# Main Group L

Lubrication and Maintenance

| Check on delivery | Mileage in m. 300 | Mileage in m. 1800 | Maintenance and Adjusting Work | Mileage in m. 3700, 11000 and, in addition, every 7500 | Mileage in m. 5500, 9300 and, in addition, every 3700 | Mileage in m. 7500, 15000 and, in addition, every 7500 |
|---|---|---|---|---|---|---|
| | | | Test run: Check condition of car | | | |
| | | | Check camshaft housing bolts for looseness. Retighten, as necessary. | | | |
| | | | Check valve clearance. Readjust, as necessary. | | | |
| | | | Check proper tension of vee-belt. Readjust, as necessary. | | | |
| | | | Check attachment of dynamo. Retighten turnbuckles, as necessary. | | | |
| | | | Check contact breaker points and spark timing. Readjust as necessary. Grease cam travel. Check spark plugs. | | | |
| | | | Check spark timing. | | | |
| | | | Clean strainer in vent tube. (Dismantle air filter and wash tube in gasoline by agitating it forth and back). | | | |
| | | | Check flange bolts on intake and exhaust manifolds for looseness and leaks. | | | |
| | | | Check flange bolts on intake manifold, vent tube, fuel pump, and exhaust manifold for looseness and leaks. Retighten, as necessary. | | | |
| | | | Clean strainer at 3-way-cock. | | | |
| | | | Clean strainer at 3-way-cock, pipes, carburator, and nozzles. | | | |
| | | | Clean air filter. | | | |
| | | | Renew air filter element. | | | |
| | | | Check starter attachment. Retighten, as necessary. | | | |
| | | | Check motor suspension. Retighten (3 rubber pads), as necessary. | | | |
| | | | Check free travel at clutch pedal and clutch lever. Readjust, as necessary. | | | |
| | | | Check axial and radial play of steering system. Readjust, as necessary. | | | |
| | | | Check castellated nuts on front and rear wheel hubs for looseness. | | | |
| | | | Check toe-in. | | | |
| | | | Check nuts on spring bridles for tightness. Retighten, as necessary. | | | |
| | | | Check shock-absorber for leakages and proper function. | | | |
| | | | Check brake hoses for free movability, brake hoses and brake lines for leaks. | | | |
| | | | Check pedal and hand brakes for perfect brake action and uniform brake pressure on brake shoes. Readjust or bleed, as necessary. | | | |
| | | | Check lighting system including head lamp adjustment, function of flashers and horn. | | | |
| | | | Check instruments on instrument panel. Check bowden cables for free movability and proper function. Restore freeness of operation, as necessary. | | | |
| | | | Check all bolts and nuts on the chassis and body for looseness. Retighten, as necessary. | | | |
| | | | Check tyres for proper inflation pressure. Readjust, as necessary. | | | |
| | | | Check tyres for proper inflation pressure and wheel nuts for fatness. Readjust tyre pressure. Retighten, as necessary, wheel nuts. | | | |
| | | | Test run: Check on delivery; no-load test. Readjust, as necessary. | | | |
| | | | Prepare car for delivery to the owner: check specified number of tools; clean the interior of car; wash car. | | | |

## Maintenance and Lubrication Service

To ensure a trouble-free operation and a long life of the car it is very important to have servicing jobs done regularly and very carefully at the intervals specified in the Maintenance and Lubrication Charts.

The Costumer's Service Booklet, supplied with the car, covers maintenance and lubrication service jobs to be performed up to 30 000 miles. When performing lubrication service jobs at 30 000 m. – or already earlier, the next Customers' Service Booklet covering the 30 000 to 61 000 m. servicing jobs should be handed over to the car owner in order to enable him to get his car serviced by the Lloyd Customers' Service Organisation.

Every Lloyd-Car Dealer should do his utmost to acquire the confidence of car owners by first-class customer's service and to convince customers that their car will be serviced best only in a Lloyd-Customer's Service Shop.

## Hints for Maintenance Service

### Air Filter

Every 3 700 m. clean filter cartridge as per Maintenance Chart (see Shop-Manual M 4 - 1). This instruction applies to normal operational conditions. If a car is used for the most part in dusty area or on muddy roads, it is recommendable to effect cleaning at shorter intervals. In any case have the filter cartridge replaced every 7 500 m., otherwise the special-type filter paper would have become unserviceable after this interval. No unobjectionable alimination of dust from the intake air can be ensured if air filters are used for a long time.

### Carburetor Air Heating

**19 H. P.-Engine**

With continuous outdoor temperatures*) exceeding + 15° C the system should be put out of operation by removing the flexible hose. In Germany this rule should be applicable during the months from May to September.

**25 H. P.-Engine**

With a 25 H. P.-Engine it is convenient to operate the engine with the carburetor air heating "ON" within a large range of temperatures. Only with continuous temperatures from – 20° C and more it is recommendable to turn off the carburator air heating. In Germany this would be generally the case in midsummer time.

Inversely, each Lloyd-Car Shop Owner must give care to ensure that Lloyd 600 ccm. cars are under no circumstances driven in fall, winter and spring-times – this refers only to the climatic conditions in Germany – **without** carburator air heating turned on so as to avoid increased fuel consumption, carburator icing and dilution of lubricating oil by fuel condensate.

*) (Continuous outer temperature = temperature lasting at least some days or longer).

## Covering of Car Front

When the colder season begins, give care to ensure that the car front will be covered in due time.

| | |
|---|---|
| Louvre covering below bonnet flap | Part-No. 134 9201–0 |
| and covering of front decoration (grill) | Part-No. 134 9203–0 |

must be fitted in the case of continuous outer temperatures below + 10° C.

This hint refers to the LLOYD 600/56 and 57, Standard, Alexander and Alexander TS models.

Covering of the car front during the cold season will result in warming up the engine to proper service temperature in a shorter time and thus in obtaining a better engine performance.

If the coverings are kept fixed to the car for about half the year (depending on the temperatures usual in Germany) it is convenient to use the durable Original-coverings supplied by LLOYD. Quite apart from the fact that any makeshift has an unpleasant appearance, we also caution against using paper or cardboard. Any cardboard or paper may become loose with the car in motion and may possible get in contact with the exhaust pipe and thus the risk of fire may be imminent!

## Valves

Effect check of valve clearance and/or adjustment of valve only with engine cold! Therefore, in the majority of cases this job will be done only at the end of service operations.

Check or adjust valve clearance always with the valve **closed!** Therefore, give care that the piston of the respective cylinder should always be in **T. D. C. position of the compression stroke!** (See Shop-Manual M, 10-9).

Check cork seals of valve chamber cover for serviceability. Replace immediately hardened or damaged seals. For collecting leakage oil dripping from the engine at the exhaust side, after removal of the cover, use always a receptacle to avoid the customer being annoyed be the smell of burned oil after the car has been handed over to him or possibly alarmed.

## Ignition

Check differences in the adjustment of firing points for the 19 and 25 H.P. engines.

| | |
|---|---|
| 19 H.P. engine | 3° before T.D.C. |
| 25 H.P. engine | 0° before T.D.C. |

The "Z" mark on the flywheel only refers to the 19 H.P. engine!

On every service operation wipe off the distributor cap with a clean and dry rag and blow out the interior of the distributor by compressed air. If the breaker points be smoothed off with a breaker point file, do not forget to re-establish the specified gap of the open points (0.4 mm).

The Bosch grease Ft 1 v 4 is especially suited for the lubrication of the cam travel – as per Maintenance Chart at 300 m., 3700 m. and every 3700 m. In every case apply only a slight coat of grease. In doing so, protect contacts from grease!

### Carburator 28 VFIS and PCI

When cleaning the carburetor check whether riveted connection between float and web is tight. If there should be the slightest slackness, replace float. Furthermore, check tightness of float. Be sure not to damage float web during dismantling and reinstalling, otherwise fuel level would be influenced! Always check choke for full opening and closing. With entirely opened choke knob for choke pull switch should protrude from the instrument panel by 1-2 mm. When dismantling top part of carburator be sure not to bend choke control cable. Replace immediately all damaged control cables.

Adjustment for idling should be made with **engine warm!** Therefore, final idling adjustment should be made when servicing jobs are finished after the trial run. Even with clutch pedal entirely depressed idling of the engine should never drop below normal idling speed. Idling adjustment must always be done with greatest care. This refers especially to the 25 H.P. engine that requires a careful special idle adjustment in order to obtain unobjectionable acceleration.

### Cleaning of the 32 PCI-Carburator

For routine cleaning of the carburator (as on the 28 VFIS type) the following additional operations should be done: Blowing out injection tube and air correction jet for the pump, with carburator top part removed (washing out of the non-return valve for the pump and the strainer arranged above).

Never blow compressed air into the pump chamber! Normally the injection pump itself shall neither be dismantled nor disassembled.

