320i

OWNER'S HANDBOOK

Your vehicle is covered by a new car limited warranty and a 5 year/ 50,000 mile Emission Performance Warranty. Detailed warranty information and maintenance schedules are contained in the warranty pamphlet and service manual respectively, which you received with this handbook. Any questions regarding any of these documents should be referred to either your dealer or to BMW of North America, Inc., Montvale, New Jersey 07645 (201-573-2091).

320i

OWNER'S HANDBOOK

Bayerische Motoren Werke AG Munich

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Dear BMW owner,

congratulations on your new car. We have tried to make it the best driving machine on the road today. Its performance capabilities enable you to drive courteously and carefully in traffic and to accelerate away from the crowd when conditions permit.

However, to get the most out of your car, you should be completely familiar with it. Please take the time to study this handbook and its recommendations for troublefree driving pleasure.

Sincerely yours,
BAYERISCHE MOTOREN WERKE
Aktiengesellschaft

In the interests of continuing
technical development work we
reserve the right to modify designs,
equipment and accessories.
Dimensions, weights and performance data quoted
in this handbook are subject to the appropriate
standards laid down by German Industrial
Standard (DIN).
**Pleas note that any discrepancies between your own
car and details in this handbook may be
due to the equipment specification offered on a
particular model or the items ordered with the car.**

OPERATING INSTRUCTIONS

SAFETY

DRIVING HINTS, MINOR DEFECTS

CARE AND MAINTENANCE

TECHN. SPECIFICATIONS AND INFORMATION

OPERATING INSTRUCTIONS

Manufacturers plate
Keys and locks
Controls, instruments and switches
Front seat, headrests
Sliding roof with elevated vent position
Heating and ventilation
Automatic transmission
Break-in rules

Before you start – what you need to know

The identify of your car can be established by comparing the registration documents with the manufacturers plate and **vehicle identifications numbers.**

The model reference, chassis number and other data are entered in the car's own logbook or registration document, and on the licensing or ownership certificate. It is a good idea to compare these entries with the references stamped on the vehicle, in case a mistake has been made. The reference data is utilized for all inquiries, examination of records or replacement claims. You should therefore be familiar with the locations of the items concerned.

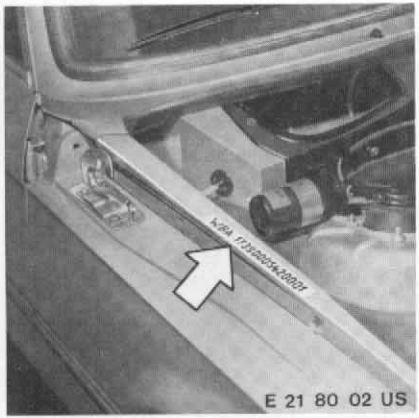
Vehicle identification number: In the engine compartment, on the support plate of the right hand wheel arch looking forward and on a label affixed to the steering column.

Manufacturers plate: at the driver's door.

You have received four keys for your new BMW. The two black coated and the smallheaded chromed are masterkeys and fit all locks. You should deposit the small master key in a safe place so it can be obtained if the master keys are lost. The big-headed chrömed key operates the two front doors and the ignition switch of your BMW. The doors are unlocked by inserting the key and turning it forwards, and locked by turning the key rearwards.

With this key/lock combination it is possible to leave luggage locked in the luggage compartment while the vehicle is in a workshop or garage.

You also received a selfadhesive label, bearing the key number. This key number must be quoted, if your BMW-dealer eventually has to provide a replacement key.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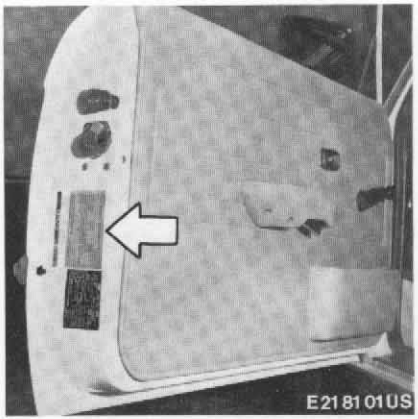
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To open the doors from the outside, lift the flap-type door handle.

To lock a door from the inside, press the locking button down; to unlock and open from the inside, pull up the handle beneath the armrest.

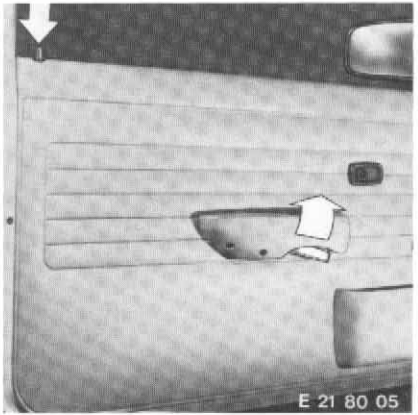
If the **driver's door** is already open, the locking button cannot be pressed down; in this way you cannot accidentally lock yourself out of the car.

The **passenger door** is locked from the inside by pushing down the locking button. This locking button remains in the locked position when the car door is shut from the outside.

The black key is required to lock and unlock the **luggage compartment** and glove box.

Do not forget to lock the luggage compartment after closing.

The luggage compartment lighting operates when the lid is raised.



Controls and instruments

1. Side window defrosting and demisting jet [left]
2. Adjustable side fresh air outlet [left]
3. Handbrake and brake fluid level telltale [red]
4.
5. Fuel gauge with fuel level telltale lamp [yellow]
6. Brake pad wear warning light [red]
7. Turn indicator telltale [green]
8. Speedometer with milage- and trip odometer
9. Tachometer
10. Digital clock
11. Oil pressure telltale
12. Battery charge telltale
13. Headlight high beam telltale
14. Coolant temperature gauge
15. Center fresh air outlet
16. Switch for hazard warning flasher
17. Warning lights (FASTEN SEAT BELT / OXYGEN SENSOR)
18. Side window demisting and defrosting jet (right)
19. Adjustable side fresh air outlet (right)
20. Operating switch for electrical adjustable outside mirror
21. Lever for turn indicator, low/high beam, head light flasher
22. Head light switch (2-stages) with instrument light control
23. Engine compartment release
24. Horn buttons
25. Switches for heated rear window
26. Fog light switch [optional]
27. Clock operating panel
28. Wiper-washer lever
29. Rotary switch for temperature control
30. Adjustable center fresh air outlet
31. Ashtray
32. Rotary control for heater blower
33. Cigarette lighter
34. Car radio [Optional]
35. Rotary control for air distribution
36. Slide control for ventilation
37. Glove box
38. Loudspeaker [with optional radio]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The **ignition/starter switch** on the right of the steering column housing is combined with the steering lock. The key can only be inserted in the "**0**" (off) position.

Turn the key clockwise to the "**1**" (accessories) position: the steering lock will disengage, but if necessary the steering wheel should be turned slightly to free the lock. The radio can then be operated. Turning the key further to the "**2**" I-(ignition) position switches on the ignition. The red carge and oil pressure warning lights will come on, and the fuel and coolant temperature gauges will operate. In key position "**C**" the red BRAKE warning light will light up also, even when the handbrake is released. This serves for checking the function of this light. Normally, the BRAKE light should extinguish as soon as the engine is running. If the light then remains on although the handbrake is released, see instructions in "DRIVING HINTS, MINOR DEFECTS".

Key position "**3**" (start) operates the starter. Release the key as soon as the engine has fired; the key will return automatically to position "**2**".

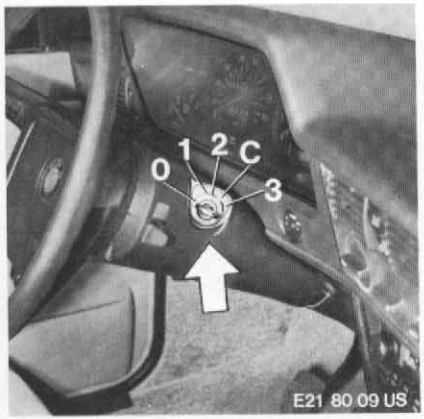
To lock the steering, turn key to the "**0**" (off) position and remove. If necessary turn the steering whell until the lock engages. The ignition key can **only** be removed in this position ("**0**" off).

A warning buzzer is actuated when the ignition key is left in the lock and the driver's door is opened.

Headlight and parking light switch
(2-positions)
First position: parking lights
Second position: headlights

The intensity of the **instrument panel, ashtray and control lighting** can be adjusted by turning the light switch knob in its pulled-out position.

The **highbeam lever and turn indicator lever** on the left of the steering column can be finger-tip operated with the left hand without releasing the steering wheel. When the lever is set to **High beam** (forward position) a blue telltale lamp on the instrument panel is illuminated. To **flash the headlights,** pull the lever toward the steering wheel. If the ignition key is turned to "**1**" or "**0**" while the headlight switch is on, the headlights will be switched off and only the parking lights will remain illuminated.



To operate the right hand **turn signals** move the turn signal upwards, to operate the left hand turn signals move the lever down. A regular ticking sound and illumination of the green telltale lamp in the combination instrument indicates that the flashing turn signals are operating correctly.

The turn signals are automatically cancelled and the lever returned to its initial position once the car has completed its turn. If the turn was only slight it may be necessary to cancel the lever manually.

If the turn signals are to be operated for a short period only (e. g. changing lanes, overtaking, moving off) press the turn signal lever only slightly in the desired direction without allowing it to engage. As soon as it is released it will return to its original position.

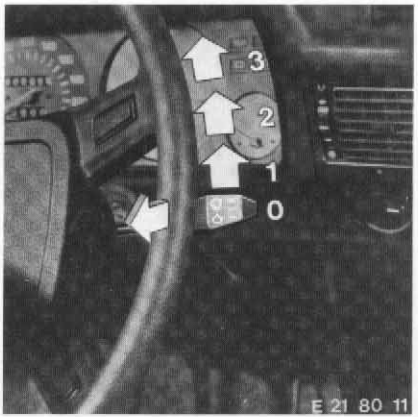
The **wiper and windshield washer lever** on the right has four positions.

Lever position 3
= fast wiper speed
Lever position 2
= normal wiper speed
Lever position 1
= intermittent action
Lever position 0, fully down
= wipers switched off

The automatic windshield washer is operated by pulling the wiper and windshield washer lever toward the steering wheel rim.

The intermittent action position provides single wiper movements at regular intervals. This avoids having to switch the wipers on and off frequently in light rain, snow, etc. Select position 3 (fast) only in heavy rain or snow. The **washer reservoir,** of approx. 1,2 liters (1,3 US quarts, 2,1 Imp. pints) capacity, is located at the front right of the engine compartment.

Warning: Do not operate the automatic wipe-wash mechanism when the reservoir is empty. This could scratch the windshield.

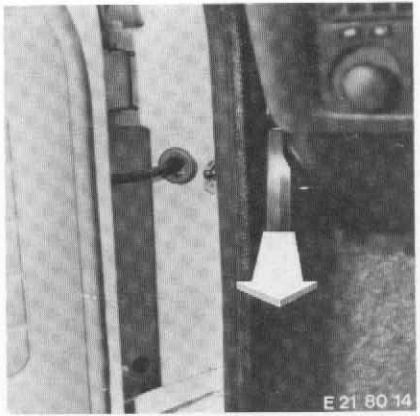


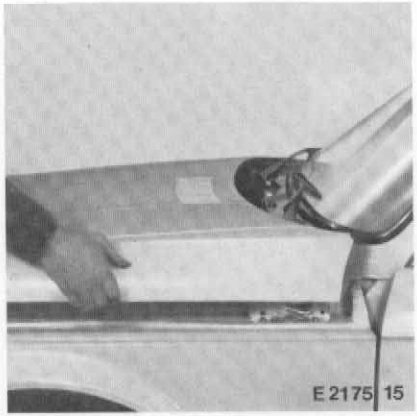
The two windshield washer jets are located beneath the windshield.

If a water jet fails to strike the glass correctly (i.e. in the middle of the wiper area) the nozzle can easily be adjusted with a needle point.

The engine compartment lid opens forwards, and is released by pulling a lever below the dashboard on the left side of the car.

A built-in spring mechanism makes it easy to open and raise the lid from the outside after release.





To close the engine compartment lid, move it down and press slightly to the rear at the middle of the lid front section.

The **trip odometer** in the speedometer can be set to zero by pressing the reset button.

In addition to the speedometer and revolution counter, the **instrument cluster** includes the fuel gauge, the coolant thermometer, digital clock and the telltale lamps for:

1	Fuel level	(yellow)
2	Oil pressure	(red)
3	Turn signals	(green)
4	Brake fluid level and handbrake	(red)
5	Battery charge	(red)
6	Headlight main beam	(blue)
7	Brake pad wear warning light.	(red)

The tachometer indicates engine speed in revolutions per minute.

To check the function of the brake pad wear warning light: the light comes on when the starter is operated.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The **hazard warning flashers** are set in action by the push button switch on the right facia panel. They function whether or not the ignition is switched on. The red switch knob and the green telltale lamp for the turn signals are illuminated at regular intervals to show that the hazard warning flashers are functioning correctly. (see SAFETY)

When the headlights are on an indicator light in the push-button illuminates the switch.

To switch on the **fog lamps** (optional equipment) pull the switch at the left side in the instrument panel close to the steering column.

For the **heated rear window** (14 elements) operate the lower push button on the left facia panel (violet telltale light).

The 14 heating elements will defrost the rear window and will also speed up the evaporation of accumulated moisture from dew, etc.

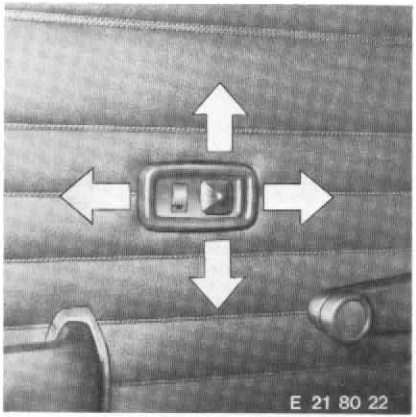
The **electric twin-tone horns** are sounded by pressing any of the four buttons set into the steering wheel spokes, or the center button of the sports steering wheel if installed. (Optional Equipment)

The **door mirror** can be adjusted in a vertical or horizontal plane by means of a switch on the driver's door to suit his seated position.

Switch moved forward
= mirror turns inwards
Switch moved back
= mirror turns outwards
Switch moved up
= mirror tilts upwards
Switch moved down
= mirror tilts downwards

When the switch is released it returns automatically to its initial position, but the mirror remains in the new setting (see also "SAFETY").

The same switch is used to adjust the mirror on the other door (dealer installed accessory), by first moving the changeover switch.



When the ignition is switched on, **the fuel gauge** in the combined instrument indicates the level of fuel in the tank. If the needle enters the red warning zone, and the yellow telltale lamp lights up, you should add fuel immediately although enough for about 30 miles or 50 km still remains in the tank, depending on the way the vehicle is driven.

As soon as the yellow telltale lamp begins to burn continuously, add fuel at once.

The coolant temperature gauge has two colored zones:

Blue: engine too cold. Keep engine and road speeds moderate.

Red: engine overheated – stop engine immediately and allow system to cool down until temperature gauge indicator is approx. in the middle of the scale.

CAUTION: DO NOT REMOVE THE FILLER CAP ON HOT ENGINE – DANGER OF SCALDING!

Warning: Allow the engine to cool (needle of coolant temperature gauge in center of white zone) before unscrewing the radiator cap. To open, turn the cap a quarter-turn counterclockwise to the first stop. Allow time for excess pressure to escape, then unscrew further and remove. To seal the radiator screw on the cap as far as the second stop.

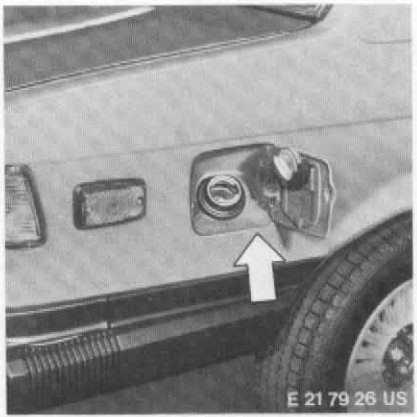
Search for cause of overheating – see also "MINOR DEFECTS"

Normal operating temperature is an indication between the two colored zones. The needle may tend to approach the red zone when the ambient temperature – and/or the engine load is very high.

The **fuel filler** cap is behind a flap on the right-hand rear side panel of the body.

When refilling, the filler cap can be protected from getting dirty or lost by putting it in a fixture on the filler flap. The filler flap can then only be closed when the filler neck is closed with the cap.

The fuel filler neck is equipped with a check valve and a leaded fuel restrictor. The check valve prevents the escaping of fuel when refilling. The leaded fuel restrictor prevents the insertion of a fuel filler nozzle designed fo leaded fuel.



The picture shows the arrangement of the **rear light cluster:**

1. Rear sid marker (red)
2. Turn indicators (yellow)
3. Rear light and reflector (red)
4. Stop light (red)
5. Reversing (backup) light (with)

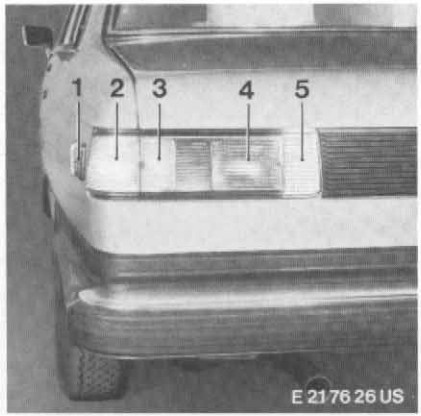
When the main light switch is pulled out, the luggage compartment will be indirectly illuminated.

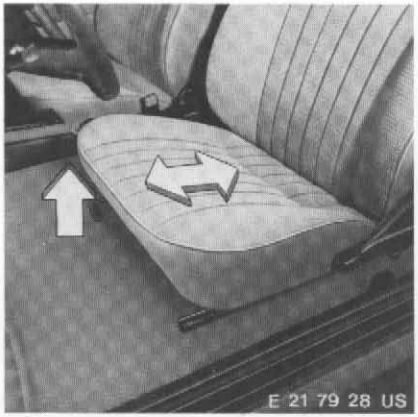
To **adjust the front seats** backwards or forwards, pull up the lever under the front of the seat near the tunnel and move the seat to the desired position. Then release the lever and ensure that the seat has locked into position. See "SAFETY".

The **front seat backs** can be adjusted to any angle by pulling up the lever on the outside of each seat back support. They can be moved down by pressing lightly against the spring pressure and will move up automatically. When the lever is released, the seat back will remain in the desired position.

In addition, the seat backs are provided with safety catches to prevent them from folding forwards accidentally. The catches are released by pulling up the knobs on the outer faces of the front seat backs.

The passenger's seat back is additionally equipped with a second releasing knob on the inner face.





Your BMW is equipped as standard with **automatic** (inertia-lock) **front seat belts,** with lap and diagonal straps.

Details of how to use the front seat belts and also the automatic lap-and-diagonal rear seat belts are given under the section "SAFETY".

The height of the front **headrests** can be adjusted after pressing in the release button. See "SAFETY".

Manual transmission

The correct positions of the gear lever for the various ratios of the manual gearbox are shown in the **gate pattern diagram.** All gears have synchromesh.

The fifth gear is an economy gear, reducing engine speed and noise level as compared with fourth gear while maintaining road speed, and may contribute to fuel consumption reduction.

To engage reverse gear (only when the car is standing still), press the gear lever, over to the left and forward until slight resistance is overcome.

The back-up light will come on when the reverse gear is selected and the ignition is switched on.

Note:
If you are not familiar with the 5-speed gearbox be aware of the following: When disengaging any gear, the gear lever automatically slips back into neutral position, between 3rd and 4th gears.

Automatic transmission

The following **selector lever positions** are available to suit various traffic conditions:

P-R-N-D-2-1

P = Park

Select only when the car is standing still. The drive train is locked as an additional precaution against rolling on a slope. To select position P, press the locking catch in below the lever handle. The engine can still be started with the transmission in park.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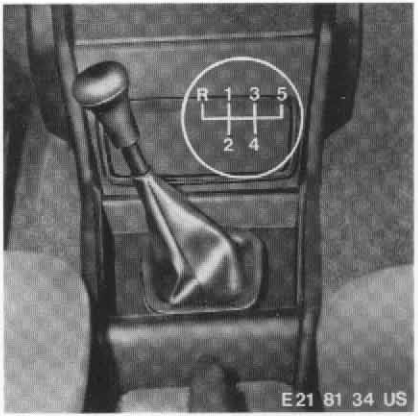

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R = Reverse

Select only when the car is at a standstill, with the locking catch pressed in. If reverse is selected while the car is moving forward, the rear wheels will lock – this could cause damage to the drive train.

N = Neutral

The engine is disconnected from the drive train and can be started. Engage neutral when stopped for **lengthy** periods (for instance in traffic jams), particulary in hot weather.

D = Drive (normal driving position)

This position should be selected for all normal road conditions. The car moves off in 1 st gear and automatically changes up into 2 nd and 3 rd gears as soon as the most favorable and economical point is reached.

