

# Chapter 1

## Routine maintenance and Servicing

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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





## 1.2 Routine maintenance

### Specifications

#### Engine

Cylinder identification .....	No. 1 (left-hand), no. 2 (right-hand)
Spark plugs	
Type .....	NGK DPR8EA-9 or Nippondenso X24EPR-U9
Electrode gap .....	0.8 to 0.9 mm
Engine idle speed	
TDM 1991 to 1995 models .....	1000 to 1200 rpm
TDM 1996-on models and all TRX models .....	1050 to 1250 rpm
XTZ models .....	1100 to 1200 rpm
Carburettor synchronisation – intake vacuum	
TDM 1991 to 1995 models .....	250 to 270 mm Hg
TDM 1996-on models .....	270 to 290 mm Hg
TRX and XTZ models .....	240 to 260 mm Hg
Carburettor synchronisation – max. difference between carburettors	
TDM 1991 to 1995 models and all XTZ models .....	10 mm Hg
TDM 1996-on models and all TRX models .....	5 mm Hg
Valve clearances (COLD engine)	
Inlet valves .....	0.15 to 0.20 mm
Exhaust valves .....	0.25 to 0.30 mm
Cylinder compression	
TDM 1991 to 1995 models	
Standard .....	152 psi (10.5 Bar)
Maximum .....	158 psi (10.9 Bar)
Minimum .....	146 psi (10.1 Bar)
Max. difference between cylinders .....	14.5 psi (1.0 Bar)
TDM 1996-on models and all TRX models	
Standard .....	175 psi (12.0 Bar)
Maximum .....	182 psi (12.5 Bar)
Minimum .....	145 psi (10.0 Bar)
Maximum difference between cylinders .....	14.5 psi (1.0 Bar)
XTZ models	
Standard .....	138 psi (9.5 Bar)
Maximum .....	144 psi (9.9 Bar)
Minimum .....	132 psi (9.1 Bar)
Maximum difference between cylinders .....	14.5 psi (1.0 Bar)

#### Cycle parts

Drive chain slack	
TDM models .....	40 to 50 mm
TRX models .....	20 to 30 mm
XTZ models .....	25 to 35 mm
Front brake lever freeplay (XTZ models) .....	2 to 5 mm
Rear brake pedal height (see text)	
TDM 1991 to 1995 models .....	17 to 41 mm
TDM 1996-on models .....	29 mm
TRX models .....	57 mm
XTZ models .....	5 to 25 mm
Brake pad friction material wear limit	
TDM and TRX models .....	0.5 mm
XTZ models .....	1.5 mm
Clutch cable freeplay	
TDM 1991 to 1995 models .....	8 to 12 mm
All other models .....	10 to 15 mm
Throttle cable freeplay	
TRX models .....	3 to 7 mm
All other models .....	3 to 5 mm
Tyre pressures (cold) and minimum tread depth .....	see <i>Daily (pre-ride) checks</i>
Swingarm – XTZ models	
Side clearance .....	0.4 to 0.7 mm
Bearing spacer length (right-hand) .....	90.95 to 91.10 mm
Bearing spacer length (left-hand) .....	80.95 to 81.10 mm
Washer thickness .....	1.9 to 2.0 mm



## Recommended lubricants and fluids

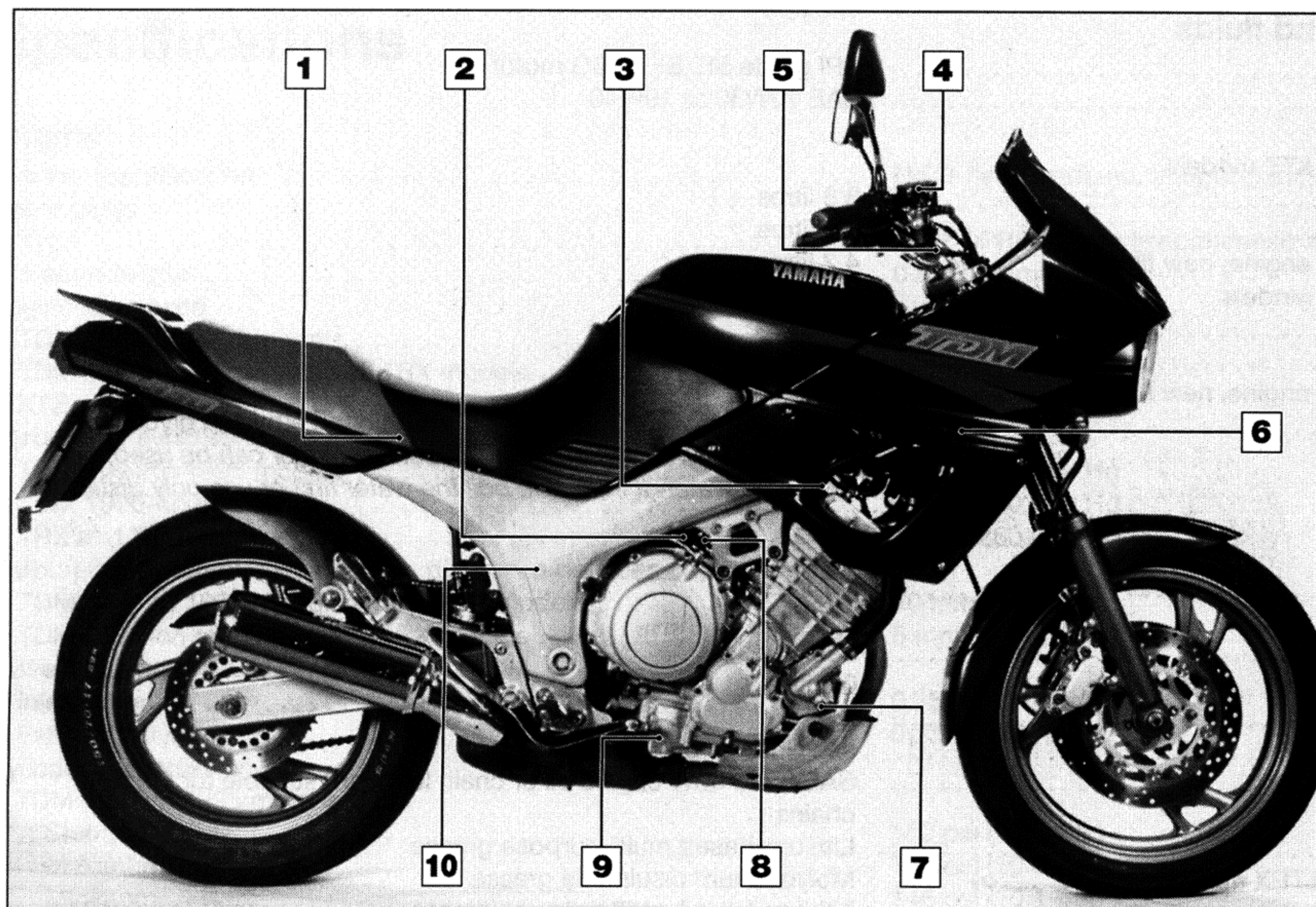
Engine/transmission oil type .....	API grade SE, SF or SG motor oil*
Engine/transmission oil viscosity .....	SAE 10W30 or 10W40
Engine/transmission oil capacity	
TDM 1991 to 1995 models and all XTZ models	
Oil change .....	3.8 litres
Oil and filter change .....	3.9 litres
Following engine overhaul – dry engine, new filter .....	4.2 litres
TDM 1996-on models and all TRX models	
Oil change .....	3.5 litres
Oil and filter change .....	3.6 litres
Following engine overhaul – dry engine, new filter .....	4.2 litres
Coolant type .....	50% distilled water, 50% corrosion-inhibited ethylene glycol anti-freeze. <b>Note:</b> Yamaha specify that soft tap water can be used, but NOT hard water. If in doubt, boil the water first or use only distilled water.
Coolant capacity	
Radiator and engine .....	1.7 litres
Reservoir	
XTZ models .....	0.45 litre
All other models .....	0.3 litre
Brake fluid .....	DOT 4
Front fork oil type, capacity and level .....	see Chapter 6 Specifications
Drive chain .....	SAE 30 to 50W engine oil or chain lubricant suitable for O-ring chains
Steering head bearings .....	Lithium-based multi-purpose grease
Swingarm pivot bearings – TDM and TRX models .....	Molybdenum disulphide grease
Swingarm pivot bearings – XTZ models .....	Lithium-based multi-purpose grease
Suspension linkage bearings – TRX models .....	Molybdenum disulphide grease
Suspension linkage bearings – XTZ models .....	Lithium-based multi-purpose grease
Wheel bearings and grease seal lips .....	Lithium-based multi-purpose grease
Gearchange lever/clutch lever/front brake lever/rear brake pedal/sidestand pivots .....	10W30 motor oil
Cables .....	10W30 motor oil
Throttle grip .....	Multi-purpose grease or dry film lubricant
*Yamaha advise against using chemical oil additives, or oils with a grade of SH/CD or higher, or oils labelled ENERGY CONSERVING II. Such additives or oils could cause clutch slip.	

## Torque settings

Rear axle nut	
TDM 1991 to 1995 models .....	105 Nm
TDM 1996-on models .....	107 Nm
TRX models .....	117 Nm
XTZ models .....	90 Nm
Rear brake caliper bracket bolt (TDM models) .....	35 Nm
Crankcase oil drain plug .....	35 Nm
Oil filter housing drain plug .....	30 Nm
Oil filter cover bolts .....	10 Nm
Steering head bearing adjuster nut (using service tool)	
1991 to 1995 TDM models	
Initial setting .....	52 Nm
Final setting .....	3 Nm
1996-on TDM models and all TRX models	
Initial setting .....	48 Nm
Final setting .....	16 Nm
XTZ models	
Initial setting .....	38 Nm
Final setting .....	6 Nm
Steering stem nut	
1991 to 1995 TDM models .....	110 Nm
1996-on TDM models .....	108 Nm
TRX models .....	110 Nm
Steering stem bolt (XTZ models) .....	80 Nm
Fork clamp bolts (top yoke) .....	23 Nm
Cooling system drain plugs .....	10 Nm
Oil gallery bolt .....	10 Nm

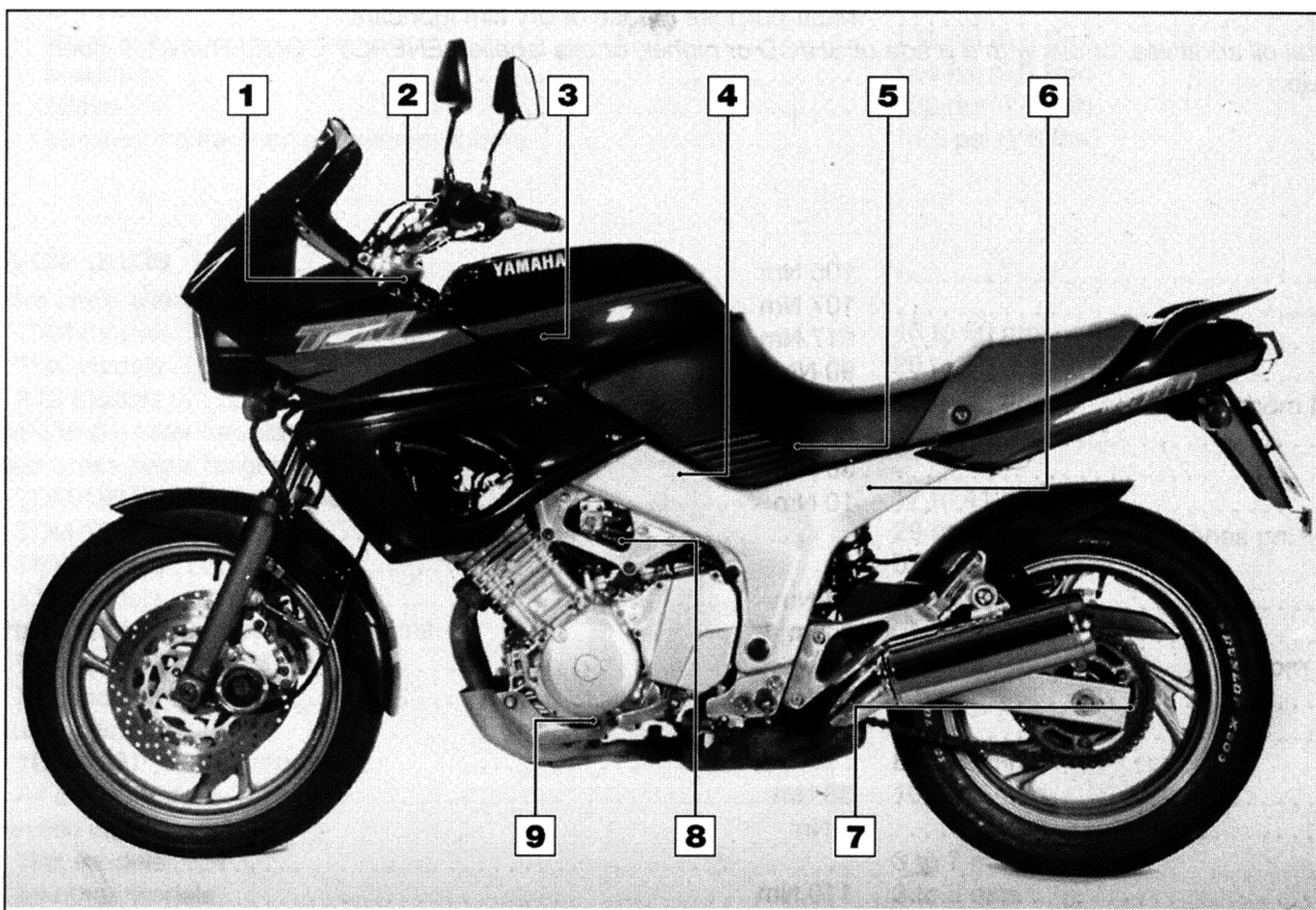


## 1.4 Component locations



### TDM

- 1 Rear brake fluid reservoir
- 2 Oil level window (1996-on)
- 3 Oil filler cap (1996-on)
- 4 Front brake fluid reservoir
- 5 Throttle cable upper adjuster
- 6 Radiator pressure cap
- 7 Coolant drain plug on water pump
- 8 Clutch cable lower adjuster
- 9 Oil filter and filter housing drain plug
- 10 Battery (1996-on)



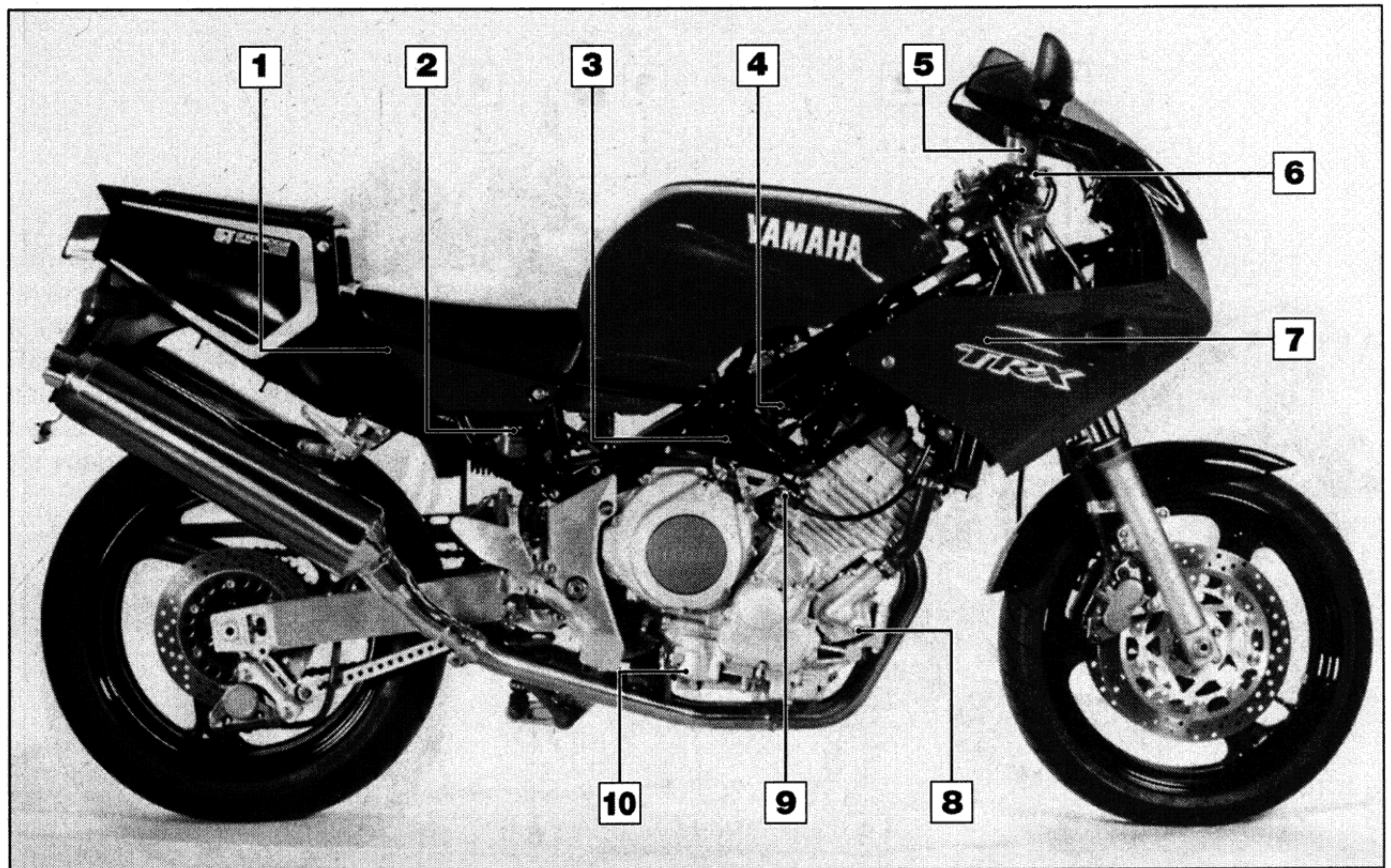
### TDM

- 1 Steering head bearings
- 2 Clutch cable upper adjuster
- 3 Air filter
- 4 Battery (1991 to 1995)
- 5 Oil filler cap/dipstick (1991 to 1995)
- 6 Coolant reservoir
- 7 Drive chain adjuster
- 8 Idle speed adjuster
- 9 Oil drain plug



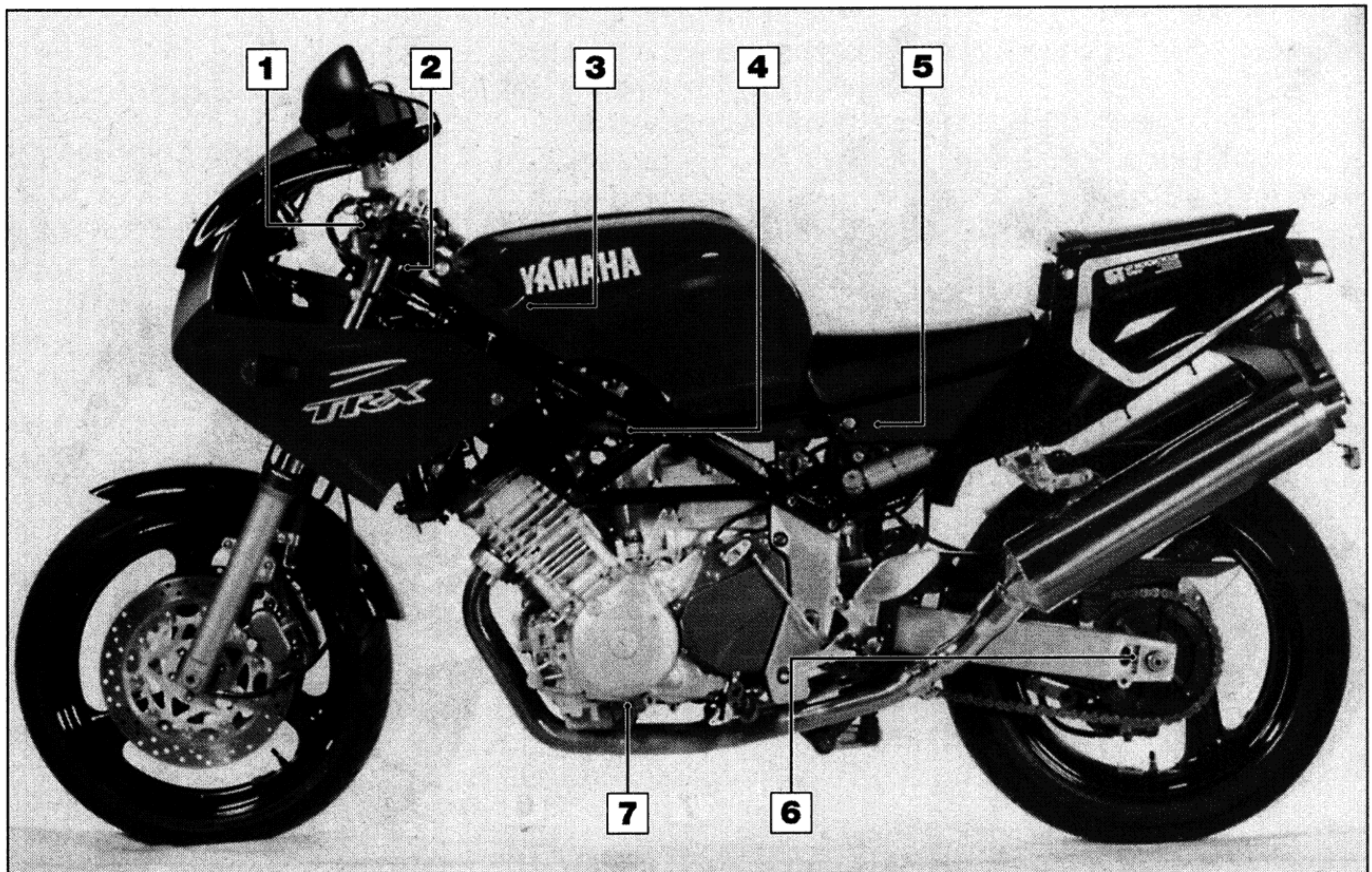
## TRX

- 1 Coolant reservoir
- 2 Rear brake fluid reservoir
- 3 Oil level window
- 4 Oil filler cap
- 5 Front brake fluid reservoir
- 6 Throttle cable upper adjuster
- 7 Radiator pressure cap
- 8 Coolant drain plug on water pump
- 9 Clutch cable lower adjuster
- 10 Oil filter and filter housing drain plug



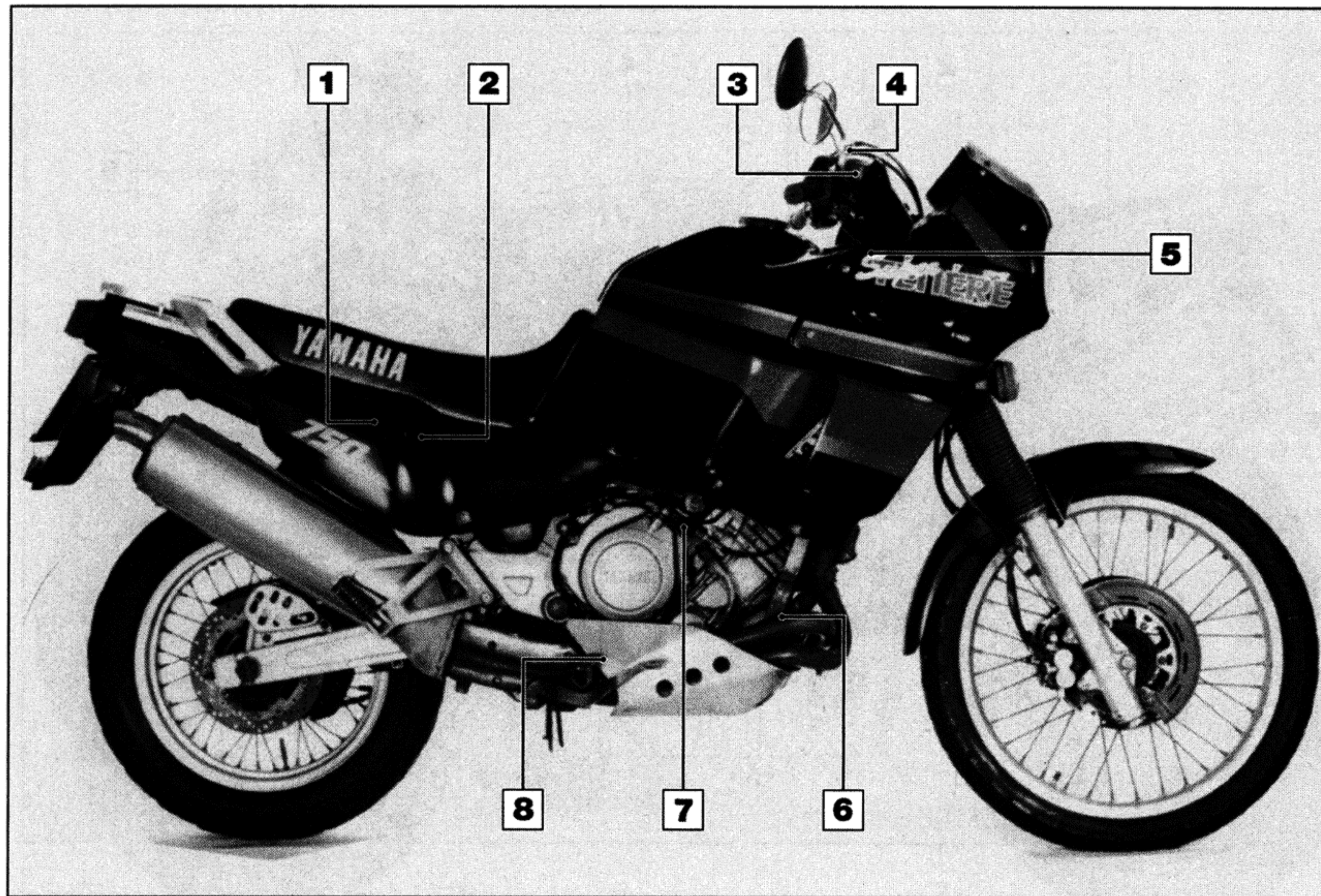
## TRX

- 1 Clutch cable upper adjuster
- 2 Steering head bearing adjuster
- 3 Air filter
- 4 Idle speed adjuster
- 5 Battery
- 6 Drive chain adjuster
- 7 Oil drain plug



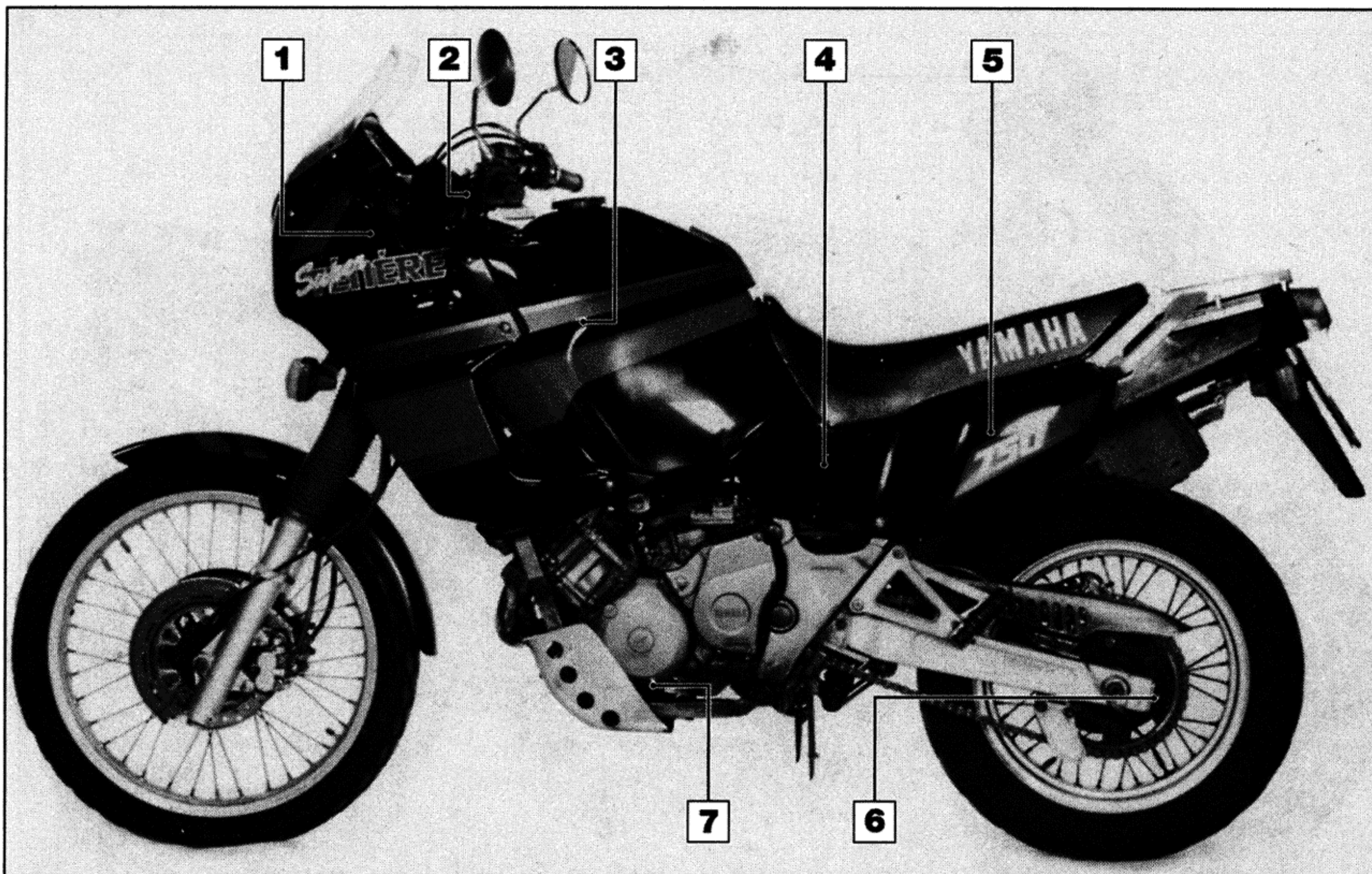


## 1.6 Component locations



### XTZ

- 1 Rear brake fluid reservoir
- 2 Oil filler cap/dipstick
- 3 Throttle cable upper adjuster
- 4 Front brake fluid reservoir
- 5 Steering head bearing adjuster
- 6 Coolant drain plug on water pump
- 7 Clutch cable lower adjuster
- 8 Oil filter and filter housing drain plug



### XTZ

- 1 Radiator pressure cap
- 2 Clutch cable upper adjuster
- 3 Air filter
- 4 Battery
- 5 Coolant reservoir
- 6 Drive chain adjuster
- 7 Oil drain plug



**Note:** The daily (pre-ride) checks outlined in the owner's manual covers those items which should be inspected on a daily basis. Always perform the pre-ride inspection at every maintenance interval (in addition to the procedures listed). The intervals listed below are the intervals recommended by the manufacturer for each particular operation during the model years covered in this manual. Your owner's manual may have different intervals for your model.

## Daily (pre-ride)

- ☐ See 'Daily (pre-ride) checks' at the beginning of this manual.

## After the initial 600 miles (1000 km)

**Note:** This check is usually performed by a Yamaha dealer after the first 600 miles (1000 km) from new. Thereafter, maintenance is carried out according to the following intervals of the schedule.

## Every 300 miles (500 km)

- ☐ Check, adjust and lubricate the drive chain (Section 1)

## Every 4000 miles (6000 km) or 6 months (whichever comes sooner)

- ☐ Check the spark plug gaps and plug condition (Section 2)
- ☐ Check and adjust the idle speed (Section 3)
- ☐ Check/adjust the carburettor synchronisation (Section 4)
- ☐ Clean and check the air filter element (Section 5)
- ☐ Check the fuel system and hoses (Section 6)
- ☐ Change the engine oil (Section 7)
- ☐ Check the brake pads (Section 8)
- ☐ Check the brake system and brake light switch operation (Section 9)
- ☐ Check and adjust the clutch (Section 10)
- ☐ Check the battery (Section 11)
- ☐ Check the condition of the wheels and tyres (Section 12)
- ☐ Check the wheel bearings (Section 13)
- ☐ Check the sidestand (Section 14)
- ☐ Check the tightness of all nuts, bolts and fasteners (Section 15)
- ☐ Check the cooling system (Section 16)
- ☐ Check and adjust the throttle and choke cables (Section 17)
- ☐ Lubricate the clutch/gearshift/brake lever/brake pedal/sidestand pivots and the throttle/choke/clutch cables (Section 18)

## Every 4000 miles (6000 km) or 6 months (whichever comes sooner) (continued)

- ☐ Re-grease the swingarm and suspension linkage bearings (XTZ models) (Section 19).
- ☐ Check the suspension (Section 20)
- ☐ Check and adjust the steering head bearings (Section 21)

## Every 8000 miles (12,000 km) or 12 months (whichever comes sooner)

Carry out all the items under the 4000 mile (6000 km) check, plus the following:

- ☐ Change the engine oil and filter (Section 22)
- ☐ Renew the fuel filter (1999 TDM models) (Section 23)

## Every 16,000 miles (24,000 km) or two years (whichever comes sooner)

Carry out all the items under the 8000 mile (12,000 km) check, plus the following:

- ☐ Re-grease the swingarm and suspension linkage bearings (TDM and TRX models) (Section 24).
- ☐ Re-grease the steering head bearings (Section 25).
- ☐ Change the brake fluid and renew the brake master cylinder and caliper seals (see Section 26)
- ☐ Renew the coolant (Section 27)

1

## Every 28,000 miles (42,000 km)

Carry out all the items under the 4000 mile (6000 km) check, plus the following:

- ☐ Check and adjust the valve clearances (Section 28)

## Every four years

- ☐ Renew the brake hoses (Section 29)

## Non-scheduled maintenance

- ☐ Check and adjust the headlight aim (Section 30)
- ☐ Check the cylinder compression (Section 31)
- ☐ Check the engine oil pressure (see Section 32)
- ☐ Renew the fuel hoses (Section 33)
- ☐ Change the front fork oil (Section 34)



## 1.8 Introduction

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

2 Deciding where to start or plug into the routine maintenance schedule depends on several factors. If the warranty period on your motorcycle has just expired, and if it has been maintained according to the warranty standards, you may want to pick up routine maintenance as it coincides with the next mileage or calendar interval. If you have owned the machine for some time but have

never performed any maintenance on it, then you may want to start at the nearest interval and include some additional procedures to ensure that nothing important is overlooked. If you have just had a major engine overhaul, then you may want to start the maintenance routine from the beginning. If you have a used machine and have no knowledge of its history or maintenance record, you may desire to combine all the checks into one large service initially and then settle into the maintenance schedule prescribed.

3 Before beginning any maintenance or

repair, the machine should be cleaned thoroughly, especially around the oil filter, spark plugs, valve cover, side panels, carburetors, etc. Cleaning will help ensure that dirt does not contaminate the engine and will allow you to detect wear and damage that could otherwise easily go unnoticed.

4 Certain maintenance information is sometimes printed on decals attached to the motorcycle. If the information on the decals differs from that included here, use the information on the decal.

## Every 300 miles (500 km)

### 1 Drive chain and sprockets – check, adjustment and lubrication

#### Check

1 A neglected drive chain won't last long and can quickly damage the sprockets. Routine chain adjustment and lubrication isn't difficult and will ensure maximum chain and sprocket life.

2 To check the chain, place the bike on its sidestand and shift the transmission into neutral.

3 Push up on the bottom run of the chain and measure the slack midway between the two sprockets, then compare your measurement

to that listed in this Chapter's Specifications (see illustration). As the chain stretches with wear, adjustment will periodically be necessary (see below). Since the chain will rarely wear evenly, roll the bike forwards so that another section of chain can be checked; do this several times to check the entire length of chain and position the tightest spot midway between the sprockets on the bottom run of the chain.

4 In some cases where lubrication has been neglected, corrosion and galling may cause the links to bind and kink, which effectively shortens the chain's length. Such links should be thoroughly cleaned and worked free. If the chain is tight between the sprockets, rusty or kinked, it's time to renew it. If you find a tight area, mark it with felt pen or paint, and repeat

the measurement after the bike has been ridden. If the chain's still tight in the same area, it may be damaged or worn. Because a tight or kinked chain can damage the transmission countershaft bearing, it's a good idea to renew it.

5 Check the entire length of the chain for damaged rollers, loose links and pins, and missing O-rings and renew it if damage is found. **Note:** *Never install a new chain on old sprockets, and never use the old chain if you install new sprockets – renew the chain and sprockets as a set.*

6 If you suspect that the chain may be worn out, you can measure a 10-link length and compare it with the wear limit. This requires the chain to be removed from the bike and first cleaned (see Chapter 6).

7 Remove the front sprocket cover (see Chapter 6). Check the teeth on the engine sprocket and the rear wheel sprocket for wear (see illustration).

8 Inspect the drive chain slider on the swingarm for excessive wear and renew it if worn (see Chapter 6).

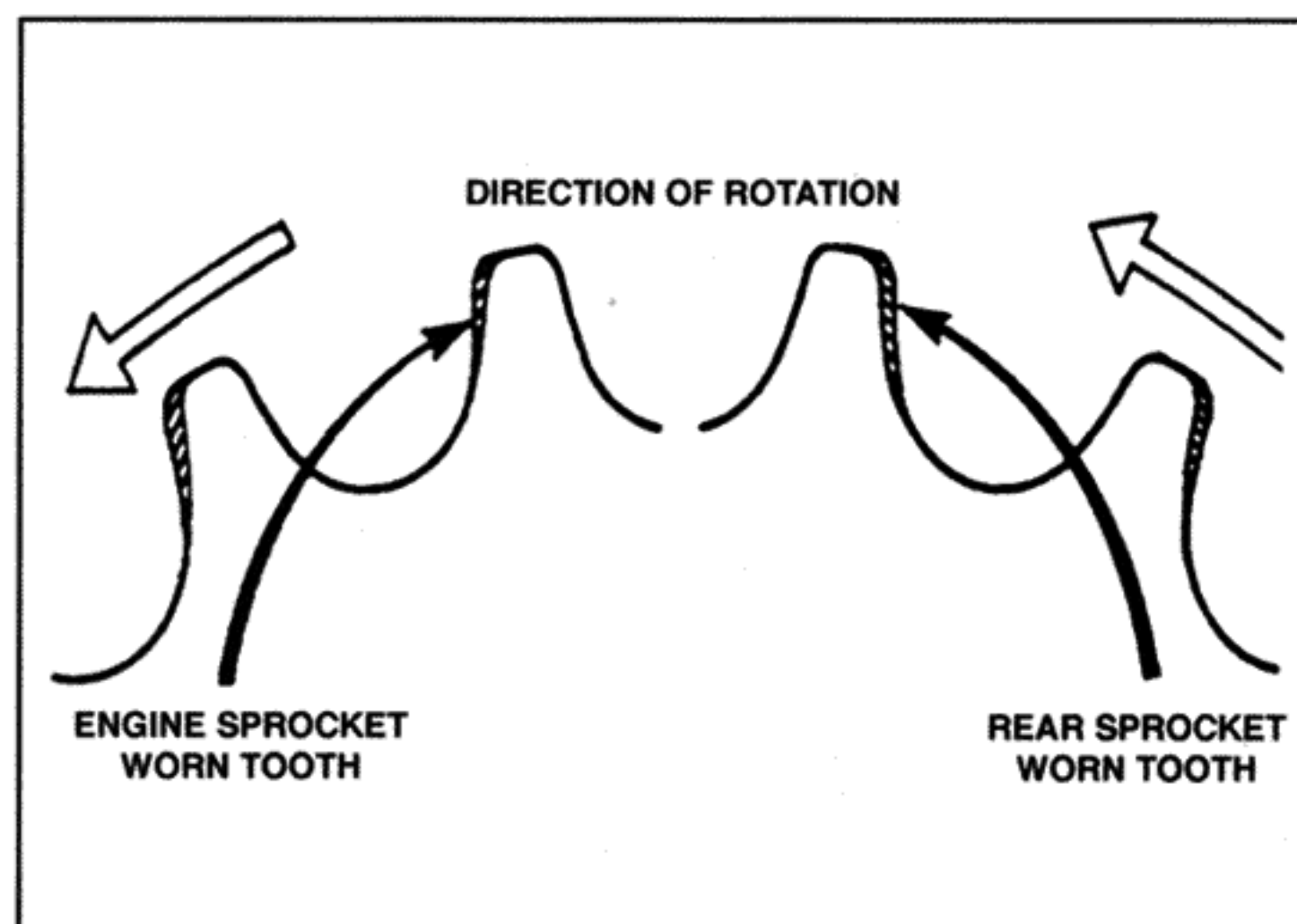
#### Adjustment

9 Rotate the rear wheel until the chain is positioned with the tightest point at the centre of its bottom run, then place the machine on its sidestand. On TDM models, slacken the brake caliper bracket bolt on the top of the swingarm (see illustration).

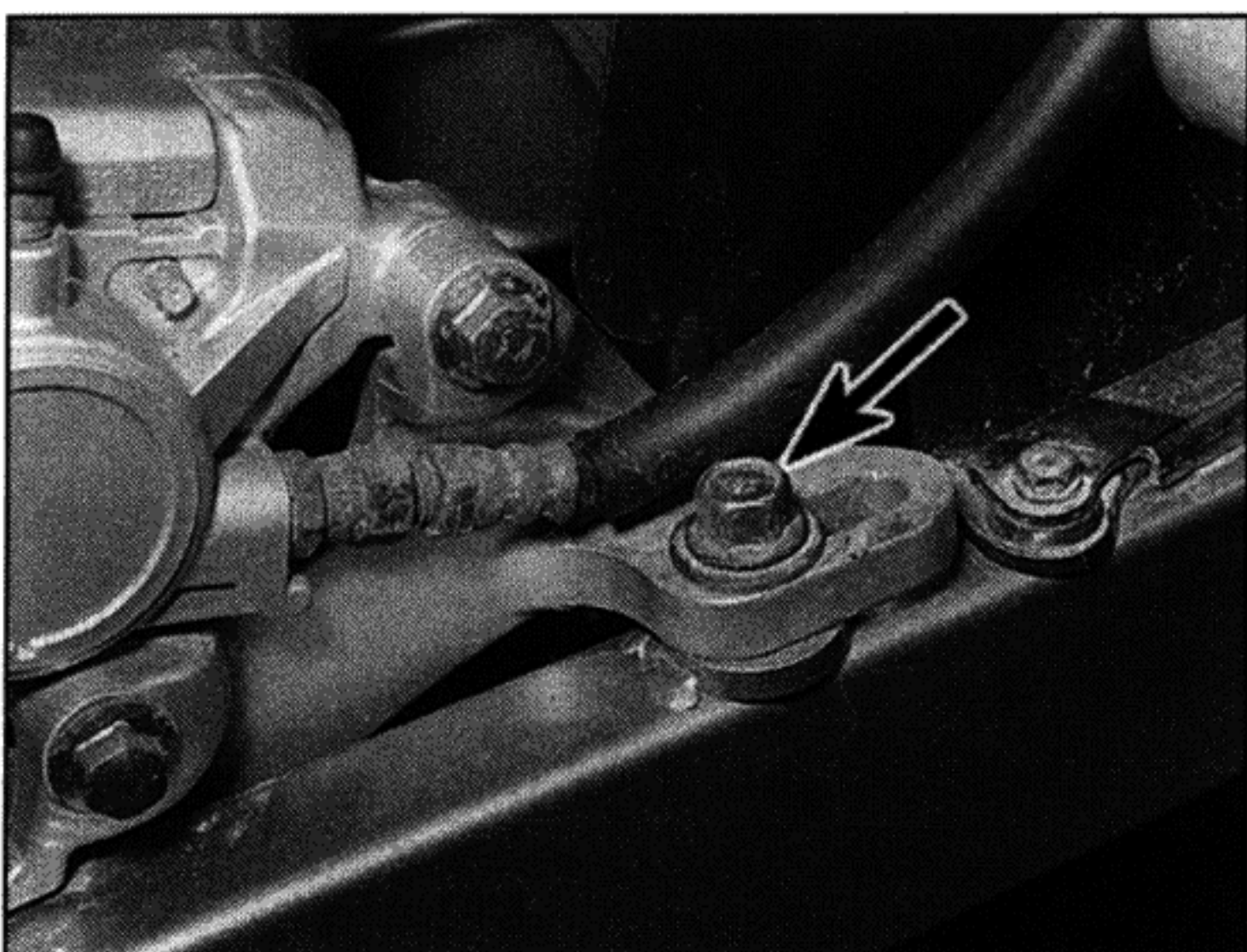
10 Where fitted, remove the split pin from the rear axle nut. Slacken the nut (see illustrations).



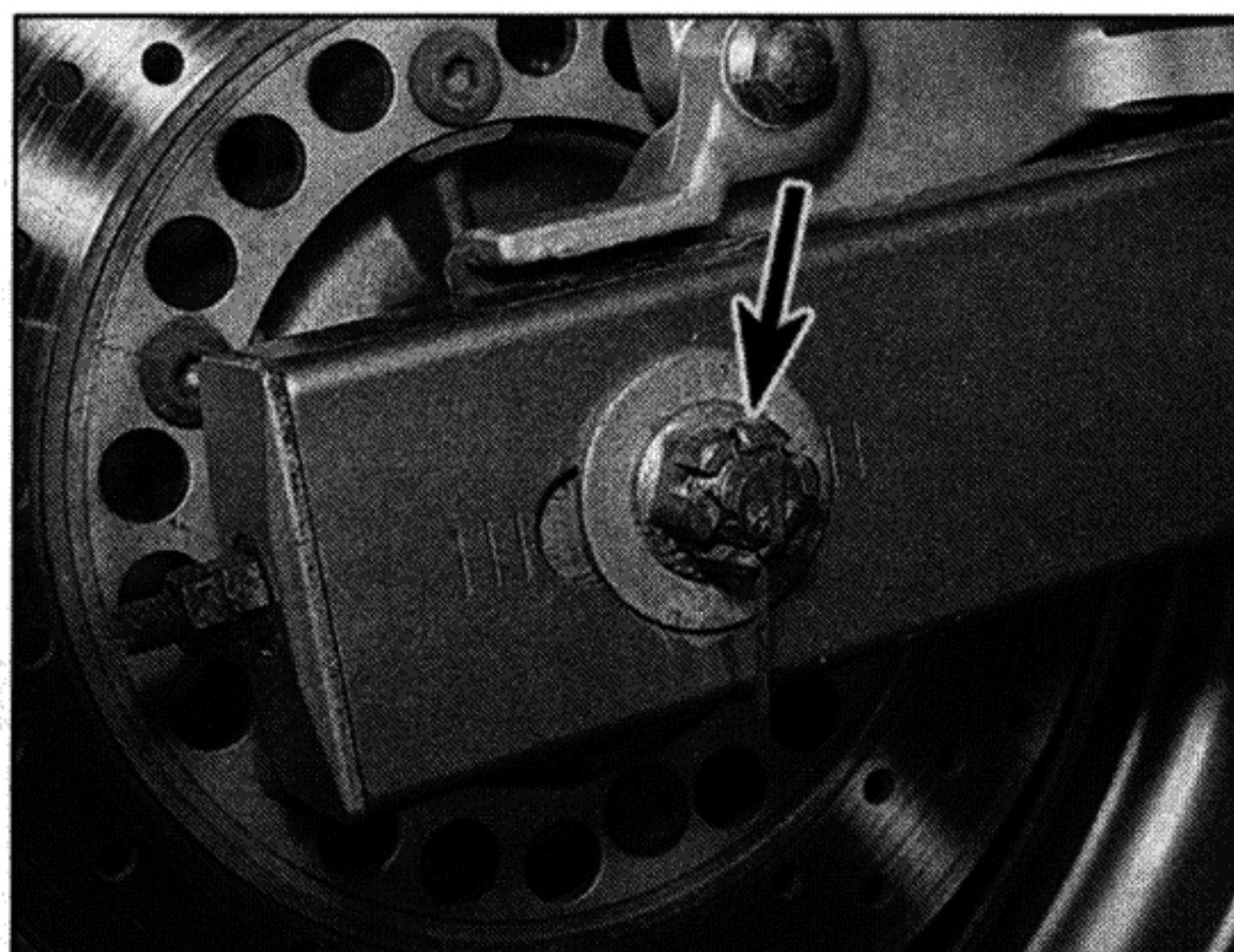
1.3 Push up on the chain and measure the slack



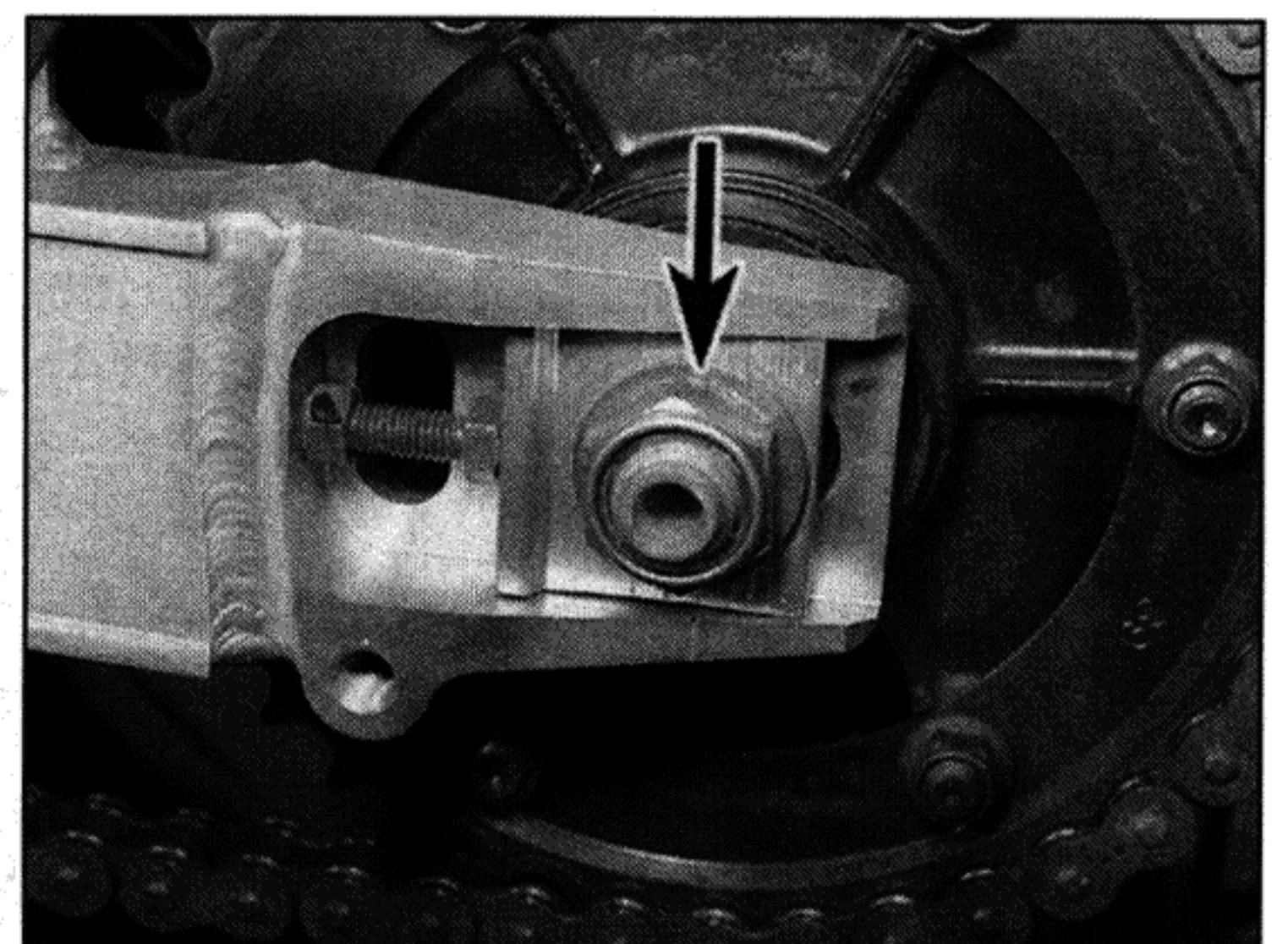
1.7 Check the sprockets in the areas indicated to see if they are worn excessively



