ALFA ROMEO GIULIA-SPIDER OWNERS WORKSHOP MANUAL

CONTENTS

Brooklands Books

A Brooklands Books Manual
www.brooklands-books.com

ALFA ROMEO GIULIA-SPIDER OWNERS WORKSHOP MANUAL

Alfa Romeo 1300, 1600, 1750, 2000 1962 - 1978 Autobook

By the Autobooks Team
of Writers and Illustrators

Alfa Romeo Giulia 1300 TI, GT Junior 1967 - 72
Alfa Romeo Giulia 1600 TI, Super 1962 - 72
Alfa Romeo Giulia 1600 Sprint GT, GTV 1963 - 68
Alfa Romeo Giulia 1600 Spider, Duetto 1962 - 68
Alfa Romeo Giulia 1.6 Super 1972 - 75
Alfa Romeo GT Junior 1.6 1972 - 75
Alfa Romeo GT Junior 1600 1975 - 76
Alfa Romeo 1750, GT Veloce 1968 - 72
Alfa Romeo 1750 Spider Veloce 1968 - 72
Alfa Romeo 2000, GT Veloce 1971 - 75
Alfa Romeo 2000 Spider Veloce 1971 - 78

BROOKLANDS BOOKS LTD.
P.O. BOX 146, COBHAM,
SURREY, KT11 1LG. UK
sales@brooklands-books.com

Autobooks Workshop manual list

The following Autobook Workshop Manuals are currently available from Brooklands Books Ltd.

Alfa Romeo Giulia-Spider 1962-1978 OWM 724
BMW 1600 1966-1973 OWM 732
Citroen 19-20-21-23 1955-1975 OWM 742 and 954
Fiat 500 1957-1973 OWM 751
Fiat 850 1964-1972 OWM 765
Fiat 124 Sport 1966-1975 OWM 925
Fiat X1/9 1974-1982 OWM 928
Land Rover Series 2 • 2A • 3 1959-1983 OWM 895
Lotus Elan 1962-1974 OWM 600
Mercedes-Benz 190 & 200 1959-1968 OWM 854
Mercedes-Benz 230 1963-1968 OWM 851
Mercedes-Benz 250 1968-1972 OWM 971
Morgan Four 1936-1981 OWM 796
MGA & MGB 1955-1968 OWM 955*
MGB 1968-1981 OWM 935*
Opel GT OWM 727
Peugeot 404 1960-1975 OWM 995
Porsche 356 1957-1965 OWM 827
Porsche 911 1964-1969 OWM 166
Porsche 912 1965-1969 OWM 897
Reliant Scimitar & Portfolio 1968-1979 OWM 896
Renault 8, 10, 1100 1962-1971 OWM 715
Renault 16 1965-1979 OWM 755
Sprite & Midget 1958-1980 OWM 745*
Sunbeam Rapier, Alpine 1955-1965 OWM 836
Toyota Celica 1600 1971-1977 OWM 804
Triumph Spitfire Mk. III, Mk. IV, 1500
1969-1980 OWM 711*
Triumph TR5 • 250 • TR6 1967-1975 OWM 826*
Volvo 1800 & 120 1960-1973 OWM 759 & 776
Volvo 164 1968-1975 OWM 782
Volkswagen Beetle 1968-1977 OWM 760
VW Transporter 1954-1967 OWM 834
* Glovebox edition

OWM 724

This do-it-yourself Workshop Manual has been specially written for the owner who wishes to maintain his vehicle in first class condition and to carry out the bulk of his own servicing and repairs. Considerable savings on garage charges can be made, and one can drive in safety and confidence knowing the work has been done properly.

Comprehensive step-by-step instructions and illustrations are given on most dismantling, overhauling and assembling operations. Certain assemblies require the use of expensive special tools, the purchase of which would be unjustified. In these cases information is included but the reader is recommended to hand the unit to the agent for attention.

Throughout the Manual hints and tips are included which will be found invaluable, and there is an easy to follow fault diagnosis at the end of each chapter.

Whilst every care has been taken to ensure correctness of information it is obviously not possible to guarantee complete freedom of errors of omissions or to accept liability arising from such errors or omissions.

Instruction may refer to the right hand or left hand sides of the vehicle or the components. These are the same as the right hand or left hand of an observer standing behind the vehicle and looking forward.

CONTENTS

Buying Secondhand

Alfa Romeo 1750/2000

THE FACT that Alfa Romeo have convincingly won outright the World Championship for Makes may or may not explain the still-powerful attraction of any of the 1750 or 2000 Alfa saloon and sports-car range to the secondhand buyer. For all its supposed publicity value, success in motor racing is not always reflected in the successful maker's production cars. And a superbly handling racing car does not mean that the firm which made it necessarily offer road cars with proportionally good handling, performance and character. Yet it is so with Alfa; every Alfa Romeo in the present car range has something about it that makes it stand out refreshingly from its competitors -even the Alfasud, which though underpowered, has extraordinary handling by any standards. None are by any means perfect. But all are fun to drive - a rare and precious thing in cars.

For a long time, Alfa have produced a typical range of cars -a compact saloon, a fixed-head coupé and a two seater sports-car, or spider. The 1750 engine introduced to the British market in March 1968 first appeared in a neat, Bertone-styled revision of the extraordinarily shaped Giulia saloon, which had been powered by a 1500 unit. The new engine had an enlarged bore (2mm more) and stroke (6½mm more) of 80×88 5mm which in fact put its swept volume at 1,779 c.c., the car's name being a sentimental reminder of the immortally beautiful pre-war 1750 Alfas. A new, stiffer block casting was adopted, but apart from the use of an alternator instead of a dynamo, all the other details of the engine were the same - notably the handsone twin overhead camshaft alloy head with its two Weber twinchoke carburettors and elegantly branched exhaust manifold. The gearbox, like the engine an entirely characteristic Alfa unit, was a five-speed, with a long but stiff gearlever and one of the most pleasing and sweetly moving gearchanges we know -although the synchromesh was always a little weak, and needed cossetting before the gearbox oil had started to warm up. The makers were unusual in laying more stress than is usual now (or then) on warming the car up for two minutes or so before moving off - a hand throttle was provided for the purpose.

Another Alfa distinction was their adherence to a live back axle, which, by positive and geometrically ideal location (by A-bracket and trailing links), provided a back end with none of the usual vices of cruder live axles. Front suspension was the usual independent wishbone arrangement; coil springs were used as before, and telescopic dampers, plus a front anti-roll bar. For

reasons presumably of production flexibility, steering was either Burman cam and peg type or recirculating ball - not the usual rack and pinion associated with good steering, yet providing steering of unusually high and delightful quality, with very little feel-blurring friction but no unpleasant over-liveliness. All-disc brakes were used. All of these points were of course inherited from the previous Alfa range, as were the bodies of the GT Veloce coupé and the Spider Veloce two-seater.

