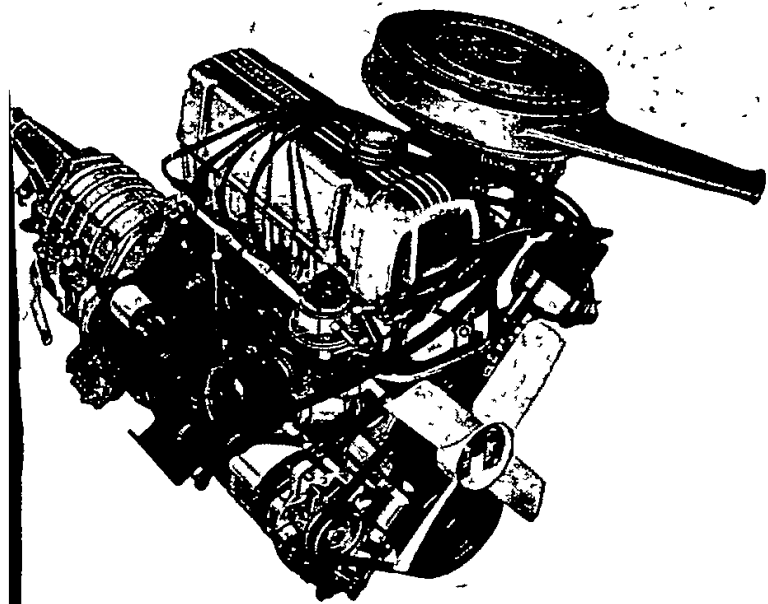


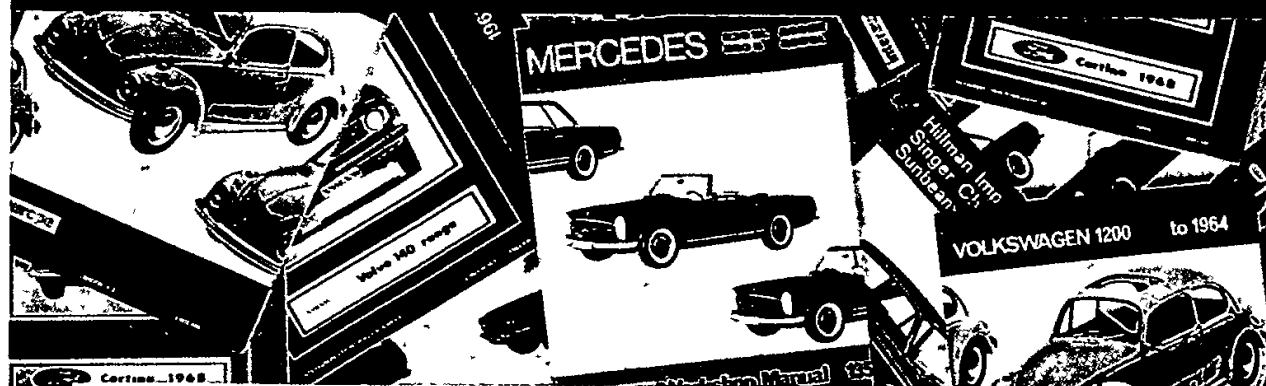
DATSUN 1300 & 1600 up to 1970



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Workshop Manual 137

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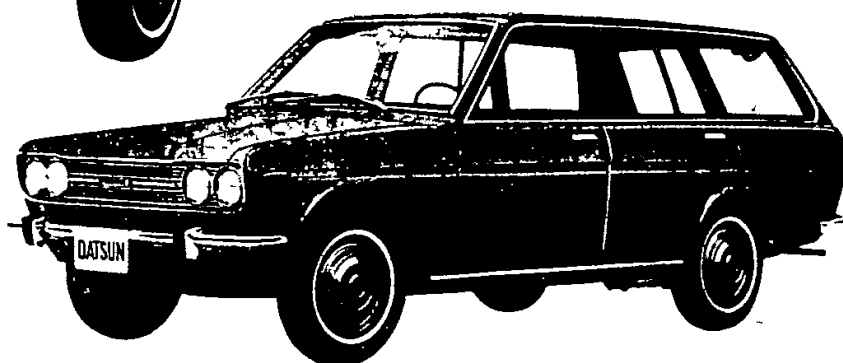
Titles available NOW

121	VOLKSWAGEN 1200	1964
122	VOLKSWAGEN 1200/1200 A	1964/1967
123	VOLKSWAGEN 1300/1300 A/1500	to 1967
124	RENAULT R8	to 1967
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126	TOYOTA CORONA	1963-1968
127	FORD ESCORT	1968-1969
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130	FORD CORTINA 1300 GT, 1600 & 1600E ENGINES	1968
131	VAUXHALL VIVA HB & HOLDEN HB TORANA	1967-1969
132	OPEL KADETT & RALLYE KADETT	1962-1968
133	ALFA ROMEO RANGE	1959-1968
134	ROOTES IMP RANGE	1963-1969
135	MERCEDES-BENZ 230 & 250 MODELS	1965-1968
136	FORD CAPRI 1300-1600 etc.	
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144	FORD 17/20M	Up to 1969
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150	PEUGEOT 403-404	
159	SAAB 99	1968-1970



419 1E12 6

WORKSHOP MANUAL **for** **DATSUN Saloon & Estate** **1300 c.c. & 1600 c.c.**



COMPILED AND WRITTEN
BY
PETER R D RUSSEK

intereurope

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Type Identification

SALOON MODELS

Model designation	Type	Engine	Gearbox
510-U, L510	Deluxe	L13	Three speed remote control
P510-U, PL510		L16	Three speed remote control
P510-UT, PL510-T, PL510-UT			Four speed floor shift
P510-UA, PL510-A, PL510-UA			Automatic three speed
510-SU, L510-S	Standard	L13	Three speed remote control
P510-SU, PL510-S		L16	Three speed remote control
P510-SUT, PL510-ST			Four speed floor shift
P510-UTK, PL510-TK	SSS	L16 with SU twin carb	Four speed floor shift

ESTATE CAR MODELS

WP510-U, WPL510	Deluxe	L16	Three speed remote control
WP510-UT, WPL510-T, WPL510-UT			Four speed floor shift
WP510-UA, WPL510-A, WPL510-UA			Automatic three speed

DIMENSIONS AND TYRE PRESSURES

Length overall	
Standard Saloon	4,070 mm (160 2 in)
De-Luxe & SSS Saloon	4,120 mm (162 2 in)
Estate Car	4,145 mm (163 2 in)
Width overall	1,560 mm (61 4 in)
Height overall	
Saloon	1,400 mm (55 1 in)
Estate Car	1,435 mm (56 5 in)
Wheel base	2,420 mm (95 3 in)
Min ground clearance	
Saloon	190 mm (7 4 in)
Estate Car	165 mm (6 4 in)
Front track	
Saloon	1,280 mm (50 4 in)
Estate Car	1,275 mm (50 2 in)
Rear track	
Saloon	1,280 mm (50 4 in)
Estate Car	1,260 mm (49 6 in)
Tyre pressures	
Front	24 psi (1 7 kg/sq cm) Normal condition 28 psi (2 0 kg/sq cm) High speed driving
Rear	24 psi (1 7 kg/sq cm) Normal condition 28 psi (2 0 kg/sq cm) High speed driving

FILLING CAPACITIES

Engine oil	
Max	4 0 litres (1 06 US gal., 0 88 Imp gal)
Min	3 0 litres (0 79 US gal, 0 66 Imp gal)
Gearbox oil	1 7 litres (1 79 US qts., 3 Imp pts)
Autom transmission	7 litres (7 39 US qts., 12 3 Imp pts.)
Differential oil	
Saloon	0 8 litres (0 84 US qts ; 1 4 Imp pts)
Estate Car	1 0 litre (1 05 US qts., 1 76 Imp pts)
Steering gear	0 32 litres (0 33 US qts., 0 56 Imp. pts.)

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Introduction

This Workshop Manual was written with the intention of providing the owner of a Datsun 1300 or 1600 and the non-franchised garage with details of all the maintenance and repair operations that they are likely to encounter. Much information from the manufacturer's original service and repair instructions have 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 Datsun range of cars.

The manual describes the 1300 and 1600 c.c. engines fitted to the Standard, De-Luxe and SSS Saloon models and the range of Estate Cars. A complete list of engine tuning data for all models with single or twin carburettors is included in the manual. There are also separate sections covering the different types of rear axles and rear suspensions, used for the Saloon and Estate Car Models.

In certain cases it will be necessary for the repairer to make use of special tools, and the appropriate tool numbers and their methods of use are either described in the text or can be taken from illustrations, referred to in the chapter.

Special mention should be made of the fact that a fault finding section is annexed to most of the major sections, thus simplifying the sometimes difficult task of diagnosis. The measurement conversions given in inches have been converted as closely as possible from the original millimetre sizes, but it is preferable to adhere to the metric dimensions whenever possible. A conversion table is included in the manual and we advise the reader to cross-reference with the table when dealing with critical dimensions.

We have tried to make this manual as brief as possible, illustrating rather than detailing the operations. This will save valuable time and will also 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 and the experience gained by the author, who himself was a skilled motor mechanic for 15 years, 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!

The author would like to thank for the help and assistance given to him by Mr. John Haley



Fig A 1 Removal of the clutch slave cylinder

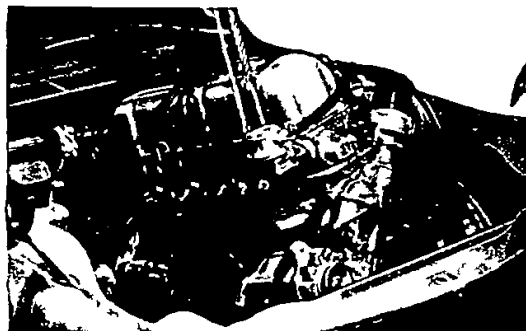


Fig.A.2 The removal of the engine.

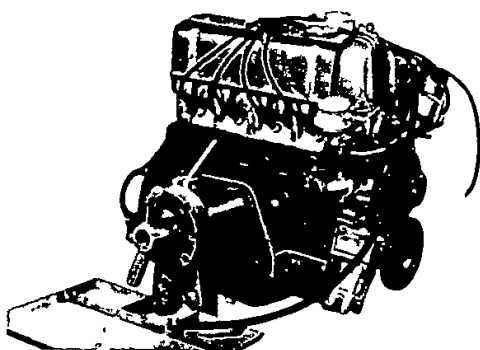


Fig A 3 L13 (or L16) engine fitted to mounting stand

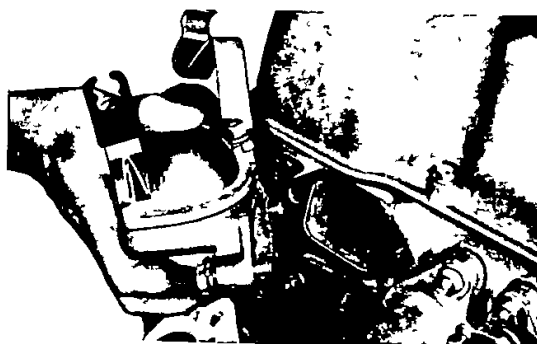


Fig.A 4 Removal of the thermostat housing.

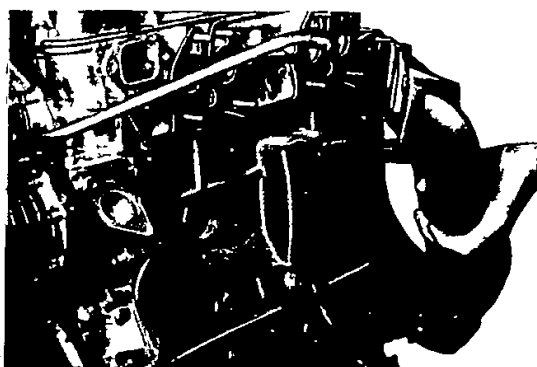


Fig.A.5 Removal of the manifold assembly

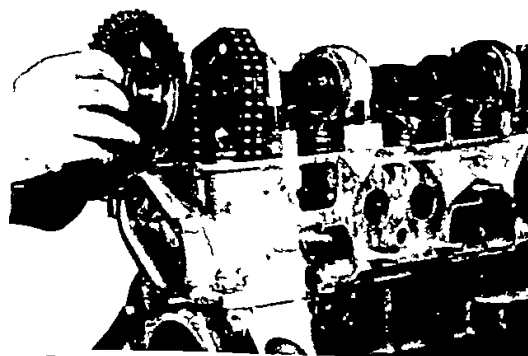


Fig.A 6 Removal of the camshaft drive sprocket

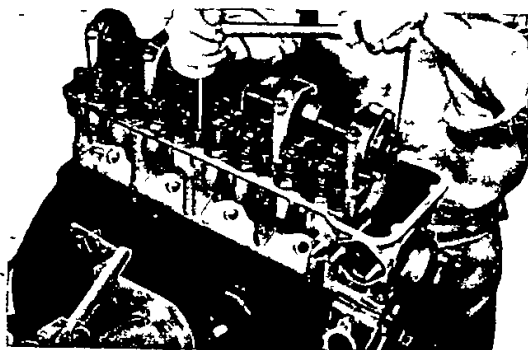


Fig.A.7. Removal of the cylinder head

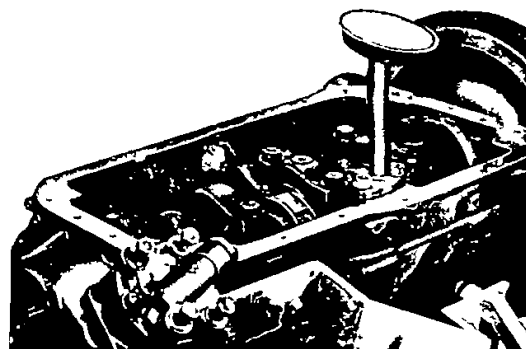


Fig.A 8. Removal of the oil strainer

Engine

INTRODUCTION

The 1300 c.c. and 1600 c.c. engines are 4 cylinder in-line engines with a single overhead camshaft and a five bearing crankshaft. The 1300 and 1600 c.c. engines differ only in size. The 1600 c.c. engine is available in two versions, one of which is equipped with twin S.U. carburettors with different cylinder head, manifolds, pistons and compression ratio whereas the other has a single twin choke carburettor.

ENGINE — Removal

Drain the coolant, engine and gearbox oil and remove or disconnect the following parts: Battery, bonnet, air cleaner and rocker box breather hose, radiator grill, upper and lower radiator hoses, radiator, torque converter cooling hoses from radiator (automatic models only), cooling fan and pulley, fuel pipe, heater hoses if fitted, accelerator linkage, choke cable, wiring from starter motor, alternator, coil, oil pressure sender unit and temperature sender unit.

Remove the clutch slave cylinder (Fig A 1) and its return spring. Remove or disconnect.

Speedometer cable, flat connector from reversing light switch, gearchange linkage, front exhaust pipe from manifold, then the front pipe first silencer and centre pipe assembly, the propeller shaft at the front.

Jack up the gearbox slightly and remove the rear engine mounting bracket, the mounting crossmember and the handbrake cable clamps.

Remove the bolts securing the front engine mounting brackets to the crossmember. Fit a lifting hook to the engine hangers and carefully lift the engine and gearbox in a tilted position, e.g. forwards and upwards, using a suitable crane or hoist (Fig A 2).

ENGINE — Dismantling

Remove the gearbox and the starter motor. Mark the clutch cover and the flywheel suitably with a centre punch, and remove the clutch cover together with the clutch driven plate.

Remove the following parts: Alternator and bracket, engine mountings, oil filter, water drain plug, oil pressure switch. Mount the engine in a suitable stand (if available Special Tool ST37200510 (attachment) and Stand ST37100000 (See Fig. A 3.))

Remove the distributor cap together with the spark plug leads, unscrew the spark plugs and remove the distributor. Remove the thermostat housing (Fig A 4).

Remove the inlet and exhaust manifolds. (Fig. A 5)

Remove the crankshaft pulley.

Remove the fan pulley and the water pump, fuel pump and rocker cover.

Remove the fuel pump drive cam and the crankshaft sprocket (Fig A.6)

Remove the cylinder head assembly (Fig A 7) using special wrench ST49010000 for removing the cylinder head bolts.

Turn the engine over and remove the sump and the internal oil strainer (Fig A 8), timing chain cover, chain tensioner and timing chain. Remove the oil thrower, the crankshaft worm gear and the chain drive sprocket (Fig A 9).

Remove the big end bearing caps, pistons and connecting rod assemblies, keeping them in sets in the correct assembly order. Remove the flywheel and the main bearing caps using a special tool (ST44630000 for the rear main bearing cap (Fig A 11)).

Remove the rear oil seal and lift out the crankshaft. Remove the baffle plate and the cylinder block net (Fig A 11).

Remove the piston rings with a suitable piston ring expander and the gudgeon pin with a suitable mandrel, the outer diameter of which should not exceed the diameter of the piston pin and a handpress (There is also special tool ST4484000D).

Remove the valve rocker springs, loosen the rocker pivot lock nuts and remove the rocker arms by pressing down the valve springs. Remove the camshaft, taking care not to score the camshaft bushes. Remove the valves with a conventional valve lifter (Fig A 12).

ENGINE — Inspection and Overhaul

Thoroughly clean all parts of dirt, oil and water scale before inspection and before attempting to carry out overhaul operations. Blow out all passages with compressed air. Remove carbon deposits from the top of the pistons, combustion chambers, cylinder head, and valves, but do not remove metal from any of the parts.

Inspect and overhaul the parts as follows:

Cylinder head

Check cylinder head for cracks and the mating faces for burrs or unevenness and replace if necessary (note that different cylinder heads are used for the single and twin carburettor versions of the 1600 c.c. engine). Check the mating surface for flatness by means of a straight edge placed across the head and checking the clearance with a feeler gauge (Fig A 13). If the clearance exceeds 1.0 mm (0.0039 in.) regrind the cylinder head to block face.

Check the valve seats for damage or wear and if necessary reface in accordance with the dimensions given in Fig A 14 and A 15. If necessary replace valve inserts. To replace the inserts, bore out the old insert and select the correct insert (Fig A 16) and fit by heating the cylinder head to 150 - 200°C. (300 - 390°F).

Valve guides

Using micrometers (internal and external) check the tolerance between the valve stems and the valve guides. This clearance must not exceed 0.048 mm (0.0019 in.) for inlet valves and 0.073 mm (0.0029 in.) for exhaust valves. An easy way of checking the clearance is to insert the valve stem into the guide.

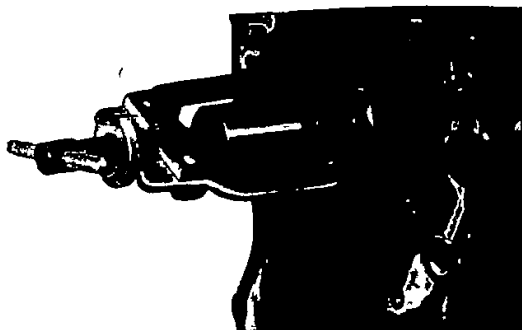


Fig.A 9 Removal of the crankshaft chain sprocket.

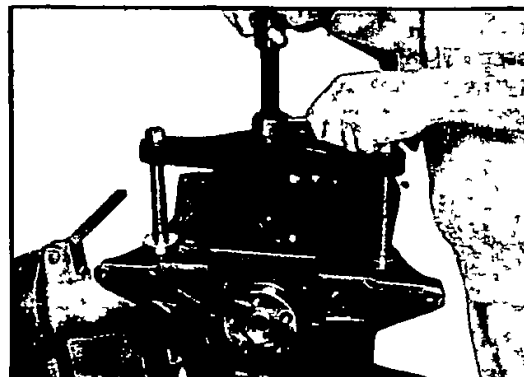


Fig A 10 Removal of the rear main bearing cap



Fig.A 11 Removal of the baffle plate and cylinder block net

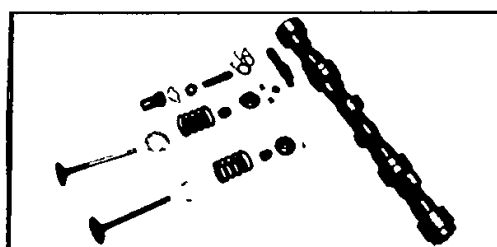


Fig.A 12 The valve mechanism

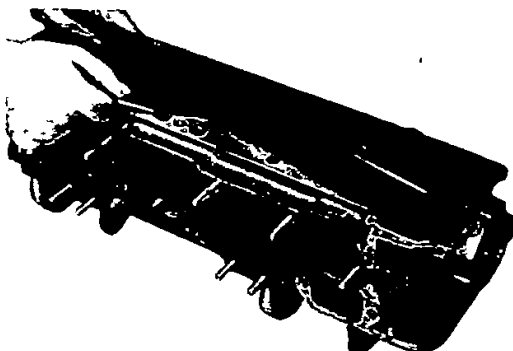
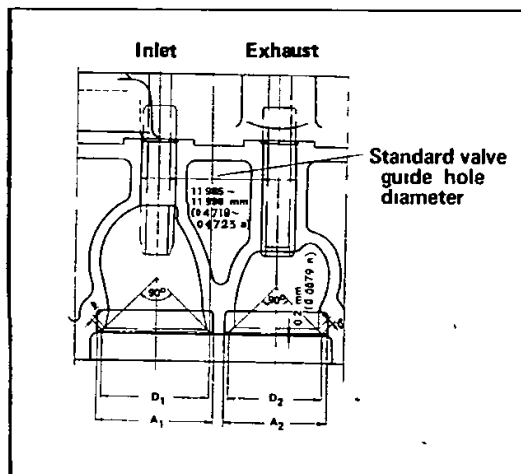


Fig.A 13 Checking the cylinder head surface for flatness.



	L13 and L16 (Single carb)	L16 (Twin carb)
A1 mm DIA	41 0 ~ 41 016	45 0 ~ 45.016
A2 mm DIA	57.0 ~ 37.016	37 0 ~ 37 016
D1 mm DIA	37 6 ~ 37 8	41 6 ~ 41 8
D2 mm DIA	32 4 ~ 32 6	32 4 ~ 32 6
ℓ 1 mm	1.4 ~ 1.8	1.4 ~ 1.8
ℓ 2 mm	1.6 ~ 2.0	1.6 ~ 2.0

Fig.A.15 Valve seat insert.

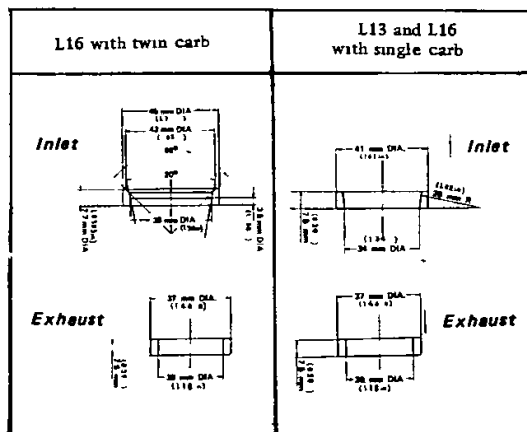


Fig.A.14. Standard valve seat insert.

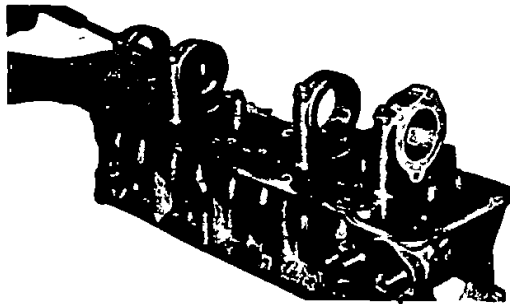


Fig.A.16 Checking the camshaft bearing inner diameter

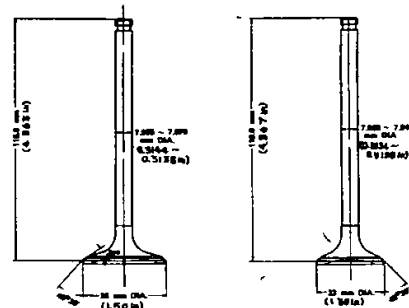


Fig.A.17 Valves for L13 and L16 engine with single carburettor

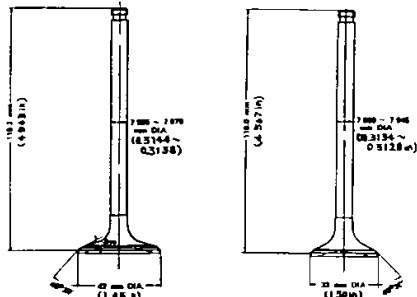


Fig A 18 Valves for L16 engine with twin carburetors.

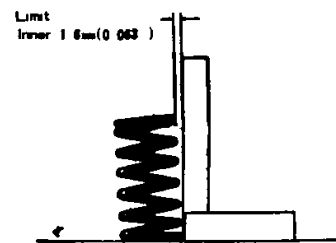


Fig.A.19 Checking the valve spring for squareness.

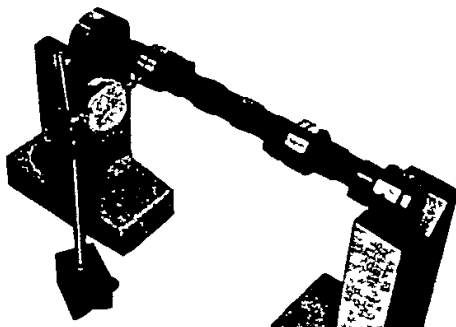


Fig.A.20 Checking the camshaft for run-out.

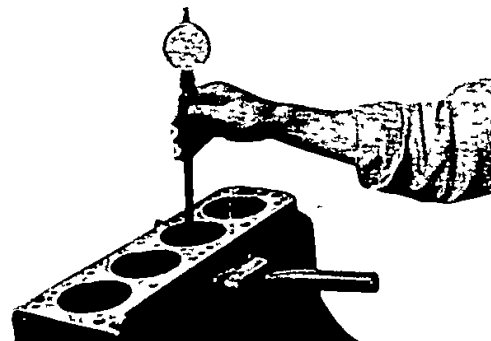


Fig.A.21 Measuring the cylinder bore by means of a dial gauge

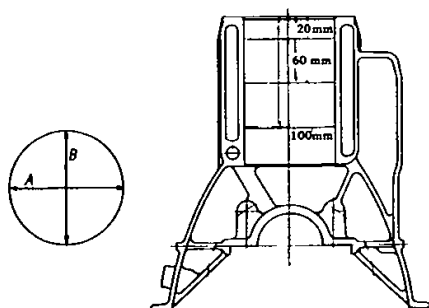


Fig.A.22. The measuring points of the cylinder bore.

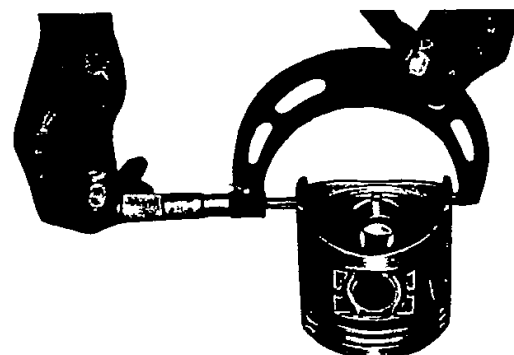


Fig.A.23 The measuring of the piston diameter by means of a micrometer.

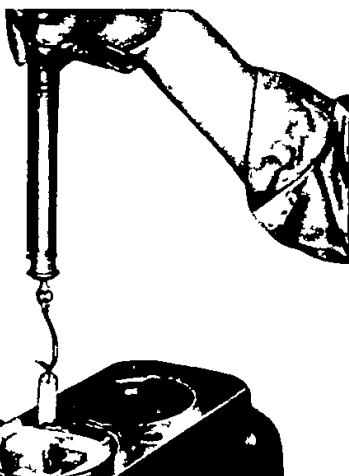


Fig A 24 Checking the piston running clearance in the cylinder bore

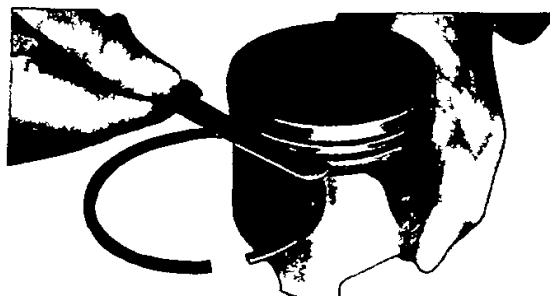


Fig A.25 Checking the side clearance of the piston rings.



Fig A 26 Checking the piston ring gap

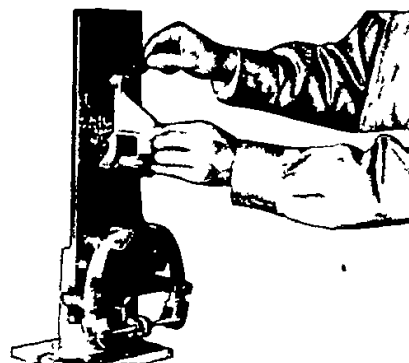


Fig.A 27 Checking the connecting rod for bends or twists



Fig.A 29 Checking the running clearance for the main bearings.

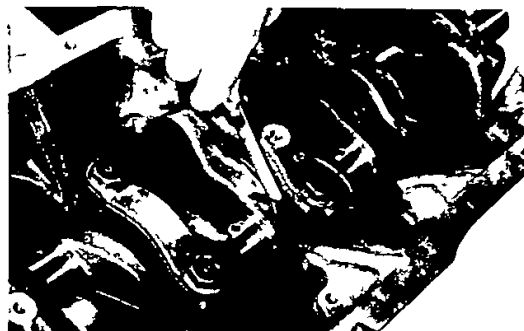


Fig A 28 Checking the crankshaft end float.

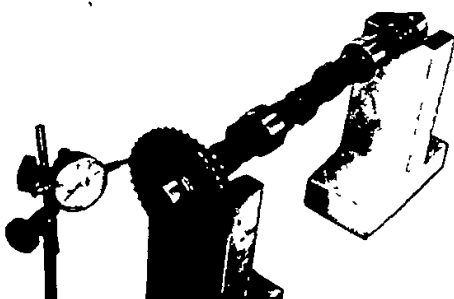


Fig.A 30 Checking the crankshaft sprocket for run-out.

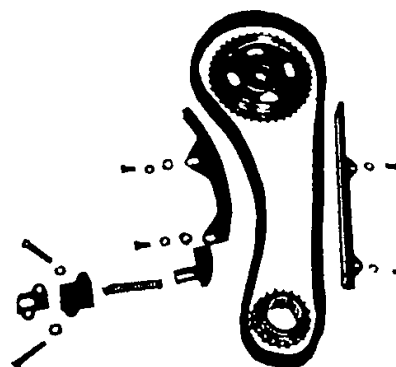


Fig.A.31 The camshaft drive mechanism.

and move it from left to right. If this movement exceeds 0.2 mm (0.0079 in) the guide needs replacing. When replacing valve guides press out the old guide and press in the new guide after the cylinder head has been heated to 150 - 200°C (300 - 390°F). Valve guides are available in oversize of 0.2 mm (0.0079 in). Finally ream the valve guide to the dimension of the valve stem, observing the specified running clearance between guide and stem.

Valves

Check the valve face for pits, grooves, scores and other damage. Check the stem for distortion and wear. When inspecting the valve heads, check in particular for burrs, cracks and corrosion. If the valve head edge is worn down to 0.20 in (0.5 mm) replace the valve. If necessary grind the valve on a valve grinding machine, taking off only enough material to remove pits and grooves. The valve dimensions are shown in Fig A 17 and A 18.

Valve springs

Measure the free length of the valve springs and replace if less than specified. Also test the valve spring pressure. Check the valve springs for distortion by placing a steel square on to a surface plate. Position the spring against the square edge and slowly rotate the spring. The clearance between the top of the spring and the edge should not exceed 1.6 mm (0.063 in) (Fig A 19). The valve spring specifications are given in section TECHNICAL DATA.

Camshaft

Measure the inside diameter of the camshaft bearings and the outside diameter of the camshaft journals and if wear is found inside the brackets, replace the cylinder head assembly. The wear limit is 0.1 mm (0.0039 in).

Check the camshaft for wear and damage and if these exceed the limits given in section TECHNICAL DATA replace the camshaft. The camshaft run-out can be checked as shown in Fig A 20. The indication on the dial gauge should not exceed 0.05 mm (0.0020 in).

Cylinder block

Visually check the block for flaws and cracks. Check the mating surface the same way as the cylinder head and if the deviation exceeds 0.1 mm (0.0039 in) regrind the block.

Cylinder bore

Check the cylinder bores for excessive wear, ovality and taper (Fig A 21). The measuring points for the cylinder bores are shown in Fig A 22. If the bores are within the limits, remove the carbon deposit ridge at the top of the cylinder bore, using a suitable tool. The specifications are given in section TECHNICAL DATA.

Reboring cylinders

When reboring, all bores must be done at the same time. As a specialised workshop is dealing with operations of this nature, it is necessary to inform the workshop of this procedure. Five oversize piston sets are available and are listed in section TECHNICAL DATA. To obtain the finished bore size, measure the piston across its skirt as shown in Fig A 23 and add the average value of the piston to cylinder clearance.

When the cylinder bores have been finish honed, check the piston cylinder clearance as shown in Fig A.24, using a feeler

gauge and a spring scale. With a feeler gauge of 0.04 mm (0.0016 in) thickness, the pulling force on the spring scale should be 0.2 - 1.5 kg (0.441 - 3.307 lbs.).

If the cylinder bores are worn beyond the maximum oversize, there are cylinder liners available.

Pistons, gudgeon pins and piston rings

Check for wear, scratches and seizing and if necessary replace. Check the side clearance of the piston rings in the grooves of the piston as shown in Fig A 25. The correct specifications are given in section TECHNICAL DATA under the same heading.

Place the piston rings into the cylinder bore and measure the piston ring gap (Fig A 26). The ring gaps should be as follows:

Upper compression ring	0.23-0.38 mm (0.0091-0.0150 in)
Second compression ring	0.15 - 0.30 mm (0.0059 - 0.0118 in)
Oil ring	0.15-0.30 mm (0.0059-0.0118 in)
Wear limit	1.0 mm (0.0394 in)

Measure the gudgeon pin hole and the gudgeon pin diameter and compare the measured results in accordance with the dimensions in section TECHNICAL DATA under the relevant heading. The gudgeon pin should have a finger-press fit in the piston and a tight press fit in the connecting rod, at room temperature. The interference fit of the gudgeon pin to connecting rod should be 0.015 - 0.033 mm (0.0006 - 0.0013 in).

Connecting rods

Check the connecting rods for bends or twists using a connecting rod aligning tool (Fig A 27). For each 100 mm (3.94 in) length a permissible bend or twist of 0.03 mm (0.0012 in) is allowed. A limit of 0.05 mm (0.0020 in) should not be exceeded.

Fit the connecting rod to the crankshaft and check the clearance which should be 0.2 - 0.3 mm (0.0079 - 0.0118 in) and should not exceed 0.30 mm (0.0118 in).

Crankshaft

Check for wear, ovality and general scores, cracks and run-out the journals and crankpins. The limits are 0.03 mm (0.0012 in) for ovality and taper. The run-out limit is a total deviation of 0.05 mm (0.002 in).

Check the crankshaft end float at the centre bearing. If the end float exceeds 0.3 mm (0.0118 in) replace the centre shims. The specified end float is between 0.05 - 0.15 mm (0.002 - 0.0059 in). Check the end float as shown in Fig A 28.

Crankshaft journals and big end bearings

The checking of the main and big end bearings should be carried out as follows:

Check the conditions of the bearings and clean the bearings. Place a piece of "Plastigage" on the bearing over its full width in parallel with the crankshaft and fit together the bearing and its cap, tightening the bolts to the following torques:

Main bearings	4.5 - 5.5 kgm (32.5 - 39.8 lb.ft)
Big end bearings	2.7 - 3.3 kgm (19.5 - 23.9 lb.ft)

Then remove the cap and check the width of the "Plastigage"

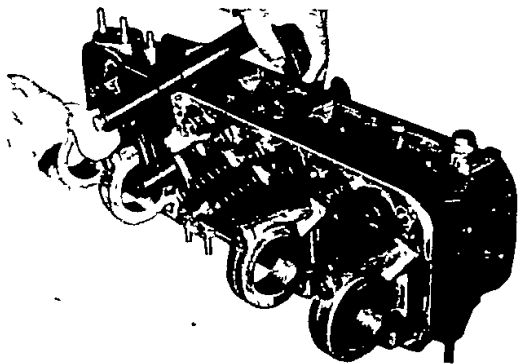


Fig.A.32 Installation of the valves.

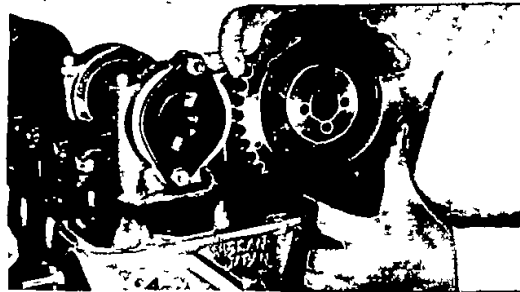


Fig.A.33 Installation of the camshaft sprocket.



Fig.A.34 Exploded view of piston and connecting rod assembly

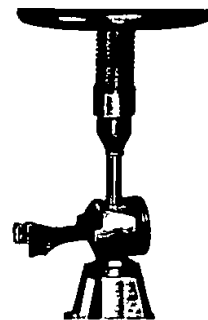


Fig.A.35 Installation of the piston pin



Fig.A.36 Checking the crankshaft end float.

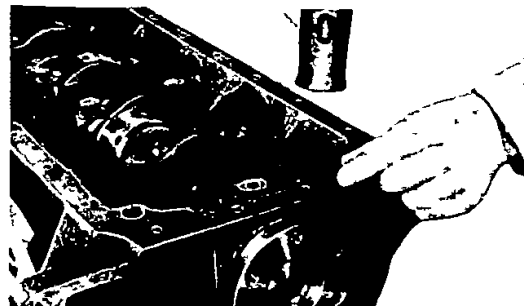


Fig.A.37 Installation of the side oil seal

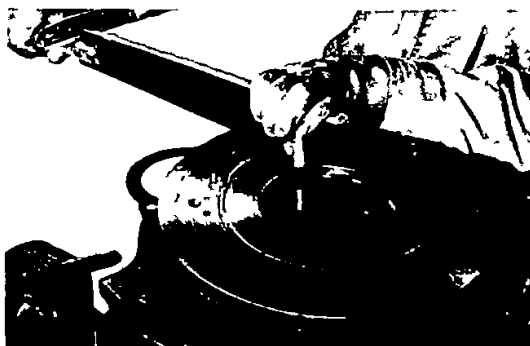


Fig.A.38. Installation of the flywheel

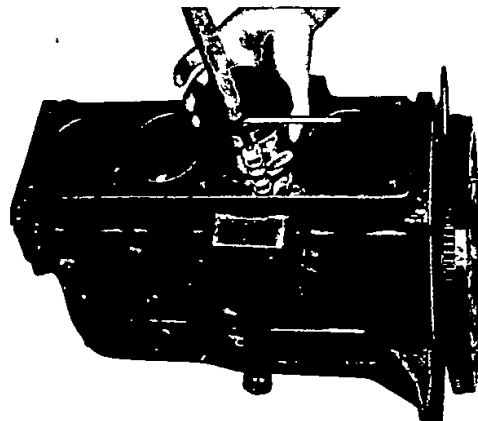


Fig.A.39. Installation of piston and connecting rod assembly



Fig.A 40 Installation of the big end bearing caps.



Fig.A 41 Checking the side play of the big end



Fig A 42. Installation of the cylinder head

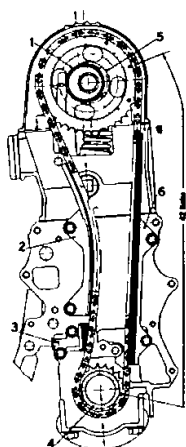


Fig A 44 The timing chain

- 1 Fuel pump drive cam
- 2 Chain guide
- 3 Chain tensioner
- 4 Crankshaft sprocket
- 5 Camshaft sprocket
- 6 Chain guide

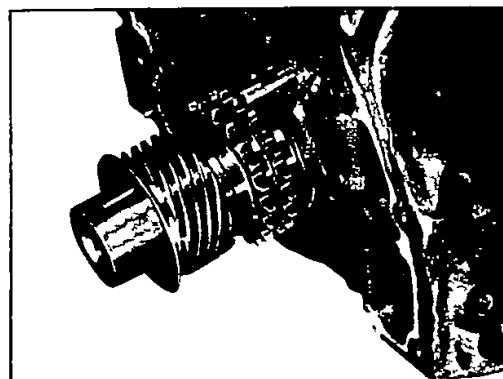


Fig.A 43 View of the crankshaft sprocket and distributor drive gear

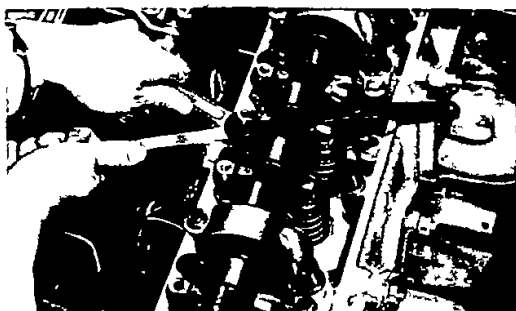


Fig.A 46. Adjusting the valve clearance

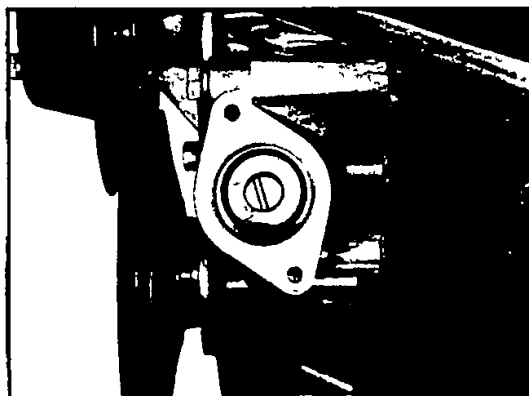


Fig.A 45 Fitting position of the distributor driving shaft

strip on the bearing journal (Fig A 29) If the clearance exceeds the wear limit of 0.10 mm (0.0039 in.) for the main bearings and for the big end bearings, fit undersize bearings and regrind the crankshaft to suit the undersize bearings. Undersize bearings are available in 1/1000 mm 25, 50, 75, 100 for main bearings and 6, 12, 25, 50, 75 and 100 for the big end bearings.

Crankshaft and camshaft timing gears

Check the sprockets and the timing chain for wear and replace where necessary. Check the run-out of the camshaft sprocket as shown in Fig A 30. The run-out should not exceed the limit of 0.1 mm (0.043 in.)

Check the chain tensioner and the chain guide for wear and replace if necessary (Fig A 31)

Flywheel

Check the clutch contact area of the flywheel for damage and wear and if necessary repair or replace the flywheel. Check the flywheel for run-out, using a dial gauge and replace the flywheel if the limit of 0.1 mm (0.043 in.) is exceeded. If the ring gear is worn or damaged remove the gear ring by heating it to about 150 - 200°C (300 - 390°F) and tapping it off. Sometimes it might be necessary to split the ring gear with a chisel. In this case take care not to damage the flywheel. Refit the new ring gear in reverse order and cool at normal air temperature.

ENGINE -- Assembly

Apply engine oil to all sliding or rotating parts of the engine, i.e. cylinder walls, pistons, bearings, gears, etc. and renew all seals, gaskets and lock plates.

Place the valve spring seat in position and fit the valve guide with the oil seal. Assemble the valves in the following order: Valve, inner and outer valve springs, spring retainer, valve cotter halves and valve rocker guide. Compress the valves with a suitable valve compressor (Fig A 32) when fitting the cotter halves.

Fit the rocker arms and the valve rocker springs. The spring holders are combined with the rocker pivot bushes.

Assemble the pistons, gudgeon pins, piston rings and connecting rods for each cylinder (Fig A 34 and A 35) and place the bearing shells into the main bearing housings and caps and the connecting rods and caps. Lift the crankshaft in the bearings. Tighten down the main bearing cap bolts to 4.5 - 5.5 kgm (32.5 - 39.8 lb ft). Arrange the arrow mark on the bearing cap to face the front of the engine. The bearing caps should be tightened in gradual steps in three or four stages, starting at the centre and working towards the outside. Check the crankshaft end play as shown in Fig A 36 which should be 0.05 - 0.15 mm (0.002 - 0.006 in.).

Install the side oil seals into the rear main bearing cap as shown in Fig A 37. Fit the rear oil seal using special tool ST49370000. If the original crankshaft is used and the contact face for the oil seal shows signs of wear, install a shim in order to shift the contact face. Fit the rear end plate.

Fit the flywheel, using lock washers, and tighten the bolts to 9.5 - 10.5 kgm (68.7 - 75.9 lb.ft.). (Fig. A 38) Install the piston and connecting rod assembly into the correct cylinder from the top of the cylinder block as shown in Fig A 39 with the "F" mark facing the front of the engine. When inserting the piston

rings ensure that the piston ring gaps are opposite each other and neither parallel to or at right angles to the gudgeon pin. Fit the connecting rods with the numbers on the same side throughout and tighten to 2.8 - 3.4 kgm (20.2 - 24.6 lb ft.) (Fig A 40). Check the end clearance of the big end bearings which should be 0.20 - 0.30 mm (0.0079 - 0.0118 in.).

Fit the cylinder head, spreading jointing compound either side of the gasket. Tighten the cylinder head bolts in the order shown in Fig A 42 to a tightening torque of 5.0 - 6.0 kgm (36.2 - 43.4 lb ft.). Note there are 3 types of bolts and each should go in the hole it came out of. Use special tool ST49010000 to tighten the cylinder head bolts.

Fit the crankshaft sprocket and distributor drive and fit the oil thrower (Fig A 43). Install the timing chain (Fig A 44) with the timing marks on the crankshaft and camshaft timing sprockets to the right-hand side, coincident with the timing marks on the chain. There must be 42 chain links between the marks on the chain.

Fit the chain guide to the cylinder block and and install the chain tensioner. Fit a new oil seal in the front cover. This seal should always be replaced when the front cover is removed for any reason. Install the lower front cover and the upper front cover in that order with a gasket between cover and cylinder block. The gasket should be coated with jointing compound. When fitting the upper cover check that it does not interfere with the cylinder head gasket. Then check the height difference between the upper faces of the cylinder block and the upper cover. The difference should be less than 0.15 mm (0.059 in.).

Fit the crankshaft pulley and the water pump. Set the engine at T D C position on the No 1 cylinder in its compression stroke. Install the oil pump and distributor drive so that the offset slot is in the position shown in Fig A 45.

Fit the fuel pump, water inlet elbow, thermostat housing, engine slinger, thermostat and water outlet elbow. Refit the oil strainer to the bottom of the cylinder block and enclose the engine interior by refitting the oil sump, coating the new gasket with jointing compound on both sides.

Fit the distributor, rear engine slinger, manifolds and carburettor(s). Adjust valve tappets (Fig A 46) to 0.20 mm (0.008 in.) for the inlet valve (cold) and 0.25 mm (0.010 in.) for the exhaust valve (cold) and fit the rocker cover, using jointing compound on the gasket.

Fit the clutch and gearbox assembly, the fuel hose to the front part of the engine and the high-tension lead to the distributor.

Remove the engine from the mounting stand and fit the alternator bracket, alternator, engine mountings, ignition coil, oil filter, oil pressure switch, oil level dipstick and the water drain plug.

ENGINE -- Installation

The installation is carried out in reverse order to the removal procedure but the following points should be noted.

Do not tighten the nuts and bolts completely until the engine is resting firmly on its mountings. Then tighten the nuts. Fill the engine with engine oil and coolant (water or anti-freeze) and the gearbox with the recommended lubricant.

