

Chapter 2 Part B

Engine, clutch and transmission (CR250R and CR500R models)

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Specifications

CR250R

Cylinder head warpage limit 0.05 mm (0.002 inch)

Cylinder

Bore

1986 through 1996

Standard 66.390 to 66.405 mm (2.6138 to 2.6144 inches)

Limit 66.44 mm (2.616 inches)

1997 (bore code A)

Standard 66.398 to 66.405 mm (2.6141 to 2.6144 inches)

Limit 66.43 mm (2.615 inches)

1997 (Bore code B)

Standard 66.390 to 66.398 mm (2.6138 to 2.6141 inches)

Limit 66.428 mm (2.615 inches)

Taper and out-of-round limits 0.05 mm (0.002 inch)

Surface warpage limit 0.05 mm (0.002 inch)

CR250R (continued)

Piston

Piston diameter	
1986 through 1996	
Standard	66.33 to 66.35 mm (2.6114 to 2.6122 inches)
Limit	66.28 mm (2.609 inches)
1997 on (bore code A)	
Standard	66.330 to 66.338 mm (2.6114 to 2.6117 inches)
Limit	66.28 mm (2.6094 inches)
1997 on (bore code B)	
Standard	66.323 to 66.338 mm (2.6111 to 2.6117 inches)
Limit	66.273 mm (2.6092 inches)
Piston diameter measuring point (above bottom of piston)	
1986 through 1991	25 to 30 mm (0.98 to 0.118 inch)
1992 on	15 to 25 mm (0.59 to 0.98 inch)
Piston-to-cylinder clearance	
1986 through 1991	
Standard	0.040 to 0.075 mm (0.0016 to 0.0030 inch)
Limit	0.10 mm (0.004 inch)
1992 through 1996	
Standard	0.007 to 0.019 mm (0.0003 to 0.0007 inch)
Limit	0.04 mm (0.0016 inch)
1997 on	
Standard	0.060 to 0.075 mm (0.0024 to 0.0029 inch)
Limit	0.09 mm (0.0035 inch)
Piston pin bore in piston	
1986 through 1988	
Standard	18.007 to 18.013 mm (0.7089 to 0.7092 inch)
Limit	18.03 mm (0.710 inch)
1989 through 1991	
Standard	18.002 to 18.008 mm (0.7087 to 0.7090 inch)
Limit	18.02 mm (0.709 inch)
1992 on	18.007 to 18.013 mm (0.7089 to 0.7092 inch)
Piston pin outer diameter	
Standard	17.994 to 18.000 mm (0.7084 to 0.7087 inch)
Limit	17.98 mm (0.708 inch)
Piston pin-to-piston clearance	
1986 through 1991	
Standard	0.007 to 0.019 mm (0.0003 to 0.0008 inch)
Limit	0.03 mm (0.001 inch)
1992 through 1996	
Standard	0.002 to 0.014 mm (0.0001 to 0.0005 inch)
Limit	0.02 mm (0.001 inch)
1997 on	
Standard	0.007 to 0.019 mm (0.0003 to 0.0007 inch)
Limit	0.04 mm (0.0016 inch)
Connecting rod small end bore	
1986 through 1991	
Standard	22.002 to 22.014 mm (0.8662 to 0.8667 inch)
Limit	22.03 mm (0.867 inch)
1992 on	
Standard	21.997 to 22.009 mm (0.8660 to 0.8665 inch)
Limit	22.02 mm (0.867 inch)
Ring end gap	
1986	
Standard	0.2 to 0.4 mm (0.008 to 0.016 inch)
Limit	0.5 mm (0.020 inch)
1987 through 1989	
Standard	0.3 to 0.5 mm (0.011 to 0.017 inch)
Limit	0.6 mm (0.024 inch)
1990 on	
Standard	0.40 to 0.55 mm (0.016 to 0.022 inch)
Limit	0.65 mm (0.026 inch)

Clutch

Spring free length

1986

Standard

Limit

43.3 mm (1.705 inches)

41.5 mm (1.634 inches)

1987 and 1988	
Standard	43.1 mm (1.697 inches)
Limit	41.3 mm (1.626 inches)
1989	
Standard	44.8 mm (1.76 inches)
Limit	43.0 mm (1.69 inches)
1990 and 1991	
Standard	44.2 mm (1.74 inches)
Limit	42.4 mm (1.67 inches)
1992 and 1993	
Standard	44.7 mm (1.76 inches)
1994 on	45.7 mm (1.83 inches)
Friction plate thickness	
Standard	2.92 to 3.08 mm (0.114 to 0.121 inch)
Limit	2.85 mm (0.112 inch)
Metal plate warpage limit	0.20 mm (0.008 inch)
Clutch housing bushing outside diameter	
Standard	27.987 to 28.000 mm (1.1018 to 1.1024 inches)
Limit	27.97 mm (1.101 inches)
Clutch housing inside diameter limit	
1986 through 1991	32.05 mm (1.262 inches)
1992 on	Not specified

Kickstarter

Spindle outside diameter	
Standard	21.959 to 21.980 mm (0.8645 to 0.8654 inch)
Limit	21.95 mm (0.864 inch)
Pinion gear inside diameter	
1986 through 1994	
Standard	22.020 to 22.041 mm (0.8669 to 0.8678 inch)
Limit	22.06 mm (0.869 inch)
1995 on	
Standard	22.007 to 22.028 mm (0.8664 to 0.8672 inch)
Limit	22.05 mm (0.868 inch)
Idler gear inside diameter	
Standard	20.020 to 20.041 mm (0.7882 to 0.7890 inch)
Limit	20.07 mm (0.790 inch)
Idler gear bushing inside diameter	
Standard	17.000 to 17.018 mm (0.6693 to 0.6700 inch)
Limit	17.04 mm (0.671 inch)
Idler gear bushing outside diameter	
Standard	19.979 to 20.000 mm (0.7866 to 0.7874 inch)
Limit	19.96 mm (0.786 inch)
Countershaft diameter at idler gear bushing surface	
Standard	16.966 to 16.984 mm (0.6680 to 0.6687 inch)
Limit	16.95 mm (0.667 inch)

Shift drum and forks

Fork inside diameter wear limits	
Center	11.04 mm (0.435 inch)
Left-right	12.07 mm (0.475 inch)
Fork shaft outside diameter wear limits	
1986 through 1994	
Center	10.95 mm (0.431 inch)
Left-right	11.98 mm (0.472 inch)
1995 on	
Center	10.97 mm (0.432 inch)
Left-right	11.95 mm (0.470 inch)
Fork finger thickness	
Standard	4.93 to 5.00 mm (0.194 to 0.197 inch)
Limit	4.8 mm (0.19 inch)
Shift drum groove width limit	Not specified

Transmission

Gear inside diameters	
Mainshaft fourth	
Standard	28.007 to 28.028 mm (1.1026 to 1.1035 inches)
Limit	28.05 mm (1.104 inches)

CR500R (continued)

Piston

Piston diameter	88.93 to 88.95 mm (3.501 to 3.502 inches)
Standard	88.88 mm (3.499 inches)
Limit	
Piston diameter measuring point (above bottom of piston)	25 mm (0.98 inch)
Piston-to-cylinder clearance	
1986	0.050 to 0.085 mm (0.0020 to 0.0033 inch)
Standard	0.10 mm (0.004 inch)
Limit	
1987 on	0.070 to 0.105 mm (0.00027 to 0.0041 inch)
Standard	0.12 mm (0.005 inch)
Limit	
Piston pin bore in piston	
1986 through 1988	20.007 to 20.013 mm (0.7876 to 0.7879 inch)
Standard	20.03 mm (0.789 inch)
Limit	
1989 on	20.002 to 20.008 mm (0.7875 to 0.7877 inch)
Standard	20.02 mm (0.788 inch)
Limit	
Piston pin outer diameter	
Standard	19.994 to 20.000 mm (0.7871 to 0.7874 inch)
Limit	19.98 mm (0.787 inch)
Piston pin-to-piston clearance	
1986 through 1988	0.007 to 0.019 mm (0.0003 to 0.0008 inch)
Standard	0.03 mm (0.001 inch)
Limit	
1989 on	0.002 to 0.014 mm (0.0001 to 0.0005 inch)
Standard	0.02 mm (0.001 inch)
Limit	
Connecting rod small end bore	
Standard	25.002 to 25.014 mm (0.9846 to 0.9848 inch)
Limit	25.025 mm (0.9852 inch)
Ring end gap	
Standard	0.3 to 0.5 mm (0.011 to 0.017 inch)
Limit	0.6 mm (0.024 inch)

Clutch

Spring free length	
1986 through 1989	
Standard	44.5 mm (1.752 inches)
Limit	42.5 mm (1.67 inches)
1990 on	
Standard	44.2 mm (1.74 inches)
Limit	42.2 mm (1.66 inches)
Friction plate thickness	
Standard	2.92 to 3.08 mm (0.114 to 0.121 inch)
Limit	2.85 mm (0.112 inch)
Metal plate warpage limit	0.20 mm (0.008 inch)
Clutch housing bushing outside diameter	
Standard	27.987 to 28.000 mm (1.1018 to 1.1024 inches)
Limit	27.97 mm (1.101 inches)
Clutch housing inside diameter limit	
Standard	32.009 to 342.034 mm (1.2602 to 1.2612 inches)
Limit	32.054 mm (1.2620 inches)

Kickstarter

Spindle outside diameter	
Standard	21.959 to 21.980 mm (0.8645 to 0.8654 inch)
Limit	21.95 mm (0.864 inch)
Pinion gear inside diameter	
Standard	20.020 to 20.041 mm (0.7882 to 0.7890 inch)
Limit	20.06 mm (0.790 inch)
Idler gear inside diameter	
Standard	20.020 to 20.041 mm (0.7882 to 0.7890 inch)
Limit	0.07 mm (0.790 inch)

Idler gear bushing inside diameter	
Standard.....	17.000 to 17.018 mm (0.6693 to 0.6700 inch)
Limit.....	17.04 mm (0.671 inch)
Idler gear bushing outside diameter	
Standard.....	19.979 to 20.000 mm (0.7866 to 0.7874 inch)
Limit.....	19.94 mm (0.785 inch)
Countershaft diameter at idler gear bushing surface.....	
	Not specified

Shift drum and forks

Fork inside diameter wear limits	
Center.....	11.04 mm (0.435 inch)
Left-right.....	12.07 mm (0.475 inch)
Fork shaft outside diameter wear limits	
Center.....	0.95 mm (0.431 inch)
Left-right.....	11.98 mm (0.472 inch)
Fork finger thickness	
Standard.....	4.93 to 5.00 mm (0.194 to 0.197 inches)
Limit.....	4.8 mm (0.19 inch)
Shift drum groove width limit.....	
	Not specified

Transmission

Gear inside diameters	
Mainshaft fourth (1986 through 1992)	
Standard.....	28.007 to 28.028 mm (1.1026 to 1.1035 inches)
Limit.....	28.05 mm (1.104 inch)
Mainshaft fourth (1993 on)	
Standard.....	28.000 to 28.021 mm (1.1024 to 1.1032 inches)
Limit.....	28.05 mm (1.104 inch)
Mainshaft fifth	
Standard.....	25.020 to 25.041 mm (0.9850 to 0.9859 inch)
Limit	
1986 through 1991.....	25.05 mm (0.986 inch)
1992 on.....	25.07 mm (0.987 inch)
Countershaft first	
Standard.....	22.020 to 22.041 mm (0.8669 to 0.8678 inch)
Limit.....	22.07 mm (0.869 inch)
Countershaft second (1986, 1987 and 1992 on)	
Standard.....	27.020 to 27.041 mm (1.0638 to 1.0646 inches)
Limit.....	27.05 mm (1.065 inch)
Countershaft second (1988 through 1991)	
Standard.....	30.020 to 30.041 mm (1.1819 to 1.1827 inches)
Limit.....	30.05 mm (1.183 inches)
Countershaft third	
Standard.....	25.020 to 25.041 mm (0.9850 to 0.9859 inch)
Limit	
1986 through 1991.....	25.05 mm (0.986 inch)
1992 on.....	25.07 mm (0.987 inch)
Bushing diameters	
Countershaft first gear	
Inside	
Standard.....	19.000 to 19.021 mm (0.7480 to 0.7489 inch)
Limit.....	19.04 mm (0.750 inch)
Outside	
Standard.....	21.979 to 22.000 mm (0.8653 to 0.8661 inch)
Limit.....	21.95 mm (0.864 inch)
Countershaft second gear (1986, 1987 and 1992 on)	
Inside	
Standard.....	24.000 to 24.021 mm (0.9449 to 0.9457 inch)
Limit.....	24.04 mm (0.946 inch)
Outside	
Standard.....	26.979 to 27.000 mm (1.0622 to 1.0630 inches)
Limit.....	26.95 mm (1.061 inches)
Countershaft second gear (1988 through 1991)	
Inside	
Standard.....	27.000 to 27.021 mm (1.0630 to 1.0638 inches)
Limit.....	27.04 mm (1.065 inches)
Outside	
Standard.....	29.979 to 30.000 mm (1.1803 to 1.1811 inches)
Limit.....	29.95 mm (1.179 inches)

CR500R (continued)

Mainshaft fourth gear (outside diameter)	
Standard	27.959 to 27.980 mm (1.1007 to 1.1015 inches)
Limit	27.94 mm (1.100 inches)
Mainshaft diameter (at fifth gear)	
Standard	24.959 to 24.980 mm (0.9826 to 0.9835 inch)
Limit	24.94 mm (0.982 inch)
Countershaft diameter	
At third gear	
Standard	24.959 to 24.980 mm (0.9826 to 0.9835 inch)
Limit	24.94 mm (0.982 inch)
At second gear bushing (1986 and 1987)	
Standard	23.959 to 23.980 mm (0.9433 to 0.9441 inch)
Limit	23.94 mm (0.943 inch)
At second gear bushing (1988 on)	
Standard	26.959 to 26.980 mm (1.1064 to 1.0622 inches)
Limit	26.94 mm (1.061 inches)
At first gear bushing	
Standard	18.959 to 18.980 mm (0.7464 to 0.7472 inch)
Limit	18.94 mm (0.746 inch)
Crankshaft	
Connecting rod side clearance	
1986 through 1989	
Standard	0.2 to 0.6 mm (0.008 to 0.024 inch)
Limit	0.7 mm (0.027 inch)
1990 on	
Standard	0.4 to 0.8 mm (0.016 to 0.031 inch)
Limit	0.9 mm (0.035 inch)
Connecting rod big end radial clearance	
Standard	0.008 to 0.020 mm (0.0003 to 0.0008 inch)
Limit	0.03 mm (0.001 inch)
Crankshaft V-block positions	
At center of each main bearing journal	
Runout measuring points	
1986 through 1991	
From alternator end	43 mm (1.7 inch) from outer surface of crank throw
From clutch end	25 mm (0.9 inch) from outer surface of crank throw
1992 on	
Not specified	
Runout limit	
0.05 mm (0.002 inch)	
Torque specifications	
Engine mounting bolts	
1986 through 1988	
10 mm	38 to 48 Nm (27 to 35 ft-lbs)
8 mm	24 to 29 Nm (17 to 21 ft-lbs)
1989	
38 to 48 Nm (27 to 35 ft-lbs)	
1990 and 1991	
60 to 70 Nm (43 to 51 ft-lbs)	
1992	
Upper	43 Nm (31 ft-lbs)
Lower	65 Nm (47 ft-lbs)
1993 on	
Upper	40 Nm (29 ft-lbs)
Lower	65 Nm (47 ft-lbs)
Engine hanger plate bolts	
1986 through 1989	
To engine	38 to 48 Nm (27 to 35 ft-lbs)
To frame	24 to 29 Nm (17 to 21 ft-lbs)
1990 and 1991	
To engine	60 to 70 Nm (43 to 51 ft-lbs)
To frame	24 to 29 Nm (17 to 21 ft-lbs)
1992	
To engine	43 Nm (31 ft-lbs)
To frame	27 Nm (20 ft-lbs)
1993 on	
To engine	40 Nm (29 ft-lbs)
To frame	27 Nm (20 ft-lbs)
Cylinder head nuts	
27 Nm (20 ft-lbs)	
Cylinder nuts	
1986 through 1988	
27 Nm (20 ft-lbs)	
1989 on	
38 to 48 Nm (27 to 35 ft-lbs)	
40 Nm (29 ft-lbs)	

Cylinder studs.....	12 Nm (84 to 120 in-lbs)*
Reed valve case bolts.....	Not specified
Right crankcase cover bolts.....	10 Nm (84 in-lbs)
Clutch cover bolts.....	10 Nm (84 in-lbs)
Clutch pressure plate bolts	
1986 through 1991.....	Not specified
1992 on.....	10 Nm (84 in-lbs)
Clutch locknut	
1986 through 1988.....	55 to 65 Nm (40 to 47 ft-lbs)
1989 on.....	82 Nm (60 ft-lbs)
Primary drive gear bolt.....	45 Nm (33 ft-lbs)
Shift drum center pin.....	22 Nm (16 ft-lbs) (2)
Shift drum stopper arm bolt	
1986 through 1991.....	Not specified
1992 on.....	12 Nm (108 in-lbs)
Kickstarter pedal bolt.....	27 Nm (20 ft-lbs)
Shift pedal pinch bolt.....	12 Nm (108 in-lbs)
Crankcase bolts.....	Not specified
Countershaft bearing retainer plate bolts.....	10 Nm (84 in-lbs) (2)
Shift drum retainer plate bolts.....	10 Nm (84 in-lbs) (2)

1. Apply anaerobic thread locking agent to the threads.
2. Apply non-permanent thread locking agent to the threads.

1 General information

The engine/transmission unit is of the liquid-cooled, single-cylinder two-stroke design. The engine/transmission assembly is constructed from aluminum alloy. The crankcase is divided vertically.

The cylinder, piston, crankshaft bearings and connecting rod lower end bearing are lubricated by the fuel, which is a mixture of gasoline and two-stroke oil. The transmission and clutch are lubricated by four-stroke engine oil, which is contained in a sump within the crankcase. Power from the crankshaft is routed to the transmission via a wet, multi-plate type clutch. The transmission has five forward gears.

2 Operations possible with the engine in the frame

The components and assemblies listed below can be removed without having to remove the engine from the frame. If, however, a number of areas require attention at the same time, removal of the engine is recommended.

- Cylinder and piston
- External shift mechanism
- Clutch and primary drive gear
- Kickstarter

3 Operations requiring engine removal

It is necessary to remove the engine/transmission assembly from the frame and separate the crankcase halves to gain access to the following components:

- Crankshaft and connecting rod
- Transmission shafts
- Internal shift mechanism (gearshift spindle, shift drum and forks)
- Crankcase bearings

4 Major engine repair - general note

- 1 It is not always easy to determine when or if an engine should be completely overhauled, as a number of factors must be considered.
- 2 High mileage is not necessarily an indication that an overhaul is needed, while low mileage, on the other hand, does not preclude the need for an overhaul. Regular maintenance is probably the single most

important consideration. This is especially true if the bike is used in competition. An engine that has regular and frequent oil changes, as well as other required maintenance, will most likely give many hours of reliable service. Conversely, a neglected engine, or one which has not been broken in properly, may require an overhaul very early in its life.

3 Poor running that can't be accounted for by seemingly obvious causes (fouled spark plug, leaking head or cylinder base gasket, worn piston rings, carburetor problems) may be due to leaking crankshaft seals. In two-stroke engines, the crankcase acts as a suction pump to draw in fuel mixture and as a compressor to force it into the cylinder. If the crankcase seals are leaking, the pressure drop will cause a loss of performance.

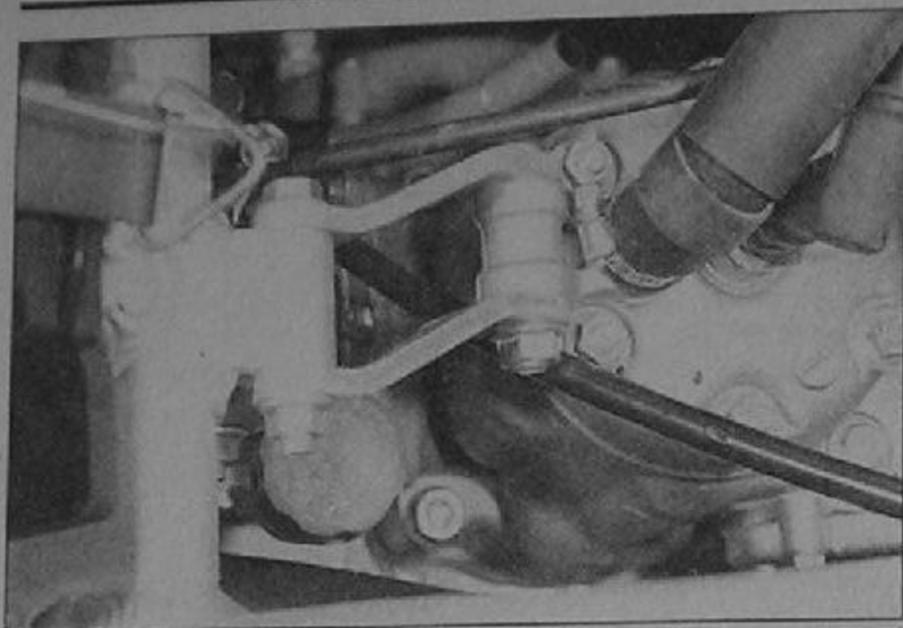
4 If the engine is making obvious knocking or rumbling noises, the connecting rod and/or main bearings are probably at fault. The upper connecting rod bearing should be replaced at the maintenance interval listed in Chapter 1.

5 A top-end overhaul, part of regularly scheduled maintenance on these machines, consists of replacing the piston and rings and inspecting the cylinder bore. The cylinder on CR500R models can be bored for an oversize piston if necessary; on CR250R models, the Nikasil coating on the cylinder wall can't be honed or bored, so the cylinder and piston must be replaced with new ones if they're worn.

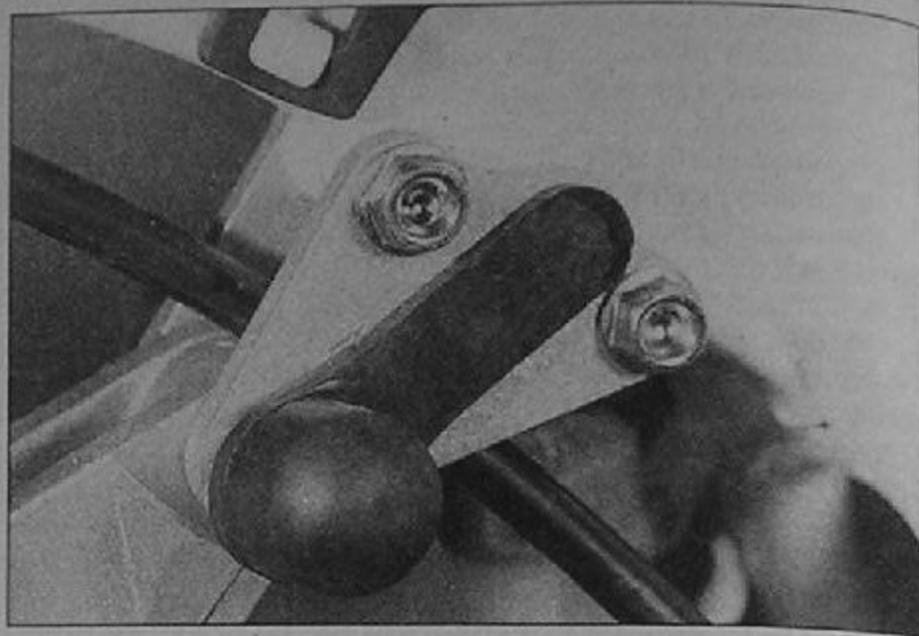
6 A lower-end engine overhaul generally involves inspecting the crankshaft, transmission and crankcase bearings and seals. Unlike four-stroke engines equipped with plain main and connecting rod bearings, there isn't much in the way of machine work that can be done to refurbish existing parts. Worn bearings, gears, seals and shift mechanism parts should be replaced with new ones. The crankshaft and connecting rod are permanently assembled, so if one of these components (or the connecting rod lower end bearing) needs to be replaced, both must be. While the engine is being overhauled, other components such as the carburetor can be rebuilt also. The end result should be a like-new engine that will give as many trouble-free hours as the original.

7 Before beginning the engine overhaul, read through all of the related procedures to familiarize yourself with the scope and requirements of the job. Overhauling an engine is not all that difficult, but it is time consuming. Plan on the motorcycle being tied up for a minimum of two (2) weeks. Check on the availability of parts and make sure that any necessary special tools, equipment and supplies are obtained in advance.

8 Most work can be done with typical shop hand tools, although a number of precision measuring tools are required for inspecting parts to determine if they must be replaced. Often a dealer service department or repair shop will handle the inspection of parts and offer advice concerning reconditioning and replacement. As a general rule, time is



6.12a Remove the upper mounting bracket; this is a 1997 CR250R . . .



6.12b . . . and this is a CR500R

the primary cost of an overhaul so it doesn't pay to install worn or sub-standard parts.

9 As a final note, to ensure maximum life and minimum trouble from a rebuilt engine, everything must be assembled with care in a spotlessly clean environment.

5 Crankcase pressure and vacuum - check

This test can pinpoint the cause of otherwise unexplained poor running. It can also prevent piston seizures by detecting air leaks that can cause a lean mixture. It requires special equipment, but can easily be done by a Honda dealer or other motorcycle shop. If you regularly work on two-stroke engines, you might want to consider purchasing the tester for yourself (or with a group of other riders). You may also be able to fabricate the tester.

The test involves sealing off the intake and exhaust ports (and the Honda Power Port or Composite Racing Valve openings on models so equipped), then applying vacuum and pressure to the spark plug hole with a hand vacuum/pressure pump, similar to the type used for brake bleeding and automotive vacuum testing.

First, remove the carburetor and exhaust system. Block off the carburetor opening with a rubber plug, clamped securely in position. Place a rubber sheet (cut from a tire tube or similar material) over the exhaust port and secure it with a metal plate. If the bike has a Honda Power Port or Composite Racing Valve system, you'll need to seal these openings as well, using rubber gaskets and special adapters.

Apply air pressure to the spark plug hole with the vacuum/pressure pump. Check for leaks at the crankcase gasket, intake manifold, reed valve gasket, cylinder base gasket and head gasket. If the crankcase gasket leaks between the transmission sump and the crankcase (the area where the crankshaft spins), transmission oil will be sucked into the crankcase, causing the fuel mixture to be oil-rich. Also check the seal at the alternator end of the crankshaft. If the leaks are large, air will hiss as it passes through them. Small leaks can be detected by pouring soapy water over the suspected area and looking for bubbles.

After checking for air leaks, apply vacuum with the pump. If vacuum leaks down quickly, the crankshaft seals are leaking.

