Chapter 1 Routine maintenance and servicing



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Air cleaner element renewal
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Degrees of difficulty



Fairly easy, suitable for beginner with some experience Fairly difficult, suitable for competent DIY mechanic

S

3

Difficult, suitable for experienced DIY mechanic



Very difficult, suitable for expert DIY or professional 1

1-2 Servicing specifications

Lubricants and fluids	Refer to end of "Weekly Checks"		
Capacities			
Engine oil with filter change			
Manual transmission	4.8 litres 5.0 litres		
Engine oil without filter change (approximate)			
Manual transmission	4.2 litres		
Cooling system	4.4 IIITES 3.5 litres		
Fuel tank			
Saloon and Clubman (approximate):			
Early models	25 litres		
Later models	33 litres		
1275 GT	33 litres		
Cooper S Mk III	50 litres		
Engine			
Oil filter type:			
Pre-1973 models	Champion X101 (cartridge type)		
1974-on models	Champion C103 (canister type)		
Cooling system			
Fan belt adjustment	13.0 mm deflection of belt between	crankshaft and dynamo/alternator	
Specified antifreeze mixture	30% antifreeze/70% water		
Note: Refer to Chapter 3 for further details.			
Fuel system - carburettor models			
Air cleaner element type:			
Pre-1973 models	Champion W131		
1974-on models	Champion W125 Champion W250		
Fuel system fuel injection models			
Air cleaner element type	Champion type not available		
Fuel filter type	Champion type not available		
Exhaust and emission control systems			
Air pump drivebelt adjustment	13.0 mm deflection of belt between	pulleys	
Ignition system			
Spark plugs:*			
Туре:			
All models up to 1987	Champion RN9YCC or RN9YC Champion N12YCC or N12YC		
998 cc engine models (1989-on)	Champion RN12YCC or RN12YC		
1275 cc engine models (1990-on)	Champion RN9YCC or RN9YC		
Electrode gap:	0.8 mm		
Champion RN9YC and N12YC	0.6 mm		
HT leads	Champion LS-02, boxed set		
*Spark plug types and electrode gaps are as recommended by Champic recommendations	on Spark Plug. If alternative plugs are	used, refer to their manufacturer's	
Clutch			
Clutch raturn ston clearance	0.50 mm		
	0.30 mm		
DI dKCS Minimum braka shaa lining thickness	2 0 mm		
Minimum brake pad thickness	3.0 mm		
Handbrake lever travel	3 clicks of ratchet		
Tyres			
Tyre pressures	See "Weekly checks"		
Torque wrench settings	Nm	lbf ft	
Engine/transmission oil drain plug	35	25	
Spark plugs	25	18	
	00	40	

The maintenance intervals in this manual are provided with the assumption that you, not the dealer, will be carrying out the work. These are the average maintenance intervals recommended by the manufacturer for vehicles driven daily under normal conditions. Obviously some variation of these intervals may be expected depending on territory of use, and conditions encountered. If you wish to keep your vehicle in peak condition at all times, you may wish to perform some of these procedures more often. We encourage frequent maintenance because it enhances the efficiency, performance and resale value

of your vehicle.

If the vehicle is driven in dusty areas, used to tow a trailer, driven frequently at slow speeds (idling in traffic) or on short journeys, more frequent maintenance intervals are recommended.

Every 250 miles (400 km) or weekly

Refer to "Weekly Checks"

Every 3000 miles (5000 km) or 3 months, whichever comes first

In addition to the items listed above, carry out the following:

- Adjust the front and rear drum brakes (Section 3)
- Check the operation of the handbrake and adjust if necessary (Section 4)
- Check the condition and security of the steering and suspension components (Section 5)
- Inspect the underbody and the brake hydraulic pipes and hoses (Section 6)
- Check the condition of the fuel lines (Section 6)
- Check the condition and security of the exhaust system (Section 7)
- Check the condition of the fan belt and renew if necessary (Section 8)
- Check the condition of the air pump drivebelt (where applicable) and renew if necessary (Section 9)
- Inspect the clutch hydraulic components (Section 10)
- Check the condition of the seats and seat belts (Section 11)
- Check the headlight beam alignment (Section 12)

Every 6000 miles (10 000 km) or 6 months, whichever comes first

In addition to the items listed above, carry out the following:

- Renew the engine/transmission oil and filter (Section 13)
- Check the condition of the front brake shoes and/or pads, and renew if necessary (Section 14)
- Check the condition of the driveshaft gaiters (Section 15)
- Lubricate the suspension and steering grease points (Section 16)
- Check the condition of the rear brake shoes and renew if necessary (Section 17)
- Check all underbonnet components and hoses for fluid leaks (Section 18)
- Check and if necessary top up the carburettor piston dashpot and lubricate the linkage (Section 19)

Every 6000 miles (10 000 km) or 6 months, whichever comes first (continued)

- Check the condition of the contact breaker points and adjust or renew (Section 20)
- Lubricate the distributor (Section 21)
- Check and if necessary adjust the clutch return stop (Section 22)
- Lubricate the dynamo bearing early models (Section 23)
- Clean and inspect the dynamo charging system control box (Section 24)
- Check and if necessary adjust the ignition timing (Section 25)
- Check and if necessary adjust the carburettor idle speed and mixture settings (Section 26)
- Lubricate the locks and hinges (Section 27)
- Check the condition of the exterior trim and paintwork (Section 28)
- Road test (Section 29)

Note: Renewal of the engine/transmission oil and filter at this service interval is only necessary on pre-1985 models. On all other models, oil and filter renewal is recommended at 12 000 miles/12 months.

Every 12 000 miles (20 000 km) or 12 months, whichever comes first

In addition to the items listed above, carry out the following:

- Renew the air cleaner element (Section 30)
- Check and if necessary adjust the valve clearances (Section 31)
- Inspect the distributor cap, rotor arm and HT leads (Section 32)
- Renew the spark plugs (Section 33)
- Check the emission control equipment (Section 34)

Every 24 000 miles (40 000 km) or twenty four months, whichever comes first

In addition to the items listed above, carry out the following:

- Renew the coolant (Section 35)
- Renew the brake fluid (Section 36)
- Renew the fuel filter fuel injection models (Section 37)

Underbonnet view of a 998 cc Mini 1000 Saloon



- Brake master cylinder reservoir
 Clutch master cylinder reservoir
- 3 Fuse block
- 4 Carburettor piston damper
- 5 Air cleaner

- 6 Windscreen wiper motor
- Radiator pressure cap 7
- 8 Engine/transmission oil filler cap
- 9 Alternator
- 10 Engine/transmission oil dipstick
- 11 Distributor
- 12 Ignition coil
- 13 Vehicle identification plate
- 14 Clutch slave cylinder
- 15 Windscreen washer reservoir

Underbonnet view of a 1275 cc Mini Cooper Saloon

(air cleaner removed for clarity)



- 1 Alternator
- 2 Ignition coil
- 3 Engine/transmission oil dipstick
- 4 Engine management (fuel injection/ignition) ECU
- 5 Radiator pressure cap

- 6 Brake fluid reservoir cap
- 7 Brake system vacuum servo unit
- 8 Relay module
- 9 Fuel cut-off inertia switch
- 10 Manifold absolute pressure (MAP) sensor fuel trap
- 11 Fuel return pipe
- 12 Fuel feed pipe
- 13 Accelerator cable
- 14 Throttle body assembly
- 15 Heater coolant valve
- 16 Charcoal canister purge valve

Front underside view of a 998 cc Mini 1000 Saloon



- 1 Engine/transmission oil drain plug
- 2 Oil filter
- 3 Front suspension tie-bar
- 4 Disc brake caliper
- 5 Driveshaft outer CV joint
- 6 Front subframe
- 7 Subframe rear mounting
- 8 Offset sphere type inner CV joint9 Gearchange extension rod
- 10 Battery positive cable

- 11 Steering tie-rod outer balljoint 12 Lower suspension arm
- 13 Exhaust bracket

Rear underside view of a 998 cc Mini 1000 Saloon



1 Rear subframe

- 2 Rear brake wheel cylinder attachment
- 3 Exhaust rear silencer
 - 4 Battery box
 - 5 Exhaust mounting

- 6 Handbrake cable guide7 Battery positive cable

1-8 Maintenance procedures

1 Introduction

1 This Chapter is designed to help the home mechanic maintain his/her vehicle for safety, economy, long life and peak performance.

