



Giulietta
Giulietta sprint

Operation and Maintenance



GIULIETTA
AND
GIULIETTA SPRINT

OPERATION AND MAINTENANCE

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WARNING

The operation and maintenance instructions contained in the present handbook must be scrupulously observed by every user who desires to get the best from his vehicle and to ensure the long life of every part.

In his own interests the user is recommended to read this handbook at least once from cover to cover, and to consult it in all cases where help is needed in tracing and eliminating faults, and with a view to a better understanding of the operational features of the car itself.

Not all maintenance work or adjustments can be carried out by the owner; in such cases he is advised to consult the nearest Alfa Romeo branch or authorized garage so as to be sure of receiving expert help and attention.

OWNERS' ADVISORY DEPARTMENT



Fig. 1. - « Giulietta » Four-seater saloon.

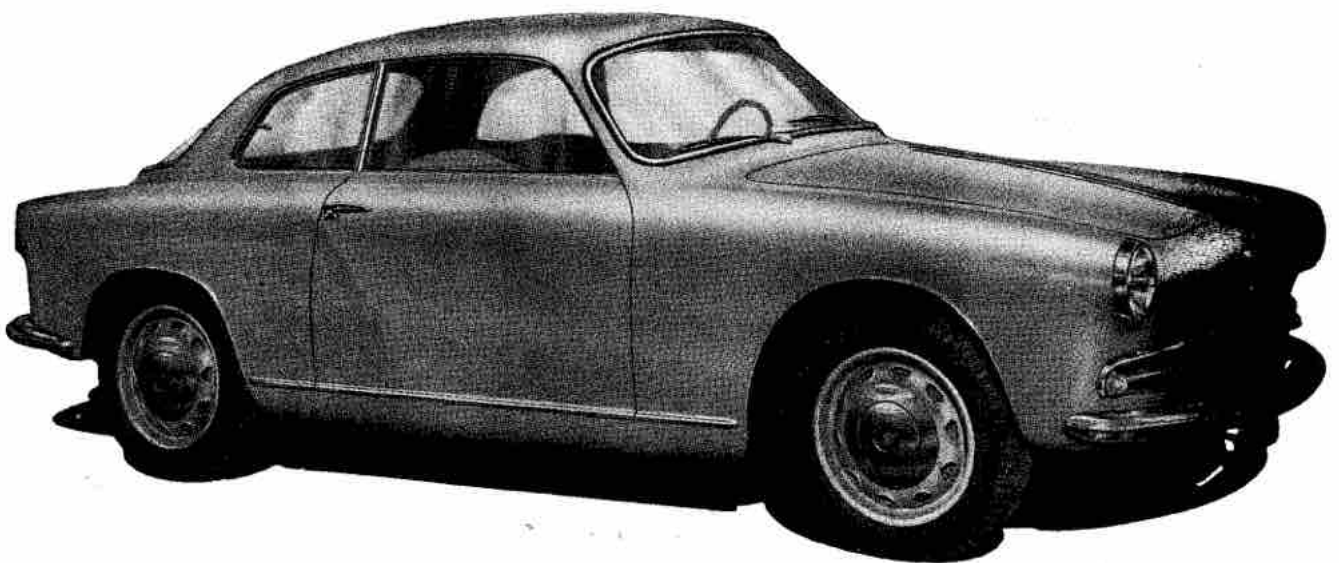


Fig. 2. - « Giulietta Sprint » Two-seater saloon.

ENGINE AND CHASSIS IDENTIFICATION NUMBERS



Fig. 3. - The engine number is stamped on the right-hand side of the crankcase, and towards the front.

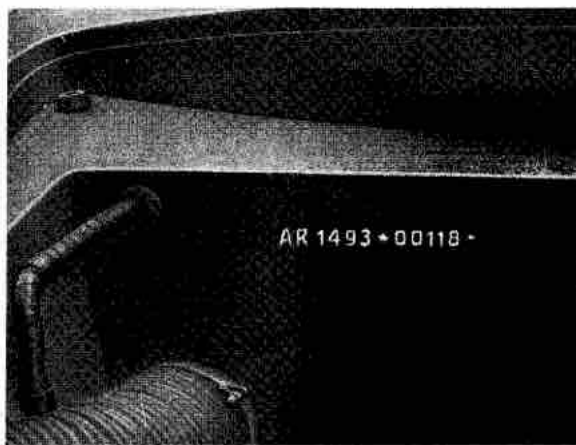


Fig. 4. - The chassis number is stamped on the right hand side of the scuttle behind the engine.

1st PART

MAIN FEATURES

Number of cylinders	4	
Bore and stroke	74 x 75 mm.	COMP. PRESS 1457.50 [#] @ RANKING SPEED
Total capacity	1290 cc.	
Max. power	Giulietta, at 5200 r.p.m.	50 H.P.
	Giulietta Sprint, at 6000 r.p.m.	65 H.P.
Front track	1286 mm.	(4 ft. 2 ¹¹ / ₆₄ ins.)
Rear track	1270 mm.	(4 ft. 2 ins.)
Wheel-base	2380 mm.	(7 ft. 10 ins.)
Minimum turning-circle diametre	11000 mm.	(36 ft. 1 ⁵ / ₆₄ ins.)
Overall length	Giulietta	3990 mm. (13 ft. 1 ⁵ / ₆₄ ins.)
	Giulietta Sprint	3980 mm. (13 ft. 2 ² / ₃₂ ins.)
Overall width	Giulietta	1555 mm. (5 ft. 1 ¹⁵ / ₆₄ ins.)
	Giulietta Sprint	1535 mm. (5 ft. 7 ¹ / ₁₆ ins.)
Overall height	Giulietta	1405 mm. (4 ft. 7 ⁵ / ₁₆ ins.)
	Giulietta Sprint	1320 mm. (4 ft. 4 ins.)
Weight	Giulietta	880 Kgs. (17 cwts. 1 qrs.)
	Giulietta Sprint	850 Kgs. (16 cwts. 3 qrs.)
Max. speed	Giulietta	135 Kms. p.h. (84 m.p.h.)
	Giulietta Sprint	160 Kms. p.h. (100 p.m.h.)

Fuel consumption / per 100 kms. — 62,5 miles (Italian C.U.N.A. specification)	}	Giulietta 8,3 litres	(1 ⁶ / ₈ Imp. gallons)
		Giulietta Sprint 9 litres	(2 Imp. gallons)

Oil consumption per 100 km (at normal speeds) about 150 grams. (5 oz.)

Number of seats	}	Giulietta	4
		Giulietta Sprint	2

Tyres 380 x 155 (155 - 15)

Electrical equipment 12 volts

PERFORMANCE

Maximum speeds in various gears (with normal 4,55 : 1 gear axle ratio) which, if exceeded, may cause mechanical damage:

Giulietta	}	1st gear	41 Kms. p.h. (26 m.p.h.)
		2nd gear	70 Kms. p.h. (44 h.p.m.)
		3rd gear	100 Kms. p.h. (62 m.p.h.)
		Top gear	135 Kms. p.h. (84 m.p.h.)
		Reverse	40 Kms. p.h. (25 m.p.h.)
Giulietta Sprint	}	1st gear	45 Kms. p.h. (28 m.p.h.)
		2nd gear	76 Kms. p.h. (47 m.p.h.)
		3rd gear	118 Kms. p.h. (74 m.p.h.)
		Top gear	160 Kms. p.h. (100 m.p.h.)
		Reverse	48 Kms. p.h. (30 m.p.h.)

DESCRIPTION OF THE MAIN UNITS

ENGINE

The **Cylinder-block** is of light alloy with inserted special cast-iron wet cylinder liners.

The light alloy **Cylinder head** has inserted valve seats with hemispherical combustion chambers and the sparking plugs are on the centre line of the cylinders.

The **crankshaft** runs on five bearings and is statically and dynamically balanced.

The **connecting rods** are in special steel, and the special alloy **pistons** have 2 compression rings (the first of which is chromium-plated) and 1 oil scraper ring.

The thin wall **main crankshaft and connecting-rod bearings** are of steel lined with **lead-indium anti-friction metal**.

The **oil sump** is in **pressed steel** and of special design to facilitate oil cooling.

Valve gear

The overhead valves are set at an angle of 80° and are directly operated by twin chain-driven overhead cam-shafts with chain tensioning device; the intermediate drive is by a second chain and a sprocket keyed to the crankshaft.

Fuel feed

The fuel is conveyed from the tank (located at the rear of the car) to the carburettor by a mechanical pump mounted on the front of the cylinder-head and driven by the exhaust cam-shaft. On request an additional electric pump can be supplied. The inlet pipe is surrounded by the engine cooling water.

The carburettor of the « Giulietta » is a Solex 32 BIC vertical, down-draught, with a starting device.

The Solex model 32 PAIAT carburettor for « Giulietta Sprint » is of the vertical, down-draught, double-port type and has an acceleration pump and a starting device.

An air filter, complete with silencer and a star-shaped felt element, is mounted above the carburettor.

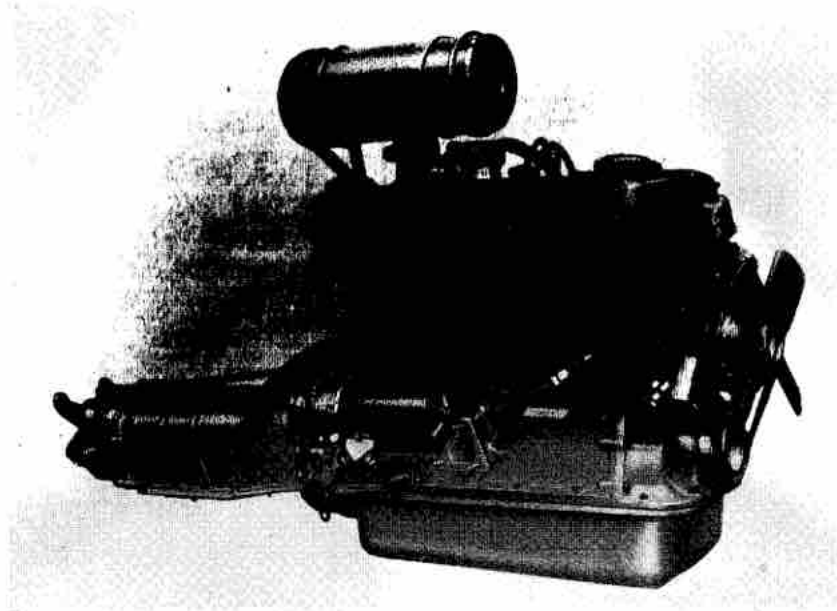


Fig. 5. - Engine and gear-box seen from the inlet side (Giulietta).

Ignition

The ignition system is of the battery and coil type with a distributor having a centrifugal ignition advance device assisted by another pneumatic device acting only at partial throttle openings.

Lubrication

The pressure-lubrication system is operated by a submerged gear-wheel pump mounted at the front of the crank-case.

The ignition distributor is mounted on an extension of the pump shaft which is driven directly from the crank-shaft by a pair of helical gears.

A filter comprising a felt cartridge is inserted in the pressure circuit.

Cooling.

The engine is cooled by the forced circulation of water driven by a centrifugal pump. To ensure rapid warming up of the engine, a thermostat is fitted in the pipe leading from the engine; it opens only when the water reaches a temperature of 80 to 85° C (175 to 185° F).

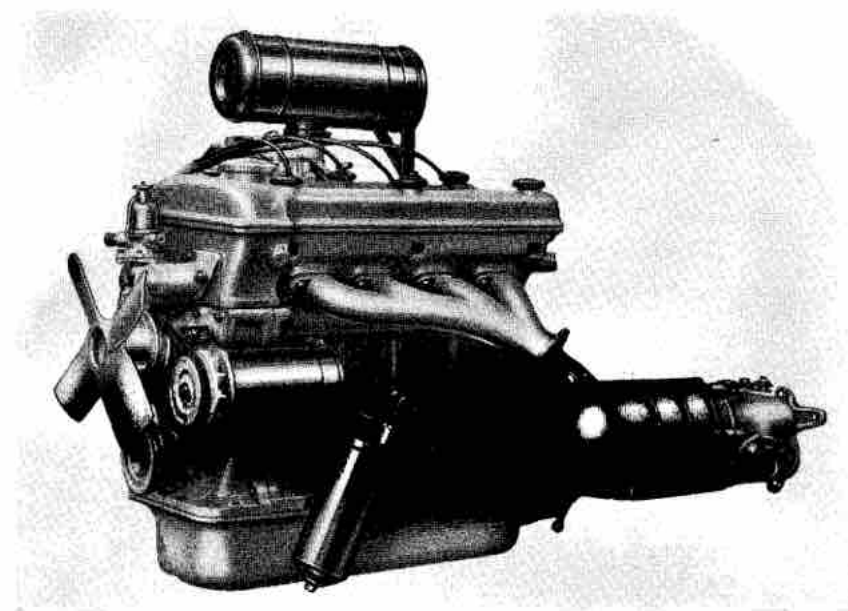


Fig. 6. - Engine and gear-box seen from the exhaust side (Giulietta).

To attain high thermal engine efficiency, the maximum water temperature is kept at 105 to 110° C (220 to 230° F) and the water circuit is therefore under pressure even in the radiator.

Suspension of the engine and gear-box unit

The engine gear-box unit is mounted on three rubber blocks, one on each side of the engine and one behind the gear-box.

TRANSMISSION

Clutch

The clutch is of the dry, single-plate type with flexible centre.

Gear-box

The gear-box, bolted to the engine, has four synchronised forward gears and one reverse.

The hand-operated gear-change lever is below the steering wheel. On request a centrally placed lever can be fitted.

Propeller shaft

The propeller shaft is in two sections with an intermediate support flexibly attached to the body-work; the front section has a rubber flexible joint behind the gear-box, with needle roller-bearing universal joints at both ends of the second section.

Rear axle

The rear axle is anchored longitudinally to the supporting structure by two radius rods with rubber blocks at each end.

Transverse anchoring is effected by an upper triangular member secured to the body through rubber bushes and to the rear axle through a spherical joint. The rear axle drive is of the hypoid type.

FRONT SUSPENSION

The front wheels are independently sprung with transverse rectangular-section wish-bones, coil springs, telescopic shock-absorbers and a stabiliser rod.

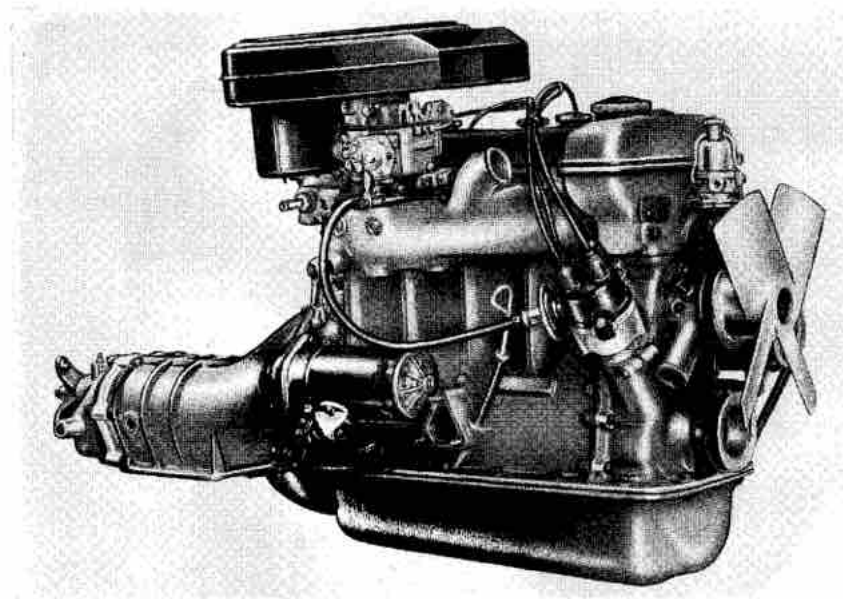


Fig. 7. - Engine and gear-box seen from the inlet side (Giulietta Sprint).

REAR SUSPENSION

The rear suspension is by coil springs with telescopic shock-absorbers co-axial with the springs so that very effective damping is obtained.

STEERING

The steering box houses a worm and roller type gear. Steering is to the best, and independent of the spring movement.

BRAKES

The braking system comprises hydraulic brakes acting on all four wheels; the hand brake acts on the rear wheels only.

At the front, the floating brake-shoes on each wheel are operated by two cylinders while the drums have helical cooling fins.

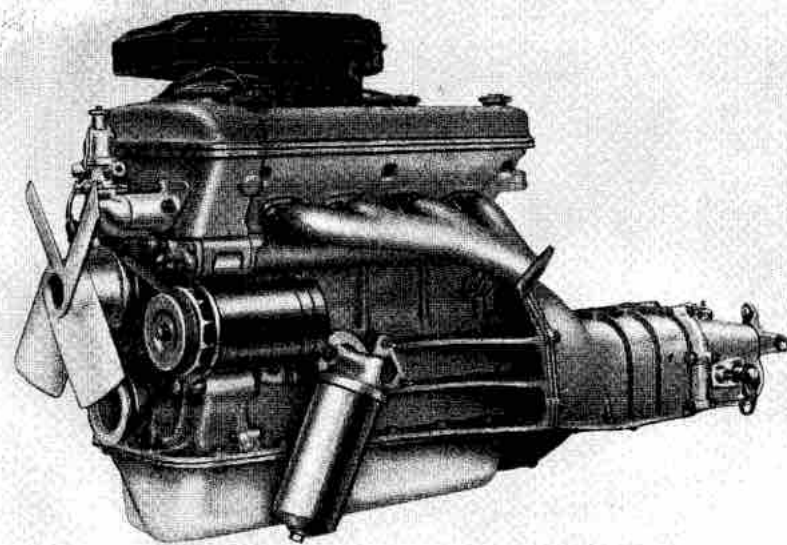


Fig. 8. - Engine and gear-box seen from the exhaust side (Giulietta Sprint).

WHEELS AND TYRES

The wheels are of the pressed steel disc type.

Wheel sizes: 4½J x 15.

(On special request, for the Giulietta Sprint, quick-change wheels with wing nuts can be supplied with suitable hubs, front and rear).

Tyres: 155-15 (380 x 155).

ELECTRICAL SYSTEM

The 12-volt electrical equipment comprises the following main units:

Battery	Giulietta	38 A/h	
	Giulietta Sprint	30 A/h	
200 W dynamo		Lucas C 39 PV 2	
Dynamo regulator		Lucas RB 106/1	
Starter motor		Lucas M 325	
Distributor		Lucas DM 2	
Coil		Lucas B 12	
Sparkling plugs	N 8 B	Marelli CW 240 D	10004240
Windscreen wipers		SWF	

HEATING AND VENTILATING EQUIPMENT

The heating system comprises a radiator and fan unit located beneath the dashboard. Hot water from the engine circulates through the radiator and a small low-consumption electric motor drives the fan.

There are two dynamically operated air inlets at the front for ventilation. These convey the air into the car through two shutters operated by hand.

