

SIMCA 1300-1500 1301-1501

from 1963



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Workshop Manual 173

INTEREUROPE LIMITED

MAIDENHEAD

BERKSHIRE

ENGLAND

WORKSHOP MANUAL

for

SIMCA 1300/1301 and 1500/1501



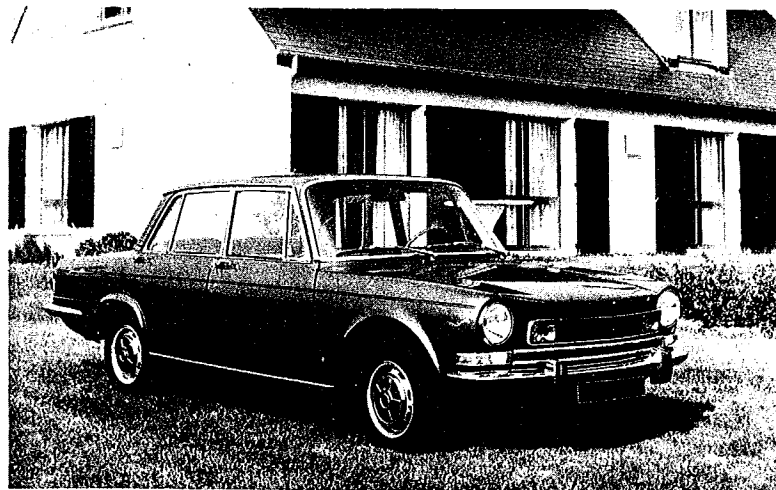
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Type Identification



We wish to acknowledge the assistance received from Chrysler Imports U.K. in providing us with technical specifications, illustration material, repair instructions and technical advice. This has enabled us to provide throughout this manual authentic instructions and data.

NO LIABILITY CAN BE ACCEPTED FOR ANY INACCURACIES OR OMISSIONS IN THIS MANUAL, although every possible care has been taken to make it as complete and accurate as possible.

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Introduction

This Workshop Manual was compiled and written with the intention of providing the owner of a Simca 1301 and 1501 and the non-franchised garage with details of the maintenance and repair operations that they are likely to encounter. As the Simca 1301/1501 is based on the previous Simca 1300/1500, the book contains most of the information necessary for the "Do-it-yourself" man to service these cars. Much information from the manufacturer's original service and repair instructions has been condensed and incorporated in the manual in a form which will enable the reader to quickly become familiar with the idiosyncrasies and technicalities peculiar to the Simca 1300/1500 and 1301/1501 range.

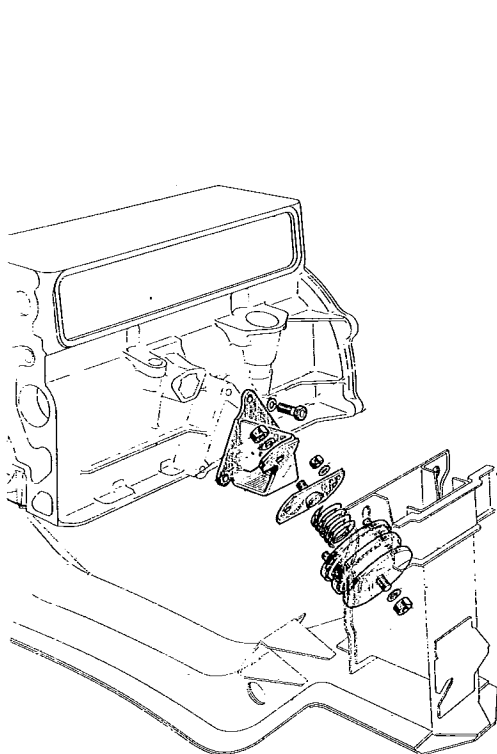
In certain cases it will be necessary for the repairer to make use of special service tools, and the appropriate tool numbers and methods are also detailed. If special tools are not available, it is sometimes also possible to employ alternative methods or other suitable tools.

Special mention should be made of the fact that a fault finding section is annexed to most of the major chapters, thus simplifying the sometimes difficult task of diagnosis. The items listed cover only the most likely causes of trouble, as it is impossible to list every aspect of malfunctioning. The list, however, has been carefully compiled and is used in all our Workshop Manual Publications. The measurement conversions given in inches have been converted as closely as possible from the original millimetre sizes. Dimensions, referring to critical diameters, widths, etc. have not been converted, in order to avoid deviations, brought about by conversions. A conversion table is included in the manual for your own convenience.

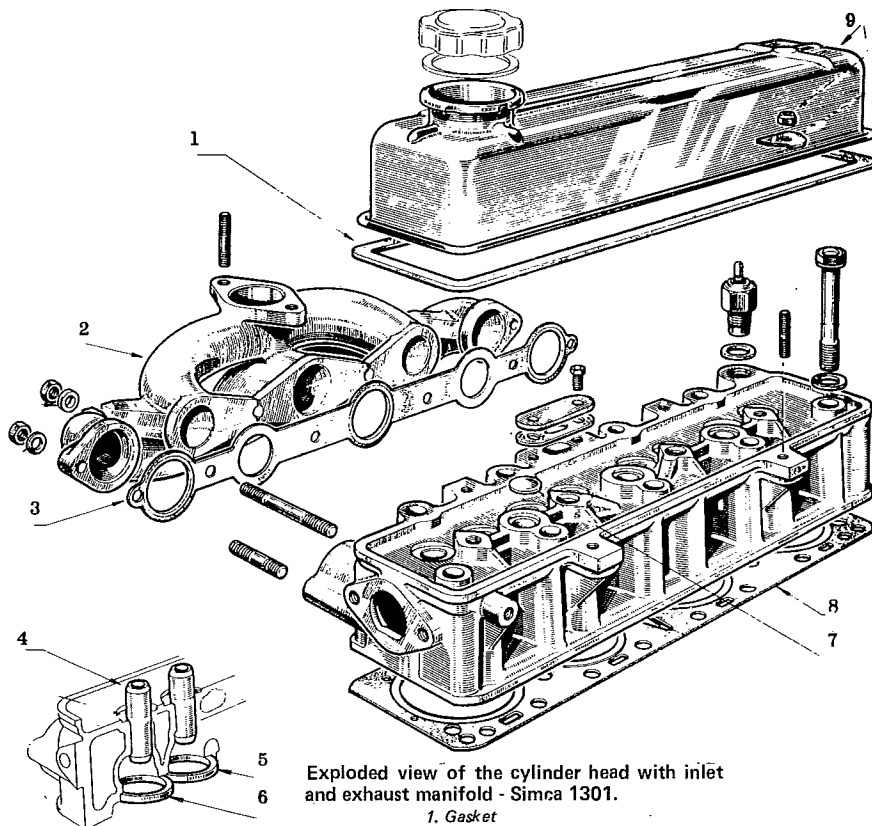
We have tried to make this manual as brief as possible, concentrating not so much on regular maintenance work but more on repair and overhaul procedures. This will show the reader immediately whether he will be able to carry out the work or not. Experience in producing hundreds of technical publications for the motor car manufacturers has proven that this is the best way for a publication of this nature.

Happy motoring — and the fewer times you have to refer to this book the better for you.

Peter R. D. Russek

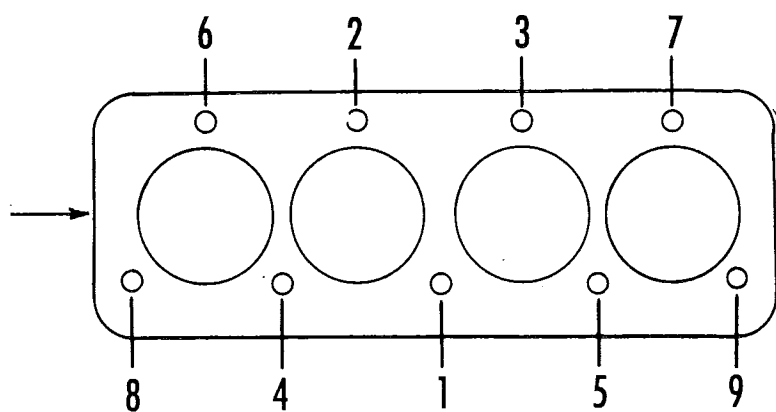


View of the front engine mounting.



Exploded view of the cylinder head with inlet and exhaust manifold - Simca 1301.

1. Gasket
2. Inlet manifold
3. Gasket
4. Valve guide
5. Valve seat insert
6. Valve seat insert
7. Cylinder head
8. Cylinder head gasket
9. Cylinder head cover



Cylinder head tightening sequence for SIMCA 1301.



Removal of the front cover for the oil centrifugal separator.

Engine

SIMCA 1300/1301 — 312 T ENGINE

ENGINE — Removal and Installation

Drain the coolant; if it is an anti-freeze mixture drain it into a suitable container. Loosen the clip on the air filter and withdraw the air filter from the carburettor. Remove the battery and disconnect the starter cable. Disconnect the exciter and feeder leads from the dynamo, and the leads of the oil pressure switch and remote thermometer transmitter. Loosen the hose clips, pull off the top and bottom water hoses between the water outlet connection and the radiator, then the water pump and radiator heater hoses. Remove the radiator. Bend open the two locking plates on the screws for securing the fan blades and unscrew the fan blades together with the packing plate. Remove the choke cable and the carburettor linkage from the carburettor. Pull the fuel pipe off the inlet connection on the fuel pump. Unscrew the clamp which connects the front exhaust pipe to the exhaust manifold. Remove the starter.

The gearbox and clutch housing can now be removed (see CLUTCH — Removal). Unscrew the cylinder head cover. Unscrew the second cylinder head bolt from the front on the carburettor side and screw in the lifting eye. Remove the two bottom nuts on the engine mounting and check that all connecting parts have been detached. Carefully lift the engine and push it to the rear at the same time so that the oil sump can be lifted over the torsion bar of the stabilizer.

Installation of the engine is a reversal of the removal procedure; check that the engine is properly positioned along the axis of the car. Ensure that the clutch disc is trued.

ENGINE — Dismantling

Fit the engine into a mounting stand to assist the dismantling procedure. Remove the dynamo; to do this unscrew and remove the two bolts and their serrated washers and nuts from the tensioning rail and the fixing bolt with serrated washer and nut on the mounting. Take off the dynamo and V-belt, pull out the oil dipstick, remove the oil vapour breather hose between the carburettor and the oil filler. On the cylinder block, unscrew the retaining clip of the fuel line between the fuel pump and carburettor and pull off the fuel line. Unscrew the fuel pump, then unscrew the water pump from the cylinder block (five hexagon head screws with washers) and remove the carburettor. Pull off the high tension leads from the spark plugs and from the ignition coil; remove the spark plugs. Detach the retaining clip on the distributor and withdraw the distributor. The removal of rocker arm supports/rocker arm assembly must only be carried out with the engine cold; the nylon rings of the self-locking nuts are so tight when the engine is warm that it is possible to strip the threads of the studs. Remove the valve rocker cover. The cylinder head should also only be removed with the engine cold as distortion of the aluminium cylinder head is otherwise possible. The cylinder head bolts should be slackened and removed (cylinder head bolt spanner 20776B) in the reverse sequence to that for tightening (see sequence diagram). Take off the cylinder head. Withdraw the push rods for the rocker arms and valve tappets and keep in correct order for re-assembly. Unscrew the distributor neck bearing. Remove the sealing ring and the drive sleeve of the distributor. Remove the clutch (see CLUTCH — Removal). Turn the engine in its mounting stand. Unscrew and remove the oil sump. Remove the oil suction pipe with the strainer, and the oil pressure pipe and

oil pump from the crankcase. Unscrew the front cover of the oil centrifuge. Release the retaining screw of the filter body and unscrew the filter using special spanner 31175H. Remove the retainer, the oil deflector plate and the V-belt grooved shell half.

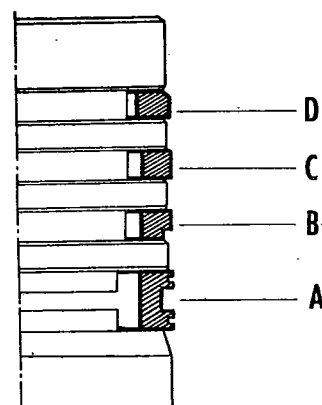
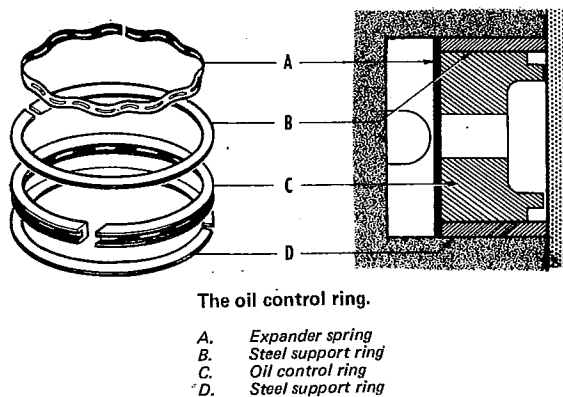
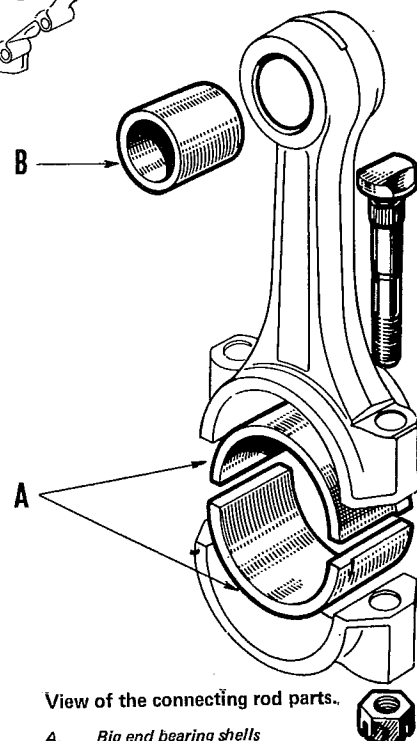
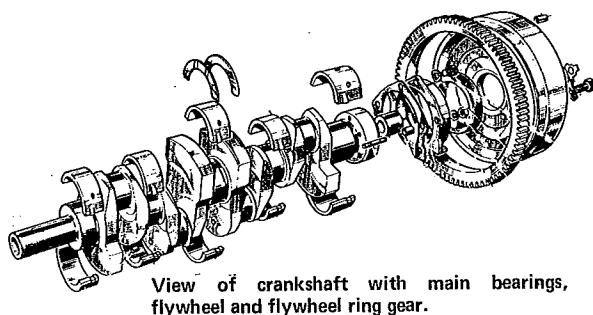
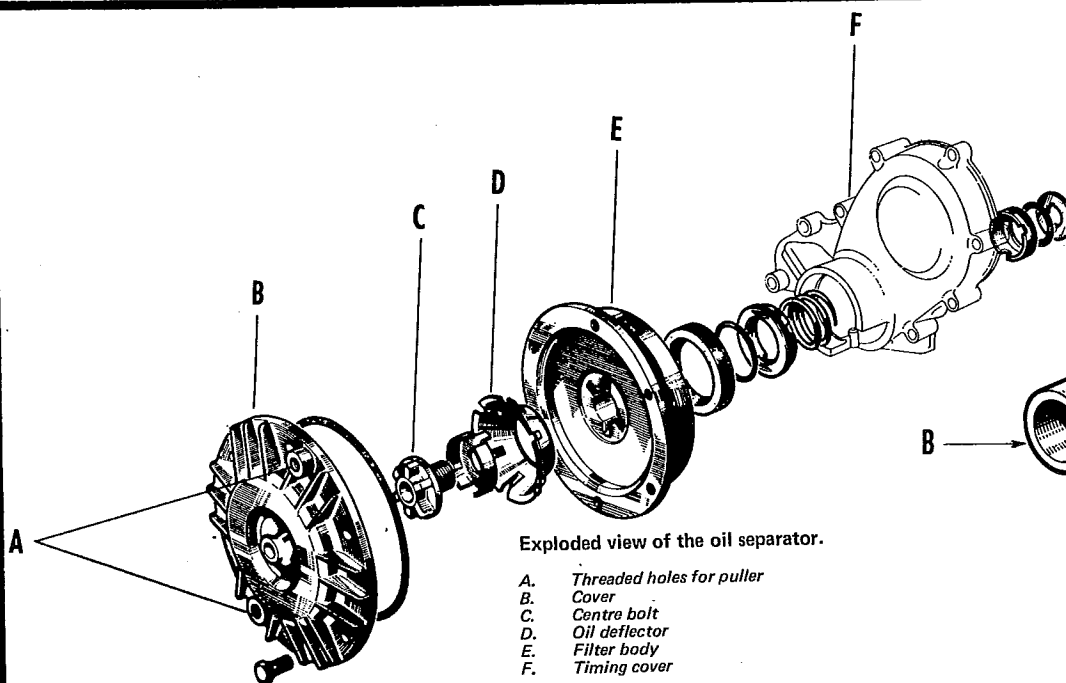
Remove the seal, ring, spring sleeve and spring from the crankcase front cover. Unscrew the crankcase front cover with socket wrench SW 10, then remove the front thrust washer on the crankshaft. Before dismantling the timing sprockets the position of the reference marks "O" and "OO" of the drive sprocket, in relation to the camshaft sprocket, must be checked. It is unnecessary to mark the seat of the camshaft sprocket on the camshaft as the fixing holes have been drilled offset and there is, therefore, only one possible position for refitting. Release and unscrew the three retaining screws on the camshaft sprocket. Remove both timing sprockets with chain. At this point check the seat of the key in the crankshaft and the drive sprocket. Unscrew the bearing flange of the camshaft using a Philips screwdriver and withdraw the camshaft forward. Remove the cover plate for the timing case cover. Unscrew the big-end caps and pull out the connecting rods with piston upwards. Attach the big-end caps to the corresponding connecting rods and mark the numbers of the pistons on the piston heads for correct reassembly. No.1 connecting rod and piston are at the flywheel end. Before dismantling the flywheel, its position in relation to the crankshaft flange should be marked by punch marks or a paint line so that the original condition of balance is maintained after reinstallation. Marking is necessary as the holes for the fixing bolts are drilled at regular intervals. Release and unscrew the fixing bolts (socket wrench 5 W 14) and remove the flywheel. Unscrew the sealing ring holder of the rear crankshaft bearing (5 screws with tooth lock washers) using socket wrench SW 10. Unscrew the crankshaft main bearing cap, remove the half washers, which absorb the crankshaft end float, from the centre bearing. Lift out the crankshaft. Attach the main bearing caps, as they were installed, and keep the bearing shells in the correct order for reassembly.

After thoroughly cleaning all parts with petrol and removing carbon and old sealing compound, the parts must be checked for re-use. It must be decided whether any damage can be rectified by refinishing or whether the part concerned should be replaced by a genuine Simca Spare Part.

CYLINDER BLOCK — Inspection

The thoroughly cleaned cylinder block must be examined for cracks and wear. Slight scores or abrasions in the cylinder working surfaces can be refinished with very fine emery cloth. However, the prerequisite is that no deviation is shown in the measurement of the cylinder diameter concerned when using a precision internal measuring instrument. The measurement should be taken with a master ring gauge and a "Subito" precision measuring instrument at the top, and at the bottom 2 inches (50 mm) from the upper or lower edge and in the centre of the piston travel, first parallel and then at right angles to the crankshaft. The permissible ovality of the bore is 0.01 mm (0.000394").

Slight grooves can be re honed without boring and new pistons



of the next class fitted (Piston Class B for bore Class A). The pistons and the cylinders are divided into the classes A, B, C and D according to their diameters. The bores are identified by class letters stamped on the sealing surface of the block. A piston B for example belongs in a bore B. If, as a result of the measurement, larger pistons must be installed, the new pistons must be of the next class up in each case when re-honing. A piston of Class D is then fitted in a bore of Class C. If the working surfaces have to be rebored, the rebore dimensions +0.2, +0.6, +0.8 and 1.0 mm must be used. If the necessary oversize is more than 1.0 mm, a dry cylinder liner must be manufactured and inserted by a specialist workshop. Where alterations are made to the bore, the class identification on the engine joint surface must be crossed out and stamped afresh in each case. Honing and boring of the cylinder working surfaces should only be carried out in a specialist workshop in accordance with the pistons and oversize pistons available.

Piston diameter
(measured at right angles
to the axis, at the bottom
on the piston skirt)

Cylinder bore

Normal

A = 73.9475 – 73.9550

B = 73.9550 – 73.9625

C = 73.9625 – 73.9700

D = 73.9700 – 73.9775

A = 73.9925 – 74.0000

B = 74.0000 – 74.0075

C = 74.0075 – 74.0150

D = 74.0150 – 74.0225

The following piston oversizes are available: 0.10, 0.20, 0.40, 0.60, 0.80, 1.0 mm.

Camshaft Bearings – Inspection

The running surface of the bearing bushes must be clean and free from scores. Check the bushes for tight fit: worn bushes must be replaced. The bearing bushes, before being pressed in, have a slight oversize in the bore which disappears when they are pressed in; reaming after installation is, therefore, not necessary.

Cylinder Block Joint Surface – Inspection

The surface on which the cylinder head locates should be coated with a fine carbon oil mixture and trued on a surface plate. High spots should be removed by hand using a triangular scraper.

Valve Tappet Seats – Inspection

The running surfaces in the block must be clean and free from scores. The running clearance is 0.02 - 0.04 mm. Out-of-round bores of tappet guides can be bored out in a specialist workshop for tappets with oversizes of +0.20 and +0.40 mm (+0.0079 and +0.0158").

Tappets – Inspection

The surfaces, which run on the camshaft, must be perfectly smooth. Slight unevenness can be polished away with a carborundum stone. Check the inner surfaces. Out-of-round tappets must be replaced.

Sealing Plates – Installation

When leaking sealing plates are removed, their seats should be coated with "Hermetic" sealing compound. After driving in the plates the seat should be obtained by stretching the material of the plates. The plate is driven in and stretched with light taps of a hammer using a punch held at an angle. Flattening the curvature by means of a hammer blow is insufficient in itself.

Crankshaft and Flywheel – Inspection

The crankshaft should be checked visually for cracks on the main and crankpin journals and replaced if necessary. Slight grooves on the surfaces of the journals can be polished away using a fine carborundum stone. If after checking the bearing journals with a micrometer it is found that the wear is beyond the acceptable limits or the crankshaft is found to be out-of-round at the centre bearing journal by more than 0.05 mm, when measured with a dial gauge, the crankshaft must be reground in a specialist workshop to match the available main and big-end bearing (0.10, 0.25, 0.50, 0.75 and 1.00 mm undersize). After carrying out all the necessary work on the crankshaft and cleaning thoroughly, the lateral plugs of the oil bores on the flywheel masses should be removed and the oil bores of the shaft cleaned. Then press in new plugs and lock each at two diametrically opposed points with a centre punch. If the shaft has been reground and if new bearing shells are to be fitted, the running clearance between journal and shell should be checked (0.016 to 0.069 mm). Check the locating flange at the seat of the flywheel, it must be clean and free of burrs. Check the bearing in the crankshaft and the journal of the main gearbox shaft and replace as necessary. The bearing bush should be removed by means of an extractor or filled out with grease and a good fitting mandrel driven in so that the bush is forced out by the grease. (The bearing is a self-lubricating bush).

Checking the Bearing Shells and Running Clearance

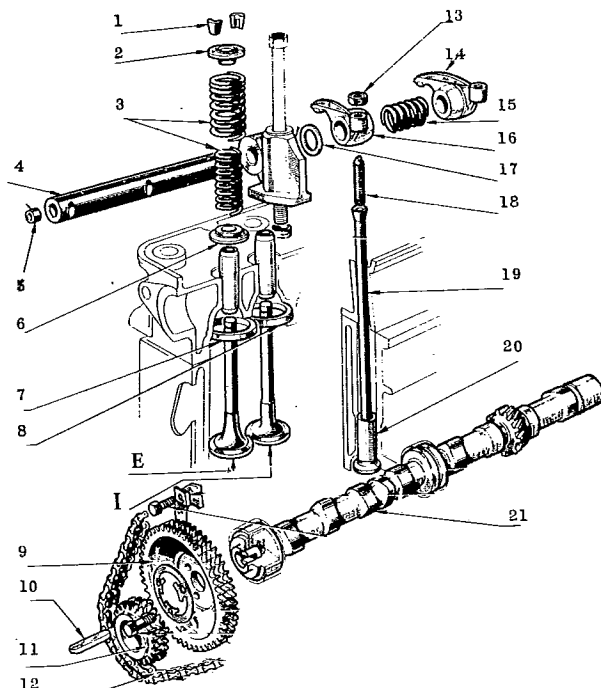
Check the outer surface for damage and the inner surfaces for wear of the bearing metal. Damaged or worn shells must be replaced. Bearing shells which can be re-used should be fitted in the block in order to check the bearing play. In doing so the cylinder block must sit on the cylinder head mating surface so that the weight of the crankshaft with flywheel is not carried by the bearing caps. The check can in this way be carried out simultaneously on all bearings. The bearing journals and bearing shells must be fitted without oil. The running clearance is measured with the help of a test wire made by Messrs "Perfect Circle" Plastigage Corporation, Hegerstone, Indiana, USA. The supplier is - as in the case of all special tools - the spare parts department of Simca. The test wires are divided into three classes:

Type PS-1 (green) includes clearances of 0.025-0.075 mm

Type PR-1 (red) includes clearances of 0.050-0.150 mm

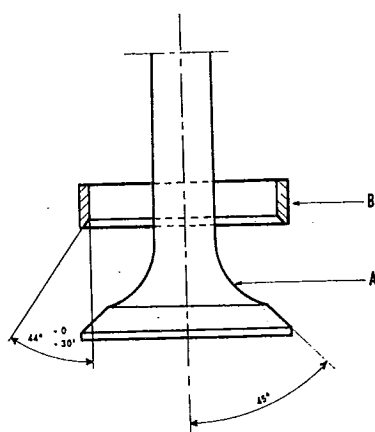
Type PB-1 (blue) includes clearances of 0.100-0.230 mm

A strip of test wire should be placed across the bearing shell halves or on the bearing journals over the whole width of the bearing shells. Fit the bearing caps and tighten to a torque of 40 to 47 ft.lb. Through the pressure the calibrated wire is compressed into a rectangular shape. Remove the bearing caps and measure the wires at the point of the greatest width using the scale on the "Plastigage" box. If one end of the test wire is wider than the other, it is possible to determine the journal taper by measuring both ends. Journal out-of-round can be measured if the test wire is placed over the whole diameter of the bearing shell at right angles to the crankshaft journal. The difference between the narrow and wide side of the flattened wire is the amount of out-of-round. If the test wire has not been compressed, the running clearance is not within the tolerance range of the gauge. The test should then be repeated with the next class Type PR-1. If the measurement shows a running clearance in excess of 0.1 mm (0.0039") the bearing shells must be replaced by under size bearing shells and the crankshaft journals reground correspondingly.



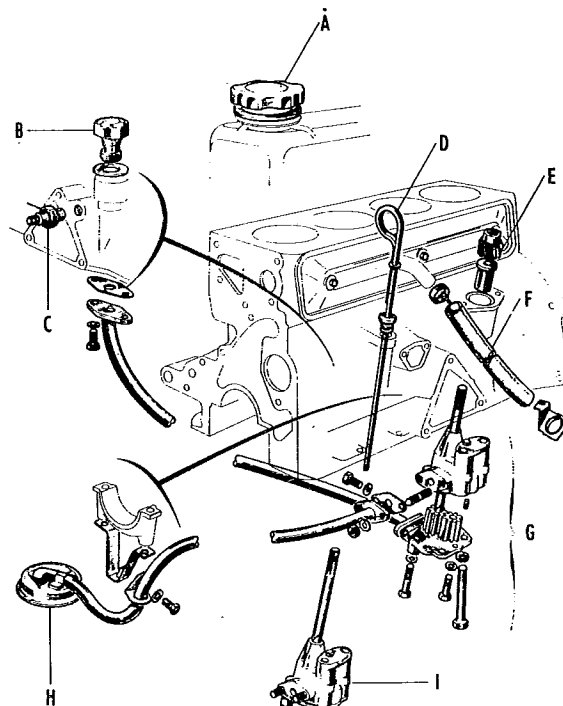
Exploded view of valve operating mechanism with camshaft and timing gears

- | | |
|----------------------------|---------------------------|
| 1. Valve cotter | 12. Timing chain |
| 2. Valve spring collar | 13. Adjusting nut |
| 3. Inner and outer spring | 14. Rocker arm |
| 4. Rocker shaft | 15. Spring |
| 5. Plug | 16. Rocker arm |
| 6. Spring seat | 17. Washer |
| 7. Valve seat insert | 18. Valve adjusting screw |
| 8. Valve seat insert | 19. Push rod |
| 9. Camshaft timing gear | 20. Tappet |
| 10. Key | 21. Camshaft |
| 11. Crankshaft timing gear | |
| E. Exhaust valve | |
| I. Inlet valve | |



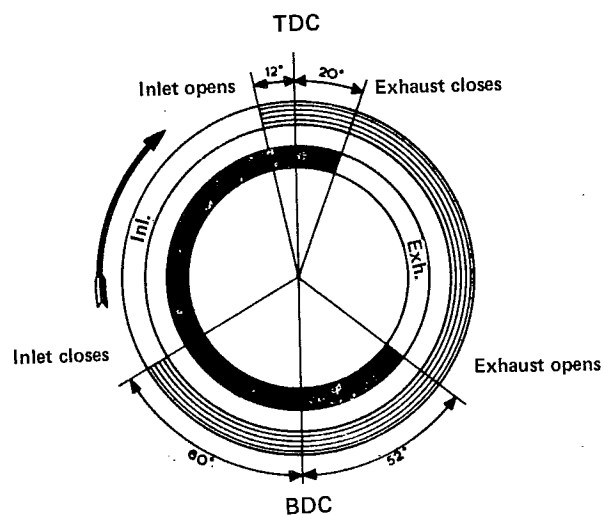
Valve head dimensions

- A. Valve
B. Valve seat
Note the difference in the angles.



Exploded view of the oil pump and components.

- | | |
|----|---------------------------|
| A. | Filler cap |
| B. | Oil pressure relief valve |
| C. | Oil pressure switch |
| D. | Oil dipstick |
| E. | Pump drive gear |
| F. | Breather tube |
| G. | Oil pump, dismantled |
| H. | Oil strainer |
| I. | Assembled oil pump |



Valve timing diagram for Simca 1301 (Engine Type 312T).

A thicker than standard half bearing PD 28078F can be fitted to remedy excessive connecting rod play: for standard half bearings 545845 or 548553A, play of more than .04 mm (0.00156") is reduced by fitting thick half bearing. For standard half bearings 548554B, play of more than 0.053 mm (0.00206") is reduced by thick half bearing.

It is important that play is not less than .03 mm (0.0078").

Crankshaft End Float — Inspection

The specified end float is 0.09-0.27 mm. Two half washers, which are located on the centre main bearing, absorb the axial thrust of the crankshaft. Push the crankshaft, in its installed condition, to one side so that the butting face of the bearing journal locates against the half washer. Then measure the play between the other half washer and the butting face by means of a feeler gauge. If the measured value is greater than 0.01 to 0.27 mm (0.00039 to 0.01063") oversize half washer must be fitted. Oversizes of 0.10, 0.15 and 0.20 mm (0.0039, 0.0059 and 0.0079") are available.

Flywheel with Starter Ring Gear

Remove slight burrs on the starter ring with a file. If the teeth are badly damaged, a new ring gear must be shrunk on. Drill the starter ring and split it with a sharp blow of a chisel. Check the locating surface for burrs. Heat the new starter ring in an oil bath to 80 - 100°C (175 - 212°F) and shrink the new starter ring on.

Camshaft — Inspection

Only very slight running marks on the journal ends and the cams may be polished away with an oil stone, otherwise the shaft must be replaced. This also applies if the cast iron alloy shaft has burn marks. If the teeth for driving the oil pump and the distributor are damaged, the camshaft must be replaced. The bearing points are checked with a dial gauge by turning the shaft slowly when it is supported on V-blocks. The measured runout must not exceed 0.03 mm (0.0018"). Check the flange to which the camshaft sprocket is bolted; it must be in perfect condition without burrs or turn marks (see Technical Data of camshaft for dimensions of bearings and clearances).

Connecting Rods and Pistons — Inspection and Assembly

The bearing shells of the connecting rods must be replaced if the shells are damaged or show signs of wear in the bearing metal. In such a case it must be checked whether or not the corresponding bearing journal on the crankshaft is also affected and must be refinished; undersize bearing shells must then be fitted.

The bushes in the small ends must be checked for wear in the bore and for a tight fit in the connecting rod. Damaged or loose bushes must be pressed out and replaced by new parts. If during dismantling it is found that the gudgeon pin play is excessive, it can be corrected by fitting an oversize gudgeon pin; otherwise new pistons must be installed. The internal diameter of the bush after being pressed in is 22.002 - 22.012 mm (0.8662"-0.8702"). The diameter of the gudgeon pin is 21.995 - 21.991 mm (0.8661" - 0.86596"). If pistons or connecting rods have to be replaced, the new pistons and connecting rods must be checked in the assembled condition for twist and distortion on a standard commercial testing device. If necessary straighten and square the connecting rod outside the testing device. Generally speaking, connecting rods and pistons which are to be re-used need not be straightened as they have already been run in the cylinder bores. If necessary remove the piston rings with a pair of conventional piston ring pliers. Clean the carbon from

the bottom of the piston ring grooves using a broken piston ring, the end of which has been ground to a wedge shape. Clean oil drain holes of carbon. In order to check the piston ring gap each ring should be inserted in the corresponding cylinder bore. To ensure that the ring is exactly at right angles to the bore it is pushed about 50 mm into the bore with the corresponding piston and the piston ring gap measured by means of a feeler gauge.

Piston ring gaps:

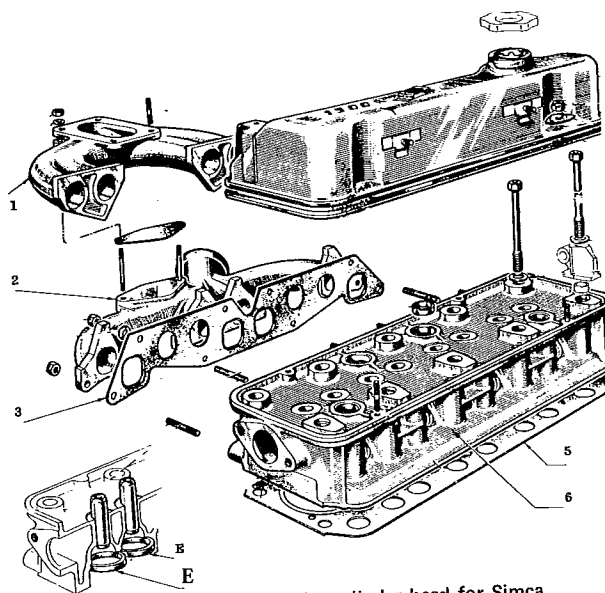
Two upper compression rings	0.15-0.35 mm (0.0059-0.0138")
Upper oil scraper ring	0.15-0.35 mm (0.0059-0.0138")
Lower oil scraper ring	0.25-0.50 mm (0.0098-0.0197")

The compression rings must be inserted with the mark "Top" facing upwards. The upper oil scraper ring has a groove at the bottom, the mark "Top" must face upwards. The lower oil scraper ring can be inserted either way round. After inserting the rings ensure that the rings run freely in the grooves by turning them around the periphery of the piston. If a ring sticks in one position it can only be due to a burr or foreign body which should be removed.

Goetze Adapter Rings

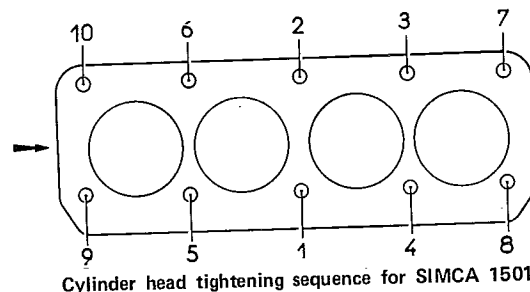
If an engine shows an increase in oil consumption and a reduction in efficiency as a result of cylinder wear, the installation of the Goetze adapter rings should be taken into consideration before reboring the cylinders or fitting an exchange engine. The adapter piston ring system is an intermediate stage before overhauling or exchange and can bring the engine up to its original efficiency. However, the precondition for this is that the inspection shows that the engine is, apart from wear, in good mechanical order (big end bearings, gudgeon pins, valves, valve guides, carburettor and oil pump). The wear of the cylinder bore can be between 0.1 and 0.25 mm (0.0039 and 0.0098") for an intermediate overhaul with Goetze adapter rings. If the cylinder wear is less than 0.1 mm (0.0039") the installation of these rings should not be considered as they run dry in the bores and would seize. The special rings are supplied by the Simca spare parts department as a complete set for an engine, but only for the standard bore dimension. It is important to note that the wear angle at T.D.C. must not be worked away or flattened when the adapter rings are fitted. The upper running edge of the top compression ring is slightly recessed for this purpose and thus makes contact with the upper wear edge impossible. The piston rings must be fitted in accordance with the instructions on the box. Engines fitted with Goetze adapter rings should be run in like new engines during the first 300 - 600 miles. The vehicle is ready for normal use after the oil change.

If pistons have to be replaced, a set of the same type and same class must be selected. The pistons are fitted as follows: first insert a retaining ring using pointed pliers in the annular groove of the gudgeon pin bore in the piston. Then heat the piston in a water bath to 80°C (175°F). As the gudgeon pin sits 2.0 mm off centre in the piston the connecting rod must be held in such a way that the milled slot at the bottom of the piston skirt faces forward. The marking on the connecting rod must face the camshaft. The cold gudgeon pin is inserted by hand in the piston and connecting rod bush until it locates against the first retaining ring. Then fit the second retaining ring on the other side of the gudgeon pin bore. Check the squareness of the connecting rod and piston assembly on the testing device. Permissible distortion is 0.20 in 100 mm (0.0079 in 3.94"), permissible twist is 0.08 in 100 mm (0.00315 in 3.94"). Straighten if necessary.

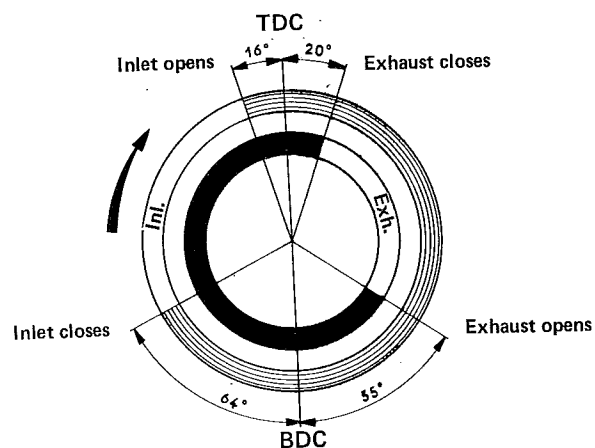


Exploded view of the cylinder head for Simca 1501.

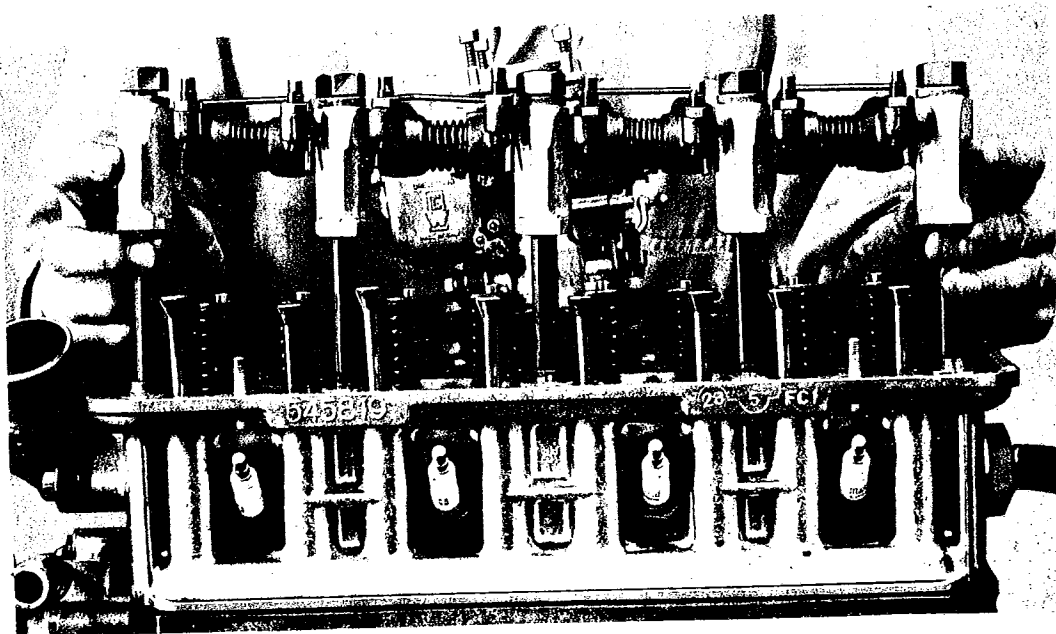
1. Inlet manifold
2. Exhaust manifold
3. Manifold gasket
4. Rocker cover
5. Cylinder head gasket
6. Cylinder head



Cylinder head tightening sequence for SIMCA 1501.



Valve timing diagram for SIMCA 1501.



Removal of the rocker gear from the cylinder head.

When replacing connecting rods and pistons always use components of the same weight because the permissible weight difference of all the connecting rods and pistons in an engine must not exceed ± 5 grammes. In order to balance the weights, material can be removed from the small end or from the big end cap.

CYLINDER HEAD — Removal, Testing and Overhaul

As it is possible to overhaul the cylinder head with the engine "in situ" the removal and the overhaul of the head is described in detail.

Remove the air intake filter. Pull off the fuel line between the carburettor and the fuel pump. Unscrew the carburettor and hang it up with a piece of welding wire without dismantling any further. Unscrew the pipe clamp from the joint of the front exhaust silencer at the manifold and remove the intake and exhaust manifolds from the cylinder head. Detach the retaining clip for the rigid pipes of the heat exchanger from the cylinder head cover. Unscrew the retaining nuts and lift off the cylinder head cover.

Detach the hose clamp on the water outlet connection of the cylinder head and pull off the water hose. Unscrew the cheese head screws in the reverse sequence to that shown in the diagram and unscrew the self-locking nuts of the rocker arm supports. This must only be carried out with the engine cold. Lift off the rocker assembly and remove the cylinder head. Remove the valves, descale and keep them in correct order. Remove any carbon from the outlet ports, the combustion chambers and the valve guides with an electrical wire brush. Coat the joint surface of the cylinder head with a fine carbon oil mixture and true it on a surface plate. If there are slight high spots, they can be removed by hand with a scraper, otherwise a horizontal grinder should be used. It may also be sufficient to check the flatness of the cylinder head with a straight edge placed at different points both longitudinally and across, and the gap between the joint surface and the straight edge observed. If it is necessary to reface the cylinder head with a horizontal grinder, no more than 0.5 mm (0.0197") should be removed. If the sealing plates must be replaced in the cylinder head as a result of leaks, they should be inserted with "Hermetic" sealing compound. Stretch the plate round the edges with a punch. Flattening it in the centre by means of a hammer is not sufficient: when fitting is completed, lock the plate with a centre punch.

Valve Guides

As the valve guides are pressed in with an interference fit, this interference fit in the cylinder block must be checked and the condition of the snap ring noted. If the bore diameters are more than 8.04 mm (0.3165") (use a plug gauge for the measurement) or if there are grooves they can be reamed out to the repair dimension of +0.25 mm (0.0098") with a cylindrical reamer. Valves with oversize stems must then be fitted. If the guides need to be replaced, the cylinder head should be heated in boiling water and the valve guides pressed in with a bench press. As the replacement guides are only rough drilled when supplied they must be reamed out to the specified bore dimension of 8.022 to 8.04 mm (0.3158 - 0.3165").

Valve Seats

If the valve seats in the block are burned or pitted they should be made gas-tight by re-cutting or regrinding. This can be done

by hand or by using a conventional valve grinding machine. Only enough material should be removed to ensure a smooth surface and a valve seat angle of 44° in the seat ring. It may then be necessary to reface the valve seat width, particularly if the valve guides have been reamed out. The width should be 2.12 mm (0.08246"). A so-called workshop replacement of the valve seat rings is not possible as the cylinder must be heated up to 230°C (450°F) for an hour and the rings inserted at room temperature. This work can only be carried out by a specialist workshop.

Valves — Replacing

Check the valve for distortion by rolling it on a flat surface. Clamp the valve stem in the chuck of a valve grinding machine. Set the headstock so that the valve head is ground to an angle of 45° . Only enough material should be removed to ensure a clean seating surface (the width of the seating surface should be between 2.82 and 3.42 mm (0.111 - 0.135"). To check the contact pattern, vertically mark the valve head seat with a few pencil lines. Move the valve backwards and forwards by lightly applying a round piece of wood. A gas-tightness test can otherwise be carried out with a conventional rubber ball tester. Bent valves or valves on which the head is less than 0.5 mm (0.0197") thick after grinding must be replaced.

Valves — Installation

Oil the valve stem and insert it in its original valve guide. If the guides have been reamed out to +0.25 mm, valves with corresponding oversize stems should be fitted. Deformed or discoloured springs must be replaced. Check the springs using a conventional spring tester. The normal length of the spring is 53 mm; under a load of 25 kg the length must be 42 mm. Springs which show different values in the test should be replaced. Ensure that the taper keys locate correctly in the grooves and spring retainers. If the spring tester is not available the springs should be compared with a new part. See "Technical Data" for dimensions.

Push Rods — Inspection

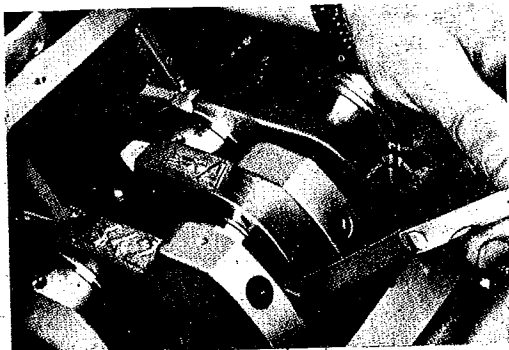
Roll the push rods by hand on a surface plate to check them for straightness, the rods must not be bent. The ball sockets for the rocker arm adjusting screws must not be scored or damaged in any other way. The same applies to the ball end of the push rods which are in contact with the tappets. Damaged ball surfaces or damaged ball socket surfaces necessitate replacement of the push rod concerned.

Rocker Arms and Rocker Shaft — Inspection

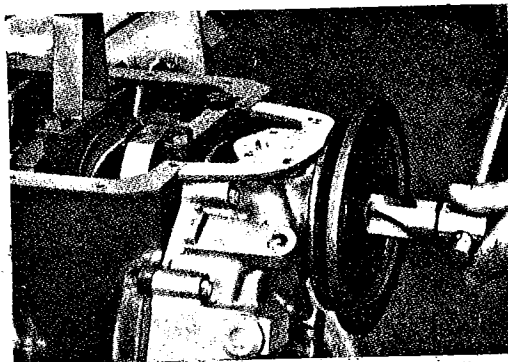
The rocker arm to valve stem contact face must be clean. Small pressure points can be polished away using a carborundum stone. Check the running surfaces of the rocker shaft and the bores in the rocker arms. They must have no scores or pressure points. Renew parts as necessary. Blow out the lubricating bores in the shaft and rocker arms with compressed air. Check the adjusting screws, the threads must be in good condition and the ball ends clean and free of scores. See Engine Assembly for installation of the cylinder head.

ENGINE — Assembly

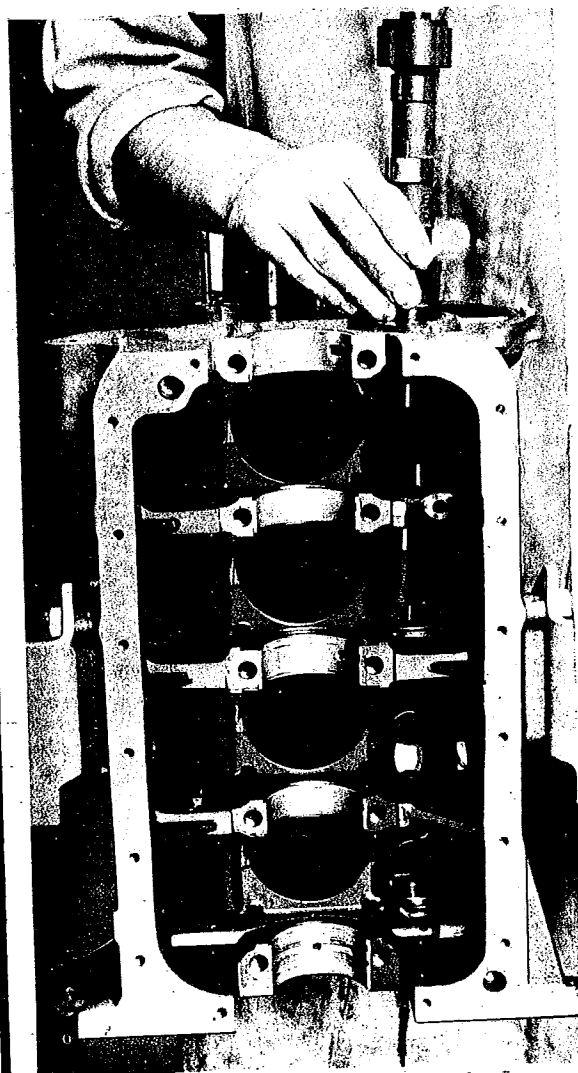
The following points apply in general to the assembly of the engine, clutch and gearbox: New gaskets, sealing rings, locking plates, split pins etc. must always be used. Bolts, nuts, washers, spring washers and lock washers must be in perfect condition. Self-locking "Nylstop" nuts must always be renewed once they are removed. Attention should be paid to absolute cleanliness



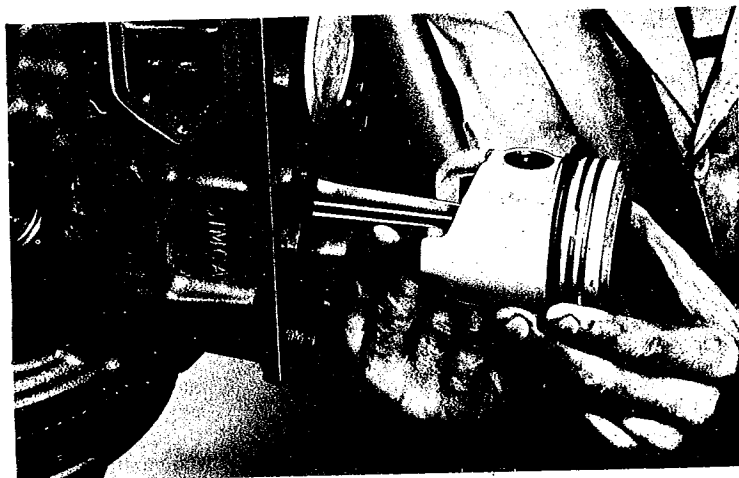
Checking the axial clearance of the crankshaft
(0.09 - 0.27 mm).



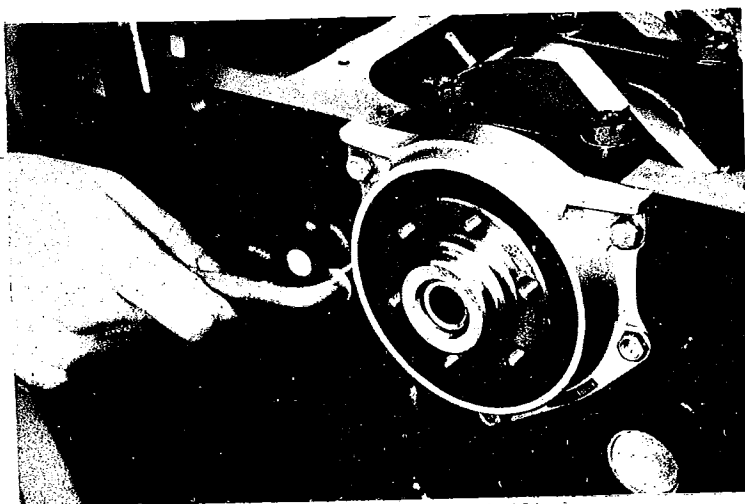
Removal of the centre bolt from the oil
centrifuge.



Removal of the camshaft from the cylinder block.



Removal of piston/connecting rod assembly from cylinder block.



Removal of the crankshaft seal carrier.

during assembly. Assembly is a reversal of the dismantling procedure, noting the following points.

Before fitting the bearing shell halves, ensure that the main bearings in the cylinder block are absolutely clean. The retaining dogs of the bearing shells should have a certain amount of play in the block. Fit the half shells; coat the shells with engine oil and fit the reground or checked crankshaft. Insert the half washers, for compensating crankshaft end float, with the markings facing the crankshaft side. Check the lateral play with a feeler gauge, it should be 0.09-0.27 mm. Renew half washers if necessary. Oversize thicknesses of 0.10, 0.15 and 0.2 mm (0.00394, 0.0059 and 0.00787") are available to obtain this play. Place the half shells in the main bearing caps and fit the bearing caps. The lugs on the bearing shells must be opposite one another. Fit new locking plates on the bolts and screw on finger-tight. The bracket, to which the oil suction pipe is screwed at a later stage, is positioned under the bolt heads of bearing No.3. Tighten the bearing cap bolts uniformly with a torque wrench, turning the crankshaft at the same time. A few light taps with a rubber faced mallet facilitates settling and centering of the bearing shells and caps. Finally tighten the bolts to a torque of 40 - 47 ft.lb. Recheck the freeness of the crankshaft. The rear oil seal and its sealing ring holder is now fitted and a new paper gasket inserted between the oil sump and the cylinder block; ensure that the gasket locates centrally in relation to the crankshaft. Turn the crankshaft so that crankpin No.1 is at the top, and fit the flywheel with the marking at the top: renew the three locking plates. As the screw holes in the crankshaft flange are drilled through, the screws must be screwed in with "Hermetic" or "Curalin". Tighten 8 mm screws to a torque of 28 ft.lb and 9 mm screws to a torque of 40 ft.lb. and bend the tabs of the locking plates onto the hexagons.

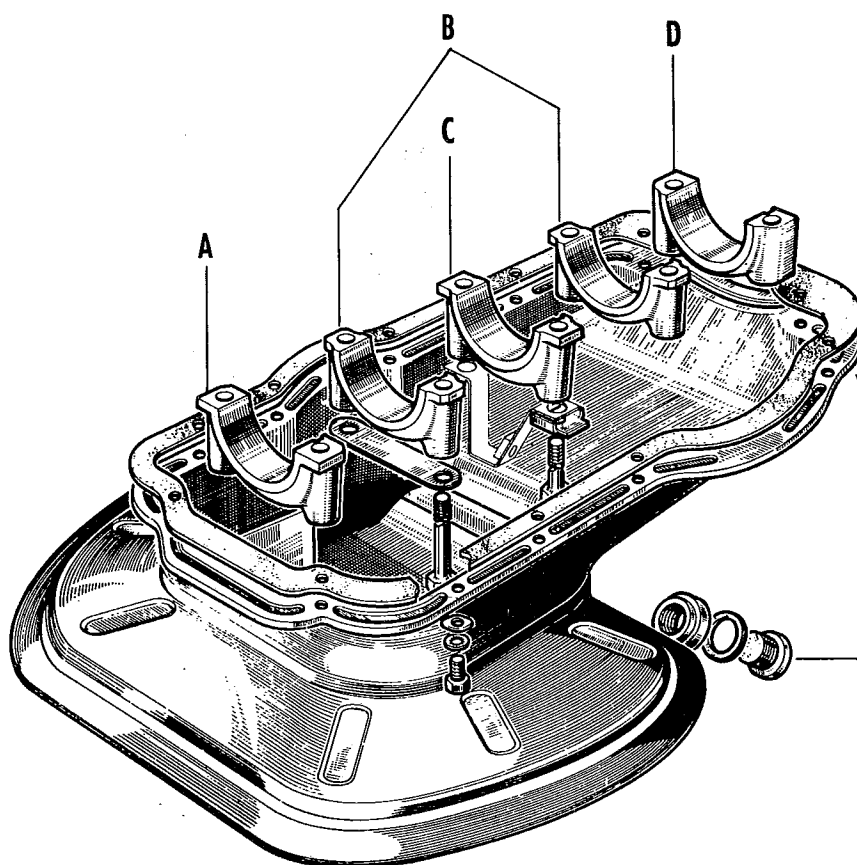
The preassembled connecting rods with pistons are fitted into the corresponding cylinder bores in accordance with the numbers marked on the pistons during the dismantling procedure. The milled slot at the bottom of the piston skirt must face forwards and the marking on the connecting rod must face the camshaft. Big end cap bolts and nuts must be removed in all cases. Lubricate the pistons, piston rings and cylinder working surfaces, then fit pistons (piston ring gaps offset) into the bores of the cylinder block from above with the help of a piston ring clamping sleeve. Carefully position the connecting rods on the big end journals. Screw on the big end caps (mating numbers must be opposite one another), ensuring that the retaining dogs on the bearing shells are located correctly in the connecting rod and big end cap. Before tightening the big end caps, check that the cap and connecting rod are in alignment with the help of feeler gauges corresponding to the axial play (0.07 - 0.17 mm/ 0.00276 - 0.00669") then tighten the big end nuts to a torque of 22 ft.lb. Check the operation of the crankshaft and the connecting rods and pistons by turning the flywheel. Then fit the cover plates of the timing housing, replacing the cork gasket if necessary. Secure the screws by hitting them with a centre punch. Lubricate the bushes for the camshaft in the cylinder block and fit the camshaft and the bearing flange. (Check the play, 0.05-0.15 mm/0.00197-0.0059"). Insert the key for the drive sprocket in the crankshaft. Fit the drive sprocket with camshaft sprocket and timing chain so that the reference marks "O" are opposite one another. Turn the camshaft until the holes in the camshaft sprocket are in alignment with the holes on the camshaft flange. Only one setting is possible as the holes are drilled offset. Fit new retainers, tighten the three hexagon head screws to a torque of 14 ft.lb, and bend the retainers onto the screw heads. Fit the front thrust washer of the crankshaft (ground side to outside). Prepare the timing case cover for assembly. Check the

seat of the sealing cups lock pin in the timing case cover. Insert a new SPI sealing ring (retaining ring) in the cover (tool 31716W). Insert the inner sealing cup in the cover with the groove opposite the lock pin. Then fit the cover with a new cork gasket if necessary, and screw on finger-tight. Push the inner sealing cup, without turning it against the thrust washer of the crankshaft.