The saloon offered comfortable seating - more comfortable if the driver was not too tall and had short-ish legs and long arms (this applied to all Alfas as it does still to the majority of Italian cars), tolerable room in the back, and a usefully sized boot. We found the turning circles rather too wide, and the brakes at first a little fierce. Minor control layout was criticized. The four-lamp lighting system came in for high praise, but we didn't think much of the ventilation, in spite of the provision of cabin outlets.

The Sprint GTV has always been a darling of enthusiasts, to a large extent because of its perfectly proportioned Bertone body, yet also thanks to its performance, character and handling. In most opinions, there isn't a view of the car which is poor, which always made it a delight to own. The personality of the engine and transmission -Typically Italian in the best sense - eager, responsive, obedient yet restive, made the car feel as good as it looked, and as both are the same as in the saloon, the same comments applied. Handling and road behaviour - with the notable exception of ride - were (and are) superb, and because of the lower build of the car, that much better than the saloon. Ride was firm and joggly. The brakes and the way they were balanced front and rear impressed greatly. The body was reasonably practical, with a useful boot with a self-raising lid released from inside a door pillar. Headlamps, twin each side on this model, gave a flood of light that allowed the GTV driver to progress safely at night on country roads almost as quickly as he could by day.

One tended to approach the long-tailed Spider open two-seater a little suspiciously, questioning its perhaps too-styled appearance. A decent drive in the car quickly convinced one otherwise, that it had all the good characteristics of the GTV married to the delights of a good convertible which was also practical. The long tail meant a long boot, of great value on holiday for two. The hood remains an example to other (notably British) sports-car makers of how to provide a traditional soft top that is truly simple and quick to erect or take down.

Everything that's Alfa . . . a 1750 Veloce Spider in full flight at Silverstone

What to look for

Being cars with a sporting flavour, any secondhand Alfa should be inspected carefully for any of the unfortunate results of hard use. On the engines of all 1750 and 2000 Alfas, one should look for cylinder head oil leaks, and down the sides of the block -these are common. Another usually small oil leak which may appear to stem from the back main bearing - oil from the bellhousing - in fact is more likely to be from the front of the gearbox, and we are told that generally it isn't worth worrying about. There are two timing chains driving the camshafts; the top one is adjustable, but the bottom one is not, so that if the latter sounds as if it will need replacing, an expensive job is likely.

It is worth checking the water pump, since unlike other such units, it also includes the rev counter drive, which makes it more costly to replace, if that is necessary; such trouble is unusual however. A noisy alternator is another trouble which can mean expense.

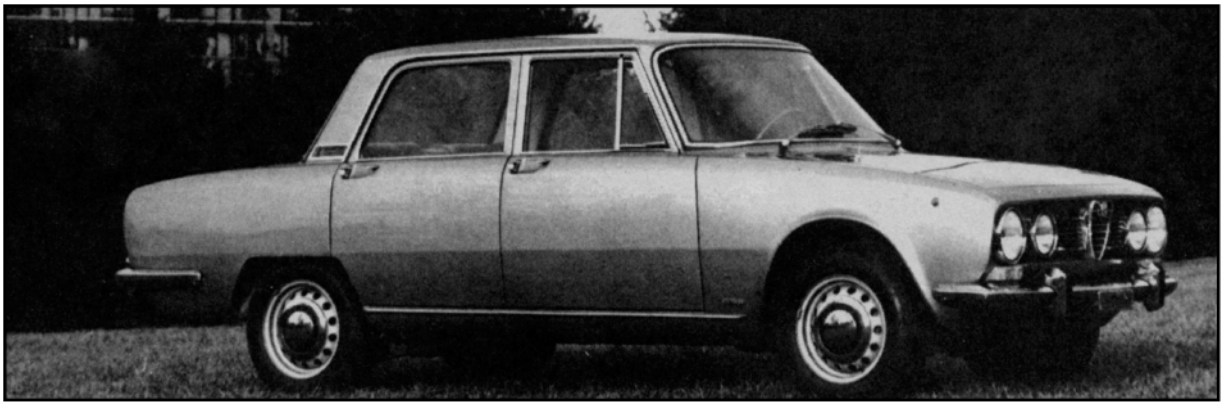
The transmission is something which some sorts of enthusiastic driver can misuse easily. Clutches on all Alfas tend to be a weak link, or at any rate over-worked. The usual tests should be applied; checking whether the take-up of drive occurs early or late in the pedal movement as it is allowed back (if late, near the fully-released end of the pedal travel, then the clutch is going to need relining soon); if it is late, then checking for clutch slip by momentarily over-loading the clutch with an abrupt full-power start.

The gearbox has quite a good reputation. Even a brand new Alfa box will grunt if hurried from 1st to 2nd when the oil is still cold, so don't worry too much if the synchromesh doesn't seem as good as it is on a lot of humbler cars, like a Ford Escort, or Morris Marina. Check however for whether the gearlever will stay in reverse -jumping out is not unknown Back axle trouble is not common, but if it did need attention it could be costly, because until recently, no exchange service was available.

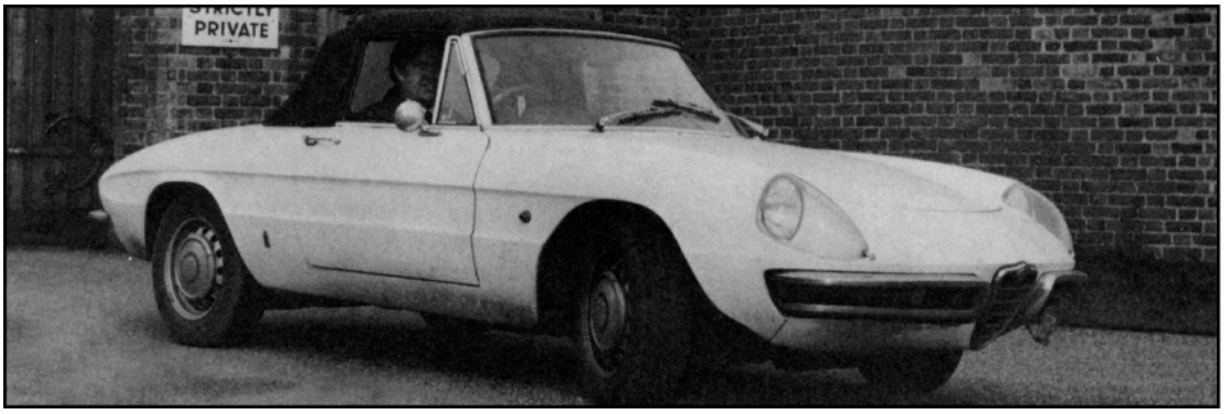
Steering itself is usually all right. If a clonk can be induced by turning the wheel, it is usually the result of the large nut holding the steering drop arm which has worked loose. It should not do this, and if it has been allowed to

remain thus for a long time, the steering box will need renewing. If not, it is possible to get away with tightening it “very tight.”

