

Jaguar Mk 1 and 2 240 and 340 Owners Workshop Manual

by J H HAYNES

Associate Member of the Guild of Motoring Writers

and BILL HARPER

Models covered

2483 cc. Jaguar 2.4 Mk 1 Saloon. Introduced October 1955.

Superceded by Jaguar 2.4 Mk 2 Saloon. Introduced October 1959.

Superceded by Jaguar 240 Saloon. Introduced September 1967.

Discontinued October 1969.

3442 cc. Jaguar 3.4 Mk 1 Saloon. Introduced February 1957.

Superceded by Jaguar 3.4 Mk 2 Saloon. Introduced October 1959.

Superceded by Jaguar 340 Saloon. Introduced September 1967.

Discontinued September 1968.

3781 cc. Jaguar 3.8 Mk 2 Saloon. Introduced October 1959.

Discontinued during 1967.

Special equipment models plus manual and automatic transmission.

SBN 900550 98 8

© J H Haynes and Company Limited 1973

1182/098



J H HAYNES AND COMPANY LIMITED
SPARKFORD YEOVIL SOMERSET

distributed in the USA by

HAYNES PUBLICATIONS INC.

9421 WINNETKA AVENUE

CHATSWORTH LOS ANGELES

CALIFORNIA 91311 USA

Acknowledgements

Our first thanks must go to Jaguar Cars British Leyland UK Limited of Coventry for allowing us to use some of their illustrations and for being most forthcoming with certain technical information.

Castrol Limited and Champion Limited have been helpful with lubrication and spark plug details respectively.

Brian Horsfall stripped the car with his usual dexterity and Les Brazier took photographs at many angles.

John Murphy has page edited this manual and our thanks must go to him.

Special note: The supply of illustrations and material by Jaguar Cars British Leyland UK Limited does not imply that Jaguar Cars has approved the contents of this book or is in any way responsible for the accuracy of any information printed. The copyright in illustrations and other technical material provided by Jaguar Cars British Leyland UK Limited remains vested in that company.

About this manual

The aim of this book is to help you get the best value from your car. It can do so in two ways. First it can help you decide what work must be done, even should you choose to get it done by a garage; the routine maintenance and the diagnosis and course of action when random faults occur. But it is hoped that you will also use the second and fuller purpose by tackling the work yourself. This can give you the satisfaction of doing the job yourself. On the simpler jobs it may even be quicker than booking the car into a garage and going there twice, to leave and collect it. Perhaps most important, much money can be saved by avoiding the costs a garage must charge to cover their labour and overheads.

The book has drawings and descriptions to show the function of the various components so that their layout can be understood. Then the tasks are described and photographed in a step by step sequence so that even a novice can cope with complicated work. Such a person is the very one to buy a car needing repair yet be unable to afford garage costs.

The jobs are described assuming only normal spanners are available, and not special tools. But a reasonable outfit of tools will be a worthwhile investment. Many special workshop tools produced by the makers merely speed the work, and in these cases guidance is given as to how to do the job without them, the oft quoted example being the use of a large hose clip to compress the piston rings for insertion in the cylinder. But on a very few occasions the special tool is essential to prevent damage to components, then their use is described. Though it might be possible to borrow the tool, such work may have to be entrusted to the official agent.

To avoid labour costs a garage will often give a cheaper repair by fitting a reconditioned assembly. The home mechanic can be helped by this book to diagnose the fault and make a repair

using only a minor spare part. The classic case is repairing a non-charging dynamo by fitting new brushes.

The manufacturer's official workshop manuals are written for their trained staff, and so assume special knowledge; detail is left out. This book is written for the owner, and so goes into detail.

The book is divided into twelve Chapters. Each Chapter is divided into numbered sections which are headed in bold type between horizontal lines. Each section consists of serially numbered paragraphs.

There are two types of illustration: (1) Figures which are numbered according to Chapter and sequence of occurrence in that Chapter. (2) Photographs which have a reference number on their caption. All photographs apply to the Chapter in which they occur so that the reference figure pinpoints the pertinent section and paragraph number.

Procedures, once described in the text, are not normally repeated. If it is necessary to refer to another Chapter the reference will be given in Chapter number and section number thus: Chapter 1/16.

If it is considered necessary to refer to a particular paragraph in another Chapter the reference is eg, 'Chapter 1/5:5'. Cross references given without use of the word 'Chapter' apply to sections and/or paragraphs in the same Chapter, eg, 'see Section 8' means also 'in this Chapter'.

When the left or right side of the car is mentioned it is as if looking forward from the drivers seat.

Great effort has been made to ensure that this book is complete and up to date. The manufacturers continually modify their cars, even in retrospect.

Whilst every care is taken to ensure that the information in this manual is correct no liability can be accepted by the authors or publishers for loss, damage or injury caused by any errors in or omissions from the information given.

Contents

Chapter	Section	Page	Section	Page
	Introduction	4	Lubrication chart	8
	Recommended lubricants	7	Routine maintenance	9
	Ordering spare parts	7		
1 Engine	General description	21	Decarbonisation	48
	Removal	21	Reassembly	54
	Dismantling	29	Valve clearances	57
	Examination and renovation	42	Replacement	61
2 Cooling system	Draining	64	Water pump	68
	Flushing and filling	65	Fan belt	68
	Thermostat	66	Anti-freeze	70
3 Fuel system and carburation	General description	74	Gauge unit	78
	Fuel pump	75	Carburettors	79
	Petrol tank	78		
4 Ignition system	Contact breaker	96	Ignition timing	99
	Distributor	98	Spark plugs	100
5 Clutch and actuating mechanism	Bleeding	104	Master cylinder	113
	Removal	106	Slave cylinder	114
	Refitting	109	Fault finding	115
6 Gearbox	Removal and replacement	120	Overdrive	131
	Dismantling	120	Fault finding	142
	Examination	127	Automatic transmission	142
	Reassembly	127	Fault diagnosis	146
7 Propeller shaft	Removal and replacement	154	Universal joints	156
	Centre bearing	154		
8 Rear axle	Removal and replacement	162	Differential reassembly	171
	Differential removal	164		
9 Braking system	Bleeding	174	Disc brakes	180
	Front brakes	177	Handbrake	183
	Rear brakes	178	Master cylinder	186
	Wheel cylinders	179	Servo unit	187
10 Electrical system	Battery	193	Lighting equipment	204
	Dynamo	194	Windscreen washer	206
	Starter motor	197	Heater	207
	Voltage regulator	198	Horn	207
	Fuses	202	Electric clock	208
	Flasher unit	203	Wiring diagram	212
	Windscreen wiper	203		
11 Suspension	Front suspension	223	Steering	234
	Anti-roll bar	230	Power assisted steering	244
	Rear road springs	233	Front wheel alignment	255
12 Bodywork and underframe	Maintenance	259	Heater	271
	Body repair	259	Exhaust system	271
	Windscreen	266	Wheels and tyres	273
	Bumpers	269		

Introduction to the Jaguar Mks 1 and 2, 240 and 340

The Jaguar 2.4 Mk 1 introduced in October 1955 was a departure. A departure for the Jaguar Company and a departure for the dulled post war years of motoring. After a considerable time of development the Jaguar 2.4, using Jaguar's XK engine (decreased in stroke), gearbox and steering gear of strong repute, appeared as a new monocoque construction; all previous Jaguar models having the conventional separate body and chassis. The 2.4 was an exciting car by the post war standards - over 100 mph performance, reasonable economy, great comfort and a very 'slippery' shape all at a price of £1269 and 10 pence including purchase tax, all in a 1955 4 door saloon.

It was not until February 1957 that the Mk 1 saloons really became significant. The full XK engine of the time, the 3.4 was installed in the same 2.4 bodyshell. Then in September of that year, 4 wheel disc brakes, wire wheels, automatic transmission and overdrive were available as options. It was now possible to buy from the showroom a luxury 4 door saloon and have one of the fastest (120 mph), best braked and most stylish cars available, all for about £1600.

October 1959 saw the next significant announcement. The Mk 2 series appeared supplemented by the 3.8 litre saloon. This was an even more powerful version, now with 220 bhp and a limited slip differential as standard. The visual changes were a slightly larger bodywork, much larger rear screen and higher

door pillars on the same waist line giving a 'taller' appearance. Internally the Mk 2 had a wider rear back, improved front suspension, disc brakes as standard, dual exhaust system and many interior improvements. Until September 1967 many minor changes took place but the basic three cars remained. Power steering was made available.

The 3.8 was discontinued in September 1967 whilst the 2.4 became the 240 and the 3.4, the 340. (The 3.4 and 3.8 'S' types introduced in 1963 continued after 1967. They are not dealt with in this manual although their specification is somewhat similar). The 240 and 340 are very similar to the earlier models, although some trim was removed and an 'E' type type cylinder head was installed on both models. Production of the 340 stopped in September 1968, the 240 in October 1969.

The Mk 1 and 2 series is a very significant car in the annals of motoring. It finally convinced the world that performance, comfort and reasonable economy could be had from a 4 door saloon at a very competitive price without any loss of tractability and carrying capacity. From a competition point of view it also showed that production saloon cars can handle racing speeds. Anyone who has seen four 3.8 saloons, two dark blue and two in off-white, with head lamps blazing driven by four grand prix drivers sweeping round 90° bends in perfectly controlled four wheel drifts, will know just what is meant by this.

Recommended lubricants

The following table gives details of the lubricants recommended by the manufacturer.

Almost all lubricating oils contain additives and although it is permissible to mix recommended brands it is an undesirable practice. If you wish to change from one brand to another it is advisable to wait until the sump or gearbox are drained and then to follow the Oil Company's recommendations in regard to flushing procedures before refilling with the different make of oil. In cases where the grade or make of oil in the engine or gearbox is not known, our advice is that you drain off and refill with a known make and grade rather than run the risk of sludge formation and gumming up.

COMPONENT	TYPE OF LUBRICANT OR FLUID	CORRECT CASTROL PRODUCTS
Engine	20W/50 Multigrade engine oil	CASTROL GTX
Upper cylinder lubrication		CASTROLLO
Distributor oil can points) Oil can lubrication)	High quality Multigrade engine oil	CASTROL GTX
Gearbox) Rear axle)	High quality 90EP Hypoid gear oil	CASTROL HYPOY
Steering box	High quality 90EP Hypoid gear oil	CASTROL HYPOY
Front wheel bearings) Rear wheel bearings) Distributor cam)	Lithium based high melting point grease	CASTROL LM GREASE
Steering tie-rods) Wheel swivels) Door hinges)	Lithium based high melting point grease	CASTROL LM GREASE
Automatic transmission unit) Power steering system)	Approved automatic transmission fluid	CASTROL TQF

Recommended Hydraulic Fluid

Castrol Girling Universal Brake and Clutch Fluid is recommended. This fluid conforms to specification SAE 70 R3 which is specially modified for additional safety to give a higher boiling point. Where those makes are not available, only fluid guaranteed to conform to specification SAE 70 R3 may be used as an alternative.

Ordering spare parts

Although spare parts can be ordered through any garage it obviously makes good sense to go straight to a Jaguar dealer where you will find that the storeman is more familiar with your car and your requirements and there is a better chance that they can supply you ex-stock.

When ordering new parts it is essential that you give full information about your particular model of Jaguar otherwise it cannot be guaranteed that you will be supplied with the correct part and there is nothing more frustrating than to find that a part, for which you may have had to wait some time due to supply difficulties, will not fit.

It is imperative therefore, that the car and engine numbers, together with any prefix or suffix letters are quoted when ordering parts. If the unit in question is the gearbox or overdrive then the gearbox number and any prefix or suffix letters must also be quoted. Look at the item you are replacing, it may have a part number stamped on it. If so, quote this number when ordering or better still take the part along with you for correct

identification.

The car number is stamped in the bonnet catch channel forward of the radiator header tank.

The body number is stamped on a plate attached to the right hand side of the scuttle.

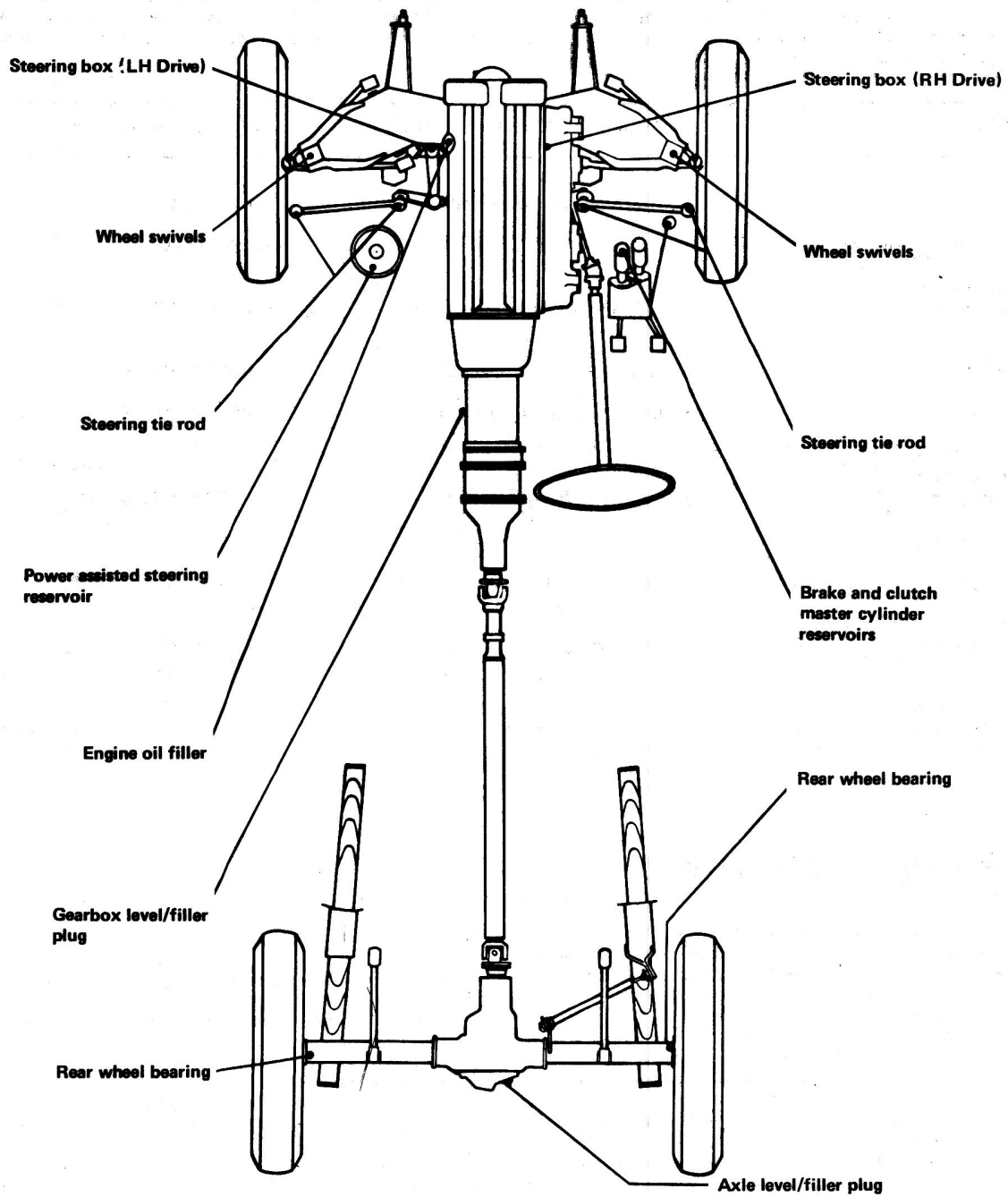
The above identifications are also stamped on a plate situated in the engine compartment as shown.

The engine number is stamped on the right hand side of the cylinder block above the oil filter and at the front of the cylinder head casting.

The gearbox number is stamped on a shoulder at the left hand rear corner of the gearbox casing and also on the top cover.

If you intend using the Jaguar exchange scheme, make sure that the component you wish to exchange is clean and is complete to the standard of the exchange item before taking it in to the stores; needless to say you should have removed those items not supplied with the exchange component.

Lubrication chart



Routine maintenance

Periodic servicing of your car should be looked upon as an essential, not only for the purpose of obtaining economy and the best performance from the vehicle, but also for ensuring safety and for finding defects at an early date before anything serious, and probably expensive, occurs. You will find that by far the largest element of the maintenance routine is a purely visual examination which will take up very little time.

The maintenance instructions which follow are those recommended by the manufacturer and they are supplemented by additional tasks which we have found, from practical experience, need to be carried out as a purely preventative measure.

