

Chapter 1

Tune-up and routine maintenance

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Specifications

Engine

Spark plugs

Type

Standard	NGK DPR8EA-9 or ND X24EPR-U9
Cold climate	NGK DPR7EA-9 or ND X22EPR-U9
Extended high-speed riding.....	NGK DPR9EA-9 or ND X27EPR-U9
Gap.....	0.8 to 0.9 mm (0.031 to 0.035 inch)

Engine (continued)

Valve clearances (COLD engine)	
Intake.....	0.13 to 0.17 mm (0.005 to 0.007 inch)
Exhaust.....	0.18 to 0.22 mm (0.007 to 0.009 inch)
Engine idle speed	
VT600	1100 to 1300 rpm
VT750	900 to 1100 rpm
Cylinder compression pressure	
VT600	12.26 to 14.22 Bars (178 to 206 psi)
VT750	11.77 to 13.73 Bars (171 to 199 psi)
Carburetor synchronization	
Maximum vacuum difference between cylinders	
VT600	
1988 and 1989, 1991 through 1996	40 mm Hg (1.6 inches Hg)
1997 on.....	20 mm Hg (0.7 inch Hg)
VT750.....	20 mm Hg (0.7 inch Hg)
Cylinder numbering	
Rear cylinder	1
Front cylinder	2

Miscellaneous

Battery electrolyte specific gravity.....	1.280 at 20 degrees C (68 degrees F)
Brake pedal position	
Pedal height (above top of footpeg)	
VT600.....	43 mm (1.7 inches)
VT750	
VT750C/CD ACE.....	50 mm (2.0 inches)
VT750DC Spirit	Not specified
Pedal freeplay.....	20 to 30 mm (3/4 to 1-1/4 inches)
Clutch lever freeplay	10 to 20 mm (3/8 to 3/4 inch)
Drive chain slack	
VT600	20 to 30 mm (3/4 to 1-3/16 inches)
VT750	15 to 25 mm (5/8 to 1 inch)
Throttle grip freeplay.....	2 to 6 mm (1/8 to 1/4 inch)
Minimum tire tread depth	
Front.....	1.5 mm (0.06 inch)
Rear.....	2.0 mm (0.08 inch)
Tire pressures (cold)	
Front.....	2 Bars (29 psi)
Rear	
Up to 90 kg (198 lbs).....	2 Bars (29 psi)
Above 90 kg (198 lbs)	2.5 Bars (36 psi)

Torque specifications

Cooling system drain plugs	
Water pump drain plug.....	13 Nm (108 in-lbs)
Rear cylinder drain plug	13 Nm (108 in-lbs)
Oil drain plug	
VT600	
1988 through 1998.....	34 Nm (25 ft-lbs)
1999 on.....	30 Nm (22 ft-lbs)
VT750	30 Nm (22 ft-lbs)
Spark plugs	
Used	14 Nm (120 in-lbs)
New	Hand tighten until sealing washer touches seat, then tighten plug 1/2-turn
Steering head bearing adjustment nut	
VT600	25 Nm (18 ft-lbs)
VT750	21 Nm (15 ft-lbs)
Valve adjustment screw locknuts	23 Nm (17 ft-lbs)
Valve adjustment cover bolts (VT600)	12 Nm (108 in-lbs)

Recommended lubricants and fluids

Fuel type	Unleaded
Fuel capacity	
VT600	
1988 and 1989, 1991 through 1993	
Total.....	9 liters (2.4 gallons)
Reserve.....	1.9 liters (0.5 gallons)
1994 on	
Total.....	11 liters (2.9 gallons)
Reserve.....	3.4 liters (0.9 gallons)
VT750C/CD ACE	
Total.....	14.0 liters (3.7 gallons)
Reserve.....	3.6 liters (0.95 gallons)
VT750DC Spirit	
Total.....	13.0 liters (3.43 gallons)
Reserve.....	4.0 liters (1.06 gallons)
Engine/transmission oil	
Type.....	API grade SF or SG
Viscosity	
Most conditions	SAE 10W-40
Cold weather.....	SAE 10W-30
Hot weather	SAE 20W-40
Very hot weather.....	SAE 20W-50
Capacity	
VT600	
Oil change only.....	2.1 liters (2.21 quarts)
With filter change.....	2.25 liters (2.38 quarts)
VT750	
Oil change only.....	2.2 liters (2.32 quarts)
With filter change.....	2.4 liters (2.54 quarts)
Coolant	
Type.....	50/50 mixture of ethylene glycol-based antifreeze and distilled water
Capacity	
Radiator and engine	
VT600	1.6 liters (1.51 quarts)
VT750	1.75 liters (1.85 quarts)
Reservoir	0.4 liter (0.42 quart)
Brake fluid.....	DOT 4
Wheel bearings.....	Medium weight, lithium-based multi-purpose grease
Swingarm pivot bearings.....	Medium weight, lithium-based multi-purpose grease
Cables and lever pivots	Chain and cable lubricant or 10W30 motor oil
Sidestand pivot.....	Chain and cable lubricant or 10W30 motor oil
Brake pedal/shift lever pivots	Chain and cable lubricant or 10W30 motor oil
Throttle grip	Multi-purpose grease or dry film lubricant

1 Honda Shadow

Routine maintenance intervals

Note: The pre-ride inspection outlined in the owner's manual covers checks and maintenance that should be carried out on a daily basis. It's condensed and included here to remind you of its importance. Always perform the pre-ride inspection at every maintenance interval (in addition to the procedures listed). The intervals listed below are the shortest 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 or before riding

- Check the engine oil level
- Check the fuel level and inspect for leaks
- Check the engine coolant level and look for leaks
- Check the operation of both brakes - also check the front brake fluid level and look for leakage
- Check the tires for damage, the presence of foreign objects and correct air pressure
- Check the throttle for smooth operation and correct freeplay
- Check the operation of the clutch - make sure the freeplay is correct
- Make sure the steering operates smoothly, without looseness and without binding
- Check for proper operation of the headlight, taillight, brake light, turn signals, indicator lights and horn
- Make sure the sidestand fully returns to its "up" position and stays there under spring pressure
- Make sure the engine STOP switch works properly

After the initial 600 miles/1000 km

Perform all of the daily checks plus:

- Check/adjust the carburetor synchronization
- Adjust the valve clearances
- Check/adjust the drive chain slack
- Change the engine oil and oil filter
- Check the tightness of all fasteners
- Check the steering
- Check/adjust clutch freeplay
- Check the front brake fluid level
- Check the cooling system hoses
- Inspect brake pads and shoes
- Check/adjust the brake pedal position
- Check the operation of the brake light
- Check the operation of the sidestand switch
- Lubricate the clutch cable, throttle cable(s) and speedometer cable

Every 300 miles/500 km

- Check/adjust the drive chain slack (if equipped)

Every 4000 miles/6000 km or 6 months

- Change the engine oil
- Clean the air filter element and replace it if necessary
- Adjust the valve clearances
- Clean and gap the spark plugs
- Lubricate the clutch cable, throttle cable(s) and speedometer cable

- Check/adjust throttle cable freeplay
- Check/adjust the idle speed
- Check/adjust the carburetor synchronization
- Check the front brake fluid level
- Adjust front brake freeplay
- Check the brake disc and pads
- Check the rear brake shoes for wear
- Check/adjust the brake pedal position
- Check the operation of the brake light
- Lubricate the clutch and brake lever pivots
- Lubricate the shift/brake pedal pivots and the sidestand pivot
- Check the steering
- Check the front forks for proper operation and fluid leaks
- Check the tires, wheels and wheel bearings
- Check the battery electrolyte level and specific gravity; inspect the breather tube
- Check the exhaust system for leaks and check the tightness of the fasteners
- Check the cleanliness of the fuel system and the condition of the fuel lines and vacuum hoses
- Inspect the crankcase ventilation system
- Check the operation of the sidestand switch
- Check and adjust clutch cable freeplay

Every 12,000 km/8,000 miles or 12 months

All of the items above plus:

- Change the engine oil and oil filter
- Replace the spark plugs

Every 18,000 km/12,000 miles

- Repack the swingarm bearings
- Inspect the cooling system and replace the coolant

Every 24,000 km/15,000 miles or two years

- Clean and lubricate the steering head bearings

Every 50,000 km/30,000 miles

- Replace the drive chain

Every two years

- Replace the brake master cylinder and caliper seals and change the brake fluid

Every four years

- Replace the brake hose

2 Introduction to tune-up and routine maintenance

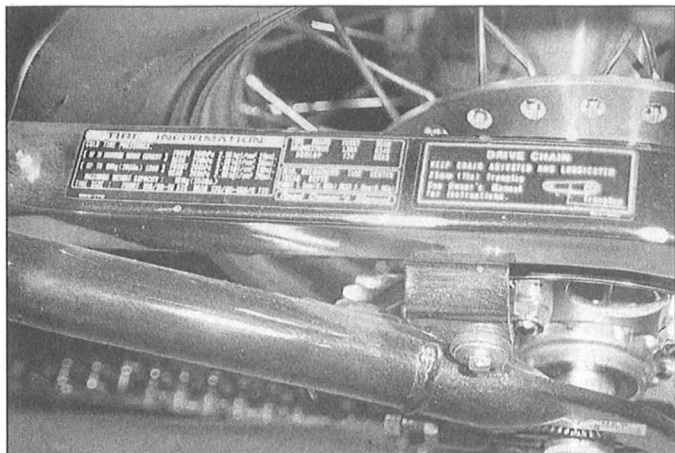
Refer to illustration 2.3

This Chapter covers in detail the checks and procedures necessary for the tune-up and routine maintenance of your motorcycle. Section 1 includes the routine maintenance schedule, which is designed to keep the machine in proper running condition and prevent possible problems. The remaining Sections contain detailed procedures for carrying out the items listed on the maintenance schedule, as well as additional maintenance information designed to increase reliability.

Since routine maintenance plays such an important role in the safe and efficient operation of your motorcycle, it is presented here as a comprehensive check list. For the rider who does all his own maintenance, these lists outline the procedures and checks that should be done on a routine basis.

Maintenance information is printed on labels attached to the motorcycle (see illustration). If the information on the labels differs from that included here, use the information on the label.

Deciding where to start, or "plug into," the routine maintenance schedule depends on several factors. If the warranty has recently expired, and if the motorcycle 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



2.3 Decals at various locations on the motorcycle include such information as tire pressures and drive chain service procedures

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.

The Sections which outline the inspection and maintenance procedures are written as step-by-step comprehensive guides to the performance of the work. They explain in detail each of the routine inspections and maintenance procedures on the check list. References to additional information in applicable Chapters is also included and should not be overlooked.

Before beginning any maintenance or repair, the machine should be cleaned thoroughly, especially around the oil filter, spark plugs, cylinder head covers, side covers, 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.

3 Fluid levels - check

Engine oil

Refer to illustrations 3.3a and 3.3b

1 Run the engine and allow it to reach normal operating temperature. **Caution:** Do not run the engine in an enclosed space such as a garage or shop.

2 Stop the engine and allow the machine to sit undisturbed for about five minutes.

3 Hold the motorcycle level. With the engine off, remove the filler cap from the right side of the crankcase and check the oil level on the dipstick. It should be between the Maximum and Minimum level marks on the dipstick (see illustrations).

4 If the level is below the Minimum mark, add enough oil of the recommended grade and type to bring the level up to the Maximum mark. Do not overfill.

Brake fluid

Refer to illustrations 3.7 and 3.9

5 In order to ensure proper operation of the hydraulic disc brake, the fluid level in the master cylinder reservoir must be properly maintained.

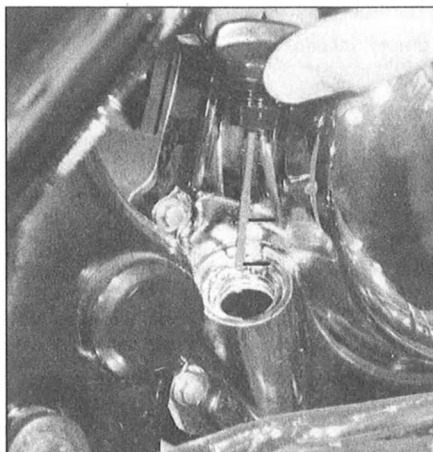
6 With the motorcycle held level, turn the handlebars until the top of the master cylinder is as level as possible.

7 Look closely at the inspection window in the master cylinder reservoir. Make sure that the fluid level is above the Lower mark on the reservoir (see illustration).

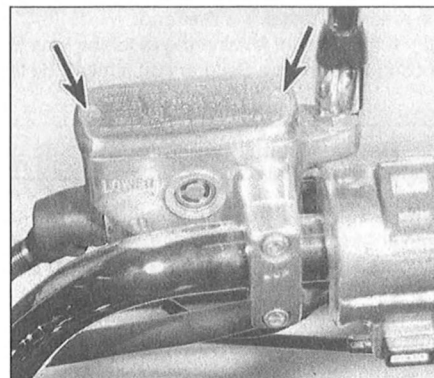
8 If the level is low, the fluid must be replenished. Before removing the master cylinder cover, cover the fuel tank to protect it from brake fluid spills (which will damage the paint) and remove all dust and dirt from the area around the cover.



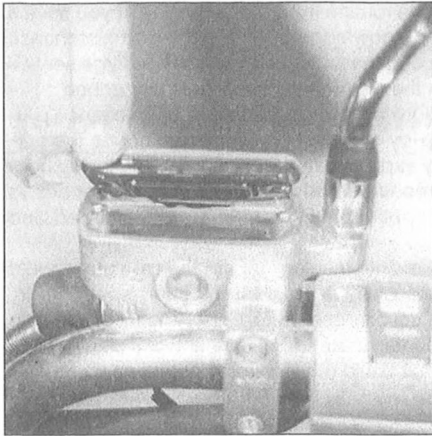
3.3a Remove the filler plug (arrow) . . .



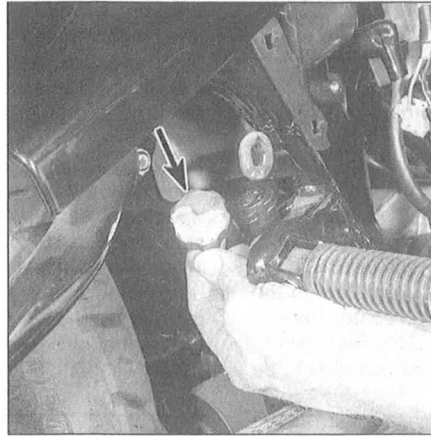
3.3b . . . and add oil, if necessary, to bring the level up to the maximum mark



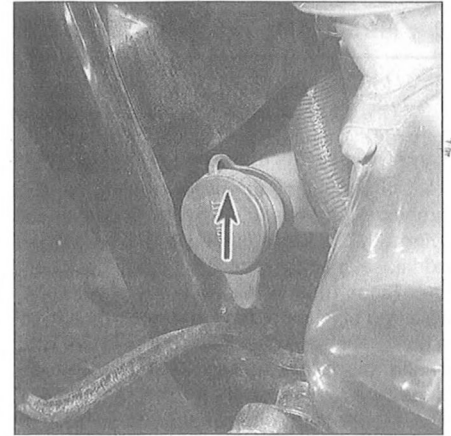
3.7 The level of the brake fluid in the master cylinder reservoir should be above the Lower line in the window; to remove the cover, remove these two screws (arrows)



3.9 To add fluid, carefully remove the cover and diaphragm



3.17a On VT600 models, the coolant reservoir filler cap (arrow) is located on the right side of the bike, near the passenger footpeg



3.17b On VT750 models, the coolant reservoir filler cap (arrow) is located on the left side of the bike, near the shift lever, below the radiator

- 9 To add brake fluid, remove the reservoir cover screws (see illustration 3.7) and lift off the cover and rubber diaphragm (see illustration). **Caution:** Do not operate the front brake with the cover removed.
- 10 Add new, clean brake fluid of the recommended type until the level is above the inspection window. Do not mix different brands of brake fluid in the reservoir, as they may not be compatible.
- 11 Reinstall the rubber diaphragm and the cover. Tighten the screws evenly, but do not overtighten them.
- 12 Wipe any spilled fluid off the reservoir body.
- 13 If the brake fluid level was low, inspect the brake system for leaks.