2 = Hill-climbing and engine braking

This position can be selected on mountain roads or other lengthy up or down grades, so that better use is made of available engine power and engine braking effect.

Position 2 can be selected at any road speed. If the speed is initially too high for 2nd gear to engage, it will come into operation only after road speed has fallen to about 70 mph or 112 kph. If the road speed then rises again, the transmission will not reengage 3rd gear, and excessive engine speeds can result.

1 = Hill-climbing and engine braking

This position is normally reserved for road and traffic conditions in which it is desirable to hold 1 st gear; for instance on very steep up or down grades.

Position 1 can also be selected at any road speed. If the road speed is initially too high for 1 st gear to engage, 2 nd gear willengage when the road speed has fallen to approx. 10 mph or 112 kph. Then 1 st gear will engage after the road speed has fallen to approx. 42 mph or 61 kph. However, even if road speed then rises the transmission will not change up again into 2nd or 3rd gear, and so excessive engine speeds can result.

Kick-down

To engage the kick-down, the accelerator pedal can be pressed down beyond the normal full-throttle position (increased resistance will be felt).
In special circumstances, for example when passing, the transmission will select the next lower gear (depending on engine speed) providing for faster acceleration.

When the kick-down has been used, the subsequent upward changes will occur at a considerably higher road speed than normal, close to the maximum permissible engine speeds in each gear. This ensures that the full available engine power can be used when needed.

The **handbrake** operates on the rear wheels. To brake or secure the vehicle, gradually pull the lever up. Until the desired level of braking is achieved. To release the handbrake lever, pull it up slightly, press in the button on the end and push the lever down. When the handbrake is applied, the **red** "Brake" **warning lamp** in the instrument cluster will come on. This also enables a check on correct operation of the telltale lamp.

If the brake telltale lamp comes on during vehicle operation, see instructions under the "SAFETY" heading.

A useful hint: to apply the handbrake without undue noise, press the button on the lever in as the lever is pulled up.

Remember to alter the settings of the **outside and interior mirrors** to suit driving position. (See "SAFETY"). The interior mirror has an anti-glare position, obtained by moving the small lever as shown. Use this position when following vehicles headlights are to bright, such as encountered during night driving.

Either **sun visor** can be released from its clip and swung to one side to cover part of the door window if strong sunlight is encountered from that direction. See „SAFETY".

The passenger side sun visor has a built-in **make-up mirror.**

The switch on the **interior light** has three positions:

Position 1: Light operates only when a door is opened

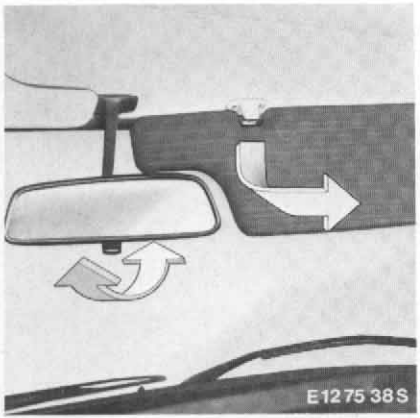
Position 2: Permanently off

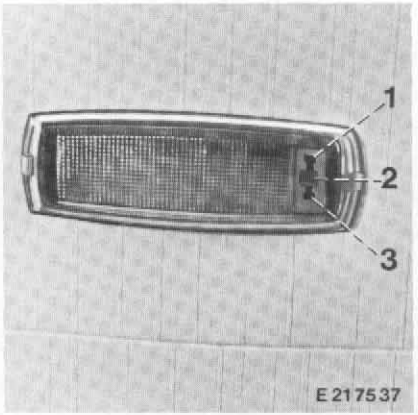
Position 3: Permanently on

The lockable **glove box** is opened downwards by pulling the flap handle. To shut, move the lid up.

When the lid is lowered, the glove box is automatically illuminated.

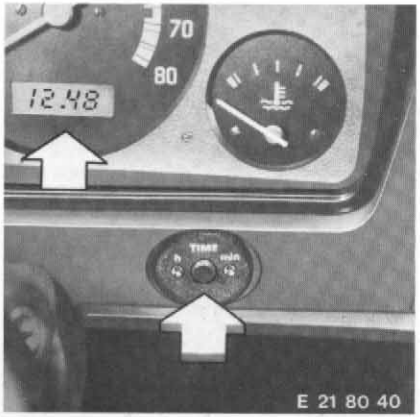
The power socket and rechargeable flashlight (optional) are located inside the glove box on the left.





The digital quartz clock can be adjusted by pressing in the adjusting buttons in the operating panel by means of a pin, pencil or another suitable tool.
Press in the:
h-button – the hours can be adjusted
min-button – the minutes can be adjusted

If the current supply to the clock becomes interrupted, i.e. if the battery is disconnected, the clock display switches to an imaginary indication. This indicates that a re-adjustment is necessary.



When the ignition is switched off the clock display extinguishes. The time display can then be read after pressing the "TIME" button in the clock operating panel.

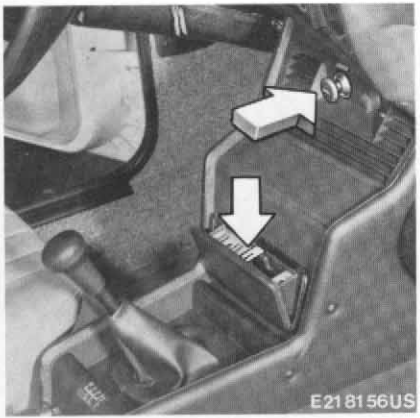
The brightness of the display will dim when the headlightes are switched on.

To use the **cigarette lighter,** push in the knob. When the element has heated, the knob will spring back to its original position and can then be pulled out.

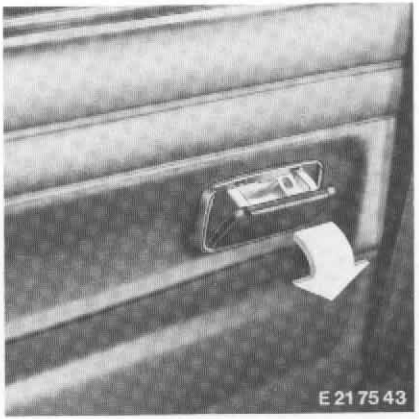
The cigarette lighter **socket** can also be used to plug in an inspection lamp, electric razor or similar appliance provided that the rating does not exceed 12 Volts, 200 W. Do not insert plugs from appliances that are of a higher rating ot that have plugs that are not designed for use in the cigarette lighter socket.

To empty the **ashtray on the instrument panel:** Pull out as far as the stop, press down the retaining spring and remove the ashtray from its holder.

Make sure that the protecting flap is folded back when inserting.



To empty the **rear ashtray:** tilt fully open, press firmly down and remove.



A radio can be installed in your BMW as an option. Instructions for the various radio models are supplied together with the car's own documents.

If you specified a factory-fitted radio option, you will receive a Service Pass with the car's documents; this contains full details of **how to operate your car radio.**

To ensure that your listening pleasure is unaffected by local reception problems, please study the following general remarks on broadcasting techniques and the possible disturbances caused by natural geographical features, man-made structures etc.

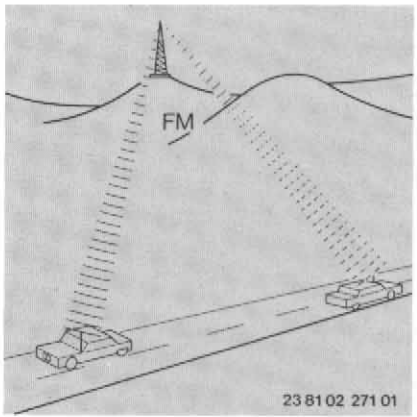
The strength of the signal received by your car radio antenna, and thus the quality of the sound emerging from the loudspeakers depend on the position of the receiver and the height and direction of the antenna. These factors are relatively easy to take into account on a home radio receiver, but for a mobile radio set such as that in a car certain concessions have to be made. The position of the receiver is constantly changing and it is impossible to keep the antenna aligned with the direction of signal transmission. Other disturbance factors are high-tension overhead wires, poor or missing interference suppression on other vehicles, buildings or natural obstacles. Even if your car radio is perfectly tuned and your car equipped with proper interference suppression, these unavoidable noises or a deterioration in sound quality are often quite severe.

For the best reception quality, pull the antenna out fully. For radio reception the bottom telescopic section at least must always be fully extended. Regular care and attention of the antenna is also important.

Climatic effects: fog, rain or snow can interfere with good radio reception.

Strong sunlight: although very weak, the emissions from the sun's surface do interfere with medium wave reception. This wavebands can be best heard after dark, when the ionosphere reflects more of the transmitted signal back to earth.

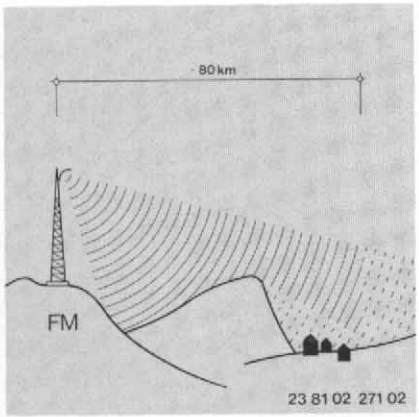
Fluttering noise is caused by signal fade, when the line-of-sight link between transmitter and receiver is blocked by large buildings or geographical features. A similar effect is sometimes heard when driving along a tree-lined road.

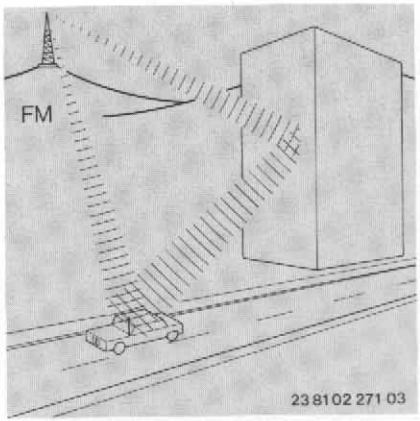


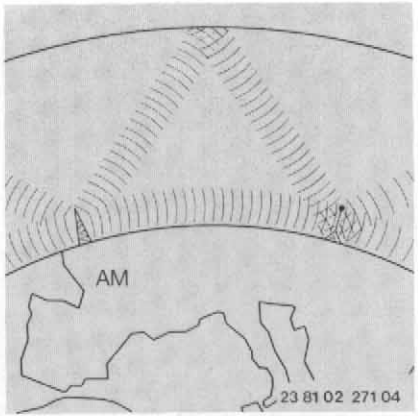
Continuous high level of background noise: this normally indicates that the edge of the transmitter's zone has been reached, or the car has been driven into a 'shadow' where no direct signals are received. The only remedy is to retune to a more powerful Station.

Hissing, sizzling and splashing noises: disturbance in this category occurs when reflected signals are picked up by the car radio a fraction of a second after the main signal, for instance from large buildings nearby. The sound level also fluctuates repeatedly.

Severe fade: this is a phenomenon more often encountered on AM, and accompanied by distortion. It is caused by the superimposing of ground waves and airborne signals at the reception point.





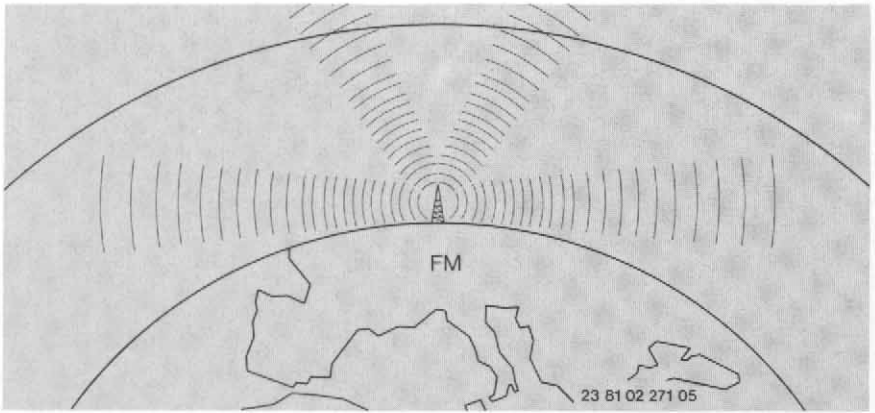


The hints below are intended to help you select the most suitable waveband for in-car listening.

The **FM** transmission system offers far better sound quality than the other wavebands. However, reception is limited to only a few stations at a time, since the radio waves are emitted **in a straight line** from the transmitter tower and thus cover an area not more than about 80 km (50 miles) in radius. As the distance from the transmitter to the receiver increases, background noise becomes more of a problem, and finally the station can no longer be heard or is displaced by a more powerful one which the car is approaching. These too are natural factors which can only be avoided by retuning to a stronger signal.

Stereo radio, if transmitted in your area, can only be received on **FM.** As you move away from the transmitter, interference becomes noticeable more rapidly than on mono transmissions. In this case, switch to mono reception or tune to another station giving reliable stereo reception.

On stereo receivers you can turn the **front-rear balance control** to vary the relative volumes of the front and rear loudspeakers.



AM provides a larger or, in some cases, exceptionally wide reception range, since the signals are not only dispersed as **ground waves,** which cling to the curvature of the earth, but also as **space waves,** which are reflected off a layer in the ionosphere and bounce back to earth.

There are physical reasons why the quality of **medium-wave** (AM) reception is not as good as on FM. However, longdistance reception is good, particularly at night, so that a large number of stations can be received, though the station density is such that mutual interference often occurs.

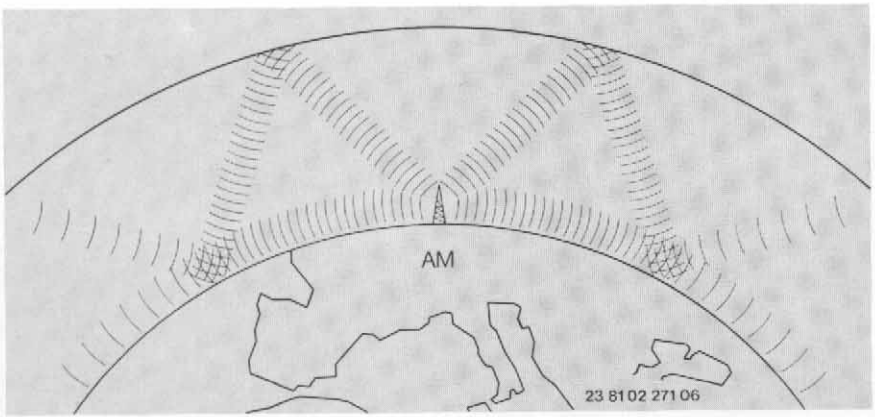
On the **long waveband** (AM), transmitters still further away than on the medium wave can be picked up. However, the total number of stations you are likely to receive is not so great, since not many broadcasting companies operate powerful long-wave transmitters.

Short wave (AM) offers the longest theoretical reception distance, but here too the individual transmitters power outputs are limited. The maximum station density and – subject bo basic physical limitations – the best sound quality is obtained in the 49-meter band.

For **cassette operation** we recommend cassettes of Type C 60 (2 x 30 minutes playing time), or Type C 90 (2 x 45 minutes). These cassettes are suitable for the jolts and vibration of in-car operation.

To prevent the tapes becoming slack or twisted, each cassette should be **kept in its box.**

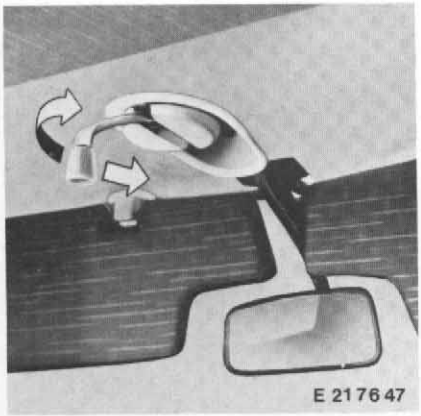
At extreme outside temperatures (below –10° C [+14° F] or above +40° C [+ 104° F]) cassettes should not be left in the car, or they may become distorted and fail to operate correctly.



The optional steel panel sunroof can be operated both as a conventional sunroof or as a vent (or air extractor depending upon vehicle speed) by raising the rear or the sunroof panel only.

To open: Unfold the hand crank. Turn clockwise until the roof panel reaches the desired position. The sliding roof panel can be opened to any intermediate position.

To close: Turn the crank counter-clockwise to move the sliding panel forwards. It is fully closed when definite resistance to further movement of the hand crack is felt.



To raise at the rear: With the sliding roof closed, unfold the crank and turn counter clockwise. The roof panel can be raised fully or left in any intermediate position.

To lower: Turn the crank clockwise to lower the rear of the roof panel.

Note: After each useage the hand crank should be folded back into its recess.

In the next column is a list of new identification **symbols.**

These symbols replace the inscriptions on the telltales within the instrument cluster and will be found on some control levers.

	High beam
	Turn signal
	Hazard warning
	Brake pads wear
	Fuel
	Engine coolant temperature
	Battery charging condition
	Engine oil
	Rear windows demisting and defrosting
	Cigar lighter
	Front fog lights
	—
	Windshield wiper
	Windshield wiper and washer
	Fan

The **heating and ventilation system** is notable for exceptional heat output, accurate temperature control and an entirely separate fresh air supply for ventilation in hot weather.

the layout of the controls is as follows:
1 = Guide to control settings for maximum window defrosting
2 = Fresh air supply side
3 = Rotary temperature control
4 = Rotary air flow control
5 = Rotary air distribution control

Fresh air supply lever (2)
As this slide is moved upwards, it permits an increasing volume of cool air to enter the car's interior. The air enters through the horizontally and vertically movable side and center grills as well as through a fixed center grill.

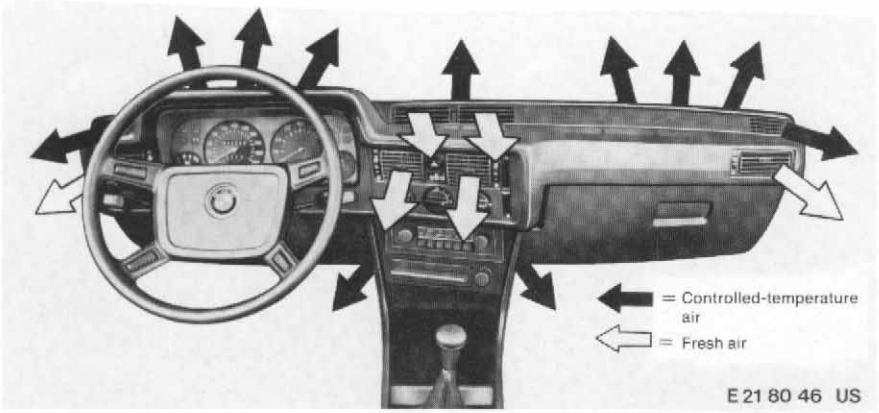
These outlets can be closed by turning the side knurled discs downwards.

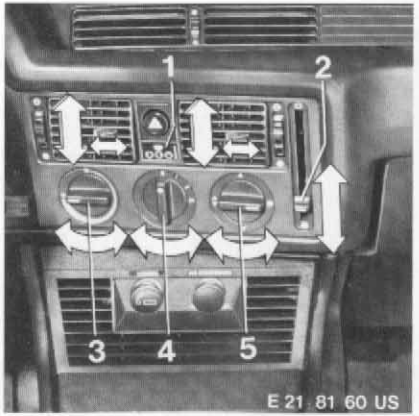
The left and center pictures below show the side outlets for controlled-temperature air (black arrows) and fresh air (white arrows).

A simultaneous warm air supply to the footwells is possible, depending on the settings of the distribution (5) and temperature control (3) knobs. This enables stratified airflow through the car's interior to be achieved and helps to reduce fatique and increase driver comfort.

Rotary temperature control (3)
To heat the air coming from the defroster vents and the footwell outlets, move the rotary control first to the red spot (warm), then to the desired temperature.

The preselected temperature will be reached shortly afterwards.





Rotary air flow control (4)
This switch is used to adjust the amount of air flowing into the passenger compartment. To increase air volume, turn the knob clockwise.

You are recommended to run the blower whenever heating or fresh air is required, particularly at slow or frequently varying road speeds.

Do not use blower speed III with the rotary temperature selector at "WARM" until the engine has reached its normal operating temperature.

Rotary air distribution control (5)
By moving this control, the airflow can be distributed to the desired outlets.

Set to white spot: the airflow is shut off altogether. As the knob is turned clockwise, the foot well outlets are opened (downward arrow). Turning the knob further open the footwell and defroster outlets (downward and upward arrows). For defrosting, or if the windows are misted or iced over, turn further to open the defrosting outlets (upward arrow), so that the full airflow is directed to the windows.

