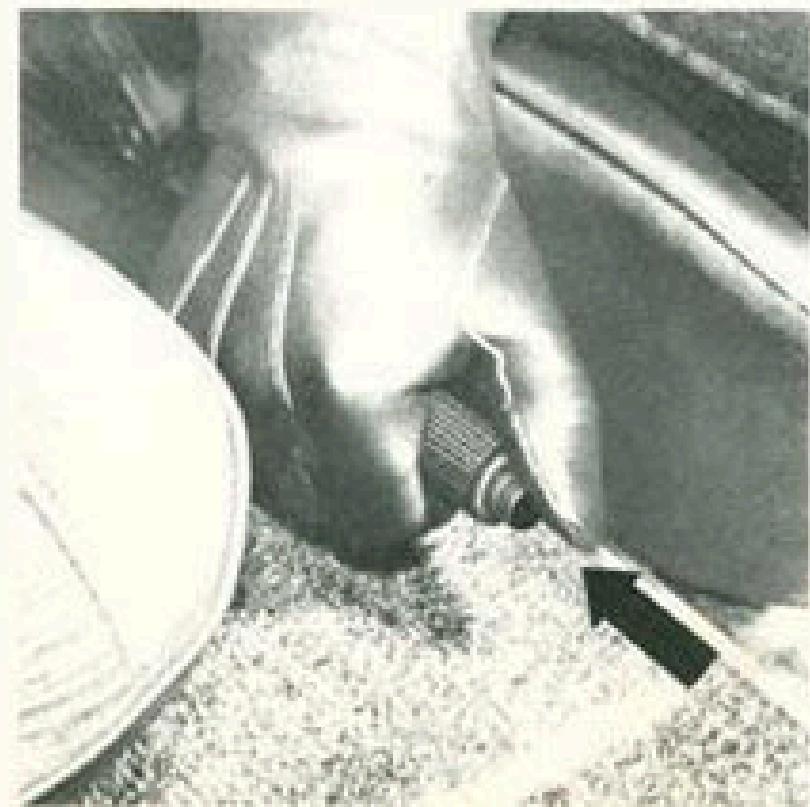


Whenever the lights are in use, in other words when the light switch (page 10, **Fig. 8**) is operated, the **luggage compartment** will be automatically illuminated.

The **handbrake** works on the rear wheels. To brake or secure the car, pull the lever upwards. To release the lever, first pull upwards slightly, then press the knob on the end of the lever and push downwards. **Fig. 23**

A useful hint: to avoid the noise of the handbrake being pulled on, first depress the knob.

23

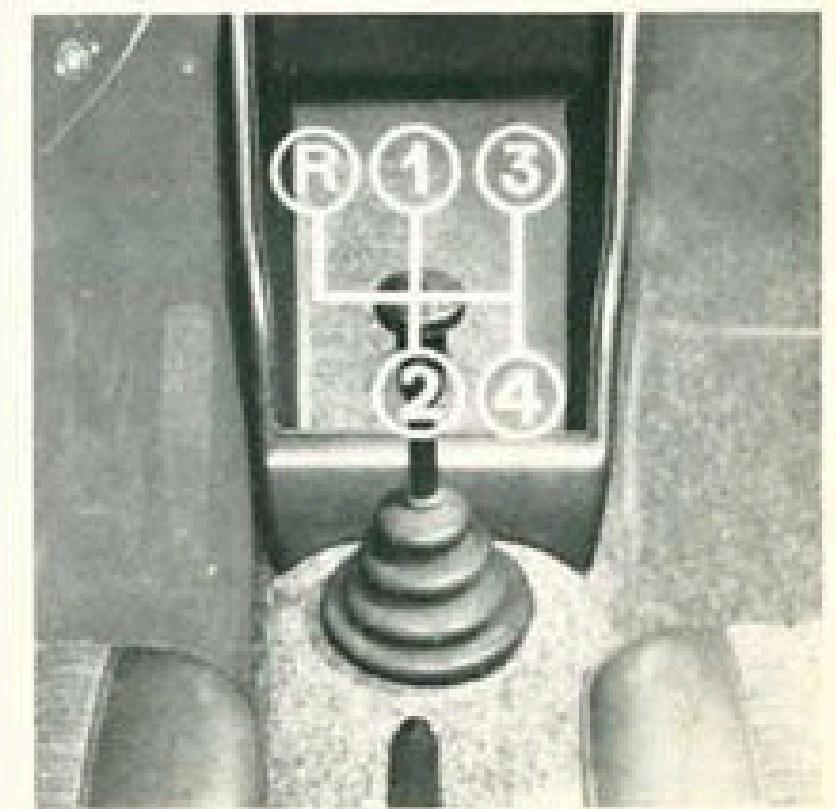


The position of the gear lever for each speed can be seen from the gear layout shown below. All forward speeds are synchronised. **Fig. 24**

To engage reverse the car must be standing still; the lever should be pressed over to the left until a slight resistance is felt and overcome.

With the ignition on and reverse gear engaged, both **reversing lamps** will be illuminated.

24



To use the **cigar lighter**, press the knob inwards. When the coil filament glows red-hot the knob will automatically spring back to the original position.

Fig. 25

The cigar lighter **socket** it also designed to accept plugs attached to handclamps, electric razors or similar apparatus. The maximum rating must not exceed 50 watts for a 12 volt supply. Make sure that the socket is not damaged by attempting to insert a plug of the wrong shape.

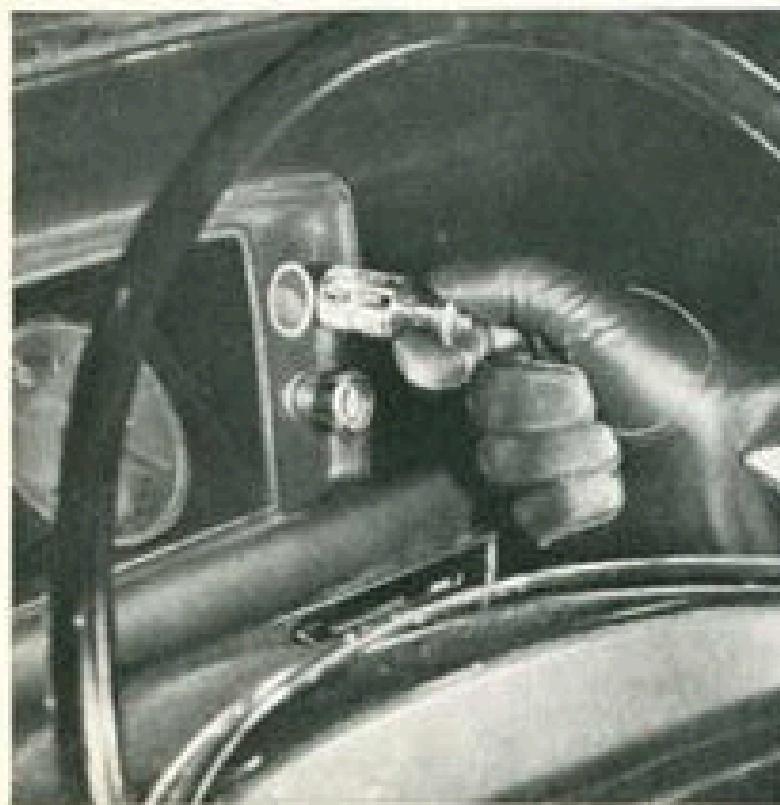
To empty the **ashtray on the instrument panel**:

Pull out ashtray as far as possible, press down on the leaf spring as shown and withdraw the ashtray completely. Fig. 26

To empty the **ashtray in the rear passenger compartment**:

Hinge out, press firmly down and remove. Fig. 27

25



26



27



For fore-and-aft adjustment of the front seats, pull up lever (Fig. 28, 1) at the front outside edge of the seat base and slide the seat to the desired position. Release the lever and move the seat very slightly to ensure that the locking catch has engaged.

The front seat backs are adjustable for angle by means of a cam operated by turning a knob (Fig. 28, 2) at the base of the seat back.

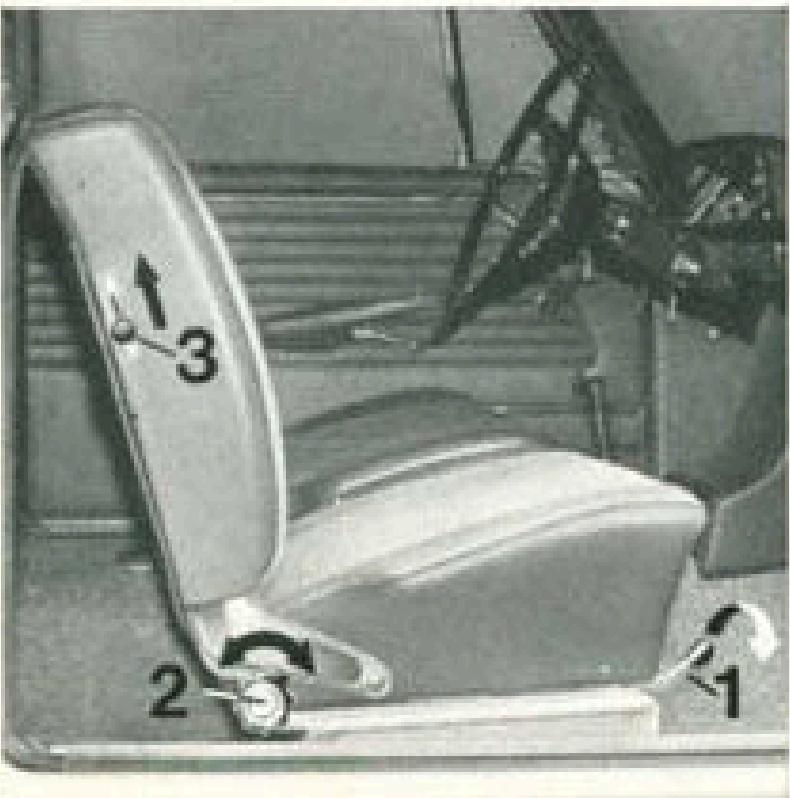
The seat backs also have a locking mechanism to prevent accidental tipping forward. To release, pull up the knob (Fig. 28, 3) on the outer edge of the seat back.

Remember to alter the angles of interior and exterior rear view mirrors to correspond with the new seat position.

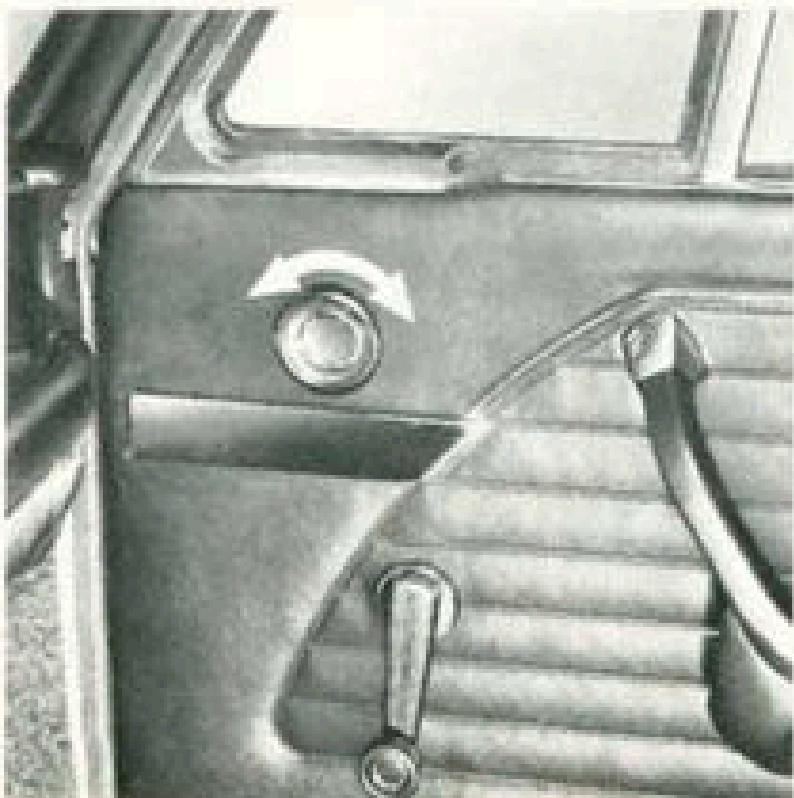
Safety belt mountings for both front and rear seats are rigidly attached to the bodywork. Your BMW dealer knows the correct mounting points and will gladly fit a set of safety belts to your car.

The hinged quarter lights are opened and closed by turning the rotary knob immediately beneath. Before leaving the car unattended remember to guard against break-in by turning both knobs until the quarter lights are completely shut. Fig. 29

28



29



The heater and ventilator of the BMW 2002 and BMW 1600 allows particularly accurate temperature control. The single slide lever varies output between full heat (lever to right, red symbol) and cool air only (lever to left, blue symbol).

Apart from the extreme limit positions, slightly less air is automatically passed to the demister slots than to the footwells. This provides stratified heating throughout the vehicle, with adequate warmth for the feet yet a pleasantly cool atmosphere at head height. **Fig. 30**

Lever to right: warm
Lever to left: cool

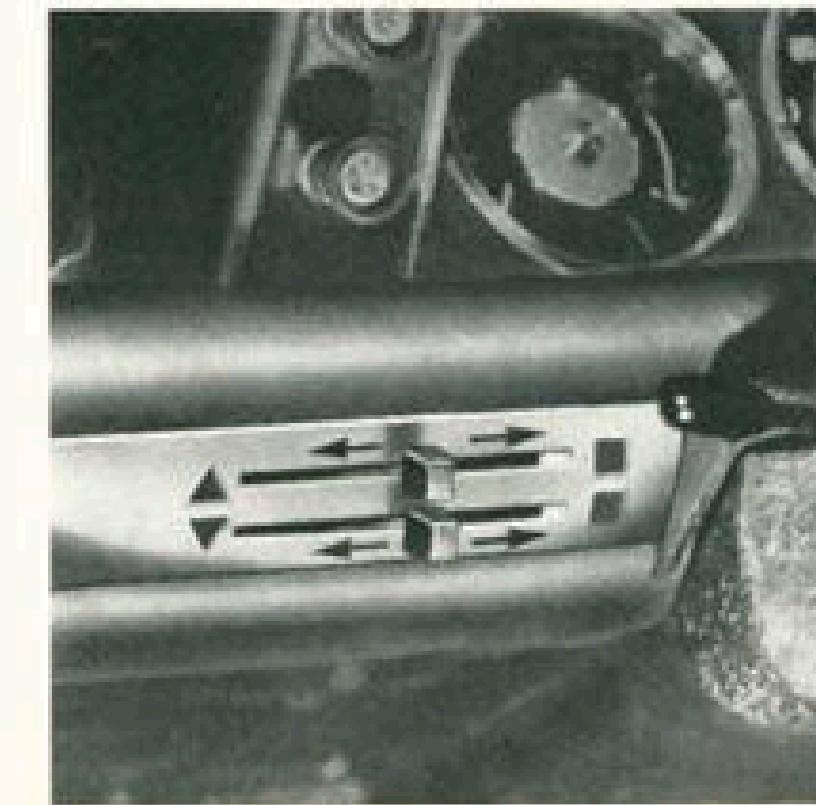
30



The supply of heated or fresh air to the interior of the car can be easily adjusted to within fine limits by means of the twin levers. The top lever controls the slots which direct air on to the screen and wide windows, and the lower lever controls independently the supply to the footwells. In damp conditions or when the screen mists over the lower lever can be moved to the right to cut off the supply to the footwells, so that the full output can reach the front and side windows. **Fig. 31**

Lever to left: air supply open
Lever to right: air supply shut off

31



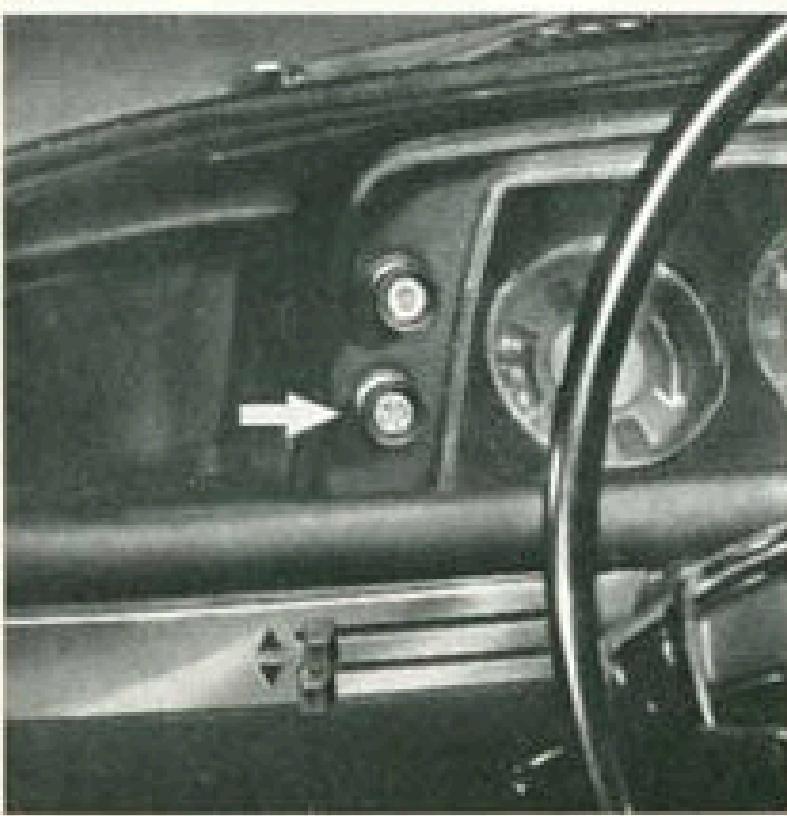
When extra warm or cool air output is needed, always switch on the blower (pull out knob, **Fig. 32**, to first stage). If the windows are misted over or the car's interior is exceptionally cold, use the second blower speed, provided that the

water temperature is sufficiently high (pointer of temperature gauge in white zone).

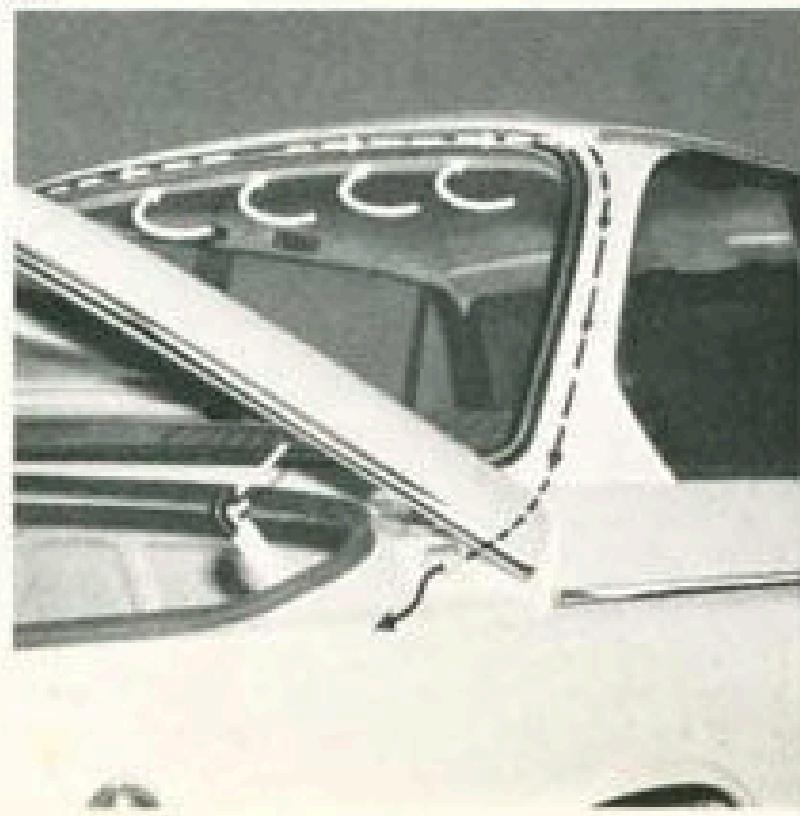
Air extraction: while the car is on the move stale air is extracted from the interior through slots above the rear window and ducted to openings below the rear roof pillars, **Fig. 33**

Extra ventilation or air extraction can be obtained by opening the front quarter lights (Fig. 30, Page 17) and the front-hinged rear side windows, **Fig. 34**

32



33



34



Starting off –
a few hints



"You think I don't know what I'm doing, don't you?"

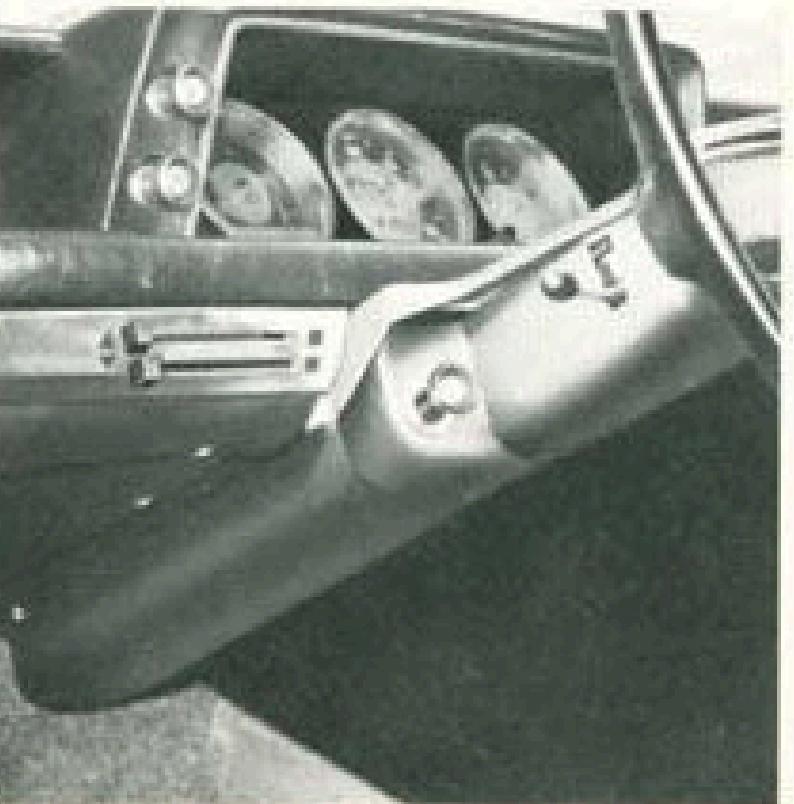
Before operating the starter, check that the gear lever is in neutral.

Pull out the **choke (cold start) knob** to the left of the steering column (Fig. 35). The distance should depend on both engine and outside temperatures.

- pull out fully if outside temperature is below -10°C (14°F).
- if the outside temperature is very low indeed, depress the accelerator once or twice briefly to inject a little fuel into the inlet manifold, at the same time operating the starter to turn the engine over.

When the engine fires, allow it to run for 3–5 seconds, then push back the choke knob a certain distance until the engine runs evenly.

35



If the engine is warm (within the normal operating temperature range) the choke and accelerator need not be touched. If the engine is hot, the accelerator only should be depressed while operating the starter.

The **starter** is operated by turning the ignition key fully to the right ("Start" position) until the engine begins to fire. However, do not allow the starter to turn the engine for longer than about 10 seconds. When released, the ignition key will spring back of its own accord to the "Fahrt" ("Drive") position. While operating the starter the radio (to special order) will automatically be switched off.

To make starting easier, especially during extremely cold weather, it is a good idea to switch off all other items which draw their electric supply from the battery and to press down the clutch pedal. If the starter has to be operated a second time before the engine will run, the ignition key must first be returned from the "Fahrt" ("Drive") to the "Garage" position. This intentional delay is introduced in order to prevent as far as possible the starter from being re-engaged while the engine is still turning. You should always try to avoid using the starter unless the engine has come to a complete standstill. This will avoid damage to the starter and flywheel.

When the engine is running, the oil pressure (orange) and battery charge (red) warning lights should go out as soon as engine speed reaches a fast tickover.

If the oil pressure warning light is illuminated while driving, you must depress the clutch pedal **Immediately** and switch off the ignition. Check the engine oil level; if there is sufficient, the fault must lie elsewhere and your BMW dealer should be summoned to assist. No danger is implied if the warning light glows briefly on the overrun, provided that it is extinguished immediately the accelerator is pressed down.

If the battery charge warning light is illuminated while on the road, you should take the car to your BMW dealer as soon as possible, or else the battery will become completely discharged.

