

SUNBEAM  
"TWENTY"

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HANDBOOK of INSTRUCTIONS

Second Edition.  
SUNBEAM "TWENTY"  
INSTRUCTION BOOK.

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Handbook of Instructions  
for the  
**SUNBEAM**  
**"TWENTY"**

Extract from the official 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 Sunbeam "Twenty" 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

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# SUNBEAM "TWENTY"

## GENERAL ENGINE AND CHASSIS DETAILS

**ENGINE.**—Type : six-cylinder, overhead valves operated by push rods.  
Sunbeam patent design steel skirt pistons.

	English.	Metric.
Bore .. .. .	2.87"	73 m/m
Stroke .. .. .	4.33"	110 m/m
Cubic capacity .. .. .	168 cu. ins.	2760 c.c.
R.A.C. rating .. .. .	19.8 h.p.	
Oil Capacity .. .. .	16 pints (approximately)	
Firing order .. .. .	1, 5, 3, 6, 2, 4	
Tappet clearances : Inlet, .008" <sup>Four</sup> (one thousandths of an inch)		
Exhaust, .008" <sup>Five</sup> (one thousandths of an in.)		

**CHASSIS.**—Pressed steel with cruciform bracing, giving exceptional strength and rigidity. "Group" system chassis lubrication.

	English.	Metric.
Wheelbase .. .. .	10' 0"	305 c/m
Track .. .. .	4' 7 7/8"	142 c/m
Ground clearance .. .. .	7 3/8"	19 c/m
Length .. .. .	14' 6"	442 c/m
Width .. .. .	5' 10"	178 c/m
Frame width .. .. .	3' 3"	100 c/m
Turning circle (mean minimum)	44' 6"	1356.36 c/m

**GEARBOX.**—Synchro-mesh gearbox.

Ratios :	4th	3rd	2nd	1st	Reverse
	5.3 to 1	7.76 to 1	12.5 to 1	19.3 to 1	23.82 to 1

Gearbox oil capacity, 3 pints (approximately).

**REAR AXLE.**—Semi-floating spiral bevel type. Ratio 5.3 to 1.  
Rear axle oil capacity, 4 pints (approximately).

**TYRES.**—Size, 5.5" for 19" rim.

Pressure, front tyres, 35 lbs. per sq. in.

Pressure, rear tyres, 38 lbs. per sq. in. See also page 42.

**PETROL TANK CAPACITY.**—14 gallons (12 gallons main supply, 2 gallons reserve).

**WATER CAPACITY.**—Radiator, 1 gall. 7 pints. Whole system, 3 galls. 1 pint.

### ELECTRICAL EQUIPMENT.

**Junction Box.**—Situated on dash, directly under offside bonnet.

**Fuses.**—Headlamp fuse 25 amp. (red colour). Windscreen wiper fuse 25 amp. (red colour). Side and tail lamp fuse 5 amp. (green colour). Interior lamp fuse 5 amp. (green colour). Direction indicators and stop light 25 amp. (red colour). Spare fuse for additional electrical fittings (green colour). All fitted in junction box. Dynamo fuse fitted on facia board.

**Bulbs.**—Headlamps, 12 volt 36 watt ; Side lamps, Tail lamps, "Stop" lamp, Interior body lamps and Dash lamps, all 12 volt 6 watt. An electrical wiring diagram is inserted at the end of this book.

## FOREWORD

This Handbook of Instructions has been compiled for the use of owners and drivers of Sunbeam "Twenty" Cars, and provides in a concise form useful information in regard to the general care, lubrication and maintenance of this model. It is not intended as a manual on driving and in its preparation it has been assumed that the reader is conversant with the general features of the modern motor car.

The information has been made as complete as possible, but it should be emphasised that some of the adjustments referred to may be required only at very long intervals. Other instructions deal with difficulties which seldom arise, but the information is included so that it is available if it should be needed.

Most of the illustrations in this book, apart from the lubrication, wiring and timing diagrams, are from actual photographs. In some instances, parts (such as wings, 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 be removed before the adjustment or lubrication referred to can be effected.

All Sunbeam Cars are guaranteed in accordance with the terms of guarantee printed 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.

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 and copies of the makers own instruction pamphlets are also supplied. In the event of any difficulty with such accessories customers are strongly recommended to consult the makers themselves.

The Sunbeam Motor Car Co., Ltd.

March, 1934.



## SPECIAL INSTRUCTIONS TO FACILITATE EASY STARTING IN COLD WEATHER.

### ENGINE LUBRICATING OIL.

In cold weather use Wakefield's "Castrol AA," Double Shell or Vacuum Mobiloil "A." The term "cold weather" is intended to cover the period between October 1st and April 30th, and during this time it is important that one of these oils should be used.

Oils recommended for Summer use (May 1st to Sept. 30th) are given on the Lubrication Diagram at the front of this book.

### BATTERY.

Keep the battery in proper condition. Both starting and lighting make the heaviest demands upon it from October to April.

When changing over to the "cold weather" grade of oil, (see paragraph above) make a point of examining the battery, and if necessary have it "topped up" to bring the Electrolyte to the correct level. Apart from this it is recommended that the battery should always be examined after 2,000 miles.

Assist starting by declutching. It is always advisable to depress the clutch pedal when starting up, and especially so in cold weather. By doing this current is not wasted by turning the gears in the gearbox.

### DRAINING THE WATER SYSTEM.

The instructions given on page 29 in regard to draining the radiator and cylinder block should be strictly observed. It is advisable to commence this practice early in the winter season to avoid any risk likely to occur from early frosts. **Do not forget to refill the radiator before again starting the engine.**

### THERMOSTAT.

See that the thermostat has been re-adjusted for Winter running as instructed on pages 28 and 29.

## STARTING UP & GENERAL RUNNING HINTS.

Treat the new car with consideration. Although the engine, gearbox, 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.

The illustration below shows the controls for the ignition and carburetter, dipping headlamp reflectors, direction indicators, clutch, brake and accelerator pedals, etc.

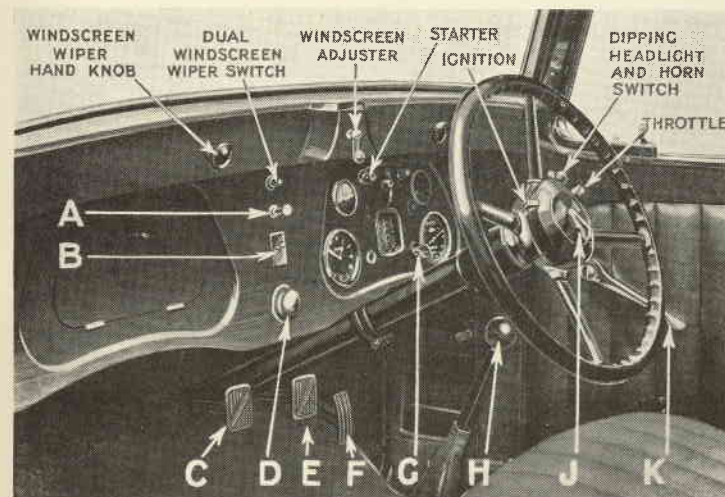


Fig. 1.

Showing Steering Wheel, Instrument Board and principal Controls. The Controls and fittings in the lower part of the illustration are Easy Starting Control (A), Switch for interior light (B), Clutch Pedal (C), Concealed Ash Tray (D), Brake Pedal (E), Accelerator Pedal (F), Ignition Switch Key (G), Gear Lever (H), Direction Indicator Control (J), Quick-lift for offside window (K).

## GENERAL RUNNING HINTS.

### PETROL.

Before attempting to start the engine see that there is an ample supply of petrol in the tank, which is carried at the rear of the chassis and has a capacity of 14 gallons. The supply is constant, no petrol tap being fitted. The level is shown by means of the gauge on the instrument board which has a reading of 12 gallons main supply, and "R," the latter representing a reserve of 2 gallons.

### OIL.

Test the level of the engine oil by means of the "indicator and cock" mounted on the nearside of the engine. There are two positions for the indicator quadrant, "On" and "Off." (See Fig. 5). The cock is situated directly under the indicator and the oil level is tested by turning the indicator to the "On" position, when, if there is sufficient oil in the sump, there will be a slight drip of oil from the cock. If there is no drip the supply is below the proper level and should be replenished until "drip" occurs. See Fig. 5, page 11.

Test the oil level in the gearbox and rear axle as instructed on pages 31 and 32.

### WATER.

Test the water level in the radiator. This should reach to within 2" of the top of the filler neck. A plate is fitted above the radiator shell to prevent splashing when filling up. See also page 29.

### TYRES.

Test the air pressure of the tyres and keep to the recommendations of the makers, as the maintenance of the proper pressure has a distinct bearing upon the life of the tyres and the riding comfort of the car. The pressures recommended are given on page 42.

### STARTING UP.

Assuming that the car is ready for its first road run after reaching its owner, and the above items have received attention, the hand brake lever should be on and the gear lever in the neutral position. See diagram Fig. 4, page 10. The throttle should be opened slightly by means of the control lever on the

## GENERAL RUNNING HINTS.

steering wheel, and the ignition switched on through the key switch on the instrument board. Advance the ignition by moving the lever on steering wheel to half its full travel, operate easy starting jet by pulling out knob on facia board and press starter. (See Fig. 1, page 5, for position of the starting jet knob and starter switch). The engine should fire then readily.

The knob operating the easy starting jet should be pushed back to its normal position after the engine has been running for about a minute. It should not be kept pulled out longer than this, as it is intended purely as an easy starting device and should not be used when the engine is running normally.

NOTE.—If the car has been standing for any length of time, and especially in cold weather, it is advisable to turn the engine over a few times by means of the starting handle in order to break the oil film. This eases the pistons and, with the ignition switched "off," there is no danger of backfire.

Special instructions to facilitate starting in cold weather are given on page 4.

### DRIVING.

Do not "race" the engine to warm up. It will be found much better to run slowly in neutral gear for a few minutes before starting out. It is, perhaps, unnecessary to add that when running the engine in the garage the doors should be wide open, as in a confined space fumes given off by the exhaust are dangerous.