Technical Data

GENERAL SPECIFICATION		
Engine model	L13	L16
Number of cylinders	4	4
Arrangement of cylinders	In-line	In-line
Cubic capacity	1296 c c (51 02 cu in)	1595 c c (62 80 cu in)
Bore x stroke	83 0 x 59 9 mm (3 2677 x 2 3583 in)	83 0 x 73 7 mm (3 2677 x 2 9016 in)
Arrangement of valves	Overhead camshaft	Overhead camshaft
Max B H P		
Single carburettor	77 at 6000 rpm	96 at 5600 rpm
Twin carburettors	-----	109 at 6000 rpm
Max torque		
Single carburettor	11 1 kgm at 3600 rpm (80 3 lb ft)	13 8 kgm at 3600 rpm (110 0 lb ft)
Twin carburettors	-----	14 3 kgm at 4000 rpm (103 0 lb ft)
Firing order	1 - 3 - 4 - 2	1 - 3 - 4 - 2
Engine idling speed		
Single carburettor	600 rpm	600 rpm
Twin carburettors	-----	650 rpm
Compression ratio		
Single carburettor	8 5 1	8 5 1
Twin carburettors	-----	9 5 1
Oil pressure	3 8 - 4 2 kg/sq cm (54 - 60 lb /sq in)	3 8 - 4 2 kg/sq cm (54 - 60 lb /sq in)

VALVE GEAR

Valve clearance (hot)	
Inlet	0 25 mm (0 010 in)
Exhaust	0 30 mm (0 012 in)

Valve clearance (cold)	
Inlet	0 20 mm (0 008 in)
Exhaust	0 25 mm (0 010 in)

Valve head diameter	
L13 and L16 w/SC*	
Inlet	38 mm (1 50 in)
Exhaust	33 mm (1 30 in)
L16 w/TC*	
Inlet	42 mm (1 65 in)
Exhaust	33 mm (1 30 in)

Valve stem dia - Inl & Exh	8 0 mm (0 31 in)
----------------------------	-------------------

Valve length	
Inlet	115 9 mm (4 56 in)
Exhaust	116 0 mm (4 57 in)

Valve lift	
L13 and L16 w/SC*	10 0 mm (0 40 in)
L16 w/TC*	10 5 mm (0 413 in)

Valve spring free length	
L13	48 12 mm (1 89 in)
L16 - outer	52 0 mm (2 05 in)
L16 - inner	44 85 mm (1 77 in)

Valve spring fitted length

L13	40 0 mm/30 7 kg (1 57 in /67 7 lb)
L16 - outer	38 9 mm/29 0 kg (1 53 in /63 9 lb)
L16 - inner	35 mm/12 3 kg (1 38 in /27 1 lb)

Valve spring coil diameter

L13	34 9 mm (1 37 in)
L16 - outer	33 2 mm (1 31 in)
L16 - inner	24 9 mm (0 98 in)

Valve guide length

Inlet	59 0 mm (2 32 in)
Exhaust	59 0 mm (2 32 in)

Valve guide protrusion from head face

L13 & L16	10 4 - 10 6 mm (0 41 - 0 42 in)
-----------	----------------------------------

Valve guide inner diameter

Inlet	8 00 - 8 018 mm (0 315 - 0 3154 in)
Exhaust	8 00 - 8 018 mm (0 315 - 0 3154 in)

Valve guide outer diameter

Inlet	11 985 - 11 996 mm (0 472 - 0 4723 in)
Exhaust	11 985 - 11 996 mm (0 472 - 0 4623 in)

Valve guide to stem clearance

Inlet	0 015 - 0 045 mm (0 0006 - 0 0018 in)
Exhaust	0 040 - 0 070 mm (0 0016 - 0 0028 in)

Valve seat width

Inlet	1 4 - 1 8 mm (0 055 - 0 071 in)
Exhaust	1 6 - 2 0 mm (0 063 - 0 079 in)

Valve seat angle - Inl. & Exh 45°

Valve seat insert interference fit

Inlet 0 08 - 0 11 mm (0 0031 - 0 0043 in)
Exhaust 0 06 - 0 10 mm (0 0024 - 0 0039 in)

Valve guide interference fit

Inlet 0 027 - 0 049 mm (0 0011 - 0 0019 mm)

CAMSHAFT AND TIMING GEAR

Camshaft end play 0 08-0 38 mm (0 0031-0 015 in)

Camshaft lobe lift

L13 & L16 w/SC* 6 65 mm (0 261 in)
L16 w/TC* 7 00 mm (0 275 in)

Camshaft journals diameter

All 47 949-47 962 mm 8877-1 8883 in)

Max camshaft run-out 0 05 mm (0 002 in)

Camshaft journal to bearing

clearance 0 038 - 0 076 mm (0 0015 - 0 0026 in)

Camshaft bearing inner

diameter 48 000-48 016 mm (1 8898-1 8904 in)

* SC = Single carburettor TC = Twin carburettors

CONNECTING RODS

**Distance from centre to
centre**

132 97-133 03 mm (5 235-5 237 in)

Bearing shell thickness

Standard 1 498 - 1 506 mm (0 059 - 0 0593 in)

Side play of big ends 0 20 - 0 30 mm (0 008 - 0 012 in)

Connecting rod bearing running

clearance 0 014 - 0 056 mm (0 0006 - 0 0022 in)

Connecting rod bend or

twist 0 03 mm per 100 mm (0 0012 in per 3 937 in)

CRANKSHAFT AND MAIN BEARINGS

Crankshaft material Special forged steel

Number of bearings 5

Main journal dia 54 942-54 955 mm (2 1631-2 1636 in)

Max journal taper 0 03 mm (0 0012 in)

Max journal out-of-round 0 03 mm (0 0012 in)

Crankshaft end play 0 05-0 015 mm (0 002-0 0059 in)

Wear limit 0 3 mm (0 012 in)

Crankpin journal dia 49 961-49 975 mm (1 967-1 9675 in)

Max crankpin taper 0 03 mm (0 012 in)

Max crankpin out-of-round 0 03 mm (0 012 in)

Thickness of main bearing

shells 1 827 - 1 835 mm (0 072 - 0 0722 in)

Main bearing running

clearance 0 020 - 0 062 mm (0 0008 - 0 0024 in)

Max main bearing running

clearance 0 12 mm (0 0047 in)

Crankshaft bend limit 0 05 mm (0 002 in)

PISTONS

Material

Cast aluminium

Type

Slipper-skirt type

Piston diameters

Standard 82 99 - 83 04 mm (3 267 - 3 269 in)
1st O/S 83 22 - 83 27 mm (3 276 - 3 278 in)
2nd O/S 83 47 - 83 52 mm (3 286 - 3 288 in)
3rd /OS 83 72 - 83 77 mm (3 296 - 3 298 in)
4th O/S 83 97 - 84 02 mm (3 305 - 3 308 in)
5th O/S 84 47 - 84 52 mm (3 326 - 3 328 in)

Width of ring grooves

Top & second 2 0 mm (0 08 in)
Oil control 4 0 mm (0 16 in)

Piston running clearance 0 025-0 045 mm (0 001-0 002 in)

PISTON PIN

Pin diameter 20 995 - 21 000 mm (0 8266 - 0 8268 in)

Pin length 72 00 - 72 25 mm (2 8346 - 2 8445 in)

Pin running clearance in

piston 0 008 - 0 010 mm (0 0003 - 0 0004 in)

Pin interference fit in small

end bush 0 015 - 0 033 mm (0 0006 - 0 0013 in)

PISTON RINGS

Piston ring height

Top & second 2 0 mm (0 08 in)
Oil control 4 0 mm (0 16 in)

Side clearance in grooves

Top 0 040 - 0 073 mm (0 0016 - 0 0029 in) - L13
0 045 - 0 078 mm (0 0018 - 0 0031 in) - L16

Second 0 030 - 0 063 mm (0 0012 - 0 0025 in)

Oil control 0 025 - 0 063 mm (0 001 - 0 0025 in)

Piston ring gaps

Top 0 23 - 0 38 mm (0 0091 - 0 0150 in)

Second 0 15 - 0 30 mm (0 006 - 0 012 in)

Oil control 0 15 - 0 30 mm (0 006 - 0 012 in)

CYLINDER HEAD

Material

Aluminium alloy

Distortion of sealing face 0 03 mm (0 0012 in)

Max distortion 0 1 mm (0 004 in)

Valve seat insert material

Inlet Aluminium-bronze

Exhaust Special cast

Fit Hot-pressed

CAMSHAFT DRIVE

Drive

From crankshaft

Chain

Double roller type

Chain tensioner

Spring and oil pressure control

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 carburetor jet Clogged fuel pipe Dirty fuel tank Faulty fuel pump Fuel filter clogged	Clean carburetor 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

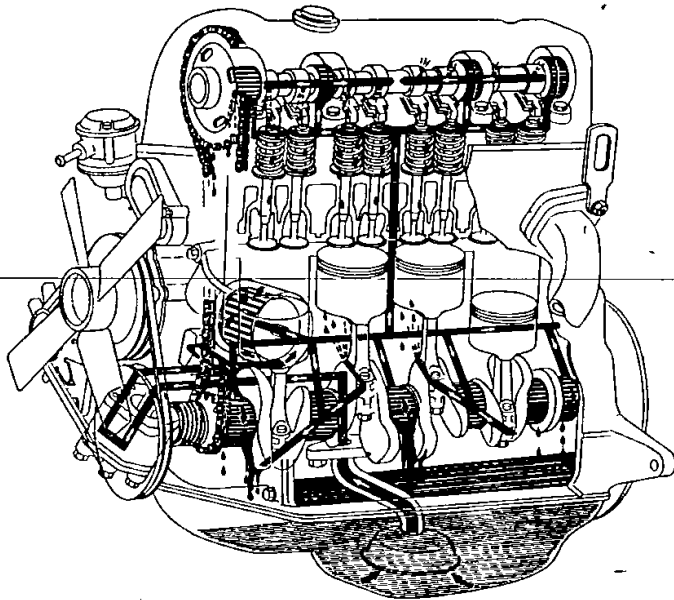


Fig B 1 General layout of the lubrication system

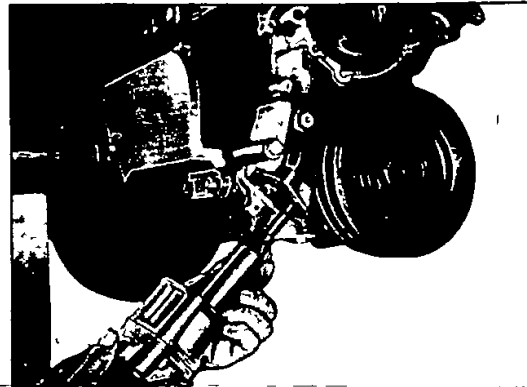


Fig.B 2 Installation of the oil pump

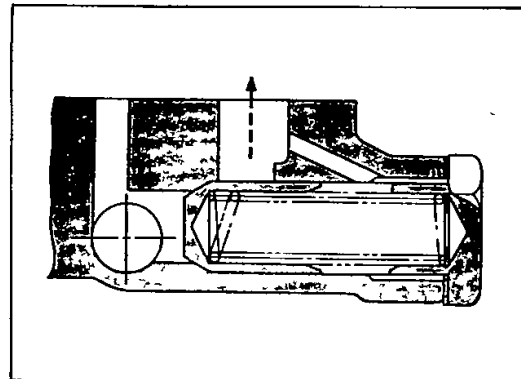


Fig B 4 Section through the oil relief valve

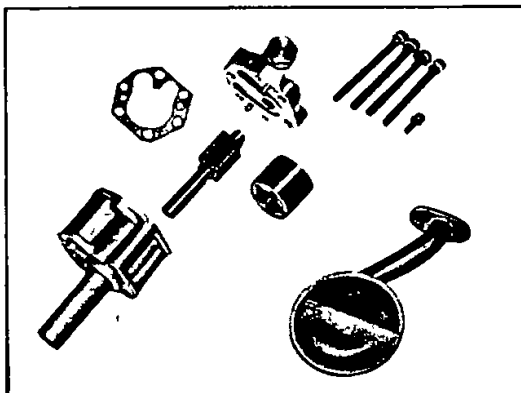


Fig.B 3. The oil pump components.

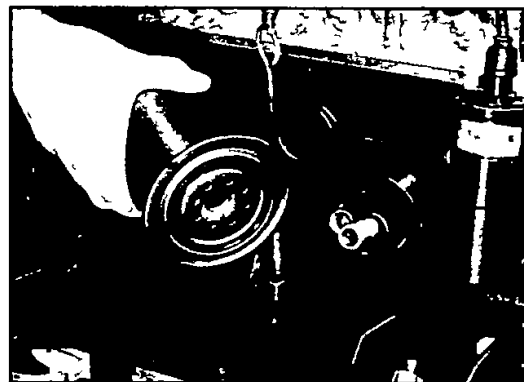


Fig B 5 The removal or installation of the oil filter

Lubrication System

DESCRIPTION

The lubricating system is a pressure-feed system, consisting of a rotor-type oil pump, incorporating a regulator valve and driven by the distributor drive shaft and a full-flow oil filter. A strainer is fitted to the bottom of the front cover and serves the purpose to filter the oil before it can reach the bearing locations.

OIL PUMP — Removal and Installation

Remove the distributor, drain the engine oil, remove the front engine bearer and the splash guard and remove the oil pump body together with the drive spindle. The oil pump is held in position by four bolts.

The installation is carried out in reverse order to the removal procedure. When replacing the oil pump set the engine so that No 1 cylinder is at T D C position in its compression stroke and then fit the oil pump and the drive spindle in the front cover with the punched mark on the spindle facing the front of the engine. Check the engagement of the drive via the distributor fitting hole. Refit the distributor and fill the engine with the recommended engine oil. Tighten the mounting bolts to 1.5 - 2.1 kgm (10.8 - 15.2 lb ft). (See also Fig A 2).

OIL PUMP — Dismantling

Separate the body cover from the pump body by unscrewing the single securing bolt and take out the pump drive and driven gears from the pump body (Fig B 3).

OIL PUMP — Inspection and Overhaul

Clean all parts in a suitable solvent and check the following items:

1. Check the oil pump body for wear. Worn bearing faces result in pressure losses. If necessary replace the body.
2. Check the clearance between the lobes of the inner and outer rotors. The maximum clearance must not exceed 0.05 - 0.12 mm (0.002 - 0.005 in). If the clearance is found to be greater a new seat of rotors should be fitted.
3. Check the clearance between the outer rotor and the pump body. This play must not exceed 0.15 - 0.21 mm (0.006 - 0.008 in). If this clearance is excessive, a new set of rotors or a new pump body must be fitted.
4. Check the end float of the rotors by placing a straight edge across the joint face of the body and measuring the clearance between the rotor ends and the straight edge by inserting a feeler gauge. (Must not exceed 0.13 mm (0.005 in)). If necessary the pump body can be carefully lapped on a flat surface.
5. Check the rotor drive shaft for excessive wear or scores. If necessary renew the rotor set.
6. Check the relief valve spring for proper fit and the sliding

surfaces for wear. Also check the spring for weakness or damage. Replace as necessary (Fig B 4). The relief valve dimensions are as follows:

Free length	57 mm (2.24 in)
Fitted length	39 mm (1.54 in)
Opening pressure	3.8 - 4.2 kg (54 - 59.7 lb)

OIL PUMP — Assembly

The assembly of the oil pump is a reversal of the dismantling procedure. Make sure the pump cover gasket is properly fitted. Tighten the oil pressure relief valve cap nut to a torque reading of 3.0 - 3.5 kgm (21.7 - 25.3 lb ft).

OIL FILTER

The oil filter is of the replaceable cartridge type and can be removed from and replaced on the cylinder block by hand. When refitting the filter element, do not overtighten and under no circumstances use any tools. The filter body with the element should be replaced every 6000 miles (10,000 km). The location of the filter is shown in Fig B 5.

Technical Data

Type	Pressure feed system
Pump type	Rotor pump
Drive	From distributor shaft
Clearance between inner and outer rotor	0.05 - 0.12 mm (0.002 - 0.005 in)
Clearance between rotor tips	0.12 mm (0.005 in)
Clearance between outer rotor and body	0.15 - 0.21 mm (0.006 - 0.008 in)
Oil pressure relief valve spring	75 mm (2.24 in)
Free length	39 mm (1.54 in)
Fitted length	3.8 - 4.2 kg/sq cm. (54 - 60 lb /sq in)
Opening pressure	
Oil pressure at idling speed	1.0 - 1.2 kg/sq cm (14.2 - 17.1 lb /sq.in)
Oil pressure at 2000 rpm (hot)	3.8 - 4.2 kg/sq.cm. (54 - 60 lb /sq.in)

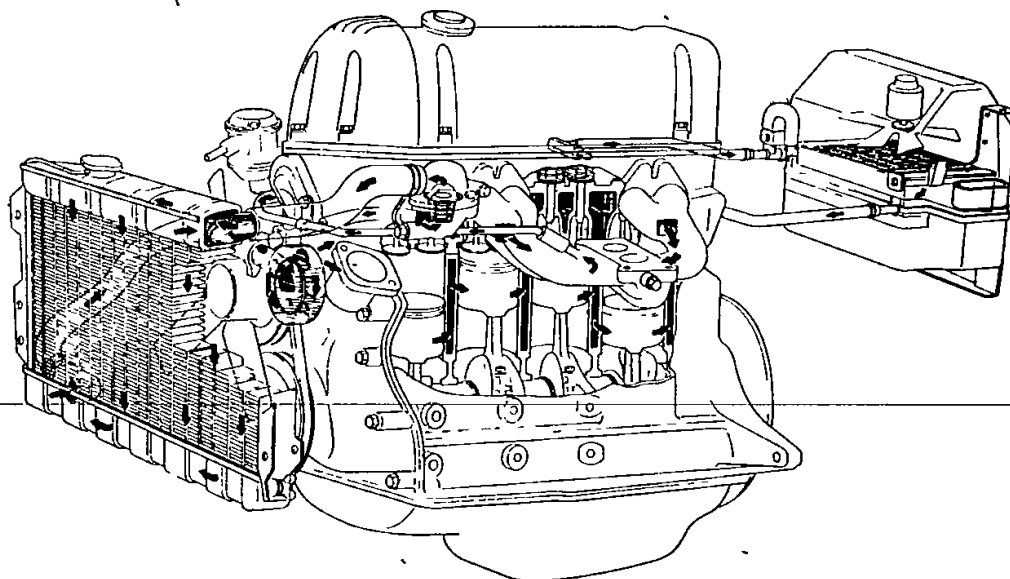


Fig C 1 General arrangement of the cooling system

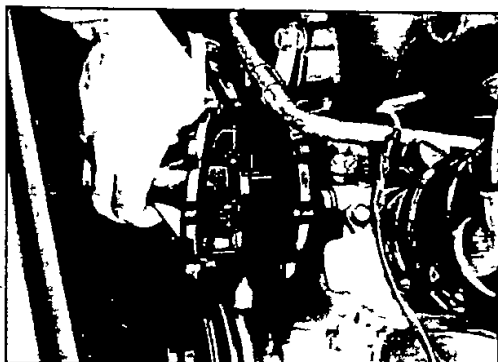


Fig C 2 Removal of the water pump

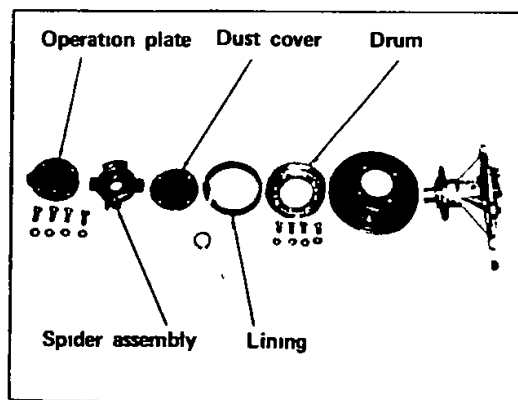


Fig.C 3 Exploded view of the fan clutch

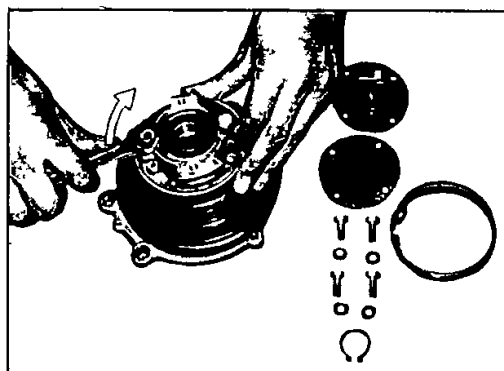


Fig.C 4. Dismantling of the fan clutch.

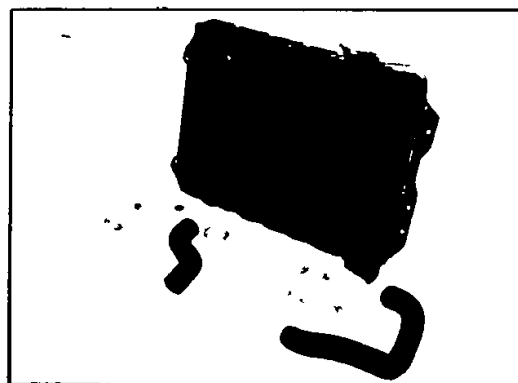


Fig C 5 View of the radiator and component parts.

Cooling System

DESCRIPTION

The cooling system is a closed pressurised system. It consists of radiator, water pump, fan clutch, thermostat and the water jackets in cylinder head and block.

WATER PUMP – Removal

To remove the centrifugal type water pump drain the cooling system completely and remove the fan belt, fan and pulley and unscrew the water pump from the front cover (Fig C 2). It is recommended that the water pump is not dismantled due to its design and manufacture. If the water pump is suspected of malfunction, an exchange water pump should be fitted.

Replace the water pump if it has excessively rusted or corroded vanes or if there is excessive wear in the bearings or squeaking with the engine running. To prevent squeak the use of Nissan cooling system protector is recommended.

The pump should be cleaned with Nissan cooling system cleaner before it is refitted to the front cover.

FAN CLUTCH

In the models with air conditioning a fan clutch is fitted to increase the efficiency of the cooling system and reduce power losses. This clutch is thermostatically controlled by the air temperature of the engine compartment. If the air temperature in the engine compartment increases, the thermostat begins to operate and the fan clutch will engage.

FAN CLUTCH – Inspection

Fully warm up the engine. Check the operation of the clutch at engine speed of 2500 rpm. The clutch should begin to operate at a temperature of 61 - 69°C (141 - 159°F) and should switch automatically off at 50 - 58°C (121 - 138°F).

The temperature should be checked near the clutch and this should be done several times as there is a time lag in the operation of the thermostat.

To check the operation of the fan clutch thermostat, remove the operating plate (see Fig C 3 and C 4) and submerge it in hot water (70°C) for 2 or 3 minutes to check its operation.

THERMOSTAT – Removal

Drain the cooling system, remove the radiator hose and the water outlet elbow and lift out the thermostat.

To check the thermostat, place it in a container, filled with water and gradually heat up the water. Immerse a thermometer into the water and observe the indication. Take care that the thermostat or the thermometer cannot touch the bottom or the sides of the container, as otherwise false readings will be obtained. The thermostat should start to open at a temperature

of 80 - 83.5°C (177 - 182°F). The maximum lift of the thermostat valve should be 8.0 mm (0.315 in) at a temperature of 95°C (203°F).

THERMOSTAT – Installation

The installation of the thermostat is carried out in reverse order to the removal procedure. Use a suitable sealing compound to seal off both sides of the gasket.

RADIATOR – Removal and Installation

To remove the radiator (shown in Fig C 5) drain the cooling system and disconnect the top and bottom radiator hoses. Remove the radiator after unscrewing the four radiator attaching bolts. Check radiator for water leaks and cracks and repair or replace as necessary. The installation of the radiator is carried out in reverse order to the removal procedure.

Technical Data

Type	Closed, pressurised system
Radiator	
Height	350 mm (13.78 in)
Width	514 mm (20.24 in)
Thickness	32 mm (1.26 in)
Capacity	2.6 litres (0.7 U.S. gall., 0.57 Imp. gall.)
Cap opening pressure	0.9 kg/sq cm (12.8 psi)
Thermostat	
Valve opening	80.5 - 83.5°C (177 - 182°F)
Max. valve lift	More than 8 mm at 95°C (0.315 in at 203°F.)

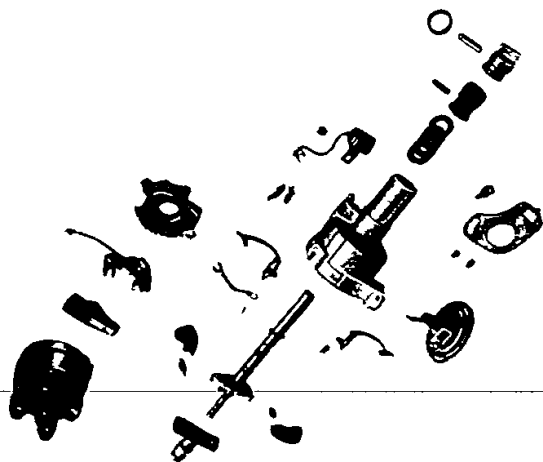


Fig D 1 Exploded view of the ignition distributor

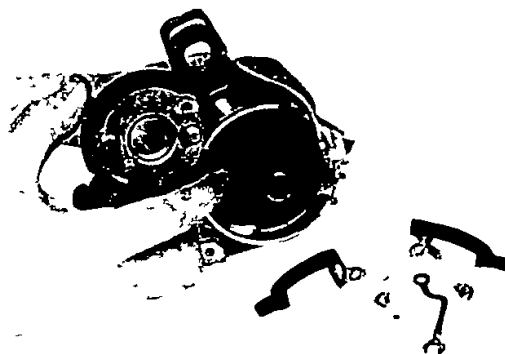


Fig.D.2. Removal of the contact breaker base plate.

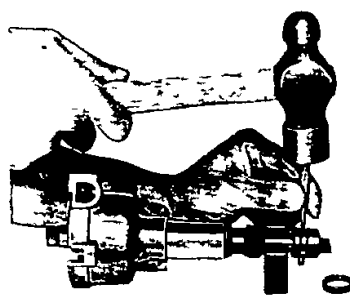


Fig D 3 Removal of the distributor drive gear retaining pin

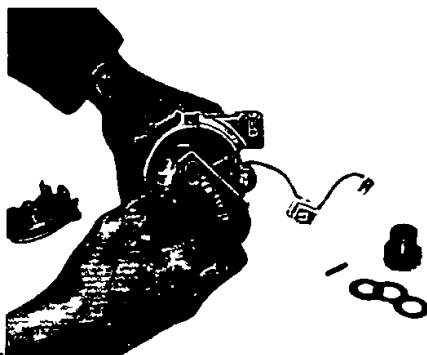


Fig.D 4 Removal of the distributor drive shaft.

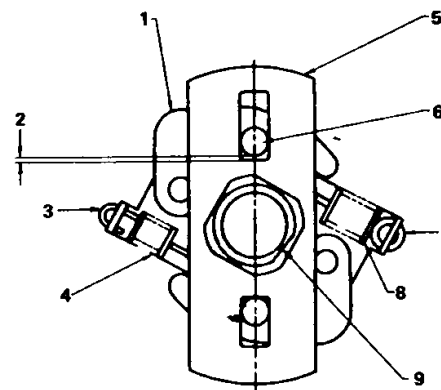


Fig D 5. The assembly of the flyweight mechanism.

- 1 Flyweight
- 2 Clearance for start and end of ignition advance angle
- 3 Hook
- 4 Flyweight spring
- 5 Distributor cam plate
- 6 Flyweight pin
- 7 Hook
- 8 Flyweight spring
- 9 Rotor positioning flat

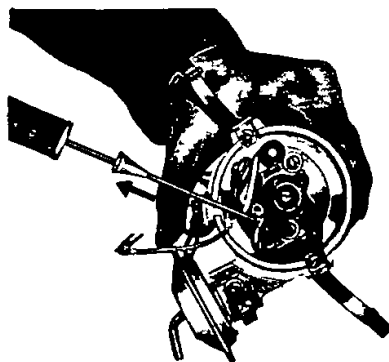


Fig.D.6. Checking the contact spring pressure.

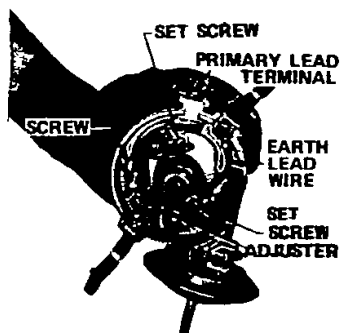


Fig.D.7 View of the distributor with cap removed.

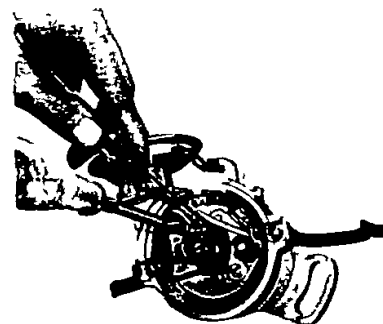


Fig D.8. Adjusting the contact breaker gap

Ignition System

DESCRIPTION

The 1300 c.c. and the 1600 c.c. engines with single carburettors are fitted with the ignition distributor model D410-58, whilst the 1600 c.c. engine with twin carburettors has model D409-54. The outside appearance of both distributor models is alike.

IGNITION DISTRIBUTOR – Removal

Disconnect the high-tension cables from the spark plugs and the ignition coil and detach the primary wire from the distributor. Remove the vacuum pipe from the distributor connection, slacken the distributor clamp bolt and withdraw the distributor.

IGNITION DISTRIBUTOR – Dismantling

Remove the distributor cap and pull off the rotor. Loosen the two vacuum unit securing screws and lift off the unit. Unscrew the fixed contact point set screw and lift off the point. Take off the spring clip from the pivot post of the moveable contact breaker point and remove the contact arm. From the side of the distributor body remove the two spring clips and remove the contact breaker base plate (see Fig D 2). Take care not to loose the steel balls between the breaker spring and the breaker plate and those between the breaker plates.

Suitably support the distributor shaft from underneath and drive out the drive gear retaining pin, using a suitable punch (Fig D 3). Remove the gear and the shims, after marking the relation of the shaft and the gear and withdraw the distributor shaft from the other side (Fig D 4). From the inside of the distributor cam remove the set screw and pull off the cam. Carefully unhook the flyweight springs without stretching or deforming them.

IGNITION DISTRIBUTOR – Assembly

Thoroughly clean all parts and examine the distributor cap for cracks, carbon tracking and burnt or corroded terminals. Check the carbon brush for excessive wear and if necessary remove defective parts. Check the contact breaker gaps for pitting, replacing them if badly marked. Light damage can be smoothed with an oil stone.

Check the shaft for wear and proper fit in the body. Check the condenser for short or open circuits and replace if necessary. Check the vacuum unit for operation and the flyweight mechanism for freedom of movement.

The assembly is a reversal of the removal procedure. Refer to Fig D 5 when assembling the flyweight mechanism. When the distributor is assembled, connect a spring scale on the end of the contact arm and slowly pull the spring scale away from the fixed contact point. Read off the indication at the moment when the arm is just lifting from the fixed point (See Fig.D.6). The correct value is 0.50 - 0.65 kg (1.10 - 1.43 lb). Adjust the contact breaker gap as described below.

CONTACT BREAKER GAP – Adjustment

With the distributor fitted in reverse order to the removal procedure, turn over the engine until the fibre pad of the contact breaker arm is at the highest point of the distributor cam. Slacken the clamping screw at the fixed contact point and turn the adjuster screw with a screwdriver until a contact gap of 0.45 - 0.55 mm (0.012 - 0.022 in) is obtained. Retighten the clamping screw and using a feeler gauge, re-check the contact breaker gap to ensure that the fixed contact breaker plate has not moved while the clamping screw was tightened.

The contact breaker points can be cleaned by using a contact file or an oil stone. The raised areas on the contact should be filed off, but do not attempt to remove the crater in the other contact. After cleaning the contacts, they should be placed opposite each other, meeting over a wide area. If the contacts only meet partially, it is possible that overheating, burning and sparking could develop. A view of the contact breaker assembly is shown in Fig D 7. The adjustment of the points is shown in Fig D 8.

IGNITION TIMING – Adjustment

Remove the distributor vacuum line and start the engine. With the engine running at idle speed proceed as follows:

Using a stroboscopic timing light, connected in accordance with the instructions of the manufacturer, check that the timing case pointer is in line with the timing mark on the crankshaft, which will be made "stationary" by the effect of the timing light. Each of the marks on the crankshaft pulley represents 5° of the crank angle. The timing setting is as follows:

1300 c.c. engine	10° B T D C /600 rpm.
1600 c.c. w/SC*	10° B T D C /600 rpm.
1600 c.c. w/TC*	14° B T D C /650 rpm.

*w/SC = Single carburettor, w/TC = Twin carburettor

CHECKING THE CENTRIFUGAL ADVANCE

Disconnect the vacuum pipe from the distributor housing, paint a white line on the crankshaft pulley and start the engine. Direct the flash of the stroboscopic timing light on the crankshaft pulley and observe the movement of the white line whilst the engine speed is slowly increased. The distance between the ignition timing pointer on the timing gear cover and the white line should increase noticeably, indicating a satisfactory operation of the centrifugal advance mechanism. If the paint marks appear to move back and forth in an irregular manner, it may be that the flyweights are sticking. If necessary, lubricate the distributor to free off the weights.

CHECKING THE VACUUM ADVANCE MECHANISM

Increase the engine speed to about 1200 - 1500 rpm. until the throttle disc valve uncovers the vacuum drilling. With the engine running, disconnect the vacuum pipe from the distributor housing and re-connect in turn. Observe the white paint line on

the crankshaft pulley. With each disconnecting and re-connecting of the vacuum pipe, the line should move back and forth. If the line remains stationary, it is possible that the pipe is obstructed or the vacuum unit is damaged.

SPARK PLUGS — Removal, Inspection and Installation

Remove the spark plug cables from the plug ends and unscrew the spark plugs, only using a spark plug spanner. No make-shift tools should be used for this purpose.

Check the plugs for cracks and chips on the insulators and check the electrodes for wear. If the carbon deposit is excessive, this is an indication of burning engine oil, so install a hotter plug. If the plug faces are excessively white or rapid electrode wear is noted, fit a colder plug. Clean the plugs with a sand blast cleaner or carefully with a wire brush and adjust the electrode gaps to 0.8 - 0.9 mm (0.03 - 0.035 in). When fitting the plugs, tighten them to 1.5 - 2.0 kgm (11 - 15 lb.ft).

Technical Data

DISTRIBUTOR

Contact gap	0.45 - 0.55 mm (0.012 - 0.022 in)
Contact spring pressure	0.50 - 0.65 kg (1.1 - 1.43 lb)
Shaft diameter (lower part)	12.45 mm (0.4902 in)
Shaft diameter (upper part)	8.0 mm (0.315 in)
Housing inner diameter	12.45 in (0.4902 in)
Clearance between housing and shaft	0.01 - 0.038 mm (0.0004 - 0.0015 in)
Clearance wear limit	0.08 mm (0.003 in)
Cam inner diameter	8.0 mm (0.315 in)
Clearance between shaft and cam	0.005 - 0.029 mm (0.0002 - 0.0011 in)
Flyweight pivot dia	5.0 mm (0.197 in)
Pivot hole dia	5.0 mm (0.197 in)
Clearance between pivot and pivot hole	0.01 - 0.46 mm (0.0004 - 0.0018 in)

IGNITION COIL

Model	
1300 & 1600 cc w/SC	C14-51
1600 cc w/TC*	C6R-50
Primary voltage	12 volts
Primary resistance	
1300 & 1600 cc w/SC*	3.2 - 4.1 ohms
1600 cc w/TC	2.1 - 2.7 ohms
Secondary resistance	11.2 - 16.8 ohms

*w/SC = Single carburettor, w/TC = Twin carburettor

IGNITION TIMING AND IGNITION ADVANCE

Fully detailed information are given under "Engine Tuning Data" (See index for page number)

Trouble Shooting

SYMPTOMS	PROBABLE CAUSE	ACTION TO BE TAKEN
Starter turns, but engine will not start.	Weak battery Excessive moisture on spark plugs or high tension wires Cracked or leaky distributor cap or rotor Broken wire in primary circuit Burned or improperly adjusted points. Defective condenser	Recharge battery. Remove moisture and dry Replace cap or rotor Repair or replace wire Adjust or replace points Replace condenser
Difficult starting	Defective spark plugs, Defective breaker points Loose connection in primary circuit Defective condenser Defective ignition coil. Defective rotor or distributor cap.	Clean, adjust or replace plugs. Replace breaker points Tighten or repair Replace condenser. Replace ignition coil. Replace cap or rotor
Engine misfires	Dirty or faulty spark plugs Loose ignition wire or faulty insulation Cracked distributor cap Breaker points not correctly adjusted	Clean, adjust or replace plugs. Tighten, repair or replace wires Replace cap Adjust breaker points
Ignition circuit interrupted and voltage drop in primary circuit	Burnt or incorrectly adjusted contact breaker gap Defective leads, loose or dirty connections Ignition switch defective Ignition coil defective	Adjust contact breaker gap Check leads, clean connections Check or replace switch. Check or replace ignition coil
Secondary circuit interrupted and no current	Spark plugs wet, worn or incorrect gap Defective condenser Defective or broken ignition cable. Tracking between coil, distributor cap and rotor Defective ignition coil	Clean and adjust or replace plugs. Replace condenser. Replace ignition cable Clean and check parts or replace Check or replace coil.

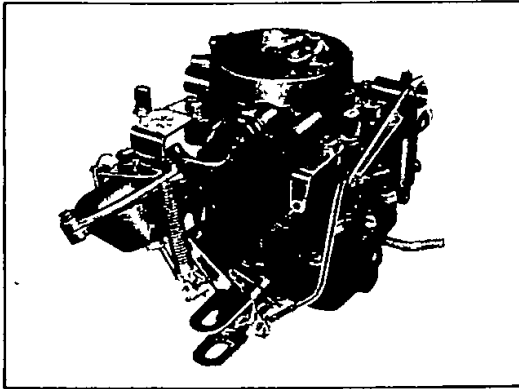


Fig E1 General view of the twin choke carburettor

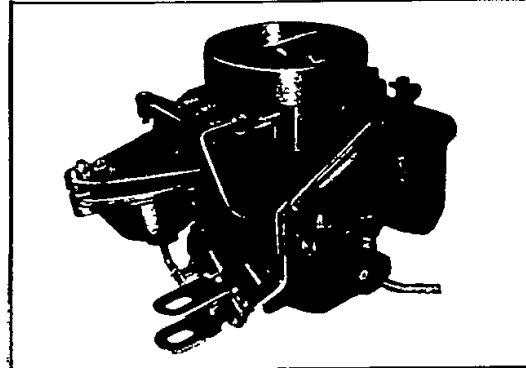


Fig E2 General view of the twin choke carburettor (L16 engine)

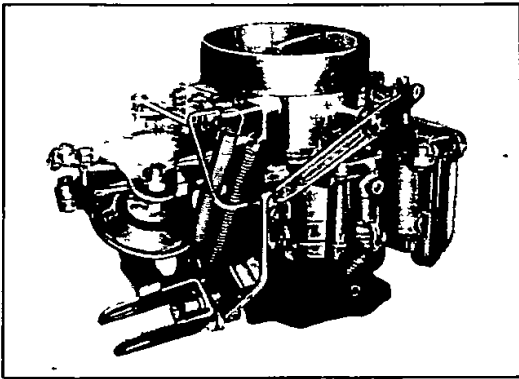


Fig E3 View of the twin choke carburettor for cars fitted with automatic transmission

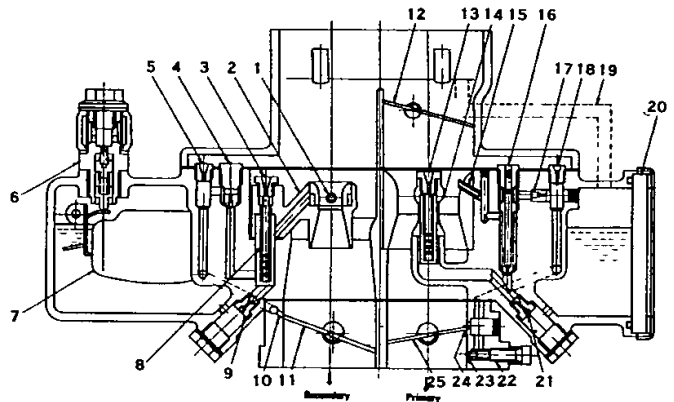


Fig E4 Section through the twin choke carburettor (L16 engine)

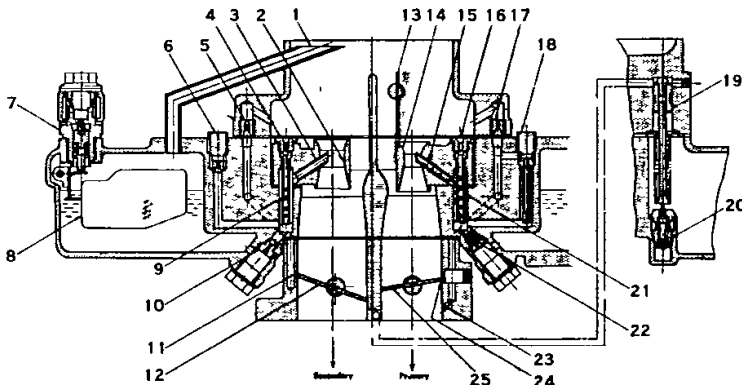


Fig E5 Section through the twin choke carburettor (L13 engine)

- | | |
|--------------------------|---------------------------|
| 1 Air vent pipe | 14. Small venturi |
| 2 Small venturi | 15. Main discharge |
| 3 Main discharge | 16. Main air bleed |
| 4 Main air bleed | 17 Slow-running air bleed |
| 5 Slow-running air bleed | 18 Slow-running jet |
| 6 Slow-running jet | 19. Vacuum piston |
| 7 Needle valve | 20. Power valve |
| 8 Float | 21 Main jet |
| 9 Emulsion tube | 22. Main jet |
| 10 Main jet | 23. Idling passage |
| 11 By-pass hole | 24. By-pass hole |
| 12 Throttle valve | 25. Throttle valve |
| 13. Choke valve | |

- | | |
|--------------------------|-------------------------------|
| 1 Main discharge | 14. Main discharge |
| 2 Small venturi | 15. Economizer bleed |
| 3 Main air bleed | 16. Slow-running jet |
| 4 Slow-running jet | 17 Slow-running economizer |
| 5 Slow-running air bleed | 18 Slow-running air bleed |
| 6 Needle valve | 19. Air vent |
| 7 Float | 20. Fuel level gauge |
| 8 Emulsion tube | 21 Main jet |
| 9 Main jet | 22. Slow-running volume screw |
| 10 By-pass hole | 23. Slow-running passage |
| 11 Throttle valve | 24. By-pass hole |
| 12 Choke valve | 25 Throttle valve |
| 13. Main air bleed | |

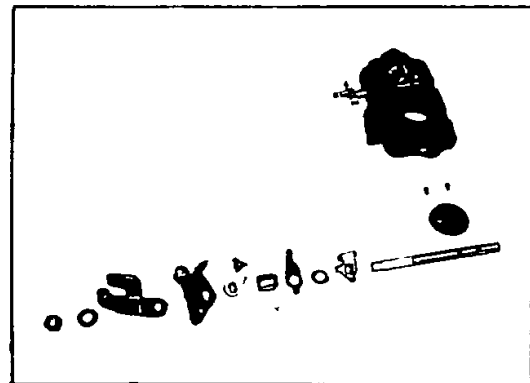


Fig E6. The dismantled throttle valve

Fuel System

DESCRIPTION

The fuel system consists basically of fuel tank, fuel pump, fuel strainer, air cleaner and carburettor. The Datsun 1300 is fitted with a two barrel carburettor, whereas the Datsun 1600 has either a two barrel downdraught carburettor or twin SU-type carburettors.

CARBURETTOR (Single twin choke) – Removal

The single carburettor versions are fitted to the Datsun 1300 (Type designation DCK306) and the Datsun 1600 (Type designation DAF 328) (See Fig E 2 & E 3). To remove the carburettor, take off the air cleaner, disconnect the fuel pipe and the vacuum pipe from the carburettor end and detach the choke cable. Remove the throttle linkage and undo the four nuts and washers, securing the carburettor to the manifold. Lift off the carburettor.

CARBURETTOR – Dismantling

The main jets, slow-running jets and the needle valves for the primary and secondary stage are accessible from the outside of the carburettor body. Remove the jets and needles (Fig E 4 & E 5).

The upper body can be removed by removing the choke connecting rod, pp connecting rod, return spring stop pin and the four securing screws (Figs E 6, E 7 and E 8).

Main body

Remove the primary and secondary emulsion tubes by removing the main air bleeds (Fig E 10). Remove the cylinder cover and take out the accelerator pump (Fig E 11). Separate the float chamber from the throttle butterfly block by removing the rod linking the diaphragm to the secondary throttle valve and the four securing screws (Fig E 12). Remove the float chamber cover and the float (Fig E 13).

Dismantle the diaphragm by removing three screws holding the diaphragm chamber and then removing three screws holding the diaphragm chamber cover (Fig E 14).

The fuel return system, shown in Fig E 15 should not be dismantled if not absolutely necessary. When dismantling, take care not to damage the bimetal spring.

Dash pot damper

This mechanism is fitted to the carburettor (Fig E 16) on vehicles with automatic transmission and is linked to the primary throttle valve linkage.

CARBURETTOR – Inspection

Thoroughly clean all parts in a suitable solvent and blow out all jets and passages with compressed air. Check all parts for wear and damage with special attention to the following parts:

Check the float needle and the seat for wear. If worn, replace the assembly.

Check the throttle and choke valve shafts and bores for eccentricity.

Check the slow-running jet needles for burrs and ridges. Replace parts as necessary.

Check choke tube clusters for wear or slackness and if necessary replace the cluster. Check all linkages for excessive wear and the filter screen for blockage and distortion.

Check the operation of the accelerator pump and the diaphragm chamber for damage to the diaphragm and air leaks. Repair or replace any defective components.

CARBURETTOR – Assembly

The assembly is carried out in reverse order to the dismantling procedure. Special care should be taken that no defective, brittle or hard gaskets are used. Where these are found, they should be replaced. When connecting the linkages, be careful not to bend or deform any of the components.

CARBURETTOR – Adjustments

Float level

If the fuel level is at the gauge line, the float is correctly set. If this is not the case, hold the float level in its chamber and check that the gap between the float seat and the stem of the float needle valve is about 1.0 mm (0.039 in.) for the L13 and 1.5 mm (0.059 in.) for the L16 engine (Fig E 17). Bend the float seat as shown in Fig E 18).

Interlock starting system

With the choke valve fully closed there should be a clearance of 1.3 mm (0.0512 in.) between the primary throttle valve and the carburettor body in the case of the DAF 328 carburettor and a clearance of 0.72 mm (0.028 in.) in the case of the DCK 306 carburettor (Fig E 19 and Fig E 20).

Interlock opening of primary and secondary throttle valves

When the primary throttle valve is opened to the specified degree (59° for DAF 328 or 56° for DCK 306), there should be a clearance of 9.10 mm (0.3583 in.) in case of the DAF 328 carburettor or 6.40 mm (0.252 in.) between the throttle valve and the inner wall of the throttle chamber. See also Figs E 22 and Fig E 23. To adjust the clearance, bend the point marked "A" on the adjustment plate.

Slow-running adjustment

The slow-running adjustment is obtained by adjusting the throttle valve stop screw and the slow-running volume control screw.

Screw in the slow-running volume control screw and back off by approximately three turns. Then screw in the throttle stop screw and start the engine. Unscrew the throttle stop screw until the engine begins to rotate unevenly when the engine speed will gradually drop. Now screw in the slow-running volume control screw until the engine runs smoothly at the

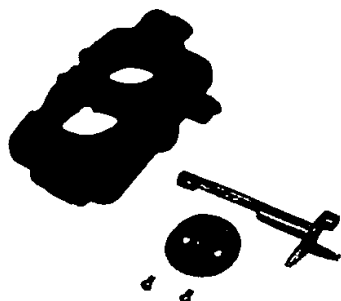


Fig E 7 Both throttle valves removed

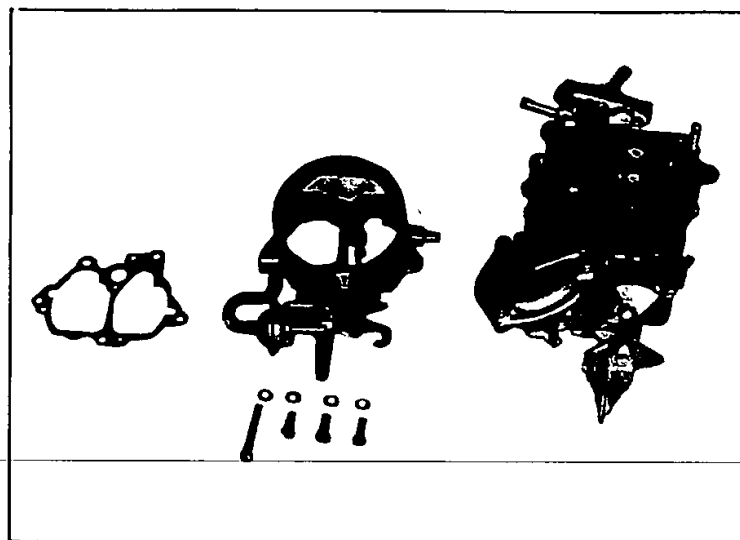


Fig.E 8 The carburettor top cover removed.

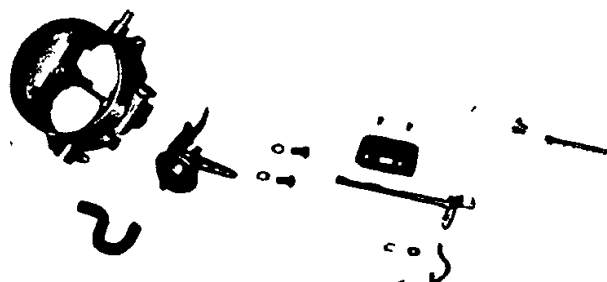


Fig E.9 The choke chamber removed

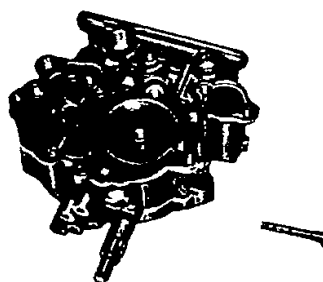


Fig.E 10 The primary and secondary emulsion tubes removed

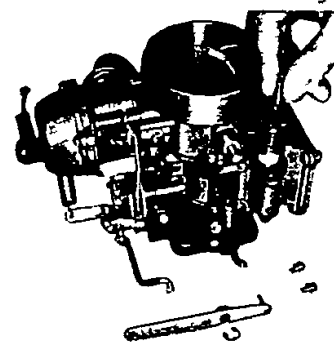


Fig.E 11 Removal of the accelerator pump

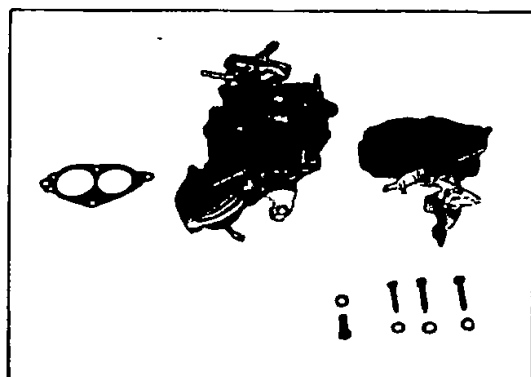


Fig.E 12. The lower and upper carburettor bodies separated

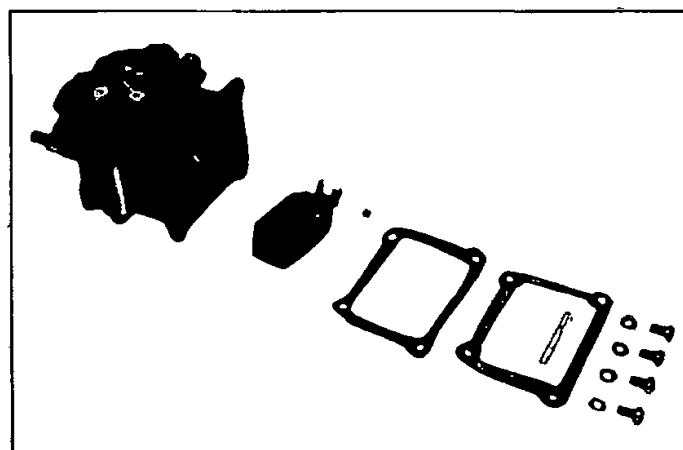


Fig.E.13. The float removed from the carburetor body

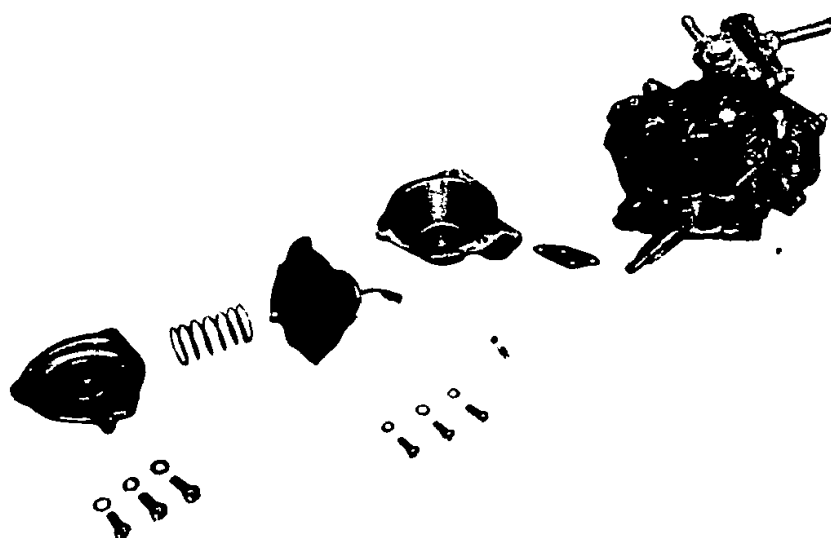


Fig.E 14. The component parts of the diaphragm.

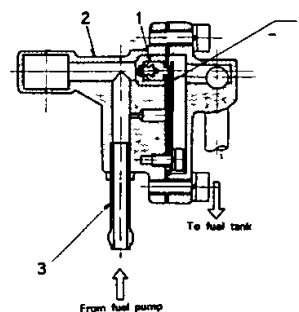


Fig E 15 The fuel return system.

- 1 Valve
- 2 Body
- 3 Pipe
- 4 Bimetal

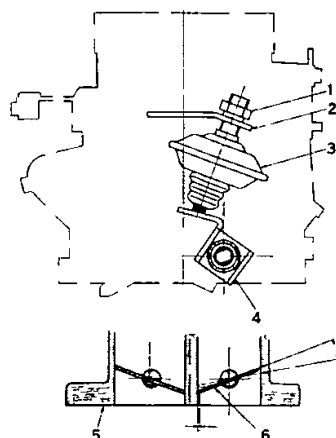


Fig E 16 The dashpot mechanism

- 1 Locknut
- 2 Choke cable arm
- 3 Dashpot
- 4 Throttle lever
- 5 Throttle chamber
- 6 Throttle valve

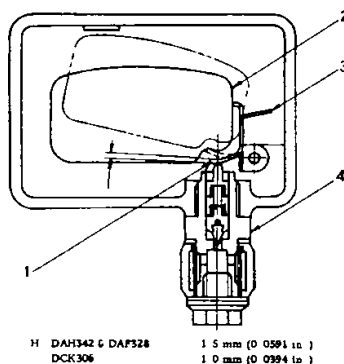


Fig E 17 The float level adjustment.

- 1 Float seat
- 2 Float
- 3 Float stop
- 4 Needle valve

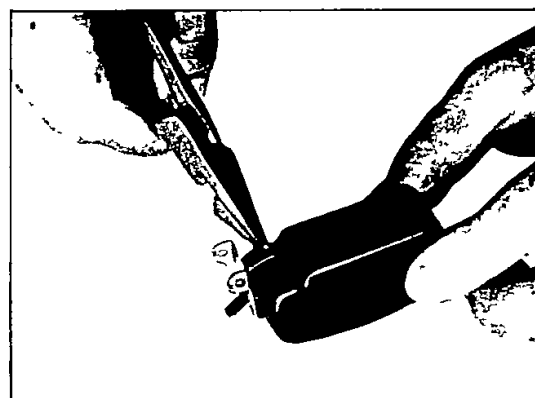


Fig E 18 Adjustment of the float seat

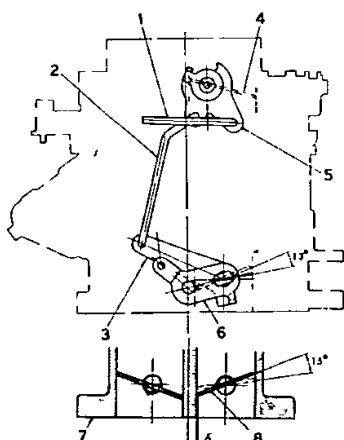


Fig E 19 Adjustment of starting interlock opening

- 1 Choke bell rod
- 2 Choke connecting rod
- 3 Starting lever
- 4 Choke valve
- 5 Choke lever
- 6 Fast idle connecting lever
- 7 Throttle chamber
- 8 Throttle valve

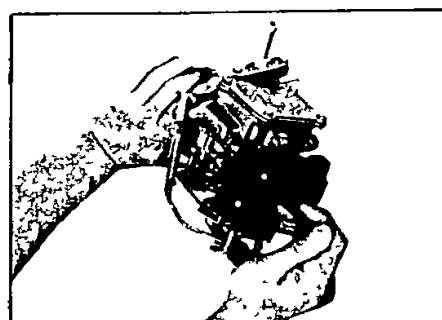


Fig E.20 Measuring the clearance of the starting interlock valve opening.

highest speed. Re-adjust the throttle stop screw to reduce the engine speed

Repeat this adjustment until an engine speed of 550 rpm has been obtained. Care should be taken not to screw in the slow-running volume control screw too tightly as otherwise the tip of the screw might be damaged

Dashpot adjustment

This adjustment is only necessary on the Datsum 1600, fitted with automatic transmission. With the engine at operating temperature check that the throttle lever will touch the dashpot stem when the engine is running with 1800 - 2000 rpm. There should be no load on the engine (Fig E 16). If this is not the case, slacken the dash pot locknuts and turn the dash pot to the right or left, until the throttle lever touches the dashpot stem at the specified engine speed. In this condition the clearance between the throttle valve and the throttle chamber wall should be 0.8 mm (0.031 in.), corresponding to a throttle valve angle of 10° .

