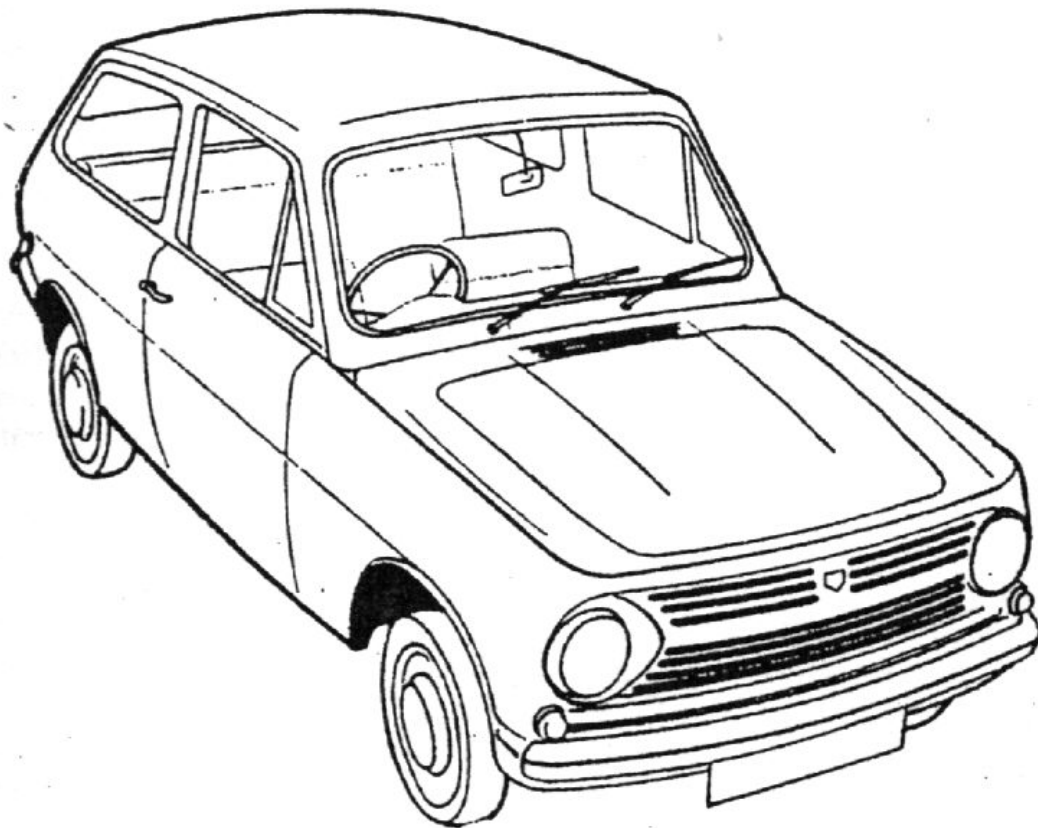


RELIANT REBEL

700 & 750



Saloon, Estate and Van Workshop Manual

Introduction

This Workshop Manual contains all the relevant information to assist Reliant Dealers to service and maintain the Rebel Saloon, Estate and Van Models.

Dismantling, assembly and adjustment procedure for all major units and associated parts are dealt with in detail.

A comprehensive stock of spare parts are available from Reliant Dealers. a spare parts list is available for use when ordering. Only genuine Reliant "R" parts should be used.

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Original "R" Part No. 90264

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General Specification

700cc Engine

Number of Cylinders		4 in-line
Bore of cylinders		60.45 mm (2.38 in)
Stroke of crankshaft		60.96 mm (2.40in)
Cubic capacity		700 cc (42.72 cu in)
Compression ratio		8.4 to 1
Valve clearance -		
Inlet	0.25 mm (0.010 in) Hot	0.152 mm (0.006 in) Cold
Exhaust	0.25 mm (0.010 in) Hot	0.152 mm (0.006 in) Cold

Performance Data

Brake Horse Power (maximum)	31 at 5,000 rpm
Torque (maximum)	5.251 kg/m (38 lb/ft) at 3,000 rpm

750cc Engine

Number of Cylinders		4 in-line
Bore of cylinders		62.50 mm (2.46 in)
Stroke of crankshaft		60.96 mm (2.40in)
Cubic capacity		748 cc (45.64 cu in)
Compression ratio	Saloon, Estate Van	8.5 to 1 7.5:1
Valve clearance -		
Inlet	0.25 mm (0.010 in) Hot	0.152 mm (0.006 in) Cold
Exhaust	0.25 mm (0.010 in) Hot	0.152 mm (0.006 in) Cold

Performance Data

Brake Horse Power (maximum)	8.5:1 ratio 34.95 at 5,500 rpm	7.5:1 ratio 32.25@ 5,500 rpm
Torque (maximum)	5.25 kg/m (38 lb/ft) at 3,000 rpm	4.98 kg/m (36 lb/ft) at 3,000 rpm

Lubrication System (700cc & 750cc)

Pump	Submerged eccentric rotor type
Filter	External full-flow type
Oil Pressure	3.16 kg/sq cm (45 lb/sq in)

Ignition System

12 Volt battery and coil	Negative Earth
Contact breaker gap	0.38 mm (0.015 in)
Sparking Plugs - Type	Motocraft AG42
Gap	0.64 mm (0.025 in)
Firing Order	1, 3, 4, 2
Ignition Timing	10° BTDC

Cooling System

Pressurised radiator, pump assisted circulation and four-bladed fan driven by a "V" belt from engine pulley	
Radiator cap pressure	0.28 kg/sq cm (4 lbs/sq in)

Fuel System

Carburettor	Zenith downdraught
Fuel Pump	AC Delco mechanical
Air Cleaner	Paper element type

Clutch

Type	Single dry plate 158.75 mm (6.25 in) diameter
Operation	Rod operation up to chassis 941001 – Hydraulic from chassis 941001

Gearbox 700cc

Four forward speeds and reverse. Synchromesh on second, third & top	
Ratios:	Top 1.0000:1
	Third 1.454:1
	Second 2.461:1
	First 4.267:1
	Reverse 5.493:1

Gearbox 750cc

Four forward speeds and reverse, synchromesh on all forward gears	
Ratio	Top 1.000:1
	Third 1.320:1
	Second 2.040:1
	First 3.880:1
	Reverse 3.250:1

Rear axle

Type	Spiral bevel gear semi floating
Ratio: saloon/estate/van	4.375:1

Brakes

System	Girling hydraulically operated internal expanding to all wheels
Size - Front	203.2 x 31.75 mm (8 in x 1.25 in)
Rear	177.8 x 31.75 mm (7 in x 1.25 in)
Handbrake	Lever type operating rear brakes mechanically by cable linkage

Suspension

Front	Independent wishbones, coil springs and damper units
Rear	Longitudinal semi-elliptic leaf spring, telescopic damper units.

Steering

Type	Worm and recirculating ball
Turning Circle	10.37 m (34 ft)
Castor	4°
Camber	0°
Toe-in	Zero
Idler shaft inclination	9°

Chassis Data

Wheelbase	2260.6 mm (89 in)
Track, front	1219.2 mm (48 in)
Rear	177.8 mm (46.625 in)
Ground clearance (fully laden)	140.0 mm (5.5 in)

Wheels and tyres

Road wheels	350J x 12 5.50 x 12 in tubeless cross ply
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Capacities

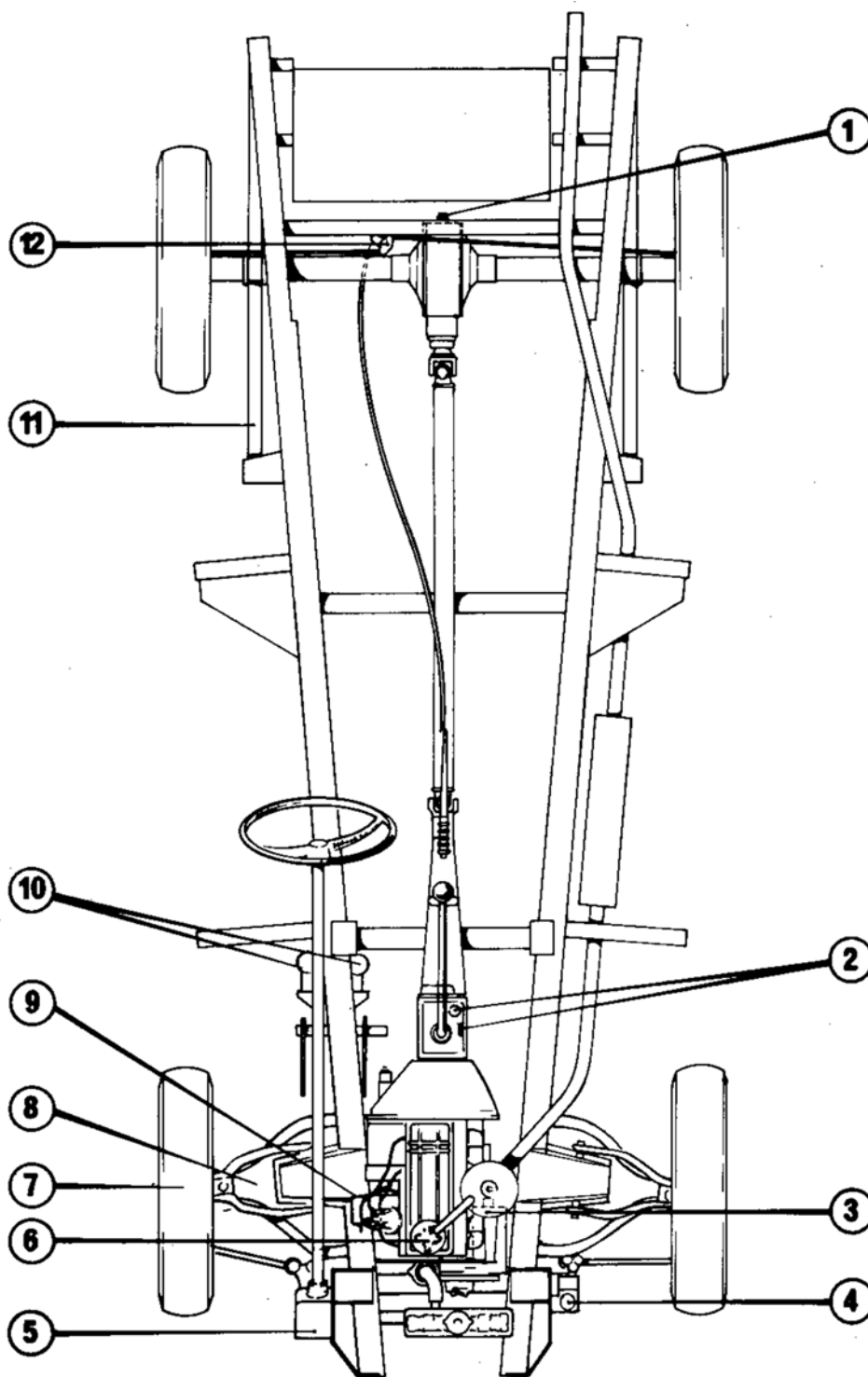
Engine including filter	3.13 litres (5.50 pints)
Gearbox (700cc)	0.85 litres (1.50 pints)
(750cc)	0.99 litres (1.75 pints)
Rear axle	1.13 litres (2.00 pints)
Steering box	0.19 litres (0.33 pints)
Cooling system including heater (700cc & early 750cc)	3.98 litres (7 pints)
(later 750cc)	3.41 litres (6 pints)
Fuel tank	27.3 litres (6 gallons)

Vehicle Dimensions

	Saloon	Estate & Van
Overall length	3479.8 mm (137 in)	3657.6 mm (144 in)
Overall width	1473.2 mm (58 in)	1473.2 mm (58 in)
Overall height	1435.1 mm (56.5 in)	1409.7 mm (55.5 in)

Kerb weight

Saloon	558.8 kg (1232 lbs)
Estate	603.3 kg (1330 lbs)
Van	572.9 kg (1263 lbs)



- | | | | |
|---|-----|---------------------------|-------------|
| 1. Rear axle filler plug | Oil | 7. Front Hubs | Grease |
| 2. Gearbox filler/level plug
or dipstick/filler plug | Oil | 8. Front suspension plugs | Grease |
| 3. Generator rear bearing | Oil | 9. Oil Filter | Replace |
| 4. Steering idler box | Oil | 10. Master Cylinder(s) | Brake fluid |
| 5. Steering Box | Oil | 11. Rear leaf springs | Spray oil |
| 6. Oil Filler - Engine | Oil | 12. Handbrake compensator | Grease |

Weekly Check

Check oil level and top-up if necessary.
Check water level of radiator.
Check tyre pressures.
Check battery electrolyte level.

At First 500 Miles (800 km) (Free Service)

Lubrication

Change engine oil and fit new filter.
Change gearbox and rear axle oils.
Oil or grease all lubrication points.
Check steering box level and top up if necessary.

Adjustments

Tighten cylinder head, rocker shaft, sump and manifold fixings to correct torque.
Check and adjust valve clearances.
Check and adjust fan belt.
Examine and adjust distributor points.
Check and adjust brakes.
Check and adjust clutch.
Check hydraulic system, bleed and top-up the master cylinder(s) as necessary.
Adjust tyre pressures and check security of wheel nuts.
Check all body, steering, spring and suspension fixings and steering connections.
Check front wheel bearings.
Balance the road wheels.
Check and adjust door operation.
Road or roller test and adjust carburettor or timing if required.

General

Top-up the battery, radiator and washer bottle.
Check operation of seat adjustment, all controls, lights, horn, instruments and windscreen wipers etc.
Check battery connections.
Check for water or oil leaks.

Every 1000 miles (1,600 km)

Lubrication

Top-up engine, gearbox, rear axle and steering box oil levels.
Top up master cylinder(s) fluid levels if necessary.
Oil or grease all lubrication points.

Adjustments

Check and adjust brakes.
Check and adjust clutch.
Check tyre pressures and security of wheel nuts.

General

Check level of electrolyte in battery.

Every 5,000 miles (8,000 km)

Lubrication

Change engine oil and fit new filter.
Change gearbox oil.
Oil or grease all lubrication points.
Check steering box oil and top-up if necessary.
Clean oil filler cap.

Adjustments

Tighten cylinder head, rocker shaft, sump and manifold fixings to correct torque.
Check and adjust valve clearances.
Check and adjust fan belt.
Examine and adjust distributor points.
Check air cleaner. (replace every 10,000 miles).
Check and adjust brakes.
Check and adjust clutch.
Check hydraulic system, bleed and top-up the master cylinder(s) as necessary.
Reposition road wheels and check tyre pressures.
Check front wheel bearings.
Balance the road wheels.
Check and adjust door operation.
Road or roller test and adjust carburettor or timing if required.

General

Top-up the battery, radiator and washer bottle.
Check operation of seat adjustment, all controls, lights, horn, instruments and windscreen wipers etc.
Check battery connections.
Check for water or oil leaks.

Every 15,000 miles (24,000 km)

The 15,000 mile service is the same as the 5,000 mile service with the addition of the following recommendations:

Change rear axle oil.
Re-pack front wheel bearings with grease.
Lubricate front suspension vertical link lower pivot.

Approved Lubricants (Winter & Summer)

	Mobil	Castrol	Esso	BP	Shell	Petrofina	Duckhams	Texaco
Engine	Mobiloil super or Mobiloil special 20w/50	Castrolite Castrol GTX	Esso Extra Motor Oil 10w/30 or Uniflo	BP Super Viscostatic 10w/40 or Energol SAE 20w	Shell Super Motor Oil	Fina Multigrade motor oil 10w/30 or 20w/50	Q20-50 Motor Oil	Havoline motor oil 10w/30 or 20w/50
Gearbox	Mobilube GX 80	Castrol Hypoy Light	Esso Gear Oil GX 80	Gear Oil SAE 80EP	Spirax 80 EP	Pontonic MP SAE 80	Hypoid 80	Multigear EP 80
Rear Axle	Mobilube GX 90	Castrol Hypoy	Esso Gear Oil GX 80/140	Gear Oil SAE 90 EP	Spirax 90 EP	Pontonic MP SAE 90	Hypoid 90	Multigear EP 90
Steering Box	Mobilube GX 80	Castrol Hypoy Light	Esso Gear Oil GX 80	Gear Oil SAE 80 EP	Spirax 80 EP	Pontonic MP SAE 80	Hypoid 80	Multigear EP 80
Front Hub	Mobilgrease MP	LM Grease	MP Grease H	Energrease L2	Retinax A	Marson HTL2	LB 10	Marfak
Chassis	Mobilgrease super	MS3 Grease	MP Grease (moly)	Energrease L21M	Retinax AM	Marson LM2	LBM 10	Molytex 2
Brakes	Castrol Girling Crimson Brake & Clutch Fluid							

Section A

Chassis Frame

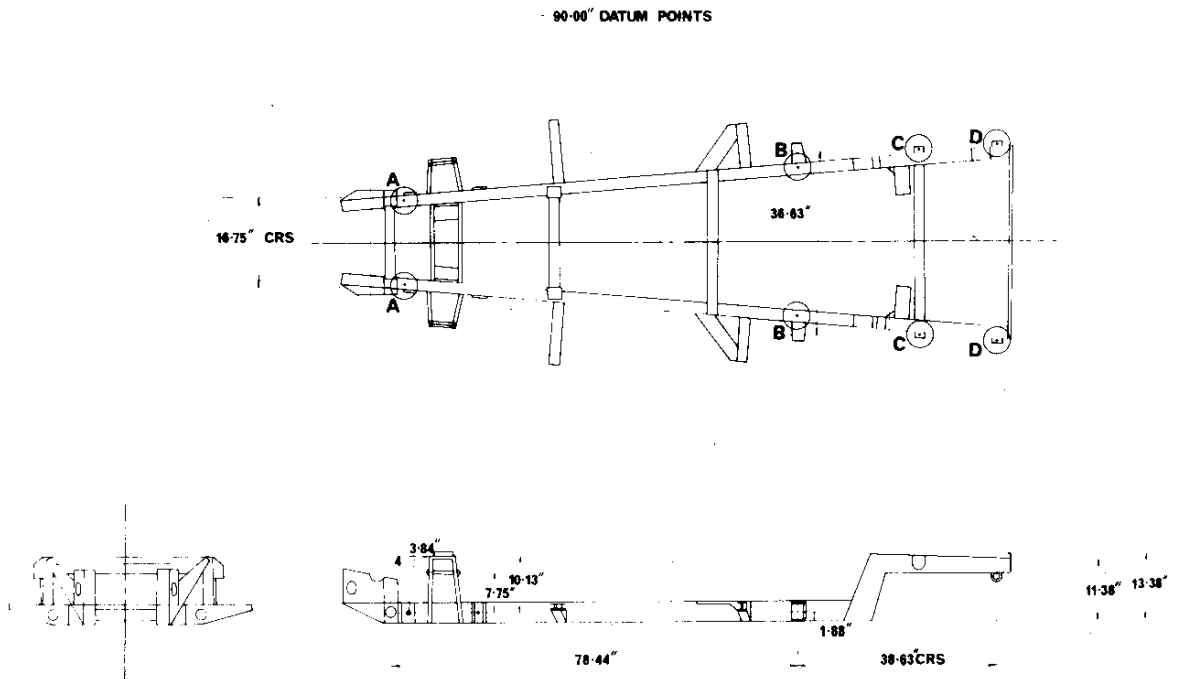


Figure 1 Frame checking dimensions – Saloon

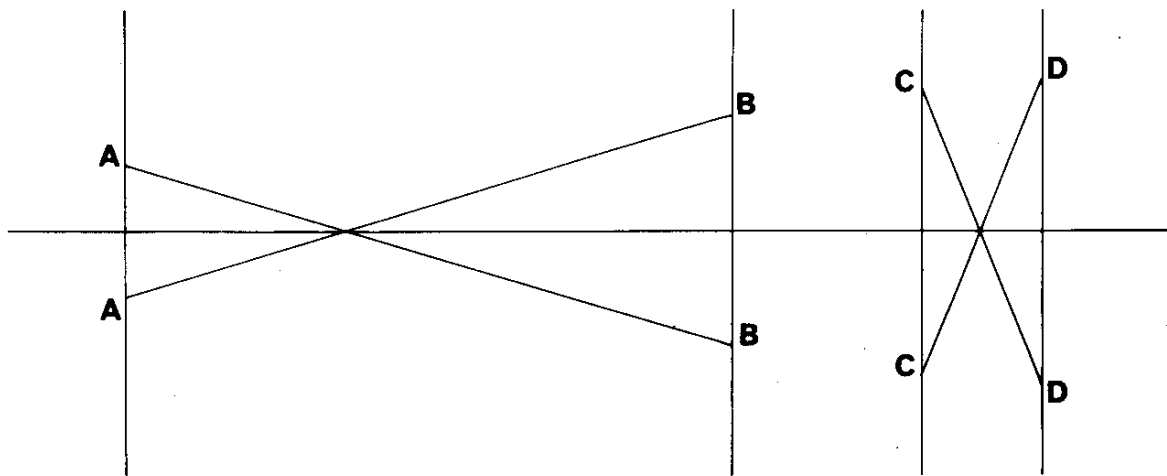


Figure 2 Frame checking diagram

Checking for squareness

1 Reference to **Figure 1** and **Figure 2** shows the critical points by which the Saloon, Estate and Van chassis should be checked for squareness. Transfer these points to the floor and letter them as shown in **Figure 3** and **Figure 4**.

2 Connect the letters in pairs by drawing a line between them, using a straight edge. AA, BB, CC and DD, as shown.

3 Measure from each point in turn to the centre and join up all centres thus producing a centre datum line XX. The diagram on the floor should then be similar to **Figure 3** and **Figure 4**.

4 A further check on squareness must be made by joining up all the diagonals, the length of which must be equal, and bisect each other on the datum line.

Chassis distortion is always assessed by the amount and direction of any transverse or diagonal lines from the datum line.

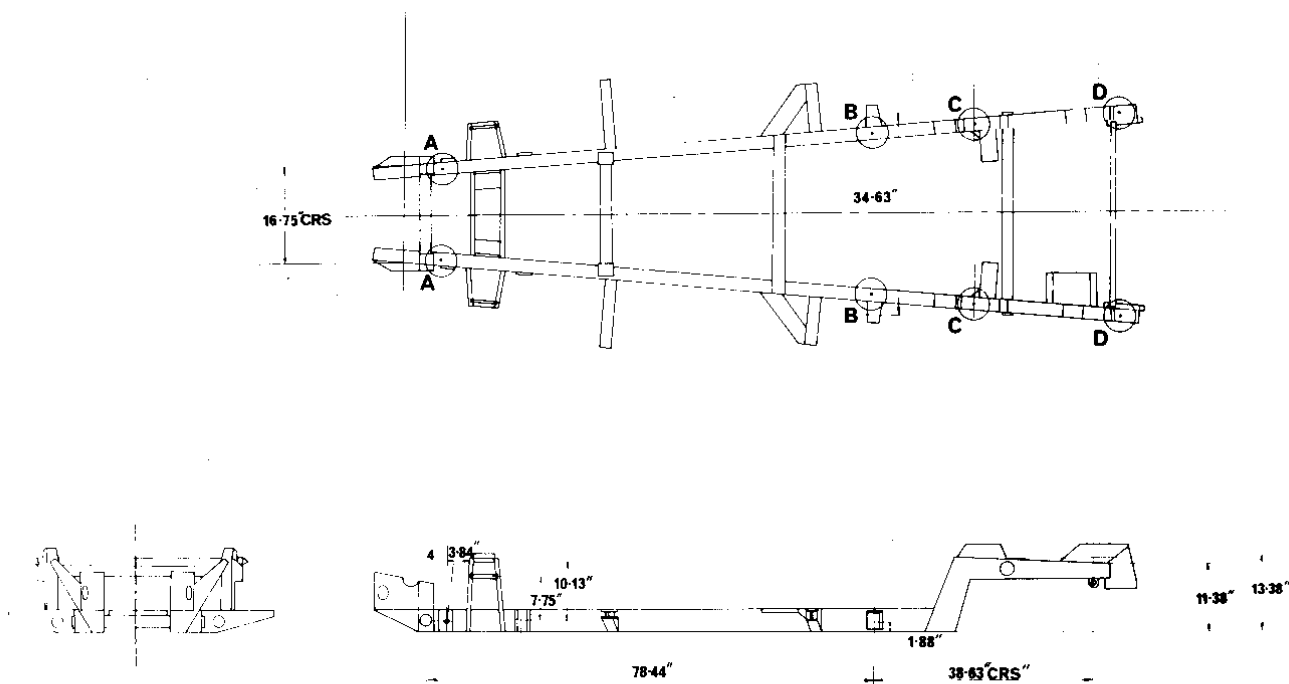


Figure 3 Frame checking dimensions – Estate and Van

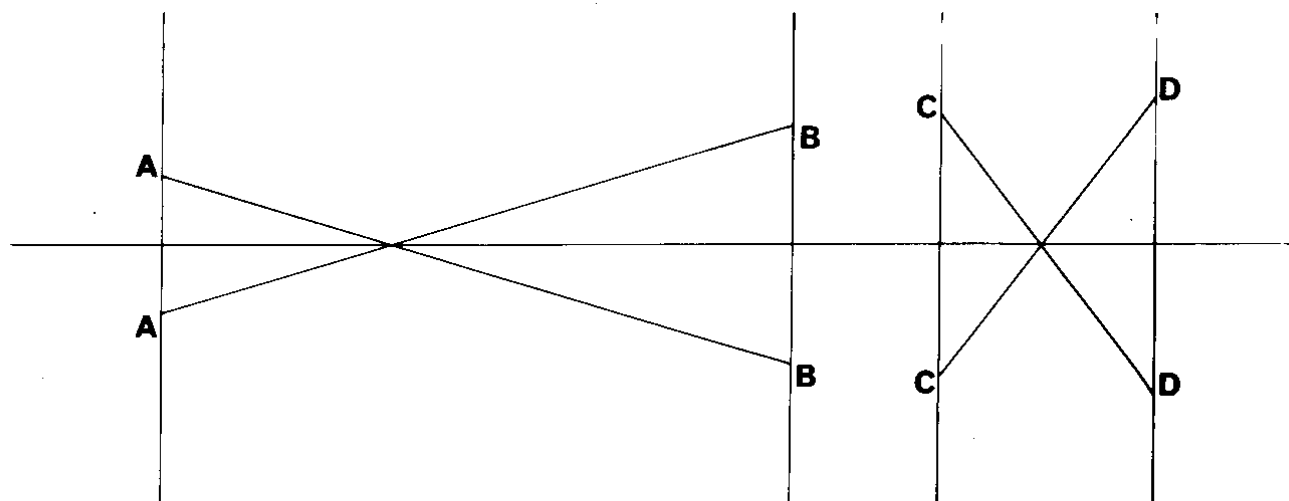


Figure 4 Frame checking diagram

Severe damage to the chassis frame is readily apparent. In some cases, however, lesser damage may cause distortion of the frame, which may not be easily detected by visual inspection.

Even when the vehicle has suffered only superficial damage it is possible that the frame members may have been displaced, causing misalignment of the road wheels.

It is recommended that the alignment of the front and rear suspension attachment points is checked including wheelbase dimensions, castor and camber angles. See 'General specification'.

All components including front suspension and rear road springs must be removed to provide access to the checking points. The checking must be carried out on a surface table or level floor.

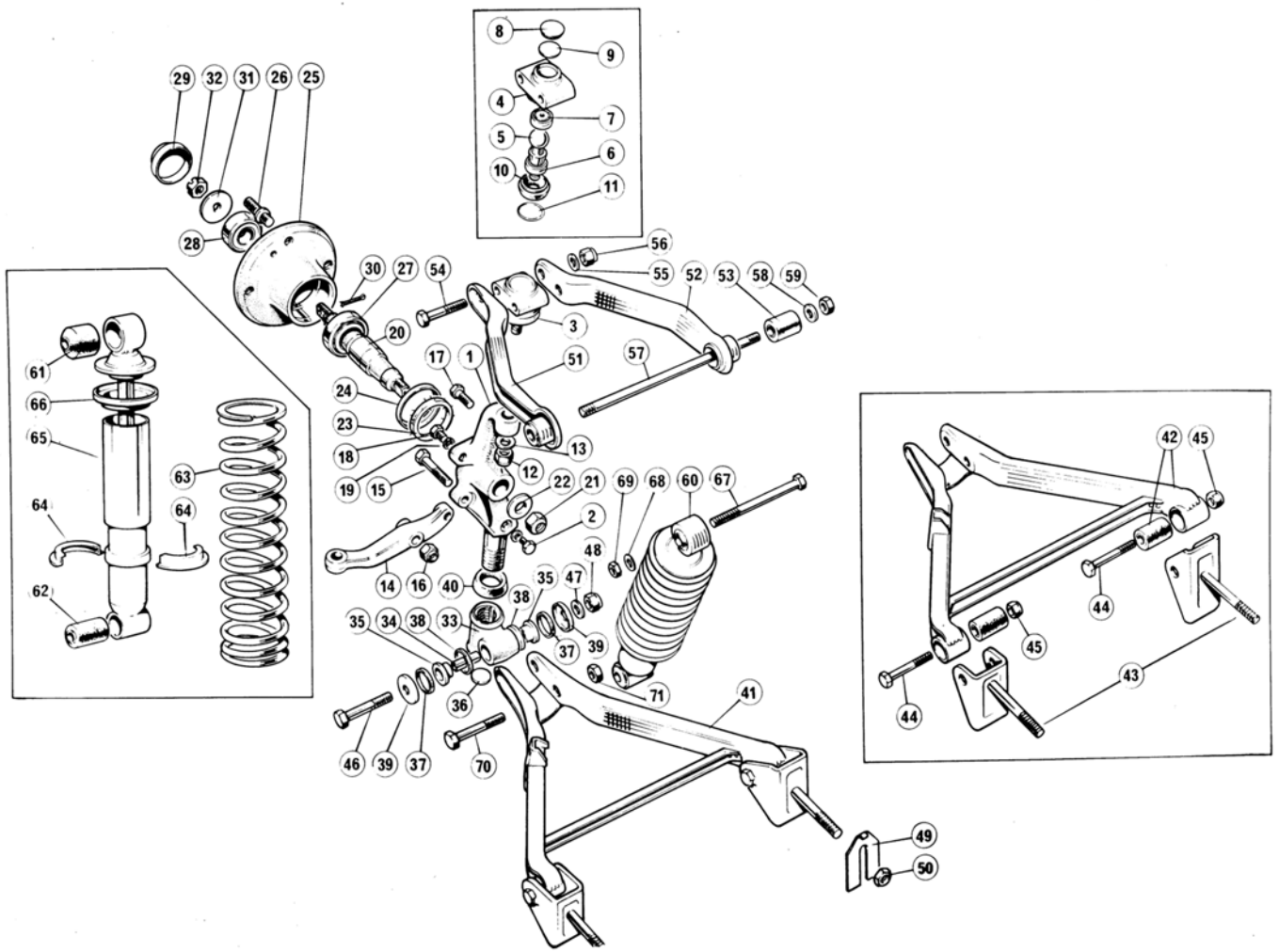


Figure 1 Front suspension exploded view

1	Vertical link – RH	25	Front hub	48	Nut
2	Plug	26	Stud	49	Shim
3	Upper ball joint assembly	27	Inner bearing	50	Nut
4	Upper ball housing	28	Outer bearing	51	Upper wishbone assembly front
5	Ball Pin	29	Hub cap	52	Upper wishbone assembly rear
6	Lower socket	30	Split pin	53	Bush
7	Upper socket	31	“D” washer	54	Bolt
8	Top cover	32	Nut	55	Washer
9	Spring penny	33	Lower trunnion RH	56	Nut
10	Gaiter	34	Distance piece	57	Pivot pin
11	Gaiter clip	35	Bearing	58	Washer
12	Nut	36	Cover	59	Nut
13	Washer	37	Seal	60	Damper unit assembly
14	Tie rod RH	38	Inner water shield	61	Rubber bush top
15	Bolt 2.125” long	39	Outer water shield	62	Rubber bush bottom
16	Nut	40	Seal	63	Spring
17	Set screw 1” long	41	Lower wishbone & bracket assembly RH	64	Spring retaining collet
18	Set screw	42	Lower wishbone & bush RH	65	Dirt shield
19	Lock washer	43	Bracket	66	Spring clip
20	Stub axle shaft	44	Fulcrum bolt	67	Bolt
21	Nut	45	Nut	68	Washer
22	Washer	46	Bolt	69	Nut
23	Oil seal	47	washer	70	Bolt

Description

The independent front suspension comprises upper and lower wishbone assemblies and vertical links assisted by coil spring and damper units.

The upper wishbones are bolted to a ball joint on the vertical link and secured and pivoted to the vehicle chassis suspension tower.

The lower wishbone assembly, secured to a trunion attached to the vertical link, supports the coil spring and damper unit. Two brackets bolted to the chassis support the wishbones, which are also pivoted.

Routine maintenance

Every 15,000 miles (24,000 km) the front wheel bearings should be packed with grease. The vertical link lower pivots should also be greased by removing the plugs and screwing in a 45° angled grease nipple.

Front Hubs

To remove and dismantle (see Figure 1)

1. Jack up the vehicle and place on suitable stands. Remove road wheel.
2. Unscrew the two countersunk screws (one on later vehicles) and remove the brake drum from the hub assembly.
3. Screw a No 10 set screw into the grease cap and force the cap from the hub.
4. Extract the split pin, unscrew the castellated nut and withdraw the hub assembly from the stub axle, complete with the "D" washer.
5. Remove the inner and outer bearings from the hub.
6. Using a soft drift, drive the outer tracks of the bearings and the grease seal retainer from the hub.

Reassembly

1. Locate the inner and outer tracks in the hub using a suitable drift.
2. Fit the bearings to the hub. Do not fit the sealing felt and retainer at this stage.
3. Position the hub assembly on the stub axle and secure with the "D" washer and the castellated nut. Tighten until resistance is felt when turning the hub.
4. Slacken the nut back until a bearing end float of between 0.051-0.152 mm (0.002-0.006 in) is obtained. A dial gauge is preferable for this measurement but if not available, slacken off the retaining nut half a flat, equivalent of 30°. See Figure 2. If the split pin hole in the stub axle shaft does not line up with the castellated nut, slacken the nut a little further until it does.
5. Mark the position by centre punching the nut and stub axle, see Figure 3.
6. Remove the hub assembly and pack the bearing assembly with the recommended grease.

Note: it is essential when re-packing the bearing that the space between the bearings and the bearing tracks must be completely filled. A smear of grease over the bearings is not sufficient.

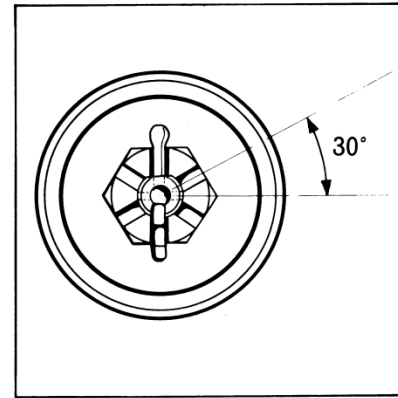


Figure 2 Hub retaining nut.

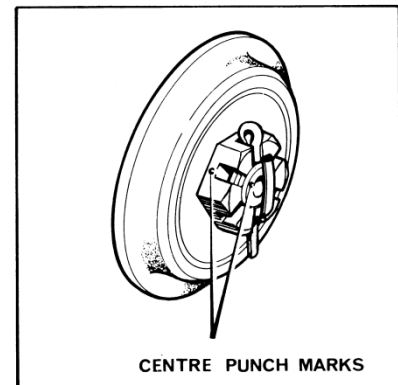


Figure 3 Centre punch marks on nut and stub axle.

7. Attach a new sealing felt to the seal retainer with jointing compound. When the compound has set, soak the seal in engine oil and squeeze out the surplus oil.
8. Fit the seal retainer to the hub positioning the felt face towards the centre of the vehicle.
9. Refit the hub assembly, "D" washer and nut to the stub axle, tightening the nut until the centre punch marks align. Secure the nut with a new split pin and fit a new hub cap.
10. Shake the hub assembly to ensure that end float is still present.

Front suspension removal

1. Jack up vehicle, place on suitable stands and remove road wheel.
2. Disconnect the brake flexible pipe from the suspension tower and plug the pipes to prevent ingress of dirt and fluid loss.
3. Unscrew the two bolts and nuts from the top and bottom fixing points and remove the damper unit through the wishbones.
4. Disconnect the outer track rod from the tie rod lever.
5. Unscrew the two nuts from the inner chassis frame and withdraw the lower wishbone from the chassis. Note the position and sizes of the shims.
6. Support the lower wishbone assembly and unscrew the two nuts from the upper wishbone pivot pin. Carefully tap out the pivot pin. The front suspension assembly can now be withdrawn for further dismantling if necessary.
7. Replace in the reverse order and bleed the brakes. Check the steering geometry (see Section D)

Section C

Rear suspension

Description

Rear suspension is provided by damper assisted four leaf springs. The rear of the springs are suspended and pivoted on shackles attached to the chassis frame. Two "U" bolts secure each spring to the rear axle and also locate the damper unit lower mounting bracket.

Routine maintenance

The rubber bushes in the damper units, leaf springs and shackles should be kept free from oil or grease and replaced when signs of wear or degrading become apparent.

To prevent squeaking, occasionally spray the leaf springs with oil. The damper units should be periodically checked to ensure full movement is still obtainable. A seized unit will give only minimal movement leading to an excessively hard ride.

Leaf spring

To remove (Figure 1)

1. Jack up the vehicle under the differential and lower on to axle stands, securely installed under the chassis frame.
2. Remove the road wheel.
3. Allow the jack to support the axle. Disconnect the damper by removing the ½" UNF lower securing nut, bolt and washer.
4. Unscrew four 3/8" UNF locknuts and four hexagon nuts from the two "U" bolts securing the leaf springs to the axle. Remove the "U" bolts.

5. Remove ½" UNF lower shackle nut and bolt and lower the rear of the leaf spring to the ground.
6. Unscrew ½" UNF nut and bolt securing the front eye of the leaf spring to the chassis mounting bracket and remove the leaf spring.
7. Replace in reverse order.

Damper unit

To remove

1. Remove the ½" UNF nut, bolt and washer from the lower damper mounting bracket.
2. Unscrew the 3/8" UNF lock nut securing the top mounting to the chassis and remove the damper from the vehicle.
3. Replace in reverse order.

Bump Stops (700cc)

Two bump stops, located under the chassis, are both secured to the mounting brackets by two split pins. To remove pull out the split pins and withdraw the bump stop.

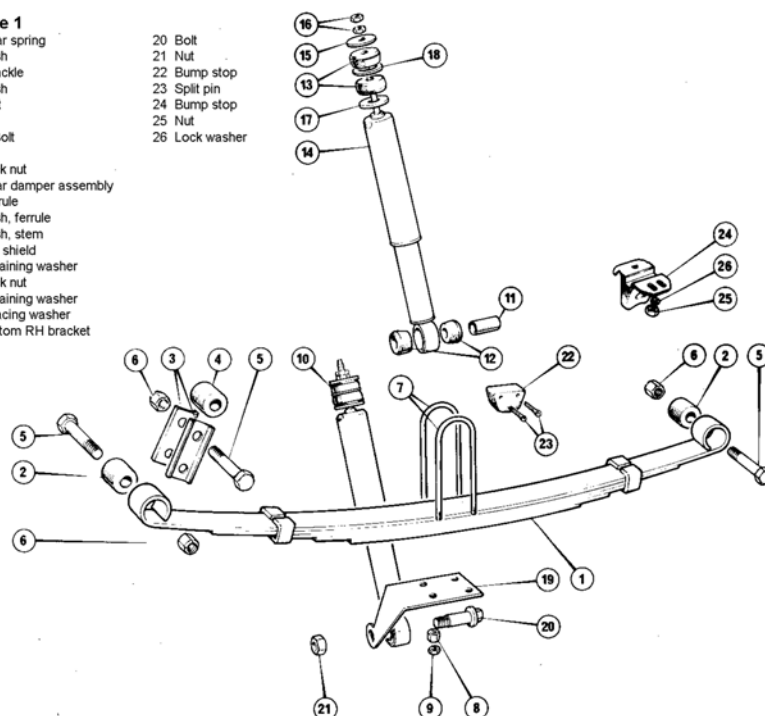
Bump stops (750cc)

The bump stops of later vehicles are secured by three 5/16" UNF nuts and lock washers to a bracket welded to the chassis side frame. To remove, undo the nuts and withdraw the bump stop.

Figure 1

- | | |
|----|----------------------|
| 1 | Rear spring |
| 2 | Bush |
| 3 | Shackle |
| 4 | Bush |
| 5 | Bolt |
| 6 | Nut |
| 7 | U Bolt |
| 8 | Nut |
| 9 | Lock nut |
| 10 | Rear damper assembly |
| 11 | Ferrule |
| 12 | Bush, ferrule |
| 13 | Bush, stem |
| 14 | Dirt shield |
| 15 | Retaining washer |
| 16 | Lock nut |
| 17 | Retaining washer |
| 18 | Spacing washer |
| 19 | Bottom RH bracket |

- | | |
|----|-------------|
| 20 | Bolt |
| 21 | Nut |
| 22 | Bump stop |
| 23 | Split pin |
| 24 | Bump stop |
| 25 | Nut |
| 26 | Lock washer |



Description

The steering mechanism comprises a single-stage worm on the lower end of the steering column supported by two ball races located in the steering box. Engaging the single-stage worm is a recirculating ball steering nut assembly secured in position by a rocker shaft which, in turn supports a drop arm linked to an idler shaft assembly. Outer tie-rods are then used to connect the steering linkage to the tie-rod levers of both front suspension assemblies.

Worm and steering nut assembly wear can be taken up by reducing the number of shims behind the cover plate. If, after omitting one or two shims, slackness is still apparent, renew the cover plate spring. End play in the column can be prevented by removing one or more shims from behind the steering box end plate.

Routine Maintenance

The steering box oil level should be checked at regular intervals (see service schedule) and topped up if necessary. Grease the idler shaft assembly every 1000 miles (1,600 km) to ensure free movement of the steering gear.

Steering box assembly removal (Figure 1)

1. Disconnect battery leads and remove battery. Remove ¼" set screw, lock washer and nut and disconnect battery earth lead and harness earth leads from battery tray. **Note:** If the battery is located in the LH of the engine compartment ignore this operation
2. Disconnect the coil leads
3. Remove three ¼" UNF set screws, plain washers, lock washers and nuts and remove battery tray, complete with coil, from the engine compartment.
4. Disconnect horn leads, unscrew 2 x ¼" UNF set screws, washers and nuts and remove horn from engine compartment.
5. Remove fascia (see section R).
6. Unscrew four no.8 self tapping screws and remove support plate securing the steering column to the body.
7. Disconnect the outer tie-rod from the steering box drop arm and tie-rod lever by unscrewing 3/6" UNF nuts. **Note:** An extractor tool must be used to release the tie-rod end taper. **Do Not Hammer Out.**
8. Unscrew the 7/16" UNF nut and disconnect centre tie-rod from the steering box drop arm, again using an extractor tool.
9. Remove the two 3/8" UNF bolts and single 3/8" UNF bolt holding the steering box assembly to the chassis mounting bracket. The single fixing bolt taps in to a weld nut on the fixing bracket.
10. Move the steering box to release the split location dowel from the mounting bracket, then, to facilitate removal, rotate the steering box 180° until the rocker shaft spline faces upwards. Then push the steering column through the bulkhead, at the same time lifting the steering box clear of the engine compartment, enabling the complete assembly to be withdrawn from the front of the vehicle.
11. Replace in reverse order taking note of the following point: The split location dowel is fitted in production to lock the steering column at the correct angle. When replacing with a new steering box however, the dowel is not required, as the support plate and grommet secured to the bulkhead will set this angle correctly.

Dismantling of steering box (Figure 1)

If the correct oil level is maintained in the steering box, no attention to the internal components should be necessary. However, if excessive wear is apparent on the worm and steering nut assembly or steering column that cannot be rectified by the deletion of shims, dismantle the steering box as follows:

1. Remove oil plug and drain the steering box oil.
2. Unscrew the 7/8" UNF nut securing the drop arm to the rocker shaft spline. An extractor tool is then necessary to remove the drop arm from the spline. Do not use force in this operation as damage to the spline or drop arm could result. Retain rocker shaft oil seal.
3. Unscrew two bolts, complete with lock washers and remove the small cover plate to release the spring pressure on the rocker shaft.
4. Remove four bolts and lock washers and detach the end plate complete with shims from the steering box.
5. Remove the washer and ball race and withdraw the inner column from the box. To facilitate removal, the column should be rotated.
6. Release the tab washers, unscrew four bolts and detach the large cover plate, complete with shims.
7. Remove bush and washer then withdraw rocker shaft and steering nut assembly from steering box. Take care not to misplace the steering nut balls.
8. Check components for wear, replacing as necessary.
9. Reassemble in reverse order, refit steering box to the vehicle. Check steering for slackness and end float and adjust accordingly.

Steering linkage removal (Figure 2)

1. Disconnect the RH outer tie-rod from the steering box drop arm by unscrewing the 3/8" UNF nuts.

An extractor tool or suitable wedges must be used to release the tie rod taper. Do not hammer out. This procedure should be adopted for all steering linkage tapers.

2. Unscrew the 7/16" UNF nut and disconnect the centre tie-rod from the steering drop arm and idler shaft drop arm.
3. Disconnect the LH outer tie from the idler drop arm and tie rod lever by unscrewing the 3/8" UNF nuts.
4. The adjustable outer and centre tie rods require no regular maintenance but the rubber gaiters, secured by a circlip, should occasionally be checked for cracking or damage and renewed if necessary.
5. Replace in reverse order.

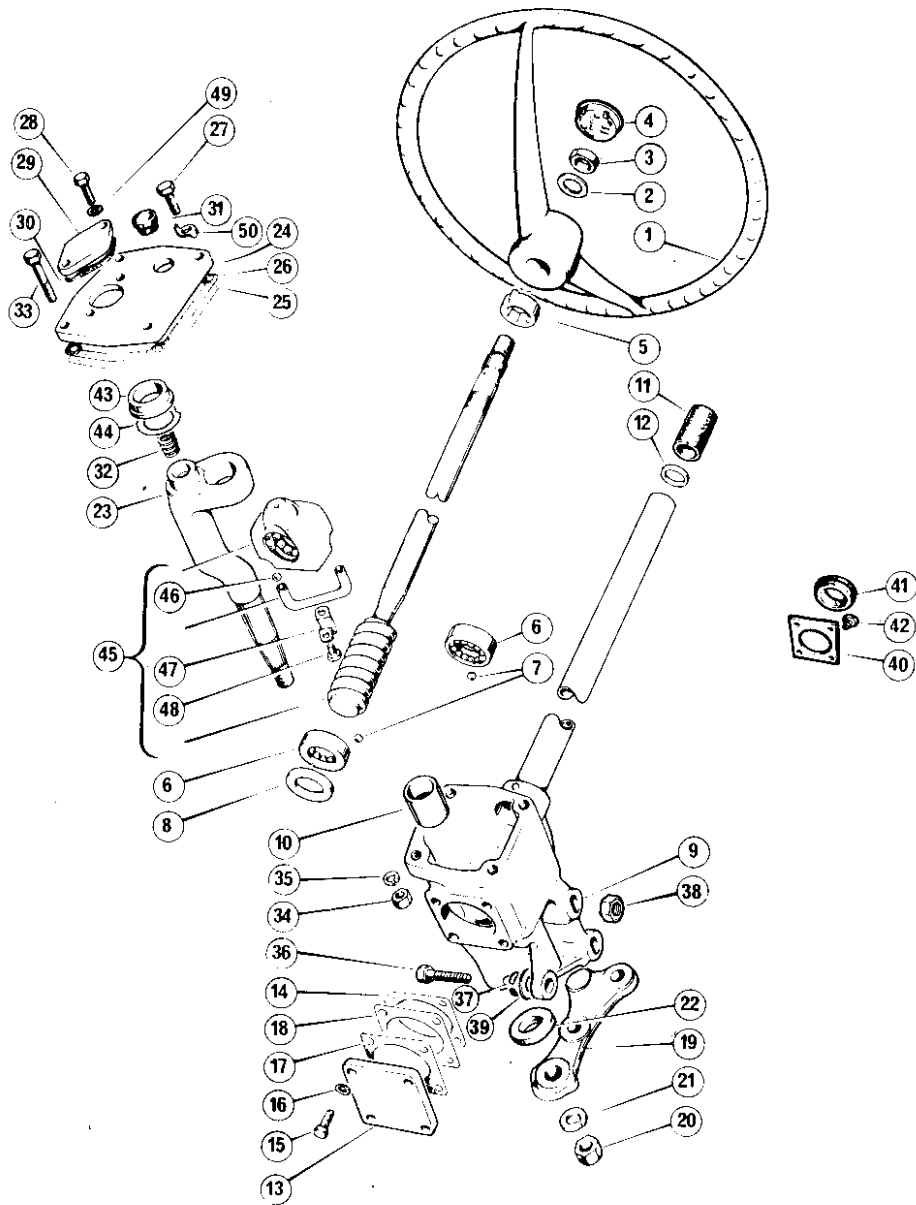


Figure 1 Steering box and wheel

- | | | |
|------------------------------------|---------------------------|------------------------------|
| 1 Steering wheel | 19 Drop arm – RH drive | 37 Washer |
| 2 Washer | 20 Nut | 38 Nut |
| 3 Locknut | 21 Lockwasher | 39 Lockwasher |
| 4 Centre, steering wheel | 22 Oil seal, rocker shaft | 40 Support plate, grommet |
| 5 Cam | 23 Rocker shaft | 41 Grommet, steering column |
| 6 Adjustable ball race | 24 Cover plate, large | 42 Screw |
| 7 Steel balls | 25 Joint washer – steel | 43 Bush, rocker shaft |
| 8 Washer, packing | 26 Joint washer – paper | 44 Washer |
| 9 Housing & tube assembly RH drive | 27 Bolt | 45 Inner column assembly RHD |
| 10 Bush, rocker shaft | 28 Bolt | 46 Ball, steering gear nut |
| 11 Bush, felt, inner column | 29 Cover plate, small | 47 Clip, transfer tube |
| 12 Washer, bush locating | 30 Joint washer – paper | 48 Screw, clip |
| 13 End plate | 31 Oil plug | 49 Lockwasher |
| 14 Joint washer – steel | 32 Spring, cover plate | 50 Tabwasher |
| 15 Bolt | 33 Dowel bolt | |
| 16 Lockwasher | 34 Nut | |
| 17 Joint washer – paper | 35 Lockwasher | |
| 18 Joint washer – steel | 36 Bolt | |

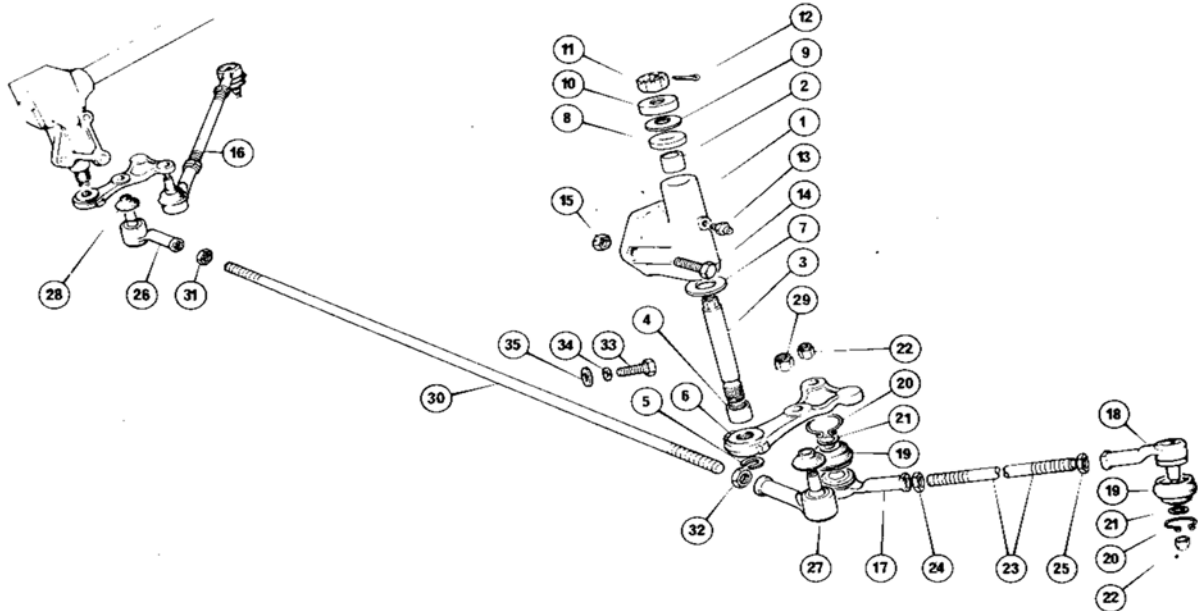


Figure 2 Steering linkage

1 Bracket, idler shaft – RH drive
 2 Bush, idler shaft
 3 Shaft, idler
 4 Needle bearing, idler shaft
 5 Circlip, idler shaft
 6 Drop arm, idler shaft
 7 Thrust washer, idler shaft
 8 'D' washer, idler shaft
 9 Spring disc, idler shaft
 10 Dust cover, idler shaft
 11 Slotted nut, idler shaft
 12 Split pin, idler shaft

13 Grease nipple, idler shaft
 14 Bolt
 15 Nut
 16 Outer tie rod assembly
 17 Tie rod end – RH
 18 Tie rod end – LH
 19 Gaiter, tie rod end
 20 Circlip
 21 Washer
 22 Nut
 23 Tie rod
 24 Locknut

25 Locknut
 26 Tie rod end – RH
 27 Tie rod end – LH
 28 Gaiter, tie rod end
 29 Nut
 30 Tie rod
 31 Locknut
 32 Locknut
 33 Set screw, steering lock stop
 34 Lockwasher, steering lock stop
 35 Washer, steering lock stop

Idler shaft assembly: remove and dismantle

1. Disconnect outer and centre tie rods from idler shaft assembly drop arm as previously described.
2. Unscrew two 3/8" UNF bolts and single 3/8" UNF bolt and withdraw idler shaft assembly from chassis bracket.
3. Remove circlip then detach drop arm from idler shaft.
4. Pull out split pin, unscrew castellated nut, remove dust cover, spring disc and thrust washers then withdraw idler shaft from housing.
5. Using a suitable drift, extract needle bearing and bush from idler bearing housing.
6. Check all components for wear and renew as required.
7. Reassemble in reverse order and refit idler assembly to chassis bracket.
8. Check steering geometry, as described in the following text.

Steering measurements and adjustments

Before carrying out measurements and adjustments of the steering and front suspension, position the vehicle on a smooth and level surface. Inflate the tyres to the correct pressures and place a load of 150lb (68kg) on each seat to represent the average weight for each occupant. Also ensure that the fuel tank is full.

Lock stop adjustment

Turn the wheels until on full lock and check that the drop arm is abutting the lock stop, which is screwed in to a boss on the chassis frame (**Figure 3**). If, however, a fouling condition exists between the centre tie rod and the chassis frame, slacken the lock nut and adjust the lock stop until the condition is eliminated. Take care to re-tighten the lock nut.

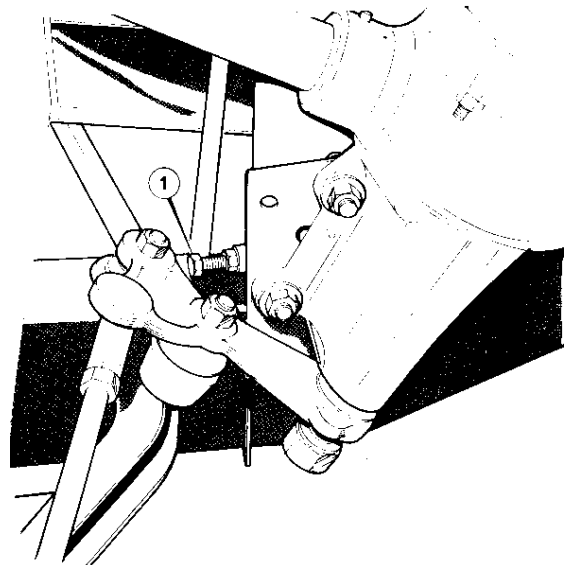


Figure 3 Lock stop adjustment

Track adjustment

Centralise the steering by turning the steering wheel from lock to lock, counting the turns necessary, then turning back exactly half the number to ensure the steering box is fully centred. The steering wheel spokes should be in a horizontal position. Using Dunlop or similar wheel alignment equipment measure the front wheel alignment. If adjustment is required slacken the outer tie rod lock nuts and turn the tie rods until the correct alignment is obtained. Take one reading, roll the vehicle forwards so the wheels rotate 180°, then obtain a second reading and adjust the rods to the mean of both readings. This compensates for any wheel rim run out.

Castor and camber adjustment

The following instructions for measuring caster and camber are applicable to the Dunlop instruments. Other types of measuring equipment will be equally effective.

The caster angle is 4° and the camber angle 0-1/2° positive (**Figure 4**)

To measure camber

Check that the vehicle is on a level surface, that the front wheels are pointing straight ahead and that the tyres are correctly inflated.

The level of the floor should be checked with a Dunlop CG/4 camber gauge (**Figure 5**) by placing the gauge on the floor in the direction in which it is desired to check the floor level, adjusting the dial (B) to centre the bubble in the spirit level (C). The angle of inclination is read from the scale on the dial (D).

If a level floor is not available it is possible to work on a small slope and correct the camber reading by adding or subtracting the measurement of floor inclination.

Apply the long edge of the gauge to the tyre wall, holding the gauge upright but avoiding the part of the tyre that bulges due to load. A small departure of the gauge from absolute vertical will not affect the reading. Adjust dial (A) until bubble in level (D) is central, read camber out or in from the scale in dial (A).

The amount of camber should be 0° to 1/2°. If this reading is not obtained, shims should be added or deleted equally to both the right and left hand fulcrum fixing bolts until the correct camber angle is achieved.

To measure castor angle

Check that the vehicle is on a level surface, that the front wheels are pointed directly ahead and that the tyre pressures are correct.

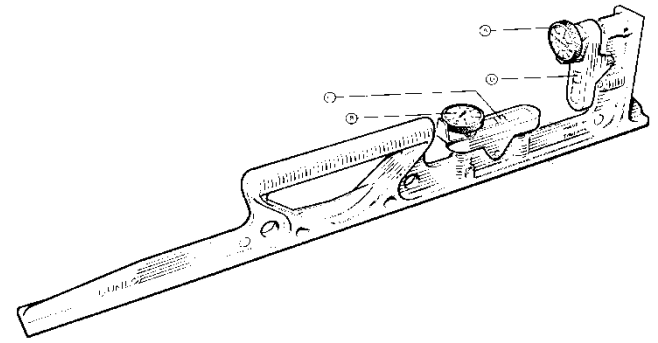


Figure 5 Camber gauge

Follow the same procedure for checking the floor as for measuring the camber angle and if necessary make corrections to the caster angle.

Using Dunlop CG/6 turntables and run-on ramps, place one turntable with locking pin in place in front of the centre of each front wheel with run-on ramps at the rear of the turntables. Place the other ramps in front of each rear wheel so that the back of the car will be raised to the same height as the front.

Drive the car on to the turntables with the locking pins in position so that the centres of the front wheels are over the centres of the turntables.

Attach the special clamp (**Figure 6**).

Remove the locking pins and check there is free movement of the turntable plates (fore, aft and laterally).

Fit the Dunlop CG/5 gauge with caster dial to the left of spindle (E) and secure with knurled nut (**Figure 7**).

The gauge should be set to approximately horizontal. Set turntable scales to zero.

Steer the wheel 20° IN, i.e. Right-hand wheel steered to the left or left-hand wheel steered to the right as viewed from the driving position.

Set the castor dial on the top to zero (**Figure 7**).

Centre the bubble in the level (E) by turning the lower knurled screw.

Centre the bubble in the level (F) by turning the lower knurled screw (H).

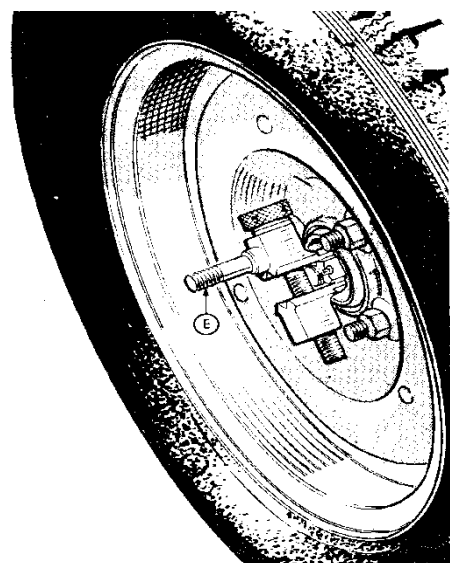


Figure 6 Caster gauge clamp

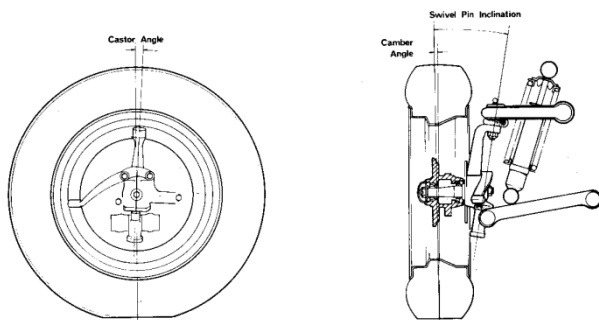


Figure 4 Castor, Camber angles and swivel pin inclination.

To avoid the possibility of the wheel rotating on its axle between setting the gauge and taking the reading apply the footbrake hard. With the footbrake still applied, centre the bubbles in the level (E) & (F) by turning the upper castor dial. Take the reading from the dial and record. The castor angle should be 4° . If this reading is not obtained, shims should be added or removed from the RH or LH fulcrum fixing bolts.

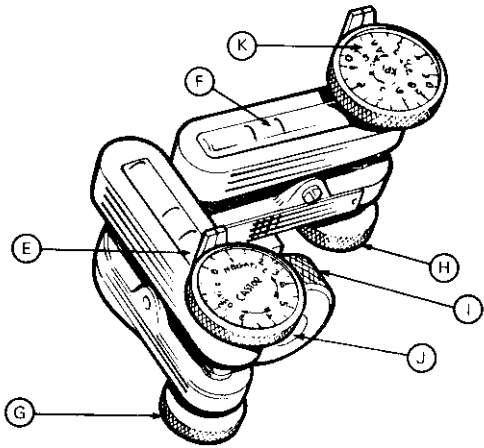


Figure 7 Castor gauge

Using template when turntables are not available

Place template against one of the front wheels and draw a line on the ground parallel to the wheel. Then place the template on the floor with its base along the line and draw lines P-Q and X-Y (**Figure 8**).

Attach the clamp (**Figure 6**) and fit the Dunlop CG/5 gauge as previously explained.

Steer the wheel 20° In as previously explained.

This can be checked using the template to see that the wheel is parallel to the P-Q line (**Figure 9**).

Set castor dial to zero, centre the bubble (E) by turning the lower knurled screw (H) (**Figure 7**).

Check the castor angle as previously explained and adjust if necessary.

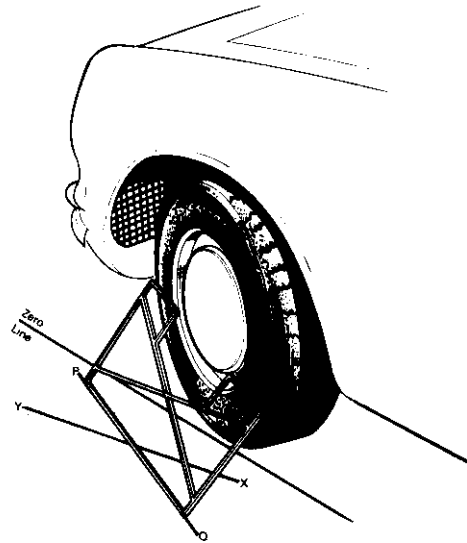


Figure 9 Steering template

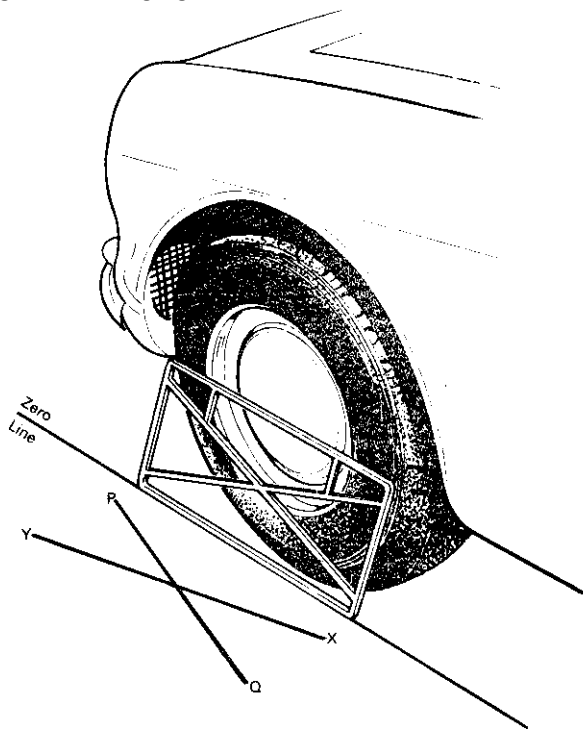


Figure 8 Steering template

Description

The engine is water cooled, assisted by a fan. The system is of the positive circulation type, incorporating a centrifugal water pump driven by a "V" belt from the crankshaft pulley. The fan is mounted on a pulley pressed on to the front of the water pump spindle. To pressurise the system and raise the boiling point of the coolant, the radiator filler cap has a spring loaded valve set to open at 0.28 kg/cm² (4.0 lb/in²)

A wax type thermostat in conjunction with a by pass hose assists rapid warming up and maintains a constant operating temperature.

