



1934

INSTRUCTION
BOOK

INSTRUCTION BOOK

OF



CARS

S.S. I. AND S.S. II. MODELS

PRICE 5/-

CARS  LTD.
ASSOCIATED WITH SWALLOW ENGINEERING CO. LTD.
FOLESHILL, COVENTRY, ENG.

Telephone : 8027 (Six Lines)

Telegrams : "Swallow, Coventry"

PREFACE

THIS book of instructions has been compiled to give assistance to the owner of the S.S. I or S.S. II in the care and maintenance of the car, and all matter included is relative to both models except where otherwise indicated.

Every effort has been made in design to render the few adjustments easy and accessible.

The continued good running of a car depends essentially upon the care and attention it receives from the owner, and we earnestly recommend that careful attention be paid to the following instructions, particularly to those which deal with general upkeep and lubrication. All the necessary maintenance instructions for body, engine and chassis, are combined in the Mileage and Maintenance Diary incorporated in this book.

It is unlikely that the owner will desire to carry out major repairs, but an intimate knowledge of the details and assembly will give at least a greater interest in the car's running and increased confidence in the rare event of a mishap. This book is fully illustrated and, by the aid of the descriptions given, it should be easy for those of a mechanical mind to obtain a working knowledge of the car.

A section will be found at the end of the book which will enable the owner to trace any fault and correct it. Should any further information be required, our Technical Department will be pleased to give all possible assistance.

The car will run for many thousands of miles before a general overhaul becomes desirable, and the work then entailed should be carried out by a skilled mechanic. We have not, therefore, given detailed instructions for dismantling the units, but the mechanical parts are illustrated in detail for the benefit of the mechanic who will have the work to do. It is desirable that any overhaul or repair work should be carried out at the works or by one of our Agents, who, being familiar with the construction of the car, are suitably equipped to give after sales service to S.S. owners.

MEMOS. AND LICENCE DATA.

Personal Memos.

Owner's Name

Address

Telegraphic Address

Telephone Number

Notes

Car Memos.

Date of Car Purchase

Insurance Policy

R.A.C. or A.A. Number

Licence Data.

Registration Number

Car Licence Date

Driver's Licence Number

Car Number (Commission No.)

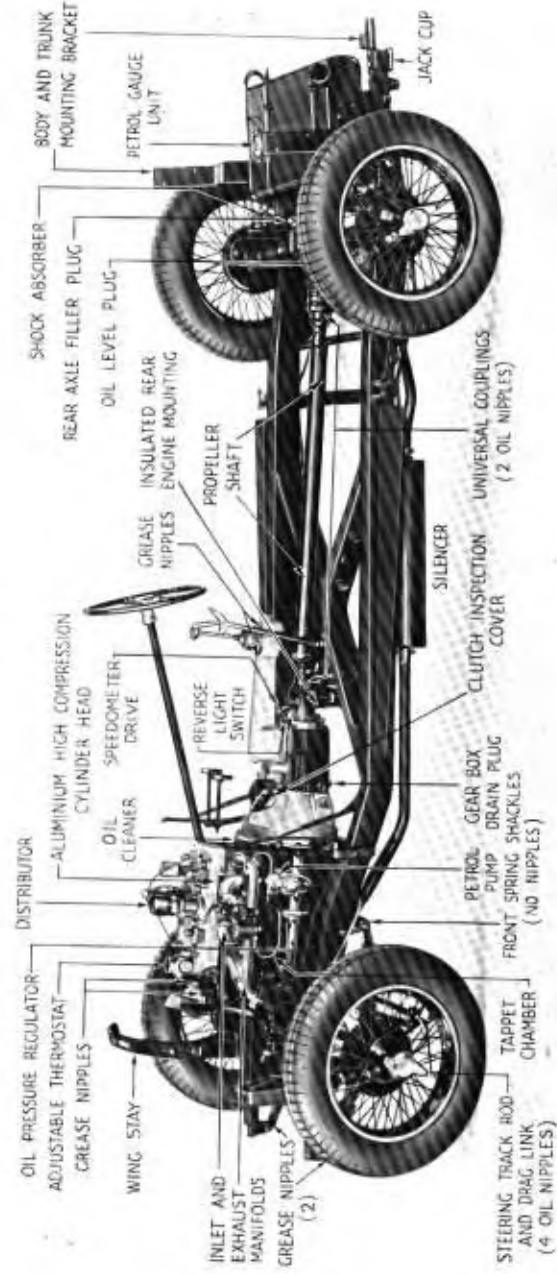
Given under bonnet at o/s. of Engine.

Engine Number

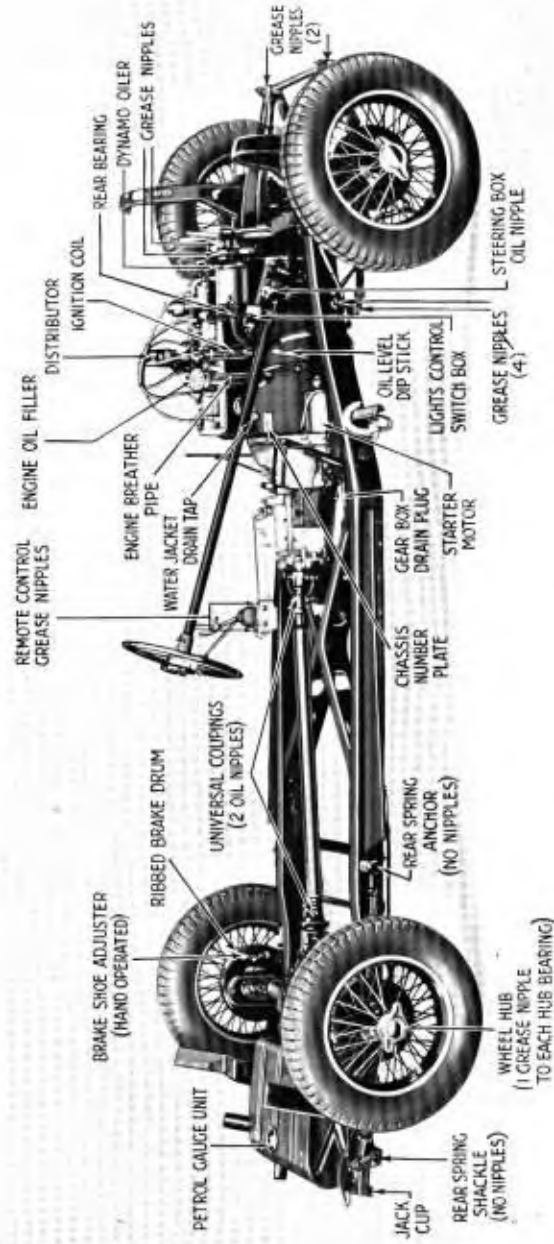
Stamped on o/s of Cylinder Block.

	16 H.P. S.S. I.	20 H.P. S.S. I.	10 H.P. S.S. II.	12 H.P. S.S. II.
Number of Cylinders	6	6	4	4
Diameter of Cylinders	65.5 m/m.	73 m/m.	63.5 m/m.	69.5 m/m.
Stroke of Piston ..	106 m/m.	106 m/m.	106 m/m.	106 m/m.
Capacity of Engine ..	2143 c.c.	2663.7 c.c.	1343 c.c.	1608.5 c.c.
R.A.C. Rating, ..	15.96	19.84	10	11.98
Tax (Annual)	£16	£20	£10	£12

S.S. II.



S.S. I.



The S.S. I. and S.S. II. Chassis are shown above prepared for body mounting.

The S.S. I. view is taken from the near side, and the S.S. II. from the off side, therefore, both illustrations are instructive, as the parts indicated are similar on all S.S. Models.

GENERAL DATA.

	16 H.P. S.S. I.	20 H.P. S.S. I.	10 H.P. S.S. II.	12 H.P. S.S. II.
Number of Cylinders ..	6	6	4	4
Bore of Cylinders, m/m.	65.5	73	63.5	69.5
Stroke of Crank, m/m.	106	106	106	106
Cubic Capacity, c.c. ..	2143	2663.7	1343	1608.5
Compression Ratio ..	6-1	6-1	6-1	6-1
Firing order ..	1.5.3.6.2.4.	1.5.3.6.2.4.	1.3.4.2.	1.3.4.2.
Brake Horse Power at 1,000 r.p.m.	17	22	10	12
2,000 ..	36	45	22	26
3,000 ..	50	63	29	35
Peak 3,600 ..	—	68	32	38
Peak 3,800 ..	53	—	—	—

Oil Capacity.	S.S. I.	S.S. II.
Engine	16 pints	9 pints
Gearbox	2 ..	2 ..
Rear Axle	3½ ..	2 ..
Water Capacity of Radiator and Engine	32 ..	22 ..
Amount of anti-freeze glycerine to use in Winter	8 ..	5 ..
Petrol Capacity.	12 gallons	8 gallons
Wheelbase	9' 11"	8' 8"
Track	4' 5½"	3' 10½"
Turning Circle (between curbs)	40'	36'
Tyre Size	5.50x18	4.75x18
Overall Dimensions.		
Length	15' 6"	14'
Width	5' 5½"	4' 7"
Height	4' 7"	4' 6"

Car Weights (ready for the Road) Cwts. Qrs. Lbs.
(Less Petrol)

S.S. I.	25	2	0
S.S. II.	20	1	0

Valve Timing Diagram.

Flywheel diameter, 11½ ins. adjacent to starter gear teeth.
10° = 0.99 ins.
50° = 4.96 ins.

Ignition Timing.

S.S. I. Set to fire at 14° before T.D.C. on full retard = 1.38" on flywheel.
S.S. II. Set to fire at 17° before T.D.C. on full retard = 1.69" on flywheel.

N.B.—These settings represent the starting points when timing the ignition. Individual engines may require slight adjustment above or below these points.

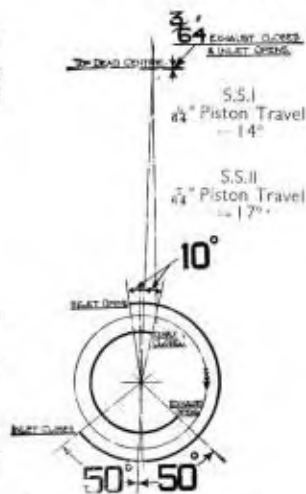


Fig. 1. Timing Diagram.

ROAD SPEED DATA.—S.S. I.

We give below tables showing the engine speeds in revolutions per minute, relative to car speeds in M.P.H. in the various gears.

M.P.H.	17.1 to 1 First and Reverse	10.04 to 1 Second	6.52 to 1 Third	4.75 to 1 Top
5	1025	602	391	285
10	2050	1204	782	570
15	3075	1806	1173	855
20	4100	2408	1564	1140
25	5125	3010	1955	1425
30		3612	2346	1710
35		4214	2737	1995
40		4816	3128	2280
45			3519	2565
50			3910	2850
55			4301	3135
60			4692	3420
65			5083	3705
70				3990
75				4275
80				4560

Final Drive. No. of teeth in spiral bevel pinion 8
No. of teeth in spiral bevel crown wheel 38

SAFE ENGINE SPEED LIMITS.

Although this engine is capable of "revving" very fast, yet continued "over-revving" should be avoided. It is in first and second gears that "over-revving" is most likely to occur, and reference to the table above will show the high engine speeds attainable.

Although the car is capable of higher speeds, we strongly recommend that the driver shall not continually exceed the following speeds, and it is of value to remember that the engine wear and tear at 5000 r.p.m. is double that obtaining at 3500 r.p.m.

Gear	Engine Speed	Road Speeds
First	3600 R.P.M.	17.5
Second	3600 R.P.M.	30
Third	3600 R.P.M.	46
Top	4000 R.P.M.	70

ROAD SPEED DATA.—S.S. 11.

We give below tables showing the engine speeds in revolutions per minute, relative to car speeds in M.P.H. in the various gears.

10 H.P.				MILES PER HOUR	12 H.P.			
1st and Reverse 20-85	2nd 12-84	3rd 7-68	Top 5-29		1st and Reverse 19-17	2nd 11-80	3rd 7-06	Top 4-86
1316	810	485	334	5	1210	745	446	307
2632	1620	970	668	10	2420	1490	892	614
3948	2430	1455	1002	15	3630	2235	1338	921
5264	3240	1940	1336	20	4840	2980	1784	1228
	4050	2425	1670	25		3725	2230	1535
	4860	2910	2004	30		4470	2676	1842
		3395	2338	35			3122	2149
		3880	2672	40			3568	2456
		4365	3006	45			4014	2763
		4850	3340	50			4460	3070
			3674	55				3377
			4008	60				3684
			4342	65				3991
			4676	70				4298

Final Drive.	No. of teeth in spiral bevel pinion	..	10 H.P.	12 H.P.
		..	7	7
	No. of teeth in spiral bevel crown wheel	..	37	34

SAFE ENGINE SPEED LIMITS.

Although this engine is capable of "revving" very fast, yet continued "over-revving" should be avoided. It is in first and second gears that "over-revving" is most likely to occur, and reference to the table above will show the high engine speeds attainable.

