HAYNES SERVICE & REPAIR MANUAL

SUZUKI

GS500E Twin

'89 to '97



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Motor Cycle News

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1 Engine/transmission oil level

Before you start

✔ Take the motorcycle on a short run to allow it to reach normal operating temperature. ***Caution: Do not run the engine in an enclosed space such as a garage or workshop.***

✔ Stop the engine and place the motorcycle on its centre stand. Allow it to stand undisturbed for a few minutes to allow the oil level to stabilise. Make sure the motorcycle is on level ground.

Bike care:

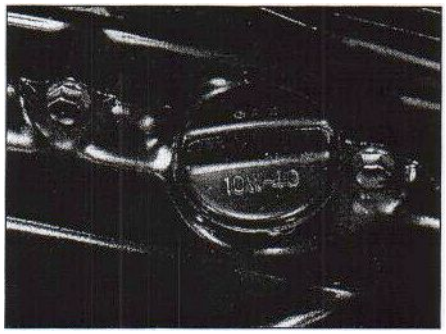
● If you have to add oil frequently, you should check whether you have any oil leaks. If there is no sign of oil leakage from the joints and gaskets the engine could be burning oil (see *Fault Finding*).

The correct oil

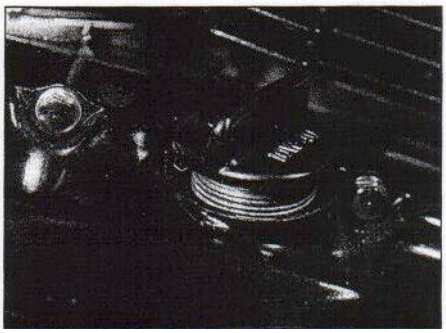
● Modern, high-revving engines place great demands on their oil. It is very important that the correct oil for your bike is used.

● Always top up with a good quality oil of the specified type and viscosity and do not overfill the engine.

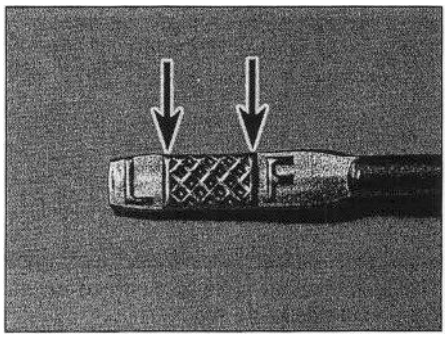
Oil type	API grade SE or SF (minimum)
Oil viscosity	SAE 10W/40



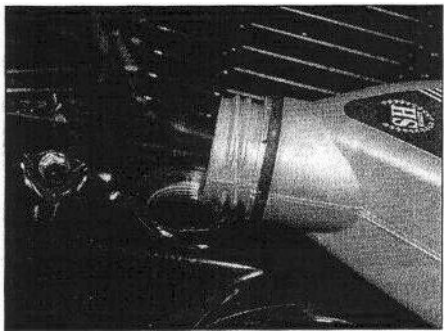
1 Unscrew the oil filler cap from the right-hand side crankcase cover. The dipstick is integral with the oil filler cap, and is used to check the engine oil level.



2 Using a clean rag or paper towel, wipe off all the oil from the dipstick, then insert the clean dipstick back into the engine, but do not screw it in.



3 Remove the dipstick and observe the level of the oil, which should be somewhere in between the upper 'F' and lower 'L' level lines (arrows).



4 If the level is below the 'L' line, top the engine up with the recommended grade and type of oil, to bring the level up to the 'F' line on the dipstick.

2 Battery electrolyte level

⚠ ***Warning: Be extremely careful when handling or working around the battery - the electrolyte is very caustic.***

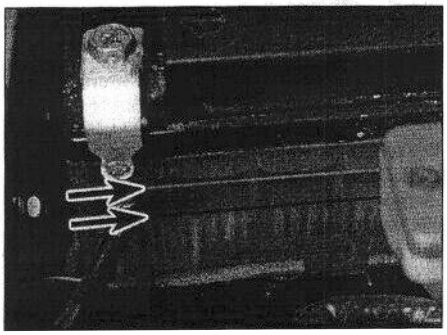
Before you start:

✔ Position the motorcycle on its centre stand on level ground. Remove the seat (see Chapter 7) for access to the battery.

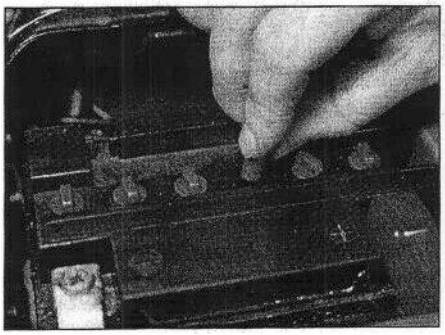
✔ Use distilled water to top up the battery. Do not use tap water (except in an emergency).

Bike care:

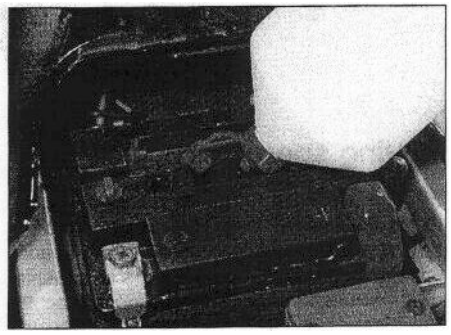
● If the battery electrolyte level needs topping up frequently, it is likely that there is a problem either with the battery or with the charging system. Refer to Chapter 8 and investigate the problem.



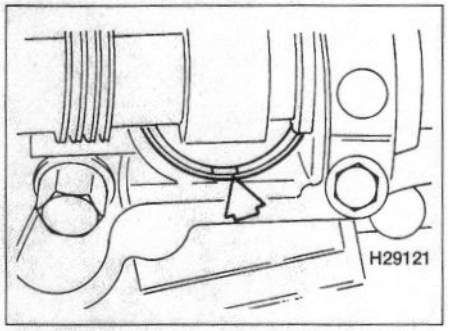
1 The electrolyte level is visible through the translucent battery case - it should be between the upper MAX and lower level lines (arrows).



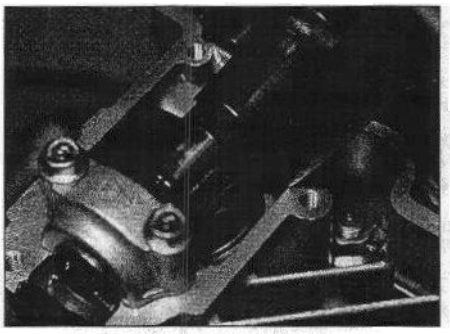
2 If the electrolyte is low the battery must be topped up with distilled water. Remove the cell caps . . .



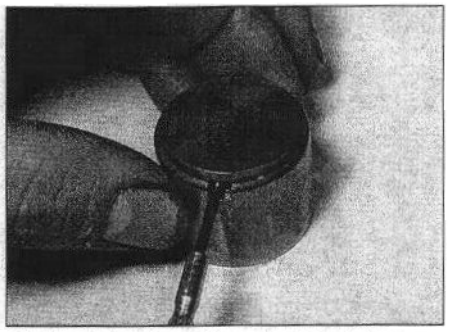
3 . . . and fill each cell to the MAX level line with distilled water - do not overfill. On completion, mop up any spills and install the cell caps.



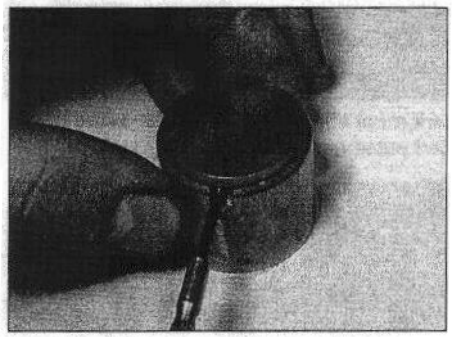
5.9 Turn the follower so that its notch (arrow) faces the middle of the engine



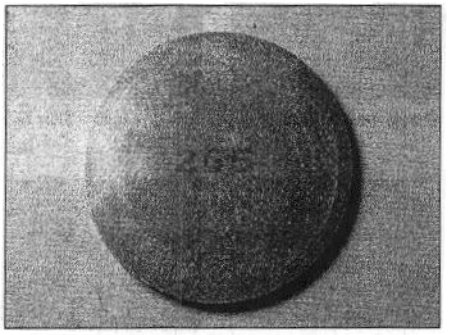
5.10 Using the tool to depress the cam follower



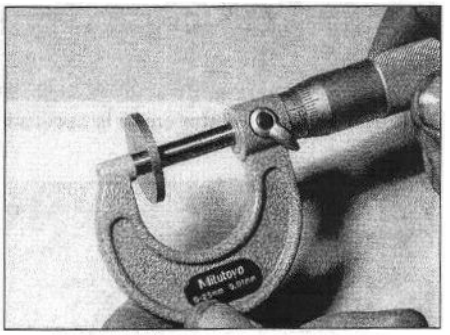
5.11a Prise the shim out of the follower (follower shown removed from engine) . . .



5.11b . . . and remove it using a pair of pliers



5.11c The shim size is marked on the underside of the shim



5.11d Measure the shim using a micrometer to confirm its size

9 Using your fingers, turn the cam follower of the valve in question so that its shim removing slot faces backwards (exhaust valve) or forwards (intake valve) **(see illustration)**.

10 Fit the tool under the camshaft, making sure it contacts only the follower and not the shim, and press it down to depress the follower **(see illustration)**.

11 Prise the shim out of the follower using a small screwdriver inserted in its slot and remove it using a pair of pliers **(see illustrations)**. The shim size should be stamped on its face **(see illustration)**. A shim size of 250 denotes a thickness of 2.5 mm, 245 is 2.45 mm. It is recommended that the shim is measured to check that it has not worn **(see illustration)**. Shims are available in 0.05 mm increments from 2.15 to 3.10 mm.

12 Using the shim selection chart, find where the measured valve clearance and existing shim thickness values intersect and read off the shim size required **(see illustration)**. Obtain and install the replacement shim, noting that its size marking should be installed downwards and that the shim should be lubricated with engine oil.

13 Remove the tool from the follower. Rotate the crankshaft several turns to seat the new shim. Check the clearance again, then repeat the process for any other valves until the clearances are correct.

14 Install all disturbed components in a reverse of the removal sequence.

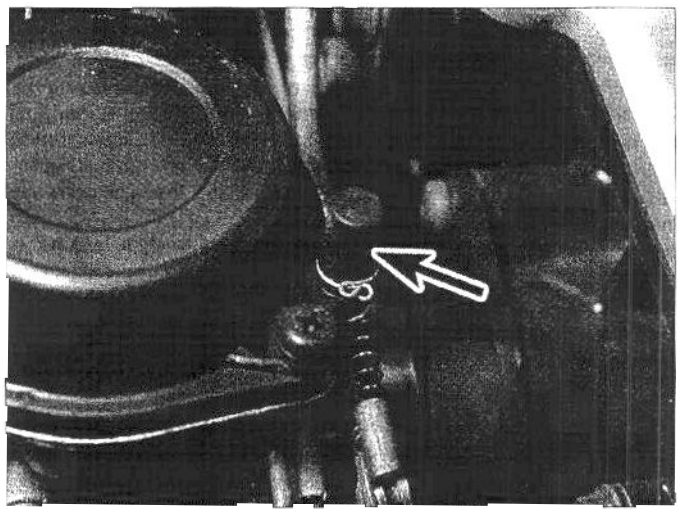
Valve Clearance (mm)	PRESENT SHIM SIZE - mm																			
	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10
0.00~0.02		2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05
0.03~0.08	CORRECT CLEARANCE: NO ADJUSTMENT REQUIRED																			
0.09~0.13	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	
0.14~0.18	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10		
0.19~0.23	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10			
0.24~0.28	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10				
0.29~0.33	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10					
0.34~0.38	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10						
0.39~0.43	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10							
0.44~0.48	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10								
0.49~0.53	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10									
0.54~0.58	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10										
0.59~0.63	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10											
0.64~0.68	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10												
0.69~0.73	2.80	2.85	2.90	2.95	3.00	3.05	3.10													
0.74~0.78	2.85	2.90	2.95	3.00	3.05	3.10														
0.79~0.83	2.90	2.95	3.00	3.05	3.10															
0.84~0.88	2.95	3.00	3.05	3.10																
0.89~0.93	3.00	3.05	3.10																	
0.94~0.98	3.05	3.10																		
0.99~1.03	3.10																			

EXAMPLE

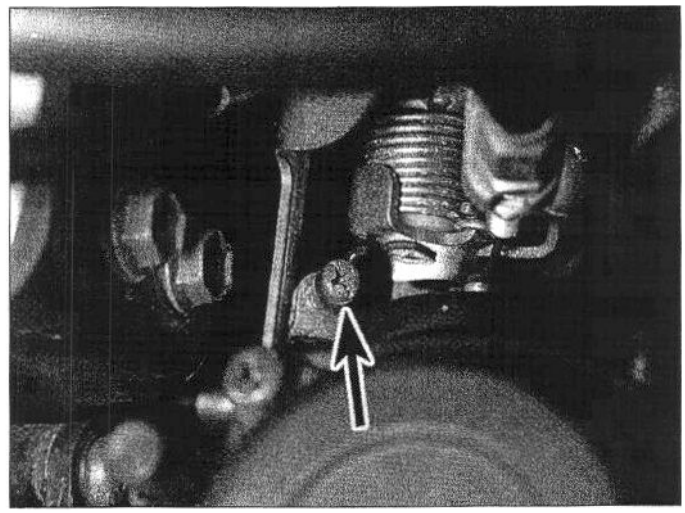
Valve clearance - 0.36 mm
Present shim size - 2.45 mm
Shim size required - 2.75 mm

5.12 Shim selection chart

H29122



25.5 Remove the vacuum take-off cap (arrow)



25.8 Carburettor synchronisation screw (arrow)

must be replaced. Note that in very rare cases the fault could lie in the carburettors rather than the cable, necessitating the removal of the carburettors and inspection of the choke valves (see Chapter 3).

25 Carburettors - synchronisation

Note: *The carburettors will go out of synchronisation over a period of time, resulting in decreased fuel mileage, increased engine temperature, less than ideal throttle response and higher vibration levels.*

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.

Warning: Take great care not to burn your hand on the hot engine unit when accessing the gauge take-off points on the intake manifolds. Do not allow exhaust gases to build up in the work area; either perform the check outside or use an exhaust gas extraction system.

1 Carburettor synchronisation is simply the process of adjusting the carburettors so they pass the same amount of fuel/air mixture to each cylinder. This is done by measuring the vacuum produced in each cylinder. Before synchronising the carburettors, make sure the valve clearances are properly set.

2 To properly synchronise the carburettors, you will need some sort of vacuum gauge set-up with a gauge for each cylinder, or a manometer, which is a calibrated tube arrangement that utilises columns of mercury or steel rods to indicate engine vacuum. If using a mercury manometer, extra precautions must be taken during use and storage of the instrument as mercury is a liquid, and extremely toxic. Because of the nature of the synchronisation procedure and the need for special instruments, most owners leave the task to a Suzuki dealer.

3 Start the engine and let it run until it reaches normal operating temperature, then shut it off.

4 Remove the fuel tank (see Chapter 3).

5 Remove the vacuum take-off cap from the top of each carburettor **(see illustration)**. Connect the gauge hoses to the take-off adapters. Make sure there are no air leaks as false readings will result.

6 Arrange a temporary fuel supply, either by using a small temporary tank or by using extra long fuel pipes to the now remote fuel tank. Alternatively, position the tank on a suitable base on the motorcycle, taking care not to scratch any paintwork, and making sure that the tank is safely and securely supported.

7 Start the engine and increase the idle speed to 1750 rpm using the throttle stop screw under the right-hand carburettor **(see illustration 9.3)**. If the gauges are fitted with damping adjustment, set this so that the needle flutter is just eliminated but so that they can still respond to small changes in pressure. The vacuum readings for both of the cylinders should be the same. If the vacuum readings vary, proceed as follows.