It is not recommended that the engine be allowed to warm up while idling; it is better to move immediately after starting the engine, using **moderate engine speeds**. If the choke was used for starting, push it in as soon as the thermometer begins to indicate that the water temperature is approaching the normal operating range. If the outside temperature is exceptionally low, however, it is better to run a cold engine for about half a minute at a fast idling speed, mainly to ensure that all parts receive an adequate supply of lubricant.

In all cases avoid running a cold engine at high speeds, as this will seriously shorten its working life.

When disengaging the clutch, always depress the pedal fully; while driving never rest the left foot on the clutch pedal. To switch off the ignition and stop the engine, turn the key to the "Garage" position.

The first few miles –
take it easy!



"OK oldtimer, not so fast!"

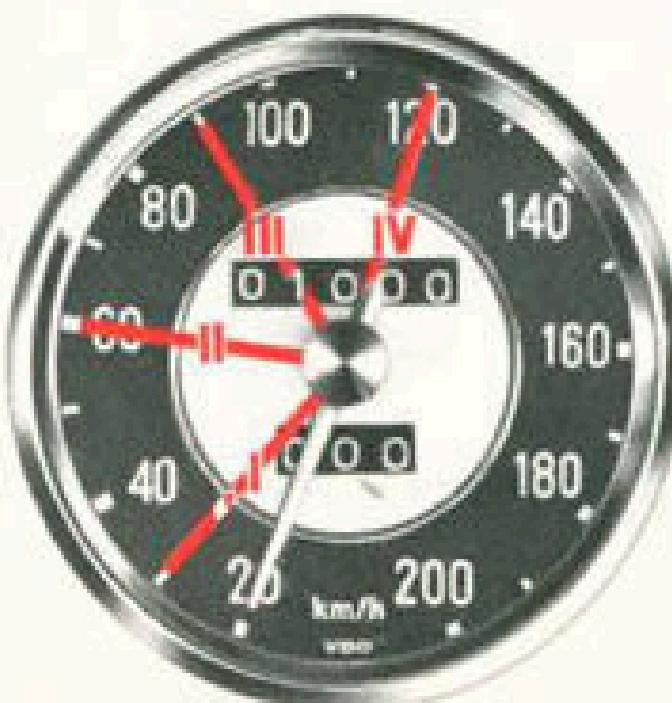
The engine of your BMW 2002 or 1600 is not governed, in other words we have imposed no artificial limitation on its performance. As a result it is up to you to achieve maximum life expectancy and economic results from your car by observing the following simple rules for running in.

Maximum permitted speeds for the first 1000 km (600 miles):

	BMW 2002	BMW 1600
1st gear	30 kph (20 mph)	30 kph (20 mph)
2nd gear	60 kph (40 mph)	55 kph (35 mph)
3rd gear	90 kph (55 mph)	85 kph (55 mph)
4th gear	120 kph (75 mph)	115 kph (70 mph)

Fig. 36

36



Maximum permitted speeds for the second 1000 km (from 600 to 1200 miles):

	BMW 2002	BMW 1600
1st gear	30 kph (20 mph)	30 kph (20 mph)
2nd gear	65 kph (40 mph)	60 kph (40 mph)
3rd gear	100 kph (65 mph)	95 kph (60 mph)
4th gear	135 kph (85 mph)	125 kph (80 mph)

Fig. 37

The maximum permitted speeds in each gear should only be maintained for short periods while running in. Make frequent speed changes and alter engine speed as much as possible during a journey. Change down in good time, especially when climbing gradients.

37



After you have reached 2000 kms (1200 miles) you may gradually increase your maximum speed to the upper limit of 160 kph (100 mph) when traffic conditions permit.

The maximum permitted touring speed is:

BMW 2002: 170 kph (106 mph)
BMW 1600: 155 kph (97 mph)

Maximum speeds after running in is complete:

	BMW 2002	BMW 1600
1st gear	44 kph (28 mph)	41 kph (26 mph)
2nd gear	82 kph (51 mph)	77 kph (48 mph)
3rd gear	125 kph (79 mph)	118 kph (74 mph)
4th gear	170 kph (106 mph)	160 kph (100 mph)

Running-in brakes:

Until 500 kms (320 miles) have been covered, try to avoid heavy brake applications especially from high speeds, and do not subject the brakes to extended tests, or the brake linings will subsequently fail to achieve their normal low wear rates and high stopping power.

During running-in the gear lever, steering and other controls may be stiff to move. As the running-in process continues this stiffness will soon disappear.

At last –
full speed ahead!



"This is daddy's helmet –
and this is my BMW racer!"

For its correct functioning the engine requires normally available branded Super petrol with a minimum octane rating of 95 (Research Method).

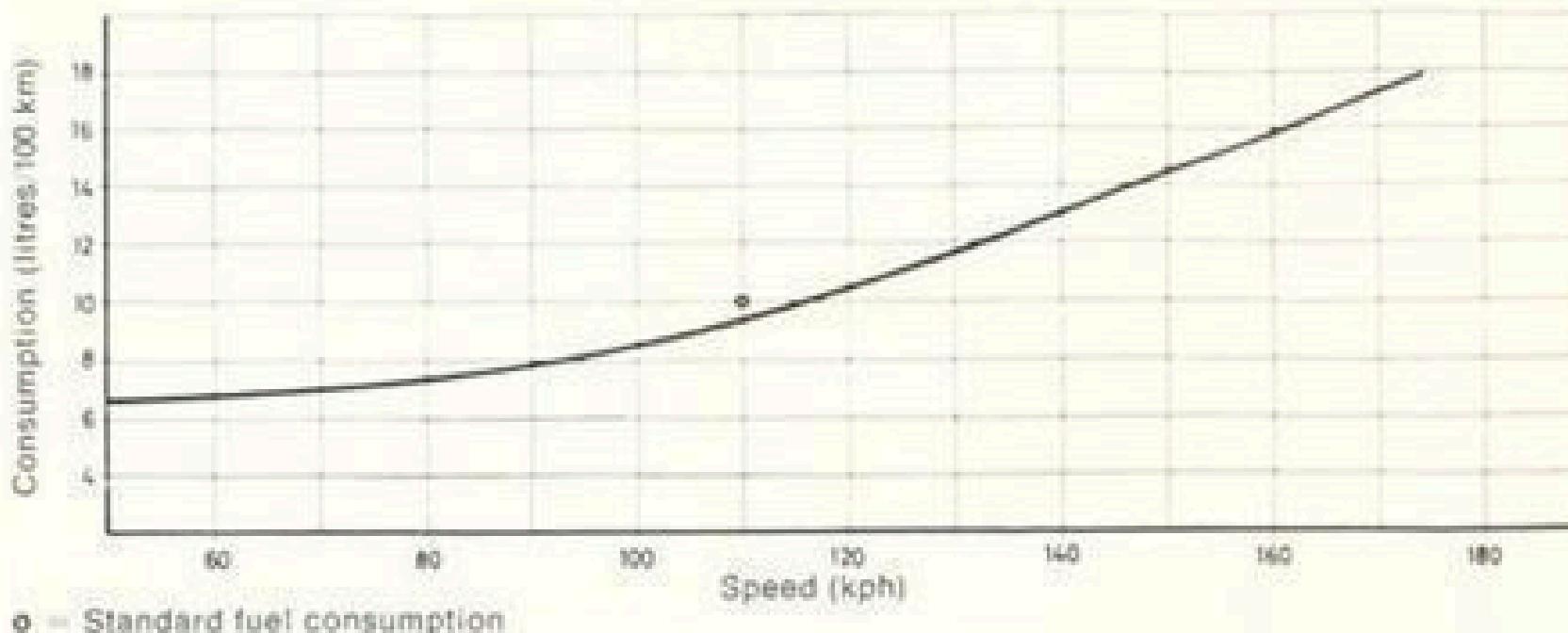
If you find yourself compelled to buy petrol with a lower octane rating, in other words with less anti-knock resistance, the following procedure should largely avoid "knocking" or "pinking" in the engine: keep the engine turning at 2500 rpm or above, change down in good time and accelerate only gently.

A graph of road speed/engine speed is shown on page 69.

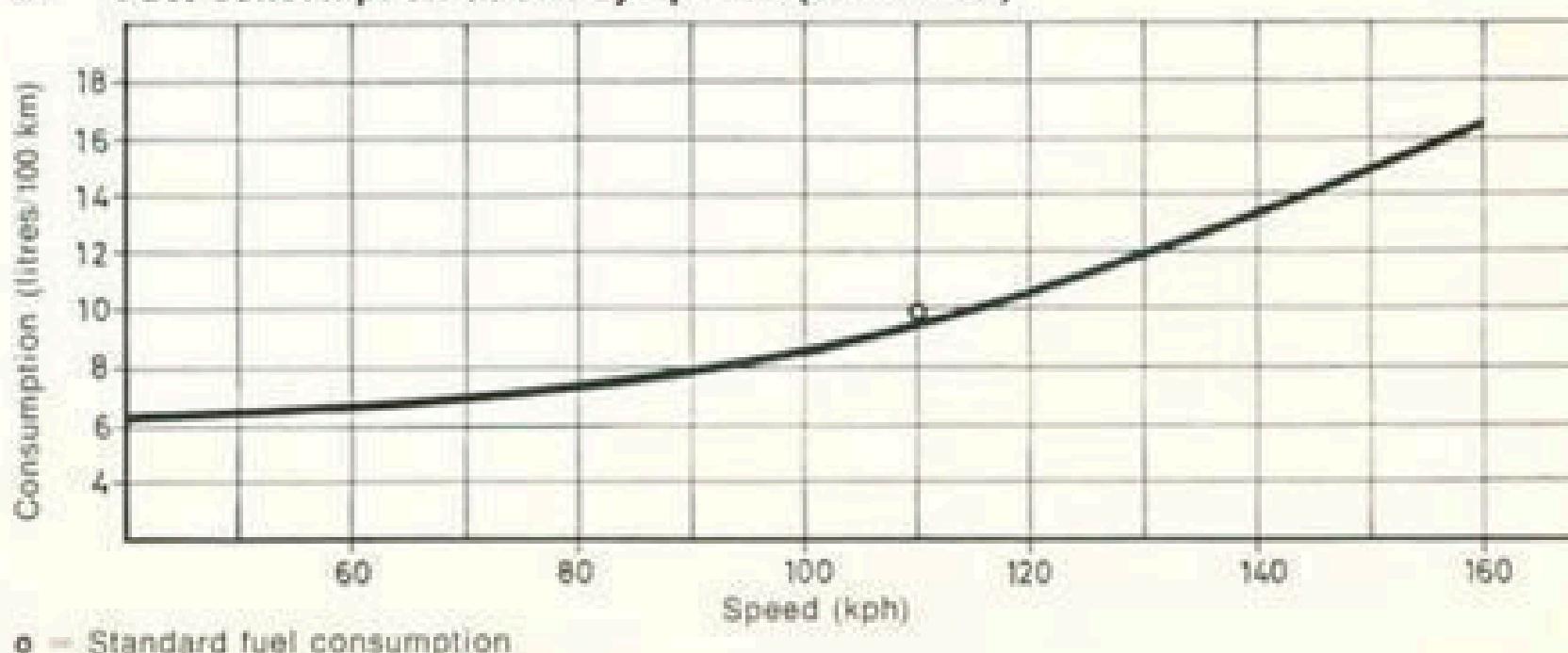
Your car's fuel economy depends mainly on your own style of driving. Just as travel by the fastest trains involves payment of a supplementary fee, so high speeds, acceleration to the limits of the gears, violent cornering and braking all take their toll, not only in terms of increased petrol and oil consumption but also through rapid tyre wear, early brake lining renewal and a more severe load on the transmission.

Figs. 38 and 39 show fuel consuption throughout the speed range for standard models with 2 passengers.

38 Fuel consumption at steady speeds (BMW 2002)



39 Fuel consumption at steady speeds (BMW 1600)



The **standard fuel consumption graph** was arrived at in accordance with the

the upper mark on the dipstick. It is use-

Warning: to remove the radiator cap

When using the car in the winter months, please take note of the following recommendations: before the really cold weather begins, add a branded anti-freeze to the **cooling water** in the proportions stated by the anti-freeze manufacturer. The total capacity of the cooling system is 7 litres (14.7 US pints / 12.3 Imp. pints). Adding a branded anti-freeze to the fluid in the **screen washer unit** will also help to keep this important component functioning correctly. The container holds approx. 1 litre (2.1 US pints / 1.8 Imp. pints).

If the normal outside temperature is less than 0° C (32° F) a branded HD engine oil of **SAE 10 W 30 grade** (not a diesel engine grade) should be used.

If the weather becomes suddenly much colder, change to this grade of oil even if a routine service is not yet due.

Do not forget to move the **flap** for automatic intake air preheat to the "winter" position during cold weather (see page 55). One essential for quick starting is a well-charged **battery**. In cold conditions the battery's efficiency falls, but the loads imposed on it are much greater than in summer.

Warning: if the battery is recharged without removing it from the car, both battery cables must be disconnected. Do this only with the car's engine switched off.

In the interests of directional stability and accurate steering winter tyres should be of the same make and type, and if possible should be fitted to all **four wheels** (and to the spare for maximum safety).

This is particularly important in the case of spiked tyres. Do not exceed 130 kph (80 mph). In the same way, a car should always be fitted with cross-ply or radial-ply tyres, **never** with a mixture of both types.

Always inflate the tyres to the correct pressures, and have the wheel rebalanced whenever the tyre or the wheel itself is changed.

When driving with **chains** in place, never exceed 70 kph (44 mph).

If parking the car in freezing conditions, engage 1st or reverse gear to hold the car firm, but do not pull on the hand-brake. This is to ensure that the brake pads and linings do not freeze solid to the discs or drums.

Blow a little graphite into the **locks** before the cold weather begins to prevent freezing. Glycerin or de-icing fluid can prevent the locks from operating correctly. If a lock freezes despite this precaution, it can be thawed by heating the key before insertion.

To prevent the **rubber seals** on the doors and lids from freezing, we recommend coating them with a little glycerin.

Chromium-plated and polished components should be protected in winter with a transparent preservative lacquer.

The **underside** of the car is undersealed at the factory. Before the cold season of the year it is a good idea to inspect the underseal and renew if necessary. Spraying with oil-based products provides no lasting protection against rust, damages rubber components beneath the car and may loosen the existing underseal. You are therefore asked to use only wax or bitum based preservatives. Your BMW dealer can recommend suitable brands. When applying underseal, carefully protect the disc brakes.

No preservative must reach the piston seals or the discs themselves.

After a heavy fall of snow, **clear the slots in front of the windscreens**, so that the heater can operate at maximum efficiency.

In winter it is wise to carry with you in the luggage compartment:

sand, to assist starting on icy uphill roads;

a shovel, in case the car has to be dug out of a drift;

a flat board or plank to put under the jack;

a brush and scraper for the removal of snow and ice from the body and windows.

**It can happen to anyone:
What to do in an emergency**



"Won't you spare a minute
to help a guy out of trouble?"

A flat tyre is fortunately a rare event these days. If you should be unlucky, pull to the side of the road as soon as possible and put the handbrake on. Unless you are well clear of the road you should then run back and display a warning triangle or flashing signal lamp at an adequate distance to the rear.

The **spare wheel, jack and tools** are housed in the luggage compartment under the left-hand floor panel. This is retained under light spring pressure and should be lifted up to remove.

Loosen the hexagon nut holding the spare wheel by turning it with the wheel brace. The nut also acts as a spare wheel nut in case you should lose one of the nuts during wheel-changing.

Fig. 42

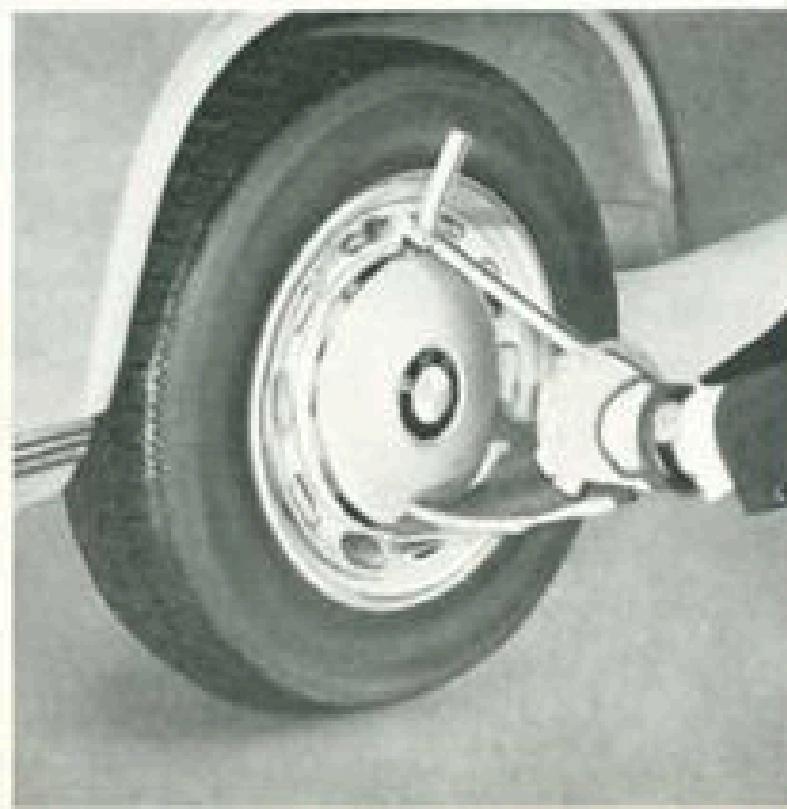


42

Carefully prise off the hub cap, using the hook provided on one end of the wheel brace. With the other hand, support the hub cap as it becomes loose. **Fig. 43**

Remove the wheel trim (BMW 2002 only) and loosen the wheel nuts slightly.

43



Set up the jack (please attach only to one of the 4 points on the body specially designed to accept it) and raise the car by turning the jack pivot nut with the wheel brace until the wheel concerned is sufficiently clear of the ground. **Fig. 44**

Screw off the wheel nuts and exchange the wheels. Replace the wheel nuts and screw up evenly all round the wheel. Lower the car with the jack, then firmly tighten the wheel nuts, working cross-wise. Refit the wheel trim (BMW 2002 only) push the hub cap over the 2 protrusions on the wheel, then strike the edge of the hub cap gently to drive it home over the third protrusion. Do not forget to have the flat tyre attended to and balanced at the earliest opportunity.

44



Starter will not turn when ignition key in "Start" position:

Test battery condition by switching on headlights and then trying starter.

1. If the lights go out slowly, the battery is insufficiently charged or has a fault. Recharge the battery or exchange it. To start the car it may be necessary to push it or have it towed. The front axle support beam is fitted with a towing eye. Fig. 45

To tow-start, engage third gear, switch on the ignition and depress the clutch pedal.

When the car is moving steadily forward, engage the clutch.

2. If the headlights go out instantly, check that the cable terminals at the battery and starter are making good contact, and tighten if necessary.
3. If the brightness of the lights does not diminish, consult your BMW dealer (a fault in the starter is indicated).

Engine will not start although starter functions correctly:

Assuming that the starting routine on page 21 was followed, and that there is enough fuel in the tank, failure to start could be due to a fault in the ignition system or the fuel supply line.

1. Check that the spark plug cables are properly in place on the spark plugs and that all cables on the coil, distributor and plug leads are making good

contact. Examine for traces of water left over from when the car was washed, in case these are causing a short-circuit.

2. Remove spark plugs and check gaps and general appearance (see p. 52).
3. Each plug can be checked by attaching the appropriate lead and laying the metal body of the plug on an unpainted part of the engine block. When the starter is operated, sparks should be seen jumping the electrode gap. If no spark is visible, attach a different plug to the same lead and repeat the test. If no spark occurs this time, the ignition distributor must be examined (see page 52).
4. To check that fuel is reaching the engine, separate the fuel supply line from the carburettor and operate the starter. If no fuel emerges from the supply line, the fuel filter (see page 51), the various fuel lines and the fuel pump must all be examined. On the other hand, if fuel is pumped through to the carburettor, unscrew the carburettor jets (see page 57) one after the other and clean them by blowing. If this fails use a single bristle from a clothes brush, dusting brush or similar, but never clean the jets with a needle, wire or other sharp object.

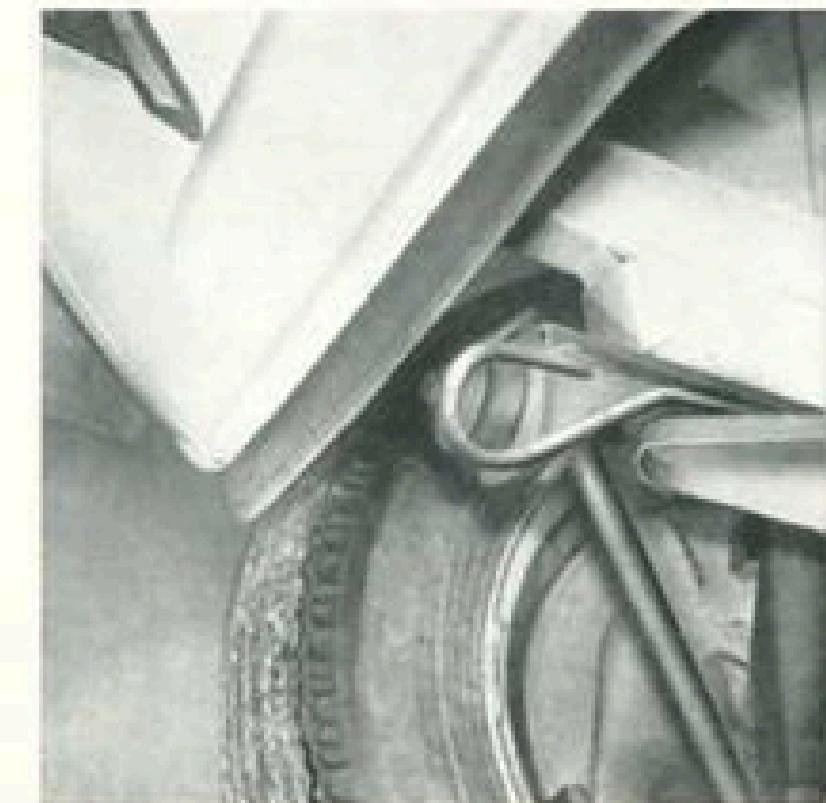
Cooling water temperature too high:

1. Carefully remove the filler cap on the radiator and inspect the water level. If a great deal of water has been lost, and the engine is hot, do not top up

the radiator straight away; wait until the engine has cooled to the extent that a hand can be placed upon it.

2. If the cooling water escapes, check the filler cap, all hose connections and the radiator block itself for leaks.
3. Make sure that any material used to blank off part of the radiator at any time has been removed when no longer required.
4. Check fan belt, and adjust tension or replace as necessary (see p. 55).
5. Check ignition timing (see p. 53).
6. If necessary, instruct your BMW dealer to flush out the cooling system.

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Faulty brakes

At the first sign that a fault may have occurred in the brake system, we strongly recommend that you contact your BMW dealer immediately.

Car brought to a standstill with the wheels spinning (deep snow, sand, soft ground, etc.):

Do not press down too far on the accelerator; before the next attempt to extricate the car is made, place some form of firm support beneath the rear wheels (in a real emergency the car's own mats can be used). Obtain help in pushing the car out of the ruts it has made before they become too deep.

Apply the handbrake to the extent necessary to prevent a single rear wheel from spinning. Do not forget to release the handbrake as soon as it has had the desired effect.