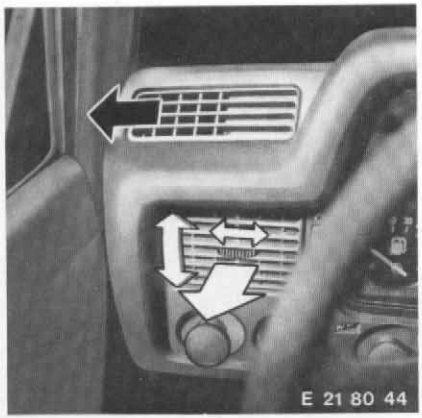
Flow of controlled-temperature air into car:

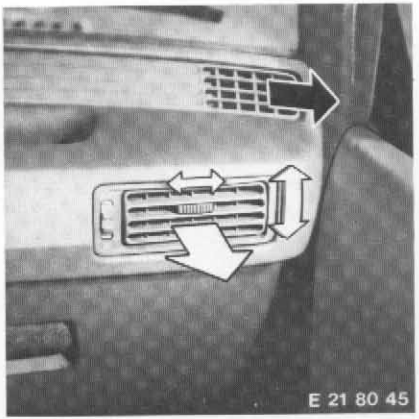
a) To footwells via openings at side of heater.

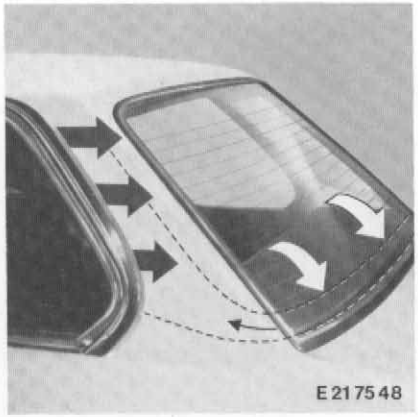
b) For defrosting via two defroster nozzles, one center nozzle and two nozzles for the side windows.

Air extraction:
Stale air is extracted from the passenger compartment through slots below the rear window, leading to openings in the rear roof pillars.

As a means of providing additional ventilation or stale air extraction, the fonthinged rear side windows (optional extra) can be opened.



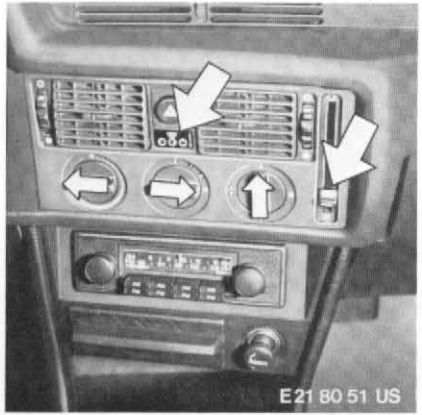




Window demisting and defrosting
The following should be done in order to achieve most efficient window demisting and defrosting:

- Rotary temperature control (3) to red point
- air distribution control to upward arrow
- blower speed to high speed (don't use max. blower speed if engine is still cold).
- close fresh air slide
- switch on heated rear window

The picture below shows the positions of the heater controls.



With the aid of the optional **air conditioning** in your BMW 320 i, the air in the interior of the car can be cooled to a pleasant temperature.

It is integrated into the standard fresh-air ventilation system, with air distribution through the movable side and center fresh-air grills and also through the fixed center grill. The controls are the same as those used for the heating.

The air conditioning switch is used to switch the air conditioning on and off and to select the desired degree of cooling.

Air conditioning switch
Continuously variable preselection of the degree of cooling.

"MIN" position
The air conditioning and blower are switched off.
Turning the control slightly clockwise switches on the air conditioning and starts the blower.

Only slight cooling of air entering the car's interior.

Further turning in a clockwise direction gradually increases the rate of cooling.

"MAX" position
Full cooling of incoming air.

Rotary air flow control (4)
Air conditioning switched off: same function as the heating.

Air conditioning switched on.

0 – Blower speed 1
1 – Blower speed 2
2 – Blower speed 3
3 – Blower speed 4

In order to permit unrestricted cooling of the air entering the interior of the car, it is best to set the rotary temperature control (3) to the blue dot (cold). If the weather is hot, the air distribution and fresh air supply controls should also be closed. The moisture condensate from the evaporator is discharged under the car and, depending on the air humidity, can be as much as 2 liters (2.1 US quarts, 3.5 Imp. pints)/h.

Important notes:

1. **The air conditioning operates only when the engine is running.**
2. **The air conditioning system should be run briefly at least once a month (remember to do this in cold weather too) or the compressor shaft seal may dry out and permit refrigerant to escape.**
3. **If any fault develops in the air conditioning system – for instance failure to deliver cold air when switched on – the system must be switched off at once and we recommend contacting your BMW dealer.**

Starting off

Before you operate the starter, always make sure that the gear shift lever is in Neutral.

On cars fitted with an automatic transmission the engine can only be started when the selector lever is in the "P" or "N" position.

To **start the engine,** turn the ignition key clockwise to the "**4**" position (without pressing down the accelerator) until the engine fires. Do not allow the engine to turn over without firing for longer than about 20 seconds. When the ignition key is released, it will spring back automatically to the "**2**" position. When a cold engine is started in this way, it will run initially at a slightly higher speed during the warm-up phase.

To make starting easier, especially in freezing conditions, switch off all current-consuming items and press down the clutch pedal to eliminate drag from the transmission.

If the starter has to be operated a second time, the ignition key must first be returned from the "**2**" position to the "**1**" position. This deliberate delay is included to prevent possible re-engagement of the starter pinion while the engine is running. Try to prevent damage to the flywheel ring or starter pinion teeth by waiting until the engine has ceased to rotate before operating the starter again.

The fuel injection engine of this BMW model is equipped with an automatic starting and warming-up device.

Starting

When starting, a magnetic valve controlled by the ignition system is opened so that fuel is injected into the inlet manifold for a certain period depending on the temperature of the coolant. The fuel/air mixture is enriched further while the engine is warming up.

When starting, do not depress the accelerator pedal at all. It is possible to start driving immediately after the engine has fired, running at a medium engine speed only.

If the engine will not start or fires only irregularly after several attempts, try again with the **accelerator pressed down fully.**

If the engine is warm, start with the accelerator pressed down halfway.

When the engine has fired, the oil pressure telltale, (red) battery charge telltale light (red) and brake pad wear warning light (red) in the combined instrument must extinguish when engine speed is increased.

If the oil pressure telltale lamp comes on while driving, disengage the clutch **immediately** and switch off the ignition after pulling over to the side of the road. If the engine oil level is not sufficient have the problem checked. If the light comes on briefly during idling, there is no danger provided that the lamp extinguishes again when the accelerator is depressed slightly. (See MINOR DEFECTS)

It is not advisable to let the engine warm up by extended idling and this is in fact forbidden in some countries. It is better to move off immediately after starting the engine, using **moderate** engine speeds. If the outside temperature is exceptionally low, it is better to run a cold engine for about 1/2 minute at a fast idling speed, to ensure that all parts of the engine receive and adequate supply of lubricant. In all cases avoid running a cold engine at high speeds, as this will shorten its working life.

When **disengaging the clutch,** always **depress the pedal fully.** While driving never rest the left foot on the clutch pedal or the clutch and throw out bearing will prematurely wear out.

Before selecting reverse gear, wait with the clutch pedal fully depressed approx: three seconds, so that the spinning gears have time to come to a standstill.

When driving an automatic transmission car, it is recommended to operate both, brake pedal and accelerator with the **right foot only.**

Moving away from a standstill with automatic transmission:

With the engine idling, selector lever positions D, 2, 1 or R can be engaged from P or N with the **brakes applied.** Let the transmission engage (slight motion) before pressing down the accelerator.

Stopping a car equipped with automatic transmission:

At normal idling speeds with drive position selected, the car will tend to creep forward on a level surface. The foot brake should be applied to prevent this.

To stop the engine, turn the ignition key back to position **1.**

If the red battery tell tale lamp comes on during normal driving, there is a problem in the charging system. The vehicle is then operating off the battery rather than the alternator and depending upon the amount of electrical components used, may be driven for a period of time.

WARNING:
Continued use will drain the battery to the point that the vehicle will stall.

Manual transmission

The shift-speeds as recommended by the Manufacturer are as follows:
from first to second gear at 15 m.p.h.
from second to third gear at 25 m.p.h.
from third to fourth gear at 40 m.p.h.
from torth to fifth gear at 45 m.p.h.

Breaking in – but how?

The engine of your BMW has not been artificially governed in any way. Since full power output is always available, it is up to you to observe the following **running-in rules,** and thus achieve maximum operating life, economy and reliability.

During the first 2000 km (1200 miles) drive at changing engine and road speeds, however, not faster than two thirds of the top speed admissible in each gear. At any rate avoid full throttle or use of kick-down setting of the accelerator.

Driving at very low engine speeds in a high gear is at least as harmful as exceeding the permissible engine speeds. Whe accelerating or on uphill gradients try to keep engine speed above 1500/min. and change down in good time, particularly on uphill gradients.

The green econometer zone on the rev counter shows you when the engine is operating in its most fuel efficient speed range. See 'DRIVING HINTS'.

The cut-out range of the speed limiting rotor arm starts at the narrow red warning zone and must not be reached even on long downhill stretches or in the lower gears.

Engine speeds in the wide red warning zone are detrimental to the service life of the power unit and should be avoided at all costs.

Remember that the running-in rules apply to other mechanical assemblies such as the gearbox or rear axle, and not just to the engine.

Should any such assembly be replaced at a later stage in the car's life, the running in procedure must be repeated.

Break-in instructions for brakes:
Until 300 miles or 500 km have been covered, avoid repeated violent brake applications, particularly from high speeds, and do not apply the brakes to prolonged endurance tests, or the pads will fail to develop their full wear-resistance and friction characteristics.

Breaking-in new tires:
Due to the manufacturing techniques for automobile tires we recommend restrained driving during the first 200 miles or 300 km so the tires can develop their best initial wear pattern.

During the **brake-in period,** the drive may feel that the gear shift, steering and other controls are slightly **shiff to move.** However, the normal running-in process will result in the stiffness disappearing completely after a short time.

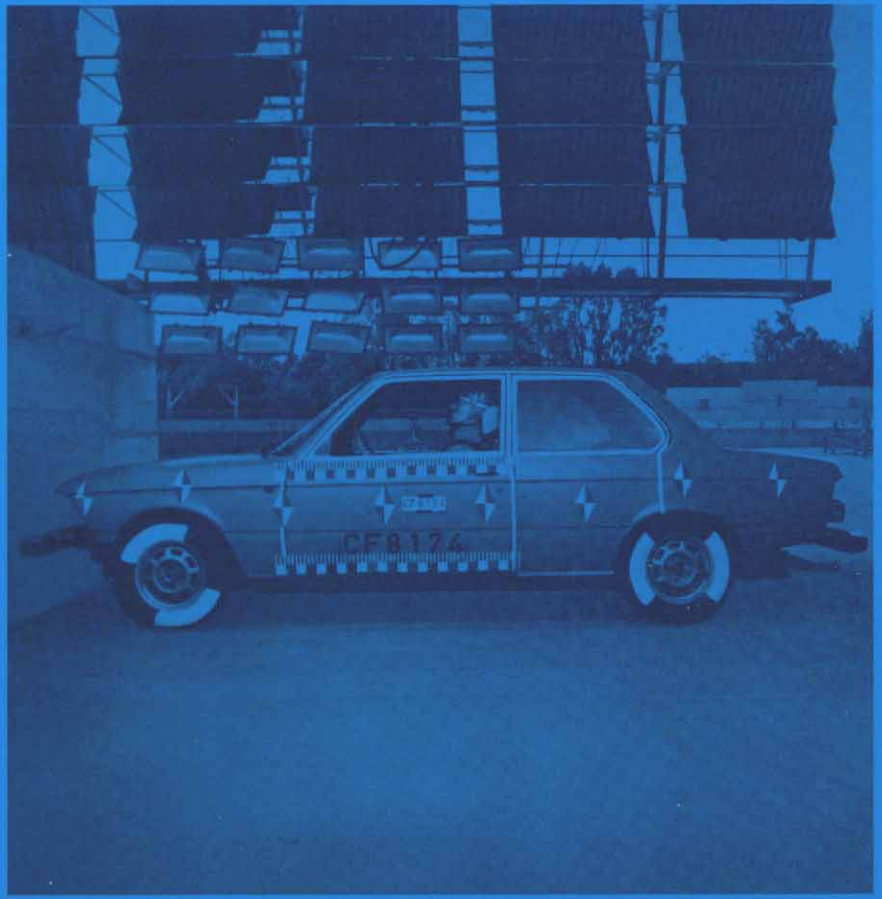
After 1300 miles or 2000 km have been covered, you can **gradually** increase your road speeds – subject to suitable road and traffic conditions – to the permissible **continuous and maximum speeds.**

For satisfactory operation, the engine requires the following commercially-available fuel for spark-ignition engines, without additives such as upper-cylinder lubricants etc.:

Unleaded fuel with an anti-knock index of 87 AKI or 91 RON (Research method)
Please note that in certain countries it may be difficult to obtain fuel of the correct octane rating or quality at all garages and filling stations.

Traveling in Foreign Countries
Prior to using your BMW in a foreign country, check to ascertain if fuel of the required octane level is available to avoid engine damage.

Should unleaded fuel not be available in the foreign country in which you are traveling or intend to travel, be aware that the use of leaded gasoline will render the oxygen sensor and catalytic converter of your BMW inoperative. As a result, the vehicle will not meet the emission requirements of the US and Canada and maximum fuel economy will not be otained. It will, therefore, be necessary upon your return to the US or Ganada for the fuel system to be purged of the leaded fuel and both the oxygen sensor and catalytic converter to be replaced in order for the vehicle to be legally operated in the US and Canada.



SAFETY

Exterior and interior safety features
Automatic inertia-lock seat belts
Telltale and warning lamps
Heated rear window
Wiper blades
Fog lights
Tires
Brake fluid

Think of yourself – and others

For your personal safety and that of your passengers, please note the following recommendations:

Before driving all **windows** and the **outside mirror** should be clean, so that good vision is assured in all directions. In addition, make sure that the **headlights and other outside light lenses** are clean – so that you can see and be seen.

If you start the car inside a garage, remember that the exhaust fumes contain an odorless and invisible but highly poisonous gas (carbon monoxide). Always open the garage door first.

Position the **driver's seat** correctly for a comfortable driving position, good all-round vision and easy access to all controls.

The most suitable driving position is normally with the arms slightly bent.

Warning: do not adjust seat position while driving – this constitutes an accident risk.

For safety reasons, position the **headrests** at head height, not at neck height.

Adjust the settings of the **interior and outside mirrors** to suit the chosen seat position.

Remember to swing down the **sun visors** to shield both driver and passengers from direct sunlight or glare.

The seat belts can only protect you and your passengers if they are worn for every journey, even short trips in town.

Automatic (inertia-lock) seat belts with lap and diagonal straps are standard equipment for the front and rear seats of your BMW.

Children should only accupy the rear seats, and depending on their age and size either wear the seat belts or a special children's seat.

The seat belts have been snug designed to simplify fastening and wearing. Place the upper strap across the shoulder and chest, the lower strap round the hips. Pull the locking catch section of the belt after insertion to ensure that the lock has engaged correctly, and check that the straps are not twisted.

Special attention should be paid to correct belt length, as this can greatly influence effective accident protection.

The lap section should be a snug fit, with any slack passed back to the reel via the shoulder section of the belt.

Attention:
Check position of the swinging link, it always must be in line with the seat belt.

The length of the shoulder section is automatically adjusted, but the belt remains free during normal driving to permit the necessary degree of movement at the controls.

To release the seat belt, press the red release button ("PRESS") on the lock unit.

If you should be unfortunate enough to be involved in an accident, the seat belts may be subjected to unusually high loadings and stretch beyond permissible limits. In this case, they must be renewed together with their fastenings as a safety precaution.

At intervals, reel lock units, anchorage points and straps should be examined for signs of damage or wear.

Instructions for the routine care of seat belts are given under the heading "CARE AND MAINTENANCE".

A reminder on the dashboard consisting of a warning buzzer and a visual warning signal "FASTEN SEAT BELTS" will be actuated for a time of about 6 sec. when the ignition is switched on.

The buzzer will not sound, when the driver's belt is put on before switching on the ignition.

Also, the buzzer is actuated when the ignition key is left in the lock and the driver's door is opened.

After 30.000 miles or 48.000 km a visual warning signal "Oxygen-SENSOR" will light up on the dashboard. This signifies that the Emission Control System needs maintenance.

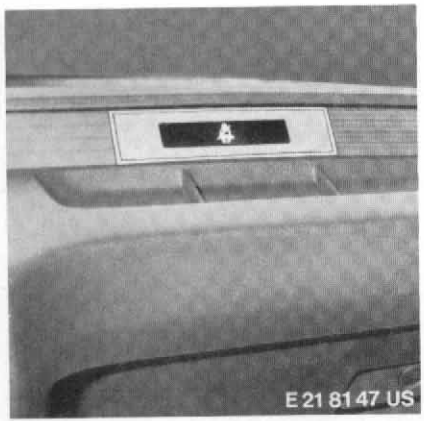
Every 30.000 miles or 48.000 km the oxygen sensor must be replaced.

When the maintenance is carried out the workshop mechanic extinguishes the warning light and resets the milage recorder.

After the engine has started, the **battery charge, oil pressure light and brake pad wear warning light** will extinguish. If either of these lights remains on, or comes on again during the journey, see instructions in "DRIVING HINTS, MINOR DEFECTS".

The **brake warning light** should go out when the handbrake is released. However, this light also indicates low brake fluid level in the reservoir by remaining on or coming on during a journey. In this event, see instructions in "DRIVING HINTS, MINOR DEFECTS".

As a test the **brake pad wear warning** light comes on while operating the starter. If this warning light comes on during a journey see "DRIVING HINTS, MINOR DEFECTS".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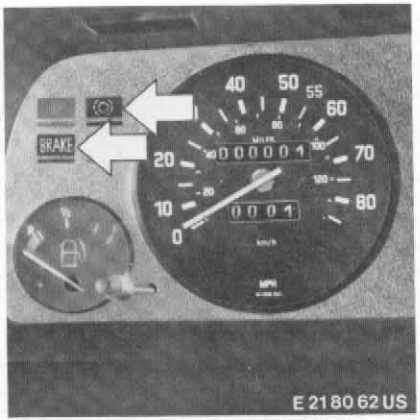

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Brake fluid is a hygroscopic substance, and thus absorbs moisture from the atmosphere over a period of time. In order to maintain the brakes in a fully operational condition, the **brake fluid always be changed at least once a year.**

Add fluid up to the "MAX" mark.
Tested and approved brake fluid grades:

USE ONLY DOT 4 BRAKE FLUID

The **electric heating elements on the rear window** ensure unobstructed rearward vision and remove or prevent misting or ice formation during cold-weather driving. Never clean the inside of the rear window with a sharp object or a powerful solvent, or the heating elements may be damaged.

Rear vision should not be obstructed by articles placed on the shelf below the rear window, as these may fly forwards during an emergency brake application and increase the risk of occupant injury.

Examine the **wiper blades** at frequent intervals. If they tend to smear or leave areas of glass unwiped, there is a risk the driver's vision will be impaired. Wiper blades should therefore be renewed at least twice a year.

Fog lights (optional) improve your range of vision just ahead of the car, and are a useful 'active safety' factor.

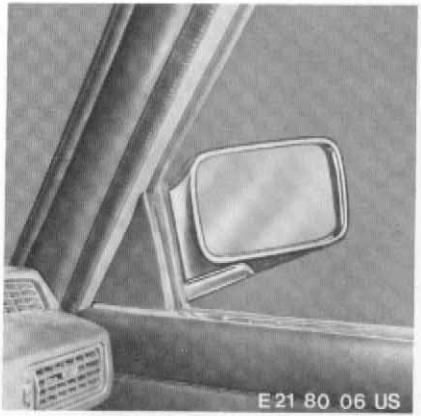
Your BMW Dealer will gladly install them if necessary. However, note that many countries have statutory regulations governing the use of these lights.

The factory-approved **steel belted tires** on your BMW have been carefully chosen to match its performance and handling characteristics, and to offer not only maximum safety but also the desired level of ride comfort. Steel belted tires should always be fitted to all four wheels to retain these advantages.

The condition of the tires and maintenance of the **specified tire pressure** can greatly affect both useful tire life and road safety. At regular intervals, and before starting a lengthy journey (but at least once a week) have the tire pressures checked. Tables showing the specified pressures are given inside the back cover of this handbook.

Inspect the tires frequently for signs of damage, stones or other objects in the treads, excessive or uneven wear and tread depth.

If your car is equiped with an autside mirror on the right hand side (optional on US-vehicles only) please take into consideration that the glass of the mirror is convex. **The objects you see in the mirror are closer than they appear.**



Tread Wear Indicators

Your BMW is fitted with steel-belt radial tires, which incorporate built-in tread wear indicators. These are molded into the bottom of the tread grooves and will appear as approx. 1/2" (13 mm) wide bands when the depth of the tread becomes 1/16" (1,6 mm). The indicators help you to visually determine when your tires have been worn down so far that they need replacing. If they appear in two or more adjacent grooves, tire replacement due to tread wear is recommended.

If you are forced to drive over obstacles such as curbs or potholes, do so with great care and at low speed in order to prevent damage to the tire carcass which might not be evident from the outside.