FILLING UP

Fuel tank capacity } Giulietta 40 lt. (8⁶/₈ gallons)
 } Giulietta Sprint 53 lt. (11⁵/₈ gallons)
 (a larger tank can be supplied on request)

Water: Engine and radiator: 7,5 litres (13 pints)

Oil	Engine	about 5 Kg. (8 ³ / ₄ pints) in sump and 0,7 Kg. (1 ³ / ₄ pints) in the filter
	Gear box	about 1,45 Kg. (2 ³ / ₄ pints)
	Rear axle	about 1,25 Kg. (2 ¹ / ₂ pints)
	Steering box	about 0,25 Kg. (½ pint)

11th PART

HOW TO GET THE BEST RESULTS

RULES TO OBSERVE DURING THE FIRST 3000 KM. (2000 MILES)

To allow the various parts of the car to bed down (particularly where the engine is concerned) a period of running-in is necessary; during that time maximum performance must not be expected.

It is therefore essential not to exceed the speeds indicated below during the first 3000 Km (2000 miles):

Model	Distance covered	Maximum speed allowed	
		1 st gear	2 nd gear
Giulietta	0 to 1000 Km.	1 st gear	29 Km. (18 miles)
		2 nd gear	48 Km. (30 miles)
		3 rd gear	70 Km. (44 miles)
		4 th gear	95 Km. (59 miles)
Giulietta Sprint	(0 to 600 miles)	1 st gear	30 Km. (18 miles)
		2 nd gear	55 Km. (34 miles)
		3 rd gear	80 Km. (50 miles)
		4 th gear	110 Km. (68 miles)
Giulietta	1000 to 3000 Km.	1 st gear	35 Km. (20 miles)
		2 nd gear	59 Km. (37 miles)
		3 rd gear	85 Km. (53 miles)
		4 th gear	115 Km. (72 miles)
Giulietta Sprint	(600 to 2000 miles)	1 st gear	40 Km. (25 miles)
		2 nd gear	65 Km. (40 miles)
		3 rd gear	100 Km. (62 miles)
		4 th gear	135 Km. (84 miles)

In addition:

When starting

Cut out the starter as quickly as possible.

Before moving off, allow the engine to idle at some 1500 r.p.m. for 3 minutes in summer and 5 minutes in winter.

When in motion

Do not press the accelerator to the floor-boards.

Release the accelerator from time to time.

During the first 1000 Km. (600 miles) avoid prolonged and sharp braking.

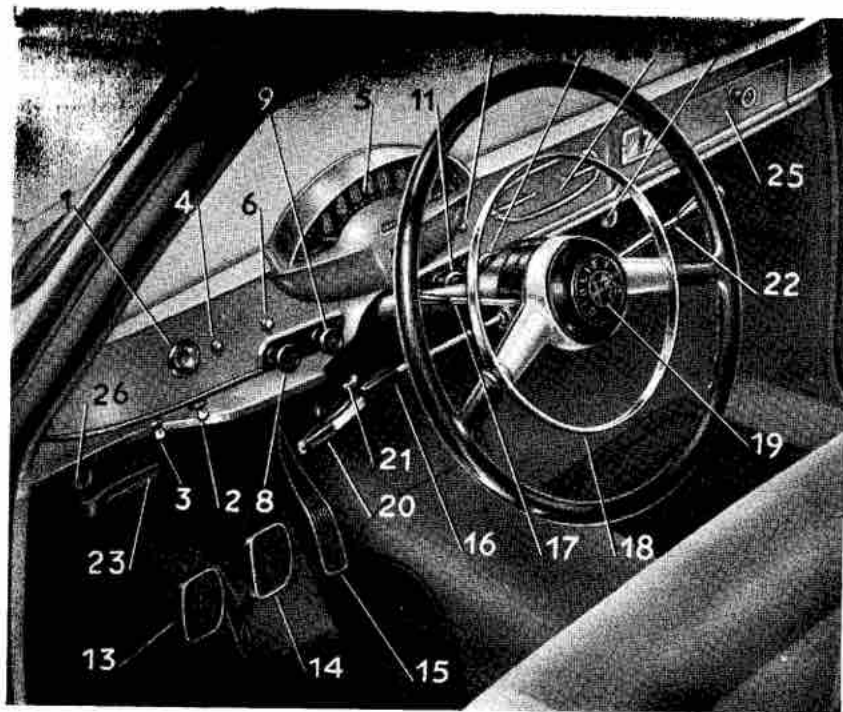


Fig. 9. - Controls and instruments (Giulietta).

1. Switch for ignition and the electric system. - 2. Windscreen wiper switch. - 3. Fascia-board light switch. - 4. Dynamo tell-tale. - 5. Speedometer, petrol level indicator, oil gauge, petrol reserve tell-tale, trafficator tell-tale. - 6. Head light tell-tale. - 7. Heater tell-tale. - 8. Head-lamp knob. - 9. Knob for hand-accelerator control. - 10. Heater motor knob. - 11. Knob for carburettor control when starting. - 12. Levers controlling ventilation shutters. - 13. Clutch pedal. - 14. Brake pedal. - 15. Accelerator pedal. - 16. Head-lamp dipping switch. - 17. Trafficator switch. - 18. Ring for horn operation. - 19. Push-button for head-lamp intersection signalling. - 20. Hand-brake control lever. - 21. Starter-motor lever. - 22. Gear change lever. - 23. Lever for operating bonnet. - 24. Radio (on request). - 25. Glove compartment. - 26. Lever for controlling air into the heater.

Changing the oil

During the running-in period, change the oil in the engine as follows:

1st change of oil after first 1000 Km. (600 miles)

2nd change after next 2000 Km. (1200 miles)

3rd change after next 3000 Km. (1800 miles)

Subsequent changes every 5000 Km. (3000 miles)

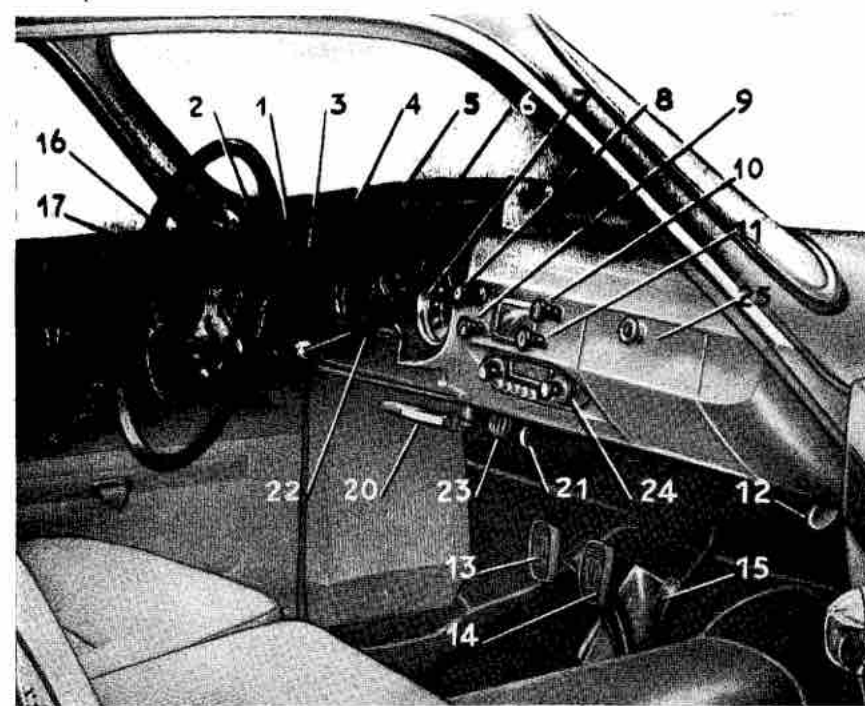


Fig. 10. - Controls and instruments (Giulietta Sprint).

1. Switch for ignition and the electric system. - 2. Wind-screen wiper switch. - 3. Fascia-board light switch. - 4. Switch for car interior light. - 5. Thermometers for water and oil temperatures, petrol level indicator, headlight tell-tale, trafficator tell-tale, petrol reserve tell-tale. - 6. Revolution counter, oil pressure gauge. - 7. Speedometer, dynamo tell-tale, heater tell-tale. - 8. Head-lamp switch. - 9. Knob for hand-accelerator control. - 10. Heater motor knob. - 11. Knob for carburettor control when starting. - 12. Lever controlling ventilation shutters. - 13. Clutch pedal. - 14. Brake pedal. - 15. Accelerator pedal. - 16. Head-lamp dipping switch. - 17. Trafficator switch. - 18. Ring for horn operation. - 19. Push-button for head-lamp intersection signalling. - 20. Hand-brake lever. - 21. Starter motor lever. - 22. Gear-change lever. - 23. Lever for operating bonnet. - 24. Radio (on request). - 25. Glove compartment.

HOW TO USE THE CONTROLS AND THE VARIOUS INSTRUMENTS

(Fig. 9-10)

Switch for electrical system

Insert the **key** in the socket **1** and turn it to the right until a click is heard; this **closes** the starter-motor contacts. The dynamo tell-tale **4** (fig. 9) or that near the instrument **7** (fig. 10) lights up and shows that the **battery** circuit is closed. This tell-tale should go out as soon as the dynamo reaches the battery charging speed, that is, about 1100 engine r.p.m.

Lever for starting the engine

To close the starter-motor circuit, pull out lever **21**.

Knob for car lights

Pull out knob **8** and the **front lamps** for town driving and the rear lamps with the **parking lights** are switched on. The tell-tale light **6** (fig. 9) or that in the instrument **5** (fig. 10) then glows. Continue pulling on the knob, after turning it to the right, and the main head-lights will also switch on. (Use lever **16** to obtain full or dipped lighting).

Push-button for head-lamp intersection signals

The push-button **19** mounted in the centre of the steering wheel is used to flash head-lamp warnings when crossing street intersection. Depressing the push-button changes the lights to full, whether the anti-dazzle lamps or those for town driving are alight. The lighting is not changed if full lighting is already on.

Dipping switch

Rotating switch lever **16**, after operating knob **8** alternatively switches on the full light and the anti-dazzle filaments.

Trafficator switch

Rotating the direction-indicator switch lever **17** up or down causes the front and rear off and near-side lamps respectively to flash intermittently. The tell-tale light in instrument **5** glows while they are switched on.

Heater switch knob

Turning the knob **10** to the right causes the motor to run up to its maximum rate; this is signalled by the heating tell-tale **7** (fig. 9) or that near the instrument **7** (fig. 10). By turning the knob further a **regulating** rheostat is inserted with a consequent reduction in the speed of the motor.

Knob for the starting device on the carburettor

Knob **11** actuates an arrangement for adjusting the carburettor when starting the engine. Pulling this knob out as far as it will go gives a rich mixture for starting from cold; pushing the knob back half way gives a slightly rich mixture for warming up the engine.

Oil pressure gauge

The oil pressure gauge shows the engine lubricating oil pressure. This gauge should be observed from time to time while the car is running, especially if the engine is running under severe conditions. Should the pressure drop below the proper figure (see p. 24) the engine must be stopped and the cause discovered.

Fuel level indicator

The fuel level indicator in instrument **5** shows the quantity of fuel in the tank. When the « petrol reserve » tell-tale glows there is only a reserve of from 6 to 7 litres (5 to 6 quarts) of petrol.

Tell-tale lamps

The red « dynamo » tell-tale should not go out until the dynamo has reached the necessary speed for battery charging, that is, when the engine is running at about 1100 r.p.m.

The red « direction indicator » lamp duplicates on the fascia board the blinking of the direction indicating lamps.

The amber « heater » lamp glows when the motor actuating the heating fan is switched on.

The green « head-lamp » tell-tale glows when the knob for switching on the car head-lamps is in use.

The red « petrol reserve » lamp signals a reserve of only 6 to 7 litres (5 to 6 quarts) of fuel in the tank.

Bonnet catch lever

To open the top of the bonnet pull the lever **23** to unlatch the locking bolt.

Lever for adjusting the position of the front seats

Lifting the locking levers at the front of the seats enables the latter to be moved to the most comfortable position. The seats remain locked as soon as the lever is released.

BEFORE, DURING AND AFTER USE OF THE CAR

Filling up and checking before using the car

Before starting the engine, always check the level of the water in the radiator, the oil in the sump, the fuel in the tank and the tyre pressures (see p. 58).

To ensure the most efficient engine performance it is advisable to use:

- 80 octane grade petrol for the « Giulietta »
- 90 octane grade petrol for the « Giulietta Sprint »

It may be necessary, when the car has been idle over a long period, to remove the sparking plugs and clean the points with a wire brush dipped in petrol; the various parts of the car should also be lubricated.

Starting the engine from cold

Before starting the engine make sure that the gear lever is in neutral (fig. 11).

Pull the knob **11** (figg. 9-10) full out, insert the key in the ignition switch, then turn it to the right and pull on lever **21** to start the engine.

As soon as the engine fires, release lever **21** and return knob **11** to the mid-position for long enough to warm up the engine.

If the engine fails to fire promptly, do not continue to pull on lever **21** (or you will discharge the battery), but repeat the operation after waiting a few minutes. If, after several attempts, the engine does not start as readily as usual, steps must be taken to trace the reason.

The most probable reasons why it may be found difficult, or impossible, to start the engine are the following:

- Battery insufficiently charged to give the starting motor adequate speed.

- Defective ignition system (faulty sparking plugs, distributor or coil).
- Dirty carburettor, resulting in clogged jets.
- Electric circuit breakdown or blown fuses.

Starting the engine when warm

During the summer, or if the engine is still warm from a previous run, it is unnecessary to pull out the carburettor starting control knob.

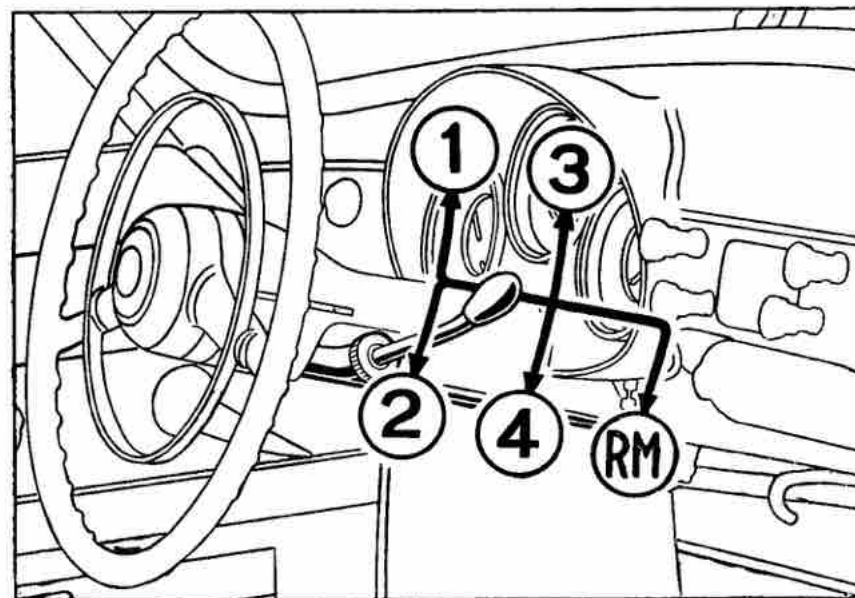


Fig. 11. - Gear-lever position for the different speeds.

1. 1st gear. - 2. Second gear. - 3. 3rd gear. - 4. Top gear. - R.M. Reverse.
Note: The illustration shows gear lever in neutral.

Before moving off

After starting the engine, let it tick over at a moderate speed for a few minutes in the summer, and for a longer period in the winter, until it is sufficiently warm. Avoid accelerating until it is well warmed up, since when the engine is cold the oil cannot reach all the points which need lubrication.

Ensure that the oil pressure gauge shows a pressure of from 3,5-4 Kg/cm² (50 to 56 pounds per square inch) with the engine running at a moderate speed.

While the car is in motion

The position of the gear levers or the different speed is shown in fig. 11.

Changing up or down between all gears is facilitated by synchro-mesh for all speeds.

Do not rest the foot on the clutch pedal except when actually using the pedal.

Avoid operating the engine above the maximum engine revolutions, and do not exceed the recommended speeds during the running-in period.

Glance at the oil pressure gauge from time to time and stop the engine if the pressure drops below 4 Kg/cm² (56 p.s.i.) at the maximum speed and with the engine warm.

Glance at the « dynamo » tell-tale at intervals; it should remain extinguished when the engine reaches 1100 r.p.m.

For effective braking, the brake pedal should normally operate when depressed only half way to the floor-boards; it should never be possible to depress it through two-thirds of its available stroke.

After stopping the car

After stopping the car remove the key from the ignition switch.

If the car is stopped on an incline, apply the hand-brake.

In order to prevent serious consequences when temperatures fall below freezing point, and unless an anti-freeze solution has been added to the water, the radiator and engine must be emptied immediately after stopping.

This is done by opening the taps at the bottom of the radiator and on the left-hand side of the engine.

If the car is to remain idle for a long period

— Drain the radiator and the engine, preferably with the engine still hot.

- Drain the fuel from the petrol tank, the fuel pump and the carburettor float-chamber.
- Clean the oil and petrol filters.
- Introduce a little oil into the cylinders through the sparking plug holes and turn the crankshaft by hand for two or three revolutions so as to spread a film of oil on the cylinder walls.
- Remove the battery and store it where not exposed to frost; have it recharged once a month.
- To protect tyres without removing them from the rims, lift the car from the ground, clean the tyres and inflate the inner tubes. If, on the other hand, the tyres are removed, sprinkle the inside of the covers and the inner tubes with French chalk, place the tubes in the covers and store in a dark place where the atmosphere is fresh and not damp.
- Smear all non-painted metal parts with an anti-rust grease.
- Sprinkle seats and floor mats with moth preventive.
- Cover the car with a dust-sheet.

HEATING AND VENTILATING EQUIPMENT

The heating equipment consists of a radiator and fan unit placed below the instrument panel, and of ducts for collecting and distributing the air. Part of the engine cooling water is used to heat the radiator, while a low-consumption electric motor operates the fan.

Heating

- Open the tap to admit hot water from the engine.
- Start the fan motor by turning the control knob to the right. Remember that turning the knob first of all runs the motor at its maximum speed (shown by the « heating » tell-tale); turning it further round switches in the rheostat with the consequent reduction in motor speed.
- For the « Giulietta » car the air is sucked in from outside the car and heated going through the heater; by handling the air controlling lever there occurs what follows:
 - a) lever at the top position: air is blown into the car and partly onto the windscreen.

- b) lever at the centre: there is no air passage;
 - c) with the lever at the bottom position the air is blown only onto the windscreen;
- For the « **Giulietta Sprint** » car, the air drawn in from outside passes into the heater where it is warmed, blown onto the windscreen, and into the car itself if the shutters on the heater are opened.
- For Both the « **Giulietta** » and the « **Giulietta Sprint** » when running at high speed the fan motor may be switched off.

Ventilation

The air for ventilation is taken in at the front part of the car through two conduits; opening and closing the shutters placed below the instrument board allows varying quantities of air to enter the body.

The ventilation may be increased by acting on the fan of the heater, shutting of course the water tap.

