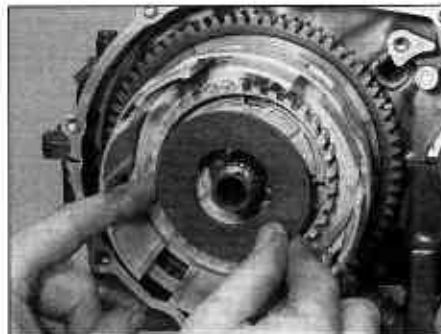




16.24b ... then slide the housing onto the shaft ...



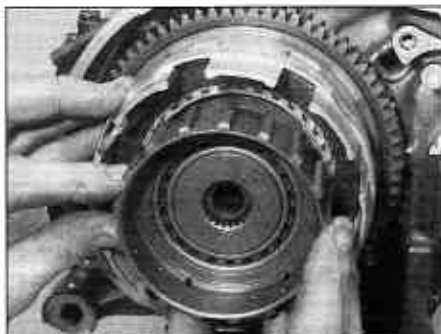
16.25a ... followed by the inner clutch centre ...



16.25b ... and the inner thrust washer



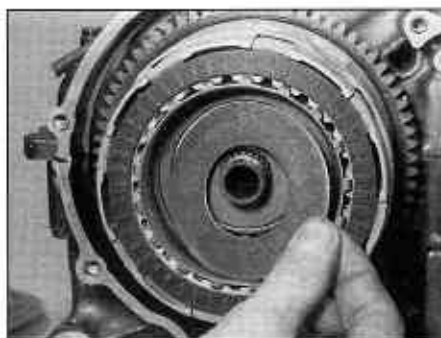
16.26 Start to build up the clutch plates as described ...



16.27 ... then fit the one-way clutch and outer clutch centre ...



16.28 ... build up the remaining clutch plates ...



16.29 ... and fit the outer thrust washer

25 Slide the inner clutch centre and the inner thrust washer onto the shaft (see illustration).

26 Start to build up the clutch plates in the housing, starting with a friction plate, then a plain plate and alternating friction and plain plates until four friction and three plain plates are installed (see illustration). Coat the plates with oil before installing them.

27 Apply clean engine oil to the one-way clutch sprags, then install the one-way clutch assembly and outer clutch centre (see illustration).

28 Build up the remaining clutch plates, starting with a plain plate and alternating them as before (see illustration). Coat the plates with oil before installing them.

29 Coat the outer thrust washer with clean engine oil and fit it into the clutch centre (see illustration).

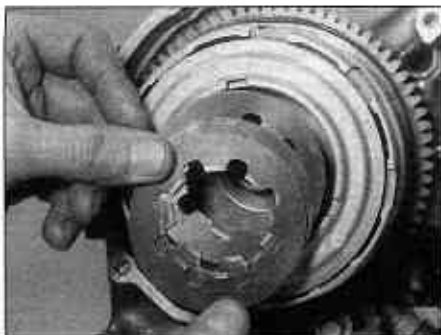
30 If removed, install the diaphragm spring seat into the pressure plate (see illustration 16.6). Install the pressure plate into the clutch centre, then install the three diaphragm springs, making sure their higher inner edges face out (see illustrations).

31 Install the diaphragm spring holder, making sure its stepped inner edge fits into the inner edge of the outer thrust washer (see illustration).

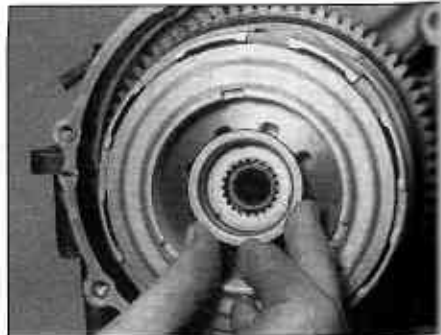
32 Fit the lockwasher, using a new one if necessary, with its "OUTSIDE" mark facing



16.30a Install the pressure plate ...



16.30b ... and the three diaphragm springs



16.31 Install the spring holder ...



16.32a ... the lockwasher (note OUTSIDE marking) ...



16.32b ... and the clutch nut



16.32c Fit the peg spanner or fabricated tool ...

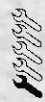
out, onto the shaft splines (see illustration). Install the **new** clutch nut and, using the method employed on dismantling to lock the input shaft and the peg spanner used to unscrew it, tighten the nut to the torque setting specified at the beginning of the Chapter (see illustrations). Stake the nut shoulder against the detent in the shaft using a punch (see illustration). Take care not to damage the shaft threads.

33 Lubricate the longer unpolished end of the pushrod with molybdenum disulphide grease and install it into the end of the input shaft, making sure the longer end faces the left-hand side of the engine (see illustration). Install the pushrod end-piece (see illustration).

34 Install the pressure plate lifter and secure it with the circlip, making sure it is properly seated in its groove (see illustrations).

35 Install the starter clutch (see Section 15).

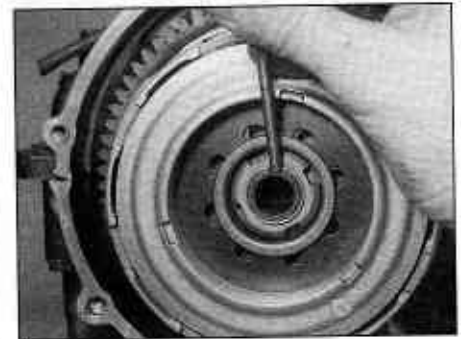
17 Clutch cable – removal and installation



1 Remove the fairing left-hand side panel (see Chapter 8). Working at the lower end of the clutch cable, fully slacken the front adjuster nut and thread the rear nut off the end of the threaded section in the cable bracket on the alternator cover (see illustration). Disconnect



16.32d ... and tighten the clutch nut to the specified torque



16.32e Stake the nut against the cutout in the shaft



16.33a Slide the pushrod into the shaft ...



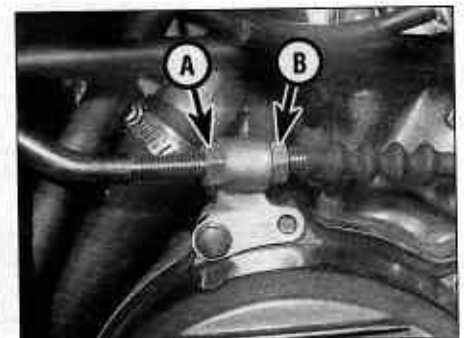
16.33b ... then fit the end-piece



16.34a Install the pressure plate lifter ...



16.34b ... and secure it with the circlip



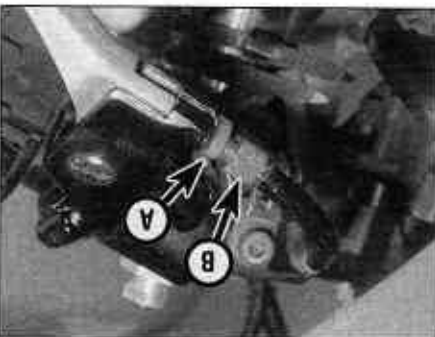
17.1a Fully slacken the front nut (A) and thread the rear nut (B) off the adjuster ...



17.1b ... then release the cable end from the lever ...



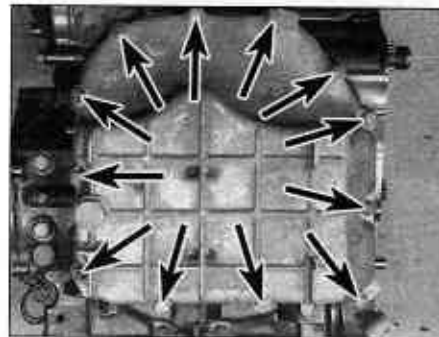
17.1c ... and draw the adjuster out of the bracket



17.2 Fully slacken the locking (A) and thread the adjuster (B) into the bracket



17.3 Align the slots as shown and detach the inner cable



18.4 The sump is secured by twelve bolts (arrowed)

H!NT
Before removing the cable from the bike, tape the lower end of the new cable to the upper end of the old cable. Slowly pull the lower end of the old cable out, guiding the new cable down into position. Using this method will ensure the cable is routed correctly.

the cable end from the clutch release mechanism lever, noting how it fits and release the adjuster from the bracket (see illustrations).
2 Fully slacken the locking on the adjuster at the handlebar end of the cable then screw the adjuster fully in (see illustration). This resets it to the beginning of its adjustment span.
3 Align the slots in the adjuster and lockwheel with that in the lever bracket, then pull the outer cable end from the socket in the adjuster and release the inner cable from the cable lever (see illustration). Remove the cable from the machine, noting its routing through the guide on the top yoke.

4 Installation is the reverse of removal. Apply grease to the cable ends. Make sure the cable is correctly routed. Adjust the amount of clutch lever freeplay (see Chapter 1).

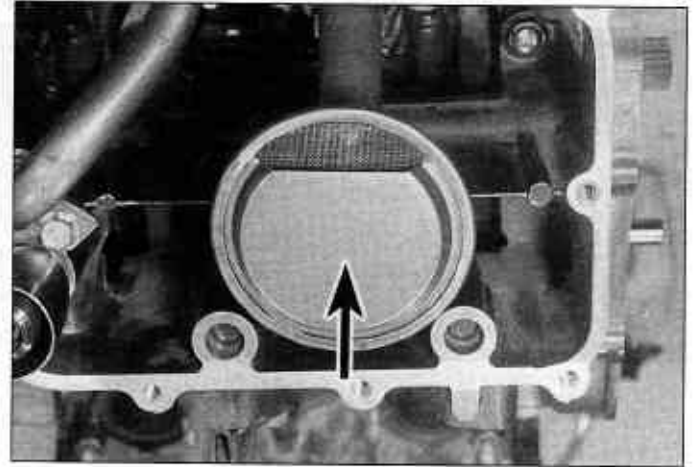
Inspection

- 7 Remove all traces of gasket from the sump used.
- 6 The pressure relief valve is a push-fit into its socket in the crankcase. Remove it, and discard the O-ring as a new one must be used.
- 5 Remove the oil strainer from the oil pump scavenge pipe - it is a push fit (see illustration). Remove the rubber seal and discard it as a new one must be used.
- 4 Unscrew the twelve sump bolts, slackening them evenly in a criss-cross sequence to prevent distortion, and remove the sump (see illustration). Discard the gasket as a new one must be used.
- 3 Remove the front cylinder exhaust downpipes (see Chapter 4).
- 2 Drain the engine oil (see Chapter 1).
- 1 Remove the lower fairing (see Chapter 8).

Removal

Note: The oil sump, strainer and pressure relief valve can be removed with the engine in the frame. If the engine has been removed, ignore the steps which don't apply.

18 Oil sump, oil strainer and pressure relief valve - removal, inspection and installation



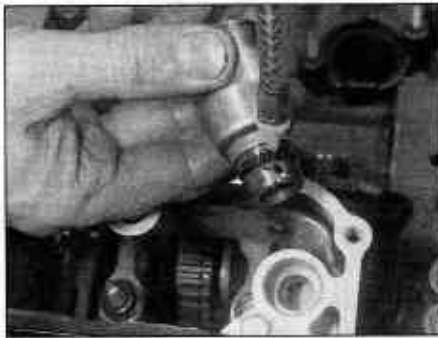
18.5 Remove the strainer (arrowed) ...



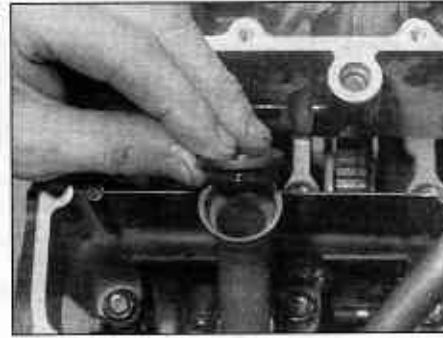
18.6 ... and the pressure relief valve



18.9 Check that the plunger moves freely in the valve body



18.10 Smear clean oil onto the new relief valve O-ring



18.11 Fit the seal into the pipe . . .

and crankcase mating surfaces, and clean the inside of the sump with solvent.

8 Clean the oil strainer in solvent and remove any debris caught in the mesh. If the strainer gauze is damaged, replace the strainer with a new one.

9 Push the relief valve plunger into the valve body and check that it moves smoothly and freely against spring pressure (see illustration). If not, replace the relief valve – individual components are not available.

Installation

10 Fit a new O-ring onto the relief valve and smear it with clean oil, then push the valve into its socket in the crankcase (see illustration).

11 Fit a new rubber seal into the oil pump scavenge pipe (see illustration). Do not fit it onto the strainer as it will distort when the strainer is fitted onto the pipe.

12 Install the strainer onto the pipe, locating the cutout in the strainer base over the lug on the pipe (see illustration).

13 Lay a new gasket onto the sump (if the engine is in the frame) or onto the crankcase (if the engine has been removed and is positioned upside down on the work surface) (see illustration). Make sure the holes in the gasket align correctly with the bolt holes.

14 Position the sump onto the crankcase and install the bolts finger-tight (see illustration). Tighten the bolts evenly in a criss-cross pattern.

15 Install the front cylinder exhaust downpipes (see Chapter 4).

16 Fill the engine with the correct type and quantity of oil as described in Chapter 1. Start the engine and check that there are no leaks around the sump.

17 Install the lower fairing (see Chapter 8).

19 Oil pump – removal, inspection and installation

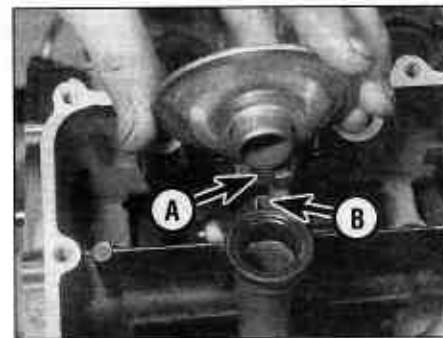
Note: The oil pump can be removed with the engine in the frame. If the engine has been removed, ignore the steps which don't apply.

Removal

1 Remove the sump and oil strainer (see Section 18).

2 Unscrew the twelve bolts securing the right-hand crankcase cover and remove the cover, being prepared to catch any residue oil, and noting the positions of the wiring clips (see illustration 15.3). Discard the gasket as a new one must be used. Remove the dowels from either the cover or the crankcase if they are loose.

3 Unscrew the bolt securing the oil pump driven sprocket (see illustration 16.9a). To prevent the sprocket from turning, engage 6th gear and have an assistant hold the rear brake on (if the engine is in the frame). Alternatively, Honda provide a special tool (Part no. 00724-001010) which locks the primary drive and



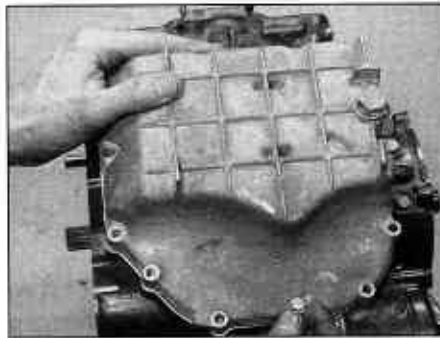
18.12 . . . then install the strainer, aligning the cutout (A) with the lug (B)

driven gears on the starter clutch and main clutch respectively, or a stout piece of cloth, such as denim, can be jammed between them, or use a screwdriver through one of the holes in the sprocket (see **Tool Tip**, Section 16). Draw the sprocket off the oil pump and slip it out of the chain.

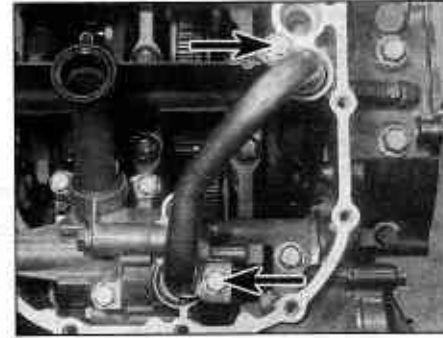
4 On UK VFR L and M models, pull the two small-bore oil pipes from their sockets in the oil pump and crankcase – they are a push-fit. On all models, unscrew the bolts securing the large-bore oil pipe to the pump and the crankcase and remove the pipe (see illustration). Remove the O-rings from the oil pipe sockets or the pipes themselves. The O-rings can be reused if they are in good condition, but should be replaced if they are in any way damaged or deteriorated.



18.13 Lay the new gasket on the sump or crankcase as appropriate . . .

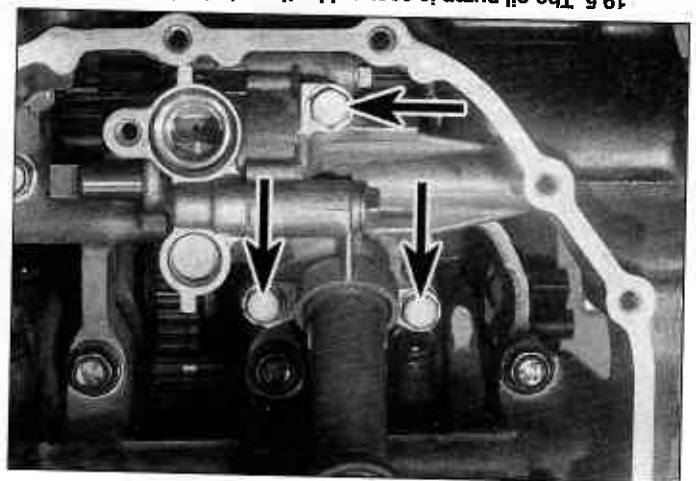


18.14 . . . then install the sump

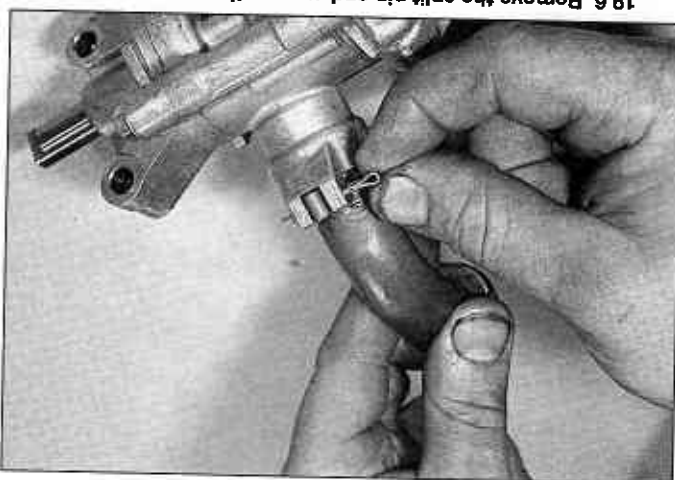


19.4 Unscrew the two bolts (arrowed) and remove the pipe

19.5 The oil pump is secured by three bolts (arrowed)



19.6 Remove the split pin and remove the scavenge pipe



5 Unscrew the three bolts securing the pump to the crankcase, then remove the pump, noting how it fits (see illustration). Note that you may need to rotate the oil pump driveshaft to aid its disconnection with the water pump driveshaft. Remove the pump dowels from either the crankcase or the pump if they are loose. Also remove the oil orifice and its O-ring from the crankcase. The O-ring can be reused if it is in good condition, but three bolts securing the covers to the pump

7 On UK VFR L and M models, unscrew the O-ring as a new one must be used.

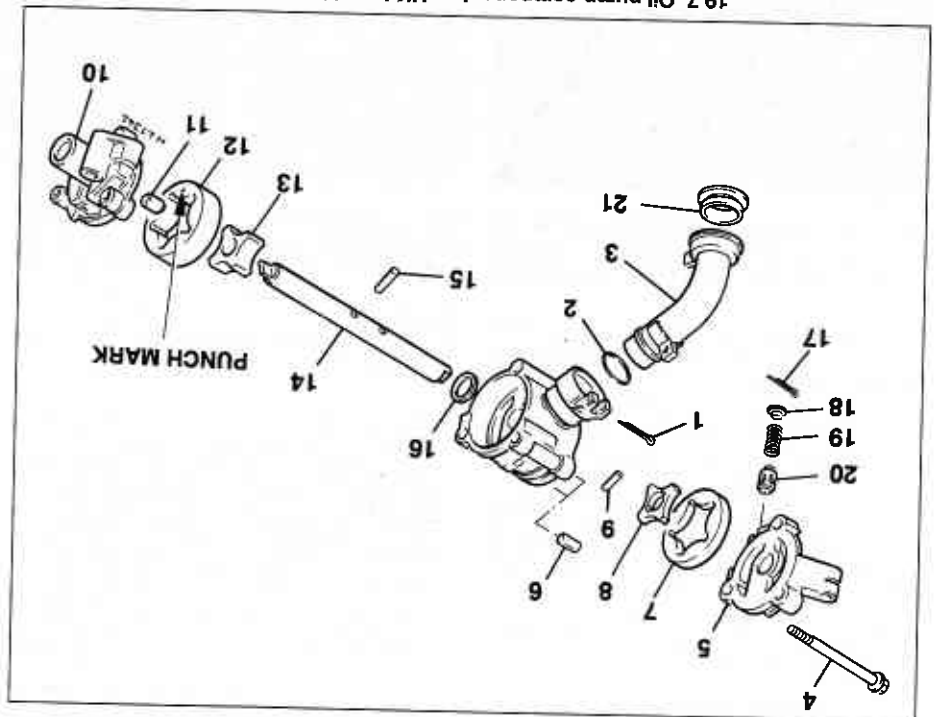
6 Withdraw the split pin securing the scavenge pipe to the pump, then pull the pipe out of the pump (see illustration). Discard the fit, then slide the drive pin out of the and outer rotors, noting which way round they its dowels if they are loose. Remove the inner fit. Remove the inner (feed circuit) cover and and inner rotors, noting which way round they dowels if they are loose. Remove the outer cover (see illustration). Remove the cover body, then remove the outer (cooling circuit) should be replaced if it is in any way damaged

Inspection

8 On all other models, unscrew the three bolts securing the cover to the pump body, then remove cover (see illustration). Remove the cover dowels if they are loose. Remove the outer and inner rotors, noting which way round they fit. Withdraw the driveshaft through the pump body and remove the drive pin and thrust washer. Note which way round the driveshaft fits in the pump. Remove the split pin securing the cooling circuit regulator in the outer cover, noting that the regulator is under spring pressure, then remove the spring retainer, the spring and the plunger, noting which way round each fits.

9 Clean all the components in solvent.

10 Inspect the pump body and rotors for scoring and wear. If any damage, scoring or

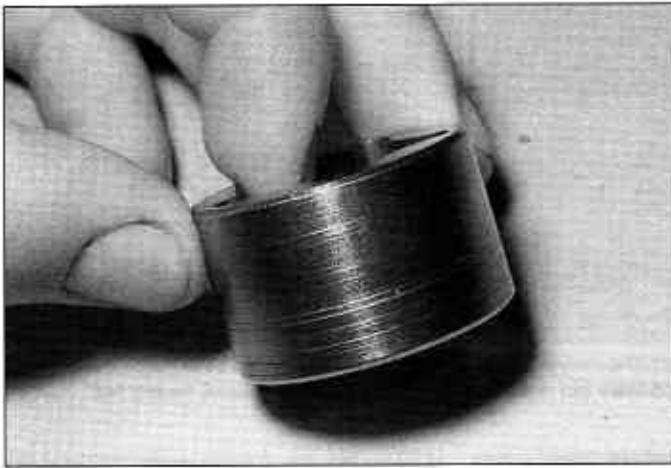


19.7 Oil pump components - UK L and M models

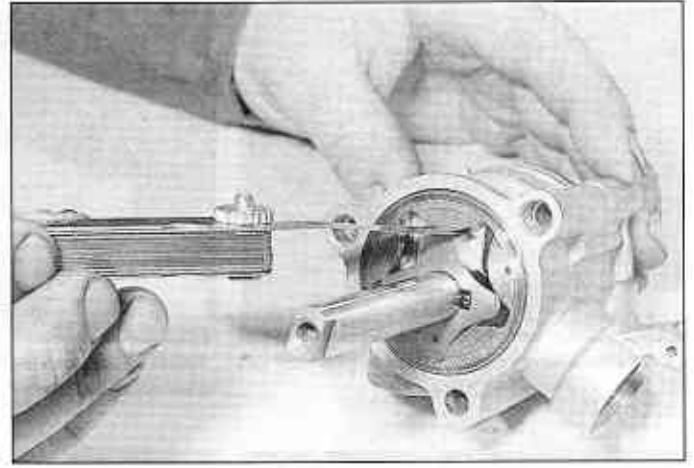
- 1 Split pin
- 2 O-ring
- 3 Scavenge pipe
- 4 Cover bolts
- 5 Outer cover
- 6 Dowels
- 7 Cooling circuit outer rotor
- 8 Cooling circuit inner rotor
- 9 Drive pin
- 10 Inner cover
- 11 Dowels
- 12 Feed circuit outer rotor
- 13 Feed circuit inner rotor
- 14 Driveshaft
- 15 Drive pin
- 16 Thrust washer
- 17 Split pin
- 18 Spring retainer
- 19 Spring
- 20 Plunger
- 21 Strainer seal

19.8 Unscrew the bolts and remove the cover





19.10 Look for scoring and wear, such as on this outer rotor



19.11 Measure the inner rotor tip-to-outer rotor clearance as shown

uneven or excessive wear is evident, replace the pump (individual components are not available) (see illustration).

11 Fit the inner and outer rotors into the pump body (on UK VFR L and M models with the dual circuit pump, make sure the thinner rotors are fitted in the cooling circuit side, and the thicker rotors in the feed side). Measure the clearance between the inner rotor tip and the outer rotor with a feeler gauge and compare it to the service limit listed in the specifications at the beginning of the Chapter (see illustration). If the clearance measured is greater than the maximum listed, replace the pump.

12 Measure the clearance between the outer rotor and the pump body with a feeler gauge and compare it to the maximum clearance listed in the specifications at the beginning of the Chapter (see illustration). If the clearance measured is greater than the maximum listed, replace the pump.

13 Lay a straight-edge across the rotors and the pump body and, using a feeler gauge, measure the rotor end-float (the gap between the rotors and the straight-edge (see illustration). If the clearance measured is greater than the maximum listed, replace the pump.

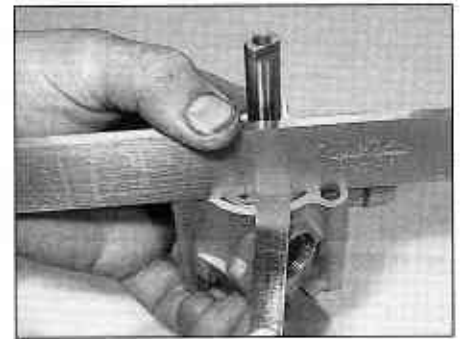
14 Check the pump drive chain and driven sprockets for wear or damage, and replace them as a set along with the drive sprocket if necessary. To access the drive sprocket, remove the clutch (see Section 16).

15 If the pump is good, make sure all the components are clean, then lubricate them with new engine oil.

16 On UK VFR L and M models, slide the thrust washer onto the shaft and fit the cooling circuit drive pin into the central hole in the driveshaft (see illustration 19.7). Slide the driveshaft through the pump body from the outer cooling circuit side, making sure the end with the tab goes through to the inner feed circuit side. Fit the feed circuit drive pin into its hole in the driveshaft, then slide the inner



19.12 Measure the outer rotor-to-body clearance as shown



19.13 Measure the rotor end-float as shown

feed circuit rotor onto the shaft so that the cutouts on the inside of the rotor locate over the ends of the drive pin. Slide the outer rotor, with its punch mark facing out, onto the shaft and over the inner rotor. Remember that the feed circuit rotors are thicker than the cooling circuit rotors. Lubricate the rotors with clean engine oil. Fit the inner cover dowels if removed, then fit the cover. Slide the inner cooling circuit rotor onto the driveshaft so that the cutouts on the inside of the rotor locate over the ends of the drive pin. Slide the outer rotor, with its punch mark facing out, onto the driveshaft and over the inner rotor. Lubricate

the rotors with clean engine oil. Fit the outer cover dowels if removed, then fit the cover and tighten the bolts to the torque setting specified at the beginning of the Chapter. Install the cooling circuit regulator plunger, spring and spring retainer into the cover and secure them using a new split pin.

17 On all other models, slide the driveshaft through the pump body from the outside, making sure the end with the bolt hole is on the outside (see illustration). Slide the thrust washer onto the driveshaft and fit the drive pin into the central hole in the driveshaft (see illustrations). Slide the inner rotor onto the



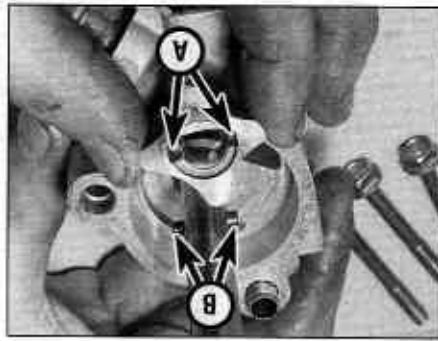
19.17a Slide the shaft through the pump...



19.17b ... then fit the thrust washer ...



19.17c ... and the drive pin



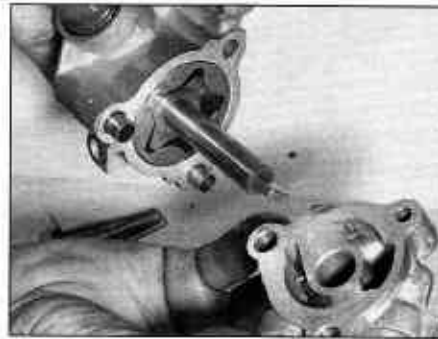
19.17d The cutouts (A) on the inside of the inner rotor locate onto the drive pin ends (B)



19.17e Fit the outer rotor with the punch mark (arrowed) facing out



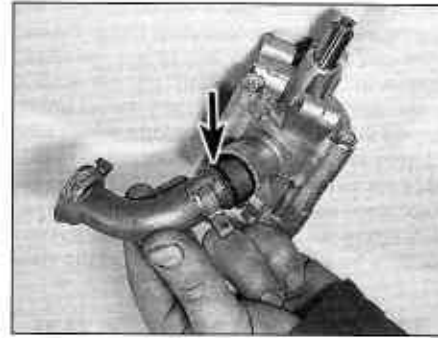
19.17f Lubricate the rotors ...



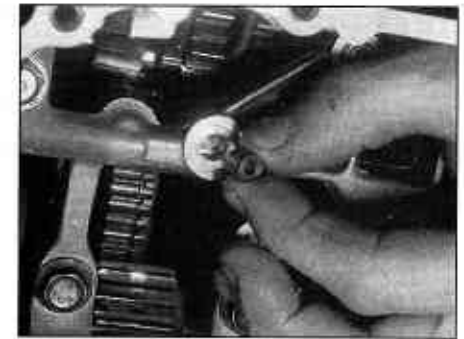
19.17g ... then install the cover ...



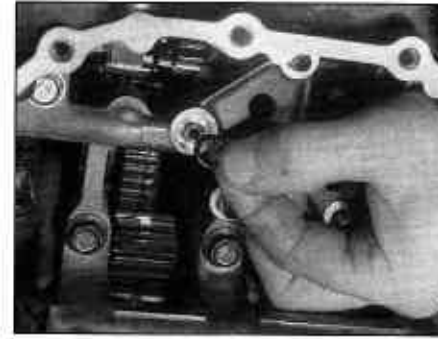
19.17h ... and tighten the bolts to the specified torque



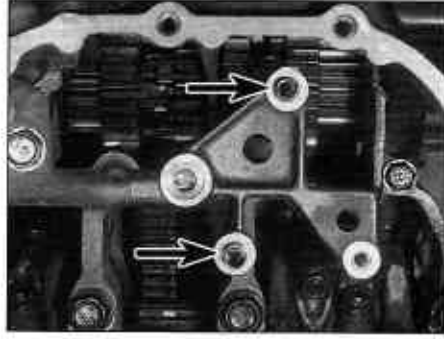
19.19 Fit the scavenge pipe using a new O-ring (arrowed)



19.20a Fit the oil orifice ...



19.20b ... then fit the O-ring around it



19.21 Make sure the dowels (arrowed) are in place ...

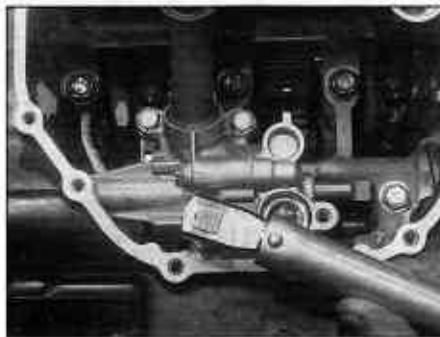
Installation

20 Check that the oil orifice is clear. Smear its O-ring with clean engine oil, using a new one if required, then fit the orifice and the O-ring into the crankcase (see illustration). 21 If removed, fit the pump dowels into the crankcase (see illustration). Position the water pump and oil pump driveshaft slots vertically so that they engage easily when the pump is installed. 22 Manoeuvre the pump into position, making sure it engages correctly with the water pump and locates correctly onto the

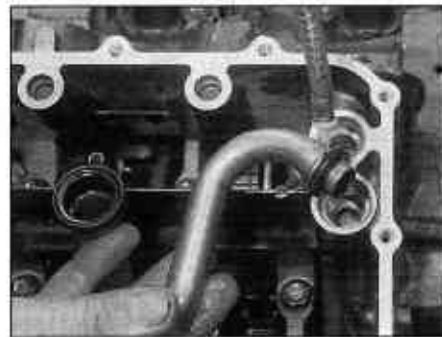
shaft so that the cutouts on the inside of the rotor locate over the ends of the drive pin (see illustrations). Slide the outer rotor, with its punch mark facing out, onto the driveshaft and over the inner rotor (see illustration). Lubricate the rotors with clean engine oil (see illustration). Fit the outer cover dowels if removed, then fit the cover and tighten the bolts to the torque setting specified at the beginning of the Chapter (see illustrations). 18 Rotate the pump shaft by hand and check that the rotors turn smoothly and freely. 19 Fit a new O-ring onto the pump end of the scavenge pipe and smear it with clean oil. Fit the pipe into the pump, aligning the holes in the tab on the pipe with those in the lugs on the pump (see illustration). Secure them using a new split pin inserted through the holes. Bend over the ends of the split pin.



19.22a ... then install the pump ...



19.22b ... and tighten the bolts to the specified torque



19.24a Smear the O-rings with clean oil ...

dowels (see illustration). Fit the pump mounting bolts and tighten them to the torque setting specified at the beginning of the Chapter (see illustration).

23 Slip the oil pump driven sprocket into the drive chain, then fit the sprocket onto the pump. Clean the threads of the sprocket bolt, then apply a suitable non-permanent thread locking compound and tighten the bolt to the specified torque, using the method employed on removal to prevent the sprocket turning.

24 The oil pipe O-rings can be re-used if they are in good condition, but should be replaced if they are in any way damaged or deteriorated. Smear them with clean oil before fitting the pipes (see illustration). On all models, fit the large bore oil pipe into the pump and the crankcase and secure it with the bolts (see illustration). On UK VFR L and M models, fit the two small bore oil pipes into their sockets in the oil pump and crankcase – they are a push-fit.

25 If removed, fit the right-hand crankcase cover dowels into the crankcase, then install the cover using a new gasket, making sure it locates correctly onto the dowels and the idle/reduction gear shaft (see illustration 15.21a). Tighten the cover bolts evenly in a criss-cross sequence to the specified torque setting, making sure the wiring clips are correctly installed (see illustration 15.21b).

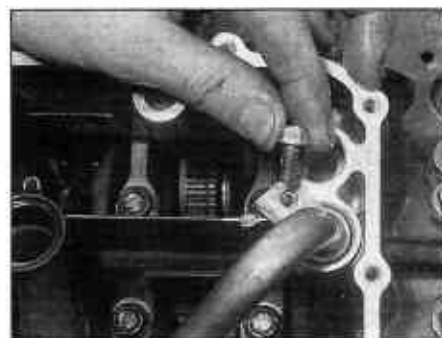
26 Install the oil strainer and sump (see Section 18).

20 Gearchange mechanism (external components) – removal, inspection and installation

Note: The gearchange mechanism (external components) can be removed with the engine in the frame. If the engine has been removed, ignore the steps which don't apply.

Removal

- 1 Remove the lower fairing (see Chapter 8).
- 2 Unscrew the gearchange lever linkage arm pinch bolt and remove the arm from the shaft, noting the alignment punch marks (see illustrations). 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 bolt securing the clutch cable holder to the alternator cover, then detach the bracket and slip the cable end out of the release lever on the engine sprocket cover (see illustrations 16.20a and b). Unscrew the two bolts securing the speedometer drive box to the engine sprocket cover and detach the box, noting how the drive tab locates in the slot in the sprocket bolt cap (see illustration 16.20c). Unscrew the bolts securing the engine sprocket cover to the crankcase and draw the cover away from the engine (see illustration 16.20d). Note the positions of the



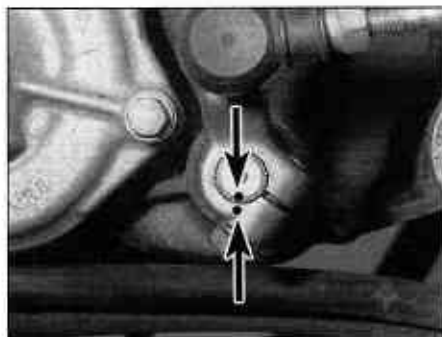
19.24b ... then fit the pipe and tighten the bolts

bolts as they are all different lengths. Note the position of the dowels and remove them if they are loose.

3 Remove the water pump (see Chapter 3).

4 Wrap some insulating tape around the gearchange shaft splines to protect the oil seal lips as the gearchange mechanism cover is removed. Unscrew the bolts and remove the cover (see illustration). Remove the dowels if they are loose. Discard the gasket as a new one must be used.

5 Note how the gearchange shaft centralising spring ends fit on each side of the locating pin in the casing, and how the eye of the selector arm locates over the collar on the drum shift assembly (see



20.2a Note the alignment of the punch marks (arrowed) ...

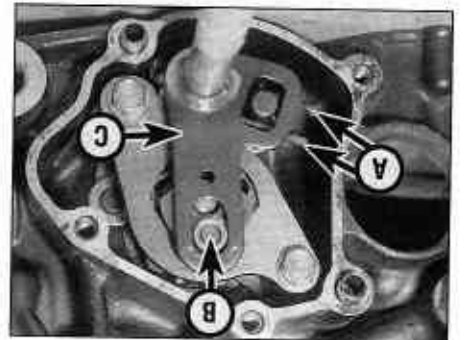


20.2b ... then remove the bolt and slide the arm off the shaft

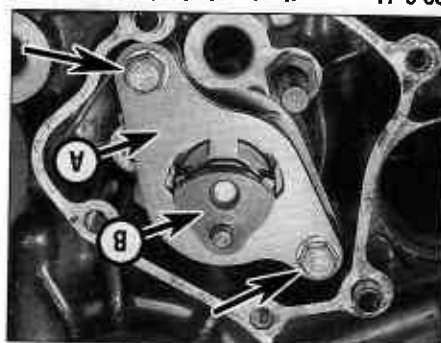


20.4 The cover is secured by four bolts (arrowed)

20.5 Note how the spring ends (A) locate, and how the eye of the arm locates over the collar (B), then withdraw the shaft/arm assembly (C)



20.6 Unscrew the two bolts (arrowed) and remove the guide plate (A) and drum shift assembly (B)



20.7 Remove the stopper arm assembly



(illustration) Withdraw the gearchange shaft and its thrust washer from the casing. Remove the collar from the pin on the drum shift assembly.

6 Unscrew the two bolts securing the drum shift guide plate, then remove the plate along with the drum shift assembly, noting that the pawls of the drum shift are under spring pressure (**see illustration**). Use your fingers to prevent them from ping-pong out. Note the correct fitted position of all components. Remove the spacer from the guide plate upper mounting dowel and the thrust washer from the lower one.

7 Lift the stopper arm off the stopper plate on the selector drum and remove the arm with its

Inspection

9 Inspect the stopper arm return spring and the shaft centralising spring. If they are loose.

(see illustration).

8 If the selector drum and forks are to be removed from the transmission casing, unscrew the pin bolt securing the drum shift cam to the selector drum, then remove the cam and the rear guide plate (see illustration). Note the locating pin between the shift cam and the selector drum and remove it for safe keeping if required (see illustration). Also remove the dowels if they are loose.

Inspection

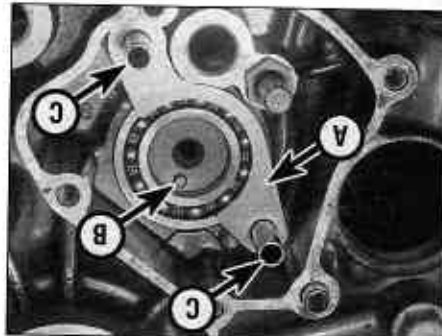
10 Check the gearchange shaft for straightness and damage to the splines. If the shaft is bent you can attempt to straighten it, but if the splines are damaged the shaft must be replaced. Also check the condition of the shaft oil seal in the casing and replace it if damaged or deteriorated. Lever the old seal out using a screwdriver and drive the new seal in squarely (see illustration).

11 Inspect the selector arm eye and the drum shift collar, and the stopper arm roller and the stopper plates. If they are worn or damaged they must be replaced.

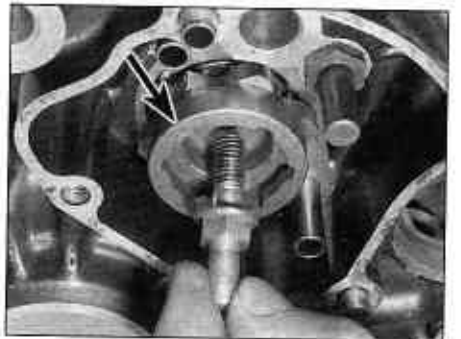
12 Check the drum shift, pawls, pins and springs for wear and damage. Replace them if defects are found.

Installation

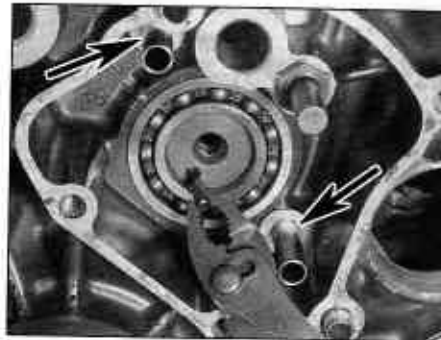
13 If removed, install the locating pin in the offset hole in the end of the selector drum, and the guide plate dowels (see [illustration](#)). Fit the rear guide plate onto the dowels, then install the drum shift cam, locating the slot in the back over the locating pin in the selector drum (see [illustrations](#)). Clean the threads of the pin bolt, then apply a suitable non-



20.8a Unscrew the pin bolt and remove the cam (arrowed) . . .



20.13a Fit the locating pin and the dowels (arrowed) . . .

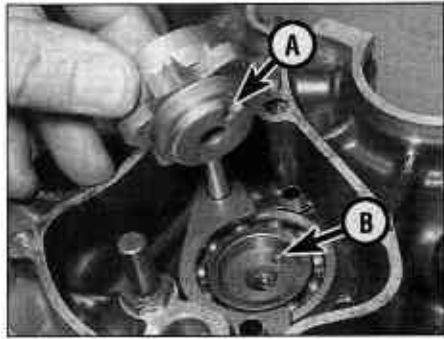


20.13b . . . then fit the rear guide plate over the dowels



20.10 Replace the gearchange cover oil seal if required

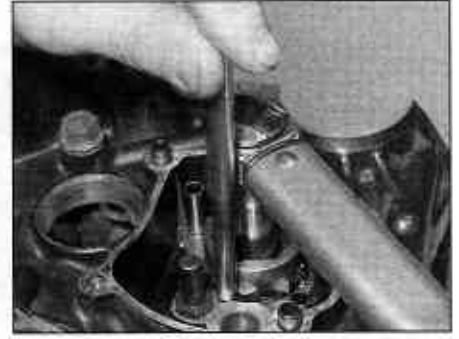




20.13c Fit the cam so the cutout (A) locates over the pin (B)



20.13d Apply a thread locking compound to the bolt . . .



20.13e . . . and tighten it to the specified torque

permanent thread locking compound (see illustration). Install the pin bolt and tighten it to the torque setting specified at the beginning of the Chapter, using a rod inserted between the cam and the crankcase to prevent the drum from turning (see illustration).

14 Fit the spacer onto the guide plate upper mounting dowel (see illustration).

15 Fit the stopper arm assembly onto the lower mounting dowel, positioning the stopper arm roller into the neutral detent in the shift cam (identified by the triangle on the top of the cam) and making sure the spring ends are located correctly over the stopper arm and against the casing (see illustration). Make sure the stopper arm is free to move and is returned by the pressure of the spring. Fit the thrust washer onto the stopper arm (see illustration).

16 If the drum shift assembly was disassembled, install the springs, pins and pawls, making sure the rounded end of each pawl fits into the rounded cut-out in the drum shift, and that the pins locate correctly in the cut-outs in the pawls (see illustrations).

17 Depress the pawls and fit the drum shift assembly into the shift cam, locating the pin bolt through the hole in the drum shift (see illustration). Make sure the pawls locate correctly in the cutouts in the cam. Fit the guide plate around the drum shift and locate it



20.14 Fit the spacer onto the upper dowel



20.15a Install the stopper arm



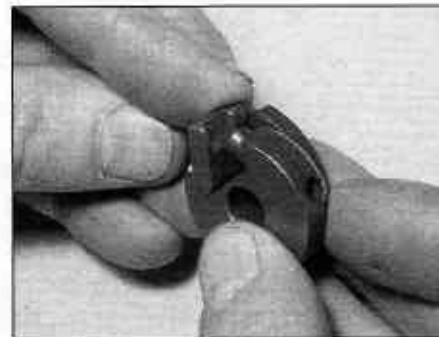
20.15b Align the cam so that the stopper arm locates against the neutral detent, identified by the triangle (arrowed)



20.15c Install the thrust washer over the stopper arm



20.16a Drum shift pawl assembly



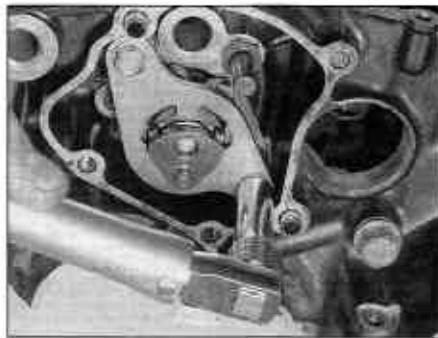
20.16b Note that the pawl cut-out is offset – ensure they are fitted correctly



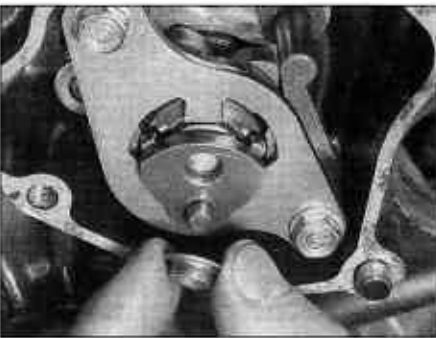
20.17a Fit the drum shift assembly into the cam . . .



20.17b ... then fit the guide plate ...



20.17c ... and tighten the bolts to the specified torque



20.18 Fit the collar onto the pin

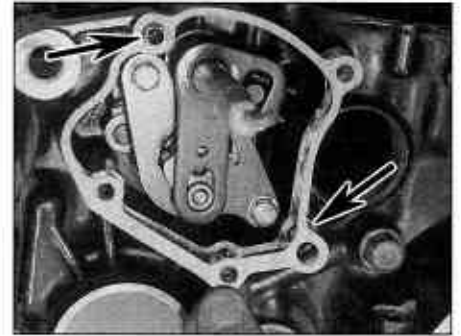
onto the dowels (see illustration). Clean the threads of the guide plate bolts, then apply a suitable non-permanent thread locking compound and tighten them to the specified torque setting (see illustration).

18 Fit the collar onto the pin on the drum shift assembly, noting that its shouldered side faces the shift assembly (see illustration).

19 Check that the gearchange shaft centralising spring is correctly positioned, then fit the thrust washer onto the inner end of the shaft (see illustrations). Fit the shaft into its hole in the casing. Make sure the centralising spring ends are correctly located on each side of the tab on the arm and the pin in the casing, and that the eye of the arm locates around the collar (see illustration 20.5).



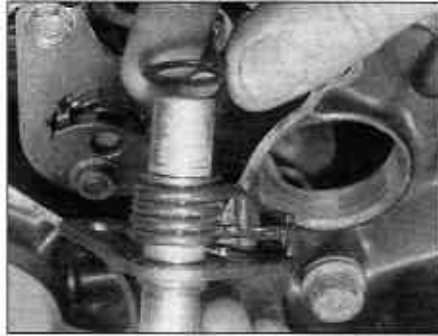
20.19a Check that the spring ends are correctly located ...



20.20a Lay the gasket onto the dowels (arrowed) ...



20.20b ... then install the gearchange cover



20.19b ... then fit the thrust washer and install the shaft

20 Fit the cover dowels in the casing if removed, then install the cover using a new gasket and tighten the bolts evenly (see illustration). Remove the tape from around the shaft splines.

21 Install the water pump (see Chapter 3). If removed, fit the engine sprocket cover dowels into the casing, then fit the cover and tighten the bolts securely, making sure the bolts are in their correct locations (see illustration 16.20g). Fit the speedometer drive gear onto the cover, making sure the drive gear tab locates correctly into the slot in the engine sprocket bolt cap (see illustration 16.20h). Fit the clutch cable end into the release lever, then mount the cable bracket onto the alternator cover and tighten its bolts securely (see illustrations 16.20b and a).

22 To enable the crankcases to be separated, the selector drum and forks, the crankcase must be split into two parts.

23 Install the gearchange linkage arm onto the end of the shaft, aligning the punch marks, and check that the mechanism works correctly (see illustrations 20.2a and b). Tighten the pinch bolt.

24 Install the lower fairing (see Chapter 8).

21 Crankcase halves - separation and reassembly

Note: To separate the crankcase halves, the engine must be removed from the frame.

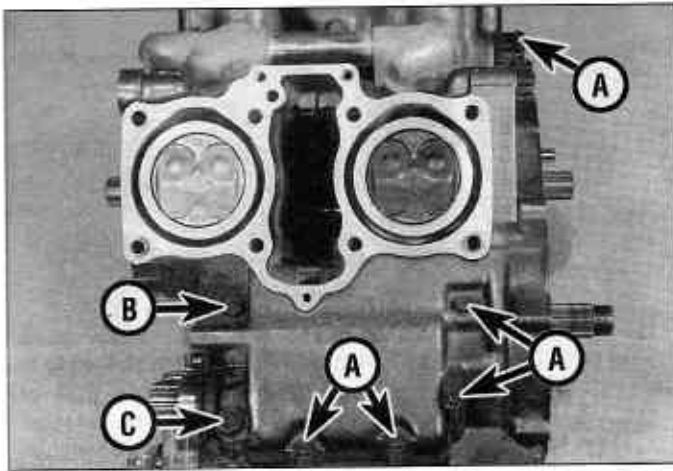
Separation

1 To access the pistons, connecting rods, crankshaft, bearings, transmission shafts and the selector drum and forks, the crankcase must be split into two parts.

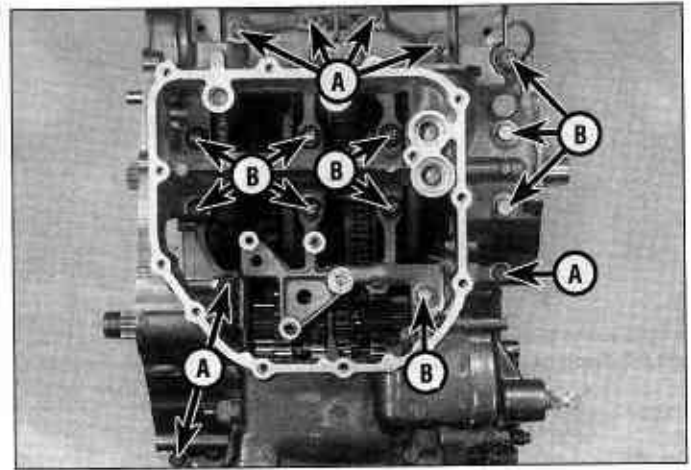
2 To enable the crankcases to be separated, the engine must be removed from the frame (see Section 5). Before the crankcases can be separated the following components must be removed:

- a) Oil cooler (UK VFR L and M models) (Section 7).
- b) Valve covers (Section 8).
- c) Camshafts (Section 9).
- d) Camshaft drive gear assemblies (Section 11).
- e) Cylinder heads (Section 12).
- f) Ignition pulse generator assembly (Chapter 5).
- g) Starter clutch and primary drive gear (Section 15).
- h) Clutch (Section 16).
- i) Water pump (Chapter 3).
- j) Gearchange mechanism external components (Section 20) - see note below.
- k) Oil sump (Section 18).
- l) Oil pump (Section 19).
- m) Alternator rotor and stator (Chapter 9).
- n) Starter motor (Chapter 9).

Note: If the crankcases are being separated to remove the crankshaft without removing it, or to remove the crankshaft without removing the connecting rods and pistons, the front cylinder head can remain in situ. The rear head must be removed, otherwise access for



21.4 Upper crankcase 6 mm bolts (A), 8 mm bolt (B) and 10 mm bolt (C)



21.6 Lower crankcase 6 mm bolts (A) and 8 mm bolts (B)

tightening one of the crankcase bolts with a torque wrench is too restricted. However, if removal of the connecting rod assemblies is intended, full disassembly of the top-end is necessary. The gearchange mechanism external components can also remain in situ unless the selector drum and forks are being removed.

3 If the transmission shafts are being removed, unscrew the two bolts securing the transmission input shaft bearing retainer plate to the right-hand side of the crankcase and remove the plate (see illustration 28.2a).

4 Unscrew the five 6 mm, one 8 mm and one 10 mm upper crankcase bolts (see illustration). Unscrew the bolts evenly, a little at a time and in a criss-cross sequence until they are finger-tight, then remove them. **Note:** As each bolt is removed, store it in its relative position in a cardboard template of the crankcase halves. This will ensure all bolts are installed in the correct location on reassembly.

5 Turn the engine upside down.

6 Unscrew the seven 6 mm lower crankcase bolts, followed by the ten 8 mm bolts (see

illustration). Unscrew the bolts evenly, a little at a time and in a criss-cross sequence until they are finger-tight, then remove them. **Note:** As each bolt is removed, store it in its relative position in a cardboard template of the crankcase halves. This will ensure all bolts are installed in the correct location on reassembly.

7 Carefully lift the lower crankcase half off the upper half, using a soft-faced hammer to tap around the joint to initially separate the halves if necessary. **Note:** If the halves do not separate easily, make sure all fasteners have been removed. Do not try and separate the halves by levering against the crankcase mating surfaces as they are easily scored and will leak oil in the future if damaged. The lower crankcase half will come away with the gearchange mechanism external components (if not already removed) and the selector drum and forks, leaving the crankshaft and transmission shafts in the upper crankcase half.

8 Remove the three locating dowels from the crankcase if they are loose (they could be in either crankcase half), noting their locations (see illustration).

9 Refer to Sections 22 to 30 for the removal and installation of the components housed within the crankcases.

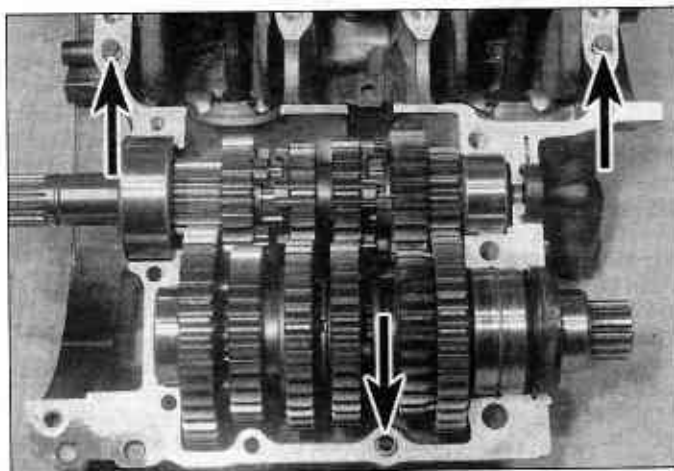
Reassembly

10 Remove all traces of sealant from the crankcase mating surfaces.

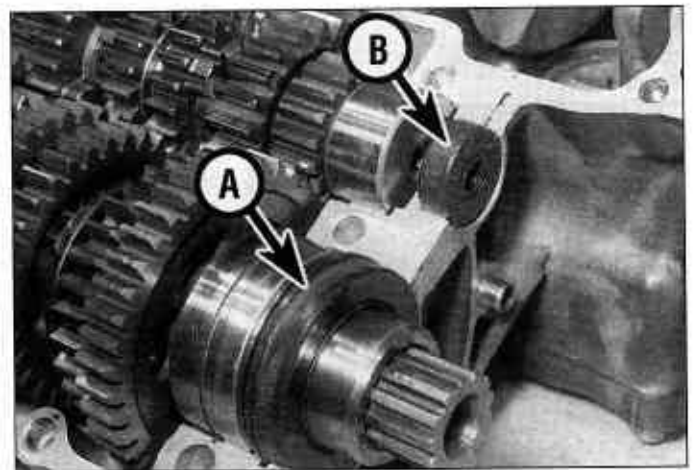
11 Ensure that all components and their bearings are in place in the upper and lower crankcase halves. If the transmission shafts have not been removed, check the condition of the output shaft oil seal on the left-hand end of the shaft and the clutch pushrod oil seal on the left-hand end of the input shaft and replace them if they are damaged or deteriorated (see illustration).

12 Generously lubricate the crankshaft and transmission shafts, particularly around the bearings, with clean engine oil, then use a rag soaked in high flash-point solvent to wipe over the mating surfaces of both crankcase halves to remove all traces of oil.

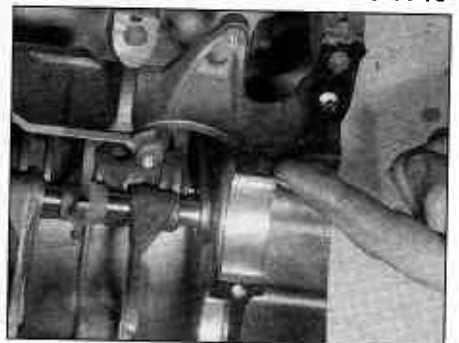
13 If removed, install the three locating dowels in the upper crankcase half (see illustration 21.8).



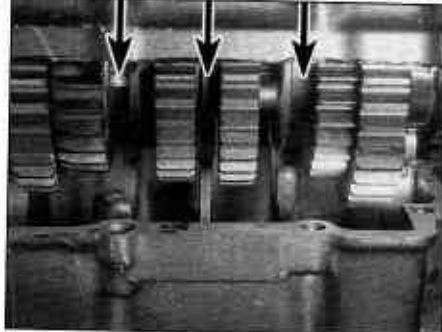
21.8 Remove the dowels (arrowed) if they are loose



21.11 Check the output shaft seal (A) and the pushrod seal (B)



21.14 Apply sealant to one crankcase half



21.15 Make sure the selector fork is located in its pinion grooves (arrowed)



21.17 Tighten the bolts as described to the specified torque

14 Apply a small amount of suitable sealant to the outer mating surface of one crankcase half (see illustration).
Caution: Do not apply an excessive amount of sealant as it will ooze out when the case halves are assembled and may obstruct oil passages. Do not apply the sealant on or too close to any of the bearing inserts or surfaces.

15 Check again that all components are in position, particularly that the bearing shells are still correctly located in the lower crankcase half. Carefully install the lower crankcase half down onto the upper crankcase half, making sure each selector fork locates correctly in the groove in its pinion, and the dowels all locate correctly into the lower crankcase half (see illustration).

16 Check that the lower crankcase half is correctly seated. **Note:** The crankcase halves should fit together without being forced. If the casings are not correctly seated, remove the lower crankcase half and investigate the problem. Do not attempt to pull them together using the crankcase bolts as the casing will crack and be ruined.

17 Clean the threads of the ten 8 mm lower crankcase bolts and insert them in their original locations (see illustration 21.6). Secure all bolts finger-tight at first, then tighten them evenly a little at a time in a cross sequence to the torque setting specified at the beginning of the Chapter (see illustration).

18 Clean the threads of the seven 6 mm lower crankcase bolts and insert them in their original locations (see illustration 21.6). Secure all bolts finger-tight at first, then tighten them evenly a little at a time in a cross sequence to the torque setting specified at the beginning of the Chapter.

19 Turn the engine over. Clean the threads of the five 6 mm, one 8 mm and one 10 mm upper crankcase bolts and insert them in their original locations (see illustration 21.4). Secure all bolts finger-tight at first, then tighten them evenly a little at a time in a cross sequence to the torque setting specified at the beginning of the Chapter.

Crankcase halves

1 After the crankcases have been separated, remove the crankshaft, connecting rods and pistons, transmission shafts, selector drum and forks, neutral switch oil pressure switch, and, if required, the cooling system unions, referring to the relevant Sections of this Chapter, to Chapter 9 for the oil pressure and neutral switches, and to Chapter 3 for the coolant unions.

2 The crankcases should be cleaned thoroughly with new solvent and dried with compressed air. All oil passages should be blown out with compressed air.

3 All traces of old gasket sealant should be removed from the mating surfaces. Minor damage to the surfaces can be cleaned up with a fine sharpening stone or grindstone.

Caution: Be very careful not to nick or gouge the crankcase mating surfaces or oil leaks will result. Check both crankcase halves very carefully for cracks and other damage.

4 Small cracks or holes in aluminium castings may be repaired with an epoxy resin adhesive.

Cylinder bores

7 Install all components and assemblies, referring to the relevant Sections of this Chapter and to Chapter 9, before reassembling the crankcase halves.

8 Do not attempt to separate the cylinder liners from the cylinder block.

9 Check the cylinder walls carefully for scratches and score marks.

10 Using a precision straight-edge and a feeler gauge set to the warpage limit listed in the specifications at the beginning of the Chapter, check the block gasket mating surface for warpage. Refer to Tools and Workshop Tips in the Reference section for details of how to use the straight-edge. If warpage is excessive the block must be replaced with a new one.

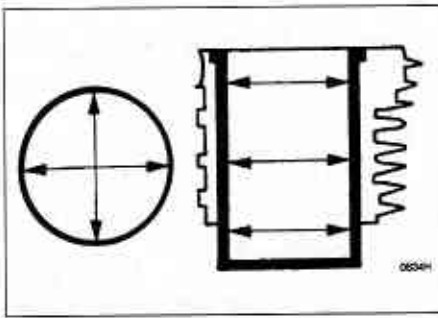
11 Using telescoping gauges and a micrometer (see Tools and Workshop Tips), check the dimensions of each cylinder to measure near the top (but below the level of the top piston ring at TDC), centre and bottom (but above the level of the oil ring at BDC) of

HAYNES
HINT
 Refer to Tools and Workshop Tips for details of installing a thread insert and using screw extractors.

dislodging the most stubborn stud or screw.

6 Sheared studs or screws can usually be removed with screw extractors, which consist of a tapered, left-hand thread screw of very hard steel. These are inserted into a pre-drilled hole in the stud, and usually succeed in pulling the stud or screw out.

5 Damaged threads can be economically reclaimed by using a diamond section wire insert, or the Heli-Coil type, which is easily fitted after drilling and re-tapping the affected thread.



22.11 Measure each cylinder bore in the directions shown

the bore, both parallel to and across the crankshaft axis (**see illustration**). Compare the results to the specifications at the beginning of the Chapter. If the cylinders are worn, oval or tapered beyond the service limit the crankcases will have to be renewed, oversize pistons and rings and not available.

12 If the precision measuring tools are not available, take the crankcases to a Honda dealer or specialist motorcycle repair shop for assessment and advice.

13 If the cylinder bores are in good condition and the piston-to-bore clearance is within specifications (see Section 25), the cylinders should be honed (de-glazed). To perform this operation you will need the proper size flexible hone with fine stones, or a bottle-brush type hone, plenty of light oil or honing oil, some clean rags and an electric drill motor.

14 Hold the block sideways (so that the bores are horizontal rather than vertical) in a vice with soft jaws or cushioned with wooden blocks. Mount the hone in the drill motor, compress the stones and insert the hone into the cylinder. Thoroughly lubricate the cylinder, then turn on the drill and move the hone up and down in the cylinder at a pace which produces a fine cross-hatch pattern on the cylinder wall with the lines intersecting at an angle of approximately 60°. Be sure to use plenty of lubricant and do not take off any more material than is necessary to produce the desired effect. Do not withdraw the hone from the cylinder while it is still turning. Switch off the drill and continue to move it up and down in the cylinder until it has stopped turning, then compress the stones and withdraw the hone. Wipe the oil from the cylinder and repeat the procedure on the other cylinders. Remember, do not take too much material from the cylinder wall.

15 Wash the bores thoroughly with warm soapy water to remove all traces of the abrasive grit produced during the honing operation. Be sure to run a brush through the stud holes and flush them with running water. After rinsing, dry the cylinders thoroughly and apply a thin coat of light, rust-preventative oil to all machined surfaces.

16 If you do not have the equipment or desire to perform the honing operation, take the crankcase to a Honda dealer or specialist motorcycle repair shop.

23 Main and connecting rod bearings – general information

1 Even though main and connecting rod bearings are generally replaced with new ones during the engine overhaul, the old bearings should be retained for close examination as they may reveal valuable information about the condition of the engine.

2 Bearing failure occurs mainly because of lack of lubrication, the presence of dirt or other foreign particles, overloading the engine and/or corrosion. Regardless of the cause of bearing failure, it must be corrected before the engine is reassembled to prevent it from happening again.

3 When examining the connecting rod bearings, remove them from the connecting rods and caps and lay them out on a clean surface in the same general position as their location on the crankshaft journals. This will enable you to match any noted bearing problems with the corresponding crankshaft journal.

4 Dirt and other foreign particles get into the engine in a variety of ways. It may be left in the engine during assembly or it may pass through filters or breathers. It may get into the oil and from there into the bearings. Metal chips from machining operations and normal engine wear are often present. Abrasives are sometimes left in engine components after reconditioning operations, especially when parts are not thoroughly cleaned using the proper cleaning methods. Whatever the source, these foreign objects often end up imbedded in the soft bearing material and are easily recognised. Large particles will not imbed in the bearing and will score or gouge the bearing and journal. The best prevention for this cause of bearing failure is to clean all parts thoroughly and keep everything spotlessly clean during engine reassembly. Frequent and regular oil and filter changes are also recommended.

5 Lack of lubrication or lubrication breakdown has a number of interrelated causes. Excessive heat (which thins the oil), overloading (which squeezes the oil from the bearing face) and oil leakage or throw off (from excessive bearing clearances, worn oil pump or high engine speeds) all contribute to lubrication breakdown. Blocked oil passages will also starve a bearing and destroy it. When lack of lubrication is the cause of bearing failure, the bearing material is wiped or extruded from the steel backing of the bearing. Temperatures may increase to the point where the steel backing and the journal turn blue from overheating.



Refer to Tools and Workshop Tips for bearing fault finding.

6 Riding habits can have a definite effect on bearing life. Full throttle low speed operation, or labouring the engine, puts very high loads on bearings, which tend to squeeze out the oil film. These loads cause the bearings to flex, which produces fine cracks in the bearing face (fatigue failure). Eventually the bearing material will loosen in pieces and tear away from the steel backing. Short trip riding leads to corrosion of bearings, as insufficient engine heat is produced to drive off the condensed water and corrosive gases produced. These products collect in the engine oil, forming acid and sludge. As the oil is carried to the engine bearings, the acid attacks and corrodes the bearing material.

7 Incorrect bearing installation during engine assembly will lead to bearing failure as well. Tight fitting bearings which leave insufficient bearing oil clearances result in oil starvation. Dirt or foreign particles trapped behind a bearing insert result in high spots on the bearing which lead to failure.

8 To avoid bearing problems, clean all parts thoroughly before reassembly, double check all bearing clearance measurements and lubricate the new bearings with clean engine oil during installation.

24 Connecting rods – removal, inspection and installation

Note: To remove the connecting rods the engine must be removed from the frame and the crankcases separated.

Removal

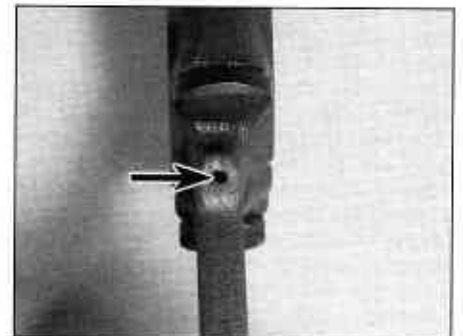
1 Remove the engine from the frame (see Section 5) and separate the crankcase halves (see Section 21).

2 Before removing the rods from the crankshaft, measure the clearance between each pair of rods with a feeler gauge (**see illustration**). If the clearance is greater than the service limit listed in this Chapter's Specifications, replace that pair of rods with new ones.

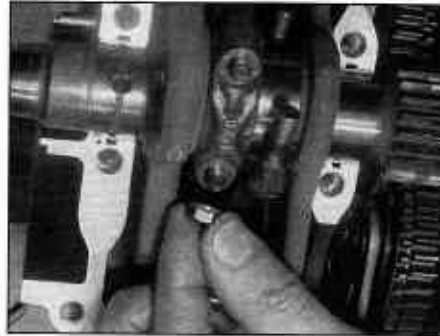
3 Using paint or a felt marker pen, mark the relevant cylinder identity on each connecting rod and cap. Mark across the cap-to-



24.2 Measure the connecting rod side clearance using a feeler gauge



24.3 The oil hole (arrowed) in each connecting rod faces the back of the engine

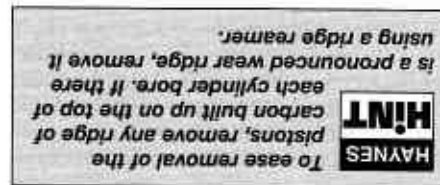


24.4 Unscrew the nuts and remove the connecting rod cap



24.5 Withdraw the piston and connecting rod assembly from the top of the cylinder

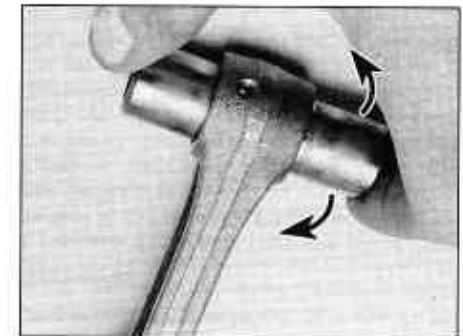
they are to be reused) the bearing shells together in their correct positions to ensure correct installation.



