






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	
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Specifications

Fuel

Grade	Unleaded, minimum 91 RON (Research Octane Number)
Fuel tank capacity (including reserve)	
1991 to 1995 TDM models	18.0 litres
1996-on TDM models	20.0 litres
TRX models	18.0 litres
XTZ models	26.0 litres
Reserve	
1991 to 1995 TDM models	3.5 litres
1996-on TDM models	3.1 litres
TRX models	3.5 litres
XTZ models	5.0 litres

4•2 Fuel and exhaust systems

Carburettors

Type	
1991 to 1998 TDM models, all TRX and XTZ models	Mikuni BDST38
1999 TDM models	Mikuni BDSR38
ID mark	
1991 to 1995 TDM models	3VD 00
1996 to 1998 TDM models	4TX 00
1999 TDM models	4TX4
TRX models	4UN 00
XTZ models	3LD 00
Pilot screw setting (turns out)	
1991 to 1995 TDM models	3
1996-on TDM models	2
TRX models	2 1/2
XTZ models	2
Fuel level (see text)	
1991 to 1995 TDM models	7.4 to 8.4 mm above float chamber line
1996 to 1998 TDM models and TRX models	15.8 to 16.8 mm below MIKUNI mark
1999 TDM models	3.4 to 4.4 mm below line
XTZ models	5.1 to 6.1 mm above float chamber line
Idle speed	see Chapter 1

Carburettor jet sizes

Main jet	
1991 to 1995 TDM models	140
1999 TDM models	147.5
All other models	142.5
Main air jet	
1991 to 1995 TDM models	50
1999 TDM models	65
All other models	60
Jet needle	
1991 to 1995 TDM models	5G52-3
1996 to 1998 TDM models and all TRX models	5E185-2/5
1999 TDM models	1 - 6DJP17; 2 - 6CL1
XTZ models	5C19-3
Needle jet	
1991 to 1995 TDM models and all XTZ models	Y-4
1996 to 1998 TDM models and all TRX models	Y-2
1999 TDM models	P-O
Pilot air jet	
XTZ models	60
1999 TDM models	87.5
All other models	70
Pilot jet	
1991 to 1995 TDM models	37.5
1996 to 1998 TDM models and all TRX models	45
1999 TDM models	17.5
XTZ models	42.5
Starter jet	
XTZ models	70
1999 TDM models	32.5
All other models	75

Fuel level sender

Resistance	
Fuel tank full	4 to 10 ohms @ 20°C
Fuel tank empty	90 to 100 ohms @ 20°C

Torque settings

Exhaust downpipe flange nuts	20 Nm
Exhaust clamp bolts	20 Nm
Silencer and collector box mounting bolts	24 Nm
Footrest bracket mounting bolts (XTZ models)	20 Nm

1 General information and precautions

General information

The fuel system consists of the fuel tank with internal filter, fuel tap, fuel pump, carburettors, fuel hoses and control cables.

On TDM models, a remote fuel tap is fitted for normal operation, while the filter is integral with the fuel outlet assembly from the tank. On TRX models, a vacuum-operated fuel tap with integral filter is mounted on the left-hand side of the fuel tank. On XTZ models, a fuel tap with integral filter is mounted on each side of the fuel tank.

Fuel is pumped to the carburettors by a vacuum-operated fuel pump on all TRX and XTZ models and 1991 to 1998 TDM models. The 1999 TDM model has an electrically-operated fuel pump.

The carburettors used on all models are CV types. There is a carburettor for each cylinder. For cold starting, a choke knob is connected to the carburettors by a cable. On 1991 to 1995 TDM models, the choke knob is mounted above the front sprocket cover; on 1996-on TDM models and XTZ models it is mounted on the handlebars; on TRX models it is mounted on the frame between the fuel tank and the fairing. On 1996-on TDM and TRX models the carburettors are warmed by the engine's coolant.

Air is drawn into the carburettors via an air filter which is housed under the fuel tank.

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

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

Precautions

Warning: Petrol (gasoline) is extremely flammable, so take extra precautions when you work on any part of the fuel system. 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.

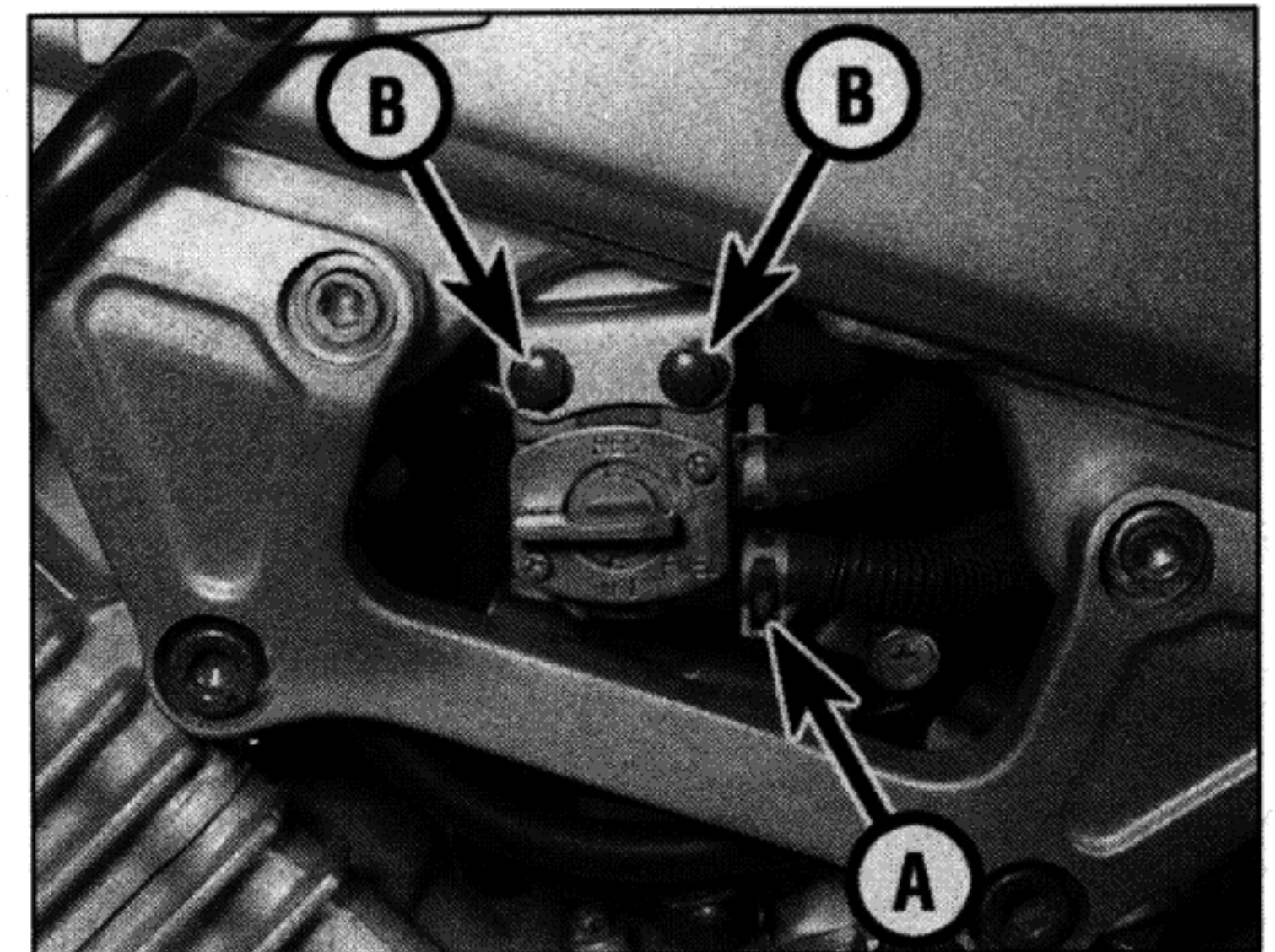
Always mop up any spilt fuel and safely dispose of the rag used.

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 Fuel tank and fuel tap(s) – removal and installation

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



2.2 Detach the lower hose (A), then unscrew the bolts (B) and displace the tap

Fuel tank – TDM models

Removal

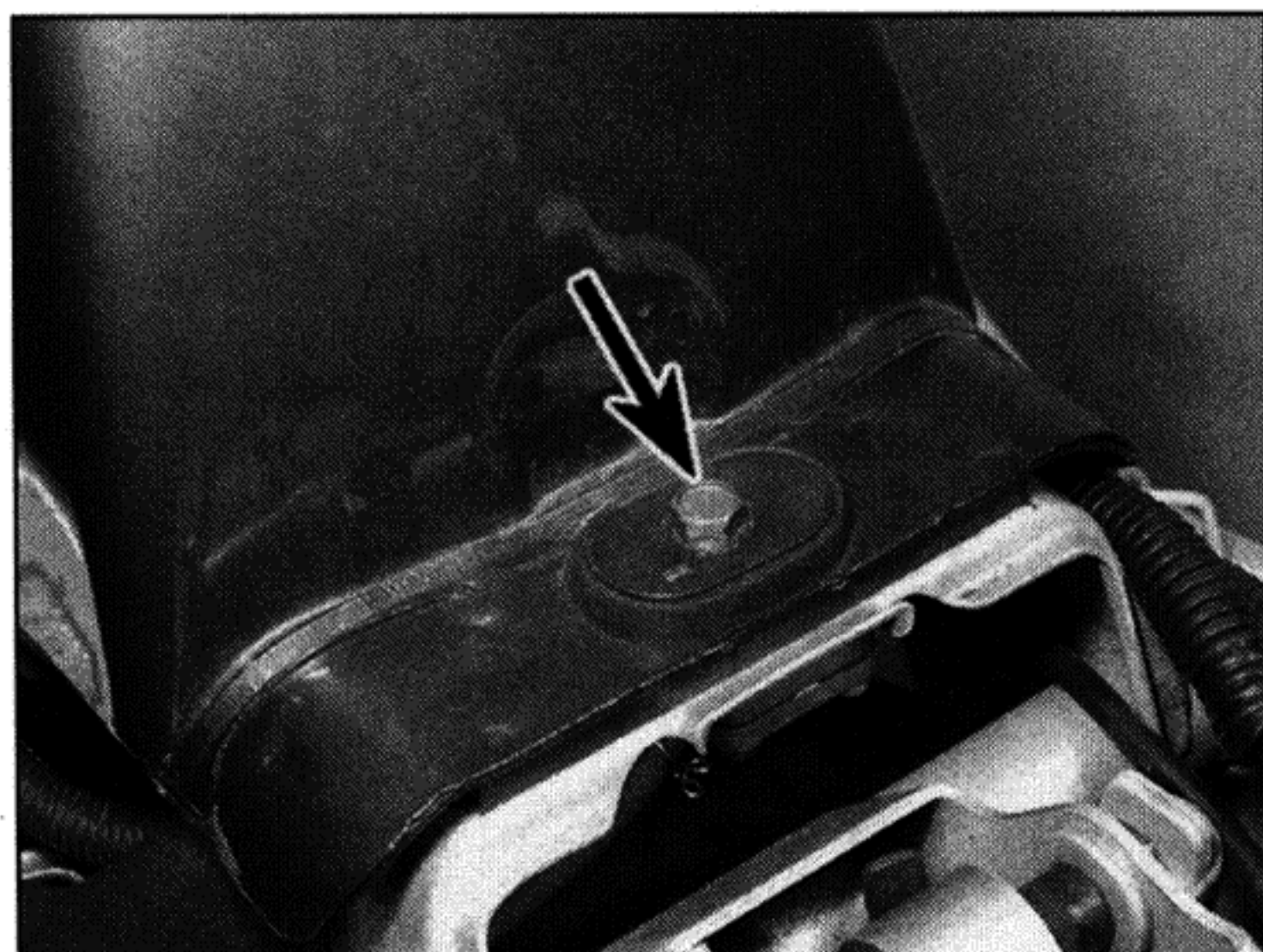
1 Make sure the fuel cap is secure and the fuel tap is in the OFF position. On 1991 to 1995 models, remove the seat, the fairing side panels and the fairing (see Chapter 8). On 1996-on models, remove the seat, the fairing side panels and the side trim panels (see Chapter 8).

2 On 1991 to 1995 models, release the clamp securing the lower hose (to the fuel pump) on the remote fuel tap and detach the hose, then unscrew the bolts securing the tap and displace it (**see illustration**).

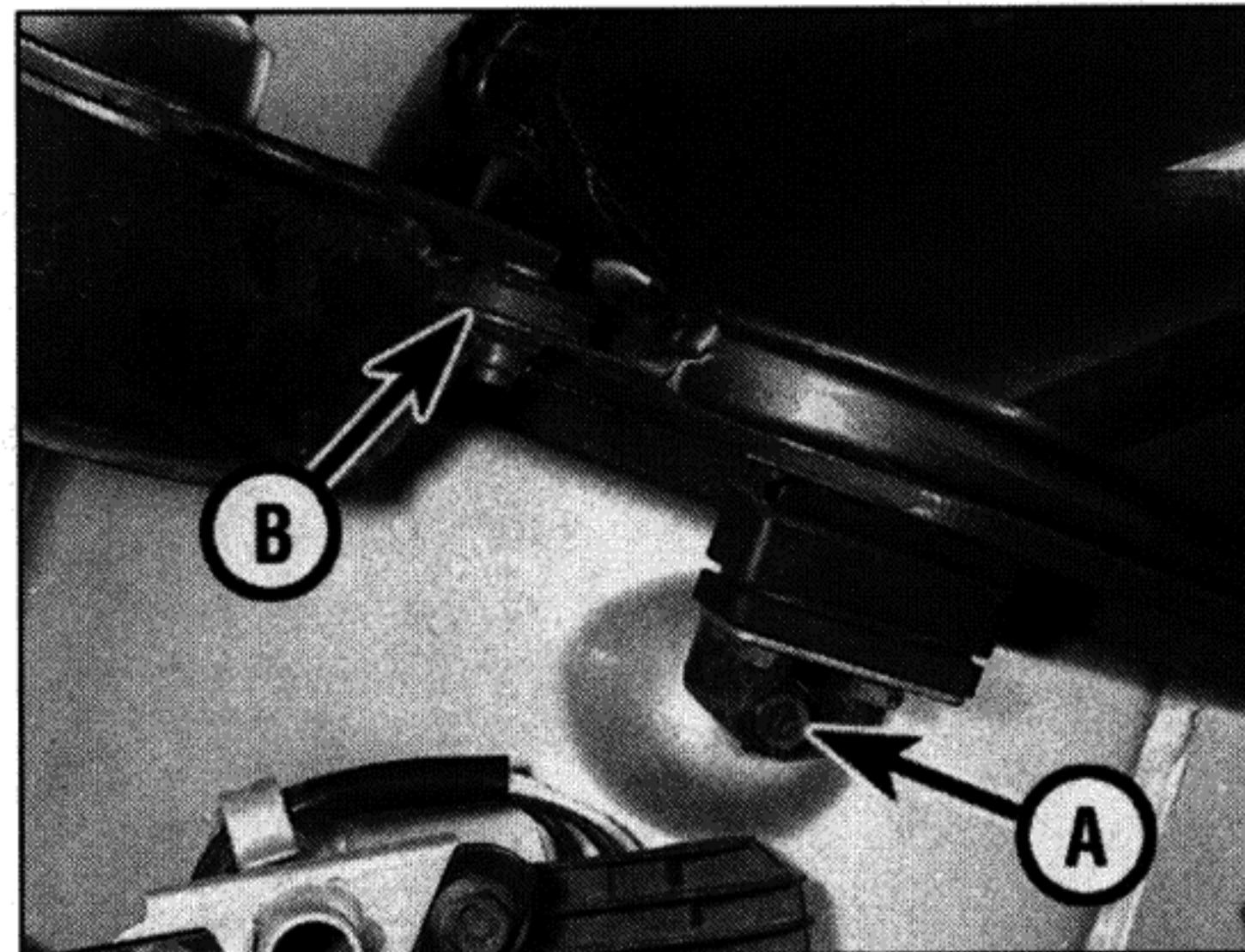
3 On 1996 to 1998 models, either proceed as described for the earlier models in Step 2, or close the tap on the fuel outlet assembly under the tank and detach the fuel hoses from the outlet, noting which fits where. Note that access may be restricted until the tank bolts have been removed and the tank can be raised at the rear.

4 On 1999 models, turn the fuel tap lever to the OFF position. Release the clamp securing the hose to the side of the fuel tap and detach the hose.