### Spark Plugs

The following spark plugs are allowed to be used on the L 600 engine:

Bosch W 225 T 1
Beru 225/14 u 2
Champion L 85
Lodge HN

From the visual inspection of a spark plug just taken out of the engine and which has run for at least 600 m. in this engine, you may draw some conclusions as to the carburator adjustment and the condition of the engine (particularly as to the condition of pistons, cylinders and valves). This can, however, be done only on condition that the engine has not been run under no load before examination of the spark plug!

- Engine and adjustment are in proper order if the lower end of spark plug body has a brown appearance, the electrodes are bright or dark-grey and neither oil nor sooty carbon deposits are existing.
- An overheated plug has a white-burned insulator foot and grey electrodes. In the case of strong overheating the plug shows welding globules. In any such a case the reason may be too lean a mixture or improperly functioning valves.
- If the spark plugs are black and if lower end of plug body, plug recess and electrode have a dry sooty carbon deposit, the reason for it may be too lean a mixture, respectively a permanently overcooled engine. Another reason may be an excessive electrode gap.
- If the "interior" of a spark plug has a fat oily sooty carbon deposit, this may be due to improper piston ring seals (worn cylinder walls). Worn or loose valve guides may likewise be the cause of this trouble. Moreover, ignition troubles or defective spark plugs may be the cause.

When using fuels compounded with tetraethyl lead, spark plugs, after they have been in service for a longer time, show at the insulator foot and insulator – depending on engine condition and carburator adjustment – a grey-yellow, brown to black lead deposit.

When dismantling and installing spark plugs, the following points should be observed:

**Dismantling**

- Before screwing out spark plug blow out plug channel in the cylinder head by compressed air in order to avoid dirt or foreign matters entering the combustion chamber through the plug holes.

- In order to avoid spark plug thread inside cylinder head being damaged when removing sticking plugs, first screw out plug only a few turns. Then, drip some Kerosene or Caramba into the threads, thereby screwing the plug down into the cylinder head. After a certain time you may try to screw out the sparking plug completely.

**Installation**

- Coat spark plug thread with dry graphite to avoid sticking in the cylinder head due to excessive heat. **Attention!** Be sure that no graphite may get into the electrodes or into the interior of spark plugs.

- Tighten spark plugs carefully. As a guide, tighten with a torque: 4 m/kg.

The electrode gap shall be 0.7 to 0.8 mm. If necessary, readjust gap by bending the outer electrodes correspondingly.

Excessive electrode gap: Engine tends to start poorly in cold weather, ignition troubles, quick sooting of the plug and quick burning away of electrodes.

Insufficient electrode gap: Untrue irregular running of idling engine, misfiring, exhaust detonations on coasting.

During the time of service the spark plugs are subjected to an ageing process and should therefore be left in the engine not longer than 9300 miles!

**Steering System**

Check proper axial and radial play of the steering pinion and, if necessary, readjust in due time. In the event of incorrect clearances being not corrected in due time, it may occur that the steering in its mid-position cannot be adjusted free of play any more as in this case it would tend to jamming in both extreme positions.

**Attention!** Steering with Hardy disk. As in this case an increase of play may not be heard eventually, the play of the steering pinion should always be carefully checked when servicing jobs are done on it.

Turn eccentric bush only with special spanner! Neither hammers and drifts nor chisels are permitted (see also Shop-Manual V 8-7). For the lubrication of the steering system see Section "HINTS FOR LUBRICATION SERVICE".

## Clutch

On each service operation check always clutch play. This is measured by the dead travel of the clutch pedal – in the models

Lloyd 600/56 and 57, Standard, Alexander and Alexander TS ..... **35 mm** (min. 30 mm)
Lloyd LT/LTK 600 ..... **50 mm** (min. 45 mm)

It is not permitted to reduce the clutch play (possibly at customer's request) as otherwise the specified declutching travel will be exceeded and the clutch pressure plate be damaged while clutch pedal being depressed too much. When adjusting proceed as specified in the Shop Manual under "K" 5-1.

Mats on the floor in front of he front seats shall have sufficient cut-outs in way of the pedal foot plate (they should not be allowed to be pushed forward) with the car moving in order to enable the designed pedal travel being maintained and – with correct dead travel of the clutch pedal – unobjectionable functioning of the clutch being accomplished.

The rubber sheating of the clutch cable should have the necessary curvature and initial tension! (See for this purpose Shop Manual "K" 6-1).

Always grease well clutch cable. Grease also threaded piece for adjusting nuts. Have damaged wire cable replaced immediately.

## Vee-Belt

The vee-belt should neither be too slack nor excessively tensioned. A new vee-belt will extend in the beginning of operation. Its length should therefore be readjusted for the first time at the 500 km servicing interval. Do not forget to screw into place all spacers in front of the outer half of belt pulley. Protect vee-belt from grease and oil. Replace immediately worn or cracked vee-belts and those increased in diameter due to the influence of oil.

Put into place new vee-belt according to service instructions, this means that the front half of vee-belt pulley must be removed. It is not permitted to run the vee-belt over onto the pulley or to lift it over the pulley shoulder with the aid of a screw driver. (See also Shop-Manual M 7-2 and 3).

## Fuel Tanks

Besides the regular cleaning of the filter cup at the fuel cock, have fuel tank drained at least once a year and flushed as experience shows that after a longer service time sludge may accumulate and water separation may take place, which especially in winter may result in pump or carburator failure. (See Shop-Manual KA, 3).

## Fuel Cock

After cleaning the filter cup and strainer be sure to tighten the filter cup only moderately. Never tighten with excessive force! From time to time renew seal ring on filter cup. Prior to screwing into place again, moisten thread at the filter cup with graphited oil in order to avoid binding (Shop-Manual KA, 2).

### Exhaust Heating and Defroster

On each service operation check heating and defroster flaps for correct closing and tight fit of hose connections. Avoid collapsing of hoses! Damaged, chamfered or narrowed (ageing) heating or defroster hoses may impair correct functioning of the system and should be replaced. (Shop-Manual KA, 6-2).

### Exhaust Ball Flange Connection

Check free movability of exhaust ball flange connection. If this connection is not free movable or the sliding piece is binding on the sliding tube, drum noises may occur. If necessary, dismantle sliding piece and sliding tube and clean sliding piece with a wire brush. In case of a snug fit, the sliding tube should be given a coat of molybdenumdisulphite glide varnish. In case of a loose fit (blow-by, clapping noises), use graphite-grease. For increased clearance due to wear, see Shop-Manual KA, 7-2.

### Battery

On each delivery control and on each lubricating service operation, check acid level and acid density. The liquid level should be 10 mm above upper edge of plates, otherwise add distilled water. Smaller quantities should be distributed best among the various cells with a hydrometer. Keep distilled water stored only in a clean glass vessel.

With a battery well charged the hydrometer should indicate a specific weight of 1.285.

| | |
|---|---|
| Battery half-charged | 1.20 |
| Battery decharged | 1.14 – 1.11 |

Have battery recharged always in due time or replace against a charged battery – especially in winter. Only a well-charged battery is protected from freezing in. In a strong cold protect battery by a cover from cooling down.

In some urgent cases which, however, shall not become common practice, there is also a possibility of "fast charging" sound, already used, batteries. In doing so, use only latest type of fast charger which do not allow any overcharging and thus an excessive heating of the battery. In no case quick charging should be done with new batteries. The efficiency and life of a new battery will be improved if in the beginning of operation it will be dismantled at shorter intervals and charged on a source of current outside car (2-3 times).

Give metallic parts of storage battery and cable terminals a light coat of acid-resisting grease (e. g. Bosch grease Ft 40 v 1) to avoid the formation of oxide and be sure all terminal screws are tight. (See also Shop-Manual E, 3).

### Tyres and Wheels

Check tyre pressure in the interest of safe driving and wear always very carefully, and, if necessary, readjust. Unless otherwise desired by the customer, adjust tyre pressure to the value specified for average load.

The inflation pressure specified in the tables must be observed when starting for a trip, that is, the inflation pressure should be measured with tyres cold. Even if the inflation pressure will increase on the way, tyres should not be deflated!

The fact that the specified inflation pressure must be strictly adhered to makes it necessary to use in the Lloyd Customer's Service shops only precision air pressure meters which from time to time have to be checked on a control set and, if necessary, readjusted.

**Tubeless Tyres.** From October 1956 all Lloyd-cars are equipped with tubeless tyres. If an old car shall be equipped with tubeless tyres at owner's request bear in mind that by no means every type of wheel rims will be suited for tubeless tyres.

1. No riveted wheel rims must be used – use only welded rims that meet Manufacturer's requirements for absolute air tightness.

2. Welded wheel rims should have in way of the valve hole a special recess to take the special valve.

For more particulars see Shop-Manual Group B or Customer's Service Circular Letter No. 204.

Battered, bent or rusted rims result in damages to the tyre bead, thus endangering the air tightness of the tyres. A deformed rim should be straightened. If the rim is damaged too heavily, replace it.

