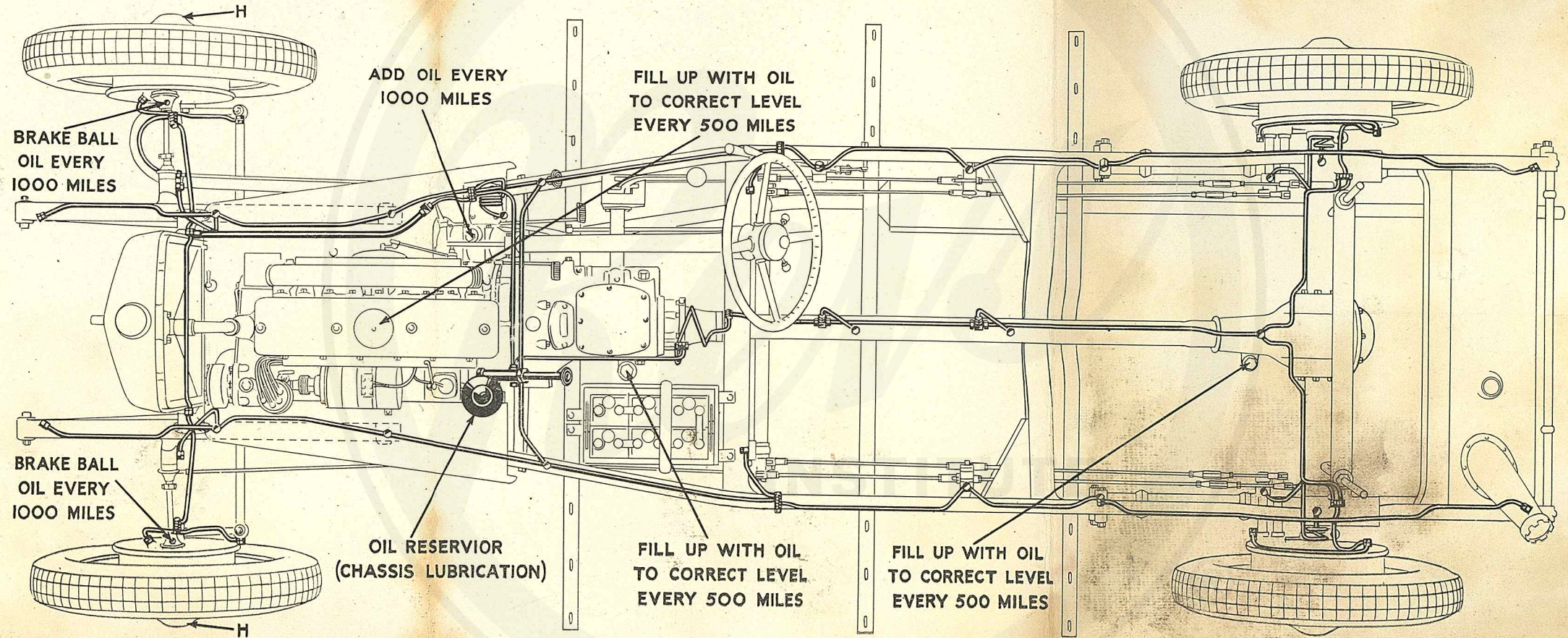


LUBRICATION DIAGRAM FOR THE 16 H.P. SIX-CYLINDER SUNBEAM ENGINE AND CHASSIS.



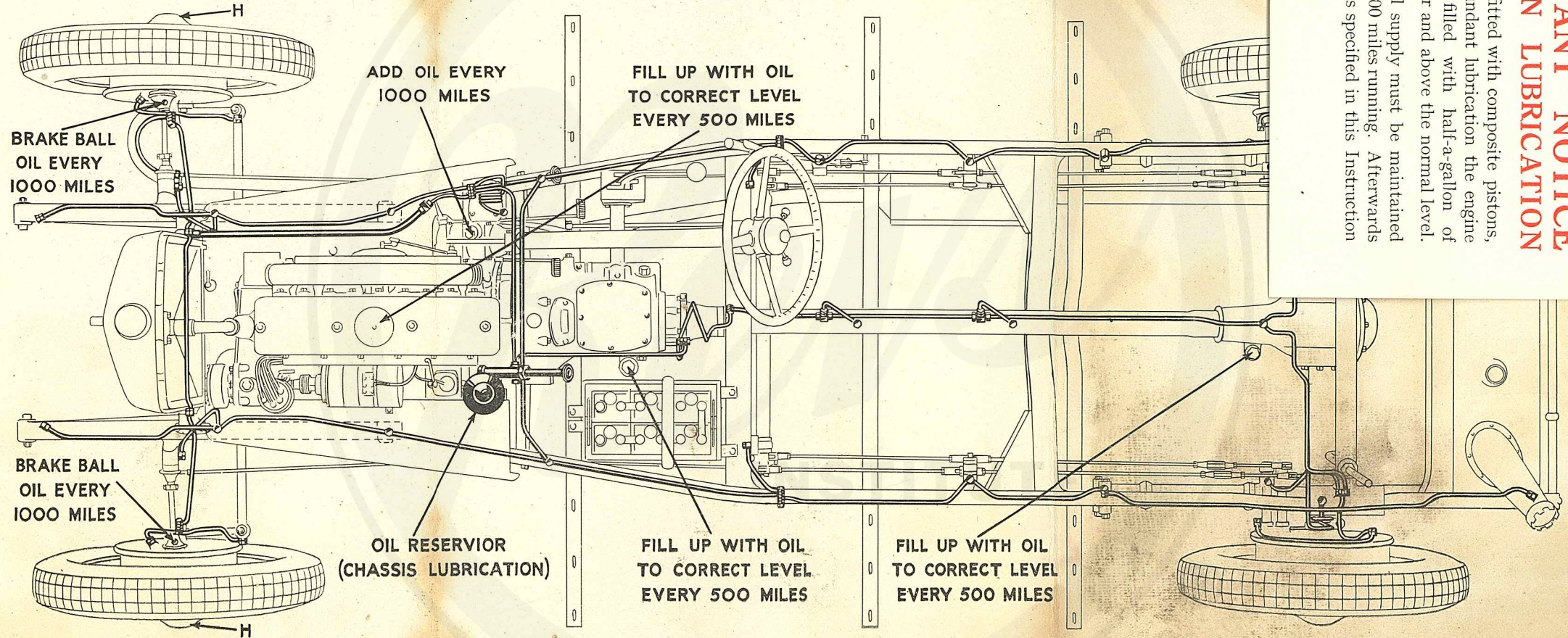
SHOWING POINTS WHICH ARE LUBRICATED BY THE CENTRAL SYSTEM OF CHASSIS LUBRICATION AND THE GENERAL LAYOUT OF THE PIPE LINES.
THE ONLY LUBRICATING POINTS WHICH ARE NOT COVERED BY THE CENTRAL SYSTEM ARE THE BRAKE CAM BALLS AND THE FRONT HUBS.

LUBRICATION DIAGRAM FOR THE 16 H.P. SIX-CYLINDER SUNBEAM ENGINE AND CHAS

IMPORTANT NOTICE re PISTON LUBRICATION

This engine is fitted with composite pistons, and to ensure abundant lubrication the engine sump has been filled with half-a-gallon of lubricating oil over and above the normal level.

This additional supply must be maintained during the first 2,000 miles running. Afterwards the normal level as specified in this Instruction Book is correct.



SHOWING POINTS WHICH ARE LUBRICATED BY THE CENTRAL SYSTEM OF CHASSIS LUBRICATION AND THE GENERAL LAYOUT OF THE PIPE LINES.

THE ONLY LUBRICATING POINTS WHICH ARE NOT COVERED BY THE CENTRAL SYSTEM ARE THE BRAKE CAM BALLS AND THE FRONT HUBS.

INSTRUCTIONS RE LUBRICATION OF ENGINE AND CHASSIS.

ENGINE LUBRICATION.

For the lubrication of the engine we recommend the following Oils: Double Shell, Wakefield's "Castrol A A" or Vacuum "Mobiloil A."

The accompanying diagram shows the lubrication points on the chassis. The parts lubricated through the central system of chassis lubrication, together with the layout of the oil pipes, are clearly shown on the diagram. Further information concerning the lubrication of the Chassis is given on pages 7, 44 and 45.

The oil reservoir for the chassis lubrication should be filled with the same brand and grade of oil as used for the engine. The Steering box, Gear box and Back Axle Case should be lubricated through the oil plugs provided for these respective units and which are shown on the accompanying diagram. Oils recommended are Shell Mex Gear Oil, Wakefield's "Castrol S" or Vacuum "Mobiloil C." The same brands of oil are suitable for the lubrication of the Brake Cam Balls (see diagram). The front hubs (marked H) should be lubricated periodically, for which purpose we recommend Gargoyle Mobilubricant Soft Grease. The rear hubs require no special attention as they are automatically lubricated from the rear axle.

IMPORTANT.—Different brands of engine lubricating oil must not be mixed. If it is desired to change over to a different brand the engine and sump must be completely emptied, as explained in this handbook, before the new oil is used. **THIS INSTRUCTION MUST BE OBSERVED.**

From Instruction Book, Reg. No. 364.

Date.....19.....

Dear Sirs,

Kindly enter my name and address in your records, and send me from time to time any printed matter or revised instructions you may issue for my 16 h.p. Sunbeam Car, No.....*

Name.....

Address.....

From whom car purchased (through agent or direct)

Date car received.....19.....

**The car number will be found (a) on a brass plate on the dash, under the bonnet, (b) stamped on the second cross member of the frame.*

Handbook of Instructions for the 16-h.p. SUNBEAM CAR.

SIXTH EDITION.
16 H.P. INSTRUCTION BOOK.

REG. NO. 364. OCTOBER, 1929.

Extract from the Terms of Business and Conditions of Sale in the Maker's current catalogue of Sunbeam Cars:

"Illustrations are given as a general guide and are not binding in detail."

"The Makers reserve the right to alter their catalogues and lists, and the standard specifications stated therein, without any previous notice."

This Handbook is Published for the use and assistance of owners of 16-h.p. SUNBEAM Cars. It embodies in a concise form the advice and suggestions of the Company's Technical Staff in regard to lubrication and the general care and maintenance of this Model, together with supplementary information regarding the necessary adjustments which may be required from time to time.

Price 5/- Nett.

Compiled and Published by
THE SUNBEAM MOTOR CAR CO. LTD.,
Moorfield Works, Wolverhampton.

TELEPHONE :
WOLVERHAMPTON 985.

TELEGRAMS :
"MOORFIELD, WOLVERHAMPTON."

LONDON SHOWROOMS AND EXPORT DEPARTMENT :
12 PRINCES STREET, HANOVER SQUARE, W.1.

SHOWROOMS { TELEPHONE : MAYFAIR 6280/1.
TELEGRAMS : "SUNOSALES, WESDO, LONDON."
EXPORT { TELEPHONE : MAYFAIR 2919.
DEPARTMENT { CABLEGRAMS : "SUBEAMOCO, LONDON."

CODES USED : A.B.C. 5TH EDITION, MARCONI INTERNATIONAL, MOTOR TRADE AND BENTLEY'S.

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PRINCIPAL CHASSIS DIMENSIONS

OF THE

16 H.P. SIX-CYLINDER SUNBEAM.

			English.	Metric.	
Bore	....	....	2.657"	67.5 m/m
Stroke	....	....	3.74"	95 m/m
Cubic capacity of cylinders	....		124.5 cu. ins.	2040 c.c.
Wheelbase	....	....	10' 6"	320 c/m
Track	....	....	4' 7"	140 c/m
Ground clearance	....	....	6"	15 c/m
(Higher ground clearance on Overseas models).					
Length overall	....	....	14' 3 $\frac{3}{4}$ "	436 c/m
Width overall	....	....	5' 8 $\frac{1}{2}$ "	174 c/m
Front of body dash to centre of rear axle	....	....	7' 4 $\frac{3}{8}$ "	225 c/m
Chassis width	....	....	3' 3 $\frac{3}{8}$ "	100 c/m
Gear ratios :					
	4th.	3rd.	2nd.	1st.	Reverse
	5.6 to 1	9.18 to 1	12.82 to 1	22.12 to 1	16.6 to 1
Tyre sizes....	5 $\frac{1}{4}$ " for 20" rim (30" x 5-25")	
Chassis weight (including petrol, oil and water) approximate			1 ton 2 cwt. 3 qrs.	
R.A.C. rating	16.95
Tax payable	£17

Modified Instructions

for the 16 h.p. Six-Cylinder Sunbeam.