SU-TYPE TWIN CARBURETTORS — Dismantling

Unscrew the plug and withdraw the piston damper. Take out the two suction chamber securing screws, lift off the suction chamber and withdraw the piston and jet needle. Disconnect the rod from the bottom of the jet, and the nylon feed tube from the base of the float chamber. Unscrew the jet adjusting nut and the spring. Unscrew the jet bearing locking nut.

Remove the float chamber cover securing bolts and withdraw the float. Screw out the needle valve assembly. The dismantling stages are shown in Figs E 24, E 25 and E 26.

CARBURETTOR — Inspection

Note the condition of the needle valve and the seating. Fit a new needle valve and seating if necessary. If the jet needle is bent or otherwise damaged, withdraw the locking screw in the piston and fit a new needle. Push the needle in until the shoulder is flush with the lower face of the piston (Fig A 27).

Clean and dry the piston assembly. Lubricate the piston rod with thin oil.

CARBURETTOR — Assembly

Reverse the dismantling procedure and centre the jet.

Centring the jet

Screw the jet adjusting nut up as far as possible, lift the piston with the lifting pin and allow it to drop. It should drop freely onto the bridge with a soft metallic click. Repeat with the adjusting nut screwed fully down. If the piston does not fall freely in either of the tests, proceed as follows.

Disconnect the rod from the bottom of the jet and the feed tube from the base of the float chamber. Pull out the jet and the tube. Unscrew and remove the jet adjusting nut and the spring. Refit the adjusting nut without the spring and screw it up as far as possible.

Slacken the jet bearing lock nut until the bearing can be turned with the fingers. Remove the piston damper and press the piston down onto the bridge. Tighten the lock nut.

Lift the piston and note whether it falls freely, fully lower the

adjusting nut and check again. If the second check produces a sharper click than the first, repeat the centring. Refit the parts that have been removed, pour thin oil into the hollow rod of the piston damper to within 0.5 in. (12.7 mm) of the top of the rod.

CARBURETTOR — Adjustments

The proper adjustment of the two carburettors is extremely important in obtaining peak vehicle performance and reducing fuel consumption.

Carburettor synchronization and idling adjustment

Remove the air cleaner when the engine has reached its operating temperature and slacken the throttle adjusting screws. The heads of the adjusting screws must not contact the throttle lever. Also make sure that the front and rear throttle shafts are not connected. Tighten the idling adjusting nuts of the front and rear carburettor by one turn towards the top of the carburettors and gradually back them off. After the nuts have been turned approximately half a turn, the nuts will contact the needle heads. Back off the nuts from this position by approx. one and a half turn. Make sure that the idling adjusting nuts of both carburettors are in the same position. The dimension "A" (adjustment described later) between the jet bridge and the needle head should then be approx. 1.5 mm (0.059 in.).

Screw in the throttle adjustment screws of the front and rear carburettors and start the engine. The engine should retain its operation temperature before carrying out the next step.

Now turn the throttle adjusting screw of both carburettors to reduce the engine speed to approx. 600 - 700 rpm. The engine should turn over smoothly and consistently. If a flow meter is available, apply the instrument to the front carburettor flange and turn the adjustment screw on the flow meter so that the upper end of the float in the glass tube is in line with the scale. Lift off the flow meter and re-apply it to the rear carburettor without altering the setting of the flow meter adjusting screw. If the position of the float is not in line with the scale, adjust the rear carburettor throttle adjusting screw to align the float with the mark on the scale.

With the carburettor flow correctly adjusted, tighten the idling adjusting nuts of both carburettors by approx. 1/8 of a turn and stop the adjusting of the nuts at a point where the engine speed is fastest and smoothest without missing or hunting. If this point cannot be determined, bring the nuts back to their original positions and unscrew them from this position until the engine runs fastest and smoothest.

Then slacken the throttle adjusting screws of the front and rear carburettors and adjust the engine speed to the specified value of 650 rpm for standard engines or 700 rpm for models with oil cooler. Make sure that the air flow of both the carburettors remains unchanged. Screw in the throttle adjusting screws until their heads contact the throttle connecting lever. Connect up the front and rear throttle shaft without changing the idling speed setting.

Move the throttle interconnecting shaft and accelerate the engine a few times. When the engine is settled once more in its idling speed, check that the speed is unchanged. Re-check also the connection of the interconnecting shaft. Then turn the interconnecting shaft adjusting screw to increase the engine speed to 800 - 1000 rpm. Check by means of the flow meter if the idling air flow is the same for both carburettors. If necessary,

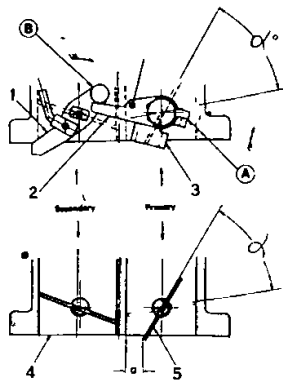


Fig E 21 Interlock opening of primary and secondary throttle valves (L16 engine)

- 1 Connecting lever
- 2 Return plate
- 3 Adjuster plate

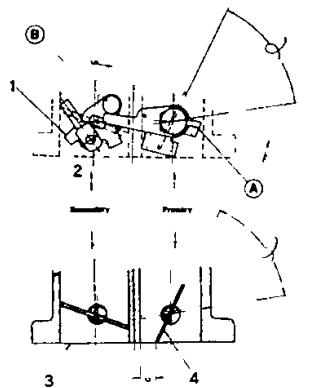


Fig E 22 Interlock opening of primary and secondary throttle valves (L13 engine)

- 1 Connecting lever
- 2 Return plate
- 3 Throttle chamber
- 4 Throttle valve

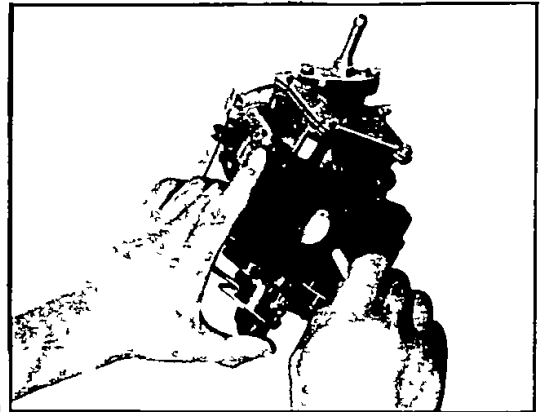


Fig E 23 Checking the clearance between throttle valve and body

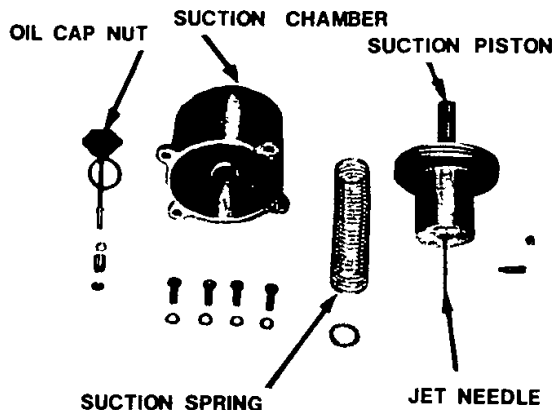


Fig E 24 Exploded view of suction chamber and suction piston

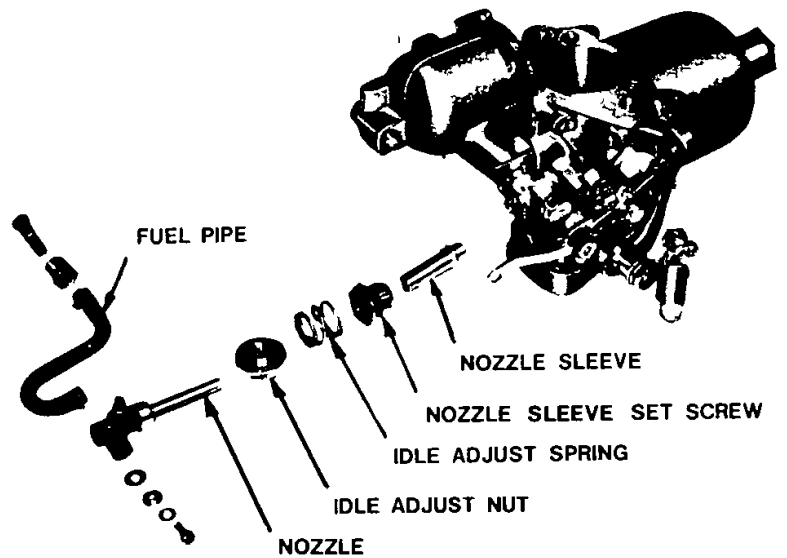


Fig E 25 Exploded view of nozzle assembly

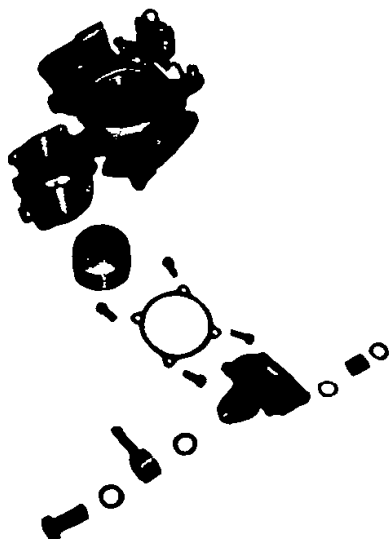


Fig E 26 Exploded view of the float chamber

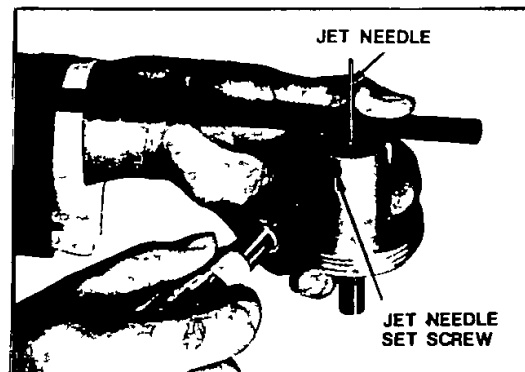


Fig E 27 Installation of the jet needle

adjust the length of the throttle connecting rod. Finally back off the interconnecting shaft adjusting screws and decrease the engine speed. Again check with the flow meter to confirm that the float settings are even. Re-adjust if necessary by means of the throttle adjusting screws. Stop the engine and refit the air cleaner.

Adjustment of jet needle

Remove the suction chamber and the suction piston and turn the idling adjusting nut. Using a depth gauge check that the dimension "A" between the jet bridge and the top of the needle head is 0.5 mm (0.0197 in). When this dimension is obtained, re-install the suction piston and the suction chamber and check the smooth operation of the suction piston. The jet needle is now set in basic position.

Float level

Remove the float chamber clip, disconnect the fuel pipe and remove the sleeve nut. If a fuel level gauge is available, connect the gauge to the fuel pipe connection on the carburettor, re-connect the fuel pipe and start the engine. The fuel level in the glass tube of the level gauge should be between 22 and 24 mm (0.866 - 0.945 in) from the top of the float chamber. If no level gauge is available, proceed as follows:

1. Remove the float chamber cover after undoing the four cover screws and lift off the cover together with the attached float lever. Hold the cover so that the float lever side is facing upwards.
2. Lift the float lever with the tip of the finger and then lower it until the float lever seat just contacts the valve needle stem. If the dimension "H" in Fig E 33 is between 14 to 15 mm (0.551 to 0.5901 in), the float level is correct. If necessary bend the float lever as shown in the illustration.

Starting interlock opening

To adjust the starting interlock opening, bend the connecting rod (4) in Fig E 34 with a suitable pair of pliers. The opening is increased by lengthening the connecting rod and reduced by shortening the rod. The length of the connecting rod is correct if the clearance between the throttle valve and the throttle chamber (dimension "B" in Fig E 34) is 0.6 - 0.8 mm (0.0234 - 0.0315 in), with the starter lever pulled out completely.

Hydraulic damper

The damper oil should be checked approx. every 3000 miles (or every 3 months). To check the oil level, remove the oil cap nut as shown in Fig E 35 and check the level marking on the two grooves on the plunger rod. If the level has dropped below the lower line, fill in SAE 20 engine oil. Use an oil can and fill in the oil until the level has reached the upper line. When inserting the cap nut take care not to bend or damage the plunger rod. Tighten the nut sufficiently by hand.

FUEL FILTER

The fuel filter is of the throw-away cartridge type and should be changed every 40,000 km (24,000 miles). To remove the fuel filter disconnect the inlet and outlet pipes and remove the filter (Fig E 36). The installation of the filter is a reversal of the removal procedure.

FUEL PUMP – Removal

Disconnect the inlet and outlet hoses from the fuel pump connection and remove the two mounting nuts.

FUEL PUMP – Dismantling

Refer to Fig E 37. Remove the screws, securing the upper to the lower body and lift off the upper body.

Remove the valve retainer securing screws and lift out the retainer, valves and packing. Remove the cover retaining screws and lift off the cover together with the gasket.

On the lower body half press down the diaphragm and unhook the diaphragm rod from the rocker arm link. Lift out the diaphragm. Remove the spring, oil seal retainer, oil seal packing. To remove the rocker arm assembly, drive out the pivot pin towards the serration and lift off the individual parts.

FUEL PUMP – Inspection

Thoroughly clean all parts and check as follows:

The body and cover for cracks, defective threads or wear. The diaphragm for wear and tear and a worn pull rod. The sealing faces of the valves and the spring for weakness and corrosion. The rocker mechanism for wear.

FUEL PUMP – Assembly

Insert the rocker arm and the link in the lower body and hold in place while fitting the pivot pin from the non-serrated side of the pin. Install the rocker arm spring.

Install the oil seal and the seal washer and the diaphragm to the lower body half. Press down the diaphragm and engage it with the rocker arm link. Fit the cover to the upper body half.

Install the packing and the valves correctly into the upper body half and secure the valves with the valve retainer and the screws. Position the upper body onto the lower body and insert the screws. Make sure the screws pass through the diaphragm without tearing the material. Tighten the screws evenly and securely.

FUEL PUMP – Installation

Reverse the removal procedure. Start up the engine and check for fuel leaks.

FUEL PUMP – Testing

Remove the carburettor fuel pipe and connect a pressure gauge on to the fuel pump outlet fitting. Run the engine and check the fuel pump pressure which should be 0.18 - 0.24 kg/sq cm (2.56 - 3.4 psi). If the pressure reading is below the setting, replace the diaphragm spring.

Conduct a flow check by connecting the inlet pipe and inserting the outlet pipe in a suitable container. Start the engine and run at 1000 rpm for one minute. The minimum quantity of fuel delivered should be 1000 cc. If not, check the pump for malfunction and the fuel lines for blockages. If blocking or restrictions are suspected in the fuel lines, remove the pump and blow out the lines with compressed air. Repeat the flow test.



Fig E 36 Removal of the fuel filter



Fig E 38 The fuel tank of Saloon Cars

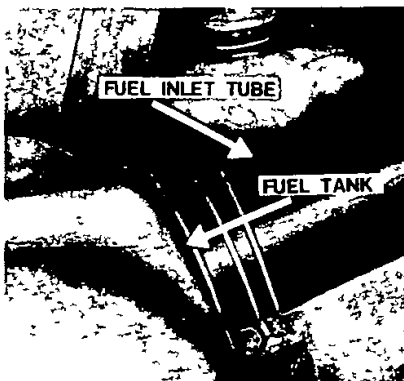


Fig E 39 The fuel tank filler tube



Fig E 41 Exploded view of the air cleaner

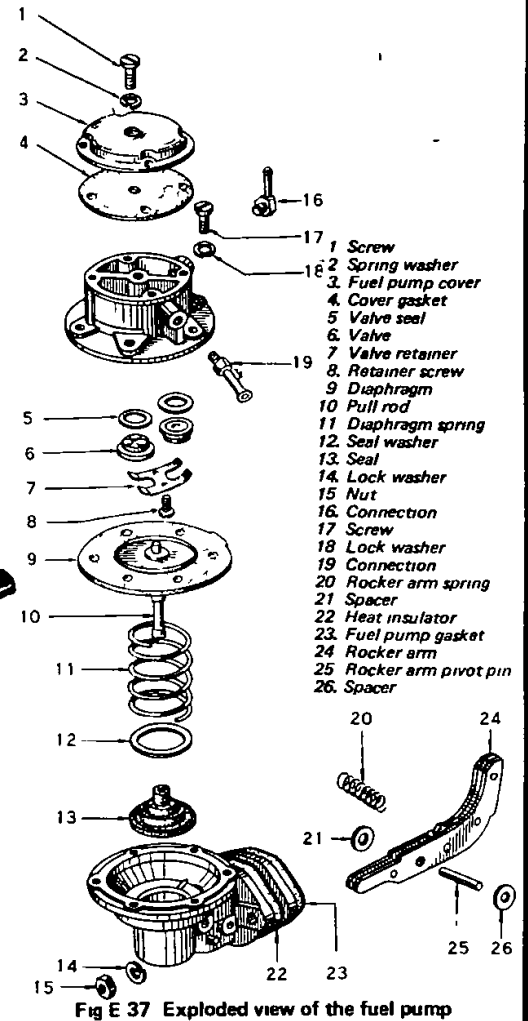


Fig E 37 Exploded view of the fuel pump

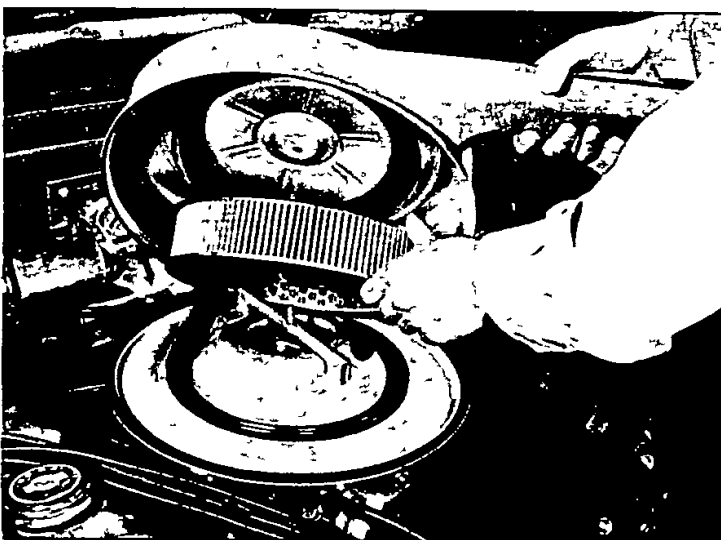


Fig.E 42. Removal of the air cleaner (engine with single carburettor)



Fig E 40 The fuel tank of Estate Cars.

after re-assembly

FUEL TANK — Removal

Saloon Remove the rear seat and the seat back and take off the seat back trim. Open the luggage compartment lid and remove the board finisher board (Fig E 38). Disconnect the fuel gauge wire and the tank filler tube (Fig E 39). Remove the tank securing bolts and disconnect the fuel outlet pipe and the fuel return line. Lift out the tank.

Estate car (station wagon) Carry out the same operations as described above, with the exception that the fuel tank securing screws are accessible from under the rear floor panel (Fig E 40).

The installation of the fuel tank is in both cases a reversal of the removal procedure.

FUEL LINES

Examine the fuel lines for damage and kinks and replace if necessary. If dirt is found in the carburettor float chamber or in the fuel pump strainer, disconnect the pipes and blow out with compressed air. It might be recommendable in this connection to empty, remove and clean the fuel tank, as deposits are without doubt in the fuel tank, which would lead to the same fault after a short time.

AIR CLEANER

The air cleaner is of the viscous paper type and cannot be cleaned, but must be replaced every 24,000 miles (40,000 km). This operation is shown in Fig E 41 and is self explanatory.

POSITIVE CRANKCASE VENTILATION SYSTEM

The L 13 engine has a ventilation pipe from the rocker box to the air cleaner (Fig E 43), whilst the L 16 engine uses a combination system (Fig E 44) which is similar to the one used for the L 13 engine, but is fitted additionally with a tube with a variable orifice valve for the crankcase to the inlet manifold.

Inspection

Every 12,000 miles (20,000 km) remove the hoses and blow out with compressed air. If the hose is blocked or collapsed, replace it. Check that the crankcase breather valve only allows one-way passage of gas into the inlet manifold. Replace the valve if it is leaking in the opposite direction. Clean all connections and the oil filler cap, which is sealed and has no connection to the atmosphere.

To check the operation of the system, disconnect the ventilation hose from the rocker cover with the engine running at idling speed and check that a hissing sound can be heard as the air passes through the valve. A strong vacuum should be felt when a finger is placed over the valve inlet. A damaged valve must always be replaced.

Technical Data

TWIN CHOKE CARBURETTORS

Engine Model	L16 (1600 c c)		L13 (1300 c c)	
	Primary	Secondary	Primary	Secondary
Outlet diameter	28 mm	32 mm	26 mm	30 mm
Venturi diameter	24 mm	28 x 9 mm	21 x 8 mm	27 x 12 mm
Main jet	115	155	96	150
Main air bleed	240	120	80	90
Slow-running jet	48	180	43	180
Economizer jet	18	—	—	—
Economizer bleed	18	—	—	—
Power jet	—	—	40	—
Float level	23 ± 1 mm (0.905 ± 0.04 in)		23 ± 1 mm (0.905 ± 0.04 in)	
Fuel pressure	0.24 kg/sq cm (3.41 psi)		0.24 kg/sq cm (3.41 psi)	
Weight	2.35 kg / 5.17 lb		2.55 kg (5.61 lb)	
Altitude setting (main jet)				
1000 m (3300 ft)	112	—	94	—
2000 m (6600 ft)	109	—	92	—
3000 m (10,000 ft)	107	—	89	—
4000 m (13,300 ft)	104	—	87	—
5000 m (16,600 ft)	101	—	85	—

SU-TYPE TWIN CARBURETTORS**FUEL PUMP**

Bore diameter 38 mm
 Weight 2.8 kg (6.16 lb)
 Needle B
 Float needle valve 20 mm (0.08 in)
 Jet needle M-61
 Suction spring No 23
 Float level 23 ± 1 mm
 Fuel pressure 0.24 kg/sq cm (3.41 psi)

Delivery pressure
 Delivery amount
 Type

0.18 - 0.24 kg/sq cm (2.56 - 3.41 psi)
 1000 cc/min at 1000 rpm
 Diaphragm pump, driven from camshaft

Trouble Shooting

SYMPTOMS	PROBABLE CAUSE	ACTION TO BE TAKEN
CARBURETOR		Check and replace parts as necessary
Flooding	Improper seating or damaged float needle valve or seat Incorrect float level Fuel pump has excessive pressure	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 valves 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 carburetor Clogged fuel pipes Manifold draws secondary air	Clean and adjust carburetor Clean carburetor Clean or replace pipes Tighten or replace gasket
Insufficient fuel supply	Clogged carburetor Clogged fuel pipe Dirty fuel Air in fuel system Defective fuel pump Clogged fuel filter	Dismantle and clean carburetor 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	
Noisy pump	Loose pump mounting Worn or defective rocker arm Broken rocker arm spring	Tighten mounting bolts Replace rocker arm Replace spring

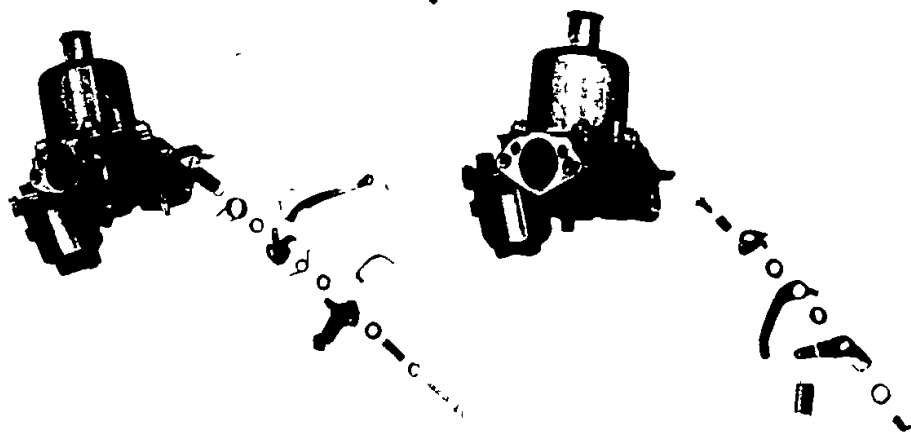


Fig E 28 Exploded view of the starter lever (left) and the throttle lever (right)

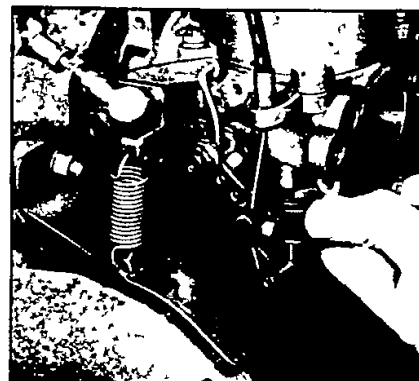


Fig E 29 The slow-running adjusting nut

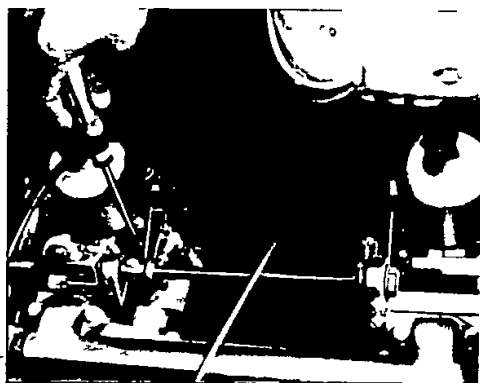


Fig. E 30 The throttle valve adjusting screw

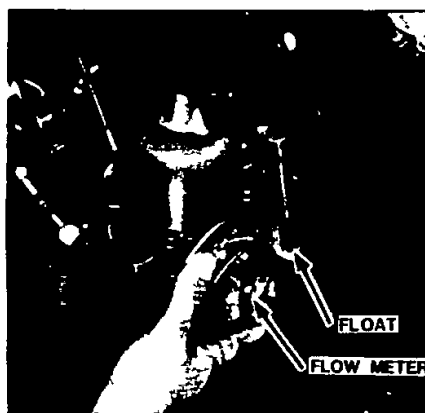


Fig E 31 Flow meter held in position.

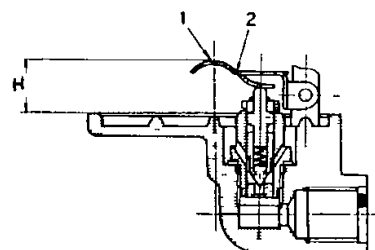


Fig E 33 Adjustment of the float level

- 1 Float lever
- 2 Bend here to adjust height 'H'

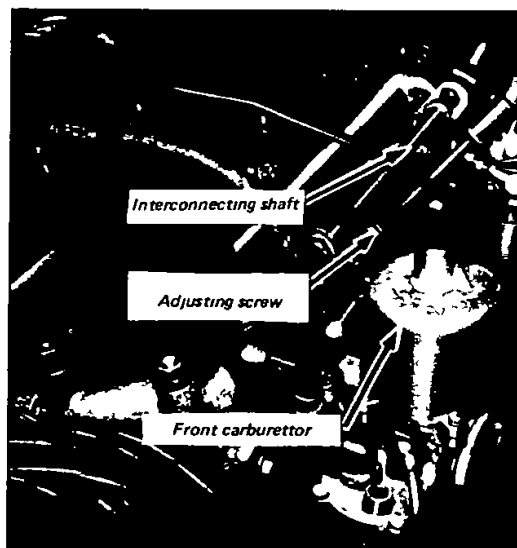


Fig E 32 The adjustment of the interconnecting shaft.

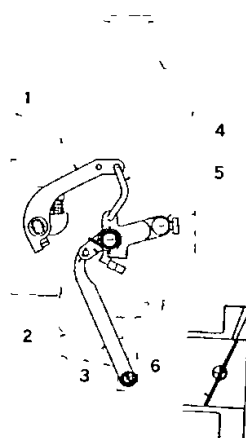


Fig E 34 Adjustment of the starting interlock opening

- 1 Fast idle lever
- 2 Connecting plate
- 3 Connecting linkage
- 4 Connecting rod
- 5 Starter lever
- 6 Throttle valve

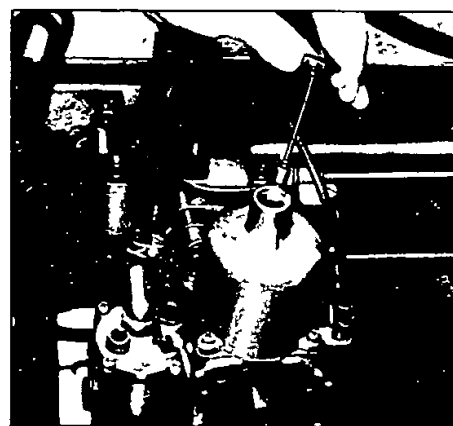


Fig E 35 Checking the hydraulic damper oil

Clutch

DESCRIPTION

Either a diaphragm-type or coil spring-type clutch is fitted. In the case of the diaphragm-type clutch, the clutch cover and the pressure plate are combined by nine spring setting bolts. The diaphragm has nine release fingers which apply pressure to the pressure plate, to hold the latter in constant contact with the clutch driven plate and thereby with the flywheel.

The coil spring-type clutch consists of the clutch cover and the pressure plate, combined by nine pressure springs. Three release levers, retained by eye bolts and nuts serve to release the clutch mechanism.

CLUTCH – Removal

Remove the gearbox as described in section "GEARBOX". When a diaphragm clutch is fitted, insert special tool ST49090000 clutch aligning tool (or a spare clutch shaft) into the splines of the driven plate in order to support the clutch. Remove the six clutch cover bolts by loosening gradually in a diagonal manner and lift off the clutch cover.

In the case of the coil spring-type, insert suitable hooks under the release levers to restrain the clutch spring tension and remove the clutch cover bolts as described above for the diaphragm-type clutch.

CLUTCH – Dismantling

Diaphragm clutch The only dismantling recommended is the replacement of the clutch cover. If the clutch is damaged to a further extent, replace the complete assembly.

Coil spring clutch A clutch assembly tool, similar as illustrated in Fig F 3 should be used to dismantle the clutch. The parts illustrated are 1 Base plate, 2 Centre spigot, 3 Distance pieces, 4 Height gauge, 5 Operating lever, 6 Securing bolts. The special Datsun Tool has the number ST47990000. Included with this tool is a chart, giving the parts to be used for every particular type of clutch.

In order to dismantle the clutch, place the distance spacers on the base plate and arrange the clutch cover so on the base plate that the cover holes coincide with the threaded holes in the base plate. Bolt down the cover to the plate.

Mark clutch cover, the pressure plate lugs and the release levers. Remove the restraining hooks previously pushed under the ends of the clutch release levers and unscrew the three nuts from the eyebolts. Slowly release the pressure on the clutch coil springs, by unscrewing the cover bolts gradually in a diagonal pattern. Lift off the clutch cover, spring caps, springs, spring seats and the pressure plate.

CLUTCH INSPECTION

Clean all parts with the exception of the clutch release bearing and the clutch driven plate and check the individual parts as follows:

Clutch driven plate

Check the clutch driven plate for run-out between the centres of a lathe and replace or straighten the plate, if the indicated value exceeds 0.5 mm (0.02 in) (Fig F 8) at a distance of 95 mm (3.74 in) from the centre of the plate. If the rivet heads are less than 0.3 mm (0.012 in) below the clutch facings or there is abnormal wear or rivets missing, replace the driven plate or the clutch facings.

Check the splines in the clutch driven plate hub for rotational backlash by placing the plate on the gearbox clutch shaft and rocking it to and fro. If it is felt that the clearance exceeds 0.4 mm (0.016 in) replace the complete plate. It is also possible to replace the hub only, but this is a job for the more skilled person and should only be carried out if the necessary equipment is available.

If the clutch facings are soiled with oil or grease, clean off with a suitable solvent and dress up with a wire brush if possible. If the oiling-up is excessive, the clutch facings or the complete plate must be renewed.

Pressure plate

Check the pressure plate for damage, such as dents and scratches and lap smooth if necessary. Remove the minimum of metal necessary to restore the surface. Using a surface plate, check that the pressure plate is not distorted. To do this, place the pressure plate on to the surface plate, press down the plate and insert feeler gauges to determine the gaps between the pressure plate and the surface plate. If this exceeds 0.1 mm (0.004 in), repair or replace pressure plate. The pressure plate can be skimmed off, but the maximum amount of metal that can be removed is 1.0 mm (0.004 in).

Clutch spring - Diaphragm clutch

With the diaphragm spring assembled to the pressure plate, inspect the assembly height and the spring load. To do this, place distance pieces of 7.8 mm (0.307 in) height on to the base plate and bolt down the clutch cover. Measure the height "B" in Fig F 9 at a diameter of 44 mm (1.732 in). The release fingers should be between 43 - 45 mm (1.693 - 1.772 in) from the base plate. If this is not the case, replace the spring.

With a plate placed on the clutch, press down the clutch (Fig F 10) by 7.8 mm (0.307 in) or until the clutch driven plate hub is flush with the edge of the clutch cover mounting face, when the applied load should be 350 kg (770 lbs). If less, replace the diaphragm spring. Do not press the clutch spring down by more than 9 mm (0.35 in) as the spring might break.

Clutch springs - Coil spring clutch

If the load on the assembled clutch is reduced by more than 15% or the free length of the coil springs has altered by more than 1.5 mm (0.06 in) or the deflection between "A" and "B" in Fig F 11 is more than 5 mm per 100 mm (0.2 in per 3.94 in) it becomes necessary to replace the clutch springs as a set.

Release bearing

Replace the release bearing if the wear is excessive, causing too much play or there is roughness or a step formed or if the

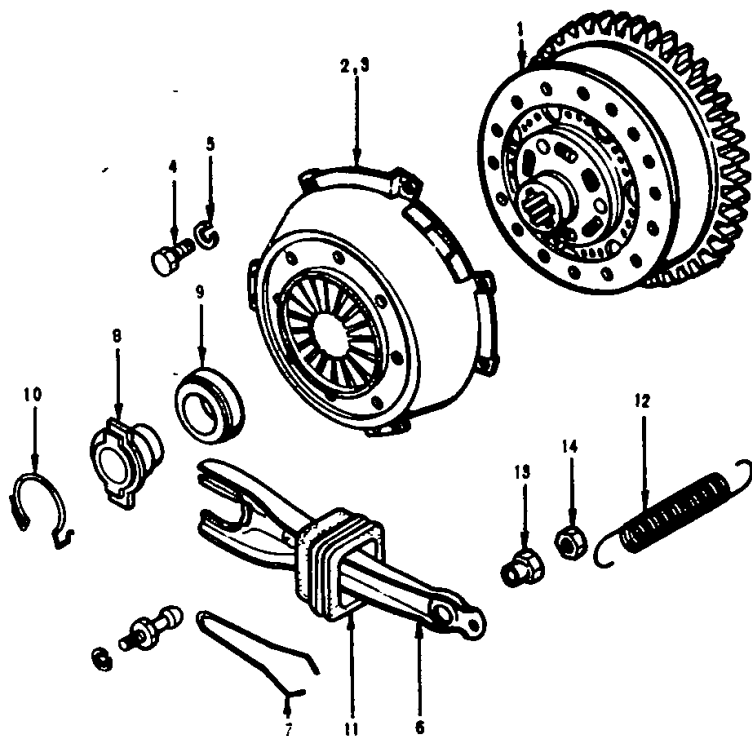


Fig F 1 Exploded view of the diaphragm spring clutch

- | | |
|---------------------------|----------------------------|
| 1 Clutch driven plate | 8 Bearing sleeve |
| 2 Clutch cover | 9 Clutch release bearing |
| 3 Pressure plate | 10 Retaining clip |
| 4 Clutch securing bolt | 11 Dust cover |
| 5 Spring washer | 12 Return spring |
| 6 Clutch withdrawal lever | 13 Withdrawal lever pusher |
| 7 Retainer spring | 14 Locknut |

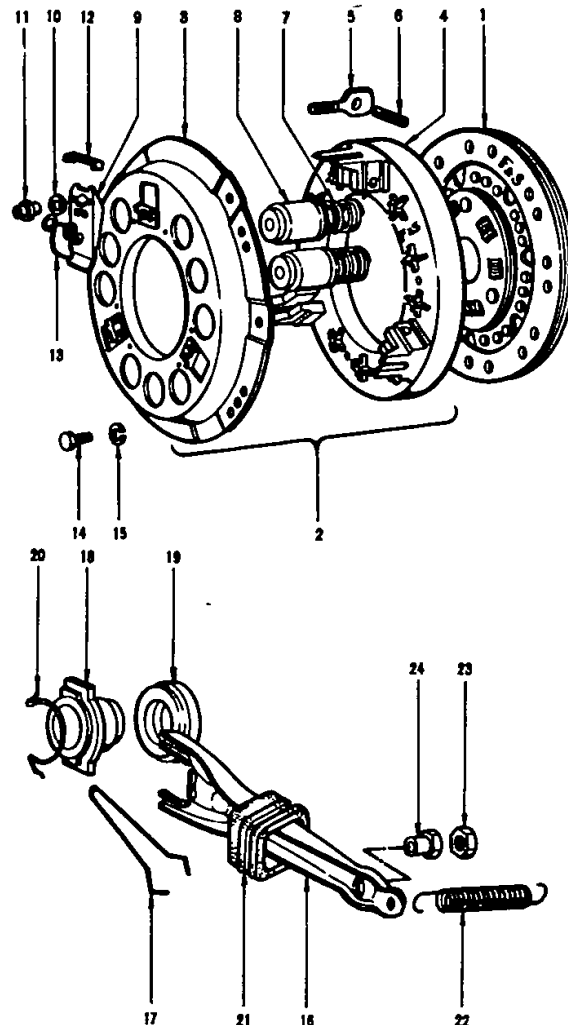


Fig F 2. Exploded view of the coil spring clutch

- | | |
|---------------------------|-----------------------------|
| 1. Clutch driven plate | 13. Retaining spring |
| 2. Clutch assembly | 14. Bolt |
| 3. Clutch cover | 15. Spring washer |
| 4. Clutch pressure plate | 16. Withdrawal lever |
| 5. Eyebolt | 17. Retainer spring |
| 6. Eyebolt pivot pin | 18. Bearing sleeve |
| 7. Pressure spring | 19. Clutch release bearing |
| 8. Spring cap | 20. Retaining spring clip |
| 9. Release lever | 21. Dust cover |
| 10. Release lever seat | 22. Return spring |
| 11. Locknut | 23. Locknut |
| 12. Release lever support | 24. Withdrawal lever pusher |

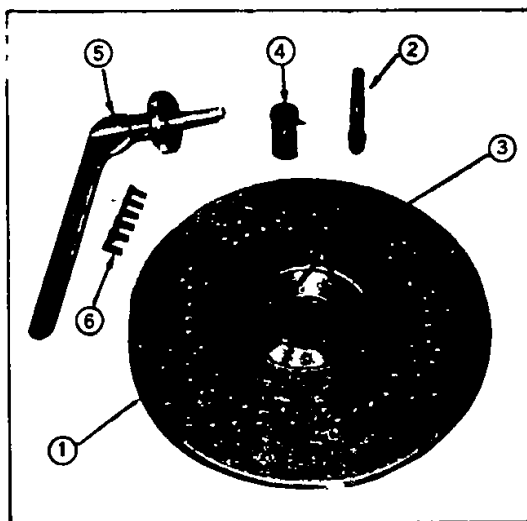


Fig.F 3. Special tool set for clutch overhaul.

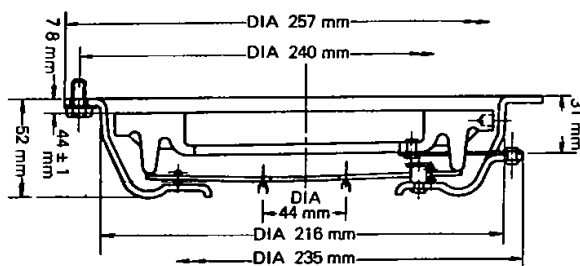


Fig.F 4 Dimension diagram for the diaphragm clutch.

clutch cover to inside diameter clearance is more than 0.5 mm (0.2 in.). If excessive grease has leaked from the bearing it should be replaced. To remove the bearing, use a conventional two-arm puller as shown in Fig F.12

The bearing should be pressed on, using a force of 400 kg (880 lbs). When pressing on the bearing for the diaphragm spring type, exert the pressure on the outer race as shown in Fig F.13. In the case of the coil spring type, the pressure must be exerted on the inner race as in Fig.F.14. After assembly check the bearing for smooth rotation

CLUTCH – Assembly (Coil spring type)

Press the pin into the eyebolt and through the pressure plate lug. Place three distance pieces on the surface of the base plate and arrange pressure plate, pressure springs and retainers on the plate. Set the retracting springs on to the cover and fit the release levers through the springs. Place the clutch cover over the pressure plate and the springs, observing that the pressure springs are not dislodged and not liable to distortion. Then tighten the cover bolts gradually in a diagonal pattern to compress the pressure springs.

Place the release levers over the eyebolts and screw on the securing nuts. Lock the eyebolt nuts after adjustment (described below). Push retaining hooks under the release levers and remove the clutch assembly from the base plate, slackening the bolts in a diagonal pattern to avoid distortion.

CLUTCH – Adjustment (Coil spring type)

Using the height gauge on the centre pillar, loosen or tighten the eyebolt nuts so that the tops of the release levers are just touching the tip of the gauge (Fig F.15). When all three levers are correctly adjusted, remove the centre pillar and screw in the actuating lever (Fig F.16). Operate the clutch mechanism several times and re-check the release lever setting as near to the edge as possible. If the deviation is more than 0.4 mm (0.016 in.), re-adjust the levers as necessary. Finally secure the eyebolt nuts by peening over the material.

CLUTCH – Installation

With the long chamfered end of the clutch driven plate splines facing the gearbox, place the clutch on to the flywheel. Use a spare clutch shaft, align the clutch driven plate by inserting the shaft through the driven plate and into the pilot bearing of the flywheel (crankshaft). Turn the clutch cover in order to bring in line the holes for the clutch bolts in the cover with the threaded holes in the flywheel and tighten the bolts in a diagonal manner gradually to a torque of 2.4 - 2.6 kgm (17.4 - 18.8 lb ft). Remove the dummy shaft. **Do not forget to remove the clutch spring restraining hooks from under the release levers.** Fit the release bearing and the bell housing.

CLUTCH PEDAL – Removal and Installation

Remove the clevis pin from the end of the push rod and disconnect the push rod end. Remove the return spring, the push rod and the push rod adjuster (if fitted). Remove the pedal lever securing bolt, loosen the handbrake bracket securing bolts and lift out the pedal.

Clean all parts and check for wear with special note to rubber parts, return spring and pedal lever bush. Replace parts as necessary. The installation of the clutch pedal is a reversal of the removal procedure.

CLUTCH PEDAL – Adjustment

With the pedal stop bracket free, adjust the pedal height to 183 mm (7.205 in.) for R.H.D. models and 208 mm (8.189 in.) for L.H.D. models by adjusting the length of the master cylinder push rod. Then tightening the pedal stop bracket, obtain a pedal height of 182 mm (7.165 in.) for R.H.D. models or 207 mm (8.150 in.) for L.H.D. models and lock the stop bracket.

Adjust the length of the assist spring push rod to 203 mm (7.992 in.) for R.H.D. models and 183 mm (7.205 in.) for L.H.D. models by rotating the push rod adjuster (only fitted with coil spring type clutch).

CLUTCH MASTER CYLINDER – Removal

Remove the push rod clevis pin, disconnect the clutch hose and drain the fluid. Remove the cylinder securing bolts and lift out the cylinder.

CLUTCH MASTER CYLINDER – Dismantling (Fig F.18)

Empty the fluid from the reservoir, pull back the rubber dust cover and remove the circlip. Withdraw the push rod together with the retaining ring. Unscrew the piston stop screw and remove the complete piston assembly. The piston can be dismantled by lifting the spring seat over the piston shoulder.

Clean all parts in brake fluid. Any damaged or abnormally worn parts should be replaced. The maximum permissible clearance between piston and cylinder must not exceed 0.13 mm (0.005 in.) and as a matter of policy the piston cup should be replaced every time. If the piston spring or valve spring is weak, replace them.

CLUTCH MASTER CYLINDER – Assembly

This is a reversal of the dismantling procedure. All moving parts should be lubricated with brake fluid. The piston cup should be soaked in brake fluid prior to assembly.

CLUTCH MASTER CYLINDER – Installation

The installation of the master cylinder is a reversal of the removal procedure. Take care that the threads of the clutch hose are not damaged. Check the pedal height and adjust if necessary as described earlier on. Finally bleed the clutch hydraulic system.

CLUTCH SLAVE CYLINDER – Removal (Fig F.19)

Disconnect the fluid line from the slave cylinder and the push rod from the clutch withdrawal lever. Remove the two cylinder mounting bolts and lift out the cylinder.

CLUTCH SLAVE CYLINDER – Dismantling

After removal of the rubber dust cover and the circlip, all parts of the slave cylinder can be easily removed. Check all parts for

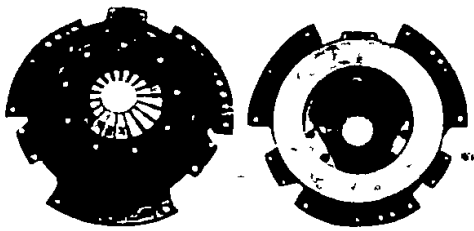


Fig F 5 View of the diaphragm clutch.

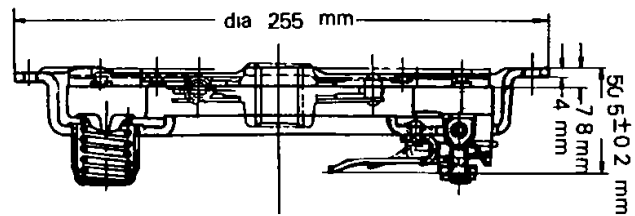


Fig F 6 Dimension diagram for the coil spring clutch

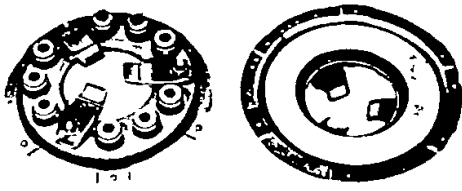


Fig F 7 View of the coil spring clutch



Fig F 8 Checking the clutch driven plate for run-out.

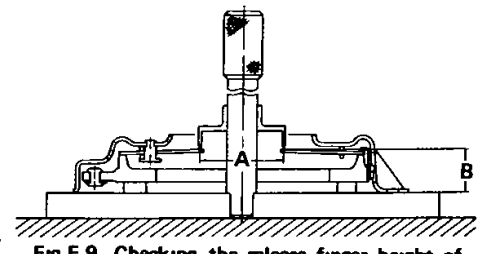


Fig F 9 Checking the release finger height of the diaphragm clutch

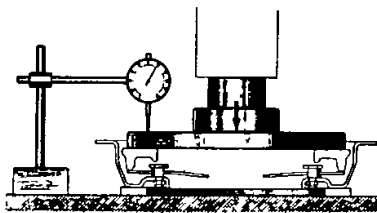


Fig F 10 Checking the load of the diaphragm clutch

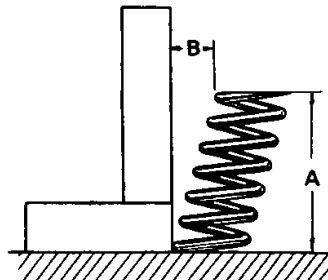


Fig F 11 Inspecting the clutch springs for distortion

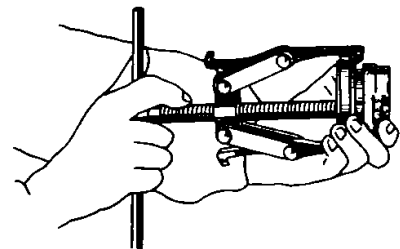


Fig F 12 Removal of the clutch release bearing

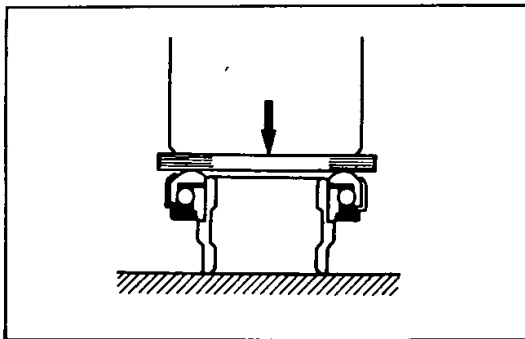


Fig F 13 Installation of the clutch release bearing (diaphragm clutch).

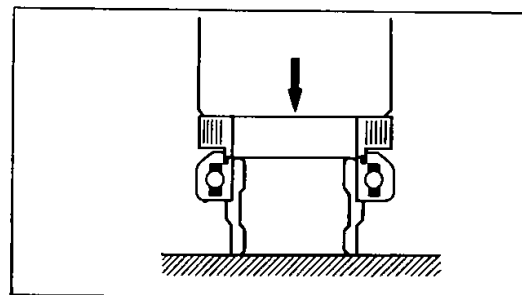


Fig.F.14. Installation of the clutch release bearing (coil spring clutch)

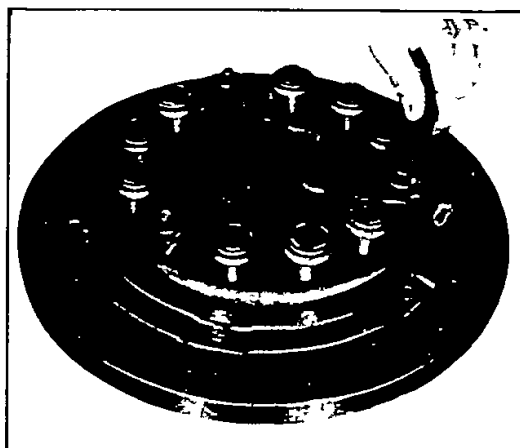


Fig F 15 Adjusting the release lever height

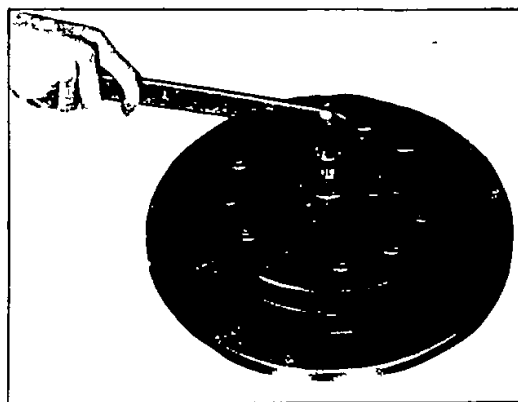


Fig F 16 Actuating the clutch to settle the mechanism

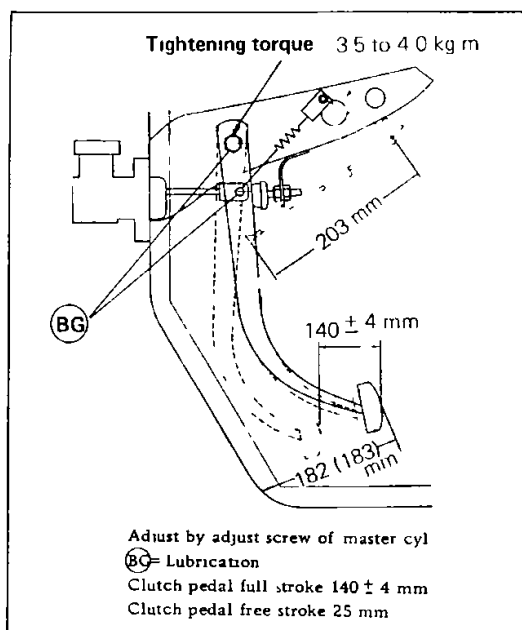


Fig F 17 The clutch pedal adjustment

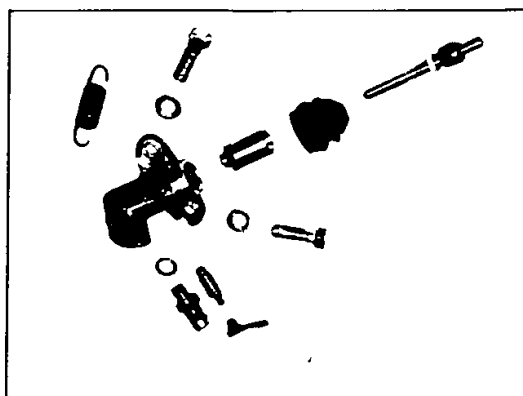


Fig F 19 Exploded view of the clutch slave cylinder

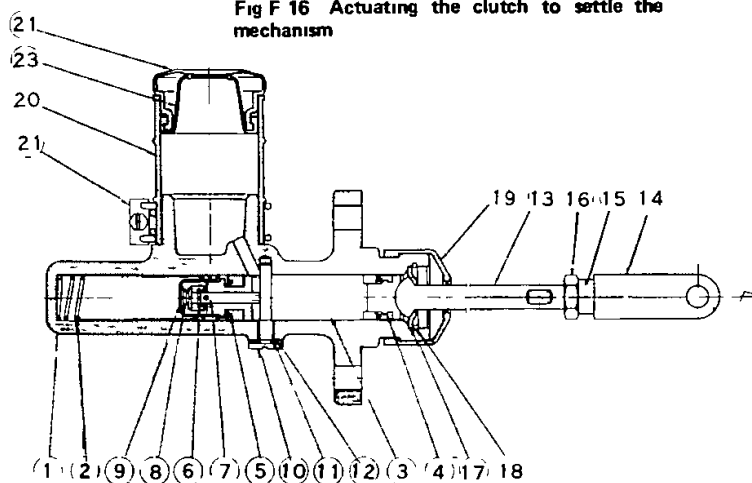


Fig F 18 Section through the clutch master cylinder

- 1 Cylinder body
- 2 Return spring
- 3 Piston
- 4 Secondary cup
- 5 Piston cup
- 6 Valve seat
- 7 Valve stem
- 8 Valve spring
- 9 Spring seat
- 10 Valve stem stop
- 11 Stop gasket
- 12 Gasket washer
- 13 Push rod
- 14 Push rod clevis
- 15 Nut
- 16 Locknut
- 17 Piston stop
- 18 Abutment washer
- 19 Rubber boot
- 20 Fluid reservoir
- 21 Clip
- 22 Reservoir cap
- 23 Cap seal

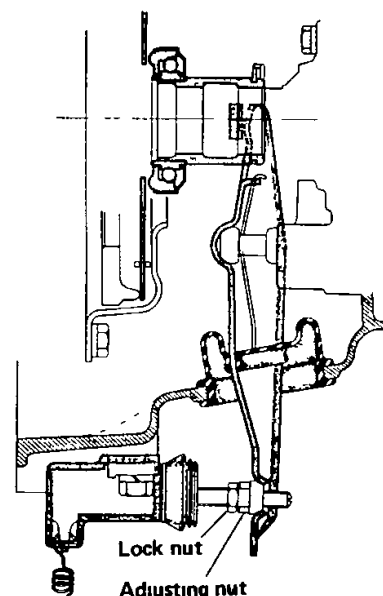


Fig F 20 Adjustment of clutch withdrawal lever

wear, especially the piston cup and replace if worn or damaged

CLUTCH SLAVE CYLINDER — Assembly and Installation

The assembly of the slave cylinder is carried out in reverse order to the dismantling procedure. All moving parts should be lubricated with brake fluid and the piston cup soaked in brake fluid prior to assembly.