With the engine running, the ignition should be kept at about half advance. The exact position will soon be found from experience, and the same applies to the throttle control. When driving at any speed over 20 m.p.h. the ignition should always be kept advanced as far as possible. The ignition system is described more fully on page 21. Note carefully the remarks regarding "switching off."



THE SUNBEAM "TWENTY" ENGINE.

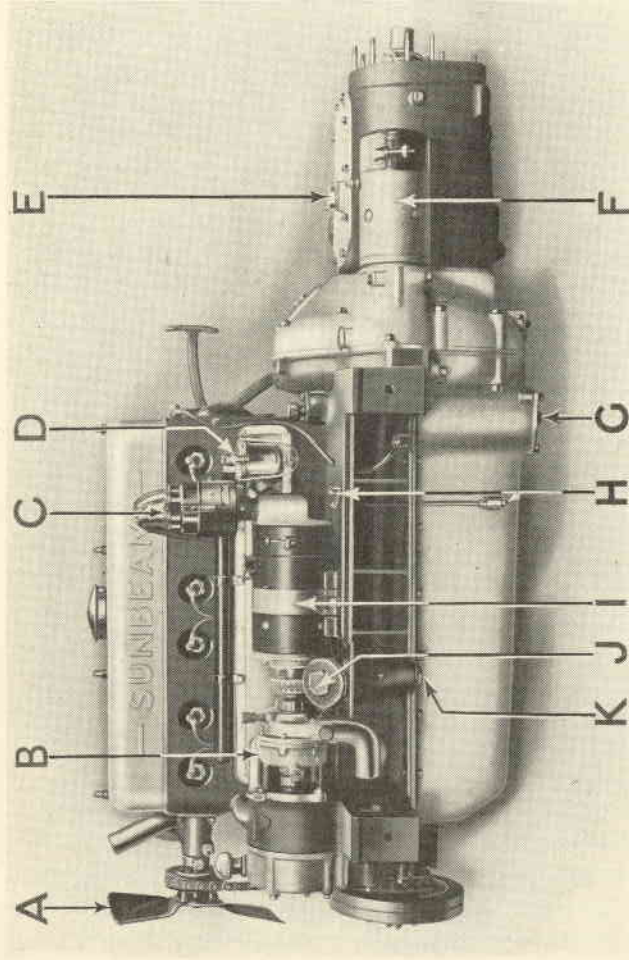


Fig. 2

Near side view of "Twenty" engine, clutch and gear box unit, shown out of the chassis to illustrate more clearly the Fan (A), Water Pump (B), Ignition Distributor (C), Petrol Pump (D), Gearbox Filler Plug and Dipstick (E), Electric Starter (F), Drain Plug and Crankcase Filter (G), Oil Level Cock (H), Dynamo (I), Oil Pressure Filter (J), Filter Drain Plug (K).

THE SUNBEAM "TWENTY" ENGINE.

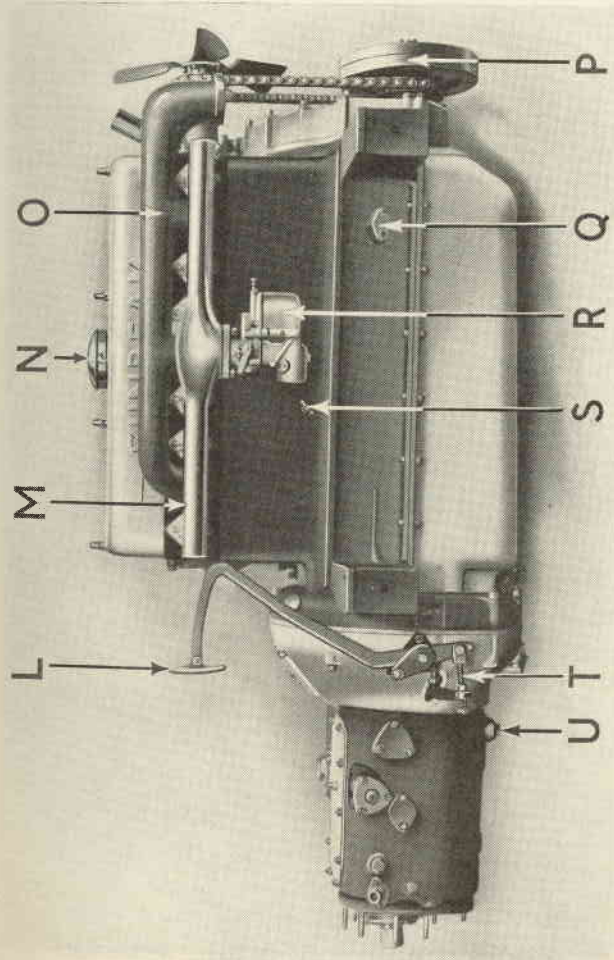


Fig. 3

Off side view of the "Twenty" engine, clutch and gear box unit, shown out of the chassis to illustrate more clearly the Clutch Pedal (L), Induction Manifold (M), Engine Oil Filler (N), Exhaust Manifold (O), Vibration Damper (P), Oil Relief Valve (Q), Carburettor (R), Cylinder Block Water Drain Cock (S), Clutch Pedal Adjuster (T), Gearbox Drain Plug (U).

## CARE AND MAINTENANCE.

All Sunbeam Coupé and Saloon cars have adjustable front seats. If the position of the driving seat is not just suitable for the individual driver as regards leg reach, etc., when the car is first delivered, the seat can be moved backwards or forwards until the most comfortable position is obtained.

The recommended speeds for changing gear are as follows: First to second 10 m.p.h., second to third 23 m.p.h., third to top 33 m.p.h.

Gear changing is accomplished easily and smoothly. The four-speed gear box is fitted with synchro-mesh clutches for the top and third speeds. The gearbox is described more fully on page 31.

## CARE AND MAINTENANCE.

The six-cylinder engine, clutch and gearbox are a combined unit and suspended directly from the main frame. Rubber mounting blocks are fitted between the engine and the frame so that vibration is absorbed. Inspection of the chassis plan on the Lubrication Diagram (attached to the inside front cover) will show the clean lines of design and accessible position of lubricating points. The illustrations of the near and offside of the engine given on pages 8 and 9 illustrate the principal accessories.

It will be found that it is necessary only to treat the car with ordinary care, attend regularly to lubrication, and follow the instructions given in these pages, to obtain the best possible service.

It should always be remembered that lubrication is of first importance if the owner 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 on the Sunbeam "Twenty" is greatly simplified by means of the "grouped" lubrication system.

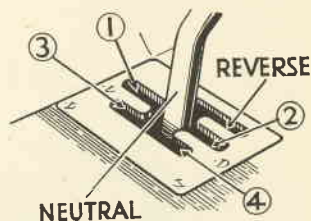


Fig. 4.  
Showing positions of Gear Lever  
in the gate on the Sunbeam  
"Twenty."

## ENGINE LUBRICATION—OIL LEVEL.

### OIL LEVEL.

The "Twenty" engine is designed to provide perfect lubrication automatically, at the same time giving off a clear exhaust. The oil filler is conveniently situated on the top of the engine, and fitted in the filler neck is a gauze filter which is easily withdrawn by the fingers for cleaning. The oil level is indicated by means of the cock situated on the nearside of the engine (see Fig. 5). After approximately 500 miles the oil level should be checked and oil added if necessary. The oil level is tested by turning the indicator to the "on" position. If there is sufficient oil in the sump there will be a slight drip of oil from the cock. If there is no drip the supply is below the proper level and should be replenished until "drip" occurs. Then turn the indicator to the "off" position.

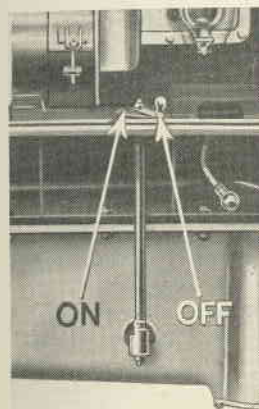


Fig. 5.  
Oil Level Cock and Indicator.

### 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 will probably be deficient in the properties necessary for efficient lubrication.

For the engine we recommend certain brands of oil which we have found after exhaustive tests to be most suitable, and this also applies to the oils for the rear axle, gearbox and chassis lubrication generally. A full list of the oils recommended is given on the Lubrication Diagram at the front of the book.

It is advisable not to mix different brands of engine lubricating oil. When changing over to a different brand, the engine and sump should be completely emptied of oil, as explained on page 14, before the new oil is used.



## ENGINE LUBRICATION SYSTEM.

The engine lubrication system consists of a gear pump situated in the lower half of the crankcase, driven by means of skew gearing from the camshaft. The oil is first drawn through the detachable gauze filter surrounding the pump, and enters an external pressure filter positioned on the nearside of the engine. The oil is then forced through the crankshaft oil-ways to the main bearings, and big-end bearings. 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 supply adequately lubricates the connecting rod small end bearings. The oil then drains back into the crankcase after passing through a filtering plate.

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 and cams.

The two filters mentioned above are easily detachable for cleaning. To remove the pump filter, detach the cover plate on the underside of the sump, see "G," Fig. 2 (page 8) and withdraw the gauze filter, which can be cleaned by rinsing in paraffin. To remove the filtering element of the pressure filter, see "J," Fig. 2, unscrew the nut and withdraw, together with the spring retaining cup. This filter should also be rinsed out with paraffin. It is recommended that this should be done after every 2,000 miles. Before screwing up the nut see that the spring retaining cup is replaced.

The external pressure filter is fitted with a drain plug, see "K," Fig. 2, for emptying the chamber. This plug is directly under the body of the filter and is reached from the underside of the chassis. It should be removed periodically (about every 2,000 miles, when the filtering element is being cleaned) and any sediment which has accumulated allowed to drain away.

## OIL PRESSURE.

With the supply of lubricating oil properly maintained, and the crankcase cleaned out periodically, it is almost impossible for the engine lubrication system to fail. One point to note carefully is the maintenance of the oil pressure. This should be for all average purposes 30 lbs. per square inch. An oil pressure gauge is fitted on the instrument board. In cold weather it may be found when first starting that the gauge will register a higher pressure than 30 lbs., but it will fall back again to its normal reading when the oil becomes thoroughly warm.