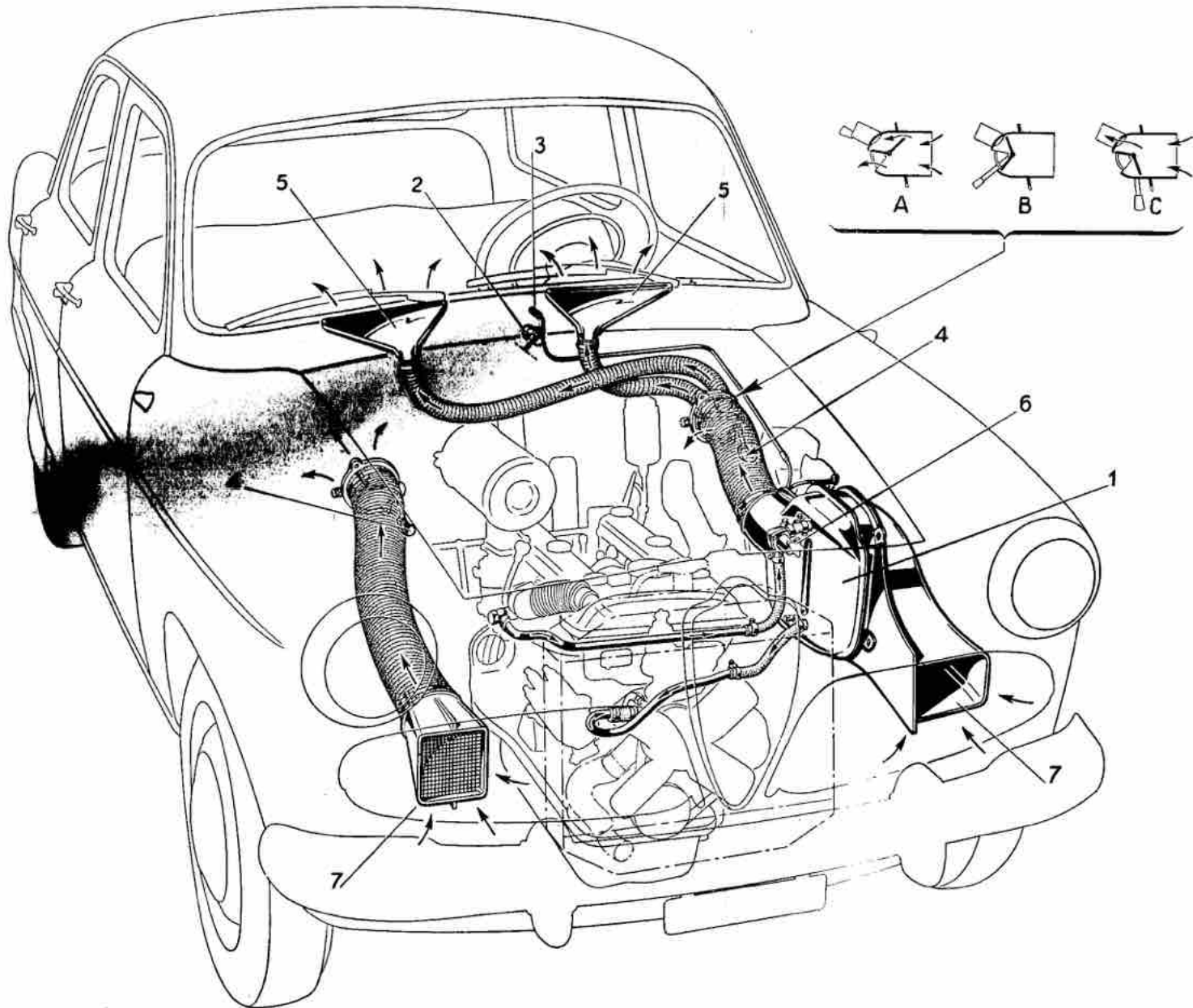


Fig. 12. - Chart of the heating and ventilation for « Giulietta ».

1. Radiator-fan assembly - 2. Fan motor knob - 3. Motor insertion tell-tale - 4. Air controlling levers. - 5. Ducts for air onto the windscreen. - 6. Hot water inlet tap of radiator-fan assembly - 7. Air intake duct on the front part of the car. - A) Lever at the top: air into the car and partly onto the windscreen - B) Lever at the centre: no air in - C) Lever at the bottom: air only onto the windscreen.

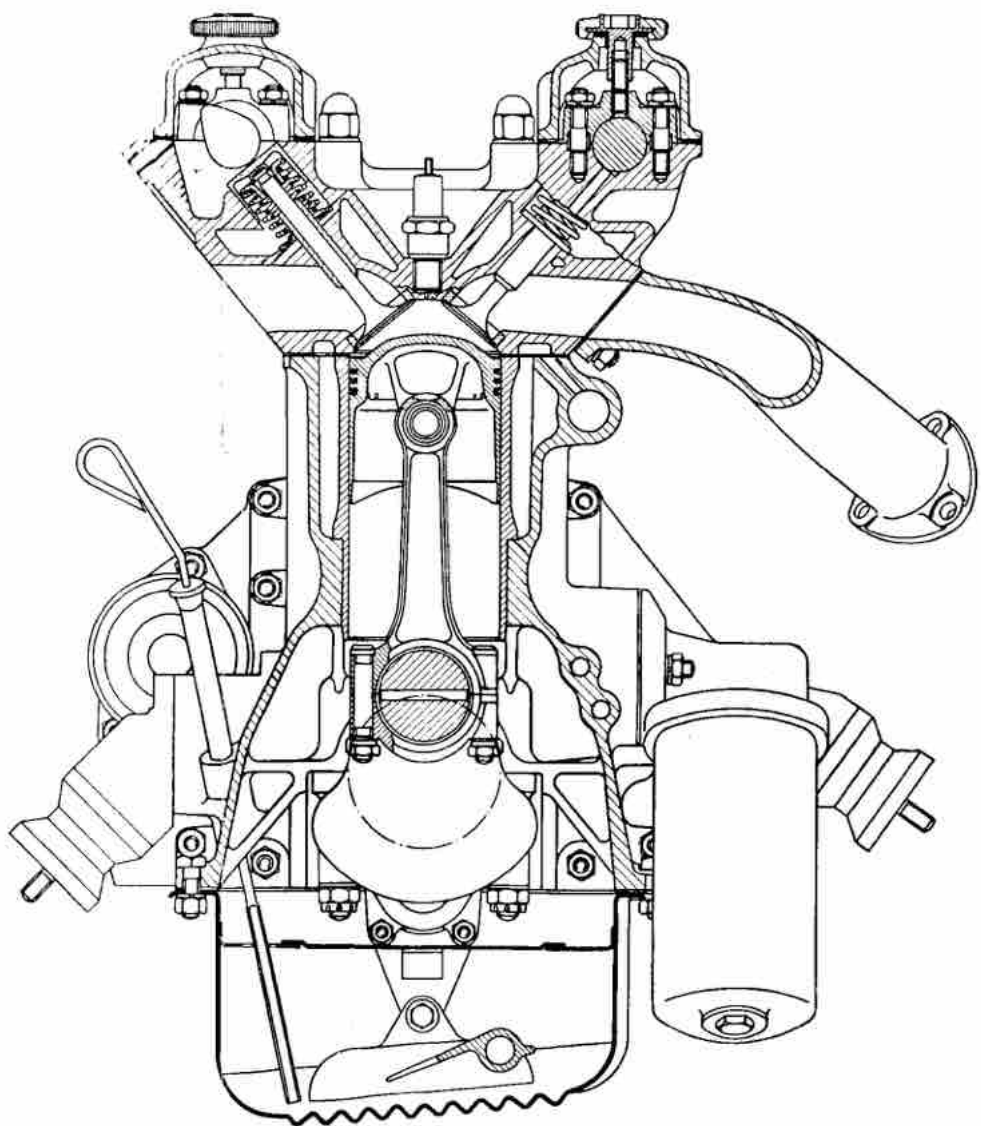


Fig. 14. - Cross section through engine.

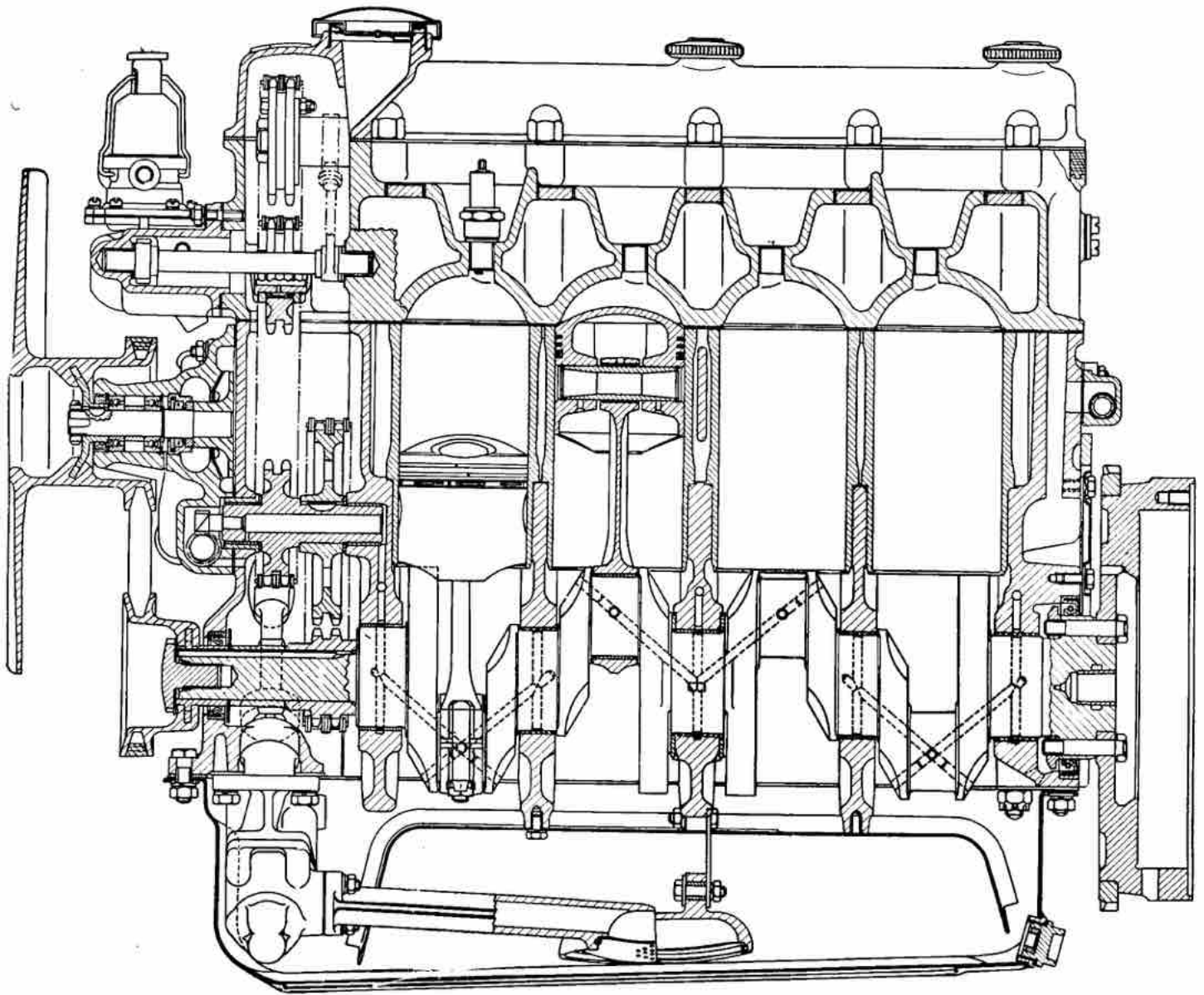


Fig. 13. - Longitudinal section through engine.

MAINTENANCE PROCEDURE

LUBRICATION INSTRUCTIONS

Engine Lubrication

The pressure lubrication system operates by means of a gear-wheel pump fitted at the front end of the top part of the crankcase; it is submerged in the sump and driven through helical gears, one of which is keyed on the front end of the crankshaft.

The oil level in the sump should be checked before starting the engine and particularly every 500 Km. (300 miles); bear in mind that the oil should never drop below the minimum level and should never exceed the maximum.

With a new or an overhauled engine the oil should be changed more frequently than usual and the instructions given on page 19 must be followed.

The maximum oil pressure is from 4,5 to 5 Kg./cm² (64-71 p.s.i.)

There are no valves in the oil circuit for regulating the pressure; but only the safety valve in the body of the pump.

If the pressure drops below the minimum values shown below, the car should be taken for examination to a specialised garage.

Minimum pressure at minimum speed with warm engine:

4 Kg./cm² (56 p.s.i.)

Minimum pressure at minimum speed with warm engine:

↓ to 1,5 Kg./cm² (14-22 p.s.i.)

Oil Filter

The engine lubricating oil is freed from impurities by a wire gauze and felt filter.

Depending on the quality of the oil used and the state of the engine, the filter cartridge should be changed every 5000 to 10000 Km. (3000 to 6000 miles); the cartridge case should be washed at the same time.

A by-pass valve fitted to the filter comes into operation if the cartridge becomes clogged.

Remember that periodical replacement of the cartridges, the perfect cleanliness and the accurate assembling of the filter are indispensable factors for optimum engine operation.

General lubrication

Lubrication of the different parts of the car should be carried out as indicated on fig. 16.

We recommend the use of Esso or Shell lubricants and, in any case, only the best brands.

Recommended Lubricants

Engine { Summer (SAE 40): Esso Extra M.O.3 - Shell X-100 M.O.40
 { Winter (SAE 30): Esso Extra M.O.3 - Shell X-100 M.O.30

Gear-box (SAE 90): Esso Gear Oil 90 - Shell Dentax 90

Steering box and rear axle { (SAE EP 90): Esso XP Compound 90 EP
 { Shell Spirax 90 EP

Front and rear suspension arms
Steering link joints
Steering knuckle pins
Propeller shaft univ. joints } Esso Chassis Grease H
 { Shell Retinax Alfa

Front wheel bearings { Esso Bearing Grease
 { Shell Retinax Alfa

Brake circuit { Esso Atlas Brake Fluid
 { Shell Donax B

Shock-absorbers: Shell Donax A1 ^

ENGINE MAINTENANCE

Tightening nuts

The bolts of the connecting-rod, main bearing and camshafts covers must be tightened with a dynamometric spanner to avoid stretching of the material.

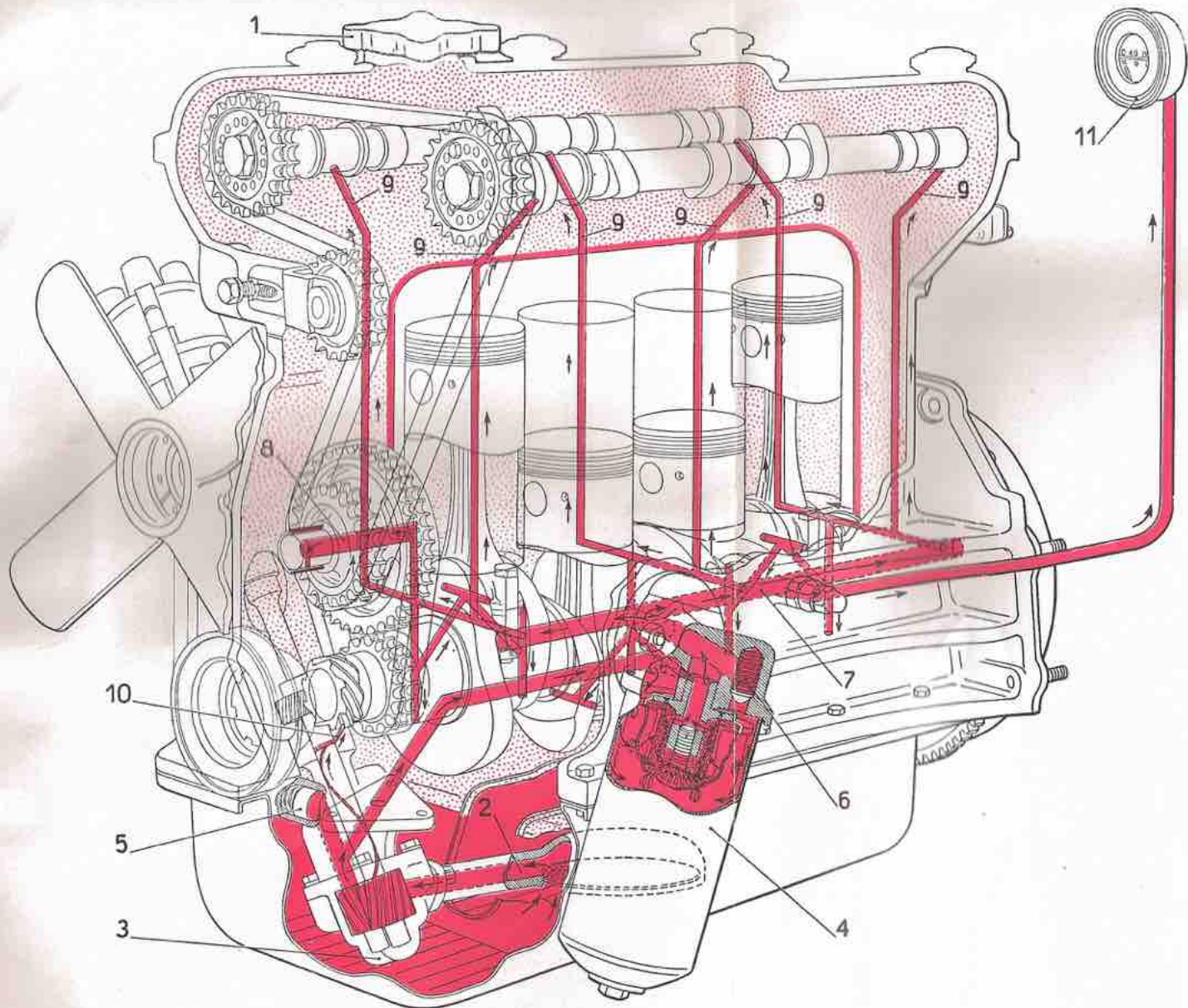


Fig. 15. - Engine Lubrication Chart.

1. Oil (lubricant) feeding union. - 2. Picking up from the sump through oil filter. - 3. Lubricant Pump. - 4. Oil Filter. - 5. Safety Valve (Pressure Relief Valve). - 6. By Pass Valve for excluding the filter in case of clogging. - 7. Main oil gallery. - 8. Duct for the lubrication of intermediate gear. - 9. Ducts for lubricating of the camshafts. - 10. Duct for the lubrication of distributor control gears. - 11. Oil gauge.