The water temperature is indicated by a meter, housed in the left-hand gauge of the fascia. This is measured electrically by a temperature sensitive sender unit screwed in to the thermostat housing.

Routine maintenance

The coolant level should be regularly checked and topped up if necessary. Check the cooling system periodically for leaks and ensure the fan belt is correctly adjusted.

Anti-freeze mixture

In the winter months an anti-freeze must be added to the coolant in the radiator to prevent damage to the cylinder block or radiator caused by freezing.

Before refilling, the cooling system should be flushed out thoroughly. Check the condition of all hoses and connections in the cooling and heater systems.

It is advisable to pre-mix the anti-freeze with water in a separate container before refilling the cooling system.

The percentage of anti-freeze solution in the cooling system will determine the degree of protection and it is advisable to allow a margin of safety in cases where lower temperatures than normal may be encountered.

The quantities of anti-freeze for various degrees of protection are given in a table at the end of this section.

The percentage of anti-freeze in the cooling system can be checked by measuring the specific gravity of the coolant using a suitable hydrometer.

It is permissible with modern anti-freeze formulation to leave the anti-freeze solution in the cooling system throughout the year, provided that the protection afforded at the onset of Winter has not been reduced by routine topping up of the coolant water during the summer months.

Note: During summer months, if no anti-freeze is used a solution of water plus 3.35 fluid oz of Reliant Coolant Inhibitor "R" part number 10374 **MUST** be used to maintain the system free of corrosion.

Operation 1 Draining the cooling system

Drain plugs are provided, one on the left hand side of the cylinder block (Figure 1) and one in the base of the radiator (Figure 2 & 3).

Some vehicles may have a radiator without a drain plug fitted. To drain the radiator on this type the bottom hose must be removed.

The vehicle should be standing on level ground with the radiator filler cap removed when draining.

Note: Do not remove the radiator cap when the engine is hot as this will cause very hot water and steam to be blown out of the filler neck possibly leading to injury from scalding.

If anti-freeze is being used it is advised that the coolant be collected in a clean container beneath the vehicle and retained for re-use.

Drain the cooling system and flush through by inserting a hose pipe in the radiator filler orifice and allowing water to flow through the system until clean.

Note: It is advisable to leave an indication within the vehicle that the cooling system has been drained.

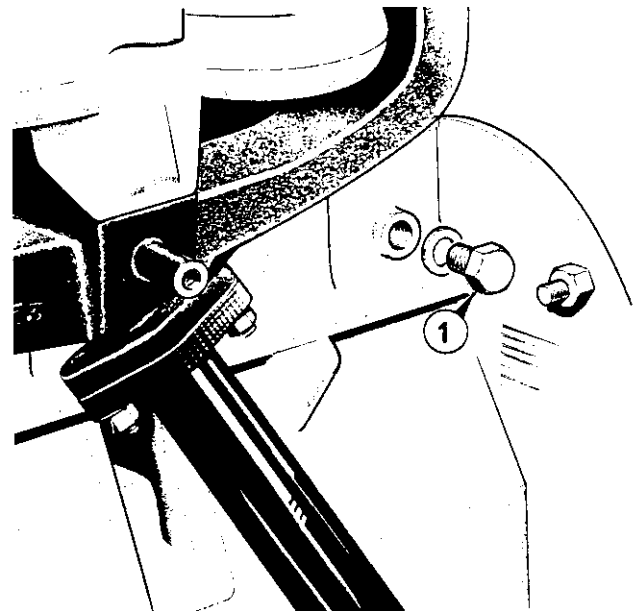


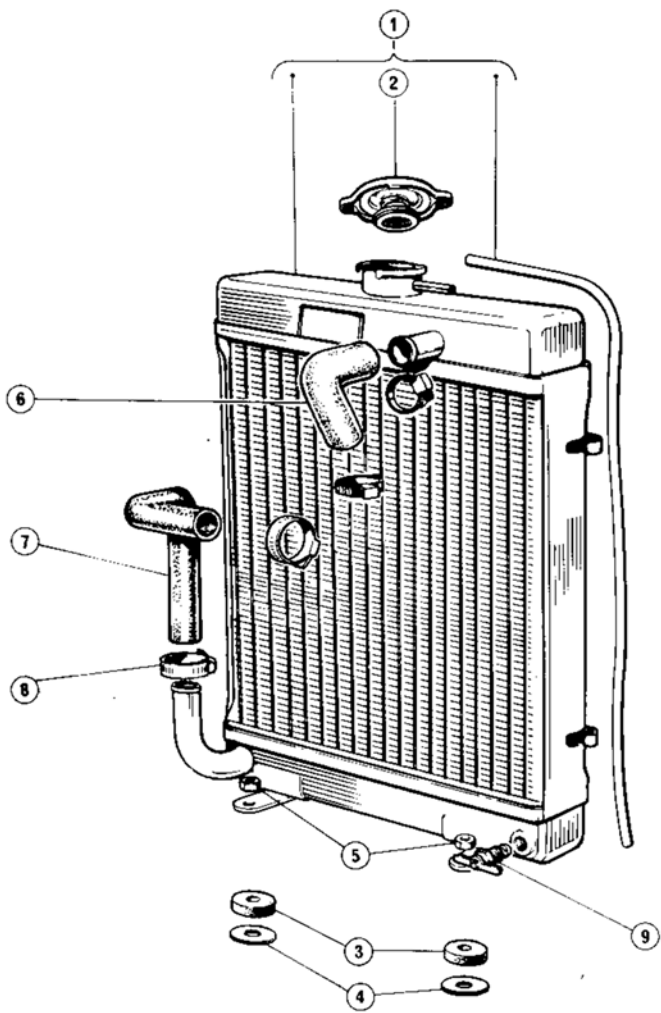
Figure 1 Cylinder block drain plug

To refill

Replace drain plugs (refit bottom hose if removed).

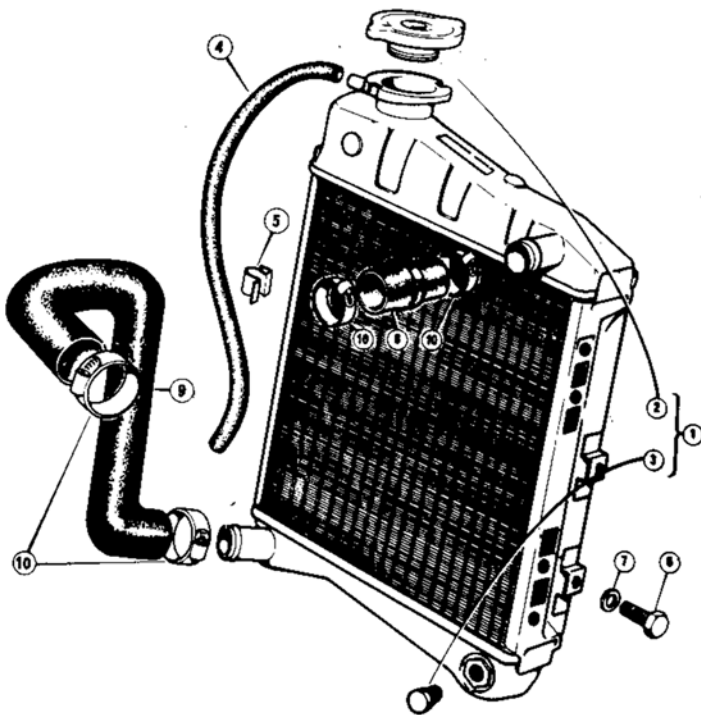
If anti-freeze solution has been retained, return it to the cooling system. If the liquid retained is not sufficient to fill the system, add additional anti-freeze solution as required. Do not top up with only water, otherwise the solution may be weakened making it less effective in adverse conditions.

Do not over fill the radiator. The correct level of the coolant in the radiator is reached when the top header tank is approximately two thirds full. Some vehicles may have a radiator with a coolant level indicator, visible in the filler neck.



- 1 Radiator
- 2 Radiator cap
- 3 Rubber washer
- 4 Washer
- 5 Nut
- 6 Top hose
- 7 Bottom hose
- 8 Hose clip
- 9 Drain tap

Figure 2 Radiator and hoses, early vehicles



- 1 Radiator
- 2. Radiator cap
- 3 Drain plug
- 4 Overflow pipe
- 5 Clip
- 6 Top hose
- 7 Lock washer
- 8 Bolt
- 9 Bottom hose
- 10 Hose clip

Figure 3 Radiator and hoses, later vehicles

Start the engine and run until normal working temperature is attained. This will remove air locks from the system.

Replace the filler cap.

Water leaks

Run the engine to normal operating temperature to allow the system to pressurise.

Thoroughly inspect all hose connections for tightness and security.

In the event of the cooling system having been disturbed, i.e. cylinder head gasket being renewed or water pump / radiator replaced, it is recommended that a "Barseal" pellet (part No 9946) be introduced to the system.

New gaskets must always be used and all fixings tightened to the correct torque to prevent possible ingress of coolant to the oil system.

Radiator

The radiator, secured to the chassis at the front of the engine compartment, consists of an upper and lower tank connected by a matrix. An overflow pipe drains surplus coolant to the road should the system be over filled.

To remove (Figures 2 & 3)

1. Drain the cooling system as has been previously described.
2. Slacken the hose clips and disconnect the hoses from the water pump and the thermostat housing.
3. Remove the two 5/16" UNF nuts at the bottom of the radiator (early models) or the four 5/16" UNF bolts on later cars.
4. The radiator can now be lifted clear and withdrawn from the engine compartment.
5. Disconnect the radiator hoses and check carefully for perishing, cracking or damage. Replace them if necessary.
6. Replace in reverse order and refill the cooling system as has been described earlier in this section.

The water pump

The water pump is mounted on the forward face of the cylinder block and comprises a cast iron impellor mounted on a spindle with a seal and thrower. The seal, bearing against the impellor, prevents leaks around the spindle. The coolant inlet is on the right of the pump body. A fabricated pulley is pressed on to the front of the spindle to which is bolted a fan, either two or four bladed depending on engine size. (figures 4 & 5)

To remove

1. Drain the cooling system and remove the radiator.
2. Slacken the upper and lower dynamo/alternator fixing bolts.
3. Pivot the dynamo/generator towards the engine and remove the fan belt.

4. Slacken the hose clips and remove the heater and bypass hoses.
5. Remove four 5/16" UNF nuts and washers and withdraw the pump assembly from the studs on the cylinder block.

Dismantling the water pump

1. Unscrew the four ¼" UNF bolts and remove the fan from the pump pulley.
2. Using a suitable extractor, remove the pulley from the pump spindle.
3. Release the spindle locating wire clip and press out the spindle from the pump body, complete with impellor, seal and thrower disc.
4. Again using a suitable extractor, remove the impellor from the spindle, followed by the seal and thrower disc.
5. Examine all components for wear and replace any that are necessary.

To reassemble

1. Position the seal and thrower disc on to the spindle followed by the impellor. Press the impellor firmly on to the spindle with a replacer tool.
2. Refit the spindle assembly to the pump body ensuring it is fully pressed in to position.
3. Note: When reassembling, allow 0.64-0.81mm (0.025-0.032in) clearance between the impellor blades and the pump housing.
4. Refit the pump spindle locating spring clip.
5. Press the pulley on to the pump spindle and replace the fan with the four ¼" UNF bolts and washers.

To replace

1. Clean the sealing faces of both pump and cylinder block and fit a new gasket.
2. Fit the pump assembly over the studs and refit the nuts and lock washers, tightening to a torque of 1.66-2.07 kg/m (12-15 lb/ft).
3. Reconnect the heater and bypass hoses.
4. Refit fan belt and adjust tension (see following text).
5. Refit radiator and connect hoses. Refill the cooling system and test for leaks.

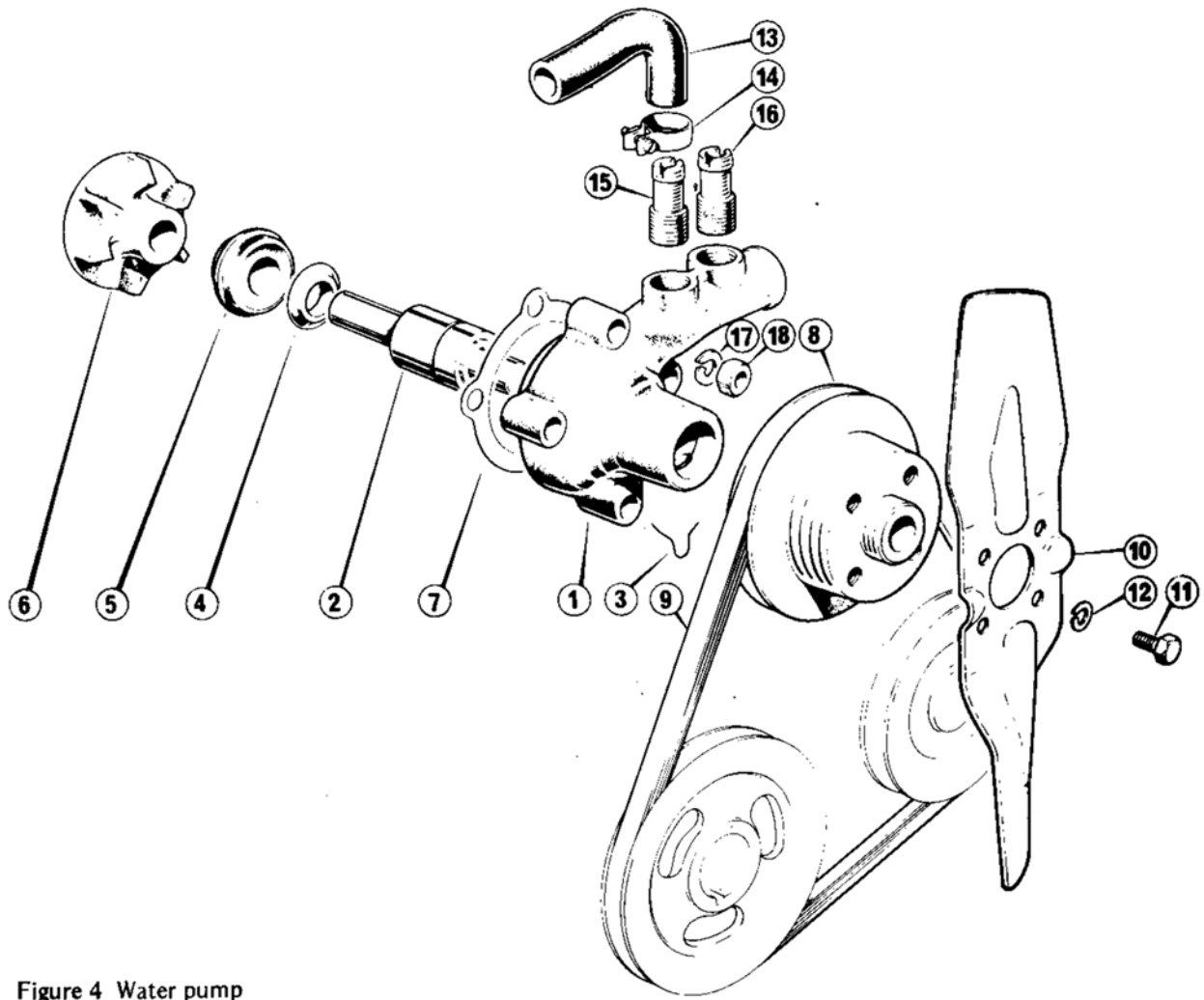


Figure 4 Water pump

- 1 Body, water pump
- 2 Spindle
- 3 Wire, spindle locating
- 4 Ring, spindle thrower
- 5 Seal, spindle
- 6 Vane

- 7 Gasket
- 8 Pulley
- 9 'V' belt
- 10 Fan blade
- 11 Set screw
- 12 Lockwasher

- 13 By-pass hose
- 14 Clip, by-pass hose
- 15 Connection, hose to cylinder head
- 16 Connection, hose to heater
- 17 Lockwasher
- 18 Nut

Fan Belt

A single "V" belt is used to drive the dynamo/alternator and water pump from the crankshaft pulley.

Correct fan belt tension is important otherwise the belt itself could be damaged or undue strain placed on the dynamo/alternator or water pump bearings. If the belt is too slack poor charging of the battery could result.

There is provision for fan belt adjustment by pivoting the dynamo/alternator on its mountings. It is vital that this adjustment is released when a new belt is fitted otherwise any attempt to strain the belt over the pulleys can easily damage the belt.

To adjust belt tension

The correct tension of the fan belt is such that if the belt is deflected at a point midway between the dynamo/alternator pulley and the water pump pulley the total movement should be 13mm (1/2") (Figure 6).

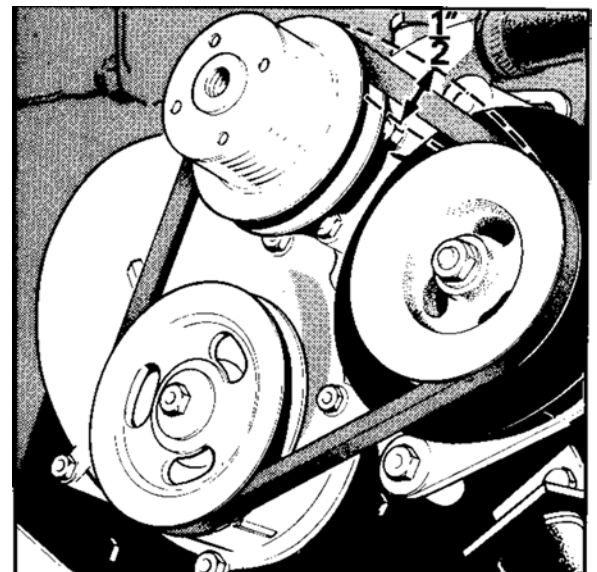


Figure 6 Fan belt tension

1. Slacken the dynamo/alternator adjustment locking bolt and lower mounting bolts.
2. Pivot the assembly towards or away from the engine as necessary to achieve the correct tension.
3. Securely tighten all bolts.

To remove

1. Drain the cooling system as previously described and remove the top hose
2. Unscrew the three bolts from the thermostat housing and remove with lock washers. Lift off the thermostat housing and remove the thermostat (Section F)

Thermostat

The wax type thermostat is located in a housing at the front of the cylinder head. When the thermostat is in the closed position, water flow is restricted within the engine to speed warming up. Coolant returning through the bypass hose returns directly to the water pump.

When the thermostat is open full flow takes place through the engine and radiator.

Testing the thermostat

If it is suspected that the thermostat is malfunctioning it can be tested in the following manner.

Suspend the thermostat in water in a suitable container, gradually heating the water. Check the temperature of the water frequently with a thermometer. Do not allow the thermostat or the thermometer to touch the container as this will lead to an incorrect reading.

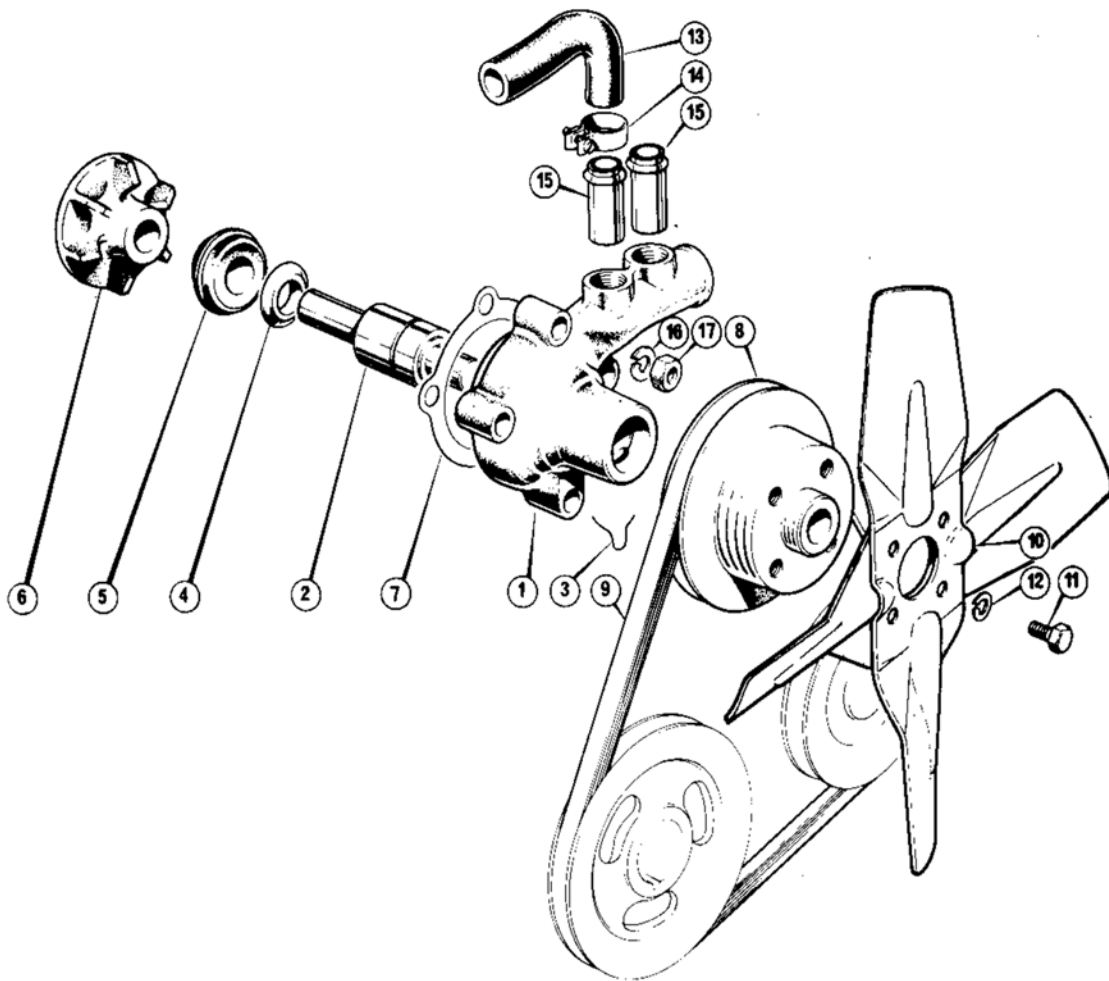


Figure 5 Water pump, 750 cc

- | | |
|--------------------------|---|
| 1 Body | 10 Fan blade |
| 2 Spindle | 11 Set screw |
| 3 Wire, spindle locating | 12 Lockwasher |
| 4 Ring, spindle thrower | 13 By-pass hose |
| 5 Seal, spindle | 14 Clip |
| 6 Vane | 15 Connection, hose to cylinder head and heater |
| 7 Gasket | 16 Lockwasher |
| 8 Pulley | 17 Nut |
| 9 'V' belt | |

The thermostat should start to open at 86-89°C (187-193°F) and be fully open when the water reaches boiling point.

If the thermostat does not function correctly replace it with a new one. Thermostats cannot be adjusted or repaired.

Temperature gauge and sender unit

The temperature gauge reading depends upon the variation in resistance of a thermistor. Needle fluctuation is reduced by the use of silicone in the pointer bearing.

If faulty readings are suspected check the unit as follows:

With the ignition on, disconnect the wire from the sender unit (located on the side of the thermostat housing). The gauge should read "cold". Now earth the sender wire to the engine and the needle should move to "hot". This proves the gauge is correctly working so would indicate that any incorrect reading will be due to a faulty sender unit, which will need replacement. A fault in the gauge will require replacement of the unit.

Cooling system specification

Cooling system

Capacity including heater 3.98 litres (7 pints) – 700cc
3.41 litres (6 pints) – 750cc

Radiator

Cap pressure 0.281kg/cm² (4 lb/in²)

Thermostat

Type Wax
Starts to open 86-89°C (187-193°F)
Fully open 103°C (218°F)
Opening distance 7.11 mm (0.28 in)

Fan

Fan Diameter (4 blade) 254 mm (10 in)
Belt tension 13 mm (½ in) total free movement

Water pump

Type Centrifugal
Pulley ratio 1.172:1

Anti-freeze quantities

Volume In water %	Fluid Down to °C (°F)	Solidifies At °C (°F)	Amount of Anti-freeze required	Specific gravity
10	-4 (+25)	-8 (+17)	0.37 litres (0.65 pints)	1.016
15	-7 (+20)	-14 (+17)	0.55 litres (0.96 pints)	1.026
20	-9 (+15)	-19 (-3)	0.74 litres (1.3 pints)	1.034
25	-13 (+9)	-29 (-20)	0.92 litres (1.62 pints)	1.042
30	-16 (+3)	-39 (-38)	1.11 litres (1.94 pints)	1.050
40	-25 (-13)	-48 (-54)	1.48 litres (2.6 pints)	1.065
50	-37 (-34)	-58 (-72)	1.84 litres (3.25 pints)	1.080

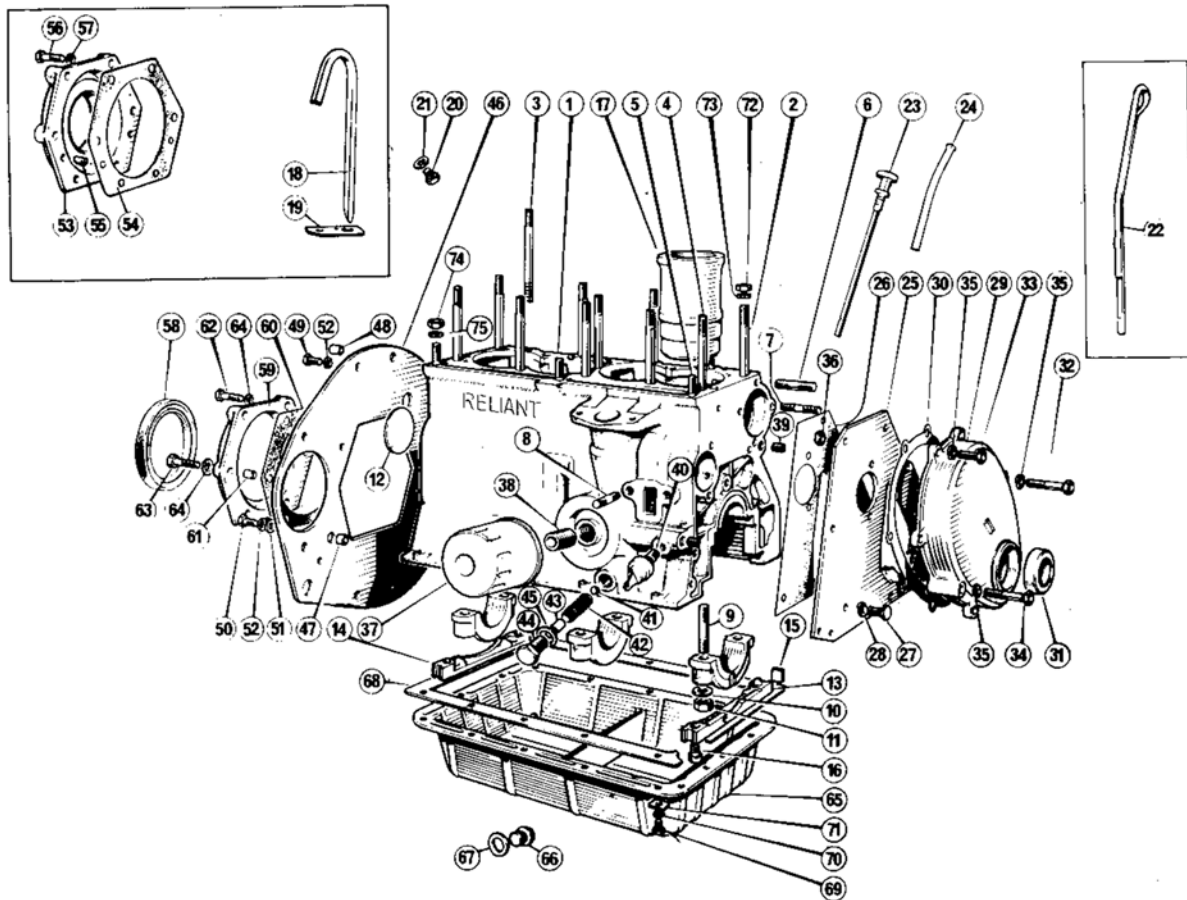


Figure 1 Cylinder block, 700 cc, early vehicles

- | | | |
|--------------------------------------|-----------------------------------|-----------------------|
| 1 Cylinder block | 32 Bolt | 63 Set screw |
| 2 Stud, cylinder head | 33 Bolt | 64 Washer |
| 3 Stud, cylinder head | 34 Bolt | 65 Sump |
| 4 Stud, cylinder head | 35 Lockwasher | 66 Plug, sump drain |
| 5 Stud, cylinder head | 36 Nut | 67 Washer, sump drain |
| 6 Stud, water pump | 37 Oil filter | 68 Gasket |
| 7 Stud, water pump & generator strap | 38 Adaptor | 69 Set screw |
| 8 Stud, fuel pump | 39 Plug, oilway end | 70 Lockwasher |
| 9 Stud, main bearing housing cap | 40 Switch, oil pressure | 71 Washer |
| 10 Washer, main bearing housing cap | 41 Ball, oil pressure release | 72 Nut |
| 11 Nut, main bearing housing cap | 42 Spring, oil pressure release | 73 Washer |
| 12 Core plug, camshaft | 43 Rod, oil pressure release | 74 Nut |
| 13 Bridge piece, front | 44 Retainer, oil pressure release | 75 Lockwasher |
| 14 Bridge piece, rear | 45 Washer, oil pressure release | |
| 15 Packing, bridge piece | 46 Mounting plate, rear | |
| 16 Screw | 47 Dowel, mounting plate location | |
| 17 Cylinder liner | 48 Dowel, mounting plate location | |
| 18 Breather, cylinder block | 49 Set screw | |
| 19 Clip, breather | 50 Set screw | |
| 20 Plug, drain | 51 Washer | |
| 21 Washer | 52 Lockwasher | |
| 22 Dipstick | 53 Cover, crankshaft oil thrower | |
| 23 Dipstick | 54 Gasket, oil thrower cover | |
| 24 Tube, dipstick | 55 Dowel, oil thrower cover | |
| 25 Mounting plate, front | 56 Bolt | |
| 26 Gasket | 57 Lockwasher | |
| 27 Set screw | 58 Oil seal | |
| 28 Lockwasher | 59 Cover, rear | |
| 29 Timing chain cover | 60 Gasket, cover | |
| 30 Gasket | 61 Dowel, cover | |
| 31 Oil seal | 62 Set screw | |

Description

The 700cc and 750cc engines are both four cylinder in line units having a die-cast aluminium cylinder head with cast iron valve guides and sintered steel valve seats. The cylinder block is also made from cast aluminium and incorporates removable wet cast iron liners. The forged steel crankshaft is mounted in three main bearings.

Engine service operations

The following service operations give detailed instructions for servicing and dismantling all the major engine assemblies. Where it is necessary to remove ancillary components and parts please refer to the appropriate sections of the document.

Before reassembling, during any operation, all components should be thoroughly cleaned, paying particular attention to joint faces and bearing surfaces. High spots or burrs should be removed carefully. Ensure that gasket fragments or dirt in blind tapped holes is removed. When tightening a bolt in to a contaminated thread a characteristic springiness will be felt. If this occurs remove the bolt and clean the hole.

Operation 1 Engine removal and installation

To remove

1. Disconnect battery.
2. Drain cooling system.
3. Drain engine oil.
4. Remove radiator complete with hoses (Section E).
5. Disconnect the heater hoses from the engine and heater and remove.
6. Disconnect wiring from dynamo/alternator, starter motor, oil and temperature senders
7. Remove the air cleaner body and element.
8. Disconnect the fuel pipe from the tank at the pump and plug to avoid ingress of dirt.
9. Remove the High and low tension leads from the coil.
10. Disconnect throttle and choke cables from carburettor.
11. Disconnect Clutch. On 700cc engines uncouple the clutch rod assembly from the clutch arm. On 750cc engines disconnect the clutch slave cylinder hydraulic pipe and plug the end to avoid dirt ingress. Remove the clutch return spring.
12. Remove the engine stabiliser rod from the rear engine plate and chassis. Note position of rubber grommets (700cc engines only).
13. Remove exhaust downpipe from manifold.
14. Disconnect the centre tie rod from the steering drop arms.

15. Remove the nut and washer securing the exhaust support bracket to the bell housing allowing the exhaust system to hang clear of the engine.
16. Remove oil filter.
17. Remove starter motor.
18. Use a jack placed beneath the gearbox to support the unit during engine removal.
19. Unscrew the two 5/16" UNC bolts and six 5/16" UNF nuts securing the rear engine plate to the gearbox.
20. Sling the engine from a suitable lifting hoist and take the weight of the engine.
21. Remove the front engine mounting brackets and rubbers (Figure 3).
22. Draw engine forwards to disengage from gearbox, then carefully lift it out through the bonnet aperture and clear of the vehicle. Lower it on to a suitable base.
23. Remove ancillary components (see appropriate sections) then carry out the necessary service works.

To replace

1. Refit all ancillary components.
2. Refit front engine mount brackets.
3. Fit engine mounting rubbers to engine mount brackets.
4. Attach suitable lifting tackle and suspend the assembly over the engine compartment.
5. Carefully lower the engine into place and manoeuvre to connect fully with the gearbox. Locate the front engine mounting lugs on to the front engine mountings in the frame.
6. Attach the nuts and washers on the front engine mountings and leave loose.
7. Fit the two 5/16" UNC bolts and six 5/16" UNF nuts to the fix the rear engine plate to the gearbox bell housing.
8. Tighten front engine mounting nuts.
9. Refit the starter motor.
10. Refit the oil filter and fill engine with the correct oil.
11. Reconnect the centre tie bar to the steering drop arms.
12. Refit the exhaust pipe to the manifold with a new gasket and secure with new brass nuts. Refit the bell housing exhaust bracket.

- | | |
|--|--|
| <p>13. Refit heater hoses.</p> <p>14. Refit radiator and hoses and refill the cooling system.</p> <p>15. Refit stabiliser bar taking care to fit the rubber grommets correctly.</p> <p>16. Reconnect clutch rod and adjust clutch (700cc).
Reconnect clutch hydraulic pipe and bleed system (750cc).</p> | <p>17. Reconnect starter motor, dynamo/alternator, oil and water temperature sensors, coil high and low tension leads.</p> <p>18. Reconnect fuel pipe to pump.</p> <p>19. Reconnect throttle and choke cables</p> <p>20. Reconnect battery and test.</p> |
|--|--|

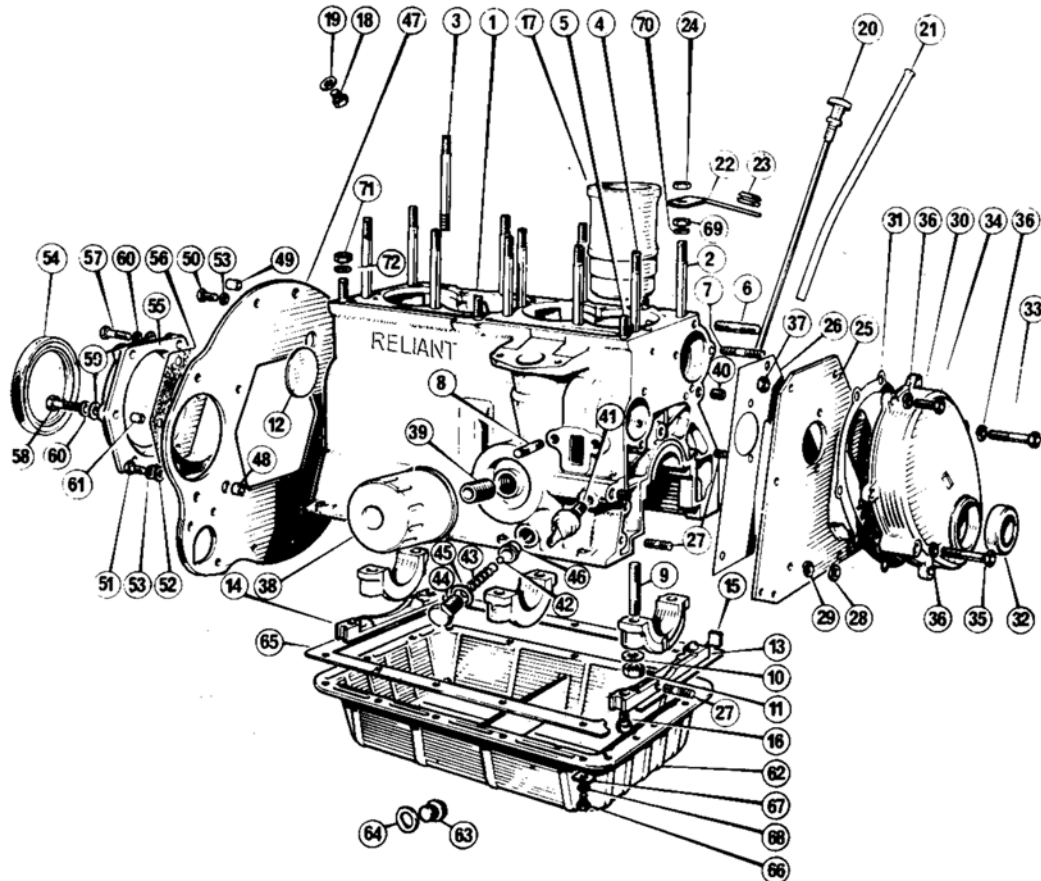


Figure 2 Cylinder block, 700 cc, later vehicles 750 cc

- | | | |
|--------------------------------------|-----------------------------------|------------------------------|
| 1 Cylinder block | 30 Cover, timing chain | 59 Washer |
| 2 Stud, cylinder head | 31 Gasket, cover | 60 Lockwasher |
| 3 Stud, cylinder head | 32 Oil seal | 61 Dowel |
| 4 Stud, cylinder head | 33 Bolt | 62 Sump |
| 5 Stud, cylinder head | 34 Bolt | 63 Plug, sump drain |
| 6 Stud, water pump | 35 Bolt | 64 Washer, plug |
| 7 Stud, water pump & generator strap | 36 Lockwasher | 65 Gasket, sump |
| 8 Stud, fuel pump | 37 Nut | 66 Set screw, sump |
| 9 Stud, main bearing housing cap | 38 Oil filter | 67 Washer, sump |
| 10 Washer, main bearing housing cap | 39 Adaptor, oil filter | 68 Lockwasher, sump |
| 11 Nut, main bearing housing cap | 40 Plug, oilway end | 69 Nut, cylinder head |
| 12 Core plug, camshaft | 41 Switch, oil pressure | 70 Washer, cylinder head |
| 13 Bridge piece, front | 42 Plunger, oil pressure release | 71 Nut, cylinder head |
| 14 Bridge piece, rear | 43 Spring, oil pressure release | 72 Lockwasher, cylinder head |
| 15 Packing, bridge piece | 44 Retainer, oil pressure release | |
| 16 Screw, bridge piece | 45 Washer, oil pressure release | |
| 17 Cylinder liner | 46 Insert, oil pressure release | |
| 18 Plug, drain | 47 Mounting plate, rear | |
| 19 Washer | 48 Dowel | |
| 20 Dipstick | 49 Dowel | |
| 21 Tube, dipstick | 50 Set screw | |
| 22 Bracket, dipstick tube | 51 Set screw | |
| 23 Grommet, bracket | 52 Washer | |
| 24 Locknut, bracket | 53 Lockwasher | |
| 25 Mounting plate, front | 54 Oil seal, crankshaft rear | |
| 26 Gasket, plate | 55 Rear cover | |
| 27 Stud | 56 Gasket, cover | |
| 28 Nut | 57 Set screw | |
| 29 Lockwasher | 58 Set screw | |

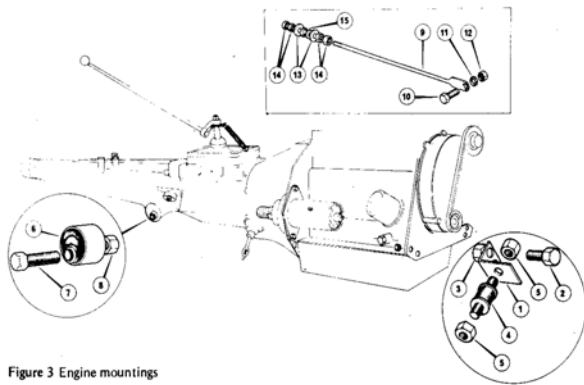


Figure 3 Engine mountings

- | | |
|--------------------------------|---------------|
| 1 Bracket, RH | 11 Lockwasher |
| 2 Set screw | 12 Nut |
| 3 Nut | 13 Collar |
| 4 Flexible mounting, front. | 14 Nut |
| 5 Nut | 15 Grommet |
| 6 Flexible mounting, rear | |
| 7 Bolt | |
| 8 Nut | |
| 9 Stabiliser rod (700 cc only) | |
| 10 Set screw | |

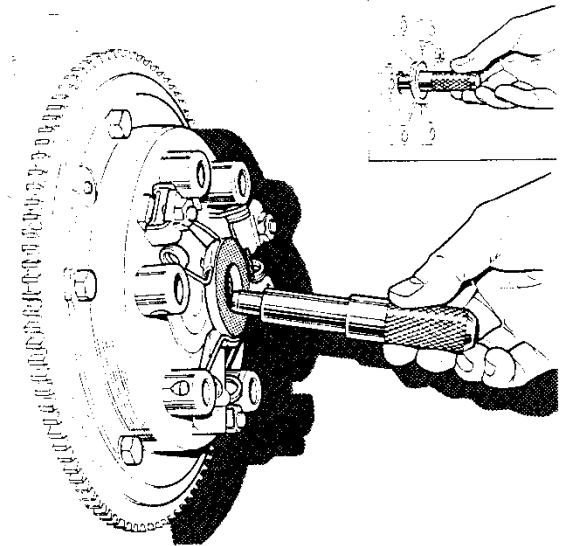


Figure 5 Centralising the clutch

Operation 2 Flywheel and ring gear removal and replacement

Flywheel removal

1. Remove the gearbox (see Section G)
2. Unscrew the six set screws, complete with lock washers, and remove the clutch cover and driven plate from the flywheel.
3. Release the tab washer and unscrew the three set screws. Remove the flywheel assembly from the flywheel.

Starter ring gear removal

1. Drill a hole 6.35 mm (0.25 in) diameter at the point of intersection of a scribed line between any two teeth and a scribed line mid way between the root diameter and the inside diameter of the ring gear. Ensure that the hole is not drilled through the ring gear in to the flywheel, as this will interfere with the subsequent balance of the flywheel.
2. Hold the flywheel assembly in a soft jaw vice.
3. Place a cloth over the ring gear as a precaution against flying shrapnel.

Warning: Ensure adequate protection, particularly for the eyes to prevent injury from the possibility of flying fragments when the ring gear is split.

4. Place a cold chisel immediately above the centre line of the drilled hole and strike sharply to split the ring gear.

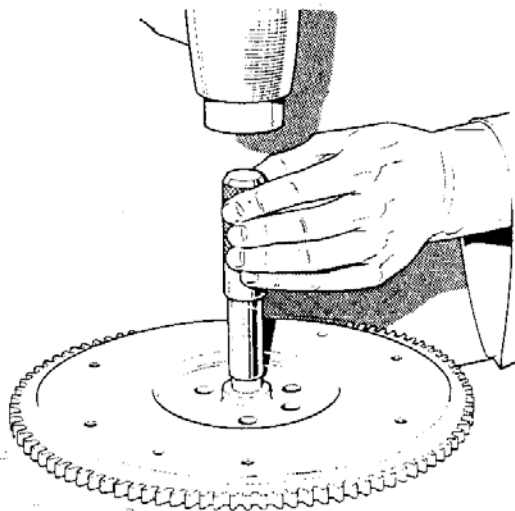


Figure 4 Fitting flywheel bearing

Refitting

1. Heat up the new ring gear uniformly to a temperature of 200°C.
2. Place the flywheel on a stable flat surface, clutch face uppermost and clean the ring gear locating surface.
3. Slip the heated new ring gear in to place and hold in position until it contracts under cooling sufficiently to grip the flywheel.
4. Allow the assembly to fully cool naturally to avoid distortion.

Refitting the flywheel assembly

1. Clean the mating face between the flywheel and the end of the crankshaft. Check that the locating dowel is undamaged and ensure that the spigot bush (needle bearing on 750cc) is in place. Check the bush for wear. If wear is evident then knock the old one out and fit a new one using special tool no. RT 7485 (Figure 2). Needle roller bearings have been used as an alternative to the phosphor bronze bush and care must be taken when replacing these. It is vital to note that the hardened square end face of the bearing must face the tool used to press in the bearing. Use of the rolled end of the bearing will distort the shell and damage the rollers. In many cases the part number or makers name will be stamped in to the hardened end to aid identification. If this does not apply, great care must be observed to identify the correct end.
2. Fit the flywheel to the crankshaft locating it over the dowel.
3. Secure the flywheel with three set screws and a new tab washer tightening to a torque of 4.03 kg/m (29 lb/ft). The tabs on the washer should be bent over to secure the set screws.
4. Check the flywheel for alignment using a dial indicator gauge. A 0.08 to 0.13 mm (0.003 to 0.005 in) run out is acceptable. If this is exceeded the flywheel needs to be renewed.
5. Using special tool no. RT 7485 as a centraliser, or if this is not available an input shaft from a spare gearbox, replace the clutch disc and pressure plate assembly on to the flywheel, securing evenly with six set screws and lock washers to a torque of 1.66 to 2.07 kg/m (12 to 15 lb/ft) see Figure 3. The pressure plate assembly should be tapped with a hide mallet to ensure it is square on the flywheel.
6. Check clutch run-out does not exceed 0.381 mm (0.015 in) on the steel thrust disc.
7. Refit the gearbox.

Operation 3 Sump removal and replacement

1. Drain engine oil.
2. Undo the 15 set screws, lock washers and spacers and remove the sump and gasket.
3. Clean the sump and cylinder block facing.
4. To eliminate oil leakage, the two centre front and rear sump fixing screws should be coated with "Hylomar" sealant.
5. Fit a new gasket, replace sump and breather tube clip and tighten the 15 set screws, spacers and lock washers evenly.

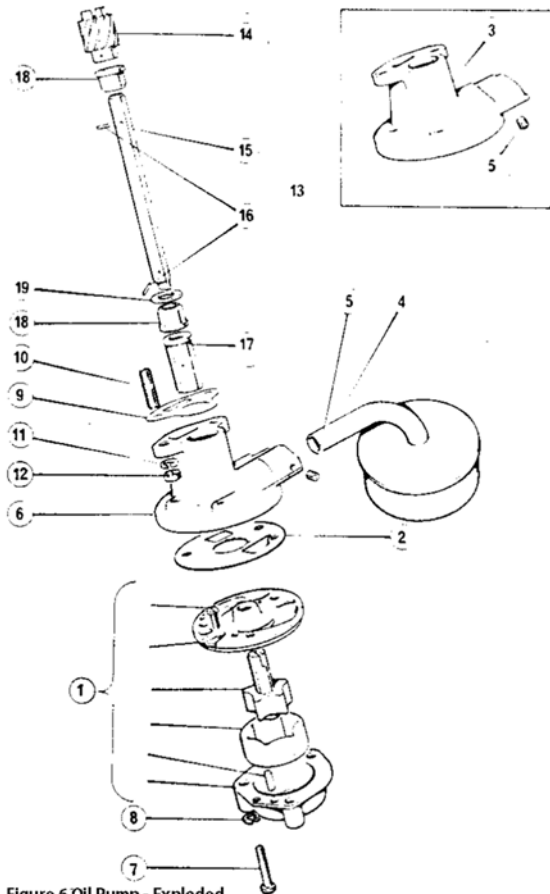


Figure 6 Oil Pump - Exploded

- 1 Oil pump
- 2 Gasket
- 3 Filter
- 4 Extension
- 5 Set screw
- 6 Bolt
- 7 Lock washer
- 8 Gasket
- 9 Stud
- 10 Lock washer
- 11 Nut
- 12 Oil pump drive shaft
- 13 Gear
- 14 Shaft
- 15 Pin thrust muff and gear
- 16 Thrust muff
- 17 Bush
- 18 Shim

Operation 4 Oil pump removal and replacement (with sump removed)

1. Rotate engine to TDC (Section T)
2. Disconnect spark plug leads from terminals.
3. Disconnect the low tension lead from the coil.

4. Unscrew the single retaining bolt at the securing the distributor clamp to the cylinder block, complete with washer and lock washer, and remove the distributor. Do not disturb the actual clamp nut and bolt unless the ignition timing is to be reset.
5. Unscrew two nuts complete with lock washers and remove the oil pump assembly, including strainer, from the cylinder block (Figure 6).

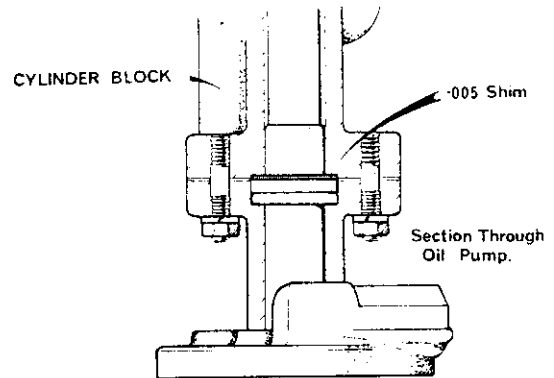


Figure 7 Oil pump drive shaft shims

6. Drift out the pin securing the thrust muff to the distributor/oil pump driveshaft which can then be withdrawn upwards through the distributor housing.

7. Inspect the oil pump and drive shaft assemblies for wear or damage and renew if required. Note: In production, it has sometimes been necessary to fit one or two 0.127 mm (0.005 in) shims between the oil pump driveshaft bush and the cylinder block (Figure 7). It is not necessary when dismantling the pump to remove the drive bush or shim, if fitted. However, if the bush and shim are removed, it is essential that they are both replaced when re-assembling. Failure to do this will allow excessive end float of the distributor driveshaft resulting in poor meshing of the oil pump drive gear with resultant engine noise.

The backlash between camshaft gear and driveshaft gear should not exceed 0.0762 mm (0.003 in).

Re-assemble in reverse order. Refit the pump to the block, ensuring that the engine is set to TDC.

When replacing the oil pump driveshaft ensure that the large "D" of the driving gear offset dog is facing towards the cylinder block with the slot aligned in a "5 minutes past 7 o'clock" position.

Operation 5 Crankshaft rear cover and oil seal replacement with flywheel removed (sealed engine only)

1. Unscrew the six set screws and remove the oil seal cover complete with gasket and oil seal, from the cylinder block.
2. Using a suitable tool, press the old seal out of the cover. Note: On no account try to drift or prise the seal out as this will damage/distort the oil seal housing.
3. Carefully press a new seal in to the rear cover. To ensure the seal is seated correctly, use a press tool similar to that shown in (Figure 8).

4. Locate the two dowels of the rear cover in the cylinder block and then secure the cover with the six set screws and lock washers. (Figure 9)

Operation 6 Timing chain cover, oil seal and gasket replacement (engine still in car)

1. Drain the cooling system.
2. Remove the radiator, complete with hoses from the vehicle.

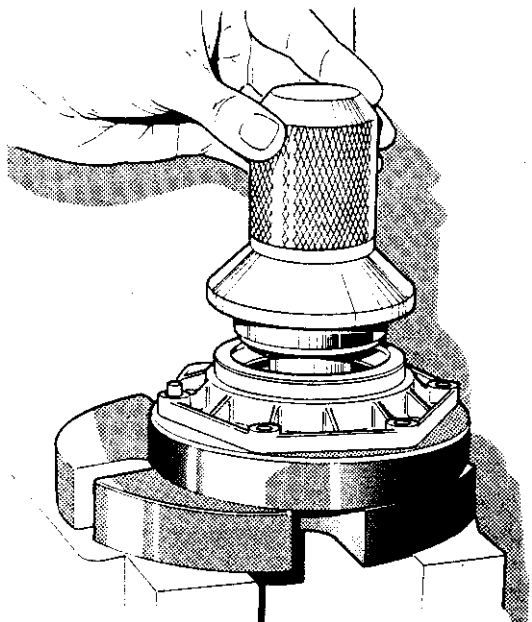


Figure 8 Replacing rear cover oil seal

7. Extract the oil seal from the cover using special tool no. RT 7480 and drive handle part no. 550 (Figure 10).
8. Fit new oil seal using special tool no. RT 7480 and drive handle locating as shown in (Figure 11).
9. With the aid of centralising tool no. RT 7481 fit the timing chain cover with a new gasket to the cylinder block, securing with the seven bolts, two nuts and lock washers.

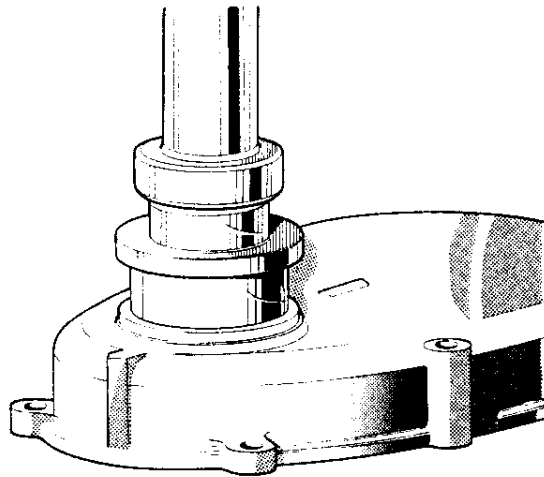


Figure 10 Extracting front cover oil seal

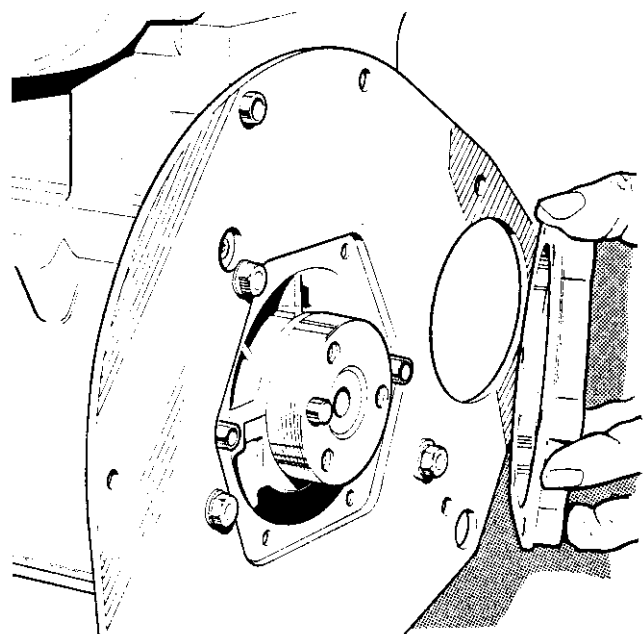


Figure 9 Fitting rear cover

3. Slacken dynamo/ alternator mountings and remove fan belt.
4. Unscrew four nuts and lock washers and remove the water pump from the cylinder block.
5. Unscrew the mounting bolt and pull off the crankshaft pulley.
6. Remove seven bolts, two nuts and lock washers and detach the timing cover from the cylinder block.

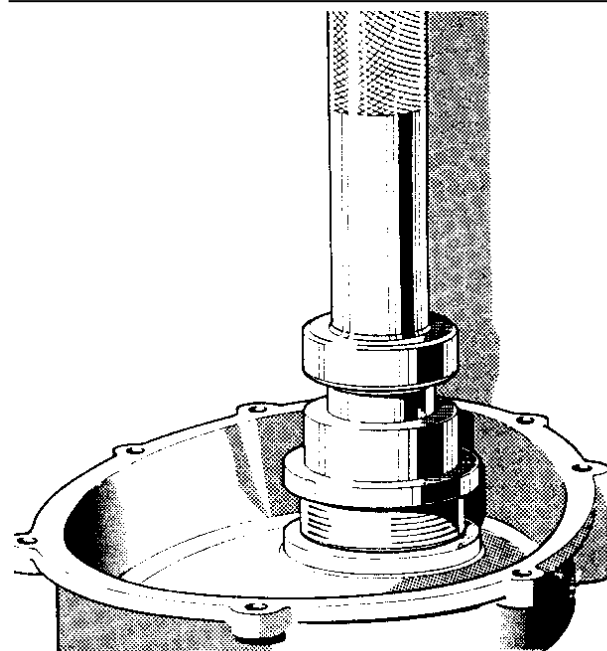


Figure 11 Replacing front cover oil seal

10. Refit crankshaft pulley, water pump and fan belt. Secure and tighten alternator.
11. Refit the radiator, reconnect the hoses and refill the cooling system.

Operation 7 Timing chain replacement (with front cover removed)

1. Release locking plate, unscrew two bolts, remove camshaft sprocket and lift off timing chain.

2. Fit new timing chain to crankshaft and camshaft sprocket which can be secured to the camshaft with the two bolts and the locking plate.
3. Check the valve timing, ensuring that the timing mark on the camshaft sprocket aligns with the woodruff key on the crankshaft (Figure 12).

Operation 8 Camshaft sprocket alignment

1. First ensure that the timing mark on the camshaft sprocket aligns exactly with the woodruff key on the crankshaft to align with either no. 1 or no. 4 piston on TDC.
2. Release the locking plate, unscrew two bolts and remove the locking plate and screws.

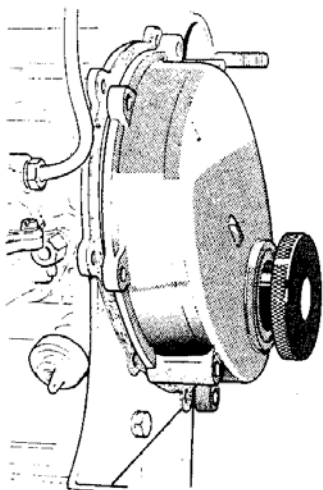


Figure 12 Centralising front cover

3. Ensure that the timing mark, a notch, on the camshaft end aligns with the woodruff key on the crankshaft. (Figure 13)
4. Remove the crankshaft woodruff key.
5. Temporarily refit both sprockets.
6. Check the alignment by placing a straight edge across the teeth of both sprockets.
7. Correct any misalignment by fitting an alternative spacer shim behind the crankshaft sprocket. Alternative spacer shims are available in increments of 0.127 mm (0.005 in).
8. Remove the sprockets.
9. Refit the woodruff key.
10. Fit a new camshaft sprocket locking plate, refit the bolts and bend the tabs to lock them.

Operation 9 Cylinder head removal (with engine in car)

1. Disconnect battery.
2. Remove heater fresh air hose.
3. Drain cooling system.
4. Release the two retaining clips and remove air cleaner body and element.
5. Remove air cleaner base plate from carburettor.
6. Remove the oil filler cap and disconnect the breather hose from the carburettor.
7. Disconnect the heater and inlet manifold heat exchanger hoses from the water pump.
8. Remove the radiator top hose.
9. Remove the distributor cap and leads.
10. To allow easier access, remove the distributor via the single fixing bolt holding the clamp to the cylinder block.
11. Remove the rocker cover nuts and rocker cover, complete with heater hose and fuel pipe clips.

12. Remove the petrol supply pipe from the carburettor plug to avoid dirt ingress. Remove the pipe from the clip on the side of cylinder head and tie back clear of the engine to improve access.
 13. Disconnect the lead from the temperature gauge sender on the thermostat housing.
 14. Disconnect the accelerator cable from the bracket on the carburettor and pull clear.
 15. Disconnect the choke cable from the carburettor.
 16. Disconnect the heat exchanger hoses from the exchanger.
 17. Disconnect the advance/retard pipe and flame trap (if fitted) from the carburettor.
 18. Disconnect the accelerator return spring from the carburettor.
 19. Remove the nut securing the carburettor abutment bracket to the carburettor.
 20. Remove the remaining nut securing the carburettor to the manifold. Remove the carburettor with gasket.
 21. Remove the nuts and washers and detach the heat exchanger adapter from the inlet manifold.
 22. Remove the drip tray complete with gasket.
 23. Remove the four nuts securing the rocker shaft assembly and detach the rocker shaft.
 24. Remove the eight push rods keeping them in the correct order.
 25. Remove the two brass nuts and disconnect the exhaust downpipe from the exhaust manifold.
 26. Remove the three small cylinder head nuts with washers on the spark plug side of the head.
 27. Remove the three bolts and washers holding the thermostat cover on to the head.
 28. Remove the dipstick support bar and earth cable from the long cylinder head stud.
 29. Remove the 12 nuts and washers securing the cylinder head to the cylinder block.
 30. Carefully lift the cylinder head complete with inlet and exhaust manifolds from the cylinder block.
- Replace in reverse order, after scrupulously cleaning the mating faces and fitting a new gasket. To ensure a good seal when replacing the cylinder head, smear grease around the metal rings of the gasket bore eyelets.
- Tighten the cylinder head nuts progressively up to a torque of 3.46 kg/m (25 lb/ft) in the sequence shown in Figure 14. The three smaller nuts along the spark plug side of the head should be tightened to a torque of 2.07 kg/m (15 lb/ft).

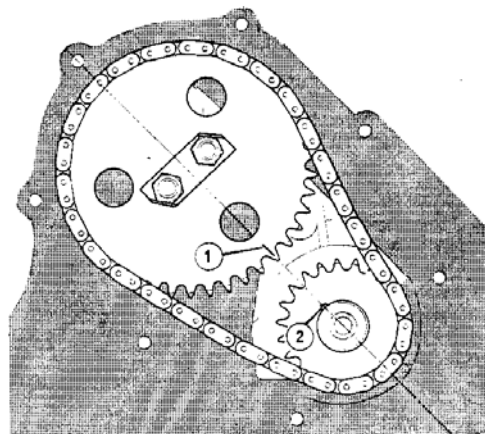


Figure 13 Alignment of camshaft sprocket and woodruff key

1. Timing mark
2. Woodruff key

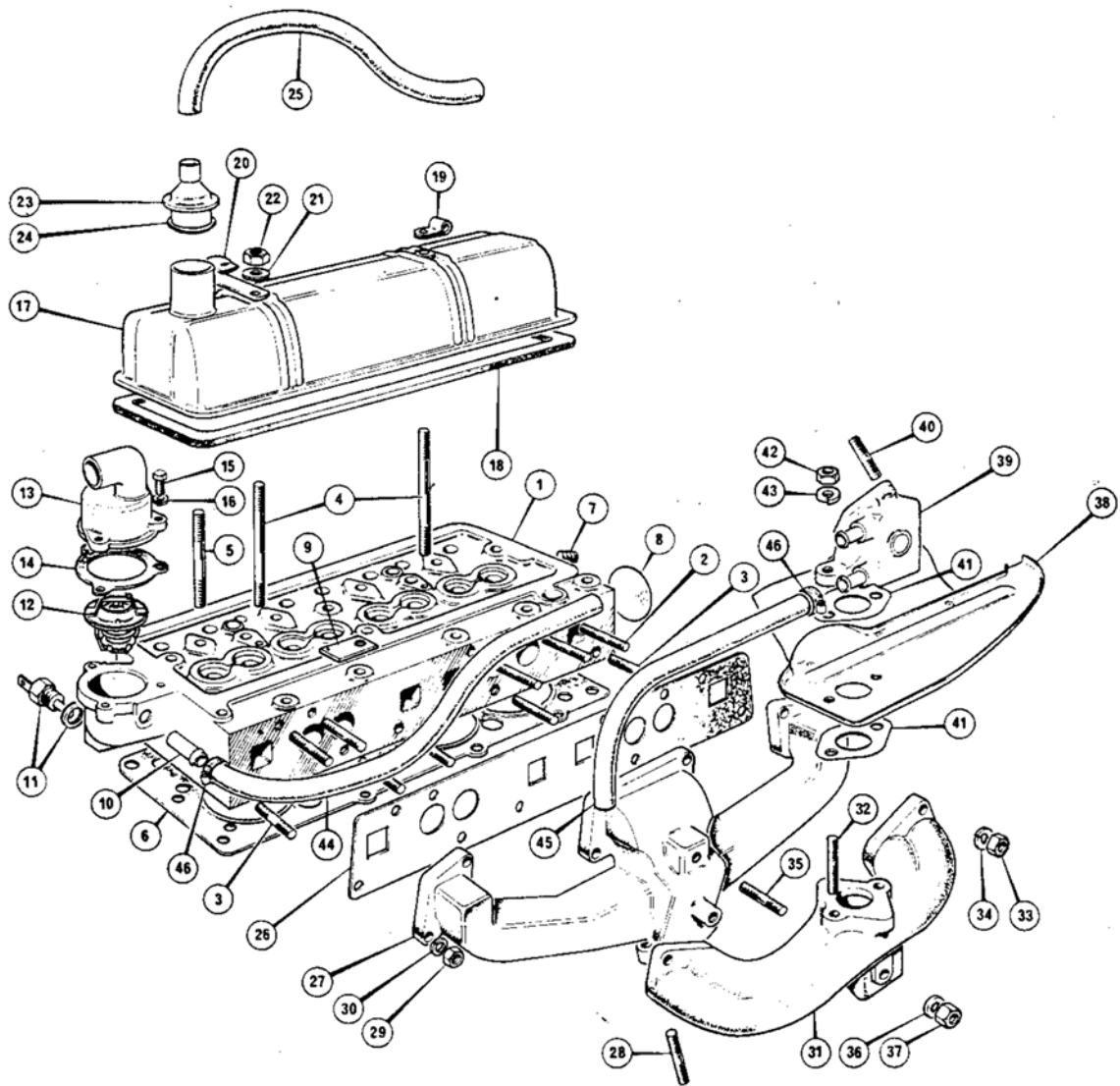


Figure 14 Cylinder head and manifolds - exploded view

- | | | |
|-------------------------|-----------------------------|--------------------|
| 1. Cylinder head | 17. Rocker cover | 33. Manifold nut |
| 2. Stud | 18. Rocker cover gasket | 34. Lock washer |
| 3. Stud | 19. "P" clip | 35. Stud |
| 4. Stud | 20. Support bracket | 36. Washer |
| 5. Stud | 21. Washer | 37. Nut |
| 6. Gasket | 22. Nut | 38. Drip tray |
| 7. Oil way plug | 23. Oil filler cap | 39. Heat exchanger |
| 8. Core plug | 24. "O" ring | 40. Stud |
| 9. Return spring plate | 25. Breather pipe | 41. Gasket |
| 10. Hose connection | 26. Exhaust manifold gasket | 42. Nut |
| 11. Temperature sender | 27. Exhaust manifold | 43. Lock washer |
| 12. Thermostat | 28. Downpipe stud | 44. Hose |
| 13. Water outlet branch | 29. Manifold nut | 45. Hose |
| 14. Gasket | 30. Washer | 46. Clip |
| 15. Set screw | 31. Inlet manifold | |
| 16. Washer | 32. Manifold stud | |

Operation 10 **Cylinder head decarbonise**
(Head removed)

1. Remove the spark plugs.
2. Remove the inlet and exhaust manifolds and carefully remove the gasket.
3. Using a suitable valve spring compressor, remove the valves, keeping them in the correct order. Retain the valve caps, springs and collets for inspection.
4. Check the valve guides for wear and renew if necessary.
5. If valve guides are worn then remove them using special tool RT 7478 (Figure 16).
6. Examine the valve seats for pitting and wear. Re-face if necessary, removing the bare minimum of material.
7. Examine the valves for pitting or wear and re-face if necessary. Renew any valves having bent or worn stems.
8. Test the valve springs for length to the dimensions given in the data at the end of this section.
9. Remove carbon deposits from the combustion chambers and ports using a hardwood scraper. Polish with wire wool.