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Gear	Engine Speed	Road Speeds	
		10 H.P.	12 H.P.
First	3600 R.P.M.	13.5 M.P.H.	15 M.P.H.
Second	3600 R.P.M.	22 M.P.H.	24 M.P.H.
Third	3600 R.P.M.	37 M.P.H.	40 M.P.H.
Top	4000 R.P.M.	60 M.P.H.	65 M.P.H.

S.S. DRIVING HINTS.

Easy Starting. When the engine is cold, a primary charge should be given before turning on the ignition. This will be accomplished if the following instructions are complied with in sequence.

1. If the battery is in a low condition and the engine has been stationary for several hours, first operate the petrol pump hand primer, at the same time lifting the carburetter needle with the left hand. This will compensate for the loss of petrol through evaporation.
2. Depress accelerator pedal about half way and retain in this position.
3. Pull out choke control.
4. Press starter button with the right hand, and after a few revolutions of the engine, switch on ignition.

Shock Absorber Adjustment. The Andre friction type shock absorbers fitted to the S.S.I. and S.S.II. models have been chosen in preference to the hydraulic type, because the damping characteristics are more suitable for the type of springing used on these models, and also because of the advantages obtainable by the simple adjustment provided to suit varying conditions of travel.

Adjustment is desirable before commencing a long distance journey, when it will be advisable to tighten the adjusting nuts, thus increasing the resistance and preparing the shock absorbers for higher speeds likely to be obtained on long distance travel.

For the average town work a lesser resistance is required to obtain maximum comfort, the adjustment required varying according to road conditions.

Brakes (after car washing). When the car is washed with hose, water may enter the brake drums, and as water acts as a lubricant on the linings the friction will be reduced, thus making the brakes less efficient. Always "try" the brakes after the car has been washed, and if it is found that water has entered the drums, drive the car for a short distance with the handbrake slightly on, to dry off the water. It is advisable to keep the handbrake "on" when washing the car, and this will help to prevent water from getting on to the brake surfaces.

Seat Operation. Simple and efficient seat slides are provided, both for adjustment and for easy entry to and from exit and the front seats. It is possible to enter and leave the seats without utilising the adjustment, but we would strongly advise our customers to carry out the following instructions and thus enjoy the maximum comfort obtainable. When the driver or passenger is entering, the seat should be in the extreme rear position, and when occupied should be moved forward to the desired position before closing the door. When leaving the car, the door should first be opened and the seat then moved to the rear. The seat will now be in the correct position for leaving and re-entering the car.

High Curbs. We would advise the owner to be wary of drawing up too close to high curbs and to acquire a habit of leaving about a foot clearance between the road wheels and the curb, thus avoiding possible damage to the low sweeping front wings.

Reducing Accumulator Discharge. In extremely cold conditions, the oil resistance to the engine and gears is considerably increased, resulting in excessive battery discharge when the starter is in operation. To counteract this, the load on the starter will be reduced by depressing the clutch pedal, thereby eliminating the friction and oil resistance obtaining in the constant mesh gears. The observance of the easy starting instructions above will also conserve the energy in the battery.

It is an advantage to disengage the clutch at any time when operating the starter, particularly when the accumulator is low.

COACHWORK.

CARE OF COACHWORK AND GENERAL INSTRUCTIONS.

As we have always enjoyed a reputation for high-class coachwork, we are naturally eager that our cars should retain their perfection and immaculate appearance after they have left our hands. For this reason, and for our customers' satisfaction, we advise all S.S. owners to ensure that the following instructions are complied with.

Cellulose. Have your car washed and polished once a week. See that all dirt is removed with a soft sponge and hose pipe. Dry the car thoroughly with a good quality wash leather, apply a small quantity of Swallow polish to a fine muslin cloth and polish an area about four square feet until the cloth becomes dry. Replenish with polish and repeat the operation in another place, and so on until the whole car has been covered. Finish off with a clean, dry cloth. Replacement tins of polish are obtainable from the S.S. works or through any of our agents.

Tar remover can be obtained from the works or from any garage, which is quite harmless to the cellulose. Petrol is a good substitute if used within a short time of the tar being picked up.

Fabric. If the fabric has become very dirty, it will be necessary to cleanse with soap and water, using a sponge and a leather. A soft brush may be used with discretion if found necessary.

When the fabric is not unduly dirty, a clean bright finish will be obtained by cleansing with a dry duster and applying a coat of S.S. Brushing Polish, using a soft brush for application and one for polishing, then a final polish with clean mutton cloth will give very pleasing results. Tins of S.S. Brushing Polish are obtainable from the S.S. works or through any of our agents. Colour of fabric should be stated when ordering.

Interior Hide. The seat upholstery may be cleaned with soap and water, using a sponge and leather. Greasy marks should be removed with a soft cloth soaked in clean petrol.

Interior Head Lining. Head lining will be kept in reasonably clean condition if cleaned frequently, using a soft hat brush or a piece of mutton cloth soaked with petrol and applied smartly, but without pressure.

Carpets. Carpets may be cleaned with petrol after the usual brushing.

Cabinet Work. Cappings and instrument board may be polished in the same manner as cellulose.

Seat Cushions. When replacing cushions, be careful that they are in their correct positions, i.e., the front cushions have two different radii at the front corners, the larger radii coming together nearest the centre of the car.

Replace front and rear cushions with front end into the frame first. The rear cushions are shaped to fit, and a little observation will suffice to place these in their respective positions.

Driving Mirror. The mirror should be set to reflect through the rear and off-side quarter lights, and if set correctly the trafficators will also be reflected. The glass is held in spring-loaded claws, which should grip the extreme near side end of the mirror, to permit a radial movement in an anti-clockwise direction.

Once the mirror has been set, with the thumb screw definitely tight, the vertical focus will remain permanent, but the horizontal focus will be adjustable by finger tip control. This arrangement allows the mirror to be situated in the most serviceable position. The roof lock, wiper and driving mirror are situated together in a central position, therefore the mirror should be moved out of the way as described above, before operating the roof lock or screen wiper.

COACHWORK.

Front Screen. The construction of the improved S.S. Saloon and Coupe screen completely eliminates the need of instruction and the only attention required is occasional lubrication, as indicated in Fig. 2, to maintain the bearing surfaces free from rust.

Front Screen (Open Four-Seater). Two security fasteners are fitted to bottom screen rail. These must be released to open in the usual manner. To fold screen flat on scuttle, first ensure that the security fasteners are closed and then completely release the wing lock nuts at each end of the frame. Place hands on both sides of screen and exert equal downward pressure.

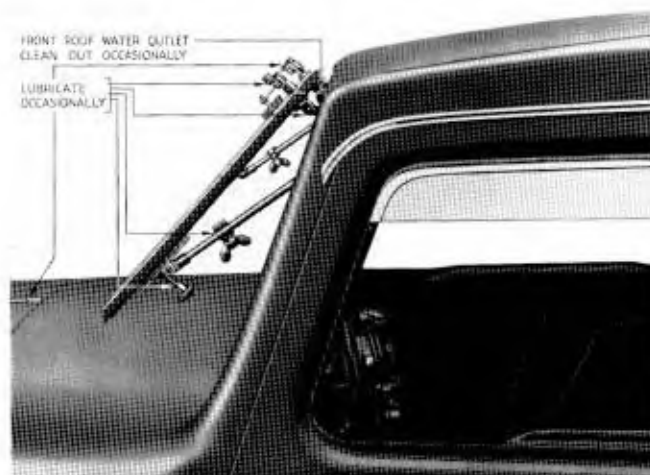


Fig. 2.

Chrome. All parts chromium plated on steel should receive attention with Chrome Shine at least once a week.

Chrome cleaning is essential, particularly where there is a foundation of a ferrous metal, i.e., steel bumper, in order to prevent an accumulation of red oxide on the chrome surface. The weekly use of Chrome Shine will prevent this rust deposit, but if the accumulation of red oxide is permitted to remain on the surface for a considerable time it will be very injurious to the chrome itself.

Bonnet Hinges. The centre and side hinges should be lubricated frequently to obviate rust and creaks.

Open Four-Seater Hood. To fold hood, the following instructions should be observed in sequence (but first ensure that hood material is dry.) Detach valances, release hood screen locks, lift hood bodily to rear with all joints locked, break frame joints and place both hands on top hood rail, exerting downward pressure and allowing hood material to hang clear of framework. (Be careful to avoid trapping hood material between the sticks.) Now fold all surplus material neatly on top of framework and fit the envelope and tonneau cover.

Seat Slides. These require very little attention, but it is advisable to check over the securing bolts and apply a little grease to the runners occasionally, to ensure smooth operation.

COACHWORK.

Open Four-Seater Side Curtains. A pocket and satchel is provided in the rear trunk, to house the complete set of six side curtains and two hood valances. These should be placed in position carefully to avoid damage, as a precaution each curtain may be wrapped in soft cloth to keep the celluloid free from scratches.

To pack away the complete set of curtains neatly and compactly, the following instructions should be observed :—

Take the near side front curtain (near side indicates left side of driver), fold and place in the inside satchel on the near side, with the feet uppermost ; take the second near side curtain and place it between the folded front curtain, also with the feet uppermost. Now place away the two front off side curtains in the same satchel on the off side. The two rear curtains may now be placed on each side of the outside satchel with the feet uppermost.

The hood valances should be rolled up separately and placed at each end of the pocket.

Door Hinges. These should receive occasional attention with the grease gun to the grease nipples provided.

Body Creaks. To preserve the silence of the body work, occasional attention is necessary.

The bonnet-rest, which supports the bonnet both at the scuttle and radiator, should be coated with grease, or an anti-squeak compound, occasionally.

The bolts securing the body to chassis, also the wing and bumper bolts, should be checked over once in every six months. If at any time a bad body creak should develop, this will be the surest method for rectification. If the creak has not then been located, after the above adjustment, check over the rear seat well fixing bolts, seat fittings, and all bolts visible under the bonnet.

We are including the above advice for the benefit of S.S. owners who cannot find it convenient to return their car to the works, but we would point out that in the event of a bad body creak developing, the car should be returned to the works, or to the nearest S.S. Agent, where rectification will be speedily carried out.

Door Locks and Buffers. The bearing surfaces of the lock bolts should receive occasional attention with thin oil, a felt pad is fitted directly behind the lock plate and is permanently in contact with the bearing surface of the lock bolt. This pad will absorb the thin oil and provide constant lubrication. It is essential to ensure the lock bolt is completely home after the door has been closed, as the lock is liable to remain open when the door has been closed carelessly. This can be checked by observing the amount of play or loose movement in the exterior or interior door handles. It is advisable to acquire the habit of testing in this way before the hand is taken away from the door handle.

Hub Caps. Hub caps should be treated with an application of grease to the bearing surface which comes in contact with the wheel hub, to facilitate easy removal when occasion arises.

Access to Back Axle Filler. To refill the back axle, remove the two screws securing the inspection cover, which will be found on the floor of the trunk. This will reveal a filler plug in the rear of the axle casing, which should be removed with the adjustable spanner. The oil level plug is situated at the near side front of the axle casing ; this plug should be removed before filling to avoid over-oiling.

Access to Gearbox Filler and Remote Control Nipples. Remove the detachable carpet from the transmission arch, indicated on Fig. 3, when the gearbox filler and the remote control grease nipples will be exposed.

COACHWORK.

Open Four-Seater Door Straps. A steel strap is incorporated in the framework of both doors to maintain a slight constant tension on the lock and thus obviate rattles.

This strap is anchored at the top of the hinge pillar and passes through the front bottom corner of the door, where adjustment is obtained by means of a $\frac{1}{4}$ " box spanner. In the event of a door developing rattle, the tension on the strap should be increased by turning the nut provided one or more turns in a clockwise direction.

Dismantling Back Axle. Before attempting to remove the back axle, the following instructions should be complied with in numerical order,

1. Remove two end bumper bolts.
2. Remove centre bumper bolt.
3. Detach bumper bar.
4. Release rear wing valances.
5. Remove trunk floor boards.
6. Remove two bottom bolts and the six coach bolts fixing trunk and back of body to chassis brackets.
7. Remove the five wood screws securing trunk to body.
8. Now remove trunk complete.
9. Remove bolts securing back axle hoops to chassis.
10. Remove chassis standing brackets. (See Fig. 14).
11. Remove petrol tank.
12. The axle can now be dismantled in the usual way and drawn out from under the back of the body.

Screen Wiper. Lubricate the exterior working parts occasionally. The interior parts are packed with grease on assembly and no further lubrication is required.

