

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 | k | Fairly difficult, suitable for competent DIY mechanic | ; | Difficult, suitable for experienced DIY mechanic | Very difficult, suitable for expert DIY or professional |
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Specifications

Front forks

| | |
|---|---------------|
| Fork oil type | |
| YZF models. | .5W fork oil |
| FZS models. | .10W fork oil |
| Fork oil capacity | |
| YZF models | |
| 1996. | 421 cc |
| All other models. | 434 cc |
| FZS models | |
| 1998 and 1999 models. | 475 cc |
| 2000 models. | 465 cc |
| Fork oil level* | |
| YZF models | |
| 1996. | 137mm |
| All other models. | 124 mm |
| FZS models | |
| 1998 and 1999 models. | 121 mm |
| 2000 models. | 132 mm |
| Fork spring free length | |
| YZF models | |
| Standard. | 424.5 mm |
| Service limit. | 419.5mm |
| FZS models | |
| 1998 and 1999 models | |
| Standard. | 323 mm |
| Service limit. | 319 mm |
| 2000 models | |
| Standard. | 316.8 mm |
| Service limit. | 309.8 mm |
| Fork tube runout limit (typical). | 0.2 mm |

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

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Rear suspension

Shock absorber spring free length

| | |
|---------------------|--------|
| YZF models. | 228 mm |
| FZS models. | 177 mm |

Final drive

Chain type

| | |
|---------------------|----------------------------------|
| YZF models. | DAIDO 50VA7 (108 links, endless) |
| FZS models. | DAIDO 50VA7 (110 links, endless) |

Torque settings

| | |
|---|-------|
| Centrestand nuts - FZS models. | 56 Nm |
| Damper rod Allen bolt | |
| YZF models. | 40 Nm |
| FZS models. | 30 Nm |
| Fork clamp bolts | |
| Top yoke. | 30 Nm |
| Bottom yoke | |
| YZF models. | 38 Nm |
| FZS models. | 30 Nm |
| Fork top bolt. | 23 Nm |
| Handlebars | |
| YZF models | |
| End-weights. | 23 Nm |
| Holder clamp bolts. | 13 Nm |
| Holder positioning bolts. | 13 Nm |
| Retaining bolts. | 28 Nm |
| FZS models | |
| Clamp bolts. | 23 Nm |
| End-weight bolts. | 7 Nm |
| Rear brake torque arm nuts | |
| YZF models. | 30 Nm |
| FZS models. | 23 Nm |
| Rear shock absorber nuts. | 40 Nm |
| Rear suspension linkage arm and linkage rod nuts. | 48 Nm |
| Sidestand bolt | |
| YZF models. | 46 Nm |
| FZS models. | 23 Nm |
| Sidestand nut - YZF models. | 39 Nm |
| Sprocket nuts | |
| Front. | 70 Nm |
| Rear. | 60 Nm |
| Steering stem nut. | 110Nm |
| Swingarm pivot bolt nut | |
| YZF models. | 90 Nm |
| FZS models. | 115Nm |

1 General information

YZF models use a twin spar box-section aluminium frame which uses the engine as a stressed member.

FZS models use a cradle-type steel frame.

Front suspension is by a pair of oil-damped telescopic forks. On FZS models, the forks have a conventional damper system, while YZF models have a cartridge damper. On YZF models, the forks are adjustable for spring pre-load and both rebound and compression damping. On FZS models, the forks are not adjustable.

At the rear, an alloy swingarm acts on a

single shock absorber via a three-way linkage. On YZF models, the shock absorber is adjustable for spring pre-load and for both rebound and compression damping. On FZS models, the shock absorber is adjustable for spring pre-load.

The drive to the rear wheel is by chain and sprockets.

2 Frame - inspection and repair

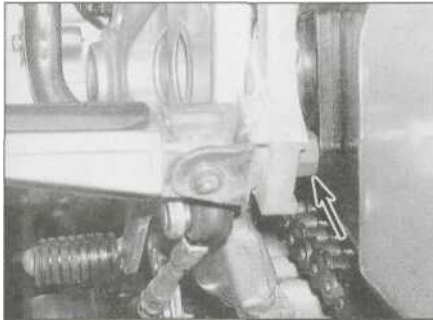
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1 The frame should not require attention unless accident damage has occurred. In most cases, frame replacement is the only satisfactory remedy for such damage. A few frame specialists have the jigs and other

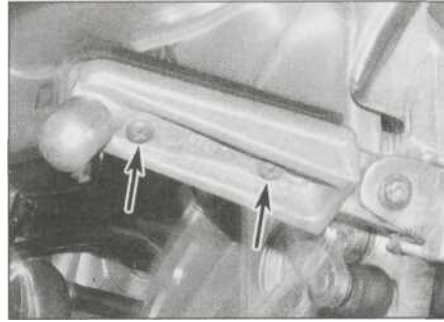
equipment necessary for straightening the frame to the required standard of accuracy, but even then there is no simple way of assessing to what extent the frame may have been over-stressed.

2 After the machine has been ridden 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 mounts themselves. Minor damage can often be repaired by welding, depending on the extent and nature of the damage.

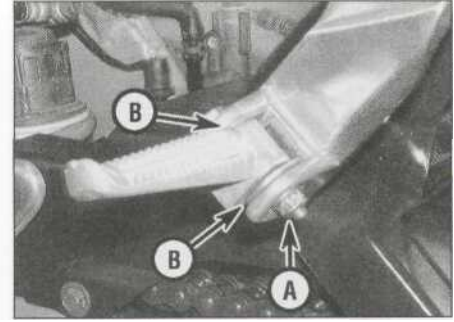
3 Remember that a frame which is out of alignment will cause handling problems. If misalignment is suspected as the result of an accident, it will be necessary to strip the machine completely so the frame can be thoroughly checked.



3.1 a Unscrew the nut (arrowed) on the back of the bracket - displace the bracket if required



3.1 b The rubber is secured by two screws (arrowed)



3.3 Unscrew the nut (A) and withdraw the bolt - note how the detent plates (B) and the ball and spring fit

Footpegs, brake pedal and gearchange lever - removal and installation

Footpegs

Removal - front footpegs

1 On YZF models, if removing the right-hand footpeg, unscrew the bolts securing the footpeg bracket and displace it. Unscrew the nut from the back of the footpeg bracket and separate the footpeg from the bracket (see illustration). The footpeg rubber can be replaced by removing the two screws that secure it to the peg (see illustration).

2 On FZS models, unscrew the bolts securing the footpeg bracket and displace it. Unscrew the bolt from the back of the footpeg bracket

and separate the footpeg from the bracket, noting how the gearchange lever or brake pedal pivots on it. The footpeg rubber can be replaced by removing the two screws that secure it to the peg.

Removal - rear footpegs

3 Unscrew the nut from the bottom of the footpeg pivot bolt, then withdraw the bolt and remove the footpeg (see illustration). Note the fitting of the detent plates, ball and spring, and take care that they do not spring out when removing the footpeg. Also note the collar for the pivot bolt.

Installation

4 Installation is the reverse of removal. When installing the front footpegs on FZS models, apply some grease to the lever or pedal pivot.

split pin and washer from the clevis pin securing the brake pedal to the master cylinder pushrod. Remove the clevis pin and separate the pushrod from the pedal. Remove the right-hand front footpeg (see Step 2).

Installation

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

- a) Apply grease to the brake pedal pivot,
- b) On YZF models, tighten the pedal pivot bolt securely.
- c) Use a new split pin on the clevis pin securing the brake pedal to the master cylinder pushrod.
- d) Check the operation of the rear brake light switch (see Chapter 1, Section 9).

Brake pedal

Removal

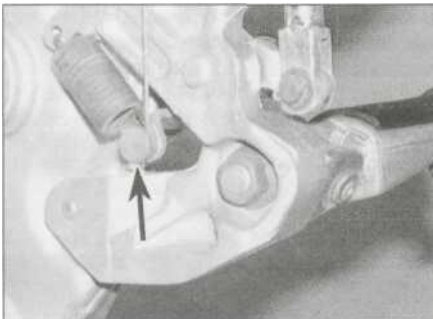
5 On YZF models, unhook the brake pedal return spring and the brake light switch spring from the lug on the pedal (see illustration). Remove the split pin and washer from the clevis pin securing the brake pedal to the master cylinder pushrod (see illustration). Remove the clevis pin and separate the pushrod from the pedal. Unscrew the pedal pivot bolt and remove the pedal, noting the wave washer on the outside and the plain washer on the inside.

6 On FZS models, unhook the brake pedal return spring and the brake light switch spring from the bracket on the pedal. Remove the

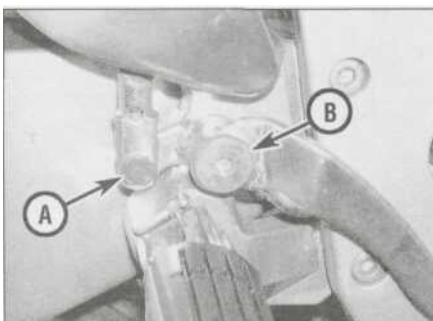
Gearchange lever

Removal

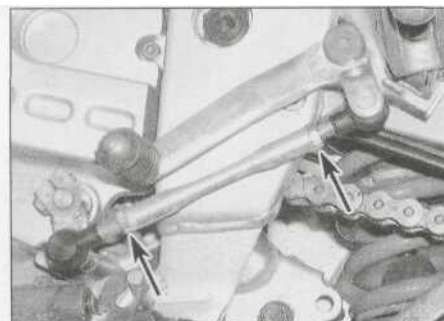
8 To remove the lever on its own, slacken the gearchange lever linkage rod locknuts, then unscrew the rod and separate it from the lever and the arm (the rod is reverse-threaded on one end and so will simultaneously unscrew from both lever and arm when turned in the one direction) (see illustration). Note the how far the rod is threaded into the lever and arm as this determines the height of the lever relative to the footpeg. On YZF models, unscrew the lever pivot bolt and remove the lever, noting the wave washer on the outside and the plain washer on the inside (see illustration). On FZS models, remove the left-hand front footpeg (see Step 2).



3.5a Unhook the brake light switch and pedal return springs (arrowed)



3.5b Separate the pushrod (A) from the pedal, then unscrew the bolt (B)

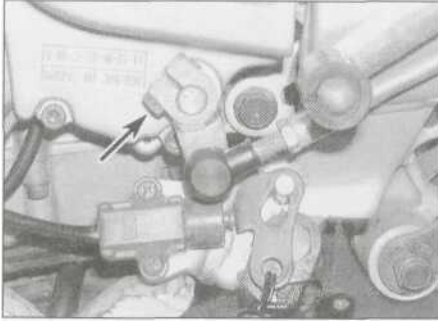


3.8a Slacken the locknuts (arrowed) and thread the rod out of the lever and arm



3.8b Unscrew the pivot bolt (arrowed) and remove the lever, noting the washers

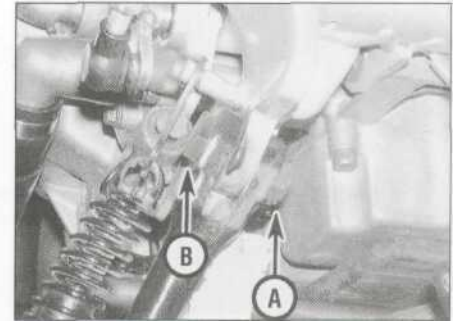
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3.9 Unscrew the bolt (arrowed) and slide the arm off the shaft



4.2a Unhook the springs and remove the hook plate (arrowed)...



4.2b ... then unscrew the nut (A) and the bolt (B)

9 To remove the lever with the linkage rod and arm as an assembly, first unscrew the gearchange lever linkage arm pinch bolt and slide the arm off the shaft, noting any alignment marks (see illustration). If no marks are visible, make your own before removing the arm so that it can be correctly aligned with the shaft on installation. On YZF models, unscrew the lever pivot bolt and remove the lever, noting the wave washer on the outside and the plain washer on the inside (see illustration 3.8b). On FZS models, remove the left-hand front footpeg (see Step 2).

Installation

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

- Apply grease to the gear lever pivot.
- If removed, align the gearchange linkage arm with the shaft as noted on removal (see illustration 3.9).
- On YZF models, tighten the lever pivot bolt securely.
- Adjust the gear lever height as required by screwing the rod in or out of the lever and arm. Tighten the locknuts securely (see illustration 3.8a).

4 Sidestand and centrestand - removal and installation

Sidestand

1 Support the motorcycle securely in an upright position using an auxiliary stand (YZF models) or the centrestand (FZS models).

2 On YZF models, unhook the stand springs and remove the hook plate, then counter-hold the pivot bolt and unscrew the nut on the inside of the bracket (see illustrations). Withdraw the pivot bolt and remove the stand, noting how it locates against the Sidestand switch plunger.

3 On FZS models, unhook the stand springs and remove the hook plate, then unscrew the retaining bolt on the inside of the bracket, noting the washer and link piece (see illustration). Slide the stand off its pivot, noting how it fits.

4 On installation apply grease to the pivot and a suitable non-permanent thread locking compound to the bolt threads. On YZF models, tighten the bolt to the torque setting specified

at the beginning of the Chapter, then tighten the nut to the specified torque (see illustration 4.2b). On FZS models, locate the link piece and tighten the bolt to the specified torque (see illustration 4.3). Fit the hook plate and reconnect the Sidestand springs and check that they hold 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 (see illustration 4.2a or 4.3).

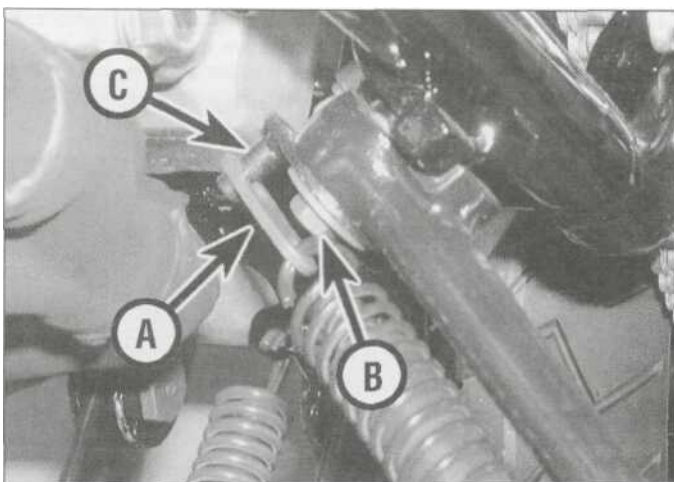
5 Check the operation of the sidestand switch (see Chapter 1).