Coolant

Refer to illustrations 3.17a and 3.17b

- 14 Warm up the engine and check the coolant level with the engine running at its normal temperature.
- 15 On VT600 models, the Upper and Lower level marks for the coolant are on the front right corner of the coolant reservoir, right behind the oil filler cap/dipstick (see illustration 3.3a). On VT750 models, the Upper and Lower level marks for the coolant are on the left side of the coolant reservoir, which is located below the radiator, in front of the engine.
- 16 The reservoir is translucent plastic, so the coolant level is easily visible in relation to the marks. The coolant level should be at the Upper mark on the reservoir.
- 17 To add coolant, shut off the engine and remove the coolant reservoir filler cap (see illustrations). Using a 50/50 mixture of ethylene glycol and distilled water, bring the coolant level up to the Upper mark on the reservoir. Install the filler cap.
- 18 If the coolant level in the reservoir was low, or empty, inspect the cooling system (see Section 20). It might be leaking.



4.4 The electrolyte level should be between the marks on the battery case

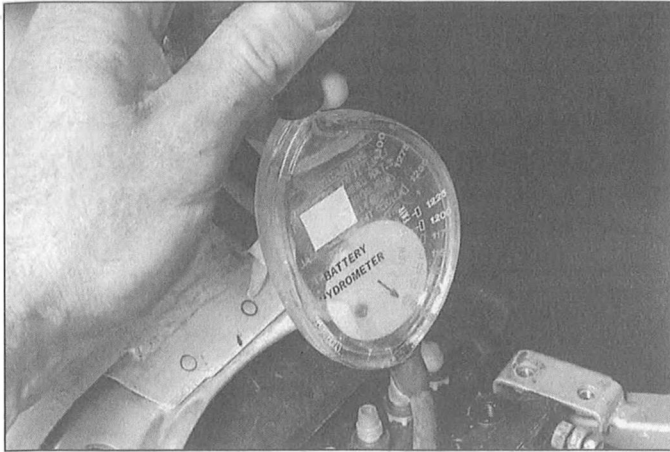
4 Battery electrolyte level/specific gravity - check

Refer to illustrations 4.4 and 4.7

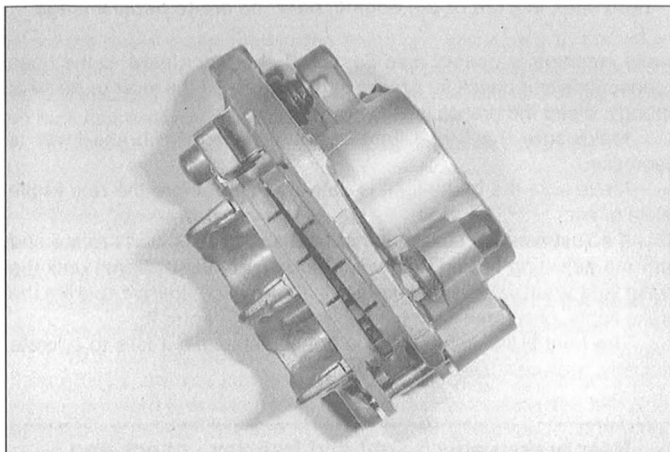
Warning: Be extremely careful when handling or working around the battery. The electrolyte is very caustic and an explosive gas (hydrogen) is given off when the battery is charging.

- 1 This procedure applies to conventional batteries with filler caps which can be removed to add water to the battery cells. The original-equipment battery is a sealed, maintenance-free battery; if the motorcycle is still equipped with the original battery, or an OEM replacement, it's unnecessary to check the electrolyte. However, if a conventional battery has been installed, it should be checked as follows.
- 2 Remove the battery (see Chapter 9).
- 3 Clean off the battery and place it on a workbench.

- 4 The electrolyte level, which is visible through the translucent battery case, should be between the Upper and Lower level marks (see illustration).
- 5 If the electrolyte is low, 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 plastic squeeze bottle with a small spout to add the water. If the level is within the marks on the case, additional water is not necessary.
- 6 Next, check the specific gravity of the electrolyte in each cell with a small hydrometer made especially for motorcycle batteries. These are available from most dealer parts departments or motorcycle accessory stores.
- 7 Remove the caps, draw some electrolyte from the first cell into the hydrometer (see illustration) and note the specific gravity. Compare the reading to the Specifications listed in this Chapter. Add 0.004 points to the reading for every 10-degrees F above 20-degrees C (68-degrees F); subtract 0.004 points from the reading for every 10-degrees below 20-degrees C (68-degrees F). Return the electrolyte to the appropriate cell and repeat the check for the remaining cells. When the check is complete, rinse the hydrometer thoroughly with clean water.
- 8 If the specific gravity of the electrolyte in each cell is as specified,



4.7 Check the specific gravity with a hydrometer



5.2b If there are no wear indicator marks on the lower end of the brake pads, inspect the pad rain grooves from the open front side of the caliper; when the grooves in the pads are no longer visible, replace the pads (caliper and pads removed from bike for clarity)

the battery is in good condition and is apparently being charged by the machine's charging system.

9 If the specific gravity is low, the battery is not fully charged. This may be due to corroded battery terminals, a dirty battery case, a malfunctioning charging system, or loose or corroded wiring connections. On the other hand, it may be that the battery is worn out, especially if the machine is old, or that infrequent use of the motorcycle prevents normal charging from taking place.

10 Be sure to correct any problems and charge the battery if necessary. Refer to Chapter 9 for additional battery maintenance and charging procedures.

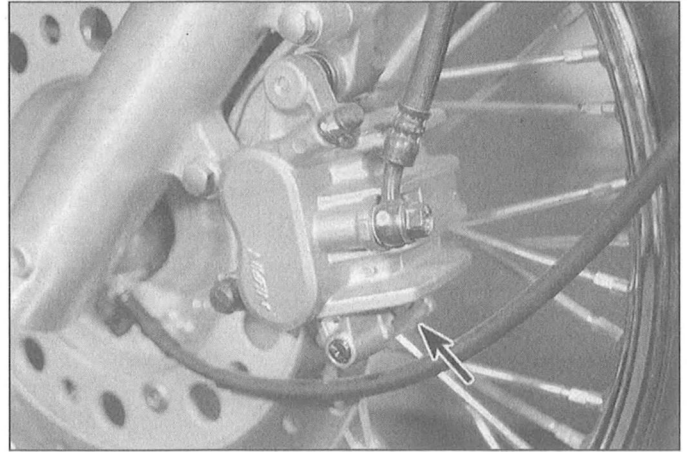
11 Install the battery cell caps, tightening them securely.

12 Install the battery (see Chapter 9). When reconnecting the cables to the battery, attach the positive cable first, then the negative cable. Make sure to install the insulating boot over the positive terminal. Install all components removed for access. Be very careful not to pinch or otherwise restrict the battery vent tube, as the battery may build up enough internal pressure during normal charging system operation to explode.

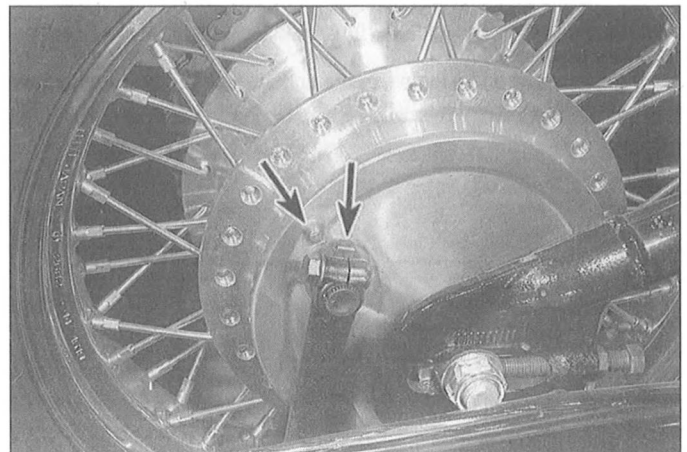
5 Brake pads and shoes - wear check

Refer to illustrations 5.2a, 5.2b and 5.3

1 The front brake pads and the rear brake shoes should be checked at the recommended intervals and replaced when worn beyond the



5.2a Using a small flashlight, look at the pads through the small openings at the bottom of the caliper and note whether the pads are worn down to the wear indicator marks parallel to the pad backing plates



5.3 To check the rear brake shoe thickness, firmly depress the brake pedal; if the pointer on the brake arm points at or near the mark on the brake panel (arrows), replace the brake shoes

limit listed in this Chapter's Specifications. Always replace pads and shoes as complete sets.

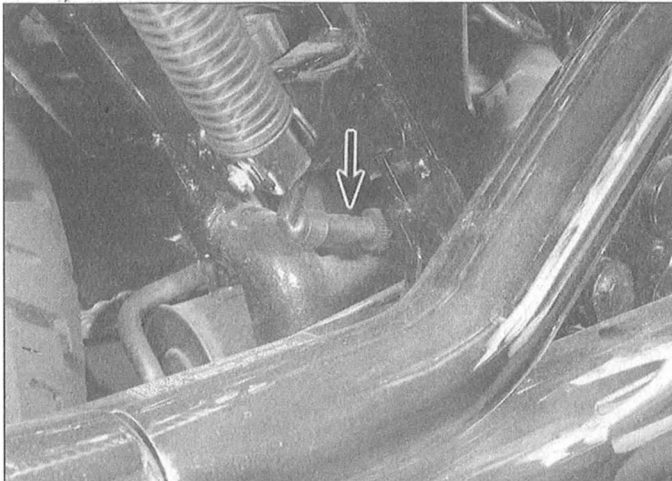
2 To check the thickness of the front brake pads, squeeze the front brake lever and look at the pads through the lower "window" of the caliper (see illustration). Note whether the pads are worn down to the wear indicator marks which run parallel to the pad backing plates. If they are, replace the pads (see Chapter 6). If there are no wear indicator marks on the lower ends of the pads, look through the open part of the caliper facing toward the front of the machine and note the small rain grooves cut into each pad (see illustration). If these grooves are still visible, the pads have some service life remaining. If the grooves are gone, replace the pads (see Chapter 6).

3 To check the rear brake shoes, press the brake pedal firmly while you look at the wear indicator mark on the brake panel (see illustration). If the indicator pointer on the brake arm is close to or at the wear indicator mark, replace the shoes (see Chapter 6).

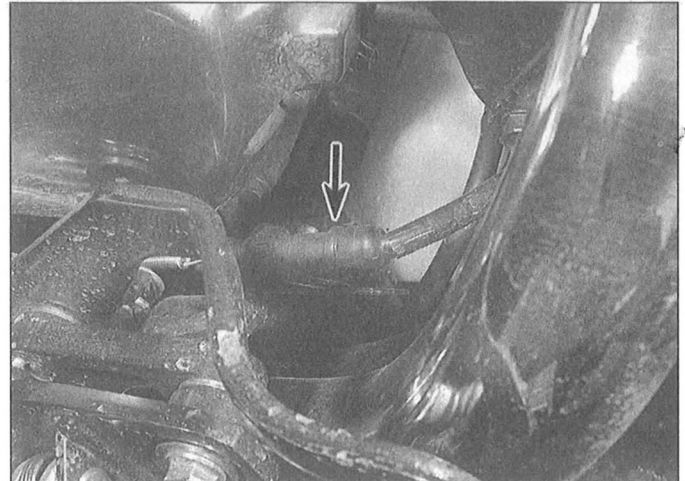
6 Brake system - general check

Refer to illustrations 6.6a and 6.6b

1 A routine general check of the brakes will ensure that any problems are discovered and remedied before the rider's safety is jeopardized.



6.6a The VT600 rear brake light switch (arrow) is located on the right side, below the right passenger footpeg



6.6b The VT750 rear brake light switch (arrow) is located on the right side, in front of the engine, near the brake pedal linkage

2 Check the brake lever and pedal for loose connections, excessive play, bends, and other damage. Replace any damaged parts with new ones (see Chapter 7).

3 Make sure all brake fasteners are tight. Check the brake pads and shoes for wear (see Section 5) and make sure the fluid level in the front

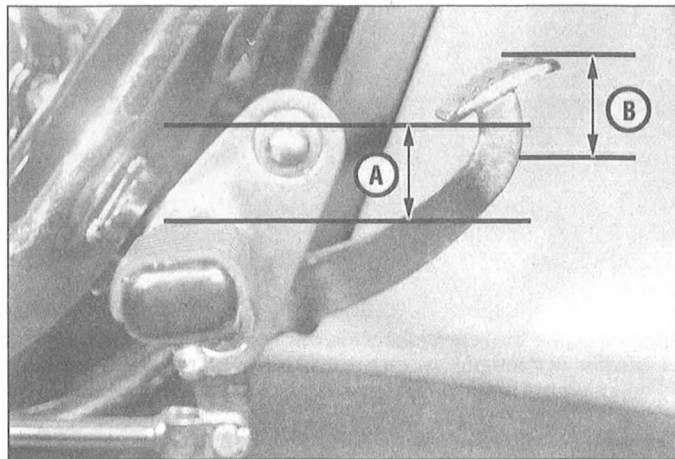
brake reservoir is correct (see Section 3). Look for leaks at the hose connections and check for cracks in the hose(s). If the lever or pedal is spongy, bleed the brakes (see Chapter 7).

4 Make sure the brake light operates when the brake lever is depressed.

5 Make sure the brake light is activated just before the rear brake takes effect.

6 If adjustment is necessary, hold the switch so it won't rotate and turn the adjusting nut on the switch body (see illustrations) until the brake light is activated when required. If the switch doesn't operate the brake lights, check the switch and circuit (see Chapter 9).