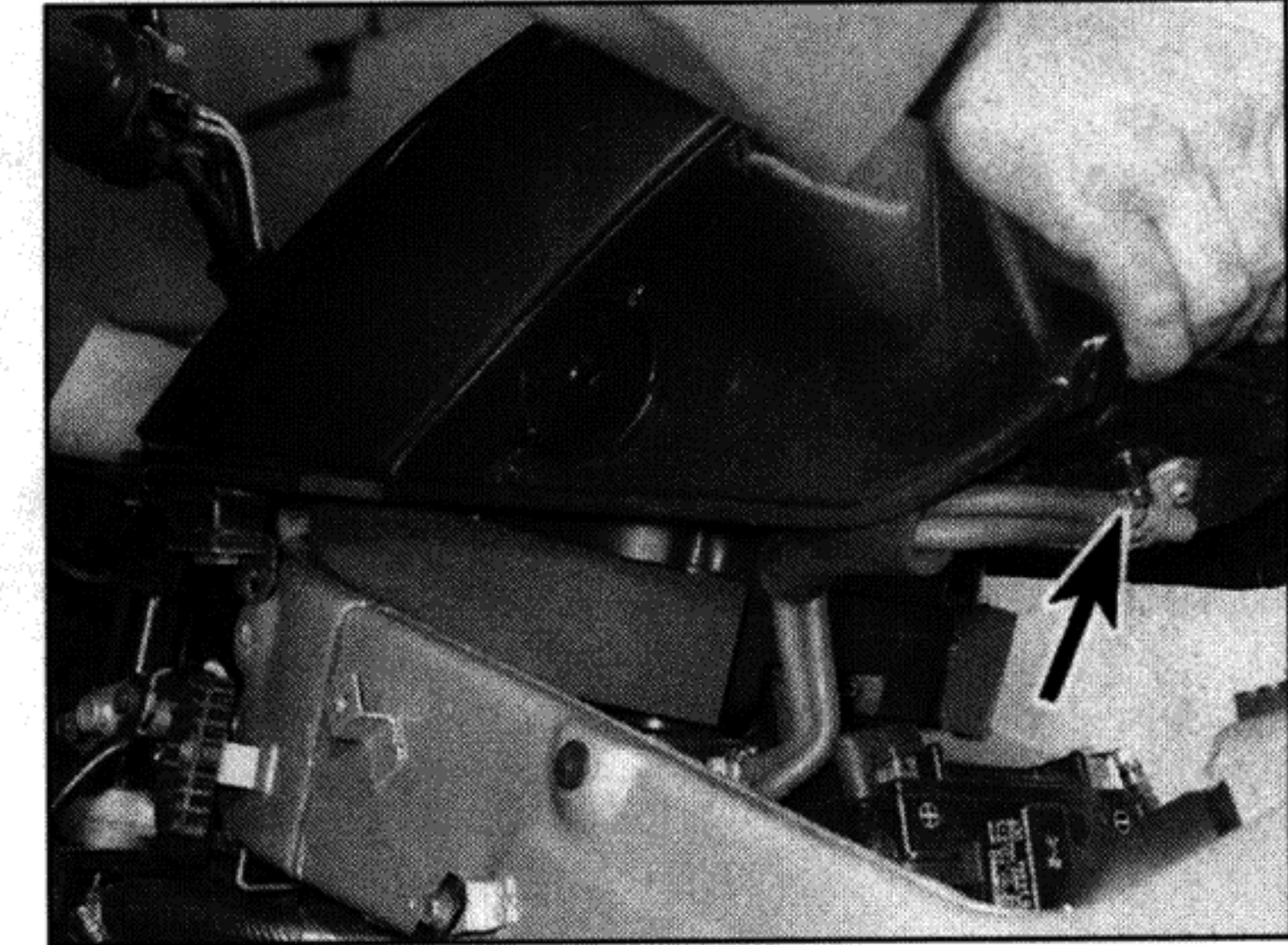
5 Unscrew the bolt securing the rear of the tank, then unscrew the bolt on each side at the front and release the trim panel from the lug (**see illustrations**). Raise the tank at the rear and release the clamp securing the breather hose to its union and detach the hose (**see illustration**). On 1991 to 1998



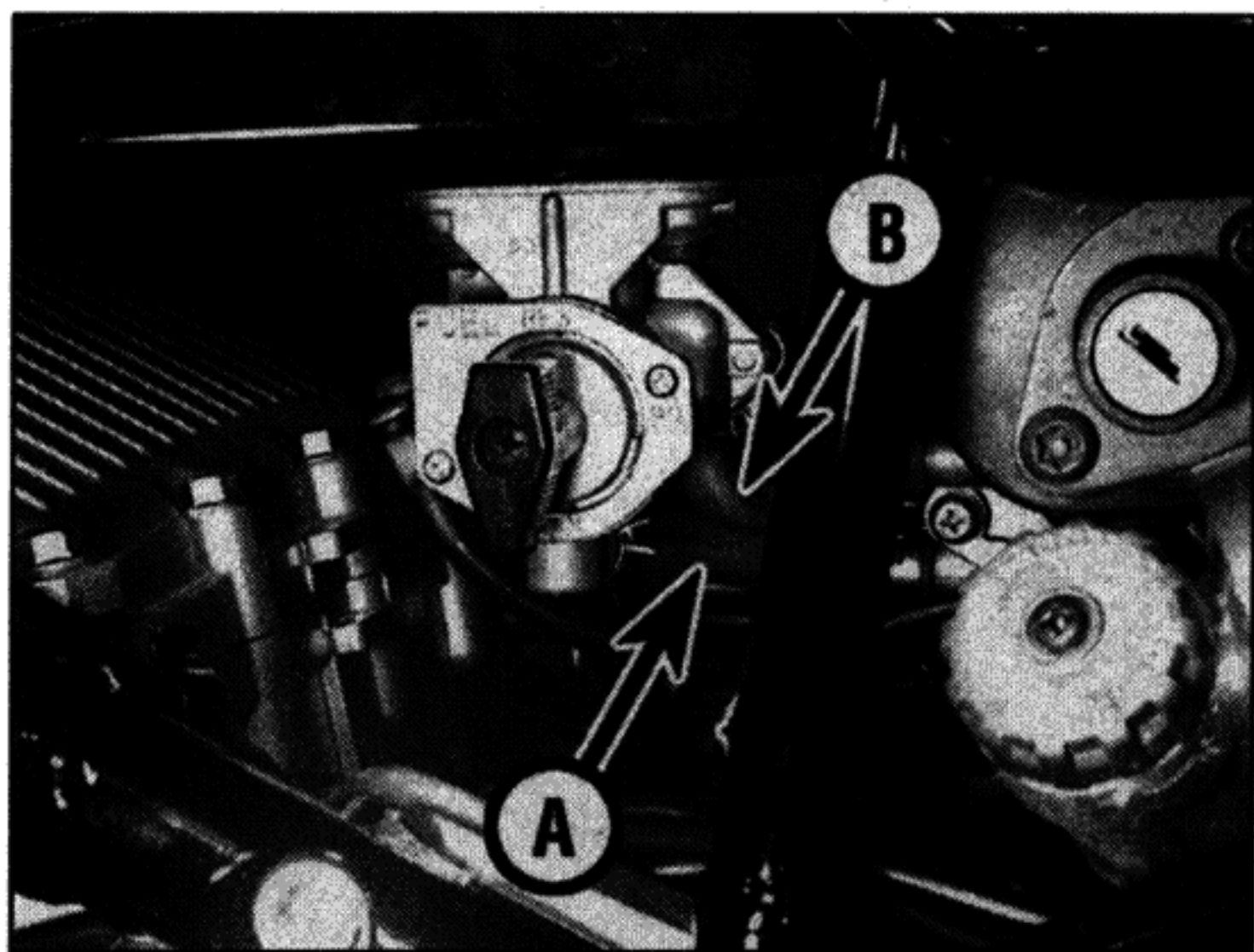
2.5a Unscrew the rear bolt (arrowed) ...



2.5b ... and the bolt on each side (A), and release the trim from the lug (B)



2.5c Detach the hose from the union (arrowed) and remove the tank



2.9a Detach the fuel hose (A), the vacuum hose (B) . . .

models, carefully lift the tank off the frame and remove it, bringing the remote fuel tap and hoses with it (where still attached), making sure the tap does not get snagged. On 1999 models, carefully lift the tank up to access the fuel level sender wiring; disconnect the wiring and remove the tank, making sure the tap does not get snagged.

6 Inspect the tank mounting rubbers for signs of damage or deterioration and renew them if necessary.

Installation

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

- Make sure the hoses are properly attached and secured by their clamps.*
- On 1996 to 1998 models, if the tap on the fuel outlet from the tank was turned OFF, do not forget to turn it back ON.*
- Don't forget to reconnect the fuel level sender wiring on 1999 TDM models.*
- Start the engine and check that there is no sign of fuel leakage, then shut it off.*

Fuel tank – TRX models

Removal

8 Make sure the fuel filler cap is secure and the fuel tap is in the ON or RES position. Remove the seat (see Chapter 8).

9 Release the clamps securing the fuel hose to the fuel pump and the vacuum hose to the fuel tap and detach the hoses (see illustration). Also release the clamp securing



2.9b . . . and the breather hose (arrowed)

the breather hose to its union and detach the hose (see illustration).

10 Unscrew the nut and withdraw bolt securing the rear of the tank, then unscrew the bolt on each side at the front (see illustrations).

11 Carefully lift the tank off the frame and remove it.

12 Inspect the tank mounting rubbers for signs of damage or deterioration and renew them if necessary.

Installation

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

- Make sure the hoses are properly attached and secured by their clamps.*
- Start the engine and check that there is no sign of fuel leakage, then shut it off.*

Fuel tank – XTZ models

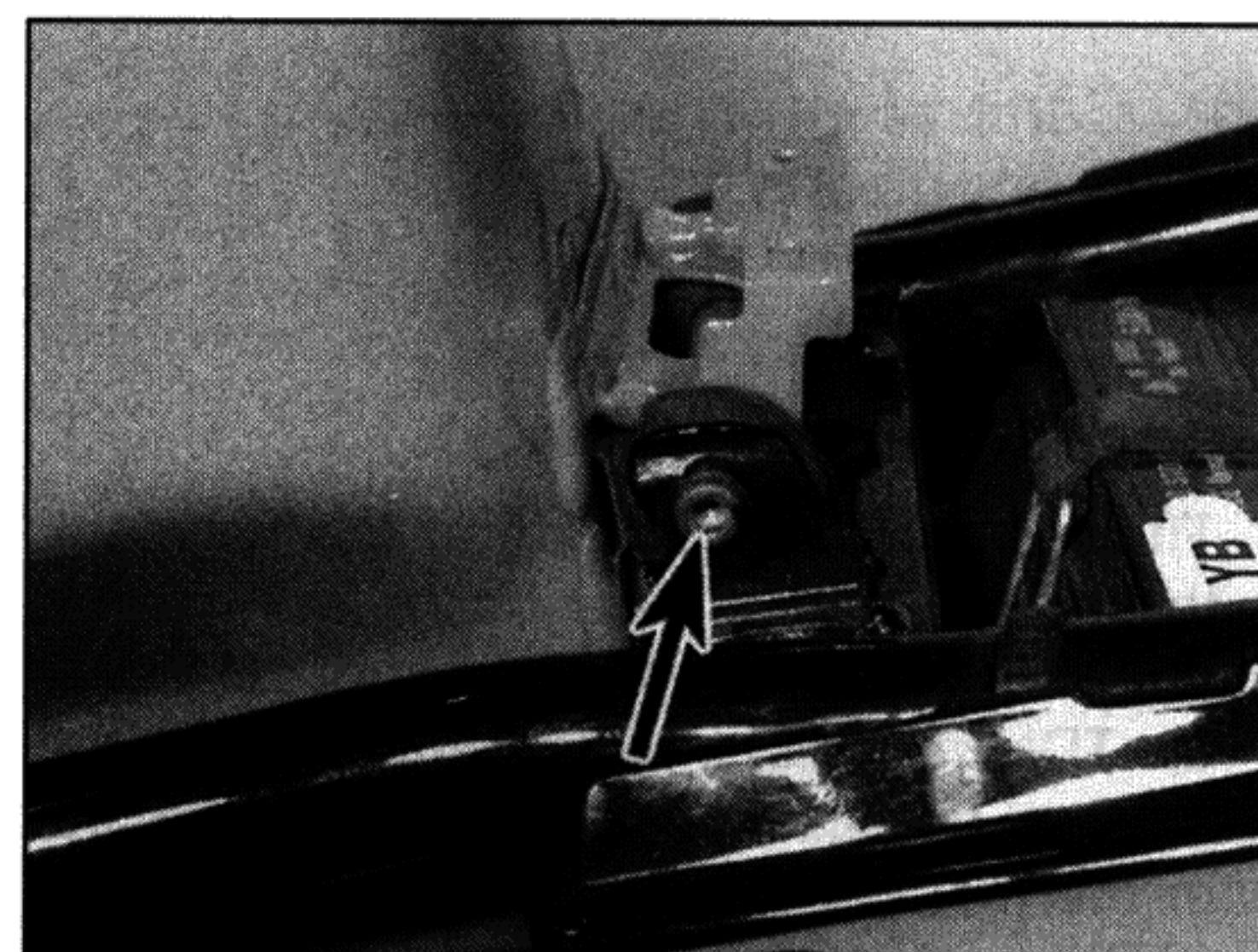
Removal

14 Make sure the fuel filler cap is secure and both fuel taps are in the OFF position. Remove the seat and the fairing side panels (see Chapter 8).

15 Release the clamp securing the fuel hose to each fuel tap and detach the hoses.

16 Unscrew the bolts securing the rear of the tank, then unscrew the bolt on each side at the front, and the top bracket-to-frame bolt (see illustrations).

17 Carefully lift the tank off the frame and remove it.



2.10a Remove the rear mounting bolt (arrowed) . . .

18 Inspect the tank mounting rubbers for signs of damage or deterioration and renew them if necessary.

Installation

19 Installation is the reverse of removal, noting the following:

- Make sure the hoses are properly attached and secured by their clamps.*
- Start the engine and check that there is no sign of fuel leakage, then shut it off.*

Fuel tap(s)

Removal

Note: The tap should not be removed unnecessarily from the tank to prevent the possibility of damaging the O-ring or the filter.

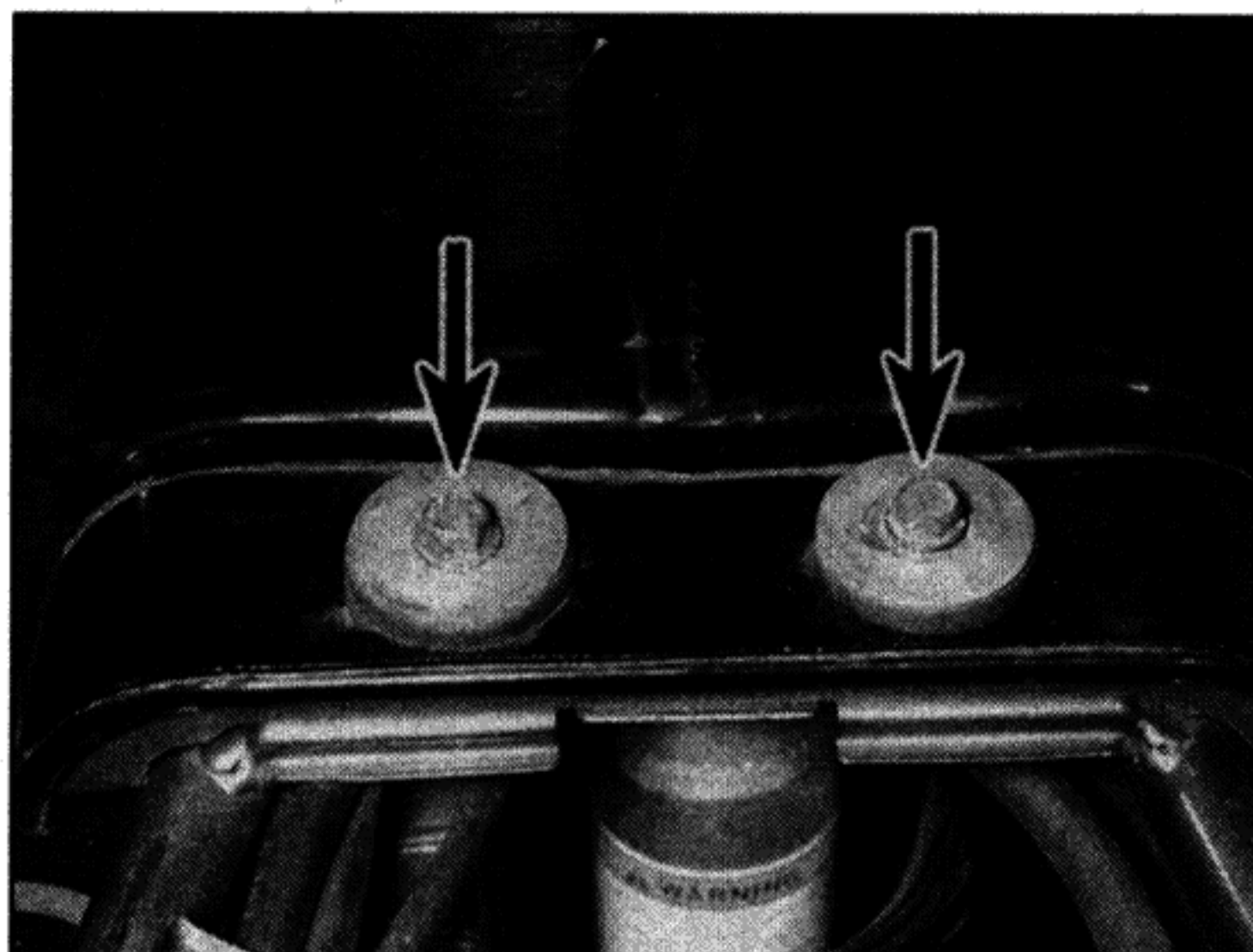
20 Remove the fuel tank as described above.

21 On 1991 to 1995 TDM models, connect a drain hose to the fuel outlet union on the remote tap and insert its end in a container suitable and large enough for storing the petrol. Turn the fuel tap to the RES position and allow the tank to drain. When the tank has drained, turn the tap to the OFF position.

