Chapter 6 Wheels, brakes and tyres

For information relating to the RD350 F II and N II models, refer to Chapter 8

Contents

Specifications

	Front	Rear
Wheels		
Type	Cast aluminium alloy	Cast aluminium alloy
Size	MT2.15 x 18	MT2.50 x 18
Maximum runout at rim:		
Radial	1.0 mm (0.04 in)	1.0 mm (0.04 in)
Axial	0.5 mm (0.02 in)	0.5 mm (0.02 in)
Tyres		
Size	90/90 – 18 51H	110/80 – 18 58H
Pressures (cold):		
Up to 90 kg (198 lb) load	26 psi	28 psi
90 – 211 kg (198 – 428 lb) load	32 psi	40 psi
High speed riding	28 psi	32 psi
Brakes		
Type	Twin disc brake	Single disc brake
Disc diameter	267 mm (10.5 in)	267 mm (10.5 in)
Disc thickness	5.0 mm (0.19 in)	5.0 mm (0.19 in)
Service limit	4.5 mm (0.18 in)	4.5 mm (0.18 in)
Pad thickness:		
RD350 LC II	6.8 mm (0.27 in)	6.8 mm (0.27 in)
Service limit	0.8 mm (0.03 in)	0.8 mm (0.03 in)
Other models	5.5 mm (0.22 in)	5.5 mm (0.22 in)
Service limit	0.5 mm (0.02 in)	0.5 mm (0.02 in)

Master cylinder bore ID	15.87 mm (0.62 in)	12.70 mm (0.51 in)
Caliper bore ID	38.18 mm (1.50 in)	38.18 mm (1.50 in)
Brake fluid type	DOT 3 or SAE J1703	DOT 3 or SAE J1703

Torque wrench settings

Component	kgf m	lbf ft
Front wheel spindle	7.5	54.0
Rear wheel spindle:		
RD350 LC II	10.0	72.0
Other models	10.5	75.0
Rear wheel sprocket	3.3	24.0
Brake disc mounting bolts	2.0	14.0
Master cylinder hose unions	2.5	18.0
Hydraulic hose to 3-way union	2.5	18.0
Hydraulic hose to caliper	2.5	18.0
Caliper bracket bolts	3.5	25.0
Caliper bleed screw	0.5	4.0

1 General description

The Yamaha RD350 YPVS models are fitted with cast aluminium alloy wheels carrying tubeless tyres. The front brake is a twin hydraulic disc unit, the rear brake being a single hydraulic disc.

2 Front wheel: examination and renovation

1 Carefully check the complete wheel for cracks and chipping, particularly at the spoke roots and the edge of the rim. As a general rule a damaged wheel must be renewed as cracks will cause stress points which may lead to sudden failure under heavy load. Small nicks may be radiused carefully with a fine file and emery paper (No 600 – No 1000) to relieve the stress. If there is any doubt as to the condition of a wheel, advice should be sought from a reputable dealer or specialist repairer.
2 Each wheel is covered with a coating of lacquer, to prevent corrosion. If damage occurs to the wheel and the lacquer finish is penetrated, the bared aluminium alloy will soon start to corrode. A whitish grey oxide will form over the damaged area, which in itself is a protective coating. This deposit however, should be removed carefully as soon as possible and a new protective coating of lacquer applied.
3 Check the lateral and radial run out at the rim by spinning the wheel and placing a fixed pointer close to the rim edge. If the maximum run out is greater than that specified the manufacturer recommends that the wheel be renewed. This is, however, a counsel of perfection; a run out somewhat greater than this can probably be accommodated without noticeable effect on steering. No means is available for straightening a warped wheel without resorting to the expense of having the wheel skimmed on all faces. If warpage was caused by impact during an accident, the safest measure is to renew the wheel complete. Worn wheel bearings may cause rim run out. These should be renewed.

3 Front disc brake: pad renewal – RD350 LC II

1 The brake pads can be removed for inspection or renewal without disturbing the caliper unit or hydraulic system. In view of the relative ease of the operation it is recommended that the pads are removed for examination, rather than attempting this with them in position.
2 Slacken and remove the pad retaining bolt between the bleed nipple and hose union. The pads should now be free and can be slid out. If they prove reluctant to come free, gently lever the caliper piston inwards by about 1 mm to give a little extra clearance.
3 Examine the pads for signs of wear, damage or contamination. The backing metal of each pad has a raised section near each end. If the friction material is worn down to this indicator, renew the pads as a set. Do **not** rely on the central groove in the friction material as a reliable indication of the degree of wear; the pads tend to wear more at one end than the other. If there are signs that the friction material is beginning to crack, renew the pads. Where the pad surface appears damp, suspect a fluid leak from the caliper. This must be rectified immediately, before new pads are fitted.
4 If the jaw area of the caliper is heavily coated with brake dust it is suggested that the caliper is removed from the fork leg to allow better access for cleaning. Remove the accumulated dust using a small paint brush dipped in methylated spirit, and work outside or in a well ventilated position. Take care not to inhale any of the asbestos-based friction material.
5 Fit the new pads by reversing the removal sequence, ensuring that they locate correctly against the shims. Note that the manufacturer recommends that the shims and the retaining bolts are renewed each time new pads are fitted.

4 Front disc brake: pad renewal – RD350 F and N

1 The RD350 F and N models employ twin piston brake calipers in place of the single piston type previously fitted. The procedure for pad renewal thus differs slightly from that described for the RD350 LC II. Start by slackening the two Allen-headed pad retaining pins. Next, remove the caliper mounting bolts and lift the caliper clear of the disc. Remove the pad pins and lift away the pads and shim.
2 Examine the pads for signs of wear, damage or contamination. The backing metal of each pad has a raised section near each end. If the friction material is worn down to this indicator at either end, renew the pads as a set. Do **not** rely on the central groove in the friction material as a reliable indication of the degree of wear; the pads tend to wear more at one end than the other.
3 If there are signs that the friction material is beginning to crack, renew the pads. Where the pad surface appears damp, suspect a fluid leak from the caliper. This must be rectified immediately, before new pads are fitted.
4 Remove the accumulated dust around the caliper jaw area using a small paint brush dipped in methylated spirit, working outside or in a well ventilated position. Take care not to inhale any of the asbestos-based friction material.
5 Fit the new pads by reversing the removal sequence, ensuring that they locate correctly against the central anti-rattle shim. Note that each pad has a thin backing shim. Each of these has a chamfered corner; this must face upwards and to the rear of the machine.
6 Fit the pad pins finger tight, then refit the caliper to the fork leg. Note that to accommodate the new pads it will probably be necessary to push the pistons back into the caliper body. Fit and tighten the caliper mounting bolts to 3.5 kgf m (25 lbf ft), then tighten the pad retaining pins to 1.0 kgf m (7.2 lbf ft).

5 Rear disc brake: pad renewal – all models

1 Rear pad renewal is basically similar to front pad renewal described in Section 4, and the remarks in the preceding Section can be applied in most respects. Note, however, that in the case of the RD350 LC II model, the caliper is provided with an inspection window concealed by a clip-on cover. If this is prised off and the two pad retaining pins removed the pads can be lifted away, leaving the caliper in position. On later machines the pads can be removed after releasing the caliper mounting bolts.

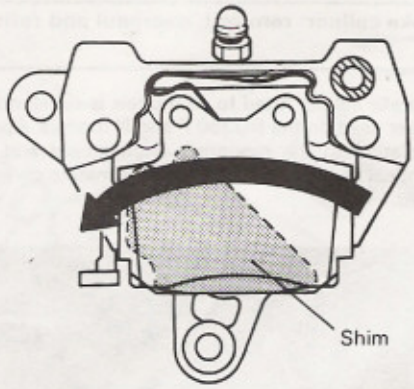
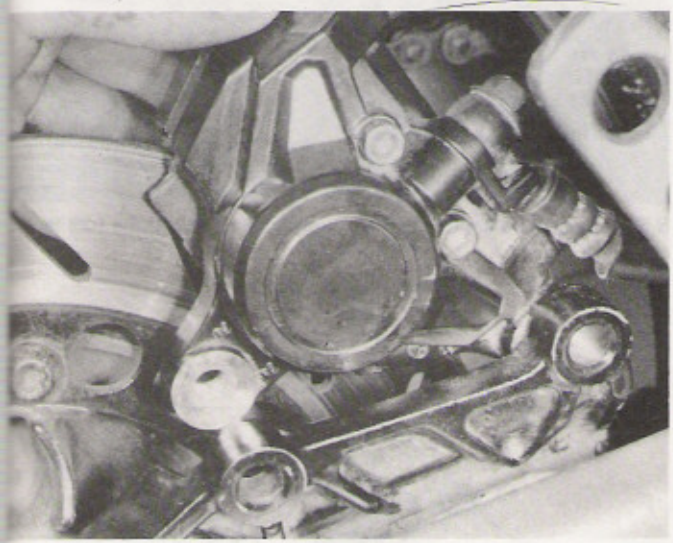
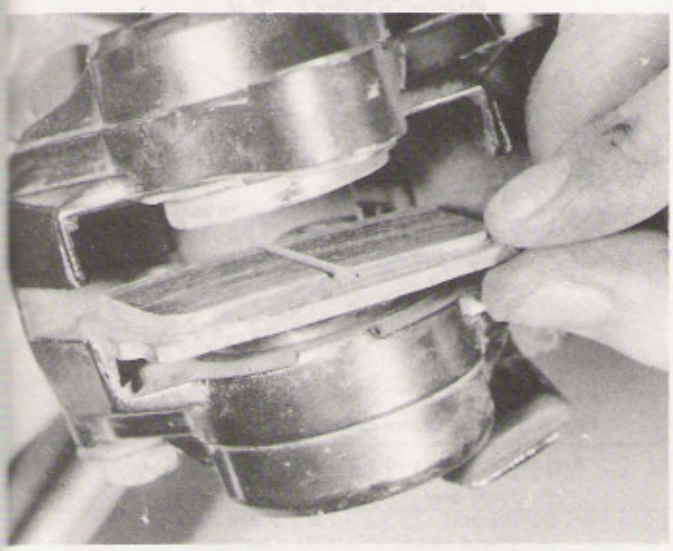


Fig. 6.1 Front brake pad shim installation – RD350 F and N

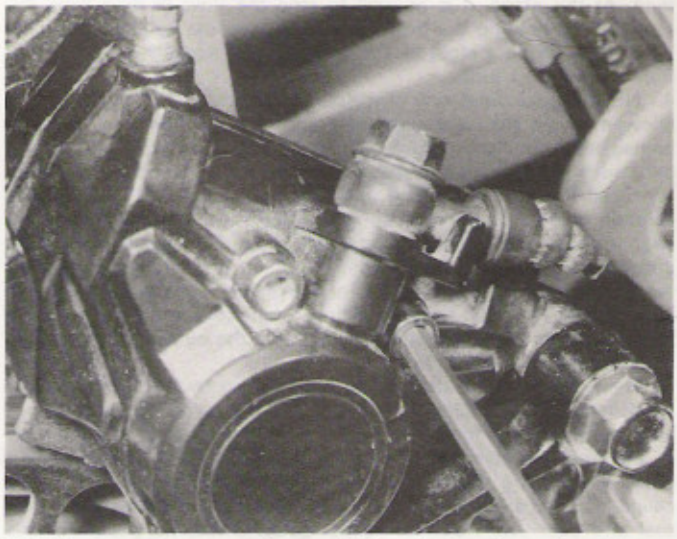
Arrow shows direction of wheel rotation



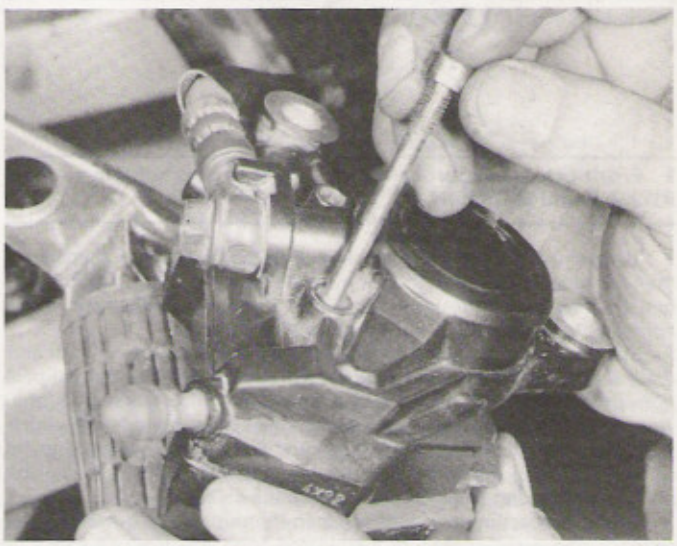
5.1b ... then release the caliper from its mounting and remove the pad pins fully



5.1c The pads can then be withdrawn from the underside of the caliper



5.1a To release the rear caliper pads, first slacken the pad retaining pins ...



