



MERCEDES-BENZ
TYPE 220 S

OWNER'S MANUAL

DAIMLER-BENZ AKTIENGESELLSCHAFT
STUTT GART - UNTERTÜR KHEIM

A point to note

when starting cars which have been laid up for a longer period of time.

To check the lubrication of the engine, watch the oil pressure when starting the car.

On no account should the engine be revved up or subjected to load before the oil pressure gauge starts functioning.



MERCEDES - BENZ
TYPE 220 S

OWNER'S MANUAL

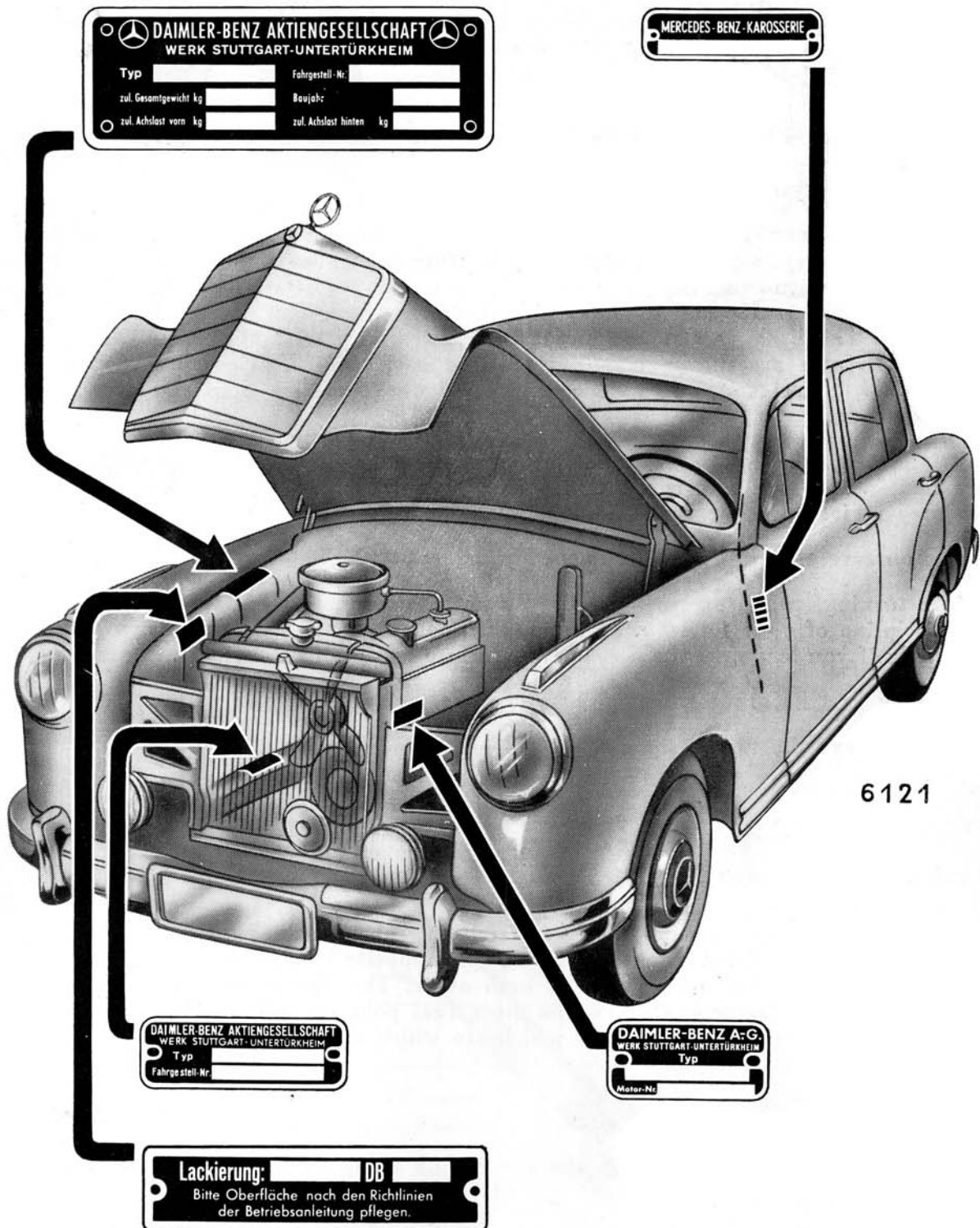
Edition C

DAIMLER - BENZ AKTIENGESELLSCHAFT
STUTT GART - UNTERTÜR KHEIM

Table of Contents

A few general hints	4-5
Operating instructions	6-23
Instruments and controls	6-11
Fuels, coolants, lubricants	12-14
Starting and stopping	15-16
The "first 900 miles"	16-17
Gearshifting	17-18
Driving hints	18-19
Winter driving	19-22
Hints for long trips abroad	22-23
Maintenance	23-46
Lubrication and maintenance schedule	24-27
Cleaning the car and care of the body work	28-30
Points of special attention on the	
Engine	31-34
Carburetor	34-35
Clutch	36
Brakes	36-37
Wheels	38-39
Greasing of wheel bearings	38
Changing	38
Balancing	38
Interchanging	39
Tires	39-41
Changing	39
Tire pressure	40
Tire wear	41
Care of tires	41
Electric system	41-45
Headlights and lamps	44-45
Cooling system	45
Keeping in a garage and storing	46
Hints for emergency repairs	46-51
Towing the car	47
Starter does not turn	47
Engine does not start	47-48
Engine fails	49
Engine is "pinking"	49
Red charging control lamp lights up during driving	49
Oil pressure suddenly drops	49
Cooling water is boiling	50
Clutch slips	50
Braking efficiency decreases	50-51
Defects in the electric system	51
Technical specifications	52

Location of Model Designation Plate, Engine and Chassis Number Plates



Make a note of the chassis and engine numbers of your car including the complete model designation which you will find above these numbers.

Should you require any spare parts – and this also applies to the ignition key and key to the door lock (which also fits the luggage compartment) – we will only be able to deal with your order satisfactorily and quickly if you indicate the chassis number and the engine number together with the complete model designation on your order.

A few general hints,

to be read before you drive your car for the first time.

Safety first!

Keep this in mind whenever you drive. Make sure that all the parts of your car are in good condition, in particular the brakes, the clutch, the steering, the tires and the entire lighting system.

The Mercedes-Benz Model 220 S is a very fast car. Owing to its perfect road holding quality and spring-suspension you may easily forget how fast you are actually driving. All the more reason to firmly resist every temptation to be careless. Adapt your driving speed to the traffic and to the condition of the road. Wet, snowy or icy roads are dangerous. The braking distance increases progressively with the speed. The relevant facts and figures are shown in a diagram in the section "Driving hints" on page 18. **You should, therefore, start to decelerate and brake earlier than you are otherwise inclined to do.**

Take full advantage of the high performance of your car only if this does not involve any danger. It is you who is responsible for your passengers and for all injuries which you may inflict on other road users.

Please observe the traffic regulations of your country.

Before turning, switch on turn signals. Do not, however, rely entirely on them, nor on the discipline of your fellow road users, but look back and into the rear view mirror, especially if you leave the main road to turn into a lane or into a private road.

Look back first before getting out of your car, especially in city traffic.

Always observe the traffic signs.

And then economy of operation

The fuel consumption of model 200 S is fairly low and can be kept in very reasonable limits provided you drive smoothly. The graph opposite clearly shows how closely fuel consumption and speed are related to each other. The figures quoted refer to a load of 2 persons. The faster you drive, the more fuel your car will consume and in particular, the greater the wear and tear will be to which the tires are subjected, especially in hot weather.

To drive economically you should:

1. accelerate just enough to keep the car rolling along evenly, and do not pump the accelerator pedal;
2. drive smoothly and evenly, adapt your speed to the countryside and, above all, do not corner too sharply. Speeding in sharp corners will do more harm to the tires than many miles driving on a normal highway;
3. avoid all abrupt changes in your driving speed by sudden braking or acceleration, as both braking and acceleration increase fuel consumption and tire wear.

Very fast "sporty" driving is more expensive.

Maintenance is important!

Only the best lubricants are good enough for your car. Make sure that only those brands are used which correspond to our viscosity specifications.

Dirt in the oil damages the bearings and cylinder liners. Make sure that the oil filter is regularly cleaned. Change the engine oil at the specified intervals, if at all possible, immediately after a long trip, as long as the oil is still hot and thin and can flush the dirt out.

Keep the air filter element thoroughly clean and in good condition, for the dust which is sucked in with the air grinds the bearings and contact surfaces and impairs the proper fit of the valves. If you drive for long periods over very dusty roads, then it is advisable to clean the air filter more frequently than is specified in the operating instructions for normal conditions.

The Type 200 S has no central lubrication; there are, however, a number of grease nipples at the front and rear axle, as well as at the drive shaft, into which grease must be pressed at the specified mileage intervals.

The fuel filter should be cleaned and the distributor and the spark plugs checked after the specified mileage.

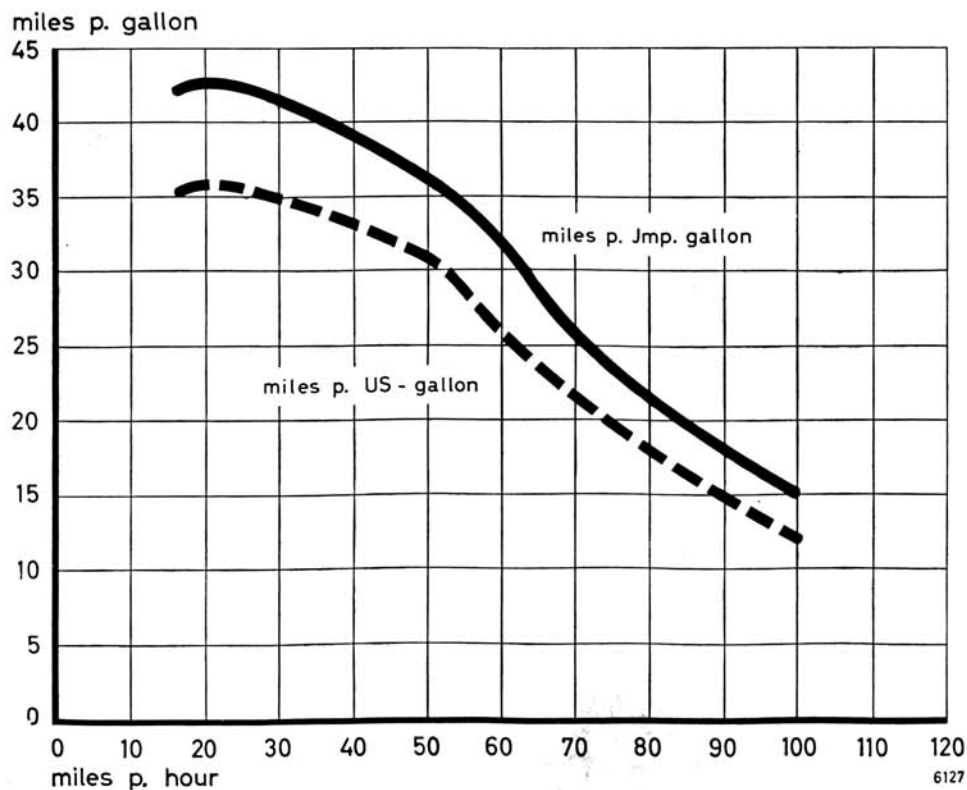
Do not forget to have your battery serviced. A new battery is expensive.

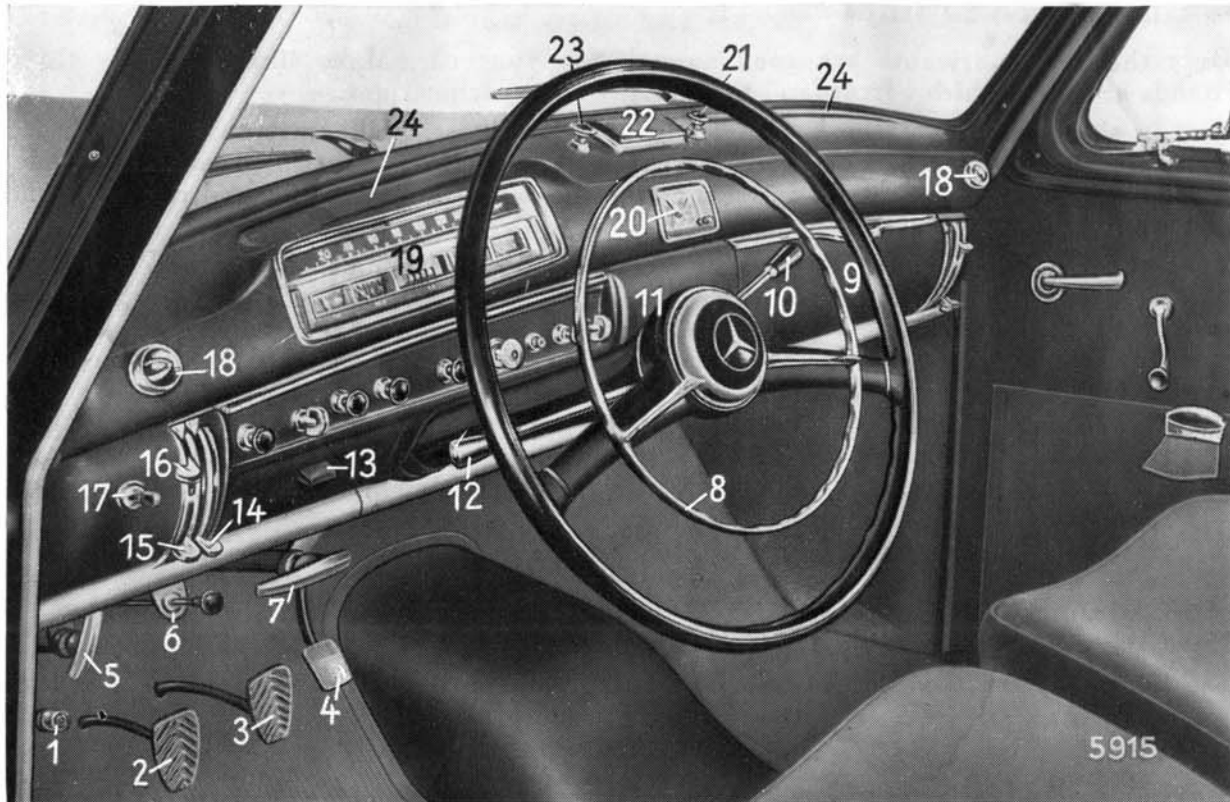
Have the wheels interchanged and balanced as specified by our instructions.

See to it that the tires are always inflated to the specified pressure. This will reduce wear and tear on the tires and the steering and spring-suspension will remain in good condition.

If you follow these hints,

your Type 220 S will never disappoint you and you will come to appreciate it as a touring car of the medium-size class which combines excellent driving qualities, great driving comfort, and safety for its passengers with a considerable economy of operation.





Driver's seat

1. Foot dimmer switch: push down to switch from "dim" to "bright" or vice-versa. The blue warning lamp in the combi-instrument (see p. 9, item 19) lights up when the bright light is on.
2. Clutch pedal. For cars equipped with a hydraulic automatic clutch (Hydrak) the special "Hydrak" instructions should be observed.
3. Brake pedal.
4. Accelerator pedal.
5. Pull-handle for engine hood lock; for opening and closing the engine hood, see page 31.
6. Control knob for fuel reversing cock; 2 positions:
pushed forward = "normal operation"; pulled back = "reserve".
Before the tank is completely empty, the engine stops and the reserve fuel, sufficient for about 19 to 21 miles (30–35 km) according to the manner of driving, is supplied to the carburetor only after the knob has been pulled.
After refuelling, the knob should be pushed forward to normal position.
7. Hand brake control: pulling out actuates rear wheel brake.
Turning clockwise to the stop will lock the control. To release, pull handle, turn counterclockwise and push forward as far as it will go.
- 8a. USA-design: contact ring for horns: depressing actuates the horns.
- 8b. European design: Contact ring for horns and turn signals: depressing actuates the horns, turning clockwise or anticlockwise switches on the turn signals. The contact ring only functions when the ignition is switched on.

9. Glove compartment with hinged lid. Pulled out, the lid can be used as a small table.
10. Column gearshift lever for transmission. For gearshifting see page 17.
11. Ornamental cover; upon special request, a radio can be installed in this space.
- 12a. USA-design: self-cancelling turn signal switch.
- 12b. European design: Control lever for the bright light signal system (overtaking signal light).
13. Small glove compartment, for driver's documents.
14. Temperature regulating lever, one each on right and left side; setting to vertical position regulates the temperature of the fresh air entering through the ventilation system (see page 11).
15. Control lever for ventilating foot space, one each at the right and left side (see page 10 and 11).
16. Control lever for ventilating windshield and side panes, one each at right and left side (see page 10 and 11).
17. Clearance light selector switch; the right or left clearance lights light up according to whether it is turned right or left (no center position).
The clearance lights are switched on by turning the light selector switch (2, page 8) to the left.
18. Air duct to the front side windows, one each at right and left side (see page 11).
If necessary, the escaping air can be reduced or completely cut off by means of the adjustable flap valve.
19. Combi-instrument.
20. Clock, electric, self-winding; this is set by turning the knob at the clock.
21. Electric cigar lighter: press the button for a few seconds until the heating coil glows red.
22. Ash tray: pull out ash tray to empty it, the lower part can easily be removed by pressing on the sides.
23. Two-stage pull switch for the electric windshield wipers.
Half pulled out: wiper blades move slowly.
Completely pulled out: wiper blades move quickly.
24. Air duct to windshield, one each at left and right side.

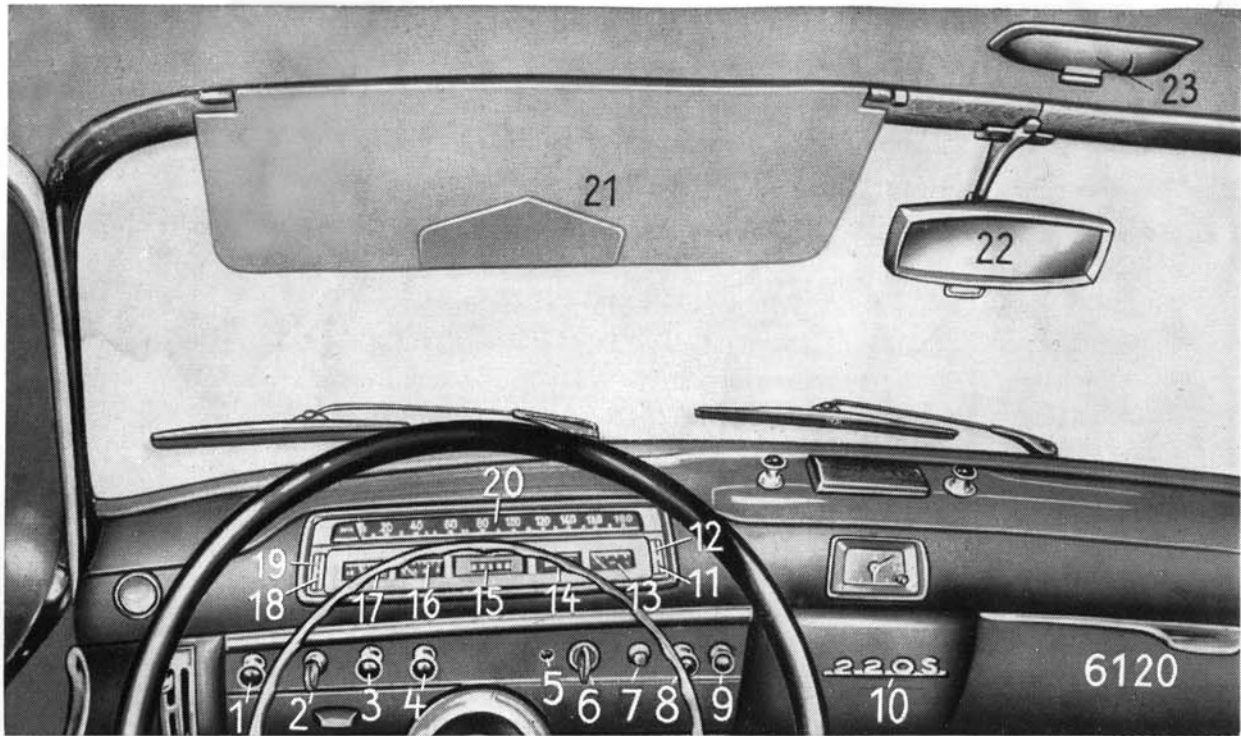
The front and rear seats can be adjusted forward and backward, the back rests can also be adjusted in an oblique direction, thus meeting all individual requirements.