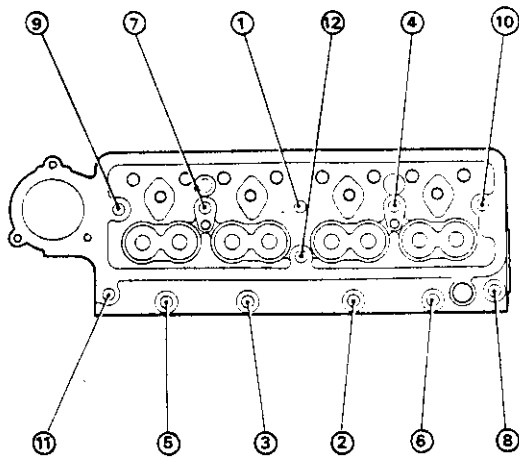


Figure 15 Cylinder head nuts tightening sequence

10. Clean the face of the cylinder head and remove all trace of carbon and high spots.
11. Clean out the waterways. If deposits exist on the piston crowns proceed as follows:-
 - (a) Turn the crankshaft until pistons 1 and 4 are at the top.
 - (b) Fill the cylinders of pistons 2 and 3 with clean non fluffy rag to stop carbon falling in to the bores. Cover the cam follower apertures.
 - (c) Carefully, without scoring the crowns, clean the carbon deposits leaving a narrow band approximately 3.1 mm (1/8 in) around the perimeter to maintain the gas seal. Avoid carbon deposits entering the waterways.
 - (d) Turn the crankshaft until pistons 2 and 3 are uppermost and repeat.

Re-assembly and replacement

1. Clean the cylinder block face removing all traces of carbon and any high spots.
2. Replace the valve guides in the cylinder head using special tool R 7478 (Figure 15).
3. Lap in the valves using fine grinding paste until a gas tight seal is attained. Ensure valves are refitted in their original positions and that all trace of grinding paste is removed.
4. Lubricate the valve stems with engine oil and assemble the cylinder head. Ensure that the valve spring collars and collets are correctly seated. Renew the valve stem seals. Refit the cylinder head using a new gasket.

Operation 11 Pistons, connecting rods and bearing replacement (head and sump removed)

To remove

1. Remove oil pump assembly (Operation 4).
2. Turn the crankshaft to bring numbers 1 and 4 connecting rod bolts to an accessible position.
3. Check the identifying marks on the bearing caps and connecting rods. Mark if necessary.

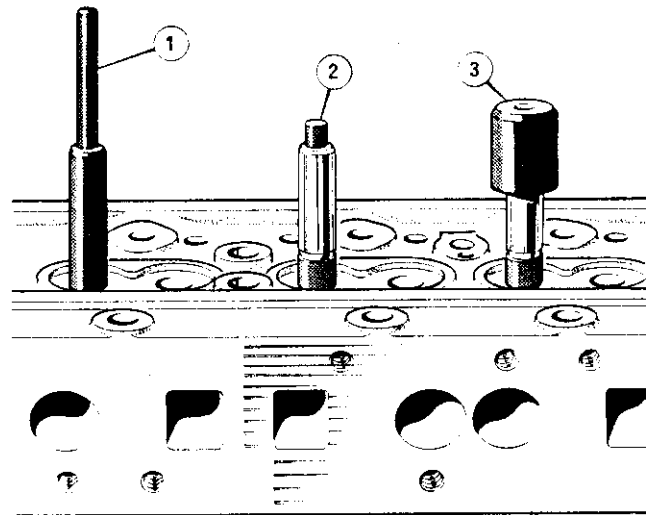


Figure 16 Valve guide removal and replacement

1. Valve guide removal
 2. Valve guide replacement
 3. Valve guide protection sleeve
4. Release the tab washers, unscrew the bolts and remove the big end bearing caps complete with shells
 5. Push the piston/con rod assemblies out through the top and carefully withdraw, keeping the end caps with their respective con rods.

Overhaul

1. Immerse the pistons and con rod assemblies in hot water for a few minutes. remove the circlips retaining the gudgeon pins.
2. Using a suitable drift, remove the gudgeon pins and disconnect the con rods from the pistons.
3. Check the small end bushes for wear and, if necessary, remove the old bushes using a hand press and fit new ones. Ensure that the oil hole in the new bush is correctly aligned with the oil hole in the con rod.
4. Having fitted the new bushes, check that the gudgeon pins will fit. It might be necessary to ream out the bushes (using an expanding reamer) to achieve a tight sliding fit.

Note: It is vital during this operation that the bush is reamed squarely to the con rod to ensure correct alignment.
5. Remove the piston rings and clean.
6. Clean the pistons, removing all carbon deposits, particularly from the ring grooves.
7. Assemble the pistons to the connecting rods using new circlips. It might be necessary to heat the pistons in hot water to enable the gudgeon pins to be pushed through.

Note: Engines up to number 5K/85/100226 have angle con rods which must be assembled with the cutaway to the camshaft side.
8. Before fitting the piston rings to the pistons, place each ring in its appropriate liner to measure the ring gap. This should be between 0.17 to 0.30 mm (0.007 to 0.012 in).
9. Fit the piston rings to the pistons, starting with the oil scraper ring, followed by the taper compression ring, then the compression ring.

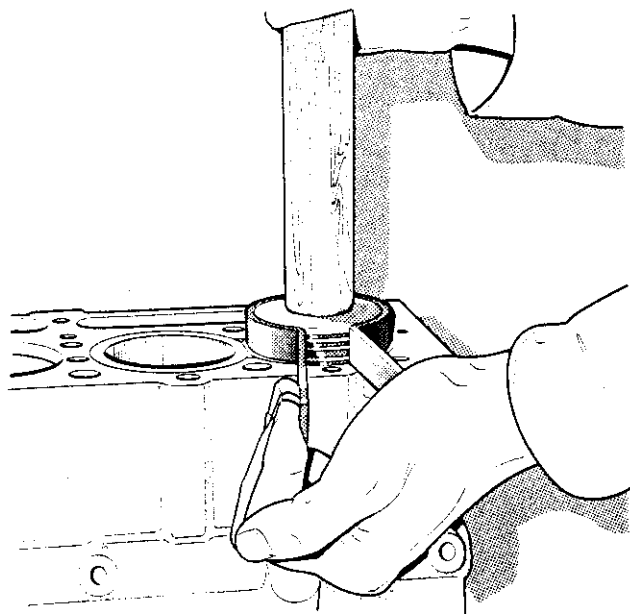


Figure 17 Compressing rings for refitting pistons

Note: The "top" mark on the taper compression ring must face uppermost. The upper groove in the piston accommodates the plain compression ring.

10. Insert the piston and connecting rod assemblies into the appropriate bores, ensuring that the piston crown arrow or front marking is facing the front of the cylinder block. The piston rings should be rotated so the gaps are equally spaced around the circumference of the pistons. Compress the rings using a piston ring compressor (**Figure 17**) and gently tap the assemblies into place.
11. Fit new big end bearing shells to the rods and caps and lubricate thoroughly using engine oil.
12. Locate the rods on to the crankshaft, position the end caps and secure in position with the bolts and new tab washers. Tighten to a torque of 2.9 kg/m (21 lb/ft). Ensure that the correct caps are fitted to the corresponding rods.
13. Replace the oil pump assembly, sump and cylinder head.

Operation 12 Crankshaft removal and installation (sump, front cover, flywheel, rear cover, connecting rods and camshaft sprocket removed)

1. Remove two bolts and lock washers and remove camshaft retaining plate.
2. Unscrew two nuts and lock washers and remove front engine plate and gasket from cylinder block.
3. Unscrew four set screws and remove the rear engine plate from the cylinder block.
4. Remove four screws and detach the two bridge pieces from the cylinder block.
5. Remove three main bearing caps each secured by nuts and lock washers.
6. The crankshaft can now be lifted from the cylinder block.

Overhaul

1. Inspect and test crankshaft journals for wear.
2. Fit new main bearing shells to crankcase and main bearing caps. See data for reground journal undersize bearings available.
3. Position the crankshaft into the new shells and fit rear and centre main bearing caps.

4. Locate the upper half of the thrust washer in the register on the inside face of the crankshaft main bearing bore in the crankcase.
5. Position the front main bearing cap and locate the lower half of the thrust washer in the register on the cap inside face.
Note: The thrust washer is fitted so that the thrust face, identified by oil grooves, bears against the crankshaft ground face.
6. Fit new bearing cap nuts and lock washers and tighten to a torque of 3.31 kg/m (24 lb/ft).

Check the crankshaft end float as follows:

- (a) Assemble the two halves of the outer thrust washer in the register on the outside face of the front bearing cap and block. Ensure that the oil grooves face forwards.
- (b) Position the steel countersunk thrust washer against the bi-metal thrust washer halves, with its countersunk aperture facing rearwards.
- (c) Refit crankshaft sprocket spacer and sprocket.
- (d) Refit crankshaft pulley and secure with bolt, washer and lock washer.
- (e) Rotate crankshaft to confirm freedom of movement. Secure a dial gauge to the crank case with the pointer bearing on a machined section of a crankshaft balance weight.
- (f) Carefully tap the rear of the crankshaft forwards to force the assembly against the dial gauge plunger. Zero the gauge.
- (g) Now tap the front pulley of the crankshaft towards the rear and note the end float on the gauge. This should indicate 0.0764 to 0.279 mm (0.003 to 0.011 in).
- (h) If necessary, adjust the end float by replacing the thrust washers with new ones of a different thickness. See data at the end of this section. refit the front cap with the replacement thrust washers and check the end float again.

Note: The end float can also be checked using feeler gauges between the thrust washer and the bearing face of the crankshaft.

To re-assemble

Replace all components in reverse order. Lubricate the main bearing shells thoroughly using engine oil before installing the bearing caps.

Note: When refitting the crankcase bridge pieces care should be taken to ensure that they are completely flush with the crankcase flange. Also it is essential to fit new cork seas when refitting bridge pieces.

Operation 13 Camshaft removal and installation (timing chain and sprocket removed)

1. Remove engine assembly (see **operation 1**)
2. Remove rocker cover and gasket.
3. Remove rocker shaft assembly.
4. Remove 8 pushrods keeping them in their correct order.
5. Remove cylinder head and distributor.
6. Remove sump (see **operation 3**)
7. Remove two nuts and lift the oil pump assembly complete with strainer from the cylinder block.
8. Knock out the pin securing the thrust muff to the distributor and oil pump drive shaft and remove the shaft upwards through the distributor aperture.
9. Remove the two bolts and lock washers securing the camshaft retaining plate.
10. Undo three nuts and washers and remove the front engine plate from the cylinder block, complete with gasket.
11. Lift the cam followers out through the cylinder block and carefully withdraw the camshaft.

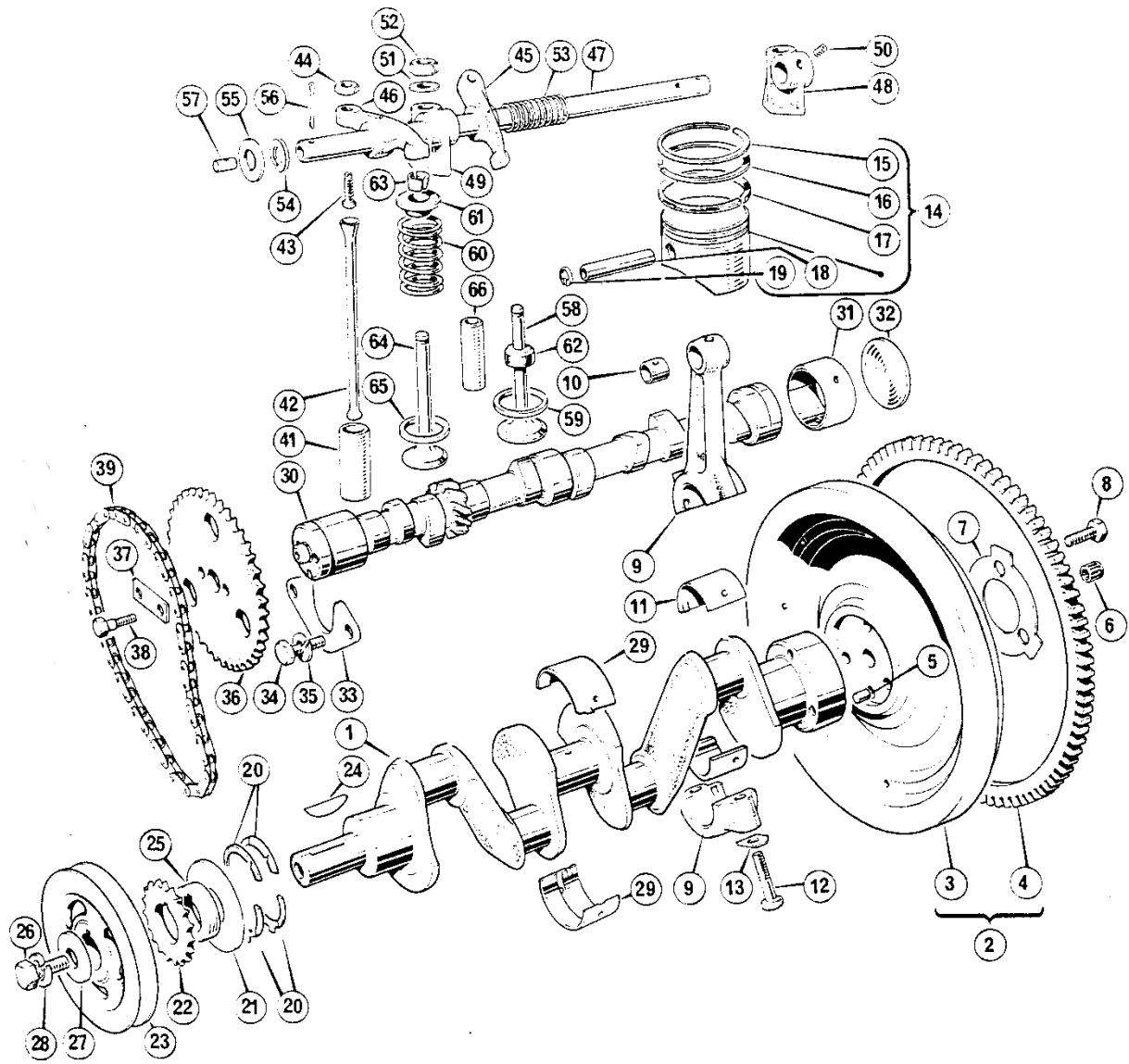


Figure 18 Engine, crankshaft and camshaft - exploded view

- | | | | | | |
|-----|--------------------------|-----|--------------------|-----|-------------------------|
| 1. | Crankshaft | 23. | Pulley | 45. | Rocker LH |
| 2. | Flywheel assembly | 24. | Key | 46. | Rocker RH |
| 3. | Flywheel | 25. | Spacer | 47. | Rocker shaft |
| 4. | Flywheel ring gear | 26. | Bolt | 48. | Bracket |
| 5. | Dowel | 27. | Washer | 49. | Bracket |
| 6. | Spigot bearing | 28. | Lock washer | 50. | Screw |
| 7. | Flywheel tab washer | 29. | Main bearing shell | 51. | Washer |
| 8. | Set screw | 30. | Camshaft | 52. | Nut |
| 9. | Connecting rod | 31. | Camshaft bearing | 53. | Rocker shaft spring |
| 10. | Small end bearing | 32. | Core plug | 54. | Rocker shaft end spring |
| 11. | Big end bearing shell | 33. | Plate | 55. | Washer |
| 12. | Bolt | 34. | Bolt | 56. | Split pin |
| 13. | Plate | 35. | Lock washer | 57. | Plug |
| 14. | Piston assembly | 36. | Sprocket | 58. | Inlet valve |
| 15. | Compression ring | 37. | Plate | 59. | Valve seat |
| 16. | Taper ring | 38. | Screw | 60. | Valve spring |
| 17. | Oil Scraper ring | 39. | Timing chain | 61. | Valve spring cup |
| 18. | Gudgeon pin | 41. | Cam follower | 62. | Valve stem seal |
| 19. | Circlip | 42. | Push rod | 63. | Valve cotter |
| 20. | Crankshaft thrust washer | 43. | Screw | 64. | Exhaust valve |
| 21. | Crankshaft thrust washer | 44. | Lock nut | 65. | Valve seat |
| 22. | Sprocket | | | 66. | Valve guide |

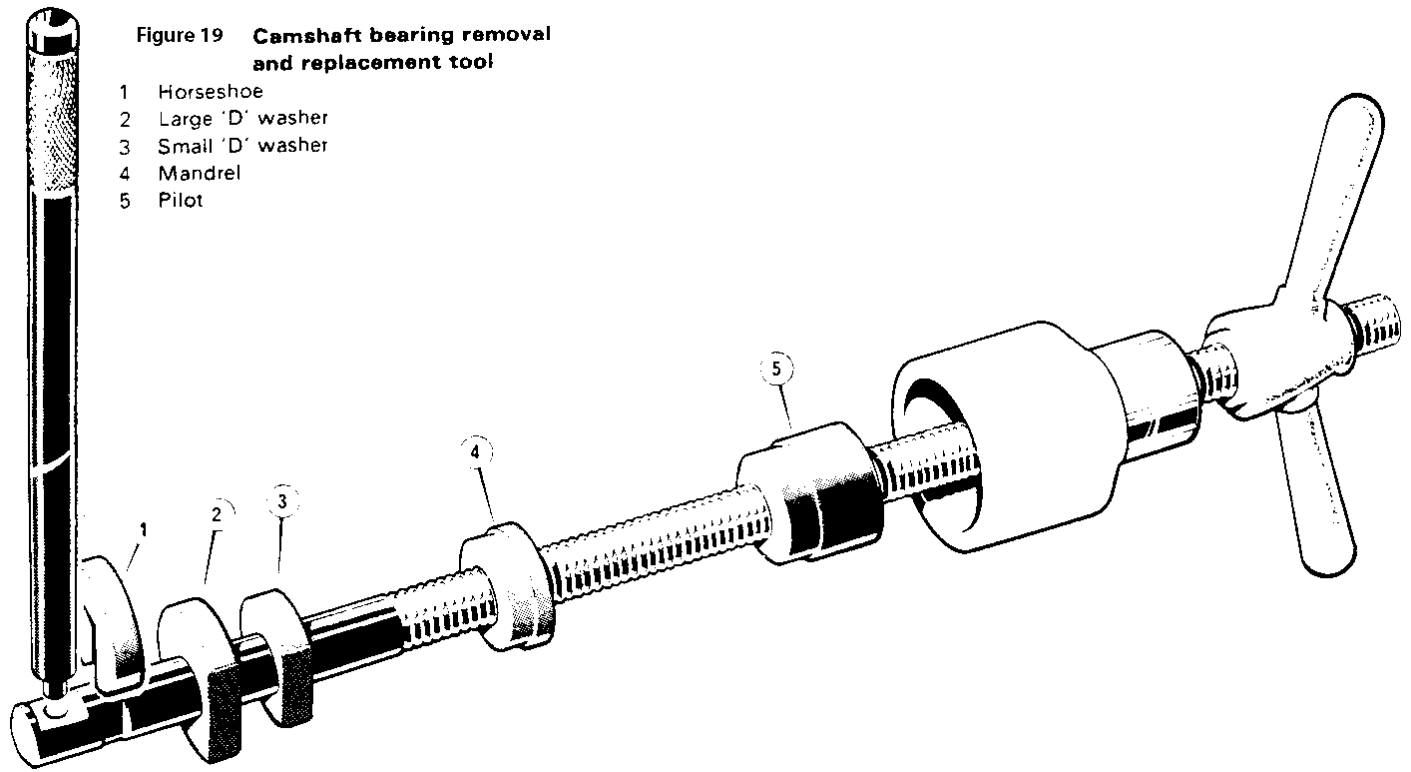


Figure 19 Camshaft bearing removal and replacement tool

- 1 Horseshoe
- 2 Large 'D' washer
- 3 Small 'D' washer
- 4 Mandrel
- 5 Pilot

To Replace

Re-assemble in the reverse order, fitting new gaskets where applicable.

Note: When refitting the distributor drive shaft, ensure the large "D" of the driving gear offset dog is facing towards the block at No. 1 piston, i.e. slot in a "5 minutes past 7 o'clock" position. Take the opportunity of checking the camshaft end-float which should be within 0.64 to 0.16 mm (0.0025 to 0.0065 in). Pull the camshaft out against the retaining plate and insert a feeler gauge between the groove and retaining plate. The camshaft retaining plate fitted as original equipment is 4.621 mm (0.182 in) thick. A service plate 5.258 mm (0.207 in) is available to counteract excessive end float but it may, of course, be necessary to reduce the thickness of the service plate to obtain the correct end float, dependent on the amount of wear.

Operation 14 Camshaft bearing removal and replacement (with camshaft removed)

Removal

1. Remove flywheel (see **operation 2**).
2. Unscrew four set screws and remove the rear engine plate from the cylinder block.
3. Drill a hole in the camshaft core plug and prise from the cylinder block.
4. Press out the rear, centre and front camshaft bearings using general tool 18G 124A and tool No. 7482 (**Figure 19**) as follows:
 - (a) Insert general tool and position pilot, mandrel and horseshoe as shown in **Figure 20**.
 - (b) Applying firm pressure, rotate the general tool handle until the camshaft bearing is removed completely from its location.
 - (c) To remove centre and front camshaft bearings position the general tool and components as shown in **Figure 20** and **Figure 21**.

To replace

1. To replace camshaft bearings position the general tool and components as shown in **Figure 22,23,**and **24**.
Note: Ensure that the oil holes in the bearing shells align with those in the block

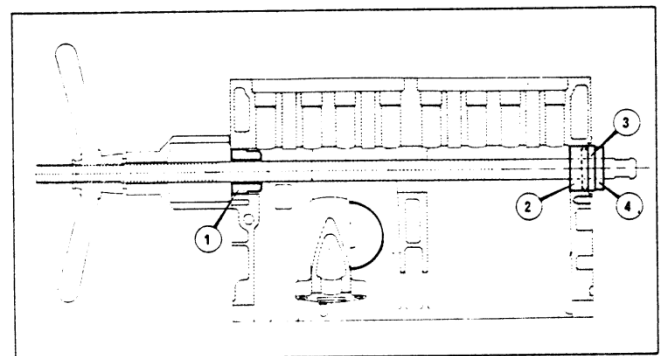


Figure 20 Removing camshaft rear bearing

1. Pilot
2. Bearing
3. Mandrel
4. Horseshoe

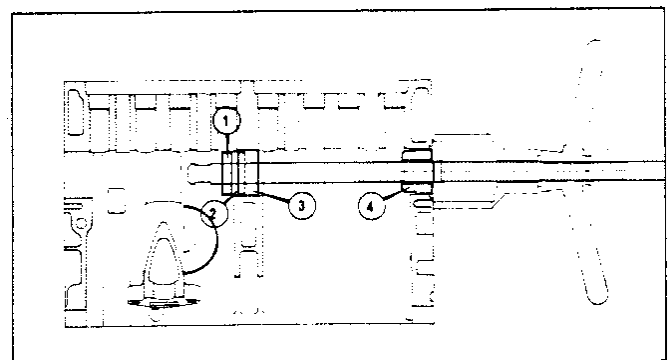


Figure 21 Removing camshaft centre bearing

1. Horseshoe
2. Mandrel
3. Bearing
4. Pilot

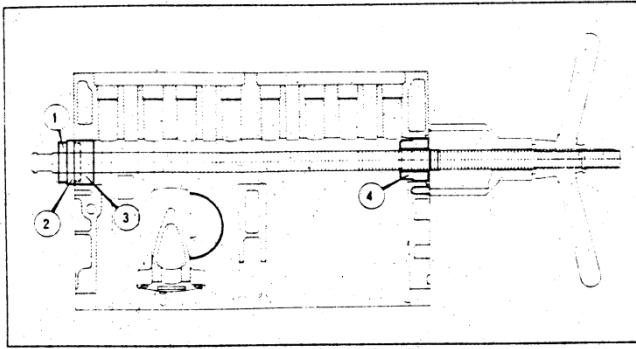


Figure 22 Removing camshaft front bearing

1. Horseshoe
2. Mandrel
3. Bearing
4. Pilot

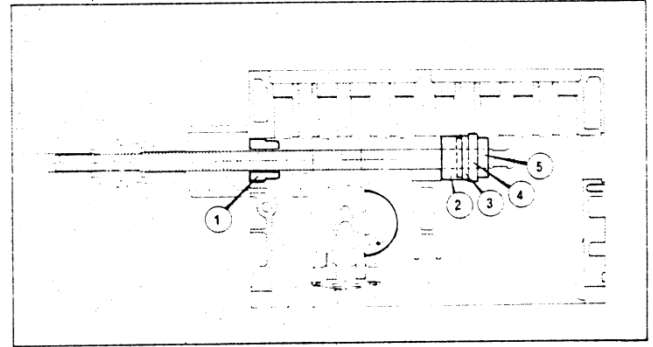


Figure 24 Replacing camshaft centre bearing

1. Pilot
2. Bearing
3. Mandrel
4. Small "D" washer
5. Horseshoe

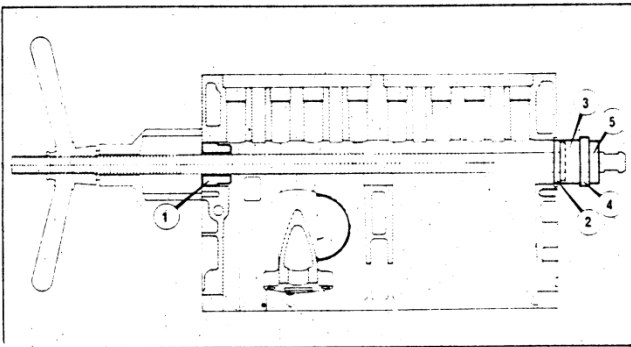


Figure 23 Replacing camshaft rear bearing

1. Pilot
2. Mandrel
3. Bearing
4. Small "D" washer
5. Horseshoe

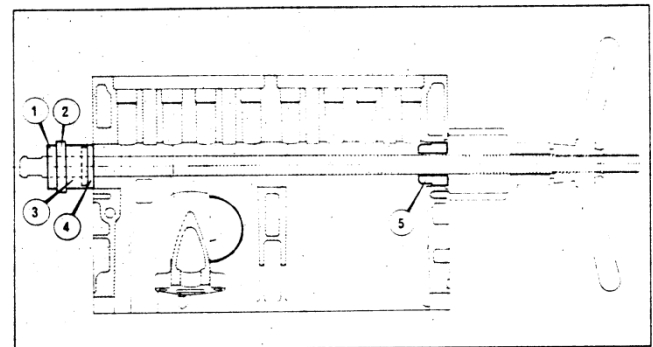


Figure 25 Replacing camshaft front bearing

1. Horseshoe
2. Large "D" washer
3. Bearing
4. Mandrel
5. Pilot

Operation 15 Cylinder liner replacement

Follow the dismantling procedure outlined in operations 1 to 15 and then continue as follows:-

1. Extract the four liners from the cylinder block using a tool similar to that shown in **Figure 26**.
2. Remove all traces of sealing compound from both the liners and their seats in the cylinder block.
3. Measure the liners for taper, ovality and maximum wear.

Note: Cylinder liners are manufactured in different grade sizes and are graded as high, low or mean. Pistons are similarly graded and it is important that a piston and cylinder liner must be of the same grade. The grade of the piston is stamped on the crown with the appropriate letter, i.e. H=high, M=mean, L=low.

The grade of the cylinder liner is marked on the outside wall with the appropriate letter (**Figure 27**). Pistons and liners are available from the spares department of your dealer in matched pairs.

It should be noted that if pistons or liners are supplied separately, the appropriate grade number must be quoted when ordering.

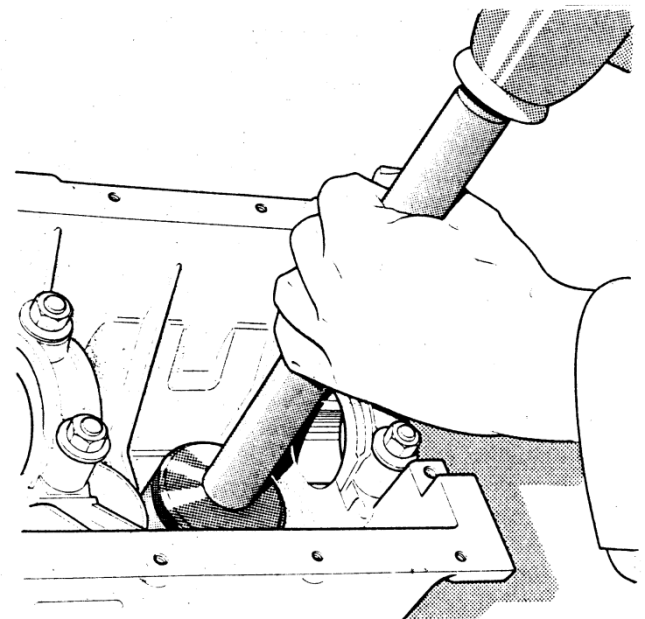


Figure 26 Removing cylinder liners

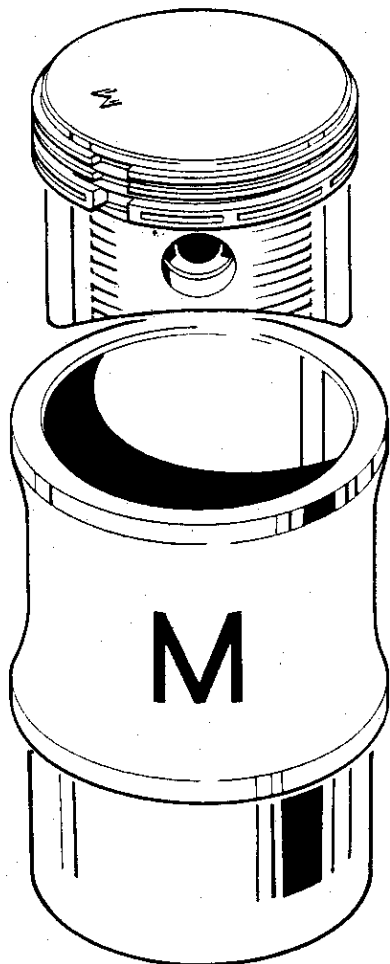


Figure 27 Piston and liner markings

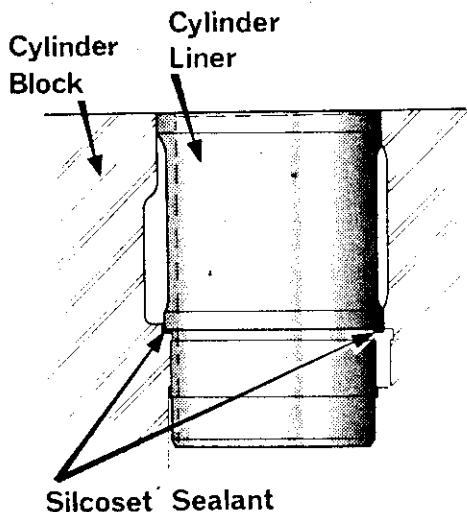


Figure 28 Sealing cylinder liners

Operation 16 Engine rebuild

The following information covers the rebuilding of an engine that has been completely dismantled e.g. to replace liners etc.

1. Smear "Silcoset 152" sealing compound thinly around the seating face of the liner and its location in the cylinder block, making a thin but complete 360° seal. (Figure 28)

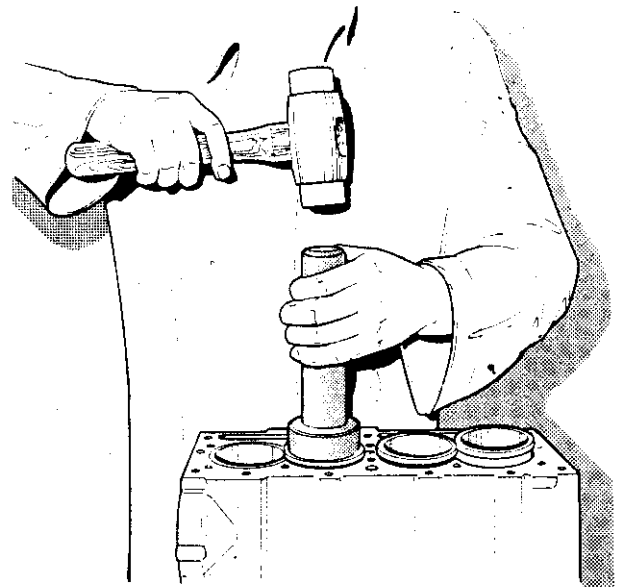


Figure 29 Fitting cylinder liners

2. Using a tool similar to that shown in **Figure 29**, insert the liners in to the block and ensure that they stand 0.050 to 0.152 mm (0.002 to 0.006 in) proud of the cylinder block face. Check that there is 0.381 mm (0.015 in) clearance between liners.
3. Assemble new pistons to the connecting rods securing in position with the gudgeon pins and circlips. To facilitate this it may be necessary to warm the pistons in hot water. Ensure that the "Front" mark or arrow on the piston is facing forwards.
4. Before fitting the rings to the pistons check the gap in the bore which should be 0.17 to 0.30 mm (0.007 to 0.012 in).
5. Insert the pistons in the bores with the rings in their correct grooves and the ring gapes spaced correctly as described in operation 11. Compress the rings for installation using a compression tool similar to that shown in **Figure 17**.
6. Fit new big end bearings in the connecting rods and caps. Ensure that the correct sizes of bearing are used. *see engine data*.
7. Check crankshaft main bearing journals. *see engine data*.
8. Fit new main bearings to crankcase and main bearing caps.
9. Fit new thrust washers to the crankshaft ensuring the thrust face of the washers makes good contact to the ground face of the crankshaft.
10. Refit the crankshaft to the engine block. Fit main bearing caps in the correct order, rear centre and front. Secure with six nuts and washers. Always use new nuts and washers and tighten to a torque of 3.316 kg/m (24 lb/ft).
11. Fit new oil seal into the rear cover oriented as shown in **Figure 4**. Position a new gasket and secure the cover to the cylinder block. Ensure that the dowels are firmly seated in their locations.
12. Fit the front and rear bridge pieces with new cork seals ensuring that the faces are flush with the cylinder block and secure with four screws.
13. Replace the rear engine plate, fixing it in to position with four set screws and lock washers.
14. Fit the flywheel assembly to the crankshaft and secure with three bolts and a new tab washer. Tighten to a torque of 3.87 to 4.14 kg/m (28 to 30 lb/ft). Check flywheel run-out (see **operation 2**)

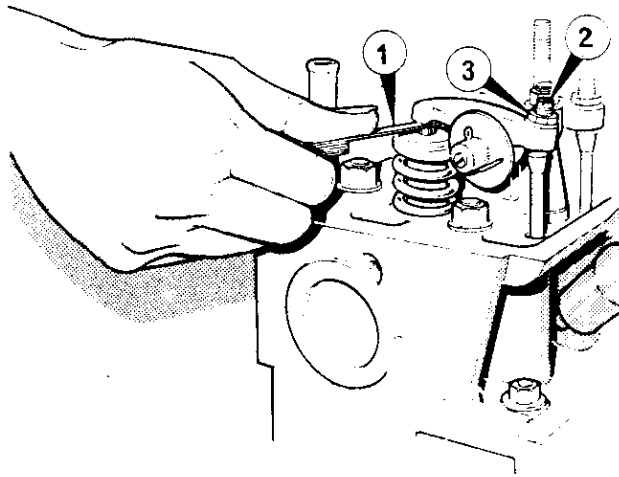


Figure 30 Valve clearance - tappet adjustment

1. Feeler gauge
2. Adjusting screw
3. Lock nut

15. Refit front engine plate with a new gasket, to the engine block and secure with three nuts and washers.
16. Fit the crankshaft outer thrust washers with the oil slots facing forward, followed by the steel thrust washer with its countersunk aperture facing rearwards.
17. Fit the woodruff key, spacer and crankshaft sprocket.
18. Using the flywheel, turn the crankshaft until the woodruff key is pointing to 11 o'clock.
19. Turn the camshaft until the groove in the end of the camshaft is in alignment with the woodruff key on the crankshaft.
20. Replace the camshaft sprocket along with the timing chain and secure with two bolts and new locking plate.
21. Using a straight edge, check the camshaft sprocket is in alignment with the camshaft sprocket. The valve timing mark on the camshaft sprocket should now be pointing to the woodruff key on the crankshaft.
22. Check timing chain tensioner for wear, renew if worn, and position on the post in the timing cover.
23. Fit the timing chain cover with a new gasket, using centralising tool No. RT 7481, and secure with seven bolts, two nuts and lock washers (**Figure 12**).
24. Replace crankshaft pulley and secure with bolt, plain washer and lock washer.
25. Locate a new gasket and fit the oil pump assembly, complete with strainer, securing to the cylinder block with two nuts and lock washers. Refit oil pump and distributor drive shaft.
26. Fit a new gasket and then fit the sump pan, tightening the fifteen set screws and spacers evenly.
27. Clean the cylinder head and cylinder block faces and fit a new gasket. Smear grease around the metal edges of the gasket bore eyelets.
28. Carefully position the cylinder head squarely on the cylinder block and secure with twelve nuts and washers. Replace the three bolts on the sparking plug side of the cylinder head.

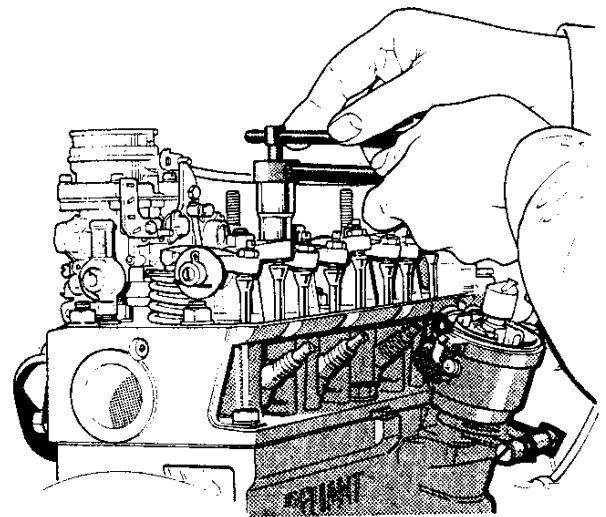


Figure 31 Tappet adjustment tool

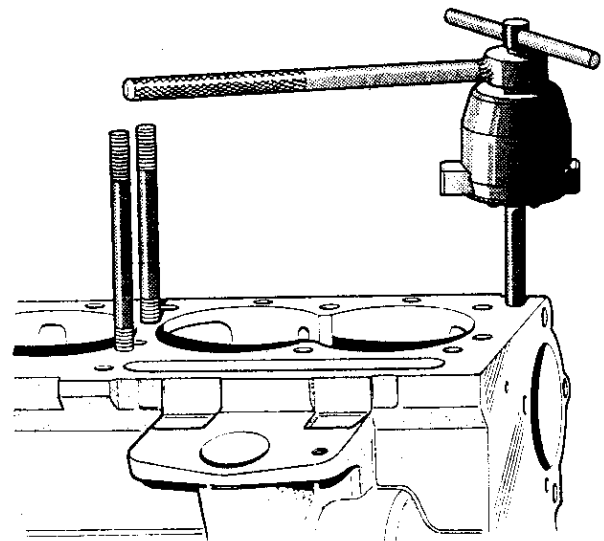


Figure 32 Stud removal tool

Check that the cylinder head nuts indicated in Figure 14 are tightened progressively to a torque of 3.46 kg/m (25 lb/ft). The three smaller nuts should be tightened to 2.07 kg/m (15 lb/ft).

29. Replace the push rods ensuring they are positioned in the correct order.
30. Install the rocker shaft on the four studs and secure firmly with four nuts and washers to a torque of 2.35 to 3.04 kg/m (17 to 22 lb/ft) Check tappet clearance (see Operation 17).
31. Fit a new gasket and refit the rocker cover.
32. Refit all ancillaries.
33. Install the engine and gearbox assembly (see **Operation 1**).

Operation 17 Valve clearance - tappet adjustment

Tappet clearances are:-
0.152mm (0.006 in) cold,
0.254 mm (0.010 in) hot

To adjust

1. Remove rocker cover.
2. Remove spark plugs.
3. Turn engine in normal running direction in order to open and close the valves and check in the following order:
 - No. 1 valve with No. 8 valve fully open.
 - No. 2 valve with No. 7 valve fully open.
 - No. 3 valve with No. 6 valve fully open.
 - No. 4 valve with No. 5 valve fully open.
 - No. 5 valve with No. 4 valve fully open.
 - No. 6 valve with No. 3 valve fully open.
 - No. 7 valve with No. 2 valve fully open.
 - No. 8 valve with No. 1 valve fully open.

When adjustment is made the valve must be in the fully closed position (**figure 30**).

4. Refit spark plugs and reconnect HT leads in the correct order.
 5. Refit rocker cover, renewing gasket if necessary.
- Alternatively the tappets can be adjusted using a proprietary tool similar to No. 6500A (see **figure 31**).

Stud removal

Damaged studs can be removed using extractor tool part No. 450A, in conjunction with the tappet adjuster wrench No. 6500A as shown in **Figure 32**

Engine specification

Cylinder head

Material	Aluminium alloy
Joint gasket thickness	1.02 mm (0.040 in)

Cylinder Block

Material	Forged aluminium alloy
----------	------------------------

Crankshaft

Material	Forged high tensile steel
Main bearing journals	44.44 to 44.45 mm (1.7495 to 1.75 inches)
Crankpin journals	33.07 to 33.08 mm (1.312 to 1.3025 inches)
End float	0.0254 mm (0.001 in) minimum 0.1524 mm (0.006 in) maximum

Crankshaft regrinding size

1st undersize	0.254 mm (0.010 in)
Main bearing journals	44.18-44.19 mm (1.7395-1.740 in)
Crankpin journals	33.07-33.08 mm (1.302-1.3025 in)
2nd undersize	0.508 mm (0.020 in)
Main bearing journals	43.93-43.94 mm (1.7295-1.73 in)
Crankpin journals	32.81-32.82 mm (1.292-1.2925 in)
3rd undersize	1.016 mm (0.040 in)
Main bearing journals	43.42-43.43mm (1.7095-1.71 in)
Crankpin journals	32.31-32.32 mm (1.272-1.2725 in)

Pistons

Material	Low expansion aluminium alloy
Size 700cc	60.50 mm (2.382 in)
750cc	62.53 mm (2.462 in)
All lands 700cc	60.15-60.2 mm (2.368-2.37 in)
750cc	62.17-62.26 mm (2.448-2.451 in)
At skirt 700cc	60.47-60.48 mm (2.381-2.386 in)
750cc	62.47-62.5 mm (2.459-2.638 in)

Piston rings

Gap	0.17-0.30 mm (0.007-0.012 in)
Width (compression rings)	1.245-1.250 mm (0.49-0.50 in)
Groove clearance	0.038-0.089 mm (0.0015-0.0035 in)
Width (oil scraper ring)	3.150-3.175 mm (0.124-0.125 in)
Groove clearance	0.038-0.089 mm (0.0015-0.0035 in)

Oversize rings available

Compression ring top	0.254 mm (0.010 in)
Compression ring bottom	0.254 mm (0.010 in)

Oil scraper ring	0.254 mm (0.010 in)
Gudgeon pin	
Diameter	14.283-14.288 mm (0.5623-0.5625 in)
Small end bush	
Bore	14.292-14.298 mm (0.562-0.563 in)
Camshaft	
Bearing diameter	38.66-38.67 mm (1.521-1.522 in)
Bearing clearances	0.0254-0.0889 mm (0.0010-0.0035 in)
End float	0.064-0.16 mm (0.0025-0.0065 in)
Chain pitch	9.525 mm (0.375 in)
Number of pitches	50
Valves	
Seat angle	45°-45°30'
Seat width	
Inlet	1.397-1.524 mm (0.055-0.060 in)
Exhaust	1.397-1.524 mm (0.055-0.060 in)
Valve lift	7.34 mm (0.289 in)
Valve guide lengths (inlet and exhaust)	41.4-41.66 mm (1.63-1.64 in)
Valve guide clearance	0.0381-0.0889 mm (0.0015-0.0035 in)
Valve springs	
Free length	700cc 40.46 mm (1.593 in)
	750cc 38.0 mm (1.496 in)
Fitted length and load	34.11 mm (1.343 in) at 17.01 kg (37.5 lbs)
Length and load valve open	28.6mm (1.125 in) at 39.6 kg (87.3 lbs)
Flywheel	
Material	Chromium cast iron
Diameter	246.126 mm (9.69 in)
Starter ring	
Number of teeth	100
Diameter over teeth	257.81 mm (10.15 in)
Crankshaft identification	
Colour code	-0.254mm (-0.010 in) - red -0.508 mm (-0.020 in) - blue -1.016 mm (-0.040 in) - green

Section G

Gearbox

Early Models prior to Chassis No 941001 – 3 Synchro

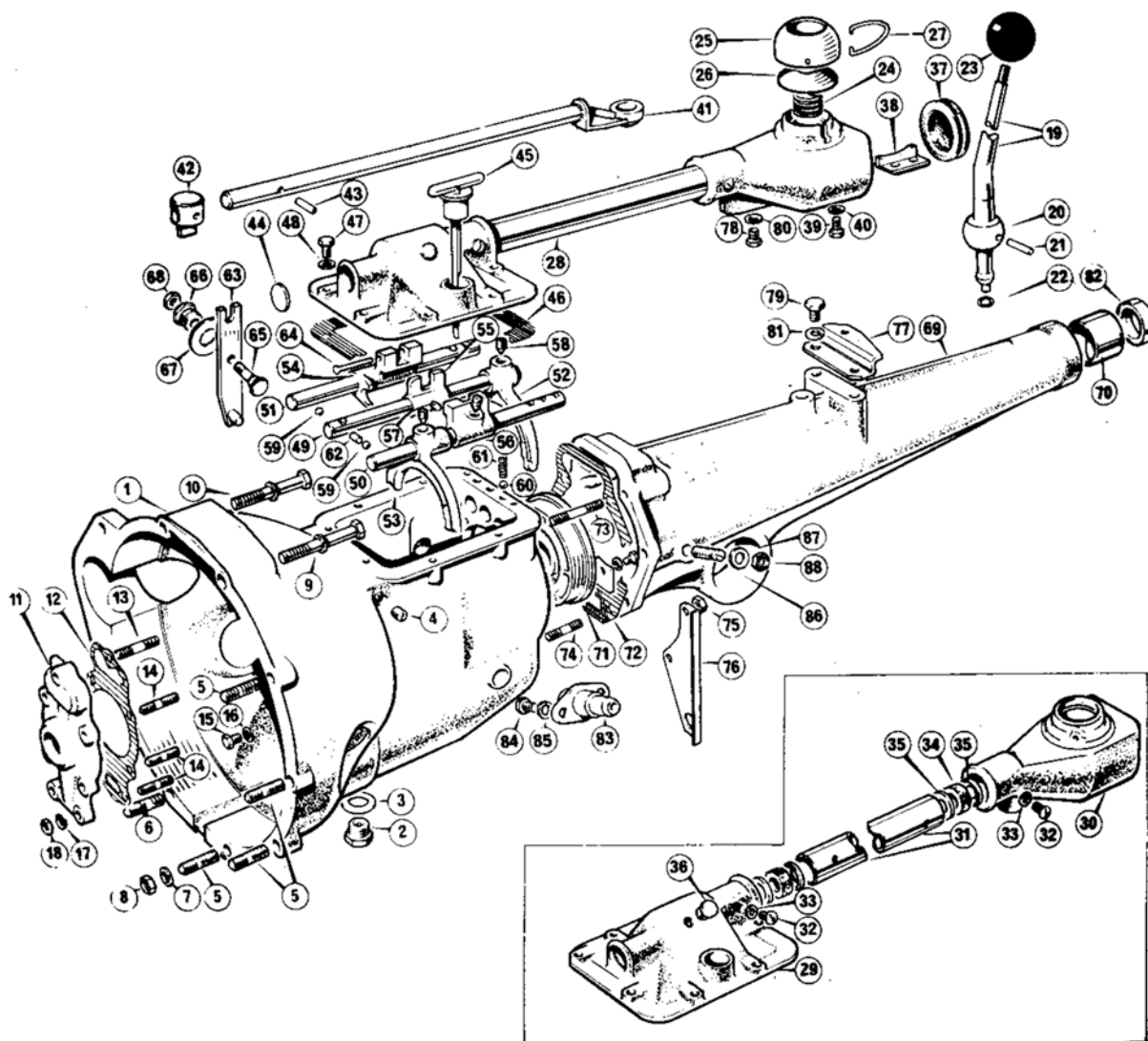


Figure 1 Gearbox exterior and selectors

1 Gearbox case	23 Knob, gear lever	45 Dipstick	67 Washer
2 Drain plug	24 Spring	46 Gasket	68 Nut
3 Washer	25 Cap	47 Set screw	69 Gearbox extension housing
4 Plug	26 Seat	48 Lockwasher	70 Bearing
5 Stud, gearbox to engine	27 Clip	49 Shaft selector fork 1st & 2nd	71 Bearing
6 Stud, gearbox to engine	28 Remote control assembly	50 Shaft selector fork 3rd & top	72 Gasket
7 Lockwasher	29 Top cover gearbox	51 Shaft selector fork, reverse	73 Stud
8 Nut	30 Remote control housing	52 Fork selector, 1st & 2nd	74 Stud
9 Bolt	31 Tube	53 Fork selector, 3rd & top	75 Nut
10 Bolt	32 Screw	54 Fork selector and lever, reverse	76 Bracket
11 Front cover	33 Washer	55 Fork lever, 1st & 2nd	77 Bracket
12 Gasket	34 Seal	56 Fork lever, 3rd & top	78 Set screw
13 Stud, front cover to gearbox	35 Retainer, seal	57 Pin	79 Set screw
14 Stud, front cover to gearbox	36 Plug, top cover	58 Screw	80 Lockwasher
15 Plug	37 Grommet	59 Ball	81 Lockwasher
16 Washer	38 Remote control block	60 Ball	82 Oil seal
17 Lockwasher	39 Set screw	61 Spring	83 Bush, speedometer
18 Nut	40 Lockwasher	62 Pin	84 Set screw
19 Gear lever	41 Shaft, remote gear change	63 Lever	85 Screw
20 Ball	42 Selector toggle	64 Fouling pin	86 Screw
21 Peg-ball to lever	43 Spring pin	65 Pivot pin	87 Washer
22 'O' Ring	44 Welch plug	66 Bush, pivot pin	88 Locknut

Gearbox removal and replacement (Figure 1)

To remove

1. Disconnect battery leads.
2. Remove gear lever gaiter.
3. Jack up the vehicle and place securely on axle stands.
4. Drain gearbox oil.
5. Disconnect speedometer cable.
6. Unscrew rear gearbox mounting bolt and remove rear cross member, noting position of earth braid.
7. Disconnect clutch rod from pedal lever and clutch operating fork.
8. Disconnect starter motor cable, unscrew two 3/8" UNF nuts, lock washers and bolts and remove starter motor (might need to remove oil filter for access).
9. Remove stabiliser rod.
10. Disconnect prop shaft from rear axle (4 x 5/16" UNF nuts, lock washers and bolts) and withdraw from gearbox.
11. Remove 2 x 5/16" UNC bolts and 6 x 5/16" UNF nuts complete with lock washers holding gearbox to rear of engine.
12. Support the gearbox and slide it rearwards from the engine.

To re-install

1. Raise the gearbox to the engine, slide forwards and locate on the six studs and secure the two assemblies together using the 2 x 5/16" UNC bolts and the 6 x 5/16" UNF nuts complete with lock washers.
2. Slide the prop shaft sleeve yoke into the rear of the gearbox engaging on the splines and secure the rear to the axle flange with 4 x 5/16" UNF nuts, bolts and lock washers.
3. Refit the stabiliser bar taking care to correctly locate the grommet in the rear engine plate.
4. Refit the starter motor using 2 x 3/8" UNF nuts, bolts and lock washers. Re-connect the starter motor cable.
5. Reconnect the clutch rod to clutch operating fork and pedal lever.
6. Using 8 x 5/16" UNF set screws and nuts secure the rear cross member to the chassis.
7. Fit the gearbox mounting bolt and reconnect the earth braid.
8. Reconnect speedometer drive cable.
9. Refill the gearbox with the recommended oil.

10. Adjust the clutch.
11. Remove the stands and lower the vehicle.
12. Reconnect the battery.

Gearbox dismantling (removed from vehicle)

To separate extension and remote control assembly from gearbox.

1. Unscrew 8 x set screws, complete with lock washers, securing top cover to gearbox. Remove the dip stick (if fitted).
2. Remove single set screw, and lock washer securing remote housing to support bracket extension.
3. Carefully lift the remote control assembly from the extension housing complete with top cover gasket (**Figure 1**).
4. Unscrew 6 x 1/4" UNF hexagon nuts and carefully separate the extension from the main gearbox body.

To dismantle the gearbox

1. Unscrew the drain plug and drain the oil from the gearbox.
2. Remove the rubber gaiter from the bell housing and detach from the operating fork.
3. Unscrew the nut and bolt securing the operating fork to its bracket and withdraw the fork from the bell housing.
4. Remove 7 x 1/4" UNF nuts and lock washers and detach the front cover from the gearbox, complete with its gasket.
5. Remove the three selector detent springs and invert the gearbox carefully to allow the balls to drop out.
6. Using an Allen key, remove the 4 x 5/16" UNF cone screws from the selector forks and levers.
7. Standing the gearbox on the bell housing, release locking plate, unscrew the 7/16" UNF bolt and remove locking plate, washer and coupling flange from the mainshaft. If necessary, use a suitable extractor to detach the coupling flange from the mainshaft.
8. Turning the gearbox on to its base and using a round drift of suitable diameter, tap the reverse gear selector shaft in to the bell housing and remove it. Withdraw the reverse forks.
9. Rocking the gearbox on to its left-hand side will allow the interlock ball bearing to roll out.
10. Using a suitable drift, remove the 3rd/4th selector shaft by tapping it in to the bell housing. Remove the fork lever.
11. Rocking the gearbox to its right-hand side will allow the interlock ball bearing to roll out.

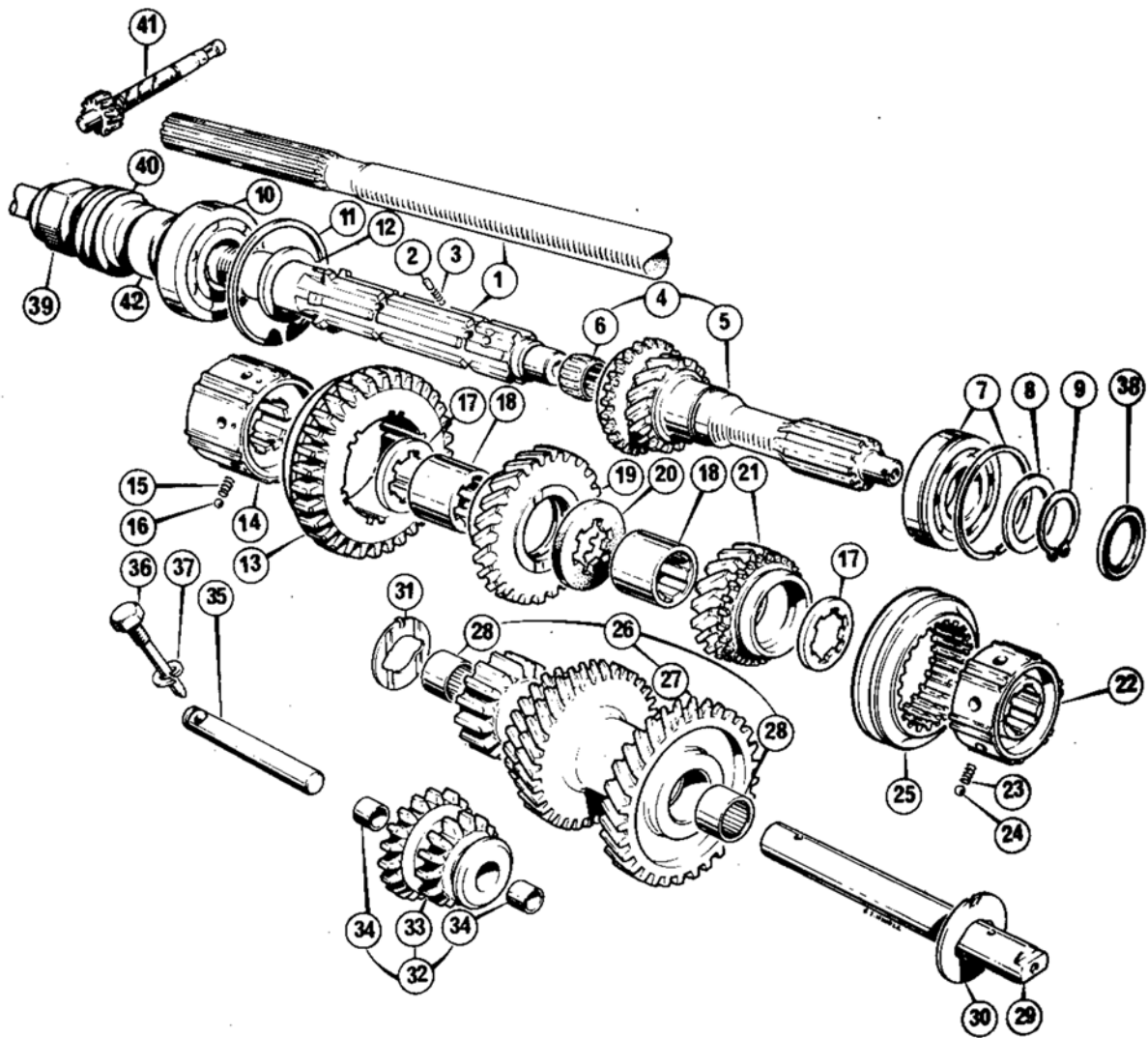


Figure 2 Gearbox interior

- | | |
|---------------------------------|---------------------------------|
| 1 Mainshaft | 25 Sleeve |
| 2 Plunger, mainshaft | 26 Laygear assembly |
| 3 Spring | 27 Laygear |
| 4 Primary gear assembly | 28 Bearing |
| 5 Primary gear | 29 Layshaft |
| 6 Bearing | 30 Thrust washer, front |
| 7 Bearing complete with circlip | 31 Thrust washer, rear |
| 8 Spacer | 32 Reverse idler assembly |
| 9 Circlip | 33 Reverse gear |
| 10 Bearing | 34 Bush |
| 11 Circlip | 35 Reverse shaft |
| 12 Spacer | 36 Screw |
| 13 Gear, 1st | 37 Lockwasher |
| 14 Synchromesh body, 1st & 2nd | 38 Oil seal, mainshaft |
| 15 Spring | 39 Nut |
| 16 Ball | 40 Gear speedo driving |
| 17 Collar | 41 Gear assembly, speedo driven |
| 18 Bearing, 2nd & 3rd | 42 Spacer |
| 19 Gear, 2nd | |
| 20 Thrust collar | |
| 21 Gear, 3rd | |
| 22 Synchromesh body, 3rd & top | |
| 23 Spring | |
| 24 Ball | |

12. Turn the 1st/2nd fork lever through 180° and remove the 5/16" UNF cone screw.
13. Using a suitable drift, remove the shaft by tapping it in to the bell housing, taking care not to lose the interlock pin.
14. Remove the selector forks. **Note** that the 1st/2nd fork has a shorter boss than the 3rd/4th fork.
15. Using a suitable drift, tap the layshaft into the bell housing. This will allow the laygear to drop in to the gearbox casing allowing the removal of the primary gear.
16. Remove the mainshaft cluster by withdrawing it through the rear aperture of the gearbox.
17. Using a drift through the mainshaft aperture bearing on to the bottom of the primary gear, gently tap the main shaft in to the bell housing complete with the primary bearing.
18. Remove the laygear and the laygear thrust washers.
19. Remove 7/16" UNF screw and lock washer and carefully tap the reverse idler gear shaft to the rear of the gearbox. **Note** there should be no need to remove the reverse lever. If this is necessary remove the pivot pin.

Reassembling the gearbox

Reverse gear assembly

1. Fit reverse lever bush, lock washer and reverse lever to the gearbox and secure with the pivot pin and ¼" UNF hexagon nut. **Note** It is important to ensure that the chamfered side of the reverse lever faces towards the front of the gearbox.
2. Fit new reverse gear bushes.
3. Position the reverse gear idler assembly in to the gearbox casing so that the reverse peg is located in the groove on the idler gear.
4. Locate reverse shaft and using the slot turn the shaft to allow the 7/16" UNF locking screw and lock washer to be fitted.

Laygear assembly

1. Replace the thrust washers on to the layshaft using a little grease. The 38.1 mm (1.5") o/d washer fits at the front of the shaft.
2. Fit new laygear bushes.
3. Position the laygear in position on the shaft and secure the 31.75 mm (1.25") o/d thrust washer using a little grease.
4. Ensure that the thrust tabs are correctly located in the slots provided.

Primary gear assembly

1. To dismantle the primary gear assembly, remove the circlip and spacer washer and press off the bearing. **Note** that

there is a retaining clip on the front of the primary bearing. Ensure that it is fitted when the bearing is replaced.

2. Using a suitable extractor, remove the primary bush.
3. Replace all worn parts as required and refit primary gear assembly to gearbox. **Note** that if a little gentle heat is used at the bell housing this will assist in the fitting of the primary gear assembly.

Mainshaft assembly

1. Remove the 3rd/4th body, complete with synchro sleeve from the front of the mainshaft after depressing the mainshaft plunger and turning the mainshaft collar. **Note** be careful not to lose the plunger spring.
2. Remove plunger and spring.
3. Remove 3rd speed gear and bearing, 2nd/3rd speed thrust collar, 2nd speed gear and 2nd speed bearing from mainshaft.
4. Depress 2nd mainshaft plunger, located below 2nd speed mainshaft collar, turn and remove.
5. Remove 1s2 speed synchro body complete with 1st speed gear.
6. Replace all worn parts as required and reassemble in reverse order.

Synchro bodies, 1st 2nd and top

1. Press the body through the gears, after first overcoming the tension of the six body springs. **Note** It is advisable to carry out this operation with the body wrapped in a suitable piece of cloth in order to avoid losing any of the six balls and springs.
2. Examine the gears and replace worn parts as necessary.
3. Reassemble in reverse order ensuring that the six flats on the splines of the first gear line up with the six balls in the first speed synchro body. Refit the mainshaft cluster to the gearbox.
4. Turn gearbox carefully on to its top face and using a suitable tool, align the laygear and thrust washers with the layshaft holes in the case.
5. Inspect the layshaft and replace if worn, then refit to gearbox. **Note** The tag end of the layshaft must face towards the front of the gearbox.
6. Hold temporarily in position with the front cover, securing with two nuts.