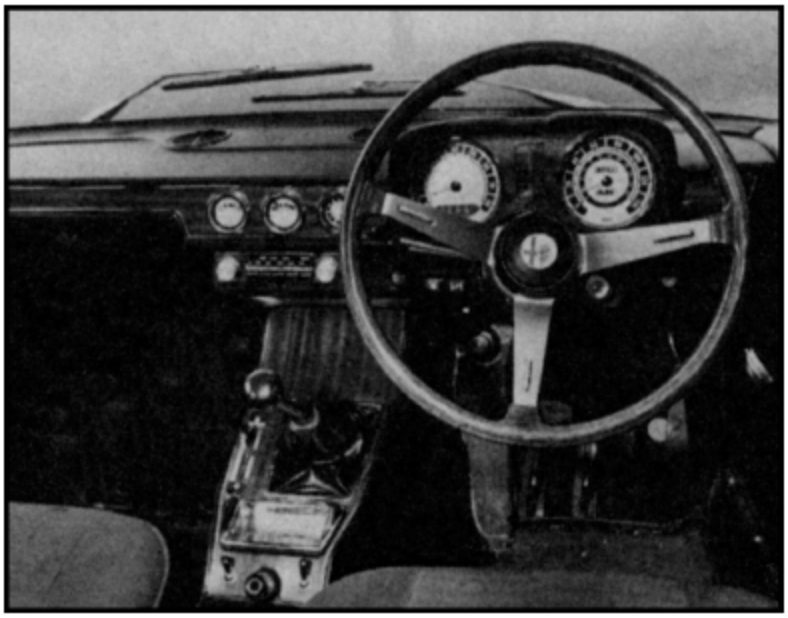
This article first appeared in Autocacr 6 September 1975 and has been reprinted with their permission. All prices refered to are those applicable in 1975.



The handsome and very conventional 1750 Berlina, which was to become the 2000



The 1750 Spider had faired-in headlamps and minimal front bumper protection



Alfa Romeo cockpits are designed very much for the driver; note the bottom - hinged pedals

The rear of the 2000 Berlina, with the lamps slightly recessed in the tail panel

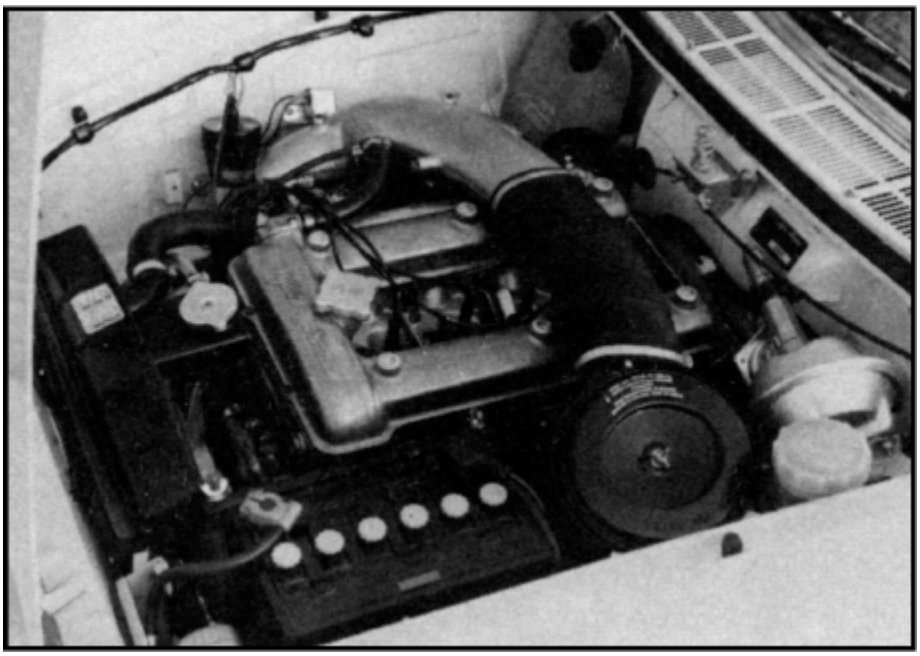
The classic lines of the 1750 GTV two-door coupé

The front suspension will in high mileage cars sometimes squeak when the front of the car is pushed down. This stems from the suspension bushes, which have no grease nipples, and are not cheap to replace.

Noises in the rear suspension are generally not worth worrying about. They can be removed sometimes by spraying the A-bracket pivots with oil (not grease). If they are serious, and will not go away when sprayed, proper stripping and replacement of worn bushes will be needed.

Brakes tend to take a beating in many Alfa drivers' hands. In too many cases, through no fault of the car, "a lot of people go right through pads" - to the destruction of discs, which have to be renewed. So even if the brakes seem all right when you try an Alfa, take the trouble to inspect the disc surfaces to see if they bear the scars of metal-to-metal contact.

As far as the bodywork is concerned, it is well to be wary of cars that have obviously been used for a lot of towing. The proper towing hitch set up for an Alfa is a comprehensive fitting that strengthens the back of the car suitably. If it has not been used, there is the possibility of body damage aft of the back doors. One might wonder a little at an owner who had bought an Alfa, even the saloon, and used it for towing a caravan; the car is not meant for that sort of carthorse job, of course. The proper tow hitch fitting can be spotted by inspection of the rear wheelarches, whose inner panels should have been strengthened in the join with the rest of the body by extra gas-welding along the seam.



All current Alfa Nord cars have the beautifully clean twin ohc engine, with aluminium cylinder head

Rust can attack an Alfa Romeo as much as any other car. Weakness of the sills due to corrosion may manifest itself just as it does with a BMC 1100/1300, by a collapsing jacking point. Rust can work out from the trim round the windows, on the tops of the front wings where mud can collect -another point of corrosion weakness in common with other makes - on the lower parts of the insides of the doors (where bubbling is usually the first sign), and, superficially, wherever there has been poor finish.

There is no shortage of Alfa Romeo dealers, who should have some secondhand stock to choose from. Their spares, in our experience of long term test cars, are not difficult to find, although they are naturally not the cheapest. The quotations and advice are from Mr Kensit, service manager of Hexagon of Highgate, to whom we are indebted for help with this article.

Milestones

March 1968: Alfa Romeo 1750 saloon first imported to GB; smoothed out, sleeker Bertone-styled version of Giulia Super, but with enlarged 1,779 c.c. version of classic Alfa twin-ohc engine. Spider Veloce imported at same time.
April 1968: GT1750 Veloce coupé introduced here, as previous 1600 with twin lamp system, and like Spider, shorter wheelbase.
March 1970: Saloon and GTV given halogen headlamps with load adjustment, sidelights and flashers on body instead of bumpers, with repeaters on wings. Twin servo, twin circuit brakes. Heated rear window standard on coupé.
July 1970: Import of long-tailed Spider stop.
April 1971: Spider with new short tail introduced here.
October 1971:2000 saloon, GTV and Spider introduced here, to replace 1750 (last imports in February 1972), Bigger bore engine, 1,962 c.c. Exposed wheel nuts. Headlamps all same size and altered grille.

March 1974: Automatic saloon introduced. Special Equipment GTV with alloy wheels, tinted glass, vinyl roof introduced.