1.9 On TDM models, slacken the bolt (arrowed)

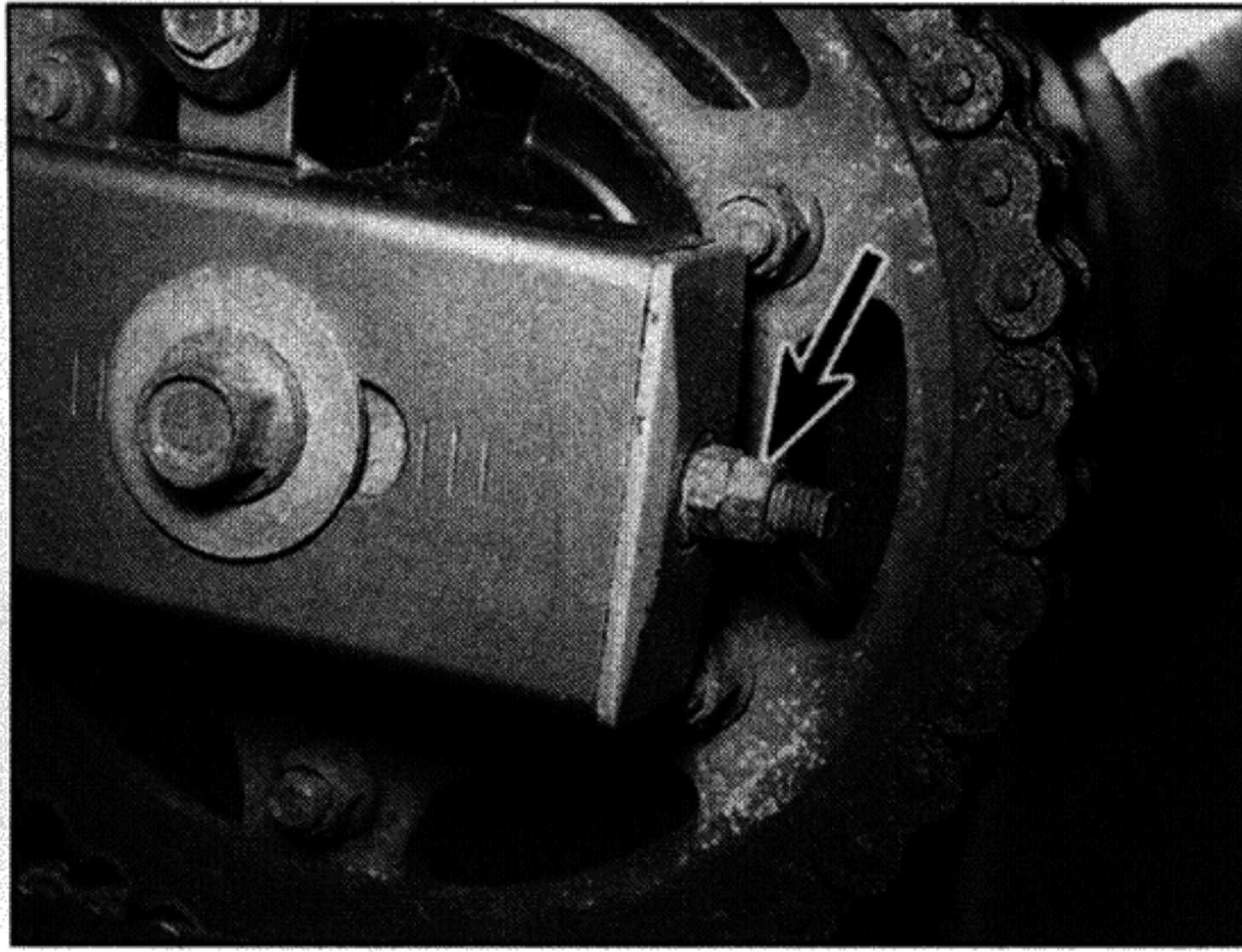


1.10a Rear axle nut (arrowed) – TDM models

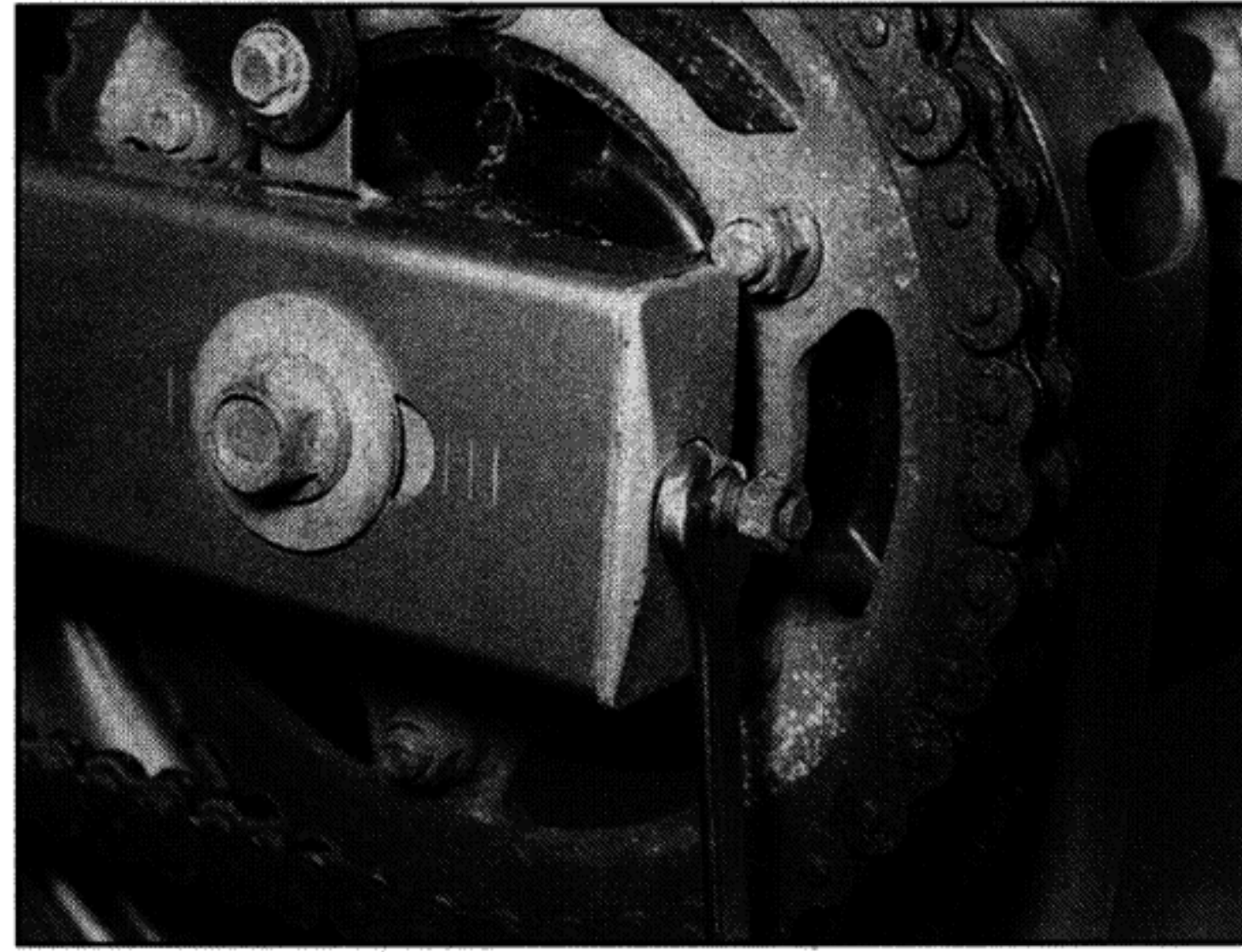


1.10b Rear axle nut (arrowed) – TRX models

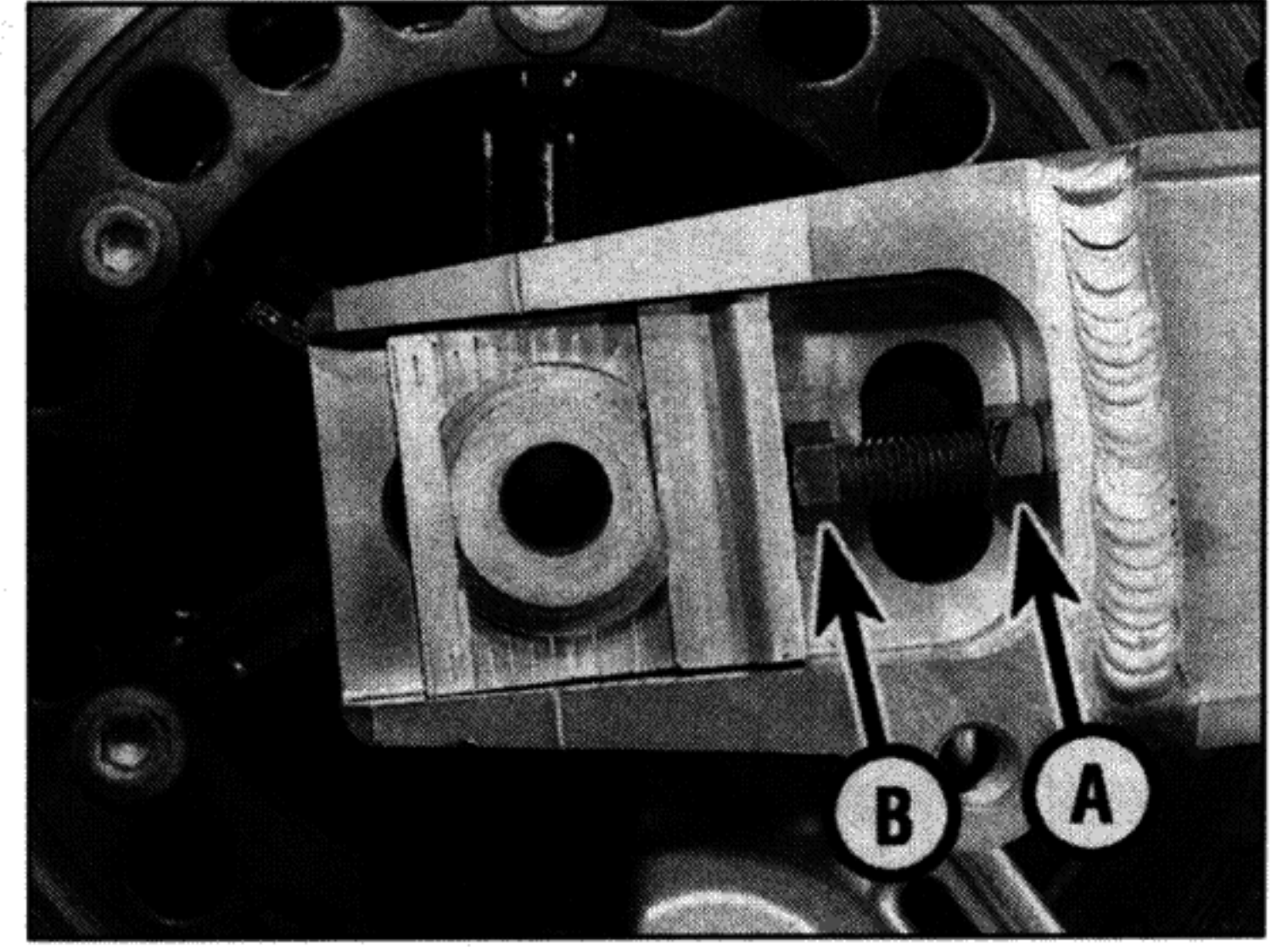




1.11a On TDM and XTZ models, slacken the locknut (arrowed) . . .



1.11b . . . and turn the adjuster as required



1.11c On TRX models, slacken the locknut (A) and turn the adjuster (B) as required

11 Slacken the adjuster locknut on each side of the swingarm, then turn the adjusters evenly until the amount of freeplay specified at the beginning of the Chapter is obtained at the centre of the bottom run of the chain (see illustrations). Following chain adjustment, check that each chain adjustment marker is in the same position in relation to the marks on the swingarm (see illustrations). It is important each adjuster aligns with the same notch; if not, the rear wheel will be out of alignment with the front. **Note:** If you need to check wheel alignment refer to Chapter 7.

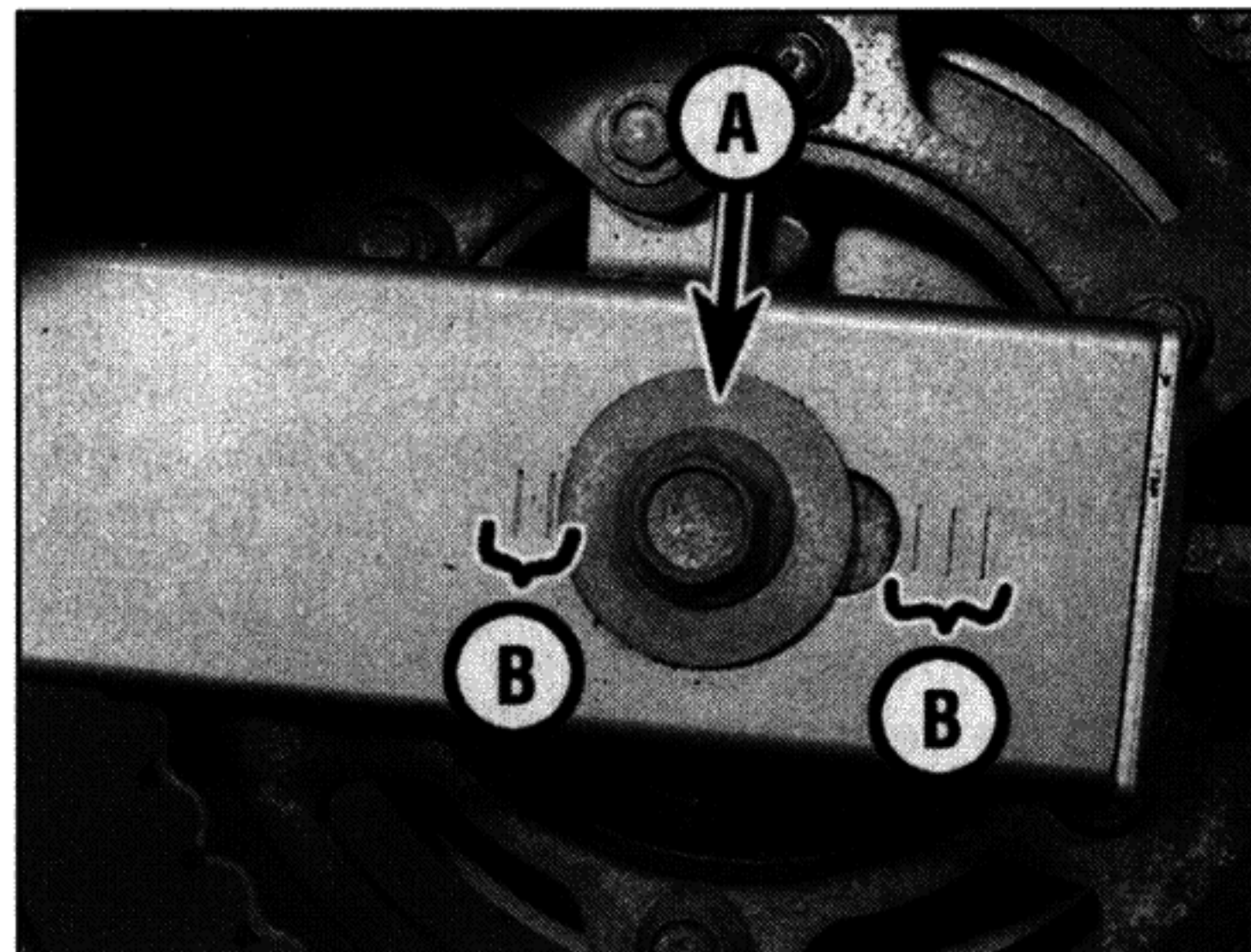
12 If there is a discrepancy in the chain adjuster positions, adjust one of them so that its position is exactly the same as the other. Check the chain freeplay as described above and readjust if necessary.

13 Tighten the axle nut to the torque setting specified at the beginning of the Chapter, then tighten the adjuster locknuts securely (see illustration). Where removed, fit a new split pin onto the axle nut (see illustration). On TDM models, tighten the brake caliper bracket bolt to the specified torque (see illustration 1.9).

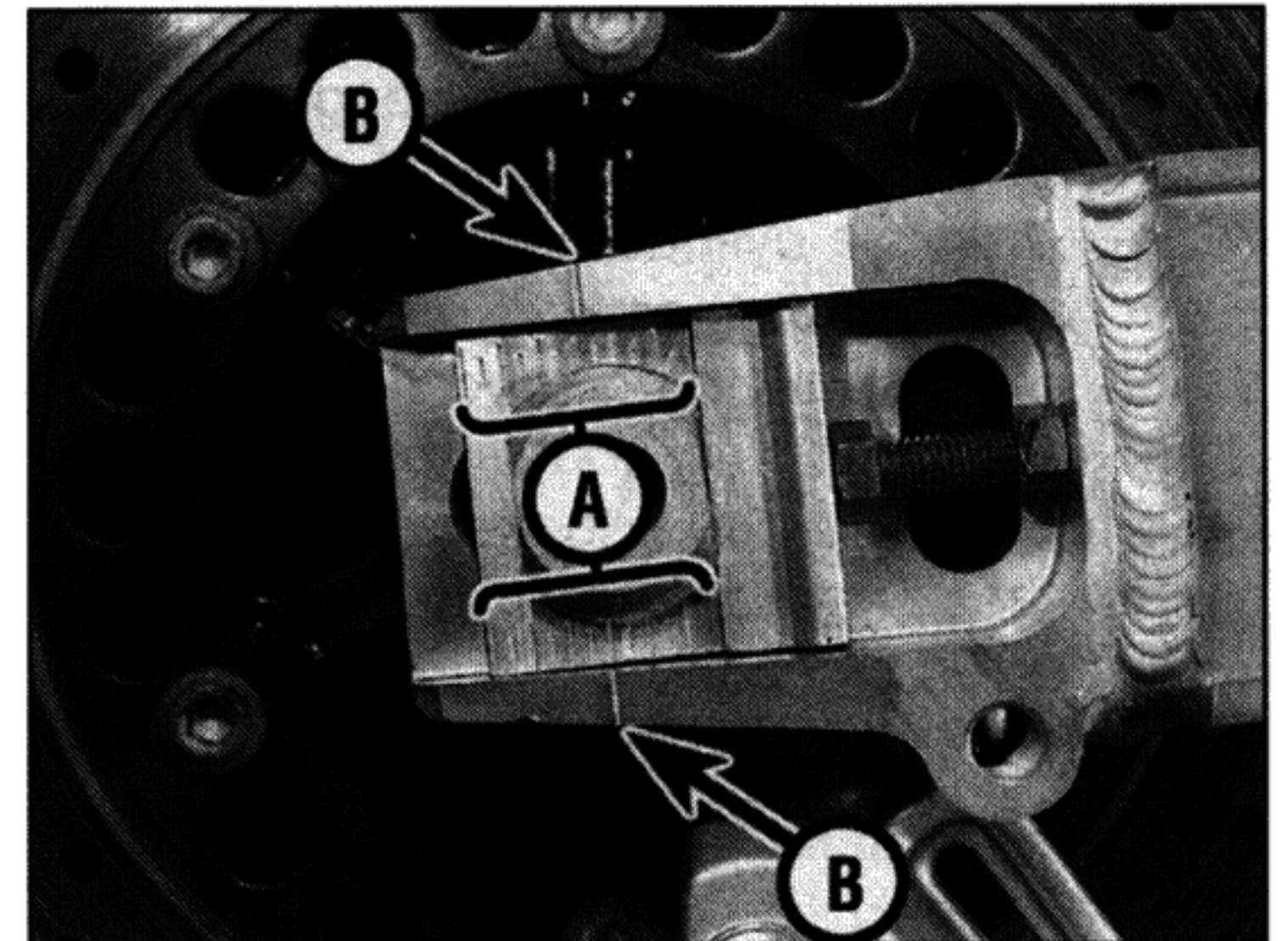
**Caution:** On models with a split pin securing the axle nut, if the groove in the nut does not align with the hole in the axle after the specified torque has been reached, tighten the nut to align it – DO NOT loosen it.

### Lubrication

14 If required, wash the chain in paraffin



1.11d On TDM and XTZ models, check the relative position of the marker (A) and the notches (B) on each side



1.11e On TRX models, check the relative position of the notches on the marker (A) and the notches in the swingarm (B) on each side

(kerosene), then wipe it off and allow it to dry, using compressed air if available. If the chain is excessively dirty it should be removed from the machine and allowed to soak in the paraffin (see Chapter 6).

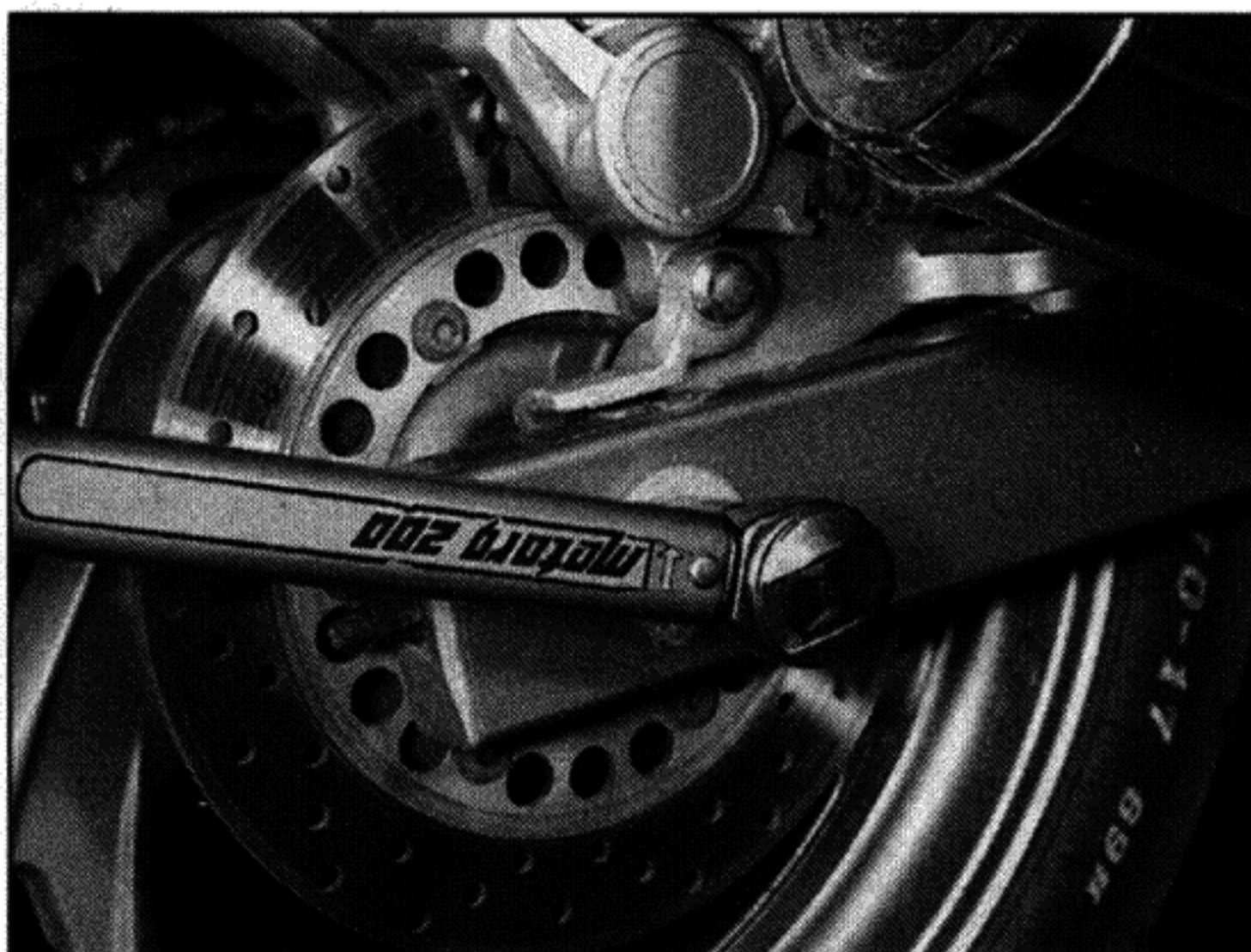
**Caution:** Don't use petrol, solvent or other cleaning fluids which might damage the internal sealing properties of the chain. Don't use high-pressure water. The entire process shouldn't take longer than ten minutes – if it does, the O-rings in the chain rollers could be damaged.

15 For routine lubrication, the best time to lubricate the chain is after the motorcycle has been ridden. When the chain is warm, the lubricant will penetrate the joints between the

side plates better than when cold. **Note:** Yamaha specifies SAE 30 to 50W engine oil; you can use an aerosol chain lube, but make sure that it is suitable for O-ring chains. Apply the oil to the area where the side plates overlap – not the middle of the rollers (see illustration).



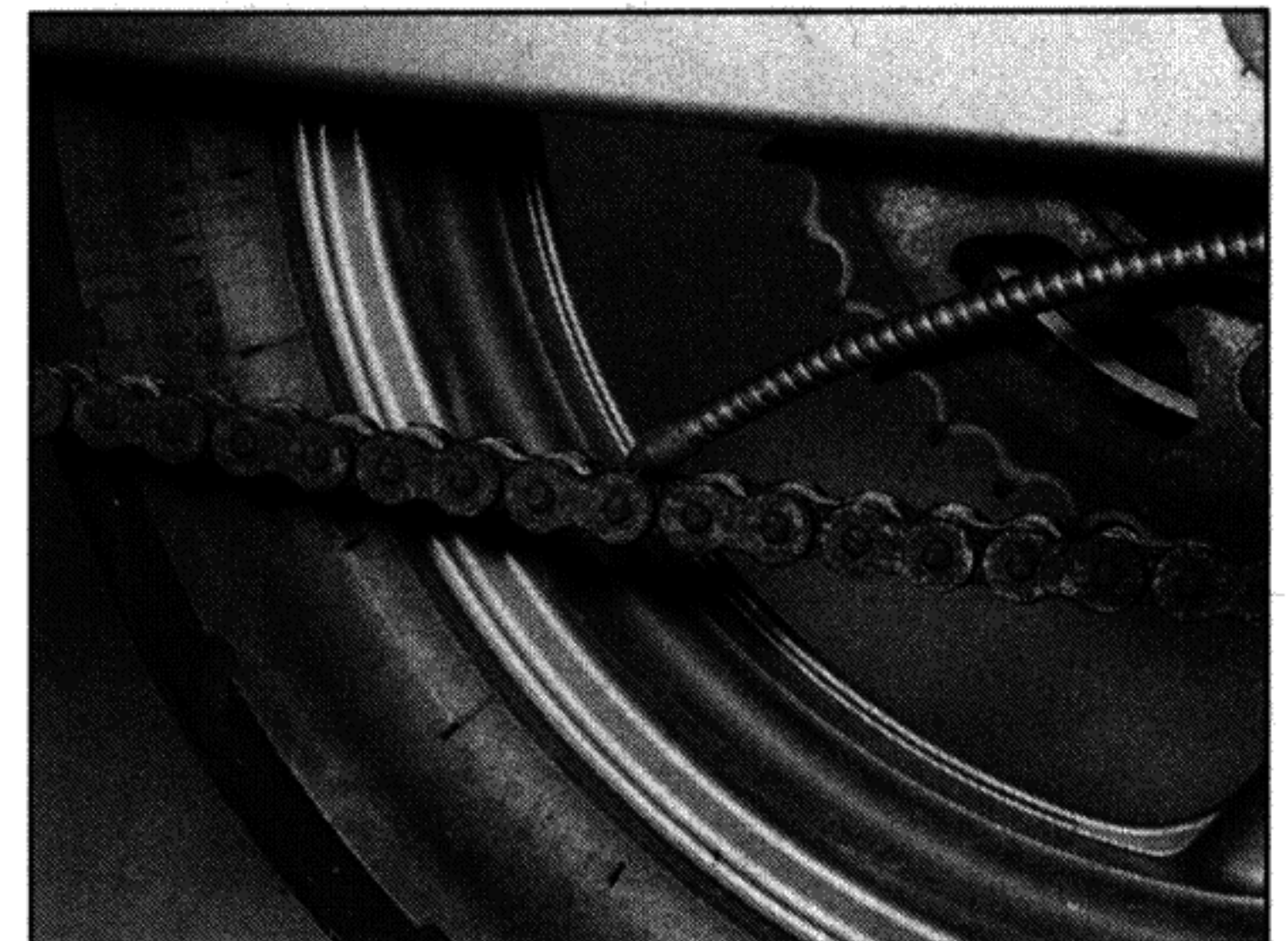
Apply the oil to the top of the lower chain run, so centrifugal force will work the oil into the chain when the bike is moving. After applying the lubricant, let it soak in a few minutes before wiping off any excess.



1.13a Tighten the axle nut to the specified torque



1.13b Use a new split pin, where appropriate

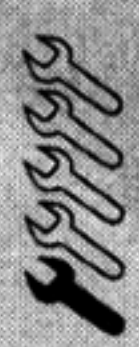


1.15 Apply the oil to the overlap in the side plates



## Every 4000 miles (6000 km) or 6 months

### 2 Spark plugs – check and adjustment



1 Make sure your spark plug socket is the correct size (18 mm) before attempting to remove the plugs – a suitable one is supplied in the motorcycle's tool kit which is stored under the seat.

2 On XTZ models, remove the fuel tank and the air filter housing (see Chapter 4).

3 Using compressed air if available, clean the area around the base of the spark plugs to prevent any dirt falling into the engine when the plugs are removed.

4 Check that the cylinder location is marked on each plug lead, then pull the spark plug cap off each spark plug (see illustration). Using either the plug tool supplied in the bike's toolkit or a deep socket type wrench, unscrew the plugs from the cylinder head (see illustration). Lay each plug out in relation to its cylinder; if either plug shows up a problem it will then be easy to identify the troublesome cylinder.

5 Inspect the electrodes for wear. Both the centre and side electrodes should have square edges and the side electrodes should be of uniform thickness. Look for excessive deposits and evidence of a cracked or chipped insulator

around the centre electrode. Compare your spark plugs to the colour spark plug reading chart at the end of this manual. Check the threads, the washer and the ceramic insulator body for cracks and other damage.

6 If the electrodes are not excessively worn, and if the deposits can be easily removed with a wire brush, the plugs can be re-gapped and re-used (if no cracks or chips are visible in the insulator). If in doubt concerning the condition of the plugs, renew them, as the expense is minimal. Yamaha do not specify a renewal interval, but leave it to the discretion of the owner.

7 Cleaning spark plugs by sandblasting is permitted, provided you clean the plugs with a high flash-point solvent afterwards.

8 Before installing the plugs, make sure they are the correct type and heat range and check the gap between the electrodes (see illustrations). Compare the gap to that specified and adjust as necessary. If the gap must be adjusted, bend the side electrode only and be very careful not to chip or crack the insulator nose (see illustration). Make sure the washer is in place on the plug before installing it.

9 Since the cylinder head is made of aluminium, which is soft and easily damaged, thread the plugs into the heads turning the tool by hand (see illustration). Once the

plugs are finger-tight, the job can be finished with a spanner on the tool supplied or a socket drive (see illustration 1.4b). If a torque wrench can be applied, tighten the spark plugs to the specified torque setting. Otherwise tighten them by 1/4 to 1/2 turn after they have been fully hand-tightened and have seated. Do not over-tighten them.

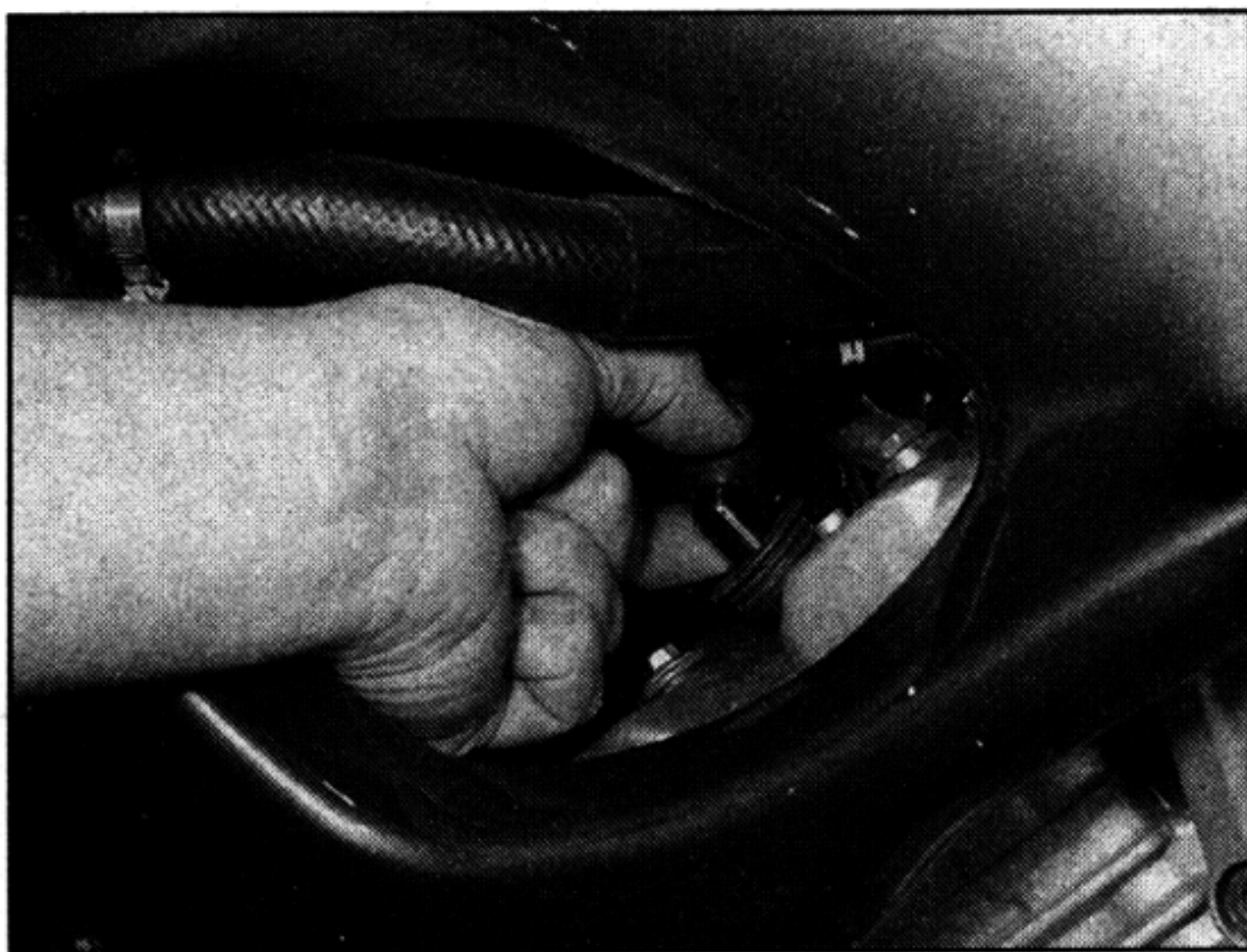
#### HAYNES HiNT

*As the plugs are quite recessed, you can slip a short length of hose over the end of the plug to use as a tool to thread it into place. The hose will grip the plug well enough to turn it, but will start to slip if the plug begins to cross-thread in the hole – this will prevent damaged threads.*

10 Reconnect the spark plug caps, making sure they are securely connected to the correct cylinder. Install all other components previously removed.

#### HAYNES HiNT

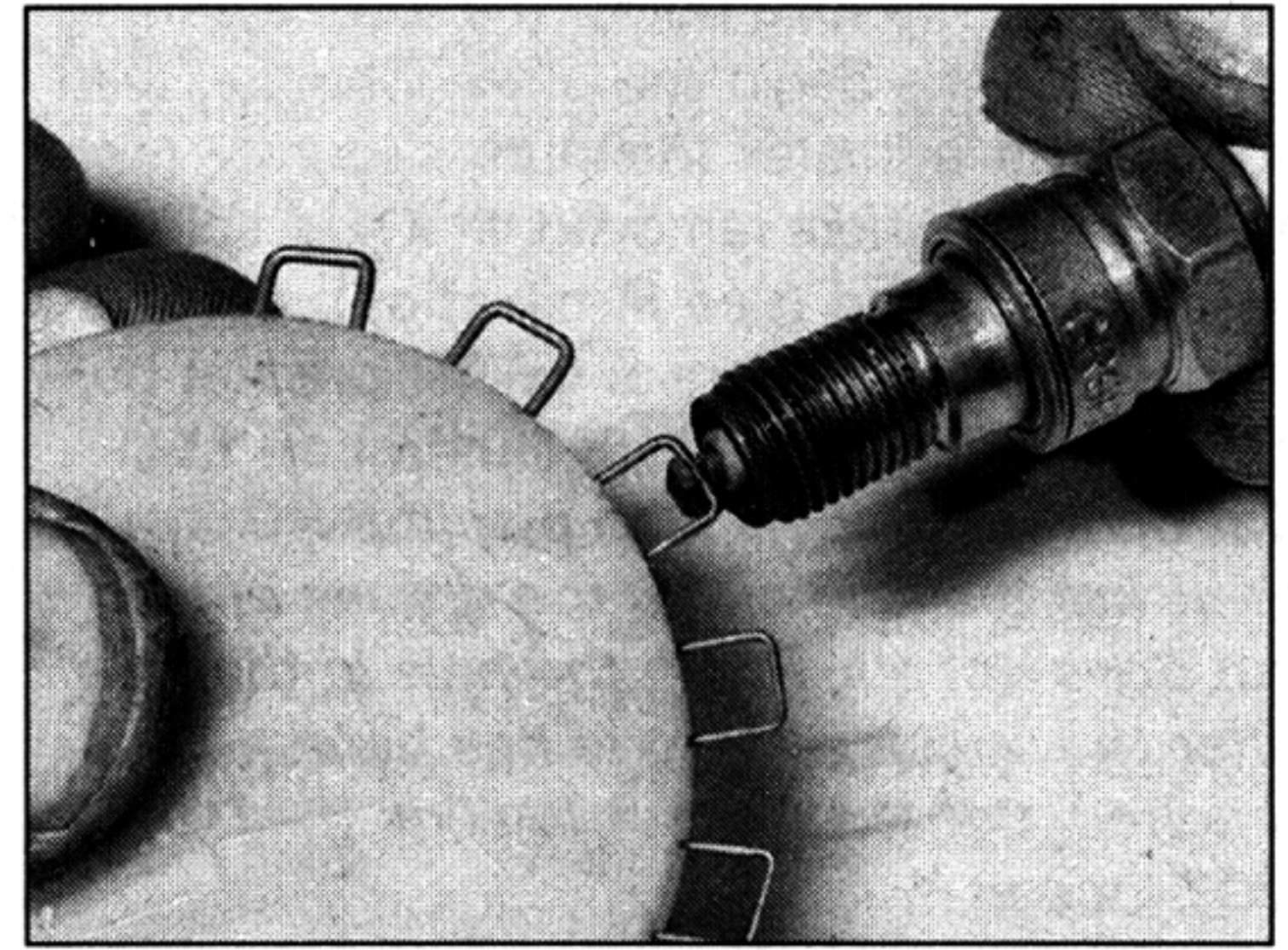
*Stripped plug threads in the cylinder head can be repaired with a Heli-Coil insert – see 'Tools and Workshop Tips' in the Reference section.*



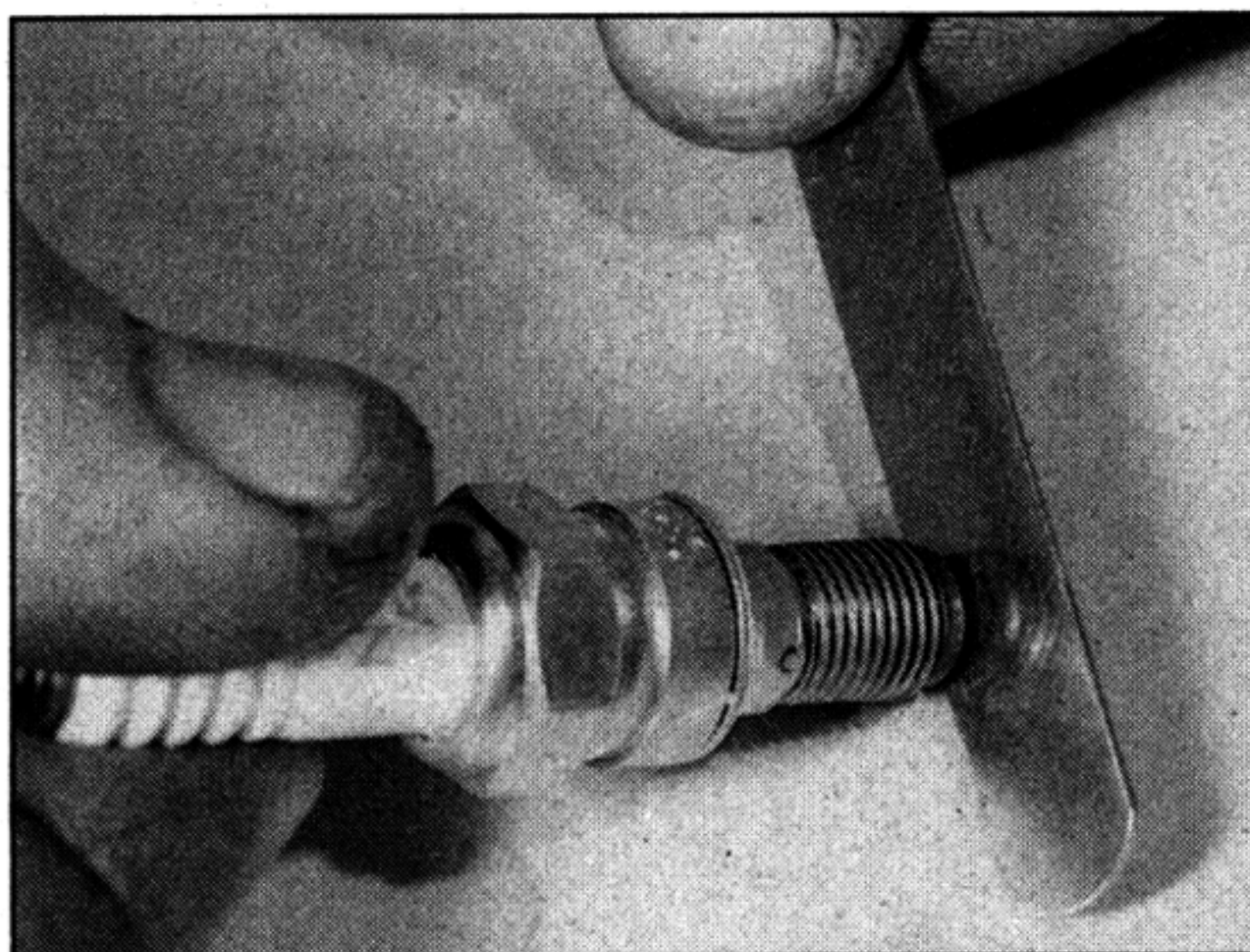
2.4a Remove the spark plug cap ...



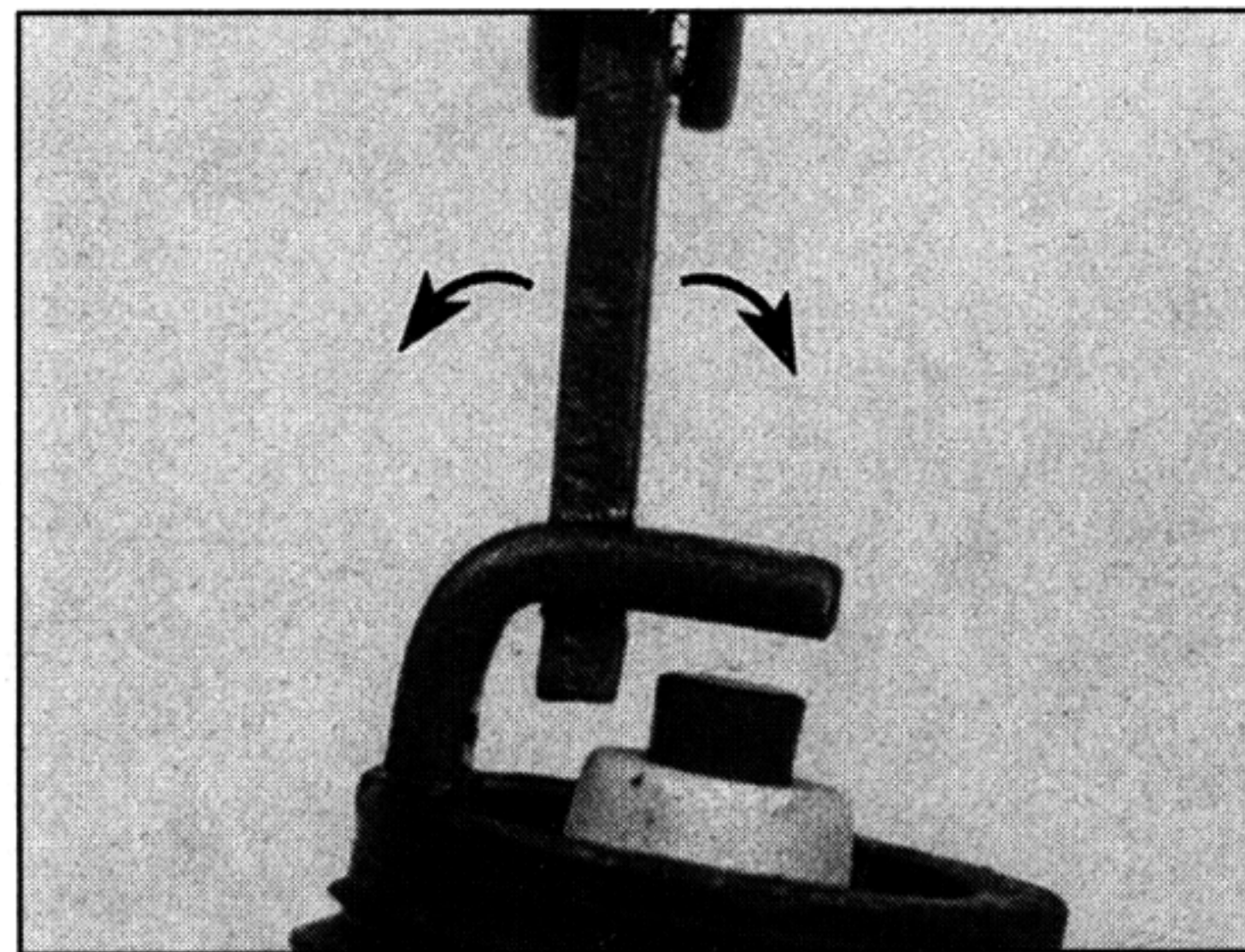
2.4b ... then unscrew the spark plug



2.8a Using a wire type gauge to measure the spark plug electrode gap



2.8b Using a feeler gauge to measure the spark plug electrode gap

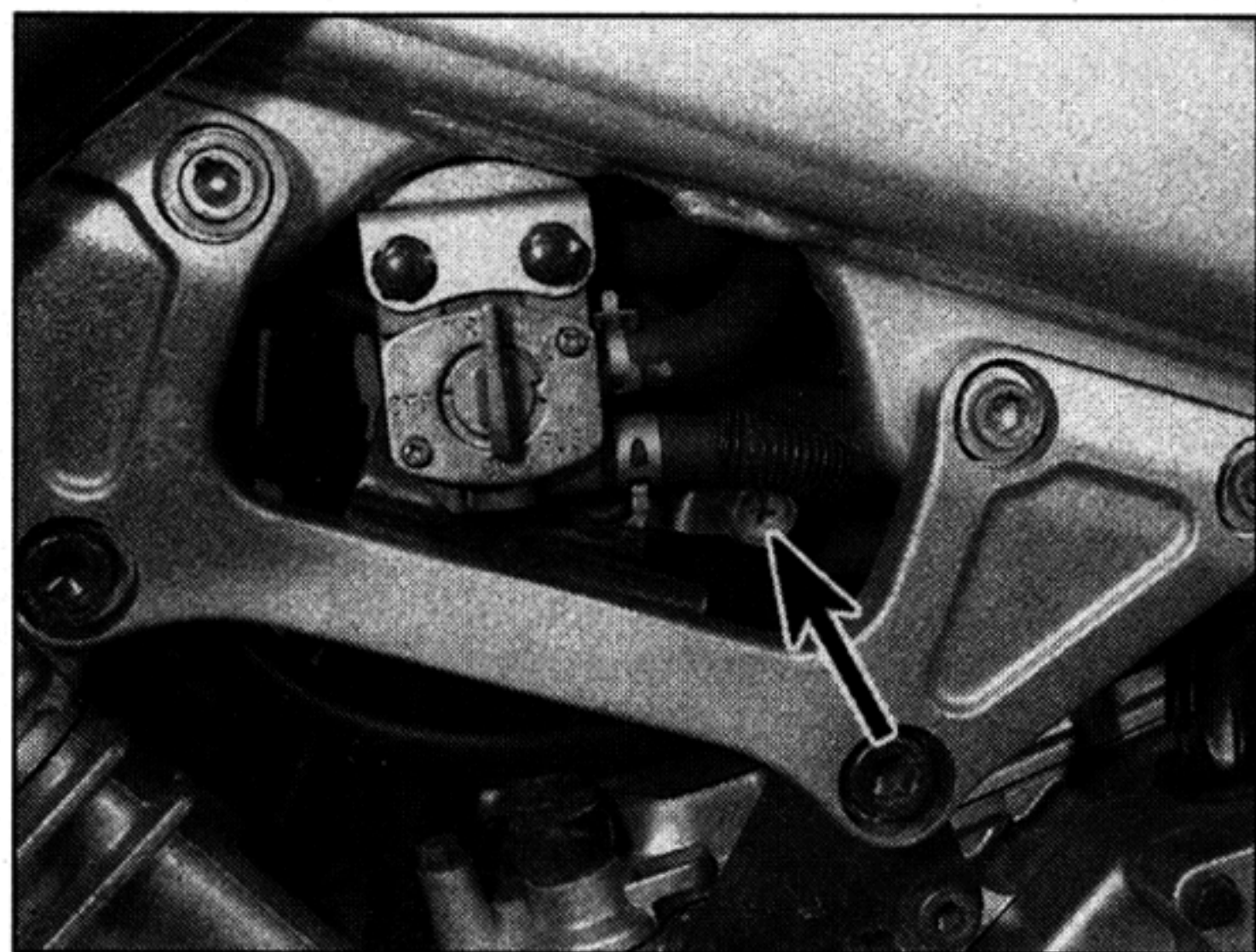


2.8c Adjust the electrode gap by bending the side electrode only



2.9 Thread the plug in as far as possible by turning the tool by hand





**3.3a Idle speed adjuster screw (arrowed) – TDM models**



**3.3b Idle speed adjuster screw (arrowed) – TRX models**

## 3 Idle speed – check and adjustment



**1** The idle speed should be checked and adjusted before and after the carburettors are synchronised (balanced) and when it is obviously too high or too low. Before adjusting the idle speed, make sure the valve clearances and spark plug gaps are correct. Also, turn the handlebars back-and-forth and see if the idle speed changes as this is done. If it does, the throttle cable may not be adjusted or routed correctly, or may be worn out. This is a dangerous condition that can cause loss of control of the bike. Be sure to correct this problem before proceeding.

**2** The engine should be at normal operating temperature, which is usually reached after 10 to 15 minutes of stop-and-go riding. Make sure the transmission is in neutral, and place the motorcycle on its sidestand.

**3** On TDM and TRX models, the idle speed adjuster is located on the left-hand side (see illustrations). On XTZ models, the adjuster is located at the back of the carburettors between the float chambers. With the engine idling, adjust the idle speed by turning the adjuster screw until the idle speed listed in this Chapter's Specifications is obtained. Turn the screw clockwise to increase idle speed, and anti-clockwise to decrease it.

**4** Snap the throttle open and shut a few times, then recheck the idle speed. If necessary, repeat the adjustment procedure.

**5** If a smooth, steady idle can't be achieved, the fuel/air mixture may be incorrect (check the pilot screw settings – see Chapter 4) or the carburettors may need synchronising (see Section 4). Also check the inlet manifold rubbers for cracks which will cause an air leak, resulting in a weak mixture.

## 4 Carburettors – synchronisation



**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.**



**Warning: Take great care not to burn your hand on the hot engine unit when accessing the**

**gauge take-off points on the intake manifolds. Do not allow exhaust gases to build up in the work area; either perform the check outside or use an exhaust gas extraction system.**

**1** Carburettor synchronisation is simply the process of adjusting the carburettors so they pass the same amount of fuel/air mixture to each cylinder. This is done by measuring the vacuum produced in each cylinder. Carburettors that are out of synchronisation will result in decreased fuel mileage, increased engine temperature, less than ideal throttle response and higher vibration levels. Before synchronising the carburettors, make sure the valve clearances and idle speed are properly set.

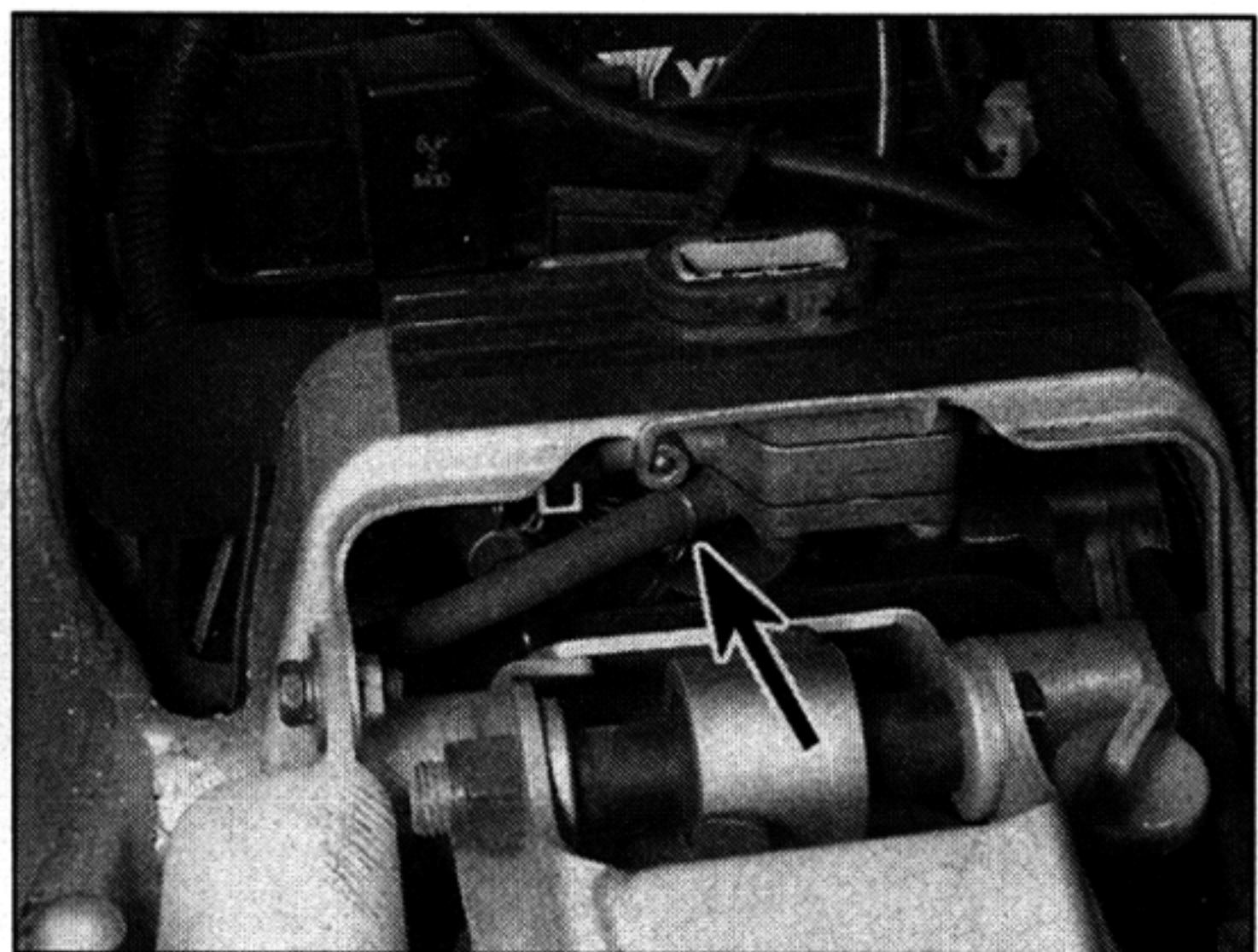
**2** To properly synchronise the carburettors you will need a pair of vacuum gauges or a manometer; these instruments measure engine vacuum and can be obtained from motorcycle dealers or mail order parts suppliers. If you don't have access to either of these instruments entrust the work to a dealer.