7 The front brake light switch is not adjustable. If it fails to operate properly, replace it (see Chapter 9).



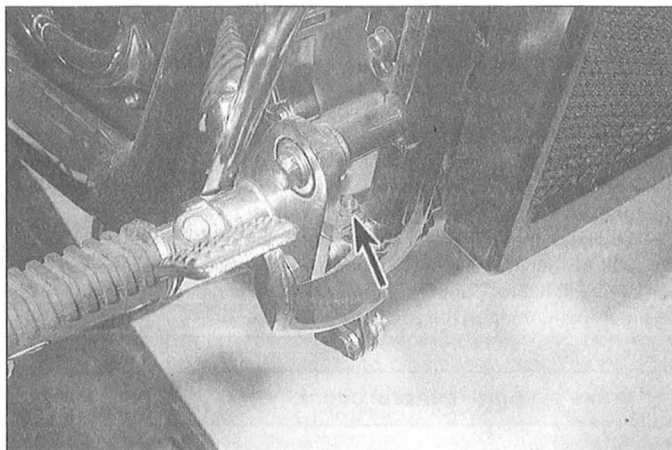
7.1a Brake pedal height (A) and freeplay (B)

7 Rear brake pedal height and freeplay - check and adjustment

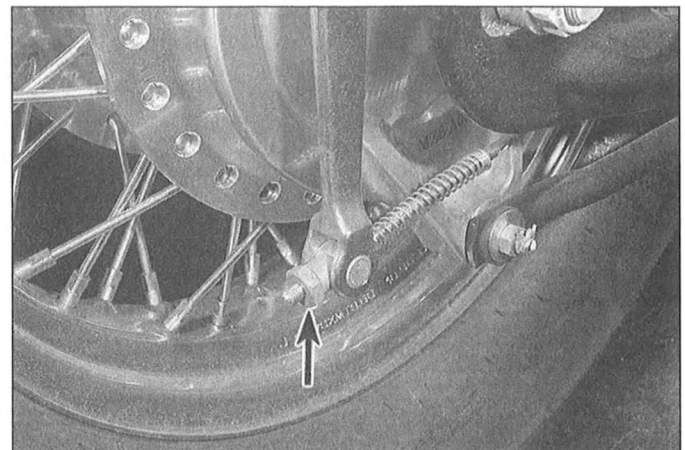
Refer to illustrations 7.1a, 7.1b and 7.2

1 The rear brake pedal height, measured from the top of the footpeg to the top of the pedal (see illustration), should be at the height listed in this Chapter's Specifications. If it isn't, adjust the pedal height. Loosen the locknut (see illustration), turn the adjuster bolt to set the pedal height and tighten the locknut.

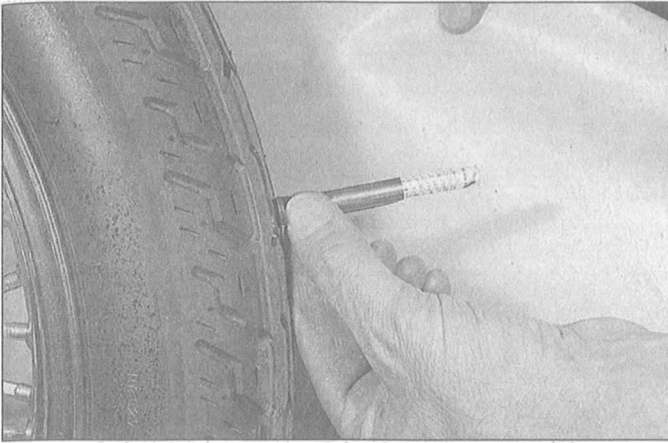
2 Check pedal freeplay (the distance the pedal travels downward



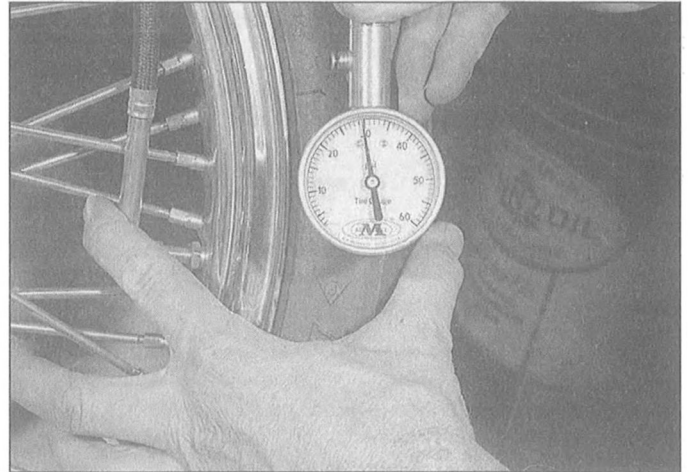
7.1b To adjust brake pedal height, loosen the locknut (arrow) and turn the adjustment bolt until pedal height is correct, then tighten the locknut



7.2 To adjust brake pedal freeplay, turn this adjusting nut until the pedal freeplay is correct



8.2 Measure tread depth at the center of the tire (tread depth gauges are available at most dealerships and motorcycle accessory shops)



8.4 Check tire pressures with an accurate gauge

before the brake shoes contact the drum) and compare it to the value listed in this Chapter's Specifications. If the pedal freeplay isn't within this dimension, adjust it by turning the nut at the rear end of the brake rod (see illustration).

3 If necessary, adjust the brake light switch (see Section 6).

8 Tires/wheels - general check

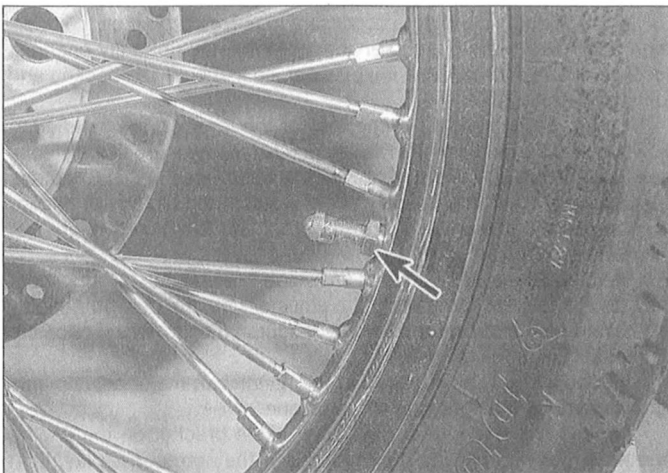
Refer to illustrations 8.2, 8.4 and 8.5

1 Routine tire and wheel checks should be made with the realization that your safety depends to a great extent on their condition.

2 Check the tires carefully for cuts, tears, embedded nails or other sharp objects and excessive wear. Operation of the motorcycle with excessively worn tires is extremely hazardous, as traction and handling are directly affected. Measure the tread depth at the center of the tire (see illustration) and replace worn tires with new ones when the tread depth is less than specified.

3 Repair or replace punctured tires as soon as damage is noted. Do not try to patch a torn tire, as wheel balance and tire reliability may be impaired.

4 Check the tire pressures when the tires are cold and keep them properly inflated (see illustration). Proper air pressure will increase tire life and provide maximum stability and ride comfort. Keep in mind that low tire pressures may cause the tire to slip on the rim or come off, while high tire pressures will cause abnormal tread wear and unsafe handling.



8.5 Make sure the tire valve locknut (arrow) is snug and the valve cap is tight

5 Make sure the valve stem locknuts (see illustration) are tight. Also, make sure the valve stem cap is tight. If it is missing, install a new one made of metal or hard plastic.

9 Throttle cable and choke operation - check and adjustment

Throttle cable

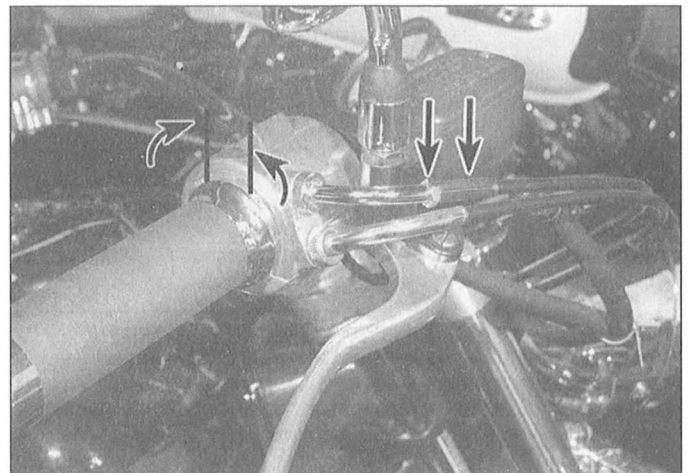
Refer to illustrations 9.3 and 9.6

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. If the throttle sticks, check the throttle cables for cracks or kinks in the housings and make sure the inner cables are clean and well-lubricated.

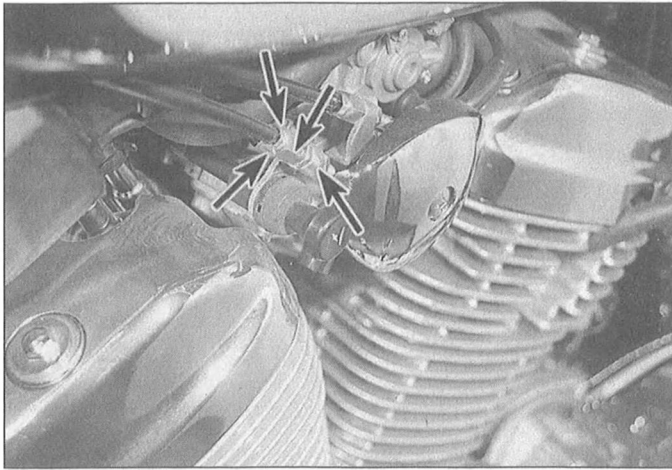
2 Start the engine and warm it up. With the engine idling, turn the handlebars all the way to the left, then all the way to the right. The idle speed should not increase. If it does, check throttle grip freeplay.

3 Throttle grip freeplay is the distance the throttle grip can be rotated before resistance is felt, i.e. the point at which the throttle cable begins to open the carburetor throttle plates. Measure the throttle grip freeplay (see illustration) and compare your measurement to the value listed in this Chapter's Specifications.

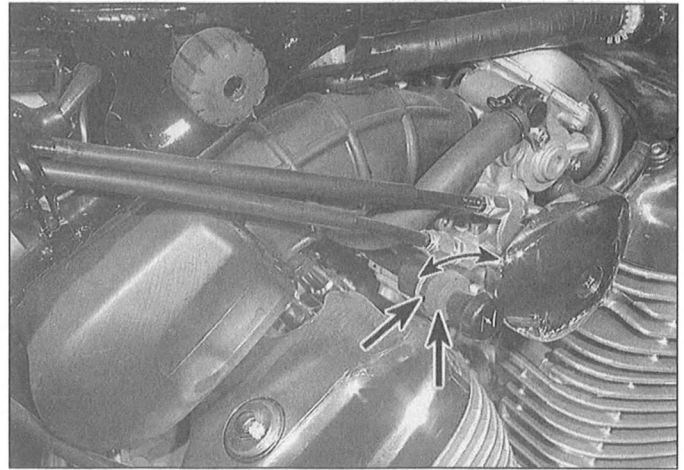
4 There are actually two throttle cables - an "accelerator" cable and a "decelerator" cable. The accelerator cable opens the throttle plates;



9.3 Rotate the throttle grip to check freeplay; loosen the locknut and turn the adjuster (arrows) to change it (VT750 shown)



9.6 Lower locknuts and adjusters for accelerator cable (lower arrows) and decelerator cable (upper arrows)



9.12 To adjust the amount of force required to pull out and push in the choke knob, pull back the rubber cover (right arrow) and rotate the friction adjuster (left arrow)

the decelerator cable closes them. If the throttle grip freeplay must be adjusted, it can be adjusted at either end of the accelerator cable, but only at the lower end of the decelerator cable. The upper adjuster at the throttle grip is used to make fine adjustments to the accelerator cable; throttle grip freeplay is usually adjusted here. The lower adjusters at the carburetors are only used to make major adjustments to the cables. Both cables can be adjusted at the carburetors, but the accelerator cable is the one that is adjusted to achieve correct throttle grip freeplay; the decelerator cable is adjusted only to compensate for the amount of freeplay that's added or subtracted from the accelerator cable. There should be no freeplay in the decelerator cable.

5 To adjust freeplay at the throttle grip, loosen the locknut and turn the adjuster until the freeplay is within the specified distance. Tighten the locknut.

6 To adjust freeplay at the carburetors, loosen the cable adjuster locknuts (**see illustration**), turn the adjuster nut on the decelerator cable to set freeplay to zero, tighten the decelerator cable adjuster locknut, then turn the accelerator cable adjuster nut to bring freeplay at the throttle grip within the range listed in this Chapter's Specifications. Once freeplay is correct, tighten the accelerator cable adjuster locknut.

7 Make sure the throttle grip is now in the fully-closed position.

8 Make sure the throttle linkage lever still contacts the idle adjusting screw when the throttle grip is in the fully-closed position.

9 Again, turn the handlebars all the way through their travel with the engine idling. Idle speed should not change. If it does, either the cables are incorrectly routed or freeplay is still insufficient. **Warning:** Correct this condition before riding the bike.

Choke

Refer to illustration 9.12

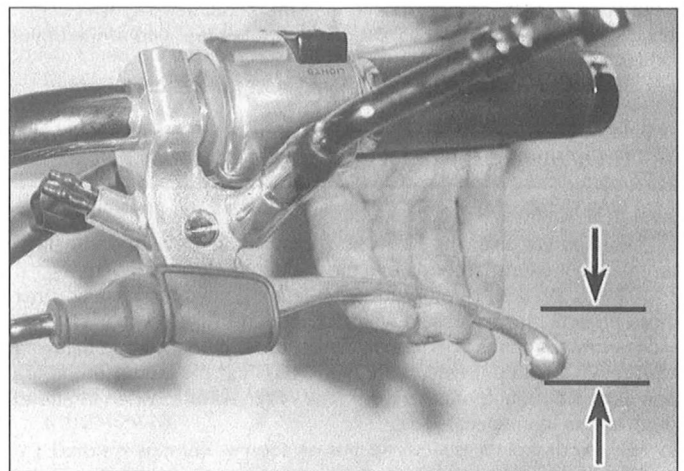
10 The choke system consists of a pair of starting enrichment (SE) valves - one per carburetor - which control the fuel enrichment circuits in the carburetors. When the choke knob on the left side of the engine is pulled out, the cable-actuated SE valves open the fuel enrichment circuits in the carburetors.

11 Make sure that the choke knob operates smoothly. If the knob is hard to pull out or push in, pull it out and lubricate its sliding surface with cable lubricant or a lightweight oil.

12 If the choke knob is still difficult to pull out or push in, pull back the rubber cover and back off the friction adjuster (**see illustration**).

13 If adjusting the friction doesn't help, the SE valve cables need to be lubricated (**see Chapter 4**).

14 If the engine is hard to start when it's cold - but easy to start when it's warmed up - the SE valves are not opening completely. If the idle speed "wanders" up and down, even after the engine is warmed up, the SE valves are not closing completely. In either case, the SE valves should be removed and cleaned, and the valves and valve seats should be inspected (**see Chapter 4**).



10.2 Clutch lever freeplay is the distance from the released position to the point at which you feel resistance

10 Clutch - check and adjustment

Refer to illustrations 10.2, 10.3 and 10.5

1 Correct clutch freeplay is necessary to ensure proper clutch operation and reasonable clutch service life. Freeplay normally changes because of cable stretch and clutch wear, so it should be checked and adjusted periodically.

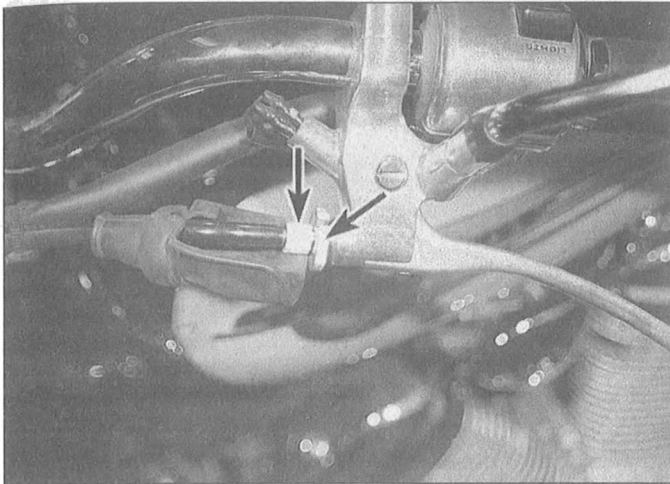
2 Clutch cable freeplay is checked at the lever on the handlebar. Slowly pull in on the lever until resistance is felt, measure this distance (**see illustration**) and compare it with the value listed in this Chapter's Specifications. Too little freeplay might result in the clutch not engaging completely. If there is too much freeplay, the clutch might not release fully.

