# Chapter 7
# Brakes, wheels and tyres

## Contents



## Degrees of difficulty

| Easy, suitable for novice with little experience | Fairly easy, suitable for beginner with some experience | Fairly difficult, suitable for competent DIY mechanic | Difficult, suitable for experienced DIY mechanic | Very difficult, suitable for expert DIY or professional |
|---|---|---|---|---|

## Specifications

### Brakes

| | |
|---|---|
| Brake fluid type | |
| Disc minimum thickness | |
| J model (front and rear) | |
| Standard | |
| Service limit | |
| All other models | |
| Front | |
| Standard | 6.0 mm |
| Service limit | 5.0 mm |
| Rear | |
| Standard | 5.0 mm |
| Service limit | 4.0 mm |
| Disc maximum runout (front and rear, all models) | 0.3 mm |

## Brakes (continued)

| | |
|---|---|
| Caliper bore ID | |
| J, K, M and P models | |
| Front | |
| Standard | 30.230 to 30.280 mm |
| Service limit | 30.29 mm |
| Rear | |
| Standard | 38.180 to 38.230 mm |
| Service limit | 38.24 mm |
| S and T models | |
| Front | |
| Standard | 27.000 to 27.050 mm |
| Service limit | 27.06 mm |
| Rear | |
| Standard | 38.180 to 38.230 mm |
| Service limit | 38.24 mm |
| Caliper piston OD | |
| J, K, M and P models | |
| Front | |
| Standard | 30.148 to 30.198 mm |
| Service limit | 30.14 mm |
| Rear | |
| Standard | 38.115 to 38.148 mm |
| Service limit | 38.11 mm |
| S and T models | |
| Front | |
| Standard | 26.935 to 26.968 mm |
| Service limit | 26.93 mm |
| Rear | |
| Standard | 38.115 to 38.148 mm |
| Service limit | 38.11 mm |
| Master cylinder bore ID | |
| J, K, M and P models (front and rear) | |
| Standard | 12.700 to 12.743 mm |
| Service limit | 12.76 mm |
| S and T models | |
| Front | |
| Standard | 11.000 to 11.043 mm |
| Service limit | 11.055 mm |
| Rear | |
| Standard | 12.700 to 12.743 mm |
| Service limit | 12.76 mm |
| Master cylinder piston OD | |
| J, K, M and P models (front and rear) | |
| Standard | 12.657 to 12.684 mm |
| Service limit | 12.65 mm |
| S and T models | |
| Front | |
| Standard | 10.957 to 10.984 mm |
| Service limit | 10.945 mm |
| Rear | |
| Standard | 12.657 to 12.684 mm |
| Service limit | 12.65 mm |

## Wheels

| | |
|---|---|
| Maximum wheel runout (front and rear) | |
| Axial (side-to-side) | 2.0 mm |
| Radial (out-of-round) | 2.0 mm |
| Maximum axle runout | 0.2 mm |

## Tyres

| | Front | Rear |
|---|---|---|
| Tyre pressures (cold) | | |
| Rider | 33 psi (2.3 Bar) | 33 psi (2.3 Bar) |
| Rider and passenger | 33 psi (2.3 Bar) | 41 psi (2.8 Bar) |
| Tyre sizes* | 110/80-17 57H | 150/70-17 69H |

**Refer to the owners manual or the tyre information label on the swingarm for approved tyre brands.*

## Torque settings

| | |
|---|---|
| Brake pad pin | 17 Nm |
| Brake pad pin plug | 2.5 Nm |
| Front brake caliper mounting bolts | 27 Nm |
| Front brake disc retaining bolts | 40 Nm |
| Front brake master cylinder clamp bolts | 12 Nm |
| Rear brake caliper mounting bolt | 27 Nm |
| Rear brake caliper slider bolt | 22 Nm |
| Rear brake disc retaining bolts | 27 Nm |
| Rear brake master cylinder mounting bolts | 12 Nm |
| Brake caliper bleed valves | 6 Nm |
| Brake hose banjo union bolts | 30 Nm |
| Footrest bracket mounting bolts | 27 Nm |
| Silencer mounting bolt | 27 Nm |
| Front axle bolt | 60 Nm |
| Front axle clamp bolts | 22 Nm |
| Rear wheel nut | 120 Nm |

## 1 General information

All models covered in this manual are fitted with cast alloy wheels designed for tubeless tyres only. Both front and rear brakes are hydraulically operated disc brakes, the front having a single sliding caliper with dual pistons, the rear having a single sliding caliper with a single piston.

***Caution: Disc brake components rarely require disassembly. Do not disassemble components unless absolutely necessary. If a hydraulic brake line is loosened, the entire system must be disassembled, drained, cleaned and then properly filled and bled upon reassembly. Do not use solvents on internal brake components. Solvents will cause the seals to swell and distort. Use only clean brake fluid or denatured alcohol for cleaning. Use care when working with brake fluid as it can injure your eyes and it will damage painted surfaces and plastic parts.***

## 2 Front brake pads - replacement

***Warning: The dust created by the brake system may contain asbestos, which is harmful to your health. Never blow it out with compressed air and don't inhale any of it. An approved filtering mask should be worn when working on the brakes.***

1 Unscrew and remove the pad pin plug **(see illustration).**

2 Unscrew and remove the pad pin, then withdraw the pads from the caliper, noting how they fit **(see illustration).**

3 Inspect the surface of each pad for contamination and check that the friction material has not worn beyond its service limit. If either pad is worn down to, or beyond, the service limit wear groove (ie the grooves are no longer visible), fouled with oil or grease, or heavily scored or damaged by dirt and debris, both pads must be replaced as a set **(see illustration).** Note that it is not possible to degrease the friction material; if the pads are contaminated in any way they must be replaced.

4 If the pads are in good condition clean them carefully, using a fine wire brush which is completely free of oil and grease to remove all traces of road dirt and corrosion. Using a pointed instrument, clean out the grooves in the friction material and dig out any embedded particles of foreign matter. Any areas of glazing may be removed using emery cloth.

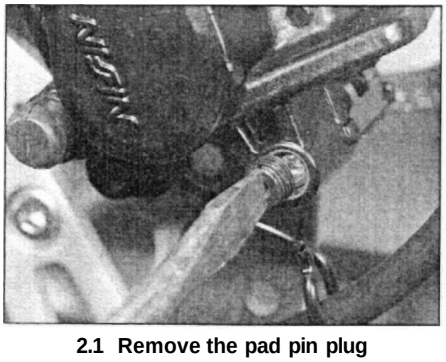
5 Check the condition of the brake disc (see Section 4).

6 Remove all traces of corrosion from the pad pin. Inspect the pin for signs of damage and replace if necessary.

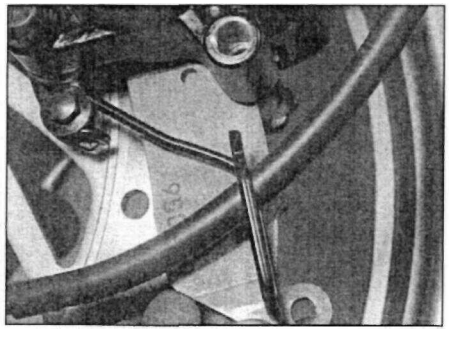
7 Push the pistons as far back into the caliper as possible using hand pressure only. Due to the increased friction material thickness of new pads, it may be necessary to remove the master cylinder reservoir cover and diaphragm and siphon out some fluid.

8 Smear the backs of the pads and the shank of the pad pin with copper-based brake grease, making sure that none gets on the front or sides of the pads. Do not use ordinary grease for this.

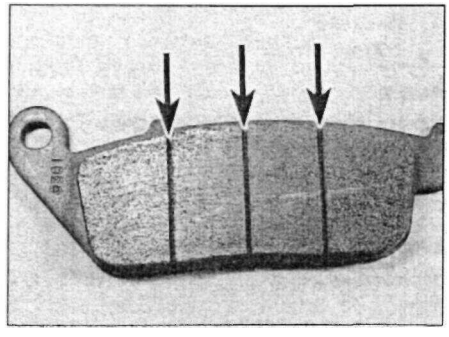
9 Installation of the pads and pad pin is the reverse of removal. Insert the pads into the caliper so that the friction material of each pad is facing the disc. Make sure that the



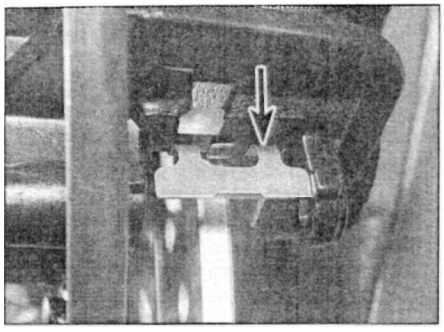
**2.1 Remove the pad pin plug to reveal the pad pin**



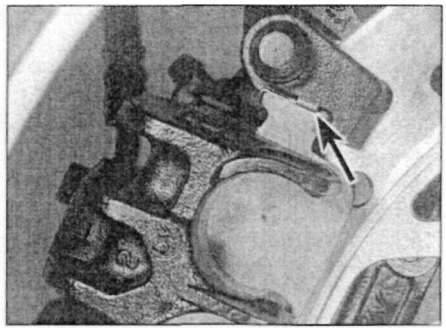
**2.2 Withdraw the pads from the caliper**



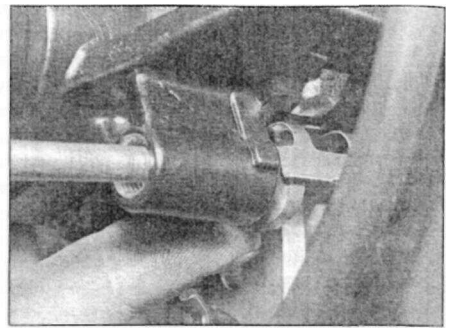
**2.3 Front brake pad wear limit grooves (arrows)**



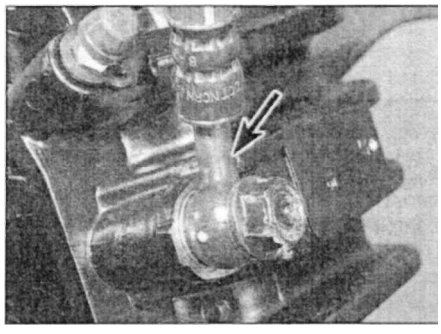
**2.9a Make sure that the pad spring (arrow) . . .**



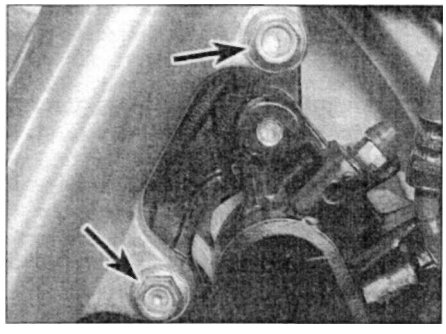
**2.9b . . . and plate (arrow) are correctly positioned**



**2.9c Push up on the end of the pads to align the holes, then install the pad pin**



**3.1 Brake hose banjo bolt. Note the alignment of the hose with the lug (arrow)**



**3.2 The front brake caliper is secured by two bolts (arrows)**

pad spring and pad plate are correctly positioned **(see illustrations).** Install the pads and push them up against the plate and spring to align the hole in the pads with that in the caliper, then install the pad pin **(see illustration).** Tighten the pad pin and the pad pin plug to the torque settings specified at the beginning of the Chapter.

**10** Top up the master cylinder reservoir if necessary (see Chapter 1), and replace the diaphragm and reservoir cover.

**11** Operate the brake lever several times to bring the pads into contact with the disc. Check the master cylinder fluid level (see *Daily (pre-ride) checks)* and the operation of the brake before riding the motorcycle.

## 3 Front brake caliper - removal, overhaul and installation

***Warning: If the caliper indicates the need for an overhaul (usually due to leaking fluid or sticky operation), all old brake fluid should be flushed from the system. Also, the dust created by the brake system may contain asbestos, which is harmful to your health. Never blow it out with compressed air and don't inhale any of it. An approved filtering mask should be worn when working on the brakes. Do not, under any circumstances, use petroleum-based solvents to clean brake parts. Use clean brake fluid, brake cleaner or denatured alcohol only.***

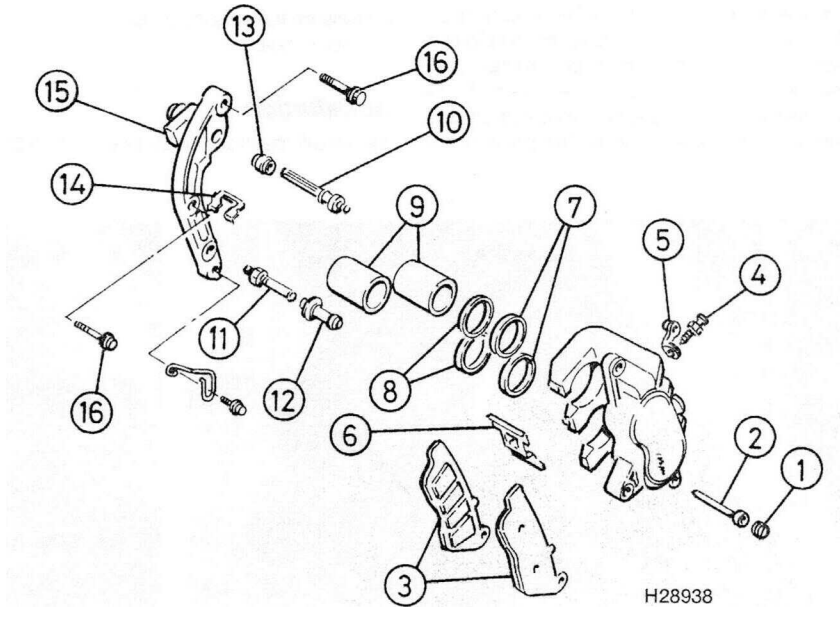
### *Removal*

1 Remove the brake hose banjo bolt, noting its position on the caliper and separate the hose from the caliper **(see illustration).** Plug the hose end or wrap a plastic bag tightly around it to minimise fluid loss and prevent dirt entering the system. Discard the sealing washers as new ones must be used on installation. **Note:** *If you are planning to overhaul the caliper and don't have a source of compressed air to blow out the pistons, just loosen the banjo bolt at this stage and retighten it lightly. The bike's hydraulic system can then be used to force the pistons out of the body once the pads have been removed. Disconnect the hose once the pistons have been sufficiently displaced.*

2 Unscrew the caliper mounting bolts, and slide the caliper away from the disc **(see illustration).** Remove the brake pads as described in Section 2.