Chassis indentification

Dates and details	Series and chassis numbers	
March 1968: 1750 saloon imports start	AR	1460001
1750 Spider imports start	AR	1470001
April 1968: GTV imports start	AR	1450001
March 1970: Saloon with halogen lamps	AR	1464001
GTV with similar mods	AR	1454001
July 1970: long-tailed Spider stops	AR	1470674
April 1971: short-tail Spider starts	AR	1835001
October 1971: 2000 saloon introduced here	—	2400301
2000 GTV starts here	—	2410001
2000 Spider Veloce starts	—	2470001
March 1974: 2000 saloon automatic	—	2490001

Approximate selling prices

	1750			2000	
Price range	**Sal.**	**GTV**	**Spider**	**Sal.**	**GTV**	**Spider**
£400–£450	1968					
£450–£550	1969	1968	1968			
£550–£700	1970	1969	1969			
£700–£900	1971	1970	1970			
£900–£1,100	1971					
£1,100–£1,200			1971			
£1,200–£1,300				1972		
£1,400–£1,600				1973	1972	1972
£1,600–£2,000				1974	1973	1973
£2,000–£2,200				1975		
£2,300–£2,400					1974	1974
£2,400–£2,700					1975	1975

Performance Data

	1750 Sal.	1750 GTV	2000 Sal.	2000 GTV
Road Tested in *Autocar*:				
Mean Maximum speed (mph)	116	116	114	120
Acceleration (sec)				
0–30 mph	3·2	3·7	2·8	3·1
0–40 mph	5·4	5·9	4·6	4·7
0–50 mph	7·8	7·9	6·8	6·7
0–60 mph	10·8	11·2	9·9	9·2
0–70 mph	14·3	14·6	13·7	12·1
0–80 mph	20·2	19·0	18·6	16·2
0–90 mph	26·4	25·9	25·5	20·9
0–100 mph	40·1	36·9	38·9	27·7
Standing ¼-mile (sec		18·0	17·4	16·4
Top gear (sec)				
10–30 mph		—	—	
20–40 mph	13·3	—	—	
30–50 mph	11·3	12·8	11·9	12·1
40–60 mph	12·2	11·9	10·1	9·6
50–70 mph	13·7	12·9	11·4	9·8
60–80 mph	14·3	15·6	13·9	11·6
70–90 mph	19·7	19·4	16·6	14·3
80–100 mph	29·0	22·1	22·5	17·9
Overall fuel consumption (mpg)	23·1	23·9	21·8	21·1
Dimensions				
Length	14 ft 5in.	13ft 5in.	As	As
Width	5ft 1·7in.	5ft 2·2in.	1750	1750
Height	4ft 8·3in.	4ft 3·8in.	Sal.	GTV
Weight (cwt)	22·1	20·0	22·2	20·6

Spares prices – ex-concessionaires

Alfa Romeo	**1750 Berlina**	**2000 Berlina**	**750 GTV**	**2000 GTV**
Engine assembly (exchange)	£593.99	£630.73	£593.99	£630.73
Gearbox (exchange)	£183.71	£183.71	£183.71	£183.71
Final drive assembly (exchange)	£140.84	£140.84	£140.84	£140.84
Half shaft	£50.14	£50.14	£50.14	£50.14
Clutch assembly	£63.47	£65.28	£63.47	£65.28
Exhaust system complete	£52.65	£52.65	£51.43	£51.43
Front disc brake pads (set of four)	£7.83	£7.83	£7.83	£7.83
Rear disc brake pads (set of four)	£7.02	£7.02	£7.02	£7.02
Front suspension spring and damper	£20.78	£20.78	£19.46	£19.46
Rear suspension spring and damper	£20.85	£20.85	£18.99	£18.99
Alternator (exchange)	£34.29	£34.29	£34.29	£34.29
Starter motor (exchange)	£35.35	£35.35	£35.35	£35.35
Front wing panel	£46.02	£46.02	£66.34	£66.34
Front door shell (complete)	£86.67	£86.67	£101.15	£101.15
Windscreen	£48.99	£48.99	£47.77	£47.77

All prices supplied by Alfa Romeo (08) Ltd. All include VAT at the standard rate of Bper Cent.

CHAPTER 1

THE ENGINE

1:1 Description

The various cars covered in this manual are all equipped with high performance, twin overhead camshaft, engines which, although of four different sizes, are sufficiently alike for one set of instructions to suffice for their maintenance and overhaul. For servicing purposes the four engines are similar, their differences being in dimensional specifications, details of which will be found in **Technical Data** at the end of the book.

The four engines and their principal dimensions are as follows:

Type	*Capacity*	*Bore Stroke*
1300	1290 cc	74 x 75 mm
1600	1570 cc	78 x 82 mm
1750	1779 cc	80 x 88.5 mm
2000	1962 cc	84 x 88.5 mm

A light alloy cylinder block is used, cast integrally with the crankcase and carrying cast iron wet liners for the cylinder bores. **FIG 1:1** shows a cutaway view of the engine and **FIGS 1:2** and **1:3** the engine internal components. The detachable cylinder head is of light alloy with machined hemispherical combustion chambers and the valve seat inserts and valve guides are of cast iron and shrunk fitted into the head.

The counterbalanced crankshaft, which is a treated alloy steel forging, is provided with five plain shell bearings all of which are pressure lubricated. Axial thrust is accommodated at the centre main bearing position. The forged steel connecting rods have plain shell big-end bearings and bronze gudgeon pin bushes. A single belt drives both the generator and the centrifugal type water pump from a pulley mounted at the front of the crankshaft.

The gear type oil pump, which is driven from a gear on the crankshaft, is located inside the light alloy sump and draws oil through a pipe and strainer assembly. Pressure oil is fully filtered before being fed to the engine. The external filter is of the fullflow type and incorporates a relief valve which operates to return excess oil to the sump in the event of oil pressure becoming higher than the desired maximum.

The light alloy pistons have cut-outs in their crowns to provide working clearance for the valves and are equipped with three rings, one oil control ring and two compression rings, the upper ring being chrome plated.

The exhaust manifold is mounted on the opposite side to the inlet manifold to provide a crossflow pattern for the inlet and exhaust gases.

1:2 Removing the engine

The normal operations of decarbonizing and servicing the cylinder head can be carried out without removing the engine, as described in **Sections 1:3** and **1:4**. The camshafts and upper timing chain can be removed and worked on in the same manner, as described in **Sections 1:4** and **1:6**. A major overhaul however can only be carried out with the engine removed from the car. If the operator is not a skilled automobile engineer it is suggested that he will find much useful information in **Hints on Maintenance and Overhaul** at the end of this manual, and that he should read it before starting work.