The following modified instructions relate to Car No.....

ENGINE.

The bore of the engine is 70m/m (2.756") giving a total cubic capacity of 2194 c.c.s. The R.A.C. rating is 18.2 and the Tax payable £19.

For the lubrication of the engine we recommend either of the following Oils :

Wakefield's "Castrol AA." or "Double Shell."

MIXTURE CONTROL.

With the latest type of carburetter the mixture control mentioned on pages 5, 6 and 7 is not fitted, and the instructions referring specifically to this device do not now apply. This should also be noted when referring to the following illustrations :—

Figs. 1, 3 and 12.

WATER PUMP.

With the latest type of water pump as now fitted the instructions given on page 31 require slight modification. If the gland should require adjustment, remove the locking plate holding the gland nut by first removing the two small fixing screws situated over the gland and then turn the gland nut with spanner provided. The reference in the first paragraph on page 31 to "under water connections" should read "under water bearings."

CARBURETTER.

The carburetter fitted is the "Amal" Type 30 VP. This is fully described in the booklet issued by the "Amal" manufacturers and a copy of which is included with this handbook.

CLUTCH PEDAL ADJUSTMENT.

The instructions given on page 32 for adjusting the clutch pedal when the minimum amount of idle movement is reached require modification. The adjustment is now made as follows :—

The external clutch withdrawal operating lever connects up to a boss on the clutch pedal lever by a short screwed rod hinged to the latter and passing through an eye pin in the forked end of the withdrawal lever. A tubular nut, bearing against the eye pin, screws on to the end of the hinged rod. The tubular nut, which is self-locking, is unscrewed the requisite number of complete half turns until the top of the pedal footplate has an idle movement of one inch.

FOUR-WHEEL HYDRAULIC BRAKING SYSTEM.

The hydraulic footbrake operates on all four wheels simultaneously and the handbrake operates mechanically on the rear wheel brake shoes only and independently of the hydraulic system.

The single pair of internal expanding fabric-lined shoes on all four wheels are operated hydraulically on the Lockheed system. The shoes are applied by the foot pedal which pulls direct on to the pressure lever of the master cylinder from which the pressure is transmitted to the wheel cylinders. These expand the brake shoes against the tension of the pull-off springs.

For a full description of the hydraulic braking system ; the efficient maintenance of same and the only adjustment required, that of the brake shoes in relation to the drums when necessary on account of wear of the shoe linings, see the Lockheed booklet, a copy of which is supplied along with this handbook of instructions.

It is vitally important that fluid of the correct Lockheed specification, namely Lockheed Di-Acetone brake fluid, should be employed exclusively in the system.

The handbrake is a mechanical brake. It operates independently through the medium of a powerful toggle linkage, the same pair of internal expanding fabric-lined brake shoes on each rear wheel as the footbrake operates hydraulically.

As the brake shoes must always be adjusted for wear of the linings in the way described in the Lockheed booklet, *i.e.*, by means of the adjustment cam provided for each shoe, the only attention to the handbrake mechanism required is to see that the **outer or rearmost** end of the long slot in the brake rod end piece connecting up to the wheel brake lever is just clear of the eye pin in the end of the lever **when both brakes are "off."** This may be adjusted when necessary by means of the turnbuckle provided on both of the two rods and to be found on each wheel a short distance forward of the connection to the brake lever.

LUBRICATION OF FRONT HUBS.

Care should be taken in " packing " the hubs with grease, since if all available space is filled up any increase in temperature forces grease into the brake drum, with consequent serious effects on the braking. If the inner hub cap is kept up to the half full condition by attention about every three thousand miles, the lubrication should be satisfactory.

LUBRICATION OF THE CHASSIS.

In addition to the steering gear box, the gear box and the rear axle case (which should be lubricated through the oil plugs provided for these respective units), the other parts of the chassis are lubricated from the central system with the exception of the following parts, which should be lubricated with the oil gun (supplied with the tool kit).

Steering side tube (both ends).	Lubricate every 500 miles.
Steering track rod (both ends)	" " " "
Centres of front springs	" " " "
Front axle swivel pin bearings,	
nearside and offside	" " " "
Front wheel brake shoe pivot pins,	
nearside and offside	" " 1,000 "
Clutch withdrawal gear*	" " 1,000 "

*use " Belmoline B " for this.

For use in the oil gun we recommend the same brand^s of oil as for the gear box and rear axle, viz. : Wakefield's " Castrol S " or Shell-Mex Gear Oil. If the same oil gun is used for lubricating the Clutch Withdrawal Gear with " Belmoline B " (which is a grease) the gun should be completely emptied of oil before using the grease. In the same way all grease should be cleaned out before again using the gun for oil.

FOREWORD.

This Handbook of Instructions has been compiled for the use of owners and drivers of 16 h.p. six-cylinder Sunbeam cars, with a view to providing in a simple and handy form useful and necessary information in regard to the general care, lubrication and maintenance of this model. It is not intended as a complete manual of motor driving, and in its preparation it has been assumed that the reader is conversant with the general features of the modern motor car.

The illustrations appearing in this book, apart from the wiring and timing diagrams, etc., are from actual photographs. These have been prepared to supplement and make more clearly understandable the explanations in the text. In one or two instances, parts (such as wings, running boards, etc.) adjacent to the particular portion of the chassis referred to have been removed. This, however, has been done merely to give an uninterrupted view for the camera, and does not necessarily imply that in practice such parts need to be removed before the adjustment, or lubrication, of chassis parts referred to can be effected.

All Sunbeam cars are guaranteed in accordance with the terms of guarantee printed in full in our catalogue. In the rare event of any unforeseen defect or unusual trouble developing, it is especially requested that the matter should **at once** be brought to the notice of the Company, either at their Head Office or at any of their Depôts, a list of which appears on page 1.

With regard to the various accessories not of our own manufacture, such as electrical equipment, carburetter, etc., brief instructions on their care, based on information supplied by the respective makers, are included in this handbook, but in the event of difficulty clients are strongly recommended to consult the makers themselves. Most of them issue their own instruction pamphlets, which are generally supplied gratuitously on request.

The Sunbeam Motor Car Co. Ltd.

October, 1929.

READ THIS CAREFULLY.

The instructions embodied in the early chapters of this handbook give all the information *re* starting up and driving necessary for the motorist who has had some experience in handling a car.

Later chapters deal with the all-important question of Lubrication, the adjustments which may be required from time to time, and the general points to be observed in maintaining the car in a condition which will ensure complete satisfaction to its owner. The best of cars will suffer under neglect.

Read carefully the chapters on Lubrication. The central system of chassis lubrication as fitted to the 16h.p. Sunbeam requires the minimum of attention—by depressing the plunger once a day the various lubricating points on the chassis receive an adequate supply of oil. Use one of the brands of oil recommended on the page facing the Lubrication diagram.

On no account must different brands of Oil be mixed. If it is desired to change over to a different brand the engine and sump must be completely emptied, as explained on page 14, before the new oil is used.

THIS INSTRUCTION MUST BE OBSERVED.

Treat the new car with consideration. Although the engine, gear box, back axle, etc., of every Sunbeam car are "run in" before being assembled in the chassis, and the complete car exhaustively tested on the road, the first few hundred miles should be done at moderate speed. The owner who treats his car considerably during this initial period, instead of immediately attempting to attain a high rate of speed, will make doubly sure of getting the utmost satisfaction from his car, and add appreciably to its life.

GENERAL RUNNING HINTS.

It has been remarked on an earlier page that this book is not intended to be a manual on the art of driving a car. It is assumed that the reader has at least a general knowledge of the motor car and of driving. The following information may therefore be regarded more as a series of general hints for the driver rather than an instruction in driving.

The illustrations upon this and the following pages show the positions of the ignition and carburetter controls, the clutch, brake and accelerator pedals, the gear lever and the gate through which the gear lever operates.

Assuming that the car is ready for its first trip on the road after reaching its owner, the following points should be observed. See that the oil level is correct (see pages 10, 13 and 14), the radiator filled, and the petrol turned on and reaching the carburetter. Always see that the gear lever is in the neutral position before attempting to start up the engine.

Before starting up the engine with the electric starter, first move the mixture control switch (see Fig. 1, page 5)

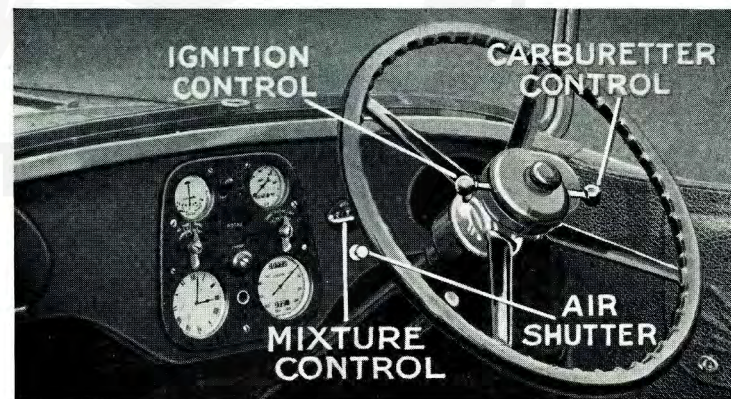


Fig. 1. Showing Steering Wheel, Instrument Board, Throttle and Ignition Controls, and Air Shutter.

over to the "STRONG" position (which is the normal position for average running conditions), and slightly open the throttle by means of the carburetter control lever on the steering wheel. If the weather is cold or the car has been standing for any length of time, swing the engine over for a few seconds with the starting handle. This eases the pistons and ensures gas entering the cylinders, and with the ignition switched off there is no danger of backfire. Switch on the ignition, leave the throttle in the position mentioned above, advance the ignition control lever to nearly midway between the advance and retard positions, close the carburetter air shutter by pulling the small knob on the instrument board and depress the starter switch. The engine should fire within the first twenty revolutions. If no explosion takes place release the starter so as not to waste current, then release the air shutter knob and open the throttle a little more. No difficulty should be experienced when the starter switch is again depressed.

Do not run the engine with the carburetter shutter closed longer than is necessary, either under its own power or by the starting motor, as the petrol sucked in is liable to wash away the oil and dry the pistons.

Under no circumstances should the carburetter shutter be held at the "CLOSED" position if the engine fails to start quickly, as the very rich mixture induced, practically pure petrol, will be too rich to fire. A very rich mixture is as likely to prevent starting as a weak one. By further opening the throttle and releasing the carburetter shutter to the open position, air is admitted to reduce the richness of the mixture.

On no account should the engine be speeded up when cold. In very hot weather, when descending a long hill, or on long straight stretches, the lever may be moved to the "WEAK" position. This action opens a valve which weakens the diffuser mixture and effects economy in fuel consumption.

With the engine running, the ignition should be kept at half advance or slightly retarded as the driver's judgment

REVERSE

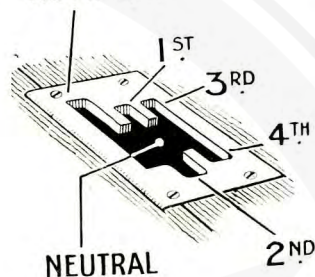


Fig. 2.
Diagram showing Gear Lever positions in Gate.

may suggest. The same applies to the throttle and mixture controls. It is impossible to fix actual positions, as there may be slight deviations with different engines, and this, like many more little points in connection with driving, must be left to the judgment of the driver, who will find by experience just the right positions for the controls at all speeds, and in course of time will instinctively open or close them to the points required. It may be emphasised that when driving at any speed over 20 m.p.h. the ignition should always be kept advanced as far as possible.

When first starting up the car each day, the plunger operating the central system for lubricating the chassis (see E, Figure 3) should be depressed to its full extent. If the operation is carried out then no further attention need be given until the following day, except in the case of a very long day's run, when the plunger should be again depressed after the first 200 miles has been done. The plunger must always be depressed to its full extent.

If the position of the front seat is not just suitable for the individual driver as regards leg reach, etc., when the car is first delivered, on all 16 h.p. Sunbeam touring, coupé and saloon cars the driving seat is adjustable and can be moved backwards or forwards until the most comfortable position is obtained.

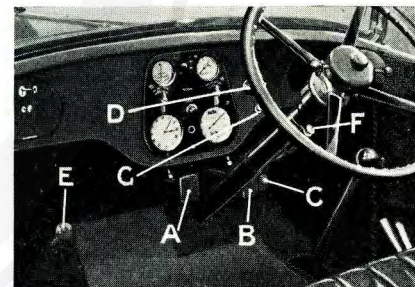


Fig. 3.
Showing Clutch (A), Brake (B), Accelerator (C) pedals, Mixture control (D), Plunger for central lubrication (E), Control for operating dipping reflectors (F) and (G) is the Air Shutter.