Caution: Do not allow the engine to overheat. If necessary, stop the engine and allow it to cool before starting again.

8 The carburettors are adjusted by turning the synchronising screw situated in-between the carburettors, in the throttle linkage **(see illustration)**. The screw is accessed using a long screwdriver. Turn the screw until the reading on each gauge is the same. **Note:** *Do not press down on the screw whilst adjusting it, otherwise a false reading will be obtained.* When the carburettors are synchronised, open and close the throttle quickly to settle the linkage, and recheck the gauge readings, readjusting if necessary.

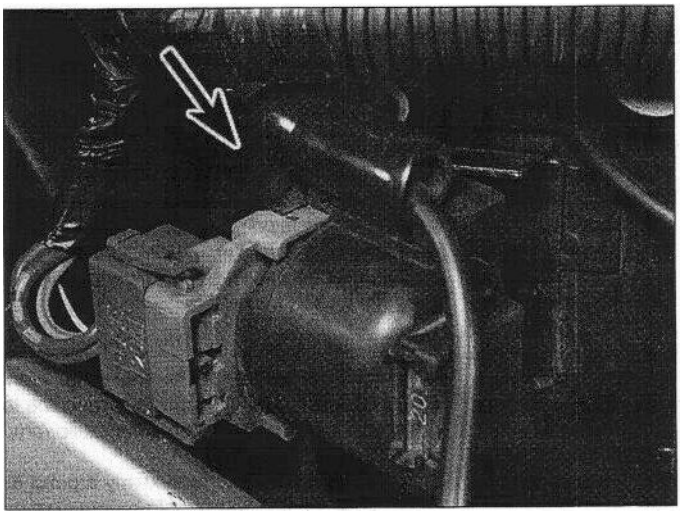
9 When the adjustment is complete, recheck the vacuum readings, then adjust the idle speed by turning the throttle stop screw until the idle speed listed in this Chapter's Specifications is obtained.

10 Stop the engine. Remove the gauge hoses and replace the take-off caps. Detach the temporary fuel supply and install the fuel tank (see Chapter 3).

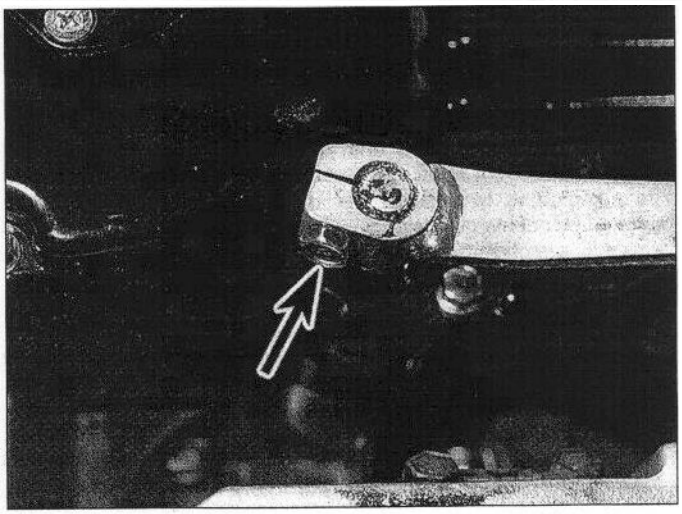
26 Headlight - aim check and adjustment

Note: *An improperly adjusted headlight may cause problems for oncoming traffic or provide poor, unsafe illumination of the road ahead. Before adjusting the headlight aim, be sure to consult with local traffic laws and regulations. For UK models, refer to 'MOT Test Checks' in the Reference section on this Manual.*

1 The headlight beam can be adjusted both horizontally and vertically. Check first that the tyre pressures are correct and the suspension is adjusted as required. The machine must be off its stand and on level ground, with the fuel tank half full and with an assistant sitting on the seat. If the bike is usually ridden with a passenger on the back, have a second assistant to do this.



5.10 Pull back the rubber cover (arrow) and disconnect the starter motor lead from its terminal on the relay



5.11 Unscrew the gearchange lever pinch bolt (arrow)

releasing it from its clamp on the frame tube. Peel back the rubber cover from the relay, then unscrew the nut securing the cable to its terminal and disconnect the cable **(see illustration)**. Pull the cable back to the starter motor, noting its routing, and coil it on top of the crankcase so that it does not impede engine removal.

11 Unscrew the gearchange lever pinch bolt and remove the lever from the shaft, noting any alignment marks on the lever and the shaft **(see illustration)**. If no marks are visible, make your own before removing the lever so that it can be correctly aligned with the shaft on installation.

12 Remove the front sprocket (Chapter 5).

13 Remove the exhaust system (Chapter 3).

14 Trace the ignition pulse generator and oil pressure switch wiring back from the base of the right-hand side crankcase cover and disconnect it at its connector. Release the wiring from any clips or ties, noting its routing, and coil it on top of the crankcase so that it does not impede engine removal.

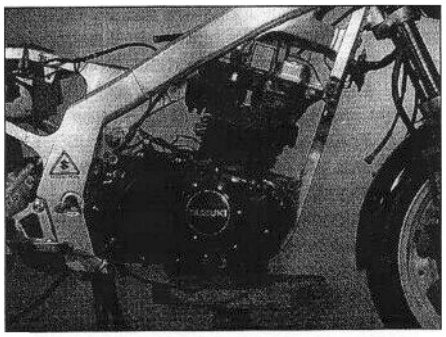
15 Trace the alternator wiring back from the top of the sprocket cover on the left-hand side of the engine and disconnect it at its bullet connectors. Release the wiring from any clips or ties, noting its routing, and coil it on top of the crankcase so that it does not impede engine removal.

16 Trace the neutral switch wiring back from the top of the sprocket cover and disconnect it at its connector. Release the wiring from any clips or ties, noting its routing, and coil it on top of the crankcase so that it does not impede engine removal.

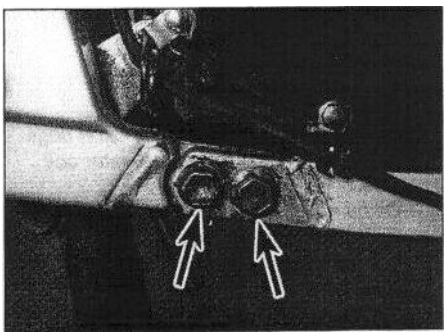
17 At this point, position an hydraulic or mechanical jack under the engine with a block of wood between the jack head and sump (oil pan) **(see illustration)**. Make sure the jack is centrally positioned so the engine will not topple when the last mounting bolt is removed. Take the weight of the engine on the jack.

18 Unscrew the nuts on the six bolts which secure the right-hand side frame downtube to the rest of the frame, then withdraw the bolts **(see illustrations)**.

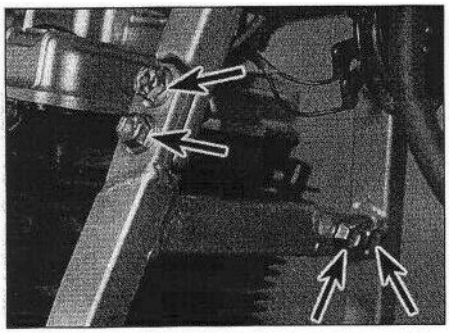
19 Unscrew the nuts on both the upper and lower front engine mounting bolts, then remove the right-hand side frame downtube **(see illustrations)**. Remove the spacers from



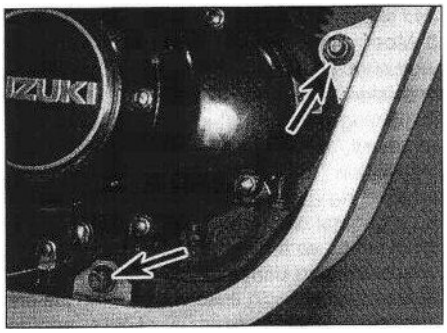
5.17 Support the engine using a jack and a block of wood



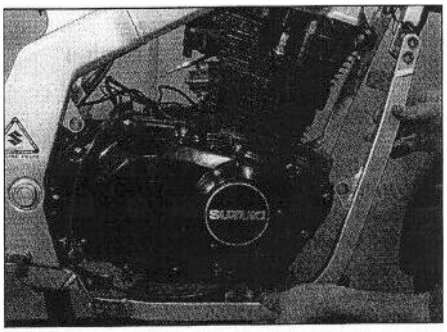
5.18a Right-hand side frame downtube is secured by two bolts at the rear (arrows) . . .



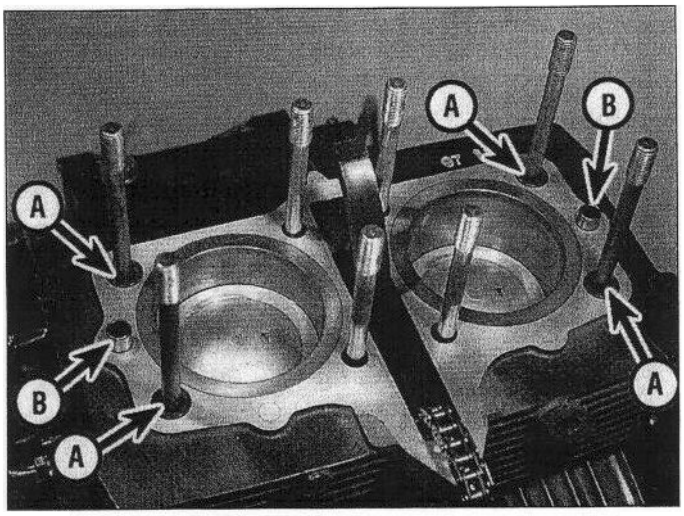
5.18b . . . and four at the front (arrows)



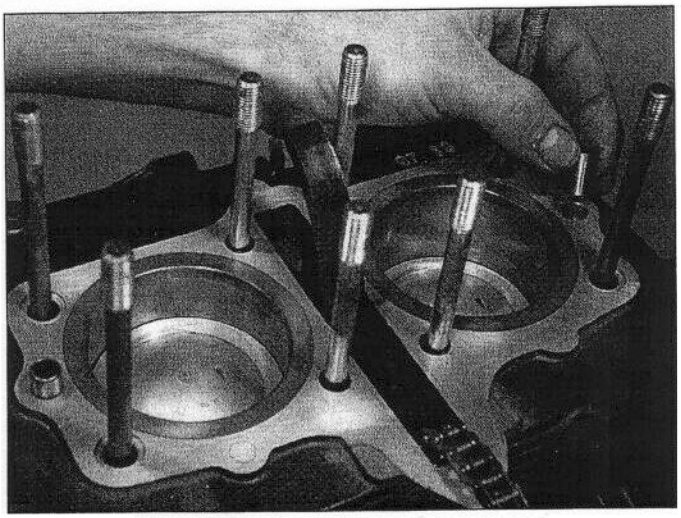
5.19a Unscrew the front engine bolt nuts (arrows) . . .



5.19b . . . and remove the frame downtube



11.7 Remove the stud O-rings (A) and the dowels (B), if they are loose



11.11 Install the two dowels, if removed

the nuts evenly and a little at a time in a **reverse** of their numerical sequence until they are all slack. Remove all the nuts and their washers, taking great care not to drop any of them into the crankcase. Discard the washers as new ones must be used.

6 Pull the cylinder head up off the studs. If it is stuck, tap around the joint faces of the cylinder head with a soft-faced mallet to free the head. Do not attempt to free the head by inserting a screwdriver between the head and cylinder block - you'll damage the sealing surfaces.

7 Lift the head off the block, and remove it from the engine. Remove the old cylinder head gasket and the O-rings which fit around the cylinder head studs **(see illustration)**. Stuff a clean rag into the camchain tunnel to prevent any debris falling into the engine. Discard the gasket and O-rings as new ones must be used.

8 If they are loose, remove the two dowels from the cylinder block studs **(see illustration 11.7)**. If either appears to be missing it is probably stuck in the underside of the cylinder head.

9 Check the cylinder head gasket and the mating surfaces on the cylinder head and block for signs of leakage, which could indicate warpage. Refer to Section 13 and check the flatness of the cylinder head.

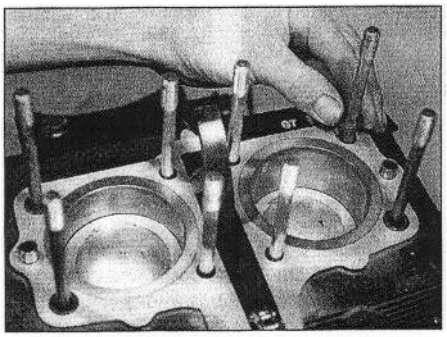
10 Clean all traces of old gasket material from the cylinder head and block. If a scraper is used, take care not to scratch or gouge the soft aluminium. Be careful not to let any of the gasket material fall into the crankcase, the cylinder bores or the oil passages.

Installation

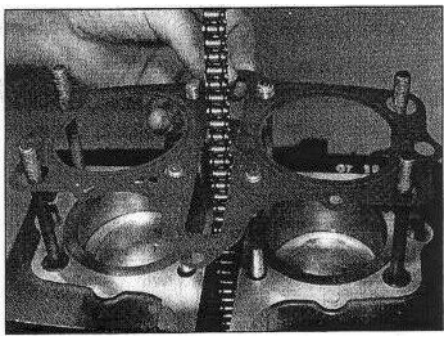
11 If removed, install the two dowels onto the cylinder block studs **(see illustration)**. Lubricate the cylinder bores with engine oil.

12 Fit a new O-ring onto each cylinder head stud and press it into its recess in the top of the cylinder block **(see illustration)**. Check that they are properly seated.

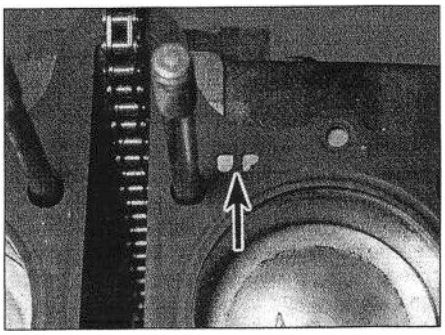
13 Ensure the cylinder head and block mating surfaces are clean, then lay the new head gasket in place on the cylinder block, making sure all the holes are correctly aligned and that the UP letters stamped out of the gasket read the correct way round **(see illustrations)**. Never re-use the old gasket.



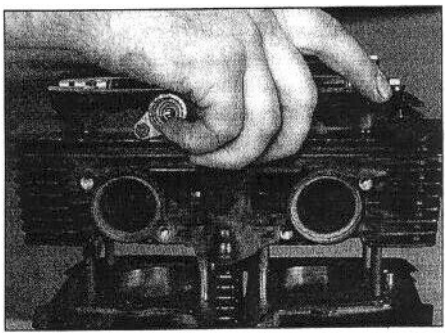
11.12 Fit a new O-ring around each stud



11.13a Fit the new cylinder head gasket . . .



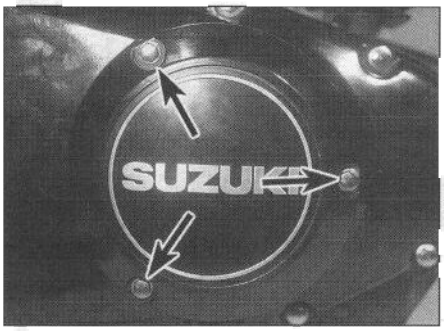
11.13b . . . making sure the UP mark (arrow) reads correctly



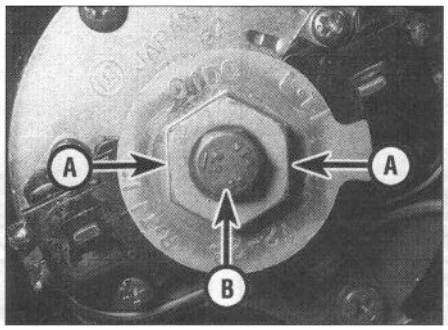
11.14 Lower the cylinder head onto the block

14 Carefully lower the cylinder head over the studs and onto the block **(see illustration)**. It is helpful to have an assistant to pass the camchain up through the tunnel and slip a piece of wire through it to prevent it falling back into the engine. Keep the chain taut to prevent it becoming disengaged from the crankshaft sprocket.