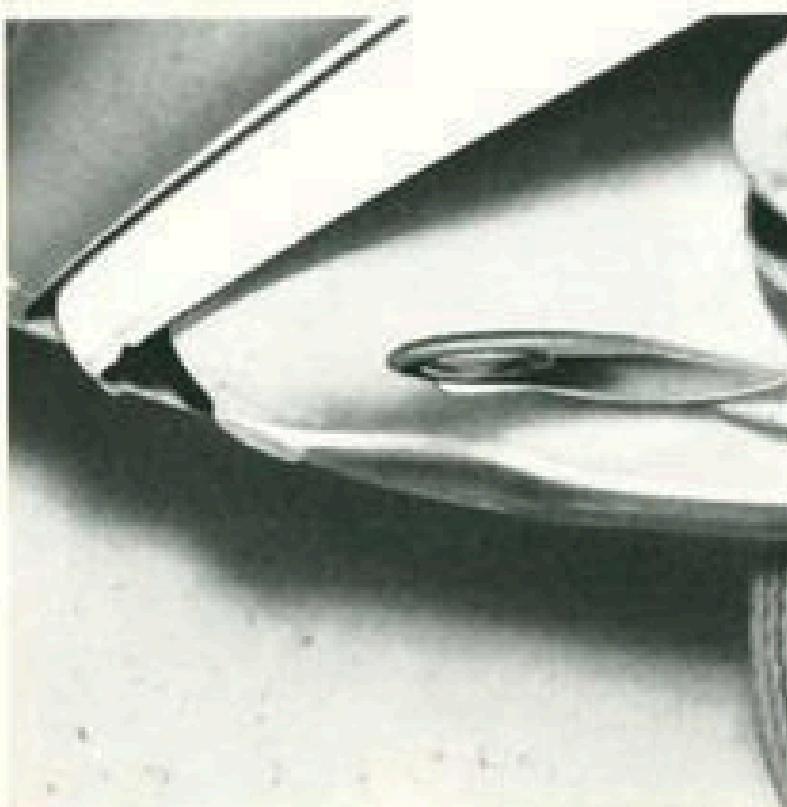
Towing another car:

If you wish to assist another motorist by towing his car with your own BMW, first ensure that the other car is not larger and heavier than your own. A towing eye is provided beneath the spare wheel well. **Fig. 46**

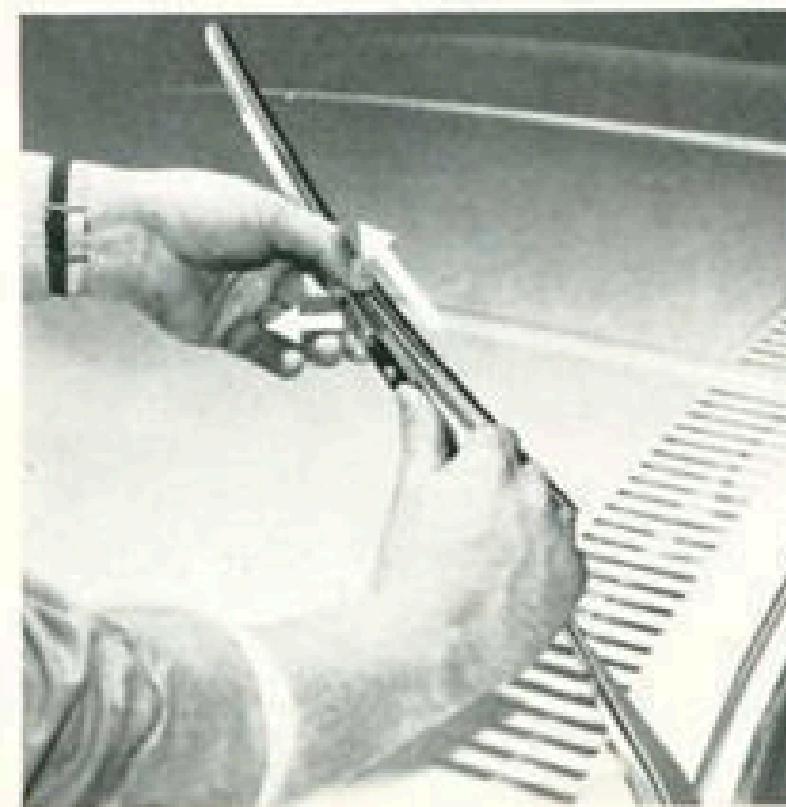
To remove a **wiper blade**, hinge the wiper arm and blade forward away from the windscreen. Press the blade out of its attachment on the arm, and withdraw upwards. **Fig. 47**

The complete **wiper arm** can be removed if its spring retainer is lifted away from the pivot shaft slightly, **Fig. 48**

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47



48



See and be seen –
lights and bulbs



"My goodness, what a bright light!"

If any power-consuming electrical component fails on your car, you should first check the fuses. The **fuse-box** is located under the bonnet at the rear end of the left-hand wheel box. **Fig. 49**

The melted metal band indicating a blown fuse can be clearly seen through the clear plastic cover of the fuse-box. Snap the blown fuse out of its spring clip fastenings and press in a replacement fuse.

Never try to replace a blown fuse with a piece of wire (this entails a fire risk). If the fuse blows repeatedly, the fault should be investigated by a specialist workshop.

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Fuse coding:

No.	Fuse insert to DIN 72581	Item
1	8 A	Rear, side and parking lights (left)
2	8 A	Number plate lights, instrument panel lights
3	8 A	Rear, side and parking lights (right)
4	8 A	Interior light, clock, cigar lighter
5	8 A	Brake and turn lights, reversing lights
6	16 A	Heater blower, horn, wiper motor, washer unit, fuel and temperature gauges, oil pressure telltale

When changing bulbs or carrying out any other work on the electrical system always switch off the item concerned in order to avoid short circuits. The earth cable can also be removed from the negative pole of the battery.

Try to avoid touching the glass of new bulbs, but handle them with a clean cloth or paper handkerchief. When removing headlight bulbs, do not disturb the setting of the beam adjustment screws.

Front flashing indicators:

Unscrew the 2 Phillips screws and remove the plastic lens and seal. Press in the round-headed bulb slightly and turn until it can be removed. Bulb rating: 21 W spherical. Part No. 63218780135.

Fig. 50

Instrument panel lights:

Before the bulbs can be changed, the padded cover below the instrument panel must be removed. The affected bulb in its holder can then be withdrawn from the rear face of the instrument concerned. The bulb is released from its holder by pressing in slightly and turning.

Speedometer:

2 indicator type bulbs, 3 W (V)

Clock:

1 indicator type bulb, 3 W (I)

Combination instrument:

Lighting:

2 indicator type bulbs, 3 W (V)

Main beam warning:

1 indicator type bulb, 3 W (V)

Battery charge warning:

1 indicator type bulb, 3 W (HL)

Oil pressure warning:

1 indicator type bulb, 3 W (V)

Turn indicating lamp:

1 indicator type bulb, 3 W (V)

Warning: A 4 W (HL) indicator type bulb must always be fitted to the battery charge warning light.

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**Main and dipped headlight beams:**

To gain access to headlights, open the bonnet and remove the plastic cover protecting the rear of the lamp. Withdraw the plug, turn the bayonet joint to the left and remove. Take out the bulb. When inserting the twin-filament 45/40 W (A) bulb, not the recess formed in the reflector to simplify fitting. **Fig. 51**

The **side and parking bulbs** (4 W indicator type, H) are held in the reflector by a small spring and can be withdrawn by pulling rearwards without difficulty.

51

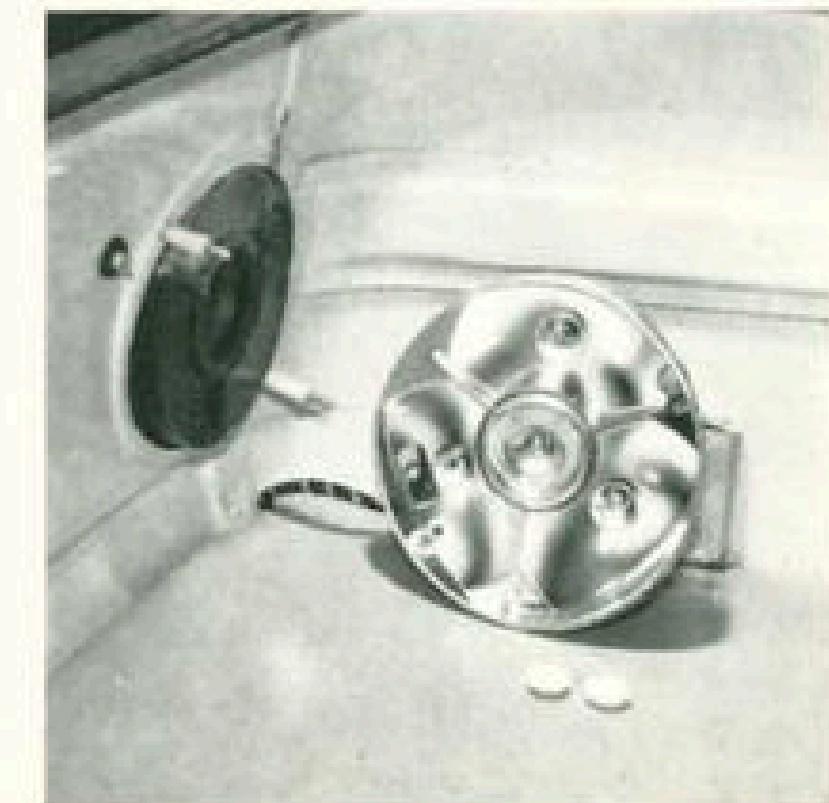
**Rear lights:**

Open the lid of the luggage compartment, unscrew the 2 knurled nuts holding each light pressing and remove the complete assembly. **Fig. 52**

Remove the defective bulb from its holder and renew as follows:

1. Flashing indicator, round-headed bulb, 21 W, Part No. 63218780135.
2. Reversing light, round-headed (F), 15 W.
3. Rear, side or parking light bulb, round headed (G), 5 W.
- 4 Brake light, round-headed, 21 W.

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Number plate light:

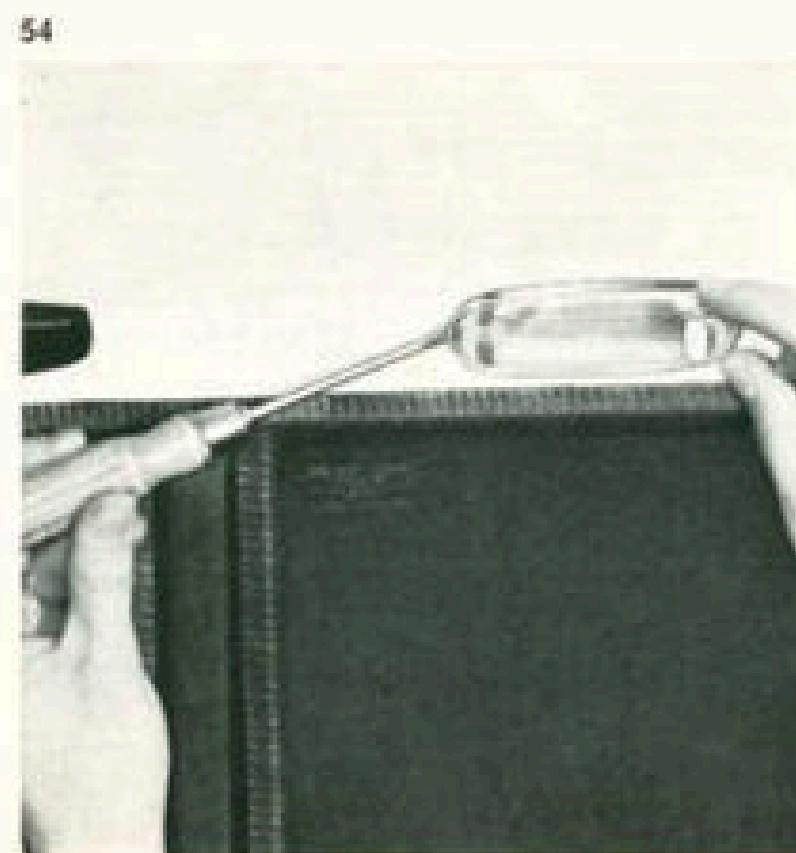
Remove 2 Phillips screws and withdraw frame complete with glass and seal.

Fig. 53

The contact clamps for the 5W (L) festoon type bulbs must have adequate spring tension and make good metal-to-metal contact with the bulb end caps. If necessary squeeze the contact clamps together slightly and clean the contact surfaces.

**Interior light:**

The lamp housing contains 1 10W (L) festoon type bulb. Using a screwdriver or similar tool, the housing can easily be removed and the bulb changed if required. **Fig. 54**



Because correct headlight adjustment is of such vital importance in terms of road safety it is best for the job to be done by a specialist workshop equipped with the proper equipment. If this is not possible, open the bonnet and turn the knurled plastic knobs until the correct setting is obtained. **Fig. 55**

- 1 Vertical adjustment
- 2 Horizontal adjustment



Follow the routine described below to adjust the headlamps if the proper equipment is not available:

Position the vehicle on a flat level surface at approx. 5 meters (16') from a light-coloured wall. Mark a point on this wall which coincides with the car's longitudinal centre-line.

Extend the centre-line vertically up the wall to give line v-v. Fig. 56

Get someone to sit in the centre of the rear seat. Measure the actual height of the headlamp centres above the ground, and transfer this height to the wall, marking out horizontal line h-h.

Mark line a parallel to h-h and 5 cm (2") below it.

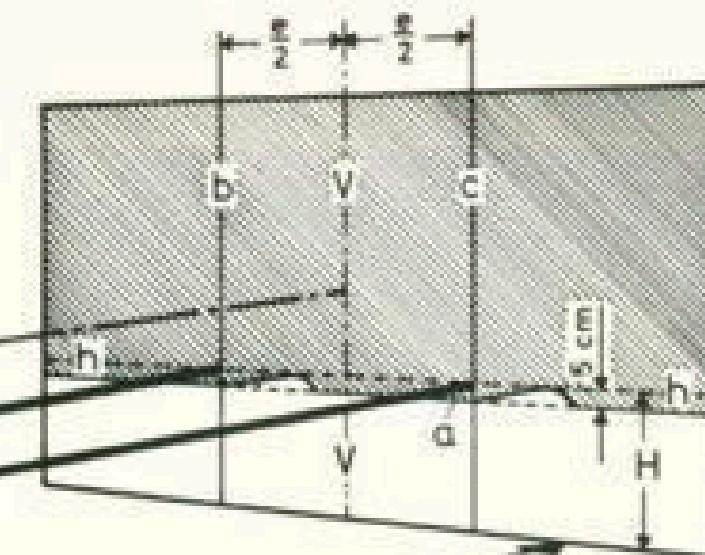
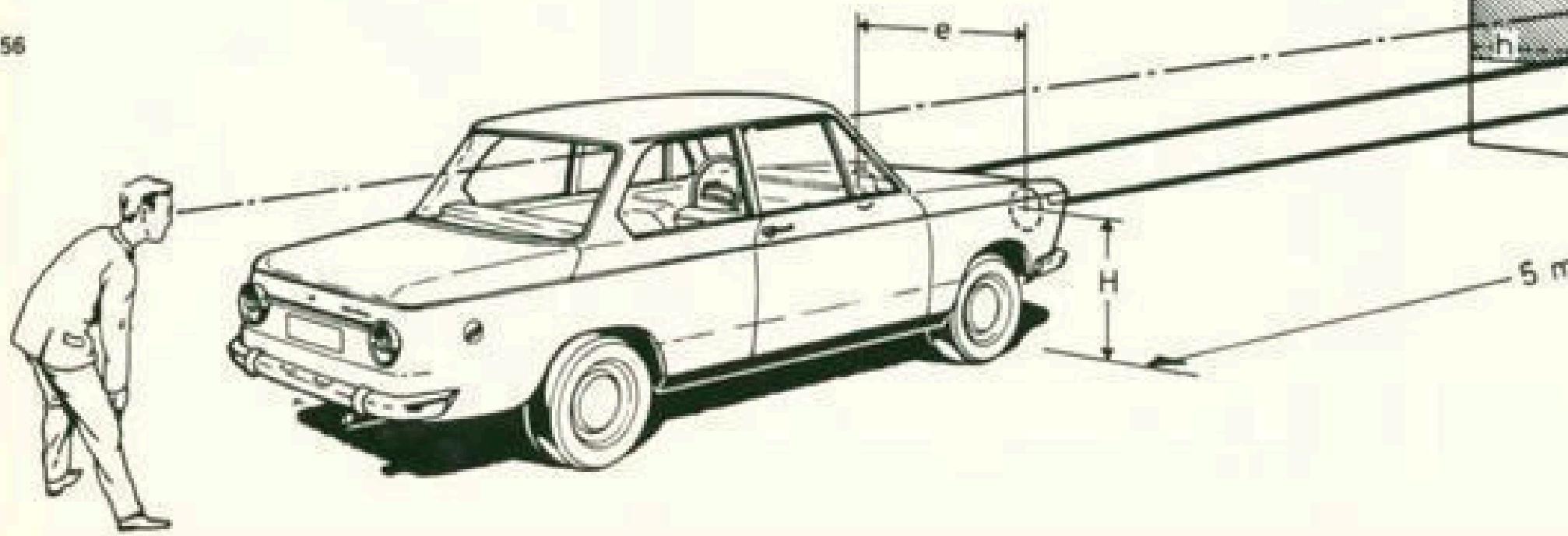
Measure the distance separating the headlamps horizontally (e); divide this amount symmetrically and mark lines b and c on the wall at the corresponding distances from vertical centre-line v-v.

Headlamp adjustment with dipped beam only:

Cover up one headlamp. Set the other headlamp to the correct height by turning knurled knob 1 (Fig. 55). The height is correct when the lefthand side of the horizontal light/dark border coincides with line a. Next move knurled horizontal adjustment knob 2 (Fig. 56) until the junction between the horizontal part of the border and the part angled upwards at 15° coincides exactly with vertical line b (or c).

Repeat the procedure for the second headlamp.

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If Sealed-Beam headlights of the American pattern are fitted, adjust as follows: Use an optical or photo-electric beam-setting device and follow the manufacturer's instructions. If no suitable device is available, park the car on a flat level surface at 7.6 metres (25 feet) from a light-coloured wall. Inflate the tyres to the correct pressures and get someone to sit in the centre of the front seat. Extend the car's centre-line forward to the wall and mark vertical line V on the wall.

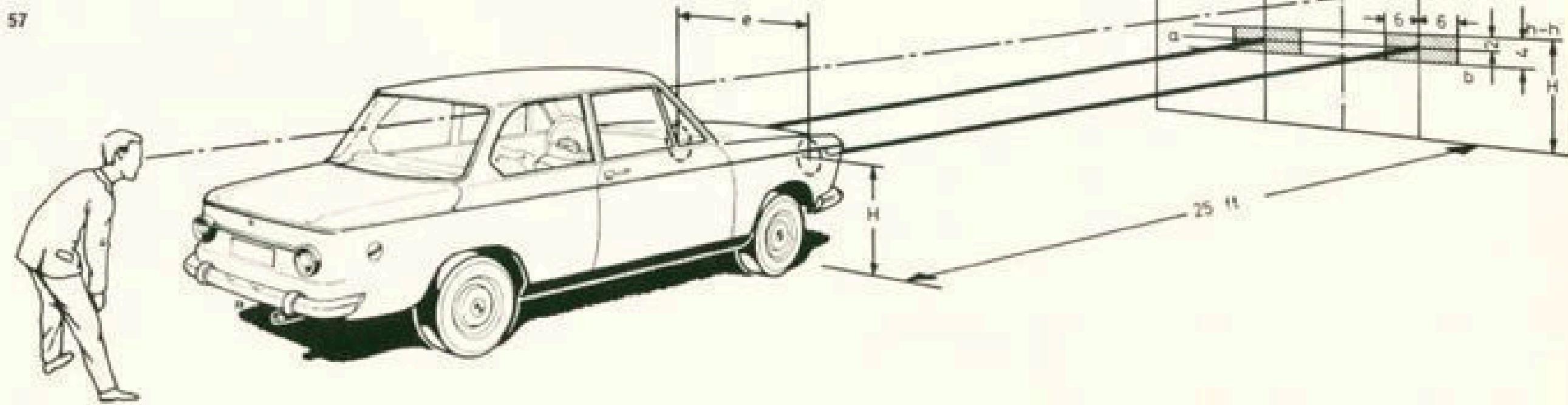
Next mark horizontal line h-h at the height of the headlight centre line, with distance H approx. 66 cm (26½"). Mark lines a and b 5 cm (2") and 10 cm (4") below and parallel to line h-h. Transfer the distance between the headlight centres (approx. 110 cm/44") on to the wall, and mark lines c and d symmetrically on either side of centre line V. Distances e/z to right and left must be exactly the same.

Mark additional vertical lines to right and left of lines c and d, and 15 cm (6") from them. This will form rectangles, the centre-lines of which can be used to align the headlight beams. Fig. 57

Adjust only on full beam

For vertical adjustment, turn the upper knurled plastic knob; for sideways adjustment the knob at the side (see Fig. 55). The headlight is correctly adjusted as soon as the centre of the brightest circular section of the beam strikes the intersecting lines in the shaded areas or falls somewhere within these areas. The second headlight is then adjusted similarly.

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What must be, must be:



"Let me tell you, Mister BMW,
my rear wheel squeaks horribly!"
"Not surprising, young man,
if you forget the regular inspections!"

Care and maintenance

Care and maintenance

A brand new car always looks magnificent. How yours will look after years of willing service is quite another matter, and depends on the trouble you take to look after it.

Please do not wash the car in direct sunlight, nor when the bonnet top is still warm, as patches may develop in the paintwork.

Road dirt and dust contain many chemicals which can damage the paintwork if allowed to remain in place for too long. For this reason any car – particularly a new one – should be washed as often as is practicable.

Traces of tar, dead insects or marks caused by thrown up stones should be removed without delay or touched up where necessary. This will prevent the discolouration of the paintwork or the formation of rust at the affected spots.

Clean out the interior of the car with a brush or vacuum cleaner.

The paintwork should be cleaned down with a fine spray of water, and all traces of dirt hosed away.

Do not direct the hose into the heater intake slots in front of the windscreen. After hosing down, wash the car with abundant warm water using a sponge or

wash-leather glove, and starting with the roof. Rinse the sponge at frequent intervals.

Wash the lower part of the body and the wheels last of all and if possible keep a separate sponge for these areas.

After washing, spray the car down most thoroughly a second time and dry off with a clean leather, so that no marks are left by residual water.

If the car cannot be cleaned by washing with water alone, it should be treated with a reputable make of car cleaner or shampoo, mixed with the water in the proportions specified by the maker of the product. The car should then be washed or hosed down with an abundant supply of water. Too frequent use of shampoos and cleaners removes oil from the paintwork, which then tends to become brittle, necessitating the application of a good-quality paintwork preservative.

It is easy to tell when your car's paintwork needs the application of a polish or preservative: the water no longer forms round globules when it comes into contact with the paint surface.

Whatever branded product you apply to your car's bodywork should always be used in strict accordance with the maker's instructions.

Minor paintwork damages may be repaired with the aid of a BMW paint spray

tin. You will find the respective colour code in a reference label located near the maker's plate.

Chromium plated and polished parts should be cleaned with water or with soapy water if very dirty. A branded chrome protector can then be applied.

Patches of tar should never be removed with a hard object such as a knife. Use instead a proprietary tar remover.

Rubber parts may be washed down with water, but no other substance should be allowed to contact them with the exception of pure glycerin.

Clean the wiper blades with soapy water. The blades will normally require replacement at least once a year.

White-wall tyres are delivered with a protective coating, and after the tyres have been fitted the coating may be removed by brushing in warm soapy water. If the white walls become exceptionally dirty a proprietary brand of special cleaner will normally restore them without difficulty.

Stains on the cloth upholstery can be removed with stain remover, but the product should not be allowed to come into contact with any real or artificial leather.

Real and artificial leather can be wiped down with a damp cloth and immediately dried using a separate drying cloth.

When you take delivery of your car you will also receive a **Service Booklet**, in which your name and details of the car will have been entered. After carrying out the **free pre-delivery inspection**, your BMW dealer will remove the appropriate section in the booklet and will make an entry to confirm that the work has been done. The same procedure will be followed when it is time for your 1st inspections at 1500 km (1000 miles).

Your BMW dealer will also put an adhesive label on the driver's door post (**Fig. 58**) to remind you when the next service is due. You will receive confirmation that this and all other specified services have been carried out when you look in the appropriate area of the

58



service booklet. Always ensure that the confirming entries are correctly made; if it is ever necessary to make a claim under the warranty this evidence may be required, and you will in any case be glad later on to have this clear proof that your car has been well looked after. We strongly recommend you to have the

prescribed services and inspections carried out at the **correct intervals** by your BMW dealer. This is the only safe way of ensuring that all the work has been done in accordance with the latest works' standards. A list giving details of the widespread BMW dealer network is supplied to you on delivery, so that your car can receive proper attention even if you have traveled a long way from your normal garage.

To ensure the reliability and long life of your car we advise a **minimum of twice-yearly inspections**, even if the mileage laid down between services has not yet reached the correct figure.

1st Inspection after 1500 km (1000 miles)

1. Change oil in engine together with filter element, while engine is warm.
2. Change oil in gearbox while engine is warm.
3. Change oil in final drive while warm.
4. Check oil content and oiltightness of rear half-shaft sliding joints and

gaiters, and top up as necessary (no-maintenance half-shafts will not require topping up).