Front seats: Adjustment

- a) forward and backward: depress lever at lower part of seat, shift seat either forward or backward, release lever;
- b) oblique position of back rest: 3 different angles can be chosen by means of 2 wedges along the lower supports of the back rest; either no wedge or the front or back wedge propped up; both wedges cannot and must not be used together.

Rear seats: Adjustment

- a) forward and backward: lift seat, shift forward or backward until the guide pins are engaging (2 positions);
- b) the back rests can be inclined in an oblique direction from the luggage compartment by means of two special cylindrical bolts; clockwise turning adjusts the back rests to a more inclined position, turning in counterclockwise direction adjusts the back rests to a more upright position. Attention! Adjust both bolts evenly.



Instrument panel

1. Pull switch for dome light.
2. Light selector switch; 4 positions:

Neutral position (control knob vertical):	“Day driving”, when steering lock is set to “Driving” position the following appliances can be operated: cigar lighter, wiper system, signal horns, turn signals, brake light, fuel gauge, choke warning light, back-up light and stationary defrosters.
Turned from neutral in clockwise direction to the 1st stop (1):	The following appliances are then switched on: parking light, tail light, license plate lighting, instrument panel light – either dim or bright according to the position of the pull knob (3) –; in addition, the consumers for “day-time driving”, as listed above, can be set in operation.
Turned in clockwise direction to the 2nd stop (2):	The bright or dimmed light, depending on the position of the dimmer switch, are switched on in addition to the units listed under (1).
Turned from neutral in counterclockwise direction to the stop:	Only the clearance lights – depending on the position of the clearance light selector switch (17, page 6) – are switched on; all other exterior lights are switched off.

The fog lamps are also switched on by the light selector switch, which is turned to position 1 or 2 and then pulled out. Please observe the respective traffic regulations.
3. Pull knob for instrument panel lighting: the instrument panel lighting is switched on when the light selector switch is in position 1 or 2; it is dim when this pull knob is pressed in, and bright when it is pulled out.
4. Pull knob for setting the daily mileage indicator to zero.
5. Red control light for the charging current; if the electric system is in order, this lamp lights up when the key has been inserted into the steering lock, and goes out as soon as the idling speed has been exceeded (normal driving).

6. Steering lock, which combines the ignition switch and a locking device for the steering column.
 Three positions of the steering lock:
 Key removed = "Stop": ignition switched off, steering locked.
 Key in vertical position = "Parking": ignition switched off, steering released.
 Key in oblique position, left = "Driving": ignition switched on, steering released.
7. Push button for starter motor. For starting see page 15.
8. "Choke". Pulling out sets the choke of the carburetor; the white control lamp (18) in the combi-instrument remains lighted as long as the choke button is pulled out. Push back in two stages (see page 15).
9. Two-stage push-pull switch for the blowers for stationary defrosting: pulling out switches on the blowers.
 Pulled out halfway: slow operation.
 Pulled out completely: fast operation.
10. Ornamental cover; upon request, a radio can be installed here.
11. Green control light for ventilation blower; remains lighted as long as the ventilation blowers are in operation.
12. Red control light for turn signals; remains lighted as long as the turn signals are switched on.
13. Fuel gauge. Only operates when the ignition is switched on, and does not indicate the last 5 ltrs. in the tank; when the pointer no longer moves at the left mark, the "Reserve" position should be turned on (see page 6).
14. Daily mileage indicator; can be set back to zero by pulling out pull knob 4.
15. Odometer.
16. Oil pressure gauge; operates only when the engine is running.
17. Cooling water temperature gauge; the cooling water temperature should not rise above the red limit mark.
18. White starting control light; remains lighted as long as the choke (8) is pulled out.
19. Blue control lamp for main headlight "bright"; remains lighted as long as high beam is switched on.
20. Speedometer with horizontal scale; red marks: permissible speeds in gears 1 to 3.
21. Sun visor, one each left and right.
22. Rear view mirror; this can be set to anti-dazzle position by folding back the little lever. The level of the mirror can also be adjusted by pivoting it.
23. Map light, at the same time courtesy light. This lamp is switched on or over by turning the lightshield.
 Lightshield closed: lamp switched off.
 Lightshield half open: courtesy light; the lamp is switched on by a door contact switch, which is actuated when one of the front doors is opened and remains switched on as long as this door is open.
 Lightshield fully opened: map light; the lamp remains lighted.
 When getting out of the car, the lightshield should always be set to "courtesy light."

Operating the door locks:

Both front doors can be locked from outside by means of a key.

Unlock: Turn key by 90° away from handle and back again. Remove key.

Lock: Turn key by 90° towards the handle and back again. Remove key.



The outer handles are rigidly mounted to the doors.

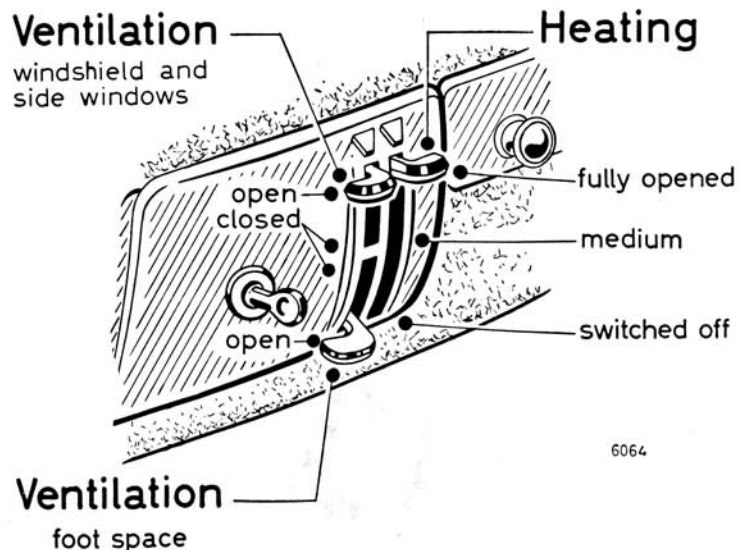
When opening the door from outside, hold the handle with your fingers and press the push button with your thumb as shown on the opposite photograph. Now the door will open easily.

All doors can be secured from inside. This is effected by means of a lock pin with push-pull knob, which protrudes behind each crank-operated window from the window moulding. If the push-pull knob remains entirely at its **bottom position**, the respective door lock is secured and bolted. Only if the lock pin is pulled up the push button on the outer door handle can be pressed and the door opened.

If you intend to secure the door after getting out of the car, the pull knob must be pressed down **before** closing the door, except the driver's door, whose pull knob can only be pushed down when the door is closed.

Luggage compartment lock: The lock is opened by half a turn of the key. The key can only be removed if the lock has been turned to its initial position. In this position it snaps in automatically when closing the lid of the luggage compartment. For this reason, make sure that you never leave the key inside the luggage compartment.

Ventilation and heating



The control of the fresh air supply and the operation of the heating is effected separately for each car side by 3 control levers each mounted at the outer right and left side of the instrument panel.

The inner one – red arrow marked – serves to control temperature,

the two outer ones – blue arrow marked – for fresh air supply, the upper one for the windshield and side window, the lower one for the leg space.

Ventilation control

Upper levers: The upward movement opens the air supply to the windshield and the side pane. The downward movement shuts it off.

Lower levers: The downward movement opens the air supply to the leg space, and the upward movement shuts it off.

The air supply can additionally be varied in the following way:

1. Adjustable flaps on the escape nozzles for side pane ventilation at the instrument panel.
2. Adjustable flaps on the outlet openings to the leg space. If these flaps are in horizontal position, then the air will be equally distributed especially in front of the leg space; if they are in vertical position, a strong air blast will escape. Usually these flaps need only be opened if the leg space in front of the rear seats shall also be heated.
3. Vent panes at the front doors. When closing the vent panes the bolts must be tightly secured; if this is not done properly it will not be possible to eliminate wind noises.
4. There is a blower in the air duct on the driver's side, and upon special request another one in the second air duct. Both can be switched on together by pulling out knob 9 (page 8) on the instrument panel.

Knob half pulled out: slow operation,

Knob pulled completely out: fast operation.

Heating control

Lever, completely lowered: heating switched off,

Lever, completely raised: heating switched on.

Every intermediate position is effective, provided that the supply of air has not been cut off by the air control levers.

As a rule, both ventilation and heating should only be turned on in winter if the cooling water has reached a temperature of about 122° F (50° C).

In order to heat the interior of the car, open the ventilation and heating levers, completely for a short while, after an interval of about 5–10 seconds, move them back to the desired heating position without waiting for the full heating effect to make itself felt. The complete heating capacity, i. e. heating fully open, will only be needed in extremely cold weather, in order to keep the temperature of the interior of the car at a pleasant level.

When the driving speed exceeds 75 m.p.h. (120 km/h) and with outside temperatures below freezing point, it is advisable to slightly decrease the air flow, i. e. to shift back the ventilation levers a little.

In order to defrost a frozen windshield and side panes put the upper levers towards top (open), the lower ventilation levers towards top (closed) and the heating levers right to the top (fully opened). Thus the entire air supply is used for defrosting. If necessary, the blowers can also be switched on (see above).

Thanks to the separate controls, the air supply to the leg space and to the windshield and side panes can be adapted to the driver's and passenger's wishes.

Do not fail to observe the following: If one is driving behind a vehicle which leaves dust or exhaust smoke in its trail, the fresh air supply should be temporarily cut off, so as to prevent the exhaust gases of the vehicle in front from entering the interior of the car.

Fuels, coolants, lubricants

Fuels

Maximum capacity of fuel tank: approx. 14.0/16.9 Imp./US gals. (64 ltrs.), out of which 1.2/1.4 Imp./US gals. (5.5 ltrs.) are for reserve. If you drive at a moderate speed this reserve quantity will be sufficient for 19–21 miles (30–35 km) to go yet.

To operate without pinking, the engine of the “220 S” requires premium fuel. In order to ensure maximum output without any pinking the engine has been set by the factory using a fuel of 93–95 octane rating according to the Research Method (ROZ).

When driving in countries, in which only fuels with a lower Research Method octane rating are available, see page 22 under “An important note for all those who are going abroad”.

Fuel substitutes, e. g. gasoline with too high a boiling point should not be used, neither alone nor in a mixture. By no means try to make your own gasoline-benzene or gasoline-benzene-alcohol mixtures.

We recommend placing protective leather around the filler neck when re-filling.

The drain holes for the tank filler cap in the fender should always be kept clean.

Coolants

Capacity of entire cooling system including DB heating: approx. 2.5/3 Imp./US gals. (11.3 ltrs.).

Caution! Overpressure cooling system. Open radiator filler cap only if cooling water temperature is below 195° F (90° C). First turn to mark I and blow off overpressure. Then turn somewhat farther and remove cap. When closing turn to mark II.

For radiator caps use only caps bearing the number 100.

The cooling water will start boiling only at 240° F (115° C) – red mark at cooling water thermometer. For mountain driving or for driving in territories with high outdoor temperatures the cooling water temperature may rise up to 240° F (115° C).

Use clean water with as low a lime content as possible or well-filtered river water.

Before driving the car the first time the cooling water should be specially treated, i.e. an anti-corrosion agent should be added. If you constantly drive with untreated cooling water, then scale, rust, and other corrosion deposits will form, thus impairing the efficiency of the cooling system.

The following agents, which go well with anti-freeze, can be used for treating the cooling water:

Brand	Manufacturer	Total quantity	Concentration
Donax C	Shell, Hamburg	30–60 ccm (1.8–3.6 cu.in.)	} 2.5–5 ccm/l (0.7–1.4 cu.in./Imp. gal. 0.6–1.2 cu.in./US gal.)
Phosphatol	Houghton-Chemie, Hildesheim	30–60 ccm (1.8–3.6 cu.in.)	

If the engine is hot, refill only with cold water when the engine is running. On the other hand hot water can be put into a cold engine without any danger.

Caution! When adding cooling water, proceed as follows:

1. Set the two heating levers towards top (completely open).
2. Slowly add cooling water up to the filler cap rim.
3. Run engine with increased idling speed and with opened radiator filler cap for some time.
4. Reduce to idling speed and slowly top up cooling system
 - a) with cold cooling water up to metal mark (about 2 ins. (5 cm) below the filler cap) in the radiator filler,
 - b) with warm cooling water up to the rim of the filler neck.



If the cooling water temperature slowly exceeds the normal temperature, then the cooling system is dirty. This should be cleaned from grease and scale (see page 45), if possible at a service station.

When the temperature falls below freezing point the measures for winter driving (see page 19) should be adhered to.

Lubricants

Lubricants have just as important a contribution to make to the satisfactory running of your car as any structural part. Therefore, the proper choice of a lube oil is of utmost importance.

When selecting lube oils, look for

quality and viscosity.

The **quality** must be of a high standard, for performance, service life and operational safety of all makes and models are closely related to the lube oil used. These requirements are met by the so-called doped lube oils, i.e. oils with special chemical additives.

However, these additives must be suitable for all materials used.

In view of our experiences, we specify the use of HD (Heavy-Duty) engine oils tested by us for the engine, for the axle drive the hypoid transmission oils and for the gear-box automatic transmission fluid.

If, in exceptional circumstances, no HD-oil is available for refilling, you can drive with other engine lube oils for a short while. However, when you fill in HD-oil again, you must adhere to the special change-over instructions. In that case, you would do well to get some advice from one of our service stations.

The **viscosity** should always correspond to the seasonal outside temperatures. With regard to the lube oils we should therefore like to advise you always to keep to the specified viscosity groups of the SAE classification which has been internationally approved.

Lubricating point	Lubricant (see enclosed list for brand names)	Filling quantity in Imp./US pints (ltr.)	Viscosity		
			Lowest ambient temperature ¹	'New and completely overhauled engines	After a distance of about 30,000 miles (50,000 km) has been covered
Engine and crankcase	HD engine oil	min. 6/7 (3,5) max. 10/13 (6)	over 77° F (25° C) over 41° F (5° C) below 41° F (5° C) below -13° F (-25° C)	SAE 30 20 W/20 10 W 5 W ²	SAE 30 30 20 W/20 10 W
Oil filter	HD engine oil	0,9/1 (0,5)			
Distributor: oiler to cam bearings Felt in cam bore Breaker rubbing block	HD engine oil HD engine oil Bosch grease Ft 1 v 4				
Transmission	Automatic transmission fluid	2,5/3 (1,4)	all the year round	—	
Axle drive	Hypoid transmission oil	3,9/4,7 (2,25)	all the year round	SAE 90	
Steering gear housing	Hypoid transmission oil	0,5/0,6 (0,3)	all the year round	SAE 90	
Water pump	Hypoid transmission oil	—	all the year round	SAE 90	
Front wheel hubs	Roller bearing grease	2,30 zs. each (65 g)	all the year round	—	
Lubricating nipple	Grease	—	all the year round	—	
Turn signal switch	Kollag grease M 1/2	0,05 oz. (1 g)	all the year round	—	
Battery terminals	Bosch grease Ft 40 v 1	—	all the year round	—	

From the many products available on the market these specified in the attached list were tested by us and can be recommended.

A special list which can be ordered from our central service dept. provides detailed information on this subject.

Starting and Stopping

Check the following points at regular intervals and before every long trip:

1. Fuel level; fuel gauge only indicates when the ignition is switched on;
2. Water level in the radiator; if the cooling water is cold, it should reach the mark at the filler neck;
3. Oil level in the crankcase; before measuring, wipe the oil dipstick. The oil level should reach the upper mark of the dipstick; do not measure when the car is parked on sloping ground;
4. the tire pressure; see page 40 for exact details about the tire pressure;
5. the effectiveness of the brakes; a noticeable degree of resistance must be felt at the brake pedal, it must not be possible to press down the pedal completely, otherwise see hints for emergency repairs, page 50;
6. the high and low beam of the headlights.

Starting. For cars equipped with a hydraulic automatic clutch (Hydrak) the special "Hydrak" instructions should be observed.

Be careful when starting and running the engine in the garage; always keep the garage door open and make sure that the exhaust gases can draw off. The latter contain the inodorous and invisible, but highly poisonous carbon monoxide gas.

Move gearshift lever to neutral (center) position.

If a radio is installed, this should not be switched on during the starting procedures, therefore, the radio must be switched off before starting the car.

Set ignition key in steering lock to "driving" position (see page 9). What is to be done next depends on the temperature of the engine and on the ambient temperature; therefore the starting procedure for warm and cold engines will be described separately.

a) Starting the cold engine (up to an outside temperature of about 5° F [—15° C]).

Starting at temperatures below 5° F (—15° C) see winter driving, page 20.

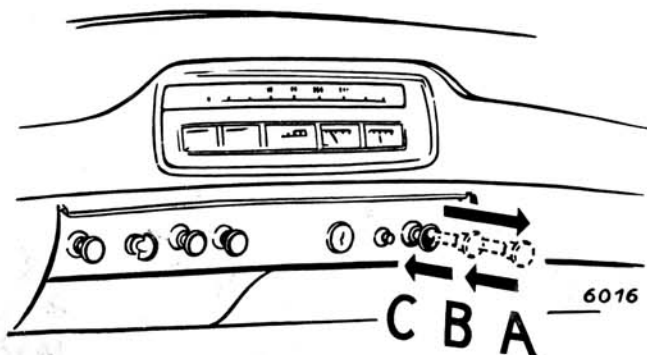
Also the cold engine starts very easily with temperatures exceeding 50° F (+ 10° C).

During the warm season the engine can mostly be started without actuating the choke.

Pull out choke completely (starting position) only when it is rather cold outside — the white control light "S" in the combi-instrument will light up.

Push starter button, release button only when the engine is firing regularly and not immediately after it has fired just once; on the other hand, you should not actuate it for longer than 20 seconds at a time, since the battery will be subjected to too great a strain otherwise.

When starting the accelerator pedal should normally not be depressed, however, in altitudes exceeding 5,000 ft. (1500 m), it is advisable to slightly accelerate the engine after it has fired until it is running smoothly.



A = Starting; B = Warming up; C = Driving.

As soon as the engine has started and has been idling for some time, depending on the outside temperature, push back choke only as far as to resting position (warming-up position). For some time — even while driving — the choke can be left in this position, without there being the danger that the engine will get too rich a mixture.

If the engine does not start after the starter has been operated twice, you should look for the source of trouble (see page 47).

b) Starting the warm engine (also at low temperature):

Press starter button – at the same time slowly floorboard the accelerator pedal – without “pumping” the gas pedal. Do not pull out choke. After the engine has started, release starter button and accelerator pedal so that the engine does not rev up too much.

Warning up the engine. For cars equipped with a hydraulic automatic clutch (Hydrak) the special “Hydrak” instructions should be observed.

It is not advisable to let the engine idle until the normal operating temperature has been reached, since this would require a very long time in view of the slight degree of heat produced by the engine when idling. When the ambient temperature is above 32° (0° C) we advise you to drive off at a moderate speed after the engine has fired. At lower temperatures, you should allow the engine to idle for 1 minute at the most before driving off, in order to ensure that the engine is lubricated even if the oil is completely cold. Do not allow the engine to idle at an excessive speed, however.

Driving off. For cars equipped with a hydraulic automatic clutch (Hydrak) the special “Hydrak” instructions should be observed.

Press down clutch pedal.

Move gearshift lever in 1st gear.

Disengage hand brake.

Slowly release the clutch pedal and simultaneously slowly depress the accelerator pedal with the right foot – the car will drive off.

When the car is moving, accelerate gradually, not abruptly, shift to 2nd, 3rd and 4th gear.

As soon as the engine has been warmed up so that a normal idling is guaranteed, completely push back choke (driving position). Between (B) and (C) there is any choke-position possible. As soon as the choke has been pushed back to driving position (C) the white control light goes out.

Stopping

Turn the key in the steering lock to position “Parking” or “Stop” and remove key. With “stop” position turn steering wheel a little until the catch snaps into place.

The first 900 miles (1500 km)

The engine is not sealed. The way the engine is handled and the strains to which it is subjected during the first 900 miles (1500 km) decisively affect the service life and economy of operation of the entire vehicle. The more carefully you treat the engine at first, the more satisfied you will be with its performance later.

For this reason drive the first 900 miles (1500 km) with varying speed and revolutions and shift gears more frequently. Above all, do not let your engine slog in lower engine speeds during this period, shift down to a lower gear in good time.