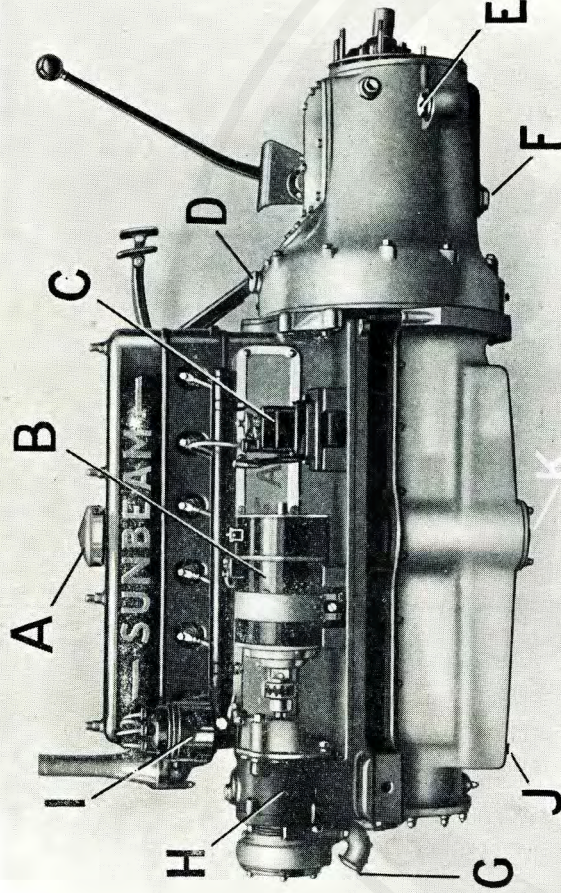


Fig. 4.

View of near-side of 16 h.p. Engine shown out of chassis to illustrate more clearly Dynamo, Coil, etc. A, Oil filler cap; B, Dynamo; C, Ignition coil; D, Breather; E, Oil filler for gear box; F, Drain plug for water pump; G, Drain cock for water pump; H, Water pump; I, Ignition distributor; J, Drain plug for crankcase; K, Filter for oil sump.

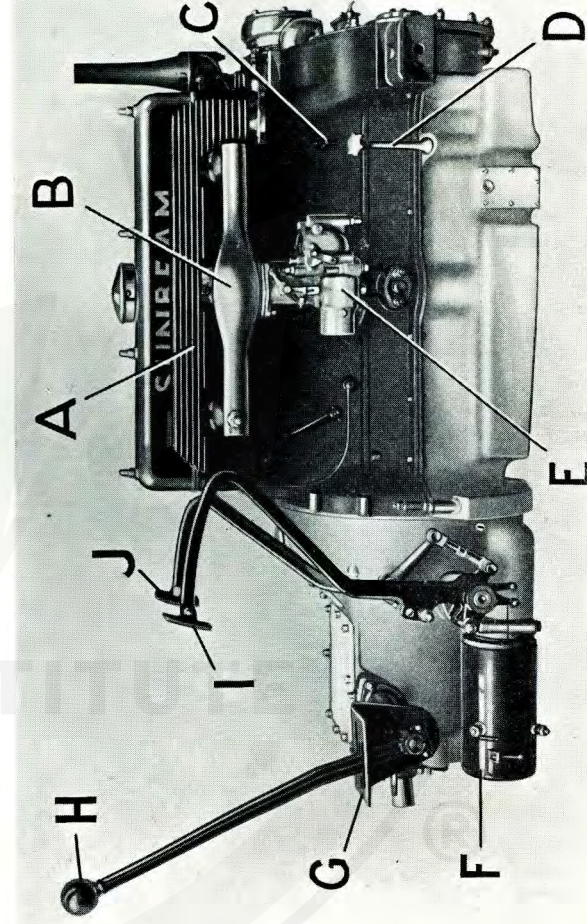


Fig. 4a.

View of off-side of 16 h.p. Engine shown out of chassis to illustrate more clearly Carburetter, Starter, etc. A, Exhaust manifold; B, Inlet manifold; C, Carburetter; D, Drain Tap for cylinder block; E, Oil-level Dip-stick; F, Electric starter; G, Change speed gate; H, Change speed lever; I, Brake pedal; J, Clutch pedal.

CARE AND MAINTENANCE.

The 16 h.p. six-cylinder Sunbeam is built with the engine, clutch and gear box combined in a single unit suspended directly from the main frame. A glance at the chassis plan on the Lubrication Diagram at the front of this book will show that the design is on very clean lines, and all accessories are placed in convenient positions. The oil fillers for the engine, gear box and back axle are all accessibly placed. It is only necessary to treat the car with regular care and follow out the instructions given on the Lubrication Diagram and in these pages regarding the lubrication to obtain and, what is equally important, maintain, the best possible service.

Lubrication is the most important matter for the motorist who wishes to get the best out of his car. Most of the troubles with which motor repairers have to deal are directly traceable to lack of proper lubrication. The absence of oil will damage any bearing and may necessitate costly repairs. Chassis lubrication is greatly simplified by the central system described on pages 44 and 45.

All Sunbeam engines are designed to provide perfect lubrication automatically and yet have a clear exhaust. A dip-stick (See Figure 5) is fitted in the crankcase so that the correct level for the oil in the sump can always be maintained. The oil filler is shown in the illustration on the next page.

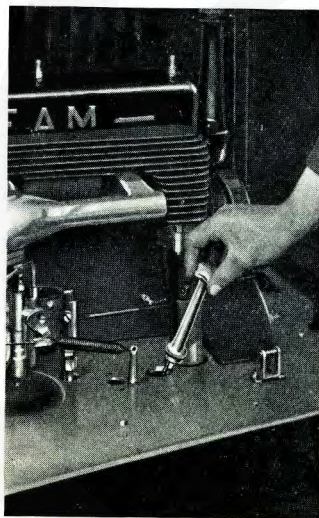


Fig. 5.
Showing Dip-Stick in Crankcase. The correct oil level is indicated by a line.

LUBRICATION.

As regards lubricating oil, only the best quality oil marketed by firms well acquainted with the requirements of high-speed internal combustion engines should be used. It is false economy to buy a very low-priced oil, which is almost sure to be deficient in those properties necessary in a good lubricant. For the 16 h.p. Sunbeam model we recommend the following oils, which we have found from our own experience to be the most suitable:—for the engine, "Double Shell," Wakefield's "Castrol AA" or Vacuum "Mobiloil A"; and for the gear box and transmission, "Shell-Mex Gear Oil"

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This engine is fitted with composite pistons, and to ensure abundant lubrication the engine sump has been filled with half-a-gallon of lubricating oil over and above the normal level.

This additional supply must be maintained during the first 2,000 miles running. Afterwards the normal level as specified in this Instruction Book is correct.

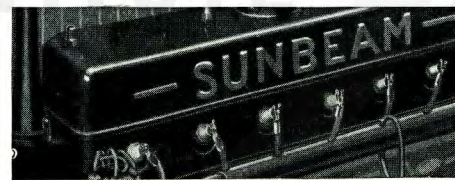


Fig. 6.
Oil Filler for Crankcase, with detachable gauze filter. Remove cap and filter can then be withdrawn by the fingers for cleaning.

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oil is used.
ED.

ear box or
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Sunbeam
lubrication
consists
ear driven
placed in
lower half of
the crankcase.
This forces oil to
the main crank-
shaft bearings
and through the
hollow crankshaft
to the big-end
bearings of the
connecting rods.

CARE AND MAINTENANCE.

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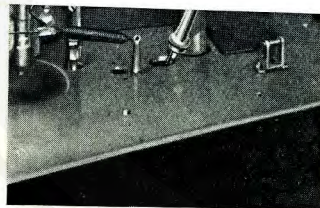


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IMPORTANT NOTICE re LUBRICATING OIL.

Different brands of lubricating oil must not be mixed. If it is desired to change over to a different brand, the engine and sump must be completely emptied, as explained in this handbook, before the new oil is used. THIS INSTRUCTION MUST BE OBSERVED.

Engine lubricating oil is not suitable for gear box or back axle. See pages 33, 34 and 45, re oil recommended for the lubrication of these parts.

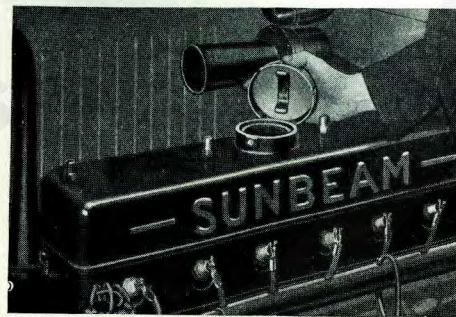


Fig. 6.
Oil Filler for Crankcase, with detachable gauze filter. Remove cap and filter can then be withdrawn by the fingers for cleaning.

The Sunbeam engine lubrication system consists of a gear driven pump placed in the lower half of the crankcase. This forces oil to the main crankshaft bearings and through the hollow crankshaft to the big-end bearings of the connecting rods.

:: LUBRICATION SYSTEM—OIL PRESSURE ::

The surplus oil from the crankshaft is thrown by centrifugal force on to the cylinder walls and into the interior of the pistons, and this effectively lubricates the bearings of the small ends of the connecting rods. The oil drains back into a large sump in the base of the crankcase and passes through a filter, so that it is cleansed before being again circulated by the pump. This filter is detachable, and should be removed periodically and cleaned out.

The rocker shafts, rockers and push rods are also lubricated from the main oiling system. An oil lead carries oil to the overhead shaft and effectively lubricates each rocker, the surplus oil passing to the push rods and falling by gravity on to the tappets.

OIL PRESSURE.

With the supply of lubricating oil properly maintained, and the crankcase cleaned out periodically, it is almost impossible for the lubrication system of Sunbeam cars to fail. One point to note carefully is the maintenance of the correct oil pressure. The pressure gauge is fitted on the instrument board as shown in Figure 1. For all average purposes the oil pressure should be 20-lbs. per square inch. A relief valve of the usual ball type is fitted in the oil pump unit and deals with any excess pressure of oil which is returned to the sump.

N.B.—When first starting up the engine should never be "raced" while the oil is cold, as this will damage the pressure gauge.

FAILURE OF OIL PRESSURE.

Although, as mentioned above, it is practically impossible for the lubrication system to fail, the following instructions

OIL PRESSURE. CLEANING OUT CRANKCASE.

are given to provide for the rare occurrence when trouble may be experienced. When the system is not working the needle of the oil gauge will either move erratically to and fro across the dial, or not register at all. The trouble may be due to one or a combination of several of the causes given below.

- (1.) Lack of oil supply, *i.e.*, an empty crankcase.
- (2.) A broken or choked oil gauge pipe.
- (3.) A blocked system, due to not keeping the crankcase clean or inferior or dirty oil being used.
- (4.) Not cleaning out oil filter periodically.
- (5.) Damage to oil pump or oil gauge.

When failure of pressure is indicated on the gauge, the engine should immediately be stopped. First ascertain if there is the correct quantity of oil in the crankcase by means of the dip-stick (see Fig. 5). The correct level is indicated by a line on the dip-stick.

When the engine is restarted, if the gauge still fails to register any pressure, test for the other causes of trouble enumerated above. Before examining the oil pump, detach the pipes which connect to the gauge and thoroughly clean these. This may remedy the trouble.

CLEANING AND REFILLING CRANKCASE.

It is important that attention should be regularly given to the oil level. After about every 500 miles the oil level should be maintained by replenishing with oil through the filler (see Figure 6), until it reaches the level indicated on the dip-stick.

CLEANING OUT CRANKCASE, REFILLING, Etc.

Under normal running conditions the crankcase should be thoroughly emptied and cleaned after about every 2,000 miles.

To empty and clean out the crankcase, remove the drain plug underneath (see Figure 4). Drain off all the oil, which will drip more readily if the engine is warm when this operation is commenced. The drain plug should then be reinserted and screwed tightly home, and three or four pints of paraffin, **not petrol**, poured into the crankcase through the crankcase oil filler (see Figure 6). With the sparking plugs removed, turn the starting handle vigorously for a few minutes so as to circulate the paraffin through the oilways, which will thoroughly cleanse the lubricating system. The drain plug should again be removed and the paraffin drained away, care being taken to see that no paraffin is left inside the engine.