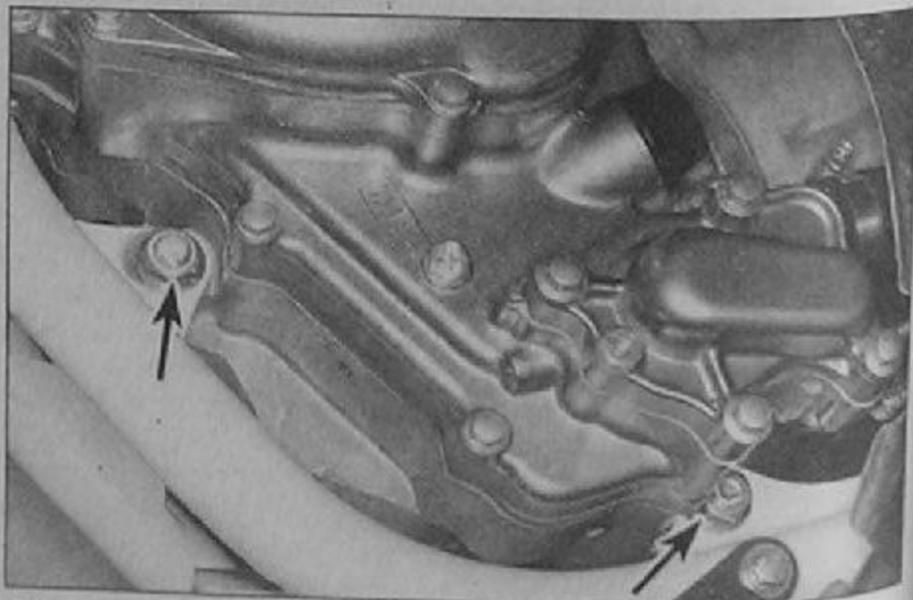
6 Engine - removal and installation

Warning: Engine removal and installation should be done with the aid of an assistant to avoid damage or injury that could occur if the engine is dropped. A hydraulic floor jack should be used to support and lift the engine if possible (they can be rented at low cost).

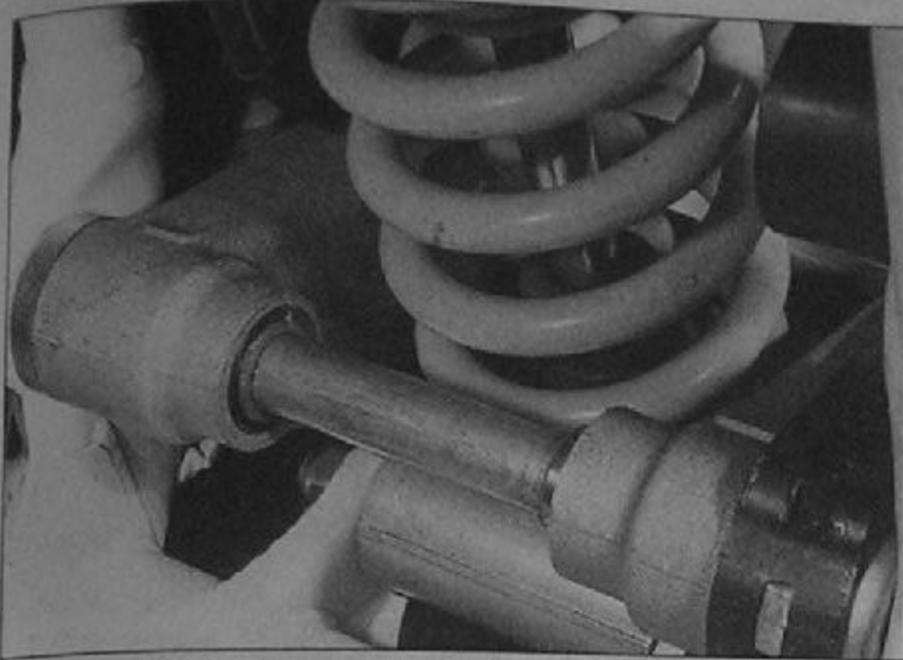
Removal

Refer to illustrations 6.12a, 6.12b, 6.14 and 6.15

- 1 Drain the transmission oil and coolant (see Chapter 1).
- 2 Remove the seat (see Chapter 8). If you're working on a 1986 or 1987 CR250R or a 1986 through 1991 CR500R, remove the right side cover.
- 3 If you're working on a 1992 or later CR250R, remove the brake pedal (see Chapter 7).
- 4 Remove the fuel tank, exhaust system and carburetor (see Chapter 4).
- 5 Disconnect the spark plug wire (see Chapter 1).
- 6 Disconnect the coolant hoses from the engine (see Chapter 3). If you're working on a 1989 through 1991 CR250R or a 1989 or later CR500R, remove the radiator(s).
- 7 Label and disconnect the alternator and pulse generator wires (refer to Chapter 5 for component location if necessary). If you're working on a 1999 or later model, disconnect the connectors for the coil primary and ground wires, ignition control unit and kill switch. Detach the wires from their retainers.
- 8 Remove the drive chain and sprocket (see Chapter 6).
- 9 Disconnect the clutch cable (see Section 12).
- 10 If you're working on a 1997 or later CR250R, remove the rear master cylinder reservoir (see Chapter 7).
- 11 Support the bike securely upright so it can't fall over during the remainder of this procedure. Support the engine with a jack, using a block of wood between the jack and the engine to protect the crankcase.
- 12 Remove the upper engine mount (see illustrations).
- 13 If you're working on a 1992 or later CR500R, remove the shock



6.14 Remove the two through-bolts at the bottom and front of the engine (1997 CR500R shown) . . .



6.15 ... and the swingarm pivot bolt where it passes through the crankcase casting

absorber lower mounting bolt (see Chapter 6).

14 Remove the engine mounting bolts and nuts at the front and bottom (see illustration). **Note:** Raise and lower the jack as needed to relieve strain on the mounting bolts.

15 Remove the swingarm pivot bolt nut (see Chapter 5). The pivot bolt passes through the rear of the crankcase to act as an engine support (see illustration), so it needs to be pulled out of the crankcase. Pull the swingarm back about half the diameter of the bolt hole to provide removal clearance for the engine.

16 Have an assistant help you lift the engine out of the frame.

17 Slowly lower the engine to a suitable work surface.

Installation

18 Have an assistant help lift the engine into the frame so it rests on the jack and block of wood. Use the jack to align the mounting bolt holes, then install the bolts, nuts and upper bracket. Tighten them to the torques listed in this Chapter's Specifications. Refer to the Chapter 5 Specifications for the swingarm pivot bolt torque.

19 The remainder of installation is the reverse of the removal steps, with the following additions:

- Use new gaskets at all exhaust pipe connections.
- Adjust the throttle cable and clutch cable following the procedures in Chapter 1.
- Fill the engine with oil and coolant, also following the procedures in Chapter 1.
- Run the engine and check for oil, coolant or exhaust leaks.

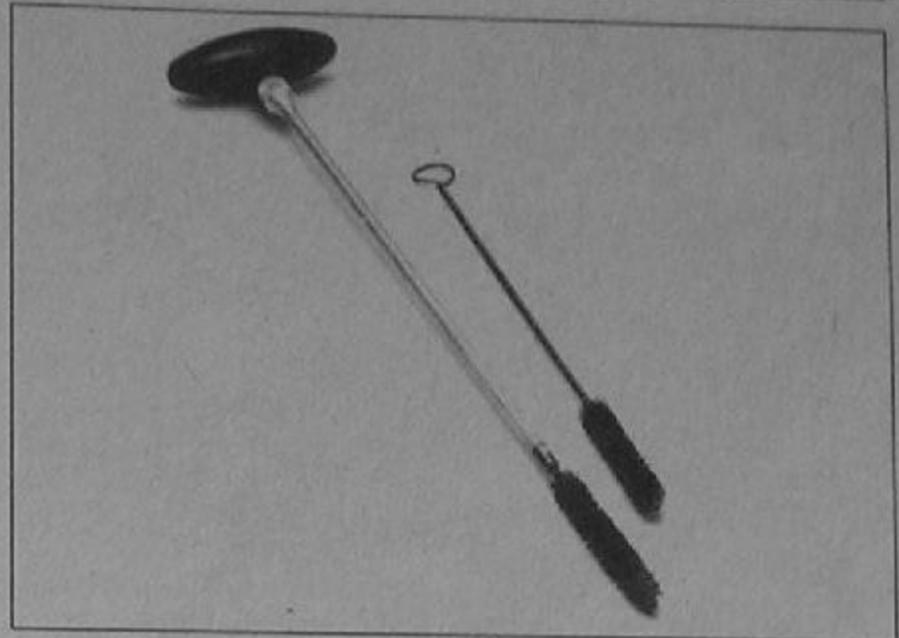
7 Engine disassembly and reassembly - general information

Refer to illustrations 7.2 and 7.3

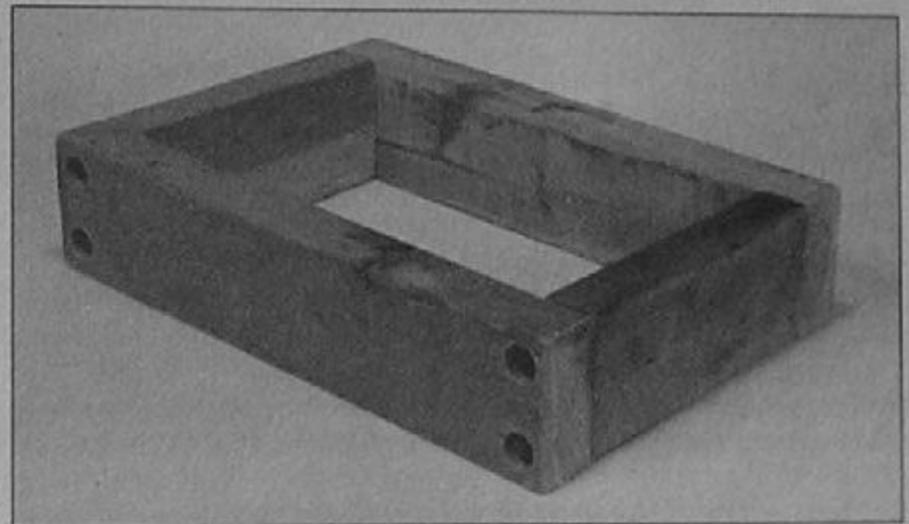
1 Before disassembling the engine, clean the exterior with a degreaser and rinse it with water. A clean engine will make the job easier and prevent the possibility of getting dirt into the internal areas of the engine.

2 In addition to the precision measuring tools mentioned earlier, you will need a torque wrench and oil gallery brushes (see illustration). Some new, clean engine oil of the correct grade and type (two-stroke oil, four-stroke oil or both, depending on whether it's a top-end or bottom-end overhaul), some engine assembly lube (or moly-based grease) and a tube of RTV (silicone) sealant will also be required.

3 An engine support stand made from short lengths of 2 x 4's bolted together will facilitate the disassembly and reassembly procedures (see illustration). If you have an automotive-type engine stand, an adapter plate can be made from a piece of plate, some angle iron and some nuts and bolts.



7.2 A selection of brushes is required for cleaning holes and passages in the engine components



7.3 An engine stand can be made from short lengths of lumber and lag bolts or nails

4 When disassembling the engine, keep "mated" parts together (including gears, shift forks and shafts, etc.) that have been in contact with each other during engine operation. These "mated" parts must be reused or replaced as an assembly.

5 Engine/transmission disassembly should be done in the following general order with reference to the appropriate Sections.

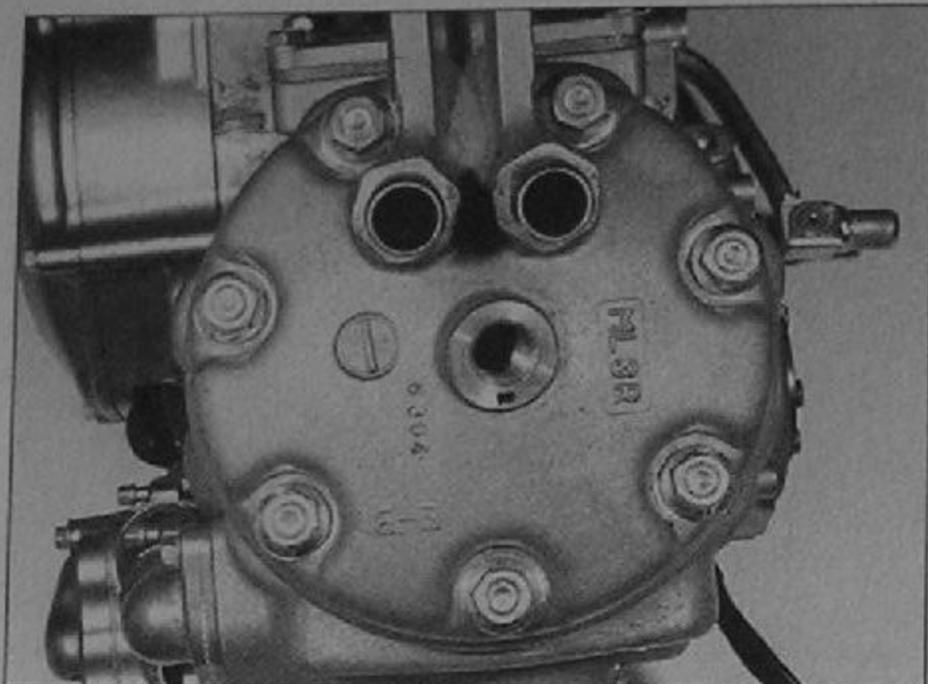
- Remove the cylinder head
- Remove the cylinder
- Remove the piston
- Remove the water pump
- Remove the clutch
- Remove the primary drive gear
- Remove the kickstarter
- Remove the external shift mechanism
- Remove the alternator rotor
- Separate the crankcase halves
- Remove the internal shift mechanism
- Remove the transmission shafts and gears
- Remove the crankshaft and connecting rod

6 Reassembly is accomplished by reversing the general disassembly sequence.

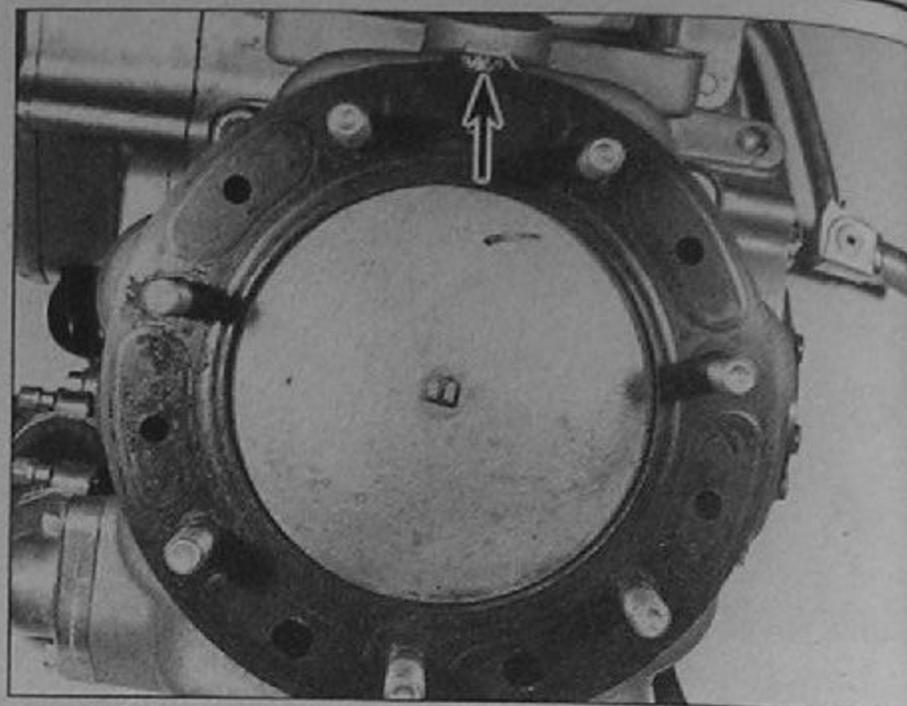
8 Cylinder head - removal, inspection and installation

Caution: The engine must be completely cool before beginning this procedure, or the cylinder head may become warped.

Note: This procedure is described with the engine in the frame. If the engine has been removed, ignore the steps which don't apply.



8.6 Loosen the cylinder head nuts evenly, in a criss-cross pattern, in stages



8.8 Make sure the small coolant passages are clear; on installation, place the UP mark on the gasket upward (arrow)

Removal

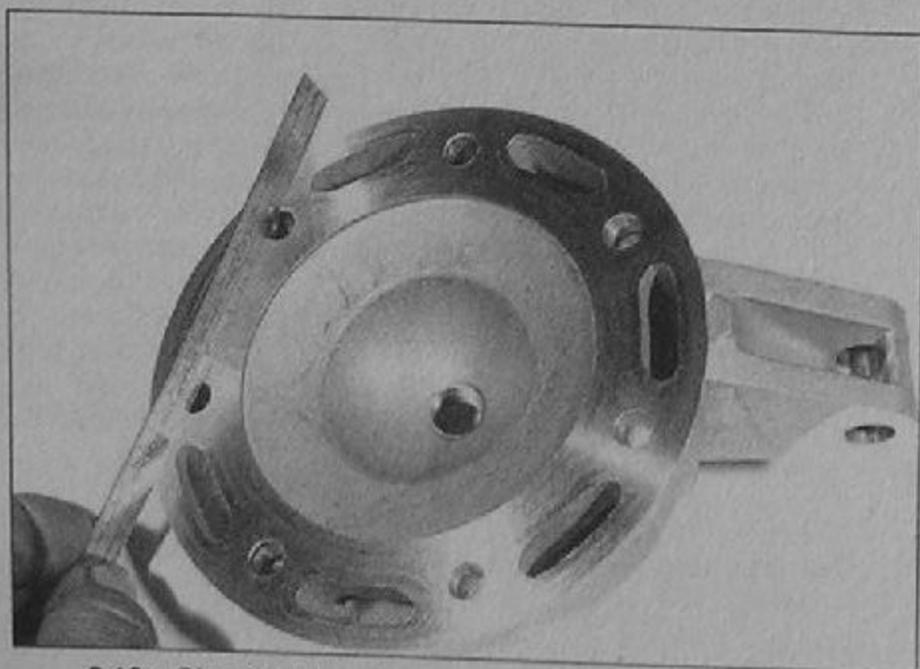
Refer to illustrations 8.6 and 8.8

- 1 Drain the cooling system (see Chapter 1) and disconnect the coolant hose from the cylinder head (see Chapter 3).
- 2 Disconnect the spark plug wire (see Chapter 1).
- 3 Remove the seat (see Chapter 8).
- 4 Remove the fuel tank and the expansion chamber (see Chapter 4).
- 5 Remove the top engine mount (see Section 6).
- 6 Loosen the cylinder head nuts in two or three stages, in a criss-cross pattern (see illustration). Remove the nuts once they're all loose.
- 7 Lift the cylinder head off the cylinder. If the head is stuck, use a wooden dowel inserted into the spark plug hole to lever the head off. Don't attempt to pry the head off by inserting a screwdriver between the head and the cylinder - you'll damage the sealing surfaces.
- 8 Rotate the piston to the top of the cylinder or stuff a clean rag into the cylinder to prevent the entry of debris. Once this is done, remove the gasket from the cylinder (see illustration).

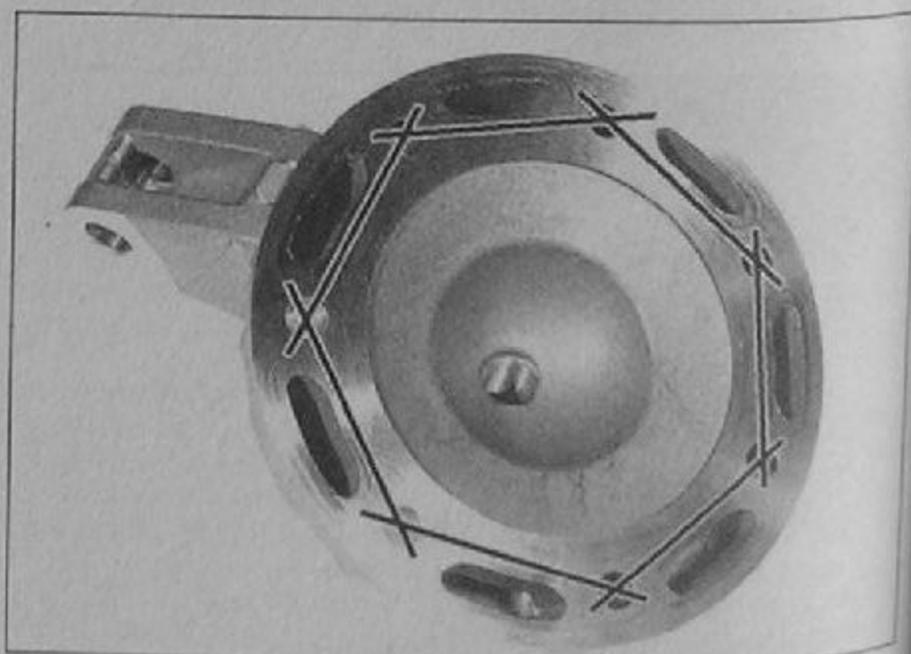
Inspection

Refer to illustrations 8.12a and 8.12b

- 9 Check the cylinder head gasket and the mating surfaces on the



8.12a Check for head warpage with a straightedge and feeler gauge ...



8.12b ... in the directions shown

cylinder head and cylinder for leakage, which could indicate warpage.

10 Clean all traces of old gasket material from the cylinder head and cylinder. Be careful not to let any of the gasket material fall into the cylinder or coolant passages.

11 Inspect the head very carefully for cracks and other damage. If cracks are found, a new head will be required.

12 Using a precision straightedge and a feeler gauge, check the head gasket mating surface for warpage. Lay the straightedge across the head, intersecting the head bolt holes, and try to slip a feeler gauge under it, on either side of the combustion chamber (see illustrations). The feeler gauge thickness should be the same as the cylinder head warpage limit listed in this Chapter's Specifications. If the feeler gauge can be inserted between the head and the straightedge, the head is warped and must either be machined or, if warpage is excessive, replaced with a new one.

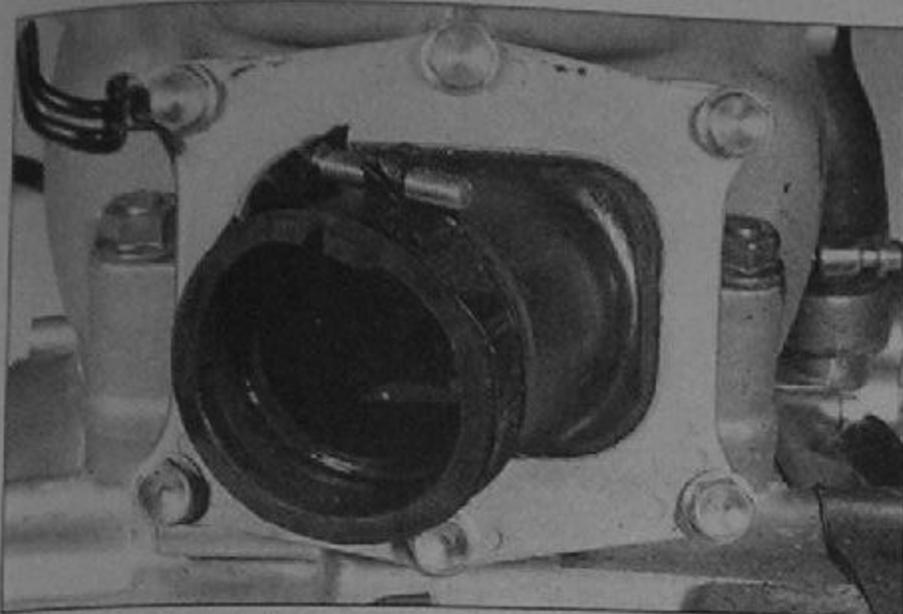
Installation

13 Lay the new gasket in place on the cylinder (see illustration 8.8). Never reuse the old gasket and don't use any type of gasket sealant.

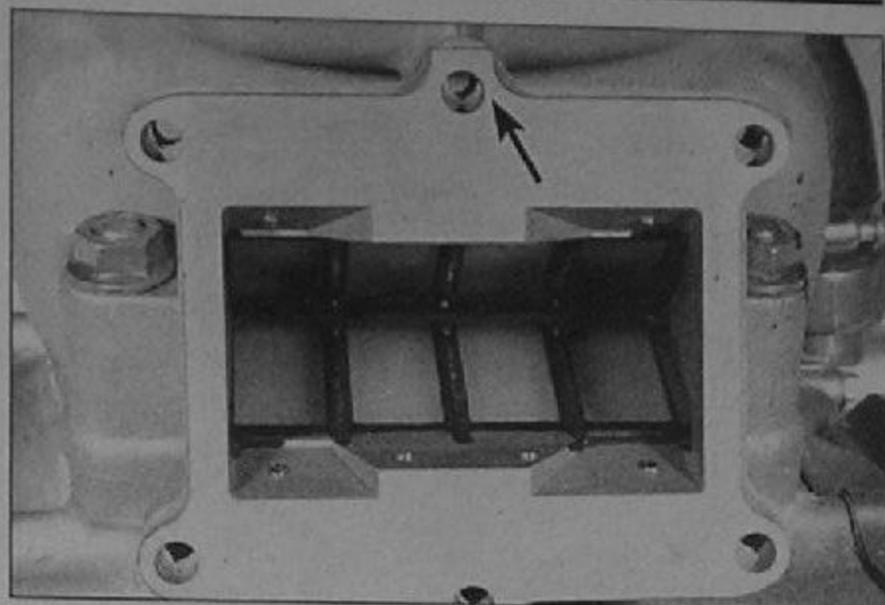
14 Carefully lower the cylinder head over the studs.

15 Install the cylinder head nuts and tighten them evenly, in a criss-cross pattern, to the torque listed in this Chapter's Specifications.

16 The remainder of installation is the reverse of the removal steps. Be sure to refill the cooling system (see Chapter 1).