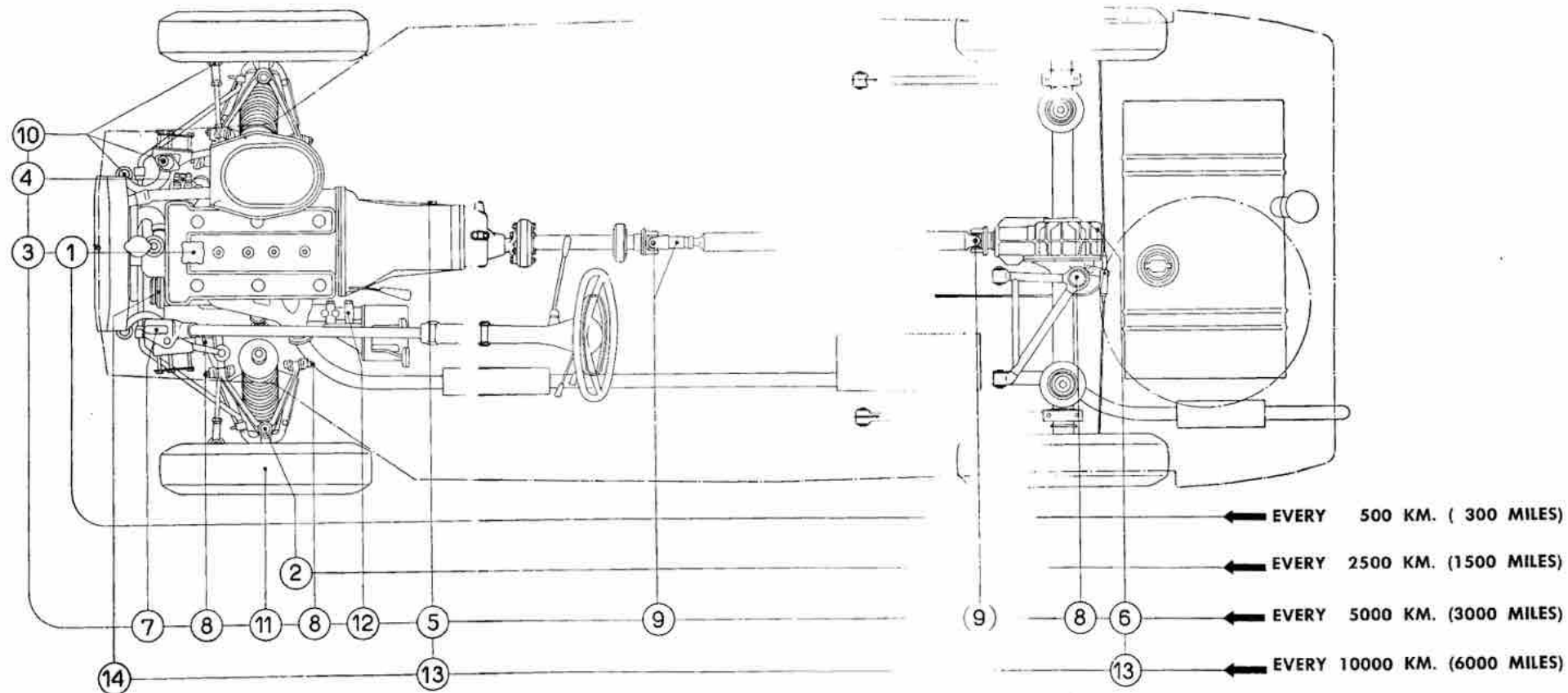


Fig. 16. - General lubrication chart.

Regular lubrication

Every 500 Km. (300 miles)

- 1. - Check the level of the oil in the sump.

Every 2500 Km. (1500 miles)

- 2. - Lubricate the upper and lower spherical pins on the steering knuckles (stub axles).

Every 5000 Km. (3000 miles)

- 3. - Change the oil in the sump.
- 4. - Ignition distributor (see p. 38).

- 5. - Gear box.

- 6. - Rear axle.

- 7. - Steering box.

- 8. - Nipples on the arms of the front and rear suspension.

- 9. - Nipples on the universal joints on the propeller shaft.

- 10. - Nipples on the steering rod joints.

- 11. - Front wheel hubs and bearings.

- 12. - Joints in the clutch, hand-brake and carburettor controls.

Every 10000 Km. (6000 miles)

- 13. - Change the oil in the gear-box and rear axle.

- 14. - Dynamo (see p. 62).

The tightening torques are as follows:

- 6,0-6,5 Kgm. (43,5-47 ft. lbs.) for head nuts
- 3,0-3,25 Kgm. (22 -23,5 ft. lbs.) for bolts heads of main bearing covers
- 3,0-3,25 Kgm. (22 -23,5 ft. lbs.) for bolts nuts of connecting rod « Giulietta »
- 3,0-3,25 Kgm. (22 -23,5 ft. lbs.) for bolts nuts of connecting rod « Giulietta Sprint »

TIMING SYSTEM

Timing data

Inlet valves	{	open 22° before top dead centre
	}	close 65° after bottom dead centre
Exhaust valves	{	open 55° before bottom dead centre
	}	close 12° after top dead centre

Valve clearance with engine cold	{	Inlet 0,45 mm. (0.017 in.)
	}	Exhaust 0,50 mm. (0.019 in.)

Every 5000-10000 Km. (3000-6000 miles) check the valve clearance to ensure efficient engine operation and long valve-seat life.

To adjust the valve clearance: the clearance for each valve must be very accurately measured with a calibrated feeler gauge then dismount the camshafts and the tappet in contact with the end-cap, measure the thickness of this end-cap and replace it by another, carefully selected to give the clearance specified for normal operation.

The end caps are supplied in 0.025 mm steps with thickness from 1,5 to 2,5 mm. so that the requisite valve clearance can be obtained.

Correct clearances are:

0,425 to 0,45 mm. (0,016 to 0,017 in.) for the inlet valves.

0,475 to 0,50 mm. (0,018 to 0,019 in.) for the exhaust valves.

The timing is correct when, with cylinder No. 1 on the compression stroke, the reference line on the flywheel marked P.M.S. (top dead centre) appears in the centre of the inspection-hole (fig. 19) and the reference marks **1** (fig. 20) on the camshafts line up with those cut on the front bearing support of each camshaft.

If, as a result of chain stretching, or for any other reason, the marks on the camshafts (with piston No. 1 on top dead centre) have moved in relation to the marks on the bearing supports by more than an

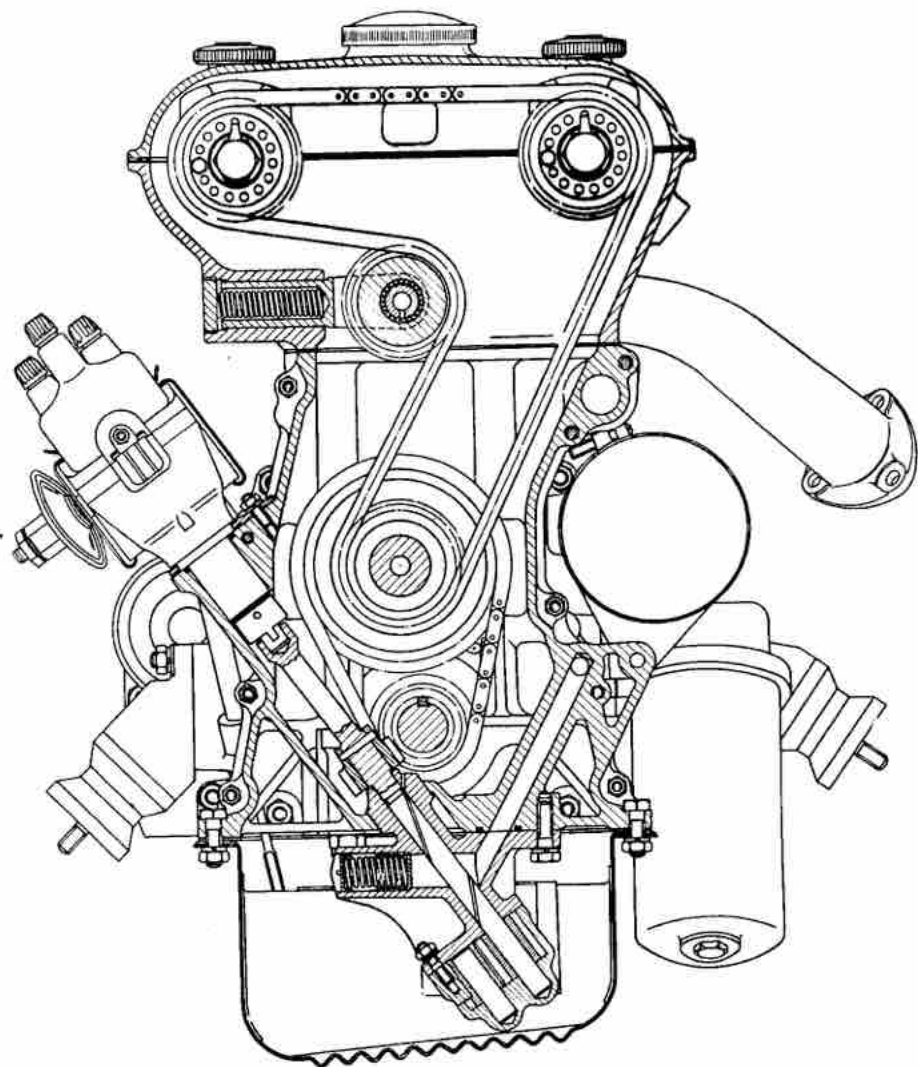


Fig. 17. - Cross section through engine showing timing gear drive.

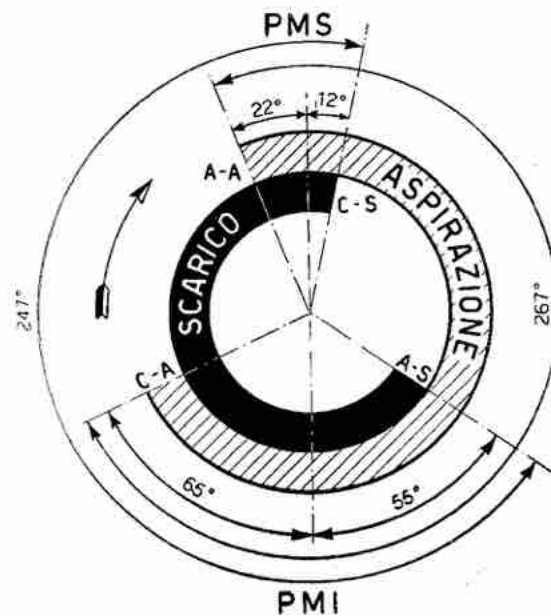


Fig. 18. - Timing diagram.

P.M.S. T.D.C. - P.M.I. = B.D.C. - Scarico = Exhaust - Aspirazione = Inlet - A.A. = Inlet opening - C.A. = Inlet closing - A.S. = Exhaust opening - C.S. = Exhaust closing.

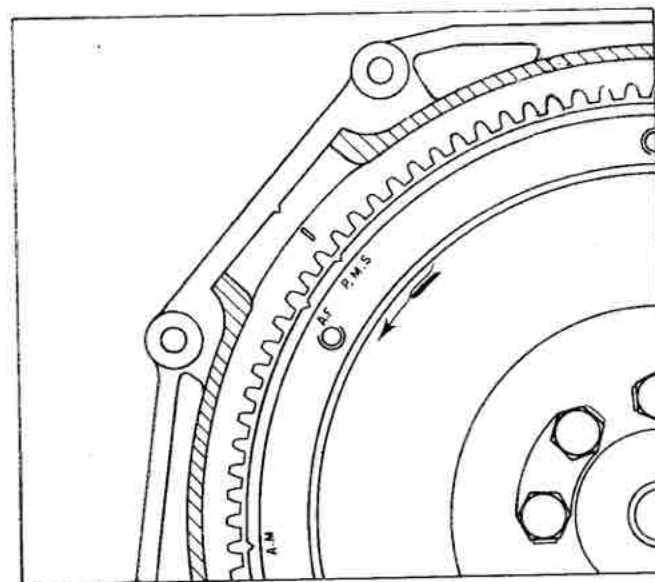


Fig. 19. - Reference marking on flywheel for timing the valve openings and ignition.

P.M.S. - Top dead centre, cylinder No. 1 at end of compression stroke. - A.F. Fixed spark advance position for distributor. - A.M. Maximum spark advance for distributor.

angle of 2", that is, by about 1 mm. it will be necessary to withdraw the bolts, to remove the studs securing the chain sprockets on the camshafts and, holding the sprockets themselves firmly, then to rotate the camshafts (by means of the proper toothed spanner engaging with the holes in the camshaft sleeve to which the sprockets are keyed) until the reference markings are in line. Then replace the studs and tighten the bolts.

If necessary, re-tension the chain driving the camshafts, especially after the first 3000 to 4000 Km. (2000 to 2500 miles). To do this, the stud 1 (fig. 22) securing the tensioning device must be slacked off so that the spring can tension the chain; the stud must then be tightened up again.

LOOSEN NUT - PUT IN 4TH. GEAR - ROCK BACK & FORTH
TIGHTEN NUT.

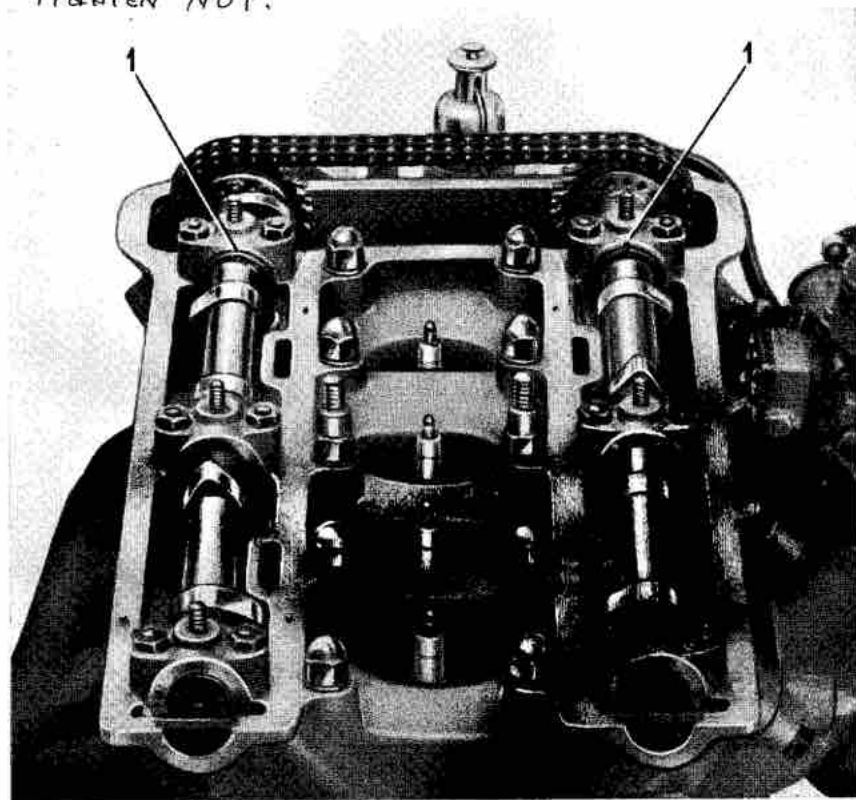


Fig. 20. - Reference marking (1) cut in the camshafts for timing the valve openings.

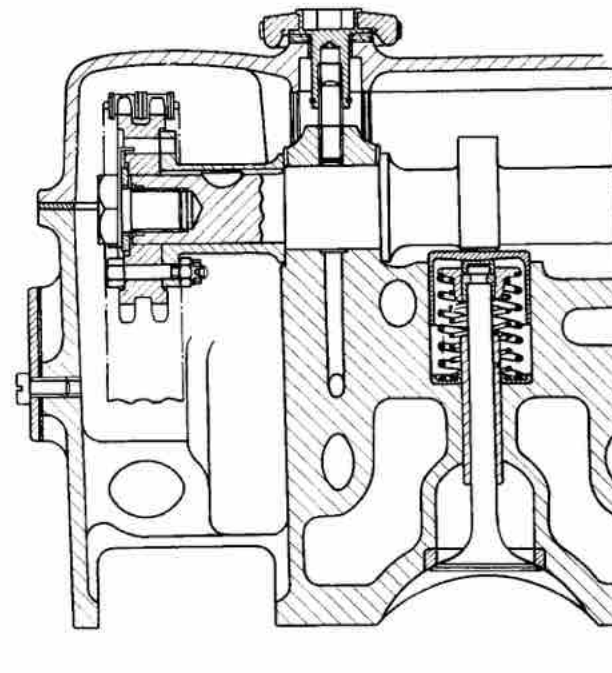


Fig. 21. - Details of the valve clearance adjustment.

To adjust instead the chain tension of the reduction gears turn the driven gear shaft properly.

If the chain has to be removed for the purpose of removing the cylinder head or camshaft, the crankshaft must be rotated to bring piston No. 1 to top dead centre on the compression stroke and simultaneously to bring the separable link of the chain to the top teeth of the sprockets on the camshaft operating the inlet valves. In this way, the reference markings on the camshafts will assume the position shown in fig. 20.

To replace the chain, take note more particularly of the lining up of the reference marks mentioned above (piston No. 1 on top dead centre and camshafts as shown in fig. 20), then loosen the stud securing the jockey-sprocket 1 (fig. 22) and, using a screwdriver, move the jockey-sprocket outwards and tighten up the stud. Place the chain in position, firmly holding the two sections not subject to the action of the tensioning device and hook on the separable link. Again slack off the stud holding the jockey-sprocket and tighten it again when the spring has actuated the chain-tensioning arrangement.

SUPPLY

Petrol Pump

Petrol is fed from the tank to the carburettor by a mechanical diaphragm pump (fig. 22) with a separate strainer filter.

To ensure proper operation of the petrol pump, first make sure that the unions have not become slack and that the washers are in good order. Then:

- Check the filter inside the cup and clean it with petrol.
- Check the suction and delivery valves, their springs and the valve seatings and clean them with petrol; if necessary replace any worn or defective parts.
- Check the diaphragm, which should be intact, and replace it if it shows any signs of disintegration or tears. It is possible to find out whether there are any leakages, without removing the diaphragm, by making sure that there are no small leaks from the pump body bottom orifice.

Carburettor

The carburettor Solex 32 BIC mounted on «Giulietta» is of vertical down-draught type, equipped with starting device.

The type 32 PAIAT Solex twin down-draught carburettor mounted on «Giulietta Sprint», has a starting device with an accelerator pump. In this carburettor, which has two choke tubes, the throttle for the second, which is towards the engine side, opens when the first throttle has opened a little more than half-way. Beneath this second throttle is a third, held closely by a counter-weight, which opens automatically when, with the second throttle at least partly open, the vacuum in the inlet manifold reaches a pre-set value.

In this way, rapid acceleration is obtained with noteworthy fuel saving at intermediate speeds.

In addition to the usual float chamber the carburettor comprises a second float chamber the purpose of which is to ensure perfect petrol feed while cornering.

FIRST STAGE - Venturi - 22MM - MAIN JET 1,15 - LOW SPEED 0,45
AIR CORRECTION 2,00 - AIR BLEED FOR IDLE 1,00

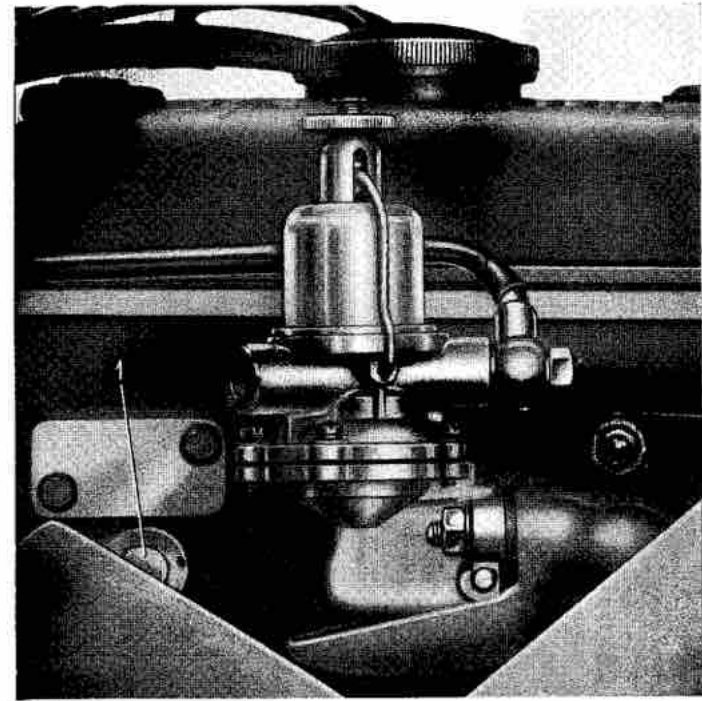


Fig. 22. - Petrol pump.