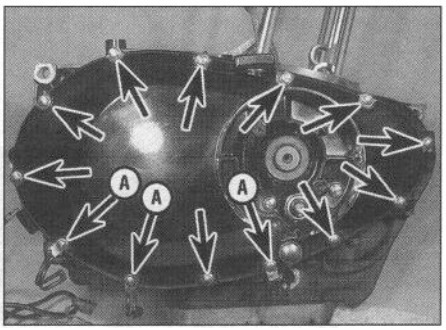
15 Install the eight domed nuts using new washers and tighten them finger-tight **(see illustrations)**.



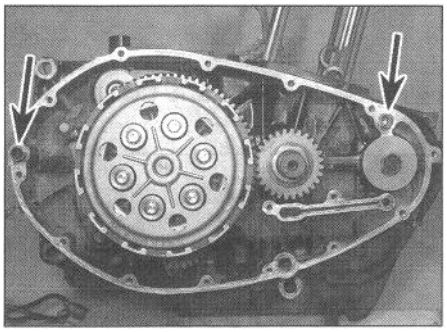
17.2a The pulse generator assembly cover is secured by three bolts (arrows)



17.2b Counter-hold the rotor using a 19 mm spanner on the flats (A) and unscrew the rotor bolt (B)



17.3 The crankcase cover is secured by thirteen bolts (arrows). Note the positions of the wiring clips on three of the bolts (A)



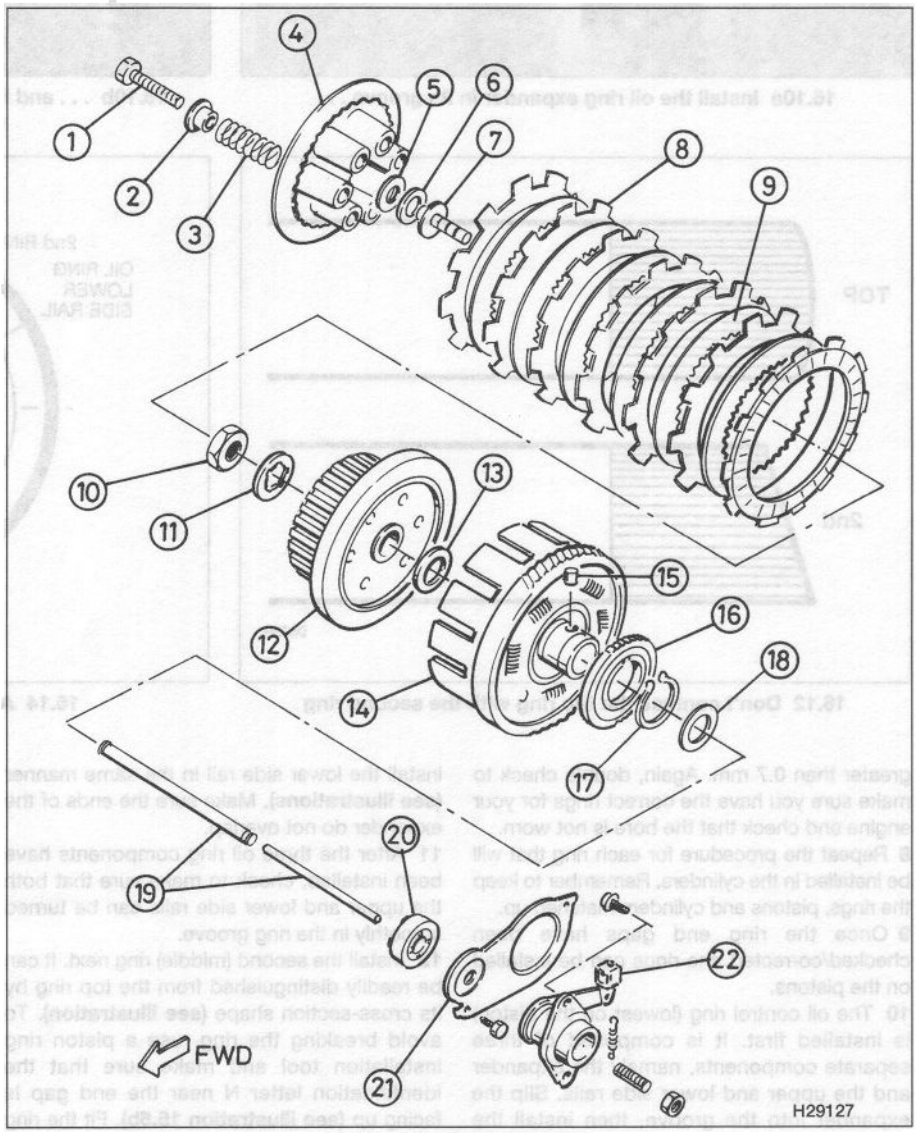
17.4 Note the positions of the two dowels (arrows) and remove them if they are loose

hand side crankcase cover **(see illustration)**. Remove the cover. Using a 19 mm spanner to counter-hold the timing rotor, unscrew the bolt in the centre of the rotor which secures it to the end of the crankshaft **(see illustration)**. Remove the rotor, noting how the pin in the end of the crankshaft locates in the slot in the rotor. The pulse generator coil assembly and oil pressure switch can remain in the crankcase cover, but the wiring must be disconnected at its connector behind the left-hand side panel and released from any clips or ties to enable the cover to be moved away from the machine.

3 Working in a criss-cross pattern, evenly slacken the right-hand side crankcase cover retaining bolts, noting the position of the cable clips **(see illustration)**. Lift the cover away from the engine, being prepared to catch any residual oil which may be released as the cover is removed.

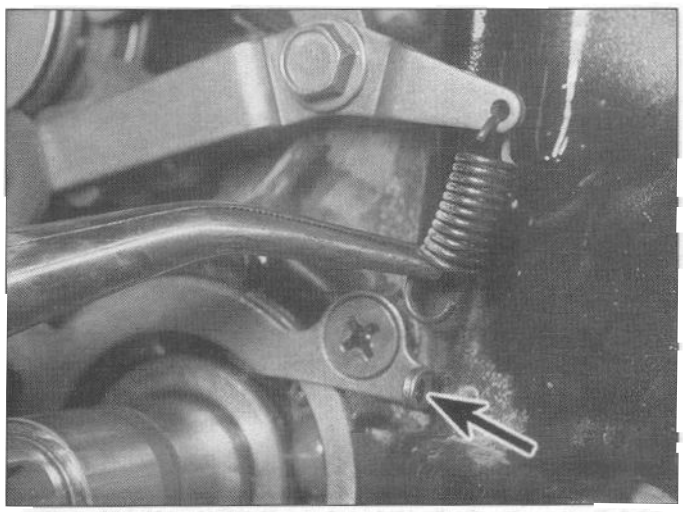
4 Remove the gasket and discard it. Note the positions of the two locating dowels fitted to the crankcase and remove them for safe-keeping if they are loose **(see illustration)**.

5 Working in a criss-cross pattern, gradually and evenly slacken the clutch pressure plate retaining bolts until spring pressure is released **(see illustrations)**. To stop the clutch from turning while initially loosening the bolts, either put the engine into gear and have an assistant apply the rear brake (if the engine is in the frame), or jam the primary drive and driven gears together using the blade of a large screwdriver (if the engine has been removed). Remove the bolts, spacers and

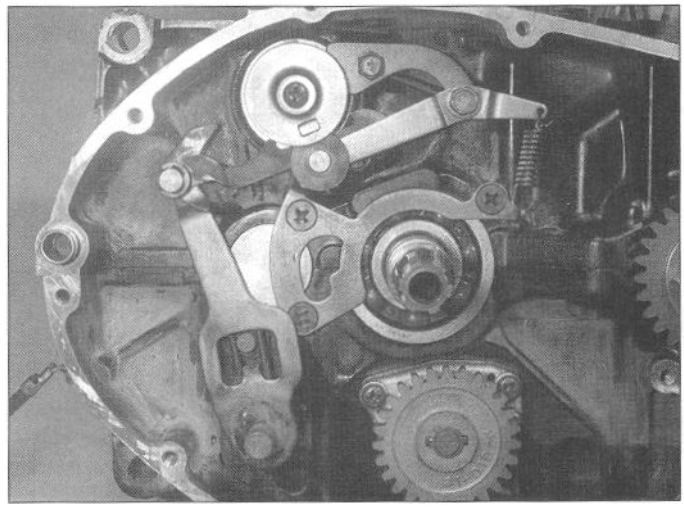


17.5a Clutch components

1 Pressure plate bolt	*7 Pushrod end piece*	*13 Outer thrustwasher*	*18 Inner thrust washer*
2 Spacer	*8 Friction plates*	*14 Clutch housing*	*19 Pushrods*
3 Spring	*9 Plain plates*	*15 Pin*	*20 Pushrod oil seal*
4 Pressure plate	*10 Clutch nut*	*16 Oil pump drivegear*	*21 Retainer plate*
5 Thrust washer	*11 Lockwasher*	*17 Circlip*	*22 Release mechanism*
6 Release bearing	*12 Clutch centre*		



20.11b Hook the return spring into its hole in the retainer plate (arrow)



20.11c The installed assembly should be **as shown**

assembly onto the crankcase, positioning the stopper arm roller onto the neutral change pin and hooking the return spring into the hole in the input shaft bearing retainer plate **(see illustrations)**. Tighten the bolt securely. Make sure the stopper arm is free to move and is returned by the pressure of the spring.

12 Install the engine sprocket cover and tighten its screws securely. Install the gearchange lever onto the end of the shaft on the left-hand side of the engine, aligning the punch marks on the arm and shaft, and check that the mechanism works correctly. Tighten the pinch bolt securely.

13 Install the clutch (see Section 17).

21 Starter clutch and gear assembly - removal, inspection and installation

Note: *The starter clutch and idle gear assembly can be removed with the engine in the frame.*

Removal

1 Remove the left-hand side panel (see Chapter 7). Trace the alternator wiring back from the top of the engine sprocket cover and disconnect it at the connectors. Release the wiring from any clips or ties.

2 Unscrew the gearchange lever pinch bolt and remove the lever from the shaft, noting any alignment marks on the lever and the shaft **(see illustration 18.1a)**. If no marks are visible, make your own before removing the lever so that it can be correctly aligned with the shaft on installation. Unscrew the bolts securing the engine sprocket cover to the crankcase and move the cover aside **(see illustration 18.1b)**. There is no need to detach the clutch cable from the cover. Release the alternator wiring from the clamp next to the neutral switch.

3 Working in a criss-cross pattern, evenly slacken the left-hand side crankcase cover retaining bolts **(see illustration)**. Lift the cover away from the engine, being prepared to catch any residual oil which may be released as the cover is removed. Remove the gasket and discard it. Note the position of the locating dowel fitted to the crankcase and remove it for safe-keeping if it is loose. Note how the idle/reduction gear shaft end locates in the socket in the crankcase cover, acting as a second dowel.

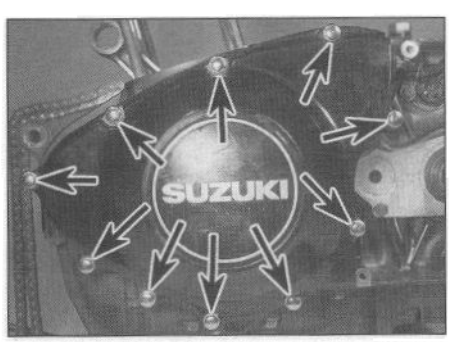
4 Withdraw the starter idle/reduction gear shaft then remove the gear, noting which way round it fits **(see illustration)**. Remove the alternator rotor (see Chapter 8). The starter driven gear should come away with the rotor. If it doesn't, remove it from the crankshaft. The starter clutch is secured to the back of the rotor by three Allen bolts **(see illustration)**.

Inspection

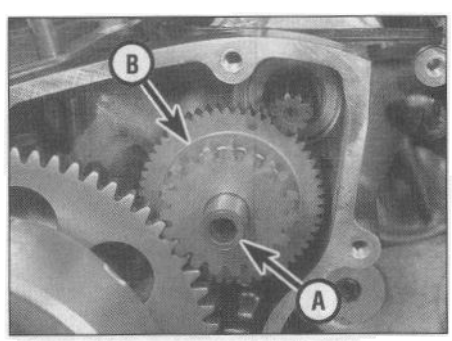
5 Install the starter driven gear into the starter clutch (if removed) and, with the rotor face down on a workbench, check that the gear rotates freely in an anti-clockwise direction and locks against the rotor in a clockwise direction. If it doesn't, replace the starter clutch.

6 Withdraw the starter driven gear from the starter clutch. If it appears stuck, rotate it anti-clockwise as you withdraw it to free it from the starter clutch. Check the bearing surface of the starter driven gear hub and the condition of the rollers inside the clutch body **(see illustrations)**. If the bearing surface shows signs of excessive wear or the rollers are damaged, marked or flattened at any point, they should be replaced.

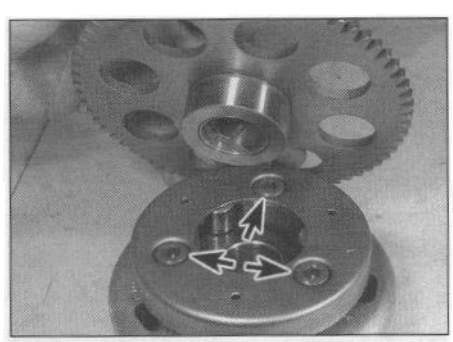
7 Remove the rollers and check the plungers



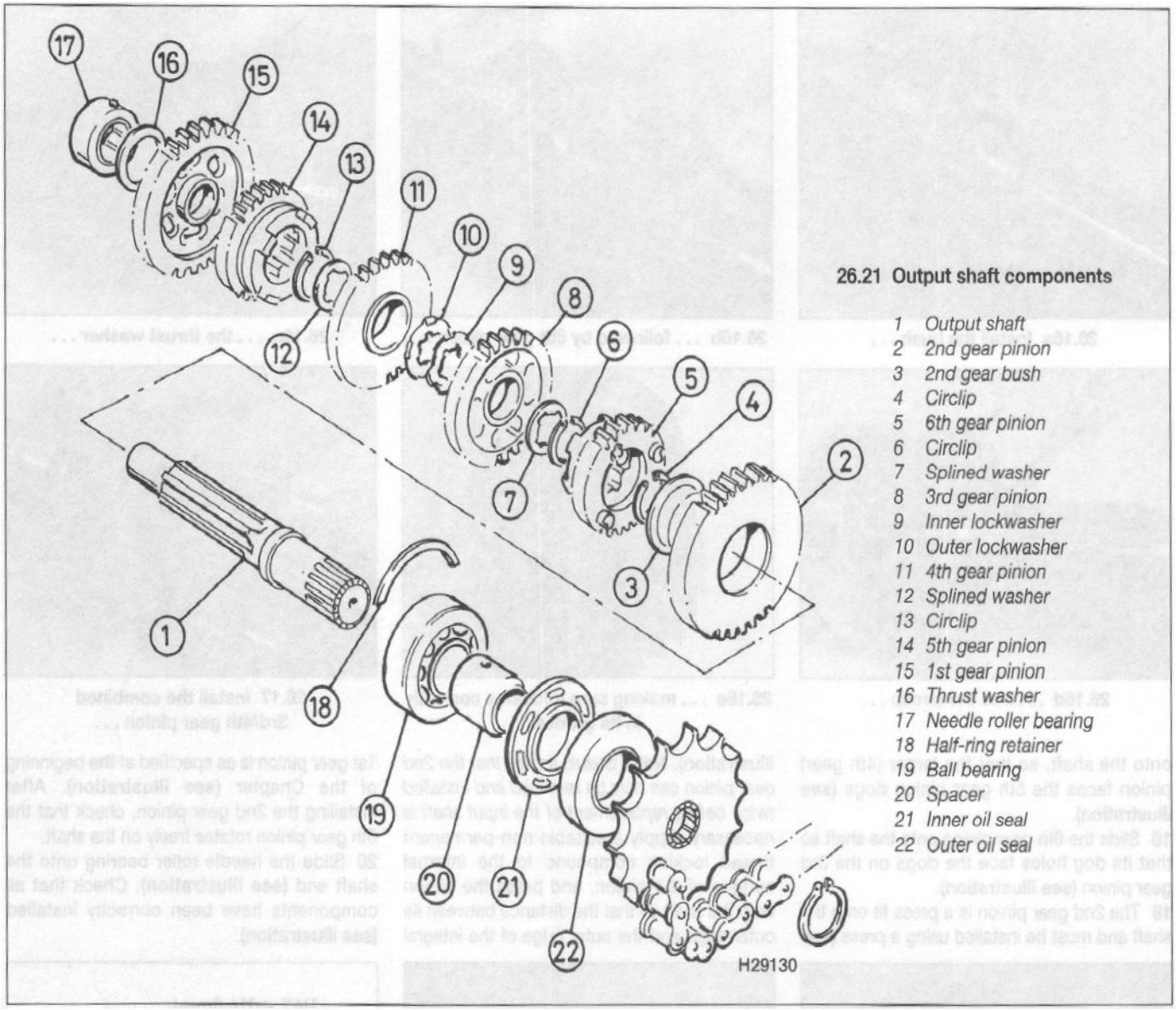
21.3 The left-hand side crankcase cover is secured by ten bolts (arrows)