Caution: Do not try to remove the piston/connecting rod from the bottom of the cylinder bore. The piston will not pass the crankcase main bearing webs. If the piston is pulled right to the bottom of the bore the oil control ring will expand and lock the piston in position. If this happens it is likely the ring will be broken.

Inspection
8 Check the connecting rods for cracks and other obvious damage.
9 Apply clean engine oil to the piston pin, insert it into the connecting rod small-end and check for any freeplay between the two (see illustration). Measure the pin external diameter and the small-end bore diameter, then calculate the difference to obtain the small-

connecting rod join and note which side of the rod faces the front of the engine to ensure that the cap and rod are fitted the correct way around on reassembly. Note that the number already across the rod and cap indicates rod size grade, not cylinder number, and the letter indicates rod weight grade. The oil hole in the big-end of each connecting rod should face the back of the engine (see illustration).
4 Unscrew the big-end cap nuts and separate the cap from the crankpin (see illustration).
5 Push each piston/connecting rod assembly up and remove it from the top of the bore making sure the connecting rod does not mark the cylinder bore walls (see illustration). Do not remove the bolts from the connecting rods. Keep the rod, cap, bolts, nuts and (if



24.9a Slip the piston pin into the rod's small-end and rock it back and forth to check for looseness



24.9b Measure the external diameter of the pin . . .



24.9c . . . and the internal diameter of the connecting rod small-end

calculate the difference to obtain the small-end and the small-end bore diameter, then calculate the difference to obtain the small-

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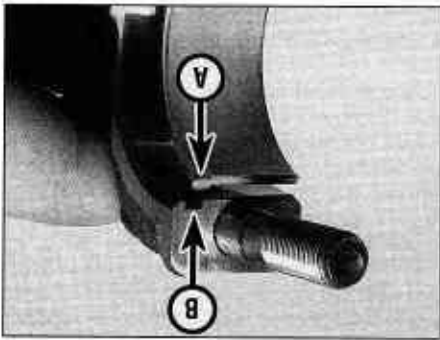
connecting rod small-end and the small-end bore diameter, then calculate the difference to obtain the small-

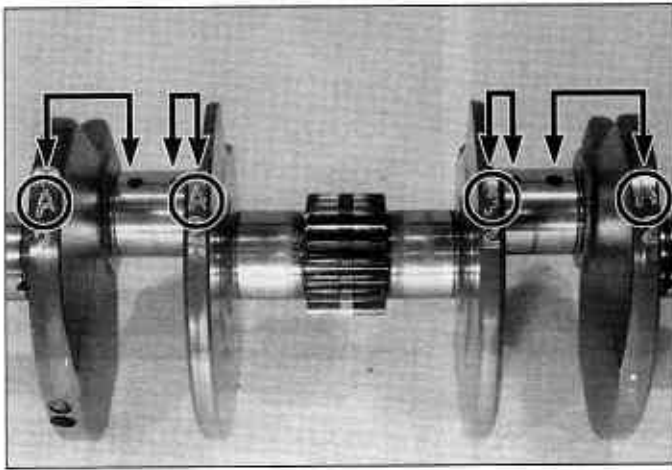
connecting rod small-end and the small-end bore diameter, then calculate the difference to obtain the small-

connecting rod small-end and the small-end bore diameter, then calculate the difference to obtain the small-

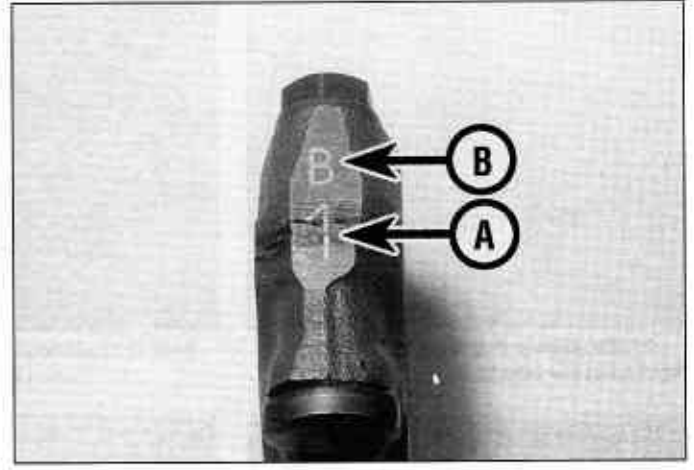
connecting rod small-end and the small-end bore diameter, then calculate the difference to obtain the small-

24.14 Make sure the tab (A) locates in the notch (B)





24.21a Crankpin journal size letters (arrowed)



24.21b Connecting rod size number (A) and weight code (B)

fitted in the correct locations and take care not to touch any shell's bearing surface with your fingers.

15 Cut a length of the appropriate size Plastigauge (it should be slightly shorter than the width of the crankpin). Place a strand of Plastigauge on the (cleaned) crankpin journal and fit the (clean) connecting rod, shells and cap. Make sure the cap is fitted the correct way around so the previously made markings align, and that the rod is facing the right way, and tighten the cap nuts evenly, in two or three stages, to the torque setting specified at the beginning of the Chapter, whilst ensuring that the connecting rod does not rotate on the crankshaft. Slacken the cap nuts and remove the connecting rod, again taking great care not to rotate the rod or crankshaft.

16 Compare the width of the crushed Plastigauge on the crankpin to the scale printed on the Plastigauge envelope to obtain the connecting rod bearing oil clearance (see illustration 27.18). Compare the reading to the specifications at the beginning of the Chapter.

17 On completion carefully scrape away all traces of the Plastigauge material from the crankpin and bearing shells using a fingernail or other object which is unlikely to score the shells.

18 If the clearance is within the range listed in this Chapter's Specifications and the bearings are in perfect condition, they can be reused. If the clearance is beyond the service limit, replace the bearing shells with new ones (see Steps 21 and 22). Check the oil clearance once again (the new shells may be thick enough to bring bearing clearance within the

specified range). Always replace all of the shells at the same time.

19 If the clearance is still greater than the service limit listed in this Chapter's Specifications, the crankpin is worn and the crankshaft should be replaced.

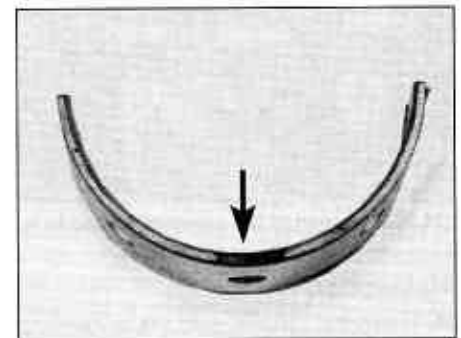
20 Repeat the bearing selection procedure for the remaining connecting rods.

Bearing shell selection

21 Replacement bearing shells for the big-end bearings are supplied on a selected fit basis. Code letters and numbers stamped on various components are used to identify the correct replacement bearings. The crankpin journal size letters are stamped on the crankshaft webs and will be either an A or a B (see illustration). Each letter is adjacent to the crankpin journal it represents. The connecting rod size code number is marked on the flat face of the connecting rod and cap and will be either a 1 or a 2 (see illustration).

22 A range of bearing shells is available. To select the correct bearing shell colour code for a particular big-end, using the table below cross-refer the crankpin journal size letter (stamped on the web) with the connecting rod size number (stamped on the rod). For example, if the connecting rod size is 2, and the crankpin size is A, then the bearing required is Green. The colour is marked on the side of the shell (see illustration). **Note:** Replacement shells for the front cylinder bearings are marked by a single colour mark, while replacement bearings for the rear cylinder bearings are marked by a double colour mark. Be sure to fit the correct shells on the relevant bearing.

Crankpin code	Connecting rod code	
	1 – (33.000 to 33.008 mm)	2 – (33.008 to 33.016 mm)
A – (29.992 to 30.008 mm)	C – Yellow	B – Green
B – (29.984 to 29.992 mm)	B – Green	A – Brown



24.22 Bearing shell colour code location

Connecting rod selection

23 If a connecting rod needs to be replaced, the weight of the replacement rod needs to be matched to the other rod on the same crankpin. If both rods are being replaced, they need to be matched together. The connecting rod weight code is marked on the flat face of the connecting rod and cap and will be either an A, B, or C (see illustration 24.21b).

24 Select the rod in accordance with the table below.

Weight code of rod being replaced	Weight code of other rod on crankpin	Weight code of new rod
A	B	A, B or C
A	C	A or B
B	A	B or C
B	B	A, B or C
B	C	A or B
C	A	B or C
C	B	A, B or C

25 Pistons - removal, inspection and installation

Note: To remove the pistons the engine must be removed from the frame and the crankcase halves separated.

3 Before removing the piston from the crankshaft (see Section 24), use a sharp scriber or felt marker pen to write the cylinder identity on the crown of each piston (or on the inside of the skirt if the piston is dirty and going to be cleaned). Each piston should also have an "N1" mark on its crown which should face the inlet side of the bore (see **illustration**). If this is not visible, mark the piston accordingly so that it can be installed the correct way round.

4 Carefully prise out the circlip on one side of the piston using needle-nose pliers or a small flat-bladed screwdriver inserted into the notch

3 Before removing the piston from the connecting rod, use a sharp scriber or felt marker pen to write the cylinder identity on the crown of each piston (or on the inside of the skirt if the piston is dirty and going to be cleaned). Each piston should also have an "IN" mark on its crown which should face the inlet side of the bore (see illustration). If this is not visible, mark the piston accordingly so that it can be installed the correct way around.

4 Carefully prise out the clip on one side of the piston using needle-nose pliers or a small flat-bladed screwdriver inserted into the notch



25 Install the pistons onto the connecting rods (see Section 25). If removed, install the crankshaft (see Section 27).

26 Install the bearing shells in the connecting rods and caps, aligning the notch in the bearing with the groove in the rod or cap (**see illustration 24.14**). Lubricate the shells with molybdenum disulphide oil (a 50/50 mixture of molybdenum disulphide grease and clean engine oil).

27 Lubricate the pistons, rings and cylinder bore with clean engine oil. Insert the piston/connecting rod assembly into the top of its bore, taking care not to allow the connecting rod to mark the bore. Make sure the "IN" mark on the piston crown is on the inlet side of the bore and the connecting rod is

24.27a Clamp the rings in position by tightening the bands on the compressor . . .



25.4a Prise out the circlip . . .



25.4b . . . then push out the pin and remove the piston



25.6 Removing the piston rings using a ring removal and installation tool

(see illustration). Push the piston pin out from the other side to free the piston from the connecting rod (see illustration). Remove the other circlip and discard them as new ones must be used. When the piston has been removed, install its pin back into its bore so that related parts do not get mixed up.



HAYNES HINT If a piston pin is a tight fit in the piston bosses, soak a rag in boiling water then wring it out and wrap it around the piston - this will expand the alloy piston sufficiently to release its grip on the pin. If the piston pin is particularly stubborn, extract it using a drawbolt tool, but be careful to protect the piston's working surfaces.

Inspection

5 Before the inspection process can be carried out, the pistons must be cleaned and the old piston rings removed.

6 Using your thumbs or a piston ring removal and installation tool, carefully remove the rings from the pistons (see illustration). Do not nick or gouge the pistons in the process. Carefully note which way up each ring fits and in which groove as they must be installed in their original positions if being re-used. The upper surface of each ring is marked with a letter at one end. The top ring is identified by the letter R, and the second (middle) ring by a mark "•" or the letters RN.

7 Scrape all traces of carbon from the tops of the pistons. A hand-held wire brush or a piece of fine emery cloth can be used once most of the deposits have been scraped away. Do not, under any circumstances, use a wire brush mounted in a drill motor to remove deposits from the pistons; the piston material is soft and will be eroded away by the wire brush.

8 Use a piston ring groove cleaning tool to remove any carbon deposits from the ring grooves. If a tool is not available, a piece broken off an old ring will do the job. Be very careful to remove only the carbon deposits. Do not remove any metal and do not nick or gouge the sides of the ring grooves.

9 Once the deposits have been removed, clean the pistons with solvent and dry them thoroughly. If the identification previously marked on the piston is cleaned off, be sure to re-mark it with the correct identity. Make sure the oil return holes below the oil ring groove are clear.

10 Carefully inspect each piston for cracks around the skirt, at the pin bosses and at the ring lands. Normal piston wear appears as even, vertical wear on the thrust surfaces of the piston and slight looseness of the top ring in its groove. If the skirt is scored or scuffed, the engine may have been suffering from overheating and/or abnormal combustion, which caused excessively high operating temperatures. The oil pump should be checked thoroughly. Also check that the circlip grooves are not damaged.

11 A hole in the piston crown, an extreme to be sure, is an indication that abnormal combustion (pre-ignition) was occurring. Burned areas at the edge of the piston crown are usually evidence of spark knock (detonation). If any of the above problems exist, the causes must be corrected or the damage will occur again.

12 Measure the piston ring-to-groove clearance by laying each piston ring in its groove and slipping a feeler gauge in beside it (see illustration). Make sure you have the correct ring for the groove (see Step 6). Check the clearance at three or four locations around the groove. If the clearance is greater than specified, replace both the piston and rings as a set. If new rings are being used, measure the clearance using the new rings. If the clearance is greater than that specified, the piston is worn and must be replaced.

13 Check the piston-to-bore clearance by measuring the bore (see Section 22) and the piston diameter. Make sure each piston is matched to its correct cylinder. Measure the piston 10.0 mm up from the bottom of the skirt and at 90° to the piston pin axis (see illustration). Subtract the piston diameter from the bore diameter to obtain the clearance. If it is greater than the specified figure, the piston must be replaced (assuming the bore itself is within limits).

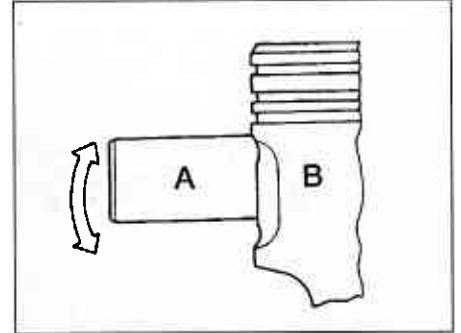
14 If not already done (see Section 24), apply clean engine oil to the piston pin, insert it into the piston and check for any freeplay between the two (see illustration). Measure the pin



25.12 Measure the piston ring-to-groove clearance with a feeler gauge



25.13 Measure the piston diameter with a micrometer at the specified distance from the bottom of the skirt



25.14a Slip the pin (A) into the piston (B) and try to rock it back and forth. If it's loose, replace the piston and pin

A close-up photograph of a metallic, cylindrical component, likely a part of a turbine or engine. A small, white, rectangular label with the handwritten text "057 176" is attached to the side of the component. The metal surface shows some texture and wear.

26 Piston rings – inspection and installation

the crankcase halves (see Section 21).

the crankshaft (see Section 24) and reassemble

18 Install the connecting rods onto the
the removal notch (see illustration).

and make sure they are properly seated in
their grooves with the open end away from

5 If the gap is too small, it must be enlarged
or the ring ends may come in contact with
each other during engine operation, which
can cause serious damage. The end gap can
be increased by filing the ring ends very
carefully with a fine file. When performing this
operation, file only from the outside in (see
illustration).

6 Excess end gap is not critical unless it
exceeds the service limit. Again, double-
check to make sure you have the correct rings
for your engine and check that the bore is not
worn

It is good practice to replace the piston

inspection and installation

• Once the ring end gaps have been checked/corrected, the rings can be installed

and bore during the end gap measurement

3 To measure the installed ring end gap, insert the top ring into the top of the bore and upper and lower side rails. Slip the expandable installed in it. It is composed of three separate components, namely the expand and the

upper and lower side rails. Slip the expander into the groove, then install the upper side rail.

core. To measure the end gap, slip a feeler

the measurement to the land. Hold it firmly in place and slide a finger gauge between the ends of the ring and

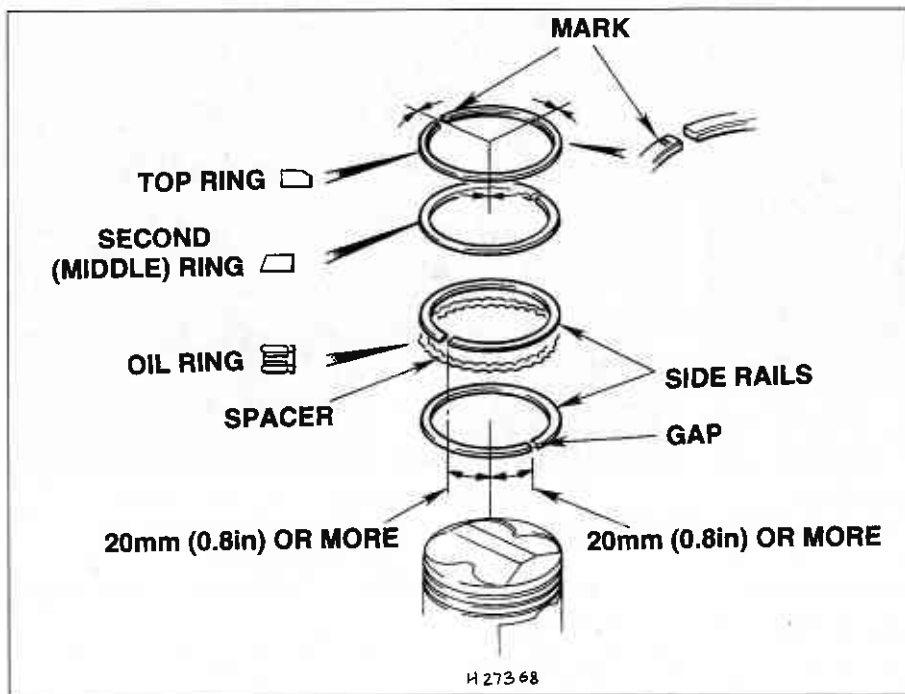
the groove. Next install the lower side rail around the piston while pushing the rail into place and slide a finger around the piston while pushing the rail into

(see illustration).

If the gap is larger or smaller than specified, the gap is larger or smaller than specified, the same manner (see illustrations).

correct rings before proceeding.

26.9b . . . and fit the side rails each side of it. The oil ring must be installed by hand



26.13 Stagger the ring end gaps as shown

10 After the three oil ring components have been installed, check to make sure that both the upper and lower side rails can be turned smoothly in the ring groove.

11 The upper surface of each compression ring is marked with a mark or letter at one end. The top ring is identified by the letter R, and the second (middle) ring by the mark "•" or letters RN. Install the second (middle) ring next. Make sure that the identification mark or letter near the end gap is facing up. Fit the ring into the middle groove in the piston. Do not expand the ring any more than is necessary to slide it into place. To avoid breaking the ring, use a piston ring installation tool.

12 Finally, install the top ring in the same manner into the top groove in the piston. Make sure the identification letter near the end gap is facing up.

13 Once the rings are correctly installed,

check they move freely without snagging and stagger their end gaps as shown (see illustration).

27 Crankshaft and main bearings – removal, inspection and installation

Note: To remove the crankshaft the engine must be removed from the frame and the crankcase halves separated.

Removal

1 Remove the engine from the frame (see Section 5) and separate the crankcase halves (see Section 21).

2 Separate the connecting rods from the crankshaft (see Section 24).

Note: If no work is to be carried out on the piston/connecting rod assemblies there is no

need to remove them from the bores, although the connecting rod bearing caps must be removed (see Section 24, Steps 3 and 4) and the pistons pushed up to the top of the bores so that the connecting rod ends are positioned clear of the crankshaft.

3 Lift the crankshaft out of the upper crankcase half, taking care not to dislodge the main bearing shells (see illustration).

4 The main bearing shells can be removed from the crankcase halves by pushing their centres to the side, then lifting them out (see illustration). Keep the shells in order.

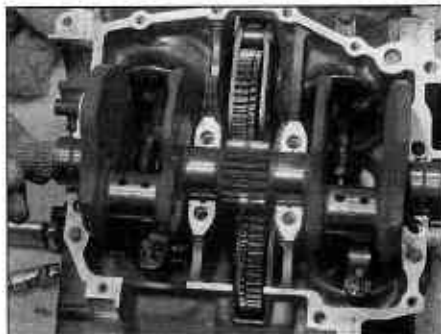
Inspection

5 Clean the crankshaft with solvent, using a rifle-cleaning brush to scrub out the oil passages. If available, blow the crank dry with compressed air, and also blow through the oil passages. Check the drive gear for wear or damage (see illustration). If any of the gear teeth are excessively worn, chipped or broken, the crankshaft must be replaced. If wear or damage is found, also inspect the camshaft drive gear assemblies (see Section 11).

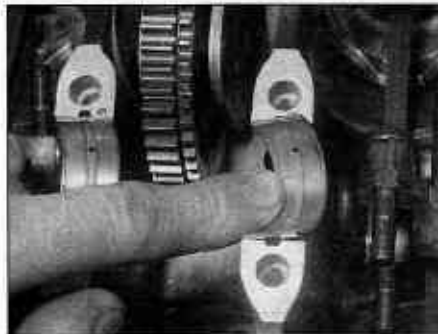
6 Refer to Section 23 and examine the main bearing shells. If they are scored, badly scuffed or appear to have been seized, new bearings must be installed. Always replace the main bearings as a set. If they are badly damaged, check the corresponding crankshaft journals. Evidence of extreme heat, such as discoloration, indicates that lubrication failure has occurred. Be sure to thoroughly check the oil pump and pressure regulator as well as all oil holes and passages before reassembling the engine.

7 The crankshaft journals should be given a close visual examination, paying particular attention where damaged bearings have been discovered. If the journals are scored or pitted in any way a new crankshaft will be required. Note that undersizes are not available, precluding the option of re-grinding the crankshaft.

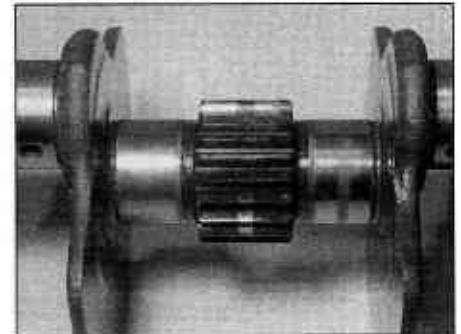
8 Place the crankshaft on V-blocks and check the runout at the main bearing journals using a dial gauge. Compare the reading to the maximum specified at the beginning of the Chapter. If the runout exceeds the limit, the crankshaft must be replaced.



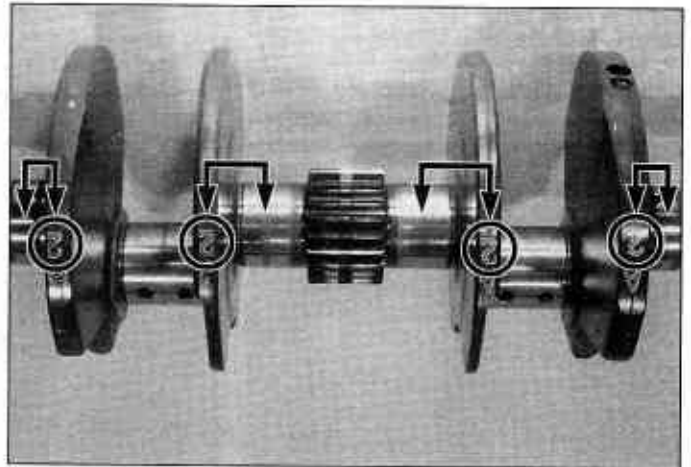
27.3 Lift the crankshaft out of the crankcase ...



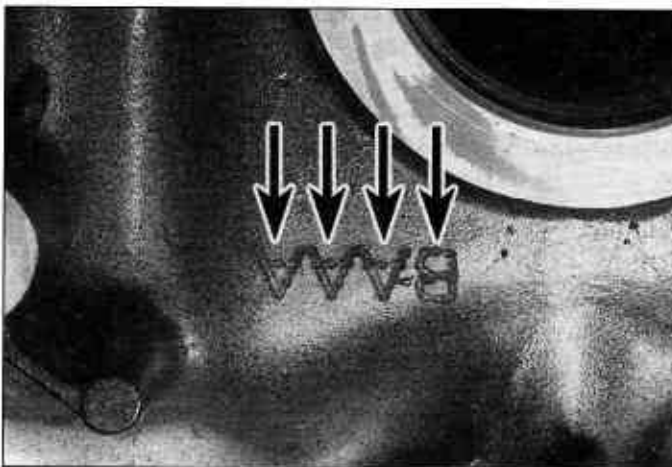
27.4 ... and remove the shells if required



27.5 Check the teeth of the drive gear as described



27.9a Main bearing journal size numbers (arrowed)



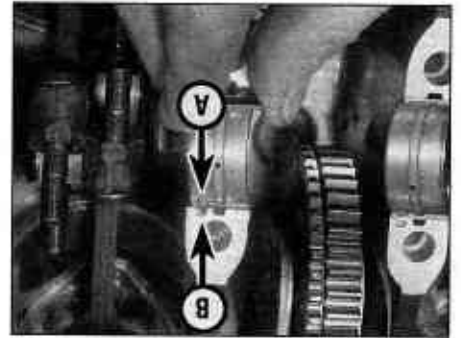
27.9b Main bearing housing size letters (arrowed)

Main bearing shell selection

9 Replacement bearing shells for the main bearings are supplied on a selected fit basis. Code letters and numbers are stamped on various components are used to identify the correct replacement bearings. The crankshaft main bearing journal size numbers are stamped on the crankshaft webs and will be either a 1 or a 2 (see illustration). Each number is adjacent to the journal it represents. The corresponding main bearing housing size letters are stamped into the upper crankcase half and will be either an A or B. The left-hand letter corresponds to the left-hand journal, the right-hand letter to the right-hand journal, and the inner left- and right-hand letters to the inner left- and right-hand journals respectively (see illustration).

10 A range of bearing shells is available. To select the correct bearing for a particular journal, using the accompanying table cross-refer the main bearing journal size number (stamped on the crank web) with the main bearing housing size letter (stamped on the crankcase) to determine the colour code of the bearing required. For example, if the journal code is 1, and the housing code is B, then the bearing required is Yellow. The colour is marked on the side of the shell (see illustration 24.22).

27.13 Fit the shells, locating the tab (A) in the notch (B)



Oil clearance check

11 Whether new bearing shells are being fitted or the original ones are being re-used, the main bearing oil clearance should be checked before the engine is reassembled. Main bearing oil clearance is measured with a product known as Plastigauge. 12 Clean the backs of the bearing shells and the bearing housings in both crankcase halves. Press the bearing shells into their cut-outs, ensuring that the tab on each shell engages in the notch in the crankcase (see illustration). Make sure the bearings are fitted in the correct locations and take care not to touch any shell's bearing surface with your fingers. 14 Ensure the shells and crankshaft are clean and dry. Lay the crankshaft in position in the upper crankcase. 15 Cut several lengths of the appropriate size Plastigauge (they should be slightly shorter than the width of the crankshaft journals). Place a strand of Plastigauge on each



27.15 Lay a strip of Plastigauge (arrowed) on each journal parallel to the crankshaft centreline

(cleaned) journal (see illustration). Make sure the crankshaft is not rotated. 16 Carefully install the lower crankcase half on to the upper half. Check that the lower crankcase half is correctly seated. **Note:** Do not tighten the crankcase bolts if the casting is not correctly seated. Install the lower crankcase 8 mm bolts in their original locations and tighten them evenly a little at a time in a criss-cross sequence to the torque setting specified at the beginning of the Chapter (see illustration 21.6). 17 Slacken each bolt evenly a little at a time the bolts are tightened. 18 Compare the width of the crushed Plastigauge on each crankshaft journal to the scale printed on the Plastigauge envelope to obtain the main bearing oil clearance (see illustration). Compare the reading to



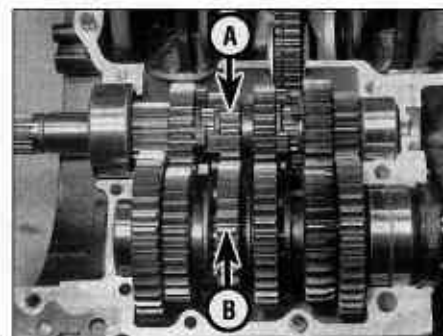
27.18 Measure the width of the crushed Plastigauge



27.23 Generously lubricate all the bearing shells



28.2a Input shaft bearing retainer plate bolts (arrowed)



28.2b Lift the input shaft (A) and the output shaft (B) out of the crankcase

the specifications at the beginning of the Chapter.

19 On completion carefully scrape away all traces of the Plastigauge material from the crankshaft journal and bearing shells; use a fingernail or other object which is unlikely to score them.

20 If the oil clearance falls into the specified range, no bearing shell replacement is required (provided they are in good condition). If the clearance is beyond the service limit, refer to the marks on the case and the marks on the crankshaft and select new bearing shells (see Steps 9 and 10). Install the new shells and check the oil clearance once again (the new shells may bring bearing clearance within the specified range). Always replace all of the shells at the same time.

21 If the clearance is still greater than the service limit listed in this Chapter's Specifications (even with replacement shells), the crankshaft journal is worn and the crankshaft should be replaced. Measure the diameter of each journal and compare the measurements to the table above to confirm that the journals are worn beyond the standard specification.

Installation

22 Clean the backs of the bearing shells and the bearing cut-outs in both crankcase halves. If new shells are being fitted, ensure that all traces of the protective grease are cleaned off using paraffin (kerosene). Wipe dry the shells and crankcase halves with a lint-free cloth. Make sure all the oil passages and holes are clear, and blow them through with compressed air if it is available.

23 Press the bearing shells into their locations. Make sure the tab on each shell engages in the notch in the casing (see illustration 27.13). Make sure the bearings are fitted in the correct locations and take care not to touch any shell's bearing surface with your fingers. Lubricate each shell with molybdenum disulphide oil (a 50/50 mixture of molybdenum disulphide grease and clean engine oil) (see illustration).

24 Lower the crankshaft into position in the upper crankcase, making sure all bearings remain in place (see illustration 27.3). If the front cylinder head was not removed, make sure the teeth of the drive gear on the crankshaft mesh with those on the camshaft drive gear assembly.

25 Fit the connecting rods to the crankshaft (see Section 24).

26 Reassemble the crankcase halves (see Section 21).

28 Transmission shafts and bearings – removal and installation

Note: To remove the transmission shafts the engine must be removed from the frame and the crankcases separated. If the engine has already been removed, ignore the steps which do not apply.

Removal

1 Remove the engine from the frame (see Section 5) and separate the crankcase halves (see Section 21). Remove the clutch pushrod oil seal (see illustration 28.8a).

2 Remove the bearing retainer plate from the input shaft right-hand end (see illustration). Lift the input shaft and output shaft out of the casing, noting their relative positions and how

they fit together (see illustration). If they are stuck, use a soft-faced hammer and gently tap on the ends of the shafts to free them. Remove the bearing half-ring retainer from the left-hand end of the output shaft and the needle bearing dowel from the left-hand end of the input shaft, noting how they fit (see illustrations 28.4a and b). If they are not in their slot or hole in the crankcase, remove them from the bearings themselves on the shafts. If necessary, the input shaft and output shaft can be disassembled and inspected for wear or damage (see Section 29).

3 Referring to *Tools and Workshop Tips* (Section 5) in the Reference Section, check the bearings on the transmission shafts. Replace the bearings if necessary, noting that the output shaft left-hand bearing is not available separately from the shaft. Also check the condition of the output shaft oil seal and replace it if it is worn or damaged (see illustration 28.5b).

Installation

4 Install the bearing half-ring retainer for the left-hand end of the output shaft into its slot in the upper crankcase half, and the needle bearing dowel for the left-hand end of the input shaft into its hole (see illustrations).

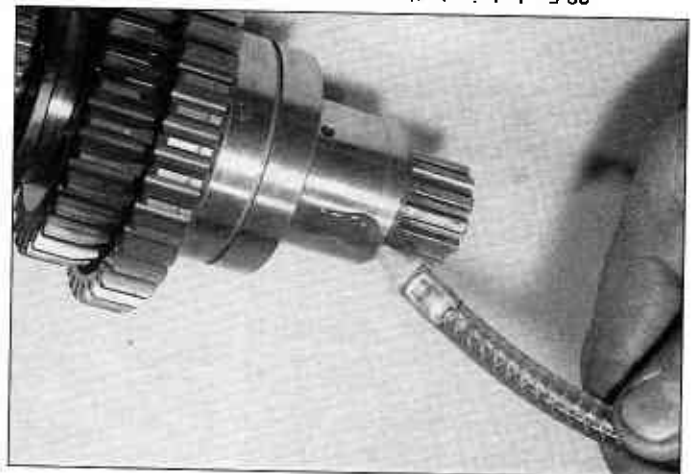
5 Lubricate the left-hand end of the output shaft with clean oil and slide the **new**



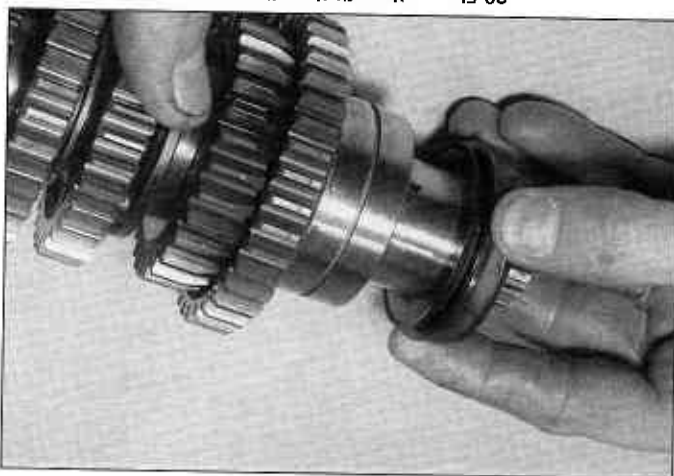
28.4a Fit the half-ring retainer into its slot ...



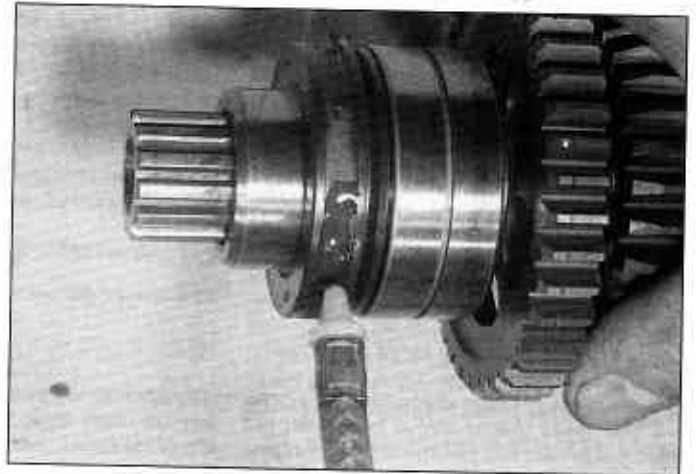
28.4b ... and the dowel pin into its hole



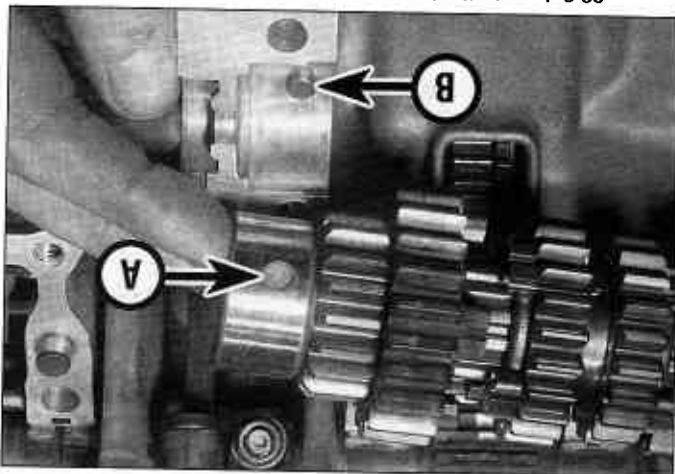
28.5a Lubricate the end of the output shaft ...



28.5b ... then fit the oil seal ...



28.5c ... and lubricate the seal lips

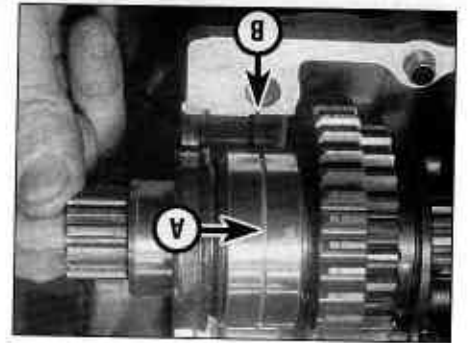


28.6 Locate the bearing hole (A) over the dowel (B)

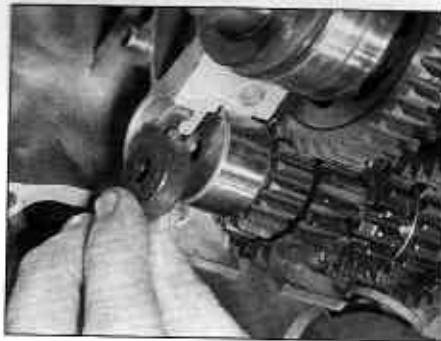
output shaft oil seal onto the shaft (see illustrations). Smear the seal lips with oil (see illustration).
 6 Lower the input shaft into position in the upper crankcase, making sure the hole in the needle bearing engages correctly with the dowel (see illustration).
 7 Lower the output shaft into position in the crankcase half, making sure the groove in the bearing engages correctly with the bearing half-ring retainer (see illustration). Also ensure that the oil seal lip locates in the crankcase groove.

8 Make sure both transmission shafts are correctly seated and their related pinions are new clutch pushed oil seal into its seat (see illustration). Position the input shaft bearing and independent (ie the input shaft can turn whilst the output shaft is held stationary) before proceeding further.
 10 Reassemble the crankcase halves (see Section 21).

Caution: If the bearing half-ring retainer or bearings, the crankcase halves will not seat correctly.
 9 Position the gears in the neutral position and check the shafts are free to rotate easily and independently (ie the input shaft can turn whilst the output shaft is held stationary) before proceeding further.
 10 Reassemble the crankcase halves (see Section 21).



28.7 Locate the bearing groove (A) onto the half-ring retainer (B)



28.8a Fit the new pushed oil seal



28.8b Apply thread locking compound to the input shaft bearing retainer bolts

29 Transmission shafts – disassembly, inspection and reassembly

1 Remove the transmission shafts from the casing (see Section 28). Always disassemble the transmission shafts separately to avoid mixing up the components.

Input shaft disassembly



When disassembling the transmission shafts, place the parts on a long rod or thread a wire through them to keep them in order and facing the proper direction.

2 Slide the needle bearing cage and bearing off the left-hand end of the shaft, followed by the thrust washer, the 2nd gear pinion, the splined washer, the 6th gear pinion and its bush, and the splined washer (see illustration).

3 Remove the circlip securing the combined 3rd/4th gear pinion, then slide the pinion off the shaft.

4 Remove the circlip securing the 5th gear pinion (see illustration 29.14f), then slide the splined washer, the pinion and its bush, and the thrust washer off the shaft.

5 The 1st gear pinion is integral with the shaft.

Input shaft inspection

6 Wash all of the components in clean solvent and dry them off.

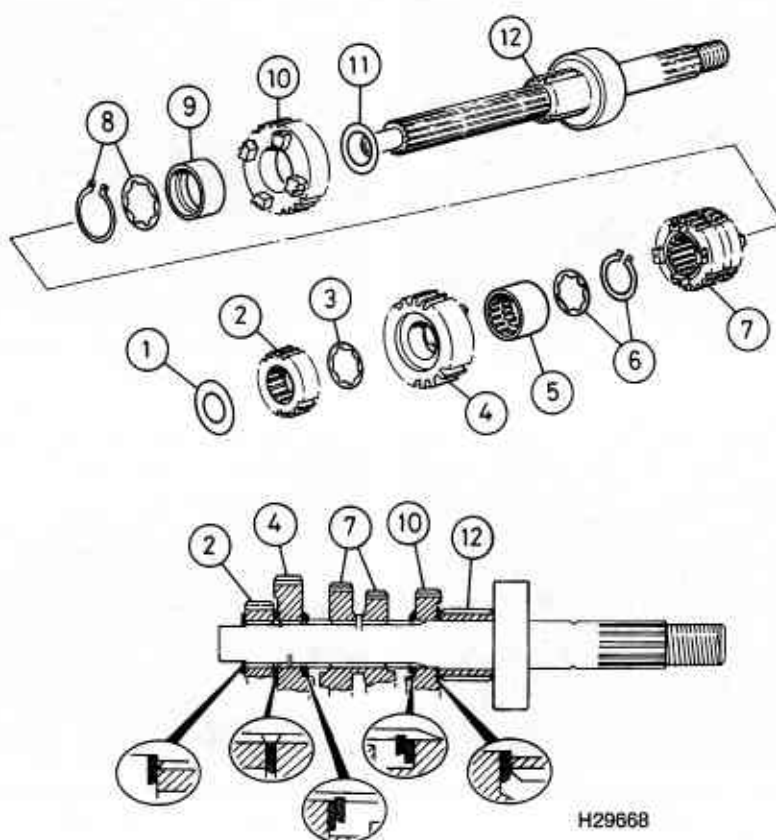
7 Check the gear teeth for cracking, chipping, pitting and other obvious wear or damage. Any pinion that is damaged as such must be replaced.

8 Inspect the dogs and the dog holes in the gears for cracks, chips, and excessive wear especially in the form of rounded edges. Make sure mating gears engage properly. Replace the paired gears as a set if necessary.

9 Check for signs of scoring or bluing on the pinions, bushes and shaft. This could be caused by overheating due to inadequate lubrication. Check that all the oil holes and passages are clear. Replace any damaged pinions or bushes.

10 Check that each pinion moves freely on the shaft or bush but without undue freeplay. Check that each bush moves freely on the shaft but without undue freeplay. If the necessary equipment is available the individual components can be measured and the results compared with the specifications at the beginning of this Chapter.

11 The shaft is unlikely to sustain damage unless the engine has seized, placing an unusually high loading on the transmission, or the machine has covered a very high mileage. Check the surface of the shaft, especially where a pinion turns on it, and replace the shaft if it has scored or picked up, or if there are any cracks. Damage of any kind can only be cured by replacement.



29.2 Transmission input shaft components

- | | | |
|------------------------|--------------------------------|--|
| 1 Thrust washer | 6 Splined washer and circlip | 9 5th gear pinion bush |
| 2 2nd gear pinion | 7 Combined 3rd/4th gear pinion | 10 5th gear pinion |
| 3 Splined washer | 8 Circlip and splined washer | 11 Thrust washer |
| 4 6th gear pinion | | 12 Input shaft with integral 1st gear pinion |
| 5 6th gear pinion bush | | |

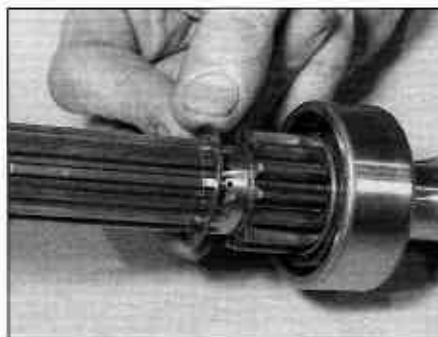
12 Check the washers and circlips and replace any that are bent or appear weakened or worn. Use new ones if in any doubt. Note that it is good practice to renew all circlips when overhauling gearshafts.

Input shaft reassembly

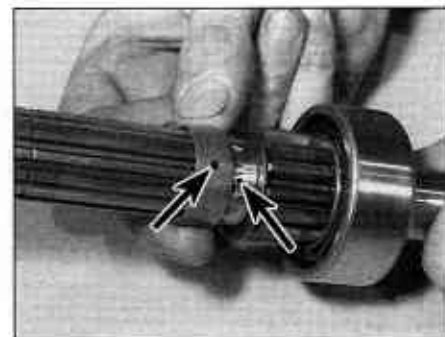
13 During reassembly, apply engine oil to the mating surfaces of the shaft, pinions and bushes. When installing the circlips, do not

expand their ends any further than is necessary. Install the stamped circlips and washers so that their chamfered side faces the pinion it secures (see illustration 29.2).

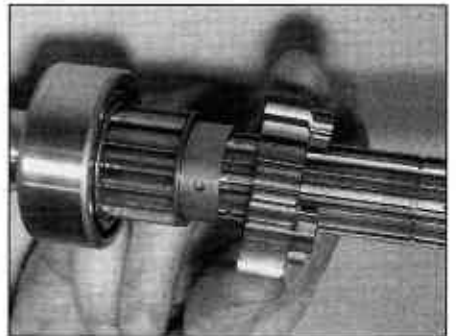
14 Slide the thrust washer onto the left-hand end of the shaft, followed by the 5th gear pinion bush, aligning the oil hole in the bush with the hole in the shaft. Fit the 5th gear pinion with its dogs facing away from the integral 1st gear (see illustrations). Slide the



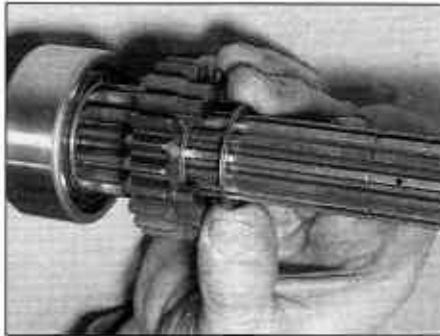
29.14a Slide the thrust washer . . .



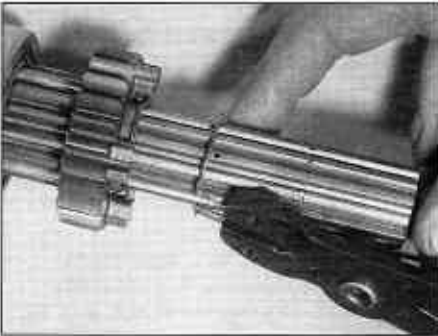
29.14b . . . the 5th gear pinion bush (oil holes arrowed) . . .



29.14c ... the 5th gear pinion ...



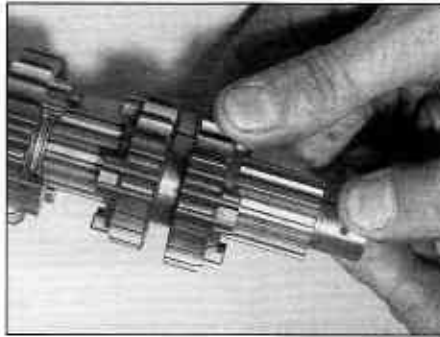
29.14d ... and the splined washer onto the shaft...



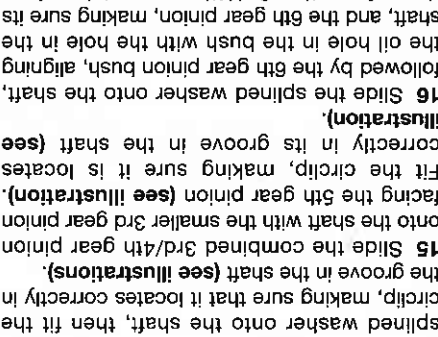
29.14e ... and secure them with the clip...



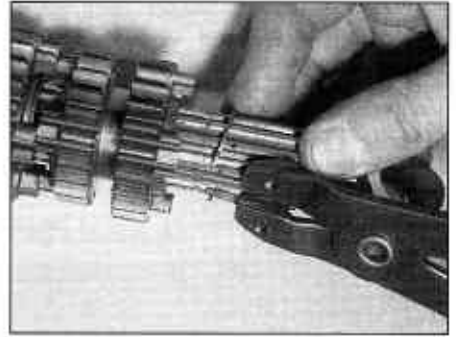
29.14f ... making sure it locates properly in its groove



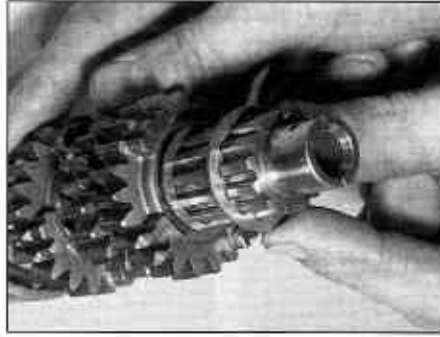
29.15a Slide the combined 3rd/4th gear pinion onto the shaft...



15 Slide the combined 3rd/4th gear pinion onto the shaft with the smaller 3rd gear pinion facing the 5th gear pinion (see illustration). Fit the circlip, making sure it is located correctly in its groove in the shaft (see illustration).
16 Slide the splined washer onto the shaft, followed by the 6th gear pinion bush, aligning the oil hole in the bush with the hole in the shaft, and the 6th gear pinion, making sure its dogs face the 3rd/4th gear pinion (see illustrations). Slide the splined washer, the 2nd gear pinion and the thrust washer onto



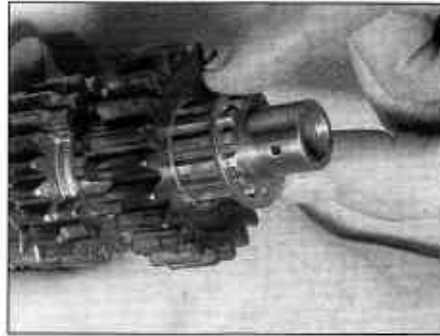
29.15b ... and secure it with the circlip



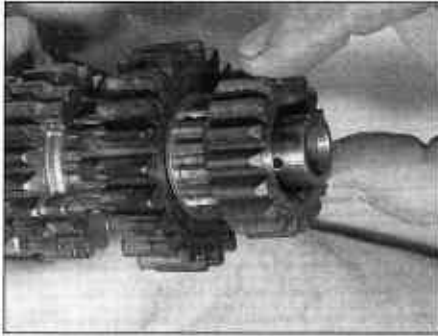
29.16a Slide the splined washer...



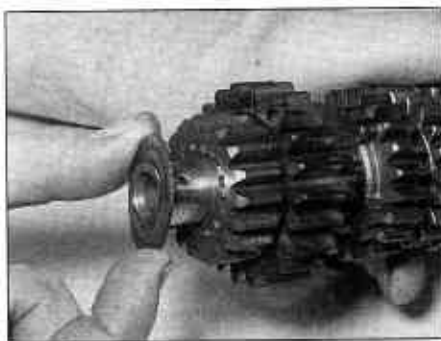
29.16b ... the 6th gear pinion bush (oil holes arrowed) ...



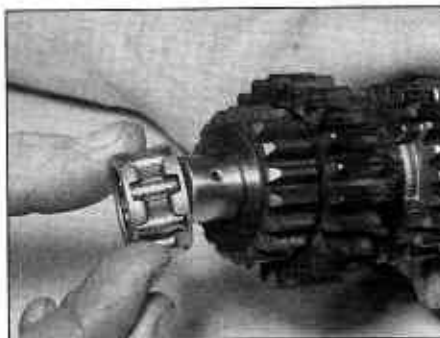
29.16d ... the splined washer...



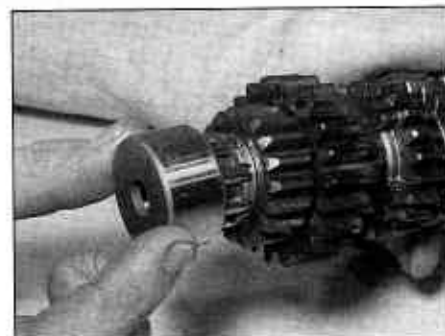
29.16e ... the 2nd gear pinion...



29.16f ... the thrust washer ...



29.16g ... the needle bearing ...



29.16h ... and the bearing cage onto the shaft

the end of the shaft, then fit the needle roller bearing and its cage over the end of the shaft (see illustrations).

17 Check that all components have been correctly installed (see illustration).

Output shaft disassembly

18 Remove the caged ball bearing from the right-hand end of the shaft, referring to *Tools and Workshop Tips* (Section 5) in the Reference Section if required (see illustration 29.34).

19 Slide the thrust washer off the shaft, followed by the 1st gear pinion and its needle

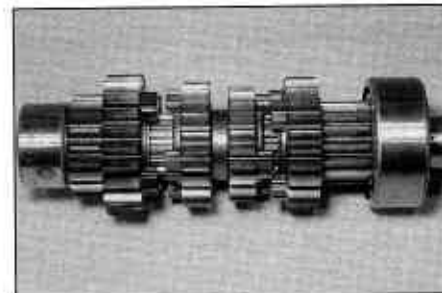
roller bearing, the thrust washer and the 5th gear pinion (see illustration).

20 Remove the circlip securing the 3rd gear pinion, then slide the splined washer, the pinion and its splined bush off the shaft.

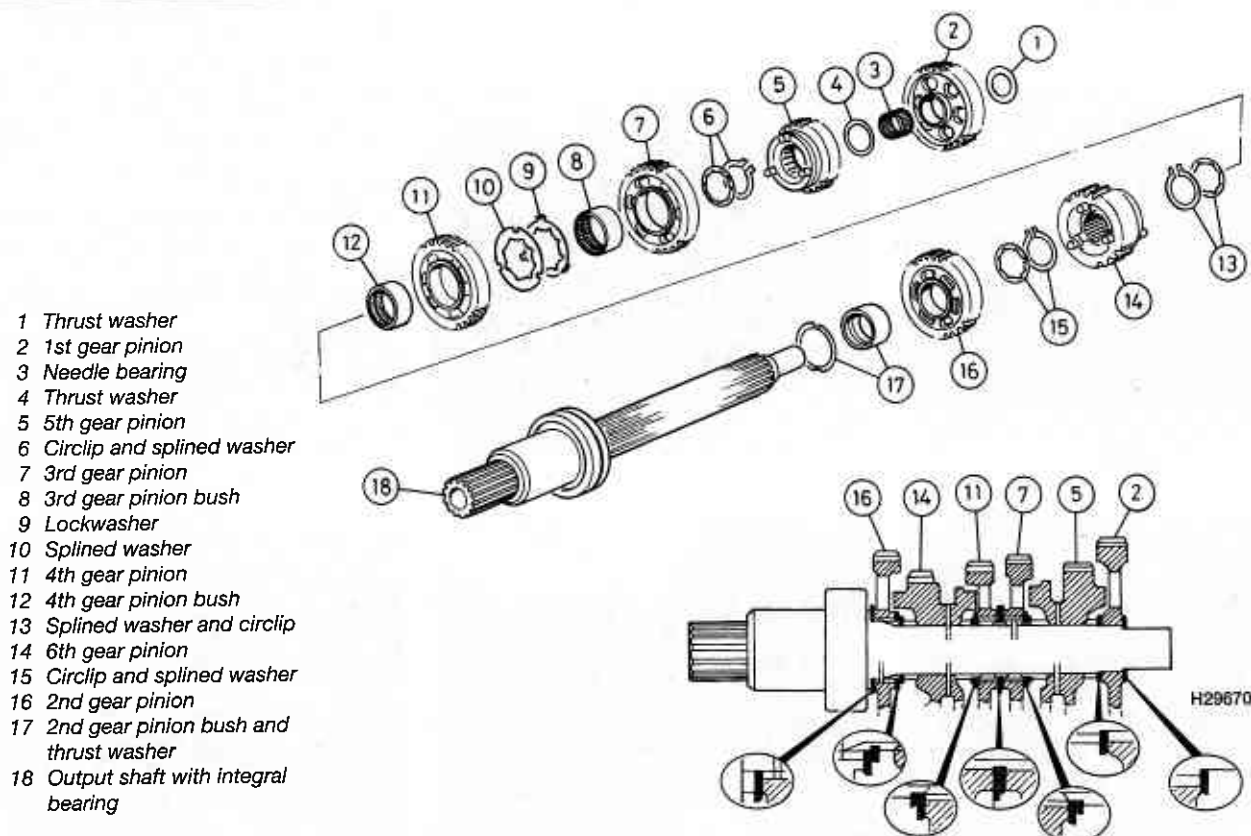
21 Slide the lockwasher and the splined washer off the shaft, noting how they fit together.

22 Slide the 4th gear pinion and its splined bush, followed by the splined washer, off the shaft.

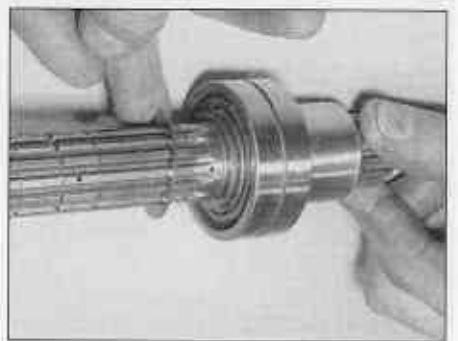
23 Remove the circlip securing the 6th gear pinion, then slide the pinion off the shaft.



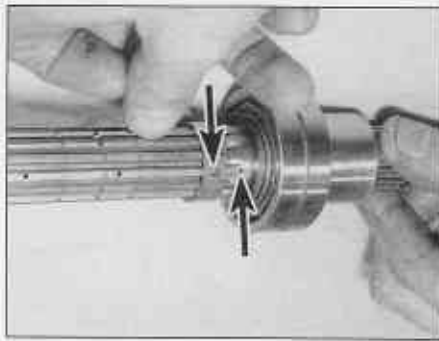
29.17 The complete input shaft assembly should be as shown



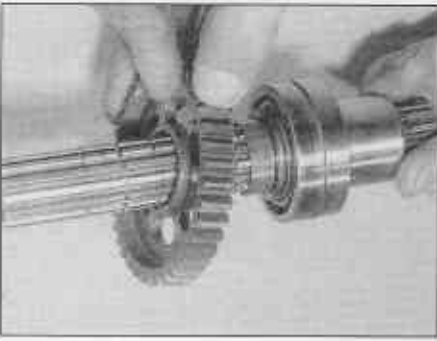
29.19 Transmission output shaft components



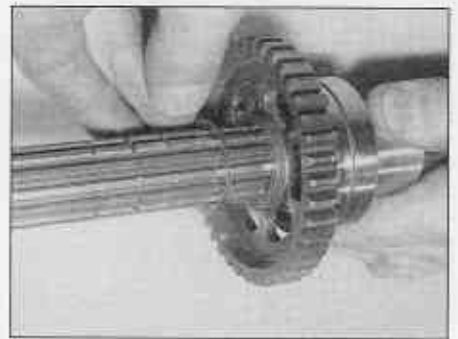
29.27a Slide the thrust washer ...



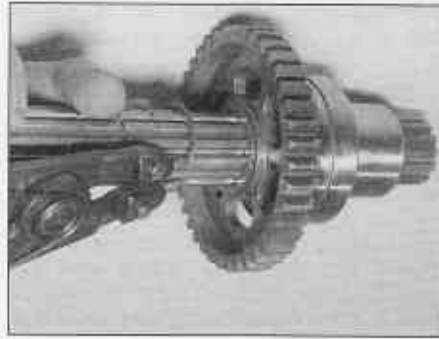
29.27b ... the 2nd gear pinion bush (oil holes arrowed) ...



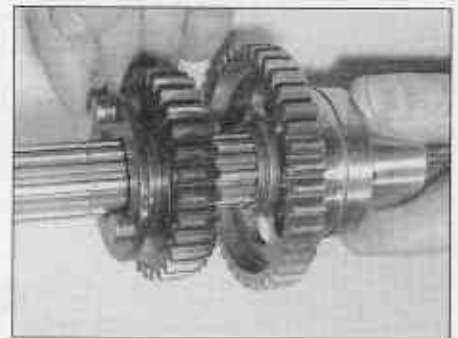
29.27c ... the 2nd gear pinion ...



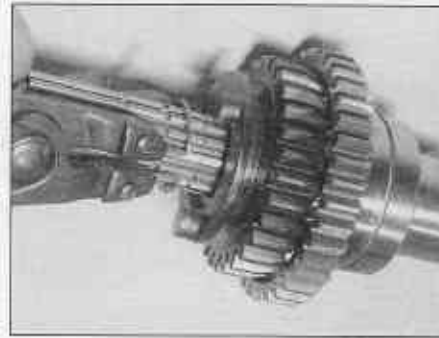
29.27d ... and the splined washer onto the shaft ...



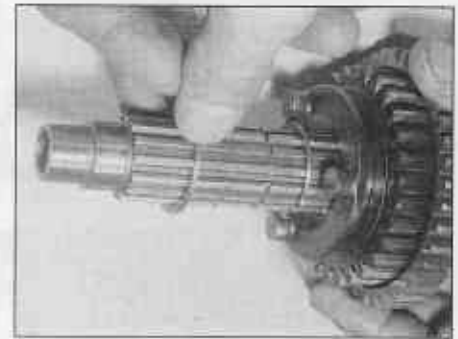
29.27e ... and secure them with the clip



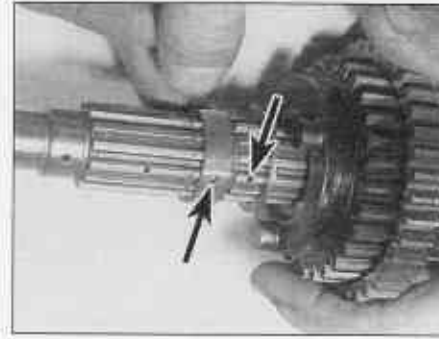
29.28a Slide the 6th gear pinion onto the shaft ...



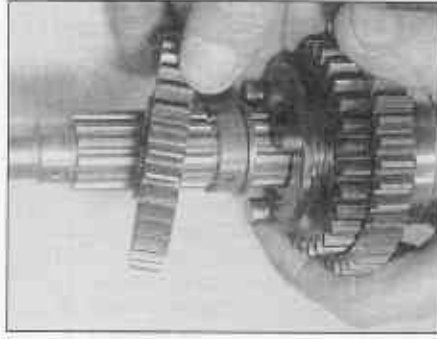
29.28b ... and secure it with the clip



29.29a Slide the splined washer ...



29.29b ... the 4th gear pinion bush ...



29.29c ... and the 4th gear pinion onto the shaft

24 Remove the circlip securing the 2nd gear pinion and its bush, and the thrust washer off the shaft.

Output shaft inspection

25 Refer to Steps 6 to 12 above.

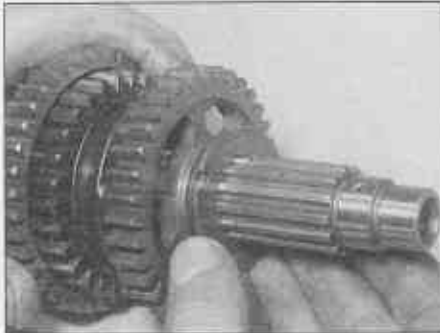
Output shaft reassembly

26 During reassembly, apply engine oil to the mating surfaces of the shaft, pinions and bushes. When installing the circlips, do not expand the ends any further than is necessary. Install the stamped circlips and washers so that their chamfered side faces the pinion it secures (see illustration 29.19).

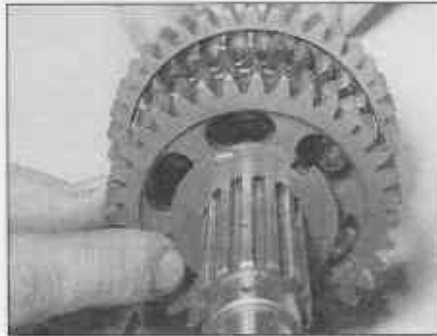
27 Slide the thrust washer onto the right-hand end of the shaft, followed by the 2nd gear pinion bush, aligning the oil hole in the bush with the hole in the shaft, the 2nd gear pinion and the splined washer, then fit the circlip, making sure it is located correctly in its groove in the shaft.

28 Slide the 6th gear pinion with its selector fork groove facing away from the 2nd gear pinion, then fit the circlip, making sure it is located correctly in its groove in the shaft (see illustrations).

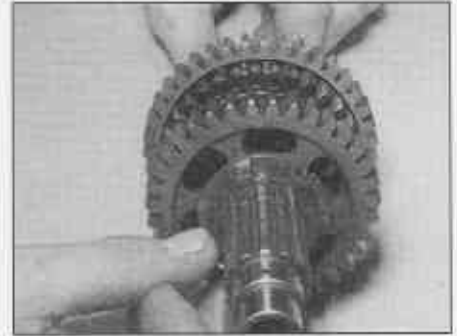
29 Slide the splined washer and the 4th gear pinion bush onto the shaft, making sure the oil hole in the bush aligns with the hole in the shaft, followed by the 4th gear pinion; note that the dished side of the 4th gear pinion faces the sixth gear pinion (see illustrations).



29.30a Slide the slotted splined washer onto the shaft . . .



29.30b . . . and locate it as shown



29.30c Slide the lockwasher onto the shaft . . .

30 Slide the slotted splined washer onto the shaft and locate it in its groove, then turn it in the groove so that the splines on the washer locate between the splines of the shaft and secure the washer in the groove (**see illustrations**). Slide the lockwasher onto the shaft, so that the tabs on the lockwasher face the left-hand end of the shaft and locate into the slots in the outer rim of the spline washer (**see illustrations**).

31 Slide the 3rd gear pinion bush onto the shaft, making sure the oil hole in the bush aligns with the hole in the shaft, followed by the 3rd gear pinion and the splined washer, then fit the circlip, making sure it is located correctly in its groove in the shaft (**see illustrations**). Note that the 3rd gear pinion is fitted so that its dished side faces away from the 4th gear pinion.

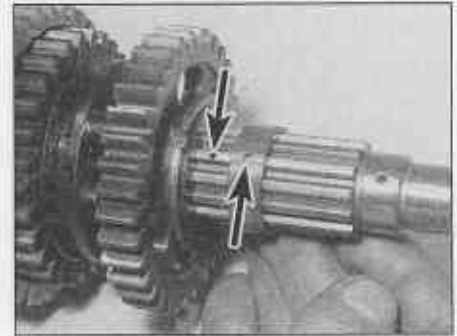
32 Slide the 5th gear pinion onto the shaft with its selector fork groove facing the 3rd gear pinion, followed by the thrust washer (**see illustrations**).

33 Slide the 1st gear pinion needle roller bearing onto the shaft, followed by the 1st gear pinion and the thrust washer (**see illustrations overleaf**). Note that the 1st gear pinion is fitted so that its dished side faces the 5th gear pinion.

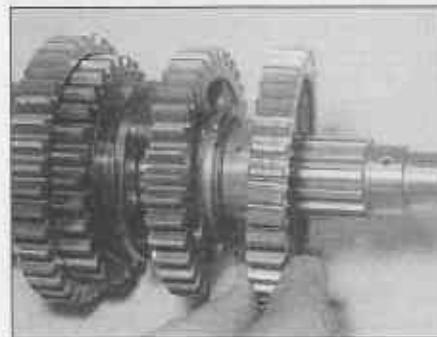
34 Fit the caged ball bearing onto the right-hand end of the shaft, referring to *Tools and Workshop Tips* (Section 5) in the



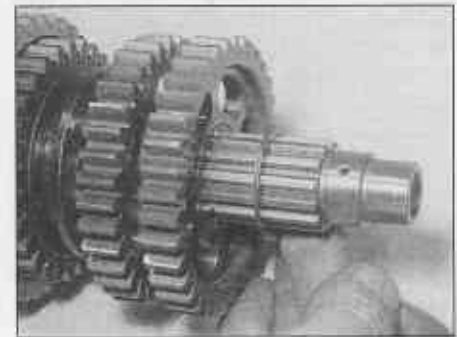
29.30d . . . and locate it as shown



29.31a Slide the 3rd gear pinion bush (oil holes arrowed) . . .



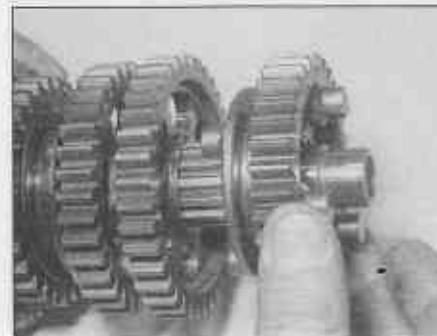
29.31b . . . the 3rd gear pinion . . .



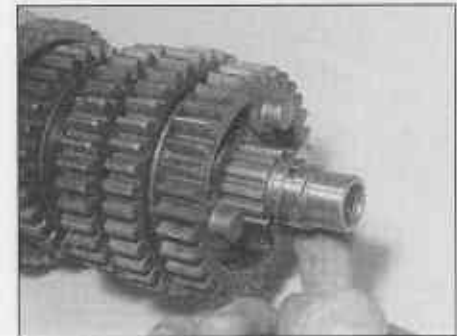
29.31c . . . and the splined washer onto the shaft . . .



29.31d . . . and secure them with the circlip



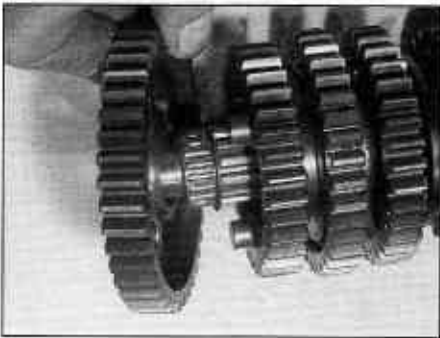
29.32a Slide the 5th gear pinion . . .



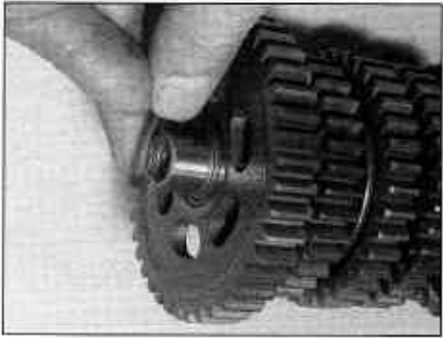
29.32b . . . and the thrust washer onto the shaft



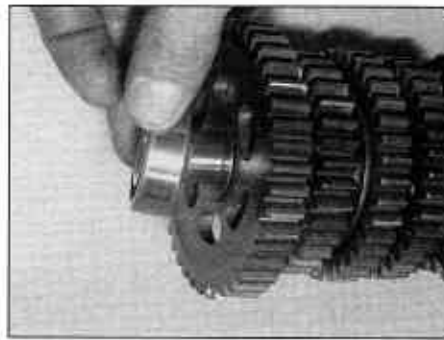
29.33a Slide the needle bearing ...



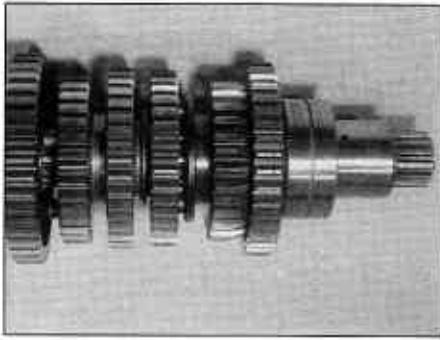
29.33b ... the 1st gear pinion ...