9.2 Unbolt the reed valve body and remove it from the cylinder with its O-ring . . .



9.3 . . . then pull out the reed valve and remove the gasket; some models have a tab that goes upward on installation (arrow)

9 Reed valve - removal, inspection and installation

Removal

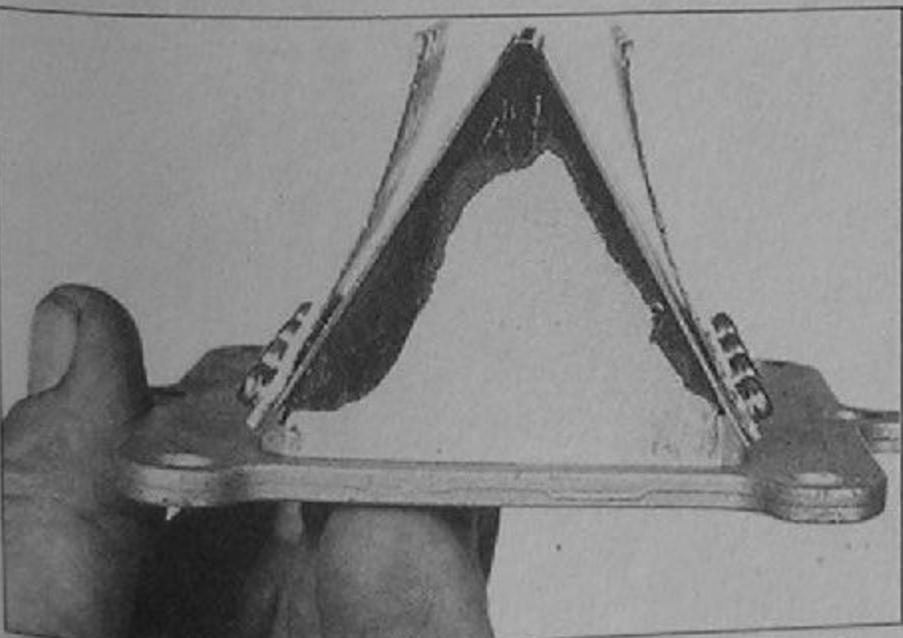
Refer to illustrations 9.2 and 9.3

- 1 Remove the carburetor (see Chapter 4).
- 2 Unbolt the carburetor intake tube from the cylinder (see illustration). Take off the intake tube and its O-ring.
- 3 Pull the reed valve out of the cylinder and remove the gasket (see illustration).

Inspection

Refer to illustrations 9.6a and 9.6b

- 4 Check the reed valve for obvious damage, such as cracked or broken reeds or stoppers. Also make sure there's no clearance between the reeds and the edges where they make contact with the seats.
- 5 If you're working on a 1986 through 1994 model, the reed valve must be replaced as an assembly if any problems are found.
- 6 1995 and later reed valves can be disassembled and the reeds replaced. Remove the screws and stoppers (see illustration). The screws have locking agent on the threads, so you may need to use an impact driver. Remove the reeds and install new ones. Install the stoppers, aligning the cutout in the stopper with the cutout in the reed. Coat the screw threads with non-permanent thread locking agent, then tighten them to the torque listed in this Chapter's Specifications. After



9.6a Measure the gap between the reed stoppers and reeds

assembly, check the clearance between the reeds and reed stoppers (see illustration).

Installation

7 Installation is the reverse of the removal steps, with the following additions:

- a) Use a new gasket between the reed valve assembly and cylinder.
- b) If you're working on a 1994 or later CR250R, install the reed valve with its tab upward (see illustration 9.3).
- c) Use a new O-ring (if equipped) between the carburetor intake tube and the reed valve assembly.
- d) Tighten the intake tube bolts in a criss-cross pattern to the torque listed in this Chapter's Specifications.

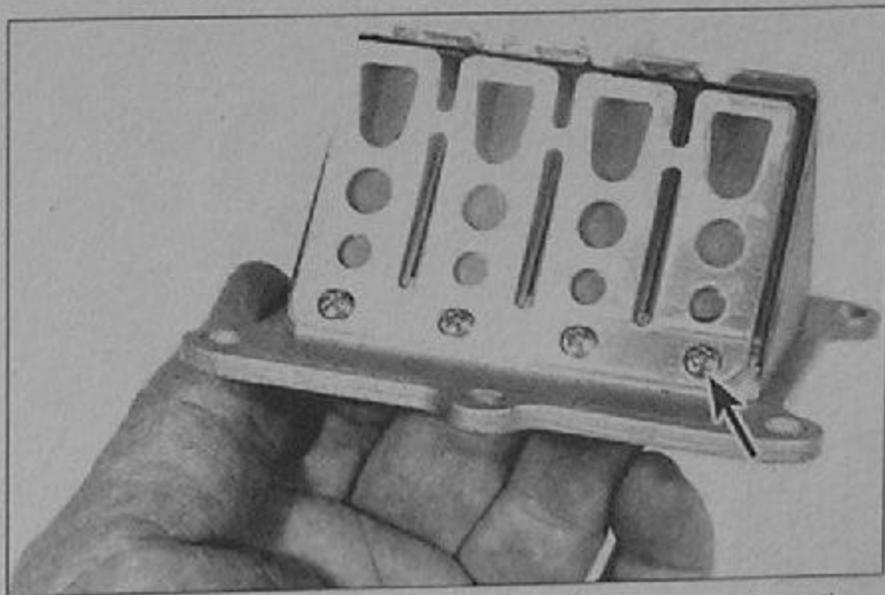
10 Cylinder - removal, inspection and installation

Note: For bikes used in competition, periodic replacement of the cylinder is a routine maintenance procedure that should be done at the intervals listed in Chapter 1.

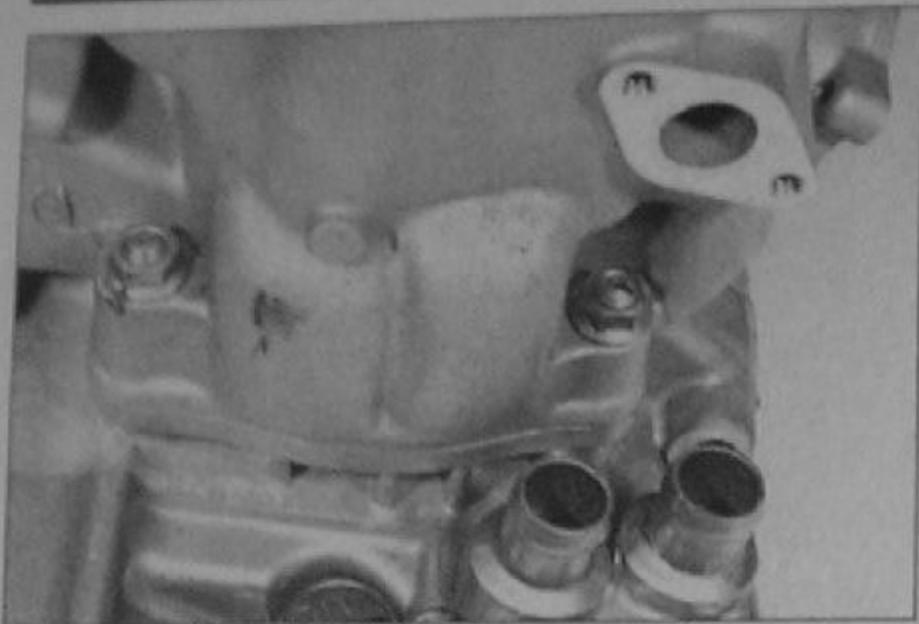
Removal

Refer to illustrations 10.2a, 10.2b, 10.2c, 10.3, 10.4a and 10.4b

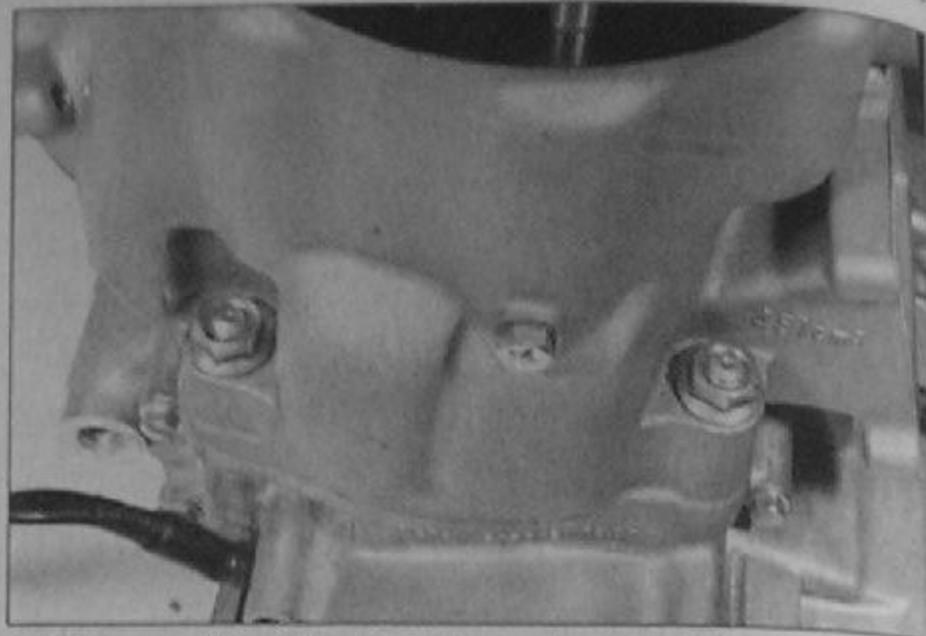
- 1 Remove the cylinder head (see Section 8). Make sure the crankshaft is positioned at top dead center (TDC).



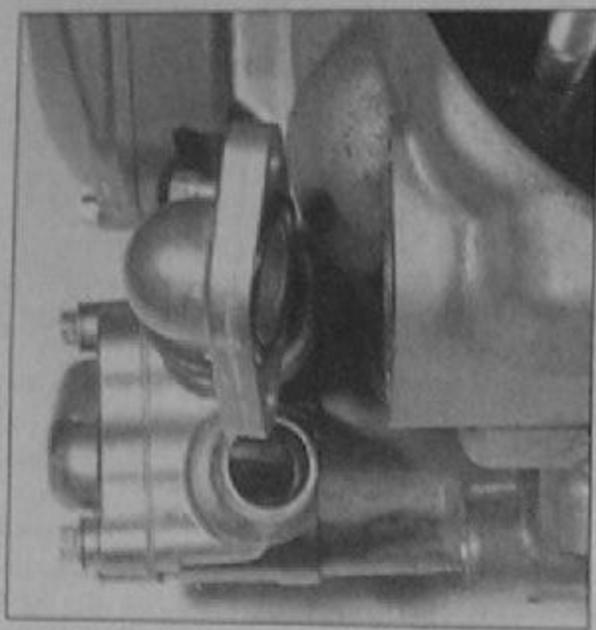
9.6b Remove the screws to detach the reed stoppers from the reed valve; on installation, align the diagonally cut corners of the reed and stopper (arrow)



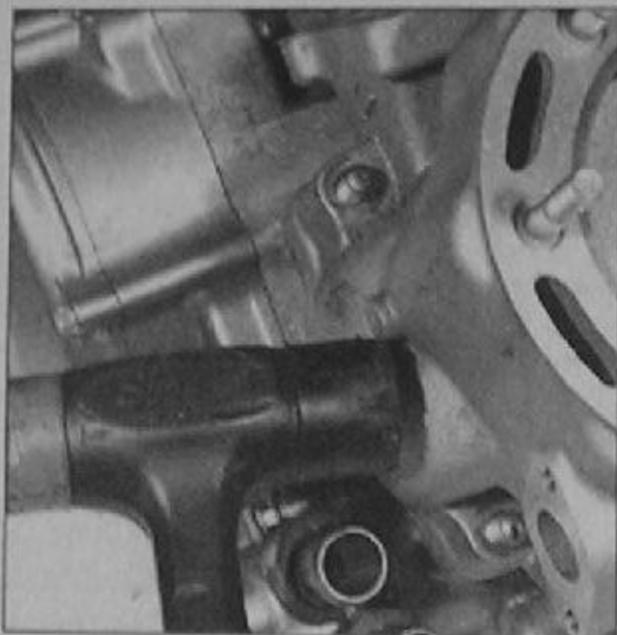
10.2a Remove the cylinder base nuts from the right side of the cylinder . . .



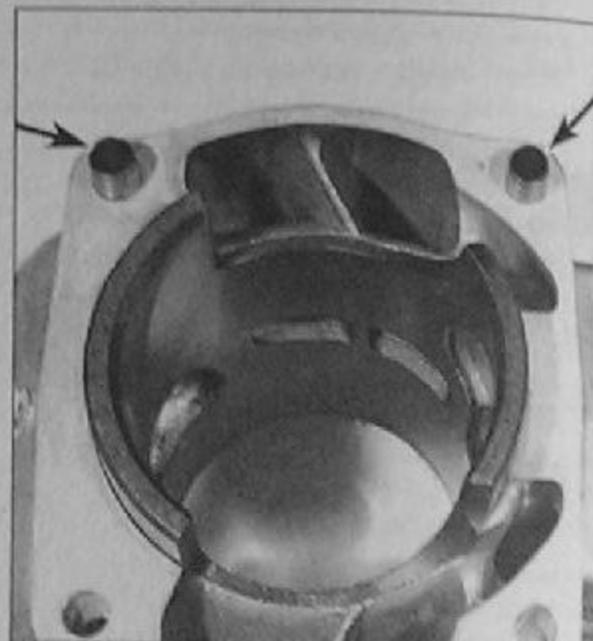
10.2b . . . and from the left side; you'll need a box-end wrench to unscrew the forward nuts



10.2c Unbolt the CR500R coolant fitting and remove its O-ring



10.3 Tap the cylinder with a soft-faced mallet to free it from the crankcase



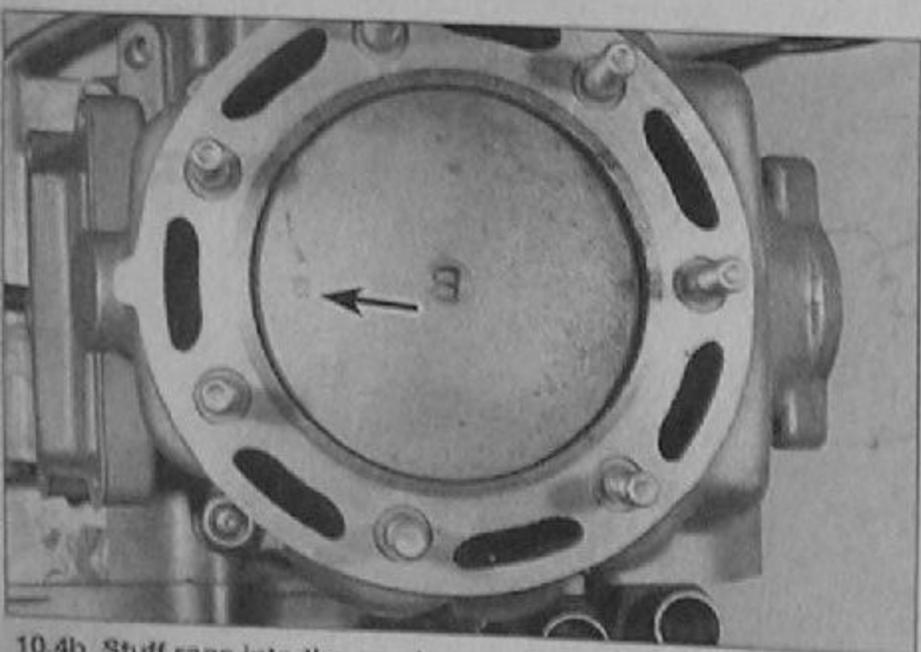
10.4a Locate the cylinder dowels (arrows) . . .

2 Remove four nuts securing the cylinder to the crankcase (see illustrations). If you're working on a CR500R, unbolt the coolant hose fitting and remove its O-ring (see illustration).

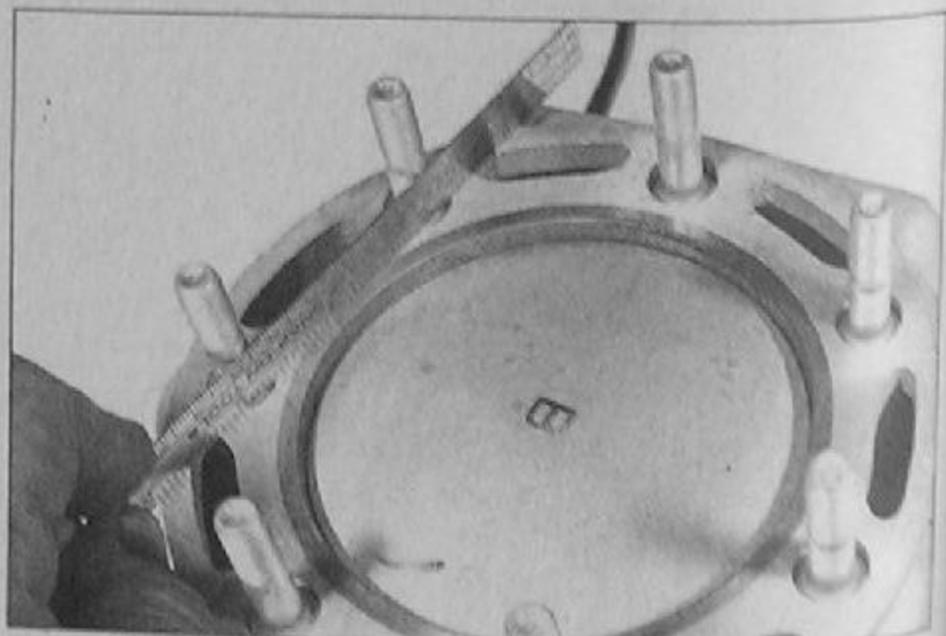
3 Lift the cylinder straight up off the piston (see illustration). If it's stuck, tap around its perimeter with a soft-faced hammer. Don't attempt to pry between the cylinder and the crankcase, as you'll ruin

the sealing surfaces.

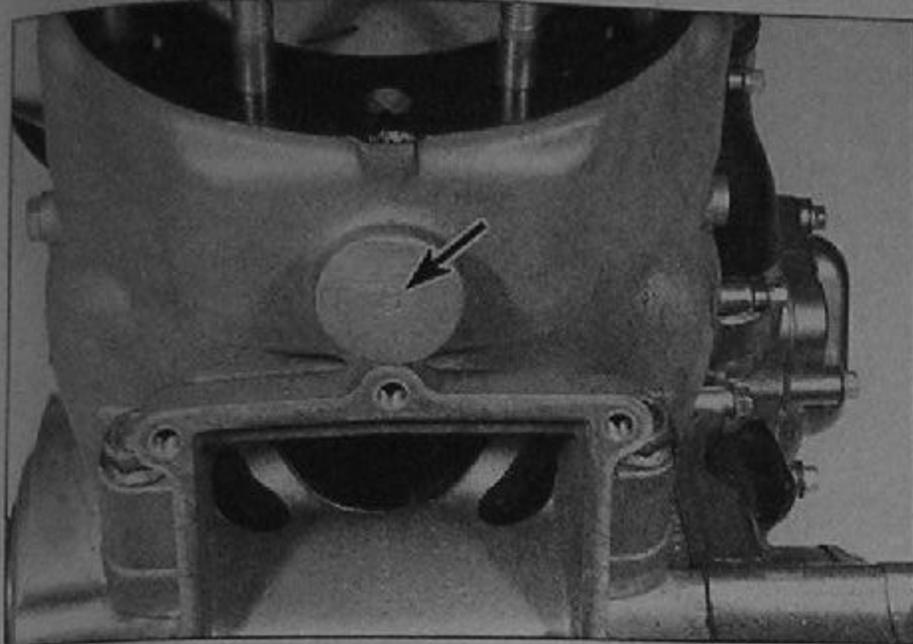
4 Locate the dowel pins (they may have come off with the cylinder or still be in the crankcase) (see illustration). Be careful not to let these drop into the engine. Stuff clean shop rags around the piston and remove the gasket and all traces of old gasket material from the surfaces of the cylinder and the crankcase (see illustration).



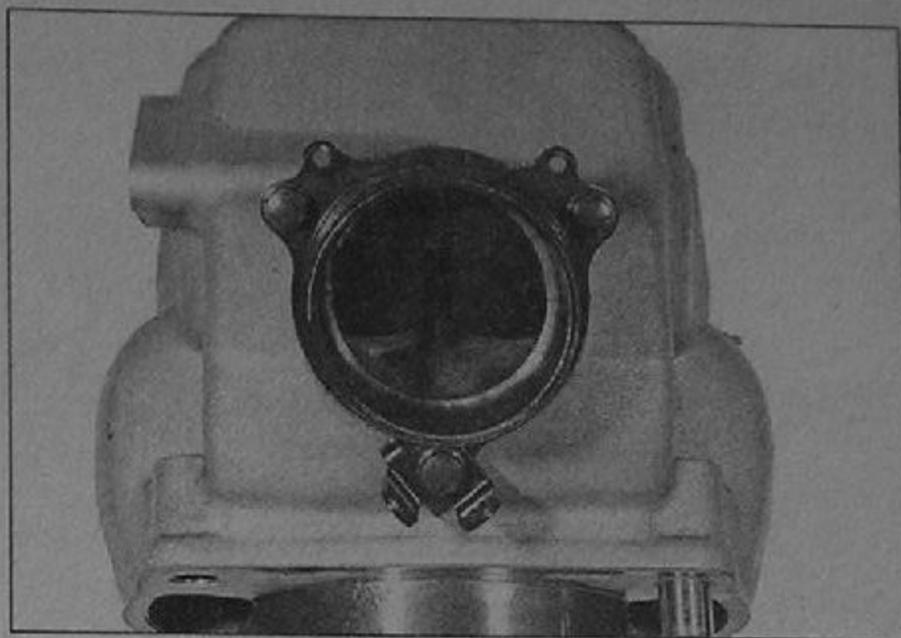
10.4b Stuff rags into the crankcase opening; on assembly, the IN mark faces the rear (intake side) of the engine - the letter mark on top of the piston is a bore grade



10.5a Measure cylinder surface warpage with a straightedge and feeler gauge along the bolt hole lines



10.5b The bore grade mark on the cylinder (arrow) should match the one on the piston



10.6a Note how the spring bracket is installed (if equipped) and unbolt the exhaust headpipe

Inspection

Refer to illustrations 10.5a, 10.5b, 10.6a, 10.6b and 10.7

Caution: Don't attempt to separate the liner from the cylinder.

5 Check the top surface of the cylinder for warpage, using the same method as for the cylinder head (see Section 10). Measure along the sides, across the stud holes (see illustration). Look for the bore code on the outside of the cylinder (see illustration). It should match the one on the piston (see illustration 10.4b).

6 Check the cylinder walls carefully for scratches and score marks. Remove the coolant drain screw and sealing washer (if you haven't already done so). Unbolt the exhaust headpipe and remove its gasket (see illustrations).

7 Using the appropriate precision measuring tools, check the cylinder's diameter at the top, center and bottom of the cylinder bore, parallel to the crankshaft axis (see illustration). Next, measure the cylinder's diameter at the same three locations across the crankshaft axis. Compare the results to this Chapter's Specifications.

8 As an alternative, if the precision measuring tools are not available, a dealer service department or repair shop will make the measurements and offer advice concerning servicing of the cylinder.

9 If you're working on a CR500R and the cylinder walls are tapered, out-of-round, worn beyond the specified limits, or badly scuffed or scored, you can have the cylinder rebored and honed by a dealer service department or a motorcycle repair shop. If a rebore is done, an oversize piston and rings will be required as well. **Note:** Honda supplies pistons in two oversizes for these models.

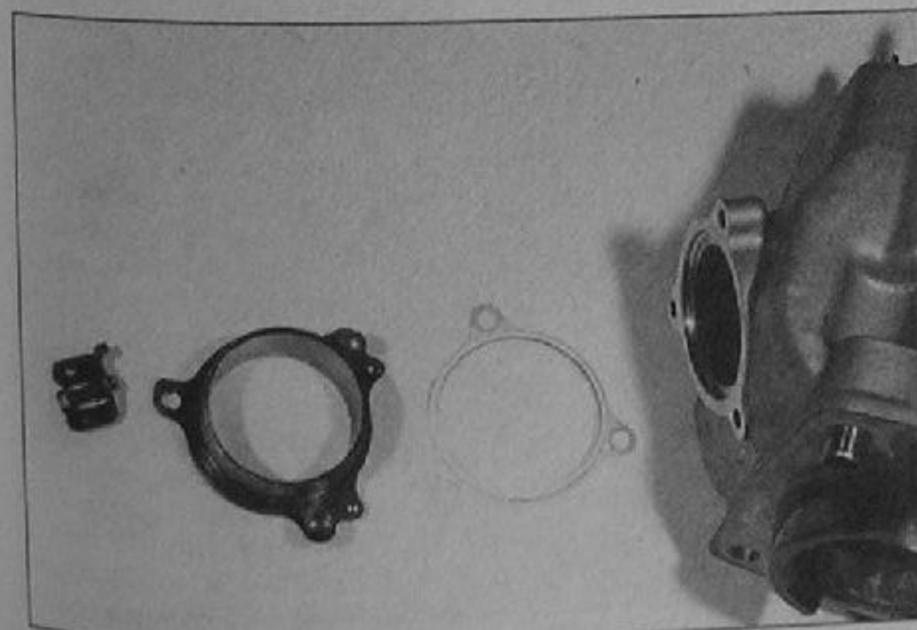
10 CR250R models have a Nikasil coating on the cylinder wall. Bor-

ing or honing will remove the coating, so the cylinder will have to be replaced if the conditions described in Step 8 are found.

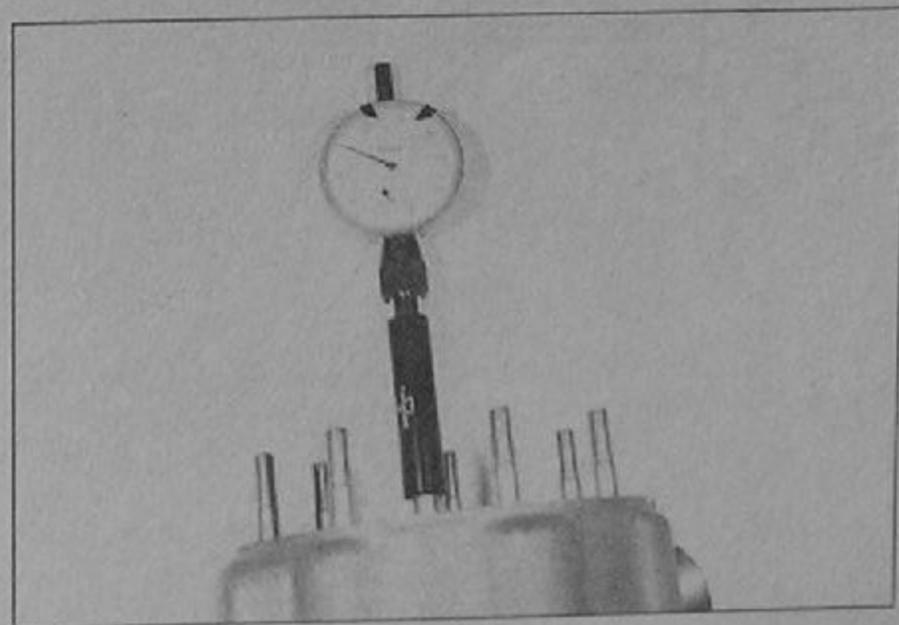
11 If a CR500R cylinder in reasonably good condition and not worn to the outside of the limits, and if the piston-to-cylinder clearance can be maintained properly, then the cylinder does not have to be rebored; honing is all that is necessary.