**3** Start the engine and let it run until it reaches normal operating temperature, then shut it off.

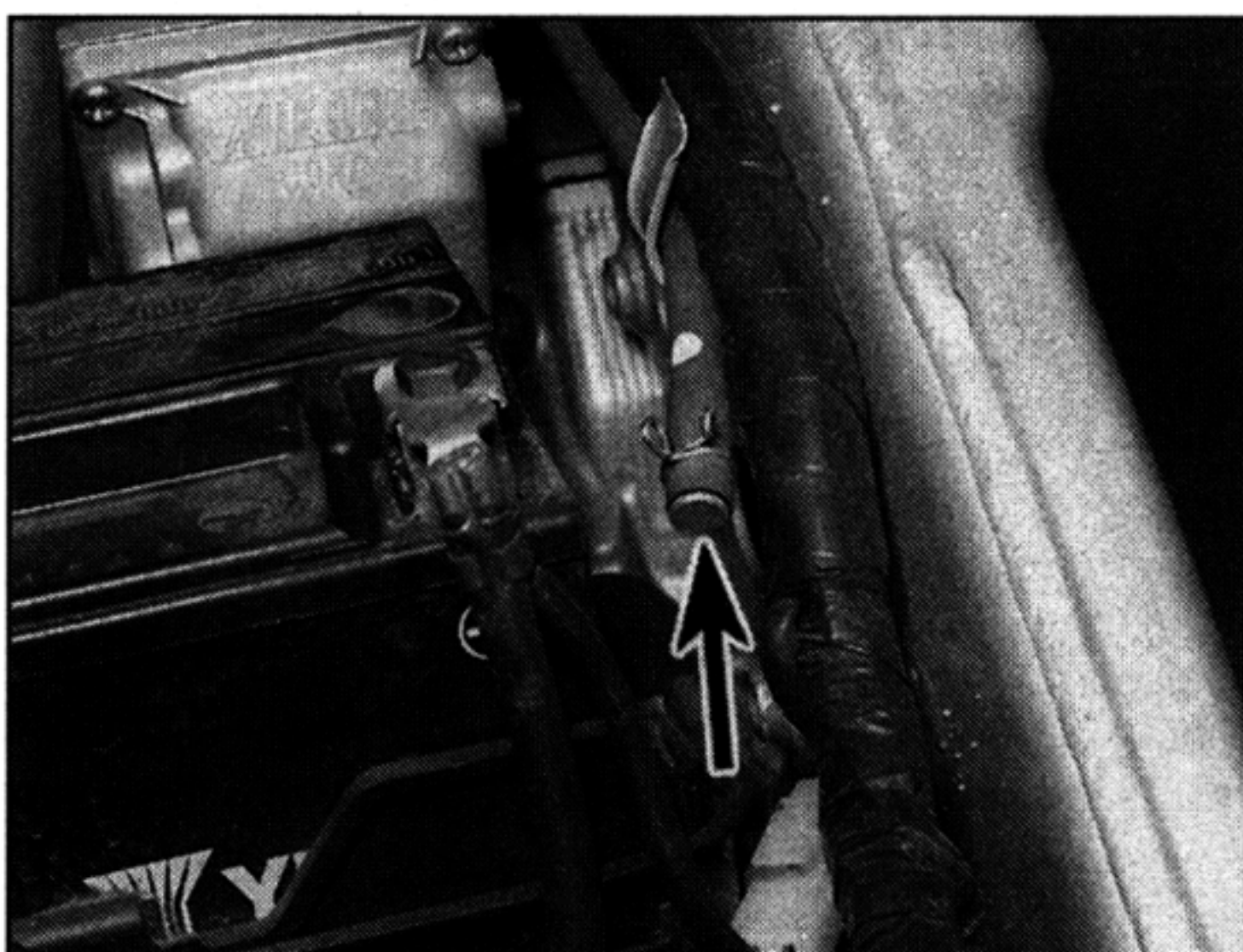
**4** Remove the fuel tank (see Chapter 4).

**5** On 1991 to 1998 TDM models, release the clamp securing the No. 1 cylinder vacuum hose to the fuel pump and detach the hose, then pull the blanking plug out of the end of the No. 2 cylinder vacuum hose (see illustrations). If in doubt, trace each hose from the take-off stub on the top of each inlet manifold between the carburettor and the cylinder head to make sure you have the correct one. On 1999 TDM models, pull the blanking plug out of both vacuum hoses situated down the right-hand side of the engine; if in doubt about their location, trace the hoses from their take-off stubs on the inlet manifolds.

**6** On TRX models, release the clamp securing the No. 2 cylinder hose to the fuel pump and detach the hose (see illustration). The No. 1 cylinder vacuum hose has already been detached from the fuel tap when removing the fuel tank. If in doubt, trace each hose from the take-off stub on the top of each intake



**4.5a On TDM models, detach the No. 1 vacuum hose (arrowed) from the fuel pump . . .**

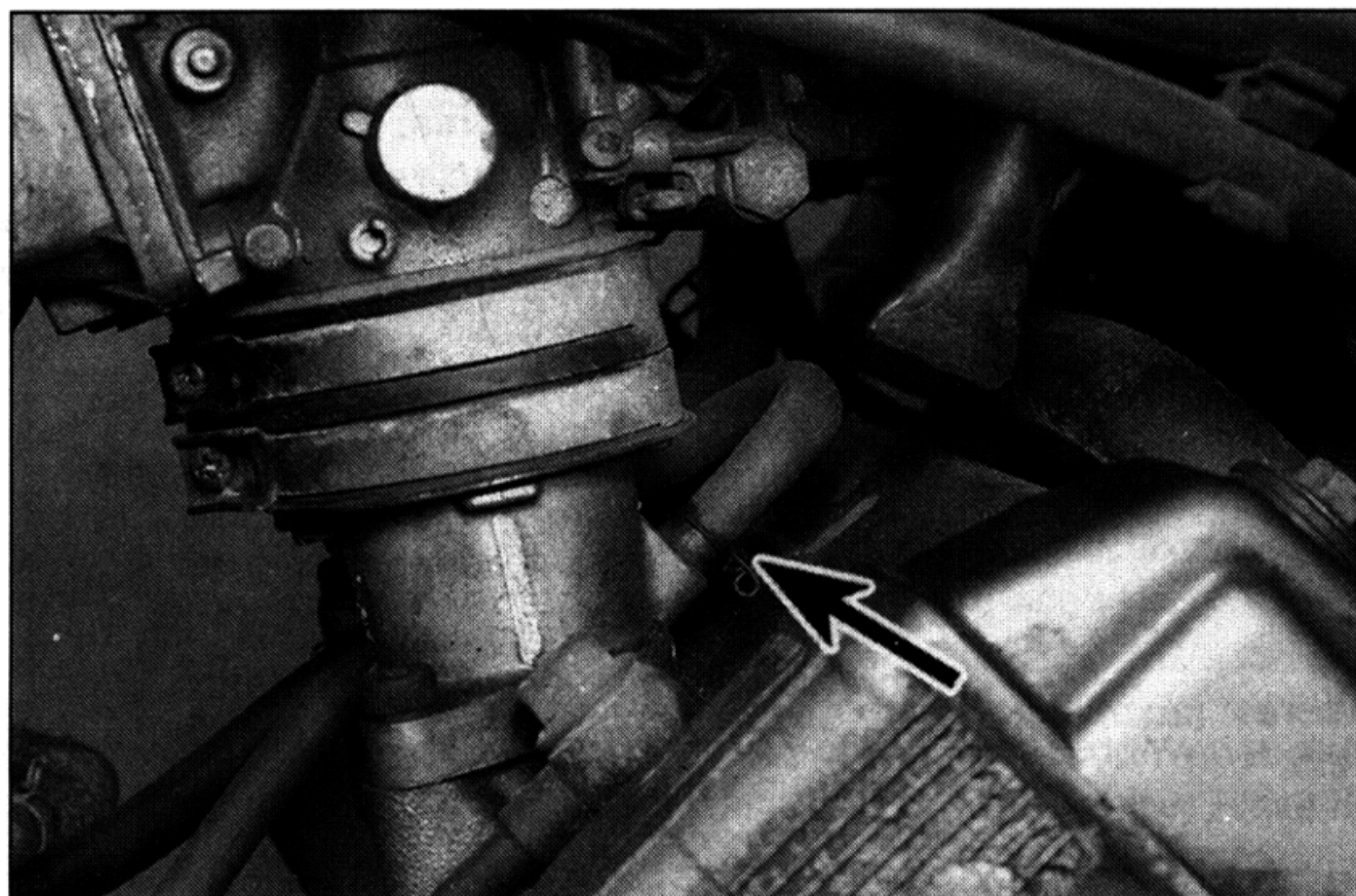


**4.5b . . . and remove the blanking plug (arrowed) from the No. 2 hose**

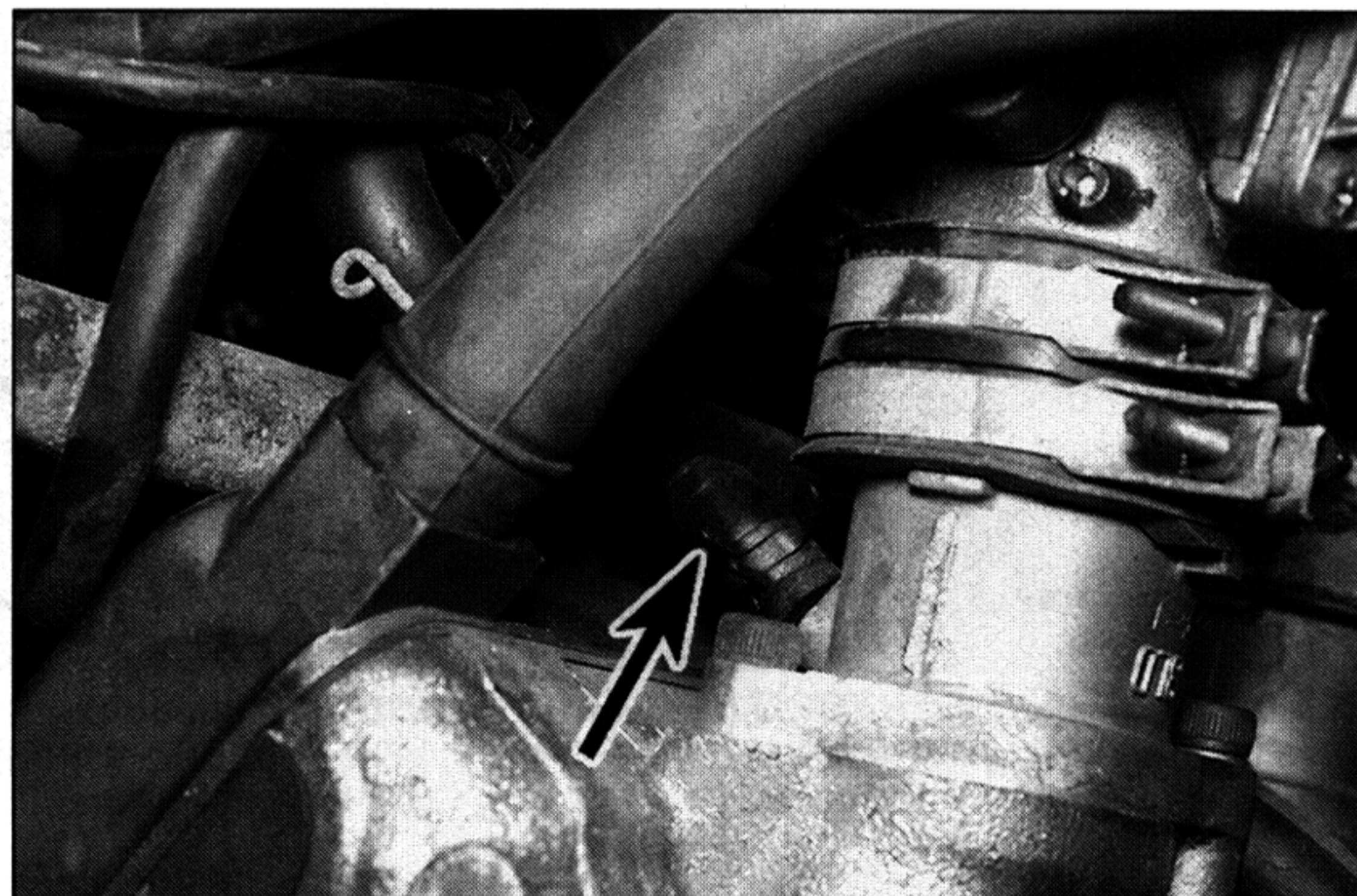


**4.6 On TRX models, detach the No. 2 vacuum hose (arrowed) from the fuel pump**

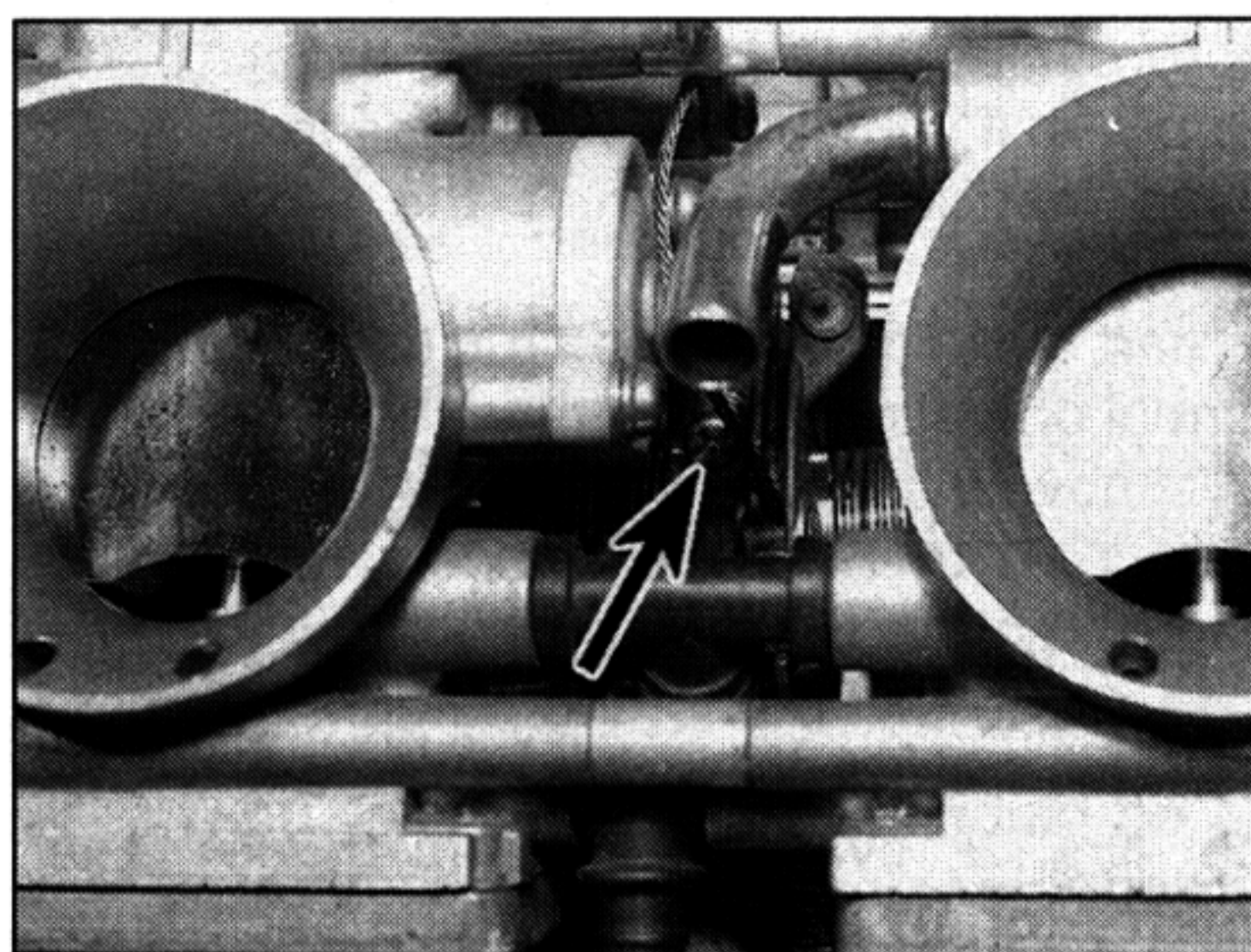




4.7a On XTZ models, detach the vacuum hose (arrowed) . . .



4.7b . . . and remove the blanking plug (arrowed)



4.12 Carburettor synchronisation screw (arrowed) – air filter housing removed for clarity

manifold between the carburettor and the cylinder head to make sure you have the correct one. If access is not too restricted, the hoses can be detached from the intake manifolds themselves.

7 On XTZ models, release the clamps securing the vacuum hose and the blanking plug to the take-off stubs on the inlet manifolds between the carburettor and the cylinder head and detach the hose and plug (see illustrations).

8 On TDM and TRX models, connect the gauges to the vacuum hose ends. On XTZ

models, connect the gauge hoses to the take-off stubs on the inlet manifolds. Make sure there are no air leaks as false readings will result.

9 Arrange a temporary fuel supply, either by using a small temporary tank or by using extra long fuel pipes to the now remote fuel tank. Alternatively, position the tank on a suitable base on the motorcycle, taking care not to scratch any paintwork, and making sure that the tank is safely and securely supported. If using the main tank, switch the tap to ON or RES on TDM and XTZ models, and to PRI on TRX models.

10 Start the engine and let it idle. If the gauges are fitted with damping adjustment, set this so that the needle flutter is just eliminated but so that they can still respond to small changes in pressure.

11 The vacuum readings for both cylinders should be the same. If the vacuum readings differ, proceed as follows.

12 The carburettors are adjusted by turning the synchronising screw situated in-between the carburettors, in the throttle linkage (see illustration). **Note:** Do not press down on the screw whilst adjusting it, otherwise a false reading will be obtained. When the carburettors are synchronised, open and close the throttle quickly a few times to settle

the linkage, and recheck the gauge readings, readjusting if necessary.

13 When the adjustment is complete, recheck the vacuum readings, then adjust the idle speed (see Section 3) until the speed listed in this Chapter's Specifications is obtained. Detach the temporary fuel supply, then remove the gauges. Refit the vacuum hoses and/or blanking plugs as required by your model (see Steps 9, 10 and 11).

14 Install the fuel tank (see Chapter 4).

## 5 Air filter – cleaning



1 Remove the fuel tank (see Chapter 4). On XTZ models, also remove the air filter housing (see Chapter 4); it is possible to remove the covers and elements with the housing in situ but access to the screws is restricted and the screws are easily dropped.

2 On TDM and TRX models remove the screws securing the air filter cover to the filter housing, then remove the cover and withdraw the filter element from the housing (see illustrations).

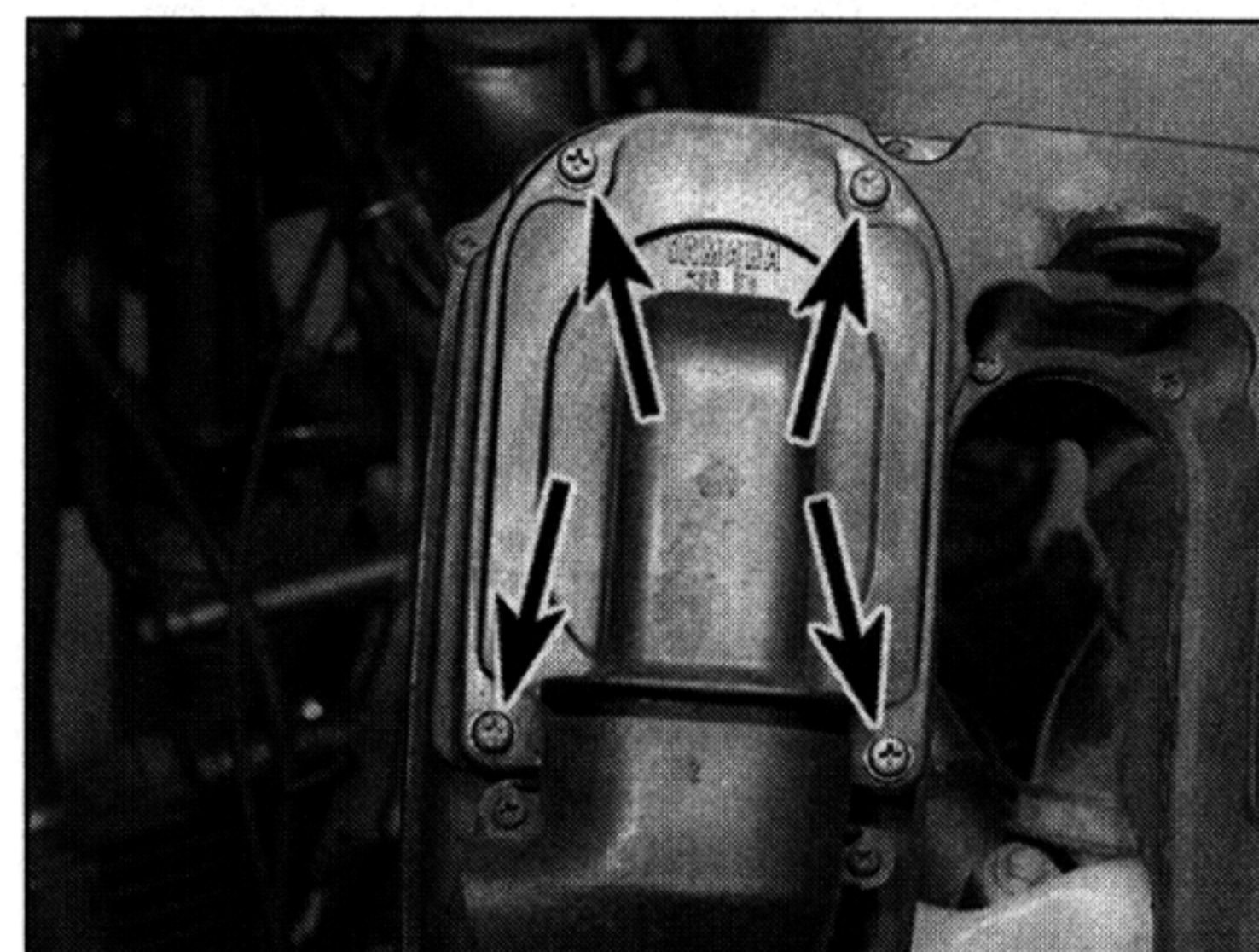
3 On XTZ models, there are two filter elements, each fitted integral with its cover on the front of the housing (see illustrations).



5.2a Remove the screws (arrowed) and lift off the cover . . .



5.2b . . . then withdraw the element (TDM shown)

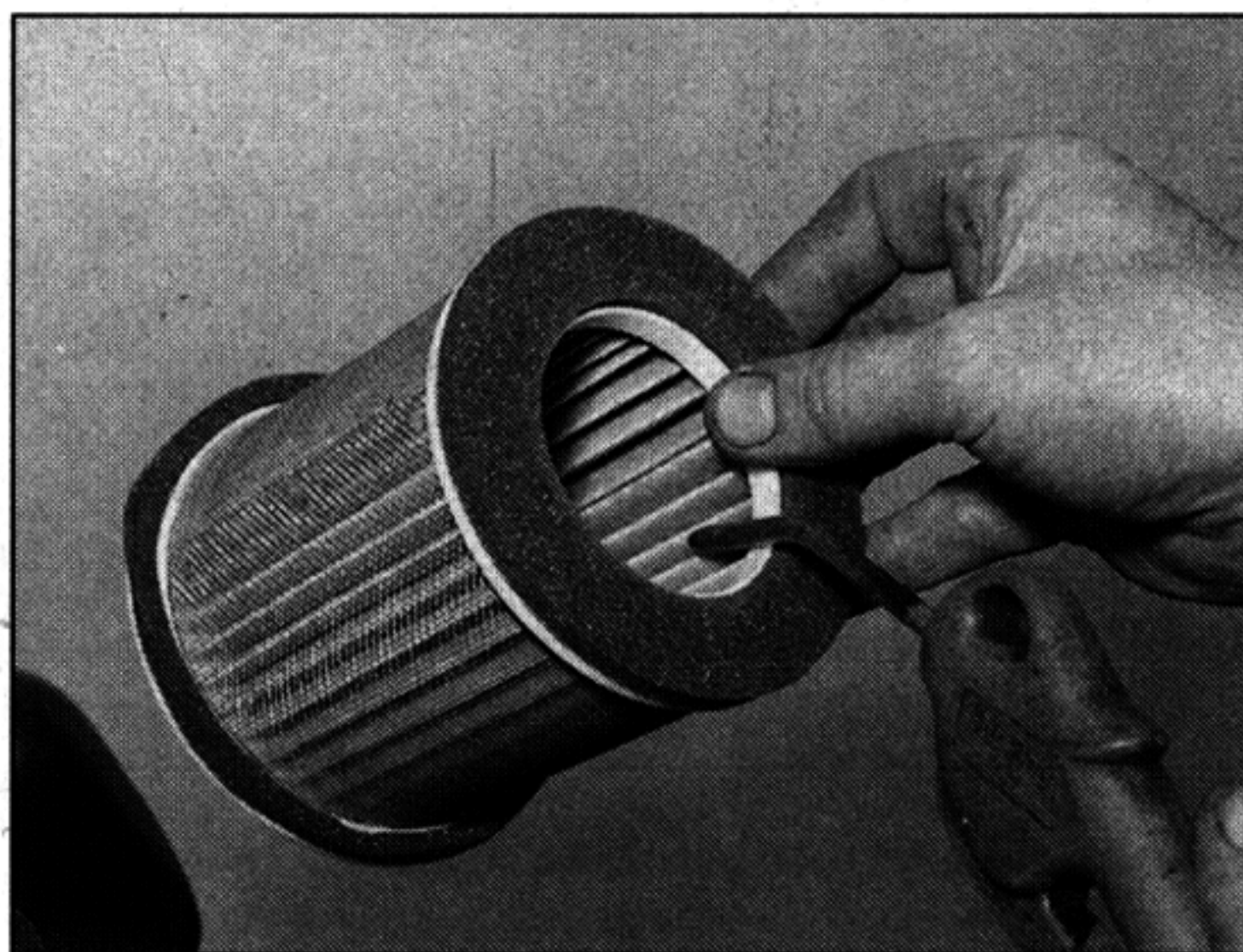


5.3a Remove the screws (arrowed) . . .





5.3b ... and remove the cover and element together



5.4 Clean the element using compressed air if available



5.6 Make sure the element is correctly seated

4 Tap the element on a hard surface to dislodge any large particles of dirt, then if compressed air is available, use it to clean the element, directing the air from the inside out (see illustration).

5 Check the element for signs of damage. If the element is torn or cannot be cleaned, or is obviously beyond further use, renew it.

6 Install the filter element, making sure it is properly seated, and install the fuel tank (see Chapter 4).

**Caution:** If the machine is ridden in dusty conditions, the filter should be cleaned more frequently.

### Check

1 Remove the fuel tank (see Chapter 4) and check the tank, the fuel tap, the fuel pump and the fuel and vacuum hoses for signs of leakage, deterioration or damage; in particular check that there is no leakage from the fuel hoses. Renew any hoses which are cracked or deteriorated.

2 If the fuel tap is leaking, tighten the assembly screws (see Chapter 4). If leakage persists remove the screws and disassemble the tap, noting how the components fit. Inspect all components and renew any that are worn or damaged. Some components are available individually, though it may be necessary to renew the whole tap, depending on your model.

3 If the carburettor gaskets are leaking, the carburettors should be disassembled and rebuilt using new gaskets and seals (see Chapter 4).

### Filter cleaning

4 Cleaning or renewal of the fuel filter is advised after a particularly high mileage has been covered. It is also necessary if fuel starvation is suspected.

5 On TRX, XTZ and 1991 to 1998 TDM models, the fuel filters are mounted in the tank. On TDM models, the filters are integral with the fuel outlet assembly from the tank. On TRX and XTZ models, the filters are integral with the fuel tap. On XTZ models, each fuel tap has its own filter. Remove the

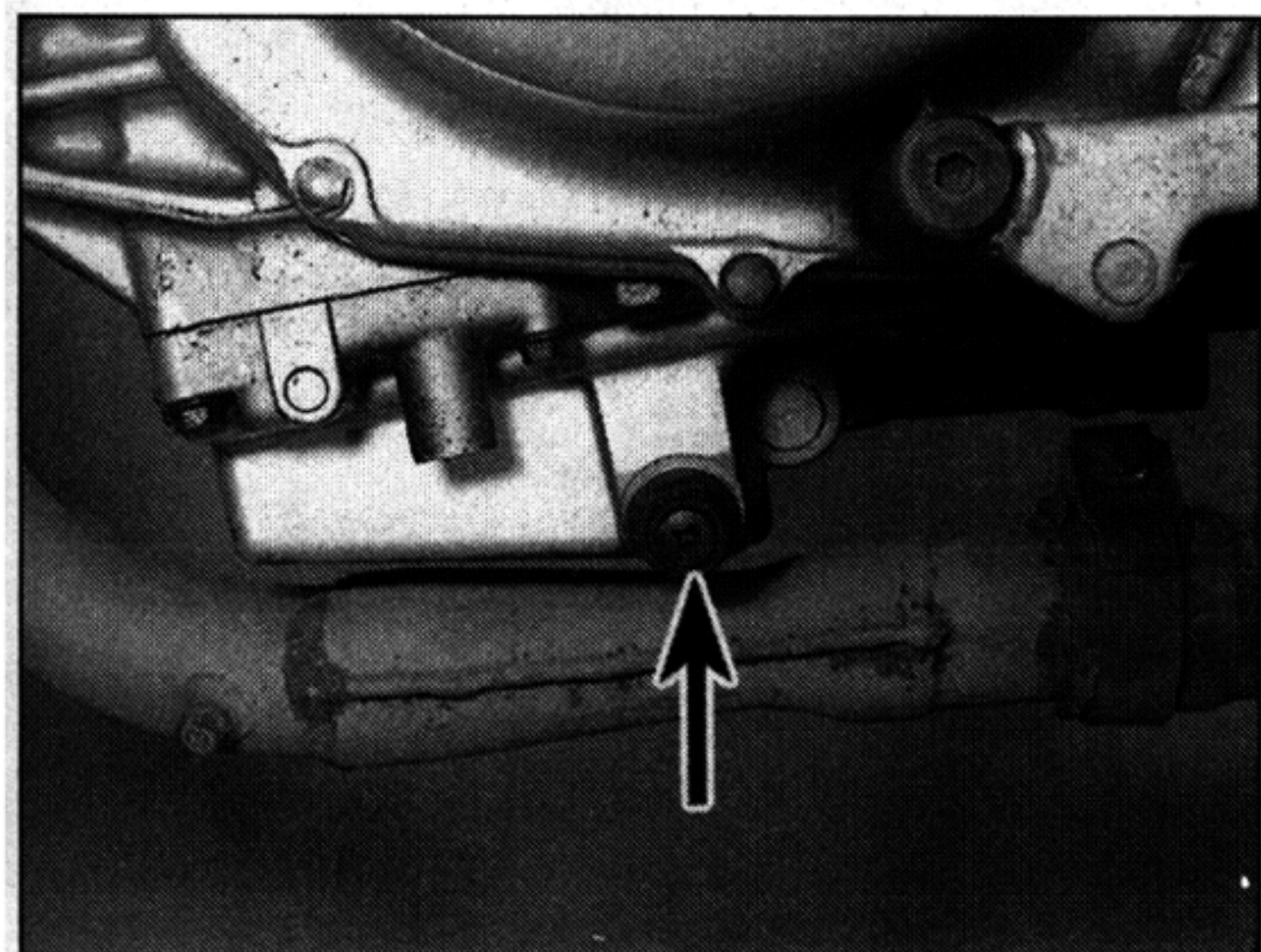
fuel tank and the fuel tap(s) (see Chapter 4). Clean the gauze filter to remove all traces of dirt and fuel sediment. Check the gauze for holes. If any are found, a new filter should be fitted (check for availability – it may be necessary to renew the whole tap). Check the condition of the O-ring and renew it if it is in any way damaged or deteriorated.

6 On 1999 TDM models and in-line fuel filter is fitted between the fuel tap and fuel pump. Refer to Section 23 for details.

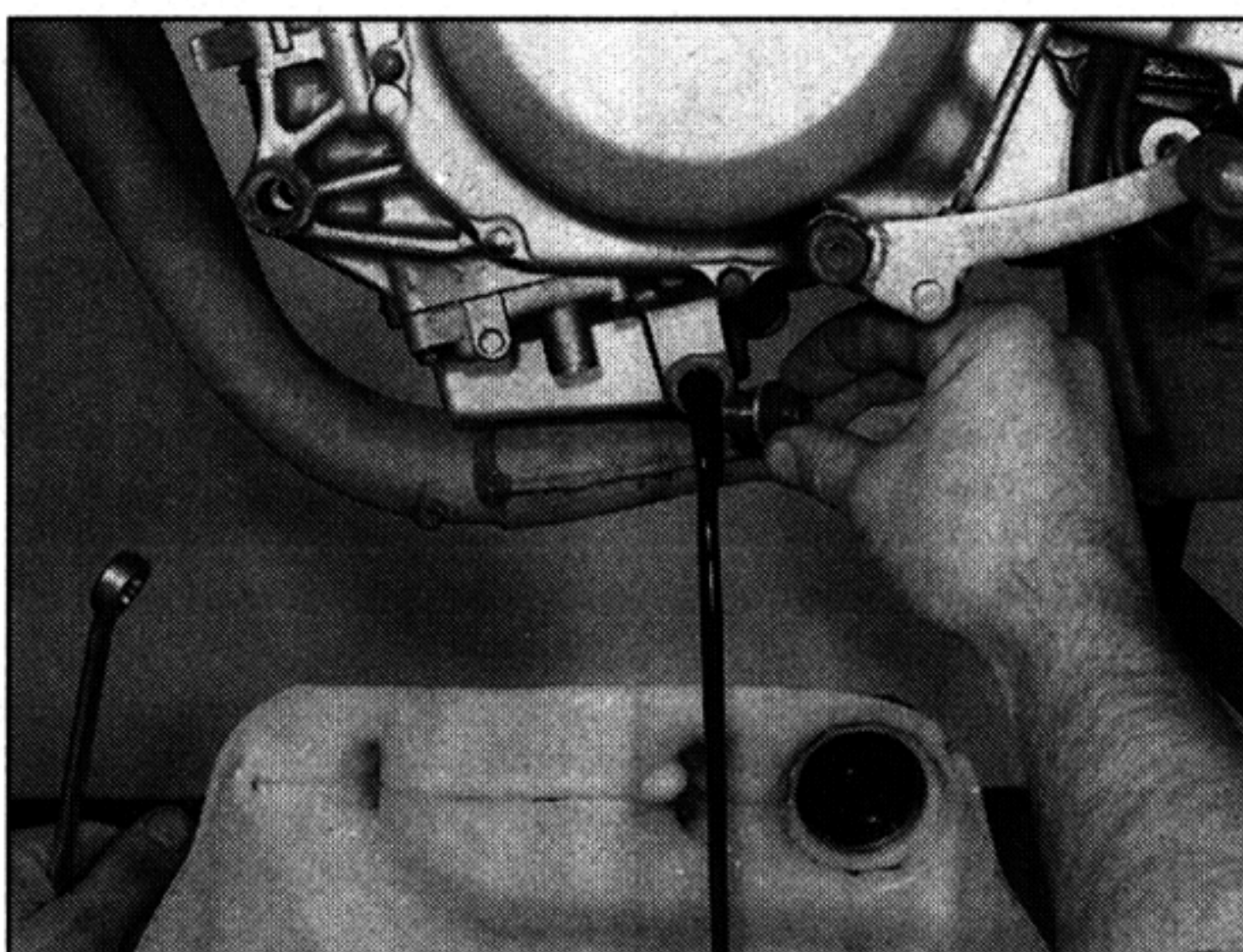
## 6 Fuel system – check



**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.



7.4a Unscrew the crankcase oil drain plug (arrowed) ...



7.4b ... and allow the oil to drain

## 7 Engine – oil change



**Warning:** Be careful when draining the oil, as the exhaust pipes, the engine, and the oil itself can cause severe burns.

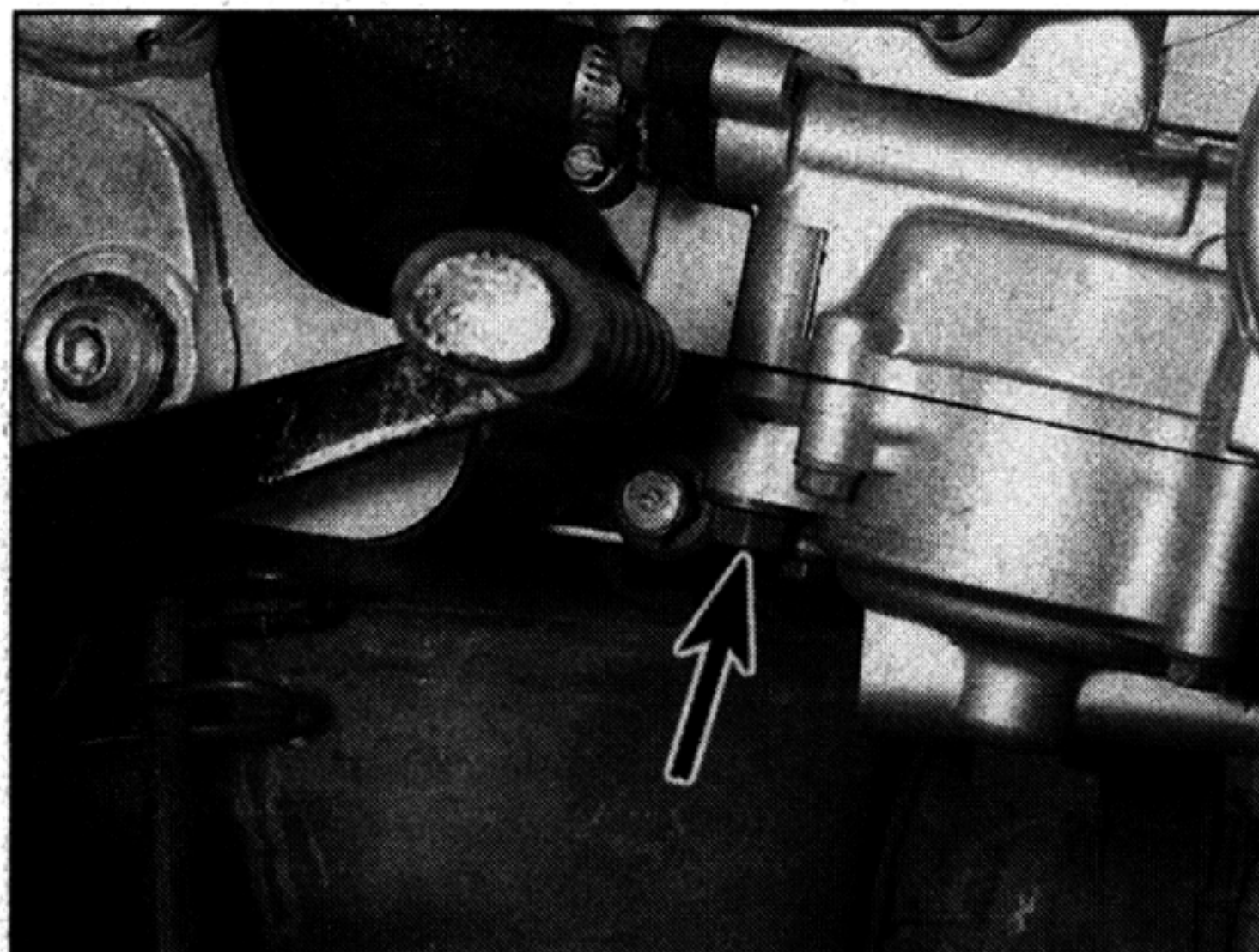
1 Consistent routine oil and filter changes are the single most important maintenance procedure you can perform on a motorcycle. The oil not only lubricates the internal parts of the engine, transmission and clutch, but it also acts as a coolant, a cleaner, a sealant, and a protectant. Because of these demands, the oil takes a terrific amount of abuse and should be changed often with new oil of the recommended grade and type. Saving a little money on the difference in cost between a good oil and a cheap oil won't pay off if the engine is damaged. The oil filter should be changed with every second oil change.

2 Before changing the oil, warm up the engine so the oil will drain easily.

3 Put the motorcycle on its sidestand, and position a clean drain tray below the engine. On 1991 to 1995 TDM models remove the seat, and on XTZ models remove the right-hand side cover (see Chapter 8). Unscrew the oil filler cap from the oil tank to vent it and to act as a reminder that there is no oil in the engine (see *Daily (pre-ride) checks*).

4 First unscrew the oil drain plug from the crankcase and allow the oil to flow into the drain tray (see illustrations). Next unscrew the oil drain plug from the oil filter housing and





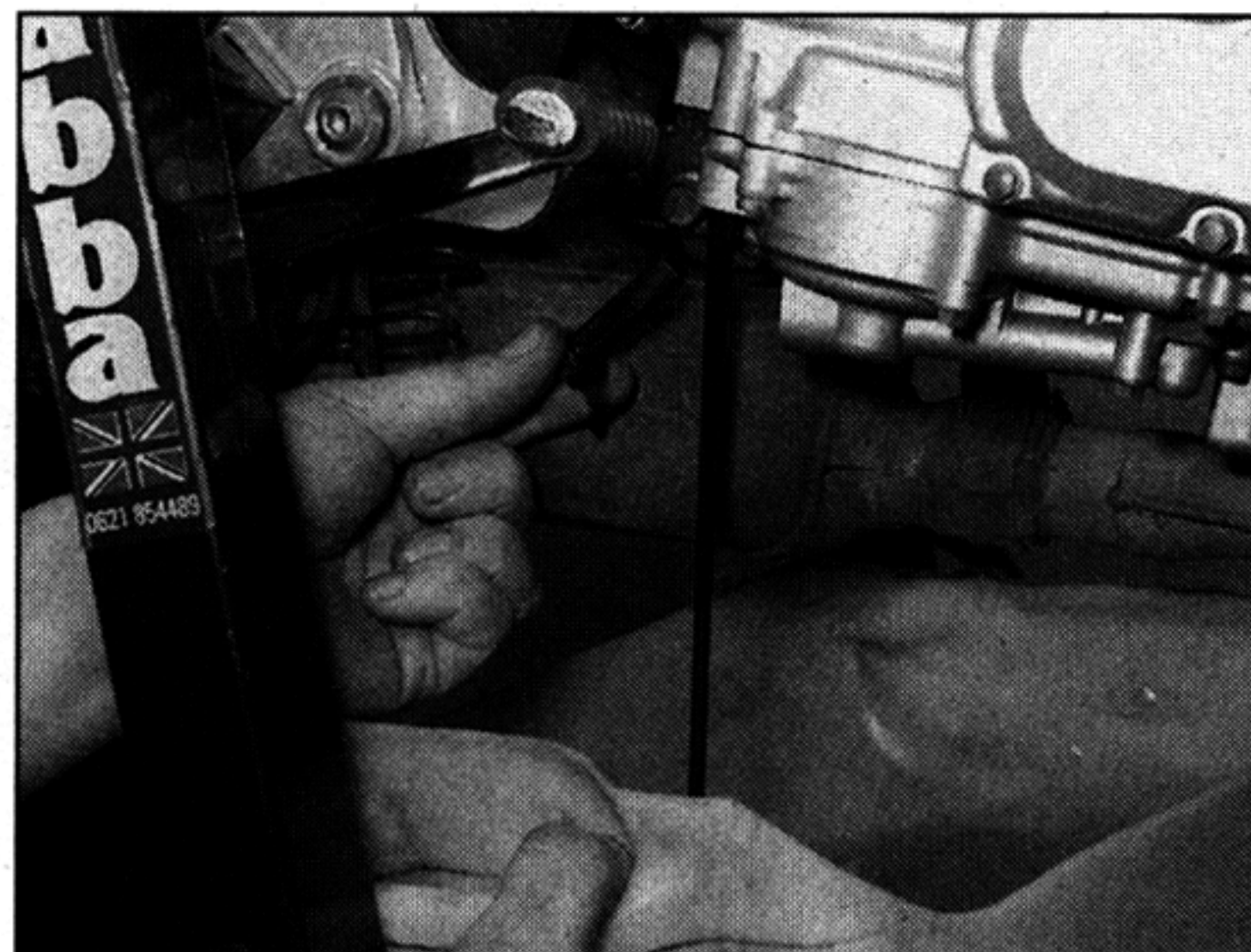
**7.4c Unscrew the oil filter housing drain plug (arrowed) . . .**

allow the oil to flow into the drain tray (see illustrations). Check the condition of the sealing washers on the drain plugs and discard them if they are in any way damaged or worn. On 1996-on TDM and TRX models, Yamaha specify using new ones as a matter of course.

**5** When the oil has completely drained, fit the plugs to the crankcase and oil filter housing, using new sealing washers if required, and tighten them to the torque settings specified at the beginning of the Chapter. Avoid overtightening, as damage to the crankcase will result.

**6** Refill the oil tank to the proper level using the recommended type and amount of oil (see *Daily (pre-ride) checks* and this chapter's specifications). With the motorcycle vertical, the oil level should lie between the maximum and minimum level lines on the dipstick or inspection window (according to model) (see *Daily (pre-ride) checks*). Install the filler cap. Start the engine and let it run for two or three minutes. It is advisable to perform an oil pressure check (see Section 32). Stop the engine, wait a few minutes, then check the oil level. If necessary, add more oil to bring the level up to the maximum level line on the dipstick or window. Check around the drain plugs for leaks.

**7** The old oil drained from the engine cannot



**7.4d . . . and allow the oil to drain**

be re-used and should be disposed of properly. Check with your local refuse disposal company, disposal facility or environmental agency to see whether they will accept the used oil for recycling. Don't pour used oil into drains or onto the ground.

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*Check the old oil carefully – if it is very metallic coloured, then the engine is experiencing wear from break-in (new engine) or from insufficient lubrication. If there are flakes or chips of metal in the oil, then something is drastically wrong internally and the engine will have to be disassembled for inspection and repair. If there are pieces of fibre-like material in the oil, the clutch is experiencing excessive wear and should be checked.*



**Note:** It is antisocial and illegal to dump oil down the drain. To find the location of your local oil recycling bank, call this number free.

## 8 Brake pads – wear check



**1** Each brake pad has wear indicators that can be viewed without removing the pads from the caliper.

**2** On TDM and TRX models, the turned-in corners of the brake pad backing material form the wear indicators – when they are almost contacting the disc itself the pads must be renewed. The indicators are visible by looking at the bottom corner of the pads (see illustration).

**Caution:** Do not allow the pads to wear to the extent that the indicators contact the disc itself as the disc will be damaged.

**3** On XTZ models, the indicators are in the form of grooves in the brake pad friction material – when the pads are worn so that the grooves are only just visible the pads must be renewed (see illustration).

**4** If the pads are worn to or beyond the indicators, they must be renewed. If the pads are dirty or if you are in doubt as to the amount of friction material remaining, remove them and measure the amount of friction material (see Chapter 7). **Note:** Some after-market pads may use different indicators to those on the original equipment as shown.

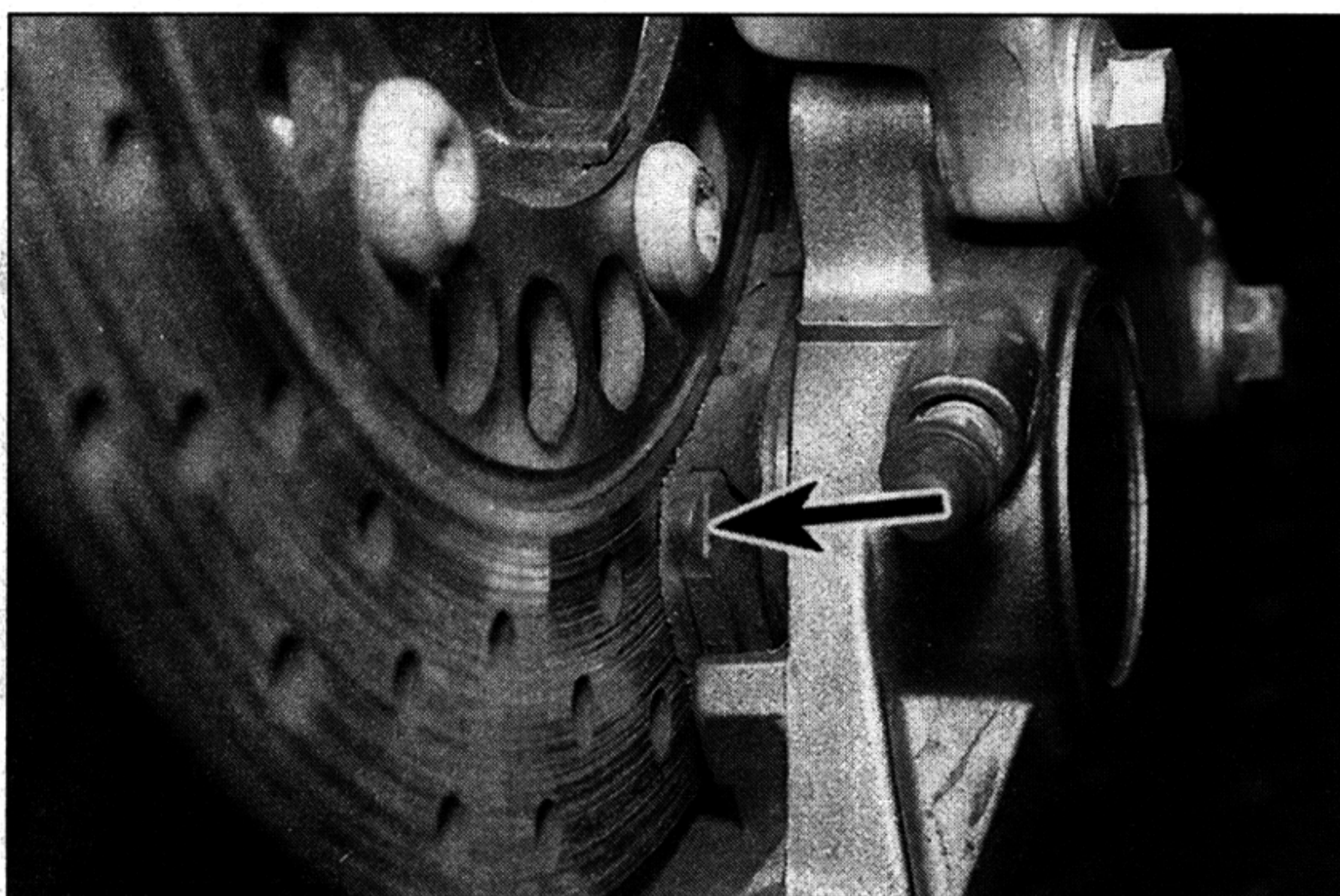
**5** Refer to Chapter 7 for details of pad renewal.

**6** Bikes used in the UK and anywhere where salt is used on the roads are referred to Chapter 7, Section 2, Step 9 for details of brake pad and caliper lubrication to prevent corrosion.

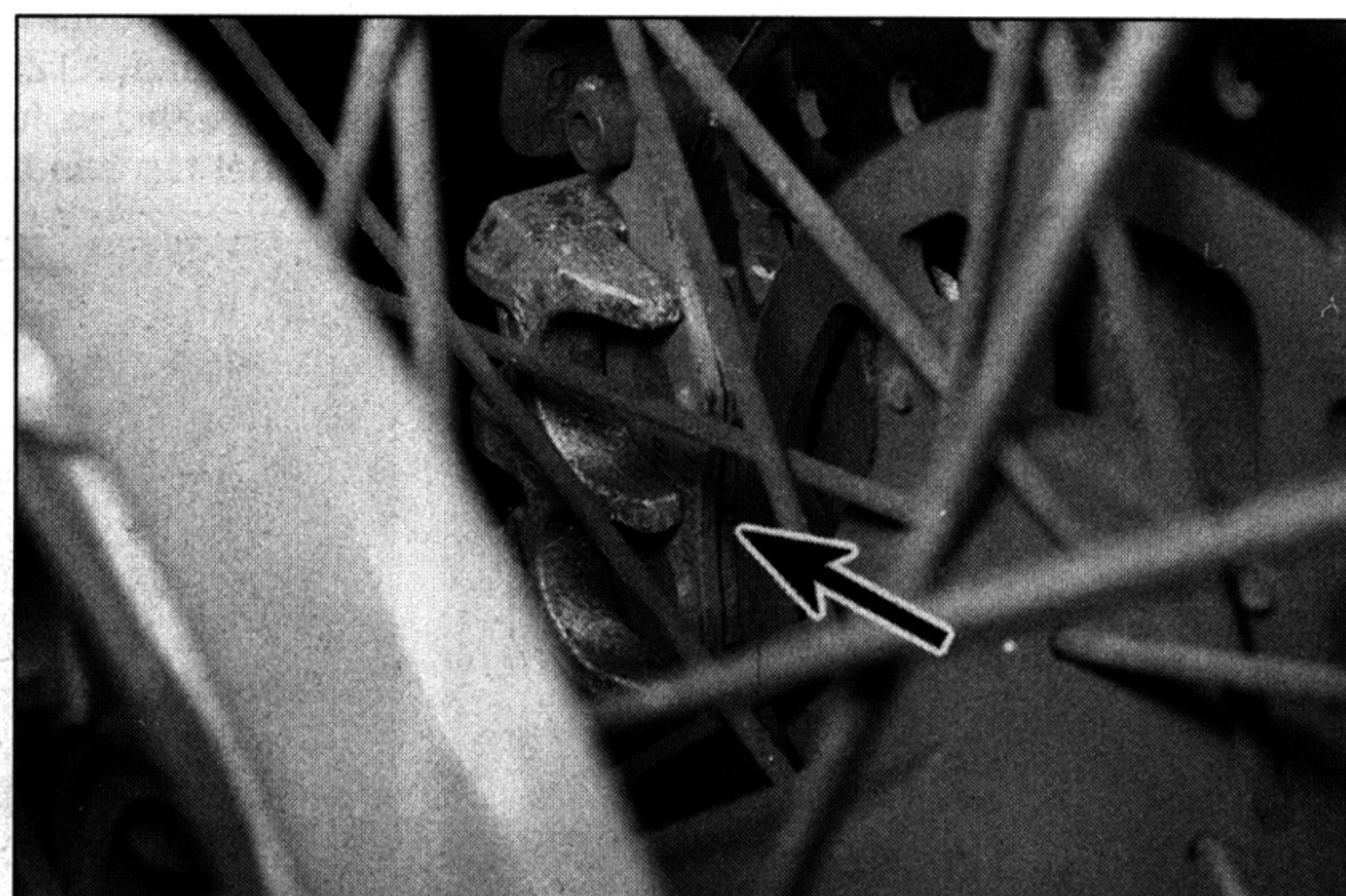
## 9 Brake system – check



**1** A routine general check of the brake system will ensure that any problems are discovered and remedied before the rider's safety is jeopardised.