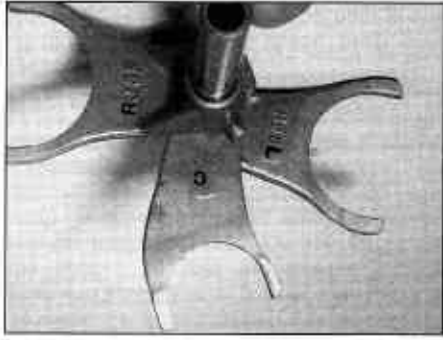
29.33c ... and the thrust washer onto the shaft ...



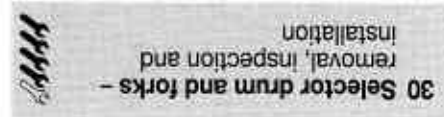
29.34 ... then fit the bearing onto the end of the shaft



29.35 The assembled output shaft should be as shown



30.3 The letters R, C and L identify each fork's position on the shaft



30 Selector drum and forks - removal, inspection and installation

Note: To remove the selector drum and forks the engine must be removed from the frame and the crankcases separated.

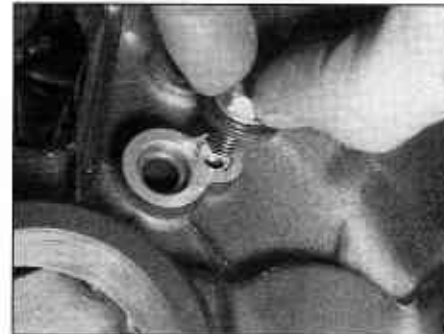
Removal

1 Remove the engine (see Section 5) and

separate the crankcase halves (see Section 21). The selector drum and forks are located in the lower crankcase half.
2 If not already done, remove the gearchange mechanism external components (see Section 20).
3 Before removing the selector forks, note that each fork carries an identification letter. The right-hand fork has an "R", the centre fork a "C", and the left-hand fork an "L" (see illustration). These letters face the right-hand side of the engine. If no letters are visible, mark them yourself using a felt pen.
4 Unscrew the bolt retaining the fork shaft (see illustration). Support the selector forks



30.4b ... then withdraw the shaft and remove the forks ...



30.4a Remove the bolt retaining the shaft ...

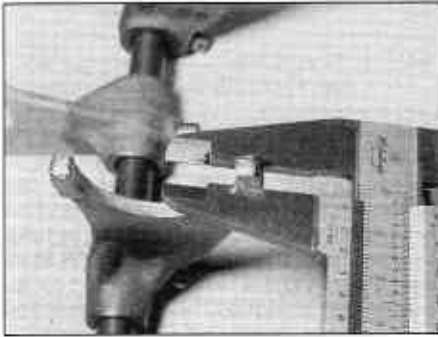
6 Inspect the selector forks for any signs of wear or damage, especially around the fork ends where they engage with the groove in the pinion. Check that each fork fits correctly in its pinion groove. Check closely to see if the forks are bent. If the forks are in any way damaged they must be replaced.

Inspection

5 Remove the selector drum (see illustration).
6 Inspect the selector drum for any signs of wear or damage, especially around the fork ends where they engage with the groove in the pinion. Check that each fork fits correctly in its pinion groove. Check closely to see if the forks are bent. If the forks are in any way damaged they must be replaced.



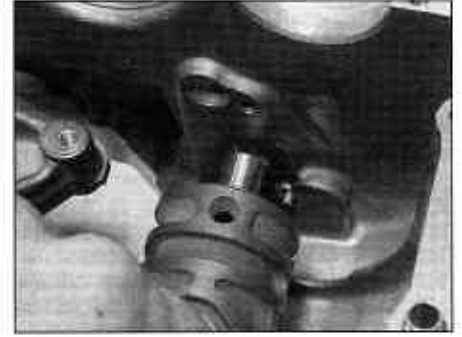
30.5 ... and the selector drum



30.7 Measure the fork end thickness as shown



30.11 Replace the bearing if necessary



30.12a Locate the drum end into its bore ...

7 Measure the thickness of the fork ends and compare the readings to the specifications (**see illustration**). Replace the forks if they are worn beyond their specifications.

8 Check that the forks fit correctly on their shaft. They should move freely with a light fit but no appreciable freeplay. Measure the internal diameter of the fork bores and the corresponding diameter of the fork shaft. Replace the forks and/or shaft if they are worn beyond their specifications. Check that the fork shaft holes in the casing are neither worn nor damaged.

9 The selector fork shaft can be checked for trueness by rolling it along a flat surface. A bent rod will cause difficulty in selecting gears

and make the gearshift action heavy. Replace the shaft if it is bent.

10 Inspect the selector drum grooves and selector fork guide pins for signs of wear or damage. If either component shows signs of wear or damage the selector(s) and drum must be replaced.

11 Check that the selector drum bearing rotates freely and has no sign of freeplay between it and the casing. Replace the bearing if necessary (**see Tools and Workshop Tips** (Section 5) in the Reference Section) (**see illustration**).

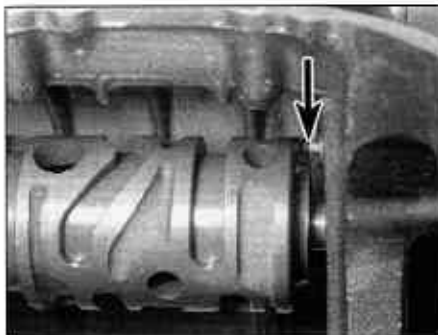
Installation

12 Slide the selector drum into position in the crankcase (**see illustration 30.5**). Make sure

the drum end locates into its bore in the casing, and position it so that the neutral contact is against the neutral switch (**see illustrations**).

13 Refer to Step 3 for the correct location of each fork (**see illustration 30.3**). Lubricate the selector fork shaft with clean engine oil and slide it through the crankcase and each fork in turn, and into its bore, locating the guide pin on the end of each fork into its groove in the drum (**see illustrations**). Clean the threads of the fork shaft bolt, then apply a suitable non-permanent thread locking compound and tighten the bolt to the torque setting specified at the beginning of the Chapter (**see illustrations**).

14 Reassemble the crankcase halves (**see Section 21**).



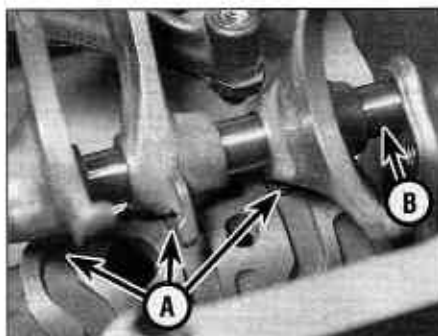
30.12b ... and position it in the neutral position (arrowed)



30.13a Slide the shaft through each fork ...



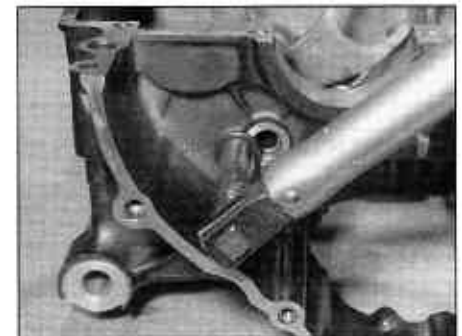
30.13b ... in turn ...



30.13c ... locating the guide pins in the drum grooves (A) and the shaft end in its bore (B)



30.13d Apply a thread locking compound to the bolt ...



30.13e ... and tighten it to the specified torque

31 Initial start-up after overhaul

- 1 Make sure the engine oil level and coolant level are correct (see *Daily (pre-ride) checks*).
 - 2 Turn the fuel tap to the "OFF" position.
 - 3 Turn the engine kill switch to the OFF position and shift the gearbox into neutral.
 - 4 Turn the ignition ON and crank the engine over with the starter until the oil pressure indicator light goes off (which indicates that oil pressure exists). Turn the ignition OFF and turn the engine kill switch back to the RUN position.
 - 5 Make sure there is fuel in the tank, then turn the fuel tap to the "ON" or "RES" position as required, and set the choke.
 - 6 Start the engine and allow it to run at a moderately fast idle until it reaches operating temperature.
- Warning: If the oil pressure warning light doesn't go off, or it comes on while the engine is running, stop the engine immediately.**
- 5 Check carefully for oil and coolant leaks



32 Recommended running-in procedure

- 1 Treat the machine gently for the first few miles to make sure oil has circulated throughout the engine and any new parts installed have started to seat.
- 2 Even greater care is necessary if new pistons/rings or a new crankcase/bore have been fitted, and the bike will have to be run in as when new. This means greater use of the transmission and a restraining hand on the throttle until at least 600 miles (1000 km) have been covered. There's no point in keeping to any set speed limit – the main idea is to keep from labouring the engine and to gradually increase performance up to the 600 mile (1000 km) mark. Experience is the best guide, since it's easy to tell when an engine is running freely. The above maximum engine speed limitations, which Honda provide for new motorcycles, can be used as a guide.
- 3 If a lubrication failure is suspected, stop the engine immediately and try to find the cause. If an engine is run without oil, even for a short period of time, severe damage will occur.

Up to 600 miles (1000 km)	6000 rpm max	Vary throttle position/speed
600 to 1000 miles (1000 to 1600 km)	8000 rpm max	Vary throttle position/speed. Use full throttle for short bursts.
Over 1000 miles (1600 km)	14,500 rpm max	Do not exceed tachometer red line

Chapter 3

Cooling system

Contents

Coolant hoses – removal and installation	9	Cooling system draining, flushing and refilling	see Chapter 1
Coolant level check	see <i>Daily (pre-ride) checks</i>	General information	1
Coolant reservoir – removal and installation	3	Radiators – removal and installation	7
Coolant temperature gauge and sender – check and replacement	5	Radiator pressure cap – check	2
Cooling fan and fan switch – check and replacement	4	Thermostat and housing – removal, check and installation	6
Cooling system checks	see Chapter 1	Water pump – check, removal and installation	8

Degrees of difficulty

Easy, suitable for novice with little experience



Fairly easy, suitable for beginner with some experience



Fairly difficult, suitable for competent DIY mechanic



Difficult, suitable for experienced DIY mechanic



Very difficult, suitable for expert DIY or professional



Specifications

Coolant

Mixture type and capacity see Chapter 1

Radiator

Cap valve opening pressure 16 to 20 psi (1.1 to 1.4 Bar)

Fan switch

Cooling fan cut-in temperature 98 to 102°C

Cooling fan cut-out temperature 93 to 97°C

Coolant temperature sender

Resistance

@ 50°C 130 to 180 ohms

@ 80°C 45 to 60 ohms

@ 120°C 10 to 20 ohms

Thermostat

Opening temperature 80 to 84°C

Valve lift 8 mm (min) @ 95°C

Torque settings – specific components

Fan switch 18 Nm

Coolant temperature sender 10 Nm

Water pump cover bolts 10 Nm

Water pump mounting bolts 10 Nm

Torque settings – non-specified components

Note: Where a specific setting is not given for a particular bolt/nut, these general settings apply. The dimension given applies to the diameter of the thread, not the head.

5 mm bolt/nut 5 Nm

6 mm bolt/nut 10 Nm

8 mm bolt/nut 22 Nm

10 mm bolt/nut 35 Nm

12 mm bolt/nut 55 Nm

6 mm flange bolt with 8 mm head 9 Nm

6 mm flange bolt/nut with 10 mm head 12 Nm

8 mm flange bolt/nut 27 Nm

10 mm flange bolt/nut 40 Nm

1 General information

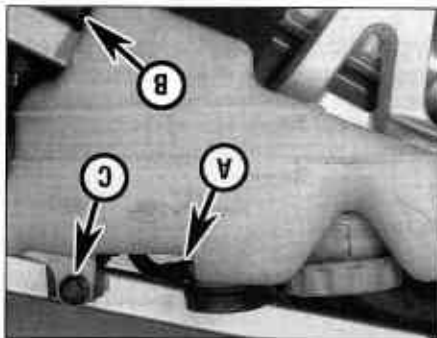
The cooling system uses a water/antifreeze form of heat. The cylinders are surrounded by a water jacket from which the heated coolant is circulated by thermo-syphonic action in conjunction with a water pump, driven by the oil pump. The hot coolant passes upwards to the thermostat and through to the radiator. The coolant then flows across the core of the upper radiator, then via two hoses to the lower radiator, to the water pump and back to the engine where the cycle is repeated.

A thermostat is fitted in the system to prevent the coolant flowing through the radiator when the engine is cold, therefore accelerating the speed at which the engine reaches normal operating temperature. A coolant temperature sender mounted in the thermostat housing transmits information to the temperature gauge on the instrument panel. A cooling fan is fitted to the rear of the lower radiator to aid cooling in extreme conditions; a thermostatically-controlled switch fitted to the side of the lower radiator triggers the operation of the fan motor.

The complete cooling system is partially sealed and pressurised, the pressure being controlled by a valve contained in the spring-loaded radiator cap. By pressurising the coolant the boiling point is raised, preventing premature boiling in adverse conditions. The overflow pipe from the system is connected to a reservoir into which excess coolant is expelled under pressure. The discharged coolant automatically returns to the radiator when the engine cools.

Warning: Do not remove the pressure cap from the radiator when the engine is hot. Scalding hot coolant and steam may be blown out under pressure, which could cause serious injury. When the engine has cooled, place a thick rag, like a towel over the pressure cap; slowly rotate the cap anti-clockwise to the first stop. This procedure allows any residual pressure to escape. When the steam has stopped escaping, press down on the cap while turning it anti-clockwise and remove it.

Do not allow antifreeze to come in contact with your skin or painted surfaces of the motorcycle. Rinse off any spills immediately with plenty of water. Antifreeze is highly toxic if ingested. Never leave antifreeze lying around in an open container or in puddles on the floor; children and pets are attracted by its sweet smell and may drink it. Check with the local authorities about disposing of used antifreeze. Many communities will have collection centres which will see that antifreeze is disposed of safely.



3.2a Detach the breather/overflow hose (A) and the reservoir hose (B), then unscrew the bolt (C) and remove the reservoir . . .

1 The coolant reservoir is located behind the seat cowl on the right-hand side. Remove the seat cowl for access (see Chapter 8).

2 Release the clamp securing the breather/overflow hose (coming out of the top of the reservoir) and detach the hose (see illustrations).

3 Place a suitable container underneath the reservoir, then release the clamp securing the radiator overflow hose to the base of the reservoir. Detach the hose and allow the coolant to drain into the container (see illustration 3.2a).

4 Unscrew the reservoir mounting bolt and remove the reservoir, noting how the lugs at the back locate in the bracket (see illustration 3.2b).

Removal

3 Coolant reservoir – removal and installation

1 If problems such as overheating or loss of coolant occur, check the entire system as described in Chapter 1. The radiator cap opening pressure should be checked by a Honda dealer with the special tester required to do the job. If the cap is defective, replace it with a new one.

2 Radiator pressure cap – check

Cautions: At all times use the specified type of antifreeze, and always mix it with distilled water in the correct proportion. The antifreeze contains corrosion inhibitors which are essential to avoid damage to the cooling system. A lack of these inhibitors could lead to a build-up of corrosion which would block the coolant passages, resulting in overheating and severe engine damage. Distilled water must be used as opposed to tap water to avoid a build-up of scale which would also block the passages.

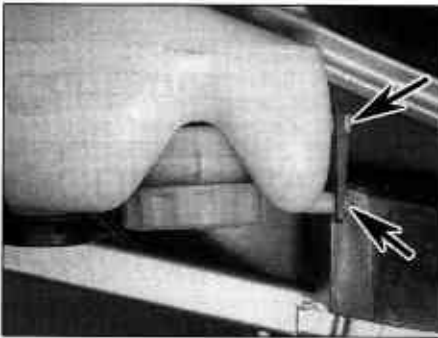
Cooling fan

Check

1 If the engine is overheating and the cooling fan isn't coming on, first check the cooling fan circuit fuse (see Chapter 9) and then the fan switch as described in Steps 8 to 12 below.

2 If the fan does not come on, (and the fan switch is good), the fault lies in either the cooling fan motor or the relevant wiring. Test all the wiring and connections as described in Chapter 9.

3 To test the cooling fan motor, remove the lower fairing (see Chapter 8), and disconnect the fan wiring connector on the left-hand side of the lower radiator (see illustration). Using a 12 volt battery and two jumper wires, connect the battery positive (+ve) lead to the black/blue fan wire and the battery negative (-ve) lead to earth. Once connected the fan should operate. If it does not, and the wiring is



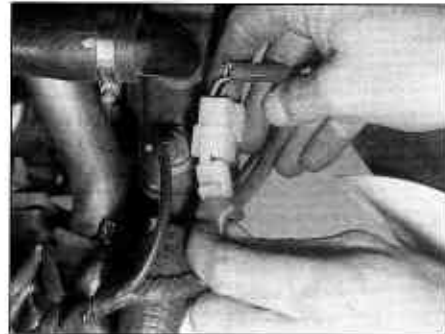
3.2b . . . noting how the lugs (arrowed) locate in the bracket

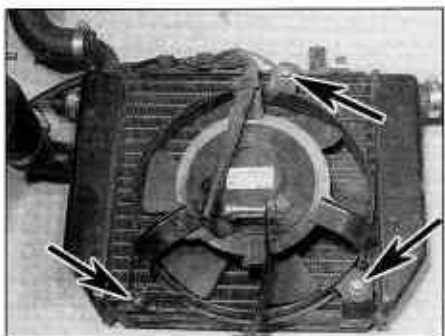
Installation

5 Installation is the reverse of removal. Make sure the hoses are correctly installed and secured with their clamps. On completion refill the reservoir as described in Daily (pre-ride) checks.

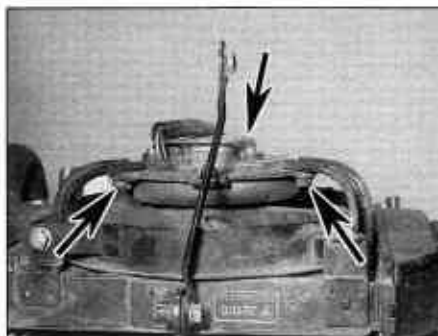
4 Cooling fan and fan switch – check and replacement

4.3 Disconnect the cooling fan wiring connector





4.5a The fan assembly is secured by three bolts (arrowed). Note the fan switch earth lead secured by the top bolt



4.5b The fan motor is secured to the shroud by three nuts (arrowed)



4.9 Disconnect the fan switch wiring connector

all good, then the fan is faulty. Individual components are available for the fan assembly.

Replacement



Warning: The engine must be completely cool before carrying out this procedure.

- 4 Remove the lower radiator (see Section 7).
- 5 Unscrew the three bolts securing the fan shroud and fan assembly to the radiator, noting that the upper bolt also secures the earth (ground) cable (see illustration). Unscrew the three nuts on the front of the fan securing it to the shroud and remove the shroud (see illustration).
- 6 Installation is the reverse of removal. Do not forget to attach the earth (ground) cable to the upper mounting bolt securing the shroud to the radiator.
- 7 Install the lower radiator (see Section 7).

Cooling fan switch

Check

- 8 If the engine is overheating and the cooling fan isn't coming on, first check the cooling fan circuit fuse (see Chapter 9). If the fuse is blown, check the fan circuit for a short to earth (see the wiring diagrams at the end of this book).
- 9 If the fuse is good, remove the lower fairing (see Chapter 8), and disconnect the wiring connector from the fan switch on the left-hand side of the lower radiator (see illustration). Using a jumper wire if necessary, connect the wire to earth (ground). The fan should come on. If it does, the fan switch is defective and must be replaced. If it does not come on, the fan should be tested (see Step 3).
- 10 If the fan is on the whole time, disconnect the wiring connector. The fan should stop. If it does, the switch is defective and must be replaced. If it doesn't, check the wiring between the switch and the fan, and the fan itself.
- 11 If the fan works but is suspected of cutting in at the wrong temperature, a more comprehensive test of the switch can be made as follows.
- 12 Remove the switch (see Steps 14 to 17). Fill a small heatproof container with coolant

and place it on a stove. Connect the positive (+ve) probe of an ohmmeter to the terminal of the switch and the negative (-ve) probe to the switch body, and using some wire or other support suspend the switch in the coolant so that just the sensing portion and the threads are submerged (see illustration). Also place a thermometer capable of reading temperatures up to 110°C in the coolant so that its bulb is close to the switch. **Note:** None of the components should be allowed to directly touch the container.

- 13 Initially the ohmmeter reading should be very high indicating that the switch is open (OFF). Heat the coolant, stirring it gently.



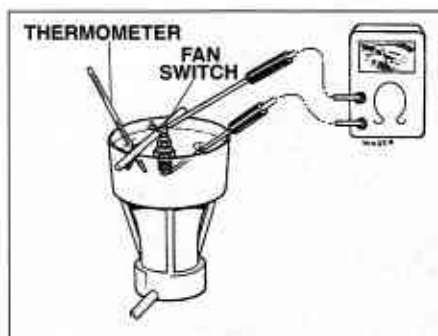
Warning: This must be done very carefully to avoid the risk of personal injury.

When the temperature reaches around 98 to 102°C the meter reading should drop to around zero ohms, indicating that the switch has closed (ON). Now turn the heat off. As the temperature falls below 93 to 97°C the meter reading should show infinite (very high) resistance, indicating that the switch has opened (OFF). If the meter readings obtained are different, or they are obtained at different temperatures, then the switch is faulty and must be replaced.

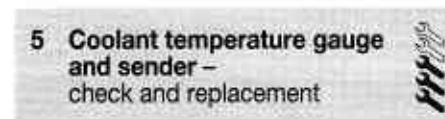
Replacement



Warning: The engine must be completely cool before carrying out this procedure.



4.12 Fan switch testing set-up



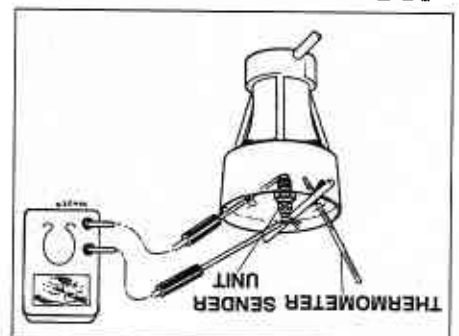
Coolant temperature gauge

Check

- 1 The circuit consists of the sender mounted in the bottom of the thermostat housing and the gauge assembly mounted in the instrument panel. If the system malfunctions check first that the battery is fully charged and that the fuses are all good.
- 2 If the gauge is not working, remove the right-hand fairing side panel (see Chapter 8). Disconnect the wire from the sender and turn the ignition switch ON (see illustration). The



5.2 Disconnect the wiring connector from the sender



5.7 Temperature gauge sender testing set-up

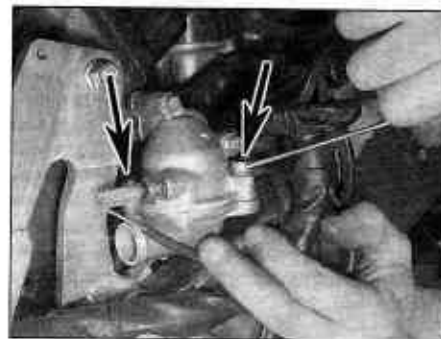
temperature gauge needle should be on the 'C' on the gauge. Now earth the sender wire immediately over to the 'H' on the gauge. **Caution: Do not earth the wire for any longer than is necessary to take the reading, or the gauge may be damaged.** If the needle moves as described above, the sender is proven defective and must be replaced. 3 If the needle movement is still faulty, or if it does not move at all, the fault lies in the wiring or the gauge itself. Check all the relevant wiring and wiring connectors (see Chapter 9). If all appears to be well, the gauge is defective and must be replaced. 4 See Chapter 9.



6.3a Slacken the clamp and detach the hose from the cover ...



6.3c ... and remove the cover ...



6.3b ... then unscrew the cover bolts (arrowed) ...



6.3d ... and the thermostat

When the temperature reaches around 50°C the meter should read between 130 and 180

Warning: This must be done very carefully to avoid the risk of personal injury.

8 Heat the oil, stirring it gently. **Warning: This must be done very carefully to avoid the risk of personal injury.**

touch the container. components should be allowed to directly

sender (see illustration). Note: None of the in the water so that its bulb is close to the

capable of reading temperatures up to 120°C submerged. Also place a thermometer

the sensing portion and the threads are suspend the sender in the coolant so that just

sender. Using some wire or other support to the terminal on the sender, and the

negative (-ve) probe to the body of the connect the positive (+ve) probe of the meter

and place it on a stove. Using an ohmmeter, below). Fill a small heatproof container with oil

7 Remove the sender (see Steps 9 to 11 that the thermostat mounting is secure.

be continuity. If there is no continuity, check sender body and earth (ground). There should

tester, check for continuity between the (see illustration 5.2). Using a continuity

6 Disconnect the sender wiring connector thermostat housing.

The sender is fitted to the bottom of the and drain the cooling system (see Chapter 1).

5 Remove the lower fairing (see Chapter 8) Check

Temperature gauge sender

ohms. When the temperature reaches around 80°C the meter should read between 45 and 60 ohms. When the temperature reaches around 120°C the meter should read between 10 and 20 ohms. If the meter readings obtained are different, or they are obtained at different temperatures, then the sender is faulty and must be replaced.

Replacement

Warning: The engine must be completely cool before carrying out this procedure.

9 Remove the lower fairing (see Chapter 8) and drain the cooling system (see Chapter 1).

The sender is fitted to the bottom of the thermostat housing.

10 Disconnect the sender wiring connector (see illustration 5.2). Unscrew the sender

12 Apply a smear of sealant to the threads of the new sender, then install it into the

thermostat housing and tighten it to the torque setting specified at the beginning of

the Chapter. Connect the sender wiring. 11 Refill the cooling system (see Chapter 1).

12 Install the lower fairing (see Chapter 8).

6 Thermostat and housing - removal, check and installation

Removal

Note: The complete thermostat housing can be removed without removing the thermostat

itself - ignore the points in Step 3 relating to cover and thermostat removal.

Warning: The engine must be completely cool before carrying out this procedure.

1 The thermostat is automatic in operation and should give many years service without requiring attention. In the event of a failure, the valve will probably jam open, in which

case the engine will take much longer than normal to warm up. Conversely, if the valve jams shut, the coolant will be unable to

circulate and the engine will overheat. Neither condition is acceptable, and the fault must be investigated promptly.

2 Remove the lower fairing (see Chapter 8) and drain the cooling system (see Chapter 1).

3 The thermostat is located in the thermostat housing on the right-hand end of the front

cylinder head. Slacken the clamp securing the hose to the housing cover and detach the

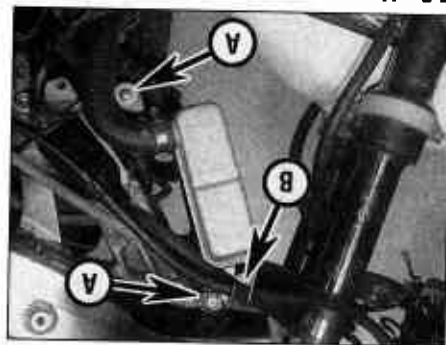
hose (see illustration). Unscrew the two bolts securing the cover and separate it from the

housing, noting that the rear bolt cannot be fully withdrawn as it does not clear the

housing bolt (see illustration). Withdraw the thermostat, noting how it fits (see

illustration). Discard the cover O-ring as a new one must be used.

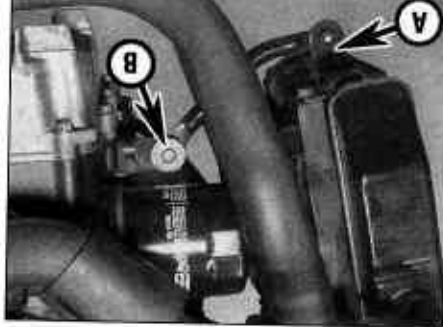
4 The thermostat housing is secured to the engine by two bolts. Slacken the clamp



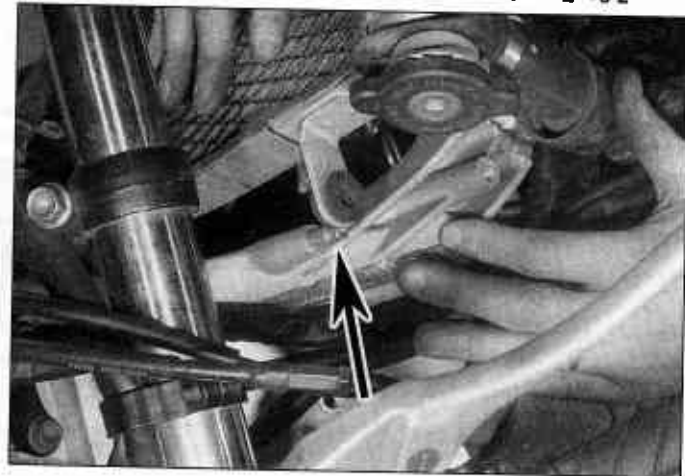
7.5a UnscREW the upper radiator mounting bolts (A) and free the speedometer cable from its guide (B) . . .



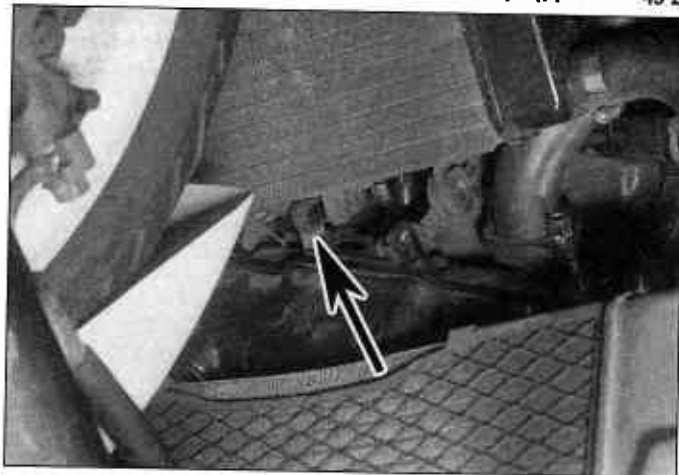
7.5b . . . then unscREW the lower radiator upper mounting bolt (arrowed) . . .



7.5c . . . and lower mounting bolt, either at the radiator (A) or at the engine (B)



7.6a Free the upper radiator from its lug (arrowed) . . .



7.6b . . . and the lower radiator from its lug (arrowed) and remove the assembly

the radiators can be left in situ and the radiators removed together.
 5 Unscrew the two bolts securing the upper radiator and the two bolts securing the lower radiator (see illustrations). Note the arrangement of the collars and rubber grommets, and how the upper radiator top bolt secures the fairing trim panel, which also has a collar. Free the speedometer cable from its guide on the left-hand side of the upper radiator.



7.9 With the exception of the mounting bolt on the bottom of the lower radiator, each bolt has a collar that fits into the rubber grommet

Installation

9 Installation is the reverse of removal, noting the following.
 a) Make sure the locating lugs fit correctly into the rubber grommets (see illustrations 7.6a and b).
 b) Make sure the various collars are correctly installed with the mounting bolts (see illustration).
 c) Make sure that the fan wiring is correctly connected.
 d) Ensure the coolant hoses are in good condition (see Chapter 1), and are

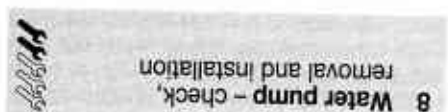
6 Carefully manoeuvre the radiators sideways to the right until they are clear of their mounting lugs, then remove the radiator assembly (see illustrations).
 7 If necessary, remove the cooling fan (see Section 4) from the radiator.
 8 Remove the stone guard from the upper radiator. Check the stone guard and the radiator for signs of damage and clear any dirt or debris that might obstruct air flow and inhibit cooling. If the radiator fins are badly damaged or broken the radiator must be replaced. Also check the rubber mounting grommets, and replace them if necessary.

Check

1 The water pump is located on the lower left side of the engine. Visually check the area around the pump for signs of leakage.

2 To prevent leakage of water from the cooling system to the lubrication system and vice versa, two seals are fitted on the pump shaft. On the underside of the pump body there is also a drainage hole. If either seal fails, this hole should allow the coolant or oil to escape and prevent the oil and coolant mixing.

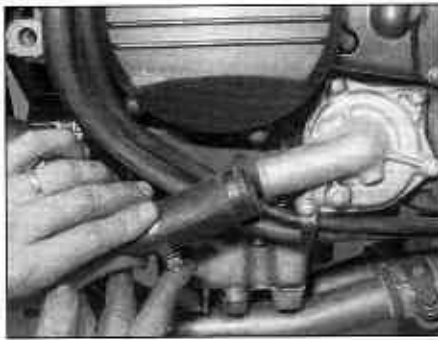
3 The seal on the water pump side is of the mechanical type which bears on the rear face of the impeller. The second seal, which is mounted behind the mechanical seal is of the normal feathered lip type. However, neither seal is available as a separate item as the



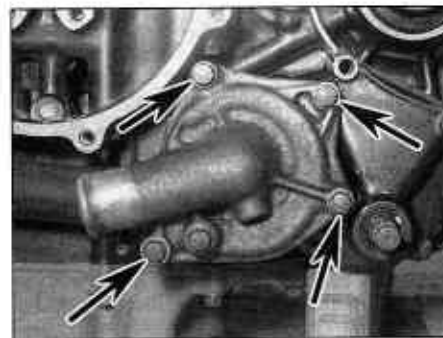
8 Water pump - check, removal and installation
 e) On completion refill the cooling system as described in Chapter 1.
 new ones if necessary.
 securely retained by their clamps, using



8.5a Slacken the clamp ...



8.5b ... and detach the hose from the pump



8.6a Unscrew the four bolts (arrowed) ...

pump is sold as an assembly. Therefore, if on inspection the drainage hole shows signs of leakage, the pump must be removed and replaced.

Removal

4 Drain the coolant (see Chapter 1). Place a suitable container below the water pump to catch any residue oil as the water pump is removed.

5 Slacken the clamp securing the coolant hose to the pump cover and detach the hose (see illustrations).

6 Unscrew the bolts securing the pump cover to the pump and the pump to the crankcase, noting the hose clip fitted with the lower bolt, and remove the cover (see illustrations). Note the position of each bolt as they are different lengths. Discard the cover O-ring as a new one must be used. Remove the dowel from the pump or the cover if it is loose.

7 Slacken the clamp securing the coolant hose to the pump body and detach the hose. Carefully draw the pump from the crankcase, noting how it fits (see illustration 8.9b). Remove the O-ring from the rear of the pump body and discard it as a new one must be used.

8 Wiggle the water pump impeller back-and-forth and in-and-out (see illustration). If there is excessive movement the pump must be replaced. Also check for corrosion or a build-up of scale in the pump body and clean or replace the pump as necessary.



8.6b ... and remove the cover, noting the dowel (arrowed)



8.8 Check for freeplay between the impeller and the housing

Installation

9 Apply a smear of engine oil to the new pump body O-ring and install it onto the rear of the pump body (see illustration). Install the pump into the crankcase, aligning the slot in the impeller shaft with the tab on the oil pump shaft (see illustration).

10 Attach the coolant hose to the pump body and secure it with its clamp.

11 Install the new cover O-ring into its groove in the pump (see illustration). Fit the pump dowel into its hole in the pump.

12 Install the cover onto the pump, then install the four bolts and tighten them to the torque setting specified at the beginning of the Chapter (see illustrations 8.6b and a). Make sure the different bolts are in their correct locations – the longest is for bottom

left, the next longest for the bottom right, and the two shortest are for the top.

14 Attach the coolant hose to the pump cover and secure it with its clamp (see illustrations 8.5b and a).

15 Refill the cooling system (see Chapter 1).

9 Coolant hoses – removal and installation



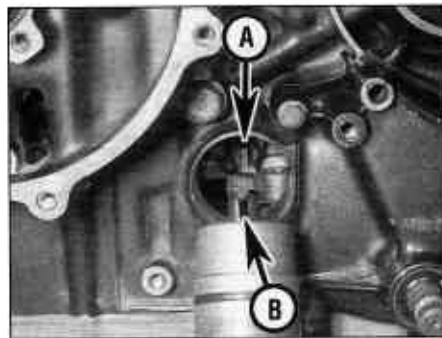
Removal

1 Before removing a hose, drain the coolant (see Chapter 1).

2 Use a screwdriver to slacken the larger-bore hose clamps, then slide them back along



8.9a Fit a new O-ring ...



8.9b ... then install the pump, aligning the slot (B) with the drive tab (A)



8.10 Fit a new O-ring into the groove in the cover

the hose and clear of the union spigot (see illustrations 8.5a and b). The smaller-bore hoses are secured by spring clamps which can be expanded by squeezing their ears together with pliers (see illustration 7.3).

Caution: The radiator unions are fragile. Do not use excessive force when attempting to remove the hoses.

3 If a hose proves stubborn, release it by rotating it on its union before working it off. If all else fails, cut the hose with a sharp knife then slit it at each union so that it can be peeled off in two pieces. Whilst this means replacing the hose, it is preferable to buying a new radiator.

4 The water pipe inlet unions to the cylinder block can be removed by unscrewing the retaining bolts (see illustration). If they are removed, the O-rings must be replaced. The

6 Rotate the hose on its unions to settle it in position before sliding the clamps into place and tightening them securely.

7 If either the inlet unions to the cylinder block or the outlet union from the cylinder

HAYNES HINT

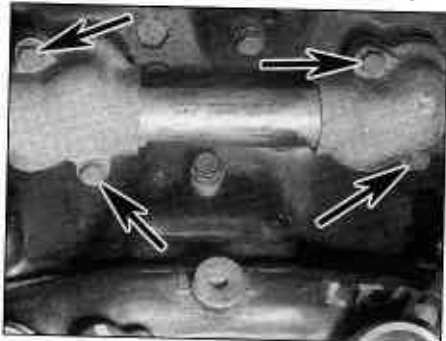
If the hose is difficult to push on its union, it can be softened by soaking it in very hot water, or alternatively a little soapy water can be used as a lubricant.

5 Slide the clips onto the hose and then work it on to its respective union.

Installation

outlet union is also secured by two bolts. If it is removed, the O-ring must be replaced.

9.4 Water pipe union bolts (arrowed)



heads have been removed, fit a new O-ring, then install the union and tighten the mounting bolts securely.

RV
R
F
VFF
R
F
VFF
R
F
VFF
Main
Pilot
Cat
Idle
RV
VFF
Float
RV
VFF
Pilot
Type
Cat
Rese
Fuel
Grad
Fuel
Sp
exp
now
E
De
Ex
Chok
Carb
Carb
Carb
Carb
Carb
Carb
Air
Co
Fu
C

Chapter 4

Fuel and exhaust systems

Contents

Air filter replacement	see Chapter 1	Fuel hoses – check and replacement	see Chapter 1
Air filter housing – removal and installation	4	Fuel system – check	see Chapter 1
Carburettor overhaul – general information	6	Fuel tank – cleaning and repair	3
Carburettor synchronisation	see Chapter 1	Fuel tank and fuel tap – removal and installation	2
Carburettors – disassembly, cleaning and inspection	8	General information and precautions	1
Carburettors – reassembly, and float height check	10	Idle fuel/air mixture adjustment – general information	5
Carburettors – removal and installation	7	Idle speed – check	see Chapter 1
Carburettors – separation and joining	9	Throttle and choke cables – check and adjustment	see Chapter 1
Choke cable – removal and installation	12	Throttle cables – removal and installation	11
Exhaust system – removal and installation	13		

Degrees of difficulty

Easy, suitable for
novice with little
experience



Fairly easy, suitable
for beginner with
some experience



Fairly difficult,
suitable for competent
DIY mechanic



Difficult, suitable for
experienced DIY
mechanic



Very difficult,
suitable for expert DIY
or professional



Specifications

Fuel

Grade	Unleaded, minimum 91 RON (Research Octane Number)
Fuel tank capacity (including reserve)	15.0 litres
Reserve	2.0 litres

Carburettors

Type	CV
Pilot screw setting (turns out)	
VFR models	2 turns out
RVF models	1 5/8 turns out
Float height	
VFR models	6.8 mm
RVF models	12.5 mm
Idle speed	see Chapter 1

Carburettor jet sizes

Pilot jet	35
Main jet	
VFR K grey import models	
Front cylinder carburettors	110
Rear cylinder carburettors	110
VFR L and N grey import models	
Front cylinder carburettors	115
Rear cylinder carburettors	118
VFR UK spec models	
Front cylinder carburettors	122
Rear cylinder carburettors	120
RVF models (all carburettors)	108

Torque settings – specific components

Front cylinder exhaust downpipe nuts	8 Nm
Rear cylinder exhaust header pipe nuts	8 Nm
Right-hand footrest bracket bolts	27 Nm

Torque settings – non-specified components

5 mm bolt/nut	5 Nm
6 mm bolt/nut	10 Nm
8 mm bolt/nut	22 Nm
10 mm bolt/nut	35 Nm
12 mm bolt/nut	55 Nm
6 mm flange bolt with 8 mm head	9 Nm
6 mm flange bolt/nut with 10 mm head	12 Nm
8 mm flange bolt/nut	27 Nm
10 mm flange bolt/nut	40 Nm

Note: Where a specific setting is not given for a particular bolt/nut, these general settings apply. The dimension given applies to the diameter of the thread, not the head.

1 General information and precautions

General information

The fuel system consists of the fuel tank, fuel tap with integral filter, carburettors, fuel hoses and control cables.

The fuel tap is automatic and opens by vacuum when the engine is turned. The fuel filter is fitted inside the fuel tank and is part of the tap.

The carburettors used on all models are CV types. On all models there is a carburettor for each cylinder. For cold starting, a choke lever (VFR models) or knob (RVF models) is mounted between the fairing side panel and the frame on the left-hand side, and is connected to the carburettors by a cable.

Air is drawn into the carburettors via an air filter which is housed under the fuel tank. On RVF models, air ducts mounted between intakes in the fairing and the fuel tank direct air under force to the air filter housing intake.

The exhaust system is a four-into-one design. Many of the fuel system service procedures are considered routine maintenance items and for that reason are included in Chapter 1.

Precautions

Warning: Petrol (gasoline) is extremely flammable, so take extra precautions when you work on any part of the fuel system. Don't smoke or allow open flames or bare light bulbs near the work area, and don't work in a garage where a natural gas-type appliance is present. If you spill any fuel on your skin, rinse it off immediately with soap and water. When you perform any kind of work on the fuel system, wear safety glasses and have a fire extinguisher suitable for a class B type fire (flammable liquids) on hand.

Always perform service procedures in a well-ventilated area to prevent a build-up of fumes.

Never work in a building containing a gas appliance with a pilot light, or any other form of naked flame. Ensure that there are no naked light bulbs or any sources of flame or sparks nearby.

Do not smoke (or allow anyone else to smoke) while in the vicinity of petrol (gasoline) or of components containing it. Remember the possible presence of vapour from these sources and move well clear before smoking.

Check all electrical equipment belonging to the house, garage or workshop where work is being undertaken (see the Safety first section of this manual). Remember that certain electrical appliances such as drills, cutters etc. create sparks in the normal course of operation and must not be used near petrol (gasoline) or any component containing it. Again, remember the possible presence of fumes before using electrical equipment.

Always mop up any spill fuel and safely dispose of the rag used.

Any stored fuel that is drained off during servicing work must be kept in sealed containers that are suitable for holding petrol (gasoline), and clearly marked as such; the

2.2 Detach the breather hose from its union

2.3 Each duct is secured by a single screw

4 Unscrew the bolt securing the rear of the ducts (see illustration).

3 On RVF models, remove the screw securing each air duct to the tank and remove the (see illustration).

2 On VFR models, pull the tank breather hose off the breather union at the front of the tank the seat cowl (see Chapter 8).

1 Make sure the fuel cap is secure. Remove

Fuel tank

Removal

Warning: Refer to the precautions given in Section 1 before starting work.

2 Fuel tank and fuel tap – removal and installation

Warning: Refer to the precautions given in Section 1 before starting work.

Fuel tank

Removal

Warning: Refer to the precautions given in Section 1 before starting work.

Fuel tank

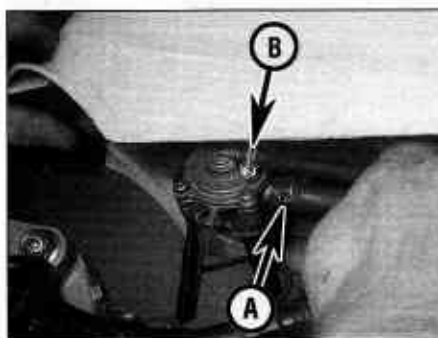
Removal

Warning: Refer to the precautions given in Section 1 before starting work.

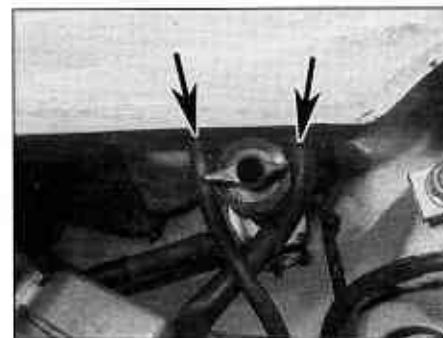
Fuel tank



2.4a Remove the tank mounting bolt (arrowed) . . .



2.4b . . . then raise the tank at the rear and detach the fuel hose (A) and the vacuum hose (B)



2.4c On RVF models, also detach the breather and drain hoses (arrowed)

tank to the frame (see illustration). Raise the tank at the rear and release the clamps securing the fuel hose and the vacuum hose to the unions on the tap, noting which fits where, and detach the hoses (see illustration). On RVF models, also detach the breather and water drain hoses from their unions (see illustration).

5 Check that all hoses have been disconnected, then carefully draw the tank back, noting how the tab locates at the front, and lift the tank away.

6 Inspect the tank mounting rubbers for signs of damage or deterioration and replace them if necessary.

Installation

7 Check that the tank mounting rubbers are fitted, then carefully lower the fuel tank into position. Keeping the tank raised at the rear, connect the fuel and vacuum hoses to their unions on the tap and secure them with the clamps (see illustration 2.4b). On RVF models, also connect the breather and drain hoses (see illustration 2.4c).

8 Locate the tab at the front of the tank under the frame and lower it into position (see illustration). Push the tank forward to align the mounting bolt holes, then install the bolt with its collar and tighten it securely (see illustration).

9 On VFR models, attach the breather hose to the union on the breather (see illustration 2.2).

10 On RVF models, install the air ducts and secure them with the screws (see illustration).

11 Start the engine and check that there is no sign of fuel leakage, then shut it off.

12 Install the seat cowling (see (Chapter 8).

Fuel tap

Removal

13 The tap should not be removed unnecessarily from the tank to prevent the possibility of damaging the O-ring or the filter.

14 The fuel tap is automatic, operated by a vacuum created when the engine is turned over. If it is faulty, it can be disassembled and



2.8a Locate the tab (arrowed) under the frame



2.8b Note the collar fitted with the tank bolt

inspected. The most likely problem is a hole or split in the diaphragm. Before removing and dismantling the tap, check that the vacuum hose is securely attached at both ends, and that there are no splits or cracks in the hose. If in doubt, attach a spare hose to the vacuum union on the tap and apply a vacuum to the hose. If fuel does not flow through the tap (make sure it is turned to ON or RES), remove it and disassemble it to check the diaphragm. The diaphragm cover and components are available as an assembly.

15 Remove the fuel tank as described above. Connect a drain hose to the fuel hose union

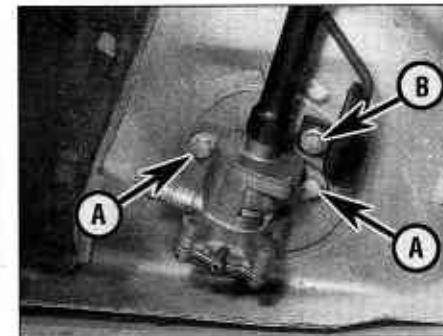
and insert its end in a container suitable and large enough for storing the petrol. Turn the fuel tap to the RES position, then attach a suitable hose to the vacuum union and apply a vacuum to allow the tank to drain.

16 Unscrew the two bolts securing the tap and the bolt securing the tap knob holder and withdraw the tap assembly (see illustration). Check the condition of the O-ring. If it is in good condition it can be re-used, though it is better to use a new one. If it is in any way deteriorated or damaged it must be replaced.

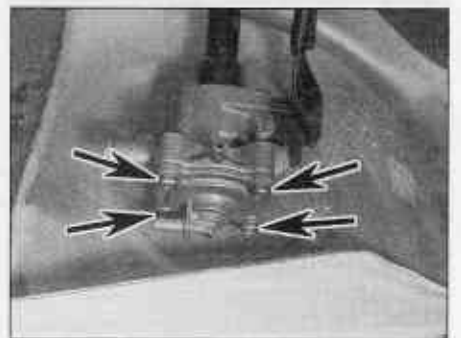
17 If the fuel tap has been leaking, tightening the assembly screws on the back of the tap



2.10 Make sure the duct locates correctly onto both the fairing and the tank



2.16 The tap is secured to the tank by two bolts (A). Also remove the bolt (B) securing the knob holder



2.17 If the tap is leaking, tighten the screws (arrowed)

may help (see illustration). Slacken all the screws a little first, then tighten them evenly a little at a time to ensure the cover seats properly on the tap body. If leakage persists, the tap should be replaced, however nothing is lost by dismantling the tap for further inspection. Unscrew the screws and disassemble the tap, noting how the components fit. Inspect all components for wear or damage, and replace them as necessary, if available. If any of the components are worn or damaged beyond repair and are not available individually, a new tap must be fitted.

18 Clean the gauze filters to remove all traces of dirt and fuel sediment. Check the gauze for holes. If any are found, a new tap should be fitted as the filters are not available individually.

Installation

19 Install the fuel tap into the tank, using a new O-ring if required, and tighten the bolts securely (see illustration 2.16).

20 Install the fuel tank (see above).

3 Fuel tank – cleaning and repair

1 All repairs to the fuel tank should be carried out by a professional who has experience in this critical and potentially dangerous work. Even after cleaning and flushing of the fuel



4.2 Release the clamp and detach the hose from the breather



4.1 Remove the sub-air cleaner element if required

system, explosive fumes can remain and ignite during repair of the tank.

2 If the fuel tank is removed from the bike, it should not be placed in an area where sparks or open flames could ignite the fumes coming out of the tank. Be especially careful inside garages where a natural gas-type appliance is located, because the pilot light could cause an explosion.

4 Air filter housing – removal and installation

Removal

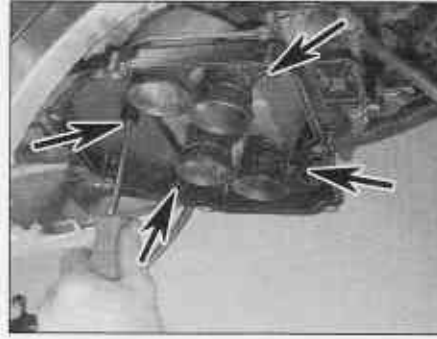
1 Remove the fuel tank (see Section 2), and the air filter (see Chapter 1). Also remove the sub-air cleaner for safekeeping if required (see illustration).

2 Release the clamp securing the engine breather hose to the breather union on the rear cylinder valve cover and detach the hose (see illustration).

3 Remove the four screws securing the filter housing to the carburettor air duct holder (see illustration). Lift the housing up off the air duct holder and remove it (see illustration).

Installation

4 Installation is the reverse of removal. Check the condition of the various hoses and their clamps and replace them if necessary.



4.3a Remove the four screws (arrowed) ...



4.3b ... and lift the housing off the carburettors

1 Poor engine performance, hesitation, hard starting, stalling, flooding and backfiring are all signs that major carburettor maintenance may be required.

2 Keep in mind that many so-called carburettor problems are really not carburettor problems at all, but mechanical problems within the engine or ignition system malfunctions. Try to establish for certain that

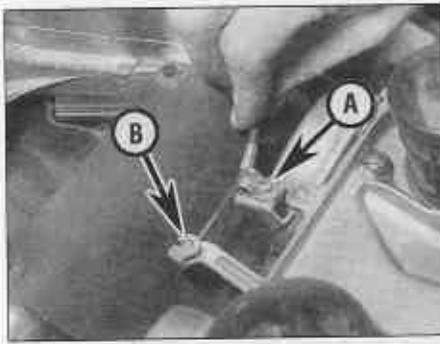
6 Carburettor overhaul – general information

3 If the engine runs extremely rough at idle or continually stalls, and if a carburettor overhaul does not cure the problem, take the motorcycle to a Honda dealer equipped with an exhaust gas analyser. They will be able to properly adjust the idle fuel/air mixture to achieve a smooth idle and restore low speed performance.

2 The pilot screws are set to their correct position by the manufacturer and should not be adjusted or removed unless it is necessary to do so during a carburettor overhaul. If the screws are to be removed, record the pilot screw's current setting by turning the screw in until it seats tightly, counting the number of turns necessary to achieve this, then fully unscrew it. On installation, the screw is simply backed out the number of turns you've recorded.

1 Due to the increased emphasis on controlling exhaust emissions, certain governmental regulations have been formulated which directly affect the carburettor of this machine. The pilot screws can be adjusted, but the use of an exhaust gas analyser and an auxiliary tachometer capable of accurately displaying changes of 50 rpm is the only certain way to adjust the idle fuel/air mixture and be sure the machine doesn't exceed the emissions regulations.

5 Idle fuel/air mixture adjustment – general information



7.2 Slacken the clamp screw (A) and detach the outer cable, then free the nipple from the lever (B)



7.4 Release the idle speed adjuster from its holder



7.5a Slacken the upper clamp (arrowed) on each intake rubber . . .

the carburettors are in need of maintenance before beginning a major overhaul.

3 Check the fuel tap and filter, the fuel and vacuum hoses, the intake manifold joint clamps, the air filter, the ignition system, the spark plugs and carburettor synchronisation before assuming that a carburettor overhaul is required.

4 Most carburettor problems are caused by dirt particles, varnish and other deposits which build up in and block the fuel and air passages. Also, in time, gaskets and O-rings shrink or deteriorate and cause fuel and air leaks which lead to poor performance.

5 When overhauling the carburettors, disassemble them completely and clean the parts thoroughly with a carburettor cleaning solvent and dry them with filtered, unlubricated compressed air. Blow through the fuel and air passages with compressed air to force out any dirt that may have been loosened but not removed by the solvent. Once the cleaning process is complete, reassemble the carburettor using new gaskets and O-rings.

6 Before disassembling the carburettors, make sure you have all necessary O-rings and other parts, some carburettor cleaner, a supply of clean rags, some means of blowing out the carburettor passages and a clean place to work. It is recommended that only one carburettor be overhauled at a time to avoid mixing up parts.



7.5b . . . and lift the carburettors off the intakes

7 Carburettors – removal and installation



Warning: Refer to the precautions given in Section 1 before starting work.

Removal

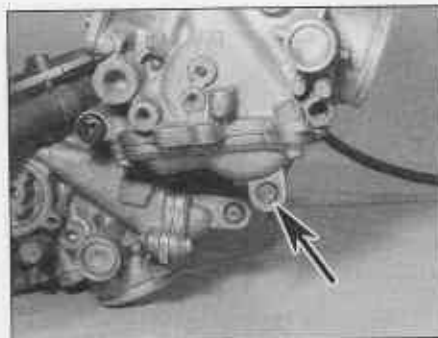
1 Remove the fuel tank and the air filter housing (see Sections 2 and 4).

2 Slacken the choke outer cable bracket screw and free the cable from the bracket on the front of the carburettors, then detach the inner cable nipple from the choke linkage lever (see illustration).

3 Detach the throttle cables from the carburettors (see Section 11, Steps 2 and 3 or 4, according to model). If access is too restricted, detach them after the carburettors have been lifted off the cylinder head intakes.

4 Release the idle speed adjuster from its holder and feed it through to the base of the carburettors (see illustration). Remove the rear bolt securing the left-hand fairing side panel trim to provide more clearance if required.

5 Fully slacken the upper clamps on the cylinder head intake rubbers, then ease the carburettors off the intakes, noting that they are quite a tight fit, and remove them (see illustrations). **Note:** Keep the carburettors upright to prevent fuel spillage from the float



7.6 Slacken the drain screw (arrowed) on each float chamber in turn and drain the carburettors

chambers and the possibility of the piston diaphragms being damaged.

Caution: Stuff clean rag into each cylinder head intake after removing the carburettors to prevent anything from falling in.

6 Place a suitable container below the float chambers, then slacken the drain screw on each chamber in turn and drain all the fuel from the carburettors (see illustration). Discard the drain screw O-rings as new ones must be used. Once all the fuel has been drained, fit the new O-rings and tighten the drain screws securely.

7 If necessary, slacken the clamps securing the intake rubbers to the cylinder head and remove the rubbers, noting which way up and round they fit (see illustration 7.8b).

Installation

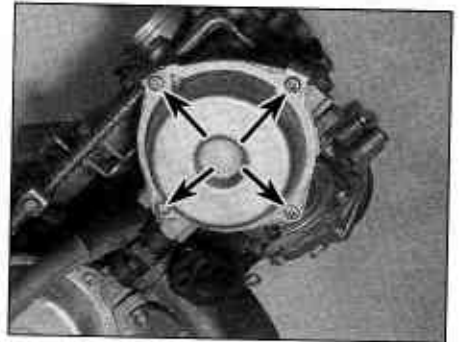
8 Installation is the reverse of removal, noting the following.

- Check for cracks or splits in the cylinder head intake rubbers, and replace them if necessary.
- If removed, make sure the intake rubbers are installed with the CARB marking facing out (towards the carburettor), and so that the arrow next to the UP mark points upwards. If this is not visible, the smaller cutout in the rubber should be central at the top and the large one central at the bottom (see illustration). If



7.8 Make sure the rubbers are fitted as described

8.3a Remove the screws (arrowed) and the cover ...



8.3b ... then withdraw the spring

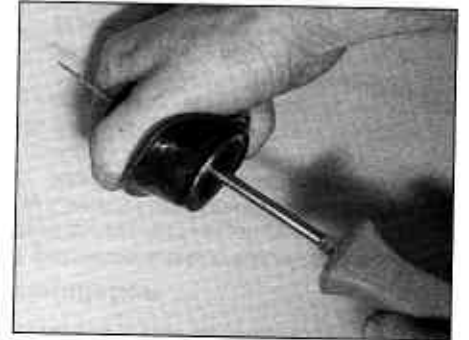


8.4 Peel the diaphragm off the carburettor and withdraw the diaphragm and piston assembly



- c) Make sure the carburettors are fully engaged with the intake rubbers and the clamps are securely tightened.
- d) Make sure all hoses are correctly routed and secured and not trapped or kinked.
- e) Refer to Section 11 for installation of the throttle cables. Check the operation of the cables and adjust them as necessary (see Chapter 1).
- f) Check idle speed and carburettor synchronisation and adjust as necessary (see Chapter 1).

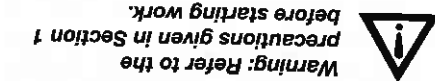
8.5a Push down on the retainer and turn it to release it ...



8.5b ... then remove the retainer ...



8 Carburettors - disassembly, cleaning and inspection



Warning: Refer to the precautions given in Section 1 before starting work.

Disassembly

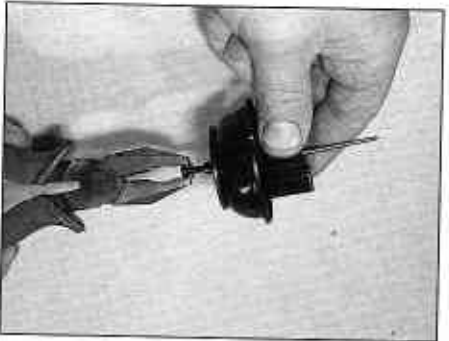
- 1 Remove the carburettors from the machine as described in the previous Section. **Note:** Do not separate the carburettors unless absolutely necessary; each carburettor can be dismantled sufficiently for all normal cleaning and adjustments while in place on the mounting brackets. Dismantle the carburettors separately to avoid interchanging parts.
- 2 If required, remove the air duct assembly from the carburettors (see Section 9, Step 3), but note that this is not necessary for carburettor disassembly and cleaning, unless they are being separated.
- 3 Unscrew and remove the top cover retaining screws, noting the position of any hose clips (see illustration). Lift off the cover and remove the spring from inside the piston (see illustration).
- 4 Carefully peel the diaphragm away from its sealing groove in the carburettor and

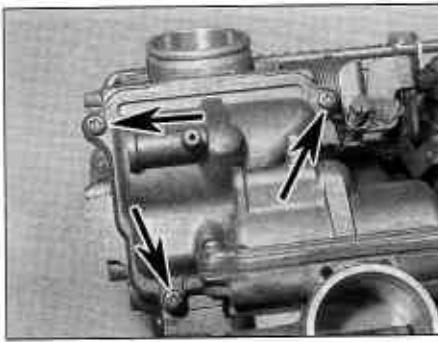
- 5 On VFR models, if required, gently push down on the jet needle retainer using a Phillips screwdriver and rotate it until its tab is released from the protrusions inside the bottom of the piston and withdraw it from the top (see illustration). Take care not to lose the spring and the washer that fits between the head of the needle and the piston.
- 6 On R/VF models, if required, thread a 4 mm screw into the top of the needle holder (one of the top cover retaining screws is ideal), then grasp the screw head using a pair of pliers and carefully draw the holder out of the piston (see illustration). Push the needle up from the bottom of the piston and withdraw it from the top (see illustration 8.5c). Take care not to lose the spring and note the washer that fits between the head of the needle and the piston. Discard the O-ring on the holder as a new one must be used.
- 7 Remove the screws securing the float chamber to the base of the carburettor and

8.5c ... and push the needle up from the bottom

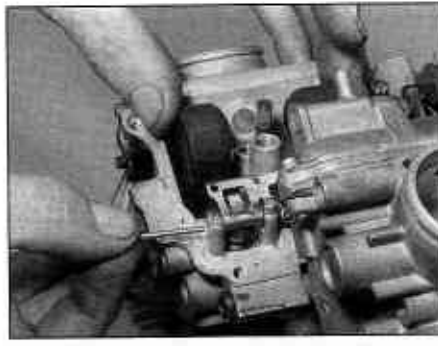


8.6 Draw the holder out of the piston using a 4 mm screw

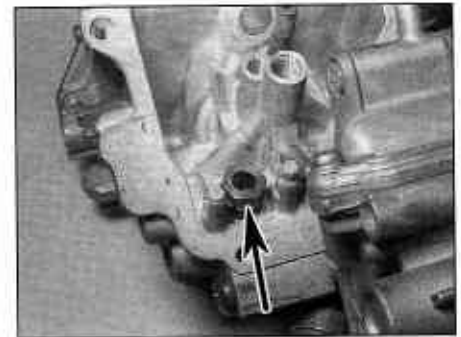




8.7 Remove the three screws (arrowed) and lift off the chamber



8.8a Withdraw the float pin and remove the float assembly



8.8b Unscrew the float needle valve seat (arrowed)

remove it (see illustration). Remove the rubber gasket and discard it as a new one must be used.

8 Using a pair of thin-nose pliers, carefully withdraw the float pin (see illustration). If necessary, displace the pin using a small punch or a nail. Remove the float and unhook the float needle valve, noting how it fits onto the tab on the float (see illustration 10.8a). On VFR models, unscrew and remove the float needle valve seat and its sealing washer, taking care not to damage its gauze filter (see illustration).

9 Unscrew and remove the pilot jet (see illustration).

10 Unscrew and remove the main jet from

the base of the needle jet holder (see illustration).

11 Unscrew and remove the needle jet holder (see illustration).

12 The pilot screw can be removed if required, but note that its setting will be disturbed (see *Haynes Hint*). Unscrew and remove the pilot screw along with its spring, washer and O-ring (see illustration). Discard the O-ring as a new one must be used.

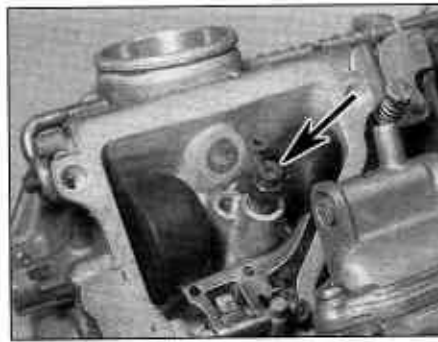
13 On VFR models, slacken the screw on the inner arm securing the choke linkage bar, then lift the bar arm off the outer choke plunger (see illustrations). If working on a carburettor with an inward facing plunger, withdraw the bar to free the inner arms, noting how the spring fits (see illustrations 9.19a and b). Unscrew the choke plunger nut and withdraw the plunger and spring from the carburettor body, noting how they fit (see



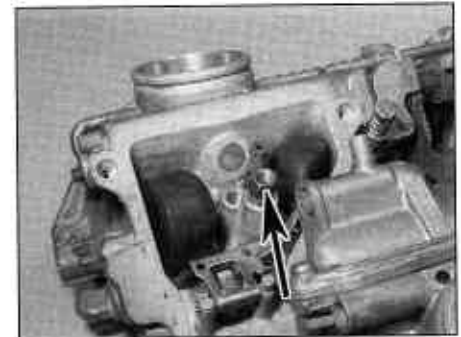
To record the pilot screw's current setting, turn the screw it in until it seats lightly, counting the number of turns necessary to achieve this, then fully unscrew it. On installation, the screw is simply backed out the number of turns you've recorded.



8.9 Remove the pilot jet (arrowed) . . .



8.10 . . . the main jet (arrowed) . . .



8.11 . . . and the needle jet holder (arrowed)



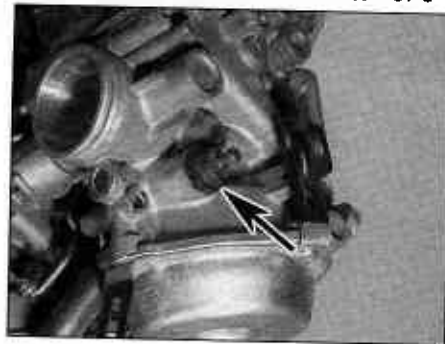
8.12 If required, remove the pilot screw along with its O-ring, washer and spring



8.13a Slacken the screw . . .



8.13b . . . then lift the arm off the plunger



8.13c Unscrew the nut and remove the plunger and spring



8.14a Undo the choke linkage bar screws . . .



8.14b . . . and remove the plastic washers . . .

Inspection

15 Submerge the metal components in the solvent for approximately thirty minutes (or longer, if the directions recommend it).
16 After the carburetor has soaked long enough for the cleaner to loosen and dissolve most of the varnish and other deposits, use a nylon-bristled brush to remove the stubborn deposits. Rinse it again, then dry it with compressed air.
17 Use a jet of compressed air to blow out all of the fuel and air passages in the main and upper body, not forgetting the air jets in the carburetor intake.
18 Check the operation of the choke plunger. If it doesn't move smoothly, inspect the needle on the end of the choke plunger, the spring and the plunger linkage bar (see illustration). Replace any component that is worn, damaged or bent.
19 If removed from the carburetor, check the tapered portion of the pilot screw and the spring and O-ring for wear or damage (see illustration). Replace them if necessary.
20 Check the carburetor body, float chamber and top cover for cracks, distorted sealing surfaces and other damage. If any defects are found, replace the faulty component, although replacement of the entire carburetor will probably be necessary (check with a Honda dealer on the availability of separate components).
21 Check the piston diaphragm for splits, holes and general deterioration (see illustration). Holding it up to a light will help to reveal problems of this nature.
22 Insert the piston in the carburetor body and check that the piston moves up-and-down smoothly. Check the surface of the piston for wear. If it's worn excessively or doesn't move smoothly in the guide, replace the components as necessary.
23 Check the jet needle for straightness by rolling it on a flat surface such as a piece of

illustration). Take care not to lose the spring when removing the nut.
14 On RVF models, remove the screws securing the choke plunger linkage bar to the carburetors, then remove the plastic washers (see illustrations). Lift off the bar, noting how it fits, and remove the collars and the return spring, noting how it fits (see illustrations). Unscrew the choke plunger nut and withdraw the plunger and spring from the carburetor body, noting how they fit (see illustration 8.13c). Take care not to lose the spring when removing the nut.

Cleaning

Caution: Use only a petroleum based solvent for carburetor cleaning. Don't use caustic cleaners.

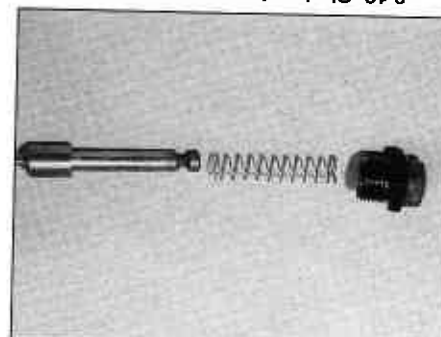
Caution: Never clean the jets or passages with a piece of wire or a drill bit, as they will be enlarged, causing the fuel and air metering rates to be upset.



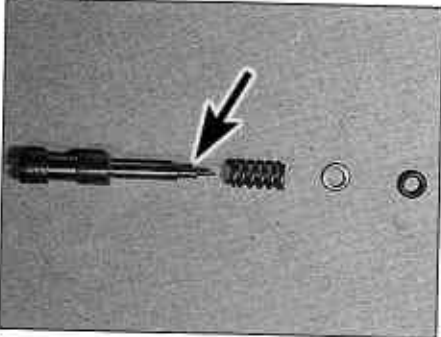
8.14c . . . then lift off the bar and remove the collars . . .



8.14d . . . and the return spring



8.18 Choke plunger components



8.19 Check the tapered portion of the pilot screw (arrowed) for wear



8.21 Check the piston diaphragm for splits or other damage

glass. Replace it if it's bent or if the tip is worn.

24 Check the tip of the float needle valve and the valve seat (*see illustrations*). If either has grooves or scratches in it, or is in any way worn, they must be replaced as a set. Gently push down on the rod on the top of the needle valve then release it – if it doesn't spring back, replace the valve. On VFR models, also check the condition of the valve seat filter and of the sealing washer.

25 Operate the throttle shaft to make sure the throttle butterfly valve opens and closes smoothly. If it doesn't, cleaning the throttle linkage may help. Otherwise, replace the carburettor.

26 Check the float for damage. This will usually be apparent by the presence of fuel inside the float. If the float is damaged, it must be replaced.