Rear bearing housing assembly

1. Unscrew the single No. 10 UNF set screw, complete with lock washer, securing bearing housing to rear of gearbox.
2. Remove the bearing housing retainer, and then withdraw the bearing housing from the mainshaft.
3. Release the circlip retaining bearing in housing.

- Using a suitable press tool or drift remove rear bearing from the housing.
- Examine all components for wear, replacing if necessary. Reassemble in reverse order.

- Remove the rubber grommet from rear of remote housing and carefully withdraw the gear change shaft.

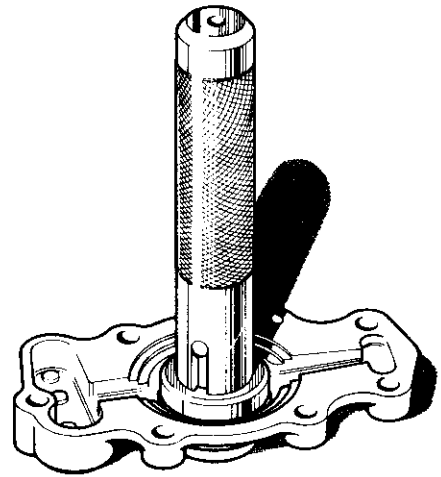


Figure 3 Replacing front cover oil seal

Reassembly of selector forks

- Fit coupling washer, tab washer and 7/16" UNF bolt, tightening to a torque of 6.91kg/m (50lb/ft). Bend over the tab washer to secure.
- Turn the gearbox on to its base and fit the 1st/2nd and 3rd/4th selector forks. **Note** 1st/2nd fork has a shorter boss than 3rd/4th fork.
- Secure interlock pin in to 1st/2nd selector shaft using a little grease. Refit to gearbox, together with associated fork lever and selector fork.
- Turn the 1st/2nd shaft and fork through 180° so that the grub screw can be fitted, then turn back to normal position.
- Turn gearbox on to left-hand side and insert the 3rd/4th shaft interlock ball in to its location.
- Fit selector shaft in to gearbox case through the fork lever and selector fork, securing with 5/16" UNF cone screw.
- Turn the gearbox on to its base and insert the reverse shaft interlock ball in to its location.
- Fit selector shaft in to gearbox case through the fork lever and secure with 5/16" UNF cone screw. **Note** Ensure that the reverse fork is engaged in the reverse gear lever.
- Treat all cone screws with "Loctite" and peen over to secure.

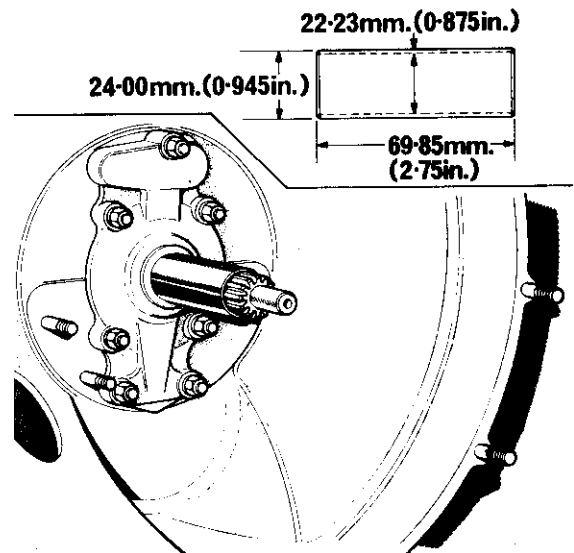


Figure 4 Refitting front cover (plus sleeve dimensions)

Front cover

- Check front cover oil seal and replace if necessary using tool No. RT 7488 (Figure 3).
- Fit a new gasket and secure front cover to gearbox case with seven 3/4" UNF nuts and washers. **Note** To prevent the primary gear damaging the oil seal when fitting front cover use a sleeve as shown (Figure 4).

- Using a 2.381mm (0.093") drift tap in the two roll pins securing the remote control housing to the housing tube. **Note** Early versions used screws and lock washers.
- Repeat the operation for removing the gearbox top cover.
- Examine the oil seals and replace if necessary.

Clutch operating fork

- Position the operating fork in its support bracket and secure with 5/16" UNF nut and bolt.
- Refit the rubber gaiter over the fork and locate in the bell housing.

To reassemble

- Locate both oil seals in their retainers in the remote control housing tube.
- Fit the housing tube in to the gearbox top cover and the remote control housing and secure with either roll pins or screws and lock washers. Tap in the roll pins until they are flush with both housings.
- Insert the gear change shaft in to the remote control housing and locate selector toggle in the gearbox top cover.
- Secure with roll pin.

Remote control housing assembly

To dismantle

- Remove the rubber plug from the gearbox top cover and, using a 3.175mm (0.125") drift tap in the roll pin to release the selector toggle from the shaft.

5. Replace top cover plug and remote control housing grommet.

Gearbox extension assembly

1. Using a suitable internal extractor tool, remove the gearbox extension rear seal. Check for wear and replace if necessary.
2. Slacken the 5/16" UNF lock nut and unscrew the speedometer drive gear stop.
3. Unscrew two ¼" UNF set screws, complete with lock washers and remove speedometer pinion thrust bush and gear assembly.
4. Remove the gear assembly from the thrust bush and check for wear. Renew if necessary.
5. When replacing the speedometer driven gear and thrust bush, ensure that the lock nut and screw are securely tightened to prevent lateral play in the gear.
6. Check the rear flexible gearbox mounting for wear or excessive movement. If the rubber has broken, this component will need renewing. A press tool will be needed to remove or replace the rubber bush.

To reconnect the remote control assembly to gearbox

1. Fit a new gasket and locate extension to gearbox studs, securing with six ¼" UNF locking nuts.
2. Insert the detent balls and springs in to the gearbox casing.
3. Position a new gasket on the top cover seating and fit the remote assembly, securing with six ¼" UNC set screws and lock washers.
4. A single ¼" UNF set screw and lock washer, supports the remote control housing to the mounting bracket which is secured to the extension with two 5/18" UNF set screws and washers.
5. Replace dipstick (if fitted).

Gearbox specification

Four forward speeds and reverse, synchromesh on second, third and top gears.

Ratios:	Top	1.000:1
	3 rd	1.454:1
	2 nd	2.461:1
	1 st	4.267:1
	Reverse	5.493:1

Oil capacity 0.85 litres (1.5 pints)

The remote control mechanism is not fitted to vehicles fitted with the all synchromesh gearbox. On these vehicles the gear lever is mounted directly to the gearbox top cover.

All synchromesh gearbox (from chassis No. 941001)

Gearbox removal and refitting (Figures 5 & 6)

To remove

1. Disconnect battery leads.
2. Remove gear lever gaiter.
3. Jack up the vehicle and place securely on axle stands.
4. Drain gearbox oil.
5. Disconnect speedometer cable.
6. Unscrew rear gearbox mounting bolt and remove rear cross member, noting position of earth braid.
7. Release spring clip and disconnect balance spring and withdraw gear lever.
8. Disconnect clutch rod from pedal lever and clutch operating fork. On 750cc engines remove the clutch slave cylinder and tie back safely.
9. Disconnect starter motor cable, unscrew two 3/8" UNF nuts, lock washers and bolts and remove starter motor (might need to remove oil filter for access).
10. Remove engine stabiliser rod (if fitted).
11. Disconnect prop shaft from rear axle (4 x 5/16" UNF nuts, lock washers and bolts) and withdraw from gearbox.
12. Remove 2 x 5/16" UNC bolts and 6 x 5/16" UNF nuts complete with lock washers holding gearbox to rear of engine.
13. Support the gearbox and slide it rearwards from the engine.

To re-install

1. Raise the gearbox to the engine, slide forwards and locate on the six studs and secure the two assemblies together using the 2 x 5/16" UNC bolts and the 6 x 5/16" UNF nuts complete with lock washers.
2. Slide the prop shaft sleeve yoke into the rear of the gearbox engaging on the splines and secure the rear to the axle flange with 4 x 5/16" UNF nuts, bolts and lock washers.
3. Refit the starter motor using 2 x 3/8" UNF nuts, bolts and lock washers. Re-connect the starter motor cable.
4. Reconnect the clutch rod to clutch operating fork and pedal lever. On 750cc engines refit the clutch slave cylinder.
5. Using 8 x 5/16" UNF set screws and nuts secure the rear cross member to the chassis.

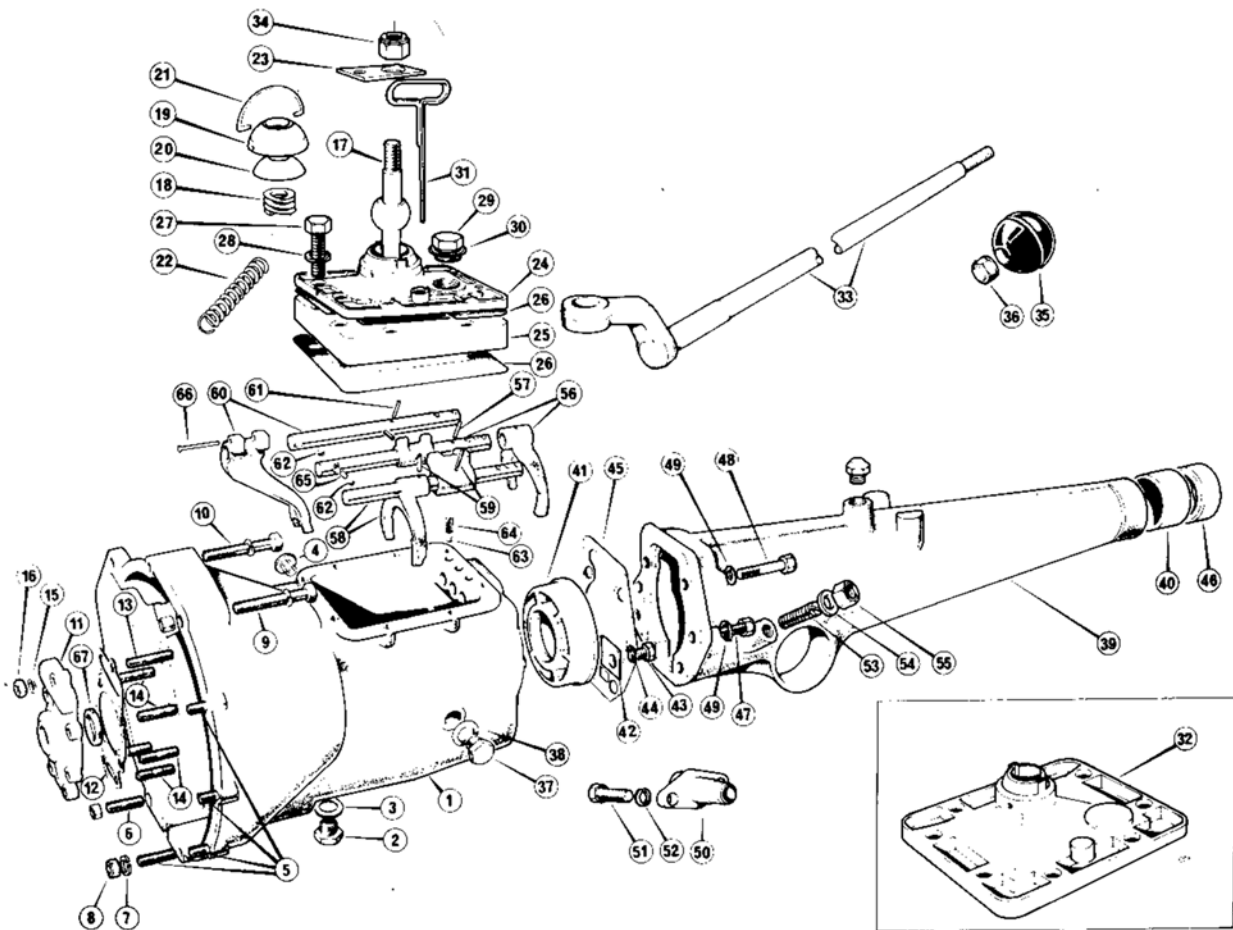


Figure 5 Gearbox exterior and selectors, all synchro

- | | | |
|---------------------------|------------------------------|-------------------------------------|
| 1 Gearbox case | 27 Bolt | 53 Screw |
| 2 Oil drain plug | 28 Lockwasher | 54 Washer |
| 3 Washer | 29 Filler plug | 55 Locknut |
| 4 Plug | 30 Washer | 56 Shaft, fork and lever, 1st & 2nd |
| 5 Stud, gearbox to engine | 31 Dipstick | 57 Pin |
| 6 Stud, gearbox to engine | 32 Top cover | 58 Shaft, fork and lever, 3rd & top |
| 7 Lockwasher | 33 Extension, gear lever | 59 Pin |
| 8 Nut | 34 Nut | 60 Shaft and fork, reverse |
| 9 Bolt | 35 Knob, gear lever | 61 Pin |
| 10 Bolt | 36 Locknut | 62 Ball |
| 11 Front cover | 37 Plug, oil filler/level | 63 Ball |
| 12 Gasket | 38 Washer | 64 Spring |
| 13 Stud | 39 Gearbox extension housing | 65 Pin |
| 14 Stud | 40 Bearing | 66 Fouling pin |
| 15 Lockwasher | 41 Bearing | 67 Oil seal |
| 16 Nut | 42 Plate | |
| 17 Gear lever | 43 Set screw | |
| 18 Spring | 44 Lockwasher | |
| 19 Cap | 45 Gasket | |
| 20 Seat, spring | 46 Oil seal | |
| 21 Clip | 47 Set screw | |
| 22 Spring | 48 Bolt | |
| 23 Anchor bracket, spring | 49 Lockwasher | |
| 24 Top cover | 50 Bush | |
| 25 Spacer | 51 Set screw | |
| 26 Gasket | 52 Lockwasher | |

6. Fit the gearbox mounting bolt and reconnect the earth braid.
7. Reconnect speedometer drive cable.
8. Refit engine stabiliser rod (if fitted).
9. Refill the gearbox with the recommended oil.
10. Remove stands and jack down the vehicle.
11. Replace gear lever.
12. Reconnect battery
13. Adjust clutch (700cc engines).

12. Lift out the laygear assembly and the two thrust washers.
13. Withdraw the reverse gear shaft through the rear of the gearbox and lift out the reverse gear.
14. Remove the rear cover from the mainshaft assembly.

Dismantling the gearbox (removed from vehicle) (Figures 5&6)

To dismantle the gearbox

1. Drain the gearbox oil.
2. Remove the clutch fork and lever assembly.
3. Unscrew eight set screws, with lock washers and remove the top cover, gasket, selector springs and detent balls.
4. Remove seven nuts and lock washers and remove the gearbox front cover.
5. Using a suitable drift, tap out the roll pins from the 3rd/4th selector fork and lever, then withdraw the selector shaft through the bell housing. Remove the selector lever.
6. Repeat the above for the 1st/2nd fork and lever and withdraw the shaft taking note of the interlock pin in the end of the shaft.
7. Tap out the roll pin from the reverse selector lever and withdraw the selector shaft through the bell housing.
8. Lift out the selector forks and tilt the gearbox to remove the two interlock balls from the cross drilling in the bell housing end of the selector shaft bores.
9. Withdraw the lay shaft into the bell housing, allowing the lay gear to drop in to the base of the gearbox.
10. Unscrew six set screws complete with lock washers and withdraw the rear cover and main shaft assembly, taking care not to displace the front or rear synchro sleeves.
11. Tap out the primary gear shaft from the bell housing.
Note: When separating the main shaft from the primary gear shaft the needle roller pilot bearing may remain on the mainshaft.

Mainshaft dismantling and re-assembly

To dismantle

1. Remove the first speed gear, bush and bush key complete with baulk ring from the mainshaft.
2. Remove the first/second gear selector sleeve. **Note:** It is advisable to carry out this operation with the sleeve wrapped in a suitable piece of cloth which will avoid losing any of the sets of balls, blocks, springs and plungers from the synchro body.
3. After removing the sleeve, recover the springs, balls, blocks and plungers from the cloth.
4. Repeat this operation for the third/fourth selector sleeve.
5. Remove the circlip from the spigot end of the mainshaft.
6. Using tool No. RT 8778, remove the third/fourth synchro body from the mainshaft.
7. Withdraw the first speed gear bush key. Using tool RT 8778, remove the first/second synchro body from the mainshaft and remove the second speed baulk ring.
8. Remove the second/third speed gear from the mainshaft.
9. Examine all components for wear and renew if necessary prior to reassembly.

To reassemble

1. Apply "Moly Grease 799" to second/third gear running faces on the mainshaft.
2. Fit the third speed gear and baulk ring on the mainshaft.
3. Secure the woodruff key in its seating on the mainshaft.
4. Locate the third/fourth synchro body on the mainshaft pressing in to position and fit the circlip.
5. Fit second speed gear and baulk ring to mainshaft followed by the thrust washer. Ensure that the thrust face of the washer abuts the gear.
6. Secure the second woodruff key in its location on the mainshaft.

7. Locate the first/second synchro body on the mainshaft and press in to position.
8. To facilitate further assembly, position the mainshaft in an assembly "pot" or a vice.
9. Fit the three springs and plungers to the third/fourth synchro body.
10. Slide the third/fourth synchro sleeve over the synchro body leaving sufficient room to enable fitment of thrust blocks and balls in the following operation.
11. Fit three thrust blocks leaving the synchro body ball seatings completely visible.
12. Seat the synchro body ball in the thrust block, press the ball down on to the plunger and slide the thrust block between the sleeve and the synchro body.
13. Repeat instruction 12 for the two remaining balls.
14. Slide the third/fourth synchro sleeve along the synchro body until it "clicks" in to position. **Note:** Ensure that the sleeve is not pushed in too far, otherwise the synchro balls and thrust blocks will be disturbed.
15. Reposition the mainshaft in a vice or assembly "pot" to facilitate first/second synchro body assembly.
16. Fit springs and plungers to the synchro body.
17. Slide first/second synchro sleeve over synchro body leaving sufficient room to enable fitment of thrust blocks and balls. Ensure the teeth of the synchro sleeve are facing forward.
18. Fit the three thrust blocks, leaving synchro ball seatings completely visible.
19. Seat synchro body ball in thrust block, press ball down on to plunger and slide the thrust block between the sleeve and synchro body.
20. Repeat instruction 19 for two remaining balls.
21. Position baulk ring on first speed gear.
22. Fit first speed gear bush key into its location in the synchro body.
23. Apply "Moly grease 799" to gear bush outside diameter and inner flange face and then fit first gear.
24. Position first gear, including bush and baulk ring, on to mainshaft splined end.
25. Rotate first gear bush, until it fully locates in the bush key seated in the first/second synchro body. **Note:** Handle mainshaft cluster with care to prevent synchro sleeves etc. from being disturbed.

26. Using tool No. RT 7490 press the rear cover on to the mainshaft.

Primary gear assembly - dismantling and re-assembly

To dismantle

1. **Prise the primary gear front seal from the gear shaft.**
2. Using circlip pliers (Tool No 7066) remove circlip securing the front bearing to the primary gear.
3. Remove the spacer and front bearing.
4. Withdraw the needle roller bearing from inside the gear body.
5. Inspect parts for wear, renewing if necessary.

To re-assemble

Replace components in reverse order. care should be taken when fitting the front seal that it is not damaged when passing the seal over the shaft splines. The seal is correctly fitted when it abuts the shoulder on which is the circlip. It must not abut the circlip.

Note: The lip on the front seal must face forward.

Lay gear - dismantling and re-assembly

1. Examine the lay gear assembly, gear teeth and renew complete assembly if obvious wear or damage is apparent.
2. The lay gear needle rollers should also be checked. remove worn items with a suitable drift. Care should be taken when fitting new needle roller bearings not to damage the bearing cage
3. If signs of scoring are apparent on the layshaft, due to worn needle roller bearings, it will have to be renewed.

Gearbox extension assembly

1. Using a suitable internal extractor tool, remove the gearbox extension rear seal. Check for wear and replace if necessary.
2. Slacken the 5/16" UNF lock nut and unscrew the speedometer drive gear stop.
3. Unscrew two ¼" UNF set screws, complete with lock washers and remove speedometer pinion thrust bush and gear assembly.
4. Remove the gear assembly from the thrust bush and check for wear. Renew if necessary.
5. When replacing the speedometer driven gear and thrust bush, ensure that the lock nut and screw are securely tightened to prevent lateral play in the gear.
6. Check the rear flexible gearbox mounting for wear or excessive movement. If the rubber has broken, this component will need renewing. A press tool will be needed to remove or replace the rubber bush.

Reverse idler gear assembly and shaft

1. Check reverse idler gear teeth and renew assembly if necessary.
2. Inspect bushes and if worn, drive out old bushes with a suitable drift and fit new ones. Ensure the end face of the bushes finish flush with the gear face,
3. Check gear shaft for scoring and replace if necessary.

To re-assemble the gearbox

1. Refit reverse idler gear and shaft in to the gearbox case with the select groove to the rear.
2. Position the laygear assembly with its thrust washers in to the base of the gearbox.
3. Refit the primary gear assembly in to the bell housing location. **Note:** Drive carefully in to position until the bearing retaining ring is flush with the case.
4. Feed in the mainshaft assembly, taking great care not to dislodge the synchro thrust blocks and balls.
5. Refit the rear cover with a new gasket to within 6.35 mm ($\frac{1}{4}$ in) of the gearbox face (to allow rotary movement and facilitate positioning of the layshaft).
6. Turn the gearbox on to its top face and slide the layshaft through the thrust washers and laygear assembly until it mates in its bore with the rear of the box. **Note:** The tang end of the layshaft must be at the front.
7. Position the tang end of the reverse shaft to engage with the horizontal slot in the rear cover, then bolt the rear cover fully home.
8. Return the gearbox to an upright position and insert the reverse, 1st/2nd and 3rd/4th selector forks on to the shafts.
9. Replace the two interlock balls in to the cross drilling in the bell housing, locating in position with grease.

10. Line up the reverse selector shaft in the selector fork and drive home the mills retaining pins.
11. Ensuring the interlock pin is in position, replace the 1st/2nd selector shaft in the selector fork and lever. Secure in position with the mills pin. **Note:** Rotate the shaft and fit the horizontal pin first, in the selector lever, before pinning to the selector fork.
12. Replace 3rd/4th selector shaft into the mating fork and lever, again retaining in position with mills pins.
13. Refit front cover. **Note:** Ensure that the oil seal is correctly positioned on the primary gear shaft. Secure front cover to gearbox with seven nuts and lock washers. Do not attempt to move selectors or change any gear until the front cover is secured as this will result in forcing the mainshaft assembly apart
14. Replace the selector shaft detent balls and springs and refit top cover and gasket, retaining in position with eight set screws and locking washers.
15. Refit the gearbox extension and secure with six $\frac{1}{4}$ " UNF nuts and lock washers.
16. Refit the clutch fork and lever assembly.

Gearbox specification

Four forward speeds and reverse with synchromesh on all forward gears.

Ratios:	Top	1.000:1
	3 rd	1.320:1
	2 nd	2.040:1
	1 st	3.880:1
	Reverse	3.250:1

Oil capacity 0.99 litres (1,75 pints)

Section H

Clutch

The clutch assembly comprises a spring pressure plate assembly and a single dry 158.75 mm (6.25 in) diameter clutch plate.

Prior to chassis number 941001 (700cc engines), The clutch pedal operates a short push rod linked to the clutch operating fork. A return spring is incorporated and is attached to the pedal lever and chassis frame.

Adjustment is achieved by a barrel type adjuster on the threaded portion of the clutch operating rod.

After chassis number 941001 (750cc engines) the clutch was operated hydraulically. Hydraulic clutches adjust in a similar manner to mechanical units. A pull off spring is mounted between the slave cylinder bracket and the clutch fork.

The clutch assembly

The clutch is located on the flywheel by two dowels and retained by six set screws and lock washers. Before dismantling it is advised that all major components be marked so they can be reassembled in the same relative positions, thus preserving balance.

To remove

1. Remove the gearbox (see Section G)
2. Unscrew the six set screws and locking washers and remove the clutch assembly from the flywheel.
3. Inspect the clutch disc carefully for wear, signs of oil contamination or signs of overheating. If any of the above are evident the clutch disc must be renewed.
4. Inspect the clutch cover for wear or signs of overheating. Should there be any sign of scoring or blueing the cover should be renewed.

Note: It is highly recommended that the clutch be replaced only as a complete three part assembly, comprising of cover, disc and release bearing.

To replace

1. Using tool No. RT 7485 as a centraliser, or a primary shaft from a gearbox, position the clutch disc and pressure plate assembly on the flywheel, securing evenly with the six set screws and lock washers to a torque of 1.66 to 2.07 kg/m (12 to 15 lb/ft) (**Figure 0**)

Release operating fork

The operating fork is secured within the bell housing by a support bracket which acts as a fulcrum for the operating fork. To ensure that the thrust pad moves in the correct plane, the pad is pivoted on the fork and secured by a pair of lock springs (**Figure 1**).

To remove

1. Withdraw the rubber gaiter from the bell housing and remove from the fork.

2. Unscrew the 5/18"UNF nut and bolt, detach the fork from its bracket and withdraw from the bell housing complete with the thrust bearing.
3. Release the lock springs from the thrust bearing and remove the bearing.

To replace

Reverse the above procedure.

On completion of the above steps, refit the gearbox.

Pedal assembly (mechanical operation) (Figure 2)

To remove

1. Release the return spring from the pedal assembly.
2. Remove the split pin and uncouple the clutch rod from the pedal lever.
3. Unscrew two ¼"UNF screws and remove the pedal arm from the clutch lever.
4. Remove 3/8"UNF nut, pedal bush outer seal and cap and withdraw clutch lever from the pivot located on the chassis frame. Remove inner seal and cap.
5. Drill out four rivets and remove the pedal gaiter retaining plate. The gaiter can now be withdrawn in to the footwell.
6. Prise off rubber clutch pedal pad and remove gaiter. Renew if split or perished.

To replace

Reverse the above procedure.

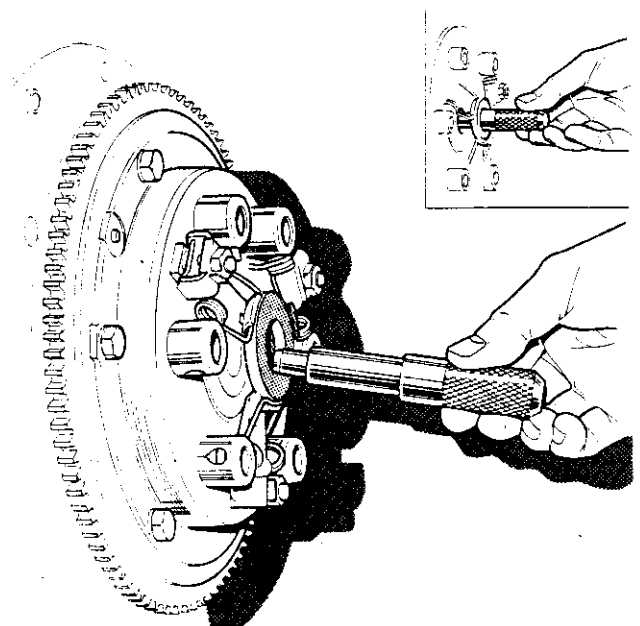


Figure 0 Clutch alignment tool

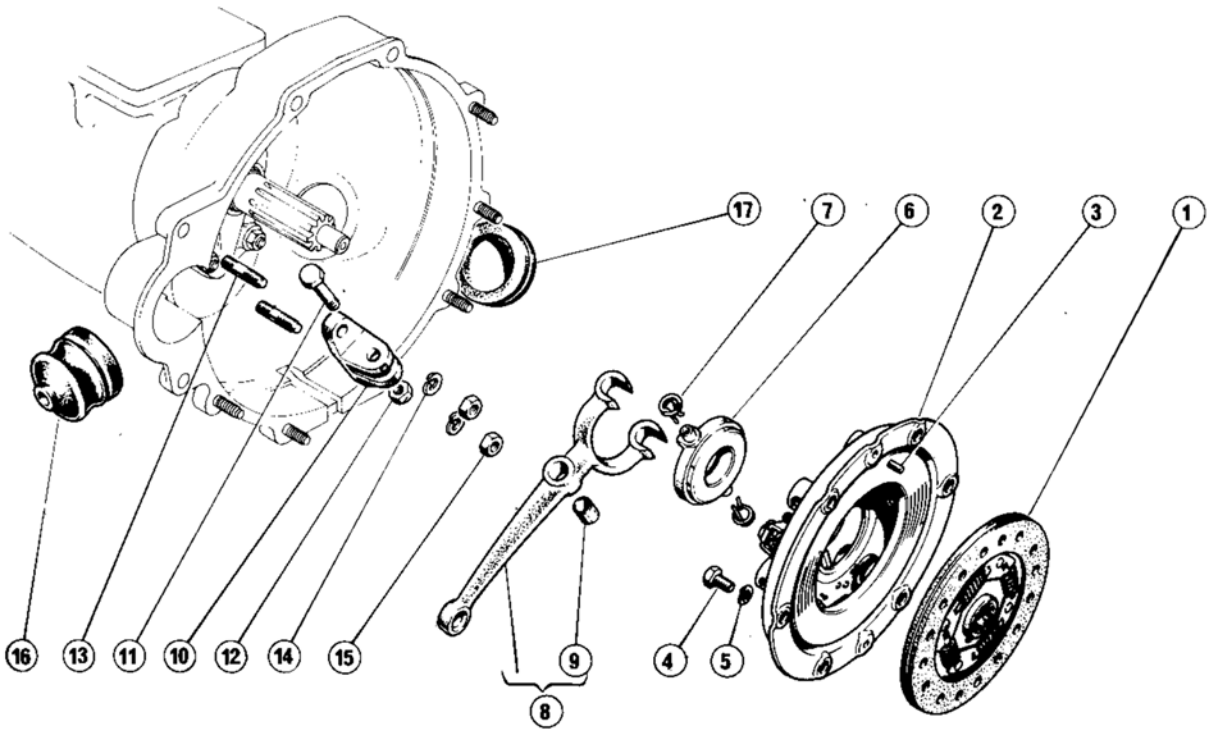


Figure 1 Clutch

- 1 Driven plate
- 2 Cover
- 3 Dowel
- 4 Set screw
- 5 Lockwasher
- 6 Thrust pad

- 7 Retaining clip
- 8 Fork
- 9 Bush
- 10 Bracket
- 11 Pivot bolt
- 12 Nut

- 13 Stud
- 14 Lockwasher
- 15 Nut
- 16 Gaiter
- 17 Grommet

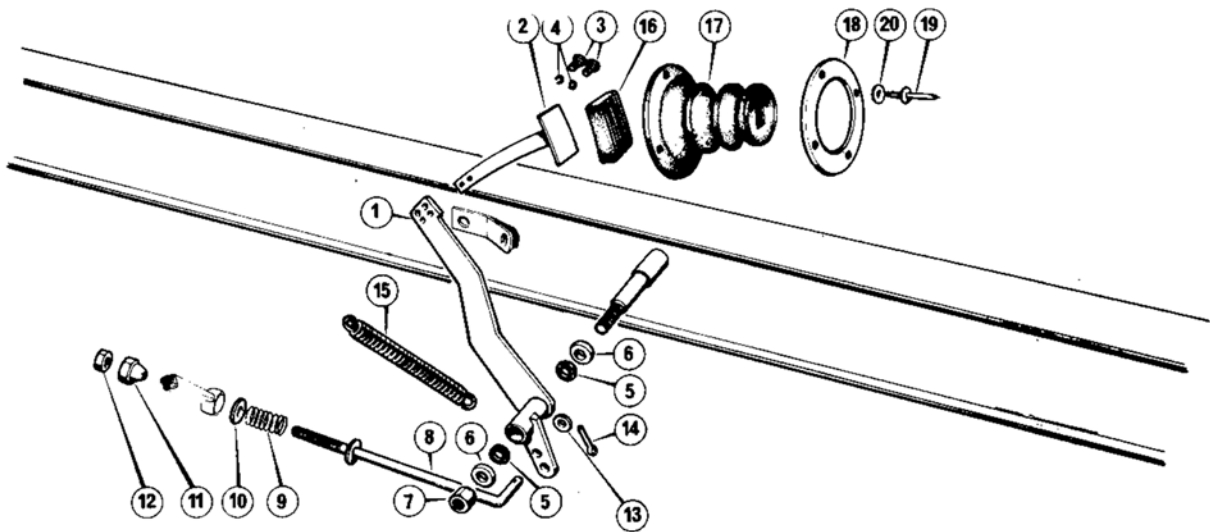


Figure 2 Clutch pedal assembly, mechanical

- 1 Lever
- 2 Pedal
- 3 Set screw
- 4 Lockwasher
- 5 Seal
- 6 Cap
- 7 Nut
- 8 Operating rod
- 9 Spring
- 10 Washer
- 11 Nut

- 12 Nut
- 13 Washer
- 14 Split pin
- 15 Spring
- 16 Cover pad
- 17 Grommet
- 18 Plate
- 19 Rivet
- 20 Washer

Clutch adjustment (Figure 3)

Adjustment is provided by a barrel type adjuster retained by a lock nut on the threaded portion of the clutch rod.

1. Slacken the lock nut and turn the adjuster to give 12.7mm (1/2in) free movement at the clutch pedal.
2. After adjustment retighten the lock nut.

Specification

Clutch type	Borg & Beck spring type or Laycock diaphragm type pressure plates with 158.7mm (6.25in) diameter single dry plate.
Operation	Mechanical.

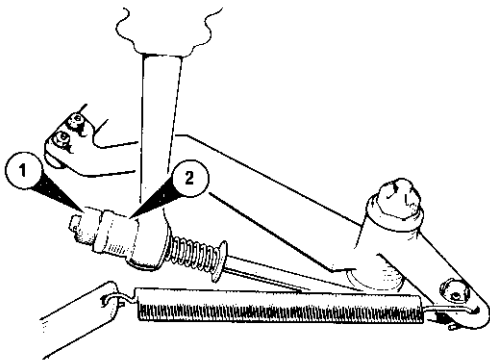


Figure 3 Clutch adjustment – mechanical (700cc)

1. Lock nut
2. Adjuster

Hydraulic clutch (after chassis number 941001)

The clutch cover, disc and release bearing are the same as the mechanically operated system as is the pedal assembly. Removal and replacement of these items has been covered earlier in this section.

Routine maintenance

The only maintenance required is to check the level of the fluid in the system and top up if necessary. The fluid level is checked by removing the left-hand cover in the foot well and then removing the master cylinder cap. The correct level is approximately 6.25mm (1/4") below the top face of the cylinder. The cap and the surrounding area should be wiped scrupulously clean before removing the cap, to avoid fluid contamination.

Ensure that the air vent in the cap is clear as a blockage will cause pressurisation in the reservoir leading to incorrect operation.

Bleeding the clutch hydraulic system

1. Clean the area surrounding the bleed screw on the slave cylinder and remove the rubber dust cap from the bleed screw. (Figure 4)
2. Fit a suitable tube on the bleed screw and put the free end of the tube into a container containing clean brake fluid. Ensure that the end remains immersed in the fluid throughout the bleeding operation.
3. Whilst an assistant slowly depresses the clutch pedal unscrew the bleed screw approximately one half of a turn. Repeat pumping the clutch pedal until air bubbles are no longer being pumped through. Have the assistant hold the pedal fully depressed and tighten the bleed screw.
4. Check the fluid reservoir level and top up as required.

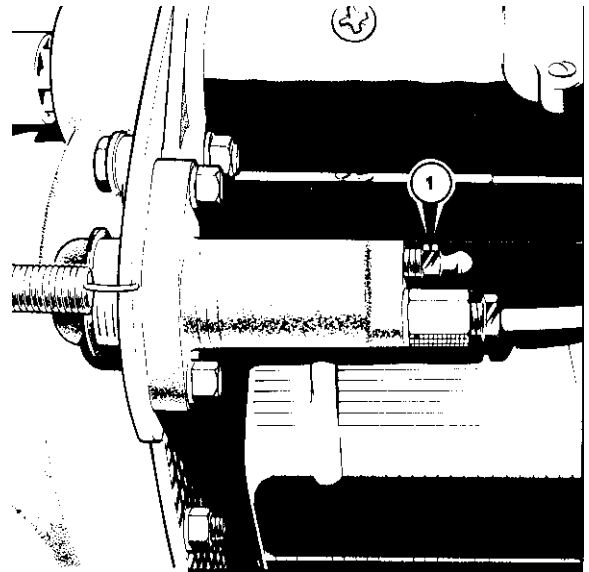


Figure 4 Clutch slave cylinder 750cc

1. Bleed screw

The clutch master cylinder (Figure 5)

The clutch master cylinder is secured to a mounting bracket, welded to the chassis, and is linked by a push rod directly to the clutch pedal.

A faulty master cylinder can be diagnosed by excessive pedal movement or signs of leakage in the area of the rubber dust boot and push rod.

Blockage of the air vent in the filler cap will result in positive pressure in the fluid reservoir which can prevent the return of the clutch pedal. Stiffness of the pedal operation can indicate a partially seized master cylinder.

Master cylinders should be changed as complete units. Whilst seal kits can be purchased and fitted this practice is not recommended.

To remove clutch master cylinder

1. Remove all superficial dirt from the assembly, particularly around the connecting point for the fluid pipe line. Use a recommended cleaning agent and do not allow the solvent to contaminate internal parts. Dry off thoroughly.
2. Disconnect the fluid pipe by unscrewing the union.
3. Disconnect the push rod from the clutch pedal by removing the split pin and washer, enabling the clevis pin to be withdrawn from the clutch pedal arm.
4. Remove two 5/16" UNF set screws, nuts and lock washers and withdraw the master cylinder from the mounting bracket.
5. Empty the contents of the master cylinder in to a clean container.
6. Plug the end of the fluid pipe to prevent fluid loss and dirt entry.

To replace master cylinder

1. Refit the master cylinder to its mounting bracket with two 5/16" UNF bolts, nuts and lock washers.
2. Reconnect the fluid pipe. Tighten the union securely but be careful not to over tighten it.
3. Reconnect the master cylinder push rod to the clutch pedal arm.
4. Top up the reservoir with clean fluid and bleed the system.
5. Check for leaks with the system under pressure – pedal held down. Road test to check clutch operation.

The clutch slave cylinder (Figure 4 & 5)

The clutch slave cylinder is mounted on the right-hand side of the engine rear plate and is secured by two 5/16" UNF set screws, nuts and lock washers. Failure of the clutch pedal to depress fully could indicate a seized slave cylinder. Any leakage from the area of the dust seal also indicates imminent failure. As with master cylinders, it is recommended that a failed slave cylinder be renewed should it fail.

To remove slave cylinder

1. Unscrew the union and remove the fluid pipe. Plug the end of the pipe to avoid fluid loss or dirt ingress.
2. Unhook the return spring from the clutch fork to the rear engine plate.
3. Remove two 5/16" UNF set screws, nuts and lock washers and withdraw the slave cylinder.

To replace slave cylinder

1. Locate the slave cylinder in to the engine back plate and secure with two 5/16" UNF set screws, nuts and lock washers.

2. Ensuring that the clutch fork is correctly located with the push rod, hook the return spring on to the fork and rear engine plate.
3. Reconnect the fluid pipe. Tighten the union securely but be careful not to over tighten it.
4. Top up the reservoir with clean fluid and bleed the system.
5. Check for leaks with the system under pressure – pedal held down. Road test to check clutch operation.

The clutch assembly

The clutch disc, cover and release bearing on hydraulic clutch cars are exactly the same as fitted to cars with mechanical clutch operation.

Clutch removal and replacement procedure is covered earlier in this section.

The pedal assembly (Figure 6)

The hydraulic clutches use a pedal assembly which is, as the clutch itself, virtually the same as the mechanically operated clutch vehicles.

Removal and replacement is as covered earlier in this section.

Clutch adjustment (Figure 6)

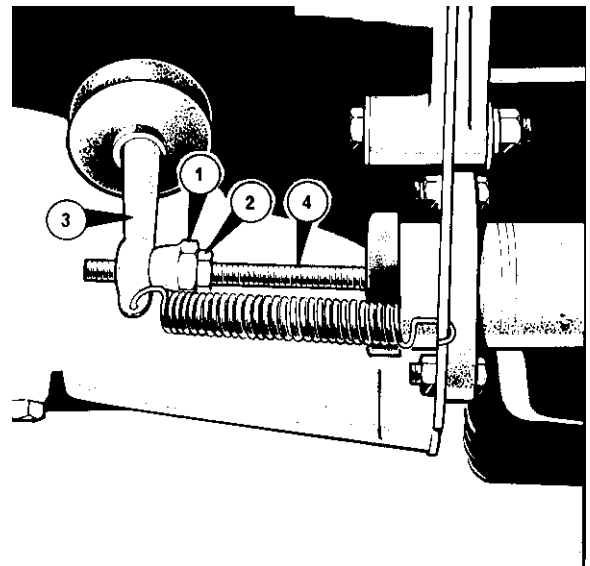


Figure 6 Hydraulic clutch adjustment

1. Adjuster
2. Lock nut
3. Operating fork
4. Push rod

Slacken the lock nut and turn the adjuster to give 0.79-1.59mm (0.031-0.063in) of movement of the operating fork against the spring pressure on the push rod.

Tighten the lock nut on completion.

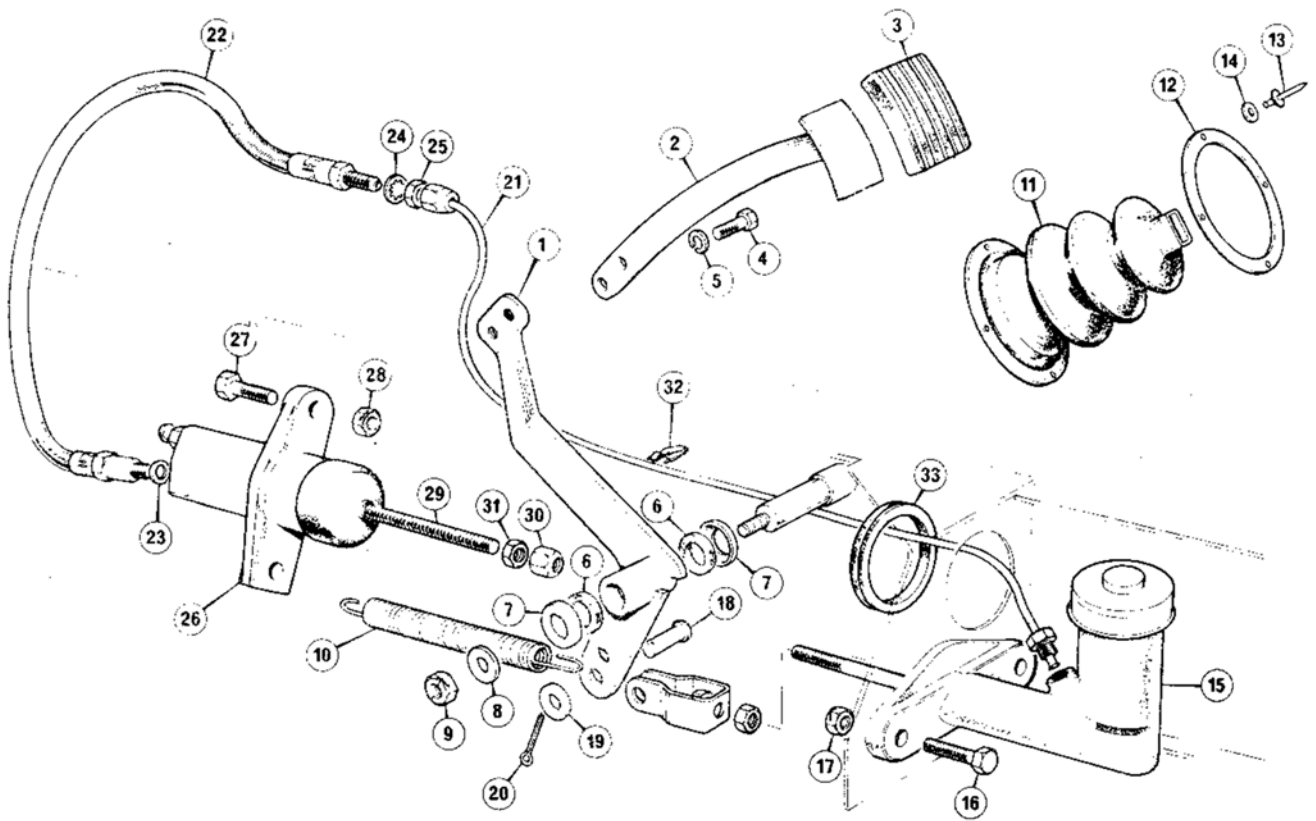


Figure 5 Clutch pedal assembly and hydraulics, 750 cc

- | | | |
|--------------|--------------------|-------------------|
| 1 Lever | 12 Plate | 23 Gasket |
| 2 Pedal | 13 Rivet | 24 Spring washer |
| 3 Cover | 14 Washer | 25 Nut |
| 4 Set screw | 15 Master cylinder | 26 Slave cylinder |
| 5 Lockwasher | 16 Set screw | 27 Bolt |
| 6 Seal | 17 Nut | 28 Nut |
| 7 Cap | 18 Clevis pin | 29 Push rod |
| 8 Washer | 19 Washer | 30 Domed nut |
| 9 Nut | 20 Split pin | 31 Locknut |
| 10 Spring | 21 Bundy | 32 Clip |
| 11 Grommet | 22 Flexible hose | 33 Grommet |

Section J

Prop Shaft (Drive Shaft)

Description

The prop shaft (or drive shaft) comprises two universal joints plus a splined section (sleeve yoke) which slides in to the rear gearbox extension on the output shaft to allow fore and aft movement of the rear axle. Each universal joint consists of a centre "spider", four needle bearings and two yokes.

Routine maintenance

Two lubrication points are provided, one for each universal joint. Grease should be applied to these points every 6,000 miles (10,000 km)

Prop shaft removal

1. Place the vehicle on a ramp, or on axle stands under the chassis.
2. Unscrew four bolts, nuts and locking washers from the coupling flange at the axle end, to allow the shaft to be lowered and slipped out of engagement with the gearbox extension.

Checking the prop shaft for wear.

The degree of wear on the shaft thrust faces can be determined by the amount of lift in the joints. This can be measured by hand using a piece of wood suitably pivoted. Any circumferential movement of the shaft relative to the coupling flange yokes indicates wear in the needle roller bearings, or ovality in the yokes.

A unit package (joint repair kit) is available for replacing worn needle bearings and journals but if excessive wear is apparent in the yoke bearings (or drive shaft splines) no action is possible and the drive shaft will need to be renewed as a complete assembly.

Prop shaft - dismantling and re-assembly

To dismantle

1. Using circlip pliers (general tool No. 7066) remove the four circlips from the universal joint.

Note: If no circlips are fitted, as may be the case on late vehicles, then the yoke bearings are "staked" in to position. These shafts are sealed and cannot be overhauled and a new shaft assembly complete will need to be procured and fitted.

It may be necessary to clean rust and paint from the yokes to enable the circlips to be removed.

2. Tap the radius of the yoke with a hide mallet to release the yoke bearings. Should this prove difficult then the bearings can be gently prised out from inside the yoke. Withdraw the bearing cups and disengage the journal from the yoke.
3. Repeat the sequence 1 and 2 on the remaining bearings, removing the journal from the yoke on the shaft.
4. Similarly separate the yoke and journals at the opposite end of the shaft.

To re-assemble

1. Remove the cups from the new spider journals.
2. Ensure that the cups contain an approved lubricant (one third full, leaving an air space to allow for heat expansion) and that all the needle rollers are in position.
3. Fit the spider to the prop shaft yoke, locating the journals in the yoke and carefully press both bearing cups in to position, ensuring that the spider trunnion engages the cups and that the needle bearings are not displaced. Repeat this operation for the other journal.
4. Using two tools of slightly smaller diameter than the bearing cups, press the cups in to the yokes until they reach the lower land of the circlip grooves. Do not press the cups below this point or damage may be caused to the cups, bearings and seals.
5. Fit the circlips.

Operation 4 Prop shaft - refitting

To replace

1. Insert the sliding spline (sleeve yoke) in to the rear gearbox extension on to the output shaft and push home.
2. Align the rear flange with the rear axle flange and secure with four 5/16" UNF bolts, nuts and locking washers.
3. Lower the vehicle back to the ground

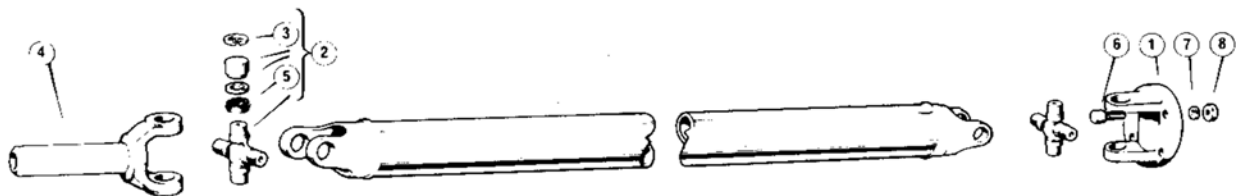


Figure 1 Drive shaft

- 1 Flange yoke
- 2 Unit package, journal kit
- 3 Circlip
- 4 Sleeve yoke
- 5 Lip seal
- 6 Bolt
- 7 Lockwasher
- 8 Nut

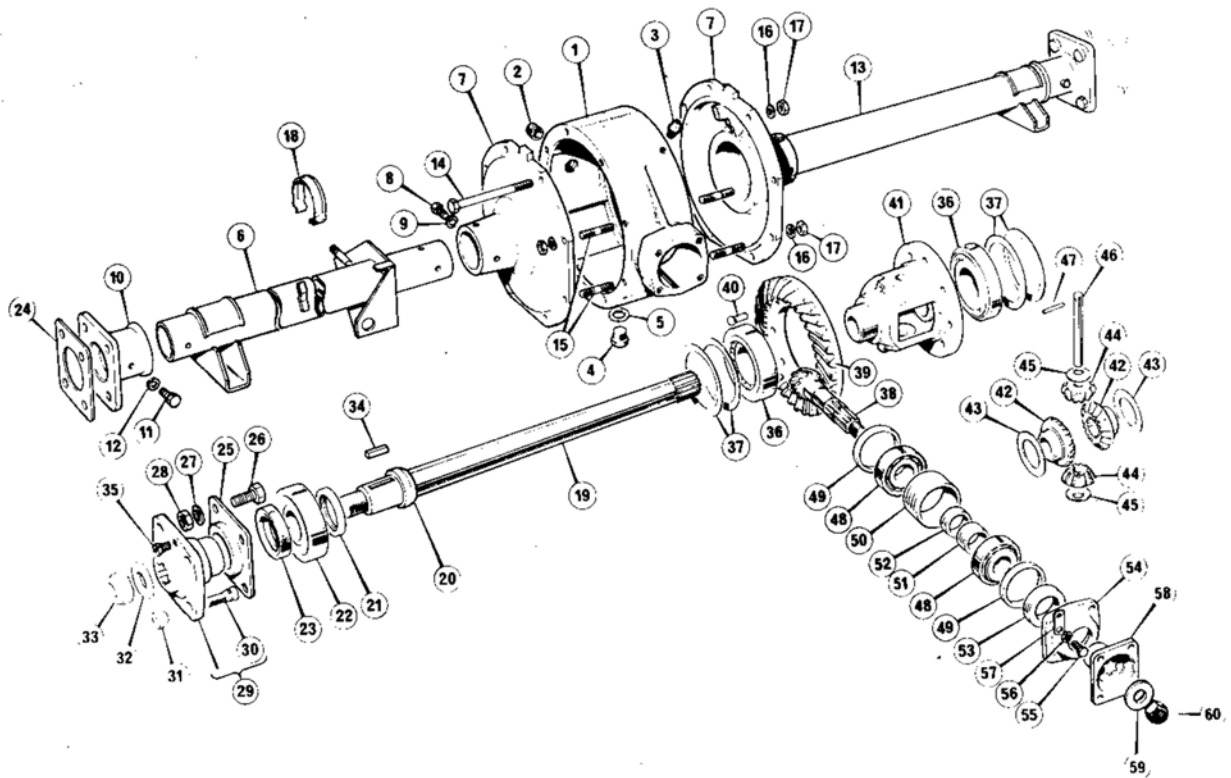


Figure 1 Rear Axle

- | | | |
|-----------------|--------------------------------|---------------------------------|
| 1 Axle case | 21 Oil seal | 41 Differential case |
| 2 Plug, filler | 22 Bearing | 42 Wheel, differential |
| 3 Breather | 23 Oil seal | 43 Thrust washer |
| 4 Plug, drain | 24 Gasket | 44 Pinion, differential |
| 5 Washer | 25 Retainer | 45 Thrust washer |
| 6 Axle tube | 26 Set screw | 46 Differential pin |
| 7 Cover plate | 27 Lockwasher | 47 Locking pin |
| 8 Set screw | 28 Nut | 48 Taper bearing, pinion |
| 9 Lockwasher | 29 Hub assembly | 49 Spacer, outer, pinion |
| 10 Axle end | 30 Stud | 50 Spacer, outer, pinion |
| 11 Set screw | 31 Wheel nut | 51 Spacer, inner, long, pinion |
| 12 Lockwasher | 32 Washer | 52 Spacer, inner, short, pinion |
| 13 Axle tube LH | 33 Nut | 53 Oil seal |
| 14 Bolt | 34 Key | 54 Cap |
| 15 Stud | 35 Screw | 55 Set screw |
| 16 Lockwasher | 36 Taper bearing, differential | 56 Lockwasher |
| 17 Nut | 37 Shim | 57 Clip |
| 18 Clip | 38 Pinion | 58 Coupling flange |
| 19 Axle shaft | 39 Crown wheel | 59 Washer |
| 20 Collar | 40 Rivets | 60 Nut |

Description

The rear axle is of the spiral bevel gear, semi floating type, all models having a ratio of 4.375:1.

A two piece axle case assembly houses a taper roller bearing differential unit with the crown wheel bolted to the casting. The pinion is located in the centre of the housing case supported by taper roller bearings.

Bearing preload in the differential assembly is controlled by shims between the bearings and the differential castings.

The depth of mesh between the pinion and the crown wheel is controlled by a spacing washer and additional shims as required. The crown wheel and pinion are a selected pair. Identifying numbers are etched on both. This condition applies to spare parts and production alike. Under no circumstances should an unmatched crown wheel and pinion be fitted.

Routine maintenance

Top-up the rear axle every 6,000 miles (10,000 km) if necessary. The rear axle oil level should be checked by means of the combined filler/level plug (**Figure 1**).

Drain and refill the axle every 15,000 miles (24,000km) with the recommended oil as shown in the lubrication chart.

Note: The rear axle has a breather hole, located in the left-hand axle tube and this should be checked and cleaned out, if necessary, every 6,000 miles (10,000 km). If the breather hole is continually blocked, pressure generated within the axle will cause oil leakage from the pinion and half shaft seals.

Rear axle- removal and replacement.

To remove

1. If a ramp is not available jack up the rear of the car and place securely on axle stands under the chassis rails. Remove the road wheels.
2. Remove the prop shaft see **Section J**.
3. Disconnect the handbrake cable from the compensator balance lever and withdraw the cable from the abutment bracket.
4. Disconnect the hydraulic flexible pipe and plug this to stop fluid leakage and dirt ingress.
5. Place a jack or suitable support under the axle.
6. Remove the bolts, nuts and washers and disconnect the lower damper mountings, freeing the dampers from the damper brackets.
7. Unscrew the 8 3/8" UNF locknuts and 8 3/8" UNF nuts and washers from the "U" bolts securing the leaf springs to the axle.
8. Remove the two 1/2" UNF nuts and bolts securing the leaf springs to the rear shackles.
9. The axle can now be removed by lowering the leaf springs and withdrawing the axle from the rear of the vehicle.

To refit

1. Support the rear axle and move it in to position beneath the vehicle.
2. Carefully raise the axle on a jack until the unit is in its correct position.
3. Raise both rear springs and secure to rear shackles with 1/2" UNF nuts and bolts.
4. Fit the "U" bolts over the axle, position the lower damper brackets and secure springs to axle using 3/8" UNF nuts and lock nuts.
5. Refit the dampers to the lower mounts using 1/2" UNF nuts, bolts and washers.

6. Reconnect rear brake flexible hose.
7. Locate handbrake cable in its abutment bracket and reconnect to the compensator balance lever.
8. Refit the prop shaft.
9. Refit the rear wheels and lower the vehicle to the ground.
10. Bleed the brakes (**Section L**).

Replacing half shaft bearings (axle in vehicle)

1. Jack up the vehicle, place suitable stands under the chassis and remove the road wheels.
2. Drain the rear axle oil.
3. Slacken the rear brake adjusters, remove two 1/4" UNF countersunk screws and remove the RH brake drum.
4. Using a plate to hold the hub, (**Figure 2**) remove the 5/8" UNF half shaft nut.
5. Fit the hub puller sleeve (**Figure 3**) on to the end of the half shaft to prevent damage to the thread. If the sleeve is not available replace the 5/8" UNF nut so that the threaded section of the nut is flush with the end of the half shaft thread.
6. A hub puller, part No. RT 8090 is necessary to remove the hub. Fit hub puller sleeve on to the end of the half shaft (**Figure 4**), to prevent damage. If the sleeve is not available, refit the nut and screw until the top face of the nut is level with the end of the half shaft.
7. Secure the hub puller to the hub using all four wheel nuts, tightened securely.
8. Tighten the hub puller to release the half shaft taper.
9. Remove the hub puller and sleeve and withdraw the hub.
10. Unscrew four 5/16" UNF set screws and washers and remove the bearing retainer and brake back plate assembly.
11. Remove the outer oil seal.
12. The half shaft is removed by using a slide hammer part No. RT 3072 and adapter RT 3072-2. Fit the adapter on to the slide hammer and screw on to the half shaft. Sliding the hammer away from the axle will release the half shaft from the axle and the shaft, complete with slide hammer, can be withdrawn from the axle tube as shown in **Figure 5**

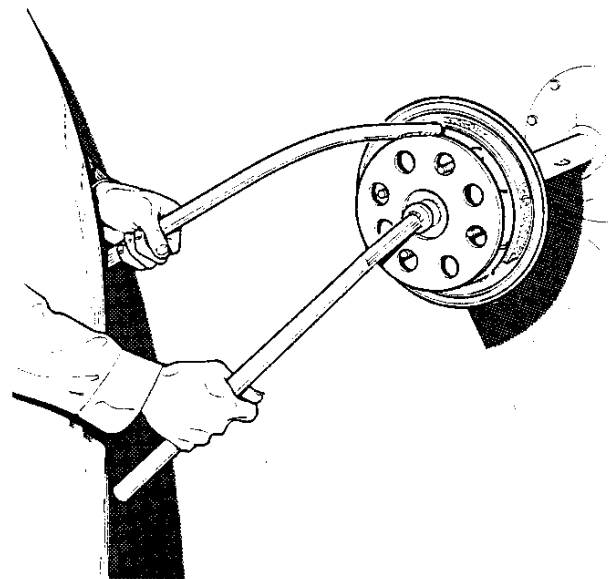


Figure 2 Slackening the half shaft nut (axle shown removed)

12. Remove the hub key and press off the half shaft bearing and remove the oil seal from the housing.

Note: The oil seal collar behind the bearing should not be disturbed, if it is accidentally removed it must be reset with a 73.91 mm (2.91 in)

clearance from the outside face of the collar to the end of the half shaft taper. If on removing the hub, the hub key comes away with it, it should be driven out with a suitable drift.

13. Repeat the above operations for the opposite hub.

To replace

1. Fit a new oil seal into the axle end housing.
2. Locate a new half shaft bearing on to the shaft and pack with the recommended grease (see Lubrication chart **page 13**).
3. Insert the half shaft into the axle tube to engage in the differential unit. Then, using the slide hammer and adapter, refit the half shaft. Fit a new outer seal.
4. Secure the back brake plate with four 5/16" UNF set screws and lock washers. Ensure that the back plate spacer is correctly positioned and that the spacer insert is free to move when the back plate screws are tightened.

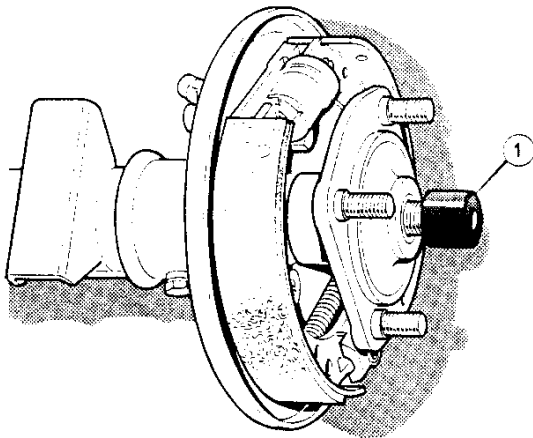


Figure 3 Hub puller sleeve (axle removed)

1. Sleeve

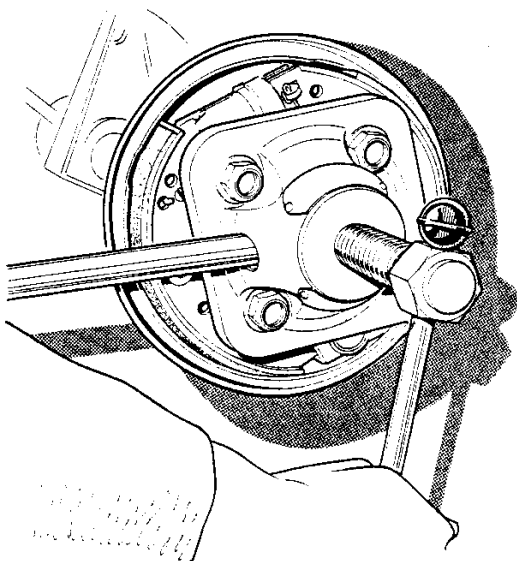


Figure 4 Hub puller in use (axle removed)

5. Clean the half shaft taper of all grease and foreign matter.

6. If the wheel studs are damaged they should be pressed out and replaced.
7. Position the hub key in its slot and fit the hub to the half shaft.
8. Secure the hub to the shaft with the nut and washer which must be tightened to a torque of 13.8 to 15.3 kg/m (100 to 110 lb/ft).
9. Check the brake drum face is clean, refit the drum and refit the road wheel.
10. Repeat sequences 1 to 11 for opposite hub.
11. Lower the vehicle back to the ground.
12. Bleed the hydraulic braking system
13. Check the rear axle oil level and top up if necessary.

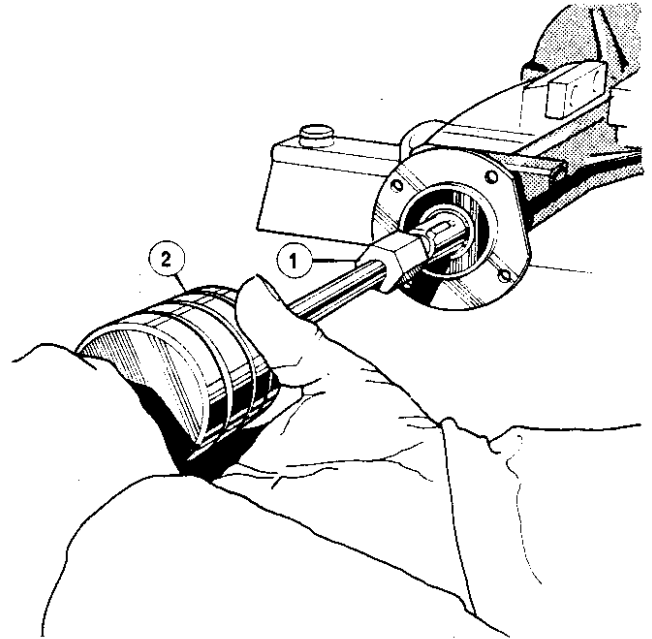


Figure 5 Removing half shaft using slide hammer (axle shown removed from vehicle)

1. Adapter
2. Slide hammer

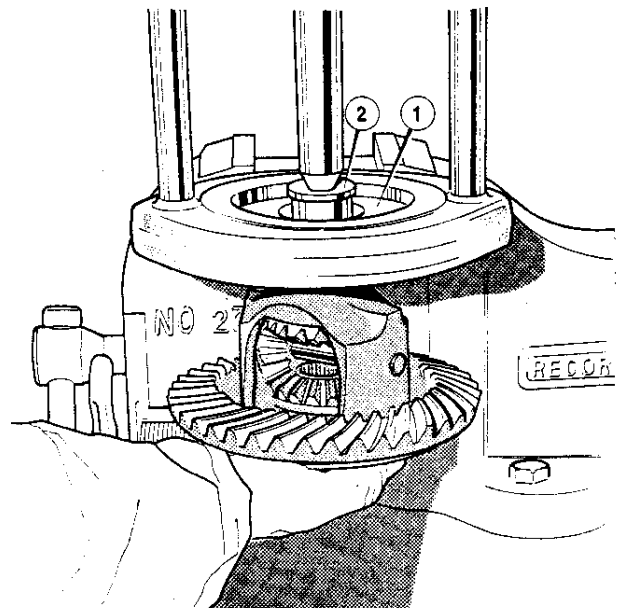


Figure 6 Removal of differential bearing using collars, adapters and hand press

1. Collars
2. Adapter

Dismantling the rear axle

1. Remove the rear axle from the vehicle as previously described.
2. Place the axle in a vice with the spring mounts uppermost and the pinion flange facing the operative.
3. Remove the right-hand brake drum and hub.
4. Remove the right-hand brake plate assembly, remove the spacer and the right hand half shaft.
5. Remove eight nuts and lock washers securing the two halves of the axle case. Remove the right-hand axle housing and withdraw the differential unit.