Insert the spring and fit the second sealing cup so that one of the grooves is opposite the lock pin. Set the piston of No.1 cylinder to T.D.C. and push on the oil centrifuge hub (belt pulley). The adjustment marks must be opposite one another. Fit the oil deflector plate and its retainer and tighten the centre mounting bolt to a torque reading of 50-72 ft.lb. with the special spanner 31175T. Renew the gasket under the cover of the lubricating oil centrifuge and tighten the cover diagonally to a torque of 7 ft.lb. Then tighten the timing case cover screws to a torque reading of 7 ft.lb. Fit the oil pump. Screw on the delivery pipe after the oil pump shaft has been centralized, then screw on the suction pipe with strainer. Fit the cylinder head using a new gasket. If the cylinder head has been reground a 1.8 mm thick Reinz gasket with steel surround should be used. If the 312 T engine is to use normal grade fuel instead of the specified super grade fuel, a 2.2 mm thick cylinder head gasket must be fitted. Centralize the cylinder head gasket in relation to the cylinder bores and the combustion chambers with 2 centering pins 7744 B which are screwed in at the front and rear on the distributor side. Lubricate the valve tappets and push rods and fit in the same order as when removed (play of valve tappets 0.02 - 0.43 mm/ 0.00079 - 0.0169").

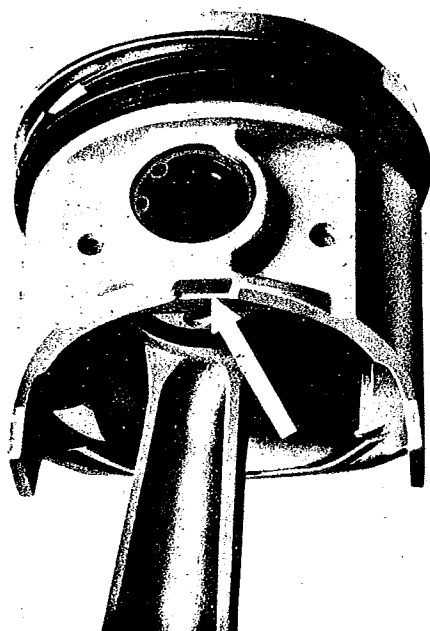
Assembly of the rocker mechanism is a reversal of the dismantling procedure; recheck the oil drillings to ensure that they are clean. Before fitting the rocker mechanism, back off the rocker arm adjusting screws slightly. Fit the rocker mechanism with copper and steel washers under the self-locking Nystop nuts. Tighten the nuts to a torque reading of 18 - 22 ft.lb. Insert the cylinder head bolts with coppered washers and screw in finger-tight. Unscrew the two centering pins and screw in the last cylinder head bolts. Then tighten the cylinder head bolts in sequence to a torque of 51 to 72 ft.lb. Retighten the cylinder head bolts to the same torque reading after a distance of 300 to 600 miles. The valve clearance of the inlet valves should be set to 0.20 mm (0.0079") and the exhaust valves to 0.25 mm (0.0098") by means of the rocker arm adjusting screws. After tightening the lock nuts the setting should be checked again with a feeler gauge. Valve clearances are set when the engine is cold. If, in the case of a repair to the cylinder head, the engine has not cooled down fully, the clearance may be set while the engine is warm. However, the clearance must be set at 0.30 mm (0.0118") for both inlet and exhaust valves. Screw on the valve rocker cover and its gasket. Fit the drive pinion of the oil pump and the drive sleeve of the distributor. See Electrical System for adjustment of distributor.

The installation of the fuel pump is a reversal of the removal procedure, renew gasket if necessary (see Fuel System). Fit the water pump. Fit the fan and tension the V-belt (see Cooling System). When fitting the oil pump use a new gasket if necessary (12 screws with tooth lock washers and retainers). Tighten the screws to a torque of 7 ft.lb. Screw the oil drain plug into the sump and tighten it to a torque of 25 ft.lb. Before fitting the cylinder head cover (new gasket) the rocker mechanism should be well lubricated with engine oil using an oil can. Screw on the inlet and exhaust manifolds; tighten the nuts to a torque of 5 - 6 ft.lb. Fit the carburettor (see Fuel System). Screw in the spark plugs and fit leads. Fill up with approximately 4 litres of Shell X100 Multigrade oil. Installation

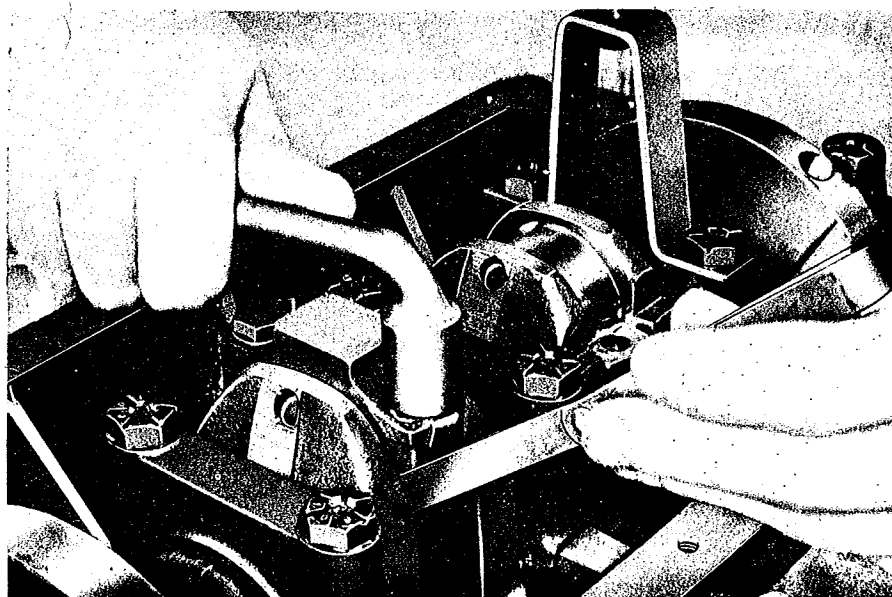


View of oil sump and main bearing caps.

- A. Front main bearing cap
- B. Intermediate bearing cap
- C. Centre bearing cap
- D. Rear bearing cap
- E. Oil sump drain plug



The identification notch in the piston.



Checking and adjusting the connecting rod bearing side clearance.

of the engine is a reversal of the removal procedure (see section ENGINE — Removal).

1300 ENGINE

From engine number 4 106 888 a new oil filter baffle 24 057N is fitted. The new filter is identified by having 3 lugs instead of the previous 6. The parts of the assemblies should always be fitted as pairs. From engine number 4 100 283, a new oil sump with oil strainer, attached by a reinforced bracket is fitted. It is imperative that the sump PN25 553M, strainer PN25 562N and plate PN26 046M be fitted on all engines prior to this number.

Please note that when obtaining an Exchange/Repair engine that the inlet-exhaust manifold and the flywheel should be removed from the old engine and held ready for fitment to the Exchange/Repair engine.

ENGINE — Removal and Installation

As the mounting of the 1501 engine is the same as that of the 312 Simca 1301, removal should be carried out as detailed for that engine. The only additional operation is the removal of the water drain tap at the rear on the cylinder head so that it is not damaged when the engine is tilted.

ENGINE — Dismantling

Remove the oil vapour breather hose between the carburettor and the breather cap and also the vacuum hose between the carburettor and the ignition distributor. Remove the fuel pipe and the fuel pump. Remove the distributor and the dynamo and take off the fan belt. Remove the water pump and the support plate of the dynamo between the water pump and the cylinder block. Remove the cylinder head cover. Removal of the rocker arm mechanism and the cylinder head may only be carried out **when the engine is completely cold**. Unscrew the cylinder head bolts in the reverse sequence to that shown in the tightening diagram. Lift off the rocker arm mechanism, holding the rocker arms with made-up clamps. If the mechanism must be dismantled, the parts should be kept in such a way that the original assembly positions are maintained. Keep the push rods for the rocker arms in their original order. Lift off the cylinder head and its gasket. Before removing the clutch mechanism, mark its fitted position in relation to the flywheel. Insert 3.5 mm (0.138") shims between the clutch release lever and the pressure plate. Loosen the securing screws of the clutch mechanism in stages and then unscrew fully.

Remove the clutch and the clutch plate. Turn the engine in its assembly stand and unscrew and remove the oil sump. Remove and dismantle the oil pump suction hose with its strainer. Unscrew the front cover of the oil centrifuge. Release and unscrew the centre bolt of the oil centrifuge. Note the position of the belt pulley (filter body of the centrifuge). Remove the belt pulley, the conical stop collar and the key in the crankshaft. Unscrew the grub screw of the sealing rings in the timing case cover. Unscrew and pull off the timing case cover including the oil pump. Remove the oil pump from the timing case cover and remove the spacer washer of the filter body on the oil centrifuge.

Before removing the timing sprockets check the reference marks "O" of the drive sprocket in relation to the camshaft sprocket.

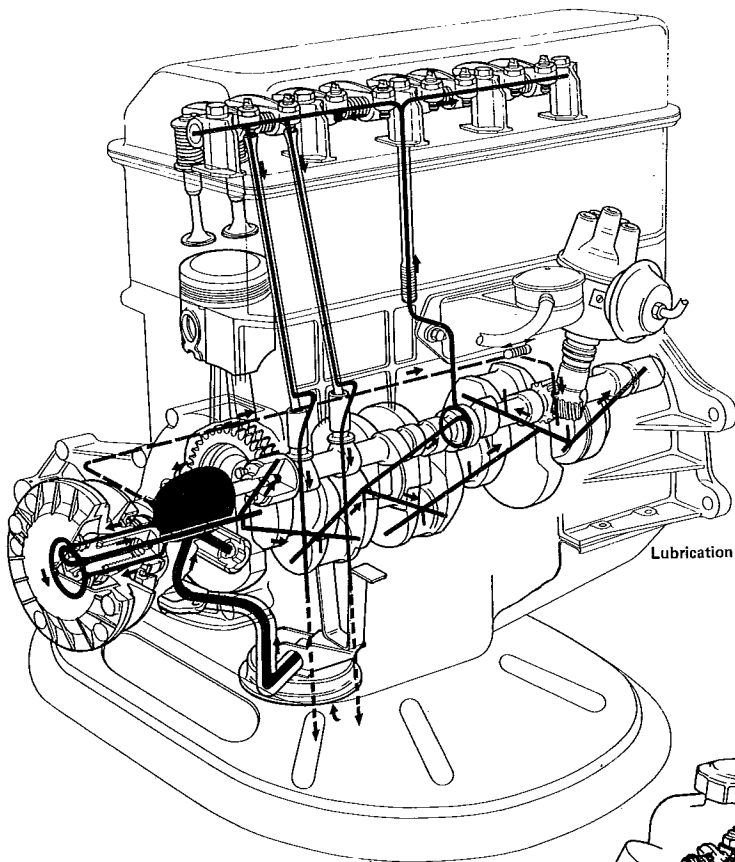
Remove both timing sprockets and the chain. Unscrew the big end caps and pull the connecting rods with pistons out from above. Attach the big end caps to the corresponding connecting rods in the order in which they were installed. Mark the pistons with numbers for reinstallation. Piston No.1 is at the flywheel end. Mark the position of the flywheel in relation to the crankshaft with a punch or a paint line in order that the original condition of balance can be obtained during reassembly.

Remove the flywheel. Remove the sealing ring holder and sealing ring of the crankshaft main bearing. Unscrew the crankshaft main bearing caps and remove the half washers for absorbing crankshaft end float from the centre bearing. Lift out the crankshaft: keep bearing caps in the order of removal: the bearing shells should also be kept in the correct order. Remove the bearing flange of the camshaft and remove the camshaft. Keep the valve tappets in their correct order. After thoroughly cleaning all parts with petrol and removing the carbon and oil sealing compound check them for re-use by means of visual inspections and measurements. It must be decided whether any damage can be rectified by refinishing or whether the part concerned should be replaced by a genuine Simca spare part.

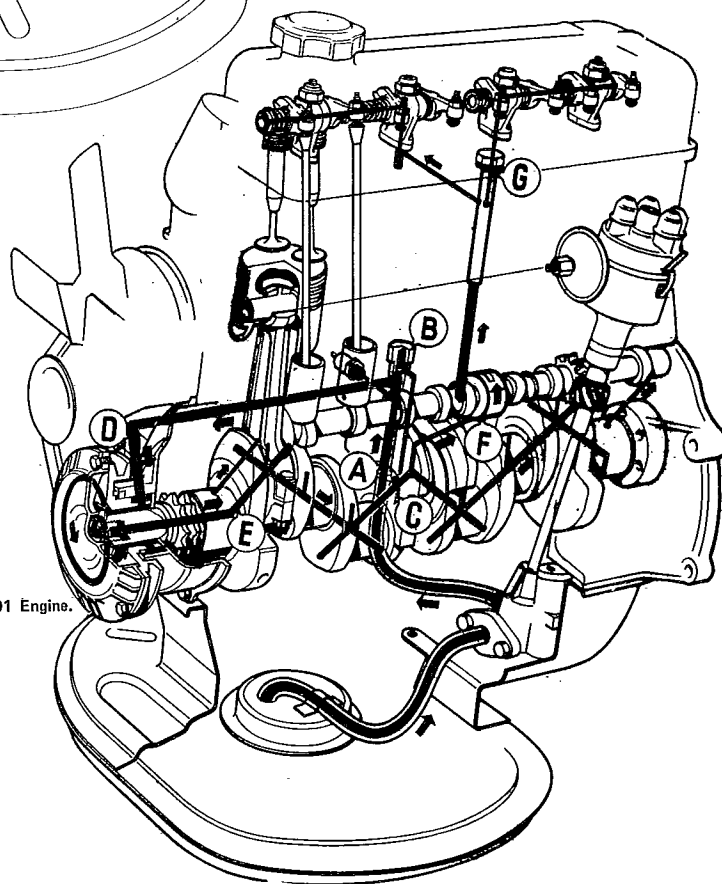
ENGINE — Assembly

The following points apply in general to the assembly of the engine, clutch and gearbox: New gaskets, sealing rings, locking plates, split pins etc. must always be used. Bolts, nuts, washers, spring washers and lock washers must be in perfect condition. Self-locking Nylstop nuts must always be renewed once they are removed. Attention should be paid to absolute cleanliness during assembly. All parts must be oiled before installation. Assembly is a reversal of the removal procedure. Fit valve tappets well oiled into their original positions. Fit the camshaft and bearing flange.

Before inserting the bearing shell halves ensure that the main bearings in the cylinder block are absolutely clean. The retaining dogs of the bearing shells should have a certain amount of play in the block. Fit the shell halves and coat the shells with engine oil and fit the reground or checked crankshaft. Insert the half washer for compensating the crankshaft end float, with the markings facing the crankshaft side. Check lateral play with a feeler gauge, it should be 0.09 - 0.27 mm (0.0035 - 0.0106"); renew half washers if necessary. Oversize thicknesses of 0.10, 0.15 and 0.2 mm (0.00394, 0.0059 and 0.00787") are available to obtain the necessary play. Place the half shells in the main bearing caps and fit the bearing caps; the lugs on the bearing shells must be opposite one another. Fit new locking plates on the bolts and screw on finger-tight. The bracket, to which the oil suction pipe is screwed at a later stage, is positioned under the bolt heads of bearing No.4. Then tighten the bearing cap bolts uniformly with a torque wrench, turning the crankshaft at the same time. A few light taps with a rubber faced mallet facilitate settling and centering of the bearing shells and caps. Finally tighten the bolts to a torque of 40 - 47 ft.lb: recheck the freeness of the crankshaft. The rear oil seal with sealing ring holder is now fitted and a new paper gasket inserted between the oil sump and the cylinder block: ensure that the gasket locates centrally in relation to the crankshaft. Turn the crankshaft so that crankpin No.1 is at the top and fit the flywheel in accordance with the marks made during dismantling. Renew the three locking plates. As the screw holes in the crankshaft flange are drilled through, the screws must be screwed in with "Hermetic" or "Curalin". Tighten the 8 mm screws to a torque of 27 ft.lb. and 9 mm screws to a torque of 40 ft.lb. and bend the tabs of the locking plates onto the hexagon heads.



Lubrication diagram for the SIMCA 1501 Engine.



Lubrication diagram for the SIMCA 1301 Engine.

Two classes of bearing shell halves are used for the big end bearings on the crankshaft. On crankpins marked A bearing No. 548 553 is used; on crankpins marked B bearing No. 548 554 is used. For repair stage +0.10 mm bearing No. 548 555 is available for A and bearing No. 548 556 for B.

The notes regarding the 1301 apply for the assembly of pistons, gudgeon pins and connecting rods, taking the different dimensions and bores into consideration (see Technical Data 1501).

The preassembled connecting rods and pistons are fitted into the corresponding cylinder bores in accordance with the numbers marked on the pistons during the removal procedure. The milled slot at the bottom of the piston skirt must face forwards and the markings on the connecting rod must face the camshaft. Big end cap bolts and nuts must be renewed in all cases. Lubricate the pistons, piston rings and cylinder working surfaces. Then fit the pistons (piston ring gaps offset) into the bores from above with the help of a piston ring clamping sleeve. Carefully position the connecting rods on the big end journals. Screw on the big end bearing caps (mating numbers must be opposite one another), ensuring that the retaining dogs on the bearing shells are located correctly in the connecting rod and big end cap.

Before tightening the big end caps check that the cap and big end are in alignment using a feeler gauge corresponding to the axial play (0.12 - 0.22 mm/0.0047 - 0.00866"), then tighten the big end nuts to a torque of 32 ft.lb. and lock them. Check the operation of the crankshaft with the connecting rods and pistons by turning the flywheel.

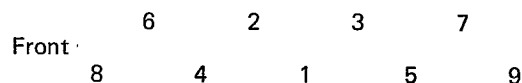
Lubricate the camshaft bushes in the cylinder block and fit the camshaft and bearing flange (check play, 0.05 - 0.15 mm/0.00197-0.0059"). Insert the key for the drive sprocket in the crankshaft. Fit the drive sprocket and camshaft sprocket and chain so that the reference marks "O" are opposite one another. Turn the camshaft until the holes on the camshaft flange are in alignment: only one setting is possible as the holes are drilled offset. Fit new retainers, tighten the three hexagon head screws to a torque of 14 ft.lb. and bend the retainers onto the screw heads. Fit the gear-type oil pump into the timing case cover. Although the cover is centralized with two set pins the screws should be tightened uniformly and the drive and driven sprockets moved at the same time in order that they do not jam. Insert a new SPI seal (retaining ring) and a new oil ring in the timing case cover.

Fit the belt pulley spacer washer on the crankshaft with the large surface facing the belt pulley. Screw the timing case cover with its built in oil pump and paper gasket (engage the oil pump shaft in the driver in the camshaft) to the crankcase. (Tightening torque 4-7 ft.lb.). Fit the belt pulley (filter body) of the oil centrifuge (note fitted position). Insert a new conical stop collar. Fit the key in the crankshaft keyway and tighten the centre mounting bolt of the filter body to a torque reading of 51 - 72 ft.lb. with the help of tool 20826 N and a torque wrench.

Measure the axial play of the sealing ring with a feeler gauge. The play must be between 0.04 and 0.12 mm, if it is not, the thickness of the sealing ring should be measured (19.95 to 19.98 mm/0.7854 - 0.7866") and the ring replaced if necessary. Peen the bolt in three slots with a punch. Screw on cover of the oil centrifuge with doughnut-shaped oil ring (torque of 7 ft.lb.). If the 342 engine is to use normal grade fuel instead of the specified super grade fuel, a 2.2 mm thick cylinder head gasket

must be fitted. Fit the cylinder head gasket and centralize it with two cylinder head bolts. Fit the preassembled cylinder head. Insert the oiled rocker arm push rods in their original order. Assembly of the rocker mechanism is a reversal of the dismantling procedure; recheck the oil drillings to ensure that they are clean. Fit the cylinder head bolts and retaining bolts of the rocker arm supports with coppered washers and tighten to a torque reading of 58 - 72 ft.lb. in the sequence shown in the diagram.

Retighten the bolts to the same torque reading after a distance of 300 to 600 miles. The valve clearance of the inlet valves should be set at 0.20 mm (0.0079") and the exhaust valves at 0.35 mm (0.0139") by means of the rocker arm adjusting screws. After tightening the lock nuts the setting should be checked again with a feeler gauge. Valve clearances are set when the engine is cold. Fit the cylinder head cover using a new gasket (cork).



Tightening sequence for cylinder head bolts

Rotate the engine in its normal direction of rotation until the first adjustment mark on the oil filter body is opposite the adjustment mark on the timing case cover. Set the distributor rotor so that it points to 1 in the distributor cap, the contact breaker points are open. Push in the distributor and secure it. Screw on the oil vapour breather device and the fuel pump (2 gaskets with an insulation piece between). Fit the cover plate of the timing case cover with its gasket between the water pump and the cylinder block. Fit the water pump with gasket, fan belt pulley and fan. Fit the dynamo and tension the V-belt. Centralize the clutch plate and screw on the clutch. Fit the oil pump strainer inserting a paper gasket under the union. Also use a new cork gasket when fitting the oil sump. Tighten the screws to a torque of 1.0 mkg (7 ft.lb.). Screw in the oil drain plug and tighten it to a torque of 25 ft.lb. Insert the oil dipstick and fill the sump with approximately 4 litres of Shell X100 Multigrade oil. Connect the hose of the oil vapour breather device to the carburettor and the fuel line and vacuum line from the carburettor to the distributor diaphragm unit. Installation is a reversal of the removal procedure. When refitting the water drain tap the threads should be coated with Hermetic sealing compound.

Note that Simca supply only a standard cylinder head as an Exchange unit. When fitting a head to a 1500 automatic engine, use a scraper to produce a chamfer 0.5 - 0.7 mm (0.195 - 0.273") around the compression chambers. Smooth the chamfer with fine emery cloth and clean and blow out the cylinder head prior to assembly.

LUBRICATION SYSTEM 1301 MODEL

The electrical contactor for oil pressure indication is located at the end of a bore which leads off from the rear camshaft bearing. If the oil pressure drops to 44 psi. the tell-tale lamp in the combination instrument is lit red. Connecting rods, gudgeon pins, cylinder working surfaces, cams, tappets, push rods and valve stems are lubricated by oil splash.

LUBRICATION SYSTEM 1501 MODEL

The lubricating oil circuit of the 1501 model differs from the 1301 model as a result of the installed position of the oil pump on the timing cover along the longitudinal axis of the camshaft. The oil pressure at operating temperature is 68 psi. + 2.8 psi. at 3500 rpm.

OIL PUMP — Removal, Inspection and Overhaul

After removing the oil sump unscrew the oil suction pipe complete with its strainer and pressure body. Unscrew the pump from the engine block, remove the pump cover and withdraw the pump shaft with drive gear and driven gear from the housing. Carefully clean the parts in petrol, blow out the oil suction pipe and delivery pipe: check all parts for wear or damage and renew if necessary.

OIL CENTRIFUGE — Cleaning and Inspection

Normally the centrifuge requires no maintenance. The dirt need only be removed every 30,000 miles, but more often under extreme operating conditions. (every 18,000 miles in the tropics

and in northerly areas). The oil centrifuge is accessible from below the vehicle so that a complete removal is unnecessary. Remove the cover, remove the dirt from the shell halves, clean individual parts with petrol. Deformed or defective parts must be replaced. A new gasket should be used for reassembly.

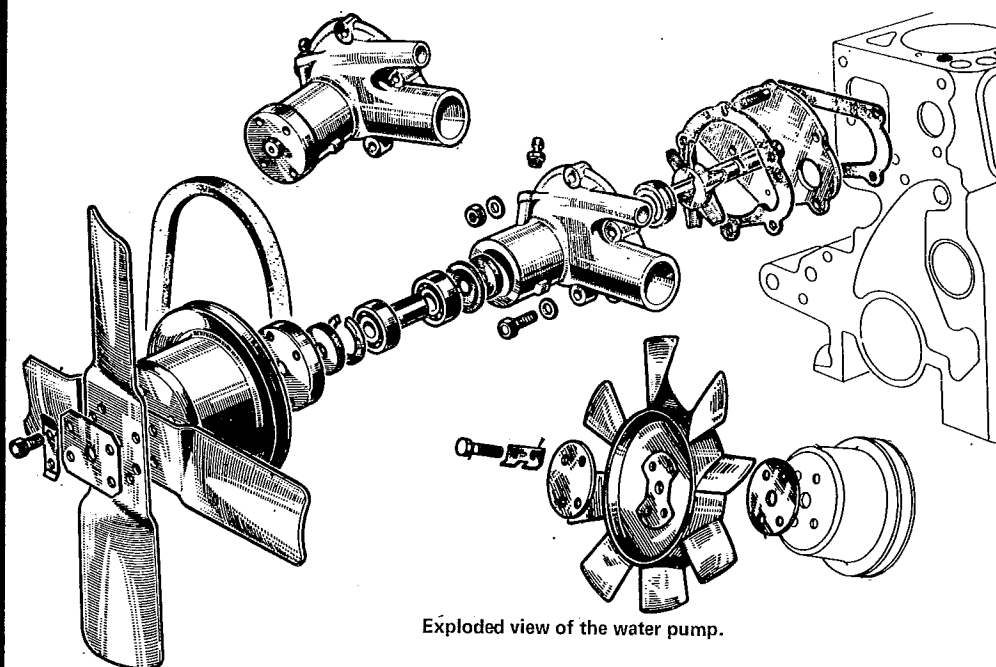
The oil centrifuge of the 1501 model is basically the same as on the 1301 model, only the mounting of the filter body on the crankshaft and the seal are different.

OIL PRESSURE VALVE AND OIL PRESSURE SWITCH

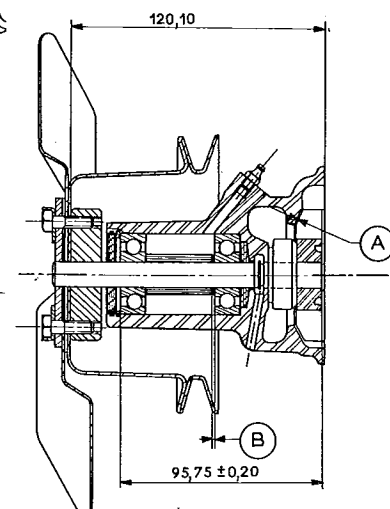
These are located on the left of the engine block. The oil pressure should be 3.5 to 4.5 kg/cm² at 3000 rpm. The oil pressure switch is electrically connected to a telltale lamp for oil pressure and water temperature in the combination instrument. When the ignition is switched on the lamp lights up red and goes out when engine speed increases and the oil pressure is correct.

Trouble Shooting

SYMPTOMS	PROBABLE CAUSE	ACTION TO BE TAKEN
Lack of power	1. Poor compression Incorrect valve clearance Intake valves leaking Sticking valves Valve springs broken Piston rings broken Rings or cylinders worn	Adjust valve clearance Lap valve seats Replace valve and guides Replace valve spring Replace piston rings Overhaul engine
	2. Ignition improperly set Incorrect ignition timing Defective spark plugs Contact breakers defective	Re-set Clean, re-set or renew Clean or replace, adjust gap
	3. Lack of fuel Clogged carburettor jet Clogged fuel pipe Dirty fuel tank Faulty fuel pump Fuel filter clogged	Clean carburettor Clean fuel pipe Clean fuel tank Check fuel pump Clean or replace element
Overheating	Insufficient coolant Loose fan belt Fan belt worn or damaged Inoperative thermostat Defective water pump Clogged cooling system Incorrect ignition timing Incorrect valve clearance Incorrect oil used Radiator fins clogged	Top-up radiator Adjust fan belt Replace fan belt Replace thermostat Repair or replace Clean system Re-set timing Adjust clearance Refill with correct oil grade Clean radiator fins
Excessive oil consumption	Oil leaks Defective piston rings Piston rings worn or sticking in grooves Piston or cylinder worn Valve stem or guide worn	Find oil leak and rectify Replace piston rings Replace piston rings Replace piston or bore cylinder Replace as necessary
Difficult starting	Improper oil Discharged or defective battery Loose connections Defective ignition system Burnt valves Pistons, piston rings or cylinders badly worn	Change to proper viscosity Charge or replace battery Clean and tighten connections Adjust ignition, check plugs Repair or replace valves Overhaul engine
Engine noisy	Crankshaft bearings or journals worn Connecting rod bearings worn Connecting rod bent Piston, piston rings and pins damaged	Replace bearings and grind crankshaft or replace crankshaft Replace bearings and grind crankshaft or replace crankshaft Straighten or replace rod Check and replace parts as necessary



Exploded view of the water pump.



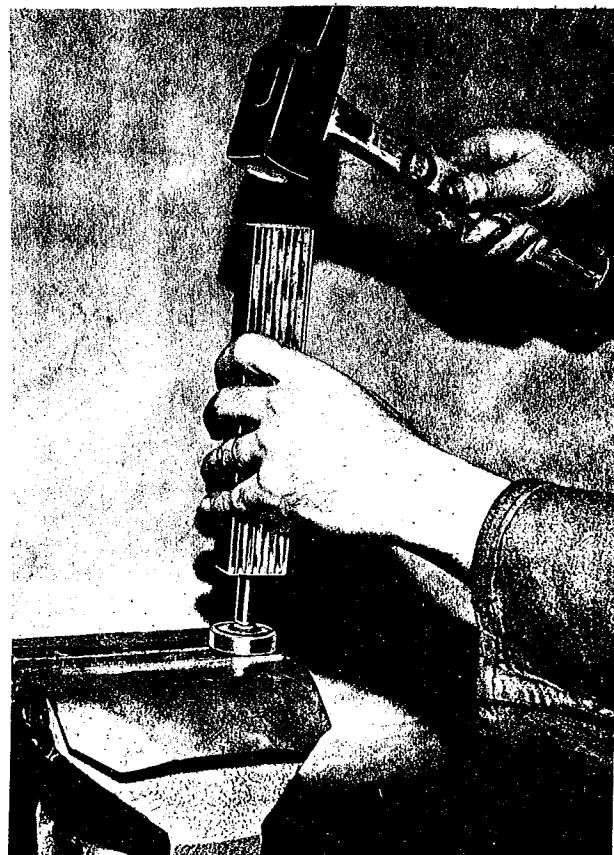
Assembly dimensions for the water pump.
(In millimetres).



Removal of the water pump impeller.



Removal of the water pump shaft together
with the two bearings.



Removal of the bearing from the shaft.

Cooling System

COOLING SYSTEM 1301/1501

The thermostat located at the outlet of the cylinder head controls water circulation. An electrical contactor at the rear of the cylinder head operates to indicate excess engine temperature at $115 \pm 5^{\circ}\text{C}$ ($239 \pm 9^{\circ}\text{F}$) by means of a telltale lamp in the combination instrument (red). In such a case the engine should be switched off immediately and allowed to cool down. Only open the radiator cap when the pressure of the hot water has dropped, otherwise scalding is possible. The cause of overheating can be the result of a lack of water, damage to the cooling system, a broken V-belt, or the radiator could be clogged through lime deposits.

RADIATOR — Cleaning

The radiator is filled with a 5% P3 solution and the vehicle driven at normal operating temperature. Drain off the solution after 24 hours. Boiler type scale should then be removed as a separate operation with a conventional boiler scale solvent or a 5% soda solution if necessary. The radiator should be flushed with water, under slight pressure, between applications of the solutions and after the last solution. Blow through the radiator core with compressed air from the engine side. This maintenance work should normally be carried out between 7,000 and 18,000 miles. The capacity of the complete system is approximately 6.5 litres (11.4 Imp. pints/13.8 U.S. pints).

RADIATOR — Removal, Repair and Installation

Loosen the hose clamps at the top and bottom hoses and pull off both hoses. Unscrew the four Philips head screws and lift the radiator out upwards. After thoroughly cleaning the radiator externally test it for leaks. Close the drain tap, seal the filler opening and the overflow connection. Connect a compressed air line to the water circuit, fill with compressed air until the water is under a pressure of 10 psi.; escaping water indicates a leakage point. When pressurizing the empty radiator in a water bath a pressure of 3.0 psi. should be applied. Leaks can be pinpointed by the air bubbles in the water. Small leakage points should be cleaned and soft soldered with tin. Larger leaks necessitate replacement of the radiator if a specialist radiator workshop cannot repair the radiator at a reasonable price.

Installation is a reversal of the removal procedure.

From body numbers 80855 (1300) and 80677 (1500) two shoulder brackets are fitted to the radiator water box sides.

WATER PUMP — Removal, Dismantling, Repair and Assembly

Loosen the upper hose clamp of the lower water hose and remove the hose end from the water pump connection. Also remove the small return hose of the heater from the water pump. Slacken the adjustment rail and mounting bolts of the dynamo. Swing back the dynamo and remove the V-belt. Release the four retaining screws of the fan blades; unscrew and remove the blades. Remove the mounting bolts and the nuts of the water pump on the cylinder block. Take off the water pump complete with gasket. Unscrew the pump body from the cover plate and dismantle the water pump. Clean the individual parts in fuel, remove any boiler scale on the shaft and impeller and clean the jointing face. Check all parts for wear and renew as necessary. Renew all seals and gaskets. Assembly is a reversal of the dismantling procedure. Pack the pump body with Shell

Retinax grease.

WATER PUMP — Installation

Installation of the water pump is a reversal of the removal procedure. If the V-belt has to be replaced only original Simca belts should be used. A newly fitted V-belt should be re-tensioned after 300 miles. The tension should be set in such a way that the belt deflects by no more than $1/2''$ in the centre between the dynamo and the water pulley when thumb pressure is applied. If the tension is too low the belt slips and the performance of the dynamo and water pump decreases (with possible overheating of the engine). Too much tension causes unequal pressure on the dynamo and the water pump bearings which leads to increased bearing wear. To tension the belt the tensioning rail and mounting bolt of the dynamo must be slackened. The correct tension is achieved by swinging the dynamo outwards.

THERMOSTAT

The thermostat is located at the outlet of the cylinder head. It remains closed until the operating temperature of 70 to 80°C (172 - 176°F) is reached, then the valve opens and water flows through the radiator and the water circuit is open. The shutting off of coolant to the radiator accelerates warming up of the engine. If it takes a considerable time for the operating temperature to be reached it can be assumed that the valve is stuck in the open position, i.e. the thermostat is damaged. In such a case the thermostat must be removed and tested.

Drain off enough coolant so that no coolant can flow from the cylinder head outlet. Slacken the hose clamp on the upper hose and pull off the hose. Remove the thermostat and place it in a water bath. Heat the water on a hotplate until the operating temperature is obtained. If the valve does not open at 77 to 80°C (170 - 176°F) the thermostat should be replaced.

Hints for winter driving in respect of the cooling system: If the temperature drops to 5°C (41°F) the direct air inlet should be shut off by turning the lever on the air filter. In order to facilitate warming up of the engine at temperatures below freezing point the cardboard shield in the luggage compartment should be pushed into the free space between the centre section of the radiator grill and the support frame. This shield delays the cooling process of the radiator, improves the efficiency of the heating system and enables the engine to reach operating temperature faster. The shield must be removed again as soon as outside temperatures go above freezing point. The recommended antifreeze agent "Simcal" is a synthetic fluid which contains no volatile constituents and has a corrosion inhibiting action. In winter, 3 litres (5.2 Imp. pints/6.3 U.S. pints) of "Simcal" should be added to the coolant; this guarantees frost protection down to minus 17°C (1°F).

AIR-CONDITIONER VALVE

The air conditioner thermostatic valve fitted on 1301 - 1501 models as from January 1967 is adaptable to earlier models. The valve allows automatic regulation of the temperature of the air admitted in the passenger compartment. The supply of heater valves Nos. 276970 and 30065 Y is discontinued; these parts being replaced by kit No. 31080 R.

Kit for fitting thermostatic valve to 1300/1500 models contains:

- 1 thermostatic valve with its regulator coil,
- 1 coil fastening strap,
- 1 spacer for valve mounting,
- 2 gaskets,
- 2 setscrews
- 1 Rear valve fixing tab (already in place)
- 1 sheath retainer fixing tab
- 1 long stroke pull-rod

Obtain a water turn hose Spare Part Ref. PD 29412 L.

NEW VALVE — Fitting

Modify the valve control by fitting an increased stroke pull-rod.

Remove air-conditioner air-intake box in the engine compartment. Remove the radiator hoses, control cable and its

sheath from the valve. Remove the air-conditioner radiator with its valve. Remove the valve and replace it by a new valve, fitting the spacer and two gaskets, and using the 2 new screws. Locate the coil at the rear of the radiator and lock it in position with the strap.

Remove the control pull-rod, and replace it by the new pull-rod. Position the sheath retainer tab under rear radiator box-to-dash panel. Fasten sheath to tab and set the radiator in position with its valve, inserting the control cable in the cable-clamp. Fix rear valve fixing tab under air-conditioner nut without removing (the screw might drop on the inside). Reassemble hoses, substituting the new water return hose for the earlier hose. Fix cable in valve cam cable-clamp, as follows: close control fully by turning knob fully to the right. Reverse rotation by 1/4 turn. Lift valve cam fully and then tighten cable in cable clamp. Actuating the control, make sure stroke is complete and cam is properly locked when unit is in "cold" position.

Fuel System

FUEL TANK — Removal and Installation

Disconnect the battery. Remove the drain plug of the fuel tank with a No.14 spanner and collect the fuel in a clean container of adequate capacity. After emptying the tank the drain plug, complete with a copper washer, should be screwed in again. Pull off the flexible fuel line from the fuel tank. Seal the end of the line with a pointed wooden peg. Open the luggage compartment, remove the floor covering, jack, crank and spare wheel. Remove the breather hose at the filler and remove its housing: note the plastic plug. Remove the sleeve and rubber packing.

Unscrew the housing of the filler (4 screws with tooth lock washers). Remove the mounting bolts at the edge of the tank. Position a mobile jack under the tank and place a suitable wooden block under the tank; loosen the tank by carefully raising the jack. Lift the tank at the front and remove.

Installation is carried out in the reverse order to that of removal, after the tank has been carefully cleaned or repaired and the residue of the old sealing strip scraped off and replaced by a new strip.

FUEL PUMP 1301/1501 — Removal, Overhaul and Installation

Remove the suction and pressure lines. Unscrew the front and rear retaining screws and lock washers. Remove the fuel pump and gasket (two gaskets and fibre insulating piece on 1501 model). Before dismantling the pump, mark the upper body and lower body with a scribe line to facilitate reassembly. Remove the cover screw and washer, take off gasket and strainer, unscrew the upper body. Unscrew the valve retaining plate, take out the seal, seats and springs of the suction and pressure valve. Remove the circlips from the rocker arm pin, knock out the pin and take the rocker arm with its spring out of the lower body. Remove the diaphragm and the push rod, the return spring and washers.

Clean all parts in fuel, dry with compressed air, check for wear and renew as necessary. Assembly is a reversal of the dismantling procedure. When fitting a new diaphragm ensure that it is dry and that the screw holes in the diaphragm line up exactly with the tapped holes in the pump body.

Installation of the pump is a reversal of the removal procedure. Ensure that the joint surfaces are clean and flat, and renew all gaskets. Only use original Simca screws for the fuel pump mounting as the hole extends into the housing and longer screws would knock against the camshaft. Coat the screws with sealing compound and screw in.

CARBURETTOR 1301

The 312 T engine is equipped with the Solex Type 32 PBIC carburettor with vacuum connection.

It is not possible to convert the old carburettor with a set of the new jets as the carburettor body is slightly different. The components of the carburettor are tuned in the works for high efficiency with a low consumption. This setting should not be changed unless it is necessary to change over to a lower grade fuel. Readjustment should be carried out by a Simca agent or Solex agent. Carburettor faults are usually the result of

contamination, it is, therefore, sufficient in most cases to clean the float chamber of dirt and water deposits and blow out all jets, holes and drillings with low-pressure compressed air after having removed the air filter and unscrewed the carburettor cover. To do this, the four oval head screws of the accelerator pump should be removed and the pump taken off, otherwise the diaphragm may be destroyed by excessive air pressure. If the fault cannot be rectified by cleaning in this way the carburettor must be removed and completely dismantled. Damaged parts should be replaced as necessary.

From Engine No. 4 315 983 a Weber 32 IBC 3 is fitted, the settings of which are given in section "Technical Data".

SOLEX CARBURETTOR 1301 — Removal Dismantling, Overhaul, Assembly and Installation

Take off the air filter. Pull off the fuel line between the fuel pump and the carburettor, disconnect the vacuum hose, detach the return spring of the throttle valve, throttle linkage and choke cable, and unscrew the carburettor from the inlet manifold.

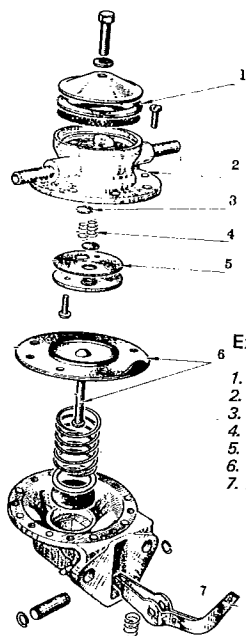
Unscrew the upper body securing screw. Remove the upper body with Econostat and gasket. Unscrew the float needle valve with its seal from the upper body. After unscrewing the fuel line union, remove the seal and strainer gauze. Unscrew the hollow screw and seal. Pull the float spindle out of the lower body and remove the float.

Unscrew the four oval head securing screws for the diaphragm pump. Unscrew the choke cover (four short oval head screws) and take out the rotary choke valve. Unscrew the throttle valve from throttle valve shaft (two short oval head screws). Pull the throttle valve shaft out of the body.

Unscrew the idling mixture control screw and idling adjustment screw complete with compression springs. Unscrew the ball valve with filter and seal. Unscrew the main jet holder and seal and then unscrew the main jet from the holder. Unscrew the choke fuel jet with sealing ring, choke air jet and slow-running jet. Take out the emulsion tube and choke tube after having unscrewed the stop screw. Remove the injector tube with seal (1 oval head screw); unscrew the pump jet with seal.

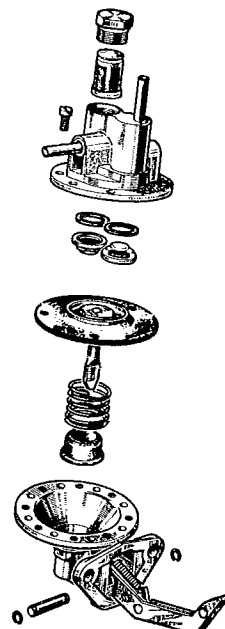
Inspection

Thoroughly clean all carburettor components and blow out all drillings and bores with compressed air. Do not use a wire brush or wire to clean any of the parts. Check the carburettor cover and body for damage and cracks. Test the float by immersing it in hot water. There should be no sign of air bubbles rising from the water, otherwise the float must be replaced. Deformed floats or floats which rattle when shaken must be replaced. Check the contact point of float needle on float arm. If there are pressure points these must be polished away or the float must be replaced. Bent float spindles must be renewed. Check the throttle valve and throttle valve shaft. A badly worn shaft indicates that other parts of the carburettor will also have signs of wear (e.g. the rotary choke valve), the individual components should, therefore, be checked thoroughly. Fit an exchange carburettor if necessary. Assembly and installation are carried out in the reverse order to that of removal and dismantling;

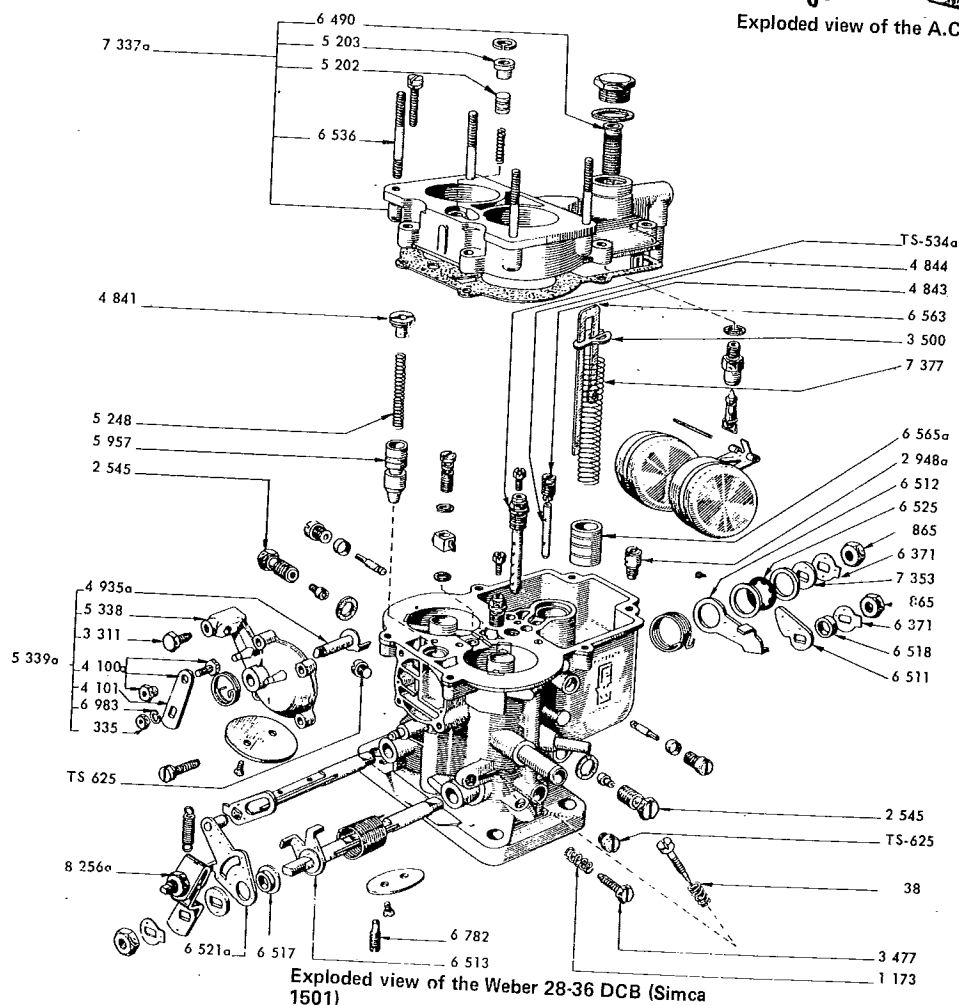


Exploded view of the fuel pump.

1. Gasket
2. Pump upper body
3. Valve
4. Valve spring
5. Valve retaining plate
6. Diaphragm
7. Rocker lever

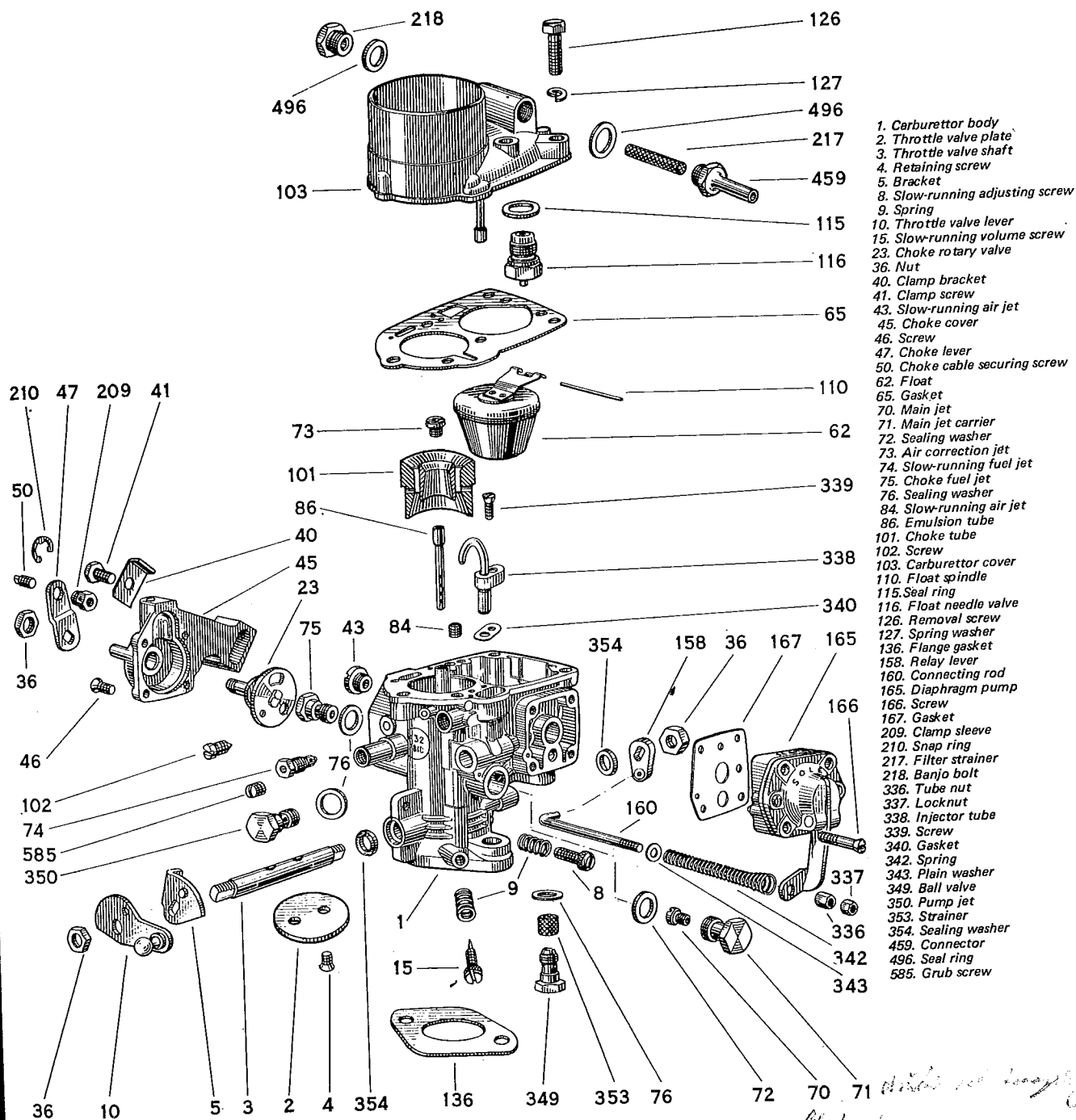


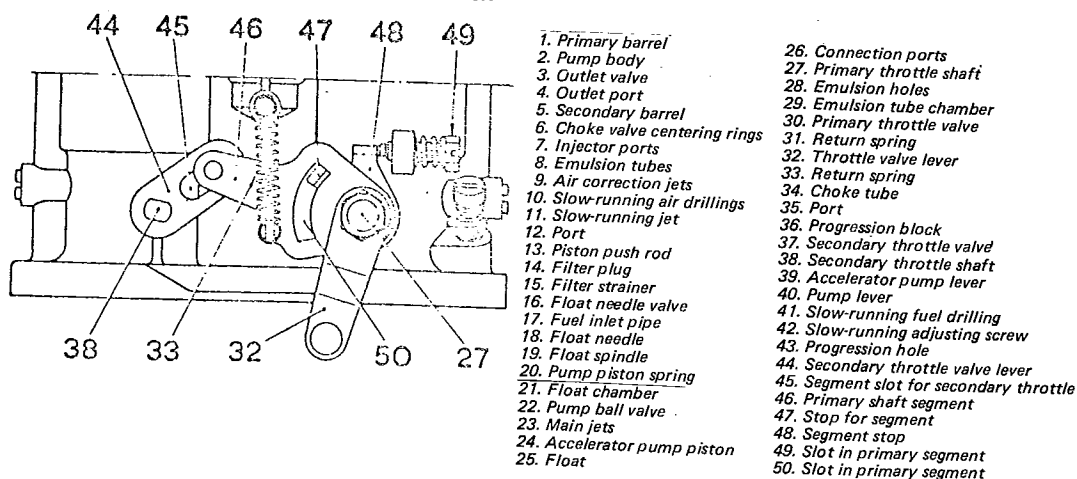
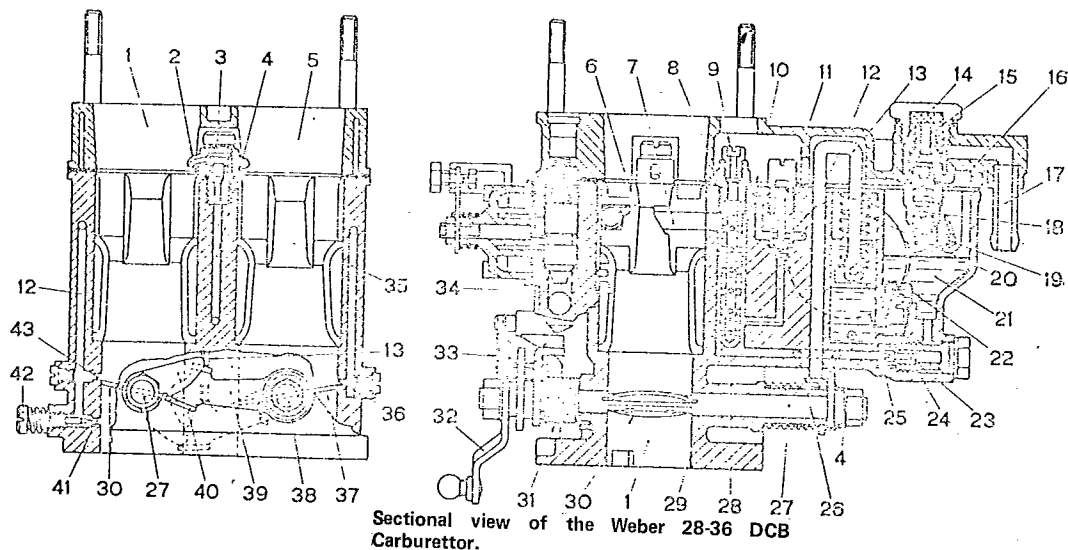
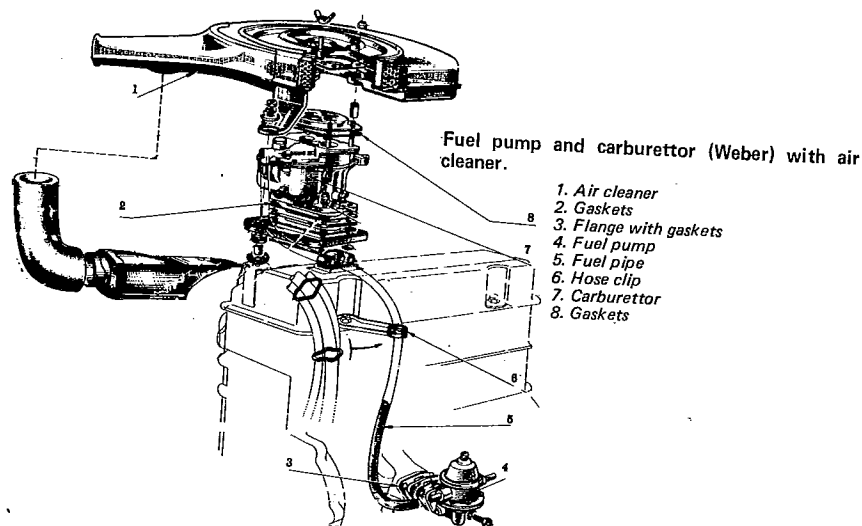
Exploded view of the A.C. fuel pump.



Exploded view of the Weber 28-36 DCB (Simca 1501)

Exploded view of the Solex 32 PBIC carburettor.





renew flange gaskets if necessary. Tighten the nuts gradually and evenly.

Slow-running Speed – Adjustment

Before attempting to adjust the slow running speed it is advisable to check the electrode gap of the spark plugs (0.6 mm/0.024"). Allow the engine to warm up, adjust the engine idling speed with the slow-running adjustment screw: screwing in increases and unscrewing decreases the speed. Slightly tighten the slow-running adjustment screw to increase the speed.

The idling fuel mixture is adjusted by means of the slow-running mixture control screw. Slacken the control screw until the engine starts to run rough, then slowly tighten it until the engine runs smoothly. The control screw is then unscrewed by 1-2 turns: slacken the slow-running adjustment screw slightly until the idling speed is approximately 700 rpm.

CARBURETTOR 1501

The 342 engine is equipped with a Weber Type 28-36 DCB carburettor. Models with automatic transmission are equipped with a Solex 35 TDIDA carburettor as from 1968.

Weber twin-choke down-draught carburettor Type 28-36 DCB

The carburettor is equipped with a progressive choke. Displacement of a piston, which is operated by the choke knob on the instrument panel, effects a smooth transition from idling to full throttle when the two throttle valves are opened; a device on the primary throttle valve ensures the different openings of the two throttle valves.

CARBURETTOR – Dismantling and Assembly

Unscrew the strainer screw plug with its seal from the carburettor cover (upper body) and remove the filter gauze. Unscrew the carburettor cover and remove it from the carburettor body with its gasket. Pull the float spindle out of the upper body and remove the float. Unscrew the following from the carburettor body (lower body): air correction jet of first and second stages, emulsion tube of first and second stages, pressure valve with seal, choke tube, choke jet, spring retainer for the choke valve spring, valve spring and choke valve. Unscrew the following from the side: jet holder with its sealing ring and main jet of 1st stage, jet holder with slow-running jet of 1st stage, slow-running adjustment screw with compression spring, slow-running mixture control screw with compression spring and the test screw plug.

Unscrew the following from the engine compartment side: jet holder with sealing ring of 2nd stage, jet holder with sealing ring and slow-running jet of 2nd stage and test screw plug. Remove the operating lever and choke housing, take out inner lever. The throttle valves and throttle valve shafts are then removed. Detach the return spring on the side of the choke device. Release and unscrew the retaining nut of the throttle valve lever of the 1st stage; remove the washer, segment and bush. Release and unscrew the retaining nut of the 1st stage throttle valve shaft on the accelerator pump side, pull the bush and the pump operating lever from the shaft. Unscrew the throttle valve of the 1st stage from the shaft and pull the 1st stage shaft out of the carburettor body; this releases the return spring. Release and unscrew the nut of the 2nd stage throttle valve shaft on the accelerator pump side. Remove the spacer, flat washer, spring tooth washer, the second flat washer, pump operating lever and the compression spring. Unscrew the throttle valve of the 2nd

stage and remove the shaft from the carburettor body. Take out the stop or supporting disc of the accelerator pump spring, remove the piston operating rod, piston and spring.