Centrestand - FZS models

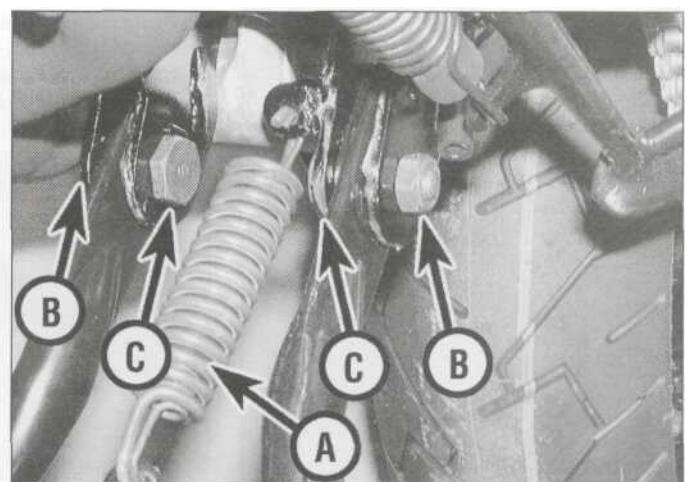
6 Support the motorcycle using an auxiliary stand or the sidestand.

7 Unhook the stand springs, then counter-hold the pivot bolts and unscrew the nuts (see illustration). Withdraw the pivot bolts and remove the stand.

8 On installation apply grease to the pivot sections of the bolts. Tighten the nuts securely. Reconnect the springs and check that they hold 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.



4.3 Unhook the springs and remove the hook plate (A), then unscrew the bolt (B), noting the link piece (C)



4.7 Unhook the springs (A), then unscrew the nuts (B) and remove the bolts (C)



5.3 Disconnect the clutch switch wiring connector (arrowed) - FZS model



5.6b ... then unscrew the bolt (arrowed)

5 Handlebars and levers - removal and installation

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Handlebars

Removal

Note: The handlebars can be displaced from the top yoke without having to remove any of the lever or switch assemblies - if this is done, make sure all wiring, hoses and cables are released from any ties or guides that will restrict their movement (see illustration 8.3a, 8.3b and 8.3c). On YZF models, if required the handlebars can be removed from the handlebar holders, leaving the holders in place around the forks.

1 Displace the front brake master cylinder and reservoir (see Chapter 7). There is no need to disconnect the hydraulic hose. Keep the reservoir upright to prevent possible fluid leakage and make sure no strain is placed on the hydraulic hose(s).

2 Displace the throttle cable housing from the handlebars (see Chapter 4). There is no need to detach the cables from the carburetors.

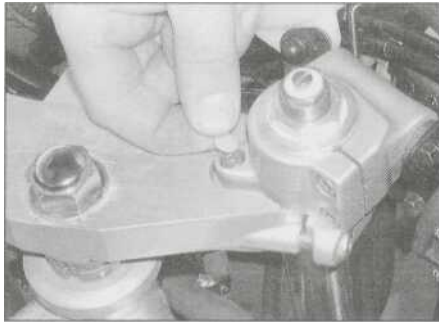
3 Either remove the clutch lever (see below), or detach the clutch cable from the lever (see Chapter 2). Disconnect the clutch switch wiring connector (see illustration).

4 Displace the handlebar switches (see Chapter 9). There is no need to disconnect the loom wiring connectors.

5 If necessary, remove the handlebar end-weights from the end of the handlebars and



5.5 Unscrew the end-weight (arrowed) if required



5.7a Remove the blanking cap ...

remove the grips - on YZF models, the weights themselves thread into the handlebars (see illustration), while on FZS models the weights are held by bolts. It may be necessary to slit open the left-hand grip using a sharp blade in order to remove it as they are sometimes stuck in place, though a screwdriver between the grip and the handlebar and some compressed air or spray lubricant directed into the grip will usually work. Depending on your removal method and its success, it may mean using a new grip on assembly. The clutch lever bracket can now be slid off the handlebar.

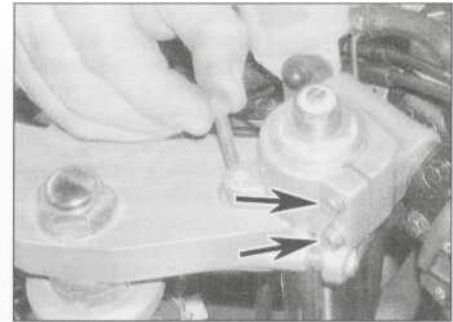
6 On YZF models, if removing the handlebar leaving the holder in place, remove the blanking cap from the inner end of the handlebar, then unscrew the retaining bolt and slide the bar out of the holder, noting how it locates (see illustrations). If the grip wasn't removed from the left handlebar, slide the



5.7c ... and draw the handlebar up off the fork



5.6a Remove the blanking cap .



5.7b ... then remove the positioning bolt and slacken the clamp bolts (arrowed)...

clutch lever bracket off the inner end. 7 On YZF models, if removing the handlebar and holder together, remove the blanking cap from the holder positioning bolt, then unscrew the bolt (see illustration). Slacken the handlebar holder clamp bolts, then ease the handlebar holder up and off the fork (see illustration).

8 On FZS models, lever out the handlebar holder clamp bolt blanking caps, then unscrew the bolts and remove the handlebars (see illustration).

Installation

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

a) On YZF models, if separated, make sure the flat on the inner end of the handlebar aligns correctly with the corresponding flat in the holder. Tighten the end-weights, retaining bolts, positioning bolts



5.8 Remove the blanking caps, then unscrew the bolts (arrowed)

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5.9a Tighten the various bolts to the specified torque settings

and clamp bolts to the torque settings specified at the beginning of the Chapter (see illustration). Tighten the positioning bolt before the clamp bolt.

- b) On FZS models, align the punchmark on the front of the handlebars with the mating surfaces of the holder. Make sure the handlebars are centrally positioned. Install the holder clamps with the arrows pointing forwards (see illustration), then tighten the front clamp bolt first, followed by the rear bolt, to the torque setting specified at the beginning of the Chapter. If removed, tighten the end-weight bolts to the specified torque.
- c) Refer to the relevant Chapters as directed for the installation of the handlebar mounted assemblies.
- d) Do not forget to reconnect the front brake light switch and clutch switch wiring connectors.
- e) Adjust clutch and throttle cable freeplay (see Chapter 1).
- f) Check the operation of all switches and the front brake before taking the machine on the road.

Clutch lever

Removal

10 Slacken the clutch cable adjuster locking and thread the adjuster fully into the bracket to provide maximum freeplay in the cable (see illustration). Unscrew the lever pivot bolt locknut, then withdraw the pivot bolt and remove the lever, detaching the cable nipple as you do (see illustration). On YZF models, note the collar for the pivot bolt.

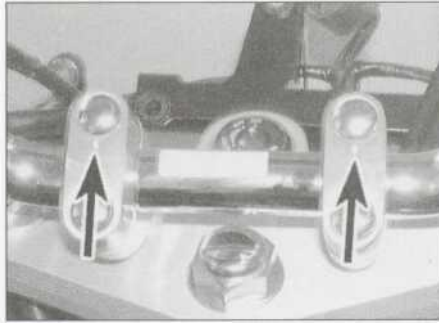
Installation

11 Installation is the reverse of removal. Apply grease to the pivot bolt shaft or, on YZF models, to the collar, and the contact areas between the lever and its bracket, and to the clutch cable nipple. Adjust the clutch cable freeplay (see Chapter 1).

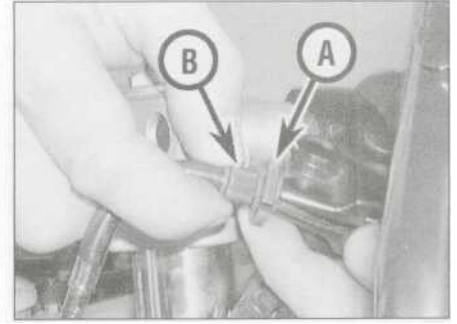
Front brake lever

Removal

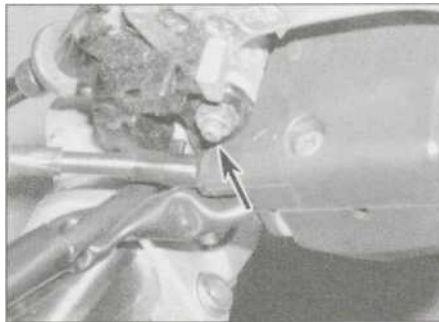
12 Unscrew the lever pivot bolt locknut, then withdraw the pivot bolt and remove the lever (see illustration).



5.9b Make sure the arrow on each clamp points forwards



5.10a Slacken the locking (A) and turn the adjuster (B) fully in



5.10b Unscrew the locknut (arrowed) on the base of the bolt, then remove the clutch lever pivot

Installation

13 Installation is the reverse of removal. Apply grease to the pivot bolt shaft and the contact areas between the lever and its bracket.

6 Forks - removal and installation

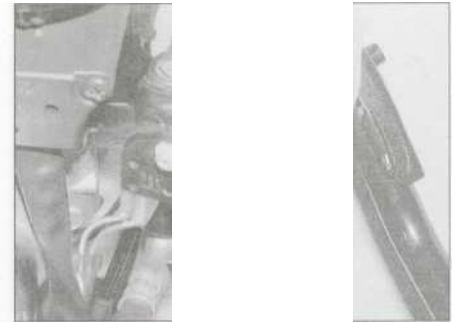
Removal

Caution: Although not strictly necessary, before removing the forks it is recommended that the fairing side panels and/or fairing are removed (see Chapter 8, Section 3). This will prevent accidental damage to the paintwork.

1 Remove the fairing, and on YZF models, the fairing side panels (see Chapter 8).



6.2a On YZF models, unscrew the nut and withdraw the bolt from the inside



5.12 Unscrew the locknut (arrowed) on the base of the bolt, then remove the brake lever pivot

2 Unscrew the brake hose clamp bolt from each fork slider (see illustrations). Displace the front brake calipers (see Chapter 7). There is no need to disconnect the hydraulic hoses. Slacken any cable ties around the top of the fork tubes.

3 Remove the front wheel (see Chapter 7).

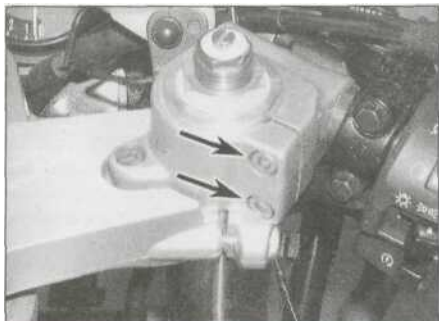
4 Remove the front mudguard (see Chapter 8).

5 Work on each fork individually. On YZF models, slacken the handlebar holder clamp bolts (see illustration).

6 Slacken the fork clamp bolt in the top yoke (see illustration). On YZF models, depending on the tools available, it may be necessary to displace the handlebar from the top yoke in order to access the clamp bolt (see Section 5). If the forks are to be disassembled, or if the fork oil is being changed, it is advisable to slacken the fork top bolt at this stage (see illustration).



6.2b On FZS models, unscrew the bolt (arrowed)



6.5 On YZF models, slacken the handlebar holder clamp bolts (arrowed)



6.6a Slacken the fork clamp bolt (arrowed) - YZF model



6.6b Slacken the top bolt (arrowed) if the forks are to be disassembled

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.

7 Note the alignment or amount of protrusion of the tops of the fork tube with the handlebar holder (YZF models) or top yoke (FZS models). Slacken but do not remove the fork clamp bolt in the bottom yoke, and remove the fork by twisting it and pulling it downwards (see illustrations).

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

8 Remove all traces of corrosion from the fork tubes and the yokes. Slide the fork up through the bottom yoke, and where appropriate the wiring tie, and up into the top yoke (see illustration 6.7b). Check that the amount of protrusion of the fork tube above the handlebar holder (YZF models) or top yoke (FZS models) is as noted on removal and equal on both sides - the tops of the tubes should be flush with the top of the holder (YZF) or top yoke (FZS), so that the base of the top bolt is fully protruding (see illustration).

9 Tighten the fork clamp bolt in the bottom yoke to the torque setting specified at the beginning of the Chapter (see illustration). If the fork legs have been dismantled or if the fork oil has been changed, the fork top bolt should now be tightened to the specified torque setting (see illustration). Now tighten

the fork clamp bolt in the top yoke (see illustration), and on YZF models the handlebar holder clamp bolts (see illustration 5.9a), to the specified torque settings. On YZF models, depending on the tools available, it may be necessary to displace the handlebars from the top yoke in order to access the fork clamp bolt (see Section 5).

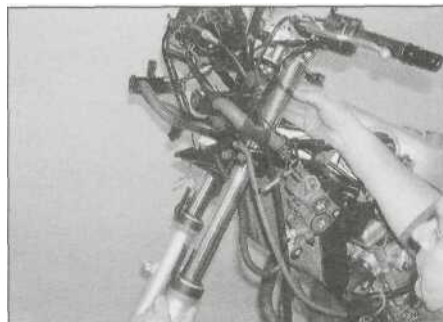
10 Install the front wheel (see Chapter 7), the front mudguard (see Chapter 8), and the brake calipers (see Chapter 7). Fit the brake hose clamps onto the forks (see illustration 6.2a or 6.2b). Make sure the speedometer cable is correctly routed.

11 If removed, install the fairing, and on YZF models the fairing side panels (see Chapter 8).

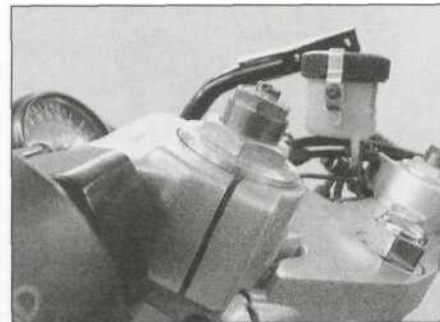
12 Check the operation of the front forks and brakes before taking the machine out on the road.



6.7a Slacken the bottom yoke fork clamp bolt (arrowed)...



6.7b ... and remove the fork



6.8 Align the top of the fork with the top of the handlebar holder on YZF model



6.9a Tighten the bottom yoke clamp bolt..



6.9b ... the fork top bolt...