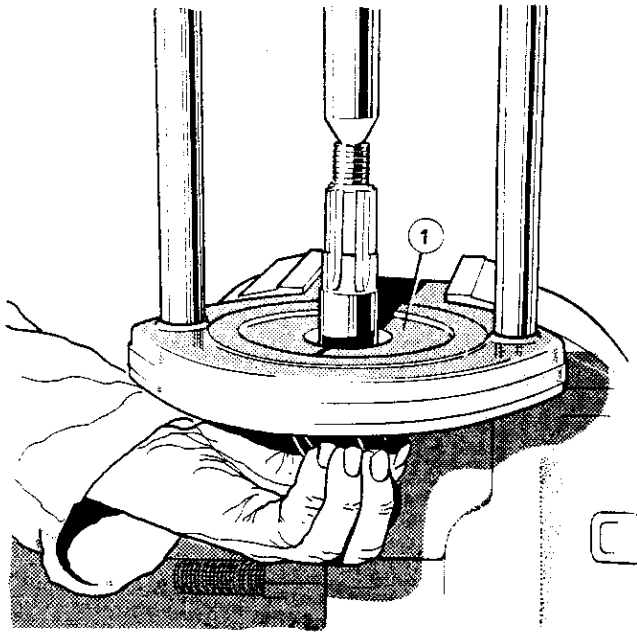


Figure 7 Removal of pinion bearing using collars and hand press

1. Collars

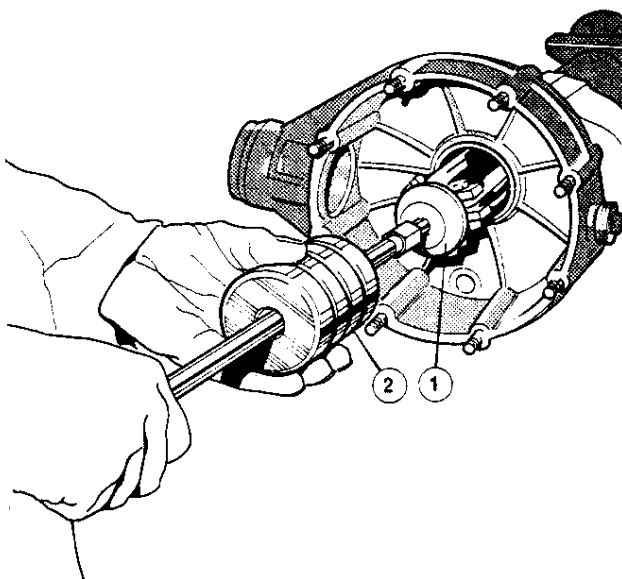


Figure 8 Removal of axle bearing cones from outer housing

1. Puller tool
2. Slide hammer

6. Using a hand press, General tool No. 47, and collars RT 8764/1, with adapter RT 8764/2, remove the differential bearings as follows: Feed the differential unit in to the hand press and fit into the cone of the tool. Ensure that the bearing fits securely into the collars and the rollers on the bearing and fit the adapter to the differential unit (**Figure 6**). Supporting the differential unit from below, turn the hand press to remove the bearing. Repeat this operation for the other bearing and take note of the value of the shims behind each bearing if only the bearings are to be renewed.

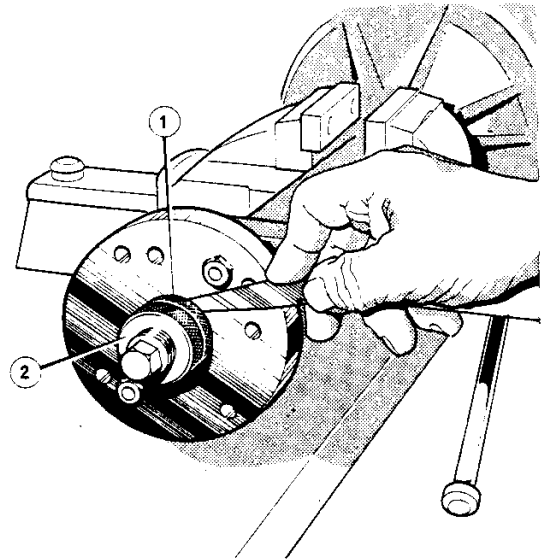


Figure 9 Determining overall differential end float using gauging tool

1. Gauging nut
2. Locking nut

7. Remove the pinion flange nyloc nut and washer and withdraw the flange. Tap the pinion assembly in to centre of the axle and remove.
8. Using hand press tool No. 47 and pinion bearing remover tool RT 8765, follow the same procedure as the differential unit and remove the pinion bearing. (**Figure 7**). Note the value of the spacing washer thickness next to the pinion head plus any additional shims.
9. Following the earlier procedure, remove the left-hand brake assembly and the left-hand half shaft.
10. Using the three legged puller tool No. RT 3072-1 on slide hammer tool No. 3072, remove the axle housing outer bearing cones (**Figure 9**).
11. Should the pinion outer bearing tracks need replacement, remove with a suitable drift after gently heating the appropriate area of the casting.
12. The pinion flange oil seal will come away when the rear bearing is removed.

Re-assembly - determining the overall differential end float.

1. Thoroughly clean all dismantled components.
2. Place two dummy bearings RT 8732 on the ends of the differential carrier without any shims and assemble in the actual casing. Secure the two halves of the axle case.
3. Check that the differential unit rotates freely.
4. Assemble the components of the tool (**Figure 9**), screwing the circular plates on to the push rods. Insert these through the axle tube, ensuring that the swivel pad on each end is felt to locate in each side of the differential carrier bore. Screw plates up to the axle tube and secure with the bolt supplied. Unscrew both rods slightly before

finally clamping the plate. The two round knurled gauging nuts should be screwed on to the push rod, which is facing the crown wheel or pinion side of the crown wheel which, for convenience of explanation, should be on the left-hand side

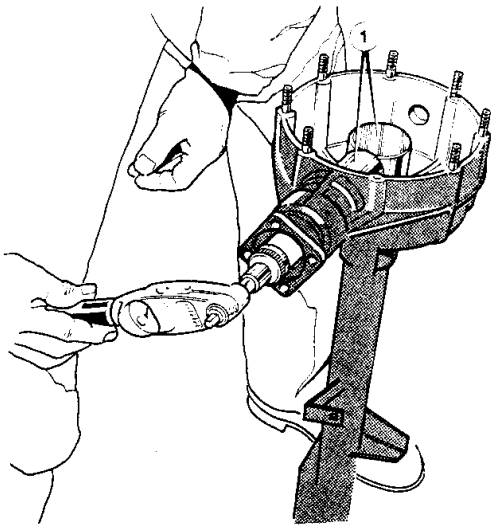


Figure 10 Measuring the torque to turn the pinion using dummy Pinion tool

1. Pinion setting tool

of the operator as they face the axle and referred to as the left-hand side throughout these instructions.

5. Unscrew the right-hand side push rod approximately 3.2 mm (1/8 in). Screw in the left-hand push rod with a load of 2-4 lb/ft maximum, thus pushing the differential assembly over in to the right-hand housing. Screw up the gauging nut lightly to the face of the circular plate. Carefully screw the locking nut up to the gauging nut and screw the push rod back approximately 3.2 mm (1/8 in), ensuring the gauge nuts move with the screw as they come away from the plate. Screw in the right-hand push rod 2-4 lb/ft maximum, thus pushing the differential unit in to the left-hand axle housing. Screw in the left-hand push rod until a stop is felt. Measure the gap between the circular plate and the gauge nut with a feeler gauge and record the figure (Figure 9) which will represent the overall end float.

6. Separate the casings and remove the differential assembly complete with dummy bearings, but **Do not remove the dummy bearings from the differential carrier.**

Re-assembly - setting the pinion

1. Ensure the pinion bearing cups are seating correctly in the pinion housing.
2. Locate the thick pinion spacer washer on the dummy pinion RT 8730 followed by the taper bearing cone.
3. Locate the dummy pinion in the pinion housing, placing the outer bearing cone in position, followed by the flange and the dummy pinion nut and tighten to give the running preload, thus setting the rollers.
4. Place the mandrel, RT 8730 in the differential side bearing bore. With a dial gauge torque wrench, check the torque required to turn the dummy pinion nut (Figure 10). This should read 0.115 to 0.150 kg/m (10 to 13 lb/in) torque without the oil seal, 0.150 to 0.184 kg/m (13 to 16 lb/ft) with the oil seal. Ensure that the mandrel is seating correctly and measure with feeler gauges the gap between the outside diameter of the mandrel and the dummy pinion face (Figure 11). Any amount in excess of 0.030 in will be the spacers required to bring the pinion to its correct operating distance. take in to account,

when determining the shims required, any figure stamped on the pinion itself, which represents any variation in manufacture from the nominal mounting distance i.e. if a figure of 0.003 is stamped on the

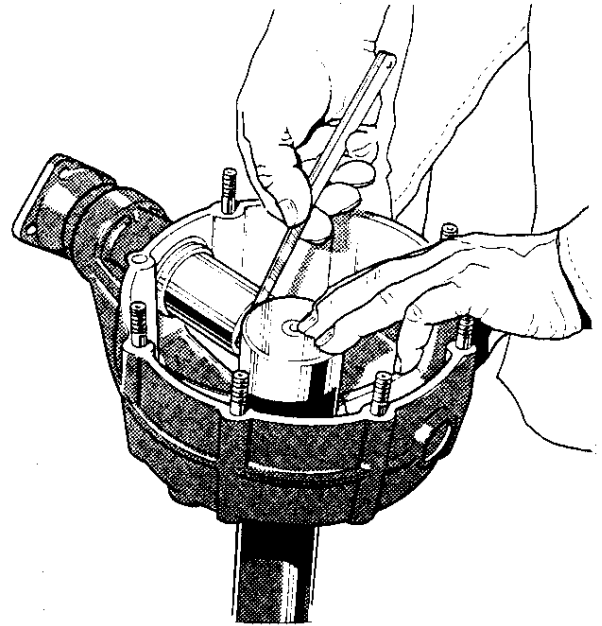


Figure 11 Determining pinion mounting distance using dummy pinion

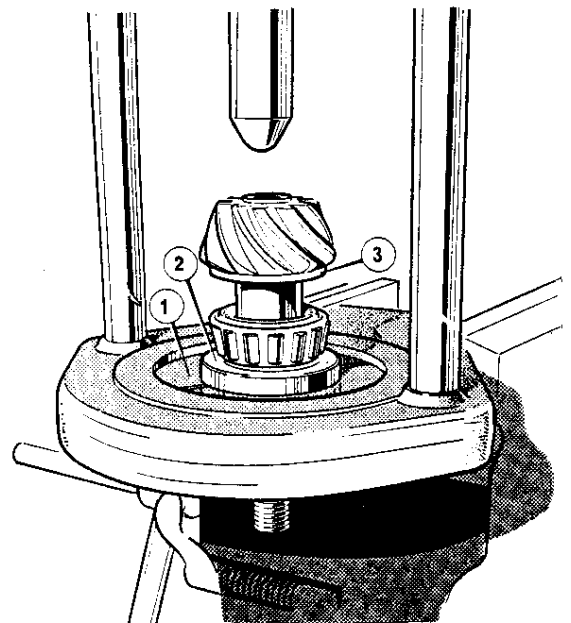


Figure 12 Replacing pinion bearing cone using hand press and collars

1. Collars
2. Adaptors
3. Spacing washer

pinion shank, this means it has been manufactured high and requires reducing in height by the same distance. Therefore if the gap measured is, say 0.044, the spacers required will be 0.44 minus 0.030 minus 0.003 which will equal spacers to the value of 0.011 thicker than that used for measurement.

5. Remove the dummy pinion assembly, place the selected spacer on the pinion and assemble the bearing cone, using the hand press tool No. 47, adapter RT 8765/2 and bearing replacer collars RT 8765/1 (Figure 12)

Re-assembly - installation of pinion in axle case

1. Add the collapsible spacer to the pinion assembly and place the new oil seal in the pinion housing. Place the pinion assembly in the pinion housing and replace the pinion flange and the nyloc nut.

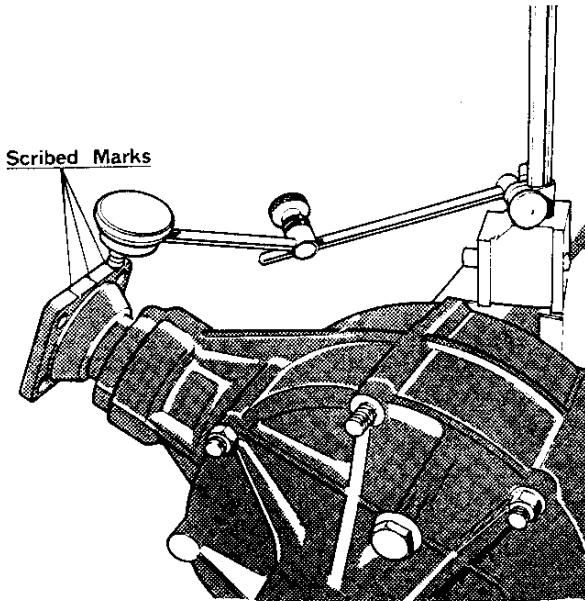


Figure 13 Determining pinion to crown wheel backlash using a dial gauge

- Using a torque wrench, progressively collapse the spacer starting at 6.91 kg/m (50 lb/ft). Preload begins when end float is eliminated at approximately 11.06 kg/m (80 lb/ft).
- Turn the pinion to ensure that the pinion rollers are correctly seated.
- Using a torque meter, check the torque required to turn the pinion nut. This should be set at 0.150 to 0.184 kg/m (13 to 16 lb/in).

Re-assembly - determining the correct backlash, crown wheel to pinion

- Replace the differential assembly complete with the dummy bearings into the differential housing and secure the two halves of the axle case together.
- If removed, refit the push rods of tool No. RT8732 as for setting the differential end float. Slacken the right-hand side and then screw in the left-hand push rod as before, using a torque wrench set to 0.28 to 0.55 kg/m (2 to 4 lb/ft) maximum. This will give minimum backlash. Screw up the gauging nut lightly to the face of the disc and lock in position with the lock nut as before.
- Unscrew the left-hand side and screw in the right-hand side until the correct backlash is obtained. This should be checked at the pinion flange as follows:

Setting the correct backlash, pinion to crown wheel, using a dial gauge

- With pinion flange horizontal, scribe a centre line on the top end of the flange and a line 7/8 in on either side of it. (Figure 13). This represents the overall diameter of the pinion.
- Set up a dial gauge indicator on a magnetic base as shown in Figure 13.
- Using a screwdriver through the level/filler aperture, lock the crown wheel by wedging it in between the pinion flange and the bolt heads.
- Rock the pinion flange and read off the backlash readings. This should measure 0.006 to 0.008 in.

- Screw in the left-hand side until a stop is felt, screw up right-hand side until contact is made. Measure minimum backlash. Unscrew left-hand rod and tighten right-hand rod at approximately half turn intervals until the correct backlash is obtained.

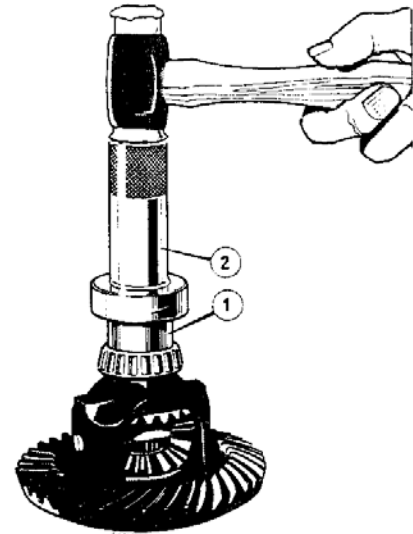


Figure 14 Replacing the differential bearing using special tool and universal handle

- Replacer tool
- Universal handle

- Measure the gap between the gauge nut and the disc and record the figure. This figure represents the amount of shims, taking in to account the bearing width variation plus the manufacturers' preload, that must be fitted to the right-hand differential carrier bearing. The remainder of the shims from the overall end-float, taking in to account again any variation in bearing width, will be fitted to the left-hand or pinion side of the differential.

Example

To give correct backlash, shims required on right-hand side equals 0.030. therefore shims on right hand side will be 0.050 minus 0.030 equals 0.020. These figures have been obtained using the dummy bearings. Separate the axle cases, remove the differential and proceed as follows:

Measure and compare each dummy bearing with the overall width of the new taper bearing assembly to be fitted on each end. Ensure that the rollers are settled by rotating before measurement. The plus readings from the dummy bearings width are subtracted from the selected shims. The minus readings are added to the selected shims.

Right-hand side

Dummy bearing width example 0.710

Taper bearing width example 0.715

Actual shims required $0.30 \text{ minus } 0.005 = 0.025 \text{ plus } 0.002$ which represents the manufacturers' preload allowance. Therefore total shims required = 0.027.

Left-hand side

Dummy bearing width example 0.712

Taper bearing width example 0.710

Actual shims required $0.020 \text{ plus } 0.002 = 0.025 \text{ plus } 0.022$ which represents the manufacturers' preload allowance. Therefore total shims required = 0.024.

Final re-assembly of axle

1. Tap both the differential bearing outer tracks in to the two halves of the axle case.
 2. Replace the correct shims on the differential unit. Using a hide mallet and tool number RT 550.1 and universal handle 550, replace the differential unit bearing (**Figure 14**)
 3. Place the differential unit in to the differential case housing.
 4. Replace the left-hand half shaft to assist in supporting the crown wheel and differential assembly.
 5. Secure the two halves of the axle case together using Hylomar jointing compound and secure with the eight nuts and lock washers to a torque of 2.76 - 3.46 kg/m (20 - 25 lb/ft).
 6. Refit the right-hand half shaft complete with hub bearing to engage in the differential unit.
 7. Check that the total torque to turn the pinion flange is 0.265 to 0.334 kg/m (23 to 29 lb/in)
 8. Locate the right-hand back plate and brake assembly to the axle end, positioning the back plate spacer and insert against the back plate. Align the holes and secure with the three set screws and lock washers. Ensure that the insert is free to move in the spacer aperture.
 9. Clean the taper of all grease and foreign matter.
 10. Position the hub key in its location and fit the hub.
 11. Secure the hub to the half shaft with the nyloc nut and washer tightening to a torque of 13.8 - 15.2 kg/m (100 - 110 ft/lb).
 12. Repeat the operations for the left-hand hub, back plate and brake assembly.
 13. Refit the axle unit on the vehicle (see previous axle replacement procedure)
 14. Reconnect the hydraulic brake pipes.
 15. Check the brake drum faces are clean and refit the brake drums and wheels.
 16. Adjust the brakes and bleed the brake system.
 17. Top up the axle with the recommended lubricant.
 18. Tighten the level/filler plug to 2.07 to 2.76 kg/m (15 to 20 ft/lb)
-
-

Section L

Brakes

Description

The Girling braking system employs two leading shoes on the front wheels and one leading, one trailing shoes on the rear wheels. The brakes are hydraulically operated with a mechanical hand (parking) brake mechanism operating on the rear wheels only.

A hydraulically operated stop lamp switch is located in a five-way brake pipe junction carrying the pipes from the master cylinder to front and rear brakes. The junction is secured to the upper face of the r/h front suspension tower.

Routine maintenance and adjustments

Check the level of the brake master cylinder weekly and top-up if necessary.

Every 6,000 miles (10,000 km)

Adjust brakes.

Check and grease handbrake cable.

Check, bleed if necessary and top up the hydraulic system.

Inspect the hydraulic system for leaks and chafing.

Every 36,000 miles (60,000 km)

Replace fluid, renew seals or replace units, replace hoses.

Front brakes

A manual eccentric pin type brake adjuster is fitted to both brake shoes (**Figure 1**).

1. Check brake drums are cold.
2. Jack up the vehicle until the front wheel is clear of the ground.
3. Remove the road wheel and fully slacken off the brake adjusters.
4. Unscrew the countersunk screw and remove the front brake drum.

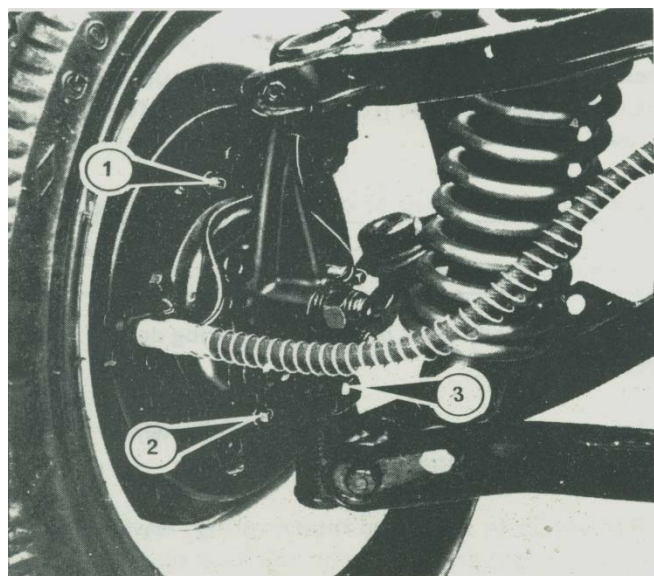


Figure 1 Front Brake Adjusters

1 & 2 Adjusters

3 Lower swivel grease plug

5. Check the lining material thickness. Linings that are bonded to the shoes must not be allowed to wear below 1.5 mm (1/16 in) in thickness. Riveted linings should be changed when the material wears within 0.75 mm (1/32 in) of the rivet heads.

6. If the linings are serviceable refit the brake drum, locating the larger stud hole over the stud with a collar on it (this is to preserve the balance of the hub/drum assembly).

7. Replace the road wheel and adjust as follows: Turn the adjuster of one shoe to bring the lining away from the shoe (in the opposite direction to wheel rotation). Turn the other adjuster in the direction of wheel rotation until the drum is locked. Then slacken back until the wheel is sufficiently free to rotate without binding.

8. Rotate the other adjuster in the direction of wheel rotation until the drum is locked. Again back off until the wheel is just sufficiently free to turn without binding.

Note: This minimum adjustment must be performed accurately to obtain the minimum clearance between the shoe linings and drum, with consequent minimum pedal travel.

Repeat with the opposite wheel.

Rear brakes

1. Jack up the vehicle until one rear wheel is clear of the ground.
2. Check the linings as described for the front wheel.
3. If the linings are serviceable, replace the drum and road wheel and adjust as follows:

Release the handbrake and whilst rotating the wheel, turn the adjuster (**Figure 2**) clockwise until the shoes touch the drum. Continue "one click" at a time until the drum is locked. Slacken the adjuster "two clicks" when the wheel should rotate freely. repeat with the other wheel.

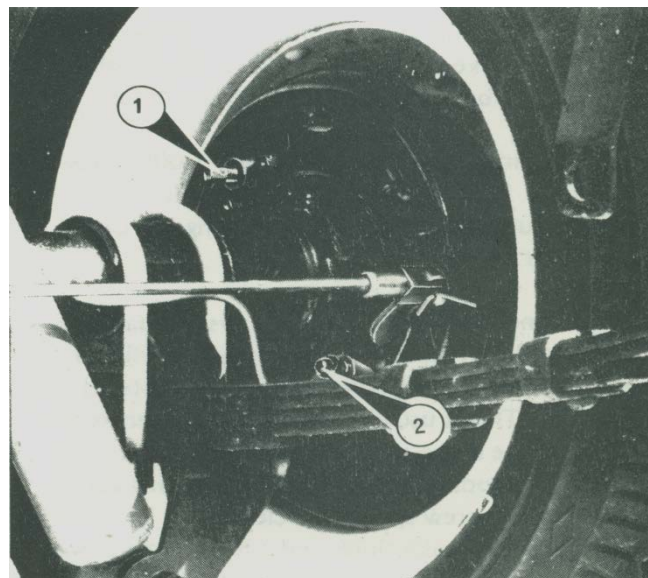


Figure 2 Rear wheel adjuster and bleed screw

1. Adjuster

2. Bleed screw

Handbrake adjustment

Before adjusting the handbrake cable, ensure that the rear brakes are correctly adjusted.

1. Ensure that the handbrake lever is in the fully "off" position and the cable is slack.
2. Remove the split pin from the clevis pin (Figure 3) at the rear of the brake cable. Adjustment is achieved by means of the clevis on the end of the adjuster screw. Adjust until the clevis pin slides easily in to the clevis and balance lever.

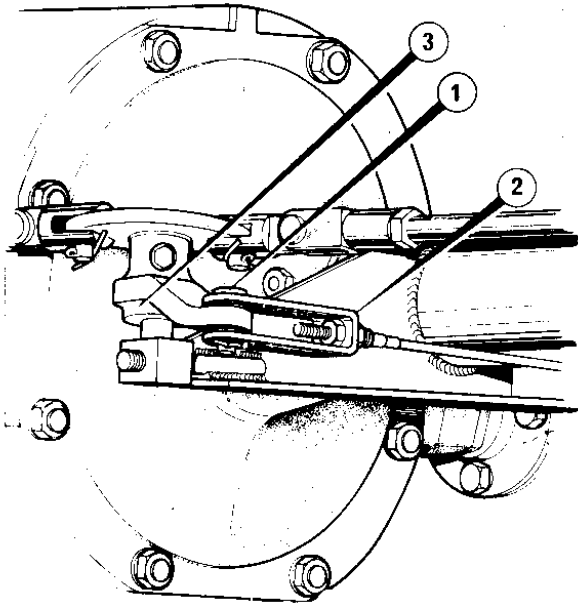


Figure 3 Handbrake compensator

1. Clevis pin
2. Clevis
3. Balance lever

Handbrake lubrication

The handbrake cable is greased on assembly but the cable inner should be greased by means of the grease nipple (where fitted). In adverse weather conditions especially it is wise to grease the exposed sections of cable. The handbrake compensator must also be greased periodically.

The hydraulic system (Figure 6)

The hydraulic brake master cylinder is situated below the right-hand driver's foot well. Access to the reservoir is achieved after lifting the carpet and removing the access cover plate. Before checking or replenishing the system, wipe the sides of the reservoir to prevent dirt entering the system when the cap is unscrewed. Top-up the reservoir as and when necessary using a recommended hydraulic fluid - see **Lubrication** chart page 13. Do not use other fluids, otherwise the seals may be damaged causing brake failure. Ensure that the breather hole in the filler cap is clear before replacing the cap.

Bleeding the hydraulic system

Bleeding - elimination of air from the hydraulic system, should only be necessary when any part has been disconnected or if the fluid level in the master cylinder has been allowed to fall so low that air has been drawn in to the system. This is usually indicated by the need to "pump" the brake pedal to obtain efficient braking. The system must then be bled.

The apparatus needed to bleed the hydraulic system consists of a clean glass jar containing some brake fluid and a rubber tube of

sufficiently small diameter to fit tightly over a bleed nipple. An assistant will be required to pump the brake pedal.

1. Locate the bleed nipple on the nearside rear wheel brake back plate (Figure 2). Remove the dust cover and fit the rubber tube over the nipple. Immerse the other end of the tube in the brake fluid in the glass jar.
2. Unscrew the nipple about a quarter of a turn.
3. Pump the brake pedal. The operation of the brake pedal is important. The pedal must be pushed down firmly through the full stroke, followed by three short rapid strokes and the pedal should be allowed to return quickly to its stop with the foot right off.
4. Repeat this operation until the fluid expelled is free from air bubbles. Tighten the bleed nipple during a down stroke of the brake pedal.
5. Remove the bleed tube from the nipple and replace the dust cover. The above procedure must be carried out on all wheels in the order: Nearside rear - offside rear - nearside front and offside front.

Always check that the stroke of the brake pedal is not impeded by floor mats or other obstructions.

Note: Throughout the above procedure, keep the master cylinder topped up with fresh clean brake fluid. Never re-use old fluid.

Scrupulous cleanliness must be observed at all times.

6. Check the operation of the brakes on road test.
- Important:** at 36,000 miles or three years the fluid should be changed. Brake fluid is hygroscopic so will absorb moisture over time, lowering the boiling point leading to fade or even failure of the brakes.

Front brakes - fitting new shoes (Figure 4)

Always fit Reliant replacement shoes, including a new set of return springs.

To remove

1. Jack up the vehicle and place on suitable stands.
 2. Remove the front road wheel, the countersunk screw and the brake drum. It might be necessary to back off the brake adjusters to enable the drum to be withdrawn.
 3. Remove the steady post pins (if fitted) and, using a large screwdriver, prise both the shoes from the grooves in the wheel cylinder pistons.
 4. Remove both shoes and return springs.
- Note:** To prevent loss of fluid, slip a rubber band over each wheel cylinder to hold the pistons in place.
5. Clean the back plate using a vacuum cleaner or wipe out with a damp cloth. Remove all traces of dust. The old-established practice of blowing off with an air line is **NOT** recommended as it represents a potential health hazard.
 6. Check the adjusters for correct operation and lubricate. Use only a proprietary brake grease.

To replace

1. Attach new return springs to the new shoes, ensuring the springs are correctly located and positioned such as they are between the shoe webs and the brake plate on assembly (Figure 4)
- Note:** Try not to touch the lining material and avoid contact with grease and other contaminants.
2. Remove the rubber bands from the wheel cylinders.
 3. Place the shoes in place with the springs attached, against the back plate locating the tongues of the shoes in to the grooves of the wheel cylinder bodies.
 4. Locate a screwdriver under the web of one shoe against the back plate and lever the shoe over the adjuster spindle and into the wheel cylinder piston groove. Refit the steady posts.
 5. Repeat for the remaining brake shoe.

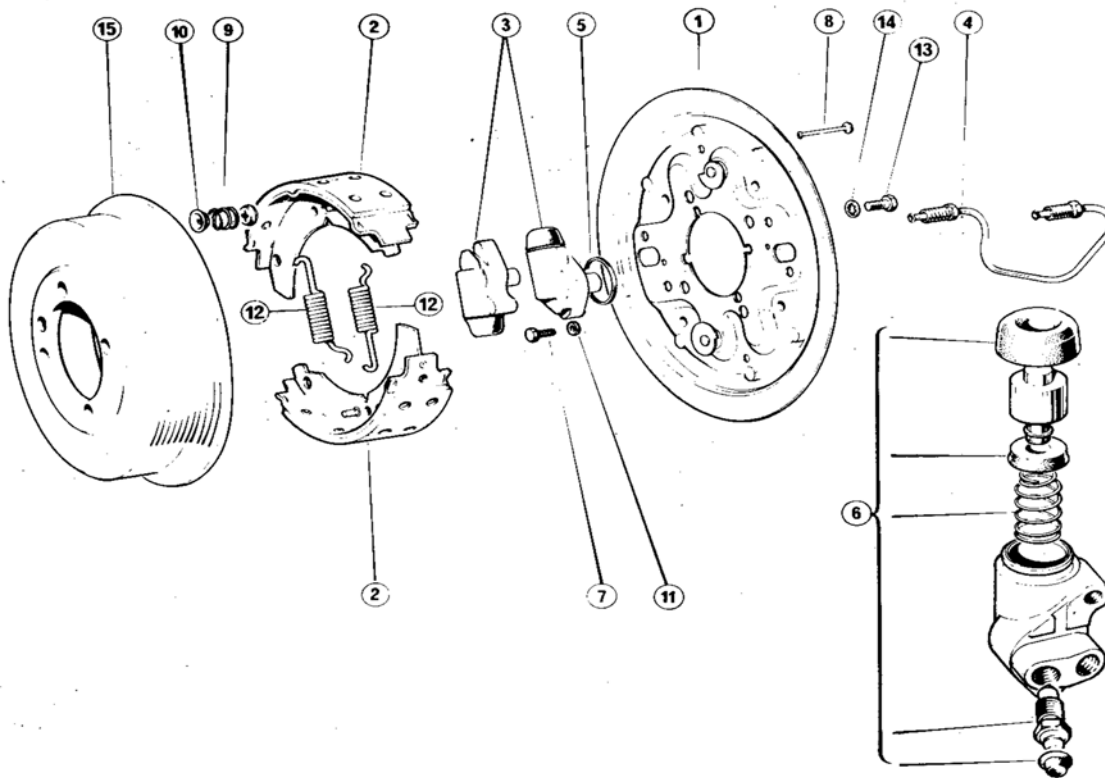


Figure 4 Front brake

- 1 Backing plate
- 2 Set, brake shoes
- 3 Front wheel cylinder assembly
- 4 Bridge pipe
- 5 Sealing ring
- 6 Service kit, wheel cylinder
- 7 Set screw
- 8 Pin, shoe hold down
- 9 Spring, shoe hold down
- 10 Washer, shoe hold down
- 11 Washer, shakeproof
- 12 Return spring
- 13 Set screw
- 14 Lockwasher
- 15 Drum
- 16 Screw

6. Refit the brake drum, making sure it is clean and free from dust or grease.

7. Refit the road wheel and adjust the brake.

Note: Brake shoes **MUST** be changed in axle sets. Repeat for the opposite front wheel.

8. Lower the vehicle and road test to check braking performance.

Front wheel cylinders - removal & replacement

A leaking wheel cylinder will cause fluid loss and may lead to excessive pedal movement and contamination of the brake shoe linings. The vehicle may also show a tendency to pull or veer under braking. A seized wheel cylinder may also exhibit some of these characteristics. In either case the defective cylinder must be replaced with a new one.

To remove (Figure 4)

1. Remove the brake shoes as previously described.
2. Disconnect the hydraulic pipes from the wheel cylinders and plug them to avoid fluid loss or dirt ingress.
3. Remove the bleed nipple.
4. Remove the screw and lock washer securing the wheel cylinder and withdraw the cylinder and gasket. Repeat for the other cylinder if necessary. Re-assemble in reverse order. Bleed the brakes.

Safety Note: Brake shoes contaminated by leaking fluid must always be replaced. On no account try to clean contaminants from brake shoe linings.

Rear brakes - fitting new shoes (Figure 5)

To remove (Figure 5)

1. Jack up the rear of the vehicle and secure on stands.
2. Remove the road wheel and slacken the brake adjuster.
3. Remove the countersunk screw and the drum.
4. Remove the steady posts. Prise the tongue of the shoe from the wheel cylinder piston groove, adjacent to the handbrake operating lever.

5. Lift the other end of the shoe from the slot in the adjuster.

6. Lever the second shoe from the piston and adjuster, disengaging the shoe from the handbrake lever.

7. Remove both shoes complete with springs and put a rubber band around the wheel cylinder to hold the piston in place.

8. Clean the back plate using a vacuum cleaner or wipe up with a damp cloth. Remove all traces of dust. The old-established practice of blowing off with an air line is **NOT** recommended as it represents a potential health hazard.

9. Inspect the wheel cylinder for leakage and check the condition of the rubber dust seals.

10. Inspect the adjuster for ease of operation. Lubricate if necessary using "copaslip" or a proprietary brake grease.

To replace

1. Attach new springs to the new shoes. Arrange the springs so they are on the back plate side of the shoe webs with the single coil spring adjacent to the adjuster.
 2. Remove the rubber band and position the shoes on the back plate so that the handbrake lever locates in the aperture in the web of the shoe.
 3. Engage the tongues of the shoe into the slots in the adjuster and wheel cylinder.
 4. Repeat with the other shoe.
 5. Refit the steady posts followed by the brake drum and the countersunk screw after ensuring all is clean and free from grease or contaminant.
 6. Refit the road wheel and adjust the brake.
- Note:** Brake shoes **MUST** be changed in axle sets. Repeat for the opposite rear wheel.
7. Lower the vehicle and road test to check braking performance.

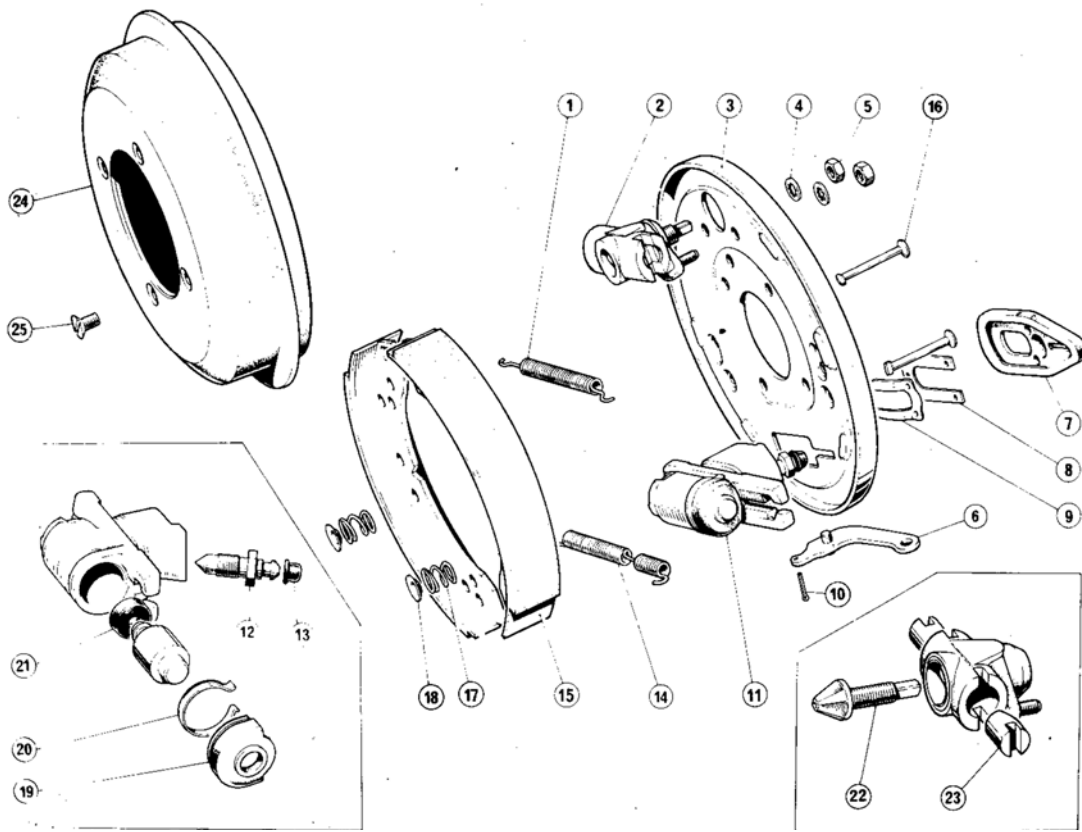


Figure 5 Rear brake

- 1 Return spring, adjuster end
- 2 Adjuster assembly
- 3 Backplate assembly
- 4 Washer
- 5 Nut
- 6 Lever assembly
- 7 Dust cover
- 8 Retaining plate
- 9 Spring plate
- 10 Split pin
- 11 Wheel cylinder
- 12 Bleed screw
- 13 Dust cap
- 14 Return spring, cylinder end
- 15 Lined shoe
- 16 Peg, steady post
- 17 Spring, steady post
- 18 Cupped washer, steady post
- 19 Dust cover
- 20 Clip
- 21 Seal
- 22 Wedge, adjuster
- 23 Link, adjuster
- 24 Brake drum
- 25 Screw

Rear wheel cylinders - removal & replacement

Faulty rear wheel cylinders will show similar symptoms to faulty front ones. If the vehicle has a tendency to gently pull to the left or right under braking, a rear cylinder might be the cause.

To remove

1. Remove the brake shoes as previously described.
2. Disconnect the hydraulic pipe from the cylinder and plug to avoid leakage and dirt ingress. Remove the bleed nipple.
3. Prise off the wheel cylinder retaining circlips and remove the cylinder.

Replace in reverse order. Bleed the brakes.

Note: The circlips **MUST** be replaced with new ones.

Safety Note: Brake shoes contaminated by leaking fluid must always be replaced. On no account try to clean contaminants from brake shoe linings.

Master cylinder - removal & replacement

A faulty master cylinder can be diagnosed by excessive pedal movement or signs of leakage around the rubber sealing gaiter and push rod. A very stiff brake pedal might indicate a seized master cylinder piston. Overhaul is not advised with complete replacement of a faulty or worn unit being the recommended course of action.

To remove

1. From beneath the vehicle, remove the split pin and the clevis pin connecting the brake pedal lever to the master cylinder.
2. Disconnect the fluid pipe from the master cylinder and plug to avoid leakage or dirt ingress.
3. Unscrew the nuts, bolts and lock washers, securing the master cylinder to the chassis and remove the master cylinder. Replace in reverse order. Bleed the brakes.

Brake pedal assembly (Figure 7)

Remove split pin, clevis pin and washer and disconnect from the master cylinder. Remove pedal return spring. Pull the brake pedal lever down and remove the countersunk screws securing the pedal to the lever. Unscrew the 3/8UNF self lock nut and withdraw the brake lever

Reassemble in reverse order.

Handbrake cable - replacement

To replace handbrake cable (Figure 6)

1. With the handbrake in the off position, from beneath the vehicle, remove the split pin washer and clevis pin and disconnect the cable from the base of the handbrake lever.
2. Remove the outer cable from the cable guide and release the cable from the handbrake lever bracket.
3. Remove the split pin, washer and clevis pin from the compensator assembly on the rear axle.
4. Slacken the adjuster locking nut, release the clevis from the compensator and withdraw the cable from the axle cable stop.

Reassemble in reverse order

Adjust the hand brake.

Operation 11 Handbrake lever - removal & replacement

1. With the handbrake off, remove the split pin, washer and clevis pin connecting the handbrake cable to the handbrake lever.
2. From inside the vehicle, peel back the carpet around the handbrake lever. Unscrew three set screws, lock washers and coach washers and detach the handbrake lever from the body mounting.

Replace in the reverse order, and re-adjust the handbrake if necessary.

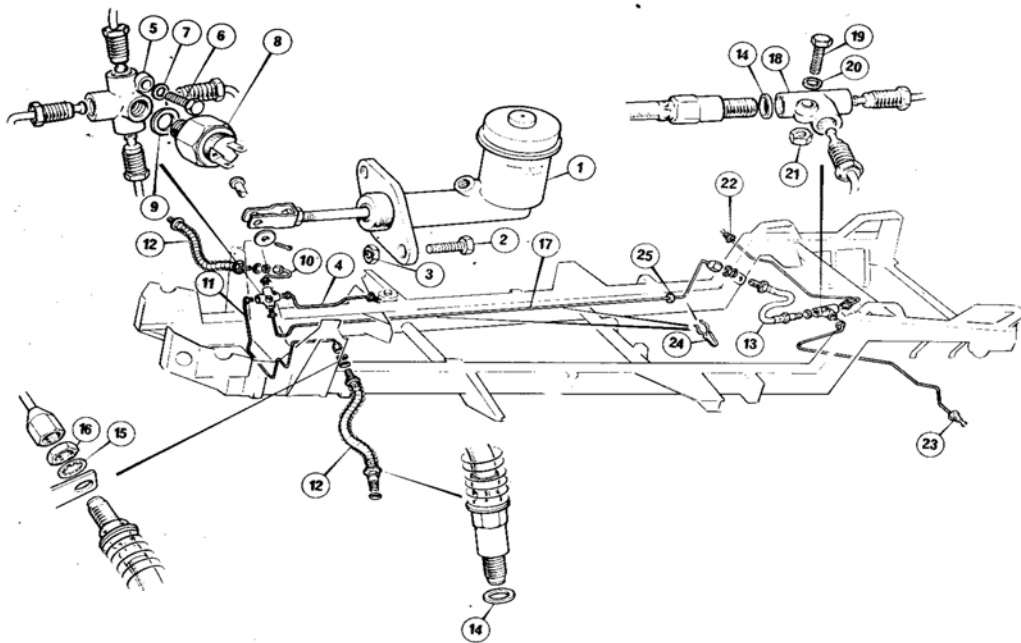


Figure 6 Hydraulics

- 1 Master cylinder
- 2 Set screw
- 3 Nut
- 4 Bundy, 5 way to master cylinder
- 5 5 Way
- 6 Bolt
- 7 Washer
- 8 Switch, stop light
- 9 Gasket
- 10 Bundy, 5 way to RH front hose
- 11 Bundy, 5 way to LH front hose
- 12 Flexible hose, front
- 13 Flexible hose, rear
- 14 Gasket
- 15 Lockwasher
- 16 Nut
- 17 Bundy, 5 way to rear hose
- 18 3 Way
- 19 Bolt
- 20 Washer
- 21 Nut
- 22 Bundy, 3 way to RH wheel cylinder
- 23 Bundy, 3 way to LH wheel cylinder
- 24 Clip
- 25 Grommet

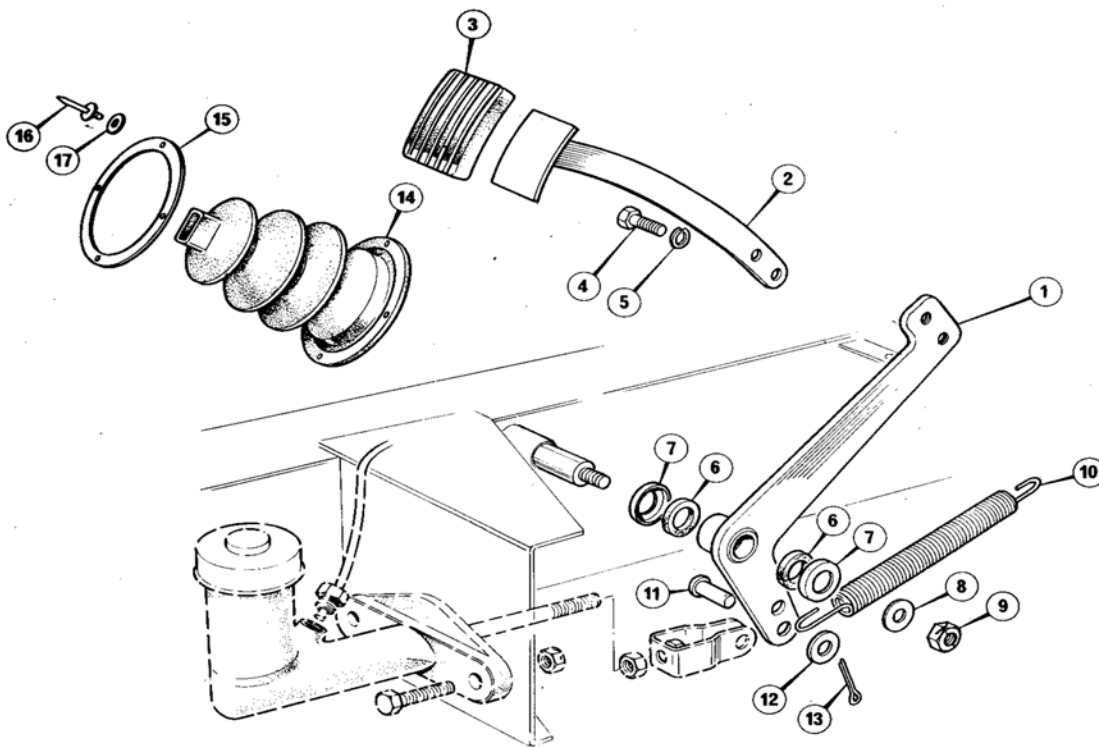


Figure 7 Brake pedal

- 1 Lever
- 2 Pedal
- 3 Cover
- 4 Set screw
- 5 Lockwasher
- 6 Seal
- 7 Cap
- 8 Washer
- 9 Nut
- 10 Return spring
- 11 Clevis pin
- 12 Washer
- 13 Split pin
- 14 Grommet
- 15 Plate
- 16 Rivet
- 17 Washer

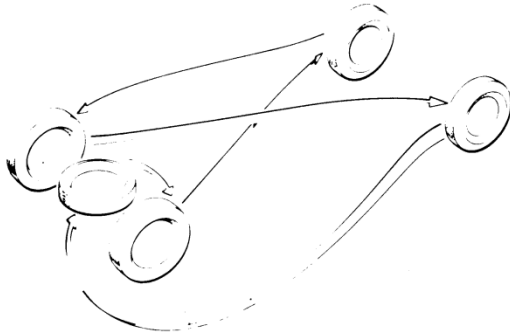


Figure 1 Tyre rotation

Cross-ply tyres are fitted as standard to all Rebel models.

Tyre pressures should be checked before a run when the tyres are cold. During use, due to heat, the pressures will increase and this additional pressure should not be released since, in determining the optimum tyre pressure, the increase has been taken into account.

Under inflation will result in damage to both the tyre walls and the outer edges of the tyre treads due to excessive flexing.

Close attention to the tyre pressures and the mechanical condition will not, themselves, prevent uneven tyre wear. It is therefore recommended that the front tyres be interchanged with the rear tyres, bringing the spare in to use, diagonally every 5,000 miles (8,000km) as shown in **Figure 1**. If radial-ply tyres are fitted, these should only be changed from side to side, front and rear.

Maintain the tyres, including the spare, at the recommended pressures, as follows:

Cross-ply tyres

Tyre pressures - saloon and estate

Normal load: Saloon	Front	1.26 kg/cm ² (18lb/in ²)
	Rear	1.26 kg/cm ² (18 lb/in ²)
Estate/ Van	Front	1.41 kg/cm ² (20 lb/in ²)
	Rear	1.69 kg/cm ² (24 lb/in ²)
Full load: Saloon	Front	1.54 kg/cm ² (22 lb/in ²)
	Rear	1.54 kg/cm ² (22 lb/in ²)
Estate/ Van	Front	1.69 kg/cm ² (24 lb/in ²)
	Rear	1.97 kg/cm ² (28 lb/in ²)

Radial-ply tyres

Tyre pressures - saloon and estate

Normal load: Saloon	Front	1.41 kg/cm ² (20lb/in ²)
	Rear	1.41 kg/cm ² (20 lb/in ²)
Estate/ Van	Front	1.41 kg/cm ² (20 lb/in ²)
	Rear	1.41 kg/cm ² (20 lb/in ²)
Full load: Saloon	Front	1.41 kg/cm ² (20 lb/in ²)
	Rear	1.54 kg/cm ² (22 lb/in ²)
Estate/ Van	Front	1.54 kg/cm ² (22 lb/in ²)
	Rear	1.69 kg/cm ² (24 lb/in ²)

Jacking up

Jacking positions

Before changing a wheel, or carrying out any servicing, ensure that the vehicle is on level ground, with the handbrake applied and, if necessary, the wheels properly chocked.

Note: Work must never be carried out underneath a vehicle when it is supported only on a jack. A proper chassis stand must be used to support the vehicle.

The recommended jacking points under the chassis main members are indicated in **Figure 2**.

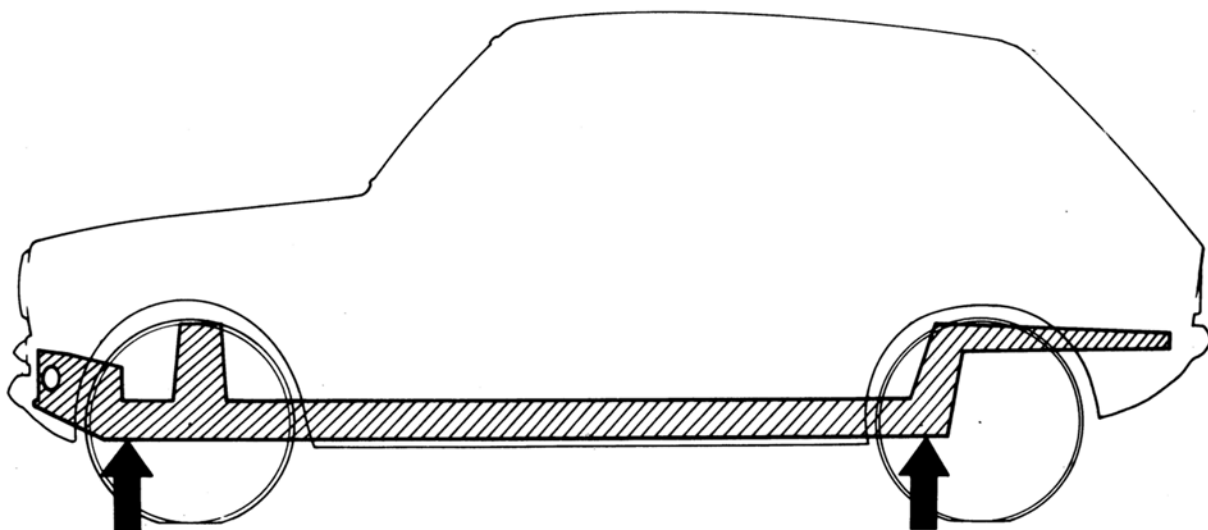


Figure 2 Jacking positions

Wheel Removal

Slacken the wheel nuts, jack the car up until the wheel is clear of the ground, remove the nuts and withdraw the wheel.

Inspection

Clean the rim and examine the rivets or welds securing the rim to the centre. Minor damage to the rim may be repaired provided that it is confined to the flange tip area.

Refitting

Wheel nuts must be fitted with the tapered side towards the wheel and tightened to 6.91-7.6 kg/m (50-55 lb/ft)

Valves and caps

When checking tyre pressures always ensure that the dust cap is replaced on the valve and tightened down firmly by hand only. The cap prevents the ingress of dirt and acts as an extra barrier against leakage should the valve fail. New valve cores can be fitted using a valve coring tool (Figure 3).

When replacing a tyre, a new tubeless valve complete should also be fitted.

Wheel and tyre balance

Unbalance in wheel and tyre assemblies will be responsible for various effects such as wheel wobble, abnormal wear of tyres and suspension components, vibration through the steering or, in extreme cases the whole vehicle.

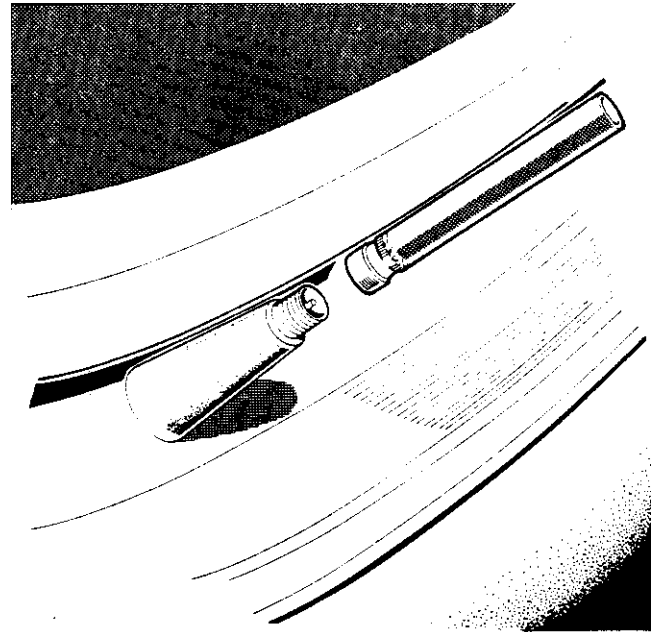
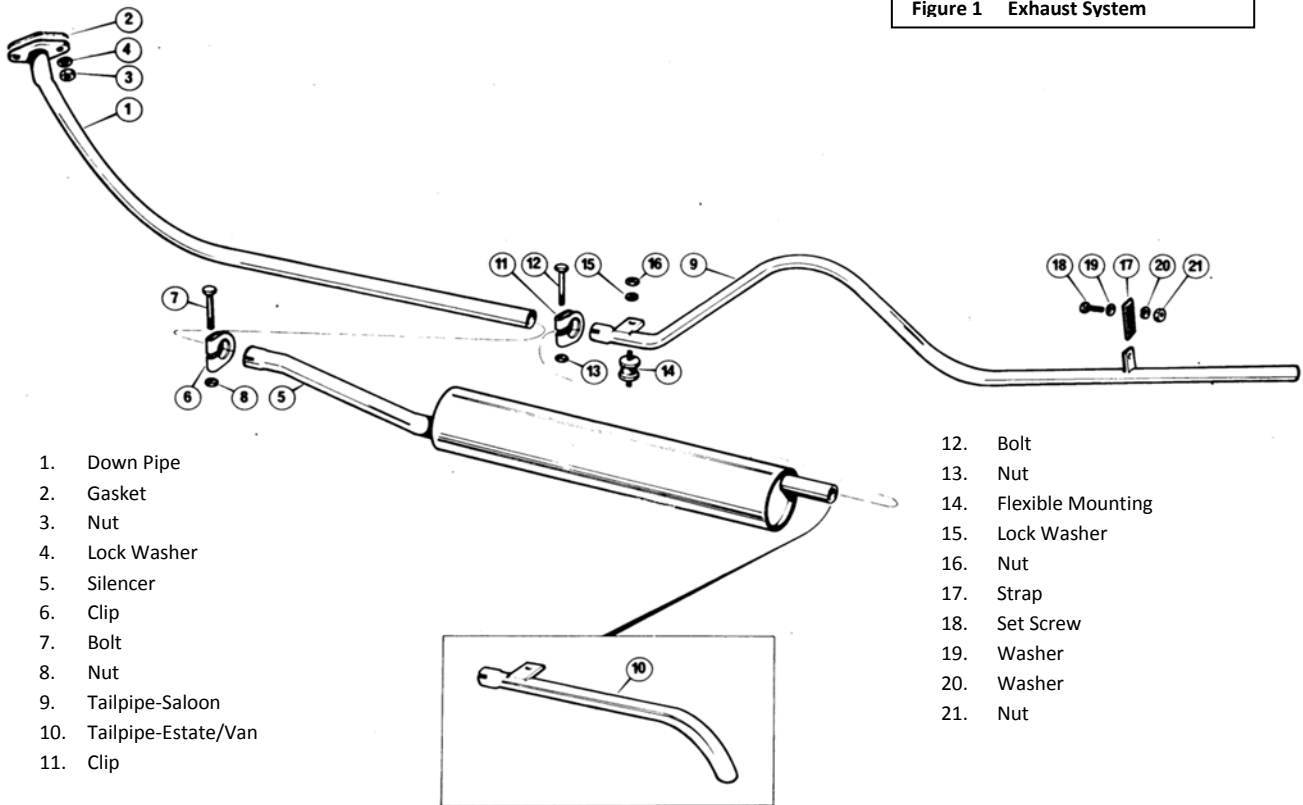


Figure 3 Valve fitting tool

Wheels should be balanced when new tyres are fitted. This can be done statically but all tyre suppliers should have a dynamic balancing machine. Failing to have the wheels balanced is false economy as the tyre life will be noticeably better with the wheels balanced.

Figure 1 Exhaust System



- 1. Down Pipe
- 2. Gasket
- 3. Nut
- 4. Lock Washer
- 5. Silencer
- 6. Clip
- 7. Bolt
- 8. Nut
- 9. Tailpipe-Saloon
- 10. Tailpipe-Estate/Van
- 11. Clip

- 12. Bolt
- 13. Nut
- 14. Flexible Mounting
- 15. Lock Washer
- 16. Nut
- 17. Strap
- 18. Set Screw
- 19. Washer
- 20. Washer
- 21. Nut

Description

The exhaust system on all Rebel vehicles comprises four main units. The manifold, the down pipe, the silencer and the tail pipe. As already described in the engine section, the manifold is bolted to the cylinder head and shares a common heat proof gasket with the inlet manifold.

The exhaust system of the Saloon is flexibly mounted by a rubber strap at the tail pipe plus a mounting rubber at the silencer.

A single rubber strap only supports the tail pipe of the Estate/Van which is directed from the side of the vehicle.

To Remove (Saloon)

1. Slacken the retaining clamp securing the tail pipe to the silencer.
2. Unscrew the lower 1/4" UNF set screw and nut, complete with washers, and disconnect the tail pipe support strap.
3. Remove the 5/16" UNF nut and washer securing the tail pipe to the flexible mounting.
4. Withdraw the tail pipe from the silencer.
5. Slacken the retaining clip securing the silencer to the down pipe and remove the silencer.
6. Unscrew the two 5/16" UNF nuts with lock washers securing the down pipe to the manifold and remove the down pipe.
7. Examine the manifold gasket and renew if necessary.

Replace in reverse order.

To Remove (Estate/Van)

1. Remove the 5/16" UNF nut and lock washer securing the tail pipe to the flexible mounting.
2. Unscrew the two 5/16" UNF nuts and lock washers securing the down pipe to the exhaust manifold.
3. Withdraw the exhaust system complete from the vehicle.
4. If necessary, slacken the clamps and separate the down pipe from the silencer.
5. Examine the manifold gasket and renew if necessary.

Replace in reverse order

Note: Periodic checks should be made to the exhaust system for tightness at all securing points and mounting points. The system fittings should be retightened after the vehicle has been run following reassembly/replacement.

Check for corrosion or damage and renew any suspect parts promptly. Exhaust gases leaking in to the vehicle can be dangerous.

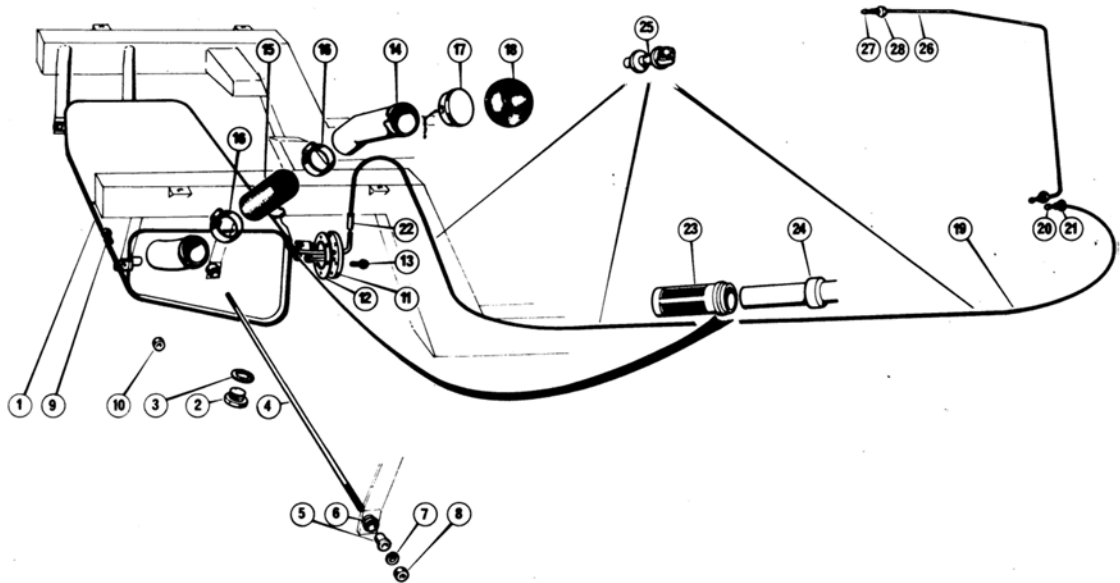


Figure 1 Fuel tank

- | | | |
|---------------------|-----------------------|------------------------------|
| 1 Petrol tank | 11 Tank unit | 21 Nut |
| 2 Drain plug | 12 Gasket | 22 Sleeve |
| 3 Washer | 13 Set screw | 23 Filter, tank unit |
| 4 Rod, tank support | 14 Filler tube | 24 Sleeve |
| 5 Bush, rod | 15 Hose | 25 Clip |
| 6 Collar, rod | 16 Clip | 26 Pipe, pump to carburettor |
| 7 Lockwasher | 17 Cap | 27 Olive |
| 8 Nut | 18 Grommet | 28 Nut |
| 9 Set screw | 19 Pipe, tank to pump | |
| 10 Nut | 20 Olive | |

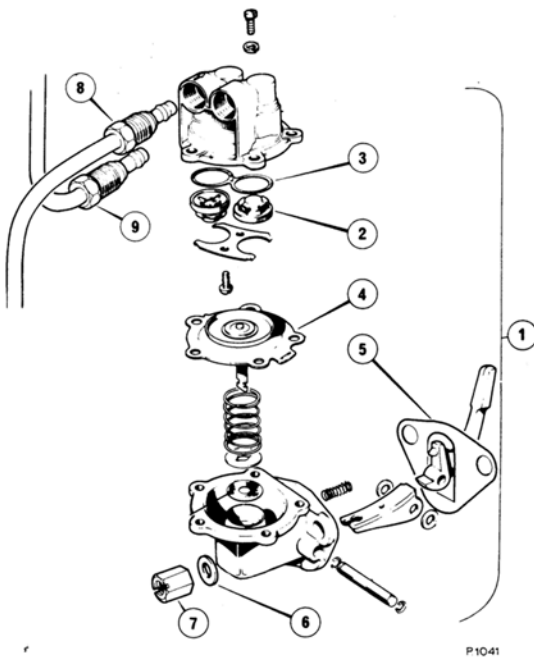


Figure 2 Fuel pump

- | |
|-----------------------------|
| 1 Repair kit |
| 2 Valve assembly |
| 3 Valve seating gasket |
| 4 Diaphragm |
| 5 Gasket |
| 6 Washer |
| 7 Nut |
| 8 Pipe, tank to pump |
| 9 Pipe, pump to carburettor |

Description

Fuel is delivered to the carburettor by an engine driven AC diaphragm pump from a rectangular fuel tank mounted under the rear floor of the vehicle. The fuel is filtered by a gauze filter located on the pick-up pipe of the fuel tank. An additional in line filter is incorporated in the fuel line from the tank to the pump, at the rear of the vehicle. The fuel level gauge is actuated by a float operated sender unit in the tank.

