# Chapter 4
# Fuel and exhaust systems

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## Degrees of difficulty

**Easy,** suitable for novice with little experience

**Fairly easy,** suitable for beginner with some experience

**Fairly difficult,** suitable for competent DIY mechanic

**Difficult,** suitable for experienced DIY mechanic

**Very difficult,** suitable for expert DIY or professional

## Specifications

### General

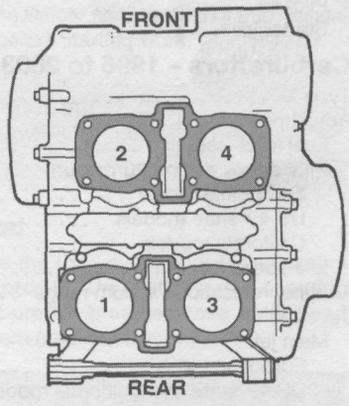
| | |
|---|---|
| Carburettor numbering | Rear left – 1, front left – 2, rear right – 3, front right – 4 |

### Fuel

| | |
|---|---|
| Grade | Unleaded, for the UK minimum 91 RON (Research Octane Number), for the USA minimum pump octane number 86 |
| Fuel tank capacity (including reserve) | 15.0 litres |
| Reserve volume | 3.0 litres |

### Carburettors – 1985 and 1987 models

| | |
|---|---|
| Type | Mikuni BDS34 |
| Adjustments | |
| Fuel level (see text) | 15 to 17 mm below index mark |
| Pilot screw setting (turns out) | preset |
| Idle speed | see Chapter 1 |
| Synchronisation vacuum range | see Chapter 1 |
| Jet sizes | |
| Main jet | |
| Cylinders 1 and 3 (rear) | 152.5 |
| Cylinders 2 and 4 (front) | 150 |
| Main air jet | Ø2.0 |
| Jet needle | 5EZ43 |
| Needle jet | Y-0 |
| Pilot air jet 1 | 90 |
| Pilot air jet 2 | 170 |
| Pilot jet | 37.5 |
| Starter jet | 45 |




*Cylinder identification*

## Carburettors – 1988 to 1992 models

| | |
|---|---|
| Type | Mikuni BDS34 |
| Adjustments | |
| Fuel level (see text) | 15.5 to 16.5 mm below index mark |
| Pilot screw setting (turns out) | preset |
| Idle speed | see Chapter 1 |
| Synchronisation vacuum range | see Chapter 1 |
| Jet sizes | |
| Main jet | 152.5 |
| Main air jet | Ø2.0 |
| Jet needle | |
| California models | 5EZ50 |
| All other models | 5EZ43 |
| Needle jet | Y-0 |
| Pilot air jet 1 | |
| California models | 100 |
| All other models | 90 |
| Pilot air jet 2 | 170 |
| Pilot jet | 37.5 |
| Starter jet | 45 |

## Carburettors – 1993 to 1995 models

| | |
|---|---|
| Type | Mikuni BDS35 |
| Adjustments | |
| Fuel level (see text) | 15 to 17 mm below index mark |
| Pilot screw setting (turns out) | preset |
| Idle speed | see Chapter 1 |
| Synchronisation vacuum range | see Chapter 1 |
| Jet sizes | |
| Main jet | 152.5 |
| Main air jet | Ø2.0 |
| Jet needle | |
| California models | 5EZ50 |
| All other models | 5EZ43 |
| Needle jet | Y-0 |
| Pilot air jet 1 | |
| California models | 100 |
| All other models | 90 |
| Pilot air jet 2 | 170 |
| Pilot jet | 37.5 |
| Starter jet | 45 |

## Carburettors – 1996 to 2003 models

| | |
|---|---|
| Type | Mikuni BDS35 |
| Adjustments | |
| Fuel level (see text) | 15 to 17 mm below index mark |
| Pilot screw setting (turns out) | |
| European models | 2 1/2 |
| US 49-state models | 2 1/4 |
| California models | 3 |
| Idle speed | see Chapter 1 |
| Synchronisation vacuum range | see Chapter 1 |
| Jet sizes | |
| Main jet | |
| European models | 150 |
| US 49-state and California models | 152.5 |
| Main air jet | Ø2.0 |
| Jet needle | |
| European models | 5EZ19-3 |
| US 49-state models | 5EZ43-1 |
| California models | 5EZ50-1 |
| Needle jet | Y-0 |
| Pilot air jet 1 | |
| European models | 95 |
| US 49-state models | 90 |
| California models | 100 |
| Pilot air jet 2 | 170 |
| Pilot jet | |
| European models | 42.5 |
| US 49-state and California models | 37.5 |
| Starter jet | 45 |

### V-Boost servo motor

| | |
|---|---|
| Resistance | 5.25 to 9.75 K-ohms @ 20°C |

### Fuel pump

| | |
|---|---|
| Output pressure | 2.35 to 2.92 psi |
| Resistance | 1 to 10 ohms @ 20°C |

### Fuel pump relay

| | |
|---|---|
| Resistance | 90 to 110 ohms @ 20°C |

### Fuel level sensor

| | |
|---|---|
| Resistance | 700 to 1100 ohms @ 20°C |

### Torque settings

| | |
|---|---|
| Front cylinder downpipe flange nuts | 20 Nm |
| Rear cylinder manifold nuts | 20 Nm |
| Rear cylinder downpipe-to-manifold clamp bolts | 7 Nm |
| Silencer assembly mounting bolts | 25 Nm |
| Silencer clamp bolts | 20 Nm |

## 1 General information and precautions

### General information

The fuel supply system consists of the fuel tank, fuel pump, filter, fuel hoses, carburettors, and control cables. There is no fuel tap – the fuel pump is switched on and off with the engine via a relay.

The carburettors used are CV types. There is a carburettor for each cylinder. For cold starting a choke lever is mounted on the left-hand side of the carburettors.

There are two different versions of the V-Max – a restricted power version on which each carburettor acts conventionally feeding one cylinder, and a full power version which uses Yamaha's V-Boost system. This system consists of two servo-controlled butterfly valves, one situated in each duct between each front and rear cylinder pair. When the valve is open it allows a fuel/air mixture from the carburettor for the cylinder on its compression stroke to be drawn into the intake duct for the cylinder on its induction stroke, effectively allowing one cylinder to be supplied by two carburettors, increasing volumetric efficiency and therefore power output. The valves start to open at a pre-set engine speed of 6000 rpm, and become fully open at 8000 rpm (the servo actually begins to turn at 5730 rpm, but due to the required slack in the cables the resultant lag means the valves open fractionally later). On restricted power versions the duct arrangement is still fitted, but the butterfly valves have been removed and the ducts between the carburettors are blanked off.

All models have a low fuel level warning light in the instrument cluster which is actuated by a level sensor inside the fuel tank, and comes on when there is approximately 3.0 litres of fuel left. Switching to the reserve fuel capacity is done electrically, via a fuel reserve switch on the right-hand handlebar.

Air is drawn into the carburettors via an air filter which is housed under the top cover.

The exhaust system is a four-into-two design.

Many of the fuel system service procedures are considered routine maintenance items and for that reason are covered in Chapter 1.

### Precautions

***Warning: Petrol (gasoline) is extremely flammable, so take extra precautions when you work on any part of the fuel system. Always remove the battery (see Chapter 9). Don't smoke or allow open flames or bare light bulbs near the work area, and don't work in a garage where a natural gas-type appliance is present. If you spill any fuel on your skin, rinse it off immediately with soap and water. When you perform any kind of work on the fuel system, wear safety glasses and have a fire extinguisher suitable for a class B type fire (flammable liquids) on hand.***

Always perform service procedures in a well-ventilated area to prevent a build-up of fumes.

Never work in a building containing a gas appliance with a pilot light, or any other form of naked flame. Ensure that there are no naked light bulbs or any sources of flame or sparks nearby.

Do not smoke (or allow anyone else to smoke) while in the vicinity of petrol (gasoline) or of components containing it. Remember the possible presence of vapour from these sources and move well clear before smoking.

Check all electrical equipment belonging to the house, garage or workshop where work is being undertaken (see the Safety first! section of this manual). Remember that certain electrical appliances such as drills, cutters etc. create sparks in the normal course of operation and must not be used near petrol (gasoline) or any component containing it. Again, remember the possible presence of fumes before using electrical equipment.

Always mop up any spilt fuel and safely dispose of the rag used.

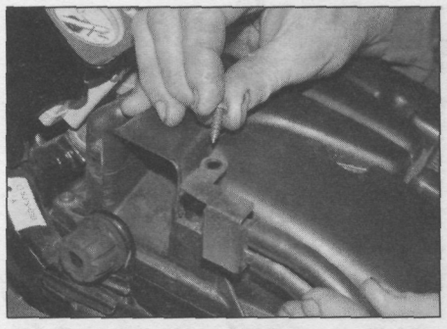
Any stored fuel that is drained off during servicing work must be kept in sealed containers that are suitable for holding petrol (gasoline), and clearly marked as such; the containers themselves should be kept in a safe place. Note that this last point applies equally to the fuel tank if it is removed from the machine; also remember to keep its filler cap closed at all times.

Read the Safety first! section of this manual carefully before starting work.

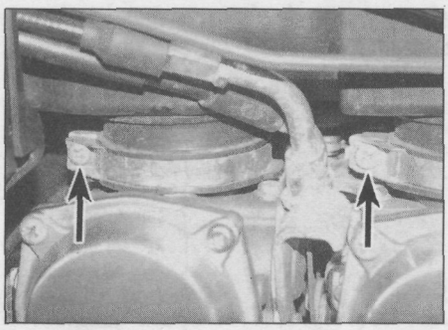
## 2 Air filter housing – removal and installation

### Removal

**1** Remove the top cover and the side covers (see Chapter 8). Undo the screw securing each carburettor breather hose holder and detach them **(see illustration)**.

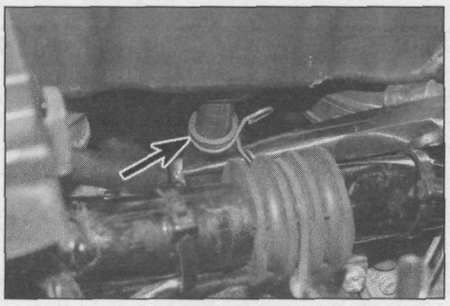


**2.1 Detach the hose holder on each side**



**2.2 Slacken the clamp screws (arrowed) on each side**

**2** Slacken the clamp screws securing the housing to the carburettors **(see illustration)**.
**3** Remove the coolant reservoir (see Chapter 3).
**4** Lift the housing up off the carburettors and disconnect the crankcase breather hose from the underside at the back **(see illustration)**. Remove the housing.



**2.4 Displace the housing and detach the crankcase breather hose (arrowed) from its union**

### *Installation*

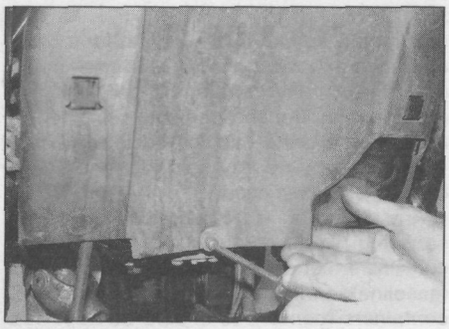
**5** Installation is the reverse of removal.

## 3 Fuel tank – removal, installation and repair

***Warning: Refer to the precautions given in Section 1 before starting work.***

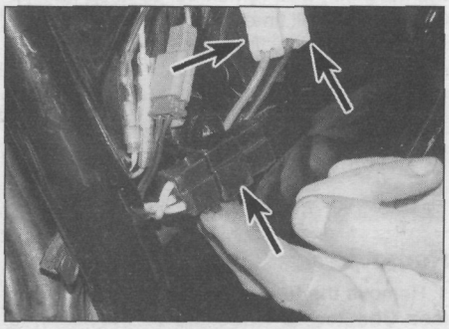
### *Removal*

**1** Make sure the fuel cap is secure. Remove the rider's seat and the side panels (see Chapter 8). Disconnect the battery negative (–ve) lead (see Chapter 9).

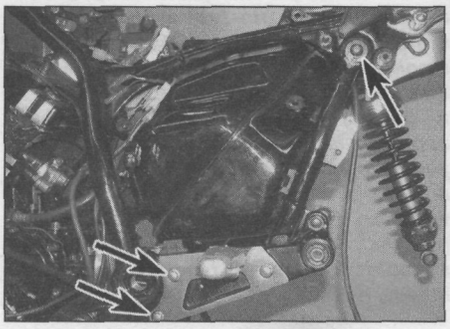


**3.4 Undo the screw and remove the mudguard front section, noting how it fits**

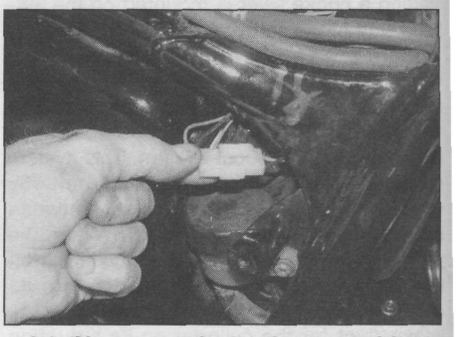
**2** Remove the exhaust silencers (see Section 15).
**3** Remove the shock absorbers and the swingarm (see Chapter 6). Note that the right-hand shock can remain attached to its upper mounting point.
**4** Undo the screw securing the front section of the rear mudguard, then release it from the tabs at the sides and remove it **(see illustration)**.
**5** Trace the wiring from the regulator/rectifier and disconnect it at the connectors **(see illustration)**. Feed the wiring down, freeing it from any ties and noting its routing. Unscrew the three bolts securing the pillion left-hand footrest bracket and rear frame section and remove it **(see illustration)**.
**6** Disconnect the fuel level sensor wiring connector **(see illustration)**.
**7** Now you have to drain the tank. To do this, position a suitable container (make sure it is large enough) under the tank, and have a supply of rag to hand. Unscrew the drain bolt and allow the tank to drain into the container **(see illustration)**. Discard the sealing washer as new one should be used.
**8** Remove the fuel tank filler cap and drip tray **(see illustrations)**. Note how the tray locates at the back, and how the wire support locates at the front. Disconnect the drain hose from the underside of the drip tray.
**9** Disconnect the breather hose from its union on the tank **(see illustration)**. Release the tail light wiring from its guide **(see illustration)**.
**10** Have some rag to hand to mop up any spilled fuel, then release the clamp securing the fuel hose to the rear union on the filter and



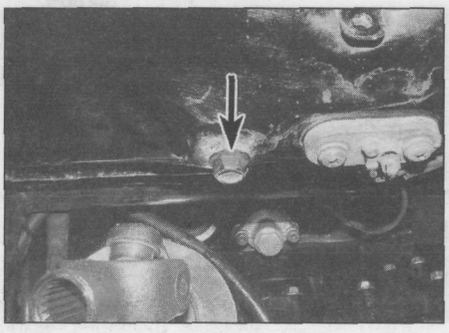
**3.5a Disconnect the regulator/rectifier wiring connectors (arrowed)**



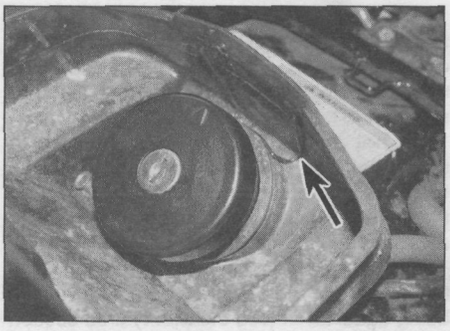
**3.5b Unscrew the bolts (arrowed) and remove the frame section**



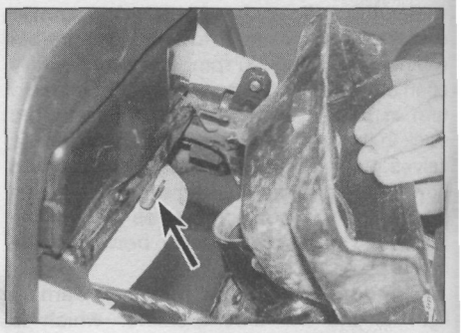
**3.6 Disconnect the level sensor wiring connector**



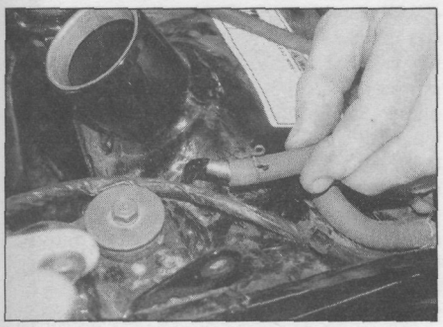
**3.7 Fuel tank drain bolt (arrowed)**



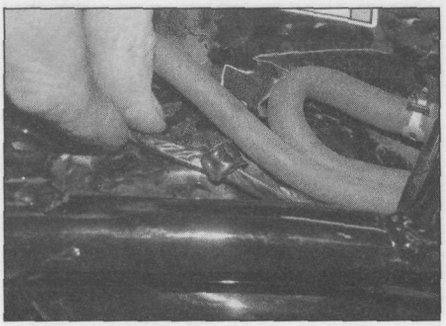
**3.8a Remove the filler cap, noting how the wire support (arrowed) locates . . .**



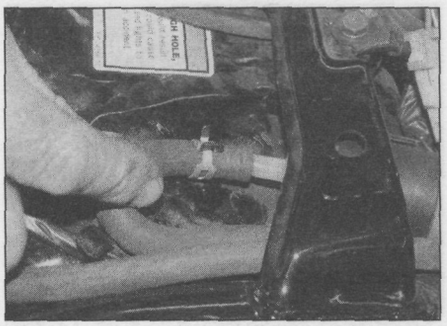
**3.8b . . . then remove the drip tray, noting how it locates on the hook (arrowed)**



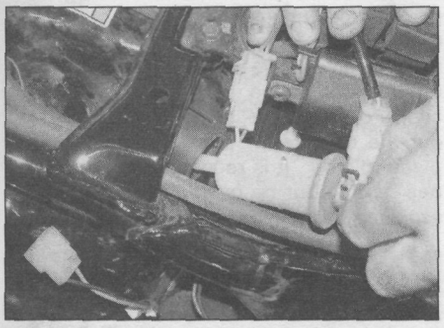
3.9a Detach the breather hose . . .