9 Carburettors – separation and joining



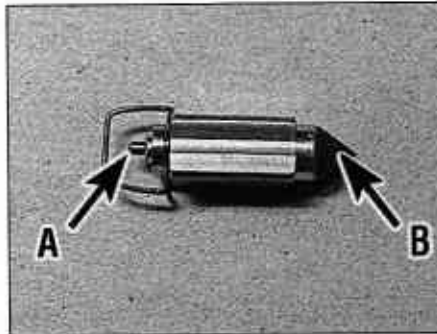
Warning: Refer to the precautions given in Section 1 before proceeding

Separation

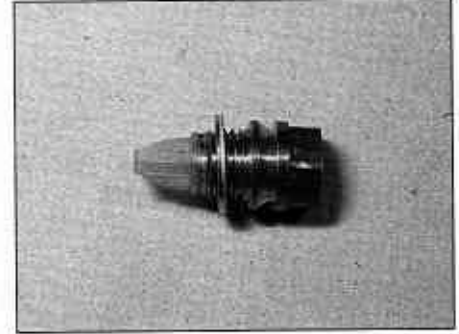
1 The carburettors do not need to be separated for normal overhaul. If you need to separate them (to replace a carburettor body, for example), refer to the following procedure.

2 Remove the carburettors from the machine (*see Section 7*). Mark the body of each carburettor with its cylinder location to ensure that it is positioned correctly on reassembly.

3 Bend back the tabs on the lockplates between each pair of screws securing the air duct assembly to the carburettors, then remove the screws and lift off the duct assembly, noting which way round it fits and how it locates onto the dowels (*see illustrations*). Also note how the rubber flanges locate around the air pipes. Remove the dowels from each carburettor intake if



8.24a Check the valve's spring loaded rod (A) and tip (B) for wear or damage



8.24b Check the valve seat for wear and the gauze filter for holes and splits

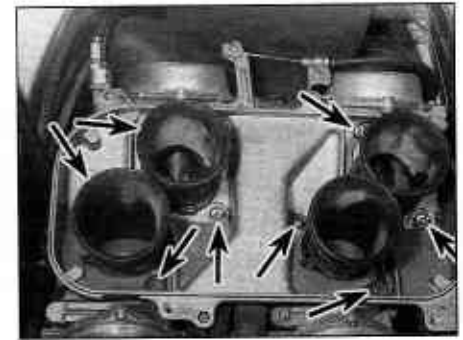
they are loose. Discard the lockplates as new ones should be used.

4 On VFR models, slacken the screws on the inner arms securing the choke linkage bars, then lift the bar outer arms off the outer plungers and withdraw the bars, recovering the springs and inner arms as you do (*see illustrations 8.13a and b*).

5 On RVF models, remove the screws securing the choke plunger linkage bar to the carburettors, then remove the plastic washers (*see illustrations 8.14a and b*). Lift off the bar, noting how it fits, and remove the collars and the return spring, noting how it fits (*see illustrations 8.14c and d*).



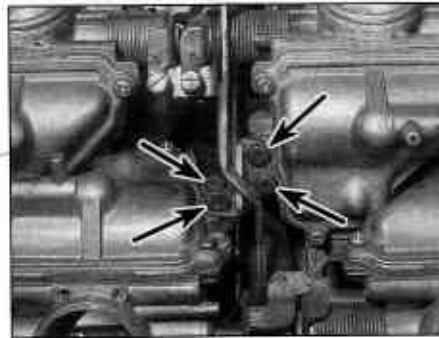
9.3a Bend back the tabs ...



9.3b ... then remove the screws (arrowed) ...



9.3c ... and lift off the duct holder



9.6a Remove the four screws (arrowed) ...



9.6b ... and remove the single screw (arrowed) on each side

9.8 Remove the split pin (arrowed) on each end of the choke linkage bar



9.9 Remove the split pin (arrowed) on each end of the throttle linkage bar

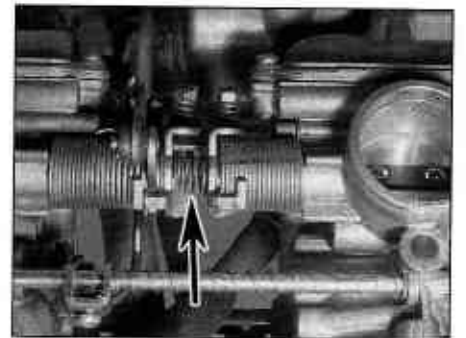


9.13 Make sure all the hoses are correctly installed - VFR model shown

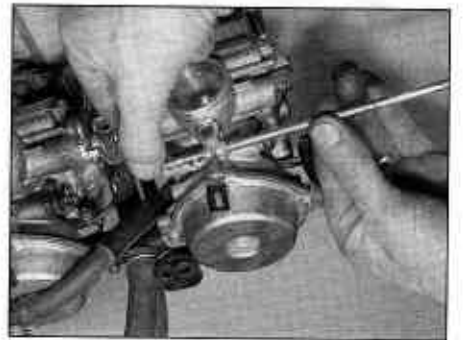


arrangement of the washers and collars (see illustration).
9 Remove the split pin securing each end of the throttle linkage joining bar, then remove the bar, noting the arrangement of the washers (see illustration). The bar can be left in situ and removed as the carburetors are separated if required.
10 Make a careful note of how the carburettor synchronisation springs and thrust springs are arranged to ensure that they are fitted correctly on reassembly. Also note the arrangement of the various hoses and their unions.
11 Carefully separate the carburetors. Retrieve the thrust springs between each left- and right-hand pair of carburetors and note the fitting of the two fuel joint pipes, the two

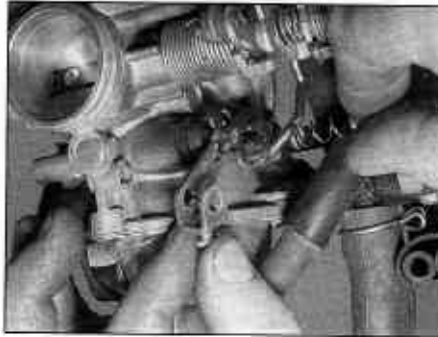
9.18 Fit the thrust spring (arrowed) between each pair



9.19a Slide the bar through the correct carburettor and fit the spring onto it...



9.19b ... then locate the inner arm onto its plunger...

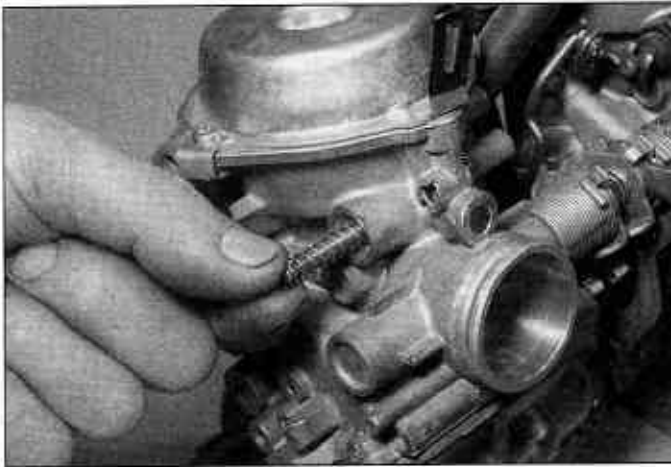


9.19c ... and slide the bar through it and into its bore



Joining
12 Where removed, fit a new O-ring onto each end of the fuel, air and sub-air cleaner joint pipes. Fit the two fuel joint pipes, the two air joint pipes, and the two sub air cleaner joint pipes into one of the carburetors for each front and rear pair. On RVF models, also fit the choke linkage joining bar support rods between the carburetors, then locate the joining bracket between each rod.
13 Carefully join the carburetors together, making sure the fuel joint pipes, air vent joint pipes, sub air cleaner joint pipes, and on RVF models the choke linkage support rods and bracket, all locate correctly into their bores (see illustration).
14 On VFR models, install the choke linkage joining bar with its collars and washers and secure it using new split pins (see illustration 8.9).
15 Install the throttle linkage joining bar with its washers and secure it using new split pins (see illustration 8.9).
16 On VFR models, install all the screws which join the carburetors to each other, but

do not yet fully tighten any of them until they are all installed (see illustrations 9.6a and b).
17 On RVF models, slide the joining bars, from the right-hand side, through each front and rear pair of carburetors, then fit the nuts onto the left-hand ends of the bars and tighten them securely. Make sure the hose clip is on the no. 3 (right-hand rear) carburettor.
18 Install the two thrust springs between each pair of carburetors, making sure it sits squarely (see illustration).
19 On VFR models, slide the choke linkage bar through the no. 1 carburettor (rear pair) and the no. 4 carburettor (front pair), then slide the spring onto the bar (see illustration). Fit the arm onto its plunger, then slide the bar through the inner arm and into its bore in the other carburettor (see illustrations). Fit each choke linkage arm onto the outer plungers (see illustration 8.13b). Align each arm on them is equidistant, so that each plunger opens simultaneously with the rest when the choke is activated, then tighten the clamp screws onto the bars (see illustration 8.13a).
20 On RVF models, fit the choke linkage bar return springs and inner plastic washers, then locate the bars, fit the outer plastic washers and secure the bars with the screws (see illustrations 8.14d, c, b and a).
21 If removed, fit the dowels into each carburettor intake (see illustration 9.3c). Fit



10.1a Fit the plunger and spring . . .



10.1b . . . and secure them with the nut

the air duct assembly onto the carburettors, making sure the assembly locates correctly onto the dowels and that each rubber flange locates correctly around the air pipes. This can be a tricky operation, but great care must be taken to ensure that the holes in each flange locate correctly around each pipe, as they can easily become distorted by the pipes as you fit them, resulting in the rubbers being damaged and air leaks occurring. If the assembly does not want to locate easily, tighten it down using the screws after installing the lockplates.

22 Install the air duct assembly lockplates, using new ones if required and install the screws (see illustration 9.3b). Tighten the screws evenly and a little at a time to ensure that the assembly is drawn down evenly and squarely onto the carburettors. Bend the tabs on the lockplates up onto the screws (see illustration 9.3a).

23 Install the carburettors (see Section 7).

10 Carburettors – reassembly and float height check



Warning: Refer to the precautions given in Section 1 before proceeding.

Note: When reassembling the carburettors, be sure to use new O-rings and seals. Do not overtighten the carburettor jets and screws as they are easily damaged.

1 Install the choke plunger and spring into the carburettor body and tighten the nut to secure it (see illustrations).

2 On VFR models, if completely removed, slide the choke linkage bar through the no. 1 carburettor (rear pair) and the no. 4 carburettor (front pair), then slide the spring onto the bar (see illustration 9.19a). Fit the arm onto its plunger, then slide the bar through the inner arm and into its bore in the other carburettor (see illustrations 9.19b and c). Fit each choke linkage arm onto the outer

plungers (see illustration 8.13b). Align each arm on each plunger so that the freeplay between them is equidistant, so that each plunger opens simultaneously with the rest when the choke is activated, then tighten the clamp screws onto the bars (see illustration 8.13a).

3 On RVF models, fit the choke linkage bar return spring and inner plastic washers, then locate the bar, fit the outer plastic washers and secure the bar with the screws (see illustrations 8.14d, c, b and a).

4 Install the pilot screw (if removed) along

with its spring, washer and O-ring, turning it in until it seats lightly (see illustration 8.12). Now, turn the screw out the number of turns previously recorded on disassembly.

5 Install the needle jet holder into the carburettor (see illustration). Screw the main jet into the end of the needle jet holder (see illustration).

6 Install the pilot jet into the carburettor (see illustration).

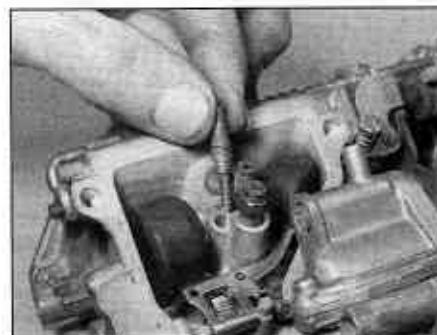
7 On VFR models, install the float needle valve seat and its sealing washer, making sure the filter is attached (see illustration).



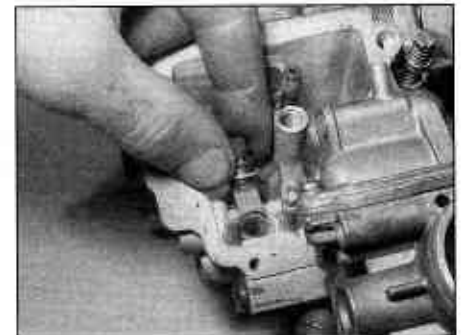
10.5a Install the needle jet holder . . .



10.5b . . . the main jet . . .



10.6 . . . and the pilot jet



10.7 Install the needle valve seat, using a new sealing washer if required



10.8a Hook the needle valve onto the tab ...



10.8b ... then fit the float assembly, making sure the valve enters the seat (arrow) ...



10.8c ... and secure it with the pin

8 Hook the float needle valve onto the float tab, then position the float assembly in the carburettor and install the pin, making sure it is secure (see illustrations).

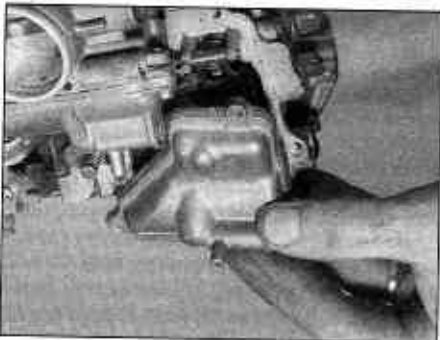
9 To check the float height, hold the carburettor so the float hangs down, then tilt it back until the needle valve is just seated, but not so far that the needle's spring-loaded tip is compressed. Measure the distance between the gasket face (with the gasket removed) and the bottom of the float with an accurate ruler (see illustration). The correct setting should be as given in the Specifications at the beginning of the



10.9 Measuring float height



10.10a Fit a new gasket into the groove ...

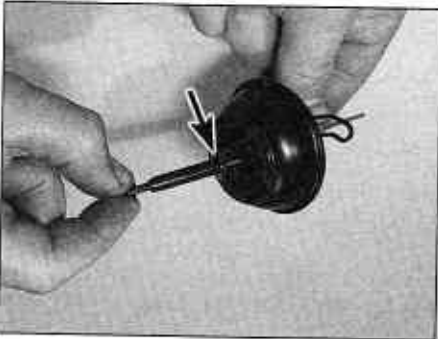


10.10b ... and install the float chamber



10.11a Fit the needle into the piston ...

10.11b ... and secure it with the retainer as described



10.12 Install the needle holder using a new O-ring (arrowed)

Chapter. If it is incorrect, adjust the float height by carefully bending the float tab a little at a time until the correct height is obtained. Repeat the procedure for all carburettors.

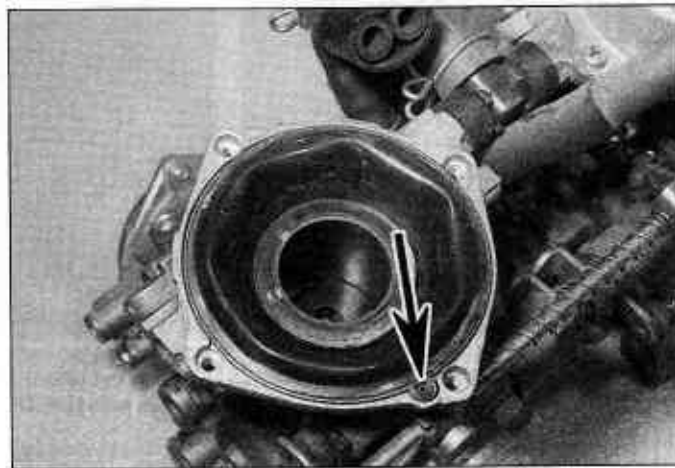
10 With the float height checked, fit a new rubber gasket onto the float chamber, making sure it is seated properly in its groove, and install the chamber onto the carburettor (see illustrations).

11 On VFR models, if removed, fit the washer onto the needle and insert the needle into the piston (see illustration). Fit the spring into the retainer then fit the retainer into the piston (see illustration). Remove the bolt used on removal from the holder, if not already done.

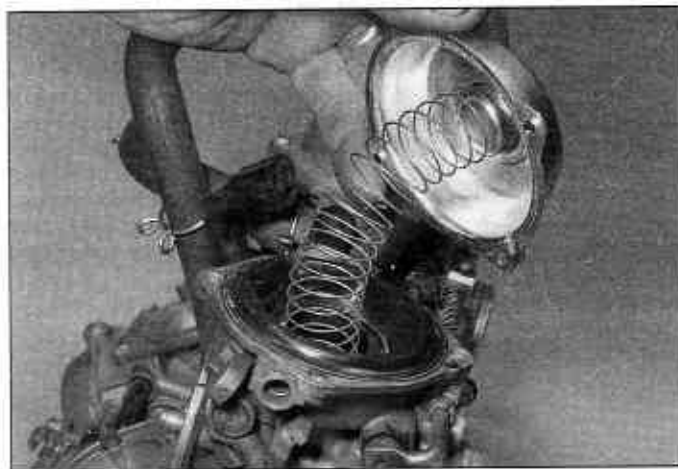
12 On RVF models, fit the washer onto the needle and insert the needle into the piston (see illustration 10.11a). Fit a new O-ring into the groove in the needle holder. Fit the spring into the holder, then insert the holder into the centre of the piston and push it down until the O-ring is felt to locate in its groove in the piston (see illustration). Remove the bolt used on removal from the holder, if not already done.



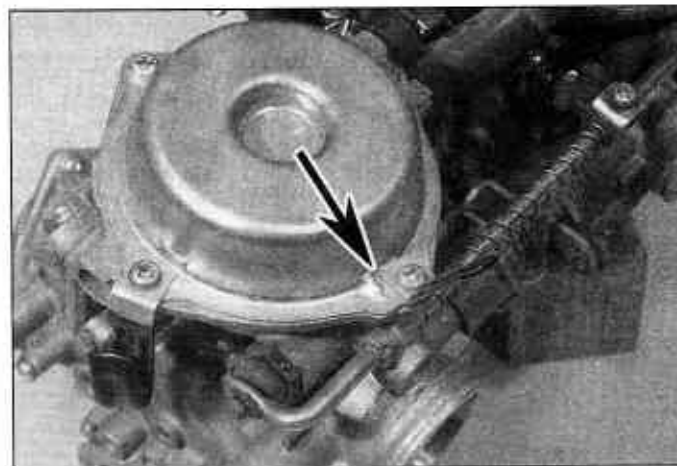
10.13a Install the piston assembly ...



10.13b ... making sure the diaphragm edge fits into the groove and the tab is correctly positioned around the air hole (arrow)



10.14a Fit the top cover onto the spring ...



10.14b ... and fit it so that the protrusion (arrowed) fits over the diaphragm tab

13 Insert the piston assembly into the body and lightly push it down, ensuring the needle is correctly aligned with the needle jet (**see illustration**). Align the tab on the diaphragm with the recess in the carburettor body, then press the diaphragm outer edge into its groove, making sure it is correctly seated and that the tab locates in the recess around the air hole (**see illustration**). Check the diaphragm is not creased, and that the piston moves smoothly up and down in its guide.

14 Install the spring into the piston (**see illustration 8.3b**). Fit the top cover to the carburettor, making sure the top of the spring locates over the raised section on the inside of the cover, and aligning the protrusion on the cover with the tab on the diaphragm and, and tighten its screws securely (**see illustrations**).

15 If removed, install the air duct assembly (**see Section 9, Steps 21 and 22**).

15 Install the carburettors (**see Section 7**).

11 Throttle cables – removal and installation



Warning: Refer to the precautions given in Section 1 before proceeding.

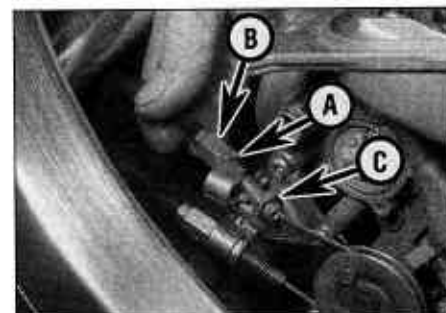
Removal

1 Remove the fuel tank and the air filter housing (**see Sections 2 and 4**). Whilst it is possible to detach the throttle cables with the carburettors in situ, there is a limited amount of space to work in and it can be tricky. If required, displace the carburettors to improve access (**see Section 7**).

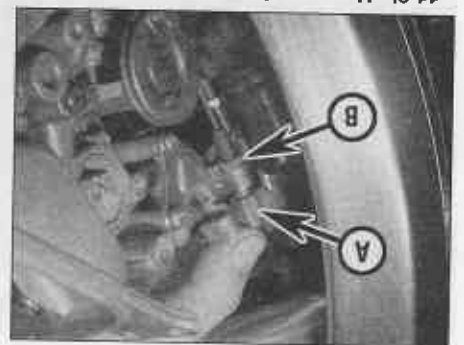
2 Turn the handlebars onto full left lock to provide the maximum freeplay in the cables. Mark each cable according to its location. On VFR models, the base carburettor is no. 2 and the accelerator cable is the upper cable in the bracket, the decelerator cable is the lower. On RVF models the base is no. 1 and the

accelerator cable is the lower cable in the bracket, the decelerator cable is the upper.

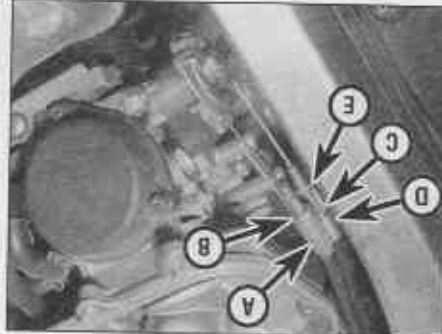
3 On VFR models, slacken the accelerator cable adjuster locknut, then unscrew the adjuster so that it threads out of the captive nut, until it is clear of the small lug on the bracket (**see illustration**). Slip the adjuster



11.3a Slacken the locknut (A), then unscrew the adjuster (B) until the captive nut (C) is free of its lug, then slip the cable out of the bracket



11.3b Unscrew the adjuster (A) until the captive nut (B) is clear of its lug, then slip the cable out of the bracket



11.4 Decelerator cable adjuster (A) and captive nut (B). Accelerator cable locknut (C), adjuster (D) and captive nut (E)



11.5a Slacken the elbow nuts (arrowed) ...

out of the bracket and detach the cable nipple from the carburetors. Now unscrew the adjuster, then slip the adjuster out of the bracket and detach the cable nipple from the carburetors. Withdraw the cable. **5** Slacken the cable elbow nuts at the throttle pulley housing, then remove the housing screws and lift off the top half (see illustrations). Detach the cable nipples from the pulley and detach the lower housing half (see illustration 11.5e). Fully unscrew the decelerator cable elbow nut, then remove the cable from the housing (see illustration). Thread the housing off the accelerator cable elbow and withdraw the



11.5b ... and remove the screws (arrowed) ...



11.5c ... then lift off the housing and detach the cable ends from the pulley ...



11.5d ... and remove the lower half of the housing



11.5e Unscrew the decelerator cable elbow nut and withdraw the cable from the housing ...



11.5f ... then thread the housing off the accelerator cable elbow

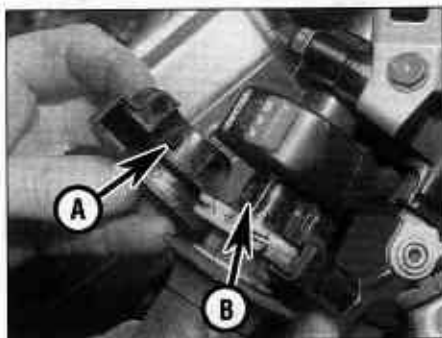


11.6 Fit the nipples into their sockets in the pulley

6 Fit the accelerator cable elbow into the forward socket of the lower half of the throttle pulley housing and thread the housing onto it (see illustration 11.5f). Fit the decelerator cable into the rear socket and tighten the nut (see illustration 11.5e). Fit the lower half of the housing onto the handlebar, then lubricate the cable nipples with multi-purpose grease and install them into the throttle pulley (see illustration). **7** Fit the top half of the housing onto the

Installation

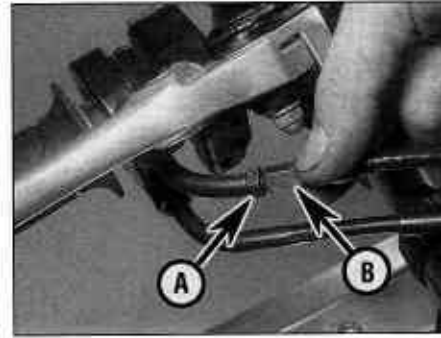
installation. Mark each cable to ensure it is connected correctly on cable (see illustration). Mark each cable to



11.7a Locate the pin (A) into the hole (B) . . .



11.7b . . . then tighten the housing screws



11.7c Slacken the locknut (A) and thread the adjuster (B) fully in

handlebar, making sure the pin locates in the hole in the top of the handlebar, and install the screws, tightening them securely (see illustrations). Slacken the locknut on the cable adjuster and thread the adjuster fully in, then tighten the locknut against it (see illustration). This resets the adjuster to the start of its range.

8 Feed the cables through to the carburetors, making sure they are correctly routed. The cables must not interfere with any other component and should not be kinked or bent sharply.

9 On VFR models, lubricate the decelerator cable nipple with multi-purpose grease and fit it into the lower socket on the carburettor throttle cam (see illustration). Fit the cable

adjuster into the lower bracket, locating the nut against the lug so that it is captive, then thread the adjuster into the nut until it is tight (see illustration). Lubricate the accelerator cable nipple with multi-purpose grease and fit it into the upper socket on the carburettor throttle cam. Fit the accelerator cable adjuster into the upper bracket, then thread the lower nut up the adjuster (see illustration 11.3a). Locate the nut against the lug so that it is captive, then thread the adjuster into the nut until the specified amount of cable freeplay is obtained (see Chapter 1). Tighten the locknut against the bracket.

10 On RVF models, lubricate the accelerator cable nipple with multi-purpose grease and fit it into the lower socket on the carburettor

throttle cam. Fit the accelerator cable adjuster into the inner bracket, then thread the lower nut onto the end of the adjuster (see illustration 11.4). Locate the nut against the lug so that it is captive, then thread the adjuster into the nut until the specified amount of cable freeplay is obtained (see Chapter 1). Tighten the locknut against the bracket. Lubricate the decelerator cable nipple with multi-purpose grease and fit it into the upper socket on the carburettor throttle cam. Fit the cable adjuster into the upper bracket, locating the nut against the lug so that it is captive, then thread the adjuster into the nut until it is tight.

11 Operate the throttle to check that it opens and closes freely.

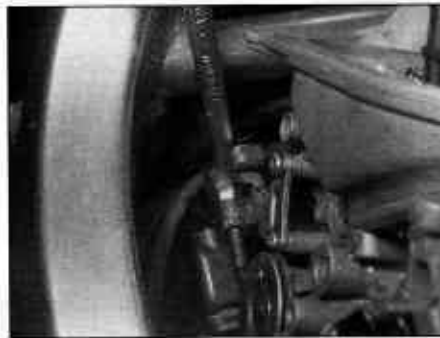
12 Check and adjust the throttle cable freeplay if required (see Chapter 1). Turn the handlebars back and forth to make sure the cable doesn't cause the steering to bind.

13 Install the carburetors (if displaced), the air filter housing and the fuel tank (see Sections 7, 4 and 2).

14 Start the engine and check that the idle speed does not rise as the handlebars are turned. If it does, the throttle cable is routed incorrectly. Correct the problem before riding the motorcycle.



11.9a Fit the decelerator cable nipple into its socket in the cam . . .



11.9b . . . then locate the cable in the bracket and fully tighten the adjuster



12.3a Slacken the bracket screw and release the outer cable . . .



12.3b . . . then free the inner cable nipple from the lever

12 Choke cable – removal and installation

Removal

1 Remove the fuel tank and the air filter housing (see Sections 2 and 4).

2 Remove the left-hand fairing side panel, and on VFR models also remove the trim panel (see Chapter 8).

3 Slacken the choke outer cable bracket screw and free the cable from the bracket on the front of the carburetors, then detach the inner cable nipple from the choke linkage lever (see illustrations). Withdraw the cable from the machine noting the correct routing.

4 On VFR models, remove the screw securing the choke lever, then remove the lever and



12.4a Remove the screw (arrowed) . . .



12.4b . . . and detach the nipple from the lever . . .



12.4c . . . then draw the outer cable from its socket

detach the cable nipple, noting how it fits (see illustrations). Draw the outer cable out of the housing (see illustration). Note the star washer in the lever housing and remove it for safekeeping if required, noting which way round it fits.

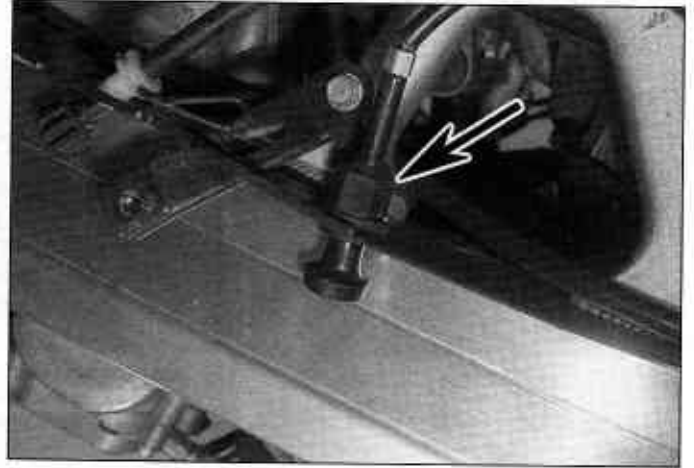
5 On RVF models unscrew the nut securing the choke knob in the fairing trim panel and draw the cable out of the panel, feeding the nut off the end of the cable as you do (see illustration).

Installation

6 On VFR models, lubricate the lever-end cable nipple with multi-purpose grease and the rubber protector on the end of the outer cable with WD40 and fit the outer cable into the choke lever housing. If removed, fit the star washer into the housing, with its curved ends facing in (see illustration). Attach the nipple to the choke lever and fit the lever onto the housing, making sure the nipple stays in place, and tighten the screw (see illustration 12.4b an a).

7 On RVF models, pass the cable down through the hole in the trim panel and locate the knob in the hole. Feed the nut onto the end of the cable and up to the knob and tighten it to secure the knob (see illustration 12.5).

12.5 Fully unscrew the nut (arrowed) and draw the cable out



12.5 Fully unscrew the nut (arrowed) and draw the cable out

Warning: If the engine has been running the exhaust system will be very hot. Allow the system to cool before carrying out any work.



13 Exhaust system - removal and installation



1 Remove the seat cowl and the lower fairing (see Chapter 8). Also remove the bolt securing the bottom of the lower radiator to its bracket and swing the radiator forward. Tie it in this position to provide access to the front downpipes.

2 Slacken the clamp bolts securing the front cylinder downpipes in the rear section pipes

Removal

has been removed as an assembly.

1 Remove the seat cowl and the lower fairing (see Chapter 8). Also remove the bolt securing the bottom of the lower radiator to its bracket and swing the radiator forward. Tie it in this position to provide access to the front downpipes.

2 Slacken the clamp bolts securing the front cylinder downpipes in the rear section pipes

12.4c . . . then draw the outer cable from its socket



13.2a Slacken the clamp bolts (arrowed) . . .



13.2b . . . then unscrew the downpipe nuts . . .



13.2c . . . and swing the downpipe down and out of the rear section

(see illustration). Unscrew the two nuts securing each downpipe to the front cylinder head, then swing each pipe outwards and free them from the rear section using a twisting motion (see illustrations). Remove the gasket from each port in the cylinder head and discard them as new ones must be used (see illustration).



Exhaust system clamp bolts tend to become corroded and seized. It is advisable to spray them with WD40 or a similar product before attempting to slacken them.

3 Unscrew the two bolts securing the rider's right-hand footrest bracket and the bolt securing the top of the heat shield to the frame, then swing the whole footrest/rear brake master cylinder/heat shield assembly up and secure it to the rear sub-frame, making sure no strain is placed on the brake and reservoir hoses (see illustration). This provides access to the rear cylinder downpipe joint nuts.

4 On VFR models, unscrew the two nuts securing the passenger's left-hand footrest bracket and the silencer bracket to the frame and leave the assembly loose on the studs (see illustration).

5 On RVF models, unscrew the nut on the

silencer mounting bolt, but the leave the bolt loosely in place.

6 Unscrew the three nuts securing the rear cylinder downpipes to the header pipes (see illustration).

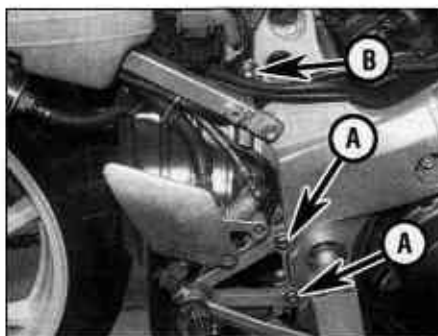
7 On VFR models draw the footrest assembly with the silencer attached off the studs, then lower the rear section to the ground (see illustrations). If required, separate the footrest bracket and silencer bracket from the silencer.

8 On RVF models, withdraw the silencer mounting bolt, then lower the rear section to the ground.

9 Remove the gasket from each rear cylinder header pipe and discard them as new ones



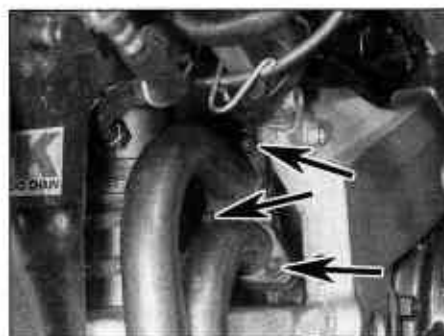
13.2d Remove the gasket from the cylinder head



13.3 Unscrew the footrest bracket bolts (A) and the heat shield bolt (B) and swing the assembly up



13.4 Remove the two nuts (arrowed)



13.6 Remove the nuts (arrowed) securing the rear cylinder downpipes . . .



13.7a . . . then draw the silencer and bracket off the studs . . .



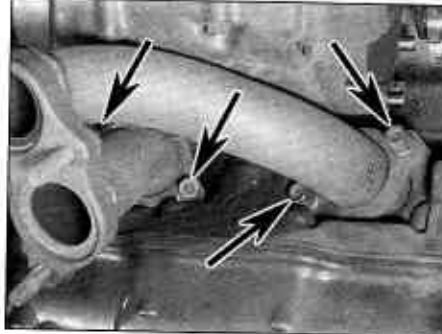
13.7b . . . and the downpipes off the header pipes



13.9 Remove the gaskets from the header pipes

must be used (see illustration). Also remove the sealing rings from the rear section pipes where they join the front downpipes and discard them as new ones should be used.

10 If required, unscrew the two nuts securing each header pipe to the rear cylinder head and remove the header pipe assembly (see illustration). Access to these nuts is difficult and is best achieved using a universal drive adapter and socket extension. Remove the gasket from each port in the cylinder head and discard them as new ones must be used.



13.10 The rear cylinder header pipes are secured by four nuts (arrowed)

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

a) Leave all fasteners loose until the entire system has been installed, making alignment of the various sections easier.

b) Tighten the silencer mountings last.

c) Use new gaskets in each cylinder head port and between the rear cylinder header pipes and downpipes (see illustration).

d) Use new sealing rings between the rear section pipes and the front downpipes.



13.11 Always use new gaskets

d) Apply some copper grease to the rear section clamp bolts to prevent them from seizing up.

e) Tighten the front downpipe nuts and the rear header pipe nuts to the torque setting specified at the beginning of the Chapter.

f) Tighten the right-hand footrest bracket and on VFR models the left-hand passenger's footrest bracket nuts to the specified torque setting.

g) Run the engine and check the system for leaks.

Chapter 5

Ignition system

Contents

General information	1	Ignition timing – general information and check	6
Ignition control unit – check, removal and installation	5	Neutral switch – check and replacement	see Chapter 9
Ignition (main) switch – check, removal and installation	see Chapter 9	Pulse generator coil assembly – check, removal and installation ...	4
Ignition HT coils – check, removal and installation	3	Sidestand switch – check and replacement	see Chapter 9
Ignition system – check	2	Spark plugs – gap check and replacement	see Chapter 1

Degrees of difficulty

Easy, suitable for
novice with little
experience



Fairly easy, suitable
for beginner with
some experience



Fairly difficult,
suitable for competent
DIY mechanic



Difficult, suitable for
experienced DIY
mechanic



Very difficult,
suitable for expert DIY
or professional



Specifications

General information

Firing order	1-4-3-2
Cylinder numbering	
Rear left	1
Front left	2
Rear right	3
Front right	4
Spark plugs	See Chapter 1

↑
FRONT

2 4

1 3

Ignition timing

At idle	
VFR models	18° BTDC
RVF models	15° BTDC
Full advance	
VFR models	35 to 37° BTDC @ 12,000 rpm
RVF models	36° BTDC @ 7400 to 7600 rpm

Pulse generator coil(s)

Resistance	450 to 550 ohms @ 20°C
------------------	------------------------

Ignition HT coils

Primary winding resistance	2.5 to 3.5 ohms @ 20°C
Secondary winding resistance	
With plug cap	14.0 to 25.0 K ohms @ 20°C
Without plug cap	11.0 to 14.0 K ohms @ 20°C

Torque settings – specific components

Timing inspection cover 18 Nm

Torque settings – non-specified components

Note: Where a specific setting is not given for a particular bolt/nut, these general settings apply. The dimension given applies to the diameter of the thread, not the head.

5 mm bolt/nut	5 Nm
6 mm bolt/nut	10 Nm
8 mm bolt/nut	22 Nm
10 mm bolt/nut	35 Nm
12 mm bolt/nut	55 Nm
5 mm flange bolt with 8 mm head	9 Nm
6 mm flange bolt/nut with 10 mm head	12 Nm
8 mm flange bolt/nut	27 Nm
10 mm flange bolt/nut	40 Nm

1 General information

All models are fitted with a fully transistorised electronic ignition system, which due to its lack of mechanical parts is totally maintenance free. The system comprises a rotor, pulse generator coil(s), ignition control unit and ignition HT coils (refer to the wiring diagrams at the end of Chapter 9 for details). VFR models are fitted with two pulse generator coils, while R/VF models have one.

The ignition triggers, which are on the starter clutch housing on the right-hand end of the crankshaft, magnetically operate the pulse generator coil(s) as the crankshaft rotates. The pulse generator coil(s) sends a signal to the ignition control unit which then supplies the ignition HT coils with the power necessary to produce a spark at the plugs.

The system uses two HT coils, the front cylinder supplying nos. 1 and 3, and the rear coil supplying nos. 2 and 4. On VFR models, the front cylinder coil is mounted on the left-hand side of the engine by the front cylinders, while on R/VF models it is mounted on the right-hand side. On both models, the rear coil is mounted on the outside of the left-hand side of the frame, to the rear of the engine. The system incorporates an electronic advance system controlled by signals generated by the pulse generator coil(s) and the ignition control unit.

On Japanese home market versions (grey imports) a rev limiter set in the speedometer transmits a signal to the ignition control unit when 180 km/h (112 mph) is reached. At this road speed, the ignition cuts out. Note that most grey imports sold in the UK will have had this system disabled at the time of first registration.

On R/VF models the system incorporates a safety interlock circuit which will cut the ignition if the slide and is extended whilst the engine is running and in gear, or if a gear is selected whilst the engine is running and the

slide and lay each plug on the engine with the threads contacting the engine. If necessary, hold each spark plug with an insulated tool. **Warning: Do not remove any of the spark plugs from the engine to perform this check – atomised fuel being pumped out of the open spark plug hole could ignite, causing severe injury!**

3 Having observed the above precautions, check that the kill switch is in the RUN position and the transmission is in neutral, then turn the ignition switch ON and turn the engine over on the starter motor. If the system is in good condition a regular, fat blue spark should be evident at each plug electrode. If the spark appears thin or yellowish, or is non-existent, further investigation will be necessary. Before proceeding further, turn the ignition off and remove the key as a safety measure.

2 Ignition system – check

Warning: The energy levels in electronic systems can be very high. On no account should the ignition be switched on whilst the plugs or plug caps are being held. Shocks from the HT circuit can be most unpleasant. Secondly, it is vital that the engine is not turned over or run with any plugs are soundly earthed (grounded) when the system is checked for sparking. The ignition system components can be seriously damaged if the HT circuit becomes isolated.

1 As no means of adjustment is available, any failure of the system can be traced to failure of a system component or a simple wiring fault. Of the two possibilities, the latter is by far the most likely. In the event of failure, check the system in a logical fashion, as described below.

2 Disconnect the HT leads from the spark plugs. Connect each lead to a spare spark

TOOL TIP



A simple spark gap testing tool can be made from a block of wood, a large alligator clip and two nails, one of which is fashioned so that a spark plug cap or bare HT lead end can be connected to its end. Make sure the gap between the two nail ends is the same as specified.

jump (see Tool Tip).

mm. A simple testing tool can be made to test

produce a spark capable of jumping at least 6

a particular size gap. Honda do not provide a

produce a spark which is capable of jumping

4 The ignition system must be able to

measure.

ignition off and remove the key as a safety

necessary. Before proceeding further, turn the

existent, further investigation will be

the spark appears thin or yellowish, or is non-

is in good condition a regular, fat blue spark

should be evident at each plug electrode. If

then turn the ignition switch ON and turn the

position and the transmission is in neutral,

check that the kill switch is in the RUN

3 Having observed the above precautions,

causing severe injury!

of the open spark plug hole could ignite,

atomised fuel being pumped out

to perform this check –

the spark plugs from the engine

Warning: Do not remove any of

hold each spark plug with an insulated tool.

threads contacting the engine. If necessary,

plug and lay each plug on the engine with the



3.4a Front cylinder coil – VFR models



3.4b Front cylinder coil – RVF models



3.4c Rear cylinder coil – all models

5 Connect one of the spark plug HT leads from one coil to the protruding electrode on the test tool, and clip the tool to a good earth (ground) on the engine or frame. Check that the kill switch is in the RUN position, turn the ignition switch ON and turn the engine over on the starter motor. If the system is in good condition a regular, fat blue spark should be seen to jump the gap between the nail ends. Repeat the test for the other coil. If the test results are good the entire ignition system can be considered good. If the spark appears thin or yellowish, or is non-existent, further investigation will be necessary.

6 Ignition faults can be divided into two categories, namely those where the ignition system has failed completely, and those which are due to a partial failure. The likely faults are listed below, starting with the most probable source of failure. Work through the list systematically, referring to the subsequent sections for full details of the necessary checks and tests. **Note:** Before checking the following items ensure that the battery is fully charged and that all fuses are in good condition.

- a) Loose, corroded or damaged wiring connections, broken or shorted wiring between any of the component parts of the ignition system (see Chapter 9).
- b) Faulty HT lead or spark plug cap, faulty spark plug, dirty, worn or corroded plug electrodes, or incorrect gap between electrodes.

c) Faulty ignition (main) switch or engine kill switch (see Chapter 9).

d) Faulty neutral, clutch or sidestand switch (RVF models only) (see Chapter 9).

e) Faulty pulse generator coil or damaged rotor.

f) Faulty ignition HT coil(s).

g) Faulty ignition control unit.

7 If the above checks don't reveal the cause of the problem, have the ignition system tested by a Honda dealer. Honda produce a tester which can perform a complete diagnostic analysis of the ignition system.

3 Ignition HT coils – check, removal and installation

Check

1 In order to determine conclusively that the ignition coils are defective, they should be tested by a Honda dealer equipped with the special diagnostic tester.

2 However, the coils can be checked visually (for cracks and other damage) and the primary and secondary coil resistance can be measured with a multimeter. If the coils are undamaged, and if the resistance readings are as specified at the beginning of the Chapter, they are probably capable of proper operation.

3 Remove the left-hand (VFR models) or the

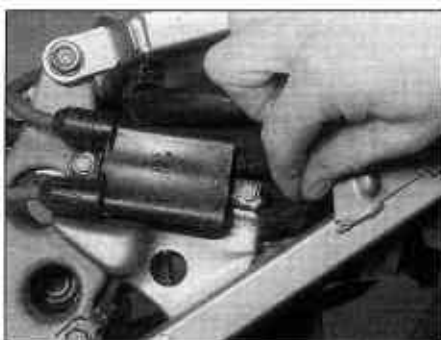
right-hand (RVF) fairing side panel and the seat cowl (see Chapter 8). Disconnect the battery negative (–ve) lead.

4 On VFR models, the front cylinder coil is mounted on the left-hand side of the engine by the front cylinders, while on RVF models it is mounted on the right-hand side (see illustrations). On both models, the rear coil is mounted on the outside of the left-hand side of the frame, to the rear of the engine (see illustration).

5 Disconnect the primary circuit electrical connectors from the coil being tested and the HT leads from the spark plugs (see illustration). Mark the locations of all wires and leads before disconnecting them.

6 Set the meter to the ohms x 1 scale and measure the resistance between the primary circuit terminals on the coil (see illustration). This will give a resistance reading of the primary windings of the coil and should be consistent with the value given in the Specifications at the beginning of the Chapter.

7 To check the condition of the secondary windings, set the meter to the K ohm scale. Connect one meter probe to one spark plug cap and the other probe to the other spark plug cap (see illustration). If the reading obtained is not within the range shown in the Specifications, remove the caps from the ends of the HT leads and repeat the measurement. If the reading is now as specified, replace the spark plug caps with



3.5 Disconnect the coils' primary circuit wiring connector



3.6 To test the coil primary resistance, connect the multimeter leads between the primary circuit terminals on the coil

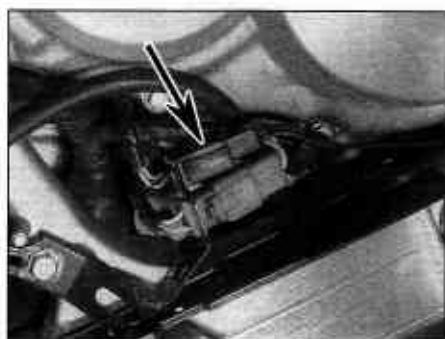


3.7 To test the coil secondary resistance, connect the multimeter leads between the spark plug leads

4.3a Pulse generator coil wiring connector (arrowed) - VFR models



4.3b Pulse generator coil wiring connector (arrowed) - RVF models



4.8a Disconnect the neutral switch wiring connector . . .



new ones. If the reading is still outside the specified range, it is likely that the coil is defective.
8 Should any of the above checks not produce the expected result, have your findings confirmed on the diagnostic tester (see Step 1). If the coil is confirmed to be faulty, it must be replaced; the coil is a sealed unit and cannot therefore be repaired.

Removal

9 On VFR models, the front cylinder coil is mounted on the left-hand side of the engine by the front cylinder, while on RVF models it is mounted on the right-hand side (see *Illustration 3.4a and b*). On both models, the rear coil is mounted on the outside of the left-hand side of the frame, to the rear of the switch/oil pressure switch wiring back from the top of the right-hand crankcase cover and disconnect it at the black 4-pin connector (see *Illustrations 4.3a and b*). Disconnect the neutral switch wiring connector from its terminal on the switch and release it from its clip, then remove the screw securing the oil pressure switch wiring connector and disconnect it (see *Illustrations 4.3a and b*).
10 If not already done, remove the seat cowl (see Chapter 8).
11 Disconnect the primary circuit electrical connectors from the HT leads from the spark and disconnect the HT leads from the spark plugs. Mark the locations of all wires and leads before disconnecting them.
12 Unscrew the two bolts securing each coil, noting the routing of the HT leads.
Note the routing of the HT leads.

4.8b . . . and the oil pressure switch wiring connector



4 Pulse generator coil assembly - check, removal and installation

13 Installation is the reverse of removal. Make sure the wiring connectors and HT leads are securely connected.

Installation

1 Remove the seat cowl (see Chapter 8) and disconnect the battery negative (-ve) lead.
2 Remove the lower fairing (see Chapter 8).
3 Trace the pulse generator coil/neutral switch/oil pressure switch wiring back from the top of the right-hand crankcase cover and disconnect it at the black 4-pin connector (see *Illustrations 4.3a and b*). Disconnect the neutral switch wiring connector from its terminal on the switch and release it from its clip, then remove the screw securing the oil pressure switch wiring connector and disconnect it (see *Illustrations 4.3a and b*).
4 Compare the readings obtained with that given in the Specifications at the beginning of this Chapter. The pulse generator coil must be replaced if the reading obtained differs greatly from that given, particularly if the meter indicates a short circuit (no measurable resistance between the terminals).
5 If the pulse generator coil is thought to be faulty, first check that this is not due to a damaged or broken wire from the coil to the connector, pinched or broken wires can usually be repaired.

4.9 The right-hand crankcase cover is secured by twelve bolts (arrowed)



6 Remove the seat cowl (see Chapter 8) and disconnect the battery negative (-ve) lead.
7 Remove the lower fairing (see Chapter 8).
8 Trace the pulse generator coil/neutral switch/oil pressure switch wiring back from the top of the right-hand crankcase cover and disconnect it at the black 4-pin connector (see *Illustrations 4.3a and b*). Disconnect the neutral switch wiring connector from its terminal on the switch and release it from its clip, then remove the screw securing the oil pressure switch wiring connector and disconnect it (see *Illustrations 4.3a and b*).
9 Unscrew the twelve bolts securing the right-hand crankcase cover and remove the cover, being prepared to catch any residue oil, and noting the positions of the wiring clips (see *Illustration*). Discard the gasket as a new one must be used. Remove the dowels from either the cover or the crankcase if they are loose.
10 Unscrew the bolt securing the pulse generator coil(s) to the crankcase (see *Illustration*). Remove the rubber wiring

4.10 Pulse generator coil assembly bolts (arrowed) - VFR models





4.12 Fit the grommet (arrowed) into its recess



4.13a Place a new gasket onto the dowels . . .



4.13b . . . then install the cover

grommet from its recess, then remove the coil(s).

11 Examine the triggers on the starter clutch for signs of damage and replace the clutch housing if necessary (see Chapter 2).

Installation

12 Install the pulse generator coil(s) onto the crankcase and tighten the bolt(s) securely (see illustration 4.12). Apply a suitable sealant to the wiring grommet and fit it into its recess (see illustration).

13 If removed, insert the dowels in the crankcase, then install the crankcase cover using a new gasket, making sure it locates correctly onto the dowels and the idle/reduction gear shaft (see illustrations). Tighten the cover bolts evenly in a criss-cross sequence to the specified torque setting, making sure the wiring clips are correctly installed.

14 Connect the oil pressure switch wire to its terminal on the switch and tighten the screw securely, then connect the neutral switch wiring connector to the switch terminal and place the wiring in its guide (see illustrations 4.8b and a). Connect the pulse generator coil/neutral switch/oil pressure switch wiring at the black 4-pin connector (see illustrations 4.3a and b).

15 Install the lower fairing (see Chapter 8).

16 Reconnect the battery negative (-ve) lead and install the seat cowl (see Chapter 8).

5 Ignition control unit – check, removal and installation

Check

1 If the tests shown in the preceding Sections have failed to isolate the cause of an ignition fault, it is possible that the ignition control unit itself is faulty. No test details are available with which the unit can be tested on home workshop equipment. Take the machine to a Honda dealer for testing on the diagnostic tester..

Removal

2 Remove the seat cowl (see Chapter 8) and disconnect the battery negative (-ve) lead.

3 On VFR models the control unit is mounted on the rear mudguard at the back, and on RVF models it is mounted on the left-hand side of the rear sub-frame (see illustrations).

4 Disconnect the wiring connector(s) from the ignition control unit (see illustration).

5 On VFR models, remove the screw securing the ignition control unit clip and remove the unit (see illustration). On RVF models, remove the ignition control unit from its rubber sleeve, or lift the sleeve and unit together off the sleeve's mounting lugs, and remove the unit (see illustration 5.3b).

Installation

6 Installation is the reverse of removal. Make sure the wiring connector(s) are correctly and securely connected.

6 Ignition timing – general information and check

General information

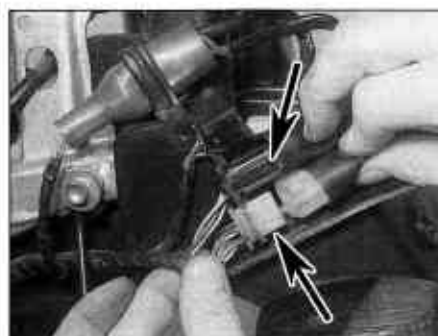
1 Since no provision exists for adjusting the ignition timing and since no component is subject to mechanical wear, there is no need for regular checks; only if investigating a fault such as a loss of power or a misfire, should the ignition timing be checked.



5.3a Ignition control unit – VFR models



5.3b Ignition control unit – RVF models



5.4 Ignition control unit wiring connectors (arrowed) – VFR models



5.5 Remove the screw to release the clip

2 The ignition timing is checked dynamically (engine running) using a stroboscopic lamp. The inexpensive neon lamps should be adequate in theory, but in practice may produce a pulse of such low intensity that the timing mark remains indistinct. If possible, one of the more precise xenon tube lamps should be used, powered by an external source of the appropriate voltage. **Note:** Do not use the machine's own battery as an incorrect reading may result from stray impulses within the machine's electrical system.

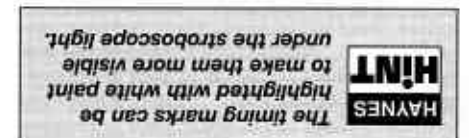
Check

3 Warm the engine up to normal operating temperature then stop it.

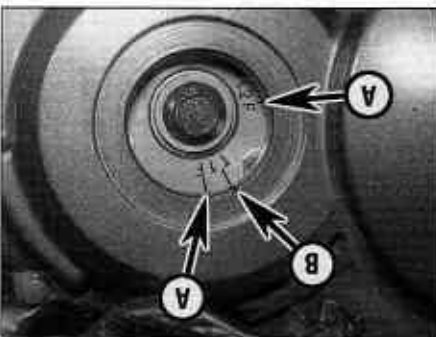
4 Unscrew the timing inspection cover from the right-hand crankcase cover (see illustration). Discard the cover O-ring as a new one must be used.

5 The timing mark on the starter clutch which indicates the firing point at idle speed for the nos. 1 and 3 cylinders is a line with the letter F next to the T1 mark (see illustration). The timing mark which indicates the firing point at idle speed for the nos. 2 and 4 cylinders is a line with the letter F next to the T2 mark. The static timing mark with which these should align is the index mark on the crankcase cover.

6 Connect the timing light to the no. 1 cylinder HT lead as described in the manufacturer's instructions.
7 Start the engine and aim the light at the static timing mark.
8 With the machine idling, the timing mark F



6.4 Remove the timing inspection cover



6.5 "F" marks (A), static timing mark (B)

suspected of being incorrect, one of the ignition system components is at fault, and the system must be tested as described in the preceding Sections of this Chapter.
12 When the check is complete, install the timing inspection cover using a new O-ring and smear it and the cover threads with molybdenum disulphide grease and engine oil (see illustration). Tighten the cover to the torque setting specified at the beginning of the Chapter (see illustration).



6.12b ... then tighten the cover to the specified torque



6.12a Fit a new O-ring and lubricate it ...

Chapter 6

Frame, suspension and final drive

Contents

Drive chain – removal, cleaning and installation	14	Sidestand – check	see Chapter 1
Drive chain and sprockets – check, adjustment and lubrication	see Chapter 1	Sidestand – lubrication	see Chapter 1
Footrests, brake pedal and gearchange lever – removal and installation	3	Sidestand – removal and installation	4
Forks – disassembly, inspection and reassembly	7	Sidestand switch – check and replacement	see Chapter 9
Forks – oil change	see Chapter 1	Steering head bearings – freeplay check and adjustment	see Chapter 1
Forks – removal and installation	6	Steering head bearings – inspection and replacement	9
Frame – inspection and repair	2	Steering head bearings – lubrication	see Chapter 1
General information	1	Steering stem – removal and installation	8
Handlebars and levers – removal and installation	5	Suspension – adjustments	11
Handlebar switches – check	see Chapter 9	Suspension – check	see Chapter 1
Handlebar switches – removal and installation	see Chapter 9	Swingarm – inspection and bearing replacement	13
Rear shock absorber and linkage – removal, inspection and installation	10	Swingarm – removal and installation	12
Sprockets – check and replacement	15	Swingarm and suspension linkage bearings – lubrication	see Chapter 1

Degrees of difficulty

Easy, suitable for novice with little experience



Fairly easy, suitable for beginner with some experience



Fairly difficult, suitable for competent DIY mechanic



Difficult, suitable for experienced DIY mechanic



Very difficult, suitable for expert DIY or professional



Specifications

Front forks

Fork oil type	10W fork oil	
Fork oil capacity		
VFR K models	450 cc	
VFR L, M and N models	390 cc	
RVF models	445 cc	
Fork oil level*		
VFR K models	90 mm	
VFR L, M and N models	122 mm	
RVF models	74 mm	
Fork spring free length (min)	Standard	Service limit
VFR K models	Not available	Not available
VFR L, M and N models	277.3 mm	271.8 mm
RVF models	234.2 mm	229.5 mm
Fork tube runout limit	0.2 mm	

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

Rear suspension

Shock absorber spring free length	Standard	Service limit
VFR K models	Not available	Not available
VFR L, M and N models	158.7 mm	155.5 mm
RVF models	121 mm	Not available

Final drive

Drive chain slack and lubricant	See Chapter 1
Drive chain size	525, 104 links (VFR), 102 links (RVF)
Sprocket sizes	
Front (engine) sprocket	15T
Rear (wheel) sprocket	40T (VFR), 38T (RVF)

Torque settings – specific components

Footrest holder bolt	45 Nm
Footrest bracket bolts	27 Nm
Sidestand pivot bolt nut	38 Nm
Sidestand bracket bolt	35 Nm
Handlebar holder clamp bolts	
VFR models	12 Nm
RVF models	27 Nm
Top yoke fork clamp bolts	
VFR models	11 Nm
RVF models	23 Nm
Bottom yoke fork clamp bolts	40 Nm
Steering stem nut	
VFR models	140 Nm
RVF models	105 Nm
Front brake master cylinder clamp bolts	12 Nm
Fork damper rod bolt	20 Nm
Fork top bolt	
VFR K models	Not available
VFR L, M and N models	20 Nm
RVF models	35 Nm
Steering head bearing adjuster nut (see text)	
VFR models	50 Nm
RVF models	25 Nm
Shock absorber mounting bolt nuts	45 Nm
Shock absorber linkage pivot bolt nuts	45 Nm
Shock absorber linkage arm bolt nuts	45 Nm
Swingarm pivot adjuster bolt	15 Nm
Swingarm pivot adjuster bolt locknut	
VFR models	80 Nm
RVF models	65 Nm
Swingarm pivot bolt nut	95 Nm
Front sprocket bolt	55 Nm
Rear sprocket nuts	35 Nm
Rear wheel bearing holder pinch bolt	55 Nm

Torque settings – non-specified components

Note: Where a specific setting is not given for a particular bolt/nut, these general settings apply. The dimension given applies to the diameter of the thread, not the head.

5 mm bolt/nut	5 Nm
6 mm bolt/nut	10 Nm
8 mm bolt/nut	22 Nm
10 mm bolt/nut	35 Nm
12 mm bolt/nut	55 Nm
6 mm flange bolt with 8 mm head	9 Nm
6 mm flange bolt/nut with 10 mm head	12 Nm
8 mm flange bolt/nut	27 Nm
10 mm flange bolt/nut	40 Nm

1 General information

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

Front suspension is by a pair of oil-damped telescopic forks. On VFR K models, the forks have a conventional damper system, while L, M and N models have a cartridge damper. RVF and N models have a cartridge damper. On all except VFR K models, the forks are adjustable for preload and damping.

At the rear, an alloy swingarm acts on a single shock absorber via a three-way linkage. The

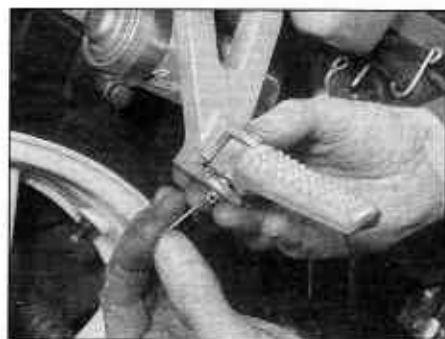
2 Frame – inspection and repair

Shock absorber is adjustable for spring preload and damping. On VFR L, M and N models, the shock absorber has a remote reservoir. The drive to the rear wheel is by chain.

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.

3 Remember that a frame which is out of the damage.

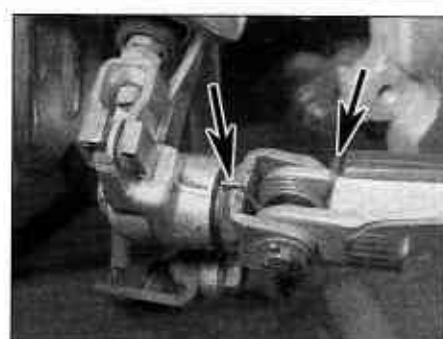
Minor damage can often be repaired by welding, depending on the extent and nature of the damage. Alignment will cause handling problems. If misalignment is suspected as the result of an accident, it will be necessary to strip the machine completely so the frame can be thoroughly checked.



3.1a Remove the split pin and washer ...



3.1b ... and withdraw the pivot pin



3.1c Note how the spring ends (arrowed) locate on the front footrest ...

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

Footrests

Removal

1 Remove the split pin and washer from the bottom of the footrest pivot pin, then withdraw the pivot pin and remove the footrest (*see illustrations*). On the front footrests, note the fitting of the return spring (*see illustration*). On the rear footrests, note the fitting of the detent plate, ball and spring, and take care that they do not spring out when removing the footrest (*see illustration*).

Installation

2 Installation is the reverse of removal.

Brake pedal

Removal

3 Unhook the brake pedal return spring and the brake light switch spring from the bracket on the pedal (*see illustration*).

4 Remove the split pin from the clevis pin securing the brake pedal to the master cylinder pushrod (*see illustration*). Remove the clevis pin and separate the pedal from the pushrod.

5 The pedal pivots on the footrest holder. Remove the bolt on the inside of the footrest bracket and remove the footrest and its holder

(*see illustration 3.3*). Remove the thrust washer and slide the pedal off the holder. If required, remove the bolt securing the spring bracket and remove the bracket.

Installation

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

- Apply molybdenum disulphide oil to the brake pedal pivot.
- Align the flat on the footrest holder with that in the bracket.
- Tighten the footrest holder bolt to the torque setting specified at the beginning of the Chapter.
- Use a new split pin on the clevis pin securing the brake pedal to the master cylinder pushrod.
- Check the operation of the rear brake light switch (*see Chapter 1*).

Gearchange lever

Removal

7 Slacken the gearchange lever linkage rod locknuts, then unscrew the rod and separate it from the lever and the arm (the rod is reverse-threaded on one end and so will simultaneously unscrew from both lever and arm when turned in the one direction) (*see illustration*). Note how far the rod is threaded into the lever and arm as this determines the height of the lever relative to the footrest.



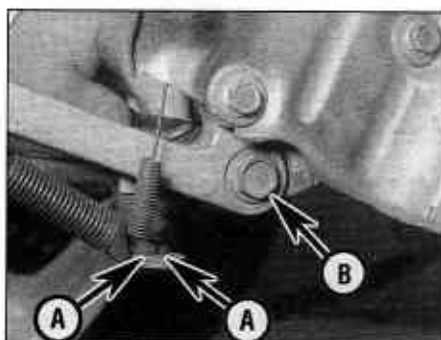
3.1d ... and how the spring, ball and detent plate fit on the rear footrest

8 The lever pivots on the footrest holder. Remove the bolt on the inside of the footrest bracket and remove the footrest and its holder. Slide the lever off the holder.

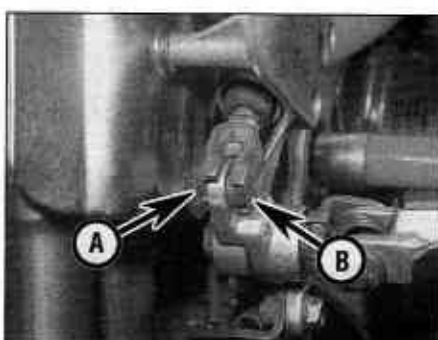
Installation

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

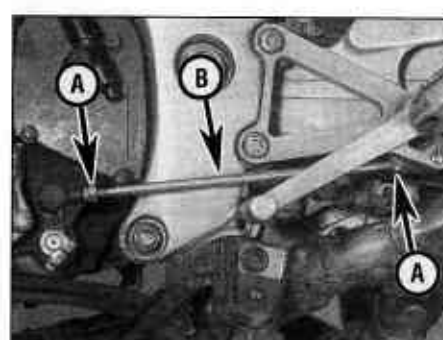
- Apply molybdenum disulphide oil to the gear lever pivot.
- Align the flat on the footrest holder with that in the bracket.
- Tighten the footrest holder bolt to the torque setting specified at the beginning of the Chapter.
- Adjust the gear lever height as required by screwing the rod in or out of the lever and arm. Tighten the locknuts securely.



3.3 Unhook the springs (A) from the bracket. Brake pedal/footrest holder bolt (B)

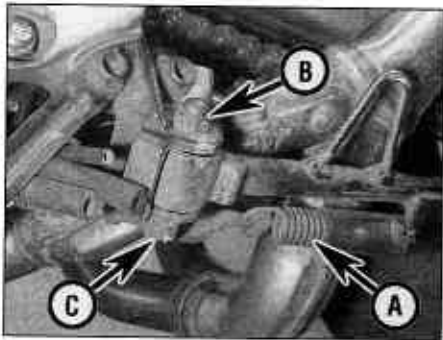


3.4 Remove the split pin (A) and withdraw the clevis pin (B)

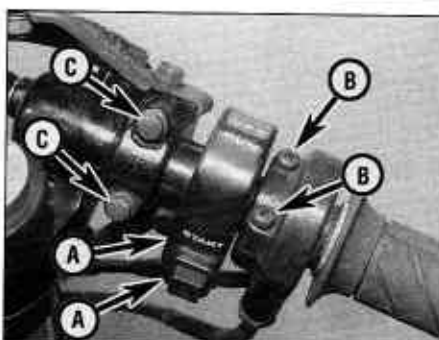


3.7 Slacken the locknuts (A), then unscrew the linkage rod (B)

6•4 Frame, suspension and final drive



4.3 Unhook the spring (A), then unscrew the nut (B) and remove the bolt (C)



5.1 Handlebar switch screws (A), throttle housing screws (B), master cylinder clamp bolts (C)



5.6 Remove the clutch lever bracket bolts and the switch housing screws

4 Sidestand – removal and installation

1 The sidestand is attached to a bracket on the frame. A spring anchored to the stand ensures that it is held in the retracted or extended position.

2 Support the bike using an auxiliary stand. On RVF models, remove the sidestand switch (see Chapter 9).

3 Unhook the stand spring and unscrew the nut securing the stand on the pivot bolt (see illustration). Remove the pivot bolt from the inside of the bracket and remove the stand, and on VFR models the thrust washers.

4 If required, unscrew the bolts securing the bracket to the frame and remove the bracket.

5 On installation apply grease to the pivot bolt shank and tighten the nut to the torque setting specified at the beginning of the Chapter. Reconnect the sidestand spring and check that it holds the stand securely up when not in use – an accident is almost certain to occur if the stand extends while the machine is in motion.

6 On RVF models, check the operation of the sidestand switch (see Chapter 1).

5 Handlebars and levers – removal and installation

Right handlebar

Removal

Note: On VFR models, the handlebars can be removed from the handlebar holders which clamp around the top of the forks, leaving the holders in place. On RVF models, the bars and holders cannot be separated.

1 Unscrew the two handlebar switch screws and free the switch from the handlebar (see illustration). Unscrew the two throttle cable housing screws and release the throttle cables from the throttle grip. Position the switch housing and the throttle housing away from the handlebar.



5.7a Remove the screw and the end-weight



5.7b Remove the fork clamp bolt . . .

2 Disconnect the brake light switch wires from the master cylinder assembly. Unscrew the two master cylinder assembly clamp bolts and position the assembly clear of the handlebar, making sure no strain is placed on the hydraulic hose (see illustration 5.1). Keep the master cylinder reservoir upright to prevent possible fluid leakage.

3 On VFR models, if removing the handlebar leaving the holder in place, unscrew the handlebar end-weight retaining screw, then remove the weight from the end of the handlebar and slide off the throttle twistgrip (see illustration 5.7a). Unscrew and remove the fork clamp bolt in the top yoke, then unscrew and remove the handlebar clamp bolt in the handlebar holder, noting how it locates in the cutout in the handlebar (see illustrations 5.7b and c). Using a flat-bladed screwdriver, spread the clamp slit to free the bar, then knock it through the holder from the outer end and withdraw it from the holder (see illustration 5.7d).

4 On VFR models, if removing the handlebar and holder together, and on RVF models, remove the steering stem nut cap, then unscrew the steering stem nut. Slacken both fork clamp bolts in the top yoke, then ease the yoke up and off the forks and position it aside (see illustrations in Section 18 of Chapter 1). Slacken the handlebar holder pinch bolts, then ease the handlebar up and off the fork (see illustrations 5.8a and b). If necessary, unscrew the handlebar end-weight retaining

screw, then remove the weight from the end of the handlebar and slide off the throttle twistgrip (see illustration 5.7a).

Left handlebar Removal

Note: On VFR models, the handlebars can be removed from the handlebar holders which clamp around the top of the forks, leaving the holders in place. On RVF models, the bars and holders cannot be separated.

5 Unscrew the two handlebar switch screws and free the switch from the handlebar. Position the switch housing away from the handlebar.

6 Disconnect the clutch switch wires from the switch in the clutch lever bracket. Unscrew the two lever assembly clamp bolts and position the assembly clear of the handlebar, making sure the cable is not unduly bent or kinked (see illustration).

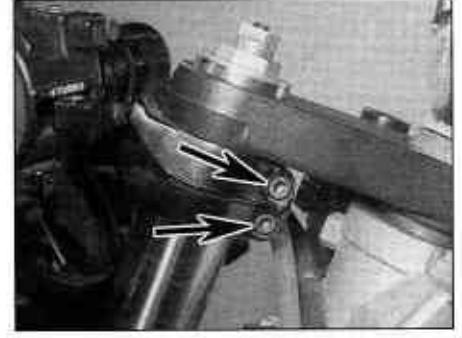
7 On VFR models, if removing the handlebar leaving the holder in place, unscrew the handlebar end-weight retaining screw, then remove the weight from the end of the handlebar and remove the grip (see illustration). It may be necessary to slit the grip open using a sharp blade in order to remove it as they are sometimes stuck in place. This will mean using a new grip on assembly. Unscrew and remove the fork clamp bolt in the top yoke, then unscrew and remove the handlebar clamp bolt in the handlebar holder, noting how it locates in the cutout in the handlebar (see illustrations).