It is recommended not to exceed the following speeds during the first 900 miles (1500 km):

Odometer reading	Speed in m.p.h. (km/h)			
	1st gear	2nd gear	3rd gear	4th gear
up to 300 miles (500) km ..	15 (25)	25 (40)	40 (60)	50 (80)
300 to 900 miles (500 to 1500 km)	18 (30)	30 (50)	50 (75)	62 (100)
900 to 1250 miles (1500 to 2000 km)	May be gradually increased to maximum speed			

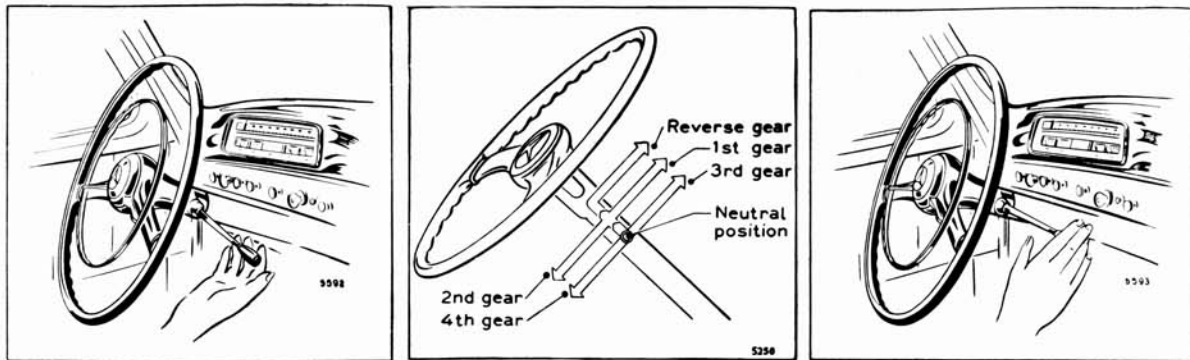
The "first" nonrecurrent lubricating and maintenance jobs listed on pages 23 and 24 vitally influence the service life of the car, the quietness with which the engine will run later and the operational safety of the vehicle. The first sheets of your service book are specially provided for the breaking in period. Please remember to call on your service station in good time.

Gear shifting. For cars equipped with a hydraulic automatic clutch (Hydrak) the special "Hydrak" instructions should be observed.

All gears of the transmission are fully synchronized, i. e. a special device in the transmission automatically ensures through couplings that the corresponding gears inter-mesh smoothly. This makes it unnecessary to double-clutch. For up- or down-shifting proceed as follows:

Decelerate, depress clutch pedal, briskly move the gearshift lever from its present gear position to the next one, engage the clutch smoothly and accelerate smoothly.

The gearshift lever itself is placed in a readily accessible position at the steering column beneath the steering wheel. It can be brought out of its central position (neutral) into three "gear levels" one above the other and can be pushed towards the desired gear at these different levels.



1st and 2nd gear

When engaging these gears pull up gently and push forward for 1st gear or backward for 2nd gear.

Reverse gear. Press up hard as far as it will go and push gear lever forward.

Gear shifting guide

3rd and 4th gear

When engaging these gears press gear lever gently down and then push forward for 3rd or backward for 4th gear.

When you reach the middle and top "gear level" a slight resistance is clearly perceptible.

Neutral is in the center position between the gears and the gear levels and the gearshift lever is automatically pulled down by a spring from the center to the lower gear level. When changing from 1st to 2nd gear you must guide the gearshift lever exactly along the stop and when you come to the half-way position you must resist the downward pull of the spring – otherwise you might get into 4th gear – and you must not press up too strongly either – otherwise you will push right up into reverse gear. Gearshifting can be effected with practically no effort. Only the following will have to be observed:

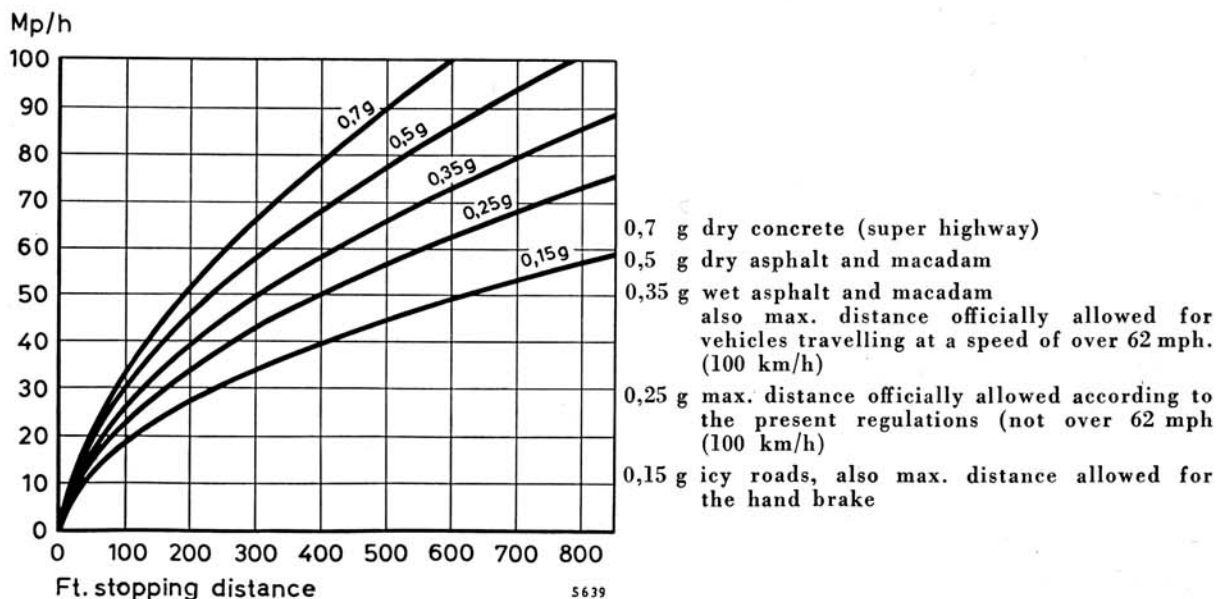
1. Before any gear change: decelerate and disengage clutch completely.
2. Always move the gearshift lever in straight lines exactly at right angles to one another, shift gear lever with a brisk and steady movement.
3. Always engage the next gear and never omit a gear.
4. Only engage the reverse gear when the car is at a standstill.

Driving hints For cars equipped with a hydraulic automatic clutch (Hydrak) the special "Hydrak" instructions should be observed.

The Type 220 S is a very fast car with powerful acceleration. Its outstanding road-holding ability and spring-suspension only too easily prevent you from realizing how fast you are actually driving. It is, therefore, all the more important for you to slow down and brake earlier than you tend to do normally.

Every increase of speed automatically involves an even greater increase in the braking distance.

The diagram opposite illustrates the relation between speed and braking distance under different road conditions and when a reaction time of 1 second has been taken into account. You can see from it that with the best brakes and optimum friction values between road and tires a speed of 90 m.p.h. (150 km/h) involves a braking distance of over 500 ft. (160 m), after allowance has been made for a reaction time of 1 second. At high speeds the air resistance itself has a considerable braking effect. In normal cases therefore decelerate early and actuate the brake pedal only afterwards. Always depress the brake pedal smoothly, and not abruptly, however jerky and sudden braking should be avoided if at all possible, as the car might start skidding on a slippery road or a vehicle coming up behind might collide with it; moreover, it damages the tires to a considerable extent. You should only brake quickly and energetically in a real emergency.



When driving, only use the foot brake, even on steep grades.

If you use the hand brake alone when the car is driving fast, this in itself will neither impair the brake nor any other part of the car. The rear wheels, however, may block and especially on a slippery road, this may cause the car to skid. The hand brake should normally be used only to keep the car stationary.

Always watch the speed at which you are driving. The speedometer has been placed well within your angle of vision and you can watch it without taking your eyes off the road.

The set-up of the gears is arranged very favourably so that it will be possible to fully utilize the good qualities of the chassis and engine at all times. You should, therefore, always take advantage of the controlled synchromesh transmission and shift gears in time, particularly with regard to city traffic, when going uphill, or when passing a speedy truck.

There are marks on the speedometer which specify the maximum permissible speeds in the 1st, 2nd and 3rd gear. Change gear at the latest when reaching these marks. You will save gasoline when shifting sooner.

With the type 220 S fairly steep grades can be taken in the 4th gear (see page 52). In very mountainous terrain, however, the fast driver should shift back to the 3rd gear in order to obtain better acceleration values.

Also when driving downhill, particularly on long steep grades, it is advisable to shift down to a lower gear. On slopes you should allow the engine to act as a brake by decelerating, however, do not declutch, and do not switch off the ignition, as otherwise the fuel which had been sucked in by the engine and is not burnt will wash off the oil film from the cylinder liners.

If you have to stop your vehicle on an upgrade it will be safer to engage also the 1st gear or the reverse gear and to turn the steering in such a way that in case the brake is released unintentionally the car will roll towards the hill and not downwards. In winter the car should be secured by blocks.

If the oil pressure suddenly drops while the engine speed remains unchanged or if from one day to the next it does not attain the usual level, you should stop and proceed as described in section "Hints for Emergency Repairs" (page 49).

If the engine is very cold, the oil pressure will rise gradually some time after the engine has been started, as the pressure increase will only become effective slowly in the narrow line leading to the oil pressure gauge.

Normally the cooling water temperature should be 160–200° F (70–95° C). This temperature is reached after the car has been driven at a moderate speed for 4–5 minutes after starting. At particularly high ambient temperatures and driving with a heavily loaded car on long upgrades the cooling water temperature may safely rise up to the red mark at the cooling water thermometer. In this case it can be decreased by shifting down to a lower gear. If the car is stopped after having climbed a long way up a steep hill, the engine should be allowed to idle for a while, as otherwise the cooling water may boil.

If the cooling water temperature rises beyond the red mark, the cooling system is defective; stop and proceed as described in "Hints for Emergency Repairs" (page 50).

Winter Driving

During the cold season certain measures have to be taken to protect the engine and the radiator and to safeguard prompt starting. Special care should also be taken when driving.

Protective measures

The summer oil should be replaced by winter oil (see page 14) in good time.

The built-in thermostat keeps the cooling water in the engine automatically at the correct temperature by allowing the water to circulate from the engine into the radiator only when the temperature of the water has reached about 158° F (70° C) and by cutting the radiator out of the cooling water circuit at lower temperatures. Consequently in winter the water in the radiator core may be frozen even though the car is being driven.

Therefore an anti-freeze should be added in frosty weather.

Only a commercial standard anti-freeze should be used for protection and the amount of the additive, which depends on the ambient temperature, should be determined in accordance with the supplier's instructions only.

The following table contains the mixing ratios of water and Glysantin or Genantin for various temperatures below the freezing point.

The capacity of the entire cooling system, radiator and engine filled up to the mark at the radiator filler neck is about 20/24 Imp./US pts. (11,3 ltrs.) with DB heating installed.

Freezing protection up to	Genantin/Glysantin			Water		
	in pints			in pints		
	Imp.	US	ltrs.	Imp.	US	ltrs.
approx. 14° F (— 10° C)	4 ¹ / ₂	5 ¹ / ₄	2 ¹ / ₂	15 ¹ / ₂	18 ³ / ₄	8.8
approx. 5° F (— 15° C)	5 ³ / ₄	7	3 ¹ / ₄	14 ¹ / ₄	17	8.05
approx. — 4° F (— 20° C)	7	8 ¹ / ₂	4	13	15 ¹ / ₂	7.3
approx. — 13° F (— 25° C)	8 ¹ / ₂	10 ¹ / ₄	4 ³ / ₄	11 ¹ / ₂	13 ³ / ₄	6.55
approx. — 22° F (— 30° C)	9	10 ¹ / ₂	5	11	13 ¹ / ₂	6.3
approx. — 40° F (— 40° C)	10 ¹ / ₄	12 ¹ / ₄	5 ³ / ₄	9 ³ / ₄	11 ³ / ₄	5.55

Thoroughly flush the cooling system before filling in anti-freeze, particularly if the water has been treated with an additive.

Caution! Do not use an acid-type anti-corrosion or radiator cleaning agent together with an anti-freeze. A corrosion preventive oil can, however, be used.

You should not fill in the cooling water above the mark to be found on the radiator filler when the engine is cold, otherwise nearly 2 pints of the cooling water will be expelled through the relief pressure valve and be lost when the coolant expands due to warming up.

Radiator and engine should be flushed well after using an anti-freeze. Please note that the coolant which had been drained off in spring can be filtered through a clean cloth and stored in a clean, well-closed container to be used next winter. Before filling it in again, however, the anti-freezing quality of the mixture should be tested by means of a Glysantin or Genantin hydrometer, and the cooling water should be treated with an anti-corrosion oil (see page 12).

If there is no anti-freeze available, the radiator should be well covered, also if the car is being driven. The air intakes of the heating and ventilation systems should, however, not be blocked.

If in this case the car is not kept in a warm garage, the cooling water must be drained off while the engine is still warm, if possible in a sheltered place. To do this, open the drain cocks at the left bottom side of the radiator and the engine and loosen the heating hoses at the bottom of each heating element, in order to thoroughly drain the heater. Moreover, remove the radiator filler cap. **Caution! Superpressure cooling system; for opening see page 12.** Watch the cooling water draining off, and if the drain cocks are clogged or frozen, clear them with a piece of wire.

Allow the engine to run for a short time so that the cooling water will be drained completely out of the entire cooling system. Keep the drain cocks open until the radiator is filled up again and attach to the radiator a warning "water drained off". Before refilling do not forget to tighten the lower cap nut at each heating element and to close the drain cocks.

Measures to ensure safe starting in cold weather

In any case a winter engine oil should be used meeting the specifications on page 14. In addition, charge your battery well.

Should temperatures fall below 5° F (— 15° C) the following additional measures should be adopted when starting, unless you have a heated garage:

1. If possible, the ignition should be adjusted to fully advanced ignition (see page 22 and 33).
2. Before starting, completely depress accelerator pedal slowly 3–6 times depending on the outside temperature, then start immediately. This should be done only, however, if the engine has cooled down completely.

If it looks as though the outside temperature would fall below -13°F (-25°C), and if the car is left in the open for a longer period of time, the following measures may be taken:

1. Remove battery and store it in a heated room or bring it to room temperature, as an undercooled battery will produce only a fraction of the starting power of a battery under normal temperature.
2. After stopping the engine drain off cooling water, warm it up to approx. 203°F (95°C) before starting and refill into cooling system. There is no risk for the cooled down engine, even if it is filled up with boiling cooling water.

This procedure, however complicated, will spare your starter motor, engine and battery.

Driving in winter

Wet, snowy or icy roads are treacherous. Always adapt your speed to the road conditions and drive carefully. On clear winter days ice may be found on places between sunny and shady spots, e. g. at sub-way crossings, at the outskirts of a town or woods etc. When frost is just setting in, bridges may already be iced while the roads are still free of ice due to the warmth of the ground. These spots should be passed with special care.

The windshield and the two front side panes are defrosted by turning all 4 ventilation levers completely towards top and the two heating levers also completely towards top (see page 11). For filling in solutions into the windshield washing system (should one have been installed upon special request) see page 29.

If the luggage compartment lid is frozen, beat along the edge of the lid with your fist to loosen the ice between the edge and the rubber moulding. A frozen door may be opened in the same way.

The insect screens in the ventilation ducts may get clogged in a snow storm thus impairing the heating of your car. After loosening a fastening screw, the insect screens can be removed and after having turned them by 180° they can be installed again. When doing this, gaps will appear in each air duct through which the air required for heating will flow from the engine room into the ventilation ducts. When there is no snow the screens should be installed in their normal position.

According to § 33 of the German Highway Code the following regulations must be followed in Germany in foggy weather or when it is snowing:

Section 4: Low-beam headlights must be switched on in the daytime if there is dense fog or snow is falling.

Section 5: Fog headlights may only be switched in conjunction with the low-beam headlights in foggy weather or when snow is falling.

Abroad, it is possible to use different methods of lighting the way. However, we urgently advise you to adhere to the traffic regulations of the country in which you are driving.

If the car is kept standing in the open air in frosty weather, you should neither pull the hand brake nor engage a gear in order to avoid freezing-in. In this case the car should be secured by blocks.

In order to prevent icing up of the windshield of a stationary car, put a piece of canvas or a newspaper of the size of the windshield under the wipers.

In general it is not necessary to use snow chains on tires of which the tread is still in good condition. Fuel consumption is increased by using snow chains. In snow regions we recommend the use of tires with special snow treads; our service stations will be glad to inform you where these tires can be bought. Snow chains should be used only under extremely adverse conditions, e. g. when the snow is especially deep and grades have to be taken. It is, however, essential for the snow chains to have small links and to prevent the tires from skidding sideways (so-called square rack chains), ladder-type chains are unsuitable.

It is better to drive on ice-covered roads without chains and to remove the chains if the roads are free of snow, as they wear off rapidly.

The special instructions for the fitting and treatment of chains which are published by the manufactures should be strictly adhered to.

Hints for long trips abroad

Also in foreign countries you will find a network of Mercedes-Benz Service Stations. For details concerning this subject please consult the "List of Authorized Mercedes-Benz Agencies in Export Countries". The place to ask for this list is our Service Department, Stuttgart-Untertürkheim, Germany. With the aid of this list, you will always know where to go for help.

In very remote regions, however, it still may happen that you are forced to see a non-Mercedes workshop for help. To meet such emergencies, we compiled an "emergency assortment of the most important spare parts (like gaskets etc.)". Before going abroad please make sure to get these parts and tools.

Moreover, we advise you to take along a spare tire, and tube valves. In addition, you should have with you agents for treating the cooling water as well as distilled water for the battery. A first-aid kit should also form part of your travelling equipment.

If your car is equipped with asymmetric low beam (see page 44) and if you enter a country in which traffic runs on the other side than in your home country, you should cover the wedge-shaped sectors of the diffusing lenses by means of an adhesive tape so that no light may penetrate. Now your low beam becomes symmetric and you will not dazzle oncoming vehicles.

When refilling fuels, coolants, and lubricants, make sure that no dirt enters.

Only use fuels with the required minimum octane rating (see page 12).

If you, however, for some reason or other, should be forced to use a fuel with a lower octane rating, and if in this case a "pinking" of the engine can be noticed, then the ignition timing can be adjusted at the distributor within certain limits, thus adapting it to the octane rating of the fuel which is being used (for details see page 33). A fuel with the required minimum octane rating should be used again as soon as possible, and if the adjustment of the distributor has been altered, the ignition timing must be corrected.

The engine oil also should meet the requirements outlined on page 14. At any rate, you should use an HD-oil of a viscosity group appropriate for the prevailing season. Should the HD oil brand you are used to not be available abroad, please change over to an internationally recognized HD oil brand, as for instance:

Castrol CR HD;

Energol HD;

Esso-Extra-Motoroil HD, Essolube HD;

Mobiloil (HD), Mobiloil Special;

Shell X-100 Motoroil (HD), Shell Rotella Oil (HD);

Valvoline HPO (HD);

Veedol 10-30 Motoroil (HD).

Our production cars are equipped for operation in Central Europe on normal roads. It is obvious that driving under extreme climatic conditions (e. g. in the tropics) or on extremely bad roads will be hard on the car. In order to meet such situations, we advise you to have certain special items fitted to your car before starting out on such trips. In this way, the engine and the aggregates will be protected from sand or dust entering into the interior; moreover, these vital parts will then not touch the ground, nor will rocks or boulders be able to damage them. The special equipment will also serve to meet the outside temperatures.

Should you have any questions with regard to the installation of these special items or with regard to any measure to be taken, please contact our general agents or our Service Department in Stuttgart-Untertürkheim. Take advantage of this possibility before starting out on a trip to countries with extreme climatic and road conditions.

Maintenance

You are urgently recommended to leave all maintenance and service work to the skilled mechanics of our service shops. In particular, it is in your own interest to see that the service work listed in the Service Book is carried out in good time and without any omissions. If you do this you will not only ensure that your car is kept in excellent condition, but also that small defects will be set right before they develop into major faults. We wish to point out in this connection that guarantee claims will not be met if not all of the specified maintenance jobs have been carried out in due time at a service station recognized by us.

In case you wish to service your car yourself or should be obliged to take it to some other garage, the following hints should be taken into consideration:

Lubrication of the grease nipples at the front and rear axle, at the pedal linkage and at the drive shaft, checking oil level and oil change in the gearbox and the rear axle housing as well as draining off the engine oil should be carried out **from below on a pit or ramp** and after the distances covered according to the specifications of the lubrication chart (pages 23–27). In addition, a cover at the center of the drive shaft has to be removed from the frame floor. All grease nipples are then easily accessible and can be serviced as usual with a standard grease gun, except for the front nipple at the center of the drive shaft – the nipple for the joint. The latter requires an extension to the normal grease gun used for lubrication. If a high-pressure grease gun is being used the lubrication pressure must not exceed 5,690 psi (400 kg/cm²), if necessary, the pressure should be limited to this value by means of a safety device on the grease gun.

Please give the necessary direction to your workshop.

