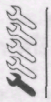
Chapter 6
Frame, suspension and final drive

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Degrees of difficulty

Easy, suitable for novice with little experience 

Fairly easy, suitable for beginner with some experience 

Fairly difficult, suitable for competent DIY mechanic 

Difficult, suitable for experienced DIY mechanic 

Very difficult, suitable for expert or professional

Specifications

Front forks

Fork air pressure	
Standard	5.7 psi (0.39 Bar)
Maximum	14 psi (0.96 Bar)
Fork oil type	10W fork oil
Fork oil capacity	
1985 to 1992 models	451 cc
1993 to 2003 models	620 cc
Fork oil level*	
1985 to 1992 models	139 mm
1993 to 2003 models	123 mm
Fork spring free length (min)	
1985 to 1992 models	
Standard	492.5 mm
Service limit	487.5 mm
1993 to 2003 models	
Standard	386.5 mm
Service limit	381.5 mm
Fork tube runout limit	0.2 mm

**Oil level is measured from the top of the fork tube with the spacer and spring removed and the leg fully compressed.*

Final drive

Final drive oil type and capacity	see Chapter 1

Torque settings

Brake torque arm nuts	22 Nm
Clutch master cylinder clamp bolts	9 Nm
Final drive housing nuts	42 Nm
Fork damper rod bolt	
1985 to 1992 models	40 Nm
1993 to 2003 models	30 Nm
Fork top bolt	23 Nm
Fork yoke clamp bolts	
1985 to 1992 models	
Top yoke	20 Nm
Bottom yoke	23 Nm
1993 to 2003 models (top and bottom)	23 Nm
Front brake master cylinder clamp bolts	9 Nm
Handlebar clamp bolts	20 Nm
Handlebar holder nuts	40 Nm
Shock absorber	
Upper mounting bolt	20 Nm
Lower mounting nut	30 Nm
Sidestand pivot bolt and nut	40 Nm
Steering head bearing adjuster nut	
Initial setting	50 Nm
Final setting	3 Nm
Steering stem nut	110 Nm
Swingarm left-hand pivot bolt	100 Nm
Swingarm right-hand pivot bolt	6 Nm
Swingarm right-hand pivot bolt locknut	100 Nm

1 General information

All models have a tubular steel cradle frame.

Front suspension is by a pair of oil-damped telescopic forks with adjustable air assistance.

At the rear, a steel swingarm acts on twin shock absorbers. The shock absorbers are adjustable for spring pre-load and rebound damping.

The drive to the rear wheel is by shaft, which runs inside the swingarm.

2 Frame – inspection and repair

1 The frame should not require attention unless accident damage has occurred. In most cases, frame replacement is the only satisfactory remedy for such damage. A few frame specialists have the jigs and other equipment necessary for straightening the frame to the required standard of accuracy, but even then there is no simple way of assessing to what extent the frame may have been over stressed.

2 After the machine has accumulated a lot of miles, the frame should be examined closely for signs of cracking or splitting at the welded joints. Loose engine mount bolts can cause ovaling or fracturing of the mounting tabs. Minor damage can often be repaired by welding, depending on the extent and nature of the damage.

3 Remember that a frame which is out of alignment will cause handling problems. If misalignment is suspected as the result of an accident, it will be necessary to strip the machine completely so the frame can be thoroughly checked.

3 Footrests, brake pedal and gearchange lever – removal and installation

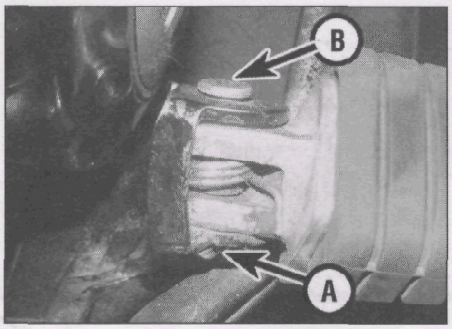
Footrests

Removal

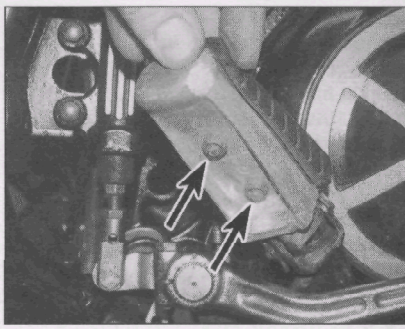
1 Remove the split pin and washer from the bottom of the footrest pivot pin, then withdraw the pivot pin and remove the footrest **(see illustration)**. On the rider's footrests, note the fitting of the return spring. On the pillion footrests, note the fitting of the detent plate, ball and spring, and take care no to let the ball and spring ping away when removing the footrest. Note that Yamaha do not list the footrests themselves as be available separately from their brackets unless you are obtaining replacements fro breaker's yard, you will have to remove brackets or holders as well (see Step 3) and replace the whole assembly with a one.

2 The footrest rubbers are avail separately. On early models they pull off push onto the footrest, though you probably need to slit the old ones with a k to get them off. Grease the inside of the ones to aid installation. On later models front footrest rubbers are secured by two on the underside of the footrest, and on rear they are secured by two screws on top **(see illustrations)**.

3 To remove the rider's footrest brack on the right-hand side remove the br pedal first (see below), then unhook pedal return spring from the foot bracket. Unscrew the two bolts securing



3.1 Remove the split pin and washer (A) and withdraw the pivot pin (B)



3.2a Front footrest rubber nuts (arrow

bracket to the frame and draw it off the brake pedal pivot **(see illustration)**. On the left-hand side unscrew the two bolts securing the bracket to the frame and remove it **(see illustration)**.

4 To remove the pillion footrest holders, on the right-hand side unscrew the nut on the inside of the frame and draw the holder out **(see illustration)**. On the left-hand side you have to remove the regulator/rectifier, mounted on the inside of the frame section which the footrest holder fits into, to access the nut (see Chapter 9).

Installation

5 Installation is the reverse of removal.

Brake pedal

Removal

6 Note how the mark on the pedal aligns with the punch mark on the pivot shaft end – if the marks are not visible, make your own **(see illustration)**.

7 Unscrew the pedal pinch bolt and draw the pedal off the shaft.

Installation

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

- Apply grease to the shaft splines. It is also worth applying some grease to the pivot section in the bracket – to do this unhook the brake light switch spring and pedal return spring, then detach the rear brake master cylinder pushrod and draw the shaft out.
- Align the mark on the pedal with the punch mark on the end of the shaft **(see illustration 3.6)**.
- Refer to Chapter 1, Section 8 and check the pedal height.
- Check the operation of the rear brake light switch (see Chapter 1).

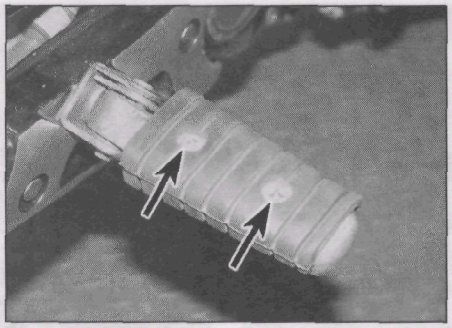
Gearchange lever and linkage

Removal

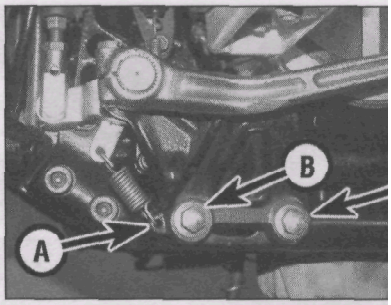
9 To remove the lever with its linkage rod and arm as an assembly, ignore this step and follow Steps 10 and 11. Slacken the gearchange lever linkage rod locknuts, then unscrew the rod and separate it from the lever and the arm (the rod is reverse-threaded on one end and so will simultaneously unscrew from both lever and arm when turned in the one direction) **(see illustration)**. Note how far the rod is threaded into the lever and arm as this determines the height of the lever relative to the footrest.

10 Remove the circlip and washer securing the lever on its shaft, then draw the lever off **(see illustration)**.

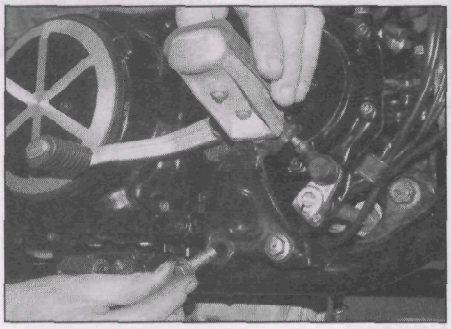
11 Unscrew the gearchange linkage arm pinch bolt and slide the arm off the shaft, noting how the slot in the arm aligns with the punch mark on the shaft **(see illustration)**.



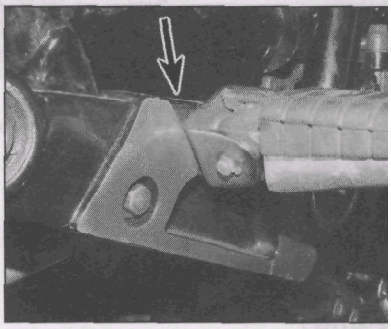
3.2b Rear footrest rubber screws (arrowed)



3.3a Unhook the pedal return spring then unscrew the bolts (B) and remov footrest assembly



3.3b Unscrew the bolts and remove the footrest assembly

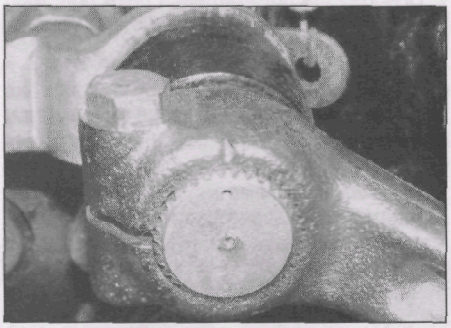


3.4 Unscrew the nut inside the fram release the footrest holder (arrowe

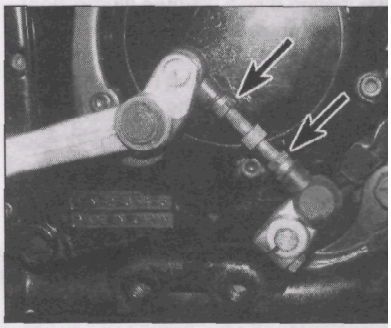
Installation

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

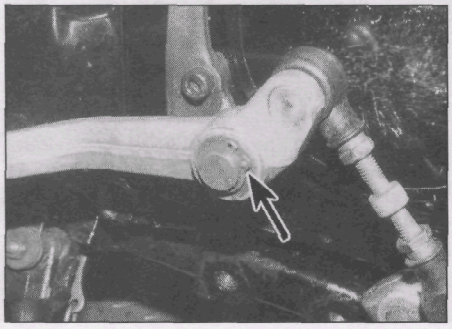
- Apply grease to the lever pivot.
- Adjust the gear lever height as requi screwing the linkage rod in or out of the and arm. Tighten the locknuts on compl



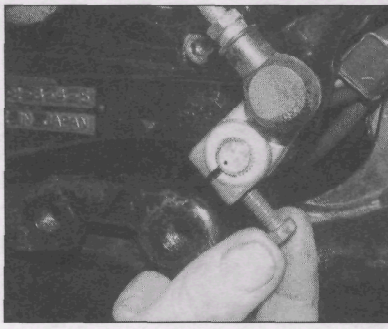
3.6 Note alignment of the pedal with the shaft, then unscrew the bolt and draw it off



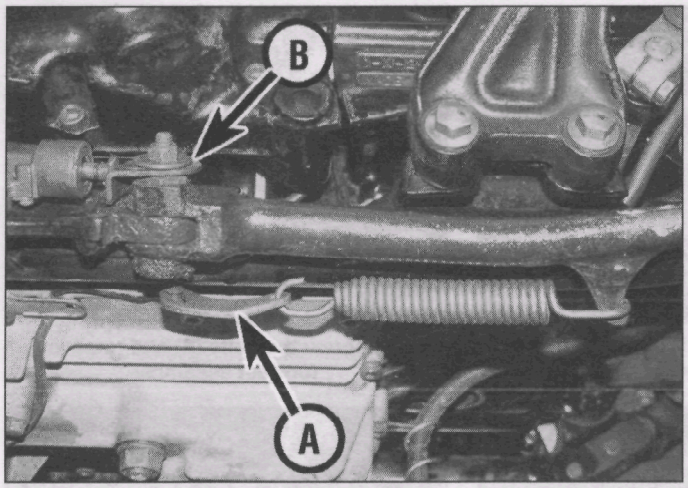
3.9 Slacken the locknuts (arrowed) unscrew the linkage rod



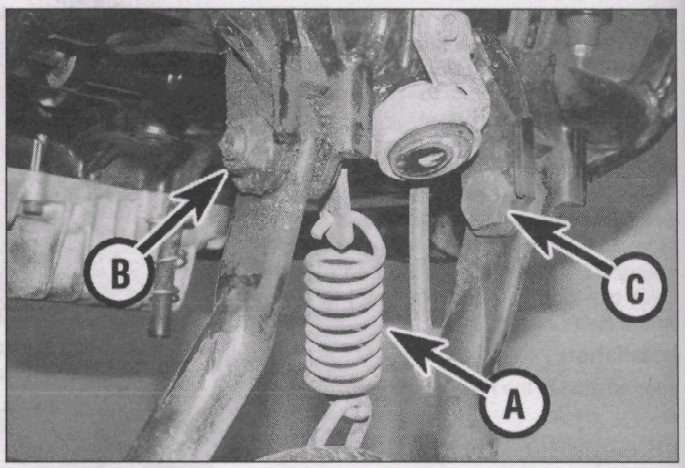
3.10 Remove the circlip (arrowed) to release the lever



3.11 Note alignment of the arm with shaft, then unscrew the bolt and draw



4.2 Unhook the spring and remove the link plate (A), then unscrew the nut and remove the contact plate (B)



4.8 Unhook the spring and remove the link plate (A), then unscrew the nut (B) on each side and remove the pivot bolt (C) on each side

4 Sidestand and centrestand – removal and installation

Sidestand

Removal

1 The sidestand is bolted to a bracket on the frame. A spring anchored between them ensures the stand is held in the retracted or extended position. Support the bike on the centrestand.
2 Unhook the stand spring and remove the link plate, noting how it fits **(see illustration)**.
3 Unscrew the nut and remove the washer securing the sidestand switch contact plate, then remove the plate, noting how it fits.
4 Unscrew the nut from the pivot bolt, then unscrew the bolt and remove the stand.