5.1d When refitting pads, hold them against the pad spring while the pins are inserted

6 Front brake caliper: removal, overhaul and refitting – RD350 LC II

1 The caliper units should be removed and dismantled whenever there is reason to suspect fluid leakage. Remember that your life, and that of other road users, depends on the condition of the braking system more than any other component. When working on the brakes, keep everything absolutely clean, and always work on one caliper at a time to avoid interchanging parts between them.

2 The caliper unit is of the single piston floating type, the caliper body being free to move sideways along a support pin in relation to the caliper mounting bracket. When the handlebar lever is squeezed the piston is displaced pushing the moving pad against the disc. This then causes the caliper body to move slightly in the opposite direction until the fixed pad exerts equal pressure on the opposite face of the disc.

3 If the caliper unit warrants removal for inspection or renovation, it is first necessary to remove and drain the hydraulic hose. Disconnect the union at the caliper. Have a suitable container in which to catch the

fluid. At this stage, it is as well to stop the flow of fluid from the reservoir, by holding the front lever in against the handlebar. This is easily done using a stout elastic band, or alternatively, a section cut from an old inner tube.

4 **Note:** Brake fluid will discolour or remove paint if contact is allowed. Avoid this where possible and remove accidental splashes immediately. Similarly, avoid contact between the fluid and plastic parts such as instrument lenses, as damage will also be done to these. When all the fluid is drained from the hose, clean the connections carefully and secure the hose end and fittings inside a clean polythene bag, to await reassembly. As with all hydraulic systems, it is most important to keep each component scrupulously clean, and to prevent the ingress of any foreign matter. For this reason, it is as well to prepare a clean area in which to work, before further dismantling. As in any form of component dismantling, ensure that the outside of the caliper is thoroughly cleaned down.

5 The caliper unit is attached to the fork leg by two bolts, which, when removed, will allow the unit to be lifted away. If the caliper is being removed with the front wheel in position, it should be lifted clear of the disc. Remove the brake pads as described in the preceding Section, exposing the piston. The piston may be driven out of the caliper body by an air jet – a foot pump if necessary. Remove the piston seal and dust seal from the caliper body. Under no circumstances should any attempt be made to lever or prise the piston out of the caliper. If the compressed air method fails, temporarily reconnect the caliper to the flexible hose, and use the handlebar lever to displace the piston hydraulically. Wrap some rag around the caliper to catch the inevitable shower of brake fluid.

7 Front brake caliper: removal, overhaul and refitting – RD350 F and N models

1 The general procedure for dealing with the front brake calipers on the later models is similar to that outlined above for the RD350 LC II, but the new caliper design necessitates a few detail changes in the approach to the overhaul. These are outlined below.

2 Start by disconnecting the brake hoses at the caliper unions and drain the hydraulic system as described above. Remove the calipers from the fork leg after removing the two bolts which retain each one. Note: **on no account** slacken or remove the caliper bridge bolts which secure the two halves of the caliper body; these do not need to be separated during overhaul. Remove the pad pins and lift away the pads, their backing shims and the anti-rattle shim.

3 Before proceeding any further, clean thoroughly the outside of the caliper using a rag soaked in methylated spirit. Do not use petrol or similar solvents; this will damage the dust seals and must be kept well away from the caliper. It will be noted that the RD350 F and N models use opposed piston calipers in place of the earlier single piston design, and thus there are two pistons and sets of seals to each unit. It is important that care is taken to fit pistons to the bore from which they were removed.

4 To displace the pistons it is necessary to hold one in place while the other is expelled using compressed air. Yamaha recommend that the right-hand piston is held in place using a pair of slip-joint pliers with rag to protect the piston surface. Compressed air is then applied to the fluid inlet to expel the piston. When work on the first piston is complete, refit it and then expel the remaining piston in a similar manner. In the absence of compressed air, temporarily refit the hydraulic hose, and gradually "pump" the pistons out of their bores. Whichever method is employed take great care to avoid getting fingers trapped by the emerging pistons.

5 Examine and clean the caliper components as described in Section 6 above, remembering not to interchange the pistons. If both are removed from the caliper at the same time it is advisable to clean them with methylated spirit and then to mark them "L" and "R" using a spirit-based marker pen on the recessed outer face of each one. Reassembly is a reversal of the removal sequence, noting that absolute cleanliness is vital. Always fit new seals regardless of apparent condition, and lubricate them with hydraulic fluid during installation. When the calipers have been refitted, fill and bleed the hydraulic system as described later in this Chapter.

8 Rear brake caliper: removal, overhaul and refitting – all models

1 The rear brake caliper fitted to all models is substantially similar to the front caliper used on the RD350 F and N models. Apart from detail differences relating to the mounting arrangement and position, the caliper is identical in operation, and the information given in Section 7 can be applied.

6.5 Front calipers are retained by two flanged bolts to the fork legs

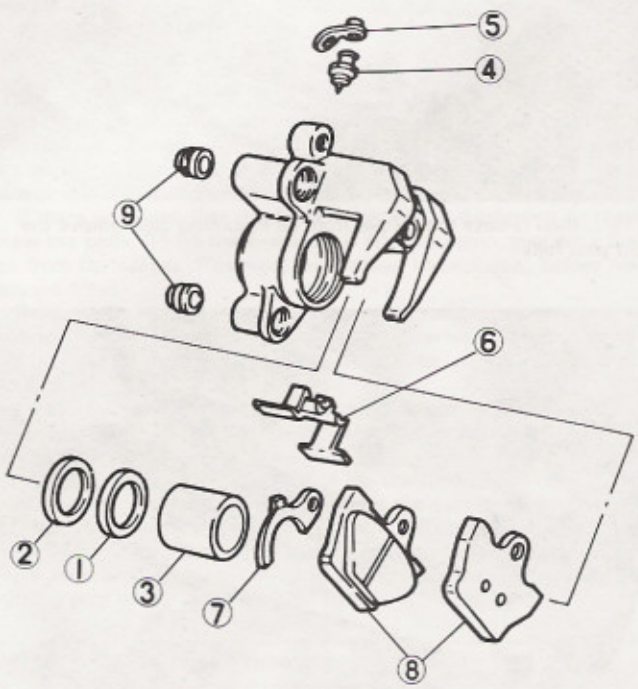


Fig. 6.2 Front brake caliper – RD350 LC II model

1	*Dust seal*	6	*Anti-rattle spring*
2	*Fluid seal*	7	*Shim*
3	*Piston*	8	*Brake pads*
4	*Bleed nipple*	9	*Dust seal*
5	*Cap*		

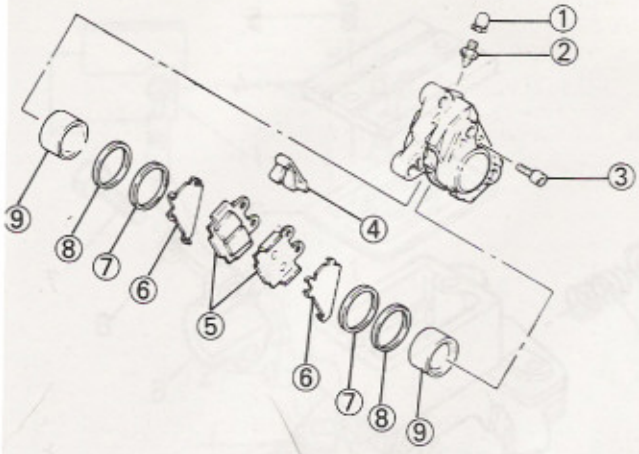


Fig. 6.3 Front brake caliper – RD350 F and N models

1 Cap
2 Bleed nipple
3 Allen bolt – 2 off
4 Anti-rattle spring
5 Brake pad
6 Shim
7 Dust seal
8 Fluid seal
9 Piston

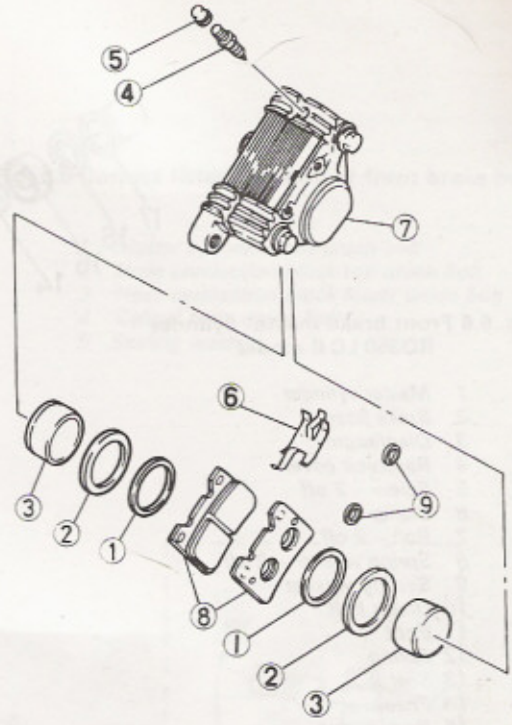


Fig. 6.4 Rear brake caliper – RD350 LC II model

1 Dust seal
2 Fluid seal
3 Piston
4 Bleed nipple
5 Cap
6 Anti-rattle spring
7 Caliper
8 Brake pad
9 Seals

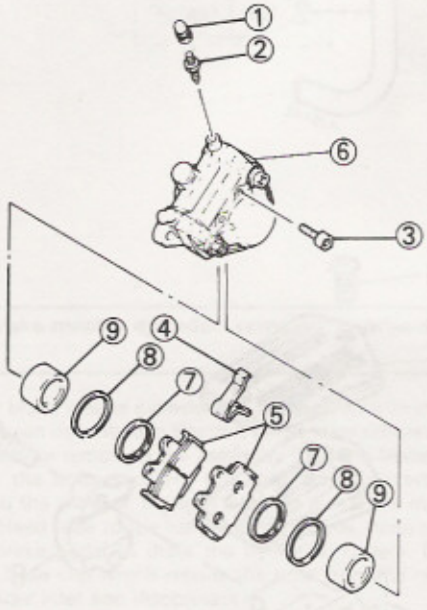


Fig. 6.5 Rear brake caliper – RD350 F and N models

1 Cap
2 Bleed nipple
3 Allen bolt – 2 off
4 Anti-rattle spring
5 Brake pad
6 Caliper
7 Dust seal
8 Fluid seal
9 Piston

9 Front brake master cylinder: removal, overhaul and refitting

1 The master cylinder forms a unit with the hydraulic fluid reservoir and front brake lever, and is mounted by a clamp to the right-hand side of the handlebars.

2 The unit must be drained before any dismantling can be undertaken. Place a suitable container below the caliper unit and run a length of plastic tubing from the caliper bleed screw to the container. Unscrew the bleed screw one full turn and proceed to empty the system by squeezing the front brake lever. When all the fluid has been expelled, tighten the bleed screw and remove the tube.

3 Select a suitable clean area in which the various components may be safely laid out, a large piece of white lint-free cloth or white paper being ideal.