The filter in the base of the crankcase (see Figure 4) can be cleaned at the same time and the starting handle again turned for about a minute to ensure that neither old oil nor paraffin remains.

Do not run the engine under power until the supply of oil in the crankcase has been renewed.

After allowing ample time for the paraffin to drip from the crankcase, insert the drain plug and carefully screw up so that it is perfectly tight. Pour in the lubricating oil through the filler (see Figure 6) until it reaches the level marked on the dip-stick. Allow the oil a few minutes to distribute itself evenly, and pour in a further slight quantity if necessary.

Note.—When refilling the crankcase with oil see that the car is standing on level ground. If the crankcase is tilted, even at a slight angle, it is impossible to gauge exactly whether the correct amount of oil has been poured in.

:: ENGINE VALVES, VALVE GRINDING, Etc. ::

VALVES.

One of the advantages of the Sunbeam overhead valve engine is that the operation of grinding-in the valves needs to be carried out at less frequent intervals than in the case of a side valve engine. This is largely due to the design of the valve seats, which, on the overhead valve engine, ensure more effective cooling for the valves themselves and the liability to burning and distortion is very appreciably reduced.

It is difficult to fix the exact period when valve grinding is necessary. The care with which the car has been driven and the quality of fuel and oil used are all factors which have a bearing on the condition of the valves. Very largely it must be left to the judgment of the individual owner, although the majority of engines should have the valves examined, and ground in if necessary, after about every 5,000 miles on the road. The exhaust valves usually require grinding-in earlier than the inlet valves owing to the continual passage of the hot gases over their faces and seatings.

VALVE GRINDING.

Grinding in the valves is not a difficult matter on the Sunbeam engine. After draining the water from the cylinder block, the cylinder head is easily removed by following these instructions:—(a)—Disconnect the high tension wires and sparking plugs and remove the plugs from the cylinder head. (b)—Remove the hose clip on the water outlet connection and detach the hose. (c)—Remove the nuts which hold down the valve cover and lift the latter away. (d)—Disconnect the carburetter controls. (e)—Remove the inlet and exhaust manifold and the carburetter. (f)—Disconnect all piping. (g)—Remove, first unscrewing each nut a few turns at a time (see Fig. 9, Page 18), the nuts which hold down the cylinder head. (h)—Carefully lift the head clear of the studs in the cylinder block.

The push rods should not be removed from the cylinder block. These rods may vary slightly in length to suit their

respective positions and if replaced differently it may be necessary to re-adjust all the tappet clearances. For the adjustment of individual tappets, see paragraph on Valve Tappet Adjustment, (page 19).

No difficulty should be experienced in lifting the head off the cylinder. Should the head, however, through some cause or other not be easily removed, care must be taken not to damage the joint (by the use of a screwdriver or similar tool) at the point of junction of the cylinder block and head. Special lugs are provided on the corners of the cylinder head to facilitate removal. Free the joint by lightly tapping the head with a mallet.

DEPRESSING VALVE SPRING.

Having removed the cylinder head, place in position as shown in Fig. 7 with a block of wood under each end. This will allow the hook end of the valve removing tool (included in

tool kit) to be placed in the cup of the valve head, and the fork of the tool under the washer of the valve spring. When the spring is depressed the washer can be easily removed and the spring withdrawn from the valve. Then turn the cylinder head on its side.

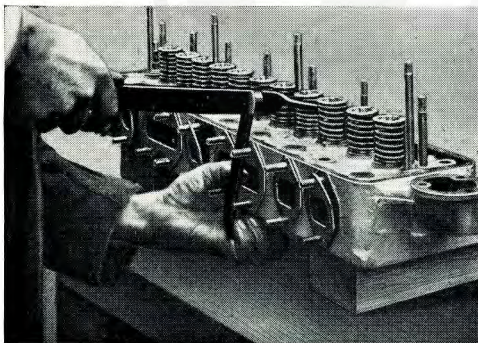


Fig. 7.
Using Valve Removing Tool.

GRINDING IN VALVES.

To grind a valve in, it is necessary only to smear a little valve grinding compound (which can be purchased from any accessory dealers) on the valve, insert a tool into the slot in the head, as shown in Fig. 8, and give it a light semi-rotary motion backwards and forwards. During this operation the position of the valve should be moved from time to time in order to secure even grinding all the way round.

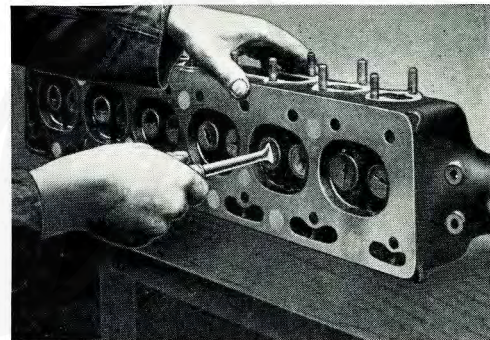


Fig. 8.
Showing method of Grinding in Valve.

Only the smallest possible quantity of grinding compound should be placed on the valve. After a minute or so the valve should be removed and another small smear of compound should be put on.

The valve should be occasionally wiped with a piece of rag in order that the surface may be seen, when the "pitting" will be found to be gradually disappearing. As soon as it has disappeared, it is as well slightly to blacken the valve seat in a candle flame and carefully return the valve, very lightly pulling it into its seat. On removal the soot should show an even contact all the way round. If this is so it may be taken that the valve is tight and is seating properly.

Scrupulous care must then be taken to wash out with a brush and petrol and clean away all particles of emery that

have been used in the grinding process, paying particular attention to getting well into the valve guide.

Do not remove all the valves before starting the grinding process ; remove them from one cylinder at a time, grind, and replace. The object of this is to prevent any risk of a valve not being replaced in its original position.

In replacing the head, care must be taken to avoid damaging the ends of the studs, and the head should be lowered steadily and evenly with the joint faces parallel.

See that the surfaces of the cylinder and head are clean, and that the gasket is flat and not wrinkled. If it is damaged fit a new one. It is important that the nuts should be free (but not slack), and any nut which has a tendency to jam on the stud must not be used, otherwise the stud itself is likely to come out when the head is again removed.

TIGHTENING NUTS.

The nuts should be tightened progressively, that is, each nut should be given about one-third of a turn at a time.

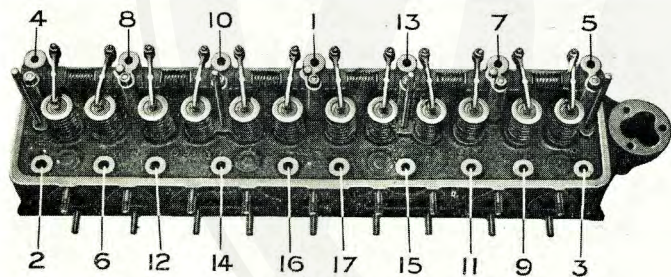


Fig. 9.

Numbers give the order in which Cylinder Head Nuts should be tightened.

If the copper and asbestos gasket is damaged when removing, and a new one has to be fitted, the following precautions should be taken:—First try the gasket on the cylinder block and make sure that the holes in the gasket

that should be coincident with the holes in the cylinder block through which the water passes registers exactly. This is most important. When replacing the head, the use of gold size or other cementing material is not recommended, as the gasket will almost certainly be damaged when the head is lifted again.

TAPPET ADJUSTMENT.

Grinding in the valves slightly reduces the distance or clearance which should be maintained between the push rods and tappet heads.

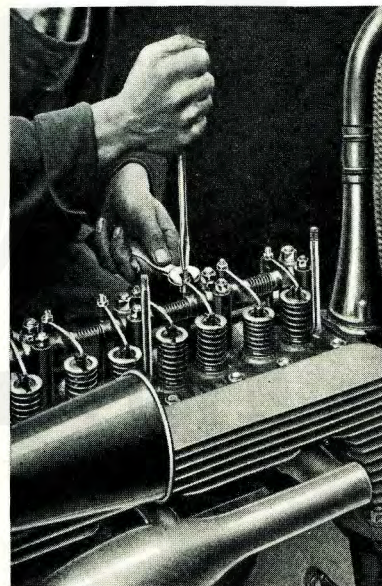


Fig. 10.

Showing method of adjusting the clearances for the Valve Tappets.

The clearance can be corrected and any slight wear adjusted by means of the separate hardened steel pin which is screwed into the split end of each rocker arm. Commence adjustment with the tappets of No. 1 cylinder and proceed in the cylinder firing order, viz., 1, 5, 3, 6, 2, 4. Adjustment should be made in each case with the piston at the top of the compression stroke, when both valves will be closed. To adjust, loosen the lock-nut (see Fig. 10). and with a screw-driver turn the pin until the correct clear-

ance is obtained. Then securely tighten the lock-nut again. The correct clearance for the inlet valves is .006" (six thousandths of an inch), and for the exhaust valves .008" (eight thousandths of an inch). These clearances should always be measured when the engine is at the average running temperature—not cold. The measurements can be accurately determined by the use of "feelers."

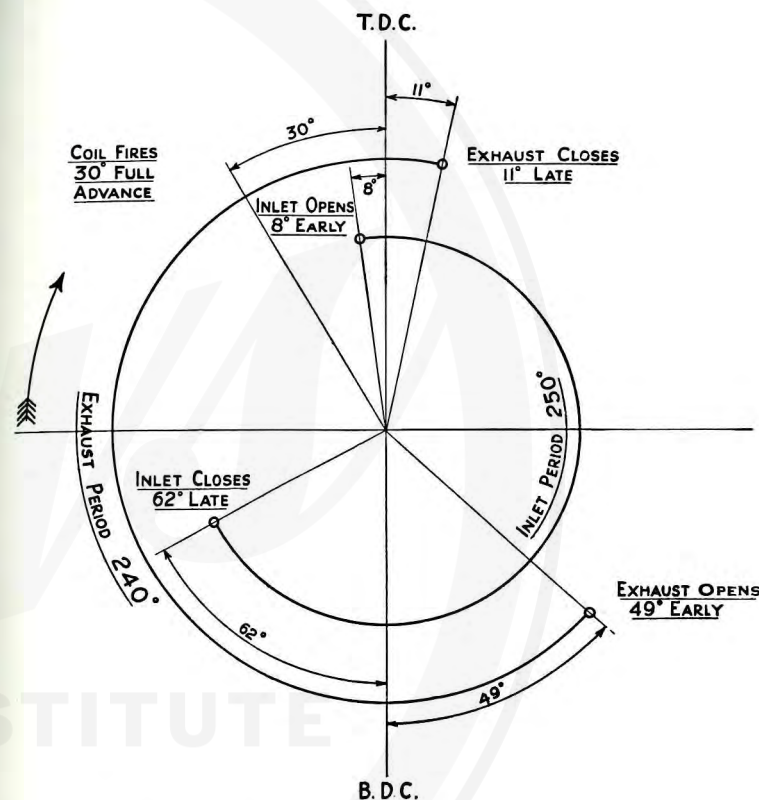
DECARBONISATION.

It is recommended that the engine should be decarbonised after about every 8,000 miles.

Even with the greatest care in the construction of an engine it is impossible to avoid a small leakage of oil past the piston rings. This will cause carbon deposit to form in the combustion chamber, and the carbon should be removed periodically. The cylinder head should be removed as described on page 15, and the interior, together with the piston crowns, thoroughly scraped, afterwards wiping away all particles of carbon with a rag moistened with petrol. Before each piston is scraped bring it to its top dead centre, to avoid risk of damage to the cylinder wall, and also to remove more easily the small pieces of carbon as they become detached. Smear a little engine oil round the edges of the piston crowns—only a very small quantity—before replacing the cylinder head.

ENGINE AND IGNITION TIMING.

On the following page a diagram is given which shows the timing for the engine and ignition of the 16 h.p. six-cylinder Sunbeam. This diagram should be followed whenever it is necessary to re-time the engine or ignition. When timing the ignition the contact breaker should be in the fully advanced position, and the points should be just breaking when the dead centre line of the flywheel is 30 degrees BEFORE the top dead centre.



TIMING DIAGRAM FOR 16 H.P. ENGINE.

Fig. 11.

Engine and Ignition Timing Diagram for 16 h.p. Six-cylinder Sunbeam.
Order of Firing: 1, 5, 3, 6, 2, 4.

IGNITION.

The 16 h.p. six-cylinder Sunbeam car is fitted with the latest type of coil ignition, the decision to adopt this being the result of a thorough investigation of the question by the Company's engineers. The purchaser may, therefore, be assured that he is being provided with an ignition system which represents the most suitable type for this particular model.