6.9c ... and the top yoke clamp bolt to the specified torque settings

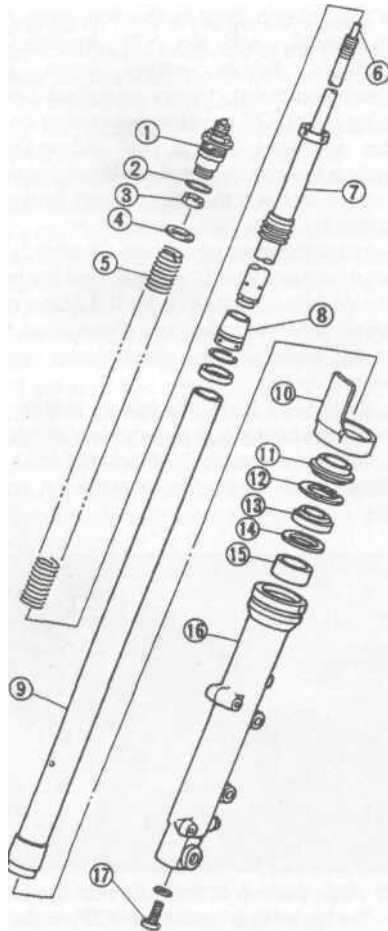
6»8 Frame, suspension and final drive

7 Forks- disassembly, inspection and reassembly

YZF models

Disassembly

1 Always dismantle the fork legs separately to avoid interchanging parts and thus causing an accelerated rate of wear (**see illustration**). Store all components in separate, clearly marked containers.



7.1 Front fork components -
YZF models

- | | |
|---------------------------------|---------------------------------------|
| 1 Top bolt | 10 Fork protector |
| 2 O-ring | 11 Dust seal |
| 3 Locknut | 12 Retaining clip |
| 4 Spring seat | 13 Oil seal |
| 5 Spring | 14 Washer |
| 6 Damping adjuster rod | 15 Top bush |
| 7 Damper rod and rebound spring | 16 Slider |
| 8 Damper rod seat | 17 Damper rod bolt and sealing washer |
| 9 Fork tube and bottom bush | |

2 Before dismantling the fork, it is advised that the damper rod bolt be slackened at this stage. Turn the fork upside down and compress the slider so that the spring exerts maximum pressure on the damper rod head, then have an assistant slacken the damper rod bolt in the base of the fork slider (**see illustration**). If an assistant is not available, clamp the brake caliper mounting lugs in a soft-jawed vice to support the fork.

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.

4 Unscrew the fork top bolt from the top of the fork tube (**see illustration**).

5 Carefully clamp the fork slider in a vice and slide the fork tube down into the slider a little way (wrap a rag around the top of the tube to

minimise oil spillage) while, with the aid of an assistant if necessary, keeping the damper rod fully extended. Counter-hold the pre-load adjuster, then slacken the locknut and thread it to the base of the threads on the damper rod (**see illustration**). Now counter-hold the locknut and thread the pre-load adjuster and top bolt assembly off the damper rod.

6 Remove the rebound damping adjuster rod from the centre of the damper rod, then remove the spring seat and withdraw the spring from the tube, noting which way up it fits (**see illustration**).

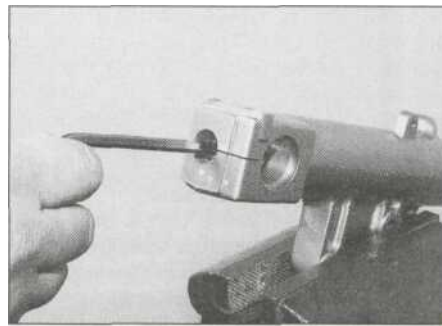
7 Invert the fork leg over a suitable container and pump the fork and the damper rod vigorously to expel as much fork oil as possible.

8 Remove the previously slackened damper rod bolt and its copper sealing washer from the bottom of the slider. Discard the sealing washer as a new one must be used on reassembly.

9 Invert the fork and withdraw the damper rod from inside the fork tube (**see illustration 7.20a**).

10 Carefully prise out the dust seal from the top of the slider to gain access to the oil seal retaining clip (**see illustration**). Discard the dust seal as a new one must be used. Note that the fork protector should not be removed from the top of the slider unless necessary, and if it is removed, it should be replaced with a new one.

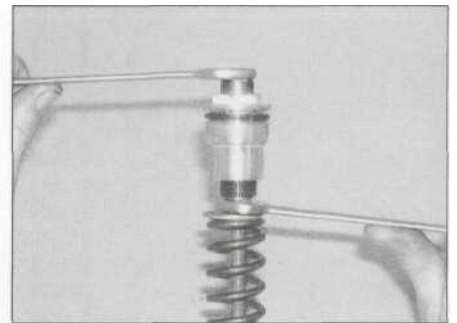
11 Carefully remove the retaining clip, taking care not to scratch the surface of the tube (**see illustration**).



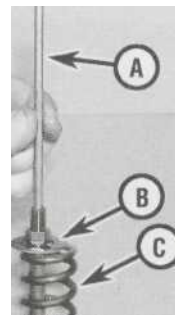
7.2 Slacken the damper rod Allen bolt



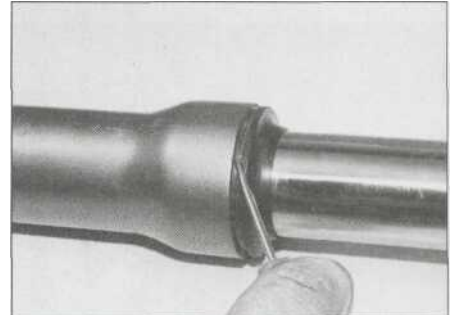
7.4 Unscrew the top bolt from the fork tube



7.5 Remove the top bolt assembly



7.6 Withdraw the damping adjuster rod (A), then remove the spring seat (B) and withdraw the spring (C)



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



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

12 To separate the tube from the slider it is necessary to displace the top bush and oil seal. The bottom bush will 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 rod seat. Take care not to do this forcibly or the seat may be damaged. Then pull the tube sharply outwards until the bottom bush strikes the top bush. Repeat this operation until the top bush and seal are tapped out of the slider (**see illustration**).

13 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.

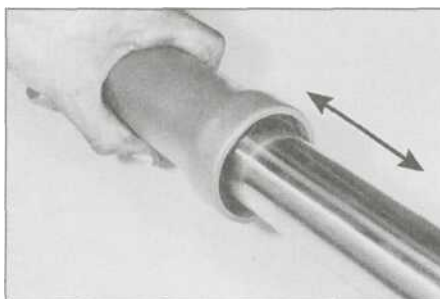
Caution: Do not remove the bottom bush from the tube unless it is to be replaced.

14 Tip the damper rod seat out of the slider, noting which way up it fits.

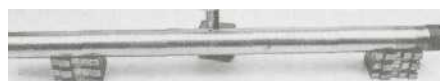
Inspection

15 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 with new ones 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.

16 Check the fork tube for runout (bending) using V-blocks and a dial gauge, or have it done at a dealer service department or other repair shop (**see illustration**). Yamaha do not specify a runout limit, but if the tube is bent



7.12 To separate the inner and outer fork tubes, pull them apart firmly several times - the slide hammer effect will pull the tubes apart



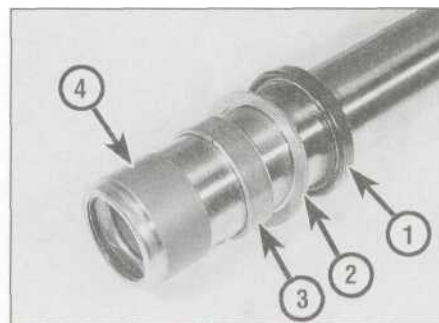
7.16 Check the fork tube for runout using V-blocks and a dial indicator

beyond the generally accepted limit specified, it should be replaced with a new one.

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

17 Check the spring for cracks and other damage. Measure the spring free length and compare the measurement to the specifications at the beginning of the Chapter. If it is defective or sagged below the service limit, replace the springs in both forks with new ones. Never replace only one spring. Also check the rebound spring on the damper.

18 Examine the working surfaces of the two bushes; if worn or scuffed they must be replaced with new ones. To remove the bottom bush from the fork tube, prise it apart at the slit using a flat-bladed screwdriver and slide it off (**see illustration**). Make sure the new one seats properly.



7.13 The oil seal (1), washer (2), top bush (3) and bottom bush (4) will come out with the fork tube



7.18 Prise the bottom bush apart using a flat-bladed screwdriver and slide it off

19 Check the damper rod assembly for damage and wear, and replace it with a new one if necessary. Holding the outside of the damper, pump the rod in and out of the damper. If the rod does not move smoothly in the damper it must be replaced with a new one.

Reassembly

20 Insert the damper rod into the fork tube and slide it into place so that it projects fully from the bottom of the tube, then fit the seat onto the bottom of the rod (**see illustrations**).

21 Oil the fork tube and bottom bush with the specified fork oil and insert the assembly into the slider. 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



7.20a Slide the damper into the tube .



7.20b ... and fit the seat onto its bottom end



7.21 Apply a thread locking compound to the damper rod bolt and use a new sealing washer

6»10 Frame, suspension and final drive



7.22a Install the top bush ...



7.22b ... followed by the washer



7.23 Make sure the oil seal is the correct way up

setting. If the damper rod rotates inside the tube, wait until the fork is fully reassembled before tightening the bolt.

22 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 washer with its flat side facing up (see illustration). Either use the Yamaha service tool or a suitable piece of tubing to tap the bush fully into place; the tubing must be slightly larger in diameter than the fork tube and slightly smaller in diameter than the bush recess in the slider. Take care not to scratch the fork tube during this operation.

HAYNES *It is best to make sure that the fork tube is pushed fully into the slider so that any accidental scratching is confined to the area above the oil seal.*

23 When the bush is seated fully and squarely in its recess in the slider (remove the washer to check, wipe the recess clean, then reinstall the washer), install the new oil seal. Smear the seal's lips with lithium-based grease and slide it over the tube so that its markings face upwards and drive the seal into place as described above until the retaining clip groove is visible above the seal (see illustration).

HIUT *Place the old oil seal on top of the new one to protect it when driving the seal into place.*

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

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

26 Slowly pour in the specified quantity of the

specified grade of fork oil, then pump the damper rod first, then the fork tube, at least ten times each to distribute the oil evenly and remove any air bubbles. Be careful not to extend the tube by more than 130 mm when pumping it as this can cause air to enter the system, in which case the process must be repeated (see illustration). Wait ten minutes, then fully compress the fork tube and damper rod into the slider and measure the fork oil level from the top of the tube (see illustration). Add or subtract fork oil until it is at the level specified at the beginning of the Chapter.

27 Fit the damping adjuster rod into the damper rod (see illustration). It is advisable to tie a piece of wire around the threads on the top of the damper rod so that it can be used to hold the damper rod out when installing the spring - otherwise the rod will settle down into the fork and will be inaccessible with the spring installed (see illustration). Clamp the slider in a vice via the brake caliper mounting



7.24 Install the retaining clip ...



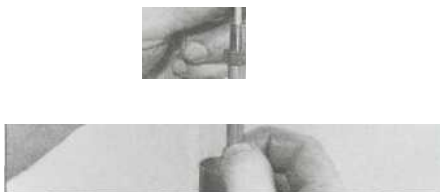
7.25 ... followed by the dust seal...



7.26a Pour the oil into the top of the tube



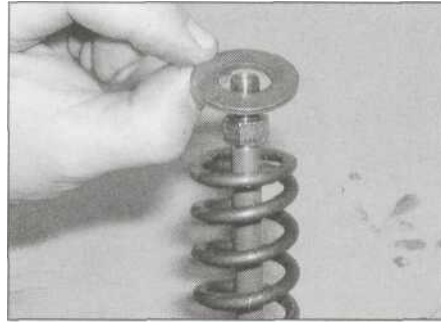
7.26b Measure the oil level with the fork held vertical



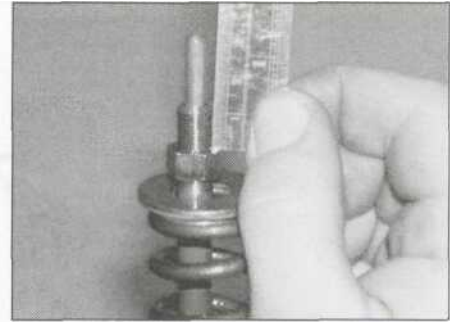
7.27a Insert the damping adjuster rod



7.27b Tie a piece of wire around the base of the locknut to keep the damper rod extended ..



7.27d ... and the spring seat



7.27e Set the locknut at the correct position

7.27c ... and install the spring ..

lugs, taking care not to overtighten and damage them. Pull the fork tube and damper rod out of the slider as far as possible then install the spring with its closer-wound coils at the top (see illustration). Fit the spring seat onto the top of the spring (see illustration). Hold the top of the damper rod and remove the piece of wire, if used. Set the locknut on the damper rod so that there is 12 mm of damper rod thread above it (see illustration).

28 Fit a new O-ring onto the fork top bolt (see illustration). Thread the pre-load adjuster and top bolt assembly onto the damper rod until it contacts the locknut (see illustration), then counter-hold the pre-load adjuster and tighten the locknut securely against it (see illustration 7.5).

ntTt'ni Use a ratchet-type tool when F* J""J installing the fork top bolt. [T] PI 77iis 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.

29 Withdraw the tube fully from the slider and carefully screw the top bolt into the fork tube making sure it is not cross-threaded (see illustration). **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

leg has been installed and is securely held in the triple clamps. If the damper rod Allen bolt requires tightening, 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 Allen bolt to the specified torque setting (see illustration 7.2).

30 Install the forks (see Section 6). Set the spring pre-load and damping adjusters as required (see Section 12).

FZS models

Disassembly

31 Always dismantle the fork legs separately to avoid interchanging parts and thus causing an accelerated rate of wear. Store all components in separate, clearly marked containers (see illustration overleaf).

32 Before dismantling the fork, it is advised that the damper rod bolt be slackened at this stage. Turn the fork upside down and compress the slider so that the spring exerts maximum pressure on the damper rod head, then have an assistant slacken the damper rod bolt in the base of the fork slider (see illustration 7.2). If an assistant is not available, clamp the brake caliper mounting lugs in a soft-jawed vice to support the fork.

33 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.

Warning: The fork spring is pressing on the fork top bolt (via the spacer) with considerable pressure. Unscrew the bolt very carefully using a ratchet tool and 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.

34 Unscrew the fork top bolt from the top of the fork tube.

35 Slide the fork tube down into the slider and withdraw the washer (2000 model only), spacer, spring seat and the spring from the tube. Note which way up the spring is fitted.

36 Invert the fork leg over a suitable container and pump the fork vigorously to expel as much fork oil as possible.

37 Remove the previously slackened damper rod bolt and its copper sealing washer from the bottom of the slider. Discard the sealing washer as a new one must be used on reassembly. If the damper rod bolt was not slackened before dismantling the fork, it may be necessary to re-install the spring, spring seat, spacer and top bolt to prevent the damper rod from turning.

A length of wood doweling (such as a broom handle) [HIRT] passed down through the fork tube and pressed hard into the damper rod head quite often suffices to prevent the damper rod from turning.