At high speeds, the load on the tires is extremely high, in particular during hot weather and when the car is loaded to the full weight limit. Note that increased tire pressures are specified for these driving conditions. Do not exceed **maximum permissible gross weights.**

DRIVING HINTS, MINOR DEFECTS

Fuel consumption
Economy
Engine oil consumption
Engineering modifications
Cold-weather driving
Breakdowns
Trouble shooting
Bulb changing

US model

The outer scale of the speedometer is calibrated in miles per hour. The inner scale is calibrated in kilometers per hour.

The odometer registers distance travelled in miles.

Canadian version

In this version the scale of the speedometer is calibrated in kilometers per hour.

The odometer registers distance in kilometers.

Engine oil consumption, like fuel consumption, depends on driving style, operating conditions and proper maintenance.

We recommend checking engine oil level regularly, for instance when filling up with fuel. If necessary, add fresh oil of the same grade as before at the filler cap on the cylinder head rocker cover, until the dipstick oil level reaches the upper mark (for oil grades, see page 63, "CARE AND MAINTENANCE").

The most accurate oil level readings will be obtained if the dipstick is examined before starting a cold engine; if the engine is already warm allow a short period for the oil to drain back into the sump. The car should stand on a flat, level surface. Make sure that the loop handle on the dipstick points to the left (forwards), and the dipstick is pushed fully into its tube. The quantity of oil represented by the space between the upper and lower dipstick marks is 1.25 liters or 1.32 US quarts.

Warning: The oil dipstick must be fully inserted into the dipstick tube or a rough idle will result.

Adding too much oil is useless and may even damage the engine or suggest abnormally high oil consumption. We recommend adding fresh engine oil only when the level has dropped almost to the lower dipstick mark, but before it drops below the minimum-level mark.

Change to another grade of oil only during a complete engine oil change including filter element renewal.

Our engines are designed to operate with the highly-advanced modern oil available commercially without the addition of any other additives. The same applies to the manual gearbox, automatic transmission, final drive and power steering.

To check oil level in the automatic transmission (check at regular intervals): Park the car on a flat level surface, apply the handbrake and run the engine at normal operating temperature with the selector lever in the "P" position at idling speed.

Remove the transmission oil dipstick, wipe with a **non-fluffy** cloth, re-insert and measure oil level. This must lie between the two marks on the dipstick.

The quantity of oil represented by the space between the two dipstick marks is 0.25 litre/0.25 US quart/0.44 Imp. pint.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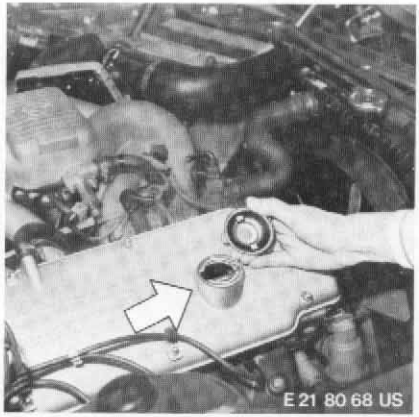

E21 80 68 US


E21 80 69 US

On your way

Your BMW is designed to operate with **Unleaded fuel with an anti-knock index of 87.** This designation is comparable to Research Octane Number 91.

Please note that in certain countries it may be difficult to obtain fuel of the correct octane rating or quality at all garages and filling stations.

Traveling in Foreign Countries

Prior to using your BMW in a foreign country, check to ascertain if fuel of the required octane level is available to avoid engine damage.

Should unleaded fuel not be available in the foreign country in which you are traveling or intend to travel, be aware that the use of leaded gasoline will render the oxygen sensor and catalytic converter of your BMW inoperative. As a result, the vehicle will not meet the emission requirements of the US and Canada and maximum fuel economy will not be obtained. It will, therefore, be necessary upon your return to the US or Canada for the fuel system to be purged of the leaded fuel and both the oxygen sensor and catalytic converter to be replaced in order for the vehicle to be legally operated in the US and Canada.

Your car's **fuel economy** is mainly dependent on your style of driving. Highspeed driving, acceleration to the limit in all gears, violent cornering and sudden braking all take their tool, not only in terms of heavy fuel and oil consumption, but also more rapid wear of brakes, tires and all the engine parts.

After driving for some time in dense city traffic or bumper to bumper, we recommend letting your engine **"take a deep breath"** by covering the next mile or two (some kilometres) at engine speeds of 4500 – 5500 rpm. This will help eliminate any carbon build-up in the cylinders.

The brake booster on your BMW works pneumatically, so that the necessary vacuum is provided only when engine is running. When the car is moving with the engine off. e.g. when it is towed, greater pressure on the brake pedal is needed to reach the desired braking effect.

For checking brake pad wear see "MINOR DEFECTS'

CAUTION!
Do not drive with your foot resting on the brake pedal. "Riding" the brakes may result in abnormally high temperatures, lining wear and possible brake failure.

The 'Ten Commandments' for energy-conscious driving

1. **Do not warm up the engine to operating temperature at idle speed, and never leave the engine to idle for long periods.**

Driving your car away immediately after starting is the quickest way of warming up the cold engine to its normal operating temperature. And the right operating temperature means greater fuel economy. Switch off the engine when you stop for a prolonged period. Only three minutes at idle speed cost as much as 1 km (3/4 mile) on the open road.

2. **Do not drive up to maximum speed in 1st gear – use it only for starting off.**

First gear consumes more fuel than any other gear at a given road speed. Full-throttle getaways result in unnecessarily high fuel consumption.

3. **Shift up to a higher gear in good time, and try to drive in the higher and more economical 3rd, 4th or 5th gears.**

Example: Driving at a steady 50 km/h (30 mile/h) in 2nd instead of 4th gear consumes up to 100% more fuel.

It can still be as much as 30% more if you use 3rd gear instead of 4th at the same speed. BMW engines have such excellent torque that they can be driven without hesitation at low speeds in high gears, e. g. at 50 km/h (30 mile/h) in town traffic.

4. **Adopt a moderate driving style and avoid extremes.**

Do not accelerate when you can see that you will have to brake in the next few moments. Drive quickly but smoothly and steadily. Try to keep off the brakes, allow your car to coast and avoid traffic jams wherever possible.

5. **Avoid driving at full throttle for long periods.**

The maximum power potential of a car is one of its most important safety reserves. However, if you always use maximum power on busy main roads, you will be constantly braking from maximum speeds. That costs energy. Steady average speeds help save fuel, nerves and wear and costs only very little extra time.

6. **Check tire pressure regularly.**

If the tire inflation pressure is only 0.5 bar (7 lb/in^2) less than specified, rolling resistance is increased by 15% and your fuel consumption too.

7. **Do not carry unnecessary weight (ballast) or use a roof rack.**

Every bit of extra weight wastes energy. Do not carry your 'weekend luggage' with you all the time. A roof rack increases air resistance and fuel consumption. Remove roof or ski racks immediately after use.

8. **Plan your journeys in advance if possible.**

Every traffic jam and every unnecessary, tiresome search for a parking space costs energy. You should plan to avoid rushhour traffic and times when there is a lack of parking spaces in city centers. You can often miss traffic jams by starting your journey half an hour earlier or later.

9. **Have your car serviced regularly and the necessary adjustments for maximum fuel economy performed.**

An ideal fuel-air mixture and optimum utilization of fuel depend on the condition of the air cleaner, spark plugs, valves, carburetor or fuel injection system and the ignition system. Regular servicing can produce a fuel saving of up to 10%. That means that the average car user would need some 150 liters (33 Imp., 39.3 US gal) less fuel over the year if his car were always set up and adjusted correctly.

10. **Check your car's fuel consumption regularly and accurately.**

Only if you know your own car's fuel consumption can you compare it with the car maker's specifiactions and empirical values. And it is only possible to keep a check on your method of driving and have minor engine adjustments performed in good time if you record the fuel consumption.

We would like to give you a few additional and useful tips Commandments 1 – 5:

More skilful driving pays off where it is needed most: under difficult conditions.

Let us start at a common point: A medium size BMW car consumes about 7 liters/100 km (40.3 mile/Imp. gal or 33.6 mile/US gal) at a steady 60 km/h (37 mile/h). But in town traffic we average only 20 km/h (12.5 mile/h) and usually consume twice as much in the process. It is in this area therefore that we can adopt new ways of behaving and observe some relatively simple driving rules. The simplest basic rule here is always to drive in the highest possible gear or, put another way, use the lowest engine speed at all times. You will have to change gear a little more often, but the fuel saving is considerable.

While you drive be conscious of the next gear shift or braking decision. Do not accelerate when you can see that you will have to brake a few moments later. Cars which move forwards in a series of jerks not only hinder the smooth flow of traffic, they are constantly wasting energy.

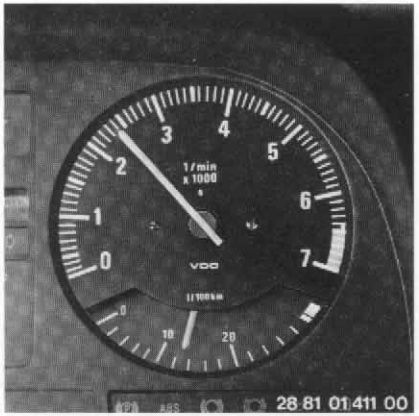
Sensible use of engineering excellence

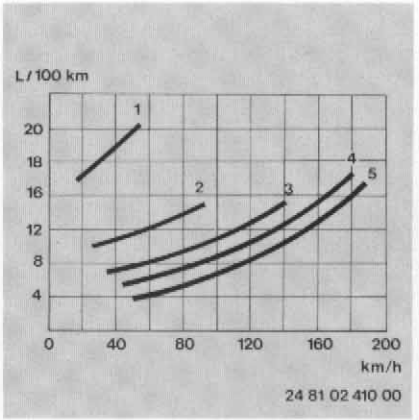
One very good psychological precondition for staying cool and composed at the wheel are cars which make it just as easy to accelerate as to give way. Cars which make one drive considerately offer safety reserves that enable them to be maneuvered with agility and speed in traffic whenever the need arises and help their driver in many situations in which one suddenly requires the poser and safety potential of a BMW. As we said, when you have the power to accelerate, it costs only a smile to hold back and give way.

The instruments show you the way to economy

The graph shows the fuel consumption in relation to road speed in the individual gears. It is clear to see how important it is to change gear in good time. BMW drivers have the advantage of possessing an engine which delivers high torque over a wide rev range and thus allows upshifts to be made very early without sacrificing either safety or comfort.

Our recommendation: Watch your tachometer. Note the most favorable torque range so that you always change to the next gear at the ideal shift point.





Thoughtfulness reduces the burden on you and your tank

The table of fuel consumptions for cars under different operating conditions, i. e. constant 90 km/h (56 mile/h) and 120 km/h (75 mile/h) and urban motoring (exhaust gas test cycle) shows the more a car is used, the greater the effect of driving style and being at ease at the wheel have on consumption.

The graph below illustrates how different fuel consumptions can be achieved at the same average speed when two different driving styles are employed.

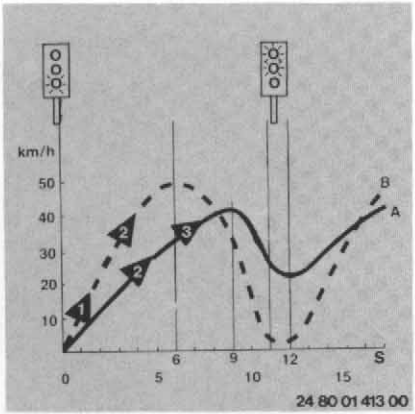
The graph plots the driving methods of two drivers: Driver A (solid line) and driver B (broken line).

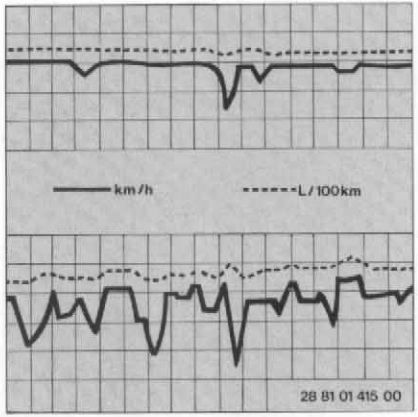
Driver B accelerates fully in 1st and 2nd gears between the first and second set of traffic lights and arrives at the lights earlier than driver A, but must brake hard because the traffic lights are 'red'. Driver A on the other hand does not use full throttle through the gears and shifts up to 3rd gear. He sees that the lights are 'red', reduces his speed and can then drive across the junction in 2nd gear without braking because the lights change to green as he arrives.

A high average is better than high speed

When one looks at the speed diagram of a car that has been driven at the maximum possible speed at every opportunity on a busy main road, one notices the following:

The extreme fluctuations clearly demonstrate that it can be far better to travel at a steady high average speed which matches the general flow of traffic. That saves a lot of nerves and a lot of energy as well. Every time the car is braked heavily the brake discs unnecessarily convert valuable energy into heat.





Commandment 6:

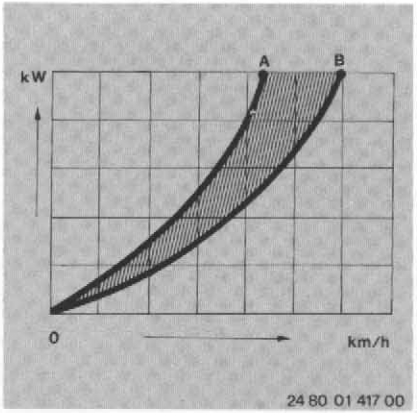
Driving with the tires under-inflated reduces their useful life and increases the risk of tire damage; the tire is flexed and deformed excessively and thus becomes too hot. Its rolling resistance is also increased, more engine power is required and fuel consumption is accordingly higher. Check tire pressures regularly at not more than 14 day intervals.

Commandment 7:

Energy – disappearing into thin air?

The graph below shows the power which must be expended to overcome air resistance as vehicle speed rises. A segment is show (see shaded area) because car shapes vary and therefore have a lower or higher air resistance to overcome.

A = Air resistance high
B = Air resistance low



Commandment 9:

A united effort to reach a common target: May we ask for your undivided attention.

The automobile industry, the European in particular, has progressively reduced fuel consumption over the past decades while satisfying greatly increased customer requirements. Its extraordinarily intensive investment and research programs are directed at improving the results obtained up to now while maintaining or even surpassing present safety and comfort requirements. But that in itself is not enough. As we have to save energy now with the existing car population and no existing technology, we ask all car users to make their contribution – in addition to the efforts of the government and the industry.

BMW engine technology makes it easy for you to adopt a reasonable approach

The best prerequisite for a new economic way of driving is the ultimate in engines – as offered by BMW. An engine that delivers high torque at the lowest possible rev/min.

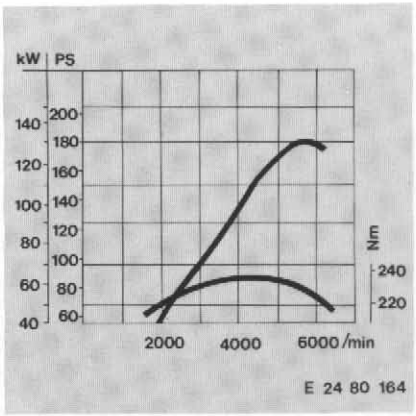
In this respect a BMW offers you maximum efficiency. The special characteristic of all BMW cars is their ability to accelerate smoothly at high revs as well as giving you plenty of jerk-free bottom end power.

A BMW responds with smooth power delivery when others are still hesitating

The effect of a very high torque at very low revs can be demonstrated by an example: The BMW 320i can climb a gradient of more than 35% with the engine turning at only 1000 rev/min.

Another example: The torque curve shows why a BMW engine is the ideal prerequisite for fuel efficient motoring at low engine speeds. The BMW 320i, for instance, delivers 85% of its maximum torque, i.e. its maximum pulling power, at only 2000 rev/min. It can be driven smoothly, comfortably and safely in high gears, i.e. the economic 3rd and 4th gears, at low speeds on busy city roads.

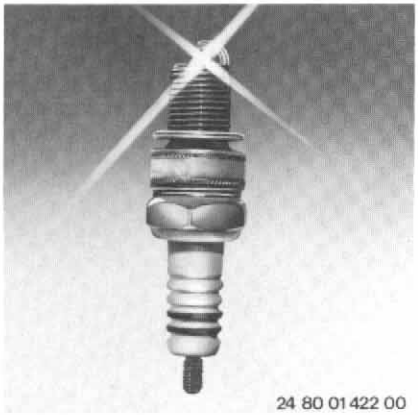
It does not spit back, will accelerate quickly when required and, because the engine is not under load, consumes very little fuel even when compared with smaller cars.



The engine is supplied with dust-free combustion air by way of the air cleaner. If the air cleaner is very dirty, the engine will be starved of fresh, clean air and the result will be an increase in fuel consumption.

Sooted and worn spark plugs reduce engine power and waste fuel. Checking them regularly also contributes to economic use of energy.

A fuel injection system service, i. e. checking the setting, can suddenly make one realize what economy is about. Your BMW dealer can perform the fuel injection system service not only to provide you with optimum economy but also to ensure that the exhaust gases remain clean and protect the environment.



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Commandment 10:

Having faith is good, checking is better

The secret of energy conscious driving is knowing exactly what your car consumes. Only if you establish what the effects of different driving styles are on consumption and what readjustments can do for the engine will you act and react with greater awareness in the future.

Keep a constant check on how much fuel you use.

Preconditions for fuel consumption measurement

1. The engine must be broken in.
2. Fill the tank to the brim.
3. The car should be perfectly level when you fill up.
4. Get rid of air bubbles in the tank by rocking the car.

'Check as you drive':

Try to maintain a constant 90 or 120 km/h (56 or 75 mile/h) in direct top (4th gear).

'Observe' –
Measuring the consumption

After finishing your journey, fill the tank to the brim again.

This is how you calculate your consumption per 100 km (or mile per gallon):

$$\frac{\text{fuel consumed in liters} \times 100}{\text{distance covered in km}} = \text{fuel consumption in liters per 100 km}$$

or

$$\frac{\text{distance covered in miles}}{\text{fuel consumed in gallons}} = \text{fuel consumption in miles per gallon}$$

Please observe the specifications regarding grades of fuel and engine oil.

Useful information on disc brakes

The brake booster servo on your BMW operates pneumatically, so that the necessary vacuum is built up only when the engine is running. When the car is moved with the engine stopped and the pressure reservoir empty, for instance when being towed, a much higher pedal pressure than usual will be needed to produce the anticipated braking effect.

On long downhill gradients the engine's braking action when the throttle is closed can be increased by selecting a lower gear. Never run downhill with the clutch pedal depressed, the gear lever in neutral or – a very dangerous practice – the ignition switched off.

It is essential to observe the break in instructions for the braking system when new brake pads are fitted – see 'OPERATING INSTRUCTIONS'.

Warning: When replacing brake pads, only BMW-approved brake pads should be used.

A disc brake system offers optimum braking efficiency, smooth response and a high load capacity. The peak temperatures which occur during brake applications, e. g. on mountain passes when driving quickly, necessitate a maximum degree of colling which is provided exclusively by ram air or the peripheral speed of the brake discs.

Wet conditions, dirt, salt spread on winter roads and corrosion of the brake discs can impair brake behavior by increasing braking distances, altering the car's normal brake pressure distribution, causing variations in the coefficient of friction on the individual wheels and thus make the car pull to one side.

Corrosion of the brake discs is accelerated if the car is used very little or garaged for long periods.

Gentle or moderate use of the brakes also promotes corrosion of the brake discs and allows the brake pads to become dirty because the minimum pressure necessary for the disc brake's self-cleaning action is not reached between the pad and disc.

Corroded brake discs cause a knocking effect when the brakes are applied and this cannot generally be eliminated by prolonged braking.

Dirt burnt into the brake pads (glazing of brake area) and clogged drain grooves cause scoring of the brake discs as well as a change, reduction or delay in braking effect.

Another problem in this connection is brake squeal which tends to increase in intensity as the discs become dirtier or glazed.

All these **climatic and environmental effects cause a change in the brakes' coefficient of friction,** i. e. less braking efficiency is available for a given pedal effort. If the coefficients of friction change in this way the brakes may respond unevenly or pull to one side.

Warning: Allow the engine to cool (needle of coolant temperature gauge in center of white zone) before unscrewing the radiator cap. To open, turn the cap a quarter-turn counterclockwise, to the first stop. Allow time for excess pressure to escape, then unscrew further and remove. To seal the radiator, screw on the cap as far as the second stop.

When **driving downhill,** the engine's braking action can be increased by shifting down to a lower gear ratio. Never drive downhill with the clutch pedal depressed, the gear or selector lever in neutral or – more dangerous still – with the ignition switched off.

The brake booster servo on your BMW operates pneumatically, so that the necessary engine vacuum is available only when the engine is running. When being towed with the engine stopped, more pedal pressure than usual will be needed to achieve the desired braking effect.

When the minimum brake pad thickness is reached a warning light comes on in the instrument cluster. Additionally, a spreader spring in each disc brake caliper comes into operation and makes increased pedal pressure necessary.