### *Overhaul*

*3* Clean the exterior of the caliper with denatured alcohol or brake system cleaner **(see illustration).**




**3.3 Front brake caliper components**

| | | | |
|---|---|---|---|
| *1 Pad pin plug* | *5 Bleed valve cap* | *9 Piston* | *13 Rubber boot* |
| *2 Pad pin* | *6 Pad spring* | *10 Slider* | *14 Pad plate* |
| *3 Brake pads* | *7 Piston seal* | *11 Slider* | *15 Caliper bracket* |
| *4 Bleed valve* | *8 Dust seal* | *12 Rubber boot* | *16 Caliper bolts* |

4 Remove the pistons from the caliper body, either by pumping them out by operating the front brake lever until the pistons are displaced, or by forcing them out using compressed air. Mark each piston head and caliper body with a felt marker to ensure that the pistons can be matched to their original bores on reassembly. If the compressed air method is used, place a wad of rag between the pistons and the caliper to act as a cushion, then use compressed air directed into the fluid inlet to force the pistons out of the body. Use only low pressure to ease the pistons out and make sure both pistons are displaced at the same time. If the air pressure is too high and the pistons are forced out, the caliper and/or pistons may be damaged.

***Warning: Never place your fingers in front of the pistons in an attempt to catch or protect them when applying compressed air, as serious injury could result.***

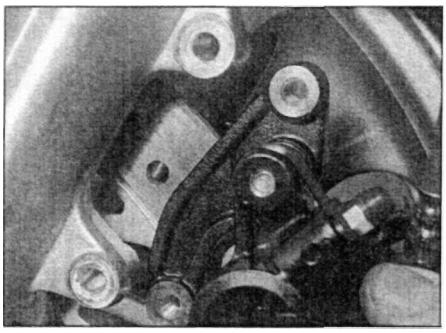
***5*** Using a wooden or plastic tool, remove the dust seals from the caliper bores and discard them. New seals must be used on installation. If a metal tool is being used, take great care not to damage the caliper bores.

6 Remove and discard the piston seals in the same way.

7 Clean the pistons and bores with denatured alcohol, clean brake fluid or brake system cleaner. If compressed air is available, use it to dry the parts thoroughly (make sure it's filtered and unlubricated).

***Caution: Do not, under any circumstances, use a petroleum-based solvent to clean brake parts.***

*8* Inspect the caliper bores and pistons for signs of corrosion, nicks and burrs and loss of plating. If surface defects are present, the caliper assembly must be replaced. If the necessary measuring equipment is available, compare the dimensions of the pistons and bores to those given in the Specifications Section of this Chapter, replacing any component that is worn beyond the service limit. Check that the caliper body is able to slide freely on the mounting bracket slider pins. If seized due to corrosion, separate the two components and clean off all traces of corrosion and hardened grease. Apply a smear of copper based grease to the mounting bracket slider pins and reassemble the two components. Replace the rubber boots if they are damaged or deteriorated. If the caliper is in bad shape the master cylinder should also be checked,



**3.13 Mount the caliper onto the disc**

9 Lubricate the new piston seals with clean brake fluid and install them in their grooves in the caliper bores

**10** Lubricate the new dust seals with clean brake fluid and install them in their grooves in the caliper bores.

**11** Lubricate the pistons with clean brake fluid and install them closed-end first into the caliper bores. Using your thumbs, push the pistons all the way in, making sure they enter the bore squarely.

### *Installation*

**12** Install the brake pads (see Section 2).

13 Install the caliper on the brake disc making sure the pads sit squarely either side of the disc **(see illustration).**

14 Apply a few drops of a suitable thread locking compound to the caliper mounting bolts, then install them in the caliper and tighten them to the torque setting specified at the beginning of this Chapter **(see illustrations).**

**15** Connect the brake hose to the caliper, using new sealing washers on each side of the fitting. Position the hose so that it butts up against its lug on the caliper **(see illustration 3.1).** Tighten the banjo bolt to the torque setting specified at the beginning of the Chapter.

**16** Fill the master cylinder with the recommended brake fluid (see Specifications) and bleed the hydraulic system as described in Section 11.

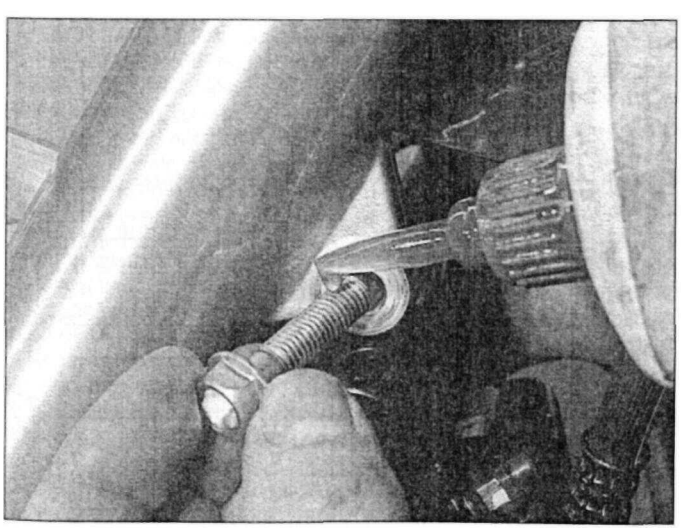
**17** Check for leaks and thoroughly test the operation of the brake before riding the motorcycle.

## 4 Front brake disc - inspection, removal and installation

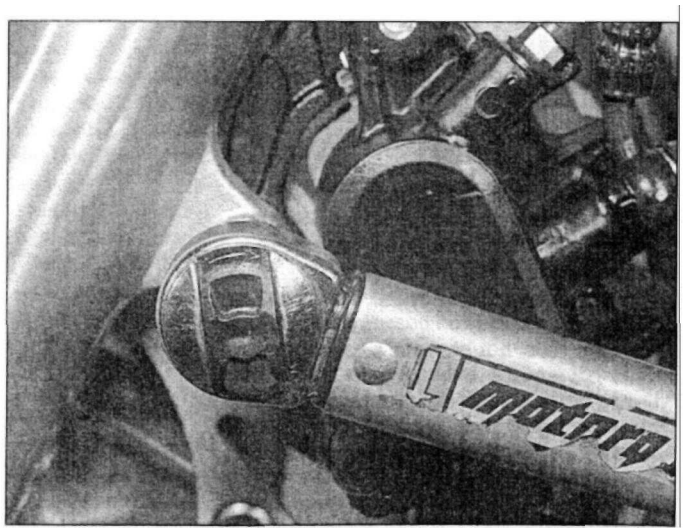
### *Inspection*

1 Visually inspect the surface of the disc for score marks and other damage. Light scratches are normal after use and won't affect brake operation, but deep grooves and heavy score marks will reduce braking efficiency and accelerate pad wear. If a disc is badly grooved it must be machined or replaced.

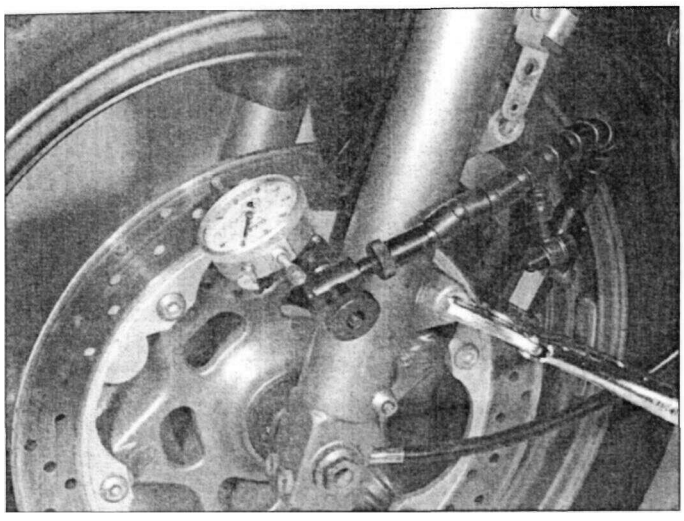
2 To check disc runout, position the bike on its centre stand (or auxiliary stand) and support it so that the front wheel is raised off the ground. Mount a dial indicator to the fork slider, with the plunger on the indicator



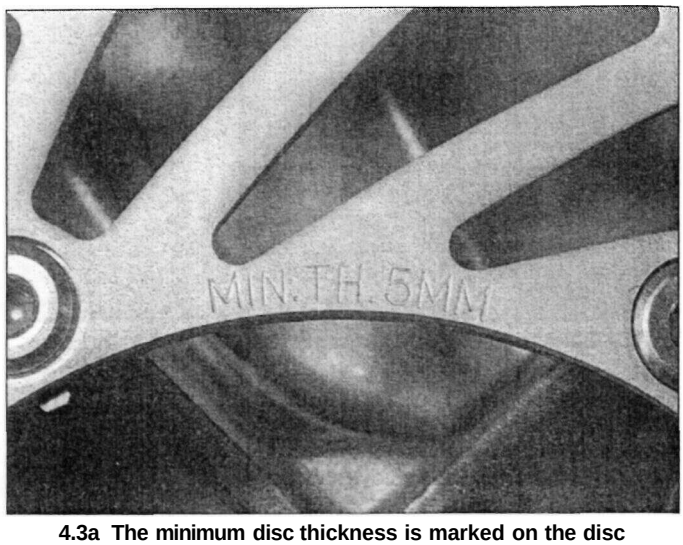
**3.14a Apply a thread locking compound to the caliper bolts .**



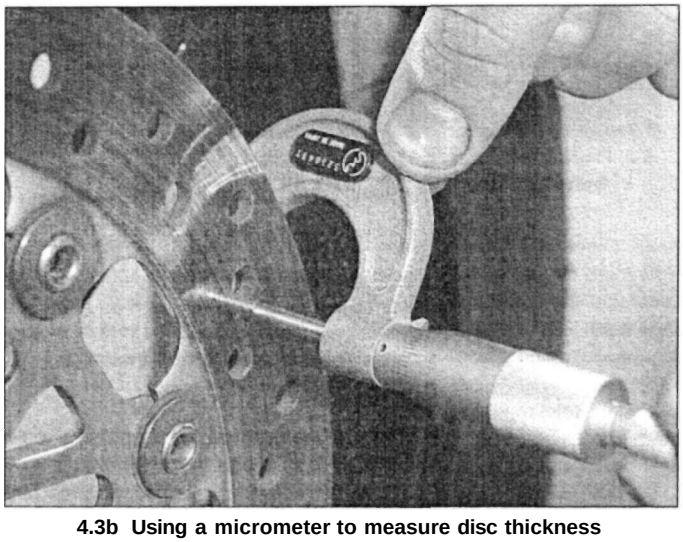
**3.14b . . . and tighten them to the specified torque setting**



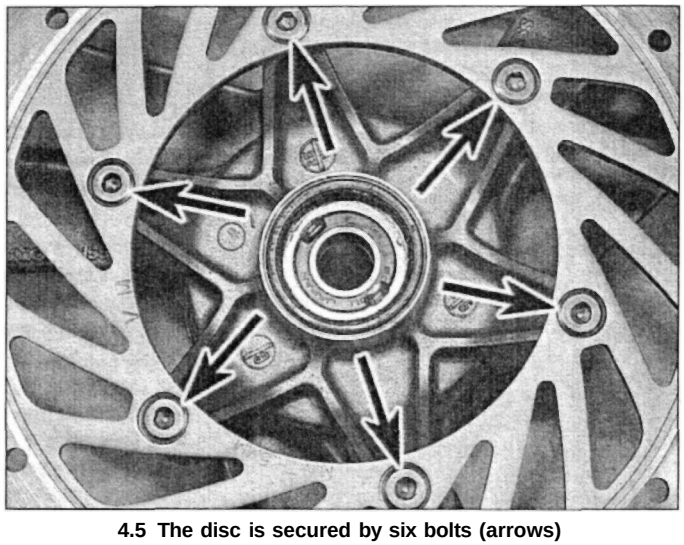
**4.2 Set up *a* dial indicator to contact the brake disc, then rotate the wheel to check for runout**




**4.3a The minimum disc thickness is marked on the disc**



**4.3b Using a micrometer to measure disc thickness**



**4.5 The disc is secured by six bolts (arrows)**

touching the surface of the disc about 10 mm (1/2 inch) from the outer edge **(see illustration).** Rotate the wheel and watch the indicator needle, comparing the reading with the limit listed in the Specifications at the beginning of the Chapter. If the runout is greater than the service limit, check the wheel bearings for play (see Chapter 1). If the bearings are worn, replace them (see Section 16) and repeat this check. If the disc runout is still excessive, it will have to be replaced, although machining by a competent engineering shop may be possible.

3 The disc must not be machined or allowed to wear down to a thickness less than the service limit as listed in this Chapter's Specifications and as marked on the disc itself **(see illustration).** The thickness of the disc can be checked with a micrometer **(see illustration).** If the thickness of the disc is less than the service limit, it must be replaced.

### *Removal*

4 Remove the wheel (see Section 14).

***Caution: Do not lay the wheel down and allow it to rest on the disc - the disc could become warped. Set the wheel on wood blocks so the disc doesn't support the weight of the wheel.***

5 Mark the relationship of the disc to the wheel, so it can be installed in the same position. Unscrew the disc retaining bolts, loosening them a little at a time in a criss-cross pattern to avoid distorting the disc, then remove the disc from the wheel **(see illustration).**

### *Installation*

6 Install the disc on the wheel, aligning the previously applied matchmarks (if you're reinstalling the original disc), and making sure the "Minimum thickness" specification stamped onto the disc is facing out.

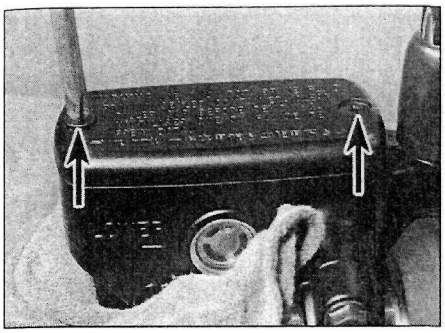
7 Apply a suitable thread locking compound to the disc mounting bolt threads, then install the bolts and tighten them in a criss-cross pattern evenly and progressively to the torque setting specified at the beginning of the Chapter. Clean off all grease from the brake disc using acetone or brake system cleaner. If a new brake disc has been installed, remove any protective coating from its working surfaces.

8 Install the front wheel (see Section 14).

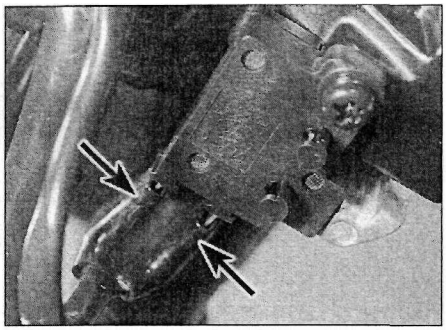
9 Operate the brake iever several times to bring the pads into contact with the disc. Check the operation of the brake carefully before riding the bike.