**Wear of Tyres**

To attain a uniform wear a general rotation of tyres – including spare wheel – after some thousand miles of operation is necessary (every 3000-4900 km), depending on the amount of wear. If, however, a tyre shows an abnormal wear at a definite wheel position, it is to no purpose to replace it unless previously the cause of this wear has been remedied. In failing to do so, after all tyre treads have become worn, the tyre performance would be too small.

An economical wheel performance can be obtained only if all wheels are correctly adjusted in their relative position with each other.

In the case of premature or non-uniform tyre wear – if the causes for it cannot be detected clearly, for example, incorrect toe-in – a wheel adjustment should be made with the aid of an optical wheel alignment equipment. (For more information see Shop-Manual V, 11).

**Balancing Wheels**

The Alexander TS will be delivered with statically and dynamically balanced wheels. It is recommendable to have the wheels balanced anew after every 7300 m., as after this wheel operation a new out-of-balance can possibly be stated due to tyre wear.

A wheel should be subjected to a new balancing if

1. the respective tyre has become emptied owing to a damaged valve.

2. the tyre has been damaged due to external influences and requires to be repaired.

3. A new tyre has been fitted on the wheels.

Statical out-of-balance tends to make the wheel jump or stamp, while dynamical out-of-balance results in shimmy of the wheels. Both failures, in turn, will result, under circumstances, in unsteady steering and bad road-holding properties.

A larger amount of out-of-balance, especially at higher speeds, causes a premature wear and tear of the rack and pinion steering system as well as in a rapid wear of the wheel bearings.

If with correctly balanced wheels the aforementioned troubles will occur, the cause may be that road dust, clay or snow are sticking to the inner side of the wheels. (It goes without saying that prior to the balancing procedure all tyres and wheel rims have to be thoroughly washed). Moreover, it is possible that one of the balancing weights has become loose, thereby producing an unbalance. Any such a tyre must be rebalanced.

## Head Lamps

Only with head lamps correctly adjusted a good lighting effect can be obtained, and dazzling so dangerous to oncoming vehicles will be avoided.

The adjustment of the asymmetrical head lamps in the Alexander TS must be effected – as compared with the adjustment of head lamps in other Lloyd models – according to the requirements in effect for this lighting system.

**Attention!** Lloyd-cars should be loaded fully and uniformly during the aiming of head lamps.

The use of modern optical equipment for aiming head lamps is preferable as with this equipment both head lamp systems and any additional lamps may be adjusted in a quick and reliable manner at day-time hours within smallest space required. If only one aiming screen is available, care is to be given to ensure that the vehicle should be at least 5 m apart from the aiming screen – Alexander TS, if possible, 10 m – and that the respective space should, as far as possible, be darkened.

Give care that the head lamps are not become coated with vapour or sweat, otherwise misaimings will result. Worn bulbs (mostly, after a longer burning time, inside blackened) should be replaced. Before installing a new bulb, clean it carefully. Do not grasp a bulb with the bare hand. After each replacement of bulbs, check head lamp adjustment (necessary owing to the bulb tolerances).

## Screwed Joints

"New" screwed joints – as it is known – will first seat somewhat; this may cause screws to slacken. In the first line it refers to joints provided with packings between the contact surfaces of the respective components or where rubber elements are used between components and nuts (or bolt heads). With screw connections, which are subjected to a high load under running conditions the pre-load may also become diminished.

Therefore, it is necessary to check the bolts and nuts in question in the vehicle for their tight fit and, if necessary, to retighten them. For this purpose use a torque wrench!

Special care is to be given to the following bolted joints:

## Engine

| | Max. Torque |
|---|---|
| Bolts of camshaft casing | 3 mkg |
| Flanged connection at inlet manifold | |
| Flanged connection at crankcase breather pipe | |
| Flanged connection at fuel pump | 2 mkg |
| Flanged connection at exhaust manifold | |
| Sliding shoe (2 hex nuts M 6) on the chain case – narrow side) | |
| Starter flange | |
| Clamp band for dynamo | |
| Engine mountings (check rubber pads of front and rear engine mountings. If necessary, renew in time). | |

## Chassis

| | |
|---|---|
| Spring saddles on front axle carrier (central tube connection) | 7.6 mkg |
| Front springs, spring bridges | 5.0 mkg |
| Front shock absorbers, upper fastening (check rubber spacers. If necessary, replace) | |
| Rear springs (leaf springs), spring shackle | 5.0 mkg |
| Rear shock absorbers (rear axle with coil springs); upper fastening | 5.5 mkg |
| Upper and lower fastening of coil springs | 8.3 mkg |
| Stabilizer connection M 8 | 2.5 mkg |

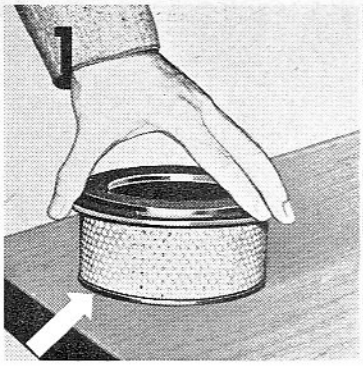
# Lubrication Chart

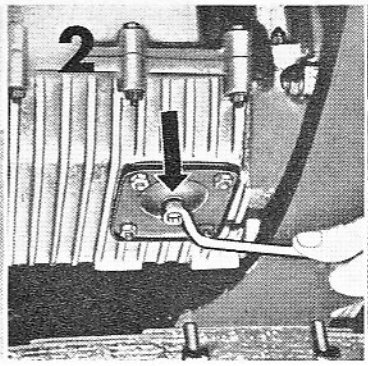
valid for

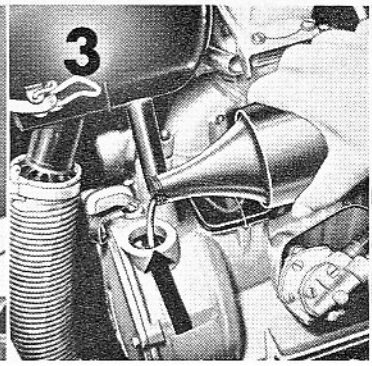
LP/LS 600/56 and 57

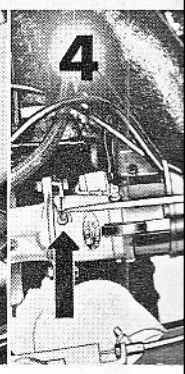
Standard, Alexander with leaf spring-full-floating type axle, rear
(Lubricating point No. 17 suppressed)

LT/LTK 600
(Lubricating point No. 5a suppressed)




**Designation of Lubricating or Servicing Points**

1 – Air filter, dry
2 – Drain screw for engine oil
3 – Filler pipe for engine oil
4 – Ignition distributor
5 – Gearbox (transmission)
6 – Steering gear housing
7 – Clutch lever
8 – Front wheel bearings and hinged joints
9 – Inner universal joints
10 – Inner universal shaft
11 – Pedal shaft
12 – Track-rod joints
13 – Rear wheel hubs
14 – Master brake cylinder
15 – Battery
16 – Springs (front and rear)
17 – Slidable suspension of rear springs

**Designation and Specification of Lubricants and Servicing Materials**

◆ **Engine oil**
HD-oil for Otto-cycle engines (quality oil). For flushing do not use flushing oils. Use only an oil of the same quality grade as used for the new charge.

+ 30° C (+ 86° F) SAE 40
0° C (+ 32° F) SAE 20 W/20 SAE 10 W
SAE 10 W/30

◇ Check oil level in the engine

● **Gearbox (transmission) oil**
Four-speed synchromesh gearbox

At especially low outer temperatures (below about 15° C = 5° F) we recommend the use of a transmission fluid (automatic transmission fluid) of an recognized quality grade.