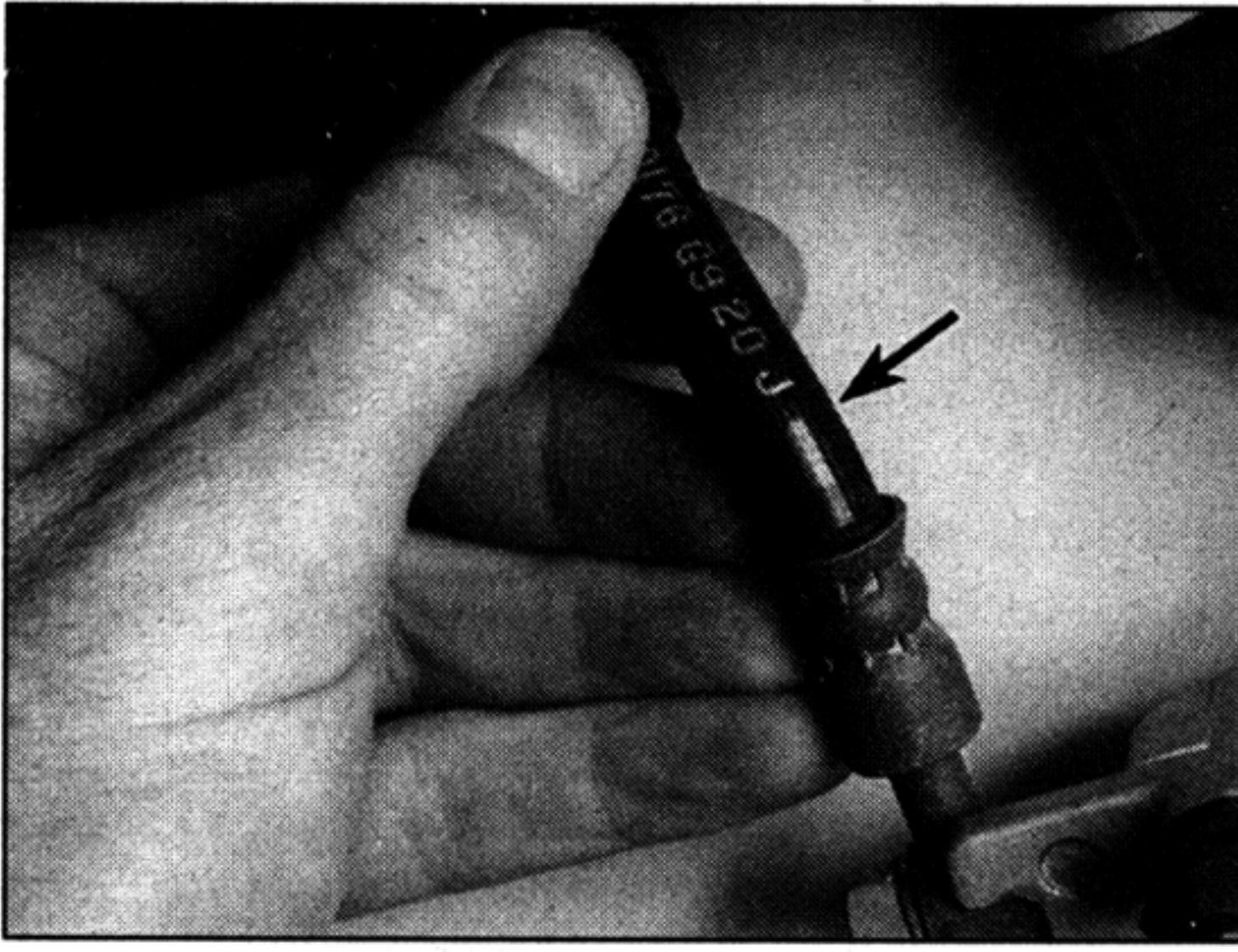


**8.2 Brake pad wear indicator (arrowed) – TDM and TRX models (TRX shown)**

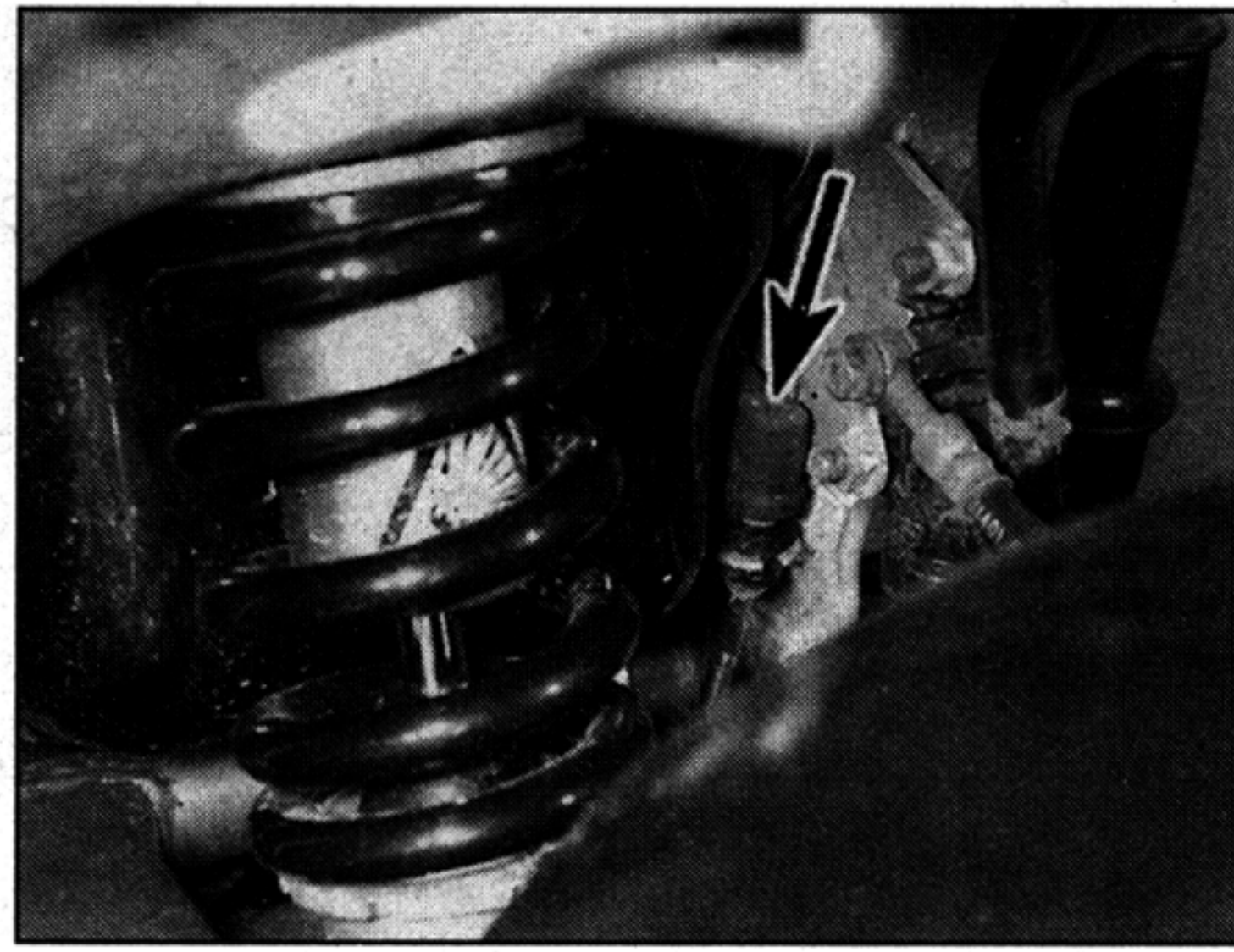


**8.3 Brake pad wear indicator groove (arrowed) – XTZ models**

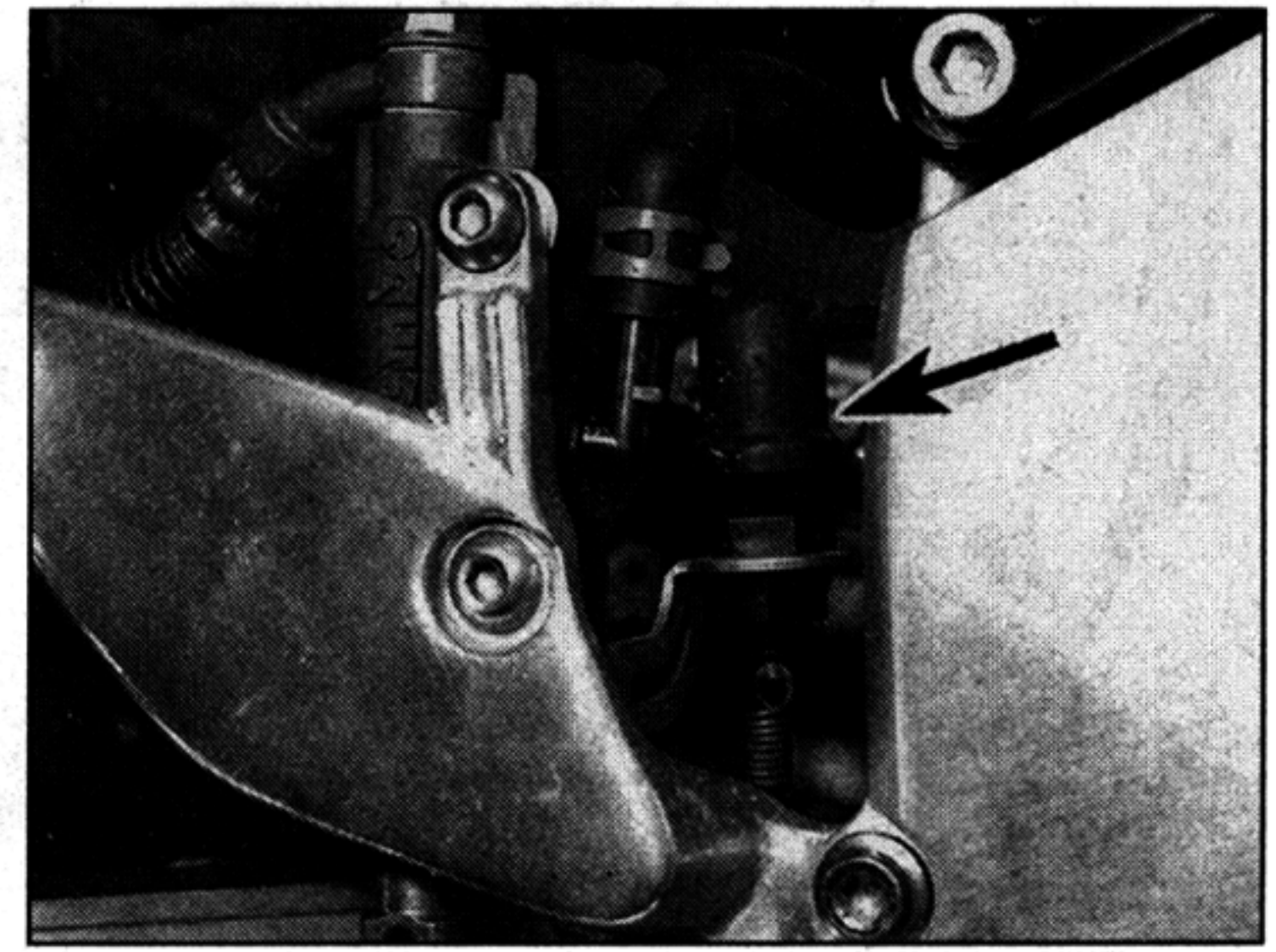




**9.3 Flex the brake hoses and check for cracks, bulges and leaking fluid**



**9.5a Rear brake light switch – TDM models**



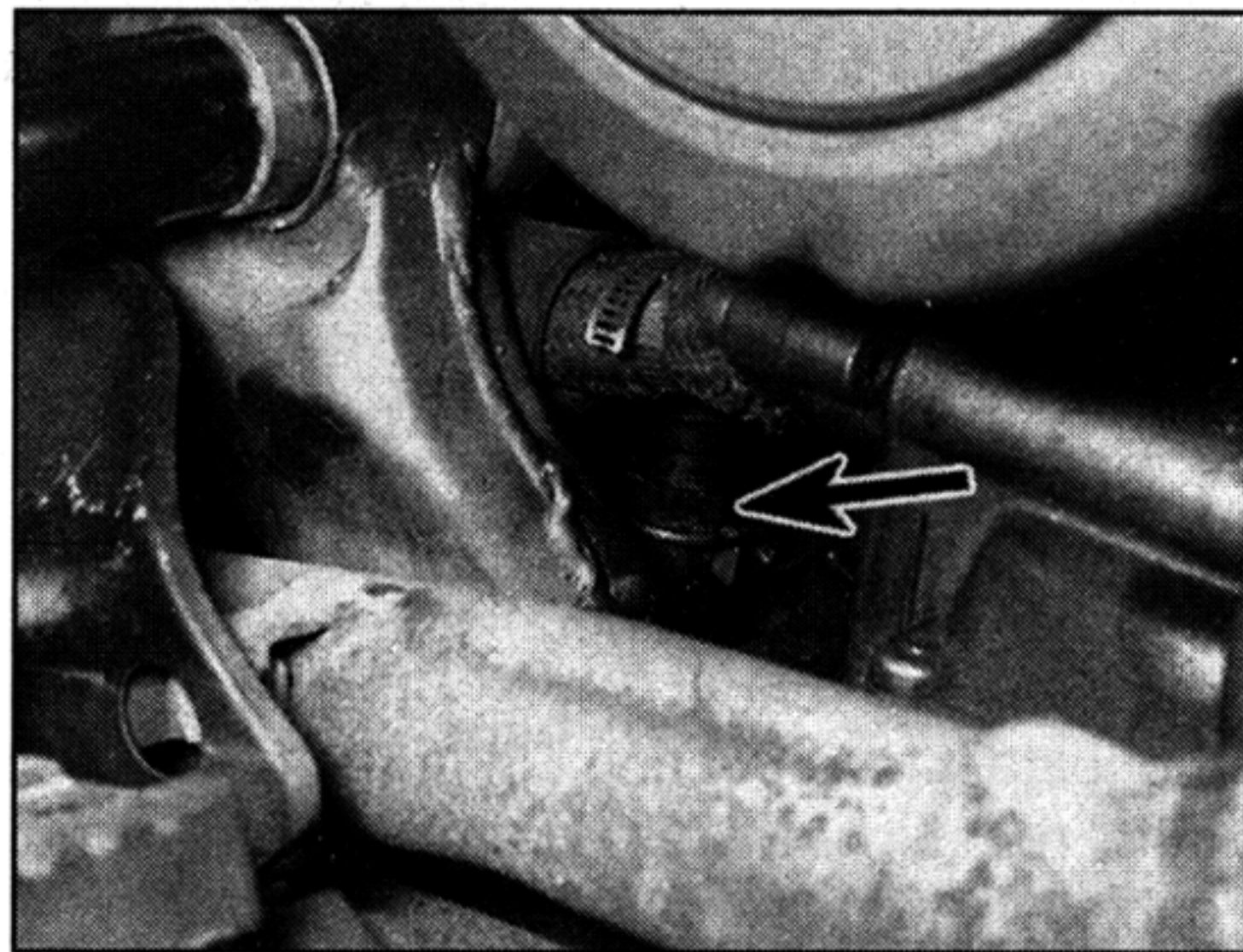
**9.5b Rear brake light switch – TRX models**

**2** Check the brake lever and pedal for loose connections, improper or rough action, excessive play, bends, and other damage. Renew any damaged parts (see Chapter 7). Clean and lubricate the lever and pedal pivots if their action is stiff or rough (see Section 18).

**3** Make sure all brake fasteners are tight. Check the brake pads for wear (see Section 8) and make sure the fluid level in the reservoirs is correct (see *Daily (pre-ride) checks*). Look for leaks at the hose and pipe connections and check for cracks in the hoses and pipes themselves (see illustration). If the lever or pedal is spongy when applied, bleed the brakes (see Chapter 7).

**4** Make sure the brake light operates when the front brake lever is pulled in. The front brake light switch, mounted on the underside of the master cylinder, is not adjustable. If it fails to operate properly, check it (see Chapter 9).

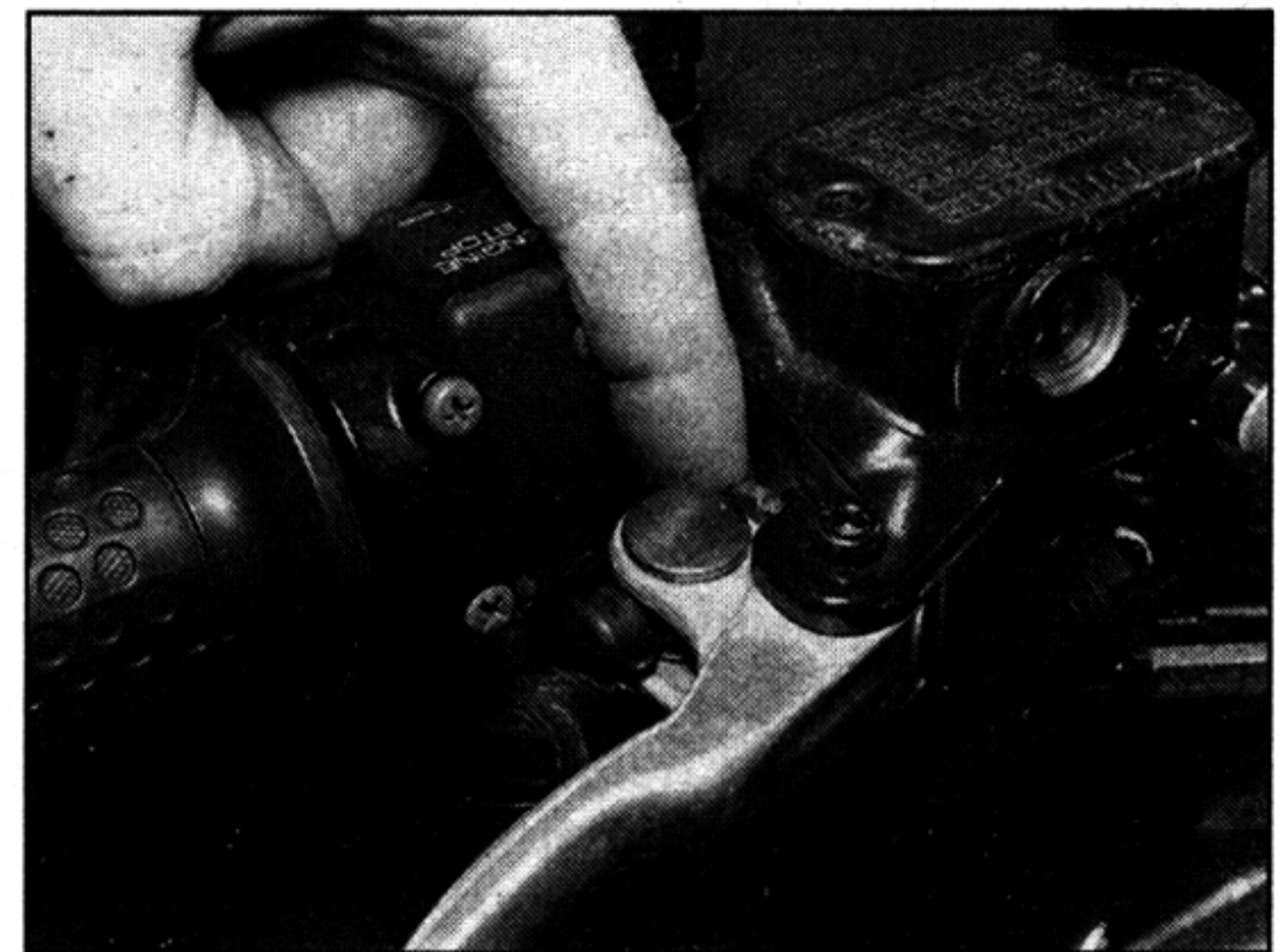
**5** Make sure the brake light is activated just before the rear brake takes effect. If adjustment is necessary, hold the switch and turn the adjuster ring on the switch body until the brake light is activated when required (see illustrations). If the brake light comes on too late, turn the ring clockwise. If the brake light comes on too soon or is permanently on, turn the ring anti-clockwise. If the switch doesn't operate the brake light, check it (see Chapter 9).



**9.5c Rear brake light switch – XTZ models**

**6** On TDM and TRX models, the front brake lever has a span adjuster which alters the distance of the lever from the handlebar (see illustrations). Each setting is identified by a number on the adjuster which aligns with the arrow on the lever bracket. Pull the lever away from the handlebar and turn the adjuster ring until the setting which best suits the rider is obtained. There are four settings.

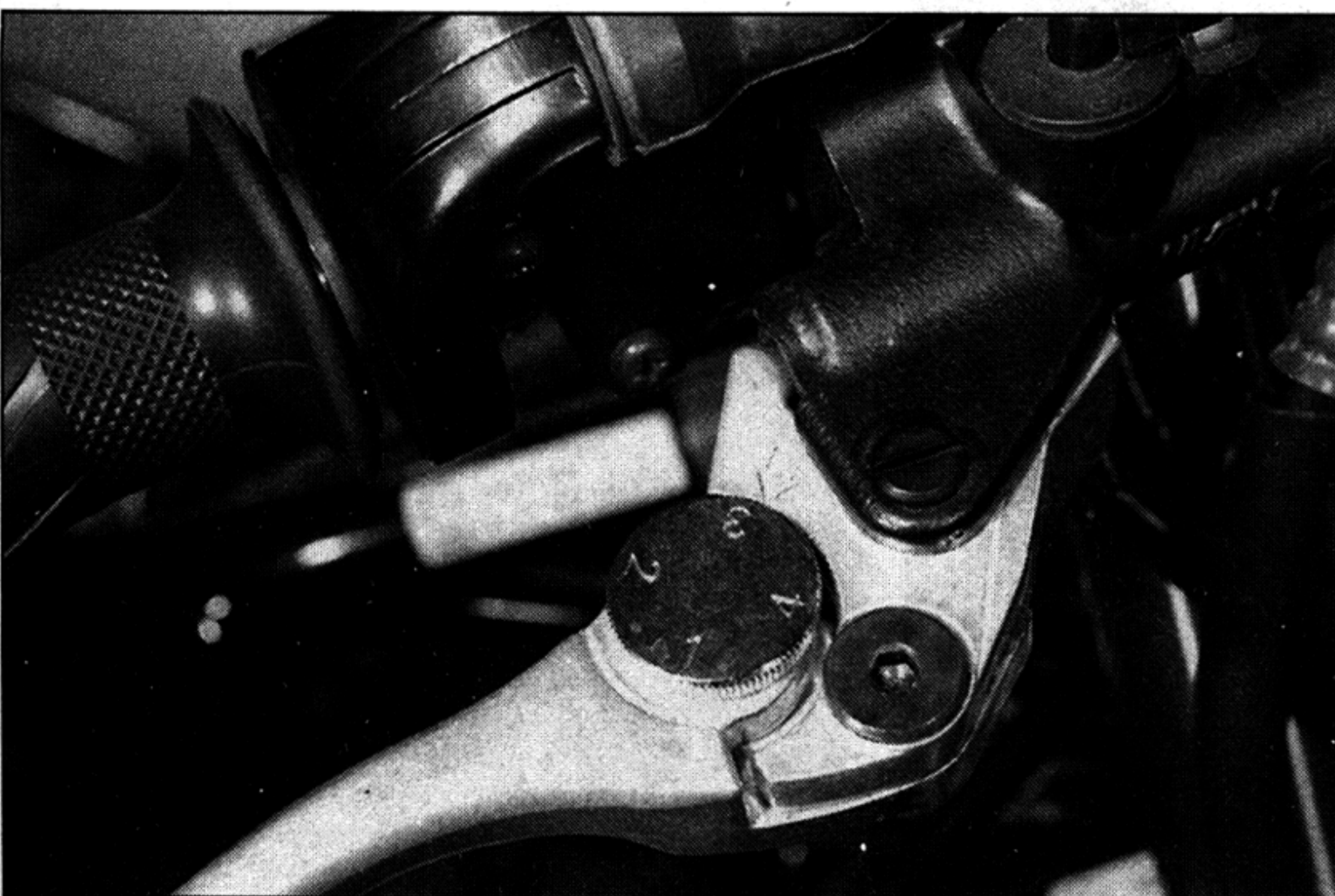
**7** On XTZ models, the front brake lever has a freeplay adjuster which alters the amount of play in the lever before the brake takes effect. Check the amount of freeplay by measuring the distance the ball end of the



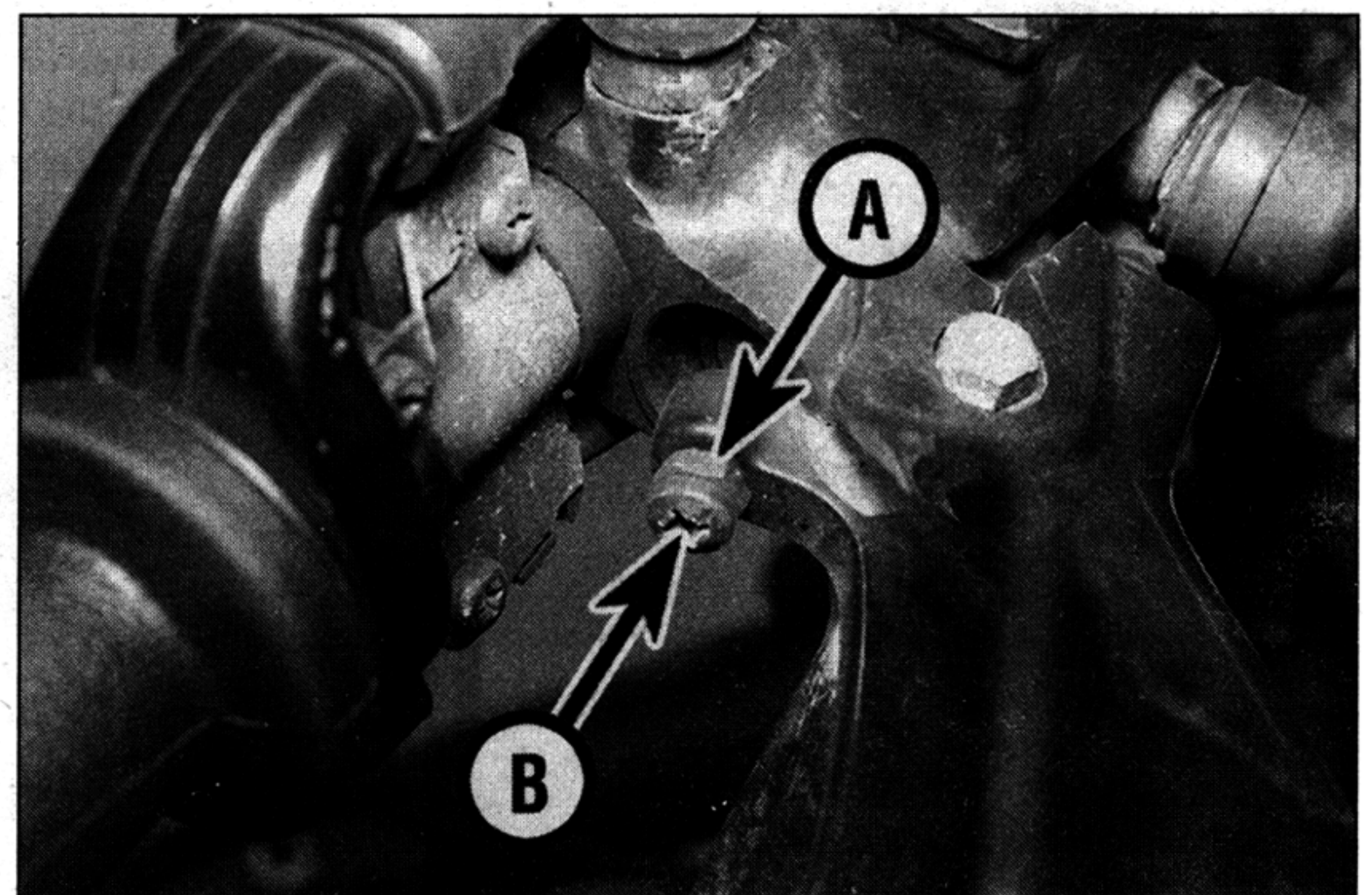
**9.6a Front brake lever span adjuster – TDM models**

lever travels before the brake comes on and compare it to the amount specified at the beginning of the Chapter. To adjust the freeplay, slacken the adjuster locknut and turn the adjuster as required until the specified amount of freeplay is achieved (see illustration). Turn the adjuster clockwise to decrease freeplay and anti-clockwise to increase it.

**Caution:** Make sure that the correct amount of freeplay is set. Insufficient freeplay could cause the brakes to bind and excessive freeplay may not allow them to operate to their full potential.

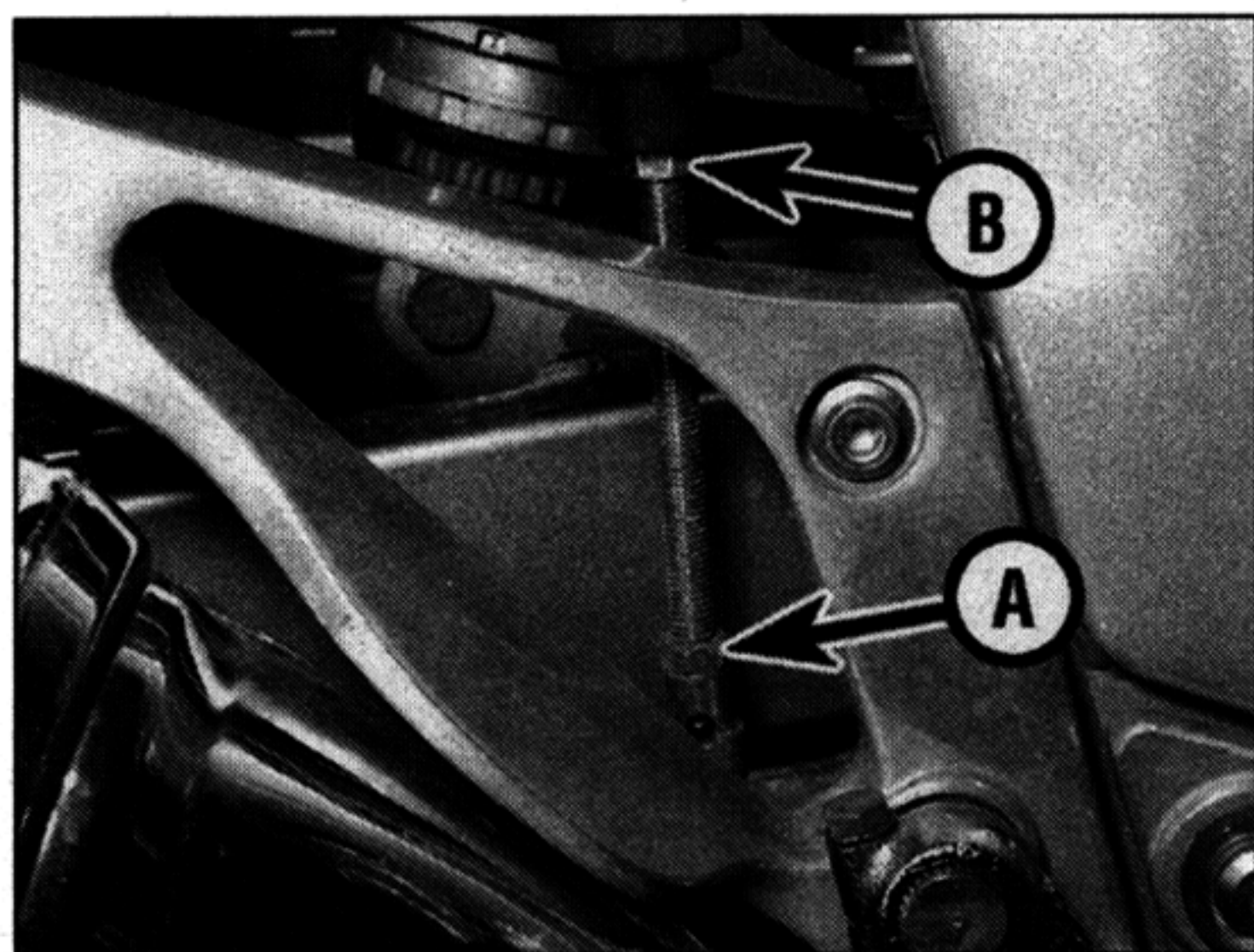


**9.6b Front brake lever span adjuster – TRX models**



**9.7 Front brake lever freeplay adjuster locknut (A) and adjuster (B) – XTZ models**





9.8a Slacken the locknut (A) and turn the pushrod using the hex (B) . . .



9.8b . . . making sure the rod end is still visible in the hole (arrowed) (TDM and TRX models)

**8** Check the position of the brake pedal. Yamaha recommend the distance between the top of the end of the brake pedal and the top of the rider's footrest should be as specified at the beginning of the Chapter. If the pedal height is incorrect, or if the rider's preference is different, slacken the clevis locknut on the master cylinder pushrod, then turn the pushrod using a spanner on the hex at the top of the rod until the pedal is at the correct or desired height (**see illustration**). After adjustment check that the pushrod end is visible in the hole in the clevis (TDM and TRX models) (**see illustration**) or below the clevis nut (XTZ models). On completion tighten the locknut securely. Adjust the rear brake light switch after adjusting the pedal height (see Step 5).

## 10 Clutch – check and adjustment

**1** Check that the clutch cable operates smoothly and easily.

**2** If the clutch lever operation is heavy or stiff, remove the cable (see Chapter 2) and lubricate it (see Section 18). If the cable is still stiff, renew it. Install the lubricated or new cable (see Chapter 2).

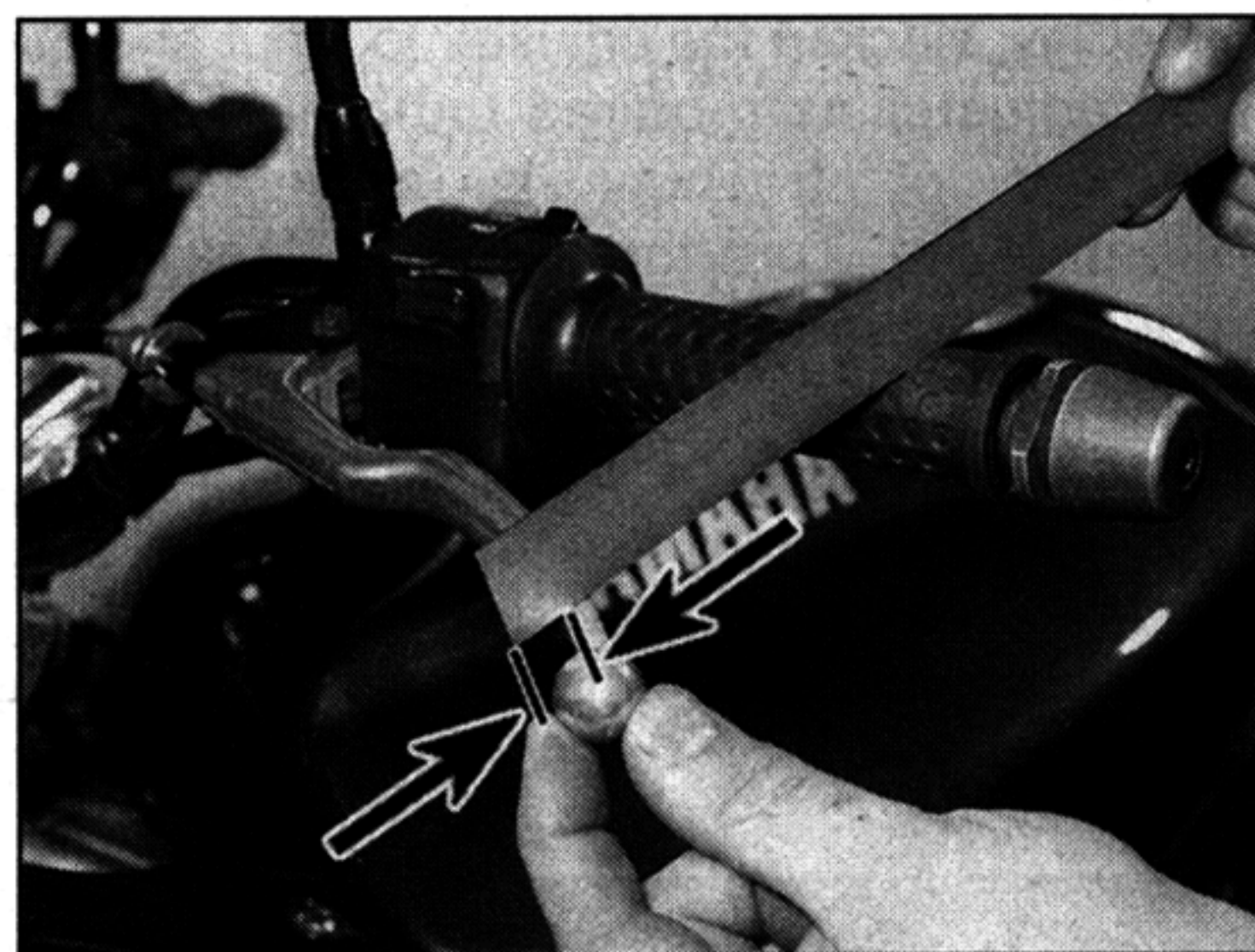
**3** With the cable operating smoothly, check that the clutch lever is correctly adjusted. Periodic adjustment is necessary to compensate for wear in the clutch plates and stretch of the cable. Check that the amount of

freeplay at the clutch lever end is within the specifications listed at the beginning of the Chapter (**see illustration**).

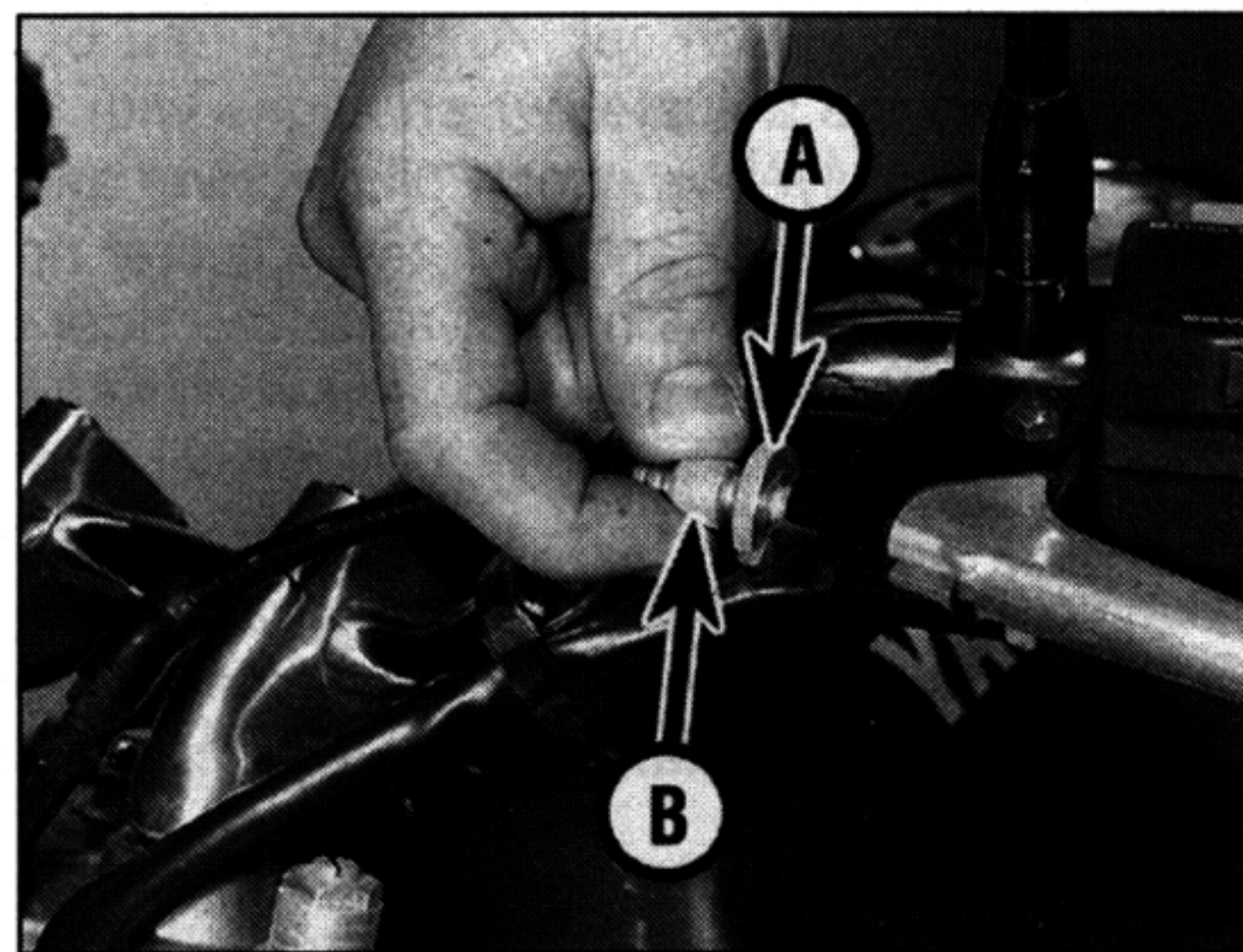
**4** If adjustment is required, loosen the adjuster locking at the top of the cable and turn the adjuster in or out until the required amount of freeplay is obtained (**see illustration**). To increase freeplay, turn the adjuster clockwise. To reduce freeplay, turn the adjuster anti-clockwise. Tighten the locking ring securely.

**5** On TRX, XTZ and 1996-on TDM models, if all the adjustment has been taken up at the lever, reset the adjuster to give a large amount of freeplay, then set the correct amount of freeplay using the adjuster nuts on each end of the threaded section in the cable bracket on the right-hand side of the engine. On TRX models, first remove the adjuster cover (**see illustration**). To reduce freeplay, slacken the rear nut and tighten the front nut until the freeplay is as specified, then tighten the rear nut (**see illustrations**). Subsequent adjustments can now be made using the lever adjuster only.

**6** On 1991 to 1995 TDM models, if all the adjustment has been taken up at the lever, set the correct amount of freeplay using the adjuster in the cable – the adjuster is positioned a short way down the cable from the lever (**see illustration**). Slacken the locknut and turn the adjuster as required until the correct amount of freeplay is obtained.



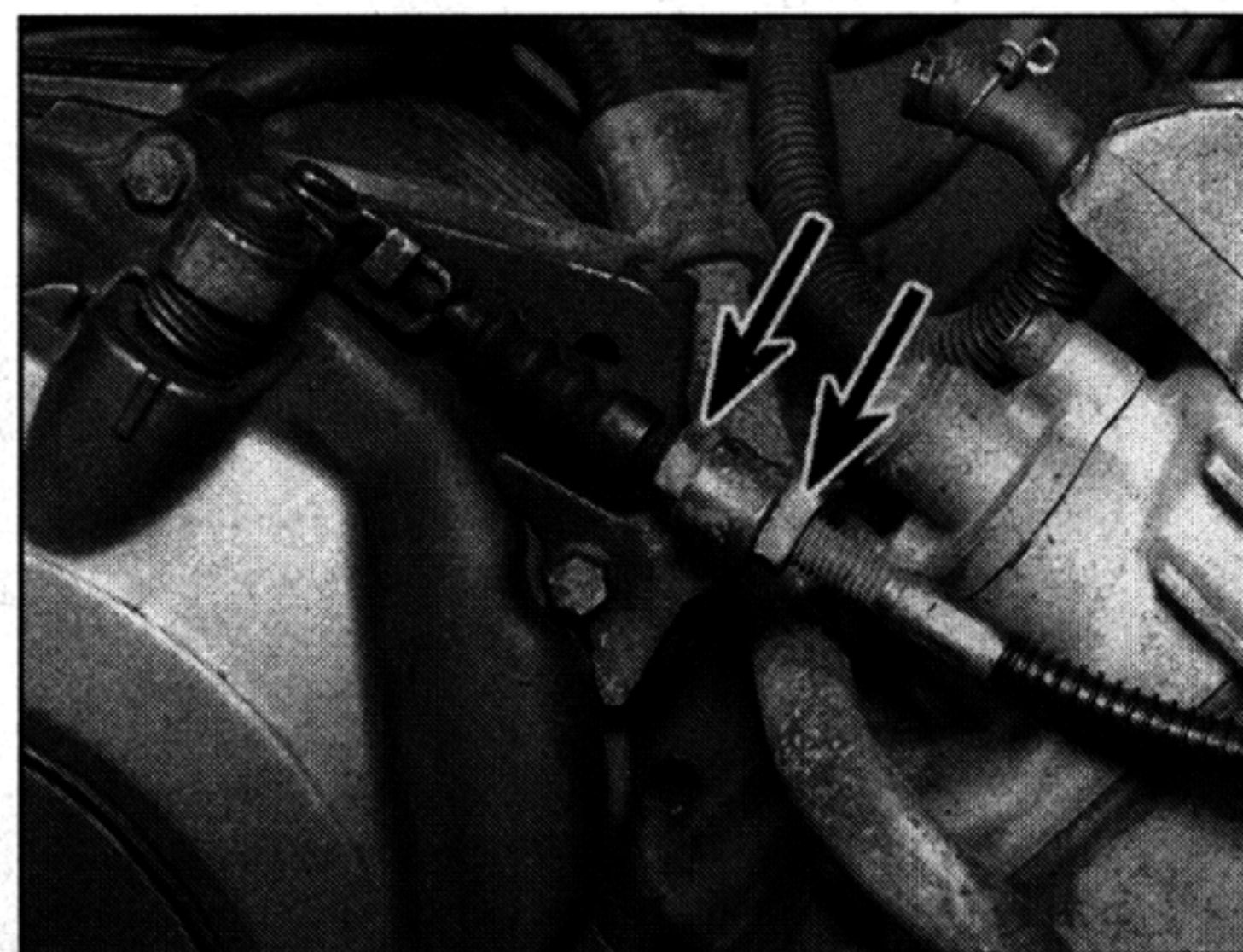
10.3 Measuring clutch cable freeplay



10.4 Slacken the lockring (A) and turn the adjuster (B) as required



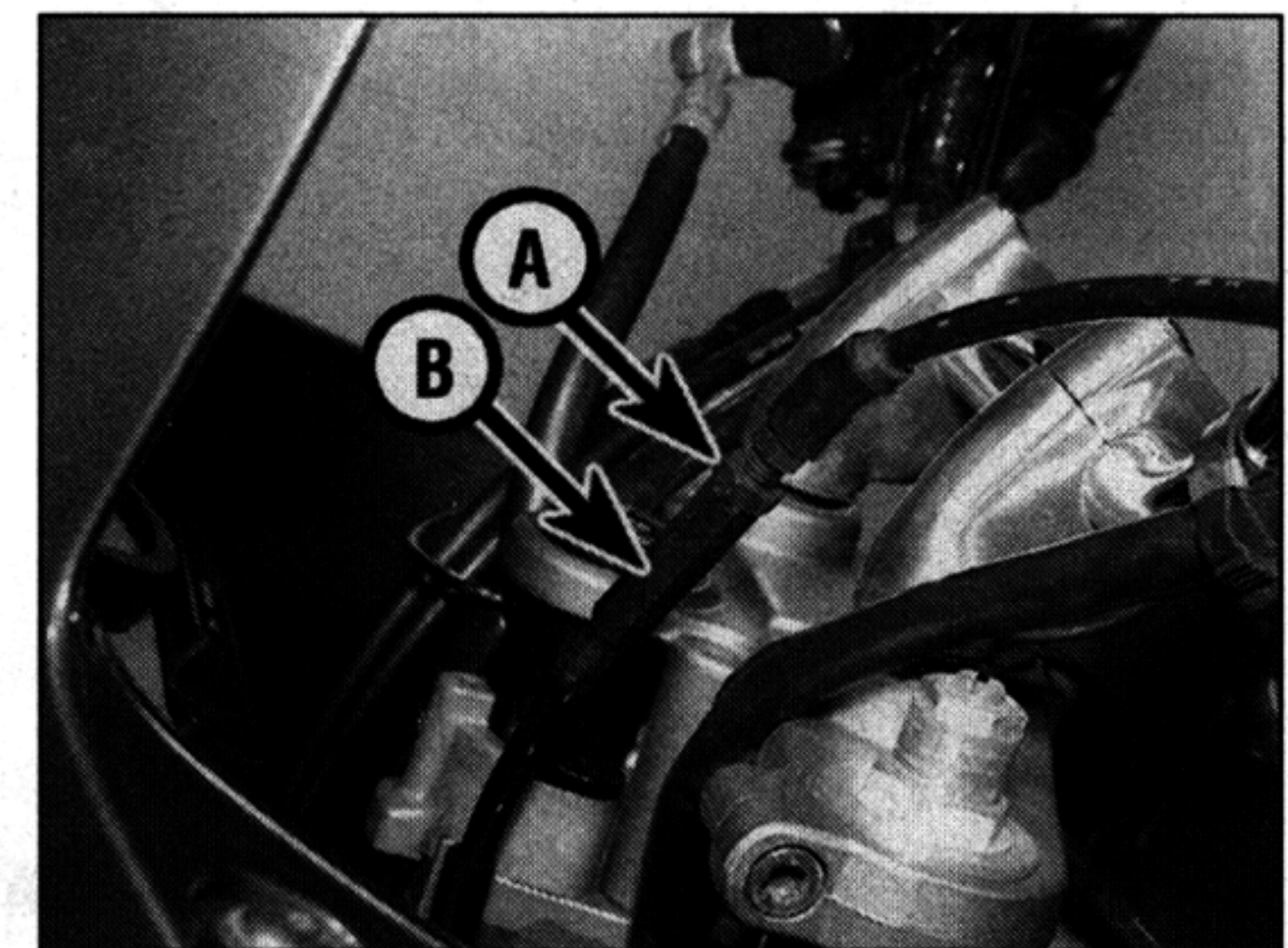
10.5a On TRX models, remove the cover and adjust the cable as described using the nuts (arrowed)



10.5b Cable adjuster nuts (arrowed) – XTZ models

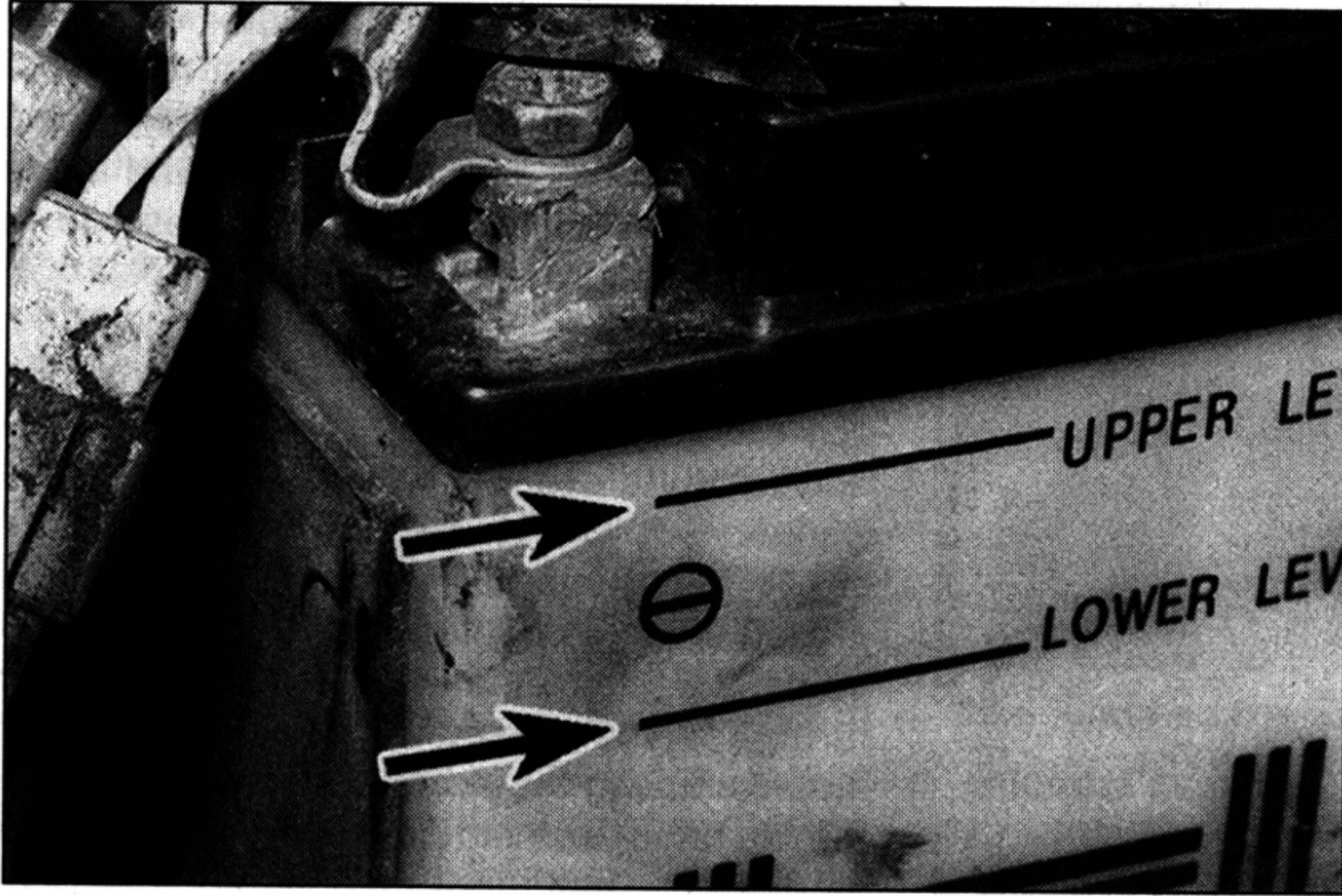
## 11 Battery – check

**1** TDM and TRX models are fitted with a sealed (maintenance-free) battery, and therefore require no maintenance. **Note:** Do not attempt to remove the battery caps to check the electrolyte level or battery specific gravity. Removal will damage the caps, resulting in electrolyte leakage and battery damage. All that should be done is to check that its terminals are clean and tight and that the casing is not damaged or leaking. See Chapter 9 for further details.