3 Normal freeplay adjustments are made at the clutch lever by loosening the lockwheel and turning the adjuster until the desired freeplay is obtained (**see illustration**). Always retighten the lockwheel once the adjustment is complete.

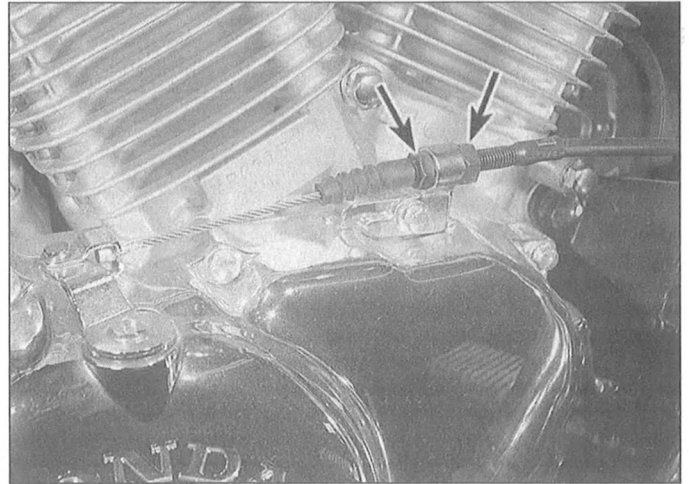
4 If freeplay can't be adjusted at the handlebar, major adjustments can be made on the right side of the engine.

5 Loosen the locknuts at the clutch cable bracket on the engine (**see illustration**). Turn the nuts to achieve the correct freeplay, then tighten them.

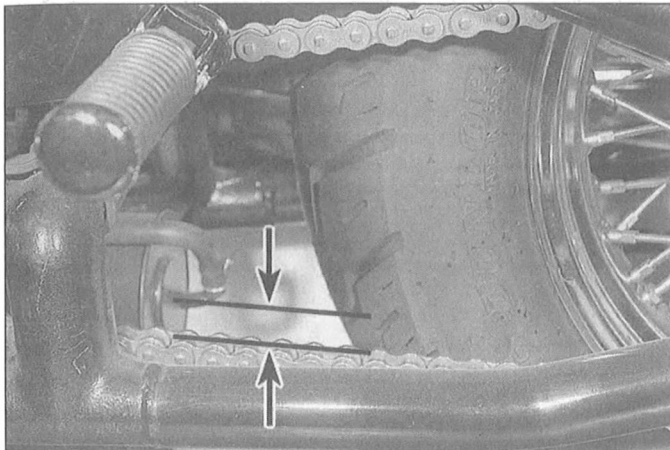
6 Recheck freeplay at the clutch lever and make further adjustments (if necessary) with the adjuster at the lever. If freeplay still can't



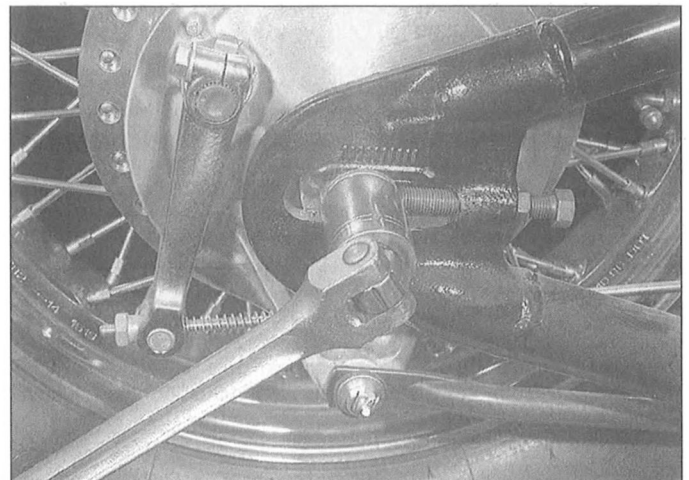
10.3 Normal clutch cable adjustments are made at the handlebar - loosen the clutch cable lockwheel (right arrow) and turn the adjuster (left arrow); tighten the lockwheel after adjustment



10.5 The clutch cable can also be adjusted at this bracket on the right side of the engine; loosen the locknut (left arrow) and turn the adjusting nut (right arrow) until clutch lever freeplay is correct (on pre-1995 models, the adjuster nut and locknut are on the same side of the bracket)



11.2 Measure chain slack at a point about halfway between the two sprockets on the bottom run



11.4 Always loosen the axle nut before adjusting the chain slack

be adjusted within the Specifications, the cable may be stretched or the clutch may be worn. Inspect the clutch cable and the clutch (see Chapter 2).

11 Drive chain and sprockets - check, adjustment and lubrication

Check

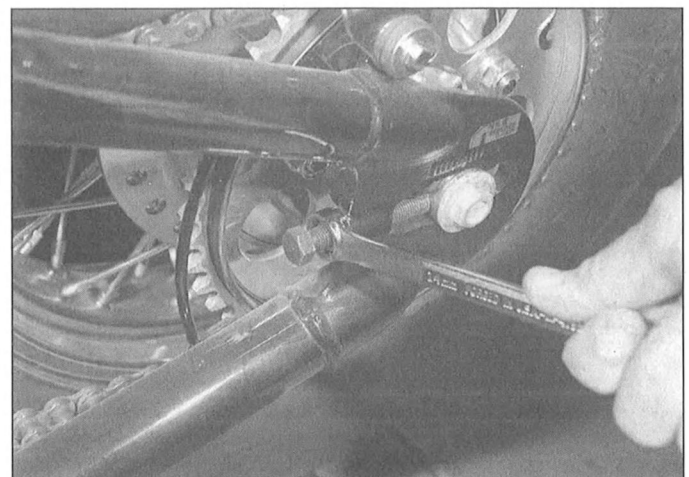
Refer to illustration 11.2

- 1 Make sure the ignition switch is off. Shift the transmission into Neutral and place the bike on its sidestand.
- 2 Push up on the bottom run of the chain and measure the slack at a point about halfway between the two sprockets (see illustration). Compare your measurement to the value listed in this Chapter's Specifications and, if necessary, adjust the chain.
- 3 The chain should be replaced at the specified mileage interval (see Chapter 5).

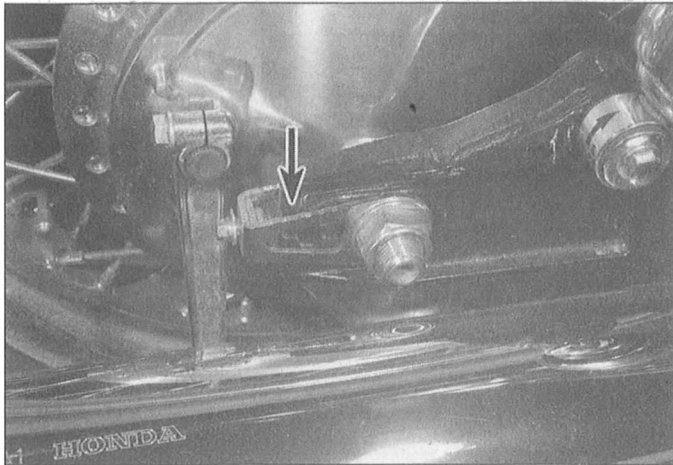
Adjustment

Refer to illustrations 11.4, 11.5, 11.6 and 11.7

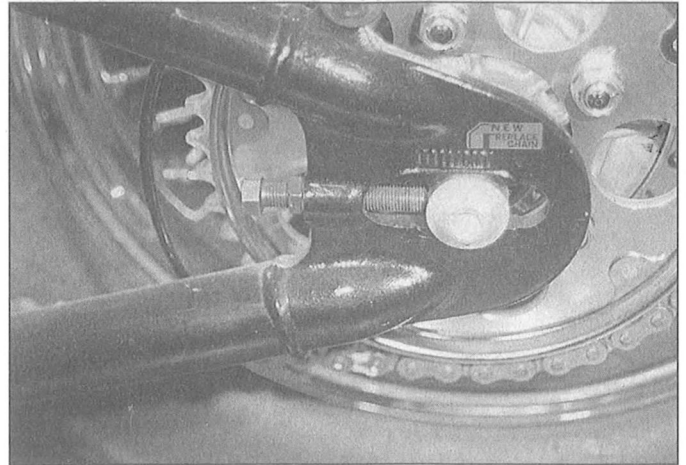
- 4 Loosen the rear axle nut (see illustration).
- 5 Loosen and back off the locknuts on both axle adjuster bolts (see illustration).



11.5 Loosen both chain adjuster locknuts before turning the adjuster bolts; on VT600 models (shown), note the pointer on top of the adjuster and the adjustment marks on the swingarm



11.6 On VT750 models, there's a single indicator mark (arrow) on each side of the swingarm, and notches in the adjusters themselves



11.7 When the pointer on the adjuster points at the red zone on the chain wear label on VT600 models, replace the chain (on VT750 models, the chain wear label is on the left adjuster; when it reaches the mark on the swingarm, replace the chain)

6 On VT600 models, there is a single index mark on each of the adjusters and a series of marks on each side of the swingarm (see **illustration 11.5**); on VT750 models, there is a single mark on each side of the swingarm and a series of notches on the adjusters (see **illustration**).

7 Turn the adjusting nuts on both sides of the swingarm until the proper chain tension is obtained (get the adjuster on the chain side close, then set the adjuster on the opposite side). Be sure to turn the adjusting nuts evenly to keep the rear wheel in alignment. If the index mark on the left adjuster reaches the red zone of the chain wear label on the left side of the swingarm on VT600 models (see **illustration**), or the red zone on the left adjuster reaches the index mark on the left side of the swingarm on VT750 models, the chain is worn out and must be replaced (see Chapter 7).

8 When the chain has the correct amount of slack, make sure the marks on the adjusters correspond to the same relative marks on each side of the swingarm (VT600 models) or the marks on each side of the swingarm correspond to the same relative notches on the adjusters (VT750 models).

9 Tighten the axle nut to the torque listed in this Chapter's Specifications.

10 Tighten the chain adjuster locknuts securely.

Lubrication

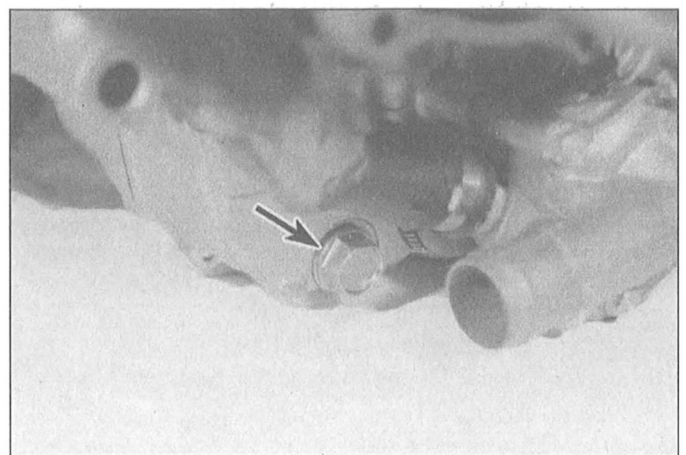
11 Lubricate the chain right after the motorcycle has been ridden. The chain is still warm, so chain lube will penetrate the joints between the side plates, pins, bushings and rollers and reach the internal load bearing surfaces. Use a good quality chain lubricant designed for O-ring type chains. Apply it to the areas where the side plates overlap - not the middle of the rollers. Apply the lube to the top of the lower chain run, so that centrifugal force will work the oil into the chain the next time the bike is ridden. After applying chain lube, let it soak in a few minutes before wiping off any excess.

12 Check the sprockets for wear while lubricating the chain (see Chapter 6).

12 Engine oil/filter - change

Refer to illustrations 12.4, 12.5a and 12.5b

1 Regular 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 replaced often with new oil of the recommended grade and



12.4 The oil drain plug (arrow) is on the lower left side of the engine, behind the water pump

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.

2 Before changing the oil and filter, warm up the engine so the oil will drain easily. Be careful when draining the oil; the exhaust pipes, the engine and the oil itself can cause severe burns.

3 Support the motorcycle securely over a clean drain pan. Remove the oil filler cap to vent the crankcase and act as a reminder that there is no oil in the engine.

4 Next, remove the drain plug from the lower left side of the engine (see **illustration**) and allow the oil to drain into the pan. Discard the sealing washer on the drain plug; it should be replaced every time the plug is removed. While the engine is draining, replace the oil filter.

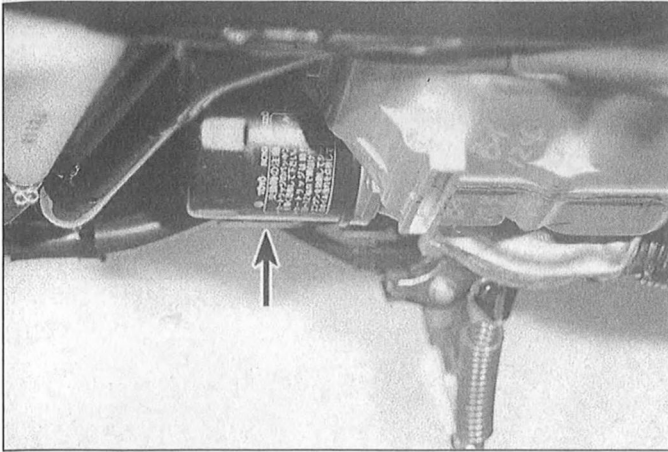
5 The automotive style spin-on oil filter is located at the left lower rear part of the engine; with the bike leaned over to the left on its side-stand, it's easier to access the filter from the right side (see **illustration**). Remove the filter from the engine with a filter wrench (see **illustration**). If you don't have this type of filter wrench, use a pair of large water pump pliers to loosen the filter.

6 Coat the threads of the new oil filter and the new filter O-ring with clean engine oil.

7 Install the new filter and tighten it by hand.

8 Check the condition of the drain plug threads and the sealing washer.

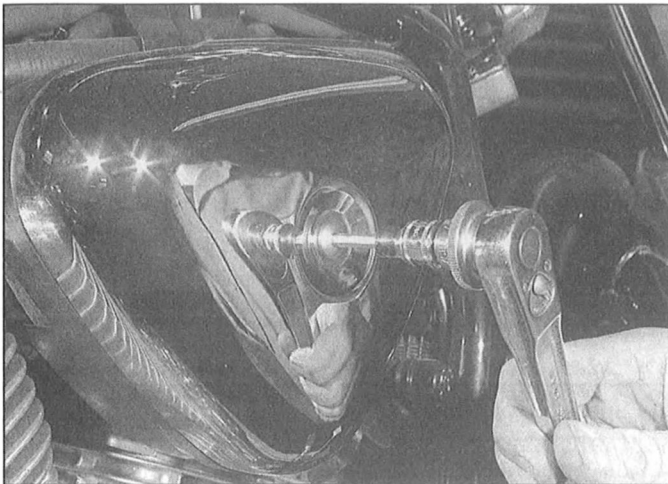
9 Slip a new sealing washer over the drain plug, then install and tighten it to the torque listed in this Chapter's Specifications. Avoid



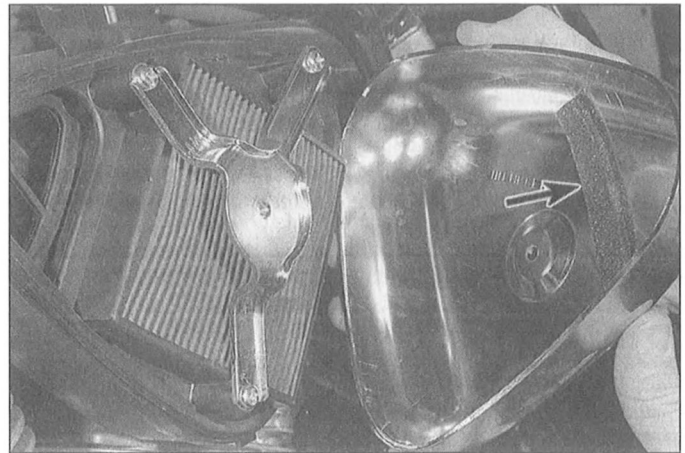
12.5a The oil filter (arrow) is at the lower rear part of the engine; the easiest way to reach it is from the right side, with the bike on its sidestand



12.5b Use a filter wrench to remove the oil filter (if you don't have this type of filter wrench, use a pair of large water pump pliers)



13.1a To remove the air cleaner housing cover on VT600 models, remove this Allen screw . . .