12 To perform the honing operation you will need the proper size flexible hone with fine stones as shown in *Maintenance techniques, tools and working facilities* at the front of this book, or a "bottle brush" type hone, plenty of light oil or honing oil, some shop towels and an electric drill motor. Hold the cylinder in a vise (cushioned with soft jaws or wood blocks) when performing the honing operation. Mount the hone in the drill motor, compress the stones and slip the hone into the cylinder. Lubricate the cylinder thoroughly, turn on the drill and move the hone up and down in the cylinder at a pace which will produce a fine crosshatch pattern on the cylinder wall with the crosshatch lines intersecting at approximately a 60-degree angle. Be sure to use plenty of lubricant and do not take off any more material than is absolutely necessary to produce the desired effect. Do not withdraw the hone from the cylinder while it is running. Instead, shut off the drill and continue moving the hone up and down in the cylinder until it comes to a complete stop, then compress the stones and withdraw the hone. Wipe the oil out of the cylinder. Remember, do not remove too much material from the cylinder wall. If you do not have the tools, or do not desire to perform the honing operation, a dealer service department or other repair shop will generally do it for a reasonable fee.

13 Next, the cylinder must be thoroughly washed with warm soapy



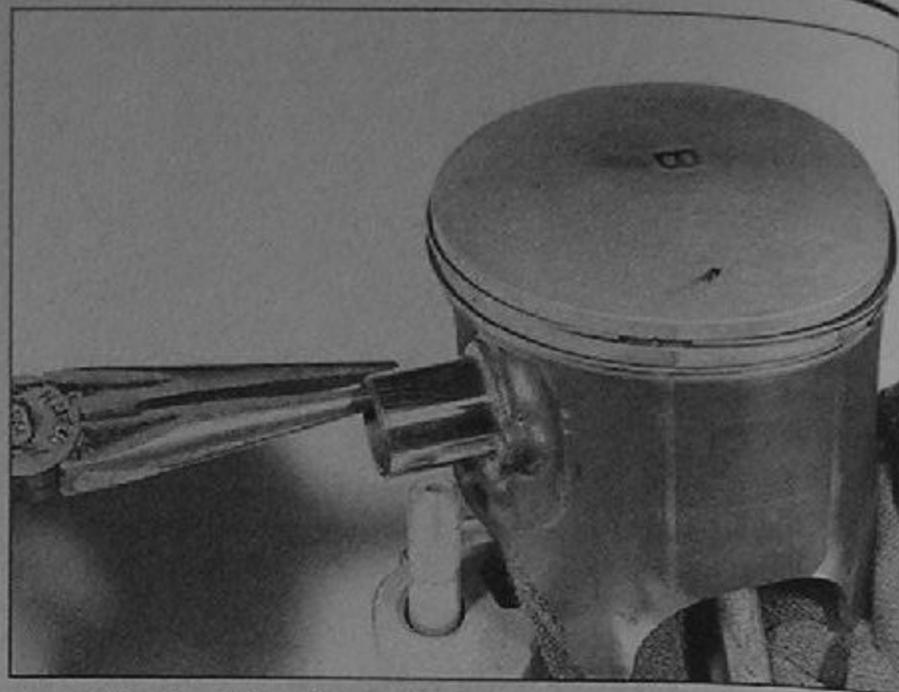
10.6b . . . then remove the headpipe and its gasket



10.7 Measure bore diameter with a bore gauge



11.3 Wear eye protection and remove the circlip with a pointed tool or needle-nosed pliers



11.4a Push the piston pin partway out, then pull it the rest of the way

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

Installation

- 14 Lubricate the piston with plenty of clean two-stroke engine oil.
- 15 Install the dowel pins, then lower a new cylinder base gasket over them (see illustration 10.4a).
- 16 Install the cylinder over the studs and carefully lower it down until the piston crown fits into the cylinder liner. Push down on the cylinder, making sure the piston doesn't get cocked sideways, until the bottom of the cylinder liner slides down past the piston rings. Be sure not to rotate the cylinder, as this may snag the piston rings on the exhaust port. A wood or plastic hammer handle can be used to gently tap the cylinder down, but don't use too much force or the piston will be damaged.
- 17 The remainder of installation is the reverse of the removal steps.

11 Piston and rings - removal, inspection and installation

Note: For bikes used in competition, periodic replacement of the pis-

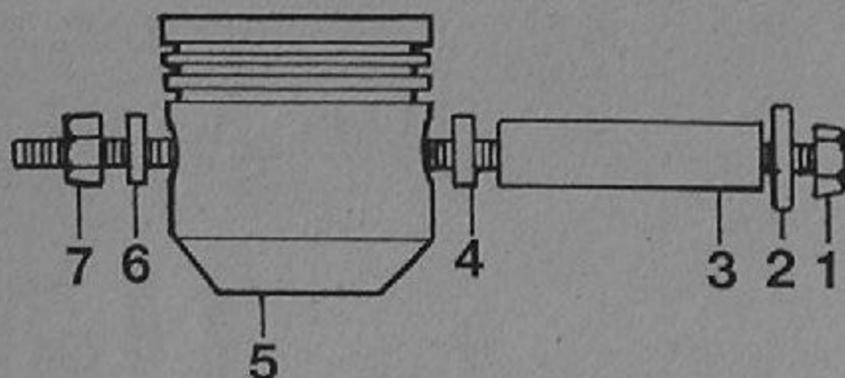
ton and rings is a routine maintenance procedure that should be done at the intervals listed in Chapter 1.

- 1 The piston is attached to the connecting rod with a piston pin that is a slip fit in the piston and connecting rod needle bearing.
- 2 Before removing the piston from the rod, stuff a clean shop towel into the crankcase hole, around the connecting rod. This will prevent the circlips from falling into the crankcase if they are inadvertently dropped.

Removal

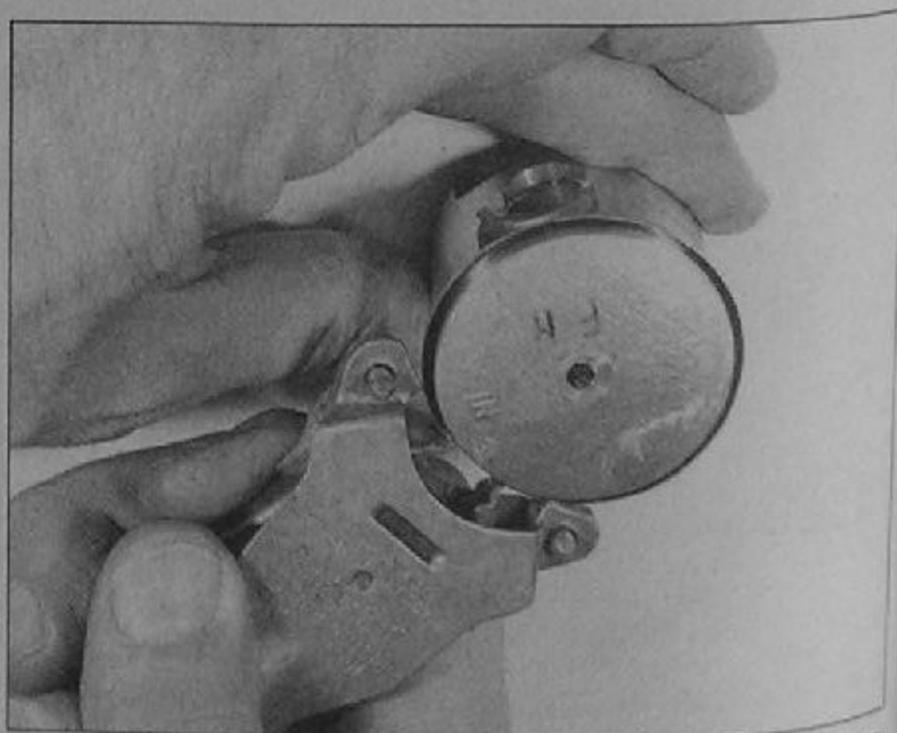
Refer to illustrations 11.3, 11.4a and 11.4b

- 3 The piston should have an IN mark on its crown that goes toward the intake (rear) side of the engine (see illustration 10.4). If this mark is not visible due to carbon buildup, scribe an arrow into the piston crown before removal. Support the piston and pry the circlip out with a pointed tool or needle-nosed pliers (see illustration).
- 4 Push the piston pin out from the opposite end to free the piston from the rod (see illustration). You may have to deburr the area around the groove to enable the pin to slide out (use a triangular file for this procedure). If the pin won't come out, you can fabricate a piston pin removal tool from a long bolt, a nut, a piece of tubing and washers (see illustration).

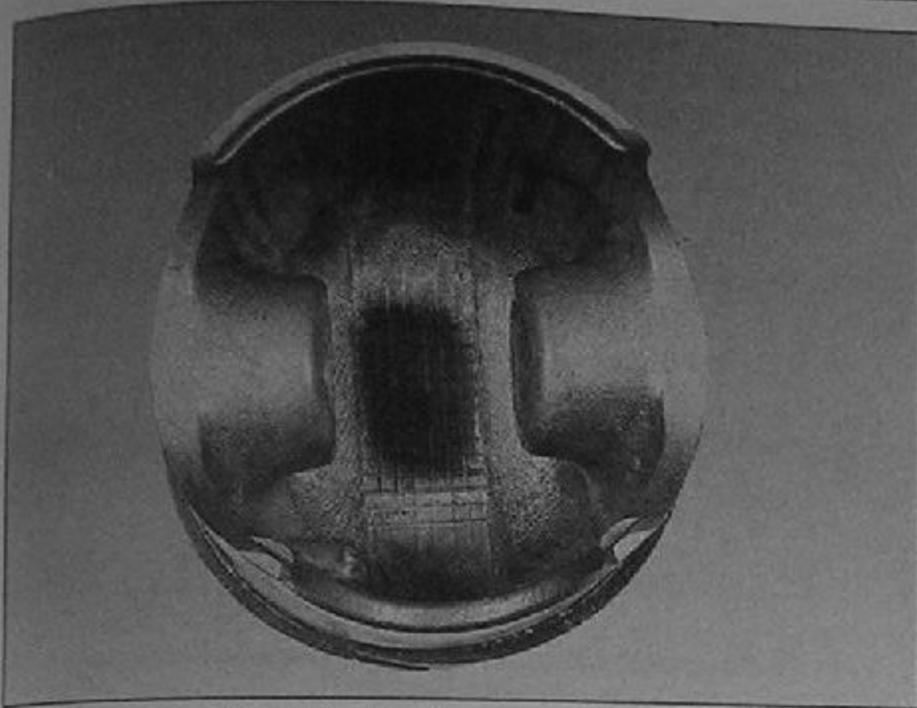


11.4b The piston pin should come out with hand pressure - if it doesn't, this removal tool can be fabricated from readily available parts

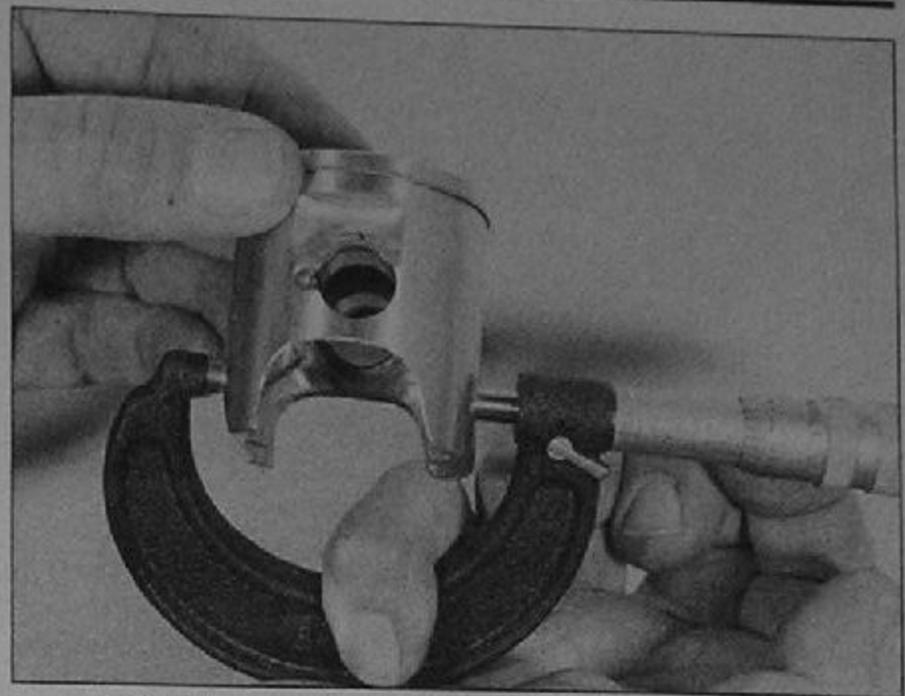
- | | |
|---------------|---|
| 1 Bolt | 7 Nut (B) |
| 2 Washer | A Large enough for piston pin to fit inside |
| 3 Pipe (A) | B Small enough to fit through piston pin bore |
| 4 Padding (A) | |
| 5 Piston | |
| 6 Washer (B) | |



11.6 Remove the piston rings with a ring removal and installation tool if you have one; you can use fingers instead if you're careful



11.9 Make sure the oil holes (if equipped) in the underside of the piston are clear



11.14 Measure the piston diameter with a micrometer

Inspection

Refer to illustrations 11.6, 11.9, 11.14, 11.15a, 11.15b and 11.16

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

6 Carefully remove the rings from the piston (see illustration). Do not nick or gouge the pistons in the process. A ring removal and installation tool will make this easier, but you can use fingers if you don't have one - just be sure not to cut yourself.

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

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

9 Once the deposits have been removed, clean the piston with solvent and dry it thoroughly. Make sure the oil return holes inside the piston (if equipped) are clear (see illustration).

10 Normal piston wear appears as even, vertical wear on the thrust surfaces of the piston and slight looseness of the ring in its groove.

11 Carefully inspect each piston for cracks around the skirt, at the pin bosses and at the ring lands.

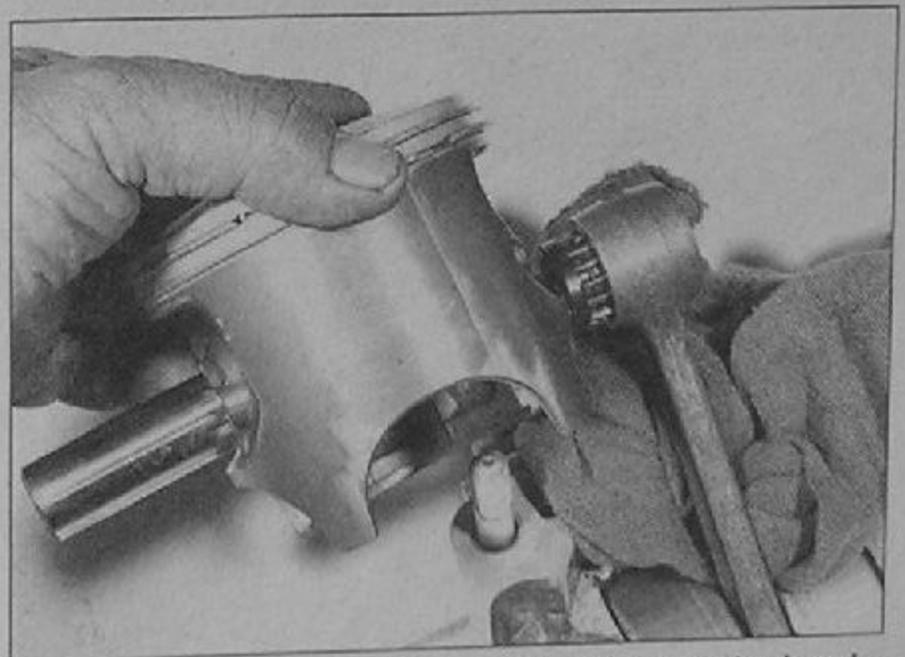
12 Look for scoring and scuffing on the thrust faces of the skirt, holes in the piston crown and burned areas at the edge of the crown. If the skirt is scored or scuffed, the engine may have been suffering from overheating and/or abnormal combustion, which caused excessively high operating temperatures. A hole in the piston crown, an extreme to be sure, is an indication that abnormal combustion (pre-ignition) was occurring. Burned areas at the edge of the piston crown are usually evidence of spark knock (detonation). If any of the above problems exist, the causes must be corrected or the damage will occur again.

13 Measure the piston ring-to-groove clearance (side clearance) by laying a new piston ring in the ring groove and slipping a feeler gauge in beside it. Check the clearance at three or four locations around the groove. If the clearance is greater than specified, a new piston will have to be used when the engine is reassembled.

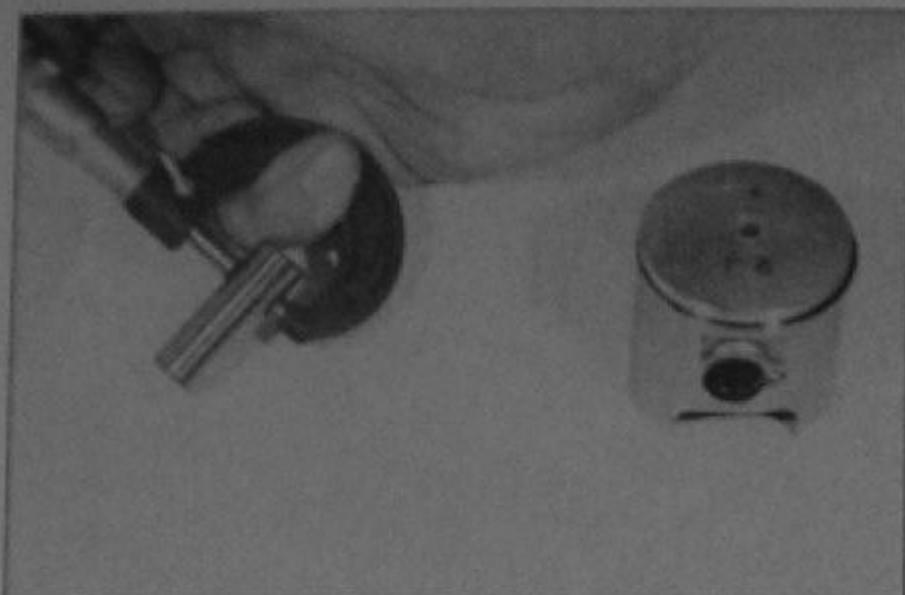
14 Check the piston-to-bore clearance by measuring the bore (see Section 10) and the piston diameter (see illustration). Measure the piston across the skirt on the thrust faces at a 90-degree angle to the piston pin, at the specified distance up from the bottom of the skirt. Subtract the piston diameter from the bore diameter to obtain the clearance. If it is greater than specified, the cylinder will have to be

rebored and a new oversized piston and rings installed (CR500R) or the cylinder and piston will have to be replaced (CR250R). If the appropriate precision measuring tools are not available, the piston-to-cylinder clearance can be obtained, though not quite as accurately, using feeler gauge stock. Feeler gauge stock comes in 12-inch lengths and various thickness and is generally available at auto parts stores. To check the clearance, slip a piece of feeler gauge stock of the same thickness as the specified piston clearance into the cylinder along with appropriate piston. The cylinder should be upside down and the piston must be positioned exactly as it normally would be. Place the feeler gauge between the piston and cylinder on one of the thrust faces (90-degrees to the piston pin bore). The piston should slip through the cylinder (with the feeler gauge in place) with moderate pressure. If it falls through, or slides through easily, the clearance is excessive and a new piston will be required. If the piston binds at the lower end of the cylinder and is loose toward the top, the cylinder is tapered, and if tight spots are encountered as the piston/feeler gauge is rotated in the cylinder, the cylinder is out-of-round. Be sure to have the cylinder and piston checked by a dealer service department or a repair shop to confirm your findings before purchasing new parts.

15 Apply clean two-stroke oil to the pin, insert it into the piston and check for freeplay by rocking the pin back-and-forth (see illustration). If the pin is loose, a new piston and possibly new pin must be installed. To determine which, measure the pin diameter and the pin bore in the pis-



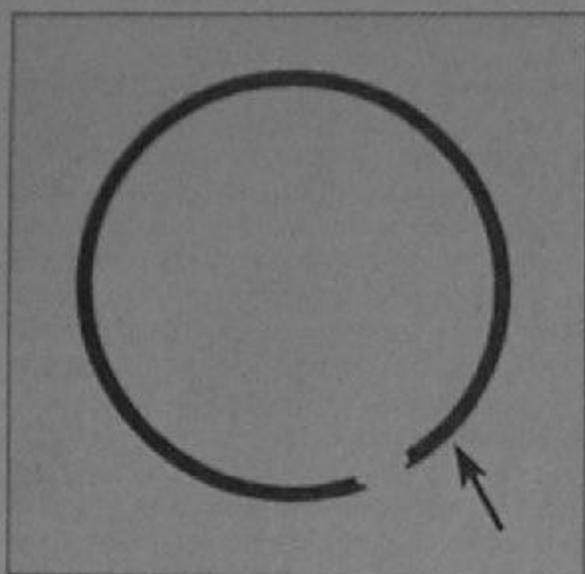
11.15a Slip the pin into the piston and try to wiggle it back-and-forth; if it's loose, replace the piston and pin; the needle bearing in the rod should be replaced if its condition is in doubt



11.15b Measure pin diameter and the diameter of the pin hole in the piston



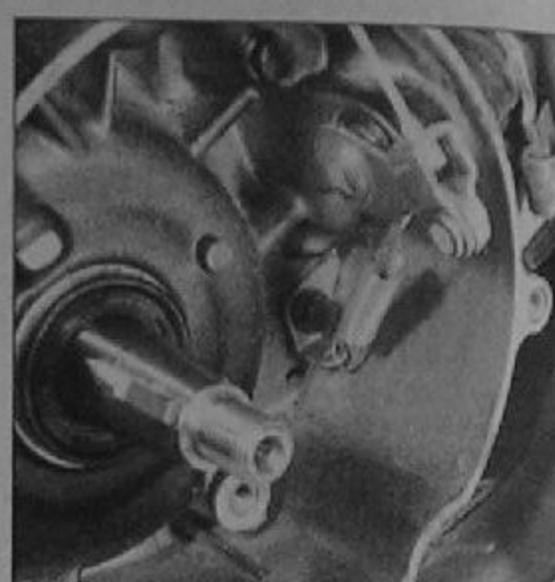
11.16 The needle bearing should be replaced if the pin wobbles inside it



11.19a The manufacturer's mark near the ring gap (arrow) should be upward when the ring is installed



11.19b Position the ring ends on either side of the dowel pin in each ring groove (arrow)



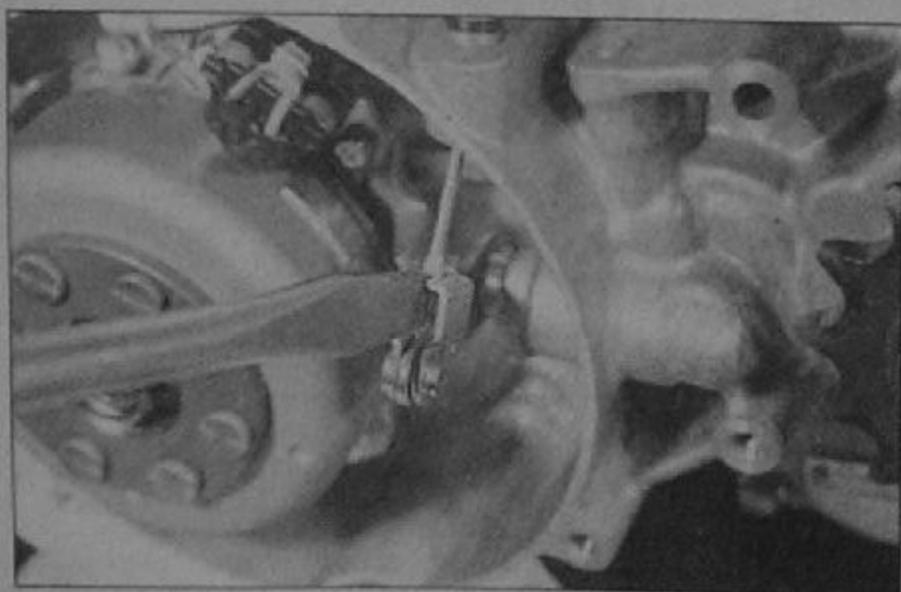
12.2a Unhook the spring from the lifter lever

ton (or have this done by a dealer or other repair shop) (see illustration).
 16 Repeat Step 15, this time inserting the piston pin into the connecting rod needle bearing (see illustration). If it wobbles and the pin diameter is within specifications, replace the needle bearing.

Installation

Refer to illustrations 11.19a and 11.19b

17 Install the piston with its IN mark toward the intake side (rear) of



12.2b You may need to widen the slot to make room for the cable

the engine. Lubricate the pin and the rod needle bearing with two-stroke oil of the type listed in the Chapter 1 Specifications.

18 Install a new circlip in the groove in one side of the piston (don't reuse the old circlips). Push the pin into position from the opposite side and install another new circlip. Compress the circlips only enough for them to fit in the piston. Make sure the clips are properly seated in the grooves.

19 Locate the manufacturer's mark on the lower piston ring near one of the ends (see illustration). Turn the ring so this mark is upward, then carefully spread it and install it in the ring groove. Make sure the end gap is positioned over the ring stoppers in the ring groove (see illustration). Install the upper ring in the same way.

12 Clutch - removal, inspection and installation

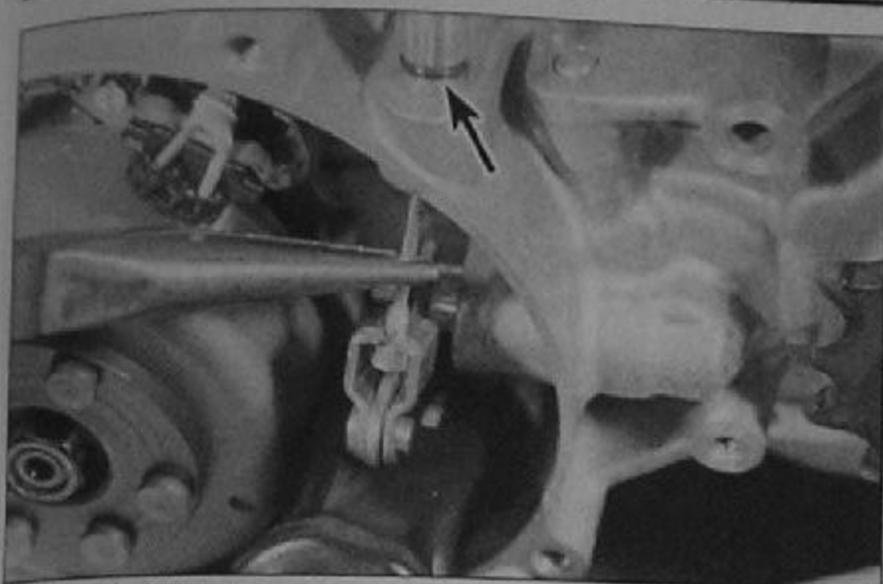
Cable

Removal

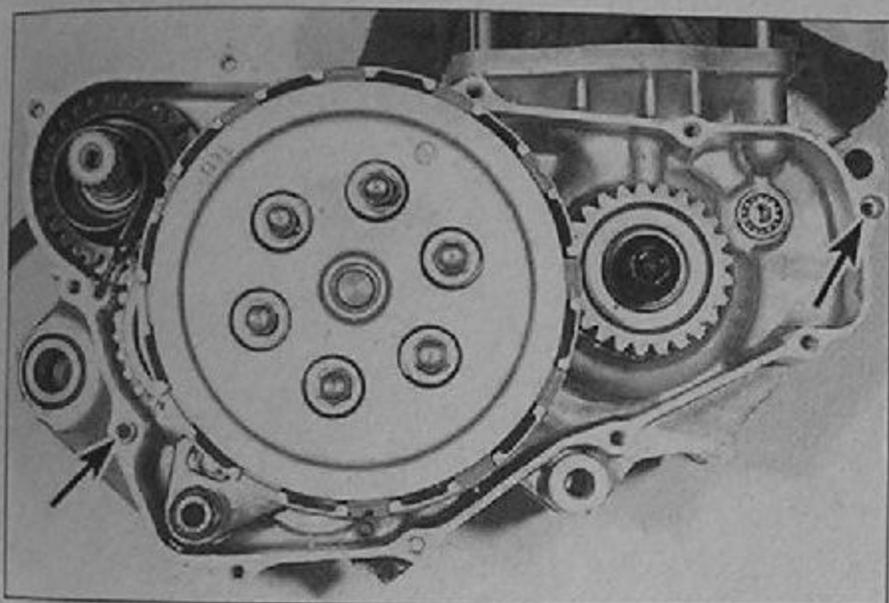
Refer to illustrations 12.2a, 12.2b and 12.2c

1 Loosen the cable adjuster at the handlebar grip all the way (see Chapter 1). Rotate the cable so the inner cable aligns with the slot in the lever, then slip the cable end fitting out of the lever.