4 Remove the locknut and the brake lever pivot bolt to free the lever. As it is lifted away note the small spring which is fitted into the end of the lever blade. Trace back and disconnect the brake switch wiring.

5 Remove the two bolts which hold the master cylinder clamp half to the body and then lift the master cylinder away. Remove the cover and empty the reservoir. If it is still connected, remove the banjo bolt and free the hydraulic hose from the master cylinder body.

6 Pull off the dust seal from the end of the piston bore to expose the piston end and the circlip which retains it. Remove the circlip to free the piston. If the piston tends to stick in the bore it can be pulled clear using pointed-nose pliers. As the piston is removed the main seal and spring will be released.

7 Examine the piston and seals for scoring or wear and renew if imperfect. Excessive scoring may be due to contaminated fluid, and if this is suspected, it is probably worth checking the condition of the caliper seals and piston. Note that the master cylinder seals, piston and spring are supplied as a set – they cannot be obtained individually.

8 Reassemble carefully, using hydraulic fluid as a lubricant on seals and piston, reversing the dismantling sequence. Make sure the rubber boot is fitted correctly, and that the unit is clamped securely to the handlebars. Reconnect the hydraulic hose, tightening the banjo union bolt to the recommended torque setting. Refill the reservoir remembering to top up after the system has been bled by following the procedure given in Section 12 of this Chapter.

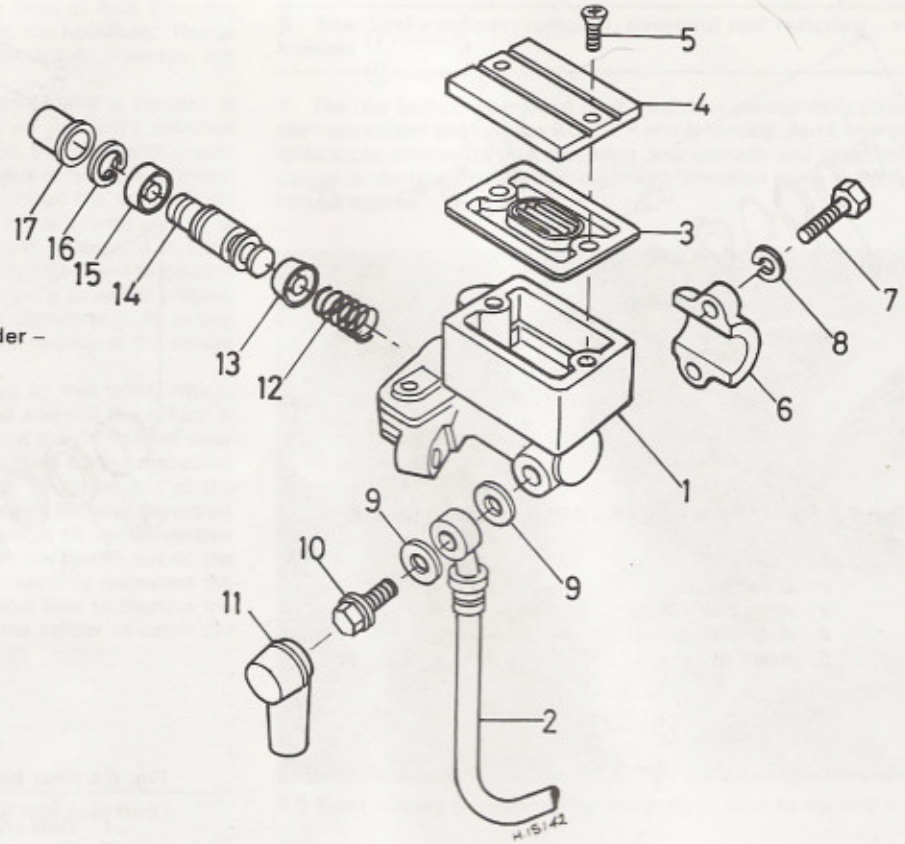


Fig. 6.6 Front brake master cylinder – RD350 LC II model

1 *Master cylinder*
2 *Brake hose*
3 *Diaphragm*
4 *Reservoir cover*
5 *Screw – 2 off*
6 *Clamp*
7 *Bolt – 2 off*
8 *Spring washer – 2 off*
9 *Sealing washer*
10 *Union bolt*
11 *Boot*
12 *Spring*
13 *Seal*
14 *Piston*
15 *Primary cup*
16 *Circlip*
17 *Boot*

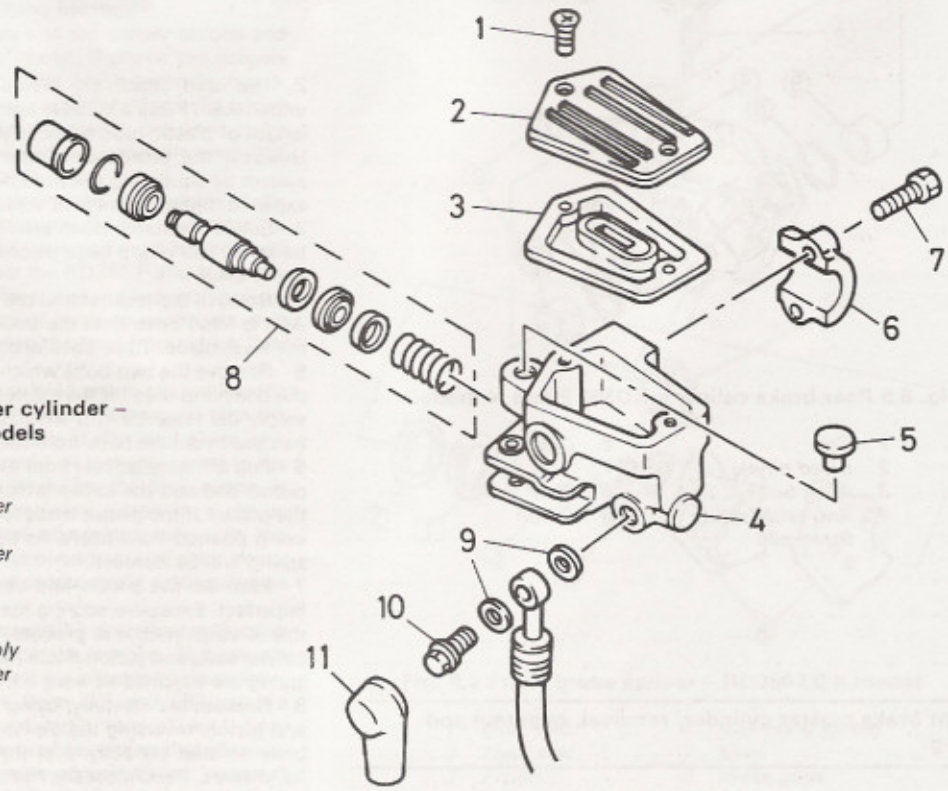


Fig. 6.7 Front brake master cylinder – RD350 F and N models

1 *Screw – 2 off*
2 *Reservoir cover*
3 *Diaphragm*
4 *Master cylinder*
5 *Plug*
6 *Clamp*
7 *Bolt – 2 off*
8 *Piston assembly*
9 *Sealing washer*
10 *Union bolt*
11 *Boot*

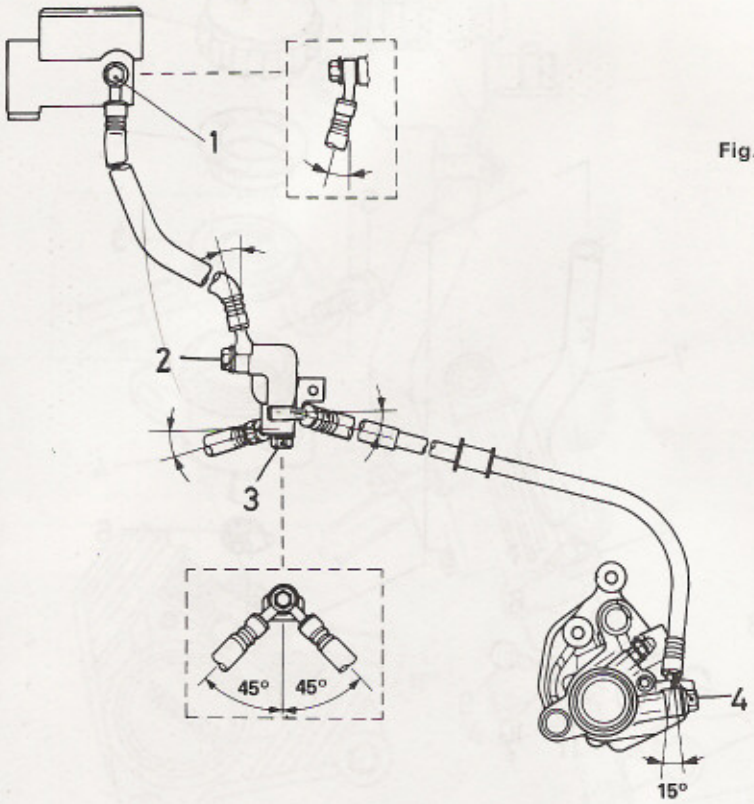


Fig. 6.8 Correct fitted position of front brake hydraulics

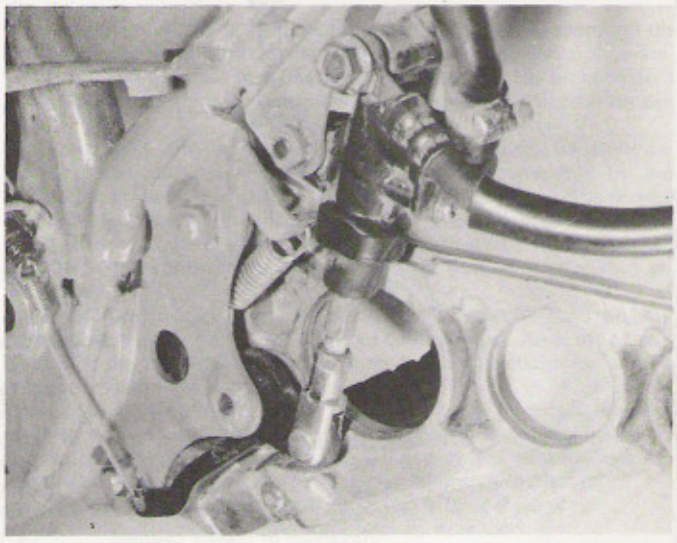
1 Master cylinder hose union bolt
2 Hose connection block top union bolt
3 Hose connection block lower union bolt
4 Caliper hose union bolt
5 Sealing washers

10 Rear brake master cylinder: removal, overhaul and refitting

1 The rear brake master cylinder can be dealt with in much the same way as has been described in Section 8, the main differences arising in the procedure for removing the assembly from the frame.
2 Remove the bolts securing the right-hand footrest plate to the frame and to the silencer, lifting it away to reveal the master cylinder. Connect a bleed tube to the caliper bleed nipple, open the nipple and pump the brake pedal to drain the hydraulic system. Once drained, slacken the hose clip which retains the hose from the reservoir to the master cylinder inlet and disconnect it.
3 Remove the circlip and clevis pin from the end of the master cylinder pushrod and free it from the brake pedal. Remove the two mounting bolts and lift the master cylinder away. Clean the cylinder carefully before dismantling commences. The internal arrangement of the cylinder differs only in detail from that of the front unit, and can be dealt with in a similar manner.

11 Brake discs: examination and removal

1 The brake discs are retained to the hub by six Allen-headed bolts. To remove the disc, first remove the relevant wheel as described later in this Chapter, then unscrew the Allen bolts evenly and in a diagonal sequence. When refitting the disc(s) check that the mounting surfaces are clean and apply Loctite to the Allen bolts. Tighten them evenly and progressively to 2.0 kgf m (14 lbf ft).
2 Examination of the disc can be carried out with the wheel installed. Look for signs of excessive scoring. Some degree of scoring is inevitable, but in severe cases renewal of the disc may prove necessary to restore full braking effect. Check the disc for warpage, which can often result from overheating or impact damage and may cause brake judder. This is best checked using a dial gauge mounted on the fork leg and should not exceed 0.15 mm (0.006 in).
3 The disc thickness should be measured using a vernier caliper or micrometer in several places around the disc surface. The nominal thickness is 5.0 mm (0.19 in) and the disc is in need of renewal if it is worn down to 4.5 mm (0.18 in) or less.