Installation

5 Apply grease to the pivot bolt shank and to the mating surfaces of the stand and its bracket on the frame. Tighten the bolt and nut to the torque setting specified at the beginning of the Chapter. Check that the stand pivots smoothly.
6 Fit the sidestand switch contact plate and secure it with the nut, then reconnect the spring and link plate and check that it holds the stand securely up when not in use – an accident is almost certain to occur if the stand extends while the machine is in motion.

Centrestand

Removal

7 The centrestand is bolted to brackets on the frame. A spring anchored between them ensures the stand is held in the retracted or extended position. Support the bike on the sidestand.
8 Unhook the stand spring and remove the link plate, noting how it fits **(see illustration)**.
9 Unscrew the nut from each pivot bolt, then withdraw the bolts and remove the stand.

Installation

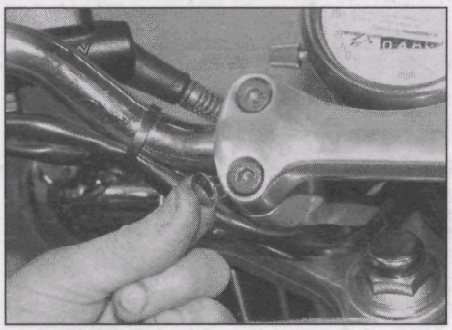
10 Apply grease to the pivot bolt shanks before installing the bolts. Install the bolts and tighten the nuts. Check that the stand pivots smoothly.
11 Reconnect the spring and check that it holds the stand securely up when not in use – an accident is almost certain to occur if the stand extends while the machine is in motion.

5 Handlebars and levers – removal and installation

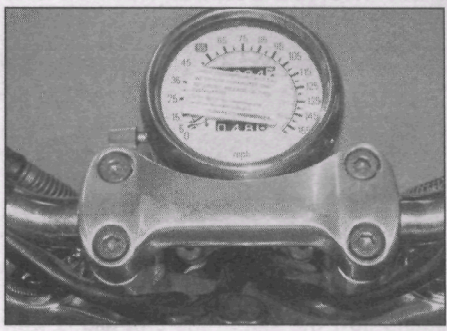
Note: *For procedures involving top yoke removal, the entire handlebar assembly can be displaced from the top yoke and laid aside without having to remove the individual assemblies from them – follow Steps 8 to 11 only. If you do this, remove the top cover (see Chapter 8), then spread some rag over the instrument cluster and the top of the air filter housing and lay the handlebar assembly on it.*

Handlebar removal

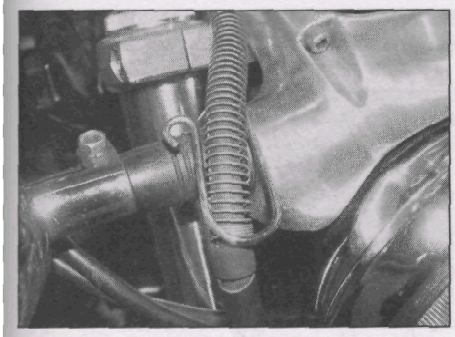
1 Remove the rear view mirrors (see Chapter 8).
2 Displace the front brake master cylinder assembly (see Chapter 7).
3 Displace the clutch master cylinder assembly (see Chapter 2).
4 Refer to Chapter 4, Section 14, and detach the throttle cables from the twistgrip – this includes detaching the switch housing from the handlebar. Refer to Chapter 9 and displace the left-hand switch housing.
5 Remove the cap from each end of the handlebars. Slide the throttle twistgrip off the right-hand end and remove the grip from the left-hand end – if it has been glued on, you will probably have to slit it with a knife to remove it.
6 Carefully prise the blanking caps out of the handlebar clamp bolts – take care to catch them if they ping out because if they drop down onto the engine they could be a nightmare to find and retrieve **(see illustration)**. Make an alignment mark between the handlebar clamp mating surfaces and the handlebars so it easy to set them in the same position later. Support the handlebars, then unscrew the bolts and remove the clamp and the handlebars **(see illustration)**.
7 If required, unscrew the handlebar holder nuts, then draw the holder out of the top yoke **(see illustration 5.11a)**.



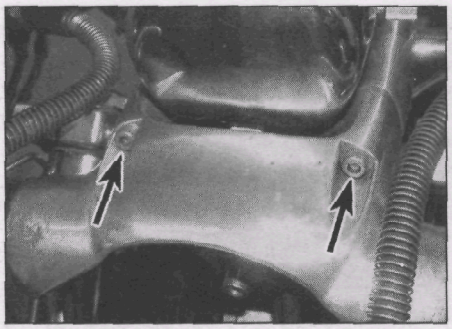
5.6a Prise out the blanking caps . . .



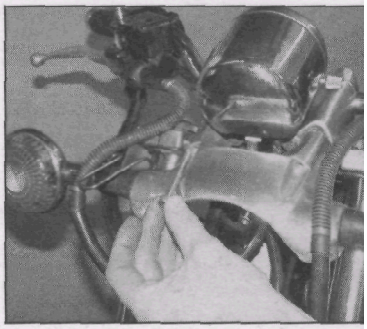
5.6b . . . then unscrew the clamp bolts



5.9a Free the brake hose from its guide



5.9b Unscrew the bolts (arrowed) . . .



5.9c . . . and remove the turn si assembly

Handlebar assembly displacement

8 Remove the complete headlight assembly (see Chapter 9). Remove the top cover (see Chapter 8).

9 Free the front brake hose from its guide above the turn signal **(see illustration)**. Unscrew the two bolts securing the front turn signal assembly to the handlebar holder and remove it **(see illustrations)**.

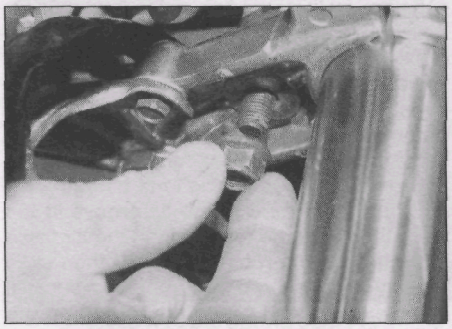
10 Unscrew the ring securing the speedometer cable and detach it.

11 Unscrew the handlebar holder nuts, then draw the handlebar assembly out of the top yoke and lay it on some rag over the air filter housing **(see illustrations)**.

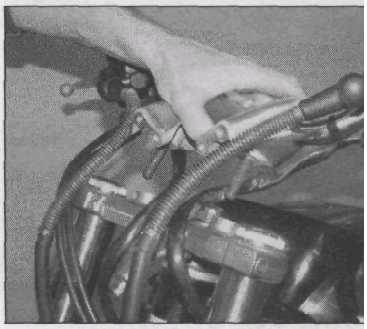
Handlebar installation

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

- If removed, tighten the handlebar holder nuts to the torque setting specified at the beginning of the Chapter.
- Make sure the handlebars are central in the clamp – the roughened surface can be used to align them. Align the handlebars as noted on removal.
- Tighten the handlebar front clamp bolts first, then the rear bolts, so that the gap between holder and clamp is at the back, and tighten them to the specified torque setting.
- Apply some grease to the throttle twistgrip section of the handlebar. If new grips are being fitted, secure them using a suitable adhesive.
- Refer to Chapter 2 when installing the clutch master cylinder assembly and to Chapter 7 for the front brake master cylinder.
- Do not forget to reconnect the front brake light switch and clutch switch wiring connectors.



5.11a Unscrew the holder nuts . . .



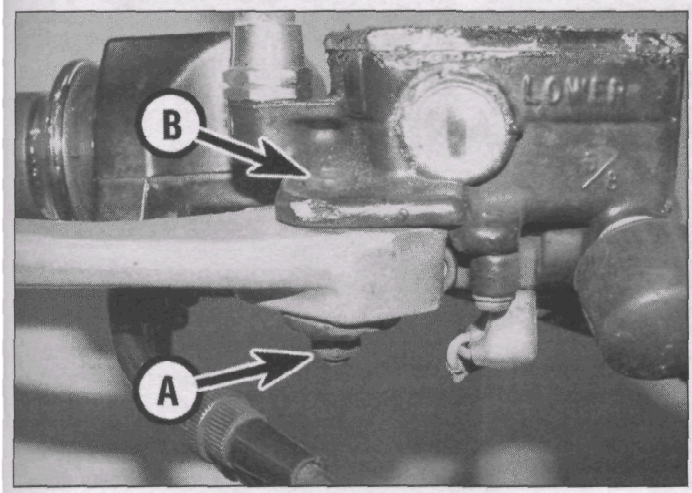
5.11b . . . and lift the handlebar as up off the yoke

Levers

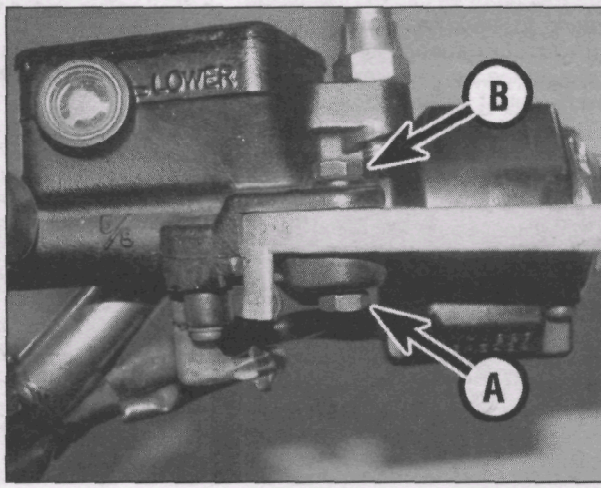
13 Unscrew the nut on the underside of the front brake lever bracket **(see illustration)**. Unscrew the pivot bolt and remove t lever. Note that there is a collar in t pivot bore – take care not to lose loose.

14 Unscrew the nut on the undersi clutch lever bracket **(see illus** Unscrew the pivot bolt and remove t lever. Note the pivot bush that locate end of the pushrod and take care nc it.

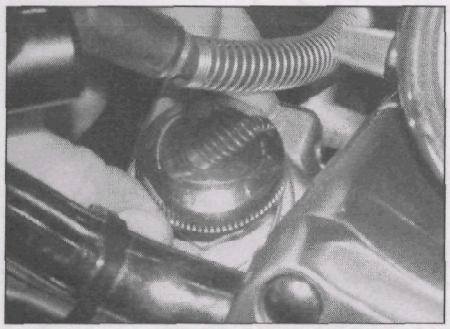
15 Installation is the reverse of Apply grease to the pivot bolt shafts contact areas between the lever bracket. Apply silicone grease to the master cylinder pushrod.



5.13 Unscrew the nut (A), then the pivot bolt (B)



5.14 Unscrew the nut (A), then the pivot bolt (B)



6.18 Remove the top cap from the fork

6 Forks – removal and installation

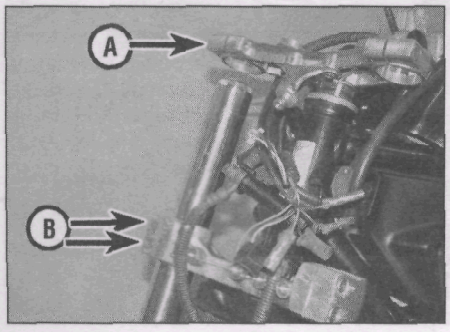
1985 to 1992 models

Removal

1 Remove the front wheel (see Chapter 7). Tie the front brake calipers and hoses back so that they are out of the way.
2 Remove the front mudguard and fork brace (see Chapter 8).
3 Remove the top cap from the fork. Release the air pressure in the forks (see Section 12).
4 Working on one fork at a time, slacken the fork clamp bolt in the top yoke **(see illustration 6.19)**. If the fork is to be disassembled, it is advisable to slacken the fork top bolt now while the fork is held by the bottom yoke **(see illustration 8.1a)**.

> HAYNES HiNT
> ***Slackening the fork clamp bolts in the top yoke before slackening the fork top bolts releases pressure on the top bolt. This makes it much easier to remove and helps to preserve the threads.***

5 Note the routing of all cables, hoses and wiring around the fork before removing it. Slacken the fork clamp bolts in the bottom yoke, then hold the air valve assembly and draw the fork out of the top yoke until it is clear of the valve assembly. At this point remove the rubber damper from the top of the valve and remove the wire circlip from the fork tube. Remove the fork from the bottom yoke by twisting it and pulling it downwards. If removing both forks, the valve assembly will become free on removing the second fork **(see illustration 6.19)**.