Clean all carburettor components in fuel, do not under any circumstances use wires or needles for cleaning drills or jets. Squirt fuel through the fuel inlet, choke drillings, slow-running drillings and the drilling between the float chamber and the choke fuel jet using an injection can, then blow out body and drillings with compressed air. After cleaning and blowing out, check the jets. Jets which do not correspond to the specified sizes must be replaced. Check freeness of valve of choke device and piston of accelerator pump. Check float needle valve and return hook for freeness. Ensure that the float valve is not scored and the ball in the needle valve is not sticking. If the seat is worn or defective the complete float valve must be renewed. Damaged or deformed floats should be replaced. Ensure that the float moves easily without friction in the bearing, bent float spindles must be replaced. The clearance between the float and the vertically held upper body of the carburettor (measured without gasket) must be 7.5 mm (0.295") with the needle seat closed. Check the float travel, if it is not 8.5 mm (0.335") it should be corrected by bending the tongue or inner lever. In doing so ensure that the tongue is always at right angles to the valve needle axis and the contact surface has no pressure points as the needle may otherwise stick. This check must always be carried out when the float, float needle valve or needle has been renewed. Check the play of the throttle valve shaft; excessive play permits the entry of secondary air which causes the engine to run unevenly, particularly at idling speed, and it is then necessary to fit new bushes and shafts. Badly worn throttle valve shafts indicate that other parts of the carburettor will also be worn. It is then advisable to replace the complete carburettor. New gaskets should be used for reassembly and the jet holders and jets should be checked for tight fit. The springs should be replaced if necessary. Check freeness of all joints and operating levers. Assembly is a reversal of the dismantling procedure with the exception of the points detailed above.

Slow-running Speed – Adjustment

After assembly a provisional adjustment should be made. Screw in the slow-running adjustment clockwise by two turns with the primary throttle valve closed. Screw in the slow-running control fully and then back it off by half a turn.

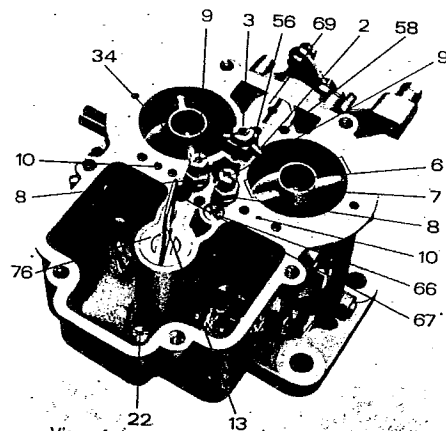
Final adjustment is made at the primary throttle with the engine running at operating temperature. The slow-running adjustment screw is first turned anti-clockwise until the engine just runs evenly. Then set the slow-running control screw so that a mixture for the fastest and smoothest idling speed is achieved with the small throttle opening given, then reduce the throttle opening until the most favourable idling speed is obtained.

SOLEX 35 TDIDA DOWNDRAUGHT CARBURETTOR Simca 1501 Automatic

(1501 with automatic transmission, 1968 model onwards).

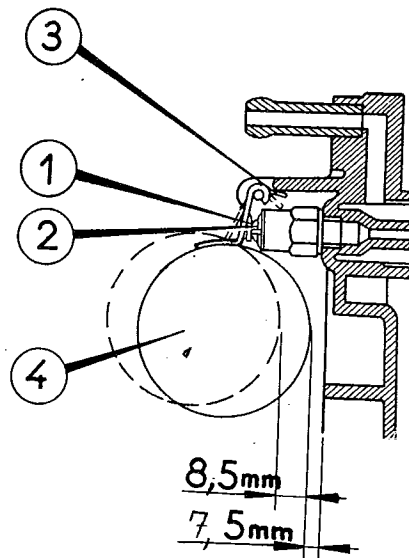
This is a mechanical carburettor with two choke tubes, automatic choke, accelerator pump, enrichment tube and variable float lever. The carburettor basically comprises:

1. The water-heated throttle valve section;
2. The carburettor body with float, accelerator pump, connector of engine breather valve and vacuum connection for sparking advance;
3. The carburettor cover with automatic choke valve, fuel inlet, float needle valve and mixture enrichment tube.



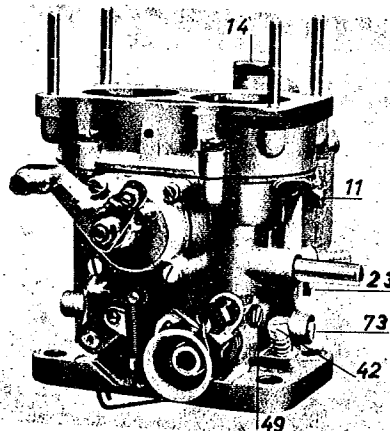
View of the Weber carburettor without cover.

- | | |
|-------------------------------|---------------------------|
| 2. Pump jet | 22. Pump ball valve |
| 3. Outlet valve | 56. Choke mixture port |
| 6. Choke tube centering rings | 58. Depression port |
| 7. Injector ports | 66. Choke fuel jet |
| 8. Emulsion tube | 67. Choke fuel well |
| 9. Air correction jet | 69. Spring locking device |
| 10. Slow-running air drilling | 76. Pump spring retainer |
| 13. Piston rod | |



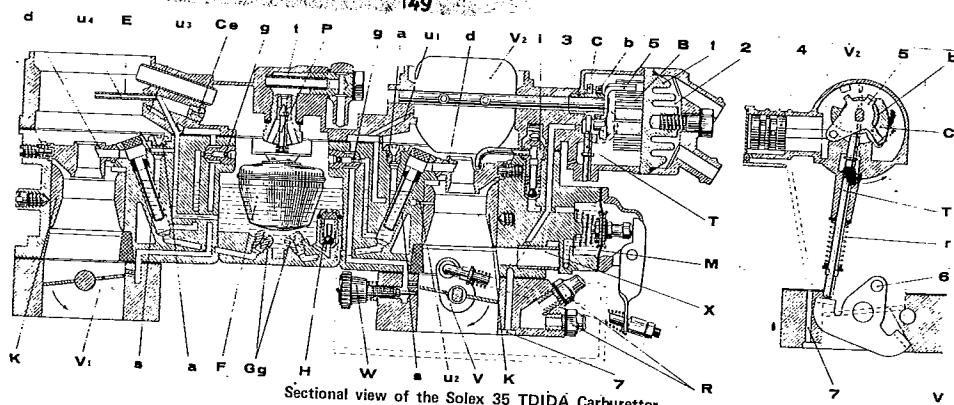
Adjusting the float setting.

- | |
|----------------------|
| 1. Float tab |
| 2. Needle valve ball |
| 3. Stop tab |
| 4. Float halves |



Outside view of Weber 28-36 Carburettor.

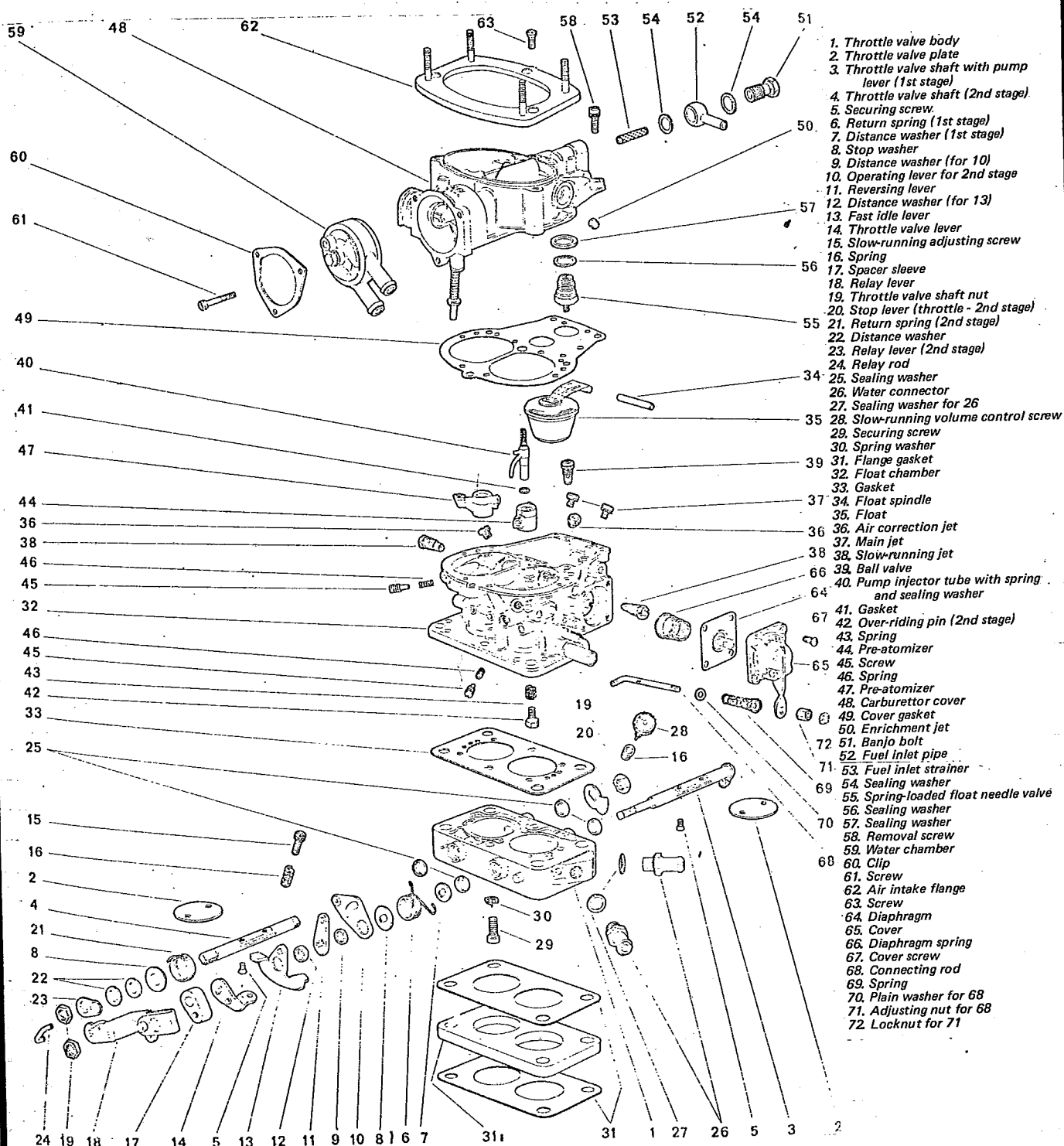
- | |
|----------------------------------|
| 11. Slow-running jet |
| 14. Filter plug |
| 23. Main jet |
| 42. Slow-running volume screw |
| 49. Slow-running adjusting screw |
| 73. Screw plug |



Sectional view of the Solex 35 TDIDA Carburettor.

- | | | |
|-------------------------|-------------------------------------|---|
| a. Air correction jets | K. Choke tube | V/V1 Throttle valve plates |
| b. Bimetal spring | M. Pump diaphragm | V2 Choke valve plate |
| c. Small bimetal spring | P. Spring loaded float needle valve | W Slow-running mixture volume control screw |
| Ce. Fast idle cam | r. Connector | X. Blow-by |
| d. Air jet | s. Spring | 1. Choke housing |
| E. Pre-atomizer | t. Emulsion tubes | 2. Chamber |
| F. Enrichment tube | U. Connecting rod | 3. Intermediate washer |
| Gg. Float | u1. Fuel inlet filter | 4. Plunger |
| H. Main jets | u2. Slow-running drillings | 5. Choke operating lever |
| K. Slow-running jet | u3. Slow-running drillings | 6. Slow-running (fast idle) lever |
| M. Ball valve | u4. Slow-running drillings | 7. Depression drilling |
| P. Injector tube | | |

Exploded view of the Solex 35 TDIDA Carburettor.



CARBURETTOR – Removal

Remove the air filter. Drain off some coolant. Disconnect the water feed hose on the throttle valve section and the water return hose on the choke valve cover. Disconnect the hose of the oil sump breather valve on the carburettor. Disconnect the hose at the vacuum bleed connector for the distributor ignition timer. Unscrew the hollow screw and pull off the fuel line, remove the kickdown cable. Remove the return spring of the throttle valve operating lever. Disconnect the carburettor operating cable from the carburettor and remove the carburettor. Take off the insulating piece and the paper gaskets. Plug the opening in the induction pipe with a clean cloth.

CARBURETTOR – Dismantling and Assembling

Unscrew the three oval head countersunk screws securing the air inlet flange and lift off the flange with the four studs. Unscrew the five mounting screws of the carburettor cover and remove the carburettor cover from the float chamber (lower body of carburettor). Remove the carburettor cover gasket and unscrew the water chamber. Remove the float with float spindle from the housing. Unscrew the two main jets which are screwed into the floor of the float chamber at an angle. Unscrew the grub screw with spring which contains the pre-atomizer. (2nd stage). Take out the spring and pull out the pre-atomizer (main jet system). Pull the pump injector tube with spring upwards and

out and withdraw the pre-atomizer (1st stage). Unscrew the throttle valve section from the lower carburettor body and remove the taper retaining pins of the choke tubes. Unscrew the lateral grub retaining screws and withdraw the choke tubes. Assembly is practically a reversal of the dismantling procedure. All gaskets should be replaced. When assembling the carburettor, all components in the Solex repair kit for the 35 TDIDA must be fitted.

CARBURETTOR – Installation

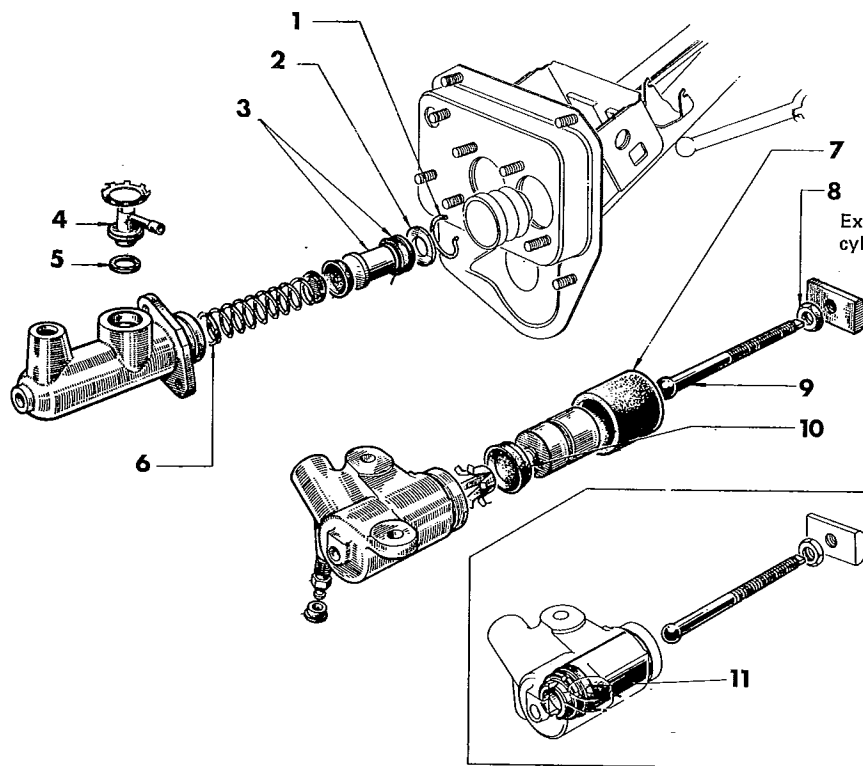
Place a paper gasket and the insulating piece on the heat deflector plate in that order and a further paper gasket on the studs for securing the carburettor. Fit the carburettor. Tighten the nuts with spring washers in a diagonal pattern and attach the return spring of the throttle operating lever. Open the choke valve of the 1st stage fully so that the stop washer for the lever operation is in the idle position and then fit the carburettor operating cable on the pivot: attach the kickdown cable. Fit all hoses and, where they are secured with hose clamps, tighten the clamps. Fit the air filter. Run the engine for a short period and check the coolant level and correct as necessary.

Slow-running Speed – Adjustment

The adjustment operation is identical to that detailed for the Weber Type 28-36 DCB.

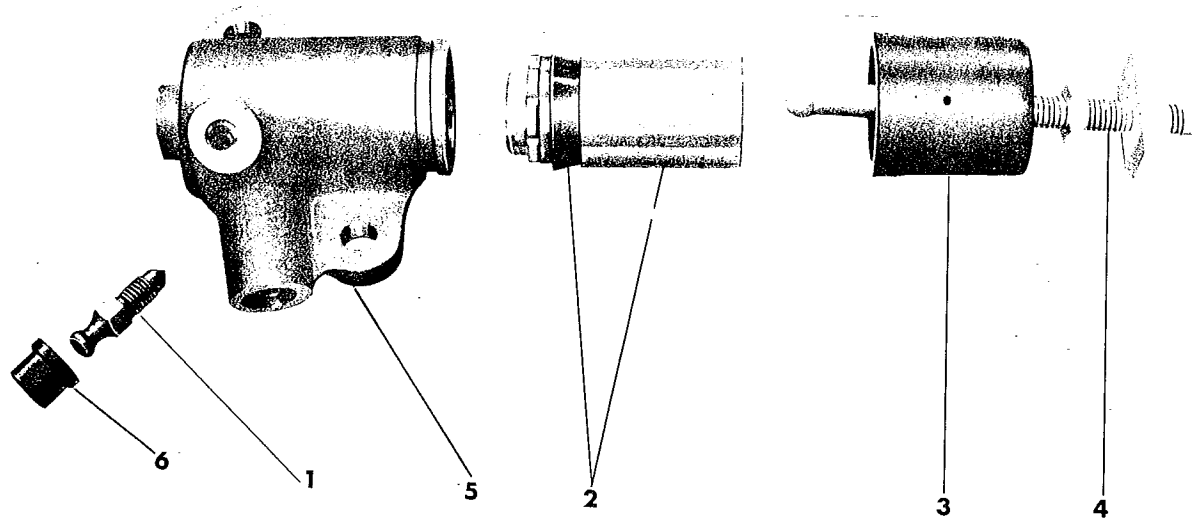
Trouble Shooting

SYMPTOMS	PROBABLE CAUSE	ACTION TO BE TAKEN
CARBURETTOR		
Flooding	Improper seating or damaged float needle valve or seat Incorrect float level Fuel pump has excessive pressure	Check and replace parts as necessary Adjust float level Check fuel pump
Excessive fuel consumption	Float level too high Loose plug or jet Defective gasket Fuel leaks at pipes or connections Choke valve operates improperly Obstructed air bleed	Adjust float level Tighten Replace gaskets Trace leak and rectify Check choke valve Check and clear
Stalling	Main jet obstructed Incorrect throttle opening Slow-running adjustment incorrect Slow-running fuel jet blocked Incorrect float level	Clean main jet Adjust throttle Adjust slow-running Clean jet Adjust float level
Poor acceleration	Defective accelerator pump Float level too low Incorrect throttle opening Defective accelerator linkage Blocked pump jet	Overhaul pump Adjust float level Adjust throttle Adjust accelerator linkage Clean pump jet
Spitting	Lean mixture Dirty carburettor Clogged fuel pipes Manifold draws secondary air	Clean and adjust carburettor Clean carburettor Clean or replace pipes Tighten or replace gasket
Insufficient fuel supply	Clogged carburettor Clogged fuel pipe Dirty fuel Air in fuel system Defective fuel pump Clogged fuel filter	Dismantle and clean carburettor Clean fuel pipe Clean fuel tank Check connections and tighten Repair or replace fuel pump Clean or replace filter
FUEL PUMP		
Loss of fuel delivery	Slotted body screws loose Diaphragm cracked Loose fuel pipe connections Defective valves Cracked fuel pipes	Tighten body screws Overhaul fuel pump Tighten fuel pipe connections Replace valves Replace fuel pipes
Noisy pump	Loose pump mounting Worn or defective rocker arm Broken rocker arm spring	Tighten mounting bolts Replace rocker arm Replace spring



Exploded view of clutch master and slave cylinder.

1. Snap ring
2. Washer
3. Piston with cup
4. Connector
5. Washer
6. Spring
7. Rubber boot
8. Adjusting nut
9. Push rod
10. Primary cup
11. Slave cylinder



Exploded view of the clutch slave cylinder.

1. Bleeder screw
2. Piston and Piston Cup
3. Rubber boot
4. Push rod
5. Cylinder body
6. Rubber dust cap

Clutch

CLUTCH 1301/1501

A hydraulically-operated single dry-plate clutch is fitted. The clutch operating mechanism consists of a pendant type clutch pedal with shaft, bearing bush, push-rod and return spring, the master cylinder, hydraulic oil line and the slave cylinder screwed to the clutch housing with adjustable torsion bar, release fork with return spring, the clutch release bearing, clutch mechanism and the clutch plate. The hydraulic fluid comes from the brake master cylinder, which also supplies the hydraulic braking system.

CLUTCH — Removal

If it is necessary to repair the clutch mechanism, the gearbox must be removed with the clutch housing. Proceed as follows: Disconnect the terminal clamps on the battery. Open the drain tap at the bottom right of the radiator (engine side) and drain off the coolant. Remove the retaining clip for the two rigid heater pipes on the cylinder head cover and remove the starter. Unscrew the pipe clamp of the exhaust pipe at the inlet/exhaust manifold. Remove the gear selector rod from the ball joint of the gear lever. Remove the gear lever. Unscrew the guard plate for the flywheel and the working cylinder from the clutch housing. Pull the exhaust pipe as far as possible to the right and tie it up in that position with welding wire. Remove the split pin on the connecting bracket at the brake proportioner and disconnect the handbrake cable.

Unscrew the three retaining belts from the triangular flange of the main gearbox shaft and disconnect the front propeller shaft from the gearbox. The rubber shaft plate remains on the front propeller half shaft. Unscrew the resilient centre bearing (propeller shaft relay). Before dismantling the gearbox mounting, mark its position, then unscrew the collar stud of the support bracket on the gearbox. Also unscrew the fixing screws of the spring plate on the body (3 screws with tooth lock washers). Remove the bolt of the spring clamp (spring plate guide). Unscrew the support bracket from the spring plate. Damaged or deformed parts must be renewed. To facilitate removal of the gearbox and clutch housing downwards to the rear, the engine is tilted to the rear. To do this push a wooden wedge approximately 5 mm (0.197") thick between the oil sump and the torsion bar of the transverse stabilizer. A second wooden wedge is pushed between the mounting of the front suspension tie rods and the lubricating oil centrifuge in order to hold the engine in the tilted position. Unscrew the speedometer shaft, unscrew the clutch housing from the engine block. Remove the screws, unscrew the nuts from the studs and remove the gearbox downwards to the rear.

Before unscrewing the clutch assembly from the flywheel, the position of the clutch should be marked so that the original balance can be achieved during reassembly. Fork shims 3.5 mm (0.138") thick must be pushed between the clutch pressure plate and the clutch release levers. If the clutch pressure plate does not need to be dismantled, the shims remain under the clutch levers until refitting is completed. Unscrew the six securing bolts, complete with tooth lock washers, slowly - stage by stage in a diagonal pattern. Remove the clutch assembly and the clutch plate.

If the clutch plate has to be relined (burnt, oiled or worn linings) only original linings and original rivets must be used.

The torsional damper springs located in the plate must be checked in the case of burnt linings. With discolouration it may be easier and more economic to fit a new plate (exchange unit) rather than renew linings and springs. After relining a used plate or when fitting a new plate, slide the plate onto a splined shaft and test it for runout between the centres of a lathe. Any unbalance should be removed by grinding the outside edge at the heaviest point. If necessary, rectify the lateral runout carefully with a fork. Check the clearance between the splines of the plate hub and the gearbox drive shaft. A perfect sliding action must be ensured for good gear selection and clutch operation. If the pressure plate (grooves) or the cover plate (cracks, distortion) have to be replaced, an attempt to repair is not advisable for practical reasons and the complete unit should be exchanged.

From engine 7103613 (1500) and 4289623 (1300) the clutch mechanisms have been improved to ensure correct positioning of the springs. The plate pressure faces have been angled to prevent the spring slipping outwards: a reduced collar has also been incorporated in the head of the retaining caps. Parts are all interchangeable.

From 1966 the bearing springs have been modified to light red - these springs must only be fitted with the new type of pressure plate.

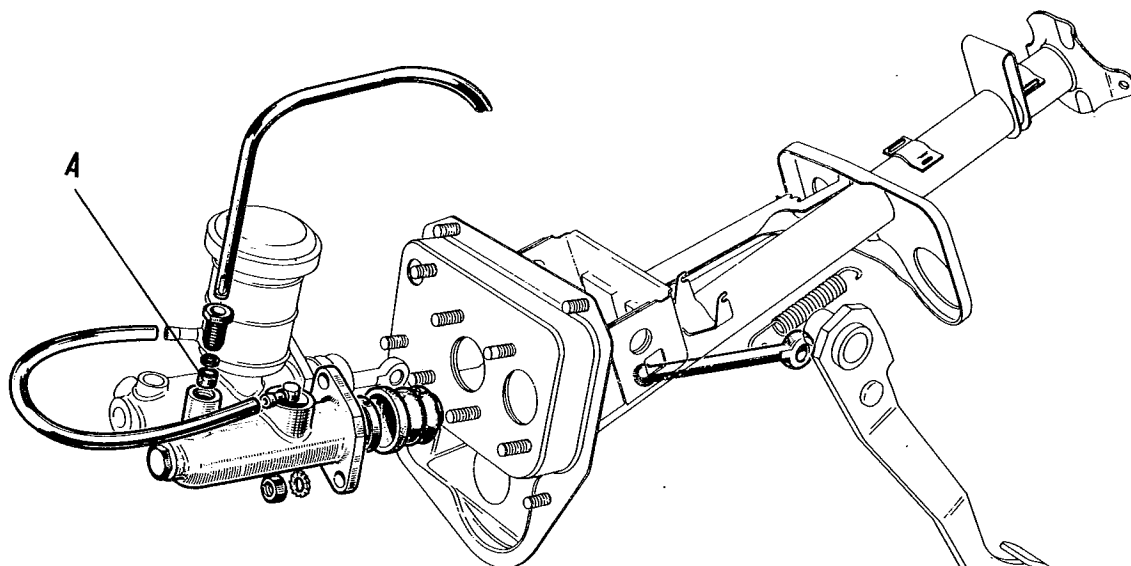
CLUTCH — Installation

Installation of the clutch is practically a reversal of the removal procedure, taking account of the following points: Fit the clutch plate with the long nose facing the rear. (Note the markings on the clutch cover and flywheel, made during removal). Centralize the clutch plate in relation to the flywheel by means of a used gearbox drive shaft. Tighten the securing bolts stage by stage to 9.4 ft.lb. Remove the fork shims under the release levers. Pull out old gearbox drive shaft used for centering. Screw the clutch housing to the gearbox housing. Installation of the gearbox with clutch housing is effected in the reverse order to that of removal. The rearward tilted position of the engine makes installation easier. Engage a gear. Take care when feeding in the drive shaft that neither the face of the clutch release bearing nor the bearing bush are damaged by the crankshaft. Remove the wooden wedges. When the gearbox is installed the spring plate of the mounting must lie horizontally (note markings made during removal). Adjust the clutch play.

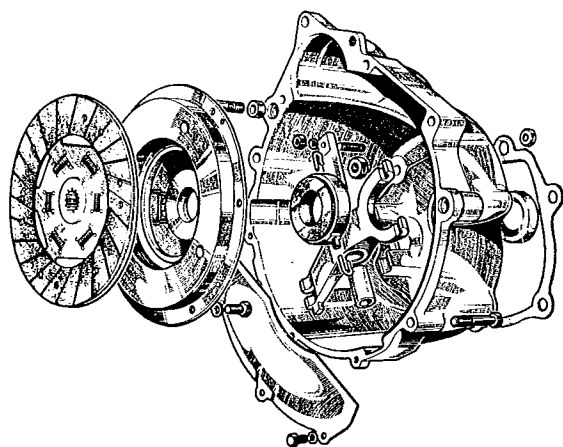
From engine 4312758 (1300) and 7119533 (1500) a new spring 62 mm (2.42") has been fitted to improve the clutch fork return. A rubber sound deadening piece PD27136D is fitted inside the spring. The sound deadening piece can be fitted inside the old type 84 mm (3.28") spring.

CLUTCH — Adjustment

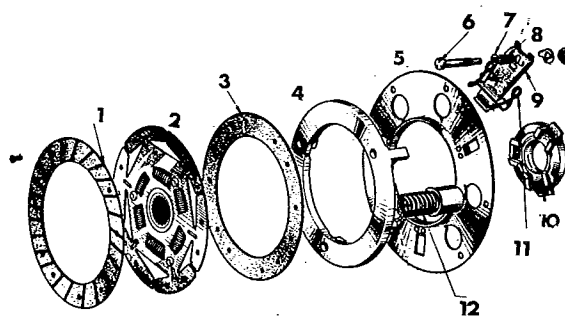
Clutch play is adjusted by moving the push rod between the slave cylinder and the clutch fork. Free travel is increased by slackening the lock nut and unscrewing the push rod and decreased by screwing in the push rod. The push rod should be set so that the clutch fork has a clearance of about 1.0 mm (0.0304"), then tighten the lock nut. Check clutch pedal free travel.



Arrangement of clutch master cylinder and pipes. (A) indicates the sealing ring.

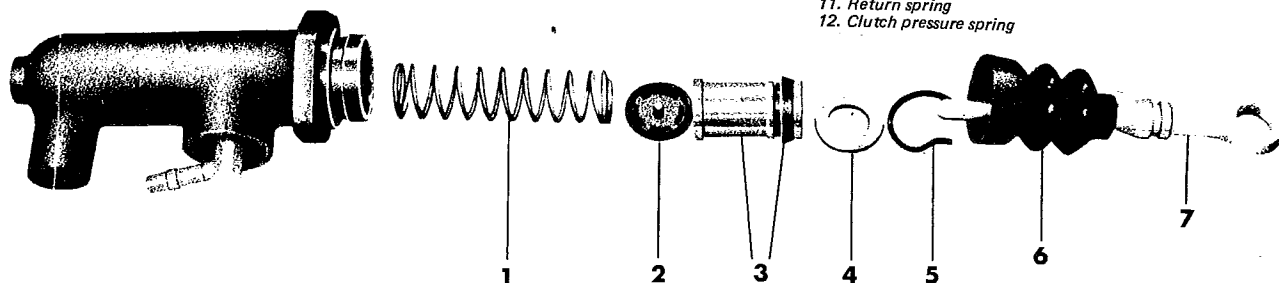


Arrangement of the clutch assembly.



Exploded view of the clutch.

1. Clutch facing
2. Clutch driven plate
3. Clutch facing
4. Clutch pressure plate
5. Clutch cover
6. Release lever bolt
7. Washer
8. Spring
9. Release lever
10. Release bearing
11. Return spring
12. Clutch pressure spring



Exploded view of the clutch master cylinder.

1. Spring
2. Spring seat
3. Piston and Piston cup
4. Stop washer
5. Snap ring
6. Rubber boot
7. Push rod

CLUTCH MASTER CYLINDER — Removal and Installation

Removal and dismantling of the clutch master cylinder is effected without removing the pedal mechanism. Disconnect the fluid lines, the ends should be sealed with pointed wooden pegs in order to avoid loss of fluid. Unscrew the two retaining nuts and tooth lock washers and take off the master cylinder. Remove the push rod rubber boot. Remove the retaining spring of the inlet union with the rubber seal. Remove the circlip and the base washer, take the piston with the primary and secondary cups and spring out of the bore. Clean all parts in white spirit and renew damaged parts. Assembly is a reversal of the dismantling procedure. Coat parts with brake fluid when fitting. Installation of the clutch master cylinder is a reversal of the removal procedure. Remove the wooden pegs, connect the fluid lines, in doing so renew the sealing ring at the end of the line between the brake and clutch master cylinders at the master cylinder. Fill the hydraulic circuit, bleed the system and check the clutch pedal free travel.

CLUTCH SLAVE CYLINDER — Removal and Installation

Remove the fluid pipe and seal the outlet from the master cylinder with a pointed wooden peg. Detach the return spring at the release fork. Unscrew the hexagon head screws with tooth lock washers and remove the slave cylinder from the clutch housing. Remove the screw plug and piston from the housing,

unscrew the bleeder screw and remove the rubber cup of the piston. Clean all parts in white spirit, check for wear and renew if necessary. Assembly is practically a reversal of the dismantling procedure. Coat the piston and cup with brake fluid before inserting them in the housing. Renew the sealing ring at the slave cylinder; fill the hydraulic circuit and bleed. Adjust the free travel of the clutch fork. Check the free travel of the clutch pedal.

HYDRAULIC CLUTCH CIRCUIT — Bleeding

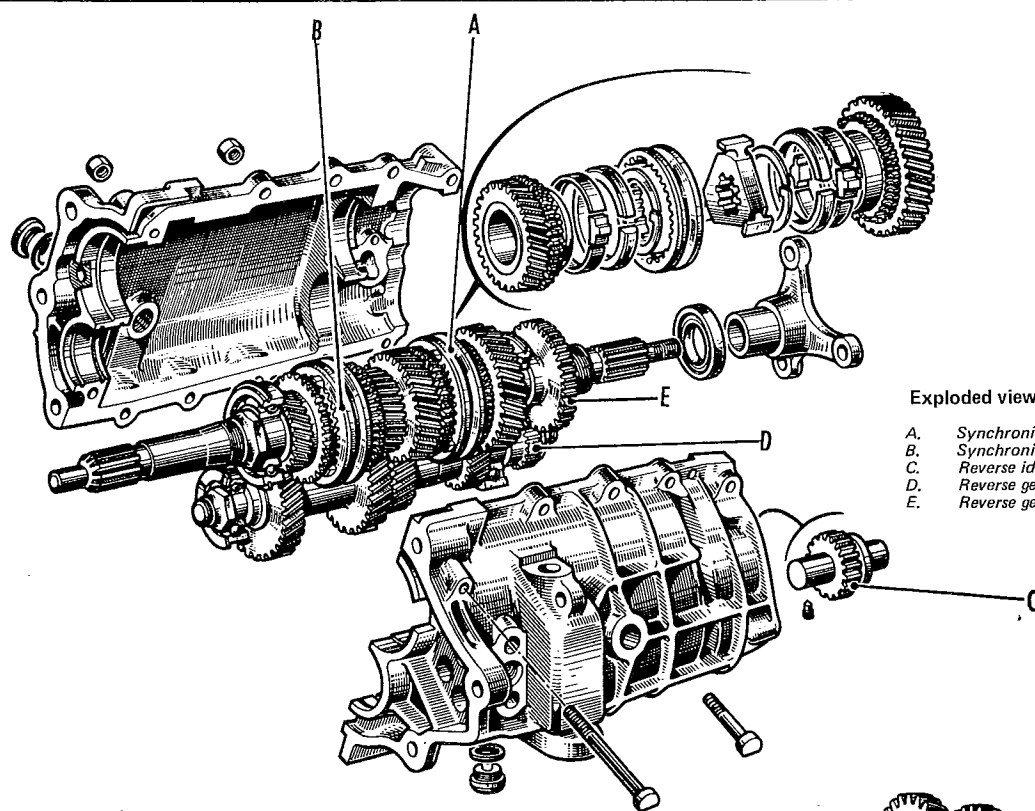
The bleeding process is best carried out by two persons. Fill up the brake fluid reservoir with Lockheed brake fluid. The bleeder hose is pushed onto the bleeder screw on the slave cylinder. The other end of the hose is put in a glass container which is half to two thirds full with Lockheed brake fluid. While the bleeder screw is slackened about a 1/4 turn by one person, the other person operates the clutch pedal until no more air bubbles appear in the glass container. Tighten the bleeder screw with the pedal depressed, remove the hose, fill up the brake fluid reservoir to within 2 cm (0.79") below the edge. Check the clutch system for leaks. To do this the clutch pedal is depressed 2-3 times, then depress the pedal hard. The pedal must remain steady. If it sinks slowly, there is a leak in the system. Rectify the leak (pipes, connections, sealing rings should be checked) and bleed again if necessary.

Trouble Shooting

SYMPTOMS	PROBABLE CAUSE	ACTION TO BE TAKEN
Slipping	Insufficient clutch pedal free travel Improper adjustment of withdrawal lever end play Oil or grease on linings Disc lining worn or burned Clutch diaphragm spring and pressure springs weak or broken Pressure plate or flywheel worn	Adjust pedal free travel Adjust end play Remove cause of leakage and replace lining if necessary Replace linings Replace springs Reface or replace
Insufficient clutch release	Excessive free travel of clutch pedal Excessive play of withdrawal lever Pilot bushing sticking Spline of clutch disc hub worn Clutch disc warped Leaking from master cylinder cup Leaking from operating cylinder cup Air infiltrations into the hydraulic line Roughness on linings Low fluid level in oil reservoir	Adjust correctly Adjust correctly Replace pilot bearing Replace clutch disc assembly Set level of clutch disc or replace clutch disc assembly Replace cylinder cup Replace cup Bleed out completely Rub linings with a metal brush or replace them Top up with brake fluid
Grabbing	Oil on facing or burned or glazed facings Loose disc linings due to poor rivet tightness Pressure plate or flywheel warped or cracked Improper adjustment of release lever Loose engine mountings Wear or damage of clutch disc torsion spring	Install new disc assembly Replace defective rivets or replace linings Replace them Adjust release lever Tighten or replace mountings Replace disc assembly
Noisy	Worn release bearing Cracked clutch disc plate Wear or damage of clutch disc torsion spring Loose clutch disc hub	Replace bearing Replace disc assembly Replace disc assembly Replace disc assembly

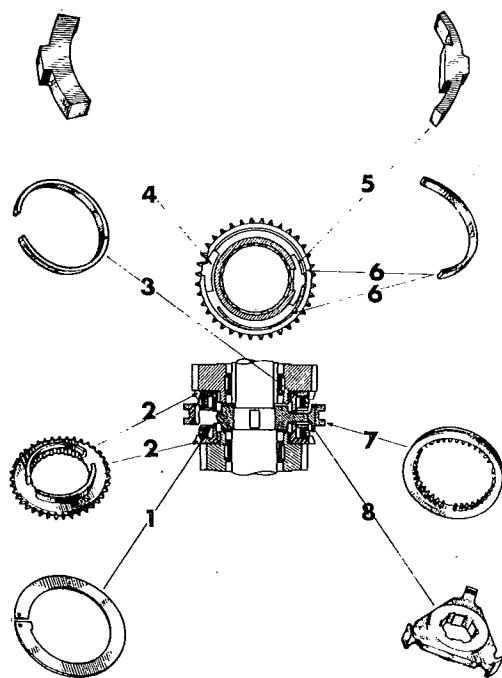
CONVERSION TABLE

mm	ins	mm	ins	mm	ins	mm	ins	mm	ins
.01	.000394	.51	.020079	1	.030370	51	2.007870	105	4.133848
.02	.000787	.52	.020472	2	.078740	52	2.047240	110	4.330700
.03	.001181	.53	.020866	3	.118110	53	2.086610	115	4.527550
.04	.001575	.54	.021260	4	.157480	54	2.125980	120	4.724400
.05	.001969	.55	.021654	5	.196850	55	2.165350	125	4.921250
.06	.002362	.56	.022047	6	.236220	56	2.204720	130	5.118110
.07	.002756	.57	.022441	7	.275590	57	2.244090	135	5.314950
.08	.003150	.58	.022835	8	.314960	58	2.283460	140	5.511800
.09	.003543	.59	.023228	9	.354330	59	2.322830	145	5.708650
.10	.003937	.60	.023622	10	.393700	60	2.362200	150	5.905500
.11	.004331	.61	.024016	11	.433070	61	2.401570	155	6.102350
.12	.004724	.62	.024409	12	.472440	62	2.440940	160	6.299200
.13	.005118	.63	.024803	13	.511810	63	2.480310	165	6.496050
.14	.005512	.64	.025197	14	.551180	64	2.519680	170	6.692900
.15	.005906	.65	.025591	15	.590550	65	2.559050	175	6.889750
.16	.006299	.66	.025984	16	.629920	66	2.598420	180	7.086600
.17	.006693	.67	.026378	17	.669290	67	2.637790	185	7.283450
.18	.007087	.68	.026772	18	.708660	68	2.677160	190	7.480300
.19	.007480	.69	.027165	19	.748030	69	2.716530	195	7.677150
.20	.007874	.70	.027559	20	.787400	70	2.755900	200	7.874000
.21	.008268	.71	.027953	21	.826770	71	2.795270	210	8.267700
.22	.008661	.72	.028346	22	.866140	72	2.834640	220	8.661400
.23	.009005	.73	.028740	23	.905510	73	2.874010	230	9.055100
.24	.009449	.74	.029134	24	.944880	74	2.913380	240	9.448800
.25	.009843	.75	.029528	25	.984250	75	2.952750	250	9.842600
.26	.010236	.76	.029921	26	1.023620	76	2.992120	260	10.236200
.27	.010630	.77	.030315	27	1.062990	77	3.031490	270	10.629900
.28	.011024	.78	.030709	28	1.102360	78	3.070860	280	11.032600
.29	.011417	.79	.031103	29	1.141730	79	3.110230	290	11.417300
.30	.011811	.80	.031496	30	1.181100	80	3.149600	300	11.811000
.31	.012205	.81	.031890	31	1.220470	81	3.188970	310	12.204700
.32	.012598	.82	.032283	32	1.259840	82	3.228340	320	12.598400
.33	.012992	.83	.032677	33	1.299210	83	3.267710	330	12.992100
.34	.013386	.84	.033071	34	1.338580	84	3.307080	340	13.385800
.35	.013780	.85	.033465	35	1.377949	85	3.346450	350	13.779500
.36	.014173	.86	.033858	36	1.417319	86	3.385820	360	14.173200
.37	.014567	.87	.034252	37	1.456689	87	3.425190	370	14.566900
.38	.014961	.88	.034646	38	1.496050	88	3.464560	380	14.960600
.39	.015354	.89	.035039	39	1.535430	89	3.503930	390	15.354300
.40	.015748	.90	.035433	40	1.574800	90	3.543300	400	15.748000
.41	.016142	.91	.035827	41	1.614170	91	3.582670	500	19.685000
.42	.016535	.92	.036220	42	1.653540	92	3.622040	600	23.622000
.43	.016929	.93	.036614	43	1.692910	93	3.661410	700	27.559000
.44	.017323	.94	.037008	44	1.732280	94	3.700780	800	31.496000
.45	.017717	.95	.037402	45	1.771650	95	3.740150	900	35.433000
.46	.018110	.96	.037795	46	1.811020	96	3.779520	1000	39.370000
.47	.018504	.97	.038189	47	1.850390	97	3.818890	2000	78.740000
.48	.018898	.98	.038583	48	1.889760	98	3.858260	3000	118.110000
.49	.019291	.99	.038976	49	1.929130	99	3.897630	4000	157.380000
.50	.019685	1 mm	.039370	50	1.968500	100	3.937000	5000	196.850000



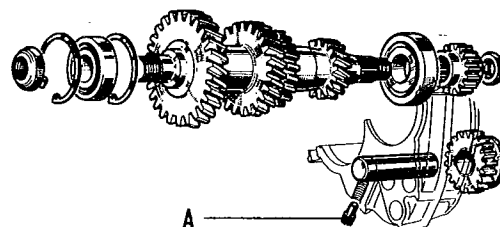
Exploded view of the gearbox.

- A. Synchroniser unit for 1st and 2nd speeds
- B. Synchroniser unit for 3rd and 4th speeds
- C. Reverse idler gear
- D. Reverse gear on countershaft
- E. Reverse gear on mainshaft

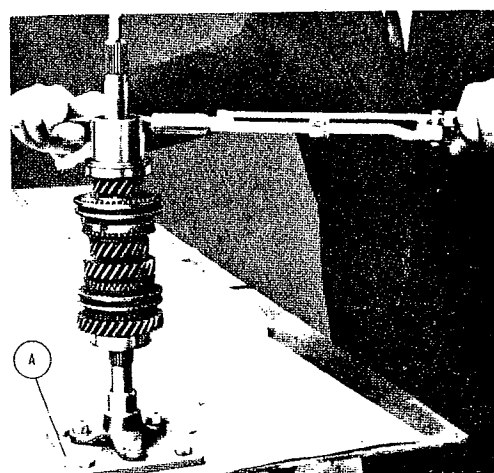


Exploded view of the synchronising device (see short description in text).

- 1. Spring securing ring
- 2. Synchronizing gearwheel
- 3. Synchronizer ring
- 4. Shifting key
- 5. Stop
- 6. Driving spring
- 7. Operating sleeve
- 8. Synchronizer hub



The pointed locating screw for the reverse idler gear shaft (A).



Removing the bearing nut from the gearbox mainshaft. A is the mounting plate to hold the shaft during dismantling.

Gearbox

GEARBOX — Models 1301/1501

The gearbox is housed in an aluminium housing which is longitudinally divided into two halves. It has four fully synchronized forward gears and a reverse gear.

Reduction ratios

1st gear	.....	17:28 x 14:31 = 0.274
2nd gear	.....	17:28 x 20:26 = 0.467
3rd gear	.....	17:28 x 25:21 = 0.723
4th gear	.....	17:28 x 28:17 = 1.0
Reverse gear	.....	17:28 x 17:35 = 0.295

A short description of the gearbox and the "Porsche baulk ring synchromesh" is given here to facilitate understanding of the operation of the gearbox and to help in any repair work.

The engine power is transmitted direct to the drive shaft via the clutch. The drive shaft is constantly in mesh, by means of a pair of gearwheels, with the countershaft which is constantly in mesh with the 2nd and 3rd speed gearwheels. The 1st speed is engaged by sliding the synchromesh selector ring (A) backwards, the 1st speed gearwheel on the drive shaft turns as well. By sliding the synchromesh selector ring (B) backwards the 3rd speed gearwheel on the output shaft is engaged so that it cannot turn. By sliding the synchromesh selector ring (B) forwards the drive shaft is connected direct to the output shaft, the 4th speed is engaged. The reverse gear is engaged by sliding the reverse pinion (C) which then connects the gearwheel of the countershaft (D) to the gearwheel on the output shaft (E). One of the illustrations shows the power flow of the gear train.

SYNCHROMEŠH MECHANISM

When 2nd, 3rd and 4th speeds are selected the synchromesh mechanism, which comprises an internally toothed selector sleeve, a guide sleeve, two drive springs, a lock key, a stop and the clutch of the gearwheel concerned, is actuated. The selector sleeve is provided with internal toothing which engages in the external toothing of the synchromesh hub which is brazed on the inside of the freely rotating gearwheels. A synchromesh ring sits inside a recess under the synchromesh hub. The ring effects a gradual matching of speeds when the selector sleeve is displaced.

During the gear change while the vehicle is in motion the selector sleeve, which is pushed by the selector fork, leaves the synchromesh ring of the gear engaged and goes beyond the centre position until contact is made with the cone faces on the selector sleeve teeth and the synchromesh ring. Through the friction contact the synchromesh ring is turned and supports itself in the process on the lock. The lock-key pushes the drive springs into the bore of the synchromesh ring, whereby the stop serves as a thrust bearing. The drive spring is distorted and becomes a spring ring thus delivering radially acting forces to the synchromesh ring which increases the friction between the selector sleeve and the synchromesh ring. The original frictional forces, determined by the tension of the synchromesh ring, are therefore intensified by the distortion of the drive spring.

As long as there is a difference in speed between the selector sleeve and the synchromesh ring, which is solidly connected to the gearwheel, it is not possible through the supporting force of the drive spring to reduce the synchromesh ring in diameter and

bring the selector toothing into mesh. If the speed difference between the selector sleeve and the gearwheel reduces, the frictional forces on the synchronizing surfaces are also reduced in the same ratio.

When both parts are synchronized the locking system is released, the synchromesh ring contracts. The shift sleeve can be pushed with little effort over the synchromesh ring up to the stop. In this position the synchromesh ring engages in the radial groove, which is machined in the tooth faces of the selector sleeve - expands and locks the selector sleeve - the disengaged gear is thus locked.

As engine speed is relatively low when starting off the synchronization on 1st gear is designed slightly differently. There is only one drive spring which locates on a projection on the inside of the lock-key. The end of the synchromesh ring butts against the lock-key, the inner projection of which locates on the synchromesh hub. During the period of speed matching the lock-key is lifted and increases the radial pressure of the synchromesh ring against the synchromesh hub.

GEARBOX — Removal and Installation

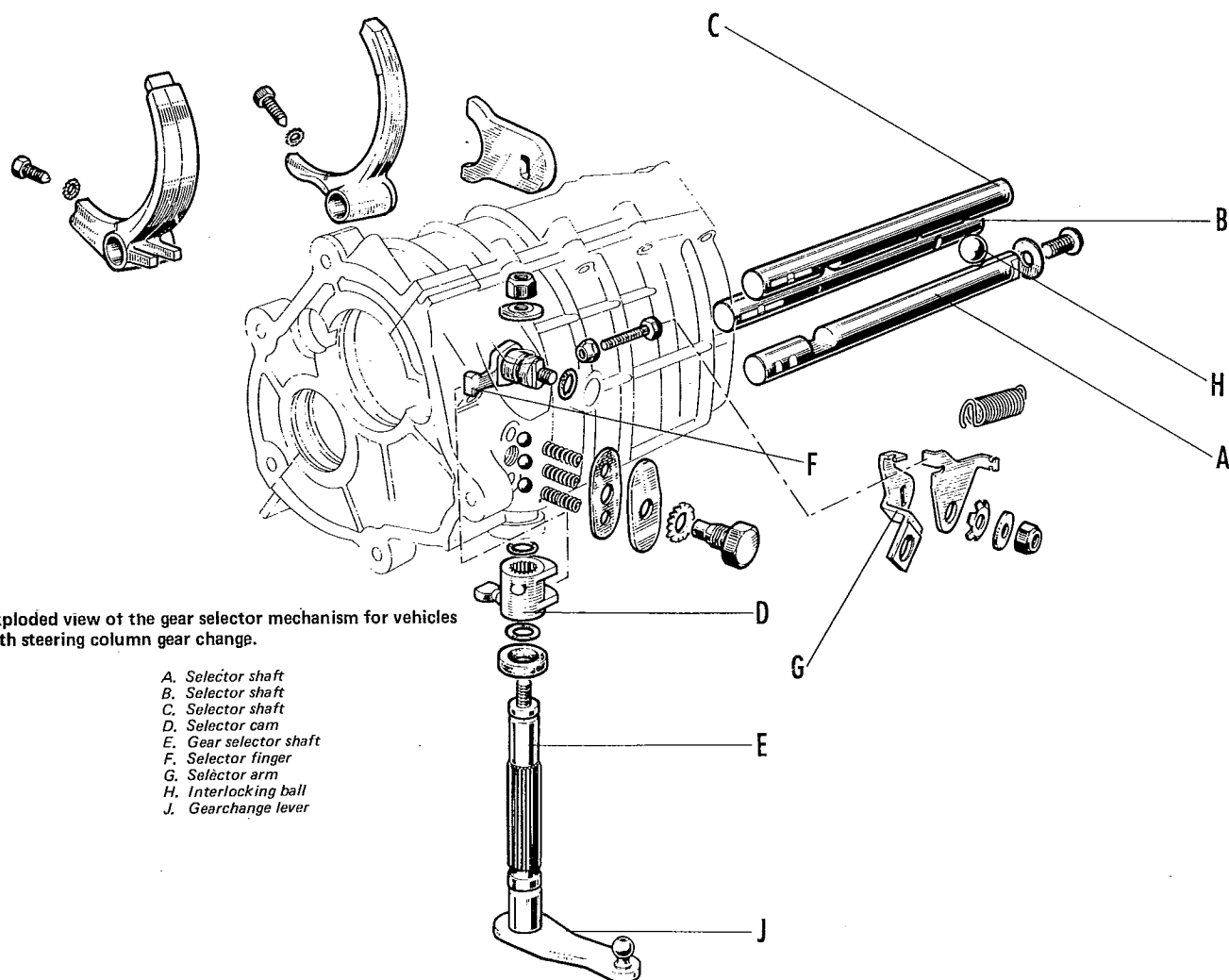
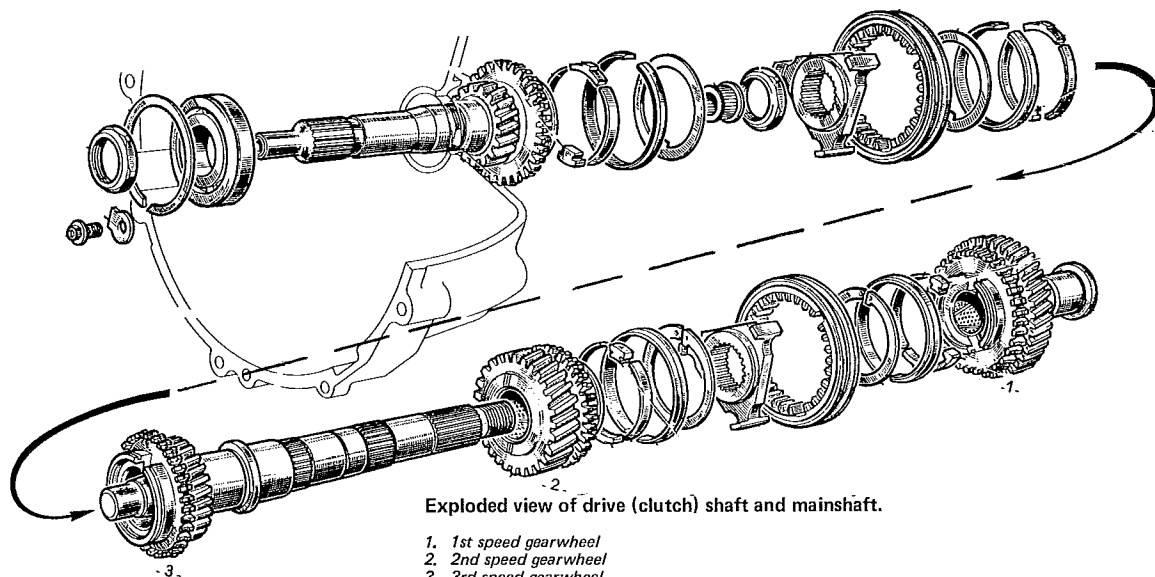
Removal and installation of the gearbox is described in Clutch — Removal and Installation

GEARBOX — Dismantling

The removed gearbox (which has been drained of oil) with the clutch housing, is fitted on the mounting stand. To do this the grub screw (retaining screw of reverse idler gear shaft) is unscrewed. This tapped hole and the tapped hole of the drain plug facilitate fitting on the mounting stand. Unscrew the retaining bolt of the speedometer drive housing and remove the housing; leave the oil ring in the groove. Remove the clutch release fork shaft, and the fork and clutch housing.

To remove the detent balls and springs of the three selector fork shafts the hexagon bolt and tooth lock washer must be unscrewed from the centre of the retaining plate. Remove the second retaining plate with seat openings for the springs, and catch the springs and balls. Bend open the locking plate of the ball nut on the triangular drive flange of the propeller shaft. Unscrew the ball nut and withdraw the drive flange. Unscrew the rear gearbox cover (5 screws with tooth lock washers), take off the oil splash plate, speedometer drive worm and reverse gearwheel.

Unscrew the input/output shaft bearing retainers and remove the retainers. Release and unscrew the retaining screw of the reverse gear selector lever. Unscrew nuts from the housing collar studs, remove the studs and lift off the upper half of the housing. Loosen the countershaft with light taps of a rubber mallet if necessary, lift the countershaft upwards in a horizontal position: the input/output shaft should also be lifted upwards. The shafts must be removed while in the horizontal position as tilting damages the shaft bearing bores and bearings. Remove the splined selector lever shaft: unscrew the nut with a socket wrench and remove the washer: withdraw the shaft downwards. Pull washers, seal and selector cam out of housing. Unscrew retaining screws and remove the tooth lock washers from the selector fork for 1st and 2nd speeds and the selector fork for



3rd and 4th speeds and remove the selector shafts. Remove the large detent ball which is located between the three selector fork shafts; take out the selector finger. Remove the selector fork shaft of the reverse pinion and remove the pinion.

INPUT/OUTPUT SHAFT — Dismantling

Secure the assembly on the work bench using the triangular flange. Engage high gear and unscrew the retaining nut of the bearing at the input end with special spanner 20 818 W. Pull off the bearing with extractor 15 933 G. Before dismantling, the relative positions of gearwheels, synchromesh sliding sleeves and drive hubs should be marked with a paint line in order that original running conditions are ensured for reassembly. Remove 3rd and 4th speed synchromesh selector ring, take off the needle bearing on the output shaft. Unscrew the bearing retaining nut on the output shaft with spanner 20 818 W. Take the input shaft with the triangular flange out of the mounting, turn it around and pull off the bearing with extractor 15 933 G.

COUNTERSHAFT — Dismantling

Clamp the shaft in a vice and unscrew the recessed nuts on the right and left. Pull off the front bearing with the extractor 8604 R. Pull off the rear bearing with extractor 15 525 F. After thoroughly cleaning all parts in fuel they should be blown dry with compressed air and checked visually and by measurement for damage, in doing so the parts which appear to be "just re-usable" should be renewed. Retaining rings, circlips, bent open locking plates, oil rings, sealing rings with lips, recessed nuts and paper gaskets which have been removed should be renewed.

Check the housing for cracks, wear of bearing seats and check the flatness of joint surfaces, gearbox cover and speedometer locating surface with a straight edge. Check roller bearing by

turning it in both directions, there should be no sign of sticking or roughness. Check balls and running surfaces for splintering or pressure points. Bearings which are not quite perfect must be renewed, the same applies to the needles of the needle bearing. Check input/output shaft and countershaft for signs of damage or wear. The following applies to the gearwheels and the individual components of the synchronization: There must be no signs of wear or pressure points, all contact and sliding surfaces must be absolutely clean and flat.

SYNCHRONISER UNITS — Repair

In principle the synchronizer unit of a gearwheel should only be dismantled if there have been complaints during operation or if reason is seen after the gearwheels have been removed. Circlip pliers with good tips should be used for removing the resilient retaining ring. It is advisable to grind a slight notch in the outsides of the tips to avoid slipping. Clamp the gearwheel in a vice with suitable hardwood jaws and remove the retaining ring. Remove the two drive springs, the lock-key and the stop-key and the synchronizer circlip. Dismantling of the 1st speed synchronizer is carried out as above only the lock-key is shaped differently and there is only one drive spring. Check the surface of the synchronizer ring for wear.

The pattern of wear of the two outer faces of the ring should be as uniform as possible and about a half to two thirds of the periphery should have carried load. However, if the pattern of wear is principally at both butt ends and at a point opposite the gap on the outer periphery the ring must be replaced. Check that the synchronizer ring is parallel. Check the noses of the lock-keys and stop-keys for wear or compressed contact faces and renew as necessary. Assembly is a reversal of the

dismantling procedure. Ensure that the lock-keys and stop-keys are fitted in the original pinion in the correct position.