A relief valve of the usual ball type is fitted in the crankcase and deals with any excess pressure of oil and returns it to the sump. **When first starting up the engine should never be "raced" while the oil is cold, as this will damage the pressure gauge, and may also cause serious damage to the engine itself.**

If the oil pressure system should at any time fail to function the needle of the oil gauge will either move erratically to and fro across the dial, or will 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.*, below proper level.
2. Oil pressure filter corroded or not cleaned periodically ; pump filter needs cleansing.
3. Oil gauge pipe choked or broken.
4. A blocked system, due to not keeping the crankcase clean, or inferior or dirty oil being used.
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 opening the oil level cock. If this is correct, remove the pressure filtering element by unscrewing the cover nut (see "J," Fig. 2) and clean. Replace and if the failure is still prevalent detach pipes and inspect. The trouble should easily be remedied if the above mentioned points are kept carefully in mind.

## CLEANING AND REFILLING CRANKCASE.

It is important that attention should be regularly given to the oil level. As previously mentioned, after about every 500 miles the oil level should be checked, and if necessary the supply replenished, until it reaches the level indicated by the oil level cock (see Fig. 5, page 11).

**After the first 500 miles have been covered the crankcase should be completely emptied and the oil replenished. Subsequently this should be done after about every 2,000 miles.** It is more economical to change the oil regularly and ensure the most efficient lubrication, than to run with old oil.

To empty and clean out the crankcase, remove the drain plug underneath (see "G," Fig. 2). Drain off all the oil, which will drip more readily and bring away with it any accumulation of sediment if the engine is warm when the operation is commenced.

By unscrewing the four nuts on the filter cover (see "G," Fig. 2) the filter in the base of the crankcase can be removed and cleaned at the same time. After this has been done and the filter and cover replaced, insert the drain plug and carefully screw it up until it is quite secure.

It is also recommended that the bottom half of the crankcase should be taken down after about every 10,000 miles and thoroughly cleaned out. It is preferable to do this either with a paraffin squirt or a stiff brush dipped in paraffin, care being taken to see that all dirt and sediment is completely removed. Cloths or rag of a linty nature are not advisable for cleaning, as particles of the lint may be left inside the crankcase and find their way into the oil-ways.

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

Open the overflow oil tap, or oil level cock (see Fig. 5), by moving indicator to the "On" position. Then pour oil in through the filler until it drips from the overflow tap. Leave the tap open a few minutes to allow the oil to distribute itself evenly. Then turn the lever to the "Off" position. **Do not forget this.** When refilling after the crankcase has been com-

pletely emptied approximately 16 pints of oil will be required to fill up to the proper level.

NOTE.—When refilling the crankcase see that the car is standing on level ground. If the crankcase is tilted even at a slight angle it is impossible to gauge the oil level correctly.

## VALVES.

One of the advantages of the overhead valve engine is that the operation of "grinding in" valves is required less frequently than with the side valve type of engine. This is largely due to the design of the valve seats, which, on the "overhead" type of engine, ensure more effective valve cooling, and the liability to burning and distortion is very appreciably reduced.

## VALVE GRINDING.

A definite "period" cannot be given for "grinding in" valves. This is determined by the mileage covered, and it is generally left to the discretion of the owner as to when they require attention. Usually it will be found that "grinding in" will be required approximately every 10,000 miles, which is also a normal period for de-carbonising.

"Grinding in" valves is not a difficult matter with a Sunbeam engine if the following procedure is adopted. Strict attention to the sequence of operations laid down will ensure that the work is done correctly, and without waste of time. After draining the water from the cylinder block proceed as follows: (1) Disconnect the high tension wires; (2) Remove the sparking plugs; (3) Remove the hose clip on the water outlet connection and detach hose; (4) Remove the nuts which hold down the valve cover and lift latter away; (5) Disconnect carburetter controls; (6) Remove the inlet and exhaust manifold and the carburetter; (7) Remove the cylinder head holding down nuts, unscrew the nuts in the order shown in Fig. 8, page 18; do not remove nuts directly, each nut should be unscrewed slightly in turn; (8) Carefully lift the head clear of the locating studs, taking care not to damage the threads.

When the push rods are removed from the cylinder block they should be carefully replaced in their original positions as



## VALVE GRINDING.

they may vary slightly in length to suit their respective positions. For the adjustment of individual tappets, see pages 18 and 19.

No difficulty should be experienced in lifting the head off the cylinder, but if the head should be a little tight care must be taken not to damage the gasket (the use of a screw-driver or other sharp implement is likely to injure it). Special lugs are provided on the cylinder head corners to facilitate removal. Free the joint by lightly tapping these lugs with a mallet.

### DEPRESSING VALVE SPRING.

Having removed the cylinder head, place it in position as shown in Fig. 6 with a packing 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.

### GRINDING IN VALVES.

To grind in a valve turn the head on its side, smear a little valve grinding compound on the valve head (the compound is obtainable from motor and accessory dealers) insert a tool in the head slot as shown in Fig. 7, and give it a light semi-rotary (backwards and forwards) motion. During this operation the position of the valve should be moved round from time to time, thus ensuring a true and even seating. A simple method is to place a suitable spring under the valve head so that when the pressure is released it automatically comes off its seat.

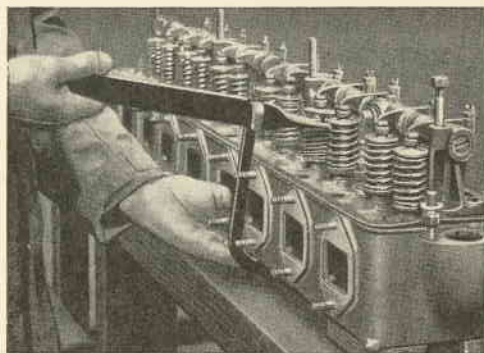


Fig. 6.  
Using Valve Removing Tool.

## VALVE GRINDING.

The grinding compound should be mixed to a stiff paste with oil and only the smallest quantity must be used. The valve should occasionally be wiped with a clean piece of rag in order that the surface may be seen. As the operation is continued the "pitting" will be found to be gradually disappearing. As soon as the "pitting" has been removed it is advisable to blacken the valve seat in a candle flame and carefully replace the valve, very lightly pulling it on to its seat. On withdrawing the valve the soot should show an even contact all the way round, and if this is so it can be taken the valve is tight and is seating properly. Scrupulous care should be taken to wash out with a brush and petrol all particles of the valve grinding compound, paying particular attention to getting well into the valve guides.

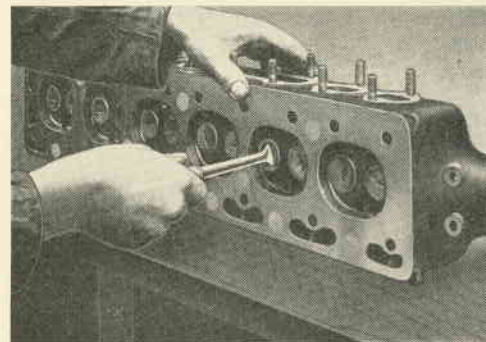


Fig. 7.  
Showing method of Grinding-in Valve.

After replacing the valve springs and cups, and before replacing the head, make a careful inspection of the gasket. It is essential that this should not be damaged in any way. Before fitting the gasket on it is advisable to smear a little engine oil all over it with the finger. The gasket can then be located over the studs, care being taken not to "rip up" the edges of the holes. It should be pushed down by means of a piece of tube (a box spanner will do quite well) as this will ease the gasket. If it is inclined to stick ascertain if the holes in the gasket that coincide with the water passages are registering exactly.



## REPLACING HEAD. :: TAPPET ADJUSTMENT.

In replacing the cylinder head a certain amount of care is necessary, firstly to ascertain that it is perfectly clean, and secondly to see that the stud end threads are not damaged. Any nut which shows a tendency to tightness on the stud should not be used, otherwise the stud itself is likely to come out when the head is again removed.

After the valves have been ground-in, the tappet clearances will require re-setting. Instructions on tappet adjustment are given in a later paragraph.

### TIGHTENING NUTS.

The nuts should be tightened progressively ; that is, each nut should be given about one-third of a turn at a time (see Fig. 8 below for order of tightening nuts).

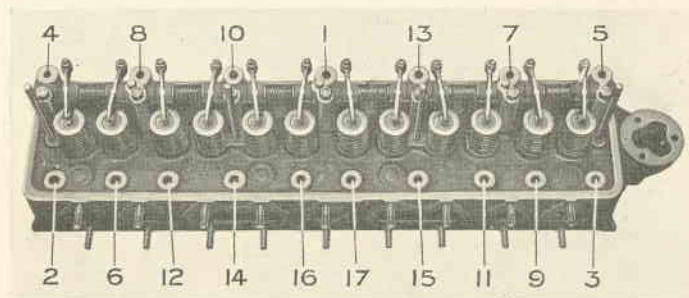


Fig. 8.

The numbers give the order in which the Cylinder Head Nuts should be removed and replaced.

### TAPPET ADJUSTMENT.

Grinding in the valves slightly reduces the tappet clearances, and these should be reset as follows. With the engine at an average running temperature—not cold, .004" (four

## TAPPET ADJUSTMENT. :: DECARBONISING.

thousandths of an inch) for the inlet and .006" (six thousandths of an inch) for the exhaust valves. The adjustment of each tappet is a simple method. Loosen the locknut (see Fig. 9) and with a screwdriver turn the valve tappet adjusting screw until the correct clearance is obtained ; this can be determined by the use of "feelers." Take care to tighten lock nut again when the adjustment has been effected.



Fig. 9.

Showing method of adjusting the clearances for the Valve Tappets, by means of the hardened steel screw in the end of each rocker arm.

### DECARBONISING.

It is difficult to fix the period when decarbonising is necessary because this varies with the conditions under which a car is used. However, it is usually advisable to decarbonise about every 10,000 miles.

The cylinder head should be removed as described on page 15, and the interior, together with the piston crowns, thoroughly scraped. See that all the particles of carbon are wiped away with a petrol-moistened cloth. Before each piston top is scraped it is advisable to bring it to its top dead centre, and so avoid risk of damage to the cylinder walls by scratching with the scraping tool. Smear a little engine oil round the edges of the piston crowns—only a small quantity—before replacing the cylinder head.