6.19 Top yoke clamp bolt (A), bottom yoke clamp bolts (B)

> HAYNES HiNT
> ***If the fork legs are seized in the yokes, spray the area with penetrating oil and allow time for it to soak in before trying again.***

Installation

6 Remove all traces of corrosion from the fork tube and the yokes.
7 Check the condition of the O-rings in the air valve assembly and replace them with new ones if they are damaged deformed or deteriorated **(see illustration 8.1a)**. Smear some grease around the O-rings.
8 Slide the fork up through the bottom yoke and fit the wire circlip into its groove in the fork tube. Slide the fork through the air valve assembly, fit the rubber damper, then slide the fork into the top yoke, making sure all cables, hoses and wiring are routed on the correct side of the fork.
9 The fork should be positioned so that the upper surface of the fork tube is flush with the upper surface of the top yoke.
10 Tighten the fork clamp bolts in the bottom yoke to the torque setting specified at the beginning of the Chapter **(see illustration 6.19)**.
11 If the fork has been dismantled, and if not already done, tighten the fork top bolt to the specified torque setting.
12 Tighten the fork clamp bolt in the top yoke to the specified torque **(see illustration 6.19)**.
13 Install the front mudguard (see Chapter 7), and the front wheel (see Chapter 6).
14 Set the fork air pressure as required (see Section 12). Fit the fork top cap.
15 Check the operation of the front forks and brakes before taking the machine out on the road.

1993 to 2003 models

Removal

16 Remove the front wheel (see Chapter 7). Tie the front brake calipers and hoses back so that they are out of the way.
17 Remove the front mudguard and fork brace (see Chapter 8).
18 Remove the top cap from the fork **(see illustration)**. Measure and note the amount of protrusion (if any) of the fork tube above the top surface of the top yoke – measure up to the top rim of the tube itself, do not include the air valve cap.
19 Working on one fork at a time, slacken the fork clamp bolt in the top yoke **(see illustration)**. If the fork is to be disassembled, or if the fork oil is being changed, it is advisable to slacken the fork top bolt now while the fork is held by the bottom yoke **(see illustration 8.1b)** – first release the air pressure in the fork (see Section 12).

> HAYNES HiNT
> ***Slackening the fork clamp bolts in the top yoke before slackening the fork top bolts releases pressure on the top bolt. This makes it much easier to remove and helps to preserve the threads.***

20 Note the routing of all cables, hoses and wiring around the fork before removing it. Slacken the fork clamp bolts in the bottom yoke, and remove the fork by twisting it and pulling it downwards **(see illustration 6.19)**.

> HAYNES HiNT
> ***If the fork legs are seized in the yokes, spray the area with penetrating oil and allow time for it to soak in before trying again.***

Installation

21 Remove all traces of corrosion from the fork tube and the yokes.
22 Slide the fork up through the bottom yoke and into the top yoke, making sure all cables, hoses and wiring are routed on the correct side of the fork **(see illustration 6.19)**.
23 Set the amount of protrusion of the top of the fork tube (not the top of the fork top bolt) above the top yoke as noted on removal. Make sure it is the same on both sides.
24 Tighten the fork clamp bolts in the bottom yoke to the torque setting specified at the beginning of the Chapter **(see illustration 6.19)**.
25 If the fork has been dismantled or if the fork oil was changed, and if not already done, tighten the fork top bolt to the specified torque setting.
26 Tighten the fork clamp bolt in the top yoke to the specified torque **(see illustration 6.18)**.
27 Install the front mudguard (see Chapter 7), and the front wheel (see Chapter 6).
28 Set the fork air pressure as required (see Section 12). Fit the fork top cap.
29 Check the operation of the front forks and brakes before taking the machine out on the road.

7 Forks – oil change

1985 to 1992 models

Note: *The forks fitted to these models are equipped with drain bolts, enabling the oil to be changed without removing the forks from the yokes. It should be noted, however, that removing the forks from the machine allows full draining of the old oil because it is much easier (and safer) to pump the fork with it off*

the machine. It is also possible to measure the oil level, and thus ensure that both forks contain an even amount of oil.

1 Place the bike on its centrestand and raise the front wheel off the ground by placing a jack under the engine, using a block of wood between it and the jack head.

2 Release the air pressure in the fork (see Section 12).

3 Slacken the fork clamp bolt in the top yoke, then remove the fork cap and unscrew the fork top bolt **(see illustration 8.1a)**. Check the condition of the O-ring and replace it with a new one if it is damaged, deformed or deteriorated.

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

4 Place some clean rag around the bottom of the fork and over the brake disc and tyre to avoid contamination by oil, or make up a cardboard chute which will direct the oil away from the tyre and disc. Place a suitable container under the bottom of the fork, then unscrew the drain bolt and allow as much oil as possible to drain (you will need to leave it a while to do this). Discard the drain bolt sealing washer as a new one should be used.

5 Fit the drain bolt using a new sealing washer.

6 Slowly pour in the specified quantity and grade of fork oil.

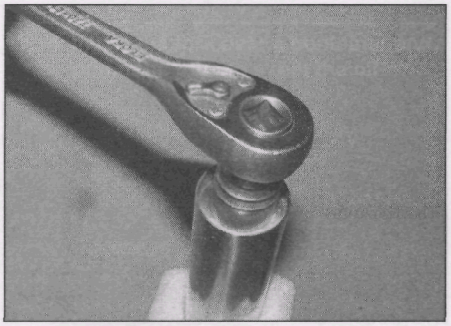
7 Smear the fork top bolt O-ring with fork oil, and if using a new one fit it onto the bolt. Thread the bolt carefully into the fork tube, making sure it is not cross-threaded, and tighten it to the torque setting specified at the beginning of the Chapter. Tighten the fork clamp bolt in the top yoke to the specified torque setting.

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

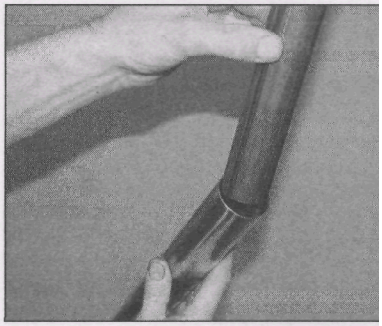
TOOL TiP ***Use a ratchet-type tool when installing the fork top bolt. This makes it unnecessary to remove the tool from the bolt whilst threading it in making it easier to maintain a downward pressure on the spring.***

8 Lower the jack and remove it, then pump the forks up and down several times to distribute the oil.

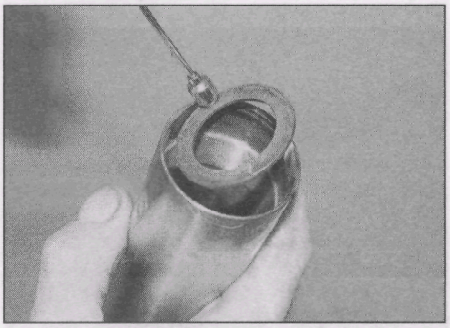
9 Set the fork air pressure as required (see Section 12). Fit the fork top cap.



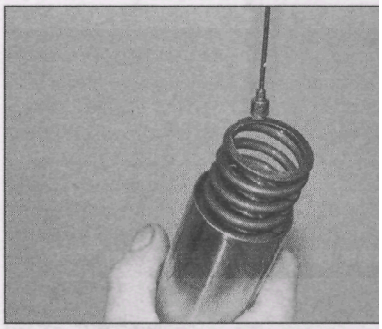
7.11 Thread the top bolt out of the tube



7.13a Remove the spacer . . .



7.13b . . . the spring seat . . .



7.13c . . . and the spring

1993 to 2003 models

10 Remove the forks (see Section 6). Always work on the fork legs separately to avoid interchanging parts and thus causing an accelerated rate of wear **(see illustration 8.1b)**. If not already done, release the air pressure in the fork (see Section 12).

11 If the fork top bolt was not slackened with the fork in situ, carefully clamp the fork tube in a vice equipped with soft jaws, taking care not to overtighten or score its surface, and slacken the top bolt **(see illustration)**.

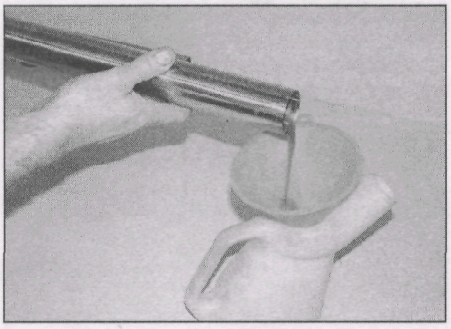
12 Unscrew the fork top bolt from the top of the fork tube **(see illustration 7.17)**. Check the condition of the O-ring and replace it with a new one if it is damaged, deformed or deteriorated.

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

13 Slide the fork tube down into the and remove the spacer, the spring se the spring from the tube – you will n hook the spring seat and spring out u piece of bent wire, or to use a tele magnet as shown **(see illustrations)** which way up the spring fits.

14 Invert the fork over a suitable co and pump the fork tube vigorously to e much oil as possible **(see illustr** Support the fork upside down in the co for a while to allow as much oil as pos drain, and pump the fork again.

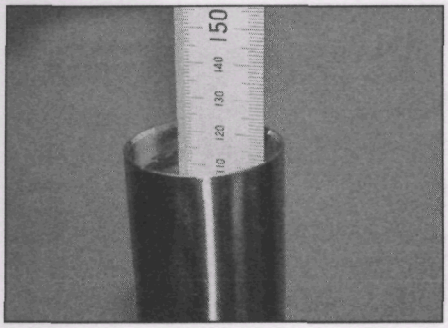
15 Slowly pour in the specified quar the specified grade of fork oil and pu fork at least ten times to distribute it **(see illustration)**. Fully compress th



7.14 Invert the fork over a container and pump the tube to expel the oil



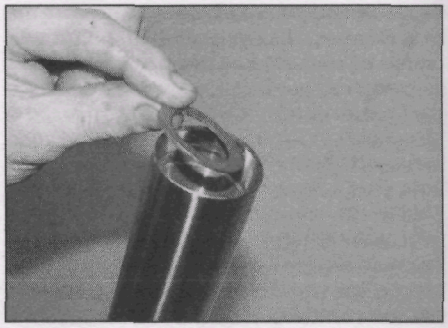
7.15a Pour the oil into the top of the



7.15b Measure the oil level and adjust if necessary



7.16a Install the spring with the closer wound coils at the top . . .



7.16b . . . then fit the spring seat . . .

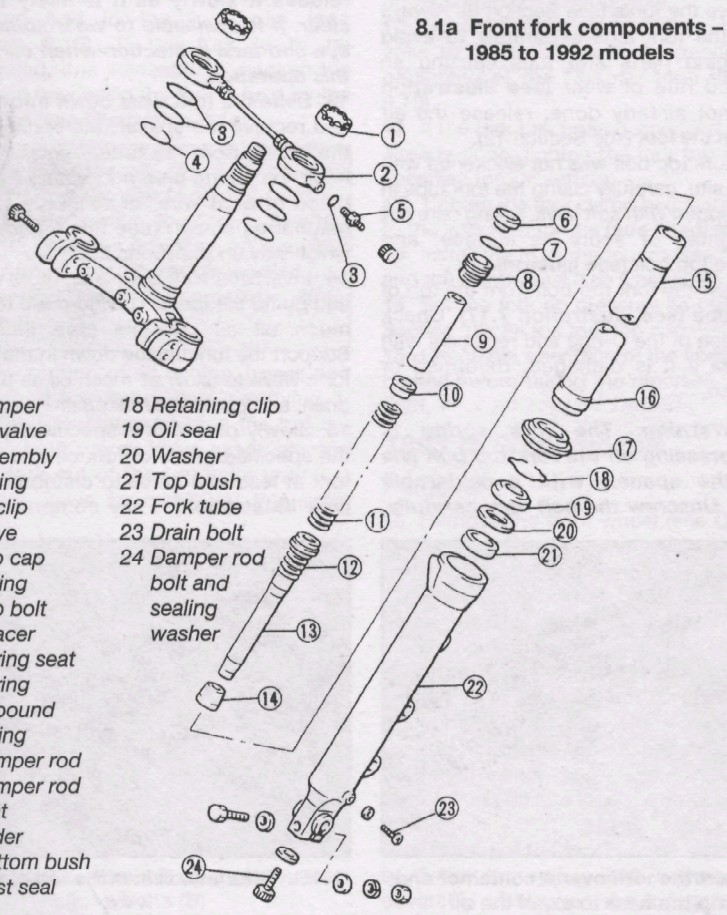


7.16c . . . and the spacer



7.17 Fit a new O-ring onto the top bolt then thread it into the fork tube

8.1a Front fork components – 1985 to 1992 models



1 Damper
2 Air valve assembly
3 O-ring
4 Circlip
5 Valve
6 Top cap
7 O-ring
8 Top bolt
9 Spacer
10 Spring seat
11 Spring
12 Rebound spring
13 Damper rod
14 Damper rod seat
15 Slider
16 Bottom bush
17 Dust seal
18 Retaining clip
19 Oil seal
20 Washer
21 Top bush
22 Fork tube
23 Drain bolt
24 Damper rod bolt and sealing washer

tube into the slider and measure the oil level, and make any adjustment by adding more or tipping some out until the oil is at the level specified at the beginning of the Chapter **(see illustration)**.

16 Pull the fork tube out of the slider as far as possible then install the spring, with its closer wound coils at the top, the spring seat and the spacer **(see illustrations)**.

17 Smear the fork top bolt O-ring with fork fluid, and if using a new one fit it onto the bolt. Thread the bolt into the fork tube **(see illustration)**.