The servicing periodicity recommended by the Manufacturers for the 2.4, 3.4 and 3.8 litre models is tied to a 2500 mile cycle as opposed to a 3000 mile cycle for the 240 and 340 models. This difference is reflected in the mileages quoted in the following servicing schedules.

Daily before use

- 1 Remove the dipstick and check the engine oil level which should be up to the "MAX" mark. Top up as necessary.
- 2 Remove the radiator filler cap, **when the engine is cold**, and top up the coolant as necessary.
- 3 Top up the windscreen washer bottle.
- 4 Look at the level of brake fluid in the reservoir. The level of the fluid will be readily seen at a quick glance by noting the position of the float needle. Investigate the cause if frequent topping up is necessary.
- 5 Check correct operation of services-horn, windscreen wipers, windscreen washer and lights.

Weekly

- 1 Check tyre pressures. See Chapter 12.

Monthly

- 1 Check condition of tyres for compliance with legal limits of wear and condition. But, depending on mileage covered and road conditions, this check may be necessary at more frequent intervals.
- 2 Check the level of electrolyte in the battery. Check the battery connections for security and cleanliness. See Chapter 10.

Every 2500/3000 miles (4000/5000 km)

- 1 Drain the oil from the engine sump by removing the plug at the right hand rear corner of the sump as shown in Fig.RM.1. Do this work when the engine is warm so that the oil will flow more

freely.

- 2 Refer to Chapter 1. Remove and discard the oil filter element. Thoroughly clean the canister, the spring, central rod and pressure plate. Fit a new filter element of the correct type for your car. Renew the circular rubber seal in the filter head, this seal will be supplied with the new filter element.

- 3 Clean and replace the sump drain plug. Refill the sump with engine oil using one of the makes and grades recommended in the chart at the end of this Section.

Note: Where the car is used for low speed driving, stop/start driving particularly in cold weather where the choke is used more than is normal, or long periods of use in dusty conditions, the oil should be changed at least every 1000 miles (1600 km).

- 4 Remove the moulded cap at the top of the distributor by springing back the two clips. Remove the rotor arm and apply a few drops of engine oil around the screw "A" in Fig.RM.2. Do not remove the screw. Apply one drop of oil on the post "B" and smear the cam "C" with grease very lightly. Lubricate the centrifugal advance mechanism through the aperture at the edge of the contact breaker base plate. Be very careful not to get any oil or grease on the contact breaker points.

- 5 Examine the contact breaker points and if they are burned or blackened, clean them with a fine carborundum stone or very fine emery cloth. You will have to remove them to do this work and Chapter 4 gives full instructions on how it is done.

- 6 Turn the engine until the contact breaker points are fully open, check the gap using clean feeler gauges. The gap should be 0.014" - 0.016" (0.36 - 0.41 mm) and, if adjustment is required, refer to Chapter 4 where full instructions will be found for dealing with the type of distributor fitted to your car.

- 7 Remove the spark plugs, clean them and reset the gap to 0.025" (0.64 mm). It is advisable to have the plugs cleaned by a garage with a machine specially designed for the purpose.

- 8 On those cars not fitted with an automatic fan belt tensioner, check and adjust the tension of the fan belt (Fig.RM.3). You should be able to get about ½" movement on the belt at the point of its longest run.

- 9 Unscrew the cap on the top of the carburettor suction chambers (SU carburettors) and lift out the damper valve which is attached to the cap. Fill the hollow piston spindle with SAE 20 oil.

- 10 The idling speed of the engine should be about 700 rpm. If adjustment is required, refer to Chapter 3 and carry out the adjustment as required for the type of carburettor fitted.

- 11 Place the car on level ground and check the level of oil in the gearbox. This is done by removing the combined level and filler plug on the left hand side of the gearbox. Thoroughly clean all dirt from around the plug before taking it out. The level of oil should be to the bottom of the filler hole. Top up as necessary with one of the makes and grades of oil given in the chart at the end of this Section. Topping up the gearbox will also fill the overdrive unit (if fitted) but extra care is required to ensure that no dirt gets in with the oil if equipped with an overdrive unit.

12 The propeller shaft universal joints fitted to later model cars are of the "sealed for life" type but on early models provided with grease nipples at the joints give a few strokes with a grease gun to lubricate the roller bearings.

13 Check the level of oil in the rear axle with the car standing on level ground. A combined level and filler plug is provided in the rear cover of the axle casing as shown in Fig.RM.4. Clean all dirt away from the plug before you take it out. The level of oil should be to the bottom of the filler plug hole. Top up as necessary with a hypoid oil of the correct grade.

14 Remove the steering box filler plug as shown in Fig.RM.5 (do not confuse this plug with the rocker shaft adjustment screw) and fill the box with oil until no more will enter. Replace the plug.

15 Clean around the filler cap on the hydraulic reservoir for power assisted steering systems. Remove the cap by turning it anti-clockwise and top up as required using the correct grade of oil.

16 Adjust the handbrake cable in the manner described in Chapter 9.

17 The air cleaner of the oil bath type (where fitted) should be removed for cleaning but the periods at which this work is necessary will vary with the conditions under which the car is operated. For normal conditions, cleaning every 2500 miles is adequate but where the car is in frequent use in very dusty conditions it is advisable to clean at about 1000 mile intervals. To remove the air cleaner (Fig.RM.6), unscrew the wing nut and take off the top cover and then lift out the filler element and the oil base. Wash the element thoroughly in a bowl of clean paraffin and allow it to drain. Empty the oil from the oil base and clean out the sludge which will have collected in the bottom. Fill the base with engine oil to the level indicated by the arrow, make sure that the top cover gasket is in good condition and then reassemble the filter. There is no need to re-oil the filter element as this will be done automatically when the car is driven.

18 Where automatic transmission is fitted, check the level of the fluid and top up as required. The transmission filler/dipstick tube is located on the right hand side of the engine just forward of the bulkhead. When checking the fluid level make sure that the car is on level ground, apply the handbrake, start the engine and place the selector lever in "P". It is preferable to check the fluid level after a run when the transmission is hot, but in any event, run the engine until the transmission attains its normal running temperature. Remove the dipstick, wipe it dry and then replace it in the filler tube, ensure that it enters fully and then withdraw immediately and check. Add only sufficient fluid to bring the level to the FULL mark on the dipstick, DO NOT OVERFILL. If the fluid level is checked and topped up when cold, a false reading will be obtained and filling to the full mark will overfill the unit.

Every 5000/6000 miles (8000/10000 Km)

- 1 Carry out the 2500/3000 mile servicing.
- 2 If the top timing chain can be heard operating, adjust it in the manner described in Chapter 1 until there is slight flexibility on both outer sides of the chain below the camshaft sprockets ie it should not be dead tight.
- 3 Remove the bolts securing the petrol pipe banjo unions to the float chambers, remove the filters and clean them in petrol. (Fig.RM.7).
- 4 Remove the fuel feed line filter bowl (Fig.RM.8) by undoing the nut at the bottom of the bowl and then swinging the clip outwards, do not drop the glass bowl. Clean away all sediment, examine the sealing washer and fit a new one if it is damaged.
- 5 Using a grease gun, grease the ball joints at the ends of the two steering tie rods (Fig.RM.9). During this operation, examine the rubber seals at the ends of the ball housings to see if they are displaced or perished, they should be replaced (see Chapter 11) if they are defective as this will allow dirt and water to enter the ball joint and cause rapid wear.
- 6 Lubricate the nipples to the wheel swivels as shown in

Fig.RM.10. There is one nipple at the top and bottom swivel joints on each side of the car.

7 Take the car to a garage equipped to do the work and have the alignment of the front wheels checked, and adjusted if necessary, to the limits quoted in Chapter 11.

8 Grease the rear wheel bearings through the nipple provided (Fig.RM.11) at the ends of the rear axle tubes. Cease pumping in grease as soon as it comes out of the bleed hole opposite the nipple.

9 Lightly spray the rear spring leaves with penetrating oil but keep the oil away from the rubber mountings at the ends and the centre of each spring.

10 On cars fitted with drum brakes, remove the road wheels in turn, take off the brake drum and examine the linings. If the rivet heads are close to the face of the friction lining a new set of brake shoes should be fitted. This work is described in Chapter 9. To get the best results it is advisable to fit new shoes all round but at least also replace the shoes to the wheel on the opposite side of the car. Clean out any dust and dirt from the brake drums and reassemble.

11 Refer to Chapter 9 and follow the instructions for the removal of the brake friction pads fitted to disc brake models. The pads should be renewed when they have worn down to a thickness of $\frac{1}{8}$ " (7 mm).

12 Remove the brake servo air cleaner which is attached to a rubber pipe on the right hand wing valance. Wash the cleaner in methylated spirits and then allow it to dry. After drying, lubricate the wire mesh with brake fluid and refit the cleaner.

13 Lubricate the door hinges sparingly using a grease gun applied to the grease nipple at each hinge. Wipe away any surplus grease.

14 Use an oil can to lubricate:-

Seat runners and adjusting mechanisms.

Handbrake ratchet.

Door locks.

Luggage boot hinges and lock.

Bonnet hinges and catches.

Windscreen wiper arms.

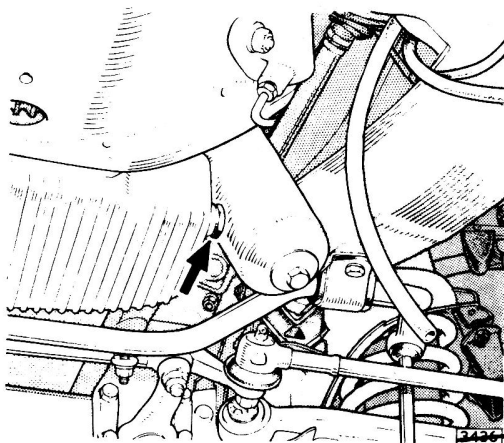
Accelerator linkage.

Petrol filler cover hinge.

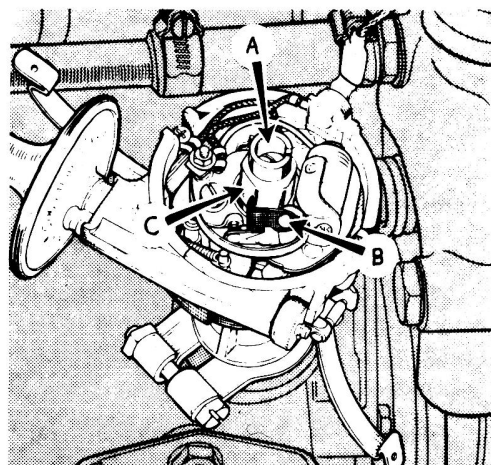
Rear bearing of the dynamo (few drops only through hole marked "oil").

Every 10,000/12,000 miles (16,000/20,000 Km)

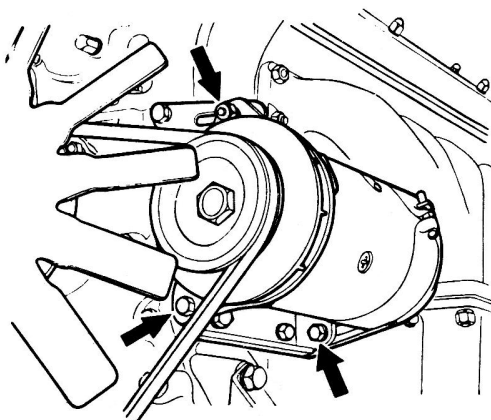
- 1 Complete the 5000/6000 mile servicing.
- 2 Renew the paper element air cleaner (if fitted), it is advisable, however, to change the element more frequently if the car is in frequent use in dusty conditions. The element is removed by rolling back the sealing rubber between the carburettor elbow and the air cleaner, slacken the two wing nuts which hold the air cleaner to the bracket on the cylinder head and then release the cleaner by pulling it towards the left side of the car. Release the two clips holding the end cover to the air cleaner and take off the end cover and the element. Now remove the wing nut, end cap and rubber ring securing the element to the end cover. Make sure that the two rubber sealing rings are in their correct positions when you refit the element.
- 3 Whilst you have the feed line filter bowl removed for cleaning, renew the sealing washers.
- 4 Drain the gearbox when warm by removing the plug shown in Fig.RM.12 and after all oil has drained away, replace the plug and then refill the box, with the recommended grade of oil, through the combined level and filler plug on the left hand side of the gearbox casing (the plug can be seen above that arrowed in Fig.RM.12). The level of oil should be to the bottom of the hole.
- 5 If an overdrive unit is fitted, this also should be drained as although the oil for the overdrive is common with that of the gearbox it is not drained when the gearbox is emptied. Remove the plug shown in Fig.RM.13 and allow the oil to drain into a container. Whilst the oil is draining, remove the filter and thoroughly clean it in petrol and allow to dry before refitting,



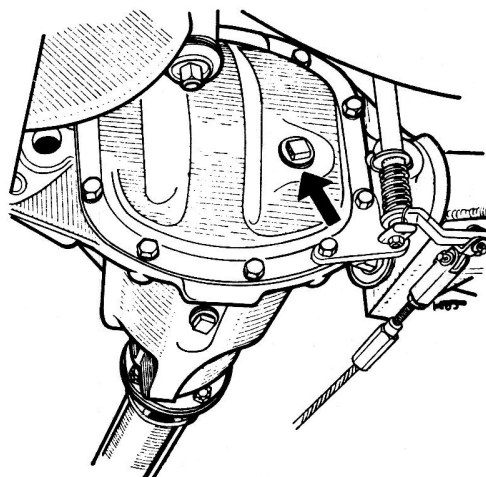
RM1. The engine sump drain plug



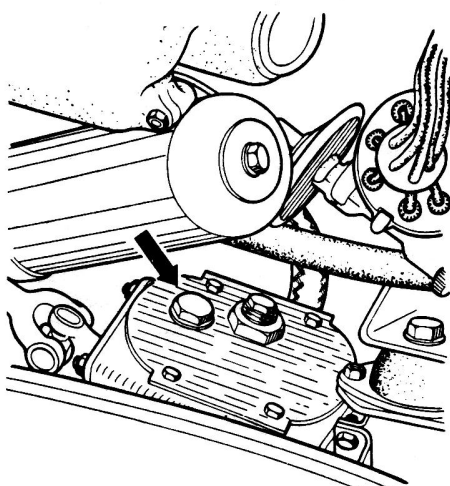
RM.2. Distributor lubrication points



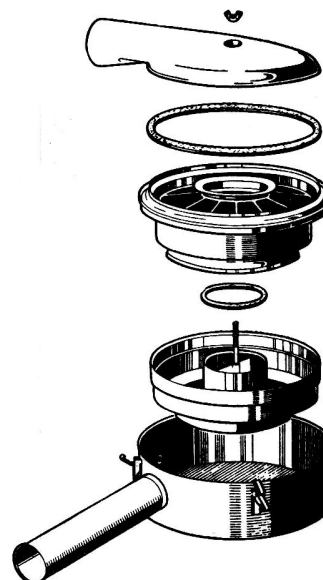
RM.3. Slacken dynamo mounting bolts to adjust fan belt tension