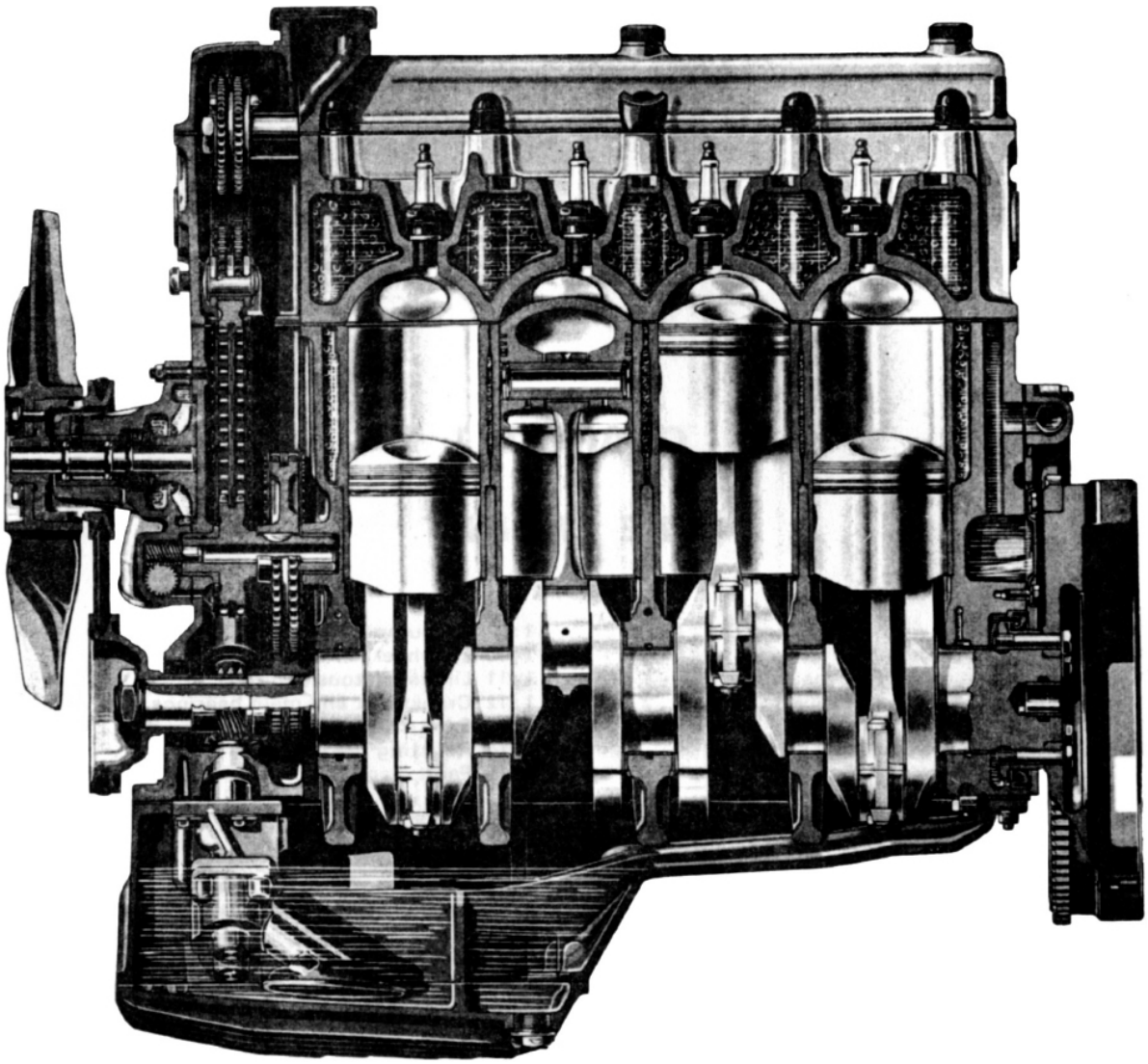


FIG 1:1 Longitudinal section of the engine

The engine and gearbox should be removed as a unit by lifting it from the car, using a suitable gantry and lifting tackle. Assistance will be essential to tilt and carefully guide the assembly upwards and forwards. **As the major castings in the engine assembly are of light alloy, care must be exercised to avoid stripping the threads in the castings when tightening fixings or connections**. Always adhere to the torque figures given in **Technical Data** and ensure that threads are clean and lightly lubricated before tightening.

1 Open the drain taps at the bottom of the radiator and the lefthand side of the engine. If the coolant contains antifreeze and is to be re-used, drain it into a clean container. Remove the bonnet at the hinge pins then remove the bonnet support strut. Disconnect the battery cables. Unscrew the sump drain plug and drain the engine oil.

2 Refer to **FIG 1:4** and detach the following from the underside of the car. The propeller shaft at the intermediate joint flange 1, after marking the front and rear parts for correct reassembly. The propeller shaft central bearing support 2 and the cross-plate 3. The speedometer cable 4 and the exhaust pipe bracket 5.

3 Refer to **FIG 1:5** and detach the clutch cover 6, the gear selector lever 7, the reversing light wires 8, the clutch operating lever 9, the manifold joint 10 and the gear engagement lever 11. Remove the tachometer cable if fitted, from the front of the engine.

4 Remove the air cleaner. Refer to **FIGS 1:6** and **1:7** and remove the following from the engine compartment. The top hose 1, the bottom hose and the radiator 2 as described in **Chapter 4**. The hose 3 from the water pump to the manifold, also the heater hoses. The fuel pipe 4, temperature gauge connector 5, coil leads 6, choke control cable 7, accelerator hand control cable 8, generator leads 9, oil pressure gauge wire 10 and the engine earth strap 11. Remove the throttle control rod and the cables from the starter.

5 Attach the lifting equipment to the engine and give a light pull just to take the engine weight. Refer to **FIG 1:8** and remove the gearbox crossmember to car floor attaching bolts. Remove the bolt fixing the crossmember to the gearbox and remove the crossmember, as shown in **FIG 1:9**

6 Lift the engine and gearbox assembly from the car, tilting it in order to clear the engine compartment. To separate the engine from the gearbox, remove the bolts attaching the clutch bellhousing to the engine and carefully withdraw the gearbox, taking great care to avoid the weight of the gearbox resting on the clutch driven plate.

7 Clamp the engine into a mounting stand and remove the ignition coil, generator complete with mounting bracket, cooling fan, water pump, starter, oil filter and bracket and the oil sump.

1:3 Removing and refitting the head

Before removing or dismantling the cylinder head the following warnings must be noted to avoid warping the head or damaging the valves against each other or against the pistons.

1 Make sure that the engine is cool before removing the cylinder head.

2 Do not rotate the engine or the camshafts after the camshaft drive has been disconnected.

3 When the cylinder head is removed, do not rotate either camshaft unless the other has been removed.

4 Before refitting the cylinder head, follow the instructions for positioning the camshafts in relation to each other and to the crankshaft.

Removal:

FIG 1:10 shows the components of the cylinder head.

1 Disconnect the battery. Drain the radiator and cylinder block, collecting the coolant in a clean container if it is to be re-used. Remove the radiator and heater hoses from the head and remove the vacuum line from the distributor.

2 Remove the air cleaner and the throttle operating linkage. Disconnect the choke cable and the hand throttle cable from the carburetter. Remove the fuel pipe from the fuel pump.