1. Stud securing the chain-tensioning sprocket

Carburettor settings are as follows:

Solex type
32 BIC
carburettor

Choke tube = 21 mm.; main jet = 1,05 mm.; slow running jet = 0,40 mm.; air jet controlling speed of mixture for main jet = 1,60 mm.; air jet controlling speed of mixture for slow running jet = 1,00 mm.; starter jet = 1,20 mm.

Solex type
32 PAIAT
carburettor

Choke tube No. 1 = 22 mm.; main jet = 1,15 mm.; slow-running jet = 0,45 mm.; air-jet controlling speed of mixture for main jet = 2 mm.; air jet controlling speed of mixture for slow-running jet = 1 mm.; acceleration pump jet = 0,45 mm.; starter jet = 1,50 mm.

Choke tube No. 2 = 23 mm.; main jet = 1,35 mm.; air-jet controlling speed of mixture = 1,10 mm.

SECOND STAGE FOR HIGH PERFORMANCE
VENTURI 27MM - MAIN JET 1,30 EMULSION 1,00
FIRST STAGE - VENTURI 25MM - MAIN JET 1,35 AIR CORRECTION 1,80

Only if the engine works irregularly while slowly ticking over or if it has a tendency to stall should adjustments be made to the carburettor; they should be made with a warm engine and after tests have shown that the sparking plugs are operating perfectly. Carburettor adjustment should follow the under-mentioned procedure:

- Slightly tighten the screw for regulating minimum throttle opening and thus cause the engine to run faster.
- Unscrew the slow-running mixture regulating screw, until the engine starts to « hunt », then screw it in gradually until the engine is ticking over regularly.
- Unscrew very slowly the throttle adjustment screw until the engine speed is about 450 r.p.m.

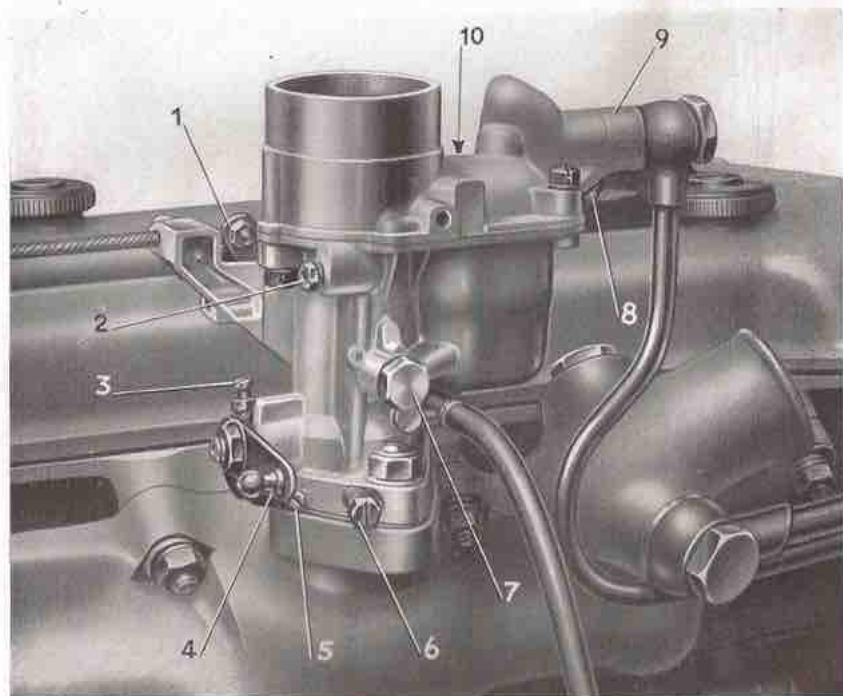


Fig. 23. - Solex type 32 BIC carburettor (Giulietta).

1. Starter control lever. - 2. Slow running jet. - 3. Throttle maximum opening adjustment screw. - 4. Throttle lever. - 5. Throttle minimum opening adjustment screw. - 6. Slow running mixture adjustment screw. - 7. Main jet. - 8. Filter. - 9. Union, with filter, fuel inlet side. - 10. Starter jet.

— If the engine again starts to « hunt », slightly screw in the slow-running mixture regulating screw; the latter should never be screwed right home.

Carburettor maintenance should be limited to cleaning the float-chamber and the jets. Cleaning the jets should only be done if the user is an expert and great care must be taken to ensure that the jet calibration is not altered. Further dismantling, overhauling and adjustment should be done only by an authorised service station.

Air Cleaner

The air cleaner has a silencer; the filter unit is of felt arranged in star form so as to increase the cleaning area.

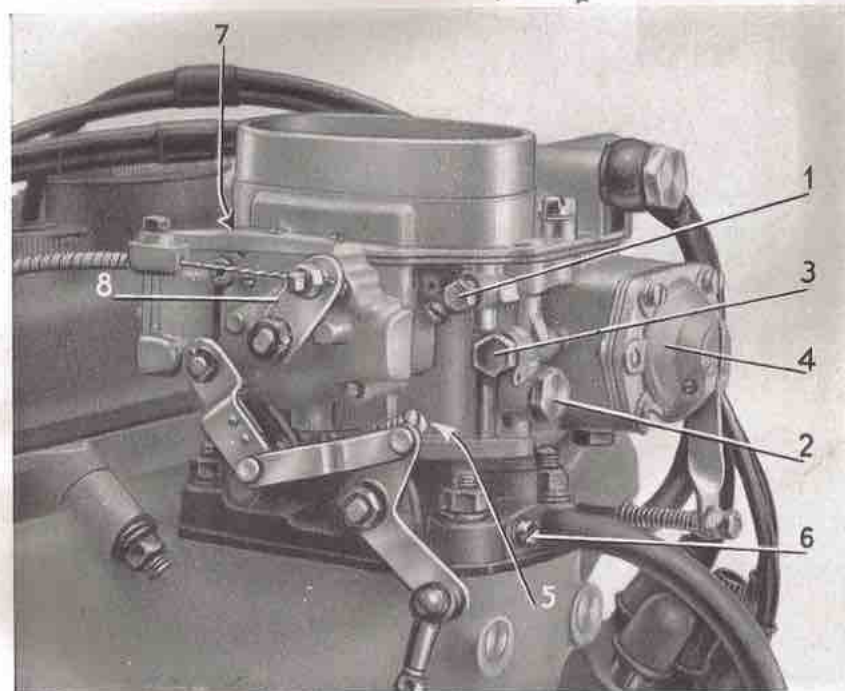


Fig. 24. - Solex type 32 PAIAT carburettor (Giulietta Sprint).

1. Slow running jet. - 2. Main jet No. 1. - 3. Acceleration pump jet. - 4. Acceleration pump. - 5. Adjustment screw for minimum throttle opening. - 6. Air adjustment screw for slow running. - 7. Main jet No. 2. - 8. Control lever for starting device.

The air cleaner must itself be cleaned every 10000 Km. (6000 miles); this is done by removing the top cover and taking out the filter unit which should be thoroughly cleaned by blowing air from the inside, and washed in petrol. After drying the filter element, moisten it slightly with engine oil.

IGNITION

The firing order of the cylinders is 1-3-4-2.

The fixed setting of the ignition advance is 8°.

The distributor contact gap is between 0,35 and 0,40 mm. (0,014 to 0,016 in.) this can be corrected by means of the adjusting screw.

The contacts should always be kept clean; if necessary, they can be trued up with a very fine file and washed with a rag dipped in petrol.

Every 5000 (3000 miles) remove the rotor arm of the distributor and put a few drops of oil both on the cam spindle and on the contact-breaker plate to lubricate the centrifugal spark advance device which is beneath this plate.

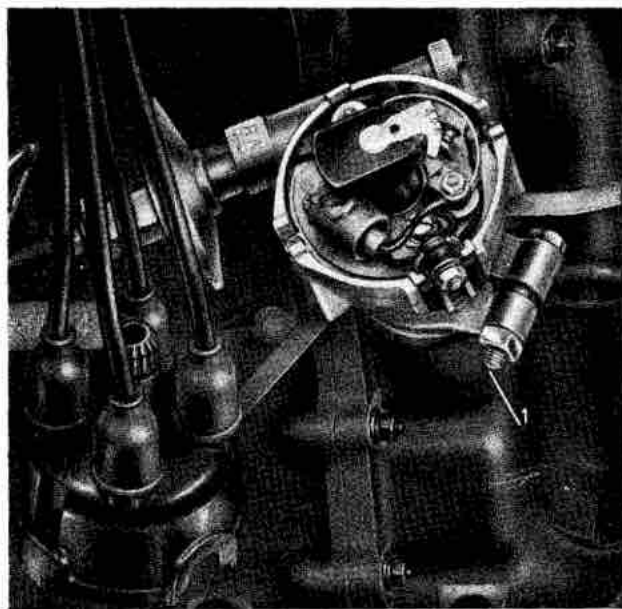


Fig. 25. - Ignition distributor.

1. Bolt locking the distributor body onto its bracket.

To time the distributor, if it has been dismantled, proceed as follows:

- 1) Turn the crankshaft to bring the piston No. 1 onto the compression stroke with both valves shut, until the degree of fixed spark advance is that specified; this point can be seen on the flywheel (reference mark AF) through the inspection hole and corresponding to its centre.
- 2) Remove the distributor cover and turn the cam spindle by hand so as to bring the rotor arm towards the distributor contact for cylinder No. 1 as shown in fig. 25.
- 3) Check that in that position the contacts are at the point of breaking.
- 4) In this position, and without moving the cam spindle, mount the distributor on its support and tighten the bolt which locks the distributor body in position (fig. 25).

If the distributor has not been removed, it is sufficient (for the purpose of checking whether the timing is correct) to turn the crankshaft in order to enable the details given in 1) above to be checked and then to verify whether a small movement of the crankshaft in its normal direction of rotation, causes the distributor contacts to start to break.

To correct the ignition timing:

- Loosen the nut on the locking bolt (fig. 25).
- Turn the distributor body clockwise or anti-clockwise so as to retard or advance the ignition setting.

Small changes in timing are obtained by turning the knurled nut on the distributor. Screw in to retard ignition and out to advance.

The maximum spark advance effected by the centrifugal device is 44°, and this can be tested with a stroboscope gun in the following way:

- Run the engine at about 5000 to 5200 r.p.m. and direct the light from the gun through the inspection hole and onto the flywheel.
- If the timing is exactly right, the indication mark with the letters AM (stamped on the flywheel) will be seen in the centre of the hole.
- If it is found that the advance is greater or less than 44°, after the fixed timing; it is preferable to have the exact setting of the advance at high engine speeds rather than at low speeds.

Sparking plugs

The recommended sparking plugs are those named on page 16.

The gap between the points should be 0,60 mm. (19 thousandths of an inch). If this gap should become enlarged after long use, the outside point may be moved towards the centre point until the gap is correct.

If the porcelain becomes blackened by soot, and if there is no sand-blasting machine available, turn the plug upside down, pour a little petrol in the upturned end and leave for a few minutes. Then clean the plug with a wire brush.

ENGINE COOLING

Fan and water pump

The pump (fig. 26) is of the centrifugal type and comprises an attachment for the fan. It is driven by the belt which also drives the fan and the dynamo.

If the belt tension requires increasing, this can be done by adjusting the dynamo bracket tensioning device after loosening the two nuts on the lower pin fixing the dynamo to the crankcase. It is advisable to check the tension of the belt every 5000 Km. (3000 miles) though it should not be too tightly tensioned as this would damage the dynamo bearings.

Radiator

The maximum temperature of the water exceeds 100° C (212° F) and therefore the water in the radiator as well as in the engine circuit is under pressure. To check the water level in the radiator, particularly when the water temperature is above 100° C (212° F), it is essential when unscrewing the radiator cap to stop at the first catch (about a quarter of a turn) to release the pressure.

Such checks should only be made when there is water available for replenishment.

After refilling with water, screw the radiator cap on tightly.

To allow the water to pass into the radiator only after it has reached a temperature of 80 to 85° C (175° to 185° F) — essential for efficient engine operation — a thermostat is fitted in the pipe between the cylinder head and the radiator.

As a result, until it has reached the pre-set temperature, the water remains in the engine and thus provides rapid warming up.

During the winter, and unless an anti-freeze substance is used, the cooling system must be drained immediately after the engine is stop-

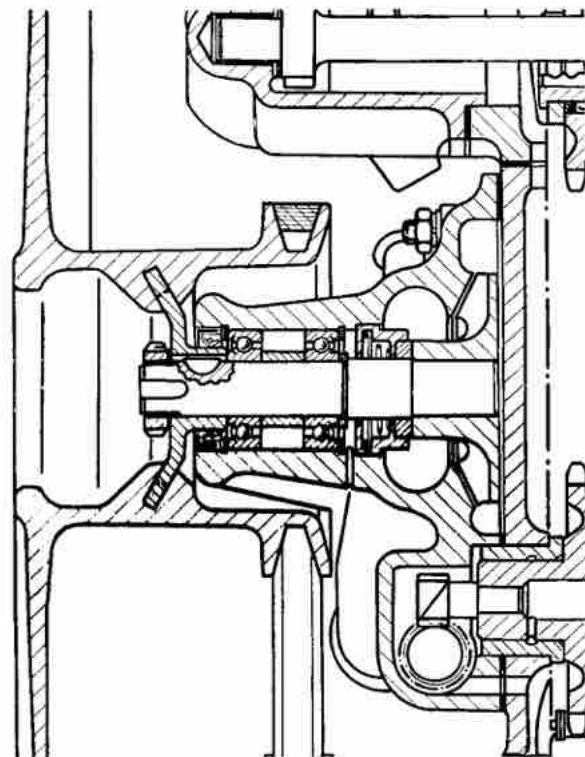


Fig. 26. - Cross-section of the water pump.

ped. The most suitable anti-freeze solutions are those with a neutral glycerine or denatured alcohol base the proportions and the freezing points of which are shown in the table below:

Glycerine	Freezing point	Alcohol	Freezing point
20%	— 6° C (21° F)	12%	— 5° C (23° F)
30%	— 11° C (12° F)	20%	— 10° C (14° F)
40%	— 18° C (— 0.4° F)	25%	— 15° C (5° F)
		30%	— 20° C (— 4° F)

Note - The alcohol solutions require periodical topping up with alcohol to compensate for losses due to evaporation.

To flush out the engine and the radiator, proceed as follows:

- Fill the engine and the radiator with a solution consisting of 8 litres (7 quarts) of water and 300 gr. (10 oz.) of sodium carbonate (washing soda).
- Run the engine slowly for 10 to 15 minutes.
- Drain off the solution.
- Wait until the engine has cooled off and then circulate running water through the engine and radiator, leaving the drain-tap open.
- Refill the radiator and engine with water and again allow the engine to tick over for a few minutes.
- Again drain off the water and refill.

CHASSIS MAINTENANCE

PERIODICAL MAINTENANCE

Every 500 Km. (300 miles)

- Check the oil level in the sump.
- Check the water level in the radiator; it should always be full.
- Check tyre pressures.

Every 1500 Km. (1000 miles)

- Check the level of the electrolyte in the battery.

Every 5000 Km. (3000 miles)

- Carry out the lubrication procedure described on fig. 16.
- Adjust the valve clearances.
- Adjust the sparking plug gap.
- Adjust the distance between the points on the distributor.
- Adjust the tension of the belt driving the dynamo and the fan.
- Check the brushes and the commutators on the dynamo and the starter motor.
- Adjust the clutch pedal free play.
- Check the oil level in the brake-fluid tank.

Every 10000 Km. (6000 miles)

- Carry out the lubrication procedure described on fig. 16.
- Replace the sparking plugs if necessary.
- Replace the oil filter cartridge.

Clean the fuel filters and the carburettor float chamber (this should be done more frequently if required).

Clean the air filter.

Check the play in the front wheel bearings.

Check the play in the steering joints.

Check the front wheel toe-in.

Check the brake linings for wear.

Check the shock-absorbers.

CLUTCH

The clutch is of the single plate dry type with torque springs, those in the clutch centre splined on the gear-box driving shaft, and flexibly secured to the clutch plate. Contact between the plate and flywheels is ensured by six round helical springs.

The clutch pedal should normally have about 20 mm. ($\frac{3}{4}$ inch) free travel before it actually starts to disengage the clutch. Under these conditions, the distance between the three toggle-levers and the thrust surface is 3 mm. ($\frac{1}{8}$ inch.).

When the free travel of the clutch pedal has been reduced to about 10 to 12 mm. ($\frac{1}{2}$ to $\frac{3}{8}$ inch) it must be restored to the requisite 20 mm. ($\frac{3}{4}$ inch) by adjusting the threaded rod so that the play between the toggle levers and the clutch thrust bearings is again 3 mm. ($\frac{1}{8}$ inch).

GEARBOX

The gearbox, which forms a block with the engine, has four synchronised forward gears and one reverse.

Gear-changing is effected by a gear-lever on the steering column below the steering wheel. The positions of this lever for the different speeds are shown in fig. 11.

Gear ratios	1st gear	3.313 : 1
	2nd gear	1.959 : 1
	3rd gear	1.354 : 1
	4th gear	1 : 1 (direct)
	Reverse	3.365 : 1

Checking and adjusting the gearbox in the case of difficulty in meshing the gears, and any other gearbox adjustment must only be done by authorised service agents.

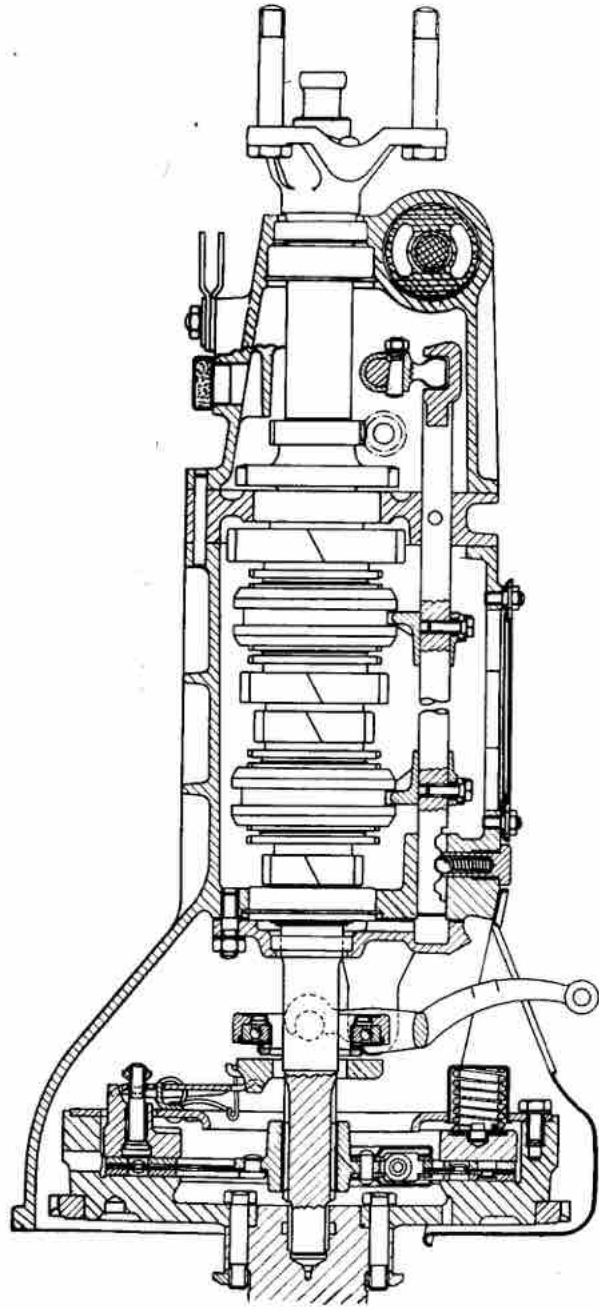


Fig. 27. - Sectional elevation through clutch and gear-box.