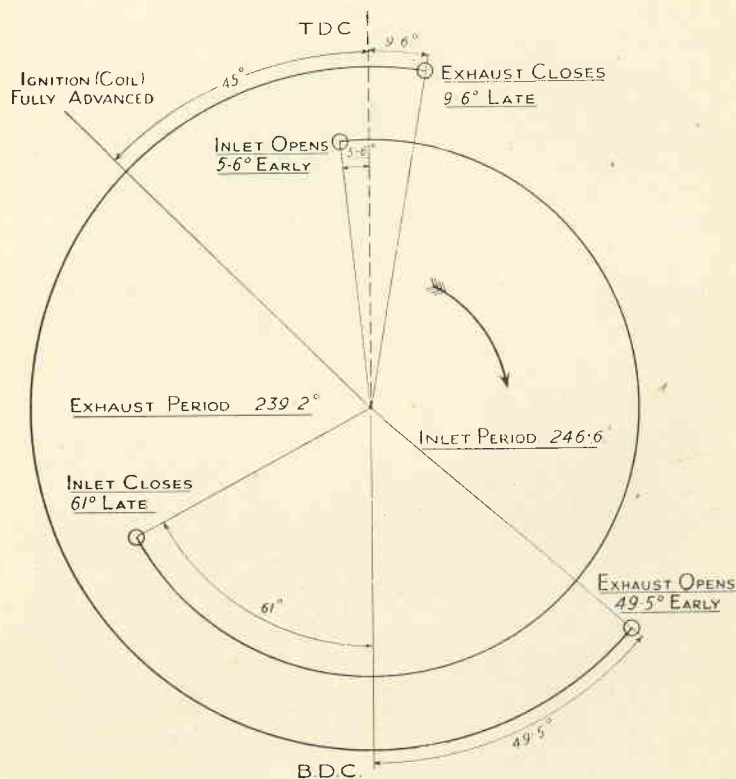


Fig. 10.

Engine and Ignition Timing Diagram for the Sunbeam "Twenty."  
Order of Firing: 1, 5, 3, 6, 2, 4.

## ENGINE AND IGNITION TIMING.

On the opposite page a diagram is given which shows the engine timing. This should be followed in detail whenever it is necessary to re-time the engine and ignition. For correct timing of the ignition, the contact breaker should be in the fully retarded position with the points just breaking contact when the piston of the cylinder corresponding to the terminal which the distributor rotor is just entering under, is at the top of the compression stroke.

## IGNITION SYSTEM.

The ignition system fitted to the "Twenty" is the latest coil type, providing easy starting and a spark of constant intensity at all speeds. The ignition switch is of the lock and key type and is incorporated in the switch box on the instrument board. The firing order of the engine is 1, 5, 3, 6, 2, 4.

The gap between the contact breaker points should be .018" (eighteen thousandths of an inch). 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 is switched "On." This, in course of time, would discharge the battery and make starting difficult or even impossible, and would also seriously damage the coil itself.

These remarks are only given as a reminder. There is no likelihood of trouble except through extreme carelessness. To guard against this a small red warning signal is fitted in conjunction with the switch, and this lights up whenever the engine is running slowly or is stopped with the ignition "On."

On some models the Ignition Distributor Spindle is lubricated through a greaser. The lubricant recommended is Mobilgrease No. 4 or Castrolase Heavy, and the greaser should be screwed down one complete turn every 1,000 miles. On other models a small oil lubricator is fitted, and in this case engine oil should be used. Oil sparingly; about three drops every 1,000 miles is sufficient.

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



**SPARKING PLUGS.**

It is advisable to examine and clean the sparking plug points occasionally and if necessary adjust the gaps to the right space. This should be .018" to .020" (18-20 thousandths of an inch).

**CARBURETTER.**

The carburetter is the "Amal" pump model 30 V.P. type to which fuel is fed by pipe from the "A.C." petrol pump.

The carburetter is of the diffuser type, designed to give a very high degree of atomisation of the fuel. This is effected by a preliminary mixing of petrol and air in the main jet chamber, the mixture then passing through diffuser tubes in the choke where it is atomised a second time, resulting in a uniform and intimate mingling of petrol and air.

The special design of the main jet, which embodies an air jet in addition to the petrol orifice, automatically ensures the provision of a correctly proportioned mixture at all speeds.

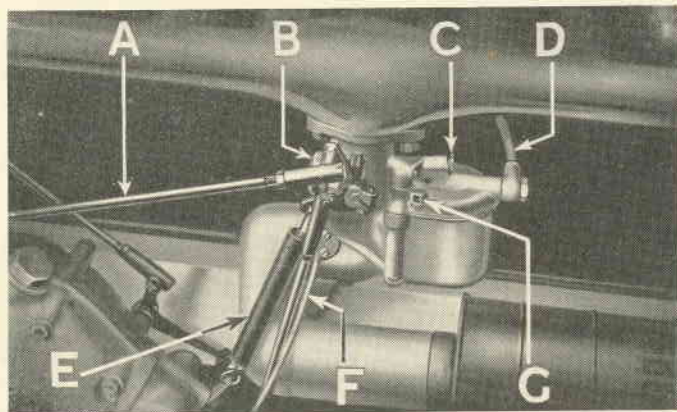


Fig. 11.

Showing Carburetter and Controls. Throttle Control (A), Easy Starting Valve (B), Idling Jet (C), Fuel Feed Pipe (D), Throttle Return Spring (E), Easy Starting Control (F), Body Bolt (G).

**AIR SILENCER AND CLEANER.**

An air silencer and cleaner is fitted to the carburetter intake. This ensures that the air is cleaned before entering

the carburetter and also silences any noise. The cleaner has a wire gauze mesh filter element and this should be cleaned after about every 5,000 miles. Instructions for cleaning are given on a plate affixed to the silencer itself.

**CARBURETTER SETTING.**

Choke 25 m.m. Main jet 190 B., c.c. Pilot jet 60 c.c. Idling jet 130 c.c. Starting jet 30 c.c. Pump jet 15 c.c.

The above setting has been adopted as standard after careful experiments and will be found to give the best engine performance obtainable consistent with economical consumption. Only in rare instances such as using heavy fuel or altered climatic conditions, is it necessary to make any alteration whatever. The petrol level is set correctly at the works; it should not be interfered with.

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

**PETROL PUMP SUPPLY SYSTEM.**

The fuel supply is drawn from the tank by means of the "A.C." pump fitted on the near side of the engine crankcase. It is of the diaphragm type as will be seen from Fig. 12, which also shows diagrammatically the chief constructional features.

The pump is operated by an eccentric on the camshaft and when the carburetter bowl is filled the float in the float chamber will shut off the inlet needle valve and so suspend the supply until more fuel is required. The fuel first enters the pump through the detachable filter and passes through the gauze filter rings, depositing all foreign matter in the sediment bowl.

Very little attention other than periodically cleaning out the sediment bowl is required, and under no circumstances must the pump be taken apart. It is advisable to clean this out at least once weekly, the procedure being as follows. Loosen the knurled thumb screw underneath and withdraw bowl. Clean out gauze filter rings and bowl, and replace. See that the cork gasket which fits between the filter rings is not broken or damaged and lies perfectly flat on its seat, finally tightening the thumb screw securely.

It is advisable, however, to give occasional attention to the following points to ensure perfect functioning of the



## PUMP FUEL SUPPLY SYSTEM.

pump. If any trouble is experienced the points enumerated below should immediately be checked over.

1. Examine and see that all fuel supply pipe connections at the fuel tank, the fuel pump and carburetter are absolutely tight.
2. See that the sediment bowl is securely tightened up, and the cork gasket in good condition and properly seated.
3. See that the gauze filter rings are kept clean as directed.
4. Inspect the suction and outlet valve and cover plugs, and ascertain that there is no leakage from either. If there is any leak the plug should be screwed up tightly without strain. The joint washer should be renewed if necessary.

**Do not attempt to dismantle the pump body.**

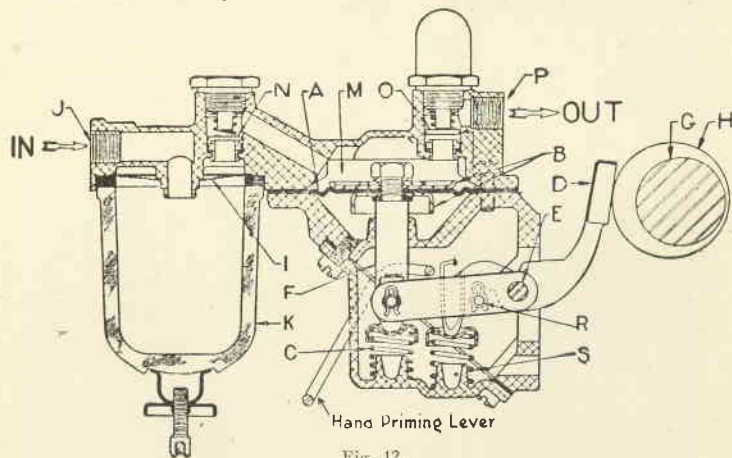


Fig. 12.  
Diagrammatic view of "A.C." Petrol Pump.

The parts marked are Diaphragm (A), Metal Discs (B), Springs (C), Rocker Arm (D), Pivot (E), Pull Rod (F), Camshaft (G), Camshaft Eccentric (H), Gauze Strainer (I), Petrole Inlet (J), Sediment Bowl (K), Pump Chamber (M), Suction Valve (N), Pressure Valve (O), Petrole Outlet to Carburetter (P), Rocker Arm Pin (R), Rocker Arm Spring (S).

If the car has been standing for some considerable time, and the petrol has evaporated from the float chamber, make use of the hand primer device fitted to the petrol pump. This is in the form of a wire hand grip and is fitted to the pump body. It is operated by pulling forward with the hand, this movement injecting a supply of fuel into the float chamber

## PETROL SYSTEM. : ELECTRICAL EQUIPMENT.

### KEEP THE PETROL SYSTEM CLEAN.

Two filters are provided to deal with any foreign matter which may be carried by the fuel. These are the "A.C." pump filter, and the filter in the petrol tank filler.