3 Remove the exhaust tube bracket from the gearbox mounting. Remove the exhaust manifold to cylinder head fixing nuts and pull the manifold off the studs. Remove the sparking plugs and the camshaft cover.

4 Rotate the crankshaft until the No. 1 piston is at TDC on the compression stroke, using the method described in **Section 1:7**. This should bring the timing chain connecting link between the two camshaft sprockets. Slacken the chain tensioner securing screw as shown in **FIG 1:11** and push the tensioner away from the chain against its spring, retightening the securing screw to hold it in this position. If this is not done the tensioner will move out when the timing chain is removed and the clamp plate will drop into the sump.

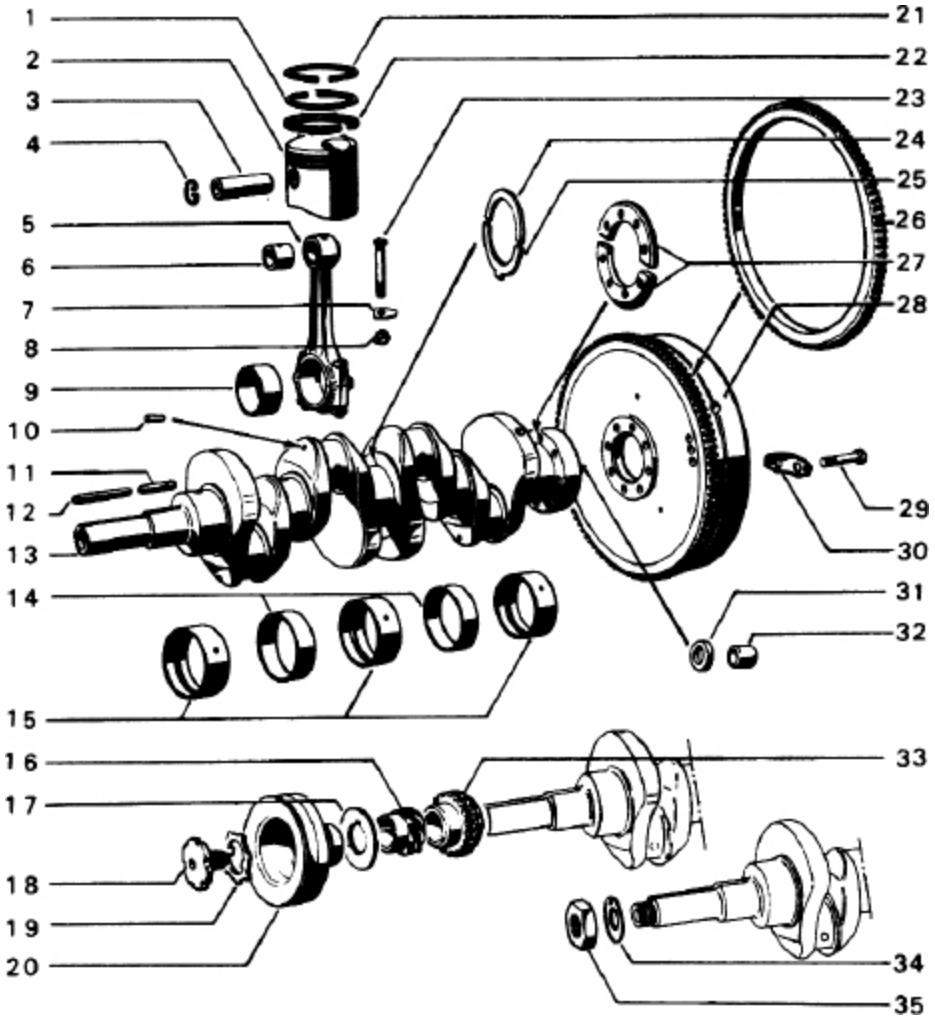


FIG 1:2 The crankshaft, pistons and flywheel assemblies

Key to Fig 1:2

1 Compression ring
2 Piston
3 Gudgeon pin
4 Circlip
5 Connecting rod
6 Small-end bush
7 Lockplate
8 Nut
9 Big-end bearing shells
10 Plugs
11/12 Keys
13 Crankshaft
14/15 Main bearing shells
16 Oil pump drive gear
17 Oil seal
18 Special bolt

19 Lockplate
20 Crankshaft pulley
21 Compression ring
22 Oil control ring
23 Big-end bolt
24/25 Thrust washers
26 Starter ring gear
27 Half-rings
28 Flywheel
29 Flywheel bolt
30 Lockplate
31 Felt washer
32 Guide bush
33 Crankshaft sprocket
34 Lockplate
35 Pulley nut

5 Tie two pieces of wire to the chain ends at each side of the connecting link, then remove the link. The wires will prevent the chain from falling into the cylinder block if they are tied to part of the car frame when the head is removed. If the chain is to be renewed, tie a long enough piece of wire to one end, and remove the chain from the other end, pulling the wire into the chain position. Leave the wire installed so that it can be used to pull the chain into position when it is fitted. **Do not turn the crankshaft when the timing chain is disconnected**. The timing marks on the lower sprockets are not visible with the timing cover fitted, so if their positions are disturbed the engine will have to be further dismantled and the timing checked as described in **Section 1:7**.

6 Slacken the cylinder head bolts by a part of a turn at a time in the order shown in **FIG 1:12** until they are free. Remove the head nuts and the two screws fixing the front cover to the head, then lift off the head.