The installation is a reversal of the removal procedure. Bleed the hydraulic clutch system and adjust the free play of the clutch withdrawal lever as described below.

CLUTCH WITHDRAWAL LEVER — Adjustment (Fig F 20)

Loosen the locknut, screw the push rod fully home whilst turning the adjustment nut and then unscrew by $1\frac{3}{4}$ turns to give an end play of 2.0 - 2.3 mm (0.079 - 0.09 in) on the withdrawal lever, giving a clearance of about 1.3 mm (0.051 in) between the release bearing and the diaphragm spring fingers or the release levers, depending which type of clutch is fitted.

NOTE: The correct adjustment of the clearance is essential as insufficient free travel between release bearing and clutch can cause the clutch to slip. Excessive free travel can cause failure to disengage the clutch. It is also important that the clutch driven plate is not worn by more than 2.0 mm (0.08 in) in thickness from the "new" dimension of 7.8 mm (0.307 in).

CLUTCH SYSTEM — Bleeding

Remove the rubber dust cap from the bleeder screw on the slave cylinder and attach a clear plastic bleeder hose to the screw, immersing the free end of the hose into a jar, partially filled with clean brake fluid. Open the bleeder screw by $\frac{3}{4}$ turn. Fill the fluid reservoir with the recommended fluid and pump clutch pedal slowly.

When all air has left the system, indicated by a solid flow of brake fluid into the jar, tighten the bleeder screw on a downstroke of the pedal. Remove the bleeder hose, replace the dust cap and replenish the fluid reservoir.

Technical Data

Clutch pressure springs

Free length	52.3 mm (2.059 in)
Fitted length/load	29.2 mm/44 kg (1.15 in/97 lb)
Side distortion	5 mm/per 100 mm (0.2 in/per 3.94 in)
Permissible deterioration of spring force	15%

Clutch driven plate

Outer diameter	200 mm (7.87 in)
Inner diameter	130 mm (5.12 in)
Thickness of facings	3.5 mm (0.14 in)
Total friction area	362 sq cm (56.11 sq in)
Thickness of clutch plate	
Free	8.6 - 9.0 mm (0.3386 - 0.3543 in)
Compressed	7.65 - 7.95 mm (0.3012 - 0.3130 in)
Number of torsion springs	6
Permissible min. depth from rivet head to facing	0.3 mm (0.012 in)
Permissible run-out of clutch plate	0.5 mm (0.020 in)
Permissible free-play on splines	0.4 mm (0.016 in)

Clutch release levers

Clearance between release bearing and release levers	1.2 - 1.4 mm (0.047 - 0.055 in)
Height between diaphragm spring and flywheel	44 ± 1 mm (1.732 $\pm$ 0.039 in)
Height between release levers and flywheel	50.5 ± 0.05 mm (1.988 $\pm$ 0.02 in)

Clutch pedal

Pedal height in rest position	182 mm (7.17 in) RHD 207 mm (8.15 in) LHD
Free stroke of pedal	25 mm (0.984 in)
Pedal effort	15 kg (33 lb)

Master cylinder

Diameter	15.87 mm (5/8 in)
Max. piston clearance	0.13 mm (0.005 in)

Pressure plate

Permissible refacing	1.0 mm (0.039 in)
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Trouble Shooting

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



Fig.G 1 Removal of the propeller shaft.

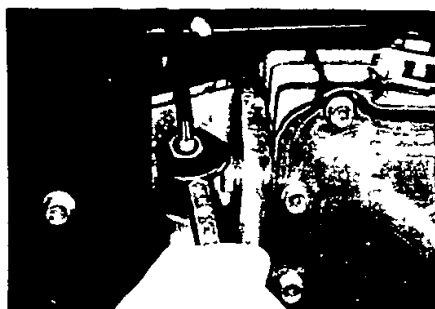


Fig G 2. Disconnecting the speedometer cable.



Fig.G 3. Disconnecting the remote control linkage



Fig.G 4 Removal of the clutch slave cylinder

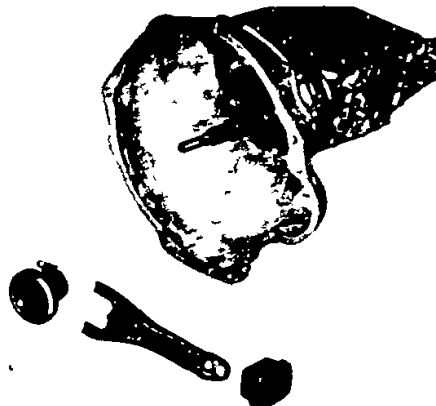


Fig.G 5 Withdrawal lever and release bearing removed

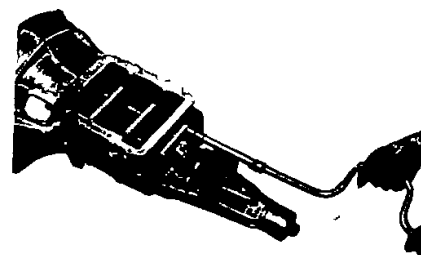


Fig G 6 Removal of the extension housing

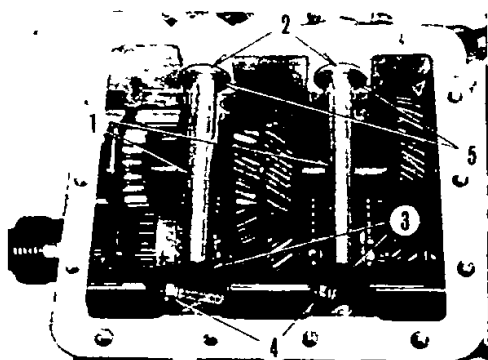


Fig.G 7. Removal of the cross-shafts. (For annotations see text)

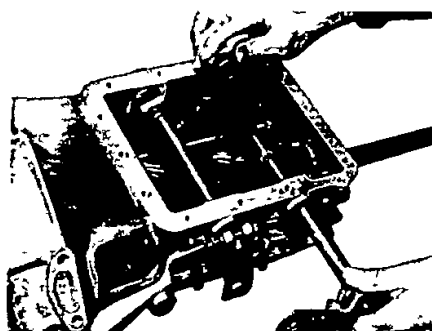


Fig.G 8 Removal of the cross-shaft.

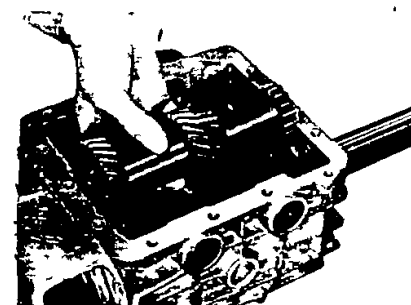


Fig.G 9 Removal of the countershaft gear cluster

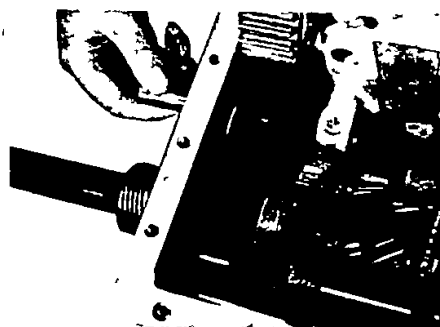


Fig.G 10. Removal of the reverse idler gear

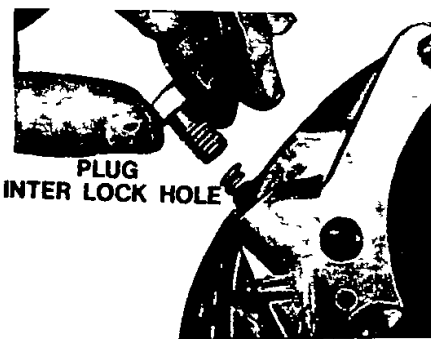


Fig.G 11. Removal of the interlocking plug.

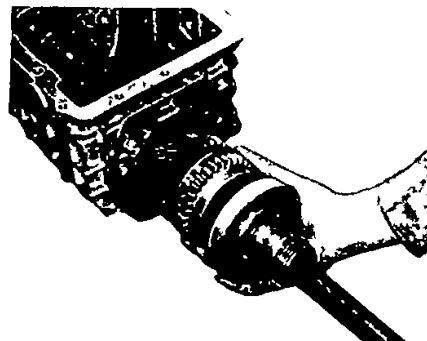


Fig.G.12. Withdrawal of the mainshaft gear train.

Gearbox

THREE-SPEED GEARBOX – Removal

Jack up the vehicle and support on suitable stands. Disconnect the handbrake cable at the equalizer bracket, loosen two exhaust pipe centre clips and turn the centre section of the exhaust assembly to the left (Fig G 1). Disconnect the propeller shaft at the rear end by removing the flange bolts from the rear axle drive flange and withdrawing the shaft to the rear. Seal off the gearbox extension housing to prevent loss of oil. Disconnect the speedometer drive cable (Fig G 2).

Disconnect the lower shift rods from the shift levers and remove the cross-shaft assembly from the gearbox casing (Fig G 3). Remove the clutch slave cylinder (Fig G 4). Support the engine on a jack, placing the jack under the sump (not under the drain plug) with a wooden block between the jack and the sump and remove the bolts, securing the rear engine mounting to the crossmember. Support the gearbox on a jack and remove the crossmember. Now lower the jack under the engine, to tilt the engine in a rearward direction and remove the starter motor and the gearbox to engine mounting bolts. Lower the jack and remove the gearbox in a rearward direction.

THREE-SPEED GEARBOX – Dismantling

Drain the gearbox oil. Remove the dust cover, release the retainer spring and remove the clutch withdrawal lever complete with release bearing (Fig G 5). Remove the bottom cover, speedometer driven pinion assembly and the rear extension housing (Fig G 6). Remove the cross-shaft retaining rings (Fig G 7, item 5) and remove the nuts holding the operating lever lock pins. Using a drift, knock the pins out of position and remove both cross-shafts (Fig G 8).

Remove the front cover and withdraw the countershaft (layshaft). Lift out the countershaft gear cluster together with the needle roller bearings and spacers (Fig G 9). Remove the reverse idler gear shaft lock bolt and remove the shaft, followed by the idler gear (Fig G 10). Drive out the pins holding the selector forks to the selector rods, unscrew the interlocking plug and remove the spring and the detent ball as shown in Fig G 11. Then remove the selector rod for first/reverse speed and 2nd/3rd speed and lift out the two selector forks.

Withdraw the main shaft assembly from the rear and the drive shaft assembly from the front of the gearbox case (Fig G 12 and G 13). To dismantle the mainshaft, remove the circlip from the front of the mainshaft (Fig G 14) and remove the synchronizer unit for the 2nd and 3rd speed (Fig G 15) and the second speed gearwheel (Fig G 16). Remove the circlip securing the speedometer drive worm and remove the worm gear together with the ball and spacer (Fig G 17). Press out the mainshaft bearing under a press. Holding the shaft with the mainshaft reverse gear, tap the shaft with a piece of wood so releasing the reverse gear assembly together with the 1st speed gearwheel.

THREE-SPEED GEARBOX – Inspection

Thoroughly clean all parts and inspect as follows (replacing or repairing any defective parts).

Check the gearbox casing for cracks and indentations. Where the surface is machined, check for burrs and remove where possible.

Clean all bearings and blow dry with compressed air without spinning the bearings. Lubricate the bearings with light oil. Check for wear, scoring or pitting. Check the needle roller bearings for wear. As wear on needle rollers is hard to ascertain, replace them after a substantial mileage has been driven. Check shafts for burrs or scores.

Check all gearwheel teeth and other machined parts of the gearwheels for scoring, scuffing and pitting. Check that the synchronizer hubs slide on the shaft splines with minimum clearance. Check the main shaft for run-out, using V-blocks as shown in Fig G 18. Replace the mainshaft if the run-out exceeds 0.15 mm (0.006 in).

Check the synchronizer rings for wear and replace if necessary. Place the synchronizer ring on the cone of the respective gearwheel and push the two parts together. Check that the gap between the gear teeth is greater than 0.8 mm (0.0315 in). The correct value is between 1.2 - 1.6 mm (0.047 - 0.063 in). (See diagram, Fig G 19).

Place the selector rods on a flat surface to check for straightness. Check locking pins and interlocking balls for damage or wear. The standard clearance between the selector forks and the operating sleeve groove is 0.15 - 0.30 mm (0.006 - 0.012 in).

Check oil seals for wear or damage. Replace any 'O' rings that have been removed (Fig G 20 shows the oil seals to be checked).

THREE-SPEED GEARBOX – Assembly

Press the bearing on to the main drive shaft (clutch shaft) and fit the spacer. Select a circlip so that there is no play between the bearing and the circlip. There are 7 sizes of circlips, ranging in size from 1.52 mm (0.06 in) to 1.89 mm (0.075 in).

When assembling the synchronizer unit, take care that the insert pressure springs are of different size for the 1st/reverse and 2nd/3rd speed synchronizers. The spring for the reverse/1st speed unit has three coil springs, whereas the other uses two expanding type springs.

To assemble the reverse/1st speed synchronizer unit insert the sliding insert circlips into the hub as shown in Fig G 22, followed by the refitting of the sliding inserts and synchronizer springs. Fit the hub complete with inserts into the operating sleeve. (Fig G 23 and G 24).

To assemble the 2nd/3rd speed synchronizer fit together with hub and the operating sleeve, ensuring that the sleeve slides freely on the splines. Fit the three shifting keys and fit a spring ring on each side of the hub (Fig G 25).

To assemble the mainshaft, start from the front end of the shaft and slide the 2nd speed gearwheel on to the shaft with the cone facing forward. Fit the corresponding baulk ring. Place the 2nd/3rd speed synchronizer assembly on the front end of the shaft and retain with a circlip, giving an end play of 0.5 - 0.25



Fig G 13 Removal of the main drive shaft (clutch shaft)



Fig G 14 Removal of the securing circlip for the 2nd and 3rd speed synchroniser hub

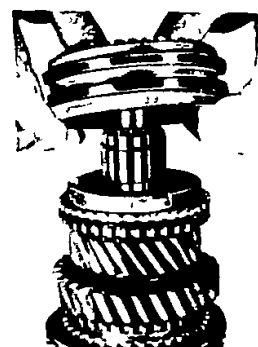


Fig G 15 Removal of the 2nd and 3rd speed synchroniser



Fig G 16 Removal of the 2nd speed gearwheel

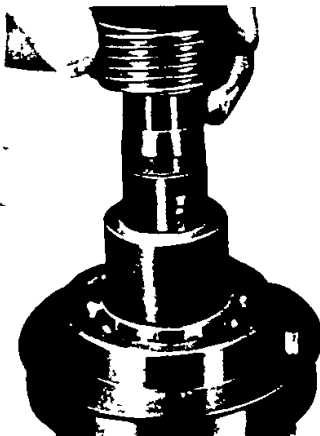


Fig G 17 Removal of speedometer drive worm and spacer

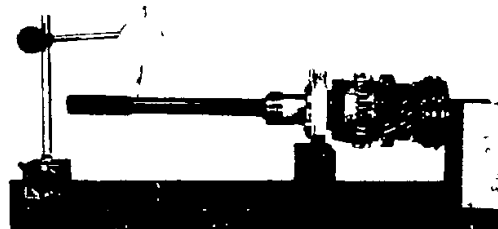


Fig.G 18 Checking the mainshaft for run-out

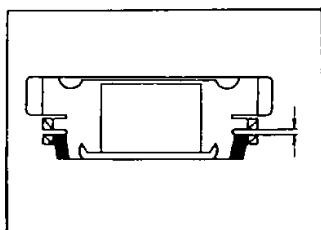


Fig G 19 Checking the synchroniser rings for wear

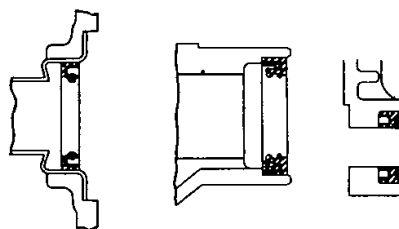


Fig.G 20 The oil seals used in the gearbox

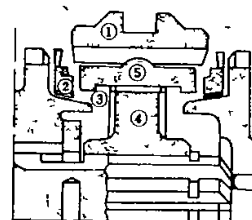


Fig G 21 Section through the synchroniser



Fig.G 22 Installation of the synchron insert circlip

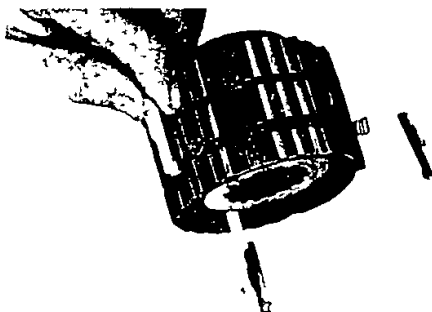


Fig.G 23 Inserting the shifting keys.



Fig G 24 Fitting the synchroniser hub on to the operating sleeve

mm (0 002 - 0 009 in) Circlips are available in 5 sizes from 1 60 - 1 80 mm (0 063 - 0 071 in)

Fit the 1st speed gear and baulk ring on the rear of the shaft with the conical end facing the rear Fit the first speed synchroniser and the reverse gear assembly on the shaft

Fit the spacer and press the mainshaft bearing and retainer on the shaft Fit spacer, ball and speedometer drive worm, using a suitable circlip to secure the drive worm with an end float of 0 05 - 0 22 mm (0 002 - 0 009 in) Circlips are available in 8 sizes from 1 30 - 1 70 mm (0 051 - 0 067 in) in thickness

Check the end float of the gearwheels as shown in Fig G 26, which should be as follows

1st speed gearwheel	0 05 - 0 22 mm (0 002 - 0 009 in)
2nd speed gearwheel	0 1 - 0 22 mm (0 004 - 0 009 in)

Fit the main drive gear (clutch shaft) and the mainshaft assembly into the gearbox casing Fit selector rods and selector forks as follows

Turn the casing so that the detent ball hole is uppermost Fit the spring and the ball in the bottom hole (Fig G 27) Hold the ball with a dummy shaft and fit the 1st/reverse selector fork and the rod, pushing the dummy shaft out Fit the interlocking plunger, 2nd/3rd speed selector fork and rod and insert the ball and the spring Screw down the interlocking plug, coating the thread with sealing compound Secure the selector forks to the rods with the retaining pins

Fit the reverse idler gear and shaft and secure with lock bolt and plate Fit the countergear cluster and the shaft, using a suitable thrust washer to obtain an end float of 0 04 - 0 12 mm (0 0016 - 0 0047 in) Washers are available in 5 sizes from 3 83 - 4 03 mm (0 151 - 0 159 in) in thickness

Fit the cross-shafts (1) Fig G 7, thrust washers (2) and operating levers (3) Secure cross-shafts with retaining rings (5) and lock the operating levers to the shafts with the pins (4)

Fit the rear extension casing to the gearbox case and tighten the bolts to a torque of 2 2 - 3 0 kgm (16 - 22 lb ft) Fit the speedometer driven pinion, set bolt and locking plate Check the gear backlash as shown in Fig G 28 which should be 0 08 - 0 13 mm (0 003 - 0 005 in) for all gears Fit the front cover and tighten the bolts to 1 1 - 1 7 kgm (8 0 - 12 2 lb ft) Refit the clutch withdrawal and release bearing and the bottom cover, tightening the bolts to a torque reading of 1 1 - 1 7 kgm (8 0 - 12 3 lb ft)

THREE-SPEED GEARBOX – Installation

The installation of the gearbox is a reversal of the removal procedure Note the following points

Fill the gearbox with the recommended MP 90 oil The filling capacity is 1 7 litres (0 45 U S gall , 0 37 Imp gall) Adjust the clutch slave cylinder push rod to obtain a withdrawal lever free play of 2 2 mm (0 087 in)

FOUR-SPEED GEARBOX – Removal and Installation

Follow the instructions for the three-speed gearbox except that the four-speed gearbox has a floor mounted gearlever which should be removed at the control lever bracket

FOUR-SPEED GEARBOX – Dismantling

NOTE There are two types of synchromesh used in this gearbox, Borg Warner and Servo The Borg Warner type is described in "Three-speed gearbox"

Drain the gearbox oil Remove the dust cover, the retainer spring, withdrawal lever and clutch release bearing Remove the clevis pin, holding the striking rod to the control lever (Fig G 31), speedometer driven pinion assembly, rear extension housing, disengaging striking rod from the selector rod gates (see Fig G 32) and unscrew the top and bottom covers

Unscrew the detent ball plugs and remove the springs and detent balls Drive out the selector fork to rod retaining pins and remove the selector rods and forks Engage the second and fourth gear by pushing the operating sleeve of the corresponding synchronizer unit to the given gear positions and slacken the main shaft nut

Remove the countershaft and the gear cluster together with the two needle roller bearings and the spacers Remove the reverse gear circlip and remove the reverse idler gears and the shaft (Fig G 33)

Remove the four bolts holding the mainshaft bearing retainer and remove the retainer (Fig G 34) Withdraw the mainshaft assembly as shown in Fig G 35 and the main drive shaft (clutch shaft)

To dismantle the mainshaft (Fig G 36) release the 3rd/4th synchronizer unit circlip and pull off the hub complete with the operating sleeve Remove the third speed gearwheel and the needle roller bearing Remove the main shaft nut and the locking plate and the speedometer drive worm with the retaining ball Then withdraw the mainshaft reverse gearwheel and the hub, and press off the mainshaft bearing retainer and the bearing

Next remove the thrust washer and the first speed gearwheel together with the needle roller bearing, taking care not to lose the small thrust washer locating ball Slide off the first speed gearwheel bush Finally remove the second speed gearwheel together with the needle roller bearing

FOUR-SPEED GEARBOX – Inspection

Follow the instructions for the three-speed gearbox in accordance with the specifications given in section TECHNICAL DATA

FOUR-SPEED GEARBOX – Assembly

The assembly is carried out in similar manner as described for the three-speed gearbox, except for the following points

When installing the main drive shaft (clutch shaft) select a suitable circlip to eliminate any end float Circlips are available in 5 sizes from 1 52 - 1 77 mm (0 06 - 0 07 in) in thickness

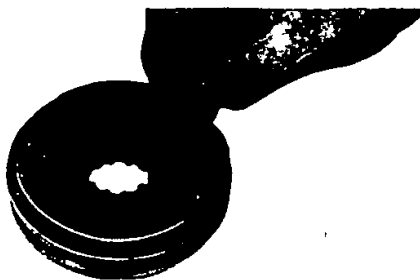


Fig G 25 Fitting the spring rings.

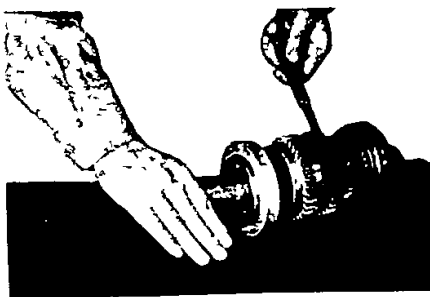


Fig G 26 Checking the end float of the gearwheels.

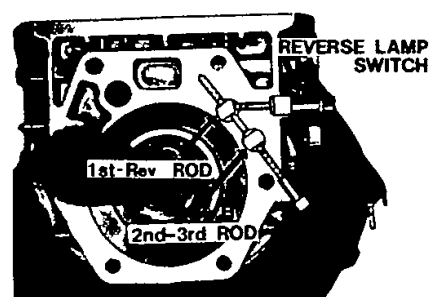


Fig G 27 Section through the gearbox case to show the interlocking system

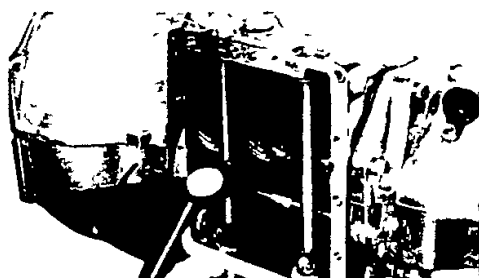


Fig G 28 Checking the countershaft gear backlash

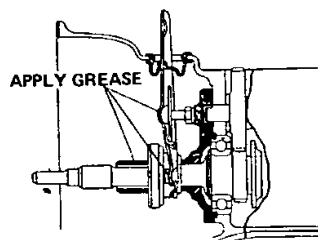


Fig G 29 Greasing points for withdrawal lever and release bearing

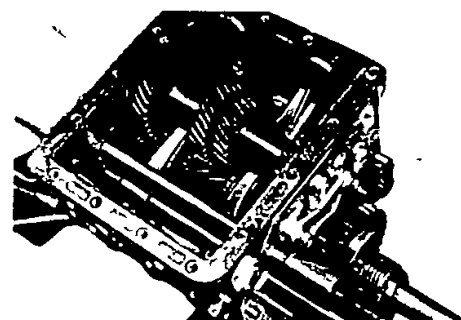


Fig G 30 View of the four-speed gearbox

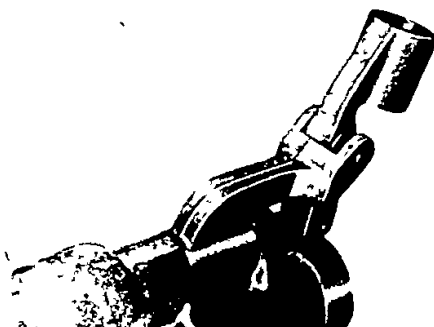


Fig G 31 View of the gearchange control arm

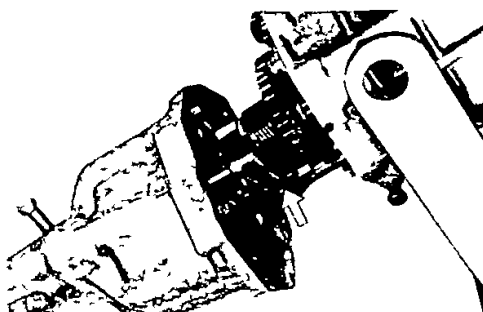


Fig G 32 Removal of the rear extension housing

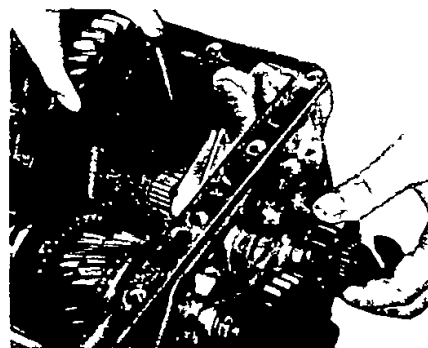


Fig G 33 Removal of the reverse idler gears.

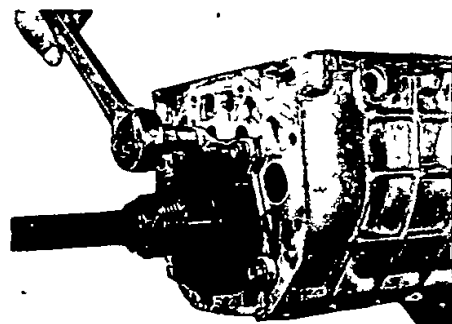


Fig G 34 Removal of the mainshaft bearing retainer

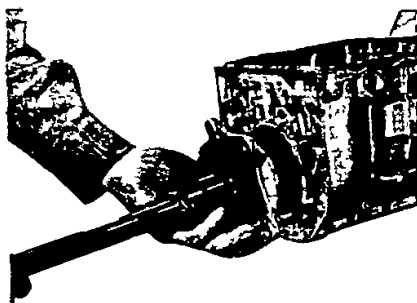


Fig G 35 Removal of the mainshaft assembly.



Fig G 36 Exploded view of the mainshaft gear train.

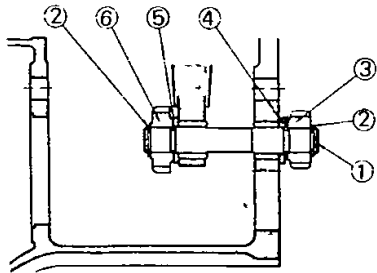


Fig G 37 Diagram of the reverse idler gear

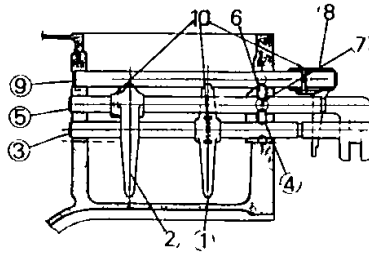


Fig G 38 Assembly of the selector forks.

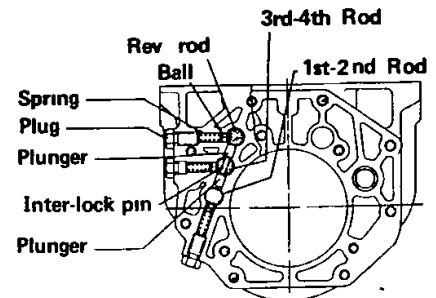


Fig G 39 Section through the gearbox to show the interlocking system

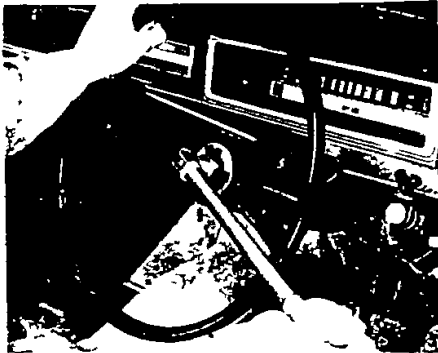


Fig G 40 Removal of the steering wheel

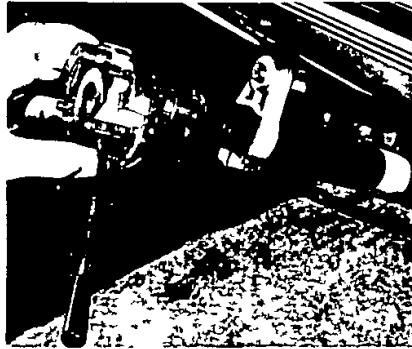


Fig G 41 Removal of the light selector switch

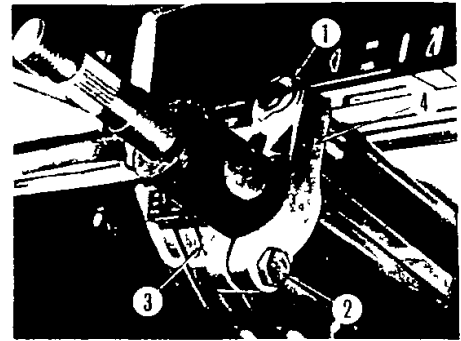


Fig G 42 Removal of the upper support bracket

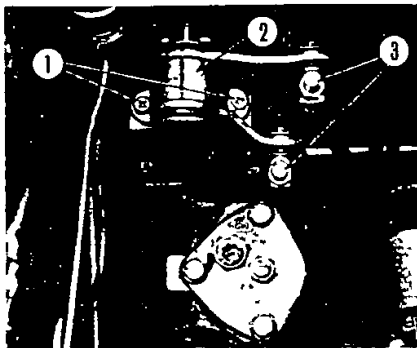


Fig G 43 Removal of the lower bracket



Fig G 44 View of the cross-shaft assembly and connections

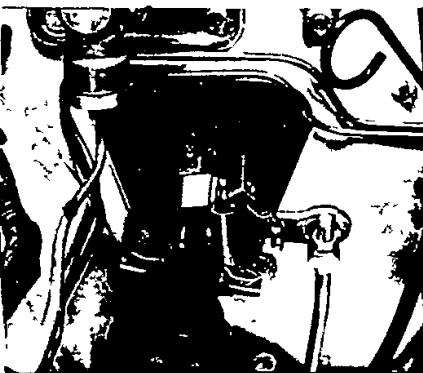


Fig.G 46 View of the selector lever

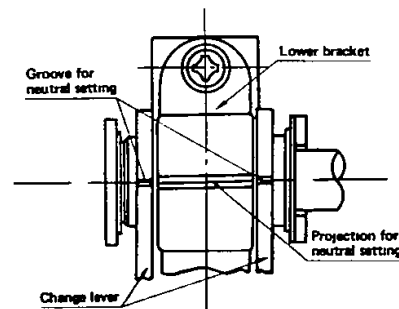


Fig.G.45 Adjustment for neutral setting.

Synchronizer assembly The Borg Warner type is dealt with under the three-speed gearbox. The instructions therefore apply only to the Servo type synchronizers. The assembly procedure is the same for all synchronizers, but the anchor block, thrust block and one brake band of the 1st speed synchronizer differ from those of the 2nd, 3rd and 4th speed.

Place gears on flat surface, fit the synchronizer ring inside the clutch gear and fit the thrust block into position, anchor block to each gear and fit the brake bands. Insert a circlip into the groove of each gear so securing the synchronizer assembly.

When assembling the mainshaft observe that the end float of the 3rd speed gearwheel should be 0.05 - 0.15 mm (0.002 - 0.006 in.). Circlips for adjusting the end float are available in 5 sizes from 1.40 - 1.60 mm (0.055 - 0.063 in.) in thickness. Tighten the locknut at the rear end of the mainshaft to 9 - 11 kgm (65 - 79.5 lb ft).

To assemble the reverse idler gear (Fig G 37) place the reverse idler drive gear (3) (14 teeth) on the rear end of the idler shaft (1) with the longest spline and retain with a suitable circlip (2). Fit the reverse shaft and the gear into the gearbox casing from the rear with the thrust washer (4) between the gear and the case. Fit the thrust washer (5) and the idler gear (6) (18 teeth) and secure with a suitable circlip (2). The end float of the gear should be 0.1 - 0.3 mm (0.004 - 0.012 in.). This can be adjusted by using a suitable circlip (2), available in 5 thicknesses between 1.1 - 1.5 mm (0.043 - 0.06 in.).

Adjust the countergear end float to 0.05 - 0.15 mm (0.002 - 0.006 in.) by using thrust washers of suitable size, which are available in 5 thicknesses from 2.4 - 2.6 mm (0.0945 - 0.102 in.).

When assembling the selector mechanism (Fig G 38) fit the selector forks (1st/2nd (1) and 3rd/4th (2) into the operating sleeves of the synchronizer units and insert the selector fork for the 1st and 2nd speed (3). Fit an interlocking plunger (4) and the 3rd/4th speed selector rod (5), remembering the interlocking pin. A section through the selector and interlocking mechanism is given in Fig G 39. Fit an interlocking plunger (6) and assemble the reverse selector fork (8) and the selector fork for the same gear (9). Secure the selector forks to the rods with the retaining pins (10).

Place a check ball and a spring in each of the holes and screw down the plug to a torque of 1.7 - 2.1 kgm (12.3 - 15.2 lb ft), after smearing the threads with sealing compound.

When fitting the rear extension housing engage the striker rod with the selector rod gates and tighten the bolts to 2.2 - 3.0 kgm (16 - 22 lb ft). Fit the front and bottom covers and tighten the bolts to 1.1 - 1.7 kgm (8.0 - 12.3 lb ft).

AUTOMATIC TRANSMISSION

Although the automatic transmission is not covered in this manual, as the maintenance, inspection and repair is considered a job for experts, the control linkage is discussed.

GEAR CHANGE CONTROL LINKAGES – Removal

Three speed gearbox

Remove the following items: Steering wheel (Fig G 40), steering column cowl, indicator switch and light switch (Fig G 41). Remove the circlip (1) in Fig G 42 and the washer

and take off the upper support bracket by releasing the locating bolt and the screw. The control rod insert with bush and return spring is now free to remove.

Remove the circlip and gear lever pivot pin and draw out the gear lever. By removing the cotter pin, the spring and the plain washer disconnect the shift rods from the gear selector levers (Fig G 43). Remove the bolts holding the lower support bracket and the clamp and remove the clamp and the gear change lever retainer, 2nd - 3rd speed selector lever, lower support bracket and 1st and reverse selector lever from the control rod.

Withdraw the control rod by removing the cotter pins. Disconnect the gear change rods, remove the cross-shaft bracket and withdraw the cross shaft assembly (Fig G 44).

GEAR CHANGE CONTROL LINKAGE – Installation

The installation of the gear change control linkage is carried out in reverse order to the removal procedure. Coat all sliding surfaces with chassis grease prior to assembly.

GEAR CHANGE CONTROL LINKAGE – Adjustment

With the linkage assembled, connect change rods with trunnions of the gear change levers. Release the adjusting nuts on the shift rods and align the gear change lever with the projection on the head of the lower support bracket (Fig G 45). Check operation of the change levers and lock the adjustment.

AUTOMATIC TRANSMISSION

To remove the gear change control linkage of the automatic transmission follow the removal of the three-speed gearbox linkage as far as and including the gear lever.

By removing cotter pin, plain and spring washer, disconnect the upper selector rod from the selector lever. Remove the speed range position plate, the circlip at the lower control rod end and unscrew and remove the lower support bracket. Release the locking screw and remove the selector lever assembly (Fig G 46). Withdraw the control rod, disconnect the selector rods and remove the cross-shaft bracket and the cross-shaft assembly.

The installation of the linkage is a reversal of the removal procedure. Set the converter side lever and the gear lever to the neutral position. Fit the upper selector rod to the selector lever and adjust the gear position plate so that the selector lever stop pin to position plate clearance is 0.5 - 1.0 mm (0.02 - 0.04 in.). This can be adjusted by turning the selector rod adjusting nut. Finally tighten the nut on each side of the trunnion.

Technical Data

GENERAL SPECIFICATIONS				
Gearbox model		RSW65L	F4W63L	F4C63L
Gearchange type		Column change	Floor change	Floor change
Synchronmesh type		Borg Warner	Borg Warner	Servo
Gear ratios	1st gear	3 263 1	3 382 1	3 382 1
	2nd gear	1 645 1	2 013 1	2 013 1
	3rd gear	1 000 1	1 312 1	1 312 1
	4th gear	-----	1 000 1	1 000 1
	Reverse gear	3 355 1	3 364 1	3 364 1
Number of teeth on mainshaft	Drive gear	19	22	22
	3rd speed	-----	27	27
	2nd speed	25	30	30
	1st speed	31	36	36
	Reverse speed	34	39	39
Number of teeth on countershaft	Driven gear	30	31	31
	3rd speed	-----	29	29
	2nd speed	24	21	21
	1st speed	15	15	15
	Reverse speed	16	14	14
Reverse idler gear		16	18	18
Speedometer	Drive gear	5	5	5
	Driven gear	19 or 17	16	16

CLEARANCES AND PLAYS		
Model	R3W6	F4W63L and F4C63L
Mainshaft end float	0 - 0.19 mm (0 - 0.008 in)	0.08 - 0.29 mm (0.003 - 0.011 in)
Max main shaft end float	0.20 mm (0.008 in)	0.30 mm (0.012 in)
Countershaft end float	0.04 - 0.12 mm (0.002 - 0.005 in)	0.05 - 0.15 mm (0.002 - 0.006 in)
Max countershaft end float	0.20 mm (0.008 in)	0.20 mm (0.008 in)
Reverse idler gear end float	0.20 - 0.40 mm (0.008 - 0.016 in)	0.10 - 0.30 mm (0.004 - 0.012 in)
Max idler gear end float	0.50 mm (0.020 in)	0.50 mm (0.020 in)
Gearwheel end float		
1st speed gearwheel	0.05 - 0.22 mm (0.002 - 0.009 in)	0.05 - 0.15 mm (0.002 - 0.006 in)
2nd speed gearwheel	0.10 - 0.22 mm (0.004 - 0.009 in)	0.05 - 0.15 mm (0.002 - 0.006 in)
3rd speed gearwheel	-----	0.05 - 0.15 mm (0.002 - 0.006 in)
Gear backlash	0.08 - 0.13 mm (0.003 - 0.005 in)	0.05 - 0.10 mm (0.002 - 0.004 in)
Max shaft run-out	0.15 mm (0.006 in)	0.25 mm (0.010 in)

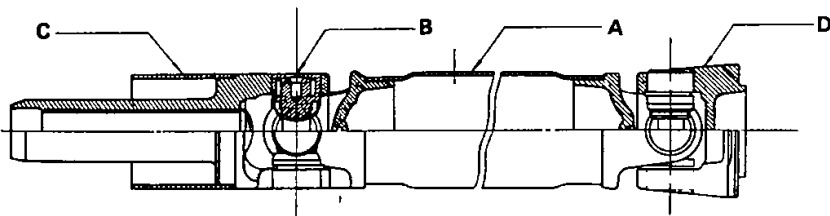


Fig H 1. Section through the propeller shaft.
A Propeller shaft, B Journal C Sleeve yoke, D Flange yoke

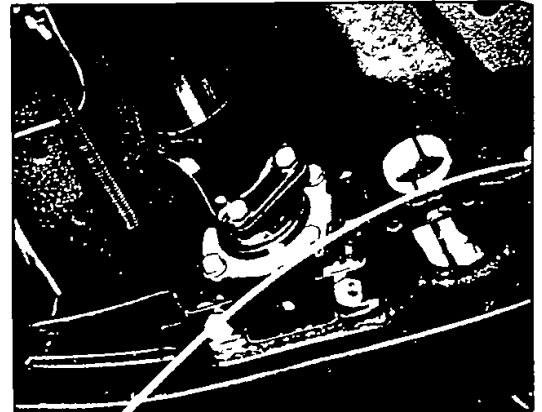


Fig H 2 Removal of the propeller shaft flange

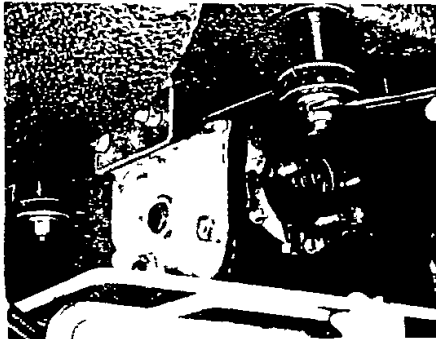


Fig H 3 Removal of differential mounting member

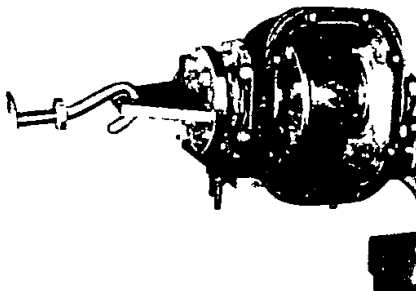


Fig H 4 Removal of the side drive flange

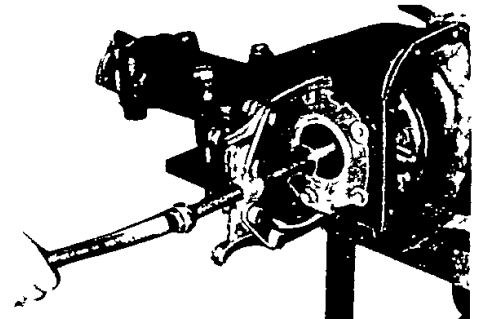


Fig H 5 Removal of differential side cover

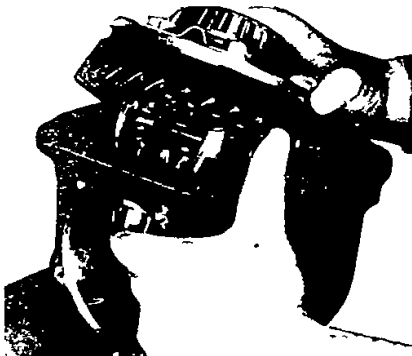


Fig H 6 Removal of differential cage

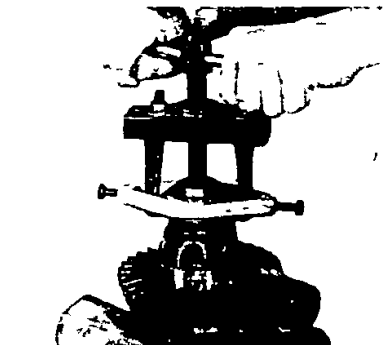


Fig H 7 Removal of differential side bearing

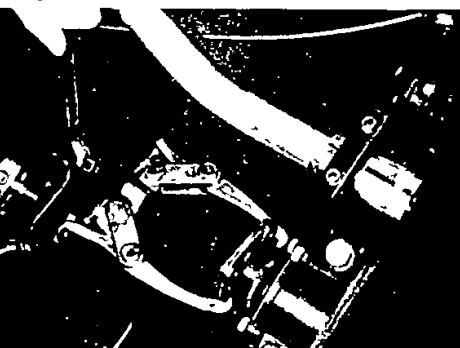
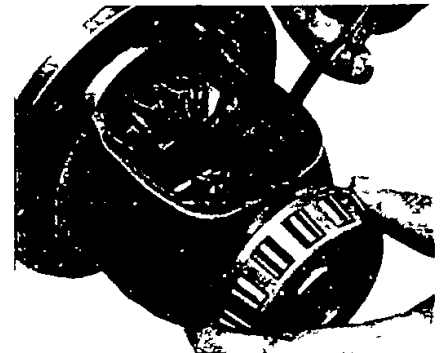


Fig H 8 Removal of drive pinion bearing retainer

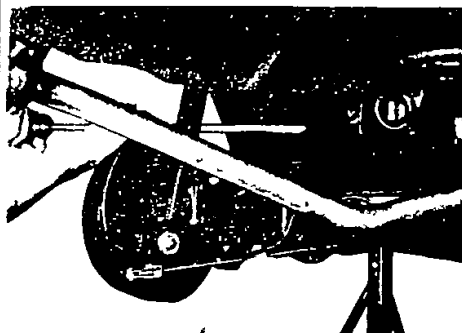


Fig H 9 Removal of side flange

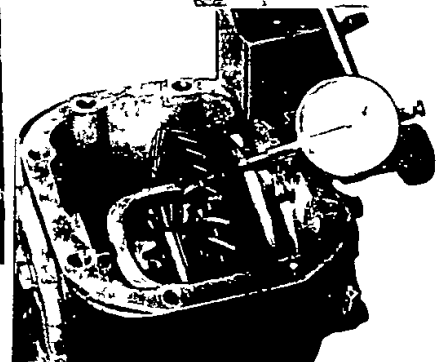


Fig.G 10 Measuring the clearance between the differential side gear and the thrust washer (top) and checking the crown wheel run-out (bottom).

Rear Axle

PROPELLER SHAFT – Removal (Fig H.1)

Release the handbrake, jack up the rear end of the car and place the rear of the vehicle on suitable stands

Loosen the outer section exhaust clamps and turn the pre-silencer to the left (saloon only) Remove the adjuster nut from the handbrake cable rear adjuster and disconnect the left-hand cable. (Saloon only). Disconnect the rear flange from the rear axle flange and draw the shaft from the gearbox mainshaft, taking care not to damage the propeller shaft by accidentally dropping it

PROPELLER SHAFT – Dismantling

Clean and mark all components for assembly in correct position Remove four circlips from the journal assembly and withdraw the needle bearing cap by tapping the yoke with a wooden mallet

Clean all parts and check as follows, replacing them if wear or damage has occurred

The spider journal diameter wear should not exceed 0.15 mm (0.006 in) The standard size is 14.7 mm (0.579 in) Check the spider seal rings and replace them if necessary The radial backlash of the sleeve yoke splines to the gearbox splines should not exceed 0.5 mm (0.002 in.)

With the shaft mounted between centres, check the run-out of the shaft which should not exceed 0.6 mm (0.023 in) The shaft can only be straightened with a hydraulic press, however, it is recommended that the shaft be replaced Also check that the dynamic balance does not exceed 15 grm cm (0.278 oz in) at 4000 rpm.

PROPELLER SHAFT – Assembly and Installation

Reverse the removal and dismantling procedure, noting the following points

Grease the needle rollers with wheel bearing grease before placing them into the bearing race Lubricate all splines with gear oil. Adjust journal radial end float to less than 0.02 mm (0.0008 in) with a suitable circlip which are available in 7 sizes between 2.00 and 2.12 mm (0.079 and 0.0835 in.) in thickness. Check that the mark on the front sleeve aligns with the mark on the rear flange yoke.

DIFFERENTIAL – Removal (Saloon)

Remove the handbrake rear cable, propeller and drive shafts. With differential supported on a jack, remove the nuts securing the differential mounting cross-member and remove the bolts holding the differential to the suspension member Remove the differential and the jack backwards and support the suspension member to avoid straining the parts. The removal of the parts to be removed is shown in Fig.H.2 and H.3

DIFFERENTIAL – Dismantling

While dismantling check the following items

Clamp the differential in a suitable mounting stand (Special tool ST 37400510 is available) and check the tooth contact pattern, using a lead oxide at two or three points

The backlash between the drive gear and pinion should be 0.10 - 0.20 mm (0.004 - 0.008 in) Also check the run-out at the rear of the crown wheel if the backlash or the tooth contact pattern is found to be out of adjustment The run-out limit is 0.08 mm (0.003 in)

The turning torque of the drive pinion should be 3 - 15 kgcm

To dismantle the differential remove the flange clamp bolt and remove the side flange as shown in Fig H 4, using the special tool ST49250000 and a slide hammer or any home made tool similar as shown in the illustration Next remove the differential bearing caps, right-hand side first, as shown in Fig H 5 Mark the differential bearing carriers in order to refit them in their original positions The differential assembly can now be lifted from the differential carrier (Fig H6)

Loosen the drive pinion nut, holding the flange with special tool ST47340000 or by other suitable means and pull off the flange. Press the drive pinion out of the differential carrier together with the front and rear bearing inner races, spacers and shims Place a suitable press plate between drive pinion head and rear bearing and press out the pinion shaft. If the correct tooth pattern has been obtained during the pre-dismantling check and crown wheel, drive pinion, carrier, rear bearing, shims, etc are not being replaced, the inner races are not to be removed To remove the outer races of the front and rear pinion bearings, drive them out with special tool ST49290000 or any suitable drift

To dismantle the differential cage remove the right-hand bearing cone as shown in Fig H 7, using a suitable puller Flatten the lock straps and remove the hypoid crown wheel, slackening the mounting bolts in a diagonal pattern Remove the left-hand bearing cone in the same manner as for the other side Take care not to mix left-hand and right-hand parts Punch out the differential shaft securing pin from the crown wheel side, using a suitable drift Great care should be taken when carrying out this operation, as the pin is caulked into the hole in the differential cage Remove the differential gears and thrust washers, keeping separated front, rear, left-hand and right-hand parts

Replacing of oil seals with differential fitted

Front oil seal

Drain the oil, jack up and support the rear end of the car and remove the propeller shaft from the differential flange and disconnect the left-hand rear cable for the handbrake. Slacken and remove the drive pinion nuts, holding the drive flange in suitable manner and remove the flange and the oil seal retainer with a conventional two-arm puller as shown in Fig.H 8 Remove the oil seal from the retainer

Replace the oil seal into the retainer, using a drift of suitable outer diameter or special tool ST 49320000. Fill the oil seal lips

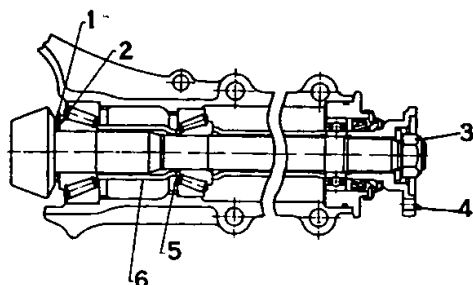


Fig.H 11 Section through the drive pinion.