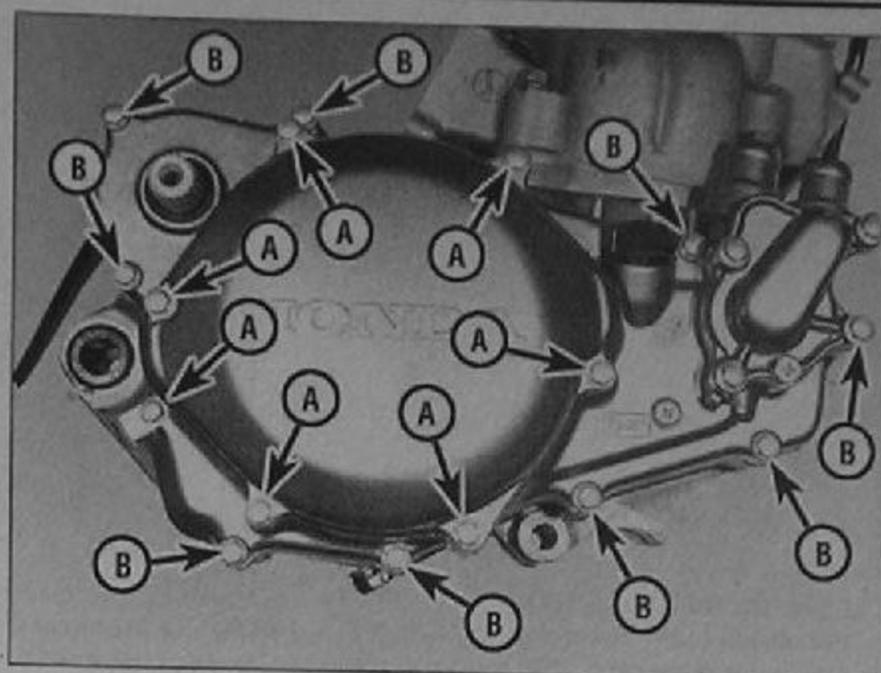
2 Remove the left crankcase cover (see Chapter 5). Unhook the lifter lever spring (see illustration). You may need to spread the gap in the lifter lever slightly so the cable will fit through it (see illustration). Turn the lifter lever to slacken the cable, then slip the cable through the gap (see illustration).



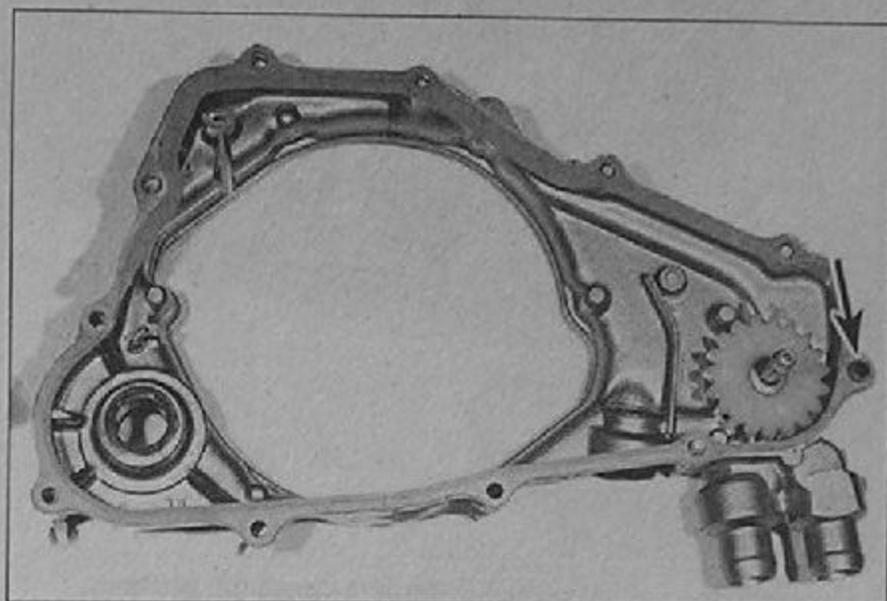
12.2c Rotate the lever arm against spring tension (you can pry it up with a large screwdriver handle) and slip the cable out of its slot



12.9b In this case, the rear cover dowel (left arrow) stayed in the crankcase, while the front dowel pulled out of its hole (right arrow) . . .



12.9a The clutch on 1987 and later models is accessible by removing the outer cover bolts (A); to remove the entire crankcase cover, remove its bolts (B)



12.9c . . . and can be found in the crankcase cover (arrow)

Inspection

3 Slide the inner cable back and forth in the housing and make sure it moves freely. If it doesn't, try lubricating it as described in Chapter 1. If that doesn't help, replace the cable.

Installation

4 Installation is the reverse of the removal steps. Refer to Chapter 1 and adjust clutch freeplay.

Right crankcase cover

Refer to illustrations 12.9a, 12.9b and 12.9c

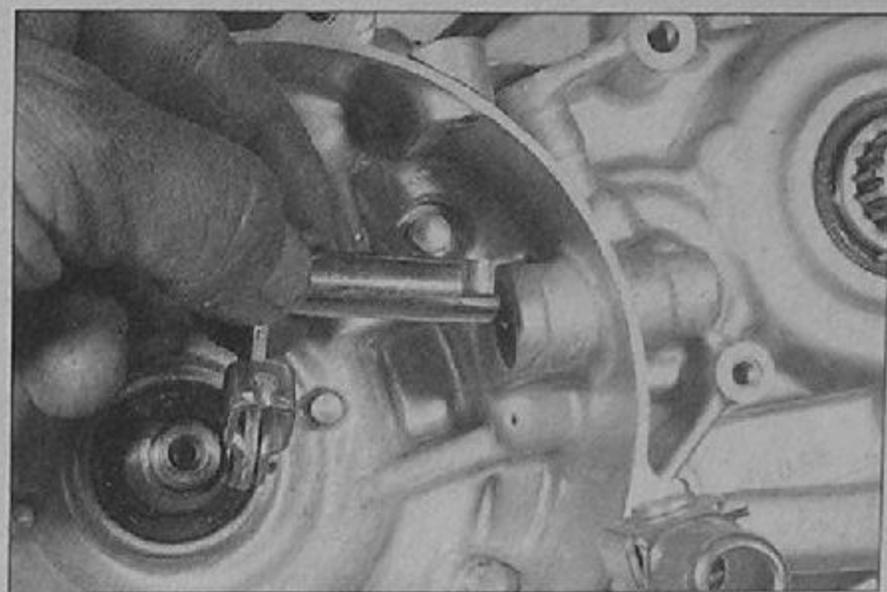
Note: If you're working on a 1987 or later model, you can service the clutch (discs, plates, center and housing) by removing just the outer clutch cover. It isn't necessary to remove the entire crankcase cover.

- 5 Drain the transmission oil and engine coolant (see Chapter 1).
- 6 Disconnect the hoses from the water pump (see Chapter 3).
- 7 Remove the brake pedal (see Chapter 7).
- 8 Remove the kickstarter pedal (see Section 15).
- 9 Remove the cover bolts and pull the cover off the engine (see illustrations). Tap gently with a rubber mallet if necessary to break the O-ring or gasket seal. Don't pry against the mating surfaces of the cover and crankcase. Once the cover is off, locate the dowels; they may have stayed in the crankcase or come off with the cover.

Lifter lever

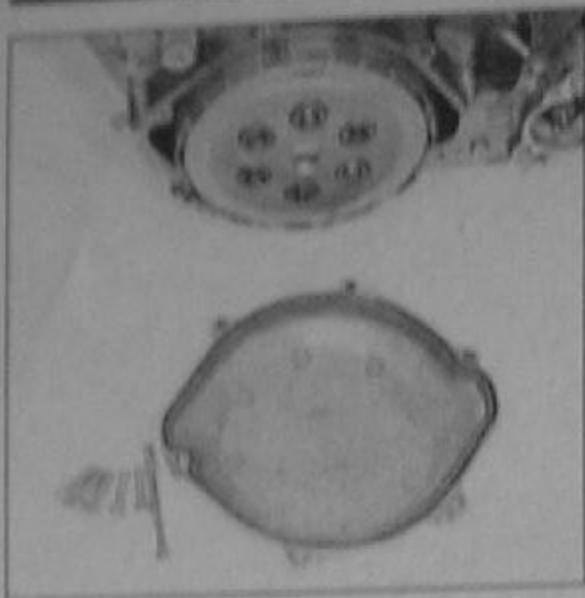
Refer to illustration 12.12

- 10 Remove the alternator cover (see Chapter 5).

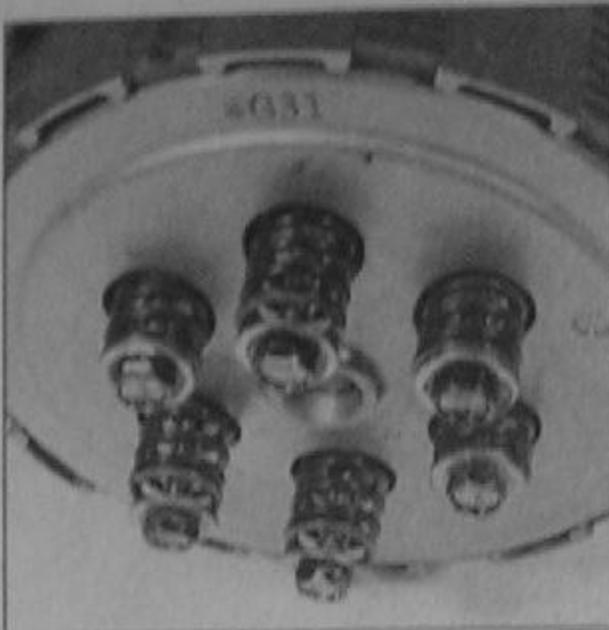


12.12 Pull the lifter lever shaft out of the crankcase; the notch in the end of the lever engages the clutch pushrod

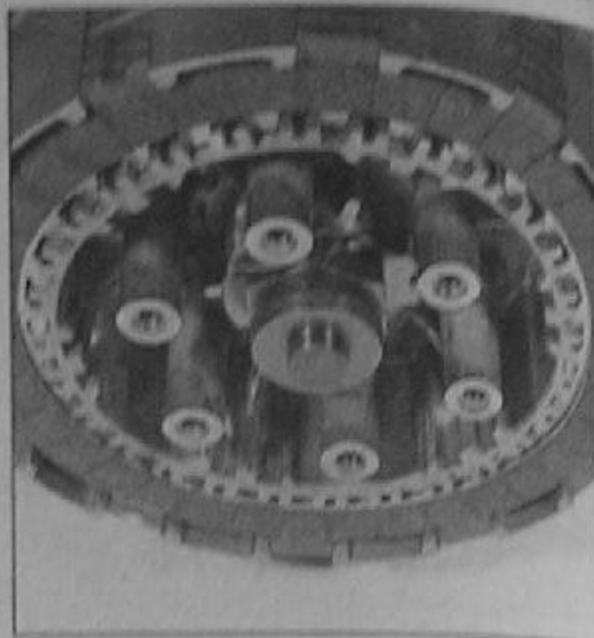
- 11 Disconnect the clutch cable as described above.
- 12 Slide the lever (and its spring and washer if equipped) out of the pivot bore in the crankcase (see illustration).
- 13 Installation is the reverse of the removal steps.



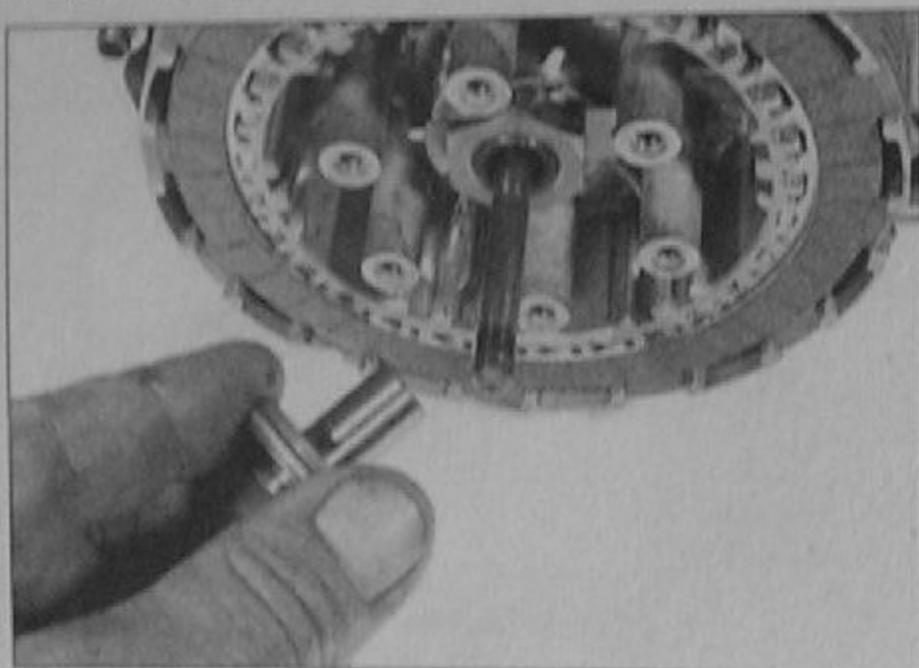
12.15a On 1987 and later models, remove the clutch outer cover and its O-ring; if you're working on a 1986 model you'll need to remove the entire crankcase cover



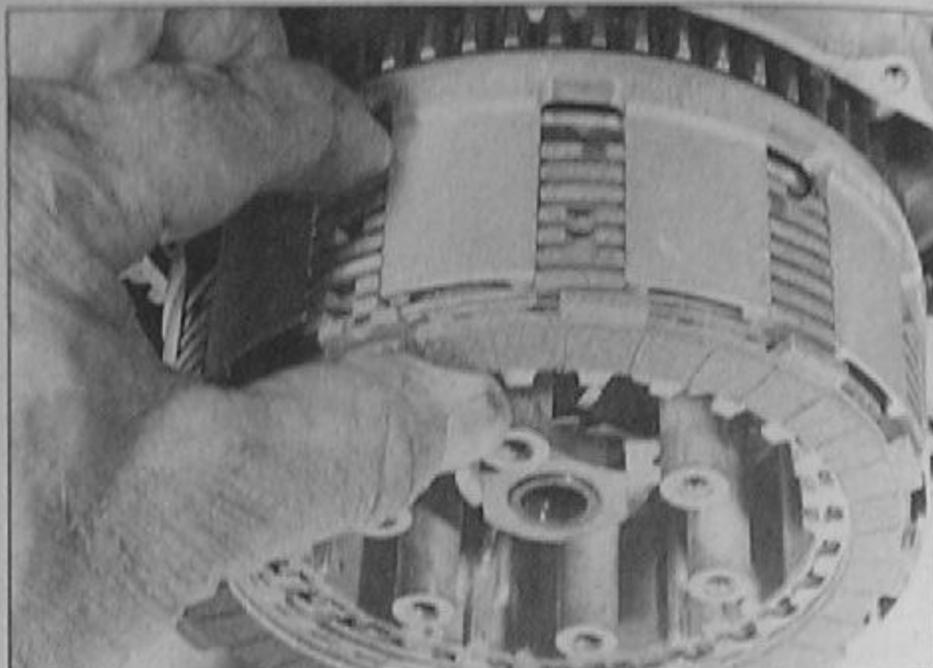
12.15b Remove the bolts and springs and take off the pressure plate



12.15c The lifter fits in the center of the clutch . . .



12.15d . . . pull it out, followed by the clutch pushrod



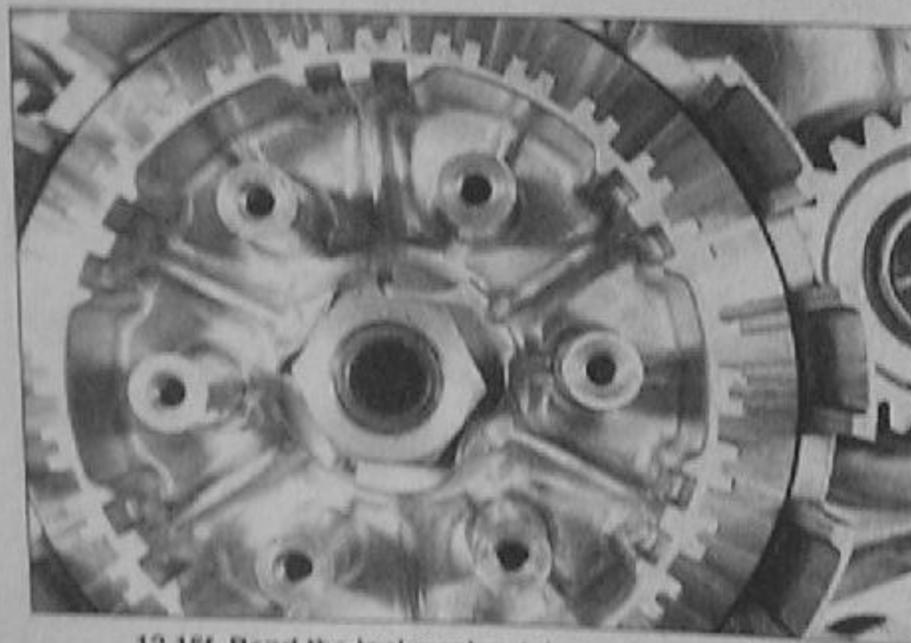
12.15e Pull the clutch plates out of the housing

Clutch

Removal

Refer to illustrations 12.15a through 12.15j

14 Remove the clutch cover or right crankcase cover as described above.



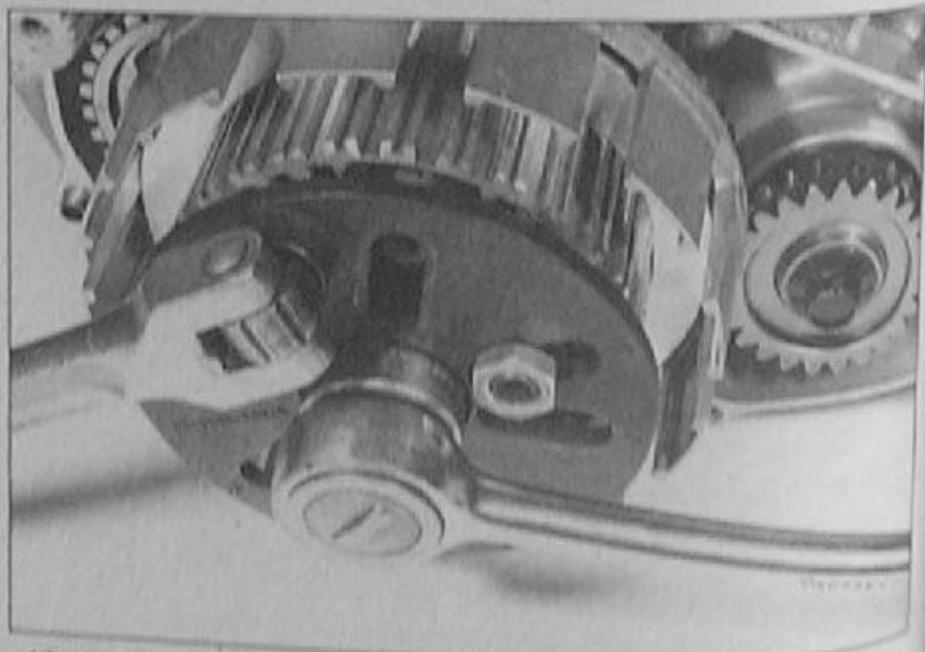
12.15f Bend the lockwasher tab away from the nut

15 Refer to the accompanying illustrations to remove the clutch components (see illustrations).

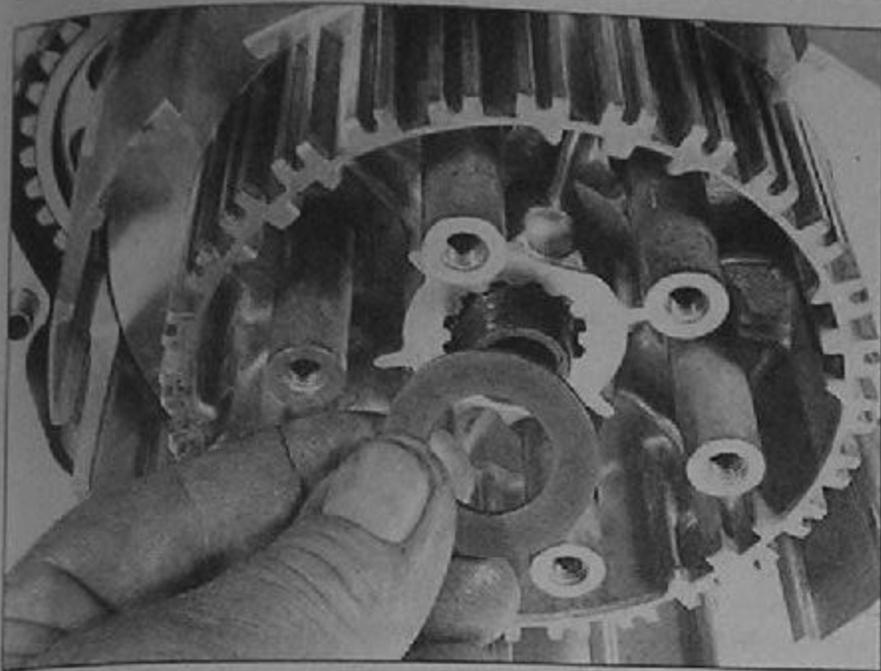
Inspection

Refer to illustrations 12.16, 12.17, 12.21, 12.22 and 12.23

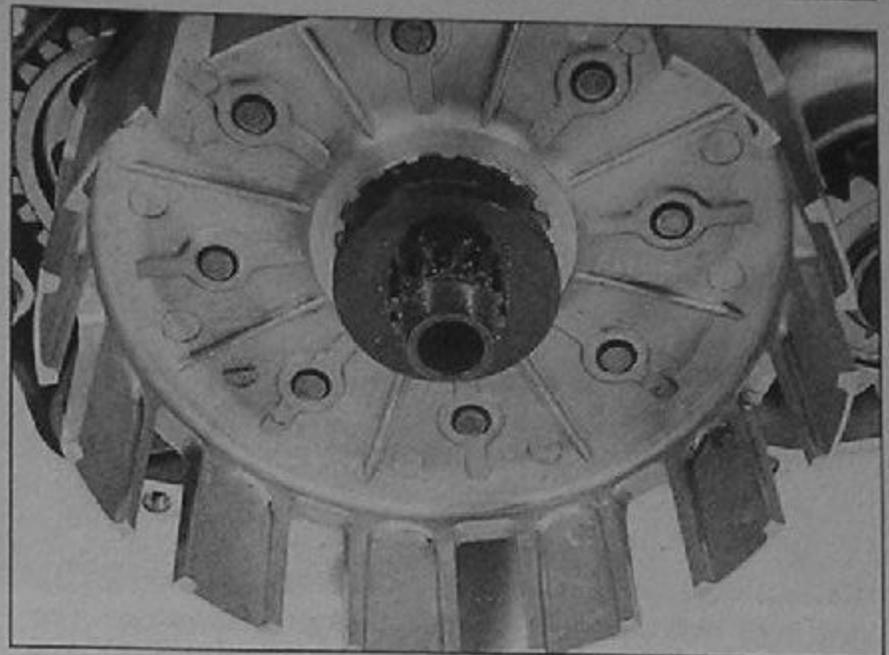
16 Rotate the clutch lifter needle bearing and check it for rough.



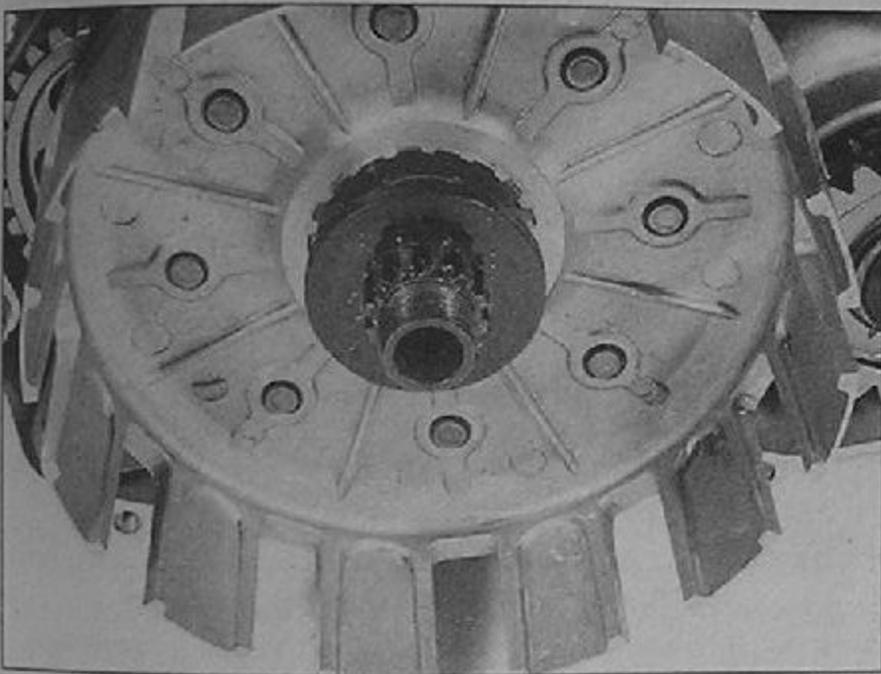
12.15g Hold the clutch from turning with a tool like this one and unscrew the nut . . .