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

Keep the fork tube fully extended whilst pressing on the spring. Screw the top bolt carefully into the fork tube making sure it is not cross-threaded. **Note:** *The top bolt can be tightened to the specified torque setting at this stage if the tube is held between the padded jaws of a vice, but do not risk distorting the tube by doing so. A better method is to tighten the top bolt when the fork has been installed in the bike and is securely held in the bottom yoke.*

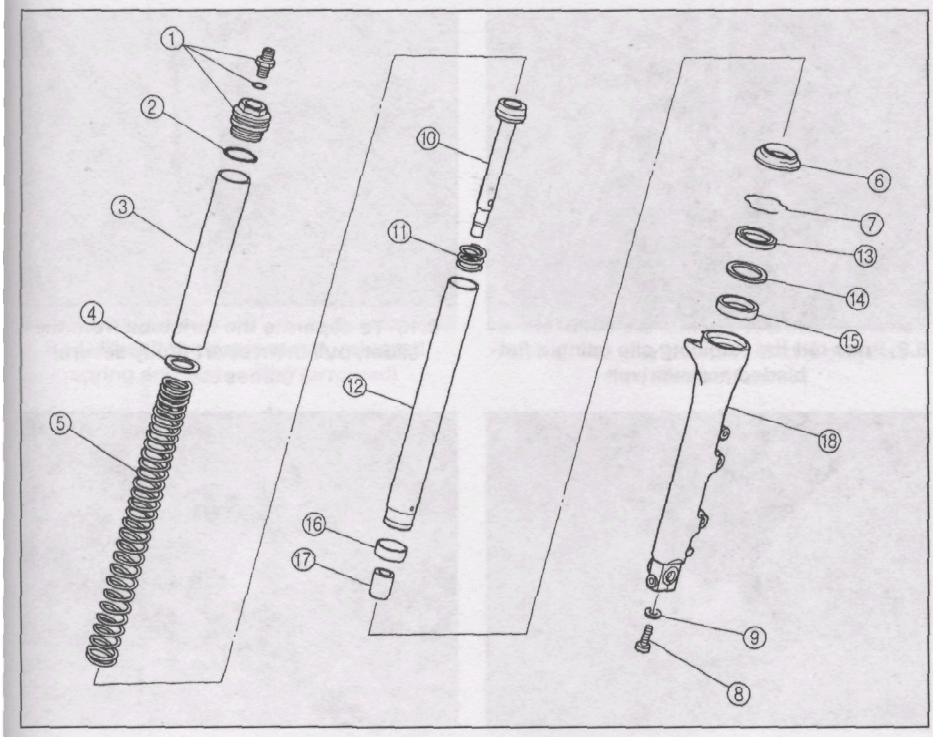
TOOL TiP ***Use a ratchet-type tool when installing the fork top bolt. This makes it unnecessary to remove the tool from the bolt whilst threading it in making it easier to maintain a downward pressure on the spring.***

18 Install the forks (see Section 6).

8 Forks – disassembly, inspection and reassembly

Disassembly

1 Remove the forks (see Section 6). Always dismantle the fork legs separately to avoid interchanging parts and thus causing an



8.1b Front fork components – 1993 to 2003 models

1 Air valve, O-ring and top bolt	*5 Spring*	*10 Damper rod*	*14 Washer*
2 O-ring	*6 Dust seal*	*11 Rebound spring*	*15 Top bush*
3 Spacer	*7 Retaining clip*	*12 Fork tube*	*16 Bottom bush*
4 Spring seat	*8 Damper rod bolt*	*13 Oil seal*	*17 Damper rod seat*
	9 Sealing washer		*18 Slider*

accelerated rate of wear. Store all components in separate, clearly marked containers **(see illustrations)**. If not already done, release the air pressure in the fork (see Section 12).

2 Before dismantling the fork, it is advisable to slacken the damper rod bolt now as there is less chance of the damper rotating with it (due to the pressure of the spring). When working on the left-hand fork, first remove the axle clamp bolt, on 1985 to 1992 models noting the order of the washers **(see illustration)**. Compress the fork tube in the slider so that the spring exerts maximum pressure on the damper head, then have an assistant slacken the bolt in the base of the fork slider **(see illustration)**.

3 If the fork top bolt was not slackened with the fork in situ, carefully clamp the fork tube in a vice equipped with soft jaws, taking care not to overtighten or score its surface, and slacken the top bolt **(see illustration 7.11)**.

4 Unscrew the fork top bolt from the top of the fork tube **(see illustration 7.17)**. Check the condition of the O-ring and replace it with a new one if it is damaged, deformed or deteriorated.

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

5 Slide the fork tube down into the slider and remove the spacer, the spring seat and the spring from the tube – you will need to hook the spring seat and spring out using a piece of bent wire, or to use a telescopic magnet as shown **(see illustrations 7.13a, b and c)**. Note which way up the spring fits.

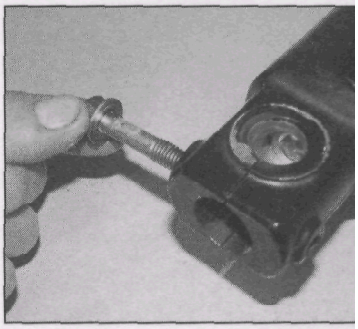
6 Invert the fork over a suitable container and pump the fork tube vigorously to expel as much oil as possible **(see illustration 7.14)**.



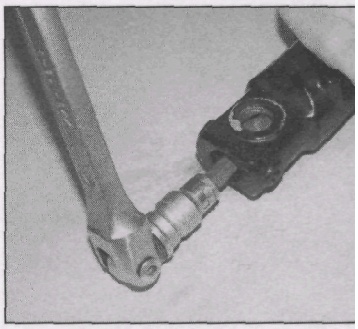
8.7a Unscrew and remove the damper rod bolt . . .



8.7b . . . then tip the damper rod o fork



8.2a Remove the clamp bo



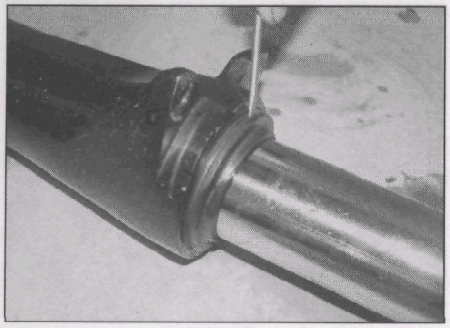
8.2b Slacken the damper rod

Support the fork upside down in the for a while to allow as much oil as p drain, and pump the fork again.

7 Remove the previously slackened rod bolt and its copper sealing was the bottom of the slider **(see illus** Discard the sealing washer as a new be used on reassembly. Invert the fo the damper rod out of the top of the **illustration)**. On the fork photograph found that the rod head stuck inside and was difficult to dislodge – if this tap the top of the tube on a piece o help it out.

8 Carefully prise out the dust seal top of the slider to gain access to th retaining clip **(see illustration)**. Di dust seal as a new one must be used

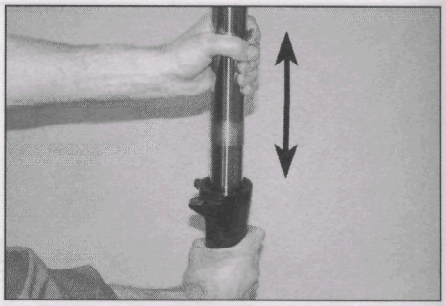
9 Carefully remove the retaining cl care not to scratch the surface of **(see illustration)**.



8.8 Prise out the dust seal using a flat-bladed screwdriver



8.9 Prise out the retaining clip using a flat-bladed screwdriver



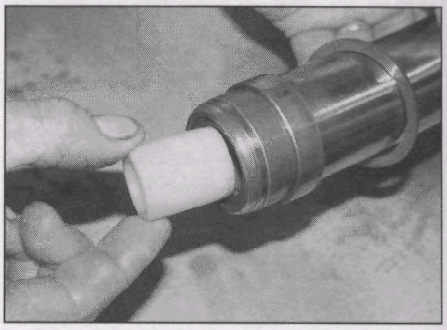
8.10 To separate the fork tube from the slider, pull them apart firmly several times . . .



8.11 . . . the slide-hammer effect will displace the oil seal and bush



8.12a Tip the damper rod seat out of the slider . . .



8.12b . . . or remove it from the bottom of the tube

10 To separate the tube from the slider it is necessary to displace the oil seal and top bush. The bottom bush does not pass through the top bush, and this can be used to good effect. Push the tube gently inwards until it stops against the damper seat. Take care not to do this forcibly or the seat may be damaged. Now pull the tube sharply outwards until the bottom bush strikes the top bush **(see illustration)**. Repeat this operation until the top bush and seal are tapped out of the slider.

11 With the tube removed, slide off the oil seal, washer and top bush, noting which way up they fit **(see illustration)**. Discard the oil seal as a new one must be used.

Caution: Do not remove the bottom bush from the tube unless it is to be replaced.

12 Tip the damper rod seat out of the slider – you may have to push it from the bottom via the damper bolt hole **(see illustration)**. Note there is a chance that the seat will have lodged itself in the bottom of the tube when the fork was compressed earlier – if this is the case, take care when removing it if using a tool to lever it out as the seat is easily scored **(see illustration)**. Clean up any marks using wet-and-dry paper.

Inspection

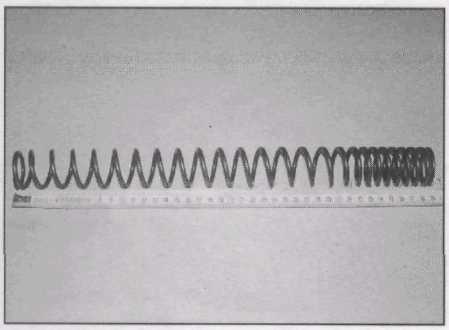
13 Clean all parts in solvent and blow them dry with compressed air, if available. Check the fork tube for score marks, scratches, flaking of the chrome finish and excessive or abnormal wear. Look for dents in the tube and replace the tube in both forks if any are found. Check the fork seal seat for nicks, gouges and scratches. If damage is evident, leaks will occur. Also check the oil seal washer for damage or distortion and replace it with a new one if necessary. On 1985 to 1992 models check the air valve assembly for cracks and damage.

14 Check the fork tube for runout using V-blocks and a dial gauge. If the amount of runout exceeds the service limit specified, the tube should be replaced with a new one.

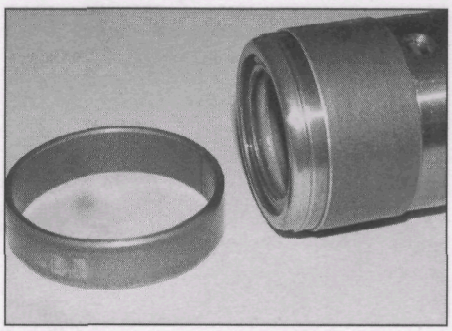
Warning: If the tube is bent or exceeds the runout limit, it should not be straightened; replace it with a new one.

15 Check the springs (the main spring and the rebound spring on the damper rod) for cracks and other damage. Measure the main spring free length and compare the measurement to the specifications at the beginning of the Chapter **(see illustration)**. If it is defective or has sagged below the service limit, replace the main springs in both forks with new ones. Never replace only one spring.

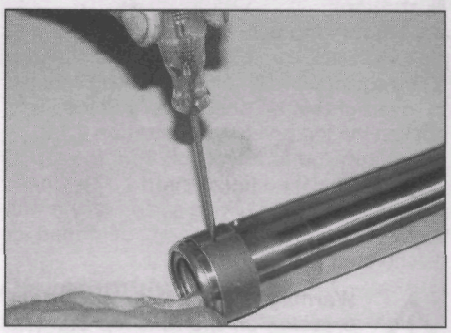
16 Examine the working surfaces of the two bushes **(see illustration)**; if worn or scuffed they must be replaced with new ones – they are worn if the grey Teflon coating has rubbed off to reveal the copper material. To remove



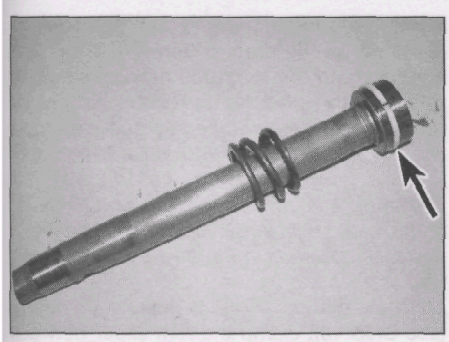
8.15 Check the spring free length



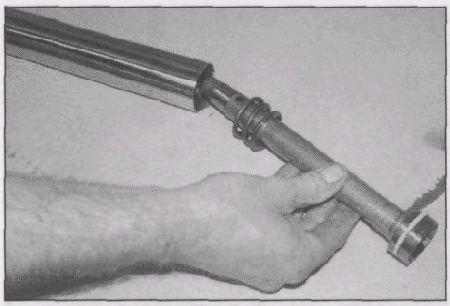
8.16a Check the bushes for wear



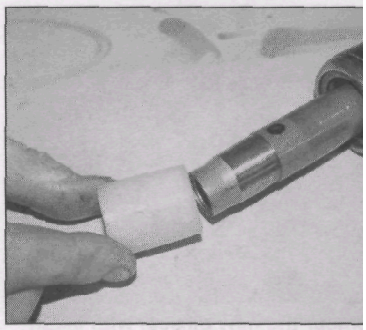
8.16b Carefully lever the ends apart and slide the bottom bush off the fork tube



8.17 Check the damper rod, rebound spring and piston ring (arrowed)



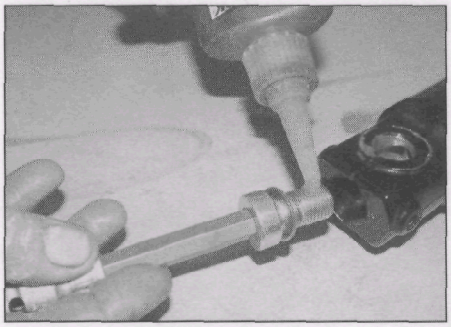
8.18a Slide the damper rod into the tube and all the way down so that it projects from the bottom . . .