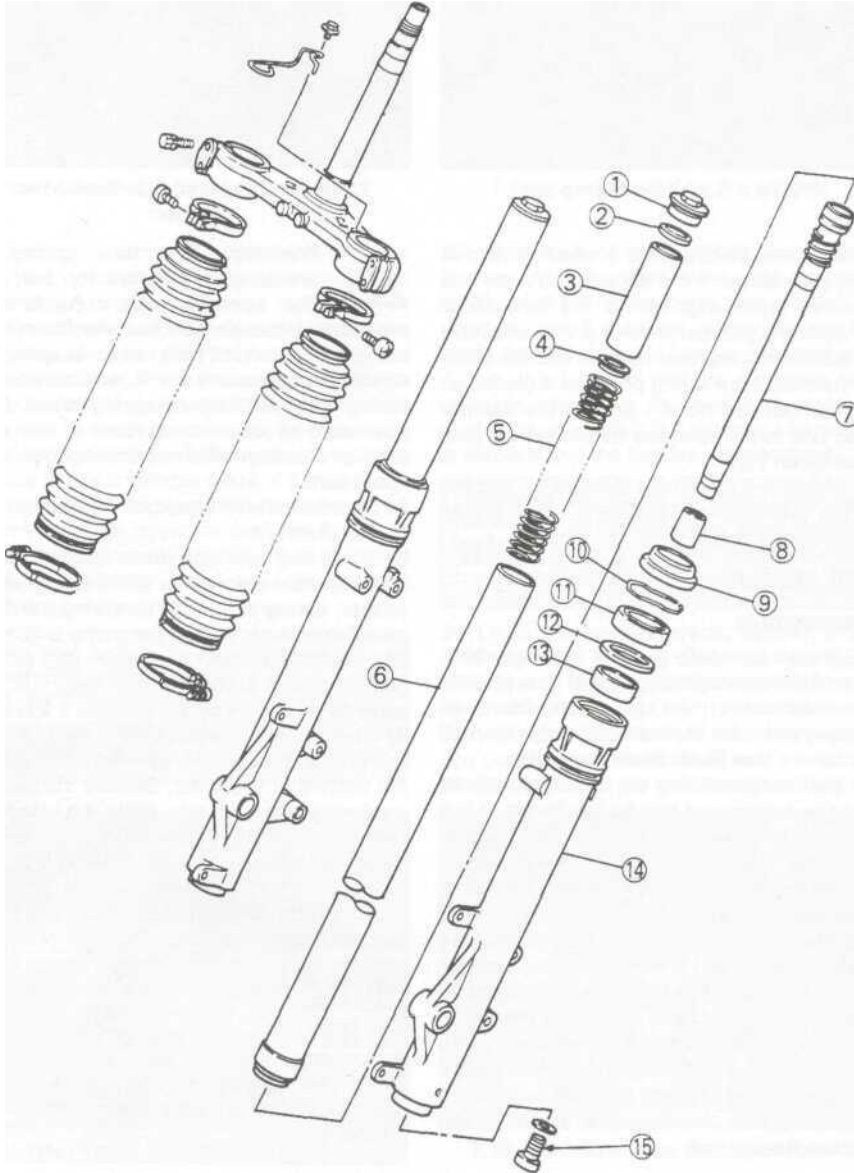
7.28a Fit a new O-ring onto the top bolt



7.28b Thread the pre-load adjuster and top bolt assembly onto the damper rod and tighten it against the locknut



7.29 Thread the top bolt into the fork tube



7.31 Front fork components - FZS models

- | | |
|---------------------------------|---------------------------------------|
| 1 Top bolt | 9 Dust seal |
| 2 O-ring | 10 Retaining dip |
| 3 Spacer | 11 Oil seal |
| 4 Spring seat | 12 Washer |
| 5 Spring | 13 Top bush |
| 6 Fork tube and bottom bush | 14 Slider |
| 7 Damper rod and rebound spring | 15 Damper rod bolt and sealing washer |
| 8 Damper rod seat | |

38 Invert the fork and withdraw the damper rod from inside the fork tube (**see illustration**). If required, slide the rebound spring off the damper rod.

39 Carefully prise out the dust seal from the top of the slider to gain access to the oil seal retaining clip (**see illustration 7.10**). Discard the dust seal as a new one must be used.

40 Carefully remove the retaining clip, taking care not to scratch the surface of the tube (**see illustration 7.11**).

41 To separate the tube from the slider it is necessary to displace the top bush and oil seal. The bottom bush will 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 rod seat. Take care not to do this forcibly or the seat may be damaged. Then pull the tube sharply outwards until the bottom bush strikes the top bush. Repeat this operation until the top bush and seal are tapped out of the slider (**see illustration 7.12**).

42 With the tube removed, slide off the oil seal, washer and top bush, noting which way up they fit (**see illustration 7.13**). 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.

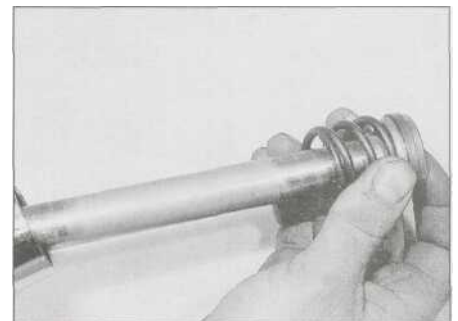
43 Tip the damper rod seat out of the slider, noting which way up it fits.

Inspection

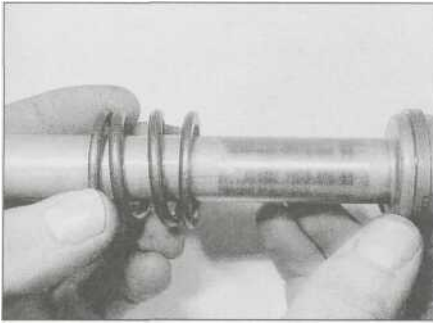
44 Clean all parts in solvent and blow them dry with compressed air, if available. Check the fork tube for score marks, scratches, flaking of the chrome finish and excessive or abnormal wear. Look for dents in the tube and replace the tube in both forks with new ones if any are found. Check the fork 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.

45 Check the fork tube for runout (bending) using V-blocks and a dial gauge, or have it done at a dealer service department or other repair shop (**see illustration 7.16**). Yamaha do not specify a runout limit, but if the tube is bent beyond the generally accepted limit specified, it should be replaced with a new one.

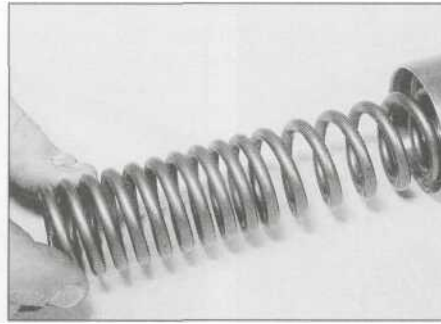
Warning: If the tube is bent, it should not be straightened; replace it with a new one.



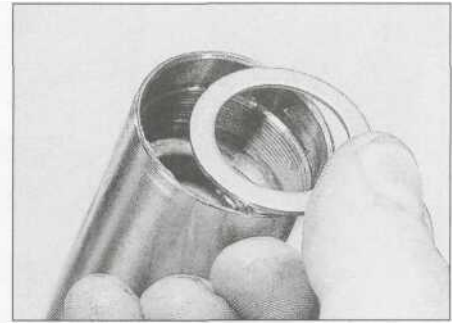
7.38 Withdraw the damper rod and rebound spring from the tube



7.49 Slide the rebound spring onto the damper rod



7.56a Install the spring



7.56b ... followed by the spring seat.

46 Check the spring for cracks and other damage. Measure the spring free length and compare the measurement to the specifications at the beginning of the Chapter. If it is defective or sagged below the service limit, replace the springs in both forks with new ones. Never replace only one spring. Also check the rebound spring.

47 Examine the working surfaces of the two bushes; if worn or scuffed they must be replaced with new ones. To remove the bottom bush from the fork tube, prise it apart at the slit using a flat-bladed screwdriver and slide it off (see illustration 7.18). Make sure the new one seats properly.

48 Check the damper rod for damage and wear, and replace it with a new one if necessary.

Reassembly

49 If removed, slide the rebound spring onto the rod (see illustration). Insert the damper rod into the fork tube and slide it into place so that it projects fully from the bottom of the tube, then fit the seat onto the bottom of the damper rod (see illustrations 7.38 and 7.20b).

50 Oil the fork tube and bottom bush with the specified fork oil and insert the assembly into the slider. Fit a new copper sealing washer to 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 7.21). Tighten the bolt to the specified torque setting. If the damper rod rotates inside the tube, temporarily install the fork spring and top bolt 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.

51 Push the fork tube fully into the slider, then oil the top bush and slide it down over the tube (see illustration 7.22a). Press the bush squarely into its recess in the slider as far as possible, then install the oil seal washer (see illustration 7.22b). Either use the Yamaha service tool or a suitable piece of tubing to tap the bush fully into place; the tubing must be slightly larger in diameter than

the fork tube and slightly smaller in diameter than the bush recess in the slider. Take care not to scratch the fork tube during this operation.



It is best to make sure that the fork tube is pushed fully into the slider so that any accidental scratching is confined to the area above the oil seal.

52 When the bush is seated fully and squarely in its recess in the slider (remove the washer to check, wipe the recess clean, then reinstall the washer), install the new oil seal. Smear the seal's lips with lithium-based grease and slide it over the tube so that its markings face upwards and drive the seal into place as described above until the retaining clip groove is visible above the seal (see illustration 7.23).

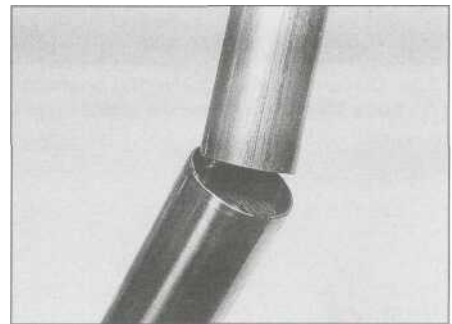
Place the old oil seal on top of the new one to protect it when driving the seal into place.

53 Once the seal is correctly seated, fit the retaining clip, making sure it is correctly located in its groove (see illustration 7.24).

54 Lubricate the lips of the new dust seal then slide it down the fork tube and press it into position (see illustration 7.25).

55 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 7.26a). Fully compress the fork tube into the slider and measure the fork oil level from the top of the tube (see illustration 7.26b). Add or subtract fork oil until it is at the level specified at the beginning of the Chapter.

56 Clamp the slider in a soft-jawed vice using the brake caliper mounting lugs, taking care not to overtighten and damage them. 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, the spacer



7.56c ... and the spacer

and, on 2000 model only, the washer (see illustrations).

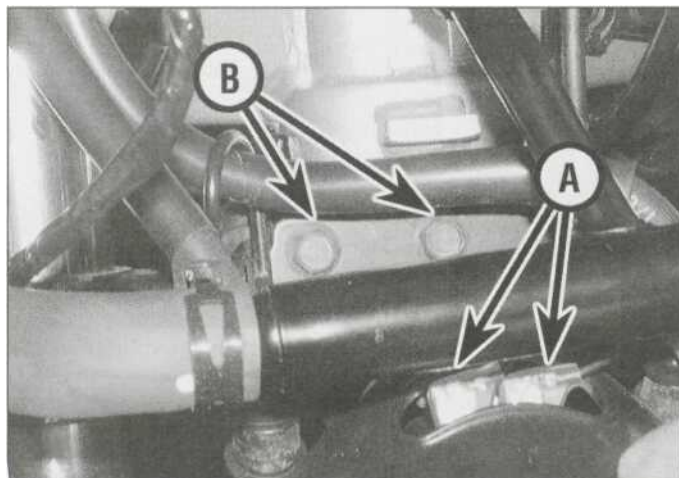
A *Warning: It will be necessary to compress the spring by pressing it down using the top bolt to engage the threads of the top bolt with the fork tube. This is a potentially dangerous operation and should be performed with care, using an assistant if necessary. Wipe off any excess oil before starting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

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

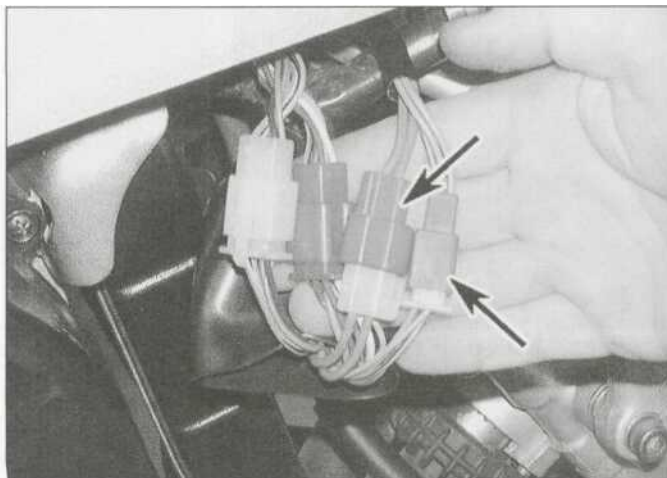


Use a ratchet-type tool when installing the fork top bolt. This makes it unnecessary to remove the tool from the bolt whilst threading it in making it easier to maintain a downward pressure on the spring.

58 Install the forks (see Section 6).



8.3a Disconnect the horn wiring connectors (A), then unscrew the bolts (B) and displace the brake hose union/horn assembly



8.3b Disconnect the ignition switch wiring connector

8 Steering stem - removal and installation

Removal

- 1 Remove the fairing (see Chapter 8). On FZS models remove the fuel tank (see Chapter 4).
- 2 Remove the front forks (see Section 6).
- 3 On YZF models, disconnect the horn wiring connectors, then unscrew the bolts securing the front brake hose/horn bracket to the

bottom yoke (**see illustration**). Trace the wiring from the ignition switch and disconnect it at the connector (**see illustration**). Free the wiring from any clips or ties. Unscrew the bolt securing the cable guide from the top yoke (**see illustration**).

4 On FZS models, unscrew the bolts securing the front brake hose union and its cover to the bottom yoke (**see illustration**). Trace the wiring from the ignition switch and disconnect it at the connector (**see illustration**). Free the wiring from any clips or ties.

5 Displace the handlebars from the top yoke (see Section 5).

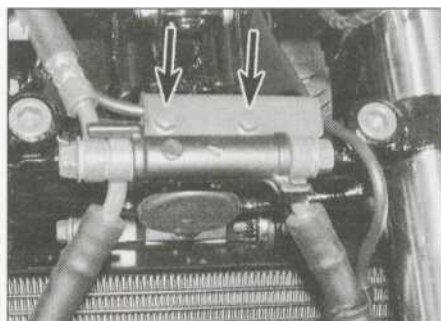
6 Unscrew the steering stem nut and remove it along with its washer (see illustration). Gently ease the top yoke upwards off the steering stem and position it clear, using a rag to protect the tank or other components (**see illustration**).