3.9b . . . and free the tail light wiring from its guide



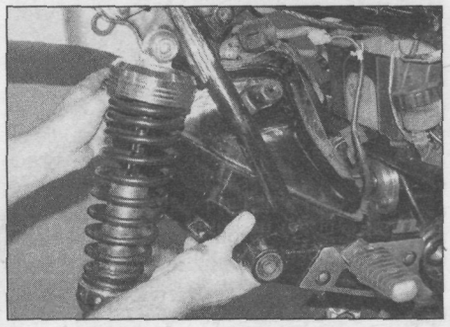
3.10a Detach the hose from the rear of the filter . . .



3.10b . . . and draw the filter out of its holder



3.11a Unscrew the bolts (arrowed) . . .



3.11b . . . and manoeuvre the tank out

detach it, and draw the filter out of its holder **(see illustrations)**.

**11** Unscrew the two tank mounting bolts **(see illustration)**. Carefully manoeuvre the tank out of the left-hand side – it is best to remove the rubber damper from the right-hand side when accessible to give a little more clearance between the tank and the rear frame section **(see illustrations)**.

**12** Check all the tank rubbers for signs of damage or deterioration and replace them with new ones if necessary.

## Installation

**13** Installation is the reverse of removal, noting the following:

- Check that the tank mounting rubbers are fitted and in good condition **(see illustration 3.13a)**.
- Make sure the lug on the front of the tank locates correctly, and the rubber does not fall off **(see illustration 3.13b)**.
- Use a new sealing washer on the tank drain bolt.
- Make sure all the hoses and wiring are securely connected and not trapped at any point.
- Make sure the front section of the rear mudguard engages correctly with the rear **(see illustration 3.13c)**, and it engages correctly with the side tabs **(see illustration 3.4)**.
- Start the engine and check that there is no sign of fuel leakage.

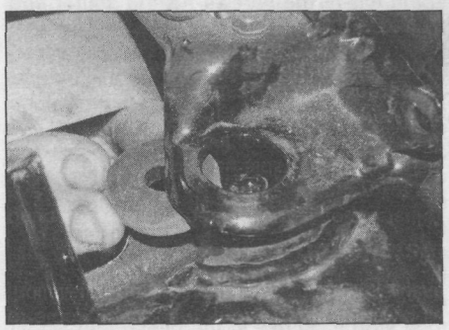
## Repair

**14** All repairs to the fuel tank should be carried out by a professional who has experience in this critical and potentially dangerous work. Even after cleaning and flushing of the fuel system, explosive fumes can remain and ignite during repair of the tank.

**15** If the fuel tank is removed from the bike, it should not be placed in an area where sparks or open flames could ignite the fumes coming out of the tank. Be especially careful inside garages where a natural gas-type appliance is located, because the pilot light could cause an explosion.



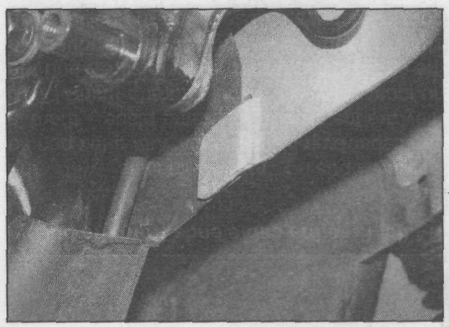
3.11c Removing the rubber gives a little more clearance



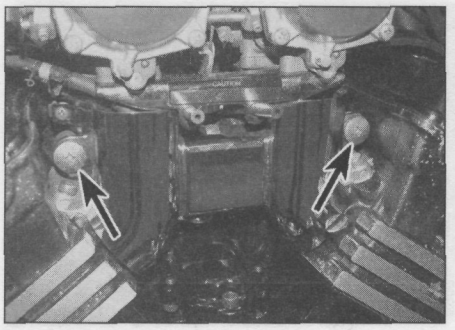
3.13a Do not forget the rubber between the tank and each mounting point



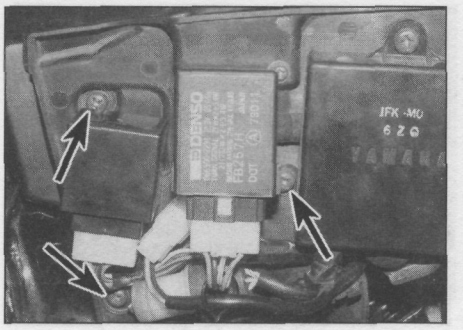
3.13b Make sure the front locates correctly and the rubber stays in place



3.13c Make sure the mudguard sections engage correctly



**6.1 Undo the screws (arrowed) and remove the duct on each side**



**6.2 Undo the screws (arrowed) and displace the board**

## 4 Air/fuel mixture adjustment

**1** If the engine runs extremely rough at idle or continually stalls, and if a carburettor overhaul does not cure the problem (and it definitely is a carburation problem – see Section 5), the pilot screws may require adjustment. It is worth noting at this point that unless you have the experience to carry this out it is best to entrust the task to a motorcycle dealer, tuner or fuel systems specialist.

**2** Also note that due to the increased emphasis on controlling exhaust emissions in certain world markets, regulations have been formulated which prevent adjustment of the air/fuel mixture. On such models the pilot screw positions are pre-set at the factory, no specifications are given for settings, and in some cases the screws have a limiter cap fitted to prevent tampering. Where adjustment is possible, it can only be made in conjunction with an exhaust gas analyser to ensure that the machine does not exceed emissions regulations.

**3** The pilot screws are located just below the centre of the carburettor end cover. Make sure the valve clearances are correct and the carburettors are synchronised before adjusting the pilot screws (see Chapter 1). Before adjusting the pilot screws, warm the engine up to normal working temperature, then stop it. Screw in the pilot screw on all carburettors until they seat lightly, then back them out to the number of turns specified (see this Chapter's Specifications). This is the base position for adjustment.

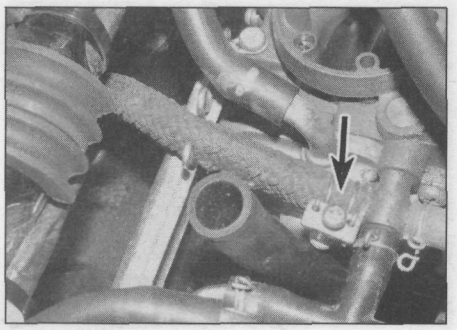
**4** Start the engine and reset the idle speed to the correct level (see Chapter 1). Working on one carburettor at a time, turn the pilot screw by a small amount either side of this position to find the point at which the highest consistent idle speed is obtained. When you've reached this position, reset the idle speed to the specified amount (see Chapter 1). Repeat on the other carburettors.

## 5 Carburettor overhaul – general information

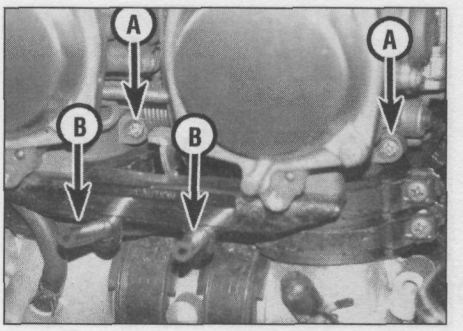
**1** Poor engine performance, hesitation, hard starting, stalling, flooding and backfiring are all signs that major carburettor maintenance may be required.

**2** Keep in mind that many so-called carburettor problems are really not carburettor problems at all, but mechanical problems within the engine or ignition system or other electrical malfunctions. Try to establish for certain that the carburettors are in need of maintenance before beginning a major overhaul.

**3** Check the fuel pump and filter, the fuel and vacuum hoses, the intake manifold joint clamps, the air filter, the ignition system, the spark plugs, valve clearances and carburettor synchronisation before assuming that a carburettor overhaul is required.



**6.4 Slacken the clamp screw (arrowed) and detach the hose from its union**




**6.5 Carburettor drain screws (A) and hoses (B)**

**4** Most carburettor problems are caused by dirt particles, varnish and other deposits which build up in and block the fuel and air passages. Also, in time, gaskets and O-rings shrink or deteriorate and cause fuel and air leaks which lead to poor performance.

**5** When overhauling the carburettors, disassemble them completely and clean the parts thoroughly with a carburettor cleaning solvent and dry them with filtered, unlubricated compressed air. Blow through the fuel and air passages with compressed air to force out any dirt that may have been loosened but not removed by the solvent. Once the cleaning process is complete, reassemble the carburettors using new gaskets and O-rings.

**6** Before disassembling the carburettors, make sure you have all necessary O-rings and other parts, some carburettor cleaner, a supply of clean rags, some means of blowing out the carburettor passages and a clean place to work. It is recommended that only one carburettor be overhauled at a time to avoid mixing up parts.

## 6 Carburettors – removal and installation





***Warning: Refer to the precautions given in Section 1 before starting work.***

### *Removal*

**1** Remove the air filter housing (see Section 2). Undo the intake duct cover screws and remove the covers **(see illustration)**.

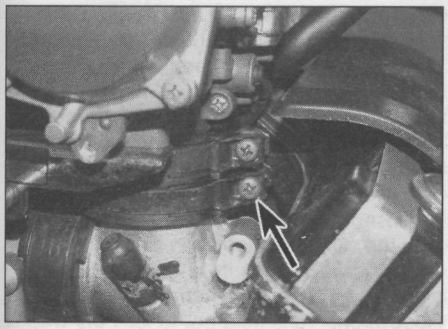
**2** Undo the screws securing the electrical component board on the left-hand side of the steering head and displace it **(see illustration)**. There is no need to disconnect any wiring connectors or detach any of the components from the board.

**3** Detach the throttle cables from the carburettor side of the cable splitter (see Section 14).

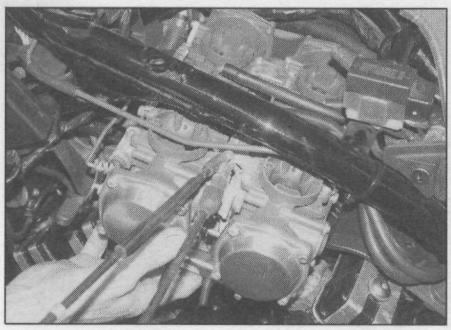
**4** Slacken the fuel supply hose clamp and detach the hose from its union, being prepared with some rag to catch any residual fuel **(see illustration)**.

**5** To prevent fuel spillage when removing the carburettors, it is best to drain them. Each one has an easily accessible drain screw, and the fuel drains from the hoses mounted in the joining bracket on each side of the assembly. Draw each hose in turn out of its hole in the bracket and place it in a suitable container, then slacken the drain screw on the carburettor and allow it to drain **(see illustration)**. Tighten the screw on completion.

**6** Fully slacken the bottom clamp screws on the intake rubbers – note the orientation of the clamps as they have indents which locate over tabs on the rubbers and so must be correctly positioned when tightened on installation **(see illustration)**.



6.6 Slacken the clamp screw (arrowed) on each carburettor



6.7 Carefully manoeuvre the carburettors out from the left-hand side

7 Ease the carburettors up off the V-Boost or duct assembly and draw them out from the left-hand side, noting the routing of the cables in relation to the clutch pipe and moving them to clear it, taking care not to snag the carburettors on the V-Boost cable (full power models), and noting the routing of the crankcase breather hose **(see illustration)**.
**Note:** *If the carburettors have not been drained, keep them level to prevent fuel spillage from the float chambers and the possibility of the piston diaphragms being damaged, or drain them now (see Step 5).*
8 If required, detach the throttle cable ends from the throttle cam then draw the cables from their holders, noting which fits where.

***Caution: Stuff clean rag into each intake after removing the carburettors to prevent anything from falling in.***

### *Installation*

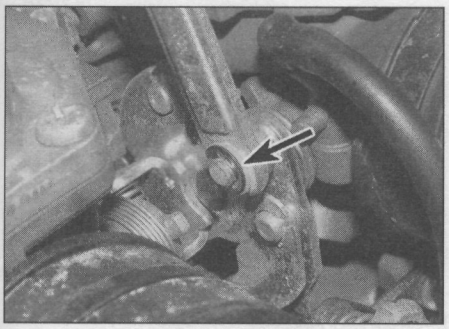
9 Installation is the reverse of removal, noting the following.
• Check for cracks or splits in the intake rubbers, and replace them with new ones if necessary. Note the orientation of the intake rubbers before removing them as they must be installed a particular way.
• Refer to Section 14 for installation of the throttle cables. Check the operation of the cables and adjust them as necessary (see Chapter 1).
• Make sure the carburettors are fully engaged with the V-Boost or intake duct assembly and the clamps are securely tightened.
• Make sure all hoses and cables are correctly routed and secured and not trapped or kinked.
• Make sure the carburettor drains are closed before starting the engine (see Step 5).
• Check idle speed and carburettor synchronisation and adjust as necessary (see Chapter 1).

## 7 Carburettors – disassembly, cleaning and inspection

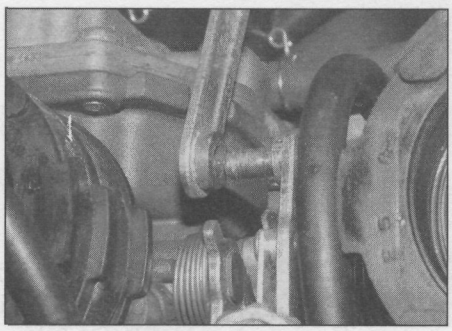
***Warning: Refer to the precautions given in Section 1 before starting work.***

### *Disassembly*

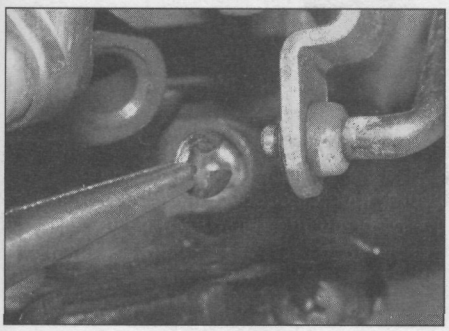
**Note 1:** *To access the float chambers the carburettors must be separated into their left-hand and right-hand pairs (see Steps 2 to 5). Do not separate those pairs into individual carburettors unless absolutely necessary; each carburettor can be dismantled sufficiently for all normal cleaning and adjustments while joined as a pair. Dismantle the carburettors separately to avoid interchanging parts.*
**Note 2:** *Each carburettor end cover has one security Torx screw which requires a special bit to unscrew it – you shouldn't have any trouble obtaining the bit from a good tool dealer.*
1 Remove the carburettors (see Section 6). Mark each carburettor according to its cylinder number (see Specifications).
2 Remove the E-clip securing the throttle linkage bar to the cam on the left-hand side of the carburettor assembly **(see illustration)**. Remove the plastic washer and slide the bar off its post **(see illustration)**.
3 Remove the E-clip securing the choke linkage bar to the arm on the right-hand side of the carburettor assembly **(see illustration)**. Draw the bar end out of the arm **(see illustration)**. Note the plastic bush in the arm and remove it for safekeeping if loose.
4 Release the fuel hose T-piece clamp and detach the hose from the four-way union **(see illustration)**.
5 Undo the joining bracket screws and remove the brackets, noting which fits where **(see illustration)**.
6 Unscrew and remove the end cover



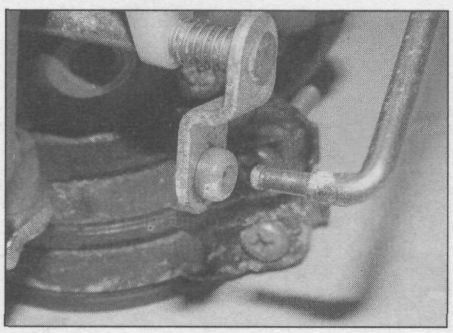
7.2a Remove the E-clip and washer (arrowed) . . .