The petrol tank filler neck cap has a small vent hole in the top. This should be kept clear of all dirt in order to admit air to the tank when the petrol is drawn out by the pump. If this vent hole becomes stopped up the petrol supply will cease, and the tank may be damaged.

**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 and for information regarding the general care and maintenance we recommend owners to consult the instruction book issued by the manufacturers. A copy is enclosed with this Handbook.

### JUNCTION BOX AND FUSES.

These are referred to on page 2.

### DYNAMO.

The dynamo is situated on the nearside of the engine and driven in tandem with the water pump. The normal charging rate is 10 amps. at 20 m.p.h. and the speed for "cutting in" 11-12 m.p.h. on top gear. See Lubrication Diagram for instructions regarding lubrication.

### STARTING MOTOR.

The starting motor is the Rotax type, and is housed on the clutch casing. It has a Bendix type engagement.

### BATTERY.

A 12 volt 75 amp. hour battery is fitted and is carried within the chassis frame.

The battery should be examined about every 2,000 miles and always when the colder weather is approaching. If the level of the electrolyte has fallen, due to evaporation, distilled water should be added until the plates are just covered. Rain or tap water must not be used.

## ELECTRICAL EQUIPMENT.

Should the terminals become dirty or corroded, remove and clean these, smearing slightly with vaseline before replacing. See that the battery connections are always kept tight, as road vibration tends to loosen them.

The battery is reached by sliding the nearside front seat rearwards and lifting the hinged lid in the floor boards.

### LIGHTING EQUIPMENT.

The lighting equipment is 12 volt, single pole type, with internally wired lamps, and externally operated arrangement for adjusting. The head lamps are fitted with "dipping" reflectors operated from a switch conveniently placed on the arm just below the steering wheel. Head lamps 36 watt, side lamps 6 watt, tail lamps and "stop" light 6 watt, with bayonet type bulb fitting. The "stop" light, which is immediately above the rear number plate, operates automatically when the foot brake is applied.

### WIRING DIAGRAM.

A wiring diagram is given at the end of the book.

### ADJUSTING AND FOCUSING HEADLAMPS.

The lamps are universally mounted which allows the beams of light to be adjusted to the best advantage. To alter the position of the lamps, slacken the mounting nut "A," Fig. 13 and adjust the lamp to the position desired, afterwards tightening up the lock nut securely.

To remove the lamp front for bulb replacement or focussing, slacken the screw (C) Fig. 13 on the underside of the lamp body and swing aside clear of locating slot (D) and the rim can then be withdrawn. The lamp reflector houses the bulb holder and bayonet, and can be removed by pulling forward clear of the spring loaded reflector supports (B). To focus the bulbs, slacken screw (G) and move bulb to desired position. Tighten screw clip securely after focussing.

To obtain the best results when adjusting and focussing the lamps, it is advisable to make the adjustment at night time—on a straight, level road—when better illumination is obtained.

## FOCUSSING HEAD LAMPS.

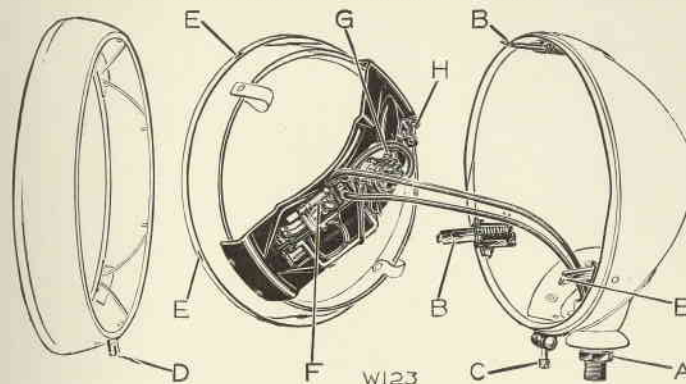


Fig. 13.  
Head Lamp dismantled showing electrically controlled mechanism. Adjustable Mounting Nut (A); Reflector Supports (B); Fixing Screw (C); Slot (D); Slots in Reflector Rim (E); Clamping Clip for Bulb Holder (G); Fuse Clip (H).

### CLEANING.

Any accidental finger marks can be removed from the reflectors with the use of a chamois leather or soft cloth, without affecting the highly polished surface. **Do not use metal polishes on the reflector faces.** The rims are chromium plated and only need wiping over, first with a damp cloth and then with a soft dry cloth. See also note on page 44 in regard to cleaning chromium plated parts.

### SIDE LAMPS.

To remove the lamp front, withdraw the locking screw on the rim top and pull rim clear. When replacing first locate the small stud on rim in the hole at the bottom of the lamp body. Then replace locking screw securely. The lamps have 6 watt bulbs.

### TAIL LAMPS & "STOP" LAMP.

Two tail lamps and a "stop" lamp are incorporated in the rear number plate box. Each lamp has a 6 watt bulb which is easily removable when replacement becomes necessary. When the hinged panel of the luggage boot is lowered two holes will be seen on the hinge ledge. A special key is provided in the tool-kit and this should be inserted in each of the holes and turned in an anti-clockwise direction. This will allow the



## DIRECTION INDICATORS. :: WATER PUMP.

number plate box lid to be lowered and the bulb or bulbs removed. On coupé models the hinged panel over the luggage boot lifts upwards and when it is raised two similar holes to those referred to above will be seen on the front edge of the luggage platform. The key should be inserted in these.

### DIRECTION INDICATORS.

The electrically operated direction indicators are of the flush fitting type. The operating switch is in the centre of the steering column (see Fig. 1, page 5).

The 6 watt bulbs fitted to the indicators are of a special type and shape. They are securely held in the indicator arms by a hinged cup which is secured by a movable stem accessible from the underside of the indicator. To remove a bulb, slide the stem clear of cup, pull cup downwards and the bulb can be withdrawn.

### WATER PUMP.

The water pump has no under-water bearings. The only parts likely to need attention are the glands.

When it is necessary to take up any wear on the glands, proceed as follows. Remove the locking plate of the gland which is leaking, and turn gland nut sufficiently to make the water seal. See that the locking plate is securely replaced. The gland nuts are marked "C," Fig. 14.

There is a greaser for each gland (see "A" and "B," Fig. 14), and these should be screwed down one turn every 500 miles. See Lubrication Diagram.

### THERMOSTAT.

To assist the cooling system a thermostat is included at the water outlet, just behind the fan. It is fitted with an adjuster,

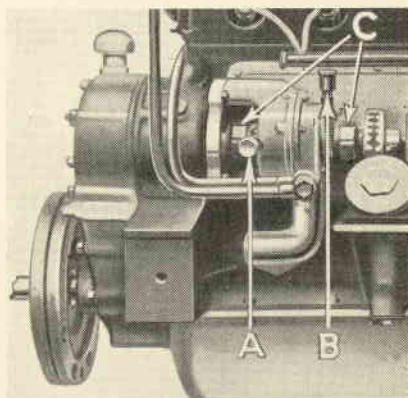


Fig. 14.  
Water Pump, showing Greasers (A and B)  
and Gland Nuts (C).

## RADIATOR. :: THERMOMETER. :: FAN.

and can be altered to suit varying climatic conditions. To alter the setting carefully pull the adjuster outwards and rotate to the setting required, the various positions being clearly indicated on the adjuster front. The settings recommended are :—For Winter, full "Increase" ; for Summer, "Decrease."

### RADIATOR.

The Sunbeam radiator combines an impressive appearance with adequate cooling area, and has a chromium plated stone guard permanently attached in front.

A thermometer is fitted on the instrument board and this should be observed occasionally, especially on long runs. The temperature reading should not exceed 85° (centigrade) as this figure has been found most suitable for conditions generally.

During cold and frosty weather, when the car is left for the night or is not being used for any length of time, it is advisable to drain the water from the radiator, cylinder block and water pump. For this purpose a drain cock is fitted at the bottom of the radiator inside the bonnet, on the offside, and a drain cock on the cylinder block (see "S," Fig. 3, page 9). Commence the practice early in the winter season to avoid any risk likely to arise from early frosts.

**Remember to turn off both drain cocks and refill the radiator before again starting the engine.**

### FAN BELT ADJUSTMENT.

Immediately behind the radiator is a fan. This is driven by a belt from the crankshaft and is provided with a simple means of adjustment. The fan spindle should be lubricated every 1,000 miles through the greaser on the spindle. See Lubrication Diagram for lubricant recommended.

To adjust the fan belt slack off the spindle clip bolt on the fan supporting bracket, insert a tommy bar in a convenient hole in the eccentric spindle and turn in whichever direction lifts the fan, until the correct tension is obtained. Hold this setting while again tightening up the clip bolt securely. Do not adjust the belt too tightly.



## CLUTCH. :: CLUTCH PEDAL ADJUSTMENT.

### CLUTCH.

The clutch is of the single dry plate type and no adjustment is required for the springs. The clutch disc, which is positioned between the clutch floating plate and the flywheel, is lined with fabric and runs on a splined shaft. The clutch pit has a removable cover. Adjustment of the clutch pedal, which will be required occasionally, is described below.

Due to the movement of the clutch floating plate being frictionless, and the dry type plate clutch, no lubrication is required. The clutch pedal shaft is fitted with an oil-less bush and no lubrication is required. The clutch withdrawal race on the stem wheel is packed with grease when assembled, and no further lubrication is required for this.

### CLUTCH PEDAL ADJUSTMENT.

It is most important that drivers should not allow the foot to remain in contact with the clutch pedal plate after the change speed or other operation is concluded. **It is the first cause of clutch wear.** The pedal should have **at least  $\frac{1}{2}$ " idle movement.** When this minimum movement is reached the pedal should be adjusted by unscrewing the nut "A," Fig. 15, until the pedal has a free or idle movement of 1" but no more. The free movement is measured between the position when the pedal is free and then depressed until the clutch action is first felt. The simple adjusting device is spring loaded and the nut has a saddle shaped end which sockets on the eye-pin of the lever "B" every half turn, and in consequence of this ratchet action it is self-locking.