8.18b . . . then fit the seat onto th



8.19a Slide the tube into the slider



8.19b Apply threadlock to the bolt and fit a new sealing washer . . .



8.19c . . . then thread it into the d rod and tighten it to the specified

the bottom bush from the fork tube, prise it apart at the slit using a flat-bladed screwdriver and slide it off. Make sure the new one seats properly **(see illustration)**.

17 Check the damper rod and its piston ring, and the damper rod seat, for damage and wear, and replace them with new ones if necessary **(see illustration)**. Do not remove the piston ring from the top of the rod unless it is being renewed.

Reassembly

18 If removed, fit the piston ring into the groove in the damper rod head, then slide the rebound spring onto the rod **(see illustration 8.17)**. Insert the damper rod into the top of the fork tube and slide it down so that it projects fully from the bottom of the tube **(see illustration)**. Fit the damper rod seat onto the bottom of the damper **(see illustration)**.

19 Oil the fork tube and bottom bush with the specified fork oil and insert the assembly into the slider **(see illustration)**. Fit a new copper sealing washer onto the damper rod bolt and apply a few drops of a suitable non-permanent thread locking compound, then install the bolt into the bottom of the slider **(see illustration)**. Tighten the bolt to the specified torque setting **(see illustration)**. If the damper rod rotates inside the tube, temporarily install the fork spring, spring seat, spacer and top bolt (see Steps 26 and 27) and compress the fork to hold the damper rod. Alternatively, a length of wood doweling (such as a broom handle) pressed hard into the damper rod head quite often suffices. Otherwise, wait until the fork is fully reassembled before tightening the bolt.

20 Push the fork tube fully into the slider, then oil the top bush and slide it down over the tube **(see illustration)**. Press the bush squarely into its recess in the slider as far as possible, then install the oil seal **(see illustration)**. Use either the service tool (Pt. Nos. 90890-013 90890-01373), or a suitable piece o tubing to tap the bush fully into pl tubing must be slightly larger in d than the fork tube and slightly sm diameter than the bush recess in th Take care not to scratch the fo during this operation; wind insulat around any exposed length of tu push the tube fully into the slider any accidental scratching is confine area above the oil seal. A drift or pu be used, but this does not help t enter squarely, and the angle nar the bush gets deeper and makes difficult to make a good contac hammer **(see illustration)**. If using punch, wrap tape around it to pr scratching the tube.



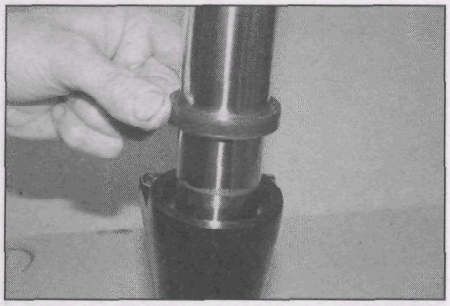
8.20a Install the top bush . . .



8.20b . . . followed by the washer



8.20c A drift can be used to tap th into place



8.22 Smear the new oil seal with clean fork oil then slide it down the tube and into the slider



8.23 Install the retaining clip . . .



8.24a . . . followed by the dust seal . . .



8.24b . . . which can be pressed in using your fingers

21 Remove the washer to check the bush is seated fully and squarely in its recess in the slider, then wipe the recess clean and refit the washer.

22 Smear the lips of the new oil seal with fork oil and slide it over the tube so that its markings face upwards **(see illustration)**. Press the seal into the slider, then drive it fully into place as described in Step 20 until the retaining clip groove is visible above it.

23 Once the seal is correctly seated, fit the retaining clip, making sure it is correctly located in its groove **(see illustration)**.

24 Lubricate the lips of the new dust seal then slide it down the fork tube and press it into position **(see illustrations)**.

25 Slowly pour in the specified quantity of the specified grade of fork oil and pump the fork at least ten times to distribute it evenly **(see illustration 7.15a)**. Fully compress the fork tube and damper rod into the slider and measure the oil level, and make any adjustment by adding more or tipping some out until it is at the level specified at the beginning of the Chapter **(see illustration 7.15b)**.

26 Pull the fork tube out of the slider as far as possible then install the spring with its closer wound coils at the top, the spring seat and the spacer **(see illustrations 7.16a, b and c)**.

27 Smear the fork top bolt O-ring with fork fluid, and if using a new one fit it onto the bolt. Thread the bolt into the fork tube **(see illustration 7.17)**.

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

Keep the fork tube fully extended whilst pressing on the spring. Screw the top bolt carefully into the fork tube making sure it is not cross-threaded. **Note:** *The top bolt can be tightened to the specified torque setting at this stage if the tube is held between the padded jaws of a vice, but do not risk distorting the tube by doing so. A better method is to tighten the top bolt when the fork has been installed in the bike and is securely held in the bottom yoke.*

28 If the damper rod bolt requires tightening (see Step 19), clamp the fork slider between the padded jaws of a vice and have an assistant compress the tube into the slider so that maximum spring pressure is placed on the damper rod head – tighten the damper rod bolt to the specified torque setting **(see illustration 8.19c)**.

29 Install the forks (see Section 6).

9 Steering stem – removal and installation

Removal

1 To prevent the possibility of damage should a tool slip remove the instrument cluster (see Chapter 9).

2 Remove the headlight assembly and the speedometer (see Chapter 9).

3 Remove the front wheel (see Chapter 7). Tie the front brake calipers and hoses aside so that they are out of the way.

4 Remove the front mudguard and fork brace (see Chapter 8).

5 Remove the front forks (see Section 6).

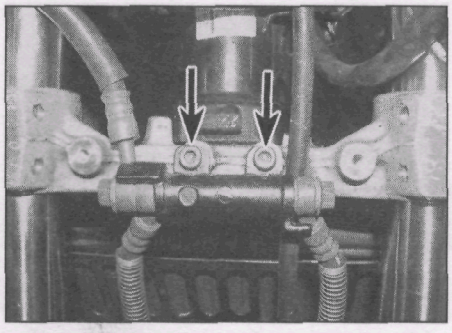
6 Displace the handlebar assembly and lay it on some rag across the air filter housing behind the steering head (see Section 5).

7 Unscrew the two brake hose splitter bolts and displace the splitter, noting the routing of the speedometer cable **(see illustration)**.

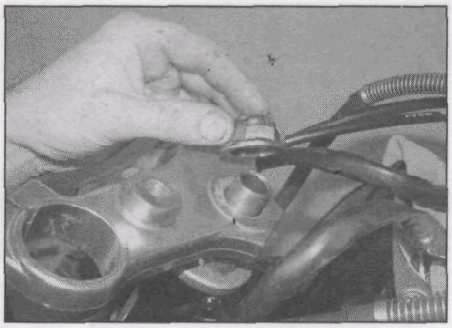
8 Unscrew the steering stem nut, and on 1999-on models remove the washer **(see illustration)**.

9 Ease the top yoke up and off the steering stem and remove it **(see illustration)**.

10 Remove the tabbed lockwasher, noting how it fits, then unscrew and remove the



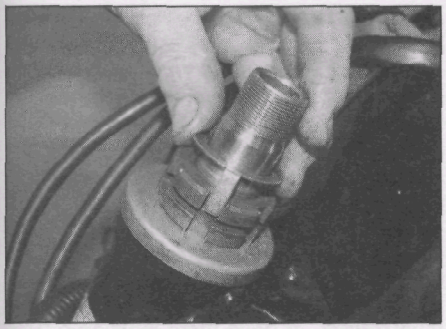
9.7 Unscrew the bolts (arrowed) and displace the splitter



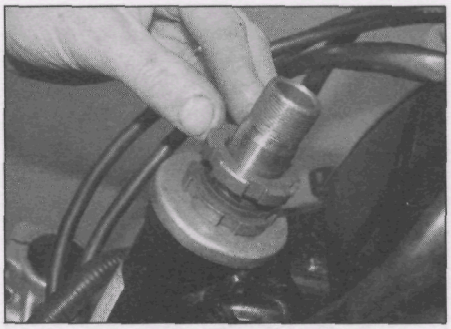
9.8 Unscrew the steering stem nut . . .



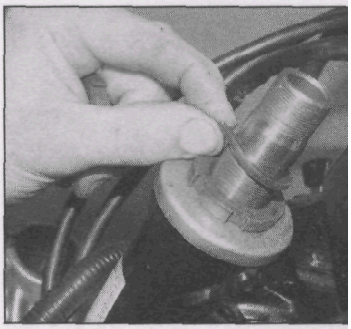
9.9 . . . and remove the top yoke



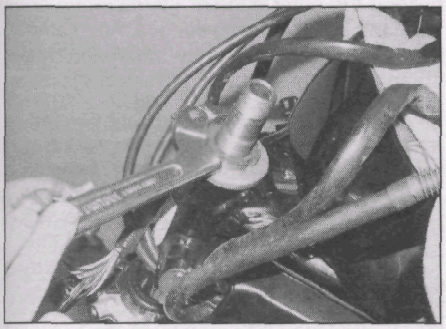
9.10a Remove the lockwasher . . .



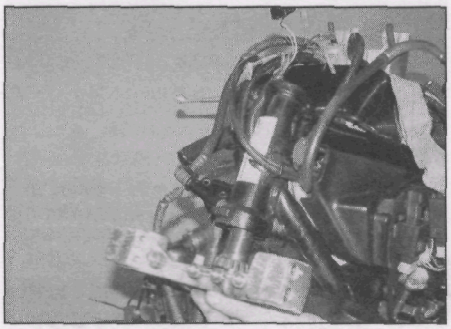
9.10b . . . then unscrew the locknut . . .



9.10c . . . and remove the rubber



9.11 Unscrew the adjuster nut . . .



9.12 . . . then draw the bottom yoke/ steering stem out of the steering head



9.13a Remove the bearing cov

locknut, if required using either a C-spanner, a peg spanner or a drift located in one of the notches, though it should only be finger-tight **(see illustrations)**. Remove the rubber washer **(see illustration)**.

11 Supporting the bottom yoke, unscrew the adjuster nut using either a C-spanner, a peg-spanner or a drift located in one of the notches, and remove it from the steering stem **(see illustration)**.

12 Gently lower the bottom yoke and steering stem out of the frame **(see illustration)**. Take care not to strain or knock the brake hoses.

13 Remove the bearing cover and the bearing from the top of the steering head **(see illustrations)**. Remove the bearing from the base of the steering stem if it is loose, otherwise refer to Section 10 **(see illustration)**.

14 Remove all traces of old grease from the bearings and races and check them for wear or damage as described in Section 10. **Note:** *Do not attempt to remove the outer races from the steering head or, if it is tight the lower bearing from the steering stem, unless they are to be replaced with new ones.*

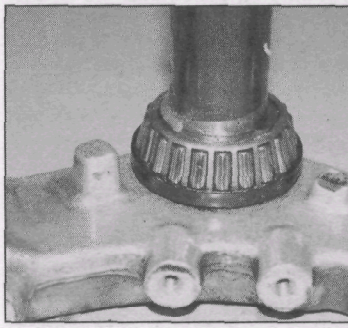
Installation

15 Smear a liberal quantity of multi-purpose grease onto the bearing races, and work some grease well into both the upper and lower bearings. If removed, fit the lower bearing onto the base of the steering stem, referring to Section 10 **(see illustration 9.13c)**.

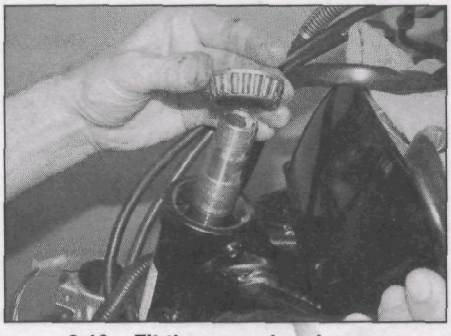
16 Carefully lift the steering stem/bottom yoke up through the steering head **(see illustration 9.12)**. Fit the upper bearing into the top of the steering head, then fit the bearing cover **(see illustrations)**. Thread the adjuster nut, with its tapered side facing down, onto the steering stem and adjust the bearings as de Chapter 1, but note that setting the l easier and more accurate, especially unable to apply the specified torqu after the forks and wheel are install



9.13b . . . and the upper bearing from the steering head . . .



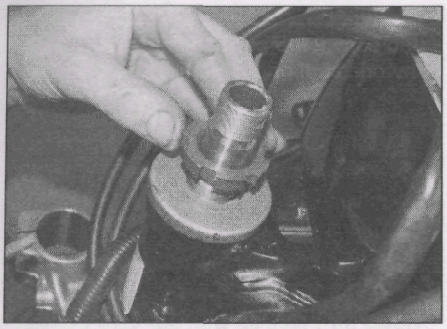
9.13c . . . and the lower bearing steering stem if loose



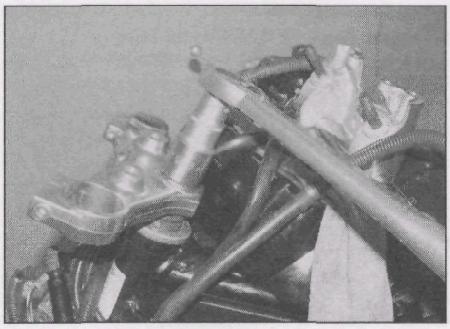
9.16a Fit the upper bearing . . .



9.16b . . . and the bearing c



9.16c Thread the adjuster nut onto the stem



9.18 Tighten the steering stem nut to the specified torque

leverage and inertia need to be taken into account. To do it that way, make sure the nut is tight enough to hold the steering stem in the head without any play, then install the forks and wheel, then refer to the procedure in Chapter 1, Section 17.