A Zenith downdraught carburettor is used on all Rebel 700 and 750cc models, incorporating a diaphragm accelerator pump and a depression operated economy device. Air is filtered through the carburettor by a dry paper element air cleaner, which, on later vehicles, also serves the breather in the oil filler cap.

Routine Servicing

Every 10,000 miles (16,000km)

Dismantle and clean the carburettor and adjust.

Renew the air filter and clean the oil filler cap.

Fuel Tank

If water, or other contaminant is present in the fuel tank, the tank must be removed and thoroughly flushed out with clean fuel.

To remove (Figure 1)

1. Disconnect the battery earth lead.
2. Jack up the rear of the vehicle and place on suitable stands.
3. Remove the tank drain plug and drain off the contents into a suitable container. If no drain plug is fitted the tank contents must be siphoned out.
4. Disconnect the sender unit electrical connections and remove the fuel pipe sleeve from the sender unit.
5. Slacken the "jubilee" clips and disconnect and withdraw the fuel filler pipe rubber coupling hose.
6. Unscrew two ¼" UNF set screws and nuts securing the tank to the rear support brackets.
7. Remove the two 5/16" UNF nuts, lock washers and bushes and withdraw the fuel tank support rod.
8. Support the tank and carefully lower and remove from the vehicle.

To replace

1. Raise the fuel tank, insert the tank support rod and secure with two 5/16" UNF nuts, lock washers and bushes. Ensure that both support rod collars are correctly seated in the mounting brackets.
2. Secure the tank rear support brackets with two ¼" UNF set screws and nuts.
3. Refit the petrol filler rubber hose and filler tube and retighten the jubilee clips to afford a good seal.
4. Reconnect the sender unit electrical connectors and refit the fuel pipe connector sleeve.
5. Refit the tank drain plug.
6. Remove stands and lower the vehicle to the ground.
7. Reconnect the battery leads.

Fuel Gauge Sender Unit

Diagnosis

If faulty or inaccurate readings are suspected on the fuel gauge, check the gauge and sender unit as follows:

With the ignition switched on, disconnect the sender wire from the sender unit on the tank. The gauge should now read empty. Ground the sender wire to the tank body and the gauge should move to full. This will indicate that electrically, the gauge unit is operating correctly. Any fault is likely to be with the sender unit, which may require replacement.

If the fault lies with the gauge unit, this will need to be removed from the dash panel multi gauge and renewed as a complete unit (see **Section T – Electrical**)

To remove the sender unit

1. Drain the fuel tank and remove the sender unit electrical connectors and the fuel line coupling.
2. Unscrew the six 10 UNF screws and remove the sender unit from the tank. Take great care not to bend or distort the float lever as this will affect the accuracy of the gauge.
3. Examine the unit to ensure that the rheostat is not damaged.

To replace the sender unit

1. Locate the unit in the tank using a new cork gasket and secure with six 10 UNF screws.
2. Reconnect the fuel feed pipe and electrical leads to the sender.
3. Refill the fuel tank.
4. Switch on the ignition and check the fuel gauge operation.

Fuel Pump

Testing the fuel pump

Provided there are no air leaks or blockages in the main fuel line, and there is fuel in the tank, a quick check on the fuel pump efficiency can be made as follows:

1. Disconnect the carburettor feed pipe at the fuel pump outlet.
2. Connect a slave pipe to the fuel pump outlet and rout this in to a clean jar.
3. Crank the engine. A well-defined spurt of fuel should be apparent for every revolution of the engine. If the pump does not operate satisfactorily, remove, dismantle and overhaul using the repair kit part No. 11858.

To remove and dismantle

1. Disconnect the fuel pump inlet and outlet pipes and suitably plug to avoid dirt ingress or fuel leakage.
2. Unscrew the two 5/16" UNF nuts and lock washers securing the pump to the side of the engine block and remove the pump by lifting the operating lever to clear the camshaft

eccentric lobe and the slotted aperture in the block.
Remove the pump gasket.

3. Before dismantling, clean the exterior of the pump and mark the upper and lower halves adjacent to the tab on the diaphragm to ensure correct alignment on reassembly.
4. Remove five screws and separate the upper and lower halves of the pump body.
5. Unscrew two small screws and lift off the retaining plate exposing the pump valves and gasket from the upper body. Replace the valves with the new ones provided in the kit. On later pumps the valves are peened into the pump body and these assemblies cannot be reconditioned.
6. Hold the lower pump body in an inverted position and turn the diaphragm assembly through 90° to release the pull rod from the key in the operating arm. Lift off the diaphragm assembly and spring. The diaphragm rod and plate are supplied as an assembly and cannot be further dismantled.
7. Release the circlip and withdraw the operating arm spindle from the lower body.
8. Remove the operating arm and extension complete with washers and return spring.

Note If a replacement part is necessary, but is not supplied in the repair kit, then the pump must only be replaced as a complete assembly. The repair kit consists of valves, diaphragm assembly and gaskets only, other components are unavailable separately.

To reassemble and replace

1. Locate operating arm, complete with return spring and extension in the lower pump body.
2. Insert the spindle, locate the two washers and secure with circlip.
3. Fit the gasket and new valve assemblies in to the upper body, locate the retaining plate and secure with the two small screws (early pumps only).
4. Position diaphragm and spring on the lower body seating and pull rod key plate.
5. Insert the diaphragm pull rod into the operating arm extension key and turn through 90° to lock into position. Ensure that the tab on the diaphragm aligns with the mating mark on the lower body flange.
6. Fit the upper body aligning with the diaphragm tab and replace the five screws to finger tightness only. Operate the operating arm a few times to centralise the diaphragm, then fully tighten the five screws.
7. Clean the pump mounting face on the cylinder block and fit a new gasket.
8. Locate the pump over the fixing studs and insert the operating arm through the aperture in the block so that the arm lies on the camshaft eccentric.
9. Secure the pump with two 5/16" UNF nuts and lock washers, tightening evenly to a torque of 2.07-2.49 kg m (15-18 lb ft).
10. Remove the plugs and reconnect the inlet and outlet pipes.
11. Run the engine and check for leaks.

Carburettor

Starting from cold

Pull the choke fully out, switch on the ignition (do not touch the accelerator pedal) and operate the starter motor. Drive the car gently

at first allowing the engine to warm. Push the choke control in progressively as the engine warms through.

Idling

Idling and throttle adjustments must only be carried out when the engine is at full, normal operating temperature.

Screw in the throttle adjustment screw to give a fast idle speed. Screw out the volume control screw slowly until the engine runs unevenly, then gradually screw it back in until the engine runs smoothly. Reset the throttle screw to give a normal idling speed. If this causes a resumption of uneven running, screw the volume control screw in slightly until the idling is once more smooth.

Accelerator Pump

An accelerator pump is incorporated to overcome any hesitation that may occur when the carburettor is adjusted to provide the leanest mixture at part-throttle cruising. To enable the engine to run efficiently in all ambient temperatures, the accelerator pump can be adjusted by altering the position of the actuating rod.

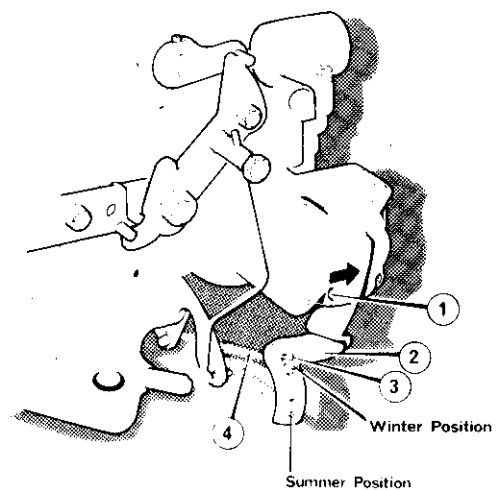


Figure 3 Accelerator pump Summer and Winter positions

1. Fulcrum pin
2. Operating lever
3. Split pin
4. Actuating rod

In the Summer months the actuating rod should be set at the lower position to give a short stroke and in the Winter to the upper position giving a longer stroke.

Adjustment is as follows:

1. Using a small punch or similar tool, gently tap out the fulcrum in the direction shown in Figure 3, just enough to release the operating lever from the accelerator pump.
2. With a pair of pliers, pull out the split pin securing the actuating rod to the operating lever.
3. Disconnect the rod and lever. Take care not to lose the return spring.
4. Taking up the pressure on the return spring, reset the actuating rod in either Summer or Winter positions as required and secure using a new split pin.
5. Position the pump lever in the accelerator pump body and replace the fulcrum pin.

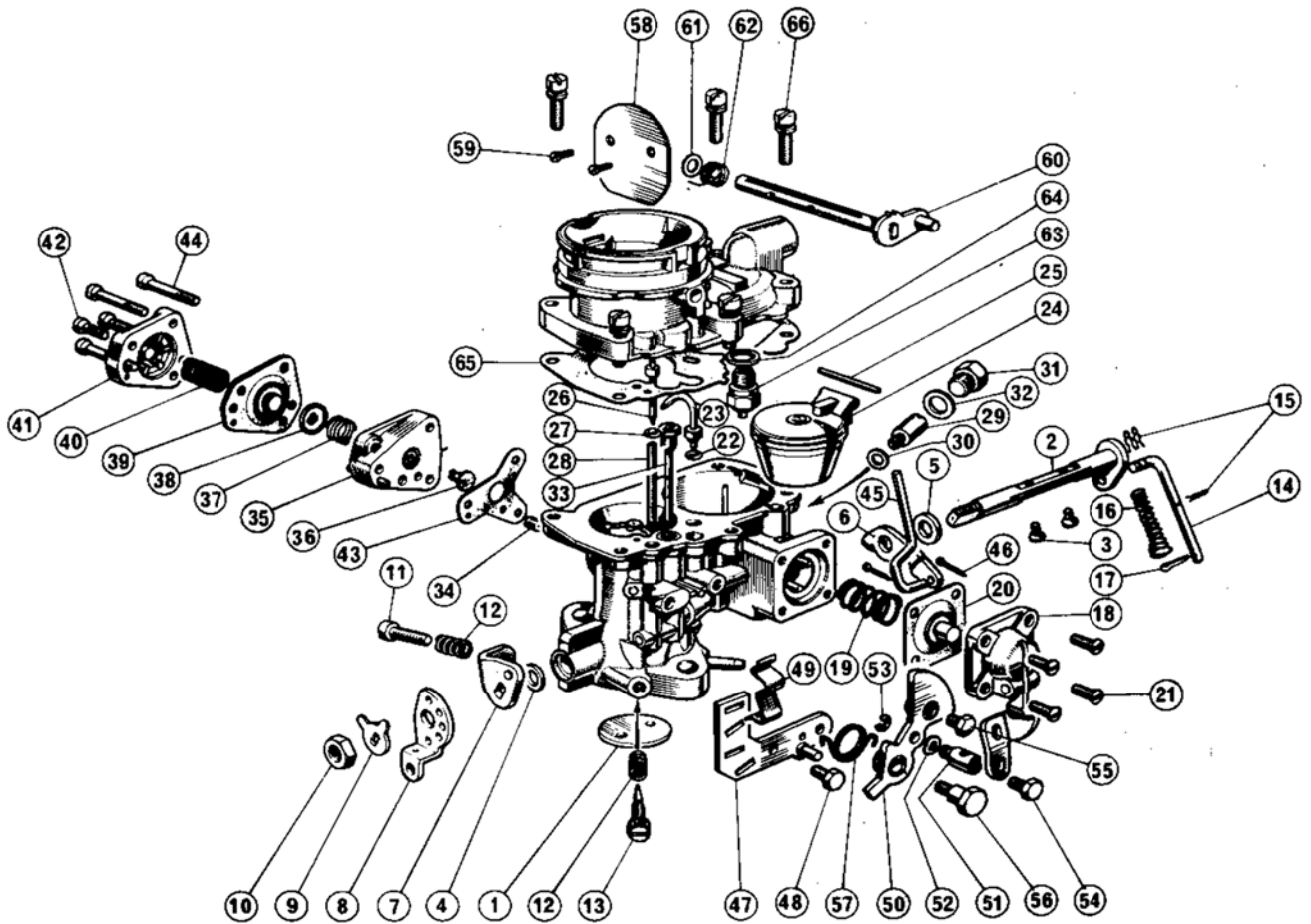


Figure 4 Carburettor

- | | | |
|------------------------|-----------------------------------|------------------|
| 1 Throttle | 25 Float spindle | 49 Clip |
| 2 Throttle spindle | 26 Slow running tube | 50 Strangler cam |
| 3 Screw | 27 Sealing ring | 51 Swivel |
| 4 Washer | 28 Filter gauze | 52 Washer |
| 5 Distance washer | 29 Main jet | 53 Circlip |
| 6 Floating lever | 30 Washer | 54 Screw |
| 7 Abutment plate | 31 Plug | 55 Screw |
| 8 Throttle lever | 32 Washer | 56 Pivot |
| 9 Washer | 33 Air correction jet | 57 Spring |
| 10 Nut | 34 Economy jet | 58 Strangler |
| 11 Screw, slow running | 35 Body, economy unit | 59 Screw |
| 12 Spring | 36 Valve, economy | 60 Spindle |
| 13 Screw, volume | 37 Spring, valve | 61 Washer |
| 14 Pump, control rod | 38 Washer, valve | 62 Spring |
| 15 Circlip | 39 Diaphragm | 63 Needle valve |
| 16 Spring | 40 Spring | 64 Washer |
| 17 Split pin | 41 Cover | 65 Gasket |
| 18 Pump cover | 42 Screw | 66 Screw |
| 19 Spring | 43 Gasket | |
| 20 Diaphragm | 44 Screw | |
| 21 Screw | 45 Fast, idle interconnection rod | |
| 22 Sealing ring | 46 Split pin | |
| 23 Pump injector | 47 Strangler bracket | |
| 24 Float & Arm | 48 Screw | |

To remove the carburettor

1. Remove the air cleaner from the air intake and the fuel pipe from the inlet boss on the float chamber
2. Disconnect the throttle operating arm from the throttle lever and disconnect the choke cable by releasing the outer casing clip and slackening the swivel in the choke lever.
3. Pull off the vacuum advance pipe from the tube protruding from the carburettor fixing flange. (If fitted – Not all Rebels have this feature).
4. Unscrew the two 5/16" UNF nuts and lock washers securing the carburettor to the inlet manifold.

To dismantle the carburettor (Figure 4)

1. Unscrew five screws and spring washers retaining the float chamber cover and gasket to the lower body.
2. Inside the float chamber cover is the needle valve which controls the entry of fuel to the float chamber. This is a screw fit.
3. The hook shaped pump jet, which consists of a hexagonal base and an "O" ring seal, sits on the lower body and is easily lifted out. Adjacent to the pump jet is the air correction jet, which has the emulsion tube attached and is a screw fit. The slow running jet, with gauze sheath, can be lifted out.
4. The casting which forms the main discharge assembly can be seen in the throat of the carburettor and is located by means of a grub screw. **On no account try to remove or loosen this screw.**
5. To gain access to the main jet, lift out the plastic float complete with its pivot pin and unscrew the hexagon plug, with plain washer, located in the base of the float chamber. Through the plug aperture, unscrew the main jet using a suitable sized screwdriver.
6. Inspection of the accelerator pump diaphragm, spring and passages can be achieved by laying the carburettor on its side with the pump uppermost. Remove the four fixing screws, whilst holding the cover in position. Now carefully swing away the cover on the operating rod, taking care to release the spring tension prior to final removal. On reassembly, first position the spring in the main casting, followed by the diaphragm which is fitted with a spigoted centre portion outwards (towards the cover). When refitting the pump cover ensure that the spring is correctly located in the centre of the diaphragm before refitting the fixing screws.
7. To check the economy device, remove the three retaining screws and lift off the assembly, including gasket. Behind the gasket is situated the economy jet which can be removed using a suitable screwdriver. Access to the economy spring and diaphragm can be gained by removing the two screws of the sub-assembly, holding the cover and carefully releasing the spring tension before lifting off. When replacing the diaphragm, spring and cover, first locate the diaphragm on the body, place the spring in the cover and bring the two parts together with the spring locating in the centre cup of the diaphragm. To refit the assembly, locate the gasket, then position the assembly in the main body of the carburettor and replace the three screws.

To reassemble the carburettor

Before reassembly of the unit, ensure that all jets are correctly replaced.

1. First lower the base of the plastic float into the float chamber and locate the pivot pin in the recess of the body flange.
2. Place the gasket in position and, holding the choke cam in the closed position, locate the upper body to the lower body and secure with the five fixing screws, Tighten evenly and firmly from the centre outwards.

To refit

Follow the reverse procedure for removing the carburettor.

Servicing

When investigating faulty carburation, first check that the correct jet sizes are fitted (see specification chart at the end of this section). It is also imperative to ensure that the electrical side, particularly ignition settings, contact breaker gap and spark plugs are operating correctly and they the tappets are adjusted to the right clearances. Faults in any of these components will upset the performance and can be wrongly diagnosed as "carburettor problems".

Difficult starting (cold engine)

Ensure that there is petrol in the float chamber, for sediment or gum can cause the float needle to stick in the closed position, preventing the entry of fuel. The fuel in the float chamber tends to evaporate as the engine cools after running. Check also that the fuel pump is operational.

If a sticking needle is suspected, remove the upper body of the carburettor and operate the needle with a finger. A tendency for the valve to stick in the closed position can usually be overcome by rinsing it in methylated spirit. This will dissolve any gum deposits and wash off sediments.

Ensure that the choke flap is completely closed when the choke knob is pulled fully out. Maladjustment or fault here could cause the choke to remain partially open which will lead to difficulty in starting from cold. Also check that the throttle screw is correctly adjusted.

Difficult starting (hot engine)

First check that the needle valve is of the correct size. Having cleaned the assembly, replace it with the correct washer and ensure that it is screwed tightly in position.

Examine the float for damage and see that it moves freely on the pivot pin. If petrol floods into the manifold after switching off the engine it is possible that there is excessive pressure from the fuel pump.

A additional washer under the needle valve may be effective in preventing flooding and could be tried prior to replacing the pump. A flooded engine can be started by holding the throttle fully open whilst cranking the engine

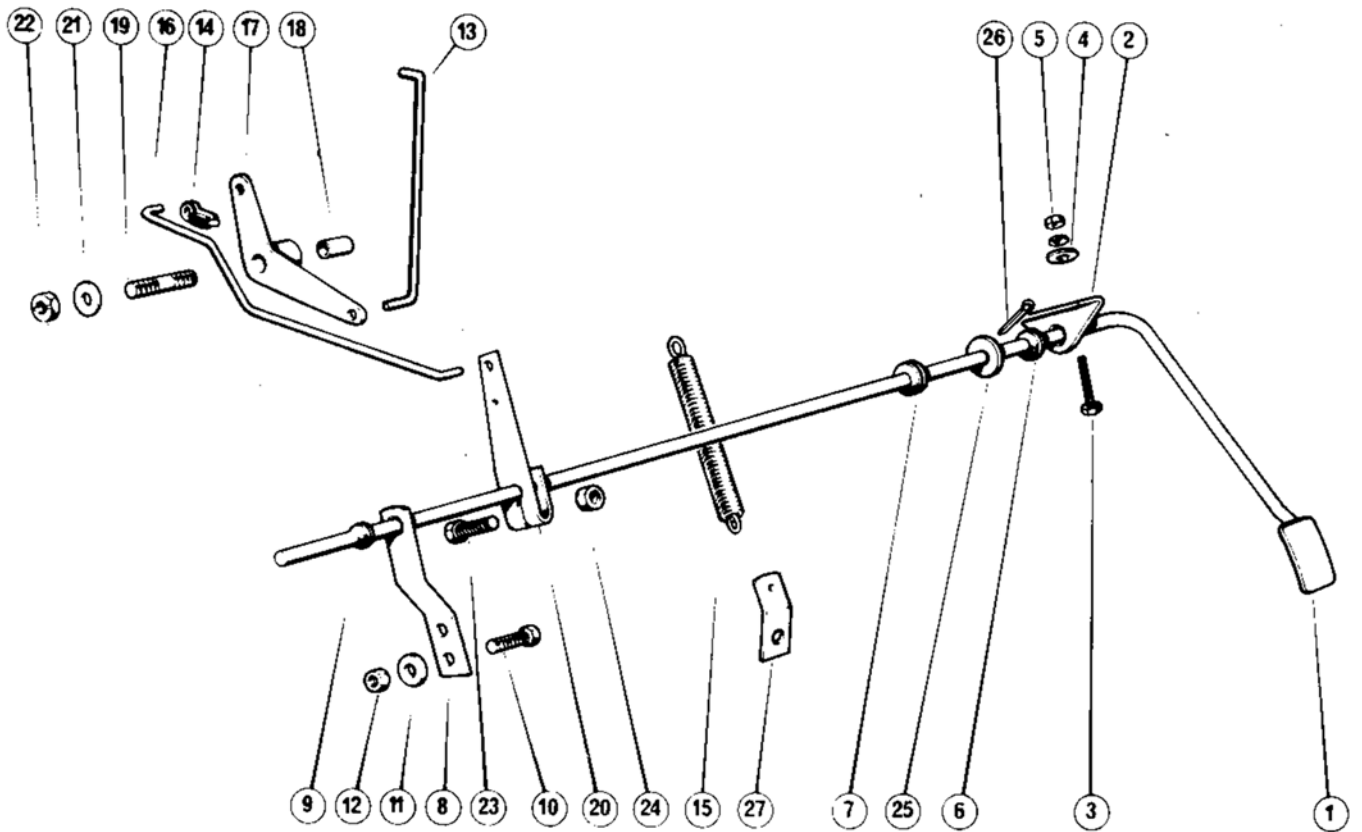


Figure 5 Accelerator mechanism

- | | | |
|------------------|---------------------------------|--------------------|
| 1 Cross shaft | 10 Set screw | 19 Stud |
| 2 Bracket | 11 Washer | 20 Operating lever |
| 3 Set screw | 12 Nut | 21 Washer |
| 4 Washer | 13 Connecting rod, short | 22 Nut |
| 5 Nut | 14 Linkage clip | 23 Bolt |
| 6 Grommet | 15 Return spring | 24 Nut |
| 7 Grommet | 16 Connecting rod, intermediate | 25 Washer |
| 8 Plate, pivot | 17 Lever, intermediate | 26 Split pin |
| 9 Grommet, plate | 18 Bush, lever | 27 Clip |

Erratic slow running or stalling on deceleration

Make certain that the slow running jet is clean and that the feed hole to the channel into which the jet screws is clear. It is also essential to ensure that the slow running air bleed into the intake is clear.

Check that the slow running outlet hole and the progression hole or holes in the throttle barrel are clear and not choked with carbon, restricting the orifice.

Remove the volume control screw and check that the tapered end is in good condition. If the taper shows any wear the screw must be renewed. Make sure that the tension spring beneath the head of the screw loads the screw correctly, preventing it vibrating out of adjustment.

Adjust the throttle control screw and volume control screw so that the engine idles evenly and acceleration is clean and progressive.

Check that the gasket between the inlet manifold and the carburettor is sound as an air leak here will seriously affect the way the engine runs.

Stalling is usually due to the idling speed being too low or the mixture being set too lean.

Excessive fuel consumption

Poor fuel economy is usually as a consequence of a mechanical defect, binding brakes and under inflated tyres being the most common causes. If the cause appears to be carburation, check as follows:

Having checked to ensure that the jets are all correct and all holes and passages within the carburettor are correct, check that the choke flap is fully open with the choke knob fully in.

Inspect the economy device to ensure that the diaphragm is intact and the gasket in sound condition. Similarly check the accelerator pump diaphragm.

If there are signs of richness during idling the carburettor may be flooding. The float needle and float should be inspected for wear or damage and renewed if necessary. These components are recommended for replacement every 15,000 m (24,000 km). A defective fuel pump can also cause flooding due to excessive pressure overrunning the float needle valve. If this is the case the pump should ideally be renewed.

Fuel leakage will also increase fuel consumption significantly.

Poor Acceleration

Check that the accelerator pump diaphragm is sound. Remove the pump jet and ensure it is completely clear. Check the rubber "O" ring sealing the jet to the carburettor body.

"Flat spots" or hesitation on progressive opening of the throttle can usually be eliminated by careful adjustment of the slow running mixture (volume) screw.

Loss of power

Check jet sizes are correct and make certain that all jets and internal passages are clear from obstructions and that the throttle is fully opening.

Accelerator pedal mechanism (Figure 5)

To remove

1. Remove two ¼" UNF set screws, nuts and washers securing the accelerator cross-shaft pivot plate to the engine bulkhead. An assistant will be required to hold the two nuts when removing the set screws.
2. Release the linkage clip and disconnect the intermediate connecting rod from the operating lever.
3. Unhook the throttle return spring from the operating lever.
4. Slacken the 5/16" UNF nut and bolt securing the operating lever to the accelerator cross-shaft. Note the position and angle of the lever.
5. Remove the two split pins located either side of the cross-shaft pivot bracket.
6. Slide the accelerator cross-shaft to the right sufficiently to allow the removal of the operating lever and cross-shaft plate.
7. Unscrew the two ¼" UNF set screws, nuts and washers and detach the cross-shaft pivot bracket from inside the foot well.
8. Completely withdraw the accelerator cross-shaft through the right-hand foot well and remove from the vehicle.

To replace

1. Position the pivot bracket, complete with grommet and location washers, on to the accelerator cross-shaft.
2. Locate the cross-shaft in the r/h foot well. Insert through the bulkhead grommet and fit the operating lever and cross-shaft pivot plate.

3. From inside the foot well, fit both split pins to prevent lateral movement of the shaft.
4. Secure the pivot bracket to the body using two ¼" UNF set screws, nuts and washers.
5. Using two 1/4" UNF set screws, nuts and washers, fit the cross-shaft pivot plate to the engine bulkhead.
6. Retighten the operating lever fixing bolt, first ensuring that the lever is at the original angle and position that it was in prior to dismantling.
7. Reconnect the intermediate connecting rod to the lever and fit the linkage clip.
8. Hook the throttle return spring on to the operating lever. Ensure also that the spring is securely located firmly on the clip fixed to the foot well.

Check the operation of the accelerator mechanism, road test the vehicle and make any necessary adjustments.

Air Cleaner (Figure 6)

Early Vehicles

The air cleaner is mounted on to the intake of the carburettor and held firmly by a rubber sleeve and a jubilee clip.

To remove filter element

1. Slacken the jubilee clip and lift the air cleaner assembly clear of the vehicle, to prevent dirt falling in to the carburettor.
2. Remove the clamping screw on the side of the air cleaner body and dismantle the complete assembly. Remove the element.
3. The paper element cannot be cleaned and must always be renewed.
4. Thoroughly clean the base plate, main body and top plate, then reassemble with a new element. Ensure the fixing clamp firmly secures all the components.
5. Replace the air filter assembly on to the carburettor and tighten the jubilee clip.

Later vehicles (sealed engine)

The air cleaner on later engines is similar, but now incorporates a pipe from the engine breather (from the oil filler cap) to pass crankcase fumes through the carburettor to be burned in the engine to help control emissions.

To remove filter element

1. Remove oil filler cap from the rocker cover.
2. Unscrew the small screw in the centre of the air filter lid and lift the air filter off the carburettor and clear of the vehicle, complete with hose and oil filler cap.
3. To prevent dirt entering the carburettor, pull out the choke knob fully before removing the air filter.
4. Remove the filter element. Never re-use or clean a used air filter. The oil filler cap has an internal gauze filter which should be inspected and cleaned using paraffin. If the gauze is missing/damaged/rusted then the cap must be renewed.
5. Clean all components and reassemble with a new filter element. Refit the assembly to the carburettor with the small screw, and refit the oil filler cap.

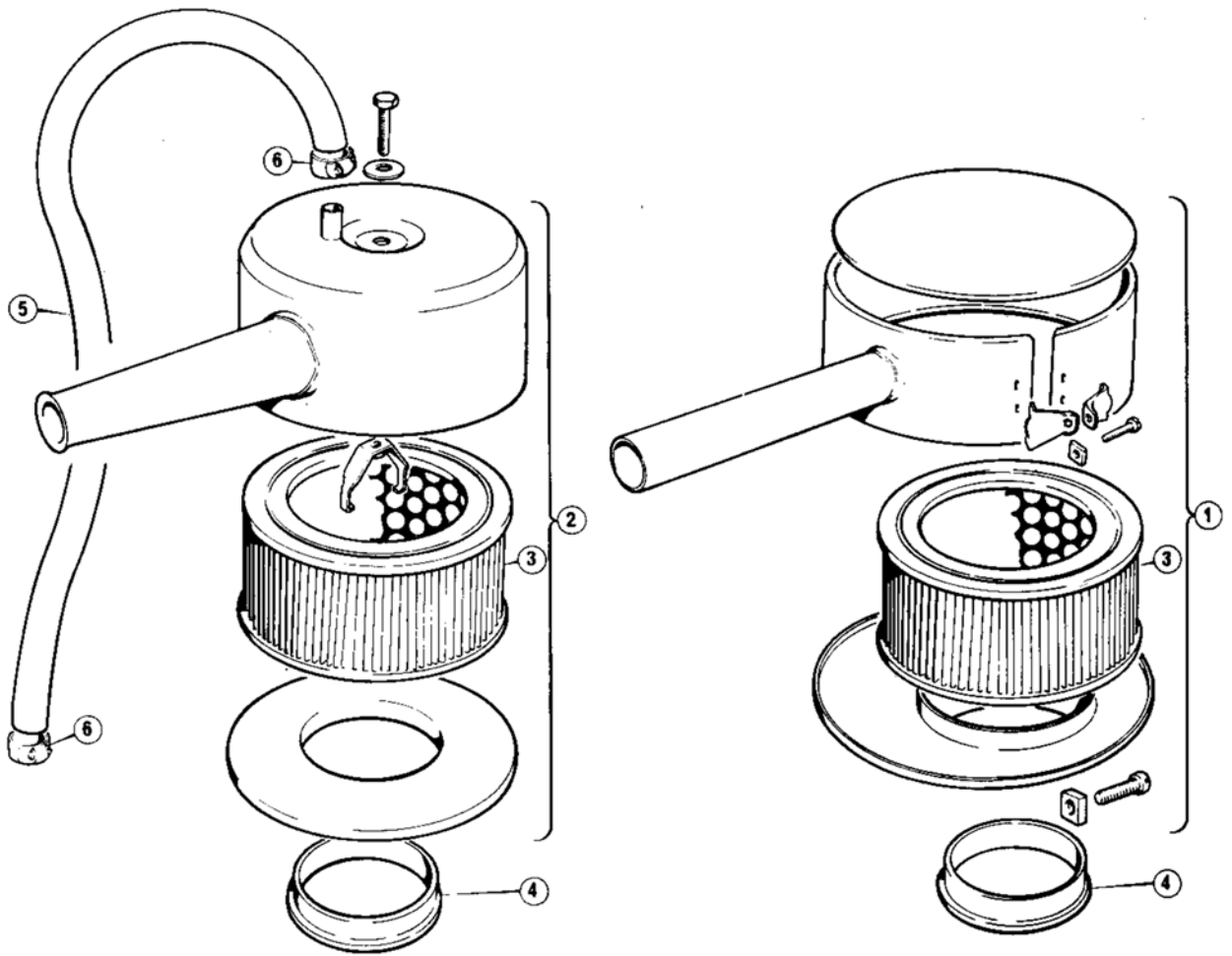


Figure 6 Air cleaner

- 1 Air cleaner – early 700 cc
- 2 Air cleaner – later 700 cc & 750 cc
- 3 Element
- 4 Sleeve
- 5 Hose
- 6 Clip

Fuel tank		
Capacity	27.3 litres (6 gallons)	
Fuel pump		
Type	AC mechanical	
Fixing torque	2.07-2.49 kg/m (15-18 lb/ft)	
Carburettor		
Type	Zenith 30IZ	
Jet sizes		
	700cc	750cc
Main jet	95	105
Compensating jet	175	160
Slow running idling jet	45	50
Slow running air bleed	80	80
Accelerator pump jet	45	40
Accelerator pump back bleed	35	35
Economy jet	55	50
Needle valve	1.3	1.6

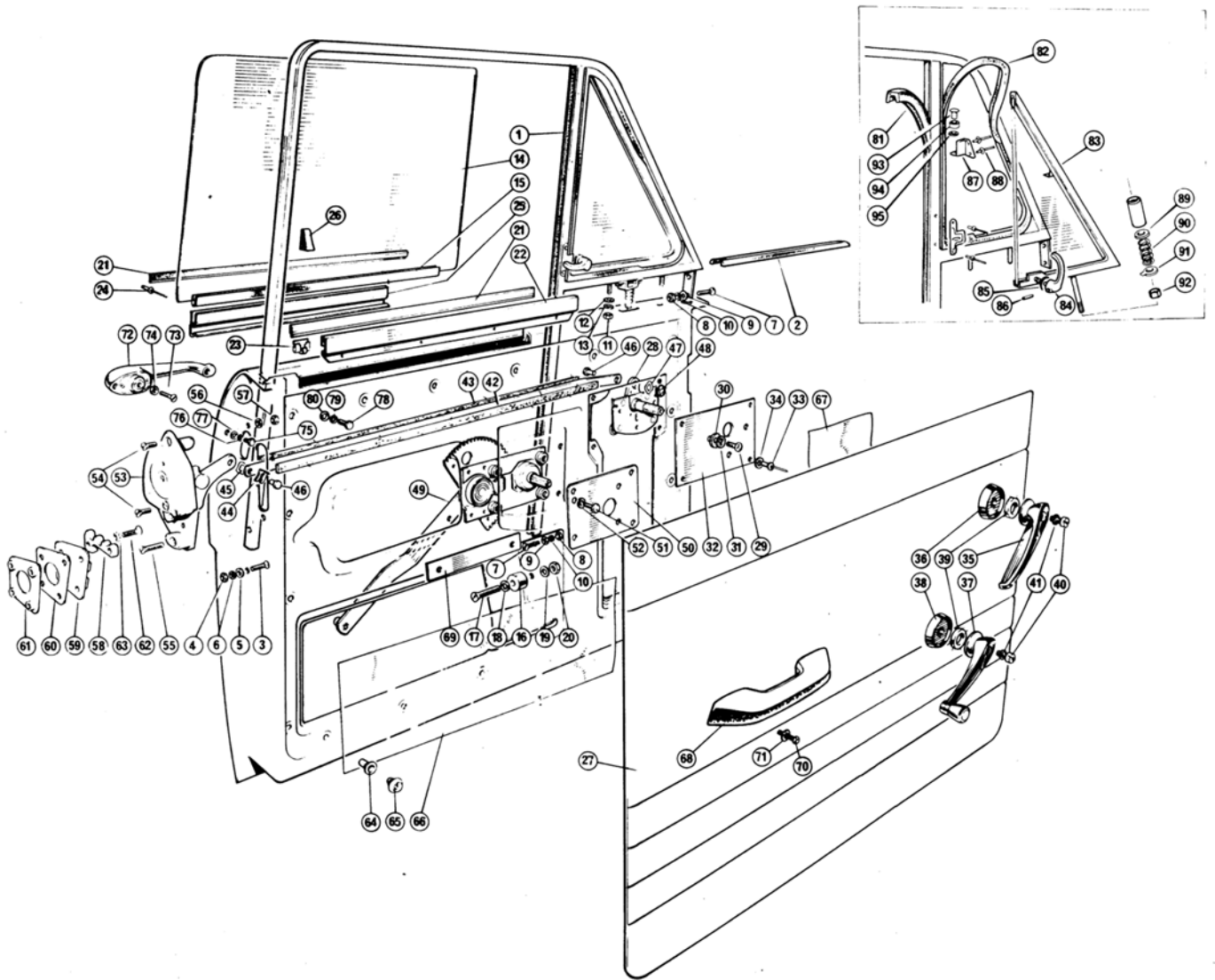


Figure 1 Side door

1. Door frame assembly LH	25. Regulator channel	49. Window regulator	73. Screw
2. Seal, vent to door	26. Door seal wedge	50. Plate	74. Nut
3. Screw	27. Door casing	51. Set screw	75. Set screw
4. Nut	28. Remote control mechanism	52. Lock washer	76. Lock washer
5. Washer	29. Screw	53. Lock	77. Washer
6. Lock washer	30. Washer	54. Screw	78. Set screw
7. Screw	31. Lock washer	55. Screw	79. Lock washer
8. Nut	32. Backing plate	56. Washer	80. Washer
9. Washer	33. Rivet	57. Nut	81. Felt, channel
10. Lock washer	34. Washer	58. Striker plate	82. Rubber seal
11. Nut	35. Handle	59. Dovetail	83. Pivot, vent
12. Washer	36. Escutcheon	60. Spacer	84. Catch lever
13. Lock washer	37. Winder handle	61. Backing plate	85. Wavy washer
14. Drop glass	38. Escutcheon	62. Screw	86. Pin
15. Rubber, glass to regulator channel	39. Washer	63. Lock washer	87. Hinge, upper
16. Bottom door glass stop	40. Screw	64. Retainer	88. Rivet
17. Set screw	41. Lock washer	65. Retainer	89. Washer
18. Washer	42. Link	66. Waterproof panel, main	90. Spring
19. Washer	43. Insulation, link	67. Waterproof panel, front	91. Tab washer
20. Nuts	44. Clip	68. Front arm rest	92. Nut
21. Silent channel	45. Waved washer	69. Backing plate	93. Rivet
22. Carrier strip	46. Rivet	70. Screw	94. Spacer
23. Clip	47. Waved washer	71. Washer	95. Washer
24. Rivet	48. Retainer	72. Door handle	

Window regulator mechanism (Figure 1)

To remove

1. Unscrew two 2BA screws and remove both interior handles complete with escutcheons.
2. Remove two No10 UNF screws and detach the arm rest from the inner door panel.
3. Beginning at the top, carefully pull back the inner door casing to reveal the retaining fasteners and release the inner panel assembly.
4. Unscrew four ¼" UNF set screws, complete with washers, securing the regulator mechanism to the backing plate, which can then be removed.
5. Lift the waterproof membrane clear, lower the regulator mechanism and slide the operating arm to disengage from the regulator channel. Remove the regulator from the door.
6. Replace in reverse order, liberally greasing the regulator channel and regulator spring.

Door lock mechanism (Figure 1)

To remove

1. Remove interior handles and door inner panel as already described.
2. Remove three cross-head screws, complete with lock washers securing the remote control mechanism to the backing plate.
3. Carefully peel back the waterproof membrane, lower the remote control mechanism and disconnect the lock to mechanism linkage. Remove the remote control.
4. Unscrew the three 10 UNF countersunk screws, nuts and washers and withdraw the door lock, complete with linkage, from the door.
5. If required, remove the retaining clip and rivet and disconnect the linkage from the door lock.
6. Remove the external door handle by unscrewing the 2 BA and the ¼ BSF set screws and washers.
7. Reassemble in reverse order
8. After fitting the external handle to the door the plunger screw should be adjusted to give a clearance of 1.58mm (0.063 in) between the plunger and lock thrust plate.

Adjustment of door striker plate and dovetail

The door striker should not normally require attention but if this is necessary then lateral adjustment can be achieved via the elongated fixing holes in the door pillar. Fore and aft adjustment requires that dovetail spacer shims be added or removed behind the striker plate.

1. Slacken the four ¼" UNF striker plate and dovetail fixing screws.
2. Adjust the door until flush with the bodywork and tighten the screws.

3. Carefully open the door and check that the wheel of the door lock makes a good seating on the dovetail. If spacers must be added or deleted, it will be necessary to completely remove the striker plate to do so. The rear of this is accessible after removing a large rubber grommet. Take extreme care not to allow the backing plate to drop into the body as the base of the body shell is sealed on Estate and Van models so retrieving it will be very difficult.
4. Re-adjust the door accordingly.

To remove the window frame and glass (Figure 1)

1. Remove interior handles and door inner panel as already described.
2. Remove three No 10 UNF screws and lower remote control mechanism to facilitate access to quarter light fixings.
3. Unscrew the two countersunk screws, nuts and washers securing the quarter light to the door.
4. Remove two ¼" UNF nuts, complete with lock washers and plain washers, securing the quarter light to the front top face of the door.
5. Peel back the front window channel felt and remove the single countersunk screw, nut, lock washer and plain washer.
6. Peel back the rear window channel felt and remove two countersunk screws complete with nuts, lock washers and plain washers securing the channel to the rear door face.
7. Push the window channel felt back into position.
8. Drill out four rivets fixing the silent channel carrier strip to the inside of the door and remove the carrier in an outward and upward direction.
9. Withdraw the window frame complete from the door.
10. Raise the window and slide to disengage the operating arm from the regulator channel, then lift the glass clear from the door.
11. Reassemble in reverse order.

Removing silent channels

1. Remove interior handles and door inner panel as already described.
2. Unscrew the No 10 UNF set screw, nut and washers and remove the lower drop glass stop.
3. Using the winder handle, carefully wind the glass down below the frame to enable access to the silent channel securing rivets.
4. Drill out five silent channel fixing rivets to enable removal of the inner silent channel. The channel is removable from the carrier strip after releasing seven retaining clips.
5. Drill out four rivets and remove the outer silent channel.
6. Replace in reverse order.

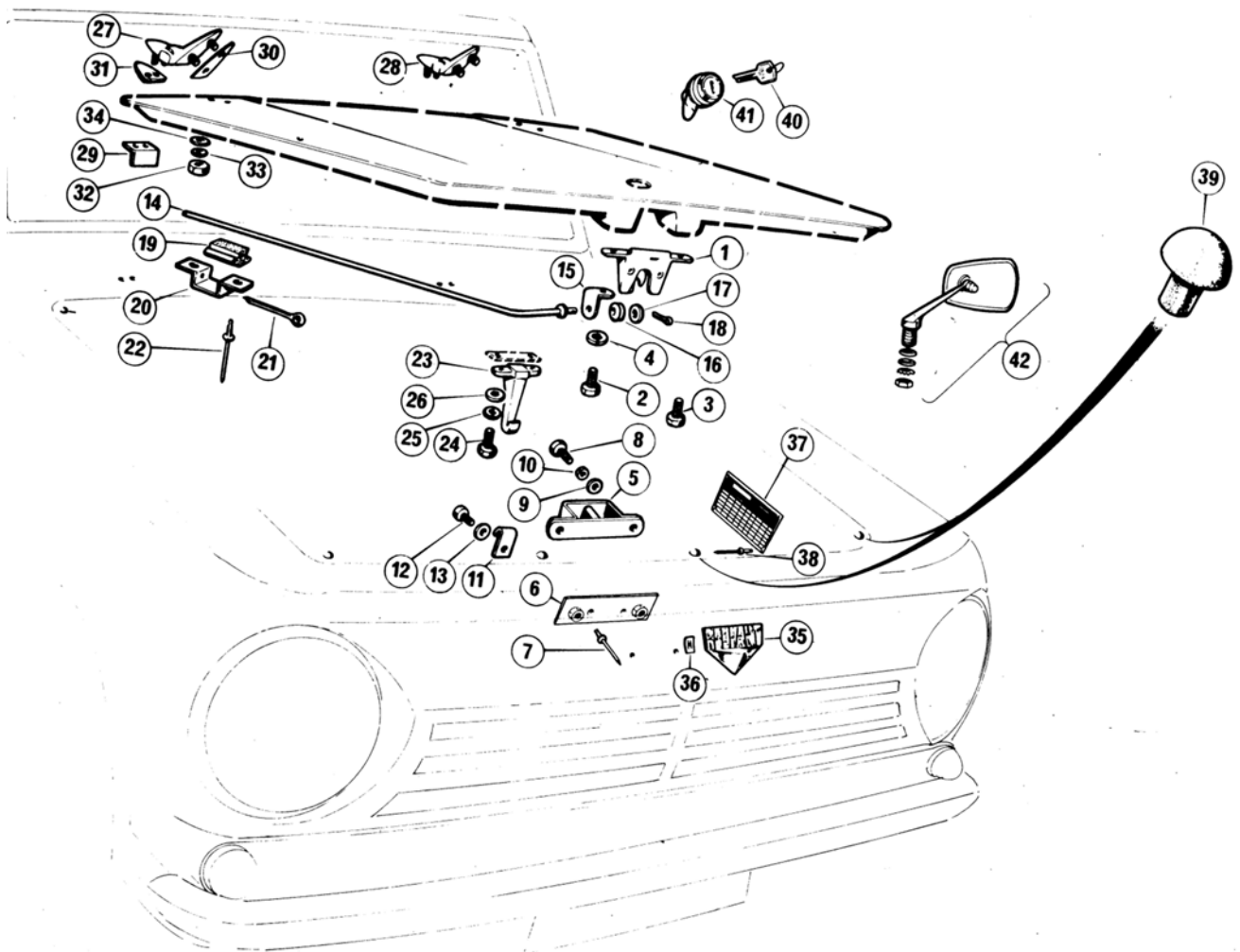


Figure 2 Bonnet assembly

- | | | | | | |
|-----|--------------------------|-----|--------------|-----|---------------------|
| 1. | Lock | 15. | Bracket | 29. | Backing plate |
| 2. | Set screw | 16. | Grommet | 30. | Packing washer |
| 3. | Set screw | 17. | Washer | 31. | Packing washer |
| 4. | Lock washer | 18. | Split pin | 32. | Nut |
| 5. | Striker | 19. | Retainer | 33. | Lock washer |
| 6. | Backing plate | 20. | Bracket | 34. | Washer |
| 7. | Rivet | 21. | Split Pin | 35. | Badge |
| 8. | Set screw | 22. | Rivet | 36. | Clip |
| 9. | Washer | 23. | Safety catch | 37. | Data plate |
| 10. | Lock washer | 24. | Screw | 38. | Rivet |
| 11. | Stop plate, safety catch | 25. | Lock washer | 39. | Buffer |
| 12. | Set screw | 26. | Washer | 40. | Key |
| 13. | Washer | 27. | Hinge RH | 41. | Private bonnet lock |
| 14. | Bonnet support rod | 28. | Hinge LH | 42. | Wing mirror |

Doors

To remove door complete from vehicle

1. Remove four self-tapping screws and remove hinge access panel from rear of front wheel arch (**Figure 4**).
2. Supporting the door in the open position and employing an assistant, remove the eight ¼" UNF bolts, nuts and washers securing the hinges to the "A" pillar and lift the door clear.

Note: It is vital to be careful to retain the shims between the hinges and the "A" post. These must be carefully stored and marked to ensure that they are replaced in their original positions when the door is refitted.

Refit in reverse order

To remove hinges from door

1. Remove Interior handles and door inner panel as already described.
2. Peel back waterproof membrane to gain access to the hinge fixing bolts.
3. Unscrew four ¼" UNF set screws, nuts and washers to remove each hinge.
4. Replace in reverse order.

Bonnet (Figure 2)

To remove

1. Open the bonnet and locate the support rod.
2. Remove two ¼" BSF nuts and washers securing each hinge to the bonnet.
3. Replace the support rod in its retainer on the bonnet, and carefully lift the bonnet clear of the hinges.
4. Refit in reverse order ensuring that the two longer packing washers are correctly seated under the hinges.

Boot lid – Saloon (Figure 3)

To remove

1. Open the boot and disconnect the two check straps which are fixed to a bracket mounted either side of the body secured by No 10 UNF set screws, washers and nuts.
2. Disconnect the number plate lamp leads at the snap connectors.
3. Unscrew the 5/16" UNF nut and coach washer from the two hinge to body fixings and lift the boot lid from the vehicle.
4. Each hinge is secured to the boot lid by two ¼" UNF self locking nuts and plain washers.
5. Reassemble in reverse order. Make sure that the hinge packing washers are correctly seated.

Rear door – Estate and van (Figures 5 & 6)

To remove

1. Fully open the door and remove the single screw connecting the check link assembly lug.
2. From beneath the vehicle, disconnect the number plate lamp wiring at the snap connector.
3. With an assistant supporting the door, remove four ¼" UNF hinge to body set screws and lock washers and lift the door clear of the vehicle.
4. Four ¼" UNF nuts and plain washers secure the hinges to the door.
5. Remove two No 10 UNF set screws, complete with lock washers, to detach the check link assembly from its body mounting.
6. The door striker is secured to the body with two No 10 UNF screws, washers and nuts which are accessible after removing the rubber grommet.
7. Replace door and components in reverse order.

Bumpers – All models (Figures 4, 5 & 6)

Front bumper removal

1. Remove headlamps. (see section T)
2. Reach down through the headlamp apertures and remove two 5/16" UNF nuts, plain and lock washers.
3. Remove two 5/16" UNF nuts, washers and lock washers accessible through the apertures provided below the bumper. The centre front bolt is for cosmetic purposes only and need not be disturbed.
4. Withdraw the six fixing bolts and detach the bumper from the body. Retain the six rubber spacers located between the bumper and the body.
5. Replace in reverse order.

Rear bumper removal – saloon

1. Remove seven 5/16" UNF bolts, nuts, plain and lock washers, accessible from under the rear body apron.
2. Detach the bumper from the body retaining the seven rubber spacers.
3. Replace in reverse order.

Rear bumper removal – estate and van

1. Remove four 5/16" UNF bolts, nuts, plain and lock washers. The three centre bolts are for cosmetic purposes only and need not be disturbed.
2. Detach the bumper from the mounting brackets and retain the rubber spacers.
3. Replace in reverse order.

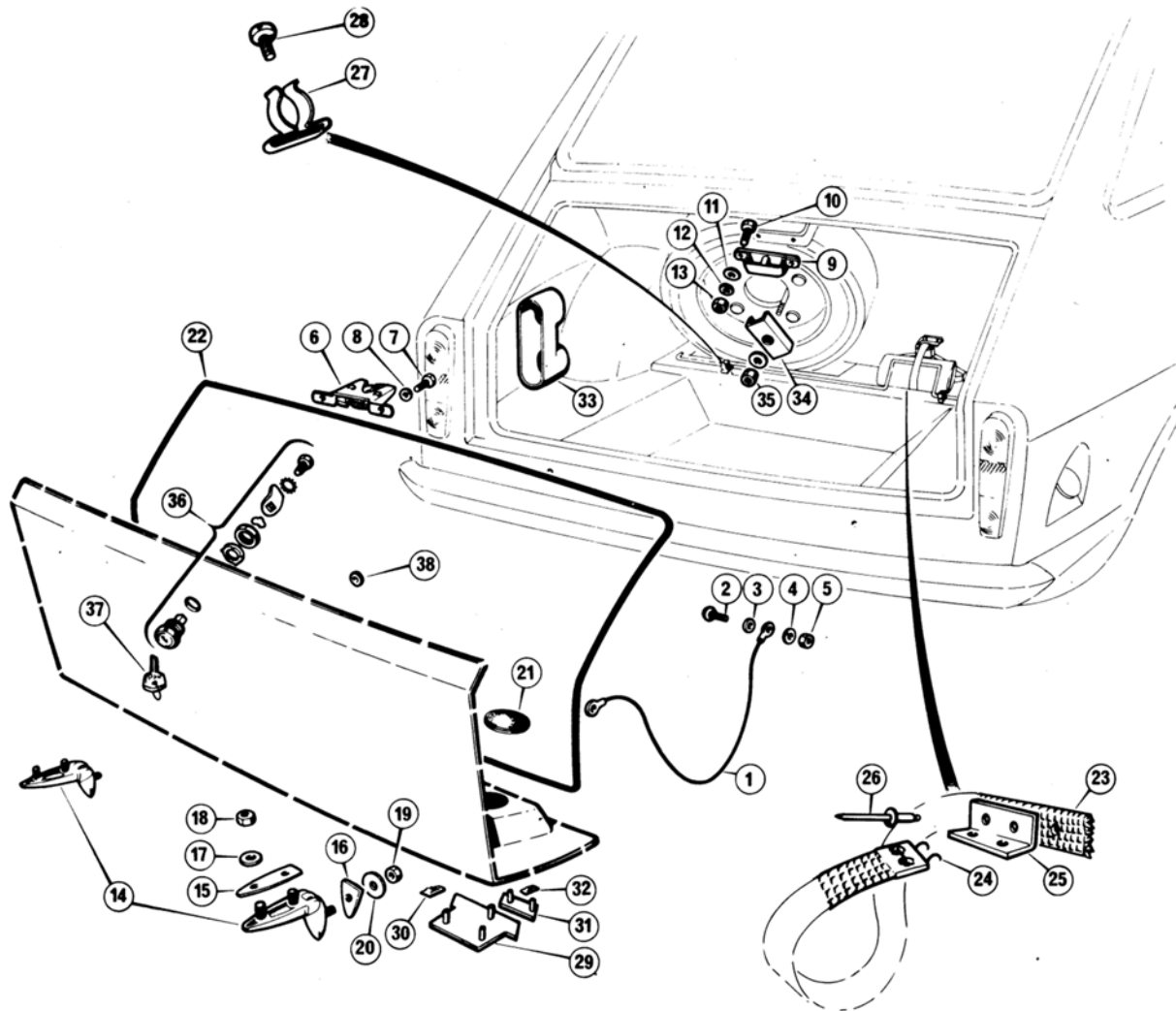


Figure 3 Boot lid Saloon

- | | |
|--------------------------|-----------------------|
| 1 Checkstrap | 30 Clip |
| 2 Set screw | 31 Motif |
| 3 Washer | 32 Clip |
| 4 Lockwasher | 33 Cover, rear lamp |
| 5 Nut | 34 Retainer channel |
| 6 Single claw lock | 35 Wheel nut |
| 7 Set screw | 36 Private lock, boot |
| 8 Lockwasher | 37 Key |
| 9 Striker | 38 Grommet |
| 10 Set screw | |
| 11 Washer | |
| 12 Lockwasher | |
| 13 Nut | |
| 14 Hinge | |
| 15 Packing washer, long | |
| 16 Packing washer, short | |
| 17 Washer | |
| 18 Nut | |
| 19 Nut | |
| 20 Washer | |
| 21 Grommet | |
| 22 Seal, boot | |
| 23 Strap | |
| 24 Hook | |
| 25 Bracket | |
| 26 Rivet | |
| 27 Clip | |
| 28 Screw | |
| 29 Badge, boot | |

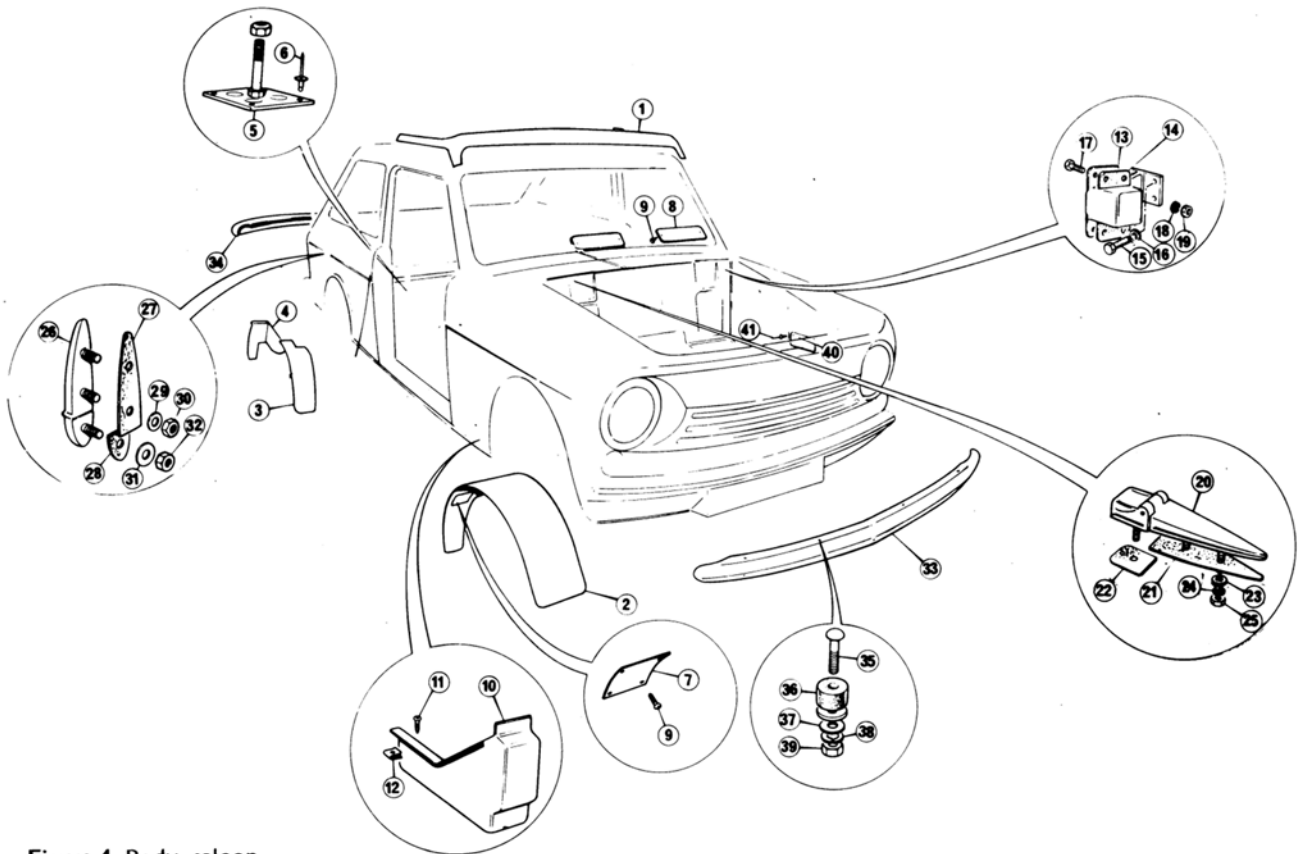
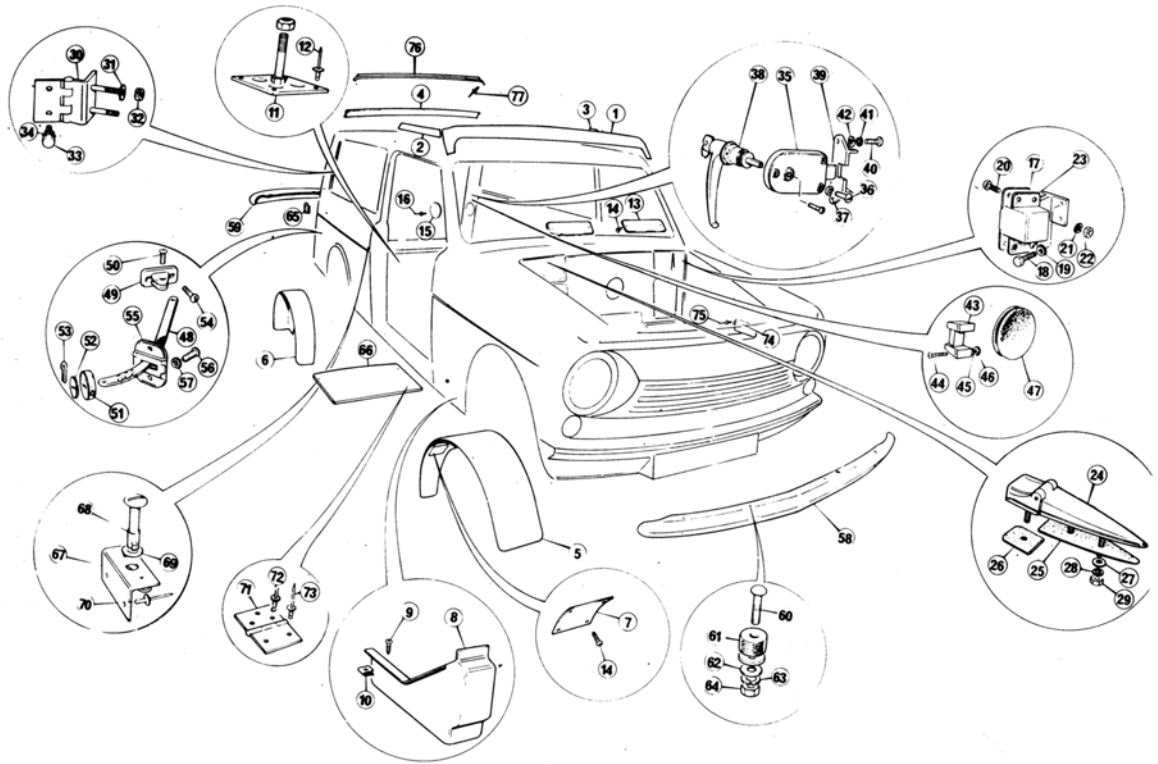


Figure 4 Body, saloon

- | | |
|-------------------------------|-------------------------------|
| 1 Header rail | 36 Spacer |
| 2 Wheelarch, front | 37 Washer |
| 3 Wheelarch, rear | 38 Lockwasher |
| 4 Wheelarch extension | 39 Nut |
| 5 Backing plate, spare wheel | 40 Lubrication recommendation |
| 6 Rivet | 41 Rivet |
| 7 Cover plate, wheelarch | |
| 8 Cover plate, wiper wheelbox | |
| 9 Screw | |
| 10 Cover, master cylinder | |
| 11 Screw | |
| 12 Captive nut | |
| 13 Hinge | |
| 14 Shim | |
| 15 Set screw | |
| 16 Lockwasher | |
| 17 Set screw | |
| 18 Washer | |
| 19 Nut | |
| 20 Hinge, bonnet | |
| 21 Washer, packing | |
| 22 Washer, packing | |
| 23 Washer, hinge | |
| 24 Lockwasher | |
| 25 Nut | |
| 26 Hinge, boot | |
| 27 Washer, packing | |
| 28 Washer, packing | |
| 29 Washer, hinge | |
| 30 Nut | |
| 31 Washer | |
| 32 Nut | |
| 33 Bumper, front | |
| 34 Bumper, rear | |
| 35 Bolt | |

Figure 5 Body, estate



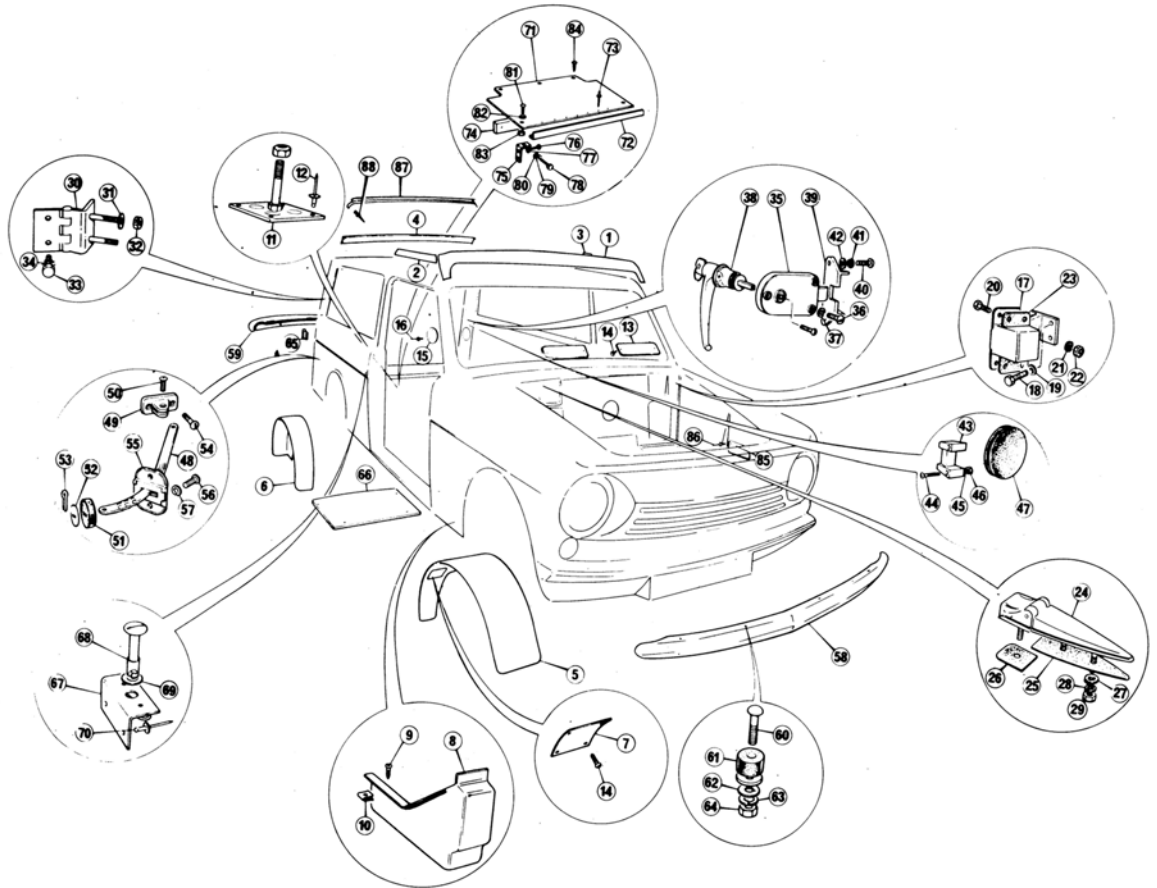
1.	Header rail, front	23.	Shim	45.	Washer	67.	Spring bracket
2.	Header rail RH	24.	Bonnet hinge	46.	Nut	68.	Stud
3.	Header rail LH	25.	Packing washer	47.	Grommet	69.	Nylon washer
4.	Header rail, rear	26.	Packing washer	48.	Check link	70.	Rivet
5.	Wheel arch front	27.	Washer	49.	Lug	71.	Hinge
6.	Wheel arch rear	28.	Lock washer	50.	Screw	72.	Rivet
7.	Cover panel	29.	Nut	51.	Rubber washer	73.	Rivet
8.	Master cylinder cover	30.	Rear door hinge	52.	Washer	74.	Data plate
9.	Screw	31.	Washer	53.	Split pin	75.	Rivet
10.	Captive nut	32.	Nut	54.	Screw	76.	Drip channel
11.	Backing plate	33.	Set screw	55.	Slide plate	77.	Rivet
12.	Rivet	34.	Lock washer	56.	Set screw		
13.	Cover plate wheel box	35.	Rear door lock	57.	Lock washer		
14.	Screw	36.	Screw	58.	Front bumper		
15.	Access cover, lights	37.	Lock washer	59.	Rear bumper		
16.	Rivet	38.	Locking handle	60.	Bolt		
17.	Side door Hinge	39.	Dovetail	61.	Spacer		
18.	Set screw	40.	Set screw	62.	Washer		
19.	Lock washer	41.	Lock washer	63.	Lock washer		
20.	Set screw	42.	Washer	64.	Nut		
21.	Washer	43.	Striker	65.	Grommet		
22.	Nut	44.	Screw	66.	Spare wheel cover		

Body – All models (Figures 4, 5 and 6)

To remove body from chassis

1. Disconnect and remove battery.
2. Disconnect alternator/generator leads.
3. Disconnect starter motor lead.
4. Disconnect temperature sender lead.
5. Disconnect oil pressure switch lead.
6. Remove high tension lead from distributor.
7. Disconnect speedometer cable at gearbox end.
8. Remove air cleaner.
9. Disconnect throttle linkage from cross-shaft.
10. Disconnect fuel supply pipe from petrol pump.
11. Remove brake and clutch pedals from their levers.
12. Disconnect handbrake cable at lever end.
13. Remove seat belt floor fixings.
14. Drain radiator.
15. Remove radiator.
16. Disconnect heater hoses.
17. Remove steering wheel.
18. Remove steering column/box assembly.
19. Remove exhaust down pipe from manifold.
20. Remove gear lever.