A booklet dealing specially with the ignition system and supplied by the manufacturers, is included with the tool kit of each 16 h.p. car.

It is most important to remember always to switch the ignition "off" when the engine is not running, as current will flow from the battery through the coil as long as the ignition switch is left on. In time this would discharge the battery, and it would be difficult, or even impossible, to start the engine. It would, however, take many hours for this condition to occur, so that there is no risk of trouble except through extreme carelessness. To guard against this, a small red warning light is fitted in conjunction with the switch, and is arranged so that it lights up whenever the engine is running very slowly or is stopped with the ignition "on." This red light serves as an efficient reminder to the driver.

SPARKING PLUGS.

Keep the sparking plugs free from carbon deposit by occasionally brushing the points with a file card and afterwards washing them in petrol. The correct gap between the points is .022 in.

CARBURETTER.

The standard carburetter fitted to the Sunbeam 16 h.p. engine is the Claudel-Hobson model V. 36 AD. to which fuel is fed by a pipe from the Autovac tank. This carburetter is of the diffuser type, being provided with an arrangement which gives a high degree of atomisation. This is effected by using a diffuser jet in combination with the usual main jet. The function of the diffuser jet is to ensure the provision of a correct mixture at all speeds and its action is perfectly automatic.

From experience it has been found that a 200 c.c. main jet is the most satisfactory size for use on the 16 h.p. engine and this size is fitted as standard. Except in very rare instances, it is inadvisable to make any alteration or to spend needless time in experimenting. Obviously the size of jet

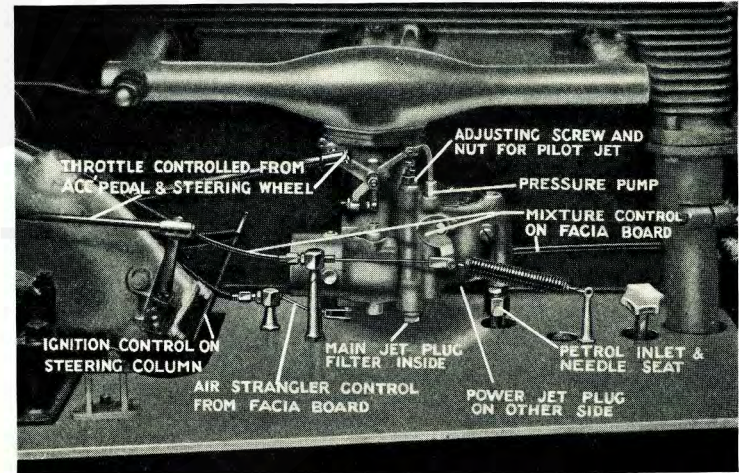


Fig. 12. Showing Carburetter and Controls.

CARBURETTER—RUNNING ON BENZOLE, *Etc.*

fitted has been standardised only after exhaustive tests, and for all-round running cannot be improved upon.

If adjustments should be necessary, the following points must be borne in mind. Under no circumstances should the diffuser be tampered with, and adjustment should be confined to the following points :—

- | | |
|-----------------------|--------------------|
| (a) Main jet. | (d) Throttle stop. |
| (b) Slow running jet. | (e) Heating. |
| (c) Air screw. | |

The petrol level is set by the makers at from 3 m.m. to 6 m.m. below the top of the guard tube, and variations between these limits are not highly important.

Before attempting any adjustment of the carburetter, all the induction pipe joints must be rendered air tight, and the engine warmed up to its normal working temperature.

The main jet, see Fig. 12, can be taken out by unscrewing the centre plug and jet complete at the base of the carburetter. The pilot or slow running jet is mounted above the main jet and can be removed by unscrewing the plug and jet complete. At the back of the plug through which the main jet is extracted is a second hexagonal plug. By removing this the power jet can be withdrawn. There is a filter inside the main jet plug which should be cleaned periodically.

A full explanation of the working of the carburetter is given in the booklet issued by the carburetter manufacturers.

ADJUSTMENTS FOR BENZOLE, ETC.

Benzole and petrol require slightly different settings to obtain the best results, but an adjustment can be found which will serve equally well when running with either fuel.

Generally speaking, the best results with pure benzole are obtained by having one size smaller jet,

Very good results can be obtained from a mixture of petrol and benzole of good quality in equal quantities, the standard carburetter setting being used.

:: THE AUTOVAC FUEL SUPPLY SYSTEM. ::

AUTOVAC FUEL SUPPLY SYSTEM.

The fuel is fed to the carburetter from the tank carried at the rear of the chassis by means of the Autovac fuel supply system. The Autovac is of simple and durable construction. Full instructions for its care and maintenance are given in the booklet issued by the makers.

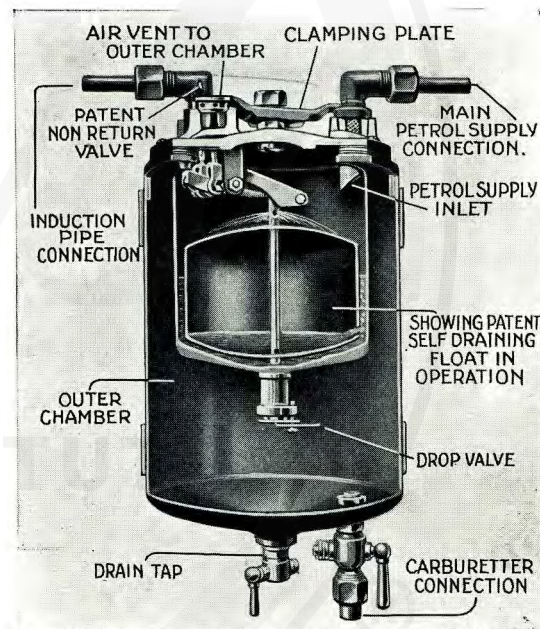


Fig. 13.
Sectional view of Autovac.

KEEP THE AUTOVAC STRAINER CLEAN.

Although full information is contained in the book issued by the makers, we would emphasise that the strainer in the Autovac, at the end of the main supply pipe from the fuel tank, should be removed and cleaned **every three weeks**.

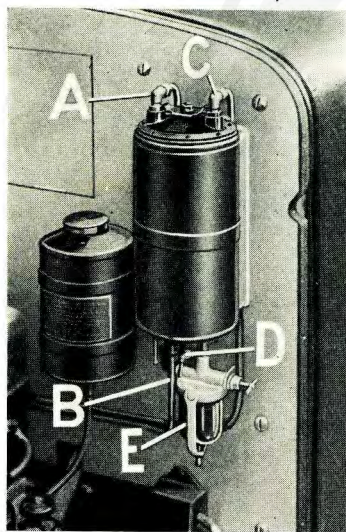


Fig. 14.
Showing position of Autovac. A is the Pipe to main Fuel Tank; B the Pipe to Carburetter; C the Suction Pipe; D the Drain Tap; E the glass petrol filter.

This strainer is provided as a screen to collect all foreign matter which might otherwise get into the Autovac and be carried through to the carburetter. Note exact position when removing the strainer to ensure replacement being properly made.

Every three months, whether it seems to need it or not, flush the Autovac through the fuel connection. At the same time open the drain tap in the bottom of the tank, and let out any sediment or water which may have collected. Also look over the suction and petrol pipe connections to see that they are absolutely tight.

AIR VENT CAP.

In the air vent cap of the Autovac four holes are drilled, which allow the atmospheric condition to be maintained in the outer or emptying chamber, and these must always be kept clear of paint, grit or other kindred substances. If the

cover has been removed for inspection, care should be taken when replacing to see that the air port corresponds with the port leading to the outer chamber.

SPECIAL PETROL FILTER.

A special type of petrol filter is fitted on the engine side of the dash which filters the fuel before it reaches the Autovac. The handle on this should be given one turn about once a week and any sediment collected will then fall into the sump of the filter. By unscrewing the retaining screw at the bottom, the glass sump can be taken off and the accumulated sediment removed.

FILLING UP WITH FUEL.

When filling the fuel tank, it is advisable to use a tundish fitted with a fine gauze strainer. A gauze filter is fitted inside the filler of the tank but the tundish provides the second filter and should almost entirely prevent particles of grit reaching the tank and eventually finding their way to the carburetter. Avoid using a tundish with a long funnel as this will damage the gauze in the tank filler.

Keep the fuel system clean. The filters provided should be regularly cleaned out. These comprise the filter in the filler of the fuel tank, the filter or strainer on the Autovac (see Fig. 13), the filter underneath the Autovac (see Fig. 14), and the filter in the carburetter. Despite the care taken in using a tundish with gauze bottom and the assistance of the gauze in the tank filler, minute particles of dirt are liable to get into the pipe and in the course of time may cause an accumulation. This is not due to any lack of cleanliness in the pipe system when the car is new but to the fact that some of the present day fuels are not entirely free from particles of foreign matter. If the Autovac is to receive a perfectly regular supply of fuel, the pipe system **must** be kept clean.

ELECTRIC LIGHTING & STARTING EQUIPMENT.

If the carburetter jet tube becomes choked through the presence of grit or dirt, unscrew the plug at the base of the carburetter casing, and the plug and jet can then be examined and the obstruction removed. Any dirt which may accumulate on the carburetter casing should be removed immediately it is noticed. See also pages 23 and 24.

The importance of cleanliness in regard to the whole system of fuel supply cannot be too strongly emphasised.

ELECTRICAL EQUIPMENT.

Rotax electrical equipment is fitted to the 16 h.p. Sunbeam. For information as to the general care and maintenance of this equipment we recommend owners to consult the comprehensive instruction book published by Rotax Ltd. This is supplied gratis.

DYNAMO.

The dynamo fitted is the Rotax model A.T. 142, this being driven from the front end of the crankshaft by helical spur gear. The normal charging rate is 10 amps. at 20 m.p.h., and the speed of "cutting in" 12 m.p.h.

STARTING MOTOR.

The starting motor is the Rotax M.T. 77, contained in a housing cast integral with the gear box and clutch casing, and has Bendix type engagement.

BATTERY.

A 12 volt battery is clamped in a container within the chassis frame, and has a capacity of 66 ampère hours.

LIGHTING EQUIPMENT.

A Rotax 12 volt set is fitted with internally wired lamps, and an externally operated arrangement for focussing (see page 30). The head lamp bulbs are 36 watt, the side lamps 6 watt, and the tail lamp 4 watt.

WIRING DIAGRAM.

A complete wiring diagram is given on page 29. On all points affecting the general maintenance of equipment, see the Rotax instruction book.

ELECTRIC WIRING DIAGRAM.

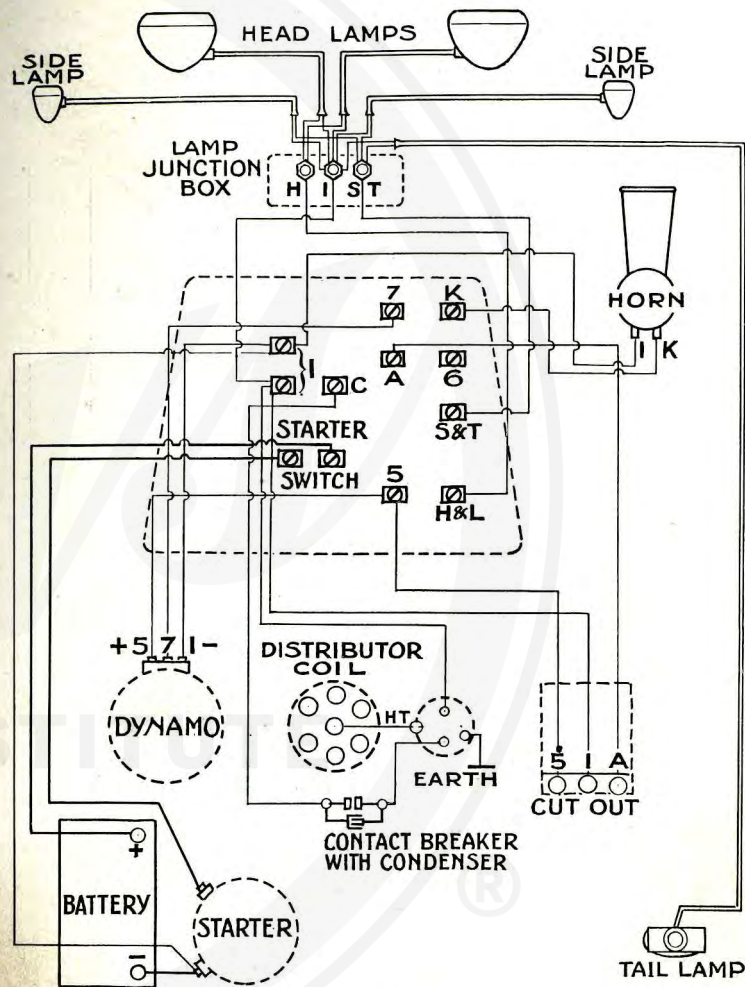


Fig. 15.