GEARBOX — Assembly

Fit the reverse gearwheel and shaft and secure the shaft in its housing with the grub screw. Installation of the gear selector mechanism is then carried out as follows: Fit the selector finger, guide lever with spring and stop lever. Insert the selector lever shaft from below, ensuring that the lips of the sealing rings are not damaged. Fit washers in original positions. When fitting the selector cam ensure that the lugs of the cam and the selector lever lie in one plane at right angles to the gearbox axis (neutral position). Fit the washers and tighten the nuts to a torque reading of 7 ft.lb. Insert the selector fork shaft of the reverse gear. Fit the 3rd and 4th speed fork shaft and the large detent ball of the selector shafts. Screw on the 3rd and 4th speed selector fork: the stop screw must be tightened to a torque of 6 ft.lb. Insert the three detent balls with springs.

Tighten the two retaining plates using a screw with tooth lock washer. If the selector lever is against the stop, the selector finger must position the selector cam so that the selector lug lies in the transverse slot of the 3rd and 4th speed selector shaft fork. Adjust the selector lever using the outer screw.

COUNTERSHAFT — Assembly and Installation

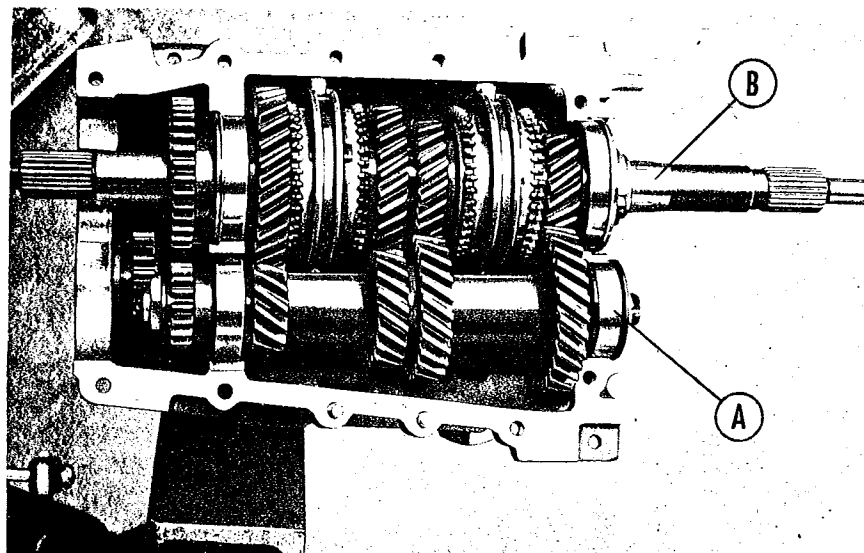
If the countershaft has been dismantled the bearings must be fitted with the help of spacer tubes (bore 26 mm, outer dia. 34 mm and length 120 mm bore 26 mm, outer dia. 30 mm and length 120 mm) under the bench press. Clamp the shaft in a vice with suitable protective jaws (clamp shell 20 803 X), screw new notched nuts on the ends and tighten to a torque of 101 ft.lb. and lock.

Fit the countershaft. To do this insert the inner circlip in the housing and place the countershaft horizontally in the lower half of the housing. Attention should be paid to correct seating and location of the ball bearing against the circlip.

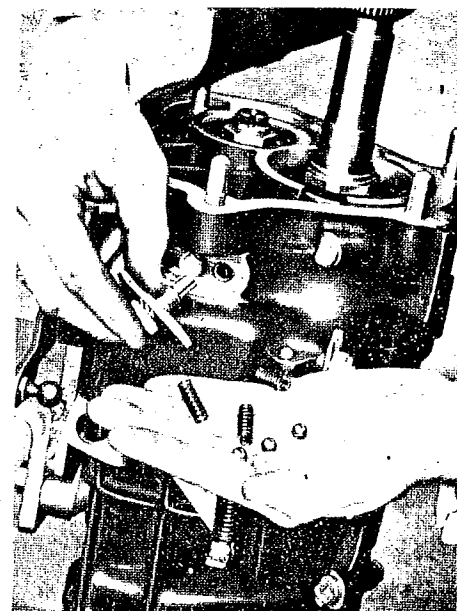
INPUT/OUTPUT SHAFT — Assembly and Installation

Assembly is a reversal of the dismantling procedure. Fit parts in accordance with the paint markings made during the dismantling procedure. Fit the bearing of the input shaft with the help of a spacer tube (bore 40 mm, outer dia. 49 mm and length 180 mm) and the bearing of the output shaft with the help of a spacer tube (bore 33 mm, outer dia. 42 mm and length 150 mm) under the bench press. Tighten clamp nuts of input shaft bearing and retainer of 3rd and 4th speed drive hub on the output shaft to a torque of 108 ft.lb. and lock. Fit the input/output shaft, to do this place it in the lower half of the housing; note circlip in the bearing. The outer bearings must locate tight with the inner faces on the housing. Recheck the housing joint faces to ensure that they are clean and there are no burrs as the joint faces locate metal to metal without a paper gasket. Fit the upper half of the housing. Insert the collar studs and provisionally screw the nuts finger tight.

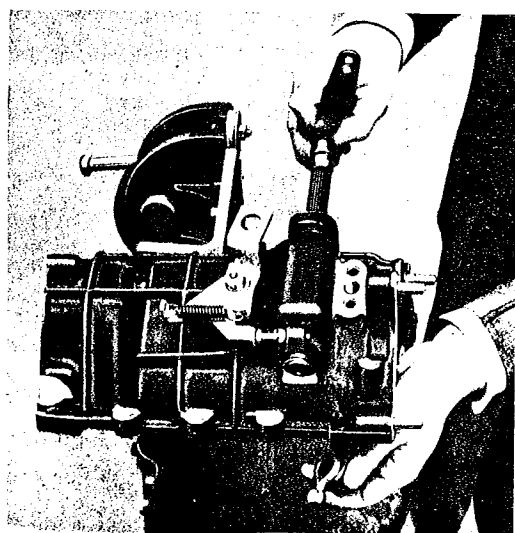
Check freeness of both shafts, then tighten the nuts of the collar studs in a diagonal pattern to a torque of 11.6 ft.lb. Insert the circlip of the rear bearing of input/output shaft. Fit the bearing locking plates and tighten the retaining screws to a torque of 11.6 lb.ft. Fit clutch housing complete with gasket and release fork. Tighten nuts to a torque reading of 27 ft.lb. Fit the reverse gear pinion, speedometer worm and the oil splash plate. Fit rear gearbox cover and gasket and tighten to a torque of 11.6 ft.lb. Insert the triangular flange: fit the washer and



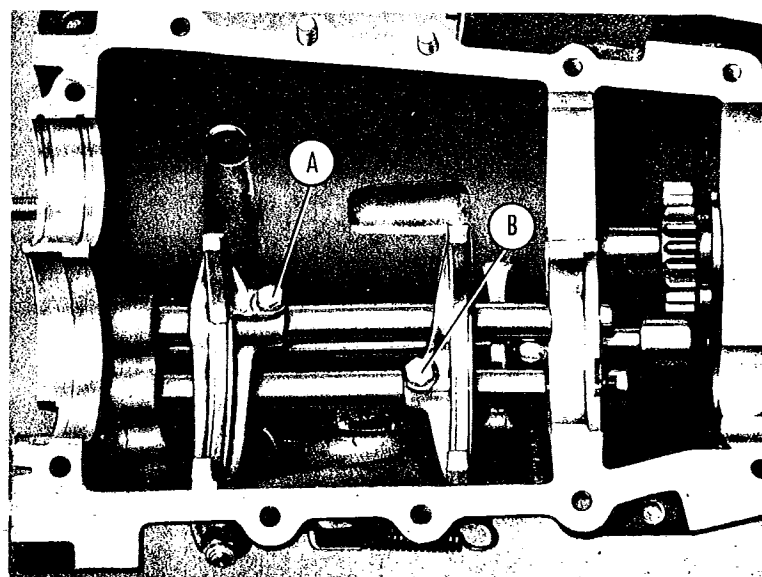
View of the gearbox case half with mainshaft and countershaft installed.



Collecting the springs and balls for the interlocking mechanism.



Removal of the gear selector shaft.



View of the gearbox case half to show the selector shaft/fork securing screws A and B.

tighten the ball nut to a torque of 130 ft.lb. and insert. Fill with about 1.30 litres (2.3 Imp. pints/2.8 U.S.pints) Shell Spirax 90 EP oil. Unscrew the gearbox with clutch housing from the mounting stand. Screw in grub screw for reverse gear shaft. (See Clutch for installation).

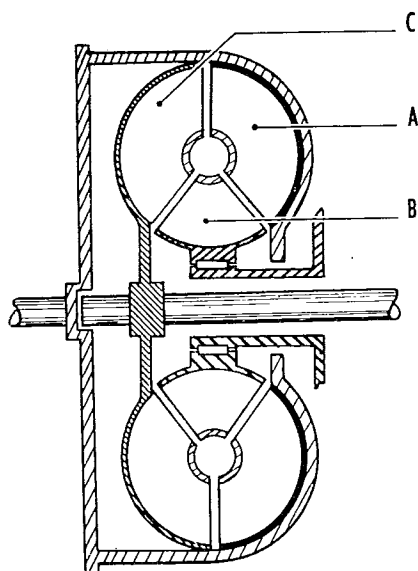
GEARCHANGE — 1301/1501
Elimination of vibrations at the control lever

From July 1965.

Remove the gear change control and reduce the selector rod play in the tubular sleeve by fitting a piece of foil between each nylon bush and the sleeve. The thickness of foil must be such that the bush - foil assembly can only be fitted by being forced into the sleeve.

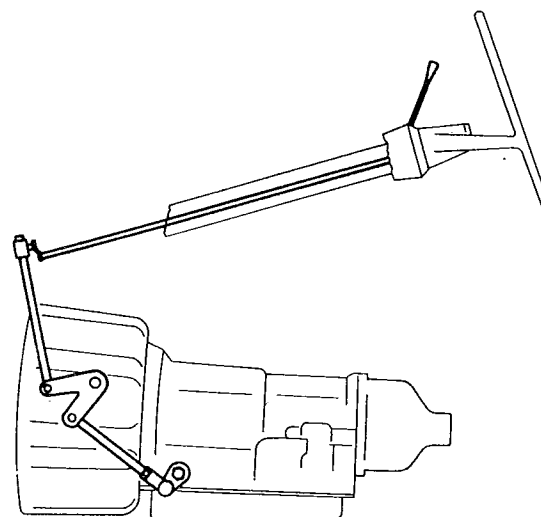
Reduce the sleeve longitudinal play on the selector rod by fitting the end of the sleeve, on the selector lever side, with a spring washer and a washer identical with the washers fitted originally on the fork end side. If necessary, modify width of keying flat. Fit a strengthened return spring, wire gauge 3.1 mm (S.W.G.10) instead of 2.9 mm (S.W.G.11) to eliminate the control lever transverse oscillations. Re-assemble the gear change control.

NOTE: At the time of writing Simca recommends Shell Oil for the gearbox. If this oil is not readily available, it is possible to use any other reliable brand, provided that SAE 90 oil is used.

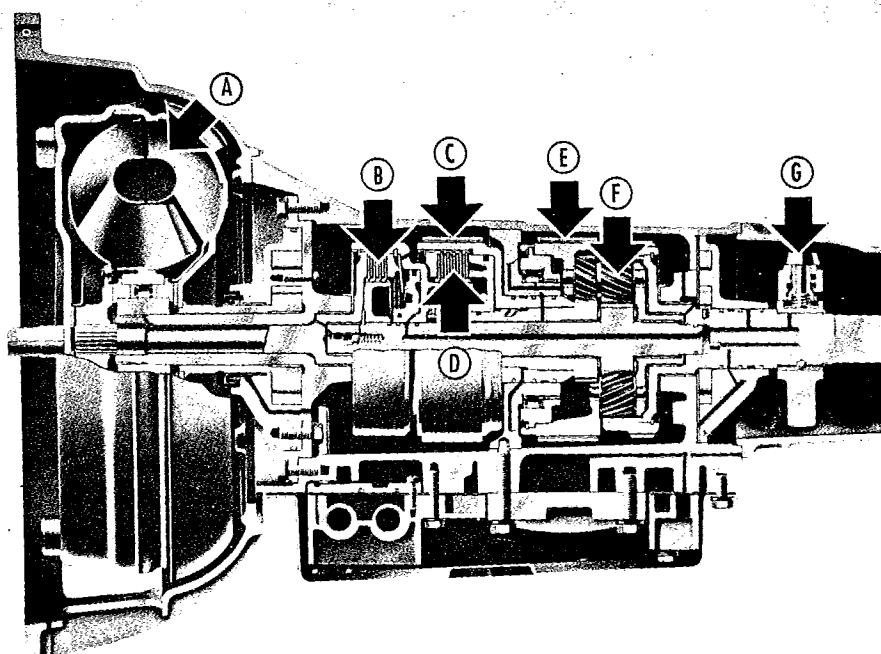


Section through the torque converter.

- A. Converter pump
- B. Stator wheel
- C. Turbine wheel



Connection between gear selector lever and selector linkage on the transmission.



Section through the automatic transmission.

- A. Torque converter
- B. Front clutch
- C. Front brake band
- D. Rear clutch
- E. Rear brake band
- F. Planetary gear train
- G. Centrifugal governor

Automatic Transmission

BORG WARNER/SIMCA 1501

A description of the automatic transmission is necessary for treatment, maintenance and adjustment. Defects which cannot be rectified by adjustment necessitate the removal of the gearbox and an exchange gearbox fitted. The defective gearbox should be sent to the appropriate regional agency for repair. Defects which necessitate an exchange hardly arise on the Borg-Warner gearbox - which has been proven - the gearbox is practically free of wear, and if one disregards the oil check, practically maintenance free.

The Simca 1501 is supplied with a Borg-Warner gearbox as an optional extra. The automatic Borg-Warner gearbox selects the appropriate gear automatically. The engine is started after moving the selector lever into position N (Neutral), then the selector lever is moved to position D (Drive) and the accelerator pedal depressed. The selector lever need not be moved any more during the journey. The gearbox automatically selects a higher or lower gear depending on the load. The speed of the vehicle is only regulated by the accelerator and brake pedals. The selector lever is located below the steering wheel and shows the following positions:

P	=	Park
R	=	Reverse
N	=	Neutral
D	=	Drive
L	=	Low

The transmission consists of a torque converter and a hydraulically operated gearbox mounted behind it with a control which automatically selects the correct gear.

THE TORQUE CONVERTER

The torque converter consists of a pump which is connected to the crankshaft of the engine by a spring plate; a turbine which is connected to the gearbox input shaft and a guide wheel which is mounted on a free wheel. The free wheel itself is fitted on a hub which is connected to the gearbox housing. The free wheel prevents the guide wheel from turning in the reverse direction to the engine.

THE GEARBOX

The gearbox consists of the planetary gearing, the front and rear clutch, the front and rear brake band and free wheel, and the hydraulic unit comprising front and rear pump, centrifugal governor and a hydraulic system which regulates and directs the internal fluid pressure.

PLANETARY GEAR TRAIN

The planetary gearing consists of two sun wheels, three pairs of planet wheel, the epicyclic unit and a hollow wheel: all wheels have involute helical toothing. The transmission ratios are achieved by engaging the hydraulically controlled brake bands and multi-plate clutches.

CLUTCHES

The clutches are the multi-plate type operated by hydraulic pistons. The front clutch is used for forward speeds and the rear clutch for reverse.

BRAKE BANDS

The different parts of the planetary gearing are held with the help of the brake bands. At position L (lock), R (reverse), the rear brake band holds the epicyclic unit and achieves a transmission ratio of 2.39: 1 in 1st gear and 2.09:1 in reverse gear. The front brake band holds the front sun wheel and achieves a transmission ratio of 1.45:1 for 2nd gear.

FREE WHEEL

At position D (Drive) the free wheel is used instead of the rear brake band. The free wheel enables the planetary gearing to move when the vehicle is pushed in 1st gear. (Gear ratio 2.39:1): it ensures a smooth transition from 1st into 2nd gear and vice-versa.

HYDRAULIC SYSTEM

The front pump always runs when the engine is running. It produces the hydraulic pressure in the gearbox while the vehicle is standing and at low speeds (up to approximately 25 mph) before the rear pump delivers the necessary pressure. Above 25 mph the front pump only ensures the pressure in the torque converter and lubrication system. When the rear pump delivers sufficient pressure, the by-pass valve of the front pump closes. Oil continues to flow to the torque converter and the lubrication system through a lateral port.

The rear pump is driven by the gearbox output shaft. It delivers full pressure at speeds above 25 mph. The second pump makes it possible to push or to start the vehicle when the battery or the starter fails.

CENTRIFUGAL GOVERNOR

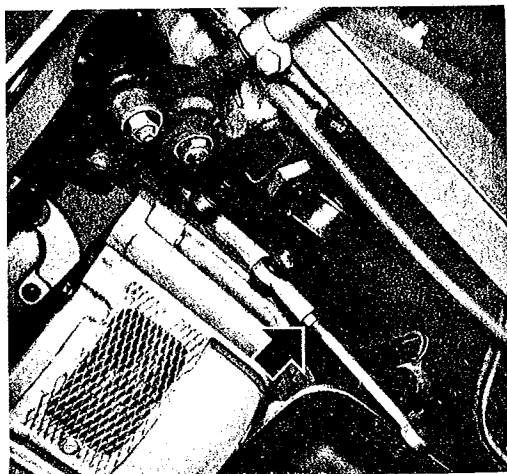
The centrifugal governor is located on the gearbox output shaft. As speed increases the governor weight moves outwards to a stop in the governor body and the governor pressure increases in relation to the centrifugal force. The variable governor pressure is fed to the selector valves of 1st gear, 2nd gear and 3rd gear in the control unit for changing over.

CONTROL UNIT

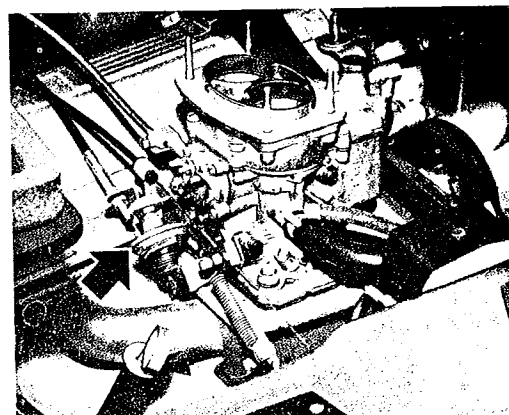
The system and torque converter pressures are regulated by a primary or secondary regulator valve. The primary regulator valve controls the pressure of the front pump at idling speed, in reverse gear and at low speed as well as the pressure of the rear pump when it exceeds the pressure of the front pump at high speed. The secondary regulator valve controls the torque converter pressure, complements the action of the primary regulator valve and lubricates the individual elements in the rear section of the gearbox. The operation of change-down and throttle valve, modulating valve and selector valve cannot be dealt with here in detail. They serve to produce and alter throttle and system pressure and control the gear changes under all operating conditions.

MANUAL SELECTION

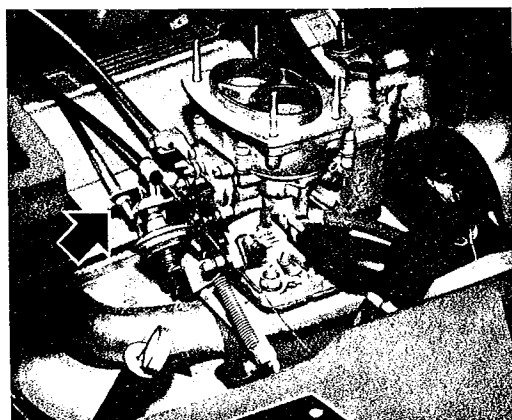
The piston of the manual control valve, operated by the selector lever, controls the oil delivery (pump pressure) to the gearbox elements in the following manner so that the correct gear is selected in each case.



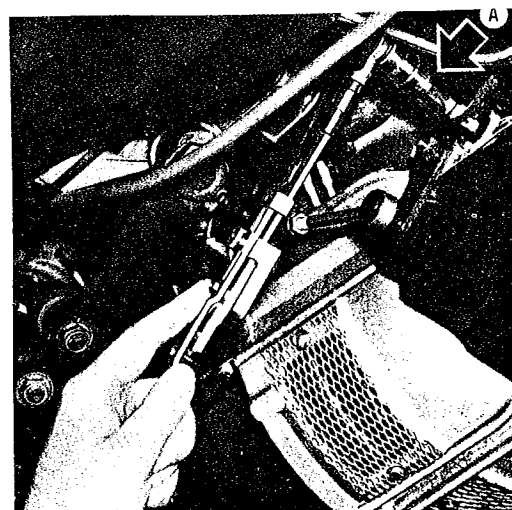
The arrow shows the adjustment point for the manual selector linkage.



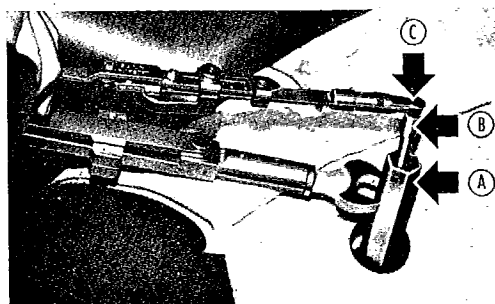
Installation position of dashpot.



The arrow shows the adjustment point for the downchange valve.



The arrow shows the adjustment point for the starter inhibitor (lock) switch.



The arrows show the adjustment details for the rear brake band. A. Wrench, B. Extension, C. Adaptor.

P position

A lock is mechanically guided into the outer ring gear of the hollow wheel. In this position oil pressure cannot reach the front clutch, the 2nd to 3rd gear selector valve and the rear clutch. The planetary gearing is disengaged from the torque converter transmission so that only the engine runs. Park with the engine engaged or disengaged. Apply handbrake on gradients.

N position

The system pressure is cut off from the clutch and the control cylinders. The cylinders are empty because the lines to the oil sump via the change-over valves are open. The planetary gearing is disengaged from the torque converter so that only the engine runs. No gear is engaged.

If the selector lever is moved into one of the positions D, L or R, the handbrake should be applied or the footbrake depressed as the vehicle will otherwise begin to move slowly forwards when the selector lever is engaged.

D position

Move the selector lever into position D while the engine is at idling speed. The system pressure is then transmitted to the front clutch, the centrifugal governor and the 1st to 2nd gear selector valve. Changing up to 2nd and 3rd gear is then effected in relation to the position of the accelerator pedal and the road speed.

L position

The L position should be selected when the vehicle is stationary with the engine at idling speed. If the vehicle is in motion the L position may only be selected below 55 mph. In practice the L position is only necessary in order to achieve a high engine braking effect on steep gradients. The system pressure is transmitted to the front clutch, the centrifugal governor and the 1st and 2nd gear selector valve. In this position only the 1st and 2nd gears can be held.

R position

Only move the selector lever into the R position when the vehicle is stationary. The system pressure is fed to the rear control cylinder via the 1st to 2nd gear selector valve and the 2nd to 3rd gear selector valve. The governor receives no pressure.

After engaging the selector lever in one of the positions D, L or R, the handbrake or the brake pedal should be released and the vehicle moves forwards (or backwards in R). Acceleration is achieved by depressing the accelerator pedal past a noticeable resistance. By releasing the accelerator pedal and applying the brake the vehicle is stopped. Then move the selector lever to P or N. If the vehicle is stuck in loose sand or in snow in winter the selector lever should be moved backwards and forwards between positions D and R while the accelerator pedal is depressed lightly and uniformly whereby the vehicle is rocked free.

MAINTENANCE WORK WITHOUT GEARBOX REMOVAL

An oil change is not necessary if the oil level check is carried out every 3,000 miles in accordance with the maintenance instructions and the oil level topped up. If repeated topping up is necessary this may be due to a leak; the cause of the leak must be ascertained and rectified. An oil loss of 1-1/2 litres (2.6 Imp. pints/3.2 U.S. pints) is sufficient to destroy a gearbox. The filler pipe with breather and oil dipstick is located in the engine

compartment on the right in front of the bulkhead. Before removing the dipstick remove any dirt from the end of the filler pipe. Ensure that the vehicle is standing on a level surface and that the gearbox is at operating temperature. If the gearbox fluid is cold the vehicle should be driven 5 to 6 miles or the engine (selector in P or N position) allowed to run until the oil is at operating temperature. The check should be carried out with the engine running and the selector lever in the P position. Pull the dipstick out of the filler pipe, wipe it with a nylon cloth, paper or chamois leather. Insert the dipstick and withdraw it again. The oil level should be between the upper and lower lines. If necessary top up with oil to the Max. mark, no more. Do not overfill the gearbox, this can lead to overheating of the gearbox and frothing of the fluid. The difference between Max. and Min. is 0.5 litres (0.88 Imp. pint/1.07 U.S. pints). If oil is put into a cold gearbox the oil level should be 10 mm (0.4") below the Max. line. Then allow the gearbox to warm up, or drive until warm, and check the oil level, correct if necessary using only Shell Donax T 6 (AQATF Type A).

ADJUSTMENTS

No periodic adjustments are necessary under normal conditions. If faults occur, the following points should be checked:

1. Fluid level.
2. Adjustment of linkage between selector lever and gearbox.
3. Adjustment of operating lever between carburettor and change-down valve.
4. Adjustment of starter lock switch.
5. Adjustment of front brake band.
6. Adjustment of rear brake band.
7. Adjustment of dashpot.

Practically all adjustment work needs to be carried out by two mechanics. One man in the driving seat, the other man for the adjustment. For safety reasons wooden chocks should be placed under the front and rear wheels.

1. Checking the fluid level. The information is detailed in 'Maintenance work without Gearbox Removal'.

2. Adjustment of manual control linkages, (selector lever).

The linkage of the gearbox lever should be detached at the gearbox. Select N at the selector lever. Turn the gearbox lever to the central position. In each of the five positions a definite engagement click must be audible. The linkage is set by adjusting the length. Secure the linkage by tightening the lock nut and check the position of the selector lever in all five positions (P, R, N, D, L). A definite engagement must be felt in each position.

3. Adjustment of the change-down valve lever

The correct adjustment of the lever is extremely important for perfect operation of the automatic gearbox. Check idling setting, connect a pressure gauge (scale reading 15 to 240 lb./sq.in. in place of the plug, with the gearbox at operating temperature. Check the lever and the crankshaft casing mouth at lever stop. Move selector lever to position D. Apply handbrake and secure the wheels with chocks. Start the engine and read the pressures indicated at idling speed, half and full opening of the throttle valve:

Idling pressure at 500/550 rpm	. . . . . 60 lb./sq.in.
Half throttle at 1000 rpm	. . . . . 88 lb./sq.in.
Full throttle	. . . . . 147 lb./sq.in.

If the pressure difference between 500 rpm and 1000 rpm is less than 0.007 psi. the cable sleeve at the carburettor end should be extended by screwing it down. If the pressure difference is more than 0.21 psi. the cable sleeve should be shortened by screwing it upwards. If a new cable has to be installed, the oil sump must be removed. Set the cable in relation to the accelerator pedal position by observing the rotation of the cam disc as follows:

When the accelerator pedal is released the fork head of the carburettor linkage locates on the idling stop and the heel of the cam disc should locate on the piston end of the change-down valve. The cable should be fully extended. When the accelerator pedal is fully depressed and the fork head of the carburettor linkage locates on the full throttle stop, the piston of the change down valve should locate on the cam disc section with the constant profile.

Note: The cable is lubricated with graphite or molybdenum sulphide and must not be lubricated with oil. The cable sleeve must locate perfectly in the adjustable sleeve end piece.

STARTER LOCK SWITCH – Adjustment

The starter lock switch has two connections for the starter lock. The engine cannot be started in any selector lever positions other than N or P. To check the wire to the switch, disconnect them and reconnect outside the switch, it should then be possible to operate the starter. When the switch is reconnected the starter must only turn in position P or N. Disconnect feeder cable of switch. Loosen the switch lock nut and unscrew the switch. Select position P or N. Connect a 3 Watt test lamp to the switch terminal. + to terminal 1, - to terminal 2. Screw in the switch until the test lamp lights (if the lamp does not light, the switch must be renewed). Turn the switch a 1/4 turn further with the lamp on. Tighten the lock nut to a torque of 4 to 6 ft.lb, then check the switch in positions D, L and R, the lamp must go out. Connect the cables to the starter and fit the guard cap on the lock switch.

FRONT BRAKE BAND – Adjustment

Adjusting the front brake band rectifies any slip when changing down from 3rd to 2nd gear. Jack up vehicle. Place the jack under the torque converter housing. Detach the exhaust pipe at the gearbox. Dismantle the propeller shaft at the gearbox flange. Remove the gearbox support angle and lower the gearbox. Drain the oil and remove the oil sump. Loosen the lock nut on the adjustment screw of the front brake band. Insert as adjustment test gauge B part No. 20843 X between the adjustment screw and the servo piston pin. Tighten the adjustment screw to a torque reading of 2 ft.lb. Tighten the lock nut to a torque reading of 14 to 21 ft.lb. and remove the test gauge. Fit the sump; secure the exhaust pipe and fill with oil to the correct level.

REAR BRAKE BAND – Adjustment

Adjusting the rear brake band can prevent difficulties in selection of the reverse gear. The band can be adjusted from outside the housing. Lift the floor mat, remove the plastic plug from the inspection hole in the transmission tunnel and adjust as follows: Loosen the lock nut on the adjustment screw and tighten the adjustment screw with a torque wrench to a torque of 10 ft.lb. then back off the adjustment screw by exactly one turn. Tighten the lock nut to a torque of 25 - 29 ft.lb.

DASH POT – Adjustment

With the carburettor throttle valve at the idle position the travel at the end of the dashpot should be 4.5 mm (0.177"). Apply

the handbrake and place chocks under front and rear wheels. Run the engine at idling speed in position D. Unscrew the dashpot until the throttle valve begins to open: observe the revolution counter (650 rpm). Screw in the dashpot 3.5 turns and tighten the lock nut.

FAULT FINDING

The following checks should be carried out to facilitate fault finding: Check the fluid level. Check the correct engagement of the selector lever in the positions P, R and L. Check that the starter operates only when the selector is in positions P or N. Start the engine, apply the brakes and move the selector lever from N to D, N to L and N to R. The gearbox should engage in each position. The revolutions in position L should be checked using a revolution counter. Start the engine, apply the brakes and select L. Depress the accelerator pedal and note the maximum revolutions after a few seconds. This test must not last longer than 10 seconds or the gearbox will overheat. The permissible speed with the brakes applied is between 1600 and 1900 rpm. If the turbine slips in L, there is a defect in the front clutch, if the turbine slips in R, there is a defect in the rear clutch, if the turbine slips in L and R, there is a defect in the rear brake band. If the engine speed is 1300 to 1500 rpm, the engine should be checked and brought up to performance. At 3000 rpm the oil supply may be inadequate owing to the operation of the clutch, if so exchange the gearbox. If the engine speed is below 1000 rpm, the torque converter is working without the guide wheel, the free wheel is defective. If noises occur during this stationary test they may be due to the following defects: a muffled whistling noise indicates a fault in the free wheel; a burring noise indicates a fault in the torque converter. The gearbox should be replaced in both cases. A rattling noise at low speeds is caused by a broken spring plate between the engine and the torque converter, the spring plate must then be replaced.

ROAD TEST

It is essential to carry out a test drive to facilitate further fault finding, during this test the following points must be checked: The change points should be checked using a revolution counter. A drop on the revolution counter indicates the respective gear changes, observe the road speed in the process.

The change points are at the following speeds:

When changing from 1 to 2

With accelerator pedal slightly

depressed 10 kph (approx.6 mph)

With accelerator pedal depressed

(without kickdown) 40 kph (approx.25 mph)

With accelerator pedal fully depressed

(kickdown) 50 kph (approx.31 mph)

When changing from 2 to 3

With accelerator pedal slightly

depressed 15 kph (approx.10 mph)

With accelerator pedal depressed

(without kickdown) 70 kph (approx.42 mph)

With accelerator pedal fully depressed

(kickdown) 85 kph (approx. 54 mph)

When changing from 3 to 2

With accelerator pedal slightly depressed —

With accelerator pedal depressed (without kickdown) —

With accelerator pedal fully depressed

(kickdown) 75 kph (approx.46 mph)

When changing from 2 to 1
 With accelerator pedal slightly
 depressed 5 kph (approx.3 mph)
 With accelerator pedal depressed
 (without kickdown) —
 With accelerator pedal fully depressed
 (kickdown) 40 kph (approx.25 mph).

Move the selector lever to D, release the brake and accelerate using very little throttle. Check upwards changes from 1st - 2nd gear and 2nd - 3rd gear. Upward changing should be checked at a small throttle opening. Check that the gearbox operates in 3rd gear by moving the selector lever into position L at up to 55 mph. The gearbox should change down into 2nd gear. Depress the accelerator pedal to the full throttle position at a speed of 28 mph. The vehicle should accelerate without changing down to 2nd gear.

Depress the accelerator pedal at 31 mph in D into the kickdown position. The gearbox should change down to 1st gear. (Engine speed 2200 to 2700 rpm). Accelerate to slightly more than 30 mph and move the selector lever into the N position, switch off the ignition and allow the vehicle to move the selector lever into the N position, switch off the ignition and allow the vehicle to roll without using the brakes. At 28 mph switch the ignition on again and move the selector lever to D. The engine should be re-started by the gearbox via the rear wheels; this is proof that the rear pump is functioning.

Stop the vehicle on a gradient, move the selector lever into the P position and release the brakes: the parking lock must hold the vehicle. Apply the brakes before the parking lock is released. The same procedure should be repeated on a gradient.

If starting difficulties are experienced on steep gradients together with poor acceleration, this is an indication that there is a free wheel defect in the guide wheel. If a speed measurement of approximately 900 rpm is obtained during hard braking, the complete gearbox should be removed or replaced. Acceleration which is slower than normal in high gear with a much reduced maximum speed and excessive heating of the gearbox indicates that the free wheel is jammed. Exchange the gearbox.

AUTOMATIC GEARBOX (Complete) — Removal and installation —

Disconnect the battery. Drain off the cooling water. Remove the top water hose on the radiator. Remove the retaining clips for the heating system pipe on the cylinder head cover. Remove the pipe clamp of the exhaust pipe. Remove the starter and detach the cable for the change-down valve at the carburettor. Jack up and support the vehicle. Detach the selector lever linkage from the gearbox and remove the exhaust mounting. Dismantle the propeller shaft at the flange of the gearbox output shaft. Remove the gearbox support angle and tilt the power unit. Turn the engine manually so that the four securing screws of the torque converter on the spring plate can be unlocked and unscrewed. Support the gearbox and unscrew the converter housing from the cylinder block. Remove the stone guard mesh from the ventilation slots and press the spring plate off the torque converter. Pull the complete gearbox out to the rear, ensuring that the torque converter does not fall.

Installation is a reversal of the removal procedure. Fill up with gearbox fluid and check the fluid level at oil operating temperature. Adjust as necessary.

TOWING

Tow starting

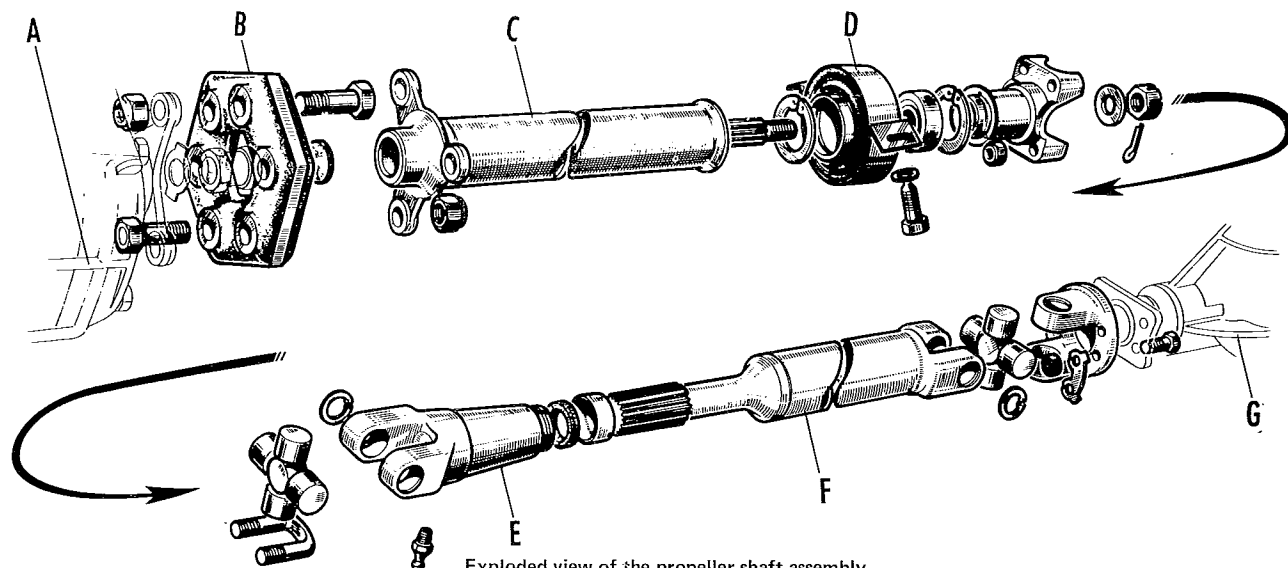
If the battery is discharged or if the starter has failed, the vehicle can be roll started down a gradient. It is also possible to tow or push start with another vehicle. In all these cases the selector lever must be left in position N until the vehicle is accelerated to about 25 mph, then the ignition should be switched on and D selected.

Towing another vehicle

The vehicle to be towed should not be heavier than 2200 lb.

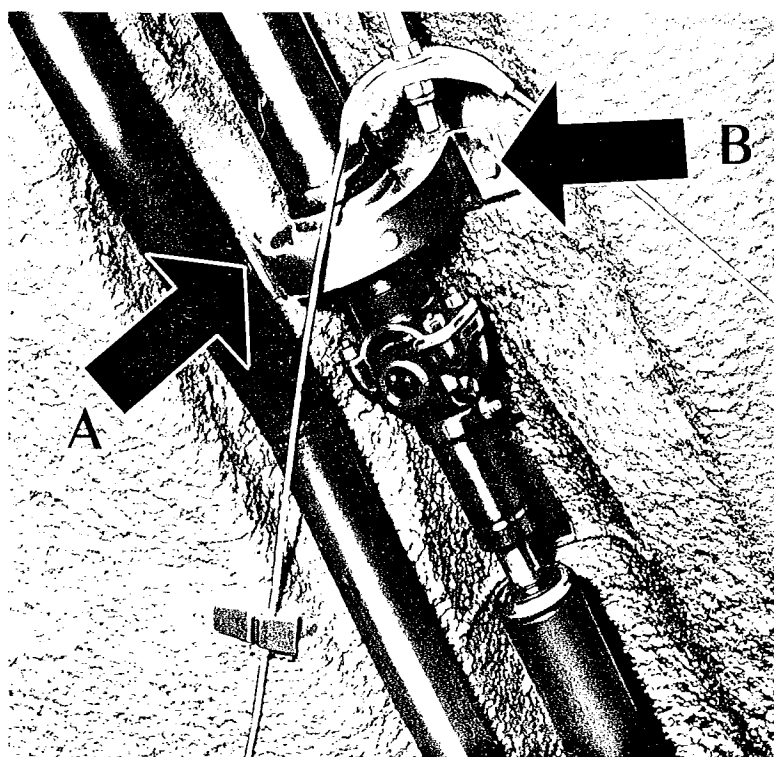
Being towed

If the vehicle has to be towed away, first check the fluid level in the gearbox and the gearbox itself are in order. Tow the vehicle away with the selector lever in position N. If the gearbox is not in order, the vehicle must be towed with the propeller shaft removed or with the rear axle lifted.



Exploded view of the propeller shaft assembly.

- A. Gearbox
- B. Propeller shaft coupling
- C. Front propeller shaft
- D. Centre bearing
- E. Sliding joint
- F. Rear propeller shaft
- G. Rear axle



The securing points for the centre propeller shaft bearing on the body.

Rear Axle

(INCL. PROPELLER SHAFT)

PROPELLER SHAFT 1301/1501 — Removal, Inspection and Installation

Lift the rear of the vehicle and support it. Unscrew the front brake cable on the brake equalizer bracket. Unscrew the central flexible bearing on the floor pan. Mark the installed position at front and rear. Engage gear and remove the three mounting bolts of the doughnut coupling on the three-arm flange of the front propeller shaft. The doughnut coupling can remain on the gearbox output shaft. Remove the final drive pinion from the flange on the rear half of the propeller shaft. Remove the two-part propeller shaft downwards. The propeller shaft should be dismantled if necessary after marking the positions of the individual parts in relation to one another.

Check the balance of the propeller shaft. If values in excess of 0.008" are measured, the half shaft must be replaced or straightened under a hydraulic press. Check the play of the spline shafts in the splines of the universal joint. The worn parts must be replaced in the case of excessive play. Check the grease nipples for blockages. Check the ball nut on the gearbox drive shaft and the freeness of the ball end in the front propeller shaft. Check the flexible centre bearing. Remove the circlip and check the ball bearings for signs of wear; renew if necessary. If the universal joints have to be removed, the individual components should be marked in relation to one another. If it is necessary to replace needle bearings, all the bearings should be replaced if possible — together with the bearing support if necessary. Assembly of the propeller shaft is a reversal of the dismantling procedure. Note the paint marks made during dismantling: the nuts of the intermediate universal joint must be tightened to a torque reading of 87 ft.lb. Note the reference marks and lines when fitting the shaft: the self-locking nuts and nut retainers must be renewed. Tighten the front doughnut coupling bolts to a torque of 40.5 ft.lb, the retaining bolts of the rear propeller shaft flange on the rear axle drive pinion flange to 17 ft.lb, then tighten the nuts of the support bracket of the flexible centre bearing to a torque reading of 9 ft.lb. Screw in and secure the handbrake cable in the brake equalizer bracket.

REAR AXLE

Repairs to the differential and the rear axle shafts can be carried out with the components in the installed condition. An examination should, therefore, be carried out with the components installed before considering complete removal of the rear axle shaft. Remove the rear wheels. Drain oil from the differential and remove the cover. Unscrew the brake drum retaining screws and the guide bolt for wheel fitting. Mark the position of the brake drums in relation to the axle shafts with a punch to aid reassembly: remove the brake drums. Seal the opening of the brake master cylinder with a pointed wooden peg. Unscrew the wheel brake cylinder. Seal the opening in the brake line with a pointed wooden peg. Take the end of the handbrake cable out of the brake anchor plate after overcoming the spring pressure.

The retaining nuts of the brake anchor plate are removed via the cut outs in the wheel shaft flange using an adjustable spanner. The wheel shafts are withdrawn from the splines of the differential bevel pinions with a support plate and extractor.

Remove the shafts, bearings and brake anchor plates. Mark the position of the rear propeller shaft, in relation to the flange of the drive bevel pinion, with a punch for reassembly and then separate. Attach the propeller shaft to the lower swinging arm.

The internal components in the axle housing should be cleaned by wiping off the residue oil with a rag. Turn the crown wheel and check any indication of a defective bearing or damaged teeth. The teeth should be checked for abnormal wear or damage. Tooth backlash should be measured with a dial gauge at four diametrically opposed points of the crown wheel, it should be between 0.10 and 0.15 mm (0.00394 - 0.00591"). The runout of the pressure side of the crown wheel should not exceed 0.04 mm (0.001575"). If no visual signs of damage are found, the pattern of wear of the teeth on the crown wheel and bevel pinion should be checked with some red lead oxide or Prussian blue. Conclusions can be drawn from the pattern of wear regarding necessary adjustments.

Wear Pattern

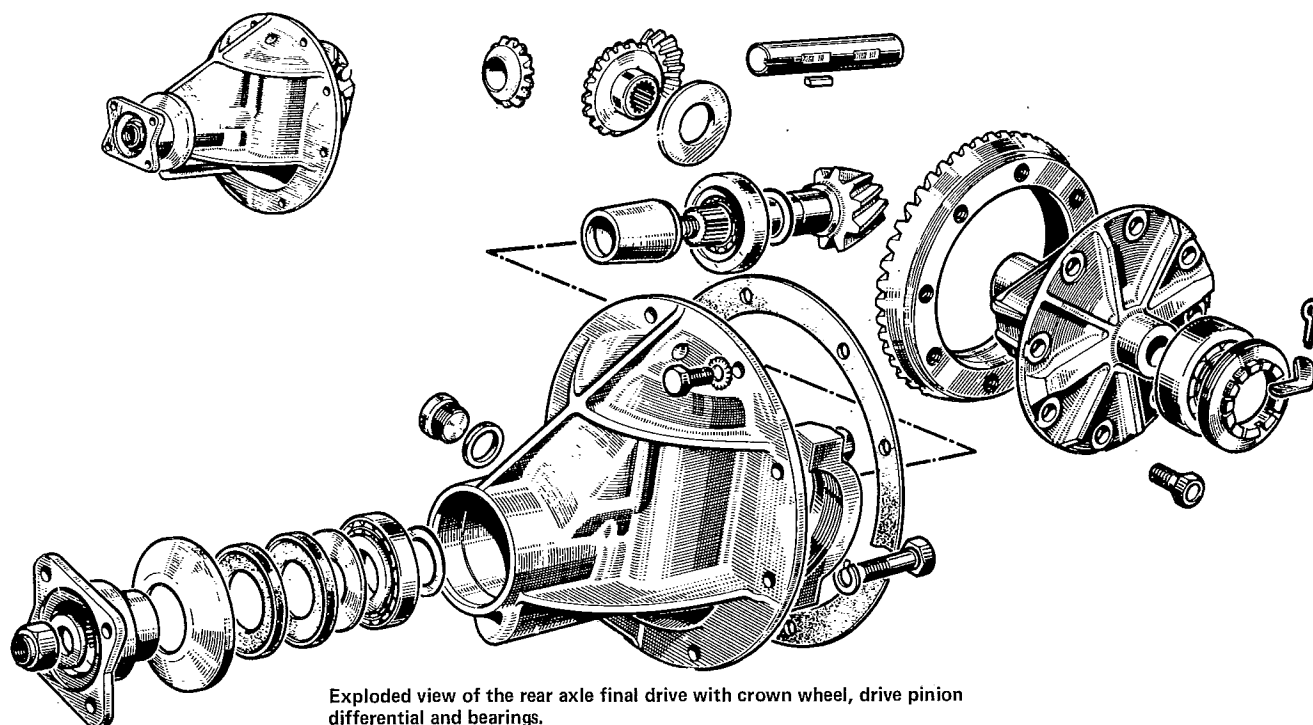
Coat 4 or 5 teeth on the periphery of the crown wheel with red lead oxide or Prussian blue. Move the differential approximately 5-6 times in each direction by turning the flange of the bevel drive pinion, the crown wheel should be slightly braked in the process by means of a rag. This braking action represents the loading of the differential. The pattern of wear is in order if the pattern is uniformly in the centre of the tooth flank length and the tooth height on the forward and reverse flanks of the teeth. If there are vague or only partial contacts, the bevel pinion must be removed from the crown wheel. This means the installation of a thinner compensating washer under the head of the bevel drive pinion, or the bevel pinion must be moved closer to the crown wheel by installing a thicker compensating washer. This requires the removal of the differential carrier and a precise calculation of the thickness of the compensating washer. (Bevel Drive Pinion — Installation and Adjustment). Remove colouring from teeth.

DIFFERENTIAL CARRIER — Removal and Installation

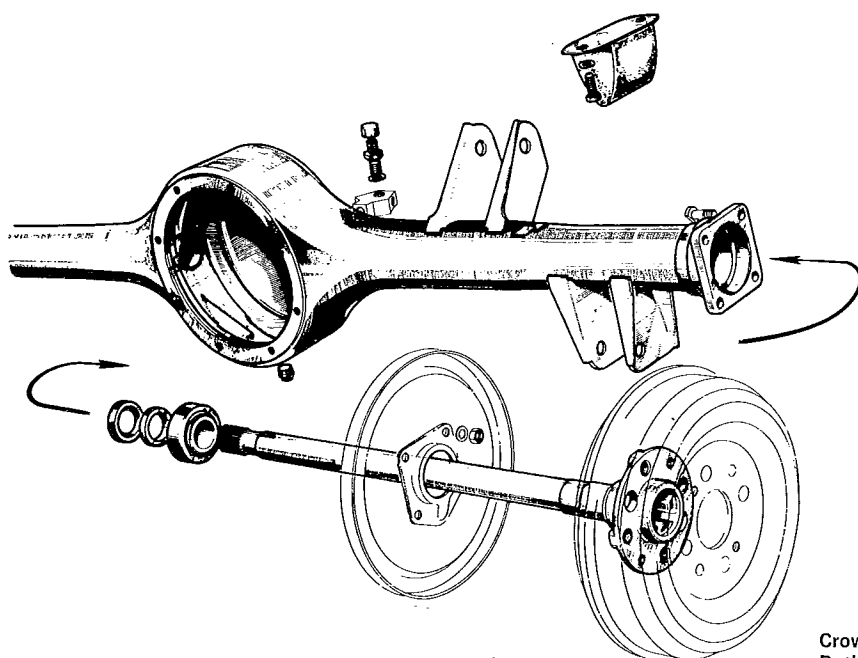
After withdrawing the wheel shafts and detaching the propeller shaft from the drive flange of the bevel drive pinion as described above, remove the mounting bolts and locking washers of the differential carrier on the axle housing and take the complete differential out of the rear axle housing.

DIFFERENTIAL CARRIER — Dismantling and Assembling

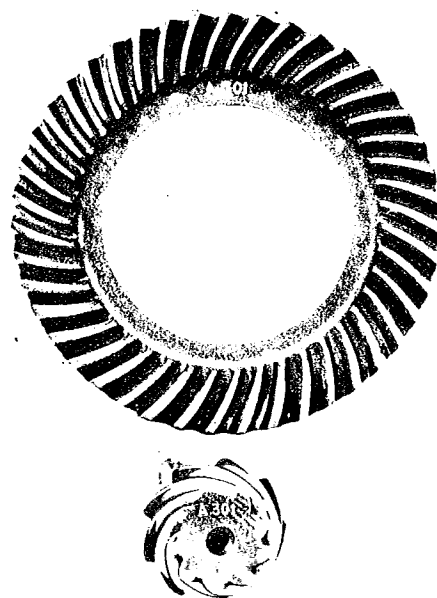
Mark the position of the bevel drive pinion in relation to the crown wheel and the crown wheel in relation to the differential housing with a paint line. Mark one bearing cap and a seat on the differential carrier with a punch if not already marked. Remove the locking plates of the screw adjustment sleeves, unscrew the bearing cap bolts, lift off the bearing caps and remove the screw adjustment sleeves. Lift out the differential. Pull off the bearings on the differential housing with extractor 15 526 G. Hold the propeller shaft flange and unscrew the self-locking nut from the bevel drive pinion. Pull off the propeller shaft flange. Knock the bevel drive pinion out of the differential carrier with a brass drift. Remove the spacer and adjusting washers from the shaft of the bevel drive pinion; note number and position. Pull off the rear bearing with extractor 15 525 F and remove the adjustment washers. Drive out the front bearing, the oil deflector plate and the two oil sealing rings with drift 7306 D. Remove the race of the rear bevel drive pinion



Exploded view of the rear axle final drive with crown wheel, drive pinion differential and bearings.



Exploded view of the rear axle drive shaft and the rear axle casing to show the various components.



Crown wheel and drive pinion must be replaced as matched set. Both parts must be marked with the same reference number.

bearing. Unscrew the crown wheel from the differential housing. Take the differential bevel pinions, bevel side gears and thrust washers out of the differential housing.

To assemble the differential carrier clean all parts thoroughly. Check bearings and races for wear, the condition of the bearing seats in the differential carrier should be checked at the same time. Check the differential housing, carefully remove any burrs on the bolt holes and the crown wheel contact face with a scraper. Check the screw adjustment sleeve thread. Check the bevel pinion and crown wheel for wear. If there is any damage the bevel pinion and crown wheel must be replaced in pairs as they are 'run-in' together in production.

Pre-assemble the differential carrier. Insert the race of the rear bearing of the bevel drive pinion in the differential carrier with drawing tool 15 524 E and the set ring 20 808 D. Press in the race of the front bearing; the races must locate tightly. Both oil sealing rings are pressed in, in the same position, after they have been greased. For this purpose the set ring 20 808 D must be fitted the opposite way round on the drawing tool 15 524 E.

Pre-assemble the differential housing. Fit the thrust washers on the respective bevel side gears, the oil grooves must locate on the gear wheel, and insert the gears in an oiled condition in the differential housing. Fit the differential bevel pinions, ensuring the holes in the housing are in alignment. The differential bevel pinion shaft should then be fitted with the keyway in alignment with the groove in the housing. Insert the key and fit the shaft. Fit the crown wheel on the housing in accordance with the marking made during dismantling. Tighten the mounting bolts stage by stage in a diagonal pattern. Prior to final tightening to a torque reading of 47 ft.lb. check that the crown wheel locates tightly all round.

BEVEL DRIVE PINION — Installation and Adjustment

Prior to adjusting the differential, the mating number of the crown wheel and bevel pinion should be checked as the crown wheel and pinion must only be used as a pair. First determine the thickness of the compensating washer, located between the bevel pinion and the lower roller bearing; the master pinion 31 622 Y, the test gauge 20 820 U and a dial gauge are used for this purpose. The set ring 20 819 X is pushed onto the master pinion on the bearing seating face for the rear bearing. Fit the pinion with the correct front bearing (not oiled), tighten the pinion so that it can only be turned with difficulty. Place the test gauge 20 820 U on the face of the master pinion by 3.925 mm (0.155"). Set the dial gauge with the measuring point on the test face of the master pinion to 0. Now the setting-up differential comprising plug gauge 31 625 B and the two removable discs 31 623 Z, which represent the bearings, is fitted. Move the setting-up differential with dial gauge from the front to the rear, and read off the minimum figure indicated. The following applies in respect of the thickness of the shims used:

Indicated value + constant value 0.45 mm (0.01772") + machining tolerance. The tolerance is electrically engraved on the face of the bevel drive pinion. Shims in thicknesses of 0.07; 0.10; 0.12; 0.15; 0.30 and 0.50 mm are available. The shims should be selected so that the minimum number of shims are used. If several shims are required, the thickest shim should be placed between two thinner ones. Remove the setting-up differential and master pinion. The calculated and selected shim set (recheck first with micrometer) are then placed on the original bevel drive pinion; the smallest set of shims is 0.45 mm (0.01772"). Fit the taper roller bearing with tool 15 525 F and

corresponding set ring and spacer. Adjust the pre-load of the taper roller bearing of the bevel drive pinion by determining the thickness of the necessary shims between the spacer and the front bevel drive pinion bearing. Insert a 2 mm dia (0.079") tin wire in place of the shims and fit the pre-assembled bevel drive pinion with non-lubricated front bearing in the differential carrier and fit the drive flange. Tighten the self-locking nut stage by stage until a torque of 1.1 - 2.2 ft.lb is obtained; use torque bar 15 504 K; it should remain steady in the horizontal position. When the weight is attached the torque bar should turn a further 30 to 75°. Remove the bevel drive pinion and measure the compressed tin wire at three points with a micrometer. The necessary shims should be selected in accordance with this dimension. Shims are available in thicknesses of 0.7; 0.10; 0.12; 0.15; 0.30 and 0.50 mm; check the pre-load without sealing rings. Tighten the self-locking nut to a torque of 94 ft.lb. and check it with torque bar and weight. If the torque is too low, shims must be removed, if the torque is too high, shims must be added. Remove the drive flange, fit the two oil sealing rings and tighten the self-locking nut to a torque of 87 ft.lb.

DIFFERENTIAL CARRIER — Installation of Differential

The preassembled differential is fitted with the outer races of the roller bearings and inserted in the differential carrier, noting the paint marking — position of bevel pinion in relation to crown wheel. Fit the bearing caps in accordance with the previous fitted position (marking) and screw in the cap bolts hand-tight. Screw in the adjustment sleeves and tighten by hand until there is very little tooth backlash between crown wheel and bevel pinion. Then tighten the bearing cap bolts to a torque of 22 ft.lb. Back off the adjustment sleeve slightly on the crown wheel tooth side, tighten the adjustment sleeve on the other side until the tooth backlash is zero, i.e. the adjustment sleeves just locate against the bearings — the bearings have not yet been pre-loaded.

The dial gauge holder with dial gauge is then fitted and the measuring point positioned vertically on the bearing cap at the crown wheel side. Set the dial gauge to zero; tighten the adjustment sleeve on the crown wheel side until the bearing cap is spread out by 0.07 to 0.10 mm (0.00236 - 0.00394"), read off on the dial gauge. The play between the bevel pinion and crown wheel should then be checked on four diametrically opposed teeth by means of a dial gauge: it should be 0.10 to 0.15 mm (0.00394 - 0.00591"). If the tooth backlash is above or below this value, the position of the adjustment sleeves in relation to the respective bearing cap should be marked so that the amount by which the crown wheel must be moved from or towards the bevel pinion can be seen exactly.

Slacken one adjustment sleeve, tighten the other adjustment sleeve by the same amount until the tooth backlash is between 0.10 and 0.15 mm (0.00394 - 0.00591"). The previously measured deformation of the bearing cap on the crown wheel side should not be altered by this lateral displacement. If the spread of the bearing cap and the backlash between bevel pinion and crown wheel is now correct, the dial gauge should be removed and the bearing caps tightened to a torque of 40 lb.ft. and the adjustment sleeve locked. Check the pattern of wear with red lead oxide or Prussian blue as described previously.