2 This Chapter contains a master maintenance schedule, followed by Sections dealing specifically with each task in the schedule. Visual checks, adjustments, component renewal and other helpful items are included. Refer to the accompanying illustrations of the engine compartment and the underside of the vehicle for the locations of the various components.

3 Servicing your vehicle in accordance with the mileage/time maintenance schedule and the following Sections will provide a planned maintenance programme, which should result in a long and reliable service life. This is a comprehensive plan, so maintaining some items but not others at the specified service intervals will not produce the same results.

4 As you service your vehicle, you will discover that many of the procedures can - and should - be grouped together, because of the particular procedure being performed, or because of the close proximity of two otherwise-unrelated components to one another. For example, if the vehicle is raised for any reason, the exhaust should be inspected at the same time as the suspension and steering components.

5 The first step of this maintenance programme is to prepare yourself before the actual work begins. Read through all the Sections relevant to the work to be carried out, then make a list and gather together all

the parts and tools required. If a problem is encountered, seek advice from a parts specialist or a dealer service department.

2 Intensive maintenance

If, from the time the vehicle is new, the routine maintenance schedule is followed closely, and frequent checks are made of fluid levels and high-wear items, as suggested throughout this manual, the engine will be kept in relatively good running condition, and the need for additional work will be minimised.
 It is possible that there will be some times when the engine is running poorly due to the lack of regular maintenance. This is even more likely if a used vehicle, which has not received regular and frequent maintenance checks, is purchased. In such cases, additional work may need to be carried out, outside of the regular maintenance intervals.

3 If engine wear is suspected, a compression test (refer to Chapter 2A) will provide valuable information regarding the overall performance of the main internal components. Such a test can be used as a basis to decide on the extent of the work to be carried out. If, for example, a compression test indicates serious internal engine wear, conventional maintenance as described in this Chapter will not greatly improve the performance of the engine, and may prove a waste of time and money, unless extensive overhaul work (Chapter 2B) is carried out first.

4 The following series of operations are those often required to improve the performance of a generally poor-running engine:

Primary operations

- a) Clean, inspect and test the battery (See "Weekly checks").
- b) Check all the engine-related fluids (See "Weekly checks").
- c) Check and if necessary adjust the valve clearances (Section 31).
- d) Check the condition of the fan belt (Section 8).
- e) Top up the carburettor piston damper (Section 19)
- f) Check the condition and adjustment of the contact breaker points (Section 20).
- g) Inspect the distributor cap, rotor arm and HT leads (Section 32).
- h) Renew the spark plugs (Section 33).
- i) Check and if necessary adjust the ignition timing (Section 25).
- j) Check the condition of the air cleaner filter element and renew if necessary (Section 30).
- k) Check and if necessary adjust the carburettor idle speed and mixture settings (Section 26).
- Renew the fuel filter fuel injection models (Section 37).
- m) Check the condition of all hoses, and check for fluid leaks (Section 18).

5 If the above operations do not prove fully effective, carry out the following operations:

Secondary operations

All the items listed under "Primary operations", plus the following:

- a) Check the charging system (Chapter 5A).
- b) Check the ignition system (Chapter 5B).
- c) Check the fuel system (Chapter 4A and B).
- d) Renew the distributor cap and rotor arm (Section 32).
- e) Renew the ignition HT leads (Section 32).

Every 3000 miles or 3 months

3 Drum brake adjustment

1 As wear takes place on the brake shoe friction material, the clearance between the friction material and the inner circumference of the brake drum will increase, resulting in excessive brake pedal travel before the brakes are applied. To compensate for this, adjusters are provided at the rear of each brake backplate, enabling the clearance between the brake shoe and drum to be kept to a minimum.

2 At the front two adjusters are fitted to each brake backplate. At the rear a single adjuster is located at the top of each brake backplate.

Front brakes

3 Chock the rear wheels then jack up the front of the car and support it on axle stands (see "Jacking and vehicle support").

4 Each front brake has two adjusters of the eccentric cam type, accessible from the rear of each brake backplate. One of these adjusters is located behind the steering arm and insufficient clearance exists to enable an ordinary brake adjusting spanner to be used. Providing the adjuster is not excessively tight or partially seized in the backplate, a % in AF open-ended spanner can be used quite successfully to turn the adjuster.

5 Begin by turning one of the adjusters in the forward direction of wheel rotation until the wheel is locked (see illustration). Now back it off slightly, until the wheel turns freely. The brake drum may rub slightly in one or two places as the wheel is turned. This is acceptable providing the wheel does not bind. *Caution: If, when attempting to adjust the brakes, the square-headed adjuster is reluctant to turn, it is quite likely that it has become seized in its housing. If this is the case do not force it, or you will probably break off the square head, necessitating* renewal of the complete backplate assembly. Apply liberal amounts of penetrating oil to the rear of the adjuster and allow it to soak in. Now turn the adjuster back and forth slightly, using gentle force if necessary, increasing the movement each time. When the adjuster turns easily apply a multipurpose grease to



3.5 Adjusting one of the front brake adjusters with a brake adjusting spanner

Every 3000 miles or 3 months 1.9



3.9 Adjusting the rear brakes

the exposed portion of the adjuster at the rear of the backplate and then turn it through its entire travel. Preferably do this with the brake drum removed.

6 Turn the second adjuster also in the direction of forward wheel rotation until the drum locks again. Now back the adjuster off until the wheel turns freely once more.

7 Repeat this procedure for the other front wheel and then lower the car to the ground.

Rear brakes

8 Chock the front wheels then jack up the rear of the car and support it on axle stands (see *"Jacking and vehicle support"*). Ensure that the handbrake is off.

9 Using a brake adjusting spanner, turn the square-headed adjuster in a clockwise direction (viewed from the rear of the backplate) until the wheel is locked (see illustration). The adjusters on the rear brakes are even more prone to seizure than those at the front. If the adjuster is reluctant to turn attempt to free it off as described above. If this fails, remove the rear brake drums and brake shoes as described in Chapter 9, and clean and lubricate the adjuster thoroughly. When all is well, refit the brake assemblies and start the adjustment procedure again.

10 Now turn the adjuster back a quarter of a

turn at a time until the wheel turns freely without binding. A slight rubbing may be felt when the wheel is turned slowly, indicating a high spot on the drum or dust on the linings. This is acceptable providing the drum does not bind.

11 Repeat this procedure for the other rear brake then, before lowering the car to the ground, check the handbrake adjustment as described in the following Section.

4	Handbrake check and
	adjustment

1 Adjustment of the handbrake cables is usually only necessary after high mileage when a slight stretching of the cables will have taken place, or if the cables have been removed.

2 Before adjusting the handbrake check that the footbrake is correctly adjusted as described in Section 3.

3 Chock the front wheels then jack up the rear of the car and support it on axle stands (see "Jacking and vehicle support").

4 Apply the handbrake lever to the third notch of the ratchet and check that the rear wheels are locked. If not, adjust the handbrake as follows.

5 With the handbrake still applied to the third click of the ratchet, tilt the front seats forward, and on models having twin cables, tighten the cable adjusting nuts at the base of the lever until the rear wheels can only just be turned by heavy hand pressure. On models having a single front cable, slacken the locknut and rotate the cable adjusting nut. When the wheels can only just be turned by heavy hand pressure, tighten the locknut (see illustrations).

6 Release the handbrake lever and ensure that the wheels rotate freely. If satisfactory lower the car to the ground.

5 Steering and suspension check



Steering

1 First check for wear in the steering tie-rod outer balljoints. Turn the steering to left or right lock sufficiently to allow the joints to be observed. Now have an assistant turn the steering wheel back and forth slightly. If there is any side movement in the balljoint it must be renewed. Similarly place your hand over the rubber gaiter at the end of the rack housing and feel for any excess free play of the inner balljoint. If the condition of this joint is suspect, a further investigation should be carried out with the gaiter removed as described in Chapter 10.

2 Check the tightness of the steering column clamp bolt at the base of the column. Any slackness at this joint can also show up as free play at the steering wheel.

Front suspension

3 To inspect the front suspension, chock the rear wheels then jack up the front of the car and support it on axle stands (see *"Jacking and vehicle support"*).

4 Visually inspect the balljoint dust covers and the steering gear gaiters for splits, chafing or deterioration. Any wear of these components will cause loss of lubricant, together with dirt and water entry, resulting in rapid deterioration of the balljoints or steering gear.