Figure 6 Body, van



1.	Header rail, front	23.	Shim	45.	Washer	67.	Spring bracket
2.	Header rail RH	24.	Bonnet hinge	46.	Nut	68.	Stud
3.	Header rail LH	25.	Packing washer	47.	Grommet	69.	Nylon washer
4.	Header rail, rear	26.	Packing washer	48.	Check link	70.	Rivet
5.	Wheel arch front	27.	Washer	49.	Washer	71.	Floor panel
6.	Wheel arch rear	28.	Lock washer	50.	Screw	72.	Front stiffener
7.	Cover panel	29.	Nut	51.	Rubber washer	73.	Rivet
8.	Master cylinder cover	30.	Rear door hinge	52.	Washer	74.	Support block
9.	Screw	31.	Washer	53.	Split pin	75.	Support bracket
10.	Captive nut	32.	Nut	54.	Screw	76.	Screw
11.	Backing plate	33.	Set screw	55.	Slide plate	77.	Lock washer
12.	Rivet	34.	Lock washer	56.	Set screw	78.	Set screw
13.	Cover plate wheel box	35.	Rear door lock	57.	Lock washer	79.	Washer
14.	Screw	36.	Screw	58.	Front bumper	80.	Lock washer
15.	Access cover, lights	37.	Lock washer	59.	Rear bumper	81.	Set screw
16.	Rivet	38.	Locking handle	60.	Bolt	82.	Lock washer
17.	Side door Hinge	39.	Dovetail	61.	Spacer	83.	Nut
18.	Set screw	40.	Set screw	62.	Washer	84.	Wood scrw
19.	Lock washer	41.	Lock washer	63.	Lock washer	85.	Data plate
20.	Set screw	42.	Washer	64.	Nut	86.	Rivet
21.	Washer	43.	Striker	65.	Grommet	87.	Drip channel
22.	Nut	44.	Screw	66.	Spare wheel cover	88.	Rivet

Remove body to chassis fixings as follows:

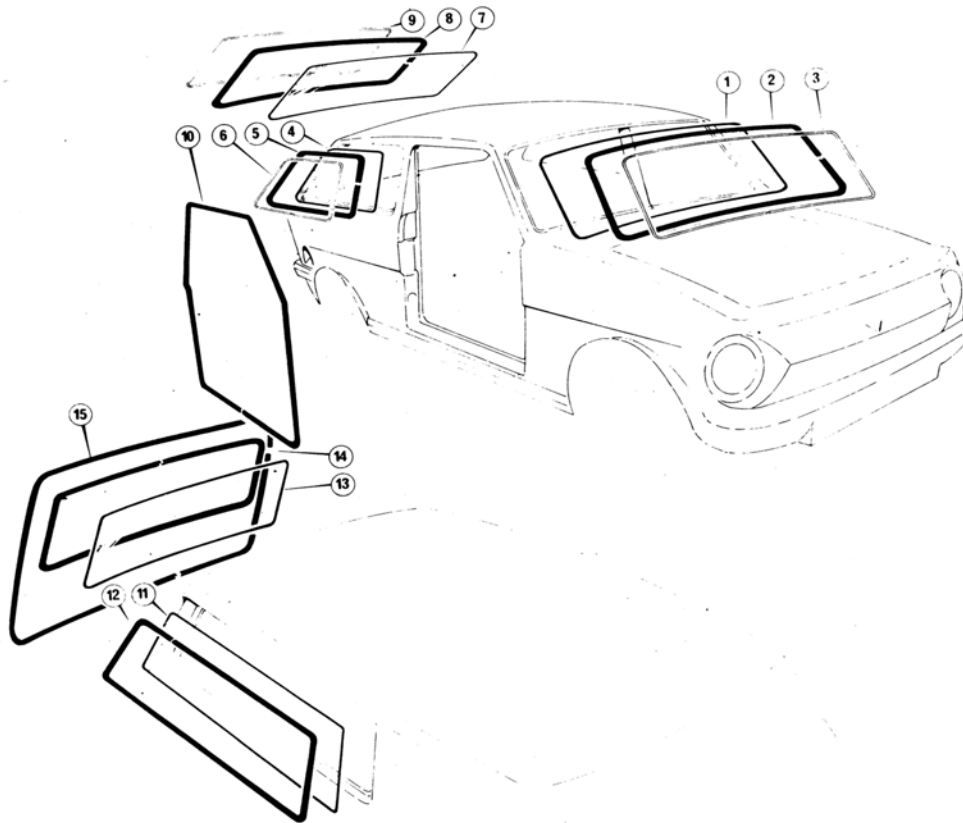
Saloon

- 11 off ¼" UNF set screws, coach washers, plain washers and locking nuts.
- 4 off 5/16" UNF set screws, locking nuts and 8 plain washers.
- 4 off 5/16" UNF bolts, plain washers, lock washers and hexagon nuts

Estate and Van

- 15 off ¼" UNF set screws, coach washers, plain washers and locking nuts.
- 4 off 5/16" UNF set screws, locking nuts and 8 plain washers.
- 4 off 5/16" UNF bolts, plain washers, lock washers and hexagon nuts

Pull the body back slightly, then lift off the chassis.
Replace in reverse order.



1. Windscreen
2. Weather strip
3. Filler strip
4. Rear quarter glass
5. Weather strip
6. Filler strip
7. Rear window
8. Weather strip
9. Filler strip
10. Seal
11. Rear quarter glass
12. Weather strip
13. Rear door glass
14. Weather strip
15. Seal

Figure 7 Glazing

Windscreen (Figure 7)

To remove

1. Remove wiper arms.
2. Protect the bonnet by using a suitable cover.
3. Pull the filler strip from the weather strip.
4. With the aid of an assistant, gently push the screen out from inside the vehicle, easing the rubber strip over the lip of the screen aperture.
5. Remove the screen from the vehicle to a safe place to avoid scratching or damage.
6. Examine the weather strip for damage or perishing. Replace if necessary.

To replace

1. Fit the weather strip to the windscreen aperture, positioning the join half way up one of the "A" posts of the frame. If a new weather strip is being used, cut it 1" over size. The ends of the overlap should be forced back until a tight butt joint is formed.
2. The windscreen can now be fitted starting from a corner and easing the lip of the moulding over the screen with a soft tapered piece of wood.
3. Using a suitable tool, insert the filler strip in to the weather strip.

Quarter glasses

Estate

To remove

Gently push the glass from inside the vehicle, easing the rubber of the weather strip over the body, and lift the glass clear.

To replace

1. Fit the weather strip to the glass.
2. Fit a draw cord in the weather strip groove allowing an overlap of approximately 6" (152mm) at the bottom.
3. Position the window over the aperture with the cord ends inside the vehicle.
4. Pull out the cord whilst an assistant applies light pressure to the outside of the glass.
5. Check the sealing of the weather strip.

Saloon

Follow the procedure for windscreen replacement with the butt joint half way up the "B" post.

Rear window

Estate and van

Follow the procedure for the quarter glass.

Saloon

Follow the procedure for the windscreen with the butt joint half way up either side of the aperture.

Door seals

The seals are carried on a "U" shaped metal section clipped to the body flanges. Care should be taken not to hammer the seals on to the flange as this will cause the metal section to open up and the retaining claws will not grip. A mallet is the recommended tool for this operation.

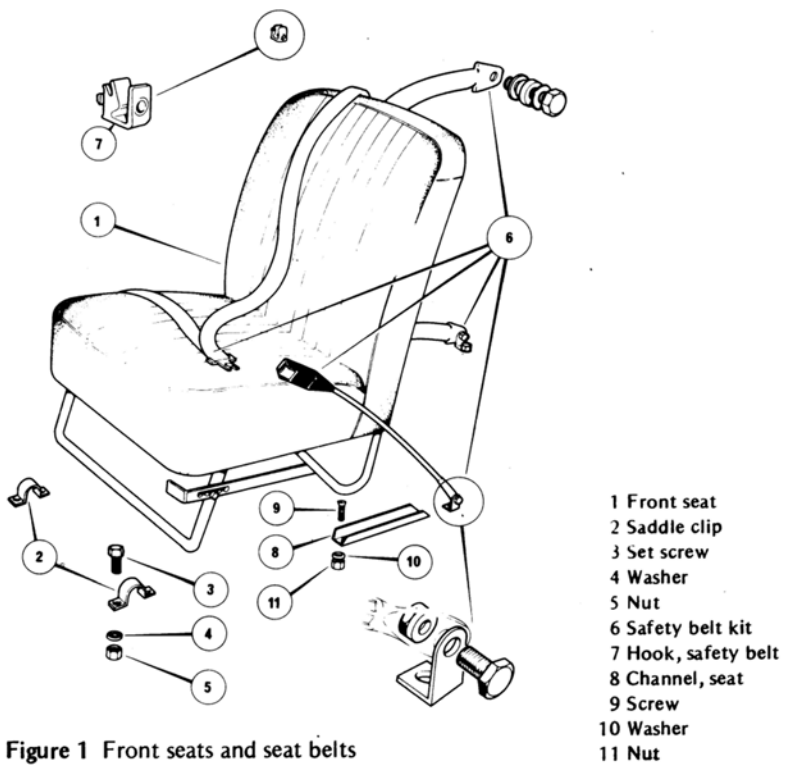


Figure 1 Front seats and seat belts

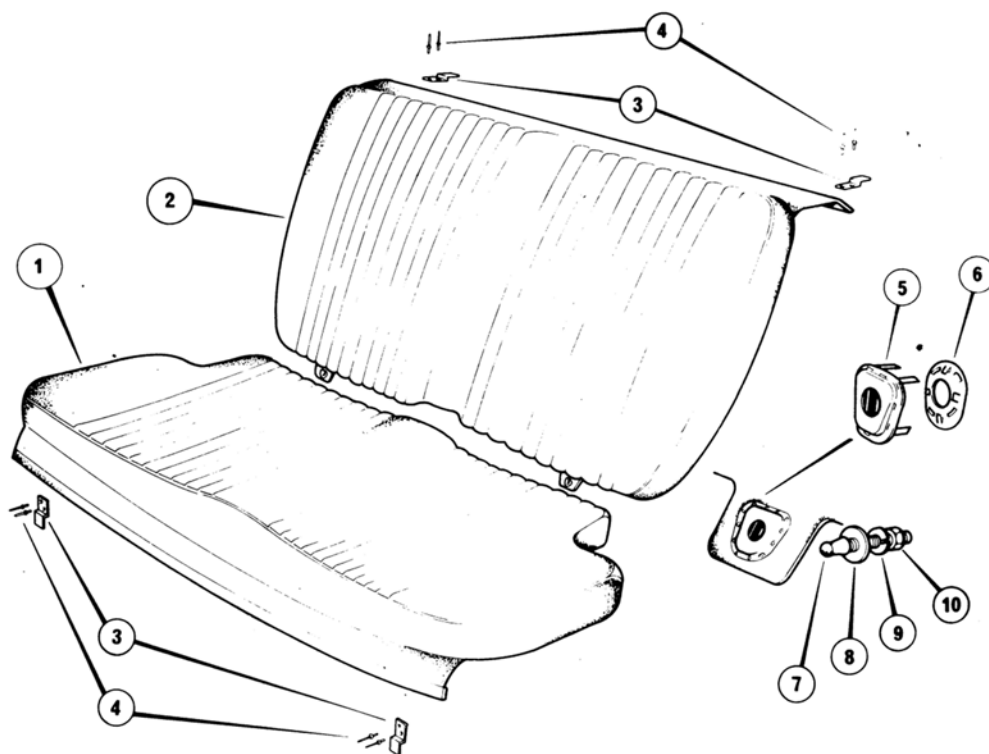


Figure 2 Rear seat, saloon

- 1 Cushion
- 2 Squab
- 3 Plate
- 4 Rivet

- 5 Socket
- 6 Clinch plate
- 7 Stud
- 8 Washer

- 9 Lockwasher
- 10 Nut

Seats

Front seats (Figure 1)

The front seats are secured to the floor by two saddle clips which locate over the forward leg of the seat assembly.

Both seats are adjustable for reach. Hinge the seat forward and push the lever located on the inside of the seat downwards. Hold the lever in this position whilst the seat is adjusted to one of the five available positions. The lever is spring loaded and will automatically lock when released.

Front seat removal

1. Remove four ¼" UNF set screws, plain washers and locking nuts from two saddles and lift the seat from the vehicle. It will be necessary to have an assistant to release the inboard saddle clip fixings.
2. Refit in reverse order.

Seat belts (Figure 1)

In accordance with regulations, all Rebels have front seat belts fitted. These are "one handed" operation belts of lap and diagonal type.

Both belts are anchored to the vehicle floor by two 7/16" UNF eye bolts bolted to chassis brackets. A third 7/16" UNF bolt secures the shoulder section of the belt to the upper section of the "B" pillar.

If the seat belt is damaged, stressed in an accident or shows fraying due to wear and tear it must be renewed.

Rear seat – Saloon (Figure 2)

The rear seat, comprising cushion and squab, is held in position by four fixing brackets into which locate metal straps inserted in a flap on both cushion and squab. Two press studs also secure the bottom of the squab to the body.

Rear seat – Estate (Figure 3)

The rear seat of the estate folds down to give an increase in area to the loading platform at the rear of the vehicle. The seat squab is held secure in the upright position by two catches, located on the side panels above the rear wheel arches. To release the squab, lower the lever on the catch and disengage the bracket on the seat back from the nylon clasp within the catch. The seat can now be lowered to a horizontal position.

On returning the seat squab to its upright position, ensure that the brackets on the seat back have securely located in the clasp before locking the catch.

Removal

1. Release the backboard retaining catches and pull the seat squab forward to gain access to the seat hinge-to-body fixings.
2. Unscrew the four ¼" UNF bolts securing the hinges to the body.
3. Remove four No 10 UNF set screws, cup washers, lock washers, plain washers and hexagon nuts securing the front flap of the cushion to the body.

4. Tilt the squab and cushion as far forward as possible to gain access to cushion hinge-to-body fixings.
5. Remove two ¼" UNF set screws and lock washers from both hinges and lift the complete rear seat assembly from the vehicle.
6. To separate the squab from the cushion, remove the six countersunk screws securing the hinge assemblies to the squab backboard.
7. Two ¼" UNF set screws and plain washers fix the hinges to the cushion frame.
8. Replace in reverse order.

The seat squab can be detached from the car without removing the whole assembly by simply unscrewing the backboard.

Carpets (figure 4)

The floor carpets are anchored by press stud fasteners. The seats must be removed, complete with carpet reinforcing plates to facilitate easy removal and replacement of the floor carpets.

Adhesive is used to retain the rubber matting on both the loading platform and rear seat backboard of the estate model.

Headlining - Saloon

To remove (Figure 4)

1. Disconnect the battery.
2. Remove the windscreen, rear quarter glasses, rear window and the weather strips.
3. Unscrew and remove the rear view mirror and the sun visors, attached with No 8 screws.
4. Pull off the door aperture sealing rubbers and carefully detach both "A" post and "B" post trim fillets.
5. Disconnect the leads from the interior lamp and remove.
6. Peel the headlining away from the lips of the door and window apertures.
7. Starting at the rear of the cabin, spring the four "listing rods" from their fixings.
8. Remove the headlining from the vehicle.
9. Withdraw the listing rods from the headlining noting that they are all different lengths so must be clearly marked for replacement in the correct positions.

To replace

1. Thread the listing rods into the headlining in the correct order.
2. Starting at the front apply adhesive to the edge of the headlining.
3. Ensure that the headlining is exactly centrally aligned then tack the cloth to the windscreen lip and secure with temporary clips.
4. Apply adhesive to the rear edge of the headlining and similarly attach to the rear window lip. During this operation be sure to keep the headlining as taut as possible.
5. Apply adhesive to the LH side of the headlining and locate the listing rods in their location brackets. Tack headlining to door aperture and rear quarter glass lip again using temporary clips.
6. Repeat for the LH side ensuring headlining is kept taut.

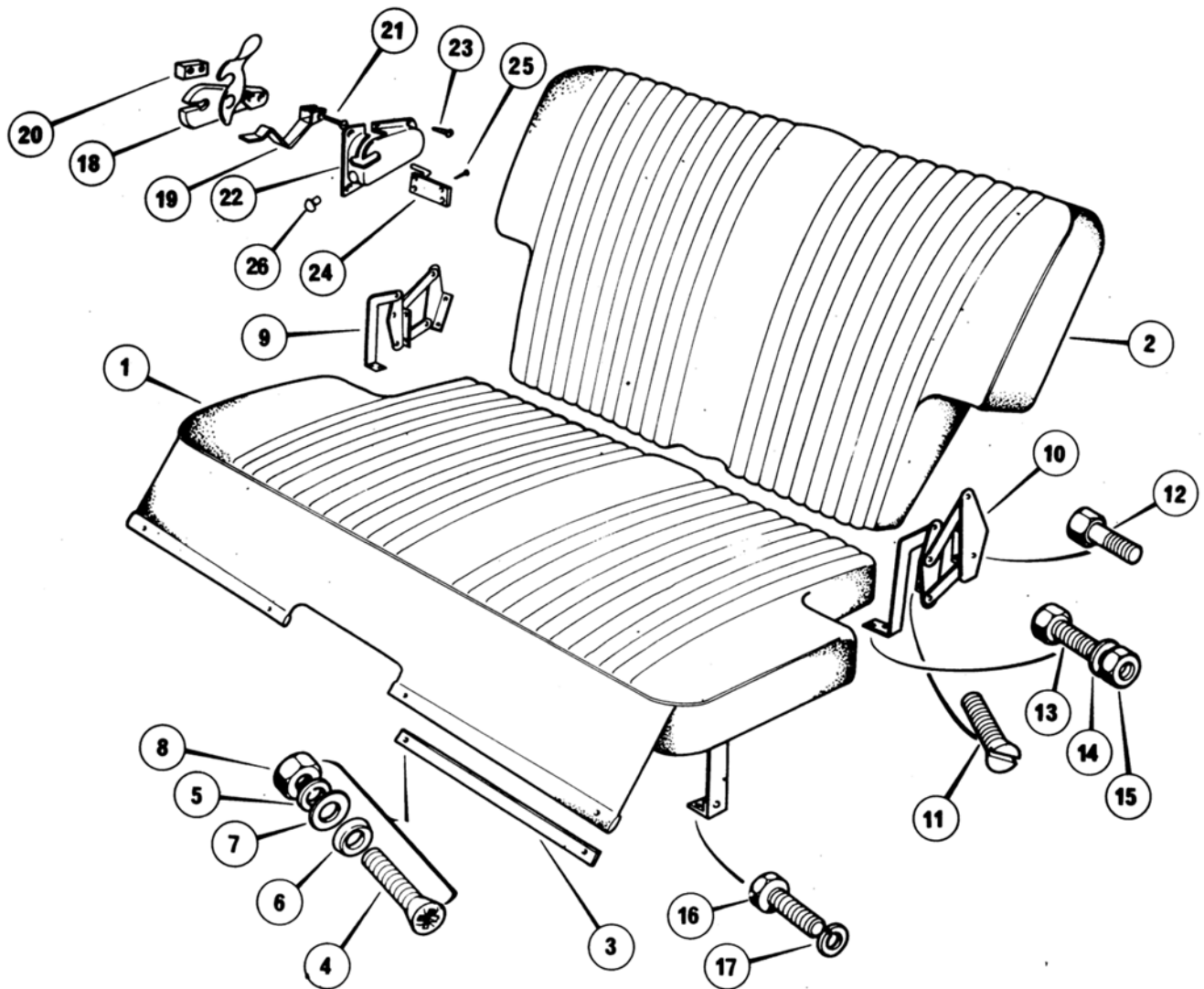


Figure 3 Rear seat, estate and van

1 Cushion	10 Hinge LH	19 Spring
2 Squab	11 Set screw	20 Spacer
3 Strap	12 Bolt	21 Screw
4 Set screw	13 Set screw	22 Catch cover
5 Lockwasher	14 Washer	23 Screw
6 Cupwasher	15 Nut	24 Striker
7 Washer	16 Set screw	25 Woodscrew
8 Nut	17 Lockwasher	26 Buffer
9 Hinge RH	18 Catch RH	

7. Leave the vehicle for a while to allow the adhesive to dry, then remove the temporary clips.
8. Reconnect and refit the interior lamp.
9. Refit the "A" and "B" post fillets and the door seals and weather strips.
10. Refit all glasses.
11. Refit sun visors and interior mirror.
12. Reconnect battery.

2. Starting from the rear, carefully peel off the foam-backed headlining from the vehicle roof.
3. Clean the roof surface thoroughly to remove all trace of adhesive and foam.

To replace

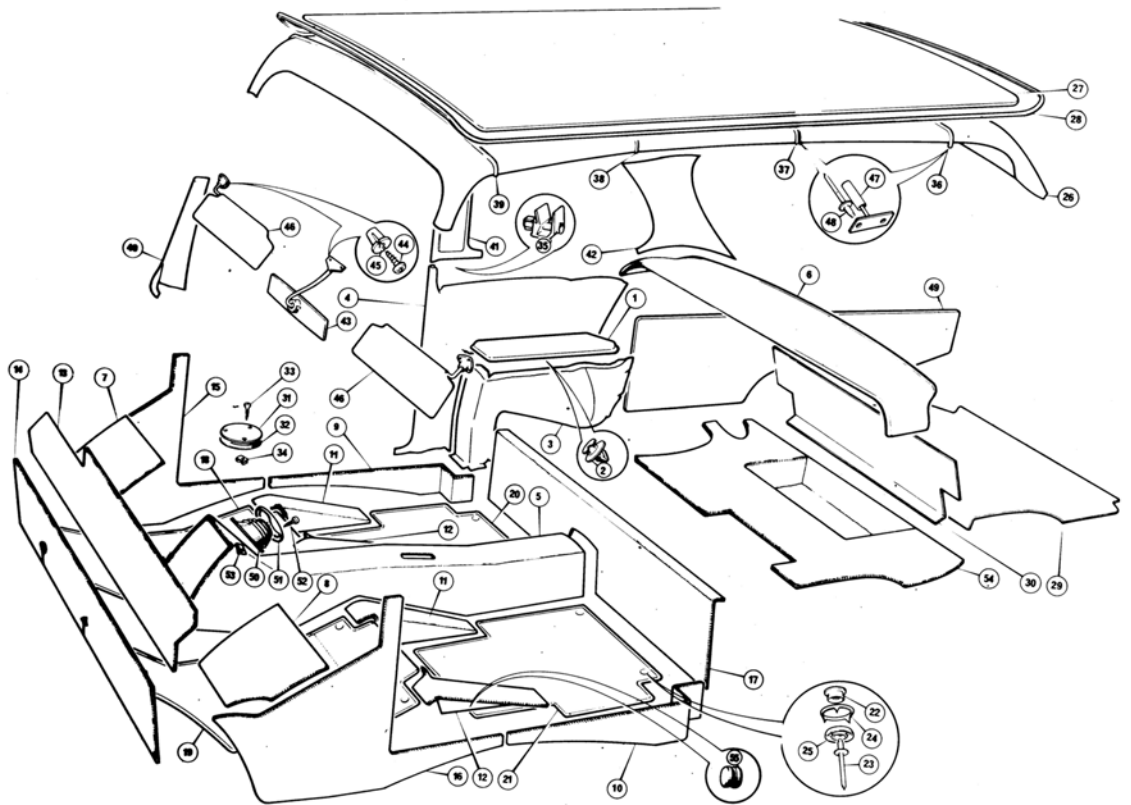
1. Coat the roof area with an even coating of Bostik 1GA 516 adhesive and allow to dry until tacky.
2. Starting at the front, offer up the new headlining and press firmly into position.
3. Refit the finisher strip.

Headlining - Estate

To remove (Figure 4)

1. Remove finisher strip from roof location.

Figure 4 Interior trim



1	Arm rest	20	Rear LH floor carpet	39	Listing rod
2	Retainer	21	Rear LH floor carpet	40	Front trim fillet
3	Trim panel	22	Stud fastener	41	Centre trim fillet
4	Trim panel	23	Rivet	42	Rear trim fillet
5	Prop shaft tunnel carpet	24	Pronged fastener	43	Rear view mirror
6	Parcel shelf carpet	25	Clinch plate	44	Screw
7	RH bulkhead carpet	26	Headlining – saloon	45	Mirror fixing insert
8	LH bulkhead carpet	27	Headlining – estate	46	Sun visor
9	RH door well carpet	28	Finisher	47	Listing rod bracket
10	LH door well carpet	29	Rear floor cover	48	Rivet
11	RH floor well carpet	30	Back squab cover	49	Rear casing panel
12	LH floor well carpet	31	Access cover plate	50	Gear lever grommet
13	Upper bulkhead carpet	32	Gasket	51	Retaining ring
14	Lower bulkhead carpet	33	Screw	52	Screw
15	RH toe box carpet	34	Nut	53	Nut
16	LH toe box carpet	35	Seat belt hook	54	Boot carpet
17	Heel board carpet	36	Listing rod	55	Grommet
18	Front RH floor carpet	37	Listing rod		
19	Front LH floor carpet	38	Listing rod		

Fascia

Removal (Figures 5 & 6)

1. Disconnect the battery.
2. Remove the air cleaner.
3. Disconnect the heater control valve cable.
4. Disconnect the choke cable at the carburettor.
5. Disconnect the demister air hoses from the heater unit.
6. Prise off the steering wheel centre motif and remove the 9/16" UNF nut and plain washer.
7. Mark the position of the steering wheel hub relative to the column, then remove the steering wheel.
8. Remove the two screws and washers and detach the multi-switch cover complete with retaining clamp from the steering column.
9. Unscrew the two multi-switch securing screws and remove clamp, spacer, multi-switch and indicator cancel bush from the steering column.
10. Disconnect multi-switch wiring and remove the assembly.
11. Remove the RH access panel from the interior of the glove compartment and disconnect the screen washer tubes from the operating plunger.
12. Unscrew the bezel nuts securing the ignition, lights and wiper switches and remove the wavy washers. Push the switches through to the rear of the fascia with their electrical connections intact.
13. Unscrew fixing screw, plain washer, lock washer and nut locates under the RH side of the fascia and remove the indicator flasher unit.
14. Disconnect the speedometer drive cable from the rear of the instrument.

15. Remove six No 14 screws securing the fascia to the body. Four are located beneath the fascia and one at each side securing the fascia to the "A" posts. The LH fixing bolt is located behind the trim carpet in the glove box. The RH bolt is accessible through the aperture beneath the steering column.
16. Withdraw the fascia just sufficiently to enable the disconnection of panel lights, warning lights, voltage stabiliser, fuel gauge, temperature gauge, electrical connections and earth leads.
17. Carefully lift the fascia, complete with its crash pad, demister hoses, heater and choke cables and remove from the vehicle.
18. Undo four self-tapping screws and remove the heater vents from the fascia moulding.
19. Pull the crash pad rearwards from its four retaining plates and remove it from the fascia.

Fascia replacement

1. Offer up the fascia to the bulkhead, feeding the demister hoses through the apertures in the bulkhead and the heater control and choke cables through their grommets into the engine compartment.

Note: Be careful to keep a sufficient working clearance between the fascia and the bulkhead to allow for subsequent reconnection of electrical equipment.

2. Reconnect the panel and warning lights, the voltage stabiliser, the fuel and temperature gauges and all earth connections.
3. Slide the fascia over the steering column and into position on the bulkhead. Be sure that the steering column grommet is correctly located in the fascia.
4. Secure the fascia to the bulkhead using six No 14 bolts.

5. Reconnect the speedometer drive cable.
6. Refit the indicator flasher unit under the RH side of the fascia with a No 10 UNF set screw, plain and lock washers and hexagon nut.
7. Locate the switches into their appropriate apertures and secure with bezel nuts and wavy washers.
8. Reconnect the windscreen washer tubes to the operating plunger, then refit the access panel in the glove compartment.
9. Locate the indicator cancel bush on the steering column and refit the multi-switch and its retaining clamp using two screws.
10. Refit the multi-switch cover using two screws, then feed the multi-switch harness through the small grommet under the steering column and reconnect the wiring.
11. Refit the steering wheel onto the column spline, aligning the marks made during disassembly. Secure with a 9/16" UNF nut and plain washer. Refit the centre motif.
12. Reconnect the demister air hoses to the heater unit.
13. Reconnect the choke cable to the carburettor.
14. Reconnect the heater control cable to the heater tap.
15. Refit the air cleaner.
16. Reconnect the battery.
17. Test all switches and lamps.

Parcel Shelf (Saloon and Estate models)

The parcel shelf is secured beneath the fascia to the body sides by four No 8 self-tapping screws, and to the prop shaft tunnel by a single screw on 700cc models only. On Rebel 750cc models, the centre fixing was deleted.

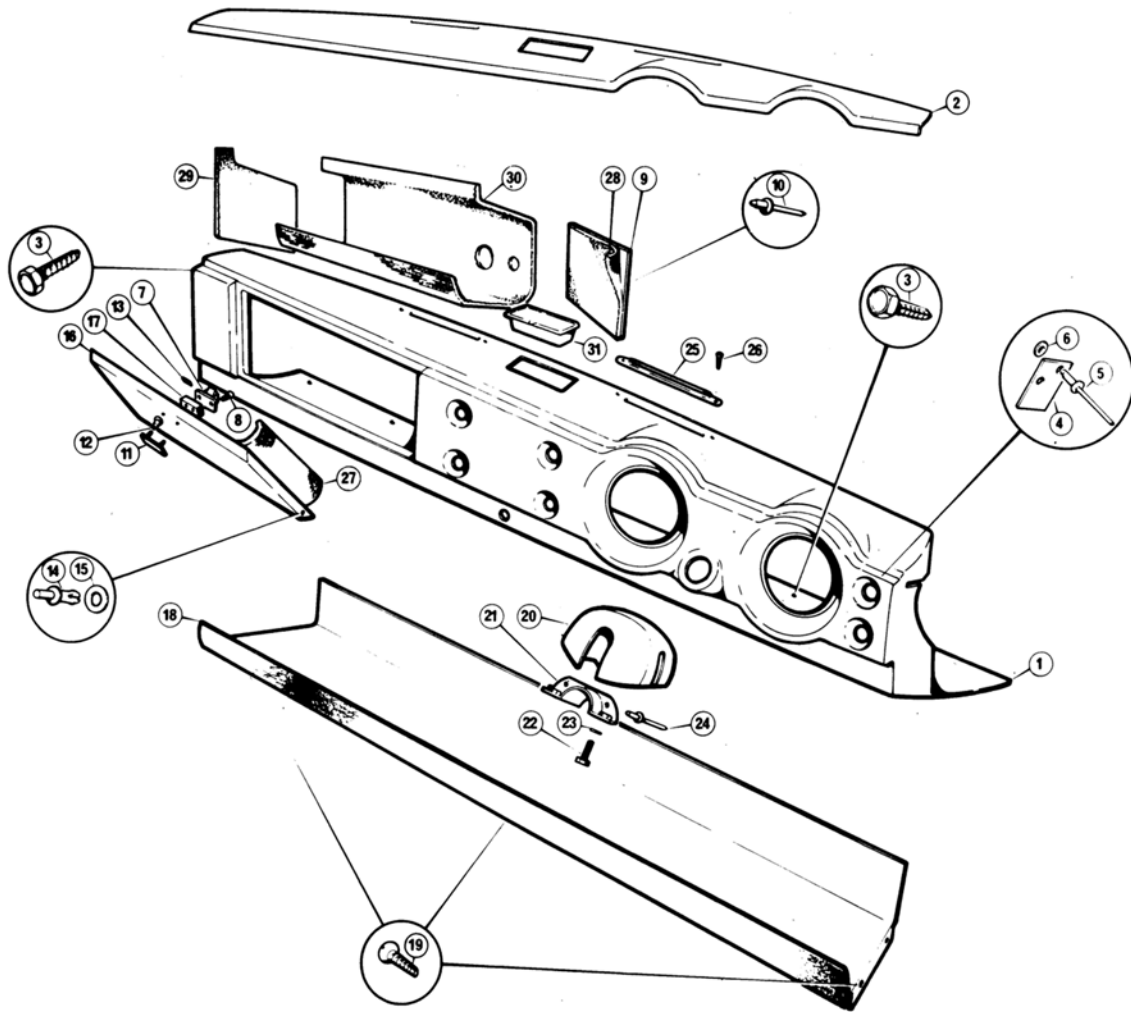


Figure 5 Fascia, early vehicles and 750 Van

- | | |
|-------------------------|------------------------------|
| 1 Fascia panel | 27 Carpet, glove box lid |
| 2 Crash pad top | 28 Carpet, glove box side RH |
| 3 Screw | 29 Carpet, glove box side LH |
| 4 Locating plate | 30 Carpet, glove box base |
| 5 Rivet | 31 Ash tray |
| 6 Washer | |
| 7 Door catch | |
| 8 Screw | |
| 9 Glove box side panel | |
| 10 Rivet | |
| 11 Motif | |
| 12 Spacer | |
| 13 Fastener | |
| 14 Hinge rivet | |
| 15 Washer | |
| 16 Glove box lid | |
| 17 Block | |
| 18 Parcel shelf | |
| 19 Screw | |
| 20 Multi-switch cover | |
| 21 Clamp | |
| 22 Screw | |
| 23 Lockwasher | |
| 24 Rivet | |
| 25 Escutcheon, demister | |
| 26 Screw | |

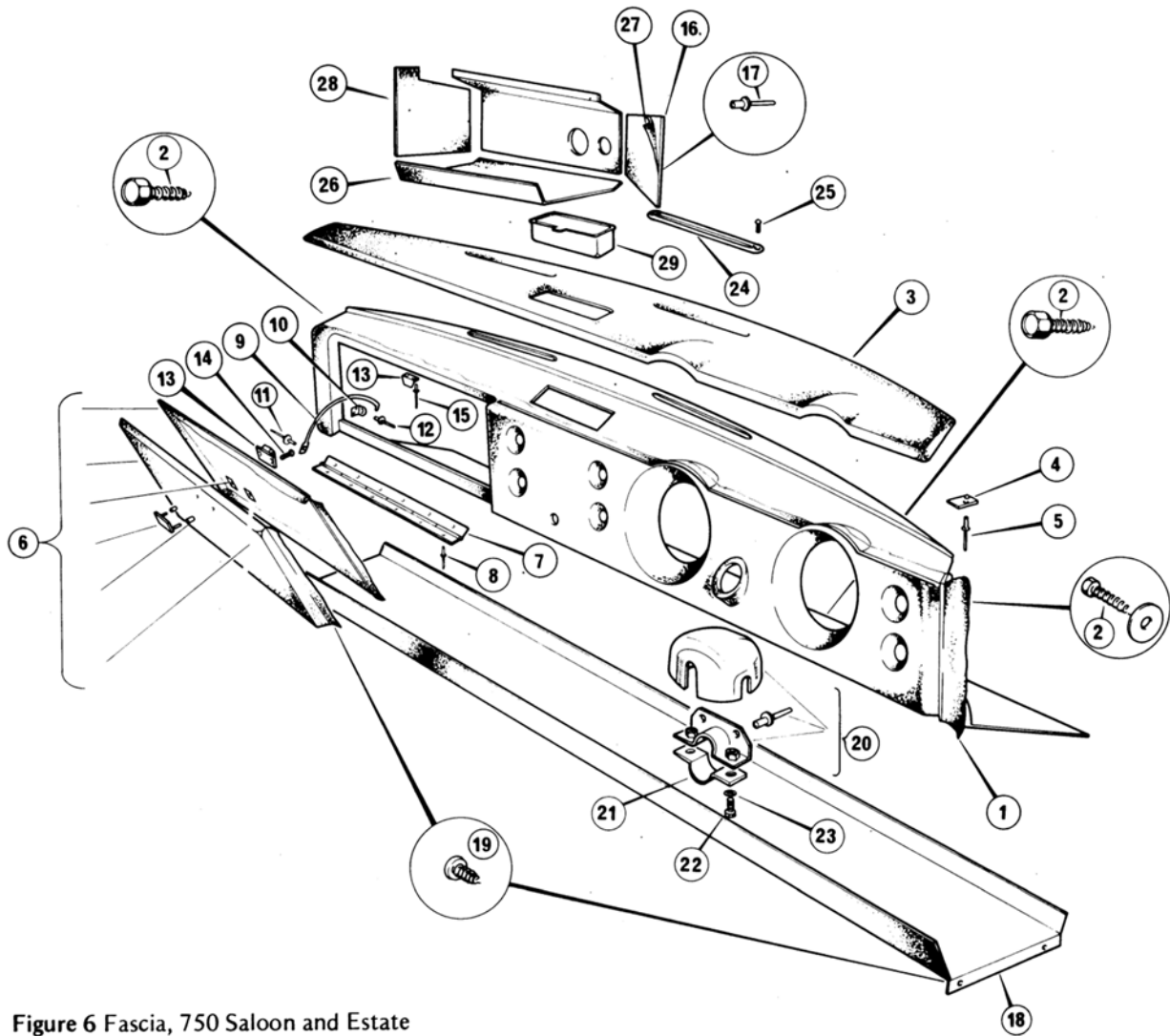


Figure 6 Fascia, 750 Saloon and Estate

- 1 Fascia
- 2 Screw
- 3 Crash pad – top
- 4 Locating plate
- 5 Rivet
- 6 Glove box lid
- 7 Hinge
- 8 Rivet
- 9 Checkstrap rod
- 10 Retaining bracket
- 11 Rivet
- 12 Rivet
- 13 Catch, striker
- 14 Screw
- 15 Rivet
- 16 Glove box, side panel
- 17 Rivet
- 18 Parcel shelf
- 19 Screw
- 20 Cover
- 21 Clamp
- 22 Screw
- 23 Lockwasher
- 24 Escutcheon, demister
- 25 Screw
- 26 Carpet, glove box base
- 27 Carpet, glove box side RH
- 28 Carpet, glove box side LH
- 29 Ash tray

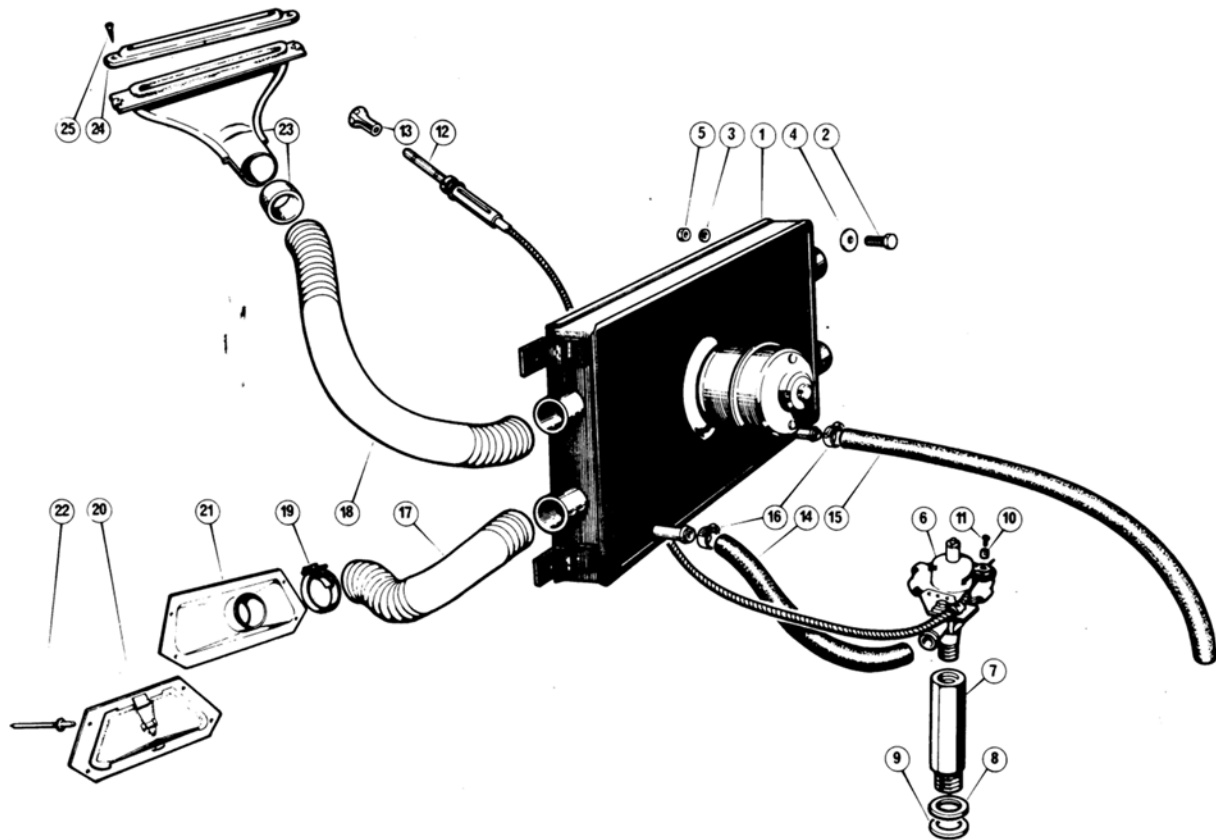


Figure 1 Heater system

1	Heater	10	Trunnion	19	Clip
2	Set screw	11	Screw	20	Heater flap
3	Lock washer	12	Push-pull control	21	Heater flap outlet
4	Washer	13	Knob	22	Rivet
5	Nut	14	Hose – to cylinder head	23	Demister nozzle
6	Water valve	15	Hose – to water pump	24	Demister escutcheon
7	Adapter	16	Clip	25	Screw
8	Gasket	17	Air tube to foot well		
9	Rubber washer	18	Air tube to demister		

The heater is of the fresh air type and is mounted to the body behind the fascia bulkhead, under the bonnet.

Warm water from the main cooling system is fed to the heater via a hose from a control valve mounted on the rear of the cylinder head. Warm air is produced by the heater internal matrix and is circulated by an electric fan to the windscreen demister vents and the foot well outlets through flexible duct hoses.

For the summer months the heater can be shut off from the engine by means of the control valve, operated by a knob on the fascia, to provide a cool air supply.

To remove heater (Figure 1)

1. Drain the cooling system (see section E)
2. Slacken the retaining clips and remove the water hoses from the heater unit. Pull the air duct hoses off.
3. Disconnect the leads from the heater motor.
4. Unscrew four ¼" UNF set screws, plain and lock washers and nuts and remove heater unit from vehicle.
5. Replace in reverse order.

Heater control valve

To remove the valve, slacken the trunnion and clip to disconnect the control cable. Unscrew the valve from the adapter. When replacing be careful to correctly adjust the control cable.

Section T

Distributor

700cc Engines

The 41245 series distributor is mounted on the right-hand side of the engine and is driven by an offset dog from an auxiliary shaft driven by the camshaft. The ignition advance is mechanically controlled by internal centrifugal weights according to engine speed. Plus a vacuum advance/retard controlled by engine load operated by inlet manifold depression. **(Figure 1)** On very early engines the distributor rotated in a clockwise direction (viewed from above) but later cars rotate in an anti-clockwise direction. An arrow cast in to the vacuum control housing adjacent to the distributor identification number confirms which type is fitted.

750cc Engines

The vacuum advance/retard function was deleted for the 750cc engines so a different model (41324 series) distributor was fitted. The distributor is still driven by an offset dog in exactly the same manner as earlier engines and the mechanical centrifugal advance control is of similar design but of different configuration. Distributor rotation is anti-clockwise viewed from above.

Whilst all distributors are *physically* interchangeable, it is vital that the correct type is fitted or the engine will perform poorly.

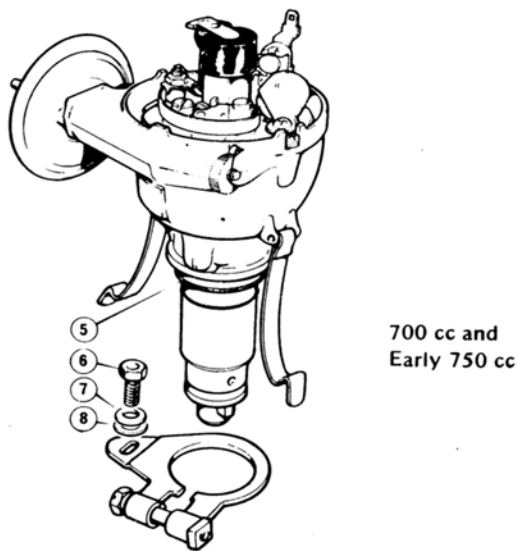


Figure 1 Distributor 700 cc and 750 cc

- 1 Cover
- 2 Rotor arm
- 3 Condenser
- 4 Contact set
- 5 Sealing washer
- 6 Screw
- 7 Washer
- 8 Washer

Electrics

Lubrication

The cam and contact breaker pivots should be periodically lubricated with petroleum jelly.

The centrifugal weight spindles should be lightly oiled with engine oil every 3000 miles (5000km). To lubricate the cam spindle, remove the rotor arm and apply a few drops of engine oil through the apertures in the breaker plate and to the felt pad (if fitted) in the distributor shaft beneath the rotor arm.

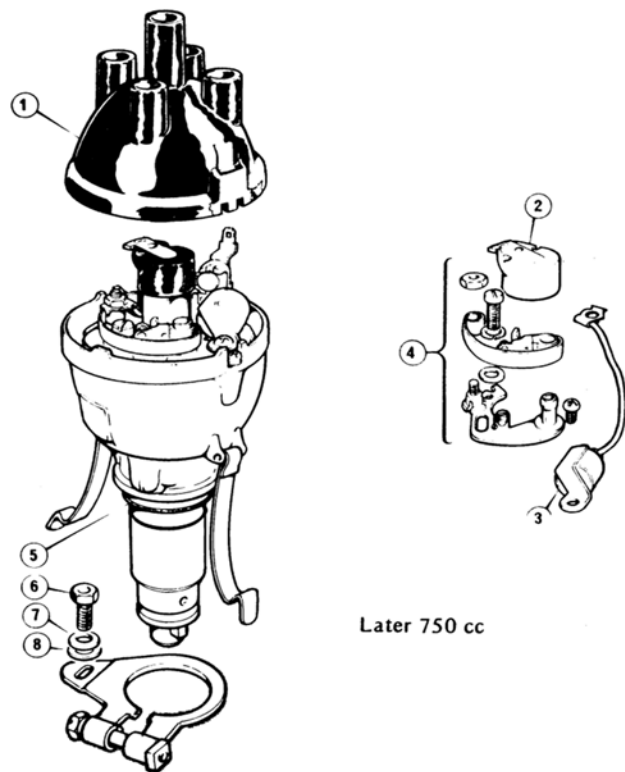
Caution It is vital not to over lubricate the distributor internal parts in case of contamination of the contact breaker points.

The presence of oil, water or other contaminant on the contact point faces, the carbon brush in the distributor cap or the contact segments in the cap will cause erratic running and misfiring and may prevent the engine from running at all.

Contact breaker points (all models)

To adjust

1. Remove the distributor cap and rotor arm.
2. Turn the engine so that the heel of the contact breaker is on the highest point of the cam. It may be necessary to first remove the sparking plugs to eliminate the resistance caused by engine compression.



Later 750 cc

- Slacken the slotted head screw "A" in the contact plate (**Figure 2**) and adjust until the gap between the contacts is 0.38mm (0.015in) as shown in **Figure 3**.
- Re-tighten the screw and check the setting again in case the setting has moved when the screw is tightened.
- Refit the rotor arm squarely on the shaft with the slot and lug in alignment. Press the rotor arm into position so that the lower face abuts the cam.

To remove the points

- Remove the distributor cap and rotor arm.
- Remove the slotted head screw securing the breaker assembly to the distributor and the hexagon nut securing the primary and condenser leads. (**Figure 2**).
- Lift the points assembly from the distributor. Inspect the points for wear and burning of the contacts. If this is apparent the contact breaker assembly must be renewed. Contacts showing an even greyish colour to the faces are fit for further service so do not need replacement. If only lightly pitted, the points can be gently refaced with a fine emery stone, then thoroughly cleaned.

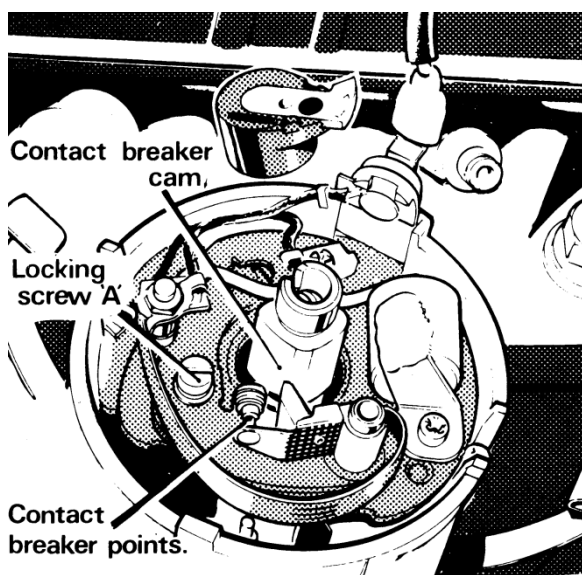


Figure 2 Contact breaker adjustment

To replace the points

- Position the breaker arm assembly on the pivot pin and locate the primary and condenser leads on to the nylon screw, secured to the breaker arm spring.
- Refit the hexagon nut to secure the flag contacts to the post.
- Replace the slotted head screw and adjust the points as described above.
- Refit the rotor arm and the distributor cap.

Distributor Condenser (all models)

The condenser is fitted in parallel to the contact breaker points to mitigate excessive arcing across the contacts. A short circuit in the condenser will cause total ignition failure. In such cases the condenser must be replaced. An open circuit however is more difficult to diagnose, without the use of specialised equipment. The usual signs of this are excessively burned contact faces and difficult starting plus a reluctance for the engine to rev from tick over. Again the condenser will need replacement (along with the contact breaker points) in this situation.

To remove the condenser

- Remove the distributor cap and rotor arm.
- Unscrew the hexagon nut and remove the condenser lead flag from the nylon screw.
- Remove the single cross-head securing screw and withdraw the condenser.
- Replace in reverse order taking care to avoid any possibility of a short circuit between the condenser lead and the breaker plate.
-

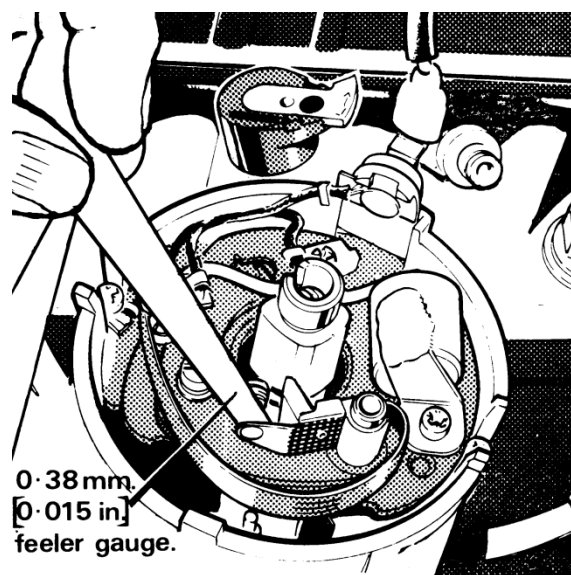


Figure 3 Checking contact breaker gap

Note: Dismantling of the complete distributor is not recommended as only the cap, rotor arm, condenser and contact set are available as spares. In the event of any wear or breakdown of internal parts of the distributor a complete new unit should be installed.

To remove the distributor from the engine

- Disconnect the plug leads from the spark plugs.
- Disconnect the high and low tension leads from the ignition coil.
- Disconnect the vacuum pipe (700cc only).
- Unscrew the two (one only on later vehicles) 3/16" UNC bolts complete with plain and lock washers and remove the distributor.

5. Do not disturb the clamping bolt unless the ignition timing is to be adjusted.
6. Refit in reverse order.

Ignition timing (700cc engines)

Incorrect ignition timing can cause rough running, poor idling, excessive fuel consumption and poor performance. In extreme cases engine damage can result. It is, therefore, vital that it should be correctly set. In order to facilitate this, two marks are stamped on to the crankshaft pulley face (**Figure 4**).

One mark indicates the TDC position, the other 10° BTDC. A pointer is cast in to the timing chain cover. The engine rotates clockwise (viewed from the front). Two methods can be used for adjusting the timing, static or dynamic.

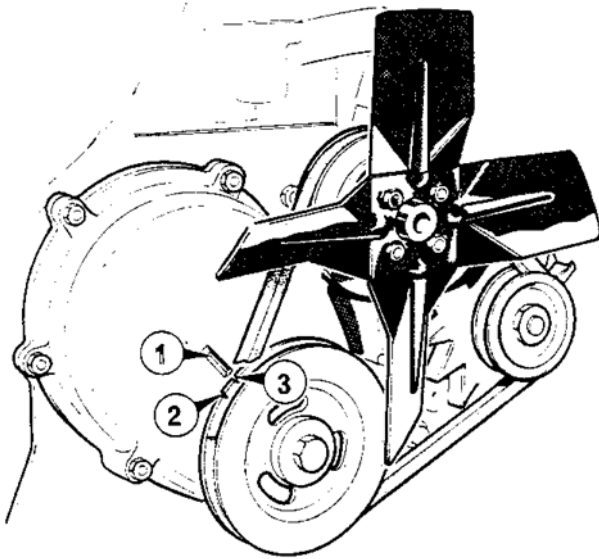


Figure 4 Timing marks

1. Timing pointer
2. TDC mark
3. 10° BTDC mark

Method 1 - static

1. Rotate the crankshaft in a clockwise direction until the 10° pulley mark is aligned with the pointer on the timing cover (**Figure 4**).
2. Remove the distributor cap and connect a 12 volt bulb between the low tension terminal and a good ground. With the ignition switched on, the bulb will glow when the contact breaker points are open.
3. Slacken the distributor clamp bolt and rotate the distributor clockwise as far as possible.
4. Switch on the ignition and apply light finger pressure to the rotor arm. Turn the distributor body slowly back until the bulb lights.
5. Tighten the distributor clamp bolt.
6. Check the timing by rotating the engine two revolutions in a clockwise direction, observing the relative position of the pointers, until the bulb lights. The 10° mark should be aligned with the pointer on the timing cover.

7. Turn off the ignition, remove the test lamp and reassemble all parts.

Method 2 - dynamic

1. Connect the leads of a "strobe" timing light in accordance with the maker's instructions.
2. Check that the pointer on the timing cover and the notches on the front pulley are visible. Mark the pointer and the 10° mark with chalk, "Tippex" or similar.
3. Disconnect the vacuum tube from the distributor and plug the end of the tube with a suitable plug to stop air being drawn in.
4. Start the engine and allow to idle at normal tick over speed. Aim the "strobe" light at the timing marks taking care not to contact the spinning fan. Ensure that the 10° mark is aligned with the pointer. If the mark is to the left of the pointer the ignition is too far advanced. Slacken the distributor and turn slightly anti-clockwise to retard the ignition until the marks align. If the mark is to the right of the pointer then the ignition is too far retarded. Turn the distributor slightly clockwise until the marks align. When the marks are correctly aligned, securely tighten the distributor clamp and re-check the timing. Stop the engine.
5. Disconnect the "strobe" light and refit the vacuum tube.

Ignition timing (750cc Engines)

These engines do not have the vacuum advance so the timing is differently specified. If for any reason a vacuum advance distributor is fitted, time as per the 700cc engines.

Method 1 - static

1. Rotate the crankshaft in a clockwise direction until the TDC pulley mark is aligned with the pointer on the timing cover (**Figure 4**).
2. Remove the distributor cap and connect a 12 volt bulb between the low tension terminal and a good ground. With the ignition switched on, the bulb will glow when the contact breaker points are open.
3. Slacken the distributor clamp bolt and rotate the distributor clockwise as far as possible.
4. Switch on the ignition and apply light finger pressure to the rotor arm. Turn the distributor body slowly back until the bulb lights.
5. Tighten the distributor clamp bolt.
6. Check the timing by rotating the engine two revolutions in a clockwise direction, observing the relative position of the pointers, until the bulb lights. The 10° mark should be aligned with the pointer on the timing cover.
7. Turn off the ignition, remove the test lamp and reassemble all parts.

Method 2 - dynamic

1. Connect the leads of a "strobe" timing light in accordance with the maker's instructions.
2. Check that the pointer on the timing cover and the notches on the front pulley are visible. Mark the pointer and the TDC mark with chalk, "Tippex" or similar.
3. Start the engine and allow to idle at normal tick over speed. Aim the "strobe" light at the timing marks taking care not to contact the spinning fan. Ensure that the TDC mark is aligned

with the pointer. If the mark is to the left of the pointer the ignition is too far advanced. Slacken the distributor and turn slightly anti-clockwise to retard the ignition until the marks align. If the mark is to the right of the pointer then the ignition is too far retarded. Turn the distributor slightly clockwise until the marks align. When the marks are correctly aligned, securely tighten the distributor clamp and re-check the timing. Stop the engine.

5. Disconnect the "strobe" light and refit the vacuum tube.

Specification

Distributor:	700cc Lucas 41245A. 750CC Lucas 41324B.
Type:	Single pair contact breaker.
Drive:	Dog gear from camshaft jack shaft.
Rotation:	700cc Early Clockwise. 700cc later Anti-clockwise. 750cc Clockwise.
Firing order:	1, 3, 4, 2.
Advance control:	700cc Centrifugal and vacuum. 750cc Centrifugal.
Static advance:	700cc 10° BTDC. 750cc TDC.
C/B spring tension:	510-686g (18-24oz).
Condenser:	0.2 microfarad.
Points gap:	0.396mm (0.015in).
Dwell angle:	60° +/- 3°.

Starting system

The starting system comprises battery, ignition switch, solenoid and starter motor (**Figure 5**). Rebel models can have either the 35G (early) or 35J (later) type starters fitted.

If the starter fails to operate when the ignition is switched on then the components should be systematically checked to diagnose the fault. Examine the starter pinion which can become jammed in mesh with the flywheel ring gear. It can be released by turning the square end of the starter motor shaft in an anti-clockwise direction or occasionally a sharp blow from a hammer on the casing.

Check the battery is in good condition and fully charged and that the terminals are tight and free from corrosion. The condition and security of earth braids is also important, particularly the braid between the chassis frame and gearbox casing adjacent to the rear gearbox mountings.

The starter solenoid could be faulty. When the ignition is switched on and in the start position the solenoid should click and the starter "bendix" gear engages with the flywheel ring gear which makes a distinctive sound. If this is not apparent a faulty solenoid could be indicated.

If the components of the starting system are found to be functioning correctly this would indicate that the fault lies elsewhere in the ignition or charging systems. Starter motor testing is detailed below

Bench testing

Remove the commutator end cover from the motor and check the brushes for wear and replace if necessary.

Measuring light running current

Clamp the motor in a vice and, using a 12 volt battery, with a moving coil ammeter of suitable range, check the light running current and the armature speed. Always use heavy gauge cabling for this test. Under light load the motor should run freely with a current of 45 amps (35G starter) at 9,500-11,000rpm or 65 amps (35J starter) at 8000-10,000 rpm. The test only proves that the motor functions correctly when not at its normal operating load. If, on refitting the motor, it again fails to crank the engine an internal fault is indicated and a replacement motor will need to be fitted.

Starter motor specification

35G

Lock torque	1.02kg/m (7.4 lb/ft) @ 350 amps
Running torque	0.64 kg/m (4.6 lb/ft) @ 257 amps
Light running current	45 amps @ 9,500-11,000 rpm
Brush spring pressure	850gf (30 ozf)

35J

Lock torque	0.97kg/m (7.0 lb/ft) @ 350 amps
Running torque	0.61 kg/m (4.4 lb/ft) @ 260 amps
Light running current	65 amps @ 8,000-10,000 rpm
Brush spring pressure	800gf (28 ozf)

Note: The later 35J starter motor is not a direct replacement for the earlier 35G model as the through bolts on the starter motor protrude from the end of the motor so require a different gearbox casing to accommodate them. The earlier 35G motor can be used on any vehicle but to fit a 35J to an earlier car the bell housing needs to be machined to clear the through bolts. (**Figure 6**)

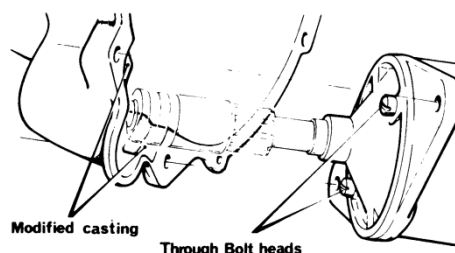


Figure 6 Starter motor location

Charging system

The charging system comprises a battery, dynamo, regulator, alternator (vans only) and ignition warning light.

It is important that the charging system be kept in good working order because the ignition, starting and lighting systems depend on it. These systems will be rendered inoperative if the battery is in an extremely low state of charge. The electrolyte level in the battery must be

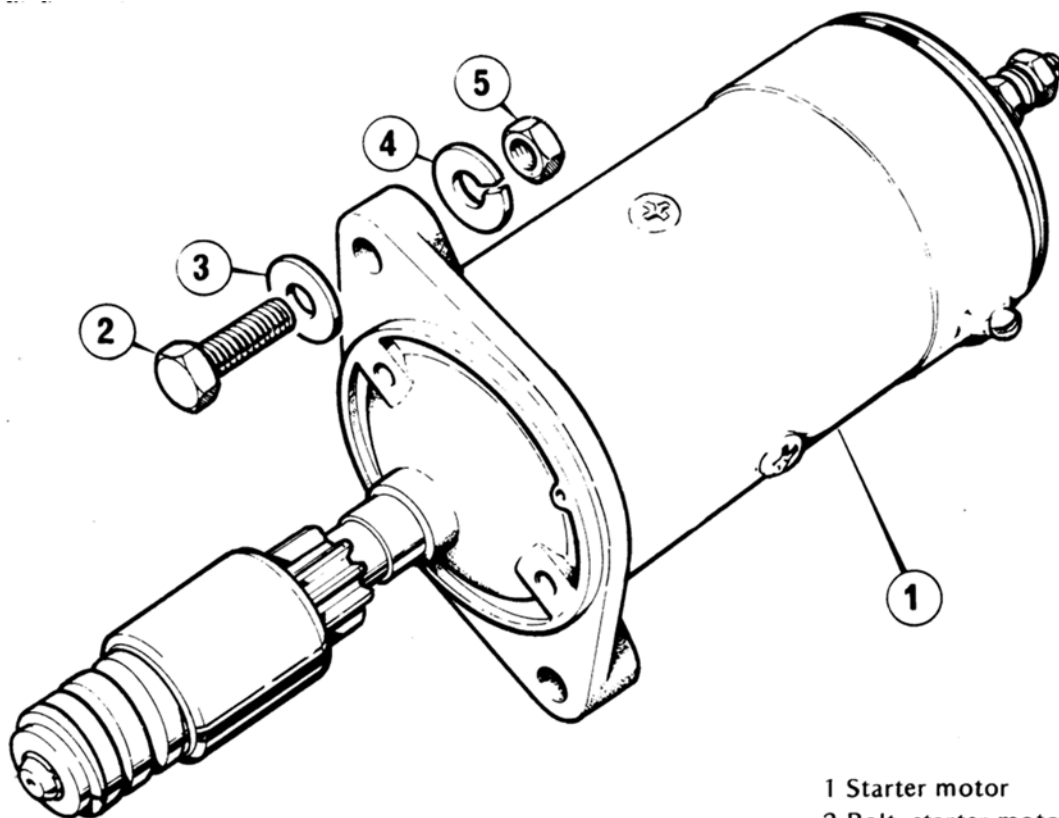


Figure 5 Starter motor

- 1 Starter motor
- 2 Bolt, starter motor fixing
- 3 Washer, starter motor fixing
- 4 Lockwasher, starter motor fixing
- 5 Nut, starter motor fixing

regularly checked and topped-up if necessary. Keep the battery terminals clean and tight.