To protect the discs from damage, we recommend that the pads should then be renewed without delay by a BMW dealer.

For major **journeys,** we suggest that certain spare parts be carried as a precaution – bulbs, fuses, V-belts, spark plugs, gaskets etc. Your BMW dealer will gladly assist you in selecting a suitable range of items, available in travel kits.

In most cases, travel abroad calls for a nationality plate to be displayed at the rear of your car. However, some countries have differing or additional regulations. In case of doubt, it is best to approach a consulate, automobile club or similar agency.

For **winter operation** of your car, a few essential steps must be taken before the cold season commences. The coolant, as delivered, contains a **long-life-antifreeze and corrosion inhibitor.** Concentration must be kept at 35% all the year round in order to provide the necessary corrosion resistance anti-boil – anti-freeze protection as shown below.

Total capacity of cooling system including heater:	7.4 US quarts 7 litres 6.0 Imp. quarts
Anti-freeze protection down to approx.	–13° F –25° C

Corrosion inhibitors lose their effectiveness in time, therefore it is necessary to change, the coolant completely **every 2 years.** (For draining and refilling the cooling system, see "CARE AND MAINTENANCE"). Check the antifreeze protection of the coolant before and during the cold season of the year. At the same time, examine the cooling system for leaks and remplace any porous or brittle hoses.

Engine temperature is controlled by a thermostat, taking into account both engine load and outside temperature. For this reason **the grille must not be blocked off, nor a radiator cover fitted.**

The **windshield washer** can be protected in cold weather by adding 40% domestic alcohol. This is effective down to temperatures in the region of –20° C (–4° F). Please note the instructions regarding engine oil to be followed at the beginning of the cold season (see "CARE AND MAINTENANCE"). If the weather suddenly turns colder, do not wait until the next routine oil change before refilling with a suitable grade of oil.

If the engine is to start reliably in winter, the **battery** must be fully charged. When cold, a battery's output is reduced, yet the demands made on it are greater in winter than in summer.

Warning: To charge the battery **without removal** from the car, the engine must be stopped, then **both battery terminals removed. Never attempt to disconnect** the battery terminals **while the engine is running.**

If **winter tires** – (M + S) radials – are installed, please note that for good directional stability and light steering, tires of the same make and type should be fitted to **all four wheels** (and to the spare as well if possible).

Warning: For reasons of safety the tire valve should always be exchanged when renewing or refitting tubeless tires see also "TECHNICAL SPECIFICATIONS AND INFORMATIONS".

Do not exceed the maximum legal speeds or maximum speeds recommended by the tire manufacturer.

Observe the prescribed **tire pressures** at all times, and have the wheels rebalanced whenever a wheel or tire is changed.

Snow chains may be used on drive wheels only. Max. speed is then 37 mph or 60 kph.

Traction can be improved on ice or snow covered roads and in mountain districts by carrying approx. 110 lb or 50 kg **of ballast in the luggage compartment.** The ballast should be prevented from moving.

Use a lubricant on your door locks to insure year round reliability. If a lock should freeze heat the blade of the key before inserting.

We recommend applying glycerin to prevent the **sealing rubber strips** on the doors and around the engine compartment and luggage compartment form freezing.

Your car is treated as standard with a **special coating on all cavities and inside surfaces,** and the **underside** is covered with an undercoating.

Do not neglect the **wiper blades** either. If they leave streaks or unwiped areas, they may affect your view of the road. Wiper blades should be renewed at least twice a year, before and after the cold season.

In winter, chromium plated and polished components can be protected with colorless lacquer.

After a heavy snow fall, clear the air inlets in front of the windshield so the car's heating and air extraction systems can function correctly.

In winter, we also suggest carrying the following items in the car:

Sand, for traction on ice-covered slopes; A shovel to dig the car out of drifts;

A board to act as a firm support for the jack; Handbrush and scraper to remove ice and snow from the body and windows.

If the car gets stuck in deep snow, sand, mud etc do not press the accelerator down too far; or the rear wheels may sink in too deeply. Place some form of support beneath the wheels (in an emergency the car's floor mats can be used) for additional TRACTION. It may help to apply the handbrake lightly to stop one rear wheel from spinning. If this remedy works, do not forget to release the handbrake immediately afterwards.

When leaving your car parked, it should be secured in such a manner to prevent it from rolling. On level ground or slight inclines, this is customarily done by placing the automatic transmission selector in P (park) or standard transmission in first or reverse gear and engaging the handbrake.

Warning: Driving the vehicle through large puddles or on flooded streets could allow water to penetrate to the handbrake shoes. At freezing temperatures, this water could cause the handbrake shoes to freeze to the drum, as with most other vehicles. Should this condition occur, pull the handbrake on as hard as possible and then release it. Attempt to move the vehicle alternately forward and backward. If the rear brakes do not free up, the vehicle should be towed for repairs.

What to do, if . . .

If your car should develop a fault which you are capable of dealing with yourself, proceed as follows if there is no service facility nearby.

Tire trouble is a rare thing these days. But if you should get a flat tire, pull to the side of the road and apply the handbrake. Do not forget to switch on the **hazard warning flashers** and to set up a warning triangle or flashing signal lamp at an adequate distance to the rear, if these measures are required by law.

The spare wheel is housed in the luggage compartment, under the floor panel; this can be lifted out.

The wing nut securing the spare wheel can be unscrewed by hand.

The **jack** and **lug wrench** are housed in a compartment on the left of the luggage compartment. The jack can be removed after unscrewing the wing nut (arrow).

Fit the jack to one of the **4 lifting points** provided on the body, and turn until the desired wheel is clear of the ground.

Warning: never work under a jacked-up vehicle.


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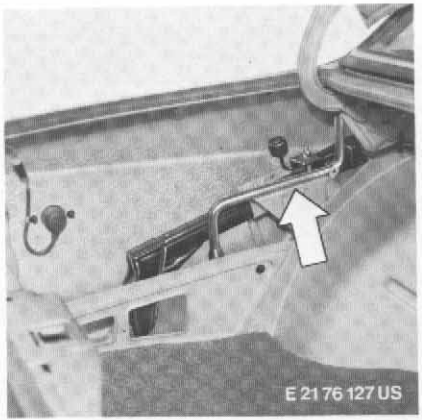
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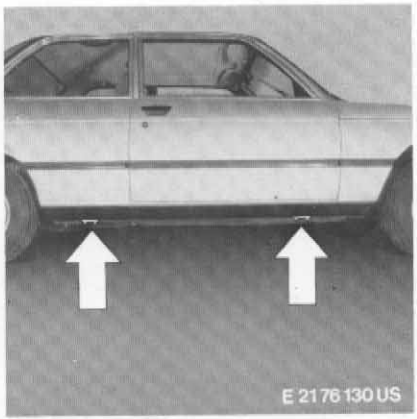
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Loosen the wheel studs.

The hub can also be pressed off from the rear after removing the wheel, using a suitable tool – e.g. a hammer shaft – towards its rim (not in the center).

Remove the wheel studs and take off the wheel. When placing the wheel onto the car, put the centering pin (located in the tool kit) in one of the four tap holes, set on the spare wheel and screw in a wheel stud. Then pull out the centering pin and replace the remaining wheel studs.

Tighten studs evenly until the wheel is held firmly. Lower the car until the wheel is supporting the load, then **finally tighten the wheel studs,** working in a crosswise pattern. Have the tightening torques checked by a service station right away, and have them checked again after 600 miles or 1000 km and then every 15.000 miles or 24.000 km.

Important: The wedge-shaped wheel chock must always be placed beneath the rear wheel on the opposite side of the vehicle from that being lifted. This precaution is made necessary by the design of the handbrake. The chock should be behind the wheel – looking forward – to prevent the car from rolling backwards.


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E 21 79 70 US


E 21 78 121 US

Set on the hub cap and press on with the flat of the hand.

Have the flat tire repaired and the wheel rebalanced as soon as possible.

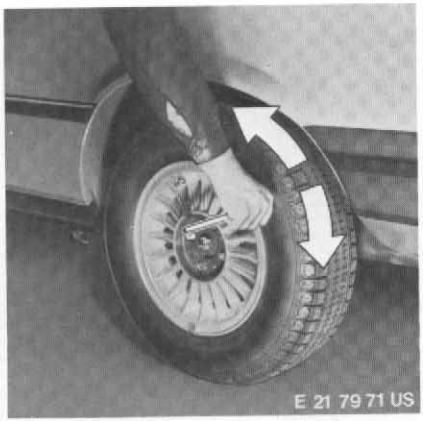
Note: When changing or renewing tubeless tires, always discard and renew the rubber valve as a safety precaution.

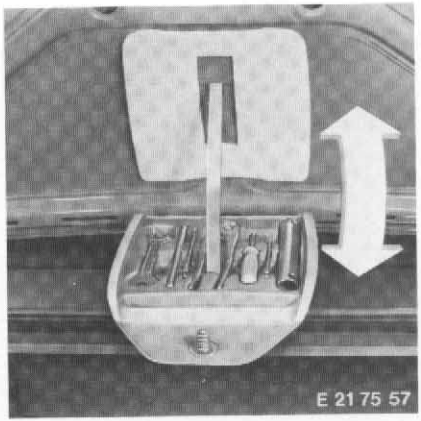
The **toolkit** is housed beneath the luggage compartment lid, and can be opened by unscrewing the wingnut.

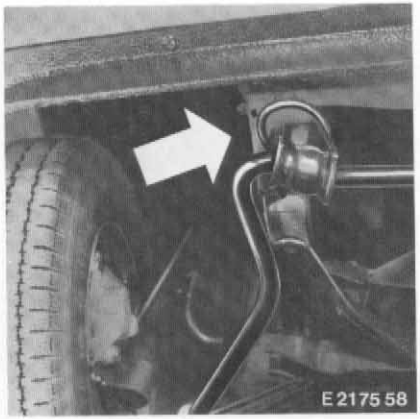
To tow-start a manual transmission car, declutch, select third gear, and switch on ignition. When the car is moving forward smoothly, engage the clutch gently.

Caution

Owing to the design of the **automatic transmission,** cars so equipped cannot be push-started or towed for starting, and must be towed away for repair. **Towing eyes** are located on the left and right hand sides of the front subframe.







Troubleshooting

	Possible cause
Engine will not start	Battery dead, battery terminals loose or corroded, automatic transmission selector not in "N" or "P" position
Starter runs but engine does not fire	Fuel tank empty, no ignition spark (loose lead), engine flooded
Engine fires but stalls immediately	Loose or leaking air and vacuum hoses, wiring for fuel injection system loose
Erratic idling	Fuel injection idle settings incorrect, misfiring or poorly adjusted ignition
Oil pressure warning light comes on	Oil level too low, oil leak
Coolant temperature too high	Coolant level too low, V-belt slipping or broken cooling system clogged
Charge warning light comes on	Loose or broken V-belt, loose lead or connection on alternator or regulator
Brake warning light comes on	Brake fluid level too low, handbrake not released, leak in clutch hydraulic circuit
Brake pad wear warning light comes on	Brake pads could be worn, Have brake pads inspected
"OXYGEN SENSOR" warning light comes on	Emission Control System needs maintenance oxygen sensor must be replaced

Starter motor does not operate when ignition key is turned to position 3:

Check by switching on headlights, then operate starter again.

1. If the headlights go out slowly, the battery is insufficiently charged or defective. Recharge the battery or have it changed. The car can be push-started or towed (not Automatic) if necessary, or the engine can be started using an auxiliary starting cable and a second 12 Volt battery (from another vehicle)
   See next page –
   Starting with a run-down battery
2. If the headlights go out immediately, check that the cable terminals at the battery and starter motor are making proper contact, and tighten if necessary.
3. If the brightness of the headlights does not diminish, (a fault in the starter circuit is indicated).

Engine will not start although starter motor is turning:

Provided that the instructions for starting have been observed, and there is enough fuel in the tank, the fault may lie in the ignition system or the fuel supply system.

1. Check that the plug leads are firmly attached to the spark plugs. Check the tightness of all cables on the coil, distributor and other terminals, and ensure that the fault has not been due to water entering the engine compartment during car washing.
2. Unscrew and check spark plugs.
3. Check whether the fuel pumps are running during starting.

If this is not the case, check the main fuel delivery pump (above the right halfshaft of the rear axle), the main fuel filter and the microfilter at the pre-delivery pump suction head, or consult your BMW Dealer.

The fuel injection lines need not be bled if the tank is run dry or drained, as the fuel delivery pumps prime the system automatically when the starter is operated.

Important:

Don't operate or crank the engine with ignition leads disconnected. The injected and unburned fuel can damage the oxygen sensor and catalytic converter.

Warning: Transistorized coil ignition system. It is highly dangerous to touch any ignition components when the engine is running.

Coolant temperature too high:

1. Allow engine to cool until the coolant temperature gauge indicator is in the white zone on the dial. Carefully remove the radiator cap and check coolant level. Never add water to the system **if the engine is hot,** after loosing a large quantity of coolant. Allow the engine to cool until the hand can be placed on the block.
2. If coolant has been lost, check the radiator cap or hose connections and the radiator itself for leaks.
3. Check V-belt condition and tension, adjust or renew as required.
4. Check ignition timing.
5. If necessary have the complete cooling system flushed out.

Fault in brake system:

If the red **brake warning light** comes on while the car is being driven, and the handbrake is released, it indicates a loss of brake fluid; if at the same time brake pedal travel increases considerably, one circuit of the hydraulic safety brake system has failed.

If faults develop on the brake system, have it examined as soon as possible.

If the red **brake pad wear warning light** comes on while the car is being driven, the brake pad minimum thickness has been reached. Have the brake pads inspected as soon as possible to prevent demaging the rotors.

A spreader spring in each brake caliper causes **pedal pressure** to increase when the **minimum brake pad thickness** is reached.

If one circuit of the hydraulic **dual-circuit brakes** should fail, **brake pedal travel** will immediately increase. In addition, higher pedal pressure will be needed to achieve the same braking action. Although the car can still be braked with only the remaining circuit in use, it is essential to have the brake system checked immediately.

If the red **oil pressure warning light** comes on while the car is being driven, declutch **at once** and switch off the ignition after pulling off to the side of the road. If the engine oil level is not too low; it need cause no alarm if the lamp flickers or comes on briefly at idle speed, provided that it goes off immediately when the accelerator is depressed.

If the red **battery charge warning lamp** comes on while the car is being driven, take the car to a service facility as soon as possible, or else the car's battery will gradually discharg, ultimately causing the vehicle to stall.

Starting with a run-down battery

You can start the engine with jumper leads to another 12 Volt battery (in another car) as follows: first connect the positive, then the negative terminals of the two batteries together.

Do not remove the battery cables from the empty battery!

Never remove battery cables when the engine is running!

Warning: do not let the cables touch part of either car or sparking will result. Operate the starter, and when the engine is running disconnect the jumper leads in the reverse order. Have the dead battery recharged if it is not otherwise defective.

Tow-starts – BMW 320 i Automatic

Design of the automatic transmission makes it impossible to start the engine by towing the car; for emergency starting procedure, see "Starting with a run-down battery" below.

Towing away – BMW 320 i Automatic

If the car has to be towed, set the transmission selector lever to "N" = **Neutral.**

Towing speed should not exceed 50 km/h or 30 miles/h, and the distance towed should be limited to 40-50 km or 25-30 miles. If the car has to be towed for a distance greater than 50 km or 30 miles, add 1 liter or 1.1 US quart, 1.8 Imp. pints of ATF (automatic transmission fluid) to the contents of the transmission, or remove the drive shaft. After repairing the car, do not forget that the oil level in the transmission must be reduced to normal before the car is returned to use.

PLEASE TOW IN THE MANNER PRESCRIBED BY STATE LAW(S).

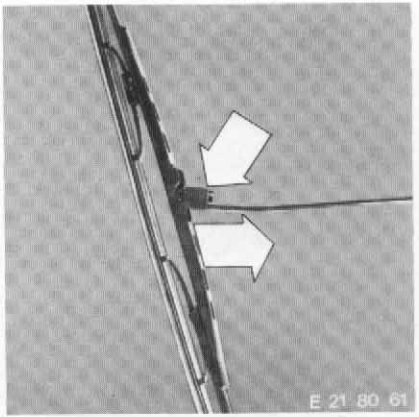
Towing another car:

PLEASE TOW IN THE MANNER PRESCRIBED BY STATE LAW(S)!

If you wish to assist another driver by towing his car with your BMW, you should ensure that the second car is not heavier than your own. **A rear towing eye** is located under the spare wheel pan. The towing eye is designed only for use with a nylon tow rope and unter **no** circumstances for a tow bar or chain.

To remove a **wiper blade** first lift the complete arm away from the windshield. Then press the spring catch and pull off the wiper blade.

The complete wiper arm can be removed after lifting up the plastic cap and loosening the fastening nut (13 mm wrench).



If any electrically operated device or bulb on your car should become inoperative, first check the fuse.

The **fusebox** current distributor box with spare fuses and relays is located in a plastic case in the engine compartment, above the wheel arch on the left-hand side, and can be reached by opening the engine compartment lid. Details of the circuits and fuse ratings in Amperes are given on the transparent lid of the fuse-box.

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.


E21 80 63 S

Never try to repair a blown fuse with a piece of wire etc. ("jumping" a fuse could cause the wiring to overheat and result in a fire). If the fuse blows repeatedly, the fault should be investigated.

When **changing a bulb** or carrying out any other work on the car.electrical system, always switch off the item in question or detach the earth lead from the battery negative terminal to avoid short circuits.

Never handle new bulbs with bare hands: use a clean cloth, paper napkin, or something similar. Avoid contact with grease or oil.

When changing headlight inserts, make sure that the beam setting screws are not disturbed.

We recommend keeping a "BMW travel kit" in the car. Ask your BMW Dealer for information about this kit.

Instrument lighting:
Before changing the 3 bulbs, the lower trim panel must be removed first. This provides access to the central screw which holds the instrument panel. After this screw and the speedometer shaft has been removed, the instrument panel can be pulled out forwards. The inoperative bulb can then be pulled out of its holder in the upper part of the trim panel.

Lighting: 3 valve-base bulbs,
W 12 V, 1.2 Watt.

Telltale lamps: W 12 V, 1.2 Watt
Battery charge telltale: W 12 V, 3 Watt

The headlight inserts for the **low beam lights** are in the two outer lamps.

After removing the ornamental grille, loosen the three screws on the clamping ring and remove the insert towards the front by pulling back the cable connector.

The headlight inserts for the **high beams** – i.e. the inner lamps – must be replaced in the same way.

Side marker lights, parking light and front turning indicator lights:

Unscrew the two Philips-head screws holding the plastic lens, and remove the lens. The 21/5 Watt (RL) spherical bulb should be pressed in slightly and turned to remove.

A rear **side marker light** is installed on both sides of your car. The side marker lights are equipped with 4 Watt (HL) bulbs. To replace loosen screws and remove cover.


E 21 76 65 US


E 21 76 68 US


E 21 76 122 US

Rear light:

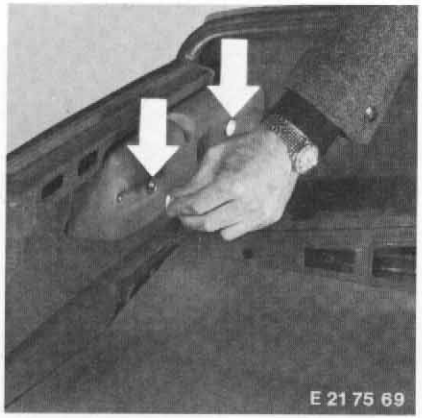
Open the luggage compartment, unscrew the two knurled nuts and take off the lens.

Remove the defective bulb from its holder and insert the new bulb.

Rear/parking light: spherical bulb (G), 10 Watt:
Turn indicator: spherical bulb (RL), 21 Watt;
Stop light: spherical bulb (RL), 21 Watt;
Back-up light: spherical bulb (RL), 21 Watt.

License plate light:

Loosen and remove Philips-head screws and take off the lens frame with rubber seal. The contact clips for the 5 Watt (L) tubulartype bulb must grip the bulb end caps firmly and make good metal-to-metal contact. If necessary, bend the clips carefully or clean the contact areas.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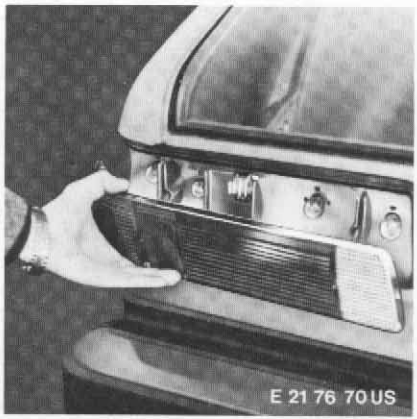
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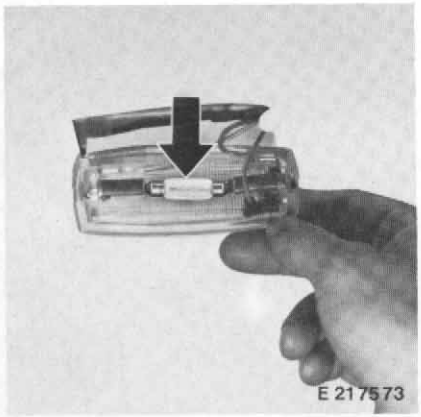
Interior light:

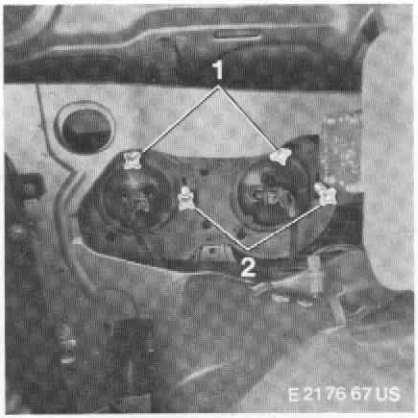
The 10 Watt (K) tubular-type bulb can be reached by pulling out the interior light.