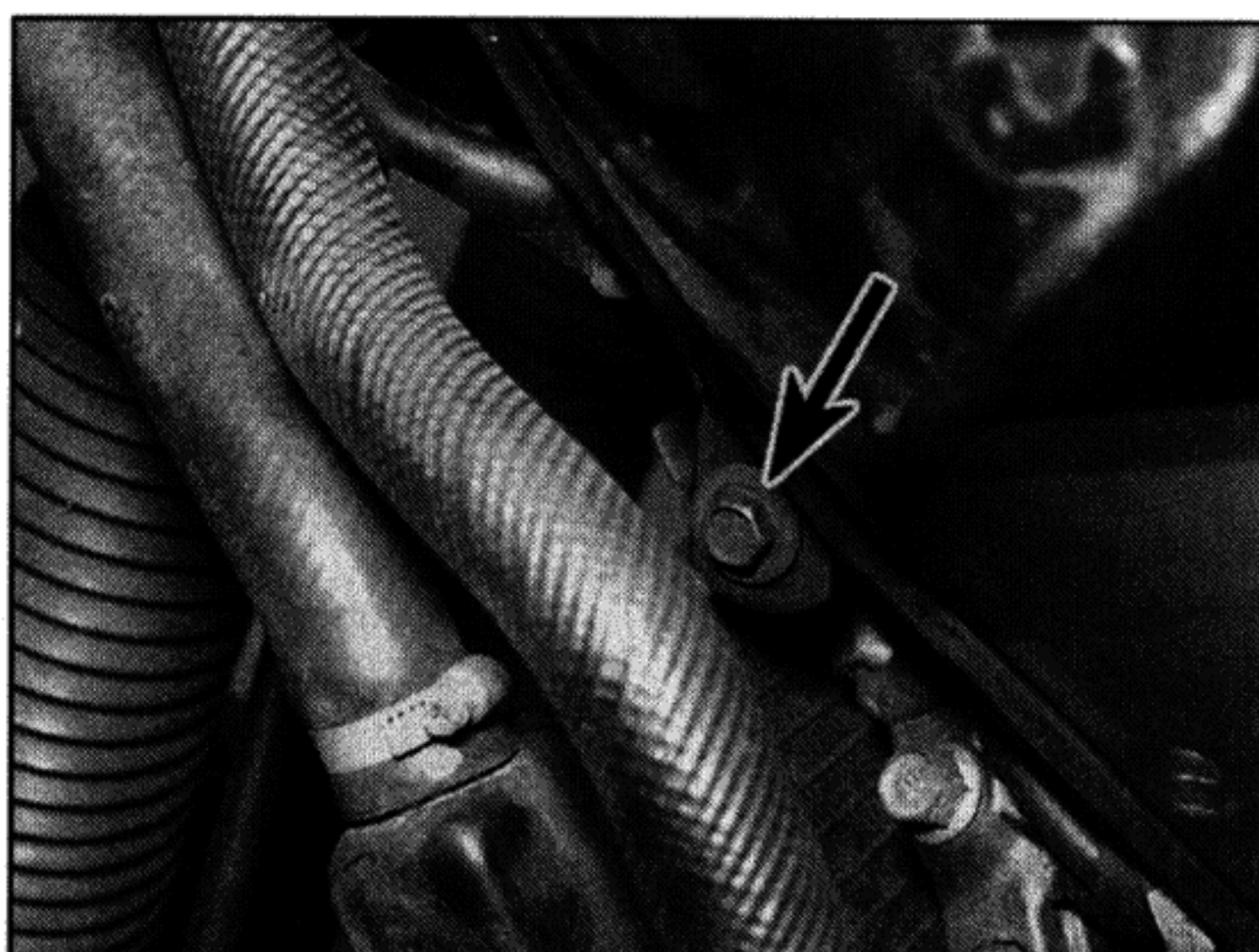
22 On 1996 to 1998 TDM models, if the remote tap is still attached, connect a drain hose to the fuel outlet union on the remote tap and insert its end in a container suitable and large enough for storing the petrol. Turn the fuel tap to the RES position and allow the tank to drain. If the remote tap was left in situ, connect a drain hose to each union on the fuel outlet on the tank and insert their ends in a container suitable and



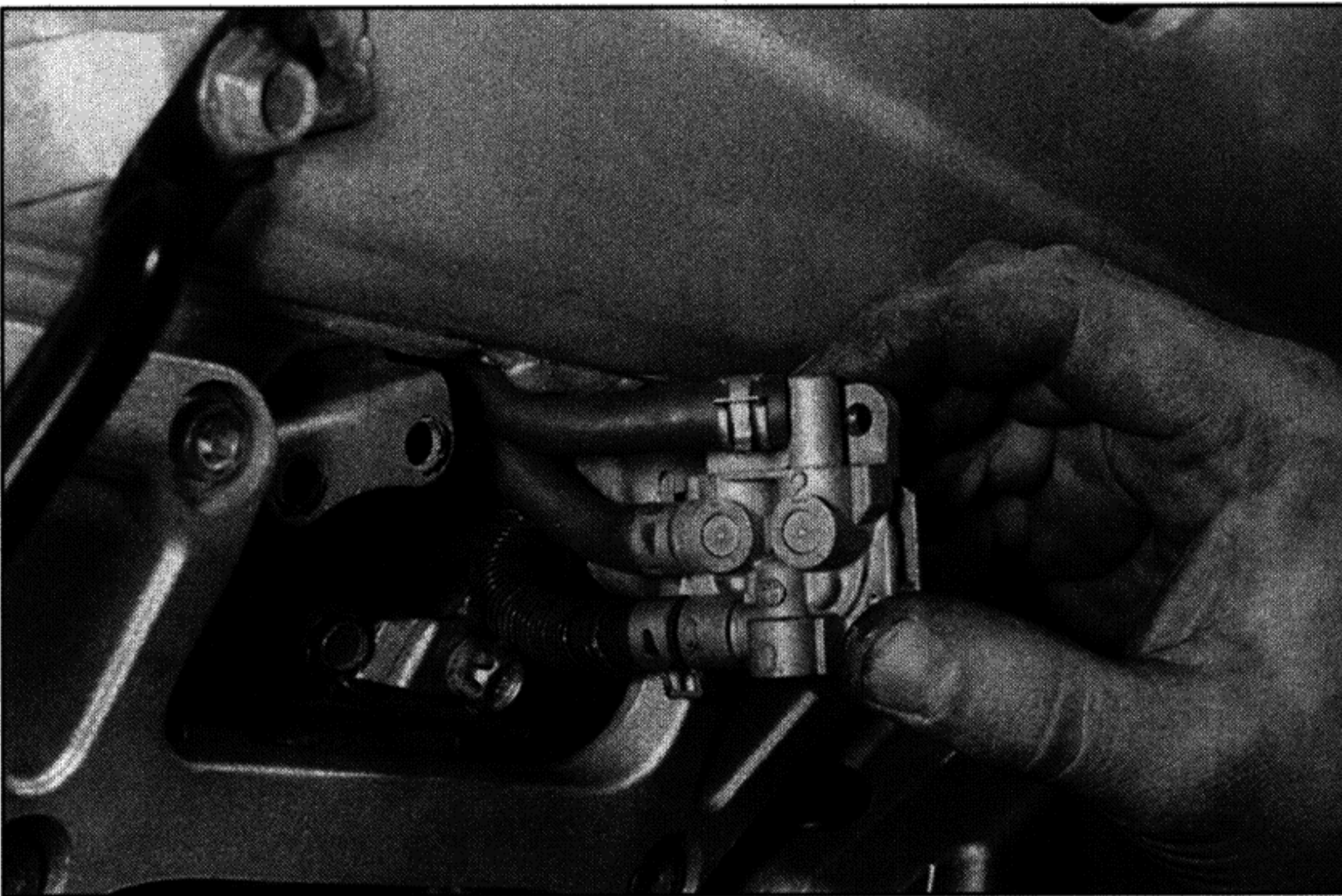
2.10b . . . and the front mounting bolt (arrowed) on each side



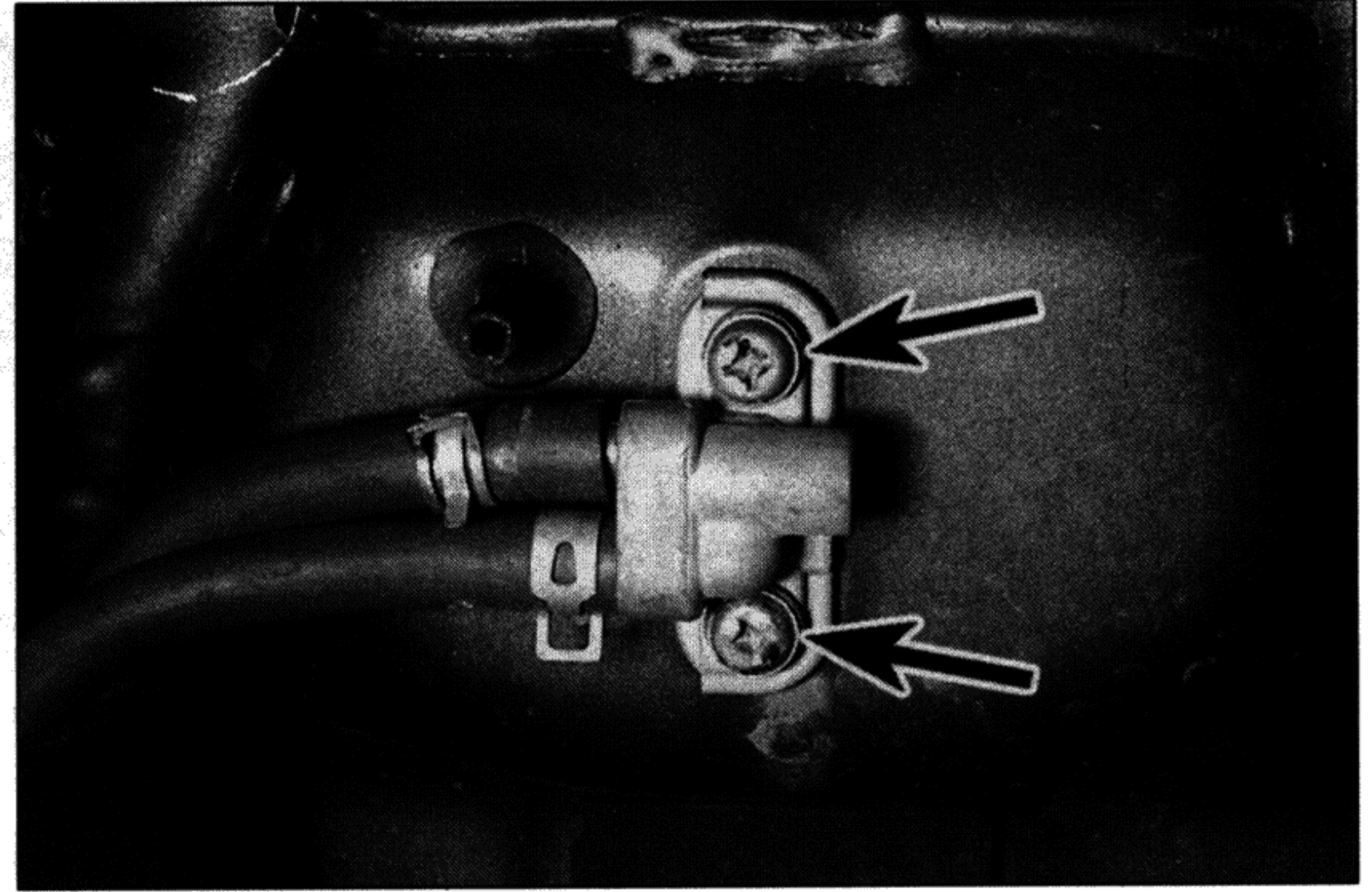
2.16a Remove the rear mounting bolts (arrowed) . . .



2.16b . . . and the front mounting bolt (arrowed) on each side



2.26 Note which hose fits where before detaching them



2.27a Fuel outlet screws (arrowed) – 1991 to 1995 TDM models

large enough for storing the petrol. Turn the outlet tap to the ON position and allow the tank to drain. When the tank has drained, turn the tap to the OFF position.

23 On 1999 TDM models, connect a drain hose to the union on the fuel tap and insert its end in a container suitable and large enough for storing the petrol. Turn the tap ON and allow the tank to drain. When the tank has drained, turn the tap to the OFF position.

24 On TRX models, connect a drain hose to the fuel outlet union on the tap and insert its end in a container suitable and large enough for storing the petrol. Turn the fuel tap to the PRI position and allow the tank to drain. When the tank has drained, turn the tap back to the ON or RES position.

25 On XTZ models, connect a drain hose to the fuel outlet union on each tap and insert their ends in a container suitable and large enough for storing the petrol. Turn the fuel taps to the RES position and allow the tank to drain. When the tank has drained, turn the taps to the OFF position.

26 If the fuel tap has been leaking, tightening the assembly screws may help. Slacken all the

screws a little first, then tighten them evenly a little at a time to ensure the cover seats properly on the tap body. If leakage persists, the tap should be renewed, however nothing is lost by dismantling the tap for further inspection. Unscrew the screws and disassemble the tap, noting how the components fit. Inspect all components for wear or damage, and renew them as necessary, if available. If any of the components are worn or damaged beyond repair and are not available individually, a new tap must be fitted. On 1991 to 1998 TDM models, note which hose fits where on the remote tap (see illustration).

27 Remove the screws securing the tap to the tank and withdraw the tap assembly (see illustrations). Check the condition of the O-ring. If it is in good condition it can be re-used, though it is better to use a new one. If it is in any way deteriorated or damaged it must be renewed.

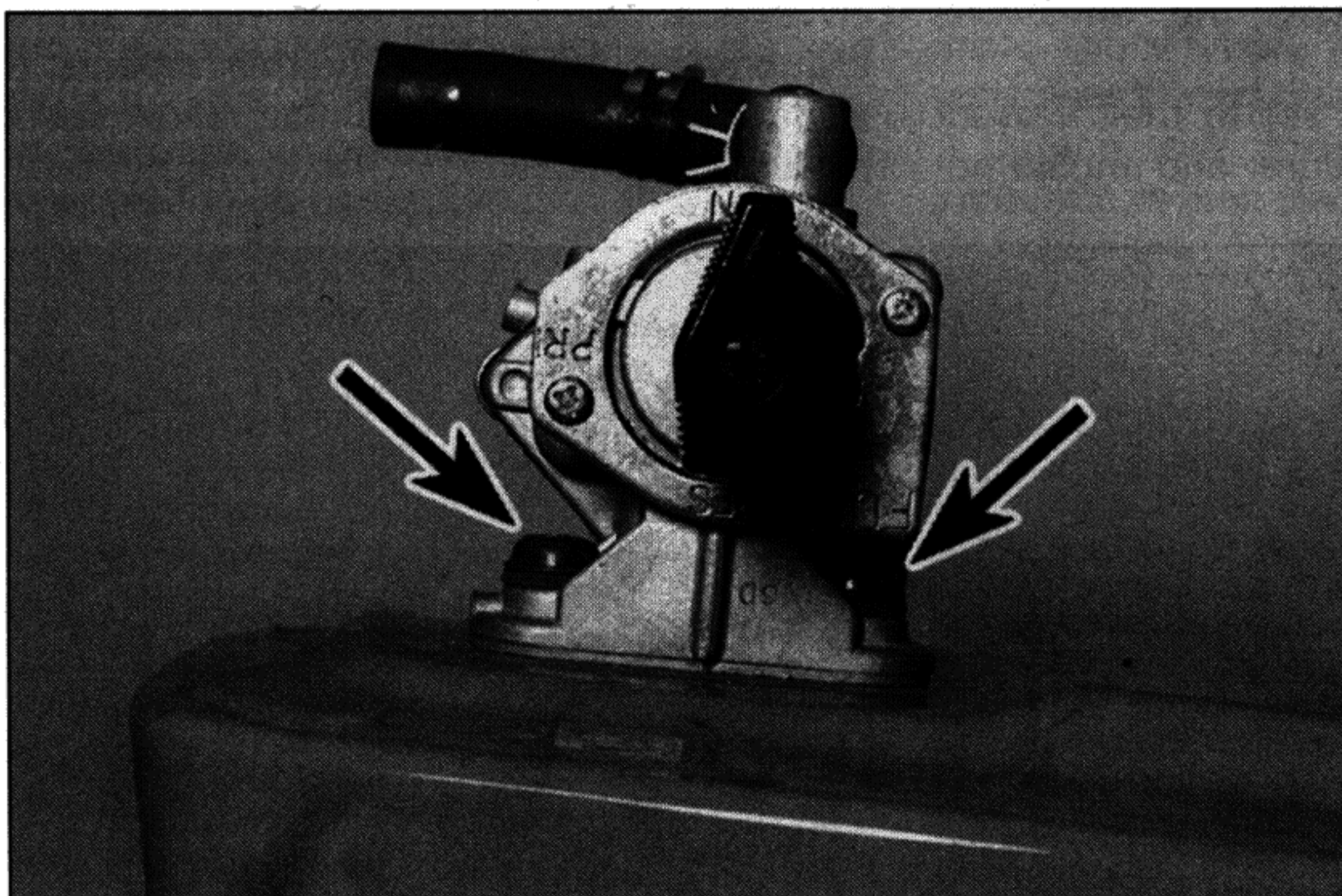
28 Clean the gauze filters to remove all traces of dirt and fuel sediment. Check the gauze for holes. If any are found, a new tap should be fitted as the filters are not available individually.

29 On TRX models, the fuel tap is automatic, operated by a vacuum created when the engine is turned over. If it is faulty, it can be disassembled and inspected. The most likely problem is a hole or split in the diaphragm. Before removing and dismantling the tap, check that the vacuum hose is securely attached at both ends, and that there are no splits or cracks in the hose. If in doubt, attach a spare hose to the vacuum union on the tap and apply a vacuum to the hose. If fuel does not flow through the tap (make sure it is turned to ON or RES), remove it and disassemble it to check the diaphragm (the best way is to hold it up to the light, which will show through any splits or holes). Some individual components are available for the tap, but if the diaphragm is split the whole tap will probably have to be renewed – check with your dealer.