7 Remove the tabbed lockwasher, noting how it fits, then unscrew and remove the locknut using either a C-spanner, a peg spanner or a drift located in one of the notches (**see illustrations**). Remove the rubber washer (**see illustration 8.13a**).

8 Supporting the bottom yoke, unscrew the adjuster nut using either a C-spanner, a peg-



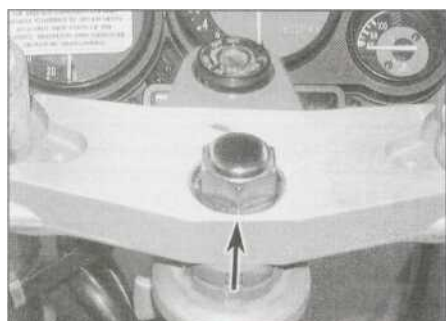
8.3c Unscrew the bolt (arrowed) and displace the cable guide



8.4a Unscrew the bolts (arrowed) and displace the brake hose union



8.4b Disconnect the ignition switch wiring connectors



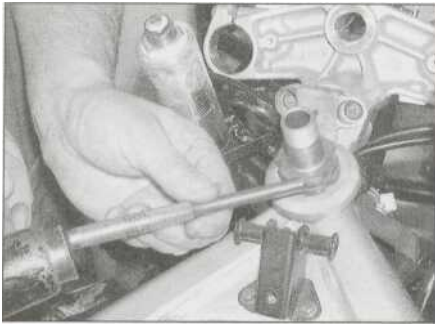
8.6a Unscrew the steering stem nut (arrowed)



8.6b Ease the top yoke up off the steering stem



8.7a Remove the tabbed lockwasher ...



8.7b ... then unscrew the locknut

spanner or a drift located in one of the notches, then remove the adjuster nut and the bearing cover from the steering stem (see illustration).

9 Gently lower the bottom yoke and steering stem out of the frame.

10 Remove the upper bearing components, comprising the inner race and the ball cage, from the top of the steering head. Remove the ball cage for the lower bearing from the steering stem. Remove all traces of old grease from the bearings and races and check them for wear or damage as described in Section 9.

Note: Do not attempt to remove the outer races from the frame or the lower bearing inner race from the steering stem unless they are to be replaced with new ones.

Installation

11 Smear a liberal quantity of lithium-based grease on the bearing races in the frame. Also

work some grease well into both the upper and lower ball cages (see illustration 8.8). Fit the ball cage for the lower bearing onto the steering stem.

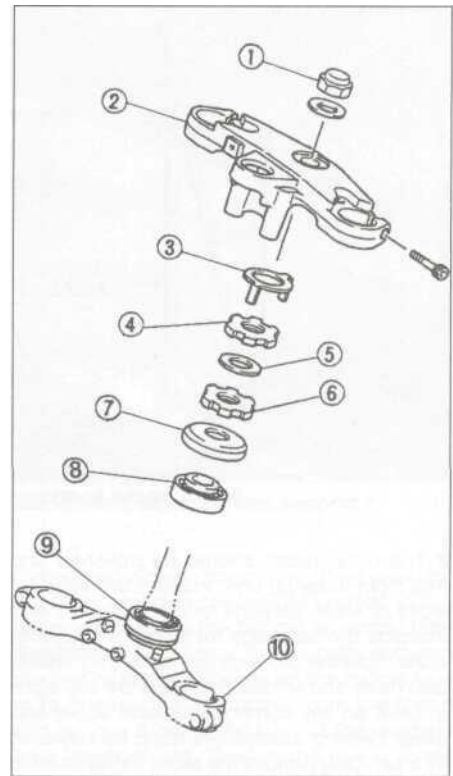
12 Carefully lift the steering stem/bottom yoke up through the steering head. Fit the upper bearing ball cage into the top of the steering head, then fit the inner race into the cage and install the bearing cover. Thread the adjuster nut onto the steering stem and adjust the bearings as described in Chapter 1.

13 Install the rubber washer and the locknut (see illustrations). Tighten the locknut fingertight, then tighten it further until its notches align with those in the adjuster nut. If necessary, counter-hold the adjuster nut and tighten the locknut using a C-spanner or drift until the notches align, but make sure the adjuster nut does not turn as well. Install the tabbed lockwasher so that the tabs fit into the notches in both the locknut and adjuster nut (see illustration 8.7a).

14 Fit the top yoke onto the steering stem (see illustration 8.6b), then install the washer and steering stem nut and tighten it fingertight (see illustrations). Temporarily install one of the forks to align the top and bottom yokes, and secure it by tightening the bottom yoke clamp bolt only. Now tighten the steering stem nut to the torque setting specified at the beginning of the Chapter (see illustration).

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

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



8.8 Steering stem components

- | | | | |
|---|------------------------------|----|---------------|
| j | Steering stem nut and washer | 6 | Adjuster nut |
| 2 | Top yoke | 7 | Bearing cover |
| 3 | Lockwasher | 8 | Upper bearing |
| 4 | Locknut | 9 | Lower bearing |
| 5 | Washer | 10 | Bottom yoke |

9 Steering head bearings - inspection and replacement

Inspection

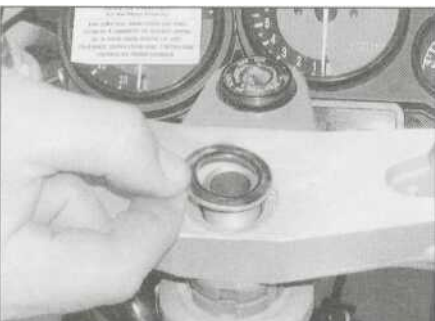
- 1 Remove the steering stem (see Section 8) (see illustration 8.8).
- 2 Remove all traces of old grease from the bearings and races and check them for wear or damage.



8.13a Fit the washer .



8.13b ... and the locknut



8.14a Fit the washer .

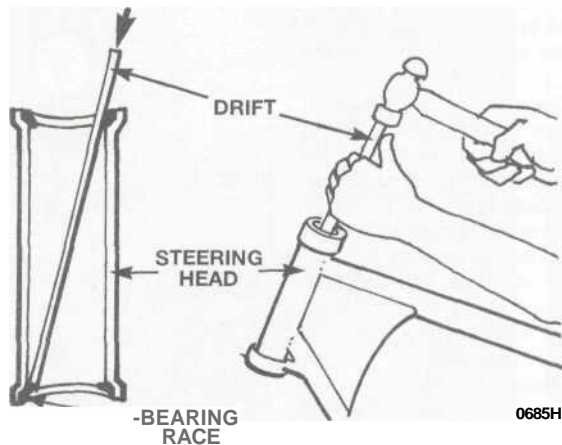


8.14b ... and the steering stem nut...



8.14c ... and tighten it to the specified torque

6»16 Frame, suspension and final drive



9.4 Drive the bearing races out with a brass drift

3 The outer races should be polished and free from indentations. Inspect the balls for signs of wear, damage or discoloration, and examine the ball cage for signs of cracks or splits. Spin the bearings by hand. They should spin freely and smoothly. If there are any signs of wear on any components both upper and lower bearing assemblies must be replaced as a set. Only remove the races if they need to be replaced - do not re-use them once they have been removed.

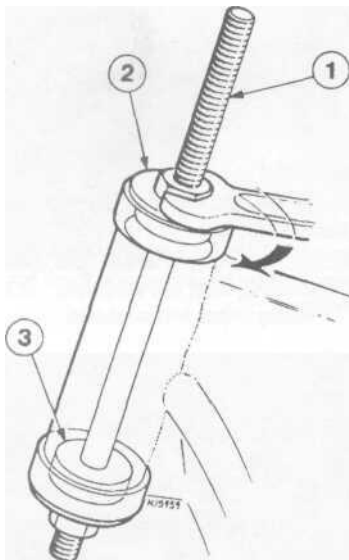
Replacement

4 The outer races are an interference fit in the steering head and can be tapped from position with a suitable drift (see illustration).

Tap firmly and evenly around each race to ensure that it is driven out squarely. It may prove advantageous to curve the end of the drift slightly to improve access.

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

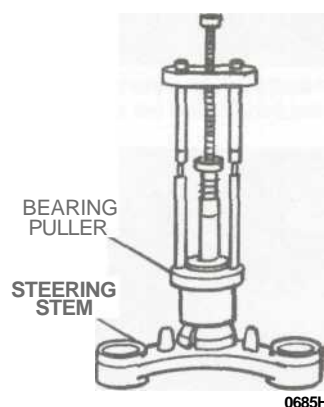
6 The new outer races can be pressed into the head using a drawbolt arrangement (see illustration), or by using a large diameter tubular drift which bears only on the outer edge of the race. Ensure that the drawbolt washer or drift (as applicable) bears only on the outer edge of the race and does not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



9.6 Drawbolt arrangement for fitting steering stem bearing races

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

HAVNES HIUT 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.



9.7 It is best to remove the lower bearing using a puller

7 The lower bearing inner race should only be removed if a new one is being fitted (see illustration). To remove the lower bearing from the steering stem, use two screwdrivers placed on opposite sides of the race to work it free, or tap under it using a cold chisel. If the bearing is firmly in place it will be necessary to use a bearing puller, or in extreme circumstances to split the bearing's inner section using an angle grinder. Take the steering stem to a Yamaha dealer if required. Check the condition of the dust seal that fits under the lower bearing and replace it if it is worn, damaged or deteriorated.

8 Fit the new lower bearing onto the steering stem. A length of tubing with an internal diameter slightly larger than the steering stem will be needed to tap the new bearing into position (see illustration). Ensure that the drift bears only on the inner edge of the bearing and does not contact the rollers.

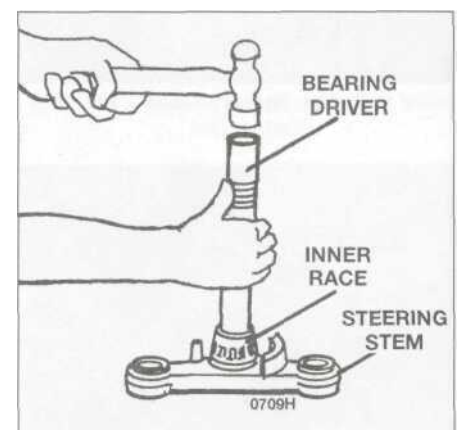
9 Install the steering stem (see Section 8).

10 Rear shock absorber - removal, inspection and installation

Warning: Do not attempt to disassemble this shock absorber. It is nitrogen-charged under high pressure. Improper disassembly could result in serious injury. Instead, take the shock to a dealer service department with the proper equipment to do the job.

Removal

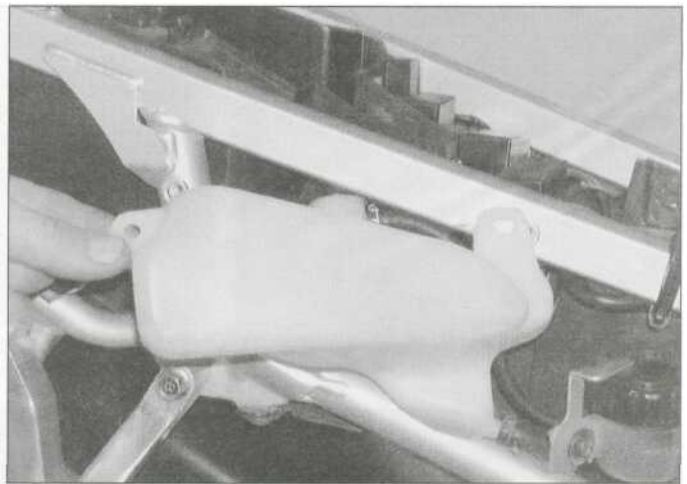
1 Support the motorcycle securely in an upright position using an auxiliary stand (YZF models) or the centrestand (FZS models). Position a support under the rear wheel so that it does not drop when the shock absorber is removed, but also making sure that the weight of the machine is off the rear suspension so that the shock is not compressed.



9.8 Drive the new bearing on using a suitable bearing driver or a length of pipe that bears only against the inner race and not against the rollers or cage



10.3a Disconnect the wiring connectors from the ignition control unit



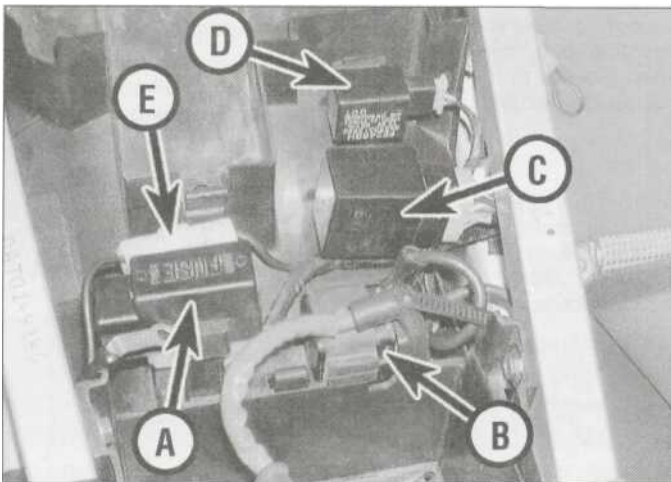
10.3b Displace the coolant reservoir and support it

2 On YZF models, remove the seat, side covers and lower fairing (see Chapter 8), and the fuel tank (see Chapter 4). On FZS models, remove the seat and side covers (see Chapter 8).