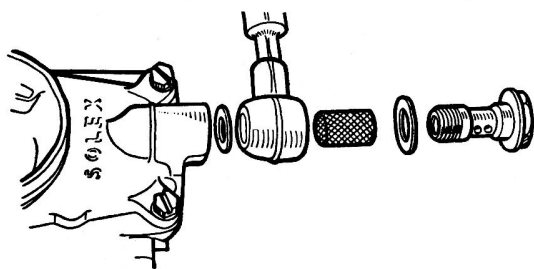
RM.4. The rear axle filler/level plug



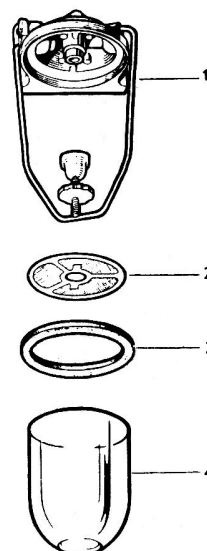
RM.5. The steering box filler plug



RM.6. The oil bath air cleaner

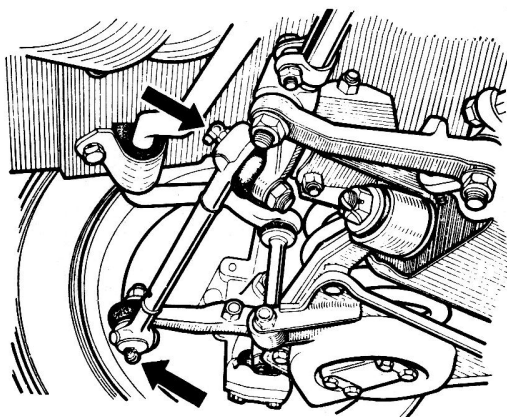


RM.7. The carburettor filter

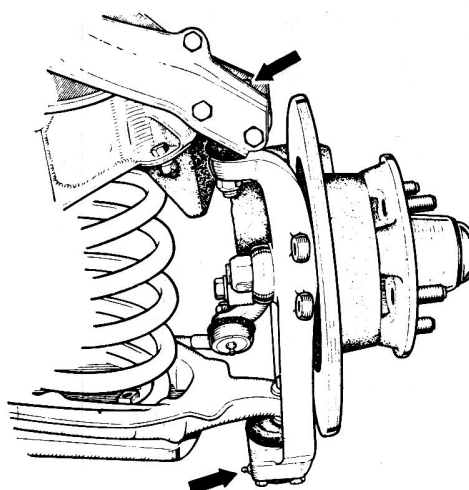


RM.8. THE FUEL FEED LINE FILTER

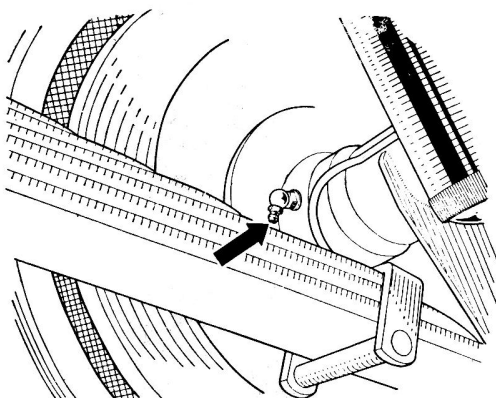
- | | |
|------------------|------------------|
| 1 Retaining clip | 3 Sealing washer |
| 2 Filter gauze | 4 Glass bowl |



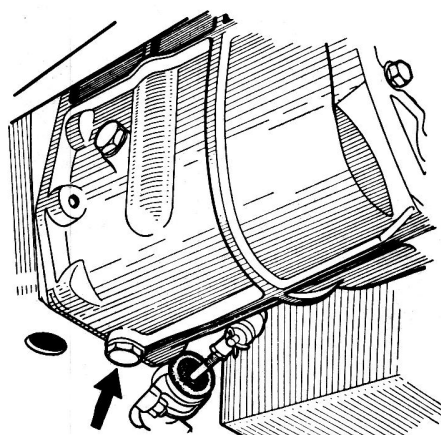
**RM.9. Steering tie rod lubrication points
(one side shown)**



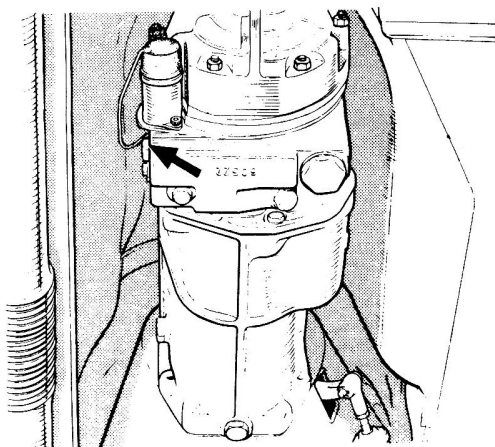
**RM.10. Wheel swivel lubrication points
(one side shown)**



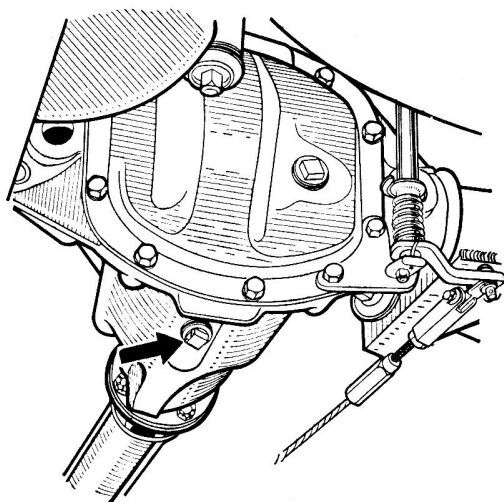
RM.11. Rear wheel bearing grease nipple



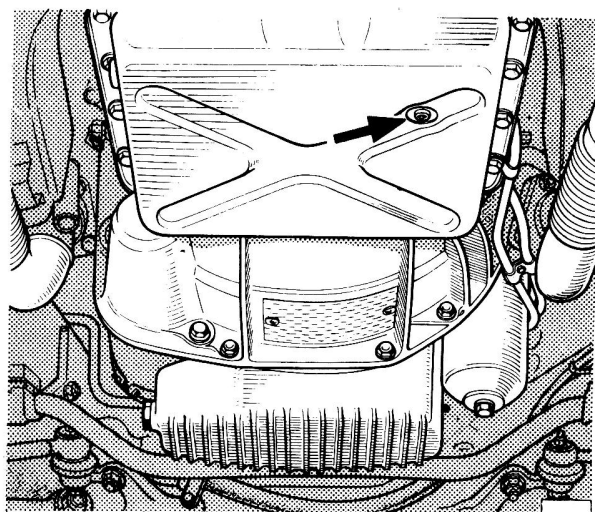
RM.12. The gearbox drain plug



RM.13. The overdrive drain plug



RM.14. The rear axle drain plug



RM.15. The automatic transmission drain plug

the "A" Type Compact unit is provided with magnetic washers and these also must be thoroughly cleaned to remove any sign of metallic dust. The filter of the "A" Type unit is accessible through the drain plug hole and is secured by a central screw. The filter plug of the "A" Type Compact unit is located in the side of the overdrive unit. Maintain absolute cleanliness when refilling the gearbox of overdrive models as any dirt entering the system may seriously affect the operation of the overdrive. Recheck the level after the car has been run as a certain amount of lubricant will have been retained in the hydraulic system of the overdrive.

6 Drain the rear axle, after a run when the oil is hot, by removing the drain plug shown in Fig.RM.14. Refill the axle with the recommended grade of hypoid oil to the level of the bottom of the filler hole (see Fig.RM.4).

7 Refer to Chapter 11 and check the end float of the front and rear wheel bearings in the manner described. Grease the bearings after checking the end float, the rear hubs by means of the grease nipple provided on the rear axle tube but cease pumping in grease when it escapes from the bleed hole opposite to the nipple. There are no grease nipples to the front wheel bearings of cars fitted with drum type brakes; on these models the front wheel hub must be removed and then the taper roller bearing must be cleaned out and repacked with a recommended grade of high melting point grease. Do not pack the hub with grease but merely apply a coating to the inside of the hub between the outer races of the bearings and apply a light coat of grease to the stub axle shaft. Do not fill the hub end cap. The front wheel bearings of early model cars fitted with disc brakes are greased by means of a grease nipple (one per wheel) but to gain access to this you will have to remove the roadwheel (make sure that the car is firmly supported before you start work). Lubricate sparingly and cease pumping in grease when it escapes through the bleed hole in the end cap of the hub or, on cars with wire spoked wheels, when the grease can be seen to escape past the outer hub bearing. The foregoing also applies to late model cars except that in this case, access to the front wheel bearing grease nipple is obtained by merely removing the nave plate.

8 Remove the spark plugs and replace them with a new set of the correct type for the model details of which will be found under Specifications to Chapter 1 of this Manual.

9 Go over the car carefully looking for deterioration of rubber components such as radiator hoses, engine mountings etc. Look also for loosening of nuts and bolts especially those locked with spring or shakeproof washers.

10 Have head and fog lamp alignment checked and adjusted if necessary.

Every 21,000 miles (35,000 km)

1 Complete the 2500/3000 mile servicing.

2 On those cars fitted with automatic transmission, drain off the transmission fluid by removing the drain plug located in the bottom of the oil pan as illustrated in Fig.RM.15. Now remove the oil pan and wash it out thoroughly. The front and rear brake bands must now be adjusted and details of how to do this will be found in Chapter 6, however, as special tools are required to do this work properly you may consider it advisable to entrust the draining and adjustment of the system to a Jaguar dealer.

Every 24,000 miles (40,000 km)

1 Complete the 12,000 mile servicing.

On those cars fitted with power assisted steering, renew the paper filter element in the oil reservoir by removing the bolt securing the oil reservoir top cover and then lifting off the top cover and collecting the spring and retainer plate. Lift out the filter. When refitting the new filter make sure that it is located in the support plate at the bottom of the reservoir. Refit the cover and tighten the central bolt.

Chapter 1 Engine

Contents

General description	1	renovation	41
Major operations with engine in place	2	Compression pressures - general	42
Major operations with the engine removed	3	Timing gear and chain - examination and renovation	43
Methods of engine removal	4	Oil pump - examination and renovation	44
Engine removal with gearbox - lifting upwards	5	Bottom chain tensioner - examination and renovation	45
Engine removal less gearbox	6	Automatic fan belt tensioner - examination and renovation	46
Engine removal with gearbox - from underside	7	Engine stabiliser - examination and renovation	47
Separating the engine from the gearbox	8	Engine mountings - general	48
Separating the engine from the transmission unit (automatic)	9	Engine mountings	49
Removal and replacement of gearbox and clutch assembly		Air cleaners - general	50
with engine installed	10	Air cleaners - maintenance	51
Dismantling the engine - general	11	Engine reassembly - general	52
Removing the ancillary engine components	12	Crankshaft - replacement	53
Cylinder head removal - engine on bench	13	Piston and connecting rod - reassembly	54
Cylinder head removal - engine in car	14	Piston ring - replacement	55
Camshaft - removal	15	Piston - replacement	56
Valve removal	16	Connecting rod to crankshaft - reassembly	57
Valve and tappet guide removal	17	Crankshaft gear and sprocket - reassembly	58
Sump, piston, connecting rod and big end bearing - removal	18	Distributor and oil pump drive gear - reassembly	59
Timing gear - removal	19	Oil pump and pipes - reassembly	60
Gudgeon pin removal	20	Timing gear - assembly	61
Piston ring - removal	21	Timing gear - reassembly to engine	62
Oil pump assembly - removal	22	Timing chain tensioner - reassembly	63
Distributor drive - removal	23	Timing cover - refitting	64
Crankshaft - removal	24	Oil sump - refitting	65
Lubrication system - description	25	Flywheel and clutch - refitting	66
Oil filter - removal and replacement	26	Oil filter - refitting	67
Engine examination and renovation - general	27	Crankshaft damper and pulley - refitting	68
Crankshaft - examination and renovation	28	Distributor - refitting	69
Crankshaft pulley and damper - examination and renovation	29	Cylinder head - reassembly	70
Big end and main bearings - examination and renovation	30	Valve clearance adjustment	71
Flywheel - examination and renovation	31	Cylinder head - refitting	72
Cylinder block - examination and renovation	32	Valve timing	73
Pistons and piston rings - general	33	Inlet manifold - refitting	74
Piston, piston ring and gudgeon pin - examination and renovation	34	Cylinder head oil feed pipe - refitting	75
Connecting rods - examination and renovation	35	Water pump - refitting	76
Camshaft and camshaft bearings - examination and renovation	36	Engine breather assembly - refitting	77
Valves and seats - examination and renovation	37	Gearbox - refitting	78
Inlet valve oil seals - general	38	Final assembly	79
Valve springs - examination and test	39	Engine replacement	80
Tappets and valve adjusting pads - examination and renovation	40	Engine initial start up after overhaul and major repair	81
Cylinder head and bore - decarbonisation, examination and		Fault diagnosis	82

Specifications

	2.4	3.4	3.8
Number of cylinders	6	6	6
Bore (INS)	3.2677	3.2677	3.425
(MM)	83	83	87
Stroke (INS)	3.0118	4.1732	4.1732
(MM)	76.5	106	106

Capacity (CC)	2483	3442	3781
Firing order	1 5 3 6 2 4		
Valve operation	Twin overhead camshafts		
Camshaft			
Number of journals	4	4	4
Journal diameter (IMS)	1.00 - 0.005 (25.4 mm - 0.013, - 0.001 - 0.025)		
Type of bearing	White metal - steel backed		
Number of bearings	Four per shaft (eight half bearings)		
Diameter clearance	0.0005 to 0.002 in (0.013 to 0.05 mm)		
Thrust taken	Front end		
Permissible end float	0.0045 to 0.008 in (0.11 to 0.20 mm)		
Tightening torque - bearing Mk I	15 lb f ft		
Tightening torque - cap nuts Mk 2	9 lbs f ft		
Connecting rods			
Length - centre to centre (IMS)	5.625	7.75	7.75
(CM)	13.28	19.68	19.68
Crankpin bearing type: Early cars	White metal steel backed shell		
Later cars	Lead bronze steel backed shell - lead indium coated		
Crankpin bearing bore: (IMS)	2.233 - 2.2335		
(MM)	56.72 - 56.73		
Big end width	2.4	3.4	3.8
	1.1875 in - 0.006 (30.16 mm - 0.15, - 0.008 - 0.20)		
Big end - diameter clearance	White metal 0.001 to 0.0025 in (0.25 to 0.06 mm)		
	Lead indium 0.0023 to 0.0039 in (0.06 to 0.10 mm)		
Big end - side clearance	0.0058 to 0.0087 in (0.15 to 0.22 mm)		
Small end bush - type	Phosphor bronze - steel backed		
Small end - width	1.0781 in (27.4 mm)		
Small end bush - bore	0.875 in + 0.0002 (22.22 mm + 0.005, - 0.0000 - 0.000)		
Tightening torque - con rod bolts	37 lb f ft		
Crankshaft			
Number of main bearings	Seven		
Main bearing - type	White metal steel backed shell		
Journal diameter	Front, centre, rear 2.750 to 2.7505 in (69.85 to 69.86 mm)		
	Intermediate 2.4795 to 2.750 in (69.84 to 69.85 mm)		
Journal length			
Front	1.6875 ± 0.005 in (42.86 ± 0.13 mm)		
Centre	1.75 + 0.0005 in (44.45 + 0.013 - 0.001 + 0.023 mm)		
Rear	1.875 in (47.63 mm)		
Intermediate	1.2188 ± 0.002 in (30.96 ± 0.05 mm)		
Thrust taken	Centre bearing thrust washers		
Thrust washer - thickness	0.092 ± 0.001 in and 0.096 ± 0.001 in (2.33 ± 0.025 mm and 2.43 ± 0.025 mm)		
Engine clearance	0.004 to 0.006 in (0.10 to 0.15 mm)		
Main bearing - length			
Front, centre, rear	1.5 ± 0.005 in (38.1 ± 0.13 mm)		
Intermediate	1 ± 0.005 in (25.4 ± 0.13 mm)		
Diameter clearance	0.0015 to 0.003 in (0.04 to 0.08 mm)		
Crankpin diameter	2.086 + 0.0006 in (52.98 + 0.015 mm, - 0.0000 - 0.000)		
Length	1.1875 + 0.0007 in (30.16 + 0.018 mm, - 0.0002 - 0.006)		
Regrind undersize	0.010, 0.020, 0.030, 0.040 in (0.25, 0.51, 0.76 and 1.02 mm)		
Minimum diameter for regrind	- 0.040 in (1.02 mm)		
Tightening torque - main bearing bolts	83 lb f ft		
Cylinder block			
Material - 2.4 and 3.4 litre	Chromium iron		
240 and 340			
3.8 litre	"Brivadium" dry liners		
Cylinder bores - nominal			
2.4 and 3.4 litre	3.2677 + 0.0005 - 0.00025 in (83 + 0.0127 - 0.0064 mm)		
240 and 340			
3.8 litre	3.4252 + 0.0005 - 0.00025 in (87 + 0.0127 - 0.0064 mm)		
Maximum rebore size	+ 0.030 in (0.76 mm)		
Bore size for fitting liners			
2.4 and 3.4 litre	3.391 to 3.392 in (86.13 to 86.16 mm)		