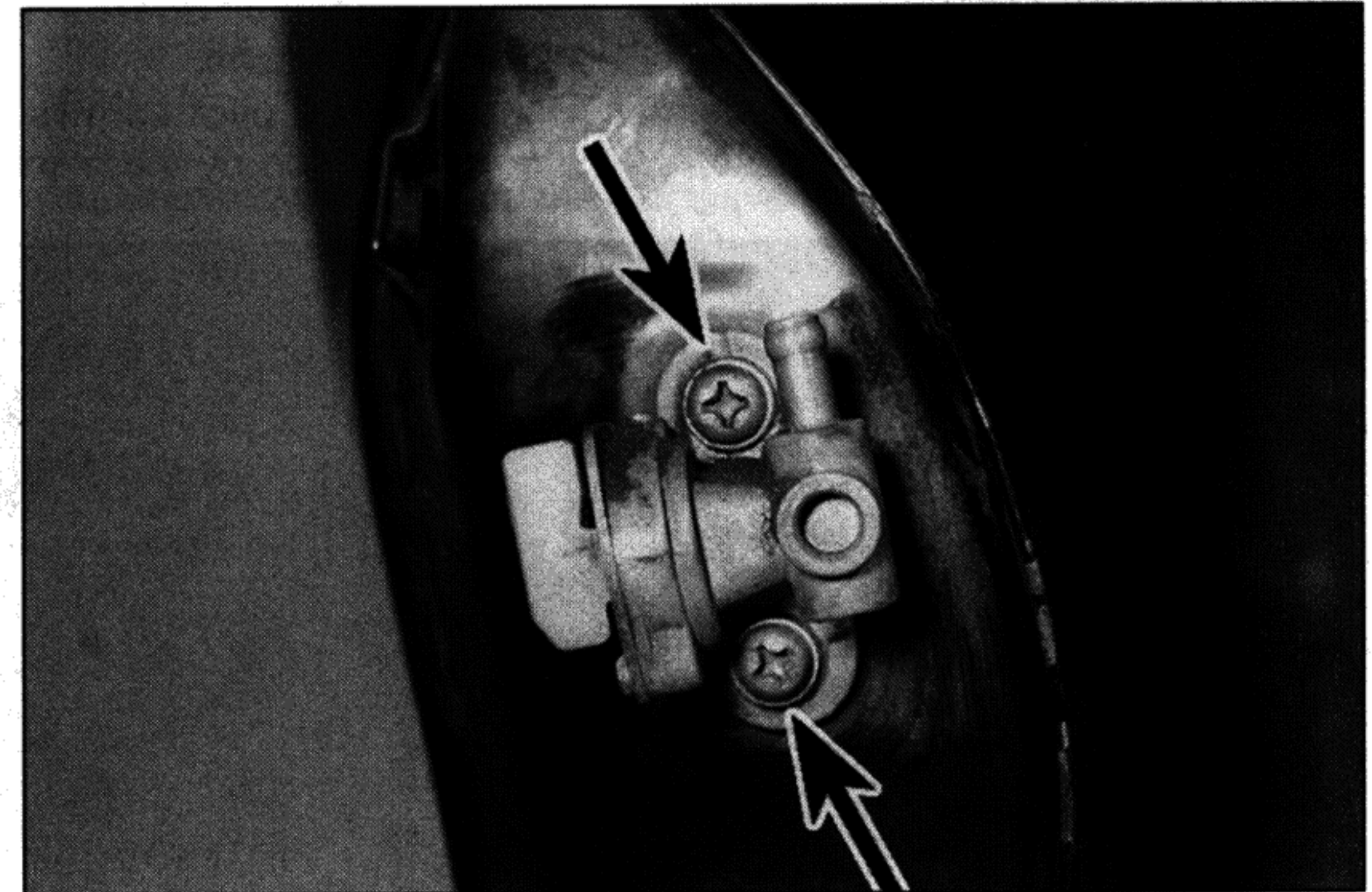
Installation

30 Installation is the reverse of removal. Use a new O-ring on the tap if required, and tighten the bolts securely.

31 Install the fuel tank (see above).



2.27b Fuel tap screws (arrowed) – TRX models



2.27c Fuel tap screws (arrowed) – XTZ models

3 Fuel tank – cleaning and repair

1 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.

2 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.

4 Air filter housing – removal and installation

Removal

1 Remove the fuel tank (see Section 2).

2 Release the clamps securing the breather hose and the drain hose to the air filter housing and detach the hoses (see illustration). Depending on your model, it may be easier to detach the drain hose once the housing has been lifted off the carburetors.

3 On TDM and XTZ models, unscrew the bolt securing the front of the housing to the frame (see illustrations). On all models, slacken the clamp screws securing the housing to the carburettor intakes (see illustration).

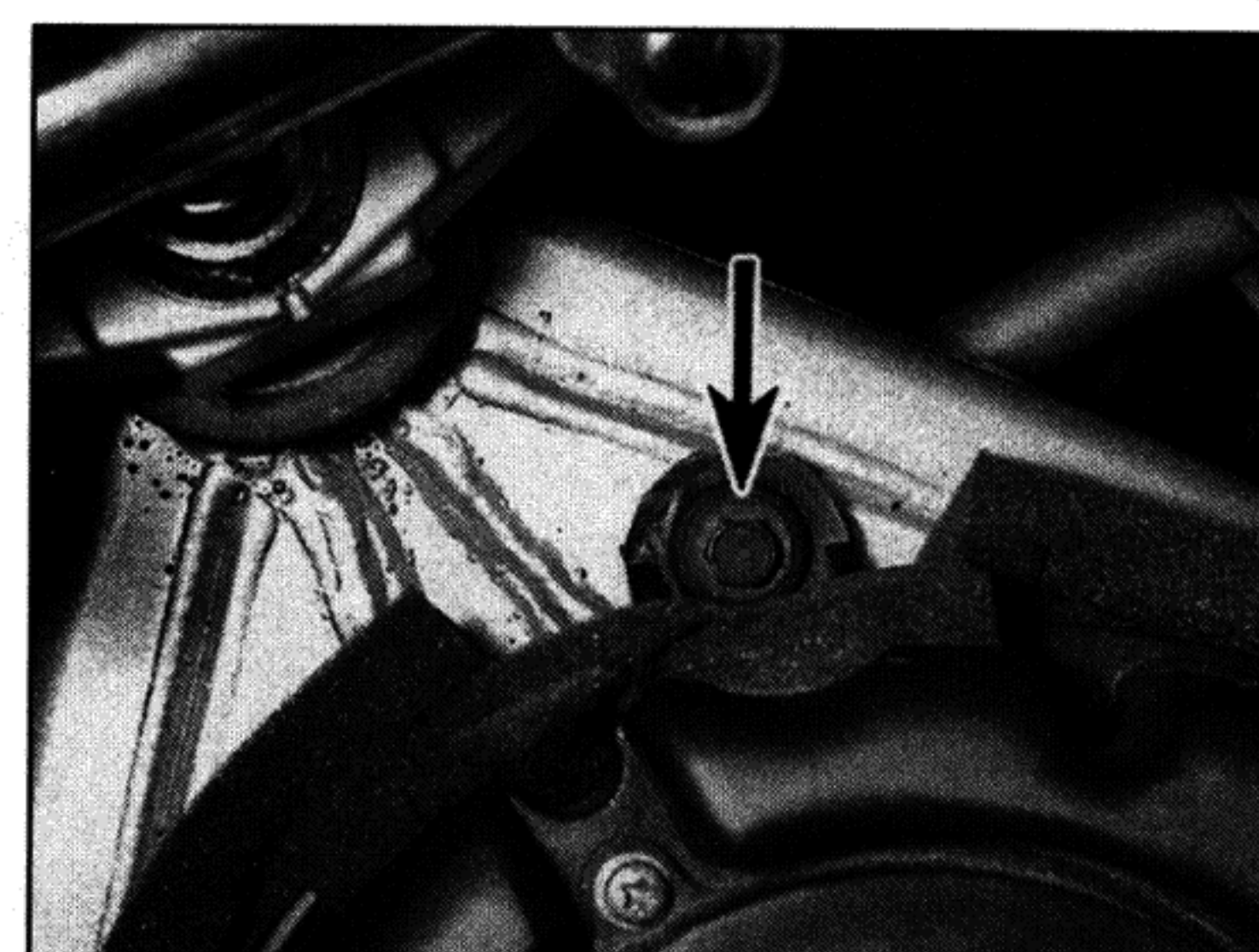
4 Lift the housing up off the carburetors and remove it, on TRX models noting how the peg at the front on the right locates in the grommet on the frame (see illustration). On XTZ models, draw the intake ducts apart so that they clear the frame tube (see illustration).

Installation

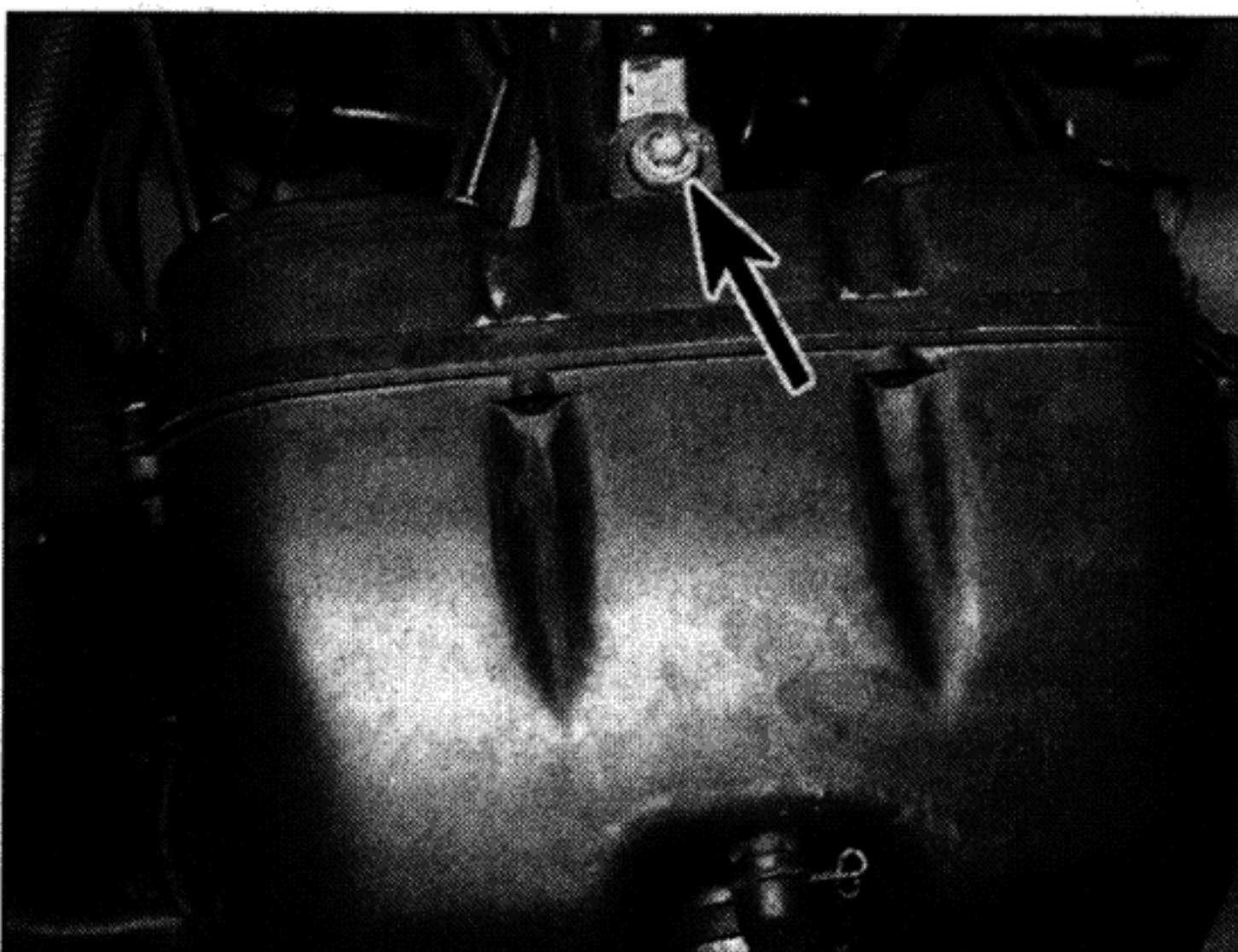
5 Installation is the reverse of removal. Check the condition of the various hoses and their clamps and renew them if necessary.



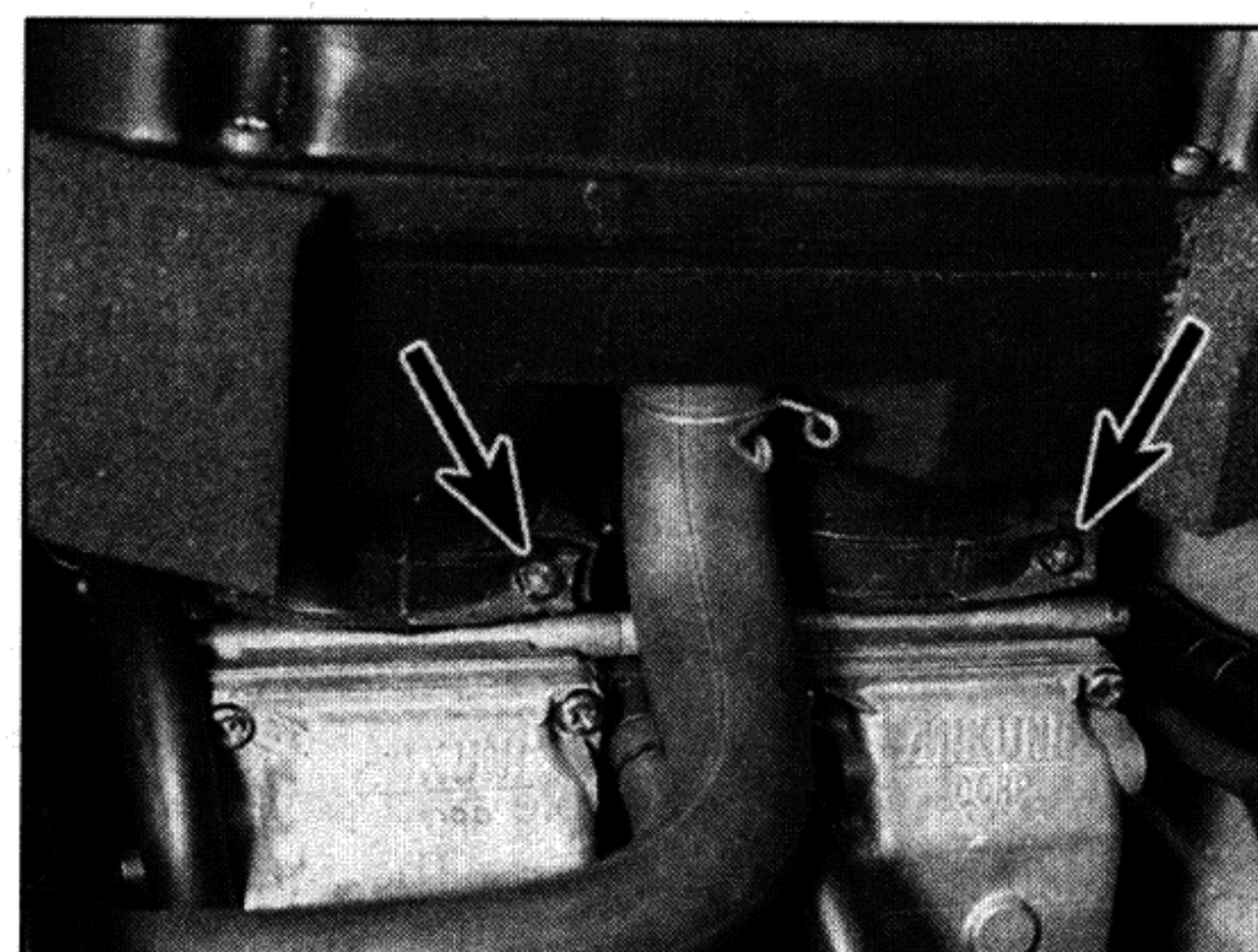
4.2 Drain hose (arrowed) – XTZ models



4.3a Air filter housing bolt (arrowed) – TDM models



4.3b Air filter housing bolt (arrowed) – XTZ models



4.3c Slacken the clamp screws (arrowed) . . .