5 Grasp the roadwheel at the 12 o'clock and 6 o'clock positions and try to rock it. If any movement is felt it is likely to be in one or more of the following areas:

Hub bearings

6 Continue rocking the wheel while your assistant depresses the footbrake. If the



4.5a Handbrake adjustment on models with twin cables



4.5b Handbrake cable adjusting nut on models with a single front cable

1.10 Every 3000 miles or 3 months

movement disappears or becomes less severe, then the wheel hub bearings in the swivel hub are at fault. Any perceptible movement at all indicates wear in the hub bearings, and they should be renewed as described in Chapter 10.

Swivel hub balljoints

7 Wear of the swivel hub balljoints is fairly common on Minis and will be quite obvious on inspection because the whole swivel hub will appear to move in relation to the suspension arms as the wheel is rocked. If this is the case, the balljoints should be adjusted, or if badly worn, renewed; these procedures are contained in Chapter 10.

Suspension arm mountings

8 Check for wear of the lower arm inner mounting bushes where the arm is bolted to the subframe. If the bushes are worn, the arm will appear to move in and out as the wheel is rocked.

9 The upper arm inner roller bearings cannot be inspected without partially dismantling the suspension because the rubber cone spring or displacer unit holds the arm in tension and any wear will not be evident. It can be removed for closer inspection if required as described in Chapter 10; however, wear of the upper arm and its bearings is uncommon.

10 With the brakes still firmly applied, try to rotate the wheel back and forth. If any movement is now felt, examine the tie-bar between the lower suspension arm and subframe for wear or deterioration of the rubber bushes.

Rear suspension

11 To check the rear suspension for wear, chock the front wheels then jack up the rear of the car and support it on axle stands (see *"Jacking and vehicle support"*).

12 Wear of the rear suspension components can often be felt when driving the car as a tendency for the rear of the vehicle to wander over uneven road surfaces or when cornering.

To isolate the worn components, grasp the roadwheel at the 12 o'clock and 6 o'clock positions and try to rock it. If any movement is felt, it is likely to be in one of the following areas:

Hub bearings

13 Continue rocking the wheel while an assistant depresses the footbrake. If the movement disappears or becomes less pronounced, then the bearings in the rear hub are at fault. The bearings should be renewed if there is any appreciable movement whatsoever.

HAYNES HINT Wear in the rear hub bearings can often be confirmed by slowly turning the wheel with your hand on the tyre. Worn bearings usually exhibit a roughness which can be felt as the wheel is turned.

Radius arm bearings

14 With the footbrake still applied, continue rocking the wheel and observe the front of the radius arm. If it can be seen to move appreciably up and down, then wear has taken place in the roller or plain bearing in the radius arm, or on the pivot shaft. If this is the case, the radius arm should be removed for overhaul as described in Chapter 10.

5 Underbody and fuel/brake line check

1 With the vehicle raised and supported on axle stands (see "Jacking and vehicle support"), or over an inspection pit, thoroughly inspect the underbody and wheel arches for signs of damage and corrosion. In particular, examine the bottom of the side sills, and any concealed areas where mud can collect. Where corrosion and rust is evident, press and tap firmly on the panel with a screwdriver, and check for any serious corrosion which would necessitate repairs. If

the panel is not seriously corroded, clean away the rust, and apply a new coating of underseal. Refer to Chapter 11 for more details of body repairs.

2 At the same time, inspect the treated lower body panels for stone damage and general condition.

3 Examine the subframes carefully, particularly the side members of the rear subframe. Corrosion here is a common occurrence on Minis, particularly older models, and is one of the main causes of MOT test failure on these cars (see illustration). Where corrosion has reached an advanced stage, renewal of the subframe is the only satisfactory cure.

4 Inspect all of the fuel and brake lines on the underbody for damage, rust, corrosion and leakage. Also make sure that they are correctly supported in their clips. The battery positive cable which runs under the car from front to rear is a common problem area as it is prone to damage or chafing if not properly routed or secured.

5 Inspect the flexible brake hoses in the vicinity of the backplates or front calipers, where they are subjected to most movement (see illustration). Bend them between the fingers (but do not actually bend them double, or the casing may be damaged) and check that this does not reveal previously hidden cracks, cuts or splits.

7 Exhaust system check



1 With the engine cold (at least three hours after the vehicle has been driven), check the complete exhaust system, from its starting point at the engine to the end of the tailpipe. Ideally, this should be done on a hoist, where unrestricted access is available; if a hoist is not available, raise and support the vehicle on axle stands (see "Jacking and vehicle support").



6.3 Advanced state of corrosion on rear subframe side member



6.5 Inspect the flexible brake hoses in the vicinity of the backplates

Every 3000 miles or 3 months 1.11



7.2a Exhaust front mounting block . . .

2 Check the pipes and connections for evidence of leaks, severe corrosion, or damage. Make sure that all brackets and rubber mountings are in good condition, and tight; if any of the mountings are to be renewed, ensure that the replacements are of the correct type. Failure of the rear mounting rubber blocks on the rear subframe is a common problem - check these carefully (see illustrations). Leakage at any of the joints or in other parts of the system will usually show up as a black sooty stain in the vicinity of the leak. 3 At the same time, inspect the underside of the body for holes, corrosion, open seams, etc. which may allow exhaust gases to enter the passenger compartment. Seal all body openings with silicone or body putty.

4 Rattles and other noises can often be traced to the exhaust system, especially the rubber mountings. Try to move the system, silencer(s) and catalytic converter. If any components can touch the body or suspension parts, secure the exhaust system with new mountings.



When checking the exhaust, pay particular attention to the mounting on the transmission. Movement of the engine causes this mounting to work loose,

causing an annoying squeak or rattle when accelerating and decelerating.



Note: If the car is fitted with exhaust emission control equipment it will first be necessary to remove the air pump drivebelt as described in Section 9 to allow access to the fan belt.

Check and adjustment

1 Release the three retaining lugs and remove the engine ignition shield, if fitted. Rotate the crankshaft so that the entire length of the fan belt can be examined. On manual transmission models, the engine can be rotated quite easily by engaging top gear and moving the car backwards or forwards to allow the belt to be inspected. This should only be done on level ground; and make sure that the car cannot run away! An alternative



7.2b ... and rear mounting block on rear subframe

method, and the method that should be used on automatic transmission models, is to press the fan belt midway between the water pump pulley and dynamo or alternator pulley and then turn the fan blades.



2 Examine the belt for cracks, splitting, fraying or damage. Check also for signs of glazing (shiny patches) and for separation of the belt plies. Renew the fan belt if worn or damaged.

3 If the condition of the belt is satisfactory, check the adjustment as follows.

4 It is most important to keep the fan belt correctly adjusted; If the belt is too loose it will slip and wear rapidly, resulting in inefficient operation of the water pump and dynamo or alternator. If it is too tight, it will impose excessive strain on the bearings of the water pump, dynamo or alternator causing premature failure of these components.

5 The fan belt tension is correct when there is 13 mm of fan belt deflection, using light finger pressure, at a point midway between



8.6 Dynamo adjusting arm nut located below the water pump

the crankshaft and dynamo or alternator pullevs

6 To adjust the fan belt, slacken the mounting bolts of the dynamo or alternator, and also the nut on the adjusting arm located below the water pump (see illustration). Now move the unit either in or out until the correct tension is obtained. It is easier if the adjusting arm nut is only slackened a little so it requires some force to move the dynamo or alternator. In this way the tension of the belt can be arrived at more quickly than by making frequent adjustments. If difficulty is experienced in moving the dynamo or alternator away from the engine, a long spanner or bar placed behind the unit and resting against the block serves as a very good lever and can be held in position while the adjusting and mounting bolts are fully tightened. When levering on an alternator, only lever on the drive end or damage may occur.

7 When the tension is correct, tighten the adjusting arm nut first, followed by the mounting bolts.

1

Renewal

8 To remove the fan belt, slacken the two dynamo or alternator upper mountings and the nut on the adjusting arm below the water pump (see illustrations).



8.8a Dynamo mountings and adjustment points

- 1 Adjustment arm retaining nuts
- 2 Securing nut and bolt (rear)
- 3 Securing nut and bolt (front)

1.12 Every 3000 miles or 3 months



8.8b Alternator mounting and adjustment points

1 Adjustment arm fixings

2 Securing nut and bolt (rear)

9 Push the dynamo or alternator toward the engine and lift the old belt off the three pulleys. Feed the belt over each fan blade in turn and withdraw it from behind the fan cowling at the special gap just below the top hose (see illustration).