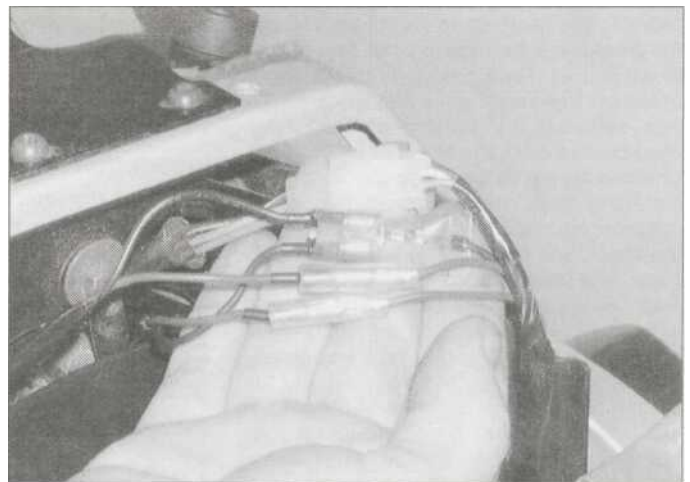
3 On YZF models, disconnect the ignition control unit wiring connectors (see illustration). Remove the battery (see Chapter 9). Remove

the screws securing the coolant reservoir and displace it from the frame, then support or tie it so that it is out of the way, making sure it stays upright (see illustration). Displace the fusebox, relays and flasher unit from the rear mudguard, then disconnect the earth wire connector and position the wire out of the way (see illustration). Disconnect the taillight and

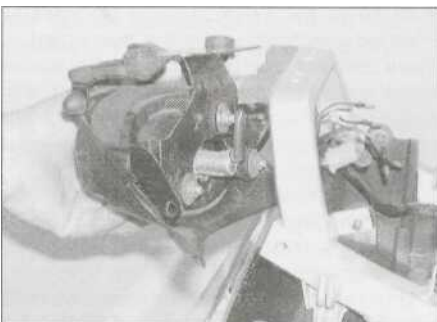
turn signal wiring connectors, then unscrew the bolts securing the taillight bracket to the frame and remove the taillight assembly (see illustrations). Unscrew the six bolts securing the rear mudguard, then push the middle lugs in to release the mudguard from the frame and remove it out of the back of the machine (see illustrations). Slacken the clamp screw



10.3c Displace the fusebox (A), starter relay (B), fuel cut-off relay (C) and flasher unit (D), and disconnect the wiring connector (E)



10.3d Disconnect the wiring connectors ...



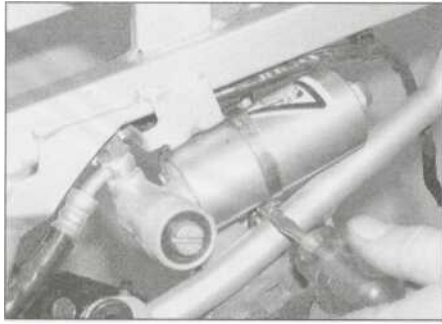
10.3e ... and remove the taillight assembly with its bracket



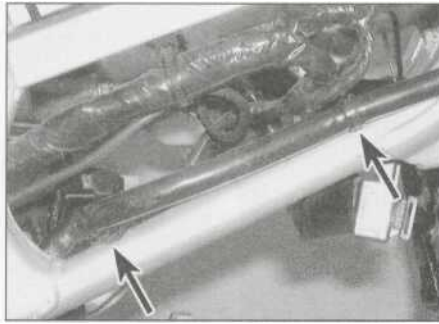
10.3f Push in the sides to free the mudguard from the frame ...



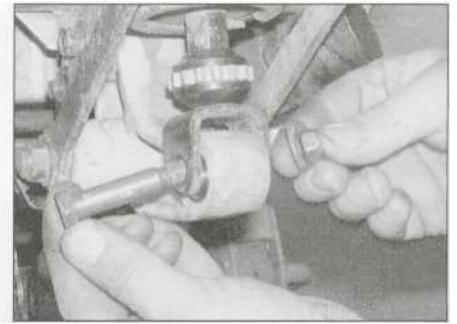
10.3g ... and remove it from the back



10.3h Release the reservoir from its clamp ...



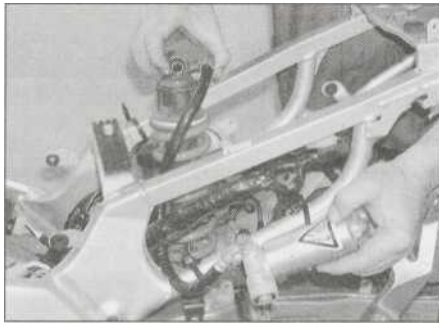
10.3i ... and the hose from the clips (arrowed)



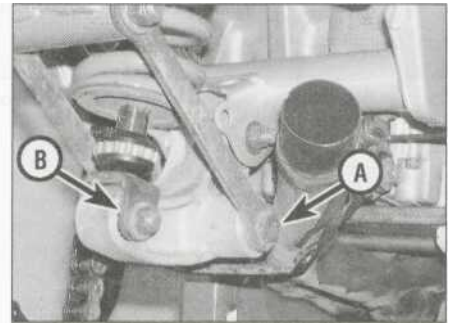
10.3j Remove the lower mounting bolt ...



10.3k ... then the upper mounting bolt...



10.3l .. and remove the shock absorber from the top of the frame



10.4a Remove the bolt securing the linkage rods to the linkage arm (A), and the bolt securing the shock absorber to the linkage arm (B)...

securing the reservoir to its holder and free the hose from its clips on the frame (see illustrations). Feed it through to the shock absorber. Unscrew the nut and withdraw the bolt securing the bottom of the shock absorber to the linkage arm (see illustration). Unscrew the nut on the shock absorber upper mounting bolt, then support the shock absorber and withdraw the bolt and remove the shock and reservoir from the top of the frame (see illustrations).

4 On FZS models, unscrew the nut and withdraw the bolt securing the suspension linkage rods to the linkage arm, then unscrew the nut and withdraw the bolt securing the bottom of the shock absorber to the linkage arm (see illustration). Swing the linkage rods rearwards and the linkage arm down. Unscrew the nut on the shock absorber upper mounting bolt, using a universal drive on a socket extension for best access (see

illustration). Support the shock absorber and withdraw the upper mounting bolt, then manoeuvre the shock down and out of the bottom of the machine, raising the swingarm to provide clearance.

Inspection

5 Inspect the 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 pivot hardware at the top and bottom of the shock for wear or damage.

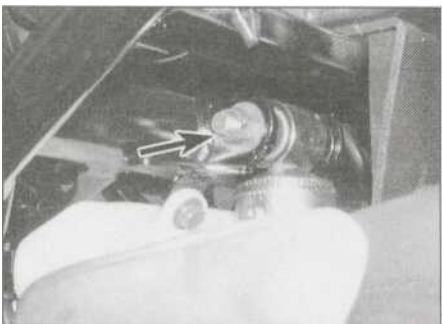
8 On YZF models, check the reservoir, hose and hose connections for damage, cracks or leakage.

9 Individual components are not available for the shock absorber. If it is worn or damaged, it must be replaced with a new one.

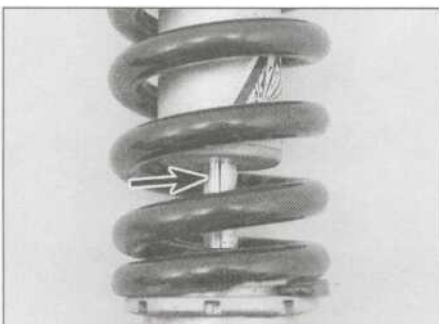
Installation

10 Installation is the reverse of removal. Apply molybdenum disulphide grease to the shock absorber and linkage rod pivot points. Install the bolts and nuts finger-tight only until all components are in position, then tighten the nuts to the torque settings specified at the beginning of the Chapter.

11 Rear suspension linkage - removal, inspection and installation



10.4b ... then remove the upper mounting bolt (arrowed)



10.6 Look for cracks, pitting and oil leakage on the damper rod (arrowed)

Removal

1 Support the motorcycle securely in an upright position using an auxiliary stand (YZF models) or the centrestand (FZS models). Position a support under the rear wheel so that it does not drop when the shock absorber lower mounting bolt is removed, but also making sure that the weight of the machine is off the rear suspension so that the shock is not compressed.

2 On YZF models, remove the seat, side covers and lower fairing (see Chapter 8). On FZS models, remove the seat and side covers (see Chapter 8).

3 Unscrew the nuts and withdraw the bolts securing the shock absorber and the linkage rods to the linkage arm (see illustration 10.4a). Note which bolts fit where.

4 Unscrew the nut and withdraw the bolt securing the linkage rods to the swingarm and remove the rods (see illustration).

5 Unscrew the nut and withdraw bolt securing the linkage arm to the frame and remove the linkage arm, noting which way round it fits (see illustration).

Inspection

6 Lever the grease seals out of the shock absorber mounting in the linkage arm, and withdraw all the spacers from the linkage arm and swingarm, noting their different sizes (see illustration). Thoroughly clean all components, removing all traces of dirt, corrosion and grease.

7 Inspect all components closely, looking for obvious signs of wear such as heavy scoring, or for damage such as cracks or distortion. Slip each spacer back into its bearing and check that there is not an excessive amount of freeplay between the two components. Renew any components as required.

8 Check the condition of the needle roller bearings in the linkage arm and in the bottom of the swingarm. Refer to *Tools and Workshop Tips* (Section 5) in the Reference section for more information on bearings. If the linkage rod bearings in the swingarm need to be renewed, remove the swingarm (see Section 13).

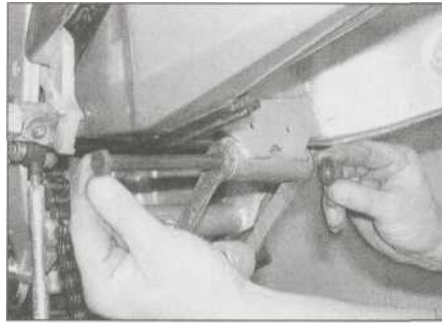
9 Worn bearings can be drifted out of their bores, but note that removal will destroy them; new bearings should be obtained before work commences. The new bearings should be pressed or drawn into their bores rather than driven into position. In the absence of a press, a suitable drawbolt tool can be made up as described in *Tools and Workshop Tips* in the Reference section.

10 Lubricate the needle roller bearings and the spacers with molybdenum disulphide grease and install the spacers.

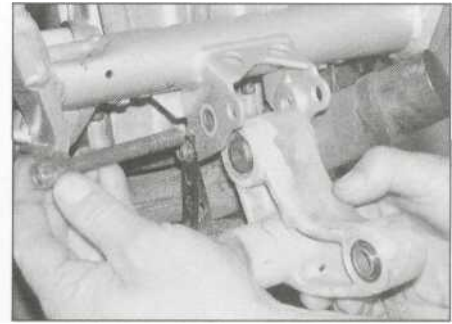
11 Check the condition of the grease seals for the shock absorber mounting in the linkage arm and renew them if they are damaged or deteriorated. Press the seals squarely into place.

Installation

12 Installation is the reverse of removal. Apply molybdenum disulphide grease to the pivot points. Install the bolts and nuts finger-tight only until all components are in position, then tighten the nuts to the torque setting specified at the beginning of the Chapter.



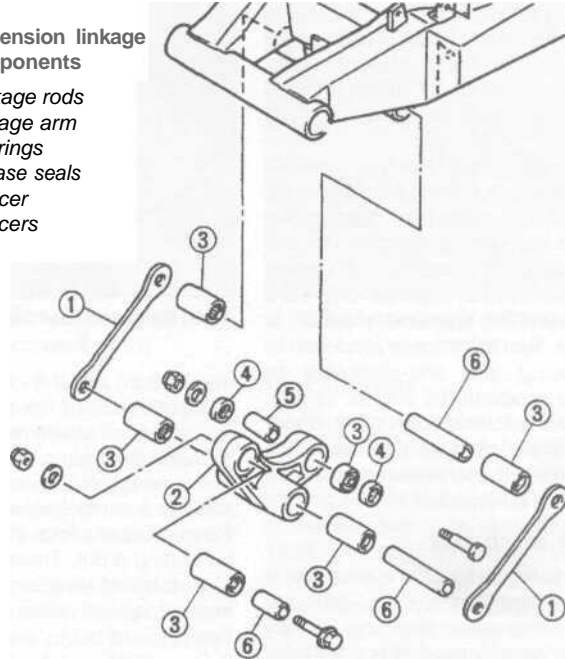
11.4 Remove the bolt securing the linkage rods to the swingarm and remove the rods



11.5 Remove the bolt securing the linkage arm to the frame and remove the arm

11.6 Suspension linkage components

- 1 Linkage rods
- 2 Linkage arm
- 3 Bearings
- 4 Grease seals
- 5 Spacer
- 6 Spacers



forks (see illustration). The amount of pre-load is indicated by lines on the adjuster. There are eight lines on YFZ models, and seven lines on FZS models. The standard position is with the fifth line just visible above the top bolt hex. Turn the adjuster clockwise to increase pre-load and anti-clockwise to decrease it. Always make sure both adjusters are set equally.

3 Rebound damping (YZF only) is adjusted using a screwdriver in the slot in the adjuster protruding from the pre-load adjuster (see illustration). The amount of damping is indicated by the number of clicks when turned anti-clockwise from the fully screwed-in position. There are twelve positions. The standard position is seven clicks out. Turn the

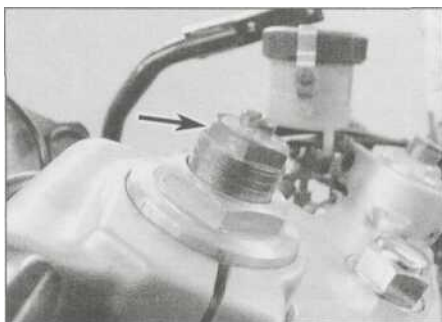
12 Suspension-adjustments



Front forks

1 On 1998 and 1999 FZS models, the front forks are not adjustable.

2 On all YZF models and 2000 FZS models, spring pre-load is adjusted using a suitable spanner on the adjuster flats on the top of the

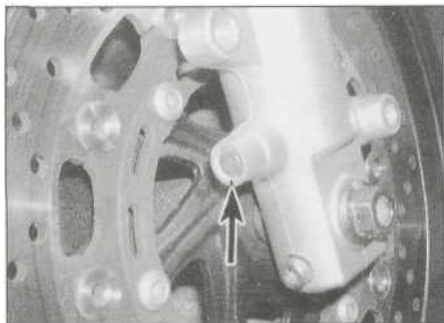


12.2 Spring pre-load adjuster (arrowed)



12.3 Rebound damping adjuster (arrowed)

6*20 Frame, suspension and final drive



12.4 Compression damping adjuster (arrowed)

adjuster clockwise to increase damping and anti-clockwise to decrease it. To establish the current setting, turn the adjuster in (clockwise) until it stops, counting the number of clicks, then reset it as required by turning it out. Always make sure both adjusters are set equally.

4 Compression damping (YZF only) is adjusted using a screwdriver in the slot in the adjuster on the base of each fork slider (**see illustration**). The amount of damping is indicated by the number of clicks when turned anti-clockwise from the fully screwed-in position. There are twelve positions. The standard position is seven clicks out. Turn the adjuster clockwise to increase damping and anti-clockwise to decrease it. To establish the current setting, turn the adjuster in (clockwise) until it stops, counting the number of clicks, then reset it as required by turning it out. Always make sure both adjusters are set equally.