The oil should always be changed immediately after returning from a trip while the oil is still hot so that it will flush away impurities.

For regular care and protective treatment of the paintwork and the chromium-plated parts see pages 28–30.

For cars equipped with a hydraulic automatic clutch (Hydrak) the special “Hydrak” maintenance instructions should be observed.

Nonrecurrent “first” lubrication and maintenance work

After the first 300 miles (500 km):

Check tightness of all wheel nuts, if necessary tighten.

After the first 300 miles (500 km):

1. Clean wire coil in oil filter.
2. Drain oil out of engine housing (while the oil is still hot), and fill in fresh oil according to chart.
3. Change oil in transmission (while oil is still hot). Before draining off check oil level (up to the rim of the filler opening) – in case of loss of oil check for leaks.

4. Check oil level in oiler at distributor, fill up, if necessary.
5. Check torque of cylinder head bolts by means of torque wrench, if necessary, retighten (for sequence see page 34).
6. Check valve clearance, adjust, if necessary.
7. Check tension of fan belt, tighten, if necessary.
8. Carburetor system: check tightness of all screwed pipe connections, the bolts at the covers of the starting device, the fastening nuts at the flange, the carburetor covers screws, the nozzle screws and the ball valves at the bottom of the accelerator pumps; check oil level in the shock absorbers.
9. Fuel pre-filter: Take off filter cap and rinse in washing gasoline. Clean bottom part and sealing ring. Clean only a wire-mesh element, never a paper element.
10. Clean strainer in the fuel pump.
11. Test foot brake and hand brake, adjust hand brake, if necessary.
12. Check wheel nuts, retighten, if necessary.
13. Check and correct tire pressure.

After the first 1,250 miles (2,000 km):

1. Drain off oil in engine housing (while oil is still **hot**), fill in fresh oil.
2. Check tension of fan belt, retighten, if necessary.
3. Check all nuts of intake and exhaust line for tightness.
4. Carburetor system: check tightness of all screwed pipe connections, the bolts at the covers of the starting device, the fastening nuts at the flange, the carburetor covers screws, the nozzle screws and the ball valves at the bottom of the accelerator pumps.
5. Check the gap between the breaker points of the distributor, adjust, if necessary; but do not re-file contacts.
On no account grease felt in cam bore with oil before having completed 15,000 miles (24,000 km) to avoid contamination of the breaker points.
6. Check wheel nuts, retighten, if necessary.
7. Check and correct tire pressure.
8. Check toe-in and camber – can be done only at a service station.
9. With sliding top models only: check tightness of screws at sliding top guide rails, retighten, if necessary. Check whether the guide rails are dirty and whether the grease has hardened.
10. Grease engine hood hinges, door hinges, hinges of luggage compartment lid, and securing hook of engine hood.
11. Check and grease door holders.
12. Apply talcum powder to the rubber draft excluders of doors.
13. Check door locks, retighten adjusting rings at the strikers, if necessary.
14. Check hand and foot brake for proper functioning. If necessary, adjust hand brake; if necessary, bleed foot brake – also bleed Ate-T-50 booster brake.

After the first 2,500 miles (4,000 km):

1. All regular lubrication and maintenance jobs which are due every 2,500 miles (4,000 km) (see page 25).
2. Replace paper insert of the oil filter by a new one.
3. Check toe-in and camber – can only be done at a service station.
4. Check tightness of lower wishbone mounting screws, retighten, if necessary.

Regular Lubrication and Maintenance Work

After every miles	Page	Part of car	Nature of work
) ¹	40	Tires	Check tire pressure of cold tires.
	—	Crankcase	Wipe dipstick; check oil level, replenish, if necessary, do not overfill
2,500 (4,000 km)	31	Oil filter ²	Clean wire coil
	—	Crankcase ²	Drain off oil while engine is still warm, fill in 10,5/12,5 Imp./US pts. (6 ltrs.) of oil, when simultaneously cleaning oil filter add. 0,8/Imp./US pt. (½ ltr.) ² .
	27	Front axle ³	Check gasket at drain screw, replace if necessary. Press grease into the following 22 grease nipples by means of grease gun – clean lubricators before: a) At the lower right and lower left wishbone 2 nipples each. b) At the upper right and left wishbone 1 nipple each, front, and 1 nipple each, rear. c) At the right and left steering knuckle 3 nipples each. d) At the bearing of the intermediary steering lever 1 nipple. e) At steering shock absorber 1 nipple. f) At left and right tie rod, as well as at drag link 2 nipples each
	27	Pedal linkage ³	} Press grease into the grease nipples by means of a grease gun, clean lubricators before.
	27	Rear axle ³	
	27	Drive shaft ³	Front: the grease nipple at flange, centre: grease nipple in universal joint and grease nipple in bearing, rear: grease nipple in universal joint and grease nipple at keyway (do not overgrease at keyway).
	—	Joints and supports for pedal linkage and steering column gear shift, as well as levers, cables and linkage to hand brake and carburetor	} Check and lubricate.
	—	Lines, hoses and connections for engine oil, cooling water, fuel, brake fluid and for vacuum	
	36	Clutch	} Check for tightness, worn spots and dents.
	32	Fuel pre-filter	
	32	Fuel pump	Check free travel of clutch pedal, adjust, if necessary.
	31	Fan belt	Take off filter cap and rinse in washing gasoline. Clean bottom part and sealing ring. Clean only a wire-mesh element, never a paper element.
	33	Exhaust pipe	Loosen cover locking screw by 2 turns and drain off water. Re-tighten locking screw.
	—	Exhaust manifold	Check tension, adjust, if necessary.
41	Battery ⁴	Check flange nuts at manifold for tightness.	
—	Electr. consumer points	Clean bearings of heat control valve shaft with crude oil or Caramba, and check for easy operation.	
36	Brakes	Check level and density of acid.	
27	Brake fluid container	Check for proper functioning.	
		Check foot and hand brake for proper functioning, adjust hand brake, if necessary.	
		Check fluid level, if necessary, refill fluid up to 0.39 in. (1 cm) below the rim; if much fluid is lost, check braking system for leaks.	

¹ From time to time and before every long trip.

² In city traffic and on very dusty roads every 1,250 miles (2,000 km); observe viscosity specifications.

³ On very muddy, slushy or extremely bad roads every 1,250 miles (2,000 km).

⁴ No later than once every 4 weeks.

After every miles	Page	Part of car	Nature of work
5,000 (8,000 km)	—	Front ventilation	Clean insect screens.
	31	Oil filter	Replace paper element by a new one.
	32	Air filter ¹	Clean paper element.
	33	Distributor	Check breaker points for contamination and proper gap, adjust, if necessary.
	33	Spark plugs	Clean, check electrode gap.
	34	Valves	Check clearance, adjust, if necessary; check compression ² .
	32	Fuel pump	Clean strainer in the cover.
	27	Transmission	Check oil level (up to the rim of the filler opening); if oil loss can be noticed, check for leaks.
	27	Rear axle housing ³	Check oil level ³ (up to the level of filler opening); if oil loss can be noticed, check for leaks.
	—	Wishbone	Check tightness of <i>lower</i> fastening screws, retighten, if necessary.
	38	Wheels ⁴	Rebalance ² , interchange ⁴ in accordance with scheme on page 39.
	—	Wheels	Check toe-in and camber ² .
	—	Seats	Retighten screws for the seat guide rails.
	—	Door draft excluders	Apply talcum powder to the rubber draft excluders of the doors.
27	Door hinges	Press grease into the grease nipples, retighten fastening screws.	
—	Door locks Luggage compartment lid lock, Engine hood lock	{ Check fastening screws at door locks and striker bolts, retighten, if necessary; retighten adjusting rings at striker bolts. Check plate of luggage compartment lid lock, adjust, if necessary. Slightly grease catch of hood lock and of luggage compartment lid lock, however, do not put any oil into the keyholes ⁵ . Retighten lock mounting of engine hood.	
—	Engine hood hinges, hinges of luggage compartment lid, safety hook of engine	{ Grease.	
10,000 (16,000 km)	41	Battery	Clean terminals, check for tightness and grease with acid-protective grease.
	33	Spark plugs	Replace by new ones.
	45	Water pump	Check oil level.
	34	Carburetor system	Clean and check; check injection quantity of accelerator pumps; check tightness of all screwed pipe connections, of screws at the covers of the starting device, of fastening nuts at flange, of carburetor cover screws, of nozzle screws and ball valves at the bottom of the accelerator pumps, retighten carefully and evenly, if necessary. Check oil level in shock absorbers.
	33	Intake and exhaust pipes	Check all nuts for tightness.
	—	Fuel pump	Check all fastening nuts for tightness.
	—	Shock absorbers	Check for oil leakage. Check only lower fastening nuts for tightness, retighten, if necessary.

¹ To be performed earlier if car has been operated in very dusty terrain.

² Can be done at a service station only.

³ After the „first“ 5,000 miles (8,000 km): change oil.

⁴ In extremely hot weather and with very sporty driving, this job should be performed after every 2,500 miles (4,000 km).

⁵ Some flaky graphite (Messrs. Edelgraphit-Gesellschaft mbH., Godesberg/Rh.) can, however, be applied to these locks.

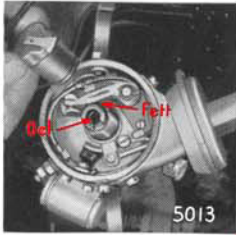
After every miles	Page	Part of car	Nature of work
10,000 (16,000 km)	—	Main muffler	Clean bores on bottom side of jacket.
	—	Nuts, screws and cotter pins of steering, engine mounting, drive shaft and rear axle housing	} Check on a pit or lifting platform and retighten, if necessary.
	27	Hand brake cables	
	27	Transmission	Lubricate grease nipple. Change oil (while it is still hot). Before draining off check oil level (up to the level of the filler opening), if oil is lost, check for leaks.
	27	Rear axle housing	Change oil (while it is still hot). Before draining off check oil level (up to the level of the filler opening), if oil is lost, check for leaks.
	27	Steering housing ¹	Check oil level ¹ .
	36	Booster braking system (Ate T 50)	Remove air filter, replace filter element by a new one.
	—	Windshield wipers ²	Grease drive shafts of linkage.
44	Headlights	Check adjustment.	
15,000 (24,000 km)	33	Distributor	Fill oiler with engine oil. Remove distributor disc and rotor; apply 3 to 4 drops of engine oil to the felt of the cam bore – Caution! Do not apply too much oil, otherwise the contacts may become soiled; slightly grease distributor cams; check grease reserve in the breaker sliding contact, if necessary, replace with Bosch grease Ft 1 v 4.
	—	Front wheel bearing	Refill grease.
	45	Cooling system	Rinse and fill with treated water.
	—	Brakes	Remove brake drums. Treat surface of linings with emery cloth. Remove any dust that has accumulated. Check drums, brake linings and dust caps of wheel cylinders.
30,000 (48,000 km)	32	Air filter ³	Replace paper element by a new one; wash housing by means of a rag that has been soaked in fuel.
	32	Fuel pre-filter	If a paper element is installed, replace by a new one.
	—	Distributor ¹	Check ¹ (special testing instructions).
	—	Generator ¹	Remove; check commutator for proper condition if necessary, turn off; clean carbon brush holder, replace carbon brushes by new ones.
	—	Clutch ¹	Check for proper functioning ¹ (special test instructions).
	—	Drive shift ¹	Check joint disc coupling.
	—	Steering spindle ¹	Check joint disc, renew, if necessary ¹ , check steering for lost motion, readjust, if necessary.
	—	Tie rods ¹	Check joints and gaskets ¹ .
	—	Brakes ¹	Check master brake cylinder and wheel brake cylinders for leaks. Check booster brake system for low pressure and leaks.
	—	Wheels	Check for external damages.
—	Blinker switch ¹	Grease notched plate and roll.	
60,000 (96,000 km)	—	Thrust rod mounting for rear axle	Renew rubber pad. In this case check step bearings for supporting struts at frame floor and the retainers, replace, if necessary.

¹ Can be done at a service station only.

² We recommend to replace the windshield wiper blades at intervals of ½ to 1 year, depending on their condition (see page 29).

³ To be performed earlier if car has been operated in very dusty terrain.

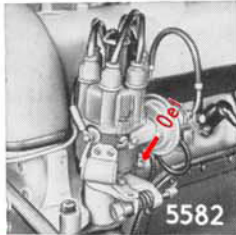
Distributor, contact breaker, point rubbing block



Fett = Grease
Oel = Oil

15000

Distributor, oiler



15000

Engine, oil filler nipple



As required

Engine, oil dipstick

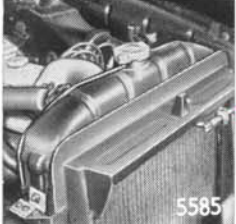


As required

Engine, water drain cock



15000



Cooling water filler nipple

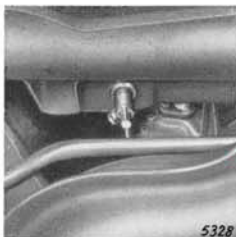
As required



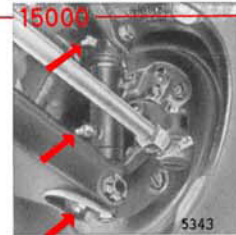
10000

Steering case - oil filler screw

15000

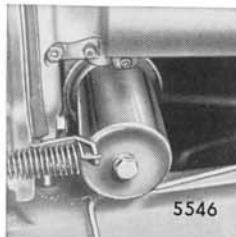


Cooling water drain cock

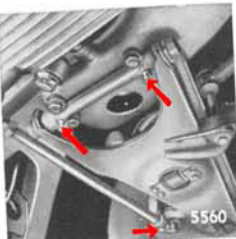


Lubrication at steering knuckle (right and left wheel)

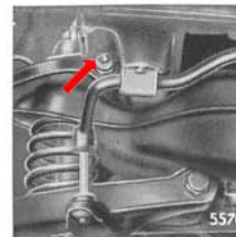
2500



Engine, oil filter



Lower wishbone, right, outer tie rod, right

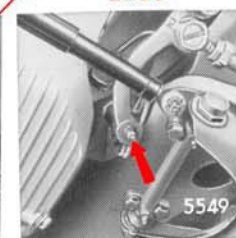


Upper wishbone, right, front

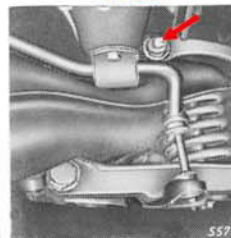
2500



Engine,



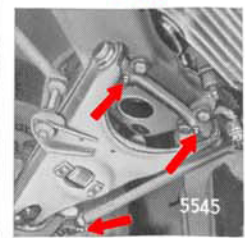
Bearing of steering intermediary lever



Upper wishbone, front, left



Front wheel bearing (left and right wheel)



Lower wishbone, left, outer tie rod, left

2500

2500

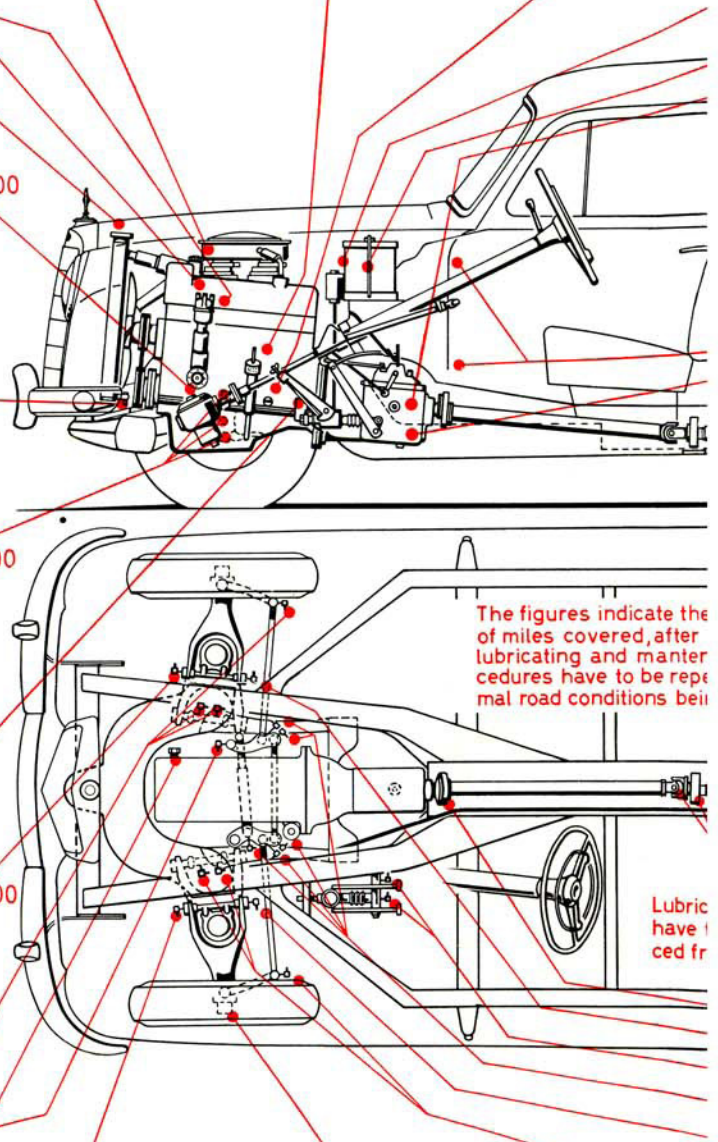
2500

15000

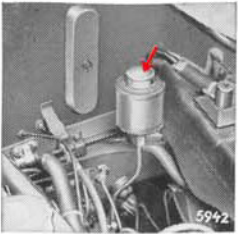
2500

The figures indicate the of miles covered, after lubricating and maintenance procedures have to be repeated under normal road conditions being

Lubrication have to be repeated from

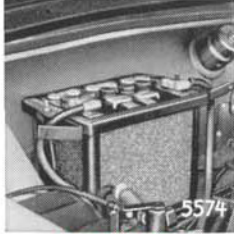


Brake fluid container



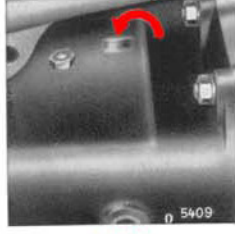
2500

Battery



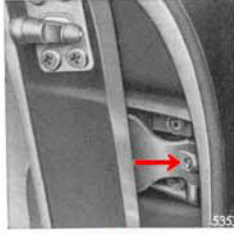
2500/10000

Transmission, oil filler screw



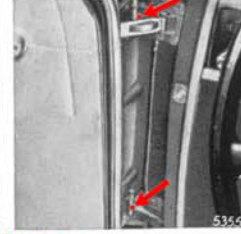
10000

Hinges at the rear doors

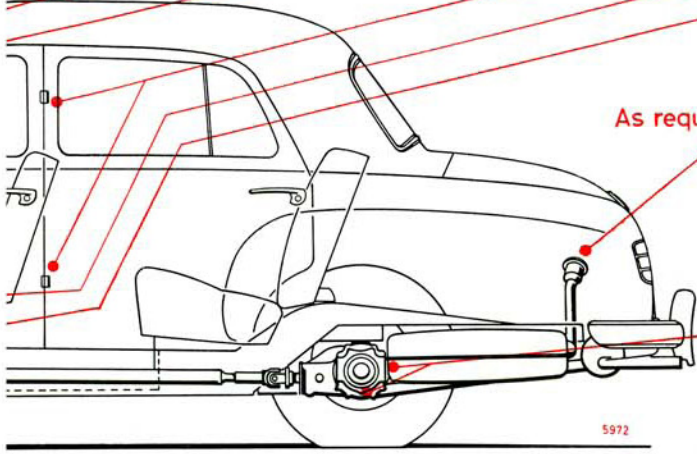


5000

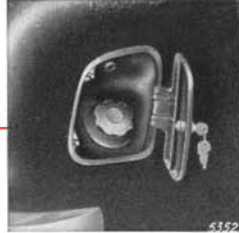
Hinges at the front doors



5000

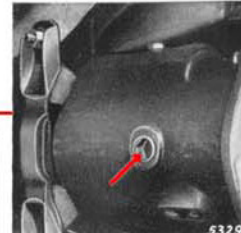


As required

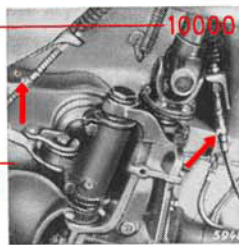


Fuel filler nipple

10000

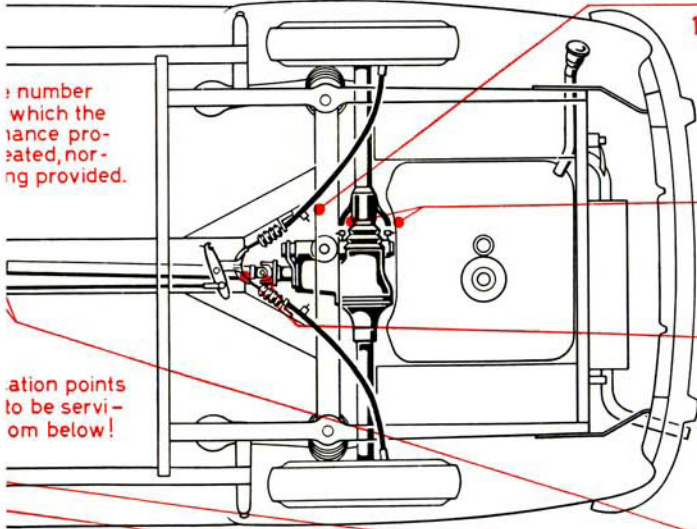


Transmission - oil drain screw



Rear axle: oil filler screw, oil drain screw

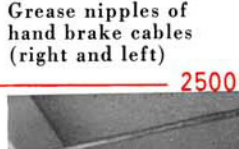
10000



number which the variance provided, nor is provided.