21.4a Withdraw the shaft (A) and remove the idle/reduction gear (B)



21.4b The starter clutch is secured to the back of the rotor by three bolts (arrows)



26.21 Output shaft components

1 *Output shaft*
2 *2nd gear pinion*
3 *2nd gear bush*
4 *Circlip*
5 *6th gear pinion*
6 *Circlip*
7 *Splined washer*
8 *3rd gear pinion*
9 *Inner lockwasher*
10 *Outer lockwasher*
11 *4th gear pinion*
12 *Splined washer*
13 *Circlip*
14 *5th gear pinion*
15 *1st gear pinion*
16 *Thrust washer*
17 *Needle roller bearing*
18 *Half-ring retainer*
19 *Ball bearing*
20 *Spacer*
21 *Inner oil seal*
22 *Outer oil seal*

Output shaft

Disassembly

21 Remove the needle roller bearing from the right-hand end of the shaft **(see illustration)**.

22 Remove the thrust washer from the right-hand end of the shaft, then slide the 1st gear pinion and the 5th gear pinion off the shaft.

23 Remove the circlip securing the 4th gear pinion, then slide the splined washer and the pinion off the shaft.

24 Slide the two lockwashers off the shaft, noting how they fit, followed by the 3rd gear pinion and the splined washer.

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

26 Remove the circlip securing the 2nd gear pinion, then slide the 2nd gear bush and the pinion off the shaft.

Inspection

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

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

29 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.

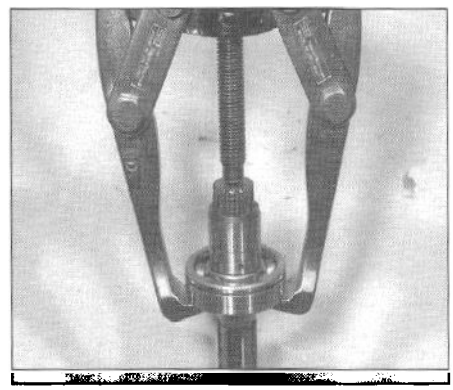
30 Check for signs of scoring or bluing on the pinions, bush and shaft. This could be caused by overheating due to inadequate lubrication. Check that all the oil holes and passages are clear.

31 Check that each pinion moves freely on the shaft or bush (2nd gear pinion) but without undue freeplay. Check that the 2nd gear bush moves freely on the shaft but without undue freeplay.

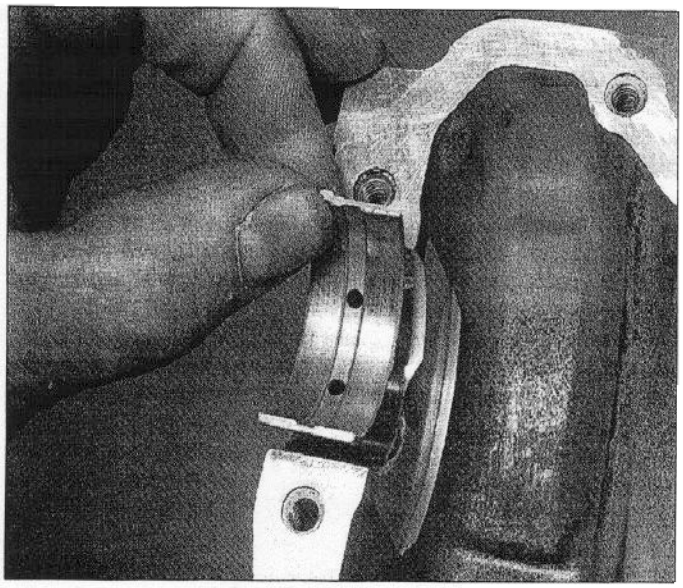
32 The shaft is unlikely to sustain damage unless the engine has seized, placing an unusually high loading on the transmission, or the machine has covered a very high mileage. Check the surface of the shaft, especially where a pinion turns on it, and replace the shaft if it has scored or picked up, or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

33 Check the ball bearing for play or roughness, and that it is a tight fit on the shaft. Replace the bearing if it is worn, loose or and the spacer **(see illustration)**. If one is not available, carefully lever them off using a pair of tyre levers **(see illustration 26.13b)**. Install the bearing using a press. Install the needle roller bearing onto the shaft, and check it for play or roughness. Replace the bearing if it is worn or damaged.

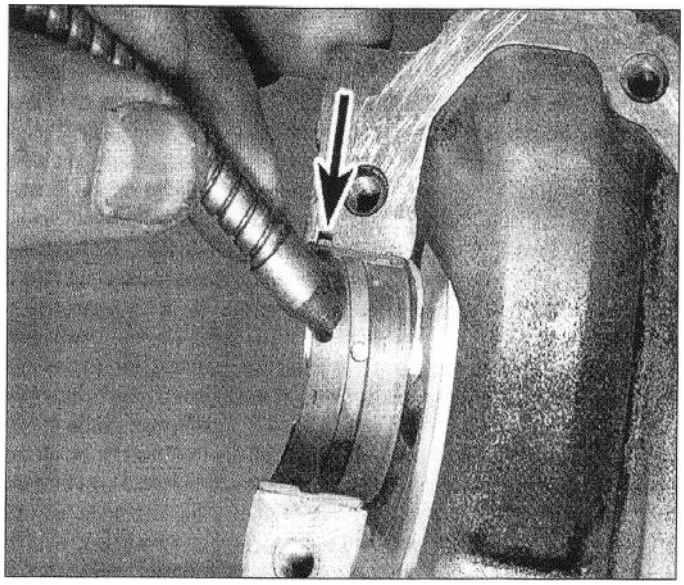
34 Check the washers and replace any that are bent or appear weakened or worn. Discard all the circlips as new ones must be used.



26.33 Use a puller and draw the spacer off



30.23a Install the shells . .



30.23b . . . making sure the tab locates in the notch (arrow), and lubricate them generously

22 Clean the backs of the bearing shells and the bearing recesses 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 **(see illustration)**. Make sure the tab on each shell engages in the notch in the casing. Lubricate each shell, preferably with molybdenum paste, or if not available with clean engine oil **(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.

24 Rotate the crankshaft until the dot on its drive gear faces forwards. Lower the balancer shaft into position in the upper crankcase, and engage the balancer shaft with the crankshaft so the dot on the drive gear on the crankshaft aligns with the dot on the driven gear on the balancer shaft **(see illustration 29.26b)**.

25 Reassemble the crankcase halves (see Section 23).

31 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 crankshaft (see Section 29).

2 Before removing the rods from the crankshaft, measure the side clearance on each rod with a feeler gauge **(see illustration)**. If the clearance on any rod is greater than the service limit listed in this Chapter's Specifications, measure the big-end and crankpin widths as described in Step 7.

3 Using paint or a felt marker pen, mark the relevant cylinder identity on each connecting rod and bearing. Mark across the cap-to-connecting rod join to ensure that the cap is fitted the correct way around on reassembly.

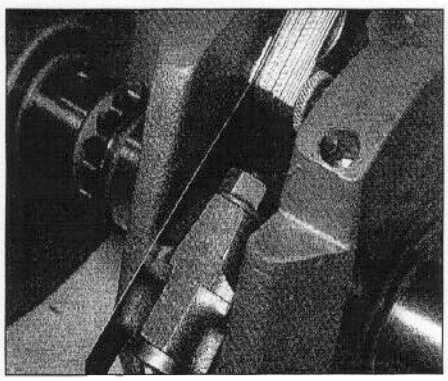
4 Unscrew the big-end cap nuts and separate the connecting rod, cap and both bearing shells from the crankpin **(see illustration)**. Do not remove the bolts from the connecting rods. Keep the rod, cap, nuts and (if they are to be reused) the bearing shells together in their correct positions to ensure correct installation.

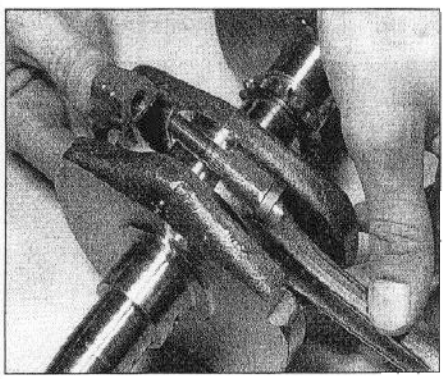
Inspection

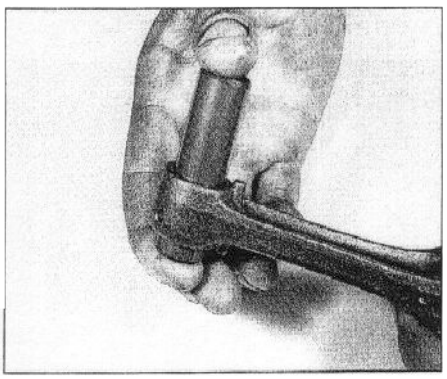
5 Check the connecting rods for cracks and other obvious damage.

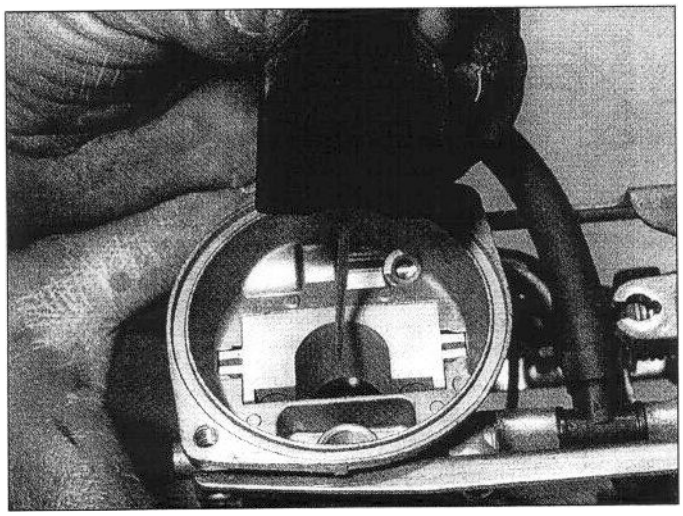
6 If not already done (see Section 15), apply clean engine oil to the piston pin, insert it into the connecting rod small-end and check for any freeplay between the two **(see illustration)**. Measure the pin external diameter and the small-end bore diameter and compare the measurements to the specifications at the beginning of the Chapter **(see illustrations 15.13b and 15.13d)**. Replace components that are worn beyond the specified limits.

7 If the side clearance measured in Step 2 exceeds the service limit specified, measure the width of the connecting rod big-end and the width of the crankpin **(see illustrations)**. Compare the results to the specifications at the beginning of the Chapter, and replace whichever component exceeds those specifications.

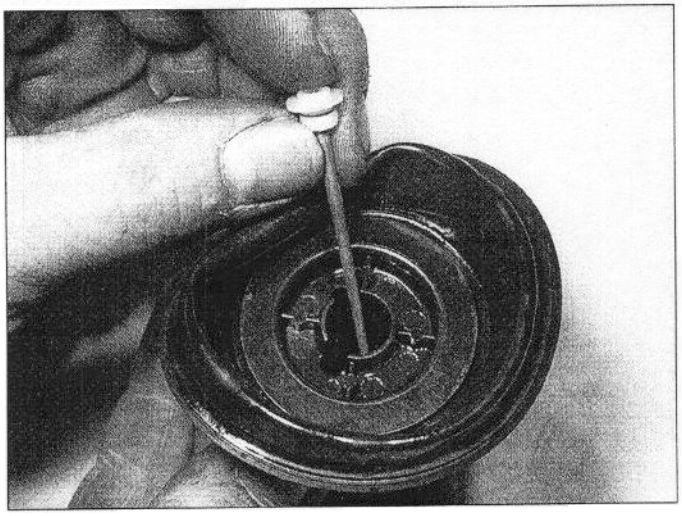








7.4 Withdraw the diaphragm and piston assembly from the carburettor



7.5 Withdraw the jet needle assembly

sealing groove in the carburettor and withdraw the diaphragm and piston assembly **(see illustration)**.

Caution: Do not use a sharp instrument to displace the diaphragm as it is easily damaged.

5 Push the jet needle up from the bottom of the piston and withdraw it from the top **(see illustration)**. Take care not to lose the spring seat, E-clip and washer. If they are removed from the needle, note which notch the E-clip is fitted in.

6 Unscrew the screws securing the float chamber to the base of the carburettor and remove the float chamber, noting how it fits **(see illustration)**. Remove the rubber gasket and discard it as a new one must be used.

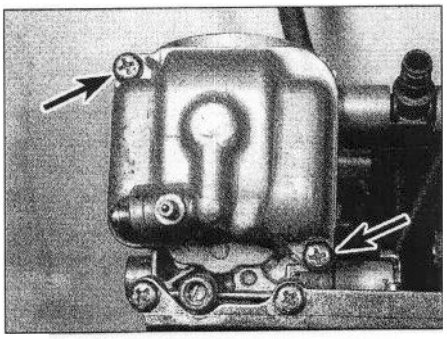
7 Carefully prise the float assembly out of the carburettor body, noting how it fits **(see illustration)**. Remove the O-ring and discard it as a new one must be used. Unhook the needle valve from the tab on the float, noting how it fits **(see illustration)**. Remove the float needle valve seat and its O-ring **(see illustration)**. Discard the O-ring as a new one must be used.