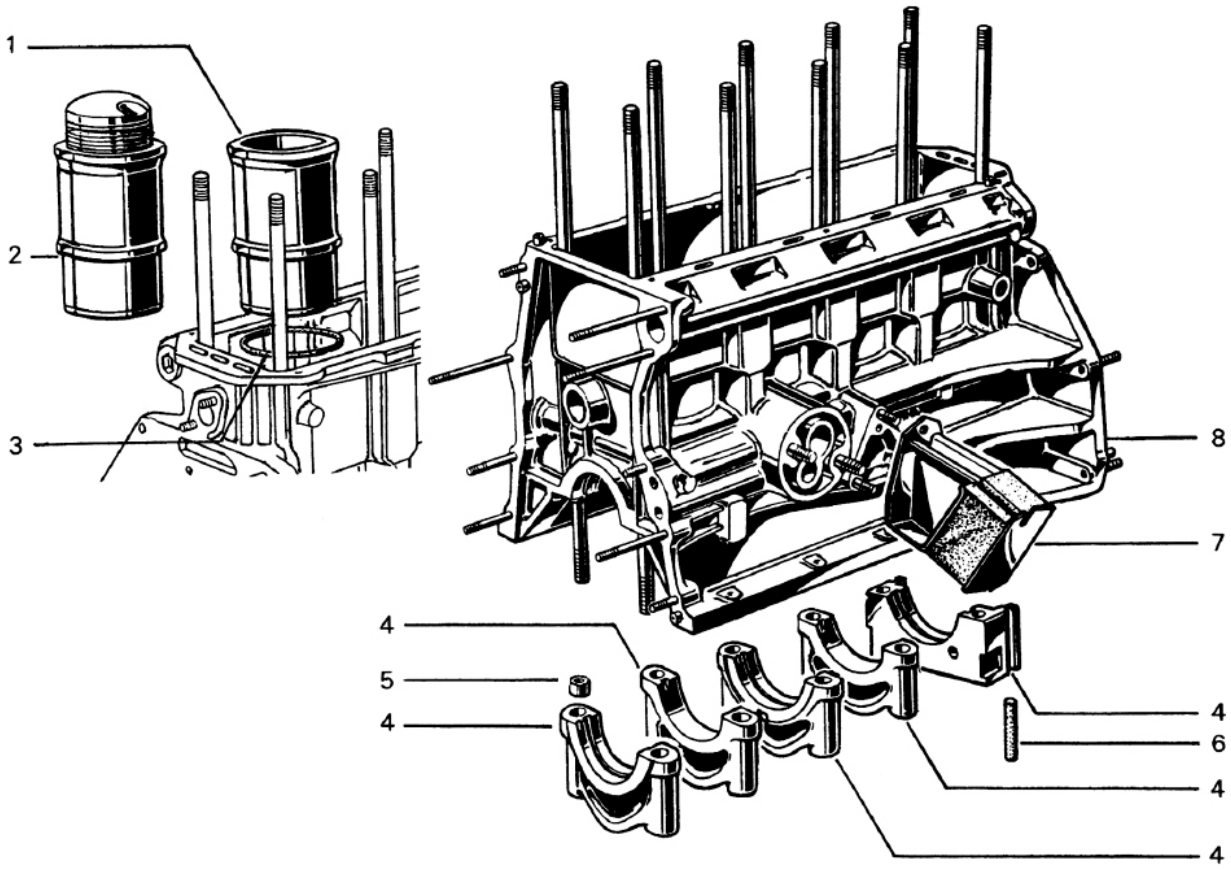


FIG 1:3 The crankcase assembly

Key to Fig 1:3
1 Cylinder liner
2 Liner with piston
3 Liner seal ring
4 Main bearing caps
5 Hollow dowel
6 Rubber plug
7 Engine mounting
8 Cylinder block

Refitting:

Refit the carburetter and inlet manifold assembly. Check that the timing marks on the camshafts and bearing caps are aligned as described in **Section 1:6** Place a new head gasket onto the cylinder block and refit the head. Oil the head nuts and tighten them in the order shown in **FIG 1:12** to the torque specified in **Technical Data**. Refit the timing chain without disturbing the alignment of the camshaft

timing marks. Refitting of all other parts is the reversal of the removal procedure.

Upon completion, drive the car to warm the engine to normal operating temperature and retighten the cylinder head nuts to the specified hot torque. Drive the car for about 300 miles, then allow the engine to cool right down. With the engine cold, slacken the head nuts $1\frac{1}{2}$ turns then tighten them finally to the specified cold torque. Always follow the order given in **FIG 1:12**. Adjust the timing chain tension as described in **Section 1:6**.

1:4 Servicing the head and valves

Take care to avoid damage to the light alloy cylinder head during servicing. The head should be supported on blocks of wood at each end, particularly while the camshafts are installed and the valve gear liable to damage. When removing sealing compound, old gasket material or carbon deposits avoid the use of pointed tools and use worn emerycloth and paraffin only for cleaning purposes.

Dismantling:

Drain the oil from the camshaft housings and thoroughly clean the cylinder head. Remove the inlet manifold and carburetter as a unit. Mark the camshaft journal bearing caps for correct refitting and remove the caps and the camshafts.

Service tools A.2.0121 valve holder and A.3.0103/1, 2 and 3 spring compressor should be used to remove the valves. If these tools are not available a block of wood must be shaped to fit into the combustion chamber to hold the valves in the closed position while the springs are compressed. In either case, work on one pair of valves at a time, removing the tappets and adjusting shims with

suitable pliers, then compressing the springs to remove the cotters. Release the compressor and remove the upper spring collars, springs, shims and lower spring collars into the order shown in **FIG 1:13**. Store all parts in the correct order for refitting in their original positions. Loosen the securing screw as shown in **FIG 1:11** and remove the timing chain tensioner from its housing, collecting the spring and clamp plate.

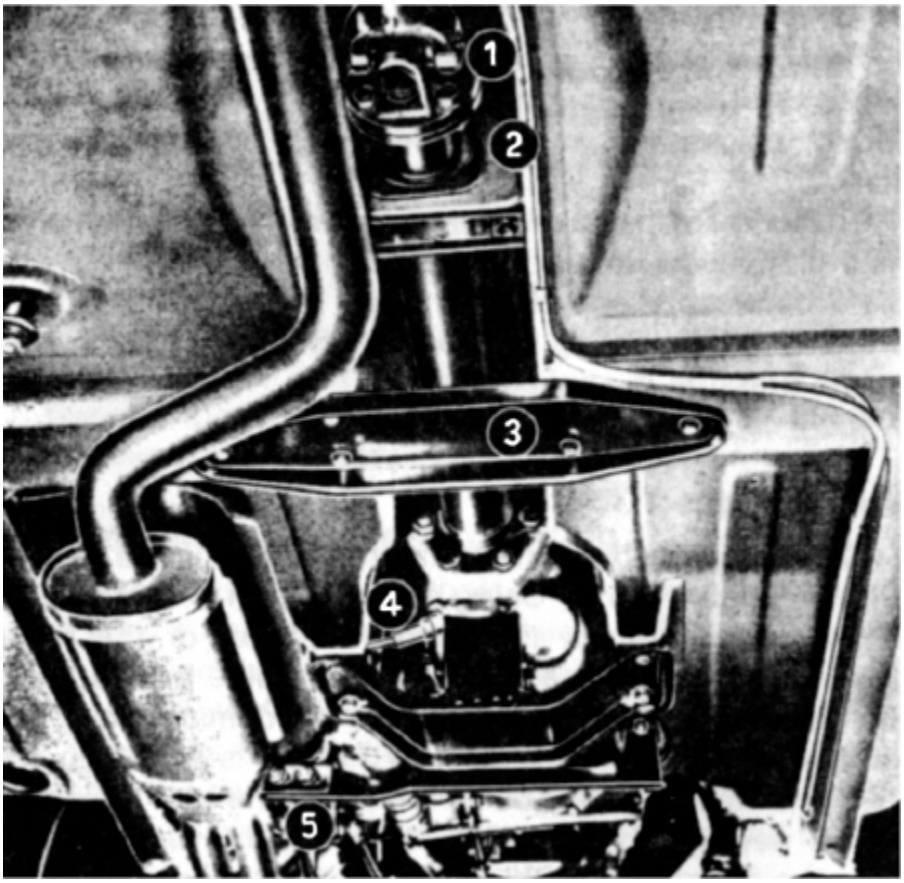


FIG 1:4 Items to be detached for engine removal. The numbers are referred to in the text