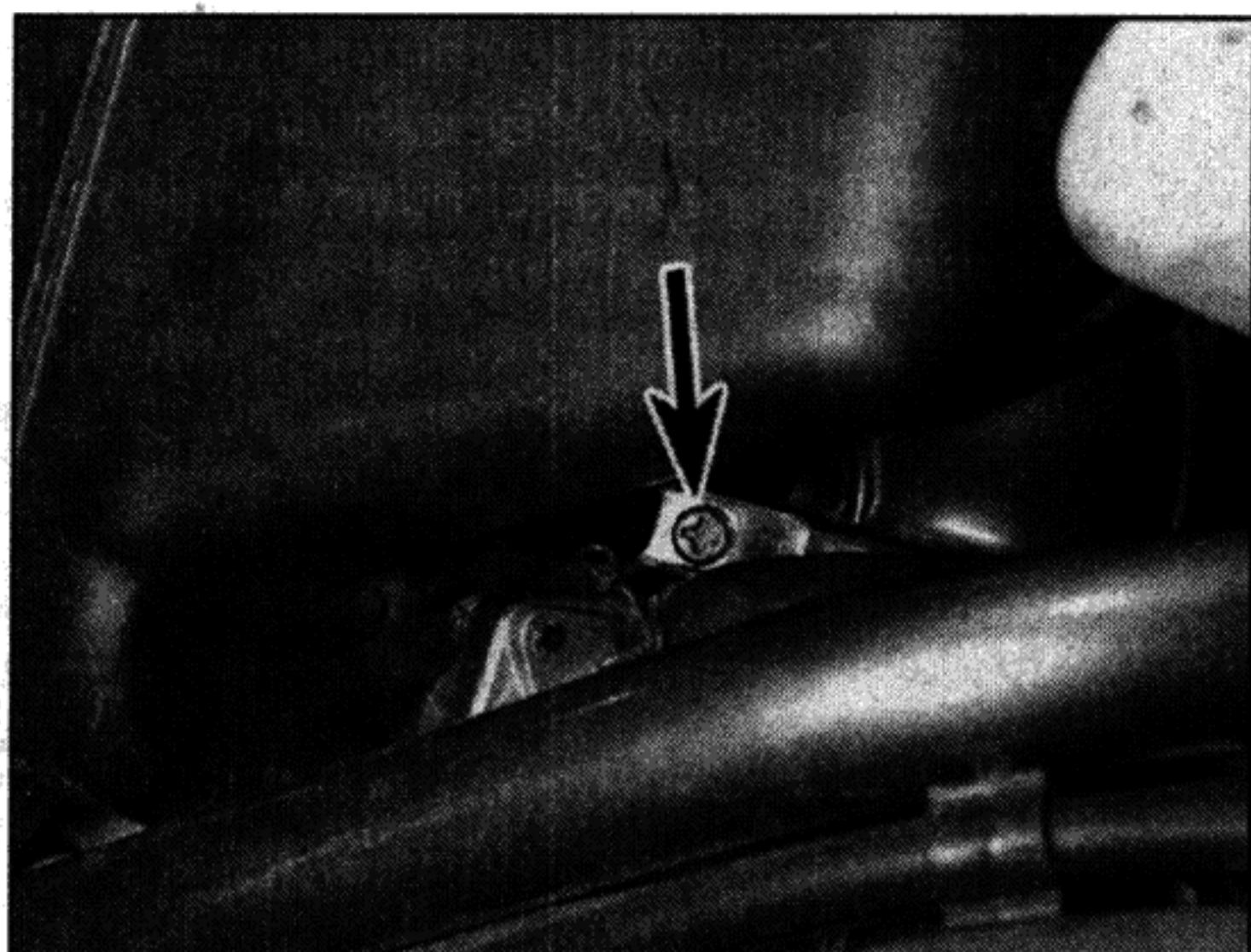
5 Idle fuel/air mixture adjustment – general information

1 Due to the increased emphasis on controlling exhaust emissions, certain governmental regulations have been formulated which directly affect the carburation of this machine. The pilot screws can be adjusted, but the use of an exhaust gas analyser and an auxiliary tachometer capable of accurately displaying changes of 50 rpm is the only certain way to adjust the idle fuel/air mixture and be sure the machine doesn't exceed the emissions regulations.

2 The pilot screws are set to their correct position by the manufacturer and should not

be adjusted or removed unless it is necessary to do so during a carburettor overhaul. If the screws are to be removed, record the pilot screw's current setting by turning the screw it 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. Note that for some markets, the pilot screws are sealed with a plug to prevent tampering.

3 If the engine runs extremely rough at idle or continually stalls, and if a carburettor overhaul does not cure the problem, take the motorcycle to a Yamaha dealer equipped with an exhaust gas analyser. They will be able to properly adjust the idle fuel/air mixture to achieve a smooth idle and restore low speed performance.



4.3d . . . which on XTZ models are accessed from each side (arrow)



4.4a On TRX models, note how the peg locates in the grommet



4.4b On XTZ models, draw the ducts apart to clear the frame

6 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.

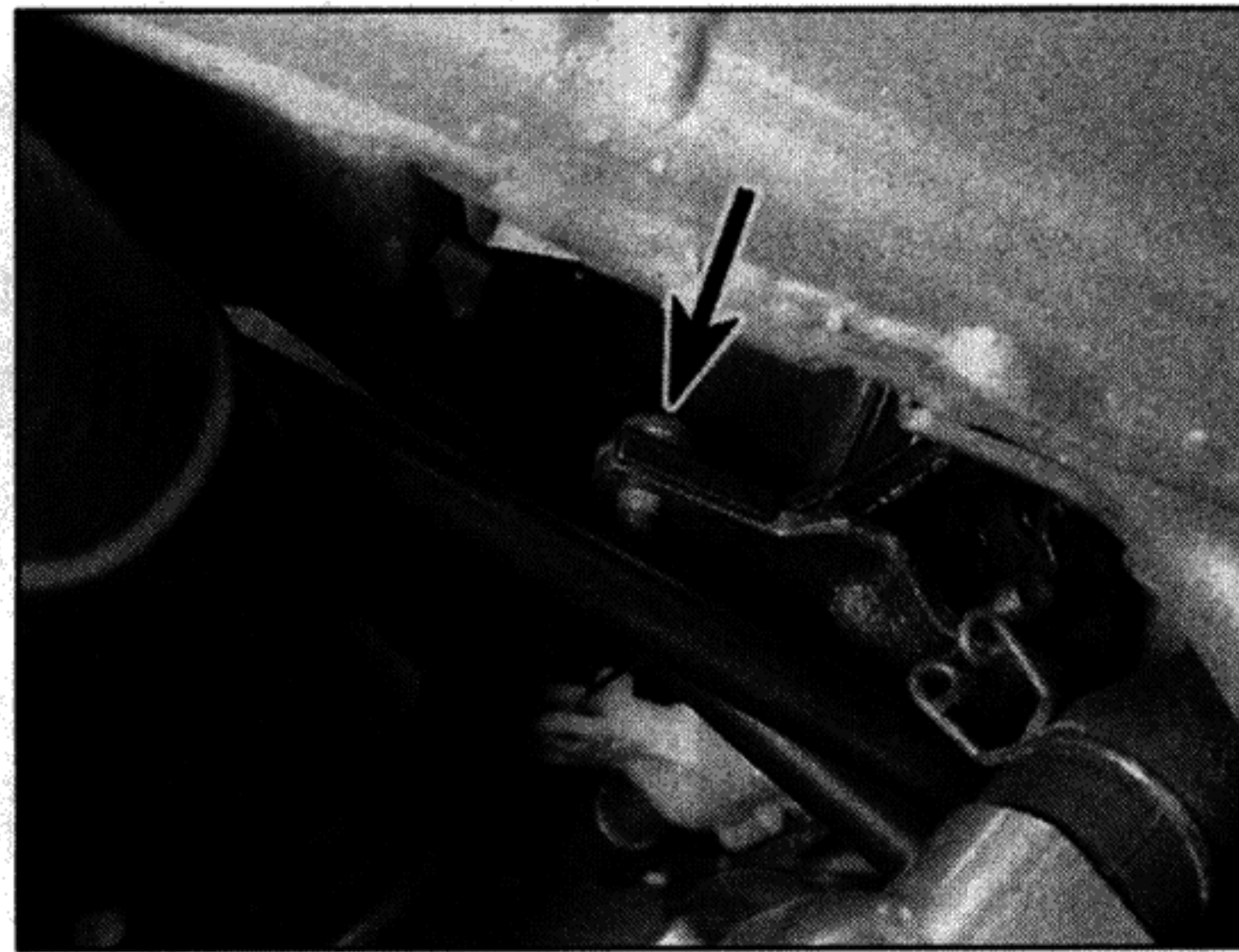
2 Keep in mind that many so-called carburettor problems are really not carburettor problems at all, but mechanical problems within the engine or ignition system malfunctions. Try to establish for certain that the carburettors are in need of maintenance before beginning a major overhaul.

3 Check the fuel tap 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.

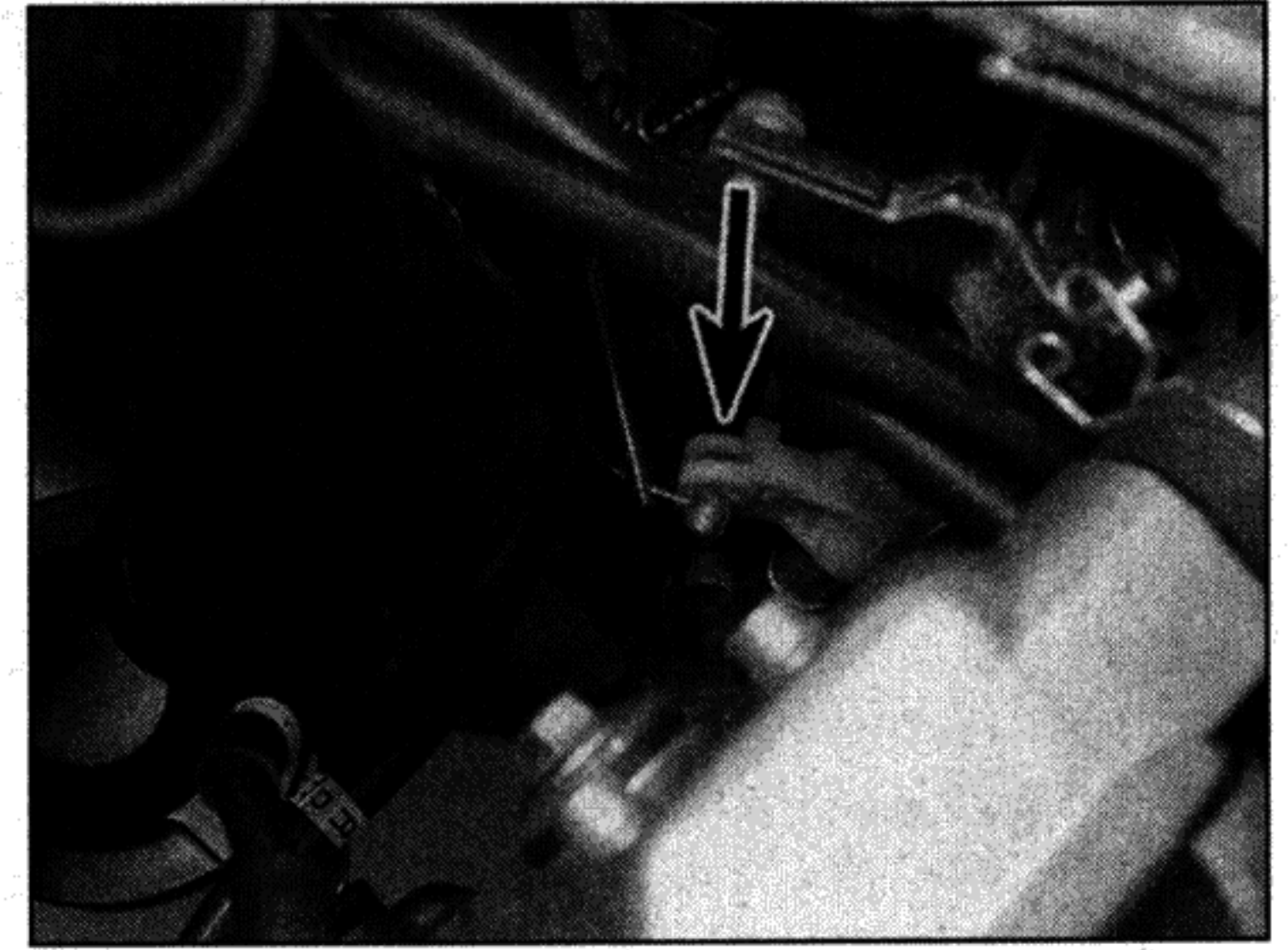
4 Most carburettor problems are caused by dirt particles, varnish and other deposits which build up in and block the fuel and air passages, especially if the motorcycle has been laid up for a time. Also, in time, gaskets and O-rings shrink or deteriorate and cause fuel and air leaks which lead to poor 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 carburettor using new gaskets and O-rings.

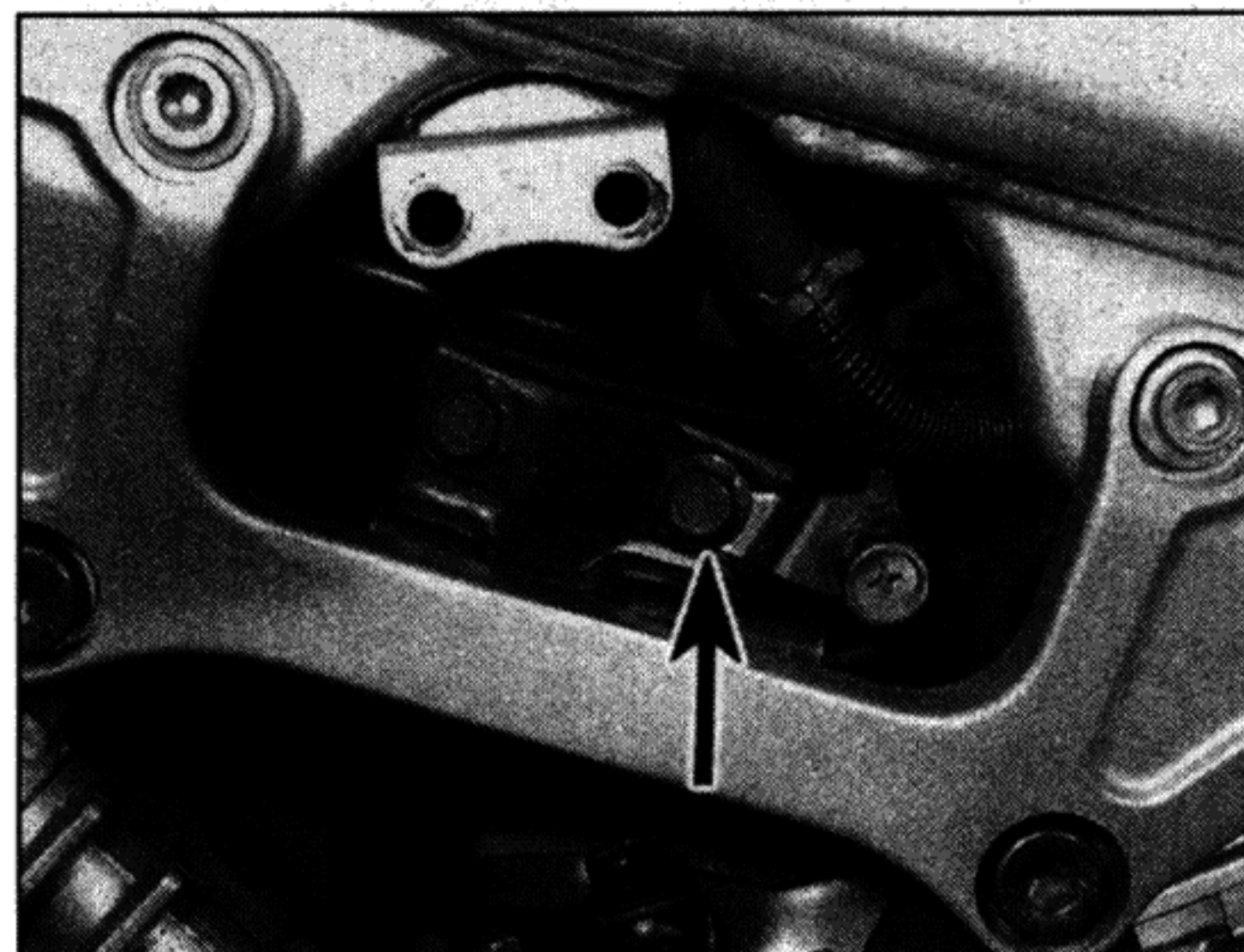
6 Before disassembling the carburettors, make sure you have all necessary O-rings and other parts, some carburettor cleaner, a supply of clean rags, some means of blowing out the carburettor passages and a clean place to work. It is recommended that only one carburettor be overhauled at a time to avoid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



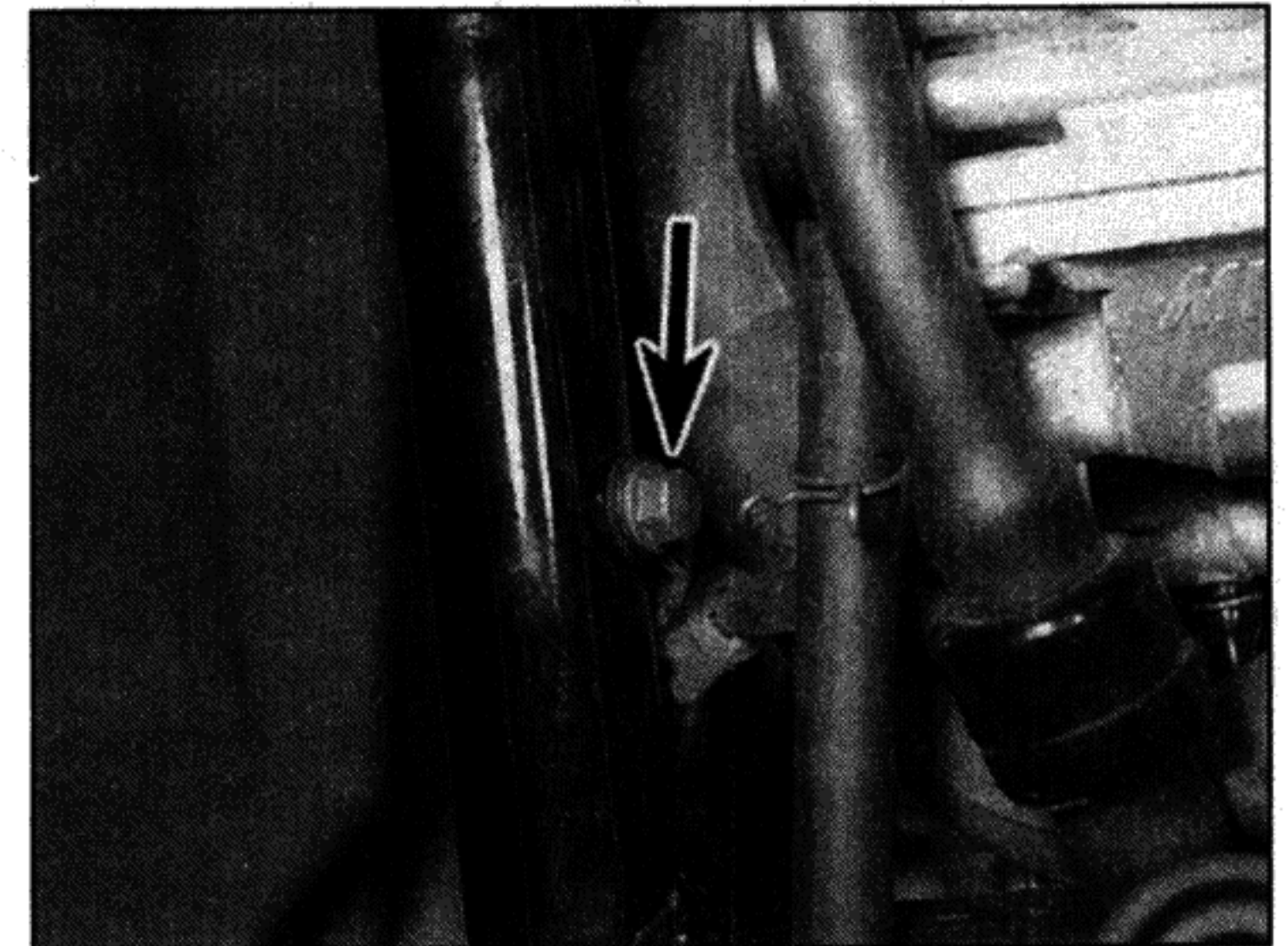
7.2a Slacken the clamp screw (arrowed) . . .