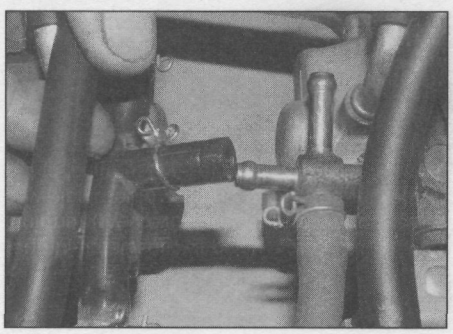
7.2b . . . and slide the bar off the post



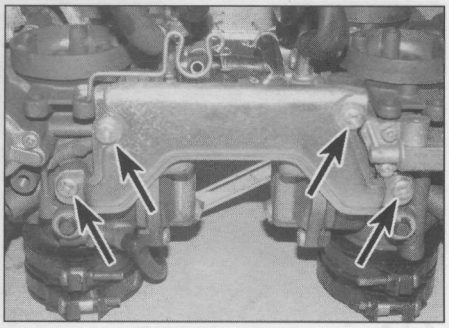
7.3a Remove the E-clip . . .



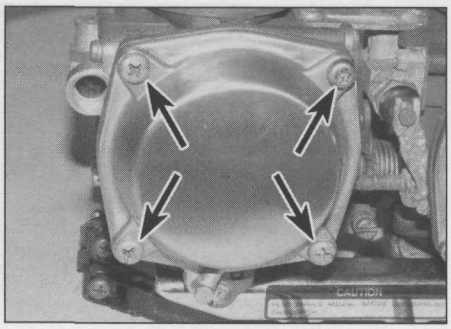
7.3b . . . and slide the bar out of the arm



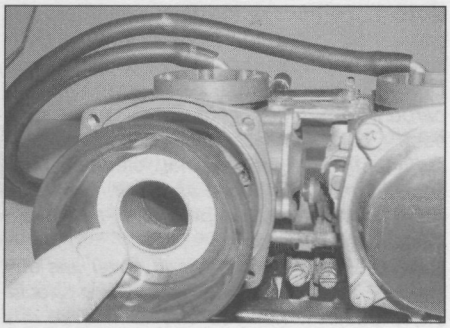
7.4 Detach the hose from the union



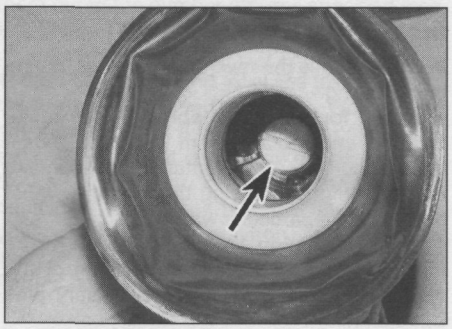
7.5 Undo the screws (arrowed) and remove the bracket on each side



7.6 End cover screws (arrowed)



7.7 Carefully withdraw the diaphragm/piston assembly



7.8a Undo the retainer (arrowed) and remove the spring

retaining screws (see **Note 2** above) – keep light finger pressure on the cover as you remove the last two as there is a spring inside which will try and push the cover up **(see illustration)**. Remove the cover and withdraw the spring from the piston **(see illustrations 9.11c and b)**. Remove the small O-ring from the air passage joint **(see illustration 9.11a)**.

**7** Carefully peel the diaphragm away from its sealing groove in the carburettor and withdraw the diaphragm and piston assembly **(see illustration)**. Note how the tab on the diaphragm fits in the recess in the carburettor body.

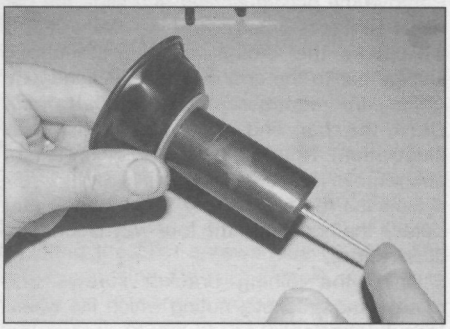
***Caution: Do not use a sharp instrument to displace the diaphragm as it is easily damaged.***

**8** If necessary, undo the jet needle retainer screw and remove it and the spring, noting how they fit **(see illustration and 9.9e and d)**. Push the needle up from the bottom of the piston and withdraw it from the top **(see illustration)**. Take care not to lose the washer on the top of the needle **(see illustration 9.9b)**. There is no need to remove the E-clip and spacer from the needle **(see illustration 9.9a)**.

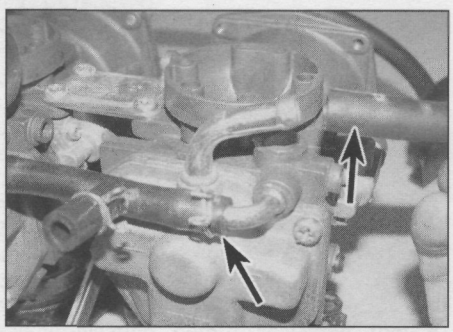
**9** Pull the fuel overflow hose off its union on the float chamber **(see illustration)**. Release the fuel supply hose clamp and pull the hose off its union. Undo the screws securing the float chamber to the base of the carburettor and remove it, noting how it fits **(see illustration)**. Remove the rubber gasket and discard it as a new one must be used **(see illustration 9.8a)**.

**10** Carefully draw the float up off its pivot pin, noting how its tab engages with the hook on the needle valve end **(see illustration)**. Withdraw the needle valve from its seat **(see illustration)**.

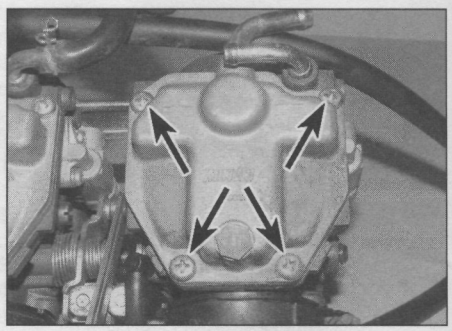
**11** Undo the needle jet holder screw, noting the washer **(see illustration)**. Undo the jet housing screws, then draw the housing up off the needle jet, noting how the pin in the housing locates in the cut-out in the base of the jet **(see illustrations)**. Remove the gasket



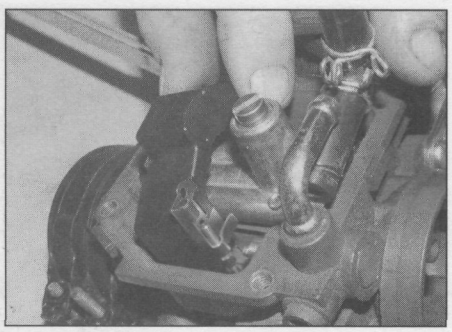
7.8b Push the needle up and withdraw it



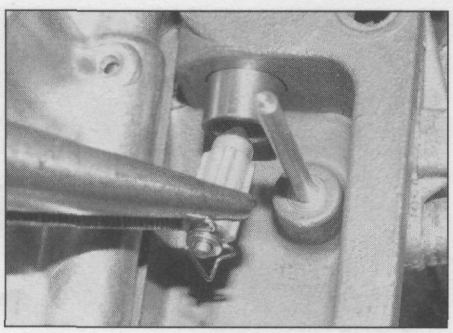
7.9a Detach the overflow hose and the fuel hose (arrowed) from their unions



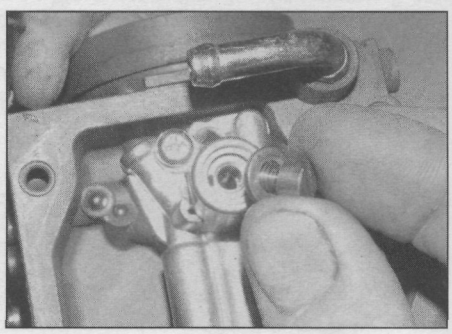
7.9b Undo the screws (arrowed) and remove the float chamber



7.10a Lift the float up off its pin . . .



7.10b . . . and withdraw the needle valve



7.11a Undo the needle jet holder screw . . .

and the O-ring **(see illustrations)**. Push the needle jet up from the bottom and withdraw it from the venturi **(see illustration)**.

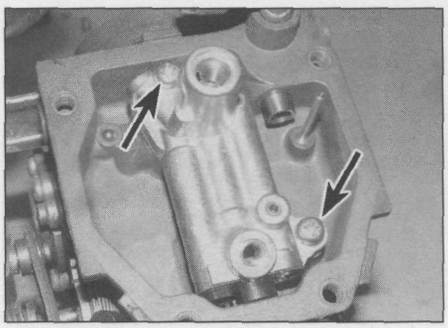
**12** Remove the rubber bungs from the jet passages in the housing **(see illustration)**. If required unscrew and remove the main jet from the top of the housing, the pilot jet from the side passage in the housing, and the emulsion tube from the central passage **(see illustration)**.

**13** The pilot screw can be removed from the carburettor, but note that its setting will be disturbed (see ***Haynes Hint***). Remove the blanking cap where fitted, then unscrew and remove the pilot screw along with its spring, washer and O-ring **(see illustration)**. Discard the O-ring as a new one must be used.

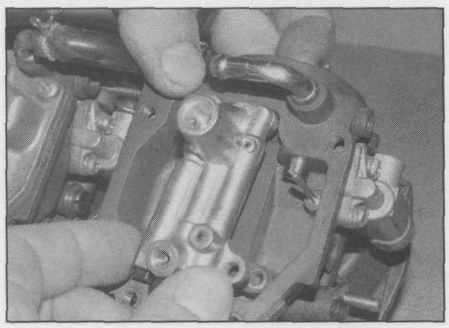
> **HAYNES HiNT** ***To record the pilot screw's current setting, turn the screw in until it seats lightly, counting the number of turns necessary to achieve this, then fully unscrew it. On installation, the screw is simply backed out the number of turns you've recorded.***

**14** Check the operation of the choke plungers by actuating the linkage then letting it go. The plungers should pull out smoothly and return home easily under spring pressure. To remove the choke plunger, undo it's actuating arm screw, then unscrew the choke plunger nut **(see illustrations)**. Draw the plunger out, rotating the arm on the shaft as you do until you can free the plunger end from the arm **(see illustrations)**. If required, slacken both arm screws for the pair being worked on and draw the shaft out – this enables the arms to be removed first and makes removing the plungers easier. Note the positions of the plastic bushes for the shafts.

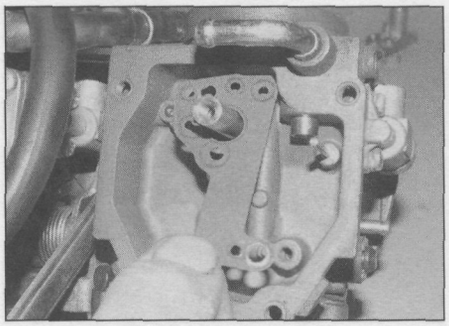
**15** If required undo the choke plunger housing screws and remove the housing and its gasket **(see illustration)**.



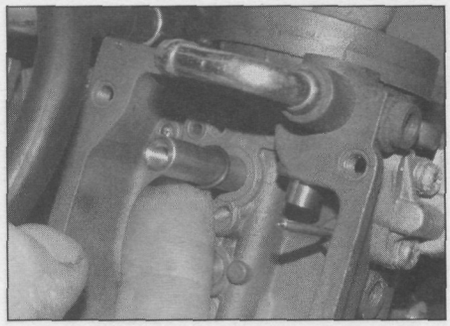
**7.11b . . . and the housing screws (arrowed) . . .**



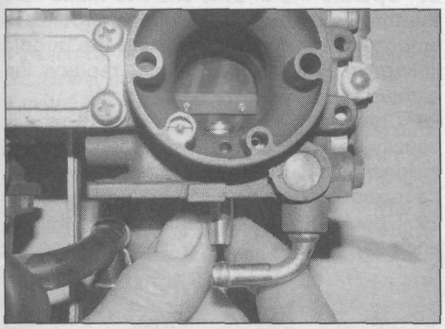
**7.11c . . . then remove the housing . . .**



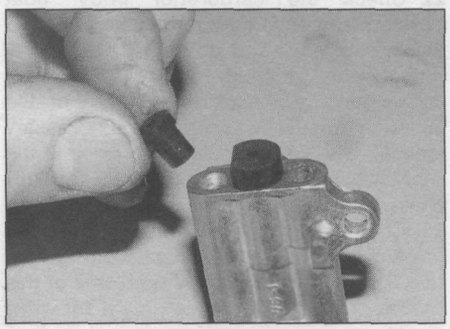
**7.11d . . . its gasket . . .**



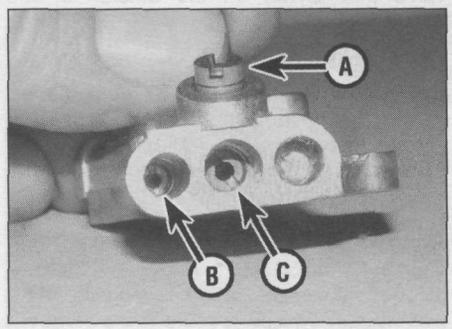
**7.11e . . . and the O-ring**



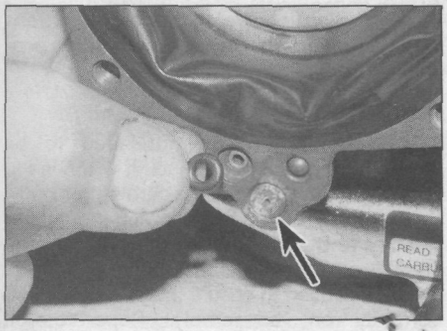
**7.11f Push the needle jet up and into the venturi and remove it**



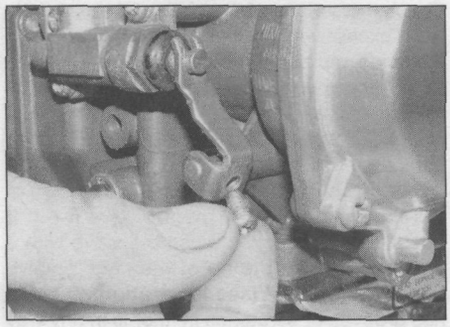
**7.12a Remove the rubber bungs . . .**



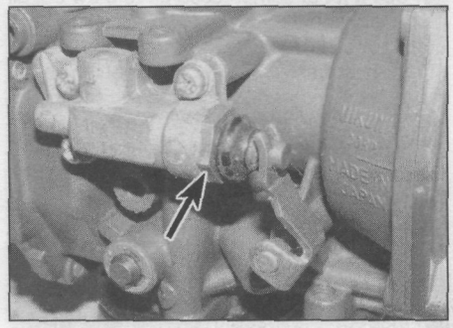

**7.12b . . . then unscrew the main jet (A), the pilot jet (B) and the emulsion tube (C)**



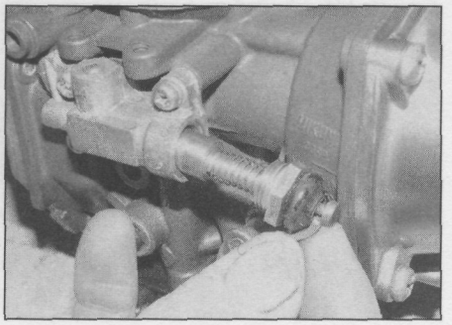
**7.13 The pilot screw is recessed, under the blanking cap (arrowed) where fitted**



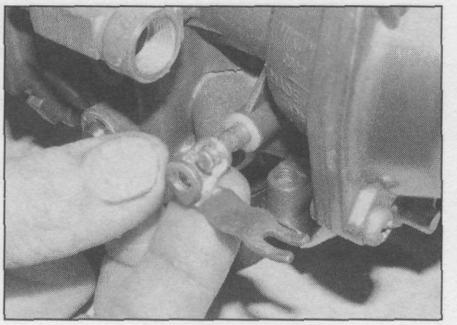
**7.14a Undo the screw . . .**



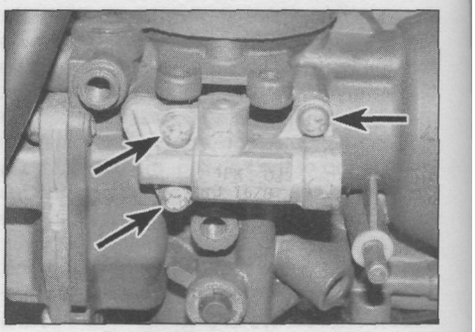
**7.14b . . . and the choke plunger nut (arrowed) . . .**



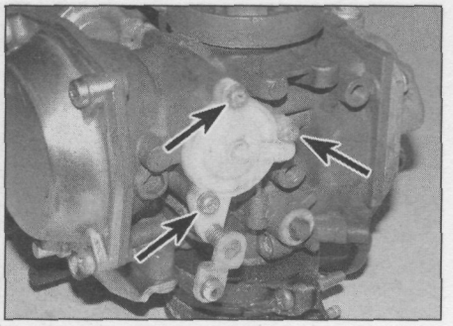
7.14c . . . then draw the plunger out and release it from it's arm . . .