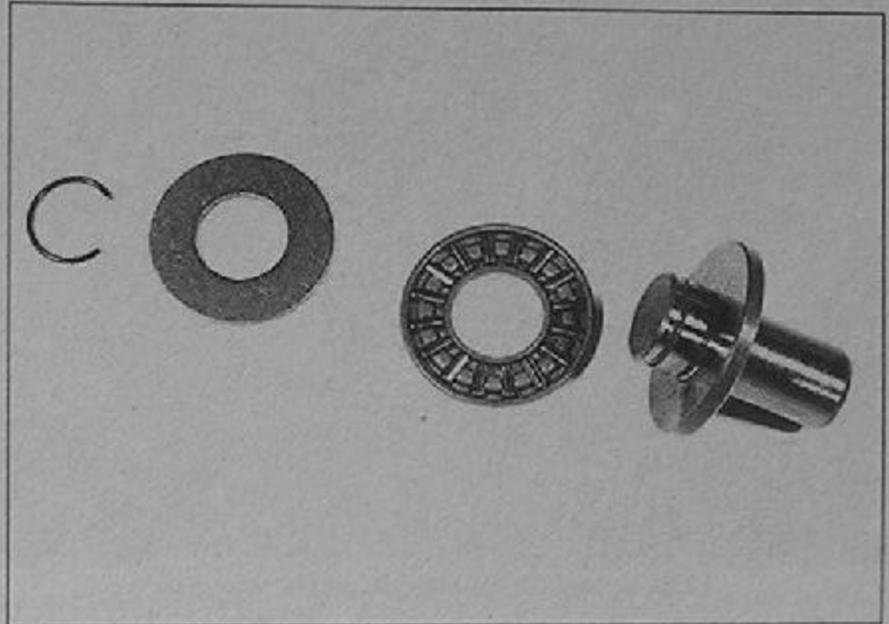
12.15h ... then remove the washer and pull off the clutch center



12.15i Remove the thrust washer and clutch housing ...



12.15j ... followed by the needle bearing and bushing



12.16 Remove the circlip and washer for access to the lifter bearing

2B

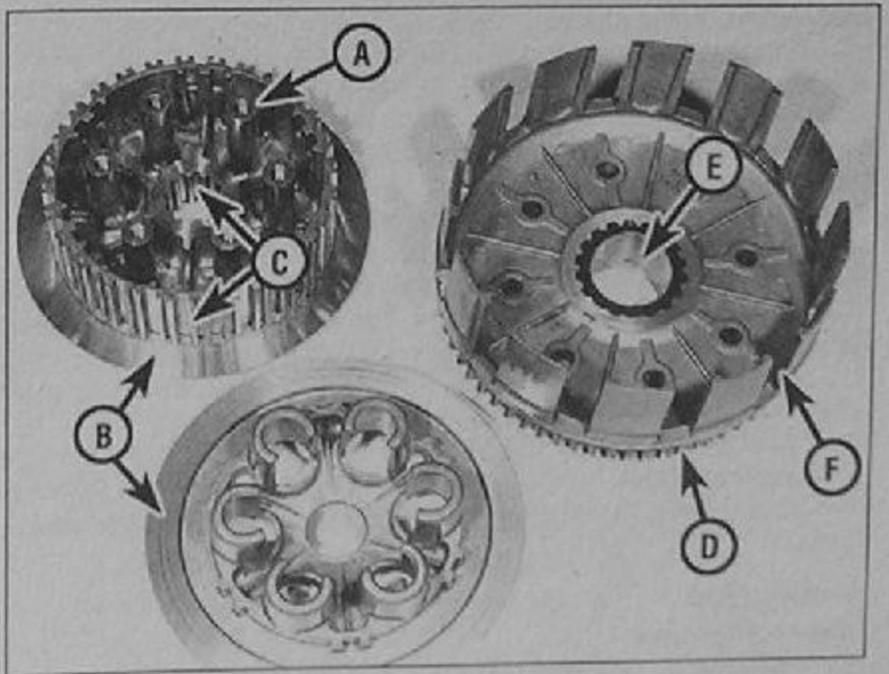
loose or noisy operation (see illustration). If the bearing's condition is in doubt, remove it from the lifter plate and install a new one.

17 Check the friction surface on the pressure plate for scoring or wear (see illustration). Replace the pressure plate if any defects are found.

18 Check the edges of the slots in the clutch housing for indentations made by the friction plate tabs. If the indentations are deep they can prevent clutch release, so the housing should be replaced with a new one. If the indentations can be removed easily with a file, the life of the housing can be prolonged to an extent. Also, check the driven gear teeth for cracks, chips and excessive wear and the springs on the back side (if equipped) for breakage. If the gear is worn or damaged or the springs are broken, the clutch housing must be replaced with a new one.

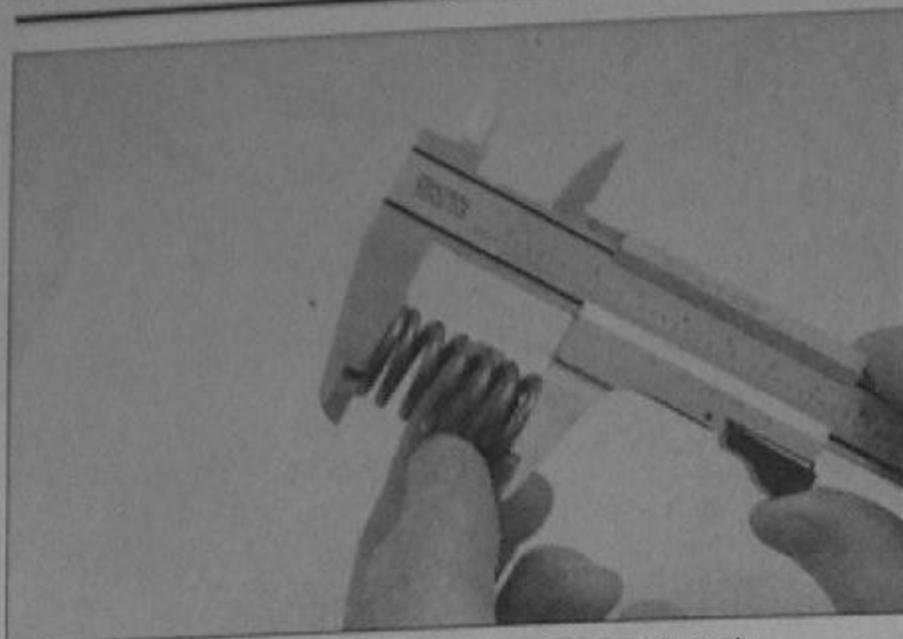
19 Check the bearing surface in the center of the clutch housing for score marks, scratches and excessive wear. Measure the inside diameter of the bearing surface, the inside and outside diameters of the clutch housing bushing and the bushing's mounting surface on the transmission mainshaft. Compare these to the values listed in this Chapter's Specifications. Replace any parts worn beyond the service limits. If the bushing mounting surface on the mainshaft is worn excessively, the mainshaft will have to be replaced.

20 Check the clutch center's friction surface and slots for scoring, wear and indentations (see illustration 12.17). Also check the splines in the middle of the clutch center. Replace the clutch center if problems are found.

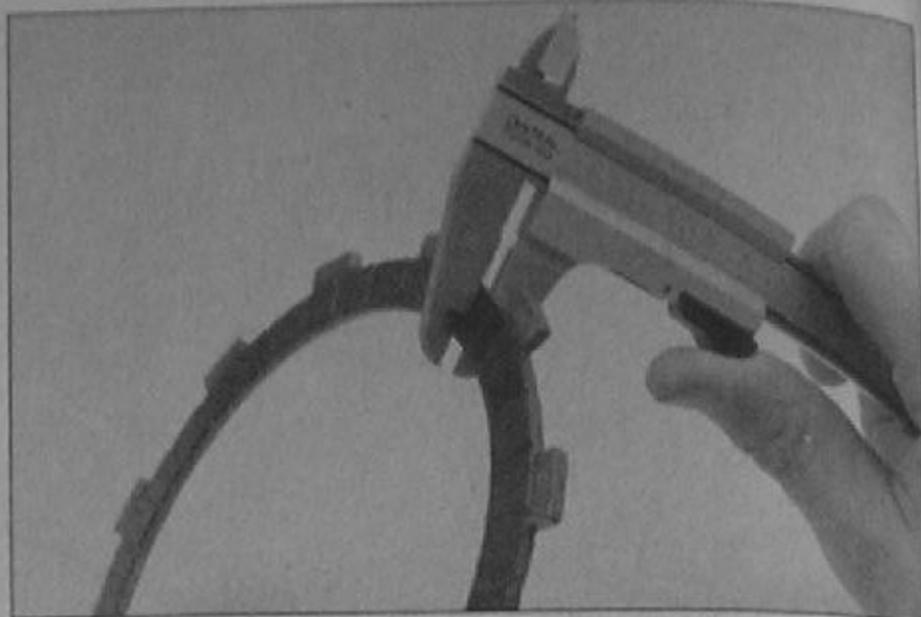


12.17 Clutch inspection points

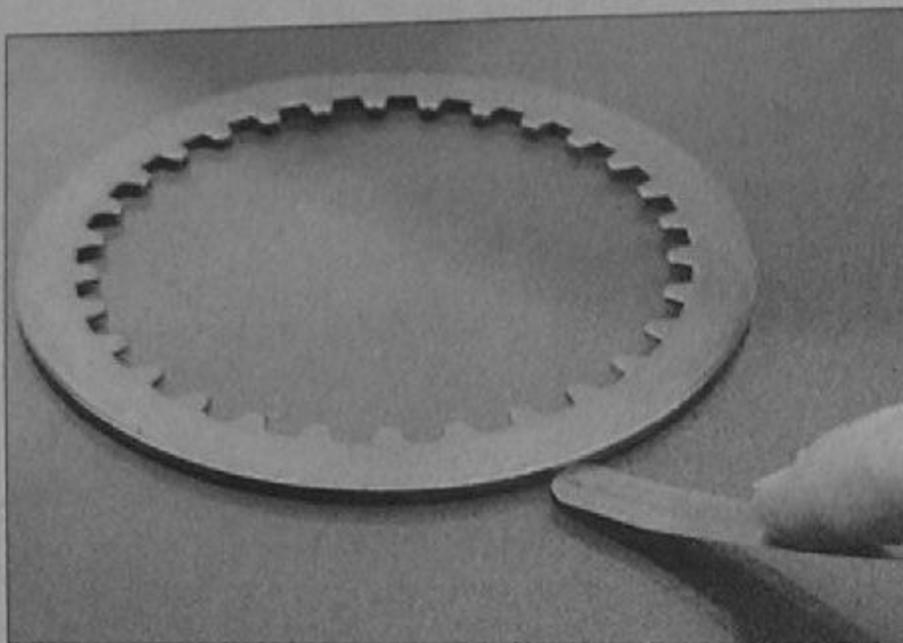
- | | | | |
|---|-------------------|---|--------------------------------|
| A | Spring posts | E | Clutch housing bushing surface |
| B | Friction surfaces | F | Clutch housing slots |
| C | Splines | | |
| D | Driven gear | | |



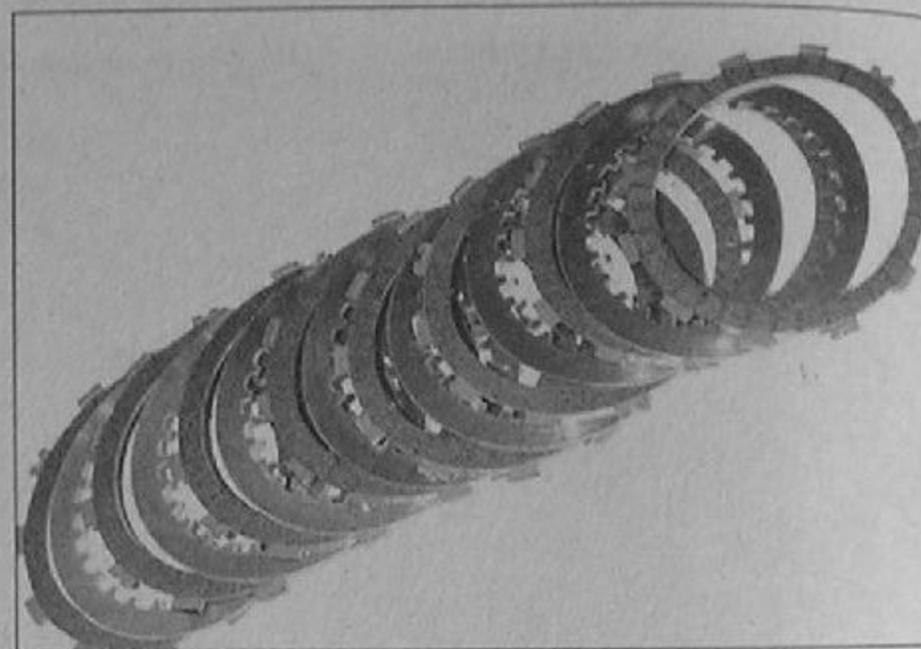
12.21 Measure the clutch spring free length



12.22 Measure the thickness of the friction plates



12.23 Check the metal plates for warpage



12.25 Alternate the metal and friction plates

21 Measure the free length of the clutch springs (**see illustration**) and compare the results to this Chapter's Specifications. If the springs have sagged, or if cracks are noted, replace them with new ones as a set.

22 If the lining material of the friction plates smells burnt or if it is glazed, new parts are required. If the metal clutch plates are scored or discolored, they must be replaced with new ones. Measure the thickness of the friction plates (**see illustration**) and replace with new parts any friction plates that are worn.

23 Lay the metal plates, one at a time, on a perfectly flat surface (such as a piece of plate glass) and check for warpage by trying to slip a feeler gauge between the flat surface and the plate (**see illustration**). The feeler gauge should be the same thickness as the maximum warp listed in this Chapter's Specifications. Do this at several places around the plate's circumference. If the feeler gauge can be slipped under the plate, it is warped and should be replaced with a new one.

24 Check the tabs on the friction plates for excessive wear and mushroomed edges. They can be cleaned up with a file if the deformation is not severe. Check the friction plates for warpage as described in Step 23.

Installation

Refer to illustration 12.25

25 Installation is the reverse of the removal steps, with the following additions:

- Install a new lockwasher and position its tabs between the ribs of the clutch center. Tighten the clutch nut to the torque listed in this Chapter's Specifications, then bend the lockwasher against two of the flats on the nut.

- Coat the friction plates with clean engine oil before you install them.
- Install a friction plate, then alternate the remaining metal and friction plates until they're all installed (**see illustration**). Friction plates go on first and last, so the friction material contacts the metal surfaces of the clutch center and the pressure plate.
- Apply grease to the ends of the clutch pushrod and the pushrod's steel ball.

13 Primary drive gear - removal, inspection and installation

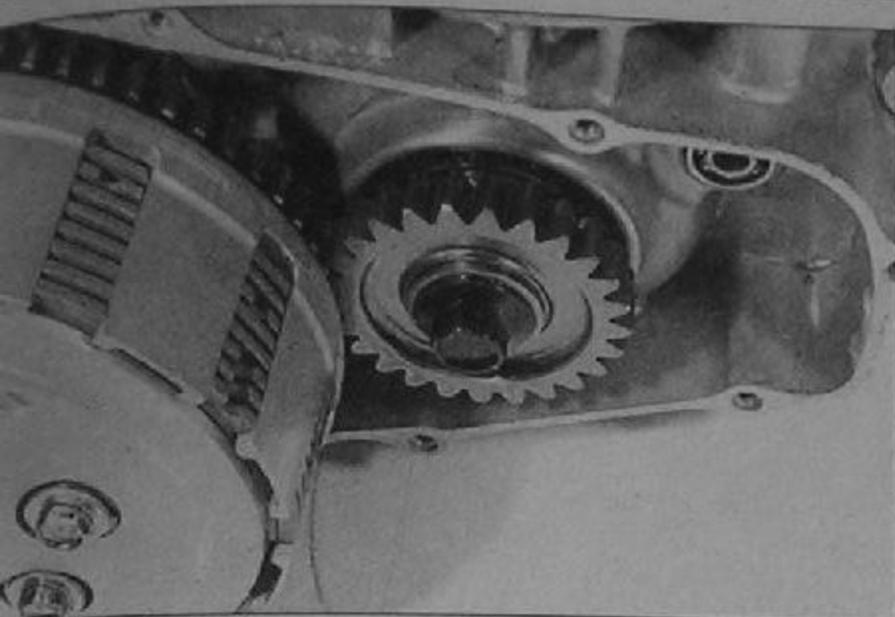
Removal

Refer to illustrations 13.2 and 13.4

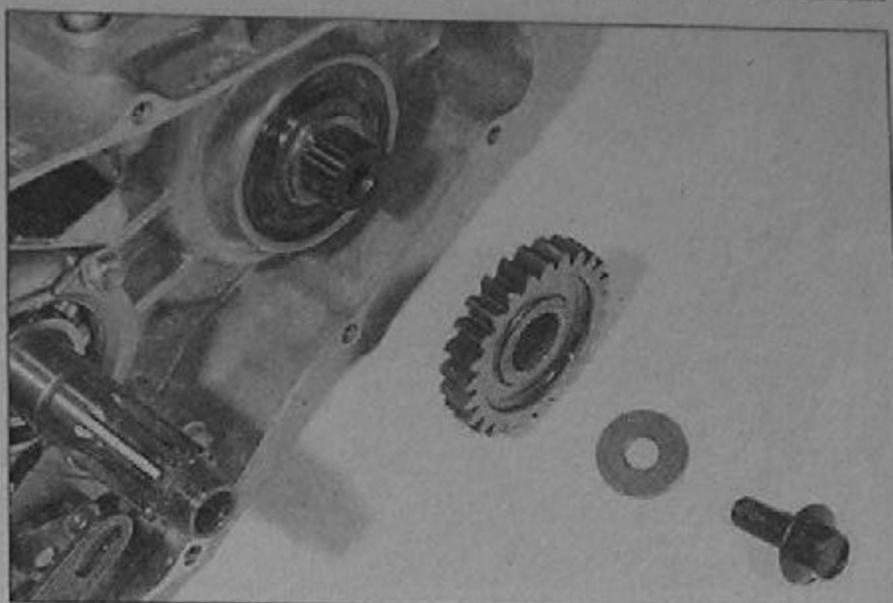
- Remove the right crankcase cover (see Section 16).
- Wedge a copper washer or penny between the teeth of the primary drive gear and the primary driven gear on the clutch housing. Unscrew the primary drive gear bolt, then remove the lockwasher (**see illustration**).
- Remove the clutch (Section 12).
- Slide the primary drive gear off the crankshaft (**see illustration**). Pull the collar (if equipped) off the crankshaft.

Inspection

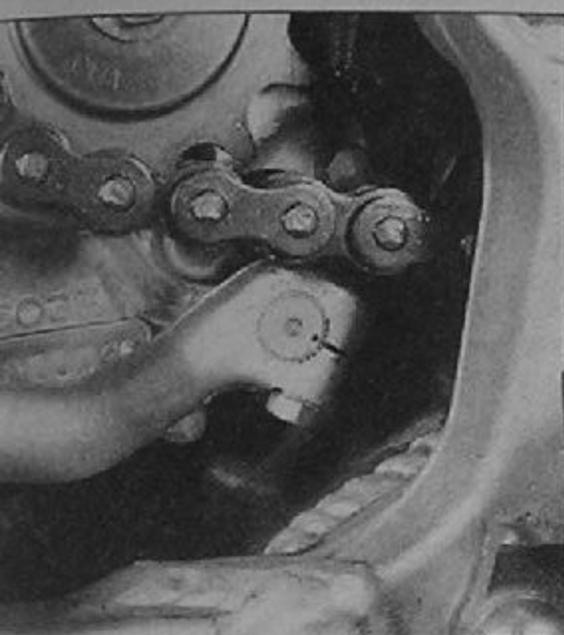
- Check the drive gear for obvious damage such as chipped or broken teeth. Replace it if any of these problems are found.



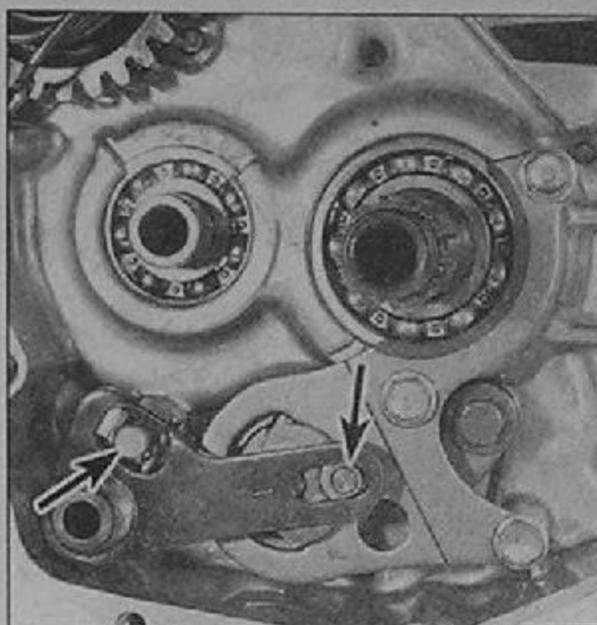
13.2 Wedge a copper washer or penny between the gears, then unscrew the bolt



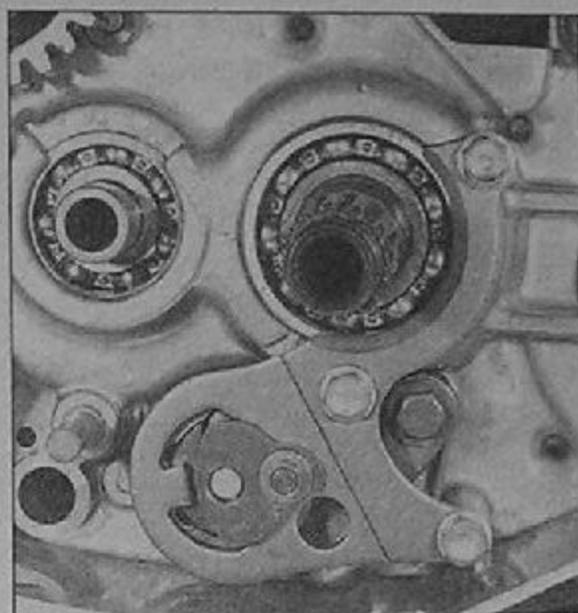
13.4 Remove the bolt, lockwasher and primary drive gear, then remove the collar from the crankshaft



14.1 If you don't see a punch mark on the pedal and the end of the spindle, make your own; check the seal behind the pedal for leaks



14.8 The ends of the return spring fit over the post (left arrow); there's a collar in the spindle arm slot (right arrow)



14.9 Pull the gearshift spindle out of the case, then remove the collar from the guide plate

2B

Installation

Installation is the reverse of the removal steps, with the following additions:

- a) If there's an OUT mark on the lockwasher, face it away from the engine.
- b) Wedge the underside of the gear using the same method used for removal, then tighten the bolt to the torque listed in this Chapter's Specifications.

4 External shift mechanism - removal, inspection and installation

Shift pedal

Removal

Refer to illustration 14.1

1 Look for alignment marks on the end of the shift pedal and gearshift spindle (see illustration). If they aren't visible, make your own marks with a sharp punch.

2 Remove the shift pedal pinch bolt and slide the pedal off the shaft.

Inspection

3 Check the shift pedal for wear or damage such as bending.

Check the splines on the shift pedal and gearshift spindle for stripping or step wear. Replace the pedal or spindle if these problems are found.

4 Check the gearshift spindle seal for signs of oil leakage (see illustration 14.1). If it has been leaking, remove the gearshift spindle as described below. Pry the seal out of the cover and install a new one. You may be able to push the seal in with your thumbs; if not, tap it in with a hammer and block of wood or a socket the same diameter as the seal.

Installation

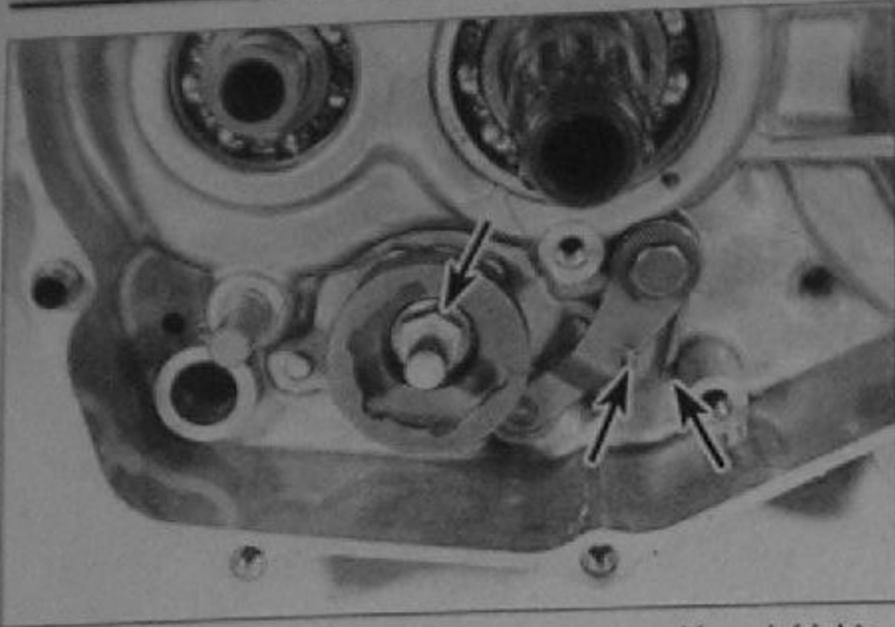
5 Line up the punch marks, install the shift pedal and tighten the pinch bolt.

External shift linkage

Removal

Refer to illustrations 14.8, 14.9, 14.10a and 14.10b

- 6 Remove the shift pedal as described above.
- 7 Remove the clutch (Section 12).
- 8 Note how the gearshift spindle's return spring fits over its pin and how the gearshift spindle's arm fits over the shifter collar (see illustration). Pull the gearshift spindle out of the crankcase.
- 9 Remove the shifter collar from the drum shifter. Unbolt the guide plate from the crankcase and remove it together with the pawl assembly (see illustration).



14.10a Note how the ends of the spring are positioned, (right arrows) then loosen the stopper arm bolt and washer; remove the bolt (left arrow) from the center of the shift drum cam

10 Remove the bolt from the shift drum cam (see illustration). Note how the stopper arm spring presses against the case post and hooks around the stopper arm. Pull the stopper arm away from the shift drum cam, then pull the cam off the shift drum (see illustration). Remove the bolt and take the stopper arm and spring off the crankcase.