7.2b . . . and detach the cable end from the lever



7.4a Idle speed adjuster bolt (arrowed) – TDM models



7.4b Idle speed adjuster bolt (arrowed) – TRX models

7 Carburettors – removal and installation



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

Removal

1 Remove the fuel tank and the air filter housing (see Sections 2 and 4).

2 Slacken the choke outer cable bracket screw and free the cable from the bracket on the front of the carburettors, then detach the inner cable nipple from the choke linkage lever (see illustrations).

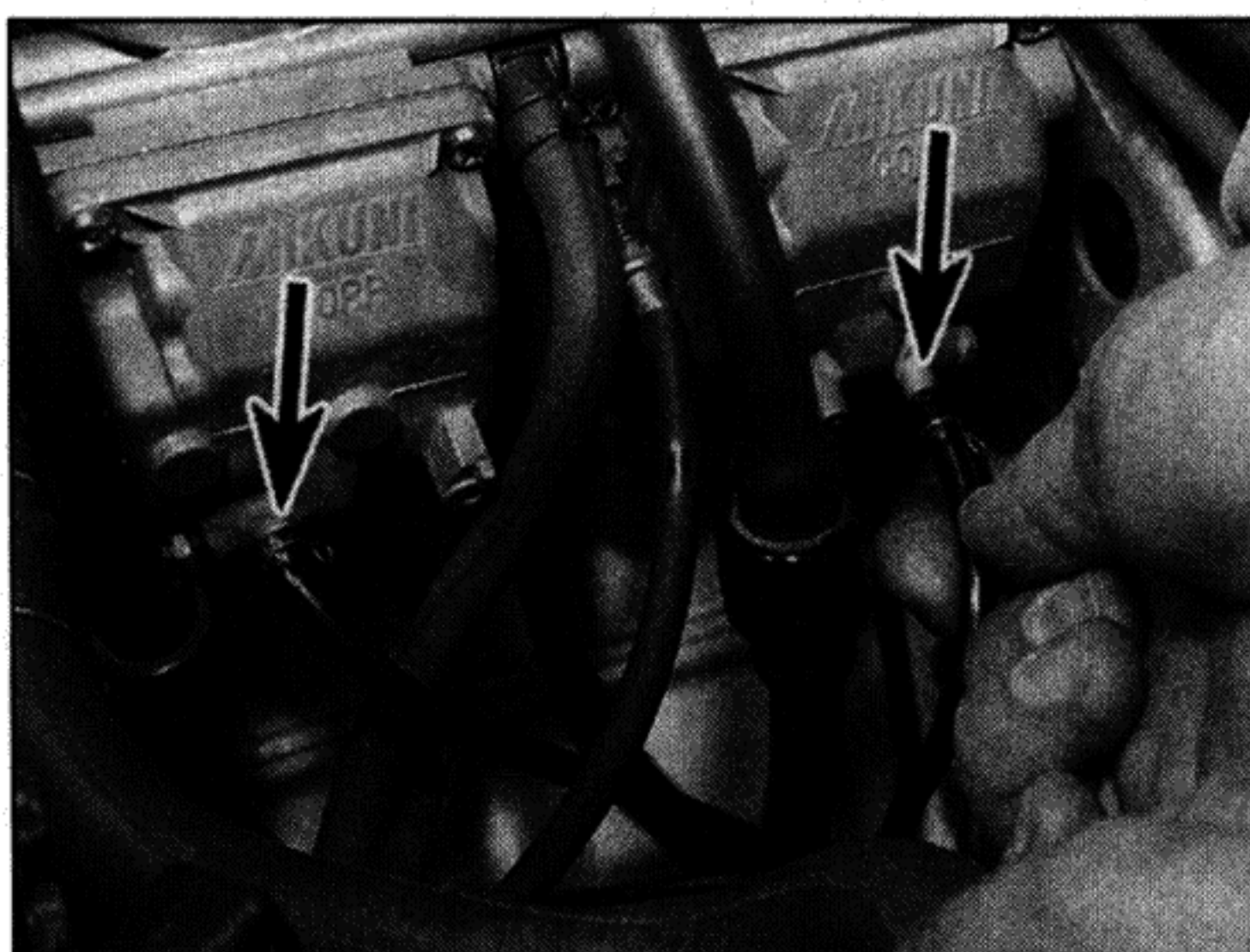
3 Detach the throttle cables from the carburettors (see Section 11, Steps 2 and 3).

If access is too restricted, detach them after the carburettors have been lifted off the cylinder head intakes.

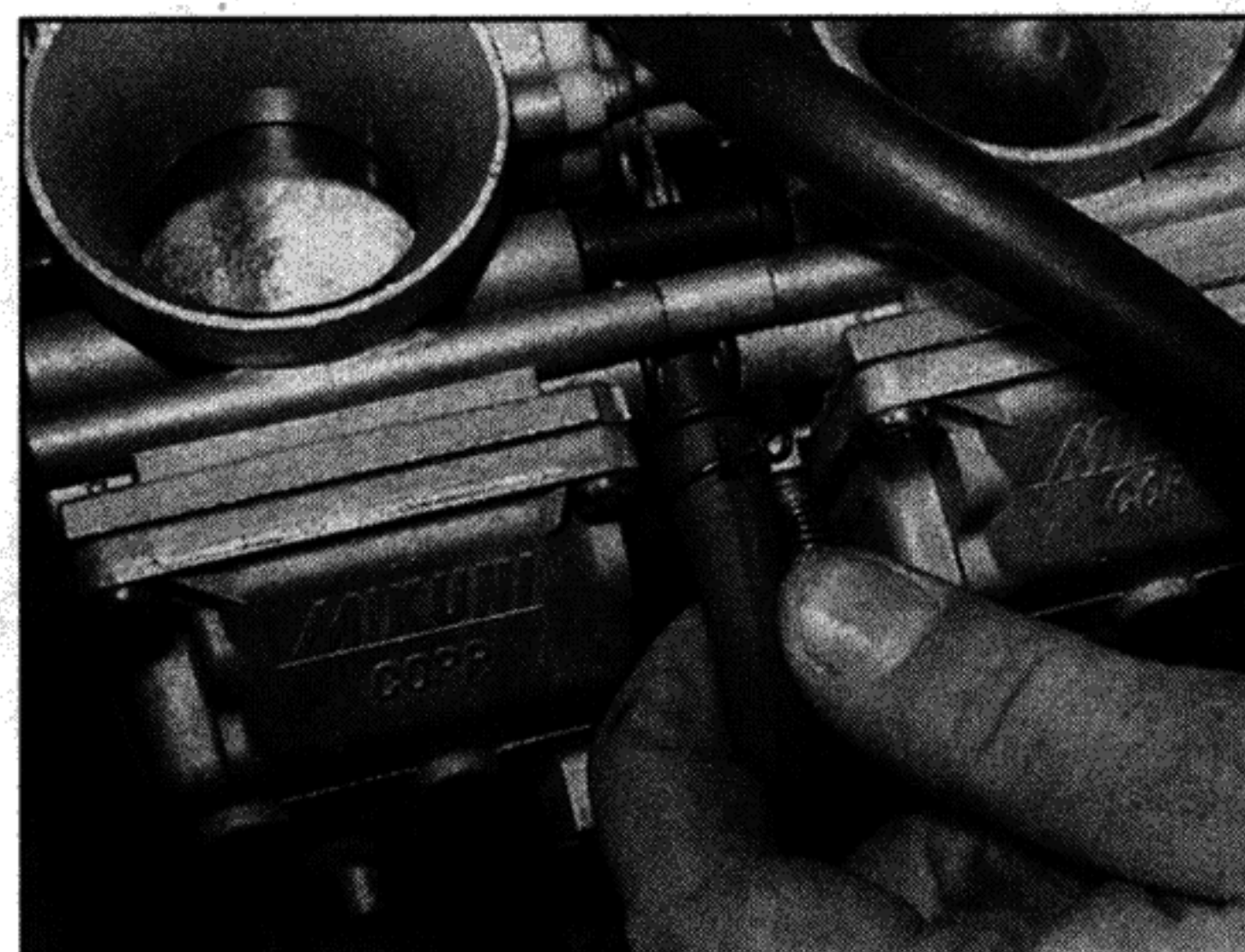
4 On TDM and TRX models, unscrew the bolt securing the idle speed adjuster and feed it through to the base of the carburettors (see illustrations).

5 Release the clamp securing the drain hose to the bottom of each float chamber and detach the hoses (see illustration). Also release the clamp securing the fuel supply hose to the carburettors and detach the hose (see illustration); be careful to catch the small gauze filter fitted in the fuel supply hose union as the hose is detached (except 1999 TDM models).

6 On 1996-on TDM models and TRX models, disconnect the wiring connector from the throttle position sensor on the left-hand end of the carburettors (see illustration). Also



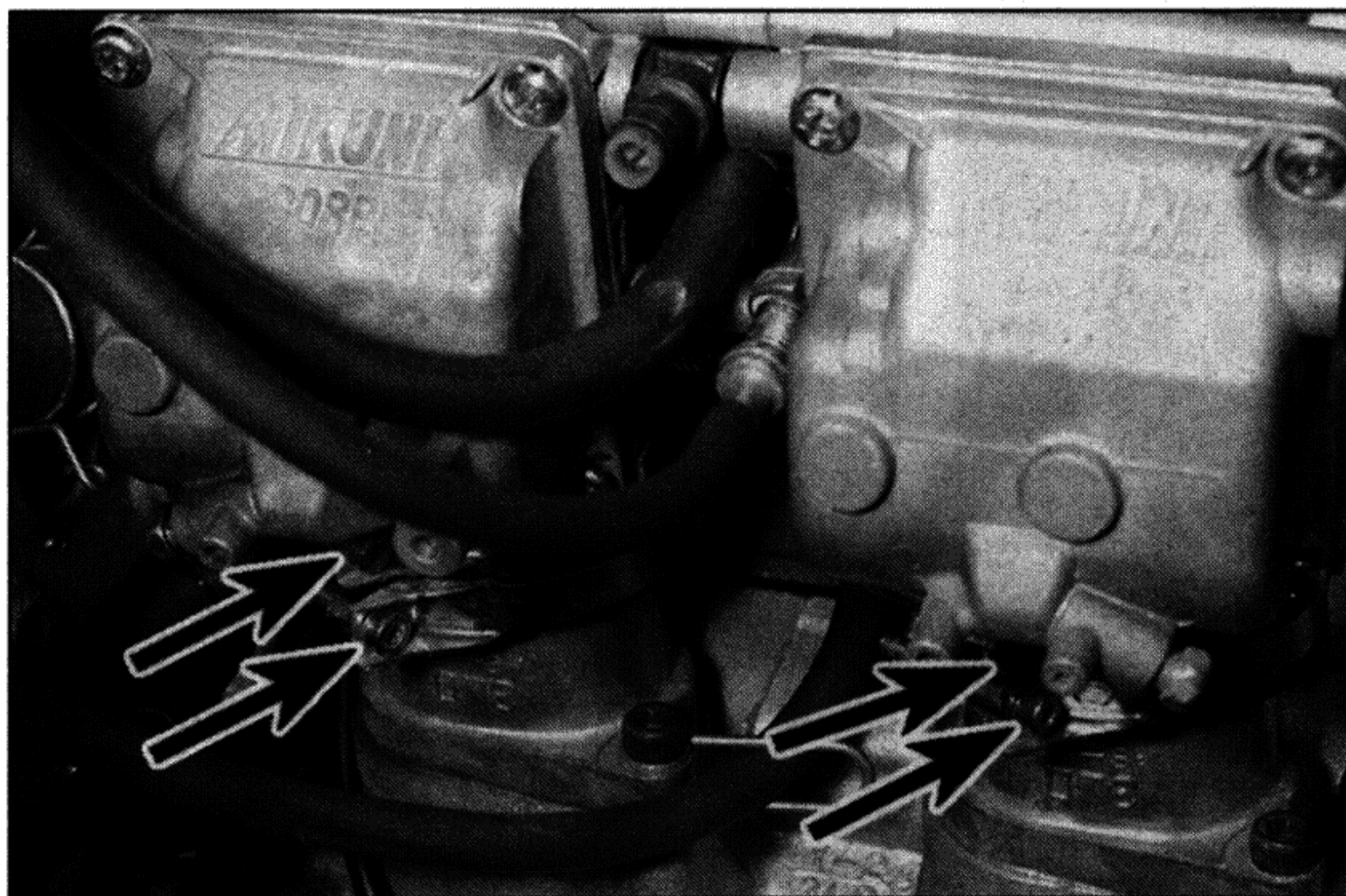
7.5a Detach the drain hoses (arrowed) . . .



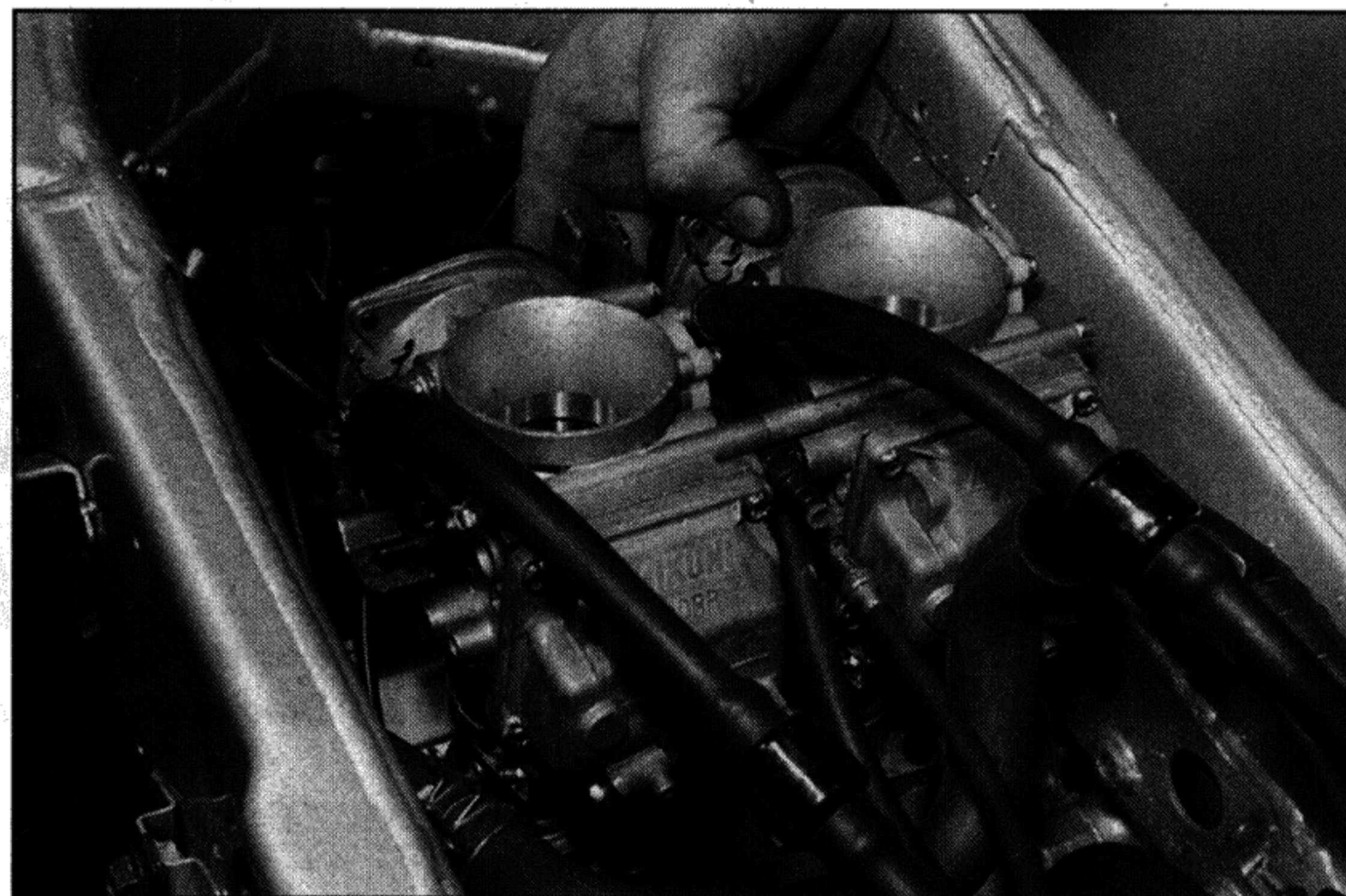
7.5b . . . and the fuel hose



7.6 Disconnect the throttle position sensor wiring connector (arrowed)



7.7a Slacken the upper or lower clamp screws as required (arrows) . . .