## 5 Front brake master cylinder - removal, overhaul and installation

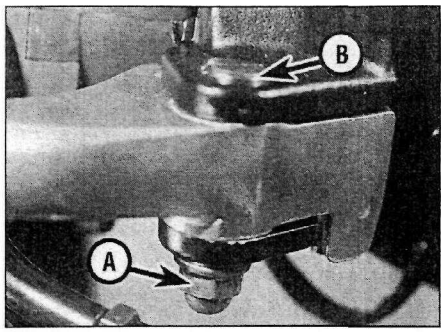
1 if the master cylinder is leaking fluid, or if the lever does not produce a firm feel when



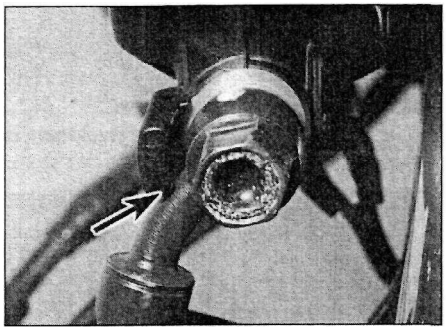
**5.4 Slacken the reservoir cover screws (arrows)**



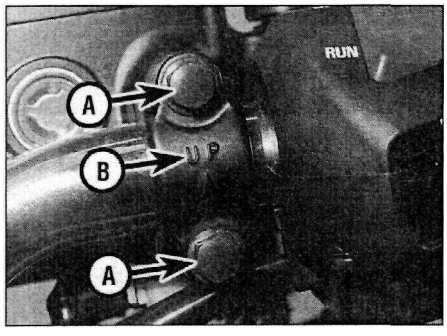
**5.5 Disconnect the brake light switch electrical connectors (arrows)**




**5.6 Remove the locknut (A), then unscrew the pivot bolt (B) and remove the lever**



**5.7 Brake hose banjo bolt. Note the alignment of the hose with the lug (arrow)**




**5.8 Front brake master cylinder mounting bolts (A). Note the "UP" mark (B)**

the brake is applied, and bleeding the brakes does not help (see Section 11), and the hydraulic hoses are all in good condition, then master cylinder overhaul is recommended.

2 Before disassembling the master cylinder, read through the entire procedure and make sure that you have the correct rebuild kit. Also, you will need some new, clean brake fluid of the recommended type, some clean rags and internal circlip pliers. **Note:** To *prevent damage to the paint from spilled brake fluid, a/ways cover the fuel tank when working on the master cylinder.*

***Caution: Disassembly, overhaul and reassembly of the brake master cylinder must be done in a spotlessly clean work area to avoid contamination and possible failure of the brake hydraulic system components.***

## Removal

3 If required, remove the rear view mirror (see Chapter 8).

4 Loosen, but do not remove, the screws holding the reservoir cover in place **(see illustration).**

5 Disconnect the electrical connectors from the brake light switch **(see illustration).**

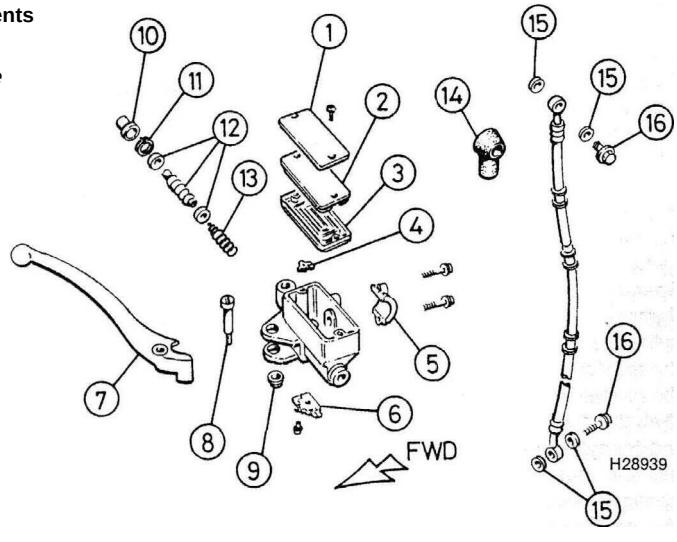
6 Remove the locknut from the underside of the brake lever pivot bolt, then unscrew the bolt and remove the brake lever **(see illustration).**

7 Peel back the rubber boot from the top of the brake hose (if fitted), then unscrew the banjo bolt and separate the brake hose from the master cylinder **(see illustration).** Note the alignment of the hose. Discard the two sealing washers as these must be replaced with new ones. Wrap the end of the hose in a clean rag and suspend the hose in an upright position or bend it down carefully and place the open end in a clean container. The objective is to prevent excessive loss of brake fluid, fluid spills and system contamination.

8 Remove the master cylinder mounting bolts to free the clamp, noting the "UP" mark on the clamp and how the mating surfaces of the clamp align with the punch mark on the handlebar **(see Illustration).** Lift the master cylinder and reservoir away from the handlebar. Do not tip -the master cylinder upside down or brake fluid will run out.

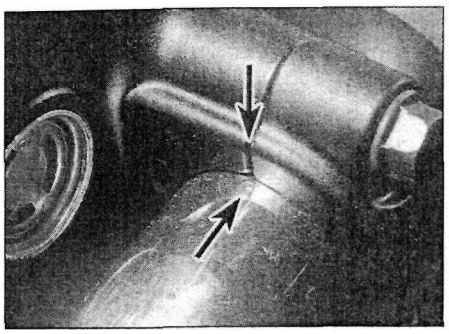
**5.9 Front brake master cylinder components**

1 *Reservoir cover*
2 *Diaphragm plate*
3 *Rubber diaphragm*
4 *Protector*
5 *Clamp*
6 *Brake light switch*
7 *Brake lever*
8 *Lever pivot bolt*
9 *Pivot bolt locknut*
10 *Dust boot*
11 *Circlip*
12 *Piston assembly*
13 *Spring*
14 *Rubber boot*
15 *Sealing washer*
16 *Banjo bolt*

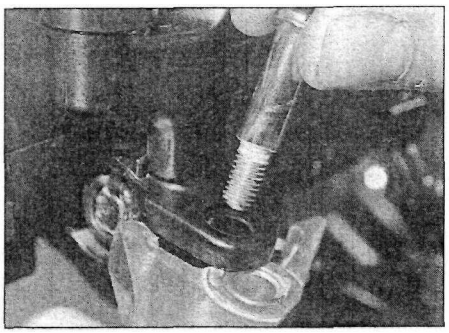



## Overhaul

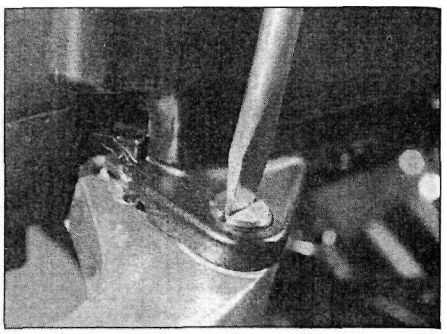
9 Remove the reservoir cover retaining screws and lift off the cover, the diaphragm plate and the rubber diaphragm **(see illustration).** Drain the brake fluid from the reservoir into a



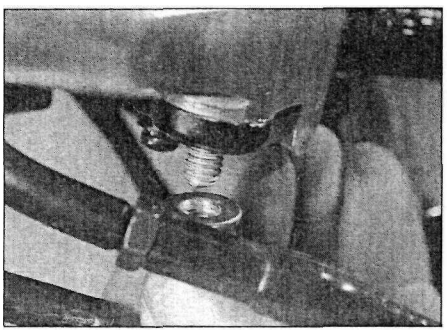
**5.21 Align the mating surfaces of the clamp with the punch mark (arrows)**



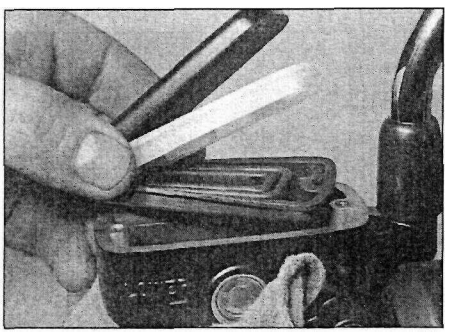
**5.23a Install the brake lever and the pivot bolt**



**5,23b Tighten the pivot bolt .**



**5.23c . . . then fit the locknut**



**5.26 Install the rubber diaphragm, the diaphragm plate and the reservoir cover**

suitable container. Wipe any remaining fluid out of the reservoir with a clean rag.

**10** Remove the screw securing the brake light switch to the bottom of the master cylinder and remove the switch **(see illustration 5.5).**

**11** Carefully remove the dust boot from the end of the piston.

12 Using circlip pliers, remove the circlip and slide out the piston assembly and the spring, noting how they fit. Lay the parts out in the proper order to avoid confusion on reassembly.

**13** Clean all parts with clean brake fluid or denatured alcohol. If compressed air is available, use it to dry the parts thoroughly (make sure it's filtered and unlubricated).

***Caution: Do not, under any circumstances, use a petroleum-based solvent to clean brake parts.***

14 Check the master cylinder bore for corrosion, scratches, nicks and score marks. If the necessary measuring equipment is available, compare the dimensions of the piston and bore to those given in the Specifications Section of this Chapter. If damage or wear is evident, the master cylinder must be replaced with a new one. If the master cylinder is in poor condition, then the caliper should be checked as well. Check that the fluid inlet and outlet ports in the master cylinder are clear.

**15** The dust boot, piston assembly and spring are included in the rebuild kit. Use all of the new parts, regardless of the apparent condition of the old ones.

**16** Install the spring in the master cylinder so that its tapered end faces the piston.

17 Lubricate the piston assembly components with clean hydraulic fluid and install the assembly into the master cylinder, making sure all the components are the correct way round. Make sure the lips on the cup seals do not turn inside out when they are slipped into the bore. Depress the piston and install the new circlip, making sure that it locates in the master cylinder groove.

18 Install the rubber dust boot, making sure the lip is seated correctly in the piston groove.

**19** Install the brake light switch.

**20** Inspect the reservoir cover rubber diaphragm and replace if damaged or deteriorated.

### *Installation*

21 Attach the master cylinder to the handlebar and fit the clamp with its "UP" mark facing up **(see illustration 5.8).** Align the mating surfaces of the clamp with the punch mark on the handlebar, then tighten the upper bolt first then the lower bolt **(see illustration).**

**22** Connect the brake hose to the master cylinder, using new sealing washers on each side of the union, and aligning the hose against the lug on the reservoir **(see illustration 5.7).** Tighten the banjo bolt to the torque setting specified at the beginning of this Chapter. Fit the rubber boot over the union.

**23** Install the brake lever into its bracket and secure it with its pivot bolt (see **illustrations).** Tighten the bolt then install the pivot bolt locknut **(see illustration).**

24 Connect the brake light switch wiring **(see illustration 5.5)** and install the rear view mirror (see Chapter 8).

**25** Fill the fluid reservoir with the specified brake fluid (see Specifications). Refer to Section 11 of this Chapter and bleed the air from the system.

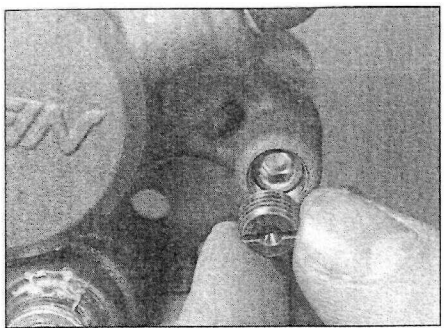
**26** Fit the rubber diaphragm, making sure it is correctly seated, the diaphragm plate and the cover on the master cylinder reservoir **(see illustration).**

## Rear brake pads - replacement

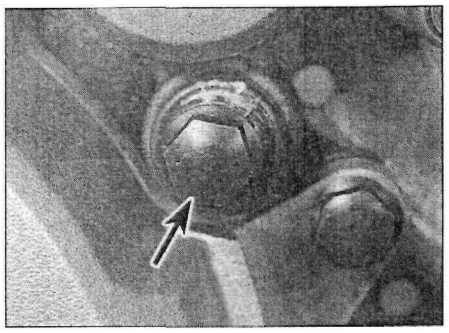
***Warning: The dust created by the brake system may contain asbestos, which is harmful to your health. Never blow it out with compressed air and don't inhale any of it. An approved filtering mask should be worn when working on the brakes.***

1 Unscrew and remove the pad pin plug, then slacken the pad pin **(see illustration).**

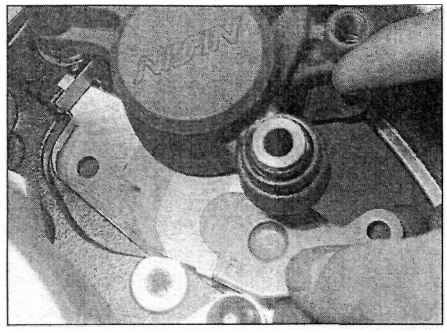
2 Unscrew and remove the caliper rear slider bolt **(see illustration),** then remove the pad pin. Pivot the caliper upwards on the front slider bolt and withdraw the pads from the caliper, noting how they fit **(see illustration).** Note the anti-squeal shim fitted to the back of the outer pad.