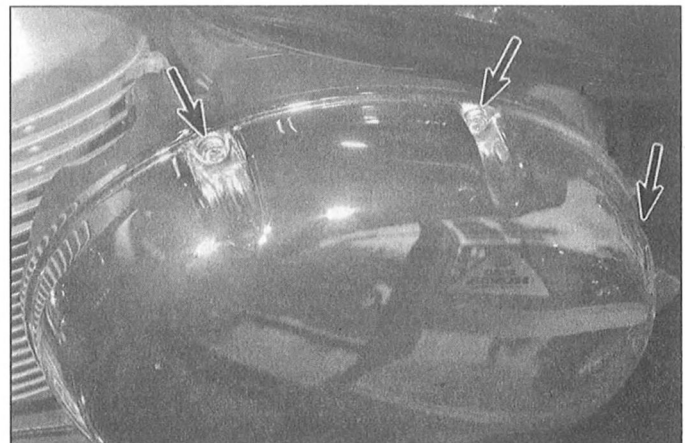


13.1b . . . remove the cover and inspect the foam strip (arrow)

13 Air filter element - servicing

Refer to illustration 13.1a, 13.1b, 13.1c, 13.2 and 13.3

- 1 Remove the air cleaner housing cover (see illustrations).
- 2 On VT600 models, remove the filter element holder (see illustration).



13.1c To remove the air cleaner housing cover on VT750 models, remove the six cover screws (three upper screws shown)

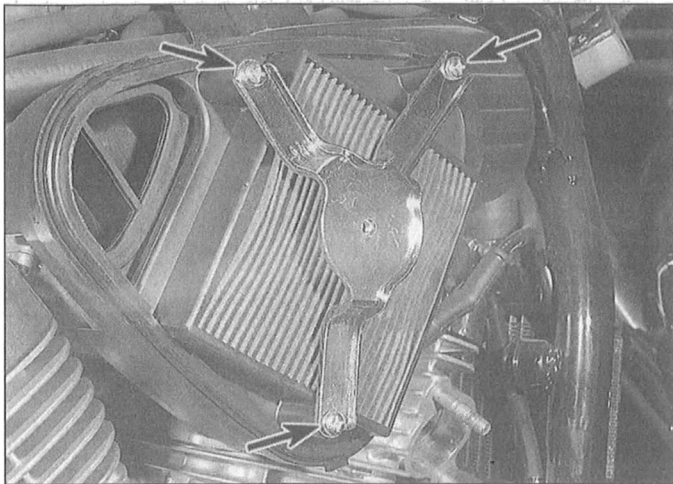
overtightening the drain plug, which can strip the threads in the aluminum engine case.

10 Before refilling the engine, check the old oil carefully. If the oil was drained into a clean pan, small pieces of metal or other material can be easily detected. If the oil is very metallic colored, 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.

11 If there are pieces of fiber-like material in the oil, the clutch is experiencing excessive wear and should be checked.

12 If the inspection of the oil turns up nothing unusual, refill the crankcase to the proper level with the recommended oil and install the filler cap. Start the engine and let it run for two or three minutes. Shut it off, wait a few minutes, then check the oil level. If necessary, add more oil to bring the level up to the Maximum mark. Check around the drain plug and filter housing for leaks.

13 The old oil drained from the engine cannot be reused in its present state and should be disposed of. 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. After the oil has cooled, it can be drained into a suitable container (capped plastic jugs, topped bottles, milk cartons, etc.) for transport to one of these disposal sites.



13.2 On VT600 models, remove the filter element holder screws (arrows) and remove the holder



13.3 Remove the filter element (VT600 shown; on VT750 models, simply pull the filter element off the air cleaner housing)

- 3 Lift out the filter element (**see illustration**).
- 4 Tap the filter element on a hard surface to shake out dirt. If compressed air is available, use it to clean the element by blowing from the inside out. If the element is extremely dirty or torn, or if dirt can't be blown or tapped out, replace the element.
- 5 Installation is the reverse of removal. Make sure the filter element is seated properly in the filter housing before installing the cover.

14 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. Depending on the outcome of the initial test, a squirt-type oil can may also be needed.
- 3 Start the engine and allow it to reach normal operating temperature.
- 4 Support the bike securely so it can't be knocked over during this procedure.
- 5 Remove *one* spark plug from each cylinder (see Section 15). Work carefully - don't strip the spark plug hole threads and don't burn your hands.
- 6 Disable the ignition by unplugging the primary wires from the coils (**see Chapter 5**). Be sure to mark the locations of the wires before detaching them.
- 7 Install the compression gauge in one of the spark plug holes.
- 8 Hold or block the throttle wide open.
- 9 Crank the engine over a minimum of four or five revolutions (or until the gauge reading stops increasing) and observe the initial movement of the compression gauge needle as well as the final total gauge reading. Repeat the procedure for the other cylinder and compare the results to the value listed in this Chapter's Specifications.
- 10 If the compression in both cylinders built up quickly and evenly to the specified amount, you can assume the engine upper end is in reasonably good mechanical condition. Worn or sticking piston rings and worn cylinders will produce very little initial movement of the gauge needle, but compression will tend to build up gradually as the engine spins over. Valve and valve seat leakage, or head gasket leakage, is indicated by low initial compression which does not tend to build up.
- 11 To further confirm your findings, add a small amount of engine oil to each cylinder by inserting the nozzle of a squirt-type oil can through the spark plug holes. The oil will tend to seal the piston rings if they are leaking. Repeat the test for the other cylinder.

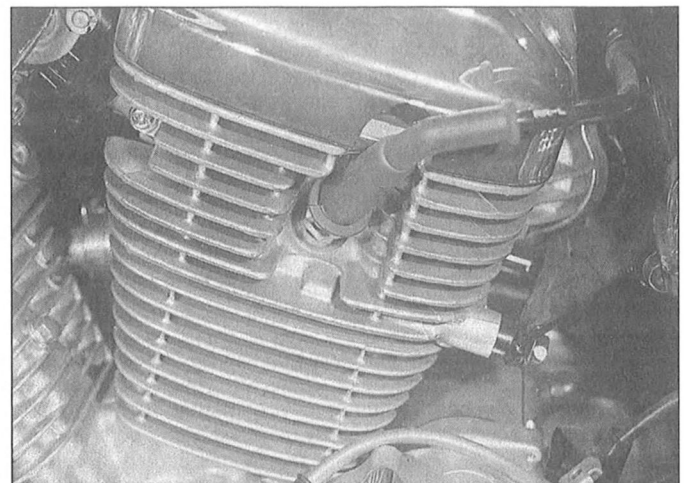
- 12 If the compression increases significantly after the addition of the oil, the piston rings and/or cylinders are definitely worn. If the compression does not increase, the pressure is leaking past the valves or the head gasket. Leakage past the valves may be due to insufficient valve clearances, burned, warped or cracked valves or valve seats or valves that are hanging up in the guides.

- 13 If compression readings are considerably higher than specified, the combustion chambers are probably coated with excessive carbon deposits. It is possible (but not very likely) for carbon deposits to raise the compression enough to compensate for the effects of leakage past rings or valves. Remove the cylinder head and carefully decarbonize the combustion chambers (see Chapter 2).

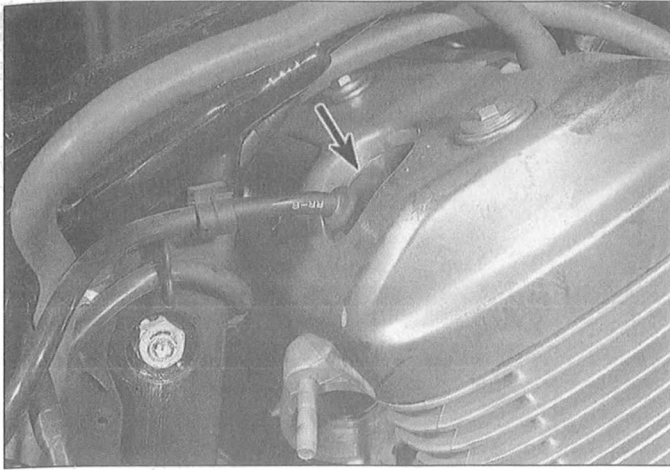
15 Spark plugs - replacement

Refer to illustrations 15.2a, 15.2b, 15.2c, 15.7a and 15.7b

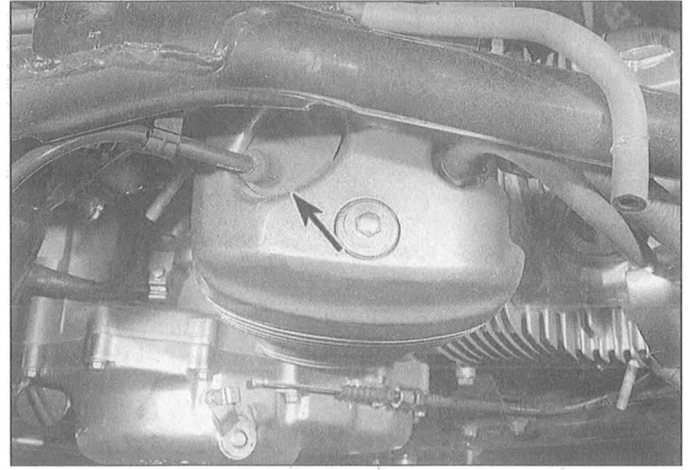
- 1 Make sure your spark plug socket is the correct size before attempting to remove the plugs.
- 2 Disconnect the spark plug caps from the spark plugs (**see illustrations**). Inspect the caps for damage and wear.
- 3 Using compressed air, blow any accumulated debris from around the spark plugs. No dirt or debris must be allowed into the combustion chamber. Remove the plugs with a spark plug socket.



15.2a There are two spark plugs per cylinder; this is the spark plug cap for the left plug on the rear cylinder . . .



15.2b ... and this is the cap (arrow) for the recessed right plug on the rear cylinder (fuel tank removed for clarity)



15.2c On the front cylinder, the open plug is on the right side and the recessed plug (arrow) is in the left front corner of the cylinder head cover (fuel tank removed for clarity)

4 Inspect the electrodes for wear. Both the center and side electrodes should have square edges and the side electrode should be of uniform thickness. Look for excessive deposits and evidence of a cracked or chipped insulator around the center electrode. Compare your spark plugs to the color spark plug reading chart. Check the threads, the washer and the ceramic insulator body for cracks and other damage.

5 If the electrodes are not excessively worn, and if the deposits can be easily removed with a wire brush, the plugs can be regapped and reused (if no cracks or chips are visible in the insulator). If in doubt concerning the condition of the plugs, replace them with new ones, as the expense is minimal.

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

7 Before installing new plugs, make sure they are the correct type and heat range. Check the gap between the electrodes, as they are not preset. For best results, use a wire-type gauge rather than a flat gauge to check the gap (**see illustration**). 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 before installing each plug.

8 Since the cylinder head is made of aluminum, which is soft and easily damaged, thread the plugs into the heads by hand. Since the plugs are recessed, 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 and the accompanying repair costs.

9 Once the plugs are finger tight, the job can be finished with a socket. If a torque wrench is available, tighten the spark plugs to the torque listed in this Chapter's Specifications. If you do not have a torque wrench, tighten the plugs finger tight (until the washers bottom on the cylinder head) then use a wrench to tighten them an additional 1/4 to 1/2 turn. Regardless of the method used, do not over-tighten them.

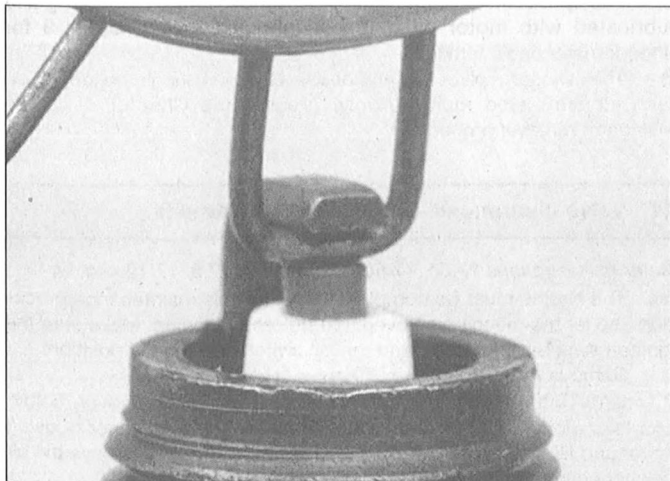
10 Reconnect the spark plug caps and reinstall the air ducts.