7.7b . . . and remove the carburettors

clamp the two warmer system coolant hoses to prevent loss of coolant and disconnect the hose from the side of each carburettor.

7 Fully slacken the clamps on the cylinder head intake rubbers, then ease the carburettors off the intakes and remove them (see illustrations). To remove the carburettors with the rubbers, slacken the lower clamp bolts (which are more accessible). To leave the rubbers on the cylinder head, slacken the upper clamp bolts. **Note:** Keep the carburettors level to prevent fuel spillage from the float chambers and the possibility of the piston diaphragms being damaged.

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

8 Place a suitable container below the float chambers, then slacken the drain screw on each chamber in turn and drain all the fuel from the carburettors (see illustration). Tighten the drain screws securely once all the fuel has been drained.

9 If necessary, slacken the clamps securing the intake rubbers and remove them, noting which way up and round they fit.

Installation

10 Installation is the reverse of removal, noting the following.

- Check for cracks or splits in the cylinder head intake rubbers, and renew them if necessary.
- Make sure the carburettors are fully engaged with the intake rubbers and the clamps are securely tightened.
- Make sure all hoses are correctly routed and secured and not trapped or kinked.
- Refer to Section 11 for installation of the throttle cables. Check the operation of the cables and adjust them as necessary (see Chapter 1).
- Refer to Section 12 for details of choke cable reconnection.
- Check idle speed and carburettor synchronisation and adjust as necessary (see Chapter 1).

8 Carburettors – disassembly, cleaning and inspection



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

1991 to 1998 TDM models, all TRX and XTZ models

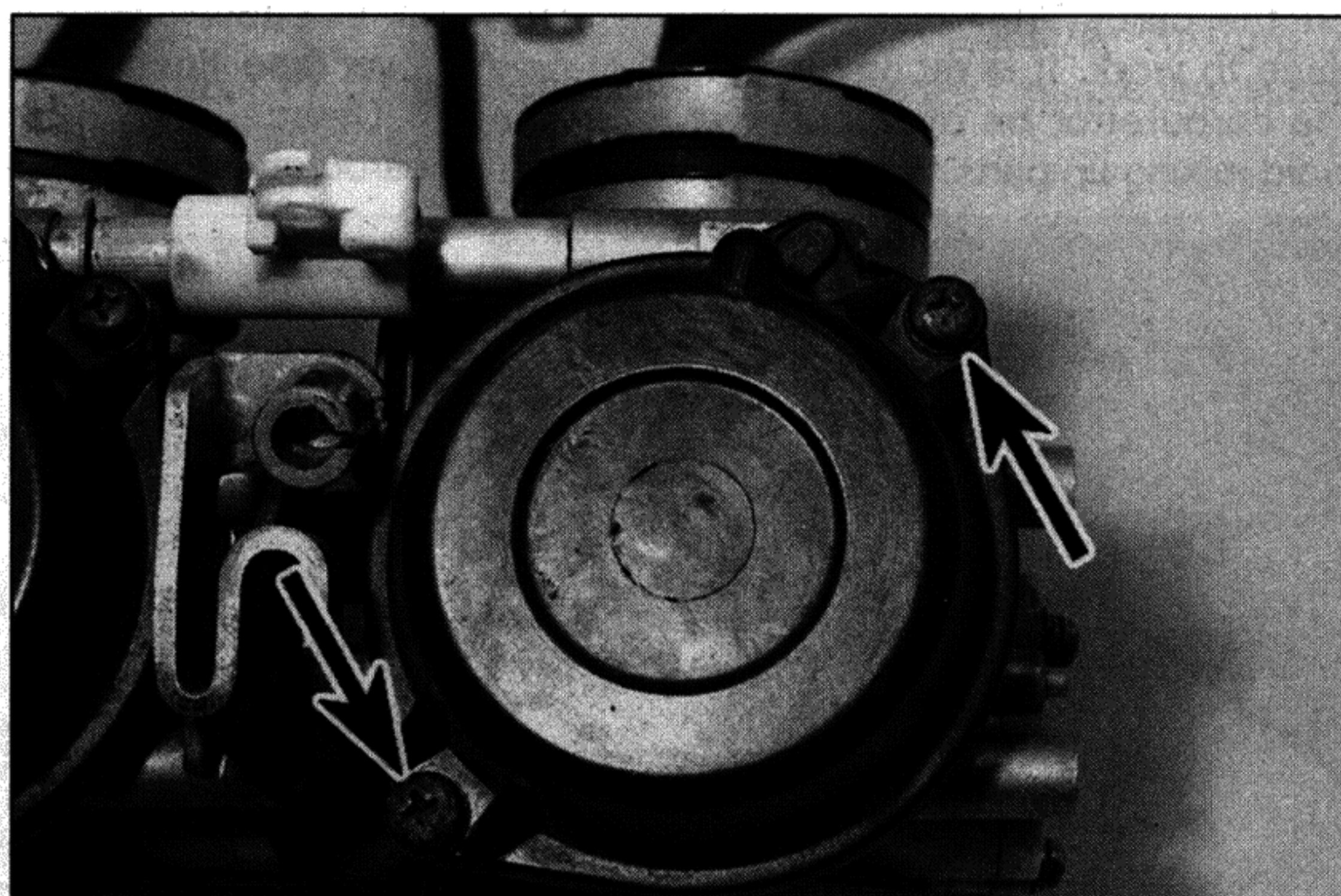
Disassembly

1 Remove the carburettors from the machine as described in the previous Section. **Note:** Do not separate the carburettors unless absolutely necessary; each carburettor can be dismantled sufficiently for all normal cleaning and adjustments while in place on the mounting brackets. Dismantle the carburettors separately to avoid interchanging parts.

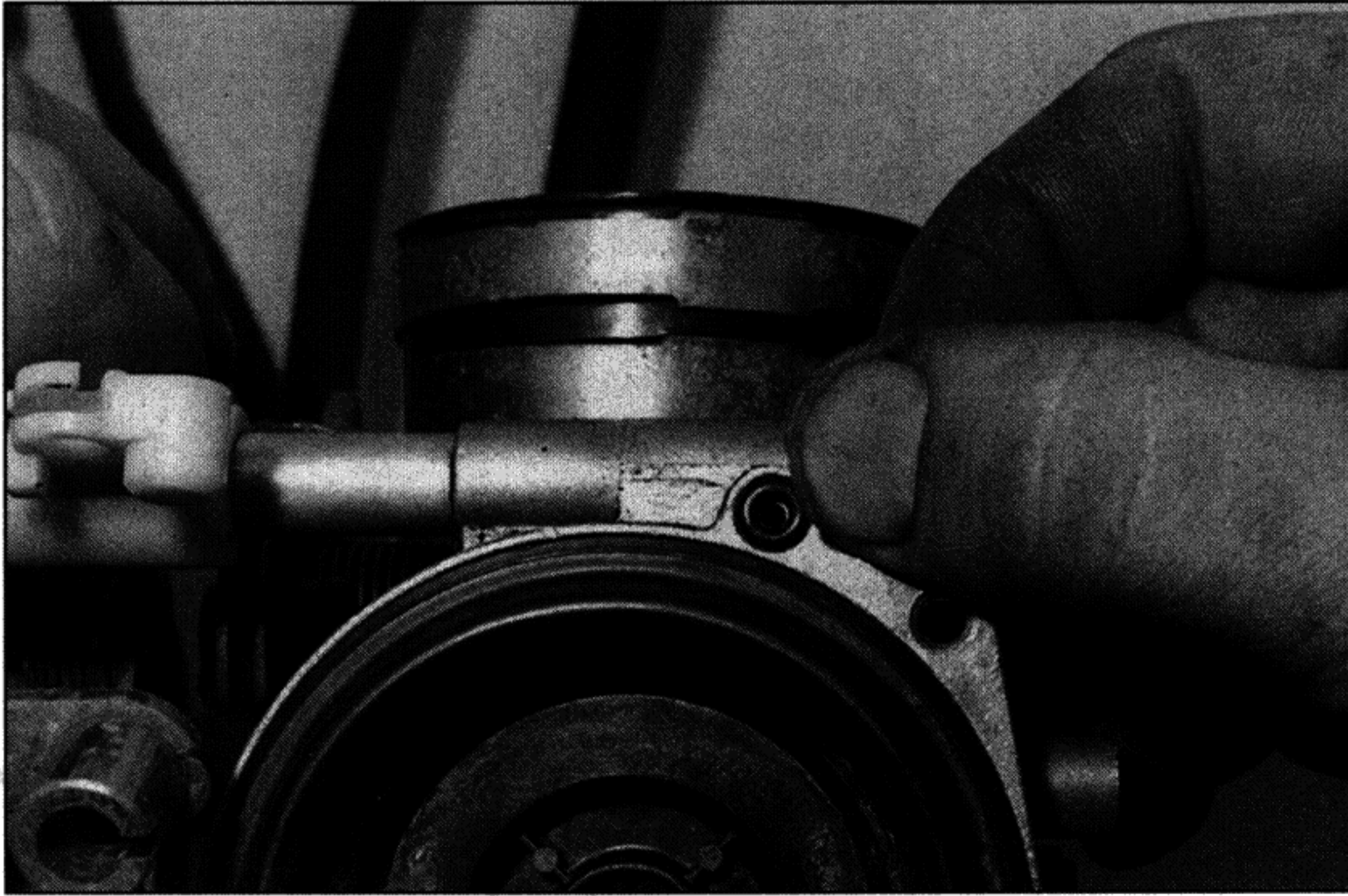
2 Unscrew and remove the top cover retaining screws (see illustration). Lift off the cover and remove the spring from inside the piston, noting the spring seat fitted in the



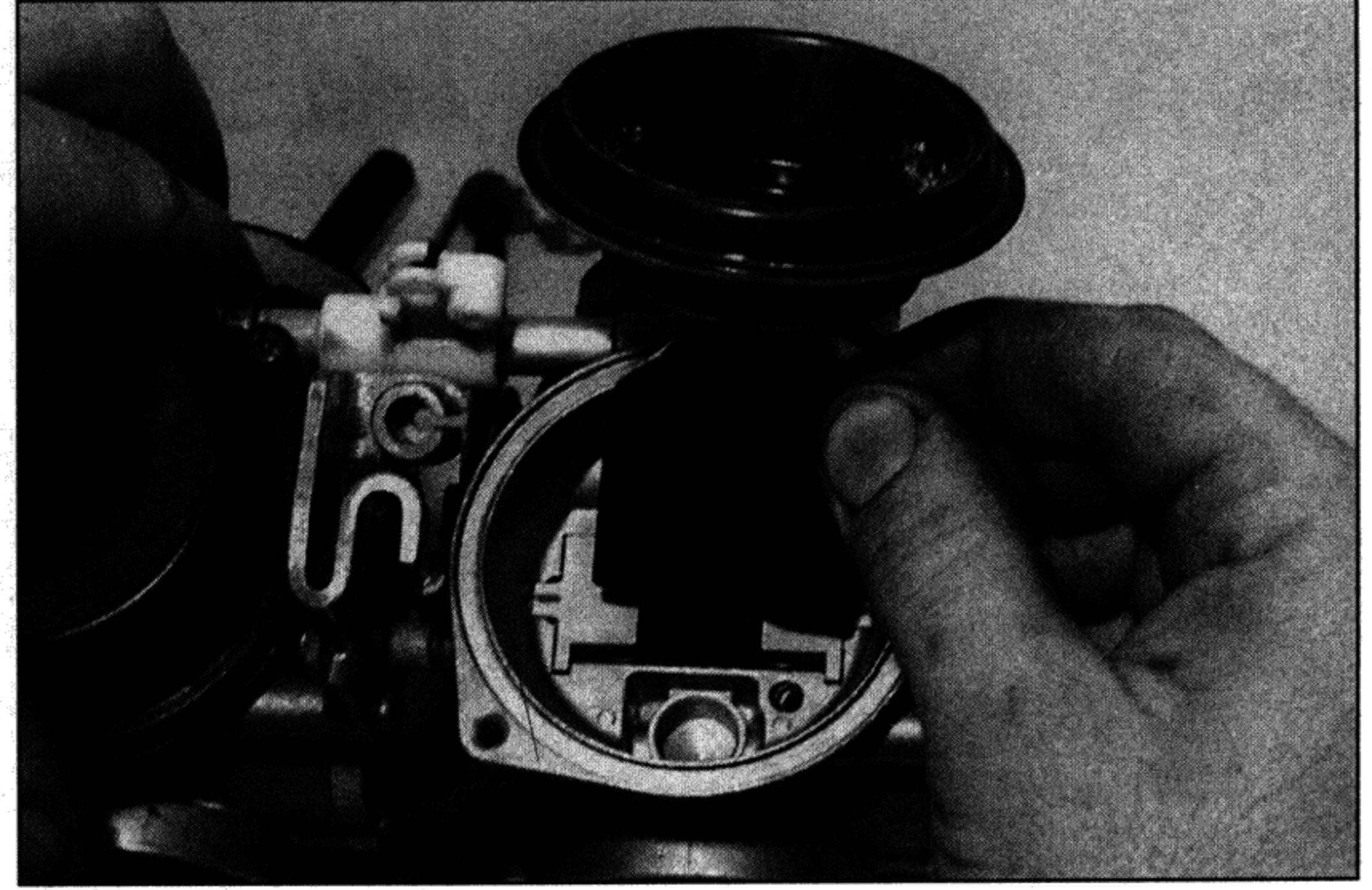
7.8 Float chamber drain screw (arrowed)



8.2 Remove the screws (arrowed) and lift off the cover



8.3 Remove the air passage O-ring



8.4 Lift out the diaphragm/piston assembly

bottom of the spring (see illustrations 10.12b and a).

3 Remove the air passage O-ring and discard it as a new one should be used (see illustration).

4 Carefully peel the diaphragm away from its sealing groove in the carburettor and withdraw the diaphragm and piston assembly (see illustration).

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

5 Push the jet needle up from the bottom of the piston and withdraw it from the top, along

with the washer (see illustration). If the E-clip is removed from the needle, note which notch it is fitted into.

6 Remove the screws securing the float chamber to the base of the carburettor and remove the float chamber, noting how it fits (see illustration). Remove the rubber gasket and discard it as a new one must be used.

7 Carefully prise the float assembly out of the carburettor body, noting how it fits (see illustration). Remove the O-ring and discard it as a new one must be used. If required, withdraw the float pivot pin and remove the float and needle valve, then unhook the

needle valve from the tab on the float, noting how it fits (see illustration).

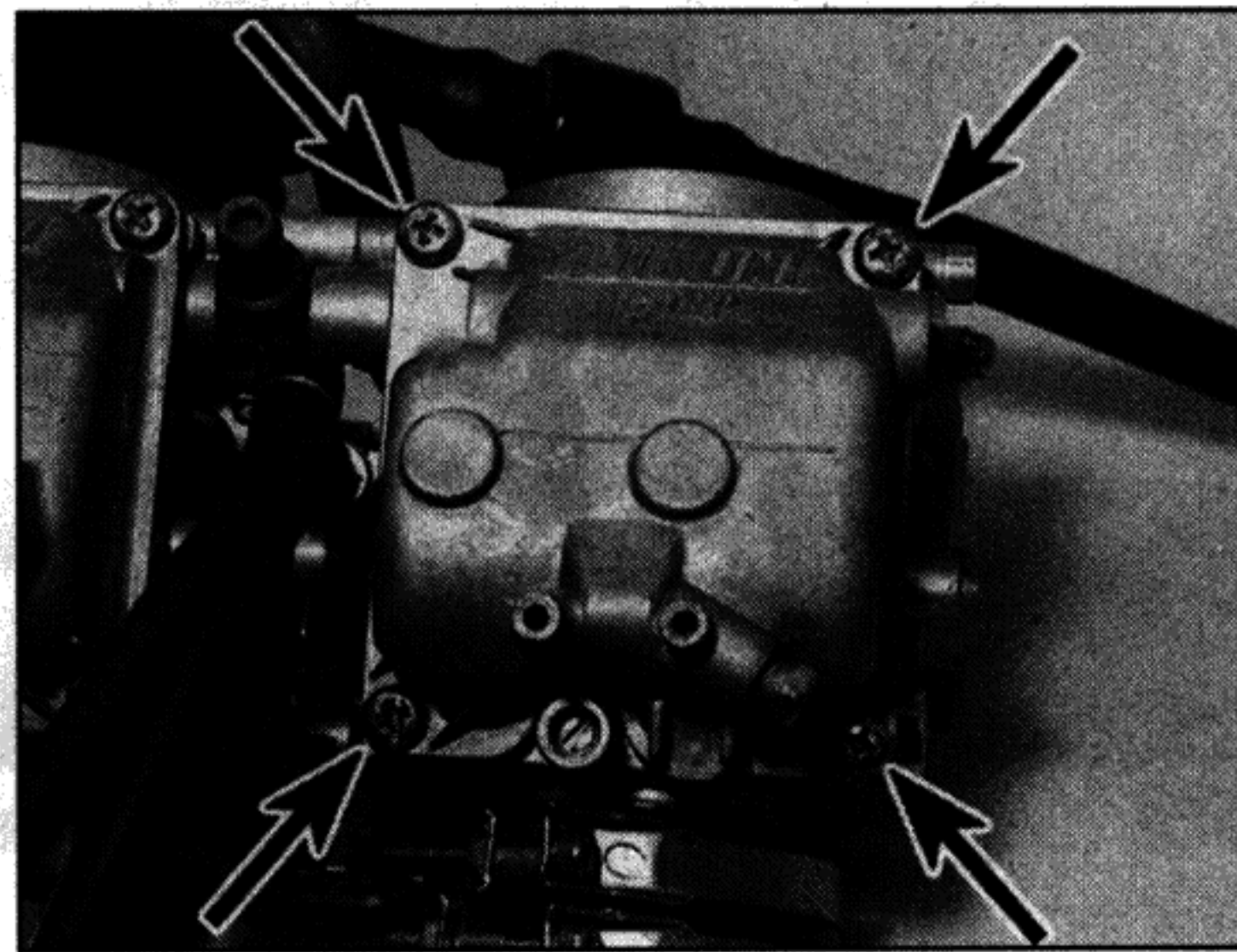
8 Unscrew and remove the starter jet, then remove the main jet holder, noting how it fits (see illustration). Remove the main jet – it is a push fit. Discard the O-ring as a new one should be used.