Inspection

Refer to illustrations 14.11, 14.13a, 14.13b and 14.13c

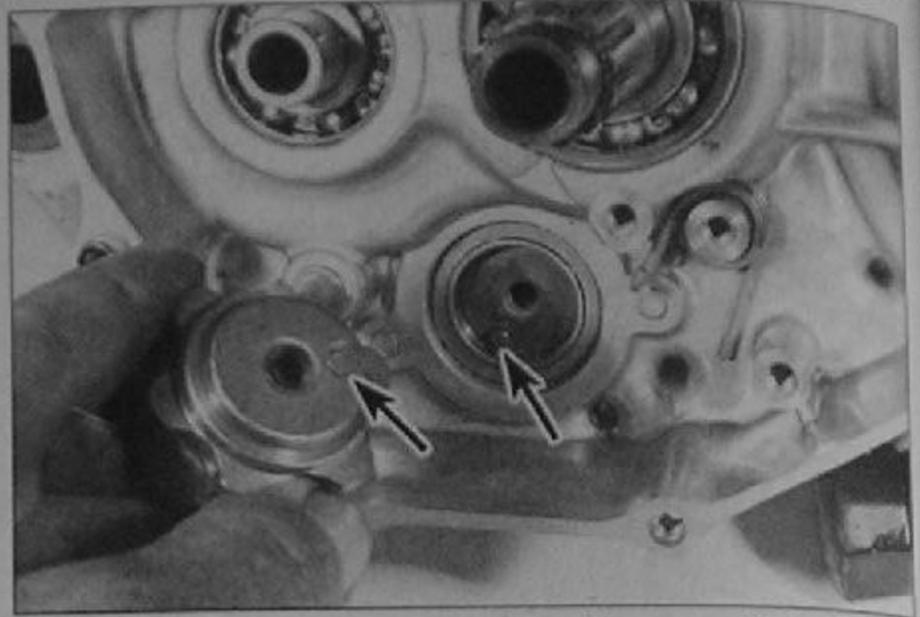
11 Check the gearshift spindle return spring and splines for damage (see illustration). The return spring can be replaced separately, but if the splines are damaged the complete shaft must be replaced. To replace the return spring, remove the snap-ring and slide the spring off the spindle. Install the new spring with its ends toward the spindle arm, so they fit securely over the tab when the spring is installed. **Note:** The snap-ring should be installed with its chamfered edge facing the spring and must be securely engaged with its groove.

12 Check the condition of the stopper arm and spring. Replace the stopper arm if it's worn where it contacts the shift cam. Replace the spring if it's bent.

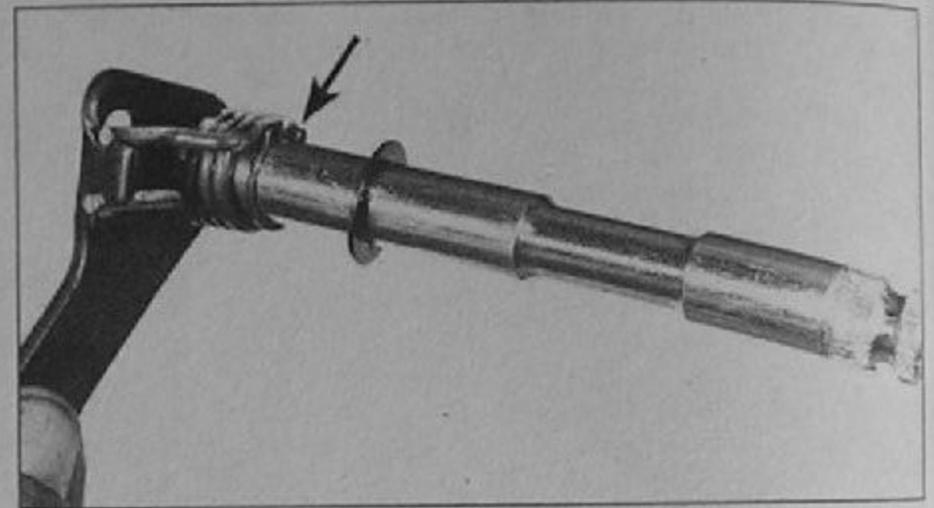
13 Inspect the shifter pawls and the shift cam for wear on their contact surfaces (see illustrations). If they're worn or damaged, replace the cam and both pawls. Replace the pawl springs if there's any doubt about their condition.

Installation

14 Install the stopper arm and spring on the crankcase. Place the straight end of the spring against the post on the crankcase and the



14.10b Pull the stopper arm away from the cam and take the cam off; its notch (arrow) aligns with the pin in the shift drum (arrow) on installation

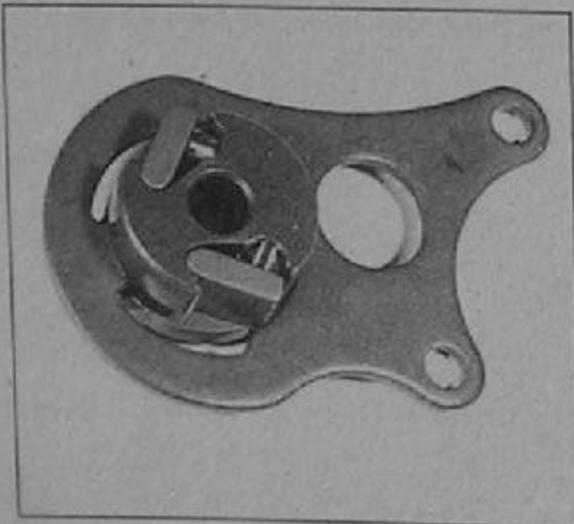


14.11 The return spring is held on the shaft by a snap-ring (arrow)

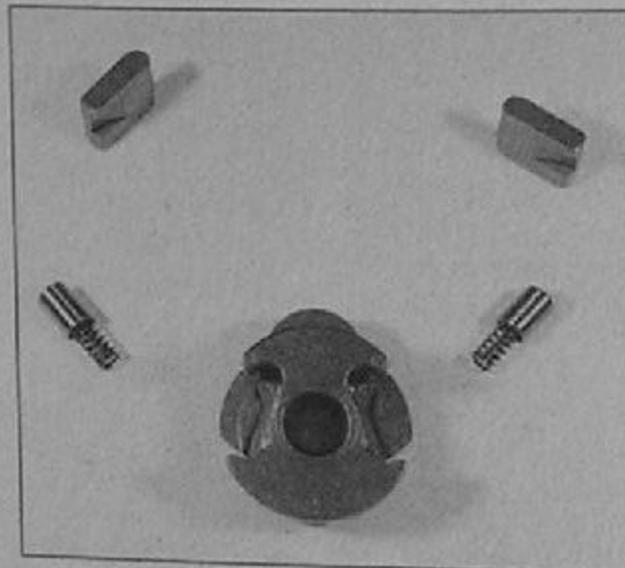
hooked end over the stopper arm. Install the washer and tighten the stopper arm bolt securely, but don't overtighten it and strip the threads.

15 Pull the stopper arm down and position the shift drum cam on the shift drum, aligning the hole in the back of the cam with the pin on the shift drum. Apply non-permanent thread locking agent to the threads of the bolt, then tighten it to the torque listed in this Chapter's Specifications. Engage the roller end of the stopper arm with the neutral notch in the shift drum cam.

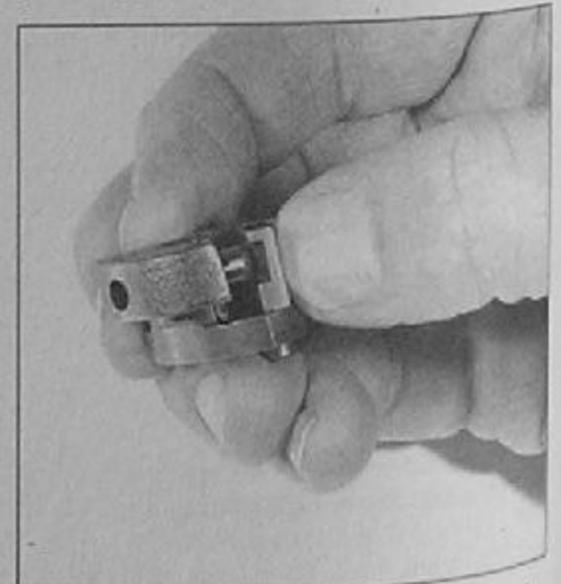
16 Place the plungers and springs in the shifter. Install the pawls, making sure the slots are offset in the proper direction (see illustration 14.13c). Place the assembly in the guide plate so the guide plate holds



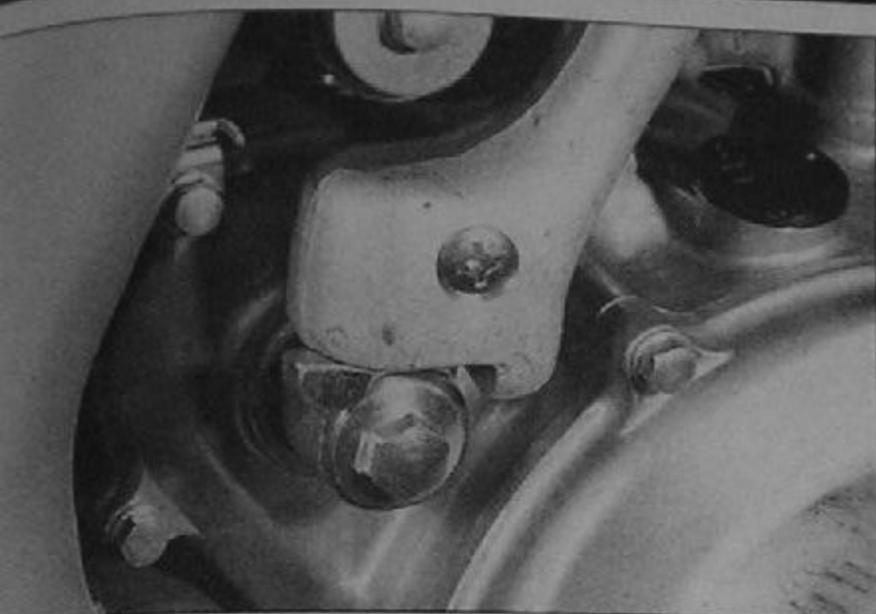
14.13a This is the crankcase side of the pawl assembly; the rounded ends of the pawls fit into the notches of the drum shifter



14.13b Pawl assembly details



14.13c The plungers fit into the pawl grooves; note how the grooves are offset in the pawls



15.2 The kickstarter pedal is attached to the pivot with a screw

together (see illustration 14.13a).

Place the drum shifter assembly in the crankcase, engaging the ratchet pawls with the shift drum cam (see illustration 14.9). Tighten the guide plate bolts securely, but don't overtighten them and strip the threads.

Place the shifter collar on the drum shifter (see illustration 14.9).

Make sure the thrust washer is in place on the gearshift spindle, and then carefully slide the spindle into the crankcase, taking care not to damage the seal on the other side.

The remainder of installation is the reverse of the removal steps.

Check the transmission oil level and add some, if necessary (see Chapter 1).

Kickstarter - removal, inspection and installation

Removal

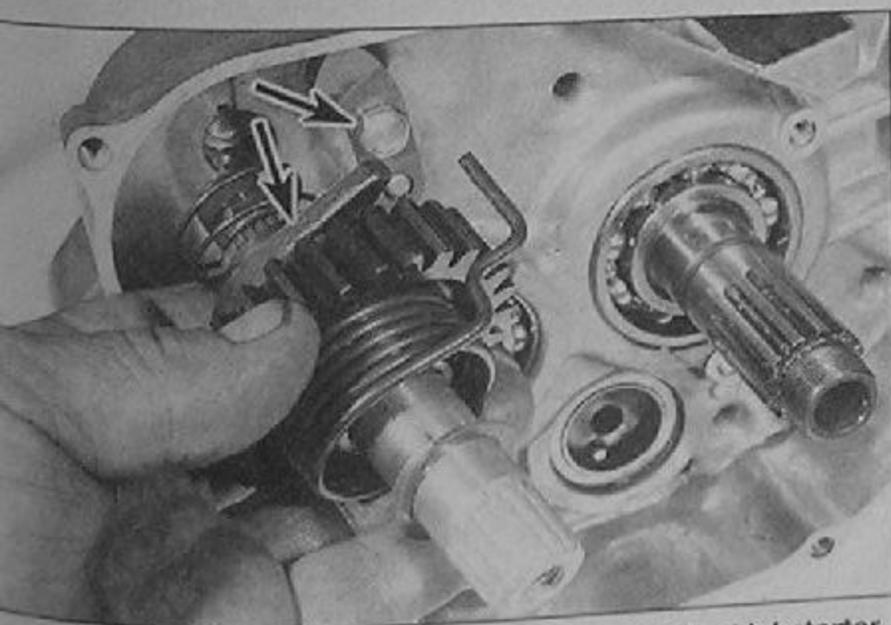
Pedal

Refer to illustration 15.2.

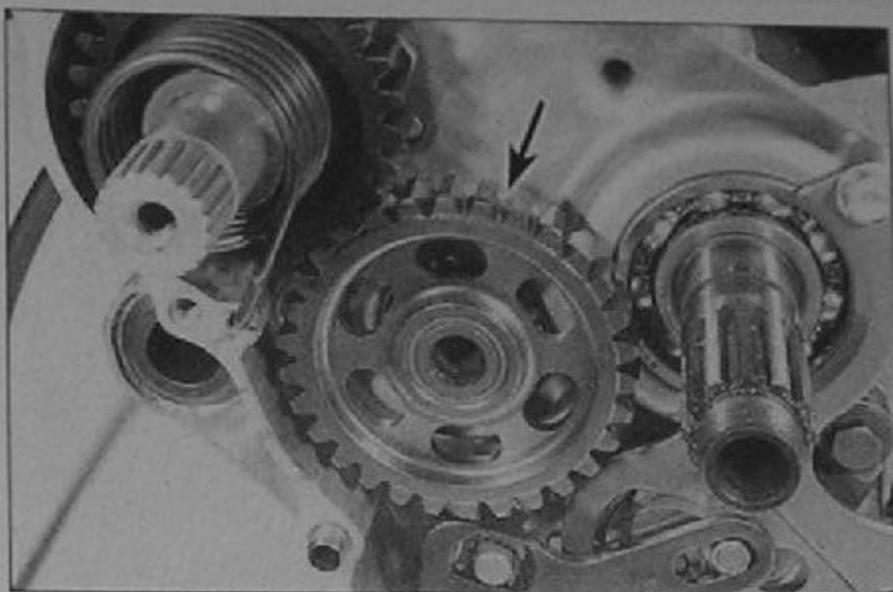
The kickstarter pedal is accessible from outside the engine. The kickstarter mechanism can be reached by removing the right crankcase cover (see Section 16).

To remove the pedal from the shaft, remove the screw and slip the pedal off (see illustration).

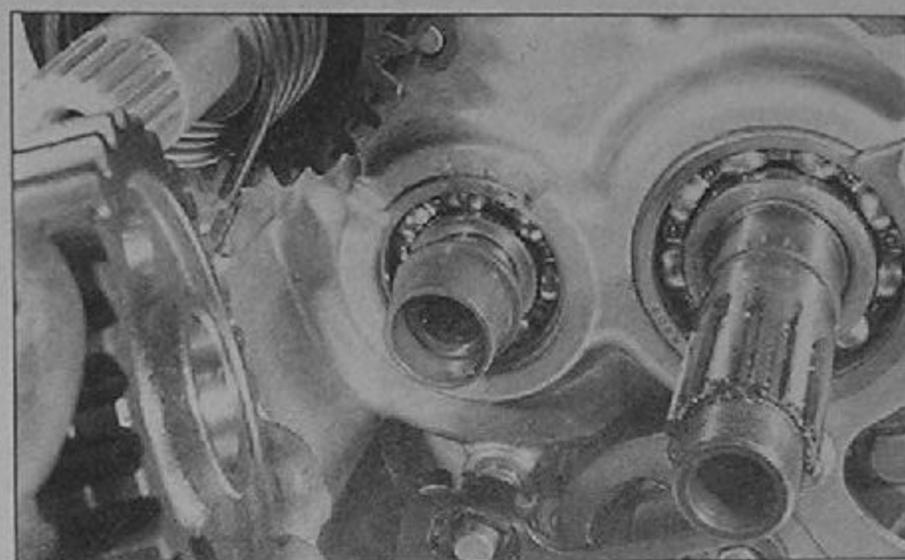
Look for a punch mark on the end of the kickstarter spindle. If you can't see one, make your own to align with the slit in the pedal shaft. Remove the pinch bolt and slide the pedal off the spindle.



15.7 Take the thrust washer off the outer end of the kickstarter spindle, then turn the kickstarter so the tab clears the guide on the crankcase (arrows)



15.6a Unhook the spring and pull off the idler gear (arrows)

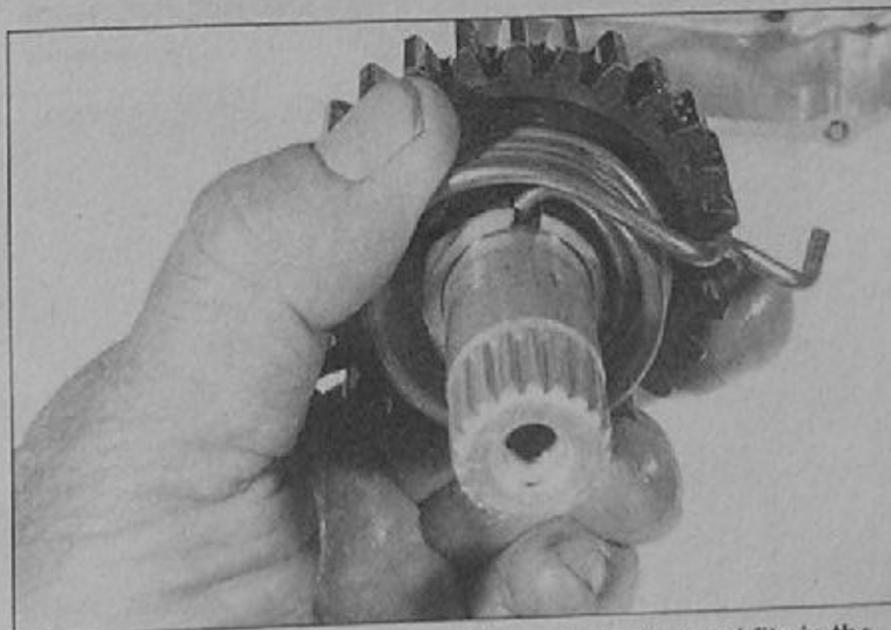


15.6b There's a bushing behind the idler gear

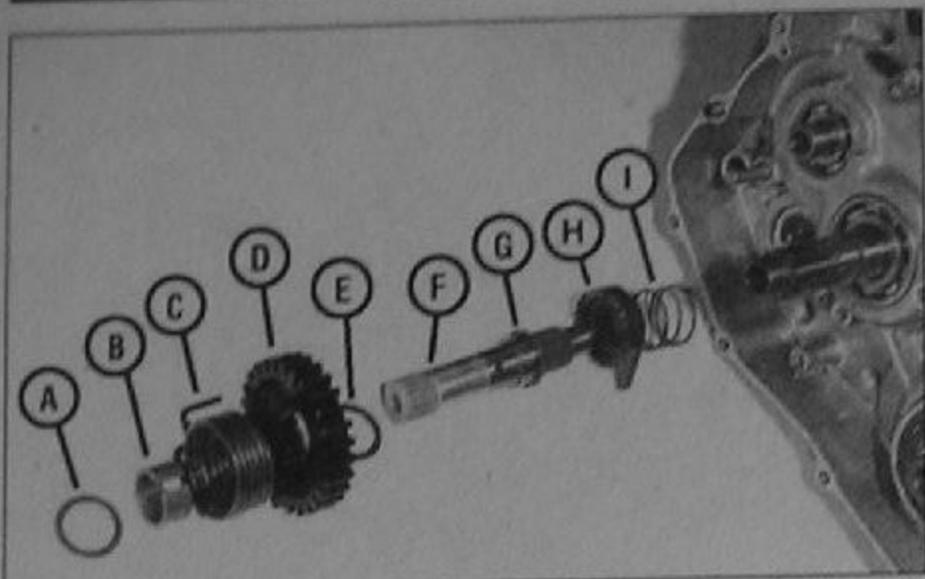
Kickstarter mechanism

Refer to illustrations 15.6a, 15.6b, 15.7, 15.8a and 15.8b

- 4 Remove the kickstarter pedal (see Step 3 above).
- 5 Remove the right crankcase cover and the clutch (Section 12).
- 6 Slip the idler gear off its shaft and remove the idler gear bushing (see illustrations).
- 7 Unhook the spring from the crankcase. Turn the kickstarter mechanism counterclockwise until the ratchet pawl clears the guide, then pull the kickstarter out of the engine (see illustration).
- 8 Disengage the return spring from the hole in the shaft (see illustration).



15.8a The return spring passes through a collar and fits in the hole in the shaft



15.8b Kickstarter details

- | | |
|-----------------|-----------------------|
| A Thrust washer | F Kickstarter spindle |
| B Collar | G Snap-ring |
| C Return spring | H Ratchet |
| D Pinion gear | I Spring |
| E Thrust washer | |

tration). Slide off the return spring and collar, pinion gear, thrust washers, ratchet spring and ratchet (see illustration).

9 If necessary, unbolt the guide from the engine.

Inspection

Refer to illustration 15.10

10 If the snap-ring is damaged, remove it from the spindle and install a new one (see illustration).

11 Check all parts for wear or damage, paying special attention to the teeth on the ratchet and the matching teeth on the pinion gear. Replace worn or damaged parts.

12 Measure the inside diameter of the pinion gear and idler gear.

13 Measure the inside and outside diameters of the idler gear bushing.

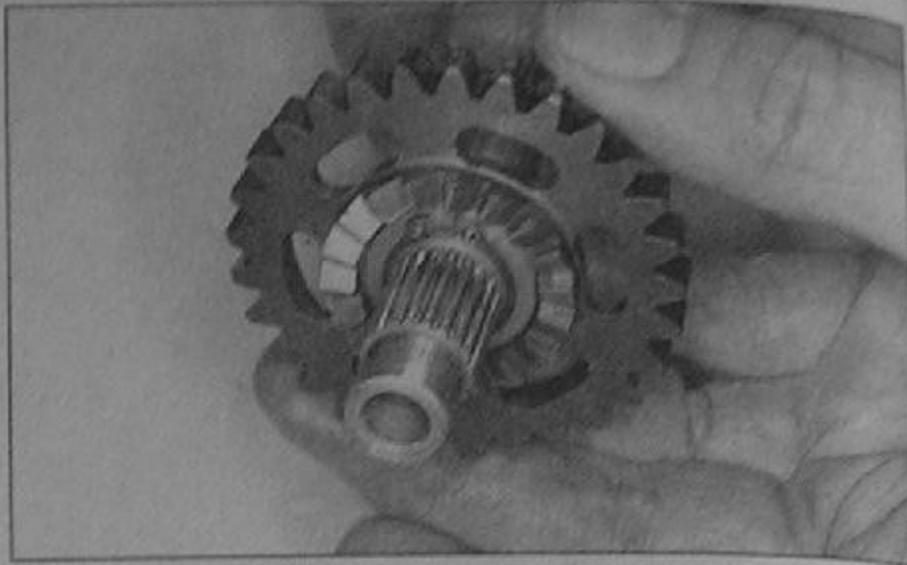
14 Measure the outside diameter of the transmission shaft where the idler gear bushing rides. Replace any parts that are worn beyond the limit listed in this Chapter's Specifications.

Installation

Refer to illustration 15.15

15 Installation is the reverse of the removal steps, with the following additions:

- Use a new snap-ring if the old one was removed.
- Align the punch marks on the ratchet and shaft (see illustration).



15.10 Remove the snap-ring with snap-ring pliers - use a new one on installation

- Place the end of the return spring through the notch or slot in the collar and into the hole in the shaft (see illustration 15.8a or 15.8b).

Pedal

16 Slip the pedal onto the kickstarter spindle, aligning the marks. Install the pinch bolt and tighten it securely.

16 Crankcase - disassembly and reassembly

1 To examine and repair or replace the crankshaft, connecting rod, bearings and transmission components, the crankcase must be split into two parts.

Disassembly

Refer to illustrations 16.9a, 16.9b, 16.10, 16.11a, 16.11b, 16.11c and 16.12

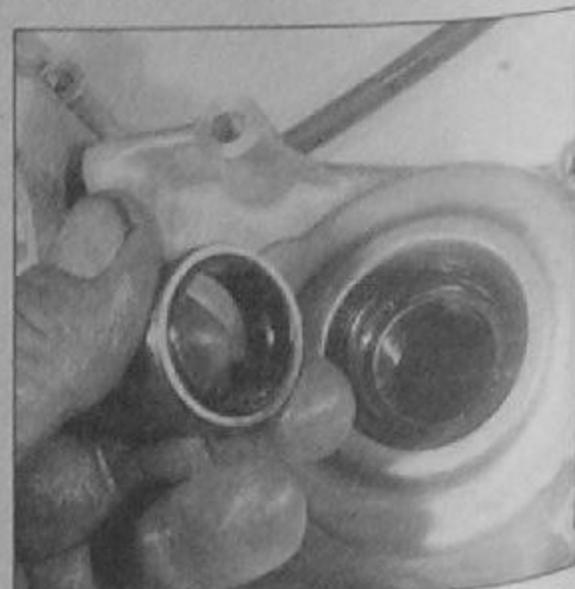
- Remove the engine from the motorcycle (see Section 6).
- Remove the carburetor (see Chapter 3).
- Remove the alternator rotor (see Chapter 5).
- Remove the clutch (see Section 12).
- Remove the external shift mechanism (see Section 14).
- Remove the cylinder head, cylinder and piston (see Sections 8, 10 and 11).
- Remove the kickstarter (see Section 15).
- Pull off the countershaft collar and rubber ring and the crankshaft collar (see illustrations). Check carefully to make sure there aren't any remaining components that attach the halves of the crankcase together.