- 1 Pinion bearing adjusting washer
- 2 Pinion depth adjusting shims
- 3 Tightening torque of pinion nut 17 - 20 kgm (123-145 lb.ft.)
- 4 Pre-load for pinion bearing without oil seal 7 - 10 kgm (51 - 72 lb.ft.)
- 5 Pinion bearing adjusting washer
- 6 Pinion bearing adjusting spacer

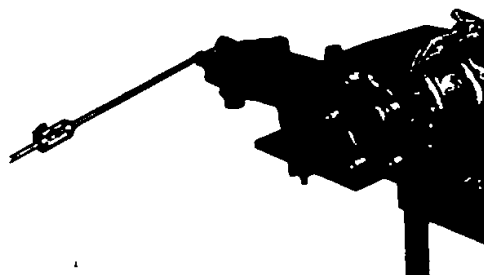


Fig.H 12. Checking the drive pinion bearing pre-load.

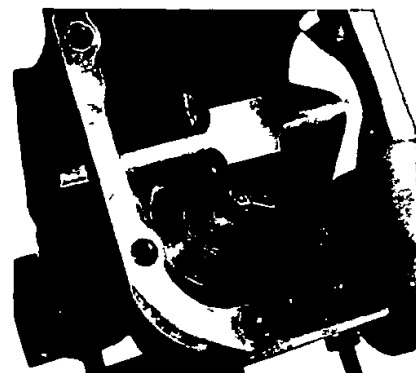


Fig.H 13. Measuring the pinion depth

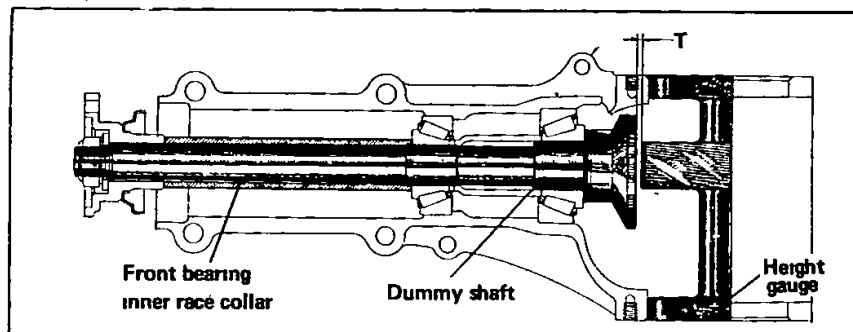


Fig.H 14 Adjusting the pinion mesh depth.

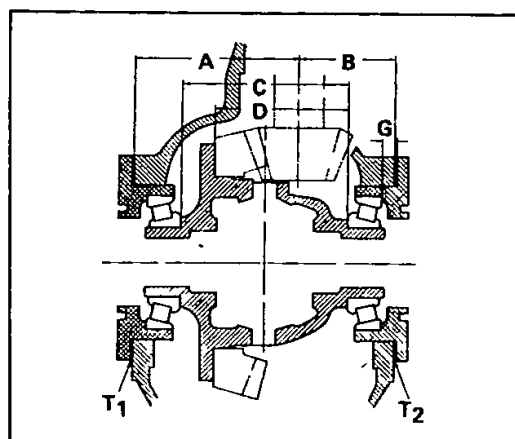


Fig.H 15 Adjusting diagram for differential side covers.

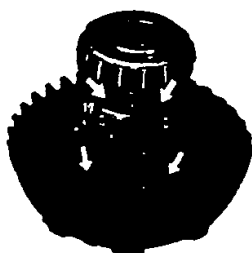


Fig.H 16. The markings of the differential cage ('C' & 'D')

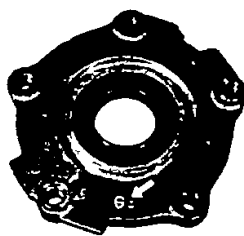


Fig.H 17 The markings of the differential side cover ('G')

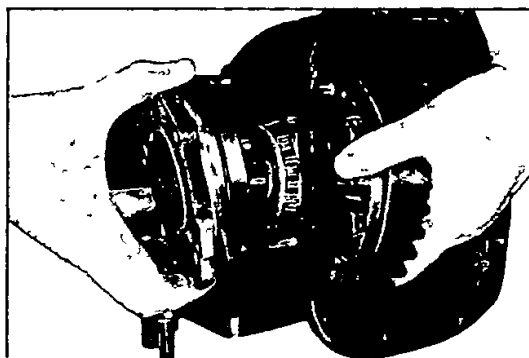


Fig.H 18. Installation of the differential side cover

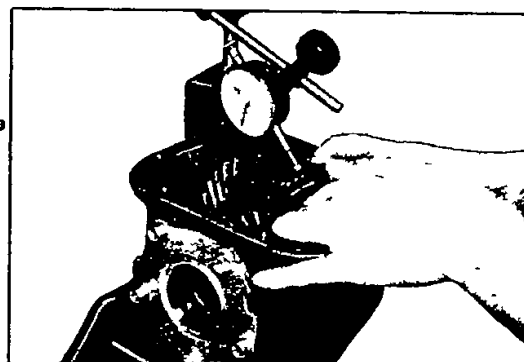


Fig.H 19 Checking the backlash of the crown wheel and pinion.

with grease. Fit the oil seal retainer and refit the other parts in reverse order to the removal procedure.

Side oil seal

Remove the drive shaft from the side flange of the final drive assembly and extract the flange with a slide hammer and an adaptor screwed to the side flange as shown in Fig.H.9. Remove the oil seal and replace in the same fashion as described for the front oil seal.

DIFFERENTIAL – Inspection

Clean all parts as follows and replace or repair where necessary.

1. Gear teeth for scoring, cracking and excessive wear. Note that the drive pinion and crown wheel should be replaced as a set.
2. Gear shaft bearings and thrust washers for chipping or excessive wear.
3. If the backlash between the differential side gear and differential pinion is over 0.2 mm (0.008 in.) and the clearance between the differential side gear and the thrust washer is over 0.3 mm (0.012 in.) replace the thrust washer which are available in three thicknesses.
4. Measure the run-out of the crown wheel at the rear face, using a dial indicator. The permissible value is 0.08 mm (0.003 in.). Replace the crown wheel and drive pinion as a set, if this value is exceeded.
5. Differential carrier and differential cage for cracks or distortion.
6. In general replace all oil seals.

DIFFERENTIAL – Assembly and Adjustment.

Assembly is the reversal of the dismantling procedure with note to the following points:

Arrange the shims, washers, etc. in correct order, clean all surfaces thoroughly and lubricate bearings with gear oil. Pack the space between the sealing lips of the oil seals with grease.

Differential cage

Fit the differential side gear and the bevel gear in the cage, using the correct thrust washers. Insert the differential shaft so that the hole for the securing pin in the shaft is in line with the hole in the differential cage. Measure the clearance between the rear face of the side gear and the cage as shown in Fig.H.10 and change if necessary change the thrust washer to obtain a clearance of 0.1 - 0.2 mm (0.004 - 0.008 in.). Fit the pinion shaft-lock pin and secure it with a punch by caulking the material of the differential cage. Lubricate the gear teeth and check the gear for freedom of rotation.

Fit the crown wheel to the differential cage and tighten the bolts to a torque reading of 7.0 - 8.0 kgm (50.6 - 57.8 lb.ft.). Use lock straps.

Measure the width of the differential side bearings by placing a weight of 2.5 kg (5.5 lb.) on the bearing. The nominal width is 20.00 mm (0.787 in.). Press the bearings on to the differential

cage. Also press the outer races of the front and rear pinion bearings into the differential carrier, using a suitable press mandrel.

Adjustment of drive pinion pre-load

Fit the pinion height adjusting washer, shims and rear bearing inner race on a dummy shaft as shown in the diagram in Fig.H.11. (Special tool 49300000). If the tooth contact has been satisfactory when it was checked before dismantling, use the old washers and shims. Then fit the drive pinion bearing spacer, the washer and the special collar ST49310000 and the drive flange on the dummy shaft and tighten the drive pinion nut to a torque reading of 17 - 20 kgm (123 - 144.5 lb.ft.). Replace the bearing washer and the spacer with thicker ones if the pinion cannot be turned by hand when the nut is tightened.

Measure the drive pinion bearing pre-load and select washers and spacers to give a pre-load of 7 - 10 kgcm (97.2 - 138 in.oz.) with new bearings or 3 - 6 kgcm (41.7 - 83.3 in.oz.) for used bearings. The pre-load should be measured as shown in Fig.H.12.

Adjustment of pinion height (depth of mesh)

Fit the setting gauge ST49300000 into the housing with the dummy pinion installed and measure the clearance between the head of the dummy shaft and the tip of the setting gauge by means of a feeler gauge as shown in Fig.H.13. Fig.H.14 shows the set-up for the adjustment. The drive pinion adjusting shim thickness "S" can be found from the following equation:

$$S = W + T - (H \times 0.01) - 0.20$$

where

W = Thickness of inserted washers and shims
T = Measured thickness
H = Figure engraved in pinion head
S = Required thickness of washers and shims

As an example the following might apply:

$$\begin{aligned} W &= 2.20 + 1.20 \dots\dots\dots = 3.40 \text{ mm} \\ T &\dots\dots\dots = 0.24 \text{ mm} \\ H &\dots\dots\dots = -2 \\ S &= 3.40 + 0.24 - (-2 \times 0.01) - 0.20 \dots\dots\dots = 3.46 \text{ mm} \end{aligned}$$

Fit the shims required to the drive pinion, fit the rear bearing inner race on the drive pinion and press home. Fit the drive pinion into the differential carrier throat together with the bearing spacer and washer, front bearing inner race and front bearing spacer, followed by the bearing retainer and the oil seal.

Fit the drive flange and the washer on to the drive pinion and secure the parts with the pinion nut, tightening the nut to 17 - 20 kgm (122.9 - 144.6 lb.ft.).

Adjustment of differential bearing covers

If differential carrier, cage, side bearings or bearing covers have been replaced, adjust the side bearing pre-load with adjusting shims. The exact thickness of the shims is obtained by the following equations:

$$\begin{aligned} T1 \text{ (left)} &= (A + C + G - D - E + H) \times 0.01 + 0.76 \\ T2 \text{ (right)} &= (B + D + G - F - H) \times 0.01 + 0.76 \end{aligned}$$

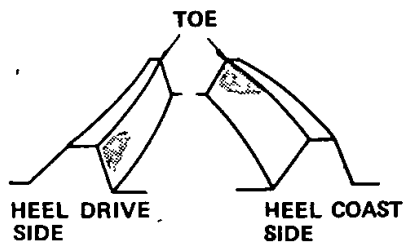


Fig.H.20 | Tooth contact on heel.

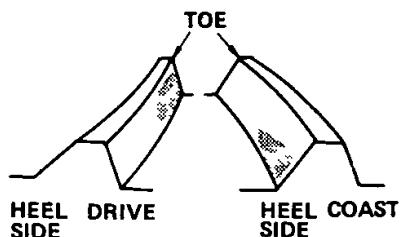


Fig.H.21 Tooth contact on toe.

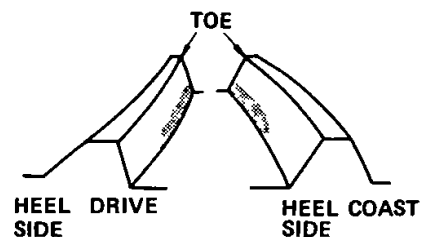


Fig.H.22 Tooth contact on flank

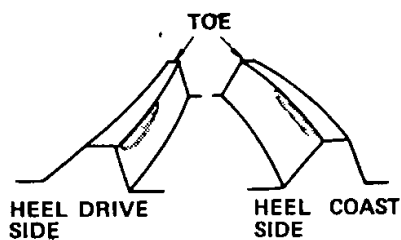


Fig.H.23 Tooth contact on face.

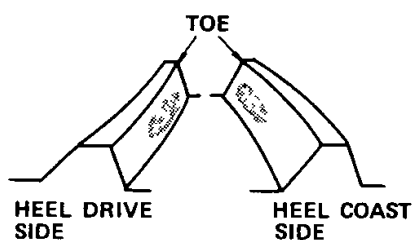


Fig.H.24 Correct tooth contact.

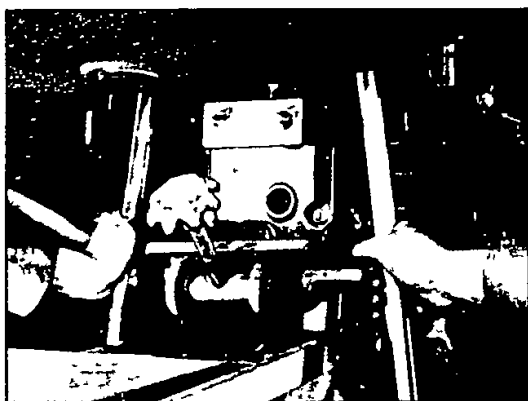


Fig.H.25 Refitting the differential mounting member

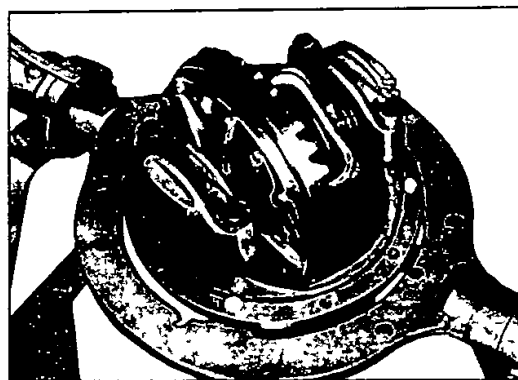


Fig.H.26 Differential carrier clamped in a fixture

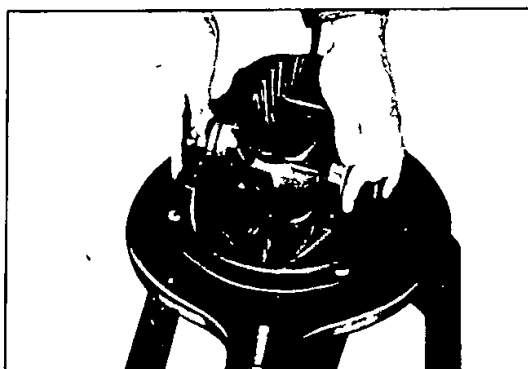


Fig.H.27 Removal of the differential cage.

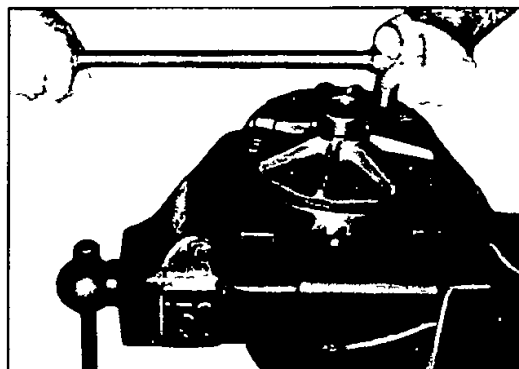


Fig H 28 Removal of the crown wheel bolts.

where
 A & B = The figure on the differential carrier
 C & D = The figure on the differential cage
 E & F = The difference in width of the left-hand or right-hand bearing against the nominal width of 20 mm (0.7874 in) given in 1/100 mm
 G = The figure on the differential bearing cover (Fig H 17)
 H = The figure etched in the crown wheel side

Measure the differential bearing width with a suitable instrument, placing a load of 2.5 kg (5.5 lb) on top of the bearing to bring in under load and determine the value "E" or "F"

Fit the differential cage assembly into the differential carrier. Insert shims and 'O' rings into both differential bearing covers and fit the retainers by screwing the guide studs ST49330000 or two other suitable pilot studs into the differential carrier (Fig H 18). Measure the tooth backlash as shown in Fig H 19 and adjust it to 0.10 - 0.20 mm (0.004 - 0.008 in). If the backlash is not sufficient, move shim from left to right, if excessive from right to left.

Check the drive pinion turning torque and adjust the bearing cover shims to give an increased turning torque of 1 - 3 kgcm, compared with the value obtained when this was checked before the differential cage was fitted to the carrier. If any of the shims must be removed or additional shims must be fitted it becomes necessary to readjust the backlash.

Tooth contact

By applying Prussian Blue to 4 or 5 teeth and turning gears evenly back and forward by hand, check the crown wheel and drive pinion tooth contact pattern and adjust as follows:

Heel contact (Fig H 20)

Increase the thickness of the drive pinion shim and the washer to bring the pinion closer to the crown wheel.

Toe contact (Fig H 21)

Reduce the drive pinion shim and washer thickness to move pinion away from crown wheel.

Flank contact (Fig H 22)

This pattern should be treated as for toe contact.

Face contact (Fig H 23)

This pattern should be treated as for heel contact.

Correct contact (Fig H 24)

A correct tooth contact is obtained when the impression lies within 2/3 to 3/4 of the distance between the tip and the root of the tooth under no load condition.

If shims or washers have been changed check the tooth backlash. Also check that the crown wheel backlash is still within 0.08 mm (0.003 in).

DIFFERENTIAL – Installation

Secure the differential carrier into the rear suspension member. Fit the differential mounting member to the mounting hole by moving it forward with a suitable bar or tyre lever. Tighten the nuts to a torque reading of 8.5 kgm (61.5 lb ft) (See also Fig H.25). Fit the remaining parts in reverse order to the

removal procedure and fill the final drive with 0.8 litres (1.3 Imp pts (0.8 US qts) of the recommended oil.

DIFFERENTIAL – Removal (Estate Car (Station Wagon))

Disconnect the drive pinion flange from the propeller shaft yoke flange and remove the rear axle shafts (refer to section REAR AXLE for this procedure). Unscrew the differential carrier from the front of the rear axle and lift out.

DIFFERENTIAL – Dismantling

Clamp the differential carrier into a suitable support as shown in Fig H 26 and inspect the tooth contact and the drive pinion depth before attempting to dismantle the differential.

Remove the side bearing caps and the differential cage assembly. Keep left and right hand parts separate (See Fig H 27). Remove the side bearings with a suitable puller. Bend back the locking straps for the crown wheel mounting bolts and remove the crown wheel bolts (Fig H 28). Now measure the backlash between the differential side gears and pinions. Drive out the lock pin for the differential pinion shaft from left to right and remove the pinion shaft, pinions, side gears and the thrust washers.

Measure the turning torque of the drive pinion in the differential carrier, using a suitable pre-load gauge and check the drive pinion mesh depth, using the special tool set ST46200000. Note the values and write down for later reference.

Remove the drive pinion nut and the flange and tap out the drive pinion shaft to the rear with a plastic mallet together with the rear bearing inner race, spacer and adjusting washer. Remove the oil seal and the front bearing inner race. Draw out front and rear bearing outer races, using special tools ST47820000 and ST46310000 as shown in Fig H 30. Also remove the drive pinion rear bearing inner race with the special tools ST47120000 and ST46320000. If these tools are not available it might be possible to use other suitable equipment.

DIFFERENTIAL – Inspection (Fig H 31)

Clean all parts thoroughly and inspect as follows and replace or repair as necessary.

Check the parts as described for the Saloon differential, with the exception that the run-out limit for the crown wheel is 0.05 mm (0.002 in) and the clearance between differential side gear and thrust washer 0.2 mm (0.008 in). Thrust washers are available in 7 different thicknesses.

DIFFERENTIAL – Assembly and Adjustment (Fig H 33)

The assembly is a reversal of the dismantling procedure noting the following points:

Fit the bevel pinions, differential side gears and thrust washers into the cage, selecting suitable thrust washers to give a clearance of 0.05 - 0.20 mm (0.002 - 0.008 in) between the side gear and the thrust washer. Fit the pinion shaft lock pin.

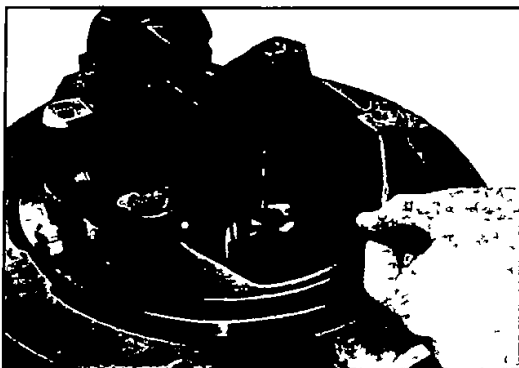


Fig.H 29 Measuring the pinion mesh depth.

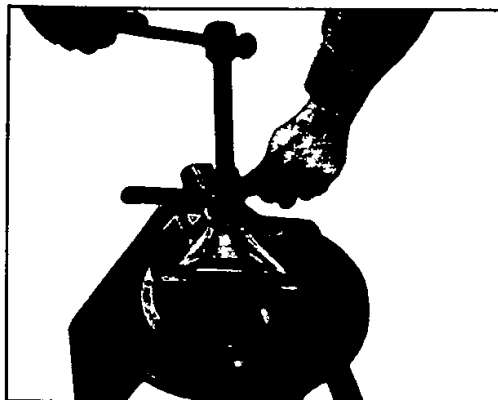


Fig.H 30. Removal of the rear pinion bearing outer race.

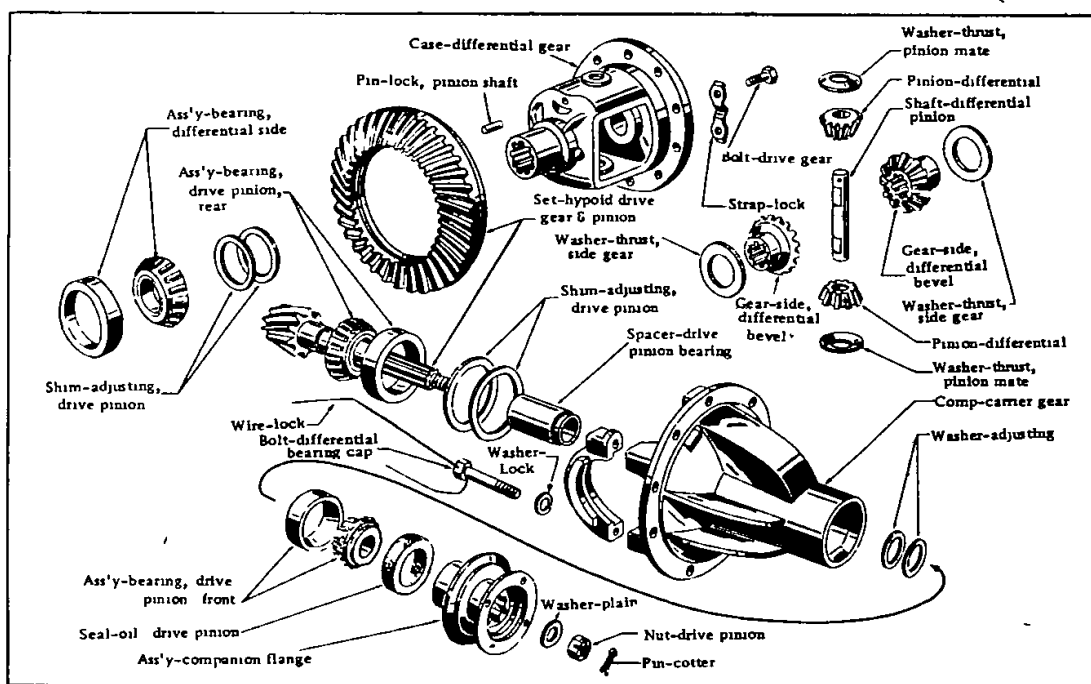


Fig.H.31 Exploded view of differential carrier assembly

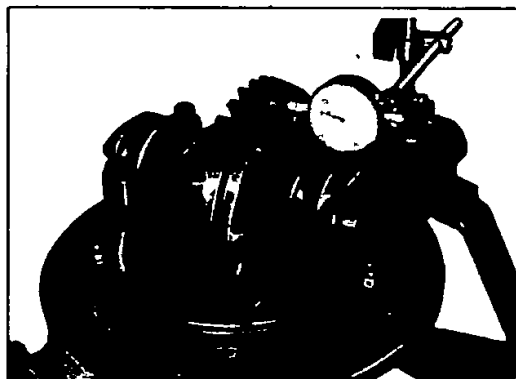


Fig.H 32. Measuring the crown wheel for run-out.

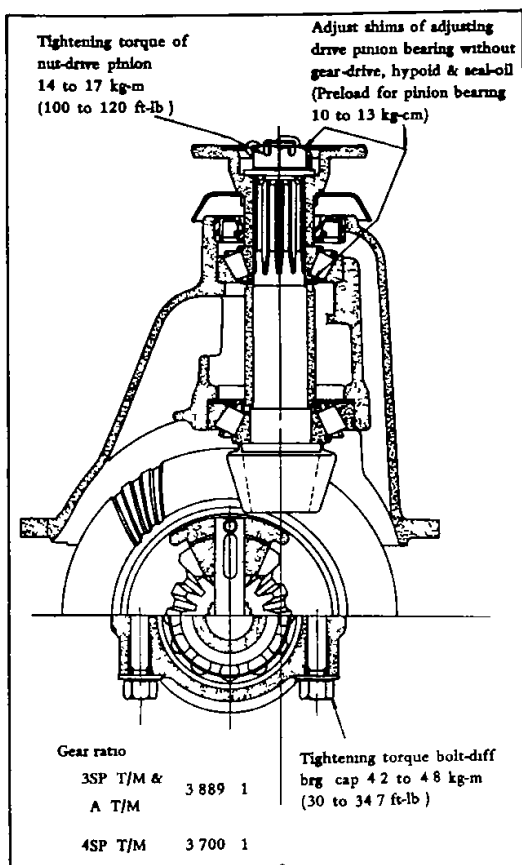


Fig H 33 Section through the differential carrier

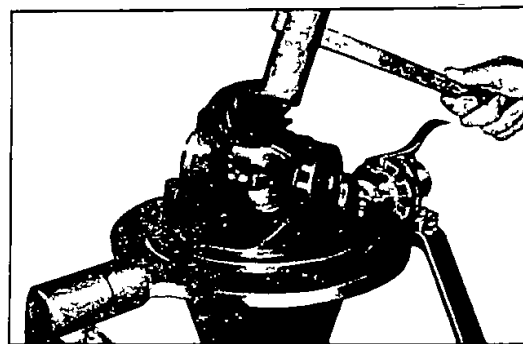


Fig H 34 Installation of the differential cage

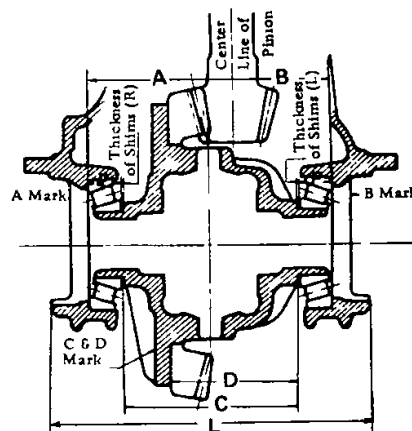


Fig H 35 Calculation of the differential side bearing shims

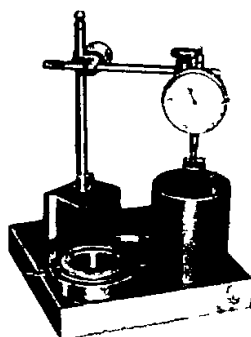


Fig H 36 Measuring the differential side bearing thickness

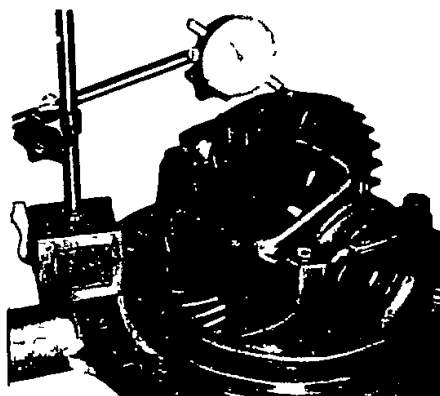


Fig H 37 Measuring the crown wheel backlash

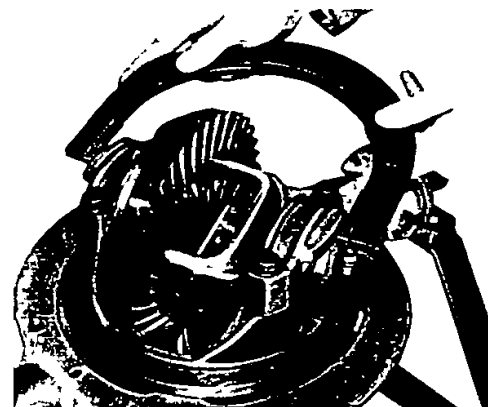


Fig H 38 Measuring the dimension "L" (see text)

from the right-hand side and peen the edges of the hole to secure the pin in position

Fit the crown wheel to the differential cage, using new lock straps and tighten the bolts to a torque reading of 4.8 - 5.5 kgm (34.7 - 39.8 lb ft) in a diagonal pattern

Using the special bearing press mandrel ST49260000 or a drift with suitable dimensions press in the side bearings inner race. Fit the crown wheel adjusting shims behind the bearings to obtain the correct pre-load. After inserting the correct shims, press in the drive pinion rear bearing outer race, using special replacer ST 47820000 or any mandrel with suitable dimensions. Also press the pinion front bearing outer race into the pinion housing and the rear bearing inner race on to the drive pinion shaft

Adjusting the drive pinion

To determine the drive pinion shim thickness, fit the drive pinion into the housing and fit the front bearing inner race and the flange. Tighten the drive pinion nut until the drive pinion turning torque is 10 - 13 kgcm (138.9 - 180.5 in oz). Now install the drive pinion setting gauge and measure the gap between the pinion head and the gauge as shown in Fig H 29. The obtained value is the pinion depth

To determine the exact thickness of the shims, use the following equation

$$T = N - (H \times 0.25) - 0.2$$

where

- T = The required rear bearing adjusting shim thickness in millimetres
N = The gap measured above in millimetres
H = The figure marked on the drive pinion head. This can be either a "+" or a "-" figure

If necessary adjust shims by removing the drive pinion and the rear bearing outer race. Fit the drive pinion and bearing spacer into the pinion housing and tighten the pinion nut to a torque of 14 - 17 kgm (101 - 130 lb ft). Check the pinion pre-load by attaching a pre-load gauge to the pinion flange and adjust to the correct value by selecting spacers (three sizes) and bearing adjusting washers (15 sizes) between the front bearing inner race and the spacer. The initial turning torque without oil seal and drive pinion nut tightened to 14 - 17 kgm (101 - 130 lb ft)

should be 10 - 13 kgcm (138.9 - 180.5 in oz) for new bearings and a value of 20 - 40% less for used bearings. Check the pinion depth and re-adjust if necessary. Remove the pinion nut and the flange and press the oil seal, well greased into the differential carrier. Refit the flange washer and the pinion nut and tighten the nut to a torque of 14 - 17 kgm (101 - 130 lb ft). If the holes for the split pin will not align with the specified torque reading, use a washer of different thickness. Do not overtighten the nut.

Fit the differential cage into the housing, tapping it down with a plastic mallet as shown in Fig H 34 and fit the differential bearing caps. Tighten the cap bolts to 4.2 - 4.8 kgm (30.4 - 34.7 lb ft)

Adjustment of differential bearing pre-load

Adjust the differential bearing pre-load in accordance with the following formula (see Fig H 35)

Left side (Crown wheel side)

$$T1 = A - C + D + E + 7$$

Right side (Differential assembly side)

$$T2 = B - D + D + F + 6$$

where

- T1/T2 = Shim thickness required in units of 1/1000 in
A/B = Figure marked on respective differential bearing housing
C/D = Figure marked on differential cage
E/F = Respective differences of differential bearing thickness to nominal thickness of 20 mm (0.7874 in) under a load of 2.5 kg (5.5 lb) in units of 1/1000 in (Fig H 36)

Measure the crown wheel and pinion backlash (Fig H 37) and adjust to 0.15 - 0.20 mm (0.006 - 0.008 in) by moving the side bearing shims from the left to the right if too small and from right to left if too great. Tighten bearing cap bolts to a torque reading of 4.2 - 4.8 kgm (30.4 - 34.7 lb ft). Using a large micrometer or special tool ST46380000 measure the dimension between the outsides of the bearing caps as shown in Fig H 38 which should be 198.4 - 198.55 mm (7.8110 - 7.8169 in). If less it should be corrected by inserting shims of 0.05 mm (0.002 in) on both sides. Check that the drive gear run-out is less than 0.05 mm (0.002 in). Finally check the tooth contact pattern as described for the Saloon differential.

Technical Data

PROPELLER SHAFT

Length	1082 mm (42 6 in) Saloon models 1242 mm (48 9 in) Estate car models
Outer diameter	63 5 mm (2 5 in) Saloon models 75 0 mm (3 0 in) Estate car models
Inner diameter	60 3 mm (2 4 in) Saloon models 71 8 mm (2 8 in) Estate car models
Axial play of spider journal	0 08 mm (0 0315 in)
Max run-out of shaft	0 6 mm (0 024 in)
Wear limit of spider diameter	0 15 mm (0 006 in)
Max unbalance	15 gr cm (0 278 in oz) at 4000 rpm

FINAL GEAR RATIOS

1 3 litres Saloon models	4 375 1
1 6 litre engine	
Saloon with 3 speed box	3 900 1
Saloon with automatic	3 900 1
Saloon with 4-speed box	3 700 1
Estate car with 3-speed box	3 889 1
Estate car with automatic	3 889 1
Estate car with 4-speed box	3 700 1

DRIVE PINION

Initial turning torque (without oil seal)	
Saloon models	7 - 10 kgcm (0 506 - 0 723 lb ft)
Estate car models	10 - 13 kgcm (0 723 - 0 940 lb ft)
Depth from axle centre	
Saloon models	48 5 mm (1 909 in)
Estate car models	61 0 mm (2 402 in)

Thickness of pinion height adjusting washers

2 0, 2 2, 2 4 mm

Thickness of pinion height shims

From 1 09 - 1 27 mm

Thickness of pinion bearing adjusting washers

Saloon From 2 31 - 2 57 mm
Estate car As Saloon

CROWN WHEEL

Backlash between gears

Saloon 0 10 - 0 20 mm (0 004 - 0 008 in)
Estate car 0 15 - 0 20 mm (0 006 - 0 008 in)

Run-out of crown wheel

Saloon Less than 0 08 mm (0 003 in)
Estate car Less than 0 05 mm (0 002 in)

DIFFERENTIAL GEARS

Thickness of side gear thrust washers

Saloon 0 775, 0 825, 0 875 mm
Estate car 0 78, 0 83, 0 88, 1 03, 1 23 mm

Clearance between side gear and washer

Saloon 0 10 - 0 20 mm (0 004 - 0 008 in)
Estate car 0 05 - 0 20 mm (0 002 - 0 008 in)

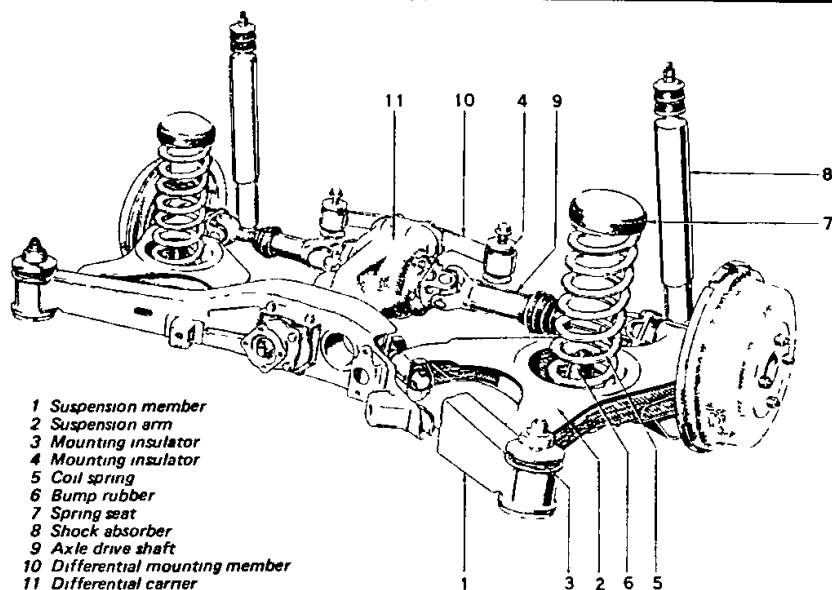


Fig 1 1 View of the rear suspension as fitted to the Saloon models.

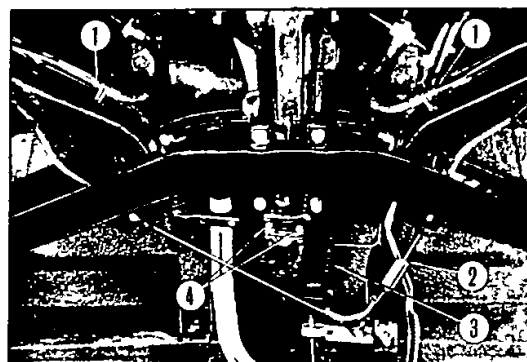


Fig 1 2 Parts to be removed or disconnected for the removal of the final drive unit.

- 1 Brake line connector
- 2 Handbrake cable adjuster
- 3 Return spring
- 4 Propeller shaft flange

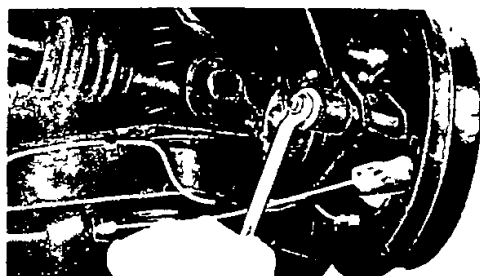


Fig 1 3 Removal of the lower shock absorber mounting

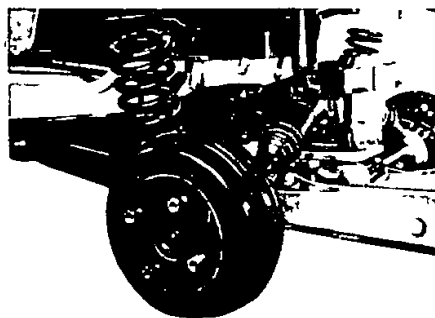


Fig 1 4 Removal of rear axle and rear suspension as a complete unit

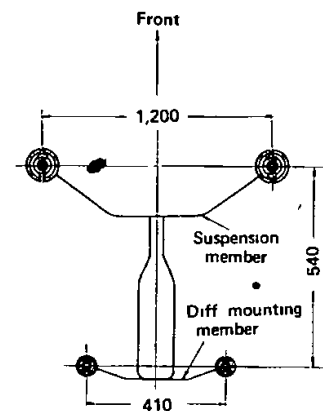


Fig 1 5 Installation diagram for rear suspension



Fig 1 6 Removal of the drive shaft securing nuts

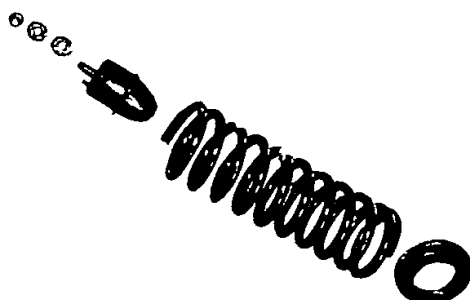


Fig 1 7 Exploded view of the rear coil spring

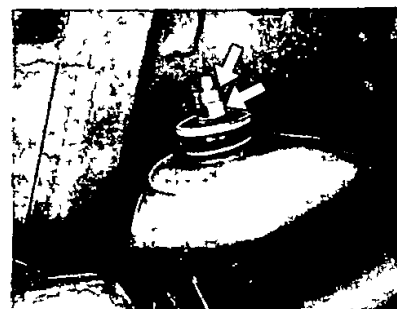


Fig 1 8 The upper shock absorber mounting

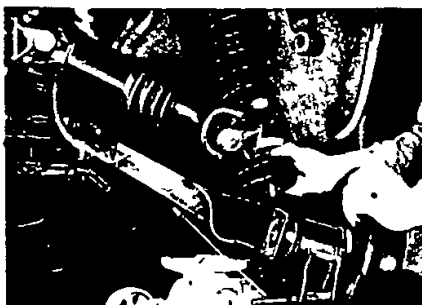


Fig 1 9 Removal of the rear coil spring.

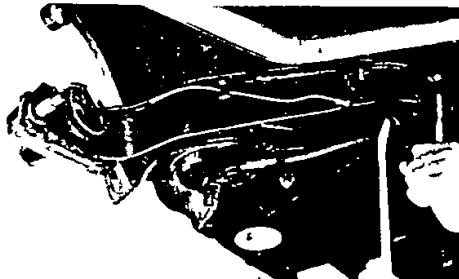


Fig 1 10 Removal of the rear suspension arm

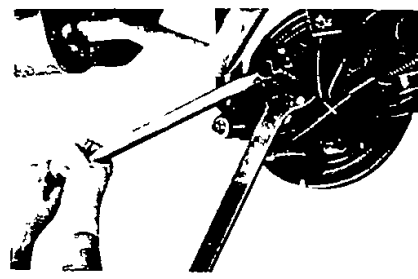


Fig 1 11 Removal of the rear wheel bearing nut.

Rear Suspension

DESCRIPTION

The Saloon models are fitted with a fully independent rear suspension with semi-trailing arms, suspension arms, coil springs and telescopic hydraulic double acting shock absorbers. The final drive unit is mounted to the suspension member by four bolts and rubber insulators.

The Estate Cars (Station Wagons) are fitted with a semi-floating rear axle with semi-elliptic leaf springs and telescopic hydraulic shock absorbers.

REAR AXLE AND SUSPENSION – Removal (Saloon models)

Refer to Fig I 1. Jack up and support the rear end of the car on suitable stands. Remove the wheels, handbrake linkage and return springs, exhaust tail pipe and silencer. Disconnect the brake hose from the tube. Remove the propeller shaft from the differential. The parts to be disconnected from underneath the car are shown in Fig I 2. Jack up the suspension arm and remove the shock absorber from the lower arm (Fig I 3) and retain the rubber bushes. Support the differential unit and the suspension with a jack and remove the suspension member securing nuts and the nuts securing the differential mounting. Carefully lower the suspension unit (Fig I 4).

SUSPENSION – Inspection

Examine all parts for wear and damage with special attention to the rubber bushes in the suspension arms and bump rubbers, spring insulators and rubber insulators in suspension unit and differential mounting member. Replace where necessary.

SUSPENSION – Installation

This is a reversal of the removal procedure, noting the following points. Suspension member and differential mounting member must be correctly lined up. The insulators should be correctly aligned as shown in Fig I 5 and fitted from the underside of the members. Tighten the suspension member mounting nuts to 10 kgm (72.3 lb ft), the differential mounting member to 8.5 kgm (61.6 lb ft) and the lower shock absorber nut to 2.3 kgm (16.6 lb ft).

COIL SPRINGS – Removal

Jack up the rear of the vehicle and support on stands. Remove or disconnect the following: Wheels, handbrake linkage and return spring, drive shaft flange nuts at the wheel end (Fig I 6) and the bump rubber securing nut. Jack up the suspension and remove the shock absorber from the lower mounting. Lower the jack and remove the coil spring, the seat and the bump rubber (Fig I 7).

COIL SPRINGS – Installation

Check the spring for yield, deformation and cracks. Test the spring and compare the results with the information in TECHNICAL DATA. Check the rubber parts for deformation or damage and replace if necessary.

The installation is carried out in reverse order to the removal procedure, ensuring that the flat face of the spring is at the top.

REAR SHOCK ABSORBERS – Removal and Installation

Remove the boot trim assembly and the two securing nuts from the upper shock absorber mounting (Fig I 8). Remove the shock absorber from the lower mounting bracket and lift out.

Test the shock absorber if facilities are available and compare the results with the specifications in TECHNICAL DATA. Check for oil leaks and cracks and check the shaft for straightness. Check the rubber bushes for deformation or wear and replace if necessary.

The installation is a reversal of the removal procedure.

REAR SUSPENSION ARMS – Removal

Jack up the car and place the rear end on stands. Remove or disconnect the following parts: Wheels, brake drum, drive shaft from axle shaft, handbrake cable from equalizer bracket and wheel cylinder lever, brake hose from brake line by removing the lock spring and withdrawing through connector, wheel bearing locknut, rear axle shaft, wheel bearing and oil seals and the rear brake assembly. Jack up the suspension arm and remove the shock absorber from the lower mounting. Lower the jack and remove the coil spring and the bump rubber (Fig I 9).

Remove the suspension arm securing bolts as shown in Fig I 10 and lift out the arm. If necessary remove the rubber bushes from the suspension arm by pulling them out with a suitable withdrawal tool.

REAR SUSPENSION ARM – Installation

Check the suspension arm for distortion or cracks and the rubber bushes for wear, damage or separation of the materials. Replace if necessary.

The installation is a reversal of the removal procedure. Tighten all the suspension arm mounting bolts when the vehicle is resting with the wheels on the ground. Replace all self-locking nuts.

REAR AXLE SHAFTS, BEARINGS, OIL SEALS – Removal and Dismantling –

Jack up and support the rear of the vehicle. Remove the wheel and brake drum. Disconnect the drive shaft from the axle shaft. Remove the wheel bearing locknut, holding the flange with a suitable tool (Fig I 11). Withdraw the axle shaft as shown in Fig I 12, using a slide hammer, suitably fixed to the flange studs. Remove the rear axle drive flange.

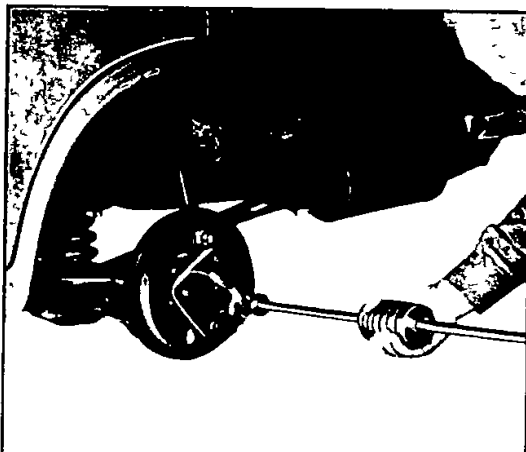


Fig I 12 Removal of the drive axle

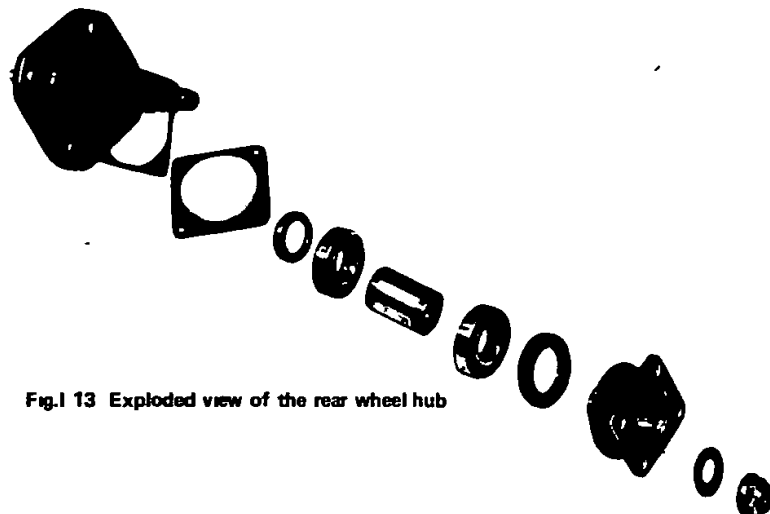


Fig.I 13 Exploded view of the rear wheel hub

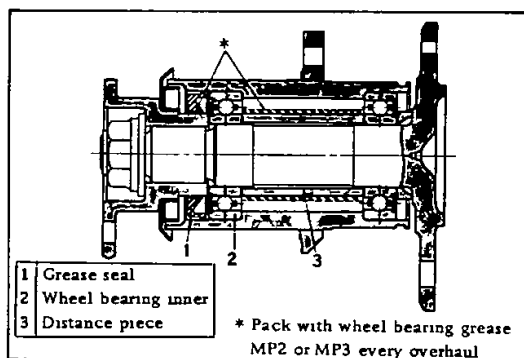


Fig I 14 Section through the rear wheel hub
Grease points marked with (*)

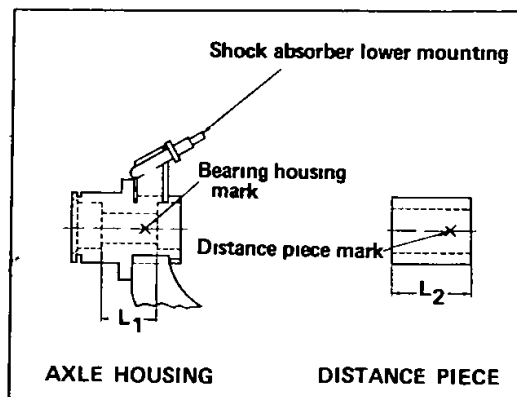


Fig I 15 The critical dimensions for the installation of the suspension arm

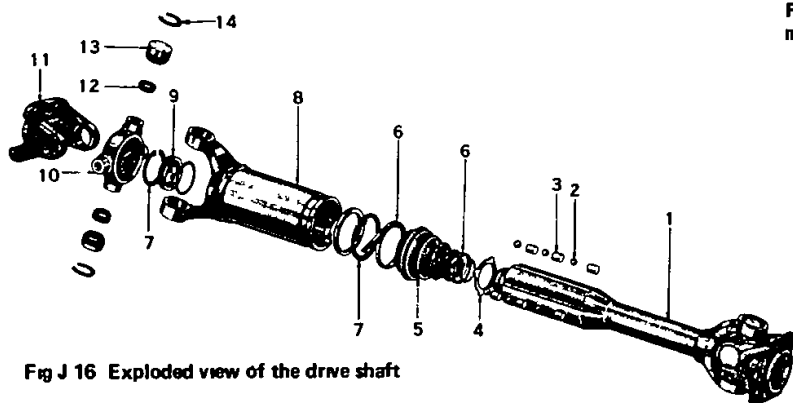


Fig J 16 Exploded view of the drive shaft

- 1 Drive shaft
- 2 Drive shaft ball
- 3 Ball spacer
- 4 Drive shaft stop ring
- 5 Rubber garter
- 6 Garter clip
- 7 Circlip
- 8 Sleeve yoke
- 9 Sleeve yoke plug
- 10 Spider journal
- 11 Flange yoke
- 12 Oil seal
- 13 Needle bearing
- 14 Circlip

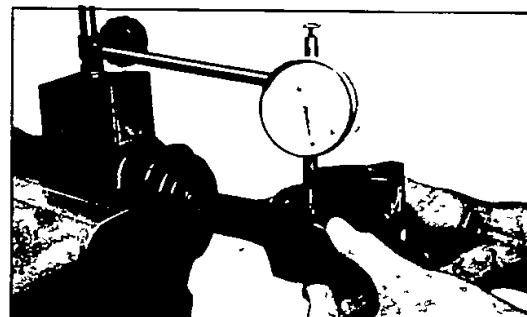


Fig I 17 Measuring the end float of the drive shaft.

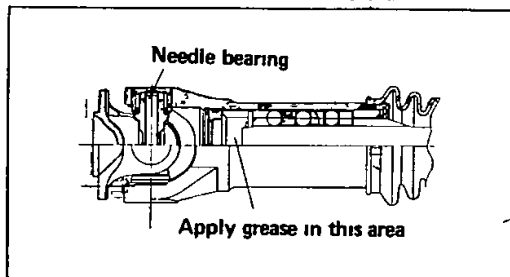


Fig.I 18. Section through the drive shaft.

With a drift of suitable size, drive out the inner bearing and the oil seal. Remove the grease catcher and the outer bearing with a conventional bearing puller.

REAR AXLE SHAFTS, BEARINGS, OIL SEALS – Assembly and Installation

Check the axle shaft for straightness, cracks, damage or wear. Replace the oil seal. Check the bearings for roughness or pitting. Replace parts as necessary.

The assembly and the following installation is a reversal of the dismantling and removal procedures, noting the following points:

Clean all parts thoroughly. The sealed sides of the wheel bearings should face to the wheel and the sealed side of the inner bearing the differential. The arrangement is shown in Fig I 14. When refitting the bearings the pressure should be applied to the inner race.

When replacing the suspension arm check that the distance piece is 0.5 mm (0.002 in) less than the housing dimension "L" (See Fig I 15) and has the same code mark as the housing. In general it should be remembered that the bearing grease should be replaced every 2 years or 30,000 miles (50,000 km). Pack the bearings with a good wheel bearing grease in the spaces shown in Fig I 14 and coat the lip of the oil seal. Replace the wheel bearing nut after it has been used twice.

Wheel bearings - Adjustment

With the nut tightened to a torque reading of 25 - 33 kgm (181 - 239 lb ft) check the axle shaft end float. The end float must be less than 0.15 mm (0.006 in). The rear axle shaft should have a turning torque of less than 4.5 kgcm (64.5 in oz). If not, replace the distance piece.