16 Lubrication - general

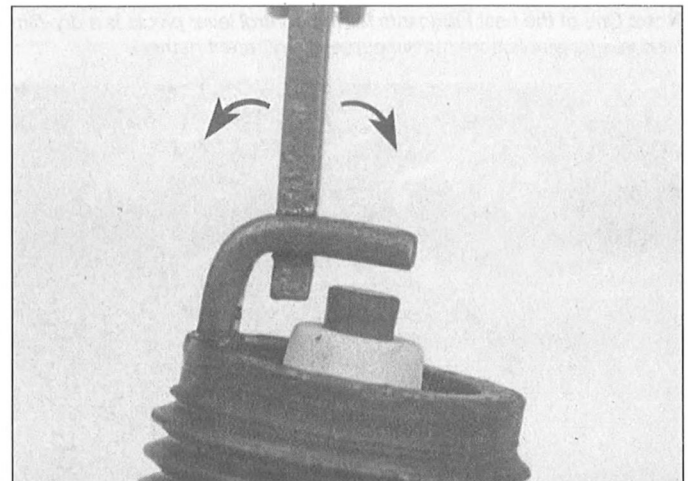
Refer to illustrations 16.2a, 16.2b, 16.3a and 16.3b

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

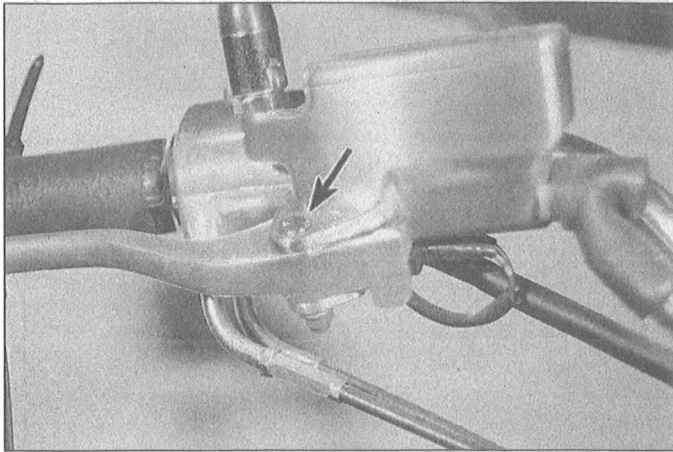
2 The clutch lever and brake lever pivots, the brake pedal, shift lever and sidestand pivots, the rear brake linkage, the shift linkage and



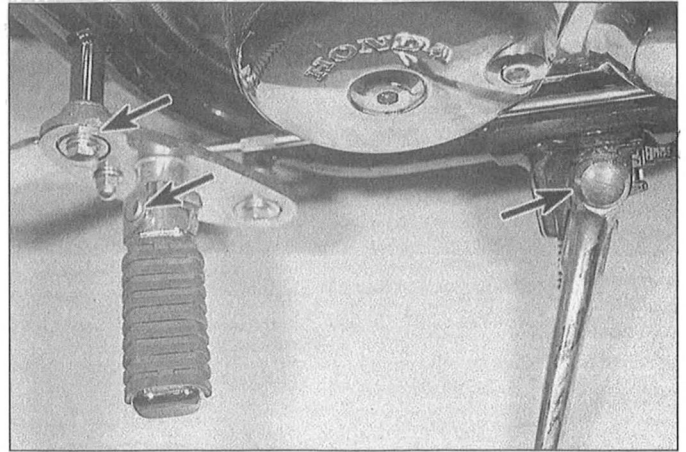
15.7a Spark plug manufacturers recommend using a wire type gauge when checking the gap - if the wire doesn't slide between the electrodes with a slight drag, adjustment is required



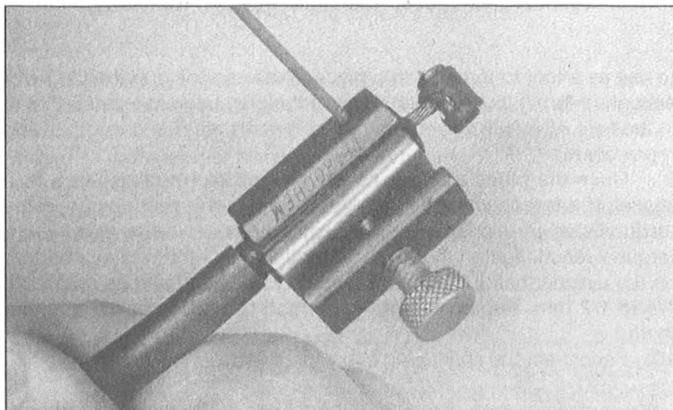
15.7b To change the gap, bend the side electrode only, as indicated by the arrows, and be very careful not to crack or chip the ceramic insulator surrounding the center electrode



16.2a Lubricate the brake lever pivot (arrow) and clutch lever pivot (not shown, but similar)



16.2b Lubricate the shift lever pivot, the footpeg hinge and the sidestand pivot (arrows)



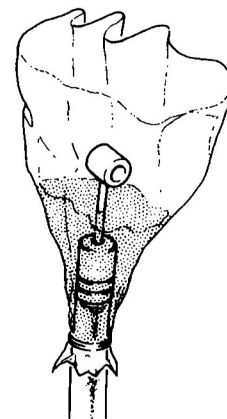
16.3a Lubing a cable with a pressure lube adapter is easier and less messy (they're available at most bike shops)

the footpeg hinges should be lubricated frequently (see illustrations). 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).



17.5a Remove the two Allen bolts and remove the intake valve adjustment cover from the rear cylinder cover (VT600 models)



16.3b If you don't have a pressure lube adapter, make a funnel at one end of the cable with a small piece of plastic, tape it to the cable and carefully pour a small amount of oil into the funnel

3 To lubricate the throttle cables, disconnect them at the lower end, then lubricate them with a pressure lube adapter (see illustration). If you don't have one, disconnect both ends of the cable and use a funnel (see illustration). It's a good idea to remove and lubricate the throttle twist grip whenever the throttle cables are lubricated (see the handlebar switch removal section of Chapter 9).

4 The choke cables should be lubricated the same way as the throttle cables (see Chapter 4 for the choke cable removal procedure).

5 The speedometer cable should be removed from its housing and lubricated with motor oil or cable lubricant (see Chapter 9 for speedometer cable removal).

6 The swingarm pivot ball and needle bearings should be lubricated with lithium-based multi-purpose grease (see Chapter 6 for the swingarm removal procedure).

17 Valve clearances - check and adjustment

Refer to illustrations 17.5a, 17.5b, 17.5c, 17.7, 17.8, 17.12 and 17.13

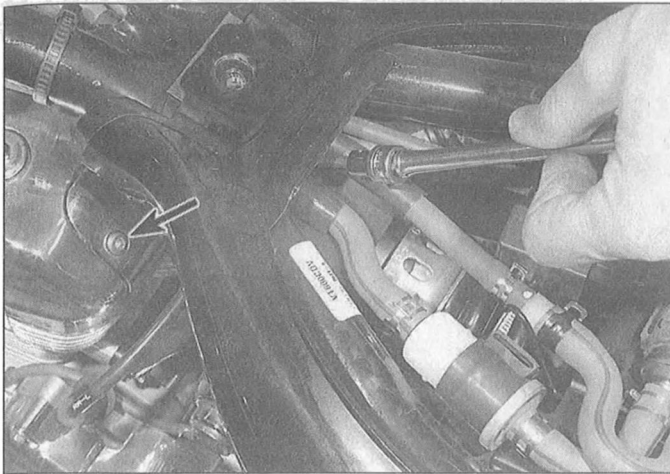
1 The engine must be completely cool for this maintenance procedure, so let the machine sit overnight before beginning. Make sure the ignition switch is turned off and the kill switch is in the Off position.

2 Remove the fuel tank (see Chapter 4).

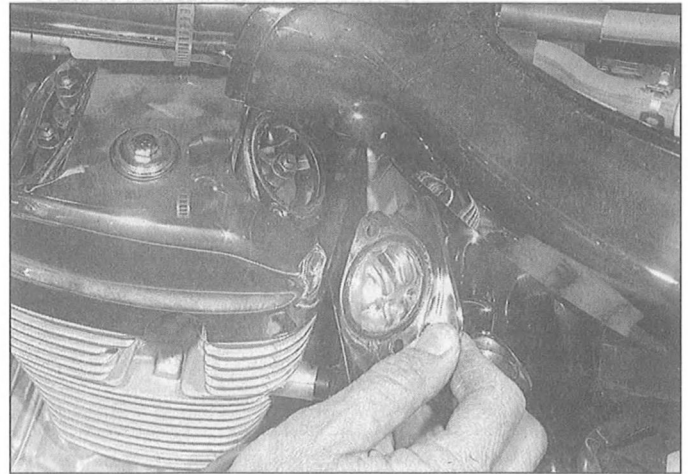
3 On VT600 models, remove the air cleaner housing cover, holder and filter element; on VT750 models, remove the air cleaner housing cover and filter element (see Section 13). On all models, remove the air cleaner chamber and intake duct assembly (see Chapter 4).

4 Remove the spark plugs (see Section 15) so the crankshaft is easier to turn.

5 On VT600 models, remove the valve adjusting covers (see illustrations).



17.5b Remove the two Allen bolts (arrow indicates outer bolt; use a long Allen bit on the inner bolt) . . .



17.5c . . . and remove the exhaust valve adjustment cover from the rear cylinder cover (VT600 models)

6 On VT750 models, remove the cylinder head covers (see Chapter 2).

7 Remove the crankshaft hole cap and the timing hole cap from the left side of the engine (**see illustration**).

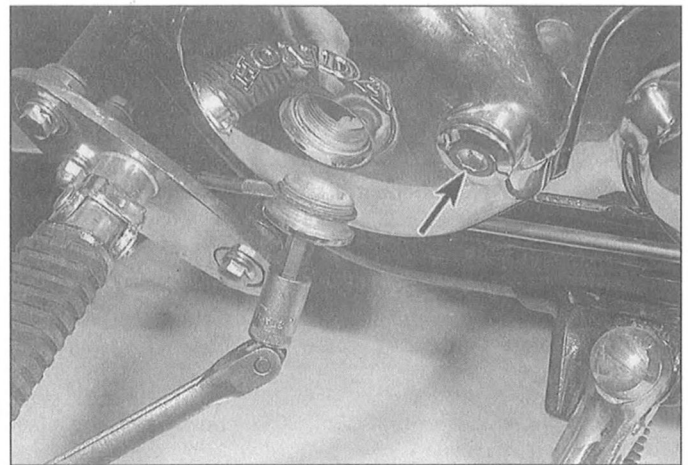
8 Adjust the valves for the front cylinder first. Rotate the crankshaft counterclockwise with a socket (**see illustration**) until the FT mark on the flywheel is aligned with the index mark on the left crankcase cover. This places the front piston at top dead center (TDC). To verify that the front piston is on its compression stroke, wiggle the tip of each front cylinder rocker arm. If the front piston is at TDC, the valves will be fully closed; the rocker arms won't be pushing against the valves, so they should feel a little loose. If the rocker arms don't feel loose, the front piston is on its exhaust stroke. Rotate the crankshaft one full turn counterclockwise, so the FT mark again aligns with the index mark.

9 Insert a feeler gauge of the thickness listed in this Chapter's Specifications into the gap between the top of each valve stem and its rocker arm adjuster screw. Pull the feeler gauge out slowly - you should feel a slight drag. If there's no drag, the clearance is too loose. If there's a heavy drag, the clearance is too tight.

10 To adjust the clearance, loosen the rocker arm locknut with a box wrench. Turn the adjusting screw to adjust the clearance, then tighten the locknut.

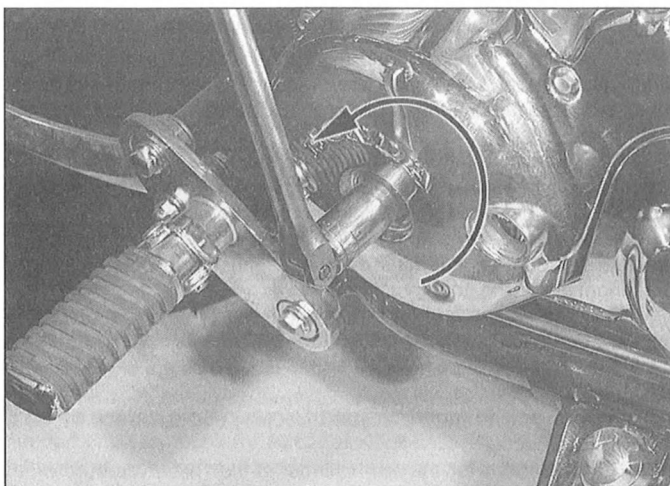
11 Recheck the clearance with the feeler gauge to make sure it didn't change when you tightened the locknut. Readjust it if necessary.

12 Rotate the crankshaft counterclockwise again until the RT mark

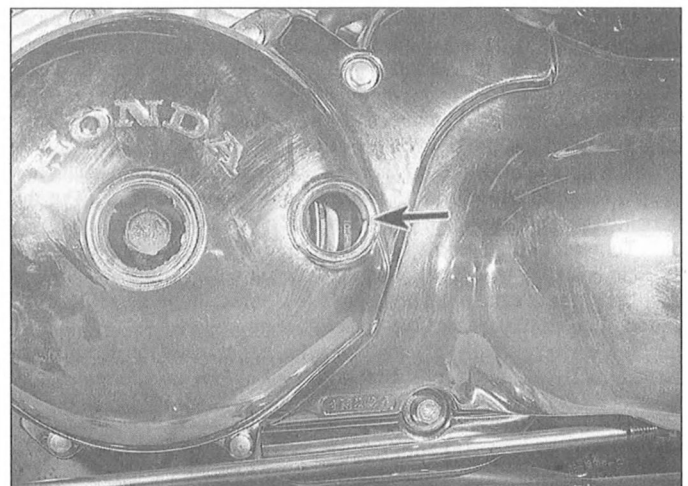


17.7 Remove the crankshaft and timing hole plugs

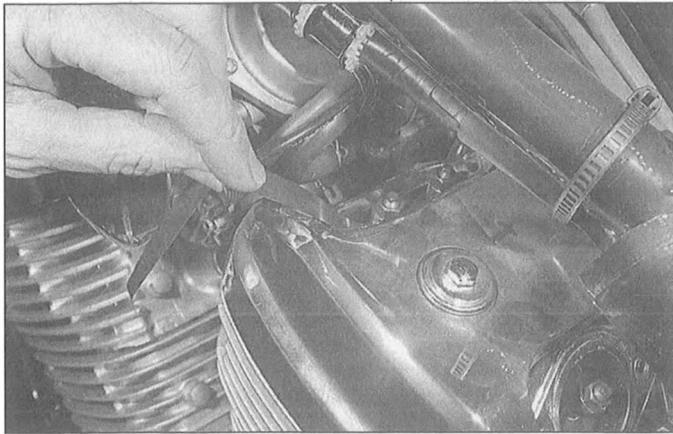
on the flywheel is aligned with the index mark on the crankcase cover (**see illustration**). The rear piston should now be at TDC. Verify that it is by wiggling the rear cylinder rocker arms. With the engine in this position, the valves for the rear cylinder can be checked.



17.8 Rotate the crankshaft counterclockwise



17.12 To bring the rear piston to TDC, align the RT mark on the flywheel with the index mark on the edge of the timing hole



17.13 To measure the valve clearance, insert a feeler gauge of the specified thickness into the gap between each rocker arm and valve stem

13 Referring to Step 9, insert a feeler gauge of the thickness listed in this Chapter's Specifications between each rocker arm and valve stem (**see illustration**). Adjust the clearances if necessary as described in Step 10.

14 On VT600 models, inspect the O-rings on the valve adjustment covers. Replace them if they're cracked, torn, flattened or distorted. Install the valve adjustment covers and tighten the Allen bolts to the torque listed in this Chapter's Specifications.

15 On VT750 models, inspect the cylinder head cover O-rings. Replace them if they're cracked, torn, flattened or distorted. Install the cylinder head covers and tighten the cover bolts to the torque listed in the Chapter 2 Specifications (see Chapter 2).

16 Install the spark plugs (see Section 15).

17 Inspect the O-rings for the crankshaft hole and timing hole plugs and replace them if necessary. Install the plugs and tighten them securely.

18 Install the air intake ducts and air chamber (see Chapter 4). Install the air cleaner filter element, holder (VT600 models) and air cleaner housing cover (see Section 13).

19 Install the fuel tank (see Chapter 4).

18 Idle speed - check and adjustment

Refer to illustration 18.3

1 The idle speed should be checked and adjusted before and after the carburetors are synchronized and whenever it is obviously high or 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 cables may not be correctly adjusted, 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. Put the transmission in Neutral and place the bike on its sidestand.

3 Turn the throttle stop screw (**see illustration**), until the idle speed listed in this Chapter's Specifications is obtained.