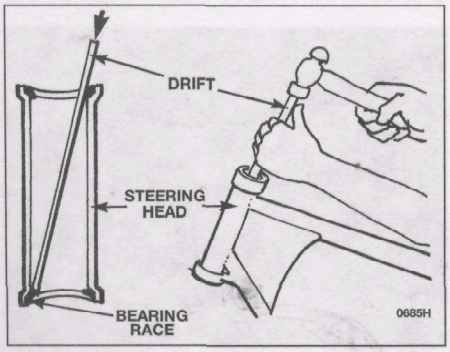
Caution: Take great care not to overtighten the bearings as this will cause premature failure.

17 When the bearings are correctly adjusted install the rubber washer and the locknut, again with the tapered side facing down **(see illustrations 9.10c and b)**. Tighten the locknut finger-tight, then tighten it further until its notches align with those in the adjuster nut, but make sure it is not so tight that the rubber washer starts to be squeezed out the side. Install the tabbed lockwasher so that the tabs fit into the notches in both the locknut and adjuster nut **(see illustration 9.10a)**.

18 Fit the top yoke onto the steering stem **(see illustration 9.9)**, then install the washer (where fitted) and steering stem nut and tighten it finger-tight **(see illustration 9.8)**. Temporarily install one of the forks to align the top and bottom yokes, and secure it by tightening the bottom yoke clamp bolts only **(see illustration 6.4)**. Now tighten the steering stem nut to the torque setting *specified at the beginning of the Chapter* **(see illustration)**.

19 Install the remaining components in a reverse of the removal procedure.

20 Carry out a final check of the steering head bearing freeplay as described in Chapter 1, Section 17, and if necessary re-adjust.



10.4 Drive each bearing outer race out with a brass drift, locating it as shown

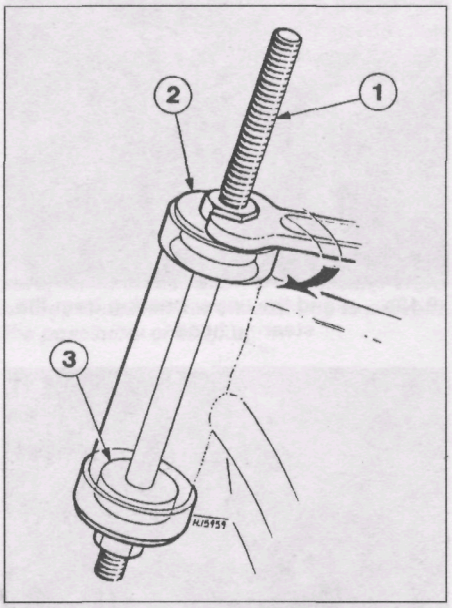
10 Steering head bearings – inspection and replacement

Inspection

1 Remove the steering stem (see Section 9).

2 Remove all traces of old grease from the bearings and races and check them for wear or damage.

3 The outer races should be polished and free from indentations. Inspect the bearing rollers for signs of wear, damage or discoloration, and examine the roller cage for signs of cracks or splits. If there are any signs of wear both upper and lower bearing assemblies must be renewed as a set. Only remove the outer races in the steering head and the lower bearing inner race on the steering stem if they need to be replaced – do not re-use them once they have been removed.



10.6 Drawbolt arrangement for fitting new bearing outer races

1 Long bolt or threaded bar
2 Thick washer
3 Guide for lower race

Replacement

4 The outer races are an interference fit in the steering head – tap them from position using a suitable drift **(see illustration)**. Tap firmly and evenly around each race to ensure that it is driven out squarely. Curve the end of the drift slightly to improve access if necessary.

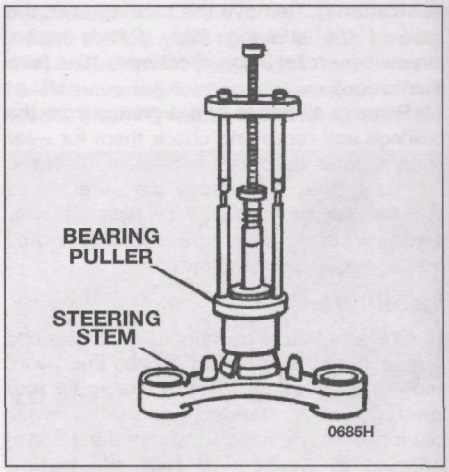
5 Alternatively, remove the races using a slide-hammer type bearing extractor; these can often be hired from tool shops.

6 Press the new outer races into the head using a drawbolt arrangement **(see illustration)**, or drive them in using a large diameter tubular drift. Ensure that the drawbolt washer or drift (as applicable) bears only on the outer edge of the race and does not contact the working surface. Alternatively, have the races installed by a Yamaha dealer equipped with the bearing race installation tools.

> **HAYNES HiNT** ***Installation of new bearing outer races is made much easier if the races are left overnight in the freezer. This causes them to contract slightly making them a looser fit. Alternatively, use a freeze spray.***

7 To remove the lower bearing from the steering stem, use two screwdrivers placed on opposite sides to work it free, using blocks of wood to improve leverage and protect the yoke, or tap under it using a cold chisel **(see illustration 9.13c)**. First thread the steering stem nut onto the top then position the yoke on its front for stability – the nut will protect the threads from the transmitted force of the impact of the chisel. If the bearing is firmly in place it will be necessary to use a puller **(see illustration)**. Take the steering stem to a Yamaha dealer if required.

8 Remove the dust seal from the bottom of the stem and replace it with a new one. Smear the new one with grease.



10.7 Remove the lower bearing using a puller if necessary

9 Fit the new lower bearing onto the steering stem. Tap it into position using a length of tubing with an internal diameter slightly larger than the steering stem and that bears on the bearing inner race **(see illustration)**.
10 Install the steering stem (see Section 9).

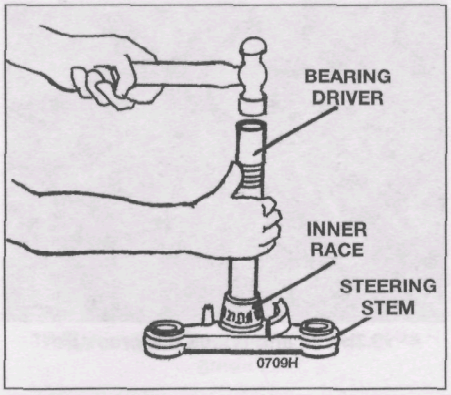
11 Rear shock absorbers – removal, inspection and installation

Removal

1 Support the motorcycle on its centrestand. If both shocks are being removed at the same time, place a support under the rear wheel or final drive housing so that the rear end does not drop when the second shock absorber is removed, but also making sure that the weight of the machine is off the rear suspension so that the shocks are not compressed. Make a note of which way round each shock absorber fits.
2 Unscrew the nut and remove the washer securing the bottom of the shock absorber to the swingarm **(see illustration)**.
3 Unscrew the bolt and remove the collar securing the top of the shock absorber to the frame **(see illustration)**.
4 Pull the top of the shock absorber off its mount and pivot it back, then draw it off the bottom mount and remove it **(see illustration)**.

Inspection

5 Inspect each shock absorber for obvious physical damage and the coil spring for looseness, cracks or signs of fatigue.
6 Inspect the damper rod for signs of bending, pitting and oil leakage **(see illustration)**.
7 Inspect the bushes at the top and bottom of the shock for wear or damage, and also check the pivots themselves on the frame, swingarm and final drive housing **(see illustrations)**.
8 No individual components are available from Yamaha for the original equipment shock absorbers, so if they are worn or damaged they must be replaced with new ones.



10.9 Drive the new lower bearing on using a suitable bearing driver or a length of pipe that bears only against its inner edge and not against the rollers or cage

Warning: Do not attempt to disassemble the shock absorbers. They are nitrogen-charged under high pressure. Improper disassemb result in serious injury. If new absorbers are fitted, take the old u Yamaha dealer or suspension spec safe disposal.

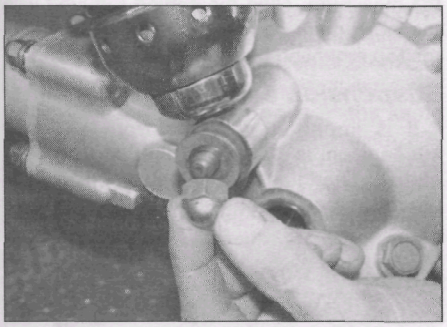
Installation

9 Installation is the reverse of remova the following.
• Apply multi-purpose grease to th absorber pivots.
• Install each shock absorber with mark for the damping adjuster (on th the shock) facing out **(see illustratior**
• Fit each shock onto both its pivot tightening either nut or bolt. Tighter and bolt to the torque settings specifi beginning of the Chapter.

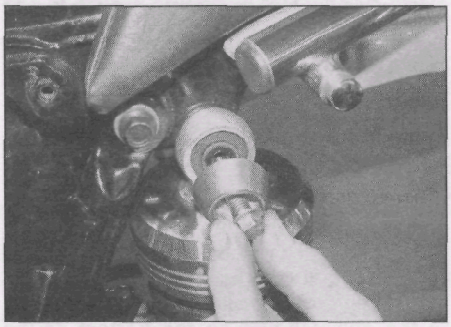
12 Suspension – adjustments

Front forks

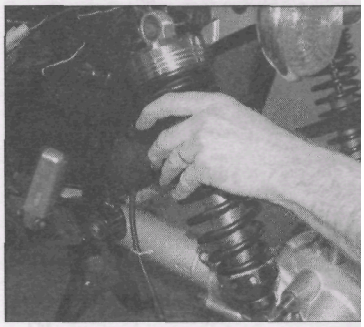
Caution: Always check the air p using a gauge that is accur pressures up to 20 psi. Dedica suspension gauges are available a also incorporate a hand-operate On no account use a garage fo gauge to check or increase air pr they are not sufficiently accurate small pressures involved and th danger of too much pressure being which could blow the fork seals.



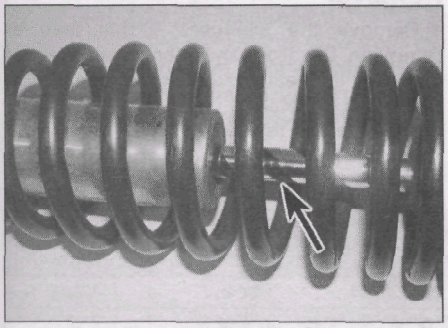
11.2 Unscrew the nut and remove the washer from the bottom mount . . .



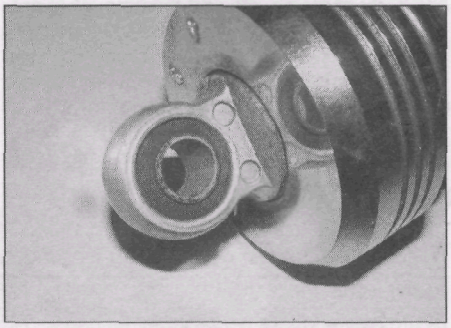
11.3 . . . then unscrew the bolt and remove the collar from the top mount . . .



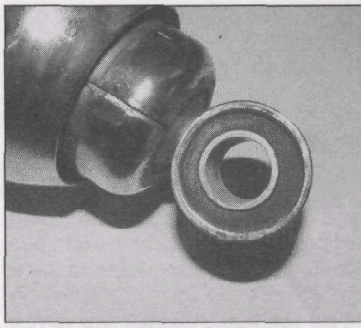
11.4 . . . and remove the shock ab as described



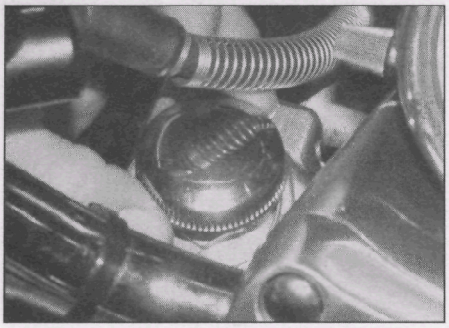
11.6 Check the damper rod (arrowed) as described



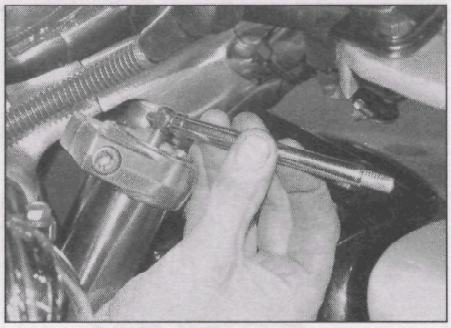
11.7a Check the top bush . . .



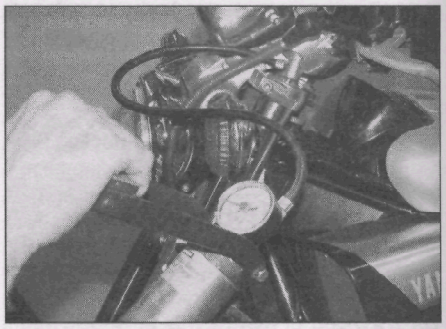
11.7b . . . and bottom bush f deterioration and wear



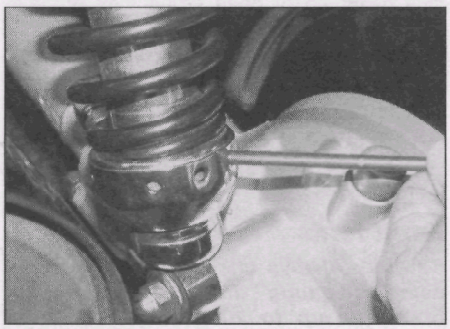
12.3a Remove the fork top cap . . .