Door Light Replacement. If at any time a door light is accidentally damaged, the nearest S.S. agent will gladly obtain and fit a replacement at current charges, or alternatively a replacement will be supplied direct from the works on request. If it is not convenient for the change over to be effected by a coach builder, we would advise the owner to simplify the operation by removing the channel from the damaged glass and forwarding this along with the order, so that our works may attach this to the replacement. In the latter case, your order should stipulate which door light is damaged, i.e., near side (passenger), off side (driver). Instructions for replacement are given in correct sequence as follows :

1. Remove polished fillets from both pillars (4 screws).
2. Remove fascia panel and capping. See Illustration No. 3.
3. Wind glass down and remove screw or tack securing the rear felt glass channel. The channel will then lift out.
4. Wind glass up to within half-an-inch of door top.
5. Now take glass in both hands and pull out rear edge towards you.
6. The door light will now wind up to the top and the glass channel disengage from the lifting mechanism.

To fit the new door light simply reverse instructions.

Trafficator Replacement. To replace a damaged indicator, remove the three screws securing the opening panel provided in the interior trimming directly behind the Trafficator. This panel will open and expose the complete indicator mechanism.

In the case of the four-light saloon, on which the indicator is fitted in the bottom quarter panel, it will first be necessary to remove the polished capping before opening the casing for access to the Trafficator.

COACHWORK.

Battery Removal. To remove the battery the following instructions should be observed:—

1. Remove the two screws securing the battery lid.
2. Push both securing rods down as low as the split pins will permit.
3. Remove battery lid.
4. Now pull the battery towards the off side (near side on S.S. II.) and carry it away.

(S.S. I. The battery is very heavy; it is therefore advisable to balance the right foot on the starter motor to avoid physical strain.)

Bedford Silent Bloc Type Buffer. This buffer is fitted to increase the stability of the doors when closed and is designed to operate as a valuable damper on door rattles. There is an adjustment provided as shown in illustration No. 3, which is operated in a clockwise motion to take up wear which may develop in the insulated bush; a metallic rattle in the vicinity of the lock and buffer will indicate that the above adjustment is required.

Private Door Locks. A locking handle is fitted to the off-side door and two keys are provided. If a replacement key is required at any time, read the letters and numbers stamped on the handles and stipulate these in your order to the works. An interior locking device is provided to the near side door, which is operated by reversing the opening action and exerting extra pressure at end of travel. See Illustration No. 3.

Interior Door Handles. The lock and winder handles are secured to the shanks by a pin neatly concealed beneath the spring loaded bush. See Illustration No. 3. To detach a handle, compress the bush and push the pin through with a garnishawl or other suitable instrument.

Opening Back Light. The opening back light provides ideal ventilation and extracts smoke and bad air. The method for opening is to release the security fasteners, when the spring loaded telescopic arms will automatically open and secure the light. Lubricate the working parts occasionally.

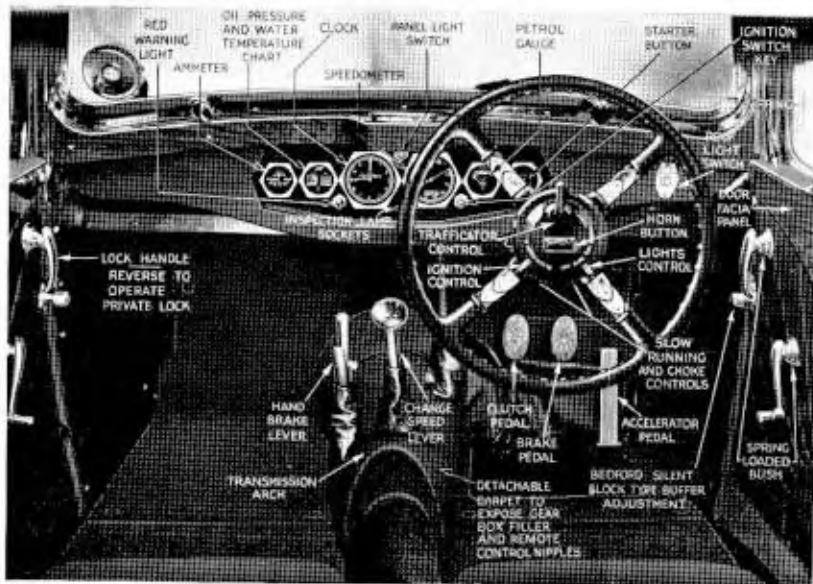


Fig. 3.

Controls.

GENERAL UPKEEP.

Regular Inspection. The oil level in the engine sump must be maintained at correct level. (The dip stick should be checked frequently and the oil level kept up to the mark). To inspect oil level, withdraw dip stick and wipe clean. Replace and again withdraw, when the level will be indicated by the oil film retained on the dip stick. Engine should not be running when inspecting oil level.

Cooling System. The water level in radiator should occasionally be examined and, if necessary, replenished until the water rises within approximately two inches from top of filler neck.

It is advisable to use rain water when replenishing the radiator, as the use of hard water results in a deposit on the inner side of the cooling surfaces, thus reducing efficiency. Yet even with the use of soft water, certain impurities accumulate and the water becomes contaminated with red oxide from the water ways in the cylinder block. To obviate this condition and eliminate the necessity for the use of soft water, a liquid vegetable composition may be obtained (see page 74) named "Kyrac," which when used constantly with water in the radiator removes all foreign matter adhering to the radiator and water jacket of the engine, and leaves a slight film on the metal surfaces, which prevents rust or any matter adhering to or obstructing any portion of the cooling system. With the use of "Kyrac," the system should be drained once every 5,000 miles and clean water run through before replenishing.

Ammeter Readings. Observe that the dynamo is charging and the oil pressure gauge registering when the engine is "revved" up. It must be remembered when noting ammeter readings that with the battery run down the ammeter will indicate a high charge rate. As the battery gets more fully charged the ammeter reading falls, and when the battery has reached a fully charged state the ammeter will not indicate more than a few amperes on the charge side. After starting, particularly from cold, the driver will note the rise of charging current for perhaps ten minutes or so. Thereafter it falls to the customary trickle charge for a fully-charged battery.

The acid level in the battery should be examined monthly, and is accessible by lifting the bonnet.

1. The acid should be kept level with the top of the separators.
2. Use only distilled water when replenishing (obtainable from the local garage or chemist). Do not overfill or the acid may splash out and cause damage.
3. Keep the filler plugs screwed tight to prevent leakage of acid.

Tyre pressures should be checked weekly with a "Schrader" gauge. The correct pressures are given on page 25.

Controls. The position of the various controls will be readily understood by a study of the accompanying illustration No. 3.

A throttle control is provided by which the idling speed of the engine can be governed. When the engine is cold it will be necessary to set this control a little "faster" than when the engine is warm, but it should at all times be set to "run" as slowly as possible according to conditions.

When the dynamo output is insufficient to charge the battery, the red warning light appears, indicating that current is being drawn from the battery for ignition purposes. The ignition switch should never be left on with the engine stationary for more than a few moments. A habit should be made of "switching off" and the red warning light simply serves as a reminder when this operation has been forgotten.

GENERAL UPKEEP.

A habit should also be made of occasionally reading the oil pressure gauge and ammeter during the course of a run, to see that the oil pump and dynamo are functioning correctly. The oil pressure should read not less than 30 to 40 lbs. per square inch when the car is travelling at normal speeds and the oil is hot.

To Start the Engine. Place the gear lever in the neutral position and see that the handbrake is on, pull the strangler control right out, slightly depress accelerator pedal, and operate starter. When engine is turning switch ignition on as soon as the engine fires, release the starter button, push back the strangler to half-open position, and as the engine warms up it will be possible gradually to push the strangler control right in, but without causing the engine to run with undue hesitation.

It is important that the strangler should not be used more than is absolutely necessary, as the prolonged use of a rich mixture causes the fluid petrol to wash the oil off the working parts, resulting in rapid wear.

In Winter the oil in the engine and gearbox becomes thick when the car has been standing for some hours, this causes the engine to be stiff and to require an unusual effort to turn it. It is therefore an advantage to depress the clutch pedal to relieve the starter of the gear oil resistance. It is a bad practice to keep the starter button depressed when the oil is so stiff that the engine will only turn slowly.

This may happen in exceptionally cold weather, and when the electrical energy of the battery has been dissipated to the effective minimum; this condition will only develop through abnormal use of the lights when the engine is stationary, or by inadvertently leaving the ignition switch on. Under these conditions it is desirable to start the engine by hand.

An intelligent use of the starter, as above described, will greatly prolong the life of the battery.

When the car has been left standing all day it may be found that the starter has to be operated for some time before the engine fires. This may be due to the petrol level in the carburettor float chamber having become rather low due to evaporation.

The hand primer on petrol pump may be used under such circumstances to conserve the electrical energy of the battery.

"Warming Up." In cold weather the engine should be allowed to run not too slowly for a few minutes to warm up the oil, and on no account should the engine be raced up from dead cold at any time. It is a decided advantage to warm up the engine as quickly as possible in cold weather, as this minimises cylinder wear. A thermostat is fitted which greatly reduces the warming-up period, and it should be adjusted as described. A good warming-up speed is about 600-700 r.p.m.

Starting the Car. When the car and engine speeds are not relatively proportionate to the gear ratio, the clutch slips until these speeds become in due proportion, then slip ceases and the drive is passed directly through the clutch to the gear box.

Clutch slip always occurs when starting away from rest because there is a minimum speed at which the engine can develop its power, and one purpose of the friction type clutch is to allow the flow of power by slipping of the surfaces until the car speed is sufficiently increased for a direct clutch drive to occur.

To obtain a minimum of clutch wear, however, always start away in first gear unless facing down hill, in which case, second or third gear may be engaged. If the driver engages a higher gear in order to save a gear change, the clutch will have to be slipped unduly, resulting in unnecessary wear. It should be remembered that the higher gear requires a higher car speed before a direct clutch drive can be obtained, and therefore a longer period of slip.

GENERAL UPKEEP.

Gear Changing. The synchro-mesh gearbox provides a synchronised easy gear change for all conditions excepting changing down into First gear with the car in motion. This particular gear change is seldom required, and changes into First or Reverse are mostly made when the car is at rest. Thus 95 per cent. of the gear changes are made easily with the synchro-mesh gearbox.

When changing into a synchronised gear the movement should be slow and deliberate. **Do Not Hurry.**

Upon its first movement the change speed lever will encounter a slight resistance from the synchronising cones. The continuance of a steady pressure will synchronise the gears and the resistance will be overcome as the driving dogs slide silently into engagement.

The change speed lever must always be pushed right home to secure full engagement.

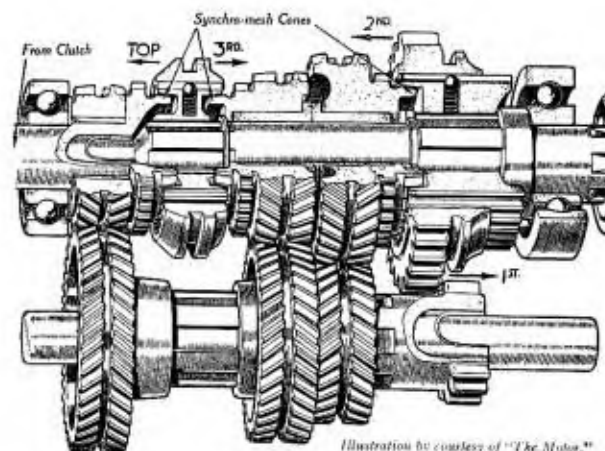


Fig. 4. Showing the synchro-mesh cones in action.

Using the Brakes. Both foot and hand apply four-wheel brakes which are of the self-engaging type, and, being very powerful, require only a small effort gradually to slow down the car.

The brakes do not require to be applied harshly except in emergency, as this only causes undue tyre wear and discomfort to passengers. The hand brake will be found of real assistance when negotiating long hills and can be applied to control the car speed without fear of overheating.

To stop the car apply the brakes gently, and when the speed has fallen to about 10 m.p.h. declutch, place the change speed lever in "Neutral" and re clutch. This will leave the engine idling when the car has stopped.

GENERAL UPKEEP.

Cooling System. In frosty weather some steps must be taken to prevent the cooling water freezing, as water when frozen expands and causes a great bursting pressure with considerable risk of cracked cylinders or radiator and consequent leaks.

If the garage is not heated, the water may be drained, but it is usually more convenient to use an anti-freezing mixture in the cooling system.

Glycerine is a cheap and reliable form, and 25 per cent. by volume of glycerine in the cooling water will give effective protection. Glycerine does not evaporate and will last the winter through. The total cooling system capacity on the S.S. I. is 32 pints, therefore, 8 pints of water may be drawn away and replaced by 8 pints of radiator glycerine.

On the S.S. II. the total cooling system capacity is 22 pints, therefore sufficient water may be drawn away and replaced by 5 pints of radiator glycerine.

Thermostat Adjustment. A thermostat is fitted in the top water pipe and the temperature control is shown in Fig. 5. The direction of rotation is shown by arrows for increase or decrease of temperature.

We suggest that the control should be set fully increased for winter running and two or three graduations back in summer. During exceptionally hot weather the thermostat valve may be turned "out-of-action" by setting the control at maximum decrease.

When refilling the radiator after it has been emptied or allowed to run very low, the valve should be fully opened by turning the control to maximum decrease, but this is not necessary when simply "topping up" the radiator.