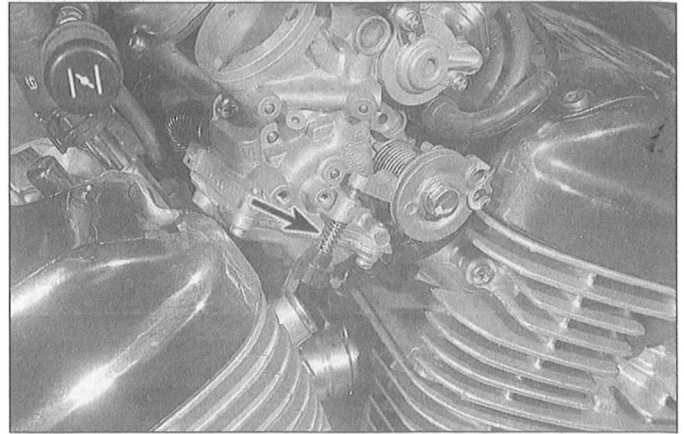
4 Snap the throttle open and shut a few times, then recheck the idle speed. If necessary, repeat the adjustment procedure.

5 If a smooth, steady idle can't be achieved, the air/fuel mixture may be incorrect. Refer to Chapter 4 for additional carburetor information.

19 Carburetor synchronization - check and adjustment

Refer to illustrations 19.7a, 19.7b and 19.12

Warning: Gasoline is extremely flammable, so take extra precautions



18.3 Turn the throttle stop screw (arrow) to set idle speed (throttle link cover, throttle cables and choke knob removed for clarity)

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 (such as a water heater or clothes dryer) is present. Since gasoline is carcinogenic, wear latex gloves when there's a possibility of being exposed to fuel, and, if you get fuel on your skin, wash it off immediately with soap and water. Mop up any spills immediately and do not store fuel-soaked rags where they could ignite. When you perform any kind of work on the fuel system, wear safety glasses and have a class B type fire extinguisher (flammable liquids) on hand.

1 Carburetor synchronization is simply the process of adjusting dual carburetors so they pass the same amount of fuel/air mixture to each cylinder. This is done by measuring the vacuum produced in each cylinder. Carburetors that are out of synchronization will result in decreased fuel mileage, increased engine temperature, less than ideal throttle response and higher vibration levels.

2 To properly synchronize the carburetors, you will need some sort of vacuum gauge setup, preferably with a gauge for each cylinder, or a mercury manometer, which is a calibrated tube arrangement that utilizes columns of mercury to indicate engine vacuum. You'll also need an auxiliary fuel tank, since the bike's fuel tank must be removed for access to the vacuum fittings and synchronizing screws.

3 A manometer can be purchased from a motorcycle dealer or accessory shop and should have the necessary rubber hoses supplied with it for hooking into the vacuum hose fittings on the carburetors.

4 A vacuum gauge setup can also be purchased from a dealer or fabricated from commonly available hardware and automotive vacuum gauges.

5 The manometer is the more reliable and accurate instrument, and for that reason is preferred over the vacuum gauge setup; however, since the mercury used in the manometer is a liquid, and extremely toxic, extra precautions must be taken during use and storage of the instrument.

6 Because of the nature of the synchronization procedure and the need for special instruments, most owners leave the task to a dealer service department or a reputable motorcycle repair shop.

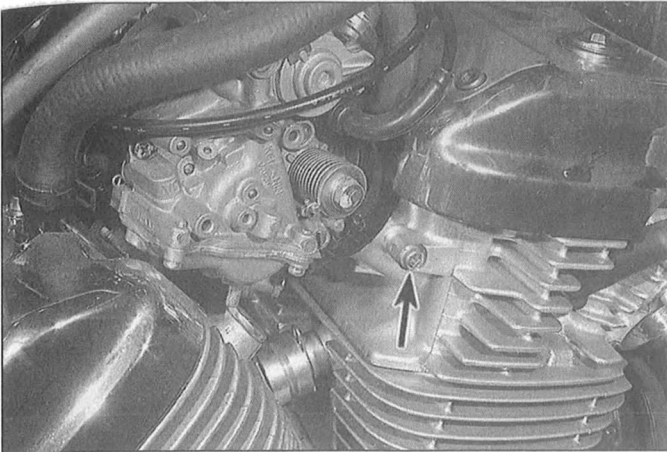
7 Remove the screws from the intake vacuum ports and install vacuum gauge adapters (**see illustrations**). Connect the vacuum gauges or manometer to the adapters.

8 Start the engine and let it run until it reaches normal operating temperature.

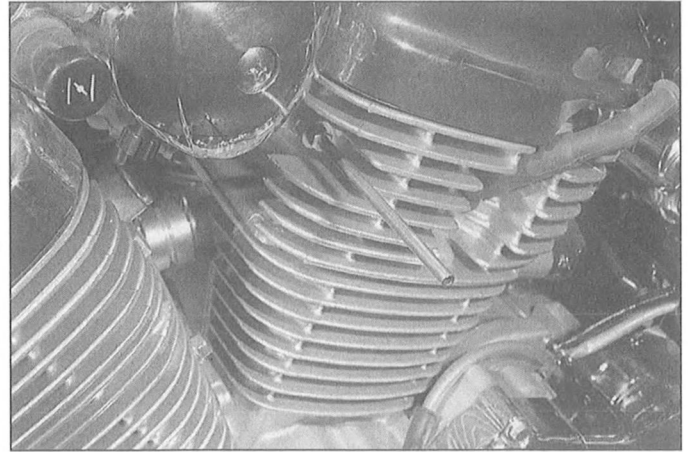
9 Make sure there are no leaks in the vacuum gauge or manometer setup, as false readings will result.

10 Start the engine and make sure the idle speed is correct. If it isn't, adjust it (see Section 18).

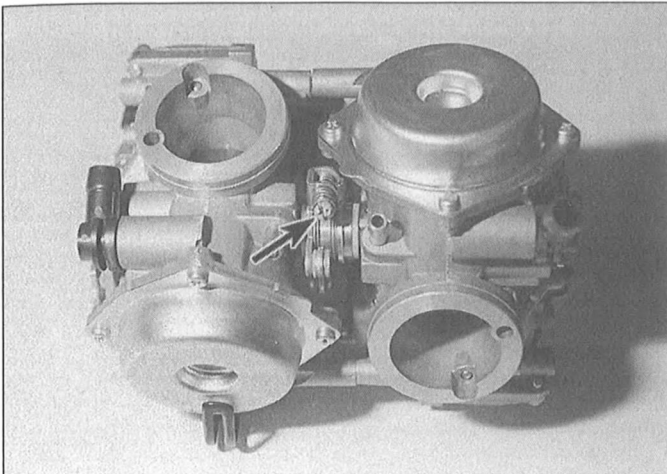
11 The carburetor for the rear cylinder is the "base" carburetor. In other words, vacuum at the front carburetor should be compared to vacuum at the rear carburetor. The vacuum readings for both of the cylinders should be within the allowable deviation listed in this Chap-



19.7a Remove the vacuum screw (arrow) from the right side of the front cylinder intake port . . .



19.7b . . . remove the other vacuum screw from the left side of the rear cylinder intake port, then install an adapter tube in each vacuum port



19.12 The carburetor synchronization screw (arrow) is located between the carburetors and can be accessed (with the fuel tank removed) through the space between the intake ducts (carburetors removed for clarity)



20.7 To remove the radiator cap, turn it counterclockwise to the first stop, let any residual pressure escape, then resume turning the cap counterclockwise until it's free and pull it off

ter's Specifications. If the variance in vacuum between the two carburetors exceeds the allowable deviation, synchronize the carburetors.

12 To perform the adjustment, synchronize the carburetors by turning the synchronizing screw (**see illustration**) until the vacuum is identical or within the allowable deviation for both cylinders.

13 Snap the throttle open and shut two or three times, then recheck synchronization and readjust if necessary.

14 When the adjustment is complete, recheck the vacuum readings and idle speed, then stop the engine. Remove the vacuum gauge or manometer and install the intake port screws.

20 Cooling system - check

Refer to illustrations 20.7 and 20.8

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

Note: Check the coolant level before checking the cooling system (see Section 3).

1 The cooling system should be checked carefully at the recommended intervals. Look for evidence of leaks, check the condition of the coolant, check the radiator for clogged fins and damage. Make sure the radiator cooling fan operates when the coolant gets hot. If it doesn't, either the fan motor, the fan switch or the circuit is defective (see Chapter 3).

2 Inspect the condition of the coolant hoses. Look for cracks, abrasions and any other damage that might cause a leak. Squeeze the hoses. They should feel firm yet pliable, and should return to their original shape when released. If they feel hard or stiff, replace them.

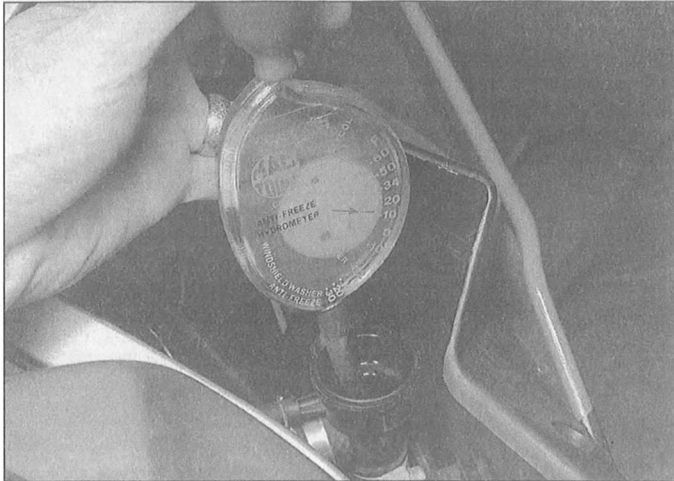
3 Look for signs of leaks at every cooling system joint (where the hoses are clamped to the radiator, thermostat and water pump). If a hose is leaking at one of these components, tighten the hose clamp. Of course, if a hose is in poor condition, tightening a hose clamp can tear the hose, making the leak worse. Such hoses must be replaced.

4 Inspect the radiator for signs of 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 and have it repaired or replace it (see Chapter 3). Do not use a liquid leak-stopping additive to try to repair leaks.

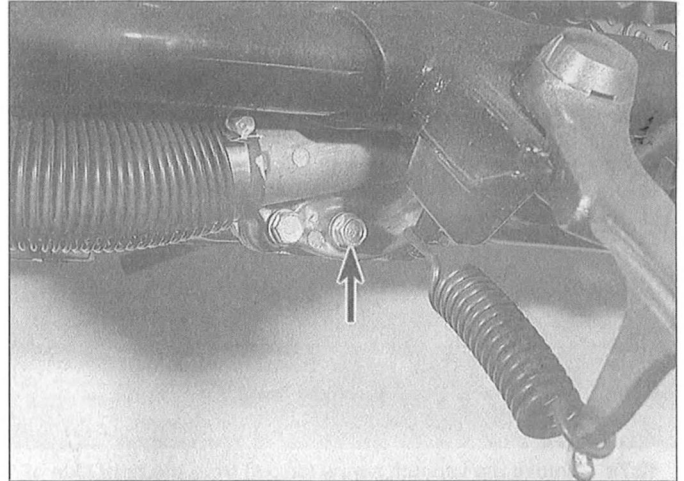
5 Inspect the radiator fins for any debris - mud, dirt, insects, etc. - which impedes the flow of air through the radiator. If the fins are dirty, force water or low pressure compressed air through the fins from the backside. If the fins are bent or distorted, carefully straighten them with a small flat-blade screwdriver.

6 Remove the fuel tank (see Chapter 4) and the steering covers (see Chapter 8).

7 Remove the radiator cap (**see illustration**) by turning it counterclockwise until it reaches a stop. If you hear a hissing sound, there's still pressure in the system. Wait until it stops. Then press down on the cap and continue turning it counterclockwise and remove it. Inspect



20.8 An antifreeze hydrometer is helpful for determining the condition of the coolant



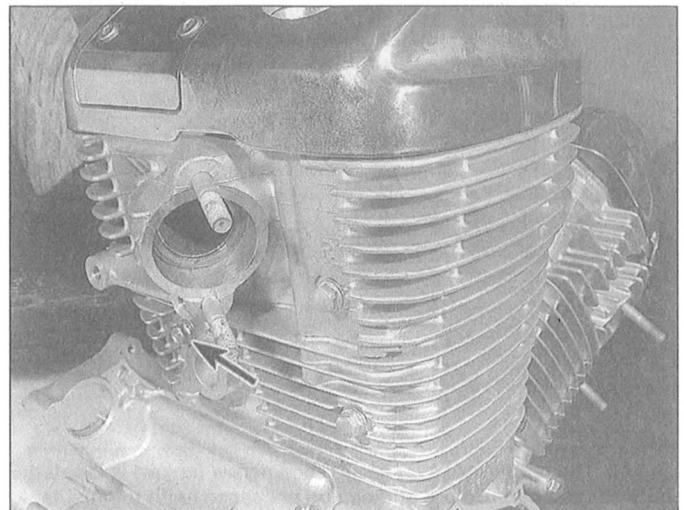
21.3a There are two cooling system drain bolts: this one (arrow) is on the water pump . . .

the condition of the coolant in the radiator. If it's rust-colored, or if scale has accumulated inside the radiator, drain, flush and refill the system with a new 50/50 mixture of distilled water and ethylene glycol. Inspect the cap gasket for cracks and any other damage. If any damage is evident, have the cap pressure-tested by a dealer service department or replace it. Install the cap by turning it clockwise until it reaches the first stop, then push it down and continue turning it clockwise until it stops.

8 Check the antifreeze content of the coolant with an antifreeze hydrometer (see illustration). Coolant might appear to be in good condition but might be too weak to offer adequate protection. If the hydrometer indicates a weak mixture, drain, flush and refill the cooling system (see Section 21).

9 Start the engine and let it reach normal operating temperature, then check for leaks again. As the coolant temperature reaches its upper operating temperature, the fan should come on automatically and the coolant temperature should begin to come back down. If it the fan doesn't come on, inspect the fan, the fan switch and the circuit (see Chapter 3).

10 If the coolant level is constantly low, and no evidence of leaks can be found, have the cooling system pressure checked by a Honda dealer service department or by a motorcycle repair shop.



21.3b . . . the other drain bolt is on the rear side of the rear cylinder, above the starter motor

21 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 painted surfaces of the vehicle. 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 about disposing used antifreeze. Many communities have collection centers that can dispose of antifreeze safely. Antifreeze is also combustible, so don't store it or use it near open flames.

Draining

Refer to illustrations 21.3a and 21.3b

- 1 Remove the fuel tank (see Chapter 4) and the steering covers (see Chapter 8).
- 2 Remove the radiator cap (see Section 20).
- 3 To drain the cooling system, remove the drain bolts from the water pump and from the rear side of the rear cylinder, right above the starter motor (see illustrations). Discard the drain bolt sealing washers. Use a funnel to direct the coolant from the rear cylinder drain hole

away from the starter; make sure that no coolant is allowed to spill onto the starter. **Note:** The coolant will rush out with some force, so be sure to position your drain pan(s) accordingly.

- 4 Remove the reservoir (see Chapter 3). Drain the reservoir into the drain pan and wash out the reservoir with clean water. Install the reservoir.

Flushing

- 5 Flush the system with clean tap water by inserting a garden hose into the radiator filler neck. Allow the water to run through the system until clear water comes out the drain hole. If the radiator is extremely corroded, remove it by referring to Chapter 3 and have it cleaned at a radiator shop.