8 Unscrew and remove the main jet **(see illustration)**.

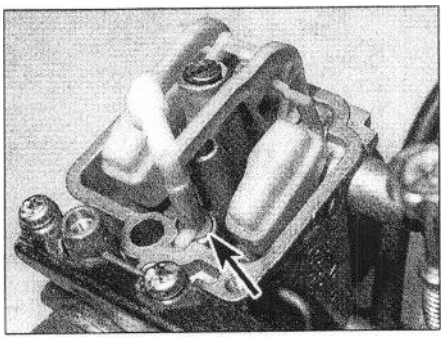
9 With the main jet removed the piston guide and needle jet can now be withdrawn through the top of the carburettor **(see illustration)**. Note which way round the guide fits into the carburettor body. Discard the O-ring on the bottom of the guide as a new one must be used. Push the needle jet up from the bottom and remove it from the guide

10 Unscrew and remove the pilot jet **(see illustration 7.8)**.

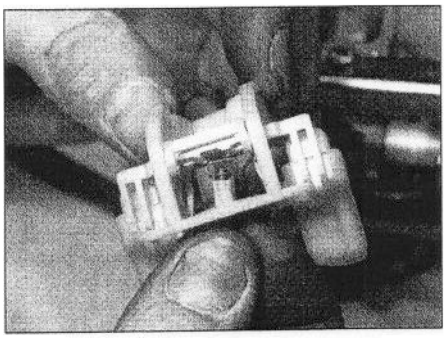
11 On UK models, the pilot screw can be removed from the carburettor, but note that its setting will be disturbed (see ***Haynes Hint***). Unscrew and remove the pilot screw along



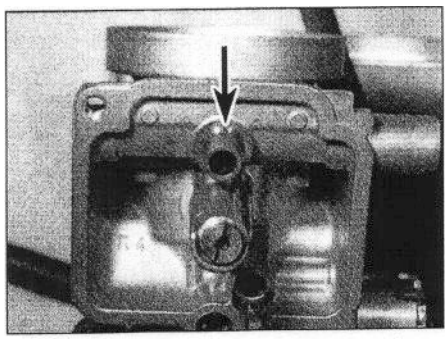
7.6 The float chamber is secured by two screws (arrows)



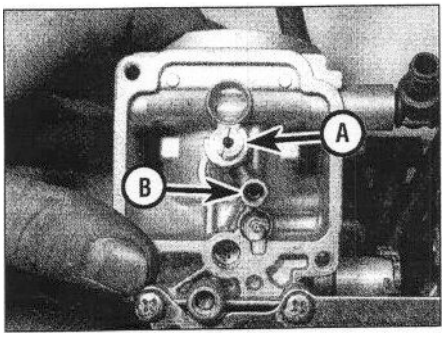
7.7a Carefully lift the float assembly out of its socket (arrow)



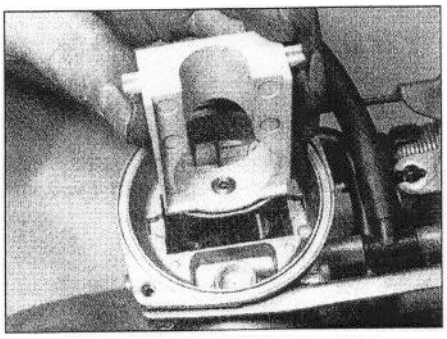
7.7b Remove the needle valve from the float . . .



7.7c . . . and withdraw the needle valve seat (arrow) from the carburettor



7.8 Main jet (A), pilot jet (B)



7.9 Withdraw the piston guide and needle jet

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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 far more likely. In the event of failure, check the system in a logical fashion, as described below.

2 Disconnect the HT lead from both cylinder spark plugs. Connect each lead to a spare spark plug and lay each plug on the engine with the threads contacting the engine. If necessary, hold each spark plug with an insulated tool.

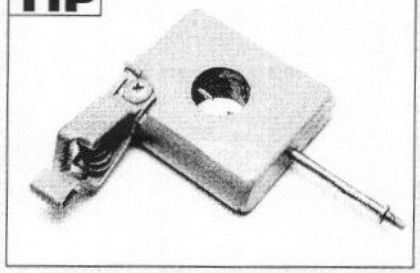
Warning: Do not remove the spark plugs from the engine to perform this check - atomised fuel pumped out of the open spark plug hole could ignite, causing severe injury!

3 Having observed the above precautions, check that the kill switch is in the RUN position, 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.

4 The ignition system must be able to produce a spark which is capable of jumping a particular size gap. Suzuki specify that a healthy system should produce a spark capable of jumping 8 mm. A simple testing tool can be made to test the minimum gap across which the spark will jump (see **Tool Tip**).

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.

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.

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 8).
b) Faulty HT lead or spark plug cap, faulty spark plug, dirty, worn or corroded plug electrodes, or incorrect electrode gap.
c) Faulty ignition switch or engine kill switch (see Chapter 8).
d) Faulty neutral or sidestand switch (see Chapter 8).
e) Faulty pulse generator coils 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 Suzuki dealer. Suzuki produce a tester which can perform a complete diagnostic analysis of the ignition system.

3 Ignition HT coils - check, removal and installation

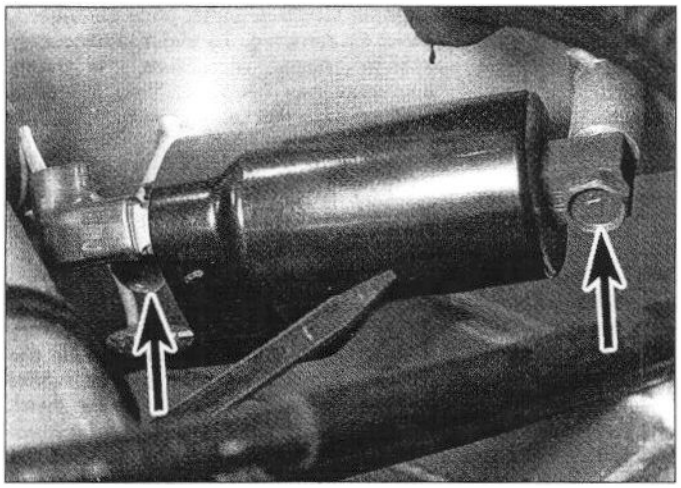
Check

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

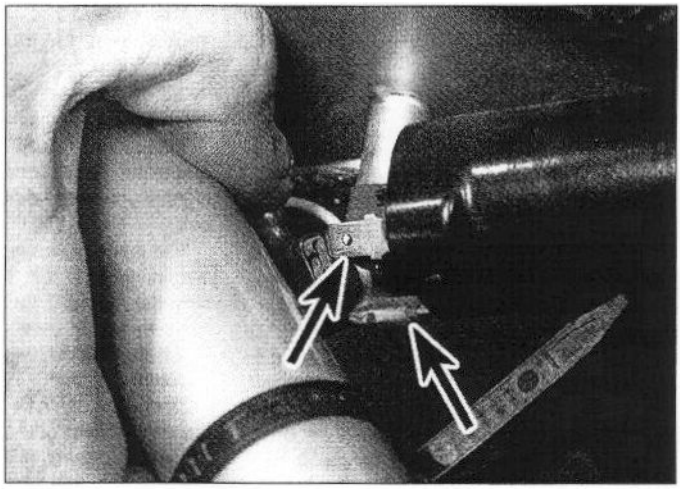
2 However, the coils can be checked visually (for cracks and other damage) and the primary and secondary coil resistances can be measured with a multimeter. If the coils are undamaged, and if the resistance readings are as specified at the beginning of the Chapter, they are probably capable of proper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

3 Remove the seat (see Chapter 7) and disconnect the battery negative (-ve) lead. To gain access to the coils, remove the fuel tank (see Chapter 3). The coils are mounted on each side of the frame behind the steering stem **(see illustration)**.

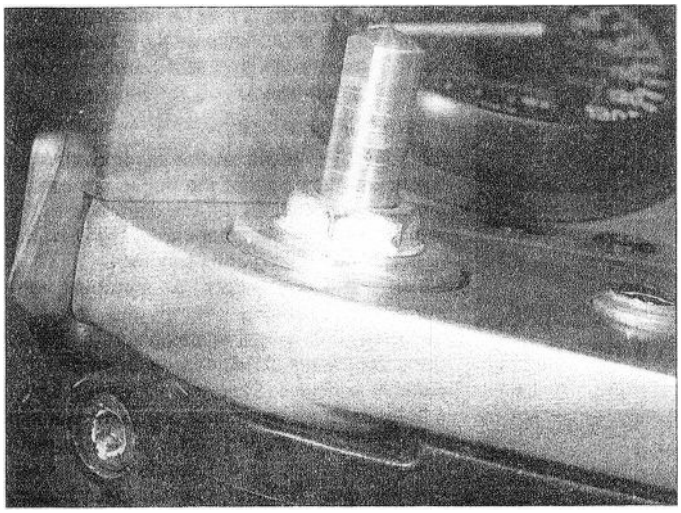
4 Disconnect the primary circuit electrical connectors from the coil being tested and the HT lead from the spark plug **(see illustration)**. Mark the locations of all wires and leads before disconnecting them.



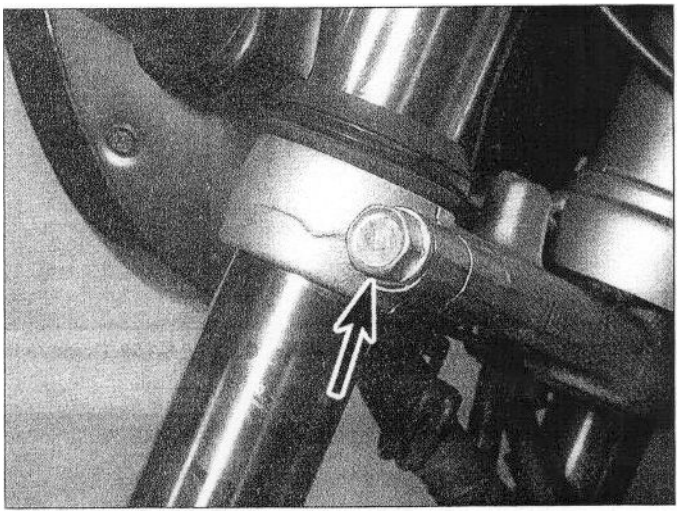
3.3 The coils are mounted on each side of the frame behind the steering stem, and are secured by two bolts (arrows)



3.4 Disconnect the primary circuit connectors (arrows)



6.4a Note the alignment of the fork with the handlebar bracket as an aid to installation



6.4b Bottom yoke fork clamp bolt (arrow)

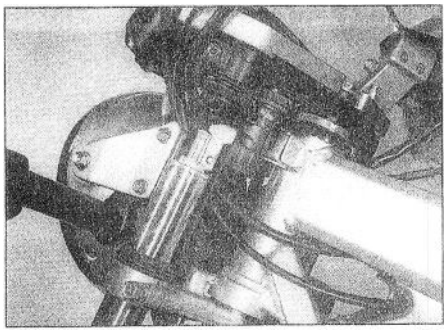
4 Note the position of the top of the fork tubes relative to the handlebar bracket so that they are installed in the same position **(see illustration)**. Slacken but do not remove the fork clamp bolts in the bottom yoke, and remove the forks by twisting them and pulling them downwards **(see illustration)**. Note how the forks pass through the headlight brackets.

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

Installation

5 Remove all traces of corrosion from the fork tubes and the yokes and slide the forks up through the bottom yoke, the headlight brackets, top yoke and handlebar bracket **(see illustration)** so that they align with the handlebar bracket as noted on removal **(see illustration 6.4a)**.

6 Tighten the bottom yoke pinch bolts to the torque setting specified at the beginning of the Chapter **(see illustration 6.4b)**. If the fork legs have been dismantled or if the fork oil has been changed, the fork top bolts should now be tightened.



6.5 Install the fork up through the yokes and headlight bracket

7 Tighten the top yoke pinch bolts to the specified torque setting **(see illustration 6.3)**. Fit the top bolt cap (where fitted). On US models, install the handlebars if displaced.

8 Install the front brace and mudguard (see Chapter 7) and the front wheel (Chapter 6). Install the brake hose clamp onto the right-hand fork and tighten its bolt securely **(see illustration 6.2)**.

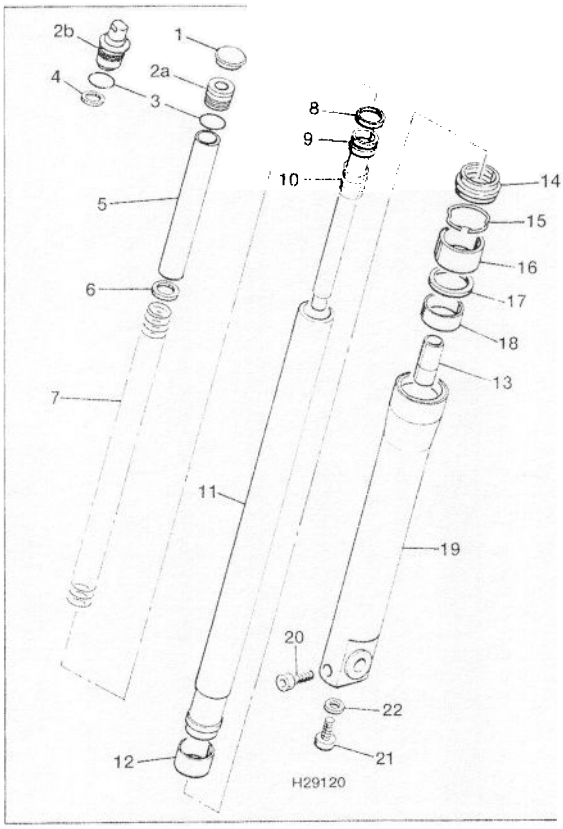
9 Check the operation of the front forks and brake before taking the machine out on the road. On UK N, P, R, S, T and V models, adjust the fork pre-load as required (see Section 12).

7 Forks - disassembly, inspection and reassembly

Disassembly

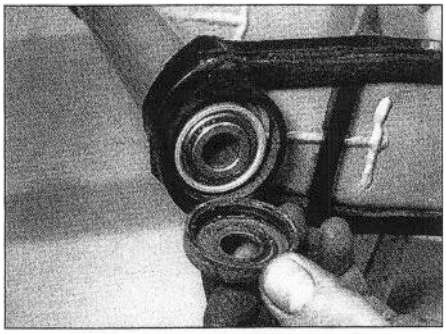
1 Always dismantle the fork legs separately to avoid interchanging parts and thus causing an accelerated rate of wear. Store all components in separate, clearly marked containers **(see illustration)**.

2 Before dismantling the fork, it is advised

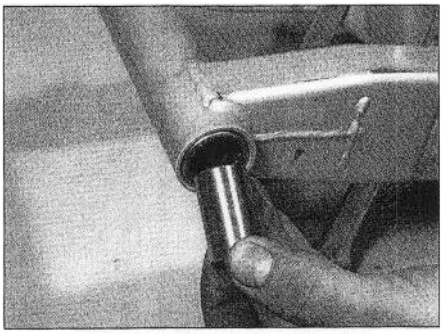


7.1 Front fork components

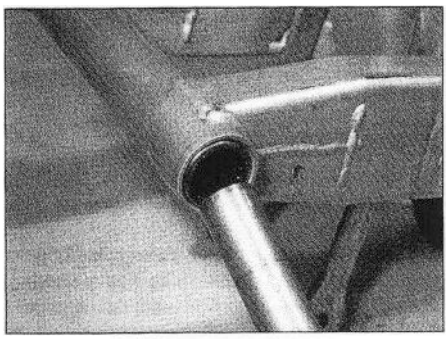
1 *Top bolt cap*
2a *Top bolt - UK K, L & M models, all US models*
2b *Top bolt - UK N, P, R, S, T & V models*
3 *O-ring*
4 *Disc washer - UK N, P, R, S, T & V models only*
5 *Spacer*
6 *Spring seat*
7 *Spring*
8 *Piston ring*
9 *Damper rod*
10 *Rebound spring*
11 *Fork tube*
12 *Bottom bush*
13 *Damper rod seat*
14 *Dust seal*
15 *Retaining clip*
16 *Oil seal*
17 *Washer*
18 *Top bush*
19 *Fork slider*
20 *Axle clamp bolt*
21 *Damper rod bolt*
22 *Sealing washer*



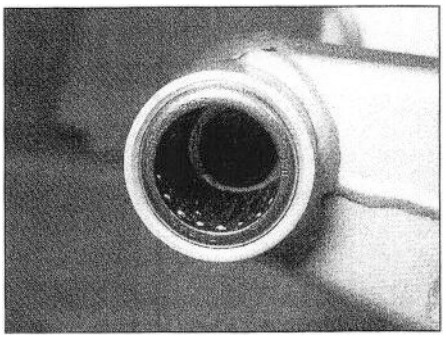
14.3a Remove the dust seals and washers . . .



14.3b . . . then withdraw the inner sleeves . . .