New Engines. When the car is new the engine may seem to be somewhat lacking in power due to the bearings being a very accurate fit. This will continue for the first 200 or 300 miles, during which time the engine will become gradually "run-in" (with proper use). The power will then gradually improve as the car is used for the first 1,000 miles.

It is inadvisable to drive a new car fast, or to run the engine at high speed in the low gears. The good and lasting bearing surfaces obtainable by careful running-in are well worth the patience required to drive the car only at moderate speed for the first 500 miles.

We have found the use of an upper cylinder lubricant to be of advantage, particularly in new engines, and recommend the use of such a lubricant until the engine is thoroughly "run-in." The lubricant should be mixed with the petrol in the proportions given on the container, and it may be used with advantage throughout the "life" of the car.



Fig. 5. Thermostat Adjustment

GENERAL UPKEEP.

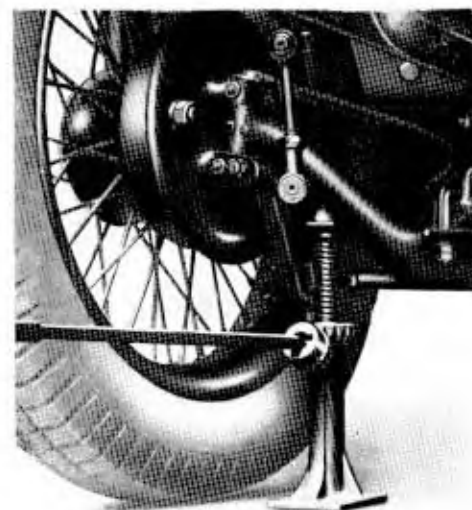


Fig. 6. Using the jack at the front

The jack may be put under the centre of the front axle bed for lifting both front wheels off the ground, but if a front tyre is flat put the jack under the web provided near to the axle.

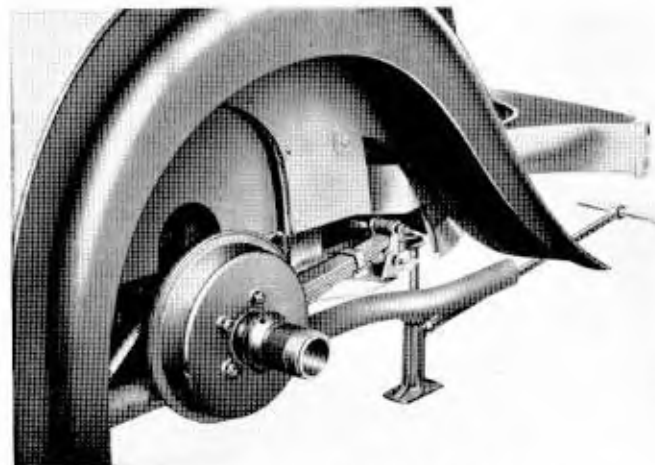


Fig. 7. Showing Jack in correct position at rear

GENERAL UPKEEP.

LUBRICATION.

This is one of the most important subjects in connection with the upkeep of a car, and careful attention to the following instructions will be amply repaid by the results obtained.

Engine. The working parts of the engine are lubricated by oil contained in the sump, drawn through filters by the gear type pump and delivered under pressure to the crankshaft journals, crankpins and camshaft bearings.

The spray from these bearings is ample for efficient lubrication of the pistons, tappets, valve gear and timing chain. Suitable oil return worms are embodied at the front and rear ends of the crankshaft, which effectively prevent oil leaking along the shaft.

The correct oil level in the sump is indicated by a mark on the dipstick, and it is advisable to examine this every 200 miles and replenish up to the top mark. The regular addition of oil not only maintains the correct level, but tends to keep up the quality of the lubricant, although gradual deterioration takes place until it becomes advisable after 2,000 miles to drain the sump and refill with fresh oil. The oil will drain more freely if the engine is first run for a short time to warm up.

The pump body is provided with a large filter which surrounds the oil pump, and this should be cleaned in petrol and allowed to dry each time the sump is drained. It is advisable to remove the sump every 10,000 miles and thoroughly clean out with petrol. Dry off with a smooth rag, taking care not to let any portions of the rag remain, and leave for a quarter of an hour whilst the remaining film evaporates before replacing the sump.

Do not attempt to clean out the sump with paraffin or petrol unless the sump is previously removed, as any small quantities remaining may cause damage to the working parts.

Special flushing oils are obtainable for the purpose of washing out the engine sump before refilling with fresh oil. This type of oil has very poor lubricating qualities, but it does help to clean out the sump and cannot do any damage such as may be caused if paraffin were used, and the cost of the flushing oil is similar to that of paraffin.

The flushing oil may be used without removing the sump.

GENERAL UPKEEP.

THE A.C. OIL FILTER.

How it Functions.

1. Dirty oil from crankcase enters filter under pressure.
2. Dirty oil forced into the tubular passages of the cloth bag expands them, and then filters through over the entire surface of the cloth, the dirt being left on the inside.
3. Clean oil passes through cylindrical perforated container, used to support the cloth bag against excessive strain.
4. Clean oil enters tank.
5. Clean oil returns to crankcase.

The S.S. II. oil cleaner is a different shape but works on the same principle.

An oil cleaner is mounted on the dash and consists of a folded cloth bag rolled up and fitted inside a metal casing. Oil from the pressure side of the pump is able to pass through the cleaner and then back into the sump. In this way, 10 to 20 per cent. of the engine oil is continually being cleaned of the most minute particles until after about 10,000 miles running, the cleaner becomes choked and then the whole unit should be replaced to ensure continued oil cleaning.

First 500 Miles. During the running-in period a certain amount of foreign matter is likely to collect in the oil. We therefore recommend that the oil be drained and completely renewed at the end of this period. This note also refers to the gearbox and rear axle. In the case of the engine, it is well worth while to remove the sump and thoroughly clean out.

Ignition Distributor. The distributor spindle is provided with an oil cup, which should be given attention with the oilcan every 1,000 miles.

If the distributor cam appears dry it should be smeared slightly with vaseline.

Every 5,000 miles withdraw the moulded rotating arm from the top of the spindle and add a few drops of thin machine oil. Do not remove the screw exposed to view, but drop the oil on top of it. The oil then passes through a clearance to lubricate the automatic timing control.

At the same time, place a single drop of oil on the pivot on which the contact breaker arm works.

Dynamo and Starter. As the bearings of the dynamo are packed with grease before leaving the works, they will require little attention, excepting as described under the mileage and maintenance instructions.



Fig. 8. S.S. I.
Oil Cleaner in Section

GENERAL UPKEEP.

After a considerable mileage, the dynamo should be removed for cleaning, adjustment and repacking the bearings with grease. This should be done preferably by the nearest Lucas Service Depot.

If, for any reason, the pinion on the starter motor does not engage with the flywheel teeth, examine the screwed sleeve on the armature spindle to see that it is free from dirt, if necessary wash over with paraffin. Occasionally give it a few drops of machine oil.

The starter is fitted with special bearings which will require no lubrication.

Water Pump. Ordinary grease dissolves in hot water and is thus able to escape into the cooling system if too much is forced into the water pump grease nipple. This may eventually result in a clogged radiator. Don't give more than two or three strokes of the grease gun every 500 miles.

Gearbox. The correct oil only should be used to fill up the gearbox as the use of very thick oils or grease will spoil the operation of gear changing.

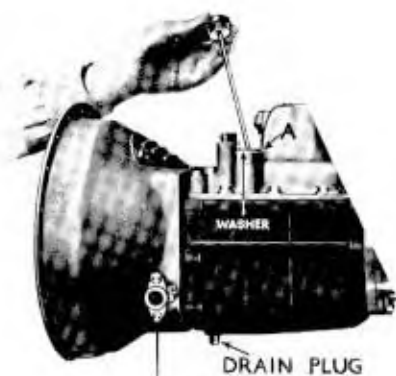


Fig. 9. Gear Box (showing dipstick).

To fill up, remove the filler plug, using the tube spanner provided. The dip stick extends below the plug. To check the oil level, wipe the stick and then insert, resting the bottom of the plug on the gearbox boss "A" as shown in illustration No. 9. Access to this filler is described on page 10.

To fill up, remove the filler plug, which is accessible through the transmission arch. The dip stick extends below the plug. To check the oil level, wipe the stick and then insert, resting the bottom of the plug on the gearbox boss (Fig. 9). Access to gearbox is described on page 10.

When draining the oil, it is advantageous first to run the engine to warm up.

Rear Axle Lubricant. Access to rear axle is described on page 10. As the type of oil used in rear axle is rather thick, it will be found easier to replenish after a run when the oil is warm and in a more fluid condition. It will facilitate pouring if the

GENERAL UPKEEP.

fresh oil is first warmed up by placing the container in hot water. Congealed oil may require clearing away from the level orifice before proceeding with the filling. Fill up to the level of the plug boss.

Rear Axle. In very cold weather the rear axle may become noisy if the oil is too thick, due to the crown wheel forming a cavity in the oil which is insufficiently fluid to run back. The remedy is to drain away some of the thick oil and add a little engine oil of the same brand. This should not be necessary if the recommended lubricant has been used.

The rear wheel hub bearings are lubricated by gun, nipples being exposed when the wheel is removed.

Propeller Shaft Universal Joints. These revolve at high speeds and it is necessary to use special non-separating greases to ensure adequate lubrication.

The lubrication of the universal joints is most conveniently carried out by a service station, but if the owner desires personally to attend to this item of lubrication, an additional grease gun will be required.

Front Axle. Nipples are provided for the lubrication of the swivel pin bearings.

The hub bearings are lubricated by means of the grease gun, the nipples on each hub being exposed when the wheel is removed.

Steering. The oil gun is used to lubricate the steering box, and the grease gun the steering ball joints. The latter should be given regular attention, as the duty of these joints is high. For the steering box use only the recommended oil.

Do not remove the steering box cover plate for the purpose of filling with oil. The cover plate locates the trunnion which may become disengaged if the plate is removed.

Brake Cross Shaft, etc. The plates which carry the brake cross shaft should receive occasional attention with the oil gun.

Road Springs. The spring blades should not be allowed to get rusty, as this will prevent the correct working of the springs. The easiest procedure is first to clean the springs and then paint with engine oil or a special penetrating oil which may be obtained for the purpose.

It is the areas around the tips of the blades which most require the lubricant, as it is at these points that one blade presses upon the next. The blade clips should also be oiled.

Controls, etc. There are several small control joints which should be given occasional attention with the oil can.

Lubrication of the "remote control" gear lever and selector mechanism is effected by means of two nipples on top of the aluminium casing. A small quantity of grease should be applied occasionally by means of the gun.

Oil Guns. We supply one oil gun in the tool kit, but the owner is advised to obtain an additional gun, for use as a grease gun. This will facilitate chassis lubrication.

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However, the gun supplied may be used for grease or for oil as required. The oil gun may be used instead of the oil can for ready lubrication of the brake and clutch connecting joints.

BRAKE CABLES AND CONDUITS.

To assure free efficient brake action, it is essential that cables be kept well lubricated, particularly where they are enclosed by the conduit.

The only satisfactory method of lubricating that part of the cable normally covered by the conduit, is by using a Bendix grease gun, which is specially designed for the purpose, and ensures adequate lubrication of the cable and conduit, maintaining free action of the cable and flexibility of the conduit. The local Service Station may be able to do this work for you, but in any case the lubrication of the cables should be carried out as follows :—

1. Remove brake drums.
2. Clean all dirt from exposed part of cables and conduit covers.
3. If conduit covers are rusty or clogged up with dirt, spray with penetrating oil, and allow to soak as long as possible.
4. Remove joint pins connecting cables to cross-shaft levers, and slide conduits out of the abutments, on chassis frame.
5. With Bendix grease gun, force grease into each conduit, from chassis frame end, until grease begins to appear at brake end of conduit. **Take care that no grease remains inside brake** or this may get on to the linings.
6. Wipe off any grease which has been forced into brake, replace drum and conduits.

The above lubrication of cables, if properly carried out with the correct type of grease, should normally last at least 10,000 miles.

Make sure brake shoes slide freely on the backing plates. If not, apply special graphite grease behind pivot nuts, where they bear on backing plate, and also behind spacer-pin washers where they contact with the shoes. **Take care that grease does not get on to linings.**

IF A BENDIX GREASE GUN IS NOT AVAILABLE, PROCEED AS FOLLOWS :—

First clean the exposed portions of the cable between the brake cross shafts and casings, then release the casing connections at the frame and brake drum cover, and slide the casing along towards the cross shaft. Cover with grease the portion of the cable now exposed before finally replacing the casing in correct position.

To release the cables, remove the pins connecting the cables to the cross shaft levers, the casing can then be pulled out of the cup at each spring bracket, and the cable passed through the slot provided. This method is not so effective as the use of special grease gun, and attention will be required at least every 5,000 miles.

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RECOMMENDED LUBRICANTS.