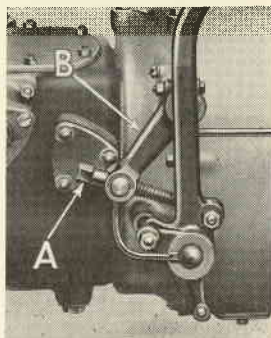


Fig. 15.

The Adjusting Nut for Clutch Pedal is marked (A). The Lever connecting Adjuster to the Clutch Shaft is marked (B).

## SYNCHRO-MESH GEAR BOX.

### SYNCHRO-MESH GEAR BOX.

The four-speed gearbox fitted to the Sunbeam "Twenty" embodies Synchro-mesh clutches for the top and third speeds. The purpose of these clutches is to bring the component gears of the speeds to be engaged to the same velocity before meshing, ensuring the operation of gear changing being carried out without clashing. In other words, the synchro-mesh device prevents any difficulty in changing, the operations normally carried out by an expert driver when changing up or down being performed automatically in the box itself.

One of the advantages of the synchro-mesh gear is that it does not necessitate the driver acquiring a new method of driving. Gear changes can be made with the synchro-mesh by double de-clutching in the ordinary way, although there is no advantage gained thereby. Whether this method is adopted or not the gear change is certain and can be made without fear of noise, clashing or damage.

The synchro-mesh gear is not complicated in design, and will not require any adjustment in use. The additional parts are few in number and consist mainly of a sleeve carrying small friction clutches and the additional portions of the gears with which they engage. It requires no special attention, and the lubrication is carried out normally by the oil in the gearbox.

### GEARBOX LUBRICATION.

Although the consumption of oil in the gearbox is very small it is essential that the level should be maintained. The level should be checked when the oil is warm. It is advisable to inspect the oil level every 2,000 miles and to add oil if required until it reaches the level marked on the "dip stick." The latter is attached to the filler plug cap. Pour the oil in slowly and allow it to distribute itself evenly, when a true level will be given. See also No. 2 on Lubrication Diagram.

**Engine lubricating oils must not be used as lubricants for the gearbox.** See Lubrication Diagram for oils recommended.

**Gearbox should be drained after first 500 miles.** See note on Lubrication Diagram.

## STEERING. :: REAR AXLE LUBRICATION.

### STEERING.

The steering is of the screw and nut pattern and provides absolute control with extreme ease of operation.

The surfaces in contact are of large area, and there is an absence of all backlash.

The oil level should be inspected every 5,000 miles by removing the plug. (See "A," Fig. 16) and oil added only if required to maintain the level, which should **not be appreciably higher than**

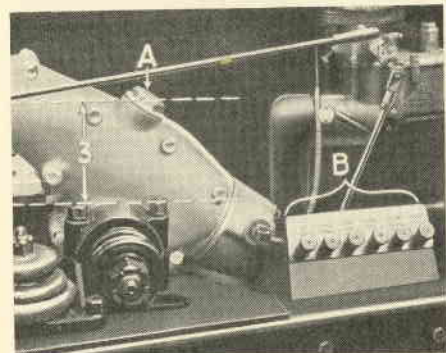


Fig. 16.  
Showing the Steering Box Oil Plug (A) and the level at which the oil should be maintained. A battery plate of grouped lubrication nipples, marked for their respective parts, is shown at (B).

**3 inches** below the top of the plug hole, measured vertically, as indicated in the illustration above.

**Oils Recommended.** The same grades of oil as recommended for the gearbox and rear axle are suitable for the steering. See Lubrication Diagram.

**Do not turn the road wheels entirely by the steering wheel when the car is stationary.** This is likely to strain the steering joints. If it is necessary to alter the position of the wheels for any purpose when the car is standing, they should be moved or assisted by hand.

### REAR AXLE LUBRICATION.

No adjustment for the rear axle is necessary as the gearing is set at the works and no attention is required except lubrication. The consumption of oil is small and only a moderate quantity will be required about every 2,000 miles to maintain the proper level. See the illustration on opposite page.

## :: HYDRAULIC FOUR-WHEEL BRAKES. ::

To lubricate the rear axle, remove the filler plug on the near side of the axle casing. Access to this is given by removing the rear seat which exposes an aperture. (See Fig. 17). The filling level is to the bottom thread of the screwed plug hole. Pour in slowly and allow oil to settle so as to get correct level.

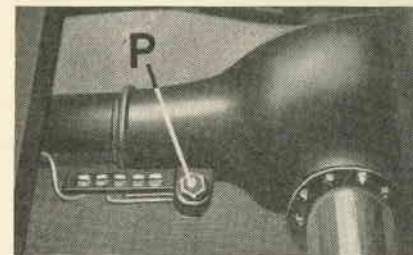


Fig. 17.  
Rear Axle Oil Filler Plug (P). The battery of grouped lubrication nipples alongside lubricates the Rear Brake mechanism and centre bearing of Propeller Shaft.

**Oils recommended.** The same grades as recommended for gearbox and steering are suitable for the rear axle. See Lubrication Diagram.

**Draining Axle.** It is most important that after the first 500 miles have been covered all oil should be drained from the axle and the supply replenished. See instructions on Lubrication Diagram.

### THE HYDRAULIC BRAKING SYSTEM.

The braking system fitted to the Sunbeam "Twenty" comprises a hydraulic foot brake which operates on all four wheels simultaneously, and a mechanical hand brake which operates the rear wheel brake shoes only, independently of the hydraulic braking system, as described on page 37.

The single pair of internal expanding fabric lined shoes on all four wheels are operated hydraulically on the Lockheed system which ensures absence of frictional loss and gives fully adequate braking effect with a light pedal pressure. The brake shoes are applied by the pedal pulling direct on to the pressure lever of the master cylinder, from which the pressure is transmitted through copper tubing equally to the brake shoe cylinder on each wheel, with flexible hose connections interposed where necessary to allow for steering and other axle



## :: HYDRAULIC FOUR-WHEEL BRAKES. ::

movements. The pistons of the wheel brake shoe cylinders connect up with the ends of the brake shoes and expand the latter against the tension of the "pull-off" springs.

The head of liquid contained in the supply reservoir box, in which the master cylinder is submerged, keeps the entire system constantly full of fluid under a small pressure which ensures complete and efficient sealing of the system. The fluid level in the reservoir box should be just clear of the underside of the filler plug "A" Fig. 18 and should be inspected once a month by removing the plug, and more fluid added if necessary. If, when adding more fluid, the level should fall rapidly, it indicates a leak at some point in the system.

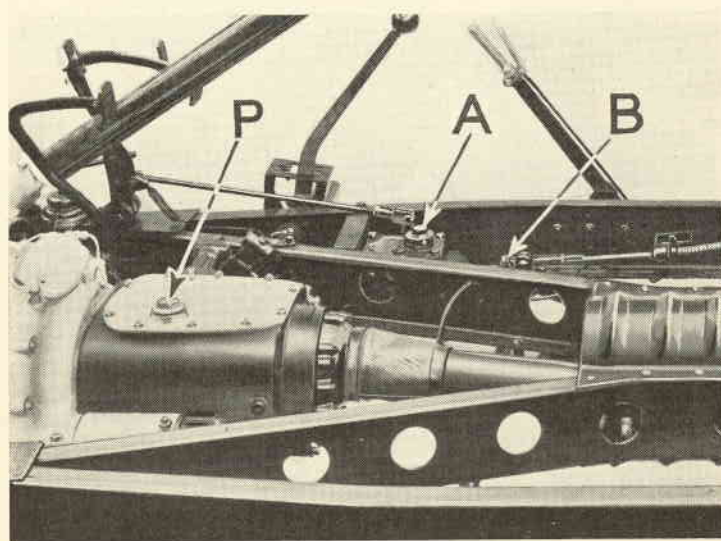


Fig. 18.

Showing the Fluid Reservoir Box (A) of the Hydraulic Braking System and Hand Brake Adjusting mechanism (B). The oil filler plug for the gear box is also shown (P).

## :: HYDRAULIC FOUR-WHEEL BRAKES. ::

**Note.**— It is most important that fluid of the correct Lockheed specification, viz. :—Lockheed Special No. 5 Brake Fluid, a liquid which is immune from freezing and unaffected by high temperatures, should be used exclusively in the system. Any other fluid may injure some part or lack important qualities required for safe and efficient maintenance. Petrol, paraffin and lubricating oils are definitely injurious.

Extreme care should always be taken, and especially when refilling the reservoir box, to ensure that no dirt or foreign matter gets into the system, and when re-assembling or replacing any of the component parts see that these are previously thoroughly well washed and cleaned in brake fluid or alcohol ; no other fluid should be used for this purpose.

**Dirt or other foreign matter must not get into the system.**

### **"BLEEDING" THE HYDRAULIC SYSTEM.**

What is known as "bleeding" is necessary when some part of the fluid system is not entirely full of fluid owing to the presence of air. This is generally detected by the brake pedal being "soft" when first depressed after the car has been standing for some time. To remedy this, remove the filler plug "A" Fig. 18, and fill the reservoir box right up with fluid. Replace the filler plug when this has been done.

A "bleeder" valve projects from the centre of each wheel cylinder, above the main pipe line connection (see D, Fig. 19) and has a central set screw which should be removed with the special box key (B) supplied in the tool kit. The rubber drain tube "A" (also supplied) should then be passed through the bore of the box key in such a way that the nipple at one end of the rubber tube may be screwed into the place of the set screw.

Now open the valve to the extent of about three quarters of a turn of the box key, allowing the free end of the rubber



## FOOT BRAKE ADJUSTMENT.

tube to hang down into a clean glass jar about half full of brake fluid. Press the brake pedal down slowly, allowing it to return to the normal or "full-off" position under the action of the piston return spring in the master cylinder. Repeat this operation about a dozen times taking care that **the reservoir box is kept well filled all the time**, otherwise air will be drawn into the system at this point. By depressing the pedal fluid is pumped through the pipe line and out at the wheel cylinder which is being bled, carrying with it any air that may be present. This will be indicated by bubbles in the glass jar. When all the air has been expelled, screw in tightly the "bleeder" valve with the box key; then unscrew the rubber tube and replace the set screw securely.