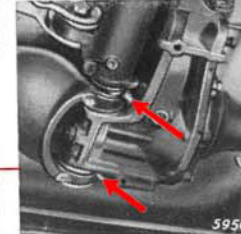
ation points to be serviom below!

10000



Grease nipples of hand brake cables (right and left)

2500

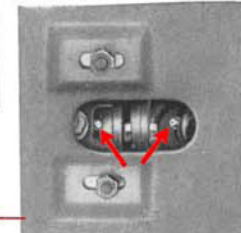


Grease nipples at rear axle



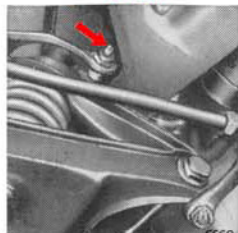
Drive shaft, rear 1 x keyway, 1 x joint

2500



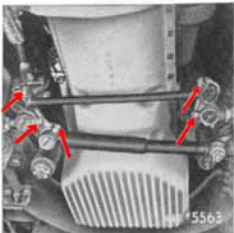
Drive shaft, center 1 x joint, 1 x bearing

2500



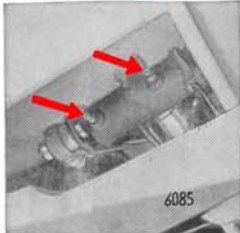
Upper wishbone, at the rear left

2500



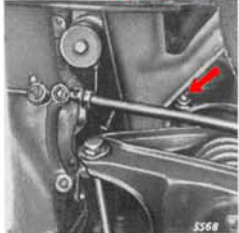
Drag link, tie rods inner, steering shock absorber

2500



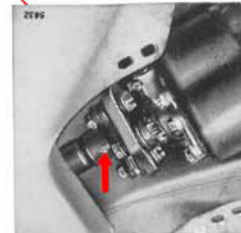
Pedal linkage

2500



Upper cross member, at the rear right

2500



Drive shaft, front

2500

Cleaning the Car and Care of the bodywork

Synthetic resin paintwork:¹

Never clean your car with anything that might leave scratches or marks on the paintwork, i. e. never use dusters, brushes, rough rags or cotton, nor any agents that are not suited for the purpose. Our service stations will gladly give you detailed information on the agents to be used and on any other questions relating to the paintwork. Should the paintwork need patching up, our service stations will do the job according to our instructions.

Regular and frequent washing is most important with regard to the paintwork, for dirt will prove harmful to it.

Never wash or polish your car in the sun, or while the engine hood is still warm.

Thoroughly wash the vehicle by spraying it with water from a hose (diffused spray) so that the hard dirt particles will get soaked and flushed away. For removing tar stains or dead insects see below.

Then wash the paintwork with a soft, clean sponge from the top downward. When doing so, rinse the sponge thoroughly several times in clean water in order to avoid scratches on the paintwork. For cleaning the chassis and the wheels by all means use a different sponge or a soft brush.

Now dry the car with a clean chamois leather so that no water stains will form.

If you want to "shampoo" your car, our service stations will be glad to inform you about the solutions to be used, all tested and approved by us. On principle, only mild products should be used, and the concentrations recommended by us must be observed. In any case, the vehicle must be rinsed thoroughly with plenty of water after it has been shampooed so that the soap will not dry onto the car. We advise you to treat the paintwork with "Mercedes-Benz-Synthetic-Resin-Polish" after shampooing.

For polishing the synthetic resin paintwork we recommend "Mercedes-Benz-Synthetic-Resin-Polish". This specially developed polish ensures careful and efficient treatment and involves very little work. By no means apply brands containing abrasive particles like nitro-polishes, standard polishes etc. They would mean less trouble, it is true, but they also would scratch the paintwork.

The purpose of the resin-polish treatment is to remove the dirt without scratches and oil particles that did not come off the surface when the car was being washed, and to preserve the paintwork. Therefore, if the resin-polish treatment is repeated fairly regularly once in 8 to 10 weeks, the lacquer will retain its gloss and resistance much longer. Light-coloured cars with metal gloss require a more frequent treatment.

After the vehicle has been washed and completely dried by means of chamois leather, and after any existing tar stains have been removed, put some polish on soft, clean cotton. With this polishing cotton treat the paintwork evenly, going over the car until it shines brightly. Now remove any polish left with clean cotton until there are no more stains on the surface of the paintwork.

In case the synthetic resin paintwork has not been regularly maintained, or if for some other reason it has lost its gloss, synthetic resin polish does, in general, no longer suffice to achieve a satisfactory gloss. In such cases, consult our service stations for other, more effective polishes.

Stains on the paintwork, as for instance, tar or oil stains, dead insects or similar things mostly do not come off merely by washing. They should be removed, however, as soon as possible as otherwise they may cause lasting damage to the paintwork.

Tar stains should only be treated with "Mercedes-Benz Tar Remover" as some of the commercial tar removers available on the market will be harmful to the paintwork.

¹ The type of paintwork is specified on a plate below the engine hood. If the car is painted with nitro (upon special request only) the maintenance instructions are different.

It is very difficult to remove dead insects from the paintwork. Therefore, try to get them off on the same day, using lukewarm water. If this is impossible, use a mild, 1-2 % non-alkali soap solution (do not use higher concentrations). After this, thoroughly rinse with plenty of water.

Car windows and windshield

It is possible to fold the windshield wipers forward so that the windshield can be easily cleaned.

The panes are cleaned best by using "Mercedes-Benz window cleaning agent" which is applied in a thin layer on the panes, and after having dried up the white film is removed by means of a soft rag. The panes can also be cleaned by means of a solution containing 1 part of "Mercedes-Benz window washing compound" and 6 parts of lukewarm water. Use a sponge, wash, and then wipe it with a soft rag. Insects and similar objects must first be soaked by means of this solution.

Should your car be equipped with a windshield washer, which is available upon special request, also use a solution of "Mercedes-Benz window washing compound" and water for filling same. The winter mixing ratio is 1 : 6, during the other seasons it is 1 : 12. Always keep closely to these ratios. If you use a larger amount of the washing compound it will harm the paintwork!

Up to 15.8° F (—9° C) the winter solution (1 : 6) will not freeze. If, however, the car is to be parked in the open air for a long space of time at temperatures below 15.8° F (—9° C), the container of the windshield washer must be emptied.

When washing the window panes also clean the windshield wiper blades from the dirt and sand that has accumulated along the rubber by means of a clean rag, or, if necessary, with soapy water or alcohol.

Moreover, we advise you to replace the windshield wiper blades by new ones once or twice a year. When removing the blades, move the small lever that protrudes from the support of the blade below the mounting point in the direction of the arrow that is stamped into the support. Now the blades can easily be removed from the wiper arms. Thoroughly clean the mounting point. After having pushed the small lever back into the direction of the arrow again (see above), the new wiper can be connected with the wiper arm.

Chromium-plated and light metal parts. All chromium-plated and light metal parts must be rubbed dry after they have been cleaned with water and a sponge. Tar stains should be removed with the above-mentioned "Mercedes-Benz Tar Remover"; by no means use any sharp-edged tools – knives or the like. Then a thin layer of the Mercedes-Benz chromium preservative "Mercedes-Brillant" is to be applied to the parts with a soft cotton rag. Allow the compound to dry for a short time, and then polish the parts with a clean part of the rag. Particularly in winter this treatment should be repeated thoroughly every time the car has been washed. There is only little expense involved, and the results you achieve will be excellent.

Under severe conditions, particularly during the winter months, when there is snow and the streets are strewn with gravel and salt, we advise you to treat the chromium-plated parts with a chrome preservative paste which offers still more protection on account of its higher wax content. The paste is to be applied with polishing cotton and spread evenly. Before doing so, clean the chrome parts from snow and salt water by washing them with warm water. After the paste has been allowed to dry for a short while, polish to high gloss by means of clean cotton.

Upholstery and canvas tops

The upholstery and tops should only be cleaned with a brush that is not too stiff. Oil and grease stains should only be removed by means of "Mercedes-Benz Stain Remover", but not with just any kind of cleaning agent, because otherwise ugly marks will be produced.

There is no universal solvent which you might resort to when trying to remove stains. It has to be decided in the particular instances which agent is most suitable. In most cases it will suffice to rub the upholstery – after it has been brushed – with diluted

liquid ammonia (use 1 part of commercial liquid ammonia for 3–4 parts of water). When rubbing, use a piece of gauze, soft muslin or something similar, which should be damp, but not wet. Then let the upholstery get dry. Sugar and ink stains come off by using warm water, oil paint and resinous substances can be removed with a little turpentine. Rust stains are treated with a diluted solution of citric acid. Always finish treatment by rubbing the material with diluted liquid ammonia.

On principle, it is recommended to contact one of our service stations in due time for removing stains

Leather covers can be cleaned with a soft hand brush or a cloth moistened in a soft soap solution. Care should be taken that the leather upholstery is allowed to dry well, and that no water will penetrate through the seams, otherwise the leather will not dry fast enough. Coarse soap and hard brushes are not suitable. The soap solution is removed with clean water. Use a rag for drying the upholstery. Then the leather is treated with “Mercedes-Benz-Karneol” in accordance with the instructions, and care must be taken that no visible residues are left in the grains of the leather after the treatment.

The artificial leather, welts and Covertex sliding tops should be well brushed with water to which a washing compound (soap, REI, Fewa etc.) has been added or they should be cleaned with Tuba dry cleaning agent.

Organic solvents (like stain or tar removers, and diluting agents etc.) should not be used.

Steering wheel, lamps and rubber parts

If possible, do not touch white steering wheels with gloves that are not colorfast. Moreover, do not use any colored plastic steering wheel covers for white steering wheels. Steering wheels, no matter what colour they are, as well as plastic fittings on lamps, also rubber parts and welts are to be cleaned with normal soap solution only. By no means use organic solvents (like gasoline, stain removers, or diluting agents). For patching up the instrument panel and the wooden ornamental mouldings use “Mercedes-Benz-Kunstharz-Polish” which is to be applied by means of a soft rag. This will not help you, though, to remove scratches. Should there be any scratches, please contact a service station to remove them.

How to use the sliding top (Sunshine roof)

In the garage the top should always be kept closed.

Opening the top:

Turn the locking lever by 180° towards left and push the top backwards.

Partial opening of top:

When turning the locking lever by 180° towards right to locking position, the top can be kept in any desired position.

If – for ventilation of the vehicle. – only a small gap should be left open or if the top should be kept in half-open position, at first push top back completely, then pull front bow forward as far as desired. Thus the folds are always in the back, in this way unpleasant drafts are avoided.

Closing of top:

Turn locking lever again towards left by 180°, pull the top right towards front, until the locking hook engages in the opening provided for this purpose, then turn locking lever by 180° towards right.

Care of top:

At all times the top must only be cleaned with water.

If it is difficult to move the top, the guide rails should be cleaned and the leather guides running in the rails should be slightly greased with a non-resinous oil, e. g. with sewing machine oil or bone oil.

To open the engine hood: Pull grip for hood lock beneath instrument panel. The radiator grille which is tightly connected with the engine hood will then open as far as to the stop of a safety hook which is at the lower left behind the radiator grille (in driving direction).

Reach right and left at the bottom of the radiator through the air intake openings behind the radiator grille, pull the safety hook forward on the left (in driving direction) and lift radiator grille.

To close the engine hood: Press down radiator grille firmly.

Points for particular attention:

Engine:

To check the fan belt: If it shows worn spots, replace it by a new one. Mount it as described below. Caution! Do not try to force it on with a screwdriver or a similar tool.

The belt should neither be too loose nor too tight. Therefore, the tension of the belt should be checked regularly: The distance A, by which the belt can be deflected if moderately pressed with your thumb on the generator side, should be at least 0.2 in. (5 mm) and not more than 0.4 in. (10 mm).

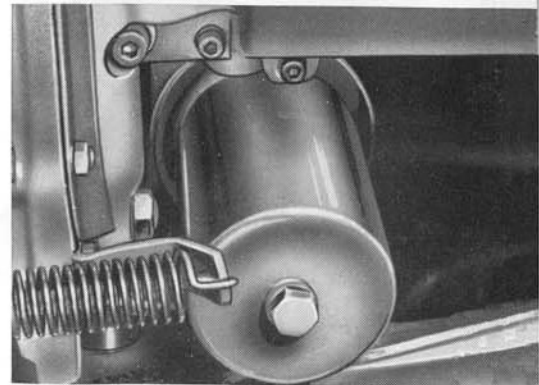
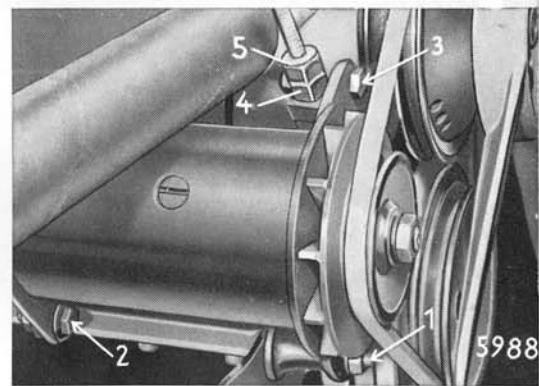
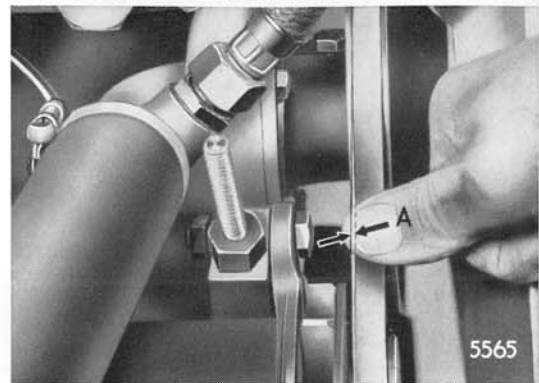
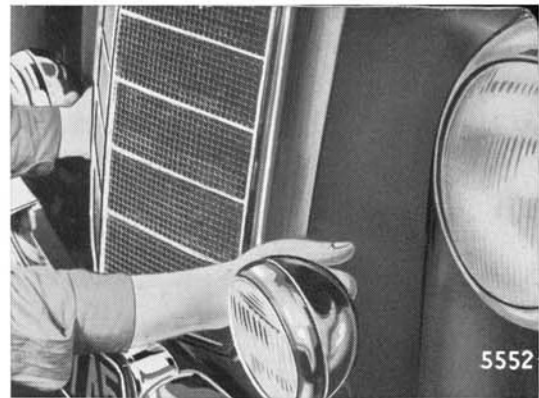
To readjust: Loosen the front (1) and the rear (2) setscrew at the generator support underneath the generator, and the setscrew (3) on top beside the adjusting nut; unscrew the adjusting nuts (4,5) with a wrench until the proper tension of the belt is obtained. Tighten screws (1-3) again.

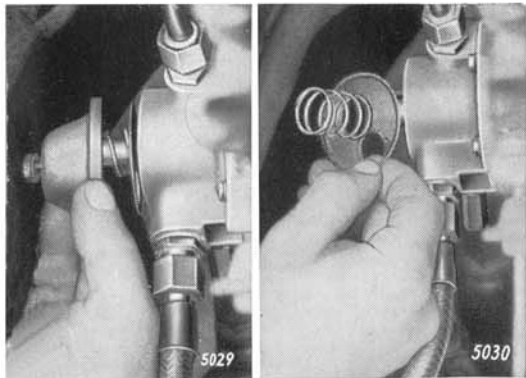
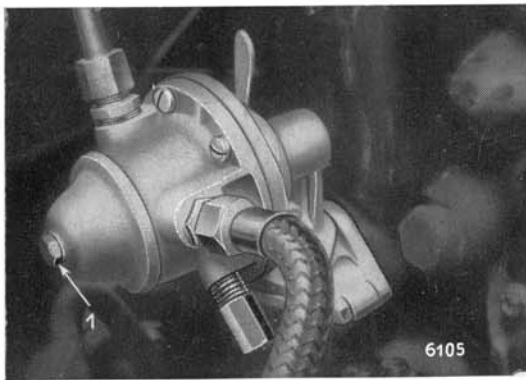
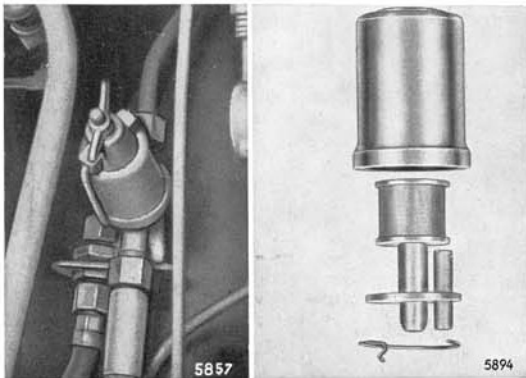
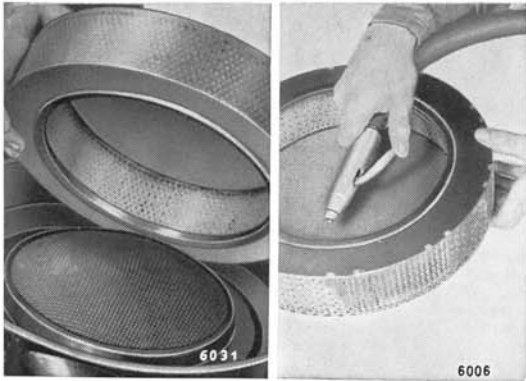
When fitting a new belt proceed in the same manner, however, the adjusting nuts should be screwed in completely.

To clean the oil filter: Unscrew the fastening screw at the bottom of the filter housing from below, at the same time keep the filter housing in a vertical position with one hand and remove it. Caution! The housing is filled with oil. Do not mislay the gasket under the hexagonal head of the fastening screw.

The filter housing cover remains at the engine. After removing the filter housing should be turned over and emptied. Then the oil filter can be taken apart: to do this, unscrew hexagonal nut, remove clamping cover and both filter elements, clean housing. Clean wire coil in clean washing gasoline with a soft brush – no wire brush – outside and inside. The paper insert cannot be cleaned, it should be replaced by a new one after 5,000 miles (8,000 km). If no new paper insert is available at the moment, you can drive without one for a while. The cleaning effect will, however, be impaired.

Assembly: Replace wire coil, paper insert, clamping cover – with centering collar towards top, and gasket towards bottom in the housing. Tighten hexagonal nut on the clamp cover. The filter housing now can be mounted to the engine from be-





low. Caution! Do not forget the gasket under the hex. fastening screw and do not tighten it too much.

Normally the element of the air filter should be cleaned after every 5,000 miles (8,000 km): loosen clamps of upper filter part, remove upper part of filter and take off element. Clean element by slightly tapping it on a table, and blow it through with compressed air – but only from inside towards outside – with weak pressure. Then wipe the filter housing. Caution! Dust and dirt in the filter housing must not enter into the carburetor opening and never in the inner side of the element. Make sure that the gaskets are correctly placed! After 30,000 miles (48,000 km) covered the element should be replaced by a new one. If your car has been operated constantly in very dusty terrain, the replacement of the filter element, the tapping and blowing through should be effected earlier.

Cleaning the fuel prefilter: loosen the knurled screw, fold down clamp, remove upper part. Two types of strainers can be installed:

Either a metal strainer is firmly situated in the upper part (Fig. 5894): in this case slightly depress snap ring at the bottom of the upper part and remove it, pull out strainer;

or a paper element is loosely situated in the upper part.

The metal strainer should be cleaned in washing gasoline every 2,500 miles (4,000 km) by means of a brush, never use a wire brush.

The paper element should not be cleaned, but must be replaced by a new one after 30,000 miles (48,000 km) have been covered.