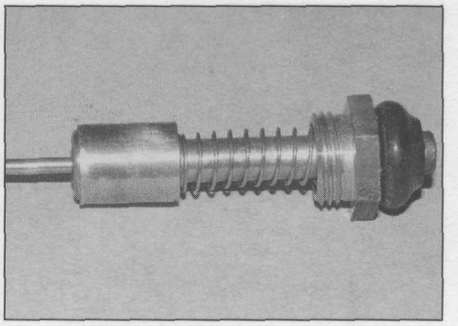
7.14d . . . and slide the arm off the shaft



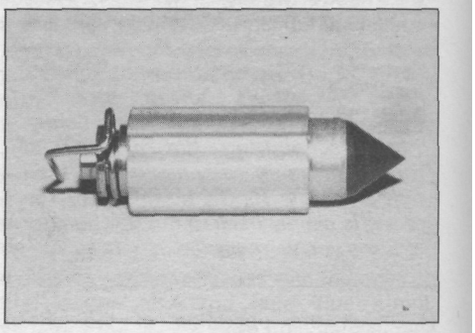
7.15 Choke plunger housing screws (arrowed)



7.16 Air cut-off valve cover screws (arrowed)



7.20 Check the plunger assembly as described



7.26 Check the needle valve as described

**16** Undo the air cut-off valve cover screws and remove the cover, the spring and the diaphragm **(see illustration)**. Depending on the tools you have available, you may have to separate the carburettor pair to access the valve that is not on the outside of the assembly (see Section 8).

### Cleaning

***Caution: Use only a petroleum based solvent for carburettor cleaning. Don't use caustic cleaners.***

**17** Submerge the metal components in the solvent for approximately thirty minutes (or longer, if the directions recommend it).

**18** After the carburettor has soaked long enough for the cleaner to loosen and dissolve most of the varnish and other deposits, use a nylon-bristled brush to remove the stubborn deposits. Rinse it again, then dry it with compressed air.

**19** Use a jet of compressed air to blow out all of the jets and the fuel and air passages in the carburettor body, jet housing and choke plunger housing. Do not forget to blow through the air jet and passages in the intake side of the carburettor, and also the air jet and passages in the diaphragm chamber.

***Caution: Never clean the jets or passages with a piece of wire or a drill bit, as they will be enlarged, causing the fuel and air metering rates to be upset.***

### Inspection

**20** Inspect the needle on the end of the choke plunger, the spring and the shaft **(see illustration)**. Replace any component is worn, damaged or bent with a new one.

**21** If removed from the carburettor, check the tapered portion of the pilot screw and the spring and O-ring for wear or damage. Replace them with new ones if necessary.

**22** Check the carburettor body, float chamber and end cover for cracks, distorted sealing surfaces and other damage. If any defects are found, replace the faulty component, although replacement of the entire carburettor will probably be necessary (check with a Yamaha dealer on the availability of separate components). Similarly check the jet and choke plunger housings.

**23** Check the piston diaphragm for splits, holes and general deterioration. Holding it up to a light will help to reveal problems of this nature. Similarly check the air cut-off valve diaphragm.

**24** Insert the piston in the carburettor body and check that it moves up-and-down smoothly. Check the surface of the piston for wear. If it's worn excessively or doesn't move smoothly in the guide, replace it with a new one.

**25** Check the jet needle for straightness by rolling it on a flat surface such as a piece of glass. Replace it with a new one if it's bent or if the tip is worn.

**26** Gently push down on the rod on the top of the float needle valve then release it – if it doesn't spring back, replace the valve with a new one. Check the tip of the needle valve and the valve seat **(see illustration)**. If either has grooves or scratches in it, or is in any way worn, they should be renewed as a set. To remove the valve seat, push up on it to dislodge the blanking cap in its bore – there is also an O-ring and gauze strainer in there. Check the gauze strainer on the valve seat for holes or splits and replace it with a new one if necessary.

**27** Operate the throttle shaft to make sure the throttle butterfly valve opens and closes smoothly. If it doesn't, cleaning the throttle linkage may help. Otherwise, replace the carburettor with a new one.

**28** Check the float for damage. This will usually be apparent by the presence of fuel inside the float. If the float is damaged, it must be replaced with a new one.

**29** Check the various springs for distortion and replace them with new ones if necessary.

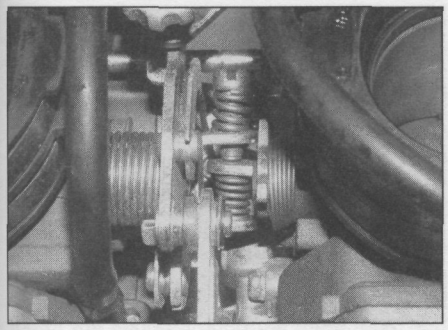
## 8 Carburettors – separation and joining

***Warning: Refer to the precautions given in Section 1 before proceeding.***

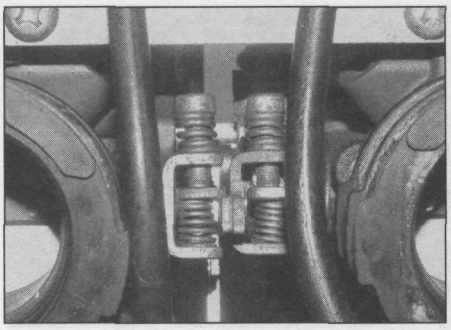
### Separation

**1** The carburettors do not need to be separated for normal overhaul. If you need to separate them (to replace a carburettor body, for example), refer to the following procedure.

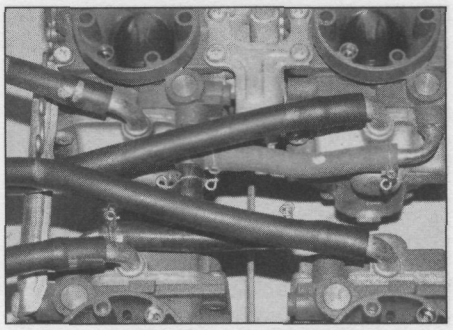
**2** Remove the carburettors (see Section 6). Mark the body of each carburettor with its cylinder location to ensure that it is positioned correctly on reassembly. Separate the carburettor assembly into its left-hand and right-hand pairs (see Section 7, Steps 2 to 5).



8.3a Note the arrangement of the throttle linkage . . .



8.3b . . . the synchronisation springs . . .



8.3c . . . and the hoses

3 Make a note of how the throttle return springs, linkage assembly and carburettor synchronisation springs are arranged to ensure that they are fitted correctly on reassembly **(see illustrations)**. Also note the arrangement of the various hoses and unions, and of the cable brackets **(see illustration)**.

4 Undo the choke actuating arms screws **(see illustration 7.14a)**. Ease the shaft out of the arms, then remove the arms from the plungers, noting how they locate.

5 Release the fuel hose clamp and detach the hose from its union on one of the carburettors **(see illustration 7.9a)**.

6 Undo the top and bottom mounting bracket screws and remove the brackets **(see illustrations)**.

7 Gently separate the carburettors, noting how the throttle linkage is connected, and being careful not to lose any springs that are present between the carburettors.

### Joining

8 Assembly is the reverse of the disassembly procedure, noting the following.

• Install the synchronisation springs after the carburettors are joined together. Make sure they are correctly and squarely seated. Visually synchronise the throttle butterfly valves by turning the synchronising screws to equalise the clearance between the butterfly valve and throttle bore of each carburettor.

• Check the operation of both the choke and throttle linkages ensuring that both operate smoothly and return quickly under spring pressure before installing the carburettors on the machine.

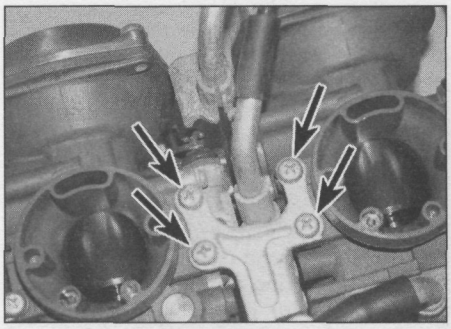
• Install the carburettors (see Section 6) and check carburettor synchronisation (see Chapter 1).

## 9 Carburettors – reassembly and fuel level check

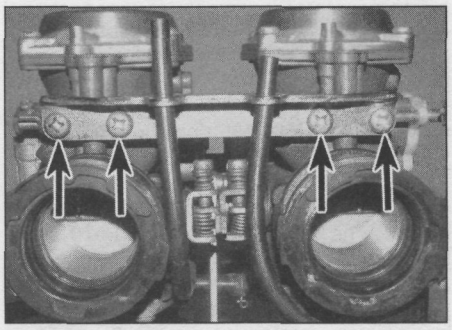


⚠ ***Warning: Refer to the precautions given in Section 1 before proceeding.***

**Note:** *When reassembling the carburettors, be sure to use the new O-rings, seals and other parts supplied in the rebuild kit. Do not overtighten the carburettor jets and screws as they are easily damaged.*



8.6a Top bracket screws (arrowed)

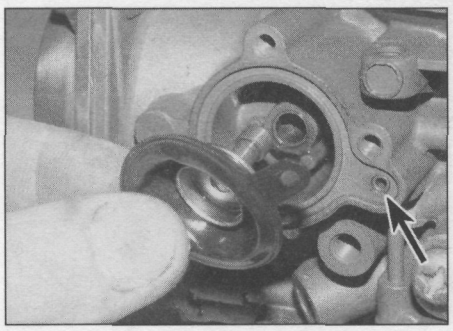


8.6b Bottom bracket screws (arrowed)

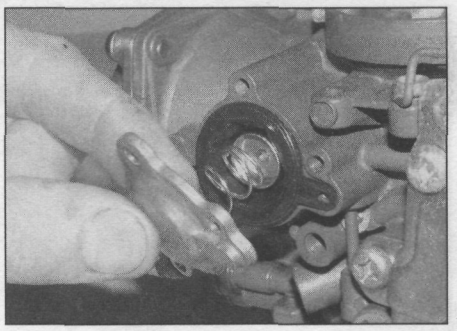
### Reassembly

1 Install the air cut-off valve diaphragm, locating the tab on its rim in the cut-out, and making sure the air passage is not obscured **(see illustration)**. Locate the spring and secure the cover with its screws **(see illustration)**.

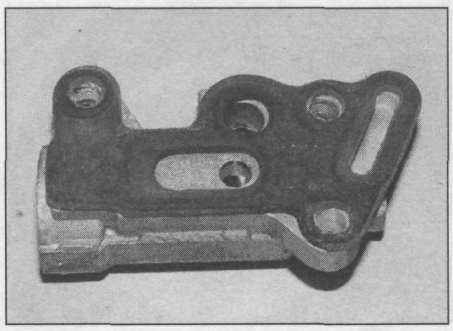
2 If removed, install the choke plunger housing using a new gasket **(see illustrations)**.



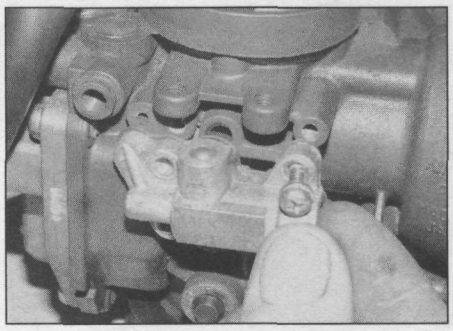
9.1a Install the diaphragm, aligning the tab with the hole (arrowed) . . .



9.1b . . . then fit the spring and cover

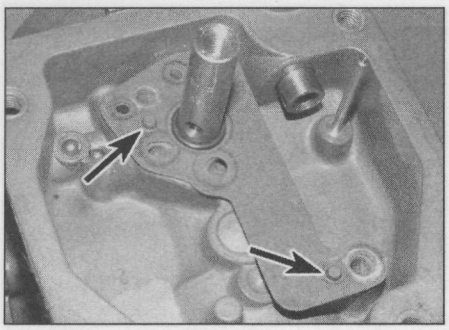


9.2a Fit a new gasket onto the housing . . .

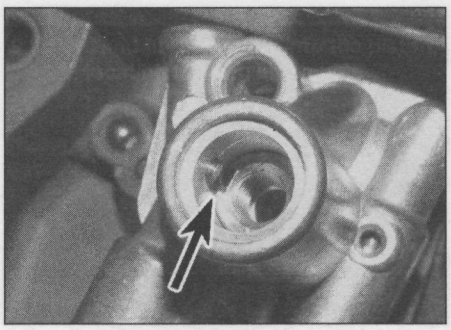


9.2b . . . then install the housing

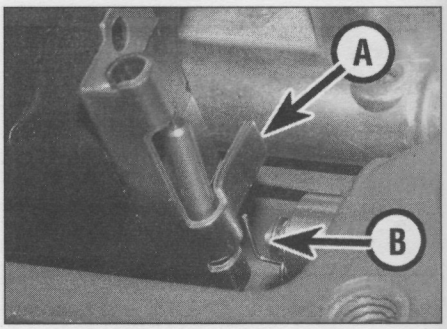
4



**9.6a Make sure the gasket locates on the pins (arrowed)**



**9.6b Make sure the pin in the housing locates in the cut-out in the needle jet (arrowed)**




**9.7 Make sure the tab (A) on the float locates inside the hook (B) on the needle valve**

**3** If removed, check that the choke shaft bushes are in place, then slide the arm through the carburettors and actuation arms. Locate the plunger end in its arm and slide it into its bore while rotating the arm on the shaft **(see illustrations 7.14d and c)**. Thread the plunger nut into the carburettor and tighten it **(see illustration 7.14b)**. Secure the arm with its screw **(see illustration 7.14a)**. Check the operation of the choke plungers by actuating the linkage then letting it go. The plungers should pull out smoothly and return home easily under spring pressure.

**4** Install the pilot screw (if removed) along with its spring and O-ring, turning it in until it seats lightly **(see illustration 7.13)**. Now, turn the screw out the number of turns previously recorded, or as specified at the beginning of the Chapter. Fit the blanking cap.

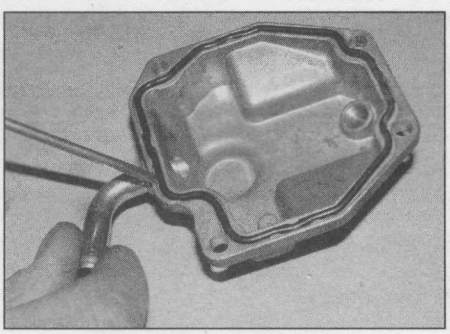
**5** If removed, thread the emulsion tube into the central passage in the jet housing, the pilot jet into the side passage, and the main jet into the top of the housing **(see illustration 7.12b)**. Fit the rubber bungs into the jet passages **(see illustration 7.12a)**.

**6** Slide the needle jet into the carburettor from the venturi, pushing or pulling it down until it seats, and rotating it so that the cut-out in its base is correctly aligned to accept the pin in the jet housing **(see illustration 7.11f)**. Fit a new O-ring around the jet **(see illustration 7.11e)**. Fit a new gasket, making sure it locates correctly over the two pins, and all other holes align with their passage **(see illustration)**. Install the jet housing, making sure the pin locates in the cut-out in the base of the needle jet **(see illustration)**. Install the jet housing screws, followed by the needle jet holder screw and its washer **(see illustrations 7.11b and a)**.

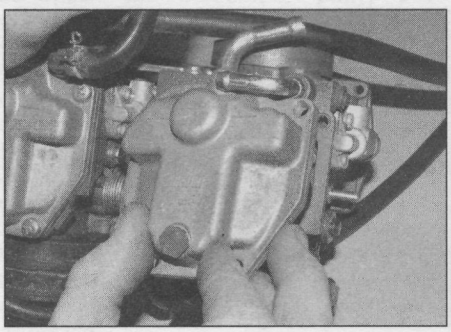
**7** Fit the needle valve into its seat **(see illustration 7.10b)**. Carefully place the float onto its pivot pin, engaging its tab with the hook on the needle valve end **(see illustration)**.

**8** Fit a new rubber gasket into the groove in the float chamber **(see illustration)**. Install the float chamber and tighten its screws **(see illustration)**. Fit the fuel supply hose and the overflow hose onto their unions and secure them with their clamps **(see illustration 7.9a)**.