5.7c ... and the handlebar clamp ...



5.7d ... then spread the clamp and remove the handlebar



5.8a Handlebar holder pinch bolts (arrowed) – VFR models

Using a flat bladed screwdriver, spread the clamp slit to free the bar, then knock it through the holder from the outer end and withdraw it from the holder (see illustration).

8 On VFR models, if removing the handlebar and holder together, and on RVF models, remove the steering stem nut cap, then unscrew the steering stem nut. Slacken both fork clamp bolts in the top yoke, then ease the yoke up and off the forks and position it aside (see illustrations in Section 18 of Chapter 1). Slacken the handlebar holder clamp bolts, then ease the handlebar up and off the fork (see illustrations). If necessary, unscrew the handlebar end-weight retaining screw, then remove the weight from the end of the handlebar and remove the grip (see illustration 5.7a). It may be necessary to slit the grip open using a sharp blade in order to remove it as they are sometimes stuck in place. This will mean using a new grip on assembly.

Installation

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

- On VFR models, when installing the handlebar into the holder, align the cutout in the bar with the bolt hole in the holder, so that the bolt locates the bar in the correct position (see illustration).
- When fitting the top yoke onto the forks, align the lug on the top of each handlebar holder with the slot in the yoke, so that

the handlebars are set in the correct position (see illustration).

- Refer to the Specifications at the beginning of the Chapter and tighten the handlebar holder clamp bolts, the fork clamp bolts and the steering stem nut to the specified torque settings.
- Make sure the front brake and clutch lever assembly clamps are installed with the UP mark facing up. Tighten the brake master cylinder clamp bolts to the torque setting specified at the beginning of the Chapter.
- Make sure the pin in the lower half of each switch housing locates in the hole in the underside of the handlebar (see illustration).

- If removed, apply a suitable non-permanent locking compound to the handlebar end-weight retaining screws. If new grips are being fitted, secure them using a suitable adhesive.
- Do not forget to reconnect the front brake light switch and clutch switch wiring connectors.

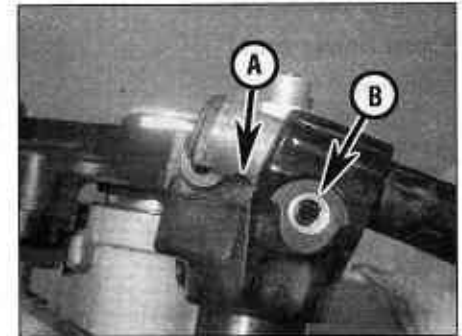
Clutch lever

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



5.8b Handlebar holder pinch bolt (arrowed) – RVF models



5.9a Align the cutout (A) with the bolt hole (B)



5.9b Make sure the lug (arrowed) on the holder locates correctly into the top yoke – VFR model shown



5.9c Locate the pin (arrowed) into the hole in the handlebar



5.10a Slacken the locking (arrowed) and thread the adjuster into the bracket

6•6 Frame, suspension and final drive



5.10b Remove the locknut, then withdraw the pivot bolt and remove the lever



5.11a Unscrew the nut...



5.11b ... withdraw the bolt and remove the lever



5.11c Note how the span adjuster assembly fits

remove the lever, detaching the cable nipple as you do (see illustration).

Front brake lever

Removal

11 Unscrew the lever pivot bolt locknut, then withdraw the pivot bolt and remove the lever (see illustrations). If required, separate the lever from the span adjuster assembly, noting how it fits (see illustration).

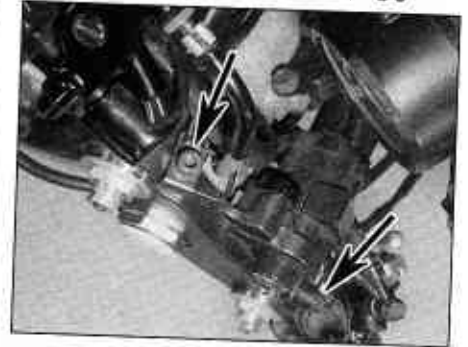
Installation

12 Installation is the reverse of removal. Apply grease to the pivot bolt shafts and the contact areas between the lever and its bracket, and to the clutch cable nipple (see illustration). Adjust the clutch cable freeplay (see Chapter 1).

6 Forks - removal and installation

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

1 Remove the front wheel (see Chapter 7).
2 Remove the front mudguard (see Chapter 3).
3 Slacken the handlebar holder clamp bolts (see illustration 5.8a and b) and the fork



6.3a Fork clamp bolts (arrowed)



6.3b Fork top bolt (arrowed)



6.4a Slacken the bottom yoke fork clamp bolt (arrowed) ...

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

clamp bolts in the top yoke (see illustration). If the forks are to be disassembled, or if the fork oil is being changed, it is advisable to slacken the fork top bolts at this stage (see illustration).

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.

4 Slacken but do not remove the fork clamp bolts in the bottom yoke, and remove the forks by twisting them and pulling them downwards (see illustration). As the forks drop clear of the top yoke, draw the handlebar assemblies and the wiring ties or hose guide clips, which supports the handlebar holders, from its groove in the fork (see illustration). Support the right handlebar so that no strain is placed on the brake master cylinder hose and the reservoir is upright.



6.4b ... and withdraw the fork, removing the handlebar, cable ties or hose guide, and the circlip (arrowed) as you do



6.5a Fit the circlip ...



6.5b ... making sure it fits into its groove ...

Installation

5 Remove all traces of corrosion from the fork tubes and the yokes. Slide the forks up through the bottom yoke, then install the circlip, wiring ties and the handlebars onto the forks (see illustration). Make sure the circlip locates properly into the groove in the fork, and press the handlebar holders down onto the ring so that it locates up inside the base of the holder (see illustration). Slide the forks up into the top yoke, aligning the handlebar holders so that the lug on the top locates into its slot in the top yoke (see illustration 5.9b). Make sure the forks are pushed fully home, so that the handlebar holders are held securely between the top yoke and the circlip. Check that the amount of protrusion of the fork tube above the top yoke is equal on both sides.

6 Tighten the fork clamp bolts 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 bolts should now be tightened to the specified torque setting. Now tighten the fork clamp bolts in the top yoke and the handlebar holder clamp bolts to the specified torque setting.

7 Install the front wheel (see Chapter 7), and the front brace and mudguard (see Chapter 8).

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



6.5c ... and that it locates into the base of the handlebar holder



6.6 Tighten the various clamp bolts to their specified torque settings

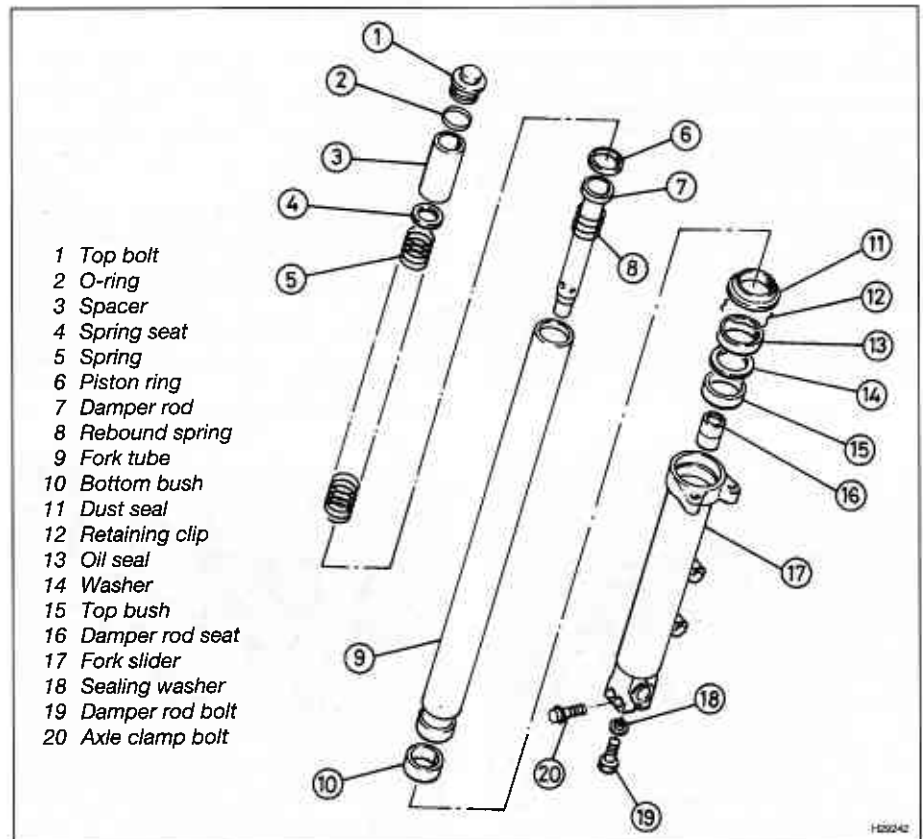
7 Forks - disassembly, inspection and reassembly

VFR K models

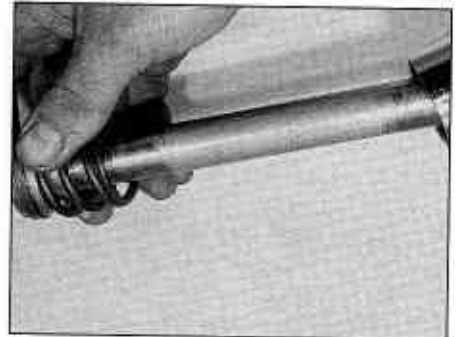
Disassembly

1 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).

2 Before dismantling the fork, it is advised that the damper rod bolt be slackened at this stage. Compress the fork tube in the slider so



7.1 Front fork components - VFR K models



7.8 Withdraw the damper rod and rebound spring from the tube



7.9 Pry out the dust seal using a flat-bladed screwdriver



7.10 Pry out the retaining clip using a flat-bladed screwdriver

7 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. Alternatively, a long metal bar or length of wood dowelling (such as a broom handle) passed down through the fork tube and pressed hard into the damper rod head quite often suffices.

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 7.11). If an assistant is not available, clamp the brake caliper mounting lugs in a soft-jawed vice to support the fork. If required, remove the circlip securing the mudguard holder to the top of the fork slider and remove the holder. If the fork top bolt was not slackened with a vice equipped with soft jaws, taking care not to over-tighten or score its surface, and slacken the top bolt.

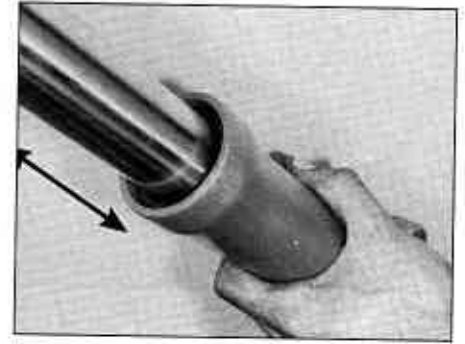
Warning: The fork spring is pressing on the fork top bolt with considerable pressure. Unscrew the bolt very carefully, keeping a downward pressure on it and release it slowly as it is likely to spring clear. It is advisable to wear some form of eye and face protection when carrying out this operation.

5 Slide the fork tube down into the slider and withdraw the spacer, spring seat and the spring from the tube (see illustrations 7.26c, b and a). Note which way up the spring is fitted, ie whether the closer-spaced spring coils are at the top or bottom of the spring. **6** Invert the fork leg over a suitable container and pump the fork vigorously to expel as much fork oil as possible.

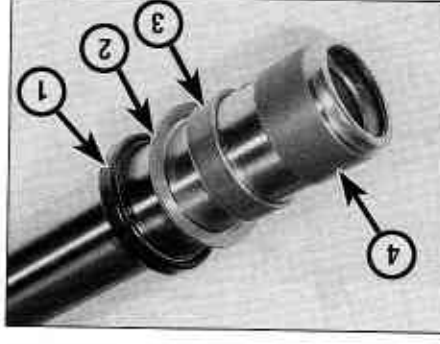
9 Carefully prise out the dust seal from the top of the slider to gain access to the oil seal retaining clip (see illustration). Discard the dust seal as a new one must be used.

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

11 To separate the tube from the slider it is necessary to displace the top bush and oil seal. The bottom bush should not pass through the top bush, and this can be used 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



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



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

tube should be replaced.

15 Check the fork tube for runout using V-blocks and a dial indicator (see illustration). If the amount of runout exceeds the service limit specified, the dealer service department or other repair shop (see illustration) or have it done at a

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

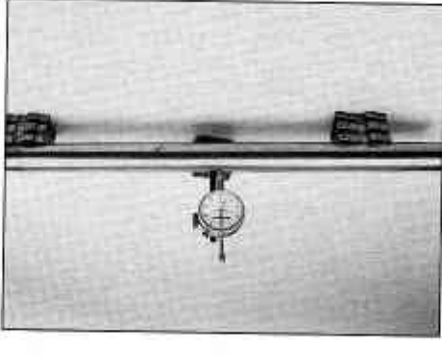
13 Tip the damper rod seat out of the slider, noting which way up it fits.

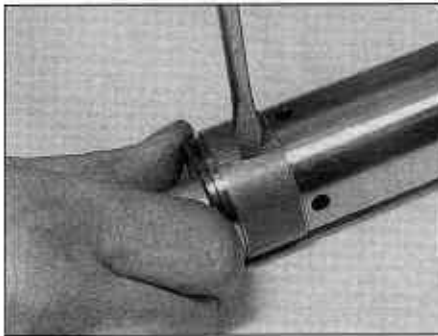
Inspection

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

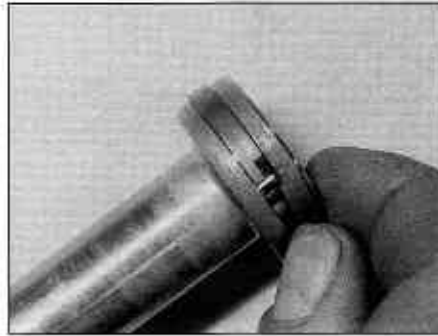
12 With the tube removed, slide off the oil seal and its washer, noting which way up they fit (see illustration). Discard the oil seal as a new one must be used. The top bush can then also be slid off its upper end.

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

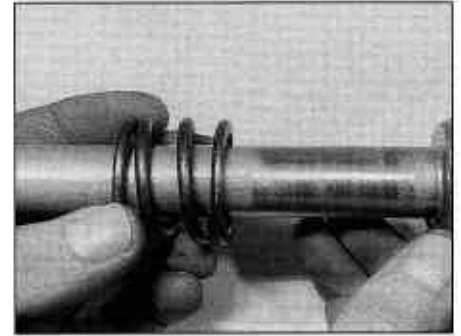




7.17 Prise off the bottom bush using a flat-bladed screwdriver



7.18 Replace the damper rod piston ring if it is worn or damaged



7.19a Slide the rebound spring onto the damper rod



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

16 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.

17 Examine the working surfaces of the two bushes; if worn or scuffed they must be replaced. 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.

18 Check the damper rod and its piston ring for damage and wear, and replace them if necessary (see illustration). Do not remove the rings from the piston unless they are being replaced.

Reassembly

19 If removed, install the piston ring into the groove in the damper rod head, then 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 install the seat on the bottom of the damper rod (see illustration).

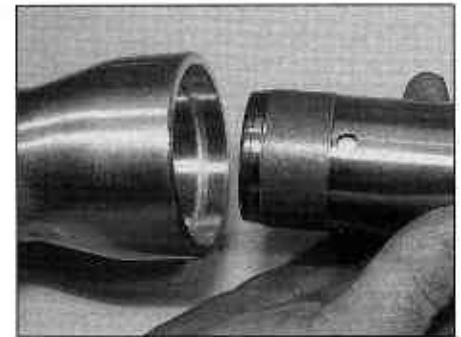
20 Oil the fork tube and bottom bush with the specified fork oil and insert the assembly into the slider (see illustration). Fit a new copper sealing washer to the damper rod bolt and apply a few drops of a suitable non-permanent thread locking compound, then install the bolt into the bottom of the slider (see illustration). Tighten the bolt to the specified torque setting. If the damper rod rotates inside the tube, temporarily install the fork spring and top bolt (see Steps 26 and 27) and compress the fork to hold the damper rod. Alternatively, a long metal bar or 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.

21 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 (see illustration). Either use the Honda 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.

22 When the bush is seated fully and



7.19b Fit the seat to the bottom of the rod



7.20a Slide the tube into the slider



7.20b Apply a thread locking compound to the damper rod bolt and use a new sealing washer



7.21a Install the top bush ...



7.21b ... followed by the washer



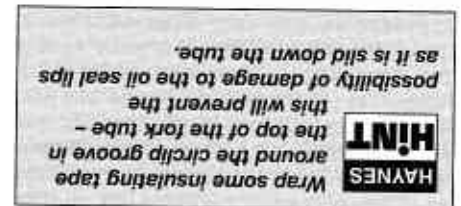
7.22 Make sure the oil seal is the correct way up



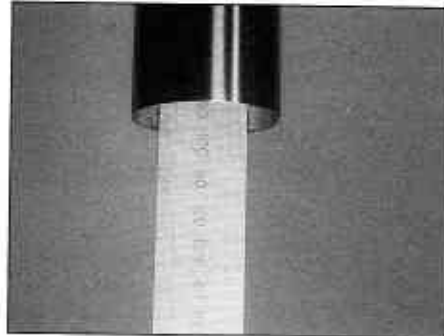
7.23 Install the retaining clip ...



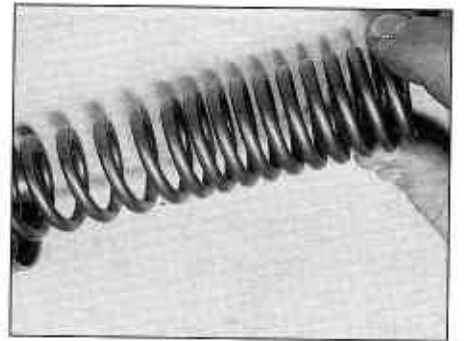
7.24 ... followed by the dust seal ...



7.25a Pour the oil into the top of the tube



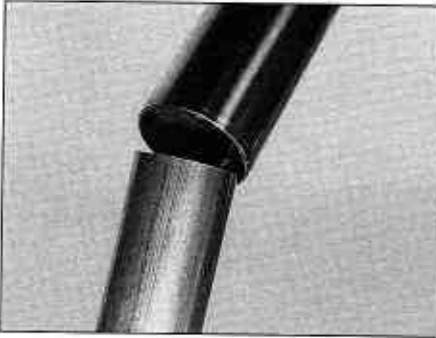
7.25b Measure the oil level with the fork held vertical



7.26a Install the spring ...



7.26b ... followed by the spring seat ...



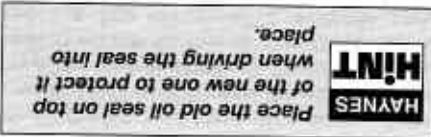
7.26c ... and the spacer ...

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.

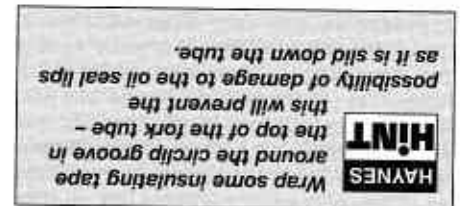


Warning: It will be necessary to compress the spring by pressing it down using the top bolt to engage the threads of the top bolt with the fork tube. This is a potentially dangerous operation and should be performed with care, using an assistant if necessary. Wipe off any excess oil before starting to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

25 Slowly pour in the specified quantity of the specified grade of fork oil and pump the fork at least ten times to distribute it evenly (see illustration); the oil level should also be measured and adjustment made by adding or subtracting oil. Fully compress the fork tube into position (see illustration).
24 Lubricate the lips of the new dust seal then slide it down the fork tube and press it into its groove (see illustration).
23 Once the seal is correctly seated, fit the retaining clip, making sure it is correctly located in its groove (see illustration).
22 Fit a new O-ring to the fork top bolt and thread the bolt into the top of the fork tube.



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.



TOOL TIP

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

28 Remove the insulating tape from around the circlip groove in the fork tube. If removed, fit the mudguard holder onto the top of the slider, noting that each is marked L or R according to its side, and secure it with its circlip.

29 Install the forks (see Section 6). Set the spring preload adjuster as required (see Section 11).

VFR L, M and N models

Disassembly

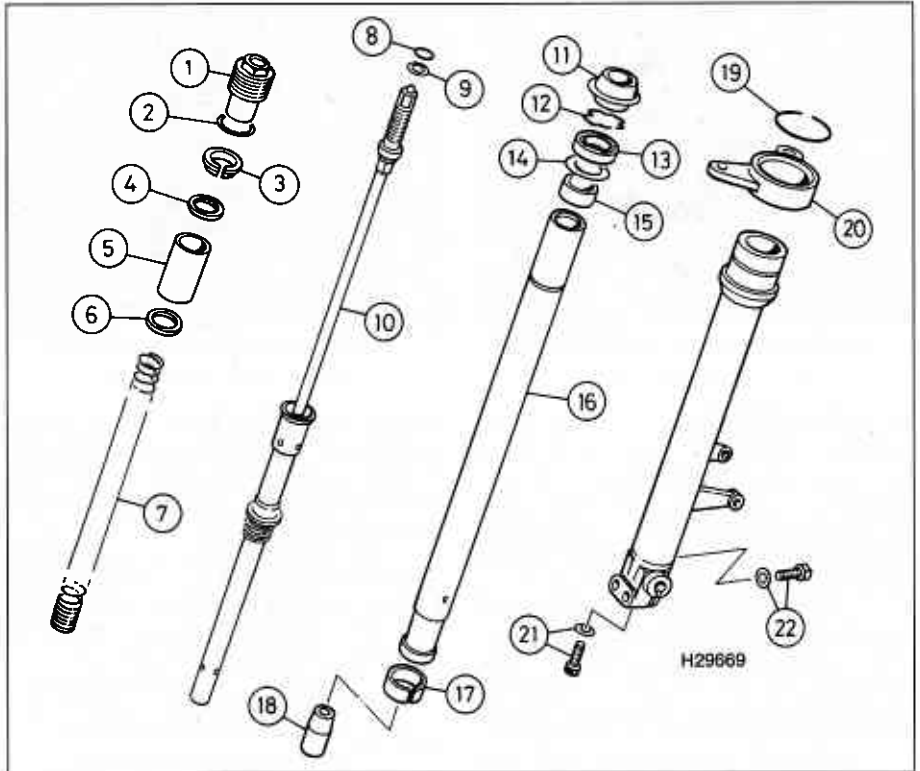
30 Always dismantle the fork legs separately to avoid interchanging parts and thus causing an accelerated rate of wear. Store all components in separate, clearly marked containers (see illustration).

31 Before dismantling the fork, it is advised that the damper rod bolt be slackened at this stage. Compress the fork tube in 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 required, remove the circlip securing the mudguard holder to the top of the fork slider and remove the holder.

32 Set the spring preload adjuster to its minimum setting (see Section 11). If the fork top bolt was not slackened with the fork in situ, carefully clamp the fork tube in a vice equipped with soft jaws, taking care not to overtighten or score its surface, and slacken the top bolt.

33 Unscrew the fork top bolt from the top of the fork tube (see illustration 7.59). The bolt will remain threaded on the damper rod.

34 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 preload adjuster and unscrew the fork top bolt from the damper rod (see illustration 7.30).



7.30 Front fork components – VFR L, M and N models

- | | | |
|-------------------------|-------------------|------------------------|
| 1 Top bolt | 9 Circlip | 16 Fork tube |
| 2 O-ring | 10 Damper rod | 17 Bottom bush |
| 3 Slotted spring collar | 11 Dust seal | 18 Damper rod seat |
| 4 Washer | 12 Retaining clip | 19 Circlip |
| 5 Spacer | 13 Oil seal | 20 Mudguard holder |
| 6 Spring seat | 14 Washer | 21 Damper rod bolt and |
| 7 Spring | 15 Top bush | sealing washer |
| 8 O-ring | | |

35 Remove the slotted spring collar by slipping it out to the side (see illustration 7.57), then remove the washer, the spacer and the spring seat (see illustration 7.56d, c and b). Note which way up the spring is fitted, ie whether the closer-spaced spring coils are at the top or bottom of the spring (see illustration 7.56a).

36 Invert the fork leg over a suitable

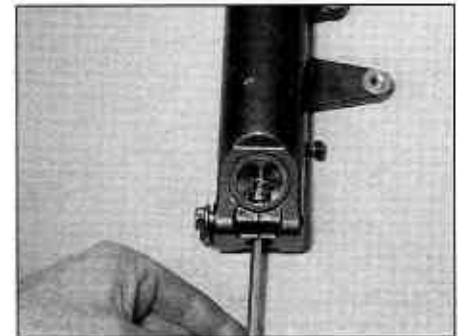
container and pump the fork vigorously to expel as much fork oil as possible.

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

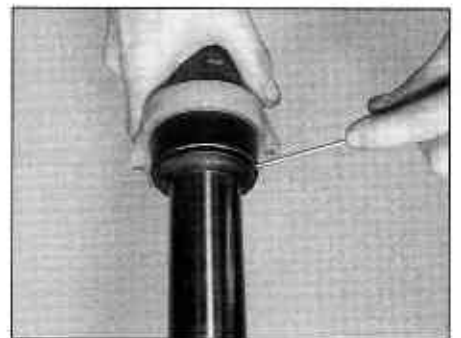
38 Invert the fork and withdraw the damper rod from inside the fork tube (see illustration 7.49a).



7.31 Slacken the damper rod bolt



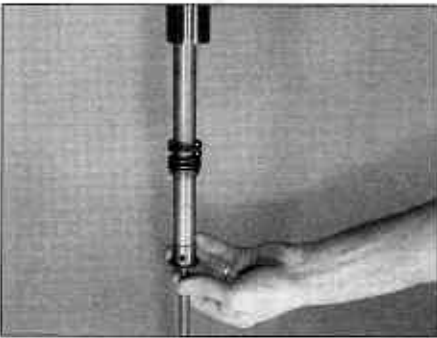
7.37 Unscrew and remove the damper rod bolt



7.39 Pry out the dust seal using a flat-bladed screwdriver



7.40 Pry out the retaining clip using a flat-bladed screwdriver



7.49a Slide the damper rod into the tube . . .

39 Carefully prise out the dust seal from the top of the slider to gain access to the oil 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 if necessary.

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

41 To separate the tube from the slider it is necessary to displace the top bush and oil seal. The bottom bush should 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 7.11).

42 With the tube removed, slide off the oil seal, washer and top bush, noting which way up they fit (see illustration 7.12). 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 replaced.

45 Check the fork tube for runout using V-blocks and a dial gauge (see illustration 7.15). If the amount of runout exceeds the service limit specified, the tube should be replaced.

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.

47 Examine the working surfaces of the two bushes; if worn or scuffed they must be replaced. 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 7.17). Make sure the new one seats properly.

48 Check the damper rod assembly for damage and wear, and replace it 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.

49 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 install the seal on the bottom of the damper rod (see illustrations).

50 Oil the fork tube and bottom bush with the specified fork oil and insert the assembly into the slider (see illustration). Fit a new copper sealing washer 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). Tighten the bolt to the specified torque setting (see illustration). If the damper rod rotates inside the tube, wait until the fork is fully reassembled before tightening the bolt.

7.50b Apply a thread locking compound to the damper rod bolt and use a new sealing washer . . .



7.50b Apply a thread locking compound to the damper rod bolt and use a new sealing washer . . .



7.50a Slide the tube into the slider



7.50c . . . and tighten the bolt to the specified torque

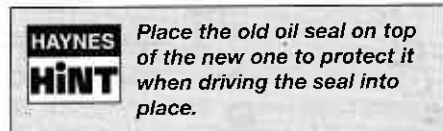
51 Push the fork tube fully into the slider, then oil the top bush and slide it down over the tube (see illustration). Press the bush squarely into its recess in the slider as far as possible, then install the oil seal washer with its flat side facing up (see illustration). Either use the service tool (Pt. Nos. 07947-KA50100 and 07947-KF00100) 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.



Wrap some insulating tape around the circlip groove in the top of the fork tube – this will prevent the possibility of damage to the oil seal lips as it is slid down the tube.

Smear the seal's lips with fork oil and slide it over the tube so that its markings face upwards and drive the seal into place as described in Step 51 until the retaining clip groove is visible above the seal (see illustration).



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



7.55a Pour the oil into the top of the tube



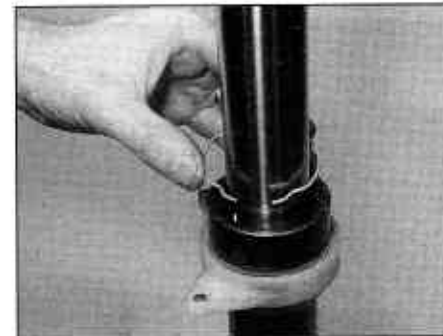
7.51a Install the top bush . . .



7.51b . . . followed by the washer



7.52 Make sure the oil seal is the correct way up



7.53 Install the retaining clip . . .

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

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

55 Slowly pour in the specified quantity of the specified grade of fork oil and pump the fork and damper rod at least ten times each to distribute it evenly (see illustration); the oil level should also be measured and adjustment made by adding or subtracting oil. 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.

56 Clamp the slider in a vice via the brake caliper mounting lugs, taking care not to



7.54 . . . followed by the dust seal

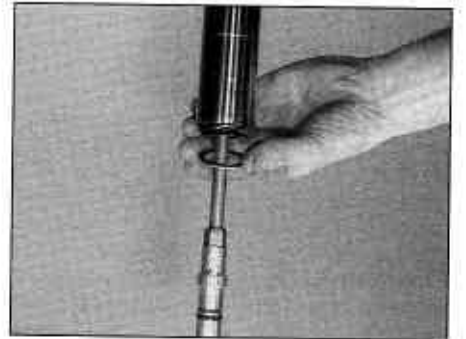
overtighten and damage them. Pull the fork tube and damper rod out of the slider as far as possible then install the spring with its closer-wound coils at the bottom (see illustration).



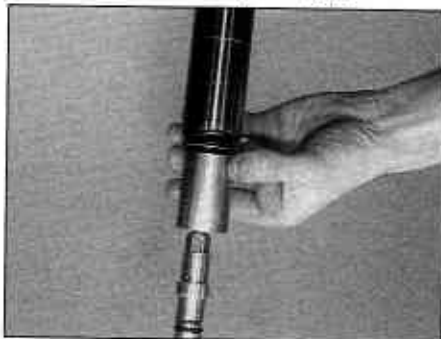
7.55b Measure the oil level with the fork held vertical



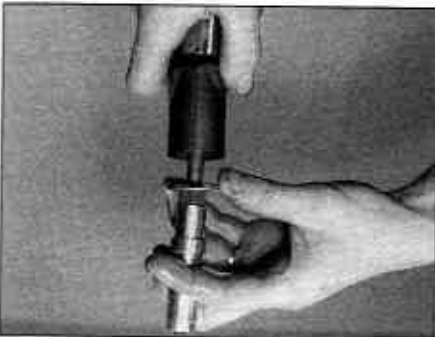
7.56a Install the spring . . .



7.56b ... followed by the spring seat ...



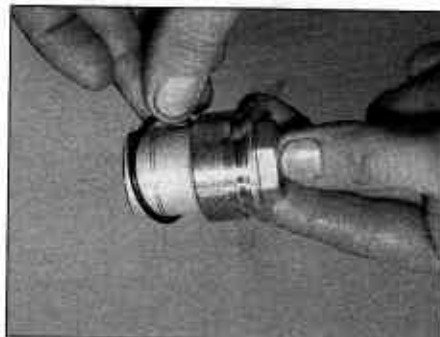
7.56c ... the spacer ...



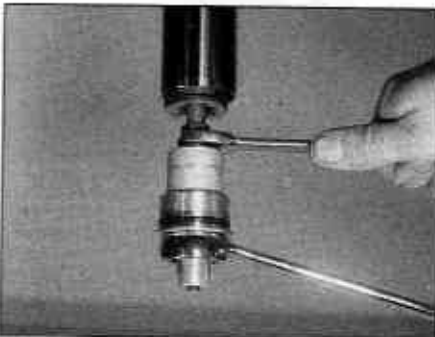
7.56d ... and the washer



7.57 Fit the slotted collar between the nut and the upper spring seat



7.58a Fit a new O-ring ...



7.58b ... then thread the top bolt onto the damper rod



7.59 Thread the top bolt into the tube

Install the spring seat, the spacer and the washer (see illustrations).

57 Slide the slotted spring collar into position between the upper spring seat and the nut on the damper rod (see illustration).

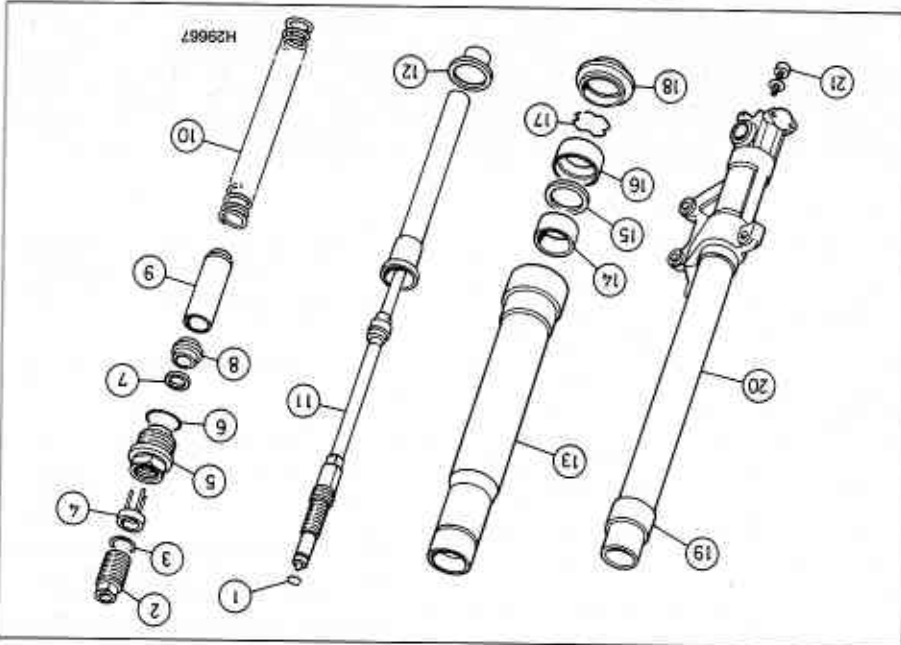
58 Fit a new O-ring onto the fork top bolt, then thread the top bolt fully, but not tightly, onto the damper rod, using a spanner on either the nut or the preload adjuster to prevent the rod from turning (see illustrations).

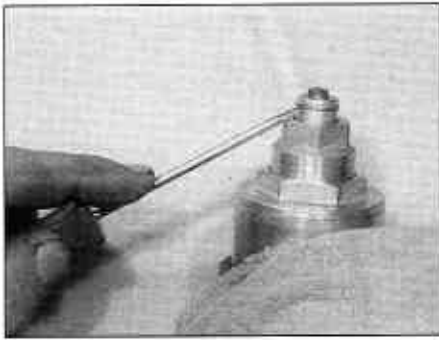
59 Withdraw the tube fully from the slider and carefully screw the top bolt into the fork tube making sure it is not cross-threaded (see illustration). Note: The top bolt can be tightened to the specified torque setting at this stage if the tube is held between the padded jaws of a vice, but do not risk distorting the tube by doing so. A better

- 1 Circlip
- 2 Pre-load adjuster
- 3 O-ring
- 4 Adjuster tripod
- 5 Top bolt
- 6 O-ring
- 7 Washer
- 8 Upper spring seat

- 9 Spacer and lower spring seat
- 10 Spring
- 11 Damper rod
- 12 Damper rod seat
- 13 Fork tube
- 14 Bottom bush
- 15 Washer
- 16 Oil seal
- 17 Retaining clip
- 18 Dust seal
- 19 Top bush
- 20 Fork slider
- 21 Damper rod bolt and sealing washer

7.62 Front fork components - RVF models





7.64a Remove the circlip . . .



7.64b . . . then unscrew the pre-load adjuster . . .



7.46c . . . and remove the adjuster tripod

method is to tighten the top bolt when the fork leg has been installed and is securely held in the triple clamps.



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.

If the damper rod Allen bolt requires tightening (see Step 50), 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 7.50c).

60 Remove the insulating tape from around the circlip groove in the fork tube. If removed, fit the mudguard holder onto the top of the slider, noting that each is marked L or R according to its side, and secure it with its circlip.

61 Install the forks (see Section 6). Set the spring preload adjuster as required (see Section 11).

RVF models

Disassembly

62 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 on opposite page).

63 Before dismantling the fork, it is advised that the damper rod bolt be slackened at this stage. Compress the fork tube in 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 7.31).

64 Remove the circlip from the top of the damper rod protruding from the fork top bolt (see illustration). Unscrew and remove the preload adjuster, then withdraw the adjuster tripod using either a magnet, or a piece of wire or welding rod, flattened at the end and hooked over slightly, to remove it (see illustrations). 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.

65 Unscrew the fork top bolt from the top of the fork tube (see illustration 7.91). The bolt will remain threaded on the damper rod.

66 Carefully clamp the fork slider in a vice and slide the fork tube fully down onto the slider (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. Push down on the spacer and insert a spanner between the washer and the bottom of the top bolt and fit it onto the flats on the damper rod. Use it to counter-

hold the damper rod, then unscrew the fork top bolt from the rod (see illustration).

67 Remove the washer, then remove the seat, the spacer and the spring seat (which fits into the bottom of the spacer and will probably come away with it). Note which way up the spring is fitted, ie whether the taped end is positioned downwards or upwards.

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

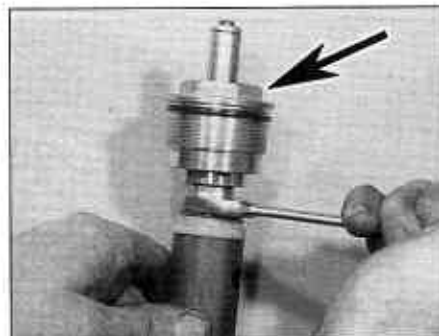
69 Remove the previously slackened damper rod bolt and its copper sealing washer from the bottom of the slider (see illustration 7.37). Discard the sealing washer as a new one must be used on reassembly.

70 Invert the fork and withdraw the damper rod from inside the fork tube. The damper rod seat may come away with the rod, otherwise remove it later (see Step 75).

71 Carefully prise out the dust seal from the bottom of the tube to gain access to the oil seal retaining clip (see illustration). Discard the dust seal as a new one must be used.

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

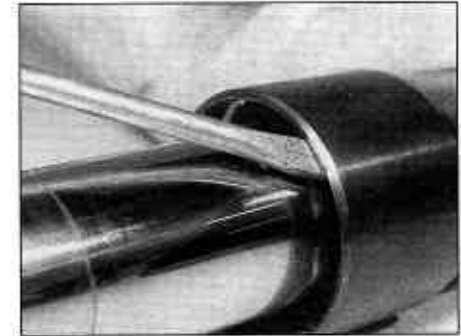
73 To separate the slider from the tube it is necessary to displace the bottom bush and oil seal. The top bush should not pass through the bottom bush, and this can be used to good effect. Push the slider gently inwards until it stops. Take care not to do this forcibly. Then pull the slider sharply outwards until the



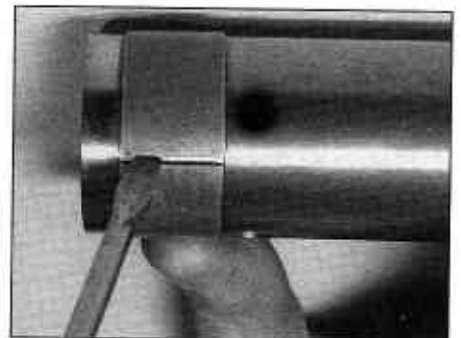
7.66 Locate the spanner as described and unscrew the top bolt (arrowed)



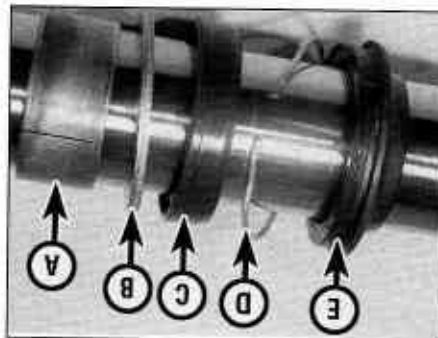
7.71 Prise off the dust seal . . .



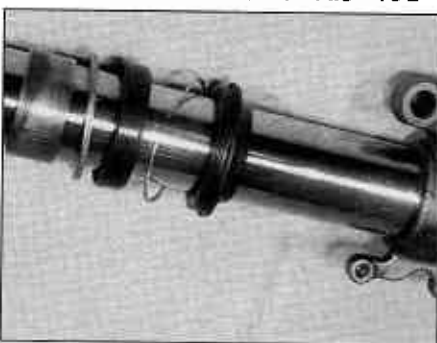
7.72 . . . then lever out the retaining clip using a flat-bladed screwdriver



7.74a Carefully lever apart the ends of the top bush and remove it from the slider



7.74b Bottom bush (A), oil seal washer (B), oil seal (C), retaining clip (D), dust seal (E)



7.81a Slide the dust seal, the retaining clip, the oil seal, the oil seal washer and the bottom bush onto the slider as shown

seal faces the dust seal (see illustration). Remove the insulating tape and fit the top bush into its recess in the slider (see illustration).

82 Apply a smear of the specified clean fork oil to the outer surface of each bush, then carefully insert the slider fully into the fork tube (see illustration).

83 Support the fork upside down, then press the bottom bush squarely into its recess in the fork tube as far as possible (see illustration).

Slide the oil seal washer on top of the bush, and keep the oil seal, the retaining clip and the dust seal out of the way by sliding them up the slider. If necessary, tape them to the slider to prevent them from falling down and interfering as the bush is drifted into place.

84 Using either the special service tool (part nos. 07KMD-KZ30100 and 07RMD-MW40100) or a suitable drift, carefully drive the bottom bush fully into its recess using the oil seal washer to prevent damaging the edges of the bush. Make sure the bush enters the recess squarely, and take care not to scratch or gouge the slider (it is best to make sure that the fork slider is pushed fully into the tube so that any accidental scratching is confined to the area that does not affect the oil seal).

85 When the bush is seated fully and squarely in its recess in the tube, (remove the washer to check, wipe the recess clean, then reinstall the washer), drive the oil seal into

top bush strikes the bottom bush. Repeat this operation until the bottom bush and seal are tapped out of the slider (see illustration 7.11).

74 With the tube and slider separated, remove the top bush from the slider by carefully levering its ends apart using a screwdriver (see illustration). Slide the bottom bush, the oil seal washer, the oil seal, the retaining clip and the dust seal off the slider, noting which way up they fit (see illustration). Discard the oil seal and the dust seal as new ones must be used.

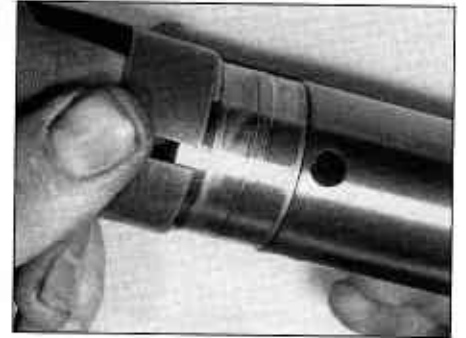
75 If the damper rod seat did not come out with the rod, tip it out of the slider, noting which way up it fits.

Inspection

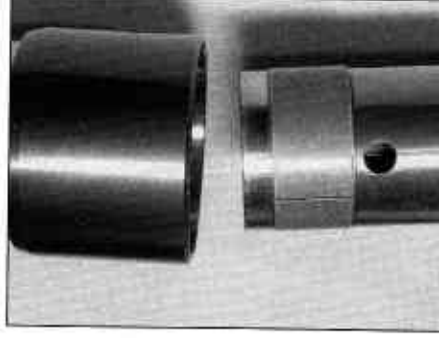
76 Clean all parts in solvent and blow them dry with compressed air, if available. Check the fork tube for score marks, scratches, flaking of the chrome finish and excessive or abnormal wear. Look for dents in the tube and replace the tube in both forks if any are found. Check the fork seal seat for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

77 Check the fork slider for runout using V-blocks and a dial gauge, or have it done at a dealer service department or other repair shop (see illustration 7.15). If the amount of

7.81b Make sure the top bush seats properly in its recess



7.82 Fit the slider into the bottom of the fork tube



7.83 Make sure the bottom bush enters the fork tube squarely



making sure that the marked side of the oil and the bottom bush onto the fork slider, retaining clip, the oil seal, the oil seal washer of the oil seal and the inner surface of each smear of the specified clean fork oil to the lips on the new oil seal as it is installed. Apply a wrap some insulating tip over the ridges at the end of the fork slider to protect the lips

Reassembly

81 Wrap some insulating tip over the ridges at the end of the fork slider to protect the lips on the new oil seal as it is installed. Apply a smear of the specified clean fork oil to the lips of the oil seal and the inner surface of each

80 Check the damper rod assembly for damage and wear, and replace it 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.

79 Examine the working surfaces of the two bushes; if worn or scuffed they must be replaced. Never replace only one spring.

78 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.

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



77 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.

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



7.85 Drive the oil seal into the bottom of the tube ...



7.86a ... and fit its retaining clip, making sure it is properly seated ...



7.86b ... then press the dust seal into place

place as described in Step 84 until the retaining clip groove is visible above the seal (see illustration).

86 Once the oil seal is correctly seated, fit the retaining clip, making sure it is correctly located in its groove, then press the dust seal into position (see illustrations).

87 Lay the fork flat and slide the tube fully onto the slider. Install the damper rod seat onto the bottom of the damper rod (see illustration), then insert the damper rod into the top of the fork tube and through the slider until it seats on the bottom of 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 and tighten it to the

torque setting specified at the beginning of the Chapter (see illustrations 7.50b and c).

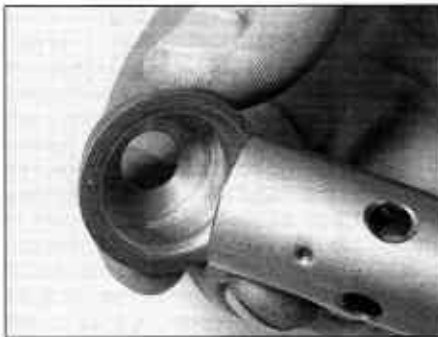
88 Stand the fork upright and slowly pour in the specified quantity of the specified grade of fork oil, then pump the damper and tube at least ten times each to distribute the oil evenly (see illustration 7.55a).

Caution: When pumping the fork, do not withdraw the slider from the tube by more than 230 mm.

The oil level should also be measured and adjustment made by adding or subtracting oil. Fully compress the fork tube and the damper and measure the fork oil level from the top of the tube (see illustration 7.55b). Add or subtract fork oil until it is at the level specified at the beginning of the Chapter.

89 If removed, fit the spring seat into the bottom of the spacer. Withdraw the damper rod as far as possible out of the fork tube, and keep it extended using the aid of an assistant (see illustration). Install the spring with its tapered end upwards into the fork tube, then install the spacer, making sure the lip on the bottom of the spring seat fits into the top of the spring (see illustration). Fit the seat into the top of the spacer, then fit the washer (see illustrations).

90 Fit a new O-ring to the fork top bolt and thread the bolt onto the damper rod (see illustration). Push down on the spacer and insert a spanner between the washer and the bottom of the top bolt and fit it onto the flats on the damper rod. Use it to counter-hold the



7.87 Fit the damper rod seat onto the end of the end of the damper rod



7.89a Withdraw the damper rod and fit the spring ...



7.89b ... the spacer ...



7.89c ... the seat ...



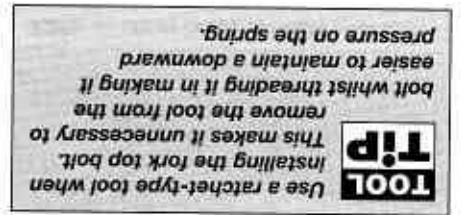
7.89d ... and the washer



7.90a Thread the top bolt onto the damper rod ...

damper rod, then tighten the top bolt to the specified torque setting (see illustration).
 91 Apply a smear of the specified clean oil to the top bolt O-ring. Fully extend the fork tube and screw the bolt securely into the tube (see illustration).

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



92 Fit the preload adjuster tripod into the top bolt, making sure the leg ends locate into the holes (see illustration 7.64c). Check the condition of the adjuster O-rings and replace them if necessary. Thread the adjuster into the top bolt, then fit the circlip into its groove in the top of the damper rod (see illustrations).
 93 Install the forks as described in Section 6. Set the spring preload adjuster as required (see Section 11).

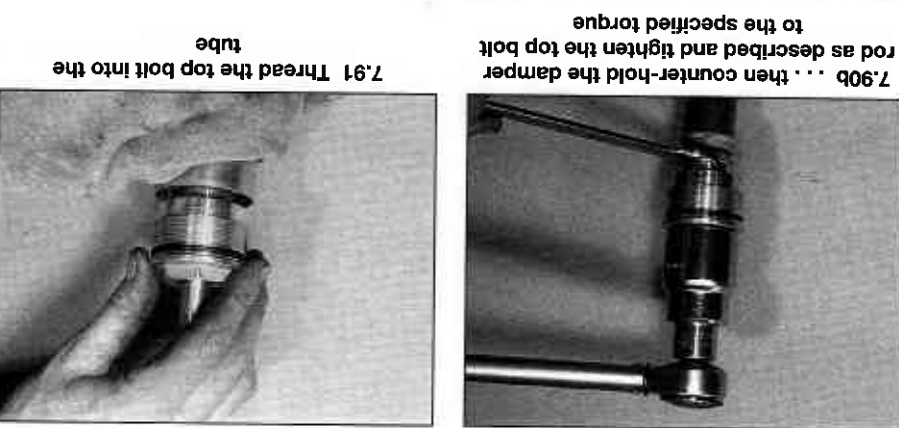
8 Steering stem - removal and installation

Removal

1 Remove the front forks (see Section 6) and the horn (see Chapter 9). On VFR models, unscrew the bolt securing the front brake hose guide (see illustration). On RVF models, unscrew the bolt securing each front brake hose union. Take care not to strain or knock the hoses when removing the steering stem. 2 Remove the steering stem nut cap and unscrew the nut (see illustration). Lift the top yoke off the steering stem and place it aside, making sure no strain is placed on the ignition switch wiring. If required, trace the wiring and disconnect it at the connector. On VFR models, this will mean removing the right-hand fairing side panel (see Chapter 8), and on RVF models, the air filter housing (see Chapter 4). 3 Bend down the tabs on the steering stem



8.1 Remove the bolt (arrowed) and detach the brake hose clamp



7.90b ... then counter-hold the damper rod as described and tighten the top bolt to the specified torque



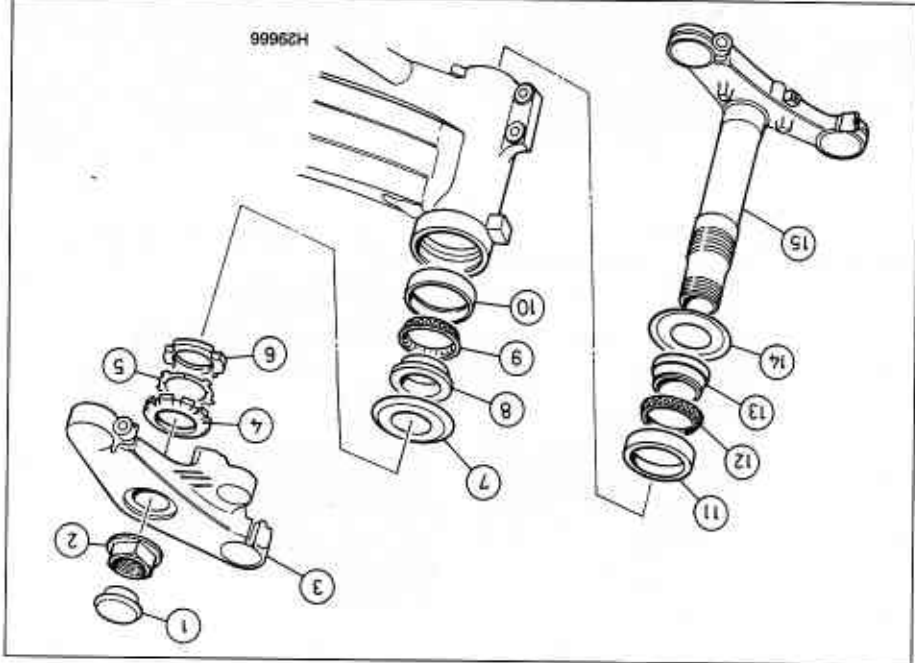
7.91 Thread the top bolt into the tube



7.92a Thread the adjuster into the top bolt ...



7.92b ... and fit the circlip



8.2 Steering stem components

- 1 Steering stem nut cap
- 2 Steering stem nut
- 3 Top yoke
- 4 Locknut
- 5 Lockwasher
- 6 Adjuster nut
- 7 Bearing cover
- 8 Upper bearing inner race
- 9 Upper bearing
- 10 Upper bearing outer race
- 11 Lower bearing outer race
- 12 Lower bearing inner race
- 13 Lower bearing
- 14 Dust seal
- 15 Bottom yoke and steering stem

lockwasher to release it from the locknut, then unscrew and remove the locknut using either a suitable C-spanner or a drift located in one of the notches. Remove the lockwasher, bending up the remaining tabs to release it from the adjuster nut if necessary. Inspect the tabs for cracks or signs of fatigue. If there are any, discard the lockwasher and use a new one; otherwise the old one can be reused.

4 Supporting the bottom yoke, unscrew the adjuster nut using either a C-spanner, a peg-spanner or a drift located in one of the notches, then remove the adjuster nut and the bearing cover from the steering stem.

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

6 Remove the upper bearing and its inner race from the top of the steering head. 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 races from the frame or the lower bearing from the steering stem unless they are to be replaced.

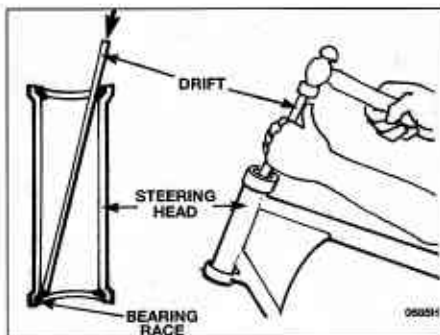
Installation

7 Smear a liberal quantity of grease on the bearing races in the frame. Work the grease well into both the upper and lower bearings.

8 Carefully lift the steering stem/bottom yoke up through the frame. Install the upper bearing and its inner race in the top of the steering head, then install the bearing cover. Apply some clean engine oil to the adjuster nut and thread the nut on the steering stem.

9 If the Honda service tool (Part no. 07HMD-MR70100) is available, use this with a torque wrench to tighten the adjuster nut to preload the bearings. Tighten the adjuster nut to the torque setting specified at the beginning of the Chapter, then turn the steering stem through its full lock four or five times and re-tighten the adjuster nut to the specified setting. Ensure that the steering stem is able to move freely from lock to lock following adjustment – if necessary reset the bearing adjustment as described in Chapter 1.

10 If the service tool is not available, tighten the nut using a C-spanner so that bearing play is eliminated, but the steering stem is able to move freely from lock to lock – refer to the procedure in Chapter 1 for details.



9.4 Drive the bearing races out with a brass drift as shown

Caution: Take great care not to apply excessive pressure because this will cause premature failure of the bearings.

11 When the bearings are correctly adjusted, install the lockwasher, using a new one if the tabs are weakened or cracked, onto the adjuster nut and fit two tabs into the slots in the adjuster nut. Install the locknut and tighten it finger-tight, then tighten it further (to a maximum of 90°) until the remaining tabs on the lockwasher align with the slots in the locknut. Hold the adjuster nut to prevent it from moving if necessary. Bend up the lockwasher tabs to secure the locknut.

12 Install the top yoke onto the steering stem. Install the steering stem nut and its washer and tighten it finger-tight at this stage. Temporarily install one of the forks to align the top and bottom yokes, and secure it by tightening the bottom yoke clamp bolt only.

13 Tighten the steering stem nut to the specified torque setting.

14 On VFR models attach the front brake hose guide, and on RVF models the hose unions, to the bottom yoke. Reconnect the ignition switch wiring connector if it was disconnected.

15 Install the horn (see Chapter 9) and the front forks (see Section 6).

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

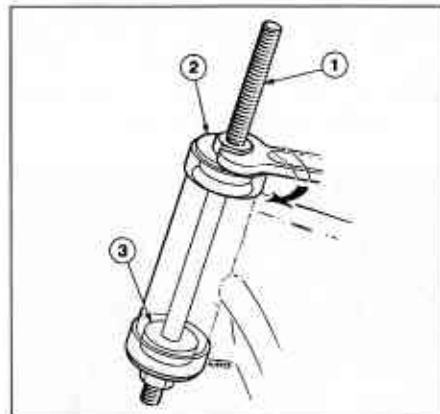
9 Steering head bearings – inspection and replacement

Inspection

1 Remove the steering stem (see Section 8).

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

3 The outer races should be polished and free from indentations. Inspect the bearing



9.6 Drawbolt arrangement for fitting steering stem bearing races

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

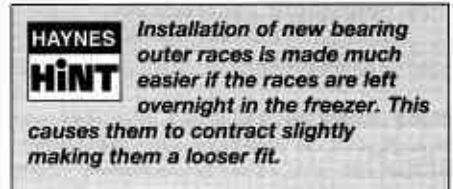
rollers for signs of wear, damage or discoloration, and examine the bearing roller retainer cage for signs of cracks or splits. Spin the bearings by hand. They should spin freely and smoothly. If there are any signs of wear on any of the above components both upper and lower bearing assemblies must be 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

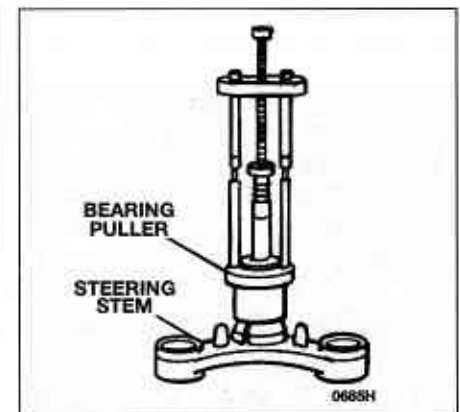
4 The outer races are an interference fit in the steering head and can be tapped from position with a suitable drift (see illustration). Tap firmly and evenly around each race to ensure that it is driven out squarely. It may prove advantageous to curve the end of the drift slightly to improve access.

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 Honda dealer equipped with the bearing race installing tools.



7 To remove the lower bearing from the steering stem, use two screwdrivers placed on opposite sides of the race to work it free. 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 (see illustration). Take the steering stem to a



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

9 Install the steering stem (see Section 8).
bearing and does not contact the rollers.
drift bears only on the inner edge of the
position (see illustration). Ensure that the
will be needed to tap the new bearing into
diameter slightly larger than the steering stem.
stem. A length of tubing with an internal
8 Fit the new lower bearing onto the steering
deteriorated.
bearing and replace it if it is worn, damaged or
of the dust seal that fits under the lower
Honda dealer if required. Check the condition

Note: Although the shock absorber and linkage can be removed with the exhaust system in situ, the procedure is quite complicated and access to certain bolts is very difficult, especially for a torque wrench, which is essential for the installation procedure. It is therefore recommended that the exhaust system is removed (see Chapter 4). A procedure for each situation is given.

1 Place the machine on an auxiliary stand. Position a support under the rear wheel so



2 Note the shock absorber spring preload current setting, then adjust it to its softest setting (see Section 11).

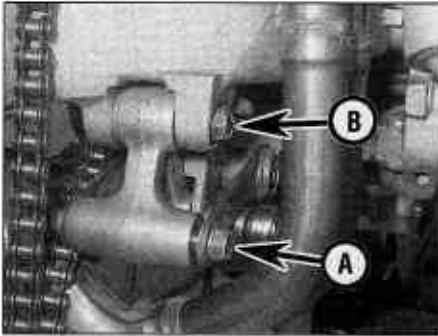
3 Remove the seat cowl (see Chapter 8). Unscrew the two bolts securing the rider's right-hand and footrest bracket and the bolt securing the top of the heat shield to the frame, then swing the whole footrest/rear brake master cylinder/heat shield assembly up and secure it to the rear sub-frame, making sure no strain is placed on

the brake and reservoir hoses (see [illustrations](#)).

4 On VFR models, using socket extensions inserted through the holes in the frame, counter-hold the shock absorber upper mounting bolt and unscrew the nut, then withdraw the bolt (see [illustrations](#)). On RVF models, unscrew the nut securing the upper mounting bracket to the top of the frame cross-member (see [illustration](#)). On VFR L, M and N models, remove the screw caps and slacken the clamps securing the shock absorber reservoir, located behind the passenger's right-hand footrest bracket. Free the reservoir from the clamps (see [illustration](#)).



10.4e . . . then free the reservoir



10.5 Remove the linkage pivot-to-linkage arm nut (A) and the linkage pivot-to-swingarm nut (B)



10.6 Unscrew the nut and withdraw the bolt, then swing the linkage arm down



10.8 Withdraw the pivot-to-swingarm bolt

5 Unscrew the nut from the bolt securing the linkage pivot to the linkage arm and from the bolt securing the linkage pivot to the swingarm (see illustration).

6 Unscrew the nut and withdraw the bolt securing the linkage arm to the frame, then swing the linkage arm down (see illustration).

7 Raise the swingarm and withdraw the bolt securing the linkage arm to the linkage pivot and remove the arm.

8 Withdraw the bolt securing the linkage pivot to the swingarm (see illustration).

9 Raise the swingarm, then remove the shock absorber with the linkage pivot still attached. On VFR L, M and N models, free the reservoir hose from its guide and feed the reservoir through as you remove the shock, noting the routing of the hose (see illustration). On all VFR models, also note the routing of the drain hose.

10 On VFR models, a metelastic bush rather than a needle bearing is fitted between the linkage pivot and the shock absorber, meaning there is very little free movement between them when the bolt is tight. As the bolt has to be tightened before installation due to the lack of access with the exhaust in place, it is essential to mark the relative positions of the shock and the pivot before separation to ensure they can be fitted together in the same position. If they are installed out of position it will either be impossible to align the linkage pivot with the swingarm and linkage arm, or if it is possible it will probably mean that the bush is under some preload which will affect the overall performance of the suspension and accelerate wear of the bush. Mark their relative positions using a permanent marker or scribe, then unscrew the nut and withdraw the bolt and separate the shock from the pivot.

11 On RVF models, unscrew the nut and withdraw the bolt securing the linkage pivot to the shock absorber and separate them.

Removal with exhaust system removed

12 Place the machine on an auxiliary stand. 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.

13 Note the shock absorber spring preload current setting, then adjust it to its softest setting (see Section 11).

14 Remove the seat cowling (see Chapter 8).

15 Remove the exhaust system (see Chapter 4).

16 Unscrew the nut and withdraw the bolt securing the linkage arm to the linkage pivot, then swing the linkage arm down. If required, unscrew the nut and withdraw the bolt securing the linkage arm to the frame and remove the arm, noting which way up it fits. The linkage arm can be left in place if only the shock needs to be removed.

17 Unscrew the nut and withdraw the bolt securing the shock absorber to the linkage pivot, then swing the pivot down. If required, unscrew the nut and withdraw the bolt securing the linkage pivot to the swingarm and remove the pivot, noting which way it fits. The linkage pivot can be left in place if only the shock needs to be removed.

18 On VFR L, M and N models, slacken the clamps securing the shock absorber reservoir, located behind the passenger's right-hand footrest bracket (see illustrations 10.4d and e). On VFR models, using socket extensions inserted through the holes in the frame, counter-hold the bolt and unscrew the nut, then withdraw the bolt (see illus-

trations 10.4a and b). On RVF models, unscrew the nut securing the upper mounting bracket to the top of the frame cross-member (see illustration 10.4c).

19 Raise the swingarm, then remove the shock absorber. On VFR L, M and N models, free the reservoir hose from its guide and feed the reservoir through as you remove the shock, noting the routing of the hose (see illustration 10.9). On all VFR models, also note the routing of the drain hose.

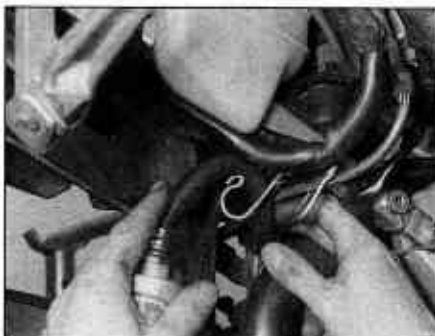
Inspection

20 Inspect the shock absorber for obvious physical damage and the coil spring for looseness, cracks or signs of fatigue.

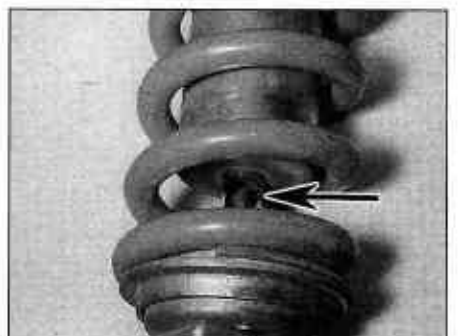
21 Inspect the damper rod for signs of bending, pitting and oil leakage (see illustration).

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

23 To measure the shock absorber spring free length, compress the spring using a coil spring compressor by just enough to access the spring stopper ring. Remove the ring and the spring seat, then carefully release the compressor until the spring is relaxed. Remove the spring, noting which way up it fits. Measure the free length of the spring and compare it to the specifications. If the spring has relaxed below its service limit, it must be replaced. Individual components for the rear shock absorber are available for VFR models. Check with your Honda dealer for availability.



10.9 Free the reservoir hose from its guide



10.21 Look for pitting and oil leakage on the rod (arrow)



10.24 Withdraw the spacers and remove the seals

On RVF models, the entire unit must be replaced if it is worn or damaged.

24 Withdraw the spacers and lever out the dust seals from the linkage pivot and arm, noting their different sizes (see illustration).

Thoroughly clean all components, removing all traces of dirt, corrosion and grease.

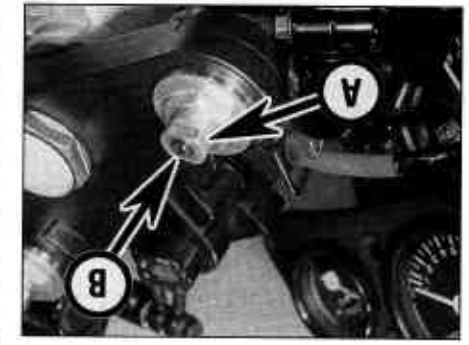
25 Inspect all components closely, looking for obvious signs of wear such as heavy scoring, or for damage such as cracks or distortion.

26 Check the condition of the needle roller bearings in the linkage pivot and arm. On VFR models, also check the condition of the metastatic bush.

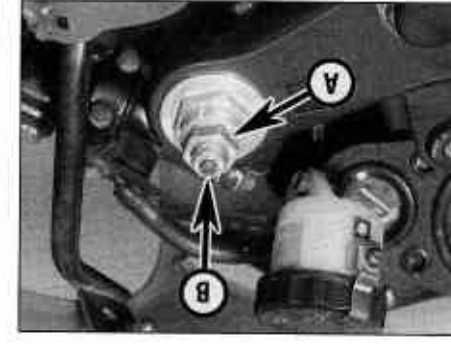
27 Worn bearings or bushes can be drifted out of their bores, but note that removal will destroy them; new components should be obtained before work commences. The new ones should be pressed or drawn into their bores rather than driven into position. In the absence of a press, a suitable drawbolt arrangement can be made up as described below.

28 It will be necessary to obtain a long bolt or a length of threaded rod from a local engineering works or some other supplier. The bolt or rod should be about one inch longer than the combined width of the linkage piece and one bearing. Also required are suitable nuts and two large and robust washers having a larger outside diameter than the bearing housing. In the case of the threaded rod, fit one nut to one end of the rod and stake it in place for convenience.

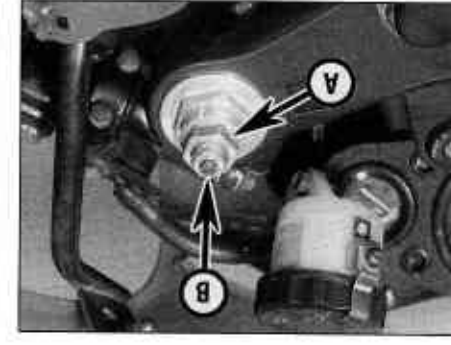
11.2a Pre-load adjuster (A), damping adjuster (B) – VFR models



11.2b Pre-load adjuster (A), damping adjuster (B) – RVF models



11.5 Pre-load adjuster locknut (A) and adjuster nut (B)



29 Fit one of the washers over the bolt or rod so that it rests against the head or staked nut, then pass the assembly through the relevant bore. Over the projecting end place the bearing, which should be greased to ease installation, followed by the remaining washer and nut.

30 Holding the bearing or bush to ensure that it is kept square, slowly tighten the nut so that the bearing or bush is drawn into its bore.

31 Once it is fully home, remove the drawbolt arrangement and, if necessary, repeat the procedure to fit the other bearings.

32 Lubricate the needle roller bearings and the spacers with molybdenum disulphide grease and install the spacers (see illustration 10.24).

33 Check the condition of the dust seals and replace them if they are damaged or deteriorated. Press the seals squarely into place.

Installation

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

a) Apply molybdenum disulphide grease to the pivot points.

b) Make sure the linkage arm is installed with the ends curving downwards.

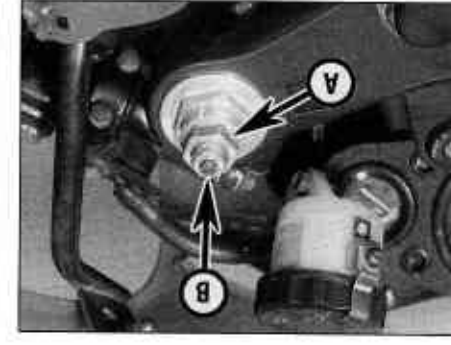
c) On VFR L, M and N models, make sure the reservoir hose is correctly routed and secured in its guide (see illustration 10.9). On all VFR models, make sure the drain hose is routed between the front of the linkage arm and the frame and out through the breather hose guide on the left-hand side of the bike.

d) If the exhaust system was not removed, tighten the shock absorber to linkage pivot nut to the specified torque setting before installing the shock, making sure on VFR models that their relative positions are as noted or marked on removal (see Step 10).