10 Fit the new belt over the fan blades in the same way and then place it in position on the three pulleys.

11 Adjust the fan belt tension as described previously then refit the air pump drivebelt, where applicable, as described in the following Section. **Note:** After fitting a new fan belt, check and if necessary readjust the tension after 250 miles (400 km).



Check and adjustment

1 The checks and adjustment procedure for the air pump drivebelt are basically the same as described in Section 9 for the fan belt. Adjust the tension of the drivebelt so that there is 13 mm deflection of the belt, using thumb pressure, at a point midway between the two pulleys.

Renewal

2 Release the three retaining lugs and remove the engine ignition shield, if fitted.

3 Undo and remove the two bolts securing the radiator upper mounting bracket to the radiator.

4 Unscrew the radiator filler cap and slacken the top hose securing clips. Carefully ease the radiator as far as possible toward the wing valance. Place a container beneath the engine to catch the small quantity of coolant that will be lost as the top hose is released.



3 Securing nut and bolt (front)

Warning: If the engine is hot, take precautions against scalding.

5 Slacken the air pump pivot and adjusting link bolts, push the pump in toward the engine, and slip the drivebelt off the two pulleys.

6 Feed the belt between the fan blades and the radiator cowling at the top as the blades are rotated. Now pull the belt out from between the fan and radiator.

7 Refitting the drivebelt is the reverse sequence to removal, adjusting the tension as described previously. Top up the cooling system as described in *"Weekly Checks"* on completion.



1 Check that the clutch pedal moves smoothly and easily through its full travel, and that the clutch itself functions correctly, with no trace of slip or drag.

2 Apply a few drops of light oil to the clutch pedal pivot.

3 From within the engine compartment check the condition of the fluid lines and hoses.



8.9 The gap in the radiator shroud of early models (arrowed) to allow removal and refitting of the fan belt

Check for signs of fluid leaks around the slave cylinder rubber boot or from the feed pipe and hose. Apply a few drops of oil to the clutch operating lever clevis pin and the pivot on the flywheel housing.

11 Seats and seat belt check



1 Check that the seats are securely attached to the floor crossmember and that there is no sign of corrosion anywhere near the mountings. Check that the seats release and then lock in place when the release mechanism is operated.

2 Check the seat belts for satisfactory operation and condition. Inspect the webbing for fraying and cuts. Check that they retract smoothly and without binding into their reels. 3 Check the seat belt mountings, ensuring that all the bolts are securely tightened.

12 Headlight beam alignment check



Accurate adjustment of the headlight beam is only possible using optical beam-setting equipment, and this work should therefore be carried out by a Rover dealer or service station with the necessary facilities.

Basic adjustments can be carried out in an emergency, and further details are given in Chapter 12.

Every 6000 miles or 6 months 1.13

13 Engine/transmission oil and filter renewal

FF13

1 Frequent oil changes are the best preventive maintenance the home mechanic can give the engine, because ageing oil becomes diluted and contaminated, which leads to premature engine wear.

2 Make sure that you have all the necessary tools before you begin this procedure. You should also have plenty of rags or newspapers handy, for mopping up any spills. The oil should preferably be changed when the engine is still fully warmed-up to normal operating temperature, just after a run; warm oil and sludge will flow out more easily. Take care, however, not to touch the exhaust or any other hot parts of the engine when working under the vehicle. To avoid any possibility of scalding, and to protect yourself from possible skin irritants and other harmful contaminants in used engine oils, it is advisable to wear gloves when carrying out this work. Access to the underside of the vehicle is greatly improved if the vehicle can be lifted on a hoist, driven onto ramps, or supported by axle stands. (see "Jacking and vehicle support"). Whichever method is chosen, make sure that the vehicle remains level, or if it is at an angle, that the drain point is at the lowest point.

Oil draining

3 Position the draining container under the drain plug on the side of the transmission casing, and unscrew the plug (see illustration). If possible, try to keep the plug pressed into the sump while unscrewing it by hand the last couple of turns.

4 Allow the oil to drain into the container (see Haynes Hint), and check the condition of the plug's sealing washer; renew it if worn or damaged. Also wipe off any metal particles that may have accumulated on the magnet.

5 Allow some time for the old oil to drain, noting that it may be necessary to reposition the container as the oil flow slows to a trickle; when the oil has completely drained, wipe clean the drain plug and its threads in the transmission and refit the plug, tightening it to the specified torque.



13.3 Engine/transmission oil drain plug (arrowed)

Oil filter renewal

6 The oil filter is located underneath the dynamo or alternator on the forward-facing side of the engine. On early manual transmission models the filter is of the disposable cartridge type contained within an aluminium bowl. On later models a throwaway canister is used. All automatic transmission models utilise the cartridge type filter. To renew the filter proceed as follows.

Cartridge type

7 Reposition the draining container under the oil filter then undo and remove the long centre bolt securing the bowl to the housing (see illustration). On some models it may be advantageous to remove the grille panel, as space is rather limited.

8 With the bolts released, carefully lift away the filter bowl, which contains the filters and will also be full of oil.

9 Discard the old filter element but first make sure that the metal pressure plate has not stuck to the bottom of it. Now thoroughly clean out the filter bowl, the bolt, and the parts associated with it, using paraffin or a suitable solvent (see illustration) Dry with a lint free cloth

10 A rubber sealing ring is located in a groove round the head of the filter housing and forms an effective leak-proof joint between the housing and the filter bowl. A new rubber sealing ring is supplied with each new filter element.

11 Carefully prise out the old sealing ring from the locating groove. If the ring has become hard and is difficult to move take



Keep the drain plug pressed into the sump while unscrewing it by hand the last couple of turns. As the plug releases, move it away sharply so the stream of oil issuing from the sump runs into the container, not up your sleeve!

great care not to damage the sides of the sealing ring groove.

12 With the old ring removed, fit the new ring in the groove at four equidistant points and press it home a segment at a time. Do not insert the ring at just one point and work round the groove pressing it home as, using this method, it is easy to stretch the ring and be left with a small loop of rubber which will not fit into the locating groove (see illustration).

13 Reassemble the oil filter assembly by first passing up the bolt through the hole in the bottom of the bowl, with a steel washer under the bolt's head and a rubber or felt washer on top of the steel washer and next to the filter bowl.

14 Slide the spring over the bolt followed by the other steel washer, the remaining rubber washer and finally the filter pressure plate concave face downwards.

15 After fitting the new element to the bowl, position the bowl on the rubber sealing ring then insert and hand tighten the bolt. Before finally tightening the centre bolt, ensure that the lip of the filter bowl is resting squarely on the rubber sealing ring and is not offset or seated off the ring. If the bowl is not seating properly, rotate it until it is. Run the engine and check the bowl for leaks.



13.7 Cartridge type oil filter and retaining bolt as seen from below



13.9 Components of the cartridge type oil filter



13.12 Fitting a new cartridge type oil filter sealing ring

Canister type

16 Reposition the draining container under the oil filter then, using a suitable filter removal tool if necessary, slacken the canister initially, then unscrew it by hand the rest of the way; be prepared for some oil spillage (see illustration). Empty the oil in the old canister into the container.

17 Using a clean, lint-free rag, wipe clean the cylinder block around the filter housing. Check the old canister to make sure that the rubber sealing ring hasn't stuck to the filter housing; if it has, carefully remove it.

18 Apply a light coating of clean engine oil to the sealing ring on the new canister. Screw the canister into position on the housing until it seats, then tighten it firmly by hand only - **do not** use any tools.

19 Remove the old oil and all tools from under the vehicle, then lower the vehicle to the ground.

Oil filling

20 Remove the dipstick and the oil filler cap from the engine. Fill the engine with oil, using the correct grade and type of oil, (see *Specifications*). Pour in half the specified quantity of oil first, then wait a few minutes for the oil to fall to the transmission casing. Take care during this operation, particularly in cold weather as it is all to easy to fill up the rocker cover before the oil drains down into the engine, with very messy results as it overflows out of the filler neck. Continue adding oil a small quantity at a time, until the level is up to the lower mark on the dipstick. Adding approximately 0.5 litres will raise the level to the upper mark on the dipstick.