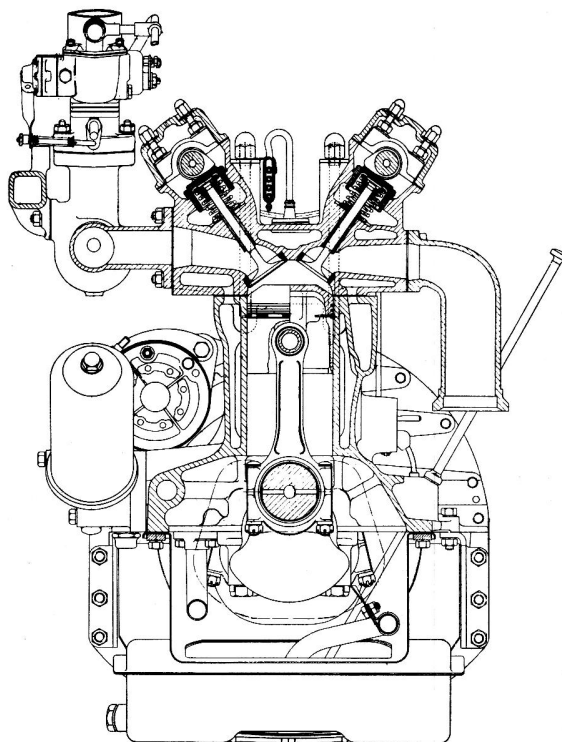


Fig.1.1. Cross sectional view of 2.4 litre engine

	240 and 340						
Outside diameter of liner	3.8 litre	...	...	...	...	...	3.561 to 3.562 in (90.45 to 90.49 mm)
	2.4 and 3.4 litre	...	...	...	...	...	3.3945 to 3.3955 in (86.22 to 86.25 mm)
	240 and 340						
Interference fit	3.8 litres	...	...	...	...	...	3.563 to 3.566 in (90.45 to 90.58 mm)
Overall length of liner	...	...	...	...	...	...	0.0025 to 0.0045 in (0.06 to 0.11 mm)
	2.4 litre	...	...	...	...	...	5.9375 in (15.08 cm)
	240						
Outside diameter of lead-in	3.4 and 3.8 litre	...	...	...	...	...	6.9688 in (17.7 cm)
	2.4 and 3.4 litre	...	...	...	...	...	3.389 to 3.391 in (86.08 to 86.13 mm)
	240 and 340						
Size of bore honed after assembly in cylinder block - Nominal	3.8 litre	...	...	...	...	...	3.558 to 3.560 in (90.37 to 90.42 mm)
	2.4 and 3.4 litre	...	...	...	...	...	3.2677 in (83 mm)
	240 and 340						
Main line bore for main bearings	3.8 litre	...	...	...	...	...	3.4252 in (87 mm)
	...	...	...	...	...	...	2.9165 + 0.0005 in (74.08 + 0.013 mm)
	...	...	...	...	...	...	-0.0000 in (-0.000 mm)
Cylinder head							
Type	2.4 Mk 1	...	...	...	...	...	Standard
	2.4 Mk 2, 3.4 and 3.8 litre	...	...	...	...	...	"B" type
	240 and 340						
Material	...	...	...	...	...	...	Aluminium alloy
Valve seat angle - inlet	2.4 litre Mk 1	...	...	...	...	...	30 degrees
	2.4 Mk 2, 3.4 and 3.8 litre	...	...	...	...	...	45 degrees
Valve seat angle - Exhaust	...	...	...	...	...	...	All models 45 degrees
Valve throat diameter							
Inlet - 2.4 litre Mk 1	...	...	...	...	...	...	1.375 in (34.9 mm)
	2.4 Mk 1, 3.4 and 3.8 litre	...	...	...	...	...	1.5 in (38.1 mm)
Exhaust - 2.4 litre Mk 1	...	...	...	...	...	...	1.25 in (31.75 mm)
	2.4 Mk 2, 3.4 and 3.8 litre	...	...	...	...	...	1.375 in (34.9 mm)

Tightening torque - cylinder head nuts	...	...	...	...	...
Firing order	...	...	...	...	...
				54 lb f ft 1 5 3 6 2 4	No 1 cylinder being at rear of engine unit.
Gudgeon pin					
Type	...	...	...	...	Fully floating
Length diameter	...	...	...	...	2.840 to 2.845 in (72.14 to 72.26 mm)
Inside diameter	...	...	...	...	0.625 in (15.87 mm)
Outside diameter	...	...	...	...	0.8750 to 0.8752 in (22.22 to 22.23 mm)
Lubricating system					
Oil pressure (hot)	...	...	...	...	40 lb per sq in at 3000 rpm
Oil pump - type	...	...	...	...	Eccentric rotor
Oil pump - clearance at end of lobes	...	...	...	...	0.010 in maximum (0.25 mm)
end clearance	...	...	...	...	0.004 in maximum (0.010 mm)
clearance between outer rotor and body	...	...	...	...	0.010 in maximum (0.25 mm)
Piston and piston rings					
Make	...	...	...	...	Brico
Type	...	...	...	...	Semi-split skirt
Piston skirt clearance (measured at bottom of skirt at 90° to gudgeon pin axis)	...	...	...	...	0.0011 to 0.0017 in (0.028 to 0.043 mm)
Gudgeon pin bore	...	...	...	...	0.8749 to 0.8751 in (2.223 to 2.227 mm)
Compression height					
7:1	...	...	...	...	240 and 2.4 litre 2.034 to 2.039 in (51.66 to 51.79 mm) 340 and 3.4 litre 1.690 to 1.695 in (42.93 to 45.05 mm) 3.8 litre 1.841 to 1.846 in (46.76 to 46.89 mm)
8:1	...	...	...	...	2.155 to 1.120 in (53.72 to 53.85 mm) 2.163 to 2.168 in (54.94 to 55.067 mm) 2.064 to 2.069 in (52.42 to 52.55 mm)
9:1	...	...	...	...	2.258 to 2.263 in (57.35 to 57.48 mm) 2.242 to 2.247 in (56.94 to 57.07 mm)
Piston rings - Number					
Compression 2.4 litre Mk 1	...	...	...	...	2
2.4 litre Mk 2	...	...	...	...	3
3.4 and 3.8 litre	...	...	...	...	2
240 and 340					
Oil control	...	...	...	...	1
Piston rings - width					
Compression	...	...	...	...	0.077 to 0.787 in (1.97 to 2.00 mm)
Oil control	...	...	...	...	0.155 to 0.156 in (3.94 to 3.96 mm)
Piston rings - thickness					
Compression	...	...	...	...	0.124 to 0.130 in (3.15 to 3.30 mm)
Oil control	...	...	...	...	0.119 to 0.127 in (3.02 to 3.23 mm)
Piston rings - side clearance in groove					
Compression	...	...	...	...	0.001 to 0.003 in (0.02 to 0.07 mm)
Oil control	...	...	...	...	0.001 to 0.003 in (0.02 to 0.07 mm)
Piston rings - gap when fitted to cylinder bore					
Compression	...	...	...	...	0.015 to 0.020 in (0.38 to 0.51 mm)
Oil control	...	...	...	...	0.011 to 0.016 in (0.28 to 0.41 mm)
Sparkling plugs					
Make	...	...	...	...	Champion
Type	...	...	...	...	2.4 Mk 1 2.4 Mk 2 3.4 Mk 1 3.4 Mk 2 3.8, 240 & 340
7:1 Compression ratio	...	...	...	...	N. 5. N. 5. N. 5. UN.12Y. UN.12Y.
8:1 Compression ratio	...	...	...	...	N. 5. N. 5. N. 5. UN.12Y. UN.12Y.
9:1 Compression ratio	...	...	...	...	— — N. 5. UN.12Y. UN.12Y.
Gap	...	...	...	...	0.030 0.025 0.025 0.025 0.025 (0.76 mm) (0.64 mm) (0.64 mm) (0.64 mm) (0.64 mm)
Tappets and tappet guides					
Tappet - Material	...	...	...	...	Chilled cast iron
Outside diameter	...	...	...	...	1.3738 to 1.3742 in (34.89 to 34.90 mm)
Diameter clearance	...	...	...	...	0.0008 to 0.0019 in (0.02 to 0.48 mm)
Tappet guide - Material	...	...	...	...	Austenitic iron
Inside diameter before reaming	...	...	...	...	1.353 to 1.357 in (34.37 to 34.48 mm)
Reaming size (when fitted to cylinder head)	...	...	...	...	1.375 +0.007 -0.000 in (34.925 + 0.018 - 0.000 mm)
Interference (shrink) fit in head	...	...	...	...	0.003 in (0.07 mm)
Timing chains and sprockets					
Type	...	...	...	...	Duplex
Pitch	...	...	...	...	0.375 in (9.5 mm)

Number of pitches - top chain	...	...	...	...	100	
bottom chain	...	...	...	...
2.4 litre Mk 1 and 2	...	...	...	...	68	
3.4 and 3.8 litre	...	...	...	...	82	
240						
340						
Crankshaft sprocket - teeth	...	...	...	...	21	
Intermediate sprocket, outer - teeth	...	...	...	...	28	
Intermediate sprocket, inner - teeth	...	...	...	...	20	
Camshaft sprocket - teeth	...	...	...	...	30	
Idler sprocket	...	...	...	...	21	
Valve timing					2.4 litres and 240	3.4 litre, 3.8 litre and 340
Inlet valve opens	...	...	...	...	10° B.T.D.C	15° B.T.D.C
Inlet valve closes	...	...	...	...	50° A.B.D.C	57° A.B.D.C
Exhaust valve opens	...	...	...	...	57° B.B.D.C	57° B.B.D.C
Exhaust valve closes	...	...	...	...	15° A.T.D.C	15° A.T.D.C
					(with valve clearances set at 0.010 in (0.25 mm))	
Valves and valve springs						
Valves - Material, Inlet	...	...	...	...	Silicon chrome steel	
Exhaust						
Mk 1 models	...	...	...	...	Austenitic steel	
Mk 2, 240 and 340 models	...	...	...	...	21-4-NS	
Valve head diameter, inlet	...	...	...	...	1.75 ± 0.002 in (44.45 ± 0.05 mm)	
exhaust	...	...	...	...	1.625 ± 0.002 in (41.27 ± 0.05 mm)	
Valve stem diameter, inlet and exhaust	...	...	...	...	0.3125 - 0.0025 in (7.95 - 0.06 mm)	
					- 0.0035 in - 0.09 mm)	
Valve lift - 2.4 litre and 240	...	...	...	...	0.3125 in (7.95 mm)	
3.4, 340 and 3.8 litre	...	...	...	...	0.375 in (9.5 mm)	
Valve clearance - Inlet	...	...	...	...	0.004 in (0.10 mm)	
Exhaust	...	...	...	...	0.006 in (0.15 mm)	
Valve seat angle - Inlet						
2.4 litre Mk 1	...	...	...	...	30°	
All other models	...	...	...	...	45°	
Exhaust	...	...	...	...	45°	
Valve spring - free length						
Inner	...	...	...	...	1.656 in (42.06 mm)	
Outer	...	...	...	...	1.9375 in (49.2 mm)	
Valve spring fitted length						
Inner	...	...	...	...	1.2188 in (30.96 mm)	
Outer	...	...	...	...	1.3125 in (33.34 mm)	
Valve spring - fitted load						
Inner	...	...	...	...	30.33 lbs (13.76 kg)	
Outer	...	...	...	...	48.375 lbs (21.94 kg)	
Valve spring - Solid length (max)						
Inner	...	...	...	...	0.810 in (20.57 mm)	
Outer	...	...	...	...	0.880 in (22.35 mm)	
Number of free coils						
Inner	...	...	...	...	6	
Outer	...	...	...	...	5	
Diameter of wire - Inner	...	...	...	...	12 SWG	
Outer	...	...	...	...	10 SWG	
Valve guide and valve seat insert						
Valve guides - material	...	...	...	...	Cast iron	
Valve guide - length, inlet	...	...	...	...	1.813 in (46.04 mm)	
exhaust	...	...	...	...	1.938 in (49.21 mm)	
Valve guide - inside diameter						
inlet	...	...	...	...	0.3125 - 0.0005 in (7.94 - 0.013 mm)	
exhaust	...	...	...	...	0.3125 ± 0.0005 in (7.94 ± 0.01 mm)	
Interference fit in head	...	...	...	...	0.0005 to 0.0022 in (0.013 to 0.055 mm)	
Valve seat inserts - material	...	...	...	...	Cast iron (centrifugally cast)	
inside diameter, inlet					+ 0.003 + 0.076	
2.4 litre Mk 1	...	...	...	...	1.375 - 0.001 in (34.92 - 0.025 mm)	
					+ 0.003 + 0.076	
All other models	...	...	...	...	1.50 - 0.001 in (38.1 - 0.025 mm)	
exhaust	...	...	...	...	+ 0.003 + 0.76	
2.4 litre Mk 1	...	...	...	...	1.25 - 0.001 in (31.75 - 0.025 mm)	
All other models	...	...	...	...	1.379 to 1.383 in (35.03 to 35.13 mm)	
interference shrink fit in head	...	...	...	...	0.003 in (0.076 mm)	

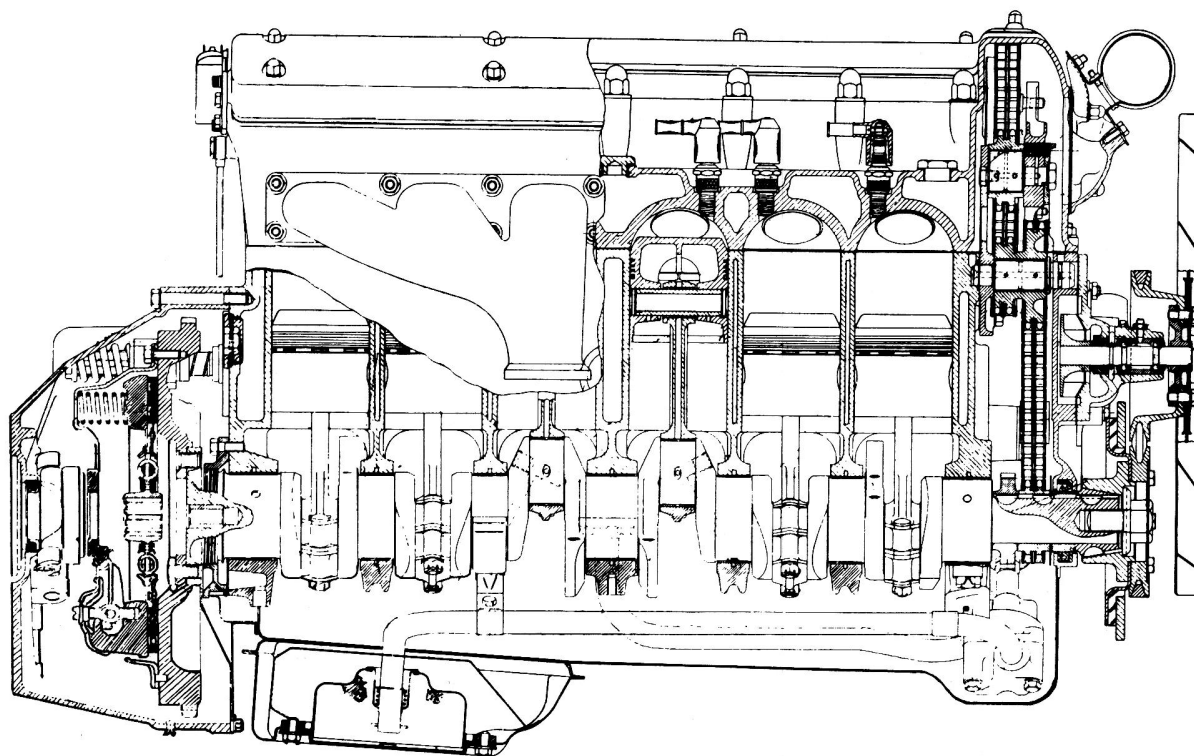


Fig.1.2. Longitudinal section view of 2.4 litre engine

1 General description

The engines fitted to the models covered by this manual are identical except in regard to length of stroke and cubic capacity.

They are based upon the original twin overhead camshaft XK power unit which had a cubic capacity of 3442 cc. The bore and stroke of that engine was retained but following development and modification it became the production 3.4 litre engine.

The 2.4 litre is a short stroke version of this engine, the stroke having been reduced from 4.1732 in (106 mm) to 3.0018 in (76.5 mm). The 3.8 litre engine is a further variation having the same stroke as the 3.4 litre but the cylinder bore was increased from 83 mm to 87 mm. The 3.8 litre engine was not available in Mk.1. cars but the 2.4 litre engine is fitted to 240 models and the 3.4 litre to 340 models.

The six-cylinder in-line engines are of unit constructions, are water cooled and are provided with two overhead camshafts operating the inlet and exhaust valves respectively. As indicated later in this chapter, there is no provision for routine adjustment of valve clearances. Valve timing 2.4 litre engines differs from that of 3.4 and 3.8 litre engines which are the same. The camshafts are roller chain driven and the drive is provided with chain tensioners.