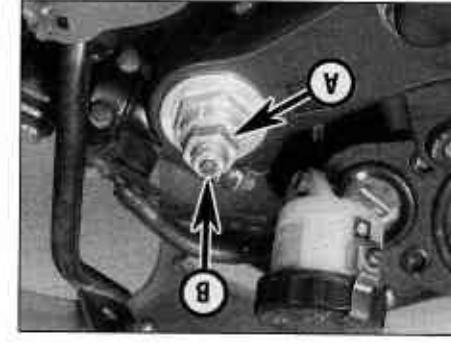
e) With the exception of the above, install the bolts and nuts finger-tight only until all components are in position, then tighten the nuts to the torque settings specified at the beginning of the Chapter.

f) Adjust the suspension as required (see Section 11).

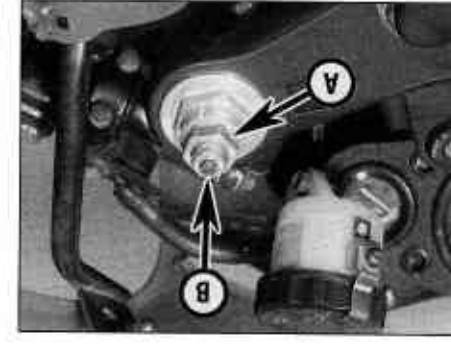
11.2a Pre-load adjuster (A), damping adjuster (B) – VFR models



11.2b Pre-load adjuster (A), damping adjuster (B) – RVF models



11.5 Pre-load adjuster locknut (A) and adjuster nut (B)



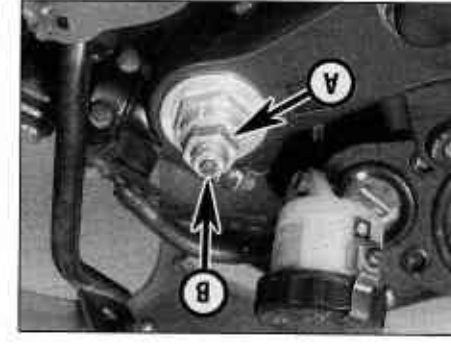
35 On all models the rear shock absorber is adjustable for spring preload and damping.

4 On VFR K models, preload 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. There are six positions. Position 1 is the softest setting, position 6 is the hardest. Align the setting required with the adjustment stopper. To increase the preload, turn the spring seat clockwise. To decrease the preload, turn the spring seat anti-clockwise.

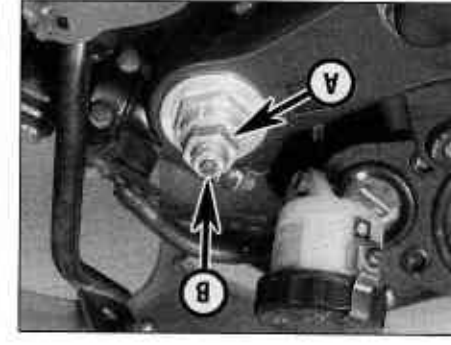
5 On all other VFR models and RVF models, preload adjustment is made by turning the adjuster nut on the threads on the shock absorber body (see illustration). Slacken the locknut, then turn the adjuster nut clockwise to increase preload and anti-clockwise to decrease it. Tighten the locknut securely after adjustment.

6 Damping adjustment is made by turning the adjuster on the bottom of the shock absorber using a flat-bladed screwdriver (see illustration).

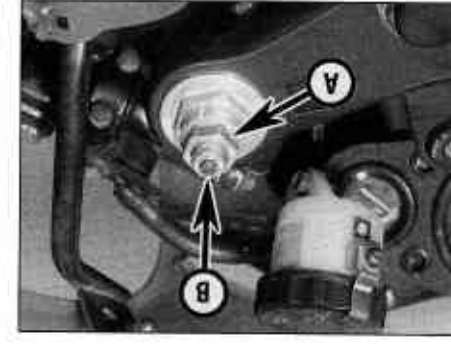
11.2a Pre-load adjuster (A), damping adjuster (B) – VFR models



11.2b Pre-load adjuster (A), damping adjuster (B) – RVF models



11.5 Pre-load adjuster locknut (A) and adjuster nut (B)

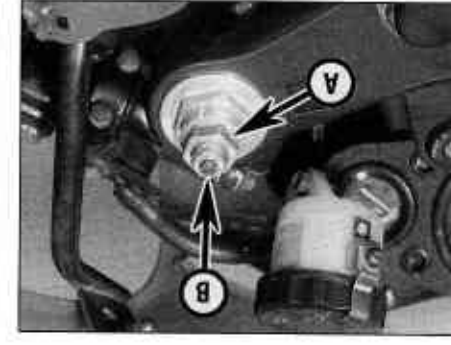


Front forks

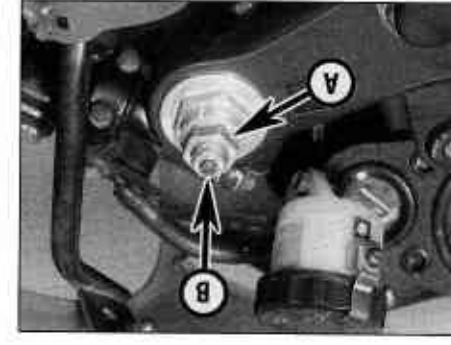
1 On VFR K models, the front forks are not adjustable.

2 On all other VFR models and RVF models, the front forks are adjustable for spring preload and damping. Spring preload is adjusted using a suitable spanner on the adjuster flats (see illustrations). Turn it clockwise to increase preload and anti-clockwise to decrease it. The amount of preload is indicated by lines on the adjuster. Always make sure both adjusters are set equally. Damping is adjusted using a screwdriver in the slot in the top of the damper rod protruding from the pre-load adjuster. Turn it clockwise to increase damping and anti-clockwise to decrease it.

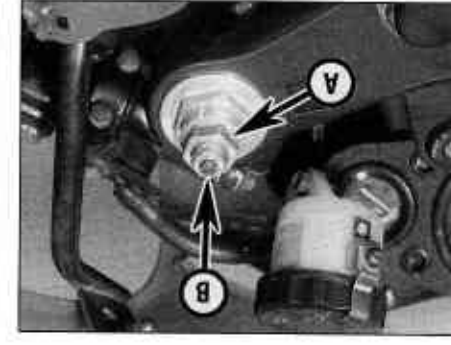
11.2a Pre-load adjuster (A), damping adjuster (B) – VFR models



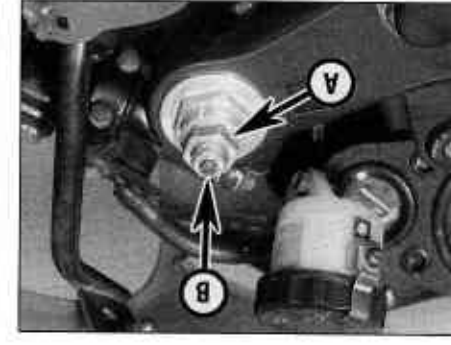
11.2b Pre-load adjuster (A), damping adjuster (B) – RVF models



11.5 Pre-load adjuster locknut (A) and adjuster nut (B)

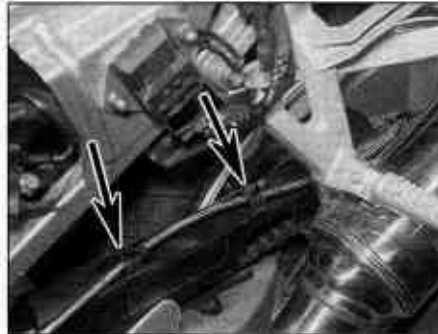


11 Suspension – adjustments

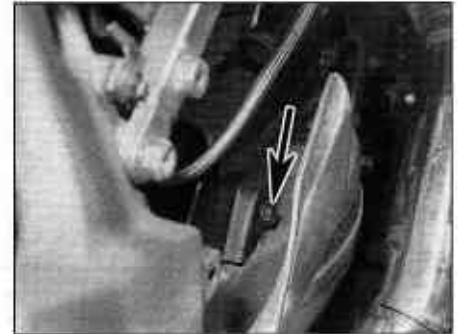




11.6 Damping adjuster (arrowed)



12.2 Free the brake hose from its clamps (arrowed)



12.3a Remove the bolt (arrowed) . . .

illustration). To set the standard position, turn the adjuster clockwise until it stops, then turn it anti clockwise 1 turn until the punch mark on the adjuster aligns with the index mark on the shock absorber. To increase the damping, turn the adjuster clockwise. To decrease the damping, turn the adjuster anti-clockwise.

12 Swingarm – removal and installation

Removal

Note: If the rear wheel hub assembly is to be removed from the swingarm, it is advisable to do it at this stage (see Chapter 7) so that the rear brake can be used to prevent the assembly from rotating while slackening the hub nut, which is very tight.

1 Remove the rear wheel (see Chapter 7). Slacken the bearing holder pinch bolt in the rear wheel (see illustration 15.9c). Using the pin spanner tool provided in the toolkit or a suitable drift located in one of the notches, turn the bearing holder until the drive chain is fully slack, then disengage the chain from the sprocket (see illustration 15.14).

2 Remove the rear brake caliper, noting that there is no need to disconnect the brake hose



12.3b . . . and the nut (arrowed), then remove the chain guard

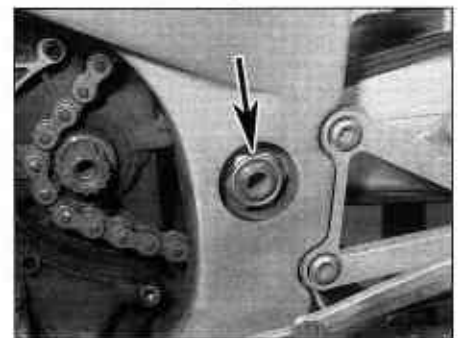
(see Chapter 7). Release the rear brake hose from its clamps on the chain guard and support the caliper so that no strain is placed on the hose (see illustration).

3 Unscrew the bolt and nut securing the chain guard to the swingarm and remove the guard, noting how it locates over the lugs on the swingarm (see illustrations).

4 Remove the rear shock absorber and linkage (see Section 10).

5 Unscrew the nut on the left-hand end of the swingarm pivot bolt (see illustration).

6 Unscrew the locknut on the adjuster bolt on the right-hand end of the pivot bolt (see illustration). This requires the use of a Honda service tool, Pt. No. 07908-4690001, which is

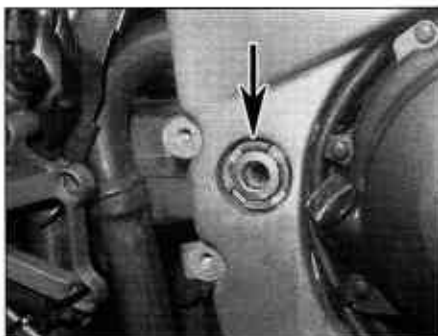


12.5 Unscrew the nut (arrowed)

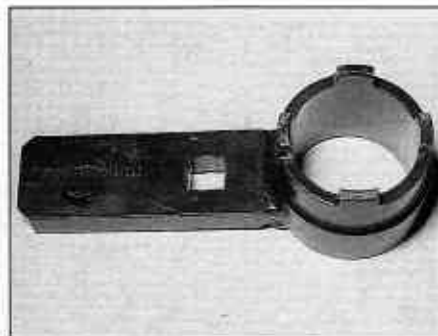
a special wrench that fits the locknut (see illustration). There is no alternative to the use of this tool, particularly for the tightening procedure (see Step 16); if you do not have access to it, the swingarm pivot locknut can be unscrewed using a suitable peg spanner, but must be later tightened by a Honda dealer service department.

7 The swingarm pivot bolt fits into the head of the adjuster bolt (actually a threaded sleeve). Using an Allen key, unscrew the pivot bolt which will also unscrew the adjuster bolt (see illustration).

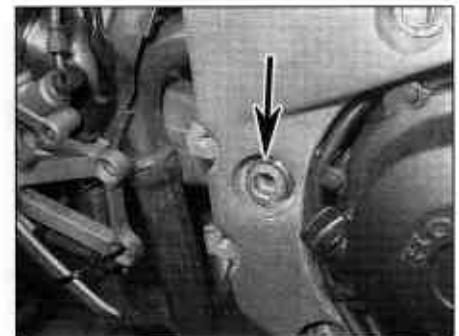
8 When the adjuster bolt is fully unscrewed, support the swingarm then withdraw the pivot bolt and the adjuster bolt and remove the



12.6a Unscrew the locknut . . .



12.6b . . . using the special tool. This tool MUST be used for the swingarm tightening procedure



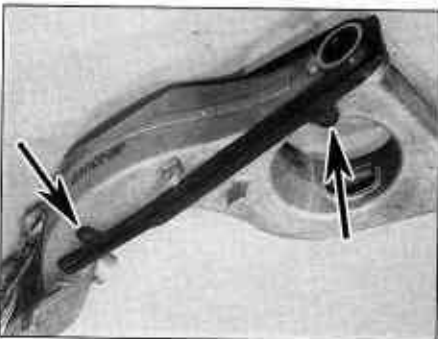
12.7 Unscrew the pivot bolt and the adjuster bolt together (arrow)



12.8a Withdraw the pivot bolt ...



12.8b ... and remove the swingarm as described



12.9 The slider is secured by four screws, two on the top (arrowed) and two on the bottom

and tighten it as much as possible by hand (see *illustration*). Tighten the adjuster bolt further by turning the pivot bolt using a suitable Allen key. Tighten the adjuster bolt in this way to the torque setting specified at the beginning of the Chapter (see *illustration*).
 15 Thread the pivot bolt nut finger-tight onto the left-hand end of the bolt (see *illustration*).
 16 Install the adjuster bolt locknut and tighten it as much as possible by hand (see *illustration*). Tighten the locknut further using the service tool as described in Step 6, and use the drive chain is looped over the front of the swingarm. Slide the pivot adjuster bolt onto the pivot bolt and engage its flats with those of the pivot bolt (see *illustrations*). Install the pivot bolt through the swingarm, to counter-hold the pivot bolt and adjuster

swingarm (see *illustration*). If the exhaust system is still in place, draw the swingarm back a little, then twist the left-hand side up and the back round to the right to manoeuvre it around the exhaust slider from the swingarm (see *illustration*). If it is badly worn or damaged, it should be replaced.
 10 Remove the collar from the left-hand side of the swingarm (see *illustration*). Inspect all components for wear or damage as described in Section 13.
 11 If removed, apply a suitable non-



12.10 Remove the collar



12.14a Slide the adjuster bolt onto the pivot bolt ...



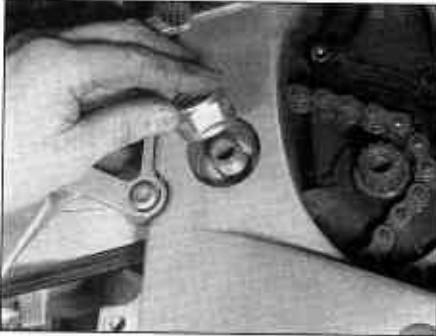
12.14b ... and engage them together



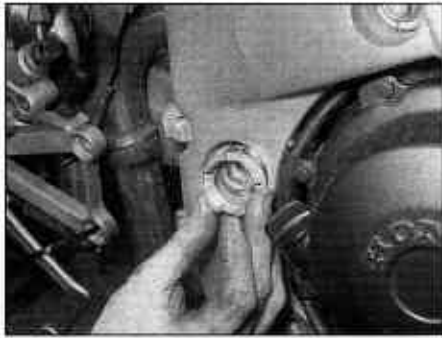
12.14d ... and tighten it to the specified torque



12.14c Slide the bolt through the swingarm ...



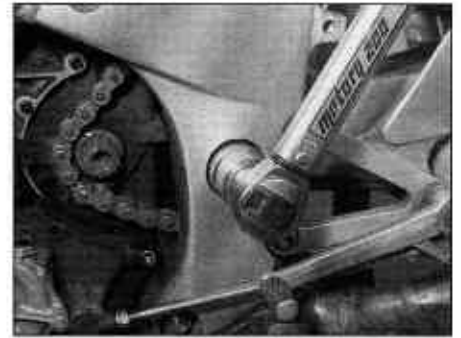
12.15 Thread the nut onto the left-hand end of the bolt



12.16a Fit the locknut ...



12.16b ... and tighten it as described to the specified torque



12.17 Tighten the nut to the specified torque

bolt and prevent them from turning. Then, using a torque wrench applied to the hole in the arm of the service tool, tighten the locknut to the specified torque setting (see illustration). **Note:** The specified torque setting takes into account the extra leverage provided by the service tool and cannot be duplicated without it.

17 Tighten the pivot bolt nut to the specified torque setting, again using an Allen key to counter-hold the pivot bolt and adjuster bolt and prevent them from turning (see illustration).

18 Install the rear shock absorber and linkage (see Section 10).

19 If removed, install the hub assembly (see Chapter 7).

20 Install the chain guard, making sure it locates correctly over the lugs on the swingarm (see illustrations). Apply a suitable non-permanent thread locking compound to the nut and the bolt and tighten them securely (see illustrations 12.3a and b).

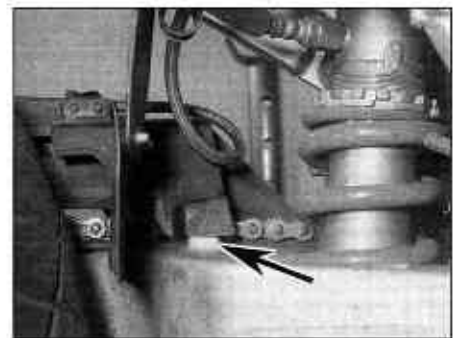
21 If not already done (See Step 19), install the rear brake caliper (see Chapter 7). Secure the brake hose in its clamps on the chain guard (see illustration 12.2).

22 Install the rear wheel (see Chapter 7).

23 Check and adjust the drive chain slack (see Chapter 1). Make sure the bearing holder pinch bolt is tightened to the specified torque setting. Check the operation of the rear suspension before taking the machine on the road.



12.20a Install the chain guard ...



12.20b ... making sure it locates correctly (arrow)

13 Swingarm - inspection and bearing replacement

Inspection

- 1 If required, remove the wheel hub assembly (see Chapter 7).
- 2 Thoroughly clean all components, removing all traces of dirt, corrosion and grease.
- 3 Inspect all components closely, looking for obvious signs of wear such as heavy scoring, and cracks or distortion due to accident damage. Any damaged or worn component must be replaced.
- 4 Check the swingarm pivot 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 equipment is available, place the axle in V-blocks and measure the runout using a dial indicator. If the axle is bent or the runout exceeds the limit specified, replace it.

Bearing replacement

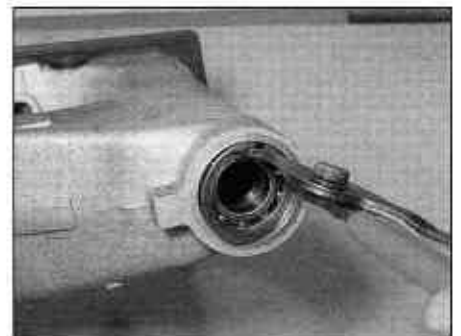
5 Withdraw the bearing spacer (see illustration). Lever out the dust seal on each side of the swingarm, and remove the circlip from the right-hand side (see illustrations). Refer to *Tools and Workshop Tips* (Section 5) in the Reference section and remove the bearings, then clean them and inspect them for wear or damage. A needle bearing is fitted in the left-hand side, and a ball bearing in the



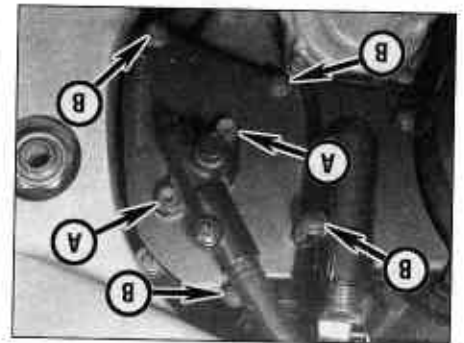
13.5a Withdraw the spacer ...



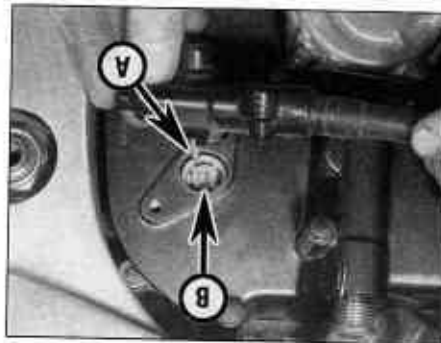
13.5b ... then lever out the seals ...



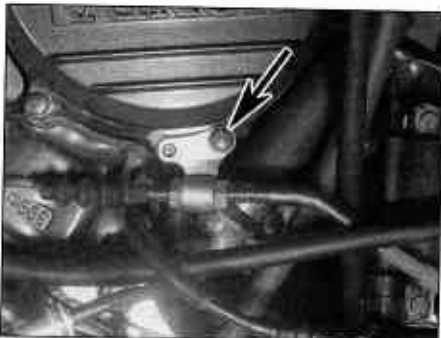
13.5c ... and remove the circlip



14.2a Speedometer drivebox bolts (A), sprocket cover bolts (B)



14.2b Note how the tab (A) locates in the slot (B)



14.3 Unscrew the bolt (arrowed) and detach the bracket

by the clutch cable (see illustration 14.2). If required, detach the cable end from the release lever on the cover. Remove the dowels if they are loose. Check the wear pattern on both sprockets (see Chapter 1, Section 1). If the sprocket teeth are worn excessively, replace 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 replacing the chain, also replace the sprockets. 5 Adjust and lubricate the chain following the procedures described in Chapter 1. **Caution: Use only the recommended lubricant.**

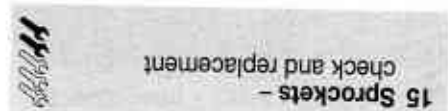
Replacement

6 Unscrew the two bolts securing the speedometer drive box to the engine sprocket cover and detach the box, noting how the drive tab locates in the slot in the sprocket bolt cap (see illustrations 14.2a and b). 7 Unscrew the bolt securing the clutch cable bracket to the alternator cover (see illustration 14.3). There is no need to separate the cable from the bracket. 8 Unscrew the bolts securing the engine sprocket cover and position the cover aside, letting it dangle by the clutch cable (see illustration 14.2). If required, detach the cable and from the release lever on the cover. Remove the dowels if they are loose. 9 Remove the cap from the engine sprocket bolt (see illustration). Have an assistant

1 Unscrew the two bolts securing the speedometer drive box to the engine sprocket cover and detach the box, noting how the drive tab locates in the slot in the sprocket bolt cap (see illustrations 14.2a and b). 2 Unscrew the bolt securing the clutch cable bracket to the alternator cover (see illustration 14.3). There is no need to separate the cable from the bracket. 3 Unscrew the bolts securing the engine sprocket cover, noting their different lengths, and position the cover aside, letting it dangle by the clutch cable (see illustration). Have an assistant

Check

15 Sprockets - check and replacement



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. 7 Installation is the reverse of removal. On completion adjust and lubricate the chain following the procedures described in Chapter 1. **Caution: Use only the recommended lubricant.**

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. **Warning: NEVER install a drive chain which uses a clip-type master (split) link.** 1 Remove the swingarm (see Section 12). 2 Unscrew the two bolts securing the speedometer drive box to the engine sprocket cover and detach the box, noting how the drive tab locates in the slot in the sprocket bolt cap (see illustrations). 3 Unscrew the bolt securing the clutch cable bracket to the alternator cover (see illustration). There is no need to separate the cable from the bracket. 4 Unscrew the bolts securing the engine sprocket cover, noting their different lengths, and position the cover aside, letting it dangle by the clutch cable (see illustration 14.2). If required, detach the cable end from the release lever on the cover. Remove the dowels if they are loose. 5 Slip the chain off the front sprocket and remove it from the bike.

Cleaning

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

Chapter 7

Brakes, wheels and tyres

Contents

Brake fluid level check	see Daily (pre-ride) checks	
Brake light switches – check and replacement	see Chapter 9	
Brake pad wear check	see Chapter 1	
Brake hoses, pipes and unions – inspection and replacement	10	
Brake system bleeding	11	
Brake system check	see Chapter 1	
Front brake callipers – removal, overhaul and installation	3	
Front brake discs – inspection, removal and installation	4	
Front brake master cylinder – removal, overhaul and installation	5	
Front brake pads – replacement	2	
Front wheel – removal and installation	14	
General information	1	
Rear brake caliper – removal, overhaul and installation	7	
Rear brake disc – inspection, removal and installation	8	
Rear brake master cylinder – removal, overhaul and installation	9	
Rear brake pads – replacement	6	
Rear wheel and hub assembly – removal, inspection and installation	15	
Tyres – general information and fitting	17	
Tyres – pressure, tread depth and condition	see Daily (pre-ride) checks	
Wheels – general check	see Chapter 1	
Wheel bearings – check	see Chapter 1	
Wheel bearings – removal, inspection and installation	16	
Wheels – alignment check	13	
Wheels – inspection and repair	12	

Degrees of difficulty

Easy, suitable for novice with little experience



Fairly easy, suitable for beginner with some experience



Fairly difficult, suitable for competent DIY mechanic



Difficult, suitable for experienced DIY mechanic



Very difficult, suitable for expert DIY or professional



Specifications

Brakes

Brake fluid type	DOT 4	
Front caliper bore ID		
VFR models		
Upper bore	Standard	Service limit
Lower bore	32.030 to 32.080 mm	32.09 mm
RVF models	30.230 to 30.280 mm	30.29 mm
Upper bore		
Lower bore	30.230 to 30.280 mm	30.29 mm
Front caliper piston OD	27.000 to 27.050 mm	27.06 mm
VFR models		
Upper piston	31.984 to 31.998 mm	31.94 mm
Lower piston	30.148 to 30.198 mm	30.14 mm
RVF models		
Upper piston	30.148 to 30.198 mm	30.14 mm
Lower piston	26.916 to 26.968 mm	26.91 mm
Front disc minimum thickness	3.8 to 4.2 mm	3.5 mm
Disc maximum runout (front and rear)	–	0.3 mm
Front master cylinder bore ID	14.000 to 14.043 mm	14.06 mm
Front master cylinder piston OD	13.957 to 13.984 mm	13.95 mm
Rear caliper bore ID	25.400 to 25.450 mm	25.46 mm
Rear caliper piston OD	25.318 to 25.368 mm	25.31 mm
Rear disc minimum thickness	5.8 to 6.2 mm	5.0 mm
Rear master cylinder bore ID	14.000 to 14.043 mm	14.06 mm
Rear master cylinder piston OD	13.957 to 13.984 mm	13.95 mm

7•2 Brakes, wheels and tyres

Wheels

Maximum wheel runout (front and rear)	2.0 mm
Axial (side-to-side)	2.0 mm
Radial (out-of-round)	2.0 mm
Maximum axle runout (front and rear)	0.20 mm

Tyres

Tyre pressures	see Daily (pre-ride) checks
Tyre sizes*	

VFR models	Front	120/60-VR17
	Rear	150/60-VR18
RVF models	Front	120/60-R17 55H
	Rear	150/60-R17 66H

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

Torque settings – specific components

Front brake pad retaining pin

RVF models 17 Nm

Front brake pad retaining pin plug

RVF models 18 Nm

Front brake caliper mounting bolts

VFR models 2.5 Nm

Front brake caliper Torx bolts

RVF models 27 Nm

Front brake disc bolts

RVF models 33 Nm

Front brake master cylinder clamp bolts

VFR models 20 Nm

Rear brake pad retaining pin

VFR models 12 Nm

RVF models 17 Nm

Rear brake caliper mounting bolts

RVF models 18 Nm

Rear brake caliper bracket slider pins

Front 23 Nm

Rear 13 Nm

Rear brake disc nuts

35 Nm

Rear brake master cylinder bolts

12 Nm

Brake hose banjo bolts

35 Nm

Rear brake hose caliper joint nut

14 Nm

Brake caliper bleed valves

6 Nm

Front axle clamp bolts

60 Nm

Rear wheel nut

22 Nm

Rear wheel drive pins

120 Nm

Rear brake torque arm nuts (VFR models)

15 Nm

Rear hub assembly nut

35 Nm

RVF models

165 Nm

Rear wheel bearing holder pinch bolt

205 Nm

55 Nm

Torque settings – non-specified components

Note: Where a specific setting is not given for a particular bolt/nut, these general settings apply. The dimension given applies to the diameter of the thread, not the head.

5 mm bolt/nut

6 mm bolt/nut

8 mm bolt/nut

10 mm bolt/nut

12 mm bolt/nut

6 mm flange bolt with 8 mm head

9 Nm

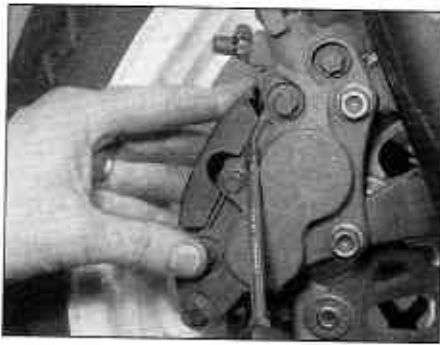
6 mm flange bolt/nut with 10 mm head

12 Nm

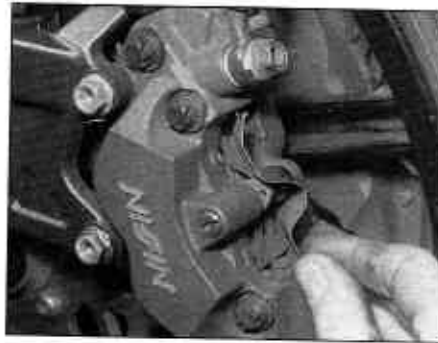
8 mm flange bolt/nut

27 Nm

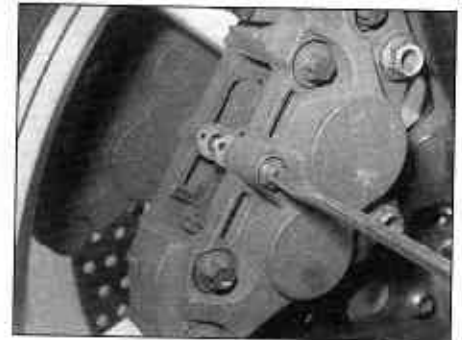
40 Nm



2.1a Pad cover removal – VFR models



2.1b Pad cover removal – RVF models



2.1c Unscrew the pad pin plug and the pad pin ...

1 General information

All models covered in this manual are fitted with cast alloy wheels designed for tubeless tyres only. Both front and rear brakes are hydraulically operated disc brakes.

On all models, the front brakes are twin opposed-piston calipers, and the rear brake is a twin piston sliding caliper.

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

2 Front brake pads – replacement



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

1 Remove the pad cover on the top of the caliper (see illustrations). Unscrew the pad retaining pin plug followed by the pad retaining pin and withdraw the pin, noting how it keeps the pad spring pressed onto the pads (see illustrations). Remove the spring, then lift out the pads (see illustrations).

2 Inspect the surface of each pad for contamination and check that the friction material has not worn level with or beyond the wear grooves in the pad face (see illustration). If either pad is worn down to, or



2.1d ... then withdraw the pin and remove the spring ...

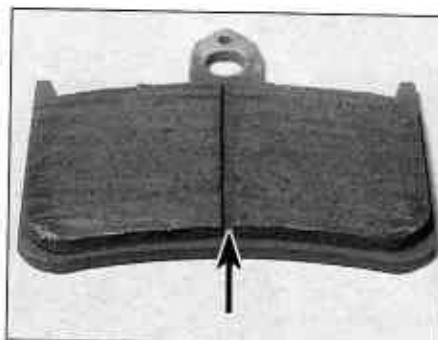


2.1e ... and lift out the pads

beyond, the service limit, fouled with oil or grease, or heavily scored or damaged by dirt and debris, both pads must be replaced as a set. Note that it is not possible to degrease the friction material; if the pads are contaminated in any way they must be replaced.

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

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



2.2 The pads must be replaced when the wear groove (arrowed) is no longer visible

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

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

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

8 Installation of the pads is the reverse of removal. Insert the pads into the caliper so that the friction material faces the disc, then slide the pad retaining pin through the hole in



2.7a Apply copper grease to the back of each pad ...



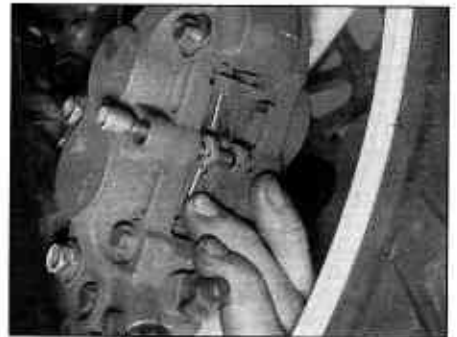
2.7b ... and to the pad pin



2.8a Install the pads ...



2.8b ... then slide the pad pin into the outer pad



2.8c Fit the spring and slide the pad pin onto it and through the inner pad ...

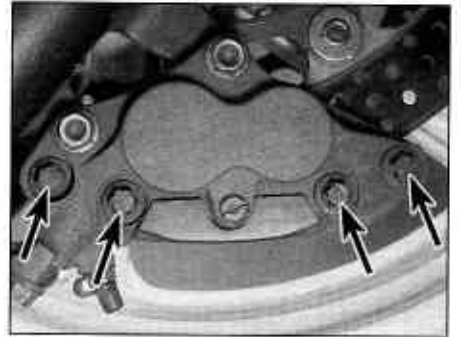


2.8d ... and tighten it to the specified torque

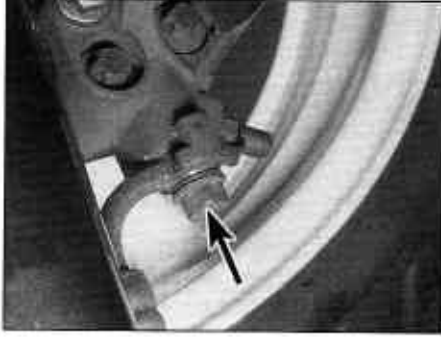
the outer pad (see illustrations). Fit the pad spring with its narrower end at the top, making sure it locates correctly onto the pads. Press down on the spring and slide the pin across so that it locates in the groove in the middle of the spring and passes through the hole in the inner pad (see illustration). Tighten the pad retaining pin to the torque setting specified at the beginning of the Chapter (see illustration). Install the pad pin plug and tighten it to the specified torque (see illustration 2.1c). Fit the caliper cover (see illustrations 2.1a or b).

9 Top up the master cylinder reservoir if necessary (see Daily (pre-ride) checks), and replace the brake lever cover and diaphragm.

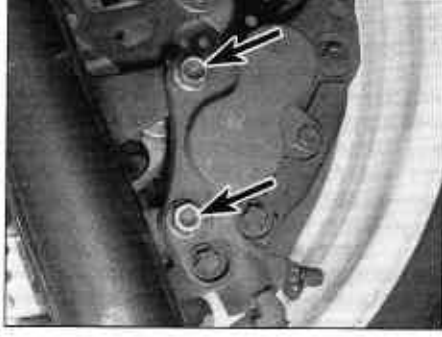
10 Operate the brake lever several times to bring the pads into contact with the disc.



3.1 The caliper halves are joined by four Torx bolts (arrowed)



3.2 Note the alignment of the hose before removing the banjo bolt (arrowed)



3.3a Unscrew the caliper mounting bolts (arrowed) ...

3 Front brake callipers - removal, overhaul and installation

Warning: If a caliper indicates the need for an overhaul (usually due to leaking fluid or sticky operation), all old brake fluid should be flushed from the system. Also, the dust created by the brake system may contain asbestos, which is harmful to your health. Never blow it out with compressed air and don't inhale any of it. An approved filtering mask should be worn when

Check the operation of the brake before riding the motorcycle.

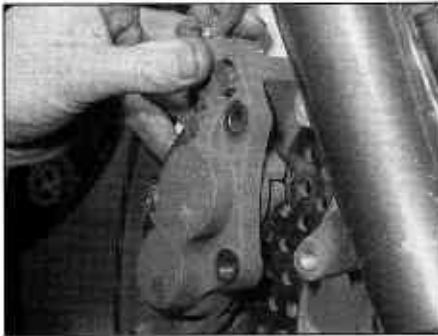
1 If the callipers are being overhauled, remove the brake pad (see Section 2), then slacken and lightly retighten the four Torx bolts which join the caliper halves (see illustration). If the callipers are just being to work on the front forks or wheel, the pads can be left in place and the Torx bolts should not be disturbed.

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

3 Unscrew the caliper mounting bolts, and

Removal

working on the brakes. Do not, under any circumstances, use petroleum-based solvents to clean brake parts. Use clean brake fluid, brake cleaner or denatured alcohol only.



3.3b ... and slide the caliper off the disc

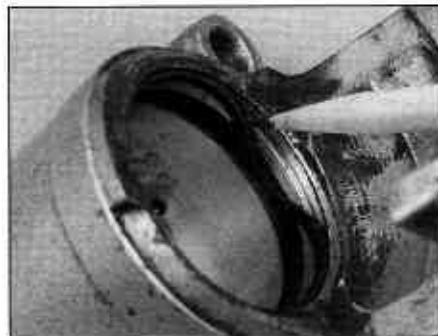
slide the caliper off the disc (see illustrations).

Overhaul

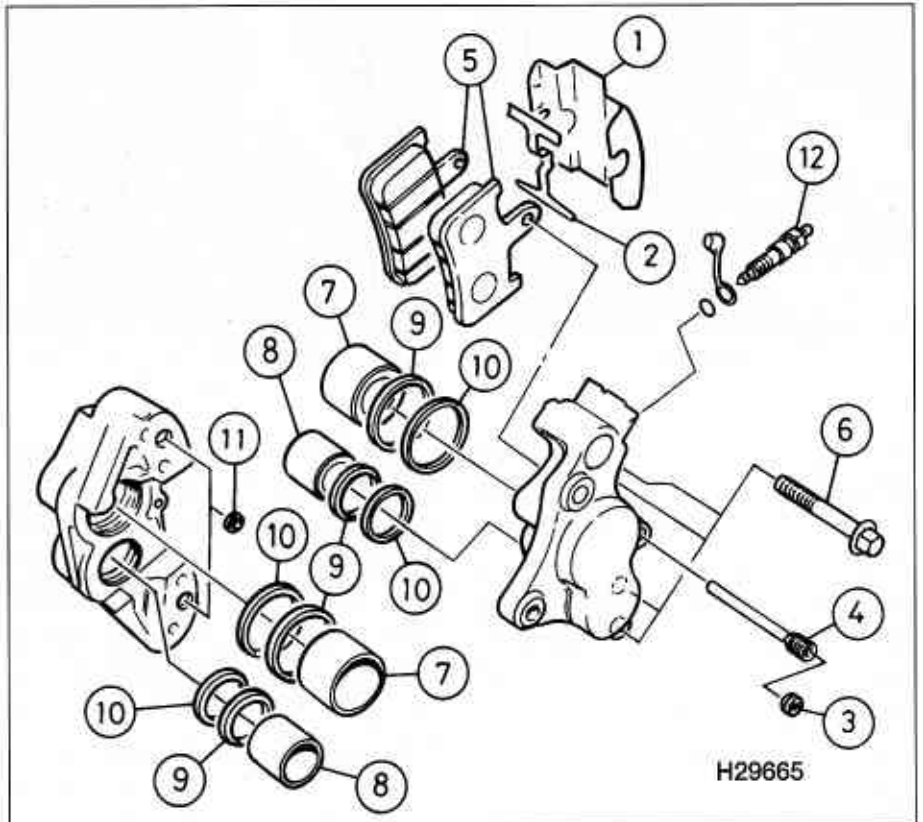
4 Clean the exterior of the caliper with denatured alcohol or brake system cleaner (see illustration).

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

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



3.6 Remove the dust seal with a plastic or wooden tool (a pencil works well) to avoid damage to the bore and seal groove



3.4 Front brake caliper components

- | | | |
|--------------------------|----------------------------|------------------|
| 1 Pad cover | 5 Brake pads | 9 Dust seals |
| 2 Pad spring | 6 Caliper Torx bolts | 10 Piston seals |
| 3 Pad retaining pin plug | 7 Pistons – large diameter | 11 Caliper seals |
| 4 Pad retaining pin | 8 Pistons – small diameter | 12 Bleed valve |

6 Using a wooden or plastic tool, remove the dust seals from the caliper bores (see illustration). Discard them as new ones must be used on installation. If a metal tool is being used, take great care not to damage the caliper bores.

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

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

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

9 Inspect the caliper bores and pistons for signs of corrosion, nicks and burrs and loss of plating. If surface defects are present, the caliper assembly must be replaced. If the necessary measuring equipment is available, compare the dimensions of the pistons and bores to those given in the Specifications Section of this Chapter, replacing any component that is worn beyond the service limit. If the caliper is in bad shape the master cylinder should also be checked.

10 Lubricate the new piston seals with clean

brake fluid and install them in their grooves in the caliper bores. Note that different sizes of bore and piston are used (see Specifications), and care must therefore be taken to ensure that the correct size seals are fitted to the correct bores. The same applies when fitting the new dust seals and pistons.

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

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

13 Fit new seals into one half of the caliper body, then join the halves together and tighten the four Torx bolts lightly. They can be fully tightened after the calipers have been installed.

Installation

14 Install the caliper on the brake disc making sure the pads sit squarely either side of the disc (if they weren't removed) (see illustration 3.3b).

15 Install the caliper mounting bolts, and tighten them to the torque setting specified at



3.15a Install the bolts . . .



3.15b . . . and tighten them to the specified torque



4.2 Set up a dial indicator with the probe contacting the brake disc, then rotate the wheel to check for runout

position. Unscrew the disc retaining bolts, loosening them a little at a time in a criss-cross pattern to avoid distorting the disc, then remove the disc from the wheel (see illustration).

Installation

6 Install the disc on the wheel, making sure the marked side is on the outside. Align the previously applied matchmarks (if you're reinstalling the original disc).
7 Install the bolts and tighten them in a criss-cross pattern evenly and progressively to the torque setting specified at the beginning of the Chapter. Clean off all grease from the brake disc(s) using acetone or brake system cleaner. If a new brake disc has been installed, remove any protective coating from its working surfaces.
8 Install the wheel (see Section 14).

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

5 Front brake master cylinder - removal, overhaul and installation

1 If the master cylinder is leaking fluid, or if the lever does not produce a firm feel when the brake is applied, and bleeding the brakes does not help (see Section 11), and the

hydraulic

2 Before (see illu

3 Loos

Rema

The beginning of the Chapter (see

16 If the callipers were overhauled, tighten the four Torx bolts to the specified torque

17 If removed, connect the brake hose to the caliper, using new sealing washers on each end of the fitting. Align the hose as noted on the removal. Tighten the banjo bolt to the torque setting specified at the beginning of the Chapter. Top up the master cylinder reservoir (see DOT 4 brake fluid (see Daily (pre-ride) checks) and bleed the hydraulic system as described in Section 11.

18 If removed, install the brake pads (see Section 2).

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

4 Front brake discs - inspection, removal and installation

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

4.3a The minimum disc thickness is marked on each disc



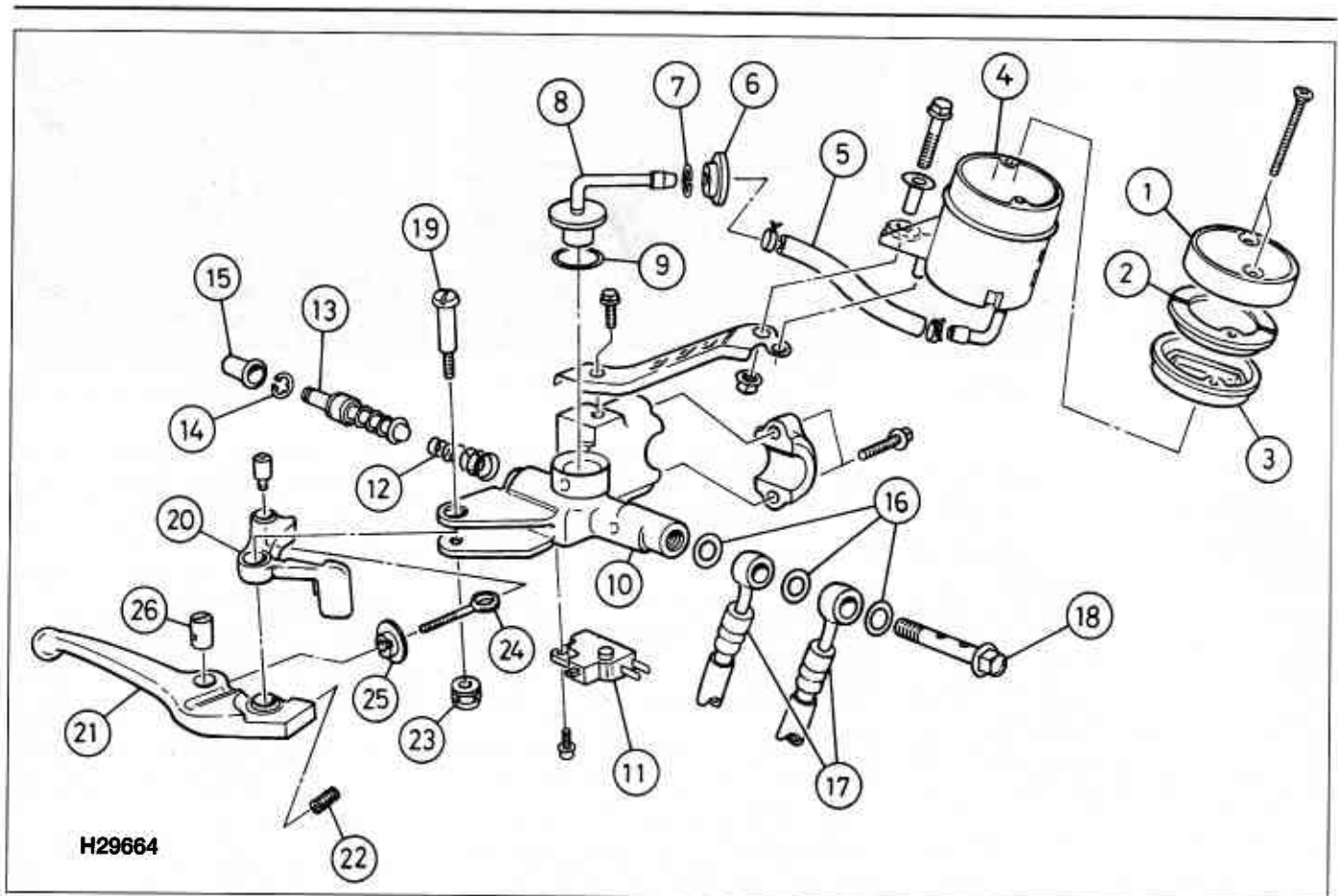
4 Remove the front wheel (see Section 14).
5 Mark the relationship of the disc to the wheel, so it can be installed in the same weight of the wheel.

4.3b Using a micrometer to measure disc thickness



4.3c Each disc is secured by six bolts (arrowed)

Rema



5.1 Front brake master cylinder components

- | | | | |
|-------------------|------------------------|---------------------------|------------------------|
| 1 Reservoir cap | 8 Reservoir hose union | 15 Rubber boot | 21 Brake lever |
| 2 Diaphragm plate | 9 O-ring | 16 Sealing washers | 22 Spring |
| 3 Diaphragm | 10 Master cylinder | 17 Brake hoses | 23 Nut |
| 4 Reservoir | 11 Brake light switch | 18 Brake hose banjo bolt | 24 Span adjuster |
| 5 Reservoir hose | 12 Spring | 19 Brake lever pivot bolt | 25 Span adjuster wheel |
| 6 Rubber cap | 13 Piston assembly | 20 Span adjuster bracket | 26 Trunnion |
| 7 Circlip | 14 Circlip | | |

hydraulic hoses are all in good condition, then master cylinder overhaul is recommended (see illustration).

2 Before disassembling the master cylinder, read through the entire procedure and make sure that you have the correct rebuild kit. Also, you will need some new DOT 4 brake fluid, some clean rags and internal circlip pliers. **Note:** To prevent damage to the paint from spilled brake fluid, always cover the fuel tank when working on the master cylinder.

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

Removal

3 Loosen, but do not remove, the screws holding the reservoir cover in place (see

illustration). Access to the front reservoir cap screws is restricted by the windshield. If a short or angled screwdriver is not available, remove the fairing to access the screws (see Chapter 8).



5.3 Slacken the two reservoir cover screws

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

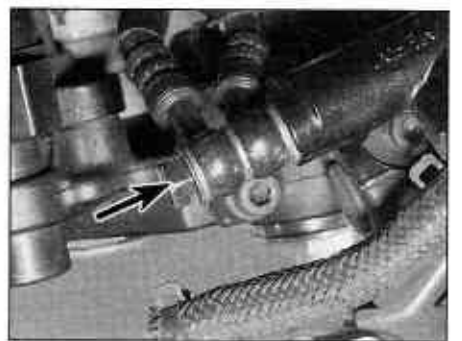
5 Remove the front brake lever (see Chapter 6).

6 Unscrew the brake hose banjo bolt and

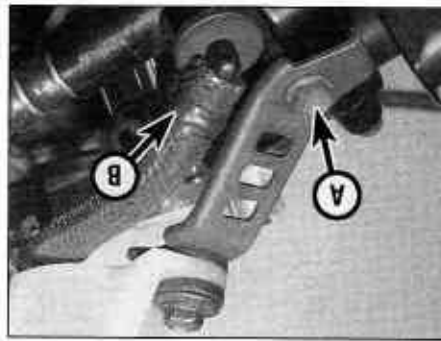


5.4 Disconnect the brake light switch wiring connectors (arrowed)

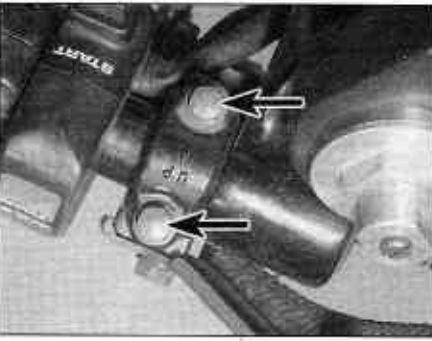
5.6 Note the alignment of the hose before removing the banjo bolt (arrowed)



5.7 Unscrew the bracket bolt (A) and release the hose clamp (B)



5.8 Unscrew the clamp bolts (arrowed) and remove the master cylinder assembly



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

7 Unscrew the bolt securing the reservoir bracket to the master cylinder, then release the clamp securing the reservoir hose to the union on the master cylinder (see illustration). Remove the reservoir cover retaining screws and lift off the cover, the diaphragm plate and the rubber diaphragm. Drain the brake fluid from the reservoir into a suitable container, then detach the reservoir hose from its union on the master cylinder. Wipe any remaining fluid out of the reservoir with a clean rag.

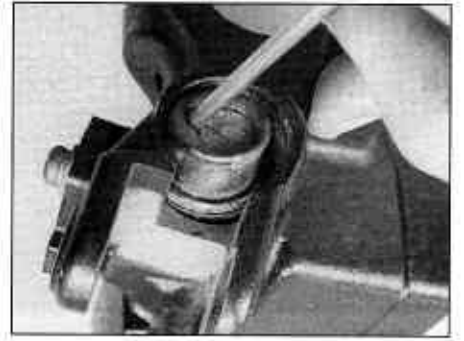
8 Unscrew the master cylinder clamp bolts, then lift the master cylinder away from the handlebar (see illustration).

9 Remove the screw securing the brake light switch to the bottom of the master cylinder and remove the switch.

Caution: Do not tip the master cylinder upside down or brake fluid will run out.

Overhaul

10 Carefully remove the dust boot from the end of the piston (see illustration).



5.10 Remove the rubber boot from the end of the master cylinder piston ...

11 Using circlip pliers, remove the circlip and slide out the piston assembly and the spring, noting how they fit (see illustration). Lay the parts out in the proper order to prevent confusion during reassembly (see illustration).

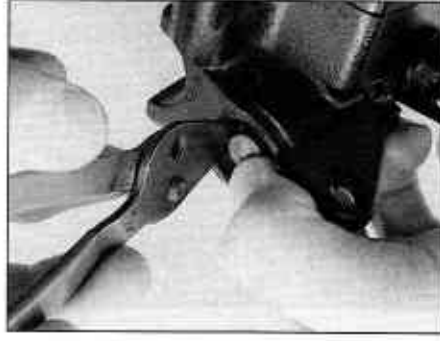
12 Remove the fluid reservoir hose union rubber cap, then remove the circlip and detach the union from the master cylinder. Discard the O-ring as a new one must be used. Inspect the reservoir hose for cracks or splits and replace if necessary.

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

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

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

15 The dust boot, circlip, piston, seal, primary cup and spring are included in the



5.11a ... then depress the piston and remove the circlip using a pair of internal circlip pliers

rebuild kit. Use all of the new parts, regardless of the apparent condition of the old ones. If the seal and cup are not already on the piston, fit them according to the layout of the old piston assembly.

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

17 Lubricate the piston, seal and cup with clean brake fluid. Install the assembly into the master cylinder, making sure it is the correct way round (see illustration 5.11b). Make sure the lips on the cup do not turn inside out when they are slipped into the bore. Depress the piston and install the new circlip, making sure that it locates in the master cylinder groove (see illustration 5.11a).

18 Install the rubber dust boot, making sure the lip is seated correctly in the piston groove (see illustration 5.10).

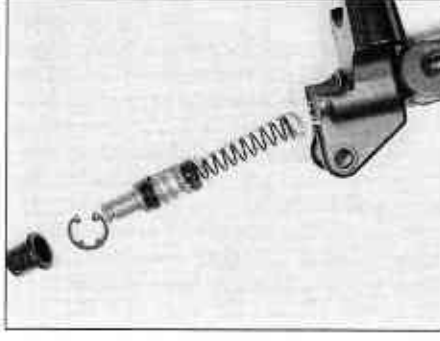
19 Fit a new O-ring onto the reservoir hose union, then press the union into the master cylinder and secure it with the circlip. Fit the rubber cap over the circlip.

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

Installation

21 Install the brake light switch.

22 Attach the master cylinder to the handlebar and fit the clamp with its UP mark facing up, then tighten the bolts to the torque



5.11b Lay out the internal parts as shown, even if new parts are being used, to avoid confusion on reassembly



5.22a Install the clamp with the UP mark facing up . . .



5.22b . . . and tighten the bolts to the specified torque



5.28 Make sure the diaphragm is correctly seated, then fit the plate and cover

setting specified at the beginning of the Chapter (see illustrations).

23 Connect the brake hose to the master cylinder, using new sealing washers on each side of the union, and aligning the hose as noted on removal (see illustration 5.6). Tighten the banjo bolt to the torque setting specified at the beginning of this Chapter.

24 Install the brake lever (see Chapter 6).

25 Mount the reservoir onto the master cylinder and tighten its bolt securely (see illustration 5.7). Connect the reservoir hose to the union and secure it with the clamp.

26 Connect the brake light switch wiring (see illustration 5.4).

27 Fill the fluid reservoir with new DOT 4 brake fluid as described in *Daily (pre-ride) checks*. Refer to Section 11 of this Chapter and bleed the air from the system.

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

29 Check the operation of the front brake before riding the motorcycle.

your health. Never blow it out with compressed air and don't inhale any of it. An approved filtering mask should be worn when working on the brakes.

1 Unscrew the pad retaining pin plug and slacken the pad retaining pin, then remove the caliper upper mounting bolt and slacken the lower one and swing the caliper down at the front (see illustrations). Access the upper caliper bolt using a socket extension inserted through one of the holes in the rear sprocket (see illustration).

2 Remove the pad retaining pin, then draw out the pads (see illustration).

3 Inspect the surface of each pad for contamination and check that the friction material has not worn level with or beyond the wear grooves in the pad face or the cutouts in

the pad edge. If either pad is worn down to, or beyond, the service limit, fouled with oil or grease, or heavily scored or damaged by dirt and debris, both pads must be replaced as a set. Note that it is not possible to degrease the friction material; if the pads are contaminated in any way they must be replaced.

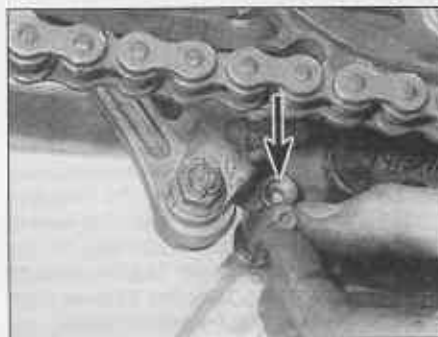
4 If the pads are in good condition clean them carefully, using a fine wire brush which is completely free of oil and grease to remove all traces of road dirt and corrosion. Using a pointed instrument, clean out the grooves in the friction material and dig out any embedded particles of foreign matter.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

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

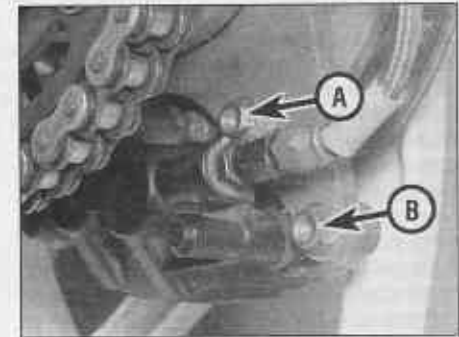
6 Rear brake pads – replacement



Warning: The dust created by the brake system may contain asbestos, which is harmful to



6.1a Remove the plug and slacken the pad pin (arrowed)



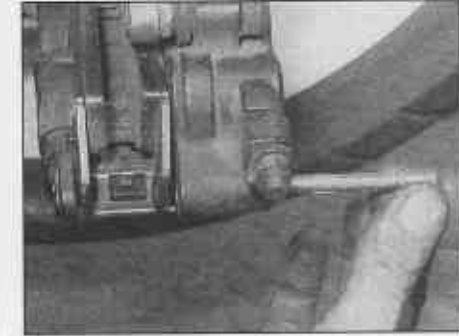
6.1b Remove the upper bolt (A) and slacken the lower one (B) . . .



6.1c . . . accessing the upper bolt as shown . . .



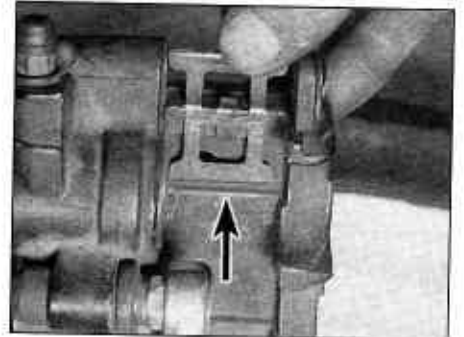
6.1d . . . and swing the caliper down



6.2 Withdraw the pin and remove the pads



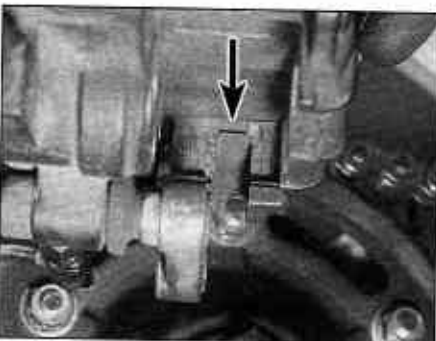
6.7 Push the pistons back into the caliper



6.9b ... and the front spring are correctly positioned (arrowed)



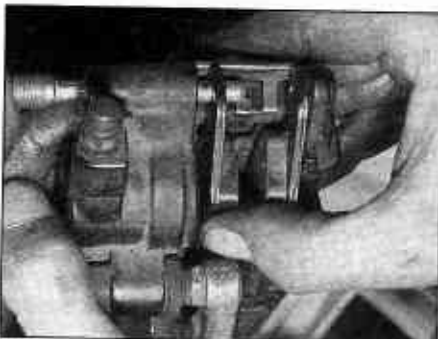
6.8 Apply copper grease to the back of each pad and to the pad pin



6.9a Check that the rear spring (arrowed) ...

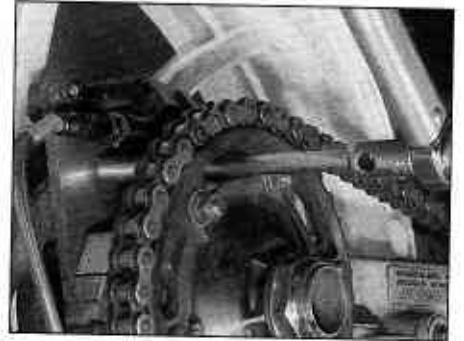


6.9c Install the pads, making sure they locate correctly against the rear spring (arrow) ...



6.9d ... then install the pad pin

6 Remove all traces of corrosion from the pad pin. Inspect the pin for signs of damage and replace if necessary.
7 Push the pistons as far back into the caliper as possible using hand pressure, a brake pad or a piece of wood as leverage (see illustration). Due to the increased friction material thickness of new pads, it may be necessary to remove the master cylinder reservoir cover and diaphragm and siphon out some fluid.
8 Smear the backs of the pads and the shank of the pad pin with copper-based grease, making sure that none gets on the front or sides of the pads (see illustration).
9 Installation of the pads is the reverse of removal. Make sure the pad springs are



6.10a Tighten the caliper mounting bolts ...



6.10b ... and the pad pin to the specified torque

correctly positioned in the caliper (see illustrations). Insert the pads into the caliper so that the friction material faces the disc, making sure they locate correctly against the springs, then slide the pad retaining pin through (see illustrations). Make sure the pin passes through the hole in each pad. Tighten the pad retaining pin finger tight.
10 Swing the caliper up onto the disc and tighten the mounting bolts to the torque setting specified at the beginning of the Chapter (see illustration). Tighten the pad retaining pin to the specified torque, then install the pad pin plug (see illustration).
11 Top up the master cylinder reservoir if necessary (see Daily (pre-ride) checks), and replace the reservoir cover and diaphragm.



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

Removal

1 If the caliper is being overhauled, remove the brake pads (see Section 6). If the caliper is just being removed, the pads can be left in place.
2 If the caliper is just being displaced and not completely removed or overhauled, do not disconnect the brake hose. If the caliper is

7 Rear brake caliper - removal, overhaul and installation

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



7.4 Slide the caliper bracket out of the caliper

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

3 Unscrew the caliper mounting bolts, and slide the caliper off the disc (see illustrations 6.1b and c). If the caliper is being overhauled, remove the pad springs, noting carefully how they fit.

Overhaul

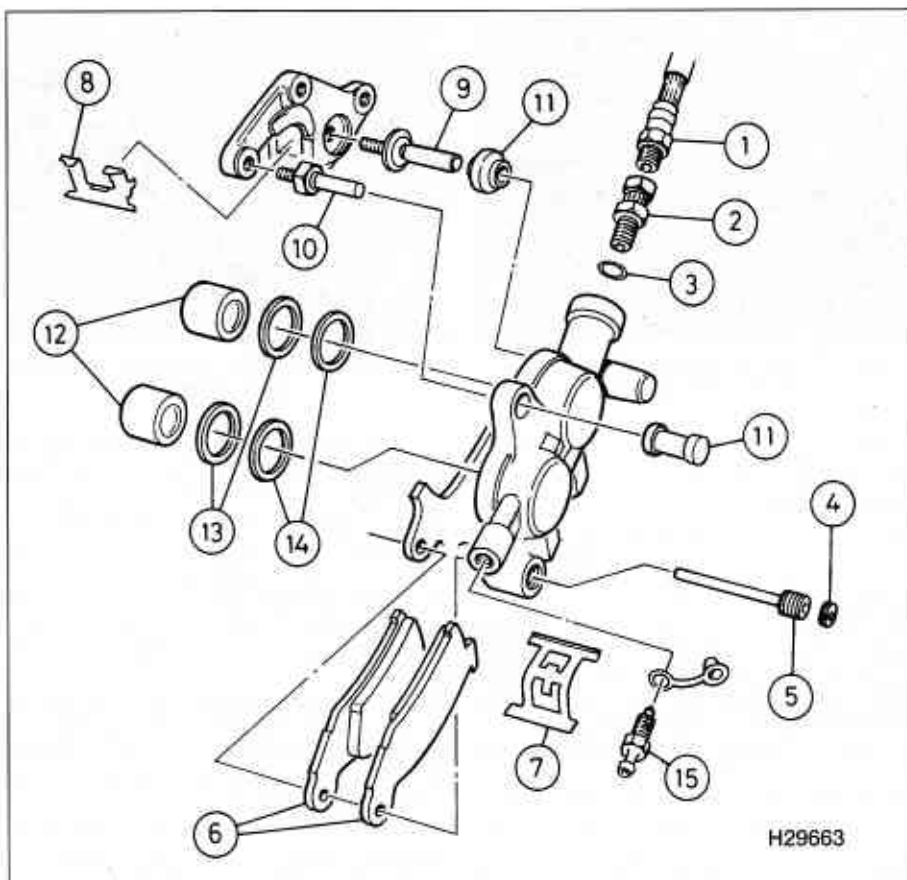
4 Slide the caliper off the caliper bracket (see illustration). If required, remove the pad spring from the bracket, noting how it fits.

5 Clean the exterior of the caliper with denatured alcohol or brake system cleaner (see illustrations).

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



Warning: Never place your fingers in front of the pistons in an attempt to catch or protect them when applying



7.5 Rear brake caliper components

- | | | |
|---------------------------|---------------------|-----------------|
| 1 Hose nut | 6 Brake pads | 11 Rubber boots |
| 2 Joint nut and hose bolt | 7 Front pad spring | 12 Pistons |
| 3 Sealing washer | 8 Rear pad spring | 13 Dust seals |
| 4 Pad retaining pin plug | 9 Rear slider pin | 14 Piston seals |
| 5 Pad retaining pin | 10 Front slider pin | 15 Bleed valve |

compressed air, as serious injury could result.

7 Using a wooden or plastic tool, remove the dust seals from the caliper bores (see illustration 3.6). Discard them as new ones must be used on installation. If a metal tool is being used, take great care not to damage the caliper bores.

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

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

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

10 Inspect the caliper bores and pistons for signs of corrosion, nicks and burrs and loss of plating. If surface defects are present, the caliper assembly must be replaced. If the necessary measuring equipment is available, compare the dimensions of the pistons and bores to those given in the Specifications Section of this Chapter, replacing any

component that is worn beyond the service limit. If the caliper is in bad shape the master cylinder should also be checked.

11 Check that the caliper body is able to slide freely on the slider pins. If not, clean off all traces of corrosion and hardened grease. Apply a smear of copper or silicone based grease to the slider pins and reassemble the two components and check again. Replace the rubber boots if they are damaged or deteriorated. If a pin is loose, remove them both and clean the threads. Apply a suitable non-permanent thread locking compound and tighten them to the specified torque.

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

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

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

15 Make sure the rear pad spring is correctly

Installation

- 17 Install the caliper on the brake disc making sure the pads sit squarely either side of the disc, then tighten the caliper mounting bolts to the torque setting specified at the beginning of the Chapter. If the pads were removed, tighten the pad retaining pin to the

19 Remove the seat cowl (see Chapter 8).
Top up the master cylinder reservoir with DOT 4 brake fluid (see *Daily (pre-ride) checks*) and bleed the hydraulic system as described in Section 11.
20 Check for leaks and thoroughly test the operation of the brake before riding the motorcycle.

8 Rear brake disc – inspection, removal and installation

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

possible.

3 The disc must not be machined or allowed to wear down to a thickness less than the service limit as listed in this Chapter's Specifications and as marked on the disc itself (see **illustration**). The thickness of the disc can be checked with a micrometer (see **illustration 4.3b**). If the thickness of the disc is less than the service limit, it must be replaced.

- ## Installation

- 6** Install the disc on the hub, making sure the marked side is on the outside, facing the wheel. Align the previously applied matchmarks (if you're reinstalling the original disc).
- 7** Install the bolts and tighten the nuts in a criss-cross pattern evenly and progressively to the torque setting specified at the beginning of the Chapter. Clean off all grease from the brake disc(s) using acetone or brake system cleaner. If a new brake disc has been installed, remove any protective coating from its working surfaces.
- 8** Install the hub assembly and the wheel (see Section 16).
- 9** Operate the brake lever several times to bring the pads into contact with the disc. Check the operation of the brakes carefully before riding the bike.

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

8.5 The disc is secured by four bolts (arrowed)



9 Rear brake master cylinder - removal, overhaul and installation

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

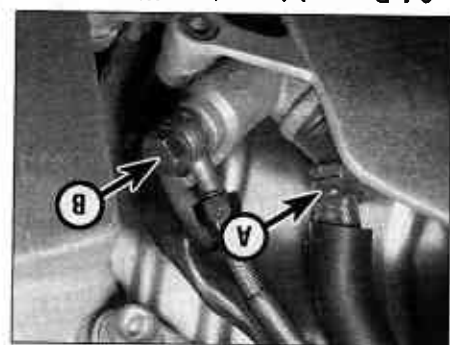
2 Before disassembling the master cylinder, read through the entire procedure and make sure that you have the correct rebuild kit. Also, you will need some new DOT 4 brake fluid, some clean rags and internal clippers. **Note:** To prevent damage to the paint from spilled brake fluid, always cover the surrounding components when working on the master cylinder.

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

- 3** Remove the seat cowl (see Chapter 8).
- 4** Unscrew the bolt securing the master cylinder fluid reservoir to the frame, then

Installation

- the reservoir hose to the union on the master cylinder and detach the hose (see illustration).



9.4 Reservoir hose clamp (A). Note the alignment of the hose before removing the banjo bolt (B)



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5 Unscrew the brake hose banjo bolt and separate the brake hose from the master cylinder, noting its alignment (see illustration 9.4). Discard the two sealing washers as they must be replaced with new ones. Wrap the end of the hose in a clean rag and suspend the hose in an upright position or bend it down carefully and place the open end in a clean container. The objective is to prevent excessive loss of brake fluid, fluid spills and system contamination.

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

7 Unscrew the two bolts securing the master cylinder to the bracket and remove the master cylinder (see illustration).

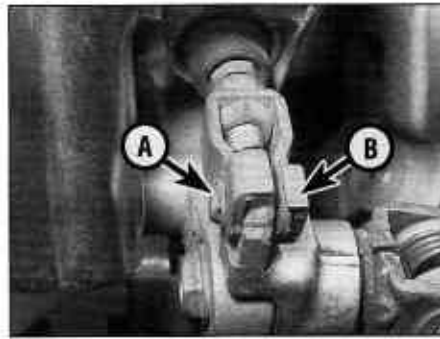
Overhaul

8 If required, mark the position of the clevis locknut on the pushrod, then slacken the locknut and thread the clevis and its base nut off the pushrod (see illustration).