12.3b . . . and check the pressure



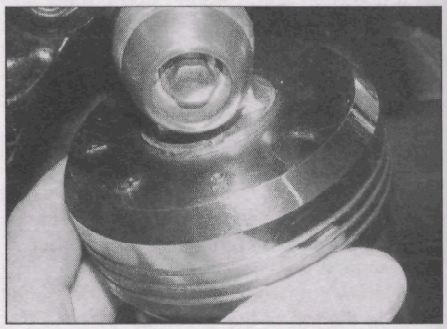
12.3c Add pressure using a hand or foot pump only, never compressed air



12.5a Adjusting rear pre-load



12.5b The amount of pre-load is indicated by the lines on the bottom of the shock



12.6 Adjusting rebound damping

use a hand- or foot-operated pump to increase air pressure and never exceed the maximum air pressure specified at the beginning of the Chapter.

Note: *If you find that you are repeatedly having to add air to the forks, the chances are that either the valve core is loose or leaking, the oils seals have blown (check for oil), or on earlier models (with the linked valve assembly) the O-rings that should seal the valve assembly around the fork tubes have failed. Remedy the fault(s) as required.*

1 The front forks are adjustable for air pressure only, this being similar to a spring pre-load adjustment on standard forks. Place the bike on its centrestand and raise the front wheel off the ground by placing a jack under the engine, using a block of wood between it and the jack head. Do not check or adjust the fork air pressure while there is weight on the front end.

2 On 1985 to 1992 models, remove the air valve cap and check the existing pressure. If necessary, add air using a hand- or foot-operated pump, rechecking the pressure after each stroke. We found that one full stroke on a standard single-cylinder foot pump was enough to add 10 psi to one fork (on later models), so two strokes should do the same for both the forks on earlier models, where there is only the one valve and the link pipe between the forks. To release pressure, press the centre of the valve in using a pointed instrument (as you would on your tyre valves). Fit the valve cap on completion.

3 On 1993 to 2003 models, remove the fork top cap and check the existing pressure **(see illustrations)**. If necessary, add air using a hand- or foot-operated pump, rechecking the pressure after each stroke **(see illustration)**. We found that one full stroke on a standard single-cylinder foot pump was enough to add 10 psi to one fork. To release pressure, press the centre of the valve in using a pointed instrument (as you would on your tyre valves). Always make sure both forks are set equally. Fit the fork cap on completion.

Rear shock absorbers

4 The shock absorbers are adjustable for spring pre-load and rebound damping.

5 Spring pre-load is adjusted using a suitable C-spanner or rod located in one of the holes in the adjuster ring on the bottom of the shock, and turning the ring as required **(see illustration)**. There are five lines marked on the body of the shock, and the amount of pre-load is determined by the number of lines visible below the adjuster ring rim **(see illustration)**. Pre-load is at a minimum with one line visible, and at its maximum with all five lines visible. Turn the adjuster anti-clockwise (as you look down on it) to increase pre-load, and clockwise to decrease it.

6 Rebound damping adjustment is made by turning the dial on the top of the shock absorber **(see illustration)**. There are four settings – the number one setting provides the minimum damping, the number four setting the maximum. Align the setting required with the index mark on the shock body just below the top mounting bolt.

Suspension settings

7 It is important that the front and rear suspension is set according to the load carried. The table below shows settings that are recommended by Yamaha.

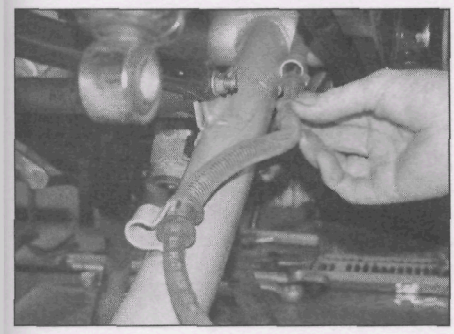
Loading	Fork air pressure	Shock pre-load	Shock damping
Solo riding	5.7 to 8.5 psi	1 or 2	1 or 2
With passenger or accessories/luggage	5.7 to 14 psi	3, 4 or 5	2, 3 or 4
With passenger and accessories/luggage	5.7 to 14 psi	5	4

13 Swingarm – removal and installation

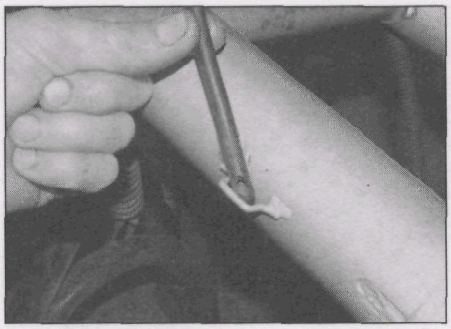
Removal

1 Remove the silencers – this involves removing the front cylinder downpipes as well, but the rear cylinder ones can stay in place (see Chapter 4).

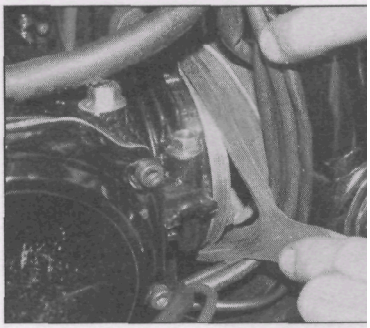
2 Remove the rear wheel (see Chapter 7). Remove the rear shock absorbers (see Section 11).



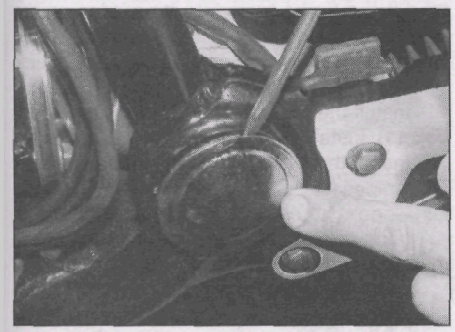
13.3a Release the brake hose from its guides . . .



13.3b . . . and draw the hose out of its guide



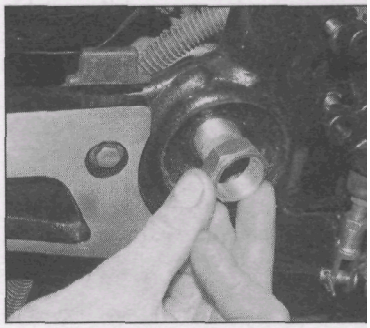
13.6a Draw the boot off the crank



13.6b Prise the cap off each side



13.7 Bend down the lockwasher tabs



13.8a Unscrew the locknut .

3 Release the brake hose from its guides on the right-hand side of the swingarm **(see illustration)**. Draw the hose out of its guide on the left-hand side **(see illustration)**.

4 If required, remove the final drive housing and the driveshaft (see Section 15) – the swingarm can be removed with the final drive housing attached, but as it is heavy the swingarm becomes unbalanced and difficult to manoeuvre out and in, especially when trying to insert the pivot bolts at the same time. If you do not want to separate them, it is advisable to have an assistant to help you.

5 If required (the swingarm can easily be removed with it in place), remove the split pin from the brake torque arm front bolt, then unscrew the nut, withdraw the bolt and remove the arm **(see illustration 13.18)**.

6 Draw the rubber boot back off the crankcase – release the spring and remove it first if required, but it can stay on the boot **(see illustration)**. Carefully prise out the pivot cap on each side **(see illustration)**.

7 Bend down the lockwasher tabs from the left-hand pivot bolt **(see illustration)**.

8 Slacken or remove the locknut on the right-hand pivot bolt, then unscrew and remove the bolt **(see illustrations)**.

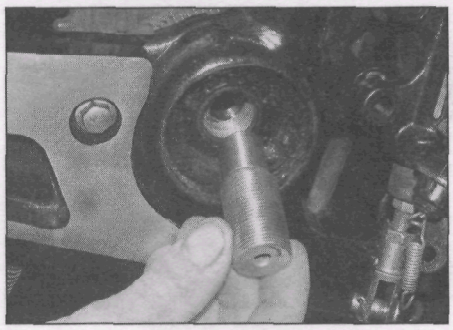
9 Supporting the swingarm, unscrew and remove the left-hand pivot bolt and its lockwasher, then manoeuvre the swingarm back and out of the frame **(see illustrations)**.

10 Refer to Section 14 for bearing inspection and renewal.

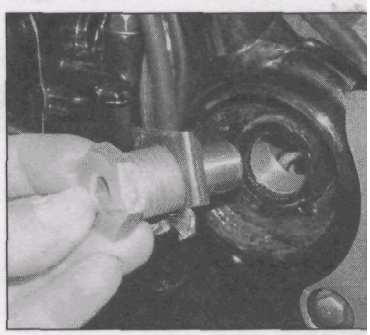
Installation

11 Remove the spacer from each swingarm pivot **(see illustration)**. Clean off all old grease, then lubricate the grease seals, bearings, spacers and the pivot bolts with new multi-purpose grease. Insert the spacers.

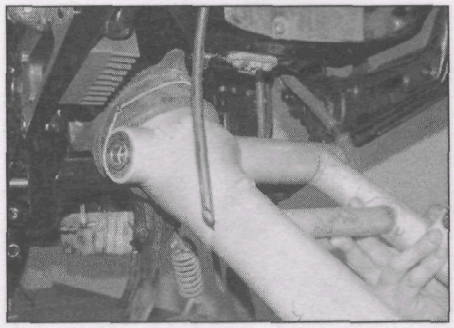
12 Fit a new lockwasher onto the left-hand pivot bolt, with the turned-in sides fa inner end of the bolt **(see illustratio** Make sure the rubber boot is fitted r front of the swingarm – replace it wit one if it is damaged **(see illustration)**.



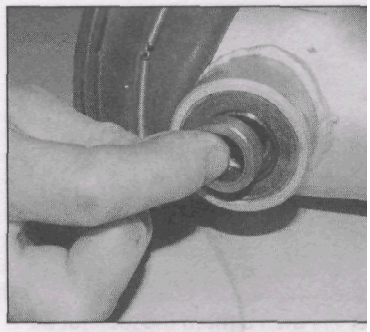
13.8b . . . then unscrew the pivot bolt



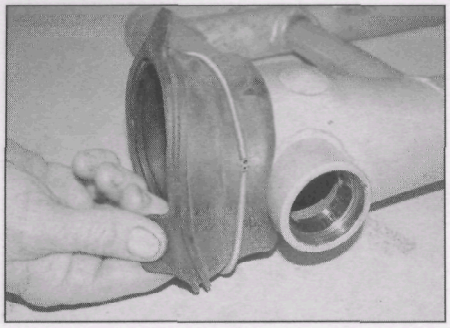
13.9a Unscrew the left-hand pivot



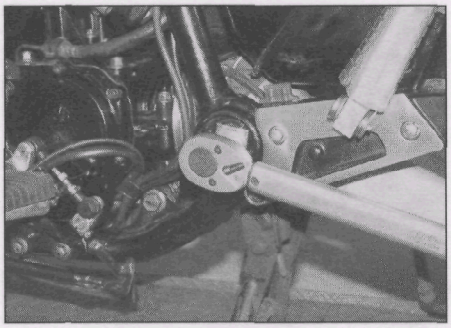
13.9b . . . and remove the swingarm



13.11 Remove the spacer from ea



13.12 Check the rubber boot for damage



13.14a Tighten the left-hand pivot bolt to the specified torque . . .



13.14b . . . then bend the lockwasher tabs up against it

13 Offer up the swingarm and if available have an assistant hold it in place **(see illustration 13.9b)**. Slide each pivot bolt into its pivot and tighten it finger-tight – locate the inward-facing sides on the lockwasher over the flats around the pivot hole in the frame **(see illustrations 13.9a and 13.8b)**.

14 First tighten the left-hand pivot bolt to the torque setting specified at the beginning of the Chapter **(see illustration)**. Bend the lockwasher tabs up against the nut **(see illustration)**.

15 Now tighten the right-hand pivot bolt to its specified torque setting **(see illustration)**.

16 Make an alignment mark between the right-hand pivot bolt head and the frame – this is used as an index to make sure the bolt does not tighten further when tightening the locknut **(see illustration)**. Thread the locknut onto the bolt and tighten it fairly tight using a ring spanner while counter-holding the pivot bolt **(see illustration)** – the idea is to tighten it enough so that the pivot bolt will not turn when applying a torque wrench for the final tightening, as with a torque wrench in place you are unable to counter-hold the bolt. Now tighten the locknut to the specified torque setting. Check to see whether the index alignment marks are still aligned – if the bolt has moved you will have to slacken the locknut and then the bolt and begin again at Step 15.

17 Fit the pivot cap into each side **(see illustration 13.6b)**. Locate the rubber boot over the crankcase and secure it with the spring **(see illustration 13.6a)**.

18 If removed, fit the torque arm onto the swingarm and tighten the nut to the specified torque setting – do not overtighten the nut as the ears on the arm and its mount will distort **(see illustration)**. Fit a new split pin into the bolt.

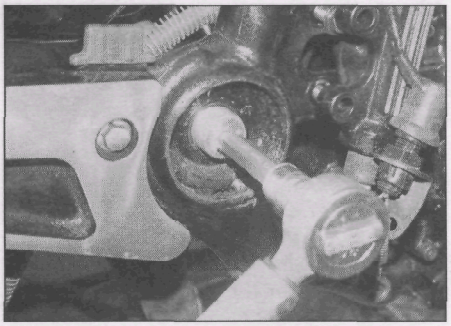
19 If removed, install the final drive housing and the driveshaft (see Section 15)

20 Fit the brake hose into its guides on the right-hand side of the swingarm **(see illustration 13.3a)**. Feed the hose into its guide on the left-hand side **(see illustration 13.3b)**.