The cylinder block is cast integral with the crankcase. The cylinder head is detachable and is made of aluminium alloy with machined hemispherical combustion chambers. The valve seat inserts and valve guides are of cast iron and are shrunk into the cylinder head.

The crankshaft is counterbalanced and is provided with seven plain shell bearings all of which are pressure lubricated. Axial thrust is taken at the centre bearing position. A torsional vibration damper (except early 2.4 litre engines) is fitted externally to the front of the crankshaft. The generator and the water pump impeller, which is of centrifugal type, are driven by a single belt from a pulley which is immediately forward of the crankshaft vibration damper.

The oil pump is driven from the front end of the crankshaft and is located inside the sump drawing oil through an internal pipe from the rear. Pressurised oil is fully filtered before being fed to the engine, it passes through an external oil filter of the fullflow type which incorporates a balance valve and a relief valve from which excess oil is returned to the sump. Oil is fed to the camshafts via the main oil feed gallery in the cylinder block and an external pipe at the rear of the engine.

Plain shell big-end bearings are provided for the connecting rods and phosphor bronze bushes for the gudgeon pins which are pressure oil-fed through longitudinal drillings up the connecting rod. The pistons are semi-split skirt type and are made from aluminium alloy. Different pistons can be used to give compression ratios of 7:1 and 8:1 in 2.4 litre engines and 7:1, 8:1 and 9:1 in 3.4 and 3.8 litre engines. Despite similar diameters the pistons for the 2.4 and 3.4 litre engines are not interchangeable. Gudgeon pins of the fully floating type are used.

All engines are fitted with twin carburettors, those on the 2.4 Mk.1 and 2 cars are Solex downdraught type whilst SU side-draught are fitted to all other models. An air cleaner, which also provides air intake silencing is fitted. It must be noted that ignition timing is not identical and is dependent on the type of air cleaner fitted, engine capacity and compression ratio; full information of the variations are given later in this Chapter. Ignition is by coil and the distributor, which is driven by the same crankshaft gear as the oil pump, is an automatic advance/retard unit.

The engine is supported on two rubber mountings at the front; engines with manual gearboxes utilise a spring type mounting at the rear whilst rubber mountings are provided for those engines fitted with automatic gearboxes. All engines have, in addition, a stabiliser which is located immediately behind the cylinder block.

Twin exhaust manifolds, each serving three cylinders, connect with a branched downpipe and single silencer and tailpipe system in the case of 2.4 litre engines but 3.4 and 3.8 litre engines are provided with two downpipes and twin silencers and tailpipes.

2 Major operations with engine in place

The following major operations can be carried out with the engine in place in the car:-

- 1 Removal and replacement of the cylinder head assembly.
- 2 Removal and replacement of the sump.
- 3 Removal and replacement of the big end bearings.
- 4 Removal and replacement of the pistons and connecting rods.
- 5 Removal and replacement of the camshafts.
- 6 Removal and replacement of the oil pump.
- 7 Removal and replacement of the timing gear.
- 8 Removal and replacement of the clutch driven plate.

3 Major operations with the engine removed

The following major operations must be carried out with the engine removed from the car and on a bench or on the floor:-

- 1 Removal and replacement of the main bearings.
- 2 Removal and replacement of the crankshaft.

4 Methods of engine removal

The engine and gearbox assembly weighs approximately 8 cwt, it is essential, therefore, that the lifting tackle and ancillary equipment being used to remove, and to replace, the engine are in good condition and are suitable for the task. The engine can be removed by either lifting it, with gearbox attached, upwards out of the engine compartment or by lowering the assembly below the car. The following factors must be taken into account when deciding which method to use:-

- 1 The lifting tackle used must be capable of lifting the engine about three feet upwards out of the car.
- 2 To drop the engine downwards out of the car:-
 - a) The front suspension must be removed.
 - b) A pit, deep enough to allow working under the car and wide enough to allow an assistant to remain in the pit, in safety, to guide the engine whilst it is being lowered, must be available.

5 Engine removal with gearbox - lifting upwards

- 1 Disconnect and remove the battery.
- 2 Drain coolant from the system in the manner described in Chapter 2.
- 3 Remove the sump and gearbox drain plugs and drain the oil from these items.
- 4 Remove the front seat squabs.
- 5 Undo and remove captive nut at the front, and the screw at the rear, of each seat slide and remove the front seats.
- 6 Remove the gear lever knob.
- 7 Remove the serrated nut at the rear of the heater cover and the screws securing it to the front console and lift out the heater cover.
- 8 Remove the screws holding the gear lever grommet securing ring and lift out the rubber grommet and the ring.
- 9 Remove the console side covers by undoing the chrome plated nut.
- 10 Remove the front console panel and heater controls by undoing the securing screws at the top of the panel and one at the base. Move the panel to one side out of the way; there is no need to disconnect the heater control cables.
- 11 Disconnect the air distribution pipes at the front connection and move them back out of the way.
- 12 Remove, as carefully as possible, the sound proofing felt stuck to the gearbox dome cover.
- 13 Remove the eleven screws securing the dome cover to the floor of the car and lift off the dome cover.
- 14 The top of the gearbox is now exposed and to the front of the gear lever remote control assembly will be seen the overdrive and reverse switches. Disconnect the leads to the switches.

15 When lifting out the engine the gear lever tends to catch on the underside of the body of the car so, although not essential, it may be found advantageous at this point to remove the gear lever remote control assembly. Undo the four retaining nuts and lift out the assembly.

16 Mark the position of the hinge brackets of the bonnet to facilitate refitting.

17 With the help of an assistant take the weight of the bonnet. Remove the two set bolts securing the bonnet to each hinge, carefully lift the bonnet towards the front of the car and store in a safe place where it will not be scratched.

18 Undo the butterfly nut to the centre bolt of the air cleaner and lift out the air cleaner.

19 Undo the two bolts securing the air intake pipe to the carburettors and remove the pipe.

20 Remove the engine breather pipe by disconnecting the clip securing the flexible pipe to the breather housing at the front of the cylinder head.

21 Disconnect the electrical leads and the plastic outlet tube to the windscreen washer bottle and remove the bottle (take note of the location of the leads for correct reassembly).

22 Undo the clips securing the top and bottom water hoses to the radiator. Remove the hoses.

23 Remove the radiator cowl (if fitted) and the radiator in the manner described in Chapter 2.

24 Remove the dynamo connections. Note that the brown/yellow wire is connected to the large terminal as is the radio suppressor (if fitted). Remove the two mounting bolts and the adjusting bolt; tilt the dynamo to slacken the fan belt, disengage the fan belt and lift out the dynamo.

25 Remove the nuts securing the exhaust manifolds to the cylinder head. Pull the manifolds outwards, secure them to take their weight and to keep them out of the way.

26 Disconnect the two clips securing the heater pipes at the rear of the engine and remove the two pipes.

27 Detach the leads from the tags on the revolution counter AC generator at the rear of the right hand camshaft cover.

28 Disconnect the clutch fluid pipe at the bracket at the rear of the cylinder head.

29 Disconnect the leads to the auxiliary starting carburettor.

30 Remove the cover on the auxiliary starting carburettor.

31 Disconnect the fuel pipes at the float chambers by removing the banjo bolts. Note the fibre sealing washers.

32 Disconnect the fuel feed pipe at the fuel filter and remove it.

33 Remove the split pin, plain and spring washers from the connecting link pivot pin located on the manifold between the front and rear carburettors and disconnect the throttle link rod joint from the ball on the bell crank lever.

34 Remove the clip attaching the overflow pipes from the float chambers to the oil filter mounting screw and disconnect the union connecting the starter pipe to the auxiliary starting carburettor.

35 Remove the nuts and washers securing each carburettor to the inlet manifold and remove the carburettors. Note: The carburettors of the 2.4 litre engine need not be removed unless so desired.

36 Remove the throttle support linkage and disconnect the throttle return spring at the oil filter.

37 Disconnect the leads from the oil pressure transmitter at the oil filter.

38 Detach the flexible rubber hose (brake servo) from the rigid pipe below the inlet manifold adjacent to the ignition distributor vacuum unit.

39 Disconnect the cable to the starter motor.

40 Detach the H.T. lead connections at the spark plugs. Remove the clip securing the plug lead harness. Disconnect the lead to the coil, unclip the distributor head and remove the head and also the rotor.

41 Remove the leads to the coil. Undo the two nuts and bolts securing the coil and remove the coil.

42 Remove the lead from the head of the temperature gauge indicator unit. This unit is located beneath or in the side of the water outlet pipe for the 2.4 litre or 3.4 and 3.8 litre cars

respectively.

43 Disconnect the earth connection to the gearbox at the bulkhead at the rear left hand side of the engine.

44 Remove the power assisted steering reservoir (when fitted) but first remove the pump inlet hose from beneath the reservoir and allow the oil to drain into a container.

45 Refer to Chapter 2 and remove the cooling fan.

46 Remove the locknut and washer from the engine stabiliser at the rear of the cylinder block.

47 Disconnect the speedometer drive from the rear of the gearbox.

48 Undo the nuts securing the clutch master cylinder to the gearbox, pull it away from the box and away from the operating plunger.

49 Mark the relative position of the propeller shaft and the gearbox flange so that they may be refitted in their original position. This is important otherwise vibration may be experienced.

50 Chock one rear wheel and jack up the other so that the propeller shaft can be rotated.

51 Remove the split pins, nuts and washers (or self locking nuts) to the bolts securing the shaft to the gearbox flange. For this operation it will either be necessary to chock the raised wheel or to hold the propeller shaft from turning by inserting a screwdriver between the shaft and the universal joint.

52 Separate the shaft from the gearbox flange.

53 Sling the engine to take the weight off the mountings. A special lifting plate, Churchill Tool No. J.8. (see Fig.1.3) can be obtained for slinging the engine. Use of the tool requires the removal of cylinder head nuts No's 3,6, 8 and 9 and these can be identified by reference to Fig.1.8. The tool fits on those cylinder head studs and is held in position by the nuts, this is illustrated in Fig.1.4 which shows slinging of the engine less gearbox. As an alternative to the tool, make up two pieces of 2" or 3" angle iron about two inches wide and drill and fit to cylinder head studs No's 3 and 6. The upper flange should be

drilled to take the point of lift immediately above those studs.

54 Remove the bolt securing the engine to each front mounting.

55 As a safety measure and to hold the engine steady, support the gearbox on a jack.

56 Place a large washer over the spigot protruding from the centre of the rear mounting and insert a 1/8" diameter rod through the hole in the spigot. This will hold the mounting spring compressed when the mounting is removed from the body (Fig 1.5).

57 Remove the bolts and packing washers from the rear engine support bracket taking note of the number and position of the various packing washers fitted between the bracket and the body floor.

58 Lower the jack slightly to facilitate the removal of the nut and shakeproof washers securing the mounting to the bracket attached to the gearbox.

59 Lower and remove the jack but have an assistant watching the engine in the engine bay because as the jack is lowered so will the engine take up a hanging attitude, with gearbox down.

60 Make a final check that all connections between the engine/gearbox and body have been disconnected.

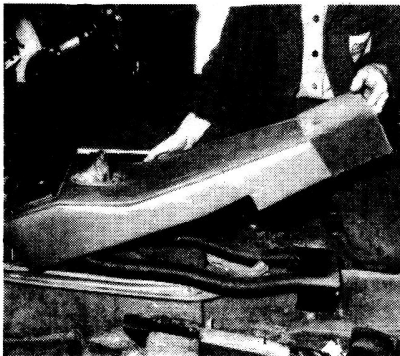
61 Commence lifting the engine checking continually that the gearbox is not fouling underneath the body.

62 When the sump is clear of the radiator grille, start inching the engine forwards or moving the car rearwards depending on the method of working.

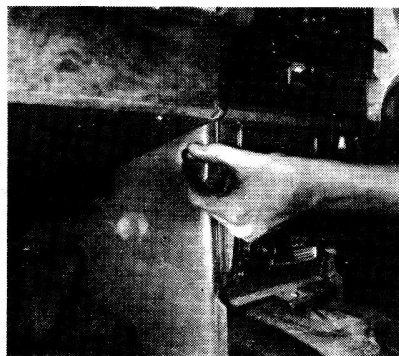
63 Carry on lifting and moving the engine away from the car until the sump is clear of the front of the car, by this time the gearbox should be clear of the body and it should be possible to lift on the gearbox and to swing the engine clear of the car.

64 The engine may now be lowered on to a prepared stand or on to supports on the bench, or on the floor, so positioned that its weight is evenly distributed.

65 To complete the job, collect any loose nuts and bolts and tools from the engine compartment and the floor and place them where they will not be lost.



5.7. Remove heater cover



5.8. Remove gear lever grommet and ring



5.9. Remove console side covers



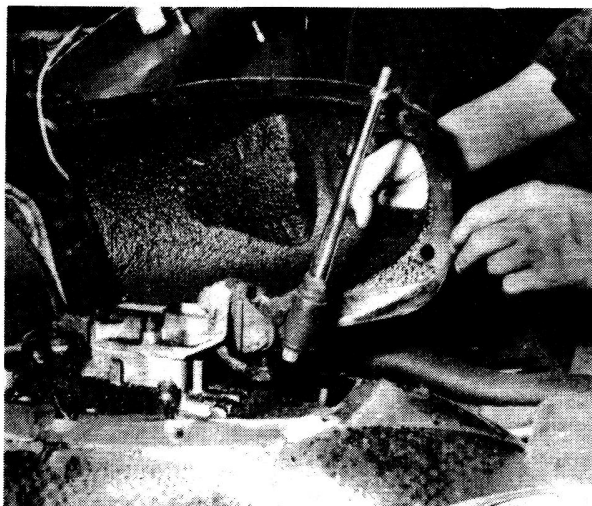
5.10. Remove front console panel



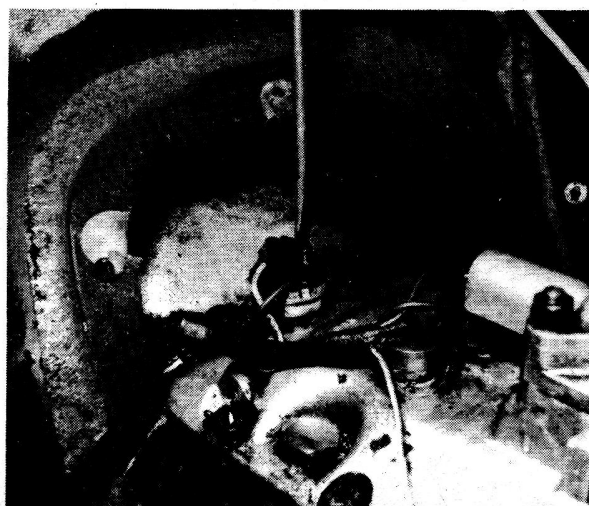
5.11. Disconnect air distribution pipes



5.12. Remove sound-proofing



5.13. Remove gearbox dome cover



5.14. The overdrive and reverse switches



5.15. Remove gear lever remote control assembly



5.16. Mark position of bonnet hinges



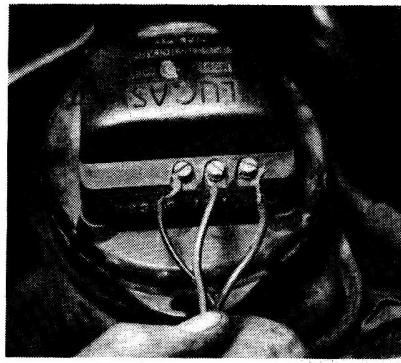
5.17. Lift off bonnet



5.18. Remove air cleaner



5.19. Remove air intake pipe



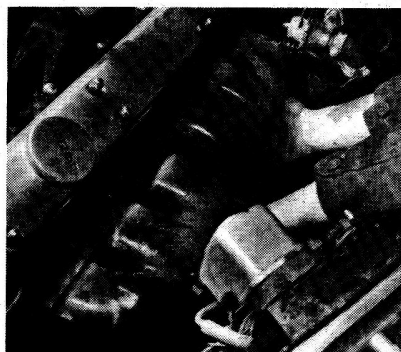
5.21. Disconnect leads to windscreen washer bottle (later models have two leads)