Component.	Wakefield "Castrol"	Vacuum "Mobiloil"	"Shell"
Engine—Winter —November —to March Summer—April to —October	CW XL	A BB	Double Triple
Gearbox	XL	BB	Triple
Steering Box and Oil Gun . .	Swanshot ST	CW	Triple
Rear Axle	D	C	Shell Gear Oil
Wheel Hubs, Front Axle Swivels, Steering Joints, Front Spring Eyes, Water Pump, Fan and Dynamo (Grease Gun)	Castrolase "Heavy"	Mobilgrease No. 4	R.B. Grease
Road Spring Blades and all parts affected by rust	Castrol Penetrating Oil	Voco Penetrating Oil	Shell Penetrating Oil
Propeller Shaft Universal Joints (Non-Separating Grease)	"Unijoynt" Grease	Mobilgrease No. 5	R.B. Grease
	or Hardy Spicer Non-Separator Grease		
Small Control Joints and Oil Cups (Oil Can)	"Oilit"	Gargoyle Velocite Oil D	Shell Household Oil
Brake Cables	"Gredag" Graphite Grease No. 526		
Upper Cylinder Lubricant . .	Castrollo	Gargoyle Upper Cylinder Lubricant	Shell Upper Cylinder Lubricant

Upper Cylinder Lubrication. We recommend the use of an upper cylinder lubricant until the engine is thoroughly "run-in." This lubricant is suitable for mixing with the petrol and is thus drawn into the combustion chambers through the carburetter. It is a valuable lubricant for use in cold weather.

CARE OF THE TYRES.

There are a number of points in the care of the tyres which, if attended to, will prolong the life and prevent premature failure. These points are listed below and careful attention to them will be well repaid.

1. Maintain the correct inflation pressure by weekly tests with the "Schrader" gauge. The maintenance of correct tyre pressure is a large factor in tyre life.

Tyres lose their pressure due to diffusion, even though there is no porosity or leakage due to a puncture or faulty valve. The loss varies from 1 to 3 lbs. per sq. in. per week and must be made up if the tyre is to give proper service.

2. Do not drive in tram lines, which apart from danger of skidding, may cut deeply into the loaded tyre.
3. Examine the tyres occasionally for flints or other road matter which may have become embedded in the tread. If the car is driven where tacks or short nails may be picked up, these also may be found buried in the tread. If these are left in, they may eventually work through the cover and puncture the tube. Fill up any larger holes with a suitable compound.
4. Oil should not be allowed to get on the tyres. If any should accidentally do so, clean off by using petrol sparingly.
5. The impact which tyres can withstand is limited, and it is inadvisable to drive at high speeds over rough roads.
6. The car is provided with powerful brakes, and it should be remembered that most of the forces of retardation are applied through the tyres. Fierce application of the brakes should not regularly be indulged in, as this places the tyres under severe stress.

7. Do not drive over sharp edged curbs or "bump" them with the side of the tyre, as this is liable to fracture the cotton tyre casing, and in the latter case upset the front wheel alignment, or even bend the wheel "out of truth."

8. If the front wheels are not properly aligned, there will be a tendency to wear the front wheel tyres unduly. The front wheels are set with a slight "toe-in" of $\frac{1}{4}$ ", and should this at any time be upset, it can be restored by adjustment of the steering track rod, although if the misalignment is due to a bent steering lever, this should first of all be re-set or replaced.

"Toe-in" is the amount by which the front wheels are inclined from parallel, and is measured at the wheel rims. To take this measurement, set the steering in the "straight ahead" position and measure the distance between the two front rims at a height above the ground equal to that of the wheel hubs. Take this measurement both in front of, and behind the axle bed. The former measurement should be $\frac{1}{4}$ " less than the latter.

9. When cuts reach the casing it is always economical to have a vulcanised repair carried out by a competent operator.



Fig. 10. Tyre tread examination.

Occasional inspection and removal of embedded matter is well worth while.

CORRECT TYRE PRESSURES.

MODEL	Inflation Pressure (lbs. per sq. in.)	
	Front	Rear
S.S. I	25	25 (5.50—18 tyres)
S.S. II.	27	27 (4.75—18 tyres)

A reduction of 2 lbs. per square inch is permissible in the front tyres at any time, and in the rear tyres when the rear seats are unoccupied.

WHY TYRE RESULTS VARY.

Scientific investigation of the actual effect of some of the major factors have recently been made, and the results are as follows:—

Speed. Car owners vary greatly in the speed at which they habitually drive. The rate of tread wear at 45 m.p.h. is double that at 35 m.p.h.

Acceleration. During wheel slippage caused by rapid acceleration, excessive tread wear takes place due to the abrasion of the tyre against the road surface.

Braking. Some owners "drive on the brakes." It is established that where this practice is adopted, and especially if stops are frequent, the rate of tyre wear increases considerably.

The rapid improvement in car performance during the past few years has brought these particular factors into prominence, because in the three respects the modern car is so vastly superior to the car of 1924 or 1925 on which low pressure tyres were first fitted.

GENERAL UPKEEP.

FITTING AND REMOVAL INSTRUCTIONS FOR WIRED TYPE TYRES ON WELL BASE RIMS

Inextensible wires are incorporated in the edges of wired type tyres. Therefore, do not attempt to stretch the wire edges of the tyre cover over the rim edge.

Force is entirely unnecessary and may be dangerous, as it merely tends to damage the cover edges and serves no helpful purpose.

Fitting or removing will be quite easy, if the wire edges are carefully adjusted into the rim base; if it is not found to be easy, the operation is not being correctly performed.

To Remove Tyre. Remove all valve parts, and push both cover edges into the base of rim at the part diametrically opposite the valve, then lever the cover edges near the valve over the rim edge.

To Fit Tyre. Push one edge of the cover over the edge of the rim. It will go quite easily if the part first put on is pushed right down into the rim base.

Very slightly inflate the inner tube—do not distend it—place it in the cover, with the valve through the hole in the rim. (Take care that the valve, which is fitted in the side of the tube, is on the correct side of the rim.)

Fit the second edge of the cover, commencing at a point diametrically opposite the valve, and pushing the edge down into the base of the rim.

Small levers may be gently used to ease the last few inches over the rim edge. Be careful not to nip the tube.

Whilst inflating, see that the edges of the cover are seated evenly round the rim; check by the line on the cover.



Fig. 11.

You cannot pull the cover edge at "A" over the rim edge until the cover edge at "B" is pushed off the rim shoulder "C" down into the well "D," then the cover edge at "A" comes over the rim easily.

Remember the cover edges are inextensible—force will only damage the cover and cannot stretch the edge.

GENERAL UPKEEP.

RUNNING ADJUSTMENTS.

Various adjustments are necessary from time to time in order to keep the mechanism in efficient running order. The speedometer reading should be taken every 500 miles, and compared with the corresponding figures in the mileage and maintenance chart; the necessary adjustments can then be completed.

Brakes. Bendix Duo Servo Brakes are fitted to all four wheels, and all four are operated both by hand and foot.

The efficient maintenance of the brakes is so important that the owner should make himself fully conversant with the operation and adjustment of these parts.

One pair of brake shoes is shown in Illustration No. 15. The two shoes are anchored together by an adjustable turnbuckle, but the anchor pin actually supports the shoes and transmits the braking forces. The shoes are operated by a floating lever inside the drum connected to the actuating cable. This lever expands either the primary or secondary shoe, according to the direction of drum rotation. Therefore, when the brakes are in action, only one shoe is in contact with the anchor pin and thus the brakes are self-energised by the cumulative action of the two shoes. The same action takes place in reverse rotation, hence the name, Duo-Servo.

The brake shoes are adjusted to correct clearance from the drum, by the turnbuckle which is geared to the adjusting nut for the sake of accessibility. See Illustration No. 12.

As the brake linings wear, the pedal pad will approach nearer to the floorboard when the brakes are applied. It is high time that adjustments should be made when the pad is almost touching the floorboards when fully depressed. If the brakes are not then adjusted, it may be impossible in an emergency fully to apply them, due to the floorboard preventing further pedal travel.

The adjustment of Bendix Brakes is effected at the brake itself, and must not be carried out by tightening the operating cables, pedal or hand brake.

Adjustment to take up wear. Normal wear can periodically be taken up by means of the Shoe Adjusters. To tighten brakes, turn shoe adjuster in a clockwise direction, until a slight brake drag is felt when turning wheel by hand in a forward direction. Then turn adjuster in opposite direction until wheel is just free. It will be necessary to use the jack and deal with each wheel in turn.

Balancing the Brakes. When the brakes are out of balance, there is a tendency for the car to "pull" to the same side as the brakes which are doing the most work.

To check this, first test the tyre pressures and then drive the car on a quiet road at about 25 m.p.h. and apply the brakes hard. The "tightest" brakes will cause their wheels to leave a mark on the road, provided that the tyre treads are equally worn. The brakes can then be adjusted accordingly.

After the brakes are balanced, it should be possible to apply them hard, yet without any deviation of the car to one side or the other. Remember to keep a sharp lookout behind before applying the brakes. It is particularly important that the front brakes should be exactly balanced, so that when they are applied hard the steering is not affected.

The front and rear brakes should work equally and this may also be checked by applying the brakes for some time and then testing the heat of the drums. The cooler drums are doing less work than the hot drums and when properly adjusted the drums on both axles will be of equal heat.

If one or more drums get hot when running without applying the brakes it is a sign that those shoes are too closely adjusted.

GENERAL UPKEEP.

After 5,000 miles. Every 5,000 miles a check and adjustment should be carried out as follows:—

1. Jack up all four wheels.
2. Detach the four operating cables from their respective levers on cross shaft.
3. Make sure that cables are free in their conduits, cross shaft works freely, and that when brakes are "off" brake pedal and operating levers return back against their stops.
4. (S.S. l. only.) Centralise shoes in drums. To do this, slack off locknut and turn eccentric adjuster in direction in which wheel revolves when car is moving forward, until a slight brake-drag is felt. Then slack off adjustment slightly until wheel is just free. Tighten locknut.
5. Expand shoes fully in drums by screwing up the shoe-adjusters.
6. Adjust cable lengths. Cables should be adjusted just tight enough, that, while there is no slack, the joint pins can just be inserted through the yoke-ends and cross shaft levers.
7. Adjust and equalise brakes. To do this, unscrew shoe adjusters until each wheel is just free, taking care to slack off all brakes equally. If the brakes are not quite balanced, adjust them on the road as previously described.



Fig. 12. Front Axle and Brake Details.

Shock Absorber Adjustment. The Andre friction type shock absorbers have been chosen in preference to the hydraulic type, because the damping characteristics are more suitable for the type of springing used on S.S. models, and also because of the advantages obtainable by the simple adjustment provided to suit varying conditions of travel.

Adjustment is desirable before commencing a long distance journey, when it will be advisable to tighten the adjusting nuts, thus increasing the resistance and preparing the shock absorbers for higher speeds likely to be obtained on long distance travel.

For the average town work a lesser resistance is required to obtain maximum comfort, the adjustment required varying according to road conditions.

The rear S.S. ll. shock absorbers are accessible through detachable plates on the floor of the trunk.

GENERAL UPKEEP.

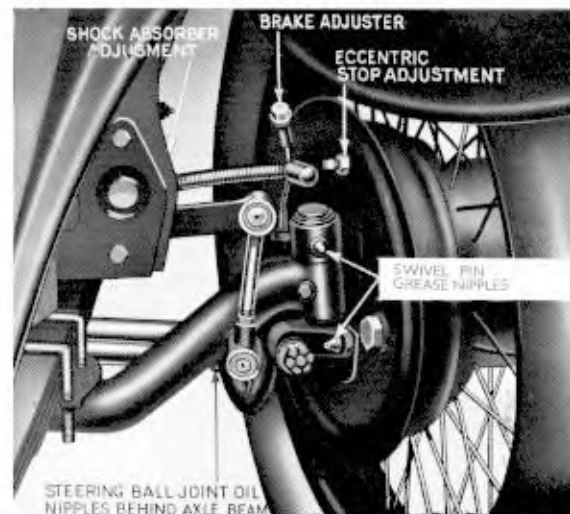


Fig. 13. Brake Adjustment.

Clutch Adjustment. A single dry plate clutch is fitted in which a central friction-lined steel plate is gripped between the flywheel and presser plate by the action of helical springs. This allows the drive to be transmitted from the flywheel to the gearbox primary shaft on which the clutch plate is mounted.

Three toggles are incorporated with the presser plate and when the clutch pedal is depressed these toggles lift the presser plate away from the clutch plate and so release the drive between the engine and gearbox.

This type of clutch is particularly sweet in action and takes up the drive in a smooth manner.

The clutch is correctly set before leaving the works and it will be some considerable time before it requires readjustment. Eventually the clutch linings will wear until the initial clearance is all taken up and it will then be necessary to reset the clearance. See Illustration No. 16.

When there is a clearance at the toggle plate there is a corresponding multiplied free movement of the pedal pad and the indication that adjustment is required is given when the free pedal movement is reduced to about $\frac{1}{4}$ ". It is then necessary to remove the transmission arch attached to the floorboards, and the clutch cover plate, which will leave the clutch inspection hole uncovered. See Fig. 17.