As correct headlight adjustment is of particular importance in traffic safety, the headlights should be adjusted by a specialist using the proper beam-setting equipment. If this is not possible, open the engine compartment and reset the headlight beam by turning the two knurled plastic knobs as required.

1 = Vertical adjustment

2 = Horizontal adjustment





CARE AND MAINTENANCE

Cleaning and washing the car
Corrosion protection
Service
Engine oil grades
Description of maintenance routines
Adjusting idle speed

Care and maintenance

Your brand new BMW is certainly a fine automobile. How long it continues to appear attractive depends on the care with which you look after it.

Wash the car in indirect sunlight and when the hood has cooled, to avoid formation of water spots.

Road dust and dirt contain chemicals which may, in the long run, damage your car's paintwork. For this reason any car – especially a new one – should be washed as often as possible.

Tar stains, dead insects and paintwork damage caused by stones should be removed or touched-up without delay, or else the paint may discolor or patches of rust may appear.

Clean the interior with a brush or a vacuum cleaner.

Soften dirt on the paintwork with a fine spray of water, then rinse away.

Do not spray water into the ventilation inlet and outlet grilles.

After rinsing down, wash the upper part of the body, beginning with the roof, with water, using a sponge or special glove. Rinse the sponge or glove in clean water at frequent intervals.

Clean the lower parts of the body and wheels last of all, and if possible keep a separate sponge for these areas.

After washing down, spray thoroughly once again and dry with a clean chamois to prevent water droplets from forming spots.

If cleaning the car with water alone is insufficient, use a reputable car washing-soap in the concentration recommended by the manufacturer. Rinse down afterwards with a generous stream of water. Excessive use of car washing compounds can damage the paint.

Your car's paintwork needs polishing or preserving when water no longer forms round droplets on the surface.

Use only reputable car care products in accordance with the manufacturer's instructions.

Minor paint blemishes can be touched up with a BMW paint spray aerosol or BMW touch-up stick. The color you need is marked on an adhesive label in the engine compartment close to the chassis number.

No mineral oils, spray or other preservative substances should be allowed to reach the wheel cylinder piston sealing sleeves or the discs themselves.

Clean **chromium plated or polished components** with water or soap and water.

Tar stains should never be scraped off with a knife or hard object. Use a commercially available tar remover. When cleaning the **inside surface of the windows,** we recommend water diluted 1 : 1 with vinegar.

Rubber components should be treated only with pure water or glycerin.

Clean the wiper blades with soapy water. **Renew blades at least twice a year – before and after the cold season.**

Stains on cloth upholstery can be removed with an ordinary stain remover, but do not let any such product come in contact with leather or vinyl.

Vinyl should only be wiped down with a damp cloth and dried immediately afterwards.

Safety belts should not be removed from the car and should only be cleaned with a weak soap and water solution; they should not be drycleaned, as this may destroy the fabric. Automatic retracting belts should only be rolled up when dry. Dirt on the belt straps impedes rolling up and thus adversely affects safety.

When you took delivery of your car, you received a Service Booklet made out in your name and for your own particular vehicle. After the **pre-delivery** check, your BMW Dealer removes the corresponding section from the booklet and makes an entry to confirm that the work has been properly carried out. The same procedure will be followed when it is time for the first BMW Inspection at approx. 600 miles or 1000 km.

Your BMW Dealer will then attach a selfadhesive label to the driver's door post as a reminder when the next service is due.

In the interests of reliability and extended operating life of your car we recommend that **at least two BMW oil services per year** should be carried out, even if the distance covered is less than the prescribed figure.

On **radios with a cassette player,** clean the playback head after every 100 hours of operation with a cotton-whool stick soaked in methylated spirit or pure alcohol. Run a head cleaning cassette through the machine if available, but never clean the tape heads with a metal object.

BMW Service

Quality Service for your Quality Automobile

MAINTENANCE SERVICES SHOULD BE PERFORMED
BY YOUR AUTHORIZED BMW DEALER
OR ANY OTHER QUALIFIED AUTOMOTIVE SERVICE OR
REPAIR ESTABLISHMENT WHICH IS COMPETENT TO
PROVIDE SUCH SERVICES AND WHICH CAN BE RELIED
UPON TO USE PROPER PARTS AND PRACTICES

Description of maintenance routines

Engine Oil Specifications

Change engine oil all the year around every 7.500 miles or 12.000 km or at least twice a year, before and after the winter.

Use only HD – oils for petrol engines, API class "SE" or "SF". The rating on class "SF" oils are higher.

Which SAE grade is used depends on the air temperature range of the season.

The chart indicates the SAE grades to be used depending on the predominant air temperature.

The temperature limits set by the SAE grades may be exceeded for a short period.

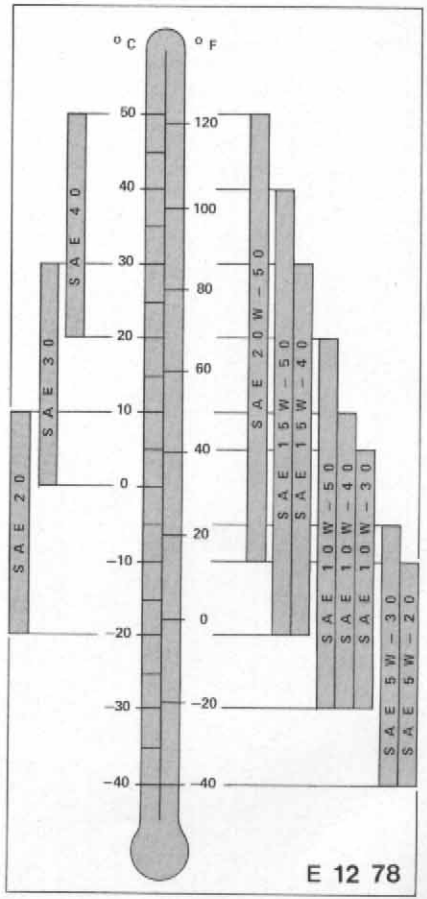
Engine oil change:

Unscrew drain plug (19 mm wrench) on the bottom right of the sump. Clean threads and tighten firmly after the old oil has drained fully.

Total oil content 3.75 litres or 4.0 US quarts/6.65 Imp. pints.
+0.25 litre or 0.44 Imp. pint/0.26 US quart when renewing filter.

Oil level: to upper mark on dipstick, not higher.

Warning: the oil dipstick must be fully inserted into the dipstick tube or a rough idle will result.



The transparent **reservoir for brake and clutch fluid** is in the engine compartment on the left hand side, and enables the level to be inspected at a glance.

Brake fluid is a hygroscopic fluid and can absorb moisture from the atmosphere over a period. To help ensure that the brakes remain absolutely safe we strongly recommend that the **brake fluid should drained and renewed once a year.**

Capacity: fill to upper "MAX" mark on reservoir.

Grades: Use DOT 4 brake fluids only.

The **clutch requires no maintenance** and is automatically adjusted at the clutch slave cylinder.

In the course of a BMW Programmtest every 30.000 miles or 48.000 km, wear of the clutch driving plate should be measured.

Every 7.500 miles or 12.000 km or at least once a month, the **battery acid level** should be checked. Remove the battery cover and unscrew the six plugs on top of the casing. The acid level should be approx. 0.2 inch or 5 mm above the surface of the plates in each cell, or up to the level mark visible in the plug orifice.

If the acid level is too low, top up with distilled water (not acid).

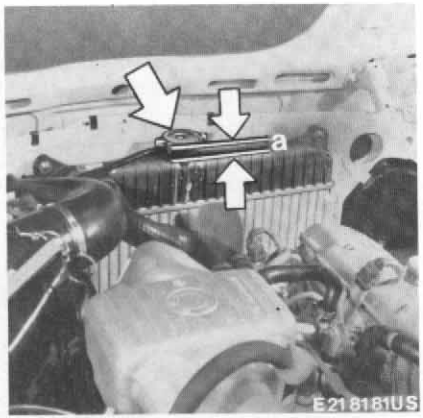
The top of the battery should be kept clean and dry.

Important notes:

1. Acid or lead oxide from the battery terminals must never be allowed to contact the eyes, skin or clothing. Rinse off immediately with clean water, and consult a physician if necessary.
2. Never short-circuit the battery poles; this will cause severe overheating and could lead to the battery case bursting.
3. When the cell plugs have been removed, never bring an open flame near the battery or cause any sparks in the vicinity. This could lead to an explosion.
4. Never detach the battery leads when the engine is running, or else an overvoltage will occur and damage the car's electronic equipment beyond repair.
5. To recharge the battery without removing it from the car, the engine must be stopped and both battery leads disconnected.
6. Disconnect the negative lead from the battery before attempting any work on the car's electrical system, to avoid the risk of a short-circuit.
7. To remove the battery, first disconnect the negative lead, then the positive lead. Unscrew the battery retaining bar. When installing, first secure the battery with the retaining bar, then connect the positive lead and finally the negative lead.

Top up radiator to point "a" not higher than 3/4" or 2 cm below the base of the filter aperture. Replace cap and tighten.

Overfilling will dilute the additives in the coolant, which will escape through the overflow pipe and no longer possess the correct antifreeze and corrosion inhibitor concentration.



Warning

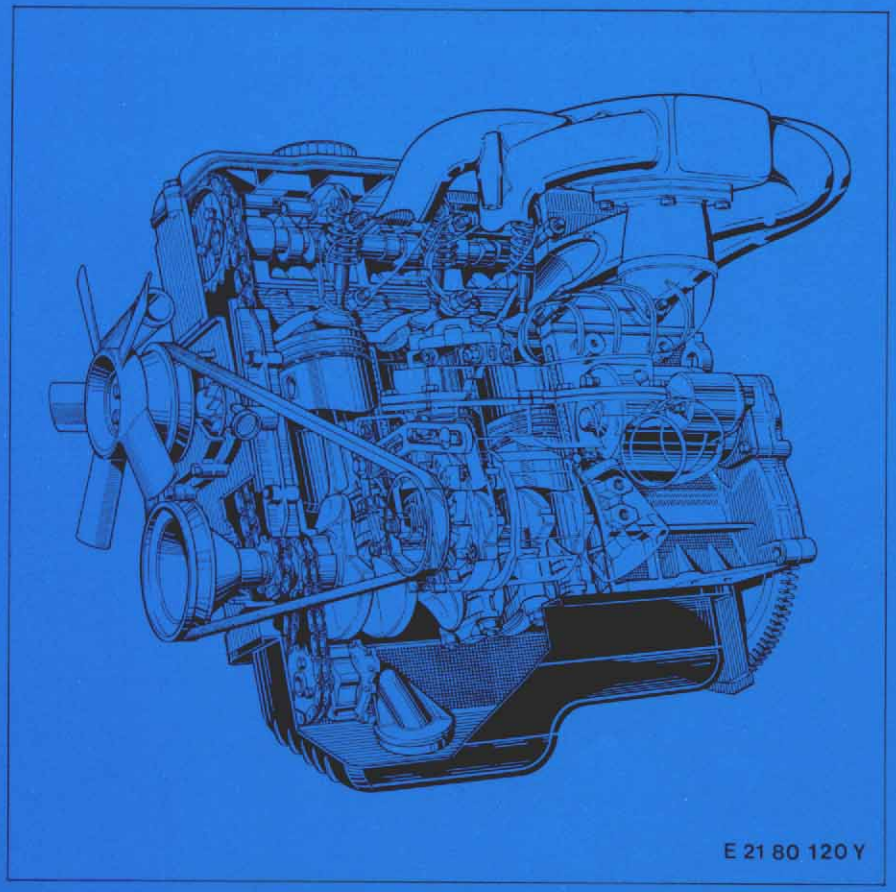
The Emission Control system of your BMW is designed to remove pollutions of **unleaded fuel** only.

If leaded fuel is used – even only for a short period – the oxygen sensor and catalytic converter will be damaged and rendered inoperative.

To fulfull EPA Emission Standards the oxygen sensor and catalytic converter must be replaced after using fuel containing lead.

Never run engine with one or more ignition cables disconnected it will overheat and destroy the catalyst.

For a compression test the fuel injection system must be inoperative.



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TECHNICAL SPECIFICATIONS AND INFORMATION

Engine
Fuel Injection System
Catalytic converter
Oxygen sensor
Evaporative Emission Control System
Clutch and gearbox
Electrical system
Dimensions and weights
Performance data
Tightening torques
Service instruction plan
Air-Conditioner
Oil grades for automatic transmission
Item reference list
At a glance

Specifications

ENGINE

Type

4 cylinder, 4-stroke inline, water-cooled, with single overhead camshaft, inclined overhead valves and combustion chambers with volume concentration around the spark plug.

Position

Over front axle, inclined at 30° from vertical, 3-point mounting: at front close to center 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 grey cast iron.

Crankshaft

Forged steel, heat treated.
4 balance weights
5 three-layer main bearings.

Connecting rods and pistons

Forged steel connecting rods with replaceable three-component bearings. Pistons with raised flat crown and chromium plated nodular iron upper rings.

Valves

Overhead; inclined in inverted V arrangement. Exhaust valve hardened, with stem hard chromium plated. Valve clearance adjustment by means of eccentrics in rockers.

Valve gear

Light alloy rockers with chill-cast pads, overhead camshaft. Camshaft drive by single roller chain with automatic oildamped tensioner and recoil protection.

Valve operating clearances

Inlet and exhaust:
0.006 – 0.008" (0.15 – 0.20 mm) with engine stopped and cold (max. coolant temperature 35° C / 95° F).

Lubrication

Pressure circulating system with fullflow oil filter, gear-type pump (Eaton system) chaindriven from crankshaft; pressed steel oil pan.

Oil filter

Full-flow, with throw-away cartridge type filter and pressure relief valve opening at 35.5 ± 4.3 psi (2.5 ± 0.3 bar).

Engine breathing

Crankcase and rocker arm housing connected by cast-in passage, and ducted to intake air filter and manifold.

Air cleaner

One filter element in the intake air silencer.

Fuel supply

Two electric fuel pumps (pre-fuel pump in fuel tank and system fuel pump). Delivery rate 31.7 US gal/h, 120 Liters/h, 26.4 Imp. gal/h.

Fuel filter

Main fuel filter with throwaway element in feed line, mesh strainer in immersed fuel level sensor in tank.

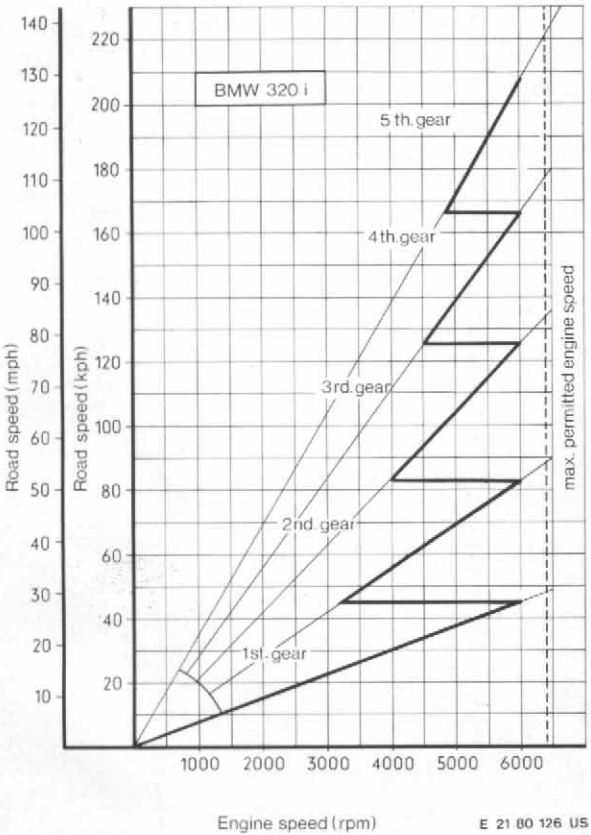
Displacement – effective	1.766 cm^3	107.8 in^3
Max. output at engine speed	75 kW 5.800 rpm	101 hp
Max. torque at engine speed	135 Nm 4.500 rpm	100 ft. lb
Output per liter displacement	42.5 kW	
Max. permissible engine speed	6400 rpm	
Max. continuous engine speed	6000 rpm	
Compression ratio	8.8 : 1	
Stroke/bore	2.79/3.50 in	71/89 mm
Ratio (stroke/bore)	0.79	
Mean piston speed at engine speed	 5.800 rpm	13.7 m/s
Power/weight ratio Car ready for road, tank full	14.8 kg/kW 32.7 lb/kW 15.0 kg/kW* 33.0 lb/kW*	11.1 kg/hp 24.5 lb/hp 11.2 kg/hp* 24.7 lb/hp*
Car fully occupied, with luggage	20.5 kg/kW 45.2 lb/kW	15.4 kg/hp 33.9 lb/hp

* Automatic model

Dimensions and weights	
Length	177.6 in or 4509 mm
Width	63.4 in or 1610 mm
Height (unloaded)	54.4 in or 1380 mm
Wheelbase	100.9 in or 2563 mm
Ground clearance (loaded)	5.7 in or 145 mm
Front overhang	35.43 in or 900 mm
Rear overhang	41.21 in or 1046 mm
Front track	54.65 in or 1387 mm
Rear track	55.0 in or 1396 mm
Min. turning circle (wheels)	30.84 ft or 9.4 m
Min. turning circle (overall)	33.46 ft or 10.2 m
Unloaded weight (ready for road, tank full) (according to FMVSS 110)	 2452 lb or 1112 kg 2474 lb* or 1122 kg*
Permissible gross weight	3438 lb or 1558 kg
Permissible front axle load	1640 lb or 743 kg
Permissible rear axle load	1860 lb or 842 kg
Maximum vehicle load	940 lb or 426 kg 940 lb* or 426 kg*
Permissible roof load	165 lb or 75 kg

* Automatic transmission model

Road speed / engine speed - BMW 320i



Performance data

Top speed		105 mph 169 km/h	102 mph* 164 km/h*
Max. gradients in	1st gear	%	
	2nd gear	%	
	3rd gear	%	
	4th gear	%	
Acceleration From	0–50 mph 0–80 km/h	8.1 sec	11.2 sec*
Standing start	$^1/_4$ mile in	18.45 sec	20.3 sec*

Fuel injection system

Your BMW 320 i is equipped with the well known Bosch K-Jetronic fuel injection system. The K-Jetronic is a mechanical, continuous operating fuel injection system. The "K" (German: **k**ontinuierlich = continuous) stands for uninterrupted fuel injection, all the time the engine is running. The K-Jetronic adjusts the injected fuel quantity in dependence of the exhaust gas composition. The fuel is injected into the intake air channel in front of the inlet valves. The injected fuel amount is adjusted by a piston in the fuel distributor.

Airflow meter and fuel distributor

The intake air passes the filter in the intake air silencer and enters the airflow meter. The airflow meter consists of:

- air funnel
- air flow sensor plate
- lever with counterweight.

The airflow meter acts on the principle of a suspended body. A round disc rises in a conical air funnel until its weight and the force of the intake air stream against the lower side of the disc are in equilibrium. If the volume of the intake air increases the rate of airflow also increases through the original annular cross-sectional area in the airflow sensor. As a result the airflow force increases, and the airflow sensor plate is forced further upwards until the original flow force exists at the new and larger cross-sectional area in the funnel. At this point the sensor plate comes again to a rest. The position of the airflow sensor plate represents a measure of the airflow rate through the funnel and is therefore a measure of the required fuel quantity. The airflow sensor plate raises a distance approx. proportional to the volumetric rate of airflow.

The weight of the lever and the airflow sensor plate are balanced by the counterweight. The control plunger in the fuel distributor operating under hydraulic pressure (fuel system pressure) builds up the counter force against the air force at the sensor plate. The intake air lifts up the sensor plate until force of intake air and force at the plunger are in equilibrium. The position of equilibrium is a measure of the intake air quantity. At the same time the control plunger is positioned at a certain point in the fuel distributor. A horizontal control edge at the control plunger opens the metering slit to a certain amount.

Control equipment in the fuel distributor

Two fuel pressures in the fuel distributor must be discerned.