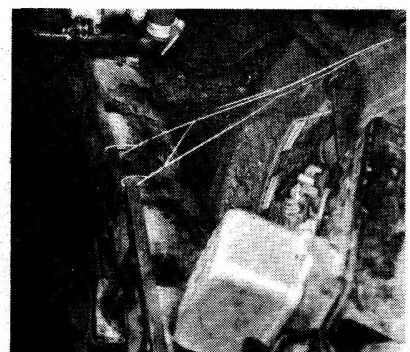
5.22. Remove radiator hoses



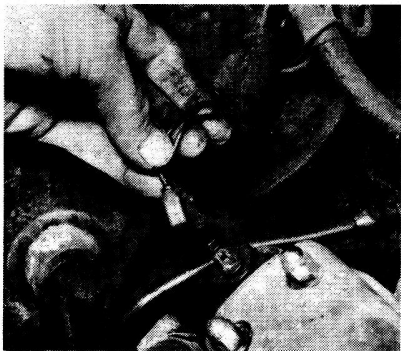
5.24. Disconnect dynamo connections



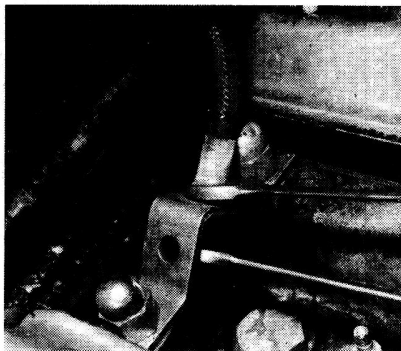
5.25a. Pull exhaust manifold outwards



5.25b. Secure exhaust manifold



5.27. Detach leads from revolution counter generator



5.28. Disconnect clutch fluid pipe



5.29. Remove cover of auxiliary starting carburettor



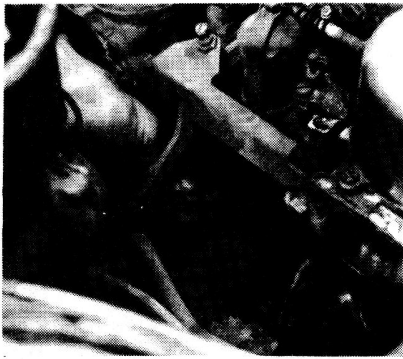
5.30. Disconnect leads of auxiliary starting carburettor



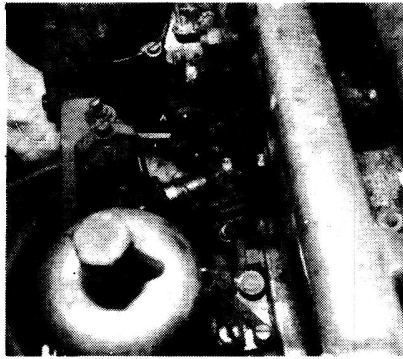
5.31. Disconnect fuel pipes at float chambers



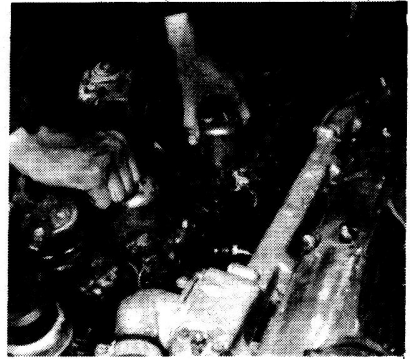
5.32. Disconnect fuel pipe at filter



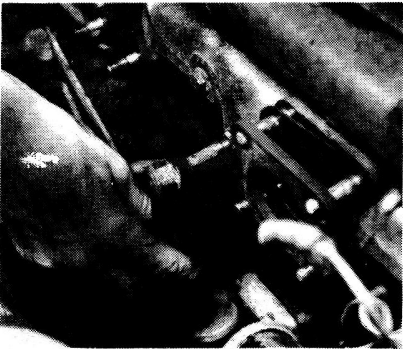
5.33. Disconnect throttle assembly



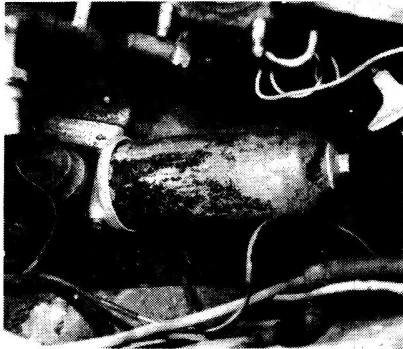
5.34. Disconnect auxiliary starting carburettor union



5.35. Remove carburettors



5.36. Remove throttle support linkage



5.37. Disconnect leads from oil pressure transmitter



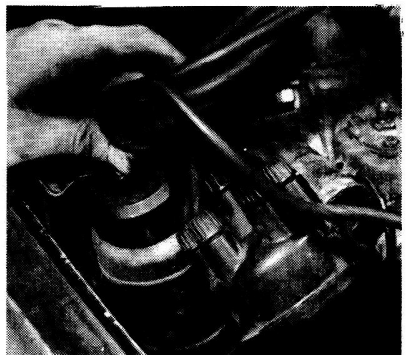
5.38. Detach brake servo pipe



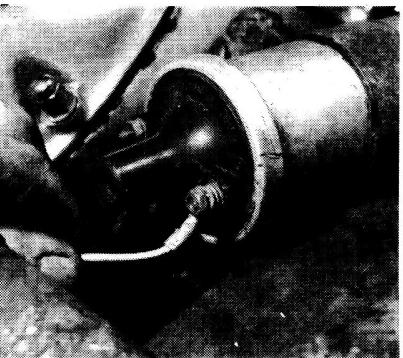
5.39. Disconnect cable to starter motor



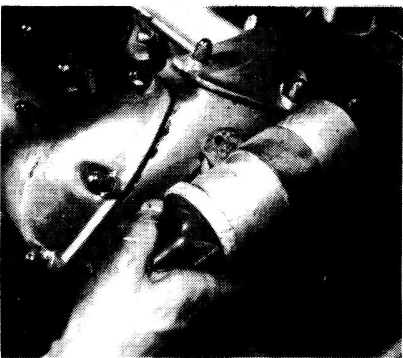
5.40a. Remove clip securing plug lead harness



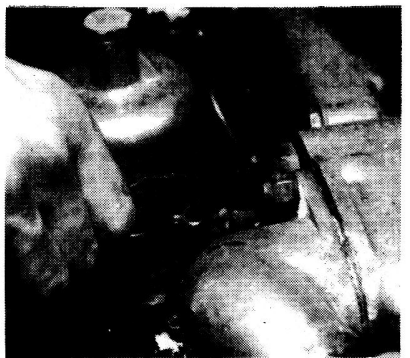
5.40b. Remove distributor head and plug lead harness



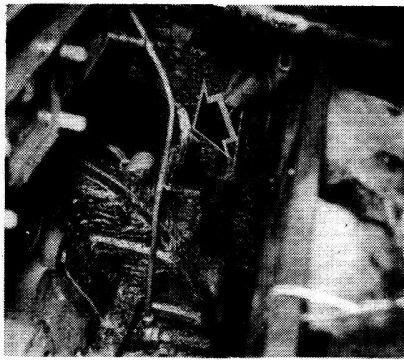
5.41a. Remove leads to coil



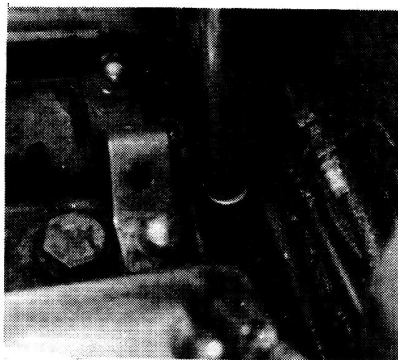
5.41b. Remove coil



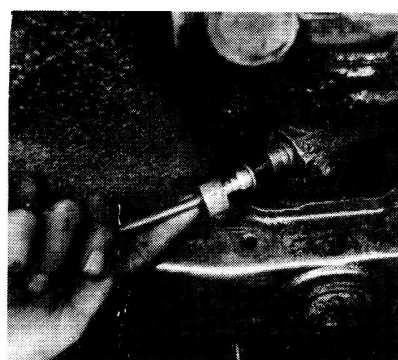
5.42. Remove lead from temperature gauge indicator unit



5.43. Disconnect gearbox earth connection



5.46. Remove locknut and washer from engine stabiliser



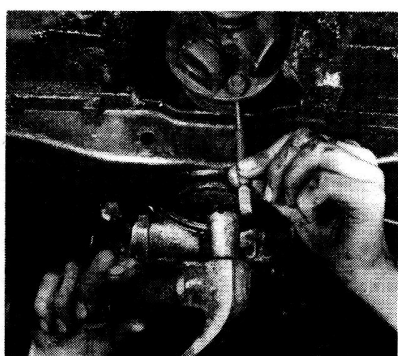
5.47. Disconnect speedometer drive



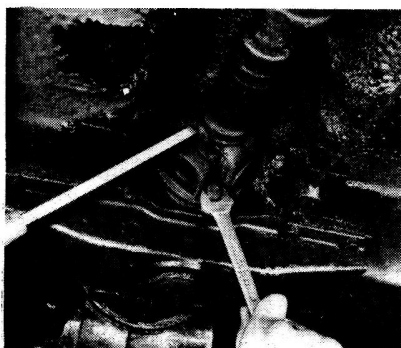
5.48a. Undo nuts at clutch master cylinder



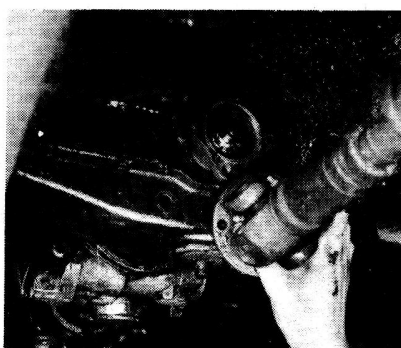
5.48b. Pull master cylinder away from operating plunger



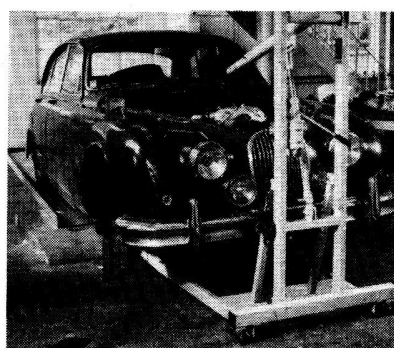
5.49. Mark position of flanges



5.51. Disconnect propeller shaft - hold it from turning



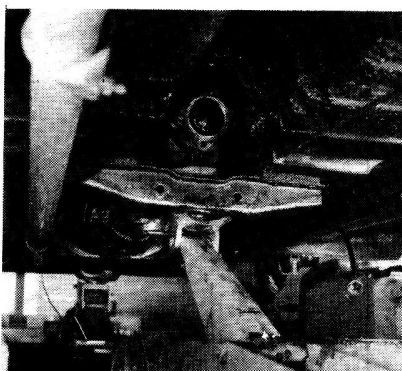
5.52. Separate shaft from gearbox flange



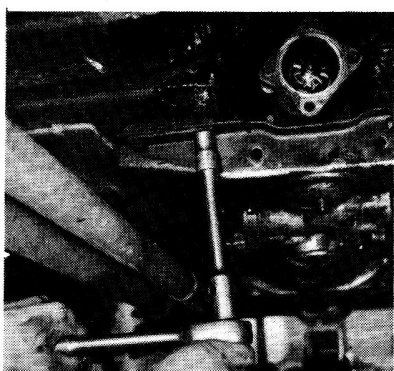
5.53. Sling engine to take weight



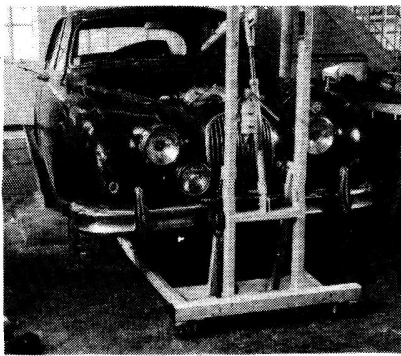
5.54. Remove front mounting bolts



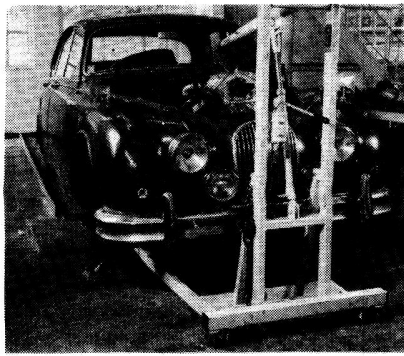
5.55. Support gearbox on a jack



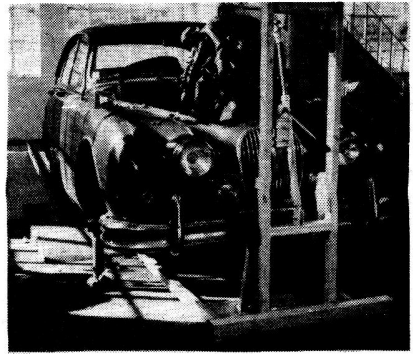
5.57. Remove rear engine support bracket



5.61a. Lifting engine - stage 1



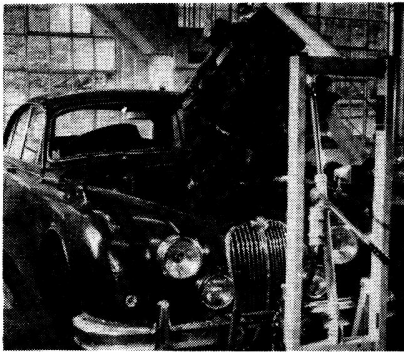
5.61b. Lifting engine - stage 2



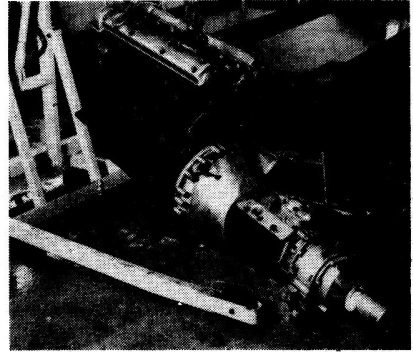
5.61c. Lifting engine - stage 3



5.62. Lifting engine - stage 4



5.63. Lifting engine - stage 5 sump clear



5.64. Lower engine to floor

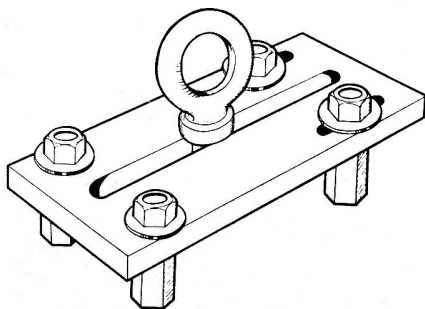


Fig.1.3. The engine lifting plate

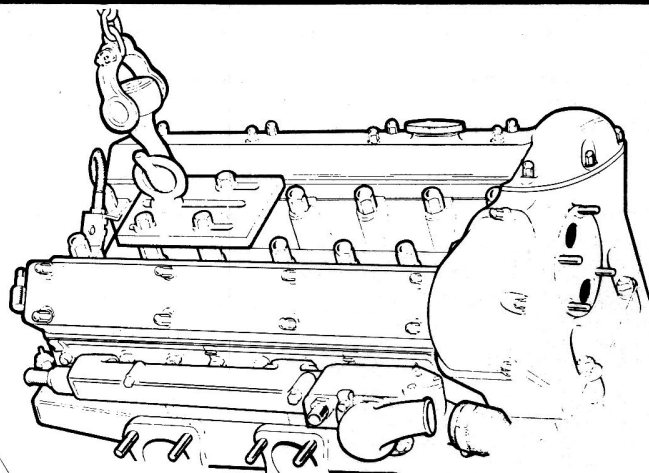


Fig.1.4. The engine lifting plate in use

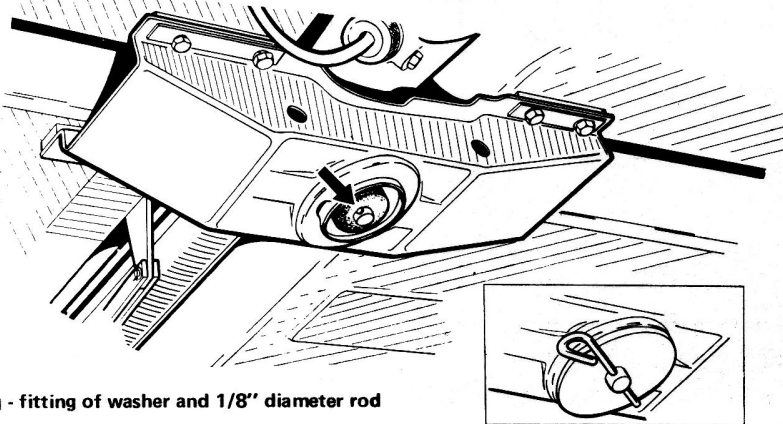


Fig.1.5. The rear engine mounting - fitting of washer and 1/8" diameter rod

6 Engine removal less gearbox

The engine may be removed less the gearbox if desired but it is felt that as there is so little work involved in disconnecting the gearbox from the car and as space for forward movement of the engine is so limited, it is preferable to remove the gearbox and engine as an assembly.