21 Start the engine. The oil pressure warning light will take a few seconds to go out while the new filter fills with oil; do not race the engine while the light is on. Run the engine for a few minutes, while checking for leaks around the oil filter seal and the drain plug.

22 Switch off the engine, and wait a few minutes for the oil to settle in the transmission once more. With the new oil circulated and the filter now completely full, recheck the level on the dipstick, and add more oil as necessary.

23 Dispose of the used engine oil safely and in accordance with environmental regulations (see *"General repair procedures"*).

14 Front brake wear check



Warning: The dust created by wear of the shoes may contain asbestos, which is a health hazard. Never blow it out with compressed air,

and don't inhale any of it. An approved filtering mask should be worn when working on the brakes. DO NOT use petrol or petroleumbased solvents to clean brake parts; use brake cleaner or methylated spirit only.



13.16 Canister type oil filter

1 Housing 3 Filter

2 Sealing ring

Drum brake models

1 After high mileage the friction linings on the brake shoes will have worn, and it will therefore be necessary to fit replacement shoes with new linings.

2 Chock the rear wheels then jack up the front of the car and support it on axle stands (see *"Jacking and vehicle support"*). Remove the front roadwheels.

3 Slacken off the brake shoe adjuster(s) from behind the backplate, and then undo and remove the two brake drum retaining screws.

4 Remove the brake drum from the wheel hub. If the drum is tight, gently tap its circumference with a soft-faced mallet.

5 Brush and wipe away all traces of asbestos dust from the brake shoes, wheel cylinders and backplate, and also from the inner circumference of the brake drum.

6 Inspect the friction material and renew the brake shoes as described in Chapter 9 if they have worn down to less than the specified minimum thickness.

7 The brake shoes must also be renewed if there is any sign of hydraulic fluid contamination of the linings due to a leaking brake wheel cylinder. If this is the case, the cause of the leak must be traced and rectified before fitting new brake shoes.

8 Brake shoes should always be renewed as complete sets (four shoes to a set), otherwise uneven braking and pulling to one side may occur.

9 It is advisable to check that the brake wheel cylinders are operating correctly before proceeding further. To do this hold the brake shoes in position using two screwdrivers while an assistant very slowly depresses the brake pedal slightly. Check that the wheel cylinder pistons move out as the pedal is depressed, and return when the pedal is released. If this is not the case, it is quite likely that one of the wheel cylinder pistons is seized and the cylinder should therefore be renewed (Chapter 9).

10 Also check the condition of the brake drum, If it is deeply scored on its inner circumference it may be possible to have it skimmed at an engineering works. If the scoring is severe, renewal will be necessary

Disc brake models

11 Jack up the front or rear of the vehicle in turn, and support it on axle stands (see *"Jacking and vehicle support"*).

12 For better access to the brake calipers, remove the roadwheels.

13 Look through the opening in the front of the caliper, and check that the thickness of the friction lining material on each of the pads is not less than the recommended minimum thickness given in the *Specifications* (see Haynes Hint). If any one of the brake pads has worn down to, or below, the specified limit, *all four* pads must be renewed as a set (ie all the front pads).



Look through the opening in the caliper and check the thickness of the friction lining material on the brake pads

14 For a comprehensive check, the brake pads should be removed and cleaned. The operation of the brake calipers can then be checked, and the brake discs can be fully examined. Refer to Chapter 9 for details.

15 Driveshaft gaiter check



With the vehicle raised and securely supported on stands (see "Jacking and vehicle support"), turn the steering onto full lock, then slowly rotate the roadwheel. Inspect the condition of the outer constant velocity (CV) joint rubber gaiters, squeezing the gaiters to open out the folds. Check for signs of cracking, splits or deterioration of the rubber, which may allow the grease to escape, and lead to water and grit entry into the joint. Also check the security and condition of the retaining clips. Repeat these checks on the inner $\ensuremath{\mathsf{CV}}$ joints where offset sphere type joints are fitted. If any damage or deterioration is found, the gaiters should be renewed as described in Chapter 8.

At the same time, check the general condition of the CV joints themselves by first holding the

Every 6000 miles or 6 months 1.15



16.1a Lubricating the swivel hub upper grease nipple . . .

driveshaft and attempting to rotate the wheel. Repeat this check by holding the inner joint and attempting to rotate the driveshaft. Any appreciable movement indicates wear in the joints, wear in the driveshaft splines, or a loose driveshaft retaining nut.

16 Steering and suspension lubrication

1 Unlike most modern cars, there are a number of steering and suspension joints on the Mini which require regular attention. Provision for lubrication of these joints is by means of a grease nipple, to which a grease gun can be engaged. The grease nipples are located in the following areas (see illustrations):

- a) Steering swivel hub; two nipples, one upper and one lower on each side.
- b) Upper suspension arm inner pivot; one nipple on each arm.
- c) Rear radius arm pivot; one nipple on each pivot. Remove the rubber blanking plug to expose the nipple on early models.

2 When lubricating the front grease nipples it is preferable to raise the front of the car and support it on axle stands (see *"Jacking and vehicle support"*) so that the load is taken off the suspension. This will allow the grease to penetrate into the joints more effectively. The rear radius arm pivots can be lubricated with the car on its roadwheels if wished.

3 With the car raised and suitably supported, wipe clean the area all round the grease nipple and the nipple itself. Engage the head of a grease gun, filled with the specified grease, squarely onto the nipple, keeping it pushed fully home. Operate the gun until grease can be seen to appear from under the dust cover over the joint or from around the side of the pivot bushes.

4 When lubricating the rear radius arm pivots, a generous amount of grease will be needed each side, quite a bit more than was required for the front suspension joints. It probably won't be possible to tell when sufficient has been applied, unless you look underneath at the inner attachment on the subframe, it may be possible to see it appear around the inner pivot; add a bit more if in doubt .This is a vitally important area on the Mini and it must be well lubricated.



16.1b ... the upper suspension arm inner pivot grease nipple ...

5 Although not actually part of the steering and suspension, the handbrake cable guides and the moving sectors on the rear subframe should be lubricated at this time to ensure smooth operation. There are no grease nipples, so the grease should be applied with a wooden spatula or similar tool to lubricate these areas thoroughly.



The procedure for checking the rear brake components is the same as described in Section 14 for models with drum brakes.

18 Underbonnet check for fluid leaks and hose condition

General

1 High temperatures in the engine compartment can cause the deterioration of the rubber and plastic hoses used for engine, accessory and emission systems operation. Periodic inspection should be made for cracks, loose clamps, material hardening and leaks.

2 Carefully check the large top and bottom radiator hoses, along with the other smallerdiameter cooling system hoses and metal pipes; do not forget the heater hoses/pipes which run from the engine to the bulkhead. Inspect each hose along its entire length, replacing any that are cracked, swollen or shows signs of deterioration. Cracks may become more apparent if the hose is squeezed (see Haynes Hint).

3 Make sure that all hose connections are tight. If the spring clamps that are used to secure some of the hoses appear to be slackening, they should be renewed to prevent the possibility of leaks.

4 Some other hoses are secured to their fittings with screw type clips. Where screw type clips are used, check to be sure they haven't slackened, allowing the hose to leak. If clamps or screw type clips aren't used,



16.1c ... and the rear radius arm pivot grease nipple

make sure the hose has not expanded and/or hardened where it slips over the fitting, allowing it to leak.

5 Check all fluid reservoirs, filler caps, drain plugs and fittings etc, looking for any signs of leakage of oil, transmission and/or brake hydraulic fluid or coolant. If the vehicle is regularly parked in the same place, close inspection of the ground underneath it will soon show any leaks. As soon as a leak is detected, its source must be traced and rectified. Where oil has been leaking for some time, it is usually necessary to use a steam cleaner, pressure washer or similar, to clean away the accumulated dirt, so that the exact source of the leak can be identified.

Vacuum hoses

6 It's quite common for vacuum hoses, especially those in the emissions system, to be numbered or colour-coded, or to be identified by coloured stripes moulded into them. Various systems require hoses with different wall thicknesses, collapse resistance and temperature resistance. When renewing hoses, be sure the new ones are made of the same material.

7 Often the only effective way to check a hose is to remove it completely from the vehicle. If more than one hose is removed, be sure to label the hoses and fittings to ensure correct installation.

8 When checking vacuum hoses, be sure to include any plastic T-fittings in the check.



A leak in the cooling system will usually show up as white or rust coloured deposits on the area adjoining the leak

1

1.16 Every 6000 miles or 6 months

Inspect the fittings for cracks, and check the hose where it fits over the fitting for distortion, which could cause leakage.