10.3 Rear master cylinder mounting (shown with wheel removed)

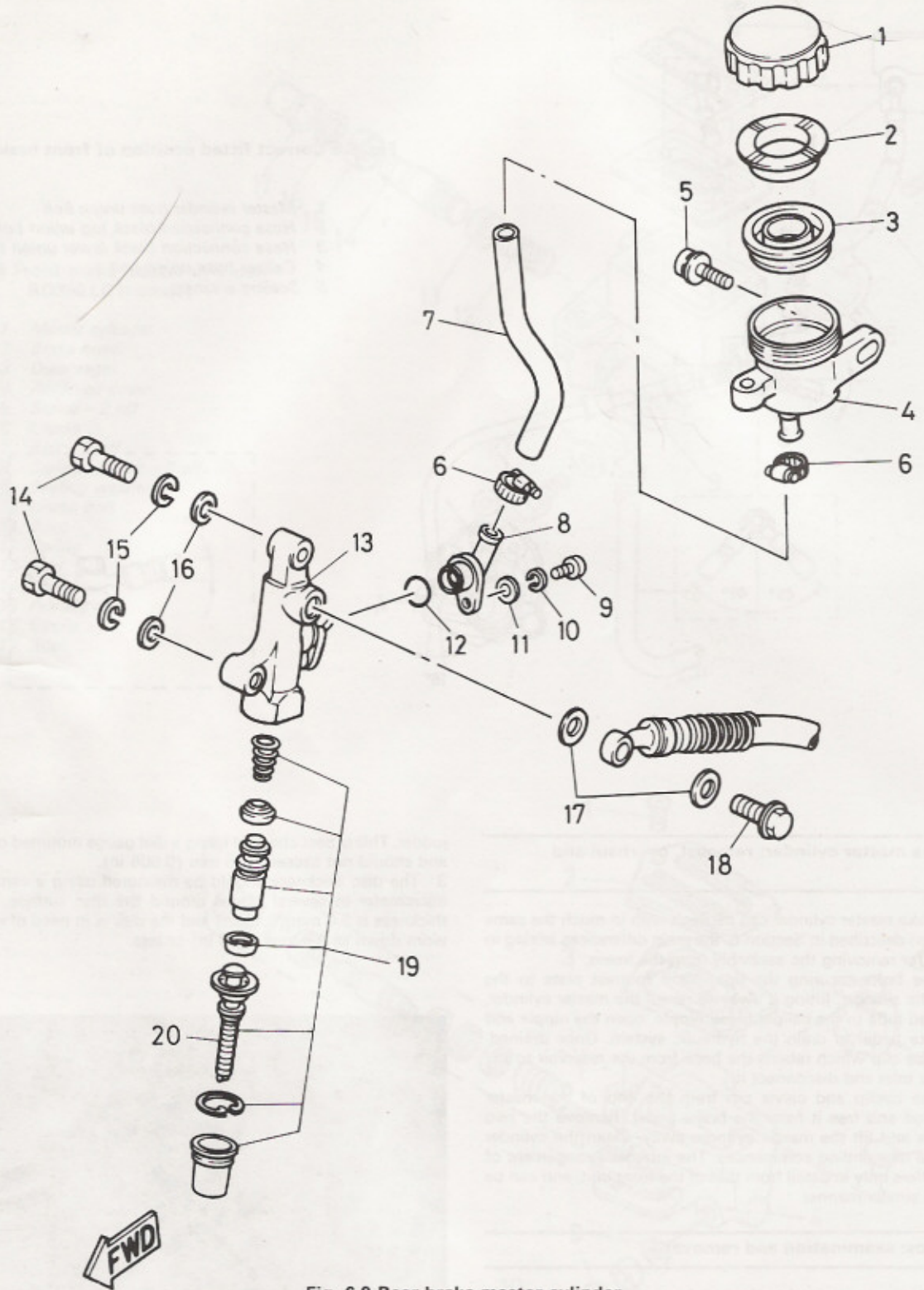


Fig. 6.9 Rear brake master cylinder

1 *Reservoir cap*
2 *Plate*
3 *Diaphragm*
4 *Reservoir*
5 *Screw*
6 *Hose clip*
7 *Reservoir to master cylinder hose*
8 *Union*
9 *Screw*
10 *Spring washer*
11 *Washer*
12 *O-ring*
13 *Master cylinder*
14 *Bolt*
15 *Spring washer*
16 *Washer*
17 *Sealing washer*
18 *Union bolt*
19 *Piston assembly*
20 *Pushrod*

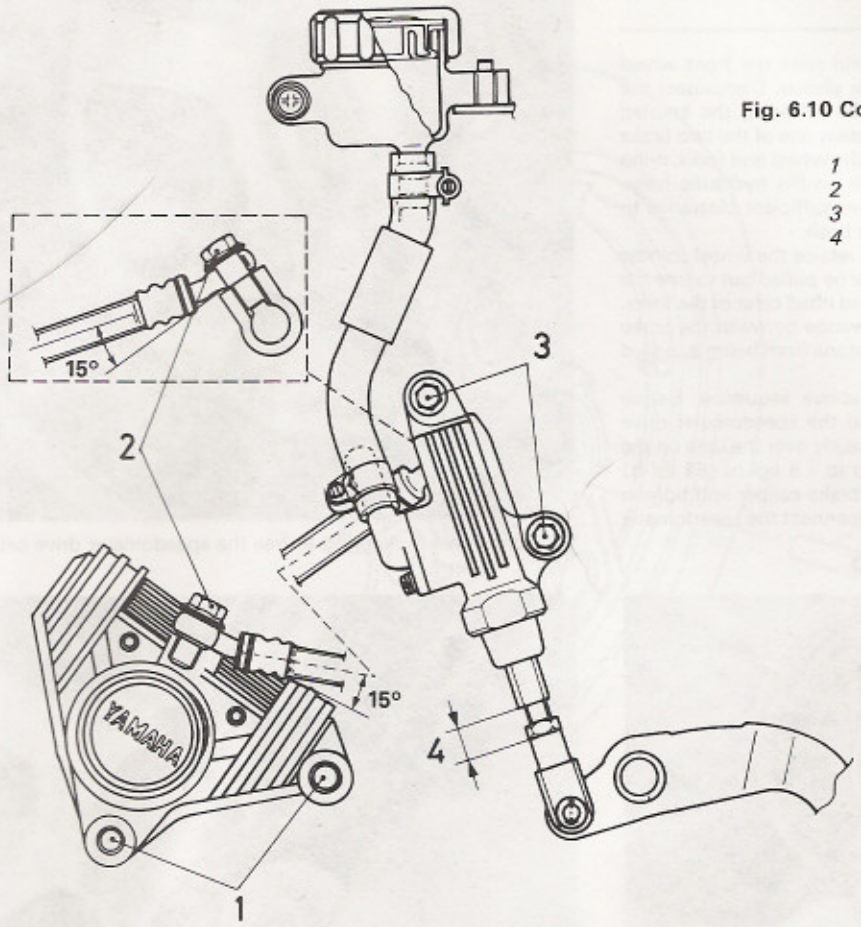


Fig. 6.10 Correct fitted position of rear brake hydraulics

1 Caliper mounting bolts
2 Brake hose banjo bolt
3 Master cylinder mounting bolts
4 Pedal height measurement point

12 Bleeding the hydraulic system

1 The method of bleeding a brake system of air and the procedure described below apply equally to either a front brake or rear brake of the hydraulically actuated type.

2 If the brake action becomes spongy, or if any part of the hydraulic system is dismantled (such as when a hose is replaced) it is necessary to bleed the system in order to remove all traces of air. The procedure for bleeding the hydraulic system is best carried out by two people.

3 Check the fluid level in the reservoir and top up with new fluid of the specified type if required. Keep the reservoir at least half full during the bleeding procedure; if the level is allowed to fall too far air will enter the system requiring that the procedure be started again from scratch. Screw the cap onto the reservoir to prevent the ingress of dust or the ejection of a spout of fluid.

4 Remove the dust cap from the caliper bleed nipple and clean the area with a rag. Place a clean glass jar below the caliper and connect a pipe from the bleed nipple to the jar. A clear plastic tube should be used so that air bubbles can be more easily seen. Place some clean hydraulic fluid in the glass jar so that the pipe is immersed below the fluid surface throughout the operation.

5 If parts of the system have been renewed, and thus the system must be filled, open the bleed nipple about one turn and pump the brake lever until fluid starts to issue from the clear tube. Tighten the bleed nipple and then continue the normal bleeding operation as described in the following paragraphs. Keep a close check on the reservoir level whilst the system is being filled.

6 Operate the brake lever as far as it will go and hold it in this position against the fluid pressure. If spongy brake operation has occurred it may be necessary to pump rapidly the brake lever a number of times until pressure is achieved. With pressure applied, loosen the bleed nipple about half a turn. Tighten the nipple as soon as the lever has reached its full travel and then release the lever. Repeat this operation until no more air bubbles are expelled with the fluid into the glass jar. When this condition is reached the air bleeding operation should be complete, resulting in a firm feel to the brake operation. If sponginess is still evident continue the bleeding operation; it may be that an air bubble trapped at the top of the system has yet to work down through the caliper.

7 When all traces of air have been removed from the system, top up the reservoir and refit the diaphragm and cap or cover, as appropriate. Check the entire system for leaks, and check also that the brake system in general is functioning efficiently before using the machine on the road.

8 Brake fluid drained from the system will almost certainly be contaminated, either by foreign matter or more commonly by the absorption of water from the air. All hydraulic fluids are to some degree hygroscopic, that is, they are capable of drawing water from the atmosphere, and thereby degrading their specifications. In view of this, and the relative cheapness of the fluid, old fluid should always be discarded.

9 Great care should be taken not to spill hydraulic fluid on any painted cycle parts; it is a very effective paint stripper. Also, the plastic glasses in the instrument heads, and most other plastic parts, will be damaged by contact with this fluid.

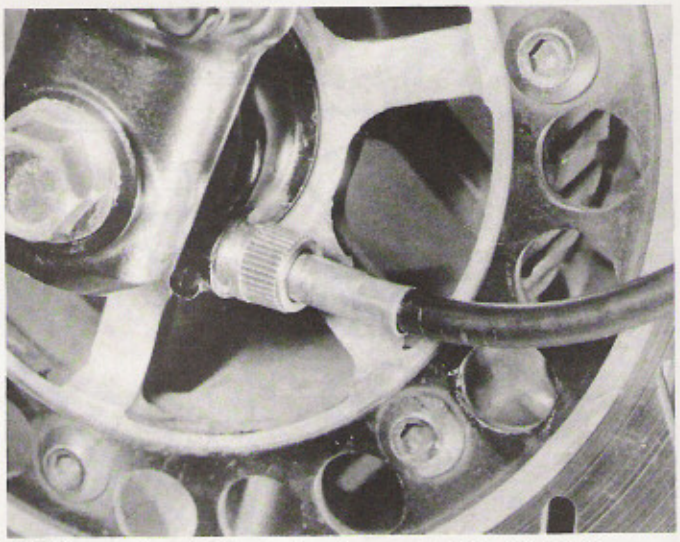
10 It should be noted that there have been some instances where a small air pocket has remained in the rear caliper after normal bleeding causing spongy operation of the rear brake. If this problem occ remove the rear mounting bolt and slacken slightly the front mo bolt. Tip the caliper upwards, leaving about 30% of the pad m contact with the disc. Repeat the bleeding operation, wh succeed in removing the residual air. Refit the caliper ar mounting bolts to the specified torque setting.