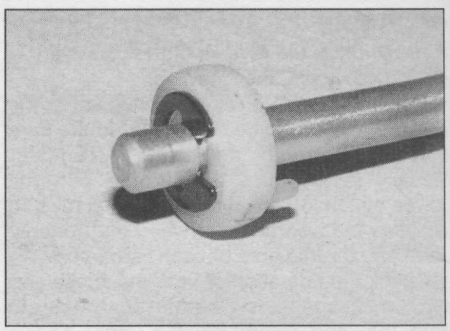
**9** Check that the spacer and E-clip are correctly installed on the jet needle, and note that the peg on the bottom of the spacer locates in the hole in the base of the piston **(see illustration)**. Fit the washer onto the top of the needle **(see illustration)**. Carefully insert the needle into the piston, making sure the peg locates in the hole **(see illustration)**. Fit the spring over the top of the needle, then fit the retainer screw **(see illustrations)**.



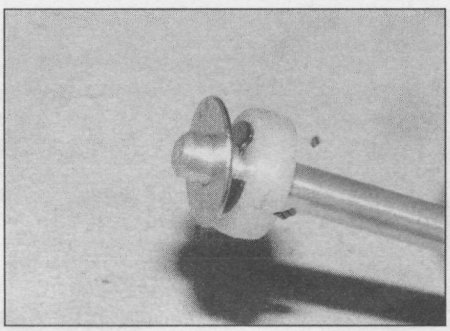
**9.8a Fit a new rubber gasket . . .**



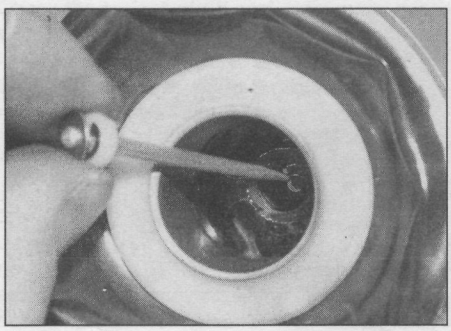
**9.8b . . . then install the float chamber**



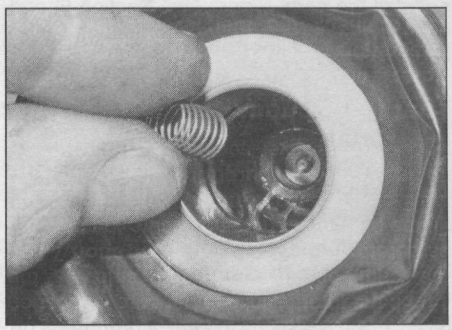
**9.9a Make sure the spacer and E-clip are fitted . . .**



**9.9b . . . then place the washer on top . . .**



**9.9c . . . and fit the needle into the piston, locating the peg in the hole**



**9.9d Fit the spring . . .**

10 Insert the piston assembly into the carburettor and lightly push it down, ensuring the needle is correctly aligned with the needle jet **(see illustration 7.7)**. Press the diaphragm rim into its groove, making sure it is correctly seated and that the tab locates in the recess. Check the diaphragm is not creased, and that the piston moves smoothly up and down in its guide.

11 Fit the air passage O-ring **(see illustration)**. Fit the spring into the piston **(see illustration)**. Fit the end cover, locating the top of the spring around the three tabs, and aligning it so the air passage locates over the O-ring, and install the screws **(see illustration)**.

12 Position the carburettor pairs together, then install the joining brackets and tighten their screws **(see illustration 7.5)**.

13 Attach the fuel hose T-piece to the four-way union and secure it with its clamp **(see illustration 7.4)**.

14 Fit the choke linkage bar end into the arm on the right-hand side of the carburettor assembly and secure it with the E-clip **(see illustrations 7.3b and a)**.

15 Fit the throttle linkage bar onto its post on the cam on the left-hand side of the carburettor assembly **(see illustration 7.2b)**. Fit the plastic washer and secure the bar with the E-clip **(see illustration 7.2a)**.

16 Install the carburettors (see Section 6). Check the fuel level (see below).

### *Fuel level check*

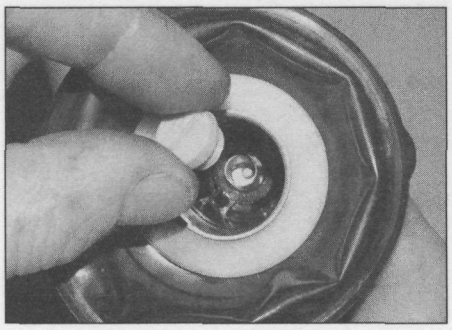
**Note:** *The fuel level is checked with the carburettors installed.*

17 To check the fuel level, position the motorcycle on level ground and support it using the centrestand so that it is vertical.

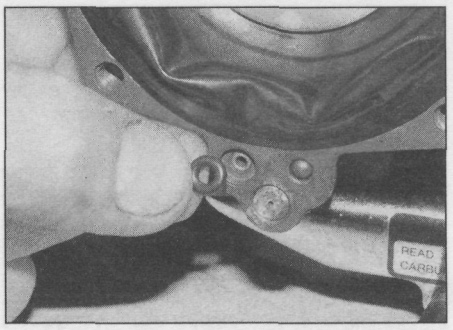
18 Yamaha provide a fuel level gauge (Pt. No. 90890-01312), or alternatively a suitable length of clear plastic tubing can be used. Attach the gauge or tubing to the drain hose stub on the float chamber of the carburettor being checked and position its open end vertically alongside and above the level of the carburettors **(see illustration)**.

19 Slacken the drain screw on the carburettor being checked and allow the fuel to flow into the tube. The level at which the fuel stabilises in the tubing indicates the level of the fuel in the float chamber. Refer to the Specifications at the beginning of the Chapter and measure the level relative to the index line on the carburettor body. Tighten the drain screw. Repeat the procedure for the other carburettors before making any adjustments.

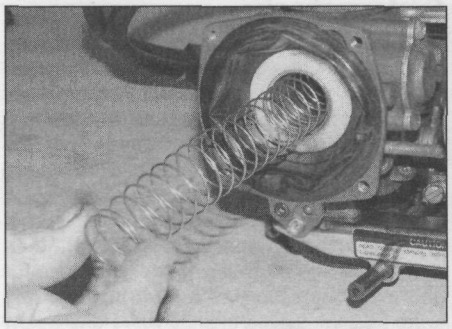
20 If the level on any carburettor was incorrect, remove the carburettors (see Section 6), then remove the float from the chamber(s) in question (see Section 7), and adjust the fuel level by carefully bending the float tab a little at a time until the correct level is obtained **(see illustration)** – unfortunately this means rebuilding the carburettors and installing them, then checking the level to see if it is correct, and if not repeating the



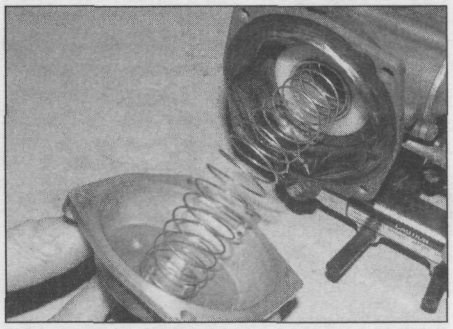
**9.9e . . . and secure the assembly with the retainer**



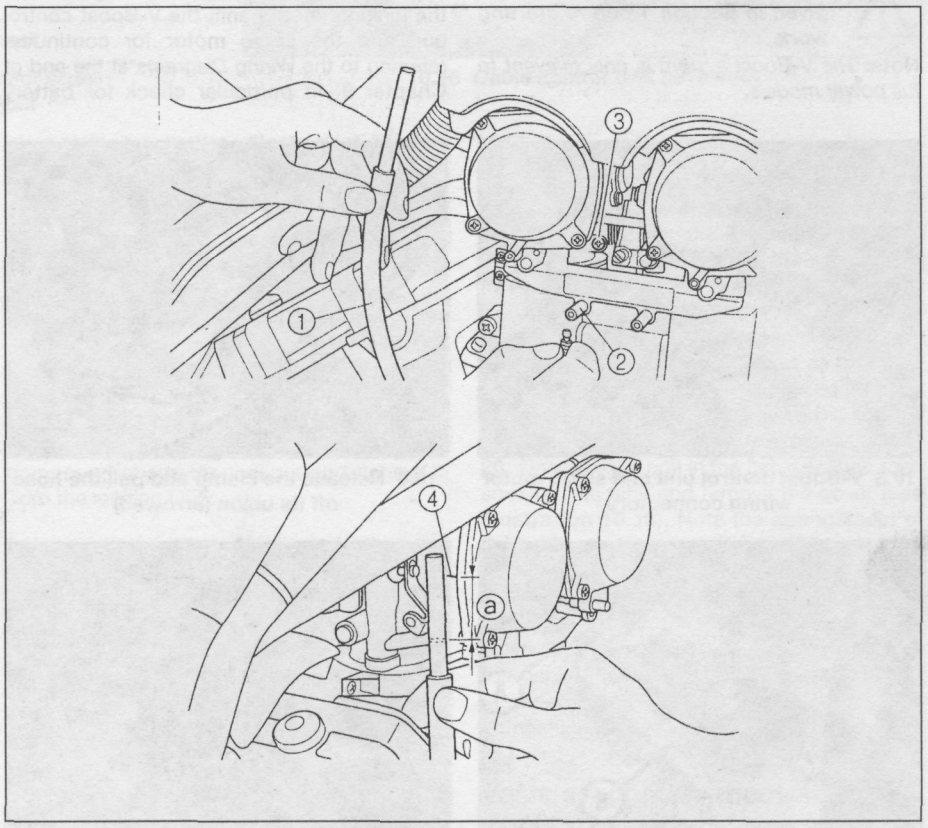
**9.11a Fit the O-ring . . .**



**9.11b . . . then install the spring . . .**



**9.11c . . . and the end cover**




**9.18 Fuel level check set-up**

*1 Gauge or tube*
*2 Drain hose stub*
*3 Drain screw*
*4 Index line*
*a Fuel level measurement*

procedure until it is. **Note:** *Bending the tab away from the float lowers the fuel level (i.e. increases the distance from the index mark) – bending it towards the float raises the fuel level (i.e. decreases the distance from the index mark).*

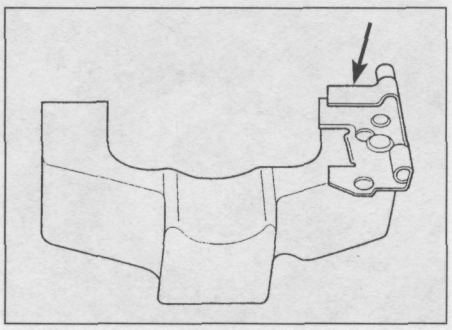
HAYNES HINT

***Checking the fuel level can turn into a time consuming and repetitive procedure if you don't get it right first time, and unfortunately Yamaha do not provide a specification for the float height which could be measured and adjusted at the same time. It is worth recording your own float height measurement when the chamber is off and recording it for future use. To do this, tilt the carburettor as required until the float tab just begins to compress the tip of the needle valve plunger, and measure the distance between the base of the float and the rim of the carburettor.***

## 10 V-Boost system – check, removal and installation

***Warning: Refer to the precautions given in Section 1 before starting work.***

**Note:** *The V-Boost system is only relevant to full power models.*



**9.20 Fuel level is adjusted by bending the float tab (arrowed)**

### System check

**1** When the ignition is switched ON, the control unit signals the servo motor to open and close the valves in the duct assembly. If this happens correctly, proceed to Step 5. If this does not happen, first check that the battery is fully charged and that all fuses are good (see Chapter 9).

**2** If they are good, detach the top cable from the servo motor pulley (see below), then switch the ignition ON. If the servo motor operates, then there is a fault in the cable system or the valves themselves. Refer below and correct the fault.

**3** If the servo doesn't operate in Step 2, check all the connectors and wiring between the ignition control unit, the V-Boost control unit and the servo motor for continuity, referring to the *Wiring Diagrams* at the end of Chapter 9. In particular check for battery voltage at the red/white wire terminal on the V-Boost control unit wiring connector with the ignition ON, and check for continuity to earth in the black wire from the same connector **(see illustration)**. Repair any faults as required.

**4** If all is good so far, check the servo motor (see below). If the servo motor is proven good, replace the V-Boost control unit with a new one (see below).

**5** If the servo operates correctly when the ignition is switched ON as in Step 1, start the engine and increase its speed to 6000 rpm. At 5730 rpm the servo should start to turn and at 6000 rpm the valves in the duct assembly should begin to open (the slight lag between them is created by the necessary slack in the cables). If this does not happen, check the connectors and wiring between the ignition control unit and the V-Boost control unit, and repair any faults found. If the wiring is good, check for a healthy spark at the No. 1 cylinder spark plug – refer to Chapter 5 for details of the test and what to do if no spark is present (i.e. checking the remaining components in the ignition system, including the ignition control unit). If the spark is good, substitute the V-Boost control unit with a known good one (see below), and recheck the system. If it now functions as described, the original control unit is faulty. If there is still a fault, the ignition control unit could be faulty (see Chapter 5).

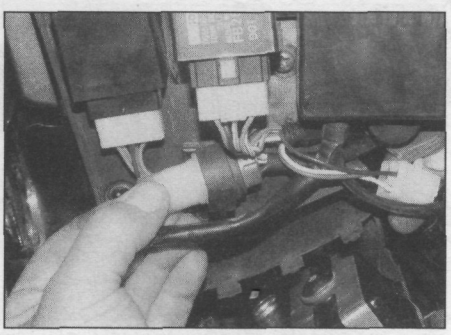
### Duct and valve assembly

**6** Remove the carburettors (see Section 6).

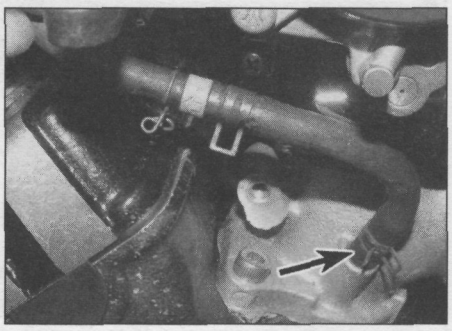
**7** Release the ignition advance unit vacuum hose clamp and detach the hose from its union on the No. 2 cylinder intake duct **(see illustration)**.

**8** Unscrew the retainer bar from the top of the cable splitter bracket and withdraw it **(see illustration)**. Displace the splitter and free the cable end from the pulley **(see illustration)**.

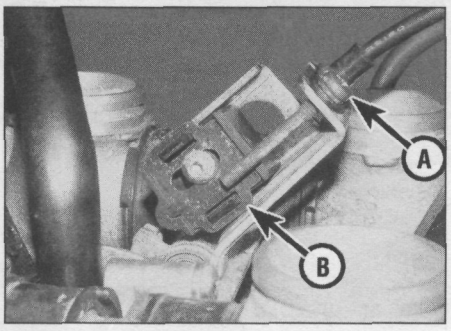
**9** Unscrew the two bolts securing each intake duct to its cylinder head **(see illustration)**. Lift the duct and valve assembly off and remove it **(see illustration)**. Discard the duct O-rings as new ones must be used **(see illustration)**. Plug the ports in the cylinder heads with clean rag. Note that the outer bolt for the front left and rear right ducts is shorter than the other bolt.