DIFFERENTIAL CARRIER — Installation

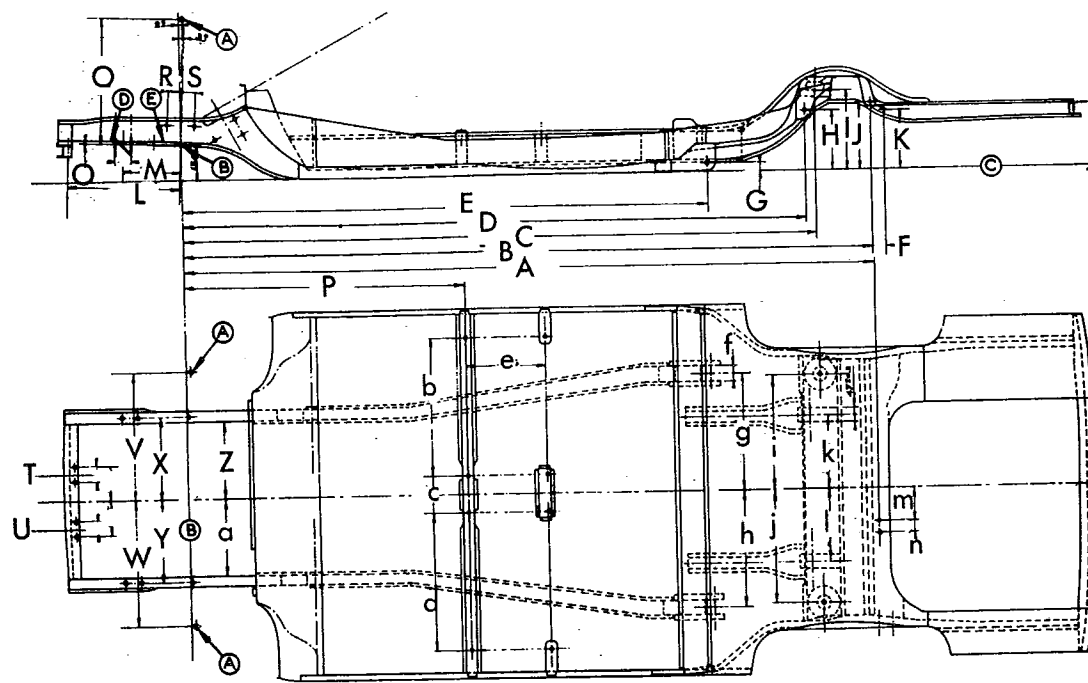
Installation is a reversal of the removal procedure, noting the following points: Use a new gasket between the carrier and the rear axle housing. All the mounting bolts of the carrier on the axle housing must be inserted with sealing compound. All locking plates and self-locking "Nylstop" nuts must be replaced. Damage to the rear axle shafts can — because of the assembly of the ball bearing with the pressed on ring — only be repaired by workshops which have the necessary equipment and testing

instruments. Defective shafts are best replaced as complete units: renew the oil sealing ring if necessary. Carefully insert the splined shaft end so that the oil sealing rings are not damaged. When fitting the brake drum note the marking made during removal. Fit the propeller shaft to the drive flange of the bevel drive pinion. Tighten the connecting bolts to a torque of 17 ft.lb. Fit the wheels. Use a new gasket under the cover of the axle housing and fill up with approximately 1.1 litre (1.9 Imp. pints/ 2.3 U.S. pints) Shell Spirax 90 EP oil up to filler neck. Remove the vehicle from the stands.

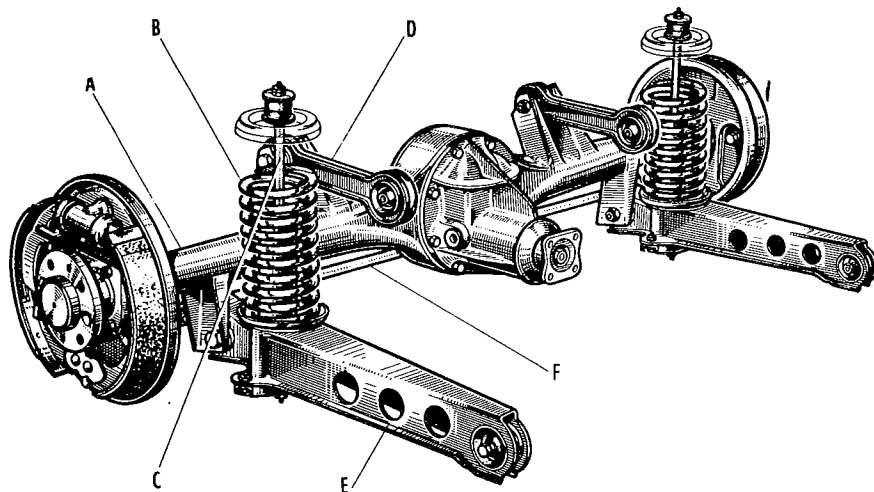
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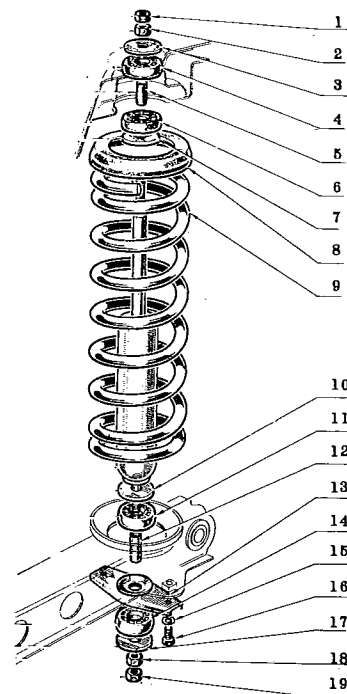


mm/inch	mm/inch	mm/inch	mm/inch
A = 2632,5 (103,62)	K = 221 (8,70)	U = 58 (2,28)	e = 304 (11,96)
B = 2626,2 (104,80)	L = 427 (16,81)	V = 132,2 (5,19)	f = 47 (1,85)
C = 2415,5 (95,07)	M = 217,2 (8,54)	W = 132,2 (5,19)	g = 440 ± 1 (17,32 ± 0,039)
D = 2376 ± 2 (93,24 ± 0,7)	N = 58 (2,28)	X = 479 ± 1 (18,85 ± 0,039)	h = 440 ± 1 (17,32 ± 0,039)
E = 2000,5 ± 1 (78,74 ± 0,039)	O = 12,2 (0,47)	Y = 479 ± 1 (18,85 ± 0,039)	i = 430 ± 1 (16,92 ± 0,039)
F = 52 (2,04)	P = 1071 (42,16)	Z = 293 (11,53)	j = 430 ± 1 (16,92 ± 0,039)
G = 34 ± 1 (1,33 ± 0,039)	Q = 476 (18,74)	a = 293 (11,53)	k = 275 (10,82)
H = 225 (8,85)	R = 52 (2,04)	b = 520 (20,47)	l = 275 (10,82)
I = 297,8 (11,69)	S = 52 (2,04)	c = 140 (5,51)	m = 47 (1,85)
J = 252 (9,92)	T = 58 (2,28)	d = 520 (20,47)	n = 125 (4,92)
			o = 45 (1,77)



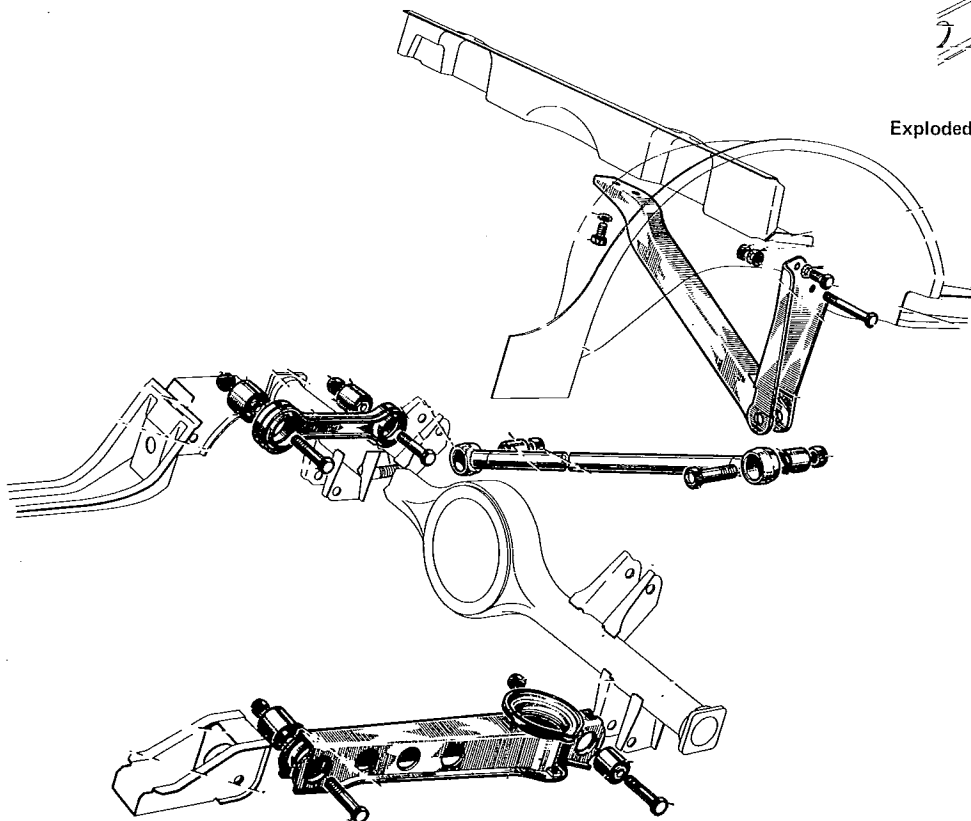
View of the rear suspension together with the rear axle.

- A. Rear axle
- B. Rear coil spring
- C. Shock absorber
- D. Upper swing arm
- E. Lower swing arm
- F. Torsion bar stabiliser



Exploded view of rear spring and shock absorber.

- 1. Nut
- 2. Nut
- 3. Washer
- 4. Rubber bush
- 5. Sleeve
- 6. Rubber bush
- 7. Washer
- 8. Spring seat
- 9. Coil spring
- 10. Washer
- 11. Rubber bush
- 12. Bush (sleeve)
- 13. Retaining plate
- 14. Rubber bush
- 15. Securing bolt spring washer
- 16. Securing bolt
- 17. Washer
- 18. Securing nut
- 19. Locknut



Exploded view of suspension arms and torsion bar to show the arrangement of the individual components.

Rear Suspension

SPRINGS AND SHOCK ABSORBERS

— Removal and Installation —

Jack up the rear of the vehicle and support it under the longitudinal members. Take off the wheel and remove the shock absorber. Unscrew the nut and lock nut of the upper shock absorber mounting in the luggage compartment. Remove the retaining plate of the lower shock absorber mounting from below (2 bolts) and withdraw the shock absorber downwards through the swinging arm. Unscrew the front bolt of the lower swinging arm: support the lower swinging arm at the rear with the jack and remove the rear pivot bolt on the rear axle housing. Lower the jack and remove the released spring.

Clean the parts and check them for re-use. Check the coil spring for spring action (Technical Data), distortion and cracks, and renew if necessary.

Check the shock absorber on a test bench or compare it with a new part and renew it if necessary as it cannot be repaired. Check if the rubber bushes are deformed or hardened and replace them if necessary; self-locking nuts must be renewed. Tighten nuts to the specified torque (Technical Data). Installation is otherwise a reversal of the removal procedure. Ensure that the plate washers are positioned correctly for the rubber bushes.

UPPER AND LOWER SWING ARM

— Removal and Installation —

Jack up the rear of the vehicle and support it under the longitudinal members. Support the rear axle with the vehicle jack. Unscrew the retaining nuts of the pivot bearings (silent blocks), remove the bolts from the pivot bearings and withdraw the swinging arm. Check the swinging arm for distortion in the test gauge, straighten slight distortions under the press,

otherwise renew the swinging arm. Check if the silent blocks are in perfect condition; if the rubber is distorted or hardened, the blocks should be pressed out, using a hydraulic press. The pressing-in operation on the front bearing is effected with tool 20 810 S with the sleeve in a steel tube 62 x 70 x 100, and on the rear bearing with tool 20 812 Q with the sleeve in a steel tube 54 x 60 x 100.

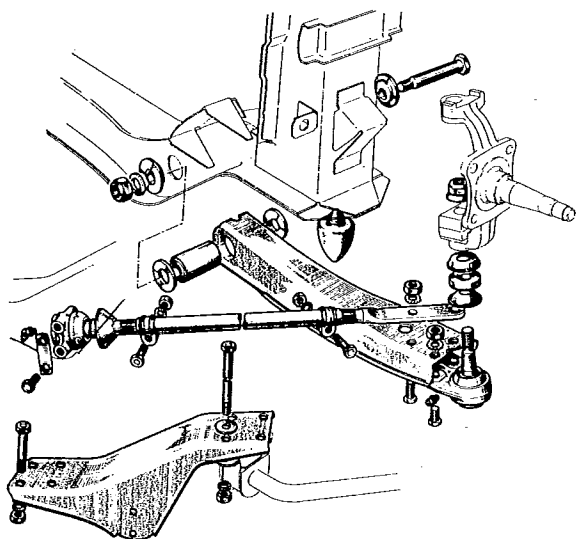
When the lower swinging arm is removed, the shock absorber and the coil spring should be removed as described above. Unscrew the retaining nuts of the pivot bearings (silent blocks). Remove the bolts from the pivot bearings and take out the swinging arm. Check the swinging arm in the test gauge for distortion; straighten slight distortions under the press, otherwise renew the swinging arm. If the rubber is distorted or hardened, the block concerned should be pressed out with a hydraulic press. The pressing-in operation on the front bearing is effected with tool 20 810 S, on the rear bearing with tool 20 812 Q.

The installation is the reverse of the removal procedure.

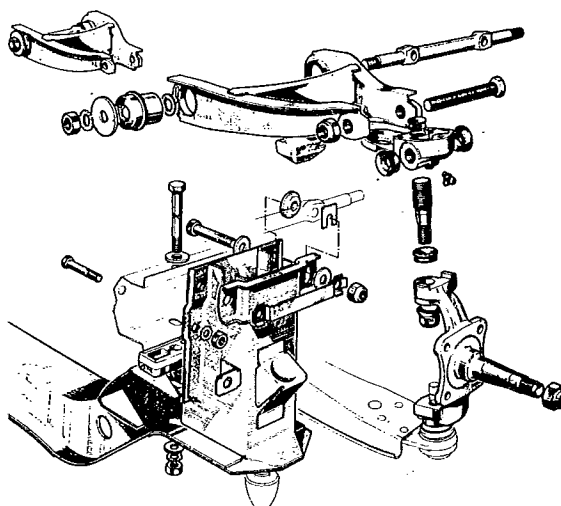
TRANSVERSE STABILISER — Removal and Installation

Mark the installed position of the tubular torsion bar, then unscrew the retaining nuts on the axle housing and on the body mounting. Pull off the torsion bar. Check the stabiliser torsion bar, slight distortion can be straightened under the press; otherwise the torsion bar should be replaced. If the rubbers in the silent blocks are distorted or hardened, they should be changed with the help of tool 20 809 F.

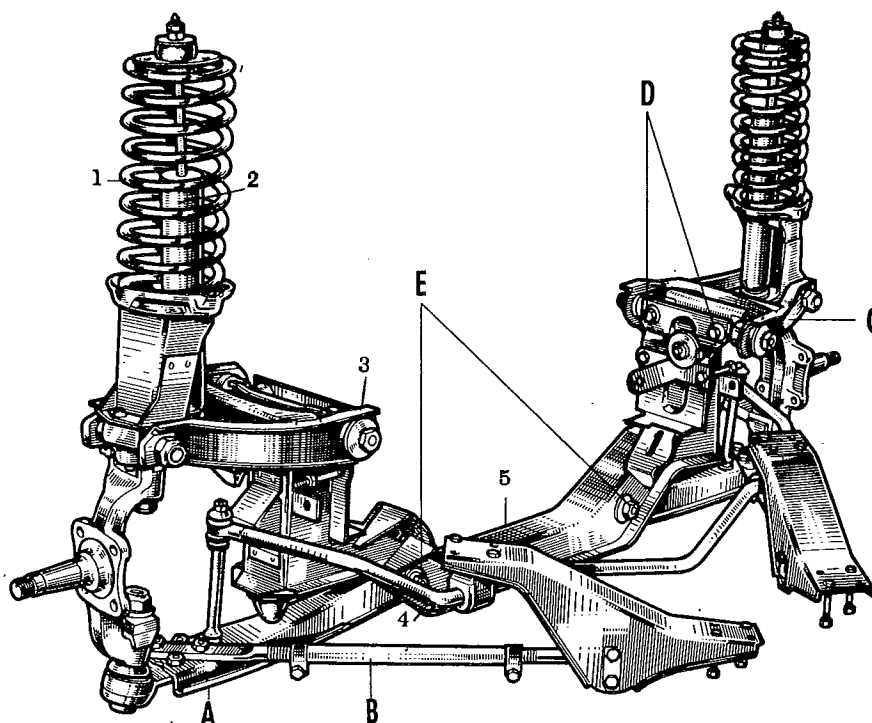
The installation is the reverse of the removal procedure.



Exploded view of the lower suspension (swing arm) and the reaction strut.



Exploded view of the upper suspension arm (wishbone), stub axle and mounting details.



View of the assembled front axle.

- | | |
|--|---------------------------|
| A. Lower suspension arm | 1. Spring |
| B. Reaction strut (track control arm) | 2. Shock absorber |
| C. Upper wishbone | 3. Upper wishbone |
| D. Securing nuts for fulcrum shaft of upper wishbone | 4. Torsion bar stabiliser |
| E. Adjusting eccentric on lower suspension arm | 5. Axle beam |

Front Axle and Front Suspension

FRONT AXLE BEAM — Removal and Installation

Apply the handbrake. Jack up the vehicle and support it under the longitudinal members. Remove the front wheels. To remove the shock absorbers the three nuts of the shell on the wing casing must be unscrewed using a socket wrench. Unscrew the shock absorbers at the bottom on the cam of the upper swinging arm. Fit the spring tensioner No. 4035 M, push the threaded rod No. 20 821 R through the lower shock absorber mounting eye and screw in the tensioner, the thrust piece being located on the shock absorber mounting eye.

The three claws should be inserted using a heavy screwdriver in such a way that as many coils as possible are gripped. Then compress the springs until the stop buffers touch the lower swinging arm. The three flat bars which hold the claws together should then be inserted in the centre of the spring coils and screwed to the feet of the claws by three screws. The spring thus compressed and braced should be relieved of load.

Detach the tensioner from the threaded rod. Swivel the spring and thus lift it out of the spring pad at the bottom. The same process should be carried out on the other side.

To remove the torsion bar of the stabilizer, the retaining nuts of the clamp bolts on the traction strut bracket must be unscrewed and the bearing bracket pulled off from below. The torsion bar should then be dismantled from the vertical support axles on the right and left-hand swinging arms. Fit thrust washers and rubber bushes on the clamp bolts in their original positions for re-assembly. Unscrew the traction strut from the brackets and the lower swinging arms. Detach the steering arm on the stub axle from the track rod, to do this pull off the ball joint with tool 4027 M.

Unscrew the rigid brake line between the brake master cylinder and the three-way distributor, the opening should be sealed with pointed hardwood pegs to prevent penetration of dirt and loss of brake fluid. If the front axle suspension is removed while the engine remains in situ, the engine must be supported. Remove the nuts and tooth lock washer from the bracket of the front engine mounting.

Raise the front axle beam, which is supported by a mobile jack, slightly and remove the six retaining bolts of the beam on the body, noting the handbrake cable pulley at the side. Then lower, if necessary, slightly compress the rubber bushes with the inset coil springs, so that the engine mountings are freed from the yoke of the front axle. Lower the jack further and remove the axle by pulling forward.

Installation is a reversal of the removal procedure. Self-locking "Nylstop" nuts and damaged rubber rings and rubber bushes must always be replaced, also note bushes of rotary discs. When fitting the front axle beam, centre it with vertical pilot bars. If the engine was also removed, the torsion bar of the stabilizer should only be fitted after the engine has been installed.

Lubricate the ball joints on the lower swinging arms, if provided with grease nipples, and the king pins, the horizontal threaded shaft on the upper swinging arm and the ball joints of the traction struts. Bleed the brakes (see Section BRAKES).

Check the alignment of the front wheels and correct if necessary (see Caster, Camber and Toe-in). It is not necessary to remove the front axle to do the following work. If this work is done with the front axle removed, the same procedure should be used.

TRACTION STRUT WITH BALL JOINT

— Removal and Installation —

Remove the four securing screws of the ball socket on the traction strut bracket using a socket wrench. Unscrew the traction strut from the lower swinging arm (two bolts with nuts and tooth lock washers). There is a threaded adjustment tube, which is slotted at both ends, between the ball joint end and the mounting flange on the lower swinging arm. Two pipe clamps secure the tube in the set position.

By reducing the length of the traction strut the caster angle is increased (see Adjustment of Caster, Camber and Toe-in). Installation is a reversal of the removal procedure. Renew the locking plates on the ball joint. Recheck the tightness of nuts on the pipe clamps after installation. It is essential that the bolts and nuts are tightened to the specified torque values (Technical Data). Check the front axle alignment and correct as necessary.

COIL SPRING — Removal and Installation

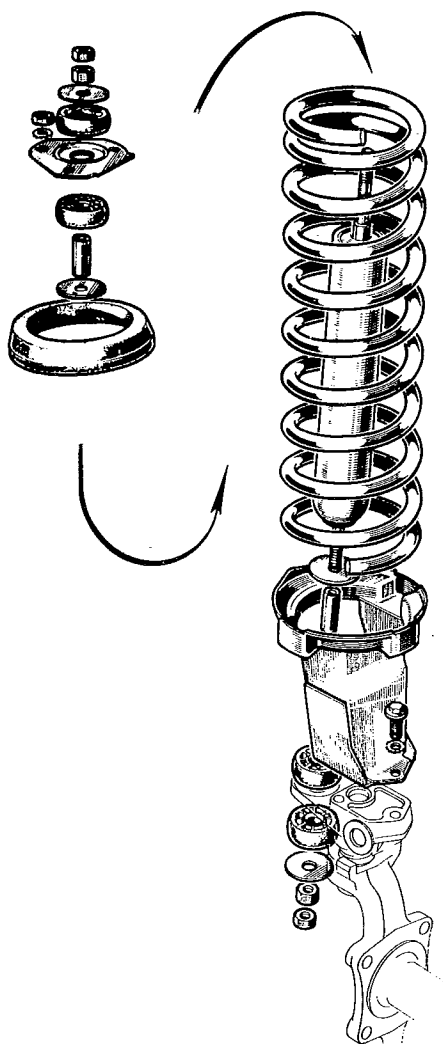
Proceed as described under 'Front Axle Beam Removal'. Compress the spring to the length measured during removal using spring tensioner 15 528 J and brace with claws and the three flat bars. Take the spring out of the tensioner in this condition and install it as described above. Check that the spring is correctly located. Fit the shock absorber, fit the wheels and lower the vehicle.

As the suspension elements have been altered on the 1300 model as from body L 080574 and on the 1500 model as from body L 080589 attention should be paid to the correct spring length when a replacement is carried out.

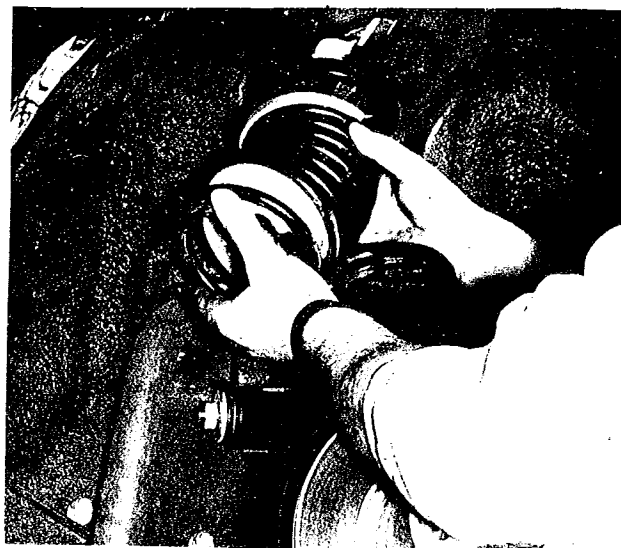
UPPER SWING ARM — Removal and Installation

Remove the shock absorber and coil spring as previously described. Remove the retaining nut of the upper king pin at the cam of the swinging arm. Press the king pin out of the tapered seat of the stub axle with tool 20 806 T. Unlock and unscrew the retaining bolts of the swinging armshaft on the yoke of the front axle beam. Pull out the two bolts and remove the swinging arm, noting the position and number of the fork-shaped shims for reassembly; the shims also serve to adjust the caster angle. Check the swinging arm on the test gauge (stop limit pins). Straightening under the bench press is possible in the case of slight distortion, but it is always preferable to install a new swinging arm. If the silent blocks have to be replaced as a result of wear or hardening, the spacer sleeve 2080 Z should be used when they are pressed in to avoid distortion of the swinging arm.

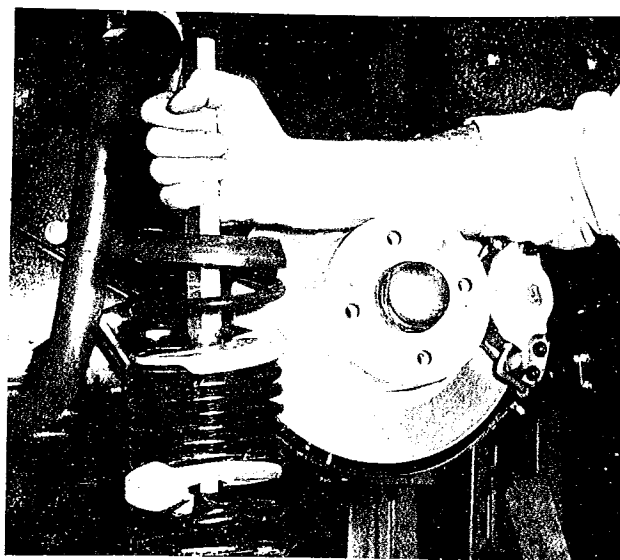
Installation of the upper swinging arm is a reversal of the removal procedure, note the number of shims on the inside of the yoke of the front axle beam. It is essential that the bolts and nuts are tightened to the specified torque values (Technical Data). Check the front axle alignment and correct if necessary (see Caster, Camber and Toe-in).



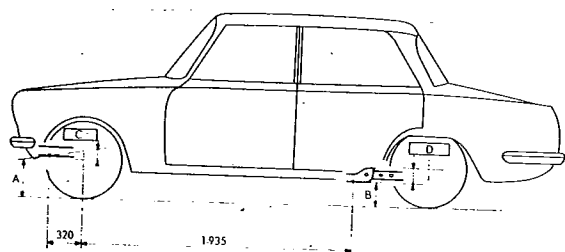
Components of the front coil spring assembly.



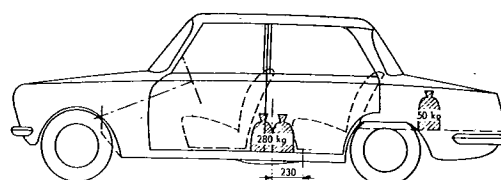
Removal of the compressed front spring.



Installation of the front spring.



Details for the trim adjustment of front and rear suspension.



Correct distribution of weight for the adjustment of the front suspension.

LOWER SWING ARM — Removal and Installation

Remove the shock absorber and coil spring. If the coil spring is not to be removed, it should be compressed with tool 4035 M, 20 821 R and 20 822 J (see Removal of Front Axle Beam). Remove the vertical support axle from the lower swinging arm as well as the traction strut. Pull off the ball joint of the steering arm with extractor tool 4027 M. Press the stub axle out of the tapered seat to the bottom using tool 26 866 T. Remove the retaining bolts of the swinging arm on the front axle beam, take the eccentric bushes for adjusting the camber angle out of the beam. Check the swinging arm with test gauge 20 801 W. Distorted swinging arms are best renewed. If the silent block of the swinging arm has to be replaced as a result of damage or hardening, the spacer sleeve 20 805 S and the drift 20 802 X must be used. Installation is a reversal of the removal procedure. The bolts and nuts must be tightened to the torque values specified (see Technical Data). Check the front axle alignment.

New ball joints are used for the swinging arms of the front axle suspension as from body No. F241 121 on the 1300/1301 model and body No. D061 222 on the 1500/1501 model. They are "packed for life" and their installation and mounting has not been changed.

DRUM BRAKE WITH BRAKE BACK PLATE AND STUB AXLE — Removal

The ball joint of the steering arm is pulled off with tool 4027 M when the vehicle has been jacked up and the wheel removed. Unscrew the brake pressure hose at the front wheel brake cylinder. Seal the hose with a pointed hardwood peg and unscrew the nut of the upper king pin; fit the tool 20 806 T and press the king pin upwards out of the tapered seat. Remove the

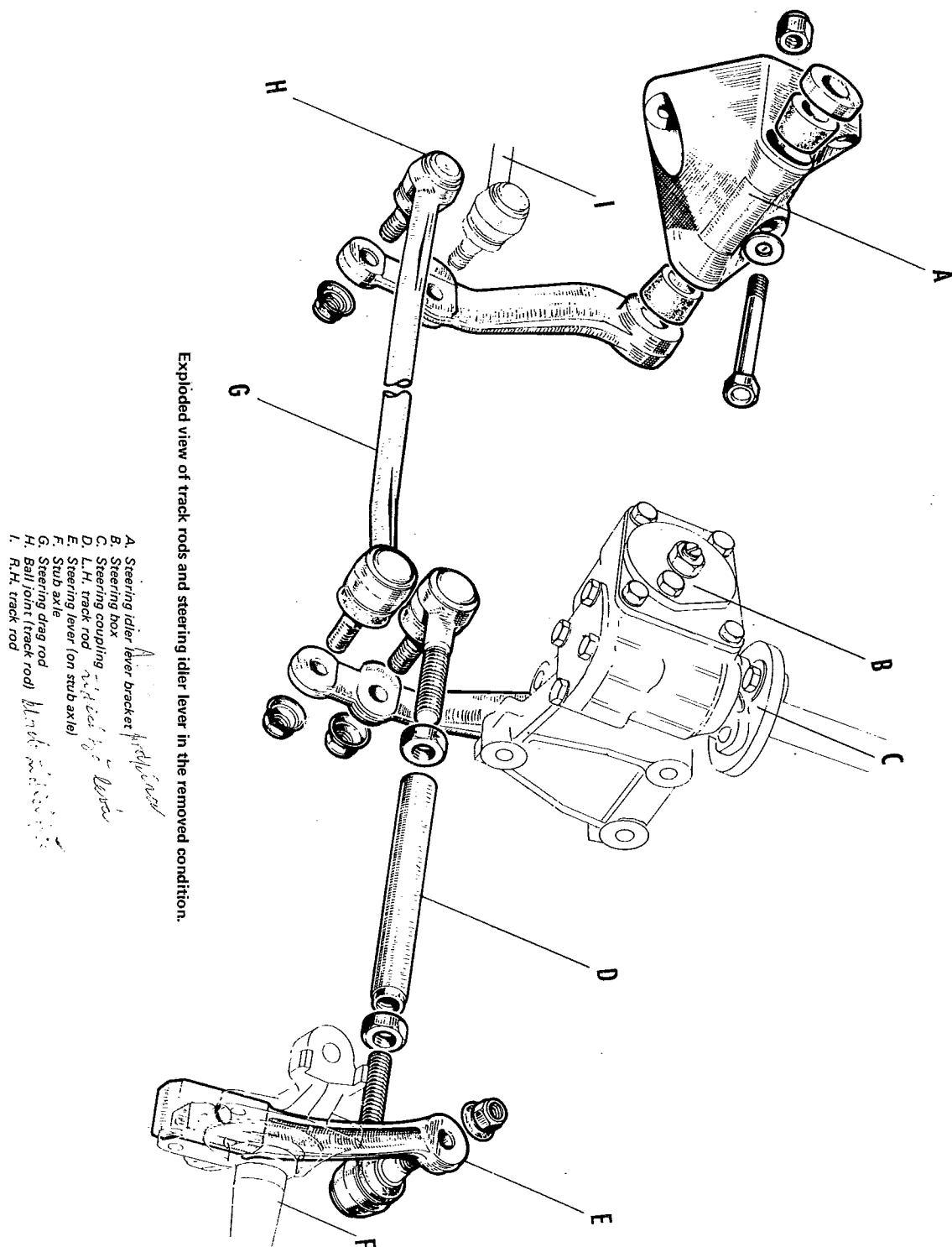
nut of the lower king pin and remove the pin (ball joint) with tool 20 806 T. Take off the stub axle with brake drum and brake anchor plate. If necessary continue the dismantling process as described below: Check the stub axle for wear and distortion. Assembly is a reversal of the dismantling procedure. Lubricate, bleed brakes, check the caster, camber and toe-in and correct as necessary.

WHEEL HUB WITH DRUM BRAKE — Removal and Installation

After removing the wheel concerned, press off the grease cap with fork 4025 K. Unlock and unscrew the stub axle nut at the end of the stub axle shaft. Remove the tab washer and pull off the hub with brake drum. Remove the sealing ring and remove the hub bearing races with extractor 39 970 X. Clean the parts and check for wear, renew if necessary. Assembly and installation is a reversal of the dismantling procedure. Pack the hub and grease cap with Shell ball bearing grease.

FRONT WHEEL BEARING — Adjustment

Adjustment of the front wheel bearing play is effected, with the vehicle jacked up, by tightening the stub axle nuts on the tab washer. To ensure that the bearings settle uniformly the wheel should be turned while the stub axle nut is being tightened. When the wheel begins to jam, the stub axle nut must be slackened by 1/6 of a turn as the bearings must not run when pre-loaded. The collar on the stub axle nut should then be slightly caulked in the groove of the threaded stub axle shaft using a chisel or punch. Recheck the bearing play by gripping the tyre of the fitted wheel and moving it from side to side. Carry out final caulking, pack the grease cap with grease, fit and then lower the vehicle.



Steering

STEERING — Inspection

Determine "free travel" on the stationary vehicle by turning the steering wheel backwards and forwards. If free travel is found on the steering wheel when in the straight ahead position the cause must be established. To do this lift the vehicle and rectify the play in the front wheels if necessary. It may be necessary to renew the ball joints of the linkage.

STEERING HOUSING — Inspection

Move the steering into the straight ahead position and remove the track rods from the steering drop arm: pull off the two ball joints with tool 15 532 E after unscrewing the self-locking nuts. Pull off the steering rod with tool No. 4027 A after unscrewing the self-locking nuts. Turn the steering wheel by one turn to the right and hold. A second person must try and move the steering drop arm laterally. If there is play in the bearings, it can be felt through axial movement of the steering wheel shaft in the housing. If a greater amount of play is found, it is necessary to remove and repair the steering housing.

WORM AND STEERING ROLLER — Adjustment

Checking the adjustment of worm and steering roller is effected with the track rods removed, by comparing the play in the steering housing at several points at regular intervals from the straight ahead position. Turn the steering wheel in the same direction by first a 1/4, 1/2 and then 3/4 of a turn and hold, the steering drop arm is moved backwards and forwards in each of the positions. The same procedure is then carried out in the other direction. Adjustment is necessary if there is play at the steering drop arm when the steering wheel is turned less than 90° from the centre position. This adjustment can be carried out with the steering housing in the installed condition. If the play cannot be rectified, the steering housing must be removed and overhauled.

STEERING ROLLER — Adjustment

For this purpose the lock nut of the adjustment screw on the housing cover is slackened and the adjustment screw turned in increments of 1/6 of a turn (check the play at the steering drop arm each time until no play is noticeable at a steering wheel deflection of 90° from the centre position, i.e. the play is practically zero). Hold and tighten the adjustment screw: secure the adjustment screw by tightening the lock nut.

STEERING ARM BLOCK — Inspection and Overhaul

Check the play with the right-hand track rod removed. If necessary the block should be unscrewed from the front longitudinal member. Dismantle the steering lever block: take the split pins out of the retaining nuts, unscrew the plate lock nut and nut, and remove the washer. Pull out the steering lever with the lower washer downwards and remove the rubber bush. Check parts for wear and renew as necessary. Assembly is a reversal of the dismantling procedure, noting the following points: pack the space between the rubber bushes with Shell Retinax C grease. Clamp the lever block in a vice so that the lever is horizontal, then tighten the retaining nut until a weight of 6 ounces fixed to the end of the lever pulls the lever down. Then screw on the plate lock nut and fit the split pin. Tighten the retaining bolts of the steering lever block to the vehicle body to a torque reading of 36 ft.lb.

STEERING HOUSING — Removal

It is not necessary to remove the outer steering tube, the steering shaft or the selector tube. Open the engine compartment lid. The position of the flange sleeve on the shaft disc should be marked in relation to the toothing of the steering worm with a paint line when the steering wheel is in the straight-ahead position. Remove the connecting bolts of the flexible shaft disc. Remove the grooved dowel pin from the lower flange of the flexible shaft disc. Unlock the axle of the steering drop arm and remove it from the support. Remove the two ball joints from the steering drop arm with tool 4028 W after having unscrewed the self-locking nuts. Unscrew the three self-locking nuts with washers at the wheel arch side. Remove the three mounting bolts of the steering housing from the other longitudinal member, then pull the steering housing off the shaft disc and remove it from the engine compartment. Unscrew the bracket of the gearchange lever shaft from the steering housing. Installation is practically a reversal of the removal procedure. When fitting the flange for the shaft disc on the serration of the steering shaft the steering wheel must be in the straight-ahead position and the paint line marking made during removal noted.

STEERING HOUSING — Overhaul

Unscrew the nut from the steering drop arm and pull the arm off the steering roller shaft. Ensure that the sealing ring is not damaged by the splines, otherwise it should be renewed. Unscrew the lock nut of the adjustment screw on the housing cover. Unscrew the housing cover and remove it with the gasket. To remove the steering worm unscrew the cover, take out the compensating washers. Press the steering roller downwards, the race with roller cage and the upper roller cage are thus released; remove the upper race. All parts must be thoroughly cleaned after dismantling, checked for wear and renewed as necessary. Assembly is a reversal of the dismantling procedure. Adjustment of bearing play is effected by means of compensating washers from kit 14 466 K which contains eight different thicknesses of paper washers, otherwise adjust the steering housing.

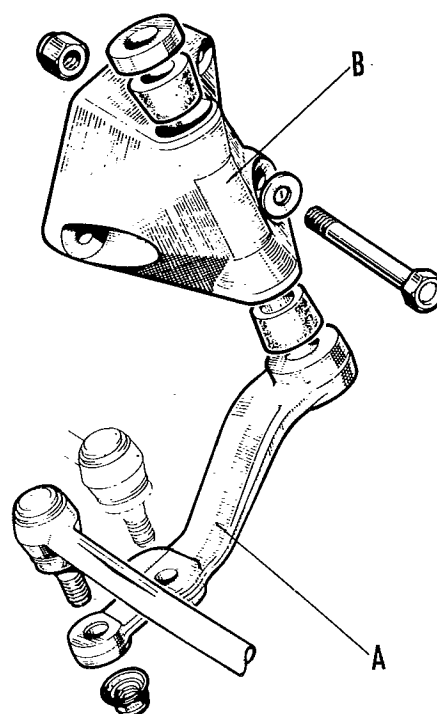
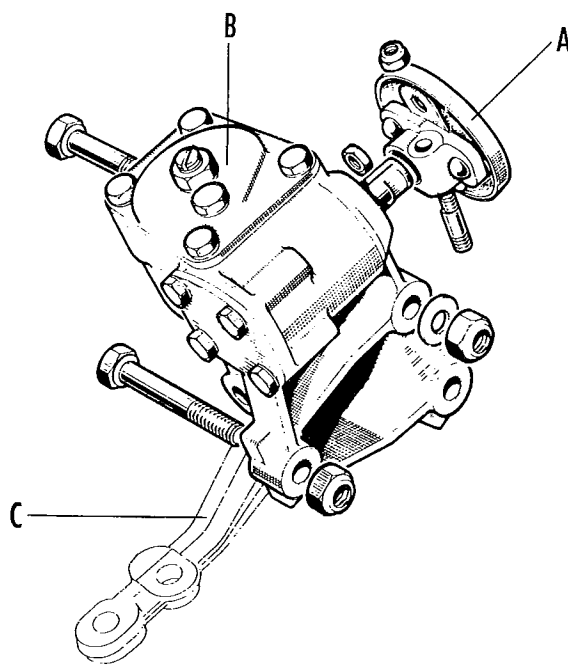
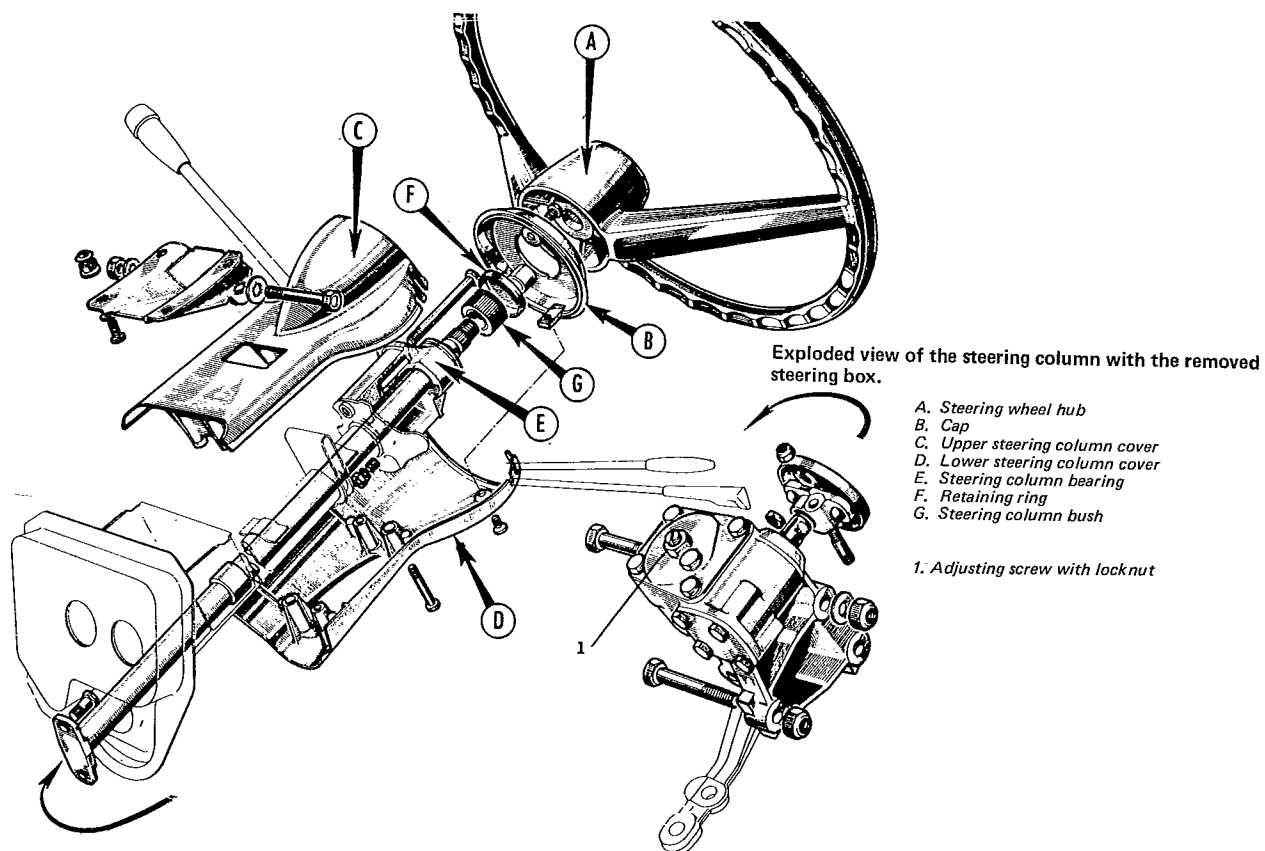
From body No. Q 130453 (1300) and Q 130404 (1500) a sound deadener sleeve is replaced by a bellow type sleeve. Additionally a centering ring is located above the anti-theft ring. The bellows sleeve can be adapted to earlier models.

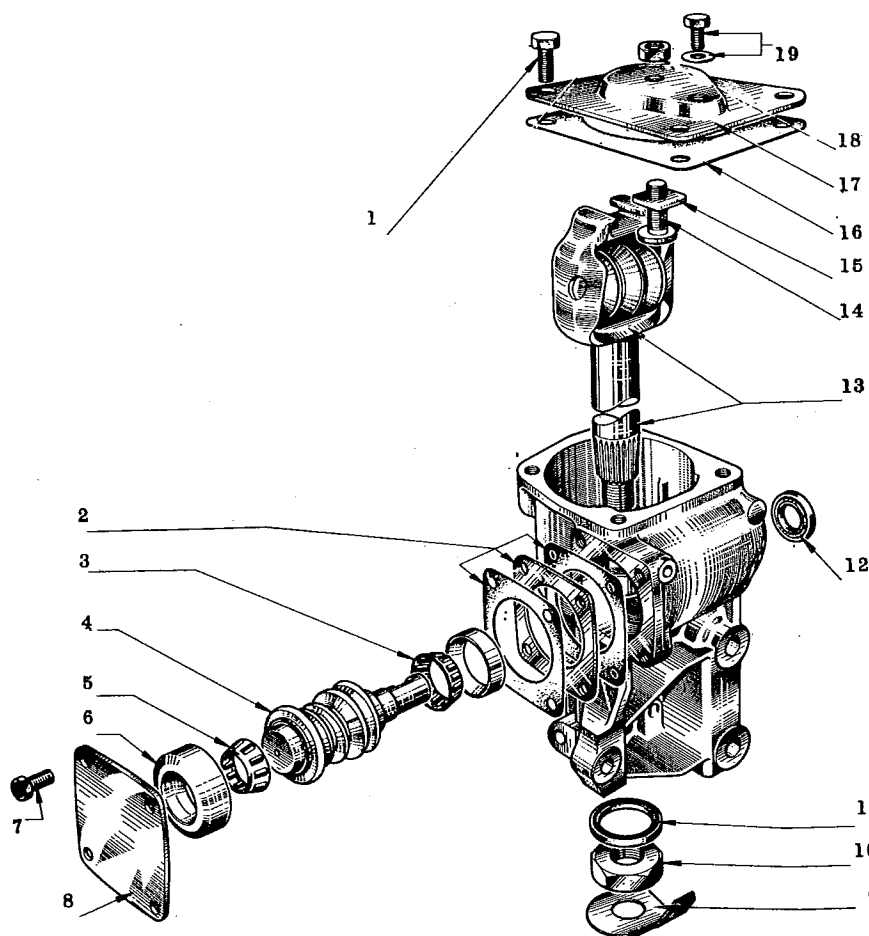
CASTER, CAMBER, TOE-IN and ALIGNMENT — Inspection

Check the vehicle in the laden condition (steering in straight-ahead position). The vehicle should be in a position which corresponds to a load distribution of 4 persons weighing 154 lb. each and 110 lb. in the rear luggage compartment, i.e. a total of 726 lb. The front axle suspension is correctly adjusted for this test when the centre point of the stub axle is 0.75 ± 0.197 " below the lower edge of the longitudinal member. The rear axle suspension is correctly adjusted when the lower edge of the longitudinal member is 5.3 ± 0.197 " below the centre point of the rear wheel.

Caster, camber and toe-in are then measured with conventional instruments in accordance with the maker's instructions. The settings of the front axle suspension, with the vehicle laden, are:

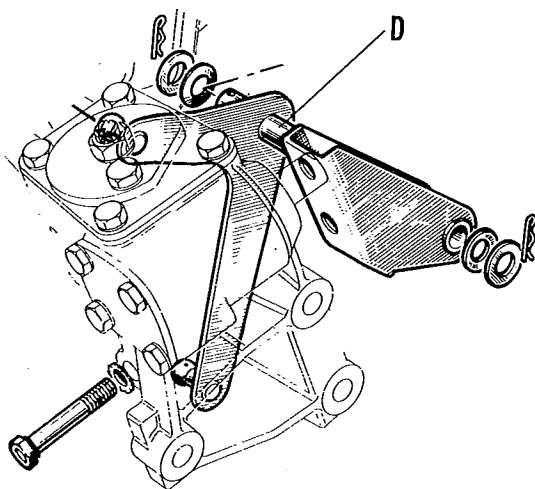
Caster	$30 \pm 30'$
Camber	$1030 \pm 30'$
King pin inclination	1 mm - 3 mm (0.0304 - 0.1181")
Toe-in	$70'$



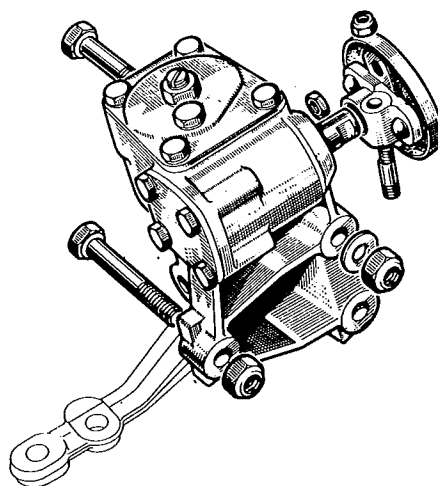


Exploded view of the steering box.

1. Cover screw
2. Shims
3. Taper roller bearing
4. Steering worm
5. Bearing race
6. Outer bearing race
7. Cover screw
8. Steering box cover
9. Lock plate
10. Rocker shaft nut
11. Sealing ring
12. Oil seal
13. Steering rocker shaft
14. Adjusting screw
15. Square washer
16. Gasket for cover
17. Cover
18. Locknut
19. Plug with sealing washer



The pivot shaft for the gear selector on the steering box.



View of the steering box to show the mounting details

If these values are not obtained during the test, the following adjustments should be carried out.

Caster

Adjust the caster angle by turning the fulcrum shaft of the upper swinging arm around one of the mounting bolts. To do this, first unscrew the nuts of the pipe clamp bolts on the traction strut and the two mounting bolts of the traction strut on the lower swinging arm. Unlock and unscrew the retaining nuts of the fulcrum shaft (note fork-shaped shims). Detach the nuts of the fulcrum shaft from the silent blocks. The fulcrum shaft of the swinging arm is pivoted around one mounting bolt by altering the length of the traction strut. The caster angle is increased by reducing the length of the traction strut or decreased by shortening the traction strut. Then set the caster angle to $3^{\circ} \pm 30'$. The shaft is locked in the set position by tightening the nuts. Tighten the bolts of the traction strut adjustment sleeve pipe clamps and the two mounting bolts of the traction strut on the lower swinging arm. Tighten the retaining nuts of the fulcrum shaft on the silent blocks. The bolt and nuts must be tightened in accordance with the specified torque values (Technical Data).

Camber

Adjust the camber by turning the silent block shaft after loosening the "Nylstop" locknut. There is an eccentric bush on the right and left of the flat along the silent block shaft, these bushes are adjusted uniformly by turning the shaft. Turn the shaft to the right or left until a camber angle of $1^{\circ} 30' \pm 30'$ is obtained. Tighten the "Nylstop" lock nut to the specified torque value (Technical Data).

Toe-in

Move wheels to straight-ahead position, steering in central position (markings on steering housing and steering shaft must be in alignment). Adjustment is effected by moving the right and left track rods after loosening the lock nuts. Set the toe-in to $0.1575 \pm 0.304''$. Tighten the lock nuts and repeat the check of toe-in with conventional track gauge.

VEHICLE TRIM ADJUSTMENT

— Front Suspension —

The trim position of the front axle is determined by measuring the height difference between the lower edge of the longitudinal member and the mechanical support centre in the stub axle.

Earlier suspension up to body No. L 080587:

Simca 1300/1600

C 19 mm \pm 5 (0.748" \pm 0.197")

New type suspension as from body No. L 080588

Simca 1300/1500	Simca 1300/1500	Simca 1500/1501
1301/1501	1301/1501	1301/1501

Tropics

Break

C 26 mm \pm 5

C 49 mm \pm 5

C 19 mm \pm 5

(1.024 \pm 0.197")

(1.93 \pm 0.197")

(0.748 \pm 0.197")

— Rear Suspension —

The trim position of the rear axle is determined by measuring the height difference between the lower edge of the longitudinal member, which supports the suspension beam, and the centre point of the rear wheel.

Simca 1300/1500

D 134 mm \pm 5 (5.276 \pm 0.197")

New type suspension as from body No. L 080588

Simca 1300/1500	Simca 1300/1500	Simca 1500/1501
1301/1501	1301/1501	

Tropics

Break

D 124 mm \pm 5

D 99 mm \pm 5

D 111 mm \pm 5

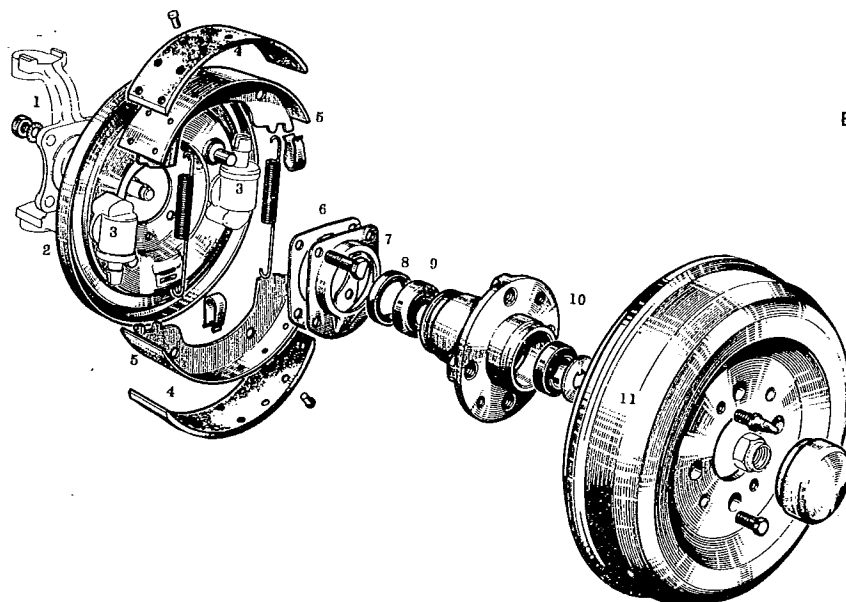
(4.882 \pm 0.197")

(3.898 \pm 0.1972")

(4.361 \pm 0.197")

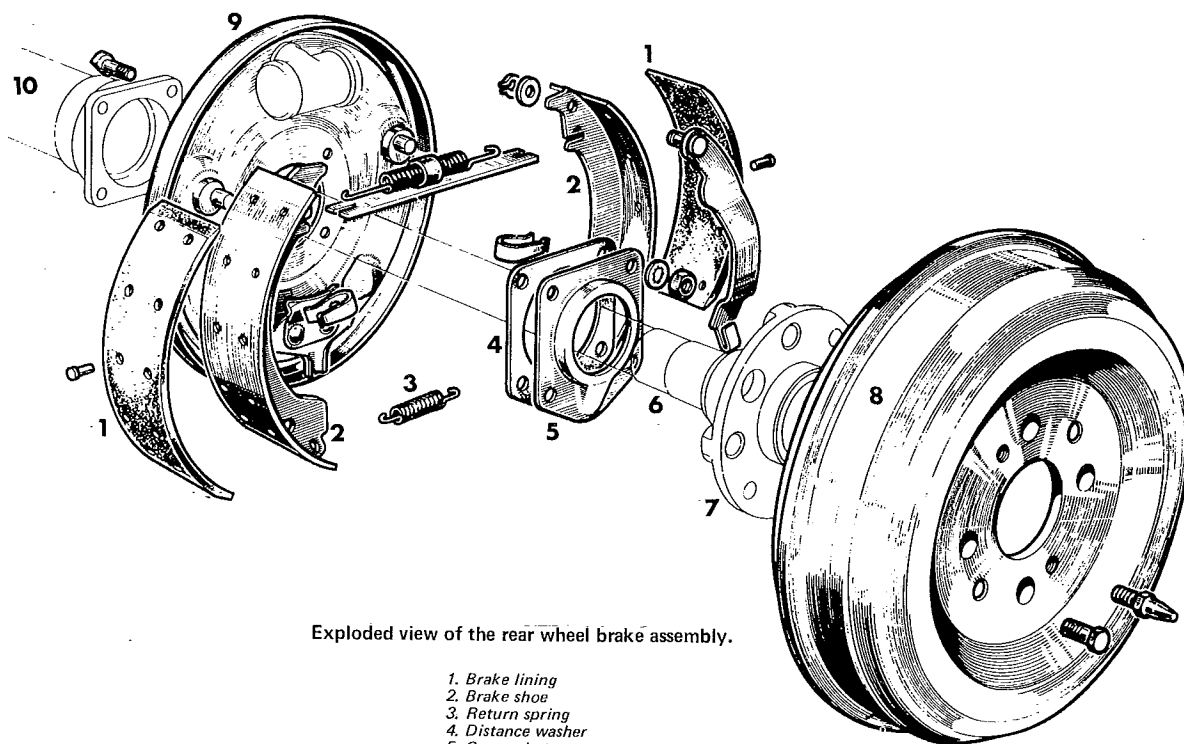
Trouble Shooting

SYMPTOMS	PROBABLE CAUSE	ACTION TO BE TAKEN
Hard steering	Low tyre pressure Incorrect wheel alignment Stiff track rod ends Steering box needs adjustment	Correct pressure Correct alignment Check and replace if necessary Adjust if necessary
Steering wheel shimmy	Tyre pressure incorrect Incorrect wheel alignment Wheels and tyres need balancing Wheel hub nut loose Wheel bearings damaged Front suspension distorted Steering box needs adjustment	Correct Correct alignment Balance as necessary Adjust wheel bearings Replace wheel bearings Check, repair or replace Adjust as necessary
Steering wheel pulls to one side	Uneven tyre pressure Improper wheel alignment Wheel bearings worn or damaged Brakes improperly adjusted Shock absorbers faulty Suspension distorted Steering box worn	Correct Correct Replace and adjust Adjust brakes Check and rectify Check and rectify Adjust or replace
Wheel tramp	Over-inflated tyres Unbalanced tyre and wheel Defective shock absorber Defective tyre	Correct pressure Check and balance if necessary Check and rectify Repair or replace
Abnormal tyre wear	Incorrect tyre pressure Incorrect wheel alignment Excessive wheel bearing play Improper driving	Correct Correct Adjust Avoid sharp turning at high speeds, rapid starting and braking, etc.
Tyre noises	Improper tyre inflation Incorrect wheel alignment	Correct Correct



Exploded view of the front drum brake assembly.

1. Stub axle
2. Brake back plate
3. Wheel brake cylinder
4. Brake lining
5. Brake shoe
6. Distance washer
7. Cover plate
8. Oil seal
9. Wheel bearing
10. Axle drive flange
11. Brake drum



Exploded view of the rear wheel brake assembly.

1. Brake lining
2. Brake shoe
3. Return spring
4. Distance washer
5. Cover plate
6. Axle drive shaft
7. Axle drive flange
8. Brake drum
9. Brake back plate
10. Rear axle tube

Brakes

GENERAL

The braking system consists of the hydraulic foot brake, operated by the brake pedal, acting on all four wheels and the mechanical handbrake (auxiliary and parking brake) which only acts on the two rear wheels.

On the Simca 1300 two Duplex drum brakes were fitted at the front and two Simplex drum brakes at the rear from 1963 - 1965. As from 1966 two ATE disc brakes were fitted at the front.

On the Simca 1500 two Girling disc brakes were fitted at the front and two Simplex drum brakes at the rear from 1964 to 1965. In 1965 the Girling brakes were replaced by ATE disc brakes.