9 Unscrew and remove the pilot jet (see illustration 8.8).

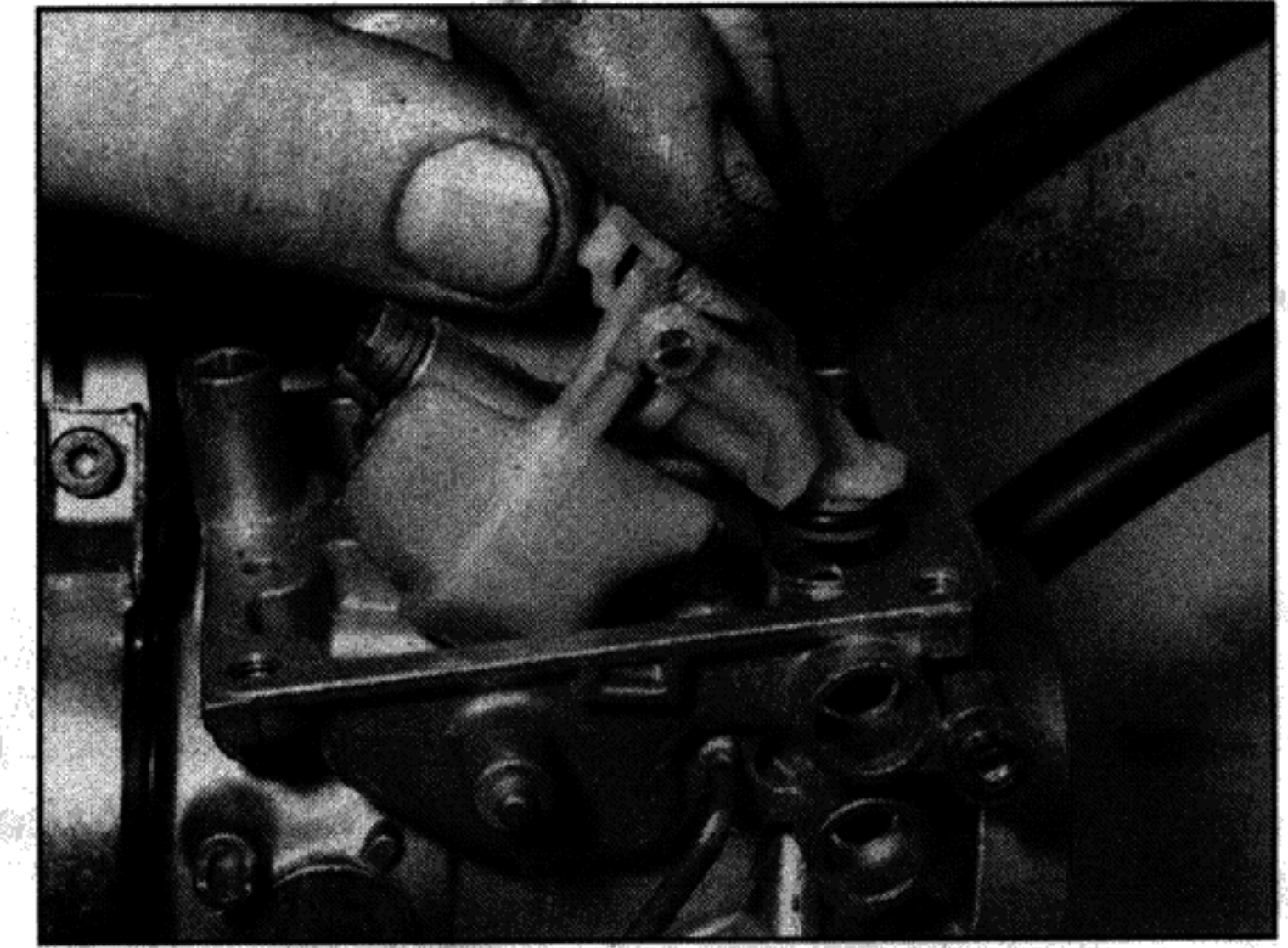
10 Unscrew the bolt securing the jet housing and remove the collar (see illustration). Remove the jet housing and discard its rubber gasket as a new one should be used. Push on the needle jet and withdraw the piston guide



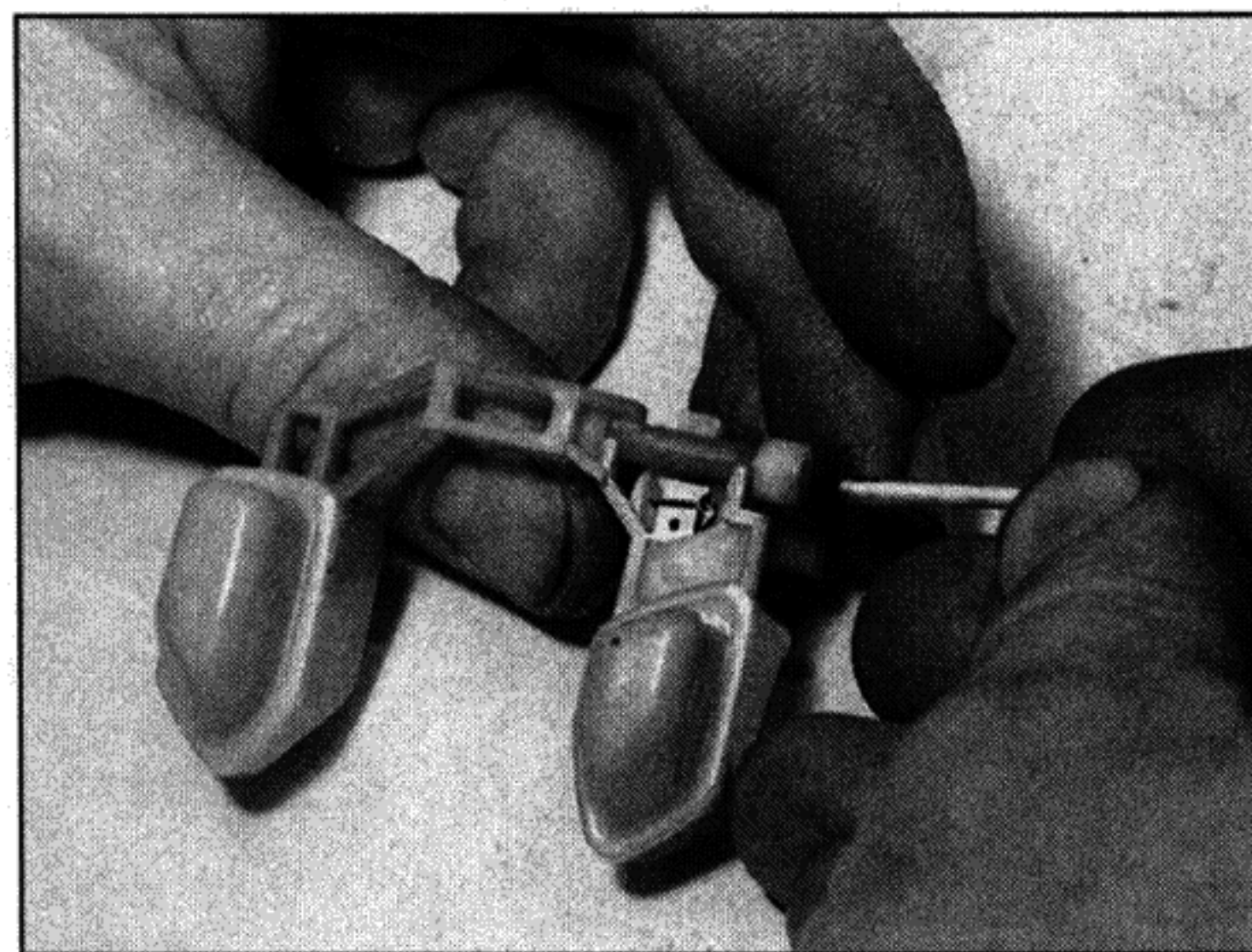
8.5 Remove the jet needle and its washer



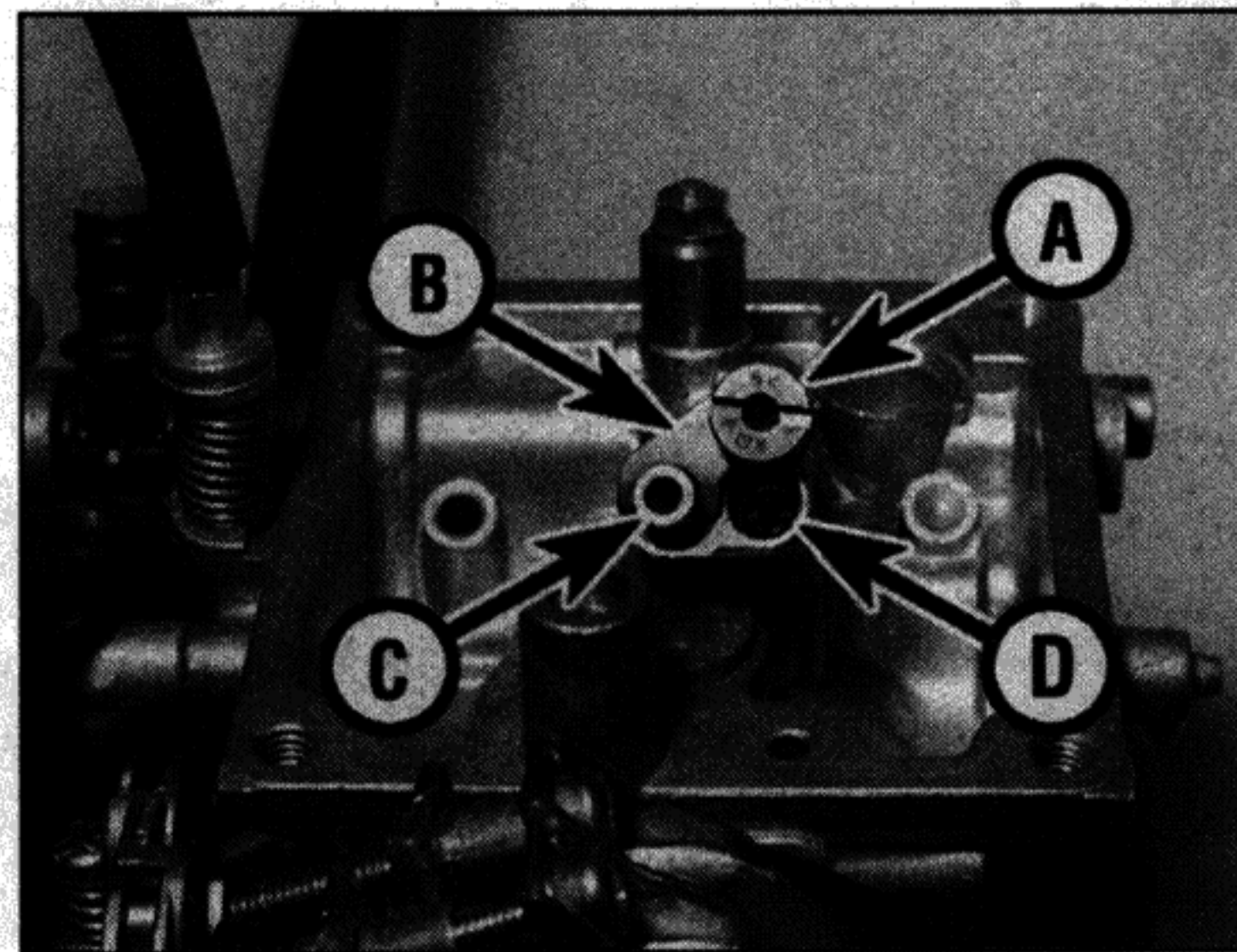
8.6 Remove the screws (arrowed) and lift off the float chamber



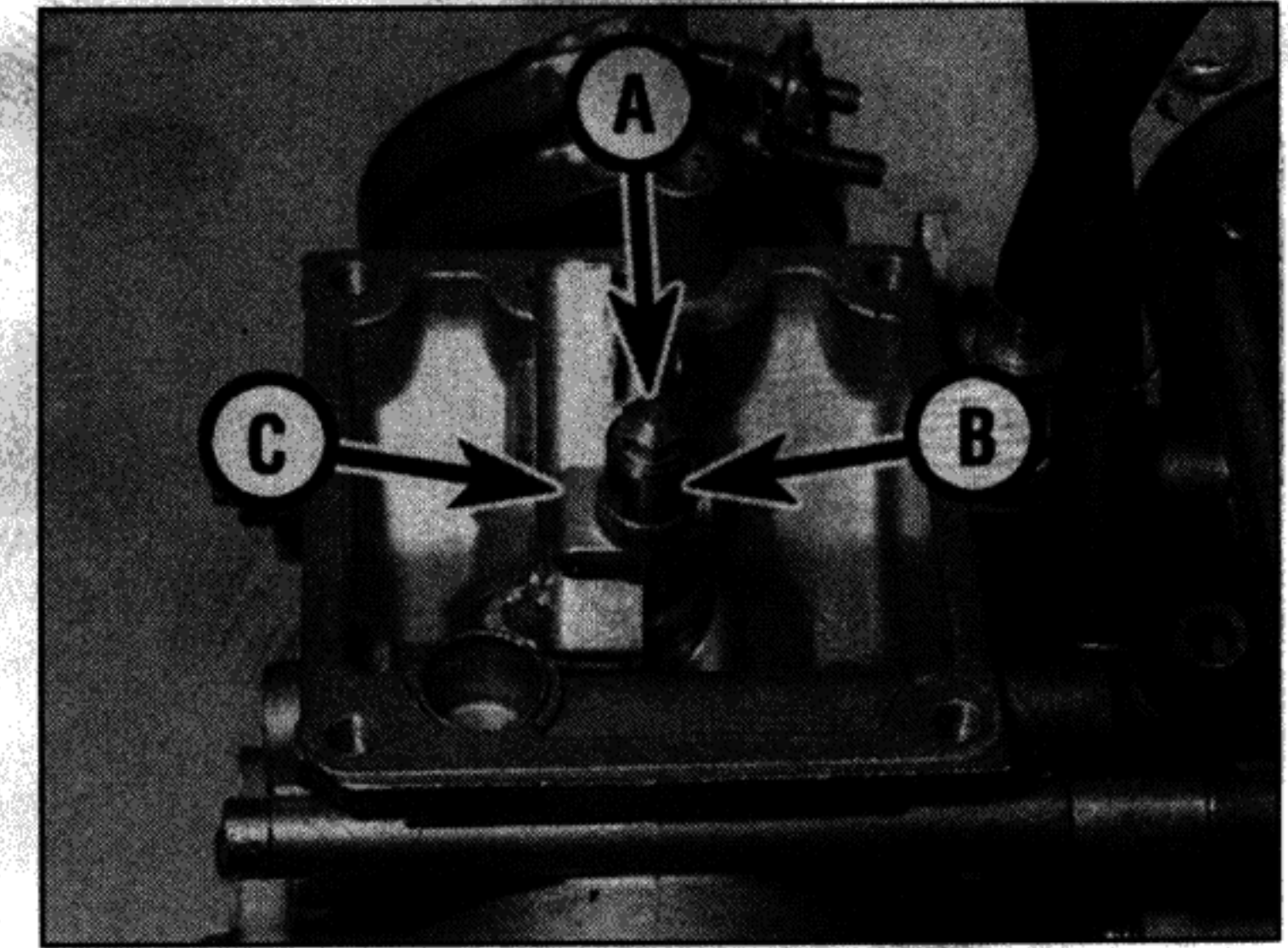
8.7a Carefully prise out the float assembly



8.7b Withdraw the pivot pin and separate the float, needle valve and seat



8.8 Starter jet (A), main jet holder (B), main jet (C), pilot jet (D)



8.10a Unscrew the bolt (A), remove the collar (B), and lift off the jet housing (C)