Wiring Diagram for the Electrical Equipment on the 16 h.p. Sunbeam.

HEAD LAMPS.

The Rotax head lamps fitted to the 16 h.p. Sunbeam are internally wired, have dipping reflectors, pneumatically operated from a plunger conveniently placed for the driver, and are focussed by adjusting the bulb in either of the three positions allowed by the bayonet slotting of the lamp holder.

To focus or replace a bulb it is necessary to remove the lamp front. This can be done by taking out the round headed screw at the top of the lamp and turning the front to the left as indicated by the arrow stamped on the rim. Try the bulb in each of the three positions to obtain the best results, reflecting the light on to a wall or some white object, for instance, a white sheet, and the correct adjustment will be arrived at when the light reaches the highest point of brilliancy with an absence of shadows. Always make this adjustment when fitting new bulbs.

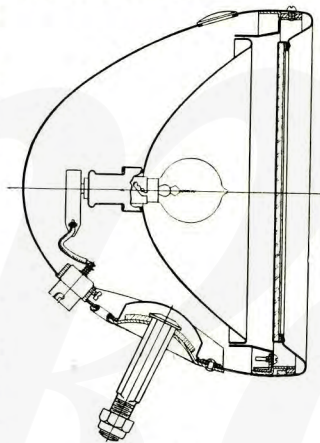


Fig. 16.
Showing sectional view of Head Lamp.

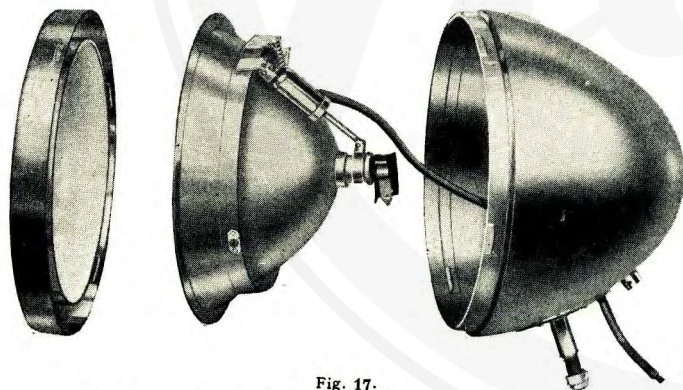


Fig. 17.
Head Lamp dismantled showing dipping reflector arrangement.

WATER PUMP.

A special feature of this pump is that there are no under-water connections. The impellor is carried on an extension of the auxiliary drive shaft on the engine, and is of gunmetal, with a stainless steel centre, which effectively resists corrosion.

To adjust or repack, remove the pump cover, unscrew the dome nut holding impellor, and dismount pump from the crankcase by unscrewing the nuts round the flange. The gland nut is then visible for screwing up or removal as required. The packing washer is a double washer being divided into two portions by a metal disc. When repacking care should be taken to see that the new packing is of the correct shape.

RADIATOR—Special Note.

During cold and frosty weather, when the car is left standing overnight, it is advisable to drain the water out of the radiator and cylinder block. A cock for this purpose is fitted at the bottom of the radiator inside the bonnet, and a drain cock on the off-side of the cylinder block, above the first holding-down stud. It is also important to drain the pump overnight in cold weather, and a drain cock is fitted for this purpose on the water pump (see "G" Fig. 4).

Do not forget to refill the Radiator before again starting the Engine.

CLUTCH.

On the 16 h.p. model, as on all other Sunbeam cars, the clutch and gearbox form a unit with the engine (illustrated on page 8, Figure 4). The clutch is of the single plate type, no adjustment being required for the springs. The Clutch disc, which is lined with fabric, and is situated between the floating clutch plate and the flywheel, runs on a splined shaft. The clutch pit is covered by a removable cover.

As the movement of the floating plate is frictionless, and the clutch being of the dry plate type, no lubrication of any kind is required. The clutch withdrawal shaft is lubricated automatically. The clutch withdrawal race on the stemwheel is packed with grease when assembled, and there is no need to lubricate this further.

CLUTCH PEDAL ADJUSTMENT AND STEERING.

CLUTCH PEDAL ADJUSTMENT.

It is vitally important that drivers should not allow the left (or clutch pedal) foot to **remain in contact with the pedal plate** after the change speed or other operation is concluded. It is the first cause of clutch wear. It is necessary that the clutch pedal should have **at least $\frac{1}{2}$ -in. idle movement**, measured at the top of the pedal plate. When the minimum movement is reached the pedal should be adjusted by releasing the lock nut on the jaw shown at "A," Fig. 18, and removing the pin "A1." The jaw can then be turned until the pedal "C," has an idle movement of 1-in. After this adjustment has been made replace the pin "A1" and tighten up the lock nut "A."

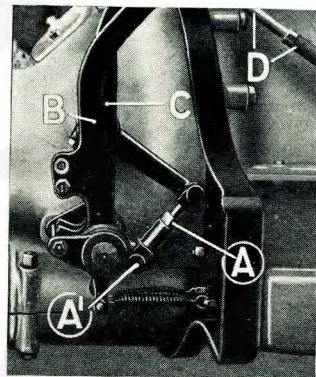


Fig. 18.
Adjustment for the Clutch Pedal is marked A and A1. The levers marked B, C and D are for the Brake, Clutch and Accelerator respectively.

STEERING.

The steering on the 16-h.p. Sunbeam is of the screw and nut pattern. The surfaces in contact are of large area, the steering being very easy in operation, and there is an absence of all backlash. A plug is fitted on the steering box (see Figure 19), and the box should be periodically supplied with oil. Use oil as recommended for gear box.

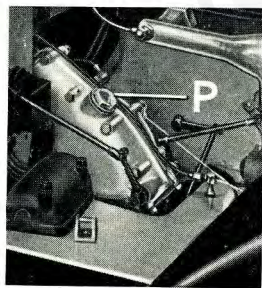


Fig. 19.
Keep the Steering Box well lubricated through the plug shown above.

Do not turn the road wheels entirely by the steering wheel when the car is stationary, as this practice strains the joints. If it is required to alter the position of the wheels when the car is standing, they should be assisted by hand.

:: STEERING AND GEAR-BOX LUBRICATION. ::

GEAR BOX LUBRICATION.

In the Gear box, as in the case of the other units requiring regular lubrication, there is a correct level for the oil. The screw plug shown in the accompanying illustration should be unscrewed and the oil replenished every 500 miles. Although the consumption of oil is small, the level must be maintained. If the oil is poured in slowly, it will drain down into the gear box, and when it reaches the bottom screw thread of the plug hole, the correct level has been reached. Do not forget to screw the plug up securely afterwards.

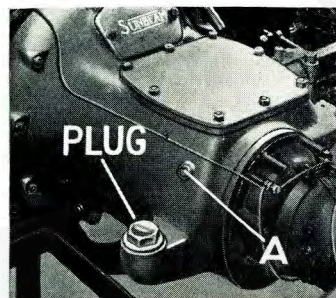


Fig. 20.
Showing Oil Filler in Gear Box. The "mud sump" plug is marked "A."

If the supply of oil is not maintained at the correct level, obviously there will be unnecessary wear on all the gears, and their life will be shortened. It cannot be emphasised too strongly that proper lubrication is most important.

The gear box is provided with a "mud sump" to prevent particles of foreign matter getting into the speedometer gears or universal joint oil ducts. The plug marked "A" Fig. 20 should be removed occasionally and the accumulated sediment drained away from the sump.

SPECIAL NOTE.—Engine lubricating oil is not suitable for the gear box. We recommend Shell-Mex Gear Oil, Wakefield's "Castrol S" or Vacuum "Mobiloil C."

LUBRICATION OF THE SPEEDOMETER DRIVE.

If at any time the speedometer is not registering correctly, or is intermittent in action, it is possible that the drive may need lubrication. When required, inject a little oil at the speedometer end of the flexible coupling. This is more easily effected if the oil is first warmed. Usually this operation is necessary only about once every three months.

LUBRICATING THE REAR AXLE.

At the back of the axle casing, as shown in Fig. 21, is a screw plug through which the axle is supplied with oil. As a safeguard, and to ensure getting the longest life from the axle parts, the supply of oil should be replenished every 500 miles.

The consumption of oil is moderate, and only a small quantity will be required every 500 miles to maintain the proper level. The correct level is indicated when the oil reaches the bottom screw thread of the plug hole through which it is poured. This lubrication **MUST NOT BE NEGLECTED.**

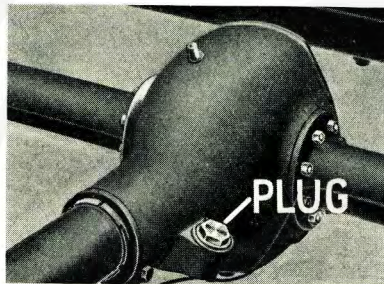


Fig. 21.
Unscrew plug to replenish oil supply in rear axle
See also Fig. 22.

In cold weather the oil tends to form a film across the plug hole. This conveys the impression that the oil level is correct. The film should be pierced and it will then probably be found that a small quantity of oil is required to bring the supply up to the proper level. **Use oil as recommended for gear box.**

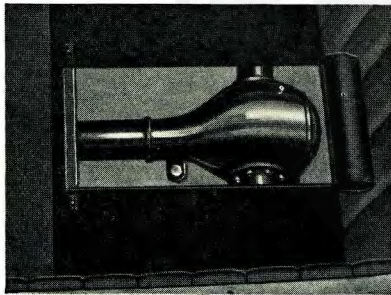


Fig. 22.
The oil plug is easily reached through the opening under the rear seat cushion.

THE BRAKING SYSTEM.

The four-wheel braking system fitted* to the 16 h.p. Sunbeam model is the outcome of long practical experience with four-wheel brakes. The braking power is applied progressively, the steering is not affected by the action of the front wheel brakes, whilst tyre wear is much more evenly distributed than when a car is braked through the rear wheels alone.

The Sunbeam front wheel brakes give considerably more than normal braking effort when pressure is applied to the pedal. This increased effectiveness is obtained by an internal arrangement in the drums themselves, the operating shoe forcing the main shoe against the drum and giving an increased effort of approximately 2 to 1. Both shoes actually come in contact with the drum and therefore are effective as brakes, but the second or main shoe, which has a larger area, has applied to it a greater pressure than would be obtained by direct pedal application alone. This arrangement which entails no complications, and in no way can get out of order, is termed a "self-servo" brake.

The principle governing the Sunbeam front wheel brakes will be easily understood from the following brief description in conjunction with the accompanying diagram (Figure 23). The brake drum on each wheel contains two shoes, C and D, one smaller than the other. The two shoes are connected together by a pivot B which is free in its housing. The other end of the smaller shoe is connected to the cam gear. E is the main anchor pin.

When the brake pedal is depressed the movement of the cam A, forces the smaller shoe into contact with the brake drum, and the shoe thereupon tends to revolve with it.

This alters the pivotal centre of the shoes, and in turn expands the larger or main shoe against the drum, both shoes thus exerting a retarding pressure on the drum.

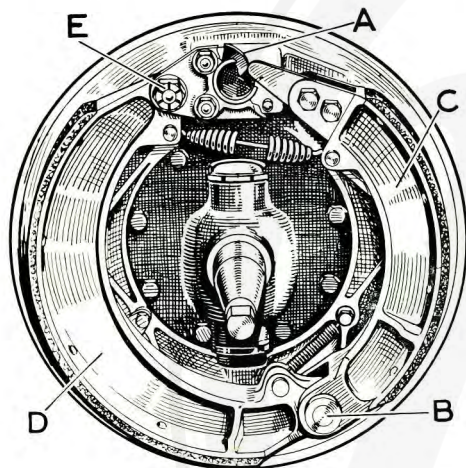


Fig. 23.

Showing lay-out of Sunbeam Front-wheel Brake. At the top of the illustration a portion of the plate has been cut away to show the cam A.

It will be seen from this that the braking system on the 16 h.p. Sunbeam actually provides six brakes—four operated by the pedal and the two separate rear wheel brakes operated by the hand lever.

In the following pages full instructions are given in regard to the adjustments which may be necessary from time to time.