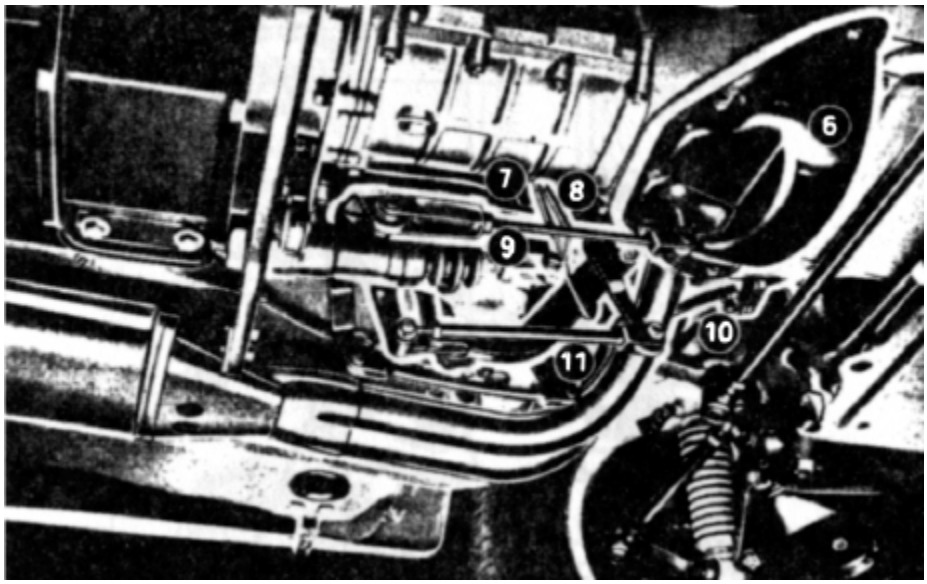


FIG 1:5 Items to be detached for engine removal. The numbers are referred to in the text

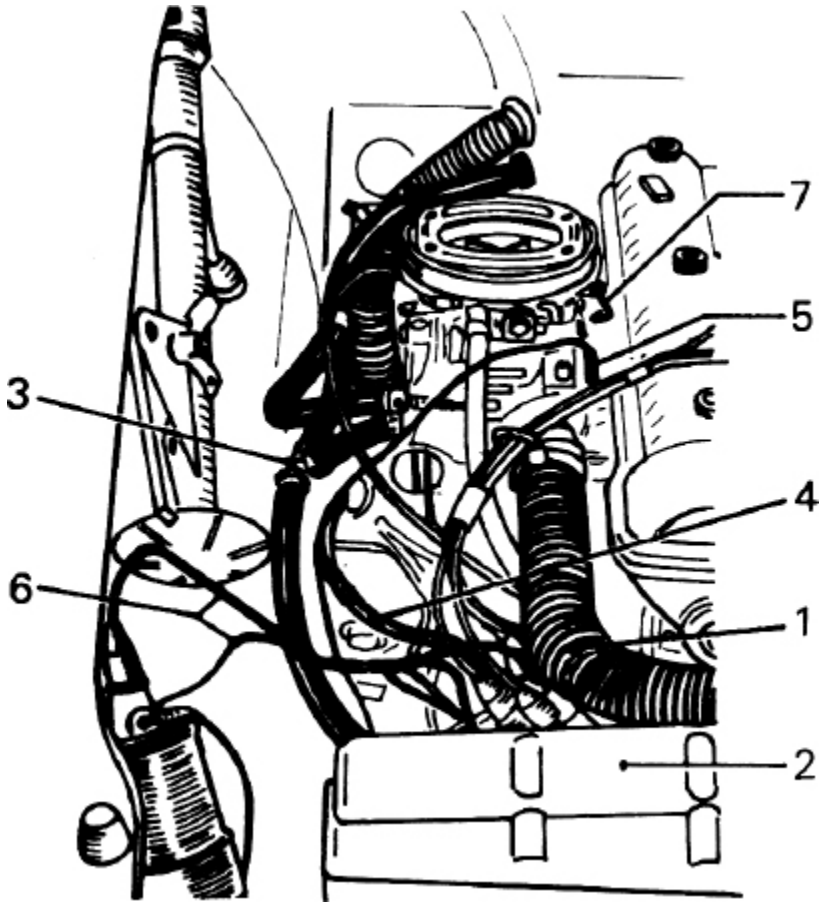


FIG 1:6 Items to be removed from the engine compartment. The numbers are referred to in the text

Valves:

When the valves have been cleaned of carbon deposits they must be inspected for serviceability. Valves with bent stems or badly burned heads must be renewed. Valves that are too pitted to clean up on grinding to their seats may be refaced by a garage, but the amount of metal that can be removed in this operation is limited and new valves will be required if refacing cannot be successfully carried out. The valve seat angle is 30 deg. in all cases. Check the valve stems for correct diameter against the dimension given in **Technical Data** for the various engines.

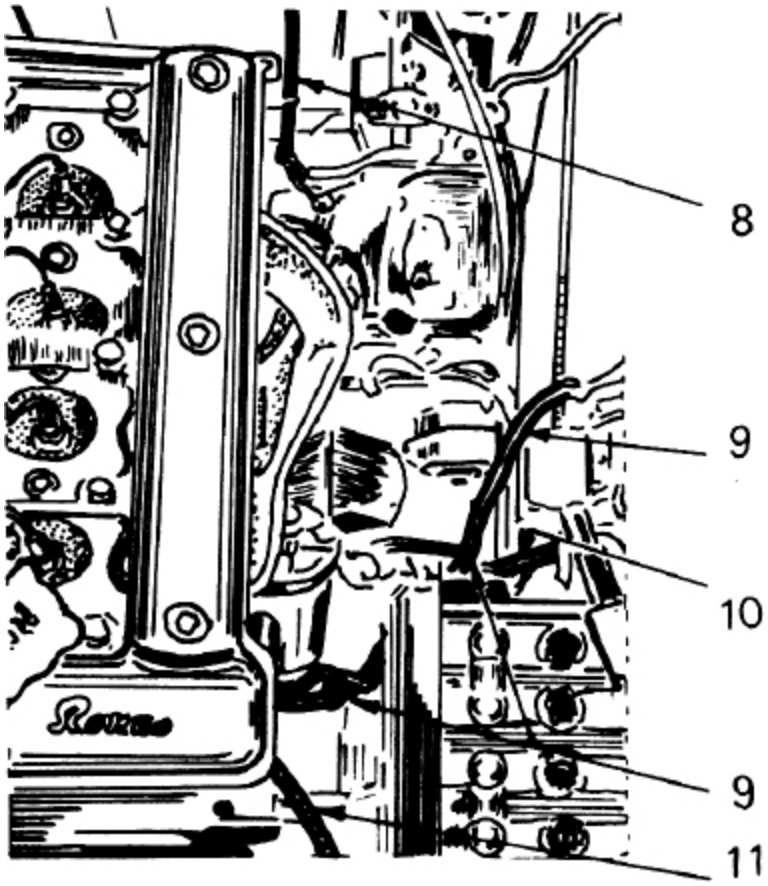


FIG 1:7 Items to be removed from the engine compartment. The numbers are referred to in the text