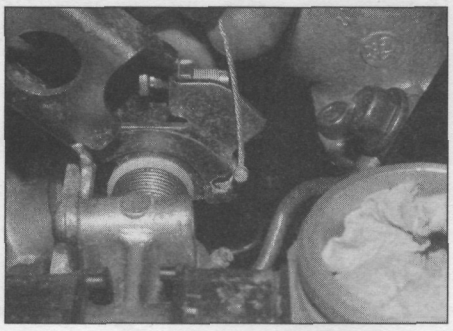
**10.3 V-Boost control unit and servo motor wiring connectors**



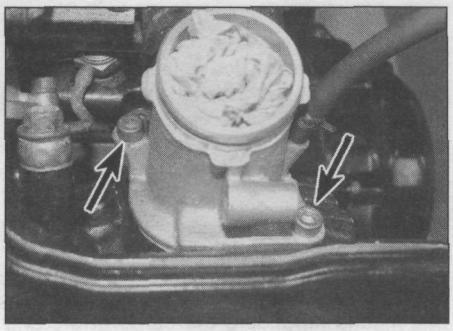
**10.7 Release the clamp and pull the hose off its union (arrowed)**



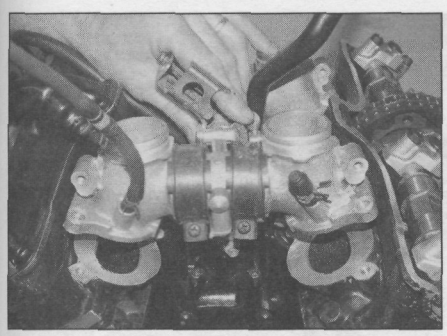

**10.8a Unscrew the bar (A) then displace the splitter (B) . . .**



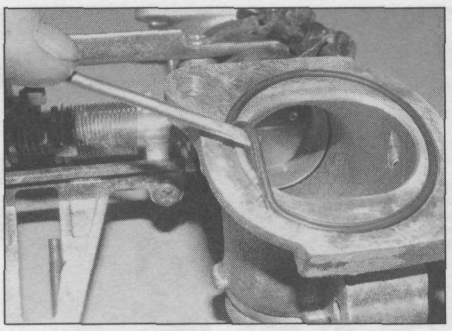
**10.8b . . . and detach the cable end from the pulley**



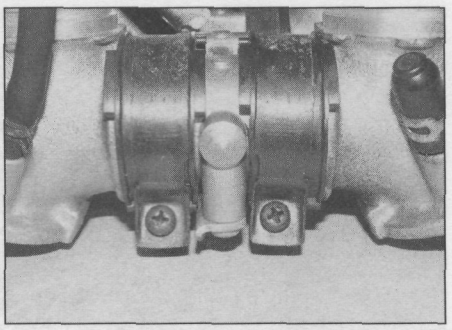
**10.9a Unscrew the two bolts (arrowed) on each duct . . .**



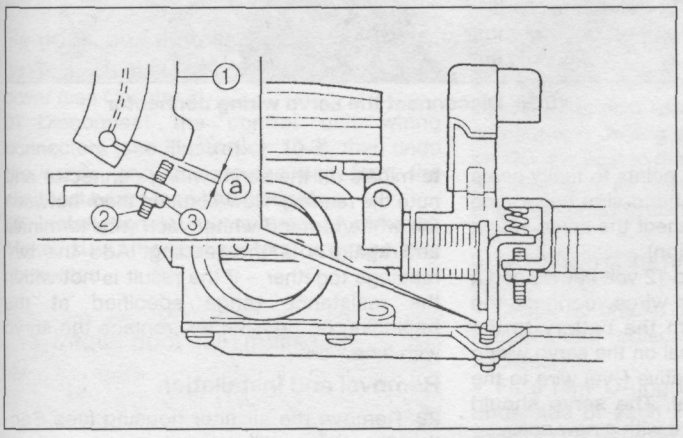
10.9b . . . and remove the valve assembly



10.9c Remove and discard the O-rings – new ones should be used

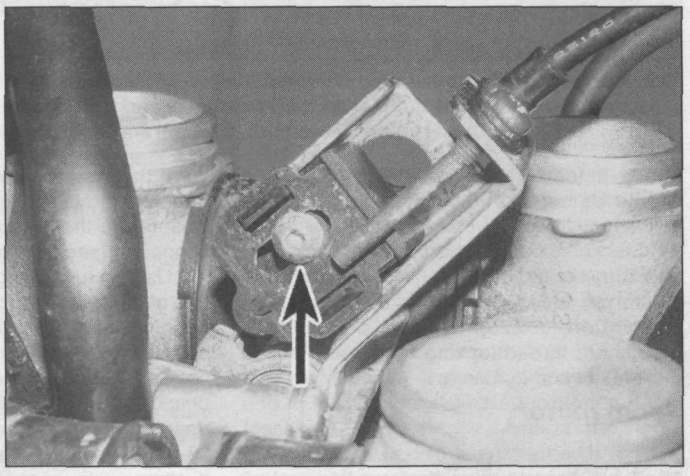


10.10 Slacken the clamp screws to separate the components




10.15 V-Boost cable adjustment

*a Clearance*
*1 Pulley*
*2 Adjuster screw*
*3 Locknut*



10.16 Cable splitter bolt (arrowed)

**10** If required, slacken the clamp screws and separate the duct assembly into its individual components, noting which fits where **(see illustration)** – if you do this it is best to mark each intake duct with the identity of its cylinder as they are handed (the joint rubbers, clamps and blanking pieces are not).

**11** Operate the butterfly valve shaft to make sure the butterfly valves open and close smoothly. If they don't, cleaning the valve linkage may help. Otherwise, replace the assembly with a new one.

**12** Installation is the reverse of removal, noting the following:

- Check for cracks or splits in the duct joint rubbers, and replace them with new ones if necessary.
- Fit a new O-ring into the groove on the underside of each intake duct. Make sure each duct is returned to its original position.
- Adjust the cables if necessary (see below).

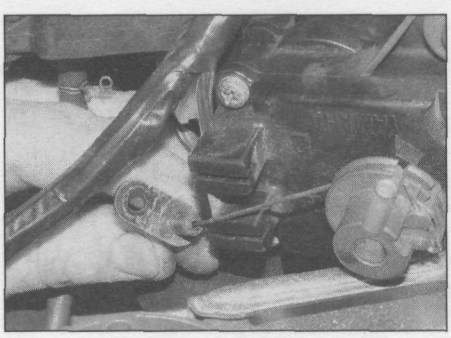
### Cable adjustment

**13** Cable adjustment is necessary only after either the servo, the cable assembly or the valve assembly have been replaced with new ones.

**14** Remove the carburettors (see Section 6).

**15** Turn the ignition switch ON. Measure the clearance between the bottom of the pulley and the top of the adjuster screw in the base plate on the bracket **(see illustration)**. Turn the ignition OFF. The clearance should be between 0.2 and 0.4 mm. If not, adjust it as follows:

**16** Slacken the bolt in the cable splitter **(see illustration)**. Turn the ignition switch ON – the servo sets itself and in so doing resets the cable spring tension in the splitter. Tighten the bolt, then recheck the clearance in Step 15. If the clearance is outside the range, slacken the locknut on the adjuster screw and turn the adjuster as required until the clearance is as specified (0.3 mm) **(see illustration 10.15)**. Apply some non-permanent thread locking compound above the locknut and tighten it. Turn the ignition OFF.



10.19 Undo the screw then free the cable from its holder and the pulley

### Cable renewal

**17** Remove the carburettors (see Section 6).

**18** Unscrew the retainer bar from the top of the cable splitter and withdraw it **(see illustration 10.8a)**. Displace the splitter and free the bottom cable end from the pulley on the duct assembly **(see illustration 10.8b)**.

**19** Undo the top cable retainer screw on the holder on the servo motor, then free the cable from its slot and detach the cable end from the pulley **(see illustration)**. Displace the servo if you can't access the screw (see below).

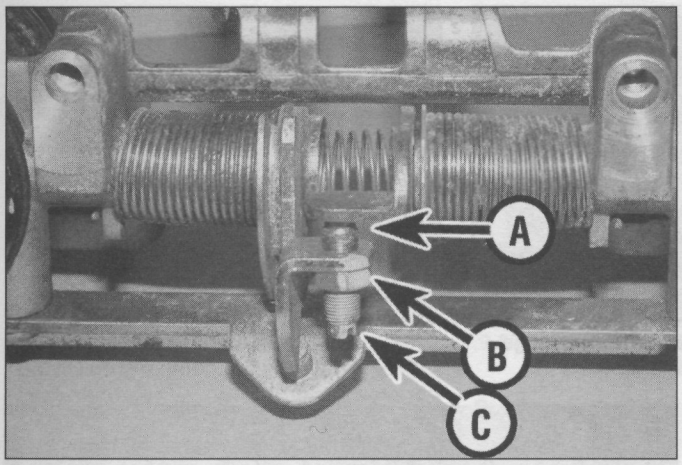
**20** Unscrew the bolt in the cable splitter, then squeeze the tabs and remove the cover **(see illustration 10.16)**. Note the arrangement of the cables and spring and separate them from the splitter.

**21** Replace the cables with new ones as required. Install the cable assembly and splitter in a reverse of the above. Note that the top cable fits into the front slot in the holder (numbered 2). Adjust the cables on completion (see above).

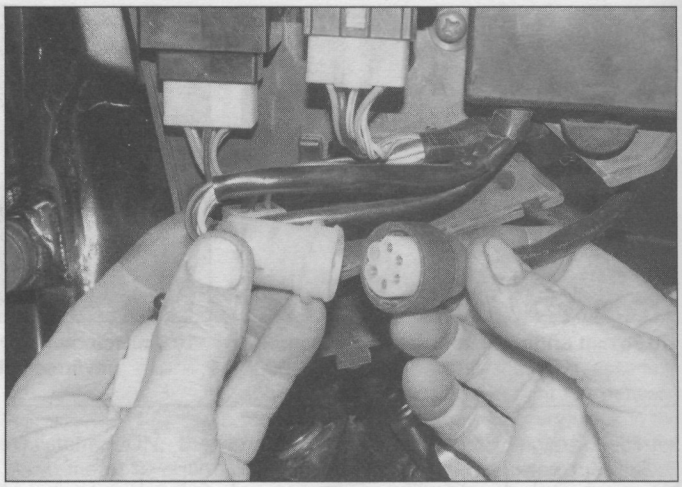
### Valve synchronisation

**22** Check the cable adjustment as described above and adjust if necessary.

**23** Measure the clearance between the top of the adjuster screw in the pulley and the plate




**10.23 Measure the clearance between the top of the adjuster screw and the plate (A). Slacken the locknut (B) and turn the adjuster (C) as required to adjust the clearance**



**10.26 Disconnect the servo wiring connector**

above it **(see illustration)**. The clearance should be between 0.3 and 0.5 mm. If not, adjust it as follows:

**24** Slacken the locknut on the adjuster screw and turn the adjuster as required until the clearance is as specified (0.4 mm) **(see illustration 10.23)**. Apply some non-permanent thread locking compound above the locknut and tighten it.

## *Servo motor*

### Check

**25** If not already done perform the system check (see above).

**26** If the system check points to faulty servo motor, remove the left-hand side cover (see Chapter 8), then disconnect the servo wiring connector **(see illustration)**.

**27** Using a fully charged 12 volt battery and a set of suitable jumper wires, connect the positive (+ve) wire from the battery to the black/yellow wire terminal on the servo wiring connector, and the negative (–ve) wire to the black/red wire terminal. The servo should operate – if not, replace it with a new one.

**28** Using a multimeter or ohmmeter set to the K-ohms scale, connect the meter probes first between the yellow/blue and white/red wire terminals on the servo wiring connector and note the reading. Now connect them between the white/red and white/black wire terminals and again note the reading. Add the two readings together – if the result is not within the resistance range specified at the beginning of the Chapter, replace the servo with a new one.

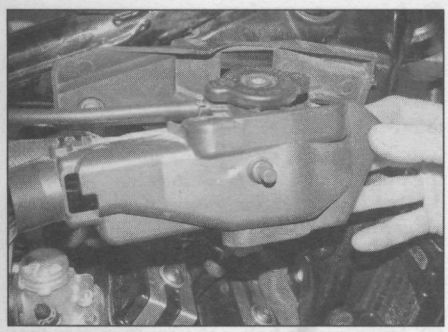
### Removal and installation

**29** Remove the air filter housing (see Section 2).

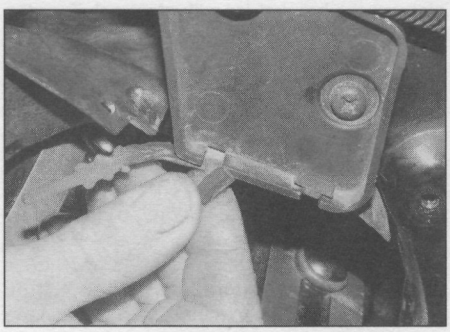
**30** Trace the wiring from the servo and disconnect it a the connector **(see illustration 10.26)**. Feed the wiring through to the servo, noting its routing.

**31** Remove the cover from the radiator filler neck on the right-hand side of the frame **(see illustration)**. Release the front cylinder heat shield tabs from the lower edge of the radiator filler neck mounting board **(see illustration)**. Undo the screws securing the board and displace it – there is no need to drain the cooling system or detach any hoses, but watch the wiring and disconnect the connectors if necessary **(see illustration)**. Mark the locations of all wires and leads before disconnecting them.

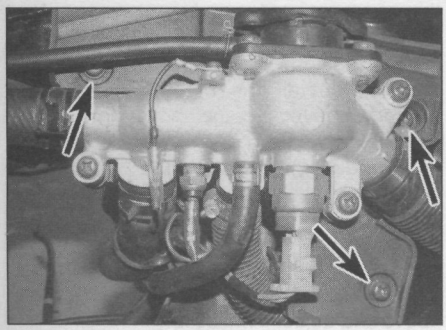
**32** Undo the two screws securing the servo motor and displace it **(see illustration)**. Undo



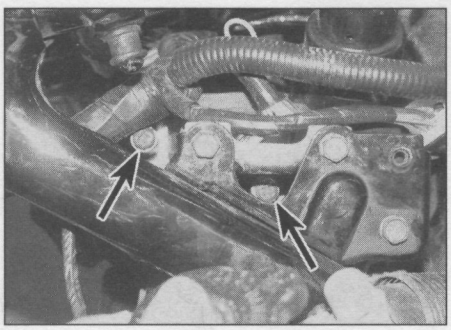
**10.31a Remove the filler neck cover**



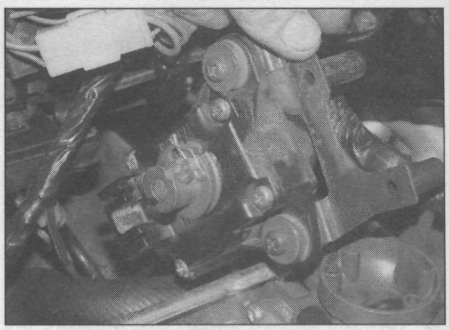
**10.31b Release the tabs . . .**



**10.31c . . . then undo the screws (arrowed) and displace the board**



**10.32a Undo the two screws (arrowed) and displace the servo**



**10.32b Detach the cable and remove the servo**

the cable retainer screw on the holder, free the cable from its slot, and detach the cable end from the pulley **(see illustration 10.19)**. Remove the servo **(see illustration)**.

**33** Installation is the reverse of removal. Note that the top cable fits into the front slot in the holder on the servo (numbered 2).

### Control unit

#### Check

**34** If not already done perform the system check (see above).

**35** If the system check points to a faulty control unit, replace it with a new one (see below) – no individual tests are specified for the unit.

#### Removal and installation

**36** Remove the top cover and left-hand side cover (see Chapter 8).

**37** Disconnect the control unit wiring connectors **(see illustration 10.3)**, then undo the screw and remove the unit from the electrical board **(see illustration)**.

**38** Installation is the reverse of removal. Make sure the connectors are securely connected.

## 11 Intake duct assemblies

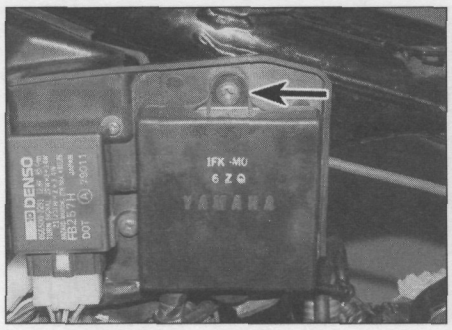
***Warning: Refer to the precautions given in Section 1 before starting work.***

**Note:** *The intake duct assemblies are only relevant to restricted power models – they fit in place of the V-Boost assembly fitted on full power models.*

**1** Remove the carburettors from the machine (see Section 6).

**2** When removing the left-hand duct assembly release the ignition advance unit vacuum hose clamp and detach the hose from its union on the No. 2 cylinder intake duct **(see illustration 10.7)**.

**3** Unscrew the two bolts securing each intake duct to its cylinder head **(see illustration 10.9a)**. Lift the duct assembly off and remove it. Discard the duct O-rings as new ones must be used. Plug the ports in the cylinder heads with clean rag. Note that the outer bolt for the front left and rear right ducts is shorter than the other bolt.




**10.37 Control unit screw (arrowed)**

**4** If required, slacken the clamp screws and separate the duct assembly into its individual components, noting which fits where – if you do this it is best to mark each intake duct with the identity of its cylinder as they are handed (the joint rubbers, clamps and blanking pieces are not).

**5** *Installation is the reverse of removal, noting* the following:

- Check for cracks or splits in the duct joint rubbers, and replace them with new ones if necessary.
- Fit a new O-ring into the groove on the underside of each intake duct. Make sure each duct is returned to its original position.
- Make sure that the shorter bolts are returned to the outer hole for the front left and rear right ducts.

## 12 Fuel pump and relay – check, removal and installation

***Warning: Refer to the precautions given in Section 1 before starting work.***

### Check

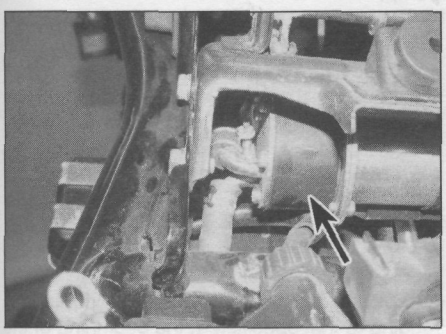
**1** The fuel pump is mounted underneath the bracket behind the coolant reservoir union – remove the rider's seat and the top cover for access (see Chapter 8) **(see illustration)**. The fuel pump relay is mounted on the electrical board behind the left-hand side cover – remove the cover for access (see Chapter 8) **(see illustration)**.

**2** The fuel pump is controlled through the relay so that it runs for about five seconds to prime the carburettors when the ignition and kill switches are turned ON, and whenever the ignition is operative (i.e. when the engine is turning over). When the ignition is stopped, the relay will cut off the fuel pump's electrical supply (so that there is no risk of fuel being sprayed out under pressure in the event of an accident). When the low fuel warning light comes on, the pump will stop after 30 seconds unless the fuel reserve switch is turned to RES.