DRIVE SHAFTS – Removal and Dismantling

Disconnect the end flanges and remove the shaft.

The drive shafts should be dismantled every 30,000 miles (50,000 km) or every 2 years to lubricate the splines. Remove the universal joint spider at the differential side in the same manner as dismantling the propeller shaft (see appropriate section) and remove the sleeve yoke plug securing circlips and take out the plug. Compress the drive shaft and remove the circlip (4) in Fig I 16 and the stopper. Disconnect the boot and split the shaft, taking care to retain all parts.

DRIVE SHAFT – Inspection, Assembly and Installation

Check the following parts and replace if necessary. Note that the drive shaft must be replaced as a complete assembly as replacement parts are not available.

Check the boots and the sleeve yoke plug 'O' ring. Check the shaft for straightness, damage or wear. Check the steel balls and the sleeve yoke for damage, wear or distortion. If any fault is found in the universal joints, replace it as described in the section dealing with the propeller shaft.

Clean the sleeve yoke and the drive shaft ball grooves and lubricate with oil. With the drive shaft compressed check that the shaft play is less than 0.1 mm (0.004 in) (Fig I 17).

The assembly of the drive shaft is a reversal of the dismantling procedure noting the following points. Align the yokes, ensuring balls and spacers are fitted in correct order. Select a circlip to give an axial play of less than 0.02 mm (0.0008 in) in the universal joints (Four sizes available). Apply a suitable quantity of multipurpose grease to the ball groove (approx. 10 gr (0.35 oz)) and additionally grease the area shown in Fig I 18.

REAR AXLE – Removal (Estate Car (Station Wagon))

Jack up the car and support the rear of the vehicle on suitable stands. Remove or disconnect the following parts: Wheels, brake drums, brake hose at the 3-way connector, handbrake rear cable from the equalizer lever, propeller shaft at the differential flange and the shock absorbers from the lower mounting. Support rear axle on a jack, loosen the "U"-bolts and remove the nuts from the rear spring shackles. Withdraw the shackles from the spring eyes. Remove the "U" bolt nuts completely and lower the jack to withdraw the axle as shown in Fig I 19.

REAR AXLE – Dismantling and Inspection

Disconnect the brake pipe from the slave cylinders and remove the brake pipe and the 3-way connector. Remove the cross rod clamp, equalizer lever and the cross rod ends from the operating levers on the brake backplates. Drain rear axle oil. Remove the four nuts holding the brake backplate to the axle housing and draw off the half shaft and the backplate using a sliding hammer. Press off or cut the bearing retaining collar (Fig I 20) and remove the bearing with a bearing puller or by other suitable means. The backplate is now free. Remove the nuts securing the differential unit to the rear axle and lift out the differential. The bearing collars must always be replaced.

Check the following items and replace or repair as necessary: Half shafts for wear, cracks and straightness. The half shafts must not be straightened by heating. Check the oil seal lips for damage or distortion and the bearings for wear or roughness.

REAR AXLE – Assembly and Installation

This is the reverse of the dismantling and removal procedure noting the following points:

Thoroughly clean all parts. Fit a new gasket between the differential unit and the axle housing. Tighten the nuts in a diagonal pattern to the recommended torque. Fit grease catcher, bearing spacer, grease-packed bearing (sealed side facing wheel) and new bearing collar (A 4 - 5 tons press-fit is needed for fitting the collar). Coat the oil seal lips with wheel bearing grease prior to fitting. Check and adjust the axial play between the wheel bearing and the axle housing to 0.3 - 0.5 mm (0.012 - 0.02 in) (See Fig I 21). Finally fill the rear axle with the recommended oil and bleed and adjust the brake system.

REAR SPRINGS – Removal and Installation

Refer to Fig I 21. Jack up the centre of the rear axle and support the rear of the car on stands. Remove the wheel and the shock absorber from the lower mounting and undo "U" bolts, bump rubber, spring seat location plates and seat pads. Remove the spring front bracket securing bolts and lower the spring bracket (Fig I 22). Remove the upper and lower rear shackle.

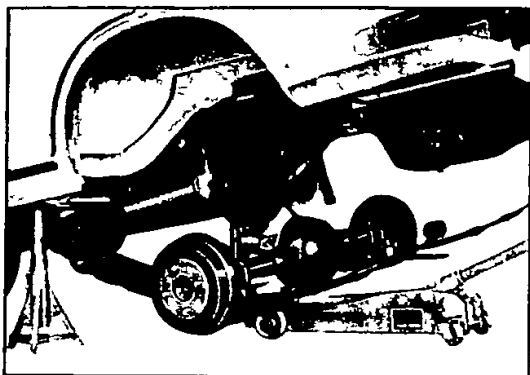


Fig I 19 Removal of the rear axle together with the rear springs.

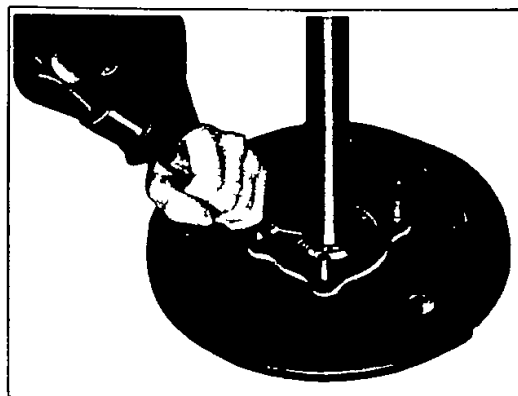


Fig I 20 Cutting the bearing retaining collar with a cold chisel

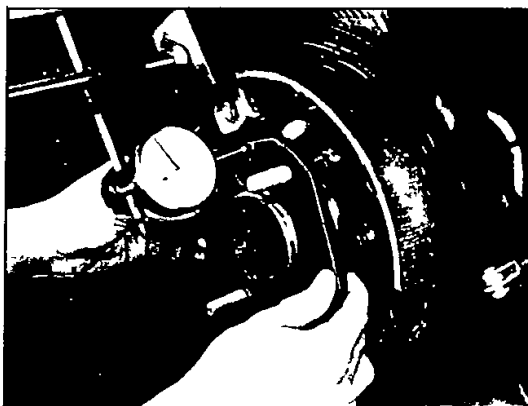


Fig I 21 Measuring the axle shaft end float.

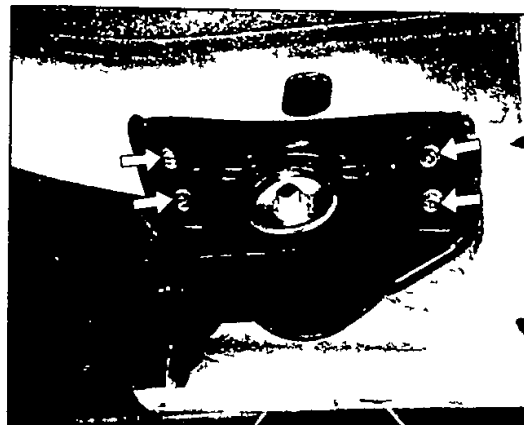
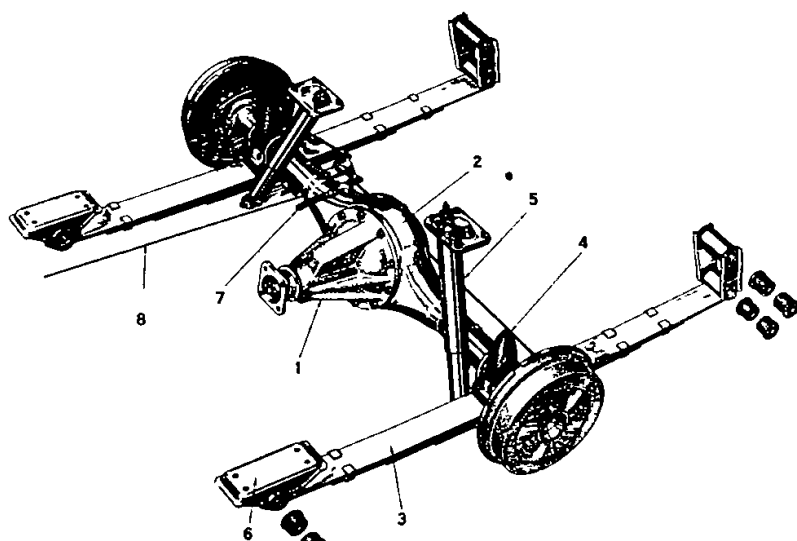


Fig.I 22 The rear spring front hanger



View of the rear suspension and rear axle as fitted to estate models.

- | | |
|------------------------|----------------------------|
| 1 Differential carrier | 5 Shock absorber |
| 2 Rear axle housing | 6 Rear spring front hanger |
| 3 Leaf spring | 7 Handbrake linkage |
| 4 Bump rubber | 8 Brake hose |



Fig.I 23 The upper shock absorber mounting

bolts and the front spring eye bolts to separate front hanger and spring

The installation is a reversal of the removal procedure, noting the following points

The bump rubber should be fitted with the longated flange to the rear Coat the front hanger mounting bolt, bushes and shackle pin with a soap solution prior to assembly The front bolt securing nut and the shock absorber lower mounting nut should be tightened with the car resting on its wheels Check that the shackle bush flange is clamped evenly

REAR SHOCK ABSORBER – Removal and Installation

Jack up and support the rear axle on stands Remove the lower end of the shock absorber from the spring seat Remove the bolts securing the shock absorber upper bracket (Fig I 23) and remove the shock absorber and the bracket

The installation is carried out in reverse order to the removal procedure Tighten the lower shock absorber mounting nut with the wheels of the car resting on the ground

Technical Data

COIL SPRINGS			
Model	L510S	510	L510 PL510
Wire diameter	14 2 mm (0 559 in)	14 2 mm (0 559 in)	14 2 mm (0 559 in)
Coil diameter	90 mm (3 543 in)	Same	Same
Free length	311 mm (12 2 in)	306 mm (12 0 in)	299 mm (11 8 in)
*The value for the 510/P510 models apply for the R H spring The only difference for the L H spring is the free length which is 299 mm (11 8 in)			

SHOCK ABSORBERS		
Model	P(L)510	(L)510
Piston diameter	25 mm (0 984 in)	25 mm (0 984 in)
Stroke	235 mm (9 252 in)	235 mm (9 252 in)
Max length	578 mm (22 76 in)	578 mm (22 76 in)
Damping force at 0 3 m/sec		
Expansion	65 kg (143 3 lb)	50 kg (110 lb)
Compression	33 kg (72 8 lb)	20 kg (44 lb)

SHOCK ABSORBERS (Estate Cars)

Piston diameter	25 mm (0 984 in)
Stroke	200 mm (7 874 in)
Max length	495 mm (19 488 in)
Damping force at 0 3 m/sec	
Expansion	75 kg (165 3 lb)
Compression	23 kg (50 7 lb)

REAR SPRINGS

Length	1200 mm (47 2 in)
Width	60 mm (2 362 in)
Thickness	6 mm (0 236 in)
Number of leaves	4
Free camber	153 mm (6 023 in)
Laden camber	24 mm at 246 kg (0 938 in at 542 lb)
Spring eye bolt diameter	
Front	45 mm (1 772 in)
Rear	30 mm (1 181 in)

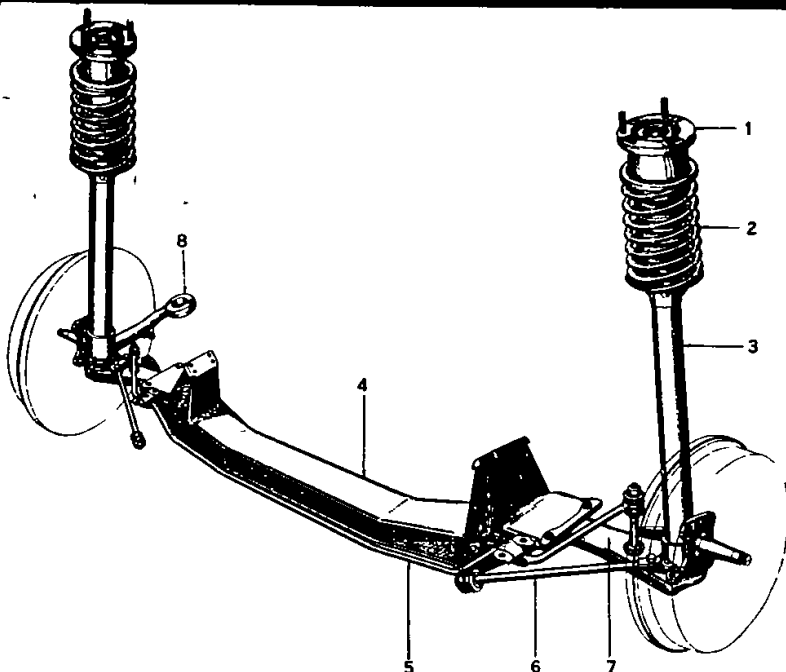


Fig.J 1 View of the front suspension

- 1 Suspension unit insulator
- 2 Coil spring
- 3 Suspension unit assembly
- 4 Suspension crossmember
- 5 Stabiliser bar
- 6 Reaction strut
- 7 Suspension arm
- 8 Steering lever

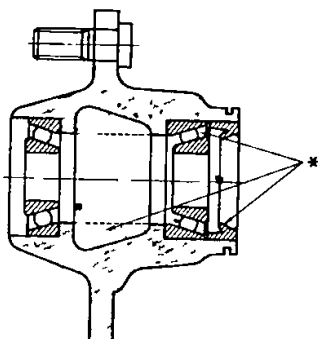


Fig.J 4 Grease with (*) indicated points.



Fig.J 5 Removal of the brake pipe

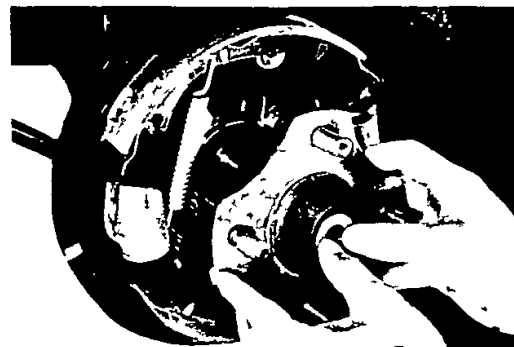


Fig.J 2 Removal of the wheel hub

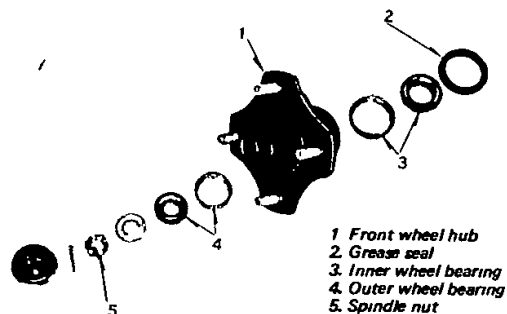


Fig.J 3 Exploded view of front wheel hub

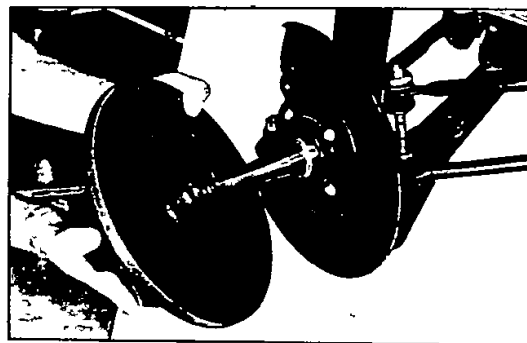


Fig.J 6 Removal of wheel hub and brake disc

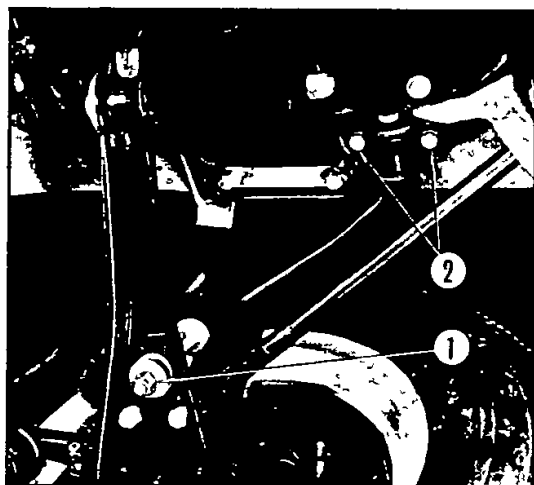


Fig.J.7. Removal of the stabiliser bar. (For annotations see text.)

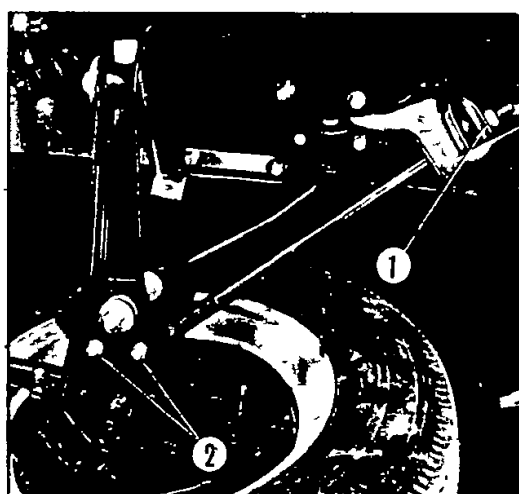


Fig.J 8. Removal of the reaction strut (For annotations see text)

Front Suspension

DESCRIPTION

The front suspension is of the spring strut type in which shock absorber and wheel spindle are combined to form a single unit. Coil springs are fitted to the upper ends of the suspension units.

FRONT WHEEL HUBS (Drum brakes) — Removal

Jack up the front of the car and support on stands. Remove the wheel and the brake drum. Remove the hub cap, split pin, bearing nut, bearing washer and hub assembly from the spindle (Fig J 2). Remove the outer bearing cage, oil seals and the inner bearing cage. Using a suitable drift, drive out the outer races of the inner and outer bearings.

Thoroughly clean all parts. Replace oil seals, damaged bearings or hub and the grease in the bearings.

FRONT WHEEL HUBS — Installation

The installation is a reversal of the removal procedure noting the following points. Apply suitable grease to the parts marked with (*) in Fig J 4 and in the hub cap. Tighten the bearing nut to a torque of 3.0 - 3.5 kgm (21.7 - 25.3 lb ft). Turn the hub several times and retighten to the same torque. Unscrew the nut by 90° and insert the split pin. Check that the end float of the hub is zero and the turning resistance when checked with a spring scale hooked to one of the wheel studs is 7 kgcm (97.2 in oz) with new bearings or in case of re-adjustment 4 kgcm (55.5 in oz).

FRONT WHEEL HUB (Disc brakes) — Removal

Jack up and support the front of the car, remove wheels, brake pipe (Fig J 5), hub cap split pin, bearing nut, bearing washer, hub and brake disc (Fig J 6). Remove the bearing collar and lift out the outer bearing cage, oil seal, inner bearing cage and drive out the outer races. Remove the brake disc from the hub.

FRONT WHEEL HUB — Installation

See description under drum brake type, noting the following torque settings:

Calliper bolts	7.3 - 9.9 kgm (52.8 - 71.6 lb ft)
Brake disc bolts	3.9 - 5.3 kgm (28.2 - 38.3 lb ft)
Back plate bolts	2.7 - 3.7 kgm (19.5 - 26.8 lb ft)

STABILISER BAR — Removal and Installation

Remove the securing bolts on the suspension arms (1) in Fig J 7 and the frame bracket bolts (2) and remove the stabiliser bar.

Check for cracks and deformation of the bar and damaged rubber parts. Reverse the removal procedure, tightening the suspension arm bolts to 1.2 - 1.7 kgm (8.7 - 12.3 lb ft) and the frame bolts to 1.9 - 2.5 kgm (13.7 - 18.1 lb ft).

REACTION STRUT — Removal and Installation

Remove the body fitting nuts (1) in Fig J 8 and the suspension arm bolts (2). Lift off the reaction rod.

Check the rod for distortion and cracks and rubber parts for damage and fit by reversing the removal instructions.

SUSPENSION UNIT — Removal (Fig J 9)

Jack up the front of the vehicle and support on suitable stands. Remove the wheel, disconnect the brake hose from the connector, reaction strut and stabiliser bar from the suspension arm. Remove the two bolts holding the suspension assembly to the swivel joint (Fig J 10). Place a jack under the suspension arm and lift up the suspension unit. Remove the mounting bolts from under the bonnet (as shown in Fig J 11). Lower the jack and remove the suspension unit.

SUSPENSION UNIT — Dismantling and Assembly

Suitably clamp the suspension unit into a vice and take off the dust cover circlip. Using the coil spring compressor ST49100000 slightly compress the spring. Then remove the self-locking nut (Fig J 12) and take off the mounting insulator, thrust bearing, spring seat and bump rubber. Slacken the spring compressor and remove the spring. Push down the shock absorber piston and clean the area around the gland packing. Using the special tool ST49130000 unscrew the gland packing. Remove the 'O' ring from the piston rod guide, piston rod and cylinder assembly by slowly lifting piston. Do not separate piston and cylinder. Drain all fluid from the suspension unit and shock absorber assembly. Wash all parts thoroughly in a suitable solvent, with the exception of the rubber parts which should just be blown dry with compressed air.

Replace the shock absorber fluid gland packing and 'O' ring, self-locking nuts. Check the suspension unit outer casing for deformation, cracks or damage and the spindle for cracks at the base or screw portion. Inspect the spring, rubber parts and thrust bearing for wear, deformation and cracks.

To assemble, fit the outer casing to the adaptor, and insert piston rod and cylinder into the casing. Fill the outer casing with the correct grade of oil in accordance with the table below.

Applied models	All sedan models Ex. P510-UTK, PL510-TK and L510-S	All wagon models	P510-UTK, PL510-TK and L510-S
Oil quantity	300 cc	325 cc	290 cc

The oil quantity is critical and should be accurately measured as it affects the damping power of the shock absorber. Fit the 'O' ring to the top of the piston rod and using the gland packing with special tool ST49340000 if it has been removed. Before tightening the gland packing, lift the piston by 90 mm (3.54 in.) and then tighten to 6 - 6.5 kgm (43.4 - 47.0 kgm). Bleed the shock absorber by pumping the piston assembly up and down.

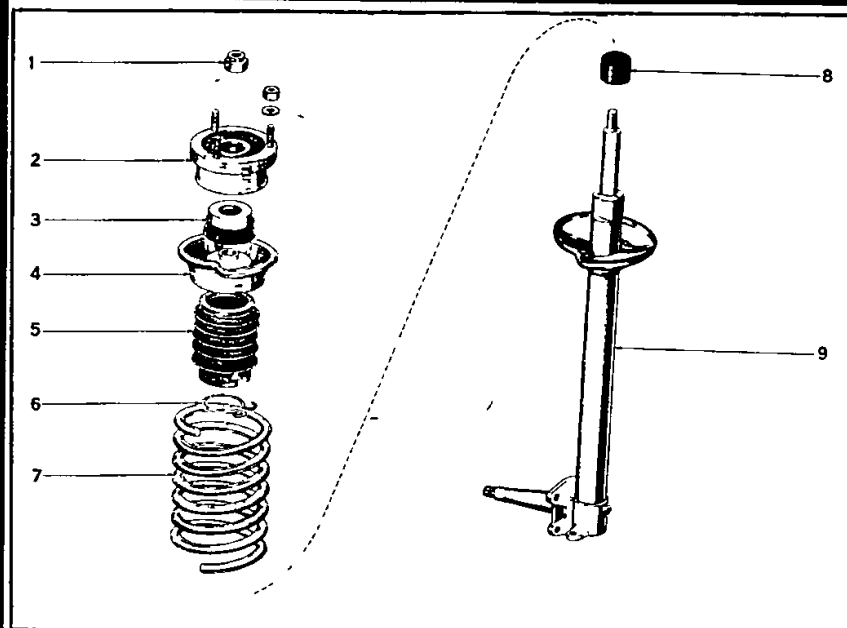


Fig J 9 Exploded view of the front suspension unit

- | | |
|---------------------|-------------------|
| 1 Nut | 6 Clip |
| 2 Upper mount | 7 Coil spring |
| 3 Gland packing | 8 Bumper rubber |
| 4 Upper spring seat | 9 Suspension unit |
| 5 Dust cover | |

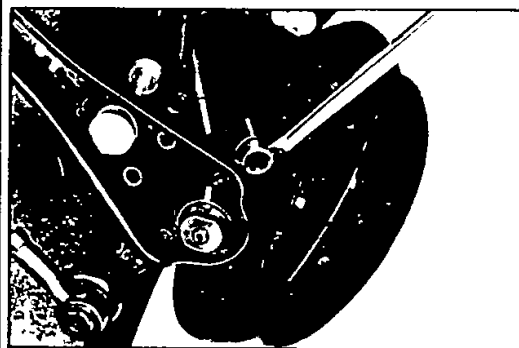


Fig J 10 Removal of the swivel joint assembly



Fig J 11 The upper mounting of the suspension unit.

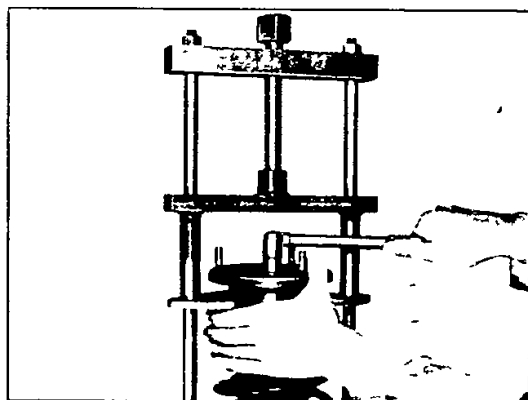


Fig J 12 Removal of the self-locking nut with the suspension unit compressed

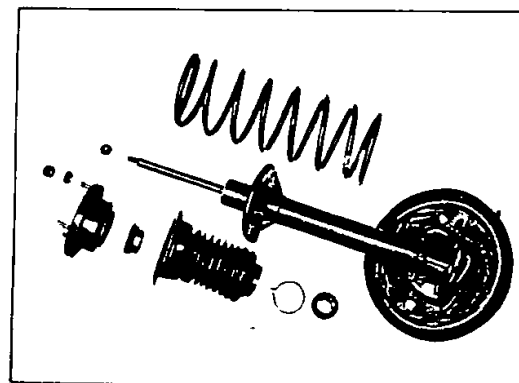


Fig J 13 Exploded view of suspension unit and spring assembly

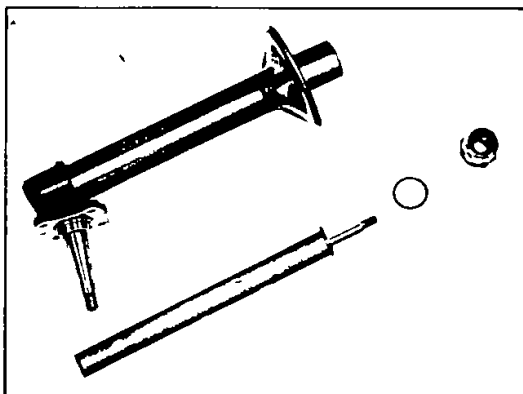


Fig J 14 Exploded view of the shock absorber

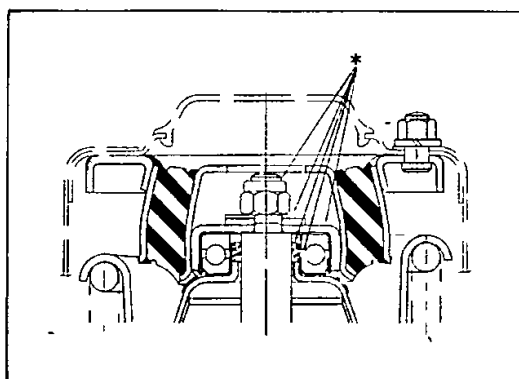


Fig J 15 Grease the points marked with (*)

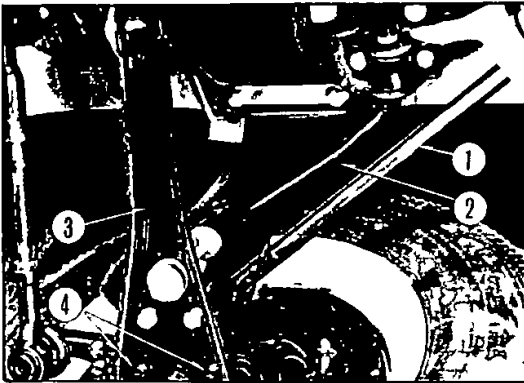


Fig J 16 Parts to be disconnected for the removal of the suspension arm

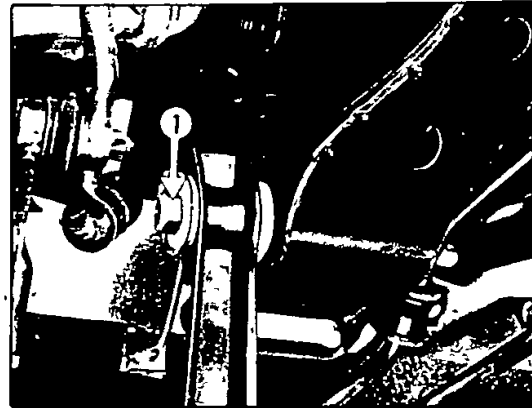


Fig J 17 The suspension arm mounting nut

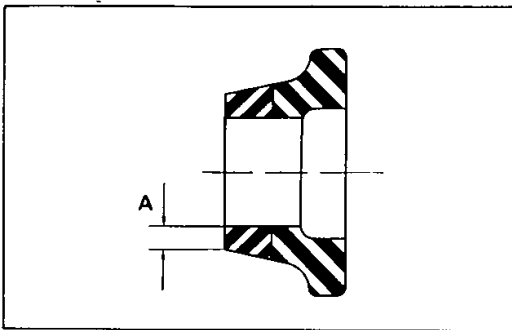


Fig J 18 The suspension arm bush

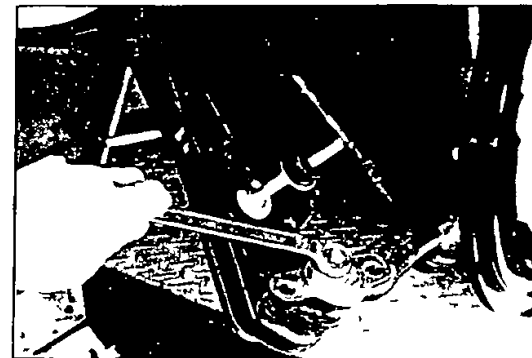


Fig J 19 Removal of the lower ball joint from the steering arm

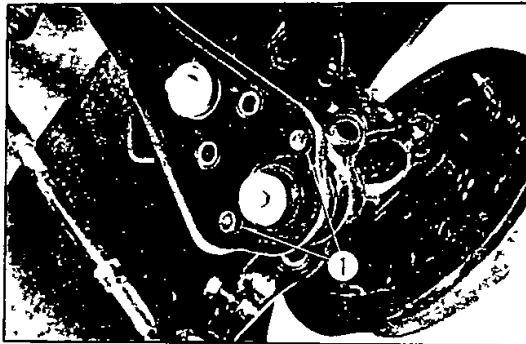


Fig J 20 The mounting bolts for the lower ball joint on the suspension arm

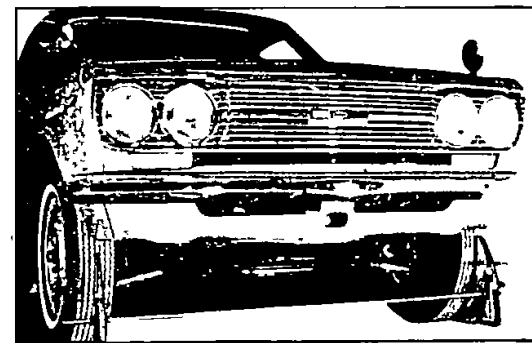


Fig J 21 Measuring the toe-in setting

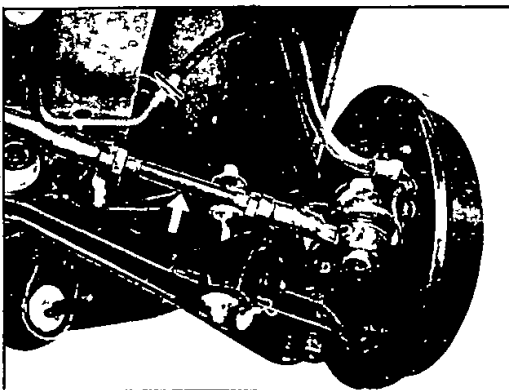


Fig J 22 Adjust the toe-in by turning the track rod centre tube

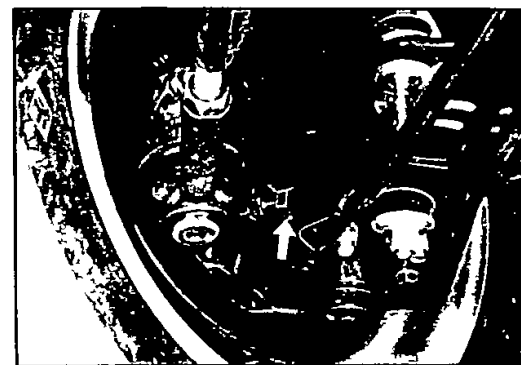


Fig J 23 Adjust the steering angle by means of the arrowed bolt.

until the pressure is in both directions the same

Complete the assembly by reversing the dismantling procedure
The torque setting of the self-locking nuts is 6.0 - 7.5 kgm (43.4 - 54.2 lb ft)

SUSPENSION UNIT — Installation

Reverse the removal procedure, greasing all parts marked (*) in Fig J 15. Tighten to the recommended torque values the following

Upper attachment nuts	3.9 - 5.2 kgm (28.2-37.6 lb ft)
Suspension unit to arm	6.0 - 8.0 kgm (43.4-57.8 lb ft)
Reaction rod to arm	4.9 - 6.3 kgm (35.4-45.6 lb ft)
Stabiliser to arm	1.2 - 1.7 kgm (8.7 - 12.3 lb ft)

SUSPENSION ARM — Removal and Installation

Jack up and support the front of the car on stands. Disconnect the reaction rod (1) and the stabiliser bar (2) from the suspension arm (3) in Fig J 16. Remove the lower ball joint bolts (4) and the nut (1) in Fig J 17. Lift out the suspension arm.

Check the suspension arm for damage, cracks or distortion and the rubber parts for abrasion. If the dimensions "A" in Fig J 18 is less than 1 mm (0.04 in) replace the rubber parts.

The installation is a reversal of the removal procedure. Tighten the bolts to the following torque values

Suspension arm to cross member	12.2 - 13.5 kgm (88.2 - 97.6 lb ft)
Ball joint	1.9 - 2.5 kgm (13.7 - 18.1 lb ft)

LOWER BALL JOINT — Removal and Installation

Jack up and support the front of the car on stands. Remove or disconnect the following: reaction rod and stabiliser bar from suspension arm, suspension unit from swivel joint arm, split pin from lower ball joint nut, ball joint from swivel joint arm (Fig J 19) and the lower ball joint from the suspension arm by removing the bolts (1) in Fig J 20.

Replace a damaged dust cover. As the ball joint is a sealed unit it must be replaced complete if the end play is greater than 0.03 - 0.6 mm (0.001 - 0.014 in). To grease the ball joint, remove the plug and screw in a grease fitting. Flush old grease out of the joint by pumping in new grease. Refit the plug.

The installation is a reversal of the removal procedure. Tighten all bolts and nuts to the torque values listed under TIGHTENING TORQUES (see index for page number), heading "Front Suspension".

FRONT WHEEL ALIGNMENT - Adjustments

All checks of the front wheels should be carried out with the tyres at correct pressures. Camber and castor angles are pre-set and cannot be adjusted. To level the vehicle, in the case that one side hangs more than the other can be accomplished by changing the springs.

Toe-in

Check the toe-in by using a gauge shown in Fig J 21 and adjust by lengthening or shortening the track rods. The standard length of the track rods between the ball joints and the centre of the swivel joints is 309.5 mm (12.19 in). Both sides should be adjusted to equal length, by turning the centre tubes (arrowed in Fig J 22).

Steering angle

With the car on a turn table adjust the steering angle, using the bolt arrowed in Fig J 23 on both sides.

Technical Data

FRONT WHEEL ALIGNMENT			
Model	All Saloon models except L510-S	L510-S	All Estate Cars
Castor	1° 40'	1° 40'	2° 0'
Camber	1° 00'	1° 30'	1° 10'
King-pin-inclination	8° 00'	7° 30'	7° 50'
Toe-in	6 - 9 mm (0.24 - 0.35 in)	9 - 12 mm (0.35 - 0.47 in)	3 - 6 mm (0.12 - 0.24 in)

COIL SPRINGS			
Models	L H spring for all models R H spring for L H D models (Except L510-S)	R H spring for all R H D models and L510-S L H spring for L510 S	L H and R H spring for all models with air conditioner
Wire diameter	12 mm (0.472 in)	12 mm (0.472 in)	12 mm (0.472 in)
Coil diameter	130 mm (5.12 in)	130 mm (5.12 in)	130 mm (5.12 in)
Free length	354.5 mm (13.94 in)	369.5 mm (14.55 in)	384.5 mm (15.14 in)
Fitted length	187 mm (7.36 in)	202 mm (7.95 in)	217 mm (8.54 in)
Fitted load	243 kg (536 lbs)	243 (536 lbs)	243 kg (536 lbs)

FRONT SUSPENSION UNITS

Models	All Saloons with drum brakes Exc L510-S	Saloons with disc brakes Exc SSS	All Estates with drum brakes	Estates with disc brakes	SSS (P510 UTK and PL510-TK)	L510 S
Strut outer diameter mm (in)	50.8 (2.0)	50.8 (2.0)	50.8 (2.0)	50.8 (2.0)	50.8 (2.0)	50.8 (2.0)
Piston rod diameter mm (in)	20 (0.787)	20 (0.787)	20 (0.787)	20 (0.787)	22 (0.866)	22 (0.866)
Cylinder inner diameter mm (in)	30 (1.181)	30 (1.181)	30 (1.181)	30 (1.181)	32 (1.260)	32 (1.260)
Damping force at piston speed 0.3 m/s (1.08 ft/s)						
Expansion kg (lb)	67 ± 10 (147.7 ± 22)	67 ± 10 (147.7 ± 22)	67 ± 10 (147.7 ± 22)	67 ± 10 (147.7 ± 22)	80 ± 12 (176.3 ± 22)	67 ± 10 (147.7 ± 22)
Compression kg (lb)	25 ± 4 (55.1 ± 8.8)	25 ± 4 (55.1 ± 8.8)	25 ± 4 (55.1 ± 8.8)	25 ± 4 (55.1 ± 8.8)	40 ± 6 (88.2 ± 13.2)	25 ± 4 (55.1 ± 8.8)
Shock absorber inner cylinder length mm (in.)	410 (16.1)	410 (16.1)	435 (17.1)	435 (17.1)	410 (16.1)	410 (16.1)

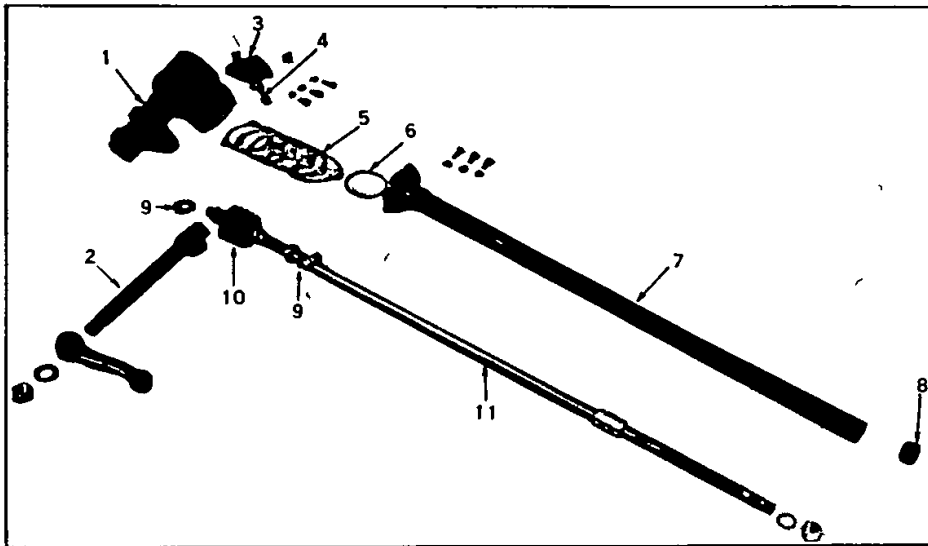


Fig K 1 Exploded view of the steering gear

- | | |
|--------------------------|---------------------------|
| 1 Steering gear housing | 7 Steering column tube |
| 2 Steering sector shaft | 8 Steering column bearing |
| 3 Sector shaft cover | 9 Steering worm bearing |
| 4 Adjusting screw | 10 Steering nut |
| 5 Worm bearing shim | 11 Steering column shaft |
| 6 Housing cover 'O' ring | |

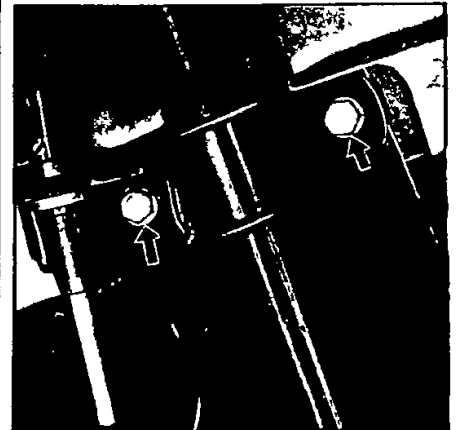


Fig.K 2. The mounting bolts of the steering column.



Fig.K 3 The mounting bolts of the steering column bottom flange.

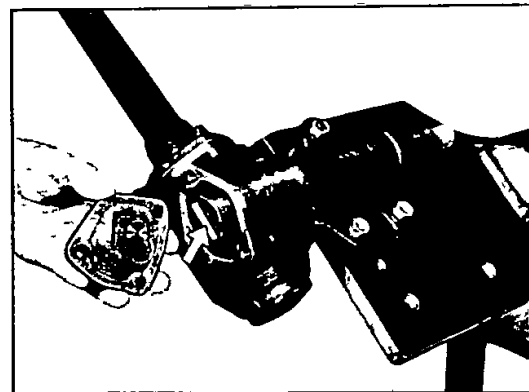


Fig.K.4. Removal of the steering sector shaft cover

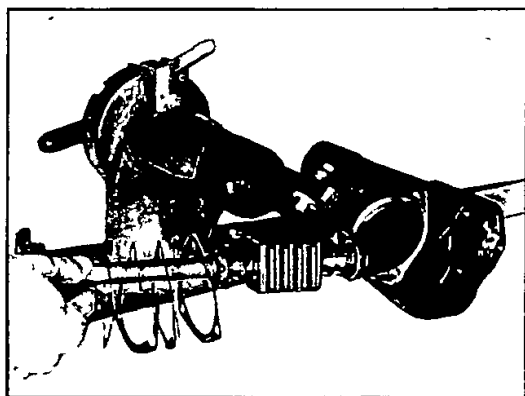


Fig K 5 Removal of the steering column shaft with steering nut.

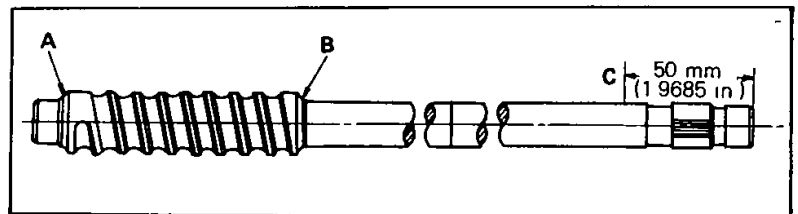


Fig.K 6. Measure the dimension shown to determine if the shaft is still serviceable

Steering

DESCRIPTION

The steering is of the recirculating ball type. The steering linkage is fitted with a torsion rubber idler arm which absorbs the wheel shock. The lubricant of the steering box should be checked every 6,000 miles (10,000 km) at which time it is also necessary to grease all grease fittings of the steering linkage.

STEERING GEAR – Removal

Remove the horn ring by depressing it and turning it to the left, the steering wheel nut and using the steering wheel puller ST46430000 or any other puller that will fit, withdraw the steering wheel. Remove the steering column cowl, direction indicator and light selector switch and disconnect the gearchange lever (steering column change only) from the change control rod. Remove the two column attaching bolts (arrowed in Fig K 2), the column bottom flange bolts (Fig K 3) and disconnect the gearchange rod and the selector rod from the gearchange lever and the selector lever by removing the cotter pin from the trunnion.

Disconnect the steering drop arm and the drag link. Remove the steering gear mounting bolts and draw the steering gear and the column assembly forward and remove the gear change control linkage as described in section GEARBOX.

STEERING GEAR – Dismantling

Clamp the steering box assembly suitably into a vice and remove the drop arm with a suitable puller or special tool ST 46440000. Drain the oil from the steering box. Slacken the adjustment nut and turn the sector shaft adjusting screw several turns anti-clockwise. Remove the sector shaft cover and the shaft from the housing as shown in Fig 4. Remove the steering column tube bolts and withdraw the steering column as shown in Fig K 5, taking care not to let the ball nut run down to either end of the steering worm. Pull the steering column out of the column tube. Remove the sector shaft oil seal. Note that the sector shaft needle bearings are a press fit in the housing. Using a puller, remove the rear bearing outer race from the column tube. Finally remove the bearing inner races of the front and rear steering worm bearings and the steering column bearing.

STEERING GEAR – Inspection and Assembly

Check the axial clearance between the ball nut and the balls. If the clearance exceeds 0.08 mm (0.003 in) the complete unit should be replaced. Inspect the gear teeth for wear or damage. Worn or imperfect bearings should be replaced. Examine the steering column shaft for straightness and check that the max deflection at points "C" in Fig K 6 is not exceeding 0.2 mm (0.008 in) when the shaft is supported at points "A" and "B". Check the sector shaft and steering column shaft serrations for wear. Replace parts as necessary and re-assemble the steering gear as follows.

Grease the oil seal lips and press the seal into the housing. Fit the steering column assembly into the column tube and fit the worm bearing shims and the 'O' ring into the housing. Tighten the flange bolts to 18.25 kgm (13.0 - 18.1 lb ft.) If the

column bearing has been changed, it should be packed with grease and then cemented into the steering column. By adjusting the worm bearing shims (4 sizes - 0.05 - 0.076 mm (0.002 - 0.003 in) adjust the initial turning torque of the steering column shaft to 4.0 - 6.0 kgcm (55.5 - 83.3 in oz) without the sector shaft being fitted. This can be carried out by hooking a spring scale to one of the steering wheel spokes which for this purpose should be pushed over the steering column shaft. (Fig K 7). The end clearance of the sector shaft adjusting screw should be 0.01 - 0.03 mm (0.0004 - 0.0012 in) and should be measured as shown in Fig K 8. There are six shims available in thicknesses from 1.45 - 1.57 mm (0.057 - 0.062 in).

With the ball nut at the centre of travel and the centre tooth of the sector shaft in line with the centre tooth space of the ball nut, place a new gasket on the sector shaft cover and fit the sector shaft and the cover ensuring that there is some backlash between the sector shaft and the ball nut teeth. Oil the sector shaft prior to assembly and tighten the bolts.

Lock the adjusting screw locknut and turn the sector shaft several times at the drop arm end. Fit the drop arm, taking care of the alignment marks on the arm and steering box. Adjust the backlash at the end of the drop arm as shown in Fig K 9 over a radius of 215 mm to less than 0.1 mm (0.004 in) with the adjusting screw at the end of the cover (Fig K 10). From this position screw in the adjusting screw by 1/8 to 1/6 turn and lock in position with the locknut.

Finally fill the steering box with gear oil 90 E.P. The filling capacity is approx. 0.33 litres (0.7 US pts, 0.6 Imp pts).

STEERING GEAR – Installation

The installation is a reversal of the removal procedure, noting the following points.

Check the front wheel alignment and the steering system for freedom of movement. The steering wheel rim should have a free travel of 20 - 30 mm (0.98 - 1.18 in), measured at the outside diameter of the rim.

STEERING LINKAGE – Removal and Dismantling

Refer to Fig K 11. With the vehicle resting in stands remove the split pins and the castle nuts holding the track rods to the steering levers. Remove the track rod ball joints from the levers by means of a suitable puller or by holding a large hammer on one side of the lever boss and tapping the opposite side with a second hammer. In the same manner disconnect the steering connecting rod from the drop arm and the idler assembly and the track rod inner ball joint from the connecting rod. Unscrew the steering idler from the chassis side member.

To dismantle the steering linkage, slacken the clamp bolts from the ends of the track rods and unscrew the ball joints. Unscrew the idler arm bracket nut and dismantle the idler assembly.

STEERING LINKAGE – Assembly and Installation

Check the rubber parts for damage, wear or other form of damage and replace if necessary. Check all steering rods for

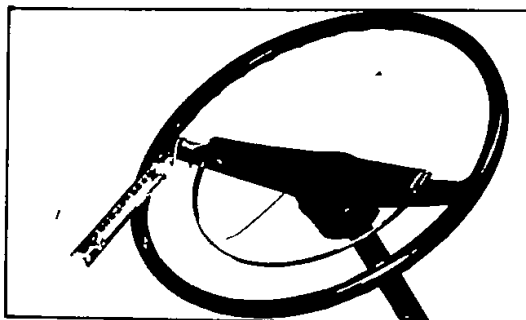


Fig K 7 Measuring the initial turning torque by means of a spring scale.

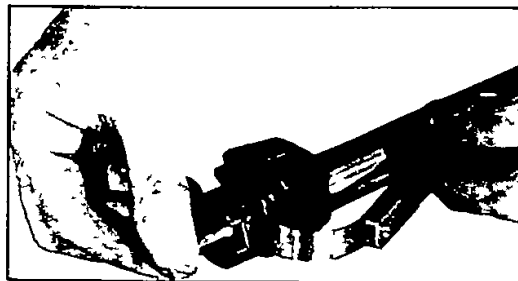


Fig K 8 Checking the end float between adjusting screw and sector shaft.

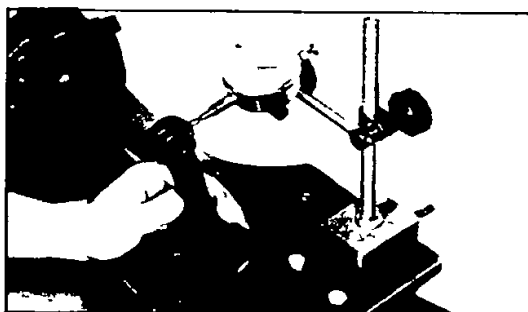


Fig K 9 Checking the steering gear backlash

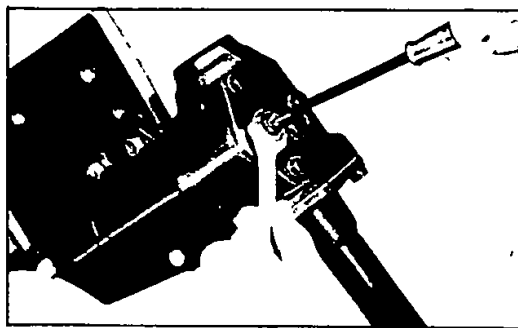


Fig K 10 Adjusting the steering gear backlash

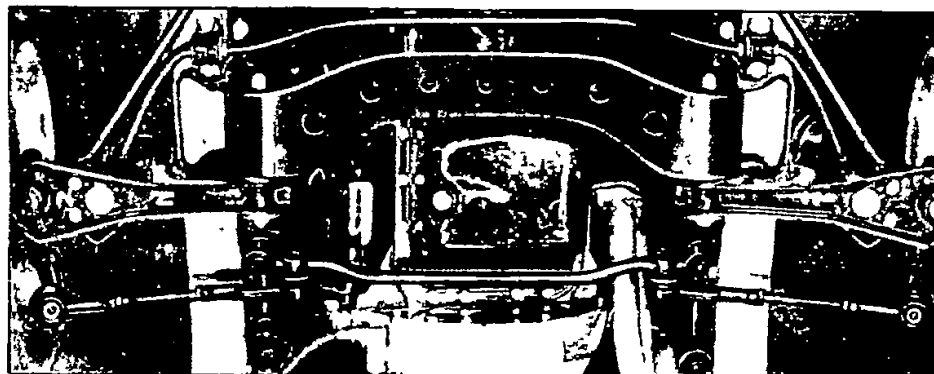


Fig K 11 The steering linkage seen from underneath

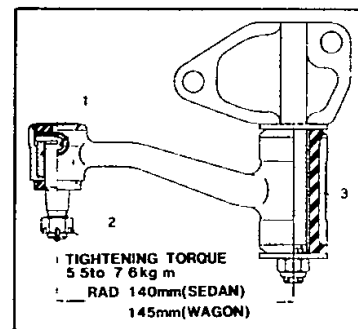


Fig K 12 Section through the idler arm

- 1 Nylon bush
- 2 Dust cover
- 3 Idler arm

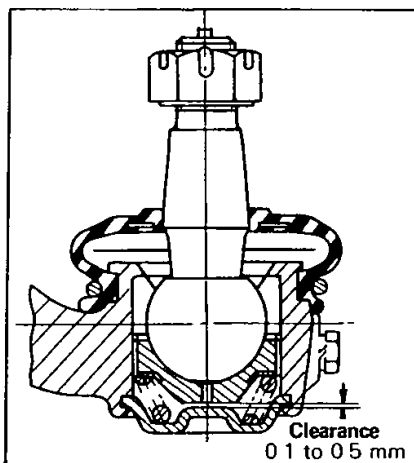


Fig. K 13. Section through the ball joint stud for the track rod.