9 A small piece of vacuum hose can be used as a stethoscope to detect vacuum leaks. Hold one end of the hose to your ear, and probe around vacuum hoses and fittings, listening for the "hissing" sound characteristic of a vacuum leak.



Warning: When probing with the vacuum hose stethoscope, be very careful not to come into contact with moving engine components such as the fan or fan belt.

Fuel hoses



Warning: Before carrying out the following operation, refer to the precautions given in "Safety first!" at the beginning of this

manual, and follow them implicitly. Petrol is a highly dangerous and volatile liquid, and the precautions necessary when handling it cannot be overstressed.

10 Check all fuel hoses for deterioration and chafing. Check especially for cracks in areas where the hose bends, and also just before fittings, such as where a hose attaches to the carburettor.

11 Spring-type clamps are commonly used on fuel lines. These clamps often lose their tension over a period of time, and can be "sprung" during removal. Replace all springtype clamps with screw clips whenever a hose is replaced.

Metal lines

12 Sections of metal piping are often used for fuel line between the fuel tank, filter and the engine. Check carefully to be sure the piping has not been bent or crimped, and that cracks have not started in the line.

13 If a section of metal fuel line must be renewed, only seamless steel piping should be used, since copper and aluminium piping don't have the strength necessary to withstand normal engine vibration.

14 Check the metal brake lines where they enter the master cylinder for cracks in the lines or loose fittings. Any sign of brake fluid leakage calls for an immediate and thorough inspection of the brake system.

19 Fuel system components, checks and lubrication



1 Sparingly apply a few drops of light oil to the throttle spindles, accelerator cable and the pedal pivot. Similarly lubricate the exposed ends of the choke cable (where fitted).

2 Check that there is a small amount of slackness in the cable so that the throttle linkage closes fully with the accelerator pedal released. Also check that full throttle can be obtained with the accelerator pedal fully depressed.

3 If there is any doubt about the cable adjustment, refer to the relevant Parts of Chapter 4 for the full adjustment procedure. 4 On carburettor models, unscrew the piston damper cap from the top of the carburettor dashpot (see illustration). Top up the damper with engine oil until the level is 13.0 mm above the top of the hollow piston rod.

5 Slowly push the damper back into the piston and screw on the cap taking care not to cross-thread it.

20 Contact breaker points check and adjustment

Refer to Chapter 5B.

21 Distributor lubrication



advance weights and cam spindle are also very lightly lubricated. 2 Great care should be taken not to use too

much lubricant, as any excess that might find its way onto the contact breaker points could cause burning and misfiring.

3 If an ignition shield is fitted over the front of the engine, release the three plastic retaining lugs and lift away the shield. Detach the two spring clips or undo the two screws securing the distributor cap to the distributor body and lift off the cap.

4 To gain access to the cam spindle, lift away the rotor arm. Drop no more than two drops of



19.4 Top up the piston damper on carburettor models

engine oil onto the felt pad or screw head (see illustration). This will run down the spindle when the engine is hot and lubricate the bearings. The centrifugal advance weights can be lubricated by dropping two or three drops of engine oil through one of the holes or slots in the distributor baseplate. No more than one drop of oil should be applied to the contact breaker arm pivot post.

5 Refit the rotor arm, distributor cap and ignition shield on completion.

22 Clutch return stop adjustment



Note: As friction linings of the clutch disc wear, the distance between the clutch release bearing and the clutch thrust plate will decrease. The pressure plate will then move in closer to the clutch disc to compensate for wear. Unless the wear is taken up by adjustment of the stop located between the flywheel housing and the



21.4 Distributor lubrication points

- 1 Contact breaker cam
- 2 Contact breaker pivot post
- 3 Centrifugal weights lubrication point
- 4 Cam spindle

Every 6000 miles or 6 months 1.17

operating lever, the clutch will start to slip. On later models fitted with the verto type clutch, the assembly is self-adjusting and the following procedure will not be necessary.

1 To carry out the adjustment, first disconnect the clutch operating lever return spring.

2 Pull the operating lever away from the engine until all the free play is eliminated.

3 Hold the lever in this position and measure the gap between the lever and the head of the stop using feeler blades (see illustration).

4 If necessary, slacken the locknut and adjust the stop bolt until the specified gap is achieved. Then tighten the locknut.

23 Dynamo check and lubrication

Dynamo checks and lubrication consist simply of checking the fan belt condition and tension (Section 8) and adding a few drops of engine oil to the dynamo rear bearing lubricating hole.

24 Control box cleaning and inspection

On dynamo equipped models, remove the control box cover and check the cut-out and regulator contacts. If they are dirty or rough or burnt, place a piece of fine glasspaper (do not use emery paper or carborundum paper) between the cut-out contacts, close them manually, and draw the glasspaper through several times

Clean the regulator contacts in exactly the same way, but use emery or carborundum paper and not glasspaper. Carefully clean both sets of contacts from all traces of dust with a rag moistened in methylated spirit. Refit the cover on completion.



1 Check that the doors, bonnet and boot lid close securely. Check that the bonnet safety



22.3 Using feeler blades to measure the clutch return stop clearance

catch operates correctly. Check the operation of the door check straps.

2 Lubricate the hinges, door check straps, the striker plates and the bonnet catch sparingly with a little oil or grease.

3 If any of the doors, bonnet or boot lid do not close effectively or appear not to be flush with the surrounding panels, carry out the adjustment procedures contained in Chapter 11.



1 The best time to carry out this check is after the car has been washed so that any surface blemish or scratch will be clearly evident and not hidden by a film of dirt.

2 Starting at one front corner check the paintwork all around the car, looking for minor scratches or more serious dents. Check all the trim and make sure that it is securely attached over its entire length.

3 Check the security of all door locks, door mirrors, badges, bumpers, front grille and wheel trim. Anything found loose, or in need of further attention should be done with reference to the relevant Chapters of this manual.

4 Rectify any problems noticed with the paintwork or body panels (see Chapter 11).

29 Road test

Check the operation and performance of the braking system

1 Make sure that the vehicle does not pull to one side when braking, and that the wheels do not lock when braking hard.

2 Check that there is no vibration through the steering when braking.

3 Check that the handbrake operates correctly, without excessive movement of the lever, and that it holds the vehicle stationary on a slope.

4 With the engine switched off, test the operation of the brake servo unit (where fitted) as follows. Depress the footbrake four or five times to exhaust the vacuum, then start the engine. As the engine starts, there should be a noticeable "give" in the brake pedal as vacuum builds up. Allow the engine to run for at least two minutes, and then switch it off. If the brake pedal is now depressed again, it should be possible to detect a hiss from the servo as the pedal is depressed. After about four or five applications, no further hissing should be heard, and the pedal should feel considerably harder.

Steering and suspension

5 Check for any abnormalities in the steering, suspension, handling or road "feel".

6 Drive the vehicle, and check that there are no unusual vibrations or noises.

7 Check that the steering feels positive, with no excessive sloppiness or roughness, and check for any suspension noises when cornering and driving over bumps.

Drivetrain

8 Check the performance of the engine, transmission and driveline.

9 Check that the engine starts correctly, both when cold and when hot.

10 Listen for any unusual noises from the engine and transmission.

11 Make sure that the engine runs smoothly when idling, and that there is no hesitation when accelerating.

1

12 On manual transmission models, check that all gears can be engaged smoothly without noise, and that the gear lever action is not abnormally vague or "notchy".

13 On automatic transmission models, make sure that the drive seems smooth without jerks or engine speed "flare-ups". Check that all the gear positions can be selected with the vehicle at rest.

Clutch

14 Check that the clutch pedal moves smoothly and easily through its full travel, and that the clutch itself functions correctly, with no trace of slip or drag. If the movement is uneven or stiff in places, check the system components with reference to Chapter 6.

Instruments and electrical equipment

15 Check the operation of all instruments and electrical equipment.

16 Make sure that all instruments read correctly, and switch on all electrical equipment in turn, to check that it functions properly.

17 Test the operation of the brake failure warning system (where fitted) by pressing the test switch located next to the heated rear window switch. When pressed, the switch should light and go out when released.

18 If the light should come on when driving, the brake fluid level should be checked (and topped up, if necessary), as soon as possible.