7 Engine removal with gearbox (from underside)

- 1 Follow the instructions given in Section 5, paragraph 1-53 (inclusive).
- 2 Move the car over a pit if not already so positioned.
- 3 Refer to Chapter 11 and remove the front suspension.
- 4 Sling the engine to take the weight off the mountings (see Section 5 paragraph 54). Remove the bolt securing the engine to each front mounting.
- 5 As a safety measure and to hold the engine steady, support the gearbox on a jack.
- 6 Place a large washer over the spigot protruding from the centre of the rear mounting and insert a 1/8" diameter rod through the hole in the spigot. This will hold the mounting spring compressed when the mounting is removed from the body.
- 7 Remove the bolts and packing washers fitted between the bracket and body floor taking note of the number and positions of the washers.
- 8 Slowly lower the jack from under the gearbox but have an assistant watching the engine in the bay because as the jack is lowered so will the engine take up an attitude with gearbox downwards.
- 9 Lower the engine slowly and inch it to the rear to clear the front mounting brackets. Remove the brackets if the attitude of the engine is such that they cannot be cleared.
- 10 Carry on lowering the engine; place some wooden battens on the floor on which the engine can be rested. Make sure that these are so positioned that the weight of the engine is evenly distributed.
- 11 To complete the job clear any loose nuts, bolts and tools

from the engine compartment and the floor and place them where they will not be lost.

8 Separating the engine from the gearbox (manual)

- 1 Remove the two bolts securing the starter to the clutch housing and remove the starter.
- 2 Tilt the engine to give access to the flywheel dust cover. Undo the four nuts and bolts securing the cover and remove it.
- 3 Remove the nuts and bolts securing the clutch housing to the engine, starting at the bottom and working towards the top. The box must be supported during this operation to avoid straining the clutch driven plate and the constant pinion shaft.
- 4 Carefully draw the gearbox rearwards clear of the engine.

9 Separating the engine from the transmission unit (automatic)

- 1 Drain the fluid from the transmission unit oil pan by removing the Allen screw using a 1/4" AF key.
- 2 Remove the dipstick, detach the dipstick tube top securing clip and unscrew the tube from the oil pan. A special tool, Churchill Tool No.508, is available for this purpose but it will probably be found that sufficient purchase can be obtained using a strap wrench.
- 3 Remove the transmission unit retaining bolts commencing with the two bottom ones. Support the unit during this operation and place a container beneath the unit to catch the fluid from the converter when the transmission unit is withdrawn. DO NOT place supports immediately below the sump tray.

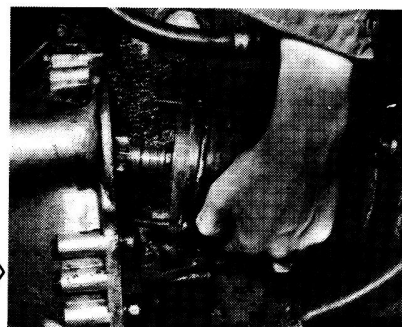
10 Removal and replacement of gearbox and clutch assembly - with engine installed

It was thought that it would be possible to remove and replace the gearbox and clutch assembly with the engine installed. It is not possible to do so without cutting away part of the bulkhead. The gearbox has to be pulled too far to the rear to clear the primary shaft of the flywheel and clutch.



8.1a. Remove starter securing bolts

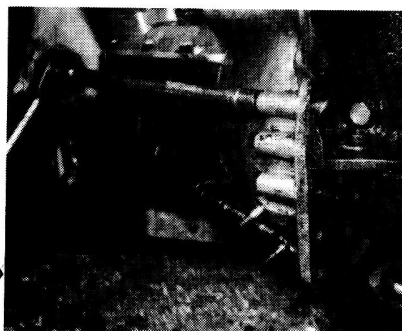
8.1b. Remove starter



8.2. Remove flywheel dust cover



8.3. Remove clutch housing securing bolts



11 Dismantling the engine - general

- 1 It is best to mount the engine on a dismantling stand, but if one is not available, stand the engine on a strong bench at a comfortable working height. It can be dismantled on the floor but this makes for very awkward and uncomfortable working.
- 2 During the dismantling process the greatest care should be taken to keep the exposed parts free from dirt. To that end, thoroughly clean down the outside of the engine, removing all traces of oil and congealed dirt. Use paraffin or a proprietary solvent. The latter will make the job much easier for, after the solvent has been applied and allowed to stand for a time, a vigorous jet of water will wash off the solvent with all the dirt. If the dirt is thickly and deeply embedded, work in the solvent with a wire brush.
- 3 Finally wipe down the exterior of the engine with rag and only then when the engine is quite clean, should the dismantling process begin. As the engine is stripped, clean each part in a bath of paraffin or solvent.
- 4 Never immerse parts with oilways (for example the crankshaft) in the cleaning bath. To clean such items, carefully wipe down with a clean paraffin rag and wipe dry. Oilways can be cleaned out with nylon pipe cleaners or blown through with air blast.
- 5 Re-use of old engine gaskets, copper washers etc is false economy and will, in all probability, lead to oil or water leaks. Always use new items throughout.
- 6 Retain the old gaskets until the job is finished for it sometimes happens that an immediate replacement is not available and in such case the old item comes in very useful as a template.
- 7 When stripping the engine it is best to work from the top down but the underside of the crankcase, when supported on wood blocks, makes a firm base from which to work. It may be preferred, therefore, to remove the sump early on.
- 8 Whenever possible, replace nuts, bolts and washers finger tight from wherever they are removed. This helps to avoid loss and muddle later; if they cannot be replaced lay them out in such a fashion that it is clear from whence they came.

12 Removing the ancillary engine components

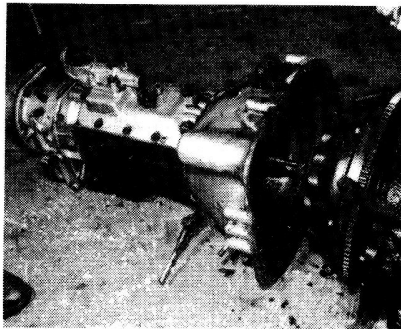
Before basic dismantling begins it is necessary to strip it of ancillary components as follows:-

- Clutch — Fuel pipes under inlet manifold
- Flywheel — Oil filter
- Distributor — Thermostat

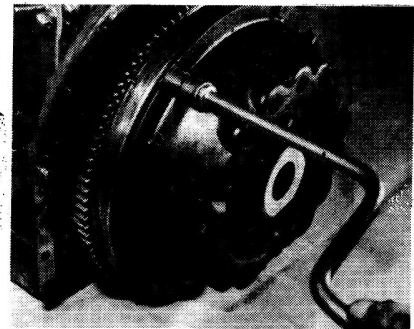
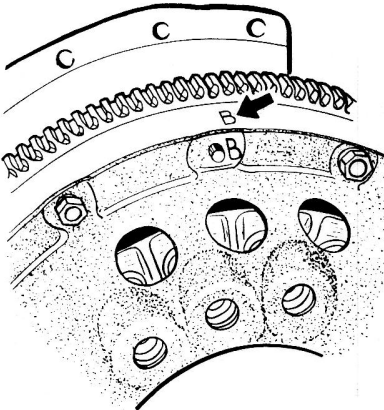
Oil supply pipes to camshaft — Water pump, crankshaft damper and pulley

- 1 Remove the clutch by slackening the mounting screws a turn at a time by diagonal selection until the thrust spring pressure is released. Remove the set screws and withdraw the clutch assembly from the flywheel. Note that the clutch and flywheel are balanced as an assembly and correct location should be marked by balance marks "B" on the clutch and flywheel. If the marks are not present, mark the clutch and flywheel assembly location yourself. Store the driven plate assembly so that the faces will not be contaminated by oil or dirt.
- 2 Knock back the tabs to the locking plate of the ten flywheel bolts. Undo the bolts and remove the locking plate. Remove the flywheel from the crankshaft by tapping with a hide faced hammer.
- 3 Slacken the distributor clamp plate bolt and remove the distributor. Remove the set screw and remove the clamp plate. Turn the engine to bring No.6 piston on TDC on the compression stroke and note the position of the offset driving slot.
- 4 Remove the oil supply pipes to the camshaft at the rear of the engine; note the fibre washers.
- 5 Unscrew the six connecting nuts and remove the fuel pipes from the underside of the inlet manifold.
- 6 Drain the upward pointing type of oil filter by removing the drain plug in the head of the assembly. Remove the two bolts holding the filter to the crankcase and remove the filter (both types). The upward pointing type is shown in the photograph adjacent but the method of attachment to the engine is the same for both types.
- 7 Slacken the clip securing the rubber hose from the water pump to the elbow on the top water rail and remove the hose from the elbow.
- 8 Unscrew the two nuts securing the elbow and remove it.
- 9 Remove the thermostat which is uncovered when the elbow union is removed. (see Chapter 2).
- 10 Slacken the clip securing the rubber hose to the water pump union and remove the hose.
- 11 Remove the bolts securing the water pump to the front cover and remove the pump.
- 12 Remove the bolts securing the centre bolt locking plate of the crankshaft damper.
- 13 Remove the damper securing bolt.
- 14 Prise the damper and pulley away from the engine off the split cone.
- 15 Remove the split cone and the distance piece and oil thrower behind it. Note the woodruff keys locating these items on the crankshaft; remove and store in a safe place. The engine is now stripped of all ancillary items and is ready for major dismantling to begin.

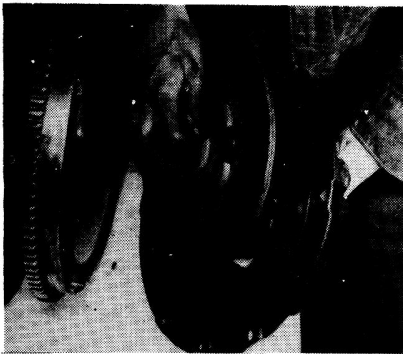
Fig.1.6. Balance marks on clutch and flywheel



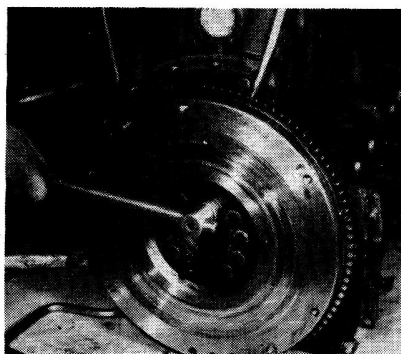
8.4. Draw gearbox rearwards clear of engine



12.1a. Remove clutch mounting screws



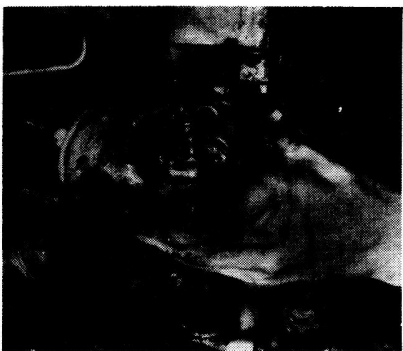
12.1b. Lift off clutch assembly



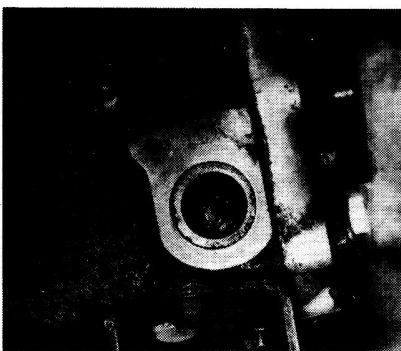
12.2a. Undo flywheel bolts



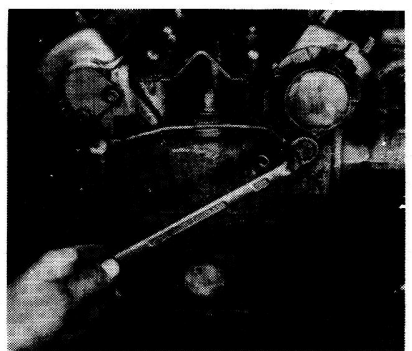
12.2b. Remove flywheel



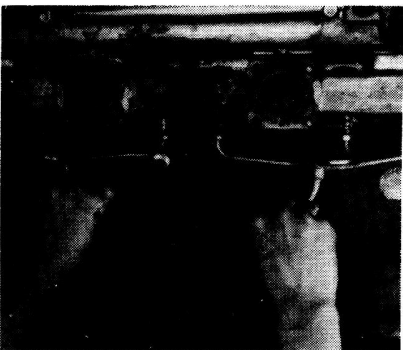
12.3a. Remove distributor



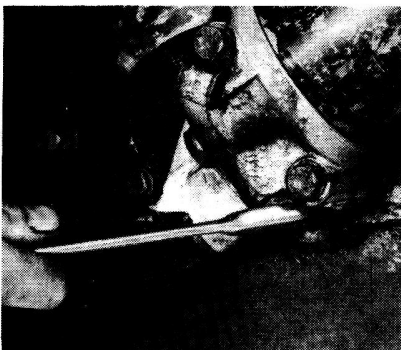
12.3b. Note position of offset slot



12.4. Remove camshaft oil supply pipes



12.5. Remove fuel pipes from inlet manifold



12.6a. Drain upward pointing type oil filter



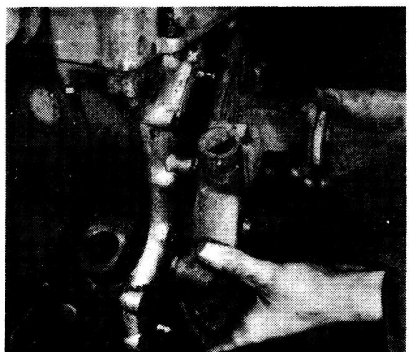
12.6b. Remove oil filter



12.10. Remove hose from water pump union



12.11a. Removing water pump bolts



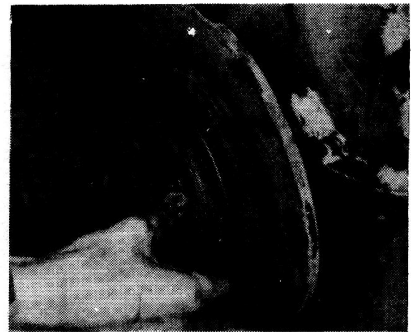
12.11b. Remove water pump



12.12. Remove crankshaft damper locking plate



12.13. Removing crankshaft damper securing bolt



12.14. Removing crankshaft damper and pulley

13 Cylinder head removal - engine on bench

- 1 Remove the eleven dome nuts securing each camshaft cover and remove the covers.
- 2 Remove the four nuts securing the engine breather at the front of the cylinder head. Remove the breather, the two gaskets and gauze filter (early cars will have a plate with two holes in lieu of the gauze filter).
- 3 In the space covered by the engine breather will be seen a serrated plate secured by a bolt. Knock up the tab washer to the bolt and slacken it. Depress the spring loaded plunger and rotate the plate in a clockwise direction (a pair of round nosed pliers entered in the holes in the plate is a handy tool for this) and this will relieve some of the tension in the top timing chain. Conversely, rotating the serrated plate anti-clockwise will tension the chain.
- 4 Break the locking wire to the two bolts securing the top sprocket to the camshaft.
- 5 It is a good tip at this stage to fit a thin nut (7/16" A/F) to the threaded end of the sprocket shaft outside of the support slide. A nut cut in half will suffice. The object of this is to retain

the sprocket and chain when disconnected from the camshaft and prevent them falling into the sump.

6 Remove the sprocket securing bolts.

7 Tighten down on the nut you have fitted to the sprocket shaft, this will pull the sprocket away from the camshaft.

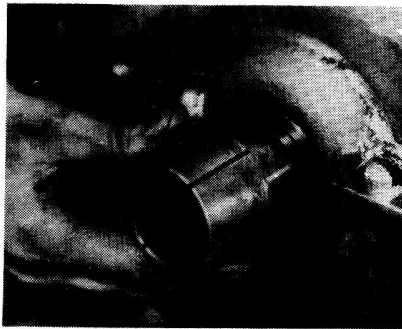
8 Push the sprocket up the support slide to slacken the chain as much as possible and lock in this position with the nut holding the sprocket shaft on the spanner flats behind the support slide.

9 Repeat the above for the other sprocket.

10 Refer to Fig 1.8 and slacken the cylinder head nuts a part turn at a time in the order shown, (nuts 15-20 are below the head and above the front timing cover).