5. Check steering box oiltightness and top up if necessary.
6. Check level of water in radiator and top up if necessary. In winter check anti-freeze.
7. Examine brake lines and connections for leaks, damage or distortion. Check level of brake fluid in reservoir ($\frac{3}{4}$ full) and top up if necessary.
8. Clean out fine mesh sieve and filter bowl in fuel pump. Tighten screws on fuel pump.
9. Tighten screws and nuts on carburettor.
10. Check automatic intake air pre-heat valve for freedom of movement, and operating lever setting for summer/winter adjustment.
11. Check V-belt tension (5–10 mm / 0.2–0.4" movement in response to finger pressure) and re-tension if necessary.
12. Inject 2 drops of engine oil into the ignition distributor oil nipple.
13. Take up any slack on all engine bolts and nuts to the required torque levels (see Specification). Check nuts on engine mountings (right and left), inlet manifold and exhaust pipe, exhaust pipe flange and oil sump. With the engine cold or the water temperature not in excess of 35°C (95°F), tighten the cylinder head bolts (for order of tightening, see sketch).



14. Check valve clearances (inlet and exhaust 0.15–0.20 mm / 0.0059" to 0.0079"); contact breaker gap (0.4 mm / 0.016"), dwell angle (60°) ignition point (3° bTDC, using a 12 V test lamp). These tests also to be carried out with the engine switched off and cold or with a max. water temperature of 35° C (95° F). Adjust as necessary.
15. Tighten all bolts and nuts on front axle, steering, gearbox, drive shafts, rear axle and brakes to the torque levels specified in the Specification for these parts.
16. Tighten all bolts and nuts throughout the bodywork and exhaust system.
17. Check steering in straight-ahead position for absence of play, and adjust if necessary.
18. Test foot brake and adjust (rear only) as necessary. Bleed the brake system. Check handbrake and adjust as necessary.
19. Check clutch operating clearance (3.0 mm / 0.12" at thrust rod) and adjust if required.
20. Check front wheel bearing radial play and adjust if required.
21. Check tyre pressure and correct if required.
22. Rebalance all four road wheels if necessary (to be invoiced separately).
23. Check headlamp settings and correct if necessary.
24. Carry out final check on items affecting road safety (brakes, steering, clutch, instrument readings, control knobs and horn). Check carburettor idling settings and adjust if required.

Service

every 12 000 km (8000 miles)
beginning at 6000 km (4000 miles)

1. Change engine oil while engine is warm. Renew oil filter element.
2. Grease cardan shaft (BMW 2002 only) and half-shaft universal joints (no-maintenance half-shafts do not require greasing).
3. Check cooling water level (in winter also check anti-freeze) and top up if required.
4. Check acid level in battery and top up if necessary with distilled water. Clean exterior of battery and grease terminal posts with special grease.
5. Inlet air silencer: carefully knock out all dust from air filter element and blow through with air from the inside. If the element is very dirty, renew.
6. Examine brake lines and connections for leaks, damage and distortion. Check level of brake fluid in reservoir (3/4 full) and top up if necessary.
7. Carry out final check on items affecting road safety and operation (brakes,

steering, clutch, instrument readings, control knobs, rear view mirror, lights, headlight beam settings, horn). Check carburettor idling settings and adjust if required.

Inspection

every 12 000 km (8000 miles)
beginning at 12 000 km (8000 miles)

1. Change oil in engine and oil filter while engine is warm. Renew filter element.
2. Check gearbox oil level and top up if necessary (every 24 000 km/16 000 miles, change the oil while the gearbox is warm).
3. Check final drive oil level and top up if necessary.
4. Half-shaft sliding joints: check oil level and oiltightness of sleeves (every 24 000 km/16 000 miles change the oil). No oil change is required on no-maintenance half-shafts.
5. Steering box: check oil level and top up if required.
6. Check level of cooling water in radiator, and top up if necessary. In winter also check anti-freeze.
7. Check battery acid level, and top up with distilled water if required. Clean exterior of battery and grease terminal posts with special grease.
8. Check level of brake fluid in reservoir (3/4 full) and top up if required.
9. Clean out sieve and bowl of fuel pump, and tighten screws on fuel pump.

10. Check automatic air intake pre-heat valve for freedom of movement and correct setting of lever for summer and winter operation.
11. Check V-belt tension (5–10 mm/0.2–0.4" movement in response to finger pressure) and re-tension if necessary.
12. Inject 2 drops of engine oil into the ignition distributor oil nipple.
13. Oil joints and bearing of the carburettor linkage.
14. Renew spark plugs. Spark plugs with normal electrodes every 12000 km (8000 miles), spark plugs with platinum electrodes according to maker's instructions.
15. Take off the distributor rotor and let a few drops of engine oil soak into the lubricating pad in the distributor shaft.
Warning: no oil must overflow or come into contact with the contact breaker points. Rub a little Bosch Ft 1 v 22 grease lightly on to the base plate guide ball track. Apply a small quantity of Bosch Ft 1 v 4 grease to the heel of the contact breaker rocker arm.
16. Tighten all bolts and nuts on the engine (see Specification for torque levels to be observed); tighten cylinder head bolts as prescribed below while the engine is cold or the water temperature not exceeding 35° C (95° F). Tighten right- and left-hand engine mounting bolts, bolts and nuts on inlet and exhaust manifolds, exhaust pipe flange, carburettor and fuel pump mountings and oil sump.
17. Check valve clearances (inlet and exhaust 0.15–0.20 mm/0.0059–0.0079") contact breaker gap (0.4 mm/0.016") dwell angle (60°) and ignition point (3° bTDC, using a 12 V test lamp) with the engine switched off and cold, or a max. water temperature of 35° C (95° F). Adjust as necessary.
18. Renew intake air silencer filter element.
19. Check steering for absence of play in straight-ahead position, and adjust accordingly. Check condition of track rod joints.
20. Final drive and half-shafts: check condition of rubber couplings; examine universal and sliding joints and grease (no maintenance half-shafts require no greasing).
21. Tighten the following bolts and nuts (keep to correct torque values shown in Specification): front axle, steering, gearbox, half-shafts, rear axle and brakes.
22. Disc brakes: check overall thickness of pads not to fall below 7 mm (0.276"); examine surface of discs, if necessary replace pads.
23. Front wheel bearings: check play and adjust if necessary.
24. Change round running wheels in the prescribed manner. Check tyre pressures and correct if necessary.
- Check condition of tyres. If uneven wear is evident, check toe-in. Optional complete check and correction of wheel position measurements (cost to be shown separately).
25. Balance all four running wheels (cost to be shown separately).
26. Check clutch clearance (3.0 mm/0.12" at thrust rod) and adjust if necessary.
27. Check brake lines and connections for leaks, damage or distortion. Clean out brake drums and linings and examine for wear. Check that handbrake cables move easily. Adjust brakes.
28. Tighten all bolts and nuts on body-work and exhaust system.
29. Oil door, bonnet and luggage compartment hinges. Lightly grease bonnet and luggage compartment lid catches as well as door strikers and latches. Test for correct operation.
30. Apply a light coating of glycerine to the outer faces of the door sealing rubbers, swivelling window rubbers and other rubber mating surfaces.
31. Check headlight beam settings and adjust if required.
32. Carry out final check on all items affecting road safety (brakes, steering, clutch, instrument readings, control knobs, rear view mirror, lights and horn). Check carburettor idling settings and adjust if necessary.

Details of maintenance routines

The engine oil should be changed only when it has become warm by running the engine for a period. Oil changes are necessary: during the summer months every 6000 km (4000 miles), during the remainder of the year, every 3000 km (2000 miles). If use of the car is confined to intensive local journeys, change the oil every month.

Unscrew the oil drain plug (19 mm) on the right-hand lower part of the sump, allow the old oil to run out and retighten the plug firmly. **Fig. 59**

59



Total oil capacity: 4 litres (8.5 US pints/7 Imp. pints) + 0.25 litre (0.53 US pints/0.44 Imp. pints) if the oil filter is changed.

Fill to the upper mark on the dipstick never higher.

Oil grade: for outside temperatures above 0° C (32° F), any branded HD petrol engine oil, grade SAE 30; for outside temperatures below 0° C (32° F) grade SAE 10 W 30.

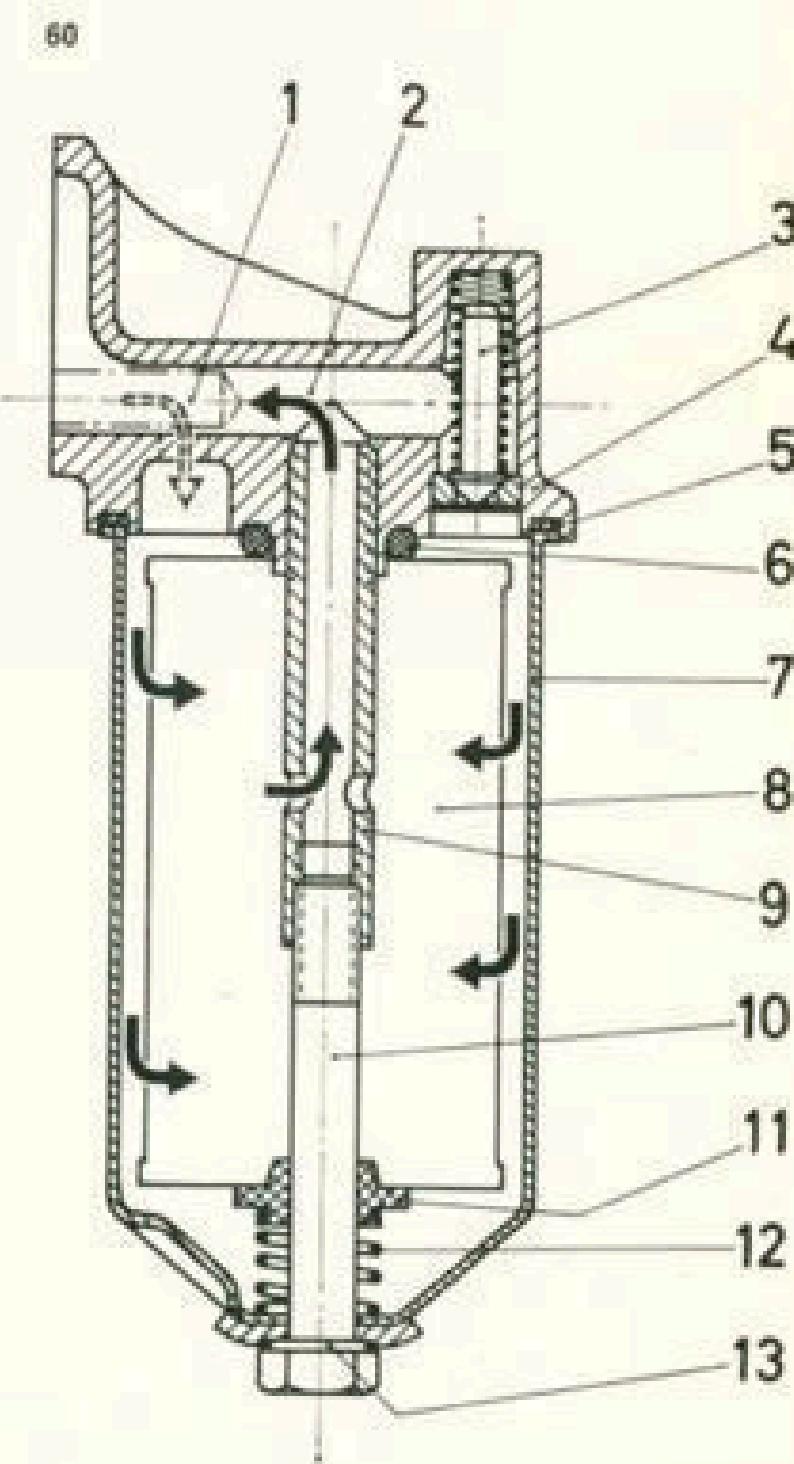
Change oil filter element every 6000 km (4000 miles) when engine oil is changed.

Unscrew holding bolt (17 mm) and remove it, together with the sealing ring and the filter casing, leaving the upper part of the filter in place.

Clean the casing, renew the element, inspect the sealing ring for damage and re-assemble. **Fig. 60**

Full-flow Oil filter (Fig. 60)

1. Oil input from pump
2. Filtered oil to lubrication points
3. Pressure relief valve
4. Upper part of body
5. Sealing ring
6. Rubber sealing ring
7. Filter casing
8. Filter element
9. Outlet tube
10. Holding bolt
11. Rubber seal
12. Spring
13. Sealing ring



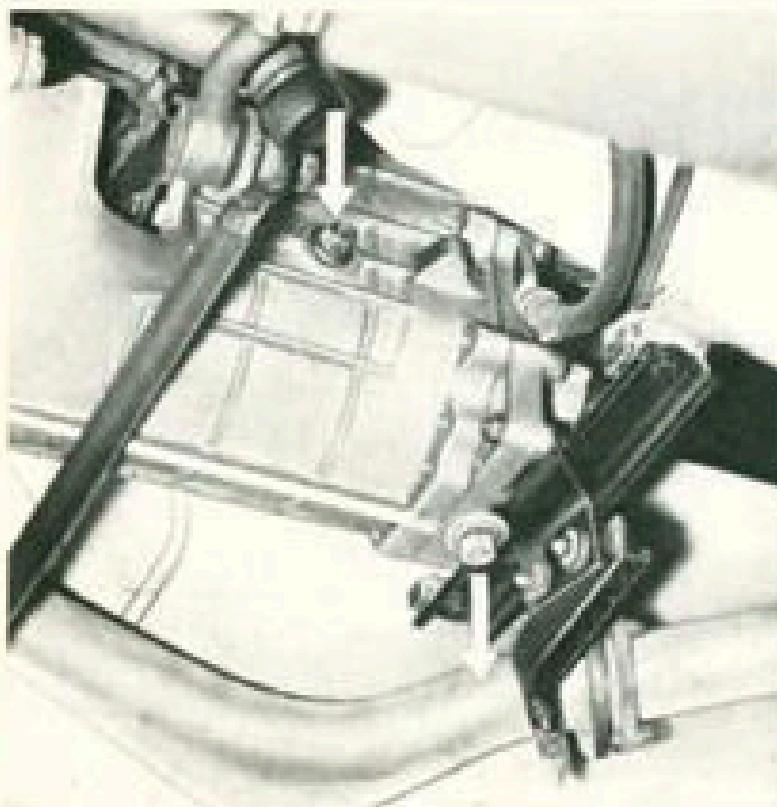
Change the oil in the gearbox only when it has become warm. The change should be made every 24 000 km (16 000 miles). Unscrew first the oil drain plug (17 mm), then the oil filter plug (14 mm) on the left-hand side of the gearbox. This will assist the oil in draining more rapidly. When fully drained, screw back the drain plug firmly into place. Both drain and filler plugs have conical threads, and should therefore not be replaced by plugs having metric threads. **Fig. 61**

Total oil capacity: 1 litre (2.1 US pints/1.8 Imp. pints).

Correct oil level: to underside of filler aperture.

Oil grade: any branded SAE 80 gearbox oil (not hypoid gear oil).

61



Change oil in the **half-shaft sliding joints** every 24 000 km (16 000 miles). No oil change is required on no-maintenance half-shafts. Turn the rear wheel until the combined filler/drain plug (11 mm) is pointing downwards. Unscrew the plug and let the oil away. **Fig. 62**

To refill the joint with oil, the wheel must again be turned until the orifice is pointing upwards at 45°.

Total capacity of each joint:

180 cc (6.3 fl. oz.).

Oil level: to lower edge of filler orifice. Checking is assisted by the transparent gaiter covering the joint.

Oil grade: branded hypoid gear oil, SAE 90.

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Change the oil in the **final drive** at 1500 km (1000 miles), when it has become warm.

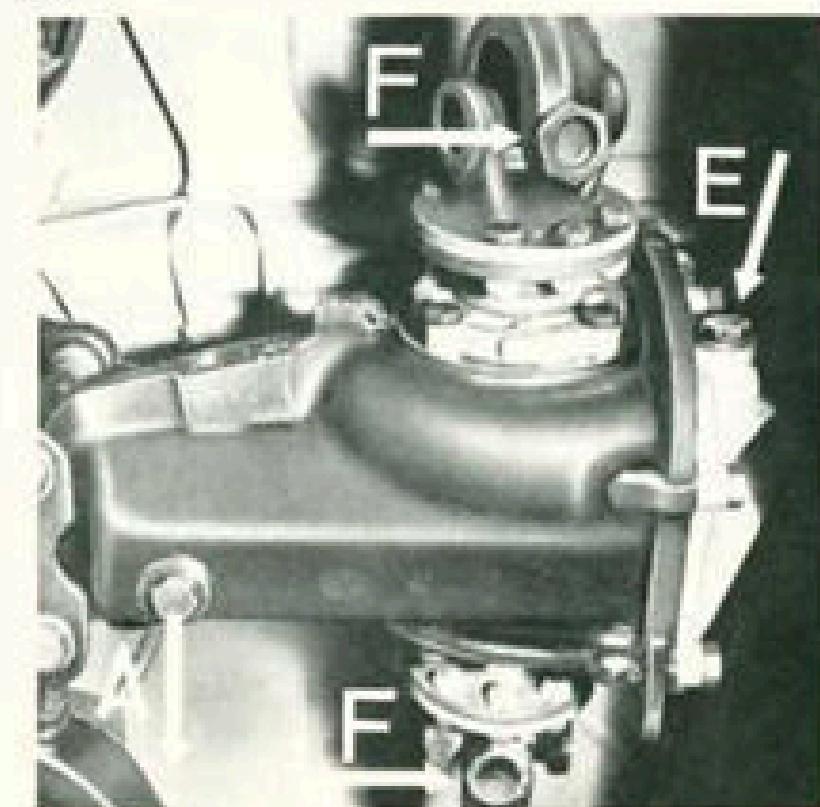
Unscrew oil drain plug A (19 mm) and then oil filler plug E (19 mm) on the left-hand side of the final drive casing. This will help the oil to escape more quickly. Clean the drain plug and replace, screwing home firmly. **Fig. 63**

Total oil capacity: 0.9 litre (1.9 US pints/1.6 Imp pints).

Oil level: to lower edge of filler orifice. Check every 12 000 km (8000 miles).

Oil grade: branded hypoid gear oil, SAE 90.

63



The 2 half-shaft universal joints (Fig. 63 F) should be greased every 6000 km (4000 miles). This applies to BMW 1600 only.

Grease: branded multi-purpose grease, drip point 180° C (355° F).

Greasing hinges, pivots etc.:

From time to time, apply a few drops of an oil containing graphite to the pivot and support points of the carburettor linkage, bonnet and luggage compartment lids and catches, door stays and hinges. Fig. 64

64



The **steering box** is permanently oil-filled, and thus no drain plug is fitted. The oil level should be checked every 12 000 km (8000 miles). Fig. 65

Total oil capacity: 300 cc (10.5 fl. oz.).

Oil level: to lower edge of filler orifice.

Oil grade: branded hypoid gear oil, SAE 90.

The **idler arm bearing** on the front axle beam opposite the steering box is also maintenance-free.

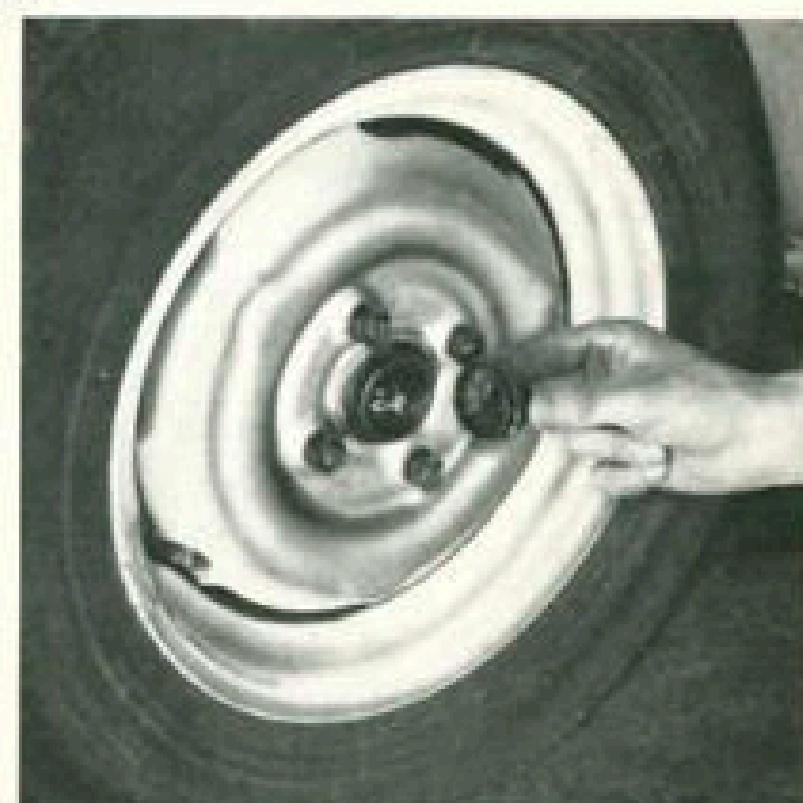
65



The **wheel bearings** should be serviced only by a BMW dealer; every 60 000 km (40 000 miles) the grease content should be checked and grease added if required. Fig. 66

Grease: branded multi-purpose grease, drip point 180° C (355° F).

66



The transparent **hydraulic brake fluid reservoir** is located on the left-hand side of the engine compartment. It enables a visible check on brake fluid level to be carried out. **Fig. 67**

We recommend inspection at least every 6000 km (4000 miles). Be careful not to allow brake fluid to contact the paint.

Lubrication of ignition distributor:
Every 12000 km (8000 miles):

Apply a narrow layer of Bosch Ft 1 v 4 grease to the **fibre heel** of the contact breaker rocker arm.

Coat the baseplate guide **ball track** lightly with Bosch Ft 1 v 22 grease.
Fig. 68

Apply 2 drops of engine oil to the outer nipple of the distributor shaft and retighten nipple. **Fig. 69, right**

Warning: no oil must overflow or be allowed to reach the contact breaker points. Excess oil in the distributor can cause misfiring, and oil vapour present causes the contact breaker points to

The top part of the battery should always be kept clean and dry. The **terminal clamps and posts** can be protected against corrosion by an application of Bosch Ft 1 v 40 anti-acid grease.

Fig. 76

Warning: make sure that no acid or lead oxide from the terminals reaches your clothing. Do not bring a naked light near the battery, as there is a risk of explosion.

Every 6000 km (4000 miles) the **air intake silencer filter element** should be removed, by undoing the over-centre catches, and examined to see how much dirt it contains. Dirt adhering to the element can be carefully knocked off and blown out from the inside; if the element is severely contaminated, however, and in any case after every 12 000 km (8000 miles), the element should be renewed.

Fig. 77

Continuing use of a choked air filter

Clean the **fine mesh filter** and bowl in the fuel pump by taking off the fuel pump cover plate (8 mm bolt and sealing ring), and extracting the nylon fine mesh sieve and cleaning out the bowl. Do not fit the same sealing ring when replacing unless it is in good condition.

Fig. 78

The 6 cheese-headed screws on the fuel pump should be tightened evenly with a screwdriver.

Check valve clearances and adjust if necessary every 12 000 km (8000 miles). The engine should be at rest and cold, or the water temperature not higher than or the water teperature not higher than breather connecting hose. Fig. 85

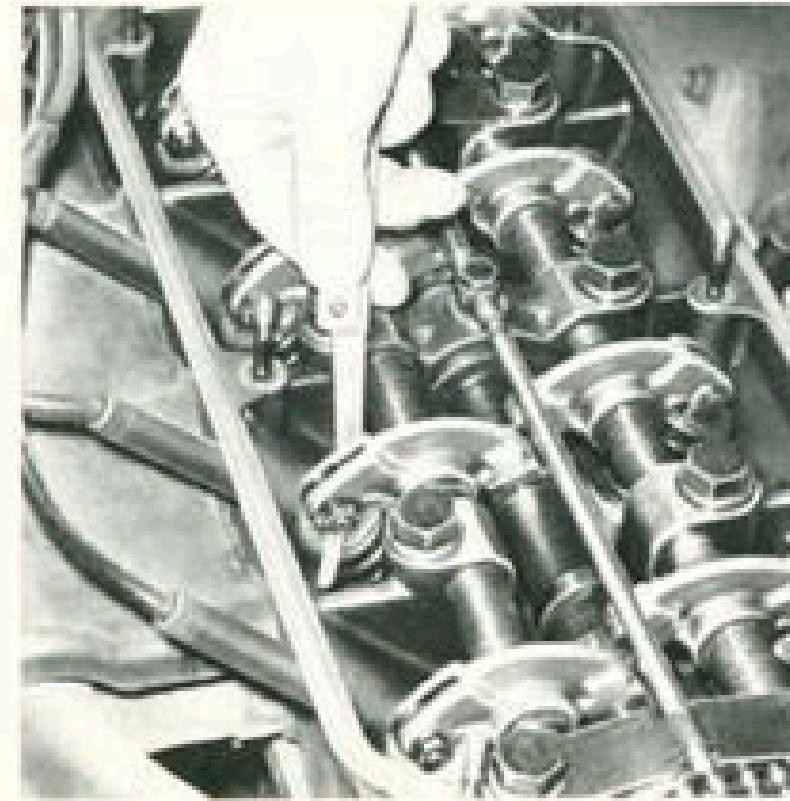
Take off the valve cover (6 nuts and 1 bolt, 10 mm, with washers). Make sure the ignition lead clip is freed before removing cover.