BRAKING SYSTEM 1300 (up to 1965)

The 1300 models from 1966 onwards and the 1301 models use the braking system fitted to 1501 models.

BRAKING SYSTEM — Maintenance

The brake fluid level in the reservoir, located in the front luggage compartment, should be checked at regular intervals. Before topping up with Lockheed HD 43 fluid, the reservoir and the cap should be cleaned thoroughly so that the brake fluid in the braking system cannot be contaminated in this way. The reservoir should be filled to within 15 - 20 mm (0.6 - 0.8 in.) of the cap edge. The level of the brake fluid must never drop below the minimum mark, as the brakes and the hydraulic clutch cannot otherwise operate.

Ensure that the breather hole in the screw cap is not blocked, as the brake fluid cannot otherwise flow into the brake master cylinder as a result of the build-up of vacuum. The complete system should be subjected to a visual inspection from time to time with particular attention being paid to the condition of the brake lines. Dampness indicates a leak and the possibility of air entering the braking system. The unions should, therefore, be tightened and damaged rigid pipes or brake pressure hoses renewed if necessary.

A brake adjustment or repair is necessary: If the pedal is soft and spongy, if the pedal can be depressed by more than half its travel without braking action, if a braking test (brake testing instrument) indicates insufficient retardation, if the vehicle pulls to one side during braking. Bleeding of the brakes is necessary, if the braking system is opened at one point or if air has got into the system.

BRAKES — Adjustment

Wear of the brake linings necessitates adjustment of the brake shoes from time to time. The wear of the brake linings is taken up by re-setting the eccentric adjustment cam. Brake linings which are worn to half their original thickness must be replaced.

Jack up the vehicle so that the wheels can turn freely; it should

be noted that the handbrake must be released fully and the brake cable completely without tension for the adjustment of the rear wheel brake shoes. Place the brake adjustment spanner 4022 Q on the square head of the eccentric adjustment cam and turn the cam in the direction of rotation of the wheel until the brake shoes make contact and the wheel can just be turned by hand. Turn the cam stage by stage in the opposite direction until the brake shoes are just clear of the drums and do not rub.

The adjustment must be carried out on all four wheels. Adjust the handbrake after completion of the foot brake adjustment.

BRAKE PEDAL FREE TRAVEL

The free travel of the brake pedal must be 2 - 10 mm (0.1 - 0.4 in.) measured at the tread plate. The free travel can be adjusted by bending the pedal stop, square rubber block, as required. However, it should be noted that this adjustment may only be carried out when the complete braking system has been overhauled and is in order.

MASTER CYLINDER

— Removal, Overhaul and Installation —

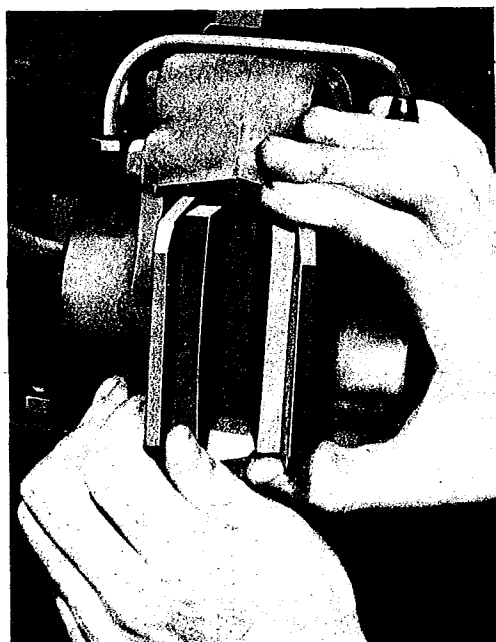
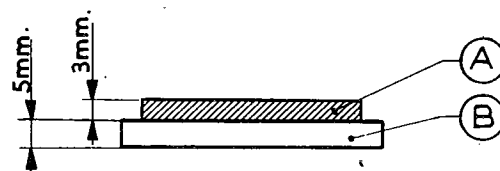
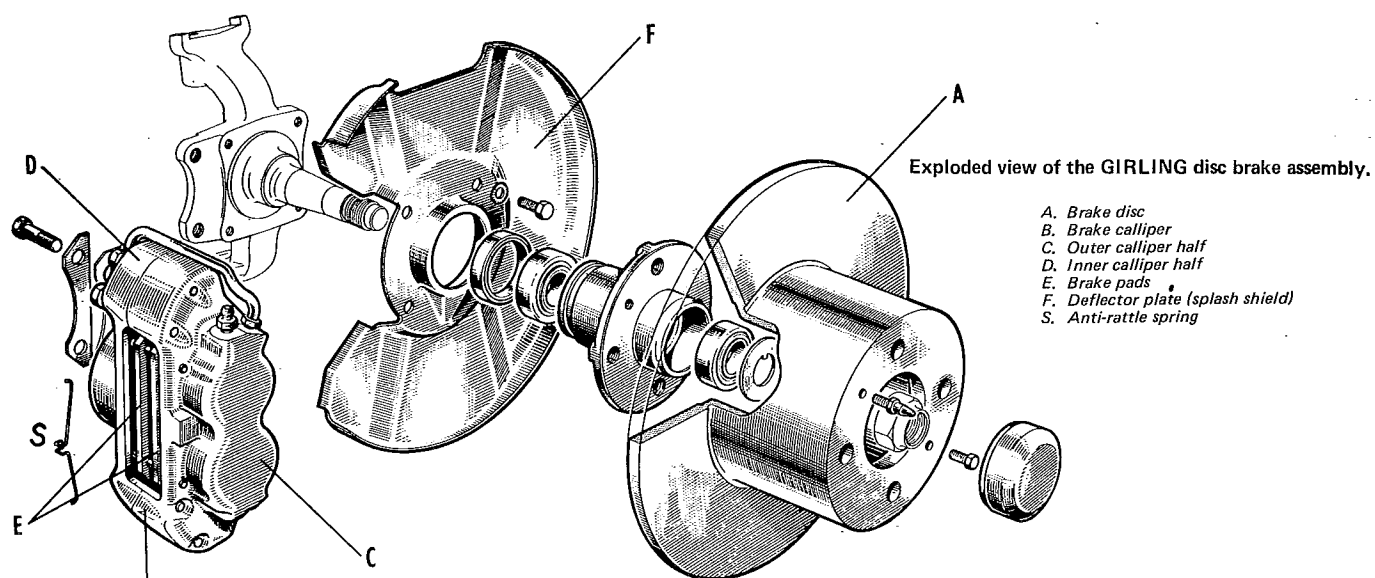
The brake master cylinder and the clutch master cylinder are each secured to the support of the pedal mechanism by means of two stud bolts with nuts and tooth lock washers. The master cylinder can be removed without dismantling the pedal mechanism. The rigid pipe to the rear wheel brakes should be unscrewed at the brake master cylinder and the brake fluid collected. Disconnect the rigid pipe line to the distributor piece for the front wheel brakes at the brake master cylinder. Seal the openings in the lines with pointed hardwood pegs so that the system cannot be contaminated. Unscrew the brake master cylinder from the support (2 nuts with tooth lock washers) and remove it from the push rod of the brake pedal; the push rod and pedal mechanism remain in the vehicle. Unscrew the brake light switch and bleed the screw.

Pull off the piston spring ring, take the packing washer, piston and secondary cup, compression spring and valve out of the brake cylinder housing.

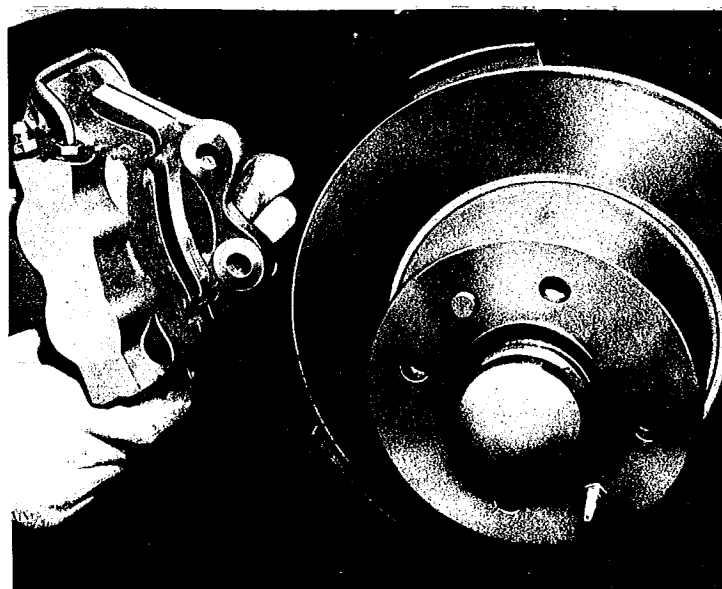
Clean all parts in white spirit and allow to dry. Do not under any circumstances use fuel, petroleum, mineral oils or trichlorethylene, as these materials attack the rubber components and cause them to swell. Blow out the compensating bore and housing with compressed air. Examine all parts for defects or wear and renew as necessary.

The assembly is a reversal of the dismantling procedure, the parts being inserted with brake fluid or the inner surfaces of the brake cylinder housing and the cups coated with Lockheed brake cylinder paste.

The installation of the brake master cylinder is the reverse of the removal procedure. Ensure that the dust cap locates correctly in the groove of the brake master cylinder. The play between the brake push rod and piston is correct when the free travel of the brake pedal is between 2 and 10 mm (0.1 and 0.4 in.) measured at the tread plate.



Removal of the brake pads.



Removal of the complete brake calliper.

PEDAL MECHANISM FOR BRAKE/CLUTCH — Removal

Unscrew the retaining plate which is situated in the centre of the pedal shaft. Detach the pedal return springs and remove the shaft from the mounting. If necessary, renew the bushes in the pedals or shaft.

FRONT BRAKE SHOES, WHEEL BRAKE CYLINDERS AND BRAKE ANCHOR PLATES — Removal

Remove the brake drum; the return springs of the brake should be detached with pliers 7331 V. Remove the retaining clips of the brake shoes and remove the brake shoes from the wheel brake cylinder push rods. Before removing the wheel brake cylinder the opening in the brake fluid reservoir should be sealed with a pointed hardwood peg; the connecting hose of the two wheel brake cylinders and the flexible brake hose are then unscrewed. Unlock and unscrew the mounting bolts of the wheel brake cylinder; remove the wheel brake cylinder.

If the brake anchor plate has to be removed, the nuts on the mounting bolts of the brake anchor plate should be unscrewed at the stub axle. Remove the brake anchor plate with its oil deflector plate and seal.

WHEEL BRAKE CYLINDER — Dismantling, Overhaul and Assembly —

Unscrew the bleed screw, remove the push rod and dust cap. Remove the piston and cup by directing a low-pressure jet of air into the tapped hole of the bleed screw. Clean and dry all parts in white spirit. **Do not use fuel, petroleum, mineral oils or trichlorethylene, as these materials attack the rubber components and cause them to swell.** Check parts for wear and defects, and renew as necessary.

The assembly is the reverse of the dismantling procedure, the cups and pistons being inserted with brake fluid or the housing and cup coated with Lockheed brake cylinder paste. When re-installing the front wheel cylinders it should be noted that the brake cylinders are not identical. Furthermore, a distinction must be made between the right-hand and left-hand sides of the vehicle. The cylinder with the threaded hole for the brake hose must be fitted at the front on the anchor plate, the cylinder with the bleed screw at the rear.

Brake Linings

Brake linings must be renewed if they are worn to half their original thickness, if an insufficient braking action is achieved with the braking system bled and the eccentric adjustment cam in the end position. Use only genuine Simca linings and rivets. If it becomes necessary to replace the linings on the front wheel brakes, replacement of the rear wheel linings should also be considered.

FRONT BRAKE ANCHOR PLATE — Installation

The installation is the reverse of the removal procedure, the lock washers of the retaining nuts must be renewed in the process. Tighten the nuts to a torque of 5.6 kgm (40.5 lb.ft.). When fitting the brake shoes the eccentric adjustment cams should be screwed back fully so that the shoes are not already spread. Bleed the braking system and adjust the brakes, for this purpose turn the square heads of the eccentric adjustment cams

with brake adjustment spanner 4022 Q in the direction of rotation of the wheel until the brake shoes locate on the drum. Back off the square heads stage by stage until the wheel just runs freely, i.e. rubbing of the linings on the drum cannot be felt.

REAR BRAKE SHOES, WHEEL BRAKE CYLINDER, BRAKE BACK PLATE AND REAR AXLE DRIVE SHAFT — Removal —

Remove the wheel hub cap, slacken the wheel studs, jack up the vehicle at the rear and support it. Unscrew the wheel studs and remove the wheel. Unscrew the retaining bolt and guide bolt for wheel fitting. Mark the brake drum and wheel shaft for re-assembly by using a punch or an oil paint line. Remove the brake drum. Detach the handbrake cable at the brake lever. Compress the spring and take the cable end out of the brake anchor plate; the return spring should be detached with the pliers 7331 V. Remove the connecting lever of the brake shoes. Take out the small return spring and remove the brake shoes.

Before removing the wheel brake cylinders the opening in the fluid reservoir should be sealed with a pointed hardwood peg. Unscrew the brake line from the brake cylinder. Unlock and unscrew the mounting screws of the wheel brake cylinder and remove the brake cylinder.

If the brake anchor plate is to be removed, the nuts should be unscrewed via the openings in the wheel shaft flange with a socket wrench.

Pull the rear axle shaft out of the splines of the bevel pinion in the differential using the support plate and extractor. Remove the axle shaft with bearing and the brake anchor plate from the rear axle housing. Damage to the individual components of the rear axle shaft can - because of the assembly of the ball bearing with the pressed-on ring - only be repaired by workshops which have the necessary equipment and testing instruments at their disposal. Defective shafts are best replaced as complete units.

WHEEL BRAKE CYLINDER — Dismantling, Overhaul and Assembly —

Unscrew the bleed screw. Take off the front and rear rubber dust caps. Remove the pistons, carefully pull out the cups on the right and left. Take out the compression spring.

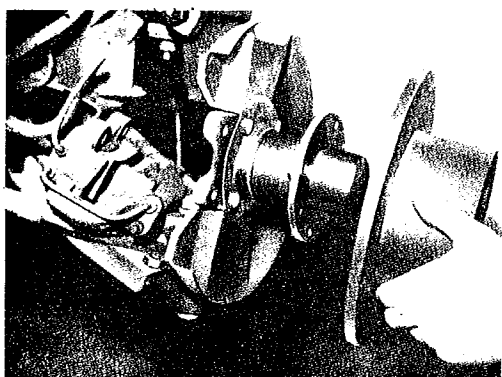
Clean all parts in white spirit and allow to dry. **Do not use fuel, petroleum, mineral oils or trichlorethylene, as these materials attack the rubber components and cause them to swell.** Check parts for wear and defective or corroded spots, renew if necessary.

The assembly is the reverse of the dismantling procedure, the parts being coated with brake fluid or Lockheed brake paste before assembly.

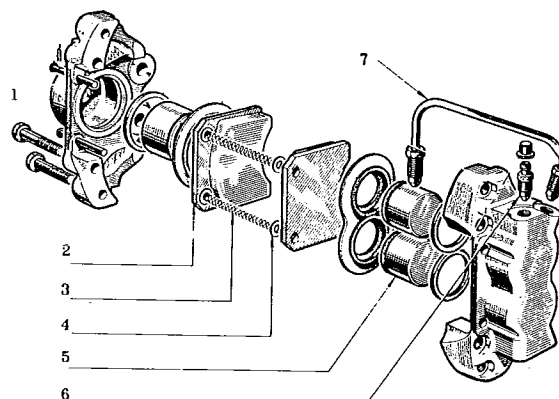
The installation of the wheel brake cylinders is the reverse of the removal procedure.

Brake Linings - Renewal

Brake linings must be renewed if they are worn to half their original thickness, if an insufficient braking action is achieved with the brakes bled and the eccentric adjustment cam in the end position. Only use genuine Simca linings and rivets. If it



Removal of the brake disc from the wheel hub.

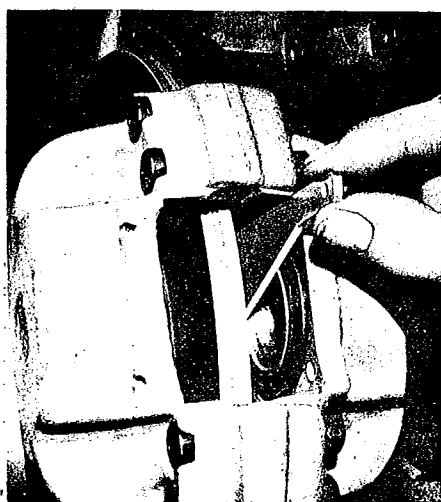
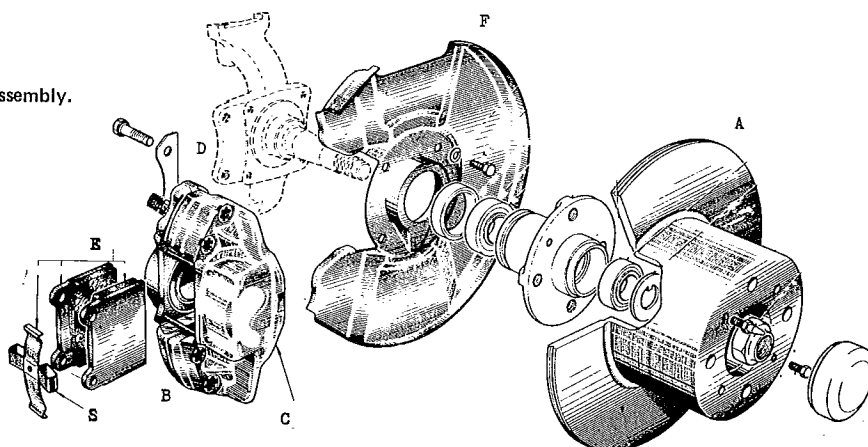


Exploded view of the brake calliper assembly.

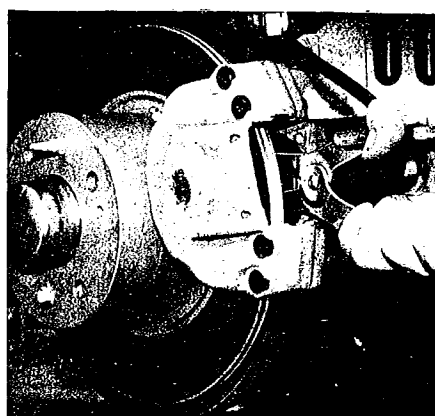
- | | |
|--------------------|----------------------|
| 1. Brake calliper | 5. Calliper cylinder |
| 2. Retaining plate | 6. Bleeder screw |
| 3. Spring | 7. Brake pipe |
| 4. Washer | |

Exploded view of the ATE disc brake assembly.

- | |
|------------------------|
| A. Brake disc |
| B. Brake calliper |
| C. Outer calliper half |
| D. Inner calliper half |
| E. Brake pads |
| F. Deflector plate |
| S. Tensioning spring |



The piston cut-out must be at a 20° angle when checked with the piston alignment checking tool.



Push the pistons into the bores with the special tool. A piece of wood is also suitable.

becomes necessary to replace the linings on the rear wheel brakes, replacement of the front wheel linings should also be considered.

BRAKE ANCHOR PLATE AND DRIVE SHAFT — Installation —

The installation is the reverse of the removal procedure, the lock washers of the mounting bolts must be renewed in the process. Tighten the nuts to a torque reading of 5.6 kgm (40.5 lb.ft.). When fitting the brake shoes the eccentric adjustment cams should be screwed back fully so that the shoes are not already spread when installed. Bleed the braking system and adjust the brakes, to do this - with the vehicle jacked up and the handbrake released fully - tighten the square heads of the eccentric adjustment cams until the brake linings locate on the drum. Then back off the square heads stage by stage until the wheel turns freely, i.e. so that rubbing of the linings on the brake drums cannot be felt.

BRAKES (MODELS 1301/1501) — Bleeding

If the bleeding operation cannot be carried out with a conventional bleeding apparatus, it is best carried out by two mechanics. Fill up the brake fluid reservoir with original Lockheed brake fluid. Bleeding should be started at the front on the right-hand wheel. Remove the dust cap, connect the bleeder hose (the free end of the hose should be hung in a clean jar which is half filled with brake fluid). Open the bleed valve about a quarter of a turn anti-clockwise. The second mechanic depresses the brake pedal slowly. Tighten the bleed valve so that no air can be sucked in at this point when the pedal is returned. Allow the pedal to return. This procedure should be repeated as often as necessary until bubble-free brake fluid flows out of the bleed hose into the jar. When no more bubbles appear in the jar the brake pedal should be held in the depressed condition and the bleed valve tightened. Remove the bleed hose and fit the dust cap.

The same procedure should be carried out on the other three wheels. During the bleeding operation the brake fluid level in the reservoir should be topped up so that no air is sucked into the system at that point. The system should be checked for leaks after being filled up. If the conventional apparatus with pedal support is not available, a mechanic depresses the brake pedal and holds it, using considerable foot pressure for about half a minute. The second mechanic subjects the system to a visual inspection at the same time.

If there is a reduction in the resistance at the brake pedal there is a pressure loss, a leak, which the second mechanic then searches for from the brake fluid reservoir along the brake line to the brake master cylinder via the distributor piece and the wheel brake cylinders.

HANDBRAKE — Adjustment

If the handbrake is to be adjusted, ensure that the hydraulic foot brake is correctly bled and adjusted. Release the handbrake lever. Slacken the locknut on the equaliser bracket, check the freeness of the cable in the equaliser and in the sleeves, free them and grease as necessary. Apply the handbrake and allow it to engage on the 6th tooth. The adjustment nut on the equaliser bracket should be tightened so that it just locates inside the equaliser bracket. Tighten the outside locknut. The rear wheels

begin to brake when the handbrake is applied up to the 6th tooth, full braking is achieved at the 8th tooth of the ratchet.

"GIRLING" FRONT WHEEL DISC BRAKES

The "Girling" disc brakes on the front wheels consist of a brake disc at the right and left, a two-part brake calliper, three pistons, the two brake pads to which the friction linings are stuck and a deflector plate. The brake pads are held in the calliper by two spindles, which are secured with two split pins and sound dampening springs.

Apart from cleaning the brake pads with a wire brush (do not allow any cleansing agents to penetrate them), checking the thickness of the friction linings and bleeding the brakes, there is no maintenance work. Adjustment of the friction linings is automatic and requires no manual settings.

Brake operation is effected via a pendant mounted brake pedal which acts directly on the brake master cylinder piston by means of a push rod. The hydraulic pressure in the braking system is thus transmitted to the pistons of the brake callipers at the front and to the pistons of the wheel brake cylinders at the rear, which press the brake pads on the two surfaces of the brake disc and the brake shoes on the brake drums respectively. When the foot is removed, the pressure in the system drops and the brake pads and brake shoes return to their idle positions.

DISC BRAKE PADS — Removal and Installation

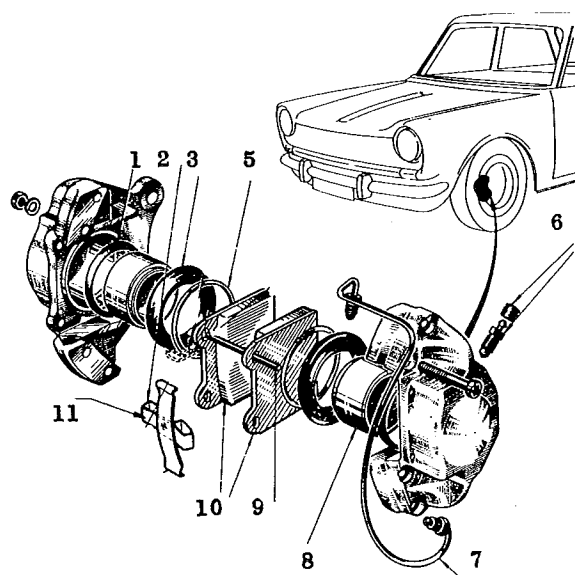
Renewal of the brake pads is necessary when the linings have been worn down to a thickness of 3 mm (0.118 in.). The inspection should be carried out with the vehicle jacked up and the wheels removed. The brake pads should be renewed on both brakes in all instances. Remove the two sound-dampening springs of the brake pads, using a screwdriver. Remove the split pins from the two spindles and take out the spindles.

Remove the brake pads and press the new pads inwards to the base of the cylinders. Push in the retaining spindles and secure with split pins; fit the sound-dampening springs. Depress the brake pedal several times until a powerful resistance is felt. Fit the wheels and remove the vehicle from the support stands.

DISC BRAKES — Removal and Overhaul

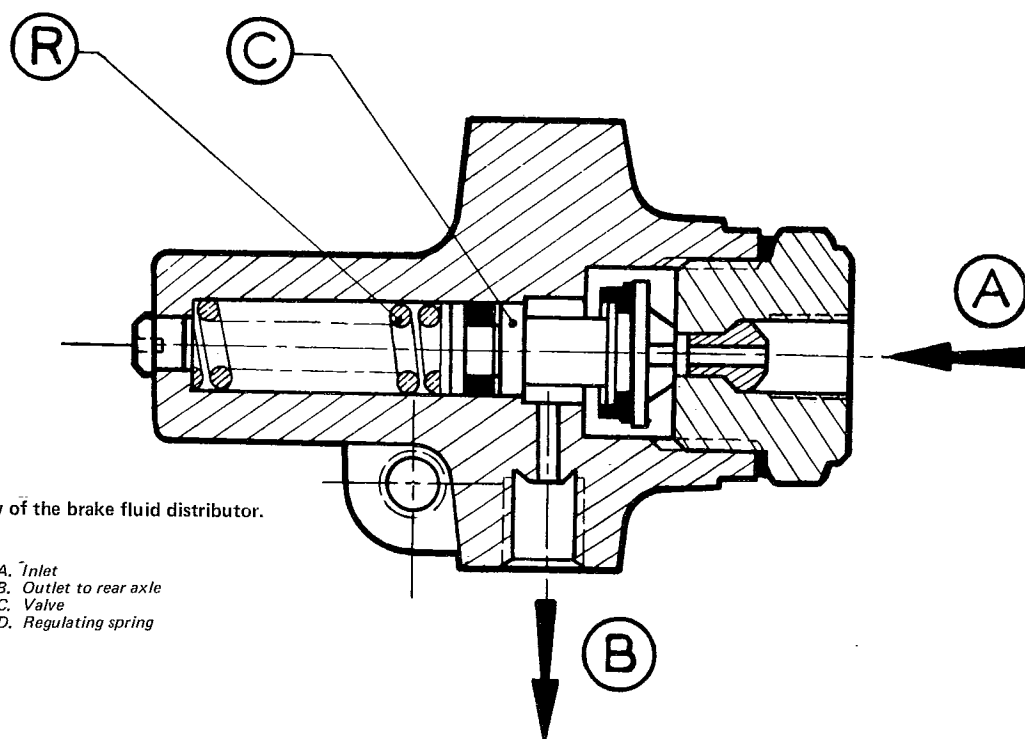
To remove the brake calliper, remove the wheels. Insert a pointed hardwood peg in the breather hole of the brake fluid reservoir to avoid loss of brake fluid. Unscrew the brake fluid line at the brake calliper. Remove the sound-dampening springs from the brake pads. Remove the split pins from the retaining spindles of the pads and remove the spindles; take out the brake pads. Unscrew the brake calliper from the stub axle (2 screws, 1 locking plate) and remove it.

The brake disc should be checked for lateral run-out, using a dial gauge. Position the measuring point about 10 mm (0.4 in.) from the upper edge of the disc, the permissible lateral run-out is 0.10 mm (0.00394 in.). If a greater value is measured, the brake disc must be renewed with the wheel hub. Damage, scores or wear of the two friction surfaces over 0.5 mm (0.0197 in.) necessitates replacement of the disc. Wear up to 0.5 mm (0.0197 in.) can be rectified by regrounding on both sides, cutting is not permissible.



Exploded view of the TEVES disc brake assembly.

1. Fluid seal
2. Piston
3. Rubber seal ring
5. Clamping ring
6. Bleeder screw with dust cap
7. Brake pipe
8. Piston
9. Retaining pin
10. Brake pads
11. Tensioning spring



Sectional view of the brake fluid distributor.

- A. Inlet
- B. Outlet to rear axle
- C. Valve
- D. Regulating spring

BRAKE DISCS — Removal and Installation

Remove the wheel. Remove the brake calliper without unscrewing the brake fluid line. Place the brake calliper on the lower front swinging arm and secure against falling with binding wire. Mark the brake disc in relation to the wheel hub for re-assembly. Remove the two mounting bolts of the brake disc on the wheel hub and pull off the disc.

The installation is the reverse of the removal procedure.

From the 1st of February, 1965, a black or grey protective coating has been applied on the brake discs to prevent them being oxidised during the period before delivery to the customer.

On new cars, this coating may cause the application of the brakes and it must be removed. Drive the car between 30 - 35 mph (40 - 60 kph) and depress the brake pedal with the left foot to bring the small plates into contact with the discs, while keeping the right foot on the accelerator pedal to maintain the running speed for approximately 400 - 500 yards (400 - 500 m) once or several times. If the brakes remain applied, clean them as follows:

Raise the car on lifting jacks and remove the wheel and small brake plates. Clean the discs with a brush and a cellulose lacquer solvent. Soak the protective paint coating applied on the discs. Allow 3 - 5 minutes for the solvent to have its full effect. Wipe both faces of the disc with a cloth and blow them clean with compressed air.

Before re-assembly use the same solvent on the small plates to eliminate the paint which may have been deposited on the lining, wipe and blow them clean.

BRAKE CALLIPER

— Dismantling, Assembly and Installation —

Unscrew the brake line from the two calliper halves. Clamp the brake calliper in a vice using soft metal jaws and unscrew and separate the inner and outer calliper halves. Pull off the dust guard caps. Force the pistons out of the halves with compressed air, for this purpose hold the line on the connector thread of the respective calliper half. Mark the pistons and corresponding calliper half. Remove the oil sealing rings, ensure that neither the rings nor the ring grooves are damaged.

Wash all parts in white spirit. Do not use fuel, petroleum, mineral oils or trichlorethylene for cleaning. Check the pistons and cylinders for wear, if the cylinder is damaged or corroded (signs of friction or seizing) a new calliper complete with pistons must be used.

When installing, handle both calliper halves with care so that no burrs are caused on the joint faces. Renew all three sealing rings and the two dust guard caps. Fit the sealing rings in the ring grooves. Fit the dust guard caps in the outer grooves of the cylinders. Insert the pistons in the cylinders after coating with brake fluid. The piston crowns face the outside of the cylinders. Push the pistons down to the base and fit the outer lips of the dust guard caps in the grooves of the pistons. Clean the joint faces of the two calliper halves again, then screw the halves together. Tighten the short outer screws to a torque of 2.8 - 4.1 kgm (20.2 - 29.6 lb.ft.) and the long inner screws to 4.1 - 7.6 kgm (29.6 - 55 lb.ft.).

Blow through the rigid brake fluid line of the calliper halves

with compressed air before fitting. Fit the brake pads. Screw on the complete brake calliper, tighten the screws to a torque of 4.4 - 8.2 kgm (32 - 60 lb.ft.), fit the guard plate and connect the brake line to the inner calliper half. Remove the wooden peg from the brake fluid reservoir. Top up with brake fluid and bleed the brakes.

The Simplex Drum Brakes on the rear wheels correspond to the brakes of the 1301 apart from the diameter of the wheel brake cylinder of 19.05 mm.

The mechanical Handbrake and Parking Brake corresponds to the handbrake of the 1301.

BRAKING SYSTEM 1301/1501

In 1966 the ATE braking system was introduced on the 1301/1501 models. The ATE disc brakes consist of one wheel hub with brake disc and brake calliper on the right and left. A brake calliper comprises a cover housing and a flange housing, two brake pads, two pistons, two rubber sealing rings in the groove of the brake calliper cylinder, two guard caps with spring rings. Cover and flange housing are joined by four bolts, spring washers and nuts. Brake callipers and cover plates are mounted on the stub axles. The brake pads are held in the calliper by means of two connecting spindles, two split pins and a cross-shaped expanding spring. There is a bleed screw in the flange housing which is sealed by a dust cap.

ATE DISC BRAKES — Inspection

The wear of the brake linings should be checked at every service, not more than every 3,000 miles (5,000 km). Replacement of the brake pads is necessary when the lining has been worn down to a thickness of 2 mm (lining 2 mm, lining with support plate 7 mm).

BRAKES — Adjustment

Adjustment of the disc brakes is automatic. The rear drum brakes must be adjusted by hand.

BRAKE FLUID

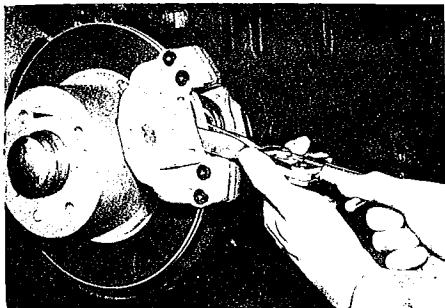
As the wear of the brake linings increases so the linings are adjusted automatically. A corresponding amount of brake fluid flows from the fluid reservoir. The inspection of the brake fluid in the reservoir should be carried out at every service, but not later than every 3,000 miles (5,000 km).

BRAKE PIPES — Inspection

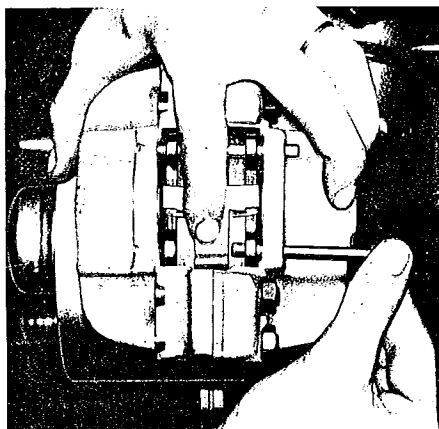
Because of the high pressure in the line system of the disc brakes, the rigid and flexible lines must be checked for leaks. Damaged pipes must be replaced. Soldering or welding of the rigid lines is not permissible.

HIGH PRESSURE LEAK TEST

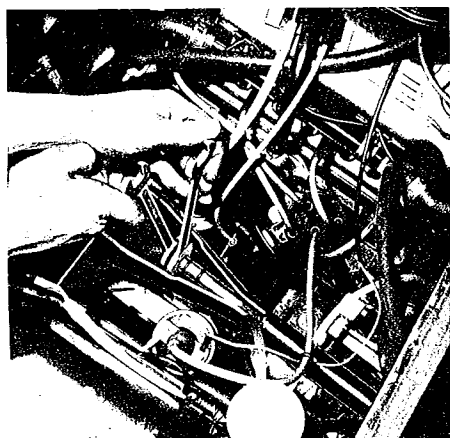
Operate the brake pedal until a pressure of about 7,000 -



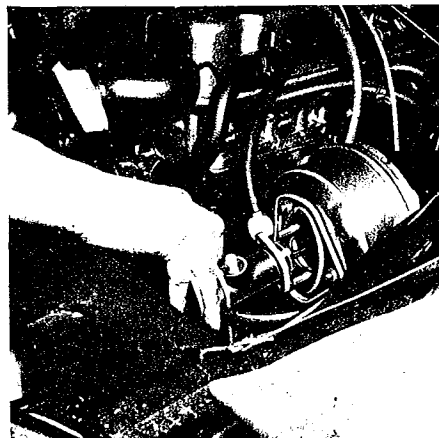
Removal of the brake pads with special pliers.



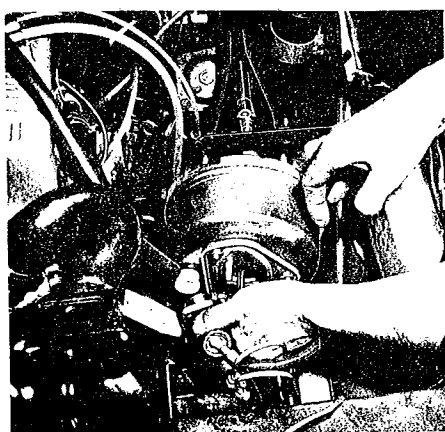
Installation of the brake pad retaining pins. Push the tensioning spring down with one finger.



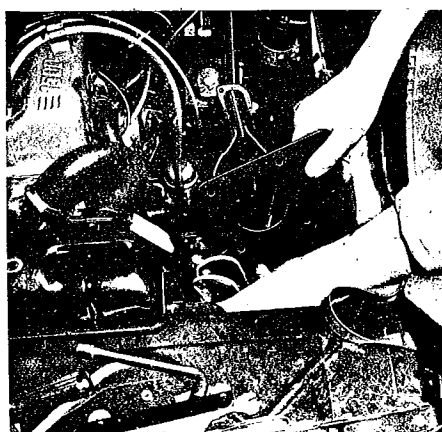
Adjusting the push rod on servo installation.



Installation of the brake master cylinder on cars with servo brake system.



Removal of the brake servo unit.



Installation of the intermediate plate.

14,000 lb./sq.in. is reached. Lock the brake pedal, using a pedal support. The pressure must not drop by more than 10% in 10 minutes.

LOW PRESSURE LEAK TEST

Operate the brake pedal until a pressure of 30 - 45 lb./sq.in. is reached. Lock the brake pedal, using a pedal support. The pressure must remain constant.

PRE-PRESSURE TEST

Connect the pressure gauge to a bleed valve of the drum brake. Remove the pedal support. With the brakes released there must be a pre-pressure in the drum brake system of 7 - 18 lb./sq.in. The pre-pressure valve should be renewed if necessary.

DISC BRAKE PADS — Replacement

Jack up the front of the vehicle and support on stands. Remove the front wheels. Remove the split pins from the connecting spindles in the brake callipers and pull out the spindles. Remove the cross-shaped expanding springs and withdraw the brake pads. The pad cavities in the calliper should be cleaned with white spirit, **do not use fuel or other cleaning agents**. A change-over of worn pads from outside to inside or from right to left or vice versa is not permitted. Only original brake pads should be used in sets. Check the position of the pistons with gauge 2083 S. The piston shoulder must be in alignment with the 20° inclined plane of the piston gauge; if necessary the piston concerned should be adjusted in accordance with the inclined plane of the gauge.

Press the pistons back into the cylinders with piston pliers 20837 R. To avoid brake fluid overflow from the reservoir, the fluid should either be sucked out of the reservoir or the bleed screw of the corresponding calliper opened so that the fluid can flow away without causing damage (paint is attacked by brake fluid). Insert the new brake pads. The pads must move easily in the cavity without having any lateral play, the outer edge must not project beyond the periphery of the disc, re-finish if necessary. Push in the upper connecting spindle, insert a new cross spring, pre-load by applying thumb pressure at the bottom and push in the lower connecting spindle. Fit the wheels. Remove the vehicle from the stands. Depress the brake pedal several times so that the pistons and pads settle. After a road test, check the brake fluid level in the reservoir and correct as necessary.

BRAKE DISCS — Inspection

At every pad inspection the condition of the brake discs should also be checked, particularly the friction surfaces. The lateral run-out, measured with a dial gauge, should not exceed 0.15 mm (0.006 in.). Note that lateral play can result from incorrectly set wheel bearings. Shallow scores can be rectified by grinding both friction faces. Distorted discs, or discs which are thinner than 9.7 mm (0.382 in.) after grinding, must be replaced.

BRAKE CALLIPERS

— Removal, Dismantling, Assembly and Installation —

Allow the brake callipers to cool down before starting removal. Remove the brake pads. Unscrew the rigid pipe between the brake calliper halves and unscrew the brake calliper from the stub axle. Unscrew the four socket head screws and separate the calliper halves. Detach the spring ring of the dust seal and remove the dust seal. Place the calliper half on a piece of foam rubber with the joint face downwards and force the piston out of the cylinder groove with a plastic needle. Clean all parts in white spirit and dry with compressed air. If damage is found in the cylinder bore or on the joint face of the calliper, the complete calliper must be replaced, otherwise the damaged parts or all parts of the repair kit replaced.

The assembly is the reverse of the dismantling procedure, taking the following points into account:

Coat all parts with a thin film of brake fluid or ATE brake paste before fitting. Insert the rubber piston sealing ring in the groove of the cylinder. Fit the piston without jamming while turning slightly. Fit the dust seal and spring ring, ensuring that it is correctly seated. Check the piston seating with gauge 20 838 S and correct if necessary with piston pliers 20 939 T. Before assembly of the calliper halves, check that they are perfectly clean. Bolts and nuts which are not perfect must be replaced, the spring washers under the nuts must always be replaced. With the nuts screwed on finger-tight, the calliper halves should be aligned so that the profiles are flush, then tighten the two inner nuts followed by the outer nuts to a torque of 1.7 kgm (12.3 lb.ft.) and then to 3.4 kgm (24.6 lb.ft.). Screw the connecting lines into the calliper halves. Fit the brake calliper to the stub axle. Fit the brake pads and bleed the brakes.

FLUID PRESSURE LIMITER

The brake fluid pressure limiter regulates the pressure in the braking system so that, when braking hard from high speeds, neither the front wheels (loss of steerability) nor the rear wheels (risk of skidding) are over-braked. It must distribute the braking force so that it corresponds to the static and dynamic load change during braking. The pressure limiter comprises a mechanical and a hydraulic section. There is a piston valve in the hydraulic section and a governor spring in the mechanical section. The pressure limiter initially delivers equal pressures to the front and rear wheel brake cylinders, i.e. the valve is fully opened. At an operating pressure of 668 - 782 psi. the pressure in the brake line increases quickly and the pressure limiter is cut in, i.e. the valve closes the line to the rear brake cylinders and the pressure to the front wheels is increased.

To check the pressure limiter, screw a pressure gauge into one of the rear brake cylinders in place of the bleed screw. Now depress the brake pedal and note the pressure needed to close the valve, it must be between 678 - 782 lb./sq.in. After removing the pressure gauge, screw in the bleed screw and bleed the brake system.

An alternative method of testing the pressure limiter is to jack up the rear wheels and depress the brake pedal firmly until the rear wheels are locked. Keep the brake pedal depressed and open one of the bleed screws on the rear brakes. When the screw is opened the wheels must become free without any noticeable change in the pedal travel.

The pressure limiter must be removed and renewed in the case of damage or defects.

SERVO BRAKE SYSTEM

An optional servo brake system may be fitted on 1968 1301/1501 models. It differs from the conventional arrangement fitted on Simca 1301/1501 standard models in that a Master-Vac (servo brake) unit is fitted between the brake pedal and the transmitting cylinder.

The brake limiter is replaced by an interlocked adjuster, which allows the pressure applied in the rear wheel receiver cylinders to be modified automatically depending on the vehicle load. Receiver cylinders of 22 mm (0.858 in.) in diameter are fitted on the rear wheels. Protective shields are fitted to each front brake calliper.

SERVO — Principle of Operation

The servo brake reduces the pressure required on the pedal. The servo brake prime-mover is a vacuum chamber with one elastically alterable side able to be subjected to the effects of atmospheric pressure. The sinking effect caused on this side imparts additional thrust to the transmitting cylinder control rod when the brake pedal is actuated.

SERVO BRAKE PUSH ROD — Adjustment

When the brake pedal is at rest, there must be a clearance of approximately 1 mm (0.04 in.) between the push rod and the bearing nut on the servo brake. When the brake pedal is being depressed, the pin must not be jammed in its housing. If required, proceed with the adjustment by acting upon the bearing nut and its locknut.

SERVO BRAKE — Removal and Installation

Disengage the servo brake transmitting cylinder without disconnecting the pipes. Remove the pin holding the push rod to the servo brake and disconnect the vacuum hose on the servo brake connection. Remove the four nuts used to fasten the servo brake to its supporting bracket. Remove the servo brake, pulling it towards the front.

Present and locate the new servo brake on its support bracket, locate the bolts correctly in relation to the transmitting cylinder fixing points and fit the servo brake to its support bracket. Re-connect the vacuum hose to the servo brake connection. Fasten the transmitting cylinder to the servo brake and refit the push rod holding pin to the servo brake. Adjust the servo brake push rod.

SERVO BRAKE PUSH ROD — Removal and Installation

Withdraw the servo brake transmitting cylinder without disconnecting the pipes, place it to the side. Remove the push rod holding pin from the servo brake. Disconnect the vacuum hose on the inlet pipe and remove the four nuts holding the servo brake to its support bracket. Remove the servo brake, pulling it towards the front and remove the two bolts fixing the bracket to the wing flange (collect the spacers, which may be fitted between the bracket and wing flange). Remove the two nuts fixing the brackets to the dash panel. Remove the servo brake support bracket, pulling it towards the front and withdraw the "push rod-to dash panel" bellows. Keep the brake pedal fully depressed. Remove the pin holding the push rod to the brake pedal spindle and remove the push rod, clearing it through the engine compartment.

With the pedal still fully depressed, locate the new push rod and re-assemble the push rod holding pin to the brake pedal. Release the brake pedal and re-assemble the push rod bellows to the pedal assembly support plate. Locate the servo brake support bracket, and fasten it first to the pedal assembly support plate.

NOTE: With the aid of forked wedges, fill up the clearance between the other two fixing points and the wing flange in order not to stress the supporting bracket.

Fasten the servo brake support bracket to the wing flange and locate the servo brake on its support bracket (check that the transmitting cylinder fixing bolts are properly located). Fasten the servo brake to its support bracket. Reconnect the vacuum hose to the inlet pipe and fasten the transmitting cylinder to the servo brake. Re-assemble the push rod holding pin to the servo brake. Proceed with the adjustment of the servo brake push rod.

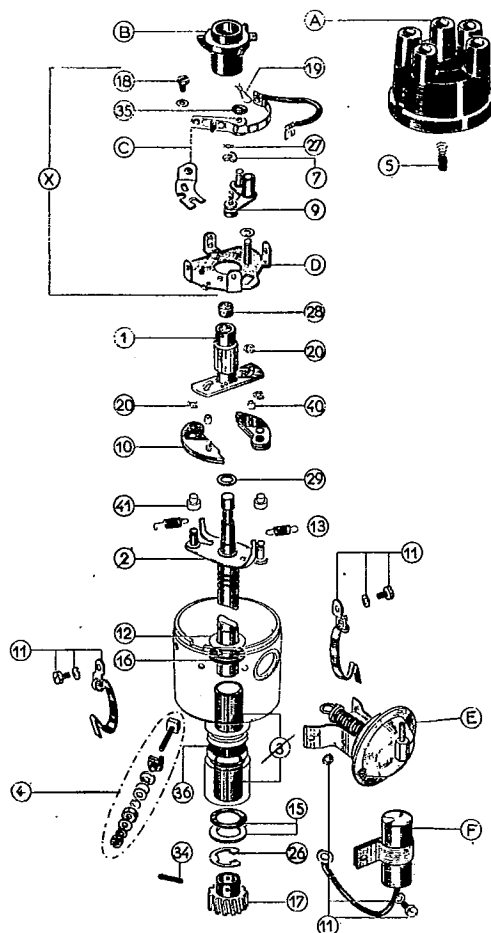
OPTIONAL SERVO BRAKE — Fitting

Fitting this optional system is possible on 1301/1501 vehicles produced after Body No. DO 9210507.

On earlier 1301/1501 vehicles or on 1300/1500 vehicles (with limiter), only the "Servo Brake Assistance" arrangement can be fitted, this excluding the brake adjuster and, therefore, the 22 mm (0.858 in.) diameter rear receiver cylinders. The L.H. rear side members on these vehicles do not incorporate the holes required for fixing the brake adjuster and, fitting 22 mm (0.858 in.) diameter receiver cylinders without a brake adjuster would produce an excessive predominance of the braking effect on the rear wheels.

Trouble Shooting

SYMPTOMS	PROBABLE CAUSE	ACTION TO BE TAKEN
Insufficient performance	Leak in hydraulic system Brake pads or linings excessively worn Water or oil on linings	Trace and rectify Replace pads or brake shoes Clean or replace linings
Pedal contacts floor	Pads or linings worn No brake fluid	Replace as necessary Refill and bleed system
Pedal feels spongy	Air in system Insufficient fluid in reservoir	Bleed system Top-up fluid system
Pedal can be depressed without action	Check valve in master cylinder faulty Valve seat dirty	Check and repair Clean valve seat, fit new valve
Brake effort decreases and pedal goes slowly to floor	Brake pipes or hoses leaking Damaged or defective cups in master brake or wheel cylinders	Tighten connections or fit new pipes and hoses Overhaul cylinder in question
Brakes overheat	Compensation port in master cylinder blocked Return spring weak Rubber parts swollen due to use of unsuitable brake fluid	Clean master brake cylinder Fit new springs Drain fluid, remove all rubber parts and flush system. Replace all parts in master brake cylinder
Brakes pull to one side	Loose back plate mounting bolts Oil on linings or pads Loose or damaged wheel bearings Improper operation of wheel cylinder Improper tyre inflation	Tighten Clean or replace Adjust or replace Repair or replace Correct tyre pressure

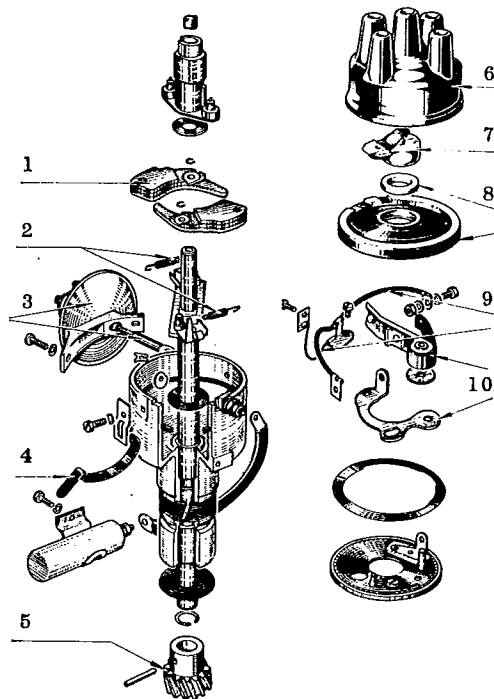


Exploded view of the Ducellier ignition distributor.

- | | |
|-----------------------------------|-----------------------------|
| 1. Distributor cap | 19. Retainer |
| 2. Shaft with flyweight mechanism | 20. Retainer |
| 3. Bushes | 26. Circlip |
| 4. Cable retaining screw | 27. Retainer |
| 5. Carbon brush | 28. Lubricating felt |
| 6. Retainer | 29. Washer |
| 7. Retainer | 34. Pin |
| 8. Adjusting screw | 35. Washer |
| 9. Flyweight | 36. Washer |
| 10. Spring clip | A. Distributor cover |
| 11. Distributor shaft | B. Distributor rotor |
| 12. Flyweight spring | C. Contact breaker set |
| 13. Washers | D. Vacuum unit |
| 14. Drive gearwheel | E. Condenser |
| 15. Screw | F. Contact breaker assembly |

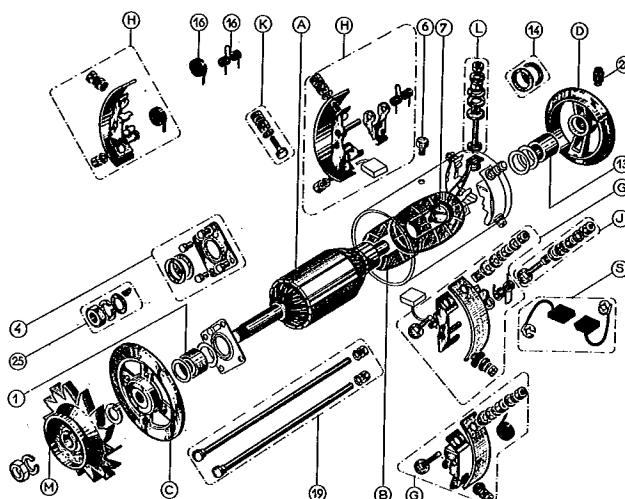
Exploded view of the Ducellier dynamo.

- | |
|----------------------------------|
| 1. Bush |
| 4. Cover plate |
| 6. Screw |
| 7. Bush |
| 13. Washers |
| 14. Springs |
| 15. Screws |
| 19. Nut with spring ring and key |
| 20. Oiler |
| 21. Armature |
| 22. Field coils |
| 23. Bearing bracket |
| 24. Cable retaining screw |
| 25. Brushholder with spring |
| 26. Screw |
| 27. Screw with details |
| 28. Cooling fan |
| 29. Brushes |



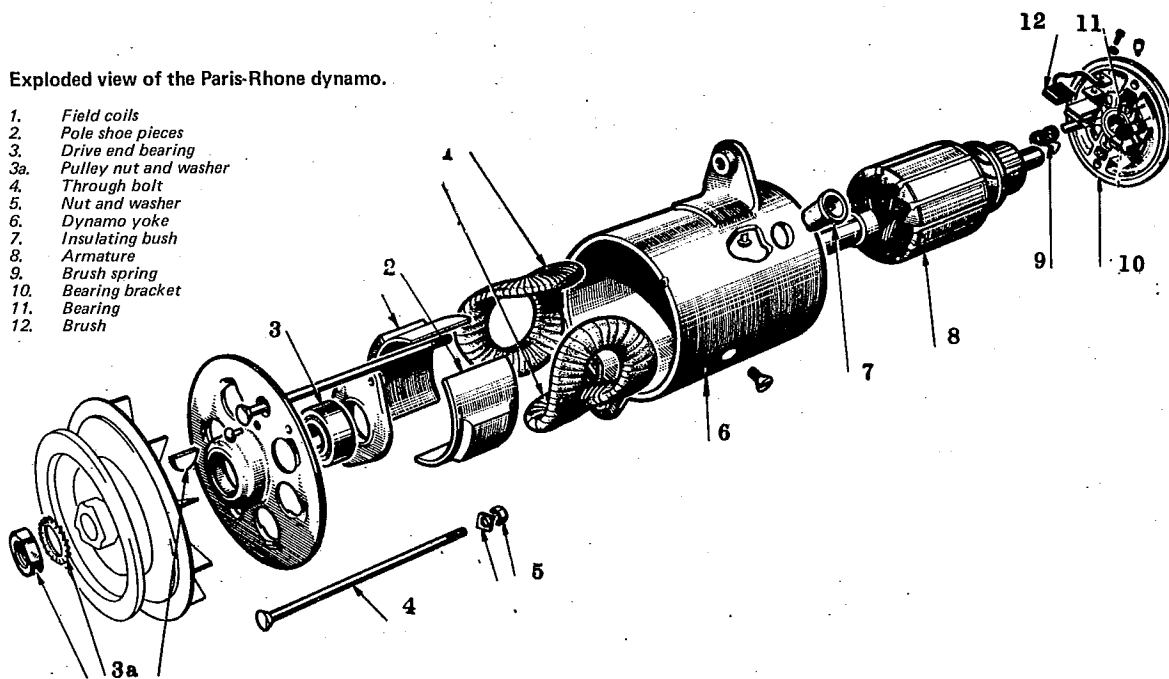
Exploded view of the S.E.V. ignition distributor.

- | |
|------------------------------|
| 1. Flyweights |
| 2. Flyweight springs |
| 3. Vacuum unit with pull rod |
| 4. Spring clip |
| 5. Drive gearwheel |
| 6. Distributor cap |
| 7. Distributor rotor |
| 8. Washer |
| 9. Contact breaker cable |
| 10. Contact breaker set |



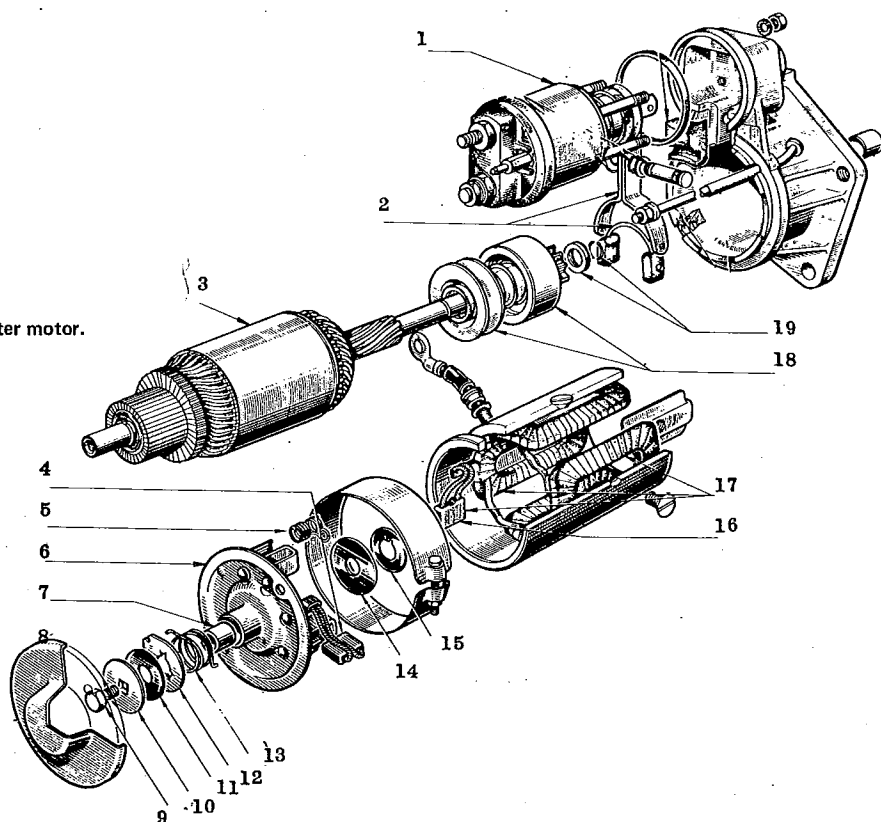
Exploded view of the Paris-Rhone dynamo.

1. Field coils
2. Pole shoe pieces
3. Drive end bearing
- 3a. Pulley nut and washer
4. Through bolt
5. Nut and washer
6. Dynamo yoke
7. Insulating bush
8. Armature
9. Brush spring
10. Bearing bracket
11. Bearing
12. Brush



Exploded view of the Paris-Rhone starter motor.

1. Solenoid switch
2. Engagement fork
3. Armature
4. Brush
5. Spring
6. Bearing bracket
7. Bush
8. Cover plate
9. Screw
10. Washer
11. Washer
12. Washer
13. Spring
14. Washer
15. Washer
16. Brush 8x15x15
17. Field coils
18. Engagement bush
19. Washer with snap ring



Electrical Equipment

(INCL. IGNITION SYSTEM)

IGNITION COIL — Testing

After switching on the ignition, check with a test lamp that there is voltage at terminal 15 of the ignition coil (one end of the primary winding and one end of the secondary winding). Check the cable of the ignition coil terminal 1 (the other end of the primary winding) to the distributor for current flow. Check the contact breaker points gap in the distributor, correct it to 0.47 - 0.53 mm (0.018 - 0.020 in.), if necessary. Pull the high tension lead out of connection 4 of the distributor cap and hold it approximately 8 - 10 mm (0.3 - 0.4 in.) away from an earth point. When the starter is operated a spark must jump from the end of the lead to the earth point, if this is not the case the ignition coil must be replaced.