The correct fan belt tension is important. A slack belt will slip and prevent the alternator from fully charging the battery.

Attention should also be given to the cleanliness and security of the earth leads / braids.

The ignition warning light serves the dual purpose of reminding the driver to switch off the ignition and acting as a no charge indicator. With the ignition switched on the lamp should only be illuminated when the engine is either not running, or is running at a very low speed. As the engine speed increases the lamp should extinguish. Failure to do so indicates a fault in the charging system.

Dynamo

The dynamo is a two pole, two brush machine, the field coils being connected in series with each other, but both in parallel with the armature.

Lubrication

At intervals of six months (or 6,000 miles (10,000km), whichever occurs first, inject a few drops of SAE 30 engine oil into the lubricator hole on the commutator end bearing.

Testing the dynamo

In the event of a charging fault developing the following preliminary check should be made with the dynamo in position on the vehicle.

1. Check that the battery is in a good state of charge.
2. Ensure the fan belt is correctly tensioned.

3. Check that the spade connectors on the back of the dynamo are secure and clean.
4. Disconnect the two leads and link the generator terminals together with a short length of cable.
5. Start the engine and run at normal idling speed.
6. Clip the black lead of a 0-20 VDC moving coil volt meter to one of the terminals and connect the positive (red) lead to ground on the yoke of the generator.
7. Gradually increase the engine speed, when the volt meter should rise without fluctuation to display a voltage of just below 20 volts. If the voltage fluctuates an internal fault is indicated. Excessive sparking at the commutator also indicates a defect with the dynamo. In either case the dynamo, available as an assembly only, will need replacement.

However, before resorting to replacing the unit, remove the existing assembly from the vehicle and check the condition of the carbon brushes. These are available and, if worn or contaminated will cause failure of the charging system so should be replaced.

To remove generator

1. Disconnect the battery and dynamo leads.
2. Unscrew the adjusting arm clamp bolt and swing the dynamo body towards the engine. Remove the fan belt.
3. Remove the lower mounting bolts and lift the dynamo assembly clear of the vehicle.
4. Replace in reverse order.

Specification

Type	Lucas C40
Output	22A at 13.5 volts DC at 2,200 rpm

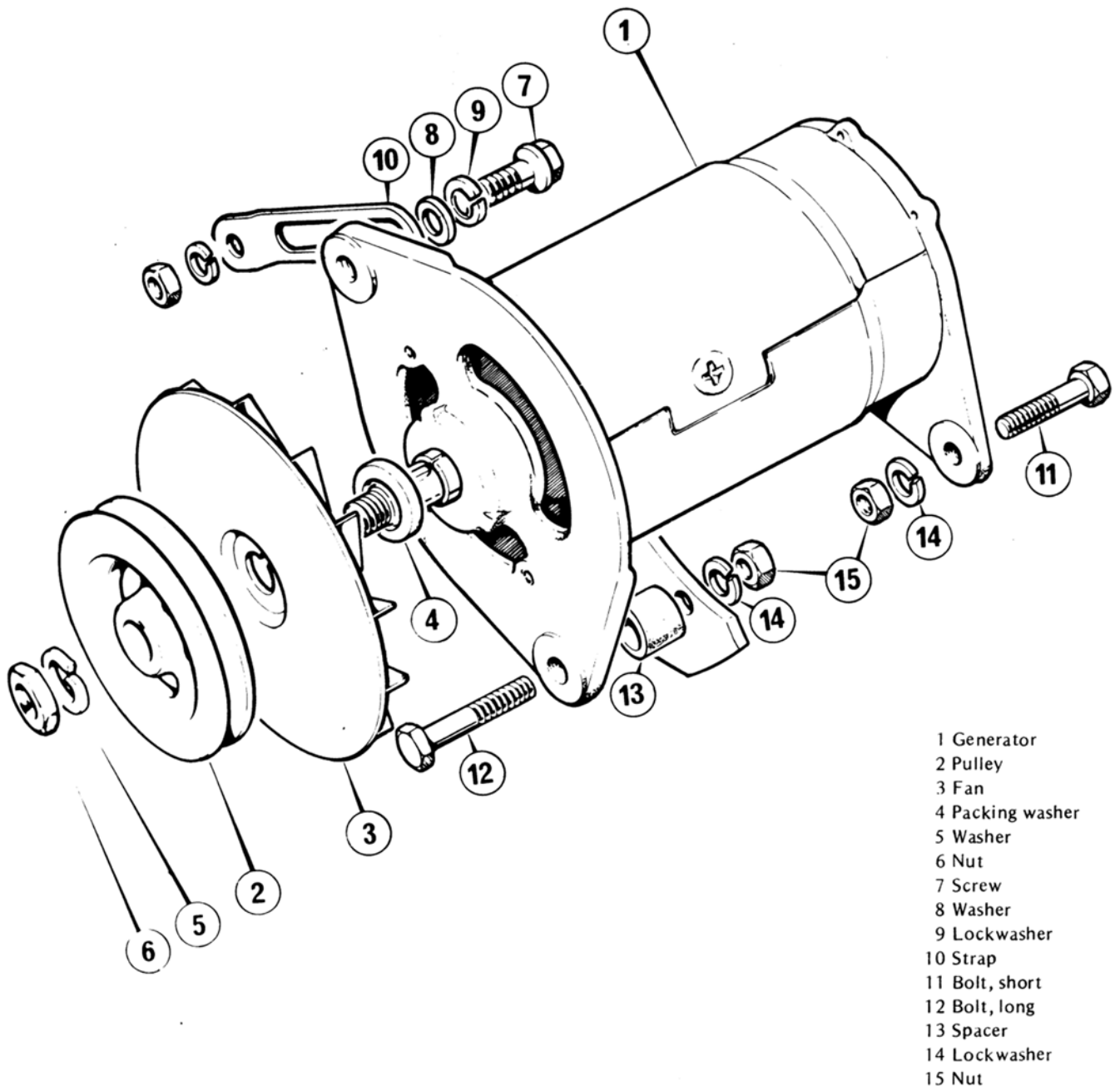


Figure 7 Dynamo

Alternator (750 Van only, from chassis No 941001)

Description

The alternator is a 12 pole 2 brush machine and is driven by a belt from the crankshaft pulley. To ventilate the interior components a multi bladed fan is fitted behind the drive pulley.

The brush gear is enclosed in a moulding screwed to the slip-ring end bracket thus providing protection against adverse effects of dust and moisture.

Voltage control is achieved by a model 14TR solid state regulator built in to the slip-ring end bracket, replaceable if faulty. A normal type of charge indicator (warning light) system is used with this alternator.

The warning light is connected in series with the field supply diodes and is extinguished when the voltage generated in the diodes equals the supply voltage from the battery. The only attention that the alternator is likely to require is the occasional checking of the brushes. To remove the alternator end cover, unscrew two 4BA bolts and lift the brush box clear from the slip-ring moulding bracket. Check that they are free from oil or grease. If necessary they can be cleaned with a petrol moistened cloth. Check brush and springs for ease of movement in the holders. If the overall length of the brush has worn to less than 7.62 mm (0.30 in) the brushes and springs need to be renewed.

Wipe away any oil or dirt which may have collected around the slip-ring end cover ventilation apertures. The main bearings are packed with grease during manufacture so do not require attention.

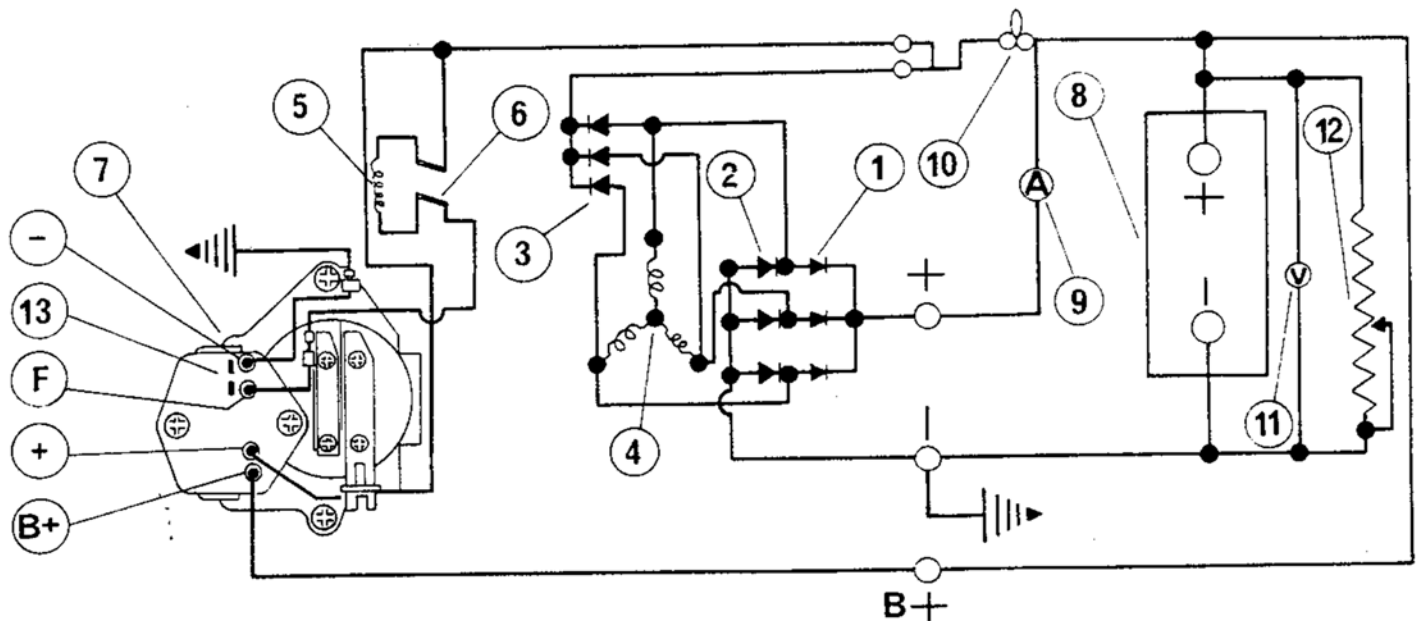


Figure 8 Alternator output test circuit

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Live side output diodes (3) 2. Earth side output diodes (3) 3. Field feed diodes 4. Stator winding 5. Field winding 6. Slip-rings 7. Voltage regulator | <ol style="list-style-type: none"> 8. 12 volt battery 9. 0-40 or 0-60 ammeter 10. 12 volt 2.2 watt lamp 11. 0-20 volt meter 12. 0-15 ohms 35 amp variable resistor 13. Link between regulator terminals "F" and "-" |
|---|---|

Note: Serious damage to the alternator can occur if the following points are not observed.

1. Ensure that the battery is connected **Negative** earth. Reversed battery connection will destroy the alternator diodes.
2. Never earth the output (B+) terminal of the alternator. It should be connected directly to the battery positive terminal.
3. Always disconnect the battery earth cables at the battery before removing the alternator or its connecting wires. Serious damage to the wiring harness and the alternator can result through accidentally earthing the output terminal.
4. Never attempt to run the engine with the output cable from the alternator to the battery disconnected. A very high voltage will develop which might burn out the rotor or the diodes.
5. When the battery is to be recharged in the car it is wise to disconnect it from the vehicle wiring before connecting the battery charger.
6. When starting from a slave battery or "jump" starting another vehicle ensure the polarity of the leads is correct, i.e. positive to positive, negative to negative. Incorrect connection may well cause one or both batteries to explode destroying the alternator and severely damaging the vehicle wiring.

Testing the alternator

First check for condition and correct tension of the drive belt. The nominal ratings given at the end of this section are for the vehicle fully warmed up. These figures may be exceeded slightly during cold running. To avoid misleading results, the following procedure should be carried out only with the unit at normal operating temperature.

Alternator output test

1. Unplug the alternator connector and remove the rear cover. link together the regulator terminals "F" and "-".
2. Connect an exterior test circuit as shown in **Figure 8**. Observe carefully the polarity of the battery and alternator terminals.

The variable resistor across the battery terminals must not be left connected for longer than is necessary to conduct this test.

3. Start the engine. At 1,500 alternator rpm (1000 engine rpm), the test circuit bulb should be extinguished. Increase the engine speed until the alternator is running at 6,000 alternator rpm (4,000 engine rpm) approximately and adjust the variable resistance until the volt meter reads 14.0 volts. The ammeter reading should then be approximately equal to the rated output of the alternator. Any appreciable deviation would suggest an internal defect and if so a new alternator will need to be fitted.

To remove the alternator

1. Disconnect the battery and alternator cables.
2. Slacken the alternator mounting bolts and tilt the unit towards the engine.
3. Remove the drive belt.
4. Remove the securing bolts, nuts, washers and spacers and detach the alternator from the engine.

Replace in reverse order. Tighten the pivot bolts to a torque of 2.08-2.77 kg/m (15-20 lb/ft). Tighten the adjuster bolt to 1.11-1.39 kg/m (8-10 lb/ft).

Alternator specification

Polarity	Negative
Nominal voltage	12 vdc
DC output (hot @ 14 volts/6,000 alternator rpm.	28 amps
Max rotor speed	12,500 rpm
Stator phases	3
Stator winding layout	Star
Rotor poles	12
Resistance of windings	4.33 ohms +/- 5%
Brush spring tension	255-368 gf (9-13 ozf)

The Battery

The battery is a 12 volt, negative earth, wet cell type and is located in a tray on the RH side of the engine compartment (LH side on early vehicles). A metal strap, connected to two hook bolts and secured by wing nuts holds the battery firmly in position (**Figure 9**).

General maintenance

Keep the battery terminals clean and tight. A smear of petroleum jelly will protect the terminals from corrosion. Regularly check the level of the electrolyte in the cells and top-up with distilled water if necessary, to bring the fluid level just above the separator plates. If the battery is found to need frequent topping up, steps should be followed to determine the reason. For example, the battery may be over charging, causing the electrolyte to heat up and evaporate. If the vehicle has a dynamo, check the settings of the regulator box. If one cell needs topping up more than the others then the battery might be defective, either having a leak or an internal fault in the cell causing local overheating. In this case replace the battery.

The efficiency of the battery needs to be checked from time to time using a hydrometer to determine the specific gravity of the electrolyte. The optimum readings are as follows:

1.280-1.3	Fully charged.
Approx 1.2	Half discharged.
Approx 1.15	Fully discharged.

If electrolyte has been spilled at any time then the cell(s) should be topped up with dilute sulphuric acid of the same specific gravity as the existing electrolyte. When mixing electrolyte it is essential that acid is always added to water. **It is extremely dangerous to add water to acid.**

Never use a naked light when examining a battery. The fumes given off by the cells are highly explosive.

To remove the battery

1. Disconnect the positive and negative cables, secured to the battery with 7/16" UNC nuts and bolts.
2. Unscrew the wing nuts securing the battery clamp bar and remove the bar complete with insulating rubber.
3. Lift the battery from the carrier keeping it horizontal to avoid spilling any electrolyte.
4. Replace in reverse order ensuring that the negative terminal is connected to earth on reconnection.

High rate discharge test

The high rate or heavy discharge test is a timed on load test applied separately to each cell of a battery. Only batteries with exposed links between the cells can be tested in this manner. Before testing the battery must be at least 70% charged and should have been off charge for some hours.

The correct type of tester for car batteries is one that is rated at 50 to 160 amps. It is essential to use only the recommended tester.

A cell in good condition will maintain a constant 1.2v – 1.5v reading for 10 seconds when the prongs of the tester are across the terminals.

Battery voltage

By means of the tests already described the condition of the battery has been ascertained and also its state of charge. The working voltage should then be checked. With a meter across the main terminals the voltage should not drop below 10.5 volts DC. If the voltage does drop rapidly the battery will need replacing.

Specification

Type:	Lead acid.
Voltage:	12 volts.
Capacity:	20 Ah.
Specific gravity:	Charged – 1.28-1.3. Discharged – 1.15.

Voltage regulator (Dynamo equipped vehicles only)

The voltage regulator is located in the RH side of the engine compartment. All settings are accurately adjusted before the unit leaves the factory so should not be disturbed. If the battery will not charge, or if the dynamo output fails to decrease when the battery is fully charged (over charging) it would indicate a fault. Voltage regulators require very sophisticated equipment and specialist knowledge to calibrate so in this event replacement with a new unit is the recommended course of action. The unit is secured to the car by two No 10 UNF set screws, plain and lock washers and nuts (**Figure 9**).

The fuses

The fuse box carries four fuses. Three operational plus one spare for accessories etc. Additionally there is space to store two spare fuses. It is located on the RH side of the engine compartment, secured with two No 10 UNF screws, plain and lock washers and nuts (**Figure 9**).

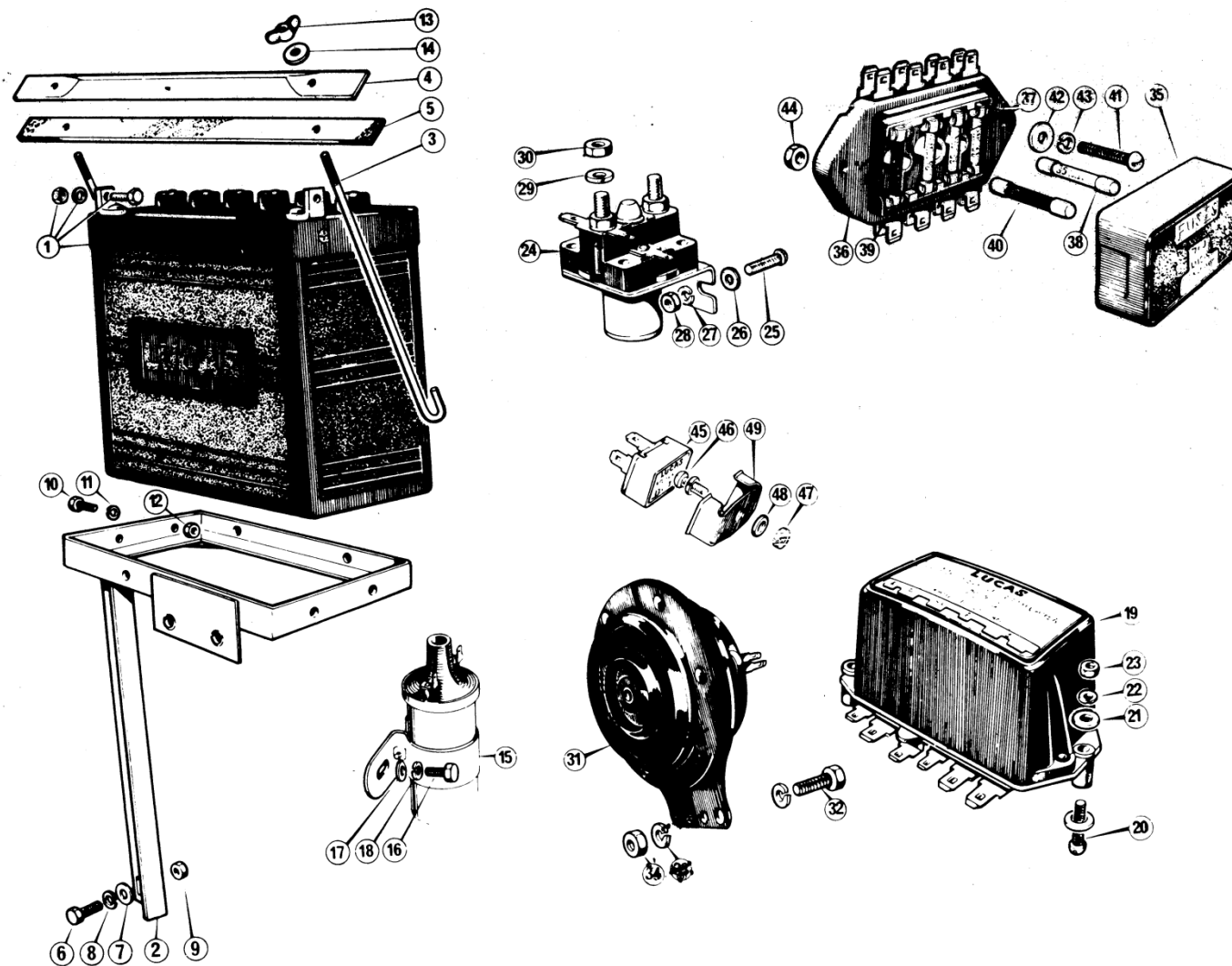
A blown fuse will be indicated by the failure of the circuits connected to it and can be confirmed on examination of the fuse. If a replacement fuse blows immediately then the fault must be traced before proceeding further. Fuses must only be changed with a correctly rated replacement. A slip of paper inside the glass tube details the rating.

The coil

The coil is secured to the battery tray by two 5/16" UNF set screws, plain and lock washers and nuts. It requires no attention other than periodic cleaning to avoid the spark tracking plus checking that all connections are clean and tight.

The efficiency of the coil can be tested as follows:

1. Remove the distributor cap and set the engine so that the contact breaker points are closed.
2. Unplug the "king" lead from the distributor cap and, holding the cable approximately 6mm (0.25 in) from the engine block, make and break the points using a small screwdriver with the ignition turned on. A strong blue spark should jump the gap from the end of the cable to ground if the coil is in order. A weak or pink spark would indicate that the coil may be failing and it should be renewed.



- 1 Battery
- 2 Battery tray
- 3 Hook bolt
- 4 Clamp bolt
- 5 Insulation strip
- 6 Set screw
- 7 Washer
- 8 Lockwasher
- 9 Nut
- 10 Set screw
- 11 Lockwasher
- 12 Nut
- 13 Nut
- 14 Washer
- 15 Coil
- 16 Set screw
- 17 Washer
- 18 Lockwasher
- 19 Voltage Regulator
- 20 Set screw
- 21 Washer
- 22 Lockwasher
- 23 Nut
- 24 Starter solenoid
- 25 Set screw
- 26 Washer
- 27 Lockwasher
- 28 Nut
- 29 Lockwasher
- 30 Nut
- 31 Horn
- 32 Set screw
- 33 Washer
- 34 Nut
- 35 Fuse unit cover
- 36 Fuse unit base c.w. cover
- 37 Fuse 35 amp
- 38 Fuse, spare 35 amp
- 39 Fuse 10 amp
- 40 Fuse, spare 10 amp
- 41 Set screw
- 42 Lockwasher
- 43 Washer
- 44 Nut
- 45 Flasher unit
- 46 Set screw
- 47 Nut
- 48 Washer
- 49 Clip

Figure 9 General electrics, battery, control box, etc.

Horn

The high-tone horn is secured to the front RH of the engine compartment by two ¼" UNF set screws, washers and nuts. If defective the horn must be renewed.

Windscreen wiper and motor

The windscreen wiper motor is a single-speed type with a self-parking switch. It drives two wheel boxes, located on the front scuttle panel, via a flexible cable rack running in rigid tubes.

Routine maintenance

Keep the wiper blades in good condition to ensure efficient wiping. The windscreen should be kept clean to prevent possible scratching of the surface due to deposits of grit, tar etc. These deposits should be removed from the windscreen with methylated spirit. On no account should the windscreen ever be cleaned with wax or a silicone based cleaner.

Erratic operation or complete failure may be caused by a mechanical or electrical defect, the symptoms and rectification being detailed below.

a) Mechanical

A kinked or damaged cable rack "bundy" tube will prevent the rack from moving freely, thus overloading the motor and restricting the wiper operation. The tubing must be reformed or renewed. On no account bend the bundy tubing to a radius of less than 9" (228mm). Check that the wheel boxes are not seized or have excessive clearance. A worn or seized wheel box must be renewed. Ensure that the rack is copiously lubricated with general purpose grease.

b) Electrical

Check that the electrical plug in the wiper motor is clean and secure. A delay in operation or complete failure can be caused by a faulty fascia switch. This can be tested by substitution.

If all other mechanical and electrical components have been found to operate correctly then it is possible that the motor has failed and a replacement unit should be fitted.

To remove wiper motor (Figure 10)

1. Prise the wiper blades from their wheel box splined spindles.
2. Disconnect the wiring plug from the wiper motor.
3. Disconnect the cable rack tubing from the motor at the union fitting.
4. Remove two ¼" UNF set screws, plain and lock washers and nuts and remove the "U" clamp securing the wiper motor to the body.
5. Remove the motor, pulling the rack from the tubing as you do so.
6. Refit in reverse order.

Wheel boxes and rack tubing

To remove

1. Remove the fascia (**see Section R**).
2. Unscrew four self-tapping screws and remove the wheel box cover plates.
3. Detach the wiper arms and remove the wheel box retaining nuts, washers and waterproof spacers.
4. Disconnect the cable rack tubing at the union fitting on the wiper motor.
5. Push the wheel boxes through their fixing holes into the cabin.
6. From within the vehicle, disconnect the intermediate bundy tube from the RH wheel box which can then be withdrawn, complete with the overrun tube still fitted.
7. Disconnect the wiper motor to wheel box tube from the LH wheel box which can now be withdrawn, complete with the intermediate tube still attached.
8. From under the bonnet, the wiper motor to wheel box tube can now be removed.

To replace

1. Insert the wiper motor to wheel box tube through the grommet in the bulkhead and locate in position.
2. From inside the vehicle fit the LH wheel box, complete with intermediate tube.
3. Locate the RH wheel box, complete with overrun tube and connect to the intermediate tube.
4. Reconnect the tubing at the wiper motor union fitting.
5. Position both wheel boxes through their holes in the front scuttle panel.
6. Secure the wheel boxes to the front scuttle panel with the waterproof spacers, washers and nuts. Refit the wiper arms.
7. Replace the wheel box cover plates, securing with four self-tapping screws.
8. Replace the fascia (**see Section R**).

Specification

Type:	Lucas model 14W – 12 volt.
Light running current	1.5 amps.
Light running speed	46 – 52 sweeps/minute.

Lighting

The headlamps are of the "sealed beam" type incorporating the pilot lamps. The filament in the light unit being sealed between the lens and reflector. In the event of main or dipped beam failure the light unit must be replaced

The pilot lamp is of the "capless" type and can be replaced in the event of failure.

Maximum efficiency is obtained and discomfort to other road users avoided if the headlamps are correctly focused, ensuring that the beam is not projected above the horizontal, particularly when the vehicle is fully laden.

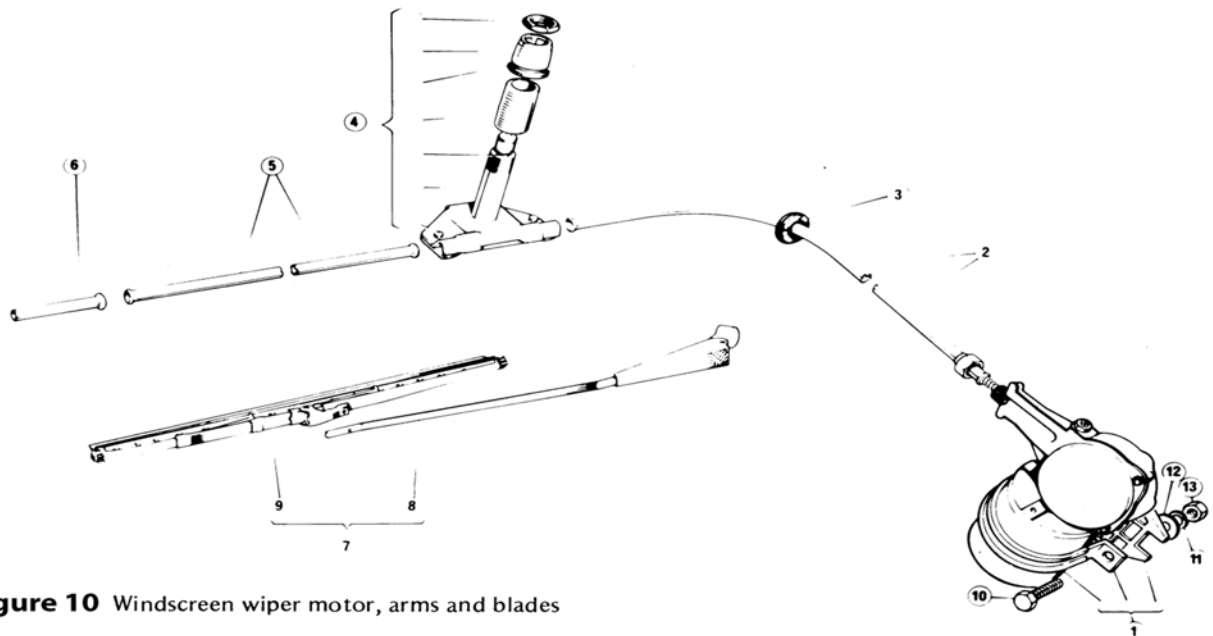


Figure 10 Windscreen wiper motor, arms and blades

- | | | |
|--|---------------------|----------------|
| 1 Windscreen wiper motor complete with pad and clamp | 6 Tube, over-run | 12 Coachwasher |
| 2 Tube, motor to wheelbox | 7 Wiper arm & blade | 13 Nut |
| 3 Grommet | 8 Arm | |
| 4 Wheelbox | 9 Blade | |
| 5 Tube, wheelbox to wheelbox | 10 Set screw | |
| | 11 Lockwasher | |

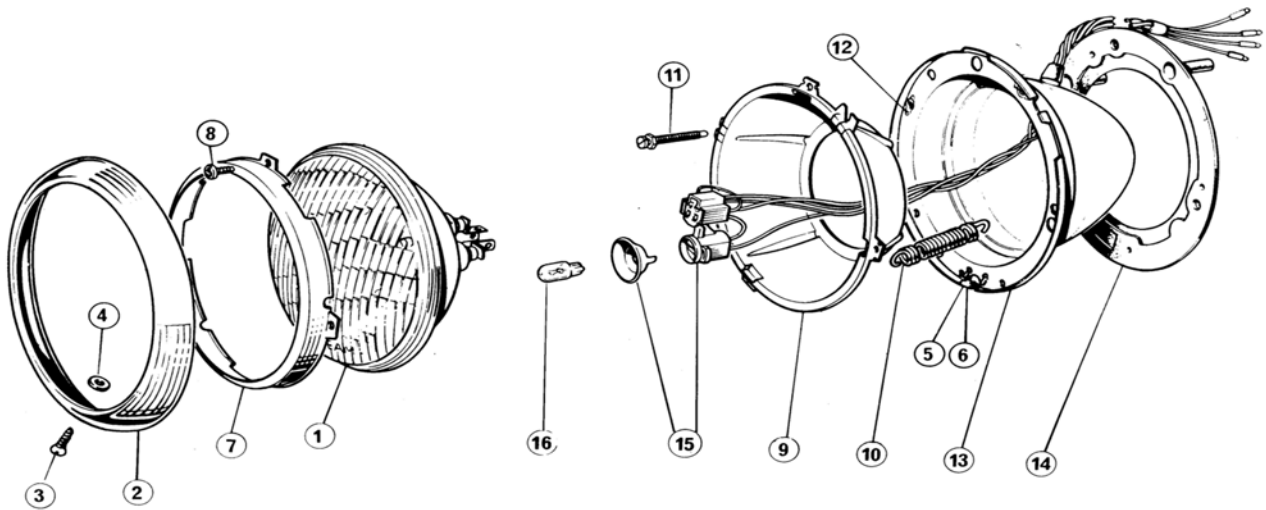


Figure 11 Headlamps

- | | | |
|--------------|-------------|------------|
| 1 Light unit | 7 Plate | 13 Body |
| 2 Bezel | 8 Screw | 14 Gasket |
| 3 Screw | 9 Rim | 15 Adaptor |
| 4 Washer | 10 Spring | 16 Bulb |
| 5 Nut | 11 Screw | |
| 6 Bracket | 12 Retainer | |

Removal of light unit (Figure 11)

1. Remove one self-tapping screw and detach the headlamp rim.
2. Unscrew three self-tapping screws from the lamp retaining rim and remove the rim. Draw the lamp unit forward.
3. The unit can now be disconnected from the cable adapters, either for replacement or simply to renew the pilot bulb.
4. Replace in reverse order.

Headlamp beam adjustment

It is recommended that a "Lucas Beam setter" is used to ensure accurate beam adjustment. Follow the manufacturer's instructions for the correct procedure. If such equipment is not available, beam adjustment can still be correctly done by the following method:

1. The vehicle should be at its kerbside weight, with a person in the driving seat, half a tank of fuel and the tyres at the recommended pressures.
2. Position the vehicle on level ground 10m (32.8 ft) from, and square to, a suitable vertical screen.
3. Measure the height from the ground to the centre of the headlamp and adjust the board so that the dividing line "H" marked on the board corresponds. (Figure 12)
4. Position the board so that the vertical dividing line corresponds to the centre line of the vehicle.
5. Switch the lights on to main beam and cover the RH headlamp.
6. The LH headlamp should be set until the area of concentrated light (the "hot spot") is focused just below "H" on the aiming board, on the centre line which is the centre of the headlamp as shown in Figure 12. Vertical adjustment is obtained by adjusting screw 1 (Figure 13) and horizontal adjustment by screw 2. With the main beam correctly set, the dipped beam will also be correct.
7. Cover the LH headlamp and repeat the process for the RH headlamp.

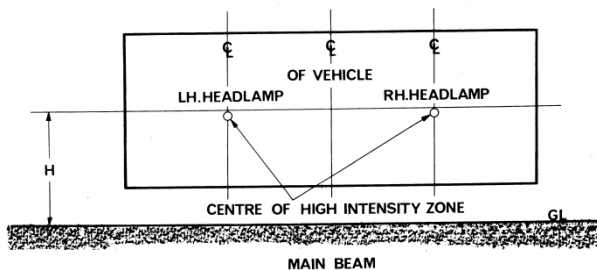


Figure 12 Headlamp alignment

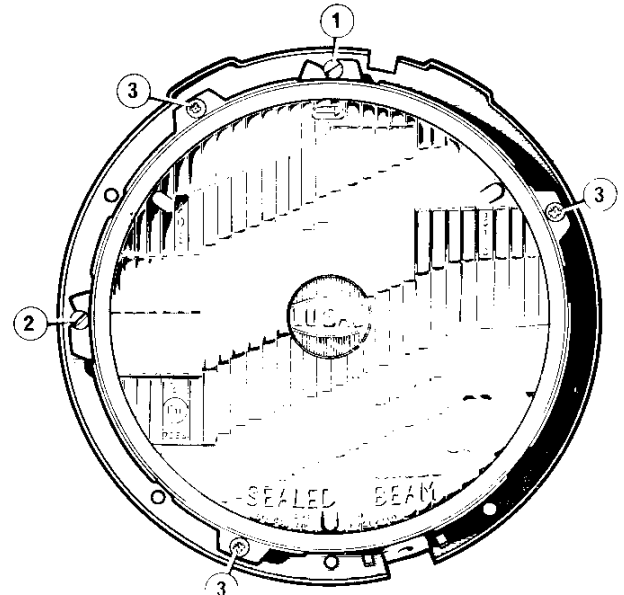


Figure 13 Headlamp adjustment

1. Vertical beam adjuster
2. Horizontal beam adjuster
3. Inner rim securing screw

Front indicator lamps (Figure 14)

The amber glass or Perspex lenses are located in a rubber body retained by a chrome rim. To gain access to the bulb holder, prise out the chrome rim from the body and remove the lens.

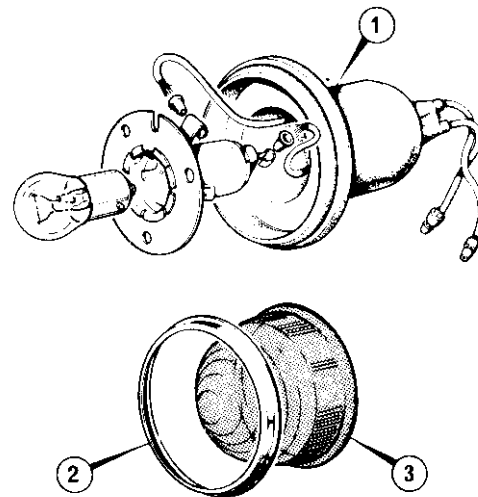


Figure 14 Front indicator lamp

1. Rubber flange
2. Rim
3. Amber lens

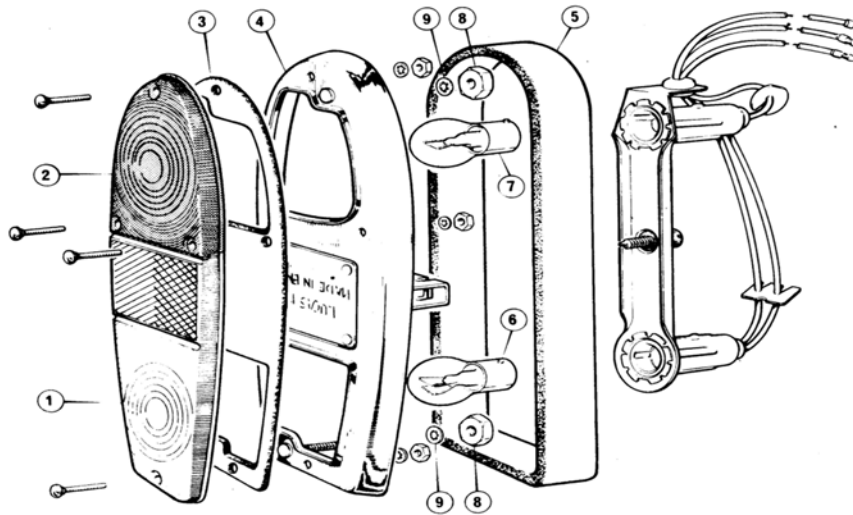


Figure 15 Stop/tail indicator lamps, Saloon, early vehicles

1 Lens, red
2 Lens, amber
3 Gasket, lens

4 Base
5 Gasket, lamp to body
6 Bulb, stop/tail

7 Bulb, indicator
8 Nut
9 Washer

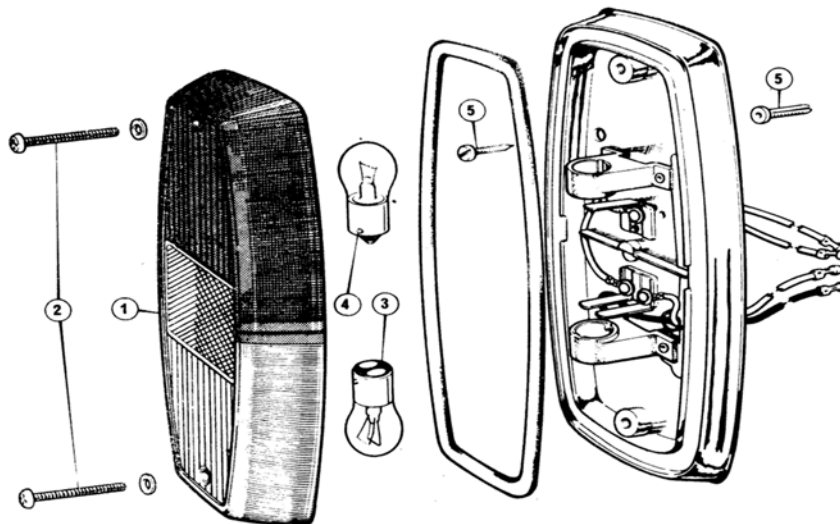
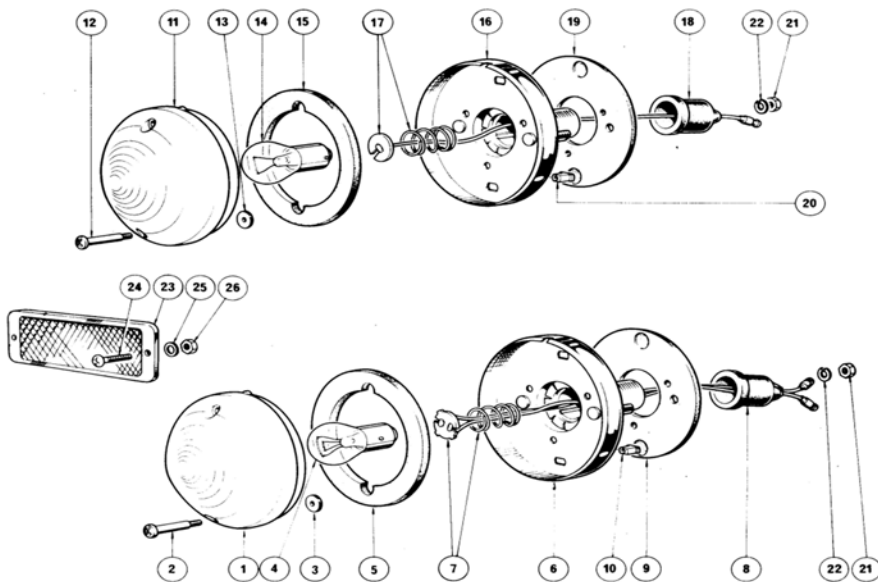


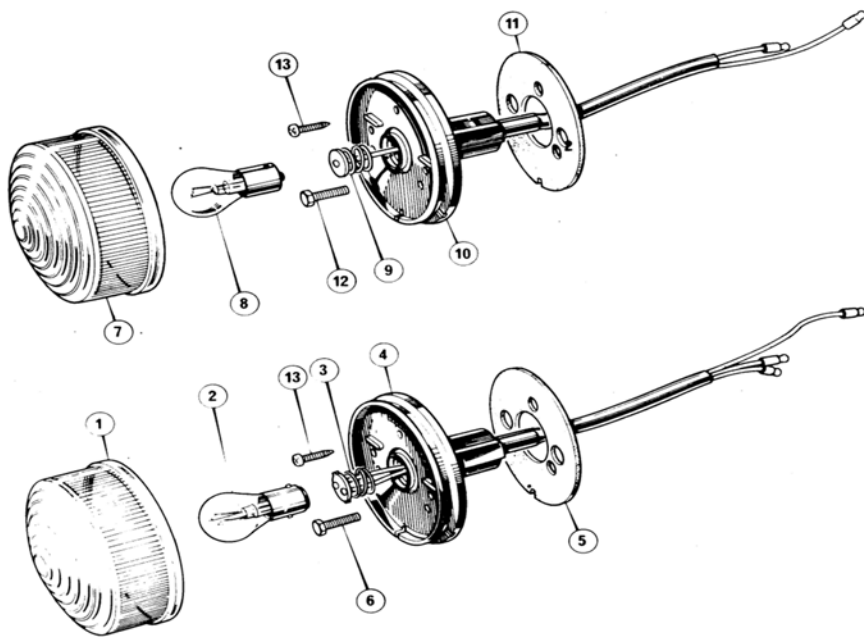
Figure 16 Stop/tail indicator lamps, Saloon, later vehicles

1 Lens – stop/tail & indicator
2 Screw, lens to lamp body
3 Bulb, stop/tail
4 Bulb, indicator
5 Tapit fixing



- 1 Lens, red
- 2 Screw
- 3 Washer
- 4 Bulb
- 5 Gasket
- 6 Body
- 7 Interior, bulb holder
- 8 Grommet
- 9 Gasket
- 10 Nut
- 11 Lens, amber
- 12 Screw
- 13 Washer
- 14 Bulb
- 15 Gasket
- 16 Body
- 17 Interior
- 18 Grommet
- 19 Gasket
- 20 Nut
- 21 Nut, lamp fixing
- 22 Lockwasher
- 23 Reflector
- 24 Screw
- 25 Washer
- 26 Nut

Figure 17 Stop/tail indicator lamps, Estate, early vehicles



- 1 Lens, red
- 2 Bulb, stop/tail
- 3 Interior, bulb holder
- 4 Body
- 5 Gasket
- 6 Screw
- 7 Lens, amber
- 8 Bulb, indicator
- 9 Interior, bulb holder
- 10 Body
- 11 Gasket
- 12 Screw
- 13 Screw, lamps to body

Figure 18 Stop/tail indicator lamps, Estate and Van, later vehicles

Rear lights prior to chassis number 941001

Saloon (Figure 15)

The stop/tail and rear indicator lamps are housed within one unit and access to the cluster is gained via the boot compartment. Remove the centre knurled screw to enable withdrawal of the bulb holder assembly. Two hexagon head nuts and washers secure the complete lamp unit to the body.

Estate (Figure 17)

The stop/tail and indicator units are similar units with identical fixings. To gain access to the bulbs remove two screws and detach the lens.

Rear lights after chassis number 941001

Saloon (Figure 16)

The lamps are again housed in composite units. To access a faulty bulb, remove two screws and lift off the lens to withdraw the bulb. The lamp base incorporates the bulb holders and is secured to the body with "tapit" fixings.

Estate and Van (Figure 18)

Separate units are used for stop/tail and indicators but use identical fixings. To remove the lens and access the bulb carefully prise the lens off using a screwdriver or similar implement. Three slots are provided in the base to aid in this. The base is attached to the vehicle with two self-tapping screws.

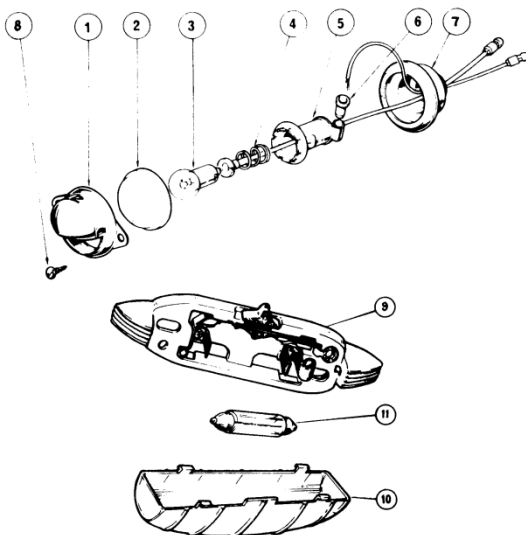


Figure 19 Number plate lamp and interior lamp

1. Bezel
2. Lens
3. Bulb
4. Bulb holder interior
5. Bulb holder body
6. Terminal sleeve
7. Body
8. Screw
9. Base
10. Lens
11. Bulb

Number plate lamp (Figure 19)

The chrome bezel of the number plate lamp is secured by two self-tapping screws. Access to the bulb is gained by removing the bezel and carefully prising out the lamp lens.

Interior lamp (Figure 19)

To gain access to the bulb, carefully squeeze the centre of the lamp cover and gently remove it.

Instruments and switches (Figure 20)

Access to the two main instruments is achieved through the aperture located beneath the fascia. Disconnect the appropriate connections and remove the knurled nuts securing the instruments to their retaining brackets to remove them. Push each instrument down behind the fascia and carefully remove through the access aperture. The temperature gauge and the fuel gauge are each secured to the main body of the instrument by two screws incorporating captive lock washers.

The windscreen wiper switch, heater blower switch, choke control and screen wash plunger are accessed via a panel in the glove compartment. Access to the light and ignition switches is again achieved through the aperture beneath the fascia.

Multi-function column switch (Figure 20)

The multi-function switch is mounted on the steering column with the stalk to the RH side. The switch has four primary positions as follows:

1. Forward – headlamp main beam
2. Back – Headlamp dipped beam
3. Up – LH indicator
4. Down – RH indicator

Additionally, pressing the button on the end of the switch operates the horn and pulling the switch arm towards the steering wheel against a return spring flashes the headlamp main beams.

To remove

1. Remove two screws, complete with lock washers and remove the switch cover and its retaining clamp.
2. Unscrew the two multi switch clamping screws and remove the clamp, the spacer and the indicator cancel bush from the steering column.
3. Disconnect the wires and pull the loom through the grommet.
4. Replace in reverse order

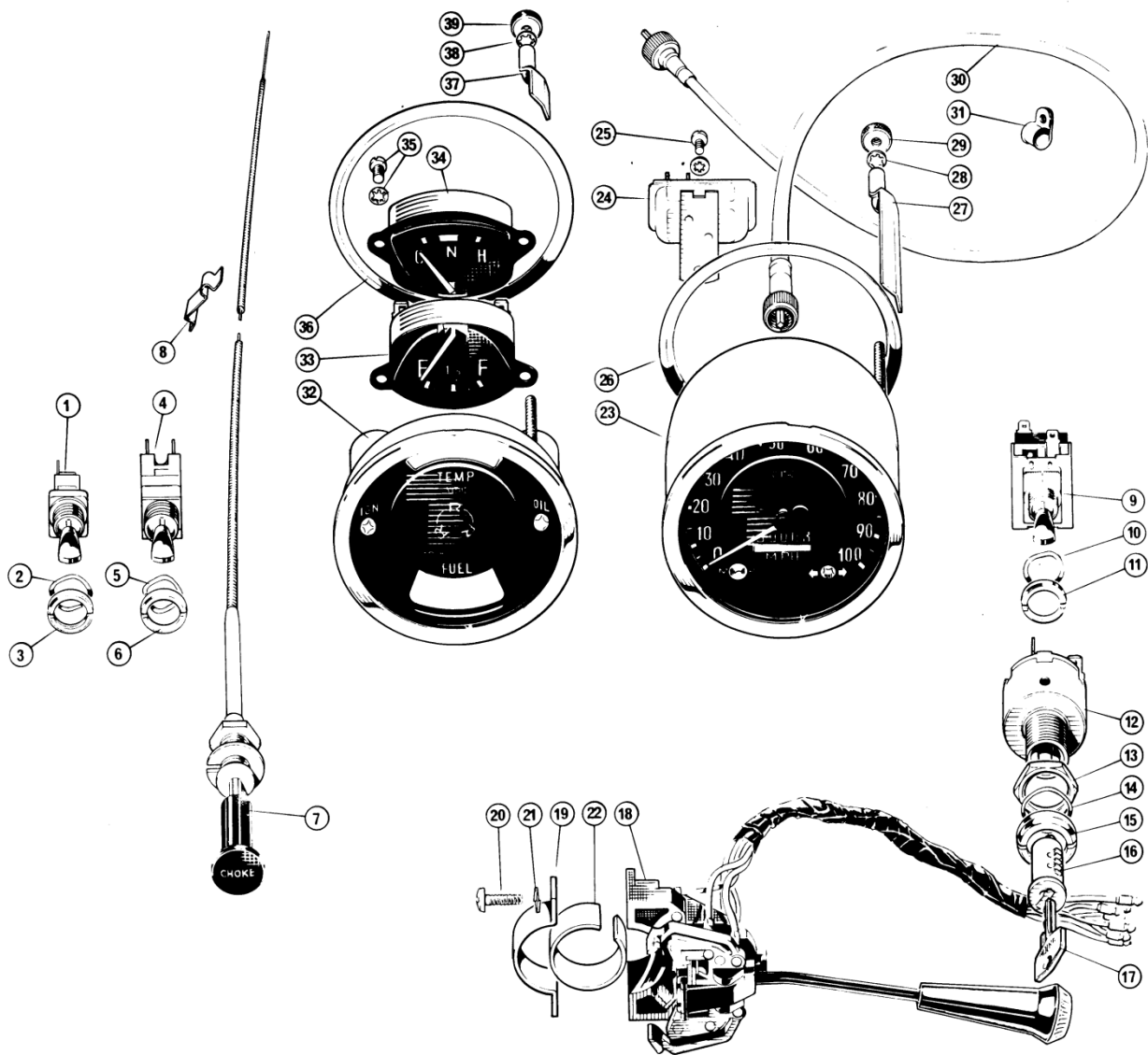


Figure 20 Instruments and switches

- | | |
|---------------------------|----------------------------------|
| 1 Windscreen wiper switch | 24 Voltage stabilizer |
| 2 Wavy washer | 25 Screw |
| 3 Nut | 26 Retaining ring, speedo |
| 4 Heater switch | 27 Clamp, speedo |
| 5 Wavy washer | 28 Washer, speedo |
| 6 Nut | 29 Knurled nut, speedo |
| 7 Choke cable | 30 Flexible drive, speedo |
| 8 Retaining clip | 31 Clip, flexible drive |
| 9 Light switch | 32 Fuel & temperature instrument |
| 10 Wavy washer | 33 Fuel gauge |
| 11 Nut | 34 Temperature gauge |
| 12 Ignition switch | 35 Screw & captive washer |
| 13 Nut | 36 Retaining ring |
| 14 Washer | 37 Clamp |
| 15 Bezel | 38 Washer |
| 16 Ignition barrel | 39 Knurled nut |
| 17 Ignition key | |
| 18 Multi-switch | |
| 19 Clamp, multi-switch | |
| 20 Screw | |
| 21 Washer | |
| 22 Spacer | |
| 23 Speedometer | |

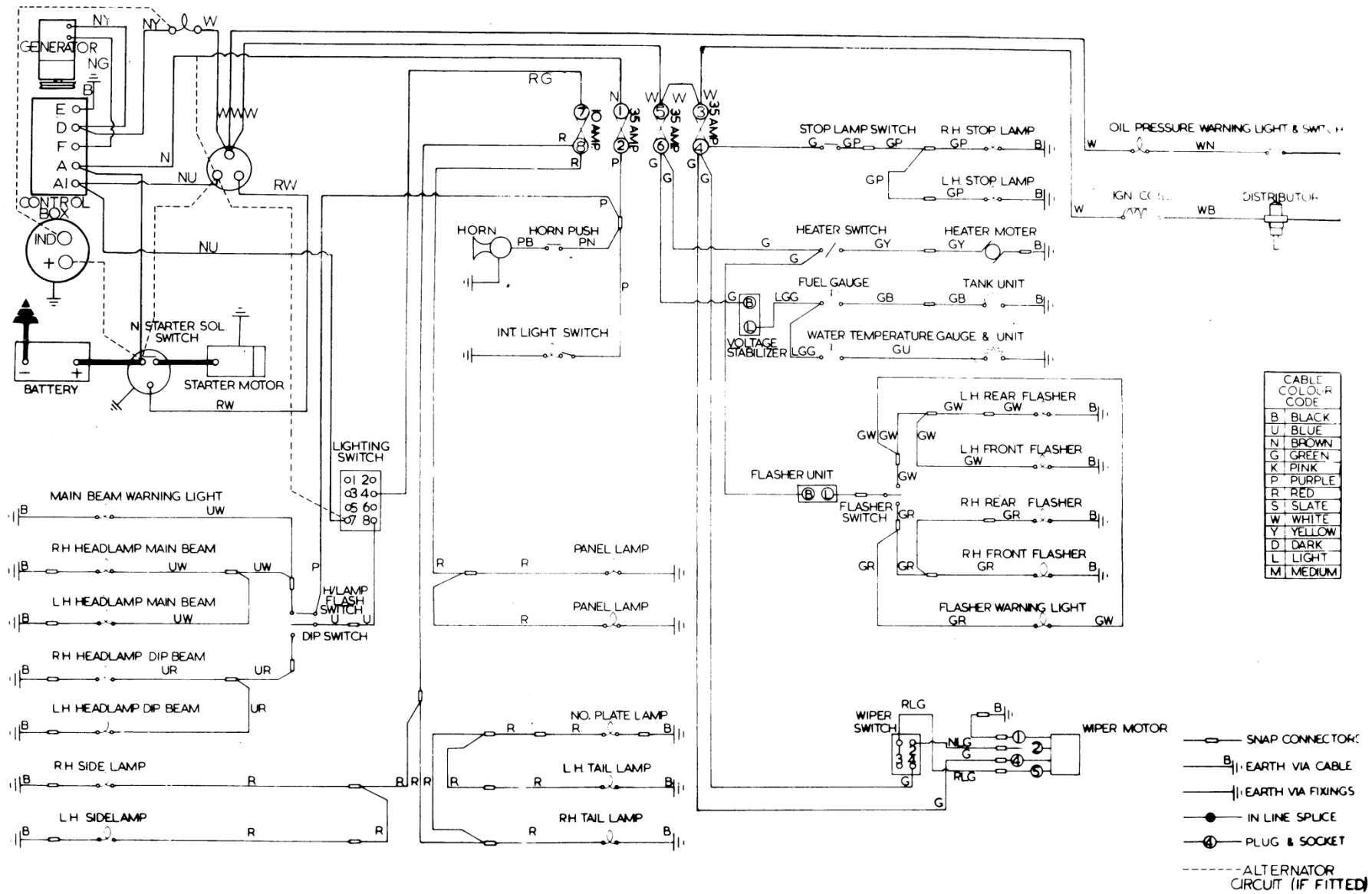


Figure 21 Wiring diagram

Section U

Windscreen Washer

The windscreen washer is operated by a plunger button situated below the wiper motor switch. Water is directed onto the screen from a two-way jet, fixed to the bonnet and linked to a reservoir with plastic tubing. The reservoir is housed in a support bracket which is rivetted to the LH bulkhead near the engine manifold.

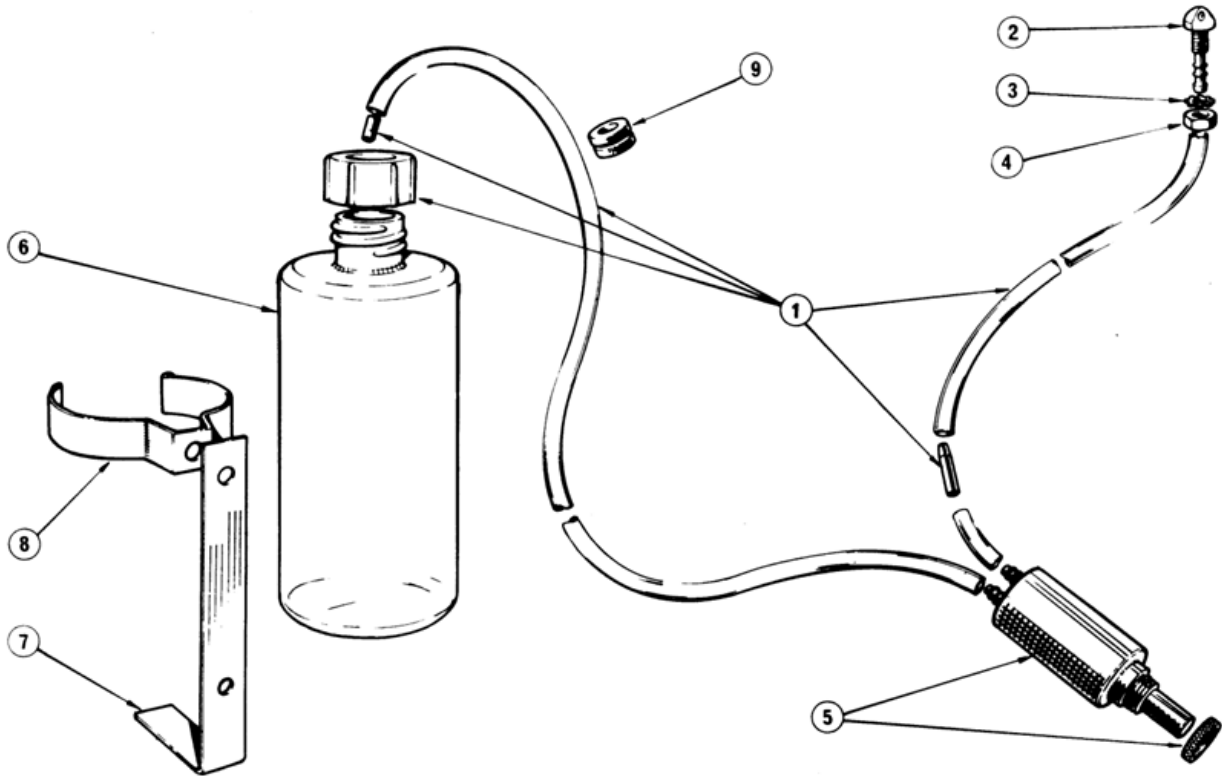


Figure 1 Windscreen washer

- 1 Hose
- 2 Jet
- 3 Washer
- 4 Nut
- 5 Pump
- 6 Container
- 7 Bracket, water container support
- 8 Bracket, water container retaining
- 9 Grommet

Section V

Tightening torques

Front Suspension

Upper wishbone to ball joint	5/16" UNF	3.46-4.15 kg/m	25-30 lb/ft
Upper wishbone to chassis	3/8" UNF	4.15-4.84 kg/m	30-35 lb/ft
Lower wishbone to trunnion	7/16" UNF	4.84-5.53 kg/m	35-40 lb/ft
Lower wishbone to chassis	3/8" UNF	4.15-4.84 kg/m	30-35 lb/ft
Damper unit to chassis	1/2" UNF	4.15-4.84 kg/m	30-35 b/ft
Damper unit to wishbone	7/16" UNF	4.84-5.53 kg/m	35-40 lb/ft

Rear suspension

Damper to mounting bracket	1/2" UNF	4.15-4.84 kg/m	30-35 lb/ft
Damper to chassis	3/8" UNF	3.46-4.15 kg/m	25-30 lb/ft
"U" bolt to spring	3/8" UNF	4.15-4.84 kg/m	30-35 lb/ft
Shackle to chassis	1/2" UNF	4.84-5.53 kg/m	35-40 lb/ft
Leaf spring to shackle	1/2" UNF	4.84-5.53 kg/m	35-40 lb/ft
Leaf spring to chassis	1/2" UNF	4.84-5.53 kg/m	35-40 lb/ft

Steering

Steering wheel to column	9/16" UNF	2.76-3.46 kg/m	20-25 lb/ft
Steering box to chassis	3/8" UNF	4.15-4.84 kg/m	30-35 lb/ft
Idler assembly to chassis	3/8" UNF	4.15-4.84 kg/m	30-35 lb/ft
Outer tie rods to tie rod lever	3/8" UNF	4.15-4.84 kg/m	30-35 lb/ft
Centre and outer tie rods to drop arms	7/16" UNF	4.15-4.84 kg/m	30-35 lb/ft

Cooling system

Water pump fixing nuts	5/16" UNF	1.66-2.10 kg/m	12-15 lb/ft
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Engine

Cylinder head nuts	3/8" UNF	3.46 kg/m	25 lb/ft
	5/16" UNF	2.07 kg/m	15 lb/ft
Big end bearing caps	5/16" UNF	2.90 kg/m	21 lb/ft
Main bearing caps	3/8" UNF	3.32 kg/m	24 lb/ft
Flywheel to crankshaft bolts	3/8" UNF	4.04 kg/m	29 lb/ft
Rocker shaft nuts	3/8" UNF	3.04 kg/m	22 lb/ft
Manifold nuts	5/16" UNF	2.07 kg/m	15 lb/ft
Fuel pump nuts	5/16" UNF	2.07 kg/m	15 lb/ft
Rocker cover nuts	5/16" UNF	0.3 kg/m	2 lb/ft
Spark plugs	M14	2.07 kg/m	15 lb/ft
Engine mountings	3/8" UNF	3.46 kg/m	25 lb/ft

Gearbox

Gearbox to engine (nuts)	5/16" UNF	1.66-2.07 kg/m	12-15 lb/ft
Gearbox to engine (bolts)	5/16" UNC	2.07-2.49 kg/m	15-18 lb/ft
Front cover	1/4" UNF	0.69-1.10 kg/m	5-8 lb/ft
Rear cover	1/4" UNC	0.83-1.24 kg/m	6-9 lb/ft
Top cover to case	1/4" UNC	0.83-1.24 kg/m	6-9 lb/ft
Drain and filler plugs	3/8" BSP	2.07-2.76 kg/m	15-20 lb/t
Gearbox mounting to support frame	3/8" UNF	2.76-3.46 kg/m	20-25 lb/ft
Support frame to chassis	5/16" UNF	2.07-2.49 kg/m	15-18 lb/ft
Main shaft to flange nut	1/2" UNF	6.92 kg/m	50 lb/ft

Clutch

Clutch cover to flywheel	5/16" UNF	1.66-2.07 kg/m	12-15 lb/ft
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Prop shaft

Universal joint flange to axle	5/16" UNF	3.46-4.15 kg/m	25-30 lb/ft
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Rear axle

Axle case nuts	5/16" UNF	2.77-3.46 kg/m	20-25 lb/ft
Hub to half shaft nut	5/8" UNF	13.8-15.2 kg/m	100-110 lb/ft
Coupling flange pinion nut	5/8" UNF	9.67-11.75 kg/m	70-85 lb/ft
Axle filler/level plug	3/4" BSP	2.07-2.76 kg/m	15-20 lb/ft

Brakes

Hydraulic unions		0.97-1.10 kg/m	7-8 lb/ft
Bleed valves		0.69-0.97 kg/m	5-7 lb/ft
Rear brake adjuster to back plate		0.55-0.69 kg/m	4-5 lb/ft
Rear back plate to axle	5/16" UNF	2.20-2.50 kg/m	16-18 lb/ft
Front back plate to upright	5/16" UNF	2.20-2.50 kg/m	16-18 lb/ft
Master cylinder mountings	5/16" UNF	2.20-2.50 kg/m	16-18 lb/ft

Road wheels

Wheel nuts	3/8" UNF	4.15-4.84 kg/m	30-35 lb/ft
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Electrical

Alternator/dynamo pivot bolts	5/16" UNF	2.08-2.77 kg/m	15-20 lb/ft
Alternator /dynamo adjusting bolt	5/16" UNC	2.08-2.77 kg/m	15-20 lb/ft
Starter motor bolts	3/8" UNF	4.15-4.84 kg/m	30-35 lb/ft