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

10 Depress the pushrod and, using circlip pliers, remove the circlip. Slide out the piston assembly and spring. If they are difficult to remove, apply low pressure compressed air to the fluid outlet. Lay the parts out in the proper order to prevent confusion during reassembly.

11 Clean all of the parts with clean brake fluid or denatured alcohol.



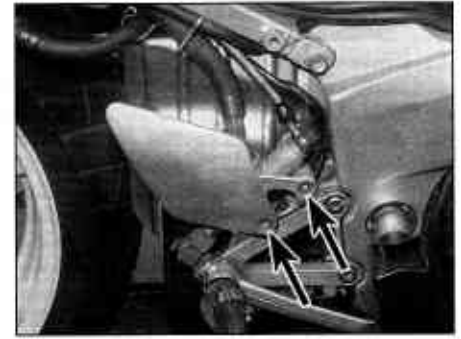
9.6 Remove the split pin (A) and withdraw the clevis pin (B)

Caution: Do not, under any circumstances, use a petroleum-based solvent to clean brake parts. If compressed air is available, use it to dry the parts thoroughly (make sure it's filtered and unlubricated).

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

13 If required, unscrew the fluid reservoir hose union screw and detach the elbow from the master cylinder. Discard the O-ring as a new one must be used. Inspect the reservoir hose for cracks or splits and replace if necessary.

14 The dust boot, circlip, piston, seal,



9.7 The master cylinder is secured to the bracket by two bolts (arrowed)

primary cup and spring are included in the rebuild kit. Use all of the new parts, regardless of the apparent condition of the old ones. If the seal and cup are not already on the piston, fit them according to the layout of the old piston assembly.

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

16 Lubricate the piston, seal and cup with clean brake fluid. Install the assembly into the master cylinder, making sure it is the correct way round. Make sure the lips on the cup do not turn inside out when they are slipped into the bore.

17 Install and depress the pushrod, then fit a new circlip, making sure it is properly seated in the groove.

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

19 If removed, fit a new O-ring to the fluid reservoir hose union, then install the union onto the master cylinder and secure it with its screw.

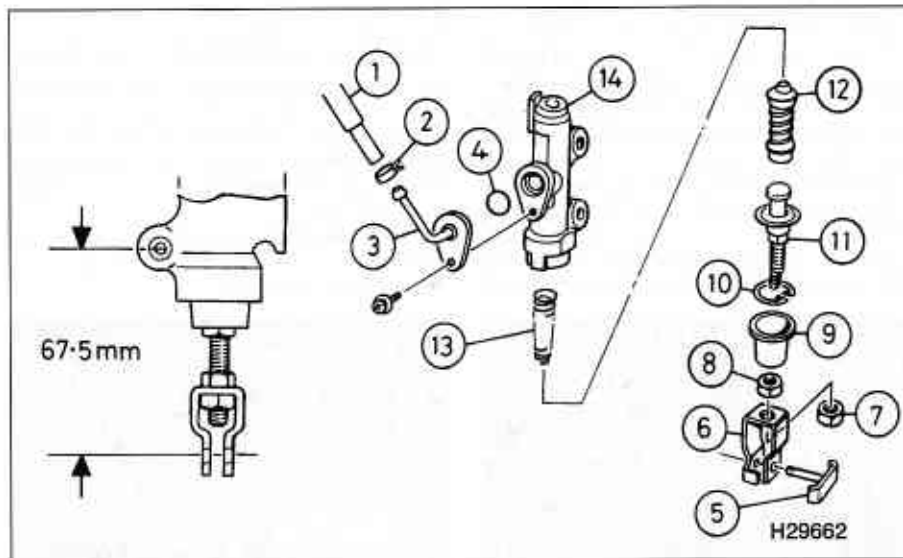
Installation

20 If removed, install the clevis locknut, the clevis and the base nut onto the master cylinder pushrod end. Position the clevis as noted on removal, then tighten the clevis locknut securely. If in doubt, Honda recommend that the distance between the lower mounting bolt hole on the master cylinder and the pin hole on the clevis is 67.5 mm (see illustration 9.8). However the pedal height can be altered to suit individual tastes. This is best done after the assembly is installed, and is done by slackening the clevis locknut, then turning the pushrod itself using a spanner on the flats on the top of the rod, until the desired pedal height is obtained. Tighten the clevis locknut securely on completion.

21 Install the master cylinder onto the footrest bracket and tighten its mounting bolts to the torque setting specified at the beginning of the Chapter (see illustration 9.7).

22 Align the brake pedal with the master cylinder pushrod clevis, then slide in the clevis pin and secure it using a new split pin (see illustration 9.6).

23 Connect the brake hose banjo bolt to the master cylinder, using a new sealing washer



9.8 Rear master cylinder components

- | | | |
|------------------------|-------------------|----------------------------|
| 1 Reservoir hose | 6 Clevis | 11 Pushrod |
| 2 Reservoir hose clamp | 7 Clevis base nut | 12 Piston and cup assembly |
| 3 Reservoir hose union | 8 Locknut | 13 Spring |
| 4 O-ring | 9 Rubber boot | 14 Master cylinder |
| 5 Clevis pin | 10 Circlip | |

**HAYNES
HINT**

If it's not possible to produce a firm feel to the lever or pedal the fluid may be aerated. Let the brake fluid in the system stabilise for a few hours and then repeat the procedure when the tiny bubbles in the system have settled out. To speed this process up, tie the front brake lever to the handlebar or tie a weight to the rear brake pedal so that the system is pressurised.

**12 Wheels –
inspection and repair**

- 1 In order to carry out a proper inspection of the wheels, it is necessary to support the bike upright so that the wheel being inspected is raised off the ground. Position the motorcycle on an auxiliary stand. Clean the wheels thoroughly to remove mud and dirt that may interfere with the inspection procedure or mask defects. Make a general check of the wheels (see Chapter 1) and tyres (see *Daily (pre-ride) checks*).
- 2 Attach a dial gauge to the fork slider or the swingarm and position its stem against the side of the rim (see illustration). Spin the wheel slowly and check the axial (side-to-side) runout of the rim. In order to accurately check radial (out of round) runout with the dial gauge, the wheel would have to be removed from the machine, and the tyre from the wheel. With the axle clamped in a vice and the dial gauge positioned on the top of the rim, the wheel can be rotated to check the runout.
- 3 An easier, though slightly less accurate, method is to attach a stiff wire pointer to the fork slider or the swingarm and position the end a fraction of an inch from the wheel (where the wheel and tyre join). If the wheel is true, the distance from the pointer to the rim will be constant as the wheel is rotated. **Note:** If wheel runout is excessive, check the wheel or hub bearings very carefully before replacing the wheel.
- 4 The wheels should also be visually

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

13 Wheels – alignment check

- 1 Misalignment of the wheels, which may be due to a cocked rear wheel or a bent frame or fork yokes, can cause strange and possibly serious handling problems. If the frame or yokes are at fault, repair by a frame specialist or replacement with new parts are the only alternatives.
- 2 To check the alignment you will need an assistant, a length of string or a perfectly straight piece of wood and a ruler. A plumb bob or other suitable weight will also be required.
- 3 In order to make a proper check of the wheels it is necessary to support the bike in an upright position, using an auxiliary stand. Measure the width of both tyres at their widest points. Subtract the smaller measurement from the larger measurement, then divide the difference by two. The result is the amount of offset that should exist between the front and rear tyres on both sides.
- 4 If a string is used, have your assistant hold one end of it about halfway between the floor and the rear axle, touching the rear sidewall of the tyre.
- 5 Run the other end of the string forward and pull it tight so that it is roughly parallel to the floor. Slowly bring the string into contact with the front sidewall of the rear tyre, then turn the front wheel until it is parallel with the string. Measure the distance from the front tyre sidewall to the string.
- 6 Repeat the procedure on the other side of the motorcycle. The distance from the front

tyre sidewall to the string should be equal on both sides.

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

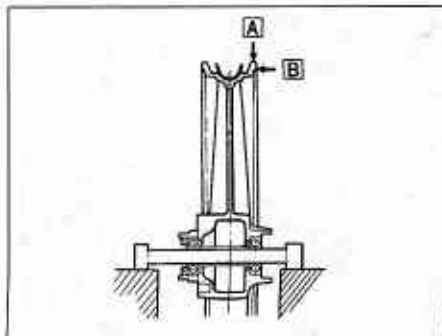
8 If the front-to-back alignment is correct, the wheels still may be out of alignment vertically.

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

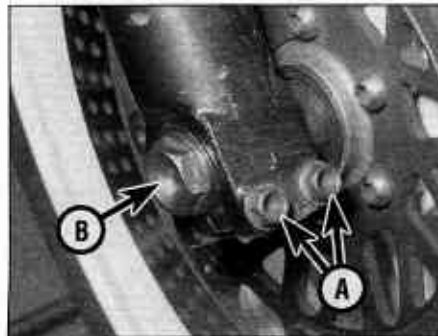
10 Once the rear wheel is vertical, check the front wheel in the same manner. If both wheels are not perfectly vertical, the frame and/or major suspension components are bent.

**14 Front wheel –
removal and installation****Removal**

- 1 Position the motorcycle on an auxiliary stand and support it under the crankcase so that the front wheel is off the ground. Always make sure the motorcycle is properly supported.
- 2 Remove the brake caliper mounting bolts and slide the caliper off the disc (see illustration 3.3a and b). Support the caliper with a piece of wire or a bungee cord so that no strain is placed on its hydraulic hose. There is no need to disconnect the hose from the caliper. **Note:** Do not operate the front brake lever with the calipers removed.
- 3 Slacken the axle clamp bolts on the bottom of the right-hand fork, then unscrew the axle bolt from the right-hand end of the axle (see illustration).
- 4 Slacken the axle clamp bolts on the bottom of the left-hand fork (see illustration). Support the wheel, then withdraw the axle from the left-hand side and carefully lower the wheel. Use a screwdriver inserted through the



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



14.3 Slacken the axle clamp bolts (A), then remove the axle bolt (B)



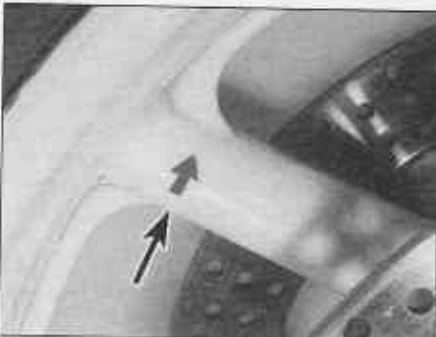
14.4a Slacken the axle clamp bolts (arrowed), then withdraw the axle



14.4b Use a screwdriver to aid axle removal



14.5 Remove the spacers from the wheel



14.8 Note the directional arrow on the wheel (arrowed)



14.10 Slide the axle in from the left ...

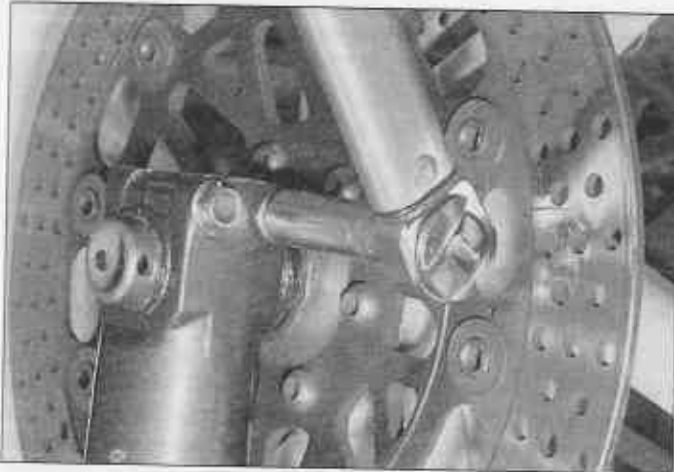


14.11a ... then install the axle bolt ...

holes in the end of the axle as a lever to aid removal (see illustration).
5 Remove the long wheel spacer from the right-hand side of the wheel and the short spacer from the left-hand side (see illustration).
Caution: Don't lay the wheel down and allow it to rest on a disc - the disc could become warped. Set the wheel on wood blocks so the disc doesn't support the weight of the wheel.
6 Check the axle for straightness by rolling it on a flat surface such as a piece of plate glass (first wipe off all old grease and remove any corrosion using fine emery cloth). If the



14.11b ... and tighten it to the specified torque

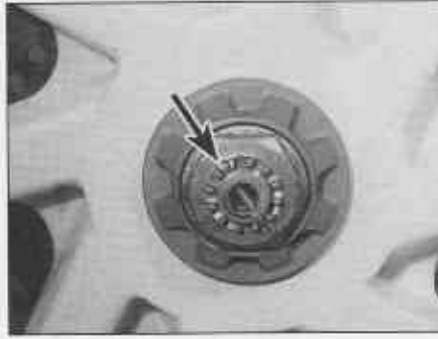


14.12 Tighten all the clamp bolts to the specified torque

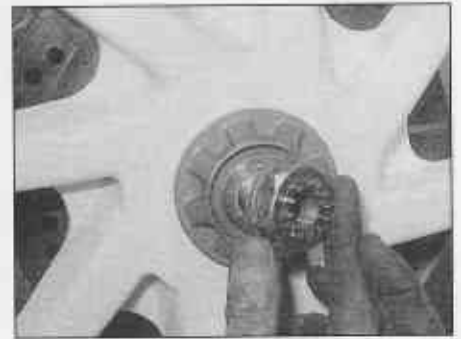
equipment is available, place the axle in V-blocks and measure the runout using a dial gauge. If the axle is bent or the runout exceeds the limit specified, replace it.
7 Check the condition of the wheel bearings (see Section 16).
Installation
8 Apply a smear of grease to the inside of the wheel spacers, and also to the outside where they fit into the wheel. Fit the long spacer into the right-hand side of the wheel and the short spacer into the left-hand side (see illustration 14.5). Each side of the wheel can be identified using the directional arrow cast into one of the pads sit squarely on either side of the disc (see illustration 3.15a). Tighten the caliper mounting bolts to the specified torque setting (see illustration 3.15b).
14 Apply the front brake a few times to bring the pads back into contact with the discs. Move the motorcycle off its stand, apply the front brake and pump the front forks a few times to settle all components in position.
15 Check for correct operation of the front brake before riding the motorcycle.



15.2a Remove the cap ...



15.2b ... and the split pin (arrowed) ...



15.3a ... then unscrew the nut ...



15.3b ... remove the shim ...



15.3c ... and the spacer ...



15.3d ... and draw the wheel off the hub

15 Rear wheel and hub assembly – removal, inspection and installation



Rear wheel

Removal

- 1 Position the motorcycle on an auxiliary stand and support it so that the rear wheel is off the ground. Always make sure the motorcycle is properly supported.
- 2 Remove the wheel nut cap (see illustration). Remove the split pin from the wheel nut and discard it as a new one must be used (see illustration).

3 Unscrew the wheel nut, using the rear brake to prevent the wheel from turning (see illustration). Remove the shim and spacer and draw the wheel off its drive pins on the hub flange (see illustrations).

Inspection

4 Check the wheel drive pins on the hub flange for wear, damage and looseness, and replace them if necessary (see illustration 15.6). If any are loose, remove them all – they are secured by bolts on the inside of the flange. Also check the corresponding drive pin holes in the wheel for damage or ovaling. If any is evident, replace the wheel. When installing the drive pins, apply a suitable non-permanent thread locking compound to the

bolts and tighten them to the torque setting specified at the beginning of the Chapter.

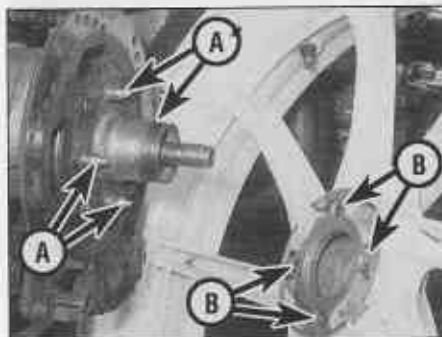
5 Refer to Chapter 1 for further wheel checks.

Installation

6 Lift the wheel into position on the hub, making sure the drive pins on the hub flange locate into the holes in the inside of the wheel (see illustration).

7 Fit the spacer, the shim and the wheel nut (see illustrations 15.3c, b and a), then tighten the wheel nut to the torque setting specified at the beginning of the Chapter, using the rear brake to prevent the wheel from turning (see illustration).

8 Secure the nut using a new split pin, then fit the nut cap (see illustration).



15.6 Locate the drive pins (A) in the holes (B)



15.7 Tighten the wheel nut to the specified torque ...



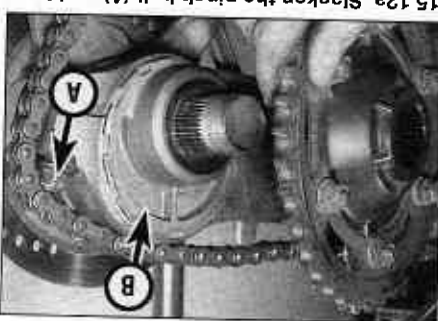
15.8 ... then fit a new split pin



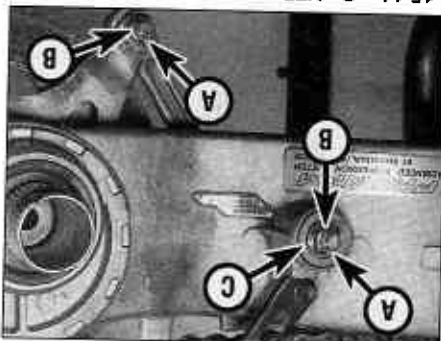
15.10a Unstake the hub nut ...



15.10b ... then remove the nut along with the spring washer and thrust washer



15.12a Slacken the pinch bolt (A) and turn the bearing holder (B) to provide chain slack, then disengage the chain and remove the sprocket assembly



15.14a On VFR models, remove the split pins (A), nuts (B) and the collar (C) ...



15.13 Draw the axle bolt out of the hub, noting how it fits

15.12b Draw the hub assembly out of the bearing holder



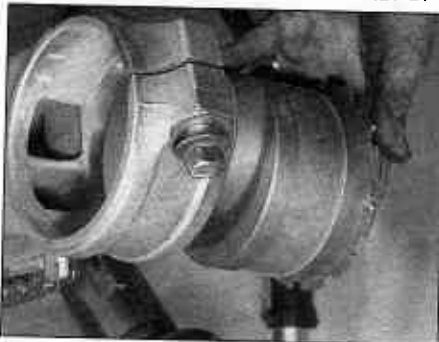
Hub assembly Removal

9 Remove the rear wheel (see above).
10 Unstake the hub nut on the left-hand side of the hub using a suitable drift (see illustration). Have an assistant apply the rear brake hard, then unscrew the hub nut, noting that it is very tight (see illustration). Remove the spring washer and the thrust washer from behind the nut (see illustration). Discard the nut as a new one must be used.
11 Remove the brake caliper mounting bolts and slide the caliper off the disc (see illustrations 6.1b and c). Support the caliper with a piece of wire or a bungee cord so that no strain is placed on its hydraulic hose. There is no need to disconnect the hose from the

caliper. **Note:** Do not operate the rear brake pedal with the caliper removed.
12 Slacken the bearing holder pinch bolt and turn the holder using the pin spanner tool provided in the toolkit, until the drive chain is fully slack (see illustration). Disengage the drive chain from the rear sprocket and draw the brake disc and draw the hub assembly out of the bearing holder from the right-hand side (see illustration).
13 Tap the right-hand end of the axle bolt using a soft-faced hammer and withdraw it from the left-hand side of the hub assembly (see illustration). Note how the splines on the head of the bolt locate in the splines on the inside of the hub.
14 On VFR models, if the bearing holder is



15.15a Remove the circlip and the caliper bracket ...



15.15b ... then draw the bearing holder out

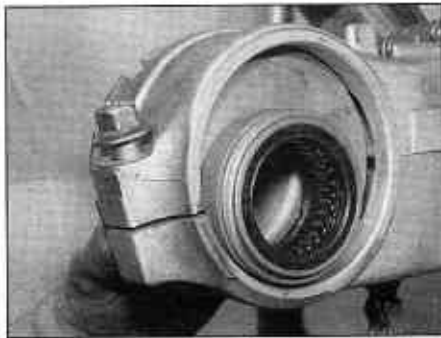


15.14b ... and withdraw the bolts and torque arm from the other side

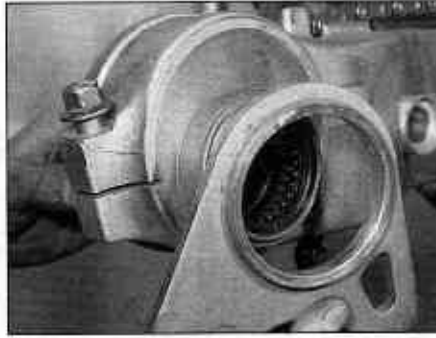
the swingarm (see illustration).
15 Remove the circlip securing the brake caliper bracket to the holder and remove the slacken the bearing holder pinch bolt and draw the holder out from the left-hand side of the swingarm (see illustration). It not already done, simply drawn off the bearing holder after lug on the swingarm, and the bracket can be the slot in the bracket locating over the long caliper bracket doubles as a torque arm, with ones must be used. On R/VF models, the illustrations). Discard the split pins as new arrangement of the various collars (see illustrations). Have an assistant apply the rear of the hub using a suitable drift (see illustration). Have an assistant apply the rear brake hard, then unscrew the hub nut, noting that it is very tight (see illustration). Remove the spring washer and the thrust washer from behind the nut (see illustration). Discard the nut as a new one must be used.
11 Remove the brake caliper mounting bolts and slide the caliper off the disc (see illustrations 6.1b and c). Support the caliper with a piece of wire or a bungee cord so that no strain is placed on its hydraulic hose. There is no need to disconnect the hose from the



(A) and turn
side chain
chain and
assembly



15.22a Install the bearing holder ...



15.22b ... and fit the caliper bracket



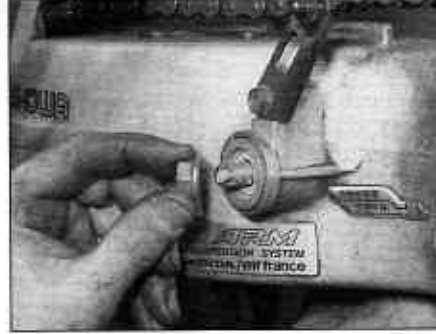
15.22c Install the torque arm assembly ...



the split
(C) ...



15.22d ... and fit the collar ...



15.22e ... and nut onto the swingarm
mount ...



15.22f ... and the nut onto the bracket
mount

16 If required, separate the brake disc from the hub assembly (see Section 8).

Inspection

17 Check the axle bolt for straightness by rolling it on a flat surface such as a piece of plate glass (if the axle is corroded, first remove the corrosion with fine emery cloth). If the equipment is available, place the axle in V-blocks and measure the runout using a dial gauge. If the axle is bent or the runout exceeds the limit specified at the beginning of the Chapter, replace it.

18 Check the condition of the bearings in the bearing holder (see Section 16).

19 Inspect the splines on the hub for damage and wear and replace it if necessary. Also check the corresponding splines in the rear sprocket holder.

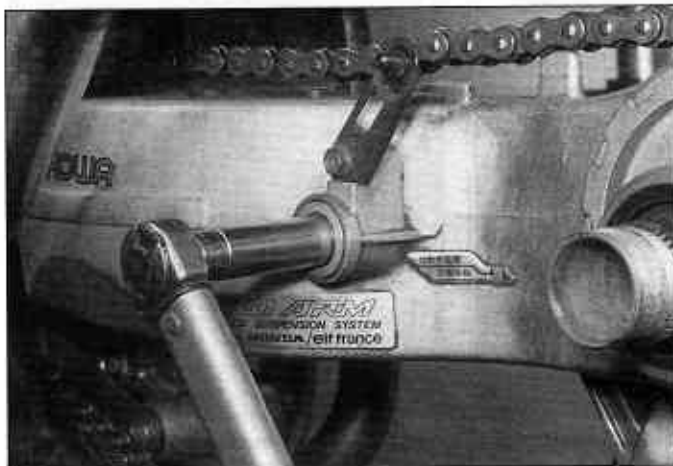
20 If not already done, check the wheel drive pins on the hub flange (see Step 4).

Installation

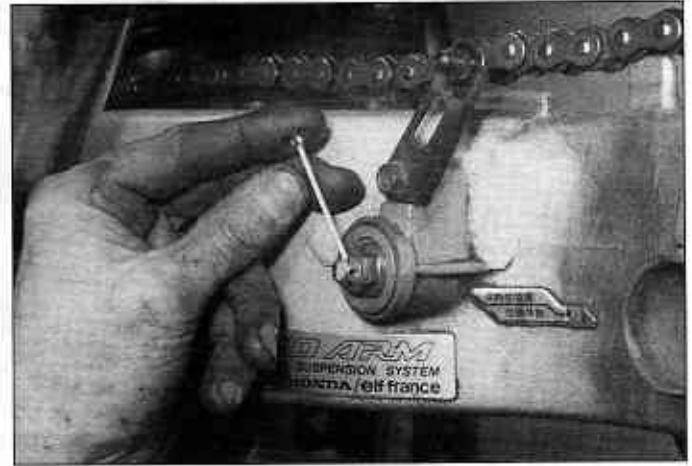
21 If removed, fit the brake disc onto the hub assembly (see Section 8).

22 If removed, fit the bearing holder into the

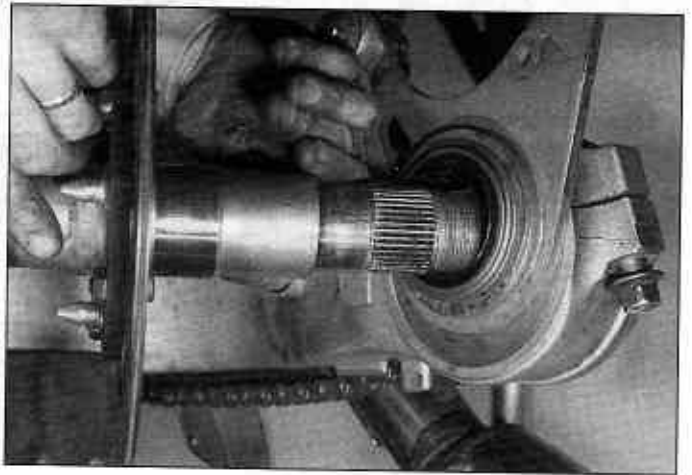
swingarm, then locate the caliper bracket onto the right-hand end of the holder (see illustrations). On RVF models make sure the slot locates over the long lug on the swingarm. Secure the bracket with the circlip, making sure it fits properly into its groove (see illustration 15.15a). On VFR models, install the brake torque arm onto the caliper bracket and the swingarm, making sure the various collars are correctly installed (see illustration). Tighten the nuts to the torque setting specified at the beginning of the Chapter and secure them using new split pins (see illustration).



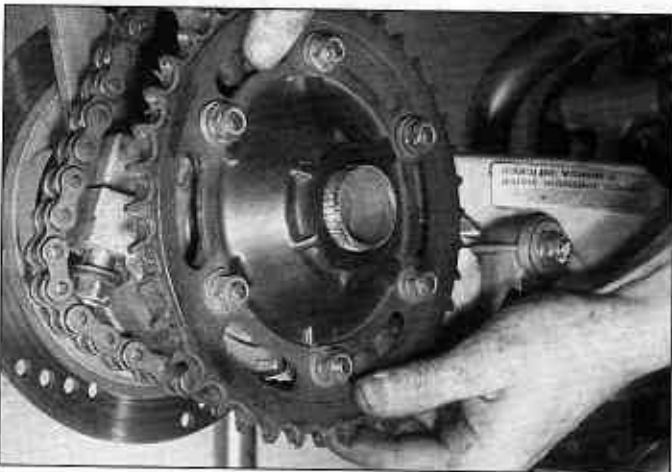
15.22g Tighten the nuts to the specified torque ...



15.22h ... and fit new split pins



15.23a Install the hub assembly ...



15.23b ... and fit the sprocket

23 Apply grease to the needle bearing in the right-hand side of the bearing holder. Slide the hub assembly through the bearing holder from the right-hand side (see illustration). Make sure the hub assembly is pushed fully into the bearing holder. Slide the rear sprocket onto the hub, aligning the splines on the sprocket holder with those on the hub, and push the sprocket fully onto the splines (see illustration).

24 Fit the thrust washer and the spring washer, with its raised inner edge facing out, onto the left-hand side of the hub, then thread the new hub nut on and tighten it hand tight (see illustrations). On RVF models, oil the threads of the nut before fitting it.

25 Install the caliper on the brake disc making sure the pads sit squarely either side of the disc. Tighten the caliper mounting bolts to the specified torque setting (see illustration 6.10a).

26 Operate the brake pedal several times to bring the pads into contact with the disc. Have an assistant apply the rear brake hard, then tighten the hub nut to the specified torque setting (see illustration). Stake the rim of the nut against the indentation in the hub using a suitable drift (see illustration).

27 Fit the axle bolt into the left-hand side of the hub assembly, making sure the splines on the head of the bolt locate with those on the inside of the hub (see illustration 15.13). Tap the bolt home using a soft-faced hammer to ensure it is properly seated (see illustration).

28 Fit the drive chain around the sprocket and install the rear wheel (see above).

29 Check and adjust the drive chain slack (see Chapter 1). Make sure the bearing holder pinch bolt is tightened to the specified torque setting. Check the operation of the rear brake carefully before riding the bike.



15.24a Fit the thrust washer ...



15.24b ... the spring washer ...



15.24c ... and the hub nut



15.26a Tighten the nut to the specified torque ...



15.26b ... and stake its rim against the indentation



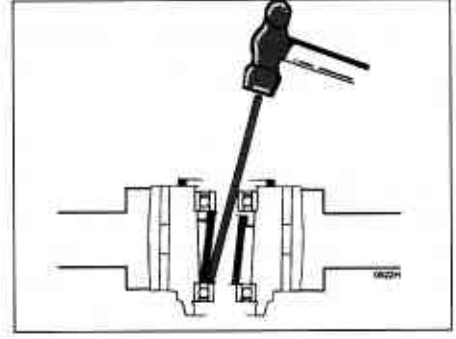
15.27 Tap the axle bolt fully home using a suitable drift, making sure the splines engage



16.3 Lever out the grease seals and discard them



16.4a Use a drift to knock out the bearings



16.4b Locate the drift as shown when driving out the bearing

16 Wheel bearings – removal, inspection and installation

Front wheel bearings

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

- 1 Remove the wheel (see Section 14).
- 2 Set the wheel on blocks so as not to allow the weight of the wheel to rest on the brake disc. Have the left-hand side of the wheel facing up.
- 3 Prise out the seal on each side of the wheel using a flat-bladed screwdriver, taking care not to damage the rim of the hub (see illustration). Discard the seals as new ones should be used.
- 4 Using a metal rod (preferably a brass drift punch) inserted through the centre of the left-hand bearing, tap evenly around the inner race of the right-hand bearing to drive it from the hub (see illustrations). The bearing spacer will also come out.
- 5 Lay the wheel on its other side so that the left-hand bearing faces down. Drive the bearing out of the wheel using the same technique as above.
- 6 If the bearings are of the unsealed type or are only sealed on one side, clean them with a high flash-point solvent (one which won't leave any residue) and blow them dry with compressed air (don't let the bearings spin as you dry them). Apply a few drops of oil to the bearing. **Note:** If the bearing is sealed on both sides don't attempt to clean it.



Refer to Tools and Workshop Tips (Section 5) for more information about bearings.

- 7 Hold the outer race of the bearing and rotate the inner race – if the bearing doesn't turn smoothly, has rough spots or is noisy, replace it with a new one.
- 8 If the bearing is good and can be re-used, wash it in solvent once again and dry it, then pack the bearing with grease.



16.9 The bearing can be driven in using a suitable socket

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

10 Turn the wheel over and install the bearing spacer. Drive the right-hand side bearing into place as described above.

11 Apply a smear of grease to the lips of the seals, then press them into the wheel. Gently



16.11 The seal can be driven in using a flat piece of wood

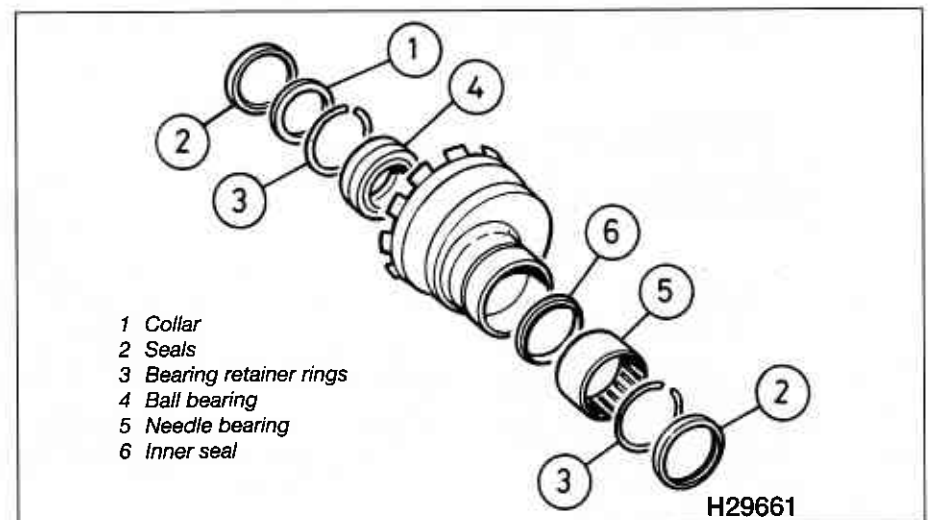
drive them into place using a seal or bearing driver, a suitable socket or a flat piece of wood (see illustration).

12 Clean off all grease from the brake discs using acetone or brake system cleaner then install the wheel (see Section 14).

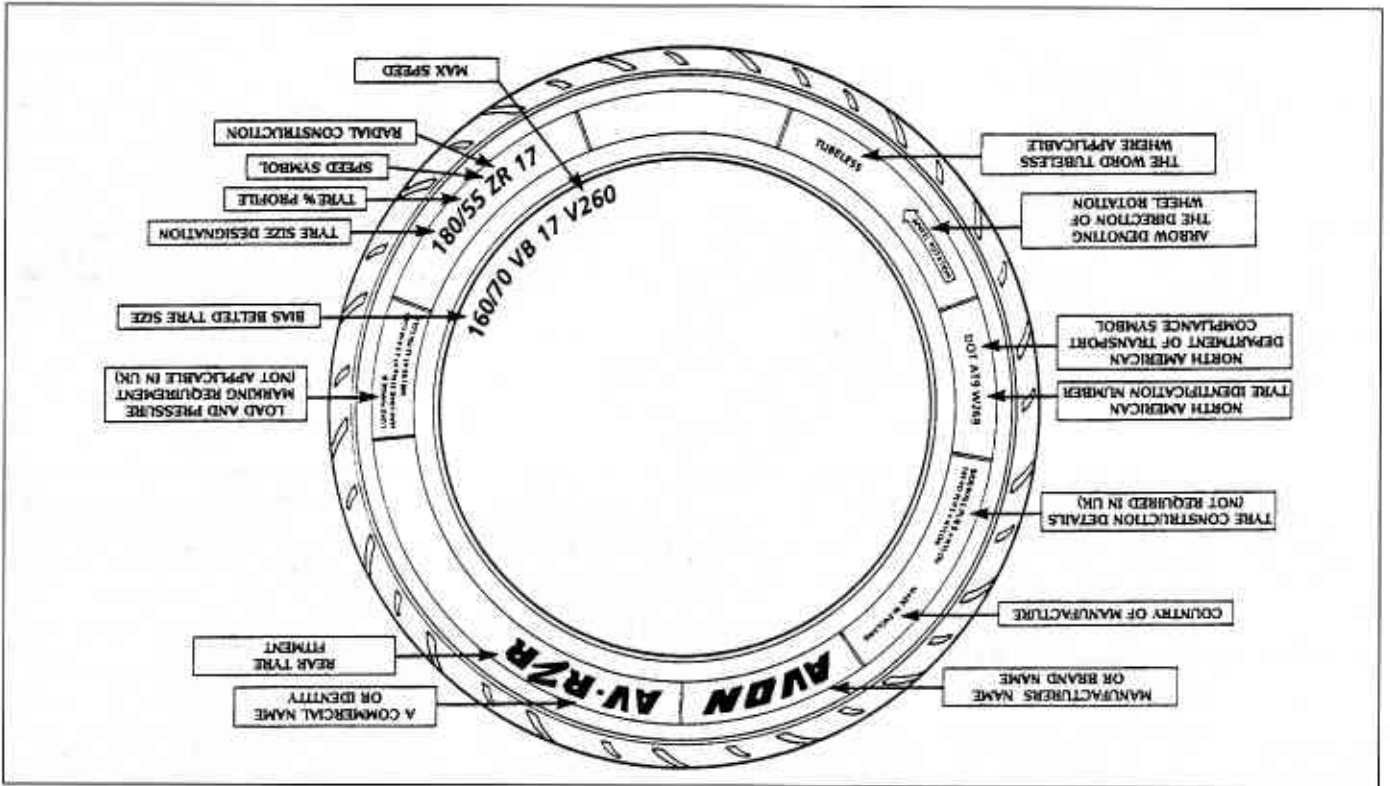
Rear wheel bearings

13 Remove the rear wheel, the hub assembly and the bearing holder (see Section 15).

14 Remove the collar from the left-hand side of the holder, noting how it fits between the seal and the bearing (see illustrations). Using



16.14a Bearing holder components



a flat-bladed screwdriver, prise out the seal from each side of the holder (see illustration). Also lever out the retaining rings securing each bearing. Discard the seals as new ones should be used.

15 Set the bearing holder on blocks to allow the bearings to be driven out. Refer to *Tools and Workshop Tips* (Section 5) in the Reference Section and remove the bearings from the holder. Also remove the inner seal.

16 Check the bearings as described in Steps 6 to 8 above.

17 Thoroughly clean the holder, then install the inner dust seal, followed by the bearings. Apply grease to the outside of the needle bearing and press, rather than drive, it home until it is fully seated. Install the caged ball bearing with the marked or sealed side facing outwards. Using the old bearing (if a new one is being fitted), a bearing driver or a socket large enough to contact the outer race of the bearing, drive it in squarely until it's completely seated.

18 Fit the bearing retaining rings, making sure they fit properly in their grooves.

19 Apply a smear of grease to the lips of the seals, and press them into the holder. Gently drive them into place using a seal or bearing driver, a suitable socket or a flat piece of wood. Fit the collar into the left-hand side of the holder (see illustration 16.14b).

20 Install the bearing holder, the hub assembly and the wheel (see Section 15).

General information

1 The wheels fitted to all models are designed to take tubeless tyres only. Tyre sizes are given in the Specifications at the beginning of this chapter.

2 Refer to the Daily (pre-ride) checks listed at the beginning of this manual for tyre maintenance.

3 When selecting new tyres, refer to the tyre information label on the swingarm and the tyre options listed in the owners handbook. Ensure

Fitting new tyres

5 Note that punctured tubeless tyres can in some cases be repaired. Honda recommend that such repairs are carried out only by an authorised dealer.

6 It is recommended that tyres are fitted by a tyre fitting specialist (see illustration).

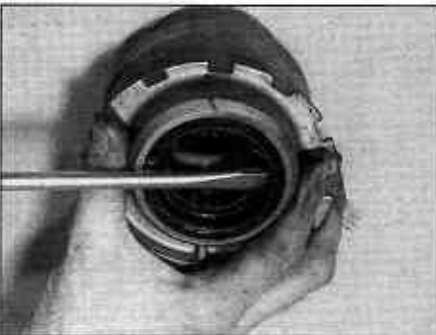
7 The correct size and correct speed rating, if the correct size and correct speed rating, if necessary seek advice from a Honda dealer or a tyre fitting specialist (see illustration).

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

16.14b Remove the collar, noting how it fits...



16.14c ... and lever out the seals



Chapter 8

Bodywork

Contents

Fairing panels – removal and installation	4	Seat cowling – removal and installation	2
Front mudguard – removal and installation	5	Rear view mirrors – removal and installation	3
General information	1		

Degrees of difficulty

Easy, suitable for novice with little experience



Fairly easy, suitable for beginner with some experience



Fairly difficult, suitable for competent DIY mechanic



Difficult, suitable for experienced DIY mechanic



Very difficult, suitable for expert DIY or professional



1 General information

This Chapter covers the procedures necessary to remove and install the body parts. Since many service and repair operations on these motorcycles require the removal of the body parts, the procedures are grouped here and referred to from other Chapters.

In the case of damage to the body parts, it is usually necessary to remove the broken component and replace it with a new (or used) one. The material that the body panels are composed of doesn't lend itself to conventional repair techniques. There are however some shops that specialise in 'plastic welding', so it may be worthwhile seeking the advice of one of these specialists before consigning an expensive component to the bin.

When attempting to remove any body panel, first study it closely, noting any fasteners and associated fittings, to be sure of returning everything to its correct place on installation. In some cases the aid of an assistant will be required when removing panels, to help avoid the risk of damage to paintwork. Once the evident fasteners have been removed, try to withdraw the panel as described but **DO NOT FORCE IT** – if it will not release, check that all fasteners have been removed and try again. Where a panel engages another by means of tabs, be careful not to break the tab or its mating slot or to damage the paintwork. Remember that a few moments of patience at this stage will save you a lot of money in replacing broken fairing panels!

When installing a body panel, first study it closely, noting any fasteners and associated fittings removed with it, to be sure of returning everything to its correct place. Check that all fasteners are in good condition, including all trim nuts or clips and damping/rubber

mounts; any of these must be replaced if faulty before the panel is reassembled. Check also that all mounting brackets are straight and repair or replace them if necessary before attempting to install the panel. Where assistance was required to remove a panel, make sure your assistant is on hand to install it.

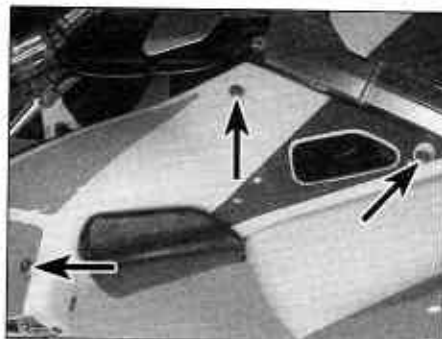
Tighten the fasteners securely, but be careful not to overtighten any of them or the panel may break (not always immediately) due to the uneven stress. Where quick-release fasteners are fitted, turn them 90° anti-clockwise to release them, and 90° clockwise to secure them.



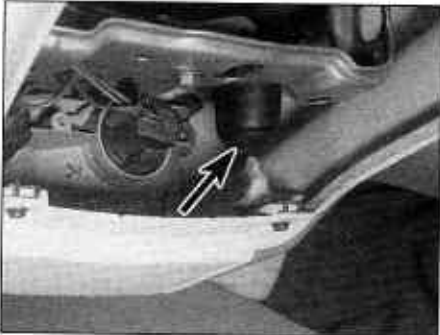
Note that a small amount of lubricant (liquid soap or similar) applied to the mounting rubber grommets of the seat cowling will assist the lugs to engage without the need for undue pressure.



2.1 Remove the passenger seat



2.2a Remove the three screws (arrowed) on each side . . .



2.2b . . . then lift the cowl out of its grommets (arrow) . . .

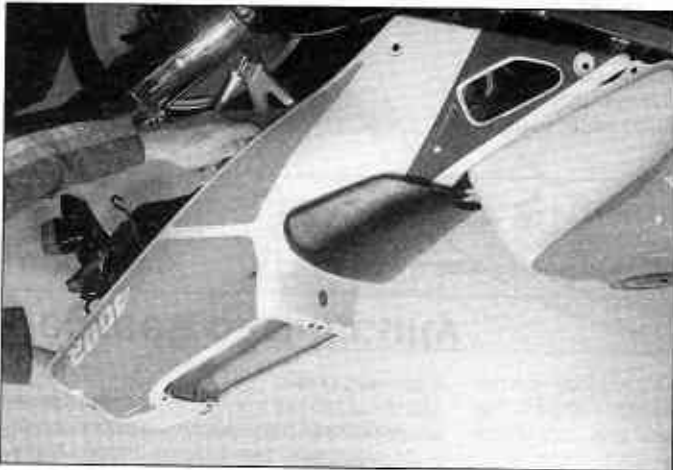
2 On VFR models, remove the three screws securing each side of the seat cowl (see illustration). Carefully lift the rear of the cowl to free the two lugs from their rubber grommets (see illustration). Lift the rear of the cowl further to access the tailight assembly wiring connector and disconnect the connector (see illustration). Carefully draw the cowl rearwards and off the bike, taking care not to bend the front sides (see illustration).
3 On RVF models, lift each side of the rear of the rider's seat and remove the two screws, bend the front sides (see illustration).
Remove the passenger's seat (see illustration).
1 Insert the ignition key into the seat lock located behind the rider's seat, and turn it clockwise to unlock the passenger's seat.

Removal

2 Seat cowl - removal and installation



2.2c . . . and raise it to disconnect the tailight wiring connector



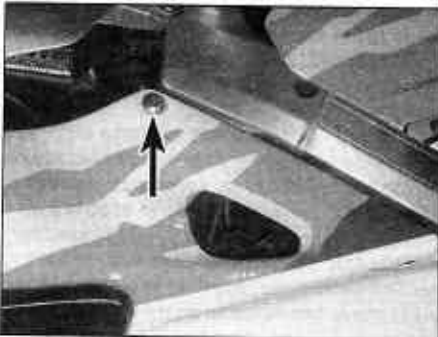
2.2d Draw the cowl carefully off the bike



2.3a Pull the seat away to access the screws . . .



2.3b . . . and remove the seat



2.3c Remove the single screw (arrowed) on each side

Installation

4 Installation is the reverse of removal. Make sure the lugs locate correctly in their rubber grommets (**see illustration 2.2b**). Make sure the tab at the front of the rider's seat on RVF models, and the tabs at the front of the passenger's seat on all models locate correctly (**see illustration**). Push down on the rear of the passenger's seat to engage the latch (**see illustration**).

3 Rear view mirrors – removal and installation

Removal

1 Unscrew the two nuts securing each mirror and remove the mirror along with its rubber insulator pads (**see illustrations**).

Installation

2 Installation is the reverse of removal.

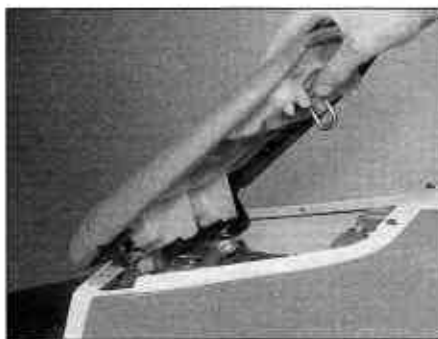
4 Fairing panels – removal and installation

Fairing

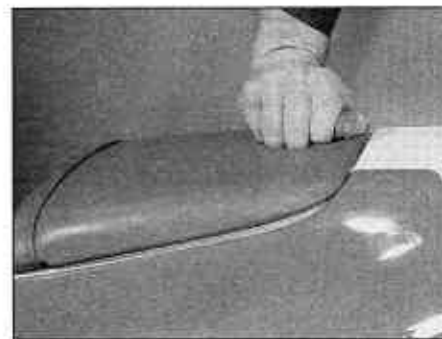
Note: The windshield is secured to the fairing with rivets and should not be removed unless it is being replaced. Windshields are available separately from the fairing. The type of rivet supplied by Honda, requires the rivet to be inserted from the outside of the windshield and a keeper pressed onto its inner end.

VFR models removal

1 Remove the fairing side panels and the radiator cover (**see below**).
2 Remove the rear view mirrors (**see Section 3**).
3 Disconnect the turn signal wiring connectors (**see illustration**).
4 Unscrew the bolt securing the front of the fairing to the fairing bracket (**see illustration**). Carefully draw the fairing forward and off the bike (**see illustration**).



2.4a Locate the tabs at the front ...



2.4b ... and push down to engage the latch



3.1a Unscrew the two nuts ...



3.1b ... and remove the mirror ...



3.1c ... noting how the rubber pad fits between the bracket and the fairing



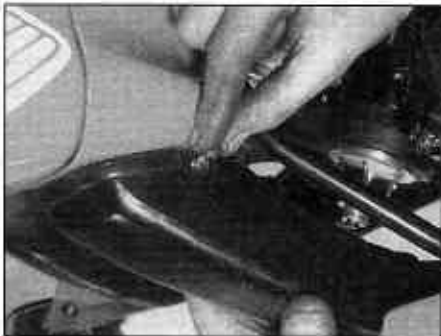
4.3 Disconnect the turn signal wiring connectors ...



4.4a ... then unscrew the bolt ...



4.4b ... and draw the fairing off the bike



4.5a Remove the screw . . .



4.5b . . . and lift off the duct

RVF models removal

- 5 Remove the screw securing each air duct to the tank and remove the ducts (see illustrations).
- 6 Disconnect the headlight and turn signal wiring connectors, and carefully pull the sidelight out of its socket in the base of the headlight.
- 7 Remove the trim clip securing each inner side of the fairing to the radiator cover.
- 8 Unscrew the bolt securing the front of the fairing to the fairing bracket. Carefully draw the fairing forward and off the bike.
- 9 If required, remove the headlight from the fairing (see Chapter 9).

Installation

- 11 Installation is the reverse of removal. On VFR models, make sure the rubber headlight surrounds do not turn inside out when installing the fairing. Make sure the wiring connectors are correctly and securely connected.

Fairing side panels

Removal

- 12 Each side panel is secured by two quick-release screws and a normal screw, and has tabs which fit into slots in the fairing (see illustration). On VFR models, there is also a screw securing the inner trim panel to each

Radiator cover

Removal

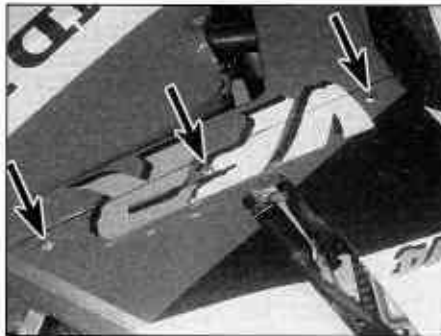
- 15 Remove the seven (VFR models) or five (RVF models) fasteners securing the radiator cover to the fairing and the lower fairing (see illustrations). Carefully draw the cover away from the bike, noting how it fits (see illustration).

Installation

- 14 Installation is the reverse of removal. Make sure the tabs locate correctly into the slots in the fairing.

Chapter 4).

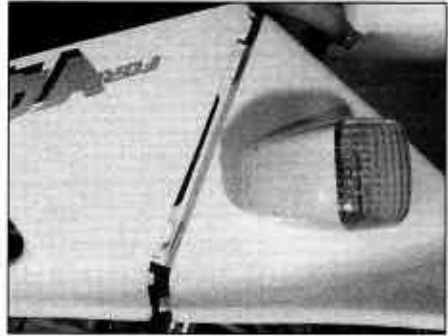
- 13 If required, remove the trim panels. On VFR models, each is secured by two bolts. On RVF models, each is secured by two trim clips, inserted from the underside. When removing the left-hand trim panel, release the idle speed adjuster from its bracket, and on RVF models, remove the choke cable (see Chapter 4).
- 16 Installation is the reverse of removal.



4.12a Remove the three screws (arrowed) . . .



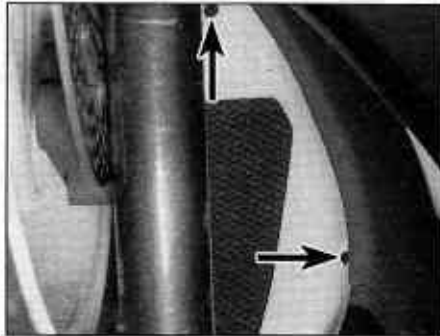
4.12b . . . and on VFR models the trim panel screw (arrowed)



4.12c . . . then remove the panel, releasing the tabs at the front



4.12d Remove the insulator pad on RVF models



4.15a Remove the screws . . .



4.15b . . . and the trim clips (two on VFR models, one on RVF models) . . .



4.15c ... and remove the radiator cover



4.18a Remove the two screws (arrowed) on each side ...



4.18b ... noting the spacers on VFR models ...

Lower fairing

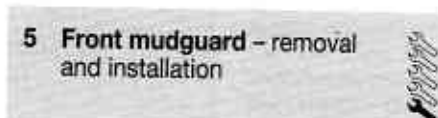
Removal

17 Remove the fairing side panels and the radiator cover (see above).

18 The lower fairing is secured by two screws on each side, one in the middle at the top, the other at the rear on the bottom (see illustration). On VFR models, a spacer fits between the inside of each top mounting and the frame (see illustration). Remove the screws, then carefully lower the fairing and manoeuvre it from under the bike (see illustration).

Installation

19 Installation is the reverse of removal. Do not forget the spacers on the top mountings on VFR models (see illustration 4.18b).



Removal

VFR models

1 Unscrew the four bolts securing the mudguard to the holder on each fork slider and remove the mudguard, noting how it fits (see illustration).

RVF models

2 Unscrew the nut securing each brake hose clamp to the mudguard, then remove the clamps, noting how they fit, and position the hoses aside (see illustration).

3 Unscrew the two bolts securing each side of the mudguard to the fork slider and remove

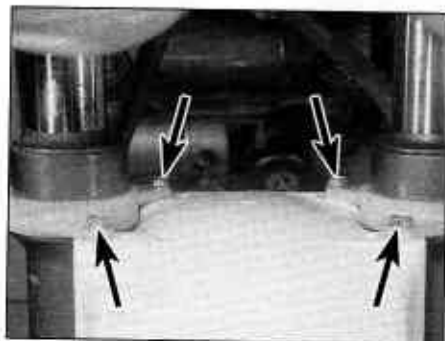


4.18c ... and remove the lower fairing

the mudguard, noting how it fits (see illustration).

Installation

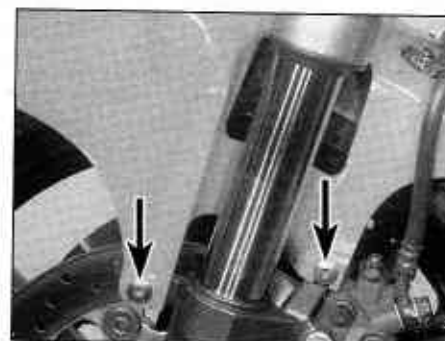
4 Installation is the reverse of removal.



5.1 The mudguard is secured by four bolts (arrowed)



5.2 Unscrew the brake hose clamp nuts ...



5.3 ... and the two bolts (arrowed) on each side

Chapter 9

Electrical system

Contents

Alternator – removal, inspection and installation	32	Ignition (main) switch – check, removal and installation	19
Battery – charging	4	Ignition system components	..see Chapter 5
Battery – removal, installation, inspection and maintenance	3	Instrument and warning light bulbs – replacement	17
Brake light switches – check and replacement	14	Instruments and speedometer cable – removal and installation	15
Brake/tail light bulb – replacement	9	Instruments – check and replacement	16
Charging system – leakage and output test	31	Lighting system – check	6
Charging system testing – general information and precautions	30	Neutral switch – check, removal and installation	22
Clutch switch – check and replacement	24	Oil pressure switch – check, removal and installation	18
Diode – check and replacement	25	Regulator/rectifier – check and replacement	33
Electrical system – fault finding	2	Sidestand switch – check and replacement	23
Fuses – check and replacement	5	Starter motor – disassembly, inspection and reassembly	29
General information	1	Starter motor – removal and installation	28
Handlebar switches – check	20	Starter relay – check and replacement	27
Handlebar switches – removal and installation	21	Tail light assembly – removal and installation	10
Headlight aim – check and adjustment	..see Chapter 1	Turn signal bulbs – replacement	12
Headlight bulb and sidelight bulb – replacement	7	Turn signal assemblies – removal and installation	13
Headlight assembly – removal and installation	8	Turn signal circuit – check	11
Horn – check and replacement	26		

Degrees of difficulty

Easy, suitable for novice with little experience



Fairly easy, suitable for beginner with some experience



Fairly difficult, suitable for competent DIY mechanic



Difficult, suitable for experienced DIY mechanic



Very difficult, suitable for expert DIY or professional



Specifications

Battery

Capacity	12 V, 6 Ah
Voltage	
Fully charged	13.0 to 13.2 V
Uncharged	below 12.3 V
Charging rate	
Normal	0.7 A for 5 to 10 hrs
Quick	3.0 A for 1hr
Current leakage	1 mA (max)

Alternator

Stator coil resistance	0.1 to 1.0 ohms
------------------------	-----------------

Regulator/rectifier

Regulated voltage output	13.5 to 15.5 V @ 5000 rpm
Regulated current output	0 to 6 A @ 5000 rpm

Starter motor

Brush length	
Standard	12.0 to 13.0 mm
Service limit (min)	6.5 mm

Bulbs

Bulbs

Bulbs

Headlight

Torque settings – specific components

Torque settings – specific components

Torque settings – non-specified components

Torque settings – non-specified components

Torque settings – non-specified components

† General information

† General information

† General information

† General information

2 Electrical system – fault finding



Warning: To prevent the risk of short circuits, the ignition (main) switch must always be OFF and the battery negative (–ve)

terminal should be disconnected before any of the bike's other electrical components are disturbed. Don't forget to reconnect the terminal securely once work is finished or if battery power is needed for circuit testing.

1 A typical electrical circuit consists of an electrical component, the switches, relays, etc. related to that component and the wiring and connectors that hook the component to both the battery and the frame. To aid in locating a problem in any electrical circuit, refer to the wiring diagrams at the end of this Chapter.

2 Before tackling any troublesome electrical circuit, first study the wiring diagram (see end of Chapter) thoroughly to get a complete picture of what makes up that individual circuit. Trouble spots, for instance, can often be narrowed down by noting if other components related to that circuit are operating properly or not. If several components or circuits fail at one time, chances are the fault lies in the fuse or earth (ground) connection, as several circuits often are routed through the same fuse and earth (ground) connections.

3 Electrical problems often stem from simple causes, such as loose or corroded connections or a blown fuse. Prior to any electrical fault finding, always visually check the condition of the fuse, wires and connections in the problem circuit. Intermittent failures can be especially frustrating, since you can't always duplicate the failure when it's convenient to test. In such situations, a good practice is to clean all connections in the affected circuit, whether or not they appear to be good. All of the connections and wires should also be wiggled to check for looseness which can cause intermittent failure.

4 If testing instruments are going to be utilised, use the wiring diagram to plan where you will make the necessary connections in order to accurately pinpoint the trouble spot.

5 The basic tools needed for electrical fault finding include a battery and bulb test circuit, a continuity tester, a test light, and a jumper wire. A multimeter capable of reading volts, ohms and amps is also very useful as an alternative to the above, and is necessary for performing more extensive tests and checks.



Refer to Fault Finding Equipment in the Reference section for details of how to use electrical test equipment.

3 Battery – removal, installation, inspection and maintenance

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

Removal and installation

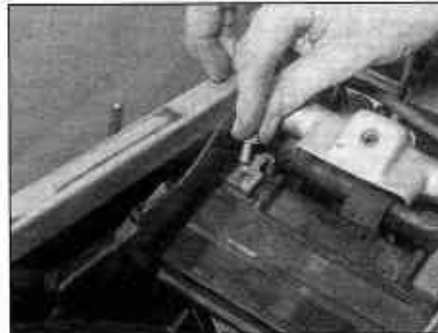
1 On VFR models, remove the seat cowling (see Chapter 8). On RVF models, lift each side of the rear of the rider's seat and remove the two screws, then remove the seat.

2 Unscrew the negative (–ve) terminal bolt first and disconnect the lead from the battery (see illustration). Lift up the red insulating cover to access the positive (+ve) terminal, then unscrew the bolt and disconnect the lead (see illustration). Release the battery strap from its hook and lift the battery from the bike (see illustrations).

3 On installation, clean the battery terminals and lead ends with a wire brush or knife and emery paper. Reconnect the leads, connecting the positive (+ve) terminal first.



Battery corrosion can be kept to a minimum by applying a layer of petroleum jelly to the terminals after the cables have been connected.



3.2a Disconnect the negative lead ...



3.2b ... and the positive lead ...



3.2c ... then unhook the strap ...



3.2d ... and remove the battery

4 Install the seat or seat cowling (see Chapter 8).

Inspection and maintenance

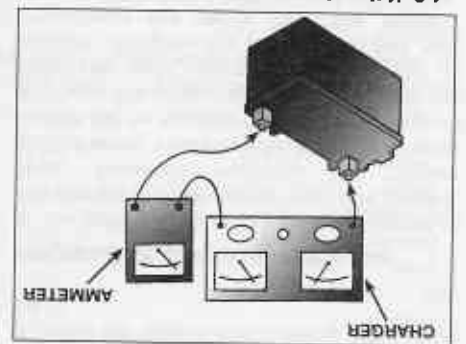
5 The battery fitted to the models covered in this manual is of the maintenance free (sealed) type, therefore requiring no regular maintenance. However, the following checks should still be regularly performed.

6 Check the battery terminals and leads for tightness and corrosion. If corrosion is evident, unscrew the terminal screws and disconnect the leads from the battery, disconnecting the negative (–ve) terminal first, and clean the terminals and lead ends with a wire brush or knife and emery paper. Reconnect the leads, connecting the negative (–ve) terminal last, and apply a thin coat of petroleum jelly to the connections to slow further corrosion.

7 The battery case should be kept clean to prevent current leakage, which can discharge the battery over a period of time (especially when it sits unused). Wash the outside of the case with a solution of baking soda and water. Rinse the battery thoroughly, then dry it.

8 Look for cracks in the case and replace the battery if any are found. If acid has been spilled on the frame or battery box, neutralise it with a baking soda and water solution, dry it thoroughly, then touch up any damaged paint.

9 If the motorcycle sits unused for long periods of time, disconnect the cables from the battery terminals, negative (–ve) terminal first. Refer to Section 4 and charge the battery once every month to six weeks.



4.2 If the charger doesn't have an ammeter built in, connect one in series as shown. **DO NOT** connect the ammeter between the battery terminals or it will be ruined

10 The condition of the battery can be assessed by measuring the voltage present at the battery terminals. Connect the voltmeter positive (+ve) probe to the battery positive (+ve) terminal, and the negative (-ve) probe to the battery negative (-ve) terminal. When fully charged there should be more than 13.0 volts present. If the voltage falls below 12.3 volts the battery must be removed, disconnecting the negative (-ve) terminal first, and recharged as described below in Section 4.

4 Battery - charging

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

1 Remove the battery (see Section 3). Connect the charger to the battery, making sure that the positive (+ve) lead on the charger is connected to the positive (+ve) terminal on the battery, and the negative (-ve) lead is connected to the negative (-ve) terminal.

2 Honda recommend that the battery is charged at a maximum rate of 0.7 amps for 5 to 10 hours. Exceeding this figure can cause the battery to overheat, buckling the plates and rendering it useless. Few owners will have access to an expensive current controlled charger, so if a normal domestic charger is used check that after a possible initial peak, the charge rate falls to a safe level (see illustration). If the battery becomes hot during charging stop. Further charging will cause damage. **Note:** In emergencies the battery can be charged at a higher rate of around 3.0 amps for a period of 1 hour. However, this is not recommended and the low amp charge is by far the safer method of charging the battery.

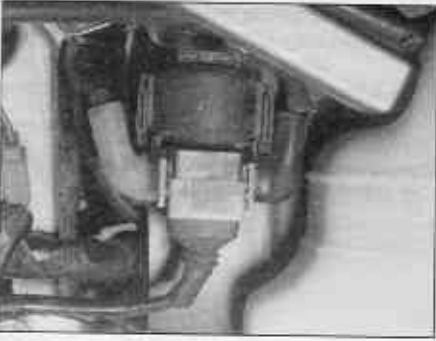
3 If the recharged battery discharges rapidly if left disconnected it is likely that an internal short caused by physical damage or



5.1a Fusebox location



5.2a Unclip the lid to access the fuses



5.1b The main fuse is located in the starter relay



5.2b The main fuse is housed under the wiring connector

5 **Fuses - check and replacement**

1 The electrical system is protected by fuses of different ratings. All except the main fuse are housed in the fusebox, which is located under the seat cowling (see illustration). The

2 To access the fuses, remove the seat cowling (see Chapter 8) and unclip the fusebox lid (see illustration). To access the main fuse, disconnect the starter relay wiring connector (see illustration).

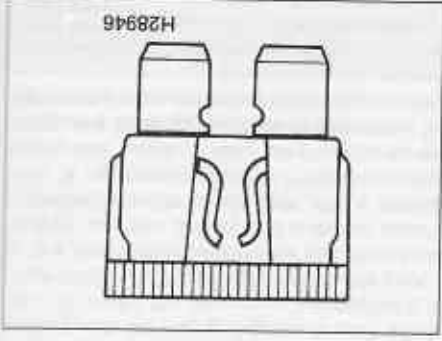
3 The fuses can be removed and checked visually. If you can't pull the fuse out with your fingertips, use a pair of suitable pliers (see illustration). A blown fuse is easily identified by a break in the element (see illustration). Each fuse is clearly marked with its rating and must only be replaced by a fuse of the correct rating. A spare fuse of each rating is housed in the fusebox, and a spare main fuse is housed

4 Install the battery (see Section 3). Charge at about 1% per day.

5 If the motorcycle sits unused for long periods of time, charge the battery once every month to six weeks and leave it disconnected.



5.3a Use a pair of pliers to remove a fuse



5.3b A blown fuse can be identified by a break in its element



5.3c Spare main fuse (arrowed)

in the bottom of the starter relay (see illustration). If a spare fuse is used, always replace it so that a spare of each rating is carried on the bike at all times.

Warning: Never put in a fuse of a higher rating or bridge the terminals with any other substitute, however temporary it may be. Serious damage may be done to the circuit, or a fire may start.

4 If a fuse blows, be sure to check the wiring circuit very carefully for evidence of a short-circuit. Look for bare wires and chafed, melted or burned insulation. If the fuse is replaced before the cause is located, the new fuse will blow immediately.

5 Occasionally a fuse will blow or cause an open-circuit for no obvious reason. Corrosion of the fuse ends and fusebox terminals may occur and cause poor fuse contact. If this happens, remove the corrosion with a wire brush or emery paper, then spray the fuse end and terminals with electrical contact cleaner.

6 Lighting system – check

1 The battery provides power for operation of the headlight, tail light, brake light and instrument cluster lights. If none of the lights

operate, always check battery voltage before proceeding. Low battery voltage indicates either a faulty battery or a defective charging system. Refer to Section 3 for battery checks and Sections 30 and 31 for charging system tests. Also, check the condition of the fuses.

Headlight

2 If the headlight fails to work, first check the fuse with the key ON (see Section 5), and then the bulb (see Section 7). If they are both good, use jumper wires to connect the bulb directly to the battery terminals. If the light comes on, the problem lies in the wiring, the relay(s), or one of the switches in the circuit. Refer to Section 20 for the switch testing procedures, and also the wiring diagrams at the end of this Chapter.

3 If either the high beam or low beam relay is suspected of being faulty, substitute it with the other relay. Remove the lower fairing to access the high beam relay – it is mounted on the right-hand side of the engine behind the wiring connectors (see illustration). Remove the fairing to access the low beam relay – it is mounted on the right-hand side of the headlight assembly (see illustration). If the beam in question then works, the faulty relay must be replaced. If not, check for voltage at the white/blue terminal of the low beam relay and the blue/white terminal of the high beam relay. If no voltage is present, check the wiring between the relays and the switches (see wiring diagrams at the end of the Chapter). If the wiring is good, check for voltage at the black/red terminal on the relay. If voltage is present, and the wiring between the relay and the headlight is good, replace the relay. If no voltage is present, check the wiring between the relay and the fusebox (see wiring diagrams at the end of the Chapter).

Note: Japanese market models (greys) using a 35 W low beam are only fitted with a high beam relay, mounted on the right-hand side of the headlight assembly. If this is the case, and a conversion to UK spec has not been

done, then the substitution test will not be possible. To check the relay, switch the ignition ON and the light switch ON, then flick the HI/LO beam switch to HI and listen for a click in the relay. If the relay clicks, check for voltage at the black/red terminal of the relay. If voltage is present, and the wiring between the relay and the headlight is good, replace the relay. If no voltage is present, check the wiring between the relay and the fusebox (see wiring diagrams at the end of the Chapter). If the relay does not click, check for voltage at the blue/white terminal of the high beam relay. If voltage is present, replace the relay. If no voltage is present, check the wiring between the relays and the switches (see wiring diagrams at the end of the Chapter).

Tail light

4 If the tail light fails to work, check the bulb and the bulb terminals first, then the fuse, then check for battery voltage at the brown/white terminal on the supply side of the tail light wiring connector. If voltage is present, check the earth (ground) circuit for an open or poor connection.

5 If no voltage is indicated, check the wiring between the tail light and the ignition switch, then check the switch. Also check the lighting switch.

Brake light

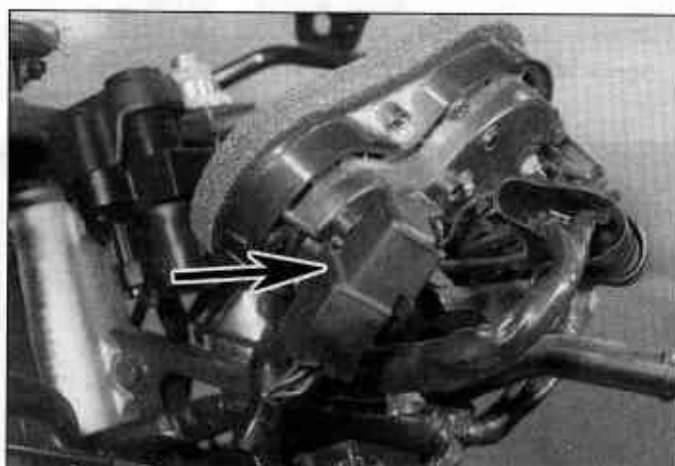
6 If the brake light fails to work, check the bulb and the bulb terminals first, then the fuse, then check for battery voltage at the green/yellow terminal on the supply side of the tail light wiring connector, with the brake lever pulled in or the pedal depressed. If voltage is present, check the earth (ground) circuit for an open or poor connection.