0° C (+ 32° F) SAE 90 SAE 80

Three-speed gearbox
SAE 90, summer and winter
Steering
SAE 140, summer and winter

○ Check gear oil level

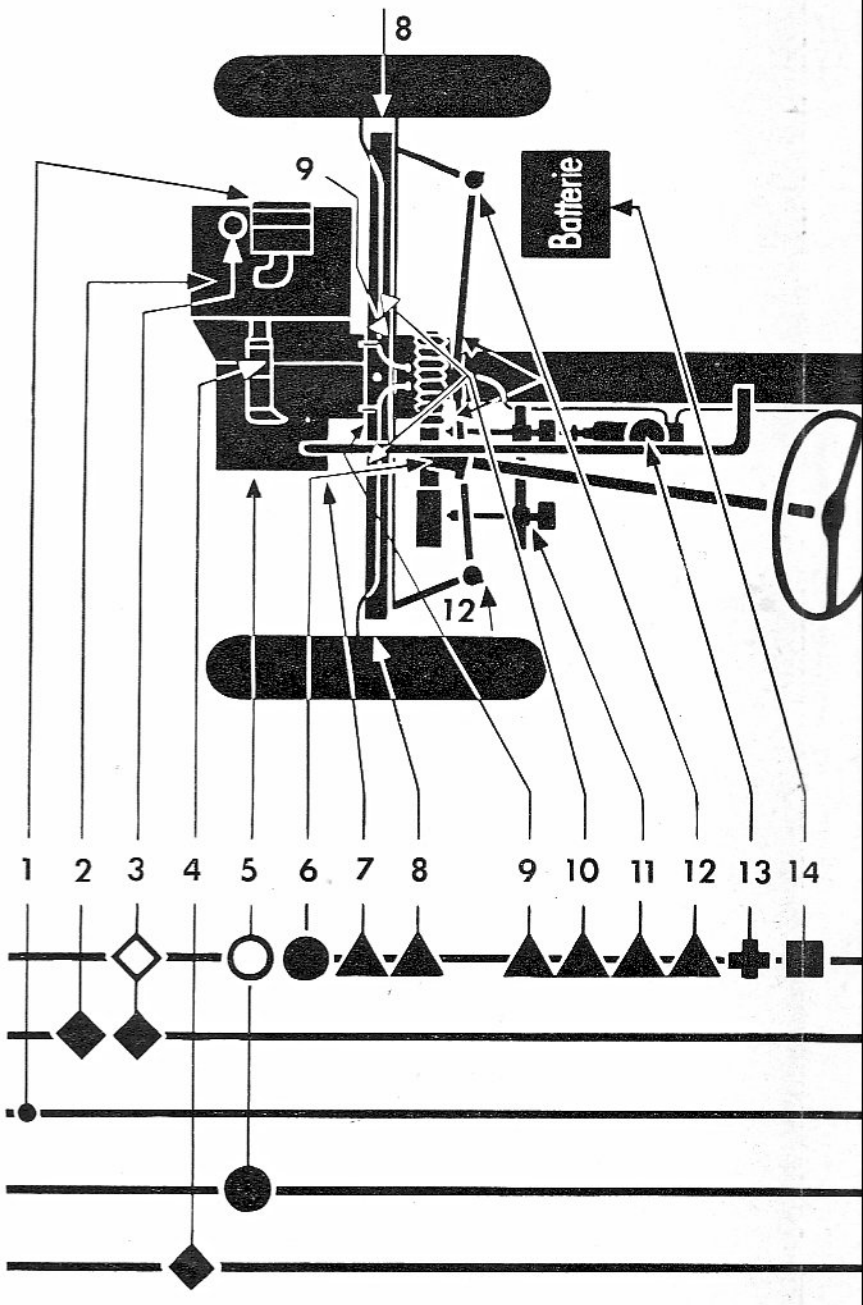
▲ Universal grease (multi-purpose grease)

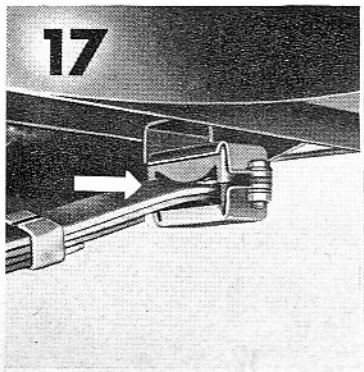
△ Graphite grease

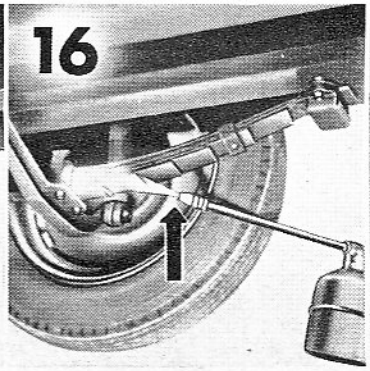
■ Distilled Water

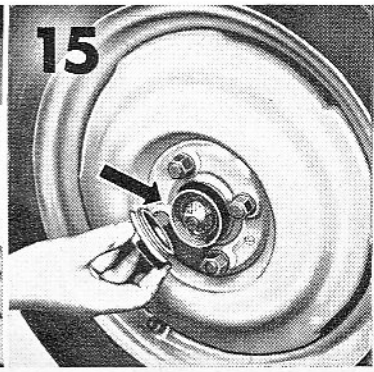
✚ Brake fluid "ATE blue" or Lockheed brake fluid