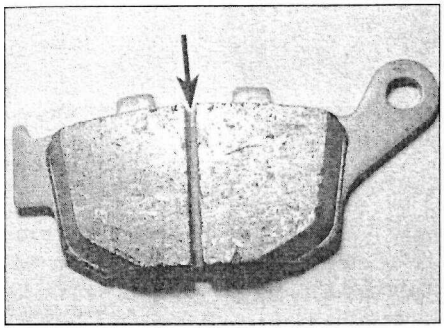
**6.1 Remove the pad pin plug to reveal the pad pin**



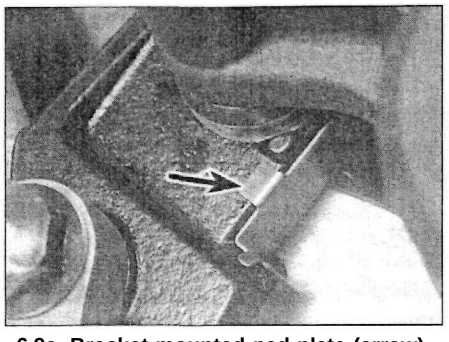
**6.2a Remove the rear slider bolt (arrow)**



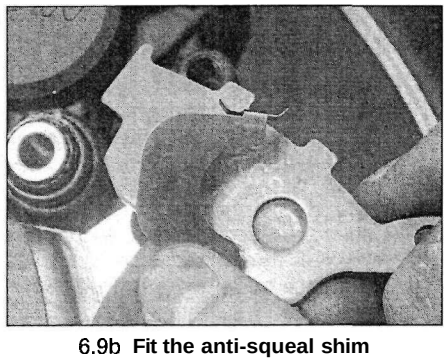
**6.2b Pivot the caliper upwards and withdraw the pads**



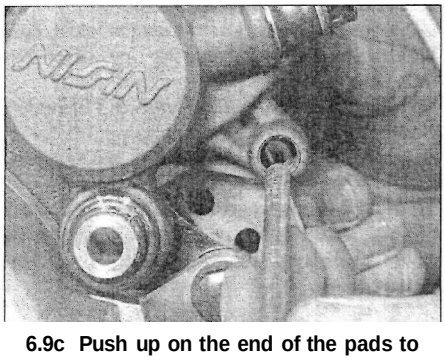
**6.3 Rear brake pad wear limit groove (arrow)**



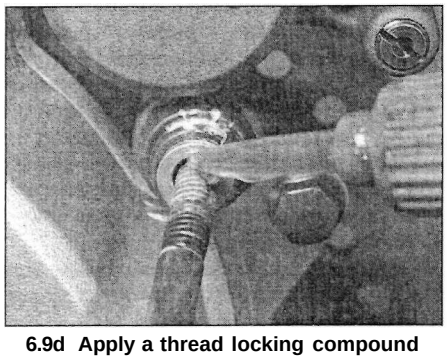
**6.9a Bracket-mounted pad plate (arrow). The pad spring is mounted inside the caliper**



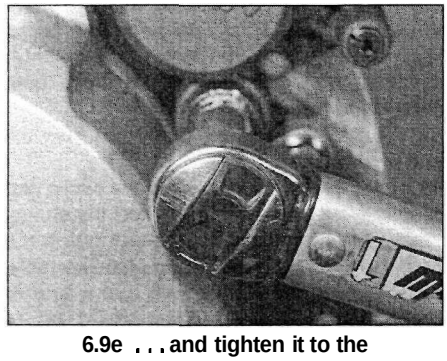
**6.9b Fit the anti-squeal shim to the back of the outer pad**



**6.9c Push up on the end of the pads to align the holes, then install the pad pin**



**6.9d Apply a thread locking compound to the slider bolt . . .**



**6.9e . . . and tighten it to the specified torque setting**

3 Inspect the surface of each pad for contamination and check that the friction material has not worn beyond its service limit. If either pad is worn down to, or beyond, the service limit wear groove (i.e. the grooves are no longer visible), fouled with oil or grease, or heavily scored or damaged by dirt and debris, both pads must be replaced as a set **(see illustration).** Note that it is not possible to degrease the friction material; if the pads are contaminated in any way they must be replaced.

4 If the pads are in good condition clean them carefully, using a fine wire brush which is completely free of oil and grease to remove all traces of road dirt and corrosion. Using a pointed instrument, clean out the groove in the friction material and dig out any embedded particles of foreign matter. Any areas of glazing may be removed using emery cloth.

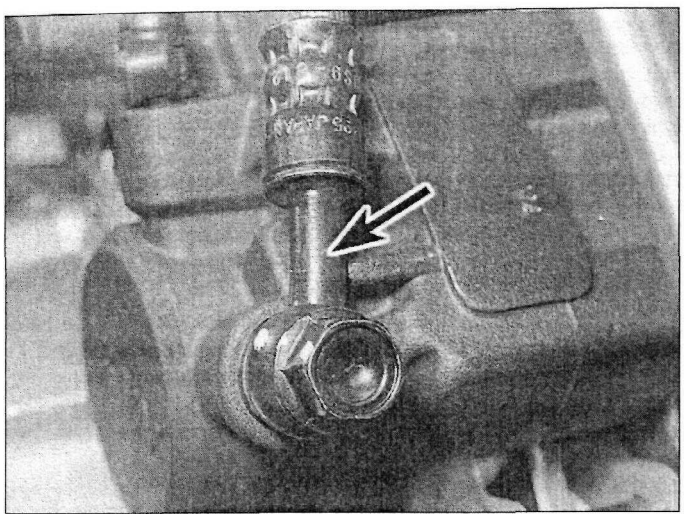
5 Check the condition of the brake disc (see Section 8).

6 Remove all traces of corrosion from the pad pin and the slider bolt. Inspect them for signs of damage and replace them if necessary.

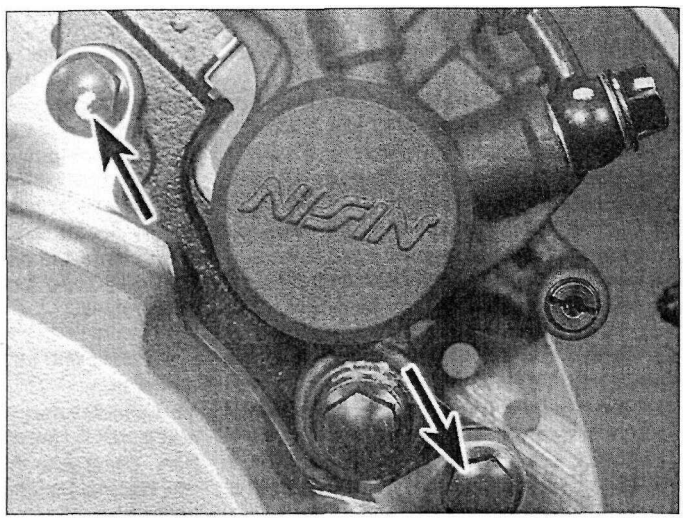
7 Push the piston as far back into the caliper as possible using hand pressure only. Due to the increased friction material thickness of new pads, it may be necessary to remove the master cylinder reservoir cover and diaphragm and siphon out some fluid.

8 Smear the backs of the pads and the shank of the pad pin with copper-based grease, making sure that none gets on the front or sides of the pads.

9 Installation of the pads and pad pin is the reverse of removal. Make sure the pad plate **(see illustration)** and spring are correctly positioned. Insert the pads into the caiiper so that the friction material of each pad is facing the disc, and do not forget to fit the anti-squeal shim to the back of the outer pad **(see illustration).** Push the pads up against the spring to align the hole in the pads with that in the caliper, then install the pad pin **(see illustration).** Pivot the caliper down onto the disc, then apply a suitable thread locking compound to the threads of the slider bolt and install it in the caliper **(see illustration).** Tighten the slider bolt, the pad pin and the pad pin plug to the torque settings specified at the beginning of the Chapter **(see illustration).**



**7.1 Brake hose banjo bolt. Note the alignment of the hose with the lug (arrow)**



**7.2 The rear brake caliper is secured by two bolts (arrows)**

**10** Top up the master cylinder reservoir with brake fluid (see Specifications), and replace the reservoir cover and diaphragm if removed.

**11** Operate the brake pedal several times to bring the pads into contact with the disc. Check the master cylinder fluid level (see *Daily (pre-ride) checks)* and the operation of the brake before riding the motorcycle.

## 7 Rear brake caliper - removal, overhaul and installation

***Warning: If a caliper indicates the need for an overhaul (usually due to leaking fluid or sticky operation), all old brake fluid should be flushed from the system. Also, the dust created by the brake system may contain asbestos, which is harmful to your health. Never blow it out with compressed air and don't inhale any of it. An approved filtering mask should be worn when working on the brakes. Do not, under any circumstances, use petroleum-based solvents to clean brake parts. Use clean brake fluid, brake cleaner or denatured alcohol only.***

### Removal

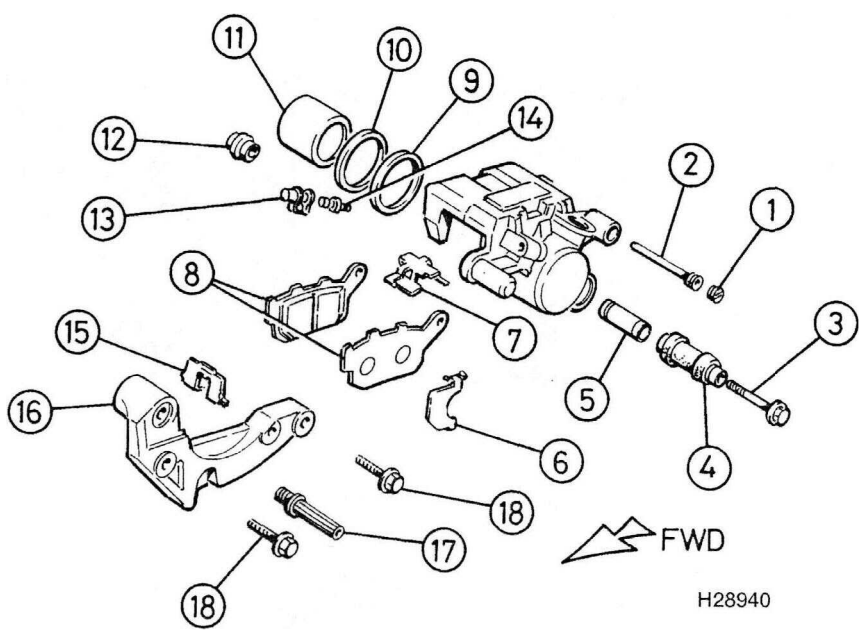
1 Remove the brake hose banjo bolt, noting its position on the caliper, and separate the hose from the caliper **(see illustration).** Plug the hose end or wrap a plastic bag tightly around it to minimise fluid loss and prevent dirt entering the system. Discard the sealing washers as new ones must be used on installation. **Note:** *If you are planning to overhaul the caliper and don't have a source of compressed air to blow out the piston, just loosen the banjo bolt at this stage and retighten it lightly. The bike's hydraulic system can then be used to force the piston out of the body once the pads have been removed. Disconnect the hose once the piston has been sufficiently displaced.*

2 Unscrew the caliper mounting bolts, and slide the caliper away from the disc **(see illustration).** Remove the brake pads as described in Section 6.

### Overhaul

3 Clean the exterior of the caliper with denatured alcohol or brake system cleaner **(see illustration).**

4 Remove the piston from the caliper body, either by pumping it out by operating the rear brake pedal until the piston is displaced, or by forcing it out using compressed air. If the compressed air method is used, place a wad of rag between the piston and the caliper to act as a cushion, then use compressed air directed into the fluid inlet to force the piston out of the body. Use only low pressure to




**7.3 Rear brake caliper components**

| | | | | | |
|---|---|---|---|---|---|
| 1 | Pad pin plug | 7 | Pad spring | 13 | Bleed valve cap |
| 2 | Pad pin | 8 | Brake pads | 14 | Bleed valve |
| 3 | Slider bolt | 9 | Piston seal | 15 | Pad plate |
| 4 | Rubber boot | 10 | Dust seal | 16 | Caliper bracket |
| 5 | Sleeve | 11 | Piston | 17 | Slider bolt |
| 6 | Anti-squeal shim | 12 | Rubber boot | 18 | Caliper bolts |

ease the piston out. If the air pressure is too high and the piston is forced out, the caliper and/or piston may be damaged.

***Warning: Never place your fingers in front of the piston in an attempt to catch or protect it when applying compressed air, as serious injury could result.***

5 Using a wooden or plastic tool, remove the dust seal from the caliper bore and discard it. A new seal must be used on installation. If a metal tool is being used, take great care not to damage the caliper bore.

6 Remove and discard the piston seal in the same way.

7 Clean the piston and bore with denatured alcohol, clean brake fluid or brake system cleaner. If compressed air is available, use it to dry the parts thoroughly (make sure it's filtered and unlubricated).

***Caution: Do not, under any circumstances, use a petroleum-based solvent to clean brake parts***

8 Inspect the caliper bore and piston for signs of corrosion, nicks and burrs and loss of plating. If surface defects are present, the caliper assembly must be replaced. If the necessary measuring equipment is available, compare the dimensions of the piston and bore to those given in the Specifications Section of this Chapter, replacing any component that is worn beyond the service limit. Check that the caliper body is able to slide freely on the mounting bracket slider pins. If seized due to corrosion, unscrew the rear slider bolt, then separate the two components and clean off all traces of corrosion and hardened grease. Apply a smear of copper-based grease to the mounting bracket slider pins and reassemble the two components. Replace the rubber boots if they are damaged or deteriorated. If the caliper is in bad shape the master cylinder should also be checked.

9 Lubricate the new piston seal with clean brake fluid and install it in its groove in the caliper bore.

**10** Lubricate the new dust seal with clean brake fluid and install it in its groove in the caliper bore.

**11** Lubricate the piston with clean brake fluid and install it closed-end first into the caliper bore. Using your thumbs, push the piston all the way in, making sure it enters the bore squarely.

### Installation

**12** Install the brake pads as described in Section 6.

**13** Install the caliper on the brake disc making sure the pads sit squarely either side of the disc **(see illustration).**

**14** Apply a few drops of a suitable thread locking compound to the caliper mounting bolts, then install them in the caliper and tighten them to the torque setting specified at the beginning of this Chapter **(see illustrations).**

**15** Connect the brake hose to the caliper using new sealing washers on each side of the fitting. Position the hose so that it butts up against its lug on the caliper **(see illustration** 7.1). Tighten the banjo bolt to the torque setting specified at the beginning of the Chapter.

**16** Fill the master cylinder with the recommended brake fluid (see Specifications) and bleed the hydraulic system as described in Section 11.

17 Check for leaks and thoroughly test the operation of the brake before riding the motorcycle.

## Rear brake disc - inspection, removal and installation

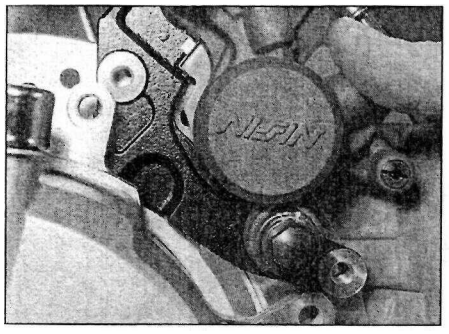
### Inspection

1 Refer to Section 4 of this Chapter, noting that the dial indicator should be attached to the swingarm. Note the "DRIVE" mark and arrow on the disc which denotes the normal direction of rotation, and must therefore be fitted facing inwards **(see illustration).** Also note the minimum thickness mark.