FOUR-WHEEL BRAKE ADJUSTMENT.

When any adjustment of the brakes becomes necessary the following instructions should be followed :—

There is individual adjustment provided for each of the four-wheel brakes, but the main adjustment is effected through the nut "A" (See Fig. 25).

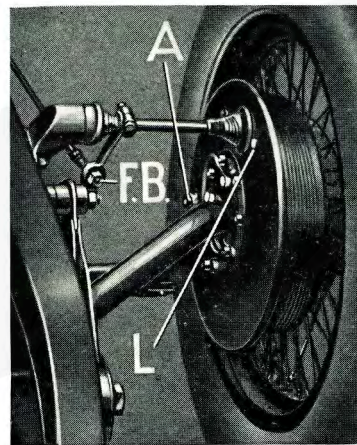


Fig. 24.

Showing near-side Front Wheel. F.B. is the Brake Adjusting Nut. A the Eccentric or Equalising Stop. The Brake Cam Ball Lubricator is marked L, through which oil should be injected in accordance with instructions on lubrication diagram at front of book.

Independent adjustment for the front wheel brakes is effected by means of the adjusting nut "F.B." (see Fig. 24), and by the nuts "A" and "B" for the rear wheel brakes (see Fig. 26). The nuts marked "A" are the adjustment for the hand-brake and the nuts "B" for the rear brakes operated from the pedal.

If the balance of adjustment between all four brakes has been disturbed by the removal of the brake shoes, rods, etc., it can be restored as follows :—

The locknut "A" (see Fig 25) should be unscrewed for several turns, the car should then be jacked up from underneath each axle so that the weight is on the springs and all the wheels are off the ground. The front brakes should now be adjusted through their independent adjustments, as explained above, until both sets of front brake shoes are just touching the drums. The rear wheel brakes should also be

adjusted by means of the nuts "B" (see Fig. 26) until the shoes are just touching the drums in the same way as the front brake shoes. The main adjustment nut "A," Fig. 25, should then be screwed up to the required position. No separate locknut is provided for this as it is a self-locking nut. When this has been done both the front and rear wheel brakes should be adjusted so that the shoes are just free of the drums. As a final test apply pressure to the foot pedal, when the front and rear wheel brakes should all come into operation equally at the same time.

In all cases care must be taken to see that the offside and nearside brakes exert the same braking power when the pedal is depressed.

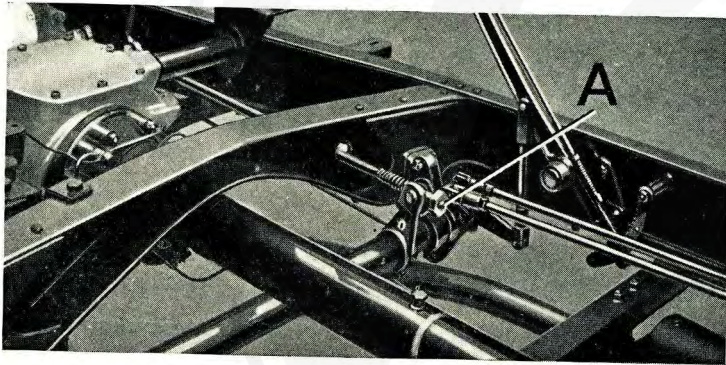


Fig. 25. Showing Main Adjusting Nut for Four-wheel Brakes.

FRONT WHEEL BRAKES.

An eccentric stop, marked "A" Fig. 24, is fitted to hold the front brake shoes in their proper position relative to the drum. It may be necessary after the car has been running for a considerable time to adjust this stop in order to counteract

wear of the shoe linings. Such adjustment would only be slight, about $\frac{1}{8}$ of a turn of the screw (the nut is a lock-nut) being sufficient. The screw must be held firmly with a screwdriver, both while unscrewing the lock-nut, and also when tightening up again. After adjustment each wheel should spin freely; if it does not, the adjustment has been overdone, and the screw will have to be screwed back slightly until the wheel spins freely. This should be tested with the wheels pulled round into full steering lock in each direction.

REAR WHEEL BRAKES.

The independent adjustment for the rear wheel brakes is described on page 38, and the adjusting nuts are shown in the illustration Fig. 26. The nuts marked "A" are on the rods from the handbrake to the rear brake shoes, the nuts marked "B" on the rods from the pedal.

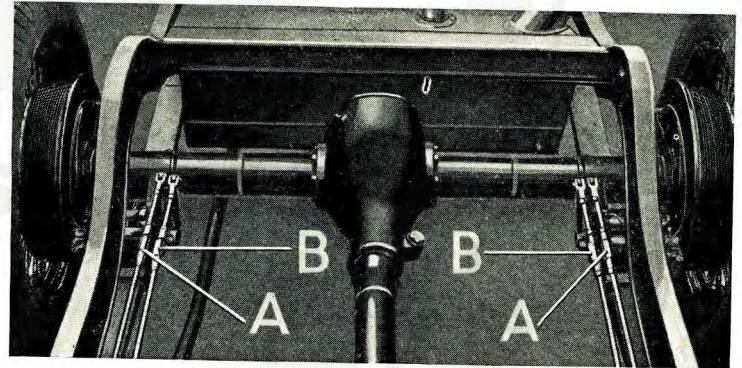


Fig. 26. Showing Brake Rods and Adjusting Nuts to Rear Wheel Brakes. The Hand Brake Adjusting Nuts are marked "A"; the Foot Brake Adjusting Nuts "B."

REMOVING FRONT BRAKE DRUM AND FRONT HUB.

To take off a front hub and brake drum, after removing the wheel, unscrew the nut at the end of the shaft inside the hub. Remove the locking plate and locking washer, when the nut inside the hub can be reached with a box spanner. The hub can then be withdrawn.

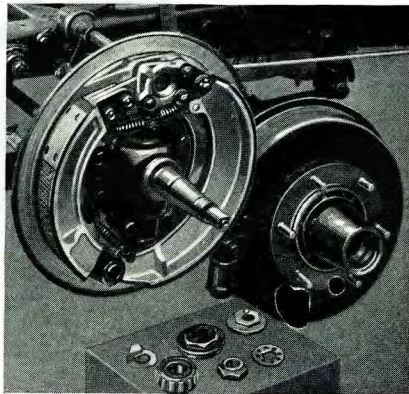


Fig. 27. Showing Front Wheel Brake with Drum and Hub and Ball Races, etc., removed.

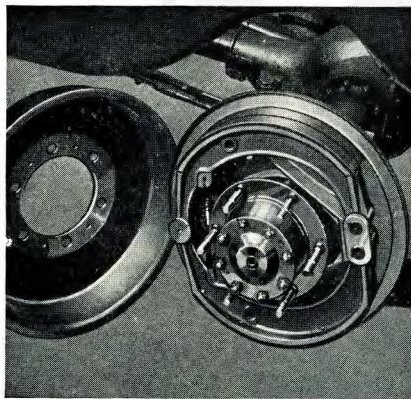


Fig. 28. Rear Wheel Brake with Brake Drum removed.

To remove a rear brake drum, unscrew the nuts which hold this on the hub. See Fig. 28. If the drum should be too tight to pull off after the nuts have been unscrewed, tap it lightly around its outer edge with a mallet or raw hide hammer. Do not use an ordinary steel hammer.

See page 42 for instructions *re* lubricating hubs.

REMOVING REAR HUBS.

Although it is rarely required to remove a rear hub, when the necessity does arise, it is quite a simple operation.

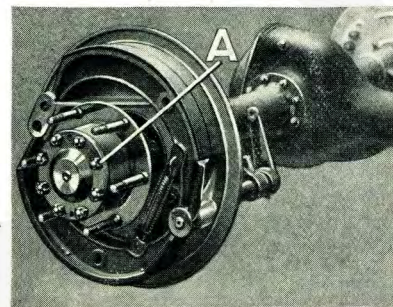


Fig. 29.

Showing the nuts "A" which retain the driving shaft.

After taking off the wheel and brake drum as explained on page 40, the eight nuts (marked "A" Fig. 29) which retain the driving shaft can be unscrewed and the shaft withdrawn. Remove the locking plate which retains the circular nut "B" Fig. 30, and the latter should then be unscrewed with care when the hub complete can be taken off. To remove the hub bearing for inspection, after the hub itself has been removed, it is necessary only to unscrew the grub screw "D" Fig. 30 and the larger circular nut "C" when the bearing can be easily withdrawn.

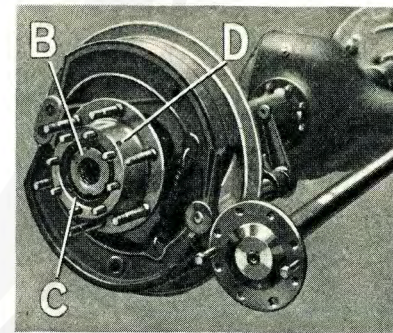


Fig. 30.

Showing the circular nuts "B" and "C," and the grub screw "D."

LUBRICATION OF HUBS.

It is important that the front hubs should, periodically, be lubricated. This is easily effected by unscrewing the hub cap with the special spanner provided in the tool kit, and packing the hub with suitable grease. We recommend Gargoyle Mobilubricant Soft Grease. The rear hubs require no special attention as they are automatically lubricated from the rear axle.

FRONT HUB ADJUSTMENT.

If the front hub bearings should require adjustment, care must be taken to see that they are not screwed up too tightly. The inner nut should be screwed up until there remains two or three thousandths of an inch end play. After placing lock washers in position, and the outer nut screwed home, practically all this end play will then be taken up.

SPRINGS AND SHOCK ABSORBERS.

The springing of the 16 h.p. Sunbeam is designed to give the fullest comfort at all road speeds; semi-elliptic springs are fitted, both at front and rear, with Hartford shock absorbers on all springs. The spring shackles and leaves are lubricated from the central system and require no other attention.

The shock absorbers are set to the proper initial tension when each car leaves our works, and no change should be made in this adjustment until the car has been driven at least 100 miles, and not even then unless the spring action seems too free or not free enough. The frictional resistance can be increased by turning the centre adjusting nut to the right (clockwise movement) by not more than one graduation at a time. If the spring action feels stiff, the frictional resistance can be reduced by turning the adjusting nut to the left (anti-clockwise movement).

Further adjustment may only become necessary after the car has run several thousands of miles, and even then the adjustment should not be altered unless the spring movement seems very free. In this case the indicator should be moved not more than half a graduation at a time. The full benefit of the shock absorbers is felt when the car is travelling at high speed, and especially over bad roads, when the springing action is most severe. When testing as to correctness of the adjustment, the observation should be made when the car is travelling at a comparatively high touring speed.

IMPORTANT.—The frictional resistance required to control the action of the springs is comparatively slight, and when adjusting the pressure should not be increased more than is absolutely necessary to obtain the desired results.

DETACHABLE WHEELS.

To change a wheel, all that is necessary is to jack up the car and with the wheel brace unscrew the five nuts which secure the wheel to the hub driving bolts. The wheel can then be drawn off the bolts, the spare wheel fitted and the nuts replaced securely.

After replacing a wheel, it is advisable after a few miles running to go over all the nuts and tighten if necessary, in order to be sure that they are secure. Care should be taken to see that the bolts and hub are greased from time to time to prevent rust taking place.

TYRE PRESSURES.

The following are the minimum tyre pressures recommended for the tyres on the 16 h.p. model (size 30-in. x 5.25-in.) and it is important that the pressures should not be allowed to fall below these figures:—

Front tyres : 40-lbs. per square inch.

Rear tyres : 35-lbs. per square inch.

CENTRAL LUBRICATION for the CHASSIS.

The introduction of a central system of Chassis Lubrication is the outcome of exhaustive tests and experiments made over a considerable period. With this system on Sunbeam cars, lubrication of the chassis parts is effected in the simplest and cleanest way.

A spring loaded plunger pump is situated on the dash, as shown in Figure 3. When the plunger is depressed and held down for a period of four or five seconds, oil flows from the reservoir (mounted on the engine side of the dash, Figure 31,) through a non-return valve and fills the pump chamber.

On releasing the plunger, the spring slowly returns it to its normal position, and ejects the charge of oil just taken in, which is forced out of the pump into the four pipe lines connected to it, and thence to the feed plugs or valves fitted on the various points requiring lubrication.

These valves are so regulated that they pass the exact quantity of oil required by the particular bearing. Thus, parts in frequent frictional movement, as spring shackles, receive a larger supply of oil than such parts as brake camshafts, etc.