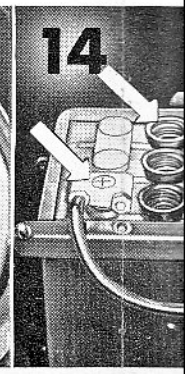
✳ Spray oil

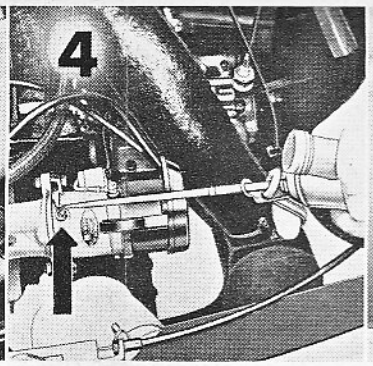
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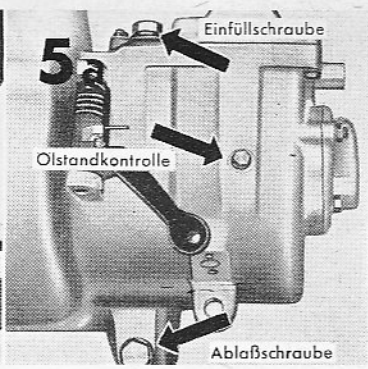
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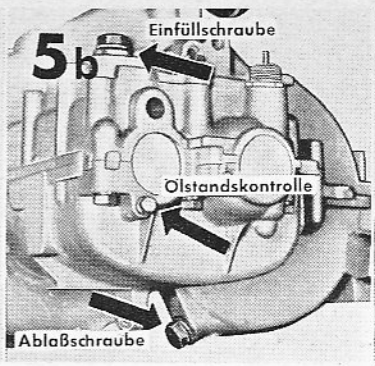
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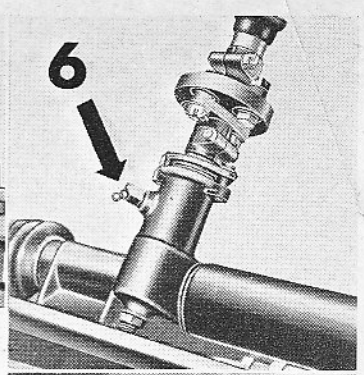
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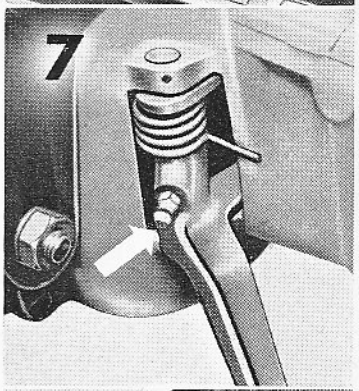
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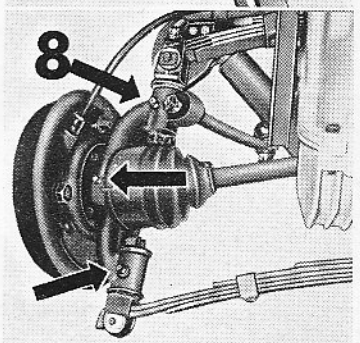
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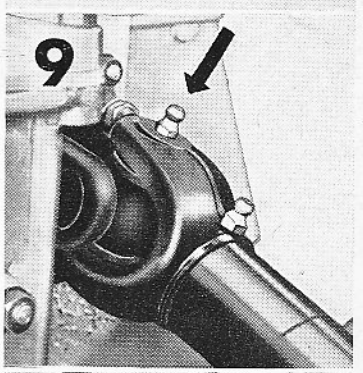
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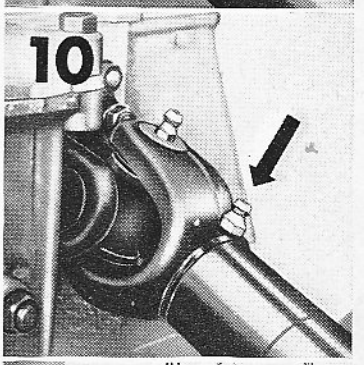
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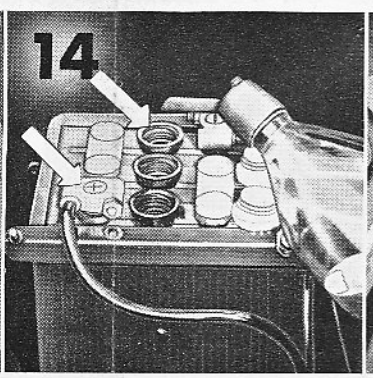
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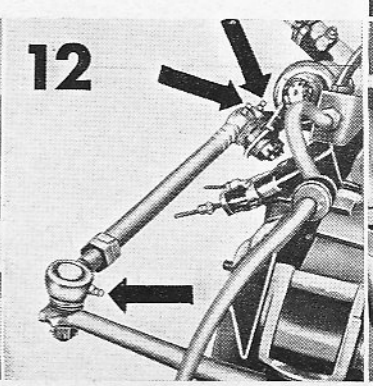
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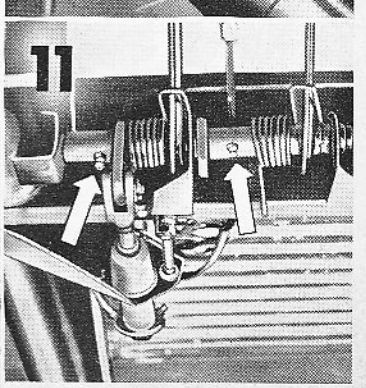
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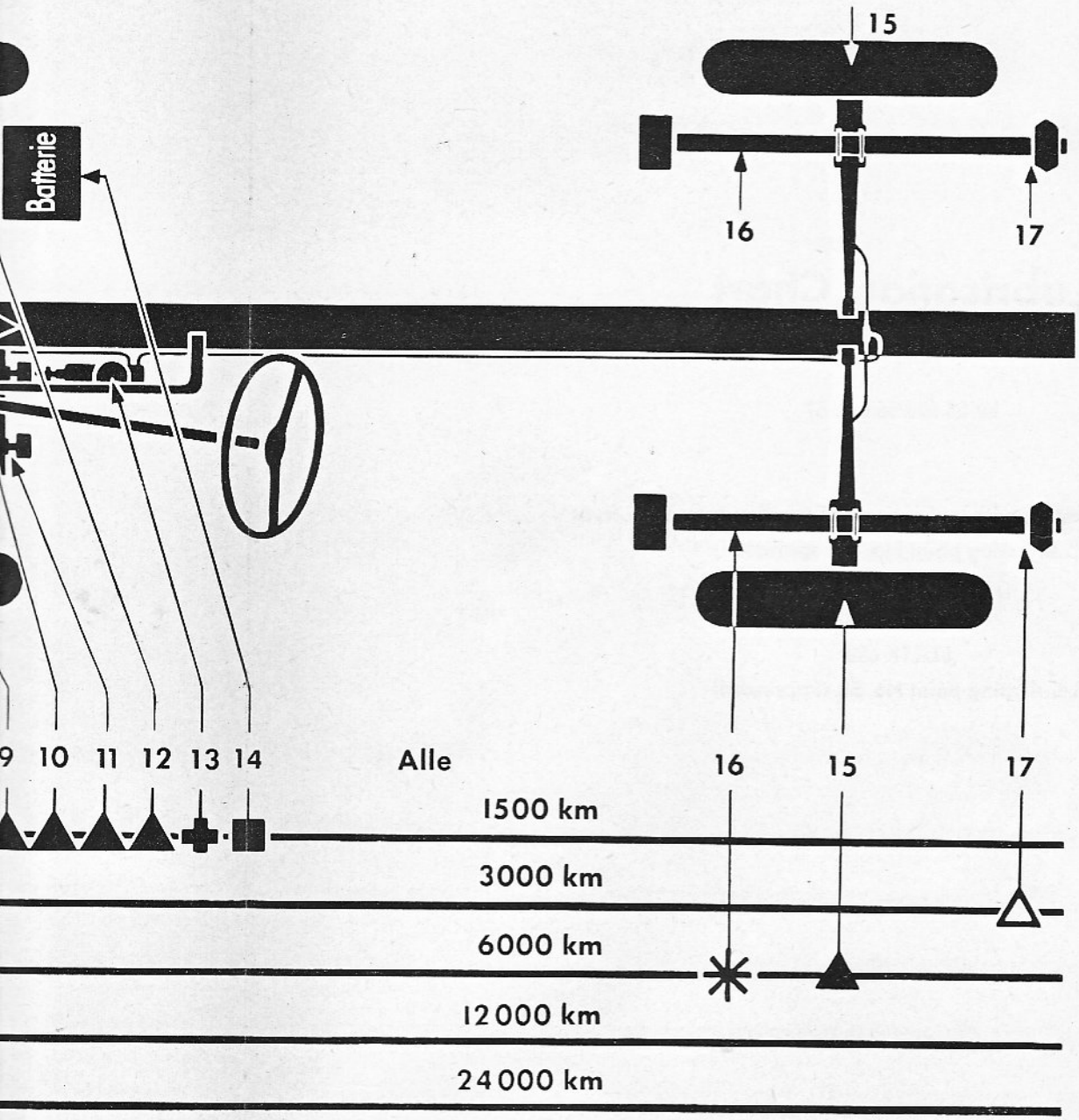
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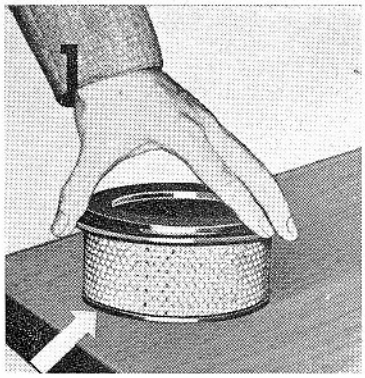
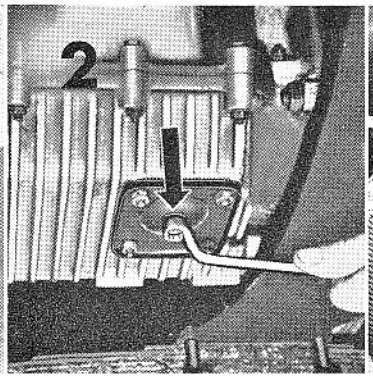
16
17
Batterie
9 10 11 12 13 14
Alle
16 15 17
1500 km
3000 km
6000 km
12000 km
24000 km

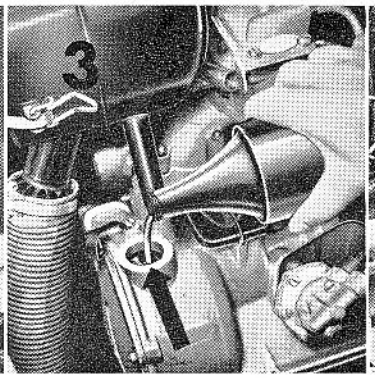
# Lubrication Chart

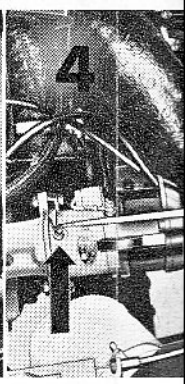
valid for

all models with coiled spring suspension, rear



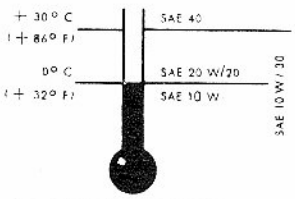




**Designation of Lubricating or Servicing Points**

1 – Air filter, dry
2 – Drain screw for engine oil
3 – Filler pipe for engine oil
4 – Ignition distributor
5a – 3-speed gearbox (transmission)
5b – 4-speed synchromesh gearbox (transmission)
6 – Steering housing
7 – Clutch lever
8 – Front wheel suspension and hinged joints
9 – Inner universal joints
10 – Inner universal shaft
11 – Pedal shaft
12 – Track-rod joints
13 – Master brake cylinder
14 – Battery
15 – Rear wheel hubs

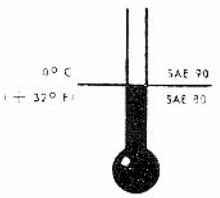
**Designation and Specification of Lubricants and other Servicing Materials**

◆ **Engine oil**
HD oil for Otto cycle engine (quality oil). For flushing do not use flushing oils. Use only an oil of the same quality grade as used for the new charge.




◇ Check for oil level in the engine

● **Gearbox (transmission) oil**
Four-speed synchromesh gearbox




At especially low outer temperature (below about 15° C = 5° F) we recommend the use of a transmission fluid (automatic transmission fluid) of a recognized quality grade.