The $\frac{1}{16}$ " clearance required at the toggle plate can be set with a gauge, but a better method is to set it from the clutch shaft lever itself. Simply adjust the clearance until there is a backlash or free movement of about $\frac{1}{8}$ " measured at the pedal pad.

Caution. Do not disturb the pedal adjustment shown in Fig. 17, which is for setting the relative positions of the clutch pedal and clutch control levers. This adjustment is correctly set before the car leaves the Works.

GENERAL UPKEEP.

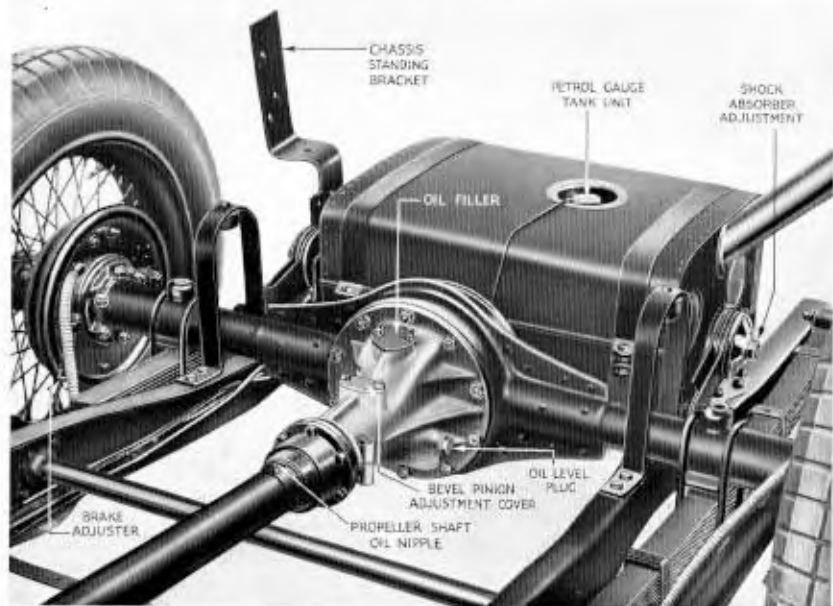


Fig. 14.

Brake and Shock Absorber Adjustment.

(A more accessible Oil Filler Plug is provided at the rear).

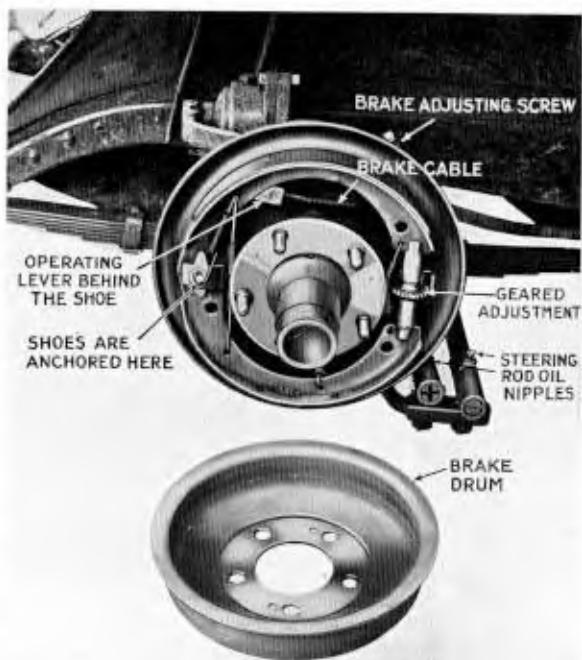


Fig. 15. S.S. I. Brake Shoes. The Shoes are similar on the S.S. II.

(The brake adjusters are not quite correct in the lower illustration, but are shown correctly on Fig. 12).

GENERAL UPKEEP.



Fig. 16.

Clutch.



Fig. 17.

Clutch Adjustment.

GENERAL UPKEEP.

Sparking Plugs. It is important that all plugs should be set to the same clearance of 0.020 inches. This can be tested with the gauge supplied in the tool kit.

The engine will not run smoothly at slow speeds, or start easily if the gaps vary too much. It is advisable to remove, clean and set the points of the sparking plugs about every 5,000 miles, and when replacing in the cylinder head, make sure that the copper-asbestos washers are in good condition and screw the plugs firmly into position.

The normal efficient life of a sparking plug is 10,000 miles, although they will function for longer periods.

When replacing, we recommend that Champion No. 16 be fitted for S.S. I., and Champion Type J.9½ on S.S. II.

Valve Clearances. A clearance between the valve stem and the tappet screw is necessary to ensure correct closing of the valves and efficient running of the engine.

The correct clearance is 0.004 inch for both inlet and exhaust valves. A gauge provided in the tool kit for the purpose of setting this clearance in the manner described below.

First run the engine for a few minutes until it becomes warm, but not too hot to handle. Then remove the tappet cover and turn the engine with the starting handle for half a revolution after the valve to be adjusted has closed. Slacken the lock nut and adjust the tappet screw until the gauge is a close sliding fit between the valve stem and the tappet screw. Now tighten the lock nut and re-check, as tightening the lock nut will occasionally alter the clearance.

If a tappet becomes noisy, it can be silenced by adjusting the clearance to the correct amount. Do not set the valve clearances too small or the engine will not maintain good tune.

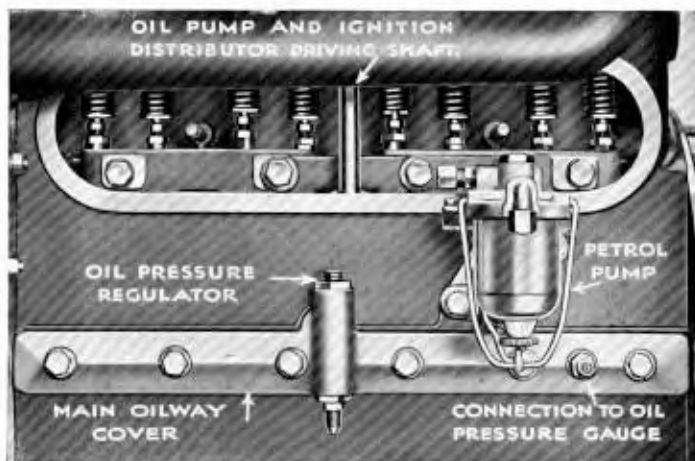


Fig. 18. S.S. I.

Interior of Tappet Chamber.

The parts shown above are similar on both models. The petrol hand primer is visible directly behind the glass bowl.

GENERAL UPKEEP.

Ignition. An Instruction Booklet is issued by the manufacturers and supplied with the car, and will give any information required about the distributor or coil. The more important points, however, are re-stated here.

All electrical connections must be securely made, kept dry and clean. The plug connections are those most liable to come loose.

When washing the car, care should be taken that water does not remain on the coil or sparking plugs, as its presence on either may cause short-circuiting and corrosion of contact points and terminals. It is also advisable to remove the distributor cover and wipe out any water that may have collected inside.

The distributor contact breaker points require cleaning and adjusting occasionally. A small spanner and gauge are provided for the purpose and a thin abrasive stone may be obtained for cleaning the points, but only a few strokes with this should be necessary. When re-setting the gap, the gauge secured to the spanner should just fit the gap at its maximum opening, which can be found by slowly turning the engine with the starting handle.

If one cylinder alone misfires, this will probably be due to a fault in the wiring connections to that cylinder, which should be carefully examined to see that there is no breakage. If a wire should be found to be broken, a temporary repair can be made by cutting through the insulating material at the break and peeling each broken end of the wire for about ½", then twisting them into each other and finally binding with insulating tape. The repaired portion should be held clear of the metal parts to prevent short circuiting.

The firing order is 1, 5, 3, 6, 2, 4 on the S.S. I., and 1, 3, 4, 2 on the S.S. II., and the distributor is shown marked in Figs. 34 and 35, corresponding to the cylinder numbers to which the high tension cables should go. The cylinder numbers are counted in sequence, No. 1 being the cylinder furthest from the radiator.



Fig. 19.

Tappet Adjustment.

CARBURATION

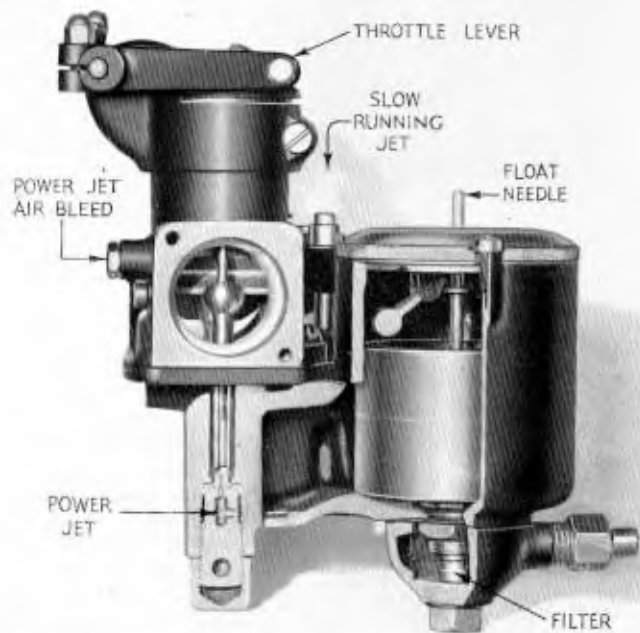


Fig. 20.
The position of the slow running or idling jet is indicated above, but the jet itself is removed.

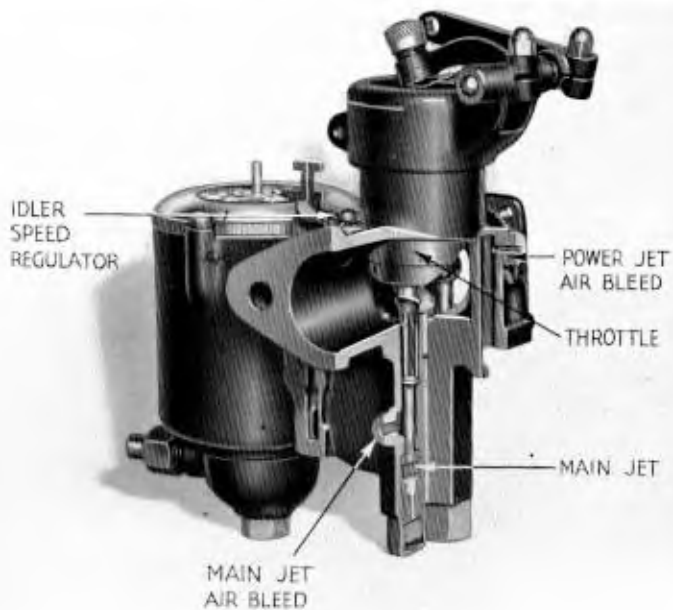


Fig. 20A.
Part sections of R.A.G. Carburetter.

CARBURATION

R.A.G. Carburetters are fitted to all models. Type M. is fitted to the S.S.I. Type T is fitted to the S.S.II

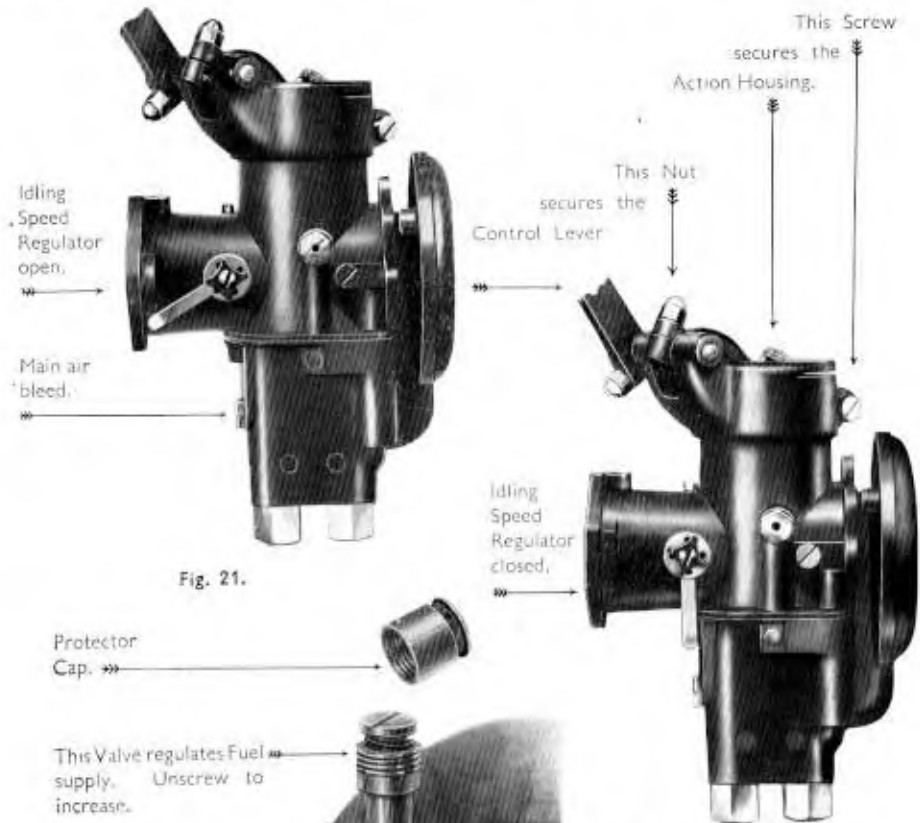


Fig. 21.