1. Fuel primary system pressure (4.7 – 5.2 bar)
2. Control pressure (0.5 – 3.7 bar)

Fuel primary system pressure

The fuel primary pressure is built up by the fuel pump (see also section: fuel pumps and fuel delivery). In the fuel distributor the fuel enters the lower chambers of the differential pressure valves. The pressure is kept constant between 4.7 – 5.2 bar by means of a system pressure regulator. The pressure regulator is spring loaded and opened by fuel pressure. The excess fuel flows pressureless back to the fuel tank.

When the engine is running, the fuel passes through the metering slits to the upper side of the diaphragm in the differential pressure valves and then flows through the fuel injection lines to the injection valves.

A fuel supply line leads from the primary fuel circuit to the cold start valve (see section: air collector and cold start valve). When the engine is turned off the primary circuit pressure regulator drops the pressure in the system rapidly to the opening pressure of the injection valves and holds it at this level for a long time. The rapid reduction of the primary pressure prevents after-running.

As a result of the linear action of airflow sensor and control plunger, and because these components are joined by the lever to a single operating unit, a stable basic ratio of air and fuel is formed.

The cone of the airflow meter is formed so that the fuel/air mixture is very close to $\lambda = 1$.

The airflow meter has no full load enrichment function. The full load enrichment is made by a special function of the Emission Control System.

Control pressure

The control pressure circuit is supplied with primary fuel system pressure through a restrictor bore in the fuel distributor. A connection line leads from the upper side of the fuel distributor to the warm-up regulator.

At normal operating temperatures the warmup regulator holds the control pressure at about 3.7 bar.

It lowers the control pressure to about 0.5 bar overpressure when the engine is cold and during the warm-up period. The control pressure acts through a damping restrictor on the control plunger and develops an opposing force to the force of the air stream. Excess fuel from the warm-up regulator flows pressureless back to the transfer valve in the fuel distributor housing and from there to the fuel tank. The transfer valve is connected in part to the pressure regulating valve. It is spring loaded and opened by the pressure regulating piston. The topping point valve keeps the fuel line fully filled with fuel when the fuel pumps are not running.

The damping restrictor above the control plunger has a special function. Under conditions of pulsating air flow it damps the vibrations of the measuring plate and prevents too fast movements of the measuring plate and control plunger.

Fuel control plunger and differential pressure valves

The fuel must be distributed uniformly to the different cylinders of the engine. The unit which distributes and controls the fuel flow is a barrel with metering slits. The barrel has 4 rectangular shaped openings – metering slits. The fuel flow through the metering slits is controlled by an edge of the control plunger.

The differential pressure valve is a diaphragm valve consisting of a lower and an upper chamber with a steel diaphragm between them. In the lower chamber there is fuel, under system pressure of 4.7 – 5.2 bar, while in the upper chamber the pressure is of 0.1 bar less. The pressure differential is produced by the helical spring in the upper chamber.

If more fuel flows through the metering slit into the upper chamber, the pressure there rises temporarily. The steel diaphragm is bent downwards and enlarges the cross-section of the outlet leading to the injection valves until the 0.1 bar pressure difference is reached again.

At high fuel flow rates the diaphragm opens a larger annular cross-section so the pressure difference remains constant. If the rate of fuel flow becomes less, the diaphragm reduces the opening. The total travel of the diaphragm is only a few hundreths of a millimeter.

Throttle valve

The purpose of the throttle valve is to control the intake air volume. The air quantity is controlled by the opening angle of the throttle butterfly activated by the accelerator pedal. The WOT position of the throttle butterfly (full load) becomes a voltage signal (by means of a micro switch) and is directed to the ECU of the emission control system. The throttle valve position is also an input to the control unit of the automatic transmission (if the car is equipped with automatic transmission).

Idle speed can be adjusted by varying the quantity of air through a bypass channel in the throttle valve.

The throttle housing has tube connections for vacuum ignition advance and retard controls and the evaporative controls and the evaporative control system.

Air collector – Cold start valve

The air collector is designed for equal air distribution to the individual cylinders.

Connected to the air collector is the cold start valve. The cold start valve injects additional fuel while starting at engine coolant temperatures below 35° C or 95° F or for a maximum of 8 seconds. The cold start valve can inject only while operating the starter.

The injection time of the cold start valve is controlled by the thermo-time switch in the coolant jacket.

Auxiliary air valve

The purpose of the auxiliary air valve is delivery of additional air after cold starting and during warming-up. The aux. valve is located on the left side of the cylinder head. The aux. air is taken from in front of the throttle butterfly and directed to the air collector.

The aux. valve is electrically heated and heated from the engine warmth. The electrical heating is controlled by the fuel pump relay and activated when the fuel pumps are running. The aux. valve closes within approx. 3 min. during warming-up and interrupts the flow of additional air.

The aux. valve is fully open at very low temperatures (approx. below –30° C or –20° F). The aux. air valve has a variable cross section dependent on temperature.

Fuel pumps and Fuel pressure accumulator

The BMW 320 i is equipped with two fuel pumps, i.e. a prefuel pump and a system fuel pump.

The pre-fuel pump is located in the fuel tank. It sucks in fuel and delivers it with a mild pre-pressure to the system fuel pump. The system fuel pump, located at the lower side of the vehicle close to the rear axle, builds up the injection pressure and delivers fuel to the fuel distributor unit and to the injection valves.

The pre-fuel pump is a vane-type pump, the system fuel pump is a roller-cell pump.

Both pumps are activated from the fuel pump relay in the engine compartment.

From the system fuel pump the fuel enters the fuel accumulator. It is located close to the fuel pump in the area of the rear axle.

In the fuel accumulator, the fuel flows into the damping chamber and compresses the spring loaded diaphragm which divides the fuel accumulator into two chambers – damping chamber and spring chamber –. The spring chamber has a connection for a leakage line which leads leaking fuel back to the suction line. The fuel accumulator acts as a damping reservoir. It compensates for small differences in the fuel system pressure. When the engine is stopped the spring in the fuel accumulator keeps up the fuel system overpressure and prevents vapor locks.

Fuel filter(s) and system pressure regulator

The purpose of the fuel filters is to prevent the intake of dirt or other micro parts into the fuel injection system. To do this, there is a fine mesh filter in the induction unit of the pre-fuel pump and the main fuel filter close to the system fuel pump.

The fuel pressure regulator is located in the fuel distributor housing. It keeps the primary system pressure constant at a value of 4.7 – 5.2 bar. The excess fuel flows pressureless back to the fuel tank.

Fuel injection valves

The purpose of the injection valves is to inject the necessary fuel quantity into the intake air in front of the inlet valves. The injection valves are located in the cylinder head in front of the inlet valves.

Warm-up regulator

During the warm-up period the engine needs a richer fuel/air mixture for reliable engine running. The unit which varies the composition of the fuel/air mixture is the warm-up regulator (or control pressure regulator). The warm-up regulator varies the control pressure in a range of approx. 0.5 – 3.6 bar. At low starting temperatures the warm-up regulator drops the control pressure to a minimum. The reduced control pressure applied to the control plunger allows a higher lifting of the airflow sensor plate and therefore a higher lifting of the control plunger. As a result the fuel flow through the injection valves increases and the fuel/air ratio becomes richer. The warm-up regulator is heated electrically and from engine warmth heated. As long as the engine is cold a bimetallic spring presses against the delivery valve spring. That enlarges the discharge cross section and reduces the pressure in the control circuit. When the engine is running the warm-up heated is electrically heated. The bimetallic spring warms up and releases the valve spring. The spring reduces the discharge cross section the control pressure increases. During the warm-up period the control pressure increases continuously and reaches a maximum of approx. 3.6 bar on a warm engine.

Frequency valve

The frequency valve, dependent on exhaust gas composition, varies the fuel pressure in the lower chambers of the fuel distributor. The frequency valve is controlled from the oxygen sensor via an electronic control unit. It allows fuel to escape from the lower chambers into the fuel return line. The fuel flows pressureless back to the fuel tank. By means of the variation of the fuel pressure in the lower chambers there is a variation of the injected fuel quantity and also a variation of the exhaust gas composition.

The frequency valve is located at the left side of the engine between the fuel distributor and engine block.

Special functions of the Emission System.

Full load enrichment

In full load driving conditions the engine needs, for a maximum of engine power an additional fuel quantity. This full load enrichment is caused by a function of the Emission Control System.

The ECU of the Emission control system switches off the normal function of the oxygen sensor above an engine speed of 3.500 ± 100 rpm. At the same time, the frequency valve is switched to a constant opening time of more than 50%.

This enlarges the discharge cross section of the differential pressure valves and enriches the fuel/air mixture.

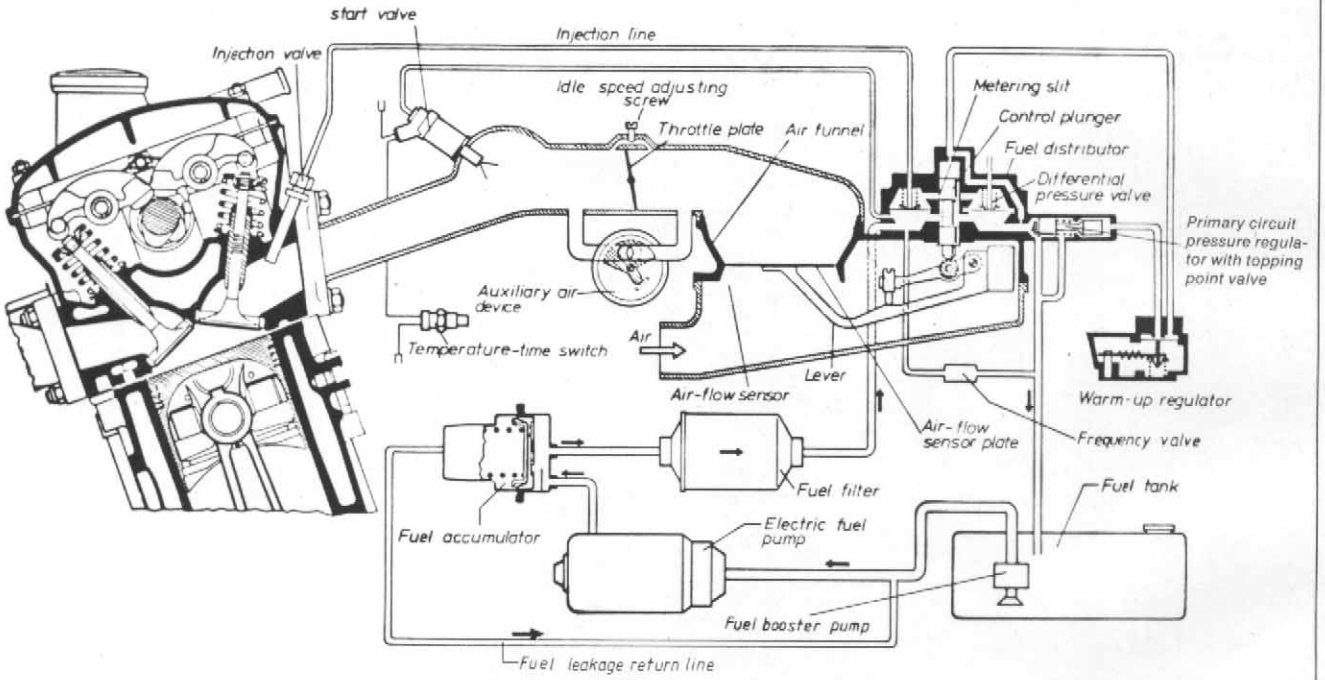
Enrichment during the warm-up phase

After cold starting and during the warming-up phase – below an engine temperature of 17 ± 3° C – the air fuel ratio is enriched by a function of the Emission Control System.

The frequency valve is switched to a constant opening time of more than 50% – as during full load driving conditions.

This function offers the necessary warm-up enrichment.

K-Jetronic fuel injection system



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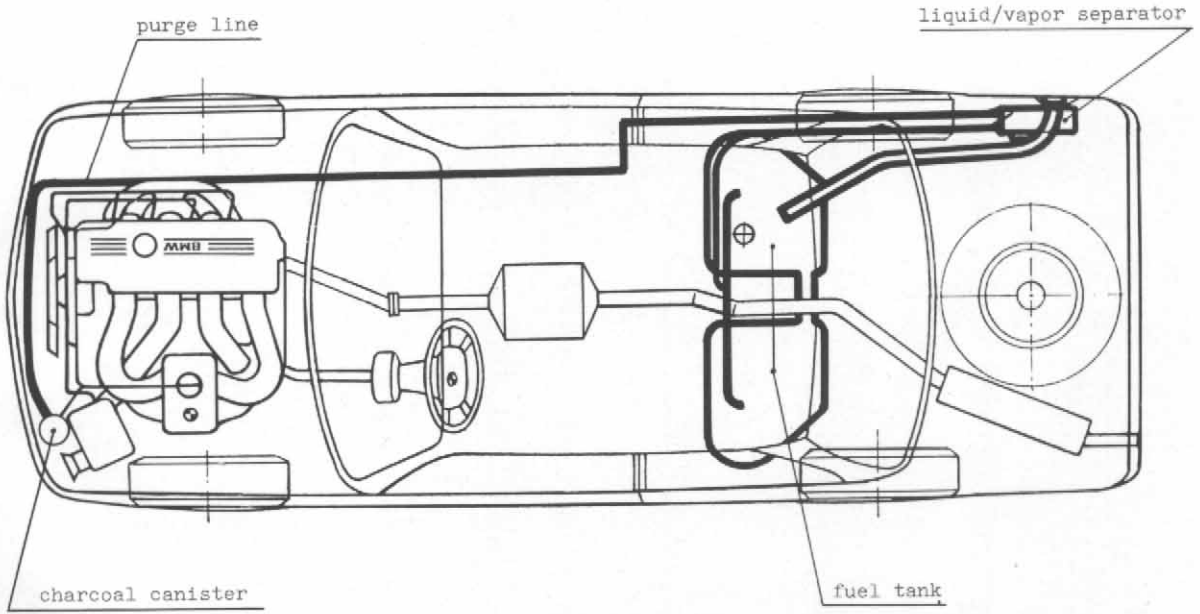
Evaporative Emission Control System



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Emission Control System

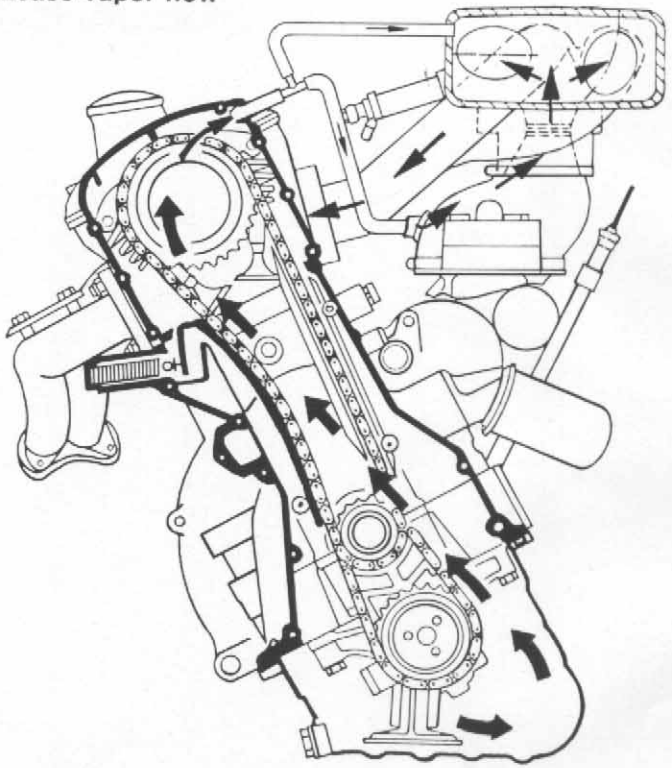
Your car has been equipped with a highly developed Emission Control System consisting of:

1. Crankcase Emission Control-System
2. Oxygen sensor
3. Catalytic converter
4. Evaporative Emission Control System
5. Ignition system with centrifugal and vacuum controls.

1. Crankcase Emission Control System

This is a "sealed system" which does not permit the entry of fresh air into the crankcase and prevents the emission of blowby to the atmosphere. The Crankcase Emission Control System is maintenance-free.

Crankcase vapor flow



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2. Lambda Control Oxygen sensor

For low pollutions it is necessary to operate the engine on a constant fuel/air mixture of 1:14. This ratio is named "stöchimetric ratio" or = 1 (Lambda).

An oxygen sensor in the exhaust pipe compares the oxygen content in exhaust gas with that in the ambient air. The measured difference is transformed into a voltage signal to the electronic control unit of the fuel injection system. If the signal changes from a given value, the ECU modulates the opening time of the frequency value and in this way readjusts the fuel/air ratio.

This oxygen sensor or lambda sensor is necessary for the most efficent use of catalytic converter.

Service warning system

After 30.000 miles or 48.000 km a warning light "OXYGEN SENSOR" comes on at the dashboard indicating that the **oxygen sensor must be replaced.**

After replacing the oxygen sensor a contact in the service interval switch will be reopened.

This extinguishes the warning light at the dashboard.

3. Catalytic converter

The catalytic converter is integrated into the exhaust system and installed below the vehicle's floor in the area of the front seats.

The catalytic converter installed in your car is a 3-way type. That means it removes carbon monoxid (CO) unburned hydrocarbons (HC) and nitrosoxides (NOx).

In this way, the catalytic converter finishes the burning process of fuel which has not been burned fully in the combustion chamber.

The catalytic converter is maintenance free. However, the catalytic converter is designed to remove the pollutions of unleaded fuel. If fuel containing lead is used even if only for a short period the catalytic converter and oxygen sensor will be destroyed or rendered inoperable.

To fulfill the EPA Emission standards the oxygen sensor and catalytic converter must allways be replaced after using leaded fuel.

Fuel filler

The fuel filler neck is equipped with a leaded fuel restrictor and a check valve.

The restrictor prevents the inserting of fuel filler nozzles not designed for lead free fuel.

The check valve prevents escaping of fuel when refilling.

4. Evaporative Emission Control System

This is a purge system consisting of a liquid-vapor separator, activated charcoal canister and purge lines to prevent gasoline vapors from escaping to the atmosphere.

Increased purging was accomplished by connection of the system to the throttle valve.

When the vehicle is stopped and the engine is off, or while standing at a non level position, the gasoline vapors are collected in the liquid-vapor separator where part of them condense and flow back to the fuel tank. The vapor continues to the charcoal canister where it is absorbed and retained until the engine is started agian. Then, suction effect causes a flow into the throttle valve and the gasoline vapor is burnt by the engine. The liquid-vapor separator is also capable of compensating the fuel expansion of a completely filled gasoline tank when ambient temperatures fluctuate about 80° F or 27° C. The system is maintenance-free.

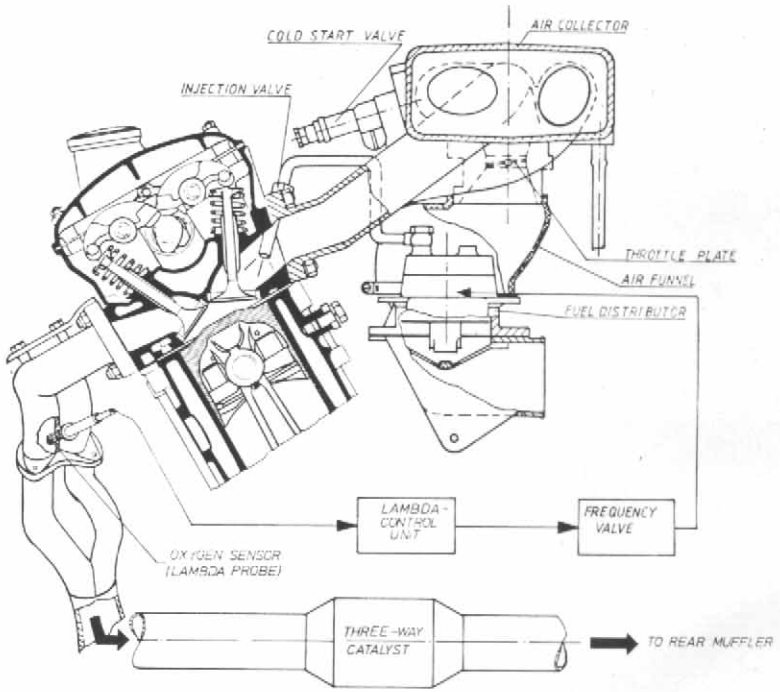
5. The **ignition system** is a transistorized breakerless coil ignition system. It consists of
   - Ignition distributor with induction coil
   - Electronic control unit
   - Ignition coil designed for operating in connection with the transistorized ignition system
   - Centrifugal advance mechanism
   - Vacuum advance device

The **centrifugal advance** system causes a variation of the ignition timing dependent on engine speed.

The **vacuum advance** system varies the ignition timing dependent on engine load.

Note: The ignition distributor has a changed rotating direction. Due to the basic construction of the engine this causes an earlier ignition point on a cold engine. As a result the engine starts easier.