13 Front wheel: removal and refitting

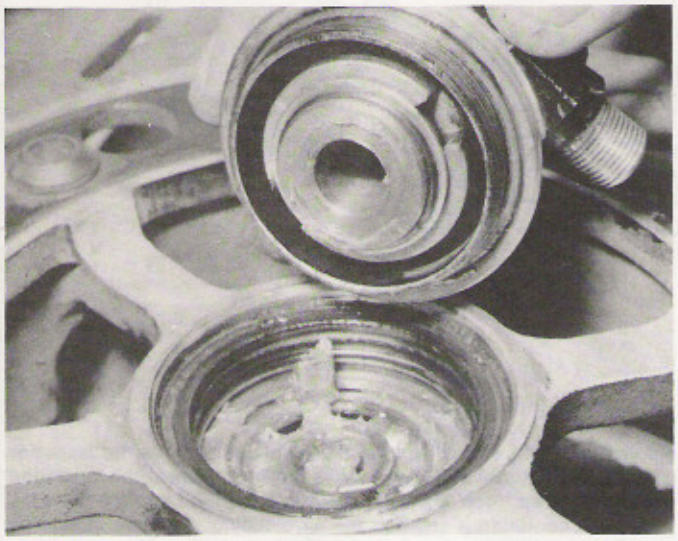
1 Place the machine on its centre stand and raise the front wheel clear of the ground using wooden blocks or similar. Disconnect the speedometer drive cable from the gearbox by releasing the knurled retaining ring. Remove the two bolts which retain one of the two brake calipers to its fork leg. Lift the caliper clear of the wheel and forks, tying it to the frame to avoid placing undue strain on the hydraulic hose. Removal of one of the calipers allows the tyre sufficient clearance to permit removal; it is not necessary to remove both.

2 Straighten and remove the split pin which retains the wheel spindle nut and remove it. The wheel spindle can now be pulled out to free the wheel, which can be lowered to the ground and lifted clear of the forks. Before proceeding further, insert a wooden wedge between the brake pads in both calipers. This will prevent the pistons from being expelled if the brake lever is operated accidentally.

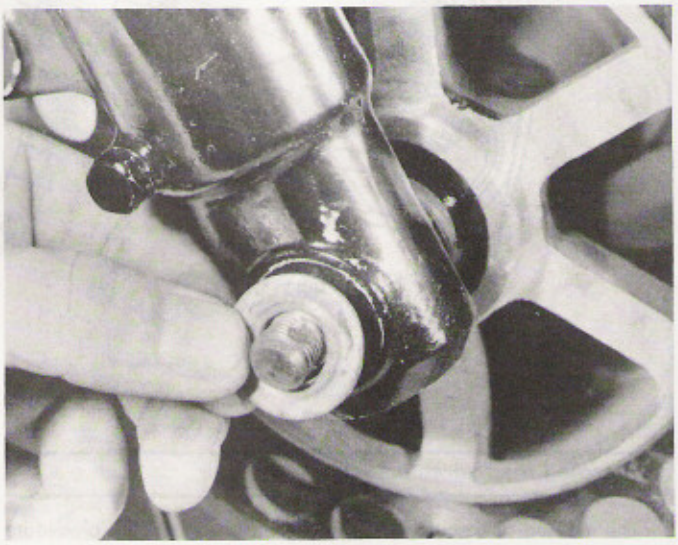
3 The wheel is refitted by reversing the above sequence. Before fitting the wheel, grease the oil seal lips and the speedometer drive gearbox. Make sure that the latter locates correctly over the lugs on the fork lower leg. Tighten the wheel spindle nut to 7.5 kgf m (54 lbf ft) and fit a new split pin to secure it. Refit the brake caliper and tighten the mounting bolts to 3.5 kgf m (25 lbf ft). Reconnect the speedometer drive cable.



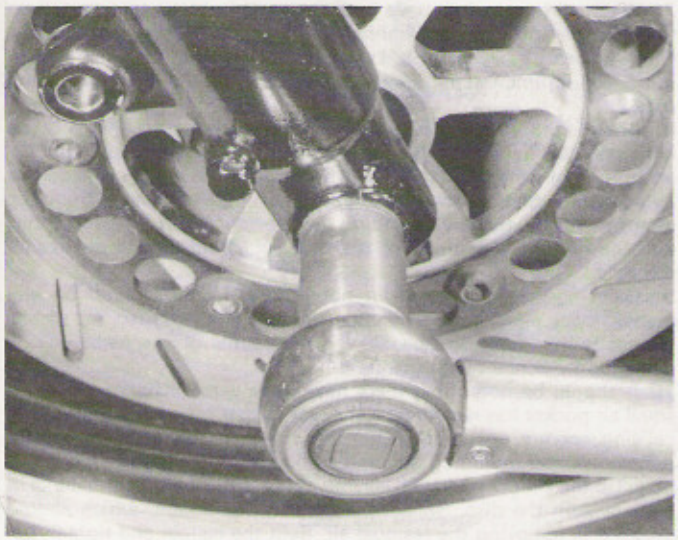
13.1 Unscrew knurled ring to free the speedometer drive cable



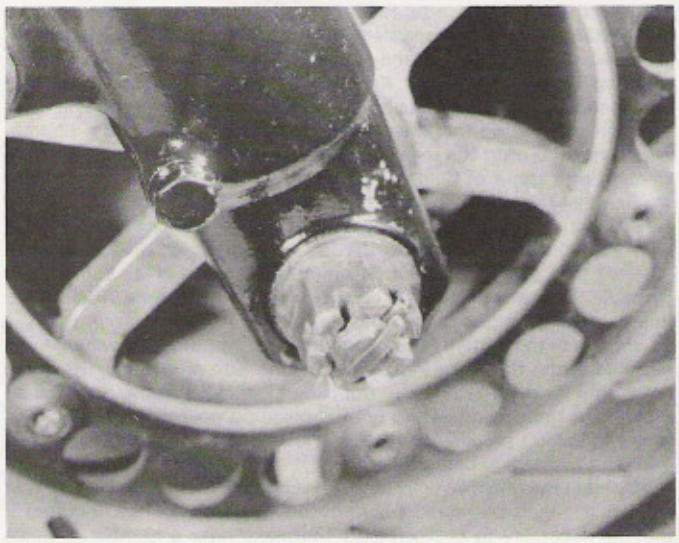
13.3a Fit speedometer drive gearbox, ensuring that drive tangs engage in their slots



13.3b Slide wheel spindle into place and fit the plain washer ...



13.3c ... and tighten nut to the correct torque setting



13.3d The nut should be secured with a new split pin

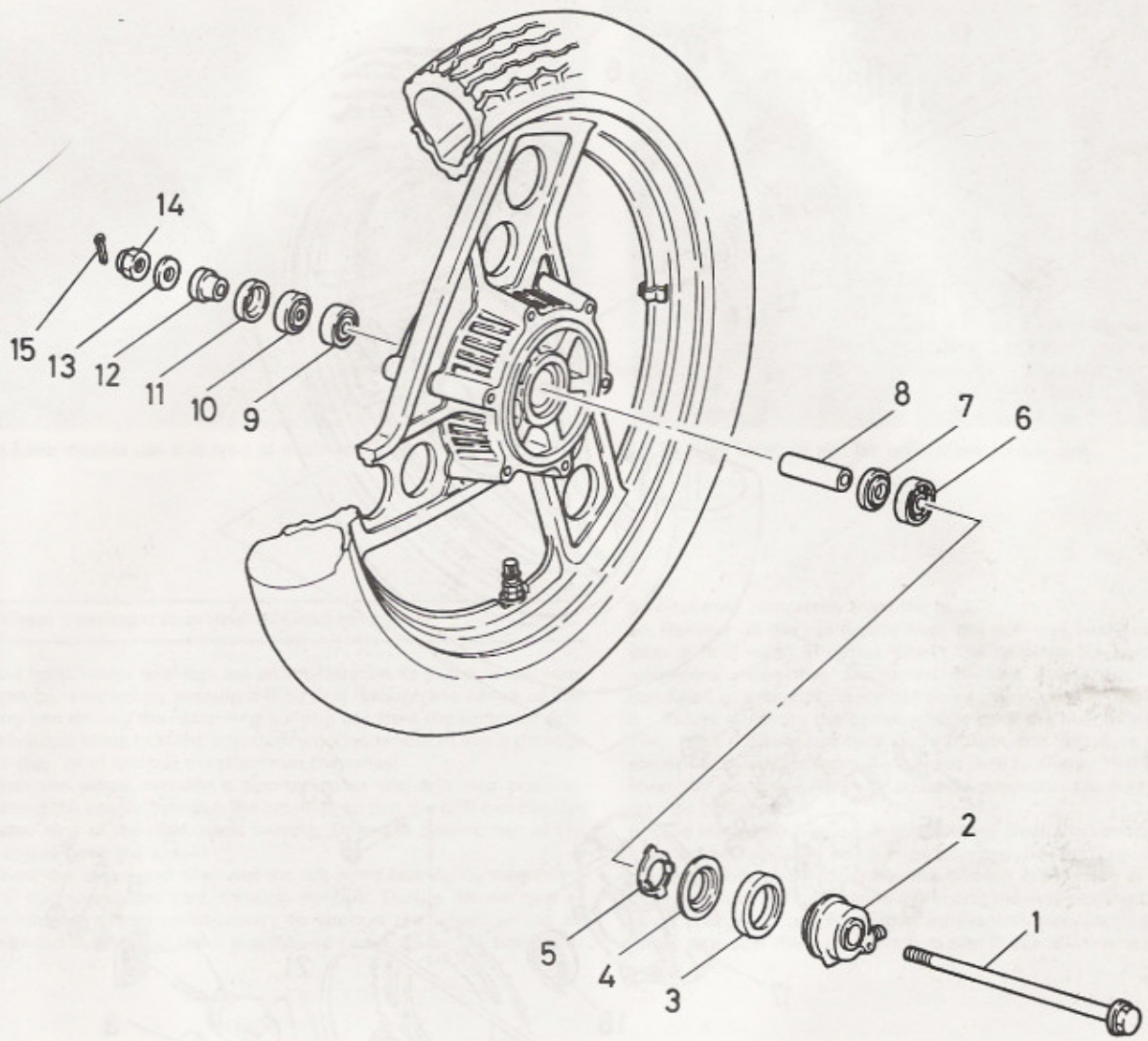


Fig. 6.11 Front wheel

1 Spindle	*6 Left-hand wheel bearing*	*11 Collar – RD350 LC II only*
2 Speedometer gearbox	*7 Spacer flange*	*12 Spacer*
3 Oil seal	*8 Spacer*	*13 Washer*
4 Retainer	*9 Right-hand wheel bearing*	*14 Nut*
5 Speedometer drive plate	*10 Oil seal*	*15 Split pin*

14 Rear wheel: removal and refitting

1 Place the machine on its centre stand so that the rear wheel is raised clear of the ground. On RD350 LC II models, slacken the chain adjuster locknuts and slacken the adjuster bolts. Push the adjusters clear of the swinging arm ends, then slide the wheel forward so that the chain is slack. In the case of the RD350 F and RD350 N a different design of adjuster is used. These should be slackened off and the wheel pushed fully forward. On all models, lift the chain away from the sprocket and allow it to hang around the wheel spindle.

2 Straighten and remove the split pin which retains the rear wheel spindle nut. Remove the nut, then tap the spindle through to free the wheel, the spacer on the sprocket side and the chain adjusters. Once the wheel has been pulled clear, place a wooden wedge between the brake pads to prevent the accidental expulsion of the caliper pistons if the pedal is depressed.

3 When installing the wheel, grease the oil seal lips. Do not omit the spacer on the left-hand side of the wheel. Check that the adjusters are fitted with the alignment marks outwards. Before tightening the wheel spindle nut, check the chain free play as described in Section 16. Tighten the wheel spindle nut to the figure specified in the Specifications.