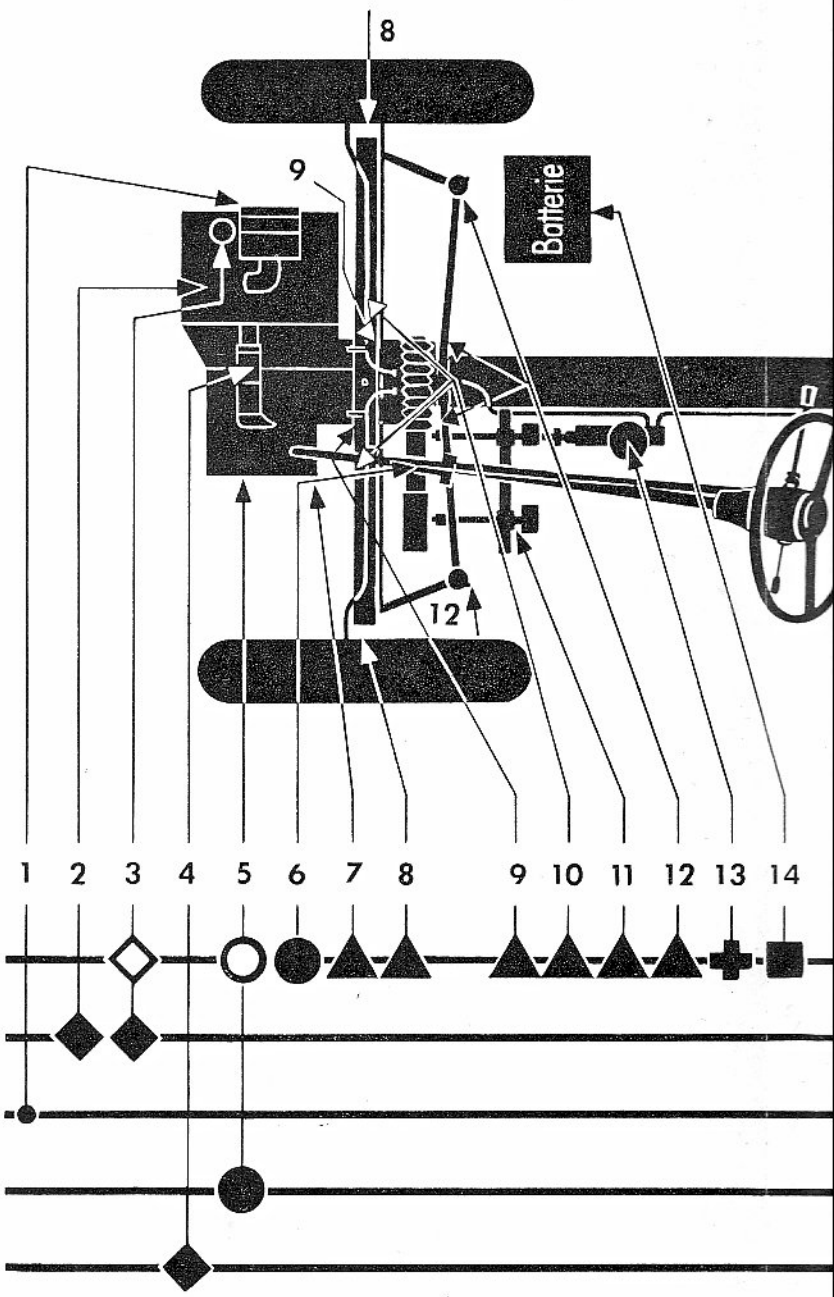
Three-speed gearbox: SAE 90 (summer and winter)
Steering: SAE 140 (summer and winter)

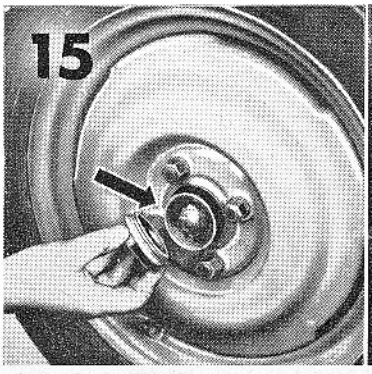
○ Check for oil level in the gearbox

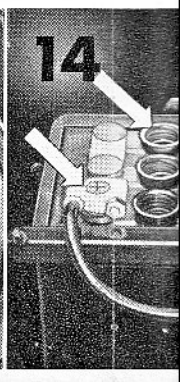
▲ Universal grease (multi-purpose grease)

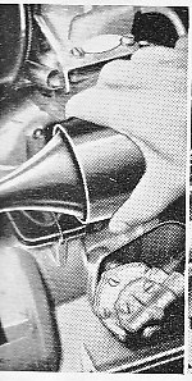
■ Distilled water

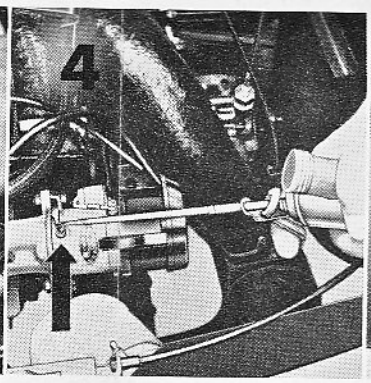
✚ Brake fluid "ATE blue" or Lockheed brake fluid