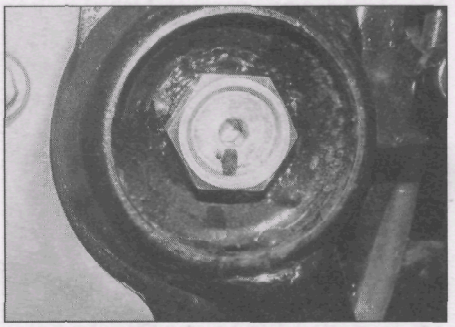
21 Install the rear shock absorbers (see Section 11). Install the rear wheel (see Chapter 7).

22 Install the silencers and the front cylinder downpipes (see Chapter 4).

23 Check the operation of the rear suspension and brake before taking the machine on the road.



13.15 Tighten the right-hand pivot bolt to the specified torque



13.16a Make alignment marks between the bolt and the frame . . .

14 Swingarm – inspection, bearing check and replacement

Inspection

1 Remove the swingarm (see Section 13).

2 Thoroughly clean the swingarm, removing all traces of dirt, corrosion and grease.

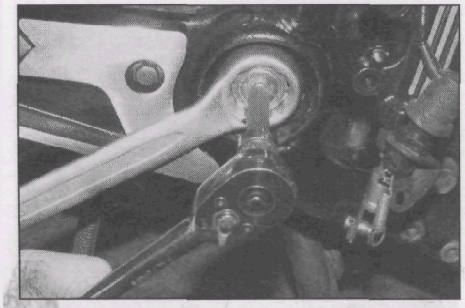
3 Inspect the swingarm closely, looking for obvious signs of wear such as heavy scoring, and cracks or distortion due to accident damage. Any damaged or worn component must be replaced.

4 Check the swingarm pivot bolts for wear and damage and replace them with new ones if necessary.

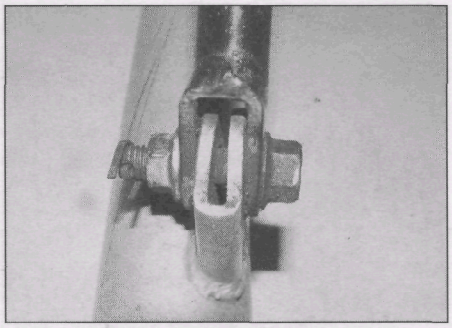
Bearing check and replacement

5 Remove the spacer from each swingarm pivot **(see illustration 13.11)**.

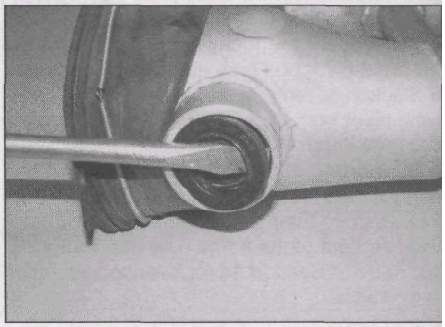
6 Lever out the grease seal from each side of the pivot **(see illustration)**. New ones should be used.



13.16b . . . then tighten the locknut as described while counter-holding the pivot bolt



13.18 Do not overtighten the nut as the ears will distort

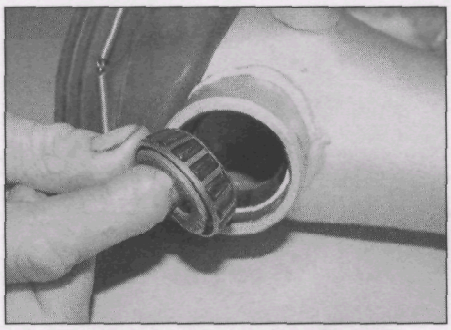


14.6 Lever out the grease seals . . .

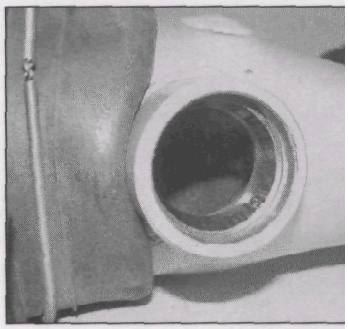
7 Remove the bearings **(see illustration)**. Refer to *Tools and Workshop Tips (Section 5)* in the Reference section and check the bearings. Clean them and inspect them for wear or damage. If the bearings do not run smoothly and freely or if there is excessive freeplay, they must be replaced with new ones – refer to the Reference Section for removal and installation methods.

8 The outer races should be polished and free from indentations **(see illustration)**. They are an interference fit in the swingarm – remove them using a slide-hammer type bearing extractor – these can often be hired from tool shops.

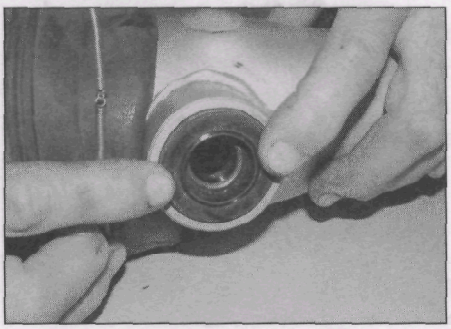
9 Drive the new outer races into the swingarm using a large diameter tubular drift that bears only on the outer edge of the race and does not contact the working surface. Alternatively, have the races installed by a Yamaha dealer equipped with the bearing race installation tools.



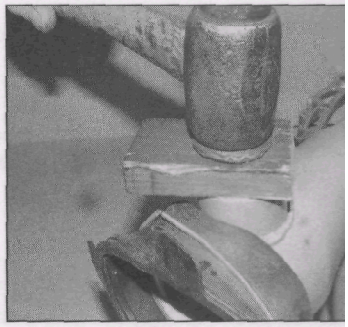
14.7 . . . and remove the bearings



14.8 Check the races for wea damage



14.10a Fit the new seals . . .



14.10b . . . and set them flush a

HAYNES HiNT ***Installation of new bearing outer races is made much easier if the races are left overnight in the freezer. This causes them to contract slightly making them a looser fit. Alternatively, use a freeze spray.***

10 Lubricate the races, bearings and grease seal lips with multi-purpose grease. Press the new seals into place, setting them flush with the rim of their bore – using a piece of wood as shown ensures they are not set too deep **(see illustrations)**.

11 Fit the spacer into each swingarm pivot **(see illustration 13.11)**.

15 Driveshaft and final drive – removal, inspection and installation

Removal

1 For best access and manoeuvrability remove the silencers – this involves removing the front cylinder downpipes as well, but the rear cylinder ones can stay in place (see Chapter 4).

2 Remove the rear wheel (see Chapter 7). Remove the left-hand shock absorber (see Section 11).

3 Support the final drive housing and unscrew the four nuts securing it to the swingarm **(see illustration)**. Remove the housing from the swingarm **(see illustration)**. The driveshaft is a push fit into the final drive housing and a slide fit in the universal joint, and therefore will probably come away with the final drive housing. Separate the driveshaft from the housing by pulling it out if required, or withdraw it from the swingarm if it stayed in there **(see illustration)**.

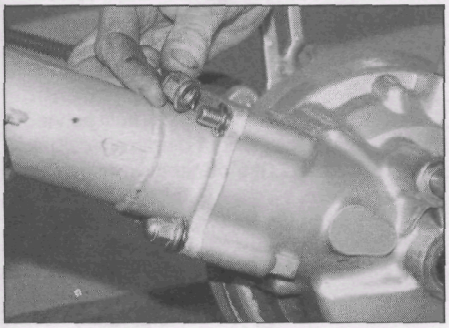
4 The universal joint is part of the middle driven gear shaft, which is covered in Chapter 2.

Inspection

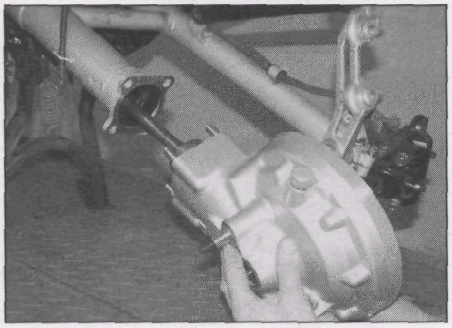
5 Inspect the driveshaft splines for wear or damage and the corresponding splines in the universal joint and final drive housi is evident and there is excessive between the driveshaft and eithe drive housing or the universal joint component(s) must be replaced v one.

6 Check the condition of the seal of the shaft. If there is evidence from it, or it has deteriorated or is remove the circlip on the front of th the circlip securing the seal onto then slide the washer and seal off the shaft **(see illustrations)**. Fit a then slide on the washer and secur circlip, making sure it is correctly s groove. Also install the front circlip.

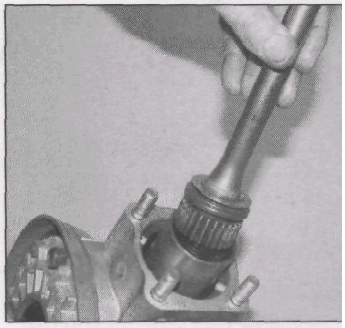
7 Fit the driveshaft into the final dri and rotate the shaft. Check that t able to rotate smoothly and freely a power is transmitted correctly th bevel gear assembly to the outp



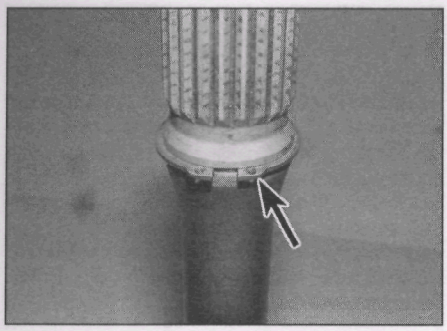
15.3a Unscrew the nuts, noting the washers . . .



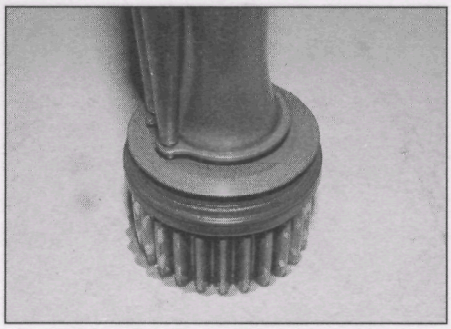
15.3b . . . and remove the final drive housing



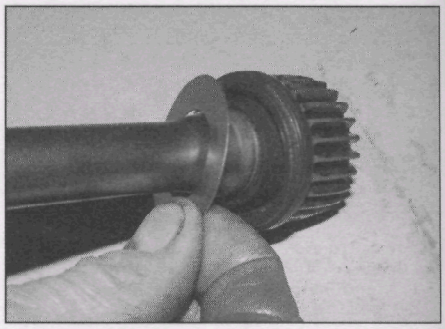
15.3c Pull the driveshaft out housing if required



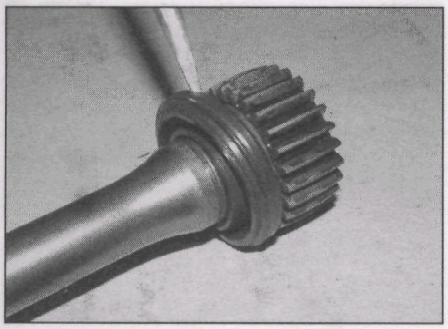
15.6a Remove the front circlip (arrowed) . . .



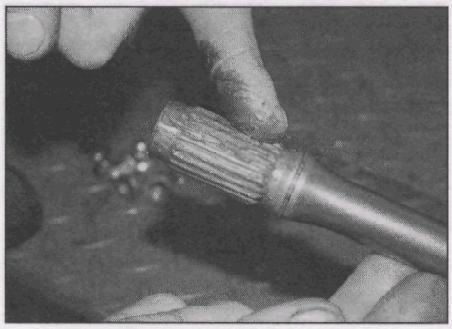
15.6b . . . and the rear circlip . . .



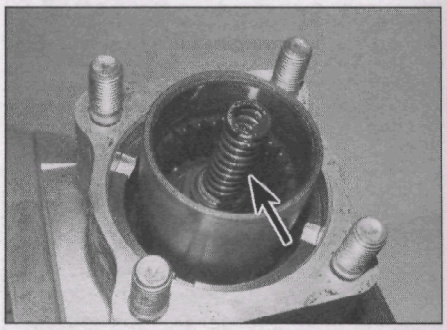
15.6c . . . then slide off the washer . . .



15.6d . . . and remove the seal



15.9 Lubricate all the splines with molybdenum grease



15.10 Make sure the spring (arrowed) is in place

there are any signs of roughness, stiffness or notchiness, any evidence of wear on the input and output boss splines, or any evidence of oil leakage from the seals, the unit must be disassembled and examined further. The same applies if any noise (rumbling, whining or clunking) has been heard during normal use, or when the wheel is rotated with the bike on its centrestand.

8 If attention to the final drive housing is required, the complete unit should be taken to a Yamaha dealer or service agent who will have the necessary special tools and expertise to carry out the rather complicated inspection and overhaul procedure. Stripping the unit down is not too tricky, but rebuilding it is, and requires extreme accuracy when setting up and shimming the gears, otherwise you could very quickly end up with more and worse problems than you started with. There is also the cost factor of rebuilding a worn or damaged housing, and you may be better off sourcing a good second-hand one from a breaker's yard.

Installation

9 Lubricate the splines on both ends of the driveshaft, in the universal joint and in the final drive housing input boss with molybdenum disulphide grease **(see illustration)**.

10 Check that the spring is still attached to the boss in the final drive housing **(see illustration)**. Fit the driveshaft into the housing and push it in until the seal is felt to locate **(see illustration 15.3c)**.

11 Slide the driveshaft into the swingarm and mount the housing onto the swingarm, making sure the driveshaft locates correctly and fully in the splines of the universal joint **(see illustration 15.3b)**. Fit the washers and nuts and tighten them to the torque setting specified at the beginning of the Chapter **(see illustration 15.3a)**.

12 Install the left-hand shock absorber (see Section 11). Install the rear wheel (see Chapter 7).

13 Install the silencers if removed (see Chapter 4).