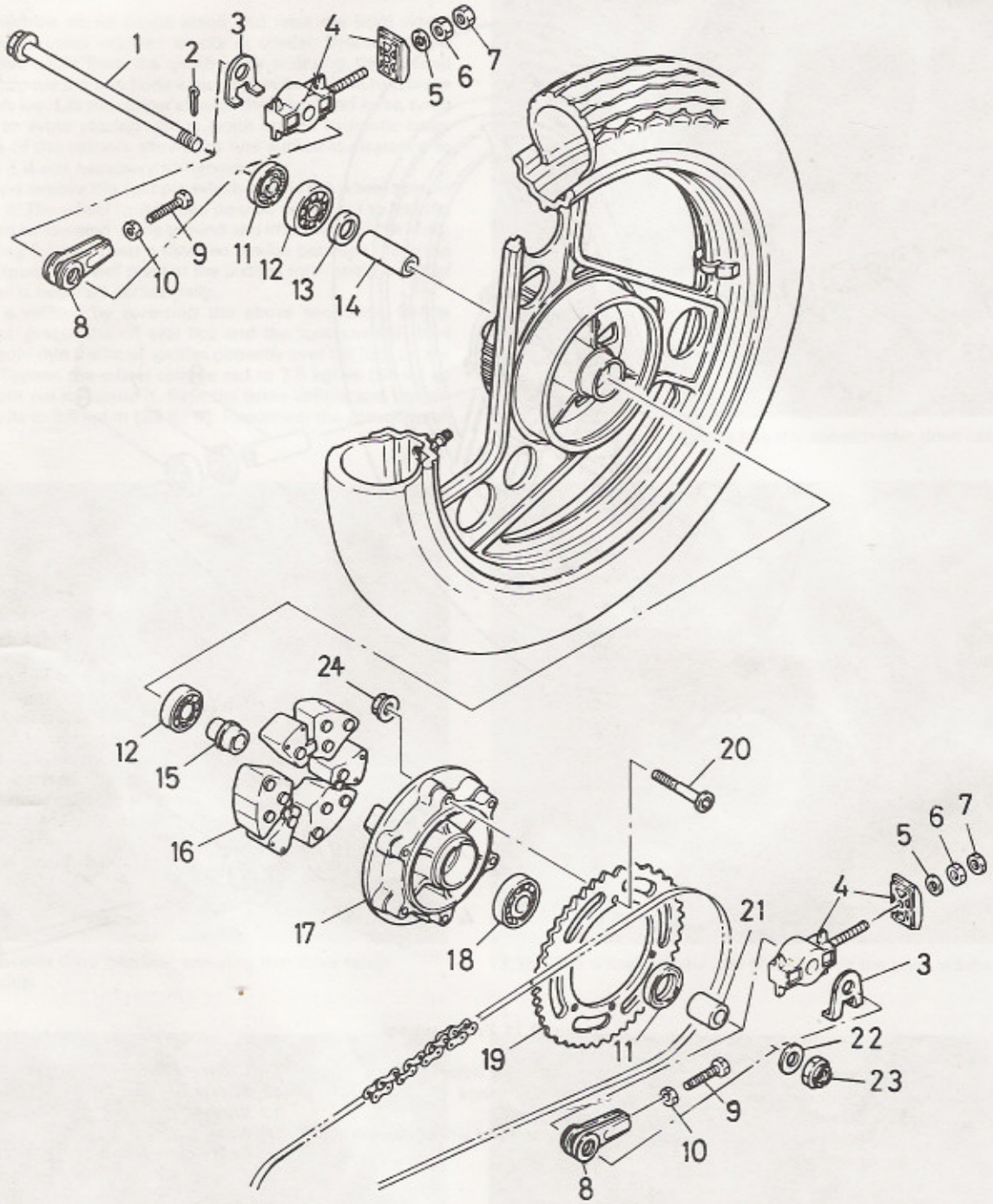
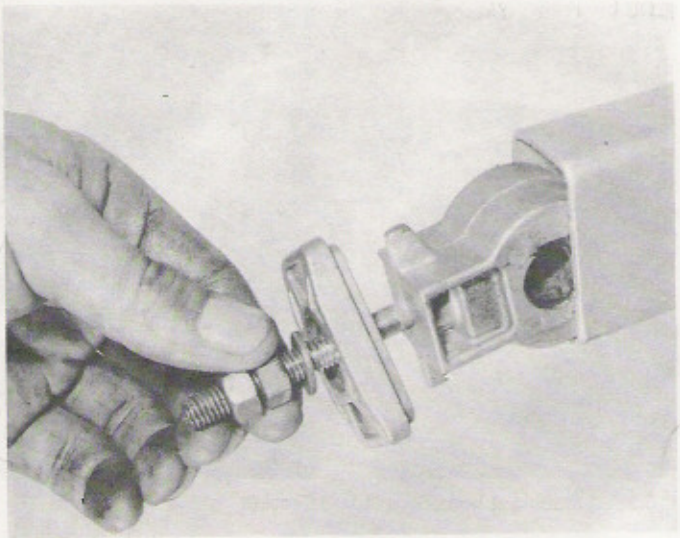


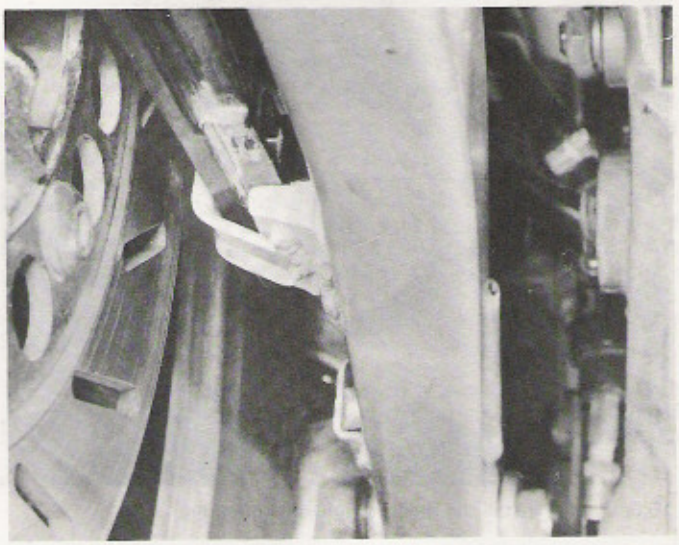
Fig. 6.12 Rear wheel

1 Spindle	*7 Locknut*	*13 Spacer flange*	*19 Sprocket*
2 Split pin	*8 Chain adjuster*	*14 Spacer*	*20 Bolt – 6 off*
3 Wear indicator plate	*9 Adjusting bolt*	*15 Collar*	*21 Spacer*
4 Chain adjuster	*10 Locknut*	*16 Cush drive rubbers*	*22 Washer*
5 Washer	*11 Oil seal*	*17 Cush drive flange*	*23 Nut*
6 Adjusting nut	*12 Wheel bearing*	*18 Bearing*	*24 Nut – 6 off*

Note: Items 3 – 7 fitted to RD350 F and N
Items 8 – 10 fitted to RD350 LC II



14.3a Later models use this type of chain tensioner



14.3b Note locating slot for rear caliper torque arm

15 Wheel bearings: examination and renewal

1 The front wheel bearings are an interference fit in the wheel hub, and can be removed by passing a long drift through the centre of one bearing and driving the remaining bearing out from the opposite side. It is advisable to support the wheel on wooden blocks to avoid damage to the disc, or to remove the disc from the wheel.

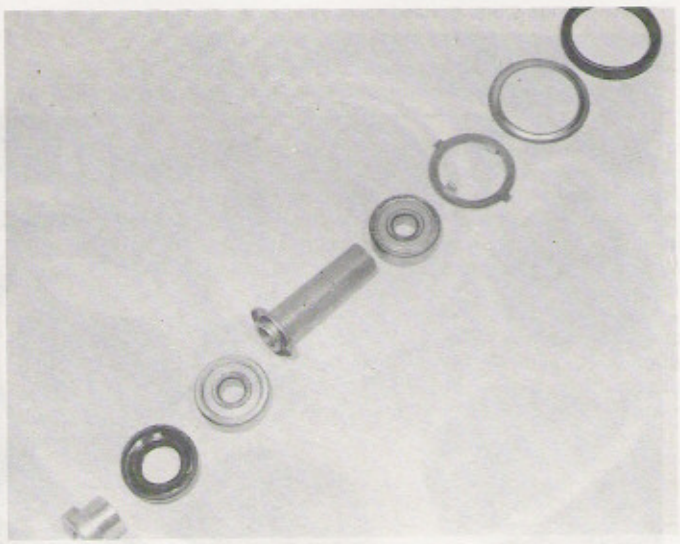
2 With the wheel suitably supported, pass the drift into position, displacing the spacer between the bearings so that the drift can bear on the inner race of the right-hand bearing. Drive the bearing out of the hub, and remove the spacer.

3 Invert the wheel and drive out the left-hand bearing by inserting a drift of the appropriate size, through the hub. During the removal of either bearing it may be necessary to support the wheel across an open-ended box so that there is sufficient clearance for the bearing to be displaced completely from the hub.

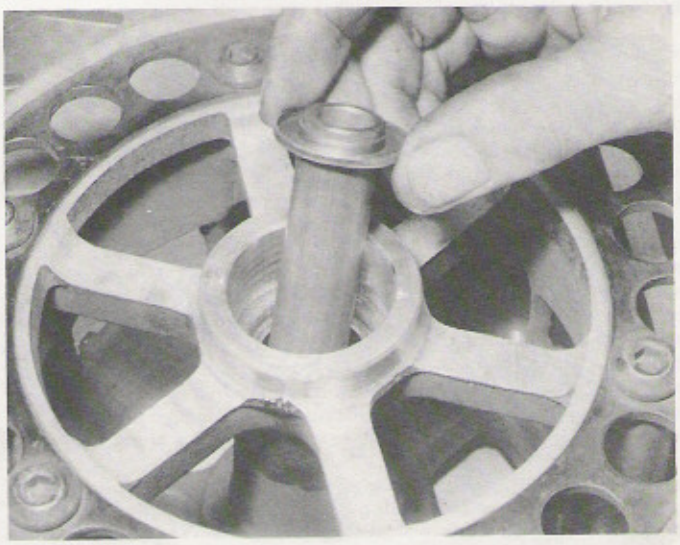
4 Remove all the old grease from the hub and bearings, giving the latter a final wash in petrol. Check the bearings for signs of play or roughness when they are turned. If there is any doubt about the condition of a bearing, it should be renewed.

5 Before replacing the bearings, first pack the hub with new grease. Then drive the bearings back into position, not forgetting the distance piece that separates them. Take great care to ensure that the bearings enter the housings perfectly squarely otherwise the housing surface may be broached.

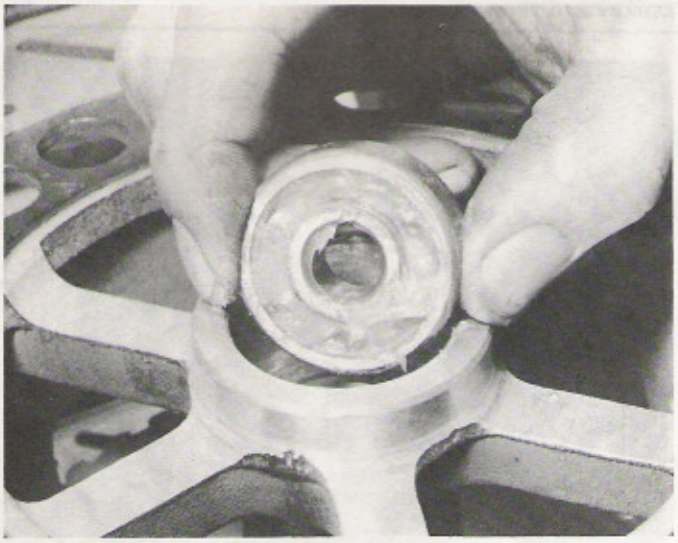
6 The rear wheel bearing arrangement is much the same as that of the front wheel, and the same approach can be adopted if renewal is required. There is a further bearing housed in the cush drive hub, and this too can be removed using a drift and the new bearing tapped home using a large socket. For further information, see Section 16. Do not forget to renew the cush drive hub seal if this is worn or damaged.