85



The correct valve clearance for both inlet and exhaust valves is 0.15–0.20 mm (0.0059–0.0079"). To measure, a feeler gauge should be inserted between the valve and the rocker; all measurements and adjustments should be carried out in a cylinder order **corresponding to the firing order: 1–3–4–2**, and at TDC for each cylinder on the compression stroke. Fig. 86

86

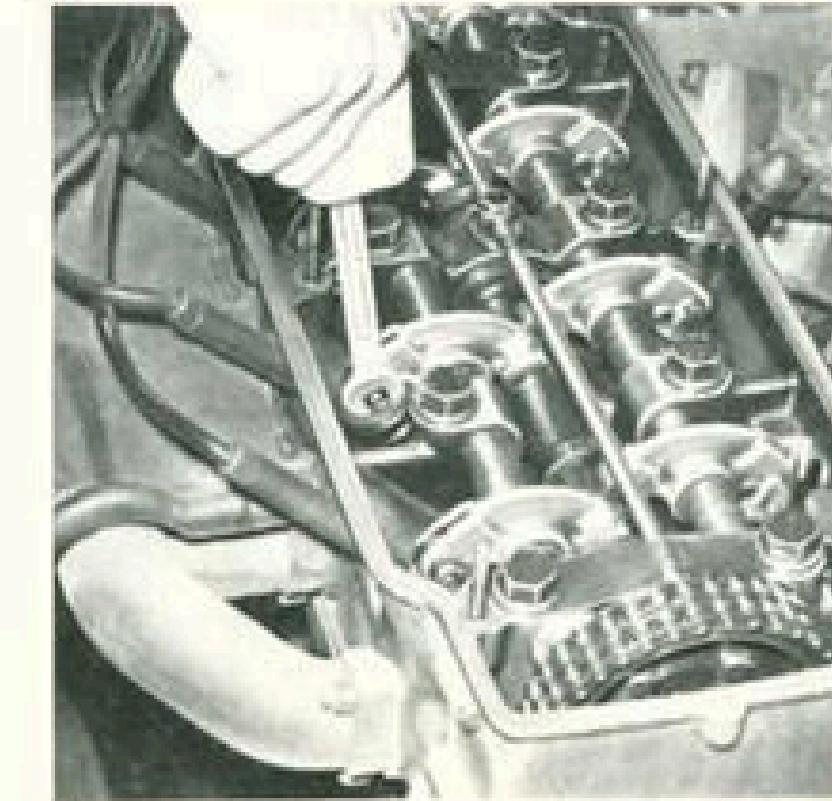


The compression stroke TDC is reached when the valves of the cylinder next but one in the firing order are on the overlap:

TDC position Cylinder No.	Valve overlap Cylinder No.
1	4
3	2
4	1
2	3

To adjust valve clearance, loosen the hexagon nut (10 mm) on the rocker. Fig. 87

87



Using a piece of 2.5 mm (0.1") steel wire bent in a slight angle, turn the eccentric adjuster until the correct clearance can be measured. **Fig. 88**

Re-tighten the hexagon nut and check that the clearance has not altered.

Check V-belt tension

every 12000 km (8000 miles).

The V-belt is correctly tensioned if it can be pushed down by 5–10 mm (0.2 to 0.4") with the finger in the centre of the top run, between the alternator and the fan pulley. **Fig. 89**

Resetting V-belt tension:

Loosen the upper and lower alternator securing bolts (13 mm) and move the

alternator bodily to one side on the tensioning strap.

Renewing V-belt:

Loosen upper and lower alternator securing bolts (13 mm) and move the alternator as close as possible to the engine. Pass the new V-belt over the fan and the crankshaft, fan and alternator pulleys, seat in pulley grooves and set correct tension as above.

The **automatic induction air pre-heat valve** is located in a housing to the right of the radiator. Every 12000 km (8000 miles) the lever should be placed in the winter (W) setting and the valve's freedom of movement checked. If necessary, oil the valve.

In the "W" position air drawn in at the front of the car is mixed with air pre-heated round the exhaust manifold in proportions dependent on outside and engine temperatures, until it reaches approx. 30° C (86° F). At approx 30° C (86° F) outside temperature the pre-heat supply hose is completely closed and the car obtains all its induction air supply from the fresh air hose.

In summer, the external lever should be used to set the valve to position "S" (see also transfer on valve housing cover plate. The cover plate can be removed for inspection purposes by unfastening one slotted screw). **Fig. 90**

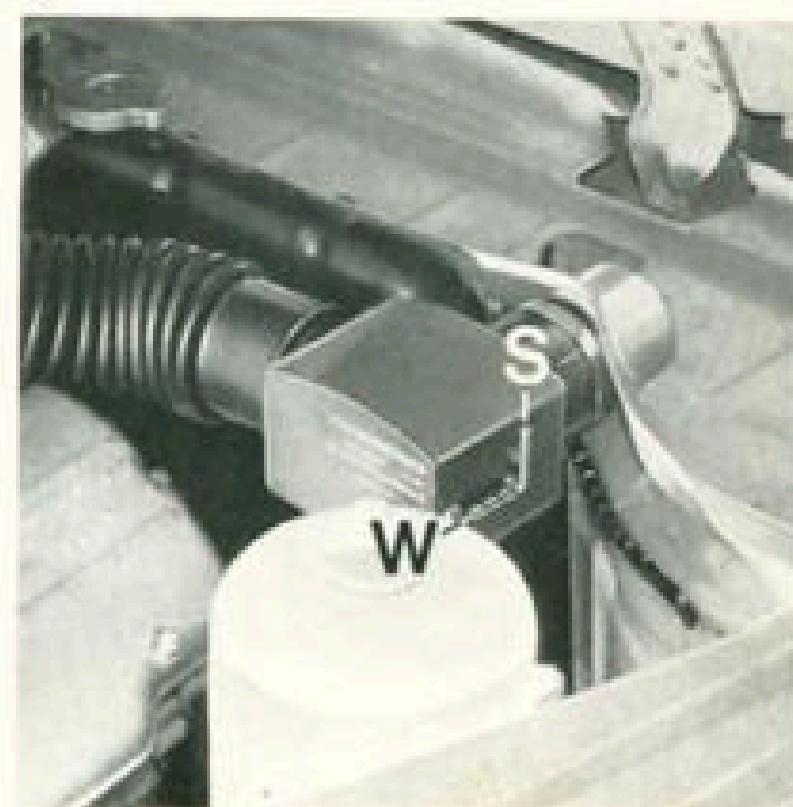
88



89



90

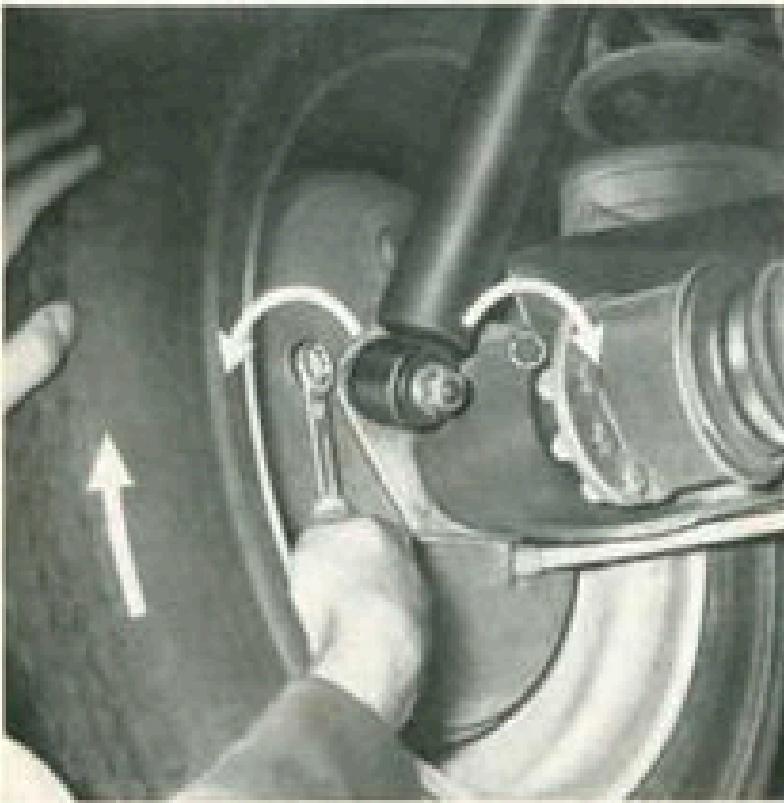


The brakes should be adjusted every 12000 km (8000 miles). The front disc brakes have automatic adjustment.

Each rear wheel brake plate carries 2 eccentric adjusters (17 mm spanner), providing separate adjustment of each brake shoe.

Turn the left eccentric hexagon nut anti-clockwise and the right nut clockwise to adjust, at the same time turning the wheel forcibly forwards until the shoes contact the brake drum and prevent further movement. Then turn each adjuster back approx. $\frac{1}{2}$ turn until the wheel just begins to turn without binding. **Fig. 91**

91



Warning: when adjusting the brake shoes, make sure that the handbrake is released.

If the brake pedal is springy and has excessive travel, the brake system must be bled.

Handbrake adjustment

(brake shoes should first be adjusted as described above):

Push back the rubber sleeve protecting the handbrake lever, loosen the locknut (10 mm) on each adjusting screw, pull the handbrake on for about 4 notches, tighten the adjusting nut (10 mm), while holding the adjusting screw with pliers to prevent it from turning, and check that the wheel cannot turn. **Fig. 92, left** Re-tighten locknut. **Fig. 92, right**

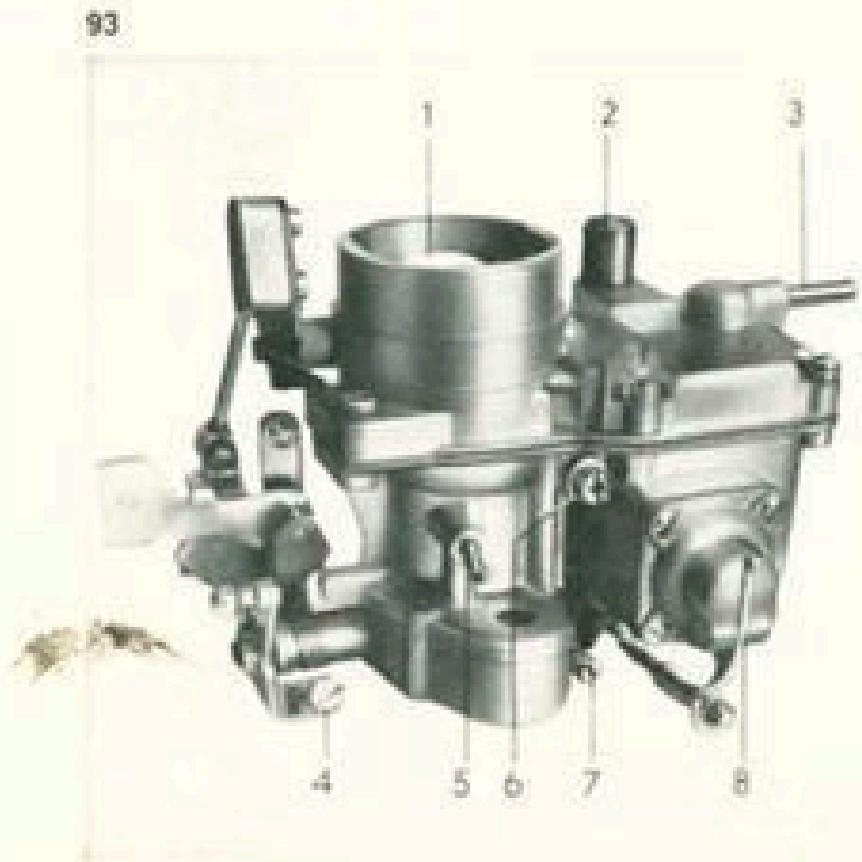
92



Following this, check that the rear wheels can turn without binding when the handbrake is released. You can confirm that both cables from the handbrake lever to the rear wheels are set to give equal braking effort by pulling the handbrake lever on gently and turning both wheels round by hand.

**Solex downdraught carburettor
40 PDSI (BMW 2002)
38 PDSI (BMW 1600) Figs. 93 and 94**

1. Cold start butterfly
2. Float chamber breather
3. Fuel inlet
4. Idling adjustment screw
5. Vacuum regulator connection
6. Idling jet
7. Idling mixture control screw
8. Accelerator pump
9. Main jet closure plug
10. Cold start connecting link



The carburettor should if possible be cleaned only by your BMW dealer. In an emergency the float chamber can be emptied by removing the plug (Fig. 94, 9; 13 mm spanner) and any water or dirt

trapped therein thus removed. In addition, the following jets can be unscrewed and cleaned by blowing through:

Main jet (accessible after removal of plug, 13 mm, Fig. 94, 9).

Idling jet (8 mm, Fig. 93, 6).

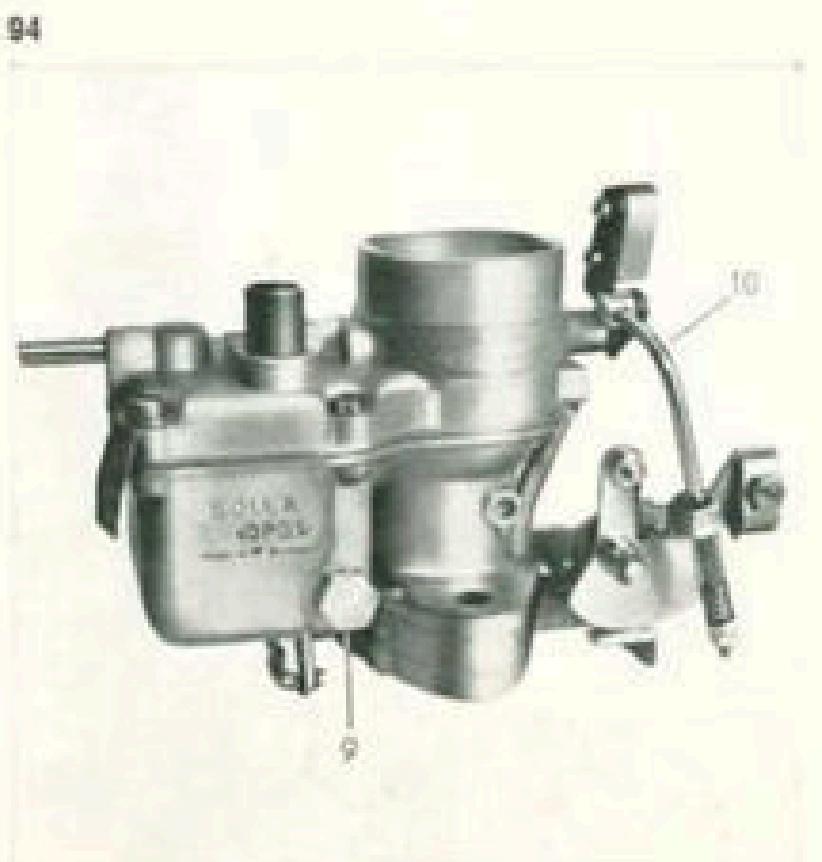
The jet sizes and basic carburettor adjustment adopted by the manufacturers should not be tampered with. See Specification for details.

Adjust **idling settings** only when the engine is at its normal operating temperature.

Screw the idling mixture control screw carefully in as far as it will go, then unscrew it by about $1\frac{1}{2}$ turns; this will give the basic idling setting.

Using the idling adjustment screw, set the idling speed of the engine to approx. 700–800 rpm.

If the idling mixture control screw is now slightly screwed in (weaker mixture), the best fuel-air mixture setting will be discernible as a slight rise in engine speed. Following this, the idling speed of the engine must again be reduced by unscrewing the idling adjustment screw, making sure that the engine continues to run smoothly and without hesitation. If this is not so, make further slight adjustment of the idling mixture control screw.





Last but not least:
Specifications

"Daddy and I will not
discuss the whole matter
again as man to man!"

Specification

ENGINE

Type

4 cylinder, 4-stroke inline, water-cooled, with overhead camshaft (OHC), inclined valves and swirl-action hemispherical combustion chambers.

Position

Over front axle, inclined at 30° from vertical, 3-point mounting: at front close to centre of gravity on two side-mounted rubber cushions attached directly to the front axle cross-member; at rear, bolted rigidly to gearbox, with single rubber mounting on gearbox cross-member.

Cylinder block

Special gray cast iron.

Cylinder head

Light alloy, with shrunk-in valve seats and guides.

Crankshaft

Hardened forged steel with 8 balance weights (BMW 2002), 4 balance weights (BMW 1600), 5 four-layer main bearings.

Connecting rods and pistons

Forged steel connecting rods with replaceable four-layer big-end bearings. Pistons with raised flat top, Chromium plated.

	BMW 2002	BMW 1600
Capacity		
bore x stroke, for fiscal purpose	1977 cc (120.6 cu.in.)	1563 cc (95.38 cu.in.)
effective	1990 cc (121.4 cu.in.)	1573 cc (95.99 cu.in.)
Max. output		
at	100 bhp (DIN) 5500 rpm 113 bhp (SAE) 5800 rpm	85 bhp (DIN) 5700 rpm 96 bhp (SAE) 5800 rpm
Output per litre	50.3 bhp	54.0 bhp
Max. permitted engine speed	6200 rpm	6200 rpm
Max. continuous engine speed	6000 rpm	5800 rpm
Max. torque		
at	16 m kp (115.7 ft/lb) 3000 rpm	12.6 m kp (91 ft/lb) 3000 rpm
Compression ratio	8.5 : 1	8.6 : 1
Stroke/Bore ratio	30/39 mm	71/84 mm
Mean piston speed	14.7 m/sec (2892 ft/min) 5500 rpm	13.5 m/sec (2657 ft/min) 5700 rpm
Torque/weight ratio (unladen)	17 m kp/1000 kg (125 ft/lb/ton)	13.7 m kp/1000 kg (99 ft/lb/ton)
Output/weight ratio	9.4 kg/bhp (20.7 lb/bhp) 13.4 kg/bhp (29.5 lb/bhp)	10.8 kg/bhp (23.8 lb/bhp) 15.5 kg/bhp (34.1 lb/bhp)

Valves

inclined in cylinder head at a narrow V angle. Armoured exhaust valve with hard chromium-plated shaft. Adjustment by eccentric-mounted rockers.

Valve operation

By light alloy rockers with case-hardened cam pads and a single overhead camshaft. Duplex roller chain drive to camshaft with automatic oil-damped chain tensioner and backlash reducer.

Breathing

Crankcase and valve chamber linked by a duct connected to the inlet tract.

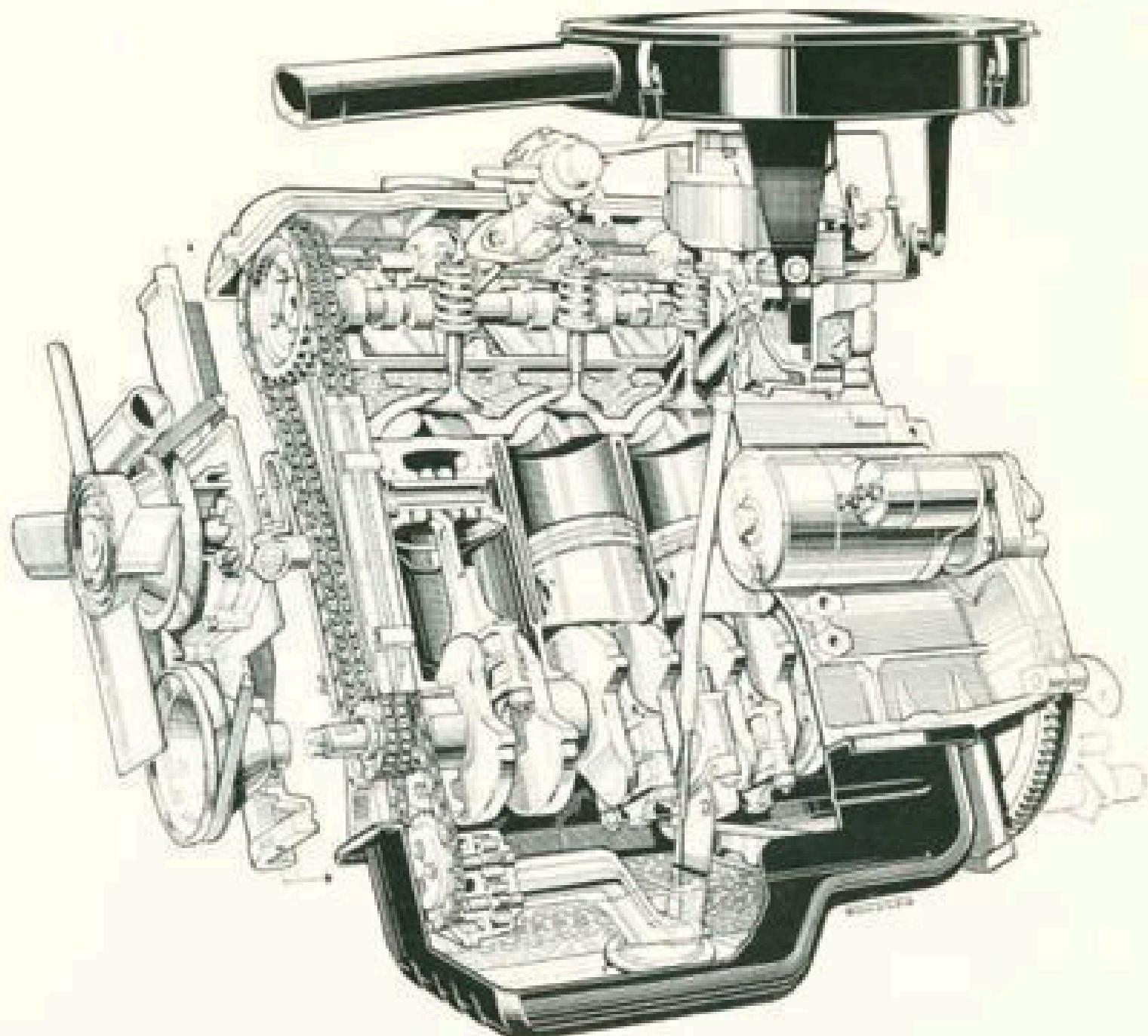
Valve operating clearance

Inlet and exhaust: 0.15–0.20 (0.0059 to 0.0079") with engine stopped and cold (max. water temperature 35° C/95° F).

Valve timing

Inlet opens 4° bTDC	(± 2.5°)
Inlet closes 52° aBDC	
Exhaust opens 52° bBDC	
Exhaust closes 4° aTDC	
allowing 0.5 mm (0.02") adjustment play measured between rocker and cam base circle.	

Engine – BMW 2002



Lubrication

Pressure circulating system with full-flow oil filter, gear-type pump chain-driven from crankshaft and pressed steel sump.

Oil filter

Full-flow filter with Micronic paper element and pressure relief valve opening at a pressure of 1.3 ± 0.2 atm (18.5 ± 2.8 psi).

Oil consumption

0.05–0.1 litre per 100 km (1650–1900 mpg).

Air filter

Filter element within induction air silencer.

Fuel supply

Mechanical fuel pump, operating pressure $0.21\text{--}0.25$ kg/cm² (2.85–3.5 psi).

Fuel filter

Fine mesh filter within fuel pump and on fuel gauge plunger tube in tank.

Radiator type

Gilled tube, with pressure relief and vacuum valves in filter cap.