The plunger of the pump, having returned to its normal position, is ready for a further operation when required. Under average running conditions this should not be necessary more than once a day.

It is recommended that the plunger should be depressed when first starting up the car each day. If the operation is carried out then no further attention need be given until the

following day, except in the case of a very long day's run, when the plunger should be again depressed after the first 200 miles or so have been done.

It is important to note that the plunger must always be depressed to its fullest extent, as the pump is divided into four separate compartments, each one connected to a different pipe line.

The oil tank or reservoir should be filled with the same grade of oil as used for the engine. The lubricating oils recommended for the 16-h.p. six-cylinder engine are Double Shell, Wakefield's "Castrol AA," or Vacuum "Mobiloil A."

To prevent jet stoppage, the oil is filtered at the tank filler by a filter insert. There is another filter at the tank outlet, and each connection is fitted with a small pad of filtering material.

The steering box, gear box and back axle case are not lubricated from the central system but through the oil plugs provided for these respective units, and which appear in the illustrations shown on pages 32, 33 and 34. For the lubrication of these parts and for lubricating the brake cam balls (see lubrication diagram at front of book) we recommend Shell Mex Gear Oil, Wakefield's "Castrol S," or Vacuum "Mobiloil C."

It is important to note that the central lubrication system is entirely independent of the engine. Full instructions regarding engine lubrication are given on pages 10, 11 and 12.



Fig. 31.
Showing Oil Reservoir.

ADJUSTING REAR SEAT AND SQUAB.

On all Sunbeam Saloon and Coupé models the separate front seats are of the sliding adjustable type, an improved type of fitting being used for the adjustment. On the Saloon models the rear seat and squab, *i.e.*, the back rest, are also adjustable for position.

This illustration shows the adjustment for the rear seat. The seat can be moved backwards or forwards within a range of about three inches, and is retained in position by the dowel pegs (one is shown, marked D, Fig. 32), engaging with the holes in the plates on the underside of the seat. When making any adjustment either to the seat or the squab, see that the dowel pegs engage firmly in the holes in the plate.



Fig. 32. Showing Adjustment for Rear Seat.

To adjust the squab the seat should be lifted out and the squab raised as shown in Fig. 33. This can then be placed at the slope desired by engaging the dowel pegs (one is marked D, Fig. 33), with the holes in the plates.



Fig. 33.
Showing Adjustment for Rear Squab.

When the rear seat is removed access to the rear axle lubricating plug is provided through the opening in the seat frame. This is covered with black leather cloth,

a portion of which folds back to enable the lubricating plug to be reached. An illustration showing this appears on page 34, where instructions are given regarding the lubrication of the axle and the oil recommended for this purpose.

CARE OF THE COACHWORK.

To preserve the fine paintwork and finish of Sunbeam cars the following suggestions are made as a result of our own wide experience. These apply to painted and varnished cars. On cars finished in Cellulose, mud and dirt can be removed with a damp sponge without the necessity for

hosing down with water, and the car afterwards polished with one of the special polishes recommended for Cellulose finish.

WASHING THE CAR. Mud and dirt must be removed AT THE EARLIEST OPPORTUNITY. This should be carried out by using only **CLEAN COLD WATER**. Nothing should be mixed with it—certainly not petrol or paraffin, which act detrimentally on the varnish.

To remove accumulated mud well soak all over the body with the water just trickling from the hose pipe. Water applied at pressure direct on to the mud only tends to fix it rather than to soften it, especially in the case of a newly finished car. If water is used with any force then the nozzle of the hose should be held at an angle (pointing downwards) so that the water slides down the body instead of reaching it at right angles. Cleaning materials should be kept specially for the chassis and under-work where oil and grease are likely to be picked up. The sponge and leather for the body of the car **SHOULD NEVER BE USED FOR ANYTHING ELSE**. A honey-comb sponge is the best kind. When drying off after washing, always use the smooth side of the chamois leather. The rough or "flesh" side may cause minute scratches.

Stains can be removed with the aid of a good Varnish Reviver. This should be a really good preparation, as some revivers contain ingredients which may ultimately prove harmful to the varnish if used too frequently.

Cars fitted with Weymann bodies should be washed down with **CLEAN COLD WATER** and the surface of the fabric afterwards dried in the same way as a coachbuilt body would be treated.

It is advisable to oil the door locks and hinges, also the bonnet hinges, occasionally. Use the oil sparingly and keep it off the paintwork and upholstery.

IMPORTANT NOTE re CHROMIUM PLATING.

It is important to note that Metal Polish or any similar preparation must not be used for cleaning chromium plated parts.

Such parts should be cleaned by washing carefully with clean cold water and afterwards polished with a soft, clean wash leather.

CARE OF THE UPHOLSTERY.

The leather selected for the upholstery of Sunbeam cars is of the best possible quality, only first-grade hand-buffed hides being used. The result is that the leather work retains its appearance and wears for a very long period. Very little attention is needed beyond an occasional brushing to remove dust from around the buttons and from the folds.

We do not recommend the use of creams, polishes or other similar preparations as there is often a risk that the leather may be adversely affected by some ingredient in the polish itself.

To clean leather upholstery the use of pure soap and water is strongly advised, but on no account should this be used on cloth upholstery or furniture hide.

Cars upholstered in cloth require only occasional light brushing to remove dust. A brush should be kept specially for this purpose, and washed periodically, so that there is no likelihood of grease or oil getting on to it. If grease marks accidentally get on to the cloth, they can usually be removed with petrol applied with a piece of clean rag. The important thing is to remove them at the earliest opportunity, before the grease has had time to penetrate deeply into the cloth.

When touring cars are standing in the garage for any length of time the hood should be raised and left in this position.

RAISING AND LOWERING THE HOOD.

The whole operation of raising the hood is very simple and can be carried out by one person. Unfasten the steel straps which hold the frame irons together. The hood can then be raised easily without disturbing the other occupants of the car. Sockets are provided in the front of the hood frame, which drop on to the rounded tops of the windscreen posts, and wing nuts secure the hood in position.

Before lowering the hood the doors of the car should be shut and fastened. Unscrew the wing nuts inside the hood frame so that it is free from its anchorage on the windscreen posts. When folding the hood care should be taken to see that none of the folds become trapped between the frame irons. Finally, see that the frame irons are fastened together with the steel straps.

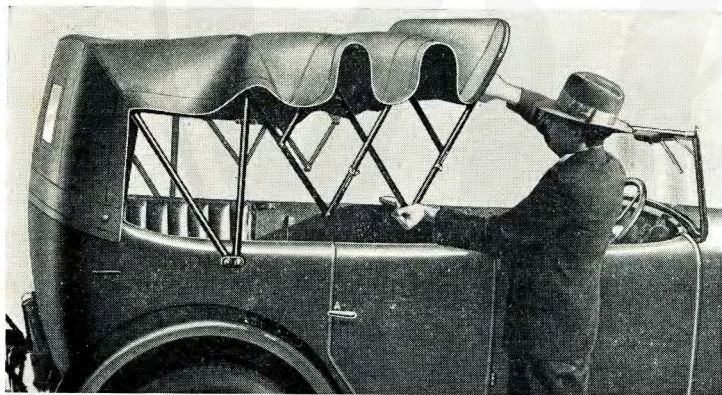


Fig. 34.

Showing how to hold the Frame to avoid "trapping" the fingers.

PUTTING ON THE HOOD COVER.

When the hood is lowered the folds of material must be pulled clear of the frame. The hood material should then be folded on to the top of the frame and the cover slipped on. It will be found that this goes on more easily if the corner is turned back as shown in Fig. 35. Then fasten the straps, taking care not to pull these too tightly. The result should be a neatly folded hood, fully protected from dust and damage.

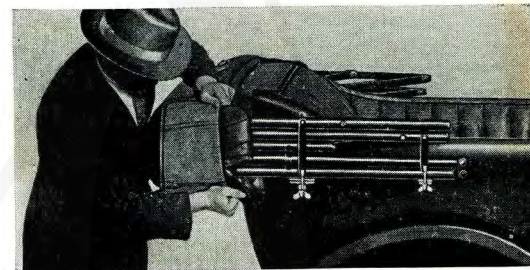


Fig. 35.

When placing the cover on the Hood turn back the corner as shown. It will slip on more easily.

SIDE CURTAINS.

The rigid side curtains supplied with all Sunbeam touring cars are very easily erected in position. There are six curtains in all and each is marked with its respective position (e.g. left front, right front, etc.) to facilitate correct fixing. The right hand front curtain has a hinged flap through which the driver's hand can be projected. Any or all of the curtains may be used without the hood, and give protection to the passengers when a side-wind is blowing.

When not required, the curtains should be packed away in the receptacle provided for them at the back of the rear seat.



Fig. 36.

The above illustration shows the complete kit of Tools supplied with each 16 h.p. Sunbeam.

- 1 Double-ended box spanner, 6 m/m and 8 m/m.
- 1 Double-ended box spanner, 10 m/m and 12 m/m.
- 1 Double-ended open spanner, 6 m/m and 8 m/m.
- 1 Double-ended open spanner, 10 m/m and 12 m/m.
- 1 Double-ended spanner, $\frac{3}{8}$ " and $\frac{7}{16}$ ".
- 1 Double-ended spanner, $\frac{5}{8}$ " and $\frac{1}{2}$ ".
- 1 Box spanner, $\frac{3}{8}$ " and $\frac{7}{16}$ ".
- Spanner for M.L. coil.
- Spanner for carburetter.
- Spanner for Tecalemit fittings.
- Special box spanner to fit $\frac{1}{4}$ " square nuts.
- Spanner for sparking plugs.
- Box spanner for gear-box filler.
- Spanner for front hub caps.
- Spanner for petrol tank cap.
- Spanner for tappet adjustment.
- "C" Spanner, with extension holder, for damper adjusting nut
- Adjustable spanner (large).
- Adjustable spanner (small).
- 2 Tommy bars for use with all box spanners.
- Jack, with handle.
- Oil can.
- Tyre pump.
- Set of valve thimbles.
- 1 Pair valve springs, complete.
- Wheelbrace.
- Valve lifting tool.
- 1 Hammer, 2 screwdrivers,
- 1 pair of pliers, punch, chisel,
- sponge cloth, tool bag.

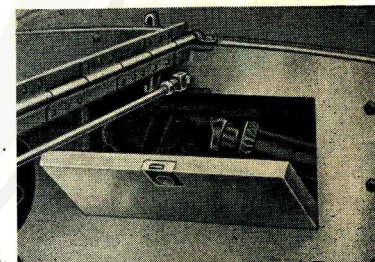


Fig. 37.

Showing position of Tool Box—on engine side of dashboard.

INDEX.

	PAGE.
Autovac	25 to 28
Brakes	35 to 40
Carburetter	23 & 24
Central Lubrication	44 & 45
Chassis Dimensions	2
Chromium Plating	49
Cleaning Out Crankcase	13 & 14
Clutch	31
Clutch Pedal Adjustment	32
Coachwork, care of	47 & 48
Cylinder Head removing and replacing	15, 16, 18 & 19
Decarbonising	20
Driving, general hints	5 to 9
Electric Lighting—	
Equipment	28 to 30
Battery	28
Focussing Headlamps	30
General Hints on Maintenance	28
Electric Starting Motor	28
Engine Timing	20 & 21
Four Wheel Brakes	35 to 40
Do. Adjustment....	37 to 39
Front Hub Adjustment	42
Fuel, Filling up	27 & 28
Gear Box	33
Hood, Lowering	50
" Raising	50
" Affixing Cover	51
Ignition	22
Ignition Timing	20 & 21

	PAGE.
Instrument Board, illustration of	5
Lubricating Oil	11
Lubrication—	
Engine....	10 to 14
Gear Box	33
Hubs	42
Rear Axle	34
Speedometer Drive	35
Steering Gear	32
Oil Pressure Gauge	12
Oil Pressure System	12 & 13
Petrol Filter	27
Radiator	31
Rear Axle....	34
Rear Seat Adjustment	46 & 47
" Squab	46 & 47
" Hubs	41
Running Hints	5 to 9
Shock Absorbers	42 & 43
Side Curtains	51
Sparking Plugs	22
Speedometer Drive	33
Springs	42 & 43
Steering	32
Tool Kit	52 & 53
Tyre Pressures	43
Upholstery, care of	49
Valves	15
Valve Grinding	15 to 18
Valve Tappet Adjustment	19 & 20
Water Pump	31
Wheels	43

This Handbook of Instructions
for the 16 - h.p. Six - Cylinder

SUNBEAM

is the property of

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