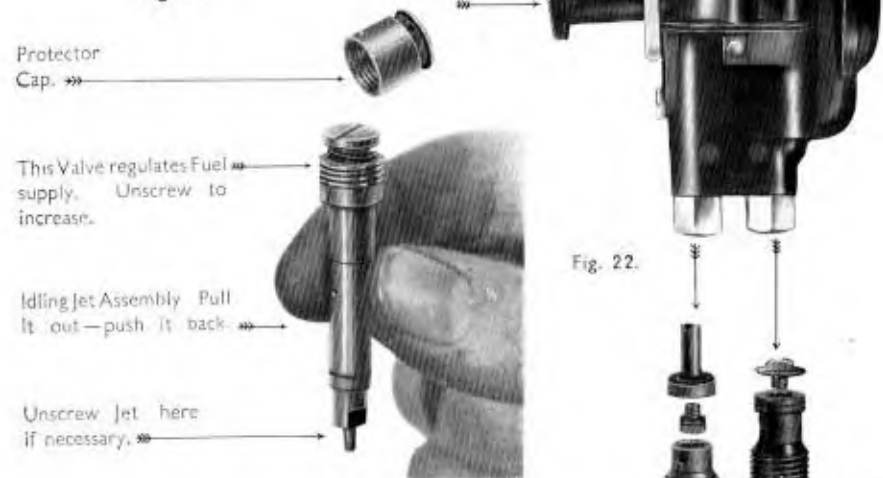


Fig. 22.

Unscrew jet here if necessary.



Fig. 24.



Fig. 25. Fig. 26.

CARBURATION

TUNING THE CARBURETTOR.

1. SET THE IDLING SPEED REGULATOR.

Set the idling speed regulator. The idling speed regulator consists of a movable plate through which holes are drilled. These holes coincide with similar holes in the carburettor body when the plate is in the fully open position. This regulator provides a small variable air leak by means of which the tick-over speed of the engine may be altered. When used in the fully open position, naturally a larger amount of fuel from the slow running jet will be required. The normal position is about half open, but the actual position can readily be found when tuning the carburettor, with the regulator nearly closed.

2. ADJUST THE FUEL SUPPLY.

First remove the protector cap by unscrewing. Turn the fuel valve screw with the fingers in a clockwise direction as far as it will go—i.e., completely close the valve, then unscrew one complete turn. A slight variation of the screw in either direction will give the required idling speed. Replace protector cap tightly.

If satisfactory, idling can only be obtained with the fuel valve fully open, that is, two complete turns from the closed position, the reason is that the idling speed regulator is too wide open. By gradually closing the idling speed regulator and at the same time gradually screwing down the fuel valve screw the best idling speed will be found with the idling speed regulator between half open and nearly closed.

THE THROTTLE MUST BE FULLY CLOSED WHEN TUNING.



JETS AND CHOKES

	Choke	Main		Power	
		Jet.	Bleed	Jet.	Bleed
S.S.I 20..	30 m/m	76	2	185	2
S.S.I 16..	28 m/m	76	2	185	2
S.S.II 10..	24 m/m	40	5	100	3
S.S.II 12..	26 m/m	56	2	120	2

The above settings have been selected after careful test for economy, maximum power and acceleration. Slight modifications which will enhance the value of one feature at the expense of another may be made. These, however, should not be undertaken without advice from the manufacturers of the carburettor.

When Refitting after decarbonisation see that there is a slight loss of action before the throttle responds to the foot or hand control, also that the striking angles of the action are square, as shown hereunder.

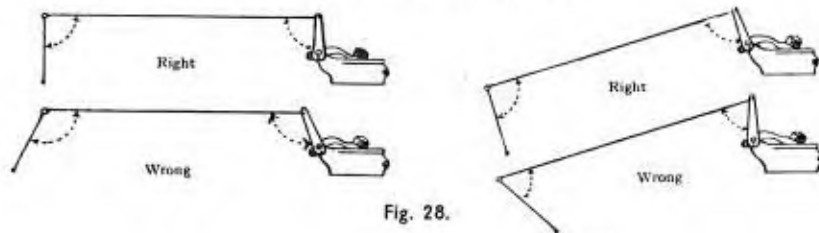


Fig. 28.

CARBURATION

YOUR ENGINE IN THE MORNING

The R.A.G. for starting purposes is just as efficient as any other carburettor. No more and no less. No carburettor can ensure easy starting. **Avoid excessive use of the strangler first thing in the morning.**

When you finished with your engine last night, the oil was hot and thin, and it ran down the cylinder walls into the sump, leaving the pistons, piston rings, and cylinder walls dry. Now, the pistons when cold are considerably smaller than the cylinder bores, in order that they may have room to expand when hot, and the piston rings are provided with an appreciable gap for the same reason, so that when your engine is cold there is quite a considerable leak through this gap, exactly, in effect, as if the walls of the cylinders were deeply scored throughout their length. And, of course, you know that an engine with scored cylinders is practically useless.

Under these conditions when the pistons travel downward on the suction stroke, cold air and a number of fine globules of water (the result of condensation) rush into the space above them. On this downward stroke each piston should be pulling a proper firing charge into the cylinder. Actually the proportion of the charge is weakened by the addition of this leak from the crank-case. The strangler, which intensifies the suction on the jet and pulls in extra petrol, is intended to compensate for this. But—again this wretched leak—when the charge is compressed a considerable portion of it is forced down through the leak, and as a result your lubricating oil is diluted with neat petrol, which is fatal. If you will take things easily—slowly swinging the engine before switching on, a certain amount of lubricating oil will be picked up by the rings from the lower part of the cylinder bore, and will form a partial and temporary seal, helping matters quite a lot. Obviously, the older your engine, the more the above applies.

Leave your Carburettor alone. It was carefully tested before the car left the works, and unless the idling adjustment has been altered, or the control mechanism been displaced, it can only be affected by stopped jets (very unusual) or a choked filter.

Owners of S.S. Cars are, by special arrangement, invited to consult Messrs. R.A.G., Ltd., 121, Victoria Street, London, S.W. 1 (Telephone : Victoria 1375-6), in case of any difficulty or doubt regarding the performance of their engines. They are also cordially invited to avail themselves of the trained technical staff at the R.A.G. Service Station, 187, High Street, Tooting, S.W.17. Telephone : Streatham 6747.

Smooth watch-like tick-over may be obtained when tuning the carburettor in the garage, but the result may be stoppages in traffic when the engine is under load. Therefore, set the idling to suit road conditions. A short run will show what is needed.

Petrol Pump. The petrol pump is operated by an eccentric on the camshaft. The sectional diagram shown in Illustration No. 29 will serve to indicate the method of operation. The petrol flows to a sediment chamber before passing through the non-return inlet valve. The pump chamber contains a non-return outlet valve and a diaphragm operated by a link mechanism from the rocker arm, which is in contact with the eccentric cam. The rocker arm constantly oscillates, and if the pump chamber is full of petrol, causing the diaphragm to be depressed, the rocker arm works freely and does not operate the diaphragm. The spring behind the diaphragm causes a constant pressure of fuel to the carburetter float chamber and thus the stroke of the diaphragm is automatically governed to meet the requirements of the carburetter.

The rocker arm itself is spring loaded for the purpose of keeping contact with the cam and so preventing noise.

A hand primer is fitted to the pump, so that it is unnecessary to turn the engine either by hand or by the starter if the tank has run dry and the pump becomes empty. A few strokes on the hand primer will soon fill the carburetter float chamber.

If the pump fails to supply petrol to the carburetter, attend to the following points :—

Remove the sediment chamber cover, and clean the gauze.

Make certain that the cork washer lies flat on its seat and makes an airtight joint. See that the valve plugs are tight, and if necessary replace the plug washer.

Examine the pipes and connections, and if the pump still fails to function remove the plugs and valves.

Wash in petrol, and replace any damaged or warped valve.

Examine the valve seats to make certain that they are in good condition and replace the valve with its polished side downwards, then carefully replace the valve spring and plug. If petrol leaks at the diaphragm, tighten the screws alternately to ensure a good joint.

If the petrol does not flow from the pump to the carburetter, examine the small filter fitted inside the petrol pipe union to the float chamber.

Caution. Do not dismantle the pump further than described above, because it cannot be properly re-assembled without the use of a special jig.

If the pump should fail to work after attending to the above points, it should be replaced and the old pump sent to the nearest A.C. Service Station.

Driving Belt Adjustment. If the dynamo and fan belt should become slack, it can be adjusted by slackening the clamp bolt and turning the dynamo in its cradle before retightening in position.

"Trafficators." If, at any time, the arm fails to light up when in operation, examine the bulb. To remove the bulb, switch on the "Trafficator" and then, whilst supporting the arm in a horizontal position, move the switch to the "off" position.

Now move aside the small trigger projecting from the underside of the arm and the cap of bulb holder will spring open. Fit a new bulb in place of the one which has burnt out and refit the cap.

Bulbs fitted :—No. T.126F. 6-watt festoon type.

See Fig. 48.

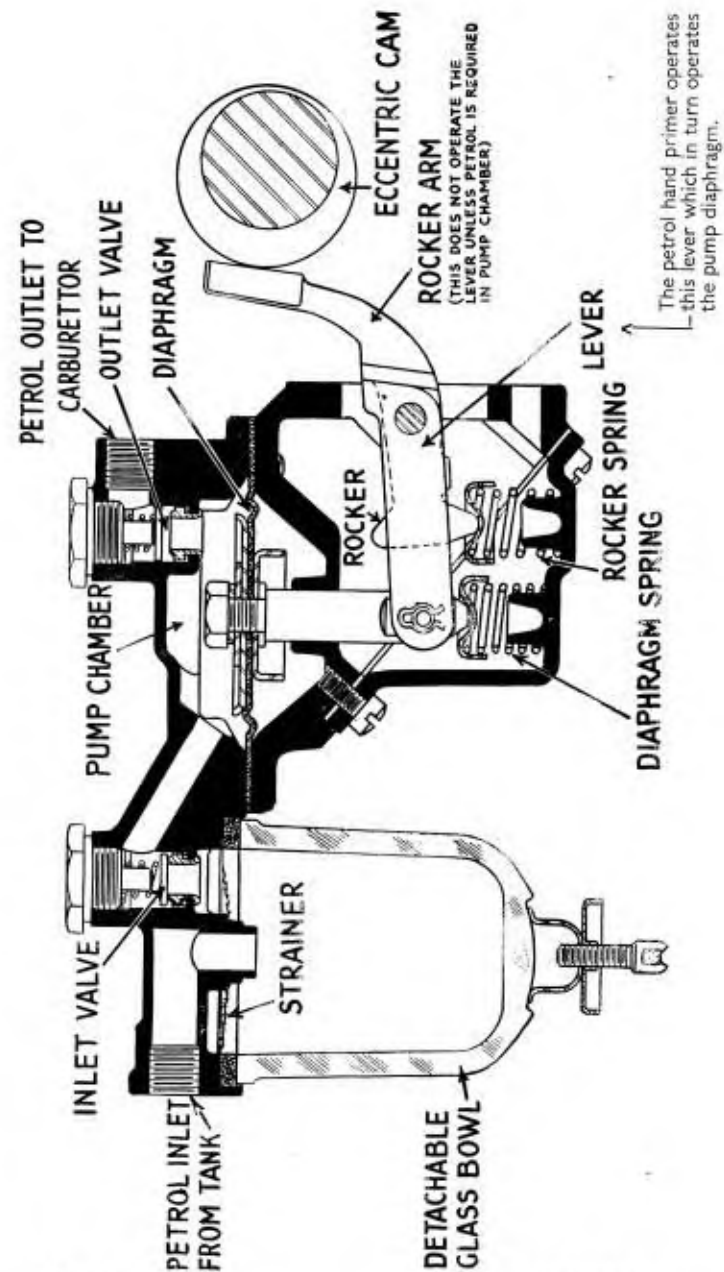


Fig. 29.

Fuel Pump—Section.

GENERAL UPKEEP.

Instructions regarding the Lucas "Alto" and "Altette" Horns. Each electric horn, before being passed out of the Works, is adjusted to give its best performance and will give long periods of service without attention. No adjustment is required in service.

If the horn becomes uncertain in its action, giving only a choking sound, or does not vibrate, it does not follow that the horn has broken down. First ascertain that the trouble is not due to some outside source, e.g., a discharged battery, a loose connection or short circuit in the wiring of the horn, or in some cases a blown fuse.

It is possible that the performance of a horn may be upset by the horn becoming loose on its mounting.