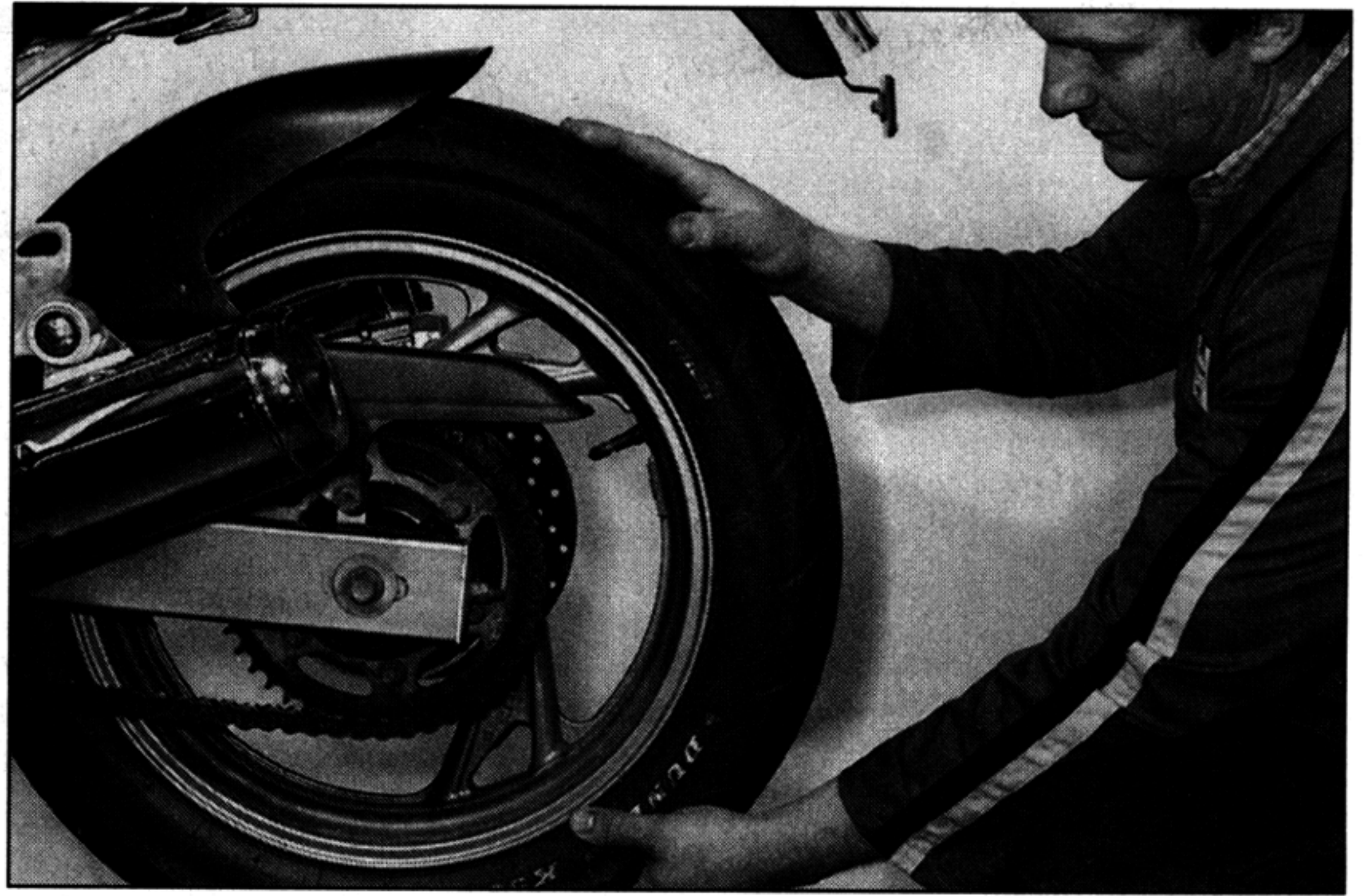


10.6 Slacken the locknut (A) and turn the adjuster (B) as required





11.2 Check that the electrolyte level is between the UPPER and LOWER level lines (arrowed)



13.2 Checking for play in the wheel bearings

2 XTZ models are fitted with a standard battery which requires regular checks of the electrolyte level. Remove the left-hand side cover for access to the battery (see Chapter 8). The electrolyte level is visible through the translucent battery case – it should be between the UPPER and LOWER level marks (see illustration). If the electrolyte is low, remove the battery (see Chapter 9), then remove the cell caps and fill each cell to the upper level mark with distilled water. Do not use tap water (except in an emergency), and do not overfill. The cell holes are quite small, so it may help to use a clean plastic squeeze bottle with a small spout to add the water. Install the battery cell caps, tightening them securely, then install the battery.

**Caution:** Be extremely careful when handling or working around the battery. The electrolyte is very caustic and an explosive gas (hydrogen) is given off when the battery is charging.

3 If the machine is not in regular use, disconnect the battery and give it a refresher charge every month to six weeks (see Chapter 9).

## 12 Wheels and tyres – general check

### Cast alloy wheels

1 The cast alloy wheels fitted to TDM and TRX models are virtually maintenance free, but they should be kept clean and checked periodically for cracks and other damage. Also check the wheel runout and alignment (see Chapter 7). Never attempt to repair damaged cast wheels; they must be renewed. Check the valve rubber for signs of damage or deterioration and have it renewed by a motorcycle tyre specialist if necessary. Also, make sure the valve stem cap is in place and tight.

### Spoked wheels

2 On XTZ models, visually check the spokes for damage, breakage or corrosion. A broken or bent spoke must be renewed immediately because the load taken by it will be transferred to adjacent spokes which may in turn fail.

3 If you suspect that any of the spokes are incorrectly tensioned, tap each one lightly with a screwdriver and note the sound produced. Properly tensioned spokes will make a sharp pinging sound, loose ones will produce a lower pitch and overtightened ones will be higher pitched. A spoke wrench will be needed if any of the spokes require adjustment. Unevenly tensioned spokes will promote rim misalignment – check the wheel runout and alignment (see Chapter 7) and seek the help of a wheel building expert if this is suspected.

### Tyres

4 Check the tyre condition and tread depth thoroughly – see *Daily (pre-ride) checks*.

## 13 Wheel bearings – check

1 Wheel bearings will wear over a period of time and result in handling problems.

2 Support the motorcycle upright using an auxiliary stand so that the wheel being checked is off the ground. Check for any play in the bearings by pushing and pulling the wheel against the hub (see illustration). Also rotate the wheel and check that it rotates smoothly.

3 If any play is detected in the hub, or if the wheel does not rotate smoothly (and this is not due to brake or transmission drag), the wheel must be removed for closer inspection of its bearings (see Chapter 7).

## 14 Sidestand and cut-off switches – check

### Sidestand

1 The sidestand return spring must be capable of retracting the stand fully and holding the stand retracted when the motorcycle is in use. If the spring is sagged or broken it must be renewed.

2 Lubricate the sidestand pivot regularly (see Section 18).

### Cut-off switches

3 The clutch and sidestand are fitted with cut-off switches to prevent the bike being started in gear unless the clutch lever is pulled in, and to prevent the bike being ridden with the sidestand down.

4 Your bike's owners handbook contains a checking procedure for the sidestand and clutch switches. To test, turn the ignition ON and make sure the engine stop switch (kill switch) is in the RUN position. Sit on the bike and retract the sidestand, then shift the transmission into gear. Pull in the clutch lever and press the starter button – the engine should start, indicating that the clutch switch is in good order. With the engine idling and the clutch lever still held in, lower the sidestand – the engine should stop; if it doesn't, the sidestand switch should be checked out. Refer to Chapter 9 for clutch switch and sidestand switch tests.

## 15 Nuts and bolts – tightness check

1 Since vibration of the machine tends to loosen fasteners, all nuts, bolts, screws, etc. should be periodically checked for proper tightness.



# 1•18 Every 4000 miles (6000 km) or 6 months

2 Pay particular attention to the following:

Spark plugs

Engine oil drain plugs

Gearchange lever, brake and clutch lever, and brake pedal bolts

Footrest and stand bolts

Engine mounting bolts

Shock absorber and suspension linkage bolts and swingarm pivot bolts

Handlebar clamp bolts

Front axle bolt and axle clamp bolts

Front fork clamp bolts (top and bottom yoke)

Rear axle nut

Brake caliper mounting bolts

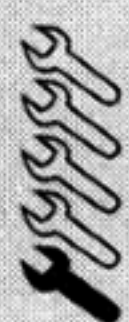
Brake hose banjo bolts and caliper bleed valves

Brake disc bolts

Exhaust system bolts/nuts

3 If a torque wrench is available, use it along with the torque specifications at the beginning of this and other Chapters.

## 16 Cooling system – check



**Warning:** The engine must be cool before beginning this procedure.

1 Check the coolant level (see *Daily (pre-ride) checks*).

2 The entire cooling system should be checked for evidence of leakage. Examine

each rubber coolant hose along its entire length. Look for cracks, abrasions and other damage. Squeeze each hose at various points. They should feel firm, yet pliable, and return to their original shape when released. If they are dried out or hard, renew them.

3 Check for evidence of leaks at each cooling system joint. Tighten the hose clips carefully to prevent future leaks.

4 Check the radiator for leaks and other damage. Leaks in the radiator leave tell-tale scale deposits or coolant stains on the outside of the core below the leak. If leaks are noted, remove the radiator (see Chapter 3) and have it repaired or renew it.

**Caution:** Do not use a liquid leak stopping compound to try to repair leaks.

5 Check the radiator fins for mud, dirt and insects, which may impede the flow of air through the radiator. If the fins are dirty, remove the radiator (see Chapter 3) and clean it using water or low pressure compressed air directed through the fins from the rear side. If the fins are bent or distorted, straighten them carefully with a screwdriver. If the air flow is restricted by bent or damaged fins over more than 30% of the radiator's surface area, renew the radiator.

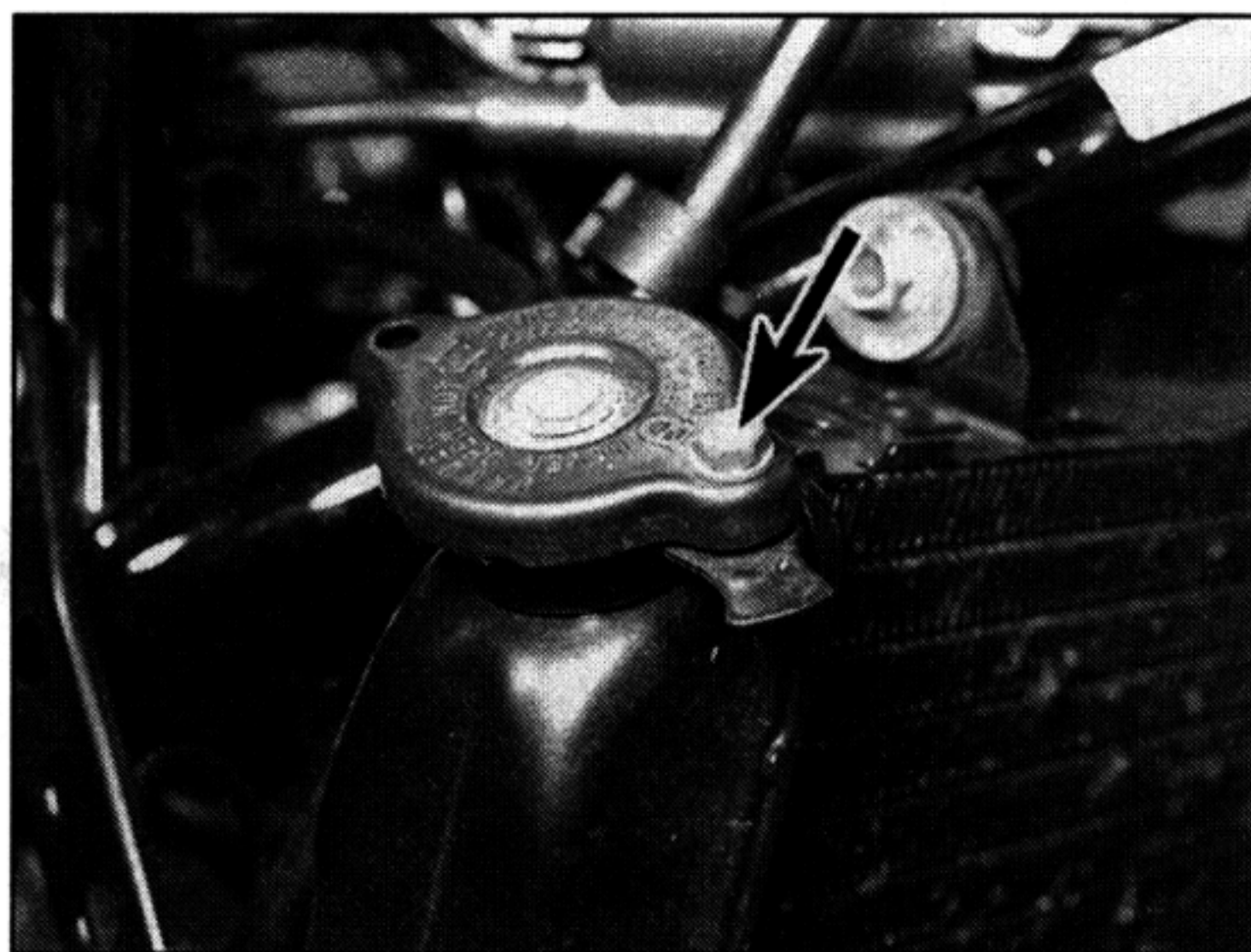
6 To access the radiator pressure cap and filler, on TDM models, remove the right-hand fairing side panel, on TRX models remove the left-hand fairing side panel (see Chapter 8). On TRX models, remove the security bolt holding the radiator cap (see illustration). Remove

the pressure cap from the radiator filler neck by turning it anti-clockwise until it reaches a stop (see illustrations). If you hear a hissing sound (indicating there is still pressure in the system), wait until it stops. Now press down on the cap and continue turning the cap until it can be removed. Check the condition of the coolant in the system. If it is rust-coloured or if accumulations of scale are visible, drain, flush and refill the system with new coolant (See Section 23). Check the cap seal for cracks and other damage. If in doubt about the pressure cap's condition, have it tested by a Yamaha dealer or renew it. Install the cap by turning it clockwise until it reaches the first stop then push down on the cap and continue turning until it can turn further.

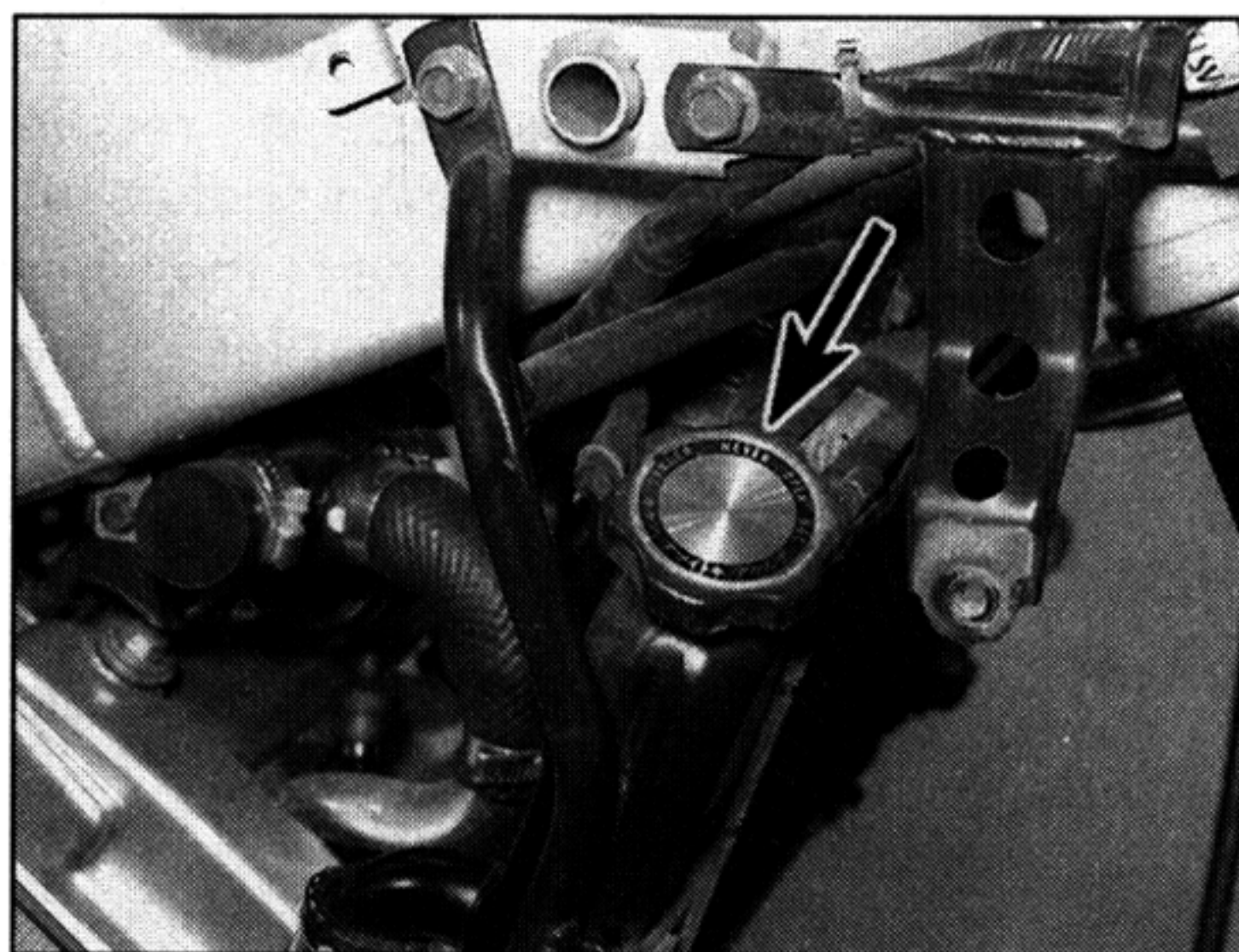
7 Check the antifreeze content of the coolant with an antifreeze hydrometer. Sometimes coolant looks like it's in good condition, but might be too weak to offer adequate protection. If the hydrometer indicates a weak mixture, drain, flush and refill the system (see Section 23).

8 Start the engine and let it reach normal operating temperature, then check for leaks again. As the coolant temperature increases beyond normal, the fan should come on automatically and the temperature should begin to drop. If it does not, refer to Chapter 3 and check the fan switch, fan motor and fan circuit carefully.

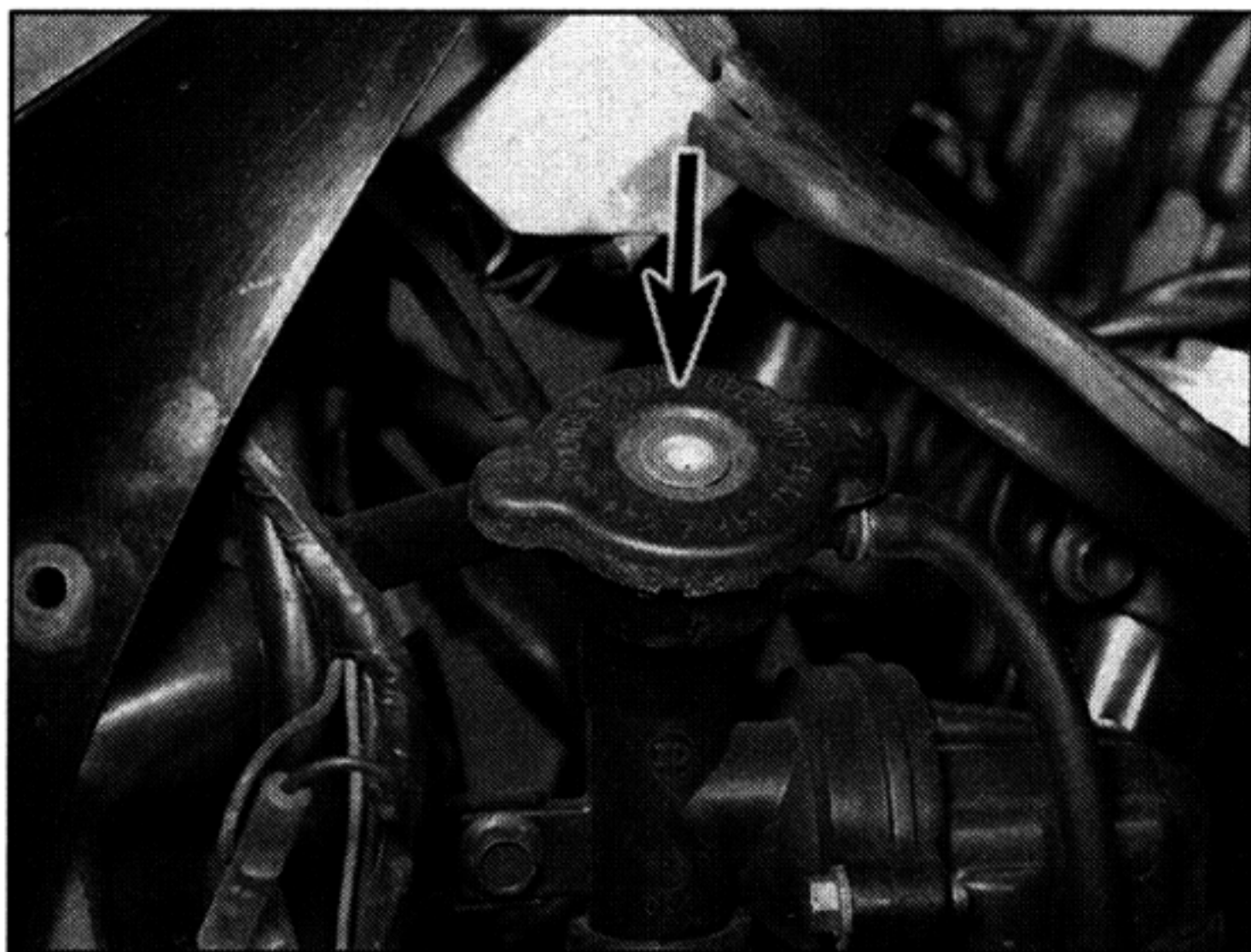
9 If the coolant level is consistently low, and no evidence of leaks can be found, have the entire system pressure checked by a Yamaha dealer.



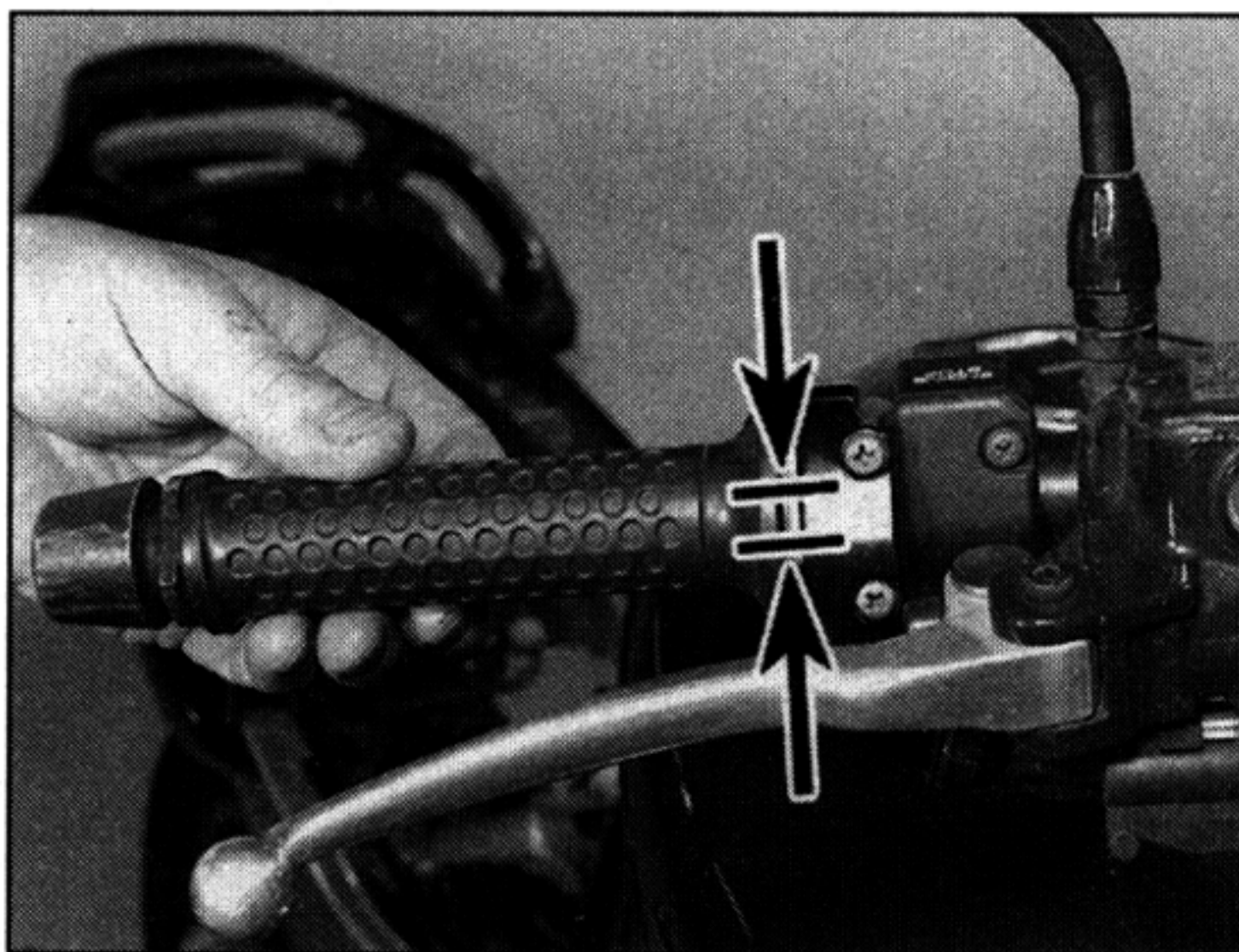
16.6a On TRX models, remove the pressure cap security bolt (arrowed)



16.6b Pressure cap (arrowed) – TDM models

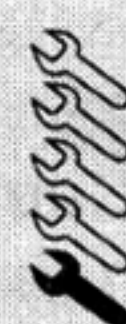


16.6c Pressure cap (arrowed) – XTZ models



17.3 Measure the amount of freeplay at the throttle grip flange

## 17 Throttle and choke cables – check



### Throttle cables

1 Make sure the throttle grip rotates easily from fully closed to fully open with the front wheel turned at various angles. The grip should return automatically from fully open to fully closed when released.

2 If the throttle sticks, this is probably due to a cable fault. Remove the cables (see Chapter 4) and lubricate them (see Section 18). Install the cables, making sure they are correctly routed. If this fails to improve the operation of the throttle, the cables must be renewed. Note that in very rare cases the fault could lie in the carburetors rather than the cables, necessitating the removal of the carburetors and inspection of the throttle linkage (see Chapter 4).

3 With the throttle operating smoothly, check for a small amount of freeplay in the cable assembly, measured in terms of the amount of twistgrip rotation before the throttle opens and the pull of the cable is felt; compare this amount to that listed in this Chapter's Specifications (see illustration). If it's incorrect, adjust the cable assembly to correct it.



4 Freeplay adjustments can be made at the upper end of the accelerator cable. Loosen the locknut on the adjuster (**see illustration**). Turn the adjuster until the specified amount of freeplay is obtained, then retighten the locknut. Turn the adjuster clockwise to increase freeplay and anti-clockwise to reduce it.

5 If the adjuster has reached its limit of adjustment, reset it so that the freeplay is at a maximum, then remove the fuel tank and air filter housing (see Chapter 4) and adjust the accelerator cable at the carburettor end. Slacken the adjuster locknut, then screw the adjuster in or out until the specified amount of freeplay is obtained, then tighten the locknut (**see illustration**). Further adjustments can now be made at the cable's upper end. If the cable cannot be adjusted as specified, renew the accelerator and decelerator cables (see Chapter 4).



**Warning:** Turn the handlebars all the way through their travel with the engine idling. Idle speed should not change. If it does, the cable may be routed incorrectly.

Correct this condition before riding the bike.

6 Check that the throttle twistgrip operates smoothly and snaps shut quickly when released.

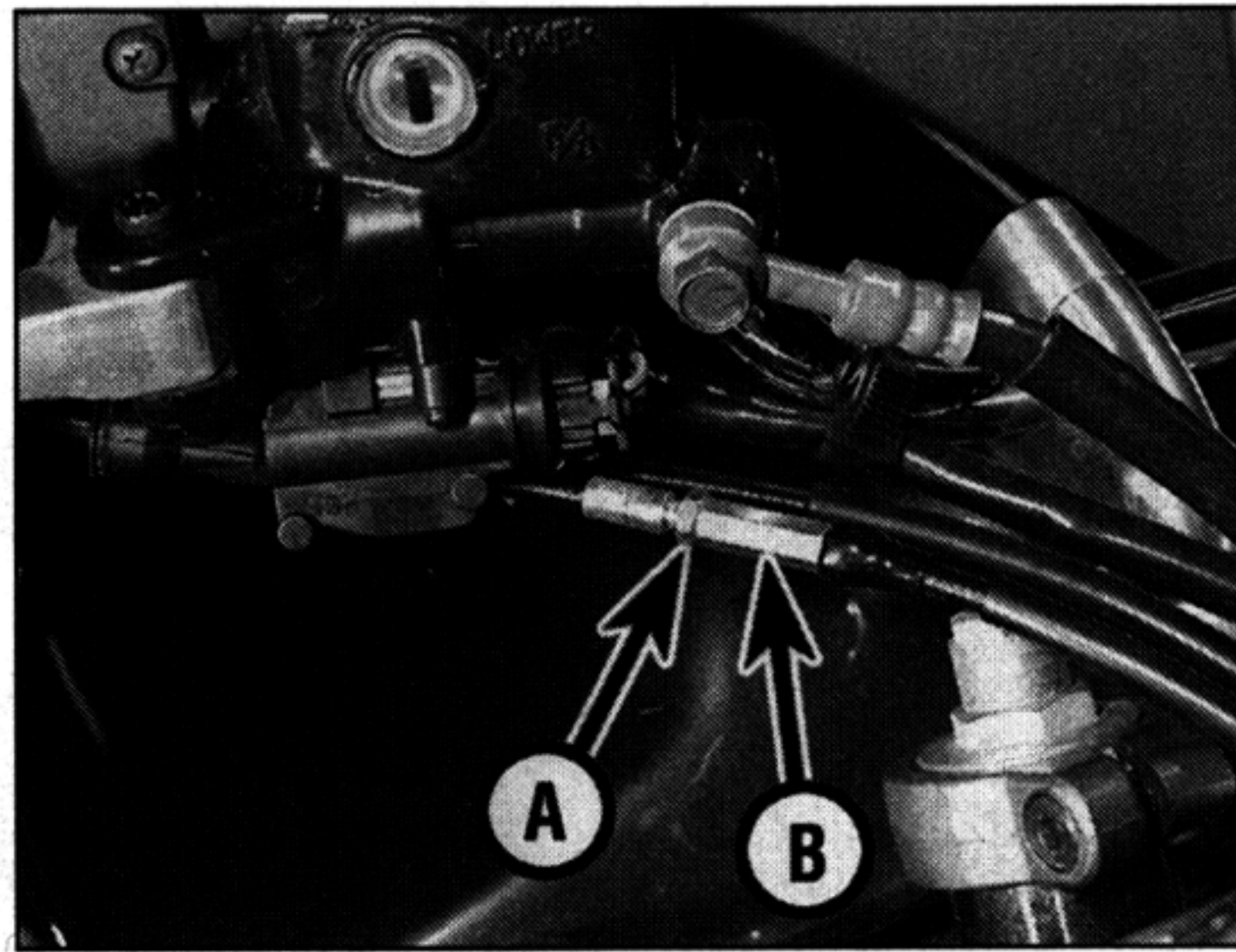
## Choke cable

7 If the choke does not operate smoothly this is probably due to a cable fault. Remove the cable (see Chapter 4) and lubricate it (see Section 18). Install the cable, routing it so it takes the smoothest route possible.

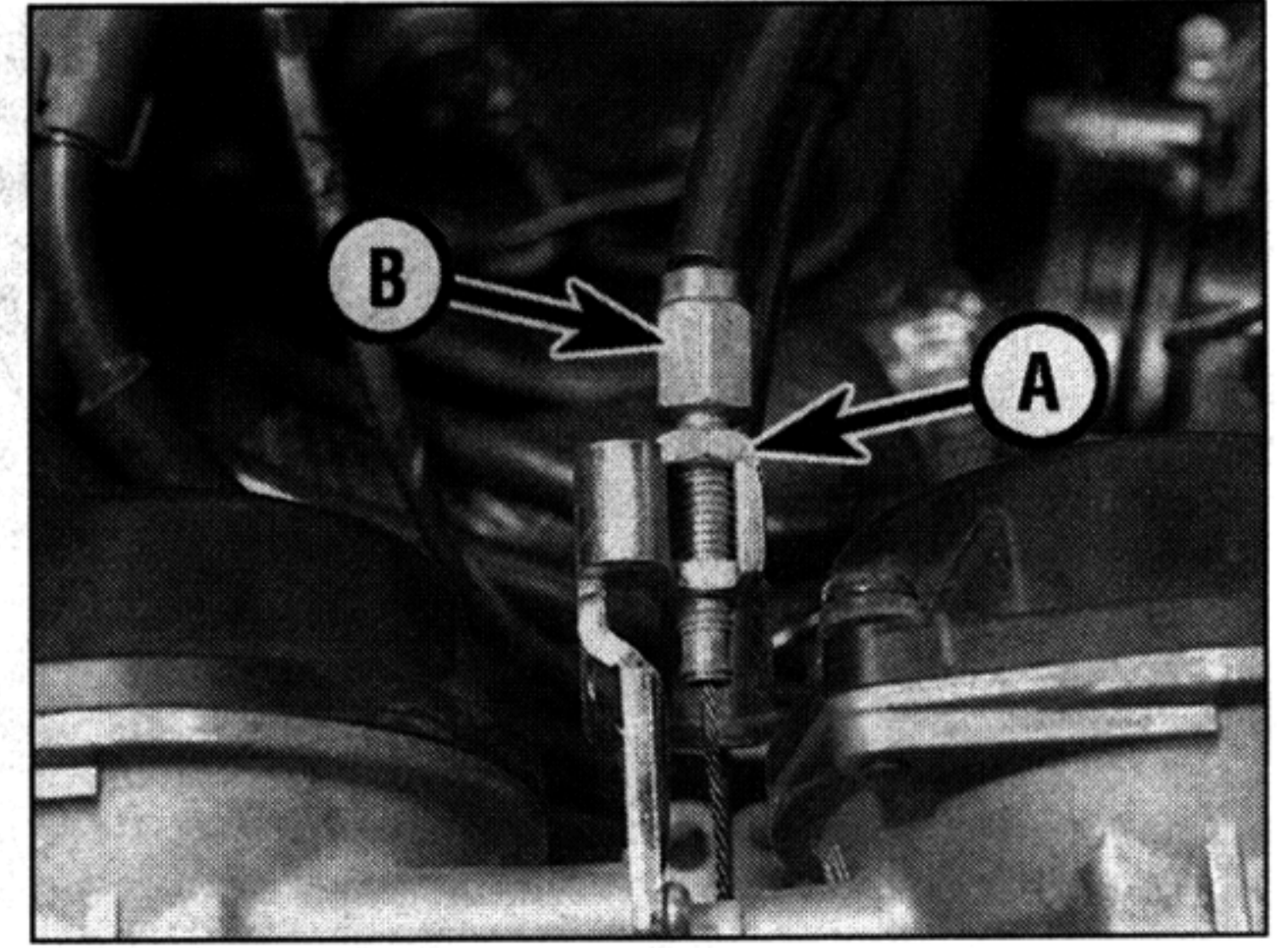
8 If this fails to improve the operation of the choke, the cable must be renewed. Note that in very rare cases the fault could lie in the carburettors rather than the cable, necessitating the removal of the carburettors and inspection of the choke plungers (see Chapter 4). Make sure there is a small amount of freeplay in the cable before the plungers move. If there isn't, check that the cable is seating correctly at the carburettor end. If it is, then slacken the choke outer cable bracket screw on the carburettor and slide the cable further into the bracket, creating some freeplay. Otherwise, renew the cable.



18.3a Lubricating a cable with a cable oiler clamp



17.4 Slacken the locknut (A) and turn the adjuster (B) as required



17.5 Slacken the locknut (A) and turn the adjuster (B) as required

## 18 Stand, lever pivots and cables – lubrication



### Pivot points

1 Since the controls, cables and various other components of a motorcycle are exposed to the elements, they should be lubricated periodically to ensure safe and trouble-free operation.

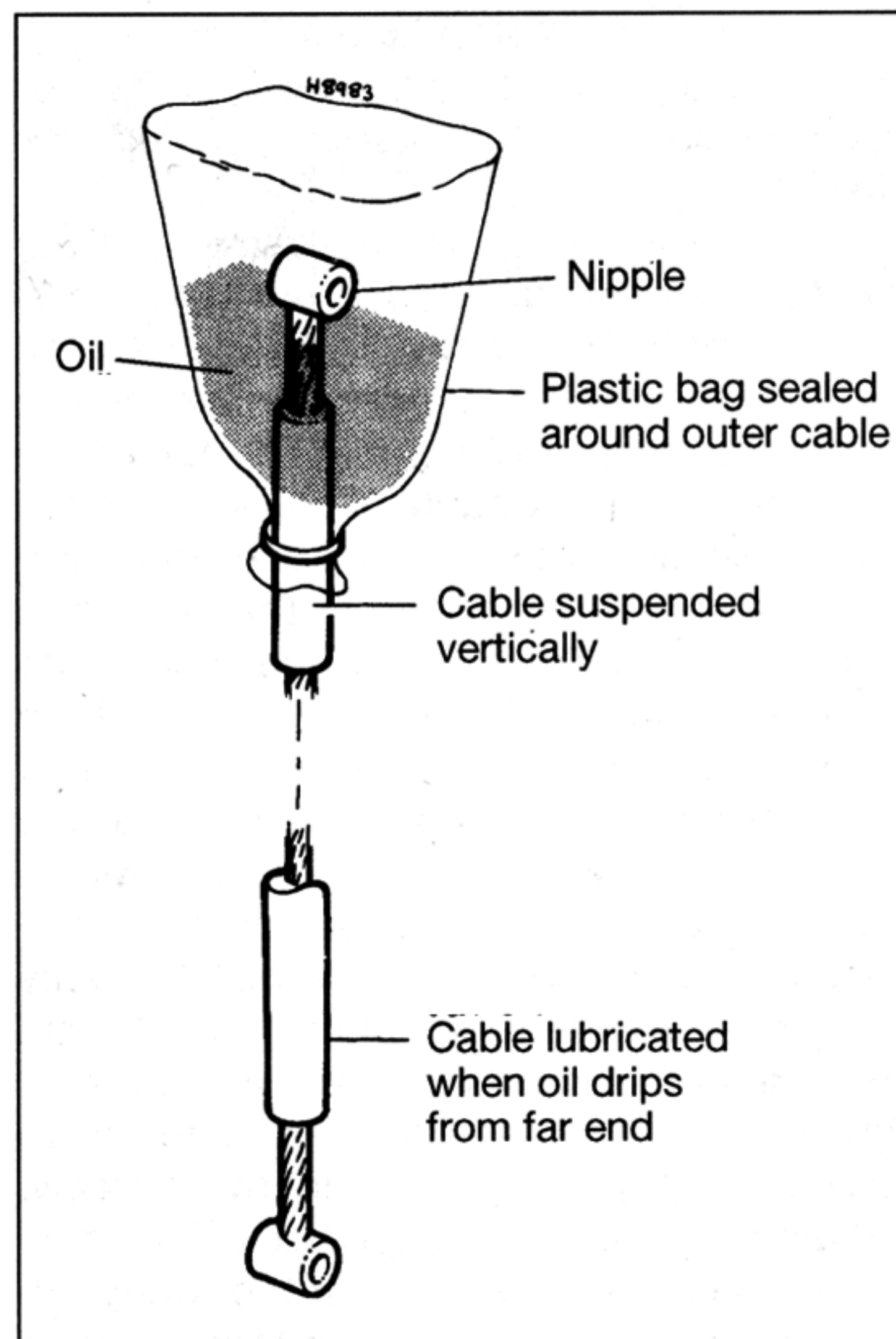
2 The footrests, clutch and brake levers, brake pedal, gearshift lever linkage and sidestand pivots should be lubricated frequently. In order for the lubricant to be applied where it will do the most good, the component should be disassembled. However, if chain and cable lubricant is being used, it can be applied to the pivot joint gaps and will usually work its way into the areas where friction occurs. If motor oil or light grease is being used, apply it sparingly as it

may attract dirt (which could cause the controls to bind or wear at an accelerated rate). **Note:** One of the best lubricants for the control lever pivots is a dry-film lubricant (available from many sources by different names).

### Cables

3 To lubricate the cables, disconnect the relevant cable at its upper end, then lubricate the cable with a cable oiler clamp, or if one is not available, using the set-up shown (**see illustrations**). See Chapter 4 for the choke and throttle cable removal procedures and Chapter 2 for the clutch cable procedure.

4 The speedometer cable should be removed (see Chapter 9) and the inner cable withdrawn from the outer cable and lubricated with motor oil or cable lubricant. Do not lubricate the upper few inches of the cable as the lubricant may travel up into the instrument head. Note that the speedometer on 1999 TDM models is electronically operated, and thus does not have a cable.



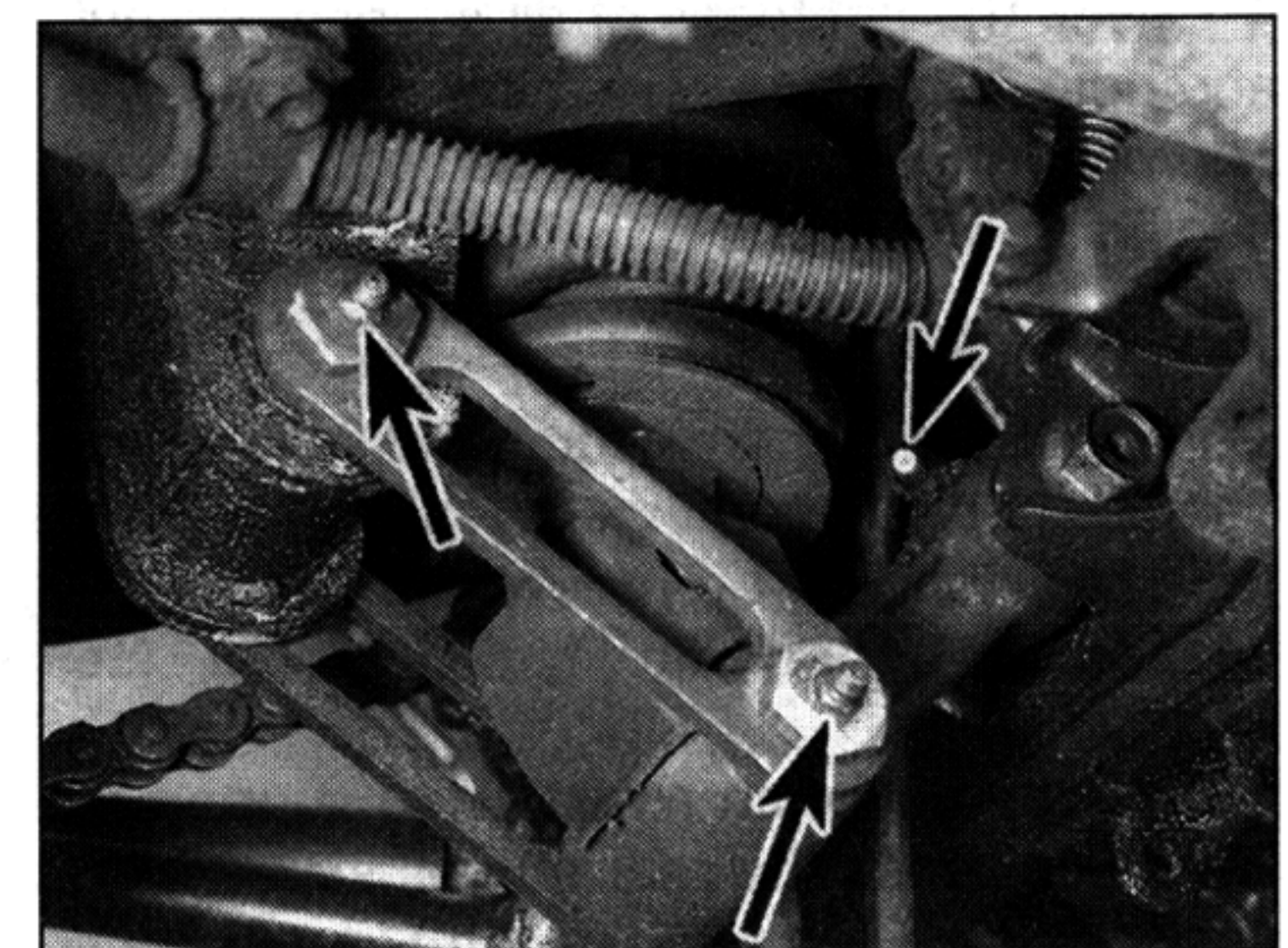
18.3b Lubricating a cable with a makeshift funnel and motor oil

## 19 Swingarm and suspension bearings (XTZ models) – re-greasing



1

1 The swingarm and suspension linkage components are equipped with grease nipples (**see illustration**). Clean off the nipples using a rag, then apply some lithium-based grease to the nipples using a grease gun.



19.1 Apply grease to the nipples on the suspension linkage (arrowed) and to the nipple on the swingarm pivot





20.3 Check above and below the dust seal for signs of fluid leakage



20.7 Checking for play in the rear shock mountings and suspension linkage bearings (TRX and XTZ models)

## 20 Suspension – check



1 The suspension components must be maintained in top operating condition to ensure rider safety. Loose, worn or damaged suspension parts decrease the motorcycle's stability and control.

### Front suspension

2 While standing alongside the motorcycle, apply the front brake and push on the handlebars to compress the forks several times. Check that they move up-and-down smoothly without binding. If binding is felt, the forks should be disassembled and inspected (see Chapter 6).

3 Inspect the area around the dust seal for signs of oil leakage, then carefully lever up the dust seal using a flat-bladed screwdriver and inspect the area around the fork seal (**see illustration**). If leakage is evident, the seals must be renewed (see Chapter 6). Check the fork tubes for scratches, corrosion and pitting as these will cause premature seal failure. If the damage is excessive the tubes should be renewed (see Chapter 6).

4 Check the tightness of all suspension nuts and bolts to be sure none have worked loose, referring to the torque settings specified at the beginning of Chapter 6.

### Rear suspension

5 Inspect the rear shock for fluid leakage and tightness of its mountings. If leakage is found, the shock should be renewed or taken to a suspension specialist for overhaul (see Chapter 6).

6 With the aid of an assistant to support the bike, compress the rear suspension several times. It should move up and down freely without binding. If any binding is felt, the worn or faulty component must be identified and renewed. The problem could be due to either

the shock absorber, the suspension linkage components (TRX and XTZ models) or the swingarm components.

7 Support the motorcycle using an auxiliary stand so that the rear wheel is off the ground. Grab the swingarm and rock it from side to side – there should be no discernible movement at the rear. If there's a little movement or a slight clicking can be heard, inspect the tightness of all the rear suspension mounting bolts and nuts, referring to the torque settings specified at the beginning of Chapter 6, and re-check for movement. Next, grasp the top of the rear wheel and pull it upwards – there should be no discernible freeplay before the shock absorber begins to compress (**see illustration**). Any freeplay felt in either check indicates worn bearings in the suspension linkage (TRX and XTZ models) or swingarm, or worn shock absorber mountings. The worn components must be renewed (see Chapter 6).

8 To make an accurate assessment of the swingarm bearings, remove the rear wheel (see Chapter 7) and the bolt securing the shock absorber (TDM models) or suspension linkage assembly (TRX and XTZ models) to the swingarm (see Chapter 6). Grasp the rear of the swingarm with one hand and place your other hand at the junction of the swingarm and the frame. Try to move the rear of the swingarm from side-to-side. Any wear (play) in the bearings should be felt as movement between the swingarm and the frame at the front. If there is any play the swingarm will be felt to move forward and backward at the front (not from side-to-side). Yamaha specify a maximum lateral movement of 1 mm measured at the rear ends of the swingarm. Next, move the swingarm up and down through its full travel. It should move freely, without any binding or rough spots. If any play in the swingarm is noted or if the swingarm does not move freely, the bearings must be removed for inspection or renewal (see Chapter 6).

9 On XTZ models, the swingarm sideplay should be measured. Push the swingarm to one side of the frame, then slip a feeler gauge between the frame and the swingarm cap on the side from which the swingarm was pushed and measure the clearance. If it is greater than specified, remove the swingarm (see Chapter 6) and follow the procedure in Section 14 of that Chapter to calculate the shims required to restore sideplay to the correct amount.

## 21 Steering head bearings – freeplay check and adjustment



1 Steering head bearings can become dented, rough or loose during normal use of the machine. In extreme cases, worn or loose steering head bearings can cause steering wobble – a condition that is potentially dangerous.

### Check

2 Support the motorcycle on an auxiliary stand so that the front wheel is off the ground.

3 Point the front wheel straight-ahead and slowly move the handlebars from side-to-side. Any dents or roughness in the bearing races will be felt and the bars will not move smoothly and freely.

4 Next, grasp the fork sliders and try to pull and push them forward and backward. Any looseness in the steering head bearings will be felt as front-to-rear movement of the forks. If play is felt in the bearings, adjust the steering head as follows.

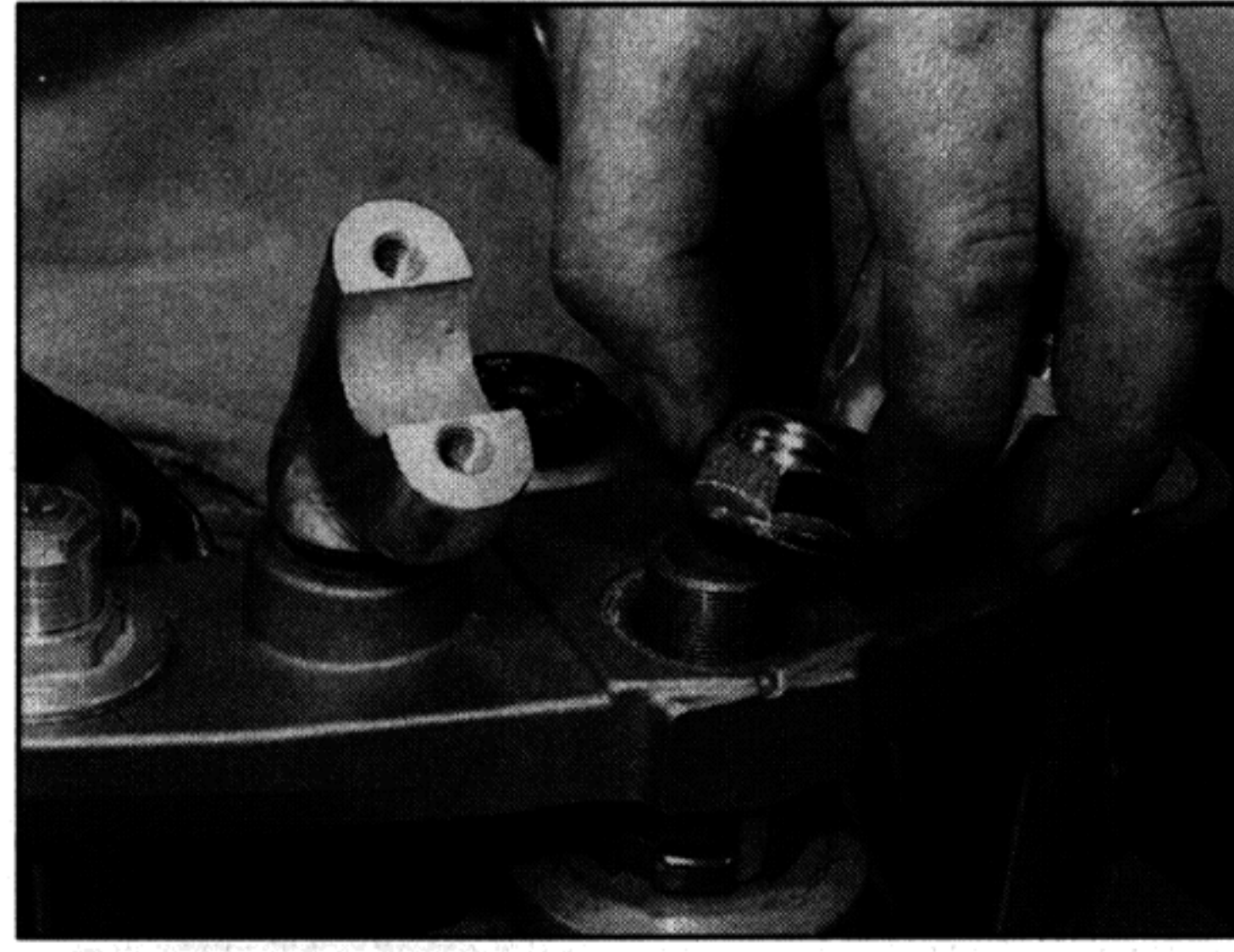
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*Freeplay in the fork due to worn fork bushes can be misinterpreted for steering head bearing play – do not confuse the two.*

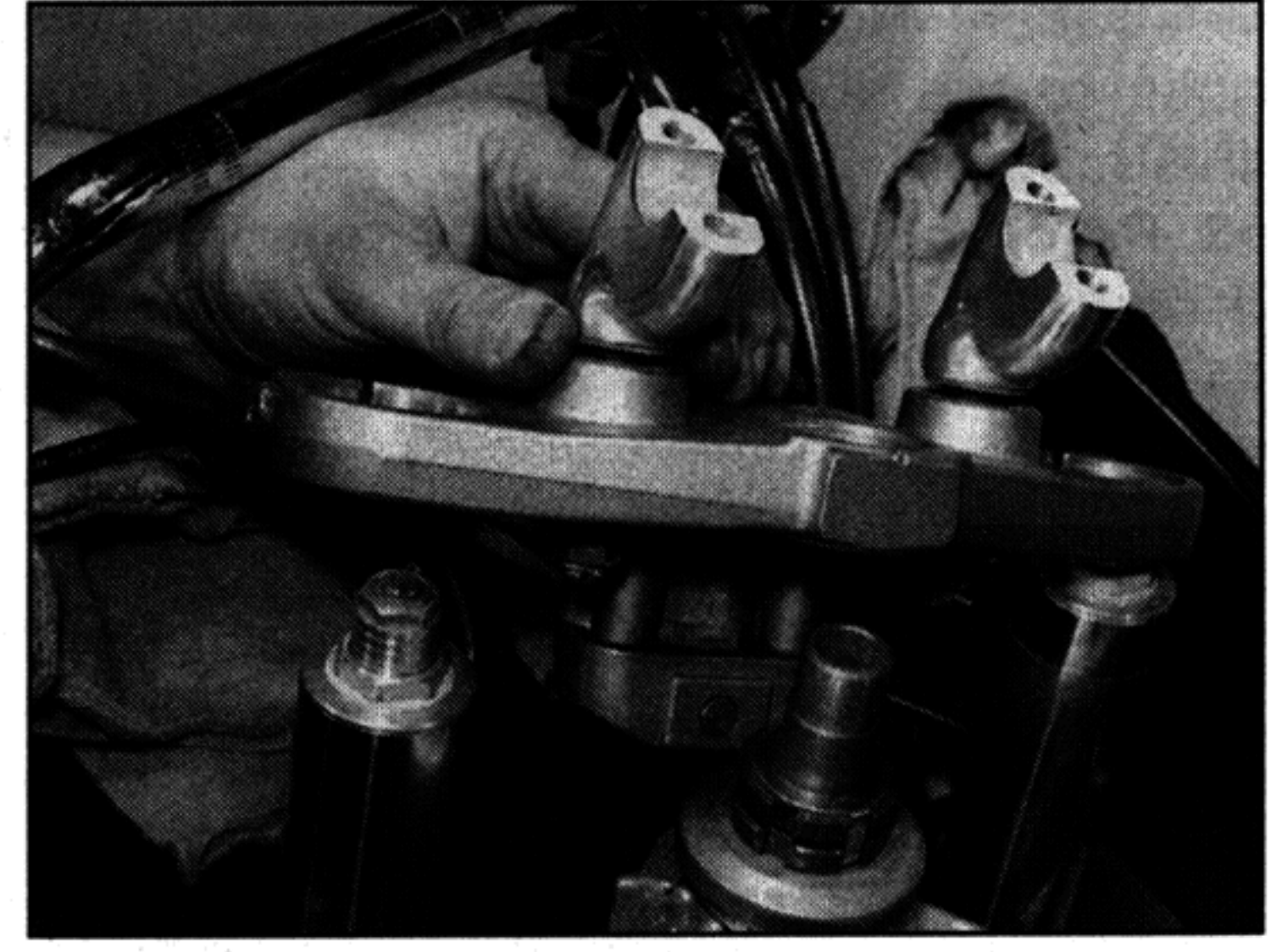




**21.6a** Slacken the fork clamp bolts (arrowed) . . .



**21.6b** . . . and unscrew the steering stem nut



**21.7** Ease the top yoke up off the steering stem and forks

## Adjustment

### TDM and TRX models

**5** Displace the handlebars from the top yoke (see Chapter 6). On 1996-on TDM models, unscrew the bolts securing the choke knob and the cable guide to the top yoke.