In both cases clean gasket in the lower part and the lower part itself, and check for proper condition. When reassembling put on clamp vertically and firmly tighten the knurled screw .

The water drain screw (1) at the fuel pump should be loosened by two turns and the water drained off. Firmly tighten the screw again.

To clean filter in fuel pump: Unscrew retaining screw of pump cover, remove cover, take out strainer, and wash it in fuel. Clean separating chamber by spraying it with fuel or by wiping it with a clean rag soaked in fuel. Replace the strainer in the bore, make sure that the gaskets are in perfect condition. Firmly tighten retaining screw so that the pump cannot suck in additional air.

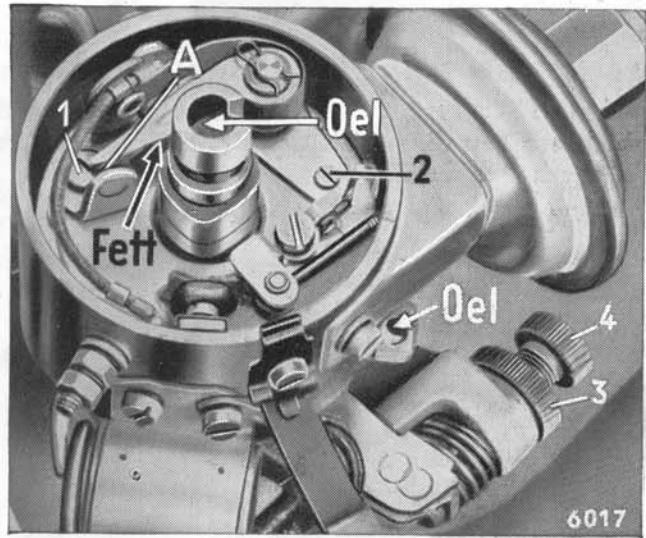
Every time the carburetor or fuel pipes have been emptied or the tank has been driven empty, push down hand lever at the fuel pump 10-12

times. A slight resistance of the lever should be perceptible and the noise made by taking in fuel and injecting it into the carburetor should be heard; the injection noise stops as soon as the carburetor is full. If no resistance is felt, and no intake or injection noise heard, which may happen at a certain position of the crankshaft, actuate the starter motor for a short while to change the position of the crankshaft so that the hand primer will operate.

Distributor

The distributor is lubricated with engine oil at the oiler which is fitted with a turnable cover. The oil level in the oiler should be checked after the "first" 300 miles (500 km) and every 15,000 miles (24,000 km) the oiler should be replenished with the engine oil in use.

Release clamp at distributor cap, take off distributor cap. Make sure that the breaker contacts are free from grease, clean them, if necessary. Any deposits at the contact points which are higher than 0.02 in. (0.5 mm) should be removed by means of a corundum file, never use emery paper for this purpose. Then clean the contact points of any filings. Make sure that the gap is 0.014 in. (0.35 mm): turn the crankshaft until the point rubbing block of the breaker arm is resting on the center of a breaker cam – this is done best by jacking up the rear wheel and turning the wheel after having engaged the 4th gear. At this point the breaker contact gap is at its maximum (A). The gap is correct, if a feeler gauge of 0.014 in (0.35 mm) thickness can slip through between the breaker contacts. To adjust the gap loosen setscrew (1) below the breaker contact and turn adjusting screw (2) at the other end of the angular piece until the correct distance is obtained. The gap becomes wider by turning to the left and narrower by turning to the right. Tighten setscrew (1) and check gap. The contacts must be free of oil, grease and dirt. Turn the engine (see above) until the contacts are closed. As a final check lift breaker arm with a small piece of wood while the ignition is switched on. If a spark appears, condenser and contact are in good order. If there is no spark, the condenser or the ignition coil are defective and should be repaired only at a service station.



Inside the cam where the rotor is situated there is a piece of felt soaked in oil; apply 3–4 drops of oil to it after every 15,000 miles (24,000 km). Do not apply too much!

Furthermore, it should be checked every 15,000 miles (24,000 km) whether there is still a grease reserve at the breaker point rubbing block, if necessary, refill with Bosch grease Ft 1 v 4 by means of a spatula 0.2 in. (5 mm) wide. The distributor cams should be slightly greased at the same time.

Be careful not to get any grease or oil on the breaker contacts.

The ignition timing can be adjusted within certain limits after loosening the setscrew (3) at the thumb screw (4):

Turning the thumb screw (4) in clockwise direction: retarded ignition, turning in counterclockwise direction: advanced ignition. Do not forget to retighten setscrew (3).

By the factory the engine is set to the most advantageous performance using a premium fuel of 93–95 octane rating according to the Research Method (ROZ). This setting corresponds to a completely advanced ignition. Setting the engine to retarded ignition will therefore only be necessary, if the fuel available does not correspond to the required minimum octane rating (see page 12) or if a "pinking" of the engine can be noticed. As soon as possible set the engine back to completely advanced ignition.

To test the spark plugs:

These should only be unscrewed with a special wrench. Clean dirty plugs with a brush and a rag soaked in gasoline, blow out. Check electrode gap with a plug gauge (normal plugs $0.027^{+0.004}$ in. [$0.7^{+0.1}$ mm], resistor plugs $0.035^{+0.004}$ in. [$0.9^{+0.1}$ mm]). Any adjustment should be made by bending the outer ground electrode only, never the center electrode. Defective plugs should be replaced. The spark plugs should be replaced by new ones every 10,000 miles (16,000 km).

Exhaust and intake pipes: Check to see that all nuts especially the flange nuts at the exhaust manifold are tight. Defective gaskets can be recognized:

a) in the exhaust pipe: by blowoff; b) in the intake pipe: by unsatisfactory idling.

After the first 300 miles (500 km) have been covered check the **torque** of the **cylinder head bolts** by means of a torque wrench and retighten them, if necessary (in the order shown opposite). Basis rule for the permissible tightening torque: 58 ft.lbs. (8 mkg) should not be exceeded with cold engine and 65 ft.lbs. (9 mkg) with warm engine.

Due to design features special measures should be adhered to when assembling the cylinder head and the cylinder head

gasket. Therefore, these jobs should only be carried out at one of our service stations, which are familiar with the necessary measures.

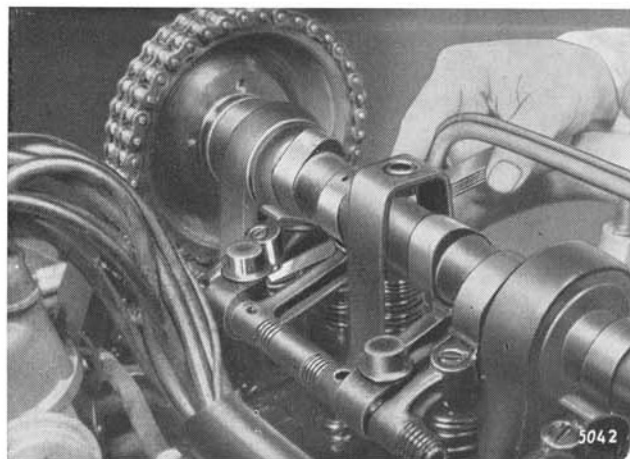
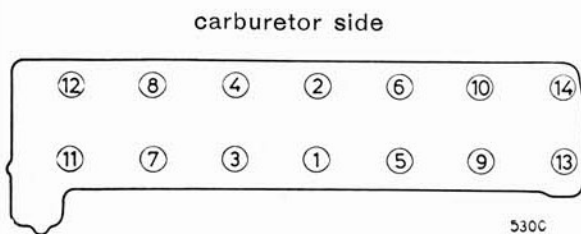
To check the valve clearance: The clearance between valve stem and adjusting screw

should be 0.005 in. (0.12 mm) at the intake valve and 0.008 in. (0.20 mm) at the exhaust valve **when the engine is cold**. After loosening and removing of the three thumb screws at the cylinder head cover the adjusting screws are accessible. The clearance of a valve can only be checked if the respective cam no longer presses on the rocker arm so that the valve is completely shut. If necessary, this position of the cam can be obtained by jacking up a rear wheel and turning it with 4th gear engaged.

Gauges of corresponding thickness (see above) should be used for measuring the valve clearance.

If the gauge will just slip between the valve stem and the adjusting screw, the clearance is correct.

When refitting the cylinder head cover make sure that the gasket is in good condition. You are recommended to have the valve clearance adjusted at a service station only. The carburetor system consists of two single carburetors which are designed as so-called "two-stage" or "compound" carburetors. Each of these two-stage carburetors has 2 separate intake ducts, so-called "stages", which are closed each by a separate throttle valve. The throttle valves are connected with each other by a linkage. As soon as the accelerator pedal is actuated the throttle of the first stage opens, and when it is somewhat more than half opened, the throttle of the second stage begins to open. In the second stage there is still an additional throttle below the throttle valve – the eccentrically mounted vacuum throttle. A counterweight which is fitted to it ensures that it only opens when a correspondingly high engine speed has been reached as a result of the accelerator pedal being completely depressed. Only then the formation of the fuel-air mixture in the second stage can start. With this arrangement the largest possible Venturi tubes can be used for the top performance in the second stage without impairing the performance in the lower speed ranges.



Position of the jets in each carburetor:

Since there are two intake ducts, there are also two main jets and two air correcting jets in each single carburetor. On the other hand, you will find the idling jet, the pump jet and the starter jet in the first stage only. The opposite photos indicate the position of the individual jets. Access to the air correcting jets can be achieved by removing the air filter and the carburetor cover.

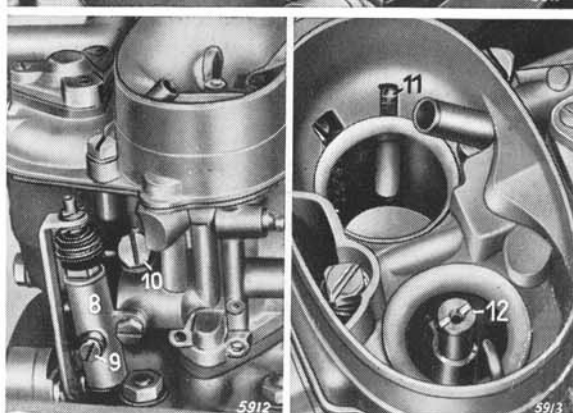
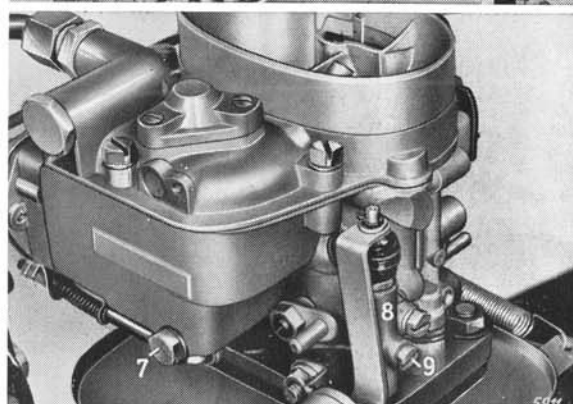
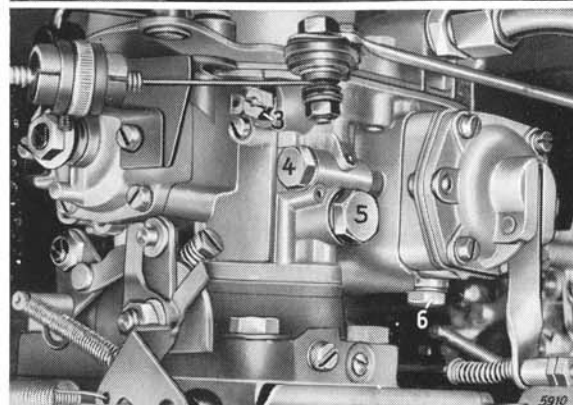
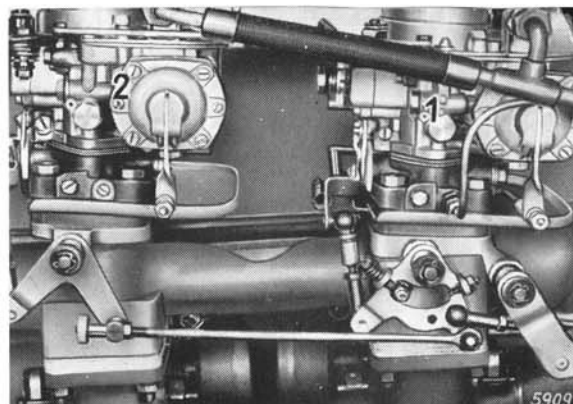
Absolutely clean fuel, and complete tightness as well as the timing specified by the factory constitute the basic conditions for satisfactory operation of the carburetor system. Any trouble which may occur will probably be due to the jets clogging as a result of dirt in the fuel, to there being water in the float chamber or to there being leaks at the connections of fiber gaskets.

Therefore, if there is any trouble, the jets, in particular the idling fuel jet and the starter jet should be cleaned first of all. This should only be done by blowing through – a metal object, needle or something similar should never be used. After the pump check valves (6) have been unscrewed, dirt and water can be drained out of the float chambers. Tighten connections and check gaskets. At each individual carburetor there is a shock absorber (8), the oil level of which should be checked for the first time after 300 miles (500 km), and then every 10,000 miles (16,000 km). If necessary, oil should be refilled on the occasion of such checks.

When refilling, proceed as follows:

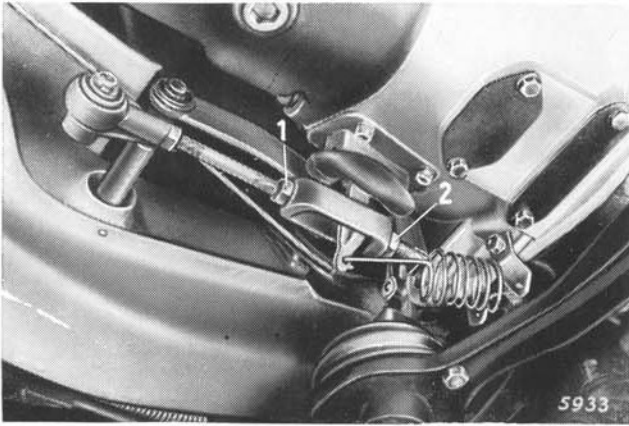
1. Remove slotted screw (9) with gasket.
2. Inject, by means of a suitable injection-type can, engine oil SAE 10 W into the filler bore until the oil overflows.
3. Put back screw (9) or close bore by placing a finger on it.
4. Move plunger rod of shock absorber up and down until, when making the upward move, a resistance is clearly perceptible. This means that the space below the plunger has been bled.
5. Open filler bore again, and again inject oil until it overflows. The total filling capacity is about 0.07 cu. in. (1.2 ccm).
6. Put back screw (9) and screw it in together with its gasket. Now the absorbing effect should be perceptible almost to the end of the stroke.

Any other remedies with regard to the carburetor, in particular adjustments at the linkage, or removal, should be effected only in one of our service workshops.



- 1 Front single carburetor
- 2 Rear single carburetor
- 3 Idling fuel jet
- 4 Pump jet
- 5 Main jet, stage I
- 6 Pump check valve
- 7 Starter jet
- 8 Shock absorber
- 9 Shock absorber filler screw
- 10 Main jet, stage II
- 11 Air correcting jet, stage II
- 12 Air correcting jet, stage I

} at rear carburetor



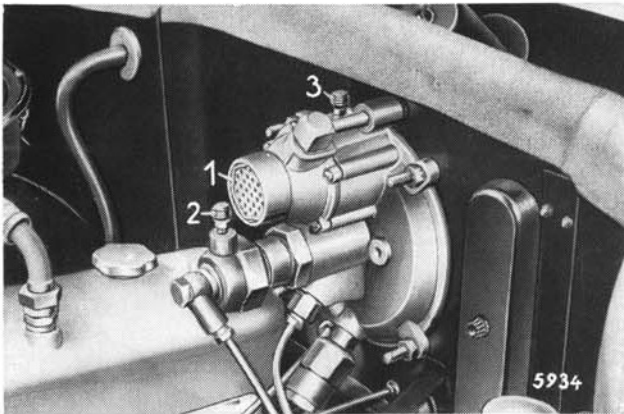
Clutch

For cars equipped with a hydraulic automatic clutch (Hydrak) the special "Hydrak" maintenance instructions should be observed.

To check free travel of the clutch pedal: The free travel of the clutch pedal should be $63/64$ in. (25 mm) measured at the upper edge of the foot plate before pressure is felt. To do this, loosen the lock nut (1) from below, give the adjusting screw (2) a few turns until the clutch rod is long enough to permit a free travel of $63/64$ in. (25 mm). If the clutch cannot be adjusted any more, take your car to a service station.

Brakes

We urgently advise you to have all brake jobs done only in one of our service stations. The hydraulically operated foot brake which simultaneously acts on all four wheels will be additionally equipped with the Ate T 50 booster brake.



This relieves the driver by providing part of the braking force. The T 50 booster brake is a hydraulic braking device that takes advantage of the difference in pressure between the vacuum created in the intake manifold of the engine and the atmospheric pressure. This difference provides a source of energy for the booster brake. The latter intensifies the braking pressure created in the master brake cylinder by the driver's foot pressure and transmits this boosted pressure to the wheel brake cylinders. If the vacuum fails, it is nevertheless possible to brake the car although a considerably stronger foot pressure is then required.

The filter element of the booster brake should be replaced every 10,000 miles (16,000 km) by a new one. After removing the outer snap ring (1) the strainer disc and the filter element can be removed. After every 30,000 miles (48,000 km) the booster brake should be checked for leaks with regard to all pipe and screw connection points. This is best done in a service workshop. Moreover, please check whether the vacuum pipe at the air intake manifold and at the check valve is leaking. The vacuum pipe should never be contracted or clogged. When bleeding the braking system, also bleed the T 50 booster brake at the two bleeder screws (2 and 3).

The reservoir of the master brake cylinder should always be three quarters full. If a great loss of brake fluid can be noticed, there must be a leakage in the braking system. Check all lines and connections for leaks. Use only the **original brake fluid ATE** or **Lockheed brake fluid**. Caution! Brake fluid corrodes and damages the paintwork and should not get into touch with the brake linings!

Never clean the rubber parts of the braking system with gasoline.

When checking the brakes before starting to drive, resistance must make itself felt at the foot brake lever after the pedal has been normally depressed. Should this not be the case, then proceed as described on page 50.

To bleed the braking system

Special tools required: 1 bleeder hose, 1 glass jar.

1. The brake fluid container should be constantly refilled while the brakes are being bled (see point 6).
2. At a front wheel: pull off rubber cap at the bleeding screw of the wheel brake cylinder and connect bleeding hose to the nipple, which is now exposed.
3. Slide wrench over the bleeding hose and place it on the bleeder screw.
4. Place the other end of the bleeder hose into the glass jar and fill the latter with enough brake fluid to cover the end of the hose.
5. Give the bleeder screw a few turns, but do not screw it right out.
6. Push the brake pedal down and release it slowly until no more bubbles appear in the glass jar. Caution! Do not allow the fluid level to sink, as otherwise fresh air will get into the lines.
7. When pushing the brake pedal down for the last time, keep it down until the bleeder screw has been tightened. Only then the brake pedal should be released.
8. Detach bleeder hose from nipple and replace rubber cap .
9. Proceed in the same manner on the other wheels and at the Ate T 50 booster brake.
10. Replenish main container and close it.

To adjust the brakes

Foot brake: automatic adjustment, no outside control.

If the brake drums have been taken off, the brake shoes should be pushed inwards over the automatic adjustment device before replacing the drums. After this has been done, check whether the shoes have full clearance within the readjusting device by lightly lifting the brake shoes (by means of a large screw driver). After the drums and the wheels have been remounted the brake pedal must be pushed down firmly several times before the car is driven, in order to bring the brake shoes into correct position.

Hand brake: Turn the adjusting nut at the hand brake lever to the right. Only adjust so far that it is still possible to easily rotate the rear wheels when the hand brake is released. The hand brake shall start being effective when the hand brake lever is pulled out up to the 3rd or 4th notch.

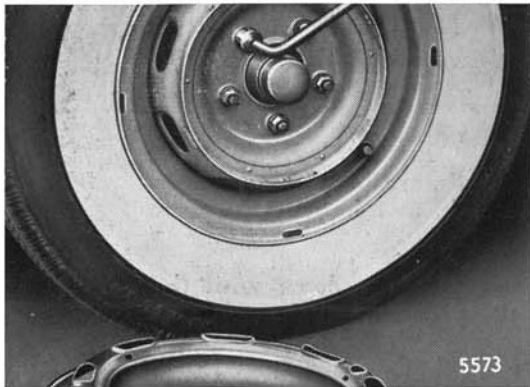
Final check-up: When the brakes are released and the car is coasting, it should come to a standstill without any jolts. The brake drums should not be found to have warmed noticeably if they are felt after you have driven for several miles without using the brakes.