Repeat this operation for each wheel brake cylinder, then refill the reservoir box to the level indicated on page 34, and replace the filler plug, which should be screwed well down.

## FOOT BRAKE ADJUSTMENT.

The only adjustment required in connection with the hydraulic foot brake is that of the brake shoes in relation to the drums, when necessary on account of wear of the shoe linings. This adjustment is made by means of the adjustment cam provided for each shoe. After jacking up the wheel being dealt with clear of the ground, apply a spanner horizontally



Fig. 19.  
Showing Rubber Drain Tube (A); Box Key (B); Brake Shoe Adjustment Cams (C); Hydraulic Brake Tube to Brake Cylinder (D); Group lubrication nipples for lubricating Axle Swivel Pin and Track Rod (E). On the offside front wheel there is a similar plate with a group of three nipples lubricating the Axle Swivel Pin, Track Rod and Side Steering Rod.

## HAND BRAKE.

to each of the cam nuts "C" on the brake carrier plate (see Figs. 19 and 20) and turn the spanner towards the ground as indicated by the arrows in Figs. 19 and 20 until the brake shoe comes into contact with the drum; then turn the spanner slightly in the reverse direction, until the wheel can rotate freely without any appreciable drag. The other wheels are then dealt with similarly, each shoe being adjusted separately. The adjustment cams are held by friction and have no locking device.

## HAND BRAKE.

The hand brake is an all mechanical brake, and operates through the medium of a powerful toggle linkage between each pair of rear wheel brake shoes, and is quite independent of the hydraulic system. It is only in an emergency that this brake will need to be used for "pulling up" purposes, as the hydraulic system will adequately meet all normal demands.

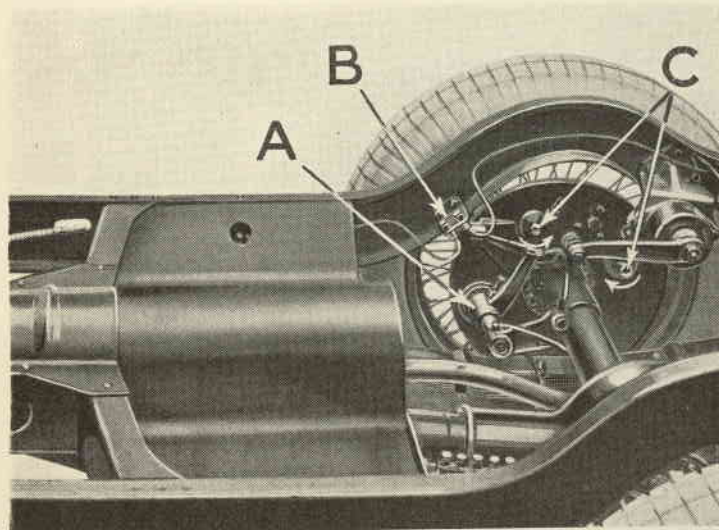


Fig. 20.  
Rear Brake Adjustment. (A) is the Hand Brake Camshaft Lever, and (B) are grouped lubrication nipples (a similar plate is on the near-side of chassis frame) for the Rear Springs. The nuts (C) operate the Brake Shoe Adjustment Cams.

## HAND BRAKE ADJUSTMENT.

### HAND BRAKE ADJUSTMENT.

When any adjustment has been made to the rear wheel brakes operated by the pedal it is advisable also to check the hand brake as a slight adjustment may be necessary to this.

To assist adjustment the first five teeth on the ratchet quadrant are machined away to give a certain amount of "free" movement. Before commencing any adjustment pull the handbrake lever to the first notch on the quadrant. This will prevent the shoes binding after the adjustment has been made, and the hand brake lever released.

The adjusting device is a spring loaded ratchet arrangement (see Fig. 18), the saddle shaped end nut socketing on the eyepin of the rod every half turn, which makes the ratchet action self locking. By rotating the nut the brake cams are pulled forward and the clearance between the shoes and drums is reduced.

### Removing Front Brake Drums for Relining Shoes.

It depends largely upon the care in driving and the nature of the country, whether hilly or otherwise, in which the car is chiefly used, as to the period that will elapse before relining is required. The procedure for carrying out this work is as follows:—Remove the road wheel, which exposes the brake drum and hub, unscrew the six nuts which hold the drum in position on the hub and withdraw the drum. If the drum does not come off easily, insert a screw in each of the holes provided for extracting and screw against the hub face. This will force the drum clear of its register on the hub.

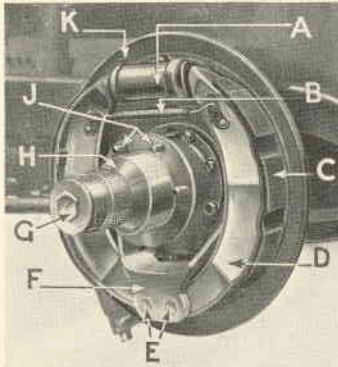


Fig. 21.

Front Wheel Brake with wheel and brake drum removed. Hydraulic Brake Cylinder (A); Brake Return Spring (B); Brake Shoe Liner (C); Brake Shoe (D); Operating Fulcrums (E); Fulcrum Plate (F); Hub Cap Nut (G); Hub (H); Screws retaining Brake Drum (I); Brake Carrier Plate (J); Brake Drum Plate (K).

NOTE.—To obtain absolute efficiency and silence of the braking system, the final process of machining the drums is accomplished with the hubs assembled in position, and it is

## REMOVING REAR BRAKE DRUMS.

advisable when removing the drum to make an identification mark on both the drum and hub to correspond, so that when re-assembling they will be returned to their original positions and so retain the braking efficiency.

To remove the shoes, release the brake return springs (see "B," Fig. 21), then remove the nuts securing the brake shoe fulcrums "E" which allow the fulcrums themselves to be withdrawn. The shoes can then be pulled clear of the hydraulic braking cylinder "A." Take notice of the lining fixing before removing and endeavour to fix similarly. It is essential that the new lining should fit firmly on the shoe and there should be no sign of bulging.

### Removing Rear Brake Drums for Relining Shoes.

Remove the wheel and drum as described for the front wheels, but the removal of the shoes differs owing to the hand brake mechanism, and is as follows:—With the brake drum off, remove the cotter pin holding the fulcrum pin of the toggle arms (L) Fig. 22, and withdraw pin when the toggle will be free. The cotter pin will be found at the back of the fulcrum pin. Then release brake return spring and the shoe fulcrum pin, and pull shoes clear of the hydraulic cylinder as mentioned above in connection with the front brakes. The instructions on the previous page ("Removing Front Brake Drum") in regard to "corresponding" marks for drum and hub should also be followed when removing either of the rear brake drums. Before replacing the brake drums ascertain that the mechanism is functioning correctly.

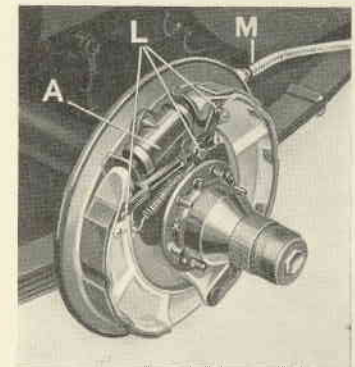


Fig. 22.

Rear Wheel Brake, with wheel and brake drum removed. The details are similar to the Front Brake, shown in Fig. 21, with the exception of (L), which are the toggle arms operated by the Hand Brake Lever. (M) is the armoured hydraulic brake cable.

It is advisable occasionally to remove the brake drums and smear the hand brake toggle joints with graphite grease.



## FRONT HUBS.

The front hubs are fitted with roller bearings designed to take both radial and thrust loads. With the special type of bearing used no adjustment is necessary. The lubrication is provided by removing the inner hub end caps (G) Fig. 21, **and the hubs should be kept about half full with one of the lubricants recommended on the Lubrication Diagram.** See No. 13. The supply of grease should be replenished when required, usually about every 3,000 miles. Under no circumstances must the hubs be more than half full.

## REAR HUBS.

The rear hubs are mounted on double row ball races and, like the front hubs, no adjustment of any kind is necessary. The hubs should be lubricated in exactly the same way as the front hubs. See instructions above.

## SPRINGS AND SHOCK ABSORBERS.

The semi-elliptic front and rear springs are designed to give the most comfortable riding at all speeds and are controlled by shock absorbers of the Luvax thermostatically controlled hydraulic type. When the correct adjustment or "setting" has been made, which is done before the car leaves the works, this is automatically maintained by the thermostatic valve, and the "damping" action of the shock absorber is unaffected by any variation of temperature in the fluid. The front springs are lubricated by nipples included in the battery of nipples for the group system of lubrication, see Fig. 16, page 32, and the rear springs by nipples situated on the near and offside of the upsweep of the chassis frame (see Fig. 20, page 37). These nipples are also shown on the lubrication diagram.

The shock absorbers are carefully set before the car leaves the Works and no adjustment whatever should be required for a lengthy period. Every 8,000 to 10,000 miles the quantity of oil in the outer or recuperator chamber should be inspected by removing the filler plug in the casing and oil added if necessary, filling up only to the base of the adjusting screw head which is visible through the plug hole. **Do not entirely fill the casing and use Luvax oil only.** A full explanation of the working, care and maintenance of the Luvax shock absorber is given in a booklet issued by the makers.

## GROUP SYSTEM CHASSIS LUBRICATION.

Chassis lubrication is greatly simplified by the batteries of lubrication nipples which are conveniently placed on various parts of the chassis. These should be lubricated as instructed on the Lubrication Diagram in the front of the book. Use one of the oils recommended, as these have been proved by exhaustive tests to be most suitable for the purpose.

## WHEELS.

The wire wheels fitted to the Sunbeam "Twenty" are easily detached whenever removal is necessary.

To remove a wheel, the lock-nut on the wheel should be slackened by turning in the direction in which the wheel revolves when the car goes forward. The car should then be jacked up, the nut removed and the wheel withdrawn. A special wheel spanner is provided in the tool kit. The lock-nuts on the off, or right-hand, side of the car have a left-hand thread. Each lock-nut is marked "left side, near side," or "right side, off side." and arrows are stamped on showing the direction in which the nut should be turned.