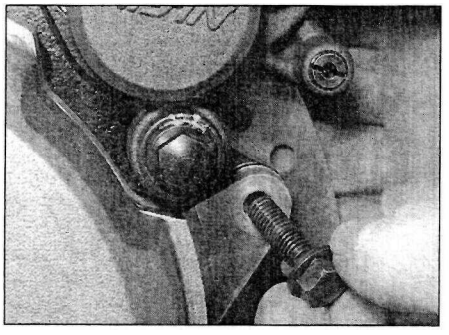
### Removal

2 Remove the rear wheel (see Section 15).

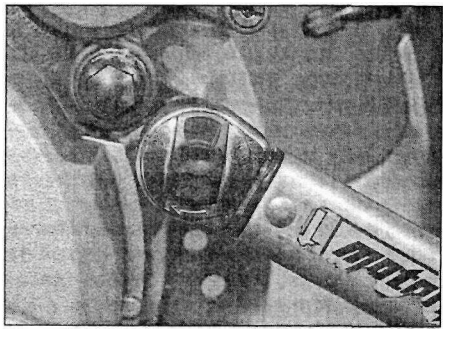
3 Mark the relationship of the disc to the final drive housing so it can be installed in the same position. Unscrew the disc retaining bolts, loosening them a little at a time in a criss-cross pattern to avoid distorting the disc, and remove the disc **(see illustration).**



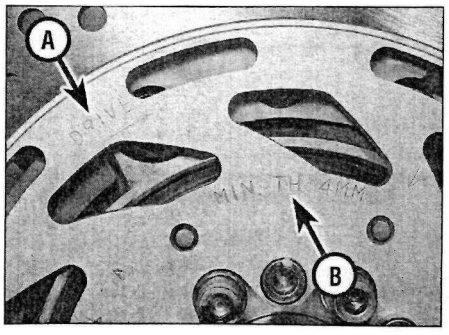
**7.13 Mount the caliper onto the disc**



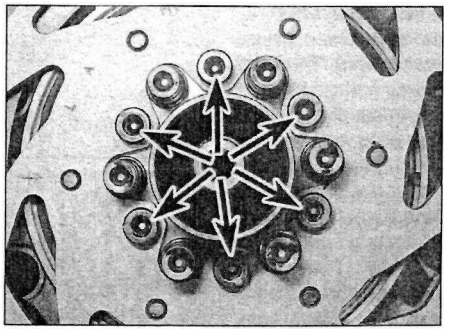
**7.14a Apply a thread locking compound to the caliper bolts . . .**



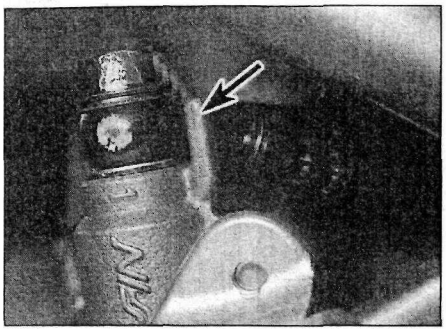
**7.14b . . . and tighten them to the specified torque setting**



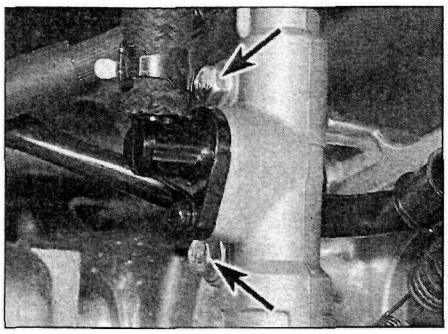

**8.1 Note the direction of drive arrow (A) and the minimum thickness mark (B)**



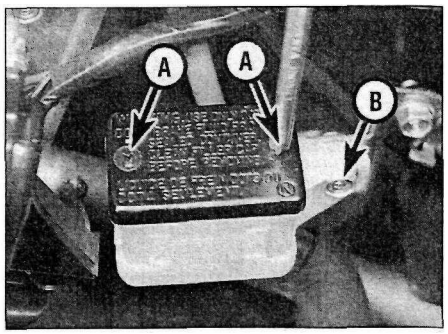
**8.3 The rear disc is secured by six bolts (arrows)**



**9.4 Brake hose banjo bolt. Note the alignment of the hose against the lug (arrow)**



**9.6 The master cylinder is secured to the back of the footrest bracket by two bolts (arrows)**




**9.7 Master cylinder reservoir cover screws (A), and mounting bolt (B)**

### *Installation*

4 Position the disc on the final drive housing, aligning the previously applied matchmarks (if you're reinstalling the original disc) and making sure the direction of wheel rotation arrow faces to the right-hand side.

5 Apply a suitable thread locking compound to the disc mounting bolts, then install the bolts and tighten them in a criss-cross pattern evenly and progressively to the torque setting specified at the beginning of this Chapter. Clean off all grease from the brake disc using acetone or brake system cleaner. If a new brake disc has been installed, remove any protective coating from its working surfaces.

6 Install the rear wheel (see Section 15).

7 Operate the brake pedal several times to bring the pads into contact with the disc. Check the operation of the brake carefully before riding the motorcycle.

## 9 Rear brake master cylinder - removal, overhaul and installation

1 If the master cylinder is leaking fluid, or if the pedal does not produce a firm feel when the brake is applied, and bleeding the brakes does not help (see Section 11), and the hydraulic hoses are all in good condition, then master cylinder overhaul is recommended.

2 Before disassembling the master cylinder, read through the entire procedure and make sure that you have the correct rebuild kit. Also, you will need some new, clean brake fluid of the recommended type, some clean rags and internal circlip pliers.

***Caution: Disassembly, overhaul and reassembly of the brake master cylinder must be done in a spotlessly clean work area to avoid contamination and possible failure of the brake hydraulic system components.***

### *Removal*

3 Remove the right-hand side panel (see Chapter 8).

4 Unscrew the brake hose banjo bolt and separate the brake hose from the master cylinder **(see illustration).** Note the alignment of the hose union. Discard the two sealing washers as these must be replaced with new ones. Wrap the end of the hose in a clean rag and suspend the hose in an upright position or bend it down carefully and place the open end in a clean container. The objective is to prevent excessive loss of brake fluid, fluid spills and system contamination.

5 Remove the split pin from the clevis pin securing the brake pedal to the master cylinder pushrod. Withdraw the clevis pin and separate the pedal from the pushrod. Discard the split pin as a new one must be used.

6 Unscrew the two bolts securing the master cylinder to the bracket **(see illustration).**

7 Slacken the master cylinder fluid reservoir cover screws **(see illustration).** Remove the bolt securing the reservoir to the bracket, then remove the reservoir cover and pour the fluid into a container.

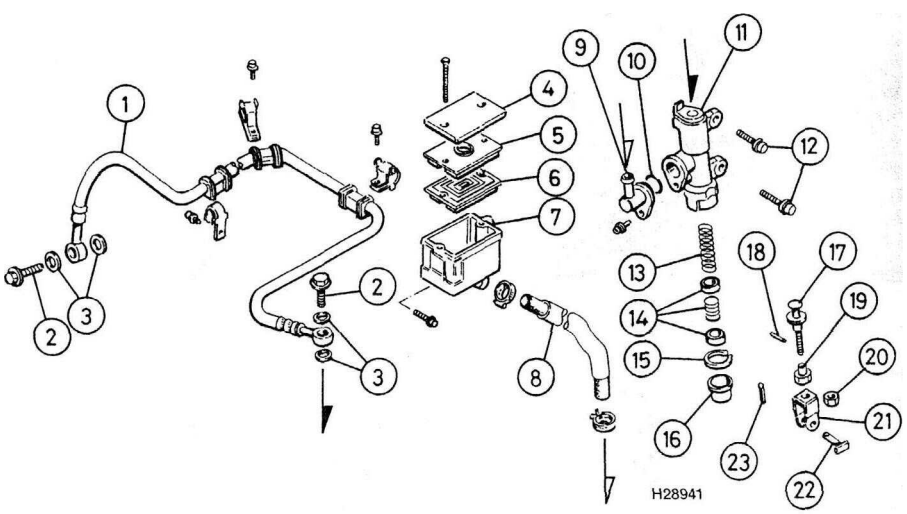
8 Separate the fluid reservoir hose from the elbow on the master cylinder by releasing the hose clamp.

### *Overhaul*

9 If necessary, remove the spring pin (late K models onward) from the bottom of the pushrod, slacken the clevis locknut, then unscrew the clevis nut from the pushrod and withdraw the clevis **(see illustration).**

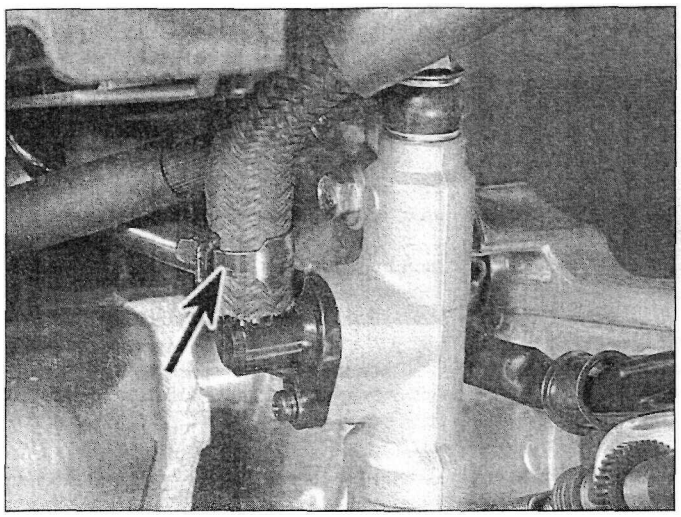
10 Dislodge the rubber dust boot from the base of the master cylinder to reveal the pushrod retaining circlip.

11 Depress the pushrod and, using circlip pliers, remove the circlip. Slide out the piston assembly and spring. If they are difficult to remove, apply low pressure compressed air to

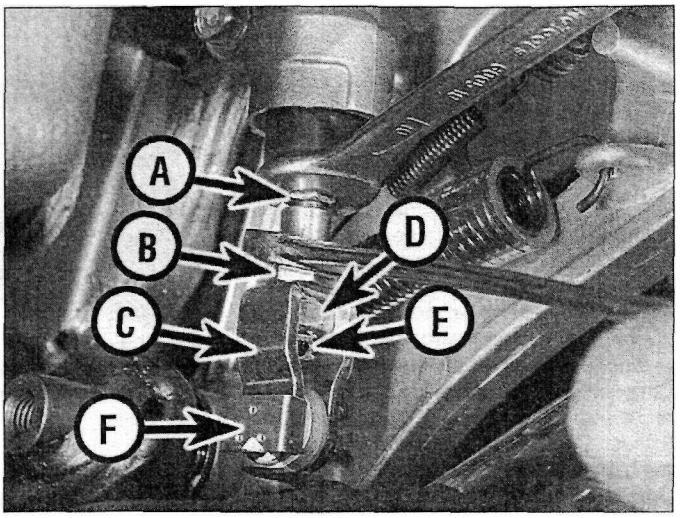



**9.9 Rear brake master cylinder components**

| | | | |
|---|---|---|---|
| *1 Brake hose* | *7 Reservoir* | *13 Spring* | *19 Locknut* |
| *2 Banjo bolt* | *8 Reservoir hose* | *14 Piston assembly* | *20 Clevis nut* |
| *3 Sealing washer* | *9 Hose elbow* | *15 Circlip* | *21 Clevis* |
| *4 Reservoir cover* | *10 O-ring* | *16 Dust boot* | *22 Clevis pin* |
| *5 Diaphragm plate* | *11 Master cylinder* | *17 Pushrod* | *23 Split pin* |
| *6 Rubber diaphragm* | *12 Master cylinder bolts* | *18 Spring pin* | |



**9.22 Make sure the reservoir hose clamps (arrow) are secure**




**9.24 Pushrod adjuster nut (A), locknut (B), clevis (C), clevis nut (D), spring pin (E), clevis pin (F)**

the fluid outlet. Lay the parts out in the proper order to prevent confusion during reassembly.

**12** Clean all of the parts with clean brake fluid or denatured alcohol. If compressed air is available, use it to dry the parts thoroughly (make sure it's filtered and unlubricated).

***Caution: Do not, under any circumstances, use a petroleum-based solvent to clean brake parts.***

**13** Check the master cylinder bore for corrosion, scratches, nicks and score marks. If the necessary measuring equipment is available, compare the dimensions of the piston and bore to those given in the Specifications Section of this Chapter. If damage is evident, the master cylinder must be replaced with a new one. If the master cylinder is in poor condition, then the caliper should be checked as well.

**14** If required, unscrew the fluid reservoir hose elbow screw and detach the elbow from the master cylinder. Discard the 0-ring as a new one must be fitted on installation. Inspect the reservoir hose for cracks or splits and replace if necessary.

**15** The dust boot, piston assembly and spring are included in the rebuild kit. Use all of the new parts, regardless of the apparent condition of the old ones.

**16** Install the spring in the master cylinder so that its tapered end faces the piston.

**17** Lubricate the piston assembly components with clean hydraulic fluid and install the assembly into the master cylinder, making sure all the components are the correct way round. Make sure the lips on the cup seals do not turn inside out when they are slipped into the bore.

**18** Install and depress the pushrod, then install a new circlip, making sure it is properly seated in the groove.

**19** Install the rubber dust boot, making sure the lip is seated properly in the groove.

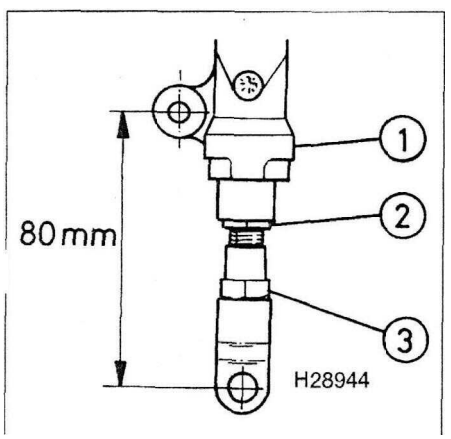
**20** If removed, fit a new O-ring to the fluid reservoir hose elbow, then install the elbow onto the master cylinder and secure it with its screw. Reconnect the fluid reservoir hose and secure it with its clamp.

### *Installation*

**21** Install the master cylinder onto the footrest bracket and tighten the mounting bolts to the torque setting specified at the beginning of the Chapter.

**22** Secure the fluid reservoir to the frame with its retaining bolt. Ensure that the hose is securely connected between the master cylinder and reservoir, correctly routed and secured by clamps at each end **(see illustration).** If the clamps have weakened, use new ones.

**23** Connect the brake hose banjo bolt to the master cylinder, using a new sealing washer on each side of the banjo union. Ensure that the hose is positioned against the lug **(see illustration 9.4)** and tighten the banjo bolt to the specified torque setting.




**9.26 Brake pedal height adjustment**

*1 Master cylinder*
*2 Pushrod adjuster nut*
*3 Clevis locknut*

**24** If removed, install the clevis locknut, the clevis and the clevis nut onto the master cylinder pushrod end, but do not yet tighten the locknut **(see illustration).** Install the spring pin into the end of the pushrod (late K models onward).