If the linings are badly worn and adjustment at the nut is insufficient, it can be improved by advancing the cable guide disc at the compensating lever by relocating the retaining bolt. After having renewed the brake shoes the displaced cable guide disc must be put back to its original position. If possible, this should be done in a service workshop.

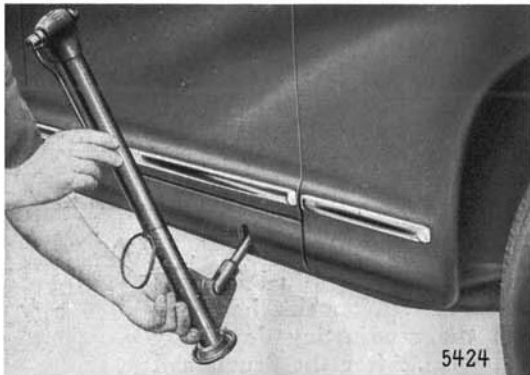
At the flexible casings of the hand brake cables one grease nipple each is provided. After every 10,000 miles (16,000 km) a small quantity of grease should be pressed into these nipples. Caution! Be careful not to overgrease, because otherwise the grease will get at the brake shoes.



5743



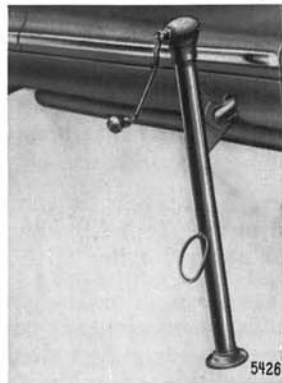
5573



5424



5425



5426



5514

Lubrication of front wheel bearings:

Take off the ornamental cover with the flat end of the wheel nut wrench and pull off the hub cap which has thus been exposed (special tool). Fill hub cap with grease and reinstall it. The grease will thus be pressed into the ball bearings. Reinstall hub cap and ornamental cap.

Lubrication of the rear wheel bearings is effected by a grease reserve which should only be replenished when carrying out repairs at the rear axle.

To change wheels:

The spare wheel, lifting jack and a wrench which can be used for removing the ornamental cap are housed in the luggage compartment. Before changing the wheels apply the hand brake. If possible the wheels should be changed while the car is placed on level ground. On upgrades the car should be secured by blocks. Take off ornamental cap with the flat end of the wheel nut wrench. Loosen wheel nuts, but do not take them off.

Place the jack into the respective support beside each wheel in such a way that the spring-loaded pin rests on the lower projection of the lifting jack; the lifting jack should be inclined towards the outside, it should on no account be in a vertical position, as the upper end might damage the body when it is lifted. Jack the car up until the wheel turns freely. Remove wheel nuts and pull off wheel. Put on new wheel with the mounting fork which you will find among the tools:

Push the mounting fork through the two upper securing holes of the wheel and slip it over the bolts at the brake drum; keep your foot at the wheel which you lift into place with the mounting fork.

Screw on all wheel nuts but do not tighten them completely. Lower the jack. Tighten wheel nuts crosswise until all of them are tightened. Correct tire pressure (see page 40). Have damaged tires repaired as soon as possible.

To balance the wheels:

An uneven distribution of material and weight in a rotating body - wheel and tire - is known as unbalance. Excessive unbalance at the wheels may at a speed of over 50 mph. (80 km/h) cause steering difficulties, vibration of the body and jumping of the wheels even on smooth roads. Tire wear, too, is increased and will become unequal.

After a new tire has been mounted or a tire which has become flat through a defective tube or valve, the wheel should be rebalanced. Tire wear may also gradually cause unbalance of the wheels. Therefore, the wheels should be rebalanced at least every 5,000 miles (8,000 km). See also "Interchanging of wheels".

The static balancing method which is usually applied is in general insufficient for top speeds – the wheels should be balanced dynamically. The special balancing weights should be fastened in the slots provided for this purpose at both sides of the wheel flange; it is not advisable to wedge the standard balancing weights between wheel flange and tire, as they will not stay in place at high speeds.

We urgently recommend having the wheels balanced at a service station only.

To interchange the wheels:

In order to ensure that the tires are evenly worn, and to raise their longevity as much as possible, we urgently advise you to have the tires interchanged at least every 5,000 miles (8,000 km) according to the scheme as shown. If the weather is extremely hot or in case of very sporty driving the wheels should be interchanged and rebalanced every 2,500 miles (4,000 km).

Tires

The high speeds of Type 220 S will severely strain the tires and not all makes on the market will prove adequate to this strain. We therefore urgently recommend consulting our Service Stations about the tire brands tested and approved by us.

To change a tire

To remove a tire from the rim, use only a tire iron never a sharp-edged one and do not apply force. If the tube is to be exchanged, the size of the new tube must match the tire.

Place the slightly inflated tube into the tire in such a way that the valve lies beside the red dot on the tire which indicates the lightest part of the tire. Before inflating check the position of the beading. Inflate to the required pressure (see page 40). After the tube has been exchanged the wheel should be rebalanced (see above).

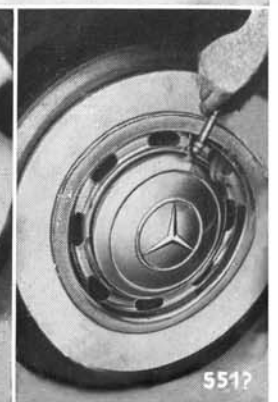
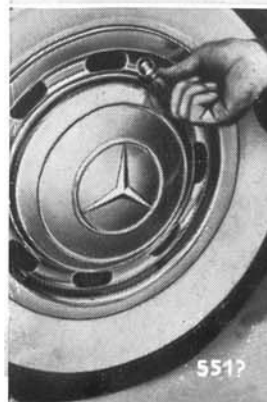
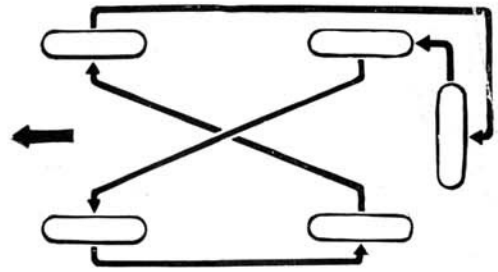
Tire pressure:

Make sure that the correct tire pressure is maintained!

This is decisive for the driving safety, the long life of the tire and the comfort.

Too low a pressure will increase tire wear and result in bad cornering, too high a pressure will impair the springs and cause severe strains of the body on bad roads.

When driving the temperature of the tires and consequently the tire pressure will rise. The increase in pressure depends on the driving speed and the load.



Therefore, if the tire pressure is found to be higher when checked after a long trip while the tires are still hot, it should on no account be decreased to the pressure specified for cold tires. On the contrary: if the tires have to be inflated on a long tour, i. e. while tires are hot, the pressure should be higher than with cold tires. See the following table:

	Cold tires	after prolonged city-driving or a long-distance trip	after a fast long-distance trip
Front wheels	22 psi (1.6 kg/cm ²)	25 psi (1.8 kg/cm ²)	27 psi (1.9 kg/cm ²)
Rear wheels and spare wheel	24 psi (1.7 kg/cm ²)	28 psi (2.0 kg/cm ²)	30 psi (2.1 kg/cm ²)

During a short trip at medium speed, e. g. from the garage to the tire inflating station, the tire temperature does practically not rise at all. In this case the pressure specified for cold tires will apply.

If after a long trip the tire temperature cannot be ascertained, we recommend adhering to the highest pressure specified and to correct it as soon as the tires are cold again.

If the car is driven exclusively on **super highways** over long distances at high speeds, we recommend increasing the tire pressure to the following values:

	Cold tires	after a fast trip on super highways	
Front wheels	27 psi (1.9 kg/cm ²)	33 psi (2.3 kg/cm ²)	only for continuous operation on super highways
Rear wheels	28 psi (2.0 kg/cm ²)	34 psi (2.4 kg/cm ²)	

The tire pressure should be checked before every long trip, at least, however, once a week.

As the pocket pressure gauges which are usually available are not always in good condition, the tire pressure should be measured only with a precision pressure gauge. This instrument should be checked from time to time at one of our service stations.

If the tire pressure drops by more than 3 psi (0.2 kg/cm²) within a week the valve or the tube is leaking and should be repaired as quickly as possible. Experience has shown that nails in the tire do not cause the air to escape immediately, but will cause only a slow dropping of the pressure. On a long trip the damage is increased by the fast motion of the tire until it is suddenly flat.

Deformation of the tire on the road is higher with low tire pressure than with normal pressure. Even the less experienced driver will, after some practice, notice a difference if he examines the tires carefully. Therefore, before every trip, just give them a quick glance.

Tire wear

As tire wear mainly depends on the manner of driving, every driver is personally responsible for the service life of the tires of his car:

Sharp cornering, sudden braking and starting will increase the tire wear considerably, whereas the tires are not noticeably affected with fast driving straight ahead, e. g. on super highways. In this connection, please refer to the hints for economic driving on page 4.

In summer tire wear is naturally higher than in winter, due to the fact, that the resistance of rubber is higher when cold.

Rough roads wear off the tires quicker than smooth roads.

One and the same tire cannot be skid-proof to a high degree and highly resistant to wear. Always keep in mind that highly skid-proof tires are subject to greater wear.

Premature and uneven tire wear may have the following causes:

1. Tire pressure too low. This is shown by greater wear at the sides of the tread than in the middle.
2. Unsuitable tires: Our Customer Service Stations will gladly advise you on the most suitable make of tires under the given circumstances.
3. Faulty toe-in at the front axle. This is the case if the tire is worn off prematurely yet evenly along the circumference. In extreme cases there will be saw-tooth-shaped patches across the tire.

The toe-in is correct if the distance between the two front wheels, measured at the edge of the rim at axle height, is 0-5/64 in. (0-2 mm) smaller at the front than in the rear with unloaded vehicle. To compensate for any possible bend in the rim, the average of two measurements should be taken, the second measurement being made after the wheel has been turned by 180°.

4. Unbalance. For balancing see page 38.
5. Defective shock absorbers.
6. Brakes grip unevenly.
7. Faulty camber of front wheels or bent rim or axle caused by running into something. The defects mentioned under 3 to 7 can be checked and fixed only at a service station.

Care of tires:

Check the tires as often as possible and remove any foreign bodies that have penetrated into the tire. The best time to carry out this inspection is when the wheels are being interchanged. All cuts and damages to the rubber should be put right by an expert.

The resistance to skidding of worn tires can be increased by re-soling (slight retreading crosswise).

If the car has been driven over long distances at high speed, we will not recommend to have worn tires completely retreaded as the carcass itself is worn by fast driving. If, however, the car has only been driven moderately, the tires may be retreaded by a reliable firm; after that the car may only be driven up to a maximum speed of 80 m.p.h. (130 km/h).

For repainting use only the special tire paints on the market, no nitro-lacquer!

Check the rims! Dented, bent or rusty rims damage the bead. Have the rust removed from the rims once a year.

Electrical equipment: Wiring diagram see page 43.

Battery: 12 volts, 56 Ah; on the front right side of the back board of the engine compartment, covered by a panel; the latter can be pulled out after loosening the securing bolts. Keep the exterior of the battery clean and dry. The fluid level should be 25/64-19/32 in. (10-15 mm) above the upper edge of the plates. Replenish only with distilled water. Special electrolytes should not be used, because they may shorten the life of the battery.

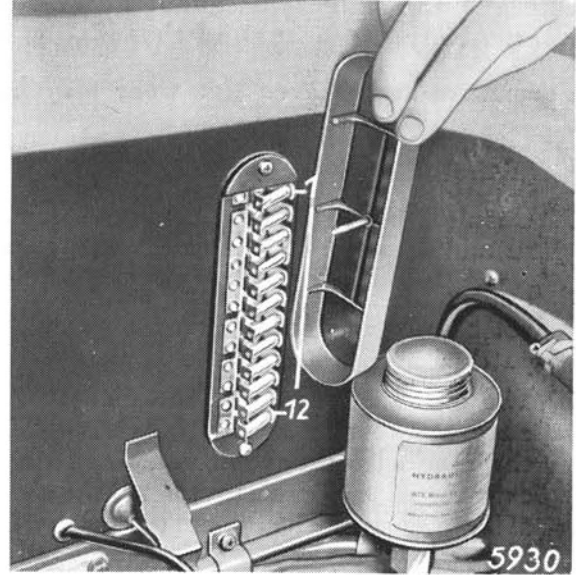
In a well-kept battery the charge is indicated by the acid density (at an acid temperature of 68° F [+ 20° C]), therefore check the charge of the battery by means of an acidimeter.

Charged:	acid density 1.285 = 32° Bé	} If too low, recharge by means of outside source of current.
Half charged:	acid density 1.20 ≈ 24° Bé	
Discharged:	acid density 1.12 ≈ 16° Bé	

Clean terminals with hot soda lye (Caution! No lye must enter the battery). Rinse with cold water, grease terminals with acid protecting grease.

Fuses: The fuses are in a box at back board of the engine compartment (seen in driving direction). The ignition wiring is not protected by fuses. If fuses burn through repeatedly have the lines checked for short circuits at a service station, and have defective lines replaced.

Note: If the ignition is switched off, the horns, turn signals, brake lights, fuel gauge, cigar lighter, starting push-button switch, wipers, starter control lamp, back-up light, overtaking signal light, and blower for defrosting when the car is stationary, are switched off too. The clearance lights, the dome light, the map light, the clock and the socket, as well as the radio¹ can, however, be used independently from the steering lock.
List of fuses from top to bottom:



No.	Fuse DIN 72581	Lead	Consumer point
1	8	30	Clearance lights, electric clock, dome light, map light, socket
2	25	54	Wipers, 1st, 2nd, and (3rd) ¹ signal horn, (horn relay) ¹ , cigar lighter
3	8	54	(Control for hydraulic-automatic clutch) ¹
4	8	54	Stop lights, back-up light, fuel gauge, starter control lamp, turn signals and turn signal control lamp
5	8	54	Defroster blower left (and right) ¹
6	8	54	(Overtaking signal light) ²
7	8	58	Tail light right, parking light right, license plate illumination right
8	8	58	Tail light left, parking light left, license plate illumination left, instrument panel lighting, (fog lamps) ³
9	8	56a	Main headlight "bright" right, "bright" light control lamp
10	8	56a	Main headlight "bright" left
11	8	56b	Main headlight "dim" right
12	8	56b	Main headlight "dim" left

¹ Is supplied only upon request and charged extra ² Not applicable on USA-design
³ On USA-design through an additional fuse

- | | |
|--|---|
| 1a Clearance light and turn signal left | 26 Back-up light switch |
| 1b Clearance light and turn signal right | 27 Stop light switch |
| 2 Engine | 28 Control for hydraulic-automatic clutch
(upon special request) |
| 3 Distributor | 29 Fuses |
| 4 Ignition coil | 30 Dimmer switch |
| 5 Map light | 31 Clearance light selector switch |
| 6 Horns | 32 Light switch (with additional position
for clearance light and pull switch for
fog lights) |
| 7a Fog lamp left | 33 Ignition switch with steering lock |
| 7b Fog lamp right | 34 (High beam blinker switch) ¹ |
| 8a Headlight left | 35 Generator indicator light |
| 8b Headlight right | 36 Horn ring and turn signal switch |
| 8c Cable for high beam headlights | 37 High beam blinker relais |
| 8d Cable for low beam headlights | 38 Starter button |
| 8e Cable for parking light | 39 Starting motor 12 volts |
| 9 Blinker relais | 40 Transmitter for fuel gauge |
| 10 Instrument cluster | 41 Generator 12 volts |
| 11 Clock | 42 Regulator |
| 12 Pre-resistance | 43 Battery 12 volts |
| 13 Socket | 44 License plate light left |
| 14 Door contact | 45 License plate light right |
| 15 Dome light | 46 Tail light, stop light, and clearance
light left |
| 16 Electric motors for heater blower | 47 Back-up light left |
| 17 Cable connection | 48 Turn signal left |
| 18 Switch | 49 Tail light, stop light, and clearance
light right |
| 19 Cigar lighter | 50 Connection for additional back-up
light right |
| 20 Collecting head | 51 Turn signal right |
| 21 Choke | |
| 22 Instrument cluster light switch | |
| 23 Dome light switch | |
| 24 Windshield wipers | |
| 25 Windshield wipers switch | |

¹ Not applicable on USA-design

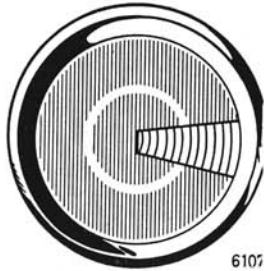
Headlights

The following description is only applicable for European countries, since in the United States sealed-beam headlights must be installed.

Do not clean the interior reflectors of the headlights. Finger prints impair the reflector surface. The headlight should only be opened to exchange the bulb.

Exchanging of headlight bulbs

This is effected in different ways depending on whether the vehicle is equipped with symmetric or asymmetric low beam light.



Headlights with asymmetric low beam can be recognized by the wedge-shaped section on the left side (seen in driving direction) of the diffusing lens (see illustration opposite). – In countries with left side traffic headlights with left-asymmetric low beam are provided. In this case the wedge-shaped section is at the right hand side (seen in driving direction). –

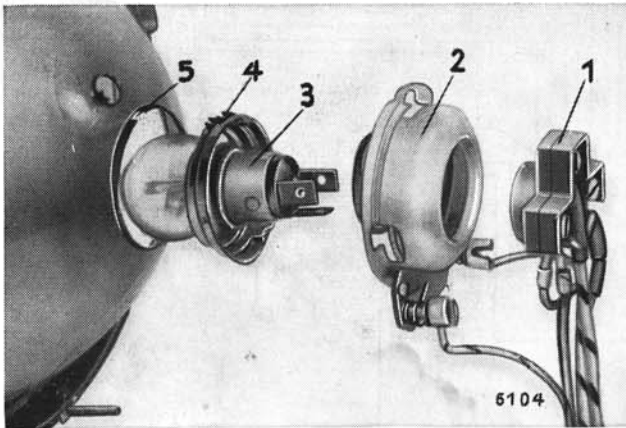
With both designs first remove the reflector unit from the fender. To do this, unscrew the oval-head countersunk screw at the bottom of the headlight, remove ornamental ring. Unscrew fastening screw of headlight, then the reflector unit can be removed from the protective housing which is located in the fender.

Moreover, the following should be kept in mind for both designs: when inserting the bulb touch it only with tissue paper or something similar. Do not touch it with moist or oily fingers, otherwise the moisture will vaporize later and impair the lighting power. Do not clean dirty bulbs with gasoline, but with alcohol.

Exchanging of bulbs in headlights with symmetric low beam:

Pull out bulb socket from the reflector unit, in which the bulb is situated. Push the bulb back, turn it counterclockwise and pull it out. Insert new bifilar bulb into socket, turn it clockwise and pull it back to the stop. Insert bulb socket into reflector unit; insert the latter into the fender and fasten it.

Exchanging of bulbs in headlights with asymmetric low beam:



In this design the bulb and the socket form an integral unit, which can only be replaced together.

Disconnect cable plug (1), then disengage and remove the lamp holder (2) by depressing and turning it counterclockwise out of its bajonet joint, then the bulb can be removed together with the socket (3). When inserting the new bulb the two fixing lugs (4) at the socket of the bulb must fit into the cut-out (5) at the reflector neck of the headlight – the bajonet joint of the lamp holder (2) can snap into place only if the bulb is in this position.

Put on lamp holder (2) and let it snap into place by depressing and turning it clockwise. Connect cable plug (1). Finally, insert and mount reflector unit into fender.

As soon as possible the headlight aiming should be checked and adjusted after having inserted a new bulb – especially in the case of asymmetric low beam – this should be done in a workshop by means of a headlight aiming device. A precise headlight aiming is absolutely necessary for asymmetric low beam.

For headlights with asymmetric low beam the aiming should only be carried out with the low beam switched on and not with the high beam.

In this case the bright-dark borderline must be horizontally from left to center and should rise by an angle of about 15 degrees beginning from the center towards right top. (In case of left-asymmetric low beam horizontally at the right side of the center, then rising towards left top under an angle of 15°.)

Combined tail light, brake and clearance light, turn signal and back-up light

These lights are situated right and left at the rear part of the vehicle in a combined housing. The lights are arranged from top to bottom as follows:

In the **upper** section behind the red glass.

- At the very top: the 5-watt tubular bulb for the tail light.
- In the center: the 15-watt bulb for the brake light.
- Bottom: the 1.5-watt bulb for the rear clearance light.