14.3c . . . and spacer



14.3d Inspect the needle roller bearings in the swingarm

each one fits as they must be replaced in the same position **(see illustrations)**. Inspect them and the bearings for wear or damage and replace them if necessary **(see illustration)**.

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

Note: *Install the bearings with their marked side facing outwards* ***(see illustration 14.3d).***

5 Apply lithium-based grease to the bearing, spacer, inner sleeves, washer and inside of the dust seal.

15 Drive chain - removal, cleaning and installation

Removal

Note: *The original equipment drive chain fitted to all models is an endless chain, which means it doesn't have a joining link. Removal either requires the removal of the swingarm as detailed below, or breaking and riveting of the chain.*

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

1 Remove the swingarm (see Section 13).

2 Unscrew the gearchange lever pinch bolt and remove the lever from the shaft, noting any alignment marks on the lever and the shaft **(see illustration)**. If no marks are visible, make your own before removing the lever so that it can be correctly aligned with the shaft on installation. Unscrew the bolts securing the engine sprocket cover to the crankcase and move it aside **(see illustration)**. There is no need to detach the clutch cable from the cover.

3 Slip the chain off the front sprocket and remove it from the bike.

Cleaning

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

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

Installation

5 Installation is the reverse of removal. On completion adjust and lubricate the chain following the procedures described in Chapter 1.

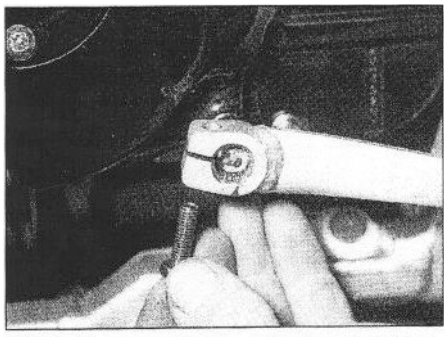
Caution: Use only the recommended lubricant.

16 Sprockets - check and replacement

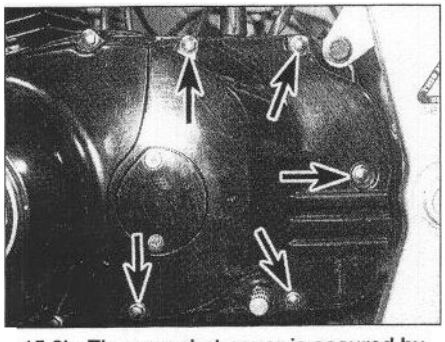
Check

1 Unscrew the gearchange lever pinch bolt and remove the lever from its shaft, noting any alignment marks on the lever and the shaft **(see illustration 15.2a)**. If no marks are visible, make your own before removing the lever so that it can be correctly aligned with the shaft on installation. Unscrew the bolts securing the engine sprocket cover to the crankcase and move the cover aside **(see illustration 15.2b)**. There is no need to detach the clutch cable from the cover.

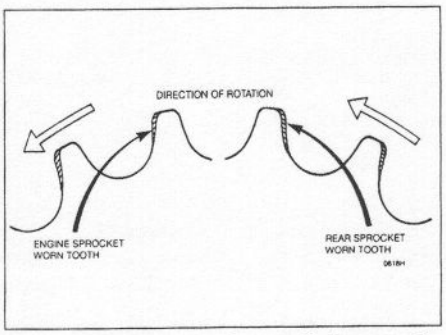
2 Check the wear pattern on both sprockets **(see illustration)**. If the sprocket teeth are



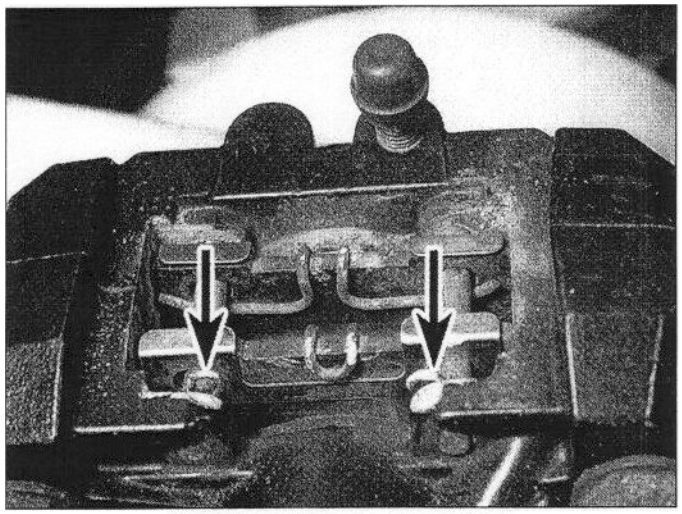
15.2a Unscrew the pinch bolt and remove the gearchange lever



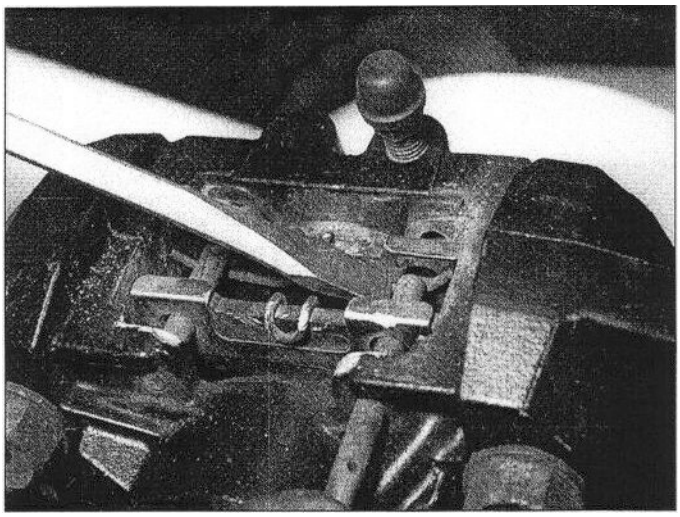
15.2b The sprocket cover is secured by five bolts (arrows)



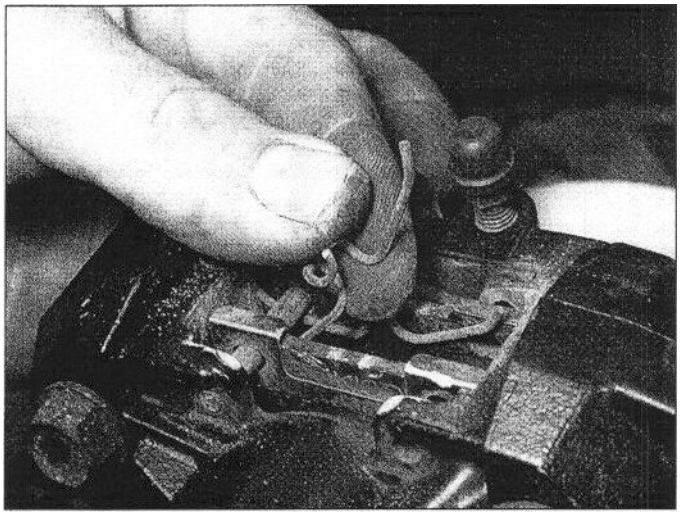
16.2 Check the sprocket teeth for wear in the areas indicated



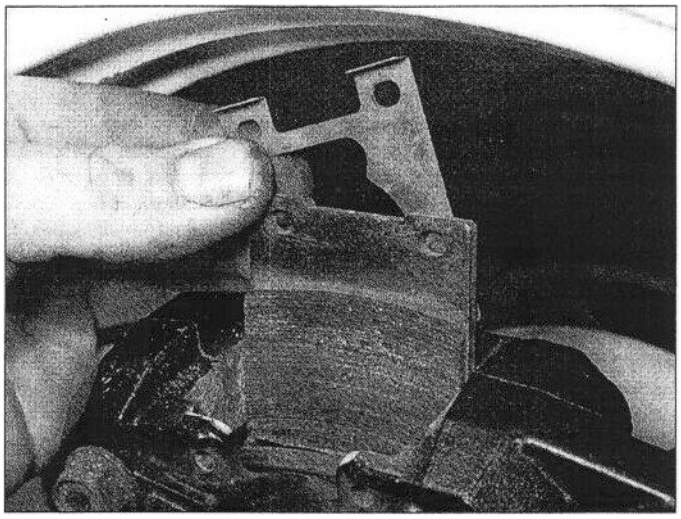
6.2 Remove the pad pin clips . . .



6.3a . . . then press down on the pad spring ends and withdraw the pad pins . . .



6.3b . . . followed by the pad springs



6.4 Withdraw the pads and remove the anti-chatter shims

with compressed air and don't inhale any of it. An approved filtering mask should be worn when working on the brakes.

1 Prise off the brake pad cover using a flat-bladed screwdriver.

2 Remove the pad pin retaining clips, noting how they fit **(see illustration)**.

3 Withdraw the pad pins from the caliper using a suitable pair of pliers and remove the pad springs, noting how they fit **(see illustrations)**.

4 Withdraw the pads from the caliper body and remove the anti-chatter shim from the back of each pad, noting how it fits **(see illustration)**.

5 Inspect the surface of each pad for contamination and check that the friction material has not worn beyond its wear limit. The original equipment pads feature a wear indicator step or groove around the pad periphery. Refer to Chapter 1 *Brake pads - wear check* and replace both pads as a set if either pad has worn down to, or beyond, the limit. Additionally, replace the pads if they are fouled with oil or grease, or heavily scored or damaged by dirt and debris. Note that it is not possible to degrease the friction material; if the pads are contaminated in any way they must be replaced.

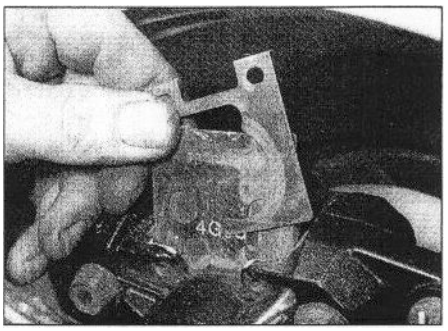
6 If the pads are in good condition clean them carefully, using a fine wire brush which is completely free of oil and grease to remove all traces of road dirt and corrosion. Using a pointed instrument, clean out the groove in the friction material and dig out any embedded particles of foreign matter.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

7 Check the brake disc (see Section 8).

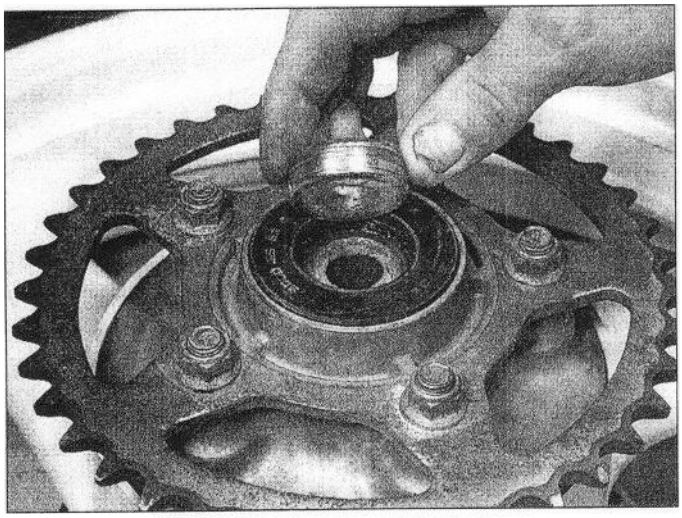
8 Push the pistons as far back into the caliper as possible using hand pressure only. Due to the friction material thickness of new pads, it may be necessary to remove the master cylinder reservoir cover and diaphragm and siphon out some fluid.

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

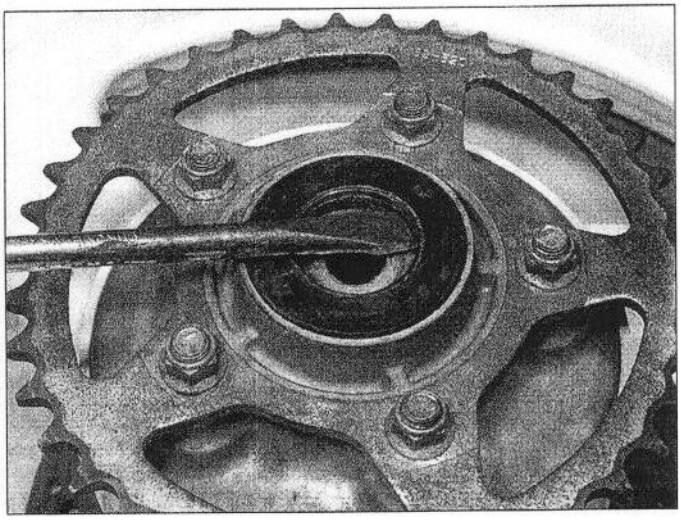
10 Installation of the pads, anti-chatter shims, pad pins, springs and retaining clips is the reverse of removal. Install the anti-chatter shim on the back of each pad with its open end facing the rear of the motorcycle **(see illustration)**. Insert the pads into the caliper so that the friction material of each pad is facing the disc. Make sure the pad springs are



6.10a Make sure the anti-chatter shims are the right way round



16.24a Remove the outer spacer . . .



16.24b . . . then lever out the bearing seal

16 Lay the wheel on its other side so that the remaining bearing faces down. Drive the bearing out of the wheel using the same technique as above.

17 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.*

18 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 anew one.

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

20 Thoroughly clean the hub area of the wheel. First install the right-hand side bearing into its recess in the hub, with the marked or sealed side facing outwards. Using a bearing driver or a socket large enough to contact the outer race of the bearing, drive it in squarely until it's completely seated **(see illustration 16.9)**.

21 Turn the wheel over and install the bearing spacer. Drive the left-hand side bearing into place as described above.

22 Clean off all grease from the brake disc using acetone or brake system cleaner. Install the rear sprocket and sprocket coupling assembly onto the wheel, then install the wheel (see Section 15).

Sprocket coupling bearing

23 Remove the rear wheel (see Section 15). Lift the sprocket and sprocket coupling assembly out of the wheel, noting how it fits **(see illustrations 16.13a and 16.13b)**.

24 Remove the spacers from the outside and inside of the coupling bearing **(see illustration)**. Using a flat-bladed screwdriver, lever out the bearing seal from the outside of the coupling **(see illustration)**.

25 Support the coupling on blocks of wood and drive the bearing out from the inside with a bearing driver or socket large enough to contact the outer race of the bearing.

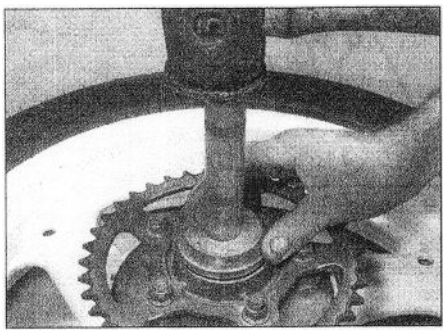
26 Clean the bearing with a high flash-point solvent (one which won't leave any residue) and blow it dry with compressed air (don't let the bearing spin as you dry it). Apply a few drops of oil to the bearing.

27 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.

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

29 Thoroughly clean the bearing recess then install the bearing into the recess in the coupling, with the marked side facing out. Using a bearing driver or a socket large enough to contact the outer race of the bearing, drive it in until it is completely seated.

30 Install a new bearing seal, using a seal or bearing driver, a suitable socket or a flat piece of wood to drive it into place **(see illustration)**. Install the outer spacer **(see illustration 16.24a)**. Install the inner spacer into the coupling **(see illustration 16.13b)**.



16.30 Drive the bearing seal onto the bearing

31 Clean off all grease from the brake disc using acetone or brake system cleaner. Install the sprocket coupling assembly onto the wheel, then install the wheel (see Section 15).

17 Tyres - general information and fitting

General information

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

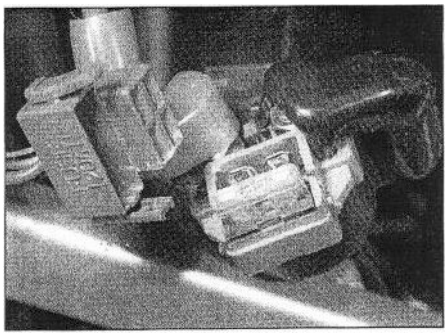
2 Refer to the Daily (pre-ride) checks listed at the beginning of this manual, and to the scheduled checks in Chapter 1 for tyre and wheel maintenance.