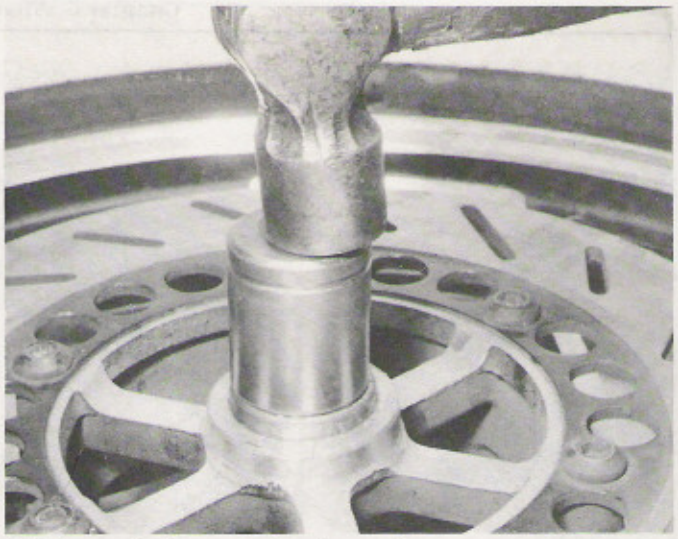
15.5a The front wheel bearing arrangement



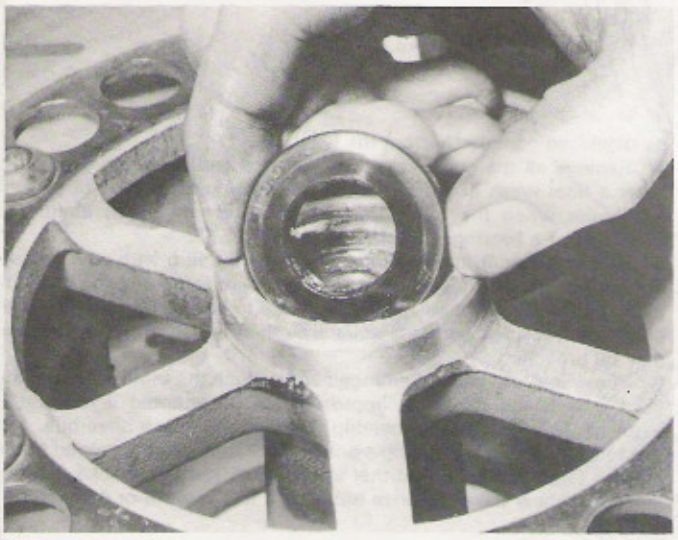
15.5b Place the headed spacer against the left-hand bearing ...



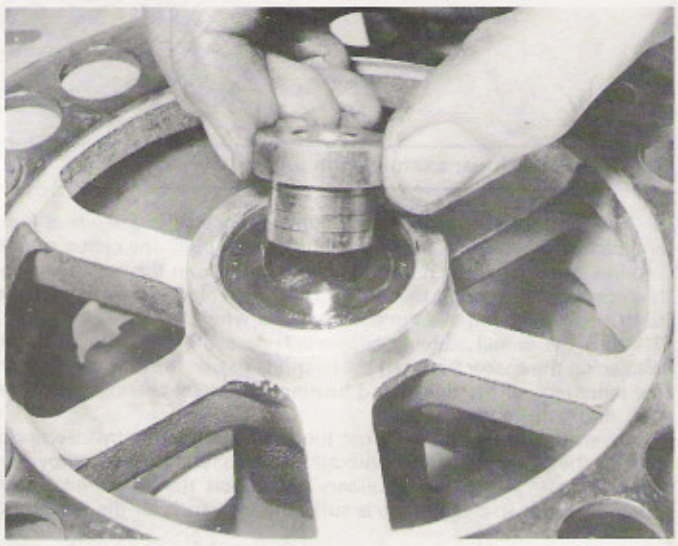
15.5c ... then install the greased right-hand bearing ...



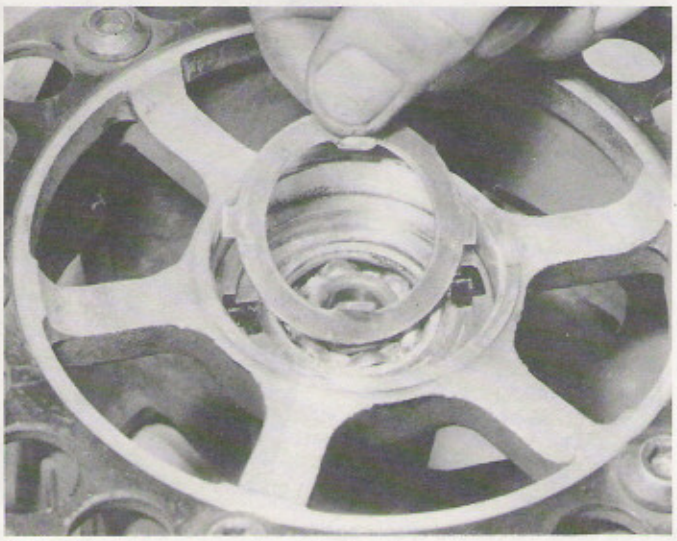
15.5d ... tapping it home with a large socket



15.5e Fit the grease seal into the hub bore ...

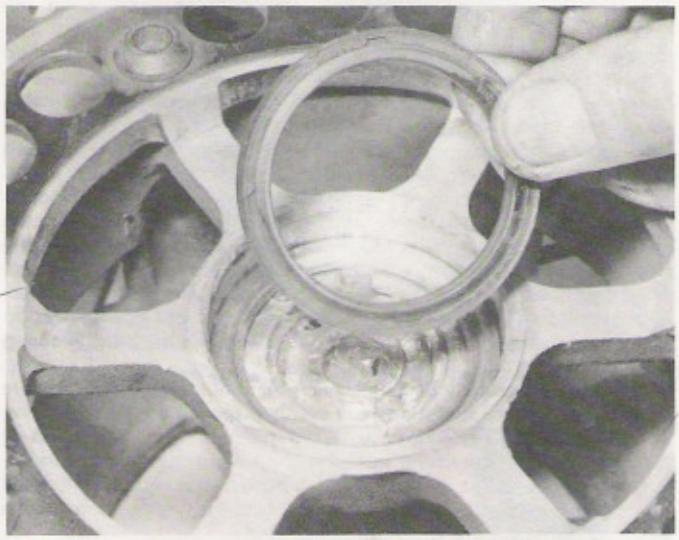


15.5f ... and fit the headed spacer as shown

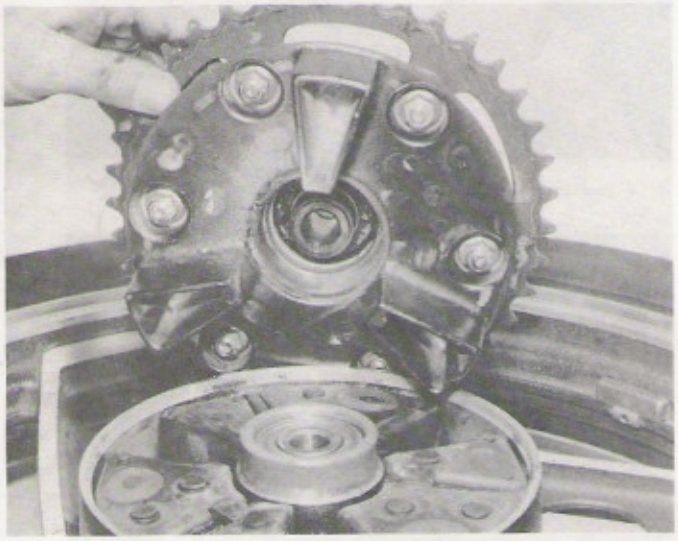


15.5g Place the speedometer drive dog in position ...

15.5h ... followed by its retainer ...



15.5i .. and the grease seal



15.6 Rear cush drive hub houses extra bearing and a spacer

16 Cush drive assembly: examination and renovation

1 The cush drive assembly is contained within the left-hand side of the rear wheel hub. It comprises a set of synthetic rubber buffers, housed within a series of vanes cast in the hub shell. A plate attached to the centre of the rear wheel sprocket has four cast-in dogs which engage with slots in these rubbers, when the wheel is replaced in the frame. The drive to the rear wheel is transmitted via these rubbers, which cushion any surges of roughness in the drive which would otherwise convey the impression of harshness.

2 Examine the rubbers periodically for signs of damage or general deterioration. Renew and fit the rubbers as a set if there is any doubt about their condition; there is no difficulty in removing or replacing them as they are not under compression when the drive plate is attached.

17 Rear wheel sprocket: examination and renovation

1 The rear wheel sprocket assembly can be removed as a separate unit after the rear wheel has been detached from the frame as described in Section 14 of this Chapter.

2 Check the condition of the sprocket teeth. If they are hooked, chipped or badly worn, the sprocket must be renewed. It is secured to the cush drive plate by six bolts.

3 It is considered bad practice to renew one sprocket on its own. The final drive sprockets should always be renewed as a pair and a new chain fitted, otherwise rapid wear will necessitate even earlier renewal on the next occasion.

4 An additional bearing is located within the cush drive plate, which supports the collar through which the rear wheel spindle fits. In common with the wheel bearings, this bearing is a journal ball and when wear occurs, the sprocket will give the appearance of being loose on its mounting bolts. The bearing is a push fit in the cush drive hub and is secured on the inside by a circlip.

5 Remove the circlip and bearing and wash out the latter to remove all traces of the old grease. If the bearing has any play or runs roughly, it must be renewed.

6 If the bearing has not been renewed it should be repacked with grease and refitted in its housing, followed by the circlip. Replace the rear wheel assembly by reversing whichever method was adopted for its removal.

18 Final drive chain: examination and maintenance

1 The final drive chain is fully exposed, with only a light chainguard over the top run. Periodically the tension will need to be adjusted, to compensate for wear. This is accomplished by placing the machine on the centre stand and slackening the wheel nut on the left-hand side of the rear wheel so that the wheel can be drawn backward by means of the drawbolt adjusters in the fork ends.

2 The chain is in correct tension if there is approximately 30 – 40 mm (1.2 – 1.6 in) slack at a point about 4 in forward of the rear wheel sprocket, on the lower run. Always check when the chain is at its tightest point as a chain rarely wears evenly during service. Note that the tension should be checked with the machine resting on its wheels, though it will be necessary to place it back on the centre stand to carry out adjustment.

3 Always adjust the drawbolts an equal amount in order to preserve wheel alignment. The fork ends are clearly marked with a series of horizontal lines above the adjusters, to provide a simple, visual check. If desired, wheel alignment can be checked by running a plank of wood parallel to the machine, so that it touches the side of the rear tyre. If wheel alignment is correct, the plank will be equidistant from each side of the front wheel tyre, when tested on both sides of the rear wheel. It will not touch the front wheel tyre because this tyre is of smaller cross section. See accompanying diagram.

4 Do not run the chain overtight to compensate for uneven wear. A tight chain will place undue stress on the gearbox and rear wheel bearings, leading to their early failure. It will also absorb a surprising amount of power.

5 After a period of running, the chain will required lubrication. Lack of oil will greatly accelerate the rate of wear of both the chain and the sprockets and will lead to harsh transmission. The application of engine oil will act as a temporary expedient, but it is preferable to remove the chain and clean it in a paraffin bath before it is immersed in a molten lubricant such as 'Linklife' or 'Chainguard'. These lubricants achieve better penetration of the chain links and rollers and are less likely to be thrown off when the chain is in motion.