11 With the help of an assistant, lift off the cylinder head. If the gasket is partly stuck to the head, clean it off because, as it will catch on the cylinder head studs, it will prevent the head being lifted. Similarly watch the nut you have fitted to secure the sprocket as this may foul the front of the head if too thick or if the sprocket shaft is protruding too far.

12 Place the cylinder head on wooden blocks on the bench to avoid damage to the valves which will be protruding proud of the head at this stage.



12.15. Removing split cone



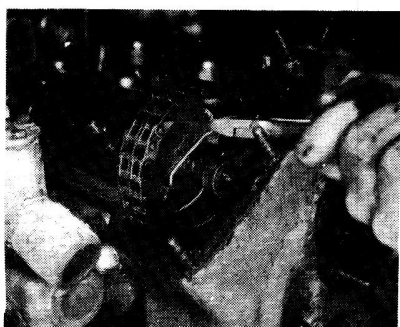
13.1. Remove camshaft covers



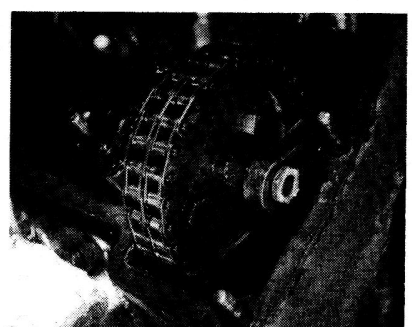
13.2. Removing engine breather



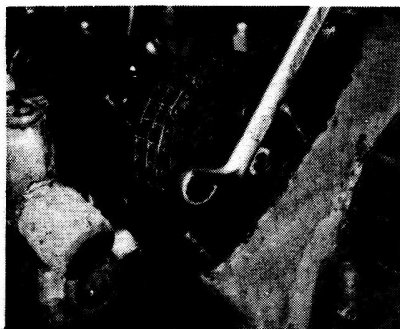
13.3. Rotate serrated plate clockwise



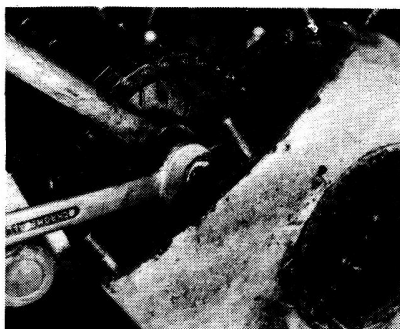
13.4. Break locking wire



13.5. Fit thin nut to sprocket shaft



13.6. Remove sprocket securing bolts



13.7. Tighten nut on sprocket shaft



13.10. The nuts below the cylinder head

14 Cylinder head removal - engine in car

Read in conjunction with the instructions given in Section 5.

- 1 Disconnect the battery.
- 2 Drain coolant from the system in the manner described in Chapter 2.
- 3 Mark the position of the hinge brackets of the bonnet to facilitate refitting.
- 4 With the help of an assistant, take the weight of the bonnet and remove the two bolts securing it to each hinge. Lift the bonnet towards the front of the car and store in a safe place where it will not be damaged.
- 5 Remove the air cleaner and the air intake pipe at the carburettors.
- 6 Disconnect the flexible pipe to the engine breather at the front of the cylinder head.
- 7 Disconnect the top water hose to the radiator and the hose from the water pump at the elbow union at the top right hand side of the cylinder head.
- 8 Remove the radiator cowl (if fitted) and the radiator in the manner described in Chapter 2.
- 9 Slacken the dynamo mounting bolts and remove the fan belt.
- 10 Remove the fan.
- 11 Remove the nuts securing the exhaust manifolds to the cylinder head. Pull the manifolds away from the engine and secure them to take their weight and to keep them out of the way.
- 12 Disconnect the two clips securing the heater pipes at the rear of the engine and remove the two pipes.
- 13 Unscrew the nuts securing the heater assembly to the bulkhead so that the assembly can be pushed to one side slightly when lifting the cylinder head.
- 14 Detach the leads from the tags on the revolution counter AC generator at the rear of the right hand camshaft cover.
- 15 Disconnect the clutch fluid pipe at the bracket at the rear of the cylinder head.
- 16 Disconnect the leads to the automatic choke.
- 17 Disconnect the automatic choke to inlet manifold.
- 18 Disconnect the fuel feed between the carburettors and the fuel feed to the fuel filter.
- 19 Remove the split pin, plain and spring washers from the connecting link pivot pin located on the manifold between the carburettors and disconnect the throttle link rod joint from the ball pin on the bell crank lever.
- 20 Remove the clip attaching the overflow pipes from the float chambers to the oil filter mounting screw and disconnect the union connecting the starter pipe to the auxiliary starting carburettor.
- 21 Remove the carburettors.
- 22 Remove the throttle support linkage.
- 23 Detach the flexible rubber hose (brake servo) from the rigid pipe below the inlet manifold adjacent to the ignition distributor vacuum unit.
- 24 Detach the HT lead to the coil. Remove the clip securing the plug lead harness. Detach the plug leads at the plugs, remove the distributor head and remove the plug lead harness.

25 Detach the leads to the coil and remove the coil.

26 Detach the lead from the head of the temperature gauge indicator unit.

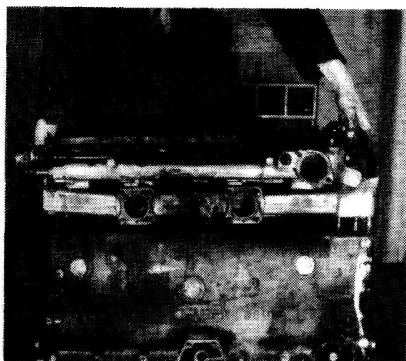
27 Refer to Section 12 and follow the instructions for the removal of the cylinder head.

15 Camshaft removal

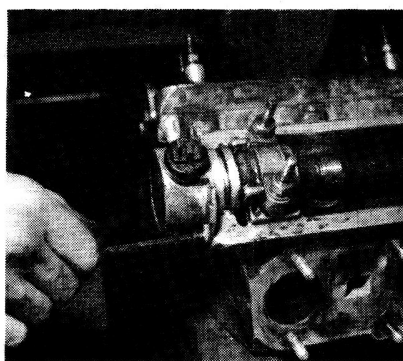
- 1 Remove the bolts securing the plate holding the revolution counter generator to the cylinder head at the rear of the inlet camshaft. Note the inlet camshaft differs from the exhaust in that it has the generator drive in the rear end whereas the exhaust camshaft is plugged at this point.
- 2 Release the eight nuts securing the bearing caps a part turn at a time. Remove the nuts, spring washers and "D" washers from the bearing stud.
- 3 Remove the bearing caps, noting that the caps and the cylinder head are marked with corresponding numbers as illustrated in Fig 1.9. Also note that the bearing caps are located to the lower bearing housings with hollow dowels.
- 4 Lift out the camshaft.
- 5 Remove the camshaft bearing shells from the cylinder head and keep them with their counterparts for correct reassembly in their original positions (if new items are not fitted). Important do not rotate a camshaft when the other shaft is fitted as the valves will foul each other.
- 6 Repeat the above (except for revolution counter generator) for the exhaust camshaft.

16 Valve removal

- 1 Make some arrangement to keep the valves, springs, tappets and adjusting pads related to each other and to their position in the cylinder head. A board as illustrated in photograph 16.1 is ideal for this purpose.
- 2 Make up a wooden block as illustrated in Fig 1.10 to support the valves when compressing the springs.
- 3 Remove the tappets. A valve grinding suction tool applied to the head of the tappet makes this an easy task.
- 4 Remove the valve adjusting pad if it has not adhered to the tappet. Keep it and the tappet together.
- 5 Place the wooden valve support block beneath the cylinder head to support the valves.
- 6 Compress the valve spring and have an assistant remove the cotters as they are released. We found that an easy way to remove the cotters is to place a piece of steel tubing, approximately $\frac{3}{4}$ " internal diameter and 9" in length, over the end of the spring, strike the tube a sharp blow with a hammer and the cotters will fall out on their own accord.
- 7 Remove the valve collar, the springs, the valve and the valve spring seat and keep them as a set for the position from which they were removed.
- 8 Repeat the above for the removal of all the valves.



13.11. Lift off cylinder head



15.1a. Removing the revolution counter generator



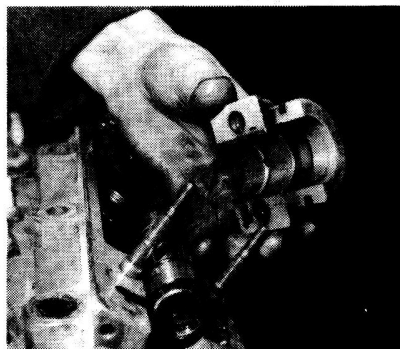
15.1b. The revolution counter drive generator



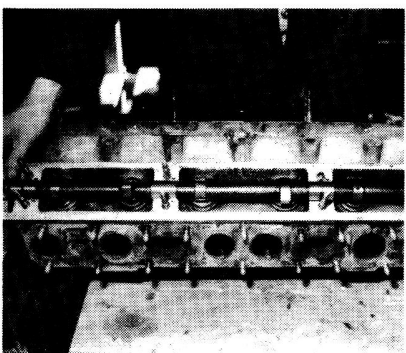
15.1c. Inlet camshaft left. Exhaust camshaft right



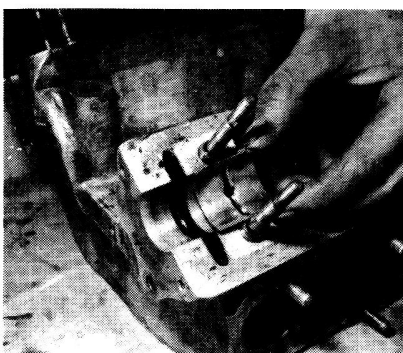
15.2. Camshaft bearing cap 'D' washer



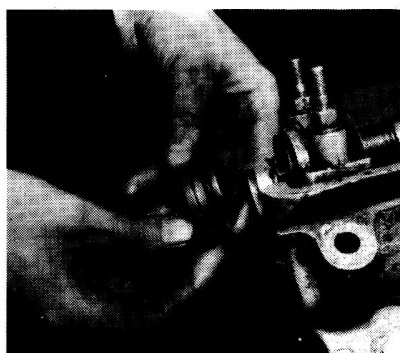
15.3. Note hollow dowels locating bearing cap



15.4. Lift out camshaft



15.5. Remove camshaft bearing shells



15.6a. Remove plate at rear of exhaust camshaft



15.6b. Securing plate and sealing plug at rear of exhaust camshaft

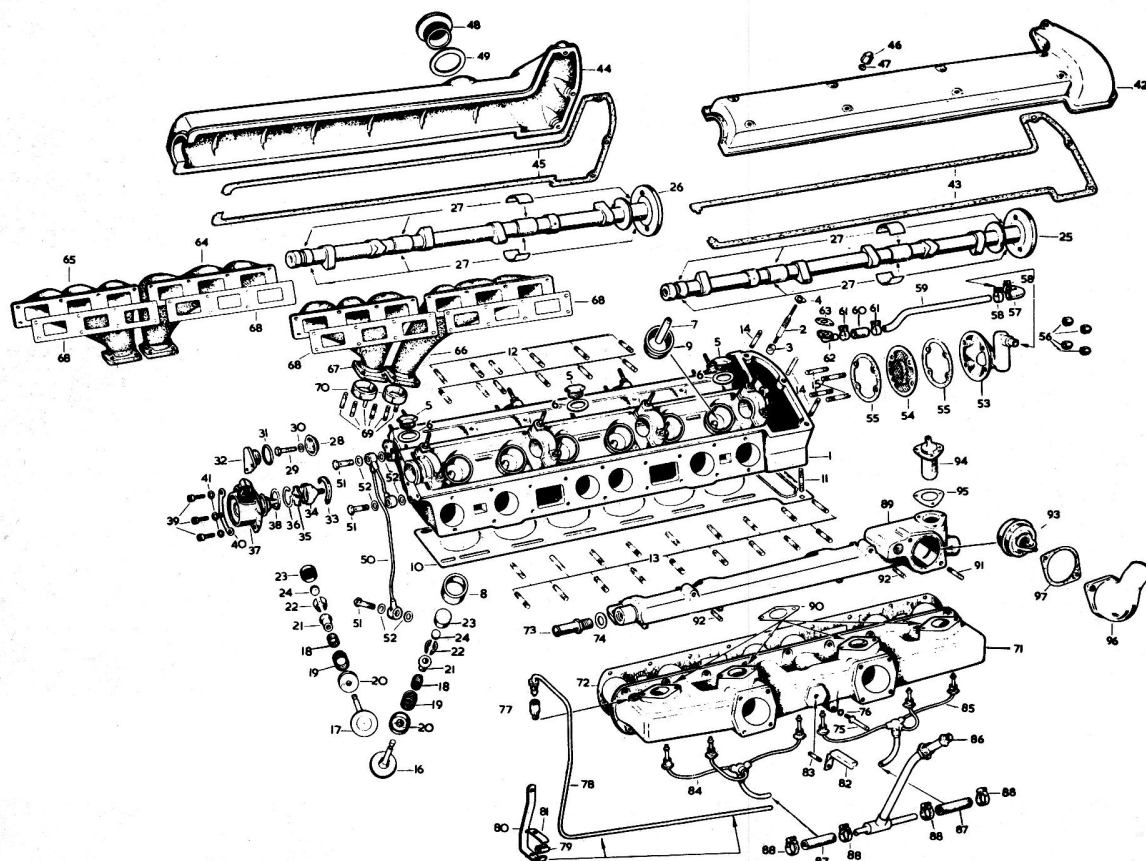


FIG.1.7. EXPLODED VIEW OF THE CYLINDER HEAD

- | | | | |
|---------------------------------------|---------------------------------|-------------------------------------|--------------------------------|
| 1 Cylinder head | 25 Inlet camshaft | 50 Oil pipe | 75 Pivot pin |
| 2 Camshaft bearing cap and cover stud | 26 Exhaust camshaft | 51 Banjo bolt | 76 Spring washer |
| 3 Ring dowel | 27 Camshaft bearing shell | 52 Copper washer | 77 Adaptor |
| 4 'D' washers | 28 Exhaust camshaft oil thrower | 53 Front cover and breather housing | 78 Brake vacuum servo pipe |
| 5 Core plug | 29 Setscrew | 54 Gauze filter | 79 Rubber sleeve |
| 6 Copper washer | 30 Copper washer | 55 Gasket | 80 Hanger bracket |
| 7 Inlet valve guide | 31 Sealing ring | 56 Dome nut | 81 Clamp |
| 8 Insert for inlet valve | 32 Flanged sealing plug | 57 Elbow hose | 82 Bracket |
| 9 Guide for tappet | 33 Rear camshaft bearing seal | 58 Clip | 83 Stud |
| 10 Cylinder head gasket | 34 Driving dog adaptor | 59 Breather pipe | 84 Starting pipe (L.H.) |
| 11 Cylinder head stud | 35 Driving dog | 60 Hose | 85 Starting pipe (R.H.) |
| 12 Exhaust manifold stud | 36 Circlip | 61 Clip | 86 Starting pipe |
| 13 Inlet manifold stud | 37 Rev. counter generator | 62 Elbow | 87 Neoprene tube |
| 14 Camshaft cover stud | 38 'O' ring | 63 Gasket | 88 Clip |
| 15 Breather housing stud | 39 Screw | 64 Exhaust manifold (front) | 89 Water outlet pipe |
| 16 Inlet valve | 40 Plate washer | 65 Exhaust manifold (rear) | 90 Gasket |
| 17 Exhaust valve | 41 Lock washer | 66 Exhaust manifold (front) | 91 Stud |
| 18 Inner valve spring | 42 Inlet camshaft cover | 67 Exhaust manifold (rear) | 92 Stud |
| 19 Outer valve spring | 43 Gasket | 68 Gasket | 93 Thermostat |
| 20 Valve spring seat | 44 Exhaust camshaft cover | 69 Stud | 94 Thermostat, automatic choke |
| 21 Valve stem collar | 45 Gasket | 70 Sealing ring | 95 Gasket |
| 22 Valve stem cotters | 46 Dome nut | 71 Inlet manifold | 96 Water outlet elbow |
| 23 Valve tappet | 47 Copper washer | 72 Gasket | 97 Gasket |
| 24 Valve clearance adjusting pad | 48 Oil filler cap | 73 Adaptor | |
| | 49 Fibre washer | 74 Copper washer | |