Fitting new tyres

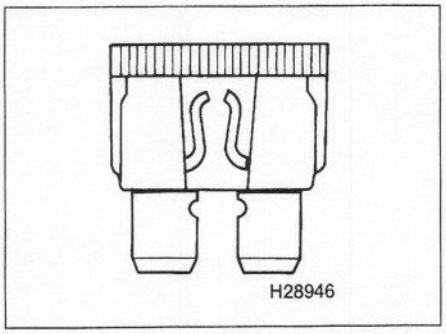
3 When selecting new tyres, refer to the tyre information and the tyre options listed in the owners handbook. Ensure that front and rear tyre types are compatible, the correct size and correct speed rating; if necessary seek advice from a Suzuki dealer or tyre fitting specialist **(see illustration)**.

4 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.

5 Note that punctured tubeless tyres can in some cases be repaired. Suzuki recommend that such repairs are carried out only by an authorised dealer.



5.3a Disconnect the connector to access the fuse



5.3b A blown fuse can be identified by a break in its element

3 The fuse can be removed and checked visually. On K models unclip the cover from the fuse holder and on all other models disconnect the starter relay wiring connector to access the fuse **(see illustration)**. If you can't pull the fuse out with your fingertips, use a pair of needle-nose pliers. A blown fuse is easily identified by a break in the element **(see illustration)**. The fuse is clearly marked with its rating and must only be replaced by a fuse of the correct rating. A spare fuse is located adjacent to the main fuse on K models, and in the bottom of the starter relay on all other models **(see illustration 5.2)**. If the spare fuse is used, always replace it so that a spare is carried on the bike at all times.

Caution: 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 the 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 the 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 31 and 32 for charging system tests. Also, check the condition of the fuse and replace it if it has blown.

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 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.

Tail light

3 If the tail light fails to work, check the bulbs and the bulb terminals first, then the fuse, then check for battery voltage 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.

4 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 on UK models.

Brake light

5 See Section 14 for the brake light switch checking procedure.

Neutral indicator light

6 If the neutral light fails to operate when the transmission is in neutral, check the fuse and the bulb (see Sections 5 and 17). If they are in good condition, trace the neutral switch wiring back from the top of the engine sprocket cover and disconnect it at the connector behind the left-hand side panel. Check for battery voltage on the supply side of the connector. If battery voltage is present, refer to Section 22 for the neutral switch check and replacement procedures.

7 If no voltage is indicated, check the wiring between the switch and the bulb for open-circuits and poor connections.

Oil pressure warning light

8 See Section 18 for the oil pressure switch check.

7 Headlight bulb and side light bulb - replacement

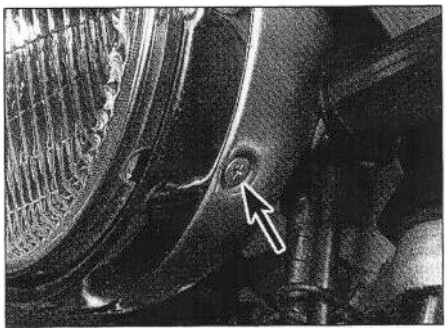
Note: *The headlight bulb is of the quartz-halogen type. Do not touch the bulb glass as skin acids will shorten the bulb's service life. If the bulb is accidentally touched, it should be wiped carefully when cold with a rag soaked in methylated spirit (stoddard solvent) and dried before fitting.*

Warning: Allow the bulb time to cool before removing it if the headlight has just been on!

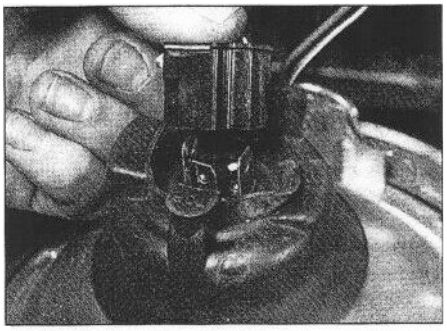
Headlight

1 Remove the two screws securing the headlight rim to the headlight shell, and ease the rim out of the shell, noting how it fits **(see illustration)**.

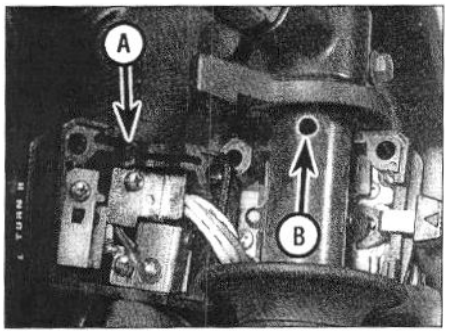
2 Disconnect the wiring connector and remove the rubber dust cover, noting how it fits **(see illustration)**.



7.1 The headlight rim is secured by two screws, one on each side (arrow)



7.2 Disconnect the wiring connector and remove the rubber cover



21.6 The switch pin (A) locates in the handlebar hole (B)

Installation

3 Installation is the reverse of removal. Make sure the locating pin in the upper half of the switch fits into hole in the top of the handlebar **(see illustration 21.6)**. If necessary, refer to Chapter 4 for installation of the throttle cable.

Left-hand handlebar switch

Removal

4 If the switch is to be removed from the bike, rather than just displaced from the handlebar, remove the two screws securing the headlight rim to the headlight shell, and ease the rim out of the shell **(see illustration 7.1)**. Work back along the harness, freeing it from all the relevant clips and ties, whilst noting its correct routing.

5 If fitted, disconnect the two wires from the clutch switch. Unscrew the two handlebar switch retaining screws on the underside of the switch and remove the switch from the handlebar, noting how it fits. Remove the choke cable (see Chapter 3 if necessary).

Installation

6 Installation is the reverse of removal. Make sure the locating pin in the upper half of the switch fits into hole in the top of the handlebar **(see illustration)**. If necessary, refer to Chapter 3 for installation of the choke cable.

22 Neutral switch - check, removal and installation



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 left-hand side of the crankcase, behind the engine sprocket cover. Trace the switch wiring from the top of the engine sprocket cover and disconnect it at its connector behind the left-hand side panel **(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 and instrument cluster must be earthed (grounded) at some point. Switch the ignition OFF.

4 Using an ohmmeter or continuity tester, check for continuity between the switch side of the wiring connector 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 either the switch is faulty or the spring and plunger mechanism is faulty. Remove the switch and check the condition of the spring and plunger, and make sure that the plunger moves freely in its hole. If there is any sign of wear or damage, replace the spring and plunger and check the operation of the switch before buying a new switch.

5 If the continuity tests prove the switch is good, check for voltage at the wire terminal using a test light. If there's no voltage present, check the wire between the switch, diode, instrument cluster, ignition switch and fuse (see the *wiring diagrams* at the end of this Chapter). Also check the operation of the diode (see Section 26).

Removal

6 Unscrew the gearchange lever pinch bolt and remove the lever from the shaft, noting any alignment marks on the lever and the shaft. If no marks are visible, make your own before removing the lever so that it can be correctly aligned with the shaft on installation. Unscrew the bolts securing the engine sprocket cover to the crankcase and move the cover aside. There is no need to detach the clutch cable from the cover.

7 Trace the switch wiring from the top of the engine sprocket cover and disconnect it at its connector behind the left-hand side panel **(see illustration 22.2)**. Free the wiring from any clips or ties, noting its routing.

8 Remove the two screws securing the switch to the crankcase and carefully withdraw it, noting that the contact plunger is under spring pressure and is likely to eject itself out of its hole in the end of the selector drum **(see illustration)**. Discard the O-ring as a new one must be used.

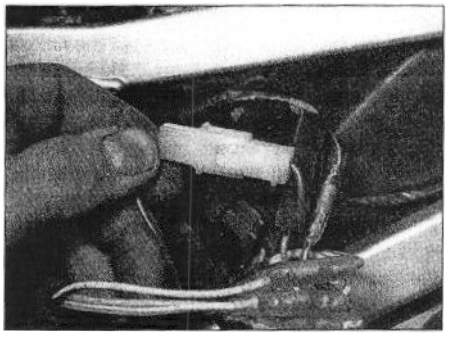
Installation

9 Install the spring and plunger into the hole in the end of the selector drum, then install the switch using a new O-ring and tighten its screws securely **(see illustrations)**.

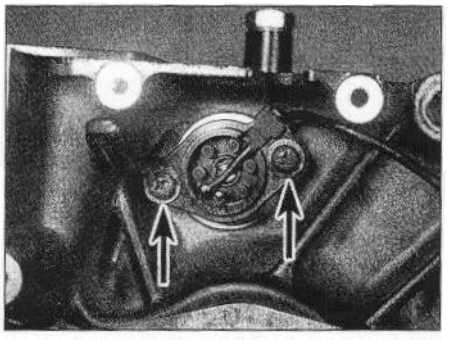
10 Route the wiring up to its connector behind the left-hand side panel and reconnect it. Secure the wiring with any clips or ties.

11 Check the operation of the neutral light.

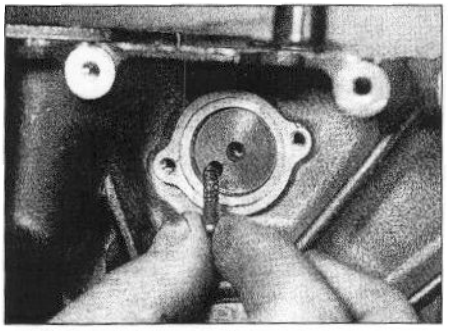
12 Install the sprocket cover and the gearchange lever, aligning the marks made on removal.



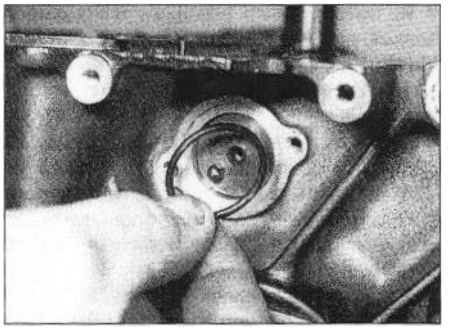
22.2 Neutral switch wiring connector



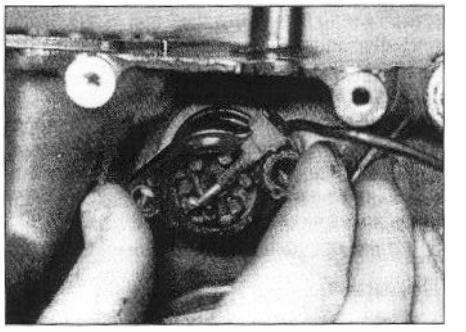
22.8 The neutral switch is secured by two screws (arrows)



22.9a Install the spring and plunger . . .

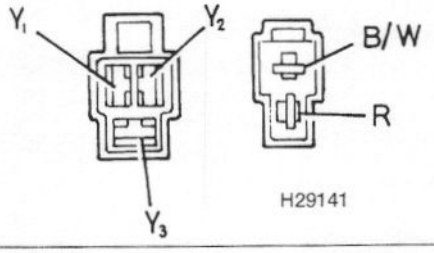


22.9b . . . and a new O-ring . . .



22.9c . . . then install the switch

- \ +	Y1	Y2	Y3	R	B/W
Y1		infinity	infinity	6 ohms	infinity
Y2	infinity		infinity	6 ohms	infinity
Y3	infinity	infinity		6 ohms	infinity
R	infinity	infinity	infinity		infinity
B/W	6 ohms	6 ohms	6 ohms	40 ohms	



35.1a Regulator/rectifier test table

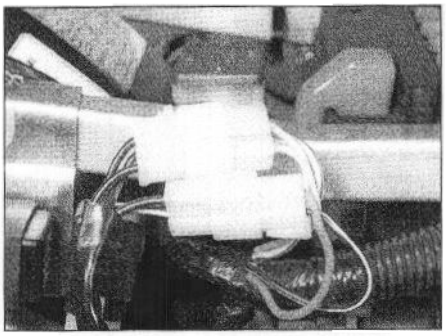
Check

1 Remove the right-hand side panel (see Chapter 7). Trace the wiring back from the regulator/rectifier unit and disconnect it at the connectors. Using a multimeter set to the appropriate resistance scale, measure the resistance between the terminal pairs of the regulator/rectifier connectors indicated in the table **(see illustrations)**.

2 If the readings do not compare closely with those shown the regulator/rectifier unit can be considered faulty. **Note:** *The use of certain multimeters could lead to false readings being obtained. Therefore, if the above check shows the regulator/rectifier unit to be faulty take the unit to a Suzuki dealer for confirmation of its condition before replacing it.*

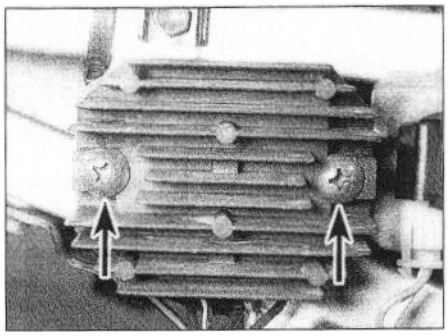
Replacement

3 Remove the right-hand side panel (see Chapter 7). Trace the wiring back from the regulator/rectifier unit and disconnect it at the connectors **(see illustration 35.1b)**.



35.1b Regulator/rectifier wiring connectors

4 Unscrew the two screws securing the unit to its bracket and remove it **(see illustration)**.



35.4 The regulator/rectifier is secured by two screws (arrows)

5 Install the new unit and tighten its screws securely. Connect the wiring at the connectors.

6 Install the right-hand side panel (see Chapter 7).

Basic maintenance techniques

There are a number of techniques involved in maintenance and repair that will be referred to throughout this manual. Application of these techniques will enable the amateur mechanic to be more efficient, better organised and capable of performing the various tasks properly, which will ensure that the repair job is thorough and complete.

Fastening systems

Fasteners, basically, are nuts, bolts and screws used to hold two or more parts together. There are a few things to keep in mind when working with fasteners. Almost all of them use a locking device of some type (either a lock washer, locknut, locking tab or thread locking compound). All threaded fasteners should be clean, straight, have undamaged threads and undamaged corners on the hex head where the spanner fits. Develop the habit of replacing all damaged nuts and bolts with new ones.

Rusted nuts and bolts should be treated with a penetrating oil to ease removal and prevent breakage. After applying the rust penetrant, let it work for a few minutes before trying to loosen the nut or bolt. Badly rusted fasteners may have to be chiselled off or removed with a special nut breaker, available at tool shops.

If a bolt or stud breaks off in an assembly, it can be drilled out and removed with a special tool called an E-Z out (or screw extractor). Most dealer service departments and motorcycle repair shops can perform this task, as well as others (such as the repair of threaded holes that have been stripped out).

Washers should always be replaced exactly as removed. Replace any damaged washers with new ones. Always use a flat washer between a lock washer and any soft metal surface (such as aluminium), thin sheet metal or plastic. Special locknuts can only be used once or twice before they lose their locking ability and must be replaced.

Tightening sequences and procedures

When threaded fasteners are tightened, they are often tightened to a specific torque value (torque is basically a twisting force). Over-tightening the fastener can weaken it and cause it to break, while under-tightening can cause it to eventually come loose. Each bolt, depending on the material it's made of, the diameter of its shank and the material it is threaded into, has a specific torque value, which is noted in the Specifications. Be sure to follow the torque recommendations closely.

Fasteners laid out in a pattern (ie cylinder head bolts, engine case bolts, etc.) must be loosened or tightened in a sequence to avoid warping the component. Initially, the bolts/nuts should go on finger-tight only. Next, they should be tightened one full turn each, in a criss-cross or diagonal pattern. After each one has been tightened one full turn, return to the first one tightened and tighten them all one half turn, following the same pattern. Finally, tighten each of them one quarter turn at a time until each fastener has been tightened to the proper torque. To loosen and remove the fasteners the procedure would be reversed.