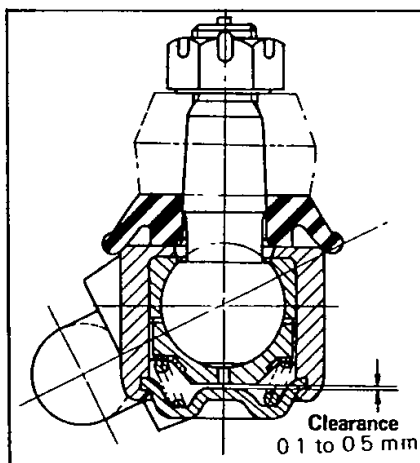


Fig. K 14 Section through the ball joint stud for the connecting rod

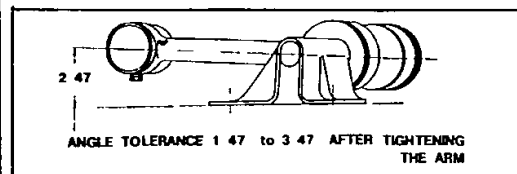


Fig K 15 Adjustment of idler bracket and idler arm.

damage, distortion or cracks. The ball joints must have no free play due to weak springs or damage. A working clearance of 0.1 - 0.5 mm (0.004 - 0.02 in) should be felt when the ball joint stud is pulled out of its socket (see Fig K 13 and K 14). Replace ball joints if necessary.

The assembly is a reversal of the dismantling procedure, noting the following points. Tighten the bolts to the following torque settings:

Ball stud nut	5.5 - 7.6 kgm (39.8 - 55.0 lb ft)
Drop arm nut	12.5 - 14.0 kgm (90 - 101 lb ft)
Idler arm nut	5.5 - 7.6 kgm (39.8 - 55.0 lb ft)

When assembling the idler arm bracket coat the rubber bush with liquid soap and press in so that it protrudes equally on both sides. Fit the idler arm body into the bush with the idler arm centre line parallel to the chassis centre line. See also Fig K 15 for the dimension to be obtained.

Bring the track rods to their basic length adjustment of 309.5 mm (12.185 in) between the ball stud centres by turning the centre tube in the appropriate direction. After installation of the complete steering linkage system check and adjust the wheel alignment as described in section "Front Suspension". Also adjust the toe-out in turn angle so that the angle of the inner wheel is 38° and that of the outer wheel 32.4°.

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

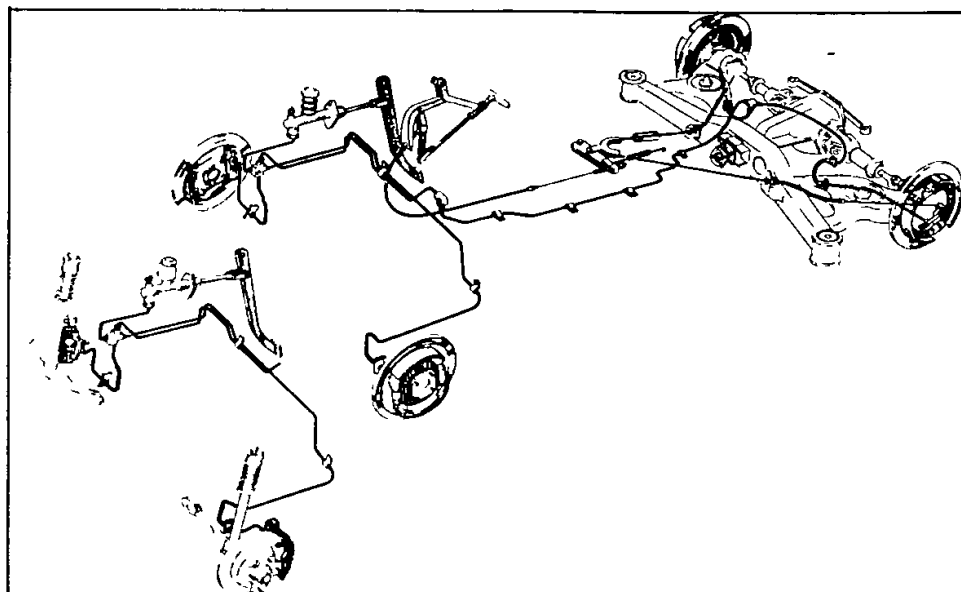


Fig L 1 Layout of the brake systems with the disc brake system on the left

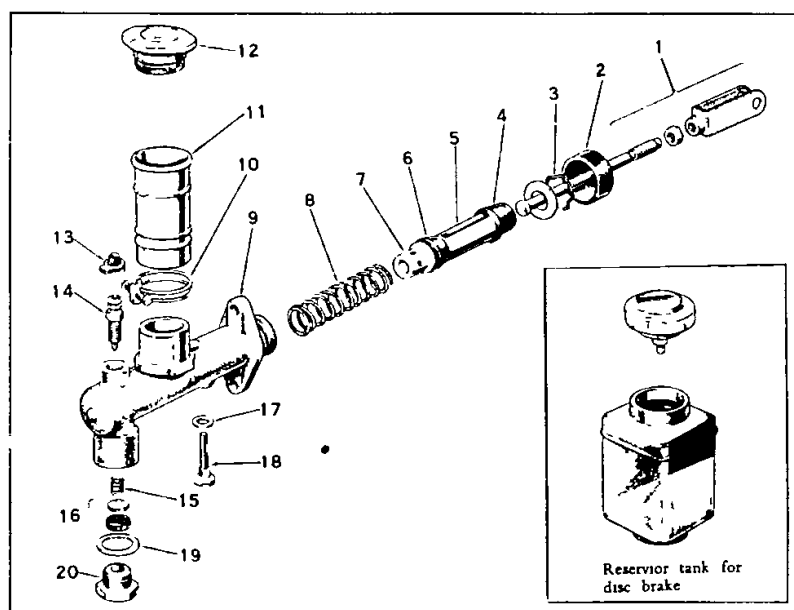


Fig L 3 Exploded view of the master brake cylinder

- | | |
|------------------------|-----------------------|
| 1 Push rod | 11 Reservoir |
| 2 Dust cover | 12 Reservoir cap |
| 3 Retaining ring | 13 Bleeder screw cap |
| 4 Secondary piston cup | 14 Bleeder screw |
| 5 Piston | 15 Check valve spring |
| 6 Primary piston cup | 16 Check valve |
| 7 Inlet valve | 17 Gasket ring |
| 8 Piston return spring | 18 Piston stop bolt |
| 9 Cylinder body | 19 Gasket washer |
| 10 Reservoir clip | 20 Valve plug |

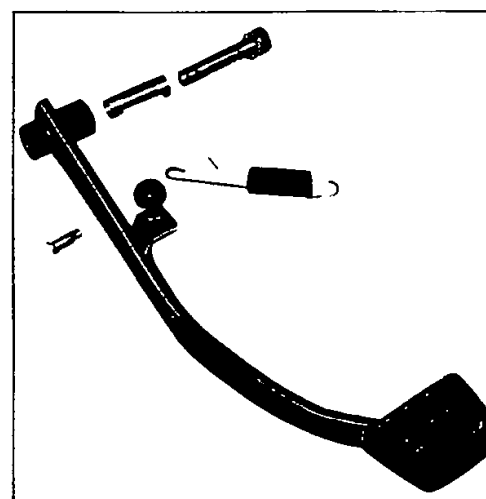


Fig L 2 Exploded view of the brake pedal assembly

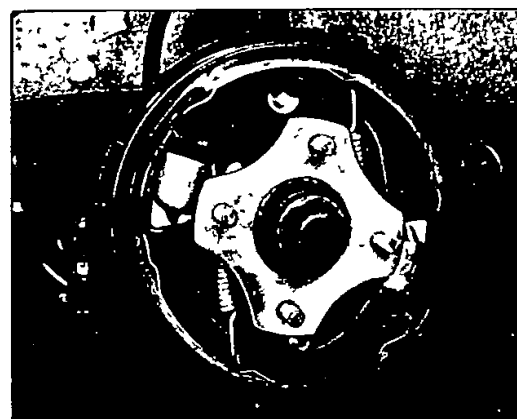


Fig L 5 The front drum brake fitted to the car

Brakes

BRAKE PEDAL – Removal and Installation

Remove the return spring and the push rod clevis pin and disconnect the pedal from the master cylinder. Remove the pivot pin and lift out the pedal. (See Fig L 2)

Check the pedal shaft bushes, the pedal and other parts for damage or excessive wear or distortion and replace parts as necessary. Install the pedal by reversing the removal procedure. Lubricate the shaft bushes and the push rod clevis pin with brake grease. Tighten the pivot pin nut to a torque setting of 3.5 - 4.0 kgm (25.3 - 28.9 lb ft).

BRAKE MASTER CYLINDER – Removal and Dismantling

Refer to Fig L 3. Remove or disconnect the following parts: Push rod clevis pin at the brake pedal, brake pipe at the master cylinder and master cylinder securing nuts from the bulkhead. Lift the master cylinder from its mounting.

Drain all fluid from the reservoir and remove the dust cover and the piston stop screw from the bottom of the cylinder. After removing the piston retaining ring and the abutment washer, shake out the piston assembly, the piston return spring, valve cap and check valve.

BRAKE MASTER CYLINDER – Assembly and Installation

Thoroughly clean all parts and check as follows, replacing any defective parts. Cups and valves should be renewed as a matter of course.

Check the piston and the cylinder bore for abnormal wear and damage. The clearance between the piston and the cylinder wall should not exceed 0.13 mm (0.005 in). Springs should be checked for damage or weakness. Inspect dust cover and reservoir for damage.

The assembly of the brake master cylinder is a reversal of the dismantling procedure, noting the following points: Soak the piston cup in brake fluid and coat the piston and the cylinder working surfaces with brake fluid prior to assembly. After the complete installation, adjust the brake pedal height and bleed the hydraulic brake system.

BRAKE PIPES

If any leakage is found to be due to brake pipes or hoses, replace the part in question making sure they do not foul any moving parts. Connectors should be tightened to 1.5 - 1.7 kgm (10.8 - 12.3 lb ft).

FRONT DRUM BRAKE – Removal and Inspection

Support the vehicle on stands and remove the brake drum, hub cap and hub assembly by removing the split pin and the castle nut from the swivel joint spindle. Disconnect the brake hose from the wheel brake cylinder. Unhook the return springs from the brake shoes and lift off the brake shoes. From the rear of the brake backplate, remove the wheel cylinder securing screws

and detach the wheel cylinders after disconnecting the bridge pipe between them. If the wheel cylinders must be dismantled, remove the rubber dust caps and withdraw the inner parts.

Check the brake drums for run-out and skim if the run-out exceeds 0.05 mm (0.002 in) to a maximum diameter of 229.6 mm (9.040 in). Also check the drums for cracks or other damage and replace if necessary. If the linings are not seated on the shoes properly, worn to below 1.5 mm (0.06 in) in thickness, grease impregnated or burnt, replace them. Check the adjusting cams for freedom of rotation and the springs for weakness. The standard dimensions are as follows:

Wire diameter	3.5 mm
Free length	77.5 mm
Number of turns	21.5

Check the brake backplate for distortion. Inspect the wheel brake cylinder bore for scoring and the piston surface for corrosion or damage. The maximum running clearance of the piston in the cylinder bore must not exceed 0.15 mm (0.005 in). It is recommended to renew the piston cups every time.

FRONT DRUM BRAKE – Assembly and Installation

Reverse the dismantling and removal procedures, noting the following points: Grind the new linings (if fitted) to the diameter of the brake drums. Take care not to bring oil or grease in contact with the brake linings. Lightly grease all moving parts, adjust the brakes and bleed the brake system.

FRONT DISC BRAKE – Removal and Dismantling

Support the vehicle on stands, remove the wheel and disconnect the brake hose. Remove the bolts securing the brake calliper to the swivel joint flange and remove the calliper (Fig L 7). Remove the hub nut and withdraw the hub together with the brake disc.

To dismantle the calliper, remove the anti-rattle clip and remove the brake pads from the calliper. Remove the tension springs and pull the cylinder out of the calliper. Blow out the piston, using air or hydraulic line at the brake hose connection as shown in Fig L 8. Remove the rubber seal from the cylinder groove and the retainer and the wiper seal.

If any fluid leaks, damage or defects can be found on the cylinder assembly, it should be replaced. Check the brake pads for wear or cracks. If the pads are worn down to a thickness of 1 mm (0.04 in), they must be replaced in sets of four. Replacing only the worn brake pads causes the brakes to pull to one side. Check the brake disc for scoring, out-of-round and run-out. The run-out is best checked as shown in Fig L 9 with the hub mounted to the swivel joint. If it is necessary to re-machine the brake disc, take care that a minimum thickness of 8.4 mm (0.331 in) is not exceeded. The nominal thickness of the brake disc is 10 mm (0.04 in). If the disc is cracked or damaged in any other way, it cannot be salvaged and must be replaced.

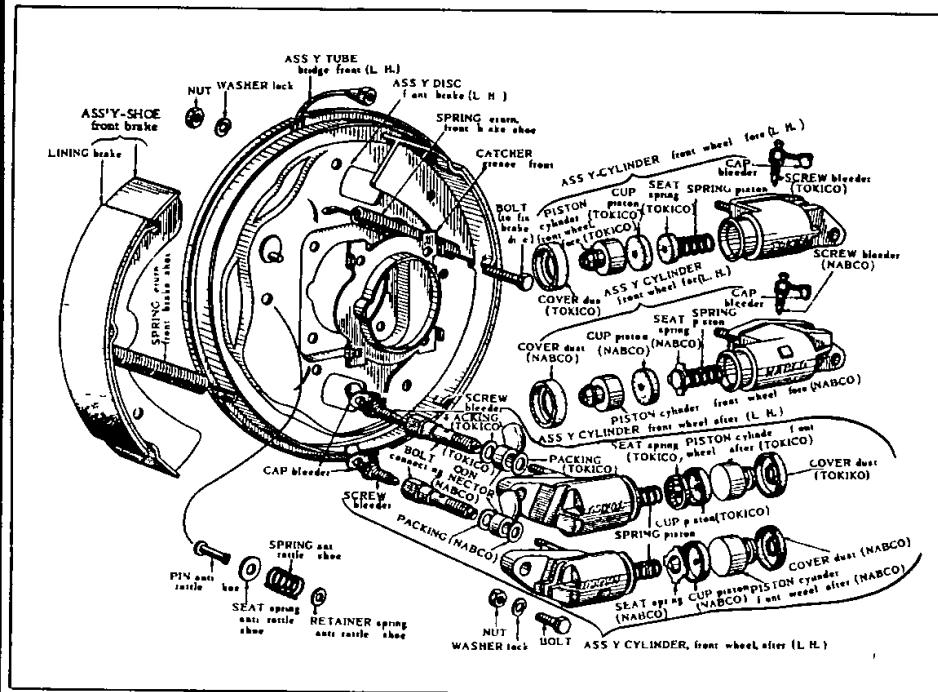


Fig L 4. Exploded view of front brake assembly

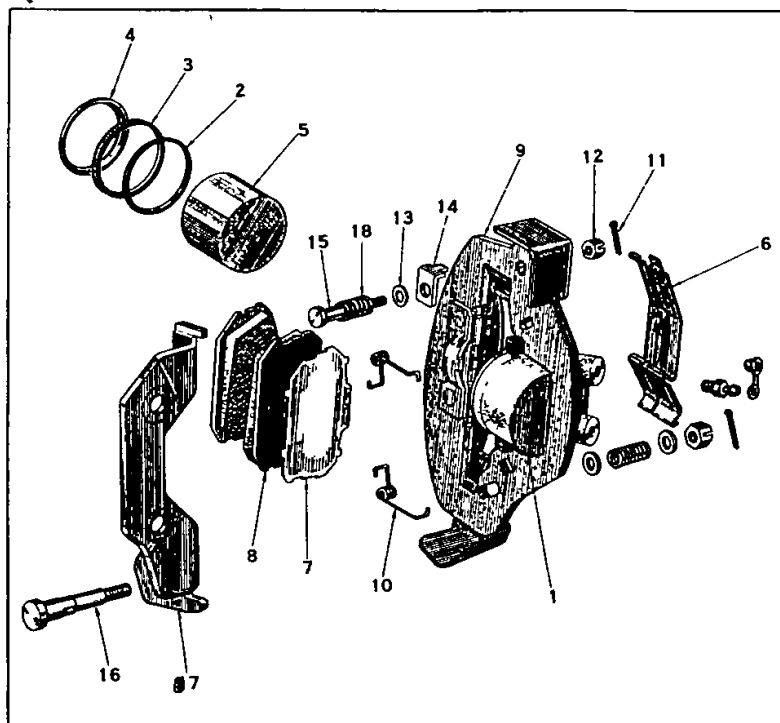


Fig.L 6. Exploded view of the front disc brake assembly

- | | |
|------------------|---------------------|
| 1 Cylinder | 10 Tension spring |
| 2 Piston seal | 11 Split pin |
| 3 Wiper seal | 12 Castle nut |
| 4 Retainer | 13 Washer |
| 5 Piston | 14 Support bracket |
| 6 Clip | 15 Hold down pin |
| 7 Shim | 16 Pivot pin |
| 8 Brake pad | 17 Mounting bracket |
| 9 Calliper plate | 18 Spring |



Fig L 7 Removal of the brake caliper.

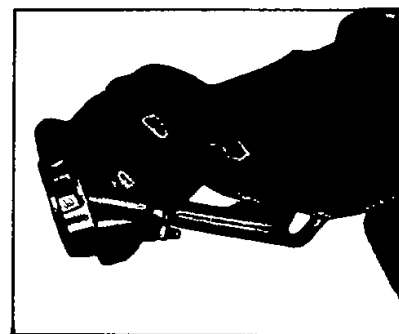


Fig L 8 Ejecting the piston by means of compressed air

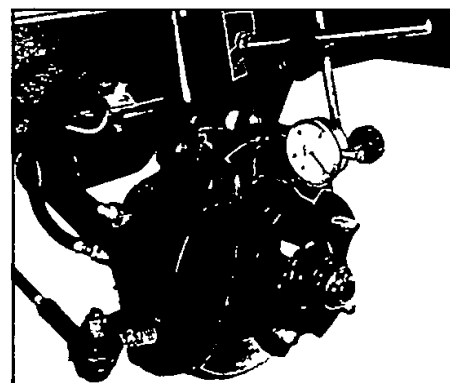


Fig L.9. Measuring the brake disc for run-out.

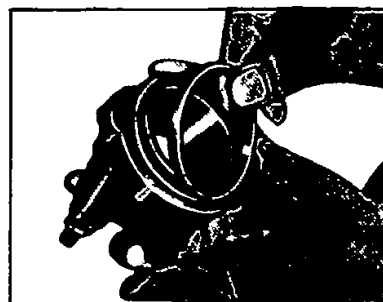


Fig.L.10. Assembly of piston, seals and retainer

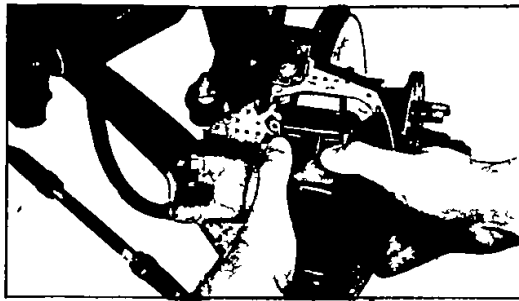


Fig L 11 Inserting the anti-rattle spring

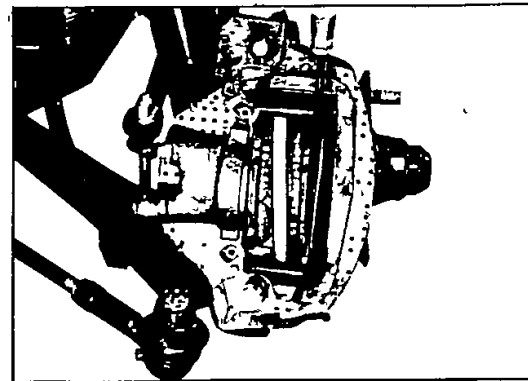


Fig L 12. Pushing the piston towards the inside

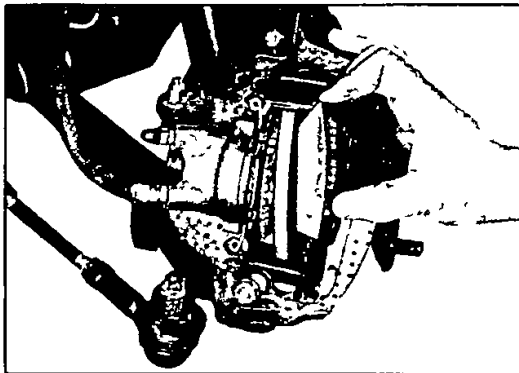


Fig L 13 Removal of the brake pads



Fig L 15 Removing the outer casing of the handbrake cable



Fig L 14 Exploded view of the rear brake



Fig L 16 The handbrake lever fitted in position

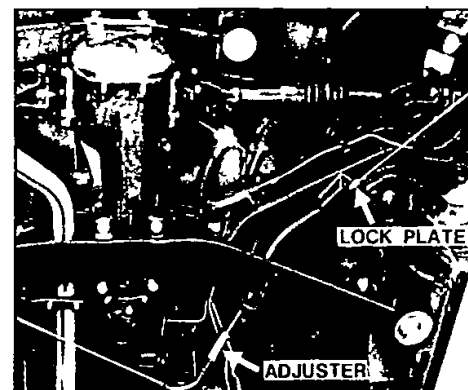


Fig L 17 The fixing points of the rear handbrake cable (Saloon models)

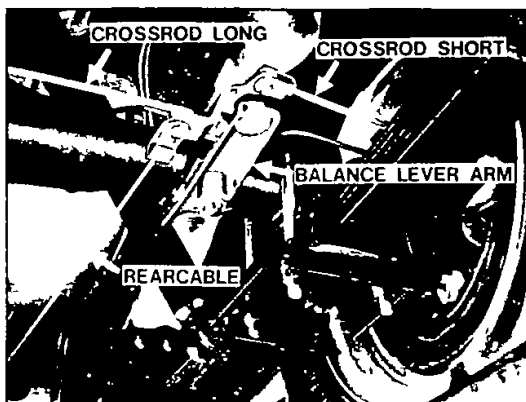


Fig L 18 The handbrake mechanism (Estate models)

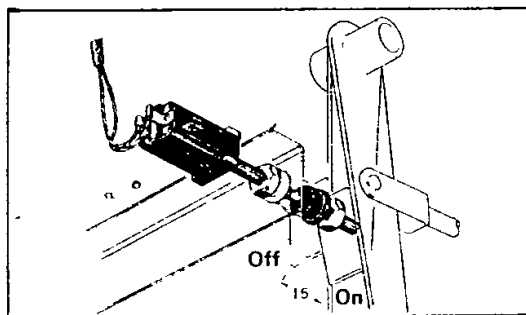


Fig L 20 Adjusting the brake light switch

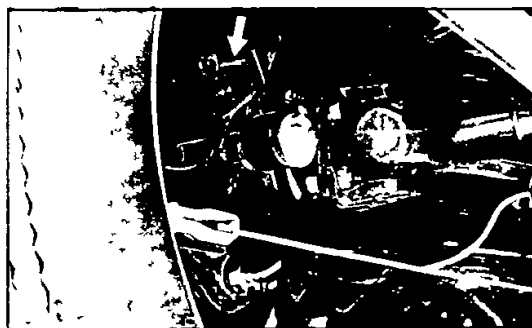


Fig L 22 Adjusting the rear brakes (Saloon models)

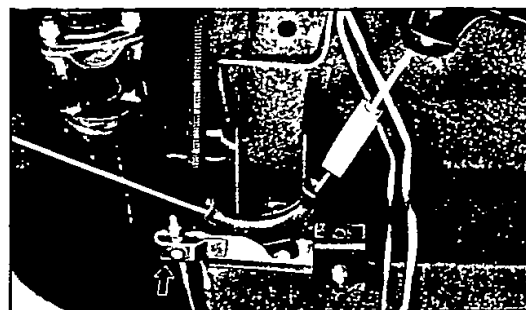


Fig L 24 Adjusting the handbrake cable (Saloon models)

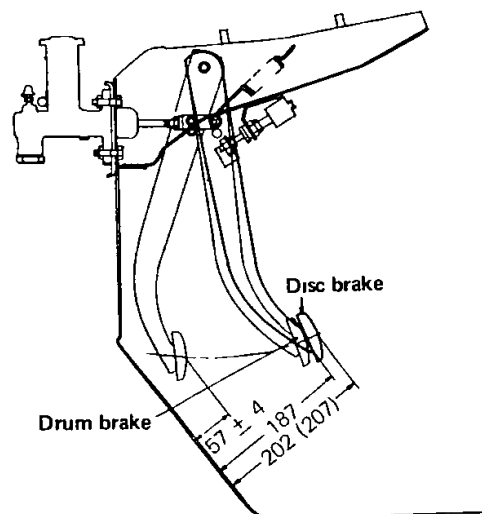


Fig L 19 The brake pedal adjustment

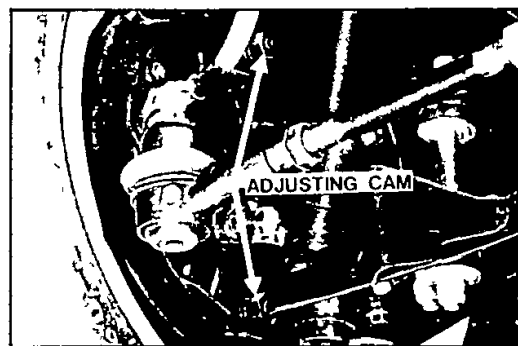


Fig L 21 Adjusting the front brakes



Fig L 23 Adjusting the rear brakes (Estate models)

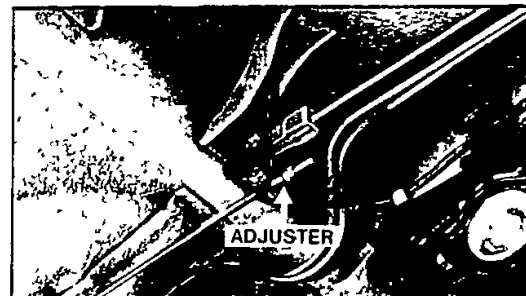


Fig L 25 Adjusting the handbrake cable (Estate models)

FRONT DISC BRAKE — Assembly and Installation

Rinse the cylinder bore thoroughly with brake fluid and fit the piston seal into the groove as shown in Fig L 10. Fit the wiper seal and lightly grease the bore with the specified grease. Clean the brake disc and fit to the hub. The hub can now be fitted to the swivel joint.

Carefully fit the piston into the cylinder, relieved portion facing the pivot pin and push in the piston until it is almost flush with the wiper seal retainer. Install the cylinder into the calliper plate and secure in position by means of the two torsion springs. Fit the hold-down pin, spring washer and the nut to the support bracket and secure the nut with a split pin. Assemble the calliper to the mounting bracket with pivot pin, with spring washer, plain washer and castle nut. Tighten the nut and secure with a split pin. Hook the hold-down bracket on to the top of the mounting bracket and turn the calliper plate to ensure that it can turn smoothly. Then fit the calliper to the swivel joint flange.

Fit a shim to the inner brake pad and insert the inner pad. Draw the calliper towards the chassis. Then insert the lower cuts on the ends of the pads into the mounting bracket and push in the pad until it contacts the piston. Move the calliper away from the chassis and insert the upper cuts. Centre the indentations of the outer pad to the calliper plate. Fit the anti-rattle clip as shown in Fig L 11.

BRAKE PADS — Replacement

The wear of the disc brake pads should be checked every 3,000 miles (5,000 km). If the pad thickness is less than 1 mm (0.04 in) change the pads as a complete set of four.

Remove the wheel. Take out the anti-rattle clip. By moving the calliper plate away from the chassis, push the piston inside by 3 - 4 mm (0.12 - 0.16 in) and remove the outer pad. Then draw the calliper plate inwards and remove the inner pad. Clean the exposed surface of the piston. The installation of the new pads is carried out in reverse order (See Fig L 11, 12 and 13 for various stages of replacement).

REAR BRAKES — Removal and Installation (Fig L 14)

Support the vehicle on stands and remove the wheels. Release the handbrake and disconnect the connecting rod from the lever at the rear of the wheel brake cylinder. Remove the brake drum. Unhook the return springs and lift off the brake shoes. If necessary disconnect the brake pipe and remove the brake cylinder dust cover plates, adjusting shims and then the cylinder. The wheel brake cylinder can be dismantled by removing the circlip and the rubber dust cover and taking out the inner parts. Remove the brake adjuster and the brake backplate (as described for the removal of the axle drive shafts in section "Rear Axle").

The assembly and installation is similar as described for the front drum brakes.

HANDBRAKE — Removal

Front cable. Release the handbrake, remove the clevis pin holding the cable and unscrew the adjusting nut at the rear of

the front cable. Remove the cable from the handbrake lever. From underneath the body release the cable from the mounting clips, pull out the lock plates holding the cable retainer and completely withdraw the cable. Pull out the front cable from the car after undoing the outer casing of the cable as shown in Fig L 15 which has a press-fit in the handbrake control bracket.

Handbrake lever. Remove the clevis pin connecting the lever yoke with the lever and the clevis pin connecting the control guide and the bracket. Lift out the handbrake lever assembly. The installed lever is shown in Fig L 16.

Rear handbrake cable (Saloon). Remove the adjusting nut and disconnect the left-hand cable from the handbrake adjuster. Pull out the lock plates and remove the clevis pins securing the cables to the rear wheel brake cylinders (See Fig L 17).

Rear handbrake cable (Estate Car). Remove the clevis pins from both ends of the rear cable. Remove the connecting rods by removing the pull-off springs and the clevis pins. See Fig L 18.

HANDBRAKE MECHANISM — Installation

Check the cables for breakage, fraying or excessive stretching. Examine the handbrake lever springs for weakness and the ratchet for wear. The return and the pull-off springs should be checked for weakness. Also check the equalizer lever and the bushes for wear or damage. Replace parts as necessary.

The installation of the removed parts is a reversal of the removal procedure. All sliding parts should be greased prior to installation.

BRAKES — Adjustments

Brake pedal. See Fig L 19. Adjust the brake pedal by turning the master cylinder push rod to obtain the heights shown in the diagram without disturbing the brake light switch. The brake pedal stop must be free. Tighten the locknut.

Now screw in the brake light switch until the threaded part of the switch is touching the front of the stop bracket (Fig L 20). Lock the switch in this position. Then screw in the stop bolt until the moveable part of the switch is fully pressed in and lock the stop bolt. Check that the brake lights come on when the pedal is pushed down by 1.5 mm (0.06 in).

Front brake (drum brakes). Jack up the front of the vehicle. Depress the brake pedal several times and then turn the adjuster cams forward until the wheels are locked. From this position back off the adjuster until the shoes free the brake drum. Note that there are two adjusters on each wheel which should be treated completely independently.

NOTE. The disc brakes fitted to the front wheels of some models are self-adjusting.

Rear brakes. Jack up the rear wheel and with the handbrake completely released, depress the brake pedal several times to settle the mechanism. Turn the adjuster (Fig L 22 and L 23) in a clockwise direction until the brake shoes are locked to the drum. Then back off the adjuster by two or three notches until the wheel rotates freely.

Handbrake: With the handbrake released and the rear brakes adjusted as described above, adjust the front and rear handbrake cable to obtain a lever stroke of 85 - 95 mm (3.346 - 3.740 in.) for the saloon (Fig.L 24). In the case of the estate car adjust at the front adjuster to give a stroke of 110 - 120 mm (4.33 - 4.724 in.). (Fig.L.25).

BLEEDING THE BRAKE SYSTEM

When any part of the hydraulic system has been disconnected or the presence of air in the system is detected, the system must be bled. To do this proceed as follows:

With the master cylinder reservoir completely filled, remove the rubber dust cap from the bleed plug, furthest away from the master cylinder, and connect a bleed hose to the bleeder valve. Immerse the other end of the hose in a jar containing a little brake fluid. Depress the brake pedal several times to expel the air, keep the pedal at its lowest position, and open the bleeder valve 1/3 to 1/2 turn, and then close the valve. Repeat this pumping operation until only brake fluid flows into the glass jar. Fit the rubber dust cap and top-up the reservoir. Repeat the bleeder operations for the other bleed plugs finishing with the bleed plug nearest to the master brake cylinder.

Technical Data

BRAKE PEDAL

Brake pedal height (Front drum brakes):

R.H.D. 187 mm (7.362 in.)

L.H.D. 187 mm (7.362 in.)

With autom. transm. 197 mm (7.756 in.)

Brake pedal height (Front disc brakes):

R.H.D. 202 mm (7.953 in.)

L.H.D. 207 mm (8.150 in.)

With autom. transm. 197 mm (7.756 in.)

MASTER BRAKE CYLINDER

Inner diameter 19.05 mm (3/4 in.)

Piston running clearance 0.13 mm (0.005 in.)

WHEEL BRAKE CYLINDERS

Inner diameter.

Front (drum) 22.22 mm (7/8 in.)

Front (disc) 50.80 mm (2 0 in.)

Rear (with front drum) 22.22 mm (7/8 in.)

Rear (with front disc) 20.64 mm (13/16 in.)

Piston running clearance 0.18 mm (0.009 in.)

BRAKE DRUM AND BRAKE DISC

Drum inner diameter 228.6 mm (9 00 in.)

Disc outer diameter 232 mm (9 130 in.)

Out-of-round of drum 0.05 mm (0.002 in.) max.

Max. permissible drum dia 229.6 mm (9 039 in.)

Max. permissible disc run-out 0.06 mm (0.0024 in.)

BRAKE LININGS

Drum brakes

Width x thickness x length 40 x 4.5 x 219 mm
(1.575 x 0 177 x 8 642 in.)

Disc brakes:

Front 39.7 x 9.0 x 86 0 mm
(1.563 x 0 354 x 3 386 in.)

Rear As for drum brake models

Total braking area.

Front drum brake 351 sq cm (54.4 sq.in.)

Front disc brake 114.2 sq.cm (17.7 sq.in.)

Rear brake 351 sq.cm (54.4 sq.in.)

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

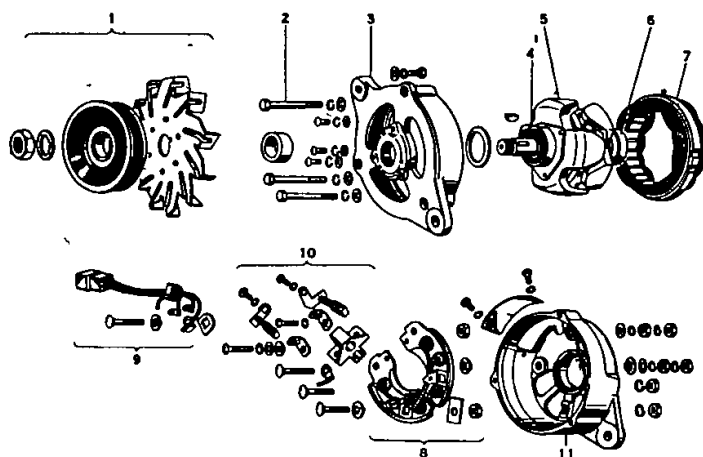


Fig.M.1. Exploded view of the alternator.

- | | |
|--------------------------|-------------------------|
| 1. Drive pulley | 7. Stator |
| 2. Through bolt | 8. Diode assembly |
| 3. Drive end bracket | 9. Lead assembly |
| 4. Drive end bearing | 10. Brush assembly |
| 5. Rotor | 11. Slip ring end cover |
| 6. Slip ring end bearing | |

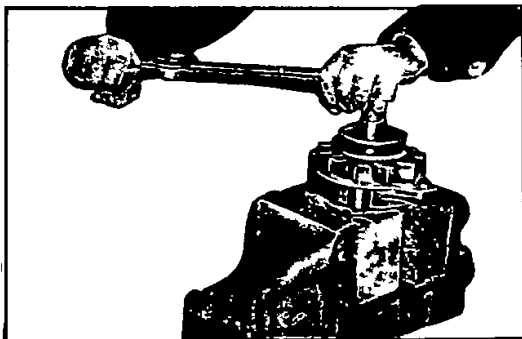


Fig.M.3. Removal of the drive pulley nut.

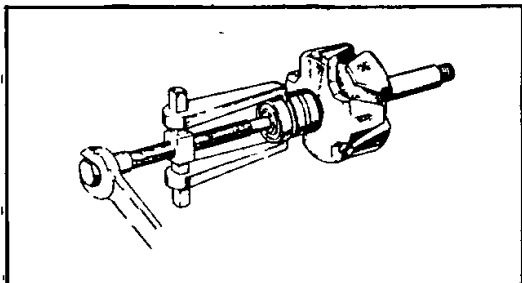


Fig.M.6. Removal of the rotor slip ring end bearing.

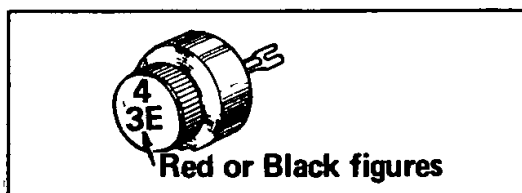


Fig.M.7. The identification of the diodes.

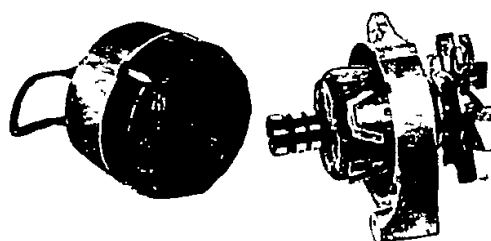


Fig.M.2. The stator housing removed from the rotor and drive end bracket assembly



Fig.M.4. The components of the drive pulley.

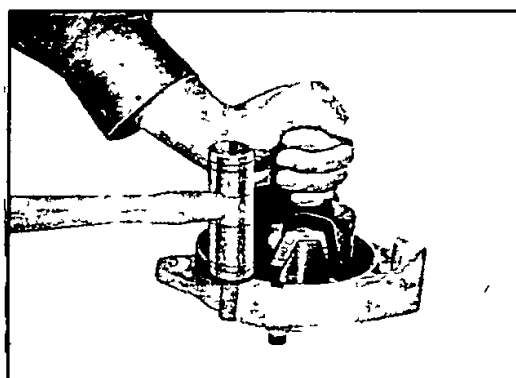


Fig.M.5. Tapping the drive end bracket off the rotor

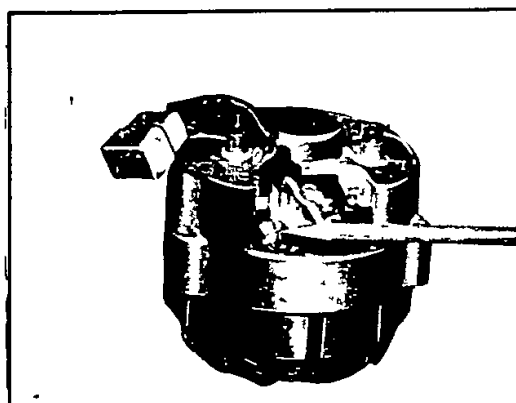


Fig.M.8. Unsoldering the terminal "N"

Electrical Equipment

ALTERNATOR – Precautionary Service Notes

The following precautions should be taken when servicing is carried out on vehicles with alternator charging systems

1. Reversed battery connections will damage the diode rectifiers. Ensure that the battery negative terminal is connected to earth
2. Never earth the main alternator cable when it is disconnected at the alternator. If this cable is earthed with the ignition switched on, the voltage regulator and the associated wiring may be damaged
3. Earthing the main cable or the terminal of the alternator will damage the alternator and/or the alternator circuit, even when the ignition switch is switched off, since no circuit breakers are used
4. Do not run the alternator with the battery disconnected and the field windings energised, otherwise the control unit will be damaged
5. Do not attempt to polarise the alternator, it is not necessary. Any attempt to do so may result in damage to the alternator, regulator, or associated circuits
6. Disconnect the battery cables before using a battery charger, to prevent damage to the rectifier diodes. A boost charger to assist starting the engine cannot be used without first disconnecting the control unit (voltage regulator). The control unit can be isolated by disconnecting the connecting wire to the alternator
7. Never use an ohmmeter of the type incorporating a hand-driven generator for checking the diode rectifiers or transistor
8. Belt tension - to avoid bearing damage when adjusting belt tension, apply leverage only on the alternator drive end bracket, not on any other part of the alternator
9. If arc welding is carried out on the car, disconnect the alternator and control unit to prevent possible damage. It is also important to inform any welding specialist of this fact, as it is possible that he will not know that this car is fitted with an alternator charging system
10. The battery must never be connected or disconnected while the engine is running, or damage may occur to the regulator semi-conductor devices

ALTERNATOR – Removal

Disconnect the battery earth cable and disconnect the wires from the alternator. Remove the bolt securing the fan belt tensioning strut and lift away the fan belt. Remove the alternator retaining bolts and lift the alternator from the mounting bracket

ALTERNATOR – Dismantling (Fig M.1)

Remove the through bolts and remove the diode end housing from the drive end housing by tapping the front bracket lightly

with a hammer. The parts separate as shown in Fig M 2. Hold the drive end rotor carefully in a vice and remove the pulley nut, the pulley, the fan and the spacer from the rotor shaft (Fig M 3 and M 4). Tap out the rotor from the drive end bracket, using a hide mallet (Fig M 5). Remove the bearing retainer and press out the bearing from the bearing housing. The bearing from the rotor is removed by means of a two-arm puller of conventional design (Fig M 6).

Remove the stator from the diode end housing by unsoldering 3 negative diodes (black figures for negative diodes, red figures for positive diodes in Fig M 6) from the coil lead wires, but take care not to overheat the diodes, as this will lead to irreparable damage. Then unscrew and remove the brush cover and unsolder the "N" terminal as shown in Fig M 8. Lift off the stator.

Remove the heat sink and the brush holder from the rear cover as shown in Fig M 9. Dismantle the brush holder and unsolder the lead wires "F" (black/white) and "E" (black) and also the brush holder wires. A dismantled view can be seen in Fig M.10.

If the diodes need replacing, they should be pressed out of the heat sink and replaced using a suitable press tool. Do not drive out the damaged diode, as the other, still serviceable diodes may be damaged through the impact and shock.

ALTERNATOR – Inspection

Rotor

Using an ohmmeter, check the rotor coil for open or short circuits. Connect the instrument to the slip rings of the rotor and check the indication on the ohmmeter. No reading indicates a disconnected field coil. When the reading is approx 4.47 ohms at room temperature, the connection is in order.

Next check the rotor between slip ring and rotor core. If there is a reading on the ohmmeter, the rotor assembly should be replaced, as in this case the field coil or the slip ring must be connected to earth. Fig M 11 shows the testing of the field coil for conductivity (top) and for earth connection (bottom). If there is a short or open circuit, then the rotor should be replaced.

Check the rotor for concentricity (Fig M 12) by clamping the rotor between the centres of a lathe and placing a dial gauge at the outer diameter of the rotor. If the eccentricity exceeds 0.10 mm (0.004 in), replace the rotor.

Stator

Check the stator for conductivity, using a circuit tester, by connecting the lead "N" (yellow) to the neutral wire of the stator. The connections are in order, if there is conductivity. If any of the other leads is connected to the other side of the tester. If this is not the case, replace the stator. There should be an open circuit condition between the stator body and any of the coil leads (Fig M 13 & M.14).

Diode Assembly

Good or defective diodes are classified by the resistance value between the diode holder (heat sink) and the diode leads. To perform this test, remove the diode holder from the stator.

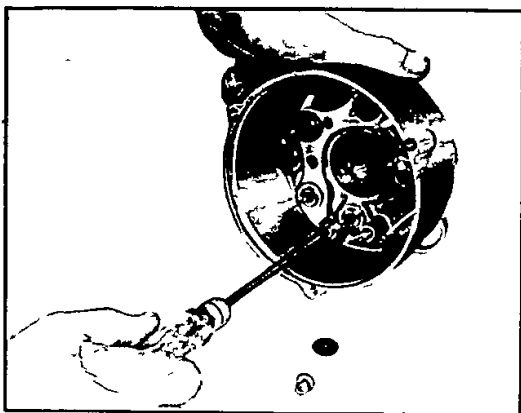


Fig.M 9 Removal of the heat sink and brush holder assembly from the rear cover

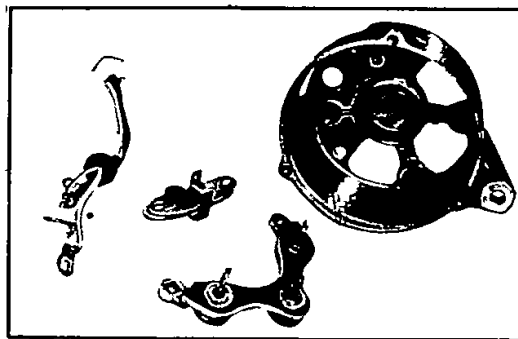


Fig.M 10 View of the removed diode holder assembly

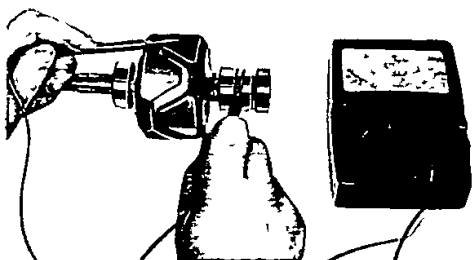
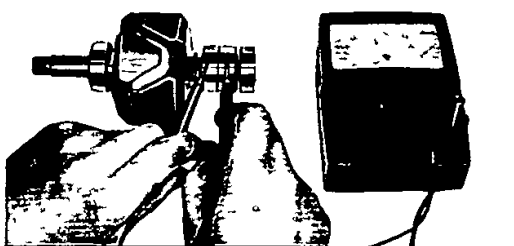


Fig.M.11 Checking the rotor field coil for continuity (top) and earthing (bottom)

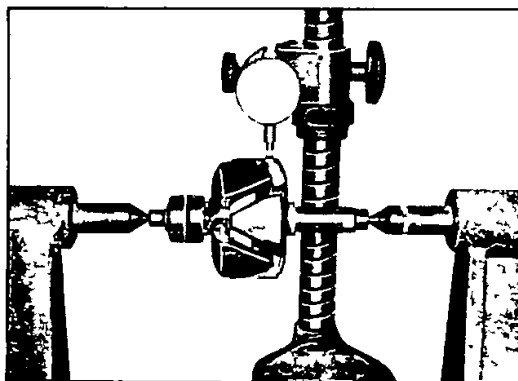


Fig M 12 Checking the rotor for run-out

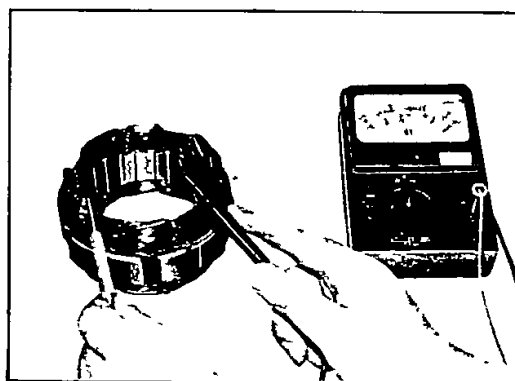


Fig.M.13. Checking the stator windings for continuity

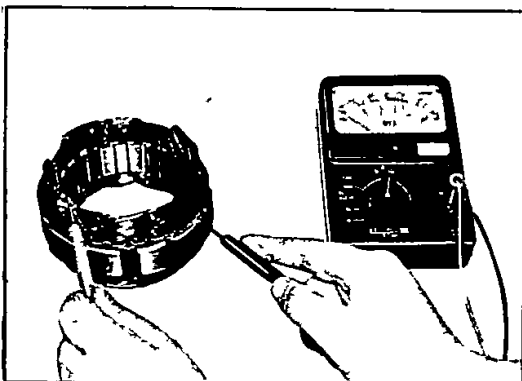


Fig.M.14 Checking the stator windings for earthing.

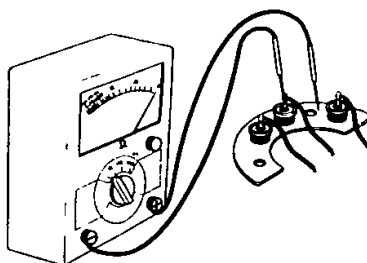


Fig.M.15. Diode test.

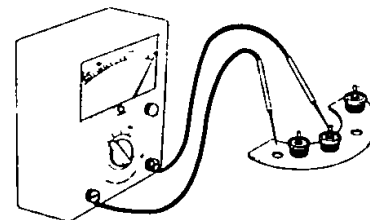


Fig.M 16 Diode test.

1 Diode holder positive side

Connect the positive lead of the circuit tester to the diode holder and the negative lead to the diode pin and check the resistance. A good diode will indicate no resistance.

Next turn the polarity of the tester and check again. If the tester needle moves in either direction, the diode is short circuited. If any of the diodes is defective, it might be advisable to renew the whole assembly. The testing connections are shown in Fig M 15.

2 Diode holder negative side

Check the negative side as described above, but the circuit tester must be reversed. (Fig M 16)

Brushes

Check that the remaining brush length is 7.5 mm (0.295 in) (Fig M 17) and check the brush spring pressure by pressing brush down to within 1 mm (0.04 in) of the holder. The pressure should be 0.35 kg (0.77 lb) in this condition, but a minimum of 0.2 kg (0.44 lb) is permissible.

ALTERNATOR – Assembly and Installation

Install the stator coil "N" terminal to the brush holder and fit the terminal insulator.

Install the bearing into the drive end bracket and fit the bearing retainer with the three screws. Pack the rear bearing with multi-purpose grease (if no sealed bearing is used). Then press the drive end bracket on to the rotor shaft drive end bearing.

The remaining operations are carried out in reverse order to the dismantling procedure. Make sure that the diodes are connected correctly. (Fig M 18 and M 19)

The installation of the alternator is a reversal of the removal procedure. Observe all points given under the heading "ALTERNATOR – Precautionary Servicing Notes".

ALTERNATOR – Inspection of output

Connect the alternator in a test circuit as shown in Fig M 20 and drive by means of a suitable motor. With the alternator at rest there will be a negative current to the field coil (2 amps). When the alternator is turning at about 1000 rpm, there should be no negative current.

With the switch closed and the load resistance at maximum, slowly reduce the load resistance, increasing the alternator speed. Read off the current value in relation to the alternator speed and check in accordance to the specifications. If the deviation is small, the alternator is in good condition.

ALTERNATOR – Finding of faults

Alternator does not charge the battery

- 1 Check driving belt tension
- 2 Field cable broken at control unit
- 3 Negative cable broken at control unit
- 4 Positive and field cables crossed

Alternator output uncontrolled

- 1 Positive cable broken at control unit
- 2 Field and negative cables crossed at control unit
- 3 Field and output connectors touching at alternator

Low, unsteady charge

- 1 Check driving belt tension
- 2 Check for high resistance at battery terminals and in circuit connections, particularly earth connections

VOLTAGE REGULATOR – Removal

Disconnect the 6-way connector and remove the screws, securing the regulator to the bulkhead.

VOLTAGE REGULATOR – Testing

Electrical test

Connect the circuit as shown in Fig M 22, using a fully charged battery and run the alternator at 5000 rpm. The voltage reading should be 14.0 - 15.0 volts. If the voltage is not correct, adjust the regulator.

Mechanical adjustments

The gap values of the constant voltage relay and the pilot lamp relay must be as follows:

Constant voltage relay (Fig M 23)	G1 – 0.9 - 1.0 mm (0.035 - 0.039 in)
	G2 – 0.8 - 1.2 mm (0.032 - 0.047 in)
	G3 – 0.4 - 0.5 mm (0.016 - 0.020 in)
Pilot light relay	G1 – 0.2 mm (0.008 in)
	G2 – 0.8 - 1.2 mm (0.032 - 0.047 in)
	G3 – 0.4 - 0.5 mm (0.016 - 0.020 in)

Back gap (G1)

Clean all contacts with fine emery cloth prior adjustment. Using feeler gauges, check the back gap G1 and adjust if necessary by means of the armature set screw.

Air gap (G2)

Check the air gap between the armature and the top of the coil with a feeler gauge and if necessary adjust by bending the primary contact support (Fig M 25), using the adjusting tool.

Point gap (G3)

Check the gap with feeler gauges and adjust if necessary by bending the secondary contact support with the adjusting tool.

Yoke gap (g1)

Use feeler gauges and measure the gap between the armature and the yoke and if necessary adjust by bending the armature setscrew.