**25** If the clevis position on the pushrod was disturbed during overhaul, position it using the adjuster nut so that the distance between the hole in the clevis and the master cylinder lower mounting bolt hole is 80 mm **(see illustration).** Tighten the locknut against the clevis **(see illustration 9.24).**

**26** Align the brake pedal arm with the pushrod clevis, then install the clevis pin and secure it using a new split pin.

**27** Fill the fluid reservoir with the specified fluid (see Specifications) and bleed the system following the procedure in Section 11.

**28** Check the operation of the brake carefully before riding the motorcycle.

## 10 Brake hoses and unions - inspection and replacement

### *Inspection*

1 Brake hose condition should be checked regularly and the hoses replaced at the specified interval (see Chapter 1).

2 Twist and flex the rubber hoses while looking for cracks, bulges and seeping fluid. Check extra carefully around the areas where the hoses connect with the banjo fittings, as these are common areas for hose failure.

3 Inspect the metal banjo union fittings connected to the brake hoses. If the fittings are rusted, scratched or cracked, replace them.

### *Replacement*

4 The brake hoses have banjo union fittings on each end. Cover the surrounding area with plenty of rags and unscrew the banjo bolt on each end of the hose. Detach the hose from any clips that may be present and remove the hose. Discard the sealing washers.

5 Position the new hose, making sure it isn't twisted or otherwise strained, and abut the tab on the hose union with the lug on the component casting. Install the banjo bolts, using new sealing washers on both sides of the unions, and tighten them to the torque setting specified at the beginning of this Chapter. Make sure they are correctly aligned and routed clear of all moving components.

6 Flush the old brake fluid from the system, refill with the recommended fluid (see Specifications) and bleed the air from the system (see Section 11). Check the operation of the brakes carefully before riding the motorcycle.

## 11 Brake system - bleeding

1 Bleeding the brakes is simply the process of removing all the air bubbles from the brake fluid reservoirs, the hoses and the brake calipers. Bleeding is necessary whenever a brake system hydraulic connection is loosened, when a component or hose is replaced, or when the master cylinder or caliper is overhauled. Leaks in the system may also allow air to enter, but leaking brake fluid will reveal their presence and warn you of the need for repair.

2 To bleed the brakes, you will need some new, clean brake fluid of the recommended type (see Specifications), a length of clear vinyl or plastic tubing, a small container partially filled with clean brake fluid, some rags and a spanner to fit the brake caliper bleed valve.

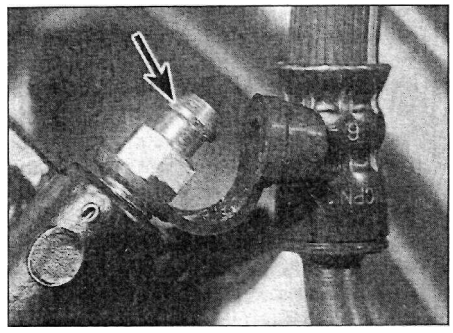
3 Cover the fuel tank and other painted components to prevent damage in the event that brake fluid is spilled.

4 If bleeding the rear brake, remove the right-hand side panel for access to the fluid reservoir.

5 Remove the reservoir cover, diaphragm plate and diaphragm and slowly pump the brake lever or pedal a few times, until no air bubbles can be seen floating up from the holes in the bottom of the reservoir. Doing this bleeds the air from the master cylinder end of the line. Loosely refit the reservoir cap/cover.

6 Pull the dust cap off the bleed valve **(see illustration).** Attach one end of the clear vinyl or plastic tubing to the bleed valve and submerge the other end in the brake fluid in the container.

7 Remove the reservoir cover and check the fluid level. Do not allow the fluid level to drop below the lower mark during the bleeding process.



**11.6 Brake caliper bleed valve (arrow)**

8 Carefully pump the brake lever or pedal three or four times and hold it in (front) or down (rear) while opening the caliper bleed valve. When the valve is opened, brake fluid will flow out of the caliper into the clear tubing and the lever will move toward the handlebar or the pedal will move down.

9 Retighten the bleed valve (note the torque setting in the Specifications of this Chapter), then release the brake lever or pedal gradually. Repeat the process until no air bubbles are visible in the brake fluid leaving the caliper and the lever or pedal is firm when applied. Disconnect the bleeding equipment and install the dust cap on the bleed valve.

**10** Install the diaphragm and cover assembly, wipe up any spilled brake fluid and check the entire system for leaks.

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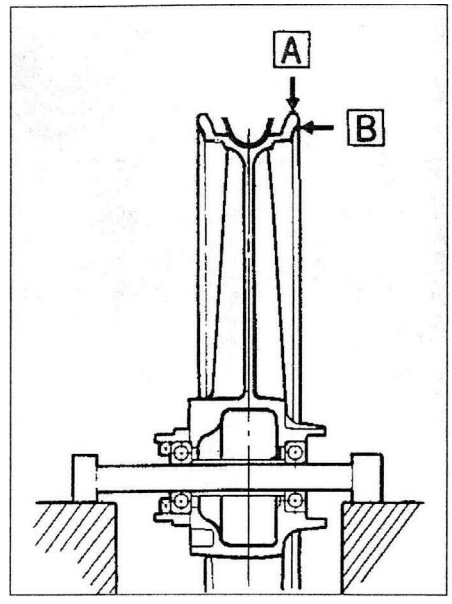
***If it's not possible to produce a firm feel to the lever or pedal the fluid my be aerated. Let the brake fluid in the system stabilise for a few hours and then repeat the procedure when the tiny bubbles in the system have settled out.***

## 12 Wheels - inspection and repair

1 In order to carry out a proper inspection of the wheels, it is necessary to support the bike upright so that the wheel being inspected is raised off the ground. Position the motorcycle on its centre stand or an auxiliary stand. Clean the wheels thoroughly to remove mud and dirt that may interfere with the inspection procedure or mask defects. Make a general check of the wheels and tyres as described in Chapter 1.

2 Attach a dial indicator to the fork slider or the swingarm and position its stem against the side of the rim (see illustration). Spin the wheel slowly and check the axial (side-to-side) runout of the rim. In order to accurately check radial (out of round) runout with the dial indicator, the wheel would have to be removed from the machine, and the tyre from the wheel. With the axle clamped in a vice and the dial indicator positioned on the top of the rim, the wheel can be rotated to check the runout.




**12.2 Check the wheel for radial (out-of-round) runout (A) and axial (side-to-side) runout (B)**

3 An easier, though slightly less accurate, method is to attach a stiff wire pointer to the fork slider or the swingarm and position the end a fraction of an inch from the wheel (where the wheel and tyre join). If the wheel is true, the distance from the pointer to the rim will be constant as the wheel is rotated. **Note:** *If wheel runout is excessive, check the wheel bearings carefully before replacing the wheel.*

4 The wheels should also be visually inspected for cracks, flat spots on the rim and other damage. Look very closely for dents in the area where the tyre bead contacts the rim. Dents in this area may prevent complete sealing of the tyre against the rim, which leads to deflation of the tyre over a period of time. If damage is evident, or if runout in either direction is excessive, the wheel will have to be replaced with a new one. Never attempt to repair a damaged cast alloy wheel.

## 13 Wheels - alignment check

1 Misalignment of the wheels, which may be due to a cocked rear wheel or a bent frame or fork yokes, can cause strange and possibly serious handling problems. If the frame or yokes are at fault, repair by a frame specialist or replacement with new parts are the only alternatives.

2 To check the alignment you will need an assistant, a length of string or a perfectly straight piece of wood and a ruler. A plumb bob or other suitable weight will also be required.

3 In order to make a proper check of the wheels it is necessary to support the bike in an upright position, either on its centre stand or on an auxiliary stand. Measure the width of both tyres at their widest points. Subtract the smaller measurement from the larger measurement, then divide the difference by two. The result is the amount of offset that should exist between the front and rear tyres on both sides.

4 If a string is used, have your assistant hold one end of it about halfway between the floor and the rear axle, touching the rear sidewall of the tyre.

5 Run the other end of the string forward and pull it tight so that it is roughly parallel to the floor. Slowly bring the string into contact with the front sidewall of the rear tyre, then turn the front wheel until it is parallel with the string. Measure the distance from the front tyre sidewall to the string.

6 Repeat the procedure on the other side of the motorcycle. The distance from the front tyre sidewall to the string should be equal on both sides.

7 As was previously pointed out, a perfectly straight length of wood may be substituted for the string. The procedure is the same.

8 If the distance between the string and tyre is greater on one side, or if the rear wheel appears to be cocked, refer to Chapter 1, *"Swingarmbearing check",* and make sure the swingarm is tight.

9 If the front-to-back alignment is correct, the wheels still may be out of alignment vertically.

**10** Using the plumb bob, or other suitable weight, and a length of string, check the rear wheel to make sure it is vertical. To do this, hold the string against the tyre upper sidewall and allow the weight to settle just off the floor. When the string touches both the upper and lower tyre sidewalls and is perfectly straight, the wheel is vertical. If it is not, place thin spacers under one leg of the stand.

**11** Once the rear wheel is vertical, check the front wheel in the same manner. If both wheels are not perfectly vertical, the frame and/or major suspension components are bent.

## 14 Front wheel - removal and installation

### *Removal*

1 Position the motorcycle on its centre stand or on an auxiliary stand and support it under the crankcase so that the front wheel is off the ground. Always make sure the motorcycle is properly supported.

2 Remove the screw securing the speedometer cable on the left-hand side of the wheel hub and detach the cable from its drive unit **(see illustration).**

3 Remove the brake caliper mounting bolts and slide the caliper off the disc **(see illustration 3.2).** Support the caliper with a piece of wire or a bungee cord so that no strain is placed on its hydraulic hose. There is no need to disconnect the brake hose from the caliper.

4 Slacken the axle clamp bolts on the bottom of each fork, then unscrew the axle bolt from the right-hand side **(see illustrations).**

5 Support the wheel, then withdraw the axle from the left-hand side and carefully lower the wheel **(see illustration). Note:** *Do not operate the front brake lever with the wheel removed.*

6 Remove the spacer from the right-hand side of the wheel, noting which way round it fits, and the speedometer drive housing from the left-hand side **(see illustration).**

***Caution: Don't lay the wheel down and allow it to rest on the disc - the disc could become warped. Set the wheel on wood blocks so the disc doesn't support the weight of the wheel.***

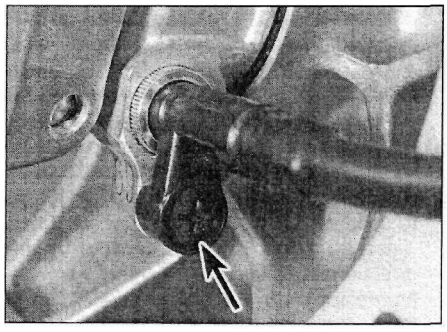
7 Check the axle for straightness by rolling it on a flat surface such as a piece of plate glass (first wipe off all old grease and remove any corrosion using fine emery cloth). If the equipment is available, place the axle in V-blocks and measure the runout using a dial indicator. If the axle is bent or the runout exceeds the limit specified, replace it.

8 Check the condition of the wheel bearings (see Section 16).

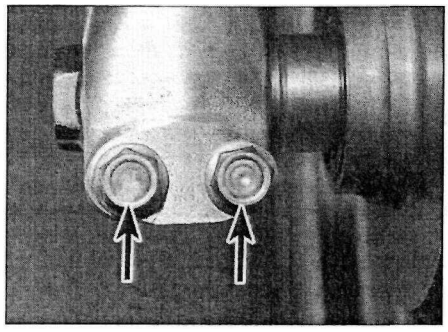
### *Installation*

9 Apply a smear of lithium-based grease to the speedometer drive components. Fit the speedometer drive to the wheel's left-hand side, aligning its drive gear slots with the driveplate tabs **(see illustration).**

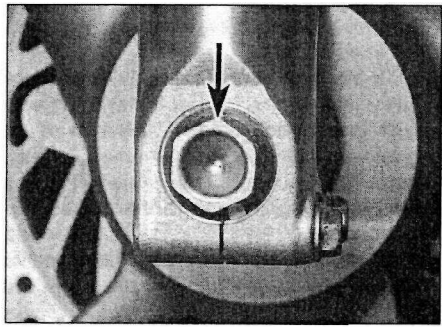
**10** Apply a smear of lithium-based grease to the outer surface of the spacer (where it contacts the grease seal) and install the spacer



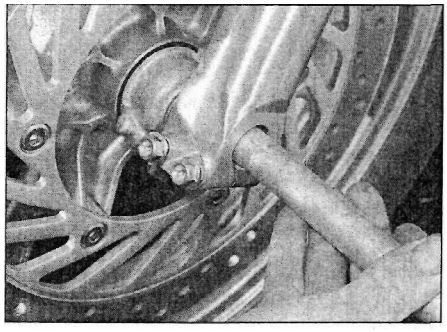
**14.2 Unscrew the speedometer cable retaining screw (arrow)**



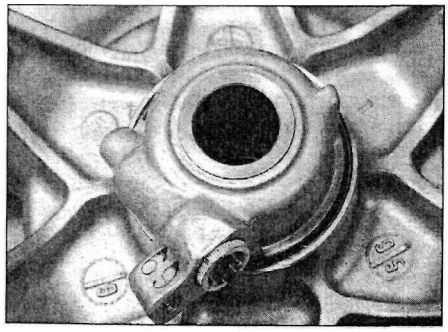
**14.4a Axle clamp bolts (arrows)**



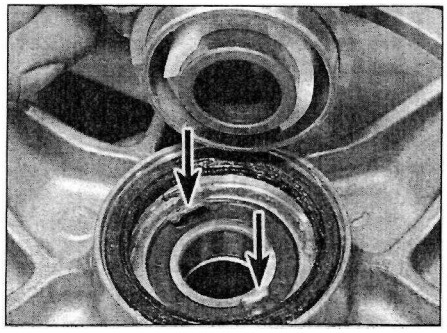
**14.4b Axle bolt (arrow)**



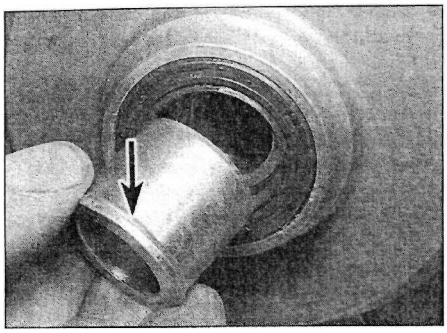
**14.5 Withdraw the axle from the left side**