6 To check whether the chain is due for replacement, lay it lengthwise in a straight line and compress it endwise so that all the play is taken up. Anchor one end and measure the length. Now pull the chain with one end anchored firmly, so that the chain is fully extended by the amount of play in the opposite direction. If there is a difference of more than 1/4 inch per foot in the two measurements, the chain should be renewed in conjunction with the sprockets. Note that this check should be made after the chain has been washed out, but before any lubricant is applied, otherwise the lubricant may take up some of the play.

7 When replacing the chain, make sure that the spring link is seated correctly, with the closed end facing the direction of travel.

8 Replacement chains are now available in standard metric sizes from Renold Limited, the British chain manufacturer. When ordering a new chain, always quote the size, the number of chain links and the type of machine to which the chain is to be fitted.

19 Tyres: removal and refitting

1 It is strongly recommended that should a repair to a tubeless tyre be necessary, the wheel is removed from the machine and taken to a tyre fitting specialist who is willing to do the job or taken to an official dealer. This is because the force required to break the seal between the wheel rim and tyre bead is considerable and considered to be beyond the capabilities of an individual working with normal tyre removing tools. Any abortive attempt to break the rim to bead seal may also cause damage to the wheel rim, resulting in an expensive wheel replacement. If, however, a suitable bead releasing tool is available, and experience has already been gained in its use, tyre removal and refitting can be accomplished as follows.

2 Remove the wheel from the machine by following the instructions for wheel removal as described in the relevant Section of this Chapter. Deflate the tyre by removing the valve insert and when it is fully deflated, push the bead of the tyre away from the wheel rim on both sides so that the bead enters the centre well of the rim. As noted, this operation will almost certainly require the use of a bead releasing tool.

3 Insert a tyre lever close to the valve and lever the edge of the tyre over the outside of the wheel rim. Very little force should be necessary; if resistance is encountered it is probably due to the fact that the tyre beads have not entered the well of the wheel rim all the way round the tyre. Should the initial problem persist, lubrication of the tyre bead and the inside edge and lip of the rim will facilitate removal. Use a recommended lubricant, a diluted solution of washing-up liquid or french chalk. Lubrication is usually recommended as an aid to tyre fitting but its use is equally desirable during removal. The risk of lever damage to wheel rims can be minimised by the use of proprietary plastic rim protectors placed over the rim flange at the point where the tyre levers are inserted. Suitable rim protectors may be fabricated very easily from short lengths (4 – 6 inches) of thick-walled nylon petrol pipe which have been split down one side using a sharp knife. The use of rim protectors should be adopted whenever levers are used and, therefore, when the risk of damage is likely.

4 Once the tyre has been edged over the wheel rim, it is easy to work around the wheel rim so that the tyre is completely free on one side.

5 Working from the other side of the wheel, ease the other edge of the tyre over the outside of the wheel rim, which is furthest away. Continue to work around the rim until the tyre is freed completely from the rim.

6 Refer to the following Section for details relating to puncture repair and the renewal of tyres. See also the remarks relating to the tyre valves in Section 20.

7 Refitting of the tyre is virtually a reversal of removal procedure. If the tyre has a balance mark (usually a spot of coloured paint), as on the tyres fitted as original equipment, this must be positioned alongside the valve. Similarly, any arrow indicating direction of rotation must face the right way.

8 Starting at the point furthest from the valve, push the tyre bead over the edge of the wheel rim until it is located in the central well. Continue to work around the tyre in this fashion until the whole of one side of the tyre is on the rim. It may be necessary to use a tyre lever during the final stages. Here again, the use of a lubricant will aid fitting. It is recommended strongly that when refitting the tyre only a recommended lubricant is used because such lubricants also have sealing properties. Do not be over generous in the application of lubricant or tyre creep may occur.

9 Fitting the upper bead is similar to fitting the lower bead. Start by pushing the bead over the rim and into the well at a point diametrically opposite the tyre valve. Continue working round the tyre, each side of the starting point, ensuring that the bead opposite the working area is always in the well. Apply lubricant as necessary. Avoid using tyre levers unless absolutely essential, to help reduce damage to the soft wheel rim. The use of the levers should be required only when the final portion of bead is to be pushed over the rim.

10 Lubricate the tyre beads again prior to inflating the tyre, and check that the wheel rim is evenly positioned in relation to the tyre beads. Inflation of the tyre may well prove impossible without the use of a high pressure air hose. The tyre will retain air completely only when the beads are firmly against the rim edges at all points and it may be found when using a foot pump that air escapes at the same rate as it is pumped in. This problem may also be encountered when using an air hose on new tyres which have been compressed in storage and by virtue of their profile hold the beads away from the rim edges. To overcome this difficulty, a tourniquet may be placed around the circumference of the tyre, over the central area of the tread. The compression of the tread in this area will cause the beads to be pushed outwards in the desired direction. The type of tourniquet most widely used consists of a length of hose closed at both ends with a suitable clamp fitted to enable both ends to be connected. An ordinary tyre valve is fitted at one end of the tube so that after the hose has been secured around the tyre it may be inflated, giving a constricting effect. Another possible method of seating beads to obtain initial inflation is to press the tyre into the angle between a wall and the floor. With the airline attached to the valve additional pressure is then applied to the tyre by the hand and shin, as shown in the accompanying illustration. The application of pressure at four points around the tyre's circumference whilst simultaneously applying the airhose will often effect an initial seal between the tyre beads and wheel rim, thus allowing inflation to occur.

11 Having successfully accomplished inflation, increase the pressure to 40 psi and check that the tyre is evenly disposed on the wheel rim. This may be judged by checking that the thin positioning line found on each tyre wall is equidistant from the rim around the total circumference of the tyre. If this is not the case, deflate the tyre, apply additional lubrication and reinflate. Minor adjustments to the tyre position may be made by bouncing the wheel on the ground.

12 Always run the tyre at the recommended pressures and never under or over-inflate. The correct pressures for various weights and configurations are given in the Specifications Section of this Chapter.

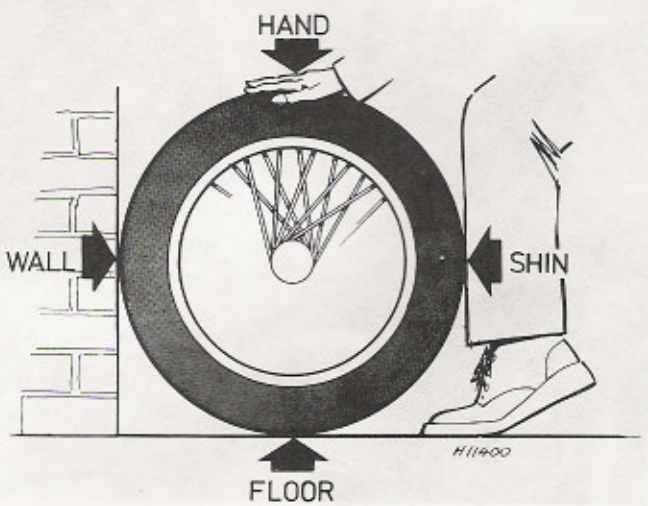


Fig. 6.13 Method of seating the beads on tubeless tyres

20 Puncture repair and tyre renewal

1 The primary advantage of the tubeless tyre is its ability to accept penetration by sharp objects such as nails etc without loss of air. Even if loss of air is experienced, because there is no inner tube to rupture, in normal conditions a sudden blow-out is avoided. If a puncture of the tyre occurs, the tyre should be removed for inspection for damage before any attempt is made at remedial action. The temporary repair of a punctured tyre by inserting a plug from the outside should not be attempted. Although this type of temporary repair is used widely on cars, the manufacturers strongly recommend that no such repair is carried out on a motorcycle tyre. Not only does the tyre have a thinner carcass, which does not give sufficient support to the plug, the consequences of a sudden deflation are often sufficiently serious that the risk of such an occurrence should be avoided at all costs.

2 The tyre should be inspected both inside and out for damage to the carcass. Unfortunately the inner lining of the tyre – which takes the place of the inner tube – may easily obscure any damage and some

Tyre removal: Deflate tyre and insert lever in close proximity to tyre valve

Use two levers to work bead over tyre rim

When first bead is clear, remove tyre as shown

Tyre fitting: Replace first bead over rim noting arrow indicating correct direction of rotation

Start second bead under the rim opposite the valve

Work bead under rim towards and each side of valve using lever if necessary

Use lever in final section

Air hose may be required for initial tyre inflation

experience is required in making a correct assessment of the tyre condition.

3 There are two main types of tyre repair which are considered safe for adoption in repairing tubeless motorcycle tyres. The first type of repair consists of inserting a mushroom-headed plug into the hole from the inside of the tyre. The hole is prepared for insertion of the plug by reaming and the applications of an adhesive. The second repair is carried out by buffing the inner lining in the damaged area and applying a cold or vulcanised patch. Because both inspection and repair, if they are to be carried out safely, require experience in this type of work, it is recommended that the tyre be placed in the hands of a repairer with the necessary skills, rather than repaired in the home workshop.

4 In the event of an emergency, the only recommended 'get-you-home' repair is to fit a standard inner tube of the correct size. If this course of action is adopted, care should be taken to ensure that the cause of the puncture has been removed before the inner tube is fitted. It will be found that the valve hole in the rim is considerably larger than the diameter of the inner tube valve stem. To prevent the ingress of road dirt, and to help support the valve, a spacer should be fitted over the valve.

5 In the event of the unavailability of tubeless tyres, ordinary tubed tyres may be fitted to these wheel rims. Use tyres of an equivalent type and grade to ensure their suitability. It is recommended that the advice of the tyre manufacturer or a reputable supplier is sought to ensure that a compatible replacement tyre is fitted.

21 Tyre valves: description and renewal

1 It will be appreciated from the preceding Sections that the adoption of tubeless tyres has made it necessary to modify the valve arrangement, as there is no longer an inner tube which can carry the valve core. The problem has been overcome by fitting a separate tyre valve which passes through a close-fitting hole in the rim, and which is secured by a nut and locknut. The valve is fitted from the rim well, and it follows that the valve can be removed and replaced only when the tyre has been removed from the rim. Leakage of air from around the valve body is likely to occur only if the sealing seat fails or if the nut and locknut become loose.

2 The valve core is of the same type as that used with tubed tyres, and screws into the valve body. The core can be removed with a small slotted tool which is normally incorporated in plunger type pressure gauges. Some valve dust caps incorporate a projection for removing valve cores. Although tubeless tyre valves seldom give trouble, it is possible for a leak to develop if a small particle of grit lodges on the sealing face. Occasionally, an elusive slow puncture can be traced to a leaking valve core, and this should be checked before a genuine puncture is suspected.

3 The valve dust caps are a significant part of the tyre valve assembly. Not only do they prevent the ingress of road dirt in the valve, but also act as a secondary seal which will reduce the risk of sudden deflation if a valve core should fail.

22 Wheel balancing

1 It is customary on all high performance machines to balance the wheels complete with the tyre. The out of balance forces which exist are eliminated and the handling of the machine is improved in consequence. A wheel which is badly out of balance produces through the steering a most unpleasant hammering effect at high speeds.

2 Some tyres have a balance mark on the sidewall, usually in the form of a coloured spot. This mark must be in line with the tyre valve, when the tyre is fitted. Even then the wheel may require the addition of balance weights, to offset the weight of the tyre valve itself.

3 If the wheel is raised clear of the ground and is spun, it will probably come to rest with the tyre valve or the heaviest part downward and will always come to rest in the same position. Balance weights must be added to a point diametrically opposite this heavy spot until the wheel will come to rest in ANY position after it is spun.

4 It should be noted that the front wheel must always be checked for balance with the brake disc in position, though it may prove necessary to remove the calipers to eliminate brake drag. The rear wheel can be balanced if required but this is unlikely to have much effect in practice. The balance weights used must be of the correct type for use with Yamaha rims, and to this end should be purchased from a Yamaha dealer. Balance weights are available in 10 gm, 20 gm and 30 gm sizes.