1.18 Every 12 000 miles or 12 months

30 Air cleaner element renewal

Carburettor models except Cooper S

1 On models with an air intake duct over the top of the engine, unscrew the two nuts securing the duct to the rocker cover studs. Release the clip and disconnect the duct from the air cleaner body.

2 Undo and remove the single wing nut and washer on early models, or the twin wing bolts and washers on later models, securing the air cleaner to the carburettor

3 If the air cleaner is retained by a single wing nut lift off the air cleaner top cover. Detach the rocker cover hose, then lift the air cleaner body off the carburettor, tip it up at the front and slide it sideways until it is clear of the long retaining stud and can be lifted away. Recover the sealing ring.

4 If the air cleaner is retained by two wing nuts, detach the hot air duct (where fitted) and then lift the air cleaner body off the carburettor.

5 With the air cleaner removed from the engine, recover the rubber sealing ring if it stayed behind on the carburettor flange.

6 Lift off the air cleaner cover and withdraw the paper element. On the later type moulded plastic air cleaners the cover is removed by prising it off with a screwdriver inserted in the slots on the periphery of the cover (see illustrations).

7 Thoroughly clean the inside of the air cleaner body.

8 Refit the air cleaner and element using a reverse of the removal procedure. Make sure that where an alignment arrow is stamped on the top cover, it is pointing toward the location lug on the air cleaner body (see illustration). Ensure also that the rubber sealing ring is in position before refitting the air cleaner.

9 If the air cleaner body incorporates an adjustable air intake spout, this should be positioned adjacent to the exhaust manifold in winter and away from it in summer.



30.6a Prise off the later type air cleaner moulded plastic cover . . .

Cooper S carburettor models

10 Undo and remove the two wing bolts and washers and lift off the air cleaner top cover. Lift out the paper elements and thoroughly clean the inside of the air cleaner body.

11 The air cleaner body may be removed if necessary after disconnecting the engine breather pipe and the throttle return spring. Take care not to lose the two rubber sealing washers from the carburettor flanges.

12 Refitting the air cleaner and elements is the reverse of the removal procedure.

Fuel injection models

13 Release the four retaining clips, then slacken and remove the three screws securing the air cleaner assembly to the throttle body, and lift off the air cleaner lid. Remove the filter element (see illustrations).14 Wipe the body of the air cleaner clean, then fit the new element, ensuring that it is

correctly seated. **15** Refit the air cleaner lid, and secure it in position with the retaining screws (tightening them securely) and clips.



Refer to Chapter 2A.



30.6b ... and lift out the element

32 Distributor cap, rotor arm and HT lead check

> Warning: Voltages produced by an electronic ignition system are considerably higher than those produced by conventional

ignition systems. Extreme care must be taken when working on the system if the ignition is switched on. Persons with surgically-implanted cardiac pacemaker devices should keep well clear of the ignition circuits, components and test equipment.

1 The spark plug (HT) leads should be inspected one at a time, to prevent mixing up the firing order, which is essential for proper engine operation. Gain access to the leads and disconnect them as described for the spark plug check and renewal.

2 Check inside the boot for corrosion, which will look like a white crusty powder. Clean this off as much as possible; if it is excessive, or if cleaning leaves the metal connector too badly corroded to be fit for further use, the lead must be renewed. Push the lead and boot back onto the end of the spark plug. The boot should fit tightly onto the end of the plug - if it doesn't, remove the lead and use pliers carefully to crimp the metal connector inside the boot until the fit is snug.

3 Using a clean rag, wipe the entire length of the lead to remove built-up dirt and grease.



30.8 Make sure the alignment arrow is toward the lug on the air cleaner body



30.13a On fuel injection models, release the clips (three arrowed) and remove the screws



30.13b Lift off the lid and remove the element

Once the lead is clean, check for burns, cracks and other damage. Do not bend the lead sharply, because the conductor might break

4 Inspect the remaining spark plug (HT) leads, ensuring that each is securely fastened at the distributor cap and spark plug when the check is complete. If any sign of arcing, severe connector corrosion, burns, cracks or other damage is noticed, obtain new spark plug (HT) leads, renewing them as a set.

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If new spark plug leads are to be fitted, remove the leads one at a time and fit each new lead in exactly the same position as the old one.

5 Spring back the retaining clips or undo the two screws and remove the distributor cap. Thoroughly clean it inside and out with a dry lint-free rag.

6 Examine the HT lead segments inside the cap. If they appear badly burned or pitted renew the cap. Also check the carbon brush in the centre of the cap, ensuring that it is free to move and stands proud of its holder. Make sure that there are no signs of cracks or black "tracking" lines running down the inside of the cap, which will also mean renewal if evident.

7 Inspect the rotor arm checking it for security and also for signs of deterioration as described above.

8 Refit the distributor cap on completion.

33 Spark plug renewal

1 It is vital for the correct running, full performance and proper economy of the engine that the spark plugs perform with maximum efficiency. The most important factor in ensuring this, is that the plugs fitted are appropriate for the engine (a suitable type is specified at the end of this Chapter). If this type is used and the engine is in good condition, the spark plugs should not need attention between scheduled renewal intervals. Spark plug cleaning is rarely necessary, and should not be attempted unless specialised equipment is available, as damage can easily be caused to the firing ends.

2 Spark plug removal and refitting requires a spark plug socket, with an extension which can be turned by a ratchet handle or similar. This socket is lined with a rubber sleeve, to protect the porcelain insulator of the spark plug, and to hold the plug while you insert it into the spark plug hole. You will also need a wire-type feeler gauge, to check and adjust the spark plug electrode gap, and a torque wrench to tighten the new plugs to the specified torque.

3 To remove the spark plugs, open the bonnet, where fitted, release the three plastic retaining lugs and lift the ignition shield off the front of the engine

4 If the marks on the original-equipment HT leads cannot be seen, mark the leads 1 to 4, to correspond to the cylinder the lead serves. 5 Pull the leads from the plugs by gripping the rubber boot, not the lead, otherwise the lead connection may be fractured (see illustration).

6 Unscrew the spark plugs, ensuring that the socket is kept in alignment with each plug - if the socket is forcibly moved to either side, the porcelain top of the plug may be broken off. If any undue difficulty is encountered when unscrewing any of the spark plugs, carefully check the cylinder head threads and sealing surfaces for signs of wear, excessive corrosion or damage; if any of these conditions is found, seek the advice of a dealer as to the best method of repair.

7 As each plug is removed, examine it as follows - this will give a good indication of the condition of the engine. If the insulator nose of the spark plug is clean and white, with no deposits, this is indicative of a weak mixture.

8 If the tip and insulator nose are covered with hard black-looking deposits, then this is indicative that the mixture is too rich. Should the plug be black and oily, then it is likely that the engine is fairly worn, as well as the mixture being too rich.

9 If the insulator nose is covered with light tan to greyish-brown deposits, then the mixture is



33.5 Pull the leads off the spark plugs by gripping the rubber boot



33.11 Adjusting a spark plug electrode gap

correct, and it is likely that the engine is in good condition.

10 The spark plug electrode gap is of considerable importance as, if it is too large or too small, the size of the spark and its efficiency will be seriously impaired. The gap should be set to the value given in the Specifications.

11 To set the electrode gap, measure the gap with a feeler blade or adjusting tool, and then bend open, or closed, the outer plug electrode until the correct gap is achieved (see illustration). The centre electrode should never be bent, as this may crack the insulation and cause plug failure, if nothing worse. If the outer electrode is not exactly over the centre electrode, bend it gently to align them.

12 Before fitting the spark plugs, check that the threaded connector sleeves at the top of the plugs are tight, and that the plug exterior surfaces and threads are clean (see Haynes Hint)

13 On installing the spark plugs, first check that the cylinder head thread and sealing surface are as clean as possible; use a clean rag wrapped around a paintbrush to wipe clean the sealing surface. Ensure that the spark plug threads are clean and dry then screw them in by hand where possible. Take extra care to enter the plug threads correctly.

14 When each spark plug is started correctly on its threads, screw it down until it just seats lightly, then tighten it to the specified torque wrench setting.

15 Reconnect the HT leads in their correct order, using a twisting motion on the boot until it is firmly seated. Finally, refit the ignition shield.