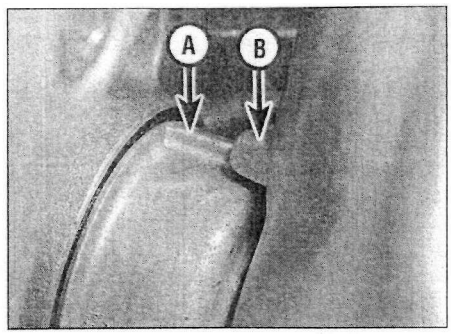
**14.6 Speedometer drive housing locates in wheel left-hand side**



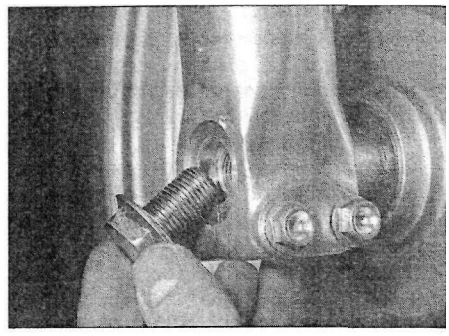
**14.9 Align the driveplate tabs (arrows) with the slots in the drive gear**



**14.10 Install the spacer with its ridged end outwards (arrow)**

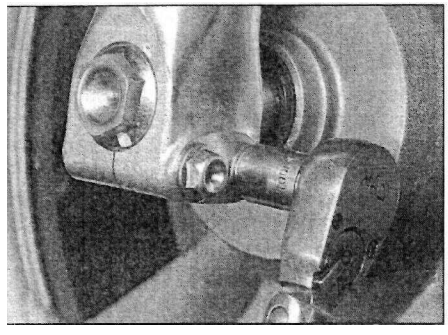



**14.12 The lug on the speedometer drive housing (A) butts on the back of the lug on the fork slider (B)**

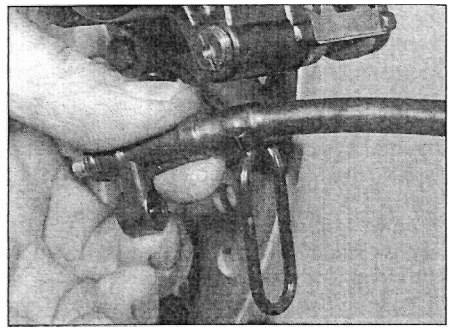


**14.14a Install the axle bolt . . .**

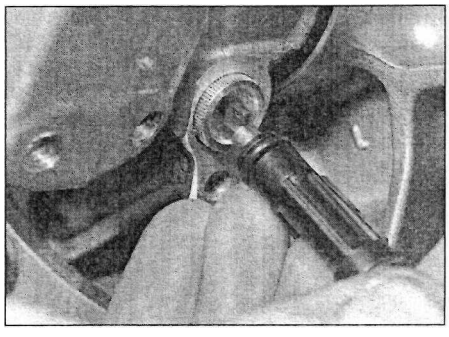
**14.14b . . . and tighten it to the specified torque setting**



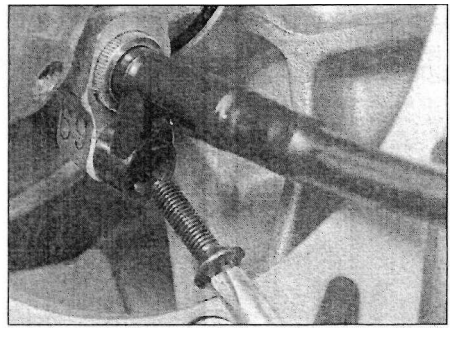
**14.15 Tighten the axle clamp bolts to the specified torque setting**



**14.17a Fit the speedometer cable into its guide on the brake caliper . . .**



**14.17b . . . then align the slot in the cable end with the drive tab . . .**



**14.17c . . . and secure it with its screw**

in the right-hand side of the wheel, with its ridged end facing out **(see illustration).**

**11** Manoeuvre the wheel into position. Apply a thin coat of grease to the axle.

12 Lift the wheel into position making sure the spacer remains in place. Make sure the lug on the speedometer drive housing fits against the back of the lug on the fork slider **(see illustration).**

13 Slide the axle into position from the left-hand side **(see illustration 14.5).**

14 Install the axle bolt **(see illustration).** Tighten the bolt to the specified torque setting **(see illustration)**

15 Tighten the axle clamp bolts on both forks to the specified torque setting **(see illustration).**

16 Install the brake caliper making sure the pads sit squarely on either side of the disc. Fit the caliper mounting bolts and tighten them to the torque setting specified at the beginning of the Chapter.

17 Pass the speedometer cable through its guides on the mudguard and the brake caliper (if withdrawn), then connect the cable to the drive housing, aligning the slot in the cable end with the drive tab, and securely tighten its screw **(see illustrations).**

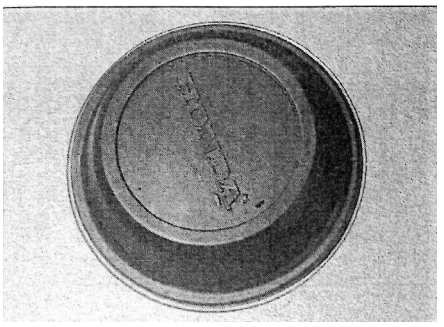
18 Apply the front brake a few times to bring the pads back into contact with the disc. Move the motorcycle off its stand, apply the front brake and pump the front forks a few times to settle all components in position.

**19** Check for correct operation of the front brake before riding the motorcycle.

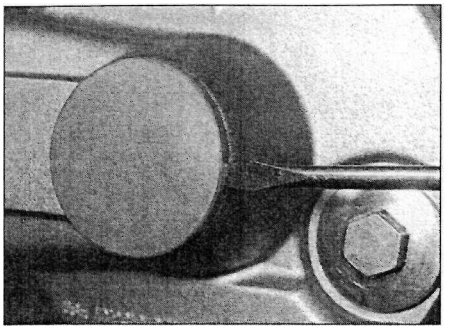
## 15 Rear wheel - removal and installation

### *Removal*

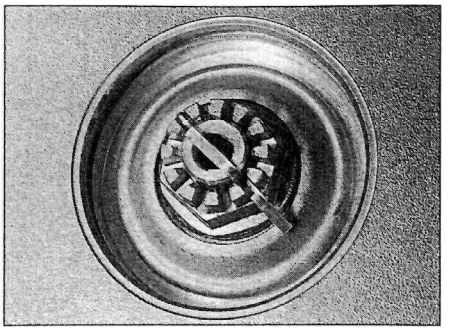
1 Position the motorcycle on its centre stand or on an auxiliary stand. Always make sure the bike is properly supported. It is advisable to place a block in front of the front wheel, or to tie the front brake lever back so that the front wheel is locked.



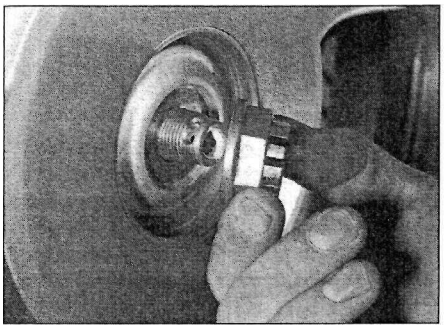
15.2a Prise off the wheel nut cap .



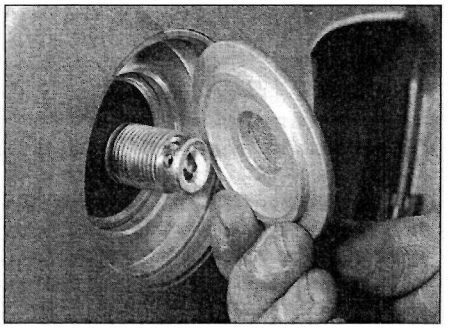
15.2b . . . and the axle cap



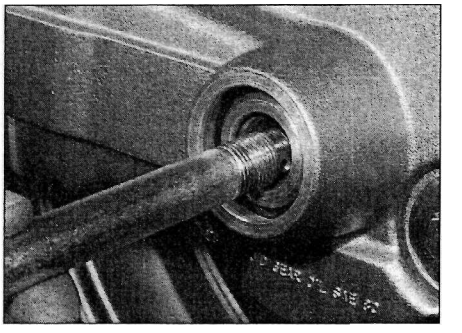
15.2c Remove the split pin from the axle and the wheel nut



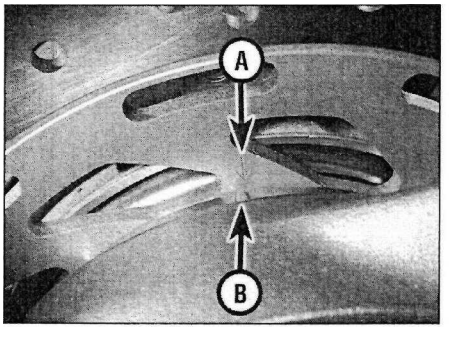
15.3a Unscrew the wheel nut . . .



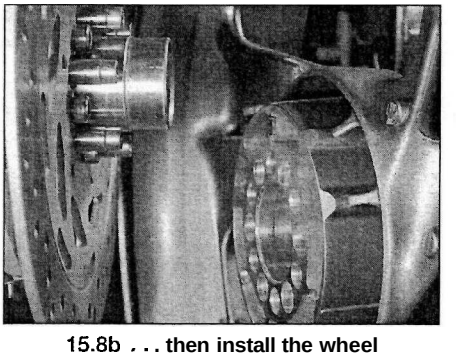
15.3b . . . and remove the axle spacer



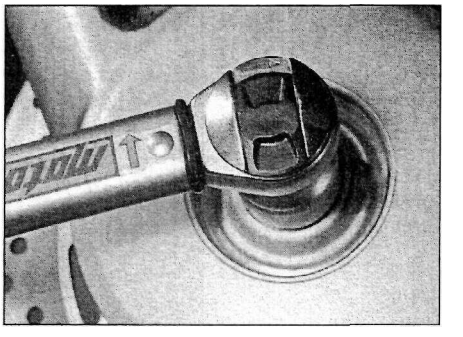
15.7 Install the axle into the final drive housing




15.8a Align the arrows on the disc (A) with the index marks on the wheel (B) . . .



15.8b . . . then install the wheel



15.9 Tighten the axle nut to the specified torque setting

2 Prise off the wheel nut cap from the right-hand side of the wheel and the axle cap from the outside of the final drive housing **(see illustrations).** Remove the split pin from the end of the axle, noting how it fits, and discard it as it is important that a new one be used **(see illustration).**

3 Unscrew the wheel nut, then remove the axle spacer **(see illustrations).** Grasp the wheel and draw it to the right until it is clear of the final drive housing, then manoeuvre it clear of the swingarm. Note the index marks on the wheel and the inside of the brake disc indicating the correct installation position.

4 Tap the axle from the inside using a soft-faced hammer and withdraw it from the final drive housing, noting how it fits.

5 Check the axle splines and threads for wear or damage. Check the axle for straightness by rolling it on a flat surface such as a piece of plate glass (first wipe off all old grease and remove any corrosion using fine emery cloth). If the equipment is available, place the axle in V-blocks and measure the runout using a dial indicator. If the axle is worn, damaged or bent, replace it.

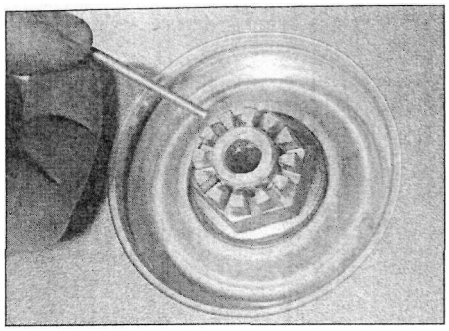
6 Check the drive pin bolts on the final drive housing for tightness, wear or damage and tighten or replace any if necessary. If disturbed, apply a suitable thread locking compound to their threads and tighten them to the torque setting specified at the beginning of the Chapter. Check the corresponding drive pin holes in the wheel for wear or damage.

### *Installation*

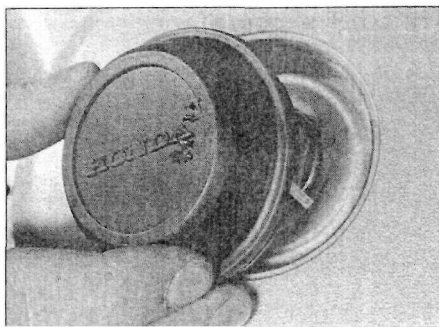
7 Apply a thin coat of lithium-based grease to the axle shaft and install it into the final drive housing, making sure the splines are correctly engaged **(see illustration).** Tap it with a soft-faced hammer to make sure it is properly seated.

8 Align the arrows on the inside of the brake disc with the index marks on the wheel, then lift the wheel into position and install it onto the final drive housing, making sure the drive pins engage correctly in the wheel **(see illustrations).**

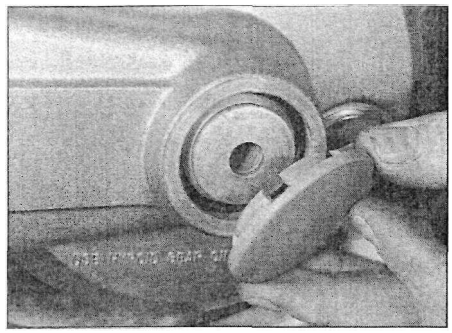
9 Install the axle spacer **(see illustration 15.3b).** Apply a thin coat of lithium-based grease to the threads on the end of the axle, then install the wheel nut and tighten it to the specified torque setting **(see illustration).**



**15.10a Fit a new split pin through the axle . . .**



**15.1Ob . . . then fit the wheel nut cap . . .**



**15.10c . . . and the axle cap**

**10** Fit a new split pin into the end of the axle and bend over its ends, then fit the wheel nut cap and the axle cap **(see illustrations).**

## 16 Wheel bearings - removal, inspection and installation

### *Front wheel bearings*

**Note:** *Always replace the wheel bearings in pairs. Never replace the bearings individually. Avoid using a high pressure cleaner on the wheel bearing area.*

1 Remove the wheel as described in Section 14.

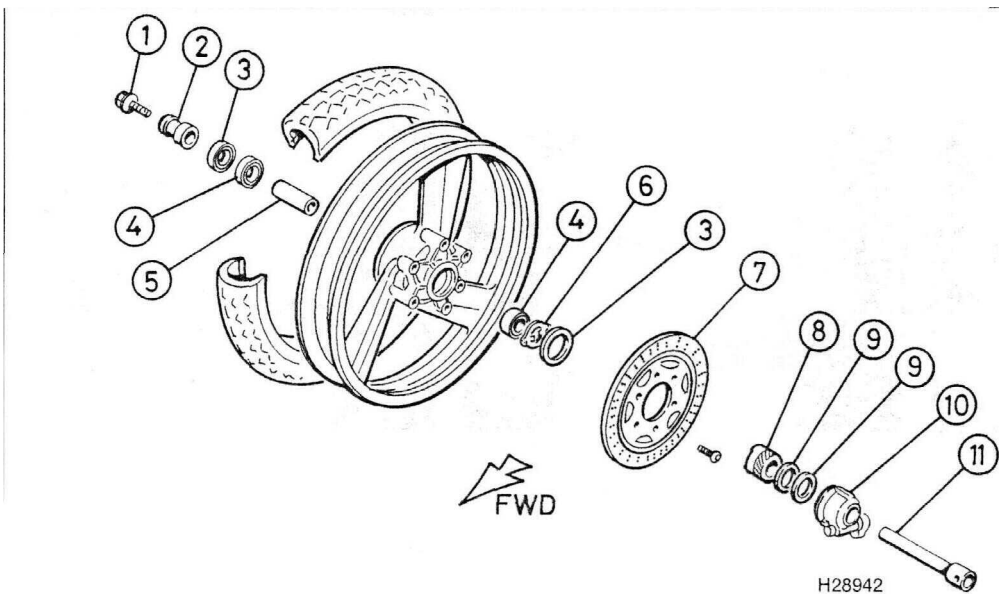
2 Set the wheel on blocks so the weight of the wheel does not rest on the brake disc.