Exhaust emission control system (location of main components as labelled below)



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COOLING SYSTEM

Radiator

Gilled aluminium tube; Automatic models with additional transmission oil cooler in lower coolant box of radiator. Pressure and vacuum relief valves in filler cap.

Opening pressures

of valves in filler cap:

Overpressure 1 $^{+0.15}_{-0.10}$ bar or

14.22 $^{+2.13}_{-1.42}$ lb/in²

vacuum max. 0.1 bar or 1.42 lb/in²

Coolant thermostat

Thermostatic control of engine coolant in output flow to engine with automatic equalization of engine load and outside temperature variations (BMW system).

Opens: 80 ± 1.5° C (176 ± app. 3° F)

CLUTCH

Single dry plate with diaphragm spring and hydraulic withdrawal mechanism: torsional vibration damper fitted. Automatic adjustment of clearance. Automatic transmission: fluid coupling with torque converter.

GEARBOX

a) Manual gearbox:

Five – speed with BORG-WARNER synchromesh on all forward gears, 1 reverse gear.

b) Automatic transmission: ZF 3 HP-22

Gear ratios	Manual 5-speed	Automatic
1st gear	3.682	2.73
2nd gear	2.002	1.56
3rd gear	1.330	1.0
4th gear	1.0	–
5th gear	0.805	–
Reverse gear	3.682	2.09

Torque converter ratio **1 – 2.36 : 1**

DRIVE SHAFT

Divided shaft with flexible mounting for center bearing and joint disc at front, universal joints in the center and at rear.

FINAL DRIVE

Hypoid bevel, running on taper roller bearings.

Ratio:

Pinion/ crown wheel	No. of teeth	
3.64 : 1	40 : 11	Automatic
3.91 : 1	43 : 11	Manual

Drive to rear wheels

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

Steering

ZF rack and pinion, with flexible rubber mountings.

Overall ratio: 21.1 : 1

Track rods: left and right side track rods.

Steering column

Safety steering column with divided shaft, 2 universal joints and 1 rubber disc joint.

Four-spoke steering wheel

380 mm (15 in) dia.

ELECTRICAL SYSTEM

Battery 12 V/55 Ah (Ampere-hours)

Ignition coil: Bosch KW 12 V
Bosch 0 221 122 029

Firing order: 1–3–4–2

Ignition timing:
25 ± 1° bTDC at 2.200 rpm

Adjust dynamically with engine at normal operating temperature, vacuum controls disconnected (engine speed 2.200 rpm) illuminate timing mark on flywheel with a stroboscope light.

Alternator
Bosch K1 – 14 V 65 A 20 – 910 W
Bosch 0 120 489 718

Voltage regulator
Bosch EE/14 V 3

Starter
Bosch GF (R) 12 V 1.5 HP/1.1 kW
Bosch 0 001 311 100

Spark plugs
Bosch WR 9 DS
Beru RS 33
Eletrode gap
0.024 + 0.004 in (0.6 + 0.1 mm)

Distributor
Bosch 0 237 002 049

Headlights: Sealed beam

Fusebox
in the engine compartment, on the left-hand wheel arch.

Horns
2 high-intensity single-tone horns

Wipers
Twin blades, with selector lever on right of steering column for 2 speeds and intermittent action or automatic wash/wipe.

Automatic windshield washer
Electric gear type pump with delaying relay for wipers, operated by wiper/washer lever.

Heated rear window
with 14 electrodeposited heating elements; power rating 140 Watts.

cigarette lighter and plug socket on dash-board
Can also be used for plugging in an inspection lamp or razor with standard plug; max. 200 Watt, 12 Volt rating.

CHASSIS

Wheels and tires

Steel disc wheels

5½ J x 13 H 2 well-base rims.

Light alloy wheels for tubeless tires.

5½ J x 13 H 2 well-base rims.

Tires (standard equipment)

Radial ply 185/70 SR 13 tubeless on steel and light alloy wheels.

Valves (for tubeless tires)
in conjunction with light alloy and steel disc rims: Rubber valve 43GS/11.5 DIN 7780. For safety reasons always renew tire valves when removing or renewing tires.

Winter tires

185/70 SR 13 or 165 SR 13

on light alloy wheels
or steel disc wheels

Snow chains may be used on drive wheels (rear) only.

Tread Wear Indicators

Your BMW is fitted with steel-belt tires, which incorporate built-in tread wear indicators. These are molded into the bottom of the tread grooves and will appear as approx. ½" (13 mm) wide bands when the depth of tire tread becomes 1/16" (1.6 mm). The indicators help you determine when your tires have worn down so far that they need replacing. If they appear in two or more adjacent grooves, tire replacement is recommended.

Front suspension

Independent, with wishbones, trailing links and spring/damper struts; doubleacting telescopic hydraulic dampers. Camber angle offset, lateral force equalization.

Coil springs mounted at top of struts and offset from centerline; rubber auxiliary springs and bump stops. Wheel travel 192 mm (7.6 in). Torsion bar stabilizer (anti-roll) mounted in no-maintenance rubber bushings.

Rear suspension

Independently sprung wheels with square section tube semi-trailing arms pivoting on no-maintenance rubber bushings. Delta-shaped box-section rear beam for semi-trailing arms and final drive, bolted to body shell at 3 points by means of rubber mountings. Rear rubber mounting acting as asymmetric selfaligning support.

Spring/shock absorber struts with doubleacting hydraulic shock absorber units, coil springs with rubber auxiliary springs; total wheel travel 220 mm (8.7 in).

Disc-type limited-slip differential (optional)

Bad road conditions can mean that one wheel on a car fitted with a normal differential is not able to transmit its share of the driving force without spinning. In certain circumstances a spinning wheel can be inconvenient and can largely be avoided by a limited-slip differential.

The locking action of the limited-slip differential is derived from internal friction dependent on load, and produced by the action of the equalizing shafts, thrust rings and symmetrically positioned friction discs.

Thanks to the internal friction of the disc and the outward thrust generated by the differential bevel pinions, wheelspin is retarded or totally avoided. The outward thrust is therefore proportional to the total torque being transmitted to the wheels.

The limited-slip differential is of particular value in that it operates as and when required, without any action on the part of the driver.

BRAKES

Foot brake
(dual-circuit system)
Hydraulic, acting on all 4 wheels, with booster servo and tandem master cylinder. Transparent fluid reservoir in engine compartment, brake system and brake pad wear warning light in instrument cluster.

Front

Two-piston fixed caliper disc brakes with automatic pad wear compensation.

Disc diameter	10.04 in (255 mm)
Piston diameter	1.89 in (48 mm)

Rear

Drum brakes with self-centering shoes.

Brake drum diameter	9.84 in (250 mm)
Cylinder diameter	0.75 in (19.05 mm)
Lining width	1.57 in (40 mm)

Handbrake

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

Brake force limiter (for rear axle) Cut-in pressure 25 ± 2 bar (356 ± 28 lb/in^2) gauge.

BODYWORK

Load-bearing all-steel bodyshell welded to floor section to form a torsionresistant complete unit.

Safety zone passenger compartment with built-in roll bar. Impact absorbing front and rear body sections.

Two doors and engine compartment lid hinged at front.

Windows

Tempered glass (windshield: laminated). Special equipment: tinted heat-insulating glass.

Luggage compartment:

Capacity 460 liters (16.2 ft^3) – absolute.
404 liters (14.3 ft^3) – German VDA method.

Fuel tank:

Capacity 15.3 US gal/58 liters/12.7 Imp. gal.

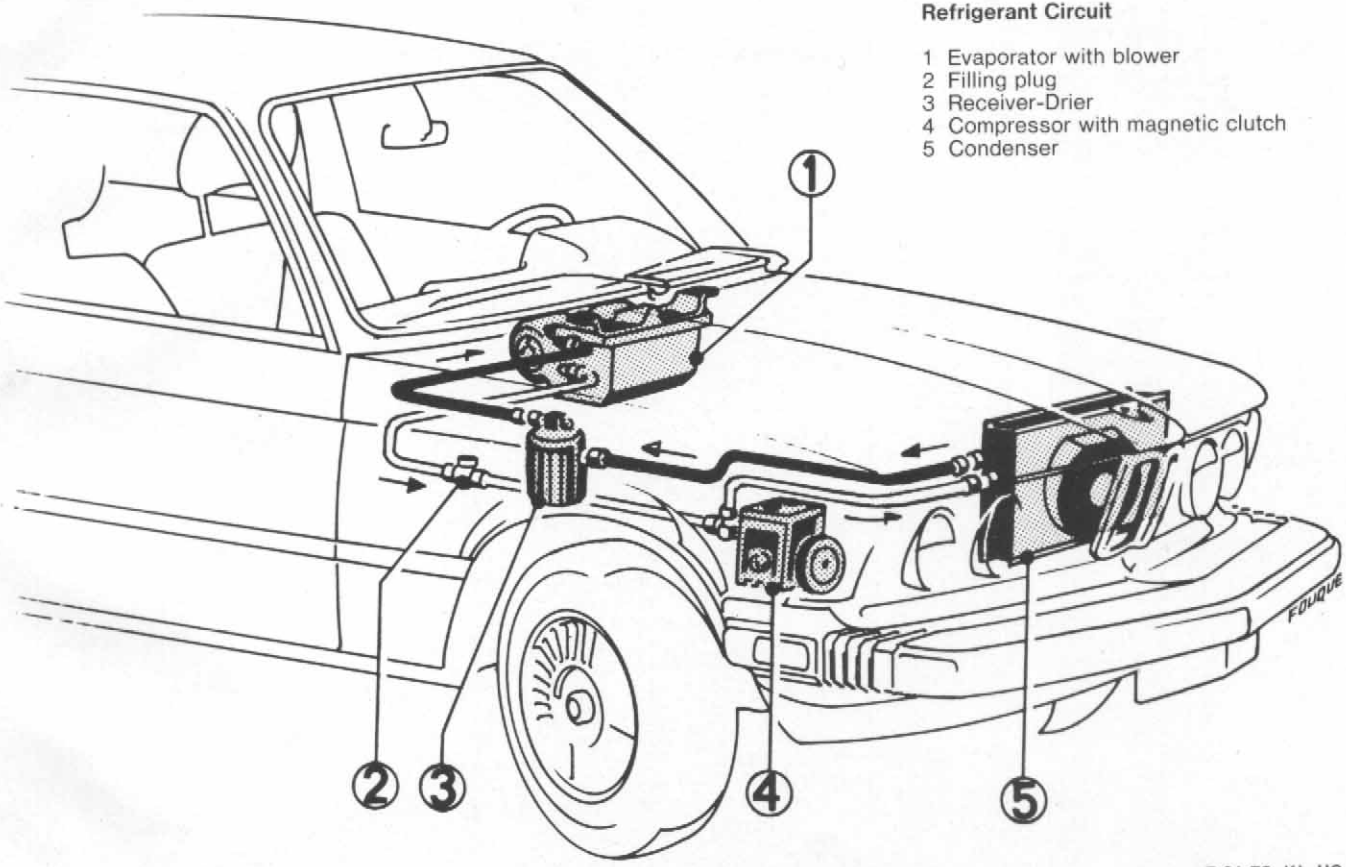
Heating and ventilation

Fresh-air heating system with heater controlled by coolant temperature and four-vane, three-speed centrifugal blower (160 W). 270° cam form or 150° tap water valve, and cross flow heater matrix or circular tube matrix with baffle plates. Simple and accurate temperature selection by a valve operated by Bowden cable with check lever (for fresh air supply), by three rotary controls (air distribution, temperature, and blower switch).
Max. heater output: 9.07 kW/h (30950 btu) 3.3 x 10^7

Independently of the warm air supply, cold air can be supplied as desired to the car's interior through variable-direction grilles in the sides and center of the instrument panel. These stratified interior temperatures help to reduce driving fatique.

The air supply emerges through 2 footwell outlets, 2 defroster nozzles, 1 central nozzle, 2 side window nozzles, 2 central and 2 side grilles.

Stale air extraction through slots below the rear window leading to ducts in the rear roof pillars.


Refrigerant Circuit
1 Evaporator with blower
2 Filling plug
3 Receiver-Drier
4 Compressor with magnetic clutch
5 Condenser
1
2
3
4
5
FOUQUE

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SPECIFICATIONS OF AIR CONDITIONER

(optional extra)

Evaporator housing

Air distribution: the evaporator is integrated into the fresh air ventilating system. The air distribution is the same as with standard series production vehicles without air conditioning:

Through a center and two side outlets (plus two outlets in the middle console).

Air circulation:
Four-vane centrifugal blower.

Airflow: Approx.
7 m^3/min

Protection:
Fuse element 25 amps. (blue) in fuse box.

Minimum air discharge temperature on evaporator: 2–3° C or 35–37° C.

Compressor

Bosch swash plate compressor or
York piston compressor

Electromagnetic clutch

Diameter: 6 inches

Condensor

Suface: 0.115 m^2

V-belt

Narrow-belt
Size dependent on type of A/C installed

Drying bottle

Steel housing with sight glass
Capacity: 0.0054 m^3

Refrigerant

Type: Freon, R 12 (CF_2Cl_2, difluordichloromethane)
Capacity: 34 oz./960 grams

Auxiliary electric fan:

Located in front of the condenser, being cut in and out of operation by means of the magnetic clutch as well as thermostatically as a function of the coolant temperature.

Make: Bosch IPK 12 V
Type: 11-vane axial fan with 282 mm fan ring diameter

Protection: Supplementary fuse, fuse element 25 amps (blue).

Function

The combination of the standard heater with the Air Conditioner offers you an ideal allweather comfort control in your BMW.

The Air Conditioner functions on the principle of a domestic refrigeratior. The refrigerant (Freon 12) is drawn into the compressor which compresses and discharges it in a gaseous state to the condenser located in front of the radiator. The refrigerant is cooled down by the air drawn in through the blower and the air resistance encountered when driving and returns to liquid. On the way to the evaporator the refrigerant passes through the dehydrator which removes any traces of moisture that may have accumulated in the system. The refrigerant expands in the evaporator due to the expansion valve and evaporates. The heat required for evaporation is withdrawn from the passing air stream supplied by the blower assembly. The evaporated refrigerant is drawn in by the compressor and compressed again. The cycle thus is completed.

The compressor is equipped with an electromagnetic clutch by which the compressor is cut in and out of operation. The magnetic clutch is controlled by a thermostatic switch which has its temperature sensing tube inserted in the fins of the evaporator core.

The electric auxiliary fan is automatically switched on when the compressor starts running or when coolant temperature is too high.

The evaporator is integrated into the fresh air ventilating system. The passenger compartment air to be cooled is drawn in by the auxiliary fan and blown through the evaporator fins and cooled. The supply of cooled air into the passenger compartment and the air distribution flows through the louvers on the dashboard. The air conditioner is of a recirculating design. Fresh air may be mixed with cooled air by operating the vent controls.

When your vehicle is exposed to direct sunlight for a fairly long time, first shift the blower control to the high speed position for maximum cooling. Then switch down to a convenient lower blower speed when the desired temperature is reached.

Important hints

1. The A/C operates only with the engine running.
2. Operate the A/C for a short time at least once a month (particularly important during the cold season) as otherwise there is the risk that the seal of the compressor shaft dries out and leaks.
3. When part of the air conditioner system begins to lenk or is damaged e.g. by an accident, and results in a lack of cooling the system must be switched off. Otherwise the compressor may be damaged.

Service Instruction Plan

		1st BMW Inspection at 600 miles or 1.000 km	**BMW Oil-Service** every 7.500 miles or 12.000 km	**BMW Inspection** every 15.000 miles or 24.000 km
Engine	Check oil level regularly Change engine oil Reputable HD 4-stroke engine oil	x	x	x
Engine oil filter	Change oil filter	x	x	x
Manual gearbox	Check oil level Change oil Reputable gear oil SAE 80 GL-4 (in cold climates, HD engine oil) Do not use hypoid gear oil.	x		x x[1])
Automatic transmission	Check oil level regularly Change oil			x[1])
Final drive	Check oil level Change oil Reputable break-in grade hypoid gear oil SAE 90	x		x x[1])
Throttle linkage	Lubricate: Engine oil	x		x
Hinges on doors, hood and trunk	Lubricate: Engine oil			x
Hood and trunk locks, door lock catches and latches	Grease: Multi purpose grease			x
Tank	Unleaded fuel (87 AKI or 91 RON)			

[1]) every 30.000 miles/48.000 km

		1st BMW Inspection at 600 miles or 1.000 km	**BMW Oil-Service** every 7.500 miles or 12.000 km	**BMW Inspection** every 15.000 miles or 24.000 km
Radiator	Check coolant level regulary – Ethylene glycol Type combatible with aluminum engine and radiator	x	x	x
		Renew coolant every two years		
Brake Clutch	Check fluid level regularly Grades: Use **only** brake fluid DOT	x	x	x
		Renew fluid in brake system once a year		
Battery	Check battery acid level regularly	x	x	x
Screen-washer unit	Top up fluid level regularly Antifreeze: Add household alcohol (40% vol.) to the water.	x	x	x
Fuel supply Main fuel filter	replace			x)[1]
Pre-mesh filter screen at pre-fuel pump in fuel tank				x)[1]
Air filter	renew			x)[1]

x)[1] Every 30.000 miles or 48.000 km
Fuel filter replacing is recommended in California but at option of owner.

Approved oil grades for automatic transmission

For USA and Canada

Use only reputable automatic transmission fluids of Dexron® formulation which possess the proper frictional characteristics to be used in your BMW automatic transmission.

ORIGINAL BMW ACCESSORIES

for even greater driving pleasure

Please remember that some of the accessories named here are not available for certain models or are already fitted as standard.

BMW car radio
BMW radios meet even the highest demands when built into your car with original BMW installation kits and aerials designed especially to match the interior and fittings of your BMW. Incidentally, stereo in the car is just as fascinating as stereo in the home.

Also available:
AM/FM stereo casette.

BMW floor mats
Four piece set cocomats in all colors. Cut to size exactly, fitted, so they will not slip. BMW sign on drivers heel pad.

BMW rubber floor mats
Just the right thing for the wet season. Bearing the BMW logo.

BMW gear shift lever knob
Beautifully finished in wood or leather with the BMW logo.

Further ORIGINAL BMW ACCESSORIES:
Luggage carrier, lockable ski rack, wheel trim rings, warning triangle, lockable gas cap, mud flaps, paints – spray and touch-up, foglights, foglight guard brackets.

Perfection to the very last detail also applies to BMW Accessories
ORIGINAL BMW ACCESSORIES meet exactly the same standards as ORIGINAL BMW PARTS. These accessories have to pass all the tests in and on a BMW before they are supplied to you.

Index

Notes:

Capacities

Fuel tank	15.9 US gal/60 litres/13.2 Imp. gal	Unleaded fuel (87 AKI or 91 RON)*
Cooling system incl. heater	7.4 US quarts/7 litres/12.3 Imp. pints	For details see page 70, 71
Engine oil	4.0 US quarts/3.75 litres/6.65 Imp. pints plus 0.26 US quarts/0.25 litres/0.44 Imp. pints if oil filter is changed.	Reputable HD petrol engine oil API classification: SE (for oil grades, see page 65
Manual gearbox	1.5 US quarts/1.4 litres/2.5 Imp. pints	Reputable gearbox oil SAE 80 (GL-4) non-hypoid HD engine oil in cold climates (see page 66)
Automatic transmission	2.1 US quarts/2 litres/3.5 Imp. pints. Total capacity of a new or exchange transmission when initially filled is 6.4 US quarts/6.05 litres 10.7 Imp. pints.	For oil grades see page 102
Final drive	1.0 US quarts/0.95 litres/1.7 Imp. pints. Initial content of a new or exchange final drive 1.2 US quarts 1.1 litres/1.9 Imp. pints.	Reputable break-in hypoid oil SAE 90 (GL-5) (see page 67)

* Warning:
Operate the engine with unleaded fuel only.
Gasohol would damage the fuelsystem.

At a glance

Tire pressure in psi (bar) with cold tires (add. 4.3 psi = 0.3 bar with warm tires).

Steel belt tires
185/70 SR 13

Load	Front	Rear
up to 4 persons	27 psi (1.9 bar)	27 psi (1.9 bar)
5 persons + luggage	29 psi (2.0 bar)	31 psi (2.2 bar)

Winter tires

165 SR 13 M + S or 185/70 SR 13 M + S for max. speed 100 mile/h (160 km/h).

Use the **same pressures** as for standard tread tires.

Spark plug type

Bosch	WR 9 DS
Beru	RS 33

Spark plug gap: 0.024 + 0.004 in (0.6 + 0.1 mm)

Ignition timing

25 ± 1° bTDC at 2.200 rpm

Valve clearances (engine cold):

Inlet and exhaust:
0.006-0.008 or 0.15-0.20 mm.

V-belts:

Water pump/alternator (V-belts are open-sided and tooth-profiled	9.5 x 975 (Manual) 9.5 x 975 (Automatic)
Air Condition compr. (opt.)	dependent on A/C installed

Final Drive Ratio

Pinion/crown wheel	No. of teeth
3.64 : 1	40 : 11 Automatic model
3.91 : 1	43 : 11 Manual model

Contact pattern: Gleason

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