CONTACT BREAKER POINTS — Adjustment

The Ducellier distributor has "self-cleaning" contacts. Through the constantly varying vacuum the moving contact is pushed backwards and forwards on the fixed contact so that pitting or bump formations hardly occur. The following general points apply to the SEV distributor:

Clean dirty or slightly burnt contacts with a contact file. **Do not use emery cloth.** The contact points are made of a tungsten alloy. Slight wear on the contacts does not matter. However, if the contact face is half worn, the contacts must be replaced (only use original parts). Check the gap of opened contact breaker points with a feeler gauge (0.47 - 0.53 mm/0.018 - 0.020 in.), ensure that the feeler gauge is clean and dry so that no grease or oil gets between the contacts. If necessary move the contact carrier correspondingly. In doing so lubricate the slip felt of the shaft with 3 drops of engine oil.

When fitting new points, their contact faces must locate flat to each other, reset them if necessary. Check the points contact pressure, to do this the tension of the spring of the moving contact point should be checked with a spring balance 650 +/- 50 g (23 +/- 1.76 oz.).

VACUUM ADVANCE

The vacuum advance is an additional ignition advance dependent on the engine loading in the partial load range. There is a hose line from above the throttle valve to the diaphragm unit of the distributor. The variations in vacuum with the throttle valve closed (idling), with the throttle valve half opened (partial load) and with the throttle valve fully opened (full load) are transmitted to the diaphragm of the vacuum unit. The diaphragm is connected to the contact breaker plate by a reaction rod. The ignition distributor can only be tested on a test bench, the centrifugal and vacuum advance being tested separately.

Adjustment or repair work should be entrusted to a Simca Workshop. The operation of the vacuum advance is checked by a suction test. The vacuum line should be removed at the carburettor and the line sucked to check whether the contact breaker moves. If no movement is noticed, check the freeness of the contact breaker plate and change the diaphragm unit. A defective diaphragm unit or hose to the diaphragm unit has no

effect on the distributor, it can only lead to increased fuel consumption.

CONDENSER

A condenser of 0.20 - 0.30 mfd capacity is fitted to the distributor and wired in parallel. It suppresses the spark when the contact breaker points open, preventing burning and effecting a quick collapse of the magnetic field. A defective condenser can cause the contacts to burn out quickly as well as a poor spark. Check the condenser using a test lamp with a built-in rectifier. If a measuring point is held on the condenser lead, the direct current flows through the bulb into the condenser and the bulb lights up. The flow of current stops as soon as the condenser is charged and the bulb goes out. If the bulb is on permanently or not at all during this test, the condenser is defective and must be replaced.

IGNITION TIMING — Adjustment

If the engine has been dismantled, the distributor removed or if the contact breaker points have been moved, the adjustment of the ignition timing must be carried out as follows:

Set the piston of No. 1 cylinder to T.D.C. on the compression stroke, the first setting mark on the cover of the lubricating oil centrifuge (belt pulley) must be in alignment with the setting mark on the timing case cover. Remove the distributor cap and turn the distributor shaft so that the arm of the rotor faces the distributor segment for cylinder No. 1. In this position the distributor is, after oiling the pinion and fitting the gasket, inserted in the neck bearing guide of the crankcase.

Engagement of the distributor pinion in the distributor drive gear is made easier by carefully moving the distributor drive shaft and the camshaft. If the position of the distributor rotor has changed during the engagement process, the distributor must be removed again, re-adjusted and inserted a second time. Fit the clamp bracket and tighten it slightly. Final tightening is carried out after the fine adjustment of the ignition.

For the fine adjustment a 0.5 mm feeler gauge is placed between the distributor contacts and the distributor housing turned carefully in the opposite direction to the normal direction of rotation of the distributor. At the moment the contacts open the feeler gauge can be pulled easily. The clamp bracket should now be tightened.

The ignition timing can also be carried out using a 12 volts test lamp, which is wired in parallel to the contact breaker points and lights as soon as the points open. For this purpose bring the flyweights into the idle position and turn the distributor rotor anti-clockwise up to the stop. If the test lamp lights, the clamp bracket of the distributor should be tightened.

SPARK PLUGS

Electrodes and Insulator Body

Medium brown Spark plugs, carburettor and engine in order

Black Mixture too rich
 Light grey Mixture too weak
 Oiled Piston leaking, spark plug misfires

The following spark plugs can be used on the Simca 1301:

Manufacturer	Electrode gap
Marchal 35 S	0.6 mm (0.024 in.)
Lodge HN	0.6 mm (0.024 in.)

Manufacturer	Electrode gap
AC 42 LZ	0.6 mm (0.024 in.)
Champion H8 or H88	0.6 mm (0.024 in.)
Bosch W 225 T 1	0.7 mm (0.027 in.)

The following spark plugs can be used on the Simca 1501:

Manufacturer	Electrode gap
Marchal 34 HS	0.6 - 0.7 mm (0.024 - 0.027 in.)
Champion N4	0.6 - 0.7 mm (0.024 - 0.027 in.)
Bosch W 225 T 2	0.7 mm (0.027 in.)

GENERATOR

A Paris-Rhone S 10 R 37 DC shunt-wound unit with two brushes is fitted on the 1301 for supplying the battery and the consumers. The cut-in speed is 1,500 rpm, at 2,500 rpm it delivers the maximum output of 240 watts. A Paris-Rhone G 10 C 23 shunt-wound unit with two brushes is used on the 1501. The cut-in speed is 1,500 rpm, at 2,500 rpm it delivers the maximum output of 350 watts.

The generator is mounted on the cylinder block at the bottom by a clamp bolt and on the tensioning rail at the top with two bolts. The drive belt pulley, which is also designed as a fan for the dynamo, is located at one end of the shaft and is secured by a key, spring washer and nut. Drive is effected by the V-belt from the V-belt pulley (oil centrifuge cover). The armature is fitted with a ball bearing at the drive end and a self-lubricating bronze bush at the commutator end.

The ball bearing requires no maintenance, the oiler for the bearing in the commutator end plate should be filled with 3 - 4 drops of engine oil about every 6,000 miles (10,000 km). The brushes of the generator should be checked for wear at the same intervals.

Brushes which are sticking or jamming in the brush holder should be freed or renewed if worn. Only brushes of the same type and quality (original spare parts) should be used.

If the commutator is dirty it should be cleaned with a cloth dipped in petrol. Check the brush pressure springs with a spring balance. The brush spring pressure on the 1301 and 1501 should be 450 - 500 g (16 - 17 oz.), replace the brush pressure springs if necessary. The generator should be overhauled by a Simca Contract Workshop if there are burn marks on the commutator.

GENERATOR — Removal and Installation

Disconnect the earth lead from the battery and the leads (exciter line, charge line) from the generator. Remove the adjustment bolt on the tensioning rail and the mounting bolt on the pivot arm of the generator. Remove the V-belt and

withdraw the generator forwards and upwards.

Installation is the reverse of the removal procedure. Ensure that the belt pulley of the water pump is in alignment with the belt pulley of the generator. If necessary align by adding washers between the bracket and the flange.

A three-element Regulator Switch made by Paris-Rhone is fitted in the engine compartment on the right-hand wing casing. It maintains the voltage constant at all road speeds. Furthermore, when the engine is running at low speeds it automatically isolates itself from the battery if the voltage of the generator is lower than that of the battery (the charge tell-tale lamp lights). The charge current must also be regulated, the discharged battery must be charged quickly with a high amperage, the charged battery with a low amperage. The regulator switch requires no maintenance, if it is defective, it must be renewed unless there is a specialist workshop for the adjustment and repair. The charge tell-tale lamp also serves to check the V-belt tension. If the V-belt slips or breaks, if the speed of the generator and water pump decreases or if both units stop, the tell-tale lamp lights. Stop immediately and switch off the engine. Fit a new V-belt and adjust the tension.

STARTER MOTOR

The 1301 and 1501 models both use Paris-Rhone D 8 E pre-engaged starter motors. The feed of the starter pinion into the ring gear on the flywheel and the switching on of the main current is effected by a solenoid which is fitted to the starter motor body. As the engine turns faster than the starter after being started, the pinion is equipped with a free-wheel device. The pinion then runs with the engine. Only when the starter is switched off does the pinion return to its original position through the action of the return spring.

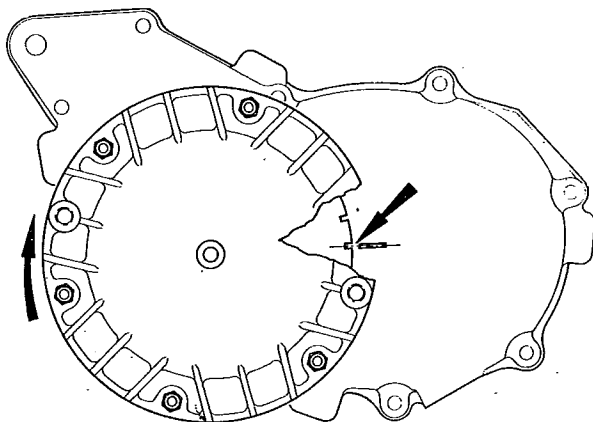
Care of the starter is limited to an inspection of the carbon brushes. Clean dirty or oiled carbon brushes and renew if worn. If the commutator is out-of-round or if it has burnt spots, the starter must be removed and overhauled by a Simca Contract Workshop.

STARTER MOTOR — Testing

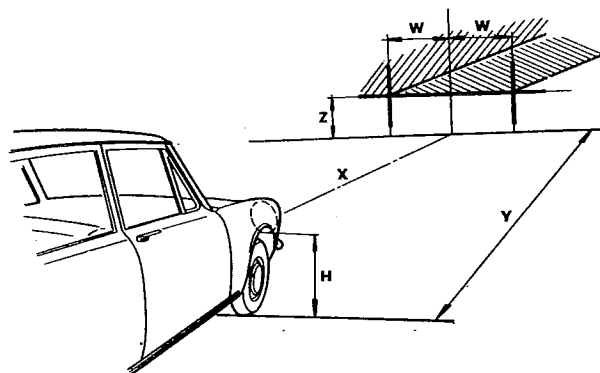
If the starter motor does not turn the engine or only turns it with difficulty, first check the charge condition of the battery, the battery, the lead connections and the starter motor. Operate the starter motor with the headlamps switched on. If the lights go out, the fault is in defective connections between battery and starter motor; if the lights go very dim, the battery is heavily discharged or the battery terminals are dirty and loose, or the starter motor is defective. If the lights remain bright and the starter motor only turns slightly, the terminal connections of the solenoid are loose or the ignition/starter switch or the solenoid is defective. As the solenoid is a unit it can only be tested with a 12 volts test lamp. If the lamp does not light, there is a break in the contact and the solenoid must be replaced.

STARTER MOTOR — Removal and Installation

Disconnect the battery, then disconnect the feed lines of the starter motor. Unscrew the three mounting bolts and remove the starter motor.

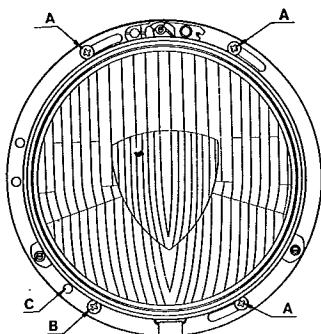


The ignition timing marks. The left hand arrow shows the direction of rotation of the engine. The right hand arrow shows the notch.

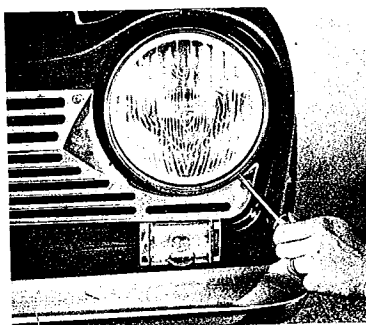


The adjustment of the headlamps

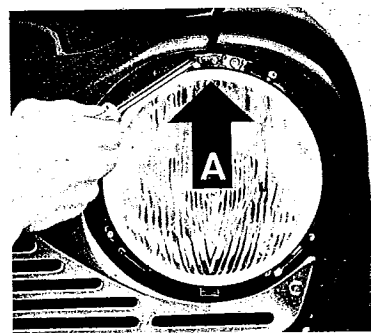
H. Height from lower edge of light beam to ground level
X. Centre line of car
W. 0.60 metres (2 ft.)
Y. 10.0 metres (33 ft.)
Z. $H - 0.10$ metres (4 in.)



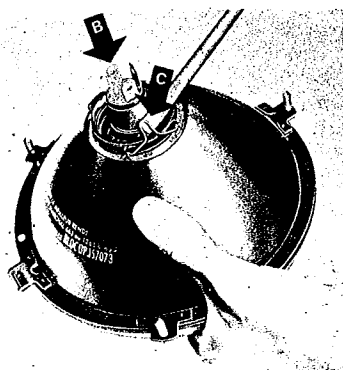
The headlamp adjustment for left hand drive traffic. Loosen screws A, remove screw B, turn headlamp and insert screw B in hole C



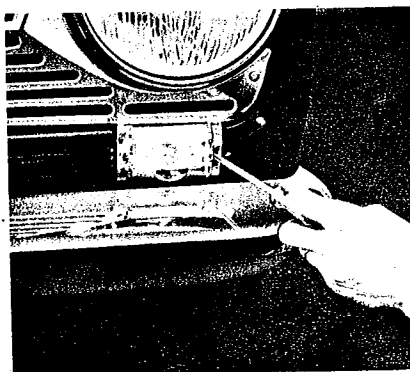
Insert the screwdriver as shown to remove the headlamp rim.



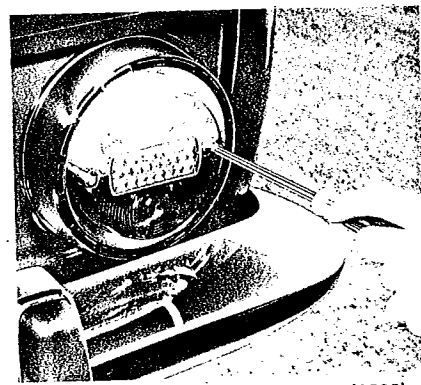
Detach the headlamp light unit from the upper mounting lug A.



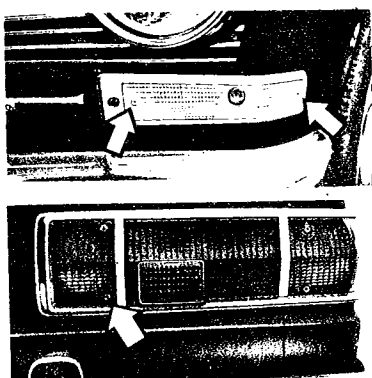
Bend up the spring clip C to remove the bulb B.



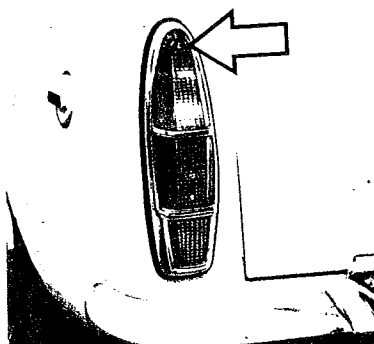
Removal of the front flasher lamp (1300/1500).



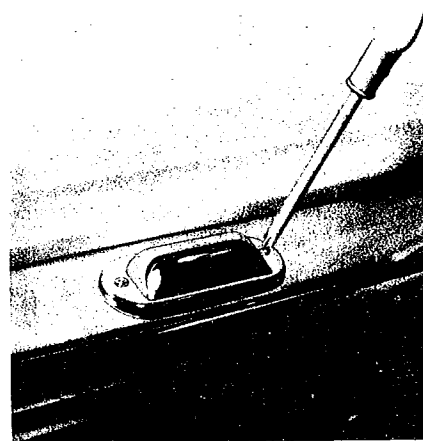
Removal of the rear light lens (1300/1500).



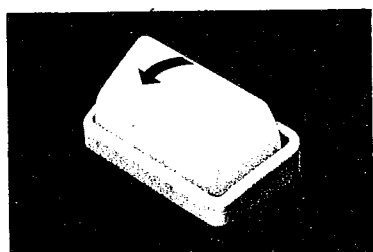
Removal of the front flasher / parking light at the top and of the rear light at the bottom (1301/1501).



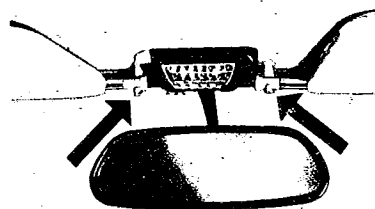
Removal of the rear light (Estate Model).



Removal of the number plate light.



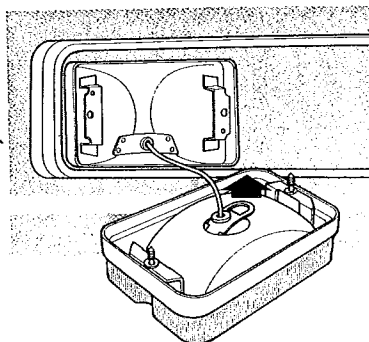
Removal of the rear interior light.



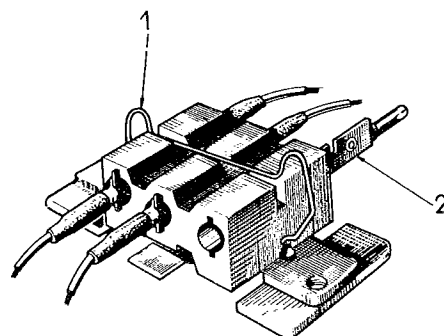
Removal of the interior light.



Removal of the rear interior light (some models).



Removal of the additional headlamp (Simca 1501 S).



The fuse connector. 1. Spring clip, 2. Cable connector.

The installation of the starter motor is the reverse of the removal procedure.

HEADLAMPS — Adjustment

The headlamp system consists of two "Marchal" headlamps type E 2 109 with asymmetric dipping and visor. When dipped, the right-hand light beam is about 80 yards (80 m) further than the left-hand light beam. The dip switch is located on the steering column.

Adjustment of the headlamp is effected quickly and safely with the help of a standard optical headlamp setter. If this is not available, a sufficiently accurate adjustment is possible, using a setting screen.

High Beam

Each headlamp must be adjusted individually, the other lamp being covered. The centre of the round light beam must lie on the horizontal line Z. ($Z = H - 0.10 \text{ m/4 in.}$) (H = lower edge of the headlamp reflector). Laterally the centre of the round light beams must lie 0.60 m (23.6 in.) on each side of the vertical centre line. The headlamps are set by adjusting the two screws at the edge of the lamps.

Dipped Beam

The angle of the bright/dark border should be set in accordance with the illustration. Adjust the lamp with the upper screw in the centre of the lamp rim if necessary. All adjustments should be carried out 11 yards (11 m) from a setting screen with the vehicle unladen and with the specified tyre pressure; front 22 psi and rear 23.5 psi.

Changing the Bulbs

Insert a screwdriver in the opening at the bottom of the lens ring, then pull the ring forwards. Lift the ring out of the support lug at the top. Remove the reflector unit (headlamp unit) by lifting the clip at the top with the screwdriver. Tilt the reflector, using slight pressure, and pull it out. Disconnect the lamp holder at the socket. Fold open the retaining springs of the lamp holder and take the lamp holder with the bulb out of the reflector. When fitting the new lamp holder with the bulb, ensure that the guide lug in the lamp holder is in alignment with the slot in the reflector. Insert the bulb with a clean cloth. Fit the lens ring. The adjustment of the headlamps is not altered by the fitting of a new bulb.

Removal of the front lights, the number plate light and the rear lights is effected by unscrewing the two securing screws and removing the plastic lens. Do not touch the bulbs with your fingers when inserting, always use a clean cloth or tissue paper.

FUSE REPLACEMENT

The electrical system is protected by three 10 amp. fuses. The fuse box is situated in the engine compartment at the rear on the casing of the front left-hand wheel arch. After a fuse ruptures it is not sufficient to renew it, but rather locate the cause and rectify it. The following current circuits are protected by the fuses:

- (1) Windshield wiper motor, fan motor of heating system, brake lights, tell-tale lamps on instrument panel.
- (2) Interior lighting, luggage compartment light, horn.
- (3) Instrument lighting, front and rear parking lights and the number plate light. On the export models for Germany there are two additional fuses for the rear lights.

The time switch for the flasher lamps is protected by its own 5 amp. fuse which is located on the transmitter.

To renew a fuse the two wires must be disconnected. Pull out the lock spring and the defective fuse. Push in the new fuse with the central notch facing the top of the holder. Fit the lock spring and push the fuse backwards and forwards so that the spring engages correctly in the central notch. Connect the wires on the right and the left.

CLOCK (on 1500 GL) — Adjustment

An adjustment screw has been fitted behind the clock. By turning the screw to the right by 90° , the gain obtained is of 5 minutes per 24 hours; in the opposite direction for the same amount of rotation, the delay obtained is of 5 minutes per 24 hours. Practically, the initial setting does not require any adjustment.

Trouble Shooting

SYMPTOMS	PROBABLE CAUSE	ACTION TO BE TAKEN
Battery in low state of charge, shown by lack of power when starting	Dynamo not charging when running at about 20 mph (30 km/h) with switched on lights:	
	Broken or loose connection in dynamo circuit or regulator not functioning correctly. Commutator greasy or dirty	Examine charging and field circuit wiring. Tighten loose connections or replace broken lead. Particularly examine battery connections. Examine regulator. Clean with soft rag moistened in petrol
	Giving low or intermittent output, when car is running in top gear: Dynamo belt slipping Loose or broken connections in dynamo circuit. Brushes greasy or dirty Brushes worn or not fitted correctly Regulator not functioning correctly	Adjust belt tension Examine charging and field circuit wiring. Tighten loose connection or replace broken lead. Particularly inspect battery connections. Clean with soft rag moistened in petrol Replace worn brushes. See that the brushes "bed" properly Examine regulator
Battery overcharged, shown by burnt-out bulbs and very frequent need for topping-up	Regulator not functioning correctly	Examine regulator
Starter does not operate or operates and does not turn the engine	Poor contact of starter switch contact points Poor brush contact Burnt commutator Shorted field coil Shorted armature Poor contact of battery leads Weak battery Open circuit between starter switch and solenoid Poor earth connection	Check switch and replace if necessary Replace brushes or springs Overhaul starter motor or clean commutator Replace coil Replace armature Clean and tighten leads Re-charge battery Check wiring and replace if necessary Check and rectify
Starter motor operates but does not seem to turn over engine quickly enough	Drive pinion defective Flywheel ring gear worn	Replace drive pinion Replace flywheel or recondition ring gear teeth
Ignition warning lamp goes out only at high rpm.	Generator faulty Regulator faulty	Repair generator Replace regulator
Ignition warning lamp does not light with ignition switched on	Discharged battery Defective battery Bulb burned out Loose or corroded battery terminals Loose or broken cables Defective ignition-starter switch Poor contact between generator brushes and commutator	Charge battery Replace battery Replace bulb Tighten or replace terminals Tighten or replace cables Replace switch Free or replace brushes. If necessary replace brush springs

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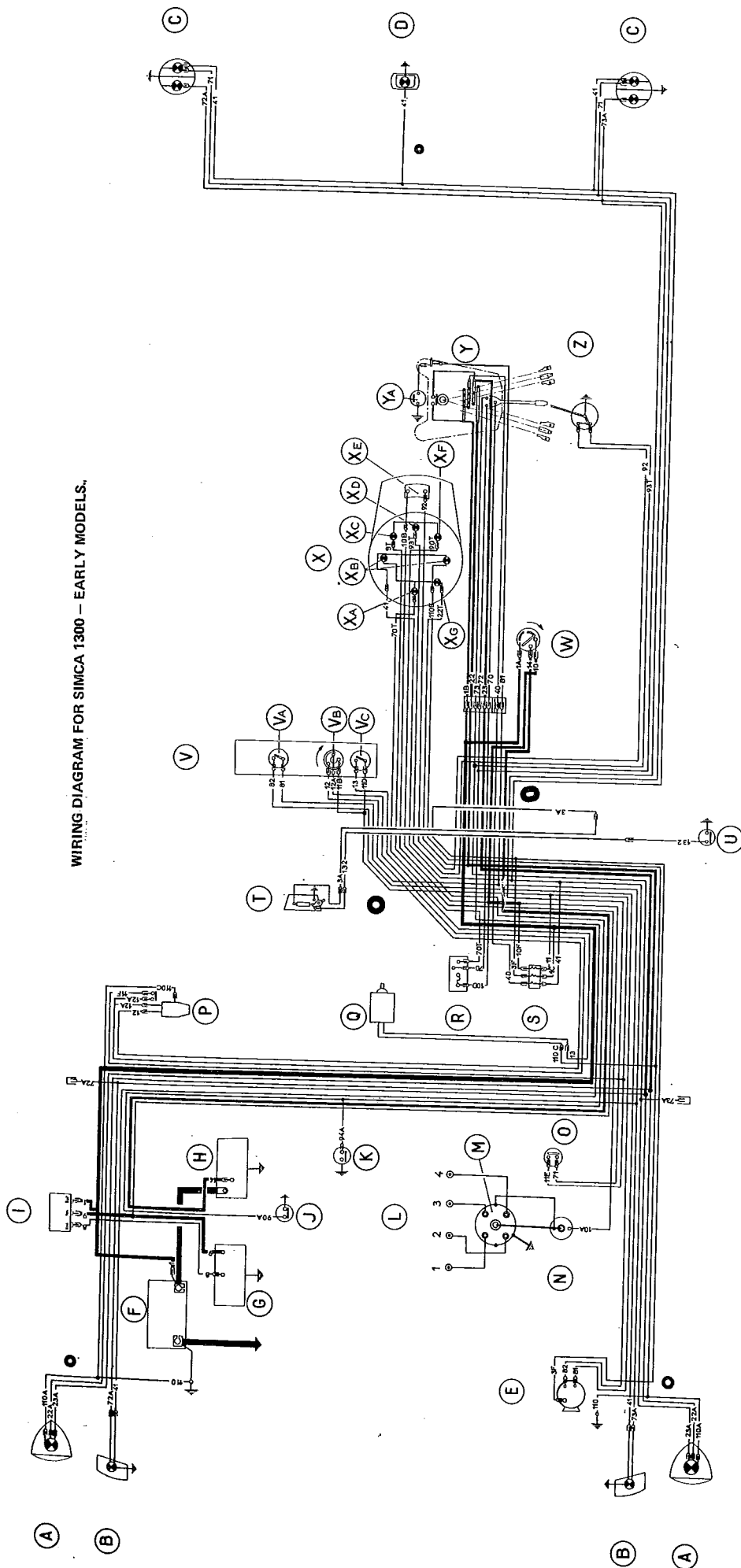
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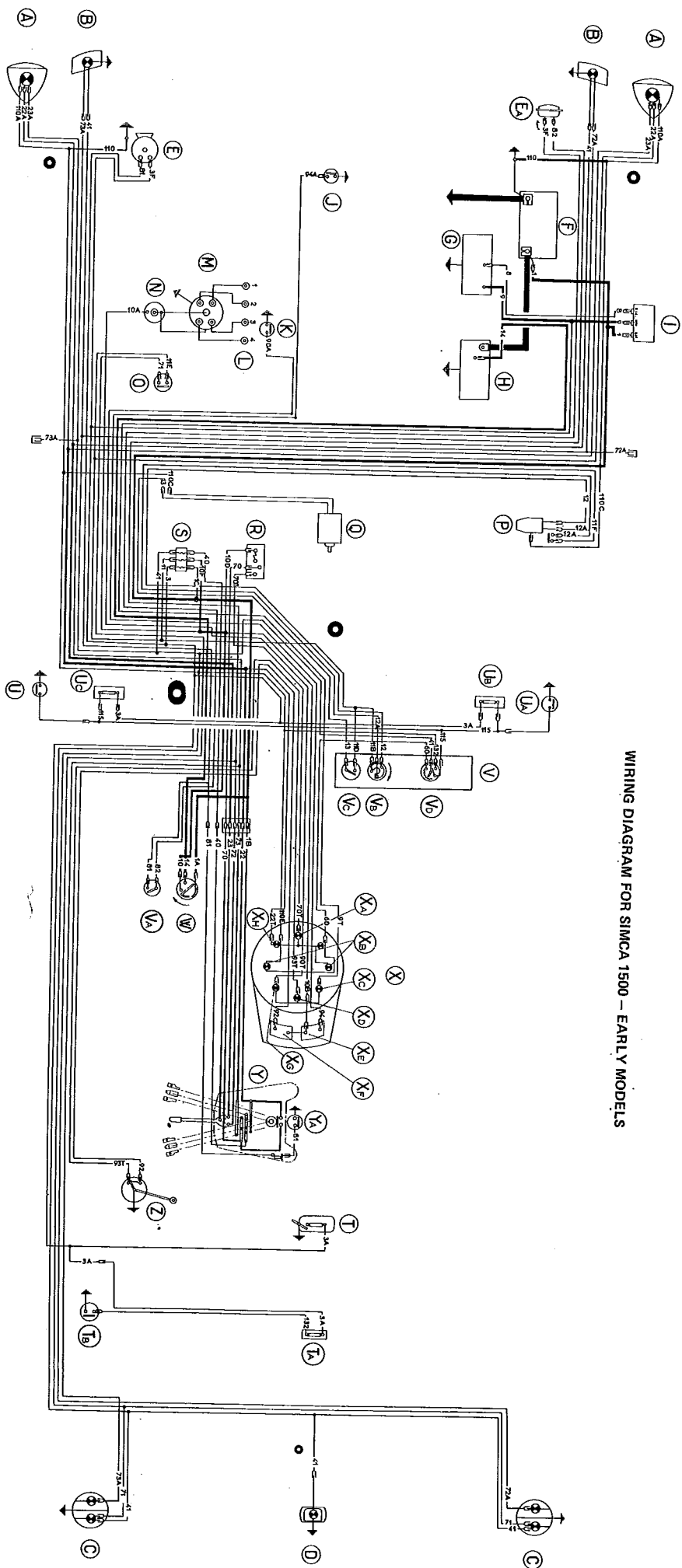
Ignition warning lamp does not go out or flickers when engine rpm is increased	Loose or broken fan belt Regulator defective Positive lead loose or broken Generator defective Commutator graphited	Adjust tension or replace belt Replace regulator Tighten connection or replace lead Repair generator Clean commutator
Wiper motor does not operate, turns too slowly or comes to a standstill	Brushes worn Brush spring weak or annealed Binding brush levers Dirty commutator Excessive friction in wiper linkages Low operating voltage Burnt out armature	Replace brushes Replace springs Free brush levers Clean commutator Lubricate all moving points; eliminate binding spots Check for voltage drops in connections Replace armature or complete motor
Wiper motor continues to run after switch is turned off or does not return blades to parking position	Contacts in housing damaged Contact spring bent Insulating bracket broken Contacts dirty Wiper motor cannot be switched off Bad connection from wiper switch to earth	Replace contacts Replace contacts Replace contacts Clean contacts Screw switch button back slightly, bend contacts Check connection; replace switch
Motor squeaks, sometimes combined with slow operation	Wiper linkages, bushings running dry. Point of armature spindle (commutator side) against stop of brush holder Incorrect position of motor cover	Grease all moving parts of linkage. Bend stop to clear Reposition cover
Starter motor pinion does not move out of mesh	Pinion or armature shaft dirty or damaged Solenoid switch defective	Overhaul starter motor Replace solenoid switch
Engine misfires	Remove each sparking plug in turn, rest it on the cylinder head, and observe whether a spark occurs at the points when the engine is turned. Irregular sparking may be due to dirty plugs or defective high-tension cables. If sparking is regular at all plugs, the trouble is probably due to engine defects.	Clean plugs and adjust the gaps to the figure given in the Engine Tuning Data chart. Renew any lead if the insulation shows signs of deterioration or cracking. Examine the carburettor, petrol supply, etc.
If applicable, read "Dynamo" as "Alternator".		

WIRING DIAGRAM FOR SIMCA 1300 - EARLY MODELS.



Headlights		Coil, ignition		Instrument cluster	
A	Turn signals - front town lights	N	Switch, stop lights	X	Warning light, turn signals
B	Turn signals - stop/tail lights	O	Motor, windshield-wipers	Xa	Lights, instrument cluster
C	Lamp, rear license plate	P	Motor, heater-defroster	Xb	Warning light, generator charge
D	Horn, two-tone	Q	Main timing switch	Xc	Warning light, fuel mini level
E	Battery	R	Fuse holder	Xd	Gauge, fuel level
F	Generator	S	Interior light	Xe	Warning light, water temperature & oil pressure
G	Starter motor	T	Switch, passenger's side door	Xf	Warning light, headlights beam
H	Regulator	U	Controls, instrument panel	Xg	Combined switch
I	Pressure switch	V	Selector switch, horn tone	V	Horn control
J	Temperature switch	Va	Switch, windshield wipers	Ya	Fuel gauge
K	Spark plugs	Vb	Switch, heater-defroster	Z	
L	Distributor	Vc	Switch, starter motor		
M		W			

WIRING DIAGRAM FOR SIMCA 1500 — EARLY MODELS



- A Headlights
- B Turn signals, front town lights
- C Turn signals, stop, tail lights
- D Lamp, rear license plate
- E Horn, «town traffic»
- Ea Horn, «road traffic»
- F Battery
- G Generator
- H Starter motor
- I Regulator
- J Temperature switch
- K Pressure switch

- L Speak plugs
- M Distributor
- N Coil, ignition
- O Switch, stop lights
- P Motor, windshield wipers
- Q Motor, heater-defroster
- R Main timing switch
- S Fuse box
- T Interior light, rear
- Ta Light, luggage compartment
- Tb Switch, luggage compartment

- U Switch, LH front door
- Ua Switch, RH front door
- Ub Courtesy light, instrument panel RH
- Uc Courtesy light, instrument panel LH
- V Controls, instrument panel
- Va Selector, horn tone
- Vb Switch, windshield wipers
- Vc Switch, heater-defroster
- Vd Switch, instr. panel lights
- W Rheostat, instr. cluster light
- X Switch, starter motor

- Xa Warning light, turn signals
- Xb Light, instrument cluster
- Xc Warning light, generator charge
- Xd Warning light, fuel minimum level
- Xe Indicator, water temperature
- Xf Indicator, fuel level
- Xg Warning light, oil pressure
- Xh Warning light, headlight beam
- Y Combined switch
- Ya Control, horn
- Z Fuel level sending unit

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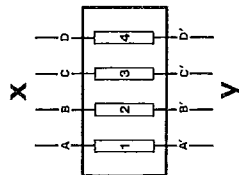
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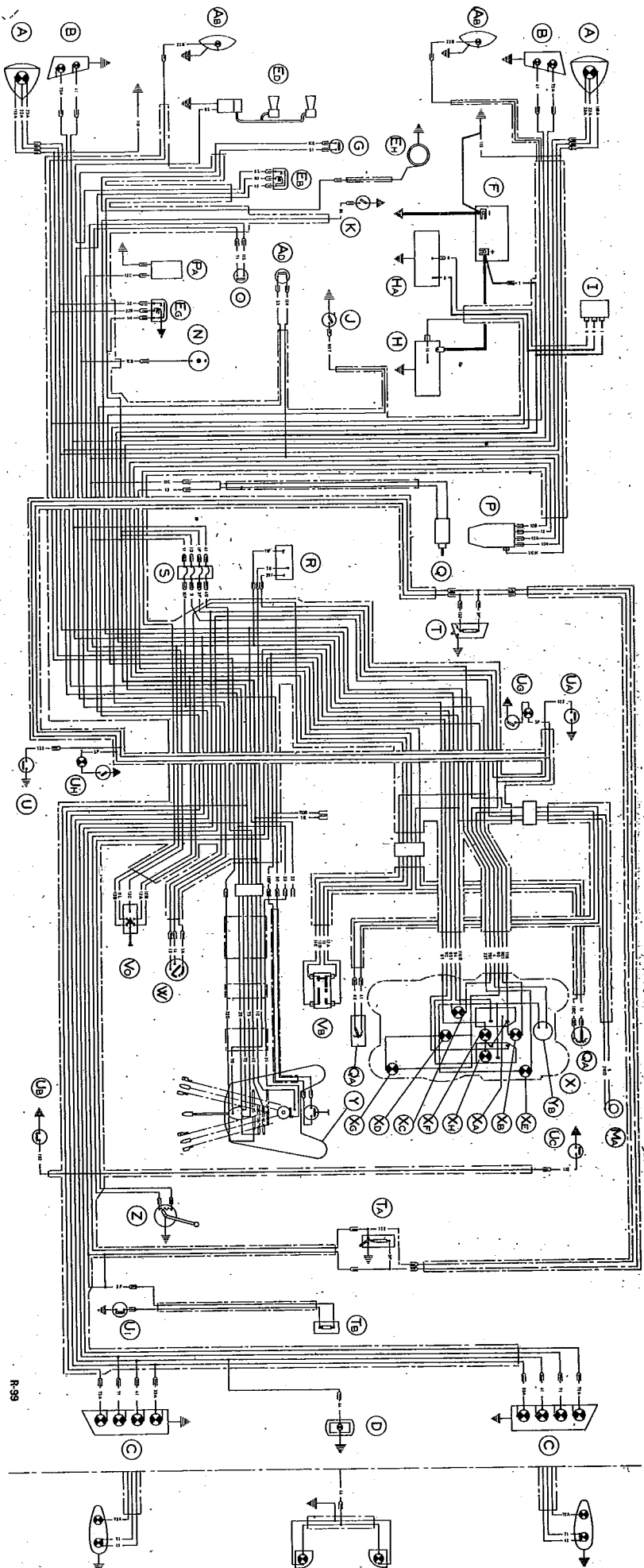
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WIRING DIAGRAM FOR SIMCA 1301/1501 — 1969



X = To Fuse Box
Y = From Fuse Box

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WIRING DIAGRAM FOR SIMCA 1301/1501 - 1970

F	Battery
A	dipped beam
B	main beam
Ba	main beam relay
C	long range headlamp
D	front side light
Xa	rear side light
Xb	registration plate light
Xc	instrument cluster light
Xd	side warning light
Xe	front flasher

C	rear flasher
Xc	flasher warning light
R	flasher unit
C	stop lights
Xc	generator warning light
Xa	main beam warning light
Xb	oil pressure warning light
Xc	minimum fuel warning light
Xd	fuel gauge
Xe	water temperature gauge
Xf	electric clock

T	front ceiling light
Ta	rear ceiling light
De and Up	glove box light
Tb	luggage compartment light S and GL
P	windscreen wiper motor
Pa	air conditioner motor
Q	air horn compressor
E	horn relay
Ba	fan electro-magnet
Bb	starter

Ba and Bb	generator
I	regulator
N	coil
Ma	clear light
C	reflector
Bb	reversing light (except estate) S
OPTIONAL	HF horn LS and GL
	flasher side repeater

WM 173

R-39

Technical Data

SIMCA 1301

ENGINE

All dimensions are given in mm.

Technical designation	312 T
Commercial designation	1301
Number and arrangement of cylinders	4, in-line, vertical
Valve gear	Overhead valves controlled by the camshaft via tappets, push rods and rocker arms
Bore	74 mm
Stroke	75 mm
Displacement	1290 cc.
Ratio stroke/bore	1.013 : 1
Compression ratio	8.6 - 8.8
Fuel	Super grade fuel
DIN power	54 BHP at 5,200 rpm
SAE torque	10.2 kgm at 2,600 rpm
DIN max. torque	9.6 kgm at 2,600 rpm
Specific output	48 BHP/litre
Mean working pressure at speed of max. torque	9.75 kg/cm ²

CRANKSHAFT

Material	Steel, drop forged and heat treated
Number of main bearings	5

Length of main bearing journals (cylindrical section):

Front bearing	23.5 mm
Intermediate bearings	19.2 mm
Centre bearing	28.03 - 28.07 mm
Rear bearing	31.9 mm

Dia. of main bearing journals	47.875 - 47.891 mm
Axial play	0.09 - 0.27 mm
Radial play	0.020 - 0.073 mm
Pilot bearing (pressure bearing)	Centre bearing
Pressure absorbed by	2 half washers on centre bearing
Balance weights	Drop forged - crankshaft balanced dynamically

Crankpins

Length of cylindrical section of the four pins	27 + 0.15 mm/+0.11 mm
Diameter of crankpin	43.990 - 44.010 mm
Axial play	0.07 - 0.017 mm
Radial play	0.016 - 0.069 mm

Main Bearing Shells

Type	Thin-walled half shell (top - bottom)
Material	Three components: Steel shell plus cast on copper/lead plus electrolytic lead/indium coating
Thickness	1.826 - 1.835 mm

Length of shell halves:

Front and Centre	22.55 - 22.80 mm
Rear shell halves	31.05 - 31.30 mm
Intermediate bearing shell halves	18.55 - 18.80 mm

Type	Half shoulder rings
Material	Two components: Steel shell plus zinc alloyed white metal
Manufacturer	SFCM
Thickness	2.31 - 2.36 mm
Outer diameter	70.0 - 70.25 mm
Internal diameter	52.90 - 53.15 mm

CONNECTING RODS

Material	Drop forged steel, heat treated
Distance between centres, small end - big end	130 +/- 0.075 mm
Length of big end	26.87 - 26.93 mm
Dia. of big end bore	47.612 - 47.6125 mm
Length of small end	22 +/- 0.03 mm
Dia. of small end bore	23.939 - 23.982 mm
Weight tolerance	5 kg in the same engine
Mounting of big end cap	Self-locking nuts

Big End Bearing Shells

Type	Thin-walled half shells
Material	Three component metal
Manufacturer	SFCM or GLYCO Metal Works
Thickness	1.783 - 1.793 mm
Length:	
Type SFCM	22.1 +0.20/-0.05 mm
Type GLYCO	22.3 -0.00/-0.25 mm

Connecting Rod Bushes

Material	Bronze
Length	Max. 23 mm after pushing in and pressing on by expanding
Internal diameter after pushing in and expanding	22.002 - 22.012 mm

CYLINDER HEAD

Material	Aluminium alloy, heat treated
Combustion chamber	Flat
Combustion chamber volume	34.05 - 35.25 cc. with valves and spark plugs fitted
Height of cylinder head	89.2 mm

Cylinder Head Gasket

Type	"Reinz-Repa" with steel edge
Inlet:	
Dia. of carburettor connection flange	32 mm
Dia. of the two connection flanges on the cylinder head	28.0 - 28.5 mm
Pre-heating of mixture	By dissipation of heat from the exhaust manifold

Exhaust:

Diameter of connection flanges on cylinder head:	
For cylinder Nos. 1 and 4 (2)	32 mm
For cylinder Nos. 2 and 3 (1)	34 mm
Dia. of outlet flange to exhaust system	40 mm

CAMSHAFT

Material Alloy cast iron, heat-treated
Duplex drive chain 46 links, pitch 9.525 mm
Adjustment Play 0.25 at cam or
0.37 at valve

Length of bearings:
Front 21.75 - 23.11 mm
Centre 16.8 - 18.6 mm
Rear 22.5 - 24.1 mm

Diameter of bearings:
Front 42.975 - 43.000 mm
Centre 38.975 - 39.000 mm
Rear 23.978 - 24.000 mm

Play between bearing and shell:
Front 0.040 - 0.090 mm
Centre 0.037 - 0.088 mm
Rear 0.035 - 0.082 mm

End float by adjustment on front
bearing 0.05 - 0.15 mm

CYLINDER BLOCK

Material Special cast iron, chrome-nickel-copper alloy
New dimension of cylinder bores 73.9925 - 74.0225 mm
Position of cylinder bores Offset by 1 mm to the right
in relation to axis of rotation of crankshaft

Number of bearings 5
Permissible oversize of bore diameter
in production 0.1 mm

Class divisions (class codes):
A 73.9925 - 74.0000 mm
B 74.0000 - 74.0075 mm
C 74.0075 - 74.0150 mm
D 74.0150 - 74.0225 mm

PISTONS

Type Autothermal, aluminium alloy, tinned
with oval-tapered skirt
Nominal diameter 73.5 mm
Piston crown area 42.429 sq.cm
Bore for gudgeon pin Dia. 22 -0.007 mm/-0.011 mm

Diameter measured at bottom of piston skirt:
A 73.9475 - 73.9550 mm
B 73.9550 - 73.9625 mm
C 73.9625 - 73.9700 mm
D 73.9700 - 73.9775 mm

Displacement of gudgeon pin axis in relation
to piston axis 2 mm -0.0 mm/-0.2 mm

PISTON RINGS

Number per piston 4
Compression rings per piston 2
Material Special cast iron for piston rings
Manufacturer Goetze-Werke
Nominal diameter 74 mm
Height 2.5 mm -0.010 mm/-0.022 mm

Width 3 mm +/- 0.08 mm

Oil scraper ring (top):

Number per piston 1
Manufacturer Goetze-Werke
Nominal diameter 74 mm
Height 2.5 mm -0.010 mm/0.022 mm
Width 3 mm +/- 0.08 mm
Gap 0.15 - 0.35 mm

Oil ring (bottom):

Type FERROXYDE with eight uniformly
spaced perforations
Number per piston 1
Manufacturer Goetze-Werke
Nominal diameter 74 mm
Height 5 mm -0.010 mm/-0.022 mm
Width 2.9 mm +/- 0.08 mm
Gap 0.25 - 0.40 mm

GUDGEON PINS

Material Steel
Length 62.5 mm -0.0 mm/-0.2 mm
Outer diameter 22 mm -0.005 mm/-0.009 mm
Type Floating, held with two circlips in piston

VALVES

Inlet Valve:

Material Steel, heat treated
Nominal dia. of head 32.1 mm +/- 0.2 mm
Overall length 112 mm +/- 0.5 mm
Valve stem diameter 8 mm -0.000 mm/-0.015 mm
Nominal angle of contact face of seat 45°
Width of seat contact face 2.82 mm +0.6 mm/+0.0 mm
Lift at tappet 5.5 mm
Lift at valve 8.14 mm

Exhaust Valve:

Material Steel
Nominal dia. of head 30.1 mm -0.0 mm/-0.2 mm
Overall length 112 mm +/- 0.5 mm
Valve stem diameter 8 mm -0.000 mm/-0.015 mm
Nominal angle of contact face of seat 45°
Width of seat contact face 2.82 mm +0.6 mm/+0.0 mm
Lift at tappet 5.5 mm
Lift at valve 8.14 mm

Inlet valve seat:

Material Cast iron
Outer diameter 33.1 - 33.185 mm
Bore diameter 28.3 - 28.5 mm
Seat angle of contact face 44° -0/-30'
Width of seat contact face 2.12 mm

Exhaust valve seat:

Material Cast iron
Outer diameter 31.1 - 31.185 mm
Bore diameter 26.3 - 26.5 mm
Seat angle of contact face 44° -0/-1
Width of seat contact face 2.12 mm

Valve guides:

Material	Cast iron
Length	56 mm
Outer diameter	14 mm +0.006/-0.012 mm
Bore dia. after being pressed in	8.022 - 8.040 mm
Position in cylinder head	Determined by a circlip which locates on the cylinder head

PUSH RODS

Material	Steel, drawn and heat treated at the ends
Length	241.5 mm max.
Diameter	7 mm -0.0 mm/-0.2 mm

Rocker shafts:

Material	Case-hardened steel, phosphate treated
Length	171 mm max.
Diameter	15 mm -0.000 mm/-0.018 mm

Valve springs:

Type	With varying pitch
Material	Swedish steel
Free length	53 mm
Max. length, completely compressed	30 mm
Number of turns	8.1
Number of useful turns	6.1
Max. outer diameter	28.5 mm
Min. internal diameter	20.4 mm
Wire diameter	3.8 mm

Valve tappets:	Cast iron, phosphate treated
Length	50 mm +/-0.50
Diameter after heat treatment	21.978-21.988 mm
Running clearance	0.20-0.043 mm

OIL PUMP

Type	Gear-type pump, gears made from sintered steel, straight toothing
Oil pressure at operating temperature with strainer	3.5-4.5 kg/cm ² at 3500 rpm

VALVE TIMING

Clearance 0.25 at cam and 0.37 between rocker arm and valve:	Degrees	mm from TDC
Inlet valve opens	12° BTDC	1 mm
Inlet valve closes	60° ATDC	60.4 mm
Exhaust valve opens	52° BBDC	64.8 mm
Exhaust valve closes	20° ATDC	2.9 mm
Valve clearance at rocker arm:	cold	hot
Inlet	0.15 mm	0.25 mm
Exhaust	0.15 mm	0.25 mm
	(feeler should slide easily)	

Firing order	1-3-4-2
Preignition on crankshaft	12°
Preignition through vacuum advance	28°-32°
Preignition overall on crankshaft	40°

CLUTCH

All dimensions are given in mm

Type	Single dry plate
Operation	Clutch pedal and hydraulic system
Free travel of clutch pedal	2-3 mm
Connection from working cylinder to clutch release bearing	Adjustable push rod and release fork

GEARBOX AND DIFFERENTIAL

All dimensions are given in mm

Number of gears	4 forward, 1 reverse speed
Synchromesh	1st, 2nd, 3rd, 4th speeds

Reduction ratios:

1st speed	3.65:1
2nd speed	2.06:1
3rd speed	1.38:1
4th speed	1.00:1
Reverse	3.39:1
Speedometer drive	5/12

Propeller shaft	Two half shafts, equipped with a rubber coupling at the front on the gearbox and universal joints at centre and rear
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REAR AXLE

All dimensions are given in mm

Rear axle	Semi-floating axle
Differential	In rear axle housing
Bevel drive pinions	Hypoid toothing
Gearing	9/40

Overall gear ratios:

1st speed	1.2 : 1
2nd speed	9.2 : 1
3rd speed	6.1 : 1
4th speed	4.4 : 1
Reverse	15.1 : 1

FUEL SYSTEM

All dimensions are given in mm

Carburettor	Solex 32 PBIC	
Carburettor setting data	up to engine No. 4 102 484	from engine No. 4 102 485
Diameter of body	32	32
Choke tube	25	25 perforated
Main jet	120	122
Air correction jet	190	190
Slow-running jet	45	50
Opening for cut-out	170	200
Slow-running air jet	100	70
Emulsion tube	No.10	No.72
Pump injector tube	50	50
Accelerator pump	54	54
Pump jet	40	40
By-pass valve for pump	40	40
Enrichment jet	100	100

(ventilated to 80)

Diameter of float needle	1.5	1.5
Choke air jet	3	3
Choke fuel jet	115	115
Float weight	5.7 g	5.7 g
Standard fuel consumption		about 8 litres/100 km (35 mpg)

From engine
4 188 373

Carburettor setting

Choke tube	25
Main jet	122.5
Air correction jet	190
Slow-running jet	50
Opening for cut-out	200
Slow-running air jet	70
Emulsion tube	72
Pump injector tube	—
Accelerator pump	54
Pump jet	40
By-pass valve for pump	40
Enrichment jet	60

Float needle	1.5
Choke air jet	5
Choke fuel jet	140
Float weight	5.7 g

WEBER 32 IBC 3 CARBURETTOR

Choke tube	25
Main jet	130
Automatic control	155
Idle jet	50
Idle air	220
Emulsion tube	F 21
Accelerator pump	40
Pump jet	40
Econostat - ventilation	190
Econostat	70
Float needle	150
Choke, air	with starting flap
Level, float with gasket	6 mm
Engine No. from	4.315.983

COOLING SYSTEM AND HEATER

All dimensions are given in mm

Cooling system	Pressure feed system controlled by thermostat
Capacity of radiator	3.25 litres
Capacity of complete system	6.50 litres
Thermostat opens at	78–80°C

LUBRICATION SYSTEM

All dimensions are given in mm

Oil pressure valve in main oil line ensure oil pressure	Normal oil pressure 3.5–4.5 kg/cm ² 3000 rpm
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Contactor for low oil Telltale lamp in combination pressure on engine block instrument

SUSPENSION

Stub axle

Material Steel, heat treated
Tensile strength 89–106 kg/cm²

Bearing seat diameter, inner bearing 27 mm–0.016 mm/–0.029 mm
Bearing seat diameter, outer bearing 20 mm–0.015 mm/–0.026 mm
Thread M 18 X 1.5 metric fine

Stabilizer torsion bar

Material Spring steel heat treated
Tensile strength 110–130 kg/cm²
Bar diameter 18 mm +/–0.1 mm
Distance between centres of bores 960 mm+ 10 mm/+ 0 mm

Adjustment data for axle geometry

Precondition for adjustment Laden vehicle ñ 4 persons and 50 kg luggage
Caster angle 2°30' – 3°30'
Toe-in 1 mm – 3 mm
King pin inclination 7°
Camber angle 1° – 1°45'

REAR SUSPENSION SPRINGS

	Up to Body No. L 080587	As from Body No. 080588
Total free length	325 mm	375 mm
Maximum height, fully compressed		
compressed	115 mm	115 mm
Outer diameter, max.	117.4 + 0.5 mm	123 + 0.5 mm
Wire diameter	12.7 mm	12.4 mm
Dynamic loading	585 kg	515 kg
Length of shock absorber body (excluding mounting shafts L – 57 mm) (not adjustable)	215.35 mm	
Length, extended	360.5 mm	
Outer tube diameter	44.5–45 mm	
Oil capacity	170.0 cm ³ /– 10 cm ³	

FRONT SUSPENSION SPRINGS

Material

Spring steel, heat treated for a tensile strength of 150 — 170 kg/cm²

	Up to Body No. L 080587	From Body No. L 080588 to No. L 300646	As from Body No. L 300647
Direction of winding	Clockwise	Clockwise	Clockwise
Total free length	394 mm	420 mm	427 mm
Maximum height, fully compressed	110 mm	114 mm	114 mm
Number of turns	10	10.5	10.5
Useful turns	8.5	9	9
Outer diameter	117.4 mm +/-0.5	117.4 mm +/-0.5	117.4 mm +/-0.5
Wire diameter	10.9 mm	10.8 mm	10.8 mm
Permissible dynamic loading	385 kg	373 kg	373 kg
Length of compressed shock absorber (excluding mounting shafts=L=57)	244 mm		
Length, extended	417.5 mm		
Diameter of outer tube	44.5—45 mm		
Oil capacity	approx. 190 cm ³		

TYRE SIZES, TYRE PRESSURES

		Front	Rear
Michelin X	5.60x13	22 psi	25 psi
Englebert Max	5.60x13	23.5 psi	26.5 psi
Kleber-Colombes V10	5.90x13	23.5 psi	26.5 psi
Dunlop SP	165 x 13	23.5 psi	26.5 psi

Overall length of primary linings (rear)	.219 mm
Width of primary linings (rear)	45 mm
Thickness of linings	5 mm front 5 mm rear

Useful braking area, front (2 wheels)	484 cm ²
Useful braking area, rear (2 wheels)	392 cm ²
Total useful braking area	876 cm ²
Normal operating clearance	0.25 mm

STEERING (GEMMER)

Reduction ratio	16.2 : 1
Diameter of turning circle	9.80 m
Steering wheel	2 spokes, horn button in centre
Number of turns from lock to lock	3-3/4

BRAKES

All dimensions are given in mm

Internal diameter	255 mm + 0.45/+ 0.25 front and rear
Outer diameter	286 mm
Width of friction surface	53.66 mm min.
Width of friction surface	rear 49.50 mm.min
Distribution of braking force	front 65% rear 35%

BRAKE LININGS

Front	2 off secondary linings
Rear	1 off primary lining 1 off secondary lining "Ferodo" 4Z
Method of fixing	Rivets
Overall length of secondary linings	267 mm
Useful length of secondary linings	242 mm
Width of secondary linings	50 mm front 45 mm rear

ELECTRICAL SYSTEM

All dimensions are given in mm

Ignition system	Battery ignition, distributor with centrifugal cam and vacuum advance
Distributor	Type Ducellier or SEV
Contact breaker points gap	0.45—0.53 mm
Dwell angle	56° +/-1
Firing order	1—3—4—2
Ignition coil	Type Ducellier or SEV
Installed position	Vertical in engine compartment on left-hand wheel arch casing
Earth connection	Negative
Dynamo	Shunt-wound with 2 carbon brushes
Manufacturer	Paris-Rhone
Amperage	17 Amp at 2500 rpm
Cut-in speed	240 Watts
Carbon brush pressure	450-500 gram.

Regulator switch	
Type	three-terminal, cut-in at 12.8-13.8 Volt
Installed position	In engine compartment on right-hand wheel arch casing

STARTER MOTOR

Type	Pre-engaged starter with solenoid with three-point flange mounting
Manufacturer	Paris-Rhone
Spark plugs	Marchal 35 S Lodge 4 N AC 42 LZ
Thread	14 x 1.25
Electrode gap	0.6 mm

TECHNICAL DATA

SIMCA 1501

ENGINE

All dimensions are given in mm

Technical designation	342
Commercial designation	1501
Number and arrangement of cylinders	4 cylinders, in-line, vertical
Valve gear	Overhead valves controlled by camshaft via tappets, push rods and rocker arms
Bore	75.21 mm
Stroke	83 mm
Displacement	1475 cc
Ratio bore/stroke	1.1
Compression ratio	9.0-9.3, automatic 9.9-10.1
Fuel	Super grade fuel
Maximum possible engine speed	5700 rpm
DIN max. power	69 bhp at 5200 rpm (auto. 72)
SAE max. torque	12.5 mkg at 3500 rpm
DIN max. torque	11.1 mkg at 3000 rpm
Specific output	50.8 bhp/litre
Mean working pressure at speed of max. torque	10 kg/cm ²
Overall length including flywheel	610 mm
Overall length including clutch and gearbox	1067 mm
Overall width	450 mm
Overall height (without air filter)	620 mm
Weight of fully equipped engine	114 kg

CRANKSHAFT

Material	Steel, drop forged and heat treated
Number of main bearings	5

Length of main bearing journals
(cylindrical section):

Front bearing	23.5 mm
Intermediate bearings	19.2 mm
Centre bearing	28.03 mm + 0.7/+ 0.3
Rear bearing	31.9 mm

Diameter of main bearing journals	53.95 - 53.97 mm
Axial play	0.09 - 0.27 mm
Pilot bearing (pressure bearing)	Centre main bearing

Pressure absorbed by	2 half washers on centre bearing
Balance weights	Drop forged, crankshaft balanced dynamically

CRANKPINS

Length of cylindrical section of the 4 pins	23 mm+0.29/+0.25
Diameter of crankpin	43.990-44.003 mm (Class A) 44.003-44.016 mm (Class B)
Axial play	0.18 - 0.28 mm
Radial play	0.046-0.071 mm (Class A) 0.045-0.070 mm (Class B)
Half stroke of crankpin	41.5 +/- 0.05 mm

MAIN BEARING SHELLS

Type	Thin-walled half shells (top-bottom)
Material	Three-component: steel shell +cast-on copper/lead+electrolytic lead/indium coating
Thickness	1.986 - 1.998 mm

Length of shell halves:

Front and centre	22.55 - 22.80 mm
Rear	31.05 - 31.30 mm
Intermediate	18.55 - 18.80 mm

Pilot ring halves:

Type	Half shoulder rings
Material	Two-components: steel shell and zinc alloyed white metal
Manufacturer	SFCM
Thickness	2.31 - 2.36 mm
Outer diameter	76 - 76.25 mm
Internal diameter	58.90 - 59.15 mm

CONNECTING RODS

Material	Steel, drop forged and heat treated
Distance between centres, small end - big end	132 mm +/-0.075
Length of big end	23.0 mm +/-0.03
Length of small end	23.0 mm +/-0.03
Diameter of small end bore (without bush)	23.939 - 23.982 mm
Diameter of small end bore (with bush)	22.008 - 22.016 mm
Weight tolerance	3 g
Mounting of big end cap	Bolts with locking plate
The connecting rods and caps are marked with the corresponding cylinder numbers	

BIG END BEARING SHELLS

Type	Thin-walled half shells
Material	Three-component metal
Supplier	Glyco
Length	18.28 + 0/-0.25
Lateral play	0.046 - 0.071 mm (Class A) 0.045 - 0.070 mm (Class B)
Wall thickness	1.777 - 1.783 mm (Class A) 1.771 - 1.777 mm (Class B)

Connecting rod bushes:

Material	Bronze
Installation	Pressed in and expanded
Length after being pressed in	23 mm +/- 0.3

Internal diameter after being
pressed in and expanded 22.008 - 22.016 mm

CYLINDER HEAD

Material Aluminium alloy
Combustion chamber volume With valves and spark
plugs fitted, without gasket 51 cc ± 0.3
Height of cylinder head 88.6 ± 0.25 mm
Height of combustion chamber
at its deepest point 16.6 mm $\pm 0.1/-0.4$

Cylinder head gasket:
Type "Reinz-Repa" with steel edge
The theoretical thickness of the installed
gasket should be 1.2 mm ± 0.1 when the
head is tightened to a torque of 8 mkg.