Air gap (g2)

Check the gap with feeler gauges and adjust by loosening the contact set screw and raising or lowering the contact set with a screwdriver. (Fig M 26)

Point gap (g3)

Check the gap by means of a feeler gauge and adjust by loosening the contact point set screw and raising or lowering the contact set with a screwdriver.

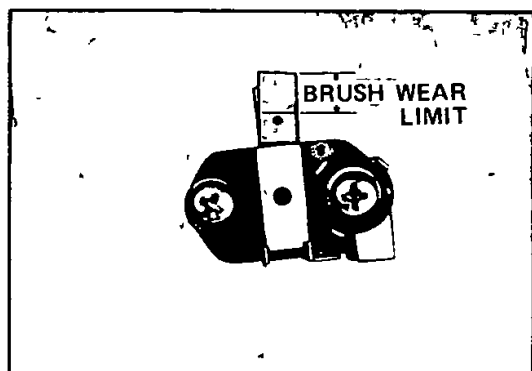


Fig M 17 The minimum brush length

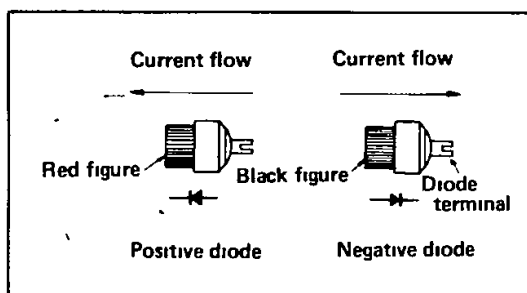


Fig M 19 The current flow in the diodes.

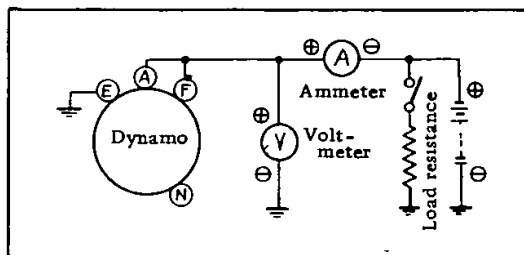


Fig.M 20 Test circuit for checking the alternator performance

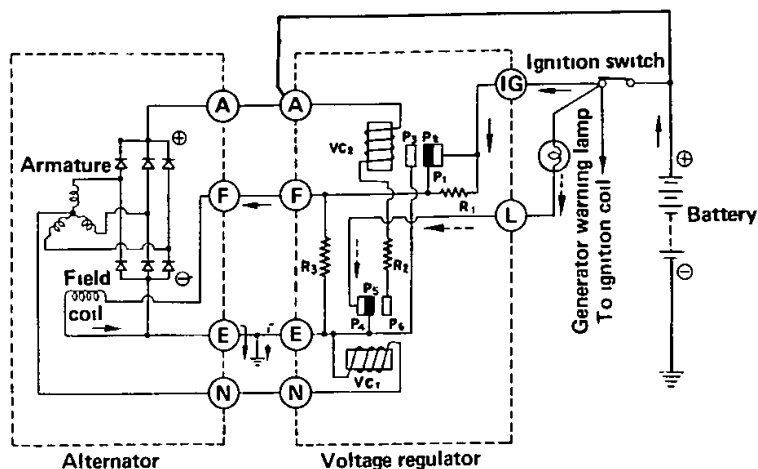


Fig M 18 Checking the brush spring pressure

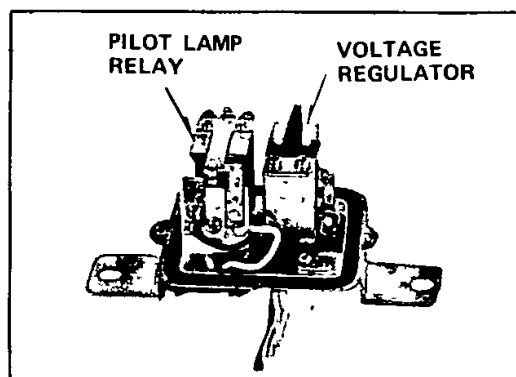


Fig M 21 View of the voltage regulator and pilot lamp relay

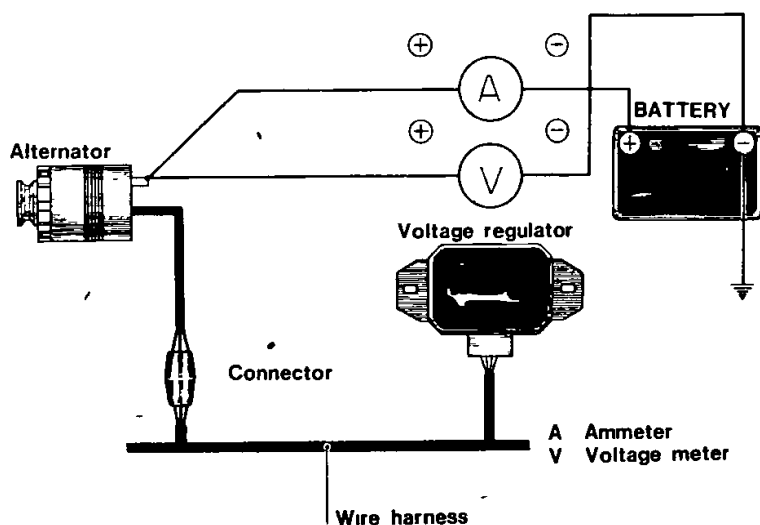


Fig.M.22 Test circuit for the voltage regulator

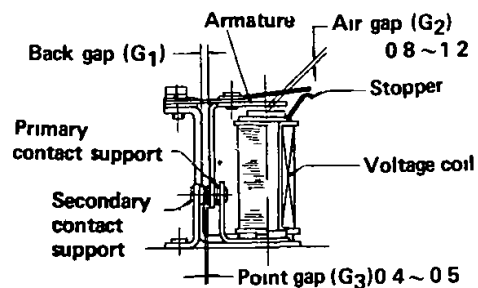


Fig.M.23 The voltage regulator (See text)

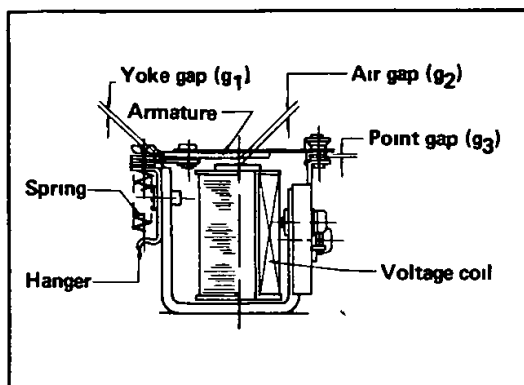


Fig.M 24. The pilot lamp relay (See text)

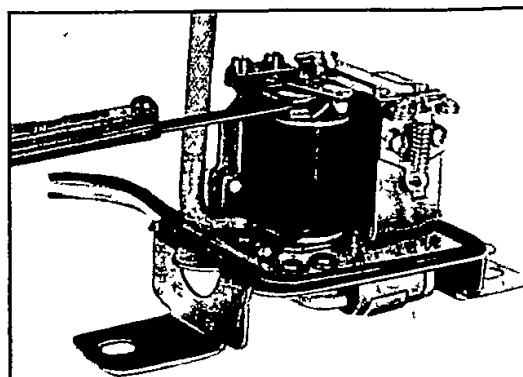


Fig M 25 Adjusting the air gap of the voltage regulator (G2 in text)

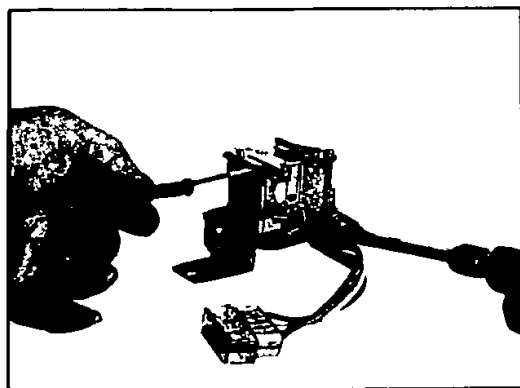


Fig M 26 Adjusting the air gap of the pilot lamp relay (g2 in text)

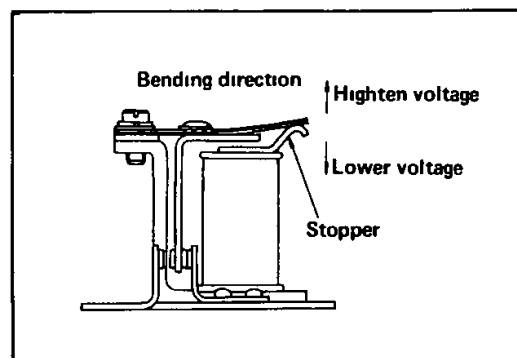


Fig.M.27 Adjusting the voltage setting.

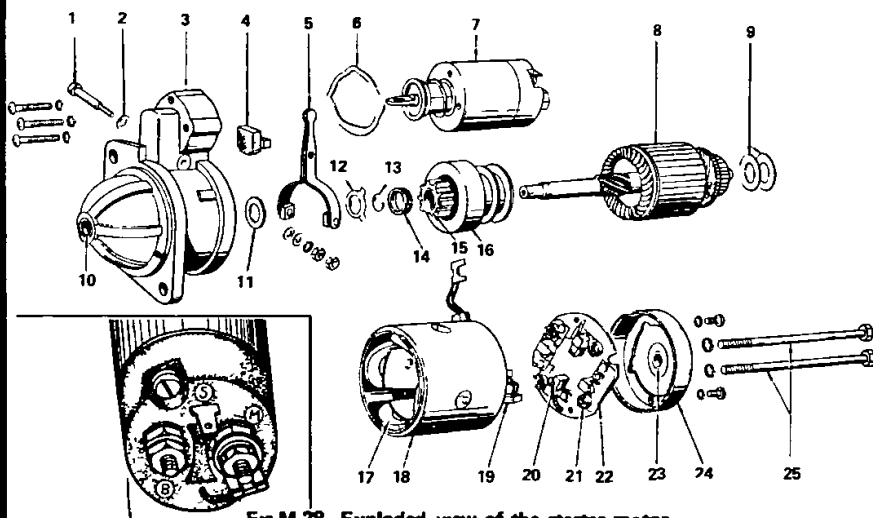


Fig.M 28. Exploded view of the starter motor

- | | | |
|------------------------|---------------------------|-----------------------|
| 1 Engagement lever pin | 10 Drive end bracket bush | 18 Starter motor body |
| 2 Sealing ring | 11 Thrust washer | 19 Positive brush |
| 3 Drive end bracket | 12 Stop washer | 20 Negative brush |
| 4 Dust protection | 13 Circlip | 21 Brush spring |
| 5 Engagement lever | 14 Pinion stop collar | 22 Brush holder |
| 6 Dust seal | 15 Drive pinion | 23 Bearing bush |
| 7 Solenoid switch | 16 Over-running clutch | 24 Rear cover |
| 8 Armature | 17 Field coil | 25 Through bolt |
| 9 Thrust washer | | |

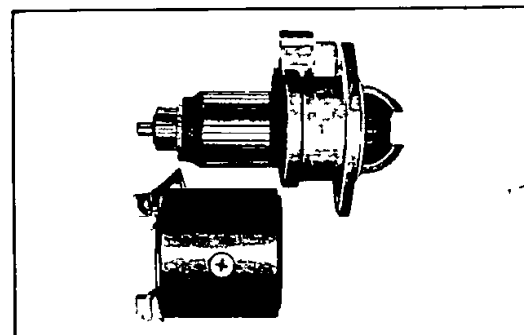


Fig M 29. The starter motor body removed from armature and drive end bracket

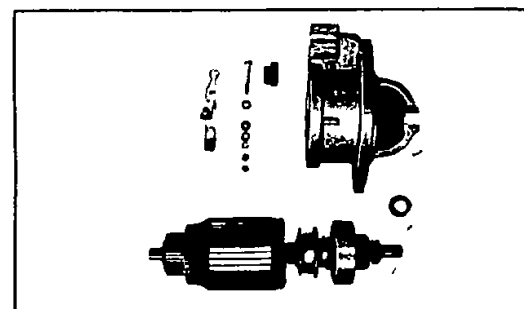


Fig M.30 The armature and engagement mechanism removed from the drive end bracket.

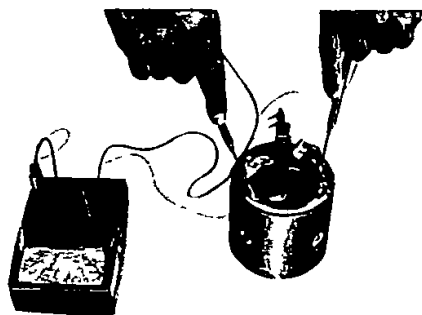


Fig M.31 Testing the field coils for continuity

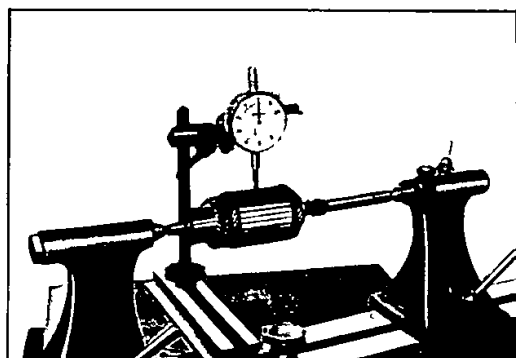


Fig M.33 Checking the armature shaft for run-out.

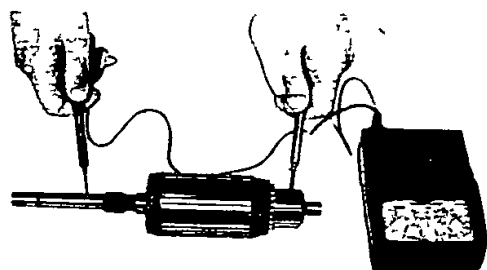


Fig.M.35 Testing the armature windings for earth connection.

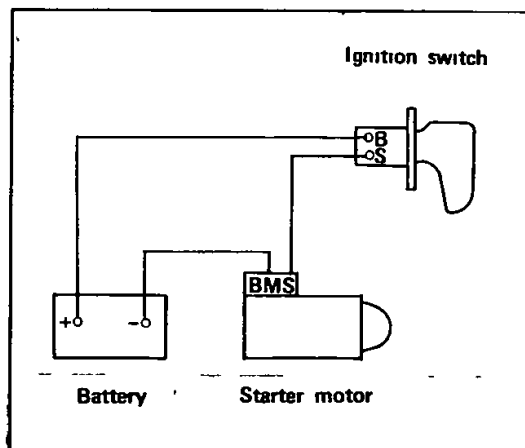


Fig.M.37. Test circuit for solenoid switch

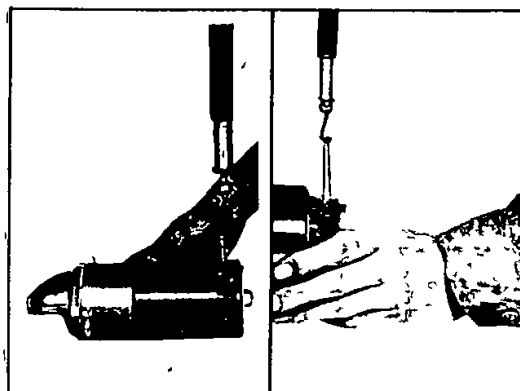


Fig M.32 Checking the brush spring tension

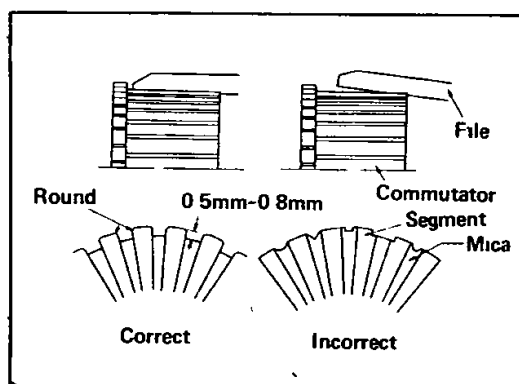


Fig M.34 Undercutting the mica insulators.

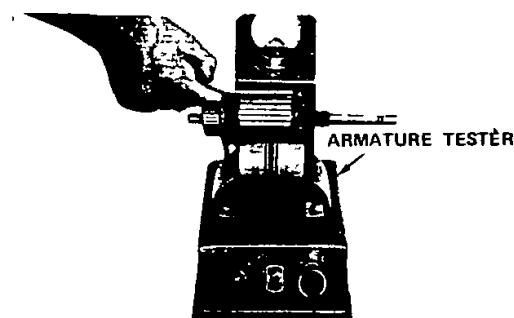


Fig M 36 Checking the armature for short circuits.

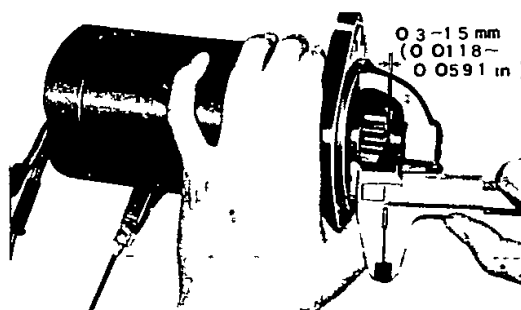


Fig.M.38. Measuring the starter motor pinion travel

Voltage adjustment

To increase the voltage bend the stopper upwards or bend it downwards to decrease the voltage on the voltage relay (Fig.M 27)

VOLTAGE REGULATOR – Installation

The installation is carried out in reverse order to the removal procedure

STARTER MOTOR – Removal

Disconnect the battery earth connection and the cables from the starter motor terminals. Remove the starter motor mounting bolts and lift the motor forward and out of the car

STARTER MOTOR – Dismantling

Disconnect the wire to the "M" terminal on the starter motor solenoid switch, remove the solenoid switch securing screws and lift off the solenoid switch. Remove the two through bolts and take off the brush cover. Gently tap off the starter motor body with a wooden hammer, to separate the parts as shown in Fig M 29. Remove the armature assembly and the engagement lever from the drive end bracket (Fig M 30). From the end of the armature shaft remove the circlip and the clutch stop collar and slide off the starter motor clutch. Unsolder the brushes from their connecting leads and lift out the brushes

STARTER MOTOR – Inspection and Overhaul

Field coils

Check the field coils for open circuit, using a circuit tester. Connect one test prod on to the field coil lead and the other prod to the other field coil lead. If the tester needle does not move, the field coil has an open circuit (Fig M 31)

Check the field coils for earth. Connect one test prod to the field coil lead and the other prod to the starter motor body. If the needle moves, the field coil is connected to earth and should be replaced

Brushes

Check the length of the brushes and replace them if they are less than 6 mm (0.24 in.) Check the contacts and replace them if loose. Check that the brush holders will hold the brushes down to the commutator. Check the spring tension with the aid of a spring balance as shown in Fig M 32. The correct tension is 0.8 kg (1.76 lb.) Replace the springs, if the tension is less than 0.7 kg (1.54 lb.) to lift the spring of the brush.

Armature

Check the armature shaft for distortion as shown in Fig M 33 and replace the complete armature if the run-out is greater than 0.16 mm (0.006 in.)

Check the commutator for roughness, burnt or scored surface. If necessary skim off the surface in a lathe, removing the minimum material necessary to obtain a smooth finish. The out-of-round of the commutator should not exceed 0.2 mm (0.008 in.) Check that the mica inserts are undercut to a depth of 0.5 - 0.8 mm (0.02 - 0.032 in.). A minimum depth of 0.2 mm (0.008 in.) must not be exceeded.

Check the armature coil for earth, using a growler. Connect one

test prod to the commutator and the other one to the armature or shaft. If the lamp lights, the armature coil is connected to earth and the armature should be replaced. The armature can also be tested by using a circuit tester as shown in Fig. M.35. If the circuit tester needle moves, the coil is earthed.

Check the armature windings for internal shorts by placing the armature on the growler and hold a hacksaw blade over the armature while rotating it. If the hacksaw blade vibrates, the windings are shorting and the armature must be replaced (Fig M 36)

Check the armature windings for open circuits by placing the armature on the growler and connecting two commutator segments with the test prods. Repeat this test for all adjacent segments. An inconsistent reading indicates an open circuit

Starter motor clutch

Check the over-running clutch for damage and inspect the free-wheel action in one direction and the slipping action in the opposite direction. Replace if faulty

Brush holders

Check the brush holders for earthing, using a circuit tester. Place one test prod on the rear cover and the other on the positive brush holder. If the tester needle moves, it becomes necessary to replace the insulator or the brush holder

Drive end bearing

Check the clearance between the bearing and the armature shaft at the drive end. If the running clearance exceeds 0.2 mm (0.008 in.) replace the bearing. Press in the new bearing and ream out to the correct size of the armature to give a running clearance of 0.03 - 0.10 mm (0.001 - 0.004 in.) The bearing should be pressed in so that the end of the bearing bush is flush with the end of the drive end housing

Solenoid switch

Check the contacts of the solenoid switch and see that no welding of the contacts has occurred.

STARTER MOTOR – Assembly

The assembly of the starter motor is carried out in reverse order to the removal procedure. Pack the rear cover with grease and lightly oil the rear bearing and the drive pinion

Solenoid switch test

With the starter motor assembled, connect up a test circuit as shown in Fig M.37. With the ignition switched on, check that the dimension between the front edge of the drive pinion and the pinion stopper is 0.3 - 1.5 mm (0.012 - 0.059 in.) Measure this dimension as shown in Fig M 38

WINDSCREEN WIPERS – Removal

Lift the wiper arm, remove the securing nut and remove the arm together with the wiper blade. Remove the link securing nut. Lift the bonnet and remove the screws, holding the wiper assembly to the bulk head. Disconnect the wiper motor wiring and remove the wiper motor and the linkage. (See Fig M.39).

WINDSCREEN WIPER – Dismantling

Remove the linkage and the bracket, the nuts of the hook-ended bolts from the motor case and remove the magnetized case from the gear case. Withdraw the armature.

1 Yoke	16 Brush	31 Tapping screw
2 Damper	17 Rivet	32 Worm wheel
3 Armature stopper	18 Spring retainer	33 Wheel arm
4 Felt washer	19 Grommet	34 Plain washer
5 Bearing	20 Gear case	35 Hexagon nut
6 Hook bolt	21 Tapping screw	36 Lock washer
7 Rivet	22 Brush holder ass'y	37 Plain washer
8 Felt washer	23 Plate spring	38 C type stop ring
9 Plate spring	24 Felt washer	39 Thrust washer
10 Spring retainer	25 Bearing	40 Wave washer
11 Ball	26 Auto stop cover ass'y	41 Bearing
12 Magnet ball	27 Lock plate	42 Hexagon nut
13 Armature ass'y	28 Plain small screw	43 Thrust screw
14 Commutator	29 Gear cover ass'y	44 Thrust washer
15 Brush spring	30 Clip	45 Gear shaft ass'y

Fig.M.39 Exploded view of the windscreen wiper motor.

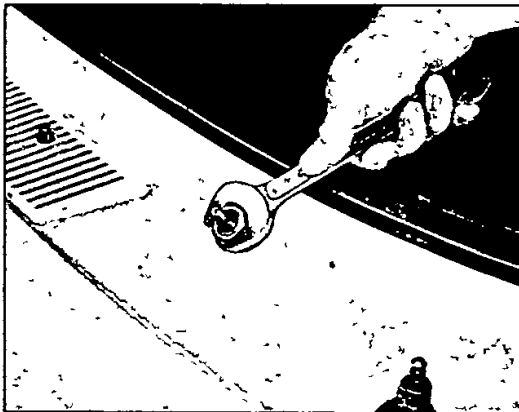
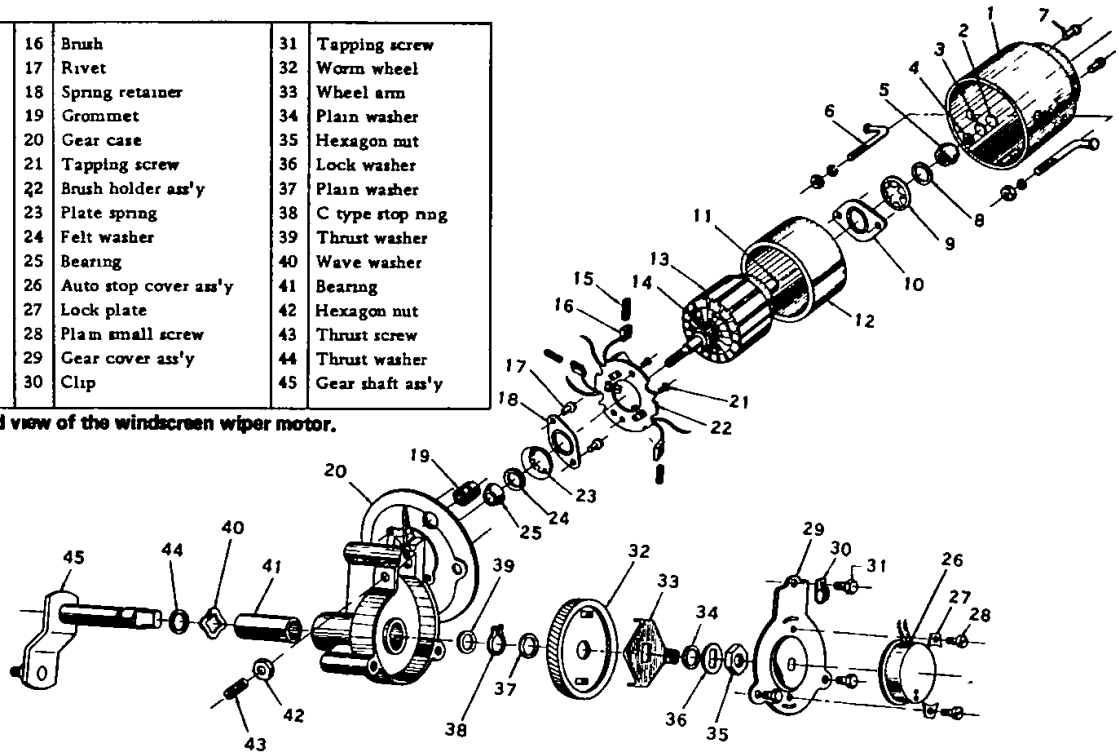


Fig.M 40 Removal of the wiper driving spindle nut.



Fig.M 41 Removal of the wiper assembly

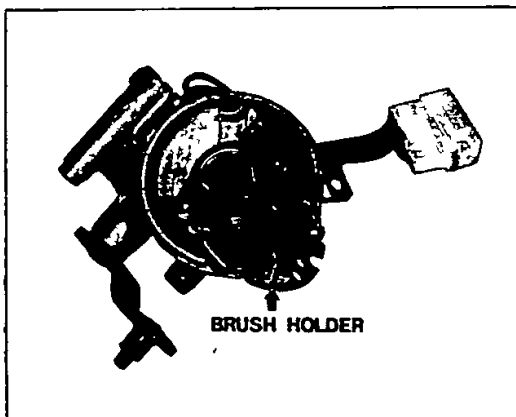


Fig.M 42 Removal of the brush holder.



Fig M 43 Adjustment for the self-parking position of the wiper blades.

Pull the carbon brush from its holder and remove the brush spring. Unsolder the brush and remove it. From the gearbox cover unscrew the cover screws and lift off the cover. The gear can be removed after loosening the securing nut. Remove the circlip from the end of the shaft and remove the shaft

WINDSCREEN WIPER MOTOR – Assembly and Installation

Reverse the dismantling and removal procedures respectively. Apply grease to the gear and coat the housing and the cover surfaces with jointing compound. Also smear jointing compound between housing and end bracket. Adjust the self-parking switch by loosening the stop cover screw and turn the cover as shown in Fig M 43

DIRECTION INDICATOR SWITCH – Removal and Installation

Disconnect the wiring from the connector at the dashboard panel, remove the horn ring and remove the steering wheel. Remove the steering column cover and take off the direction indicator switch

The installation is the reversal of the removal procedure

When fitting the steering wheel make sure that the spokes are in correct relation to the straight-ahead position of the front wheels

Technical Data

ALTERNATOR

Maker	HITACHI
Nominal output	12 volts, 30 amps
Earth connection	Negative
Speed	1,000 - 13,500 rpm
No-load min. speed	1000 rpm
Output current	22 amps at 14 volts and 2500 rpm
Pulley ratio (to engine)	2.25:1

VOLTAGE REGULATOR

Maker	HITACHI
Type	Constant voltage relay
No-load regulating voltage	14 - 15 volts/5000 rpm

STARTER MOTOR

Type	HITACHI S114-103
Voltage	12 volts
Output	1.0 kw
Starting current	Less than 480 amps
Starting voltage	6 volts
Lock torque	1.1 kgm (8.0 lb ft)
No-load current	Less than 60 amps at 12 volts
Free running speed	7000 rpm
Operation medium	Solenoid switch
Number of teeth on pinion	9
Number of teeth on engine flywheel ring gear	120
Weight	5.1 kg (10.4 lb)

Armature shaft dia	11.0 mm (0.433 in) (pinion side) 11.5 mm (0.453 in) (rear end)
Max. permis. shaft run-out	0.08 mm (0.04 in)
Bush running clearance	0.03 - 0.01 mm (0.001 - 0.004 in)
Clearance limit	0.2 mm (0.008 in)
Commutator outer dia	35.0 mm (1.38 in)
Wear limit	2.0 mm (0.079 in) less
Brush length	18.5 mm (0.728 in)
Wear limit	6.0 mm (0.236 in)
Brush spring tension	0.8 kg (1.76 lb)
Drive end bracket bearing bush inner diameter	11.0 mm (0.433 in)
Drive end bracket bush bore inner diameter	11.5 mm (0.453 in)

LAMPS

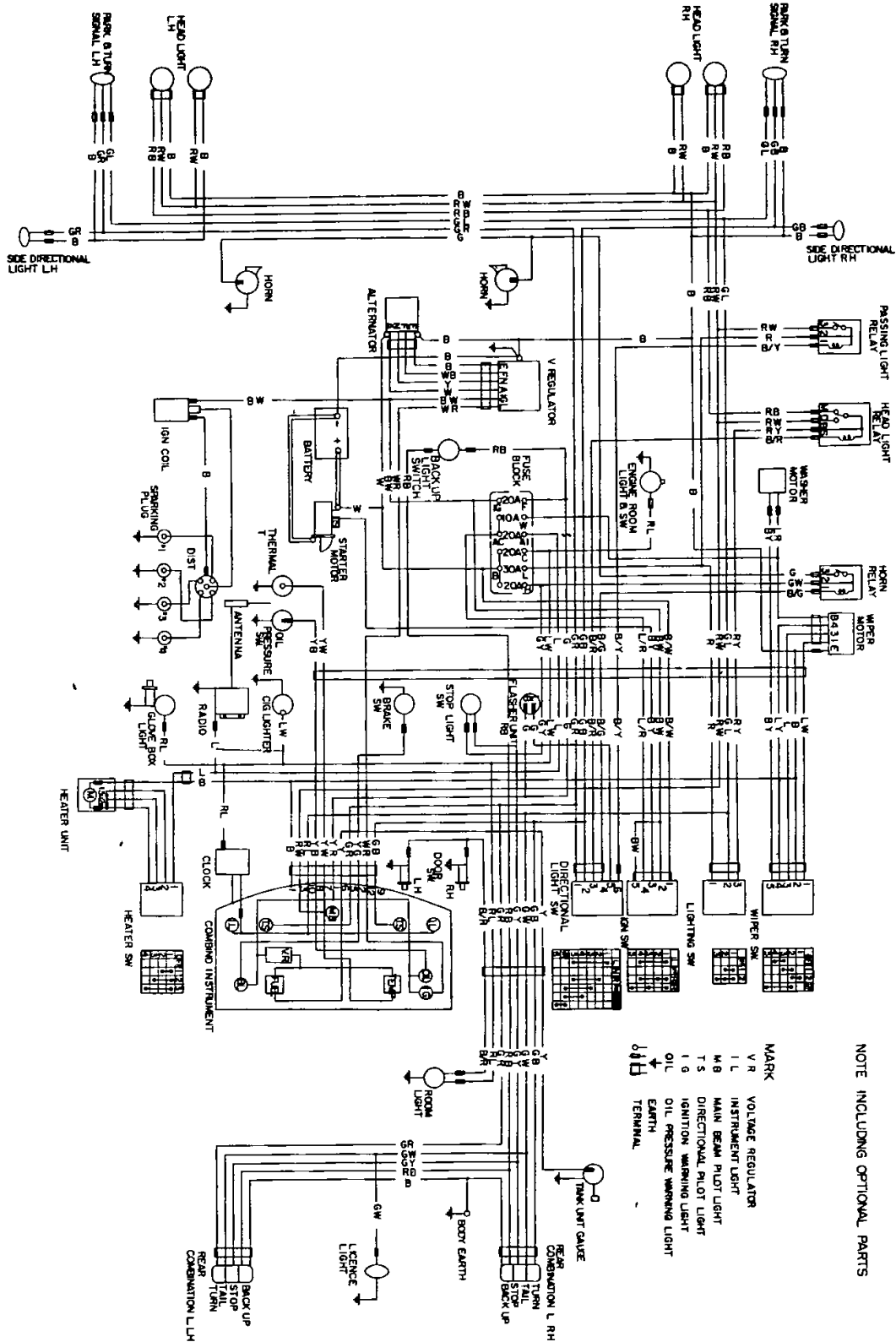
Type 1 sealed beam	37.5 watts
Type 2 sealed beam	37.5/50 watts
Parking lamp	8 watts
Front flasher lamp	25 watts
Side flasher lamp	6 watts
Engine compartment lamp	8 watts
Interior lamp	10 watts
Rear flasher lamp	25 watts
Tail/stop lamp	25/8 watts
Reversing lamp	25 watts
Number plate lamp	8 watts
Indicator lamps	3 watts

Trouble Shooting

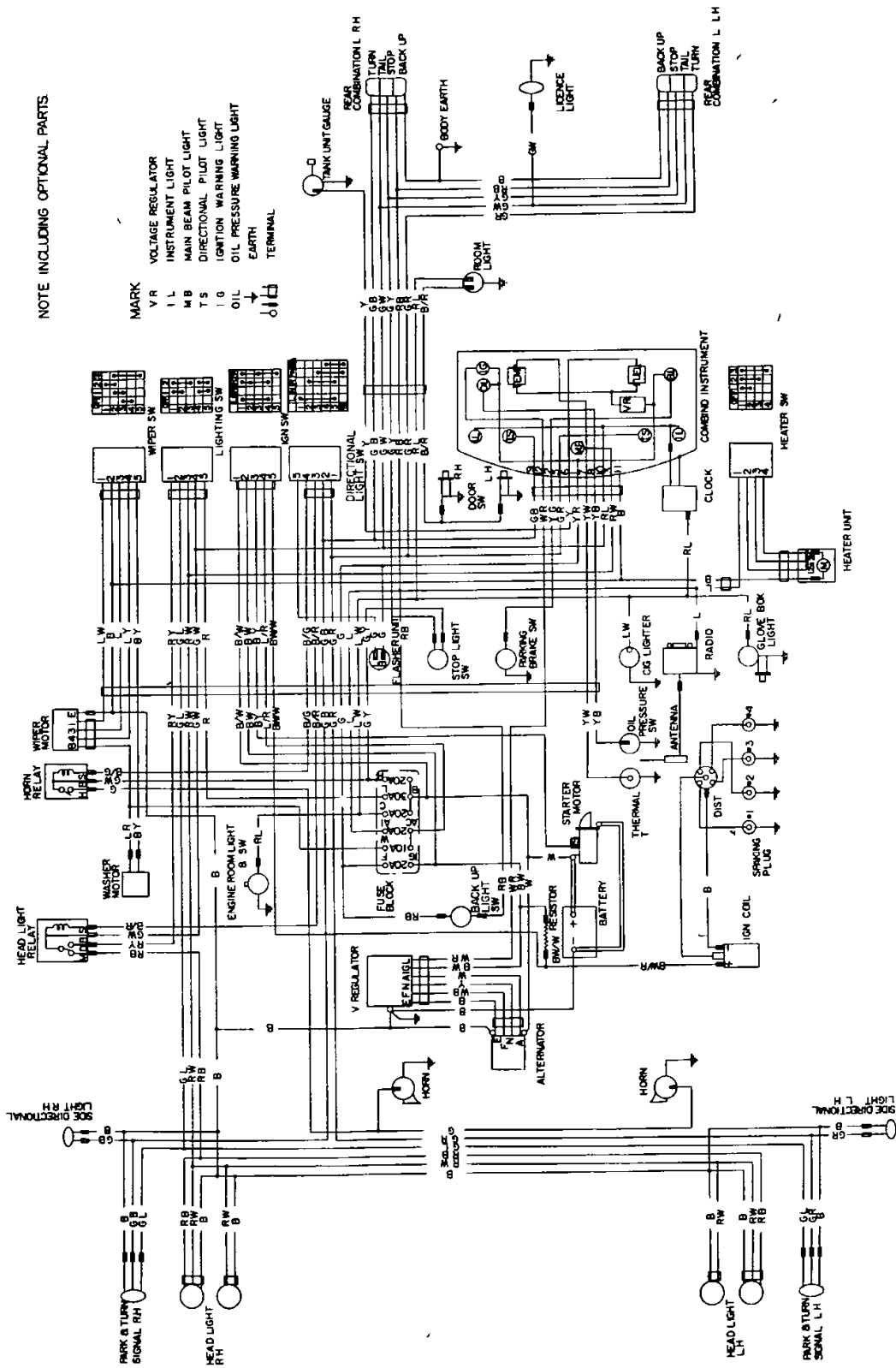
SYMPTOMS	PROBABLE CAUSE	ACTION TO BE TAKEN
Battery in low state of charge, shown by lack of power when starting	Dynamo not charging when running at about 20 mph (30 km) with switched on lights	
	Broken or loose connection in dynamo circuit or regulator not functioning correctly	Examine charging and field circuit wiring Tighten loose connections or replace broken lead Particularly examine battery connections Examine regulator
	Commutator greasy or dirty	Clean with soft rag moistened in petrol
	Giving low or intermittent output, when car is running in top gear	
	Dynamo belt slipping	Adjust belt tension
	Loose or broken connections in dynamo circuit	Examine charging and field circuit wiring Tighten loose connection or replace broken lead Particularly inspect battery connections
	Brushes greasy or dirty	Clean with soft rag moistened in petrol
	Brushes worn or not fitted correctly	Replace worn brushes See that the brushes "bed" properly
	Regulator not functioning correctly	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	Check switch and replace if necessary
	Poor brush contact	Replace brushes or springs
	Burnt commutator	Overhaul starter motor or clean commutator
	Shorted field coil	Replace coil
	Shorted armature	Replace armature
	Poor contact of battery leads	Clean and tighten leads
	Weak battery	Recharge battery
	Open circuit between starter switch and solenoid	Check wiring and replace if necessary
	Poor earth connection	Check and rectify
Starter motor operates but does not seem to turn over engine quickly enough	Drive pinion defective	Replace drive pinion
	Flywheel ring gear worn	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
Ignition warning lamp does not go out or flickers when engine rpm is increased	Loose or broken fan belt Regular defective Positive lead loose or broken Generator defective Commutator graphited	Adjust tension or replace belt Replace regulator Tighten connection re 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 spring 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

WIRING DIAGRAM FOR DE-LUXE SALOON



WIRING DIAGRAM FOR SSS SALOON



ENGLISH

1	Year	1	1969/70	1969/70	1969/70		1
2	Model	2	1300	1600 (LC)	1600 (HC)		2
3	Engine type	3	510	510	510		3
3A	EEC CO %	3A					3A
4	Number of cylinders	4	4	4	4		4
5	Firing order	5	1-3-4-2	1-3-4-2	1-3-4-2		5
6	Capacity cu cm	6	1296	1595	1595		6
7	Bore/Stroke mm	7	83/59.9	83/73.7	83/73.7		7
8	Compression ratio	8	8.5	8.5	8.5		8
9	Compression pressure psi/kg/cm ²	9	170/11.9	171/11.6			9
10	Oil pressure psi/kg/cm ²	10	50 - 57/3.5 - 4.0	54 - 60/3.7 - 4.2	54 - 60/3.7 - 4.2		10
11	Rated output HP/rpm	11	77 SAE/6000	96 SAE/5600	109 SAE/6000		11
11A	Fuel consumption (mpg/Ltr 100 km/DIN)	11A					11A
12	Valve clearance inlet in/mm	12	0.010/0.25	0.010/0.25	0.010/0.25		12
13	Valve clearance outlet in/mm	13	0.011/0.3	0.012/0.3	0.012/0.30		13
14	Inlet valve opens °BTDC	14	12	12	12		14
15	Outlet valve closes °ATDC	15	8	8	8		15
15A	Road horsepower	15A					15A
15B	Km h/rpm/gear	15B					15B
16	Battery V/Ah	16	12 V/40 Ah	12 V/50 Ah	12 V/50 Ah		16
17	System polarity plus/minus	17	-	-	-		17
18	Carburettor make	18	HITACHI	HITACHI	HITACHI		18
19	Carburettor type	19	DCK 308	DAF 328	HJL 38W		19
20	Idling speed rpm	20	600	600	600		20
21	Fuel pump pressure psi/kg/cm ²	21	2.5-3.5/1.7-2.4	-	-		21
22	Distributor make	22	HITACHI	HITACHI	HITACHI		22
23	Distributor type	23	D 411 57 K	D 411 58	D 409 54		23
24	Contact breaker gap in/mm	24	0.017-0.021/0.45-0.55	0.017-0.021/0.45-0.55	0.017-0.021/0.45-0.55		24
25	Dwell angle Degrees	25	49 - 55	49 - 55	49 - 55		25
26	Static timing °BTDC	26	-	-	-		26
27	Stroboscopic timing °BTDC/rpm	27	10/650	10/600	14/650		27
28	Timing mark location	28	CP	CP	CP		28
28A	Ignition coil make & type	28A	HITACHI	HITACHI	HITACHI		28A
28B	Primary resistance Ohms	28B	3.2 - 4.1	1.5	1.5		28B
29	Centrif advance starts °/rpm E	29	0/800	0/800	0/800		29
30	intermediate °/rpm E	30					30
31	intermediate °/rpm E	31					31
32	ends °/rpm E	32					32
33	Vacuum advance starts °/in=mm Hg	33					33
34	ends °/in=mm Hg	34					34
35	Condenser capacity Mfd	35	0.22 0.24	0.22 0.24	0.22 0.24		35
36	Spark plug make	36	NGK	NGK	NGK		36
37	Spark plug type	37	BP - 6E	BP - 6E	BP - 6E		37
38	Spark plug gap in/mm	38	0.031/0.8	0.031/0.8	0.031/0.8		38
38A	Starter motor make & type	38A	HITACHI	HITACHI	HITACHI		38A
38B	Lockdraw Amps/Volts	38B	-	-	-		38B
39	Generator make	39	HITACHI (ALT)	HITACHI (ALT)	HITACHI (ALT)		39
40	Generator type	40	LT 130 41K	LT 133 01 K	LT 140 46K		40
41	Generator output A/V/rpmG	41	30/12	30/12	30/12		41
42	Regulator make	42	HITACHI	HITACHI	HITACHI		42
43	Regulator type	43	TL1 Z 17	TL1 Z 17	TL1 Z 17		43
44	Cut in closing voltage V	44					44
45	Drop-off voltage V	45					45
46	Reverse current A	46					46
47	Open circuit V	47					47
48	Closed circuit A	48					48
49	Current regulator A	49					49
50	Voltage regulator V/A/min	50					50
51	NOTES	51					51
52	from chassis number	52					52
53	from engine number	53					53

TIGHTENING TORQUES

ENGINE

Connecting rod nuts	2.7 - 3.3 kgm (19.5-23.9 lb.ft.)
Flywheel bolts	9.5 - 10.5 kgm (68.7 - 75.9 lb.ft.)
Main bearing bolts	4.5 - 5.5 kgm (32.5 - 39.8 lb.ft.)
Camshaft sprocket bolt	5.0 - 6.0 kgm (36.2 - 43.4 lb.ft.)
Oil sump	0.4 - 0.7 kgm (2.9 - 5.1 lb.ft.)
Oil pump	1.5 - 2.1 kgm (10.8 - 15.2 lb.ft.)
Oil strainer	0.8 - 1.2 kgm (5.8 - 8.7 lb.ft.)
Crankshaft pulley bolt	16.0 - 18.0 kgm (115.7-130.0 lb.ft.)
Cylinder head bolts	5.5 kgm (39.8 lb.ft.)
Oil relief valve nut	3.0 - 3.5 kgm (21.7-25.3 lb.ft.)
Clutch bolts	2.4 - 2.6 kgm (17.4 - 18.8 lb.ft.)

GEARBOX

Rear extension to case	2.2 - 3.0 kgm (16.0 - 21.7 lb.ft.)
Gearbox to engine	4.5 - 5.3 kgm (32.6 - 38.3 lb.ft.)
Bottom cover	1.1 - 1.7 kgm (8.0 - 12.3 lb.ft.)
Front cover	1.1 - 1.7 kgm (8.0 - 12.3 lb.ft.)
Drain plug	3.5 - 5.0 kgm (25.3 - 36.2 lb.ft.)
Selector lever bolt	1.8 - 2.1 kgm (13.0 - 15.2 lb.ft.)
Reverse lamp switch	2.0 - 4.0 kgm (14.5 - 28.9 lb.ft.)
Idler shaft screw	0.7 - 1.1 kgm (5.1 - 8.0 lb.ft.)
Cross shaft lock pin	0.7 - 1.1 kgm (5.1 - 8.0 lb.ft.)
Mainshaft nut	9.0 - 11.0 kgm (65.1 - 79.5 lb.ft.)

FINAL DRIVE

Propeller shaft flange	4.0 - 8.5 kgm (28.9 - 61.5 lb.ft.)
Drive pinion nut	
Saloon	17.0 - 20.0 kgm (122.9 - 144.6 lb.ft.)
Estate	14.0 - 17.0 kgm (101.2 - 122.9 lb.ft.)
Crown wheel bolts	
Saloon	7.0 - 8.0 kgm (50.6 - 57.8 lb.ft.)
Estate	4.8 - 5.5 kgm (34.7 - 39.8 lb.ft.)
Saloon models only	
Side cover bolts	0.9 - 1.2 kgm (6.5 - 8.7 lb.ft.)
Drive flange bolts	1.9 - 2.6 kgm (13.7 - 18.8 lb.ft.)
Bearing retainer bolts	0.9 - 1.2 kgm (6.5 - 8.7 lb.ft.)
Rear cover bolts	1.9 - 2.6 kgm (13.7 - 18.8 lb.ft.)
Final drive to final drive mounting member	6.0 - 8.0 kgm (43.4 - 57.8 lb.ft.)
Final drive to suspension member	6.0 kgm (43.4 lb.ft.)
Final drive to drive shafts	7.0 - 8.0 kgm (50.6 - 57.8 lb.ft.)
Final drive flange to propeller shaft	4.0 - 8.5 kgm (28.9 - 61.5 lb.ft.)
Estate car models only	
Differential carrier to axle housing	2.0 - 2.2 kgm (14.5 - 15.9 lb.ft.)
Drive flange to propeller shaft	1.8 - 2.2 kgm (13.0 - 15.9 lb.ft.)

REAR AXLE AND REAR SUSPENSION

Rear wheel bearing nut	25 - 33 kgm (181 - 239 lb.ft.)
Brake backplate	2.7 - 3.7 kgm (19.5 - 26.8 lb.ft.)
Upper shock absorber mounting	2.3 kgm (16.6 lb.ft.)

Lower shock absorber mounting	2.3 kgm (16.6 lb.ft.)
Drive shaft to differential nuts	7.0 - 8.0 kgm (50.6 - 57.8 lb.ft.)
Drive shaft to rear axle flange nuts	7.0 - 8.0 kgm (50.6 - 57.8 lb.ft.)
Bumper nut	2.0 - 2.5 kgm (14.5 - 18.8 lb.ft.)
Wheel nuts	8.0 - 9.0 kgm (57.8 - 65.1 lb.ft.)
Rear suspension member mounting nuts	10 kgm (72.3 lb.ft.)
Differential member mounting nuts	8.5 kgm (61.5 lb.ft.)
Suspension arm nuts	8 - 10 kgm (57.8 - 72.3 lb.ft.)
Differential to differential member	6.0 kgm (43.4 lb.ft.)
Propeller shaft flange	4.0 - 8.5 kgm (29 - 61.6 lb.ft.)

FRONT SUSPENSION

Front hub nut	3.0 - 3.5 kgm (21.7 - 25.3 lb.ft.)
Brake calliper bolts	7.3 - 9.9 kgm (52.8 - 71.6 lb.ft.)
Brake disc bolts	3.9 - 5.3 kgm (28.2 - 38.3 lb.ft.)
Stabiliser bolts (suspension arm side)	1.2 - 1.7 kgm (8.7 - 12.3 lb.ft.)
Stabiliser bolts (frame side)	1.9 - 2.5 kgm (13.7 - 18.1 lb.ft.)
Reaction rod to frame	7.2-9.6 kgm (52.1-69.2 lb.ft.)
Reaction rod to suspension arm	4.9 - 6.3 kgm (35.4 - 45.6 lb.ft.)
Suspension unit upper nuts	3.9 - 5.2 kgm (28.2 - 37.6 lb.ft.)
Steering lever to suspension unit	6.0 - 8.0 kgm (43.4 - 57.8 lb.ft.)
Suspension arm to suspension cross member	12.2 - 13.5 kgm (88.2 - 97.6 lb.ft.)
Lower ball joint	1.9 - 2.5 kgm (13.7 - 18.1 lb.ft.)
Lower ball joint nut	5.5-7.6 kgm (39.8-55.0 lb.ft.)
Piston rod nut	6.0 - 7.5 kgm (43.4 - 47.0 lb.ft.)
Gland packing	6.0 - 6.5 kgm (43.4 - 47.0 lb.ft.)
Wheel nuts	8.0 - 9.0 kgm (57.8 - 65.1 lb.ft.)

STEERING

Flange mounting bolts	1.8 - 2.5 kgm (13.0-18.1 lb.ft.)
Ball stud nut	5.5 - 7.6 kgm (39.8-55.0 lb.ft.)
Drop arm nut	12.5 - 14.0 kgm (90.0-101.0 lb.ft.)
Idler arm nut	5.5 - 7.6 kgm (39.8-55.0 lb.ft.)
Adjusting screw nut	1.8 - 2.5 kgm (13.0-18.1 lb.ft.)
Steering gear mounting bolts	10.0 kgm (72.3 lb.ft.)
Idler arm bolts	4.4 - 6.1 kgm (31.8-44.1 lb.ft.)

BRAKES

Brake pedal pivot	3.5 - 4.0 kgm (25.3-28.9 lb.ft.)
Brake pipes	1.5 - 1.7 kgm (10.8-12.3 lb.ft.)
Brake disc bolts	3.9 - 5.3 kgm (28.2-38.3 lb.ft.)
Bridge pipe	1.7 - 2.0 kgm (12.3-14.5 lb.ft.)
Brake hose to cylinder	1.7 - 2.0 kgm (12.3-14.5 lb.ft.)
Calliper bolts	7.3 - 9.0 kgm (52.8-65.1 lb.ft.)

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

MERCEDES

VOLKSWAGEN 1200 to 1964

Cortina 1968

Hillman Imp Singer Chamois Sunbeam Siletto 1963-1969

TOYOTA CORONA Mk I & Mk II 1962-1969

Intercooler Workshop Manual 125

INTEREUROPE WORKSHOP MANUALS
Titles to be published SHORTLY

138	VW TRANSPORTER
139	VW 1600 FASTBACK
140	FIAT 125
142	B M C 1100 - 1300
143	RENAULT R10
145	TRIUMPH 2000 & 2.5
146	TOYOTA COROLLA
147	OPEL REKORD (CHEVY)
148	MINI
149	FIAT 124

ALFA ROMEO 1959-1969
Giulietta - all models
Gulka 1300 - all models
Gulka 1600 - all models
Gulka 1750 - all models

OPEL KADETT
Type A 1962-65
Type B 1965-67
Type B 4-door Rallye SR 1967-68

Renault 11 and Renault 13 to 1967

138	VW TRANSPORTER
139	VW 1600 FASTBACK
140	FIAT 125
142	B M C 1100 - 1300
143	RENAULT R10
145	TRIUMPH 2000 & 2,5
146	TOYOTA COROLLA
147	OPEL REKORD (CHEVY)
148	MINI
149	FIAT 124

- 138 VW TRANSPORTER
139 VW 1600 FASTBACK
140 FIAT 125
142 B M C 1100 - 1300
143 RENAULT R10
145 TRIUMPH 2000 & 2,5
146 TOYOTA COROLLA
147 OPEL REKORD (CHEVY)
148 MINI
149 FIAT 124

COVERS



1300cc and 1600cc Standard, De Luxe, SSS - Saloon and
Estate up to 1970

CONTAINS

Detailed description of Service, Repair and Overhaul Operations,
clearly explained and shown in hundreds of Illustrations

plus

- * Trouble Shooting Tables
 - * Tune-up Data Tables
 - * Wiring Diagrams
 - * Exploded Parts Diagrams
with Detailed Parts Identification
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DATSUN 1300 & 1600 up to 1970