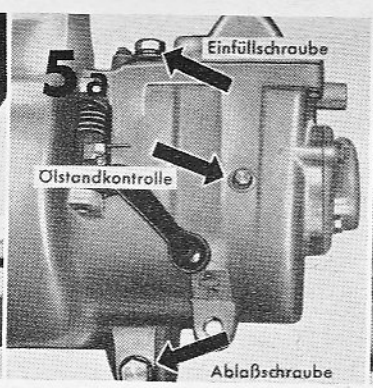


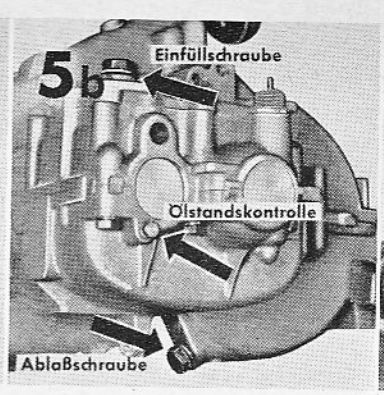



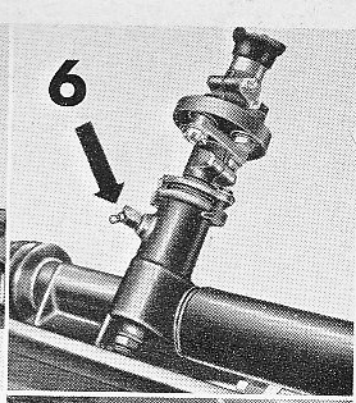



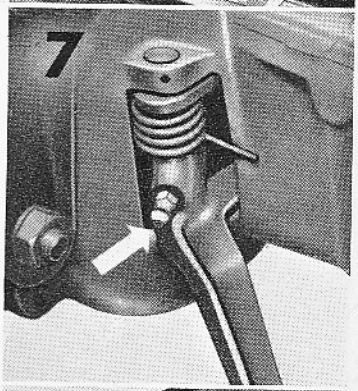


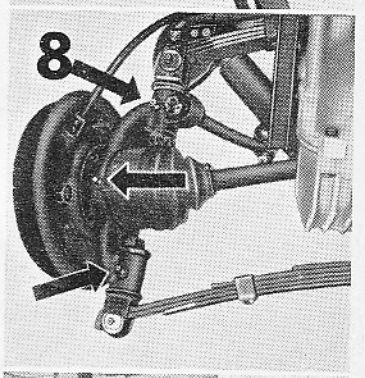


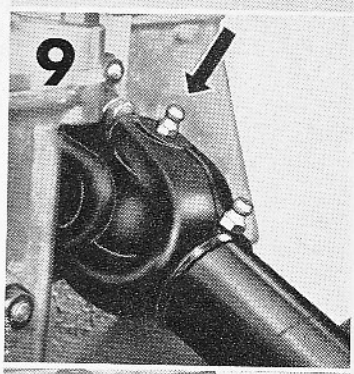



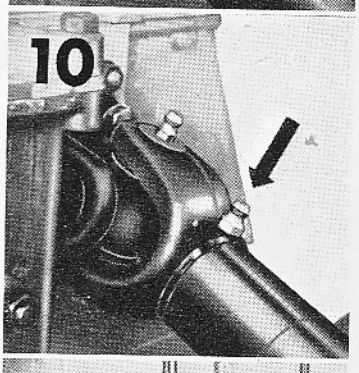



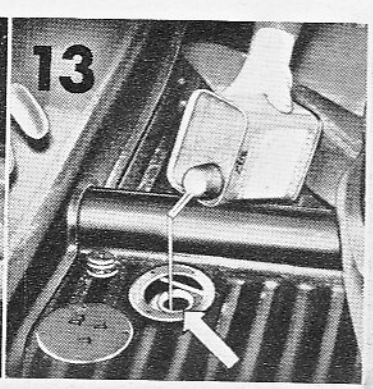



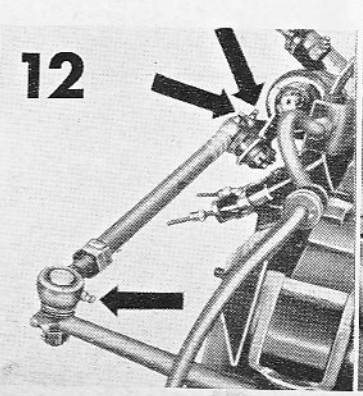



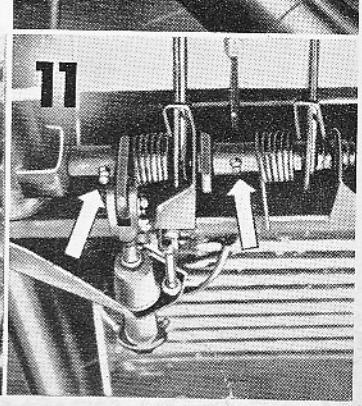



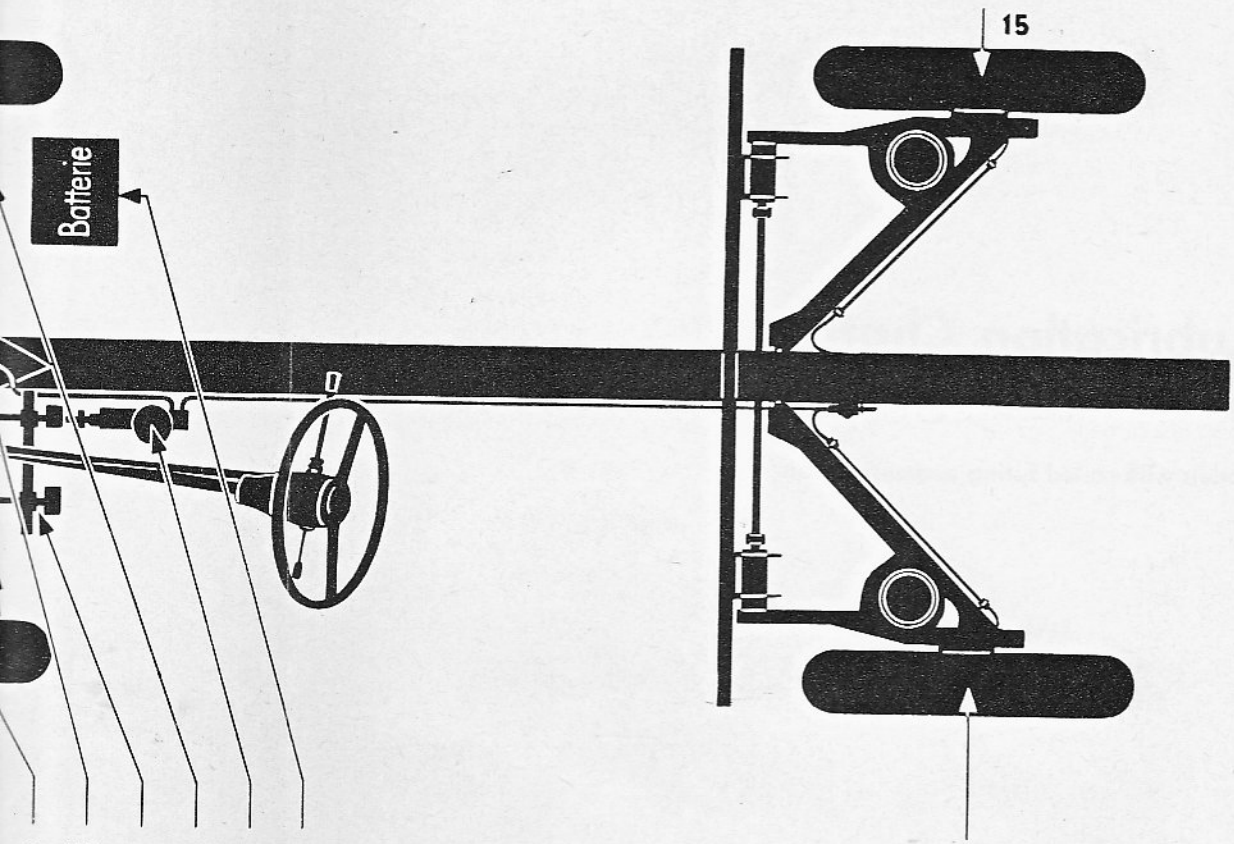








9 10 11 12 13 14 Alle 15

1500 km

3000 km

6000 km

12000 km

24000 km

## Hints for Lubrication-Service

For the lubrication of the cars the respectively valid lubrication chart is applicable. In connection with the lubrication the instructions given in the customer's Service Booklet have to be followed. Use only lubricants, the characteristics of which must conform to the data specified therein. As we do not favour any special approved brand, we shall not indicate here the name of lubricant manufacturers. If we specify so-called branded lubricants, this means that you are allowed to use those lubricants which correspond to the specifications issued by well-reputed oil manufacturers and the trade marks of which give security for uniform quality.

## Engine Oil

For the 600-ccm engines of both types (19 and 25 H.P. HD-oils are prescribed for gasoline engines (HD = Heavy Duty). HD-oils contain active substances to avoid acid formation, sludge, corrosion, etc. Moreover, these oils contain additives which are powerful dissolvents and have a large sludge carrying power. Thanks to these qualities any deposits in the engine (oil resins, oil carbon, etc.) are dissolved and kept in suspension in the oil so that on the change of oil all impurities may be eliminated with the old oil drained out of the engine. It results therefrom that a HD-oil will quickly show a dark discoloration in service without such „dark" oils being allowed to be called „deteriorated".

The L 600 engine should be operated in a profitable manner with an HD-oil. There is no reason to add any other lubricant – no matter what type – to a HD-oil.

The viscosity (fluidity of an oil) is indicated in SAE-degrees (SAE = Society of Automotive Engineers). Abroad engine oils are frequently designated according to the API-system (API = American Petroleum Institute). Depending on the qualification of any oil for definite service conditions the container of oils for gasoline engines are marked „for Service MS", "– – MM" or "– – ML".

For the L 600 engine, for example, an engine oil of the group "For Service MS" must be selected. The viscosity should be adapted to the climatic conditions, that is, according to the seasonal outer temperatures. For the 19 H.P. and 25 H.P.-engine, the same requirements are applicable.

- At outer temperatures between + 30° C (+ 86° F) and freezing point, i. e. down to 0° C (+ 32° F) use SAE 20 W/20. – summer time operation –
- As soon as a drop in the temperature below the freezing point is to be expected, oil should be replaced in due time by a SAE 10 W grade. – winter time operation –
- At extreme high continuous temperatures above + 30° C (+ 86° F) as generally usual only in so-called "warm countries", use only HD-oils SAE 40.
- So-called multi-grade oils are always HD-oils. According to their designation, for example, SAE 10 W/30, these oils have a viscosity corresponding to the viscosity of single-grade oils of the valence 10 W to 30. You are allowed to use multigrade oils in a L 600 engine, which may be run both in summer and winter times.

F = Fahrenheit

### Transmission-Oil

For the lubrication of gears only transmission oils of approved, well introduced, brands should be employed.

- For the **four-speed gearbox** at outside temperatures above 0° C (+ 32° F) an oil that meets the requirements of the specification SAE 90 is prescribed.
- As soon as temperatures below zero are expected, it is convenient to change in time the oil by an oil of SAE 80 to facilitate starting. Change of oil in the gearbox should be made when going over from summer to winter operation!
- At especially low outer temperatures (below appr. –15° C = + 5° F) it is recommended to use a so-called "transmission fluid" (Automatic Transmission Fluid) to facilitate starting.

  Transmission fluids can be supplied from well-known Lubricant Manufacturers under different brands. In doubtful cases, please consult our Customers Service Department for information.

  In the **three-speed gearbox** the prescribed gear oil SAE can be used throughout the entire year. When going over from summer to winter operation, gearbox oil need not be changed!

### Change of Oil

**Engine oils should be changed every 3000 km.** During the running-in periods shorter intervals are prescribed (at distances of 500, 1500 and 3000 kms.) = (300 m., 900 m. and 1800 m.).

If for any reason whatever a change of oil prescribed requires to be postponed, the additional distance should exceed 500 km.

A more frequent change of oil, however, is unnecessary also in the case of unfavourable service conditions such as short-distance traffic, winter drive.

Used oil should be drained out immediately after a tour, that is, if possible, with the warm engine. Open oil filling cover! If oil drains out only at a slow rate, this is an indication for a clogged strainer. Dismantle strainer immediately. Wash it in gasoline and then blow it out with compressed air. Check oil strainer and, if damaged, replace.

Flushing of the engine is recommendable practice. Use no flushing oil, etc., but about 1 litre of oil of the same quality as used for filling.

**Amount of oil required for engine 1.8 litres = .4 Imp. gall./.475 US Gall. – and not more.**

After every change of oil check with a dipstick for proper oil level, but also for tight seal of the closing cover and of the dipstick. (Check sealing rubber on dipstick for wear and replace, if necessary). Moreover, check also bushing of oil dipstick for possible loosenes.

**Change of transmission oil should be made every 12 000 kms. = .7200 m.** During the running-in period shorter distances are required (at distances of 500 and 3000 kms). The gear oil shall likewise be drained out with the engine warm, as in this case finest abrasive particles, etc. will be eliminated more easily.