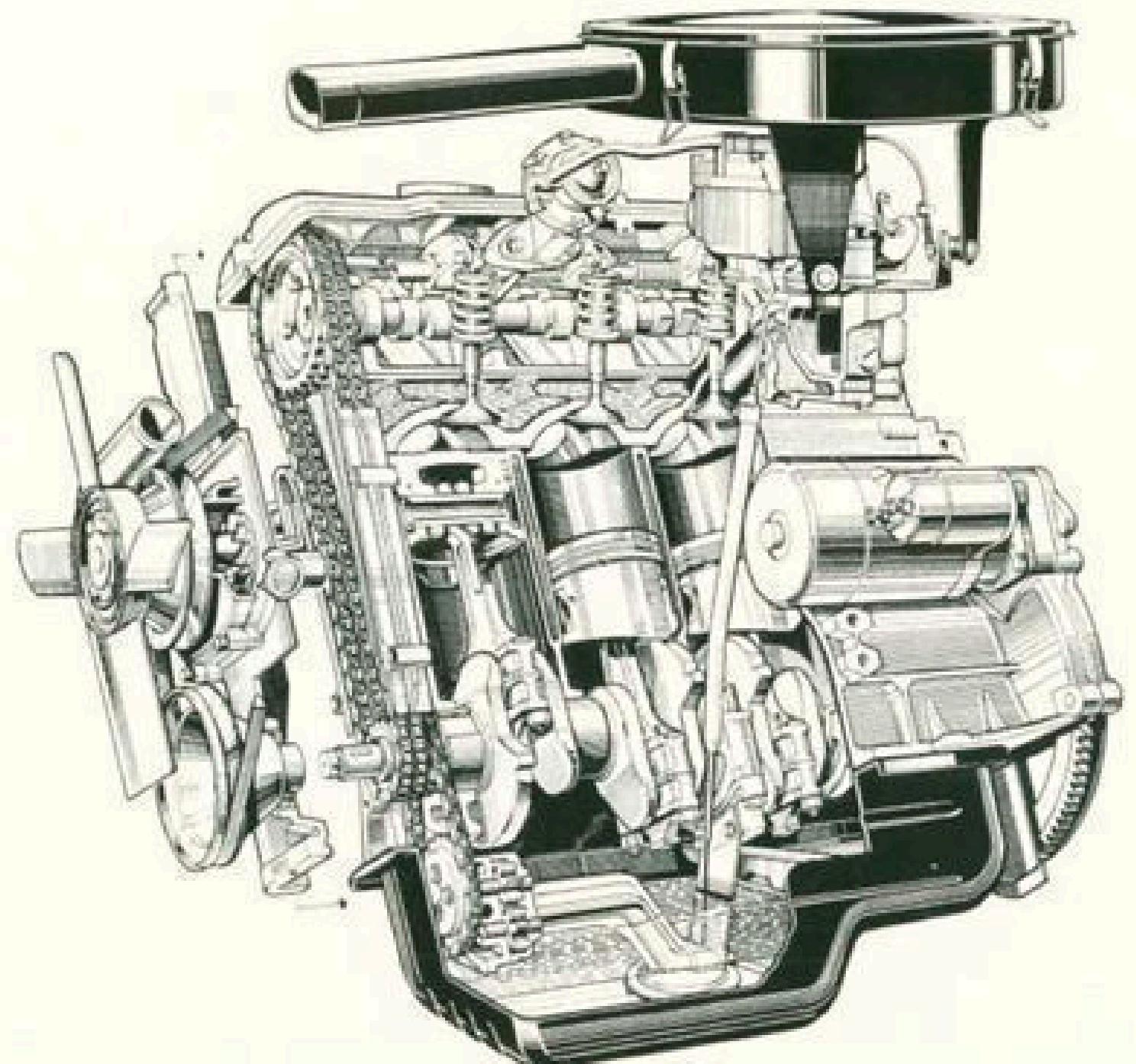
Opening pressure

of radiator filler cap valves
Excess pressure 0.7 kg/cm²

$+ 0.15$ kg/cm² ($+ 2.13$ psi)
 $- 0.10$ kg/cm² ($- 1.42$ psi)

Underpressure up to 0.05 kg/cm² (0.71 psi).

Engine – BMW 1600



Cooling water thermostat

with air temperature equalising device, mounted in front of the water pump inlet. Opening begins at 75° C (167° F). (Secondary water temperature at engine cooling water outlet: approx. 80° C / 176° F).

	BMW 2002	BMW 1600
Fuel consumption (DIN 70030 standard procedure)	10.0 litres/100 km (23.5 mpg [US]/28.2 mpg [Imp])	9.9 litres/100 km (23.8 mpg [US]/28.5 mpg [Imp])
Carburettor type	1 Solex 40 PDSI downdraught	1 Solex 38 PDSI downdraught
Carburettor settings		
Main jet	X 155	X 130
Corrector jet	130	110
Venturi	30	26
Idling jet	45	47.5
Rich mixture valve	100	90
Injection volume	2 ± 0.2 cc/stroke (0.122 ± 0.012 cu.in.)	1.4–1.7 cc/stroke (0.109–0.134 cu.in.)
Float needle valve	2.0	2.0
Float weight	8.5 g (0.3 oz.)	8.5 g (0.3 oz.)
Fuel level	17–19 mm below joint (0.67–0.75")	17–19 mm below joint (0.67–0.75")

CLUTCH**BMW 2002**

Hydraulically operated single dry plate with torsional vibration damper.

BMW 1600

Mechanically operated single dry plate with torsional vibration damper.

GEAR BOX

4-speed, with Porsche synchromesh on all forward gears, 1 reverse gear.

Ratios:

1st gear	3.835 : 1
2nd gear	2.053 : 1
3rd gear	1.345 : 1
4th gear	1.0 : 1
Reverse	4.18 : 1

PROPELLOR SHAFT**BMW 2002**

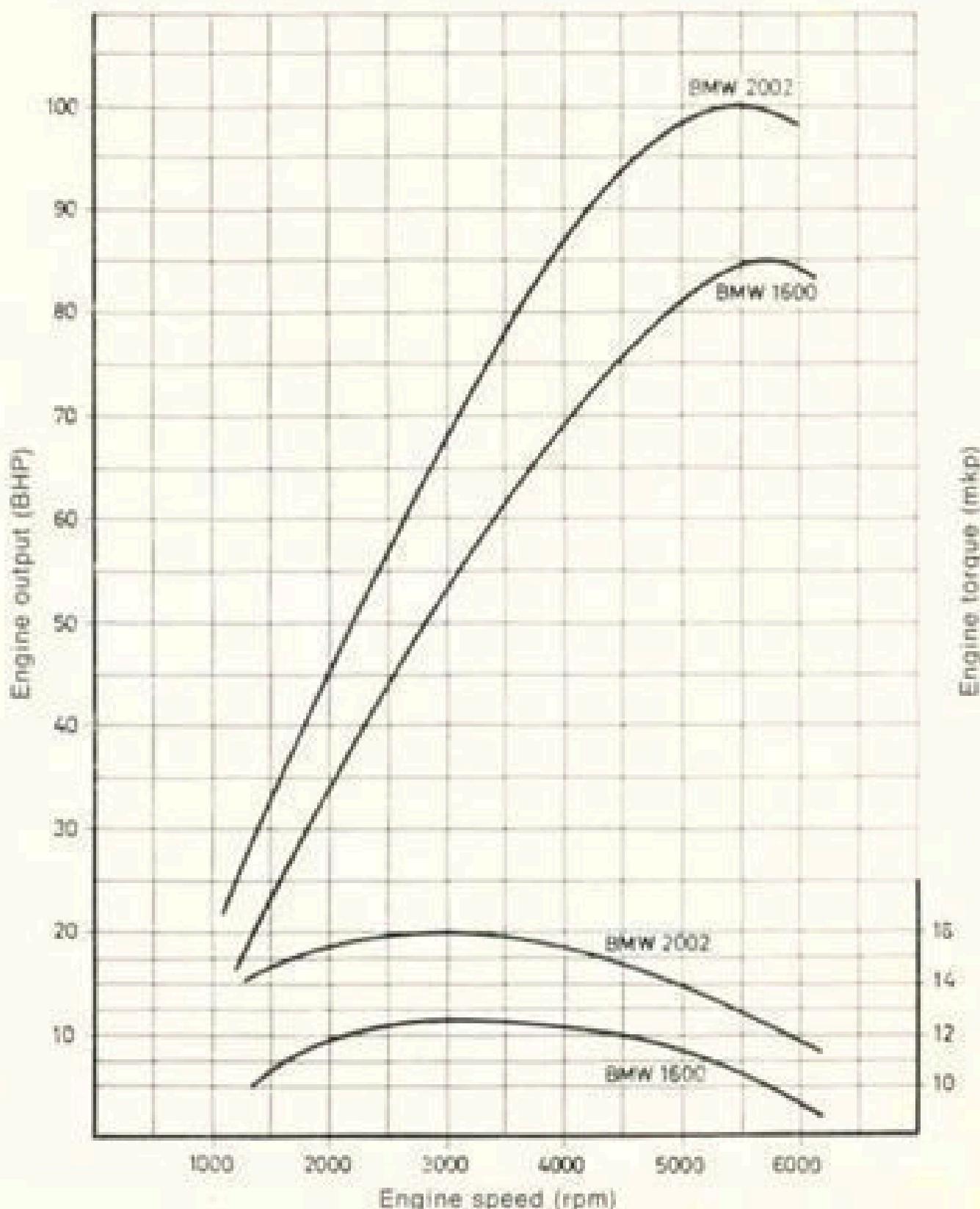
Divided shaft with flexible mounting for centre bearing and rubber coupling at front, needle roller universal joints in the centre and at rear.

BMW 1600

Divided shaft with flexible mounting for centre bearing and three rubber couplings.

FINAL DRIVE

Hypoid bevel, running on taper roller bearings.

Engine output

Ratio: BMW 2002

Pinion-/crown wheel	No. of teeth	Type of toothing
3.64 : 1	11 : 40	Klingelnberg

Ratio: BMW 1600

Pinion-/crown wheel	No. of teeth	Type of toothing
4.11 : 1 or 4.10 : 1	9 : 37	Klingelnberg
	10 : 41	Gleason

Rear axle drive

Left and right half-shafts with needle-roller universal joint at the final drive end and needle roller sliding joint at the wheel end, in oil bath.

or

left and right double universal joint half-shafts with no-maintenance homokinetic joints.

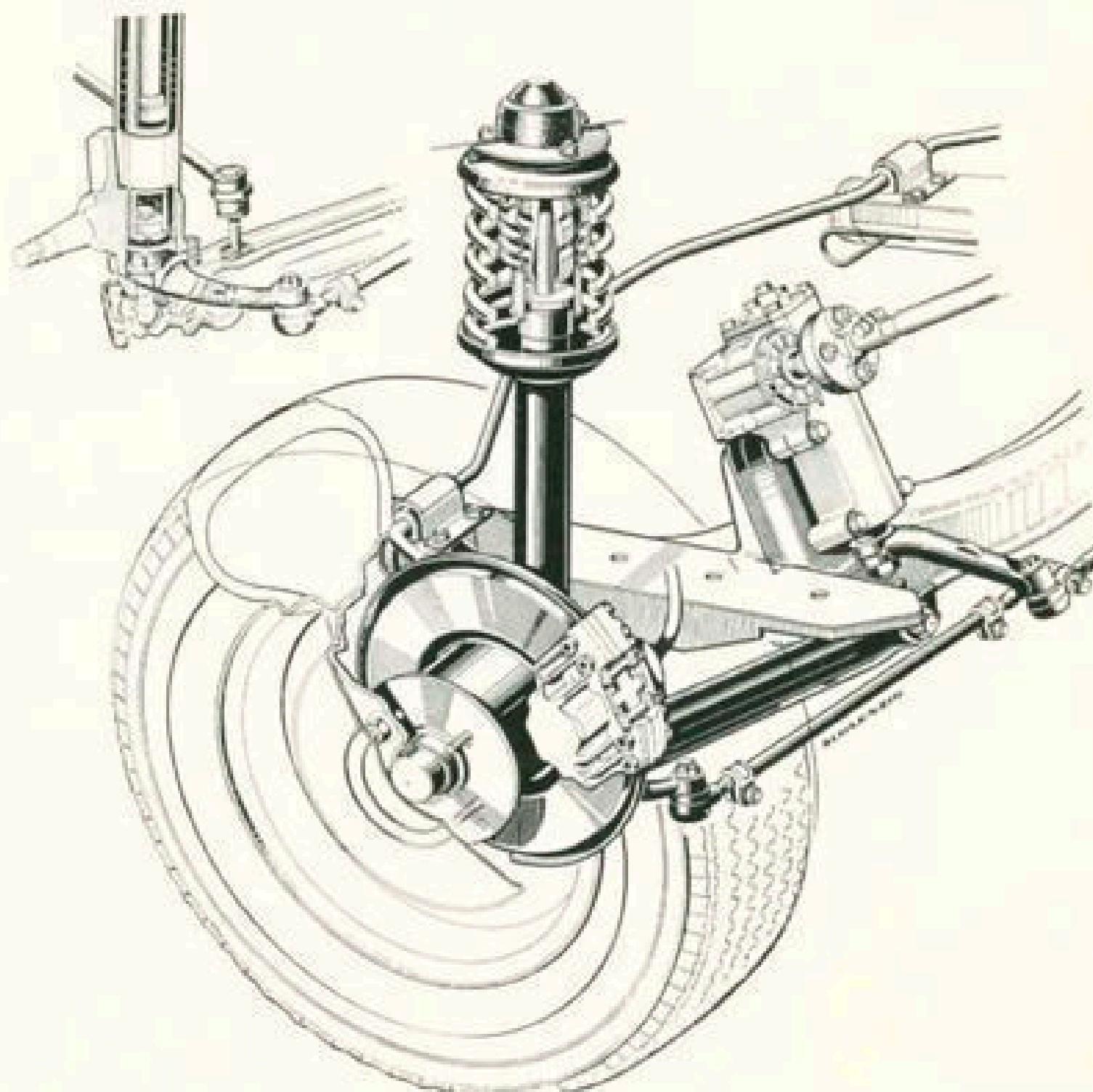
WHEELS AND SUSPENSION**Front wheel mounting: BMW 2002**

Independent suspension by lower wishbones and spring columns incorporating double acting hydraulic shock absorbers, coil springs and rubber auxiliary springs. Wheel travel 180 mm (7").

Torsion bar stabiliser with no-maintenance rubber mountings.

Front wheel mounting: BMW 1600

As BMW 2002, but without torsion bar stabiliser.

Front suspension – BMW 2002

Toe-in with vehicle normally loaded*:
 $1 \pm 1 \text{ mm (} 0.04 \pm 0.04 \text{")}$.

Camber angle, vehicle normally loaded*:
 $0^\circ 30' \pm 30'$

Castor angle: $4^\circ + 30'$

King pin angle: $8^\circ 30'$

Toe-out on turns for 20° deflection of inside wheel: 1°

Max. wheel lock

Inside wheel 42°

Outside wheel 34°

Rear wheel mounting: BMW 2002

Independently sprung wheels with semi-trailing arms mounted on rubber bushes requiring no maintenance.

Delta-shaped box-section support beam for trailing arms and final drive, attached to bodywork at 4 points by rubber mountings.

Coil springs and auxiliary rubber springs, spring travel 190 mm (7.5"); double-acting hydraulic telescopic shock absorbers.

Torsion bar stabiliser with no-maintenance rubber mountings.

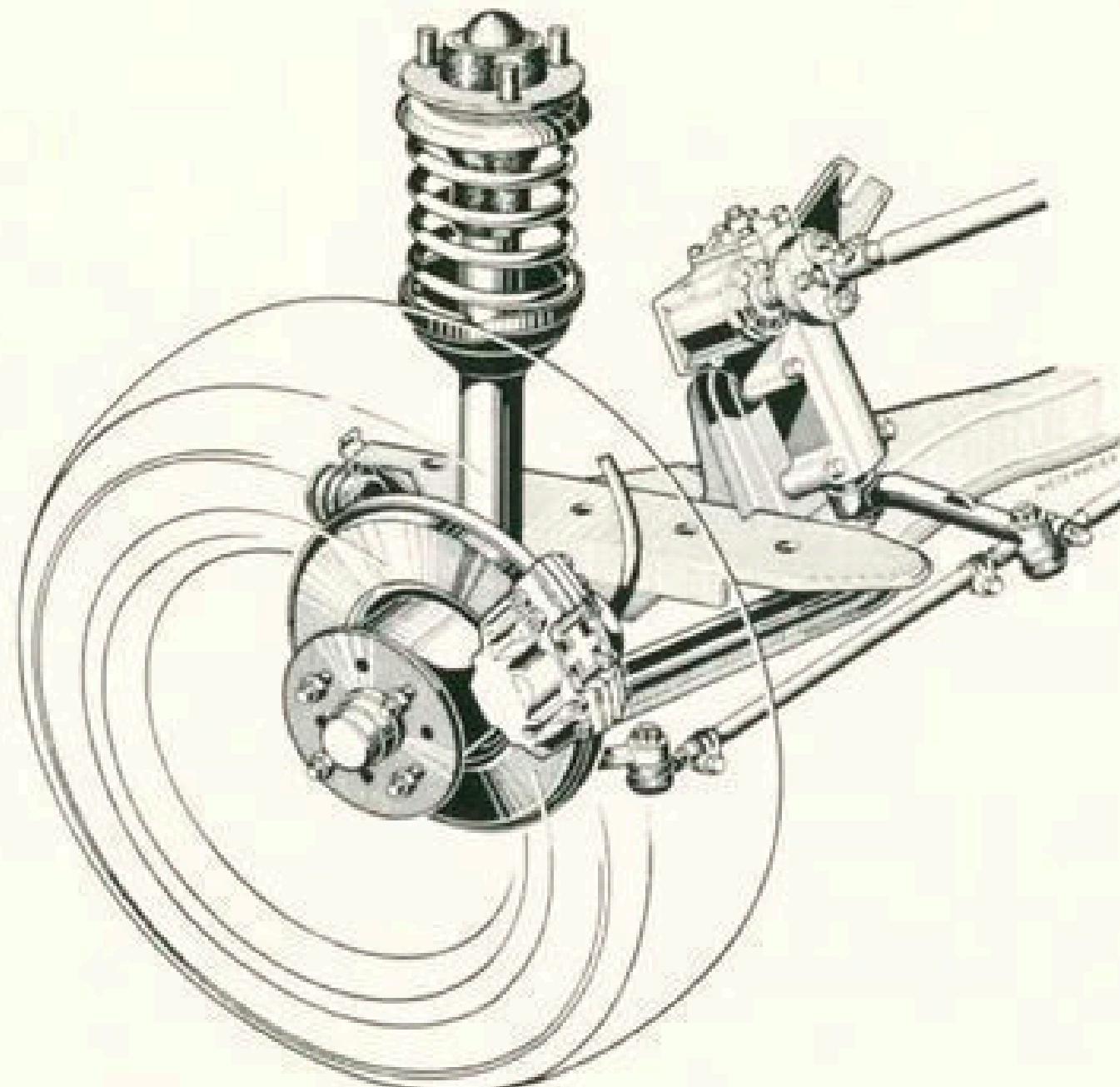
Rear wheel mounting: BMW 1600

As BMW 2002, but without torsion bar stabiliser.

Normal toe-in*: $1.5 \pm 1.5 \text{ mm (}.059" \pm .059"\text{)}$.

Normal camber angle*: $2^\circ \pm 20'$ negative

Front suspension – BMW 1600



* Normal load: 3 persons

= 3 x 65 kg (143 lbs) + luggage 30 kg (66 lbs).

Steering

ZF Gemmer with hourglass worm and roller.

Gear ratio: 15.5 : 1

Overall steering ratio: 17.58 : 1

3-piece track rod

Steel disc wheels

4½ J x 13 well-base rims

Tyres: BMW 2002

165 SR 13 radial-ply, with tube

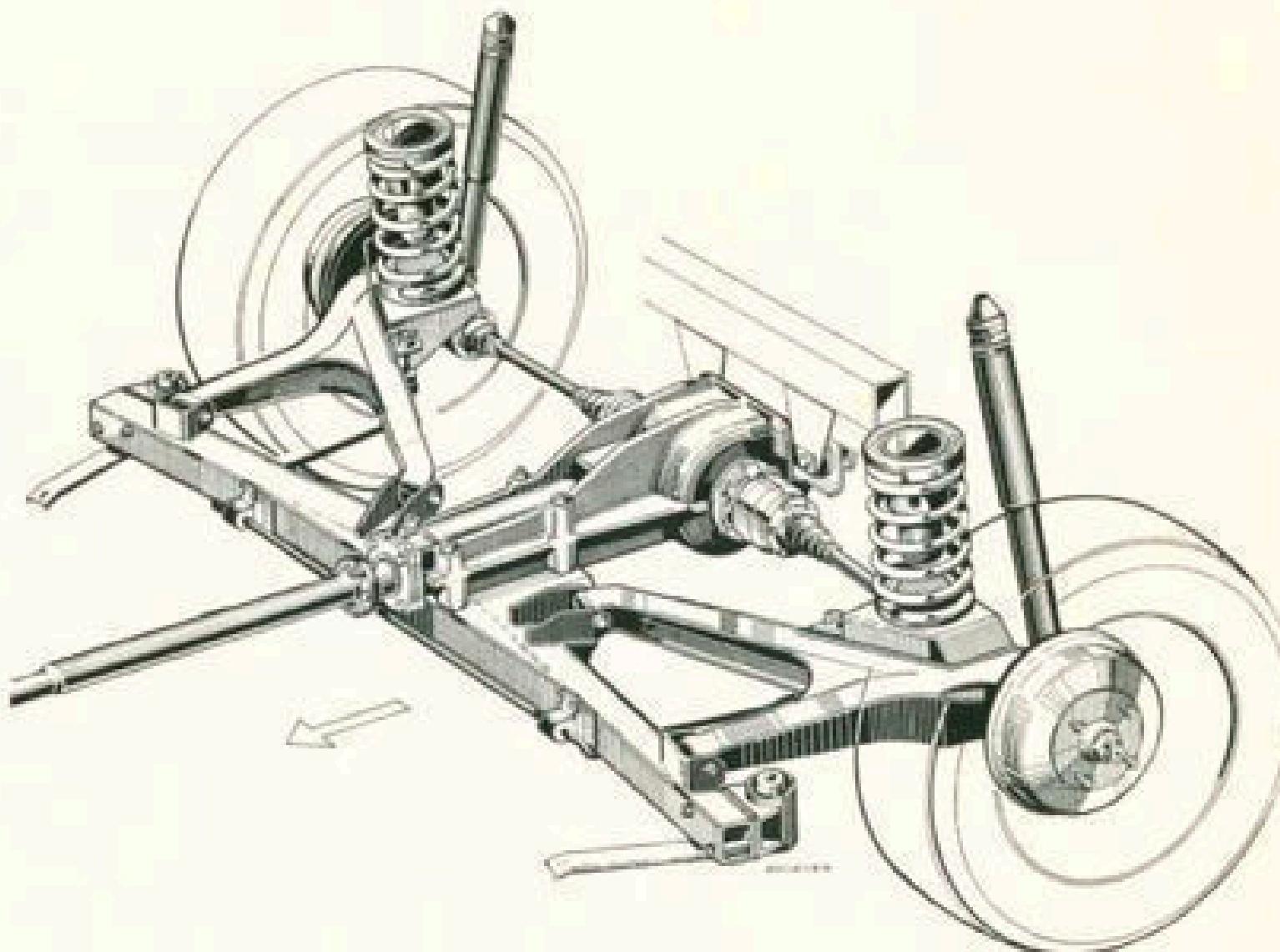
Dynamic radius: 287 mm (11.30")