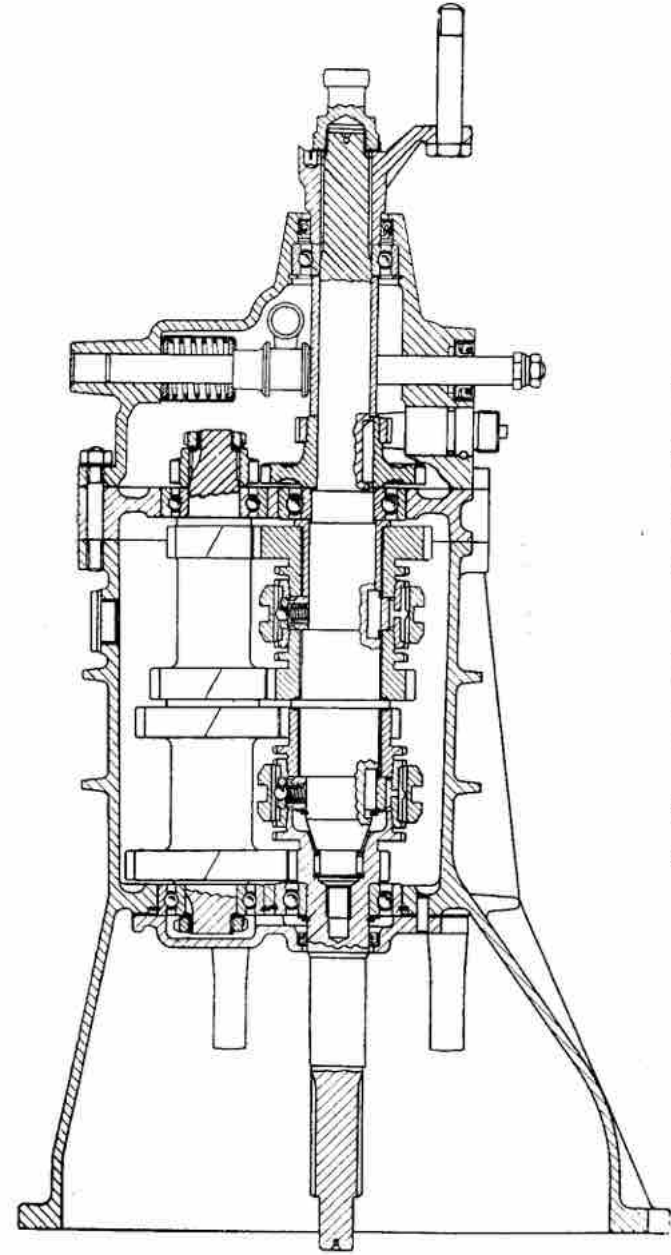
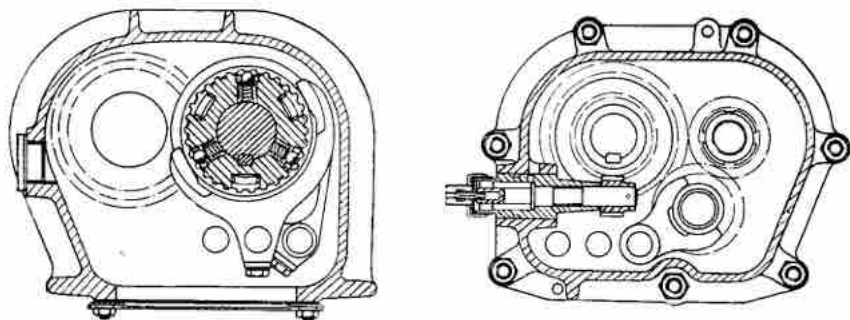


Fig. 28. - Sectional plan view through gear-box.

PROPELLER SHAFT

Should noise be caused by the propeller shaft, the state of the flexible rubber joints, the needle roller bearings universal joints, and the alignment of the shaft should all be checked by an authorised service station.

The needle roller bearing universal joints should be lubricated every 5000 Km. (3000 miles).



Cross-section through the synchronising arrangement for third and fourth gears.

Cross-section through the reverse gear and speedometer drive.

Fig. 29. - Gearbox.

REAR AXLE

The bevel pinion has 9 teeth and the crown wheel 41, giving a rear axle ratio of 4.55 : 1. On request, bevel pinions with 8 or 10 teeth can be supplied, giving back axle ratios of 5.125 : 1 and 4.10 : 1 respectively.

Engine/rear axle ratios with 4.55 : 1 rear axle	1st gear	16.33 : 1
	2nd gear	9.55 : 1
	3rd gear	6.15 : 1
	4th gear	4.55 : 1
	Reverse	15.30 : 1

In addition to lubricating the rear axle periodically as described in fig. 16, have the rear axle examined by an authorised service station after every 20000 Km. (12.500 miles) with a view to adjustment of the bevel drive and the play in the bearings.

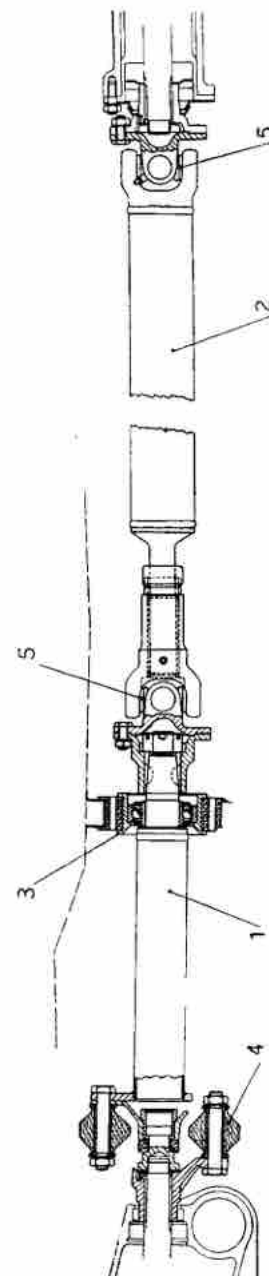


Fig. 30. - Propeller shaft.

1. Front section. - 2. Rear section. - 3. Intermediate bearing. - 4. Flexible rubber joints. - 5. Needle roller bearing universal joints.

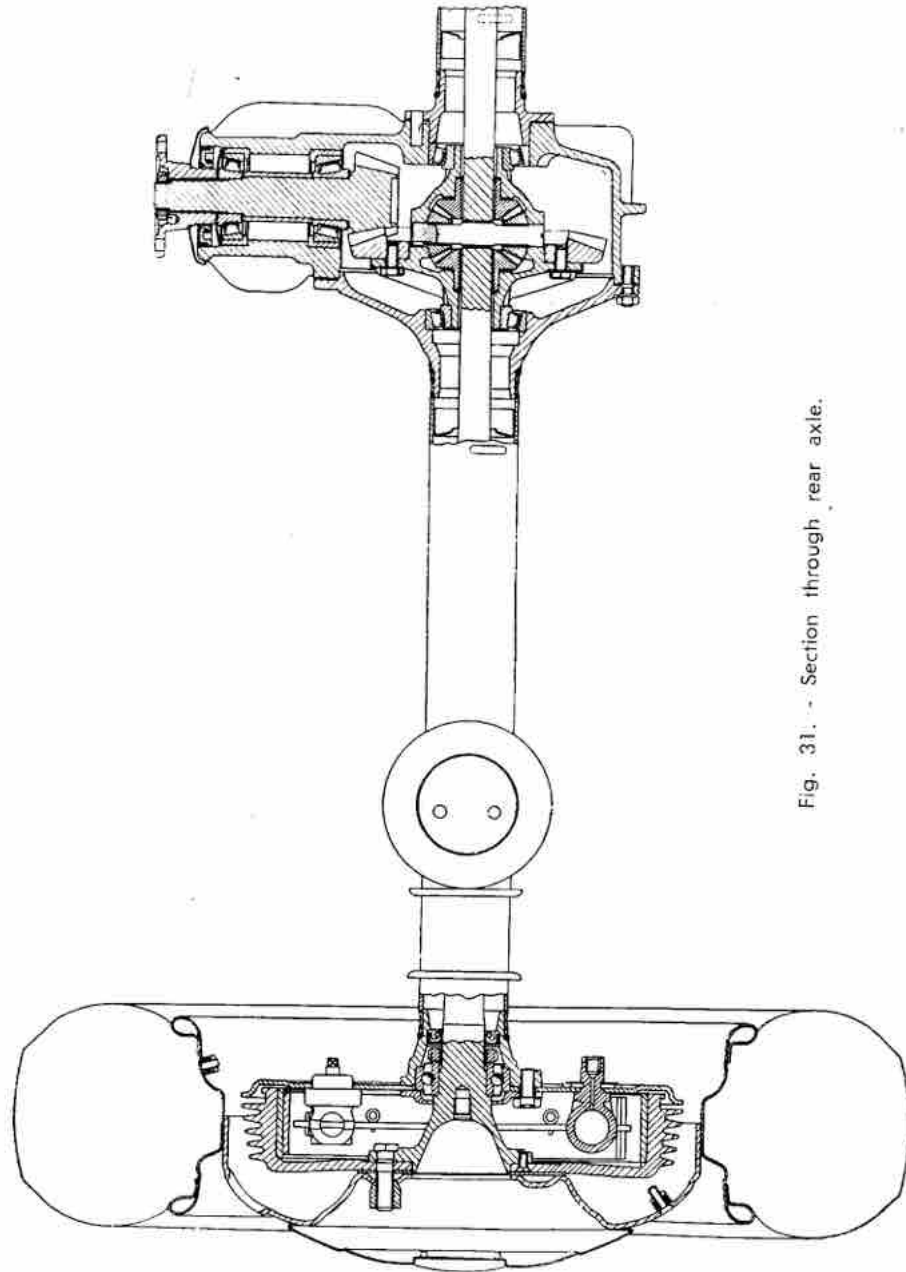


Fig. 31. - Section through rear axle.

FRONT AND REAR SUSPENSION

Apart from the periodical lubrication of the front and rear suspension-link pins, it is advisable whenever the damping of the shock-absorbers becomes uneven, to have them checked without delay by an authorised service station.

STEERING

For steering to remain soft and easy it is necessary to check the oil level in the steering box and to lubricate the joints in the steering linkage every 5000 Km. (3000 miles).

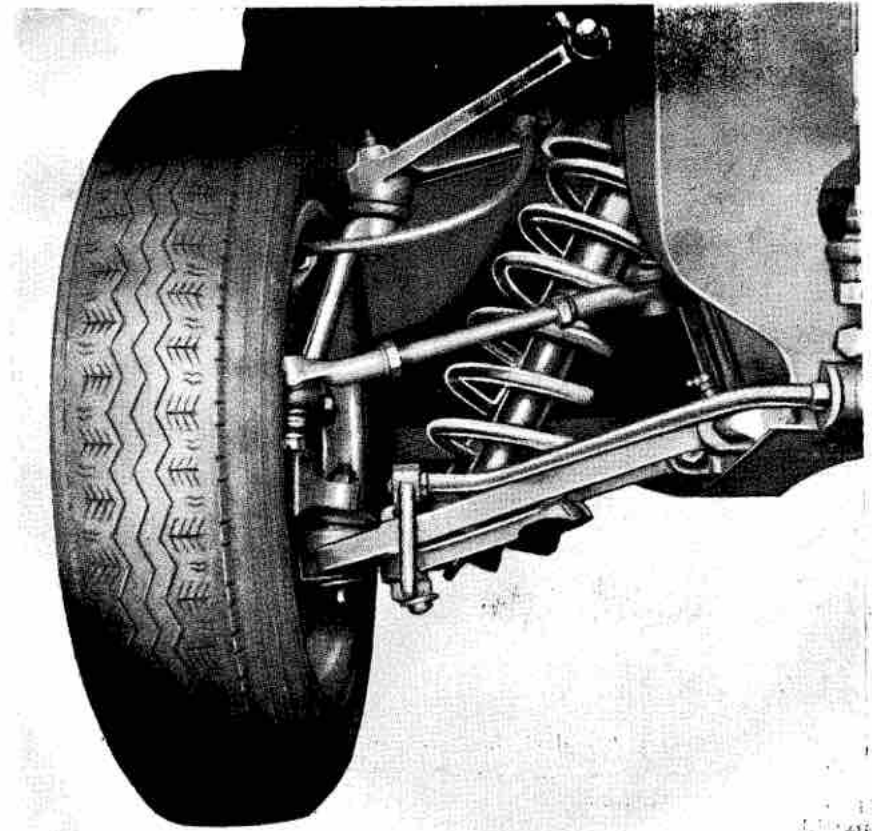


Fig. 32. - Front suspension.

To ensure steering stability it is essential that:

- a) There is no abnormal slack in the controls (steering box bearings, steering worm and roller, spherical pins);
- b) The front wheels are perfectly balanced and the tyres inflated as specified;
- c) All the front wheel suspension units are thoroughly efficient.

To adjust the play between the roller and the worm, use the stud **2** (fig. 34), blocking it with the lock-nut after completing the adjustment.

To take up the play in the worm bearings, insert a shim **3** of suitable thickness between the bearing and the lower cap on the steering box.

All these adjustments should be made in such a way as to eliminate all play but without causing excessive stiffness due to friction.

Adjusting the camber and toe-in of the front wheels and the steering lock

The camber of the front wheels is variable in relation to the load the car is carrying. Fig. 36 shows wheels when the car is fully loaded.

Front wheel camber and toe-in should be checked every 10000 Km. (6000 miles) to prevent abnormal wear on the tyres and to maintain easy and stable steering.

Adjustment of toe-in is effected by shortening or lengthening the track-rod **3** (fig. 35) by means of the threaded ends so as to obtain the 2 mm. ($\frac{5}{64}$ in.) toe-in shown in fig. 37.

The minimum turning circle diameter for the steering is 11 m. (36 ft. 1 in.). Adjustment is by means of the studs **5** (fig. 35), suitable washers being inserted under their heads.



BRAKES

Fig. 38 shows the pedal-operated hydraulic brake system and also the hand-operated mechanical brakes.

Hydraulic brakes

Every 5000 Km. (3000 miles) the level of the oil in the hydraulic fluid tank should be checked; the level should not drop by more than a quarter of the maximum. Top up when necessary, using only the oil specified.

The best brands of acid-free vegetable oil must be used.

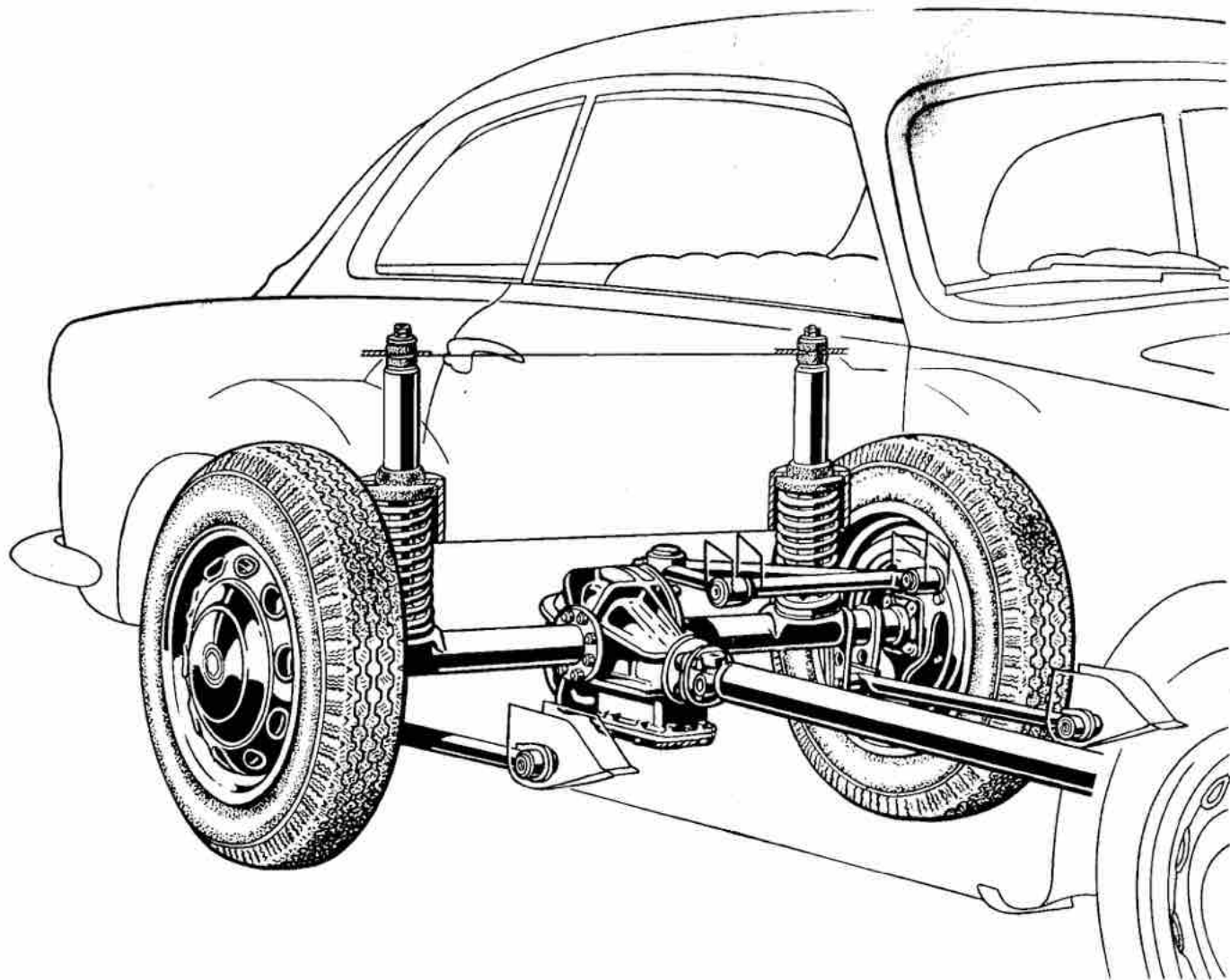


Fig. 33. - Rear suspension.