**Amounts of oil required for filling: Three-speed gearbox, 0.9 litre = 1 US-Liquid quart; four-speed gearbox 1.0 litre = .22 Imp. Gall./.26 US Gall.**

### Check of Oil Level

**Engine**

The oil level must be checked only one minute after the engine has been stopped as the oil level can only be correctly measured after the entire oil has flow back into the crankcase.

The oil level should never drop below the lower mark on the dipstick, but shall always be maintained between both marks. If the oil level has reached the lower mark, it is not absolutely necessary to refill to the upper mark. Refill only an amount of oil to ensure that before the next oil change the oil level will not drop below the lower marking.

To avoid excessive oil temperatures, however, the oil level should be maintained close to the upper marking in summer time when the engine is subjected to heavy load as this is the case when driving on the highway over long stretches at high speed or on mountain roads.

At too high an oil level (more than 1.8 l = .4 Imp. Gall./.475 US Gall. oil) the oil will be excessively agitated in the crankcase and thus becomes splashed onto the cylinder walls, thereby, as experience shows, the excessive oil will be consumed in a relatively short time. Furthermore, an excessive high oil level may result in oil leakage at the vent slide valve. In any such cases engine oil will be found in the air filter casing.

At the factory new engines are filled with 1.25 l = .27 Imp. Gall./.32 US Gallon special running-in and anti-corrosive oil. In the case of longer shut-down periods this oil is suited to protect the interior of the engine from rusting in a far better and durable way than it can be done by a normal HD-oil. Simultaneously, such an oil is of great advantage for the first running-in process. After the first 500 km = 300 m. (first change of oil) it should be changed against 1.8 l = .4 Imp. Gall./.475 US Gall. HD-oil of the SAE-Specification in force at the time of oil change.

**Gearbox** (Transmission)

The oil level in the gearbox shall be checked on every service operation by screwing out the control screw plug. The oil level must line up with the lower edge of the bore. The hinged cap oiler on the gearbox cover serves to vent the interior of the gearbox. In order to avoid troubles due to overpressure or underpressure in the gearbox, care must be given to ensure that the air breather is not clogged.

As the oil in the gearbox fails to be consumed, the oil level will in normal cases drop between the various oil changes only by a small amount. If any loss of oil should be noticed, this might be an indication for a leakage.

## Oil Consumption

Every car engine provided with forced oil lubrication system will consume oil, just so the L 600 engine. If with the car in motion no small amount of oil would always enter past the piston rings the combustion chamber, the upper piston ring would receive no lubrication – this would at the least result in a high rate of wear of the cylinders.

Therefore, the oil consumption principally depends on the amount of oil burned during the power stroke. In addition, oil will always vaporize in the crankcase at sufficient service temperature of the engine. These oil vapours are passed through the venting to the air filter, from whence it is drawn off by the pistons – and also passed into the combustion chamber.

As to the effective oil consumption no definite data can be given as oil consumption depends in a high degree on the driving style or, in other words, on the load and speed of the engine. At economical driving habit, there will be consumption figures between 0.02–0.04 litre/100 kms = 0.2–0.4 litre/1000 kms. At maximum speed, the consumption can be several times higher as in this case more oil than normally usual will enter the combustion room owing to the more powerful pumping action of the piston rings and due to the suction of oil by the valve shafts – especially during the suction stroke.

If customers are complaining about high oil consumption and if no losses due to leakage can be detected, first check whether the consumption should be considered as normal with due regard to the driving style of the car driver, before you are suspecting any failure to the engine or wear of the cylinder and before you are going to detach and disassemble the engine, for example, for overhaul.

If the engine seems to consume no oil, this might in most cases be due to a dilution of the oil by gasoline, in addition to the always existing oil consumption. Any dilution of the oil may be due to the following causes:

1. Driving with excessively cold engine.
2. Starter flap actuated too long or does not open fully.
3. Incorrect manipulation of the accelerating pump (25 H.P. engine).
4. Troubles of the carburettor (leaky float needle valve, leaky or loose float, too rich idling speed adjustment).

### Steering

Lubricant: Transmission oil SAE 140. By no means grease or other oils should be used. For lubrication of the steering system use a hand grease press. Do not use a high-pressure device.

The steering system is properly lubricated, if oil escapes at top of the eccentric bush and, when checking with the hand, an amount of oil in the sleeve and in the protective bush can be felt. During lubrication service operation, always turn steering to either side until the stop.

### Lubricating with the High-Pressure Press

**Lubricant:** Universal or multi-purpose grease (approved grade).

These types of greases combine specific qualities of a lime-saponified lubricating grease with those of a soda-saponified antifriction bearing grease; they are water-repellent and heat- and cold-resistant and, therefore, well suited for the lubrication of plain friction bearings on the front axle (clutch lever, spring fork shafts, hinges, axles, pedal shaft and track-rods) and for the supply to the ball bearings on the front and rear wheel hubs and needle bearings of universal joints.

Before applying the lubricating press, clean carefully press nozzle and grease fittings (with kerosene or with diesel-oil-moistened rags) in order to avoid dirt to enter the fittings or between the gliding surfaces on pressing-in the grease.

All bearings will be properly supplied with lubricant if the used grease escapes laterally so that cleaning of the bearings is effected from inside. Wipe off any grease squeezed out, except a small "grease collar", so that it cannot come in contact with the tyres or brake hoses. The "grease collar" protects the bearings in an effective manner from water, dust and dirt. If in spite of several tests a bearing does not allow grease to be squeezed in, immediately eliminate cause of clogging.

**Clutch Lever.** Press in only a little amount of grease and carefully remove any excessive amount of grease. First apply grease press properly at the grease press fitting and only then pull lever. By closely following this procedure there is no risk of grease getting through the casing slot into the clutch casing owing to incorrect applying the grease press ("false shot"). (Do not hold jet of spray gun in the casing slot when spraying the chassis).

**Axle Head.** Hinge joints and wheel bearings are sufficiently supplied with grease when grease can be distinctly felt in the axle head protection bush. Check by hand. Never fill up protection bush tightly.

Underlubrication: Insufficiently greased or dry universal joints (fluttering of steering, especially on speeding up).

Overlubrication: Greased brakes.

Check protection cover for damage; replace damaged protection cover immediately.

**King-Pin Support**

Regular sufficient lubrication of the suspension fork prevents not only premature wear of bearing bushes, but ensures easy movability of the steering mechanism. If the steering system should show no free movability, check always movability of the king-pin support as well as adjustment of steering.

**Universal Joints (inner joints)**

The universal joints are properly supplied with grease if old grease escapes at **all 4 needle bearings.**

**Rear Wheel Bearings**

These bearings must be supplied with new grease every 6000 kms.! Remove old grease and refill with new grease only to such a degree a the cleaned closing flap may take up. Give care to greatest cleanliness so as to avoid dirt getting into the ball bearings.

**Additional Lubrication and Maintenance Work**

**Ignition Distributor**

Check oil in the hinged flap oiler after distance of 500 kms. and refill, if necessary. Refilling would be necessary not before a distance of 24000 kms. is reached and then every 24000 kms. Only some drops of engine oil would suffice.

**Leaf Springs**

Every 3000 kms lubricate sliding bearing of rear spring in the models 600/56 and 57 and LT 600 with graphited grease. Replace worn silentblocs!

Do not lubricate front bearing of rear springs!

Spray front and rear leaf springs at intervals of 6000 kms (if required, more often) in unloaded condition with graphited spray oil.

Regular lubrication of the following lubricating points which are not indicated in the lubrication chart, prevents premature wear, labouring of the engine and possibly troublesome noises during road operations.

Carburator joints
Locks on engine hood and trunk lid
Hood-support
Hinges on hood and trunk lid
Hinges on heater and defroster flaps
Brake equalizer of hand brake
Windscreen wiper joints
Hinges on the rear seat
Window crank (only at larger intervals)

Lubricant:
Engine Oil SAE 10

Previously clean lubricating points. Remove drip oil carefully!

Grease inner wire of Bowden-cables:

Cable for clutch
throttle
choke
hood
trunk lid

Lubricant:
Universal grease

Clean and apply a thin coat of grease to locking plates of doors and seat rails of front seats.
Keep lock bolts free of oil and dirt!

Do not oil cylinder lock but treat with dry graphite periodically, particularily in winter to prevent lock from freezing-in. Also inject dry graphite into key-hole and turn key several times back and forth.

## Hints for maintenance service

Powder door sealing rubber profiles and sealing rubber for crank disk with talc. Previously, remove rubber abrasives on door grooves with gasoline.

It is recommendable to replace blades of windscreen wiper every 6 months, respectively every year, depending on the degree of wear.

**Brake**

Brake fluid: Ate blue or Lockheed brake fluid.

In the interest of road safety, the fluid level in the compensating tank must be checked on every service operation. If a greater loss of brake fluid is stated, check brake system for leakage and repair instantly, if necessary.

Be sure water drain hole in the protective sleeve on the brake master cylinder is free!