Disassembly sequence

Component disassembly should be done with care and purpose to help ensure that the parts go back together properly during reassembly. Always keep track of the sequence in which parts are removed. Take note of special characteristics or marks on parts that can be installed more than one way (such as convex washers and gear pinions). It's a good idea to lay the disassembled parts out on a clean surface in the order that they were removed. It may also be helpful to make sketches or take instant photos of components before removal.

When removing fasteners from a component, keep track of their locations. Sometimes threading a bolt back in a part, or putting the washers and nut back on a stud, can prevent mix-ups later. If nuts and bolts can't be returned to their original locations, they should be kept in a compartmented box or a series of small boxes or labelled plastic bags. A box of this type is especially helpful when working on assemblies with very small parts (such as the carburettors, tappets, shims etc).

Whenever wiring looms, harnesses or connectors are separated, it's a good idea to identify the two halves with numbered pieces of masking tape so they can be easily reconnected.

Gasket sealing surfaces

Gaskets are used to seal the mating surfaces between components and keep lubricants, fluids, vacuum or pressure contained in an assembly.

Many times these gaskets are coated with a liquid or paste type gasket sealing compound before assembly. Age, heat and pressure can sometimes cause the two parts to stick together so tightly that they are very difficult to separate. In most cases, the part can be loosened by striking it with a soft-faced hammer near the mating surfaces. A normal hammer can be used if a block of wood is placed between the hammer and the part. Do not hammer on cast parts or parts that could be easily damaged. With any particularly stubborn part, always recheck to make sure that every fastener has been removed.

Avoid using a screwdriver or bar to pry apart components, as they can easily mark the gasket sealing surfaces of the parts (which must remain smooth). If prying is absolutely necessary, use a piece of wood, but keep in mind that extra clean-up will be necessary if the wood splinters.

After the parts are separated, the old gasket must be carefully scraped off and the gasket surfaces cleaned. Stubborn gasket material can be soaked with a gasket remover (available in aerosol cans) to soften it so it can be easily scraped off. A scraper can be fashioned from a piece of copper tubing by flattening and sharpening one end. Copper is recommended because it is usually softer than the surfaces to be scraped, which reduces the chance of gouging the part. Some gaskets can be removed with a wire brush, but regardless of the method used, the mating surfaces must be left clean and smooth. If for some reason the gasket surface is gouged, then a gasket sealant thick enough to fill scratches will have to be used during reassembly of the components. For most applications, a non-drying (or semi-drying) gasket sealant is best.

Hose removal tips

Hose removal precautions closely parallel gasket removal precautions. Avoid scratching or gouging the surface that the hose mates against or the connection may leak. Because of various chemical reactions, the rubber in hoses can bond itself to the metal union that the hose fits over. To remove a hose, first loosen the hose clamps that secure it to the union. Then, with slip joint pliers, grab the hose at the clamp and rotate it around the union. Work it back and forth until it is completely free, then pull it off (silicone or other lubricants will ease removal if they can be applied between the hose and the outside of the union). Apply the same lubricant to the inside of the hose and the outside of the union to simplify installation.

If the hose is particularly stubborn, slit the hose with a sharp knife and peel it off the union. The hose will obviously be destroyed using this method.

If a hose clamp is broken or damaged, do not reuse it. Also, do not reuse hoses that are cracked, split or torn.

1 Engine doesn't start or is difficult to start (continued)

- ☐ Piston ring-to-groove clearance excessive. This is caused by excessive wear of the piston ring lands. Piston replacement is necessary (Chapter 2).
- ☐ Cylinder head gasket damaged. If the head is allowed to become loose, or if excessive carbon build-up on the piston crown and combustion chamber causes extremely high compression, the head gasket may leak. Retorquing the head is not always sufficient to restore the seal, so gasket replacement is necessary (Chapter 2).
- ☐ Cylinder head warped. This is caused by overheating or improperly tightened head bolts. Machine shop resurfacing or head replacement is necessary (Chapter 2).
- ☐ Valve spring broken or weak. Caused by component failure or wear; the springs must be replaced (Chapter 2).
- ☐ Valve not seating properly. This is caused by a bent valve (from over-revving or improper valve adjustment), burned valve or seat (improper carburation) or an accumulation of carbon deposits on the seat (from carburation or lubrication problems). The valves must be cleaned and/or replaced and the seats serviced if possible (Chapter 2).

Stalls after starting

- ☐ Improper choke action. Make sure the choke linkage shaft is getting a full stroke and staying in the out position (Chapter 3).
- ☐ Ignition malfunction (Chapter 4).
- ☐ Carburettor malfunction (Chapter 3).
- ☐ Fuel contaminated. The fuel can be contaminated with either dirt or water, or can change chemically if the machine is allowed to sit for several months or more. Drain the tank and float chambers (Chapter 3).
- ☐ Intake air leak. Check for loose carburettor-to-intake manifold connections, loose or missing vacuum gauge adapter caps, or loose carburettor tops (Chapter 3).
- ☐ Engine idle speed incorrect. Turn idle adjusting screw until the engine idles at the specified rpm (Chapter 1).

Rough idle

- ☐ Ignition malfunction (Chapter 4).
- ☐ Idle speed incorrect (Chapter 1).
- ☐ Carburettors not synchronised. Adjust carburettors with vacuum gauge or manometer set (Chapter 1).
- ☐ Carburettor malfunction (Chapter 3).
- ☐ Fuel contaminated. The fuel can be contaminated with either dirt or water, or can change chemically if the machine is allowed to sit for several months or more. Drain the tank and float chambers (Chapter 3).
- ☐ Intake air leak. Check for loose carburettor-to-intake manifold connections, loose or missing vacuum gauge adapter caps, or loose carburettor tops (Chapter 3).
- ☐ Air filter clogged. Replace the air filter element (Chapter 1).

2 Poor running at low speeds

Spark weak

- ☐ Battery voltage low. Check and recharge battery (Chapter 8).
- ☐ Spark plugs fouled, defective or worn out (Chapter 1)
- ☐ Spark plug cap or HT wiring defective (Chapters 1 and 4).
- ☐ Spark plug caps not making contact. Make sure they are properly connected.
  Incorrect spark plugs. Wrong type, heat range or cap configuration. Check and install correct plugs (Chapter 1).
- ☐ Ignition control defective (Chapter 4).
- ☐ Pulse generator coils defective (Chapter 4).
- ☐ Ignition HT coils defective (Chapter 4).

Fuel/air mixture incorrect

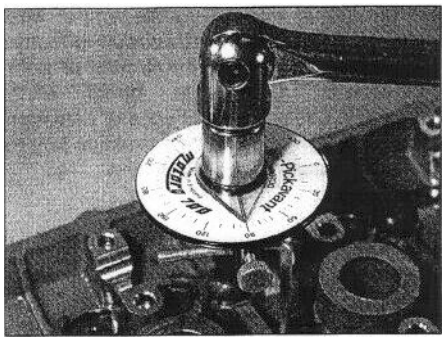
- ☐ Pilot screws out of adjustment (Chapter 3).
- ☐ Pilot jet or air passage clogged. Remove and overhaul the carburettors (Chapter 3).
- ☐ Air bleed holes clogged. Remove carburettor and blow out all passages (Chapter 3).
- ☐ Air filter clogged, poorly sealed or missing (Chapter 1).
- ☐ Air filter housing poorly sealed. Look for cracks, holes or loose clamps and replace or repair defective parts (Chapter 3).
- ☐ Fuel level too high or too low. Check the float height (Chapter 3).
- ☐ Carburettor intake manifolds loose. Check for cracks, breaks, tears or loose clamps. Replace the rubber intake manifold joints if split or perished (Chapter 3).

Compression low

- ☐ Spark plugs loose. Remove the plugs and inspect their threads. Reinstall and tighten to the specified torque (Chapter 1).
- ☐ Cylinder head not sufficiently tightened down. If the cylinder head is suspected of being loose, then there's a chance that the gasket or head is damaged if the problem has persisted for any length of time. The head bolts should be tightened to the proper torque in the correct sequence (Chapter 2).
- ☐ Improper valve clearance. This means that the valve is not closing completely and compression pressure is leaking past the valve. Check and adjust the valve clearances (Chapter 1).
- ☐ Cylinder and/or piston worn. Excessive wear will cause compression pressure to leak past the rings. This is usually accompanied by worn rings as well. A top-end overhaul is necessary (Chapter 2).
- ☐ Piston rings worn, weak, broken, or sticking. Broken or sticking piston rings usually indicate a lubrication or carburation problem that causes excess carbon deposits or seizures to form on the pistons and rings. Top-end overhaul is necessary (Chapter 2).
- ☐ Piston ring-to-groove clearance excessive. This is caused by excessive wear of the piston ring lands. Piston replacement is necessary (Chapter 2).
- ☐ Cylinder head gasket damaged. If the head is allowed to become loose, or if excessive carbon build-up on the piston crown and combustion chamber causes extremely high compression, the head gasket may leak. Retorquing the head is not always sufficient to restore the seal, so gasket replacement is necessary (Chapter 2).
- ☐ Cylinder head warped. This is caused by overheating or improperly tightened head bolts. Machine shop resurfacing or head replacement is necessary (Chapter 2).
- ☐ Valve spring broken or weak. Caused by component failure or wear; the springs must be replaced (Chapter 2).
- ☐ Valve not seating properly. This is caused by a bent valve (from over-revving or improper valve adjustment), burned valve or seat (improper carburation) or an accumulation of carbon deposits on the seat (from carburation or lubrication problems). The valves must be cleaned and/or replaced and the seats serviced if possible (Chapter 2).

A

ABS (Anti-lock braking system) A system, usually electronically controlled, that senses incipient wheel lockup during braking and relieves hydraulic pressure at wheel which is about to skid.
Aftermarket Components suitable for the motorcycle, but not produced by the motorcycle manufacturer.
Allen key A hexagonal wrench which fits into a recessed hexagonal hole.
Alternating current (ac) Current produced by an alternator. Requires converting to direct current by a rectifier for charging purposes.
Alternator Converts mechanical energy from the engine into electrical energy to charge the battery and power the electrical system.
Ampere (amp) A unit of measurement for the flow of electrical current. Current = Volts ˚ Ohms.
Ampere-hour (Ah) Measure of battery capacity.
Angle-tightening A torque expressed in degrees. Often follows a conventional tightening torque for cylinder head or main bearing fasteners **(see illustration)**.

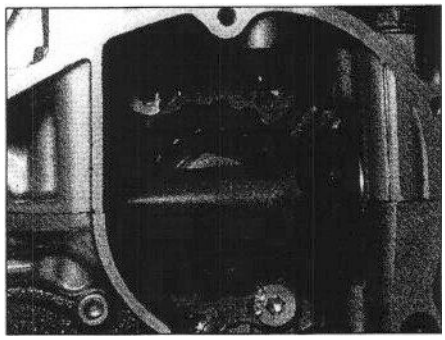


Angle-tightening cylinder head bolts

Antifreeze A substance (usually ethylene glycol) mixed with water, and added to the cooling system, to prevent freezing of the coolant in winter. Antifreeze also contains chemicals to inhibit corrosion and the formation of rust and other deposits that would tend to clog the radiator and coolant passages and reduce cooling efficiency.
Anti-dive System attached to the fork lower leg (slider) to prevent fork dive when braking hard.
Anti-seize compound A coating that reduces the risk of seizing on fasteners that are subjected to high temperatures, such as exhaust clamp bolts and nuts.
API American Petroleum Institute. A quality standard for 4-stroke motor oils.
Asbestos A natural fibrous mineral with great heat resistance, commonly used in the composition of brake friction materials. Asbestos is a health hazard and the dust created by brake systems should never be inhaled or ingested.
ATF Automatic Transmission Fluid. Often used in front forks.
ATU Automatic Timing Unit. Mechanical device for advancing the ignition timing on early engines.
ATV All Terrain Vehicle. Often called a Quad.
Axial play Side-to-side movement.
Axle A shaft on which a wheel revolves. Also known as a spindle.

B

Backlash The amount of movement between meshed components when one component is held still. Usually applies to gear teeth.
Ball bearing A bearing consisting of a hardened inner and outer race with hardened steel balls between the two races.
Bearings Used between two working surfaces to prevent wear of the components and a build-up of heat. Four types of bearing are commonly used on motorcycles: plain shell bearings, ball bearings, tapered roller bearings and needle roller bearings.
Bevel gears Used to turn the drive through 90°. Typical applications are shaft final drive and camshaft drive **(see illustration)**.

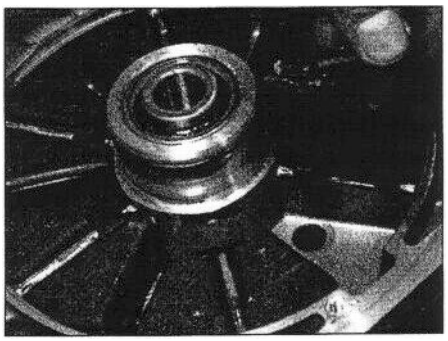


Bevel gears are used to turn the drive through 90°

BHP Brake Horsepower. The British measurement for engine power output. Power output is now usually expressed in kilowatts (kW).
Bias-belted tyre Similar construction to radial tyre, but with outer belt running at an angle to the wheel rim.
Big-end bearing The bearing in the end of the connecting rod that's attached to the crankshaft.
Bleeding The process of removing air from an hydraulic system via a bleed nipple or bleed screw.
Bottom-end A description of an engine's crankcase components and all components contained there-in.
BTDC Before Top Dead Centre in terms of piston position. Ignition timing is often expressed in terms of degrees or millimetres BTDC.
Bush A cylindrical metal or rubber component used between two moving parts.
Burr Rough edge left on a component after machining or as a result of excessive wear.

C

Cam chain The chain which takes drive from the crankshaft to the camshaft(s).
Canister The main component in an evaporative emission control system (California market only); contains activated charcoal granules to trap vapours from the fuel system rather than allowing them to vent to the atmosphere.
Castellated Resembling the parapets along the top of a castle wall. For example, a castellated wheel axle or spindle nut.
Catalytic converter A device in the exhaust system of some machines which converts certain pollutants in the exhaust gases into less harmful substances.
Charging system Description of the components which charge the battery, ie the alternator, rectifer and regulator.
Circlip A ring-shaped clip used to prevent endwise movement of cylindrical parts and shafts. An internal circlip is installed in a groove in a housing; an external circlip fits into a groove on the outside of a cylindrical piece such as a shaft. Also known as a snap-ring.
Clearance The amount of space between two parts. For example, between a piston and a cylinder, between a bearing and a journal, etc.
Coil spring A spiral of elastic steel found in various sizes throughout a vehicle, for example as a springing medium in the suspension and in the valve train.
Compression Reduction in volume, and increase in pressure and temperature, of a gas, caused by squeezing it into a smaller space.
Compression damping Controls the speed the suspension compresses when hitting a bump.
Compression ratio The relationship between cylinder volume when the piston is at top dead centre and cylinder volume when the piston is at bottom dead centre.
Continuity The uninterrupted path in the flow of electricity. Little or no measurable resistance.
Continuity tester Self-powered bleeper or test light which indicates continuity.
Cp Candlepower. Bulb rating common found on US motorcycles.
Crossply tyre Tyre plies arranged in a criss-cross pattern. Usually four or six plies used, hence 4PR or 6PR in tyre size codes.
Cush drive Rubber damper segments fitted between the rear wheel and final drive sprocket to absorb transmission shocks **(see illustration)**.



Cush drive rubbers dampen out transmission shocks

D

Degree disc Calibrated disc for measuring piston position. Expressed in degrees.
Dial gauge Clock-type gauge with adapters for measuring runout and piston position. Expressed in mm or inches.
Diaphragm The rubber membrane in a master cylinder or carburettor which seals the upper chamber.
Diaphragm spring A single sprung plate often used in clutches.
Direct current (dc) Current produced by a dc generator.

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