**6** Slacken the fork clamp bolts in the top yoke (see illustration). Unscrew the steering stem nut and remove it along with its washer, where fitted (see illustration).

**7** Gently ease the top yoke upwards off the fork tubes and position it clear, using a rag to protect the tank or other components (see illustration). Make sure no strain is placed on the ignition switch wiring. On TRX models the yoke should be supported so that the master cylinder reservoir remains upright and so that no strain is placed on the hydraulic hose.

**8** Remove the tabbed lockwasher, noting how it fits, then unscrew and remove the locknut using either a C-spanner, a peg spanner or a drift located in one of the notches (see illustrations). Remove the washer.

**9** To adjust the bearings as specified by Yamaha, a special service tool (part No. 90890-01403) and a torque wrench are required. If the tool is available, first slacken the adjuster nut, then tighten it to the initial torque setting specified at the beginning of the Chapter, making sure the torque wrench handle is at right angles (90°) to the centreline between the adjuster nut and the wrench socket in the special tool (see illustration). Now slacken the nut one turn, then tighten it to the final torque setting specified. Check that the steering is still able to move freely from side to side, but that all freeplay is eliminated.

**10** If the Yamaha tool is not available, using either a C-spanner, a peg spanner or a drift located in one of the notches, slacken the adjuster nut slightly until pressure is just released, then tighten it until all freeplay is removed, then tighten it a little more. This preloads the bearings. Now slacken the nut, then tighten it again, setting it so that all freeplay is just removed yet the steering is able to move

freely from side to side. To do this tighten the nut only a little at a time, and after each tightening repeat the checks outlined above (Steps 3 and 4) until the bearings are correctly set. The object is to set the adjuster nut so that the bearings are under a very light loading, just enough to remove any freeplay.

**Caution:** Take great care not to apply excessive pressure because this will cause premature failure of the bearings.

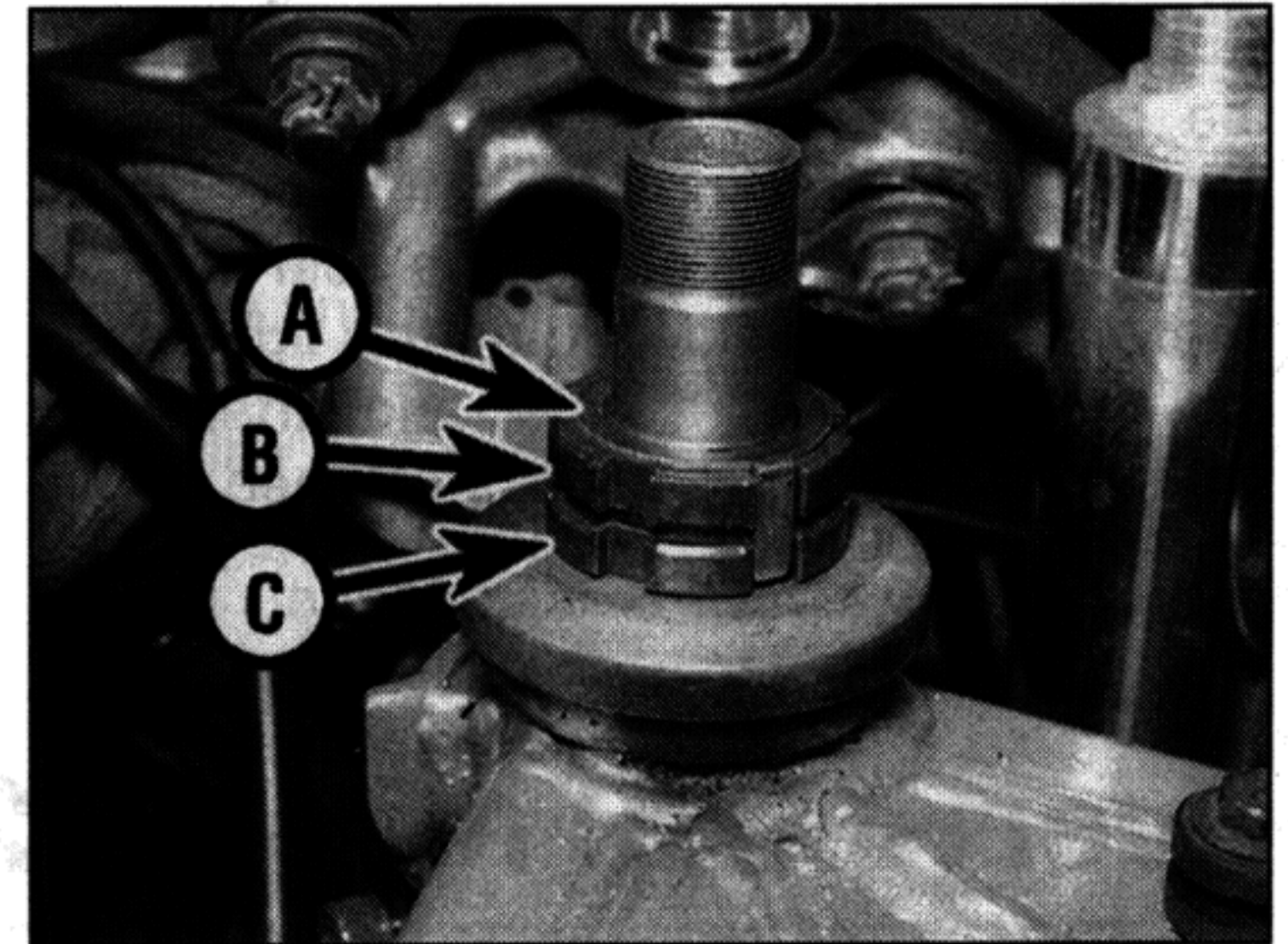
**11** With the bearings correctly adjusted, install the washer and the locknut (see illustration 22.8b). On 1991 to 1995 TDM models the tapered side of the locknut must

face down. Tighten the locknut finger-tight, then tighten it further until its notches align with those in the adjuster nut. If necessary, counter-hold the adjuster nut and tighten the locknut using a C-spanner or drift until the notches align, but make sure the adjuster nut does not turn as well. Install the tabbed lockwasher so that the tabs fit into the notches in both the locknut and adjuster nut (see illustration 22.8a).

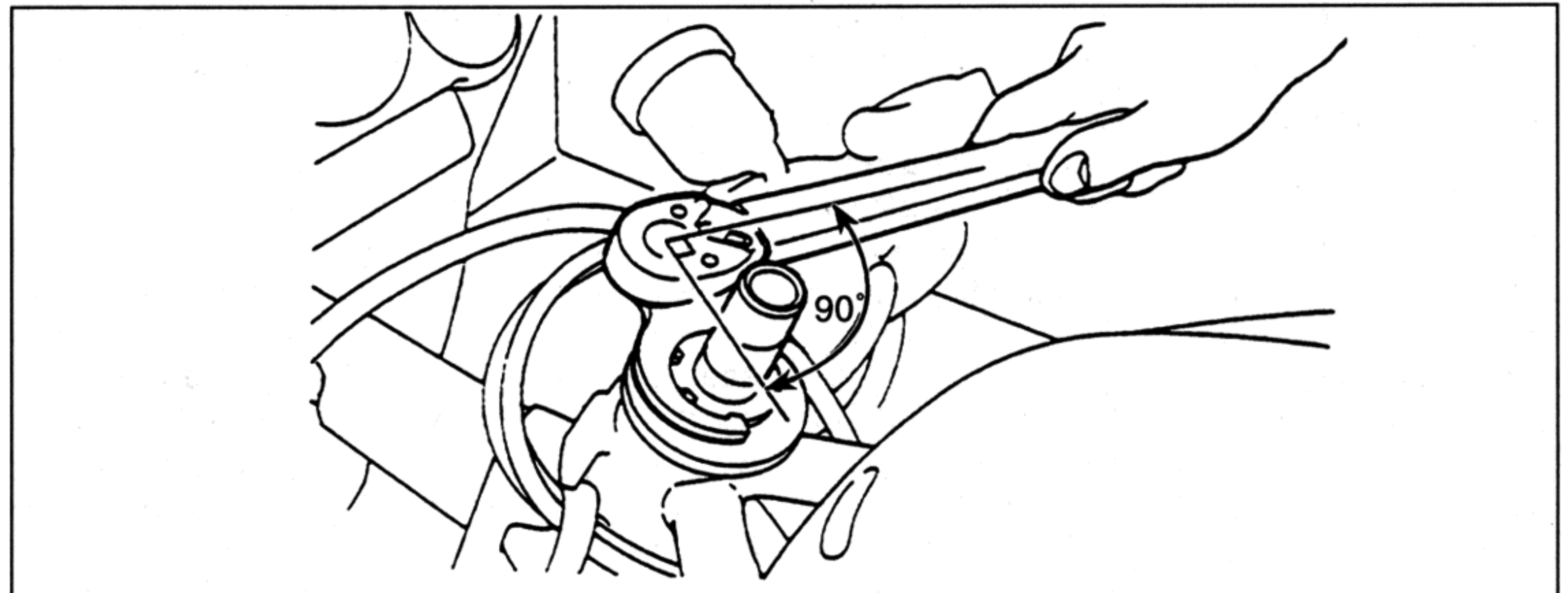
**12** Fit the top yoke onto the steering stem (see illustration 22.7), then install the washer (where fitted) and steering stem nut; tighten the nut to the torque setting specified at the beginning of the Chapter (see



**21.8a** Remove the tabbed lockwasher . . .



**21.8b** . . . then unscrew the locknut (A), remove the washer (B), and adjust the bearings as described using the adjuster nut (C)



**21.9** Make sure the torque wrench arm is at right angles (90°) to the tool



## 1•22 Every 4000 miles (6000 km) or 6 months

**illustration).** Now tighten both the fork clamp bolts to the specified torque setting (**see illustration**).

**13** Re-check the bearing adjustment as described above and re-adjust if necessary.

**14** Install the handlebars (see Chapter 6).

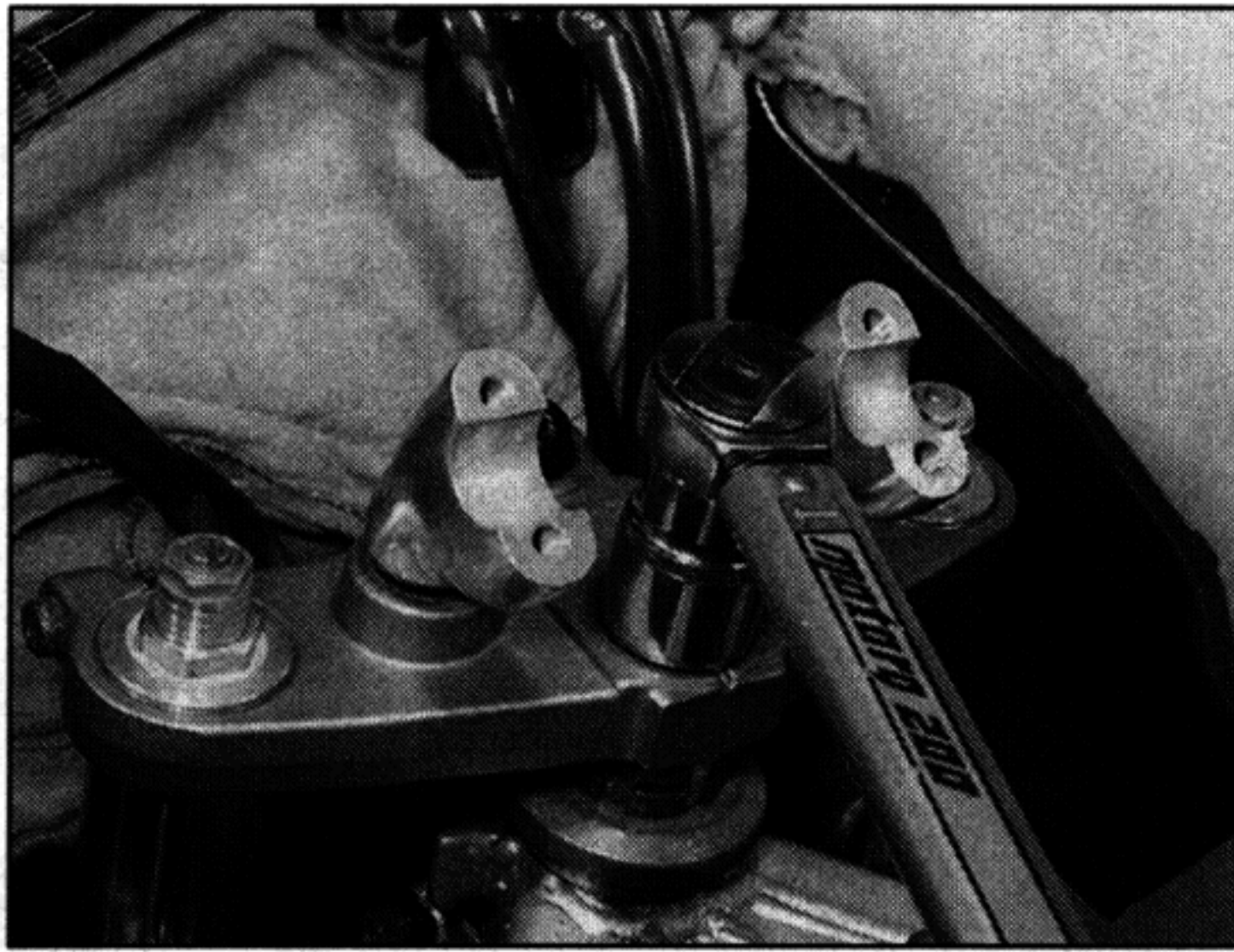
### XTZ models

**15** Displace the handlebars from the top yoke (see Chapter 6).

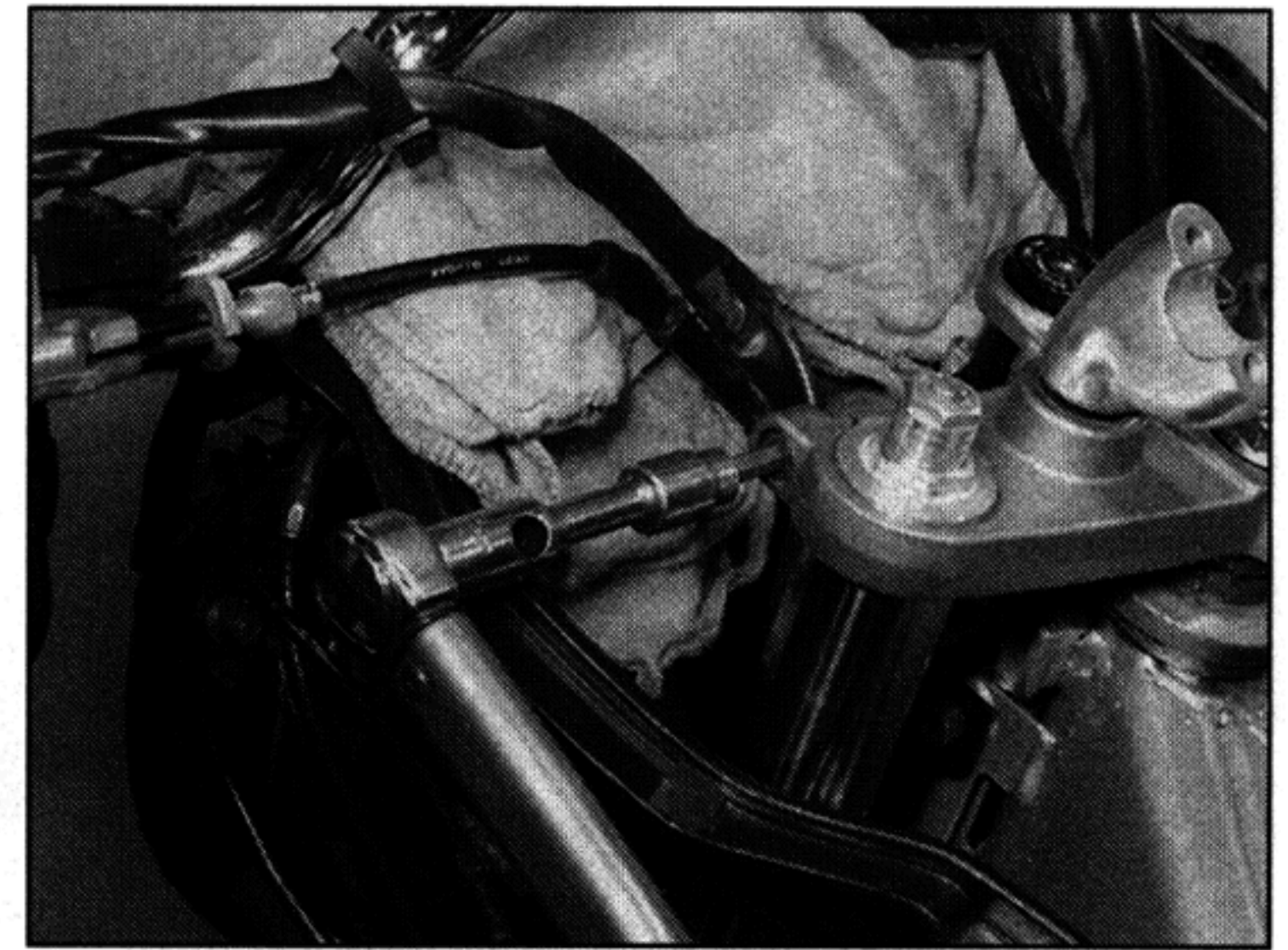
**16** Slacken the fork clamp bolts in the top yoke, then slacken the steering stem bolt (**see illustration**). There is no need to remove the top yoke.

**17** To adjust the bearings as specified by Yamaha, a special service tool (part No. 90890-01268) and a torque wrench are required. If the tool is available, first slacken the adjuster nut (**see illustration 22.18**), then tighten it to the initial torque setting specified at the beginning of the Chapter, making sure the torque wrench handle is at right angles (90°) to the line between the adjuster nut and the wrench socket in the special tool (**see illustration 22.9**). Now slacken the nut one turn, then tighten it to the final torque setting specified. Check that the steering is still able to move freely from side to side, but that all freeplay is eliminated.

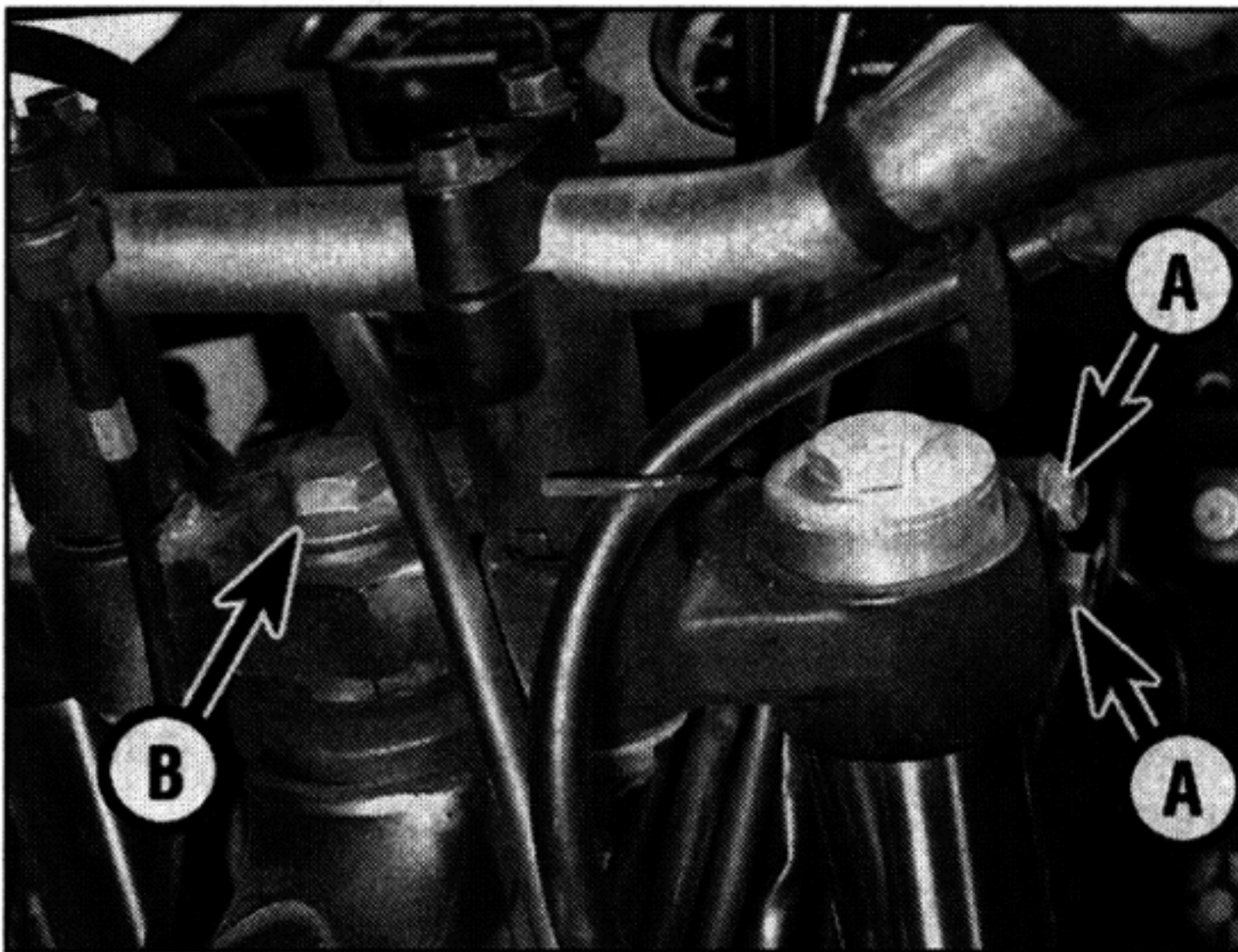
**18** If the Yamaha tool is not available, using either a C-spanner or drift located in one of the notches, slacken the adjuster nut slightly until pressure is just released, then tighten it until all freeplay is removed, then tighten it a little more (**see illustration**). This pre-loads the bearings. Now slacken the nut, then tighten it again, setting it so that all freeplay is just removed yet the steering is able to move freely from side to side. To do this tighten the nut only a little at a time, and after each tightening repeat the checks outlined above



**21.12a Tighten the steering stem nut . . .**



**21.12b . . . and the fork clamp bolts to the specified torque**

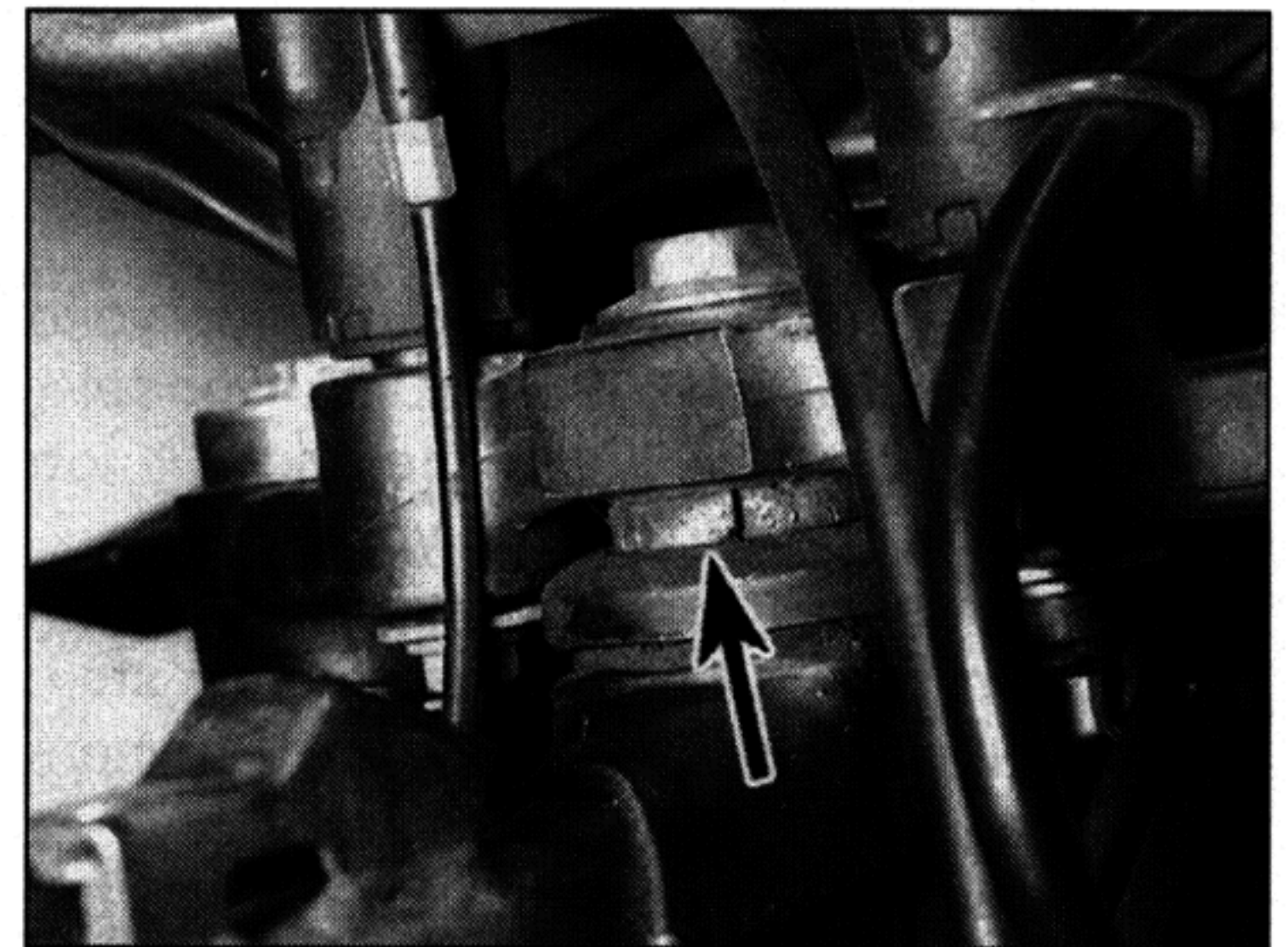


**21.16 Slacken the fork clamp bolts (A) and the steering stem bolt (B)**

(Steps 3 and 4) until the bearings are correctly set. The object is to set the adjuster nut so that the bearings are under a very light loading, just enough to remove any freeplay.

**Caution: Take great care not to apply excessive pressure because this will cause premature failure of the bearings.**

**19** With the bearings correctly adjusted,



**21.18 Steering head bearing adjuster nut (arrowed)**

tighten the steering stem bolt and both the fork clamp bolts to the torque settings specified at the beginning of the Chapter (**see illustration 22.16**).

**20** Re-check the bearing adjustment as described above and re-adjust if necessary.

**21** Install the handlebars (see Chapter 6).

## Every 8000 miles (12,000 km) or 12 months

Carry out all the items under the 4000 mile (6000 km) check, plus the following:

### 22 Engine – oil and filter change



**Warning: Be careful when draining the oil, as the exhaust pipes, the engine, and the oil itself can cause severe burns.**

**1** Consistent routine oil and filter changes are the single most important maintenance procedure you can perform on a motorcycle. The oil not only lubricates the internal parts of the engine, transmission and clutch, but it also acts as a coolant, a cleaner, a sealant, and a protectant. Because of these demands, the oil takes a terrific amount of abuse and should be changed often with new oil of the recommended grade and type. Saving a little

money on the difference in cost between a good oil and a cheap oil won't pay off if the engine is damaged. The oil filter should be changed with every second oil change.

**2** Before changing the oil, warm up the engine so the oil will drain easily. On 1991 to 1995 TDM models and XTZ models, remove the engine bashplate (see Chapter 8).

**3** Put the motorcycle on its sidestand, and position a clean drain tray below the engine. On 1991 to 1995 TDM models remove the seat, and on XTZ models remove the right-hand side cover (see Chapter 8). Unscrew the oil filler cap from the oil tank to vent it and to act as a reminder that there is no oil in the engine (see *Daily (pre-ride) checks*).

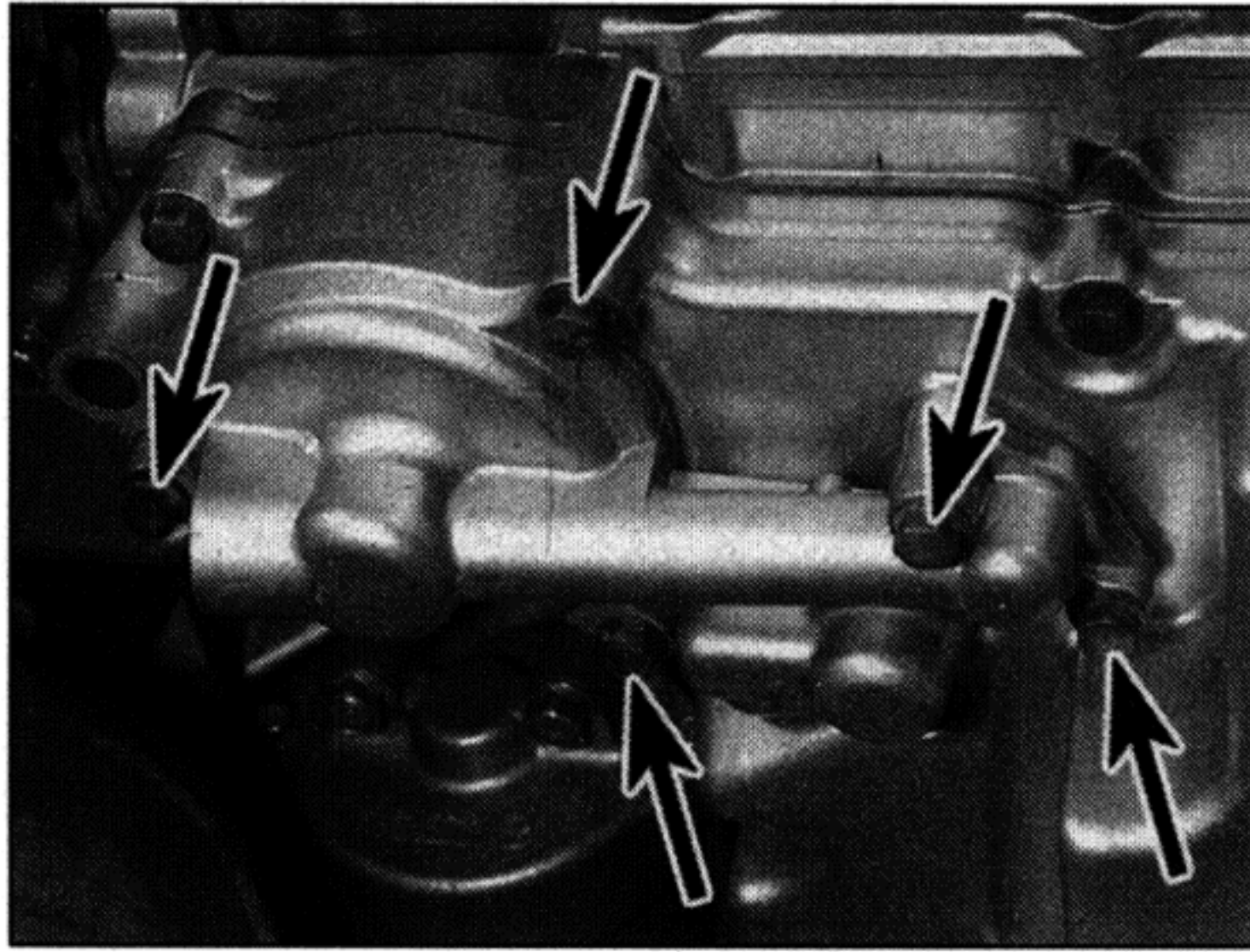
**4** First unscrew the oil drain plug from the crankcase and allow the oil to flow into the drain tray (**see illustrations 7.4a and b**). Next

unscrew the oil drain plug from the oil filter housing and allow the oil to flow into the drain tray (**see illustrations 7.4c and d**). Check the condition of the sealing washers on the drain plugs and discard them if they are in any way damaged or worn. On 1996-on TDM and TRX models, Yamaha specify using new ones as a matter of course.

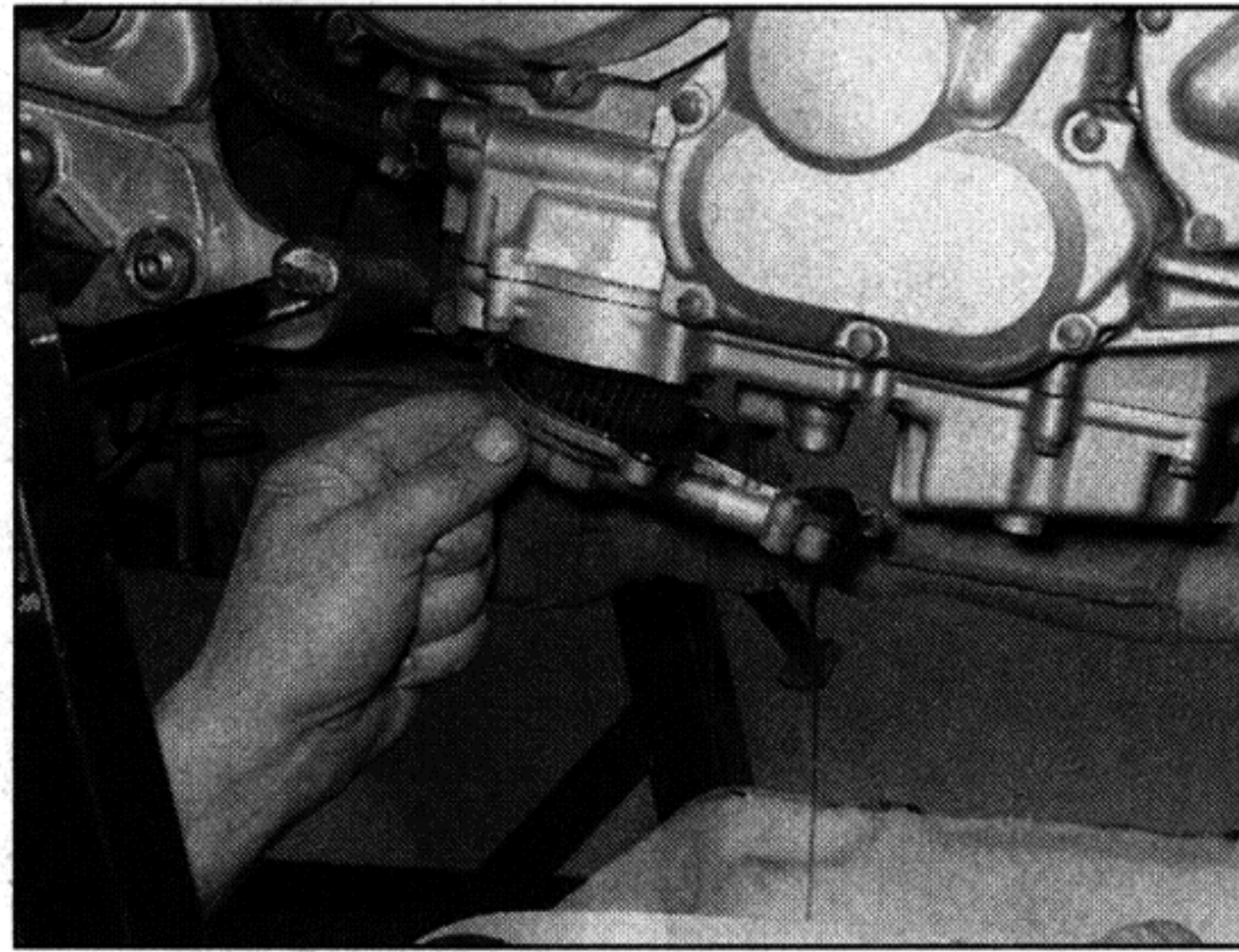
**5** When the oil has completely drained, fit the plugs to the sump and oil filter housing, using new sealing washers if required, and tighten them to the torque settings specified at the beginning of the Chapter. Avoid overtightening, as damage to the crankcase will result.

**6** With the drain tray still under the engine to catch any residue oil, unscrew the bolts securing the oil filter cover to the crankcase and remove the cover along with the filter,

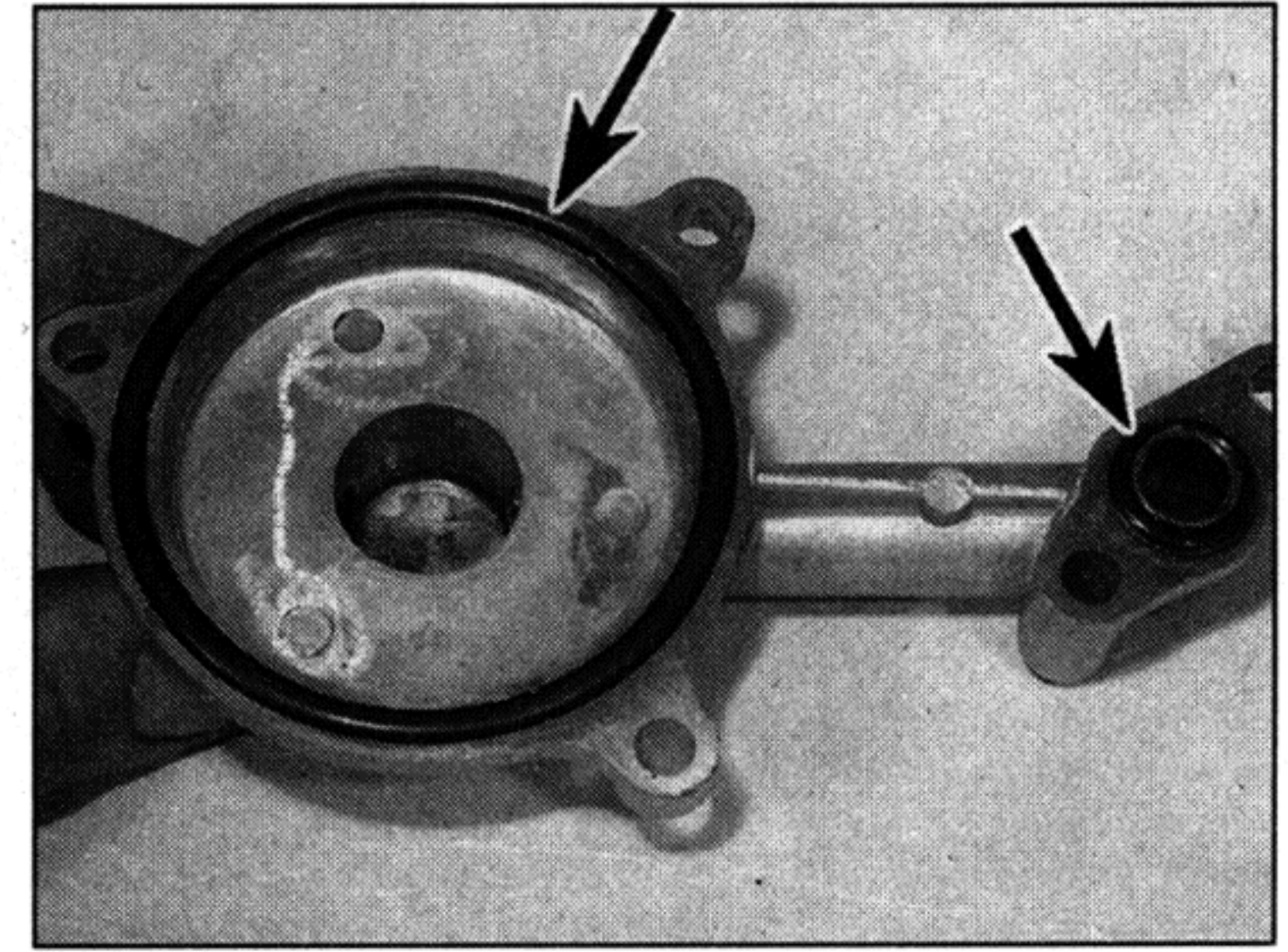




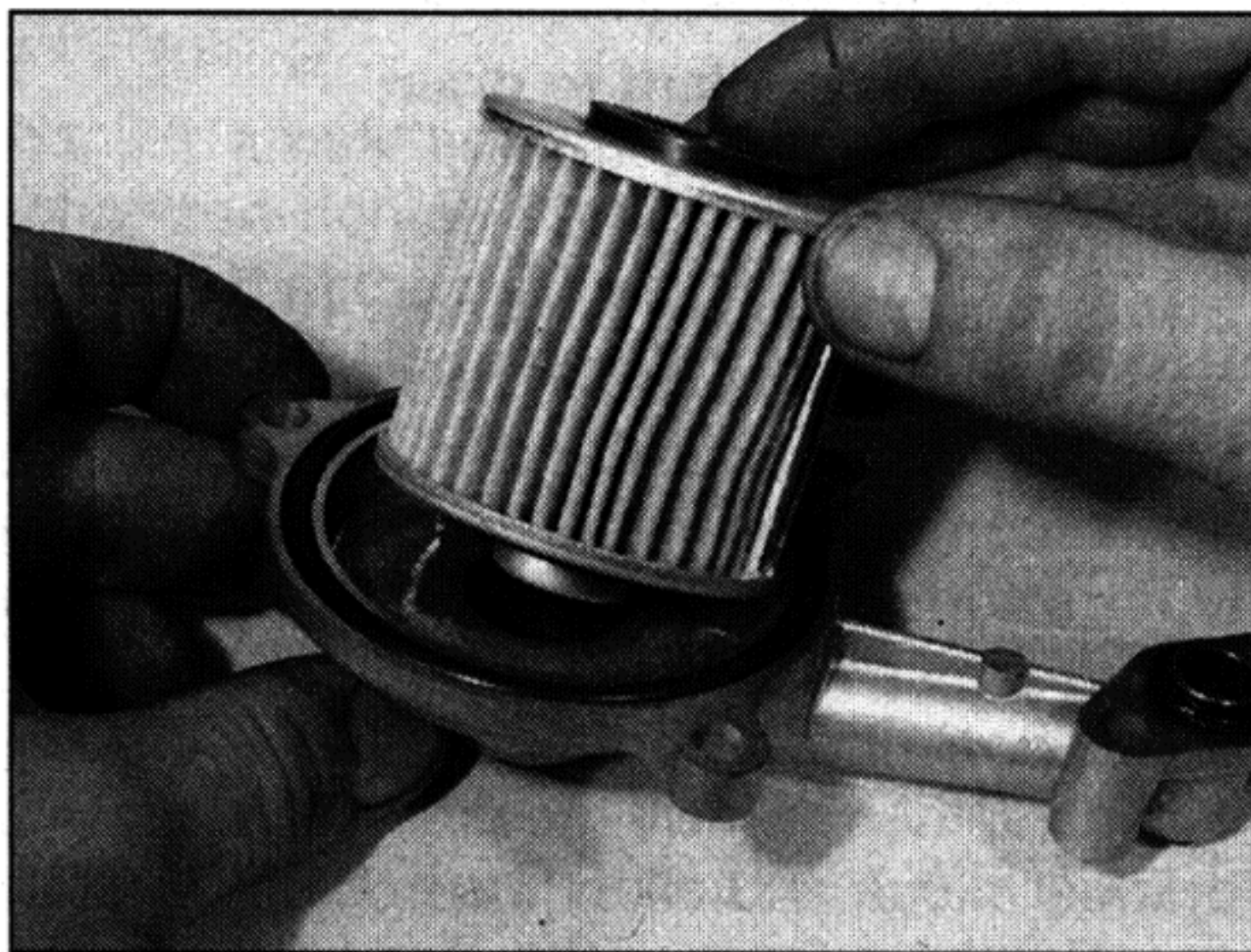
**22.6a** Unscrew the filter cover bolts (arrowed) . . .



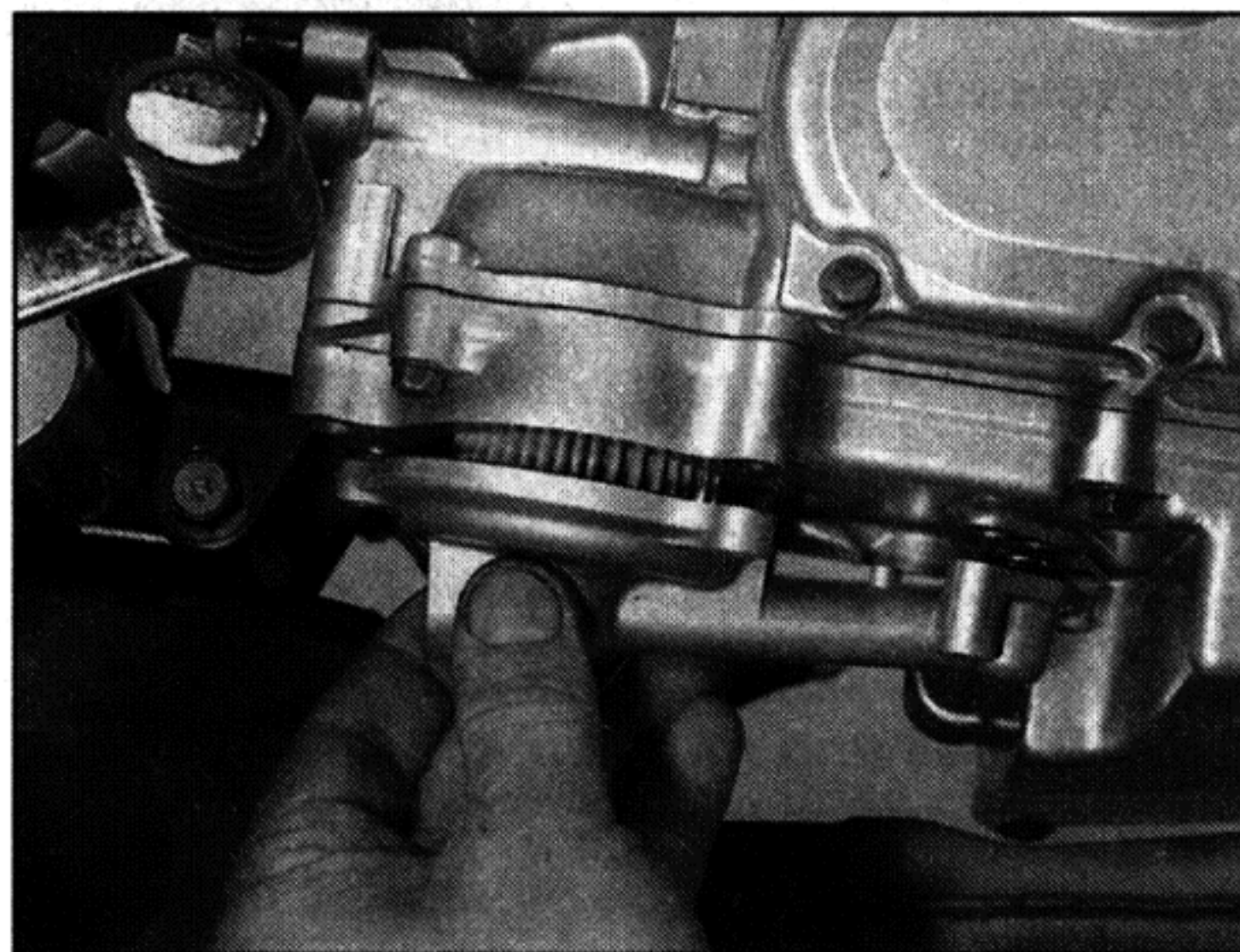
**22.6b** . . . and remove the cover and filter



**22.7a** Fit the new O-rings (arrowed) . . .



**22.7b** . . . then install the filter with the projection fitting into the cover . . .



**22.7c** . . . and fit the cover onto the engine

noting which way up it fits (**see illustrations**). Discard the filter. Discard the O-rings as new ones must be used.

**7** Fit new O-rings into the cover, making sure they fit properly in the groove and around the collar (**see illustrations**). Fit the filter into the cover with the projection on the filter facing into the cover (**see illustration**). Fit the cover onto the sump, then apply a suitable non-permanent thread locking compound to the bolts and tighten them to the torque setting specified at the beginning of the Chapter (**see illustration**).

**8** Refill the oil tank to the proper level using the recommended type and amount of oil (**see Daily (pre-ride) checks and this Chapter's Specifications**). With the motorcycle vertical, the oil level should lie between the maximum and minimum level lines on the dipstick or inspection window (according to model) (**see Daily (pre-ride) checks**). Install the filler cap. Start the engine and let it run for two or three minutes. It is advisable to perform an oil pressure check (**see Section 32**). Stop the engine, wait a few minutes, then check the oil level. If necessary, add more oil to bring the

level up to the maximum level line on the dipstick or window. Check around the drain plugs for leaks.

**9** The old oil drained from the engine cannot be re-used and should be disposed of properly. Check with your local refuse disposal company, disposal facility or environmental agency to see whether they will accept the used oil for recycling. Don't pour used oil into drains or onto the ground – **see Haynes Hint and UK's safe oil disposal contact in Section 7.**

## 23 Fuel filter – renewal (1999 TDM models)



**1** The fuel filter should be renewed periodically. To do so, loosen the hose clamps and slide them down the hoses, away from the filter. Pry the hoses off each end of the filter and connect a new filter in its place (**see illustration 15.12 in Chapter 4**); fuel filters usually have an arrow on their body indicating the direction of fuel flow.

**2** Check that there is no sign of leakage from the fuel pump. Check that the fuel pump hose connections are secure.

# Every 16,000 miles (24,000 km) or two years

Carry out all the items under the 8000 mile (12,000 km) check:

## 24 Swingarm and suspension bearings (TDM and TRX models) – re-greasing



**1** Over a period of time the grease will harden or dirt will penetrate the bearings due to failed dust seals. Unlike the XTZ, these models are not equipped with grease nipples

**2** Remove the swingarm as described in Chapter 6 for greasing of the bearings.

**3** On TRX models, the suspension linkage is

not equipped with grease models. Remove the linkage as described in Chapter 6 for greasing of the bearings.