3 Using a flat-bladed screwdriver, prise out the grease seals from both sides of the wheel **(see illustrations).** Note the differences between the seals for installation. Discard the seals if they are worn or damaged as new ones should be used.

4 Withdraw the speedometer driveplate from the left-hand side of the wheel, noting how it fits **(see illustration).**

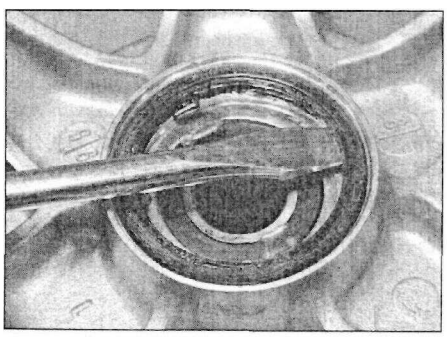
5 Insert a finger through the bearing inner race and rotate it - if the bearing doesn't turn smoothly, has rough spots or is noisy, it must be replaced with a new one. **Note:** *Honda advise that the wheel bearings must be replaced with new ones if they are removed from the wheel hub.*

6 Using a metal rod (preferably a brass drift punch) inserted through the centre of the hub

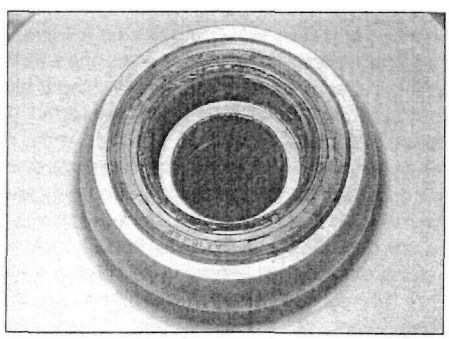



**16.3a Front wheel components**

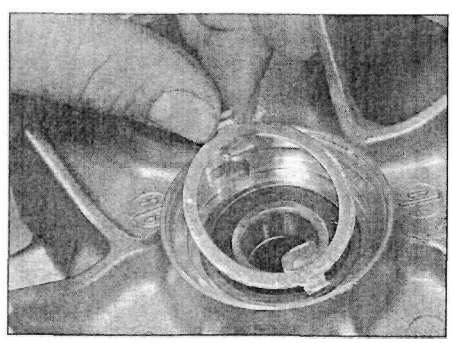
1 *Axle bolt*
2 *Spacer*
3 *Grease seal*
4 *Bearing*
5 *Bearing spacer*
6 *Speedometer driveplate*
7 *Disc*
8 *Speedometer drive gear*
9 *Washer*
10 *Speedometer drive housing*
11 *Axle*



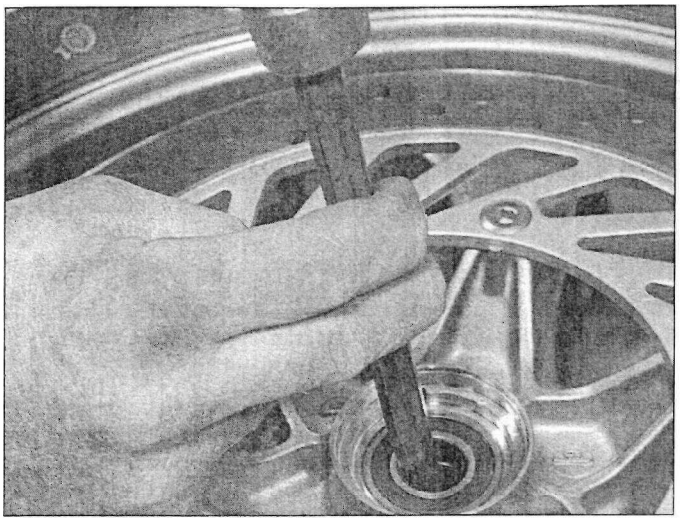
**16.3b Prise out the left-hand grease seal . . .**



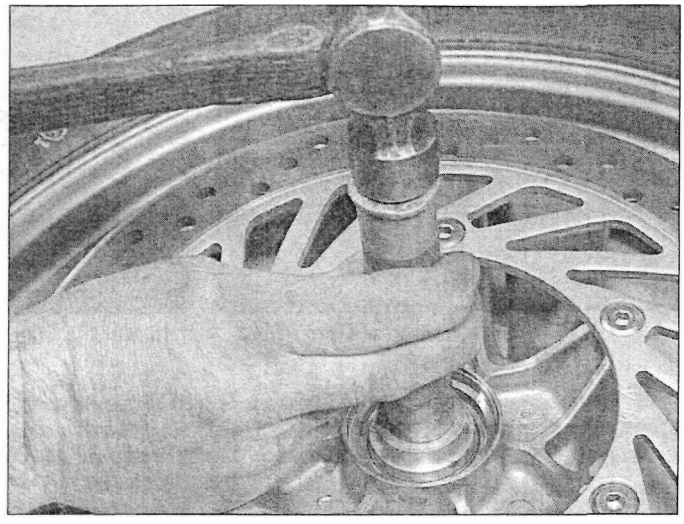
**16.3c . . . and the right-hand grease seal, noting their differences**



**16.4 Remove the speedometer driveplate**



16.6 Using a drift to knock out the bearings



16.9 Using a bearing driver to drive in the bearings

bearing from the left-hand side, tap evenly around the inner race of the right-hand side bearing to drive it from the hub **(see illustration).** The bearing spacer will also come out.

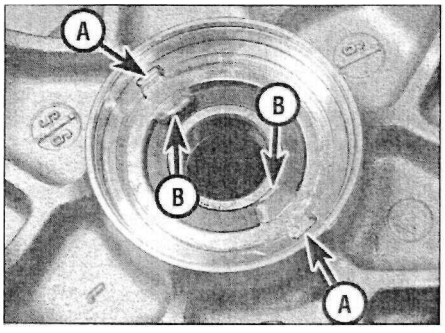
7 Lay the wheel on its other side and remove the other bearing using the same technique.

8 If the bearing is good and can be re-used, wash it in solvent once again and dry it, then pack the bearing with high-quality lithium-based grease.

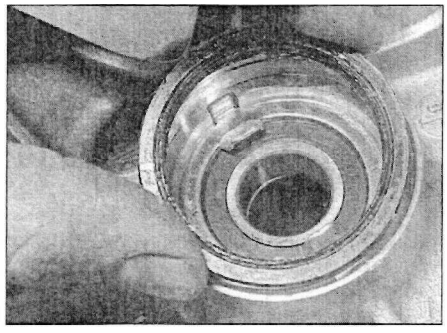
9 Thoroughly clean the hub area of the wheel. Install the left-hand side bearing into its recess in the hub, with the marked or sealed side facing outwards. Using a bearing driver or a socket large enough to contact the outer race of the bearing, drive it in until it's completely seated **(see illustration).**

10 Turn the wheel over and install the bearing spacer.

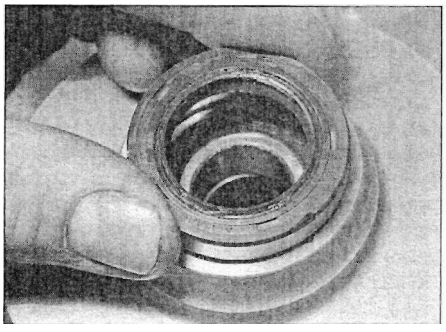
**11** Drive the right-hand side bearing into place as described in Step 9.



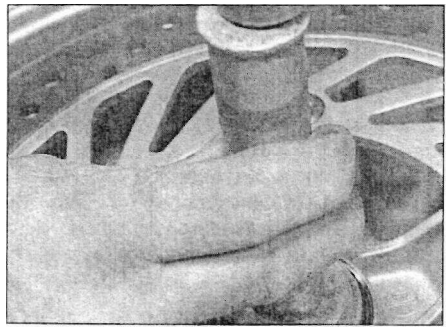

16.12 Fit the speedometer driveplate with its outer tangs located in the slots in the hub (A) and its drive tabs facing out (B)



16.13a Fit the left-hand side . . .



16.13b . . . and the right-hand side grease seals . . .



16.13c . . . and drive them into place

**12** Fit the speedometer driveplate to the left-hand side of the wheel, making sure its locating tangs are correctly located in the hub slots and the drive tabs face out **(see illustration).**

**13** Apply a smear of lithium-based grease to the lips of the grease seals, then install them using a seal driver, large socket or a flat piece of wood to drive them into place **(see illustrations).** Make sure each seal is fitted to its correct side.

14 Clean off all grease from the brake disc using acetone or brake system cleaner then install the wheel as described in Section 14.

### Rear *wheel/final drive bearings*

**15** The rear wheel has no bearings. Refer to Chapter 6 for the procedure regarding the final drive bearings.

## 17 Tyres - general information and fitting

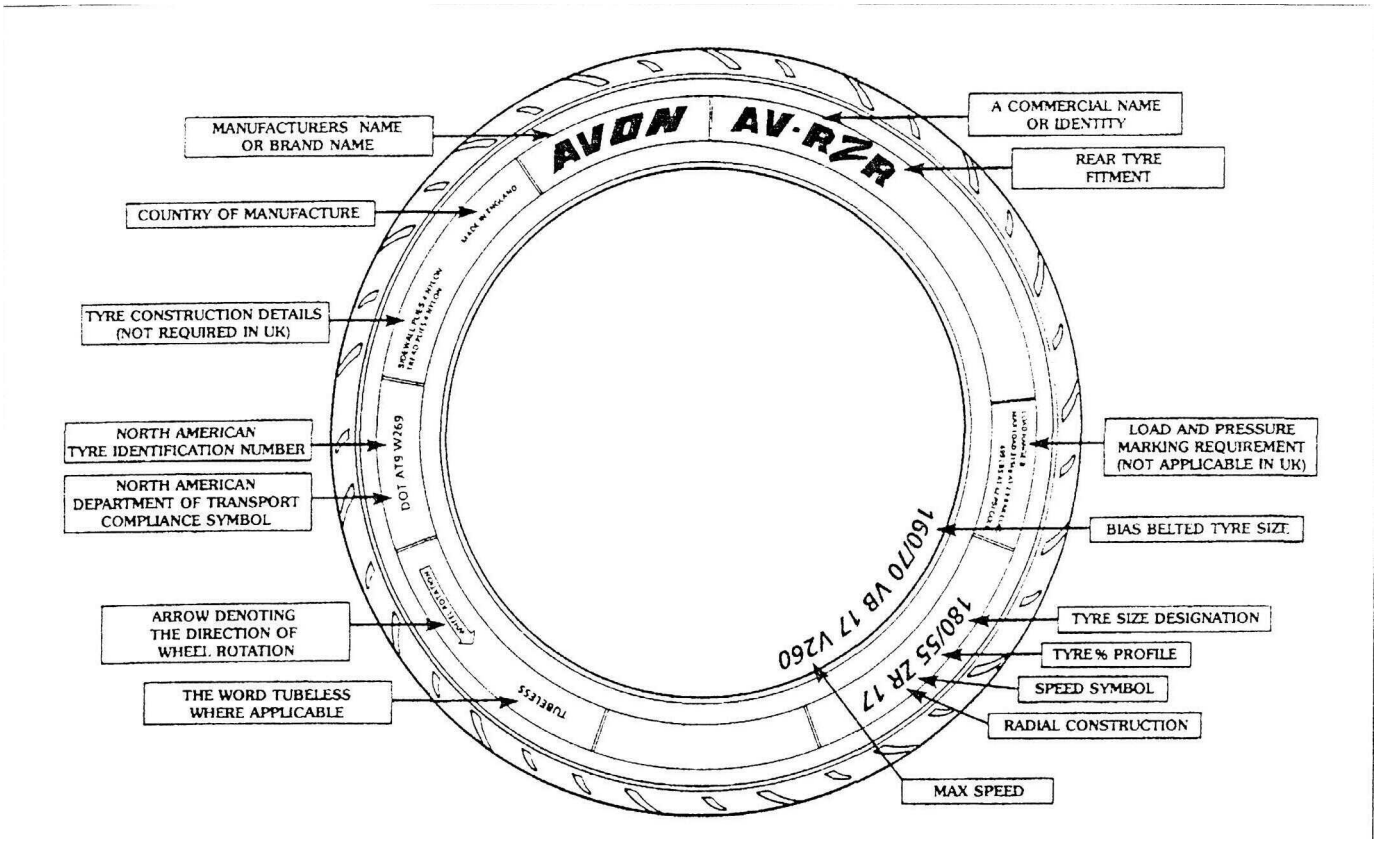
### *General information*

1 The wheels fitted to all models are designed to take tubeless tyres only.

2 Refer to *Daily (pre-ride) checks* at the beginning of this manual, and to the scheduled checks in Chapter 1 for tyre and wheel maintenance.

### *Fitting new tyres*

3 When selecting new tyres, refer to the tyre information label on the swingarm and the tyre options listed in the owners manual. Ensure that front and rear tyre types are compatible, the correct size and correct speed rating; if necessary seek advice from a Honda dealer or tyre fitting specialist **(see illustration).**




**17.3 Common tyre sidewall markings**

4 It is recommended that tyres are fitted by a motorcycle tyre specialist rather than attempted in the home workshop. The force required to break the seal between the wheel rim and tyre bead is substantial, and is usually beyond the capabilities of an individual working with normal tyre levers. Additionally, the specialist will be able to balance the wheels after tyre fitting.

5 Only certain types of puncture repair are suitable for tubeless motorcycle tyres. Refer to a tyre fitting specialist for advice and to your owners manual for details of the reduced speeds advised for a repaired tyre.