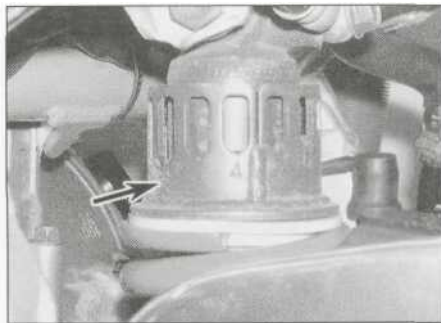
Rear shock absorber

5 On YZF models the rear shock absorber is adjustable for spring pre-load, rebound damping, and compression damping. On FZS models the rear shock absorber is adjustable for spring pre-load.

6 On YZF models, pre-load adjustment is made using a suitable C-spanner (one is provided in the toolkit) to turn the spring seat on the top of the shock absorber (**see illustration**). There are seven positions. Position 1 is the softest setting, position 3 is the standard, position 7 is the hardest. Align the setting required with the adjustment stopper. To increase the pre-load, turn the spring seat clockwise. To decrease the pre-load, turn the spring seat anti-clockwise.

7 On FZS models, pre-load adjustment is made using a suitable C-spanner (one is provided in the toolkit) to turn the spring seat on the top of the shock absorber (**see illustration**). There are nine positions. Position 1 is the softest setting, position 4 is the standard, position 9 is the hardest. Align the setting required with the adjustment stopper. To increase the pre-load, turn the spring seat clockwise. To decrease the pre-load, turn the spring seat anti-clockwise.

8 On YZF models, rebound damping adjustment is made by turning the adjuster on



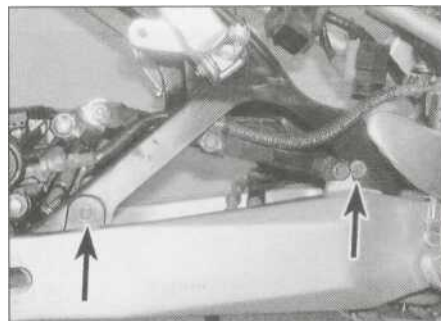
12.6 Spring pre-load adjuster (arrowed) - YZF models



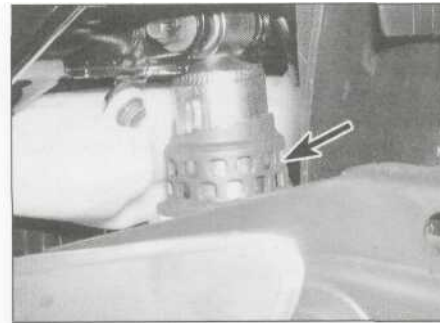
12.8 Rebound damping (arrowed) adjuster

the bottom of the shock absorber (**see illustration**). Turn the adjuster anti-clockwise (as you look down at it from the top) to increase damping and clockwise to decrease it. To establish the current setting, turn the adjuster anti-clockwise until it stops, counting the number of clicks, then reset it as required by turning it out. There are twenty positions. The standard position is ten clicks out. The hardest is zero clicks out, and the softest is twenty clicks out.

9 On 1996 and 1997 YZF models, compression damping adjustment is made by turning the adjuster on the shock absorber reservoir using a screwdriver (**see illustration**). Turn the adjuster clockwise to increase damping and anti-clockwise to decrease it. To establish the current setting, turn the adjuster in (clockwise) until it stops, counting the number of clicks, then reset it as



13.2a The mudguard and chain guard are secured by two bolts (arrowed) on each side



12.7 Spring pre-load adjuster (arrowed) • FZS models



12.9 Compression damping adjuster (arrowed)

required by turning it out. There are twenty positions. The standard position is ten clicks out. The hardest is zero clicks out, and the softest is twenty clicks out.

10 On 1998-on YZF models, compression damping adjustment is made by turning the adjuster on the shock absorber reservoir using a screwdriver (**see illustration 12.9**). There are six positions. Position 1 is the softest, position 4 the standard, and position six the hardest. Align the dot on the adjuster with the position required.

13 Swingarm - removal and installation

Removal

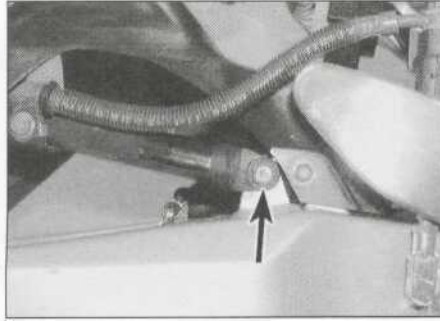
Note: Before removing the swingarm, it is advisable to perform the rear suspension checks described in Chapter 1 to assess the extent of any wear.

1 Remove the rear wheel (see Chapter 7) and the shock absorber (see Section 10).

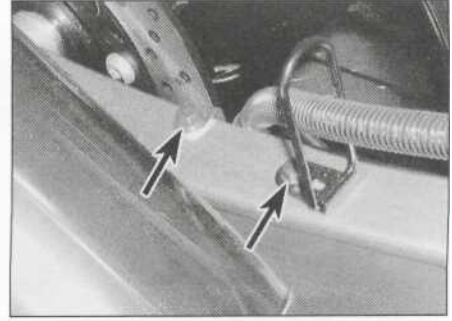
2 On YZF models, unscrew the bolts securing the chain guard and rear mudguard to the swingarm and remove them, noting how they fit (**see illustration**). Remove the split pin from the bolt securing the brake torque arm to the swingarm, then unscrew the nut, withdraw the bolt and detach the arm along with the brake caliper and bracket (**see illustrations**). Tie the assembly to the frame, making sure no strain is placed on the brake hose.



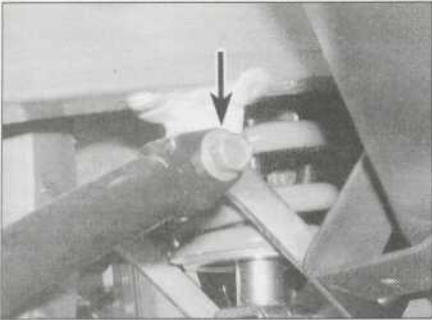
13.2b Remove the split pin (arrowed), then unscrew the nut..



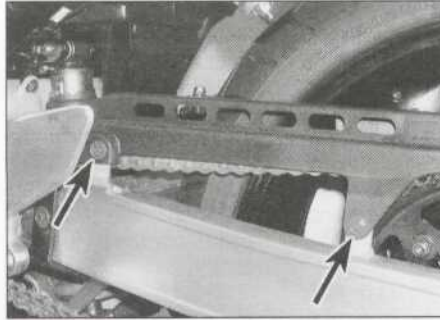
13.2c ... and withdraw the bolt (arrowed)



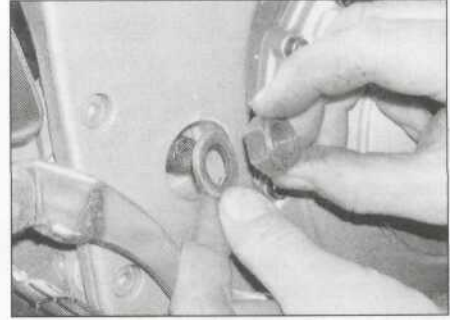
13.3a Unscrew the bolts (arrowed) and detach the guides



13.3b Remove the bolt (arrowed) and detach the torque arm



13.3c The chainguard is secured by two bolts (arrowed)



13.6 Unscrew the nut and remove the washer...

3 On FZS models, unscrew the bolt securing each brake hose guide to the swingarm (**see illustration**). Unscrew the nut on the bolt securing the brake torque arm to the swingarm, then detach the arm along with the brake caliper and bracket (**see illustration**). Position the assembly aside, making sure no strain is placed on the brake hose. If required, unscrew the bolts securing the chain guard to the swingarm and remove the guard (**see illustration**).

4 On YZF models, and on FZS models if required, unscrew the nut and withdraw the bolt securing the suspension linkage rods to the swingarm (**see illustration 11.4**).

5 Before removing the swingarm it is advisable to re-check for play in the bearings (see Chapter 1). Any problems which may

have been overlooked with the other suspension components attached to the frame are highlighted with them loose.

6 On FZS models, remove the blanking cap from each end of the swingarm pivot. Unscrew the nut on the end of the swingarm pivot bolt and remove the washer, where fitted (**see illustration**).

7 Support the swingarm, then withdraw the pivot bolt and remove the swingarm (**see illustration**). Knock the pivot bolt through using a drift if required.

8 Remove the chain slider from the front of the swingarm if necessary, noting how it fits (**see illustration**). If it is badly worn or damaged, it should be replaced with a new one.

9 Inspect all components for wear or damage as described in Section 14.

Installation

10 If removed, install the chain slider and tighten its bolt(s) securely (**see illustration 13.8**).

11 If not already done (Section 14), remove the cap with its seal and washer from each side of the swingarm (**see illustrations 14.2a and 14.2b**). Lubricate the bearings with molybdenum disulphide grease. Also grease the swingarm pivot, the washers and caps, and the linkage rod bearings in the bottom of the swingarm - remove the collar first and grease that as well (on FZS models, if not already done, you will also need to remove the linkage rods) (**see illustration**). Check the condition of the seal in each cap and replace them with new ones if necessary (**see illustration 14.2c**). Re-install the collar, washers, seals and caps.



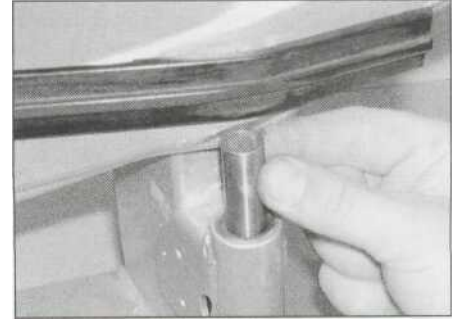
13.7 ... then withdraw the bolt and remove the swingarm



1

13.8 On YZF models, the chain slider is secured by two bolts (arrowed) on the inside of the arm.

On FZS models, it is secured by a single bolt on the outside

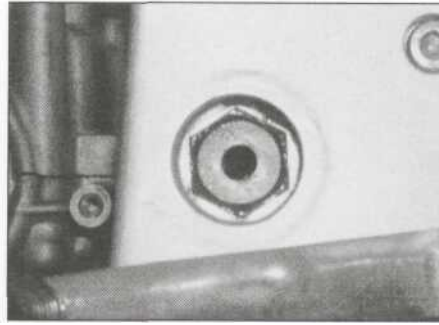


13.11 Withdraw the collar and grease it and the linkage rod bearings

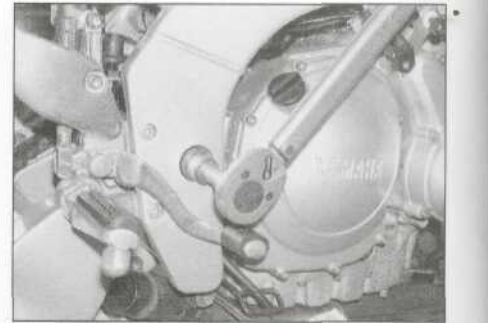
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13.12a Locate the swingarm and install the pivot bolt...



13.12b ... making sure the bolt head flats locate correctly in the frame



13.12c Tighten the nut to the specified torque

12 Offer up the swingarm and have an assistant hold it in place (**see illustration**). Make sure the drive chain is looped over the front of the swingarm. Slide the pivot bolt through from the left-hand side, locating the hex head correctly in the frame (**see illustration**). Install the nut with its washer (**see illustration 13.6**), and tighten the nut to the torque setting specified at the beginning of the Chapter (**see illustration**). On FZS models, fit the blanking caps.

13 On YZF models, and on FZS models if removed, fit the linkage rods onto the swingarm, then install the bolt and tighten the nut to the specified torque setting (**see illustration 11.4**). Install the rear shock absorber (see Section 10).

14 Fit the brake torque arm onto the

swingarm, locating and aligning the caliper bracket on the inside of the swingarm, then install the bolt and tighten the nut to the specified torque setting (**see illustration 13.2c or 13.3b**). On YZF models, fit a new split pin onto the bolt (**see illustration 13.2b**). On FZS models, fit the brake hose guides onto the swingarm (**see illustration 13.3a**).

15 Install the chain guard, along with the rear mudguard on YZF models, making sure they locate correctly over the lugs on the swingarm (**see illustration 13.2a or 13.3c**).

16 Install the rear wheel (see Chapter 7).

17 Check and adjust the drive chain slack (see Chapter 1). Check the operation of the rear suspension before taking the machine on the road.

14 Swingarm - inspection and bearing replacement

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5^

Inspection

1 Thoroughly clean the swingarm, removing all traces of dirt, corrosion and grease (**see illustration**).

2 Remove the cap with its seal and washer from each side of the swingarm, then withdraw the collar (**see illustrations**). Check the condition of the seal in each cap and replace them with new ones if necessary (**see illustration**).

3 Inspect all components closely, looking for obvious signs of wear such as heavy scoring, and cracks or distortion due to accident damage. Check the bearings for roughness, looseness and any other damage, referring to *Tools and Workshop Tips* (Section 5) in the Reference section (**see illustration**). Any damaged or worn component must be renewed.

4 Check the swingarm pivot bolt for straightness by rolling it on a flat surface such as a piece of plate glass (first wipe off all old grease and remove any corrosion using fine emery cloth). If the axle is bent, replace it.

Bearing replacement

5 Remove the cap with its seal and washer from each side of the swingarm, then withdraw the collar (**see illustrations 14.2a**



14.1 Clean off all chain lube and road dirt using a suitable degreaser



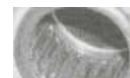
14.2a Remove the cap with its seal, and the washer..



14.2b ... then withdraw the collar



14.2c Check the seals and renew them if necessary



14.3 Check the needle bearing (arrowed) in each side

and 14.2b). Refer to *Tools and Workshop Tips* (Section 5) in the Reference section for more information on bearing checks and replacement methods.

6 Needle bearings can be drawn or drifted out of their bores, but note that removal will destroy them; new bearings should be obtained before work commences. Pass a long drift with a hooked end through one side of the swingarm and locate it on the inner edge of the bearing on the other side. Tap the drift around the bearing's inner edge to ensure that it leaves its bore squarely. Use the same method to extract the other bearing. If available, a slide-hammer with knife-edged bearing puller can be used to extract the bearings, and is better than using a drift.

7 The new bearings should be pressed or drawn into their bores rather than driven into position. In the absence of a press, a suitable drawbolt arrangement can be made up as described in *Tools and Workshop Tips* (Section 5) in the Reference section. Lubricate the bearings with molybdenum disulphide grease. Fit the seal into the cap, if removed (see illustration 14.2c). Install the collar, then fit the washer and cap onto each side (see illustrations 14.2b and 14.2a).