When fitting a spare wheel the inside of the wheel hub and the outside of the permanent hub should be clean except for a little lubricant. Push the wheel right home on the inner hub and screw up the lock-nut as far as possible while the car is still jacked up. Then withdraw the jack and make the lock nut secure when the wheel is on the ground.

When a wheel has been changed it is advisable to test the lock nut after running a few miles to see if there is any slackness. This will be noticeable if the wheel is rocked backwards and forwards (when jacked up), and any tendency to movement should be removed by again tightening up the nut. This slackness is sometimes wrongly attributed to the lock-nut unscrewing, a thing which never happens if it has been correctly put on.

## CARE OF THE TYRES.

Tyres and tyre pressures have an important bearing on comfort, and Messrs. Dunlops have published a booklet which gives valuable information and hints for prolonging the life of tyres.

It is of the utmost importance that the air pressure should be maintained in accordance with the figures given below. Frequent examination of pressure is not necessary, but it is important that it should be checked regularly. Once a week should be sufficient unless a tyre is suspected of having a leaking valve or slow puncture. Any loss of air can be made up with very little effort if it is done weekly.

## TYRE PRESSURES.

The following figures are given as a guide, but the pressure should not be allowed to fall below these :—

Front wheels :—35-lbs. per square inch.

Rear wheels :—38 lbs. per square inch.

A slight reduction in the pressure of the rear tyres is permissible when the rear seats are unoccupied.

## BONNET FASTENERS.

The bonnet fasteners are of the spring loaded type: To lift the bonnet the fasteners should be turned slightly to the left, *i.e.*, anti-clockwise and the bonnet side lifted up. When replacing turn the bonnet fasteners in the opposite direction to make secure.

## LUBRICATION OF SPEEDOMETER DRIVE.

If at any time the speedometer is not registering correctly, or is intermittent in action, it is possible that the drive may require lubrication. If this is so, inject a little thin oil at the speedometer end of the flexible coupling. This is more easily effected if the oil is first warmed. Lubrication will be required only at fairly long intervals.

## 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. With the Cellulose finish surface dust 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. The material known as "mutton cloth" is suitable for polishing after the polish itself has been applied. When the car is muddy and dirty we strongly recommend that the following procedure should be followed when cleaning.

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 painted surface.

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-painted 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. When drying off after washing, always use the smooth side of a chamois leather. The rough or "flesh" side may cause minute scratches. Special cleaning materials should be kept 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 honeycomb sponge is the best kind.

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 if used too frequently.

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 then polished with a soft, clean wash leather. Afterwards smear lightly, except on door handles, with a little thin oil. Such oils as Wakefield's "Oilit," Gargoyle Velocite Oil D, or Shell Sheet Finishing Oil P.5 are suitable for this purpose.

### 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 good "saddle soap" is recommended, but on no account should this be used on cloth upholstery or furniture hide. In any case it must be used very sparingly and quickly wiped off.

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 coupés of the folding head type are standing in the garage for any length of time the head should always be raised. A touring car should also have the hood raised if the car is not likely to be used for a considerable time.

### The following tools are supplied with each car :

- 1 Double-ended box spanner, 6 m/m and 8 m/m nuts.
- 1 Double-ended box spanner, 10 m/m and 12 m/m nuts.
- 1 Double-ended box spanner,  $\frac{3}{8}$ " and  $\frac{7}{16}$ " nuts.
- 1 Double-ended open spanner, 6 m/m and 8 m/m nuts.
- 1 Double-ended open spanner, 10 m/m and 12 m/m nuts.
- 1 Double-ended open spanner,  $\frac{3}{8}$ " and  $\frac{7}{16}$ " nuts.
- 1 Double-ended open spanner,  $\frac{1}{2}$ " and  $\frac{5}{8}$ " nuts.
- Box spanner for rear axle filler plug.
- Box spanner for gearbox filler plug.
- Spanner for sparking plugs.
- Spanner for water pump gland nut.
- Spanner for carburetter.
- Spanner for ignition distributor.
- Spanner for petrol tank filler cap.
- Spanner for head lamp adjusting nuts.
- Spanner for hub grease caps.
- Spanner for wheel caps.
- Spanner for tappet adjustment.
- Adjustable spanner (large).
- Adjustable spanner (small).
- "Bleeder" box key wrench for hydraulic brakes.
- "Bleeder" drain tube for hydraulic brakes.
- 1 Tommy bar,  $\frac{1}{4}$ " dia.
- 1 Tommy bar,  $\frac{3}{8}$ " dia.
- Lifting jack with handle.
- Grease gun.
- Tyre pump.
- 1 set of valve thimbles.
- Valve lifting tool.
- Screw-driver (large).
- Pair of pliers.
- Chisel.
- Oilcan.
- 1 pair of valve springs.
- Hammer.
- Screw-driver (small).
- Peg punch.
- Sponge cloth.

## TERMS OF GUARANTEE.

### TERMS OF GUARANTEE.

The Sunbeam Motor Car Co., Ltd. (hereinafter called the Makers), desire to draw the attention of Purchasers of Sunbeam cars to the Terms of Guarantee applying to their cars.

The makers take all usual and reasonable precautions to secure the use of the best materials and the best workmanship. All warranties or guarantee as to quality, or as to the fitness for the purpose for which goods are sold, or as to other matters implied by Common Law or Statute, are excluded, but the makers give to purchasers from them or from any authorised dealer in the makers' products, a guarantee for one year, for which written application must be made to the makers by the purchaser, on a special form provided for the purpose and attached prominently to each new car or chassis, and no other warranty or guarantee is intended or shall be implied. The guarantee is not transferable.

The makers do not warrant or guarantee or accept any responsibility for accessories not made by them, nor for the method of fixing, nor do they accept responsibility for the breakage of, or for any damage to, the windscreen or other glasswork of a car after delivery from their works.

The chassis supplied by the makers are intended to be fitted with bodies similar in weight and general character to those shown in the makers' catalogue, and unless the makers are allowed to inspect, test and finally approve the chassis after a body, not of the makers' manufacture, has been fitted, the forementioned guarantee will not apply to the said chassis.

The makers do not give any guarantee in respect of second-hand goods sold by them.

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for the

# SUNBEAM "TWENTY"

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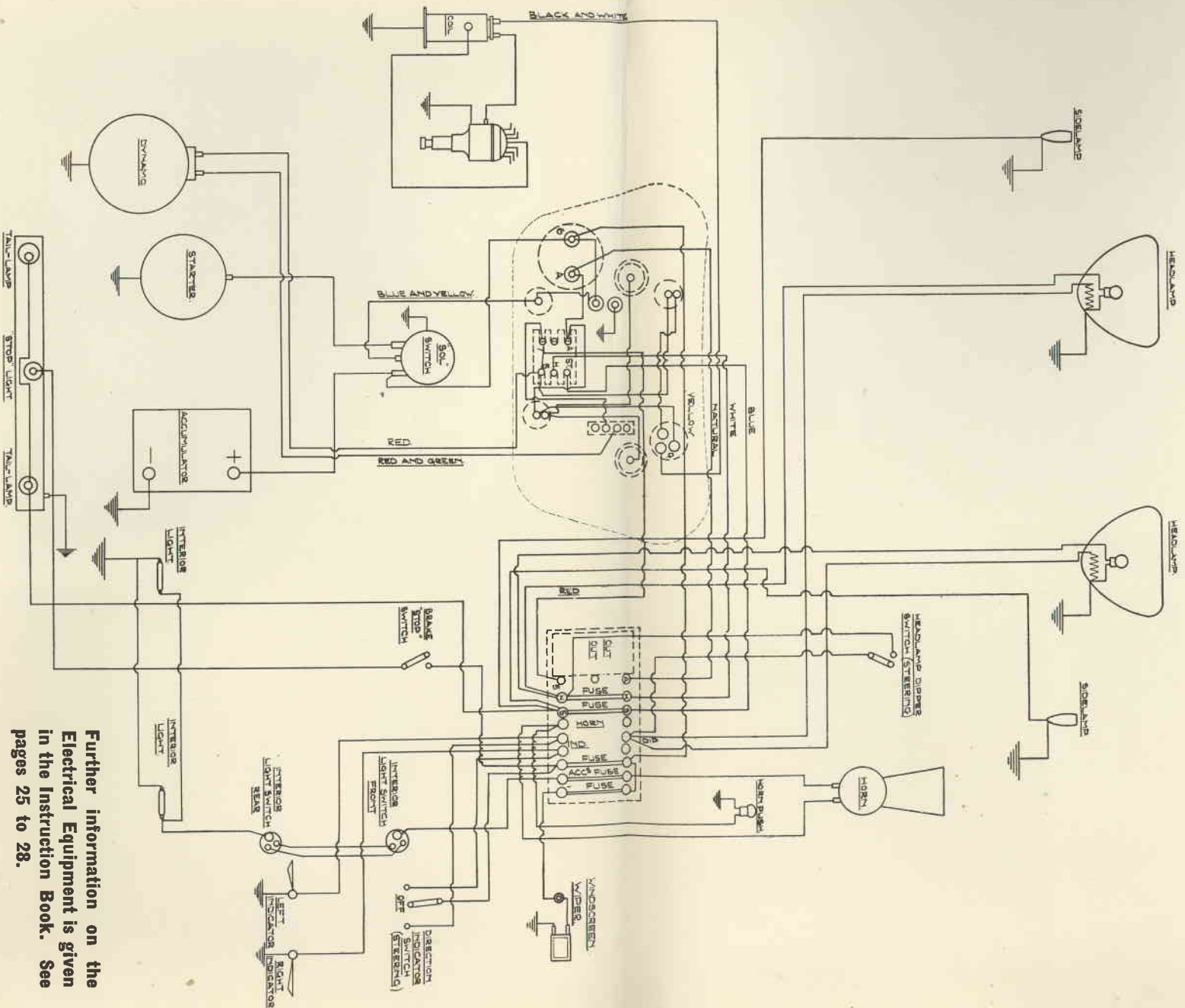
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# ELECTRICAL WIRING DIAGRAM for the SUNBEAM "TWENTY."



Further information on the Electrical Equipment is given in the Instruction Book. See pages 25 to 28.