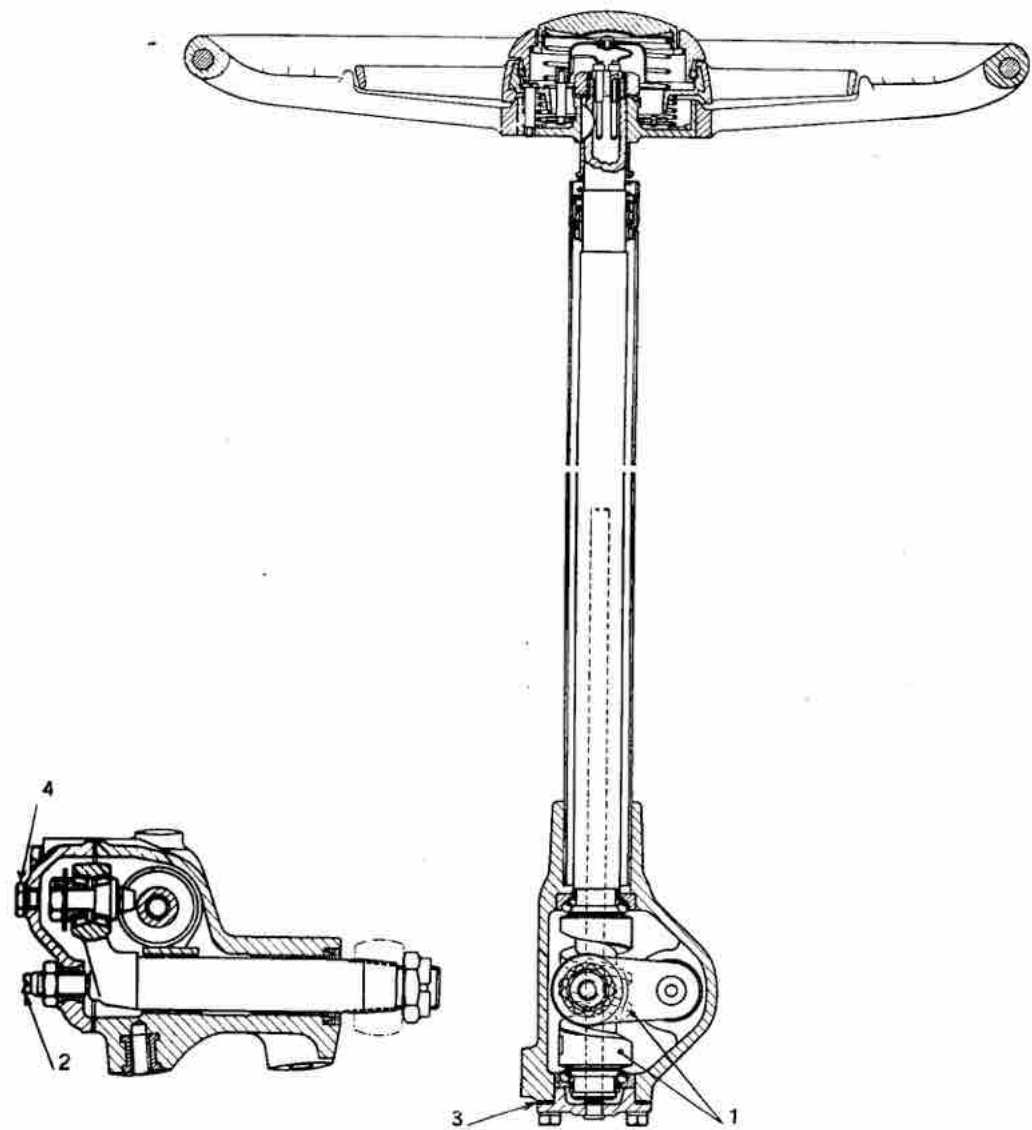


Fig. 34. - Section through steering-box and column.

1. Worm and roller. - 2. Stud for adjusting axial play of drop-arm shaft, carrying roller. - 3. Shims for adjusting play in worm bearings. - 4. Oil filter plug.

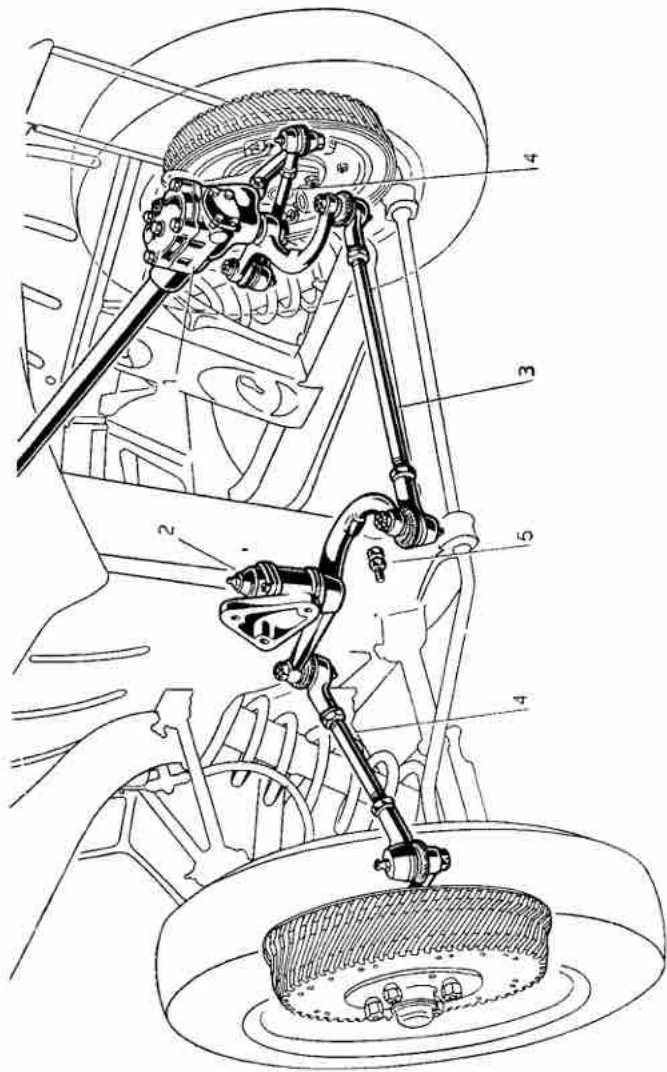


Fig. 35. - Steering controls.

1. Steering box. - 2. Steering arm bracket. - 3. Track rod with adjustment for front wheel « toe-in »
 - 4. Lateral steering rods. - 5. Studs for adjusting steering lock.

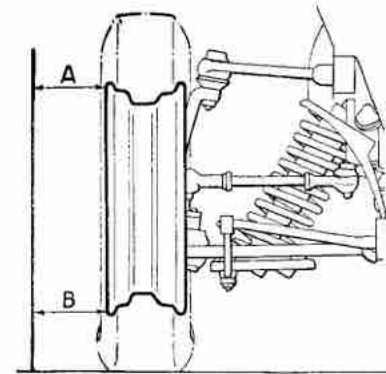


Fig. 36. - Front wheel camber with car fully loaded: $B = A$.

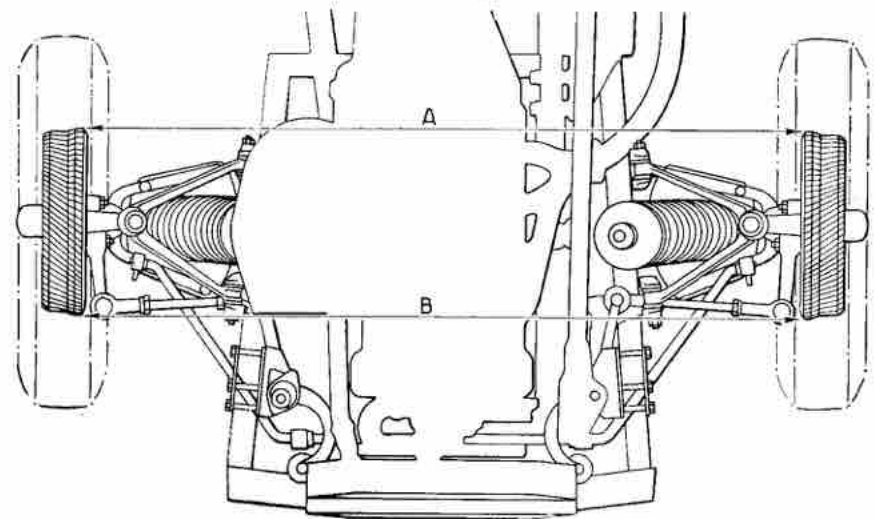


Fig. 37. - Toe-in of front wheels: $A = B + 2 \text{ mm. } (5/64 \text{ in.})$.

Mineral oil invariably damages the rubber washers and must not be used.

For efficient operation of the hydraulic brakes it is essential that the system should always be filled with fluid so as to eliminate air bubbles.

Excessive and resilient clutch-pedal travel indicates the presence of air bubbles in the system.

Bleeding should be effected with the greatest care and the following instructions attentively followed:

- 1) Fill the tank with suitable oil, remembering that during the air-bleeding operation the oil level must not drop by more than a quarter below the maximum.
- 2) Release the air from the rear wheel cylinders, one at a time, as follows (see fig. 39).
 - Loosen the drain screw after having pushed a rubber tube over the end of the nipple. The other end of the tube will be inserted in a glass container to catch the oil.
 - Depress the brake pedal several times, letting it return slowly until the rubber tube discharges oil free from air bubbles.
 - Replace and tighten the drain-screw:
- 3) Release the air from the front wheel cylinders as follows: (see fig. 40).
 - Turn the cams for adjusting the brake-shoes inwards so as to move the shoes as far away from the drums as possible.
 - Proceed as for the rear wheels, making sure, however, that the brake pedal is firmly depressed and that the air discharge plug is closed before the pedal is released.
 - When all the air has been drawn off, re-set the brake shoe clearance by means of the cams.

If the bleeding operation has been carefully performed, it will be found that when the brake pedal is pressed, and immediately at the end of the free play stroke, direct action on the fluid can be felt; there will then be no resilience.

The brake pedal push-rod should have free play of 1 to 1,5 mm. ($\frac{3}{64}$ to $\frac{1}{16}$ in.) before commencing to operate the master cylinder.

Brake pedal travel should be adjusted when, as a result of wear on the brake linings, the pedal travels (when braking hard) through more than two-thirds of the total distance possible.

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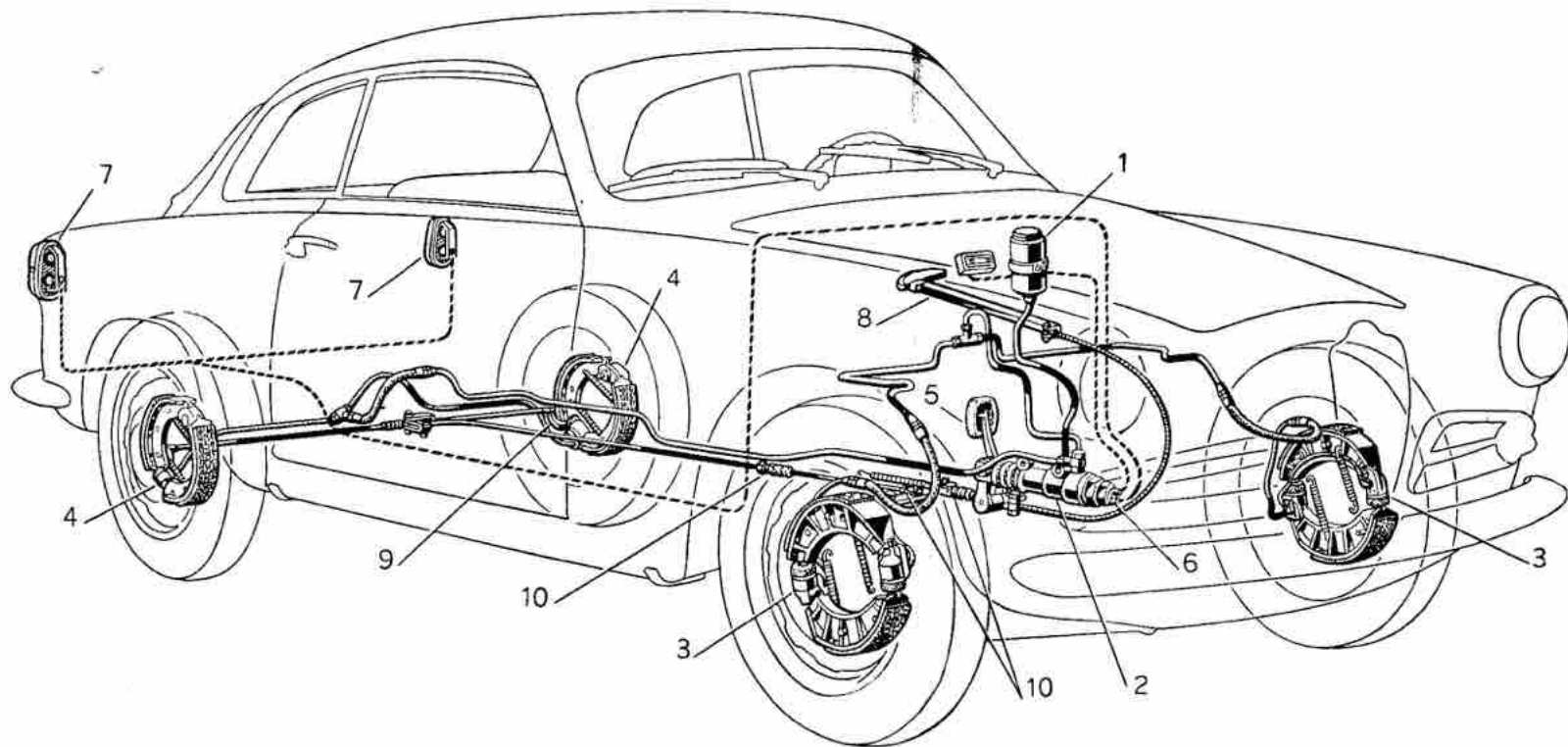


Fig. 38. - Hydraulic and mechanical braking system.

1. Feed tank. - 2. Hydraulic master cylinder. - 3. Front wheel hydraulic cylinders. - 4. Rear wheel hydraulic cylinders. - 5. Pedal operating master cylinder. - 6. Hydraulic pressure switches operating rear stop-lights. - 7. Rear stop lights. - 8. Rear hand-brake lever. - 9. Hand control levers for rear brake cylinders. - 10. Hand-brake adjustment device.

It is therefore necessary to adjust the clearance between the brake linings and drums at least every 10000 Km. (6000 miles); this is done by turning the cams **1** (fig. 40) in the case of the front wheels, and the adjustment device **1** (fig. 39), in the case of rear wheels.

The clearance should be adjusted so that the drums can revolve without rubbing on the linings.

When, as a result of continued wear of the brake linings, it is no longer possible to reduce the pedal travel by means of the adjusting cams, new linings must be fitted.

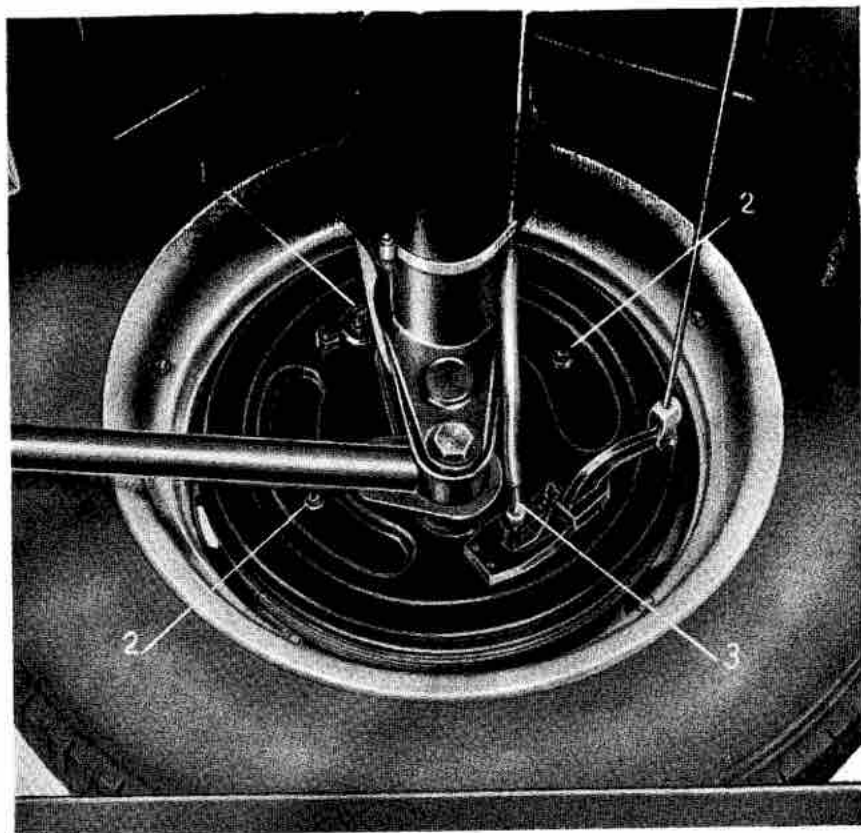


Fig. 39. - Adjustment of clearance between brake linings and drums for bleeding the rear wheel brake cylinders.

1. Adjustment for clearance between brake lining and drum. - 2. Studs for adjusting parallelism of shoes and drums. - 3. Bleeding nipple.

The front and rear brake shoes are of the floating type (not hinged) so that they can be centred in relation to the drum.

To ensure parallelism between the shoes and the drum (indispensable for uniform contact over the whole width of the linings) the studs 2 (figg. 39 and 40) are mounted on the back plates; these studs must be adjusted when it is found that the linings have not worn uniformly over their full width.

The front wheel brake drums are fitted with helical fins for better heat dissipation.

Note 1: In order to draw the attention of our customers to the distance over which the car can be brought to a standstill in emergencies, we have shown in fig. 41 the «Braking distances as a function of the speed of travel».

These are minimum distances to enable braking to be effected without skidding and with complete safety.

As braking distances, assuming the braking system is in perfect condition, are determined solely by the degree of adherence between the tyres and the road, figures are shown on the chart for two particular conditions:

- a) Level and dry asphalt road; tyres in good condition (the coefficient of friction used for the calculations was 0,7).
- b) Level road, asphalted, wet but not slippery, tyres in good conditions (coefficient of friction 0,4).

On the chart, the distances covered by the car at various speeds in 1 second (that being the average time that elapses between the moment when the driver realises the need for braking and that at which effective braking action is obtained between the shoes and the drums) have been added to the braking distances.

Note 2: After washing the car, make sure that the brakes function properly, as water may have entered the drums. Should this happen the brake should be applied gently several times so as to heat the linings and dry off the water on them.

Hand brake

If the hand-brake is properly adjusted, the rear wheels should be locked when the brake-lever has completed half its possible total travel, that is, about 8 cm. (3 in.).

Adjustment is normally only necessary when the brake shoes have to be re-set as a result of lining wear or, in exceptional cases, if the cables stretch. The latter sometimes happens with new cars.

To regulate hand-brake travel use the adjustment device shown at 10 (fig. 38).

WHEELS

The front wheel bearings in the hubs should be lubricated every 5000 Km. (3000 miles) see fig. 16; the rear wheel bearings are factory packed and do not require lubrication.