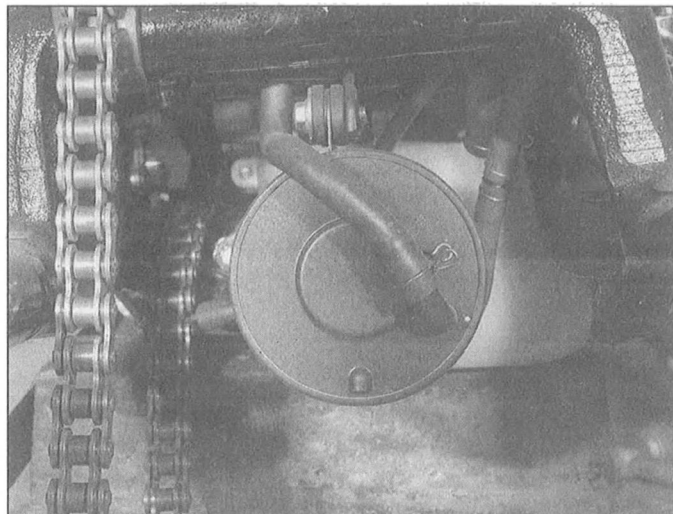
- 6 Clean the drain bolt holes and install the drain bolts with new sealing washers. Tighten the drain bolts to the torque listed in this Chapter's Specifications.

- 7 Fill the cooling system with a mixture of clean water and flushing compound. Make sure that the flushing compound is compatible with aluminum components and follow the manufacturer's instructions carefully.

- 8 Install the radiator cap (see Section 21), start the engine and allow it to reach normal operating temperature. Let it run for about ten minutes.



22.3 Inspect the condition of the hoses connecting the various EVAP system components (late-model VT600 shown; refer to the vacuum hose routing diagram on the inside of the left side cover for a schematic of the system on your machine)



22.4 The EVAP canister is located down low, right behind the engine, below the swingarm pivot; inspect the condition of the canister and make sure that the hoses and clamps are tight (VT600 model shown; on VT750 models, the canister is in the same location, but is installed transversely instead of longitudinally)

- 9 Stop the engine. Let the machine cool for awhile, then cover the radiator cap with a heavy rag and turn it counterclockwise to the first stop, wait for it to release any pressure in the system, then push down on the cap and remove it.
- 10 Drain the system again.
- 11 Fill the system with clean water, then repeat Steps 8, 9 and 10.

Refilling

- 12 Fill the system with a 50/50 mixture of distilled water and ethylene glycol. When the system is full (all the way up to the top of the radiator filler neck).
- 13 Remove the cap from the cooling system reservoir (see Section 3) and fill the reservoir.
- 14 To bleed the cooling system of air, place the fuel tank in position (it's not necessary to bolt it down), hook up the fuel lines to the carburetors, put the transmission in Neutral, start the engine and let it idle for two to three minutes. Snap the throttle three or four times. Stop the engine and add coolant up to the top of the filler neck again. Install the radiator cap. Check the coolant level in the reservoir and, if necessary, fill it to the upper mark. Install the reservoir filler neck cap.
- 15 Install the steering head covers (see Chapter 8) and the fuel tank (see Chapter 4).

22 Evaporative emission control system (California models only) - inspection

Refer to illustrations 22.3 and 22.4

- 1 Remove the fuel tank (see Chapter 4).
- 2 Remove the left side cover (see Chapter 8) and study the Vacuum Hose Routing Diagram on the inside of the side cover. You can order a new diagram from a Honda dealer if the old one is missing or illegible.
- 3 Inspect the hoses that connect the fuel tank, the EVAP canister, the EVAP purge control valve and the carburetors (**see illustration**). Look for loose or detached hoses and weak or missing clamps. Note the condition of the hoses themselves. There should be no cracks, tears or general deterioration. Make sure that none of the hoses are kinked or twisted, which will obstruct the passage of crankcase and fuel system emissions through the system. If any hose is damaged, replace it (see Chapter 4).
- 4 Lean the bike over to the left on its sidestand and inspect the EVAP canister (**see illustration**), which is located underneath the

machine, between the engine and the rear wheel, below the swingarm pivot.

- 5 Install the left side cover and the fuel tank.

23 Exhaust system - check

- 1 Periodically check all of the exhaust system joints for leaks and loose fasteners. If tightening the clamp bolts fails to stop any leaks, replace the gaskets with new ones (see Chapter 4).
- 2 The exhaust pipe flange nuts at the cylinder heads are especially prone to loosening, which could cause damage to the head. Check them frequently and keep them tight.

24 Steering head bearings - check, adjustment and lubrication

- 1 Steering head bearings can become dented, rough or loose as the machine ages. In extreme cases, worn or loose steering head bearings can cause steering wobble that is potentially dangerous.

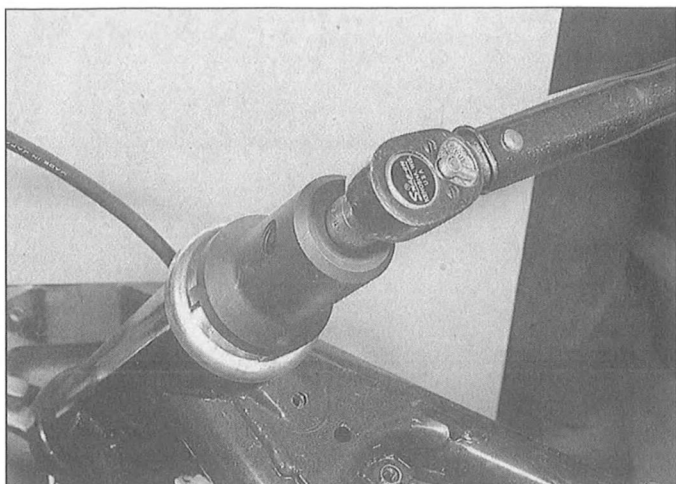
Check

- 2 To check the steering head bearings, support the motorcycle securely and block the machine so the front wheel is in the air.
- 3 Point the wheel straight ahead and slowly move the handlebars from side-to-side. If there are any dents or rough spots in the bearing races, the front end will feel "rough" as the bearings roll over these spots when the handlebars are turned from side-to-side. If the front end feels rough, replace the steering head bearings and races (see Chapter 6).
- 4 Facing the bike from the front, grasp the fork legs firmly and try to move them forward and backward. If the steering head bearings are loose, you'll feel a "clunk" (freeplay) as the fork legs are moved back and forth. If there's freeplay in the steering head bearings, adjust the steering head as follows.

Adjustment

Refer to illustration 24.7

- 5 Remove the headlight (see Chapter 9).
- 6 Remove the handlebars, the upper triple clamp, the steering stem



24.7 You'll need the right socket to torque the steering head bearing adjustment nut (Honda tool 07916-3710100, or equivalent, available at Honda parts departments)

locknut and the lock washer (see Chapter 6).

7 Tighten the bearing adjustment nut (**see illustration**) to the torque listed in this Chapter's Specifications.

8 Turn the steering stem from lock to lock five or six times and check for binding.

9 If there is any binding in the steering stem, disassemble the steering stem assembly and inspect the bearings (see Chapter 6).

10 If the steering operates properly, verify that the adjustment nut is still tightened to the correct torque, then reassemble the front end.

11 Install the lock washer, locknut, upper triple clamp and handlebars (see Chapter 6).

12 Install the headlight (see Chapter 9).

Lubrication

13 Periodic cleaning and repacking of the steering head bearings is recommended by the manufacturer. Refer to Chapter 6 for steering head bearing lubrication and replacement procedures.

25 Fasteners - check

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

2 Pay particular attention to the following:

Brake caliper bolts and banjo bolts

Spark plugs

Engine oil drain plug

Oil drain plug

Cooling system drain plugs

Gearshift pedal (and linkage, if equipped)

Footpegs and sidestand

Engine mounting bolts

Shock absorber or rear suspension unit mounting bolts

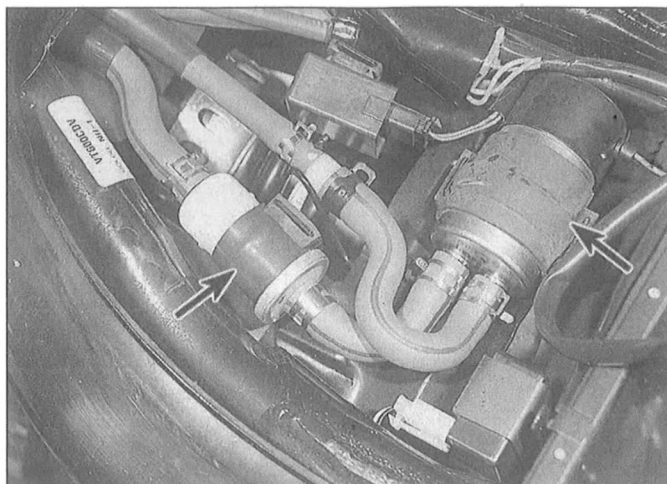
Front axle (or axle nut) and axle pinch bolt

Rear axle nut

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

26 Fuel system - check and filter replacement

Warning: 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 (such as a water heater or clothes dryer) is present. Since gasoline is carcinogenic, wear latex



26.8 Install the fuel filter (left arrow) with its directional arrow pointing toward the fuel pump (right arrow)

gloves when there's a possibility of being exposed to fuel, and, if you get fuel on your skin, wash it off immediately with soap and water. Mop up any spills immediately and do not store fuel-soaked rags where they could ignite. When you perform any kind of work on the fuel system, wear safety glasses and have a class B type fire extinguisher (flammable liquids) on hand.

1 Remove the fuel tank (see Chapter 4).

2 Inspect the condition of the fuel tank, the fuel tap, the fuel lines and the carburetors. Look for leaks and signs of damage or wear (see Chapter 4).

3 If the fuel tap is leaking, note whether the fuel tap-to-fuel tank locknut is tight. If leakage persists, the tap should be removed from the fuel tank, disassembled, cleaned and inspected (see Chapter 4).

4 If the fuel lines are cracked or otherwise deteriorated, replace them.

5 If the carburetor gaskets are leaking, the carburetors should be disassembled and rebuilt (see Chapter 4).

6 Install the fuel tank.

Fuel filter replacement

Refer to illustration 26.8

7 Remove the fuel tank (see Chapter 4).

8 Disconnect the lines from the filter (**see illustration**) and remove the filter from its bracket.

9 Install the new filter with the directional arrow on the filter pointing toward the fuel pump.

10 Reconnect the lines. Make sure that the hoses fit tightly on the filter pipes and the clamps are snug.

11 Install the fuel tank.

27 Suspension - check

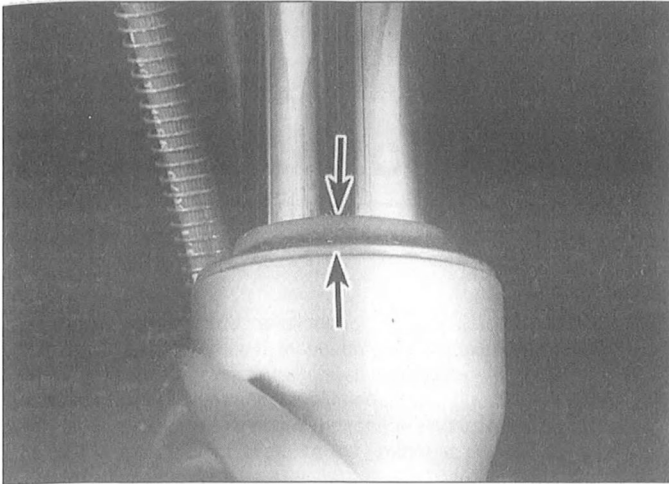
Refer to illustration 27.3

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

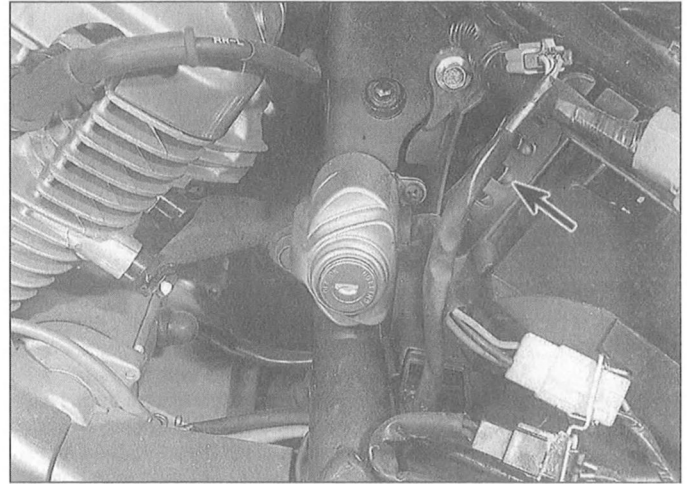
2 While standing alongside the motorcycle, lock the front brake and push on the handlebars to compress the forks several times. See if the fork tubes move up-and-down smoothly without binding. If the fork tubes stick in the sliders, disassemble and inspect the fork legs (see Chapter 6).

3 Carefully inspect the area around the fork seals for any signs of fork oil leakage (**see illustration**). If leakage is evident, the seals must be replaced (see Chapter 6).

4 Check the tightness of all suspension nuts and bolts to be sure



27.3 Inspect each fork seal for oil leaks in the indicated areas (arrows); if oil is leaking past either side of the seal, replace the seal



28.2 To gain access to the spring preload adjuster on VT600 models, remove the left side cover, then use the pin spanner in the bike tool kit to turn the adjuster (arrow)

none have worked loose.

5 Inspect the shock absorber(s) for fluid leakage and tightness of the mounting nuts. If leakage is found, the shock(s) must be replaced.

6 Support the bike securely so it can't be knocked over during this procedure. Grab the swingarm on each side, just ahead of the axle. Rock the swingarm 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, make sure the pivot bolt or shafts are tight. If they're tight but movement is still noticeable, remove the swingarm and replace the bearings (see Chapter 6).

7 Inspect the tightness of the rear suspension nuts and bolts (see Chapter 6).

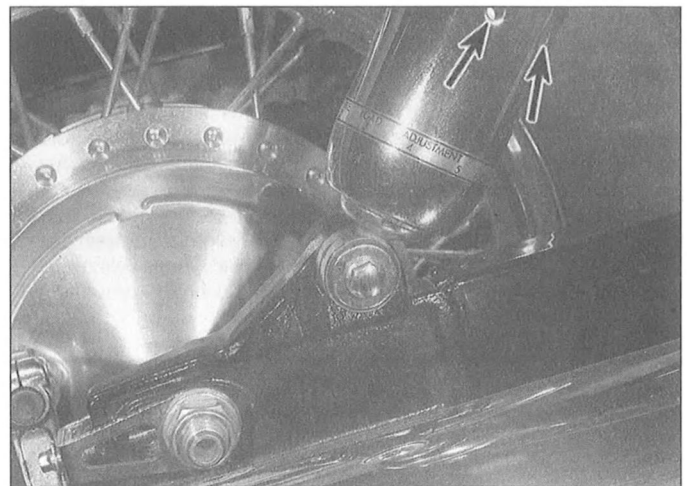
28 Suspension adjustments

Refer to illustrations 28.2 and 28.3

1 Rear spring preload can be adjusted on all models. **Warning:** The rear shock absorber settings on VT750 models must be even to prevent unstable handling.

2 On VT600 models, remove the left side cover (see Chapter 8) and adjust rear spring preload with the special pin spanner and expansion bar provided in the tool kit. The pin spanner fits into the holes in the preload collar (see illustration).

3 On VT750 models, adjust rear spring preload by turning the adjuster on the bottom of each shock absorber with the special pin spanner provided in the bike tool kit. The pin spanner fits into the holes



28.3 On VT750 models, insert the pin spanner included in the bike tool kit into the holes (arrows) in the shock body to adjust the spring preload

in the lower part of the shock body (see illustration).

4 The numerically lower settings are for lighter loads and smooth roads. The numerically higher settings are for heavier loads and rough roads. Position 2 is the standard position.

Notes