15 Drive chain-removal, cleaning and installation

Removal

Note: *The original equipment drive chain fitted to all models is an endless chain, which means it doesn't have a split link and therefore cannot be split. Removal requires the removal of the swingarm.*

A **Warning: NEVER install a drive chain which uses a clip-type master (split) link.**

- 1 Remove the swingarm (see Section 13).
- 2 Withdraw the clutch pushrod, then slip the

chain off the front sprocket and remove it from the bike (see illustration).

Cleaning

3 Soak the chain in paraffin (kerosene) for approximately five or six minutes.

Caution: Don't use gasoline (petrol), solvent or other cleaning fluids. Don't use high-pressure water. Remove the chain, wipe it off, then blow dry it with compressed air immediately. The entire process shouldn't take longer than ten minutes - if it does, the O-rings in the chain rollers could be damaged.

Installation

4 Installation is the reverse of removal. Clean the clutch pushrod and smear it with molybdenum disulphide grease before installing it. On completion adjust and lubricate the chain following the procedures described in Chapter 1.

Caution: Use only the recommended lubricant.

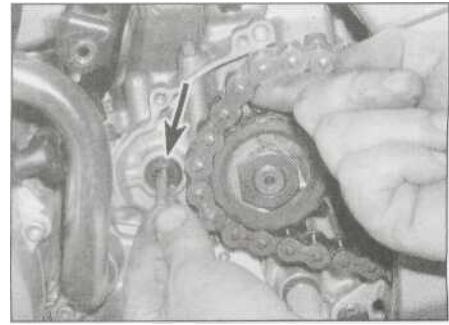
16 Sprockets - check and replacement

1 Check

1 On YZF models remove the left-hand fairing side panel (see Chapter 8, Section 3).

2 Unscrew the gearchange lever linkage arm pinch bolt and slide the arm off the shaft, noting any alignment marks (see illustration).

If no marks are visible, make your own before removing the arm so that it can be correctly aligned with the shaft on installation. Unscrew the bolts securing the front sprocket cover and displace the cover (see illustration). There is no need to detach the clutch cable from the cover unless you want to (see Chapter 2). Note the position of the dowels and remove them if loose. Discard the gasket as a new one must be used.



15.2 Withdraw the pushrod (arrowed) and slip the chain off the sprocket

3 Check the wear pattern on both sprockets (see illustration 1.7 in Chapter 1). If the sprocket teeth are worn excessively, renew the chain and both sprockets as a set. Whenever the sprockets are inspected, the drive chain should be inspected also (see Chapter 1). If you are fitting a new chain, fit new sprockets as well.

4 Adjust and lubricate the chain following the procedures described in Chapter 1.

Caution: Use only the recommended lubricant.

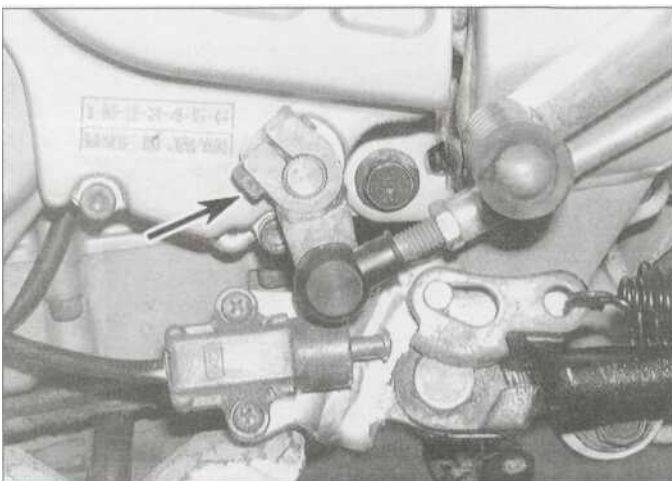
Replacement

Front sprocket

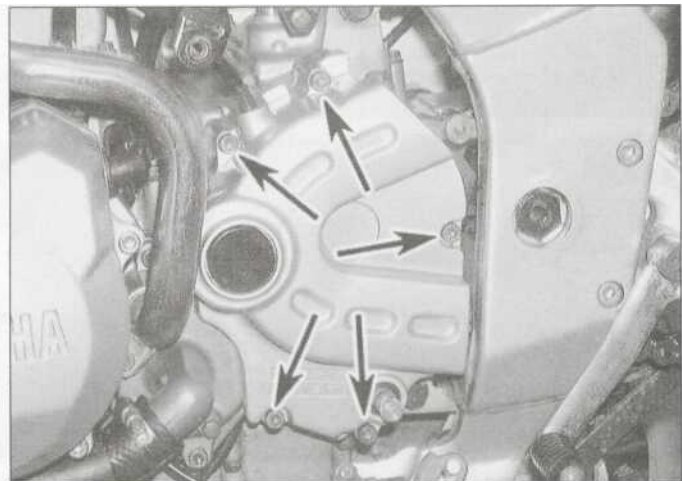
5 On YZF models remove the left-hand fairing side panel (see Chapter 8, Section 3).

6 Unscrew the gearchange lever linkage arm pinch bolt and slide the arm off the shaft, noting any alignment marks (see illustration 16.2a). If no marks are visible, make your own

before removing the arm so that it can be correctly aligned with the shaft on installation. Unscrew the bolts securing the front sprocket cover and displace the cover (see illustration 16.2b). There is no need to detach the clutch cable from the cover unless you want to (see Chapter 2). Note the position of the dowels and remove them if loose. Discard the gasket as a new one must be used.

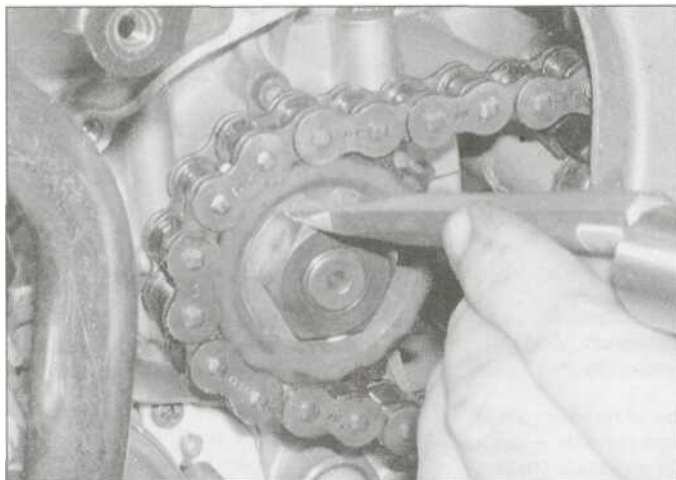


16.2a Unscrew the bolt (arrowed) and slide the arm off the shaft

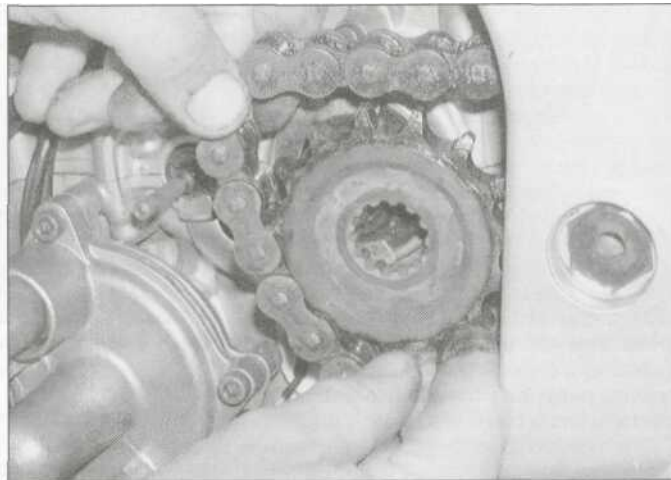


16.2b Sprocket cover bolts (arrowed)

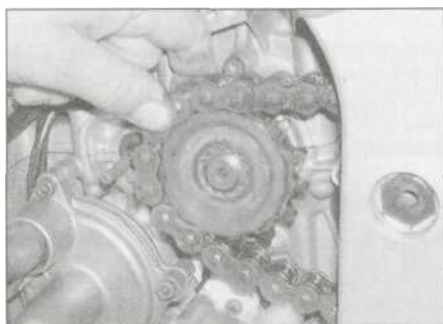
6»24 Frame, suspension and final drive



16.7 Bend back the lockwasher tab(s), then unscrew the nut



16.8 Slide the sprocket off the shaft and remove it



16.9 Fit the sprocket into the chain and slide it onto the shaft

7 Bend down the tab(s) on the sprocket nut lockwasher (**see illustration**). Have an assistant apply the rear brake hard, then unscrew the nut and remove the washer. Discard the washer as a new one should be used. Refer to Chapter 1 and adjust the chain so that it is fully slack.

8 Slide the sprocket and chain off the shaft and slip the sprocket out of the chain (**see illustration**). If there is not enough slack on the chain to remove the sprocket, disengage the chain from the rear wheel.

9 Engage the new sprocket with the chain and slide it on the shaft (**see illustration**).

Take up the slack in the chain (see Chapter 1).

10 Slide on the new lockwasher, then fit the nut and tighten it to the torque setting specified at the beginning of the Chapter, using the rear brake to prevent the sprocket from turning (**see illustrations**). Bend up the tabs of the lockwasher against the nut (**see illustration**).

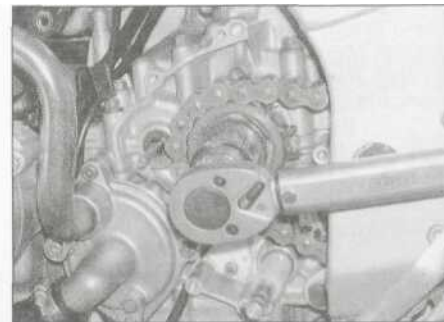
11 If removed, fit the sprocket cover dowels into the crankcase. Install the cover using a new gasket, making sure it locates correctly onto the dowels, and tighten its bolts to the specified torque setting (**see illustrations**). Note that on the gasket supplied by Yamaha,



16.10a Fit the new lockwasher ...



16.10b ... and the nut...



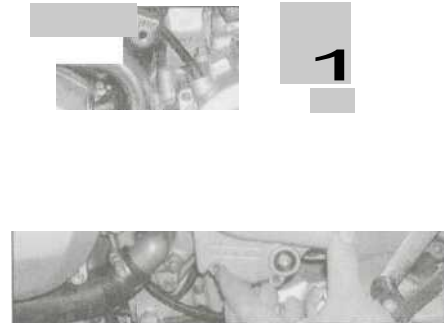
16.10c ... and tighten it to the specified torque



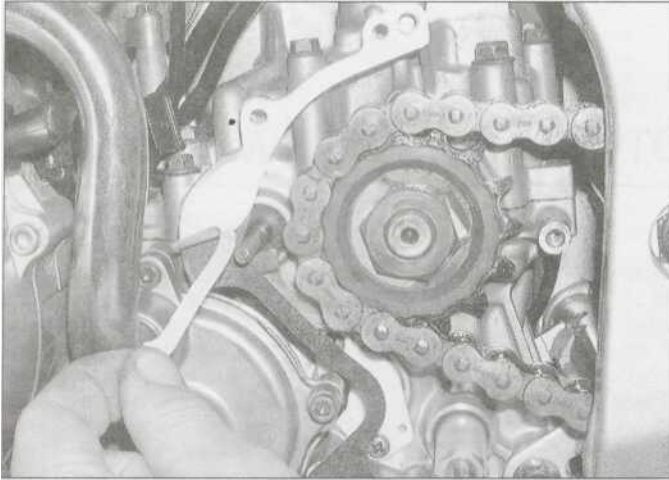
16.10d Bend the tabs up against the nut



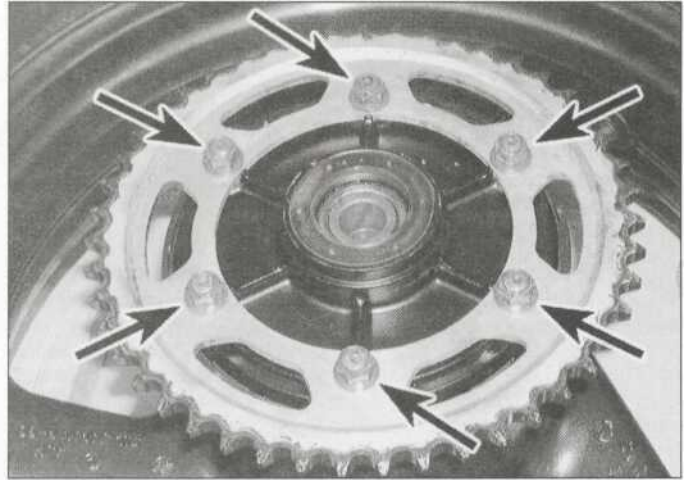
16.11a Fit the gasket onto the dowels (arrowed)...



16.11 b ... then fit the cover



16.11c Peel the cover off the gasket if it has a sticky side



16.13 Unscrew the nuts (arrowed) and remove the sprocket

a protective layer must be peeled off to expose a sticky side (see illustration). Slide the gearchange linkage arm onto the shaft, aligning the marks, and tighten the pinch bolt (see illustration 16.2a).

Rear sprocket

- 12 Remove the rear wheel (see Chapter 7).
- 13 Unscrew the nuts securing the sprocket to the hub assembly (see illustration). Remove the sprocket, noting which way round it fits.
- 14 Install the sprocket onto the hub with the stamped mark facing out. Tighten the nuts evenly and in a criss-cross sequence to the torque setting specified at the beginning of the Chapter.
- 15 Install the rear wheel (see Chapter 7).

17 Rear sprocket coupling/rubber dampers - check and replacement

- 1 Remove the rear wheel (see Chapter 7).

Caution: Do not lay the wheel down on the disc as it could become warped. Lay the wheel on wooden blocks so that the disc is off the ground.

- 2 Lift the sprocket coupling away from the wheel leaving the rubber dampers in position in the wheel (see illustration). Note the spacer inside the coupling - it should be a tight fit but remove it if it is likely to drop out

- (see illustration). Check the coupling for cracks or any obvious signs of damage. Also check the sprocket studs for wear or damage.
- 3 Lift the rubber damper segments from the wheel and check them for cracks, hardening and general deterioration (see illustration). Renew the rubber dampers as a set if necessary.
- 4 Checking and replacement procedures for the sprocket coupling bearing are described in Chapter 7, Section 16.
- 5 Installation is the reverse of removal. Make sure the spacer is still correctly installed in the coupling, or install it if it was removed (see illustration 17.2b).
- 6 Install the rear wheel (see Chapter 7).



17.2a Lift the sprocket wheel, **ig out of the**



17.2b ... noting the spacer .



17.3 ... and remove the rubber dampers