7 If no voltage is indicated, check the brake light switches, then the wiring between the tail light and the switches.

8 See Section 14 for brake switch check and Section 9 for tail light bulb replacement.



6.3a Hi-beam relay (arrowed) – UK models



6.3b Hi-beam relay (arrowed) – imported models, lo-beam relay – UK models

Instrument and warning lights

- 9 See Section 17 for instrument and warning light bulb replacement.
- 10 See Section 11 for turn signal circuit check.

Turn signal lights

Note: The headlight bulb is of the quartz-halogen type. Do not touch the bulb glass as skin acids will shorten the bulb's service life. If the bulb is accidentally touched, it should be wiped carefully when cold with a rag soaked in methylated spirit and dried before fitting.

Warning: Allow the bulb time to cool before removing it if the headlight has just been on.



Headlight

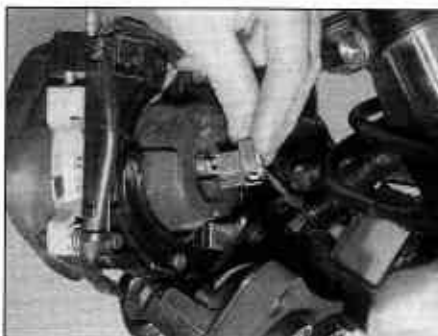
- 1 Disconnect the relevant wiring connector from the back of the headlight assembly and remove the rubber dust cover, noting how it fits (see illustrations).
- 2 Release the bulb retaining clip, noting how it fits, then remove the bulb (see illustrations).
- 3 Fit the new bulb, bearing in mind the information in the **Note** above. Make sure the



7.2a Release the clip ...



7.6a Remove the bulbholder ...



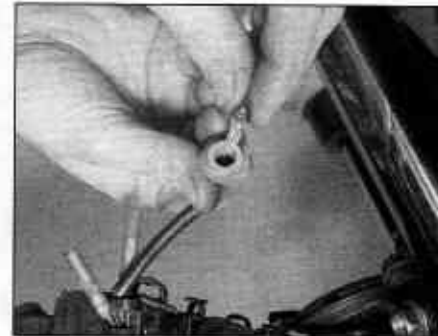
7.1a Disconnect the wiring connector ...



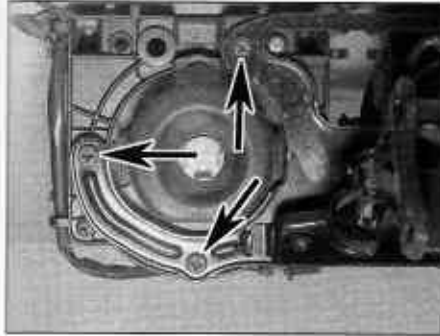
7.1b ... and remove the dust cover



7.2b ... and remove the bulb



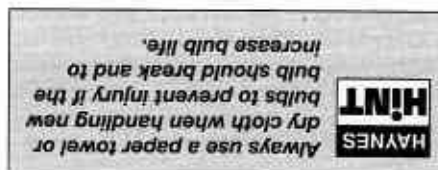
7.6b ... and pull out the bulb



8.3 Each unit is secured by three screws (arrowed)

Sidelight

- 6 Pull the bulbholder out of its socket in the



- 5 Check the operation of the headlight.

4 Install the dust cover, making sure it is correctly seated and with the "TOP" mark at the top, and connect the wiring connector.

- 3 Check the operation of the sidelight.

VFR models

Removal

- 1 Remove the fairing (see Chapter 8).
- 2 Remove the instrument cluster (see Section 15).
- 3 To remove an individual light from the assembly, disconnect the relevant wiring connector from the back of the headlight (see illustration 7.1a). Remove the three screws securing each light to the assembly bracket and remove the light (see illustration).
- 4 To remove the headlight assembly complete, disconnect the wiring connector from the back of each headlight (see illustration 7.1a). Release the wiring loom and the headlight wiring from the clamp on

8 Headlight assembly - removal and installation

- 8 Check the operation of the sidelight.

7 Install the new bulb in the bulbholder, then install the bulbholder by pressing it in. Make sure the rubber cover is correctly seated.

- 6 Check the operation of the headlight.

HINT

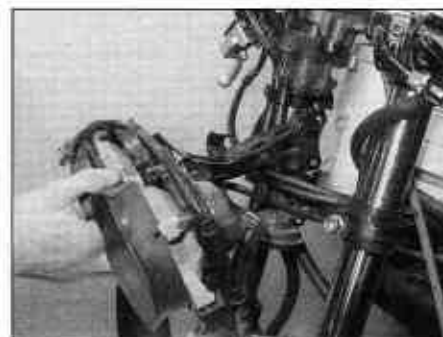
Always use a paper towel or dry cloth when handling new bulbs to prevent injury if the bulb should break and to increase bulb life.



8.4a Release the wiring from its clamp . . .



8.4b . . . then unscrew the nuts and withdraw the bolts . . .



8.4c . . . and remove the assembly

the bracket (see illustration). On UK VFR L and M models, remove the oil cooler mounting bolt. Unscrew the nuts on the bolts securing the assembly bracket to the steering head, then support the assembly and withdraw the bolts (see illustrations). If required, remove the three screws securing each light to the assembly bracket and remove the lights (see illustration 8.3).

5 To separate the beam unit from its holder, first mark each unit according to its side and note the positions of the beam adjusting screws (see illustration). Check the current aim setting by measuring the amount of thread projecting from the holder on each beam adjusting screw. Remove the beam unit pivot screw and open the pivot cover (see illustration). Also remove the two headlight

beam adjusting screws. Lift the beam unit off the holder, noting how the pivot locates, and remove the adjuster springs (see illustrations). Remove the captive nuts from the beam unit.

Installation

6 Installation is the reverse of removal. Make sure all the wiring is correctly connected and secured. Check the operation of the headlight and sidelight. Check the headlight aim (see Chapter 1).

RVF models

Removal

7 Remove the fairing (see Chapter 8).

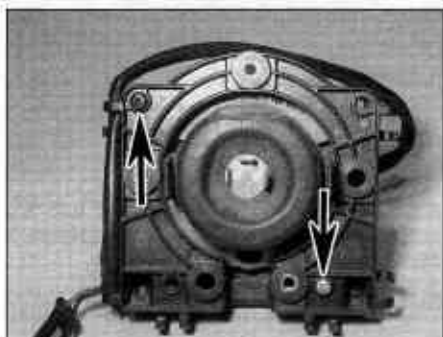
8 Unscrew the four screws securing the headlight unit to the fairing and remove the headlight, noting how it fits (see illustration).

Installation

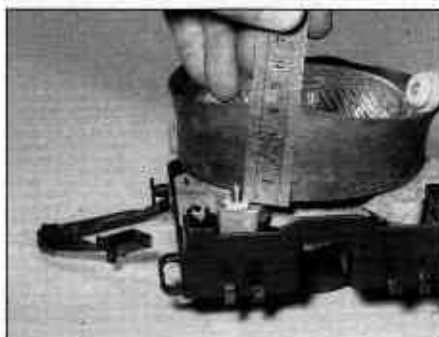
9 Installation is the reverse of removal. Make sure all the wiring is correctly connected and secured. Check the operation of the headlight and sidelight. Check the headlight aim (see Chapter 1).

9 Brake/tail light bulb – replacement

1 Insert the ignition key into the seat lock located behind the rider's seat, and turn it clockwise to unlock the passenger's seat. Remove the passenger's seat.



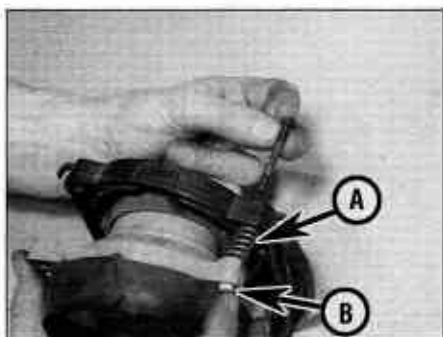
8.5a Beam adjusting screws (arrowed)



8.5b Measure the projecting thread as an aid to installation



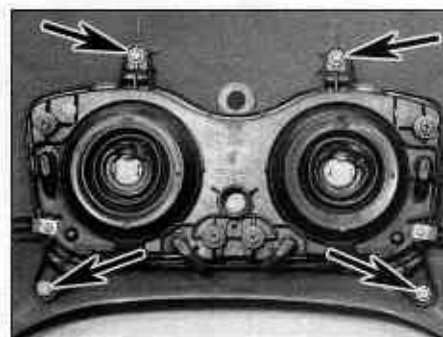
8.5c Remove the pivot cover screw (arrowed) . . .



8.5d . . . and the adjusting screws, noting how the spring (A) and captive nut (B) fit . . .



8.5e . . . and how the pivot locates

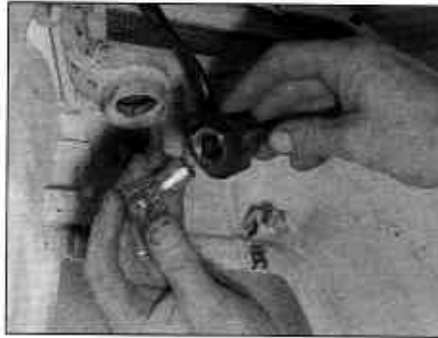


8.8 The headlight unit is secured by four screws (arrowed)

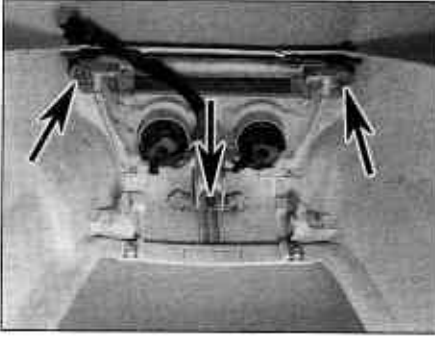


9.2 Remove the bulbholder from the

tail light ...



9.3 ... and the bulb from the holder



10.2 The tail light unit is secured by three screws

2 Turn the bulbholder anti-clockwise and withdraw it from the tail light (see illustration).
3 Push the bulb into the holder and twist it anti-clockwise to remove it (see illustration). Check the socket terminals for corrosion and clean them if necessary. Line up the pins of the new bulb with the slots in the socket, then push the bulb in and turn it clockwise until it locks into place. **Note:** The pins on the bulb are offset so it can only be installed one way. It is a good idea to use a paper towel or dry cloth when handling the new bulb to prevent injury if the bulb should break and to increase bulb life.
4 Install the bulbholder into the tail light and turn it clockwise to secure it.
5 Locate the tabs at the front of the passenger's seat and push down on the seat to engage the latch.

10 Tail light assembly - removal and installation

1 Remove the seat cowl (see Chapter 8).
2 Remove the three screws securing the tail light assembly and carefully withdraw it from the cowl (see illustration). If required, turn the bulbholders anti-clockwise and withdraw them from the tail light.

Removal

1 The battery provides power for operation of the turn signal lights, so if they do not operate, always check the battery voltage first. Low battery voltage indicates either a faulty battery or a defective charging system. Refer to Section 3 for battery checks and Sections 34 and 35 for charging system tests. Also, check the fuse (see Section 5) and the switch (see Section 20).
2 Most turn signal problems are the result of a burned out bulb or corroded socket. This is especially true when the turn signals function properly in one direction, but fail to flash in the other direction. Check the bulbs and the sockets (see Section 12).
3 If the bulbs and sockets are good, check for power at the turn signal relay black/brown wire (VFR) or brown/white wire (RVF) with the

operation of the tail light and the brake light.
3 Installation is the reverse of removal. Check the operation of the tail light and the brake

Installation

1 Remove the screw securing the turn signal lens and remove the lens, noting how it fits (see illustration). On VFR K models, remove the rubber gasket if it is free, and discard it if it is damaged or deteriorated.
2 On all except VFR K models, turn the bulbholder anti-clockwise and withdraw it from the lens (see illustration).
3 Either a bayonet type bulb or a capless type bulb will be fitted. The bayonet type bulb is removed by pushing the bulb into the holder and twisting it anti-clockwise (see

12 Turn signal bulbs - replacement

ignition ON. The relay is mounted under the seat cowl on the left-hand side of the bike (see illustration). Remove the seat cowl (see illustration). Turn the ignition OFF when the check is complete.
4 If no power was present at the relay, check the wiring from the relay to the ignition (main) switch for continuity.
5 If power was present at the relay, using the appropriate wiring diagram at the end of this Chapter, check the wiring between the relay, turn signal switch and turn signal lights for continuity. If the wiring and switch are sound, replace the relay with a new one.

12.1 Remove the screw and detach the lens ...



12.2 ... then remove the bulbholder from the lens ...

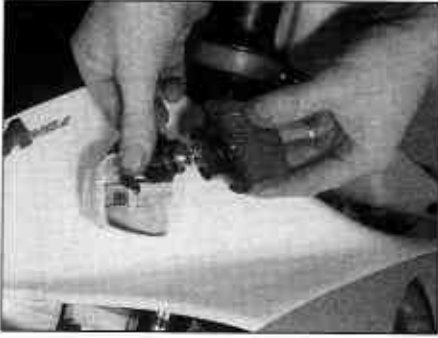


illustration). The capless type bulb is simply pulled out of the bulbholder.

4 Check the socket terminals for corrosion and clean them if necessary. On bayonet type bulbs, line up the pins of the new bulb with the slots in the socket, then push the bulb in and turn it clockwise until it locks into place. When fitting the capless bulb, carefully align its fine connecting pins with the holes in the bulbholder and press it into place.

5 On all except VFR K models, install the bulbholder back into the lens, making sure it is securely held.

6 Fit the lens onto the holder. On VFR K models, use a new rubber gasket if required, and make sure it is properly seated and not pinched by the lens. On all other models, locate the tab on the back of the lens in the slot in the housing.

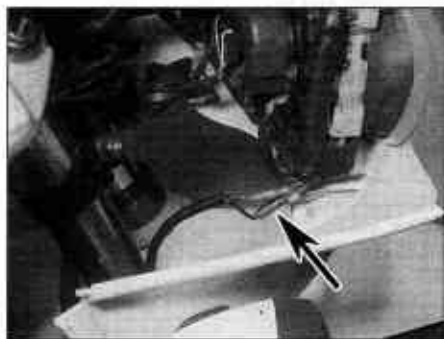


12.3 ... and the bulb from the holder

13 Turn signal assemblies – removal and installation

Removal

1 Disconnect the turn signal wiring connectors. On the front turn signals, they are



13.1a Front turn signal wiring connectors (arrowed)



13.1b Rear turn signal wiring connectors

on the inside of the fairing (**see illustration**). On the rear turn signals, remove the seat cowling (**see Chapter 8**) – the connectors are inside a rubber boot which is secured by a clip (**see illustration**).

2 On UK VFR L and M models, remove the nut securing the assembly to either the inside of the fairing or rear mudguard. Remove the assembly, noting how the lug locates in the hole in the bracket. Note the mounting rubbers fitted with the front assemblies.

3 On all other models, remove the screw securing the assembly to either the inside of the fairing or rear mudguard (**see illustrations**). Remove the assembly, noting the arrangement of the mounting base and collar.

Installation

4 Installation is the reverse of removal. Check the operation of the turn signals.

14 Brake light switches – check and replacement

Circuit check

1 Before checking any electrical circuit, check the bulb (**see Section 9**) and fuse (**see Section 5**).

2 Using a multimeter or test light connected to a good earth (ground), check for voltage at the black/brown terminal on the brake light switch wiring connector (**see illustration 14.5 or 14.8**). If there's no voltage present, check the wire between the switch and the ignition switch (**see the wiring diagrams** at the end of this Chapter).

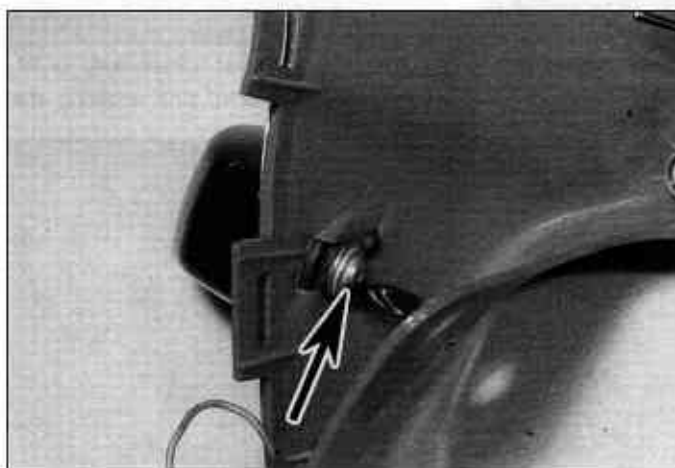
3 If voltage is available, touch the probe of the test light to the other terminal of the switch, then pull the brake lever in or depress the brake pedal. If no reading is obtained or the test light doesn't light up, replace the switch.

4 If a reading is obtained or the test light does light up, check the wiring between the switch and the brake light bulb (**see the wiring diagrams** at the end of this Chapter).

Switch replacement

Front brake lever switch

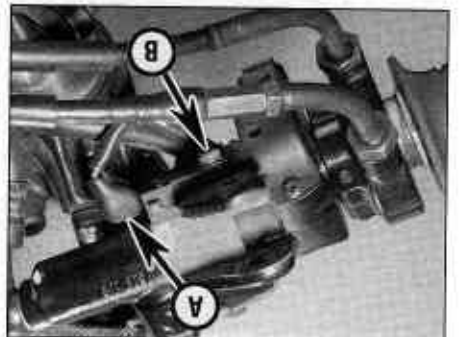
5 The switch is mounted on the underside of the brake master cylinder. Disconnect the



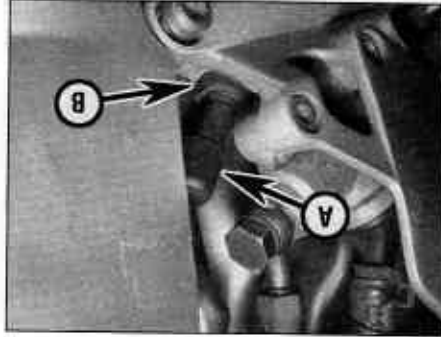
13.3a Front turn signal mounting screw (arrowed)



13.3b Rear turn signal mounting screw (arrowed)



14.5 Front brake switch wiring connectors (A), and mounting screw (B)



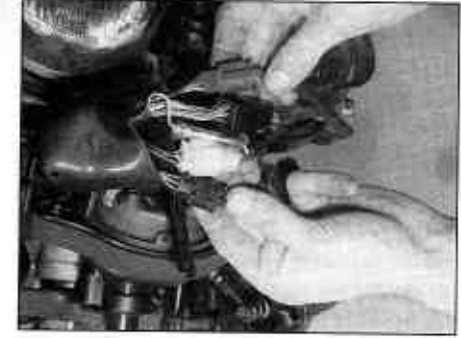
14.8a Rear brake light switch (A) and its adjuster ring (B)



14.8b Disconnect the wiring connector

wiring connectors from the switch (see illustration).
6 Remove the single screw securing the switch to the bottom of the master cylinder and remove the switch (see illustration 14.5).
7 Installation is the reverse of removal. The switch isn't adjustable.
Rear brake pedal switch
8 The switch is mounted on the inside of the right-hand footrest bracket (see illustration). Remove the seat cowl for access to the connector (see Chapter 8). Trace the wiring from the switch and disconnect it at the connector (see illustration).
9 Detach the lower end of the switch spring from the brake pedal, then unscrew and

remove the switch. If access to the switch is too restricted, unscrew the two bolts securing the rider's right-hand footrest bracket and the brake master cylinder/heat shield assembly out, making sure no strain is placed on the brake and reservoir hoses.
10 Installation is the reverse of removal. If removed, tighten the footrest bracket bolts to the torque setting specified at the beginning of the Chapter. Make sure the brake light is activated just before the rear brake pedal takes effect. If adjustment is necessary, hold the switch and turn the adjusting ring on the switch body until the brake light is activated when required.



15.3a Disconnect all the wiring connectors . . .



15.3b . . . and feed the loom between the instruments



15.4 The instrument cluster is secured by two bolts (arrowed)



15.5 Locate the pegs in the grommets (arrows)

Removal
7 Unscrew the knurled ring securing the speedometer cable
Speedometer cable
Installation
6 Installation is the reverse of removal. Make sure that the speedometer cable and wiring connectors are correctly routed and secured.
5 Carefully remove the instrument cluster. On RV/F models, note how the two pegs locate in the rubber grommets in the bracket (see illustration).
4 Unscrew the two bolts securing the instrument cluster and remove them with their collars, where fitted (see illustration).
3 Release the clip securing the wiring between the speedometer and the tachometer (see illustration). Feed the loom and the boot and position it clear (see illustration).
2 Unscrew the knurled ring securing the speedometer cable to the back of the instrument cluster and detach the cable (see illustration).
1 Remove the fairing (see Chapter 8).
Removal
Instrument cluster

15 Instruments and speedometer cable - removal and installation



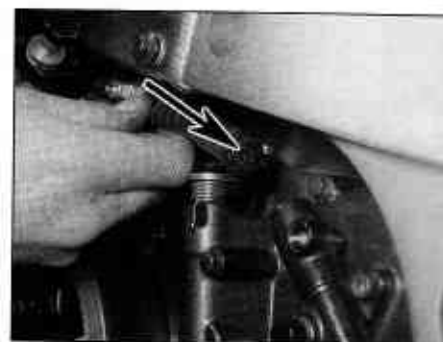
15.7 Unscrew the ring and detach the cable



15.8a Remove the screw (arrowed) . . .



15.8b . . . and detach the cable



15.12 Align the slot (arrowed) with the drive tab

speedometer cable to the back of the speedometer and detach the cable (see illustration).

8 Remove the screw securing the lower end of the cable to the drive housing on the engine sprocket cover and detach the cable (see illustrations).

9 Withdraw the cable, releasing it from its guides, and remove it from the bike, noting its correct routing.

Installation

10 Route the cable up through its guides to the back of the instrument cluster.

11 Connect the cable upper end to the speedometer and tighten the retaining ring securely.

12 Connect the cable lower end to the drive

housing, aligning the slot in the cable end with the drive tab, and tighten the retaining screw securely (see illustration).

13 Check that the cable doesn't restrict steering movement or interfere with any other components.

16 Instruments – check and replacement

Speedometer

Check

1 Special instruments are required to properly check the operation of this meter. If it is

believed to be faulty, take the motorcycle to a Honda dealer for assessment.

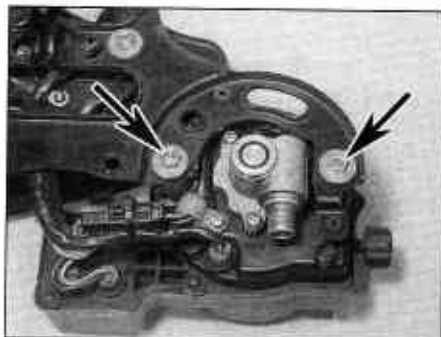
Replacement – VFR models

2 Remove the instrument cluster (see Section 15).

3 Remove the two nuts securing the speedometer/warning light assembly to the bracket and remove the assembly, feeding the wiring connector under the instrument bracket as you do (see illustrations).

4 Using a very small Phillips screwdriver, remove the screw in the centre of the odometer trip knob and remove the knob (see illustrations).

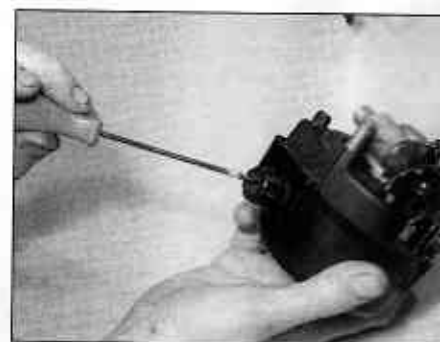
5 Remove the five screws securing the speedometer/warning light assembly front cover and remove the cover (see illustrations).



16.3a Unscrew the two nuts (arrowed) . . .



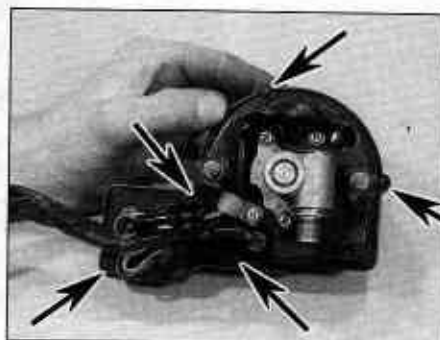
16.3b . . . and separate the speedometer from the assembly



16.4a Remove the screw . . .



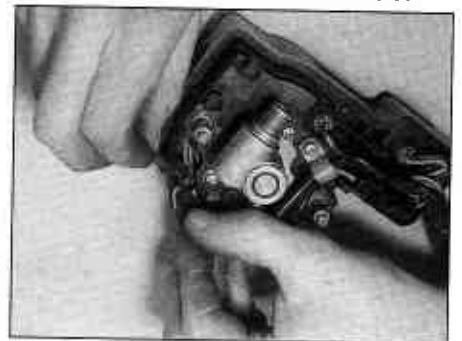
16.4b . . . and pull off the knob



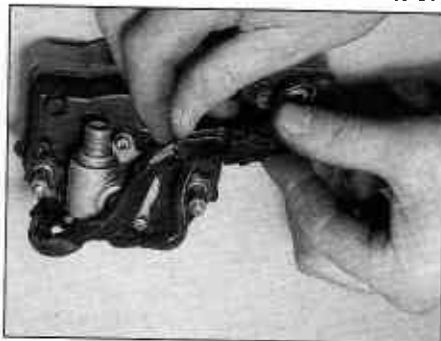
16.5a Remove the screws (arrowed) . . .



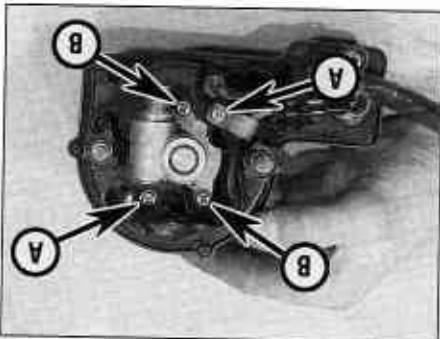
16.5b . . . and lift off the front cover



16.6a Remove the blanking cap . . .



16.6b . . . and disconnect the wiring loom



16.7 Remove the two mounting screws (A) and the gearbox screws (B) . . .

speedometer gearbox, noting the earth wire secured by the upper screw, and lift off the box (see illustration).

13 Remove the screws securing the instrument cluster front cover, noting the positions of the wiring clips, and remove the cover.

14 Remove the blanking cap from the entry hole for the speedometer wiring. Disconnect the wiring connector.

15 Remove the two screws securing the speedometer to the casing. Carefully withdraw the speedometer from the casing.

Feed the wiring and its connector through the hole as you do.

Tachometer

Check

47 Special instruments are required to properly check the operation of this meter. If it is believed to be faulty, take the motorcycle to a Honda dealer.

Replacement – VFR models
a Holiday dealer for assessment.

Replacement – VFR models

18 Remove the instrument cluster (see Section 15).

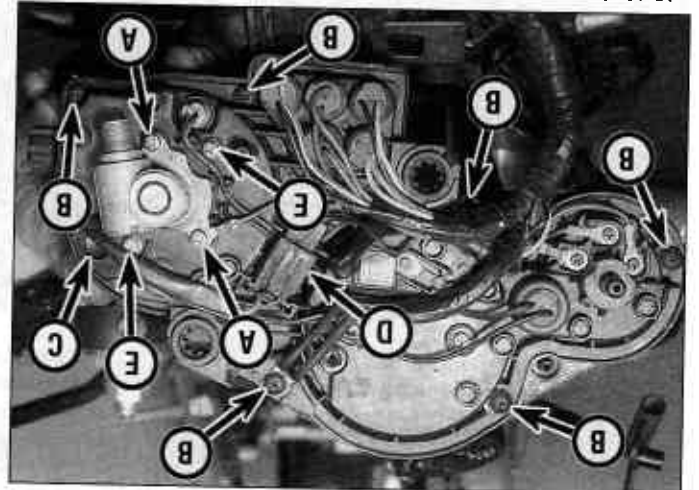
19 Disconnect the tachometer wiring connector, and remove the screw securing the earth wire (see illustration).

wiring and its connector through the hole as you do (see illustration).

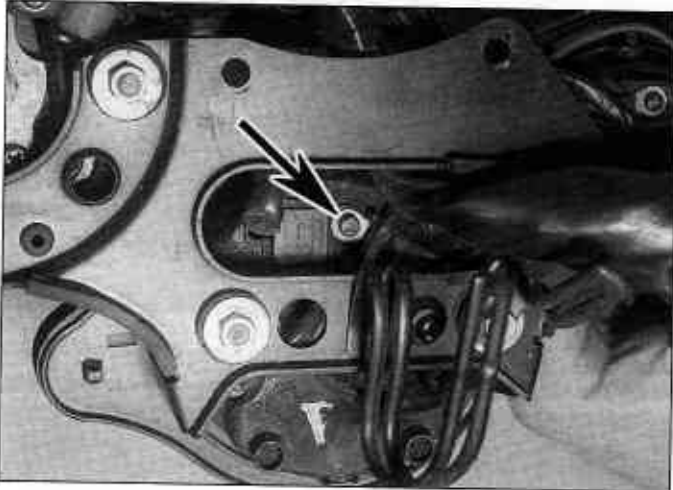
Replacement – RVF models

11 Using a very small Phillips screwdriver, remove the screw in the centre of the

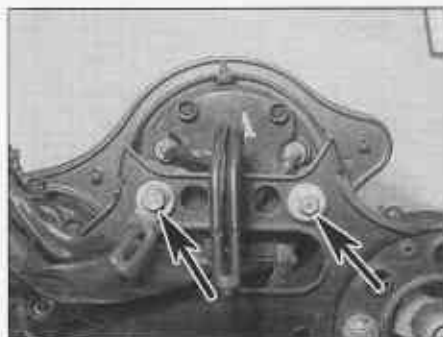
12 Remove the two screws securing the



16.12 Speedometer gearbox screws (A), front cover screws (B), blanking cap (C), wiring connector (D), speedometer mounting screws (E)



16.19 Remove the screw (arrowed) securing the earth lead . . .



16.20 ... then remove the nuts (arrowed) ...



16.21a ... pull out the bulbholders ...



16.21b ... and remove the tachometer

20 Remove the two nuts and their washers securing the tachometer to the bracket, noting the wiring clip secured by the left-hand nut (see illustration).

21 Carefully pull the two tachometer light bulbholders out of the back of the tachometer, and withdraw the tachometer from the front (see illustrations).

22 Installation is the reverse of removal. Make sure the wires are correctly and securely connected.

Replacement - RVF models

23 Remove the instrument cluster (see Section 15).

24 Using a very small Phillips screwdriver, remove the screw in the centre of the

odometer trip knob and remove the knob (see illustration 16.4a and b).

25 Remove the screws securing the instrument cluster front cover, noting the positions of the wiring clips, and remove the cover (see illustration).

26 Remove the blanking cap from the entry hole for the tachometer wiring. Disconnect the wiring connector. Also remove the screw securing the earth wire.

27 Remove the two screws securing the tachometer to the casing. Carefully withdraw the tachometer from the front, feeding the wiring and its connector through the hole as you do.

28 Installation is the reverse of removal.

Coolant temperature gauge

Check

29 See Chapter 3.

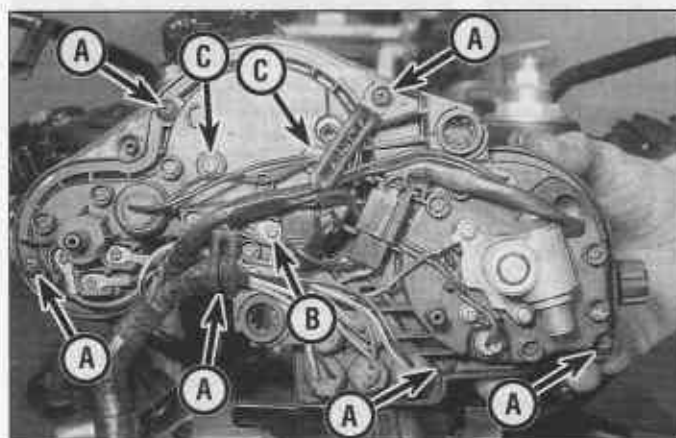
Replacement - VFR models

30 Remove the instrument cluster (see Section 15).

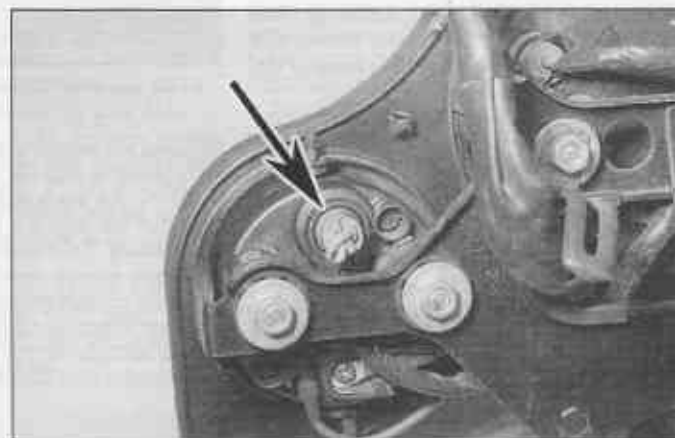
31 Carefully pull the light bulbholder out of the back of the temperature gauge (see illustration).

32 Remove the screw securing each wiring connector, making a note of which fits where (see illustration).

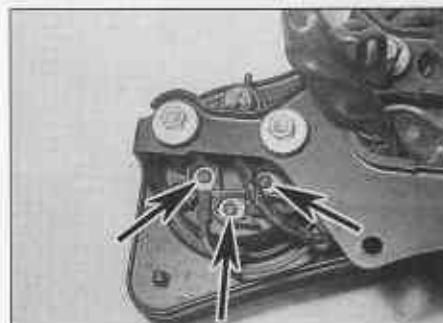
33 Remove the two nuts and their washers securing the temperature gauge to the bracket and carefully withdraw the gauge from the front (see illustrations).



16.25 Front cover screws (A), earth wire screw (B), tachometer mounting screws (C)



16.31 Pull out the bulbholder (arrowed) ...



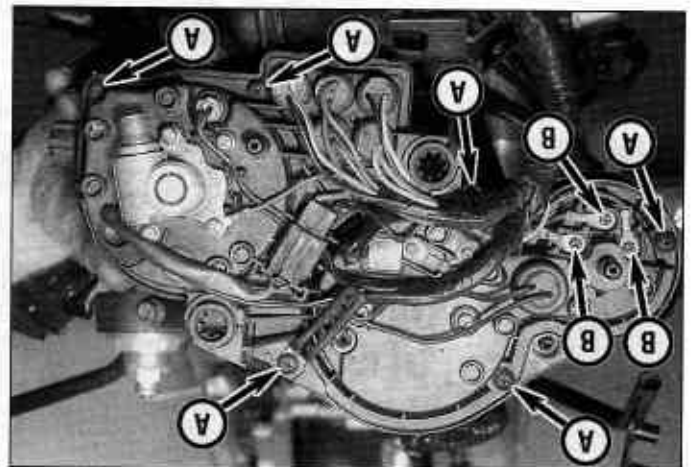
16.32 ... and remove the wiring connector screws



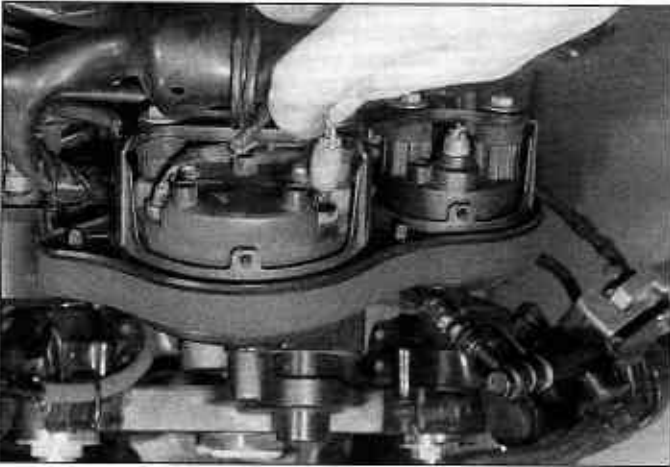
16.33a ... then remove the two nuts ...



16.33b ... and remove the temperature gauge



16.37 Front cover screws (A), wiring connector screws (B)



17.2a Pull the bulbholder out of the instrument ...



17.2b ... and the bulb out of the holder



17.4 Pull the bulbholder out of the panel and remove the bulb

34 Installation is the reverse of removal. Make sure the wires are correctly and securely connected.

Replacement - RVF models

35 Remove the instrument cluster (see Section 15).

36 Using a very small Phillips screwdriver, remove the screw in the centre of the odometer trip knob and remove the knob (see illustrations 16.4a and b).

37 Remove the screws securing the instrument cluster front cover, noting the positions of the wiring clips, and remove the cover (see illustration).

38 Remove the screw securing each wiring connector, making a note of which fits where, then carefully withdraw the temperature gauge from the front.

39 Installation is the reverse of removal. Make sure the wires are correctly and securely connected.

17 bulbs - replacement

17 instrument and warning light bulbs - replacement

1 Remove the fairing (see Chapter 8).

2 Gently pull the bulbholder out of the instrument casing, then pull the bulb out of the bulbholder (see illustrations). If the socket contacts are dirty or corroded, scrape them clean and spray with electrical contact cleaner before a new bulb is installed. Carefully push the new bulb into the holder and install the windshield, trim and inner screen (see Chapter 8).

3 Remove the fairing (see Chapter 8). The bulbs are accessible with the instrument cluster in place, but access is quite restricted. If it is too restricted, unscrew the two bolts

Indicator/warning light bulbs

18 Oil pressure switch - check, removal and installation

1 The oil pressure warning light should come on when the ignition (main) switch is turned ON and extinguish a few seconds after the engine is started. If the oil pressure warning light comes on whilst the engine is running, stop the engine immediately and carry out an oil level check, and if the level is correct, an oil pressure check (see Chapter 1).

2 If the oil pressure warning light does not come on when the ignition is turned on, check the bulb (see Section 17) and fuse (see Section 5).

Check

18.3a Pull back the rubber cover (arrowed) ...

18.3a Pull back the rubber cover (arrowed) ...



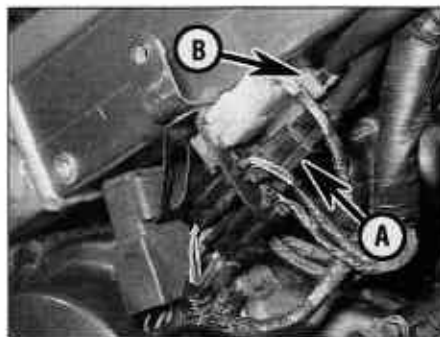
3 The oil pressure switch is screwed into the crankcase between the cylinders and is accessed by removing the lower fairing (see Chapter 8). Pull the rubber cover off the switch and remove the screw securing the wiring connector (see illustrations). With the light comes on. If the light comes on, the switch is defective and must be replaced.

4 If the light still does not come on, check for voltage at the wire terminal. If there is no voltage present, check the wire between the

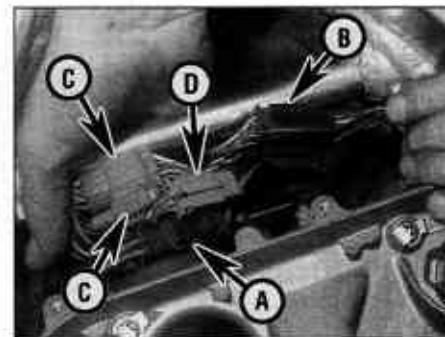
18.3a Pull back the rubber cover (arrowed) ...



18.3b ... then remove the terminal screw and detach the wiring



19.1a Ignition switch wiring connector (A), right-hand switchgear connector (B) – VFR models



19.1b Ignition switch wiring connector (A), right-hand switchgear connector (B), left-hand switchgear connectors (C), sidestand switch connector (D) – RVF models

switch, the instrument cluster and fusebox for continuity (see the *wiring diagrams* at the end of this Chapter).

5 If the warning light comes on whilst the engine is running, yet the oil pressure is satisfactory, remove the wire from the oil pressure switch. With the wire detached and the ignition switched ON the light should be out. If it is illuminated, the wire between the switch and instrument cluster must be earthed (grounded) at some point. If the wiring is good, the switch must be assumed faulty and replaced.

Removal

6 Remove the lower fairing (see Chapter 8).
7 Pull the rubber cover off the switch and remove the screw securing the wiring connector (see illustrations 18.3a and b).
8 Unscrew the oil pressure switch and withdraw it from the crankcase.

Installation

9 Apply a suitable sealant to the upper portion of the switch threads near the switch body, leaving the bottom 3 to 4 mm of thread clean. Install the switch in the crankcase and tighten it to the torque setting specified at the beginning of the Chapter. Attach the wiring connector and secure it with the screw, then fit the rubber cover (see illustrations 18.3b and a).
10 Run the engine and check that the switch operates correctly.
11 Install the middle fairing panel (see Chapter 8).

19 Ignition (main) switch – check, removal and installation



Warning: To prevent the risk of short circuits, disconnect the battery negative (–ve) lead before making any ignition (main) switch checks.

Check

1 On VFR models, remove the lower fairing. On RVF models, remove the air filter housing

(see Chapter 4). Trace the ignition (main) switch wiring back from the base of the switch and disconnect it at the black connector (see illustrations).

2 Using an ohmmeter or a continuity tester, check the continuity of the connector terminal pairs (see the *wiring diagrams* at the end of this Chapter). Continuity should exist between the terminals connected by a solid line on the diagram when the switch is in the indicated position.

3 If the switch fails any of the tests, replace it.

Removal

Note: Support the bike on an auxiliary stand and tie the back end down so that all weight is off the front end of the bike.

4 On VFR models, remove the lower fairing. On RVF models, remove the air filter housing (see Chapter 4). Trace the ignition (main) switch wiring back from the base of the switch and disconnect it at the black connector (see illustrations 19.1a or b). Draw the wiring through to the switch, noting its routing.

5 Two Torx bolts mount the ignition switch to the underside of the top yoke (see illustration). Remove the bolts and withdraw the switch from the top yoke.

Installation

6 Installation is the reverse of removal. Tighten the Torx bolts to the torque setting



19.5 The ignition switch is secured by two Torx bolts (arrowed)

specified at the beginning of the Chapter. Make sure wiring is securely connected and correctly routed.

20 Handlebar switches – check

1 Generally speaking, the switches are reliable and trouble-free. Most troubles, when they do occur, are caused by dirty or corroded contacts, but wear and breakage of internal parts is a possibility that should not be overlooked. If breakage does occur, the entire switch and related wiring harness will have to be replaced with a new one, as individual parts are not available.

2 The switches can be checked for continuity using an ohmmeter or a continuity test light. Always disconnect the battery negative (–ve) cable, which will prevent the possibility of a short circuit, before making the checks.

3 Trace the wiring harness of the switch in question back to its connector and disconnect it. On VFR models, the connector for the right-hand switch is below the main frame on the right-hand side – remove the lower fairing for access (see illustration 19.1a). The connectors for the left-hand switch are in a rubber boot behind the left-hand side of the upper radiator – remove the left-hand fairing side panel for access (see illustration). On



20.3 Left-hand switchgear wiring connectors (arrowed) – VFR models



21.3a Remove the screws . . .



21.3b . . . and separate the halves



21.4 Locate the pin (arrowed) in the hole in the handlebar

RVF models, the connectors for both switches are behind the steering stem – remove the air filter housing for access (see Chapter 4) (see illustration 19.1b).
 4 Check for continuity between the terminals of the switch harness with the switch in the various positions (i.e. switch off – no continuity, switch on – continuity) – see the wiring diagrams at the end of this Chapter.
 5 If the continuity check indicates a problem exists, refer to Section 21, remove the switch and spray the switch contacts with electrical contact cleaner. If they are accessible, the contacts can be scraped clean with a knife or polished with crocus cloth. If switch components are damaged or broken, it will be obvious when the switch is disassembled.

21 Handlebar switches – removal and installation

Removal

1 If the switch is to be removed from the bike,

trace the wiring harness of the switch in question back to its connector and disconnect it. On VFR models, the connector for the right-hand switch is below the main frame on the right-hand side – remove the lower fairing for access (see illustration 19.1a). The connectors for the left-hand switch are in a rubber boot behind the left-hand side of the upper radiator – remove the left-hand fairing side panel for access (see illustration 20.3). On RVF models, the connectors for both switches are behind the steering stem – remove the air filter housing for access (see Chapter 4) (see illustration 19.1b). Work back along the harness, freeing it from all the relevant clips and ties, whilst noting its correct routing.

2 Disconnect the two wires from the brake light switch (if removing the right-hand switch) or the clutch switch (if removing the left-hand switch) (see illustration 14.5 or 24.1).
 3 Unscrew the two handlebar switch screws and free the switch from the handlebar by separating the halves (see illustrations).

22 Neutral switch – check, removal and installation

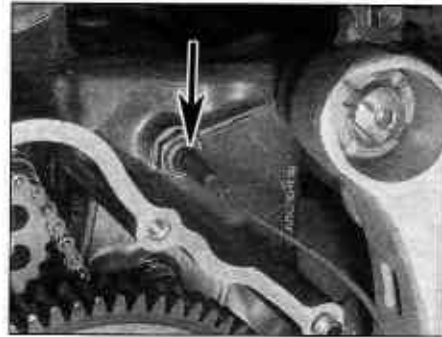
Installation

4 Installation is the reverse of removal. Make sure the locating pin in the lower half of the switch locates in the hole in the underside of the handlebar (see illustration).

Check

1 Before checking the electrical circuit, check the bulb (see Section 17) and fuse (see Section 5).
 2 The switch is located in the right-hand side of the transmission casing on the back of the engine (see illustration). Remove the lower fairing for access (see Chapter 8). Detach the wiring connector from the switch (see illustration). Make sure the transmission is in neutral.

3 With the connector disconnected and the ignition switched ON, the neutral light should be out. If not, the wire between the connector (grounded) at some point.
 4 Check for continuity between the switch terminal and the crankcase. With the transmission in neutral, there should be continuity. With the transmission in gear, there should be no continuity. If the tests prove otherwise, then the switch is faulty.
 5 If the continuity tests prove the switch is good, check for voltage at the wire terminal



22.2a Neutral switch (arrowed)



22.2b Disconnect the wiring connector

Check

1 The sidestand switch is mounted on the back of the sidestand. The switch is part of the safety circuit which prevents or stops the engine running if the transmission is in gear whilst the sidestand is down, and prevents the engine from starting if the transmission is in gear unless the sidestand is up, and unless the clutch is pulled in. Before checking the

23 Sidestand switch – (RVF models) – check and replacement

Installation

6 Remove the lower fairing (see Chapter 8).
 7 Detach the wiring connector from the switch (see illustration 22.2b).
 8 Unscrew the switch and withdraw it from the transmission casing.

Removal

using a test light. If there's no voltage present, check the wire between the switch, the instrument cluster and fusebox (see the wiring diagrams at the end of this Chapter).

21.4 Locate the pin (arrowed) in the hole in the handlebar



23.6 Sidestand switch (arrowed)

electrical circuit, check the indicator bulb (see Section 17) and fuse (see Section 5).

2 Remove the lower fairing (see Chapter 8) and the air filter housing (see Chapter 4). Trace the wiring back from the switch to its connector and disconnect it (see illustration 19.1b).

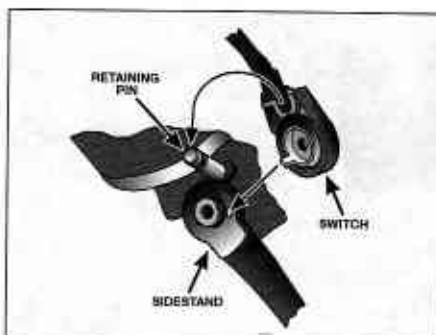
3 Check the operation of the switch using an ohmmeter or continuity test light. Connect the meter to the green/white and green wires on the switch side of the connector. With the sidestand up there should be continuity (zero resistance) between the terminals, and with the stand down there should be no continuity (infinite resistance). Now connect the meter to the yellow/black and green wires on the switch side of the connector. With the sidestand down there should be continuity (zero resistance) between the terminals, and with the stand up there should be no continuity (infinite resistance).

4 If the switch does not perform as expected, it is defective and must be replaced.

5 If the switch is good, check the wiring between the various components in the starter safety circuit (see the wiring diagrams at the end of this book).

Replacement

6 The sidestand switch is mounted on the back of the sidestand (see illustration). Remove the lower fairing (see Chapter 8) and the air filter housing (see Chapter 4). Trace the wiring back from the switch to its connector and disconnect it (see illustration 19.1b). Work back along the switch wiring, freeing it



23.8 Make sure the lug on the switch locates in the hole in the stand, and the cutout in the switch locates around the retaining pin

from any relevant retaining clips and ties, noting its correct routing.

7 Unscrew the switch bolt and remove the switch from the stand, noting how it fits.

8 Fit the new switch onto the sidestand, making sure the pin locates in the hole in the sidestand, and the lug for the spring on the stand bracket locates into the cutout in the switch body (see illustration). Secure the switch with its bolt.

9 Make sure the wiring is correctly routed up to the connector and retained by all the necessary clips and ties.

10 Reconnect the wiring connector and check the operation of the sidestand switch.

11 Install the lower fairing (see Chapter 8).

24 Clutch switch - check and replacement

Check

1 The clutch switch is housed in the clutch lever bracket. The switch is part of the safety circuit which prevents or stops the engine running if the transmission is in gear whilst the sidestand is down, and prevents the engine from starting if the transmission is in gear unless the sidestand is up and the clutch lever is pulled in. The switch isn't adjustable.

2 To check the switch, disconnect the wiring connectors from the switch (see illustration).



24.2 Disconnect the clutch switch wiring connectors (arrowed)

Connect the probes of an ohmmeter or a continuity test light to the two switch terminals. With the clutch lever pulled in, continuity should be indicated. With the clutch lever out, no continuity (infinite resistance) should be indicated.

3 If the switch is good, check the other components in the starter circuit as described in the relevant sections of this Chapter. If all components are good, check the wiring between the various components (see the wiring diagrams at the end of this book).

Replacement

4 Remove the clutch lever (see Chapter 6).

5 Disconnect the wiring connectors from the clutch switch (see illustration 24.2). Using a small screwdriver, push the switch from the connector end and withdraw it from inside the bracket (see illustration).

6 Installation is the reverse of removal. Make sure the ridge on the top of the switch locates in the cutout in the lever bracket, and push the switch fully home (see illustration).

25 Diode - check and replacement

Check

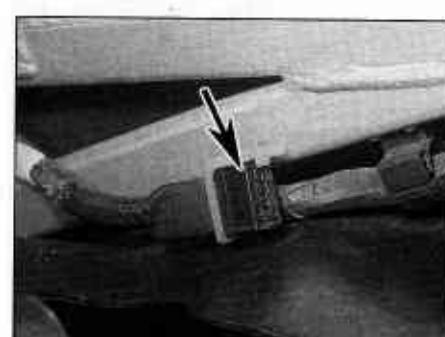
1 The diode is a small block that plugs into a connector in the main wiring harness, and is located on the left-hand side of the rear sub-frame (see illustration). The diode is part of



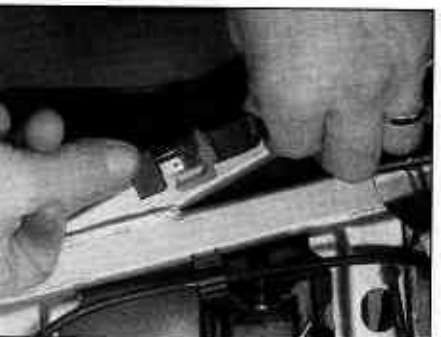
24.5 Push the switch out using a screwdriver



24.6 Make sure the ridge locates in the cutout (arrowed)



25.1 Diode (arrowed)



25.2 Pull the diode out of its connector



26.5a Unplug the wiring connectors ...



26.5b ... then unscrew the bolt and remove the horn

between the various components (see the wiring diagrams at the end of this book).

Replacement

6 The diode is a small block that plugs into a connector in the main wiring harness, and is located on the left-hand side of the rear sub-frame (see illustration 25.1). Remove the seat cowl for access (see Chapter 8).

3 On models with a two-pin diode connector, using an ohmmeter or continuity tester, connect the positive (+ve) probe to the green/red terminal of the diode and the negative (-ve) probe to the light green/red terminal. The diode should show continuity. Now reverse the probes. The diode should show no continuity. If it doesn't behave as stated, replace the diode.

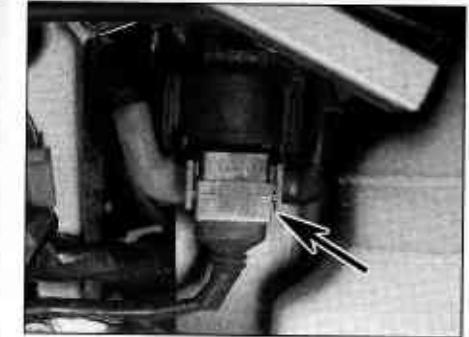
2 Remove the seat cowl (see Chapter 8) and disconnect the diode from the harness (see illustration).

3 On models with a two-pin diode connector, using an ohmmeter or continuity tester, connect the positive (+ve) probe to the green/red terminal of the diode and the negative (-ve) probe to the light green/red terminal. The diode should show continuity. Now reverse the probes. The diode should show no continuity. If it doesn't behave as stated, replace the diode.

4 On models with a three-pin diode connector, using an ohmmeter or continuity tester, connect the positive (+ve) probe to one of the outer terminals of the diode and the negative (-ve) probe to the middle terminal of the diode. The diode should show continuity. Now reverse the probes. The diode should show no continuity. Repeat the tests between the other outer terminal and the middle terminal. The same results should be achieved. If it doesn't behave as stated, replace the diode.

5 If the diode is good, check the other components in the starter circuit as described in the relevant sections of this Chapter. If all components are good, check the wiring

27.2a Disconnect the wiring connector (arrowed) ...



4 The horn is mounted on the underside of the bottom yoke.

Replacement

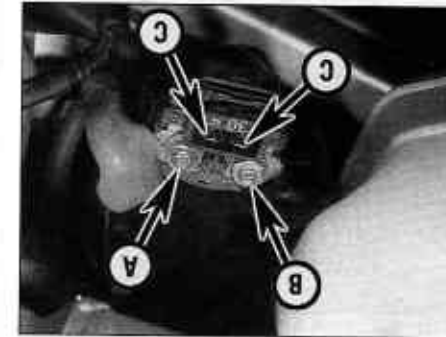
3 If the horn doesn't sound, replace it.

1 The horn is mounted on the underside of the bottom yoke.

26 Horn -
check and replacement

connect the new one (see illustration 25.2).

27.2b ... to access the battery lead (A), the starter motor lead (B) and the wiring terminals (C)



5 Unplug the wiring connectors from the horn, then unscrew the bolt securing the horn, and remove it from the bike (see illustrations).

6 Install the horn and securely tighten the bolt. Connect the wiring connectors to the horn.

27 Starter relay -
check and replacement

1 If the starter circuit is faulty, first check the fuse (see Section 5).

2 The starter relay is located under the seat cowl on the right-hand side of the bike, just ahead of the coolant reservoir. Remove the seat cowl for access (see Chapter 8).

Disconnect the relay wiring connector to the rubber terminal cover and unscrew the bolt securing the starter motor lead (see illustrations); position the lead away from the relay terminal. Reconnect the wiring connector. With the ignition switch ON, the engine kill switch in the RUN position, the transmission in neutral and the clutch pulled in, press the starter switch. The relay should be heard to click.

3 If the relay doesn't click, switch off the ignition and remove the relay as described below; test it as follows.

4 Set a multimeter to the ohms x 1 scale and connect it across the relay's starter motor and battery lead terminals (see illustration 27.2b). Using a fully-charged 12 volt battery and two insulated jumper wires, connect the positive (+ve) terminal of the battery to the yellow/red wire terminal of the relay, and the negative (-ve) terminal to the green/red wire terminal of the relay. At this point the relay should be heard to click and the multimeter read 0 ohms (continuity). If this is the case the relay is proved good. If the relay does not click when battery voltage is applied and indicates no continuity (infinite resistance) across its terminals, it is faulty and must be replaced.

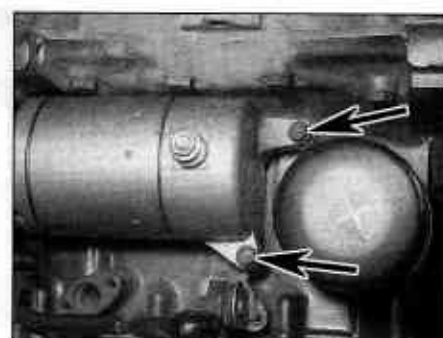
5 If the relay is good, check for battery



28.3a Pull back the terminal cover . . .



28.3b . . . then unscrew the nut and detach the lead



28.4 Unscrew the two bolts (arrowed) and remove the starter motor

voltage between the yellow/red wire and the green/red wire when the starter button is pressed. Check the other components in the starter circuit as described in the relevant sections of this Chapter. If all components are good, check the wiring between the various components (see the *wiring diagrams* at the end of this book).

Replacement

6 Remove the seat cowling (see Chapter 8).
7 Disconnect the battery terminals, remembering to disconnect the negative (-ve) terminal first.

8 Disconnect the relay wiring connector, then unscrew the two nuts securing the starter motor and battery leads to the relay and detach the leads (see illustrations 27.2a and b). Remove the relay with its rubber sleeve from its mounting lug on the frame.

9 Installation is the reverse of removal. Make sure the terminal nuts are securely tightened. Connect the negative (-ve) lead last when reconnecting the battery.

28 Starter motor – removal and installation

Removal

1 Remove the seat cowling and the lower

fairing (see Chapter 8). Disconnect the battery negative (-ve) lead. The starter motor is mounted at the front of the engine.

2 Remove the bolt securing the bottom of the lower radiator to the bracket, then swing the radiator forward.

3 Peel back the rubber terminal cover and remove the nut securing the starter lead to the motor (see illustrations). Detach the lead and withdraw it from its guide, if required.

4 Unscrew the two bolts securing the starter motor to the crankcase (see illustration). Slide the starter motor out from the crankcase and remove it from the machine.

5 Remove the O-ring on the end of the starter motor and discard it as a new one must be used (see illustration).

Installation

6 Install a new O-ring on the end of the starter motor and ensure it is seated in its groove (see illustration). Apply a smear of engine oil to the O-ring to aid installation.

7 Manoeuvre the motor into position and slide it into the crankcase (see illustration). Ensure that the starter motor teeth mesh correctly with those of the starter idle/reduction gear. Install the mounting bolts and tighten them securely.

8 Connect the starter lead to the motor, making sure it is fitted in its guide, and secure it with the nut (see illustration 28.3b). Make

sure the rubber cover is correctly seated over the terminal.

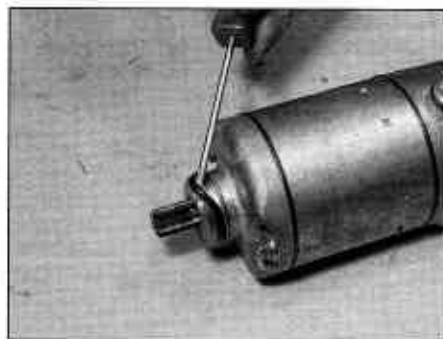
9 Connect the battery negative (-ve) lead and install the lower fairing and the seat cowling (see Chapter 8).

29 Starter motor – disassembly, inspection and reassembly

Disassembly

1 Remove the starter motor (see Section 28).

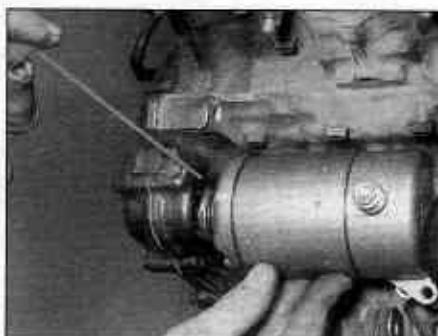
2 Note the alignment marks between the main housing and the front and rear covers, or



28.5 Remove the O-ring and discard it



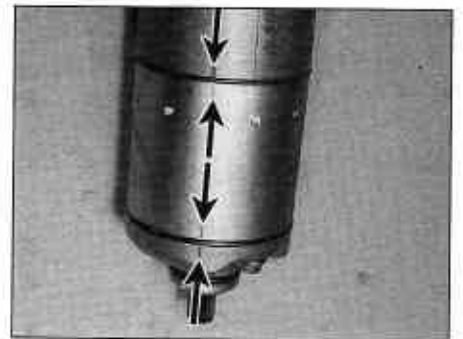
28.6 Fit a new O-ring . . .



28.7a . . . and lubricate it, then install the starter motor . . .



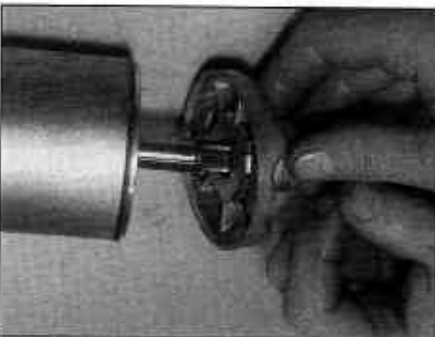
28.7b . . . and fit the bolts



29.2 Note the alignment marks between the housing and the covers (arrows)



29.3 Unscrew and remove the two bolts (arrowed) ...



29.4a ... then remove the front cover ...



29.4b ... the shims ...



29.4c ... and the tabbed washer

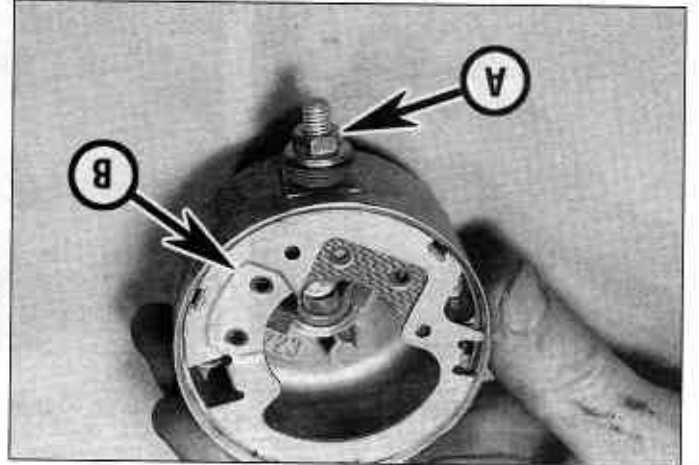


29.5 Remove the rear cover

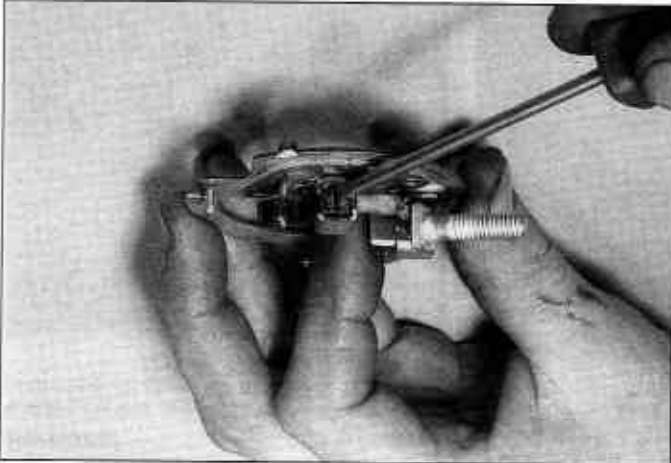
make your own if they aren't clear (see illustration).
 3 Unscrew the two long bolts, noting how the washers locate, and withdraw them from the starter motor (see illustration). Discard their O-rings as new ones must be used.
 4 Wrap some insulating tape around the teeth on the end of the starter motor shaft – this will protect the oil seal from damage as the front cover is removed. Remove the front cover from the motor (see illustration). Remove the used. Remove the shims from the rear end of the armature shaft or from inside the rear

discard it as a new one must be used. Remove the shims from the front end of the armature shaft or the inside of the front cover, noting their correct fitted locations (see illustration). Also remove the tabbed thrust washer from the front cover (see illustration). 5 Remove the rear cover and brushplate assembly from the motor (see illustration). Remove the cover O-ring from the main housing and discard it as a new one must be used. Remove the shims from inside the rear

cover after the brushplate assembly has been removed.
 6 Withdraw the armature from the main housing.
 7. Noting the correct fitted location of each component, unscrew the terminal nut and remove it along with its washer, the insulating washers and O-ring (see illustration). Withdraw the terminal bolt and brushplate assembly from the main housing.
 8 Lift the brush springs and slide the brushes out from their holders (see illustration).



29.7 Unscrew the nut (A) and remove the washers, then remove the brushplate assembly (B)



29.8 Lift the brush springs and withdraw the brushes

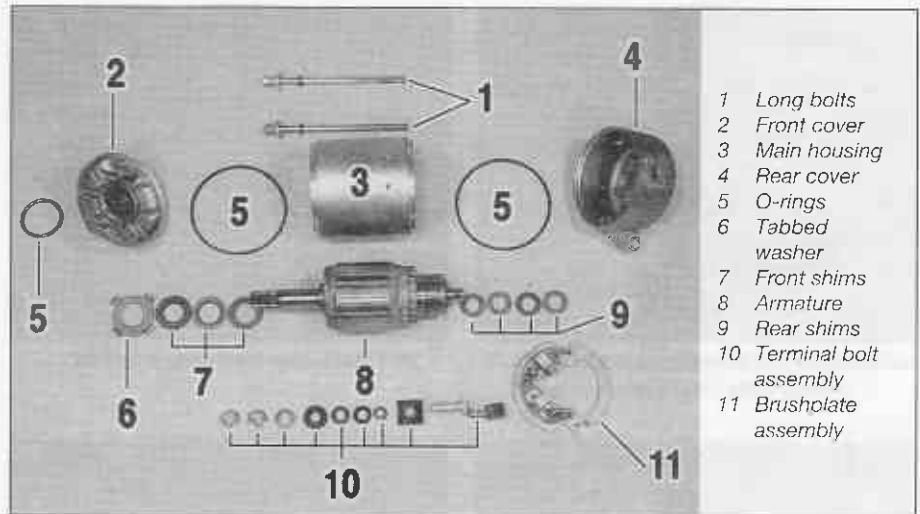
Inspection

9 The parts of the starter motor that are most likely to require attention are the brushes (*see illustration*). Measure the length of the brushes and compare the results to the brush length listed in this Chapter's Specifications (*see illustration*). If any of the brushes are worn beyond the service limit, replace the brush assembly with a new one. If the brushes are not worn excessively, nor cracked, chipped, or otherwise damaged, they may be re-used.

10 Inspect the commutator bars on the armature for scoring, scratches and discoloration. The commutator can be cleaned and polished with crocus cloth, but do not use sandpaper or emery paper. After cleaning, wipe away any residue with a cloth soaked in electrical system cleaner or denatured alcohol.

11 Using an ohmmeter or a continuity test light, check for continuity between the commutator bars (*see illustration*). Continuity should exist between each bar and all of the others. Also, check for continuity between the commutator bars and the armature shaft (*see illustration*). There should be no continuity (infinite resistance) between the commutator and the shaft. If the checks indicate otherwise, the armature is defective.

12 Check for continuity between each brush and the terminal bolt. There should be continuity (zero resistance). Check for continuity between the terminal bolt and the



29.9a Starter motor components

housing (when assembled). There should be no continuity (infinite resistance).

13 Check the front end of the armature shaft for worn, cracked, chipped and broken teeth. If the shaft is damaged or worn, replace the armature.

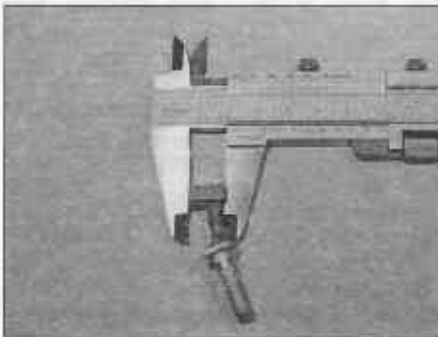
14 Inspect the end covers for signs of cracks or wear. Inspect the magnets in the main housing and the housing itself for cracks.

15 Inspect the insulating washers and front cover oil seal for signs of damage and replace them if necessary.

Reassembly

16 Slide the brushes back into position in their holders and place the brush spring ends onto the brushes (*see illustration*).

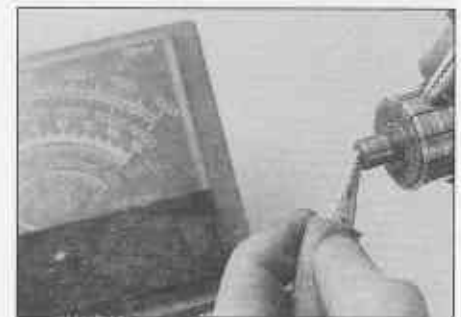
17 Ensure that the inner rubber insulator is in place on the terminal bolt, then insert the bolt through the rear cover and fit the brushplate assembly in the rear cover, making sure its tab is correctly located in the slot in the cover (*see illustrations*). Fit the O-ring and the insulating washers over the terminal, then fit



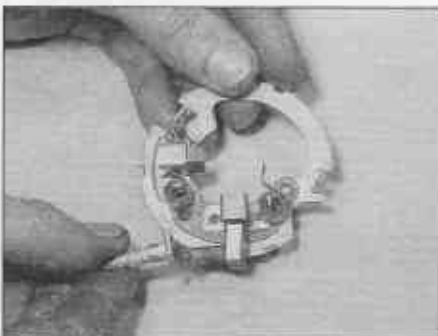
29.9b Measure the brush length



29.11a Continuity should exist between the commutator bars



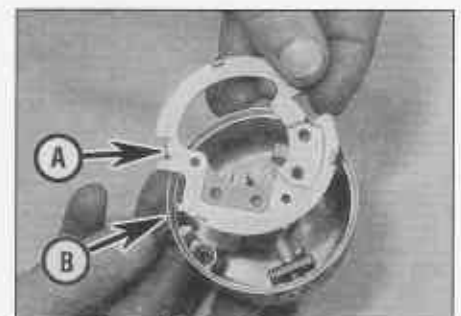
29.11b There should be no continuity between the commutator bars and the armature shaft



29.16 Fit the brushes into the brushplate and locate the springs . . .



29.17a . . . then fit the inner insulator (arrowed) onto the terminal bolt



29.17b Fit the brushplate assembly into the rear cover, aligning the tab (A) with the slot (B) . . .