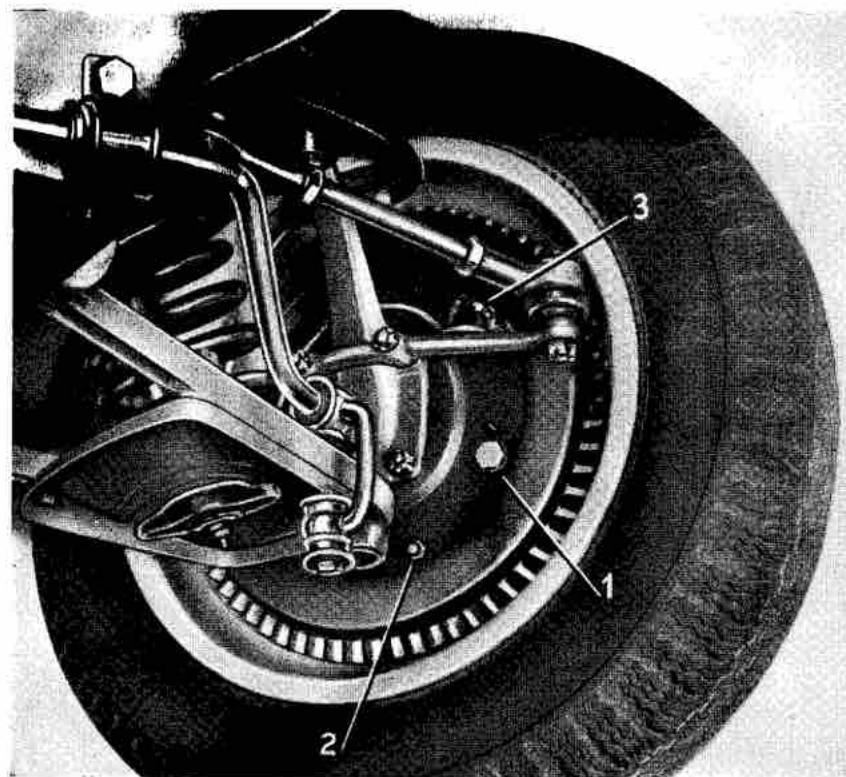


Fig. 40. - Adjustment of clearance between brake linings and drums; bleeding the front wheel hydraulic brake cylinders.

1. Cams for adjusting clearance between linings and drums. - 2. Studs for adjusting parallelism of shoes in relation to drums. - 3. Air bleeding nipple.

To lubricate the front wheel bearings, remove the outer hub cover, take off the wheel, fill the bearings and the hub with grease, adjust the axial play of the bearings and replace the wheel.

Adjusting the axial play of the front wheel bearings

To adjust the axial play of the taper roller bearings in the front wheels proceed as follows:

- Gradually tighten up the castle nut (while turning the brake drum) until all play between the rollers and their races is taken up.
- Loosen the nut by 1½ to 2 « slots » so as to make a slot coincide with a hole.
- Tap the hub a few times with a lead hammer to drive back the inner race of the outside bearing and help it to slide by pulling the brake drum outwards. In this way the washer behind the nut should be blocked.
- Check that the drum rotates freely but without appreciable play.
- Replace the split pin securing the nut.
- Fill the hub cap with grease before replacing it on the hub.

TYRES

Section of the pneumatic tyres: 380 x 155 (155-15).

The inflation pressures are as follows:

Giulietta:

- Pirelli « Pordoi » tyres: Front 1,3 Kg./cm.² (19 p.s.i.); rear 1,3 Kg./cm.² (19 p.s.i.)
- Michelin « Pilota » tyres: Front 1,3 Kg./cm.² (19 p.s.i.); rear 1,4 Kg./cm.² (20 p.s.i.)

Giulietta Sprint:

- Pirelli « Cinturato » tyres: Front 1,5 Kg./cm.² (22 p.s.i.); rear 1,6 Kg./cm.² (23 p.s.i.)
- Michelin « X » tyres: Front: 1,4 Kg./cm.² (21 p.s.i.); rear 1,5 Kg./cm.² (21½ p.s.i.)

To ensure efficient suspension and to prevent premature tyre wear, it is necessary that the inflation pressures be those specified. Insufficient pressure causes overheating and tread wear.

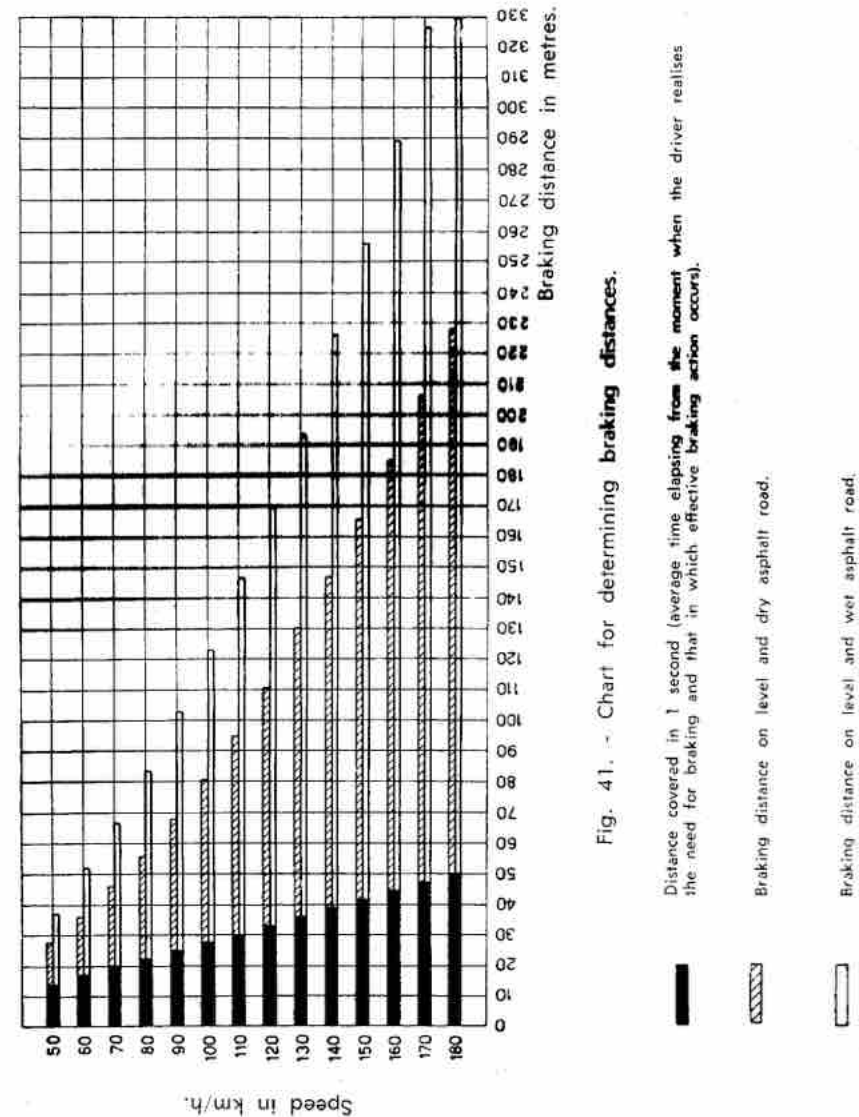


Fig. 41. - Chart for determining braking distances.

Distance covered in 1 second (average time elapsing from the moment when the driver realises the need for braking and that in which effective braking action occurs).

Braking distance on level and dry asphalt road.

Braking distance on level and wet asphalt road.

Each wheel, complete with its tyre, is balanced at the factory by adding suitable plates (fig. 42). Whenever the tyres have to be changed or refitted, the wheels with their tyres should be re-balanced.

To ensure uniform wear on the tyres, and to increase their life, it is advisable to make a «cross-over» exchange of the front and rear tyres every 4000 to 5000 Km. (2500 to 3000 miles).

See page 25 for treatment of the tyres if the car is to be left unused for a considerable time.

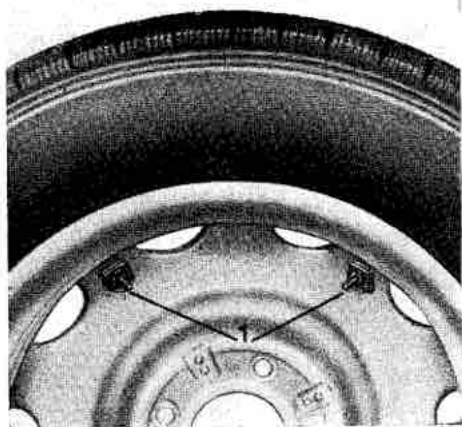


Fig. 42. - Wheel balancing.

1. Plates for balancing the wheels.

ELECTRICAL SYSTEM

Attention is drawn to the fact that the positive of Lucas Electric Equipment is grounded.

Every piece of equipment used (except the starter motor and the ignition circuit) is protected by an individual fuse on a fuse-board beneath the instrument panel.

Should any apparatus not function or any lamp fail to light up, check the appropriate fuse. If the fuse is undamaged, make sure that the terminals on the wiring are well tightened and that the lamp bulbs are not loose or burnt out.

If the defect continues the electrical system must be checked by an authorised service station.

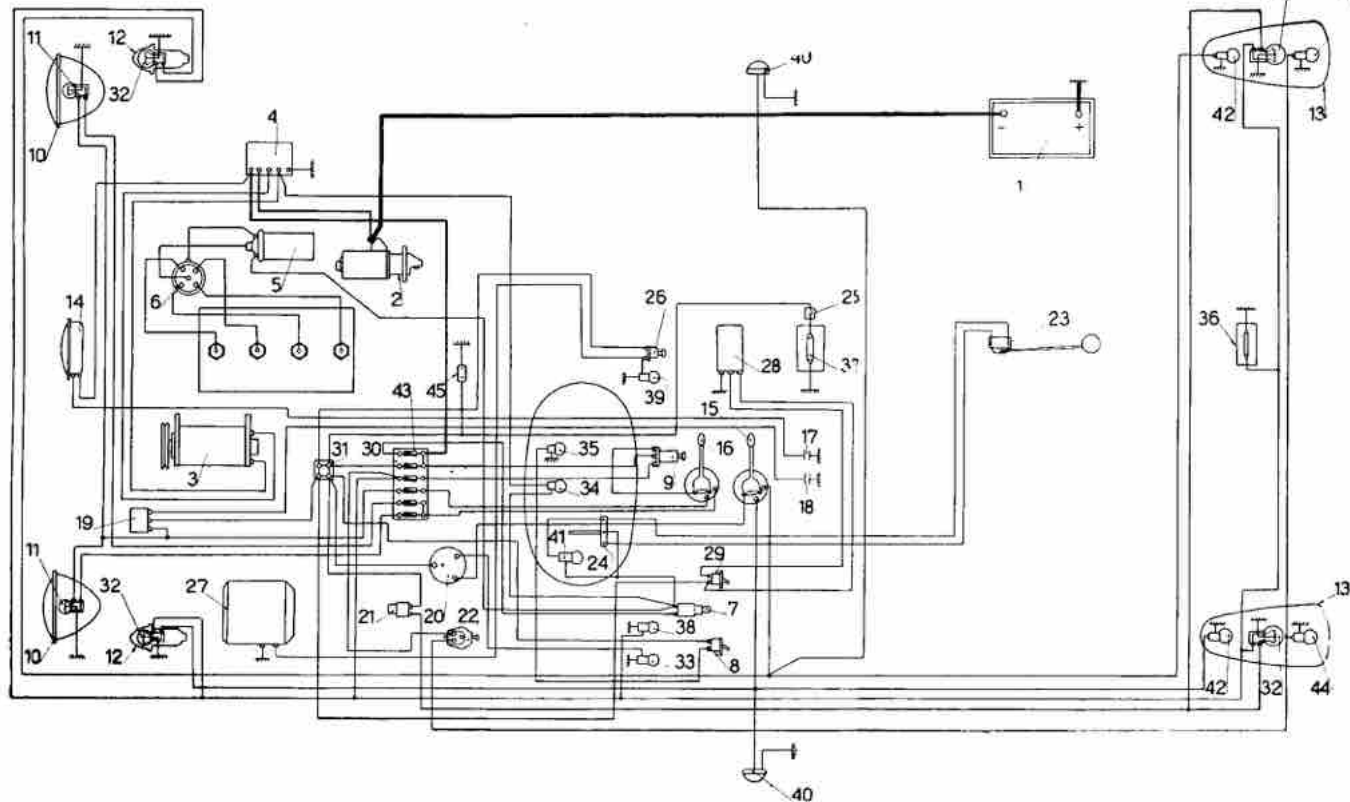


Fig. 43. - Circuit diagram of the electrical system (Giulietta).

- | | | |
|-------------------------------------------------------------------------------------------|----------------------------------------------------------------------|-----------------------------------------------------|
| 1. Battery. | 16. Switch for full and anti-dazzle lighting. | 33. 12 V - 1.5 W lamp for trafficators. |
| 2. Starter motor. | 17. Push-button for horn. | 34. 12 V - 1.5 W lamp for battery charge tell-tale. |
| 3. Dynamo. | 18. Push-button for headlights blinking | 35. 12 V - 1.5 W lamp for speedometer lighting. |
| 4. Dynamo voltage regulator. | 19. Electromagnetic change-over switch for trafficators. | 36. 12 V - 5 W lamp for rear number plate. |
| 5. Ignition coil. | 20. Automatic device for blinking. | 37. 12 V - 3 W lamp for roof light. |
| 6. Distributor. | 21. Stop signal switch. | 38. 12 V - 1.5 W tell-tale lamp for headlights. |
| 7. Ignition switch. | 22. Switch of reverse. | 39. 12 V - 1.5 W for heater tell-tale. |
| 8. Switch for instrument panel light. | 23. Float of petrol level indicator. | 40. 12 V - 1.5 W lamp for blinking lamps repeater. |
| 9. Switch for parking lamps and headlights. | 24. Petrol level indicator. | 41. 12 V - 1.5 W tell-tale lamp for petrol level. |
| 10. Headlights. | 25. Switch for rooflight. | 42. 12 V - 20 W lamp for rear lamps. |
| 11. 12 V, 45 W - 40 W double filament bulb for headlights. | 26. Switch for heater motor. | 43. Fuses. |
| 12. Front lamps with white glass for town driving and blinking. | 27. Heater. | 44. 12 V - 20 W lamp for indicating reversing. |
| 13. Rear lamps with red glass for parking, stop-lights, blinking and to signal reversing. | 28. Windshield wiper motor. | 45. Socket for inspection lamp. |
| 14. Electric horn. | 29. Switch for windscreen wiper motor. | |
| 15. Trafficator switch. | 30. Fuse-board with 6 fuses. | |
| | 31. Terminal board for making various connections. | |
| | 32. 12 V, 3 W - 20 W double filament bulb for front and rear lights. | |

Battery

It is important to prevent the battery from being over-discharged. To ensure that this does not occur, it is necessary:

- To use the starter motor, the horn and the various lamps in moderation.
- Not to change the original lamps for others consuming more current.
- Always to switch off the ignition when the engine is not running.
- To ensure that the battery is always clean and dry externally and that metal objects are not laid on it.
- At least every 1500 Km. (1000 miles), and more frequently in the summer, check the level of the electrolyte. It should never be more than 8 mm. ($\frac{5}{16}$ in.) above the plates nor leave them uncovered.
- Make sure that the terminals are tight and have sufficient vaseline on them to prevent corrosion.
- If the car is to be laid up for a considerable time, arrange for the battery to be recharged every month; never let it become completely discharged or sulphating will occur.
- When « topping up » only distilled water should be used; it should be kept in a glass container.

The specific gravity of the electrolyte is checked by means of a hydrometer which makes it possible to ascertain the state of the charge.

The relationship between the specific gravity of the electrolyte and the charge is:

- Specific gravity 1.28 (32° Beaumé) = battery charged.
- Specific gravity 1.23 (27° Beaumé) = battery semi-charged.
- Specific gravity 1.11 to 1.14 (15° to 18° Beaumé) = battery discharged.

If distilled water or a sulphuric acid solution has been added, the electrolyte should be checked when mixing has been completed: to facilitate mixing, discharge the battery for 30 minutes.

Note: In tropical climates where the temperature is nearly always above 30° C (85° F), the battery should be run with the specific gravity of the electrolyte (when the battery is charged), lower than normal, namely, 1.21 (25° Beaumé).

Dynamo and starter motor

Check the brushes and the commutator every 5000 to 10000 Km. (3000 to 6000 miles).

Every 10000 Km. (6000 miles), inject a few drops of oil into the hole in the rear bearing of the rotor.

The brushes should be well cleaned and move freely in their holders.

The working face of the commutator should be cleaned with a cloth dipped in petrol. The brush springs should apply effective pressure.

The commutator should be perfectly smooth. Score marks can be removed with very fine emery cloth; the surface should then be wiped over with a cloth dipped in petrol.

When replacing a brush it is necessary to bed the sliding surface to the commutator by winding emery cloth round the latter and revolving it slowly until the brush fits accurately.

The above, as any other maintenance work on the dynamo and starter motor, should only be carried out by an authorised service station and skilled electricians.

Headlamps

To replace a headlamp bulb, the rim of the lamp must be removed with a screwdriver; the bottom screw in the lampholder must then be turned through 90°, the holder itself withdrawn and the bulb changed.

The 40/45 W double filament bulb (one for full lighting and the other for dipping) must not be replaced by others of higher power which would consume a heavier current than the dynamo could supply, as this would lead to gradual discharge of the battery.

When lamps have been removed from the bodywork, they should be aligned in the following way after re-fitting:

- Position the car on level ground 5 m. (16 ft.) from a white screen or a light-coloured wall, making sure that the centre line of the car is at right angles to the screen.
- Draw a vertical line on the screen in line with the vertical centreline of the car and make two crosses spaced 145 cm. (4 ft. 9 in.) on each side of the centre-line and 65 cm. (2 ft. 1⁵/₈ in.) from the ground.
- Turn the three adjusting screws on the bulb-holder rim until the light is centred properly on the corresponding cross.

Other lamps

The white-light front lamps have bulbs with two filaments, one rated at 3 W for town driving and the other at 20 W; the latter constitutes a blinking light for direction indication.

The rear lamps each contain three bulbs. Of these:

- The first, at the top, gives an amber light, rated at 20 W and indicates direction of travel;
- The second, in the centre, gives a red light, has a 3 W filament for the parking light and a 20 W filament as a braking light;
- The third, at the bottom, also gives an amber light and has a 20 W filament which lights up when the reverse gear is engaged.

To change a bulb in these lamps, remove the screws holding the transparent cover.

Trafficators

The trafficators are of the blinker type. Operating the trafficator switch lever on the steering column causes the front and rear lamps to « blink » on the near-side or off-side of the car.

If it is seen from the trafficator tell-tale on the instrument board that there is faster blinking on one side than on the other when the switch is turned in both directions, this indicates that one of the front or rear signalling lamps has burnt out.

Windshield wiper

The two windshield wipers, operated by a single motor, automatically take up a horizontal position so as to give complete visibility when the motor is switched off.

If the wipers have to be dismantled for any reason, care must be taken to see that they are replaced in the horizontal position.

JACKING UP THE CAR

To raise the car, the jack should be inserted in the proper seatings after removing the caps covering the latter, after having also made sure that the hand-brake is applied and after placing blocks behind and in

front of the wheels which are not off the ground. This is done to prevent movement, particularly if the car is on an incline and if a rear wheel is jacked up.

WASHING THE CAR

It is advisable to have the car washed by a competent person as otherwise the varnish might be damaged.

It is better to begin by washing the lower part of the car, taking care not to get water into the brake drums, and to go on to the upper part last.

Do not let the jet of water strike the varnish violently; go over the car a second time with a sponge which should be frequently wrung out and soaked in fresh water; always use plenty of water. Then dry the car with a chamois leather.

To restore the gloss on the paintwork, apply a good commercial car polish, taking care always to use only the best quality.