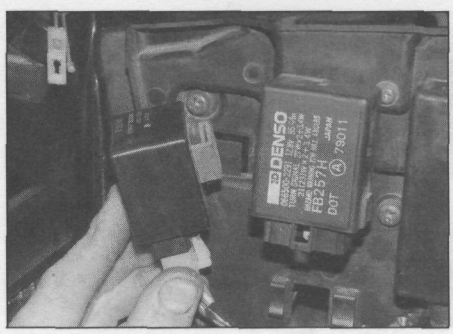
**3** It should be possible to hear or feel the fuel pump running whenever the engine is turning over – either place your ear close beside the fuel pump or feel it with your fingertips. If you can't hear or feel anything, check that the battery is fully charged and the ignition circuit fuse is good (see Chapter 9) and that all the wiring is good. Check the pump and relay for loose or corroded connections or physical damage and rectify as necessary.

**4** To check whether the pump is operating, remove the air filter housing (see Section 2), then release the clamp securing the fuel supply hose to the carburettors and detach the hose **(see illustration 6.4)**. Place the open end in a container suitable for storing petrol (gasoline). Turn the engine over on the starter motor and check to see whether fuel flows from the hose into the container. If fuel flows, the pump is working correctly. If no fuel flows, first check that this is not due to a blocked filter or hose. Check all the hoses for splits, cracks and kinks, and check that they are securely connected on each end by a good clamp.

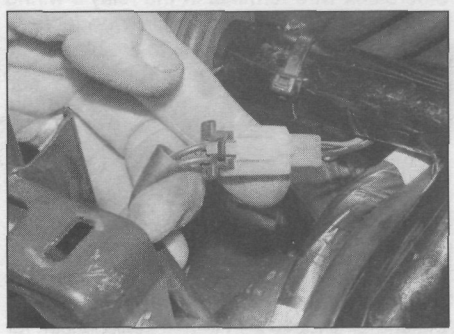
**5** If the pump still does not work, trace the wiring from the pump and disconnect it at the connector **(see illustration)**. Using an ohmmeter, connect the positive (+ve) probe to the pump's blue/black wire terminal, and the negative (–ve) probe to the black terminal, and measure the resistance. If the reading is not as specified at the beginning of the Chapter, replace the pump with a new one. A definitive check of the pump can be made by removing it (see below), and connecting a fully charged



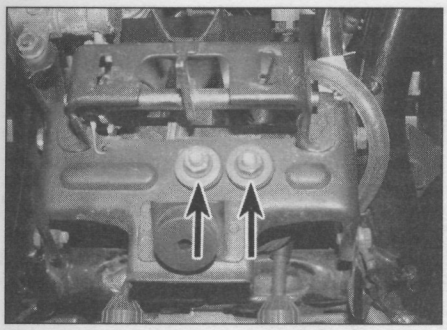
**12.1a Fuel pump (arrowed)**



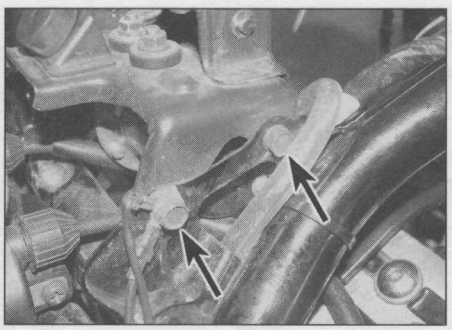

**12.1b Fuel pump relay**



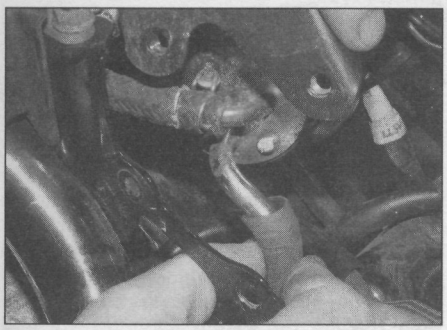
**12.5 Disconnect the fuel pump wiring connector**



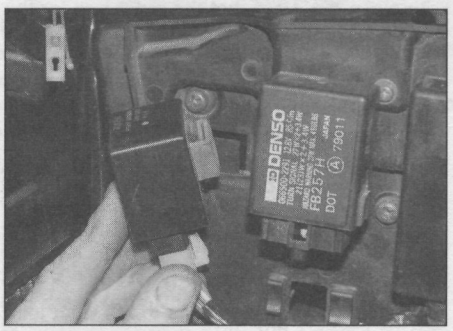
12.10a Slacken the nuts (arrowed) . . .



12.10b . . . then unscrew the bracket bolts (arrowed) on each side



12.11 Detach the hoses from the pump, noting which fits where




12.15 Displace the relay and disconnect its wiring connector

12 volt battery to it using two insulated jumper wires, connecting the positive (+ve) terminal of the battery to the pump's blue/black wire terminal, and the negative (–ve) terminal of the battery to the pump's black terminal. The pump should work. If it doesn't, replace it with a new one. It is possible to disassemble the pump for cleaning or inspection – holding the diaphragm up to the light will reveal any splits or holes – but no individual components are available for it.

**6** If the circuit is fine so far, and if the pump works when removed and connected to a remote battery as above, the problem lies in the relay, the wiring, or other components in the circuit that influence the relay, for example the ignition control unit or the fuel reserve switch. Switch the ignition ON. Using a voltmeter or multimeter set to the 20V dc scale, connect the positive (+ve) probe to the blue/black wire terminal in the relay's wiring connector (which must be still connected), and the negative (–ve) probe to the black wire terminal. Start the engine. There should be battery voltage present, which is the relay output voltage to the pump. If there is voltage, check the wiring and connectors between the relay and the pump. If no voltage is present, perform the same check between the red/white (+ve) and black (–ve) wire terminals to check for input voltage to the relay. If no voltage is present, check the red/white wire for faults, referring to the *Wiring Diagrams* at the end of Chapter 9. If that is good, check for continuity in the black wire to earth. If all is good so far, check the fuel reserve switch circuit (see Chapter 9), the ignition circuit relating to the No. 1 cylinder HT coil and including the ignition control unit (see Chapter 5), and the fuel level sensor circuit (see Section 13). If all these circuits are good, then the relay is faulty and must be replaced with a new one. To avoid having to make all the electrical circuit checks, obtain a substitute relay that is known to be good and see whether the problem is resolved.

### *Removal and installation*

#### Fuel pump

**7** The fuel pump is mounted underneath the bracket behind the coolant reservoir union – remove the rider's seat and the top cover for access (see Chapter 8).

**8** Remove the coolant reservoir (see Chapter 3).

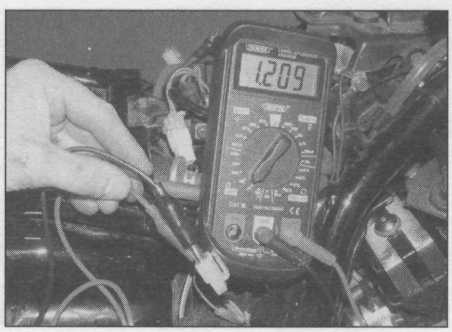
**9** Trace the wiring from the fuel pump and disconnect it at the connector **(see illustration 12.5)**.

**10** Slacken the two nuts securing the pump **(see illustration)**. Unscrew the pump mounting bracket bolts, noting the earth wire secured by the rear bolt on the right-hand side, and displace the bracket **(see illustration)**.

**11** Make a note of which fuel hose fits on which union on the pump as an aid to installation. Using a rag to mop up any spilled fuel, release the clamps and pull the two fuel hoses off their unions **(see illustration)**.

**12** Unscrew the two nuts and remove the pump.

**13** Installation is the reverse of removal. Make sure the fuel hoses are correctly and securely fitted to the pump – the hose to the carburettors attaches to the union marked 'OUTLET'; the hose from the in-line filter attaches to the other union **(see illustration 12.11)**. Make sure the clamps are tight. Do not forget to secure the earth wire with the rear bracket bolt on the right-hand side **(see illustration 12.10b)**. Start the engine and check carefully that there are no leaks at the hose unions.




13.3 Checking fuel level sensor resistance

#### Relay

**14** The fuel pump relay is mounted on the electrical board behind the left-hand side cover – remove the cover for access (see Chapter 8).

**15** Displace the relay from its clip on the board, then disconnect its wiring connector and remove the relay **(see illustration)**.

**16** Installation is the reverse of removal.

## 13 Fuel warning light and level sensor – check and replacement

### *Check*

**1** The circuit consists of the sensor mounted in the fuel tank and the warning light mounted in the instrument panel. It is also linked to the function of the fuel pump via its relay – if the reserve switch on the handlebar is not switched to RES within 30 seconds of the warning light coming on, the relay stops the pump.

**2** If the system malfunctions check first that the battery is fully charged and that the bulb and fuses are good (see Chapter 9). If they are, remove the right-hand side panel (see Chapter 8), and disconnect the sensor wiring connector **(see illustration 3.6)**.

**3** Connect the positive (+ve) probe of an ohmmeter set to the K-ohm scale to the green wire terminal on the sensor side of the wiring connector, and the negative (–ve) probe to the black wire terminal **(see illustration)**. Check the resistance of the sensor and compare the reading to that specified at the beginning of the Chapter. If the reading is not within the range specified, replace the sensor with a new one.

4 If the reading is as specified, check the green wire between the loom side of the connector and the warning light bulbholder for continuity, and the black wire for continuity to earth. Also check the green wire for continuity to the fuel pump relay wiring connector.

### Replacement

⚠ ***Warning: Refer to the precautions given in Section 1 before starting work.***

5 See Chapter 9 for replacement of the warning light bulb.

6 To replace the sensor, remove the right-hand side panel (see Chapter 8), and disconnect the sensor wiring connector **(see illustration 3.6)**. Feed the wiring down to the sensor, noting its routing.

7 Remove the swingarm (see Chapter 6).

8 Now you have to drain the tank. To do this, position a suitable container (make sure it is large enough) under the tank, and have a supply of rag to hand. Unscrew the drain bolt and allow the tank to drain into the container **(see illustration 3.7)**. Discard the sealing washer as new one should be used.

9 Free the sensor wiring grommet from the cut-out and the wiring from its guide **(see illustration)**. Undo the screws securing the sensor and carefully withdraw it from the tank **(see illustrations)**. Discard the rubber O-ring.

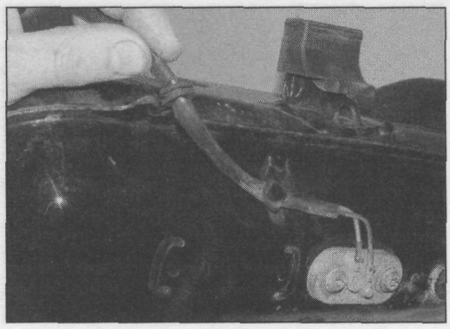
10 Fit a new O-ring into the groove in the sensor base then install it in the tank with the wiring to the front **(see illustration)**. Tighten the screws evenly. Fit the sensor wiring grommet into the cut-out and the wiring into its guide, then feed it back up to its connector and re-connect it.

11 Install the tank drain bolt using a new sealing washer. Install the swingarm (see Chapter 6). Check carefully for leaks around the sensor before using the bike.

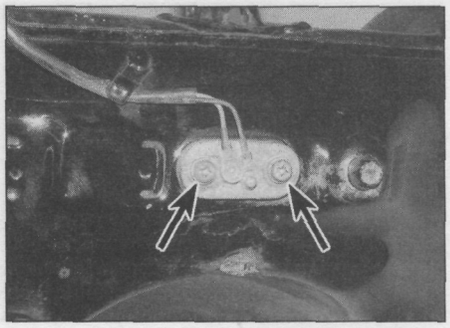
## 14 Throttle cables – removal and installation

⚠ ***Warning: Refer to the precautions given in Section 1 before proceeding.***

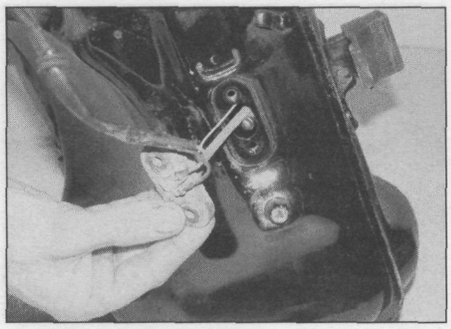
**Note:** *Four cables make up the whole throttle system, two opening cables and two closing cables, with a splitter fitted behind the electrical component board, itself behind the left-hand side cover. All cables are available individually, though if one breaks you can be fairly certain that the others will be nearing the end of their life, so it would be worth renewing them all.*



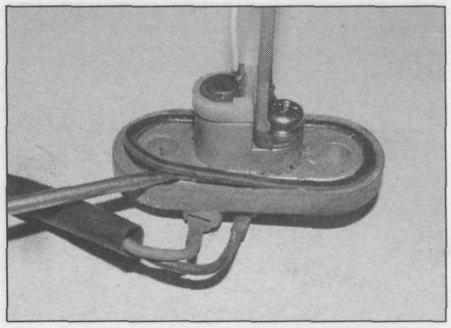
**13.9a Free the wiring . . .**



**13.9b . . . then undo the screws (arrowed) . . .**



**13.9c . . . and withdraw the sensor**



**13.10 Always use a new O-ring, and make sure it is located in its groove**

### Removal

1 Remove the left-hand side cover (see Chapter 8).

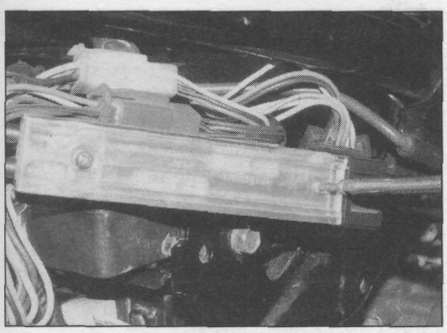
2 Undo the screws securing the electrical component board and displace it – there is no need to disconnect any connectors, but watch the wiring and disconnect them if necessary **(see illustration 6.2)**. Mark the locations of all wires and leads before disconnecting them.

3 Undo the splitter cover screws and remove the cover **(see illustration)**. Make a note of the layout of the cables as an aid to installation – there is a certain amount of information on the cover, but supplement it if necessary.

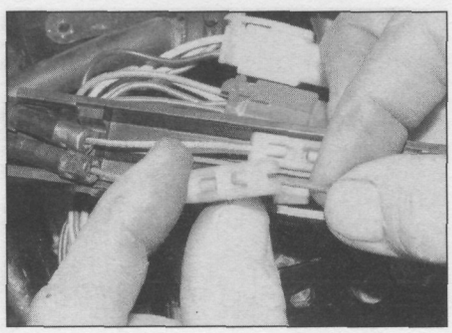
4 Free the outer ends of the cables on the handlebar side from the splitter, then detach the inner cable ends from the sliders, noting how they fit **(see illustration)**. Free the sliders from the inner cable ends on the carburettor side and remove the sliders. Undo the cable holder screw for the cables on the carburettor side and separate them from the splitter **(see illustration)**.

5 To remove the cables from the carburettors, pull the outer cable ends from their holders and detach the inner cable ends from the cam, noting which fits where **(see illustration)**. Withdraw the cables from the machine noting their correct routing.

6 To remove the cables from the pulley in the switch housing, first note the alignment of the



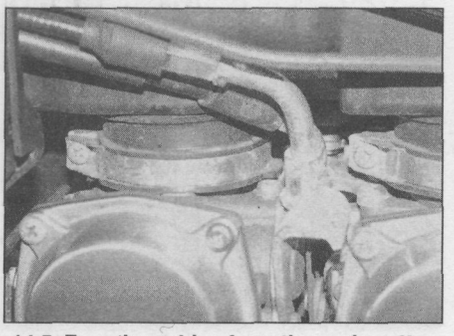
**14.3 Undo the screws and remove the cover**



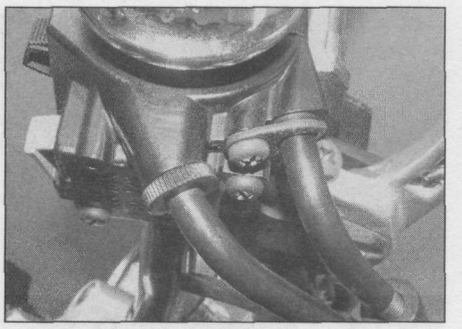
**14.4a Free the throttle cables from the splitter and the sliders**



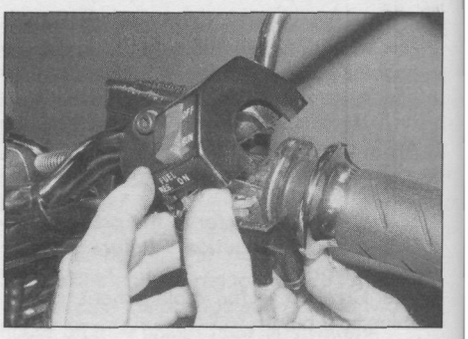
**14.4b Undo the screw and remove the holder to free the carburettor cables from the splitter**



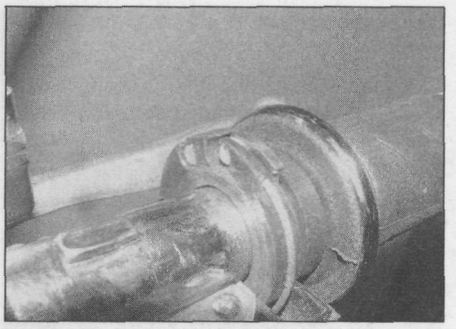
14.5 Free the cables from the carburettor as described



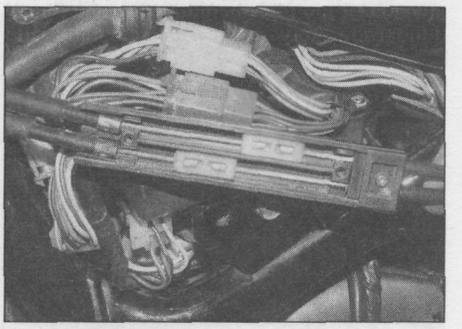
14.6a Undo the cable retainer screw and ring, then the housing screws . . .