## 25 Steering head bearings – lubrication



**1** Over a period of time the grease will harden or may be washed out of the bearings by incorrect use of jet washes.

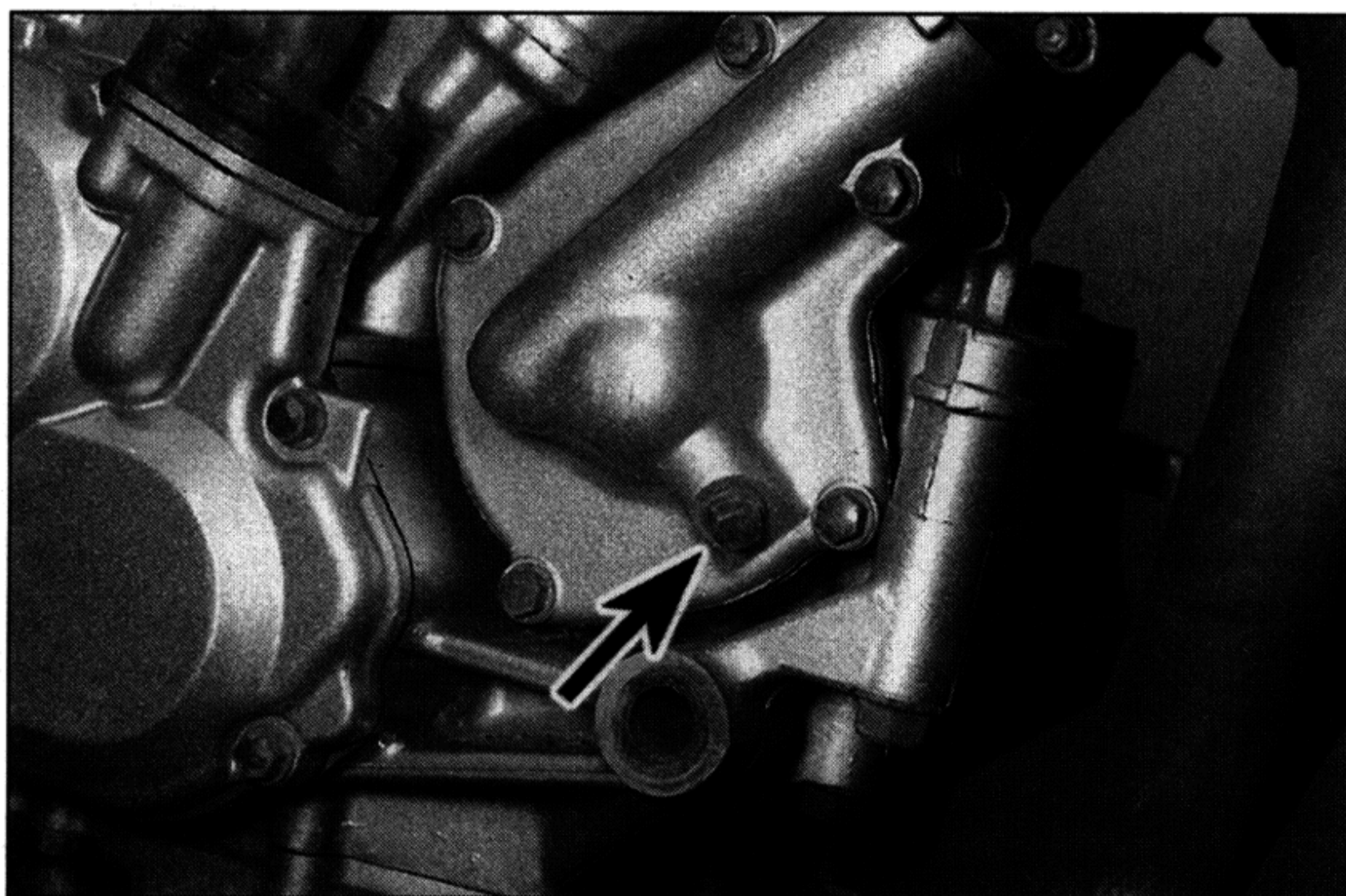
**2** Disassemble the steering head for re-greasing of the bearings. Refer to Chapter 6 for details.

## 26 Brakes – fluid change and seal renewal

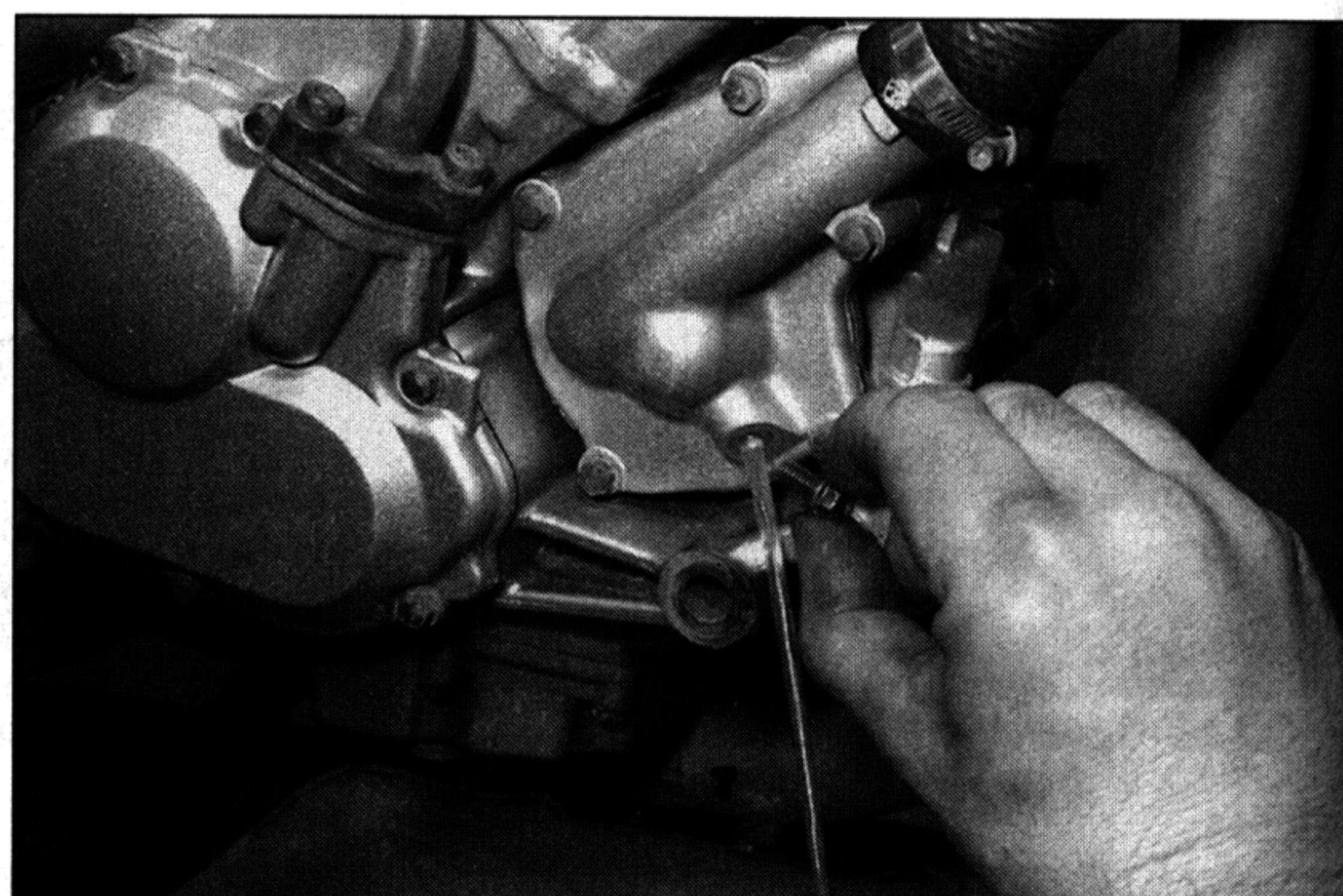


**1** The brake fluid should be changed every two years or whenever a master cylinder or caliper overhaul is carried out. Refer to the





27.2a Unscrew the water pump drain plug (arrowed) . . .



27.2b . . . and allow the coolant to drain

brake bleeding section in Chapter 7, noting that all old fluid must be pumped from the fluid reservoir and hydraulic line before filling with new fluid.



**Old brake fluid is invariably much darker in colour than new fluid, making it easy to see when all old fluid has been expelled from the system.**

2 Brake caliper and master cylinder seals will deteriorate over a period of time and lose their effectiveness, leading to sticking operation or fluid loss, or allowing the ingress of air and dirt. Refer to Chapter 7 and dismantle the components for seal renewal every two years.

## 27 Cooling system – draining, flushing and refilling



**Warning:** Allow the engine to cool completely before performing this maintenance operation. Also, don't allow antifreeze to come into contact with your skin or the

**painted surfaces of the motorcycle. Rinse off spills immediately with plenty of water. Antifreeze is highly toxic if ingested. Never leave antifreeze lying around in an open container or in puddles on the floor; children and pets are attracted by its sweet smell and may drink it. Check with local authorities (councils) about disposing of antifreeze. Many communities have collection centres which will see that antifreeze is disposed of safely. Antifreeze is also combustible, so don't store it near open flames.**

### Draining

1 On all models remove the seat, on TDM models the right-hand fairing side panel, on TRX models the fairing, and on XTZ models the left-hand fairing side panel (see Chapter 8). On 1991 to 1995 TDM models and XTZ models, remove the engine bashplate (see Chapter 8). On TRX models, remove the security bolt holding the radiator cap (see illustration 16.6a). Remove the radiator pressure cap by turning it anti-clockwise until it reaches a stop (see illustrations 16.6b and c). If you hear a hissing sound (indicating there is still pressure in the system), wait until it stops. Now press down on the cap and continue turning the cap until it can be removed.

2 Position a suitable container beneath the water pump. Remove the coolant drain plug from the water pump and allow the coolant to drain completely from the system (see illustrations). Retain the old sealing washer for use during flushing.

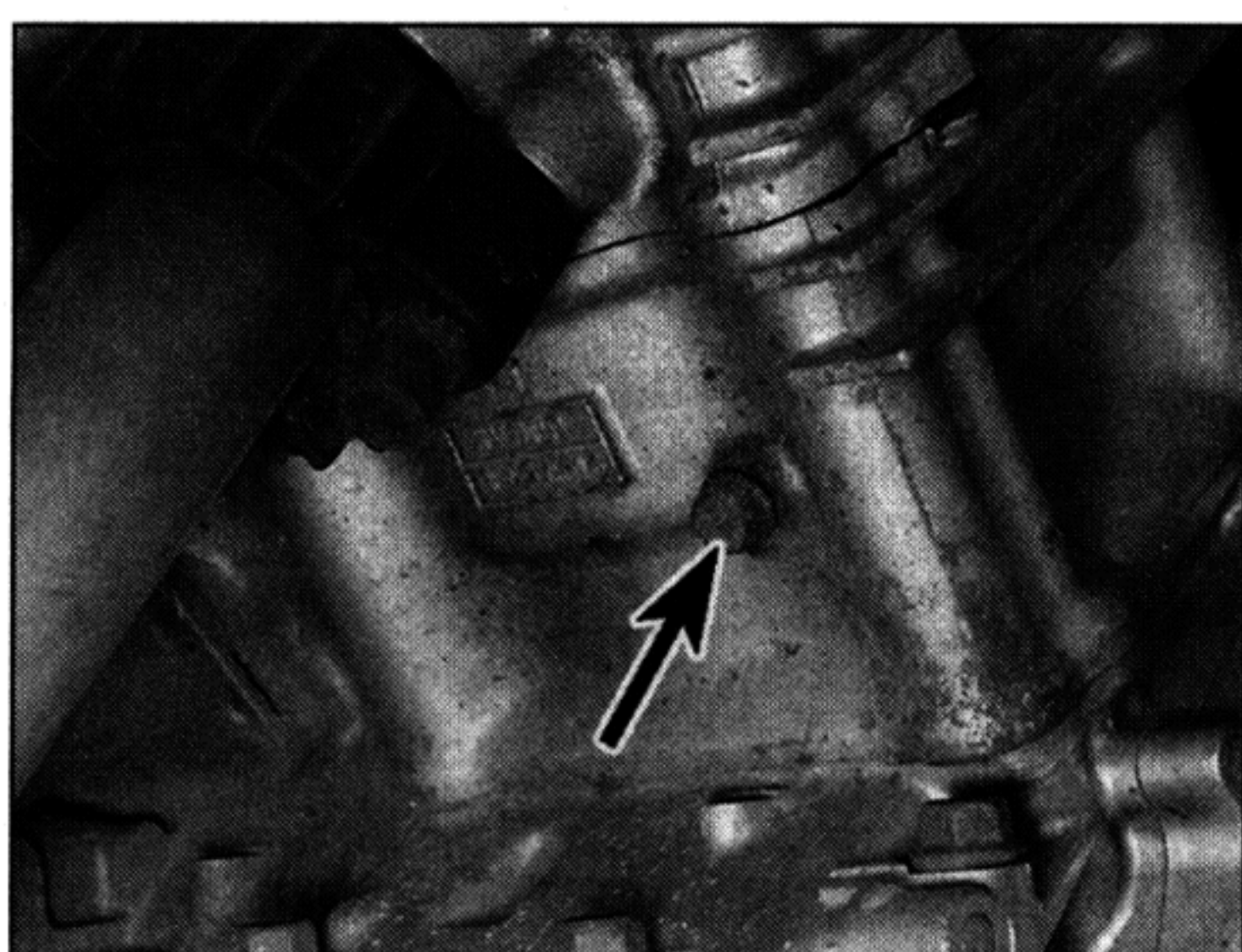
3 Position the container beneath the cylinders, then remove the drain plug from the cylinder block and allow the coolant to drain completely from the engine (see illustrations). Retain the old sealing washer for use during flushing.

4 Position the container beneath the coolant reservoir and remove the filler cap. Release the clamp and detach the hose from the bottom of the reservoir and allow the coolant to completely drain (see illustration). Fit the hose back onto the reservoir and secure it with the clamp.

### Flushing

5 Flush the system with clean tap water by inserting a garden hose in the radiator filler neck. Allow the water to run through the system until it is clear and flows cleanly out of the drain holes. If the radiator is extremely corroded, remove it (see Chapter 3) and have it cleaned professionally.

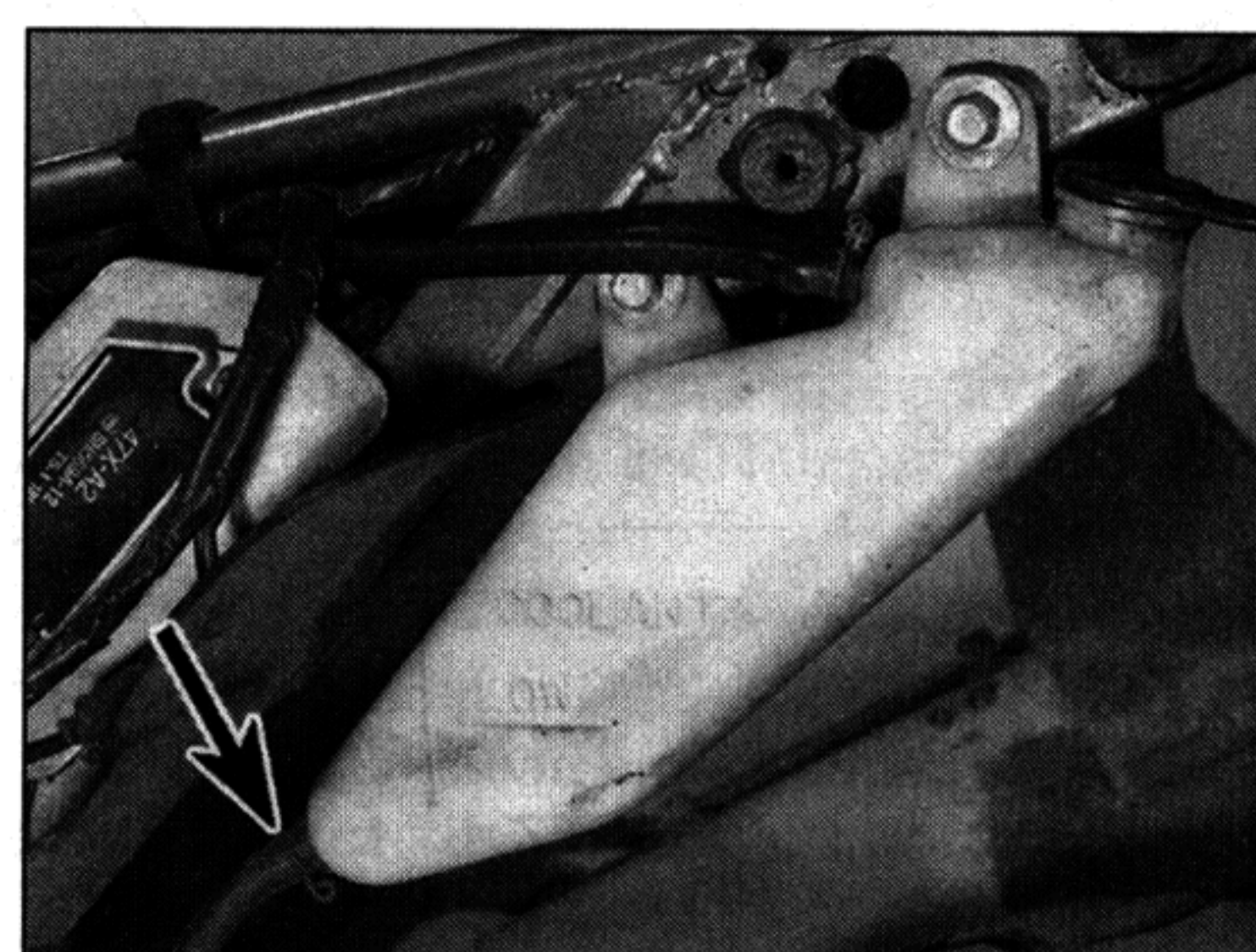
6 Clean the drain holes then install the drain plugs using the old sealing washers.



27.3a Unscrew the cylinder drain plug (arrowed) . . .



27.3b . . . and allow the coolant to drain



27.4 Release the clamp and detach the hose (arrowed) – XTZ shown



7 Fill the cooling system with clean water mixed with a flushing compound. Make sure the flushing compound is compatible with aluminium components, and follow the manufacturer's instructions carefully.

8 Start the engine and allow it to reach normal operating temperature. Let it run for about ten minutes.

9 Stop the engine. Let it cool for a while, then cover the pressure cap with a heavy rag and turn it anti-clockwise to the first stop, releasing any pressure that may be present in the system. Once the hissing stops, push down on the cap and remove it completely.

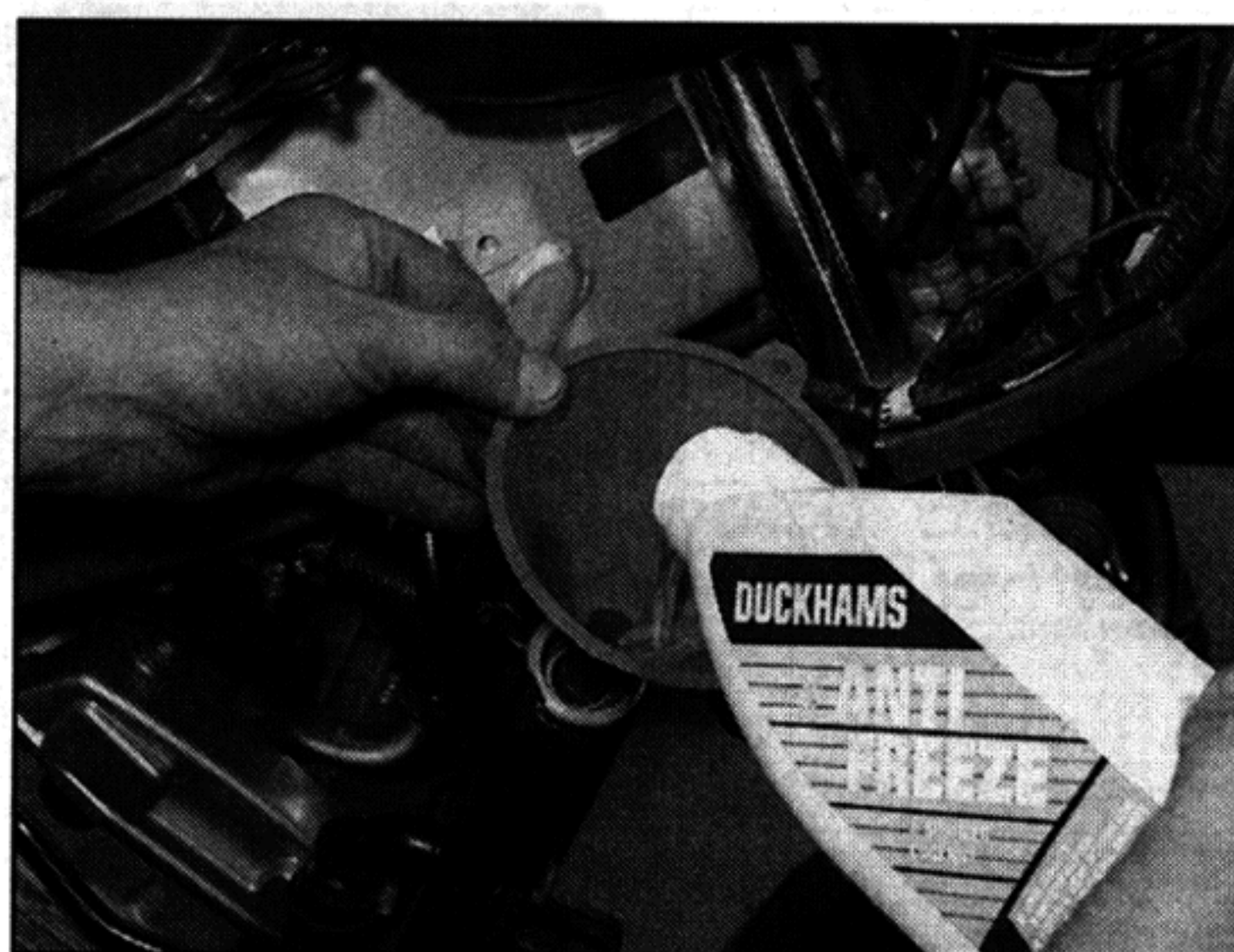
10 Drain the system once again.

11 Fill the system with clean water and repeat the procedure in Steps 7 to 9.

## Refilling

12 Fit a new sealing washer to each drain plug and tighten them to the torque setting specified at the beginning of the Chapter.

13 Fill the system with the proper coolant mixture (see this Chapter's Specifications) (see illustration). **Note:** Pour the coolant in slowly to minimise the amount of air entering the system. When the radiator appears full, pull the bike upright off its stand and shake it slightly to dissipate the coolant, then place the bike back on the stand and top the radiator up.

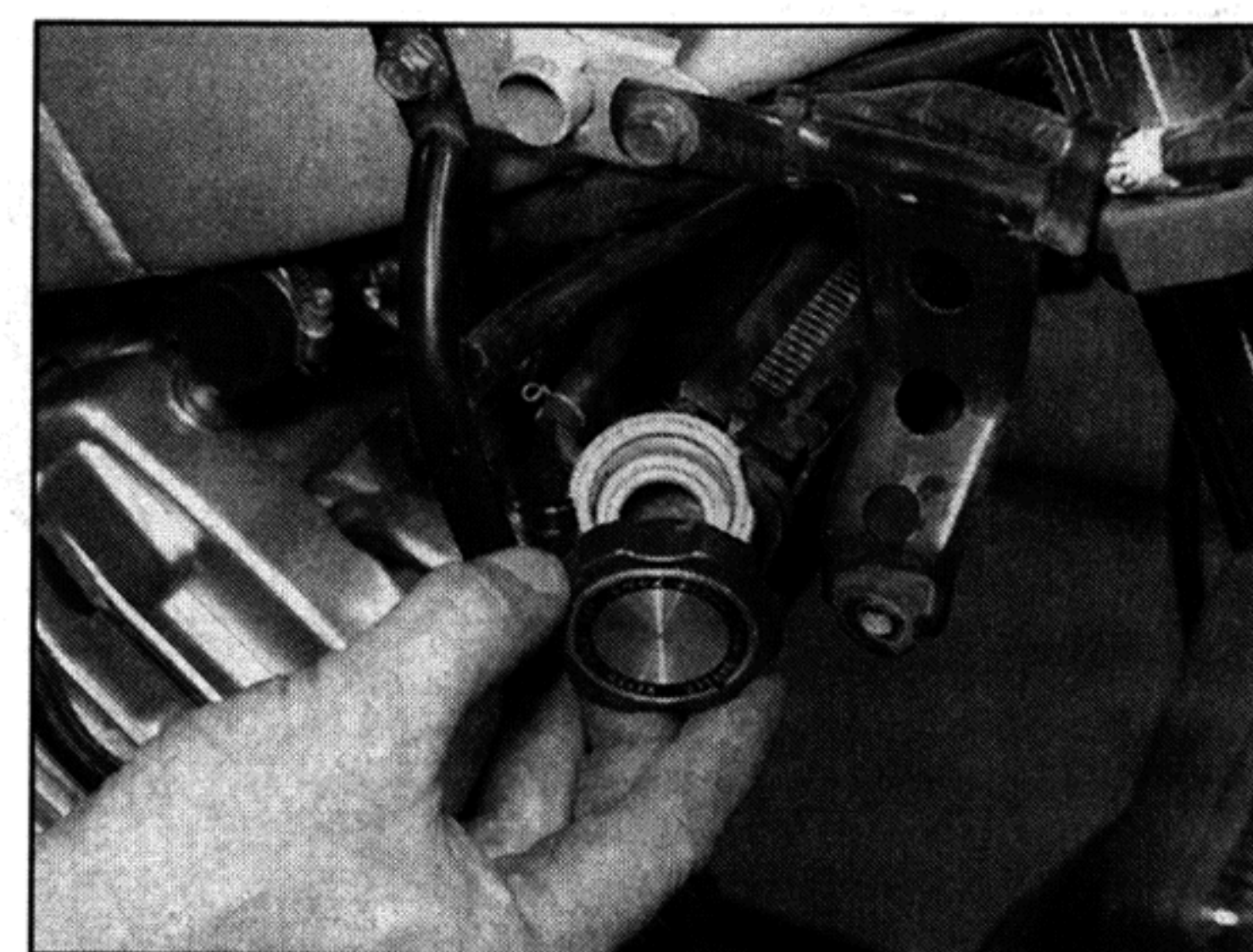


27.13 Use only the specified coolant mixture to fill the system . . .

14 When the system is full (all the way up to the top of the radiator filler neck), install the pressure cap (see illustration). Now fill the coolant reservoir to the UPPER level mark (see Daily (pre-ride) checks).

15 Start the engine and allow it to idle for 2 to 3 minutes. Flick the throttle twistgrip part open 3 or 4 times, so that the engine speed rises to approximately 4000 – 5000 rpm, then stop the engine. Any air trapped in the system should have bled back to the radiator filler neck.

16 Let the engine cool then remove the pressure cap as described in Step 1. Check that the coolant level is still up to the radiator



27.14 . . . then fit the pressure cap

filler neck. If it's low, add the specified mixture until it reaches the top of the filler neck. Refit the cap, then on TRX models fit the security bolt.

17 Check the coolant level in the reservoir and top up if necessary.

18 Check the system for leaks.

19 Do not dispose of the old coolant by pouring it down the drain. Instead pour it into a heavy plastic container, cap it tightly and take it into an authorised disposal site or garage – see **Warning** at the beginning of this Section.

20 Install the seat and body panels as required (see Chapter 8).

## Every 28,000 miles (42,000 km)

Carry out all the items under the 4000 mile (6000 km) check, plus the following

### 28 Valve clearances – check and adjustment



1 The engine must be completely cool for this maintenance procedure, so let the machine sit overnight before beginning.

2 Remove the fuel tank and the air filter housing (see Chapter 4), the radiator (see Chapter 3), the spark plugs (see Section 2), and the valve cover (see Chapter 2). Each

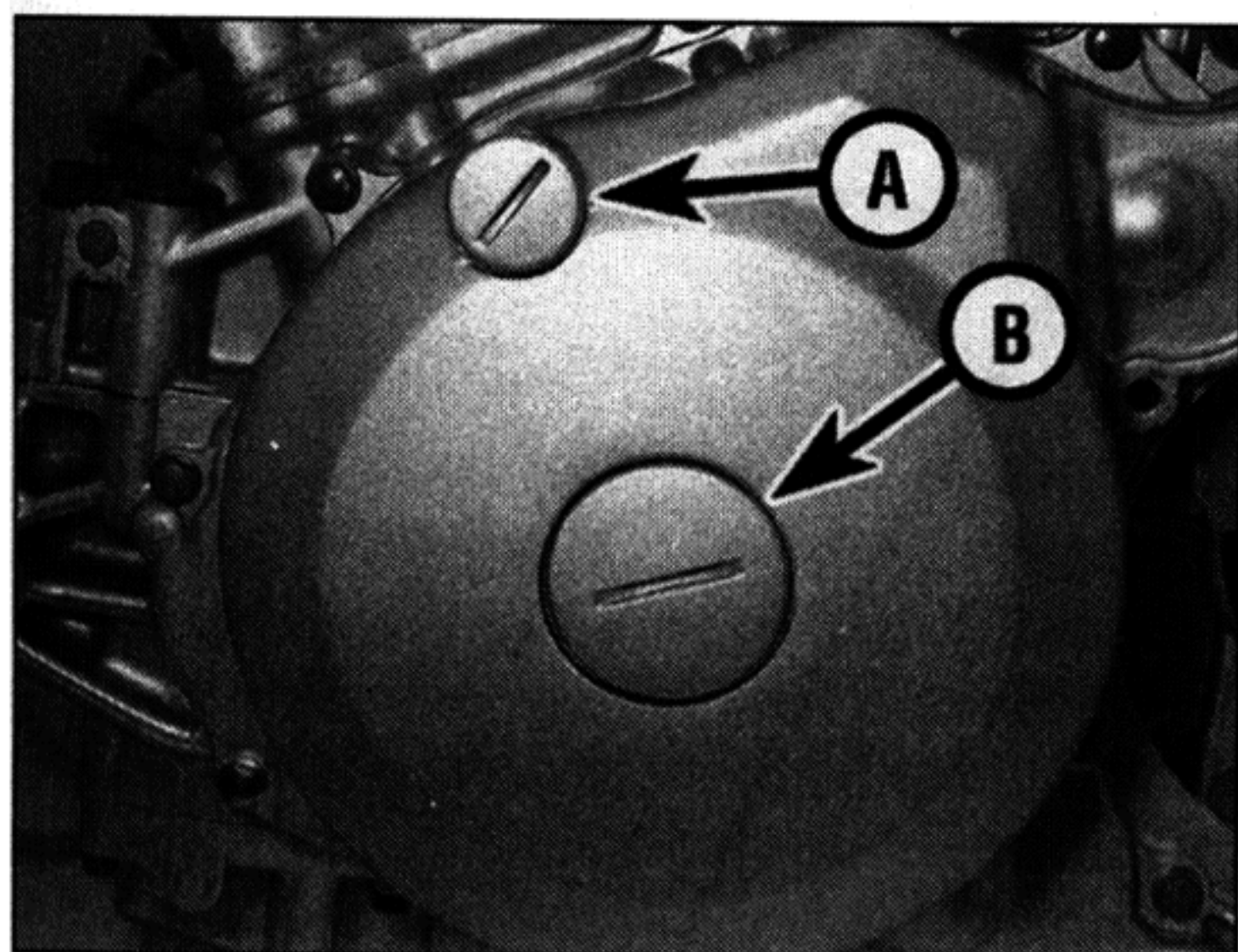
cylinder is referred to by a number: no. 1 cylinder is the left cylinder and no. 2 cylinder is the right.

3 Make a chart or sketch of all valve positions so that a note of each clearance can be made against the relevant valve. There are two exhaust valves and three inlet valves per cylinder.

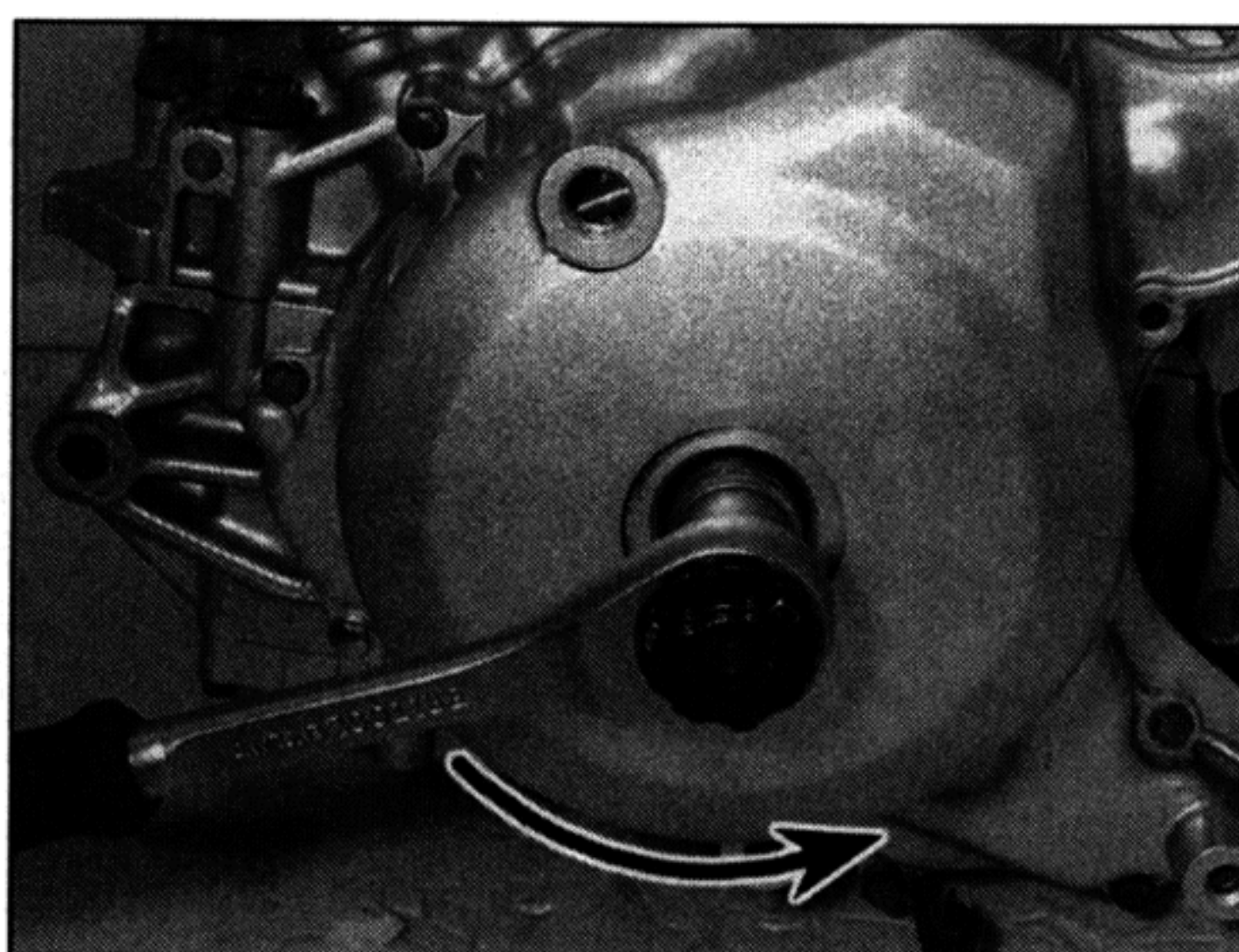
4 Unscrew the timing inspection plug and the centre plug from the alternator cover on the left-hand side of the engine (see illustration). Discard the plug O-rings as new ones should

be used. The engine can be turned using a 19 mm socket on the alternator rotor bolt and turning it in an anti-clockwise direction only (see illustration). Alternatively, place the motorcycle on an auxiliary stand so that the rear wheel is off the ground, select a high gear and rotate the rear wheel by hand in its normal direction of rotation.

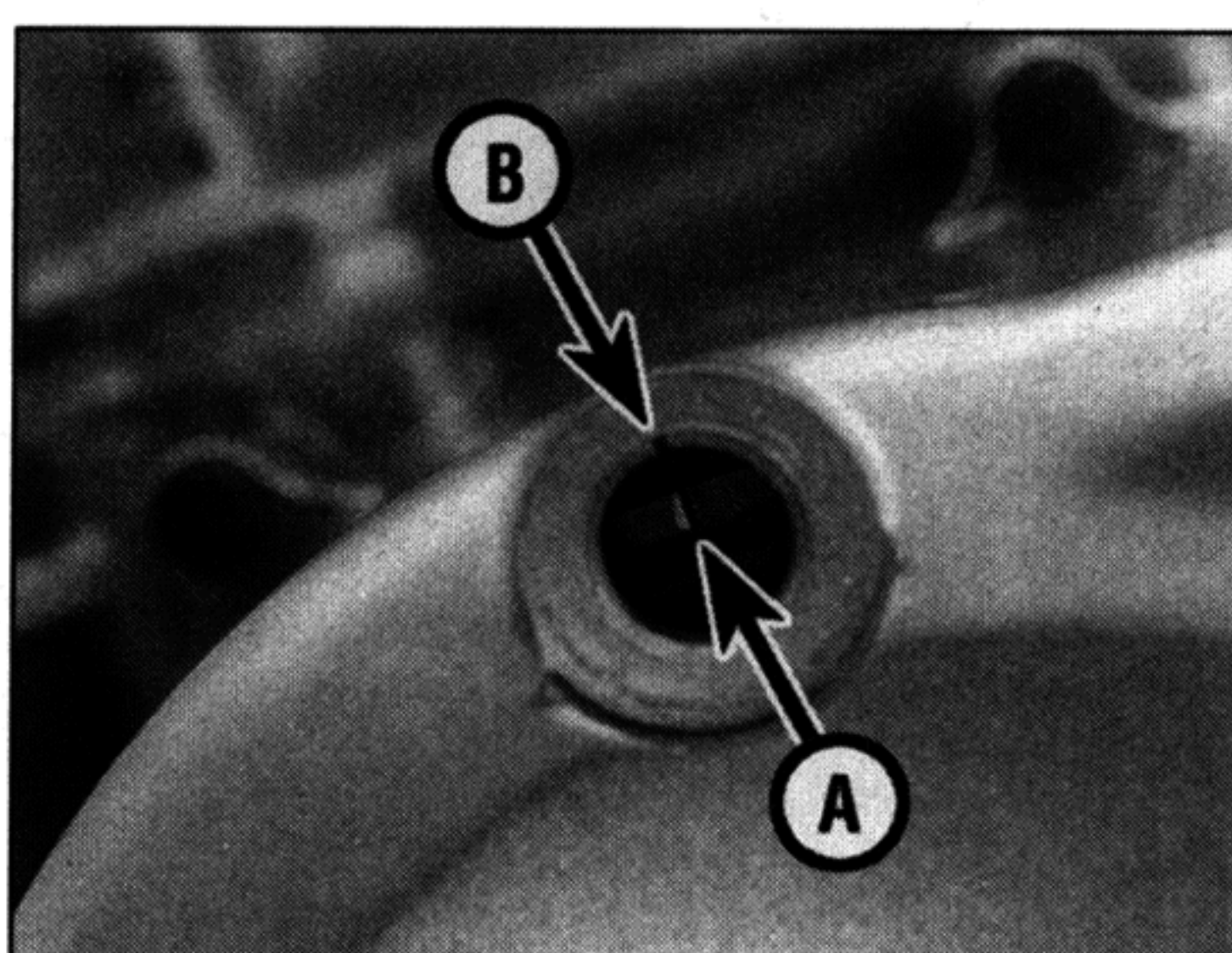
5 Turn the engine until the 'I' mark on the rotor aligns with the static timing mark on the alternator cover (a notch in the timing inspection hole) (see illustration), and the



28.4a Unscrew the timing inspection plug (A) and the centre plug (B)

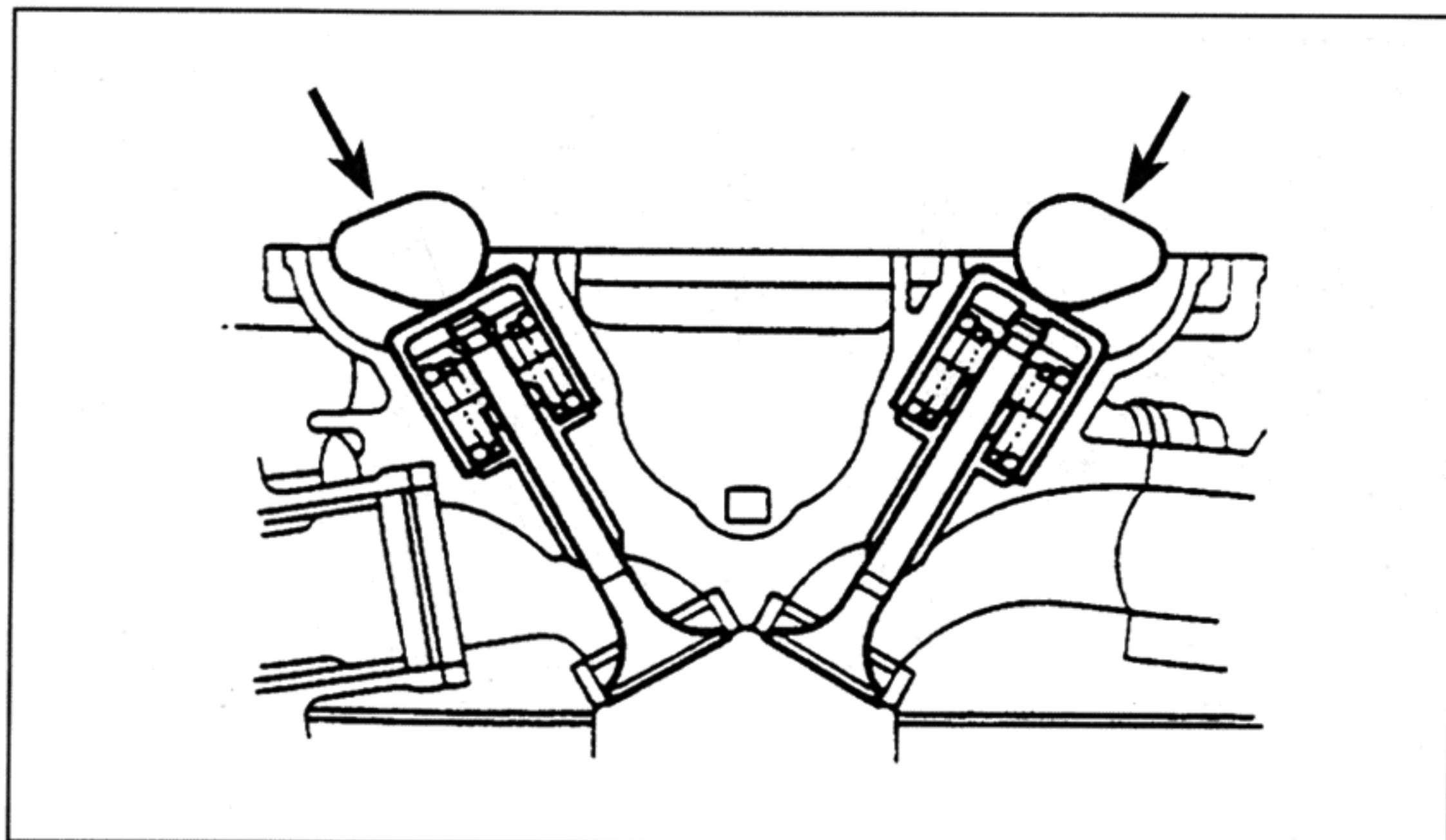


28.4b Turn the engine using a socket on the alternator bolt



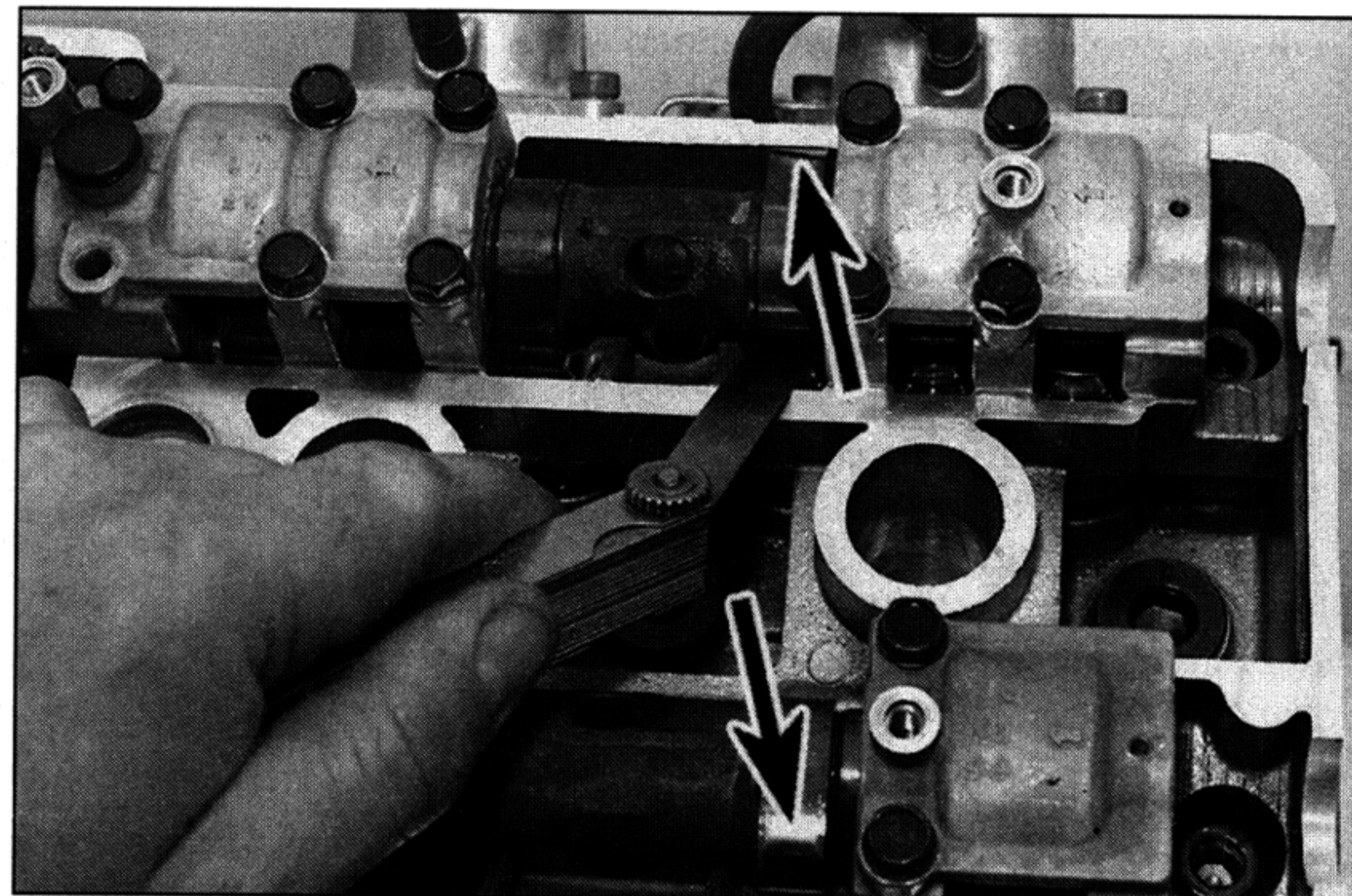
28.5a Turn the engine until the mark on the rotor (A) aligns with the static mark on the cover (B)





**28.5b Note the position of the cam lobes (arrowed)**

With the cylinder at TDC on the compression stroke the lobes should not be depressing the valves and should be facing away from each other



**28.6 Make sure the cam lobes (arrowed) face away from each other, then check the valve clearances as shown**

camshaft lobes for the No. 1 (left-hand) cylinder are facing away from each other (**see illustration**). **Note:** Do not confuse the 'I' mark on the rotor (which indicates TDC) with the 'H' mark which will appear first and which indicates the firing point of the ignition system. If the cam lobes are facing towards each other, rotate the engine anti-clockwise 360° (one full turn) so that the 'I' mark again aligns with the static timing mark. The camshaft lobes will now be facing away from each other and the No. 1 cylinder is at TDC (top dead centre) on the compression stroke.

**6** With No. 1 cylinder at TDC on the compression stroke, check the clearances on

the No. 1 cylinder inlet and exhaust valves. Insert a feeler gauge of the same thickness as the correct valve clearance (**see Specifications**) between the camshaft lobe and follower of each valve and check that it is a firm sliding fit – you should feel a slight drag when the you pull the gauge out (**see illustration**). If not, use the feeler gauges to obtain the exact clearance. Record the measured clearance on the chart.

**7** On 1991 to 1995 TDM models and XTZ models, now turn the engine anti-clockwise 360° (one full turn) so that the I mark on the timing plate again once again aligns with the static timing mark on the crankcase cover, and the camshaft lobes for the No. 2 (right-hand) cylinder are facing away from each other. On 1996-on TDM models and TRX models, turn the engine anti-clockwise 270° (3/4 turn) so that the camshaft lobes for the No. 2 (right-hand) cylinder are facing away from each other. The No. 2 cylinder is now at TDC on the compression stroke. Measure the clearances of the No. 2 cylinder valves using the method described in Step 6.

**8** When all clearances have been measured and charted, identify whether the clearance on any valve falls outside that specified. If it does, the shim between the cam follower and the valve must be swapped with one of a

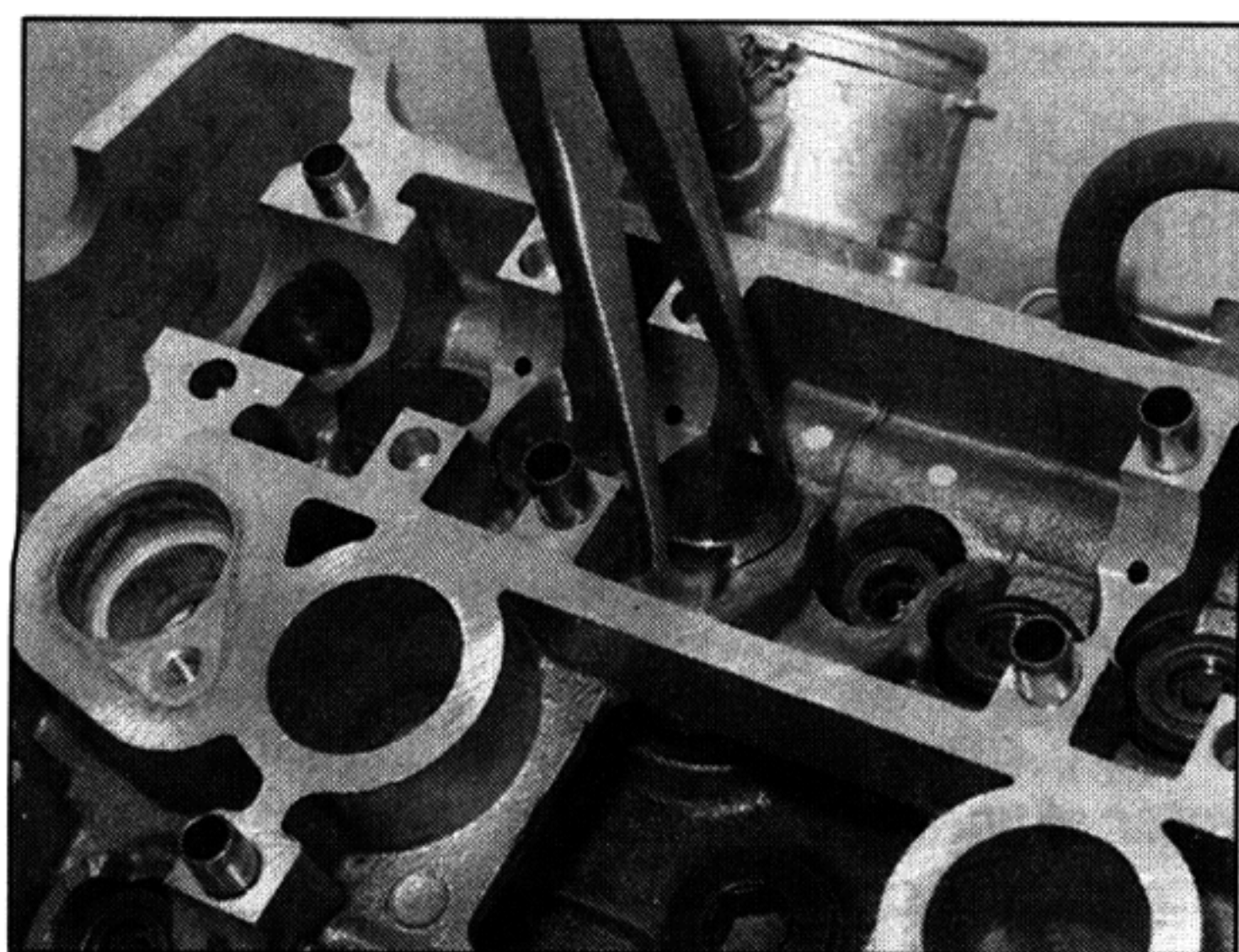
thickness which will restore the correct clearance.

**9** Shim replacement requires removal of the camshafts (**see Chapter 2**). There is no need to remove both camshafts if shims from only one side of the engine need replacing. Place rags over the spark plug holes and the cam chain tunnel to prevent a shim from dropping into the engine on removal.