In the **center** section behind the white glass:

the 15-watt bulb for the back-up light – to be found in the left housing only.

In the **bottom** section behind the orange-coloured glass:

the 15-watt bulb for the turn signal.

To replace a bulb:

Unscrew upper and lower fastening screw of the housing cover – can also be done with a coin – take off housing cover. Ball-type bulb (brake light, clearance light, tail light, turn signal): press in bulb, turn counterclockwise and pull out.

To install a ball-type bulb:

Press bulb with the guide pins into the sections of the reflector, then turn clockwise by pressing slightly until a stop can be felt.

Tubular tail light bulb:

Press contact spring outward and remove or install tubular bulb.

Cooling system

To clean the cooling system:

If the cooling water temperature rises gradually above normal, the cooling system is dirty. It should then be degreased, descaled and cleaned. **Caution! Superpressure cooling system; for opening see page 12.**

- a) **Degreasing:** Pour about 2 lbs. (1 kg) of soda or 1 lb. (0.5 kg) of P 3 into the cooling system through the filler opening. Drive with this solution for one day. Drain off solution at the two drain cocks – at the radiator bottom left and at water while the engine is running.
- b) **Descaling:** If it is necessary to descale the cooling system, we advise you to have it carried out at a Mercedes-Benz service station only. Different kinds of commercial products may be used for this purpose. However, make sure not to use any aggressive agents, such as products containing hydrochloric acid.

It is best to use a hydrochrome treatment. Closely follow the instructions of the manufacturer – hydrochrome should not be used together with an antifreeze.

Depending on the degree of scale formation in the cooling system add. 0.9/1–1.8/2.1 Imp./US pt. (0.5 –1 ltr.) while the engine is running. Do not fill in more than 0.9/1 Imp./US pt. (0.5 ltr.) at a time.

Briefly dip a testing strip through the filling opening into the cooling water after a long drive, or, at the latest, after a day. Refer to the color scale, which is supplied with the testing instructions and the testing strip by the manufacturer, to find out which pH-value corresponds to the shade on the testing strip which has been used. If this amounts to more than 6, the cooling water should be drained off, the cooling system thoroughly rinsed out again and the procedure repeated. The cleaning process is completed when the pH-value remains below 6 after a long drive. Then drain off the cooling water again, thoroughly rinse the cooling system and treat the cooling water which is then filled in according to the instructions (see page 12).

- c) **Cleaning:** Blow through radiator from the engine with compressed air or spray with water to clean the radiator ribs thoroughly from all foreign matter. Check rubber hose connections between radiator and pipe for leaks and replace, if defective.

Remove and thoroughly clean thermostat

Check water pump oil level every 10,000 miles (16,000 km) at the oil level check screw of the water pump (at the side of the bearing housing approx. 0.18 in. (4.5 mm) below shaft center). The oil level should also be checked if the water pump has been dismantled or if a replacement pump is installed. If the oil level does not come up to the check screw, the same oil as for the rear axle should be filled in at the filler screw (upper). Make sure the ventilation hole in the filler screw is not clogged.

Garaging and storing a car

Make sure the place you have chosen for your garage is well aired and dry. Caution! Do not allow the engine to run in a closed garage, the exhaust gases are poisonous.

If the car is to be laid up over a longer period of time, it should be thoroughly cleaned inside and outside and lubricated. The painted parts of the body should be checked for scratches and repainted, the chromium-plated parts should be treated with a protective paste. The chassis should also be checked for damaged paintwork and repainted with chassis paint. All parts which are not painted including springs and spring suspension should be greased with corrosion protective vaseline or corrosion protective grease. At the engine, the crankcase, the combustion chambers, the carburetor system, the cooling water jackets and all those parts of the exterior which are not painted, like the side parts of the V-belt pulley, carburetor etc. should be preserved. To do this properly, drain off engine oil and refill the normal quantity of "corrosion protective oil for engines SAE 10"¹. Empty the fuel tank and refill a mixture of approx. 1/1.3 Imp./US gal. (5 ltrs.) of fuel and 15 cu.ins. (250 ccm) (5%) of the same "corrosion protective oil for engines SAE 10". Add about 3.6 cu.ins. (60 ccm) (1/2 %) of water-soluble anti-corrosion oil to the cooling water. See page 12. Now run the engine warm (cooling water temperature at least 140° F [60° C]) Then put the car in the place where it is to be kept.

In order to preserve the combustion chambers, unscrew the spark plugs and spray approx. 0.6 cu.in. (10 ccm) of "corrosion protective oil for engine" SAE 10 through each plug bore. Screw plugs in again and crank the engine by means of the starter motor **just for one second**. Before doing this, pull the thick high-tension leads out of the ignition coil.

In conclusion, spray those parts of the engine which are not painted with "corrosion protective oil for engines" SAE 10; when doing so, the V-belt should be covered up or removed.

Only drain off the cooling water, if you expect the weather to turn frosty and if you have not added any anti-freeze to it. For measures concerning draining see page 12.

If possible, the battery should be removed and stored at a place where there is no danger of frost. We urgently advise you to check the charge once every 4-6 weeks, and to re-charge the battery carefully, if necessary.

To take the weight off the tires, the car should be jacked up and blocks should be placed only under the four jack supports. Keep the tires which are being relieved in this way at a pressure of about 7-14 p.s.i. (0.5-1.0 kg/cm²).

When taking the car into operation again, check the cooling water level and refill, if necessary. Crank the engine - without ignition - (the thick-tension lead must be pulled out of the ignition coil) by means of the starter motor for about 10 seconds. Then unscrew the spark plugs, clean with gasoline, and put them back again.

For a short while, you may go on using "corrosion protective oil for engines" in the engine; however, as soon as you get a chance you should drain it off, and replace it by normal HD-oil appropriate for the prevailing season (see page 14).

If the car is to be laid up for more than 6 months we advise you to consult our service stations for additional preservative measures.

Hints for emergency repairs

If you service your car yourself in accordance with the maintenance instructions or, better still, have it regularly attended to at our service stations there is little danger that the engine does not start or, apart from possible tire defects, that you will have trouble with your car on the road.

If, however, in spite of this, your car refuses to function properly, the following hints will be helpful in diagnosing from the symptoms the cause of the trouble and in removing the fault.

¹ For details concerning "corrosion protective oils for engines" SAE 10 consult our service stations.

The spare wheel is housed in the trunk compartment, right. After loosening the wing screw, the bracket can be lifted and the spare wheel taken out. The tools, the car jack and the wheel nut wrench can be found near the spare wheel. Should it prove necessary to tow the car fasten the towing rope to the bracket mounted to the front part of the sub-frame only. While driving, the rope between the two vehicles must always be stretched. When starting, the guiding vehicle must therefore tighten the rope by slowly releasing the clutch, whereas during the trip the second car must also keep the rope tightened by braking carefully and in time – also when going downhill.

The starter-motor does not turn. Possible causes:

The key in the steering lock is not in “driving” position.

Should this not be the case, switch on the main headlight “bright” and press the starter push button. If now

1. the lamps suddenly go out, there is a bad contact at one of the two battery terminals or at one of the two cable connections of the starter motor. Thoroughly clean the terminals until the metal shines;
2. if the lamps go out slowly, the battery is insufficiently charged. Have it recharged by an outside source of current. If necessary, engage third gear for starting, de-clutch, push the car or have it pulled and engage the clutch;
3. if the lights remain unchanged there is a defect in the starter motor itself, which can be remedied only at a service station.

The engine does not start although the starter motor turns

I. Faulty procedure:

- A. Fuel tank is empty, the fuel gauge operates only as soon as the ignition is switched on; it does not indicate the last gallon (5 ltrs.) in the tank.
- B. The choke has not been pulled out when the engine is cold or when starting in great heights the instructions on page 15 have not been observed.
- C. The accelerator pedal had not been depressed while the engine was warm.

II. Defects on car:

A. Trouble with the ignition

The following tests are carried out best with a leather glove on or with a dry cloth, and in order to avoid a short circuit, never use a metal tool, but a dry wooden stick. The cable at the battery should not be disconnected either, except if the defect has been found and is to be remedied.

Test as follows: remove the lead from a spark plug, screw it off the cable. Caution! Touch the high-tension ignition lead only as far as $1\frac{1}{4}$ – $1\frac{3}{4}$ in. (30–40 mm) off its outer end. Get someone else to press on starter button with the ignition switched on and the gear lever in neutral. The end of the lead should be kept about $\frac{9}{32}$ – $\frac{5}{16}$ in. (7–8 mm) away from the grounded cylinder block. A spark should jump over this gap from the end of the cable to the cylinder block. If the spark does not jump over, the ignition is defective; in this case check

1. whether
 - a) the cable leading to the ignition coil (terminal 15),
 - b) the high-tension cable (thick) and the low-tension cable (thin) between ignition coil and distributor,
 - c) the cables leading to the spark plugsare not broken and that the ends are making good contact. At the same time check the electrode gap of the spark plugs and make sure they are clean.
2. whether the current reaches the ignition coil; to do this, detach the cable leading to the ignition coil at terminal 15. Press the free end of the cable against the brass sleeve of the plug for the hand lamp and hold its center contact against the cylinder head. If the hand lamp lights up the current supply is in good order. If the lamp does not light up, one of the cables is interrupted or the ignition lock is defective. Makeshift repair: Attach an additional emergency cable from terminal 51 (thick cable) of the generator regulator to terminal 15 of the ignition coil. If, however, the engine is not running, the emergency cable should be taken away under all circumstances, as with this makeshift solution current is constantly being taken from the battery even while the engine is stopped.

Take your car to a service station as soon as possible and have the defect put right by an expert.

3. whether the ignition coil is in order: to check it, disconnect the thin cable leading from the ignition coil to the condenser, terminal 1 of the distributor, press the free end of the cable against the brass sleeve of the hand lamp plug and the center contact of the latter against the cylinder head. If the lamp does not light up, and if the current supply has been in order when tested as under 2, then there is a defect in the ignition coil (broken wire or short circuit). This can be put right at a service station only.
If the lamp lights up, reconnect the cable to the distributor and check:
4. whether the distributor is in order: see page 33.
If the final test shows that the distributor is in good order, and if the cause of the trouble has not yet been discovered, check once again:
5. whether a spark jumps over to the grounded cylinder block – with spark plug connection unscrewed – while the engine is being cranked by the starter motor. Should this not be the case, then the high-tension winding of the ignition coil is defective and should be replaced.

B. Defects in the fuel supply. Check as follows:

Switch off ignition, slightly loosen the fastening screw of the fuel supply pipe at the carburetor, actuate lever at the fuel pump and see whether any fuel escapes at the screwed joint. During the operation a slight resistance should be felt at the lever and a sucking noise should be heard. If not – which may be the case at a certain position of the crankshaft – actuate the starter motor for a short time so that the pump diaphragm can work.

If still no resistance can be felt and no sucking noise heard, screw off the pump and find out whether the plunger can be moved easily, if necessary, pull it out and make sure that it functions smoothly. Screw the pump on again. If no fuel escapes at the screwed joint of the carburetor after the lever has been actuated 15–20 times, the causes may be:

1. **Fuel filter dirty:** For cleaning see page 32.
2. **Fuel pump does not work, because:**
 - a) water drain screw not tight; tighten,
 - b) fastening screw at cover not tight; tighten,
 - c) gasket of cover leaking; replace it,
 - d) washer under the cover fastening screw not tight; replace it,
 - e) filter screen is clogged; take out and clean, see page 32,
 - f) diaphragm or valves of the pump are loose. This can be ascertained as follows:

Disconnect flexible hose at the pump, press your finger against intake opening of the pump, actuate the lever, keep it down and take your finger off the opening. If the pump is in good order a sucking noise should be heard. If not, a replacement pump should be installed.

3. **Fuel reverse cock is clogged:**
Dismount and check whether the rubber seal is not damaged, the bores are still free and the ducts clean. If necessary, clean bores in the rubber seal. During assembly insert rubber seal in such a way that the guide pin coincides with the hole in the bottom. Tighten locking nut only to such an extent that the lever can still be turned. If no trouble is to be found at the reverse cock, reassemble it, and check whether:
4. **The fuel pipe is clogged:**
Disconnect flexible hose at the fuel pump, lift it, and pour in fuel. After about $\frac{1}{2}$ Imp./US qt ($\frac{1}{4}$ ltr.) of it have been poured in, fuel should escape at the pipes in the rear of the tank. If the pipe is clogged, disconnect pipe at reverse cock and push a sheet wire about $\frac{5}{64}$ in. (2 mm) thick into it.

The engine fails. The causes may be:

1. **Lack of fuel:**

- a) There is not enough fuel in the tank to reach the normal outlet openings, this becomes particularly evident in curves.

Remedy: Turn fuel cock from position N = normal to position R = reserve, and refuel as soon as possible. When driving at moderate speed the spare fuel is sufficient for about 18–22 miles (30–35 km). After refueling turn fuel cock again to the “N” position.

- b) If there is a noticeable loss of power, however, the engine does not stop running, one or more carburetor jets are clogged. For location of jets see page 35.

2. **Defects in fuel supply**

If the performance gradually decreases and the engine stalls in hot weather in dense city traffic or when driving at moderate speed over long mountain passes, this can be due to the formation of steam bubbles in the fuel pump, if poor qualities of fuel are used. To remedy this, wrap a wet rag around the fuel pump, wait for a short while, then start the engine again.

If trouble occurs in the fuel supply at normal temperatures and under normal driving conditions, check as described under “The engine does not start”.

3. **Trouble with the ignition system.** See under “The engine does not start”.

Engine is “pinking”. The causes may be:

1. Unsuitable fuel. To remedy this, see under “Hints for trips abroad” on page 22.
2. Fuel deposits in the combustion chambers. Consult a service station.
3. Incorrect ignition timing. Please, visit a service station.

The red charging control lamp lights up during driving

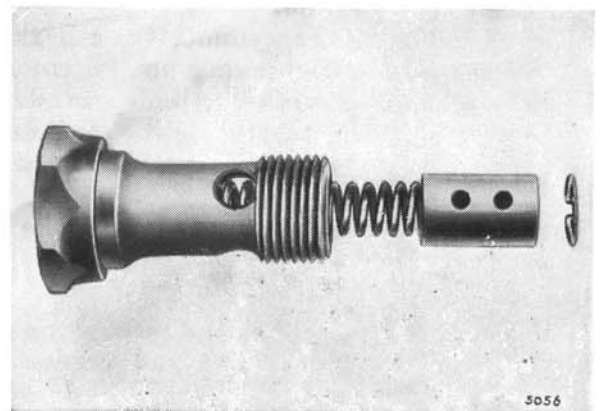
If the charging control lamp lights up while the car is being driven, i. e. at medium or higher speeds, the electrical system is defective. Stop the car and look for the fault!

The cause of the trouble may be:

1. **Defect at the generator,** which should be attended to as soon as possible, since the battery can no longer be charged if the generator is not working.
2. **Loose or defective V-belt:** For tightening see page 31.
3. **The cable leading from the charging control lamp to the generator or from charging control lamp to battery is grounded.**

Oil pressure drops suddenly

1. **Too little oil.** Lack of oil can be noticed by a decrease of oil pressure in a curve, while the indicated oil pressure remains unchanged when driving straight ahead: the oil level in the crankcase should reach at least the first mark on the oil dipstick.
2. **Oil relief pressure valve at the engine is dirty or loose:**
Remove, dismantle and clean oil relief pressure valve.



3. **Pipe between engine housing and oil filter is not tight.** Tighten connecting bolts if points 1–3 are in good order:

4. Check oil pressure gauge:

Disconnect connecting pipe at filter. If oil escapes at the connection while the engine is running, the oil pressure gauge itself or the pipe leading to the gauge is defective and should be replaced. If not, there is a defect in the engine, which can be repaired at a service station only.

Cooling water is boiling. The cause of the trouble may be:

1. **Too little cooling water in the radiator. Caution! Superpressure cooling system.** The permissible cooling water temperature is 240° F (115° C). **Open only if cooling water temperature is below 195° F (90° C).** First turn to stop I and allow the excess pressure to escape, then go on turning and remove cap. When closing turn to stop II. Add cooling water slowly and only when the engine is running. Check upper and lower hose connection between radiator and engine, as well as those right and left between engine and heater for tightness and retighten, if necessary.
2. **Radiator may be covered up too much.**
3. **V-belt for fan and water pump not tight enough (see page 31), or broken.**
4. **Radiator cover is leaking** so that no superpressure can form. Then the cooling water is boiling at 212° F (100° C).
5. **The radiator thermostat is defective;** it should be replaced.
6. **Cooling pipe is clogged.**
7. **Defective water pump.**
8. **Retarded ignition;** in this case, a loss of power is noticed.
9. **Defective cylinder head gasket.**

The defects mentioned under 5-9 should be repaired at a service station only.

The clutch slips. For cars equipped with a hydraulic automatic clutch (Hydrak) the special "Hydrak" instructions should be observed.

If it is found that the number of revolutions rises without increasing the speed of the car when accelerating, then the clutch is slipping. You will then just be able to drive on slowly to the nearest service station, accelerating very carefully, so as to prevent the clutch from slipping. This is possible by engaging a low gear. The cause of the trouble may be:

1. **The clutch pedal does not have the correct free travel.** For adjusting see page 36.
2. **The clutch is smeared with oil.**
3. **Clutch facing or the clutch itself is defective.** This should be repaired at a service station.

Brakes

When the free travel of the brake pedal is adjusted correctly, a noticeable resistance should be felt whenever the brakes are being checked **before driving off.**

1. **The brake pedal can be pushed right down quickly or slowly.**

The causes may be:

- a) A wheel brake cylinder or a brake line is not tight. Before driving off, repair the leak by tightening up the connections or take your car to a service station.
 - b) The master brake cylinder is defective. There will be not outward sign of leakage. The master brake cylinder can be repaired at a service station only.
2. **The brake pedal can be pushed down almost completely against a clearly perceptible, elastic resistance.**

In this case there is air in the brake line: for bleeding the brakes see page 37, if necessary, add brake fluid to the reserve container.

During a trip

1. **If the brake pedal can be pushed right down during a long downhill drive:** release the pedal for an instant and press down twice in quick succession, the resistance should again be felt. If the brakes do not grip all the same, stop the vehicle with the handbrake and, if necessary, by shifting down to a lower gear.

Check whether the defect is not of the nature described under 1a or 1b. Have the brakes checked at a service station as soon as possible.

2. **Inadequate braking effect.** The causes may be:
 - a) Defective brake linings: should be checked at a service station.
 - b) No vacuum in the T-50 booster brake due to leaking lines in the booster brake itself or in the intake line or throttle valve on the engine side. Check all pipe connections and replace them, if necessary; you may also have the booster brake checked at a service station.
3. **Retarded braking effect:** the cause may be:
Slow increase of vacuum in the booster brake cylinder: check hose of vacuum line; if dented, have it replaced.
4. **Slow releasing of brake.** The cause may be:
 - a) Jamming of the pedal linkage.
 - b) The piston in the T-50 booster brake does not move freely; have booster brake checked at a service station.
5. **Insufficient gradation.** The causes may be:
 - a) The linkage and toe-board do not move freely; grease, and make sure it operates smoothly.
 - b) The piston in the T-50 booster brake does not move freely; have booster brake checked at a service station.
6. **Chattering of brake.** The causes may be:
 - a) Brake drums out of round (motion can be felt at the pedal): have the brake drums refinished.
 - b) Brake linings burnt (brake tends to grab): replace linings, have the drums refinished.
7. **The pedal cants or vibrates when the brake is actuated or released.** Possible cause: The piston in the booster brake does not move freely: have the booster brake checked.
8. **The brakes do not disengage although the hand cable and pedal have been released.**
Remedy:
 - a) Remove brake drums, check the shoes for ease of movement and check the clearance.
 - b) Check whether the relief port in the master brake cylinder is not clogged when the brake pedal is in resting position. To do this, remove the filler screw of the brake fluid container and depress the brake pedal: if the port is unobstructed brake fluid gushes out when the brake pedal is actuated; should this not be the case, have the adjustment of the brake pedal checked at a service station.

Defects in the electrical system

All fuses are to be found in a box in front on the left side of the back board of the engine compartment (see page 42). The cause of failure of an electrical device may be:

1. Bad contact of fuse: turn the fuse round, polish contact surfaces, if necessary, re-adjust contact spring.
2. A fuse is defective; it has either blown or the fuse wire has no contact in the cartridge, which defect cannot be discovered from the outside. Only soldered, welded or such fuses, the metal parts of which are made of one piece, should be used as replacements.
3. Bad contact at a connection: tighten terminals.
4. A line is grounded: check cables for worn spots.
5. The device itself is defective: defects listed under 3-5 should be checked at a service station.