This can be ascertained by removing the horn from its mounting and testing its note.

If the note is still unsatisfactory, do not attempt to dismantle the horn, but return it to a Lucas Service Depot for examination.

Decarbonizing and Valve Grinding. During the course of running, carbon forms on the walls of the combustion chambers and after several thousands of miles this causes a metallic noise in the engine termed "pinking," which is evident when pulling hard up hill or when accelerating from low speed in top gear. It is then necessary to remove the cylinder head, scrape clean the combustion chambers and grind-in the valves.



Fig. 30. S.S. I. Correct order for tightening the Cylinder Head Nuts.

Many owners would prefer to have these operations carried out by a competent mechanic, but for those desiring to do this work themselves, the method is outlined below.

As it is more comfortable to work with the metal parts in a warm condition, run the engine for a while before proceeding with the work.

Now drain the water from the cooling system. If it is winter and an anti-freezing solution is being used, the owner may desire to preserve the cooling water for further use. If, however, the old water is discarded, do not forget to renew the anti-freezing element.

Whilst the water is draining, the ignition leads may be removed, and when sufficiently drained the top water connection can be released.

It is a good plan to number the ignition leads by tying on small labels so as to facilitate refitting.

GENERAL UPKEEP.

Do not remove the cylinder head nuts individually, but slacken them gradually and in the order indicated in Illustrations Nos. 30 and 31, and finally remove the cylinder head.



Fig. 31. S.S. II. Cylinder Head Nuts.

Caution. Do not insert any instrument, such as a screwdriver, between the cylinder head and cylinder face for the purpose of freeing the head, as this would damage the gasket. Projecting lips are provided at the front and rear of the head for the purpose of removal.

If any water should find its way into the bore, wipe it away immediately.

If the gasket joint does not separate freely when lifting the head, a blunt knife may be carefully inserted and the joint made free.

It will now be necessary to remove the exhaust manifold by uncoupling the exhaust pipe and removing the manifold nuts, but first remove the petrol pipe connection to the carburetter and the control connections.

Having removed the cylinder head, gasket and exhaust branch, as described above, next remove the valves. Care should be taken not to mix the valves, and to ensure this, they are numbered accordingly.

Referring to Illustration 32, it will be seen that the valve spring compressing tool is shaped to fit over the spring and raise it so that the cup may be withdrawn.

Caution. Be careful not to drop the spring cups into the crankcase, and to avoid this, it is desirable to remove the tappet blocks and fill up the space with clean rag. This will catch the cups if they are accidentally dropped, and removal of the tappet blocks facilitates removal of the valves.

Before starting to clean off the carbon from the piston crowns first turn the crankshaft over by hand until any two pistons are at top dead centre, then fill the remaining cylinder bores with clean rag to prevent any chips of carbon falling into the cylinders.

Scrape the piston crowns and the carboned portions of the cylinder face, using an old screwdriver or similar blunt tool in a "chiselling" manner. Scrape clean the valve ports, but be careful not to scratch the valve seats, and when completed, wipe clean with a paraffin damped rag. Then give the starting handle a partial turn and treat two more pistons in the same manner until all pistons are clean.

Do not polish the ports with emery cloth or other abrasive, for the particles may get into the cylinder bore and do serious harm. If compressed air is available, it is advisable to blow through the inlet pipe to clear out any particles of carbon which may have fallen through the valve ports.

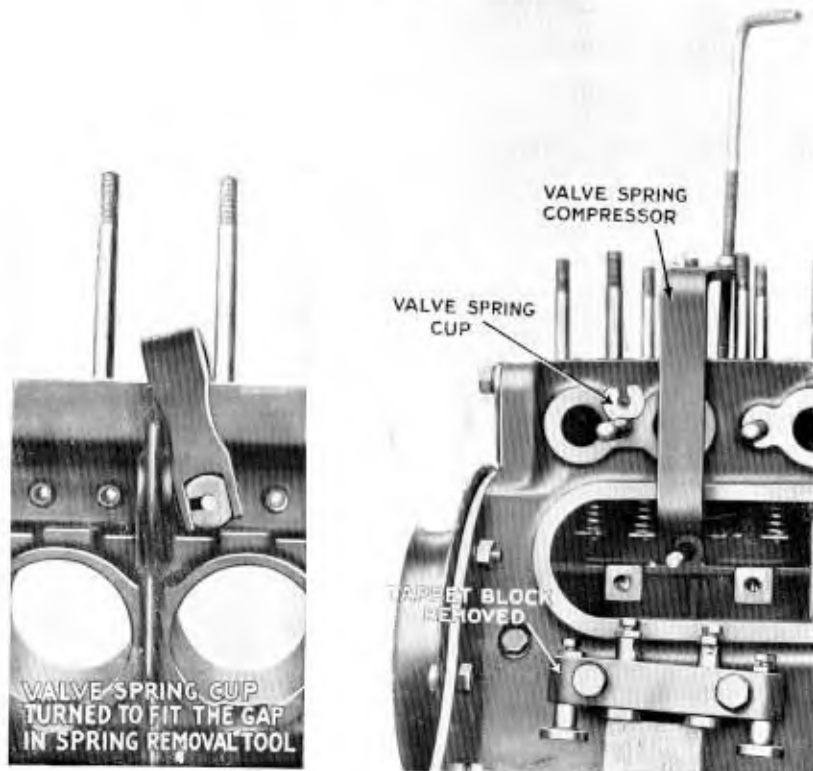


Fig. 32. Showing application of Valve Spring Compressor. View from underneath.

Fig. 33. Valve Spring Removal.

The cylinder head should now be scraped, but first remove the sparking plugs, and when this operation is complete wipe the chambers clean. The sparking plugs should then be cleaned and the points reset before replacing in the cylinder head.

Grinding the Valves. In order that the valves shall all be gas tight, it is necessary for the bevelled surfaces of the valve and cylinder seat to make perfect contact when fitted together. This is achieved by grinding the two surfaces together, but each valve must be ground into the correct seat as indicated by the numbers stamped on the valves.

A small tin of special grinding paste may be obtained, containing both fine and coarse grades.

The grinding process consists in coating the bevelled face of the valve with grinding paste and refitting the valve in its guide.

A small spring may with advantage be fitted under the valve head for the purpose of lifting the valve from its seating during the grinding operation. Use a large screw-

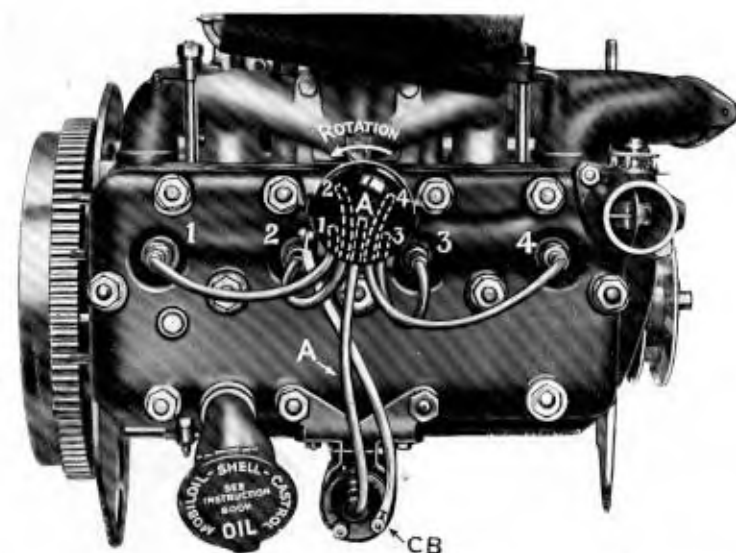


Fig. 34. S.S. II.

Ignition Timing.

driver to turn the valve to and fro. After each movement, allow the spring to lift the valve, then press down into another position before giving the next turn. This will keep the grinding even.

Continue these operations until the surfaces assume an even matt appearance, then wipe away all traces of paste from the valve seats, as any paste finding its way into the cylinder bores or valve guides would do serious harm.

If the valve seats are in fairly good condition it will only be necessary to use the fine paste, but if this is insufficient to produce a clean surface a little coarse paste must be used. When the valves are badly pitted, they should either be renewed or skimmed up in a lathe. Do not attempt to grind them in, or you will remove an undue amount of metal from the cylinder seats. It should be remembered that the steel valves are much harder than the cast iron cylinder seats with which they engage.

The valves may now be assembled and when all the spring cups are safely in position, remove the rag which was previously placed to prevent the cups falling into the sump. Replace the tappet blocks and reset the valve clearances.

The camshaft can be turned until it is in the best position for removal or refitting the tappet blocks by turning the engine with the starting handle.

Before replacing the gasket on the cylinder it is advisable to smear it with clean grease or a wet portion of white soap, which will prevent the gasket sticking and allow easy removal when the head is next removed. If the gasket has been damaged, it is advisable to procure a new one, as the damaged gasket is likely to leak. Take care to fit the gasket so that the oil filling hole is in correct position.

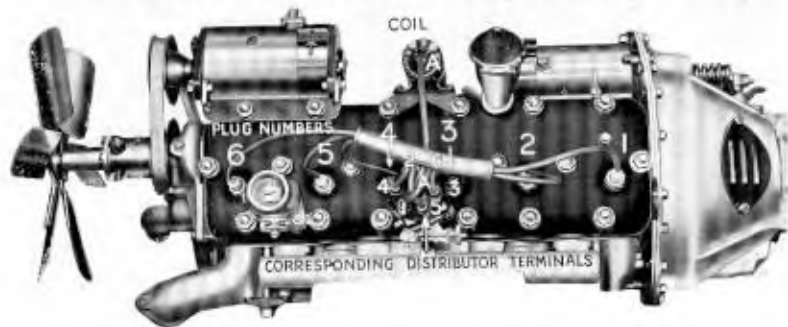


Fig. 35. S.S.I.

Ignition Timing.

When replacing the cylinder head nuts, it is most important to tighten them gradually in turn, in the sequence shown in Illustrations Nos. 30 and 31. This will produce an even pressure on the gasket and prevent undue strain in the cylinder head casting. If a new gasket has been fitted, it will be additionally necessary to run the engine until warm, go over the nuts again and give them a further tightening.

Replacing Distributor. When the cylinder head is removed for decarbonizing the distributor vertical driving shaft may be accidentally lifted out of engagement with the oil pump at the bottom end. Before attempting to replace the distributor, make certain that the lower end of the shaft engages with the pump by pressing on to the top end whilst someone turns the engine with the starting handle.

To engage the distributor spindle with the top half of the driving shaft, remove the distributor cover and turn the spindle until it engages with the shaft. There is only one position in which the parts can be engaged and thus the timing is not disturbed.

Caution. Don't use force in refitting the vertical bracket and distributor. When the shafts are correctly engaged the bracket will touch the cylinder head flange, the nuts may then be tightened up.

Loose Bolts or Nuts. All the vital nuts are locked in position by a split pin or by an additional lock nut. It is, however, desirable that the car should be examined every 5,000 miles, so that if any nut is found to be loose it may be tightened.

The wheel nuts can periodically be checked by the owner himself, but the general examination of the chassis is a mechanic's job.

GENERAL DESCRIPTION OF CHASSIS.

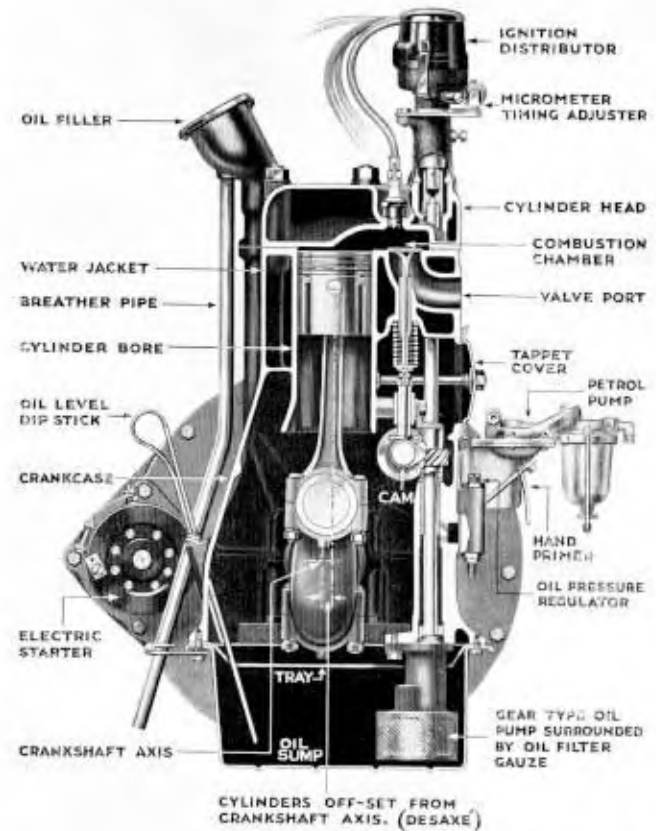


Fig. 36.

[Illustration by courtesy of the Standard Car Review]

Engine Section.