CAMSHAFT

Drive Through sprocket, via "Duplex"
roller chain "Brampton B 14038"
Camshaft sprocket 34 teeth
Crankshaft sprocket 17 teeth
Chain 46 links
Setting Theoretical play: 0.35 at cam
or 0.52 at valve
Diameter of front bearing 42.975-43.000 mm
Diameter of centre bearing 38.975-39.000 mm
Diameter of rear bearing 23.978-24.000 mm

CAMSHAFT BEARING BUSHES (THIN-WALLED)

Length:
front 22.25 mm
centre 14.75 mm
rear 22.25 mm

Internal diameter after installation
in the cylinder block:
front 43.430-43.065 mm
centre 39.037-39.063 mm
rear 24.035-24.060 mm

CYLINDER BLOCK

Material Special cast iron (chrome-nickel-
copper alloy)
New dimension of cylinder
bores 75.200-75.230 mm
Position of cylinder bores Offset by 1mm to the
right in relation to the axis of rotation of
crankshaft
Number of bearings 5
Permissible oversize of bore
diameter in production 0.1mm
Class divisions (class codes)
stamped onto the upper joint face:
A=75.200 - 75.210 mm
B=75.210 - 75.220 mm
C=75.220 - 75.230 mm

PISTONS

Type Autothermal, aluminium alloy,
tinned (protective coating 0.004 thick),
with oval-tapered skirt

Nominal diameter 75.133-75.163 mm
Diameter of bore for
gudgeon pin 22 mm-0.001/-0.005
Weight variation between pistons
in one engine 3g

The pistons are marked with figures
1 - 6 according to their weight:
1 = 337 - 340 g 4 = 346-349 g
2 = 340 - 343 g 5 = 349-352 g
3 = 343 - 346 g 6 = 352-355 g

Diameter measured at top of piston skirt:
Class A = 75.133 - 75.143 mm
Class B = 75.143 - 75.152 mm
Class C = 75.153 - 75.163 mm
Permissible oversize of
diameter in production 0.1 mm
Displacement of gudgeon pin
axis in relation to piston axis 2 mm $-0.0/-0.2$

Piston rings:
Number per piston 3
Compression ring:
Number per piston 1
Manufacturer "Goetze" and "Nova"
Nominal diameter 75.2 mm
Height 1.75 mm $-0.010/-0.022$
Width 3.3 mm ± 0.08
Gap 0.20-0.35 ("Nova")/0.30-0.45("Goetze")

Oil scraper ring:
Number per piston 1
Manufacturer "Goetze" and "Nova"
Nominal diameter 75.2 mm
Height 2 mm $-0.010/-0.022$
Width 3.3 mm ± 0.08
Gap 0.20-0.35 mm ("Nova")/0.30-0.45
("Goetze")

Oil ring:
Type with 8 uniformly spaced perforations
Number per piston 1
Material Cast iron, heat treated in the
Ferroxide process
Manufacturer "Goetze" or "Nova"
Nominal diameter 75.2 mm
Height 4mm $-0.010/-0.022$
Width 3.3 mm ± 0.08
Gap 0.20-0.35 mm ("Nova")/0.30-0.45
("Goetze")

Gudgeon pins:
Material Steel
Length 62.5 mm $-0.0/-0.2$
Outer diameter 22 mm $-0.005/-0.009$
Internal diameter 12 mm $\pm 0.2/-0.1$
Location Held in position by 2 circlips

VALVES

Inlet valves:
Material Steel, heat treated
Nominal diameter of head 33.5 mm ± 0.1
Overall length 8 mm $-0.000/-0.015$
Valve stem diameter 8 mm $-0.000/-0.015$ mm
Nominal angle of seat contact face 45°

Width of seat contact face	2 mm +0.6/+0.0
Lift at tappet	5.72 mm
Lift at valve	8.58 mm

Exhaust Valves:

Material	Steel
Nominal diameter of head	30 mm +/- 0.5 mm
Overall length	112 +/- 0.5 mm
Valve stem diameter	8 mm -0.000/-0.015
Nominal angle of seat contact face	45°
Width of seat contact face	2 mm +0.6/+0.0
Lift at tappet	5.72 mm
Lift at valve	8.58 mm

Inlet Valve Seat:

Material	Cast iron
Outer diameter	35.105 - 35.125 mm
Bore diameter (before processing cylinder head)	28 mm
Seat angle of contact face (after processing)	44° +15' / +0

Insertion in Cylinder Head:

The cylinder head is heated for one hour to 230° C and the valve seats (at ambient temperature) uniformly pressed in and checked (check at base of bore).

Exhaust Valve Seat:

Material	Cast iron
Outer diameter	32.105 - 32.125 mm
Bore diameter (before processing cylinder head)	26 mm
Seat angle of contact face (after processing)	44° +15' / +0
Insertion in cylinder head	Same procedure as for inlet valve seats

Valve Guides:

Material	Cast iron
Length	52 mm
Outer diameter	14 mm +0.003/-0.012
Bore diameter after being pressed in	8.022-8.040 mm

Installed position in Cylinder Head:

After being pressed into the cylinder head the guide for the inlet valve should project 20.5 +/- 0.5 mm out of the head and the exhaust valve 18 +/- 0.5 mm. The cylinder head is heated for one hour to 230° C, the guides chilled to -70° C and pressed in uniformly.

Push Rods:

Material	Steel
Length	247.5 mm max.
Diameter	7 mm -0.0/-0.2

Rocker Shafts:

Material	Steel, heat treated
Length	184.5 mm
Outer diameter	18 mm -0.000/-0.018
Internal diameter	8 mm +0/+0.5

Valve Springs - Outer Springs:

Two concentric springs per valve	Outer spring
Type	Constant turn pitch
Direction of winding	Clockwise
Free length	58.1 mm

Max. length when compressed	29.2 mm
Number of turns	7.25
Number of useful turns	5.75
Outer diameter max.	31.2 mm
Internal diameter max.	23 mm
Wire diameter	3.8 mm

Valve Springs - Inner Springs:

Two concentric springs per valve	Inner spring
Type	Progressive turn pitch
Direction of winding	Clockwise

Free length	47 mm
Max. length when compressed	24 mm
Number of turns	9
Number of useful turns	7
Outer diameter max.	20.9 mm
Internal diameter max.	15.3 mm
Wire diameter	2.5 mm

Valve Tappets:

Material	Cast iron, phosphate treated
Length	40 mm +/- 0.5
Dia. after heat treatment	16.974 - 17.0 mm
Bore dia. in cylinder block	17.0 - 17.021 mm

Rocker Arms:

Material	Steel
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Oil Pump

Gear-type pump, gears made of sintered steel, straight toothing. Installed position on timing case cover on longitudinal axis of camshaft. Oil pressure at operating temperature with strainer 4.8 kg/cm² +/- 0.2 at 3,500 rpm.

VALVE TIMING

Setting with clearance of 0.35 at cam and 0.52 between rocker arm and valve:

Inlet valve opens	17° B.T.D.C.
Inlet valve closes	63° A.B.D.C.
Exhaust valve opens	54° B.B.D.C.
Exhaust valve closes	19° A.T.D.C.

Valve Clearance at Rocker Arm:

Inlet - cold	0.25 mm
Inlet - hot	0.30 mm
Exhaust - cold	0.35 mm
Exhaust - hot	0.40 mm

(Feeler gauge should slide easily.)

IGNITION

All dimensions are given in mm.

Firing order (No. 1 cylinder at the flywheel end)

Pre-ignition on crankshaft 1 - 3 - 4 - 2
12° (with automatic gearbox = 8°)

Pre-ignition through centrifugal advance 32° crankshaft

Pre-ignition through vacuum advance max. 16° at vacuum of 400 g/cm²

Pre-ignition overall on crankshaft 44°

CLUTCH

All dimensions are given in mm.

Type	Single dry plate
Operation	Clutch pedal and hydraulic system
Free travel of clutch pedal	2 - 3 mm

GEARBOX AND DIFFERENTIAL

All dimensions are given in mm.

Number of gears	4 forward, 1 reverse speed
Synchromesh	1st, 2nd, 3rd, 4th speeds

Reduction ratios:

1st speed	3.65 : 1
2nd speed	2.06 : 1
3rd speed	1.38 : 1
4th speed	1.0 : 1
Reverse	3.39 : 1
Speedometer	5/12

Propeller Shaft

Two half shafts, equipped with rubber coupling at the front on the gearbox and universal joints at centre and rear.

REAR AXLE

All dimensions are given in mm.

Rear axle	Semi-floating axle
Bevel drive pinions	Hypoid toothing
Gearing	9/40

Overall gear ratios:

1st speed	16.2 : 1
2nd speed	9.2 : 1
3rd speed	6.1 : 1
4th speed	4.4 : 1
Reverse	15.1 : 1

FUEL SYSTEM

Carburettor

Carburettor	Weber 28-36 DCB
Setting data	1st barrel (primary)
Choke tube	25
Main jet	135
Air correction jet	205
Slow-running jet	45
Slow-running air jet	200
Emulsion tube	F33
Float needle valve	175
Float level	7.5
Centering ring	F4.5

Accelerator pump	Return flow sealed
Pump jet	50
Vacuum connection for "blow-by"	Diameter 8
Choke air jet	150
Choke fuel jet	F 1/180
Normal fuel consumption	About 10 litres/100 km (28 mpg)

Carburettor

Carburettor	Weber 28-36 DCB
Setting data	2nd barrel (secondary)
Choke tube	26
Main jet	140
Air correction jet	150
Slow-running jet	70
Slow-running air jet	70
Emulsion tube	F33
Centering of choke tube	F4.5

MODELS WITH AUTOMATIC TRANSMISSION 1966 - 1967 Models

Weber Carburettor 28-36 DCB2

	1st barrel	2nd barrel
Nozzle	25	26
Main jet	130	135
Automatic control	205	155
Idle jet	45	70
Idle, air	190	70
Emulsion tube	F 33	F 33
Needle	175	
Floats (level, without gasket)	7,5 mm	
Mixture adjuster	F 4,5	F 4,5
Accelerator pump	Outlet closed	
Pump jet	50	
Blow-by intake	Dia.8	
Choke, air	100	
Choke, fuel	F1./205	
Air vent,choke	Dia. 6,25	
Dash-pot: idle stroke	4,5 +/-0.5 mm	
Engine No. from 650,000		

Choke tube	25
Main jet	130
Automatic control	155
Idle jet	50
Idle air	220
Emulsion tube	F 21
Accelerator pump	40
Pump jet	40
Econostat - ventilation	190
Econostat	70
Float needle	150
Level, float with gasket	6 mm
Engine No.	from 4.315.983

Carburettor Settings - 1966 Models

	1st barrel (primary)	2nd barrel (secondary)
Choke tube	25	26
Main jet	135	140
Air correction jet	205	150
Slow-running jet	45	70
Slow-running air jet	200	70
Emulsion tube	F 33	F 33
Float needle valve	175	—
Float level	7.5	—
Centering of choke tube	F 4.5	F 4.5
Accelerator pump	sealed return	
Pump jet	60	
Vacuum connection for 'Blow-by'		
Choke air jet	150	
Choke fuel jet	F1/180	

Carburettor Setting - Solex 35 TDIDA

	Stage 1	Stage 2
Choke tube	23	27
Main jet	117.5	130
Air correction jets (automatic control)	110	100
Slow-running jets	47.5	70
Float needle valve (with two gaskets fitted)	1.5	1.5
Float	7.3 g	7.3 g
Pump injector tube	40	
End of pump stroke at a throttle valve opening of		3 mm
Air jet for enrichment tube		220
Fuel bore for enrichment tube		120

COOLING SYSTEM AND HEATER

All dimensions are given in mm.

Cooling system	Pressure feed system controlled by thermostat
Capacity of radiator	.3.25 litres
Capacity of complete system	.6.50 litres
Position of radiator	In front of engine
Type of radiator	Radiator with top and bottom water tanks, vertical cooling pipes
Fan	Four blades at end of water pump shaft in centre of cylinder block
Thermostat opens at	80° C
Water pump	Rotary pump
Drive	V-belt
Temperature control in system	By thermostat

Cooling water control:

Thermo-electric switch on cylinder head indicates temperature by means of tell-tale lamp in combination instrument on instrument panel

Draining of cooling water By opening tap at the bottom right of the radiator

LUBRICATION SYSTEM

All dimensions are given in mm.

System	Pressure feed lubrication through geartype pump
Oil pressure valve in main oil line	ensures oil pressure Normal oil pressure 3.5 - 4.5 kg/cm ² at 3,000 rpm
Contact for low oil pressure on engine block	Tell-tale in combination instrument
Oil filter	Suction filter of oil pump and lubricating oil centrifuge on front end of engine

FRONT SUSPENSION

All dimensions are given in mm.

FRONT SUSPENSION SPRINGS (Up to Body No. L 080587)

Direction of winding	Clockwise
Total free length	.394 mm
Max. height, fully compressed	.110 mm
Number of turns	.10
Useful turns	.8.5
Outer diameter max.	.117.4 +/- 0.5 mm
Wire diameter	.10.9 mm
Permissible dynamic loading	.385 kg

FRONT SUSPENSION SPRINGS (Up to Body No. L 300646)

Direction of winding	Clockwise
Total free length	.420 mm
Max. height, fully compressed	.114 mm
Number of turns	.10.5
Useful turns	.9
Outer diameter max.	.117.4 +/- 0.5 mm
Wire diameter	.10.8 mm
Permissible dynamic loading	.373 kg

FRONT SUSPENSION SPRINGS (From Body No. 300647)

Direction of winding	Clockwise
Total free length	.427 mm
Max. height, fully compressed	.114 mm
Number of turns	.10.5
Useful turns	.9
Outer diameter max.	.117.4 +/- 0.5 mm
Wire diameter	.10.8 mm
Permissible dynamic loading	.373 kg

FRONT SHOCK ABSORBER

Front shock absorbers Hydraulic, thermostatic telescopic shock absorbers, double-acting
non-adjustable

Length of compressed shock absorber (excl. mounting shafts = L = 57)	244 mm
Length, extended	417.5 mm
Diameter of outer tube	44.5 - 45 mm
Oil capacity	About 190 cm ³

STUB AXLES

Material	Steel, heat treated
Bearing seat diameter:	
Inner bearing	27 mm $-0.016/-0.029$ mm
Outer bearing	20 mm $-0.015/-0.026$ mm
Thread	M 18 x 1.5 metric fine

Stub axle bearings	Taper roller bearings
Inner bearing	27 x 50.3 x 14.22
Outer bearing	20 x 47 x 15-15.5

STABILISER TORSION BAR

Material	Spring steel, heat treated
Bar diameter	18 \pm 0.1 mm
Distance between centres of bores	960 \pm 10/0 mm

ADJUSTMENT DATA FOR AXLE GEOMETRY

Pre-condition for adjustment	Laden vehicle = 4 persons and 50 kg luggage
Castor angle	2° 30' – 3° 30'
Camber angle	1° - 1° 45'
Toe-in	1 - 3 mm
Perm. deviation for camber and castor between right and left wheels	30'
King pin inclination	7°

REAR SUSPENSION

All dimensions are given in mm.

REAR SUSPENSION SPRINGS (Up to Body No. L 080587)

Total free length	.325 mm
Max. height, fully compressed	.115 mm
Number of turns	8.5
Useful turns	7
Outer diameter max.	117.4 +/- 0.5 mm
Wire diameter	12.7 mm
Dynamic loading	.585 kg

REAR SUSPENSION SPRINGS

Total free length	375 mm
Max. height, fully compressed	115 mm
Number of turns	9
Useful turns	7.5
Outer diameter, max.	123 +/- 0.5 mm
Wire diameter	12.4 mm
Dynamic loading	515 kg

Shock absorber typeHydraulic, thermostatic
telescopic shock absorber, double-acting,
non-adjustable

Length of shock absorber body (excl. mounting shafts L = 57)	215.35 mm
Length extended	360.5 mm
Outer tube diameter	44.5 - 45 mm
Oil capacity	170 - 0 cm ³ /-10 cm ³

WHEELS AND TYRES

Tyre Sizes and Tyre Pressures

Front:

Michelin X 5.90 x 13	23.5 psi
Englebert Max 5.90 x 13	23.5 psi
Kleber-Colombes V10 5.90 x 13	23.5 psi

Rear:

Michelin X 5.90 x 13	26.5 psi
Englebert Max 5.90 x 13	26.5 psi
Kleber-Colombes V10 5.90 x 13	26.5 psi

STEERING (Gemmer)

All dimensions are given in mm.

Reduction ratio	16.2 : 1
Dia. of turning circle	9.80 m
Number of turns from lock to lock	3 3/4

BRAKES

All dimensions are given in mm.

Type - Front Disc brakes with fixed calliper
and two pads, two wheel brake
cylinders per wheel

Type - Rear Simplex, drum brakes, one wheel brake cylinder per wheel

FRONT WHEEL BRAKES

Dia. of brake discs	246 mm
Mean radius of brake pad contact	99 mm
Size of brake pads	73 x 45 mm
Braking area for 1 wheel (2 disc faces)	590 cm ²

Diameter of wheel brake cylinders (per wheel):	
Inner	48.1 mm
Outer	33.9 mm

REAR WHEEL BRAKES

Diameter of drum 255 +0.45/+0.25 mm
Outer diameter 286 mm
Width of friction surface 49.50 mm
Diameter of wheel brake cylinder 19.05 mm

ELECTRICAL EQUIPMENT

All dimensions are given in mm.

Ignition system Battery ignition, distributor
with centrifugal cam and vacuum advance
Distributor Type Ducellier or SEV
Distributor drive Via intermediate pinion
from camshaft
Gap of contact breaker points 0.47 - 0.53 mm
Dwell angle 56 +/- 1°
Firing order 1 - 3 - 4 - 2
Ignition coil Type Ducellier or SEV
Installed position Vertical in engine
compartment on left-hand wheel
arch casing

BATTERY

Type Dutor - 6 DH 4 or USL 1240 AS
Battery capacity 40 Ah
Voltage 12 volts
Installed position Front right in engine compartm.
Earth connection Negative
Dynamo Shunt-wound with 2 carbon brushes
Manufacturer Paris-Rhone
Amperage 25 amps. at 2,500 rpm
Cut-in speed 1,500 rpm
Maximum output 350 watts
Carbon brush pressure 450 - 500 grams

Regulator switch:

Type Three-terminal, cut-in at
12.8 - 13.8 volts
Installed position In engine compartment on
right-hand wheel arch casing

STARTER MOTOR

Type Pre-engaged starter with solenoid
with three-point flange mounting
Manufacturer Paris-Rhone
Spark plugs Marchal 34 HS
Champion N4
Thread 14 x 1.25
Electrode gap 0.6 - 0.7 mm

TIGHTENING TORQUES 1301

ENGINE

Cylinder Head

Cylinder head bolts (Class 80)	.6.5 kgm (47 lb.ft.)
Cylinder head bolts (Class 100)	.8 kgm (58 lb.ft.)
Nuts of manifold stud bolts	.2 kgm (14.5 lb.ft.)
Nuts - rocker shaft supports	.3 kgm (21.7 lb.ft.)
Adjustment screws and nuts of rocker arms	1.2 kgm (8.6 lb.ft.)
Spark plugs	.2.8 kgm (20.3 lb.ft.)
Sender unit, cooling water temperature	.1.5 kgm (10.8 lb.ft.)
Retaining screws, water outlet	.2.2 kgm (15.9 lb.ft.)

Cylinder Block

Mounting bolts and nuts - Gearbox housing (with washers)	.5.2 kgm (37.6 lb.ft.)
Mounting bolts and nuts - Gearbox housing (without washers)	.2 kgm (14.5 lb.ft.)
Mounting bolts, bearing caps of main crankshaft bearings	.5.5 kgm (39.8 lb.ft.)
Oil pressure switch (sender unit)	.3.5 kgm (25.3 lb.ft.)
Water drain plug	.2 kgm (14.5 lb.ft.)
Screws - oil sump	1 kgm (7.2 lb.ft.)
Screws, sealing ring holder, rear main bearing	1 kgm (7.2 lb.ft.)
Screws, oil pump	.2.2 kgm (15.9 lb.ft.)
Screws, oil pressure line to block	1 kgm (7.2 lb.ft.)
Plug for pressure relief valve of oil pump	.7.5 kgm (54.2 lb.ft.)
Screws/timing case cover	1 kgm (7.2 lb.ft.)
Mounting bolts and nuts, intermediate plate and water pump	1 kgm (7.2 lb.ft.)

Engine Mounting bolts:

Mounting to block	.2.2 kgm (15.9 lb.ft.)
Rubber bearing to mounting	.2.2 kgm (15.9 lb.ft.)
Rubber bearing to crossmember	.2.2 kgm (15.9 lb.ft.)

Crankshaft:

Mounting bolts/flywheel (bolts 9 mm dia.)	.5.5 kgm (39.8 lb.ft.)
Mounting bolts/flywheel (bolts 8 mm dia.)	.3.7 kgm (26.7 lb.ft.)
Centre bolt of oil centrifuge	.8 kgm (58 lb.ft.)

Miscellaneous:

Big end bearing cap bolts	.3 kgm (21.7 lb.ft.)
Mounting bolts/camshaft sprocket	.2 kgm (14.5 lb.ft.)
Mounting bolts/oil pump cover	1 kgm (7.2 lb.ft.)
Screws, oil pressure line to oil pump cover	1 kgm (7.2 lb.ft.)
Nuts/oil pump strainer to oil pump	1 kgm (7.2 lb.ft.)
Bolt, strainer to bracket	.1.7 kgm (12.2 lb.ft.)
Screws, cover of oil centrifuge	1 kgm (7.2 lb.ft.)
Screws, fan blades	1 kgm (7.2 lb.ft.)
Screws, guard plate of flywheel	.2.2 kgm (15.9 lb.ft.)
Retaining nuts/carburettor	.2 kgm (14.5 lb.ft.)
Bolt and nut, adjustment rail of dynamo to intermediate plate of water pump	.2.2 kgm (15.9 lb.ft.)
Bolt and nut, dynamo to adjustment rail	.2.2 kgm (15.9 lb.ft.)
Mounting bolts/starter motor	.2.2 kgm (15.9 lb.ft.)

CLUTCH

Bolts and nuts, clutch housing to cylinder block and gearbox housing with "Onduflex" washers	.5.2 kgm (37.6 lb.ft.)
Bolts and nuts, clutch housing to cylinder block and gearbox housing without "Onduflex" washers	.2 kgm (14.5 lb.ft.)
Retaining nut/clutch release fork	1.2 kgm (8.6 lb.ft.)
Bolts, guard plate/engine flywheel	1 kgm (7.2 lb.ft.)
Bolts, clutch mechanism to flywheel	1.2 kgm (8.6 lb.ft.)
Mounting bolts, clutch cylinder	.2.2 kgm (15.9 lb.ft.)

FRONT AXLE

Shock absorbers	1 kgm (7.2 lb.ft.)
Nut, upper mounting on body	1.2 kgm (8.6 lb.ft.)
Nut, lower mounting on cam of king pin	1.2 kgm (8.6 lb.ft.)
Retaining bolts, spring pad to king pin cam	.2.2 kgm (15.9 lb.ft.)

Stub axle:

Nut, upper king pin to stub axle	.7.5 kgm (54.2 lb.ft.)
Nut, lower ball joint to stub axle	.8 kgm (58 lb.ft.)
Upper swinging arm (wishbone):	
Bolt to king pin cam	.5.5 kgm (39.8 lb.ft.)
Nut to cam	.5.5 kgm (39.8 lb.ft.)
Bolts and nuts, pivot shaft to crossmember	.8.5 kgm (61.6 lb.ft.)
Nut, pivot shaft to pivot bearing (silent block)	.8.2 kgm (59.4 lb.ft.)

Lower swing arm:

Mounting axle with nut to cross member	.8 kgm (58 lb.ft.)
Bolts and nuts, ball joint to lower swinging arm	.5.5 kgm (39.8 lb.ft.)

Front axle crossmember:

Vertical mounting bolts, crossmember to body	.4.7 kgm (34 lb.ft.)
Horizontal mounting bolts and nuts, cross member to body	.4.7 kgm (34 lb.ft.)

Traction strut support:

Bolts, support to front body crossmember	.2.2 kgm (15.9 lb.ft.)
Bolts, support to longitudinal member and stabiliser	.2.2 kgm (15.9 lb.ft.)

Traction strut:

Bolt/swinging arm	.6 kgm (43.4 lb.ft.)
Bolts and nuts, torsion bar to traction strut	.2.2 kgm (15.9 lb.ft.)
Screw, pipe clamps (for adjustment of castor angle)	.2.2 kgm (15.9 lb.ft.)
Bolt, ball joints to support	.3 kgm (21.7 lb.ft.)

STEERING

Nuts of retaining bolts, steering housing	.4.7 kgm (34 lb.ft.)
Nuts of retaining bolts, steering lever block	.4.7 kgm (34 lb.ft.)
Retaining nuts, ball joints of steering rod to drop arm and intermediate steering arm	.3 kgm (21.7 lb.ft.)
Retaining nuts, ball joints of track rods to drop arm and steering arm of stub axle	.3 kgm (21.7 lb.ft.)
Bolts and nuts of pipe clamps on adjustment sleeve	.2.2 kgm (15.9 lb.ft.)
Retaining nut of steering wheel	.5.2 kgm (37.6 lb.ft.)
Key and nut, shaft disc mounting	1 kgm (7.2 lb.ft.)

GEARBOX

Bolt/spring plate to body	.2.2 kgm (15.9 lb.ft.)
Bolt/support plate to body	.2.2 kgm (15.9 lb.ft.)
Bolt/rubber bearing to gearbox housing and rubber bearing to spring shackle	.2.2 kgm (15.9 lb.ft.)
Bolt/spring shackle to body	.2.2 kgm (15.9 lb.ft.)
Collar studs of housing halves	.2.2 kgm (15.9 lb.ft.)
Nut/drive flange to output shaft	.8 kgm (58 lb.ft.)
Nuts, bearing and reverse gear pinion to countershaft	15 kgm (108.5 lb.ft.)
Retaining nut, speedometer drive housing	1 kgm (7.2 lb.ft.)
Stop screw, selector fork 1st, 2nd and 3rd, 4th speed	1 kgm (7.2 lb.ft.)
Retaining screw, reverse selector fork	.2.2 kgm (15.9 lb.ft.)
Retaining nut of complete gear selector fork	1.2 kgm (8.6 lb.ft.)
Retaining nut of selector shaft	1.2 kgm (8.6 lb.ft.)
Retaining nut of drive hub of 3rd, 4th gear on output shaft	15 kgm (108.5 lb.ft.)
Retaining screw, locking plates of bearings (drive and output shafts)	.2.2 kgm (15.9 lb.ft.)
Mounting screws, rear cover and exhaust silencer bracket	.2.2 kgm (15.9 lb.ft.)
Retaining screws of clamp plate of fork shaft springs	.2 kgm (14.5 lb.ft.)
Bolts and nuts, clutch housing to cylinder block and gearbox housing (with "Onduflex" washers)	.5.2 kgm (37.6 lb.ft.)
Bolts and nuts, clutch housing to cylinder block and gearbox housing (without washers)	.2 kgm (14.5 lb.ft.)
Retaining nuts, clutch release fork shaft	1 kgm (7.2 lb.ft.)
Mounting bolt, guard plate of flywheel	.2.2 kgm (15.9 lb.ft.)
Mounting bolts, clutch slave cylinder	.2.2 kgm (15.9 lb.ft.)

Propeller Shaft

Mounting bolts and nuts, "Juboflex" doughnut coupling to three-arm flange, gearbox side	.5.2 kgm (37.6 lb.ft.)
Mounting bolts and nuts, "Juboflex" doughnut coupling to three-arm flange, propeller shaft side	.5.2 kgm (37.6 lb.ft.)
Bolt, intermediate universal joint bracket to body	.2.2 kgm (15.9 lb.ft.)

Nuts of clamps on intermediate universal

joint flange	.1 - 1.5 kgm (7.2 - 10.8 lb.ft.)
Nut of intermediate universal joint flange	13 kgm (94 lb.ft.)
Bolts and nuts, drive pinion flange to propeller shaft	.2.2 kgm (15.9 lb.ft.)

REAR AXLE

Shock Absorbers

Nut, shock absorber bracket to lower suspension arm	.2.2 kgm (15.9 lb.ft.)
Nut, top, shock absorber to body	1.2 kgm (8.6 lb.ft.)
Nut, bottom, shock absorber to lower suspension arm	1.2 kgm (8.6 lb.ft.)
Bolt, swinging arm to axle housing	11.5 kgm (83 lb.ft.)
Bolt, swinging arm to body	.7.5 kgm (54.2 lb.ft.)

Upper Suspension Arm

Bolt, swinging arm to axle housing	11.5 kgm (83 lb.ft.)
Bolt, swinging arm to body	.7.5 kgm (54.2 lb.ft.)

Torsion Bar of Transverse Stabiliser

Bolt, torsion bar to axle housing	.9.5 kgm (68.7 lb.ft.)
Bolt, torsion bar to body bracket	.9.5 kgm (68.7 lb.ft.)
Bolt, body bracket to body, 8 mm dia.	.2.0 kgm (14.5 lb.ft.)
Bolt, body bracket to body, 10 mm dia.	.4.7 kgm (34 lb.ft.)

Differential

Bolts of bearing cap to differential carrier	.4.7 kgm (34 lb.ft.)
Bolts of crown wheel to differential housing	.6.5 kgm (47 lb.ft.)
Nut of bevel drive pinion	13.7 kgm (99 lb.ft.)
Mounting bolts of differential carrier on axle housing	.3.0 kgm (21.7 lb.ft.)
Drain plug to axle housing	1.0 kgm (7.2 lb.ft.)
Bleed plug to axle housing	.1.5 kgm (10.8 lb.ft.)

BRAKES

Bolt, brake anchor plate to stub axle	.4.7 kgm (34 lb.ft.)
Bolt, brake anchor plate to axle housing	.2.4 kgm (17.4 lb.ft.)
Threaded centering pin and mounting bolt, brake drum to front wheel hub	1.2 kgm (8.6 lb.ft.)
Threaded centering pin and mounting bolt, brake drum to rear axle housing	1.2 kgm (8.6 lb.ft.)
Bolts, front wheel brake cylinder to brake anchor plate	1 kgm (7.2 lb.ft.)
Bolts, rear wheel brake cylinder to brake anchor plate	1 kgm (7.2 lb.ft.)
Retaining pin and nut of front handbrake cable to intermediate lever	.4.7 kgm (34 lb.ft.)
Mounting bolt and nut, three-way distributor to suspension crossmember	.1.6 kgm (11.5 lb.ft.)
Brake hoses to connectors	.2 kgm (14.5 lb.ft.)
Wheel bolts	.6.2 kgm (44.8 lb.ft.)

TIGHTENING TORQUES 1500/1501

ENGINE

Cylinder Head

Cylinder head bolts	.8 kgm (58 lb.ft.)
Nuts of manifold stud bolts to cylinder head	.2 kgm (14.5 lb.ft.)
Adjustment screws and nuts of rocker arms	1.2 kgm (8.6 lb.ft.)
Spark plugs	.28 kgm (20.3 lb.ft.)
Sender unit of remote thermometer	.15 kgm (10.8 lb.ft.)
Retaining screws, water outlet	.22 kgm (15.9 lb.ft.)
Mounting of rear water outlet to cylinder head	.65 kgm (47 lb.ft.)

Cylinder Block

Mounting bolts and nuts:

Gearbox housing to block (with "onduflex" washers)	.52 kgm (37.6 lb.ft.)
(without washers)	.2 kgm (14.5 lb.ft.)
Bolts of crankshaft bearing caps	.65 kgm (47 lb.ft.)
Oil pressure switch	.35 kgm (25.3 lb.ft.)
Drain plug in cylinder block	.2 kgm (14.5 lb.ft.)
Securing screws of oil sump	1 kgm (7.2 lb.ft.)
Screws of upper and lower half shells of sump	1 kgm (7.2 lb.ft.)
Screws of sealing ring holder on rear bearing cap	1 kgm (7.2 lb.ft.)
Securing screws of timing case cover	1 kgm (7.2 lb.ft.)
Mounting bolts and nuts, intermediate plate of water pump	1 kgm (7.2 lb.ft.)
Securing screws of fuel pump	.2 kgm (14.5 lb.ft.)
Securing screws, camshaft flange	1 kgm (7.2 lb.ft.)
Securing screws, dynamo to cylinder block	.47 kgm (34 lb.ft.)

Engine Mounting:

Bolt, engine mounting to cylinder block	.22 kgm (15.9 lb.ft.)
Nuts, mounting of rubber bearing to engine mounting	.22 kgm (15.9 lb.ft.)
Nut, mounting of rubber bearing to crossmember	.22 kgm (15.9 lb.ft.)

Crankshaft:

Mounting bolts of flywheel (bolt dia. 9)	.55 kgm (39.8 lb.ft.)
Mounting bolts of flywheel (bolt dia. 8)	.37 kgm (26.7 lb.ft.)
Centre bolt of oil centrifuge	.8 kgm (58 lb.ft.)

Miscellaneous:

Big end bearing cap bolts	.45 kgm (32.6 lb.ft.)
Mounting bolts, camshaft sprocket	.2 kgm (14.5 lb.ft.)
Mounting bolts, oil pump cover	1 kgm (7.2 lb.ft.)
Plug of oil pump pressure relief valve	.4 kgm (29 lb.ft.)
Screws, oil pump strainer to timing case cover	1 kgm (7.2 lb.ft.)
Bolt, oil pump strainer to bracket	.17 kgm (12.2 lb.ft.)
Securing screws, cover of oil centrifuge	1 kgm (7.2 lb.ft.)
Securing screws of fan blades	.22 kgm (15.9 lb.ft.)
Retaining nuts, carburettor	.2 kgm (14.5 lb.ft.)

Bolts and nuts, adjustment rail of dynamo to

intermediate plate of water pump	.22 kgm (15.9 lb.ft.)
Mounting bolt, dynamo to adjustment rail	.22 kgm (15.9 lb.ft.)
Mounting bolts, starter motor*	.22 kgm (15.9 lb.ft.)

CLUTCH

Bolts and nuts, clutch housing to cylinder

block and gearbox housing (with "onduflex" washers)	.52 kgm (37.6 lb.ft.)
Bolts and nuts, clutch housing to cylinder block and gearbox housing (without washers)	.2 kgm (14.5 lb.ft.)
Retaining nut, clutch release fork	1.2 kgm (8.6 lb.ft.)
Mounting bolts, guard plate of engine flywheel	1 kgm (7.2 lb.ft.)
Bolts, clutch mechanism to flywheel	1.2 kgm (8.6 lb.ft.)
Mounting bolts, clutch cylinder	.22 kgm (15.9 lb.ft.)

FRONT AXLE

Shock absorbers:

Securing nut, upper mounting on body	1 kgm (7.2 lb.ft.)
Securing nut, lower mounting on cam of king pin	1.2 kgm (8.6 lb.ft.)
Spring pad bolt, spring pad to cam of king pin	.22 kgm (15.9 lb.ft.)

Stub axles:

Nut, upper king pin to stub axle	.75 kgm (54.2 lb.ft.)
Nut, lower ball joint to stub axle	.8 kgm (58 lb.ft.)

Upper swing arm (wishbone):

Bolt, swinging arm to cam of king pin	.55 kgm (39.8 lb.ft.)
Nut, bolt of swinging arm to cam	.55 kgm (39.8 lb.ft.)
Bolts and nuts, pivot shaft of swinging arm to crossmember	.85 kgm (61.6 lb.ft.)
Nut, pivot shaft of swinging arm to pivot bearing (silent block)	.82 kgm (59.4 lb.ft.)

Lower swing arm:

Bolt, swinging arm to cross member	.8 kgm (58 lb.ft.)
Bolts and nuts, ball joint to lower swinging arm	.55 kgm (39.8 lb.ft.)

Front axle crossmember:

Vertical mounting bolt, crossmember to body	.47 kgm (34 lb.ft.)
Horizontal mounting bolt, crossmember to body	.47 kgm (34 lb.ft.)

Traction strut support:

Bolt, support to front body crossmember	.22 kgm (15.9 lb.ft.)
Bolt, support to longitudinal member and stabiliser	.32 kgm (23.1 lb.ft.)

Traction strut:

Bolt, traction strut to swinging arm	.6.0 kgm (43.4 lb.ft.)
Securing screw, pipe clamps of traction struts (adjustment of castor angle)	.2.2 kgm (15.9 lb.ft.)
Bolt, ball joint to support	.3 kgm (21.7 lb.ft.)

STEERING

Nuts of retaining bolts, steering housing	.4.7 kgm (34 lb.ft.)
Nuts of retaining bolts, steering lever block	.4.7 kgm (34 lb.ft.)
Nuts, ball joints of steering rod to drop arm and intermediate steering arm	.3 kgm (21.7 lb.ft.)
Nuts, ball joints of track rods to drop arm and steering arm of stub axle	.3 kgm (21.7 lb.ft.)
Bolts and nuts of pipe clamps on adjustment sleeve	.2.2 kgm (15.9 lb.ft.)
Retaining nut of steering wheel	.5.2 kgm (37.6 lb.ft.)
Key and nut, shaft disc mounting	1 kgm (7.2 lb.ft.)

GEARBOX

Bolt, spring plate to body	.2.2 kgm (15.9 lb.ft.)
Bolt, support plate to body	.2.2 kgm (15.9 lb.ft.)
Bolt, rubber bearing to gearbox housing and rubber bearing to spring shackle	.2.2 kgm (15.9 lb.ft.)
Bolt, spring shackle to body	.2.2 kgm (15.9 lb.ft.)
Collar studs of housing halves	.2.2 kgm (15.9 lb.ft.)
Nut, drive flange to output shaft	.8 kgm (58 lb.ft.)
Nuts, bearing and reverse gear pinion to countershaft	15 kgm (108.5 lb.ft.)
Retaining nut, speedometer drive housing	1 kgm (7.2 lb.ft.)
Stop screw, selector fork 1st, 2nd and 3rd, 4th speed	1 kgm (7.2 lb.ft.)
Retaining screw, reverse selector fork	.2.2 kgm (15.9 lb.ft.)
Retaining nut of complete gear selector lever	1.2 kgm (8.6 lb.ft.)
Retaining nut of selector shaft	1.2 kgm (8.6 lb.ft.)
Nut of input shaft bearing	15 kgm (108.5 lb.ft.)
Retaining nut of drive hub of 3rd and 4th gear on output shaft	15 kgm (108.5 lb.ft.)
Retaining screw, locking plates of bearings (drive and output shaft)	.2.2 kgm (15.9 lb.ft.)
Retaining screws, rear cover and exhaust silencer bracket	.2.2 kgm (15.9 lb.ft.)
Retaining screws of clamp plate of fork shaft springs	.2 kgm (14.5 lb.ft.)
Mounting bolts and nuts, clutch housing to cylinder block and gearbox housing (with washers)	.5.2 kgm (37.6 lb.ft.)
(without washers)	.2 kgm (14.5 lb.ft.)
Retaining nuts, clutch release fork shaft	1 kgm (7.2 lb.ft.)
Mounting bolts, guard plate of flywheel	.2.2 kgm (15.9 lb.ft.)
Mounting bolts, clutch slave cylinder	.2.2 kgm (15.9 lb.ft.)

AUTOMATIC GEARBOX

Torque converter to spring plate	.3.5 - 4.1 kgm (25.3 - 29.7 lb.ft.)
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Converter housing to gearbox	1.1 - 1.4 kgm (8.6 - 11.1 lb.ft.)
Oil sump to gearbox	1.1 - 1.4 kgm (8.6 - 11.1 lb.ft.)
Outer lever to selector control shaft on gearbox housing	1.4 - 2.1 kgm (11.1 - 15.2 lb.ft.)
Union of pressure gauge	0.6 - 0.7 kgm (4.3 - 5 lb.ft.)
Oil drain plug	1.4 - 1.9 kgm (11.1 - 17.8 lb.ft.)
Locknut, front brake band adjustment	2.1 - 2.8 kgm (15.2 - 20.3 lb.ft.)
Locknut for switch of starter lock	0.6 - 0.8 kgm (4.3 - 5.8 lb.ft.)
Cap nut, sleeve stop of change-down valve cable at gearbox	1.1 - 1.2 kgm (7.9 - 8.6 lb.ft.)
Cap nut, oil filler pipe to gearbox	2.8 - 4.1 kgm (20.3 - 29.7 lb.ft.)
Stone guard mesh to ventilation slots of convertor housing	0.2 kgm (1.4 lb.ft.)
Cap nuts of oil cooler pipes	0.8 - 1.4 kgm (5.8 - 11.1 lb.ft.)

Propeller Shaft:

Bolts and nuts, "Juboflex" doughnut couplings to three-arm flanges, gearbox and propeller shaft side	.5.2 kgm (37.6 lb.ft.)
Bolt, intermediate universal joint bracket to body	.2.2 kgm (15.9 lb.ft.)
Nuts of clamps on intermediate universal joint flange	1.0 - 1.5 kgm (7.2 - 10.8 lb.ft.)
Nuts of intermediate universal joint flange	13.0 kgm (94 lb.ft.)
Bolts and nuts, drive pinion flange to propeller shaft	.2.2 kgm (15.9 lb.ft.)

REAR AXLE

Shock absorbers:

Retaining nut, shock absorber bracket to lower suspension arm	.2.2 kgm (15.9 lb.ft.)
Nut, top, shock absorber to body	1.2 kgm (8.6 lb.ft.)
Nut, bottom, shock absorber to lower suspension arm	1.2 kgm (8.6 lb.ft.)

Lower suspension arm:

Bolt, swinging arm to axle housing	11.5 kgm (83 lb.ft.)
Bolt, swinging arm to body	.7.5 kgm (54.2 lb.ft.)

Torsion bar of transverse stabiliser:

Bolt, torsion bar to axle housing	.9.5 kgm (68.7 lb.ft.)
Bolt, torsion bar to body bracket	.9.5 kgm (68.7 lb.ft.)
Bolt, body bracket to body:	
Bolt 8 mm dia.	.2.0 kgm (14.5 lb.ft.)
Bolt 10 mm dia.	.4.7 kgm (34 lb.ft.)

Differential:

Mounting bolts of differential carrier to axle housing	.3 kgm (21.7 lb.ft.)
Mounting bolts of bearing cap to differential carrier	.4.7 kgm (34 lb.ft.)
Mounting bolts of crown wheel to differential housing	.6.5 kgm (47 lb.ft.)
Nut of bevel drive pinion	13.7 kgm (99 lb.ft.)
Drain plug to axle housing	1 kgm (7.2 lb.ft.)
Bleed plug to axle housing	1.5 kgm (10.8 lb.ft.)

BRAKES

Threaded centering pin and mounting bolt, brake disc to wheel hub	1.2 kgm (8.6 lb.ft.)
Mounting bolt, deflector plate of disc . . . . .	.2.2 kgm (15.9 lb.ft.)
Mounting bolt of complete calliper to stub axle . . . . .	.7.0 kgm (50.6 lb.ft.)
Mounting bolt of pressure distributor . . . . .	.2.2 kgm (15.9 lb.ft.)

PRECAUTIONS FOR THE WINTER AND HINTS FOR WINTER DRIVING

INTRODUCTION

This section is written for the thoughtful and safety-minded driver, giving recommendations to guide you safely through the hazards of driving during the winter months.

By regular maintenance you will most probably maintain your car in its top performance, however, it might be advisable to follow the instructions in this section to give you added safety insurance during the difficult months of snow, ice and hazardous road conditions.

Battery

As the battery is more called upon during the winter, it must be at all times in good condition to fulfil its function. Shorter days, with consequently more frequent use of the lights, the use of the heater blower and the increased load on the windscreen wipers during periods of snow fall all claim their share from the battery. To maintain the efficiency of the battery, check the electrolyte level and the specific gravity of the electrolyte. The battery performance will be impaired by loose or corroded connections. So in good time, make sure your terminal posts and connectors are thoroughly cleaned and that all connections at the battery, starter motor, starter solenoid switch and in particular the earth connections are absolutely tight. If your car is garaged during the winter, the battery should be re-charged every 4 - 8 weeks to be ready for the spring.

Cooling system

This might be the item every driver immediately connects with frost and winter, as the dangers of serious damage to the engine are well known, if the correct precautions are not observed. The system should be drained, flushed with clear water and then re-filled with a suitable anti-freeze solution. If your cooling system is filled already with a "all-year-round" anti-freeze solution check the specific gravity of the coolant to make sure that the cooling system is protected to the lowest temperature that might prevail in your area. As anti-freeze has a searching effect for leaks check all hoses and clips for tightness.

Brakes

There is little we can tell a driver about braking on ice and snow, but just to remember that the brakes should be in top condition and the braking power to all wheels should be in the correct relation to each other. Brake hoses and connections should be checked to make sure they are not chafed or damaged. All leaks should be rectified. Special attention should be given to the brake pedal rubber. If the rubber is worn smooth, it is easier to slip off with your foot, especially when you just stepped into the car with your shoes covered in snow. A pedal rubber with the proper profile will reduce this danger. When applying your brakes on ice or snow, it should be done firmly and an "apply/release" technique should be used to avoid locking the wheels. If you experience that your car is moving off slowly on a frosty morning, it might be advisable not to apply the handbrake the next night, as the reason for the sluggish behaviour are frozen brake linings. To free a handbrake in this condition, pull and release the lever until the ice is broken. Sudden acceleration or braking and violent movement of the steering wheel should be avoided to prevent skidding.

Tyres

The condition of the tyres is of particular importance during winter driving. Apart of the legal requirements of your country, which will require from you a minimum tread depth whatever the conditions, it will also save you embarrassing situations on ice and snow covered roads. Even if you drive with the minimum tread depth it might be that your journey becomes a nightmare, as confidence in road holding ability can be easily lost after the slightest breakaway.

Special consideration should be given to the use of snow chains or special winter tyres for extremely bad conditions. Even a set of ordinary new tyres will make already a difference when it comes to negotiating a hill or a bend when there is ice or snow on the roads. If the traction of your drive wheels is lost, engage the next highest gear, reduce the engine speed and move away slowly. If your wheels are spinning without showing any grip whatsoever, engage alternatively forward and reverse gears and bring the car to a rocking movement, controlling the accelerator pedal carefully. With patience (and luck!) it might be possible to regain grip on firmer ground. If the described method is not successful, clear away the ice and snow in front of the wheels and place grit, old sacks (or if nothing else is available your floor mats) in front of the driving wheels and try again.

Engine oil

Make sure the oil in your engine sump is suitable for the temperatures to be expected. If your engine is turned over slowly by the starter motor, depress the clutch pedal to disengage the transmission flow between engine and gearbox to remove the additional effort of turning the gears through the cold gearbox oil.

Ignition

The humid and wet conditions of winter can emphasize any weak points in the ignition system. Starting problems on a cold winter's day are not welcome. To avoid them, check all connections, spark plugs, leads and the distributor cap well in advance of the winter. In case that your engine runs normally, but will not accelerate, check your carburettor for icing-up and don't assume immediately that it is an electrical matter. To de-ice the carburettor, stop the car and let the engine run normally for a few minutes.

Lights and lamps

Winter not only brings colder weather but longer nights and day-time fog. This means more driving in the hours of darkness and greater use of lights during daytime. Check your headlamp alignment to avoid dazzling oncoming traffic. Also make sure that all bulbs and lamps are in proper working order. It is advisable to keep a set of bulbs and fuses in your glovebox.

Body

The salt used to thaw up the roads and dissolve ice and snow has its natural usefulness, but shows also a side effect, that is to say it has a detrimental effect on the underbody of a car. It is, however, possible to avoid this disadvantage, if the underside of your car is cleaned immediately after driving over roads with road treatment salts. The investment of having underbody protection sprayed over the vulnerable areas might be well worth considering. Check the paint work of your body and repairs areas that have been scratched with a matching touch-up

paint. Winter conditions accelerate the development of rust and subsequent repair of your paint work becomes more expensive than a tin or spray can of touch-up paint.

Never wash or polish your car in direct sunlight or in the open when it is freezing.

Windscreen wipers and washer

Check the condition of your wiper blades well in advance of the winter and replace your rubbers if not in absolute top. Wipers have to shift snow during the winter months and they

must be able to cope with it, to assure you an uninterrupted vision. Remember that your windscreen washer container will freeze if it only contains water. You will find a proprietary brand of special liquid to be filled into the container, but do not use anti-freeze as used in the cooling system. Do not operate your windscreen washer if the temperatures are below freezing point, if only plain water is filled in your container. A sheet of ice will form immediately on your windscreen. In this connection it should also be remembered that the driving wind will contribute considerably to this danger.

MODEL CHECK		1300	1301	1500	1501			
Year & Chassis No.		1963 - 66	1966 >	1963 - 65	1968 >			
ENGINE CHECK	Engine Type/No.	312 T		342				
	No. of Cyl./Capacity	4 1290	4 1290	4 1475	4 1475			
Compression Ratio	:1	8,4	8,4		10,1			
Compression Pressure	kg/cm ² /psi	9,75/139	9,75/139		10,7/152			
Oil Pressure	kg/cm ² /psi	3,5 - 4,5/50 - 64	3,5 - 4,5/50 - 64					
Valve Clearance - Inlet	mm/in.	0,2/0,008 (c)	0,2/0,008 (c)	0,2/0,007 (c)	0,3/0,012 (h)			
" " - Outlet	mm/in.	0,25/0,010 (c)	0,25/0,010 (c)	0,35/0,013 (c)	0,4/0,015 (h)			
OUTPUT	HP/rpm	62 BHP/5200	62 BHP/5200	81 BHP/5400	84 BHP/5600			
Max. Torque	mkp/lb. ft./rpm	10,2/74/2600	10,2/74/2600	12,5/90,4/3500	12,3/89/4000			
Road Horsepower	kmh/rpm/gear							
	HP							
Top Speed at 1000 rpm.	gear/kmh/mph							
Acceleration	0-100 kmh/60 mph/secs.							
CARBURETTION CHECK	Octane	97		97				
Carburettor	Make	SOLEX	SOLEX	WEBER	WEBER			
	Type	32 PBIC	32 PBIC	28/36 DCB	28/36 DCB			
Idling Speed	rpm	700	700	700	700			
Fuel Pump Pressure	kg/cm ² /psi	0,2/2,8		0,2/2,8	0,2/2,8			
Fuel Consumption	l/100 km(DIN)/mpg							
Combustion Efficiency	Vol. %/CO at rpm							
ELECTRICAL CHECK								
Battery Type/Polarity	V/Ah/neg./pos.	12/40 neg.	12/40 neg.	12/40 neg.	12/40 neg.			
IGNITION CHECK								
IGNITION COIL	Make/Type	DUCELLIER/SEV	DUCELLIER/SEV	DUCELLIER/SEV	DUCELLIER/SEV			
Ballast Resistor	Ohms							
Voltage at Terminal 15	min. V							
Coil with steady Current	min. V							
During Cranking	Ohms							
Primary Resistance at 20°C/68°F	Ohms	0,5	0,5		0,5			
DISTRIBUTOR	Make	DUCELLIER/SEV	DUCELLIER/SEV	DUCELLIER/SEV	DUCELLIER/SEV			
	Type							
Dwell Angle	Degrees/%	56 ± 1	51 - 58	51 - 58	51 - 58			
Contact Breaker Gap	min. mm/in.	0,5/0,019	0,5/0,019	0,5/0,019	0,5/0,019			
Condenser capacity	Mfd/min.k Ohms	0,20 - 0,30	0,20 - 0,30	0,20 - 0,30	0,20 - 0,30			
Firing Order/Cylinder 1		1 - 3 - 4 - 2	1 - 3 - 4 - 2	1 - 3 - 4 - 2	1 - 3 - 4 - 2			
Timing mark location	Moving/Fixed	P	P	P	P			
IGNITION TIMING - Static	°BTDC	12	12	4	12			
Stroboscopic Timing	°BTDC/rpm							
Stroboscopic at Idl. Speed	°BTDC/rpm							
CENTR. ADVANCE	Vacuum discon.							
- Starts	rpm/c/s deg.	1500/0 - 1	1000/0	1000-1500/0-1	1000/0			
- Interm.	rpm/c/s deg.	2000/4 - 10	2000/6	2000/5 - 8	2000/6			
- Interm.	rpm/c/s deg.	3000/12 - 16	3000/14	3000/13 - 17	3000/14			
- Ends	rpm/c/s deg.	4400/24 - 28	4400/26	4800/28 - 32	4800/30			
VACUUM ADVANCE	Range c/s deg.	14 - 18	26 - 30	18 - 22	22 - 26			
	Start mm Hg/in.	139/5,5	150/6	60/6,5	104/5			
	End mm Hg/in.	300/11,8	300/12	393/15,5	400/16			
SPARK PLUGS	Make	MARCHAL/LODGE	MARCHAL/LODGE	MARCHAL/CHAMPION	MARCHAL			
	Type	35 S/4 N	35/HN	34 HS/N 4	35 HS			
Gap	mm/in.	0,6/0,024	0,47-0,53/0,019-0,021	0,65/0,025	0,6/0,024			
STARTER CHECK	Make/Type	PARIS RHONE	PARIS RHONE	PARIS RHONE	PARIS RHONE			
Starting Voltage	min. V							
Lockdraw	min. V/A							
GENERATOR CHECK	Make/Type	PARIS RHONE	PARIS RHONE	PARIS RHONE	PARIS RHONE			
Output	A/V/rpm G	17/14,5/2400	17/14,5/2400	25/14/2500	25/14/2500			
REGULATOR CHECK	Make/Type	PARIS RHONE	PARIS RHONE	PARIS RHONE	PARIS RHONE			
Open Circuit	V	14,4 - 15,3	14,4 - 15,3	14,4 - 15,3	14,4 - 15,3			
Voltage Regulator	V			14,2 - 14,9				
Closed Circuit	A							
Current Regulator	A	18	18	25	17			
Cut-in Voltage	V	12,8 - 13,8	12,8 - 13,8	12,4 - 13,4	12,4 - 13,4			
Drop-off Voltage	V	6	6	6	6			
Reverse Current	A							
NOTES								

SUPPLEMENT FOR SIMCA 1301 GL/GLS WITH 345 ENGINE

Engine type number	345
Compression ratio	9,1
Capacity	1290 cc
Power output	66 DIN
Axle ratio	9 x 38
Engine oil pressure at 3000 r.p.m. and 70° C	56 to 80 p.s.i.
Firing order	1-3-4-2
Initial advance	12°
Dwell angle	56° ± 1°
Approx. C.B. gap	,017" to ,019" ,43mm to 48mm
Spark plug gap	.60mm ,025"
Recommended plugs	Champion N5, N9Y Marchal 35 HS Bosch W200T30 - AC44XL Lodge HLN
Valve clearance cold	Inlet ,25mm Exhaust ,35mm Inlet ,010" Exhaust ,013"
Valve clearance hot	Inlet ,30mm Exhaust ,40mm Inlet ,012" Exhaust ,016"
Head bolt size	19mm A/F
Head bolt torque	80 lbs.ft. 11m.k.g.
Petrol minimum octane	97 4 star
Fuel tank capacity	12 gallons
Engine sump capacity/Engine oil grade	7 pints/20/W50
Gearbox capacity and grade	2 ³ / ₄ pints/EP90
Axle /Transaxle capacity /Oil grade	1 ³ / ₄ pints/EP90
Steering box/rack oil	EP 90
Cooling system capacity	12 pints
Antifreeze required	3 pints Bluecol standard
Brake fluid	Lookhead Super 105
Tyre type and size	165 x 13 radial
Tyre pressure p.s.i. (Av. load)	Front 23 p.s.i. Rear 26 p.s.i.
Toe in - out (front)	,5mm ± ,5mm ,02" ± ,02"
Castor	2° 30' ± 30'
Camber	1° ± 15'

The SOLEX 28/35 SDID carburettor may be fitted on the 1301 model cars in replacement of the WEBER 28/36 DC3 5 or 6 carburettor.

The operating principle of this carburettor is identical to that of the 35 SDID fitted to the 1501 S model cars.

Carburettor Data	1st Barrel	2nd Barrel
Venturi	23,5	27
Secondary venturi	2,8	3,5
Main jet	125	145
Air correction jet or	110	100
Main ventilation		
Emulsion tube	Special	Special
Fuel enrichment		140
Air enrichment		40
Idling jet	47,5	75
Idling air bleed	80	80
Air below venturi	200	
Progression holes	115-90-70	100-100
Accelerating pump jet	45	