Tyres: BMW 1600

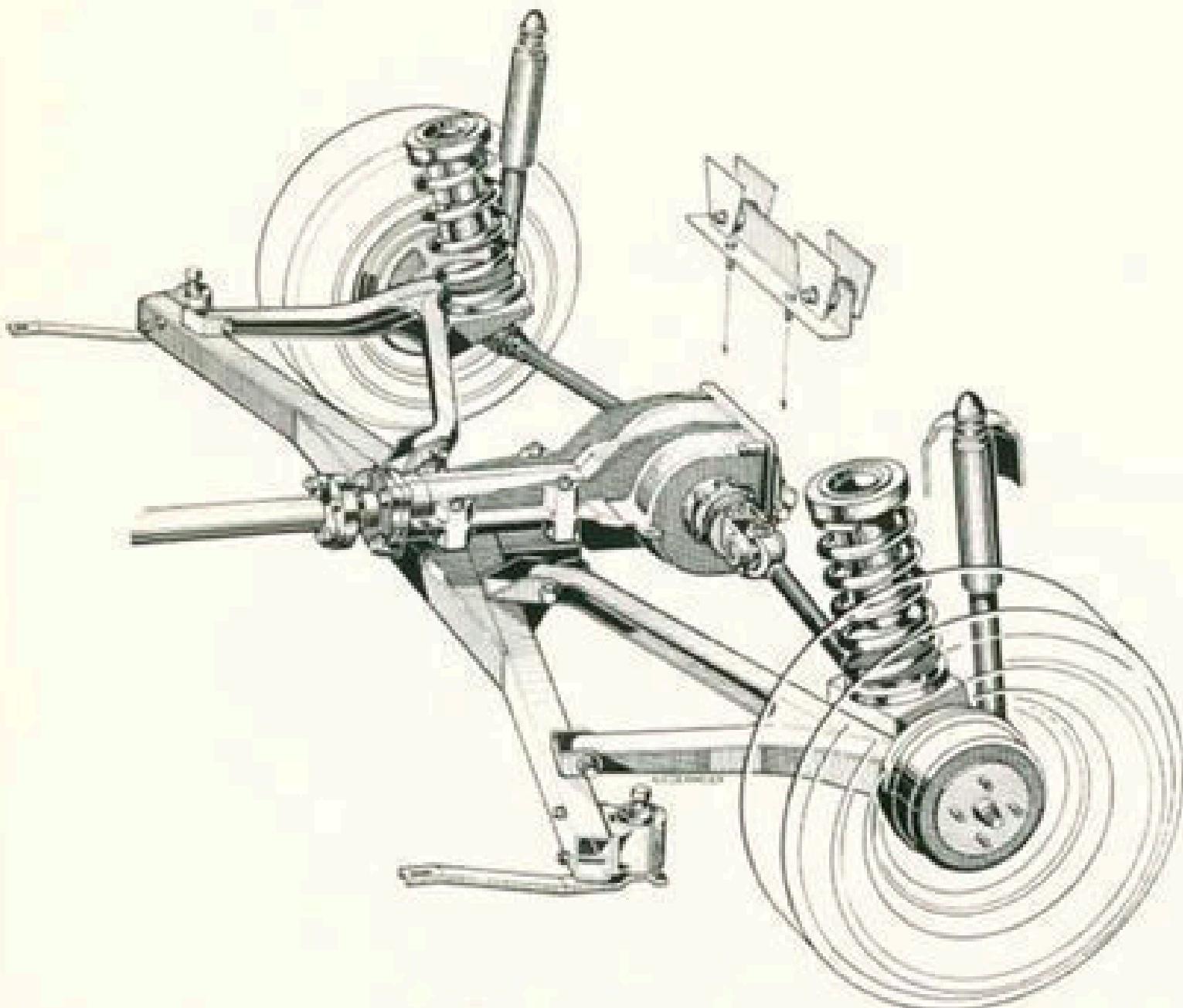
600 S 13 tubeless

Dynamic radius: 288 mm (11.34")

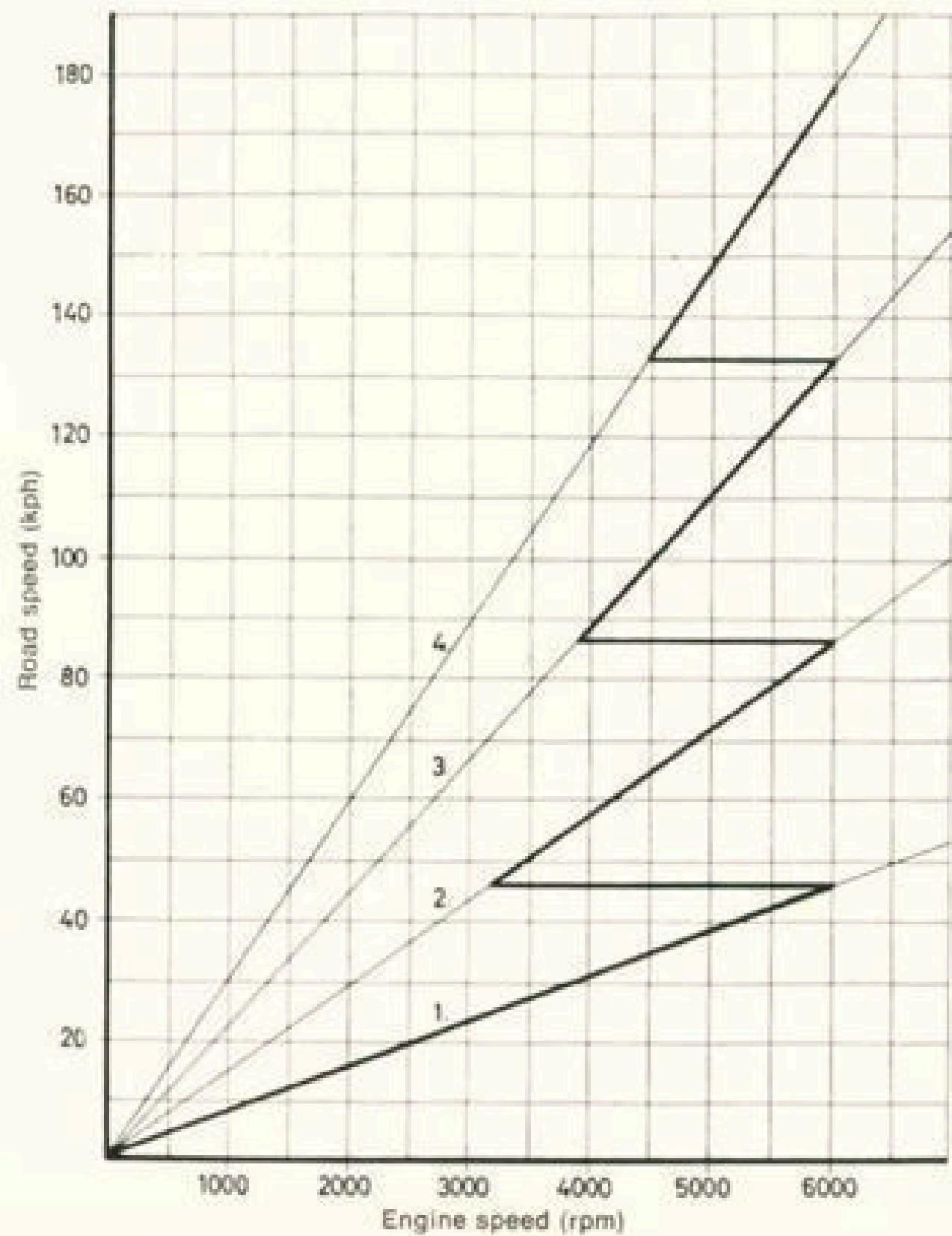
Special equipment: 165 SR 13 radial-ply
tyres, with tube.

Rear suspension – BMW 2002

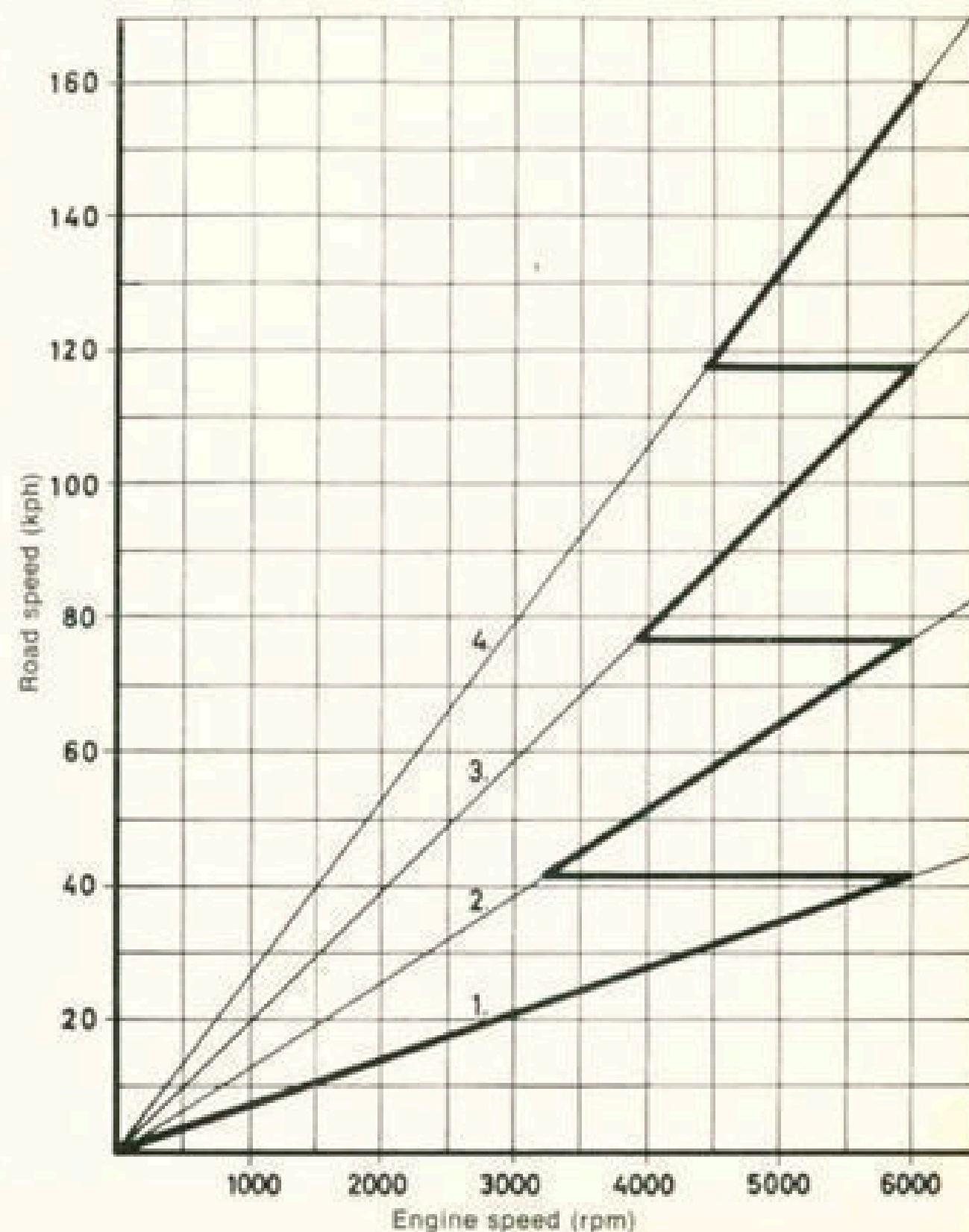
Rear suspension – BMW 1600



Road speed/engine speed – BMW 2002



Road speed/engine speed – BMW 1600



B R A K E S

Foot brake: BMW 2002

Hydraulic, acting on all four wheels, and fitted with servo assistance. Master cylinder located in engine compartment, diameter 0.81" (20.64 mm). Transparent brake fluid reservoir also located in engine compartment.

Foot brake: BMW 1600

Hydraulic, acting on all four wheels. Master cylinder located in engine compartment, diameter 3/4" (19.05 mm). Transparent brake fluid reservoir also located in engine compartment.

Front

Fixed caliper disc brakes with automatic pad wear compensation.

Disc diameter 240 mm (2.45")

Wheel cylinder diameter 48 mm
(2.13")

Rear

Drum brakes with self-centering shoes.

Cylinder diameter

BMW 1600: 17.46 mm (0.68")

BMW 2002: 15.87 mm (0.625")

Brake drum diameter

BMW 1600: 200 mm (7.87")

BMW 2002: 230 mm (9.05")

Lining width 40 mm (1.57")

Handbrake

Operates mechanically on rear wheels only. Adjust at handbrake lever after lifting rubber sleeve. Cable to each rear wheel adjustable separately.

Braking distance

The best possible brakes can only attain a road efficiency corresponding to the friction between tyre and road surface. As the graph on p. 71 shows, the maximum possible retardation of a vehicle travelling on an icy surface is only in the region of 1.5 m/sec^2 (4.9 ft per sec).

This implies that your car's speed in such circumstances is reduced in every second by only 1.5 metres per second (4.9 ft per sec). In other words, every second the speed drops by only 5.4 kph (3.375 mph). If you had, for example, been travelling at 54 kph (33.75 mph), it would take 10 seconds for you to stop. As the graph shows, you would cover almost 100 m (330') in that time.

The lowest curve (1.5 m/sec^2) shows you your braking distance related to travelling speed in the conditions just described.

In contrast the uppermost curve (8 m/sec^2) refers to the shortest braking distances generally obtainable in ideal conditions.

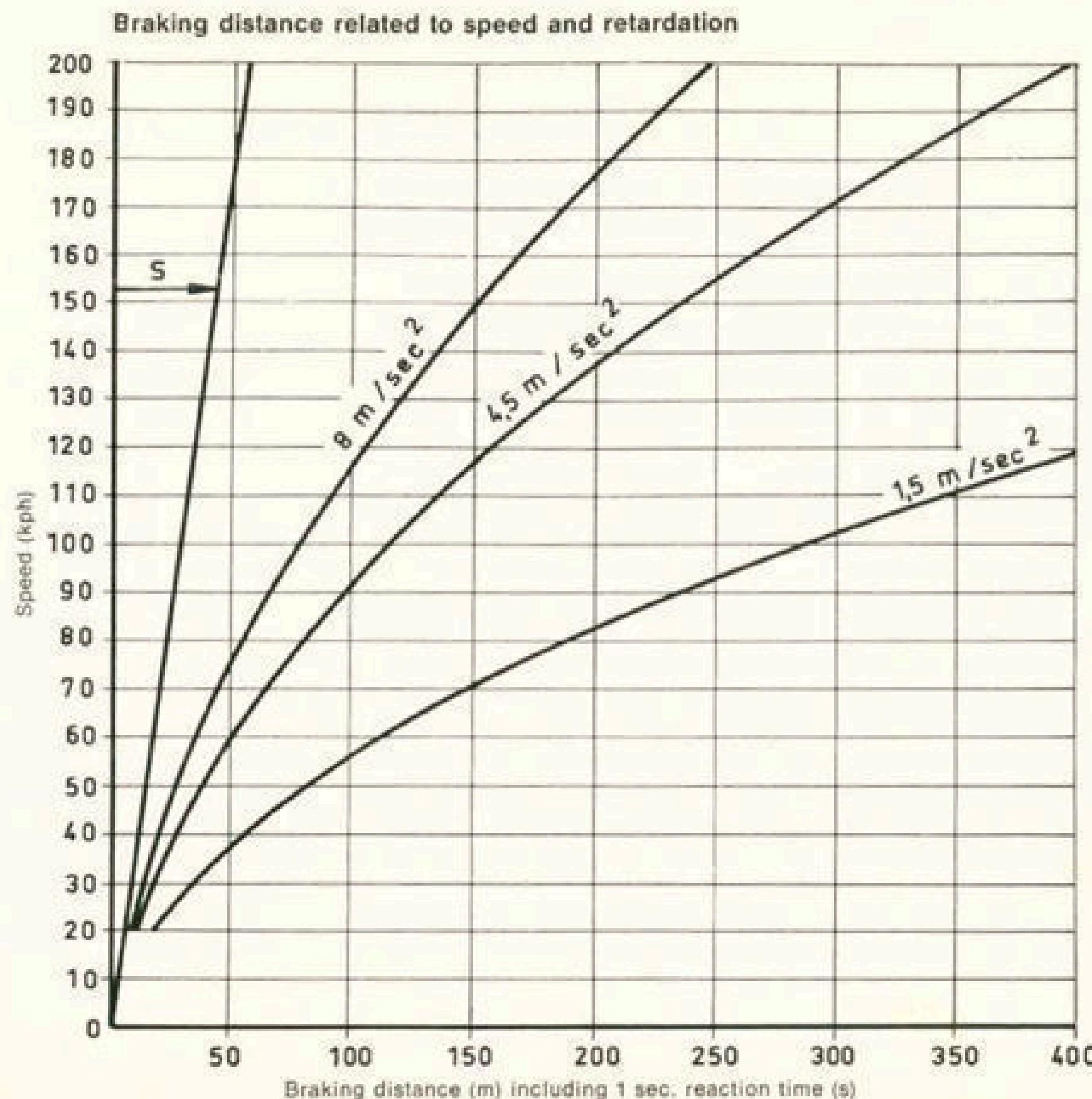
The middle curve (4.5 m/sec^2) applies to a damp road not entirely devoid of grip for the tyres, and thus represents an average set of values which could be used as a guide for normal strength braking during everyday driving on dry roads.

All the values plotted on the graph can vary for better or worse, depending on the state of the brakes, the condition of the tyre treads and the road surface itself.

The lengths quoted for braking distances include a proportion "S" covered during one second's reaction time on the part of the driver.

Most efficient braking takes place not with locked wheels, but when the wheels are still just turning.

Locking the wheels can be dangerous, as locked front wheels can no longer be steered, and locked rear wheels tend to allow the car to slide sideways or spin.



BODYWORK

Load-carrying all-steel body welded to floor section, and giving a particularly torsion resistant complete unit. Two doors; engine compartment bonnet hinged at front.

Luggage compartment capacity: approx. 450 litres (15.9 cu. ft.)

Fuel tank capacity: 46 litres (12.1 US gal./10.1 Imp. gal.)

Heating and ventilation

Fresh-air heater with warm water heat exchanger and 2-speed axial blower. 6 outlet nozzles in all covering all parts of the front screen, side windows and foot area. Air extraction from the car's interior through slots above the rear window, conveying stale air to outlets in the rear body pillars (concealed below the luggage compartment lid).

ELECTRICAL SYSTEM

Battery

12 V, 44 Amp/hr (BMW 2002)

12 V, 36 Amp/hr (BMW 1600)

Coil

Bosch K 12 V (BMW 2002)

Bosch TE 12 V (BMW 1600)

Distributor

Bosch IUR 4 (BMW 2002)

Bosch JFUR 4 (BMW 1600)

Ignition point: 3° bTDC

Adjust only with engine stopped and cold (max. water temperature 35° C / 95° F).

Firing order: 1-3-4-2

Contact breaker dwell angle: 60°

Contact breaker gap: 0.4 mm (0.016")

Ignition advance and retard	Headlights	Ground clearance
Centrifugal and vacuum	with assymmetric dipped beam and side/parking lights included. Lens diameter 170 mm (6.7")	(laden) 160 mm (6 5/16")
Centrifugal adjustment: BMW 2002	12 V bulbs	Front overhang 720 mm (2' 4 1/16")
Begins: approx. 800 rpm Ends: approx. 2400 rpm Max. adjustment range: 37° CS	see page 35–37 for details.	Rear overhang 1010 mm (3' 3 1/16")
Centrifugal adjustment: BMW 1600	Fuse box	Front track 1330 mm (4' 4 1/16")
Begins: approx. 800 rpm Ends: approx. 3800 rpm Max. adjustment range: 41° CS	Under bonnet on left-hand side; contains 6 fuses. For circuits controlled by each fuse, see page 35.	Rear track 1330 mm (4' 4 1/16")
Vacuum adjustment	Cigar lighter and plug socket on instrument panel	Min. track circle dia. 9.60 m (31' 6")
Begins: approx. 115 mm (5.12") Hg Ends: approx. 210 mm (8.27") Hg Max. adjustment range: 10° CS	Can be used to plug in a handlamp, an electric razor with standard type plug or similar apparatus not exceeding 50 W rating at 12 V.	Min. turning circle dia. 10.40m (34' 2")
Alternator	Automatic screen washer	Vehicle weight, empty 940 kg (2073 lb)
Bosch K 1 – 14 V 35 A 20	Electric gear type pump with delaying relay; operated by finger-tip switch on turn indicator lever.	(ready for use with full tank) 920 kg (2028 lb)*
Voltage regulator	Horn	Permitted total weight 1340 kg (2954 lb) 1320 kg (2910 lb)*
Bosch ADN 1/14 V (BMW 2002) Bosch AD 1/14 V (BMW 1600)	Well positioned for maximum audibility behind the radiator grille, with protection against dirt.	Permitted front axle load 650 kg (1433 lb)
Starter	DIMENSIONS AND WEIGHTS	Permitted rear axle load 720 kg (1587 lb) 700 kg (1544 lb)*
Bosch GF (R) 12 V 1 hp (BMW 2002) Bosch EF (R) 12 V 0.8 hp (BMW 1600)	BMW 2002 and BMW 1600	Permitted trailer load
Spark plugs	Overall length , ... 4220 mm (13' 10 1/16")	without brakes 500 kg (1103 lb) with brakes 1200 kg (2645 lb)
Beru 200/14/3 A Electrode gap 0.6 + 0.1 mm Bosch W 200 T 30 (0.024" + 0.004") Champion N 9 Y	(The vehicle's fully loaded condition	Permitted load on roof 75 kg (165 lb)
For mainly short-distance operation and when using heavily leaded fuel		
Bosch W 215 P 21*		
Electrode gap 0.6 + 0.1 mm		

PERFORMANCE

	BMW 2002	BMW 1600
Maximum speed	170 kph (106 mph)	160 kph (100 mph)

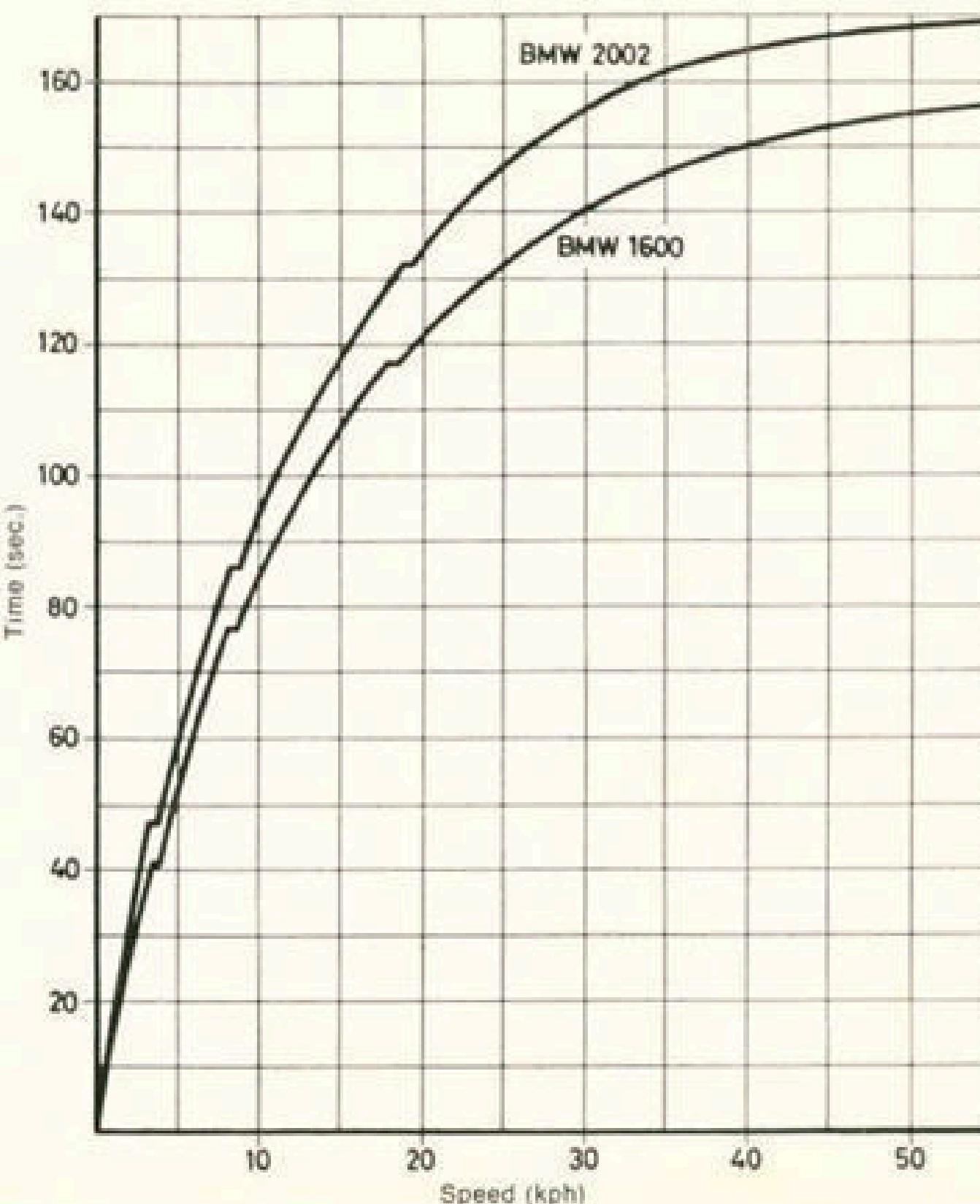
Max. gradients

1st gear	76% (1 in 1.3)	65% (1 in 1.5)
2nd gear	33% (1 in 3.0)	30% (1 in 3.3)
3rd gear	19% (1 in 5.3)	18% (1 in 5.5)
4th gear	13% (1 in 7.9)	12% (1 in 8.3)