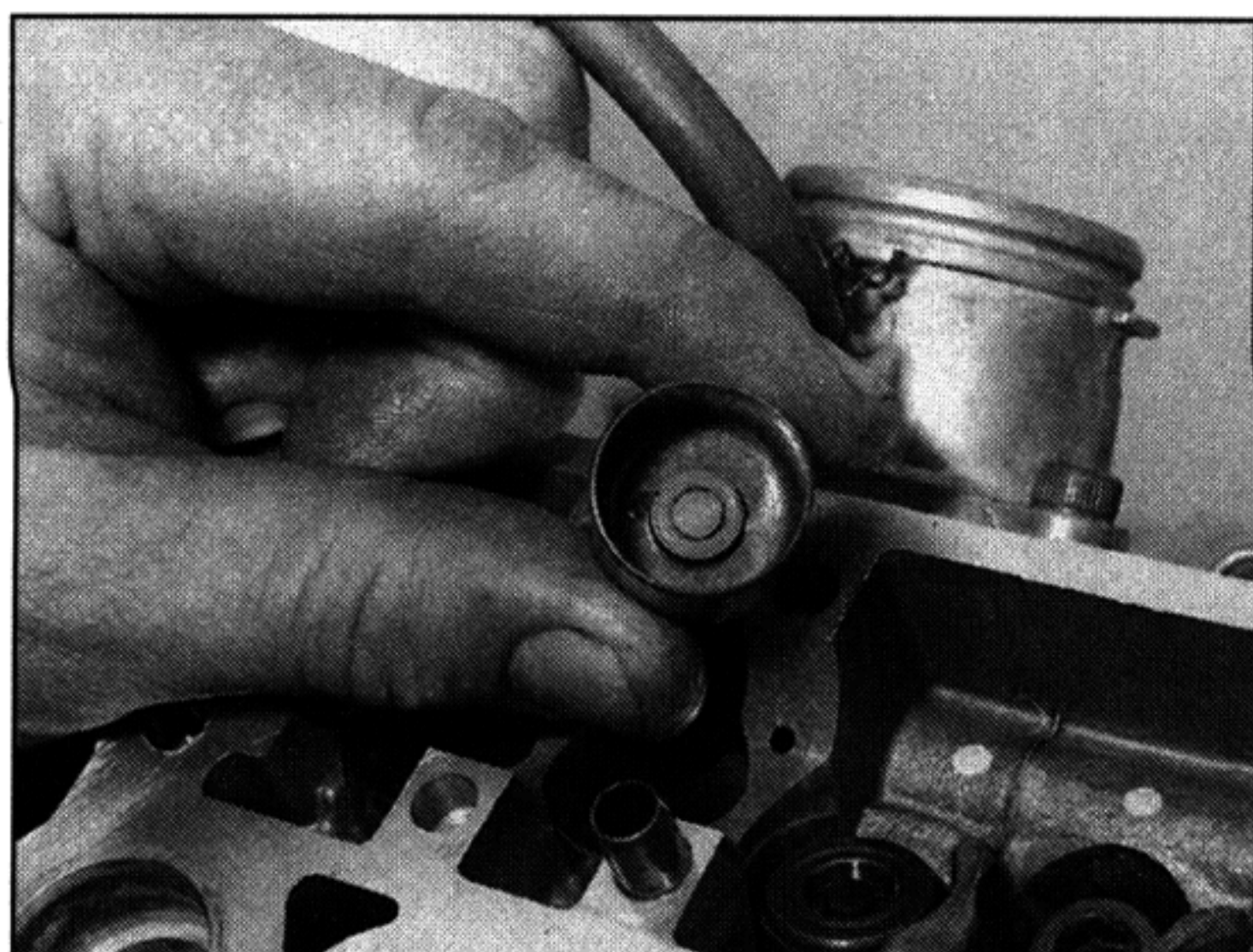
**10** With the camshaft removed, remove the cam follower of the valve in question, then either retrieve the shim from the inside of the follower or pick it out of the top of the valve using either a magnet, a small screwdriver with a dab of grease on it (the shim will stick to the grease), or a screwdriver and a pair of pliers (**see illustrations**). Do not allow the shim to fall into the engine.

**11** A size mark should be stamped on the upper face of the shim – a shim marked 175 is 1.75 mm thick. If the mark is not visible the shim thickness will have to be measured. It is recommended that the shim is measured anyway to check that it has not worn (**see illustration**).

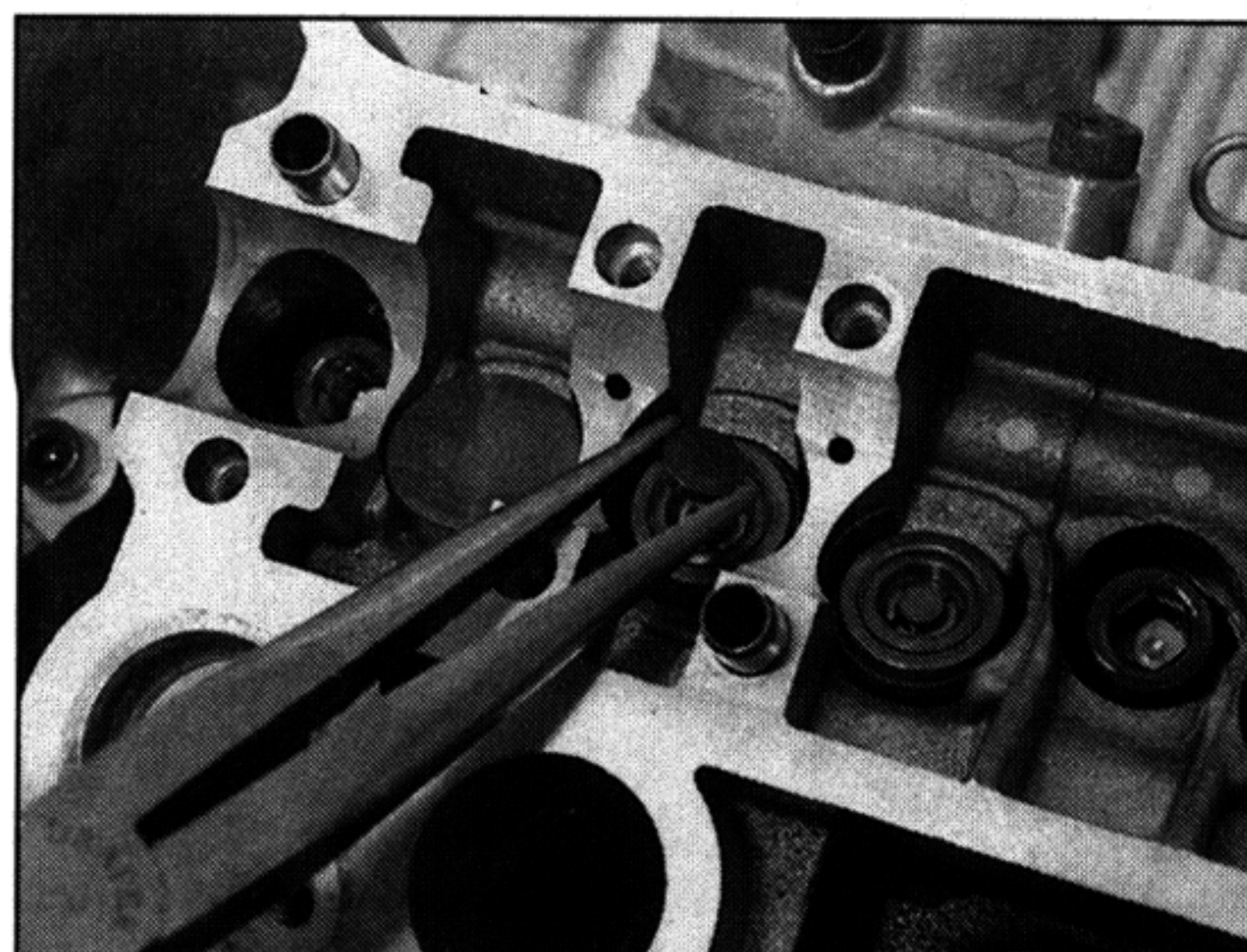
**12** Using the appropriate shim selection chart (either inlet or exhaust), find where the measured valve clearance and existing shim thickness values intersect and read off the shim size required (**see illustrations**). **Note:** If



**28.10a Lift out the follower ...**



**28.10b ... and remove the shim either from inside the follower ...**



**28.10c ... or from the top of the valve**



**28.11 Measure the shim using a micrometer**



MEASURED CLEARANCE	INSTALLED SHIM SIZE																								
	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240
0.00 ~ 0.04				120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225
0.05 ~ 0.09			120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230
0.10 ~ 0.14		120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235
0.15 ~ 0.20	RECOMMENDED CLEARANCE																								
0.21 ~ 0.25	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240	
0.26 ~ 0.30	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240		
0.31 ~ 0.35	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240			
0.36 ~ 0.40	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240				
0.41 ~ 0.45	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240					
0.46 ~ 0.50	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240						
0.51 ~ 0.55	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240							
0.56 ~ 0.60	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240								
0.61 ~ 0.65	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240									
0.66 ~ 0.70	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240										
0.71 ~ 0.75	175	180	185	190	195	200	205	210	215	220	225	230	235	240											
0.76 ~ 0.80	180	185	190	195	200	205	210	215	220	225	230	235	240												
0.81 ~ 0.85	185	190	195	200	205	210	215	220	225	230	235	240													
0.86 ~ 0.90	190	195	200	205	210	215	220	225	230	235	240														
0.91 ~ 0.95	195	200	205	210	215	220	225	230	235	240															
0.96 ~ 1.00	200	205	210	215	220	225	230	235	240																
1.01 ~ 1.05	205	210	215	220	225	230	235	240																	
1.06 ~ 1.10	210	215	220	225	230	235	240																		
1.11 ~ 1.15	215	220	225	230	235	240																			
1.16 ~ 1.20	220	225	230	235	240																				
1.21 ~ 1.25	225	230	235	240																					
1.26 ~ 1.30	230	235	240																						
1.31 ~ 1.35	235	240																							
1.36 ~ 1.40	240																								

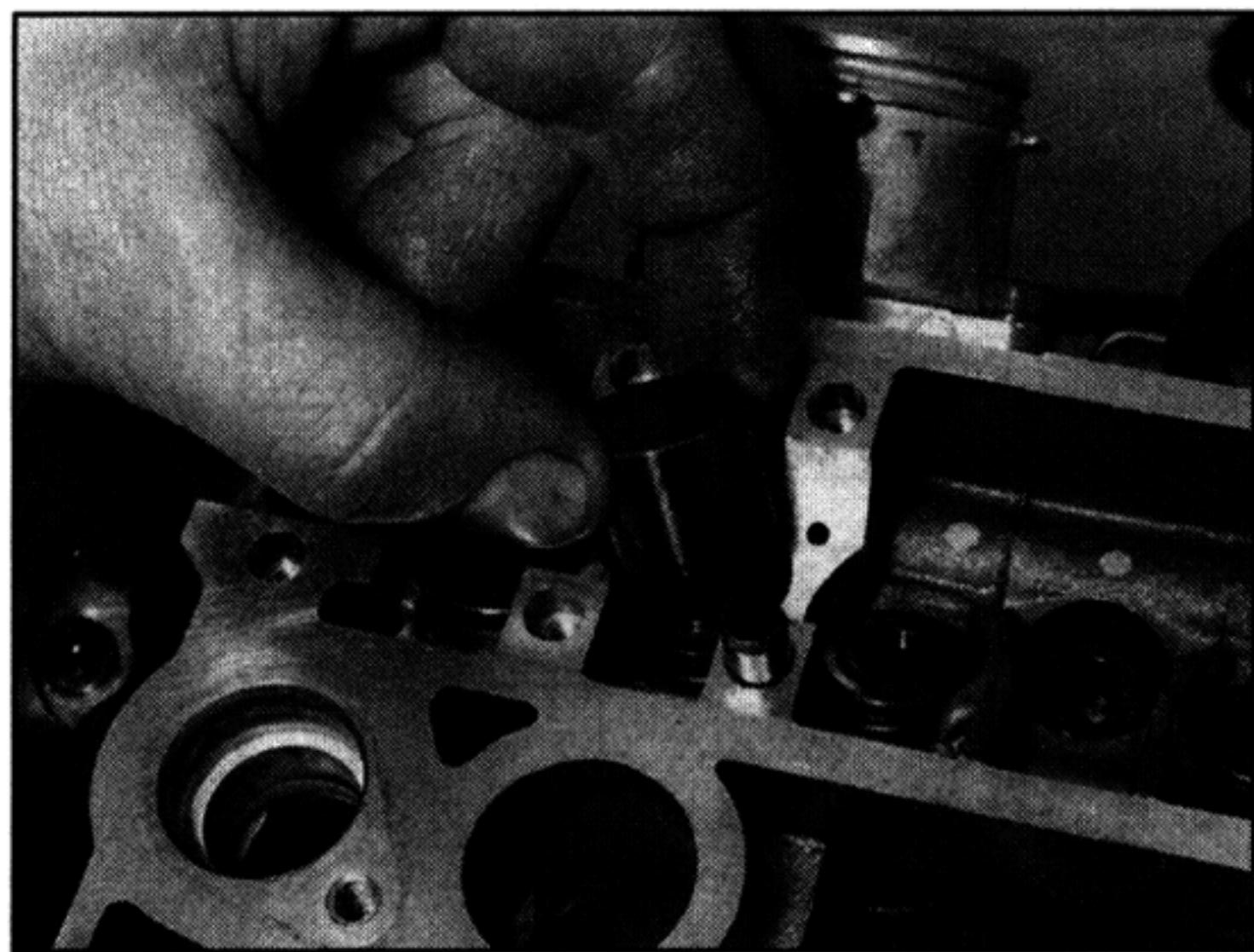
28.12a Shim selection chart – inlet valves

B MEASURED CLEARANCE	INSTALLED SHIM SIZE																								
	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240
0.00 ~ 0.04						120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215
0.05 ~ 0.09					120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220
0.10 ~ 0.14				120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225
0.15 ~ 0.19			120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230
0.20 ~ 0.24		120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235
0.25 ~ 0.30	RECOMMENDED CLEARANCE																								
0.31 ~ 0.35	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240	
0.36 ~ 0.40	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240		
0.41 ~ 0.45	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240			
0.46 ~ 0.50	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240				
0.51 ~ 0.55	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240					
0.56 ~ 0.60	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240						
0.61 ~ 0.65	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240							
0.66 ~ 0.70	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240								
0.71 ~ 0.75	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240									
0.76 ~ 0.80	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240										
0.81 ~ 0.85	175	180	185	190	195	200	205	210	215	220	225	230	235	240											
0.86 ~ 0.90	180	185	190	195	200	205	210	215	220	225	230	235	240												
0.91 ~ 0.95	185	190	195	200	205	210	215	220	225	230	235	240													
0.96 ~ 1.00	190	195	200	205	210	215	220	225	230	235	240														
1.01 ~ 1.05	195	200	205	210	215	220	225	230	235	240															
1.06 ~ 1.10	200	205	210	215	220	225	230	235	240																
1.11 ~ 1.15	205	210	215	220	225	230	235	240																	
1.16 ~ 1.20	210	215	220	225	230	235	240																		
1.21 ~ 1.25	215	220	225	230	235	240																			
1.26 ~ 1.30	220	225	230	235	240																				
1.31 ~ 1.35	225	230	235	240																					
1.36 ~ 1.40	230	235	240																						
1.41 ~ 1.45	235	240																							
1.46 ~ 1.50	240																								

28.12b Shim selection chart – exhaust valves



## 1•28 Every 28,000 miles (42,000 km)



28.13 Fit the follower onto the valve

the existing shim is marked with a number not ending in 0 or 5, round it up or down as appropriate to the nearest number ending in 0 or 5 so that the chart can be used. Shims are available in 0.05 mm increments from 1.20 mm to 2.40 mm. **Note:** If the required



28.15 Use new O-rings on the plugs

replacement shim is greater than 2.40 mm (the largest available), the valve is probably not seating correctly due to a build-up of carbon deposits and should be checked and cleaned or resurfaced as required (see Chapter 2).

13 Obtain the replacement shim, then lubricate it with molybdenum disulphide oil (a 50/50 mixture of molybdenum disulphide grease and engine oil) and fit it into its recess in the top of the valve, with the size marking on each shim facing up (see illustration 28.10c). Check that the shim is correctly seated, then lubricate the follower with molybdenum disulphide oil and install it onto the valve (see illustration). Repeat the process for any other valves until the clearances are correct, then install the camshafts (see Chapter 2).

14 Rotate the crankshaft several turns to seat the new shim(s), then check the clearances again.

15 Install all disturbed components in a reverse of the removal sequence. Use new O-rings on the timing inspection plug and centre plug and tighten the plugs securely (see illustration).

## Every four years

### 29 Brake hoses – renewal



1 The hoses will in time deteriorate with age and should be renewed every four years regardless of their apparent condition.

2 Refer to Chapter 7 and disconnect the brake hoses from the master cylinders and calipers. Always renew the banjo union sealing washers.

## Non-scheduled maintenance

### 30 Headlight aim – check and adjustment



**Note:** An improperly adjusted headlight may cause problems for oncoming traffic or provide poor, unsafe illumination of the road ahead. Before adjusting the headlight aim, be sure to consult with local traffic laws and regulations – for UK models refer to MOT Test Checks in the Reference section.

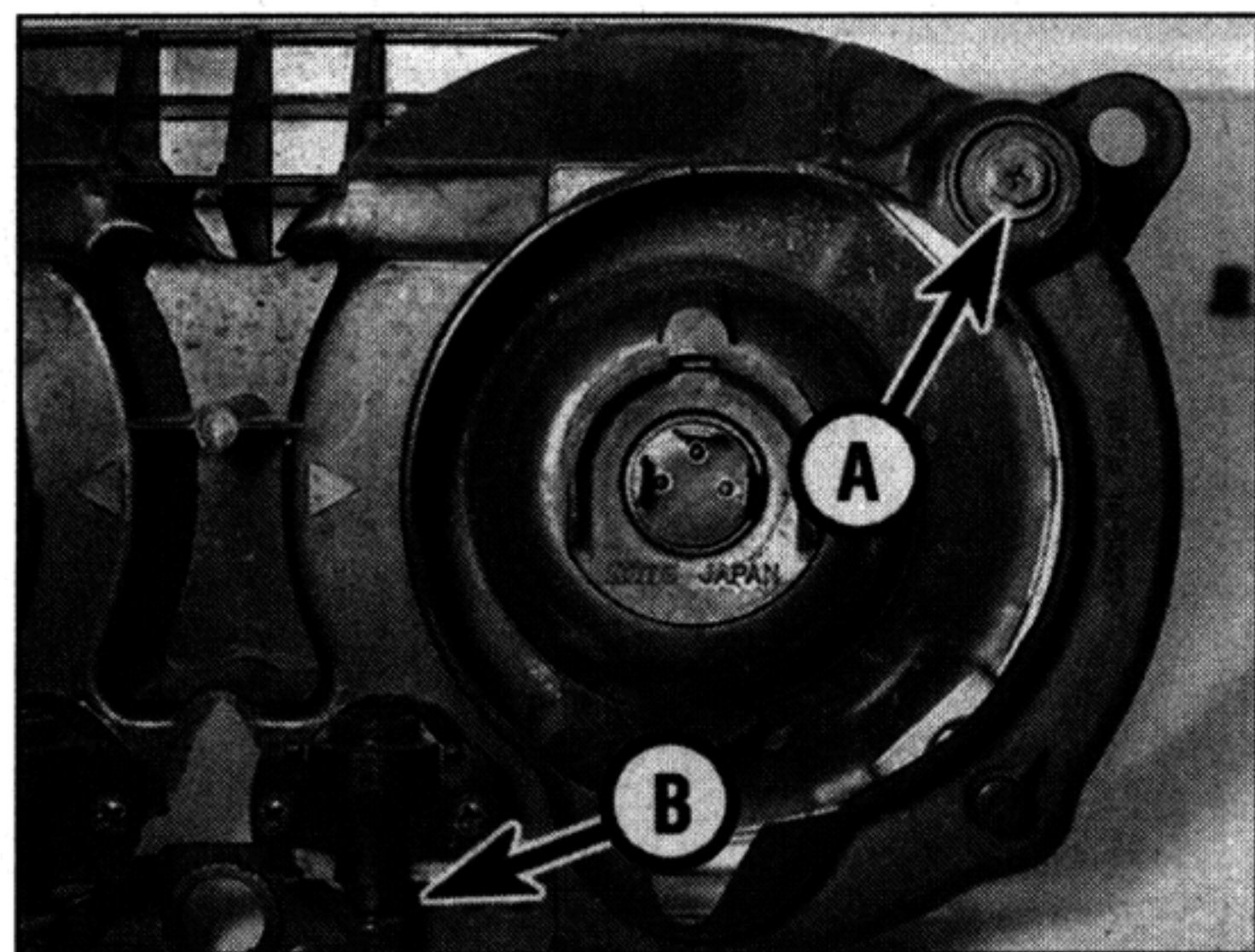
1 The headlight beam can be adjusted both

horizontally and vertically. Before making any adjustment, check that the tyre pressures are correct and the suspension is adjusted as required. Make any adjustments to the headlight aim with the machine on level ground, with the fuel tank half full and with an assistant sitting on the seat. If the bike is usually ridden with a passenger on the back, have a second assistant to do this.

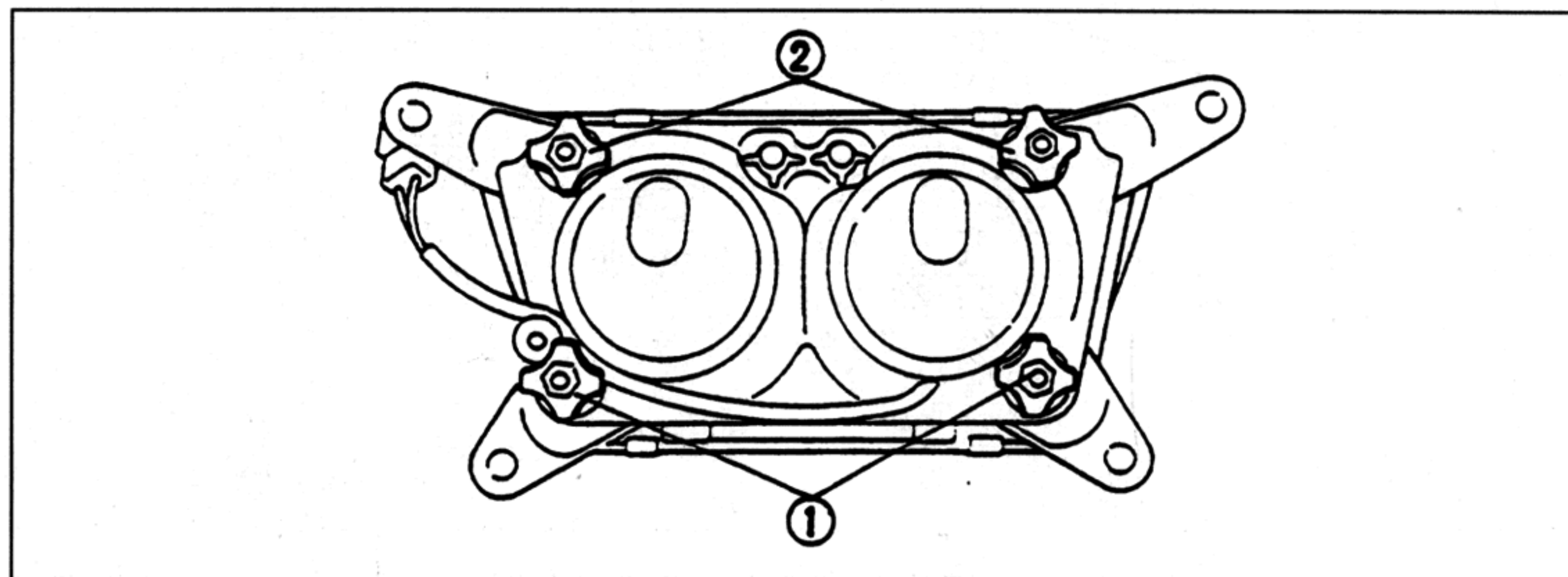
2 On 1991 to 1995 TDM models and XTZ models, vertical adjustment is made by turning the adjuster screw on the top outer corner of each headlight unit (see illustration). Turn it clockwise to raise the beam, and anti-clockwise to lower it.

Horizontal adjustment is made by turning the adjuster screw on the bottom inner corner of each headlight unit. For the left-hand beam, turn it clockwise to move the beam to the right, and anti-clockwise to move it to the left. For the right-hand beam, turn it clockwise to move the beam to the left, and anti-clockwise to move it to the right.

3 On 1996-on TDM models, vertical adjustment is made by turning the adjuster screw on the bottom outer corner of each headlight unit (see illustration). Turn it anti-clockwise to raise the beam, and clockwise to lower it. Horizontal adjustment is made by turning the adjuster screw on the top outer

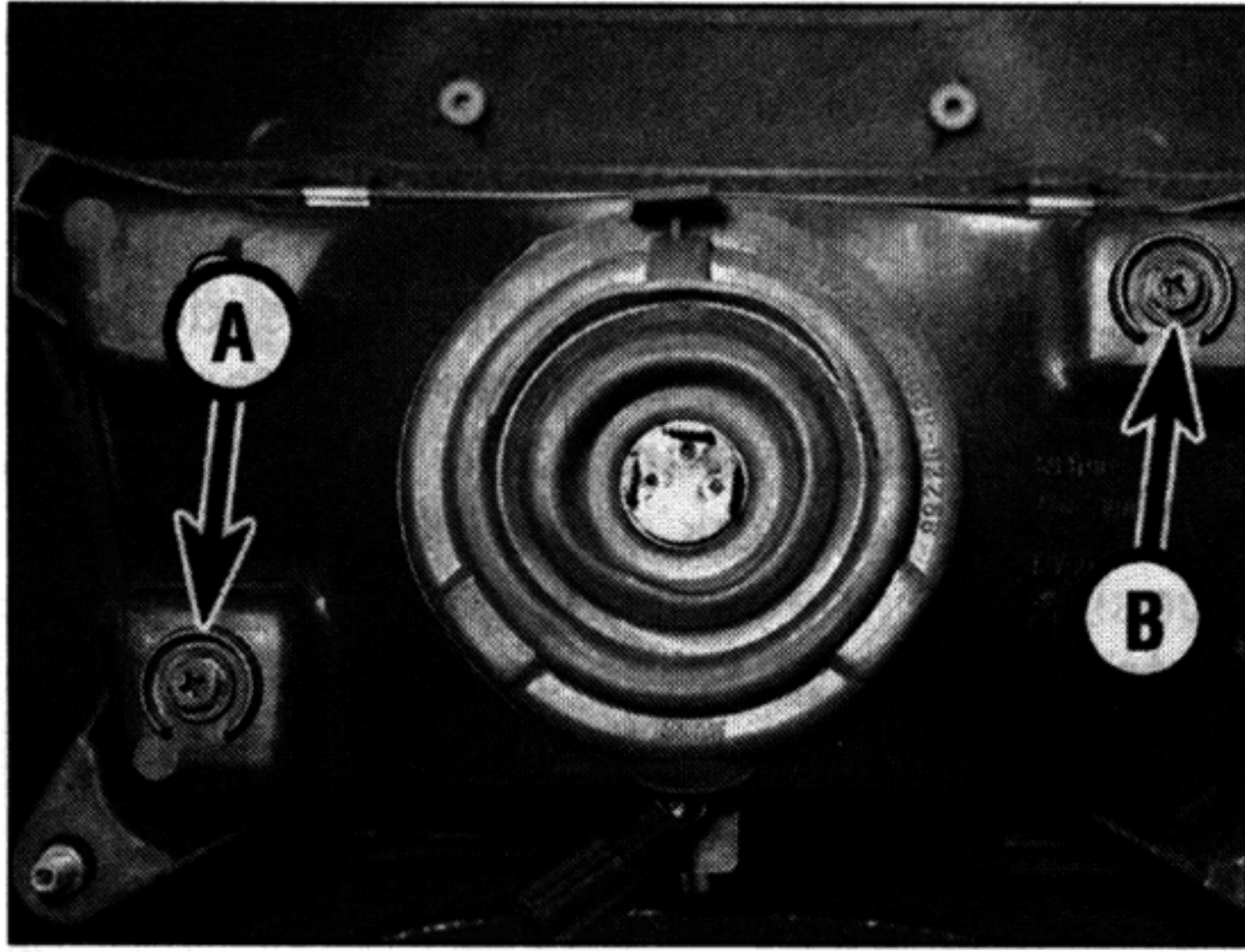


30.2 Vertical adjuster (A), horizontal adjuster (B) – 1991 to 1995 TDM models and XTZ models



30.3 Vertical adjusters (1), horizontal adjusters (2) – 1996-on TDM models





**30.4 Vertical adjuster (A), horizontal adjuster (B) – TRX models**

corner of each headlight unit. For the left-hand beam, turn it clockwise to move the beam to the left, and anti-clockwise to move it to the right. For the right-hand beam, turn it clockwise to move the beam to the right, and anti-clockwise to move it to the left.

4 On TRX models, vertical adjustment is made by turning the adjuster screw on the bottom left corner of the headlight unit (see illustration). Turn it clockwise to raise the beam, and anti-clockwise to lower it. Horizontal adjustment is made by turning the adjuster screw on the top right corner of the headlight unit. Turn it clockwise to move the beam to the left, and anti-clockwise to move it to the right.

## 31 Cylinder compression – check

1 Among other things, poor engine performance may be caused by leaking valves, incorrect valve clearances, a leaking head gasket, or worn pistons, rings and/or cylinder walls. A cylinder compression check will help pinpoint these conditions and can also indicate the presence of excessive carbon deposits in the cylinder heads.

2 The only tools required are a compression gauge and a spark plug wrench. A compression gauge with a threaded end for the spark plug 12 mm diameter hole is preferable to the type which requires hand pressure to maintain a tight seal. Depending on the outcome of the initial test, a squirt-type oil can may also be needed.

3 Make sure the valve clearances are correctly set (see Section 28) and that the cylinder head fasteners are tightened to the correct torque setting (see Chapter 2).

4 Refer to *Fault Finding Equipment* in the Reference section for details of the compression test. Refer to the specifications at the beginning of the Chapter for compression figures.

## 32 Engine – oil pressure check

1 None of the models covered in this manual are fitted with an oil pressure warning light. If a lubrication problem is suspected, first check the oil level (see *Daily (pre-ride) checks*)

2 If the oil level is correct, an oil pressure check must be carried out.

3 To check the oil pressure, slacken the oil gallery bolt in the left-hand side of the cylinder head – there is no need to remove it (see illustration).

4 Start the engine and allow it to idle. After a short while oil should begin to seep out from the oil gallery plug (see illustration). If no oil has appeared after one minute, stop the engine immediately.

5 If the oil does not appear after one minute, either the pressure regulator is stuck open, the oil pump is faulty, the oil strainer or filter is blocked, or there is other engine damage. Begin diagnosis by checking the oil filter (Section 22 of this Chapter), strainer and regulator, then the oil pump (see Chapter 2). If those items check out okay, chances are the

bearing oil clearances are excessive and the engine needs to be overhauled.

6 If the oil appears very quickly and spurts out, the pressure may be too high, meaning either an oil passage is clogged, the regulator is stuck closed or the wrong grade of oil is being used.

7 Refer to Chapter 2 and rectify any problems before running the engine again.

8 Tighten the oil gallery bolt to the torque setting specified at the beginning of the Chapter.

## 33 Fuel hoses – renewal



**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.**

1 The fuel delivery and vacuum hoses should be renewed after a few years regardless of their condition.

2 Remove the fuel tank (see Chapter 4). Disconnect the fuel hoses from the fuel tap, fuel pump and from the carburetors, noting the routing of each hose and where it connects (see Chapter 4 if required). It is advisable to make a sketch of the various hoses before removing them to ensure they are correctly installed.

3 Secure each new hose to its unions using new clamps. Run the engine and check that there are no fuel leaks before taking the machine out on the road.



**32.3 Slacken the gallery bolt (arrowed) . . .**



**32.4 . . . then start the engine and check that the oil dribbles out within a minute**



## 34 Front forks – oil change

**TDM, TRX and 1995 XTZ models**

**1** Fork oil degrades over a period of time and loses its damping qualities. The forks do not have drain screws so it is necessary to remove them from the fork yokes (see Chapter 6, Section 6) and remove their top bolts, spacer and spring assembly so that they can be turned upside down and pumped to expel the fork oil.

**2** Once the forks have been removed from the yokes, refer to the appropriate part of Section 7, Chapter 6, to unscrew the fork top bolt and withdraw the spacer and spring assembly. Note that there is no need to slacken the damper rod bolt as advised in the early part of this procedure because this relates to fork overhaul. Turn the fork upside down and pump the inner tube and slider to expel as much oil as possible.

**3** Refill each fork with the specified amount and type of fork oil (see Chapter 6 Specifications) and install the fork spring, spacer and top bolt. Take careful note of how the oil level is measured and the importance of the level being identical in each fork. Refer to the final part of the relevant reassembly procedure in Chapter 6, Section 7 for details.

**1989 to 1994 XTZ models**

**4** Fork oil degrades over a period of time and loses its damping qualities. These models are equipped with drain screws in the fork sliders (see illustration 7.59 in Chapter 6) and therefore changing the fork oil is a relatively straightforward task.

**5** Position the bike on an auxiliary stand and support it under the engine so that the front wheel is off the ground. Unscrew the fork top bolt from the top of each fork tube.



**Warning:** *The fork spring is pressing on the fork top bolt (via the spacer) with considerable pressure. Unscrew the bolt very carefully, keeping a downward pressure on it and release it slowly as it is likely to spring clear. It is advisable to wear some form of eye and face protection when carrying out this operation.*

**6** Hold a piece of thick card to act as a chute beneath the fork drain screw on one fork slider, then remove the drain screw and allow the oil to drain. Pump the fork to expel all of the oil. Now do the same on the other fork leg.

**7** Slide the fork tube down into the slider and withdraw the spacer, spring seat and the spring from the tube. Note which way up the spring is fitted.

**8** Check the condition of the sealing washers on the drain screws and screw them back into the fork sliders.

**9** Slowly pour in the specified quantity of the specified grade of fork oil (see Chapter 6

Specifications) and pump the fork at least ten times to distribute it evenly; the oil level should also be measured and adjustment made by adding or subtracting oil. Fully compress the fork tube into the slider and measure the fork oil level from the top of the tube (see illustration 7.26b in Chapter 6). Add or subtract fork oil until it is at the level specified at the beginning of the Chapter. Note that bike must be upright when the oil level is measured and the oil level must be the same in each fork.

**10** Extend the fork tube and slider fully, then install the spring, the spring seat, with its shouldered side fitting down into the top of the spring, and the spacer.

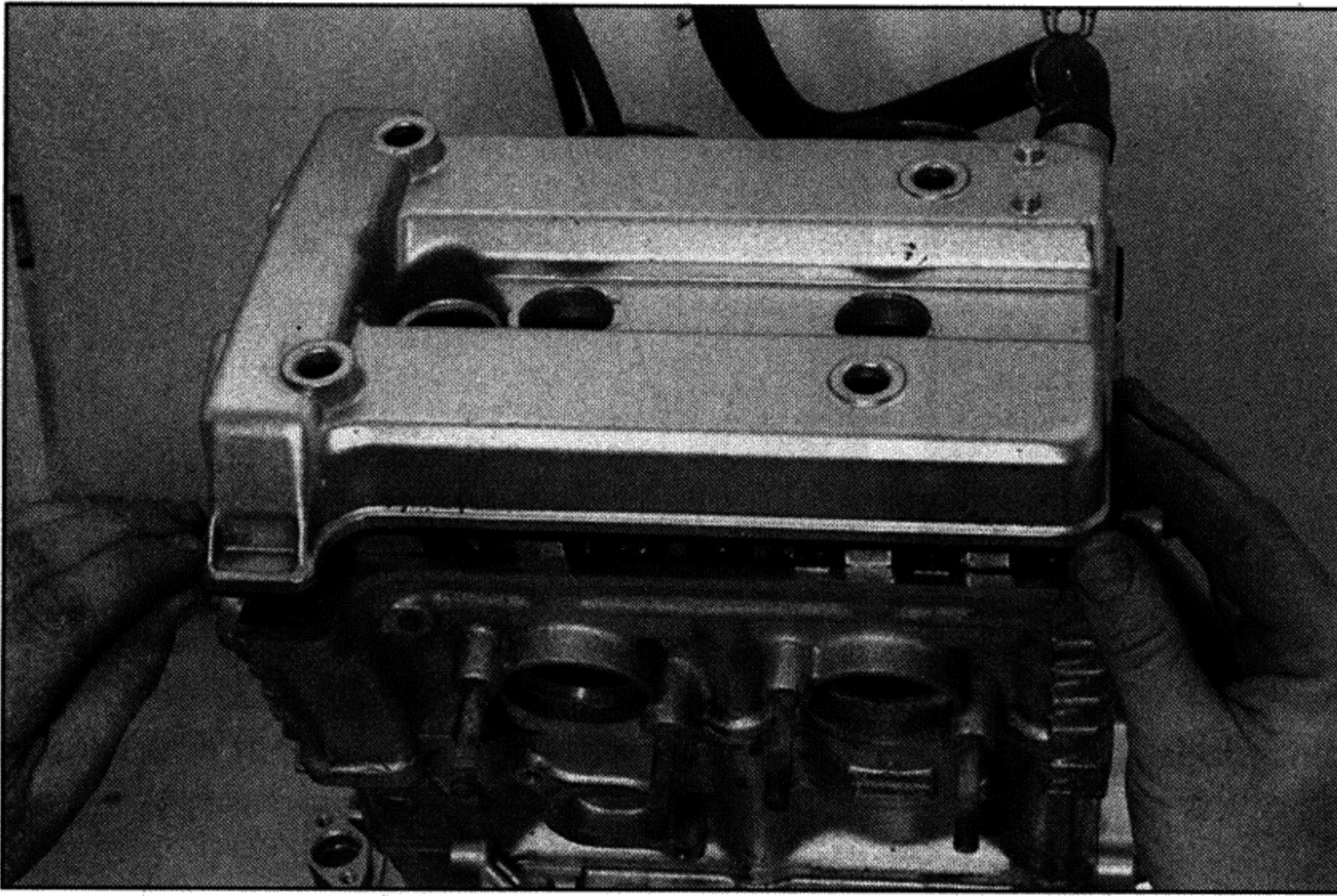
**11** Apply a smear of grease to the top bolt O-ring and thread the bolt into the top of the fork tube.



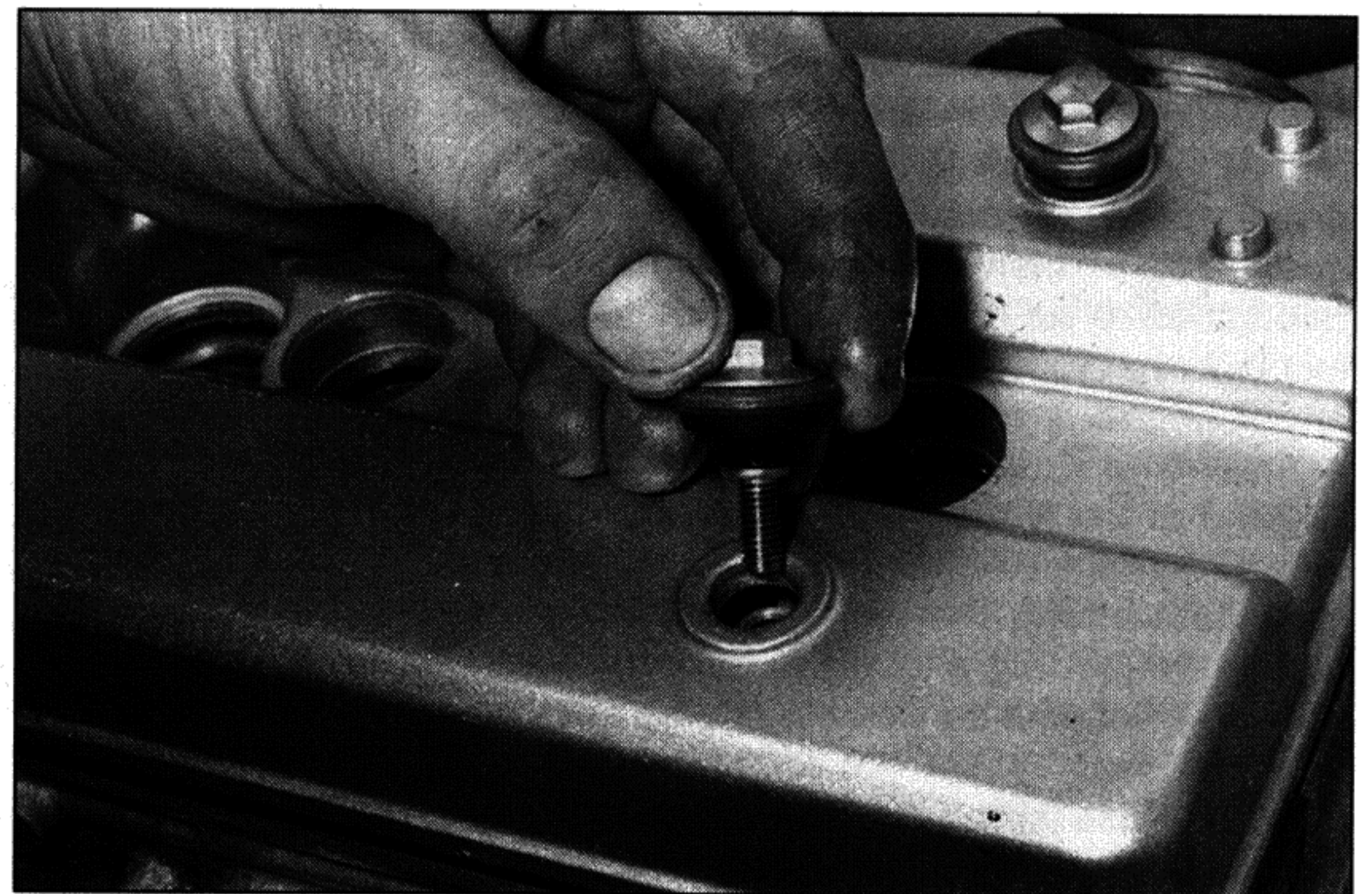
**Warning:** *It will be necessary to compress the spring by pressing it down using the top bolt to engage the threads of the top bolt with the fork tube. This is a potentially dangerous operation and should be performed with care, using an assistant if necessary. Wipe off any excess oil before starting to prevent the possibility of slipping.*

Keep the fork tube fully extended whilst pressing on the spring. Screw the top bolt carefully into the fork tube making sure it is not cross-threaded and tighten it to the specified torque setting (see Chapter 6 Specifications).

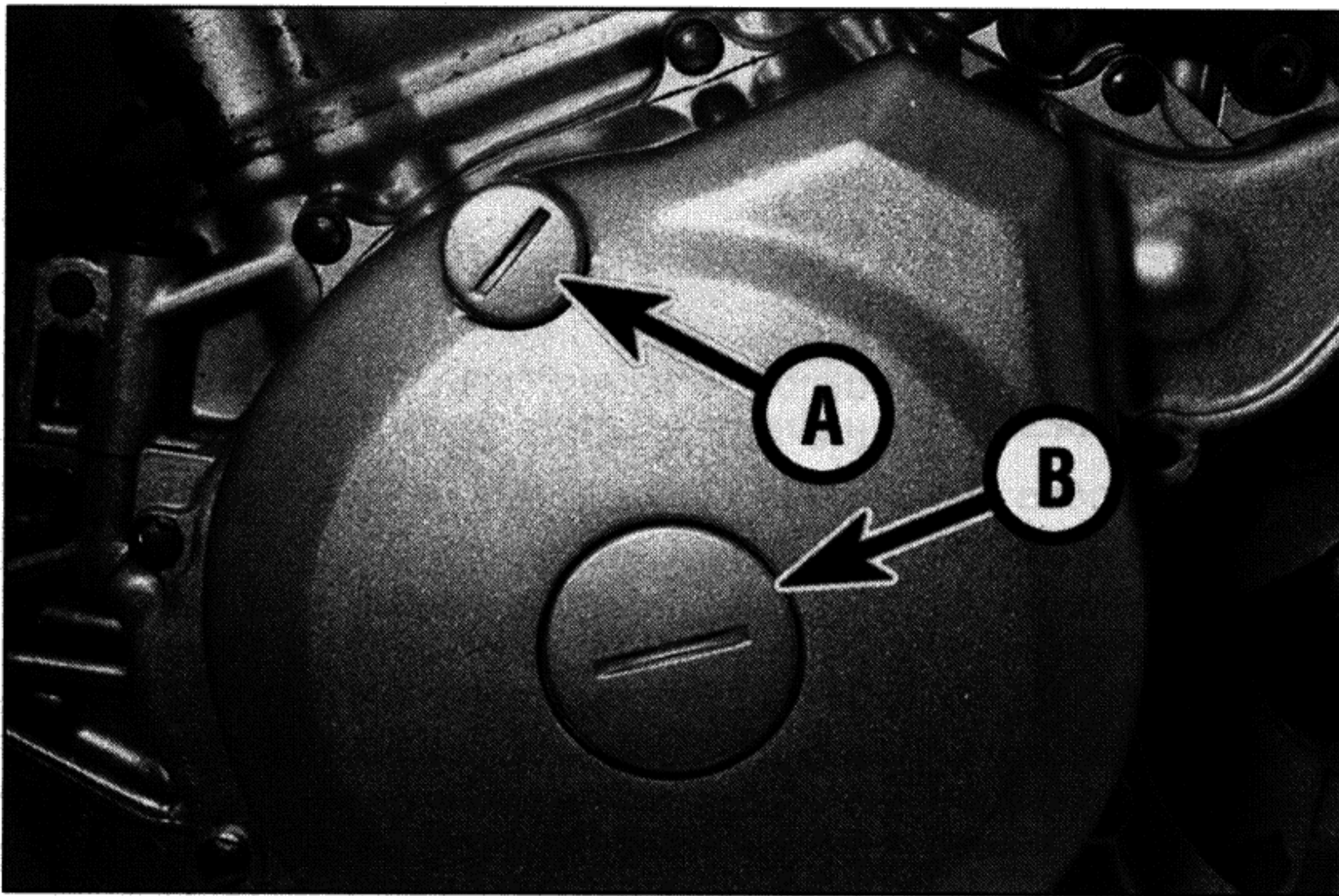




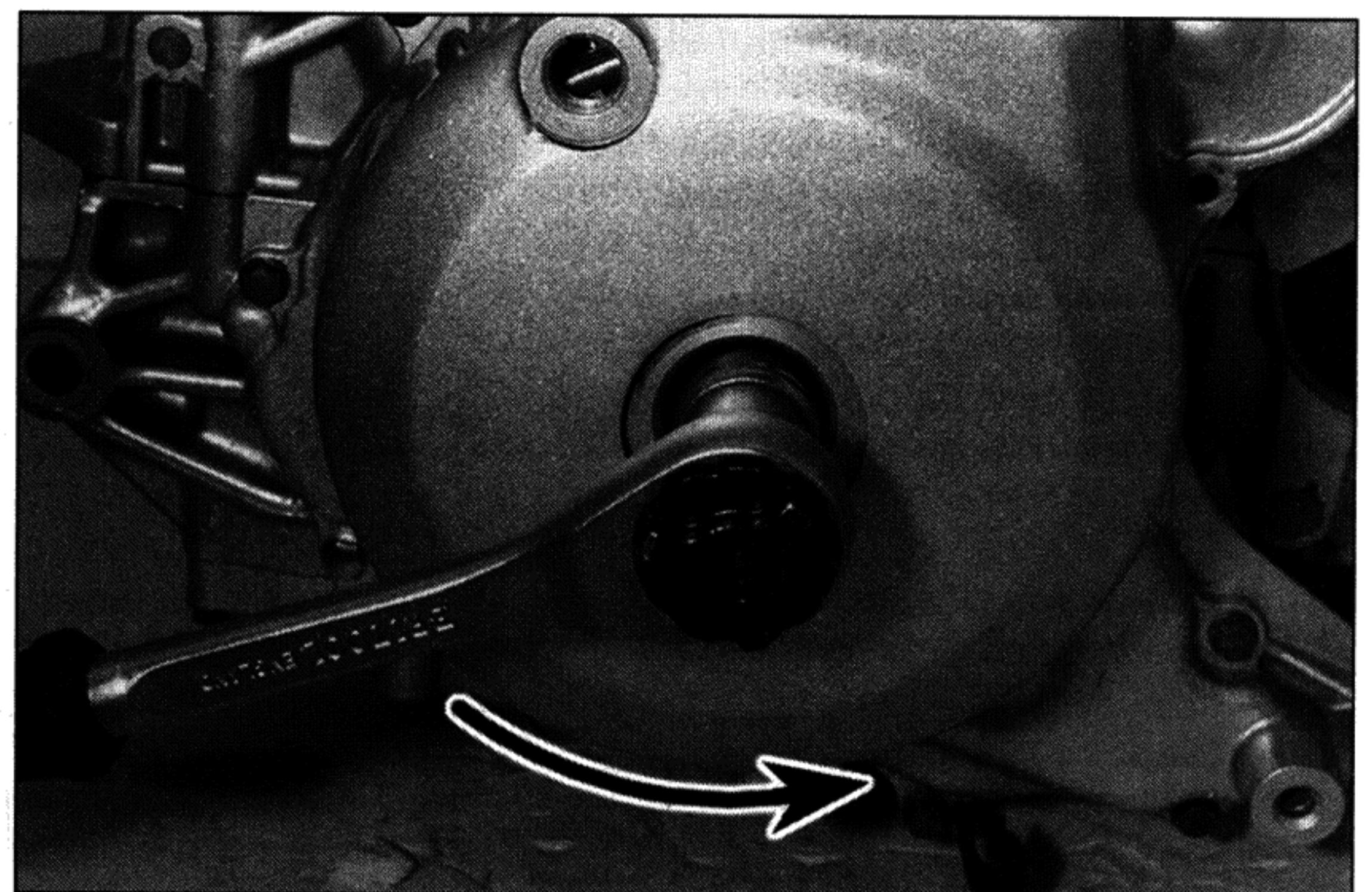
7.10a Install the valve cover . . .



7.10b . . . and tighten the bolts



8.2a Unscrew the timing inspection plug (A) and the centre plug (B)



8.2b Turn the engine using a socket on the alternator bolt

**10** Position the valve cover on the cylinder head, making sure the gaskets stay in place (**see illustration**). Install the cover bolts and tighten them to the torque setting specified at the beginning of the Chapter (**see illustration**).

**11** Install the remaining components in the reverse order of removal.

## 8 Camshafts and followers – removal, inspection and installation



**Note:** The camshafts can be removed with the engine in the frame. Place rags over the spark plug holes and the camchain tunnel to prevent any component from dropping into the engine on removal.

### Removal

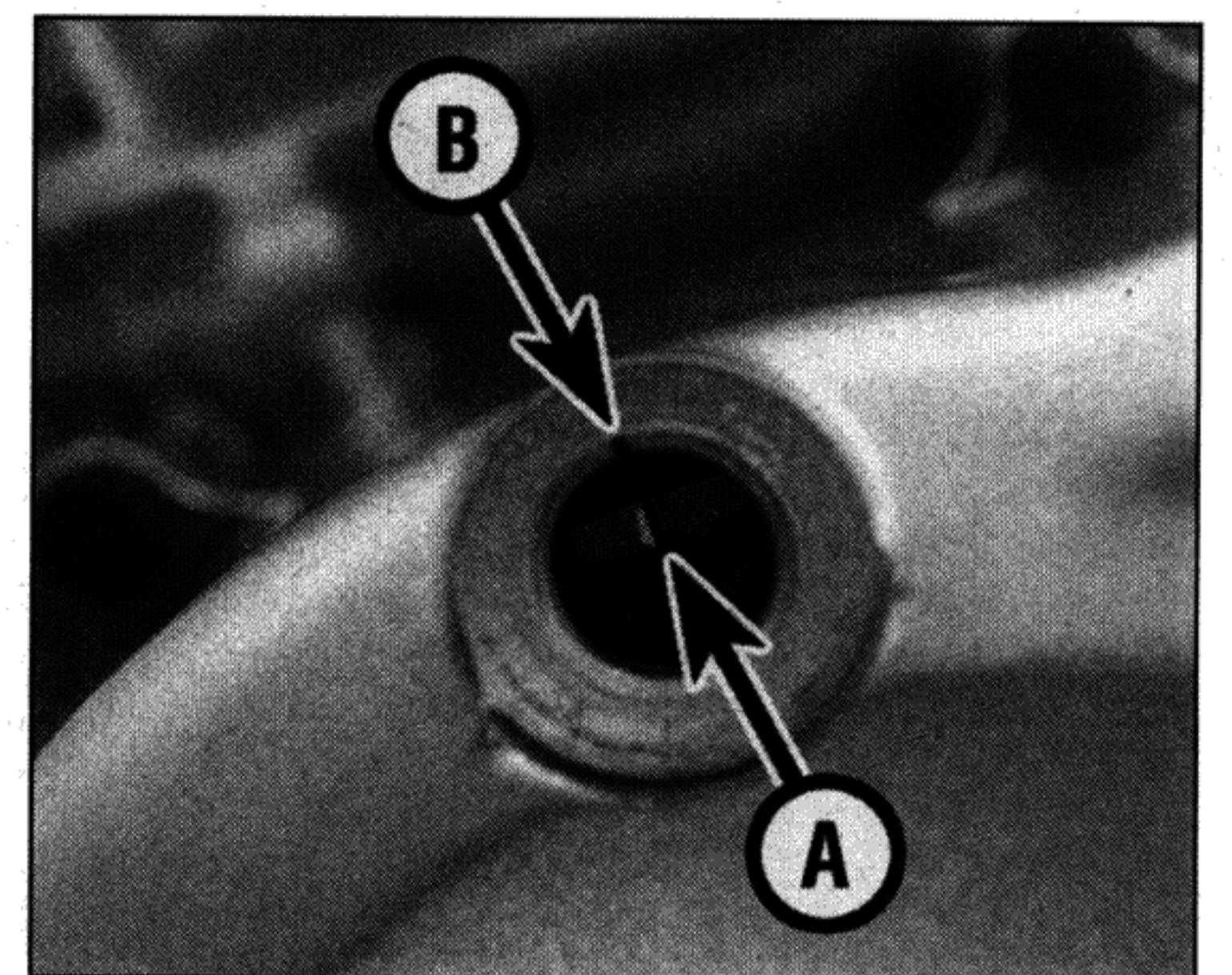
**1** Remove the valve cover (see Section 7).

**2** Unscrew the timing inspection plug and the centre plug from the alternator cover on the left-hand side of the engine (**see illustration**).

Discard the plug O-rings as new ones should be used. The engine can be turned using a 19 mm socket on the alternator rotor bolt and turning it in an anti-clockwise direction only (**see illustration**). Alternatively, place the motorcycle on an auxiliary stand so that the rear wheel is off the ground, select a high gear and rotate the rear wheel by hand in its normal direction of rotation.

**3** Turn the engine until the 'I' mark on the rotor aligns with the static timing mark on the alternator cover (a notch in the timing inspection hole), and the camshaft lobes for the No. 1 (left-hand) cylinder are facing away from each other (**see illustration**). **Note:** Do not confuse the 'I' mark on the rotor (which indicates TDC) with the 'H' mark which will appear first and which indicates the firing point of the ignition system. If the cam lobes are facing towards each other, rotate the engine anti-clockwise 360° (one full turn) so that the 'I' mark again aligns with the static timing mark. The camshaft lobes will now be facing away from each other and the No. 1 cylinder is at TDC (top dead centre) on the

compression stroke. Before disturbing the camshafts, make a note of the timing markings on the sprockets and how they align with the cylinder head. With the No. 1 cylinder at TDC, The 'E' mark on the exhaust camshaft sprocket is parallel with the cylinder head top



8.3a Turn the engine until the mark on the rotor (A) aligns with the static mark on the cover (B)