It is very often difficult to insert spark plugs into their holes without crossthreading them. To avoid this possibility, fit a short length of 5/16 inch internal diameter rubber hose over the end of the spark plug. The flexible hose acts as a universal joint to help align the plug with the plug hole. Should the plug begin to cross-thread, the hose will slip on the spark plug, preventing thread damage to the aluminium cylinder head

1.20 Every 12 000 miles or 12 months

34 Emission control equipment check

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1 Of the emission control systems that may be fitted, only the air pump drivebelt (where

applicable), the crankcase ventilation system and the evaporative emission control systems require regular checking, and even then, the components of these systems require minimal attention.

2 Checks and adjustment of the air pump drivebelt are contained in Section 9.

3 The crankcase ventilation system filter in

the oil filler cap should be renewed by simply renewing the cap (the new cap is supplied with filter inside). Checks of the other system components are contained in Chapter 4C.

4 Should it be felt that the other systems are not functioning correctly, the advice of a dealer should be sought.

Every 24 000 miles or 24 months

35 Coolant renewal



Warning: Wait until the engine is cold before starting this procedure. Do not allow antifreeze to come into contact with your skin, or with painted surfaces of the vehicle. Rinse off spills immediately with plenty of water. Never leave antifreeze lying around in an open container, or in a puddle in the driveway or on the garage floor. Children and pets are attracted by its sweet smell, but antifreeze can be fatal if ingested.

Note: If coolant to Rover specification, in the correct ratio, has been continuously maintained in the system, then coolant renewal will not normally be necessary. However, to be absolutely sure about the integrity of the antifreeze and anti-corrosion properties of the coolant, periodic renewal is to be recommended.

Cooling system draining

1 To drain the system, first remove the expansion tank filler cap (see *"Weekly checks"*). Move the heater temperature control to the hot position.

2 If there is anti-freeze in the system, place clean bowls beneath the radiator and at the rear of the engine to collect the coolant for re-use.

3 Undo and remove the radiator drain plug and cylinder block drain plug, and allow the coolant to drain. If fitted, the radiator drain plug is located at the bottom of the radiator nearest the grille, and the cylinder block drain plug (if fitted) can be found at the rear of the block, beneath the engine tie-bar (see illustration).

4 On later models the radiator does not incorporate a drain plug, and it is therefore necessary to detach the bottom hose to drain the coolant. To do this slacken the bottom hose retaining clip and pull the hose off the radiator outlet. The hose clip is very inaccessible and a long thin screwdriver is quite useful here. If the hose proves difficult to remove from the radiator outlet, it is possible to gently push it off from the access hole under the wheel arch.

5 When the coolant has stopped running, probe the orifices, particularly the cylinder block orifice, with a short piece of wire to dislodge any particles of rust or sediment which may be preventing the coolant from completely draining out.

Cooling system flushing

6 With time, the cooling system may



35.3 Cylinder block coolant drain tap or plug location (arrowed)

gradually lose its efficiency if the radiator core becomes choked with rust, scale deposits from the water, and other sediment. This is especially likely if an inferior grade of antifreeze has been used that has not been regularly renewed. To minimise this, as well as using only the specified type of antifreeze and clean soft water, the system should be flushed as follows whenever any part of it is disturbed, and/or when the coolant is renewed.

7 With the coolant drained, close the drain taps and refill the system with fresh water. Refit the radiator cap, start the engine and warm it up to normal operating temperature, then stop it and (after allowing it to cool down completely) drain the system again. Repeat as necessary until only clean water can be seen to emerge, then refill finally with the specified coolant mixture.

8 If only clean, soft water and good-quality antifreeze has been used, and the coolant has been renewed at the specified intervals, the above procedure will be sufficient to keep the system clean for a considerable length of time. If, however, the system has been neglected, a more thorough operation will be required, as follows.

9 To flush the system first drain the coolant as described in the previous Section. Place a garden hose in the radiator filler cap neck and allow water to run through the system for ten to fifteen minutes.

10 To flush the engine, remove the thermostat (see Chapter 3), insert the garden hose into the thermostat housing, and allow water to circulate until it runs clear from the bottom hose. If, after a reasonable period, the water still does not run clear, the radiator should be flushed with a good proprietary cleaning agent.

11 In severe cases of contamination, reverse-flushing of the radiator may be necessary. To do this, remove the radiator (see Chapter 3), invert it, and insert the garden hose into the bottom outlet. Continue flushing until clear water runs from the top hose outlet. A similar procedure can be used to flush the heater matrix.

12 The use of chemical cleaners should be necessary only as a last resort. Normally, regular renewal of the coolant will prevent excessive contamination of the system.

Cooling system filling

13 Refit the cylinder block and radiator drain plugs or bottom hose connection as applicable.

14 Prepare a sufficient quantity of coolant mixture (water and antifreeze), in the specified concentration, to allow for a surplus, so as to have a reserve supply for topping-up. Note: *On models with no cylinder block drain plug, it is not possible to fully drain the coolant.* To establish a suitable antifreeze concentration it will be necessary to pour adequate antifreeze directly into the radiator and then top-up with water. Subsequent topping-up should be done with an antifreeze/water mixture.

15 Set the heater control knob to the maximum heat position and then fill the cooling system slowly. Slow filling reduces the possibility of air being trapped and forming air-locks. It helps also, if the large radiator hoses are gently squeezed during the filling procedure.

16 Do not fill the system higher than within 12 mm of the filler orifice. Overfilling will merely result in coolant loss down the overflow pipe due to expansion.

17 When the system is full, refit the filler cap and turn it firmly clockwise to lock it in position. Start the engine and run it at idle speed, until it has warmed-up to normal operating temperature.

18 Stop the engine, allow it to cool down *completely* (overnight, if possible), then remove the radiator filler cap and top-up if necessary. Refit the filler cap, tightening it securely, and wash off any spilt coolant from the engine compartment and bodywork.

19 After refilling, always check carefully all components of the system (but especially any unions disturbed during draining and flushing) for signs of coolant leaks. Fresh antifreeze has a searching action, which will rapidly expose any weak points in the system.

36 Brake fluid renewal



Warning: Brake hydraulic fluid can harm your eyes and damage painted surfaces, so use extreme caution when handling

and pouring it. Do not use fluid that has been standing open for some time as it absorbs moisture from the air. Excess moisture can cause a dangerous loss of braking effectiveness.

The procedure is similar to that for the bleeding of the hydraulic system as described in Chapter 9, except that the brake fluid reservoir should be emptied by siphoning, and allowance should be made for the old fluid to be removed from the circuit when bleeding a section of the circuit.



37 Fuel filter renewal (fuel injection models)



Warning: Before carrying out the following operation, refer to the precautions given in "Safety first!" at the beginning of this manual, and follow them implicitly. Petrol is a highly dangerous and volatile liquid, and the precautions necessary when handling it cannot be overstressed.

 Disconnect the battery negative lead.
 Chock the front wheels then jack up the rear of the car and support it on axle stands (see "Jacking and vehicle support"). **3** To minimise fuel loss during the following operation, working inside the luggage compartment, remove the top stud, then pivot the fuel tank trim panel downwards and fit a hose clamp to the fuel tank feed hose.

4 Refer to the information on fuel system depressurisation contained in Chapter 4B, Section 6.

5 From underneath the vehicle, slacken the union nuts and disconnect the inlet and outlet pipes from the fuel filter, whilst retaining the union adapter/filter with an open-ended spanner (see illustrations).

6 Remove the two bolts securing the filter mounting bracket to the subframe, and remove the filter assembly from the car.

7 Slacken and remove the outlet pipe adapter and O-ring from the filter, then slacken the clamp bolt and slide the filter out of the mounting bracket, noting which way the arrow stamped on the filter is pointing.

8 Remove the plugs from the filter, then fit the outlet pipe adapter (using a new O-ring), and tighten it securely. Ensuring that the arrow is pointing in the direction of the flow of fuel, slide the filter into position in the mounting bracket, and securely tighten the clamp bolt.
9 Refit the filter assembly to the car,

tightening its mounting bolts securely.

10 Refit the inlet and outlet pipes to the filter, and securely tighten their union nuts.

11 Lower the car to the ground, then remove the clamp from the fuel tank feed hose, and secure the trim panel in position with its retaining stud. Reconnect the battery, then start the engine and check the filter unions for leakage.



Warning: Dispose of the old filter safely; it will be highly flammable and may explode if thrown on a fire.



37.5a Fuel filter inlet union "A", outlet union "B" and mounting bracket retaining bolts "C"



37.5b Slacken the union nuts whilst retaining the union adapter/filter with an open-ended spanner