Acceleration

BMW 2002				BMW 1600			
Gears	kph (mph)	sec.		Gears	kph (mph)	sec.	
1-2	0- 50 (0-31)	3.8		1-2	0- 50 (0-31)	4.5	
1-2	0- 80 (0-50)	7.3		1-3	0- 80 (0-50)	9.0	
1-3	0-100 (0-62)	10.9		1-3	0-100 (0-62)	13.3	
1-3	0-120 (0-75)	15.4		1-4	0-120 (0-75)	19.4	
1-4	0-140 (0-87)	22.0		1-4	0-140 (0-87)	29.7	

	BMW 2002	BMW 1600
Standing start kilometer	32.4 sec.	35.0 sec.
Average speed over the distance:	111 kph (69 mph)	103 kph (64 mph)
Terminal speed:	159 kph (99 mph)	147 kph (92 mph)

Acceleration through gears

**TIGHTENING
TORQUE VALUES
FOR BOLTS
AND NUTS**

Engine			
Cylinder head bolts	7 ± 0.2 mkp (56.6 ± 1.4 ft/lb)	Compression strut to body floor	4.5 mkp (32.5 ft/lb)
Crankshaft V-belt pulley	14 mkp (101.3 ft/lb)	Trailing arms on axle carrier	7.5 mkp (54.2 ft/lb)
Walter pump V-belt pulley	4 mkp (28.9 ft/lb)	Shock absorber, lower end	4.5 mkp (32.5 ft/lb)
Engine mounting bracket	4.7 mkp (34.0 ft/lb)	Half shaft pick-up flange	3 mkp (21.7 ft/lb)
Rubber mounting nuts	2.5 mkp (18.1 ft/lb)	Half shaft at rear axle shaft	3 mkp (21.7 ft/lb)
Gearbox		Universal joint shaft at gearbox take-off flange	4.5 mkp (32.5 ft/lb)
Engine attachment flange	2.5 mkp (18.1 ft/lb) M 8	Rear axle carrier rubber mountings	4.5 mkp (32.5 ft/lb)
	4.7 mkp (34.0 ft/lb) M 10	Rubber coupling	4.5 mkp (32.5 ft/lb)
Front axle		Rear axle shaft castellated nuts	30 + 5 mkp (217.0 + 36.2 ft/lb)
Spring/shock absorber unit, top centre	8 mkp (57.8 ft/lb)	Axle carrier support points	4.5 mkp (32.5 ft/lb)
Spring/shock absorber unit, support bearing	2.5 mkp (18.1 ft/lb)	Steering	
Tierod arm to kingpin	2.5 mkp (18.1 ft/lb)	Steering wheel securing nut	5.5 + 0.5 mkp (39.7 + 3.6 ft/lb)
Tierod arm guide joint	7 mkp (50.6 ft/lb)	Plate mounted joint	1.9 mkp (13.7 ft/lb)
Front axle carrier to engine carrier	4.7 mkp (34.0 ft/lb)	Flange mounted joint	2.5 mkp (18.1 ft/lb)
Wishbone to front axle carrier	15 mkp (108.5 ft/lb)	Drop arm to steering box	14 mkp (101.3 ft/lb)
Tension strut at wishbone and front axle carrier	6 mkp (43.4 ft/lb)	Tierod castellated nuts	3.5 mkp (25.3 ft/lb)
Rear axle		Steering box to front axle carrier	4.7 mkp (34.0 ft/lb)
Cross member on underbody	4.5 mkp (32.5 ft/lb)	Track rod clamp bolts	2.5 mkp (18.1 ft/lb)
Casing to cross member	4.5 mkp (32.5 ft/lb)	Brakes	
Final drive to axle carrier	9 mkp (65.1 ft/lb)	Brake disc to wheel hub	6 mkp (43.3 ft/lb)
Axle carrier to body floor	12 mkp (86.8 ft/lb)	Saddle to king pin	9.5 mkp (68.7 ft/lb)
		Wheel nuts	9 mkp (65.1 ft/lb)

Key to Lubrication Chart

Important instruction to service stations

Strengthened points for single column car lifts with 4 lifting points:

Outer extremity of body under fold directly adjacent to the reinforced points for the car's own jack.

For lifts with 3 lifting points:

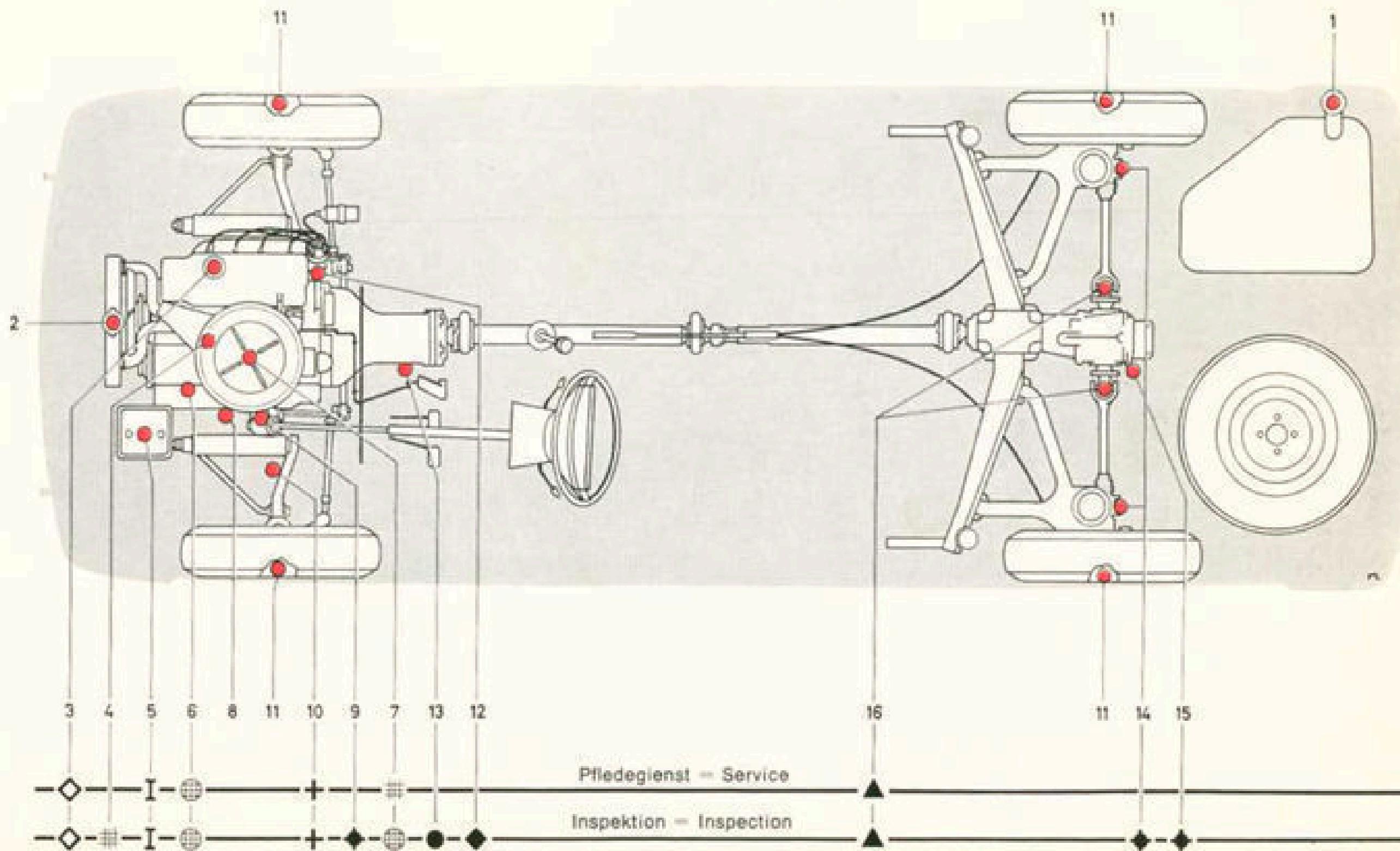
At front below the two floor section struts, in line with the front door pillars.

At rear, in the centre of the V-shaped box-section carrier, close to the propeller shaft flange.

Warning: Never jack up directly on to the final drive.

1. Fuel filler	Branded super grade fuel
2. Radiator filler (Water outlets are situated at the bottom left of the radiator and the bottom right of the engine block)	Clean water with low lime content and a) in summer an anti-corrosion agent b) in winter an anti-freeze
3. Engine oil filler	◆ Branded HD engine oil; SAE 30 for outside temperatures above 0° C (32° F), SAE 10 W 30 for temperatures below 0° C (32° F) ◇ indicates oil change
4. Fuel pump fine mesh filter	■ indicates filter cleaning
5. Battery	I Distilled water
6. Engine oil filter	● indicates filter renewal
7. induction air filter	■ indicates filter cleaning ● indicates filter renewal
8. Engine oil level dipstick	Check oil level regularly
9. Steering box (permanently filled)	◆ Branded hypoid gear oil SAE 90
10. Hydraulic brake fluid reservoir	+ ATE brake fluid, blue
11. Wheel bearings (examine every 60 000 km/40 000 miles)	▲ Branded multi-purpose grease with drip point 180° C (356° F)
12. Oil nipple for ignition distributor shaft (for remaining lubrication points, see page 48)	◆ Branded HD oil, as engine oil
13. Gearbox (change oil every 24 000 km/16 000 miles)	● Branded gearbox oil, SAE 80
14. Half shaft sliding joints (change oil every 24 000 km/16 000 miles not used on no-maintenance half-shafts)	◆ Branded hypoid gear oil, SAE 90
15. Final drive	◆ Branded hypoid gear oil, SAE 90
16. Half-shaft universal joint grease nipples (not used on no- maintenance half-shafts)	▲ Branded multi-purpose grease with drip point 180° C (356° F)

Lubrication chart



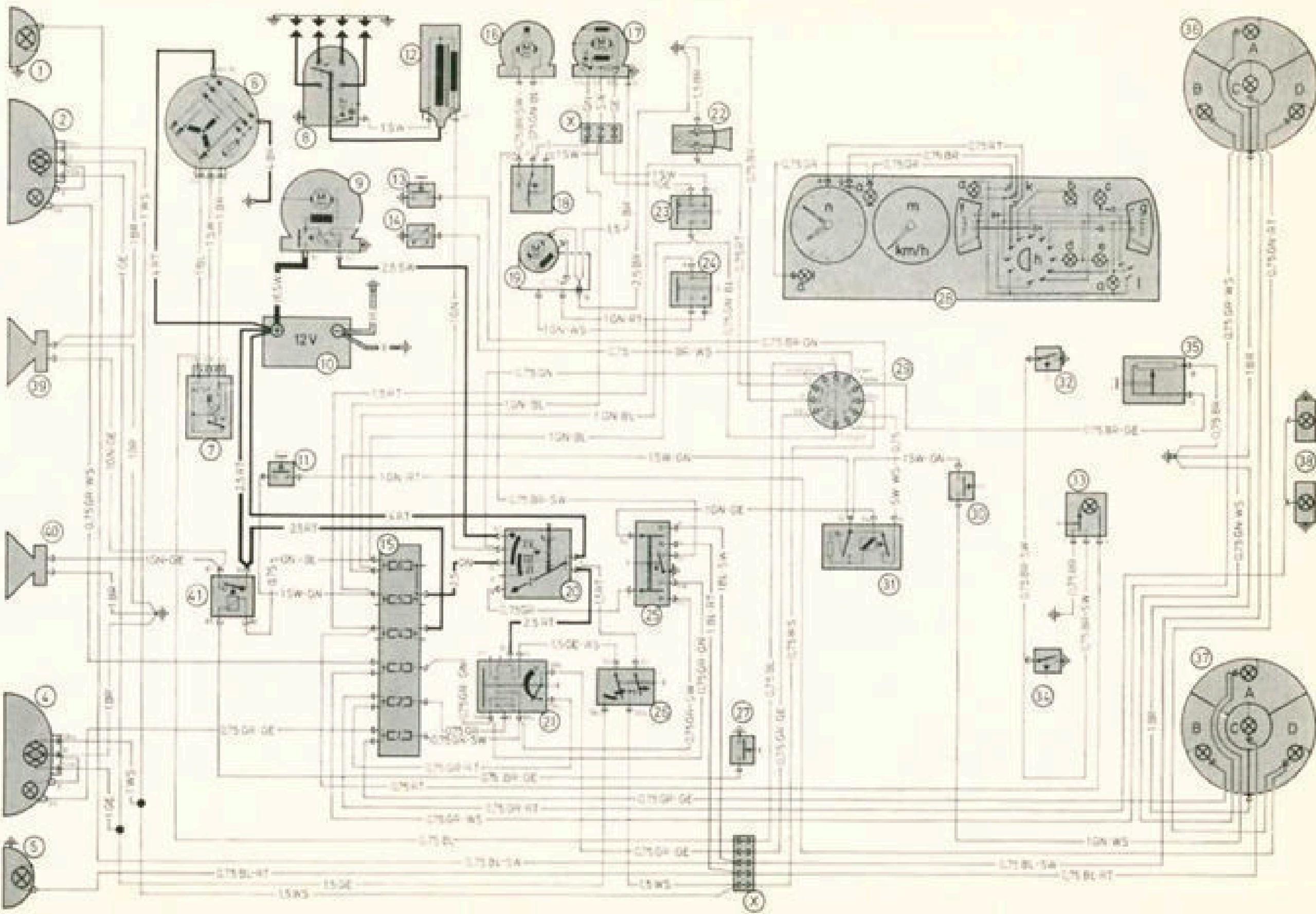
Key to electrical wiring diagram

Cable colour coding	
Cross-section (sq. mm)	1.5 GN
BL - blue	RT - red
BR - brown	SW - black
GE - yellow	VI - violet
GN - green	WS - white
GR - grey	

- 1 Front r. h. flashing indicator
- 2 R. h. headlight with side light
- 4 L. h. headlight with side light
- 5 Front l. h. flashing indicator
- 6 Alternator
- 7 Regulator
- 8 Distributor
- 9 Starter
- 10 Battery

- 11 Brake light switch
 - 12 Coil
 - 13 Oil pressure switch
 - 14 Water temperature gauge contact
 - 15 Fusebox
 - 16 Washer pump
 - 17 Wiper motor
 - 18 Delay relay
 - 19 Heater blower motor
 - 20 Ignition/starter switch
- Positions:
- I Stop
 - II Garage
 - III Drive
 - IV Start
- 21 Main light switch
 - 22 Cigar lighter/socket
 - 23 Screen wiper switch
 - 24 Blower switch
 - 25 Flashing indicator, parking light and washer switch
 - 26 Dip switch and headlight flasher
 - 27 Horn button
 - 28 Instrument panel
 - a) Dial illumination
 - b) Charge warning (red)
 - c) Oil pressure warning (orange)
 - d) Main beam (blue)
 - e) Flashing indicator repeater (green)
 - f) Water temperature gauge
- g) Fuel gauge
 - h) 12-pole plug-in connector
 - k) 3-pole plug-in connector (clock)
 - l) 3-pole plug-in connector (revolution counter)
 - m) Speedometer
 - n) Clock
 - 29 Instrument panel connector plug
 - 30 Reversing light switch
 - 31 Flasher unit
 - 32 Door-operated switch, r. h.
 - 33 Interior light
 - 34 Door-operated switch, l. h.
 - 35 Fuel gauge tank contact
 - 36 R. h. rear light cluster
 - A Reversing light
 - B Rear light
 - C Flashing indicator
 - D Stop light
 - 37 L. h. rear light cluster
 - A Reversing light
 - B Rear light
 - C Flashing indicator
 - D Stop light
 - 38 Number plate light
 - 39 R. h. horn
 - 40 L. h. horn
 - 41 Horn relay
 - X Flat plug connector

Electrical wiring diagram BMW 2002



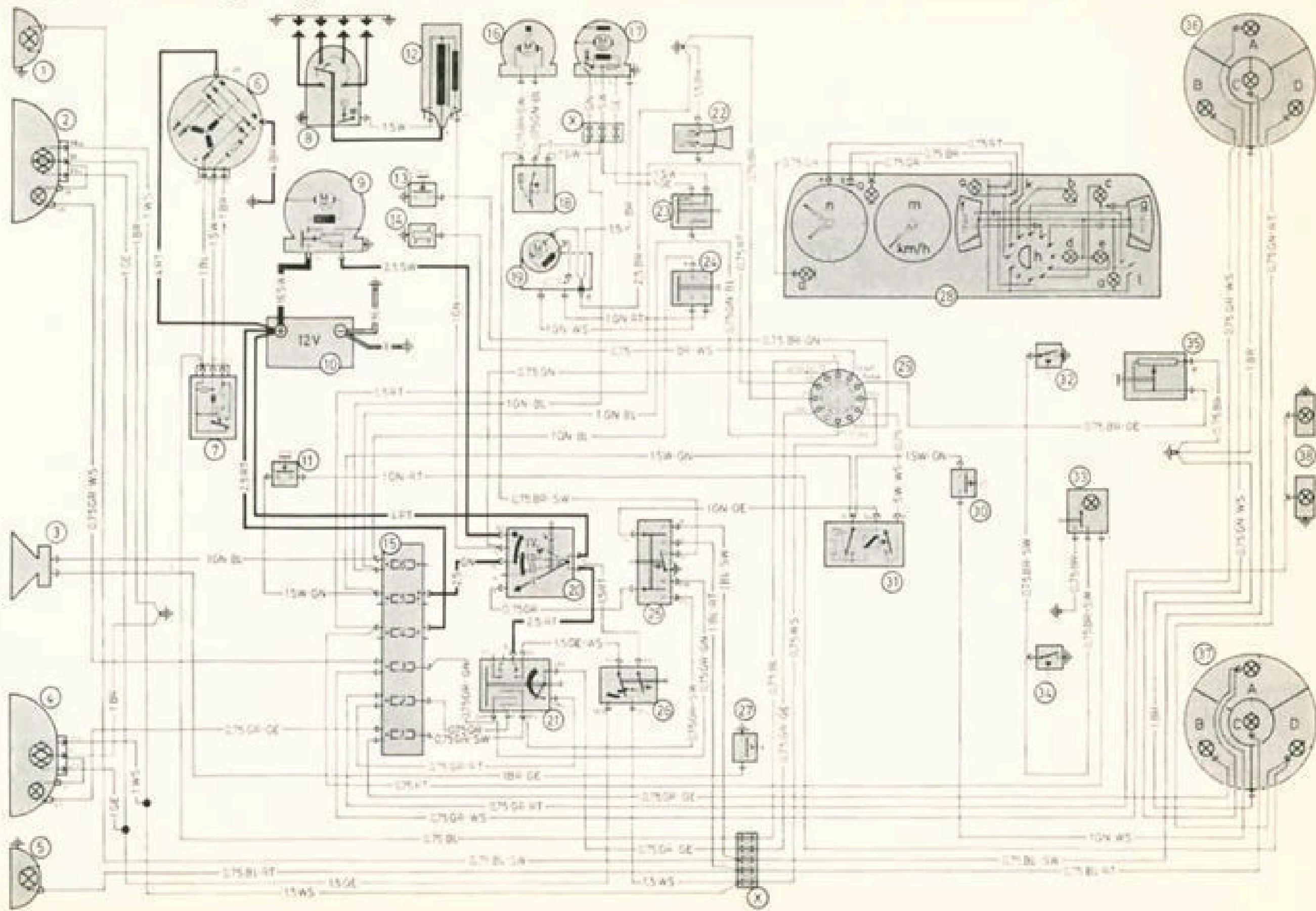
Key to electrical wiring diagram

Cable colour coding	
1.5 GN	
Cross-section (sq. mm)	Colour
BL	blue
BR	brown
GE	yellow
GN	green
GR	grey
RT	red
SW	black
VI	violet
WS	white

- 1 Front r. h. flashing indicator
- 2 R.h. headlight with side light
- 3 Horn
- 4 L. h. headlight with side light
- 5 Front l. h. flashing indicator
- 6 Alternator
- 7 Regulator
- 8 Distributor
- 9 Starter
- 10 Battery

- 11 Brake light switch
 12 Coil
 13 Oil pressure switch
 14 Water temperature gauge contact
 15 Fusebox
 16 Washer pump
 17 Wiper motor
 18 Delay relay
 19 Heater blower motor
 20 Ignition/starter switch
- Positions:
- I Stop
 - II Garage
 - III Drive
 - IV Start
- 21 Main light switch
 22 Cigar lighter/socket
 23 Screen wiper switch
 24 Blower switch
 25 Flashing indicator,
 parking light and washer switch
 26 Dip switch and headlight flasher
 27 Horn ring
 28 Instrument panel
 - a) Dial illumination
 - b) Charge warning (red)
 - c) Oil pressure warning (orange)
 - d) Flashing indicator repeater (green)
 - f) Water temperature gauge
 g) Fuel gauge
 h) 12-pole plug-in connector
 k) 3-pole plug-in connector (clock)
 l) 3-pole plug-in connector
 (revolution counter)
 m) Speedometer
 n) Clock
- 29 Instrument panel connector plug
 30 Reversing light switch
 31 Flasher unit
 32 Door-operated switch, r. h.
 33 Interior light
 34 Door-operated switch, l. h.
 35 Fuel gauge tank contact
 36 R. h. rear light cluster
 - A Reversing light
 - B Rear light
 - C Flashing indicator
 - D Stop light
 37 L. h. rear light cluster
 - A Reversing light
 - B Rear light
 - C Flashing indicator
 - D Stop light
 38 Number plate light
 X Flat plug connector

Electrical wiring diagram BMW 1600



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Notice

Notice is hereby given that the Board of Directors of the First National Bank of New Braunfels, Texas, has declared a dividend of \$1.00 per share on the common stock of the bank, payable January 15, 1938, to stockholders of record at the close of business on December 31, 1937.

First National Bank of New Braunfels
New Braunfels, Texas

At a glance

Tyre pressures in atm (psi) when cold; when tyres are hot, increase by 0.3 atm (4 psi).

Normal tyre dimensions 6.00 S 13

Load	front atm	rear lbs	front atm	rear lbs
up to 4 persons	1.7 (24)	1.7 (24)		
5 pers. and luggage	1.7 (24)	1.9 (27)		
For motorway travel increase the pressures by 0.2 atm (3 lbs)				

Radial tyre dimensions 165 SR 13

Load	front atm	rear lbs	front atm	rear lbs
up to 4 persons	1.8 (26)	1.8 (26)		
5 pers. and luggage	1.8 (26)	2.0 (29)		
For competition use, special rules apply.				

Capacities

Fuel tank	46 litres (12.1 US gal/10.1 Imp. gal.)	Branded super grade fuel
Cooling system incl. heater	7 litres	Clean water with low lime content and with: <ul style="list-style-type: none"> a) in summer an anticorrosion additive b) in winter an anti-freeze
Engine	4 litres (8.5 US pints/7 Imp. pints) 0.25 litre (0.53 US pint/0.44 Imp. pint) if oil filter is changed	Branded HD engine oil, SAE 30 for outside temperatures above 0°C (32°F), SAE 10 W 30 for below 0°C (32°F)
Gearbox	1 litre (2.1 US pints/1.8 Imp. pints)	Branded gearbox oil, SAE 80
Final drive	0.9 litre (2.1 US pints/1.6 Imp. pints)	
Half-shaft sliding joints (not fitted to no-maintenance half-shafts)	180 cc (6.3 fl. oz.) per joint 300 cc (10.5 fl. oz.) permanently filled	Branded hypoid gear oil, SAE 90

Winter or spiked tyres:

Load	front atm	rear lbs	front atm	rear lbs
up to 4 persons	1.9 (27)	1.9 (27)		
5 pers. and luggage	1.9 (27)	2.1 (30)		
Radial-ply types + 0.2 atm (3 lbs)				

Spark plugs

Beru 200/14/3 A	Electrode gap
Bosch W 200 T 30	0.6 + 0.1 mm
Champion N 9 Y	(0.024" + 0.004")

For mainly short-distance operation and when using heavily leaded fuel:

Bosch W 215 P 21*

Electrode gap 0.35 mm (0.014")

* Spark plugs with platinum electrodes (also for motorway driving).

Contact breaker gap 0.4 mm (0.016").

Dwell angle 60°.

Ignition timing

3° bTDC; test with engine stopped and cold.

Valve clearance (engine cold)

Inlet and exhaust: 0.15–0.20 mm (0.0059–0.0079")

V-belt

alternatively:

9.1 x 870

9.5 x 875 LA DIN 7753

Bayerische Motoren Werke AG München

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