14.6b . . . and separate the halves



14.6c Free the cable ends from the pulley



14.7 Cable splitter arrangement

switch housing mating halves with the handlebar by making a mark with a felt pen so they are installed in the same place – there is no locating pin or manufacturer's mark. Undo the opening cable retainer plate screw and the closing cable lockring, then remove the housing screws and separate the halves **(see illustrations)**. Detach the cable ends from the pulley, then withdraw the opening cable from the housing and unthread the closing cable elbow **(see illustration)**. Mark each cable to ensure they connected correctly on installation.

### *Installation*

**7** Installation is the reverse of removal, noting the following:

- The opening cable goes in the front socket in the switch housing, the top slot in the cable splitter and the outer socket in the carburettors. The cable assembly in the splitter should be as shown **(see illustration)**.
- Assemble the switch housing on the handlebar before tightening the elbow retainer plate screw and lockring to allow the cables to align themselves. The longer housing screw goes at the front.
- Lubricate the inner cable ends with multi-purpose grease.
- Make sure the cables are correctly routed – they must not interfere with any other component and should not be kinked or bent sharply.
- Spray some dry lubricant onto the sliders and their runs in the cable splitter. Make sure the splitter cover is fitted with the arrow pointing to the carburettor end as marked.
- Operate the throttle to check that it opens and closes freely.
- Check and adjust the throttle cable freeplay if required (see Chapter 1). Turn the handlebars back and forth to make sure the cable doesn't cause the steering to bind.
- Start the engine and check that the idle speed does not rise as the handlebars are turned. If it does, the throttle cables are routed incorrectly. Correct the problem before riding the motorcycle.

## 15 Exhaust system – removal and installation

***Warning: If the engine has been running the exhaust system will be very hot. Allow the system to cool before carrying out any work.***

### *Removal*

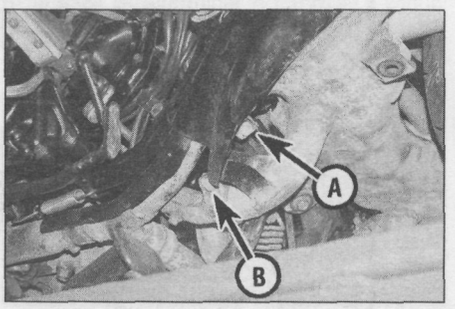
**1** Slacken the clamp bolts securing the front cylinder downpipes in the silencers **(see illustration)**.

> **HAYNES HiNT** ***Exhaust system clamp bolts tend to become corroded and seized. It is advisable to spray them with WD40 or a similar product before attempting to slacken them.***

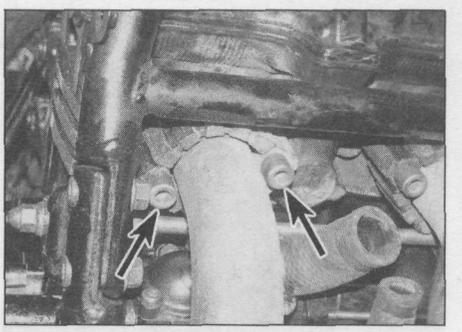
**2** Unscrew the nuts securing the front cylinder downpipes to the cylinder head **(see illustration)**. Draw the flanges off the studs **(see illustration)**.

**3** Simultaneously draw the downpipes off the head and out of the silencers, and remove them **(see illustration)**.

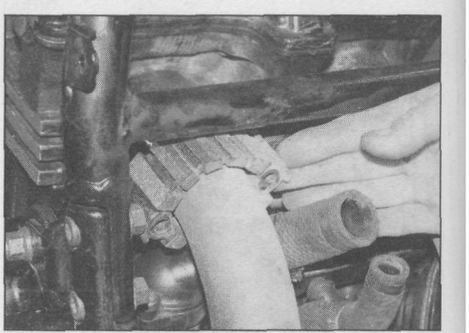
**4** Unscrew the bolt securing the front of the



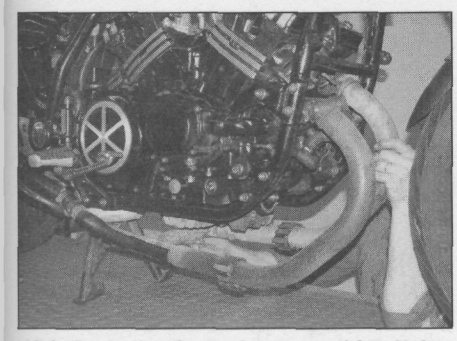

15.1 Front cylinder downpipe clamp bolt (A); rear cylinder downpipe clamp bolt (B) – left-hand side



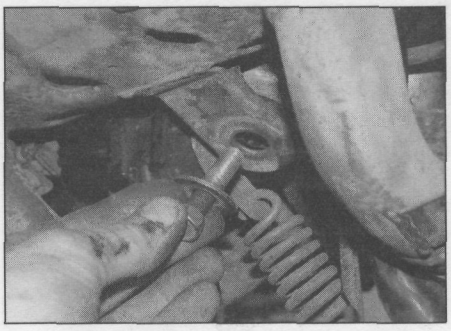
15.2a Unscrew the nuts (arrowed) on each downpipe . . .



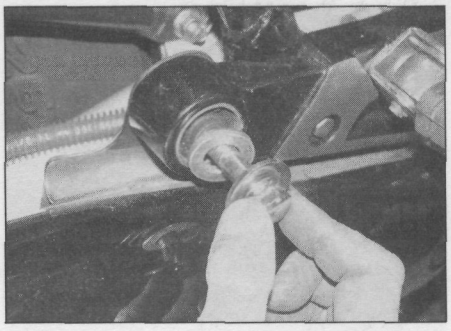
15.2b . . . and draw the flanges off the studs



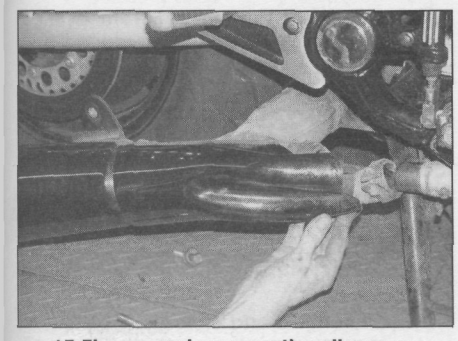
15.3 Draw the downpipe assembly off the head and out of the silences



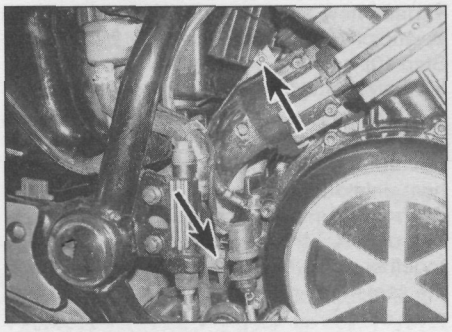
15.4 Unscrew the silencer bolt



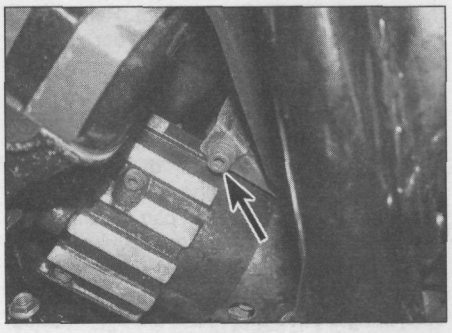
15.5a Unscrew the bolt on each side . . .



15.5b . . . and remove the silencers



15.6a Unscrew the two bolts on the right-hand side (arrowed) . . .



15.6b . . . and the bolt on the left (arrowed) and displace the heat shield

silencer assembly **(see illustration)**. Slacken the clamp bolts securing the rear cylinder downpipes in the silencers **(see illustration 15.1)**.

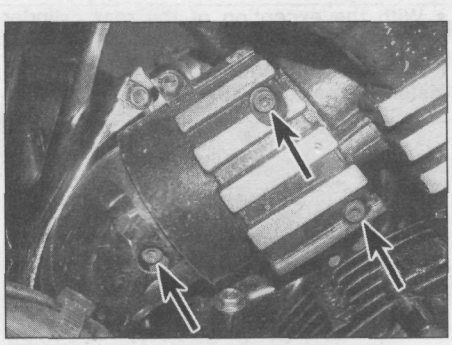
5 Support the silencer assembly, then unscrew the rear bolts, noting the washers **(see illustration)**. Draw the assembly back off the rear cylinder downpipes and manoeuvre it out from under the bike **(see illustration)**.

6 Unscrew the three bolts securing the metal heat shield above the rear cylinder downpipes **(see illustrations)**. Manoeuvre the shield back so it is out of the way. Unscrew the manifold cover bolts and remove the covers **(see illustration)**.

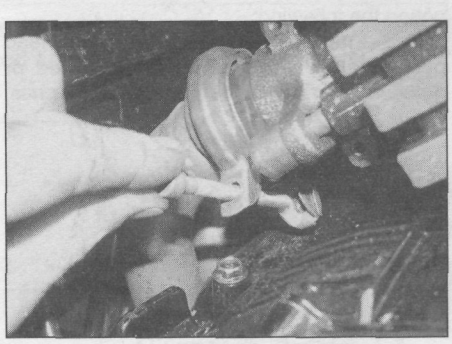
7 Unscrew the clamp bolts securing the rear downpipes in the manifolds **(see illustration)**. Remove the clamps **(see illustration)**. Draw the downpipes out of the manifolds at the same time and manoeuvre them down and out from under the bike – it is easier to remove both pipes at the same time rather than twist them around each other **(see illustration)**. Remove the heat shield **(see illustration)**.

8 If required unscrew the rear cylinder manifold nuts and remove the manifolds.

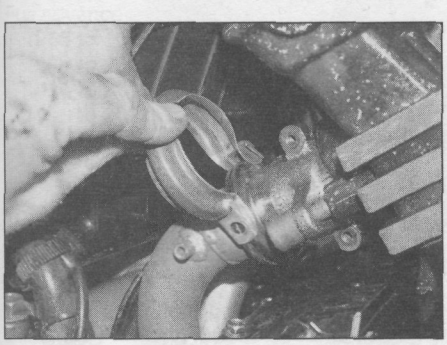
9 Remove the gasket from each port in the cylinder head and discard them as new ones



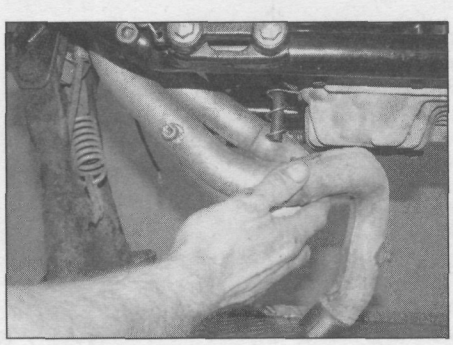
15.6c Unscrew the bolts (arrowed) securing each cover and remove them



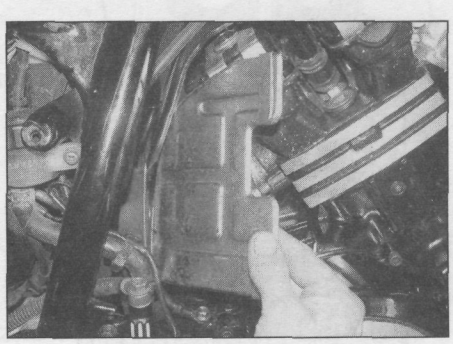
15.7a Unscrew the bolt . . .



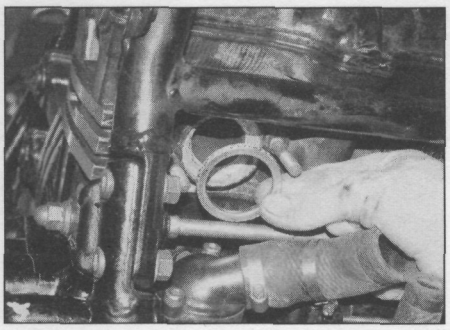
15.7b . . . and remove the clamp on each side



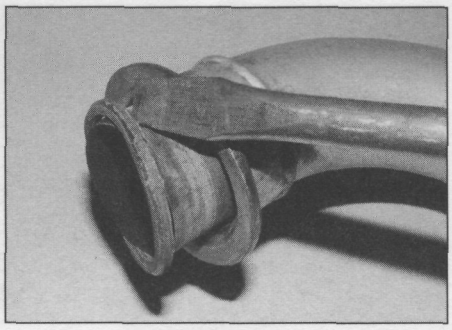
15.7c Manoeuvre the downpipes down and out



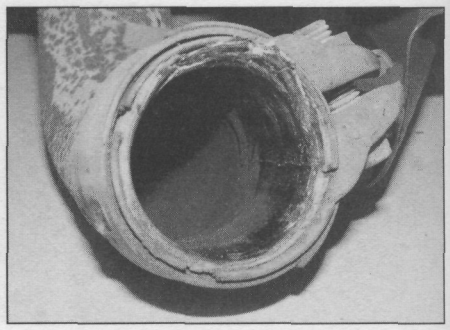
15.7d Remove the heat shield



**15.9a Remove the gasket from each head port . . .**



**15.9b . . . and from the rear cylinder downpipes**



**15.10 Remove the sealing rings from each silencer port if necessary**

must be used **(see illustration)**. Remove the gasket from the top of each rear cylinder downpipe and discard them as new ones must be used **(see illustration)**.

**10** Check the condition of the sealing rings in the silencers and replace them with new ones if they are damaged or deformed **(see illustration)**. **Note:** *Yamaha recommend using new sealing rings, but they can be difficult to remove, and unless they are damaged they are re-usable. It is too easy to damage a new one trying to install it to make it worthwhile destroying a good one that is already installed. If necessary, dig the old ones out using a screwdriver, then push the new ones into place – if you tap them in with a hammer you will damage them, making it difficult for the downpipes to enter.*

### *Installation*

**11** Installation is the reverse of removal, noting the following:

- Use a new gasket in each cylinder head port. Replace any damaged, deformed or deteriorated mounting rubbers with new ones.
- Use new sealing rings between the downpipes and the silencers (but see **Note** in Step 10).
- Apply a smear of copper grease to all nuts and bolts to prevent them from seizing up.
- When installing the rear cylinder downpipes, do not forget to position the heat shield loosely out of the way first as it cannot be installed after the downpipes. Manoeuvre the downpipes into place together – it is easier to install both pipes at the same time rather than twist them around each other.
- When installing the front cylinder downpipes, locate them simultaneously onto the head and into the silencers, then secure them to the head by fitting the flanges and loosely fitting the nuts. Now make sure they are fully inserted in the silencers – tap the cross-piece with a soft-faced hammer to make sure.
- With the exception of the rear cylinder downpipe manifold nuts, leave all fasteners loose until the entire system has been installed, making alignment of the various sections easier. Tighten the front cylinder downpipe flange nuts and the rear cylinder downpipe-to-manifold clamp bolts before the silencer clamp bolts – this helps to align the flanges and reduce the possibility of leaks. Leave the rear cylinder manifold cover bolts loose to help alignment of the heat shield, then tighten the shield bolts first. Note that the shorter cover bolts are for the rear holes.
- Tighten the various nuts and bolts to the torque settings specified at the beginning of the Chapter.
- Run the engine and check the system for leaks. Note that the rear cylinder downpipe joints with the manifolds on the head can be difficult to seal – if leakage is evident, tighten them some more, but if this doesn't stop the leak slacken the silencer clamp bolts as well, then tighten the manifold clamps first as before. Some perseverance may be required – the design of the clamps for the manifold joints are such that if they become distorted they will not hold the components together tightly enough, in which case new clamps are required.