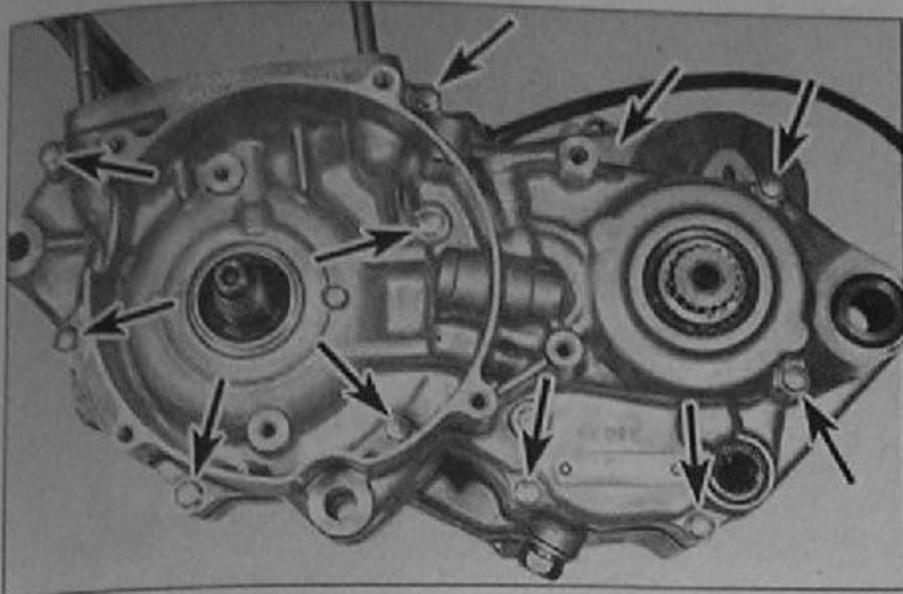
15.15 Align the ratchet punch mark with the mark on the spindle



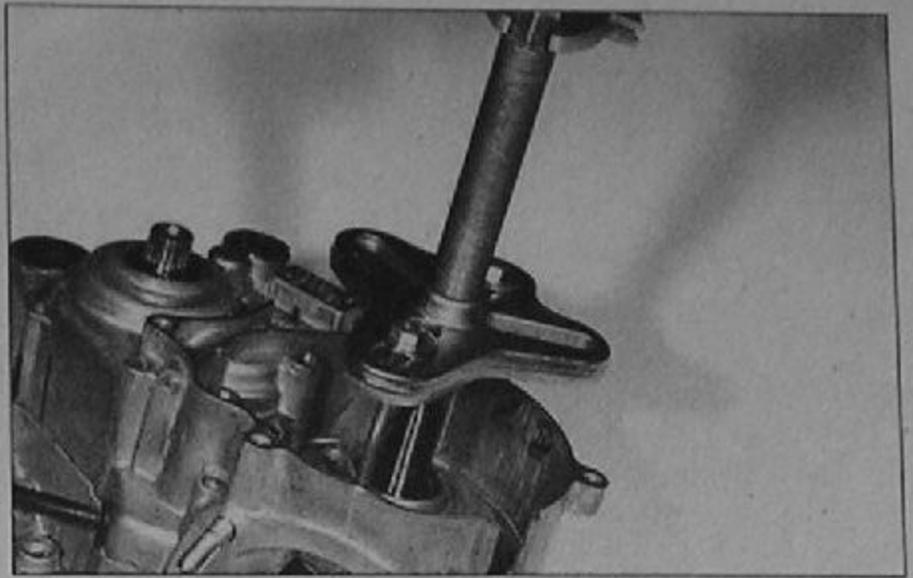
16.9a Note which way the narrow end of the collar faces, then pull it out



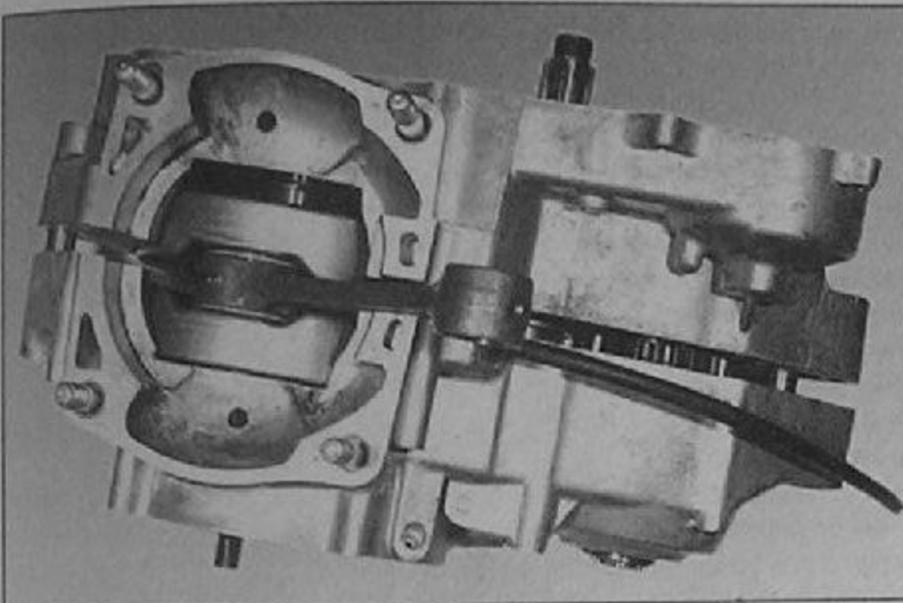
16.9b There's an O-ring inside the inner end of the countershaft collar



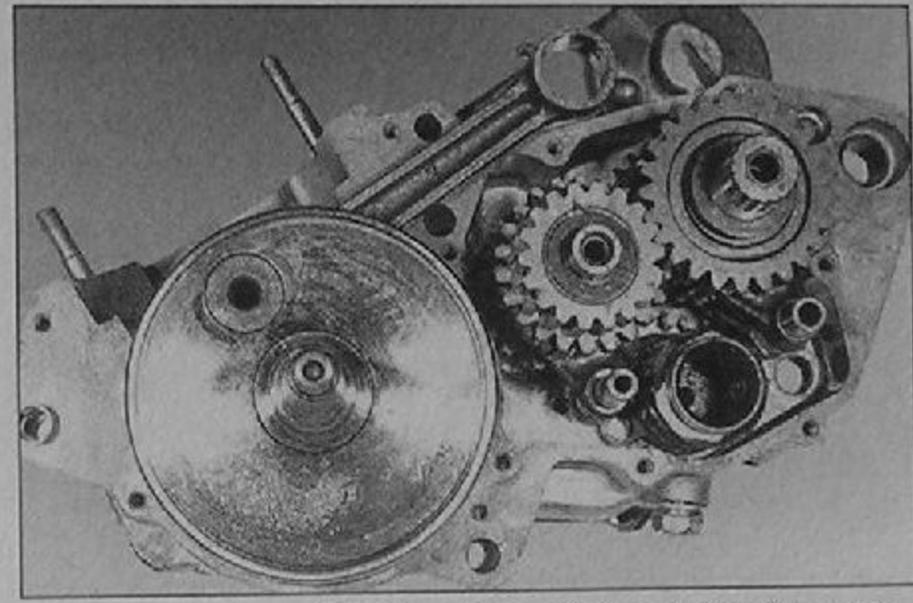
16.10 Crankcase bolts (1997 CR500R shown)



16.11a Use a tool like this one to push the crankshaft out of the left case half . . .



16.11b . . . and lift the left case half off the right half . . .



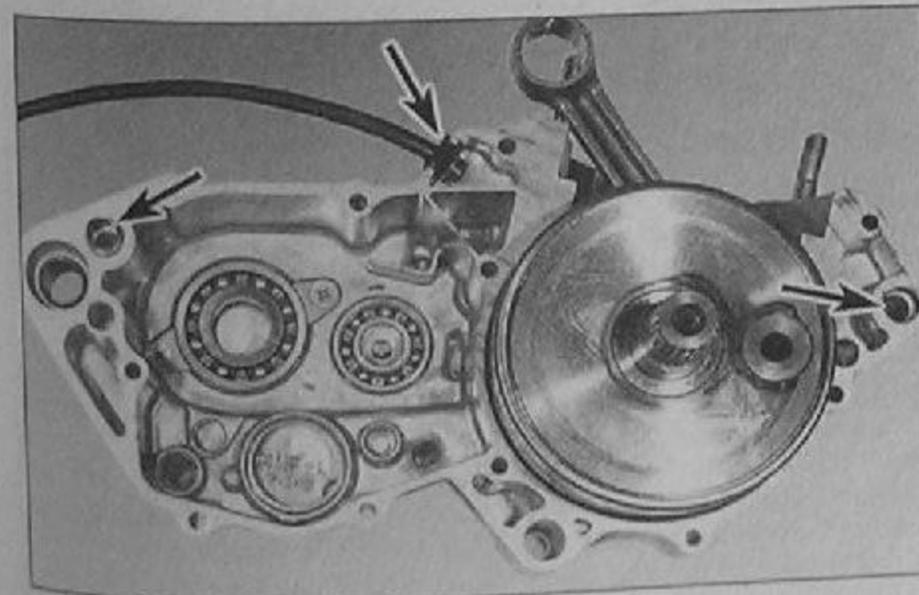
16.11c . . . the crankshaft and transmission shafts will usually stay in the right case half

10 Loosen the crankcase bolts evenly in two or three stages, then remove them (see illustration).

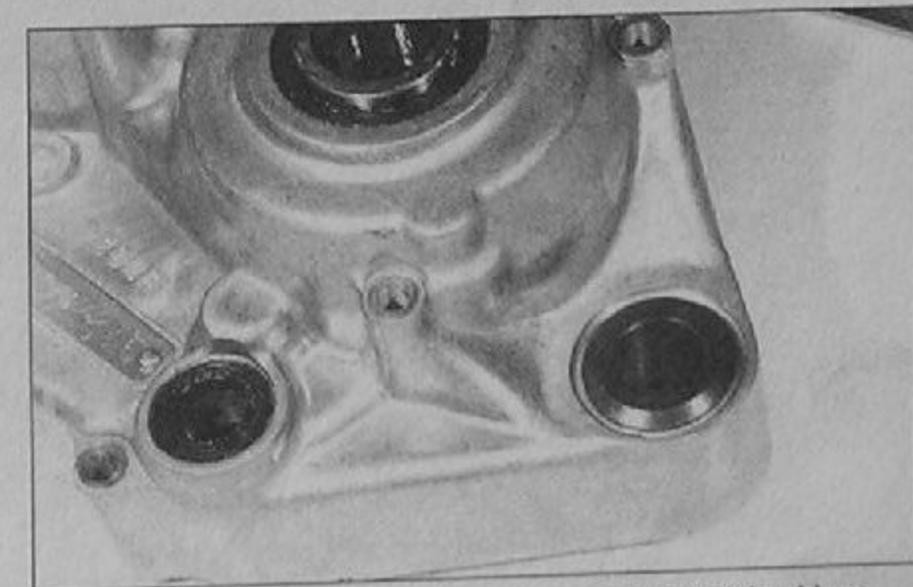
11 Place the crankcase with its right side down on a workbench. Attach a puller to the crankcase (see illustration). As you slowly tighten the puller, carefully tap the crankcase apart and lift the left half off the right half (see illustrations). Don't pry against the mating surfaces or they'll develop leaks.

12 Locate the crankcase dowels (see illustration).

13 Refer to Sections 17 through 20 for information on the internal components of the crankcase.



16.12 Case dowels and breather hose



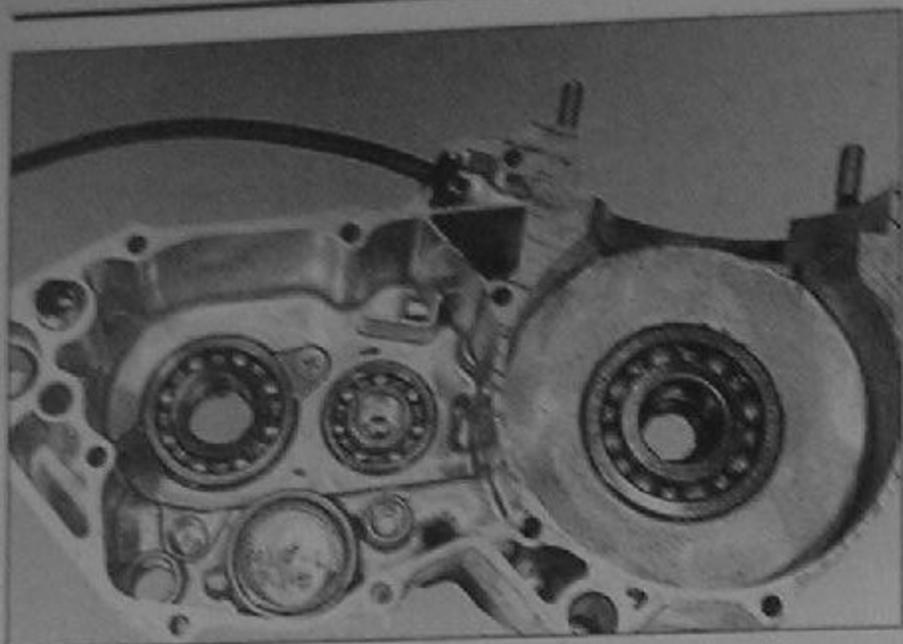
16.15 Don't lose track of the swingarm pivot bolt bushings

Reassembly

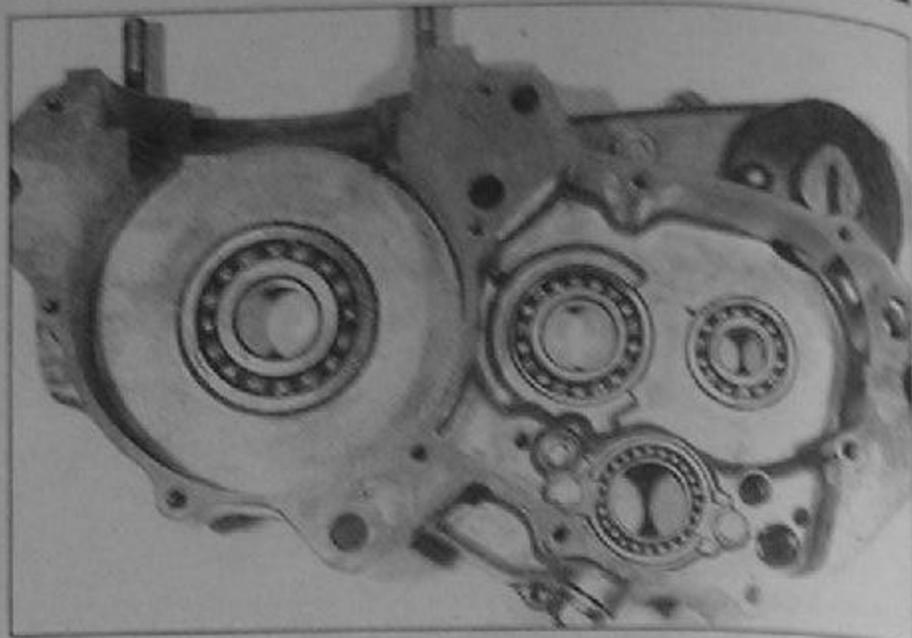
Refer to illustration 16.15

14 Remove all traces of old gasket and sealant from the crankcase mating surfaces with a sharpening stone or similar tool. Be careful not to let any fall into the case as this is done and be careful not to damage the mating surfaces.

15 Check to make sure the dowel pins are in place in their holes in the mating surface of the left crankcase half (see illustration 16.12). Make sure the collars for the swingarm pivot bolt are in their bores (see illustration).



17.3a The countershaft bearing in the left side of the transmission case is secured by retainers . . .



17.3b . . . as is the shift drum bearing in the right case half

16 Pour some engine oil over the transmission gears. Don't get any oil in the crankshaft cavity or on the crankcase mating surface.

17 Install a new gasket on the crankcase mating surface (see illustration 16.12). Cut out the portion of the gasket that crosses the cylinder opening.

18 Carefully place the right crankcase half onto the left crankcase half. While doing this, make sure the transmission shafts, shift drum and crankshaft fit into their bearings in the right crankcase half.

19 Install the crankcase bolts and tighten them so they are just snug. Then tighten them evenly in two or three stages to the torque listed in this Chapter's Specifications.

20 Turn the transmission mainshaft to make sure it turns freely. Also make sure the crankshaft turns freely.

21 The remainder of assembly is the reverse of disassembly.

17 Crankcase components - inspection and servicing

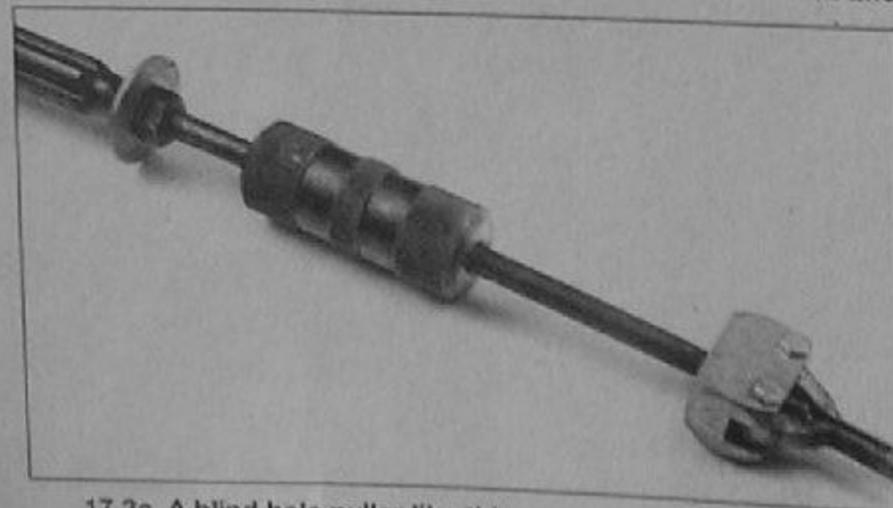
Refer to illustrations 17.3a, 17.3b and 17.3c

1 Separate the crankcase and remove the following:

- Shift drum and forks
- Transmission shafts and gears
- Crankshaft

2 Clean the crankcase halves thoroughly with new solvent and dry them with compressed air. All oil passages should be blown out with compressed air and all traces of old gasket should be removed from the mating surfaces. **Caution:** Be very careful not to nick or gouge the crankcase mating surfaces or leaks will result. Check both crankcase halves very carefully for cracks and other damage.

3 Check the bearings in the case halves (see illustration 16.12 and



17.3c A blind hole puller like this one is needed to remove bearings which are only accessible from one side

the accompanying illustrations). If the bearings don't turn smoothly, replace them. For bearings which aren't accessible from the outside, a blind hole puller will be needed for removal (see illustration). Drive the remaining bearings out with a bearing driver or a socket having an outside diameter slightly smaller than that of the bearing outer race. Before installing the bearings, allow them to sit in the freezer overnight, and about fifteen-minutes before installation, place the case half in an oven, set to about 200-degrees F, and allow it to heat up. The bearings are an interference fit, and this will ease installation. **Warning:** Before heating the case, wash it thoroughly with soap and water so no explosive fumes are present. Also, don't use a flame to heat the case. Install the ball bearings with a socket or bearing driver that bears against the bearing outer race.

4 Replace the oil seals whenever the crankcase is disassembled. The crankshaft seals are critical to the performance of two-stroke engines, so they should be replaced whenever the crankcase is disassembled, even if they look perfectly alright.

5 If any damage is found that can't be repaired, replace the crankcase halves as a set.

6 Assemble the case halves (see Section 16) and check to make sure the crankshaft and the transmission shafts turn freely.

18 Shift drum and forks - removal, inspection and installation

1 Refer to Section 16 and separate the crankcase halves.

Removal

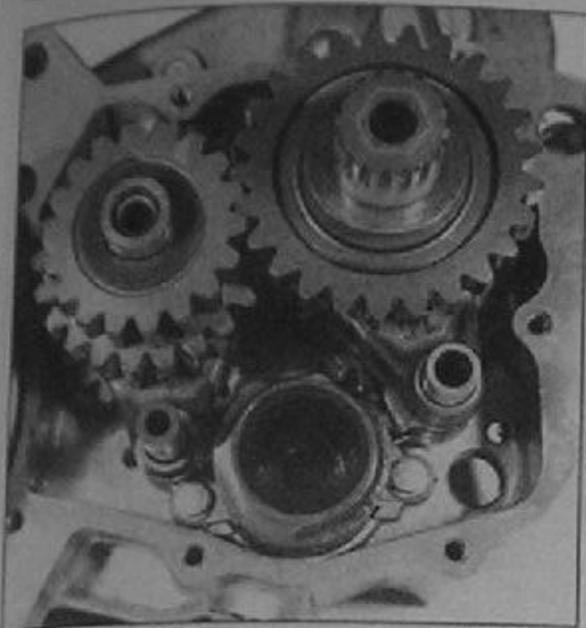
Refer to illustrations 18.2a through 18.2e

- Pull up on each shift rod until it clears the case, then move the rods and forks away from the gears and shift drum (see illustrations).
- Lift the shift drum out of the case.

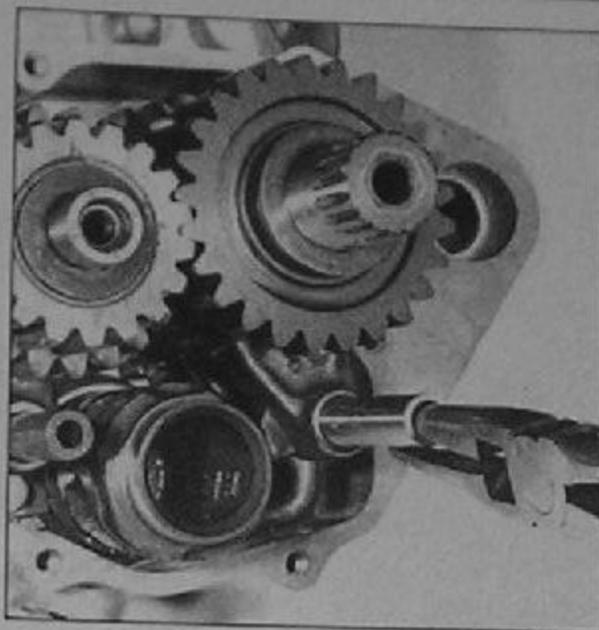
Inspection

Refer to illustrations 18.6 and 18.8

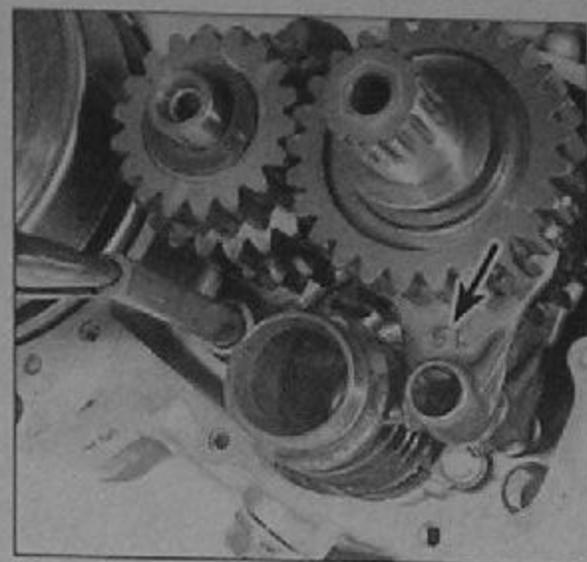
- Wash all of the components in clean solvent and dry them off.
- Inspect the shift fork grooves in the gears. If a groove is worn or scored, replace the affected gear (see Section 19) and inspect its corresponding shift fork.
- Check the shift forks for distortion and wear, especially at the fork fingers (see illustration 18.2e and the accompanying illustration). Measure the thickness of the fork fingers and compare your findings with this Chapter's Specifications. If they are discolored or severely worn they are probably bent. Inspect the guide pins for excessive wear and distortion and replace any defective parts with new ones.
- Measure the inside diameter of the forks and the outside diameter of the fork shaft and compare to the values listed in this Chapter's Specifications. Replace any parts that are worn beyond the limits.



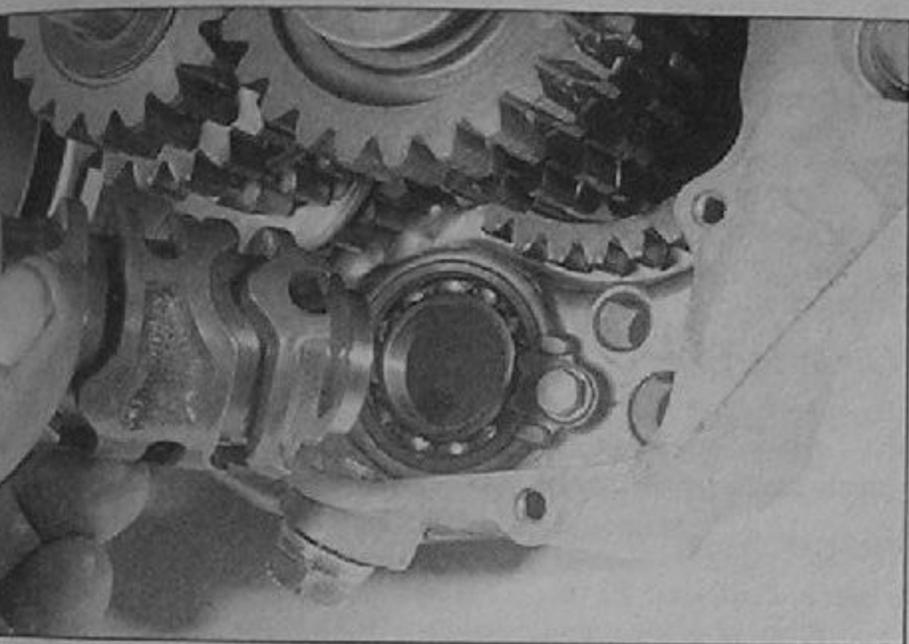
18.2a The assembled shift forks and shafts should look like this



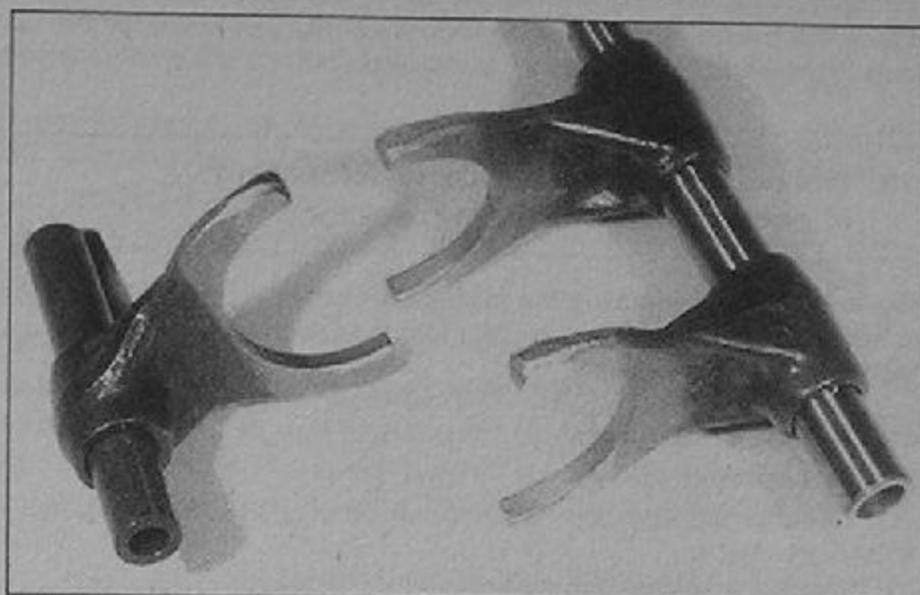
18.2b Pull out the right-left fork shaft. . .



18.2c . . . then pull out the center fork shaft and remove the forks; each fork has a letter indicating its position (left, center or right) . . .



18.2d . . . lift the shift drum out of the case . . .



18.2e . . . and reassemble the forks on the shafts so you don't forget how they go; check the forks for wear on the pins and fingers

2B

Check the shift fork shaft for evidence of wear, galling and other damage. Make sure the shift forks move smoothly on the shaft. If the shaft is worn or bent, replace it with a new one.

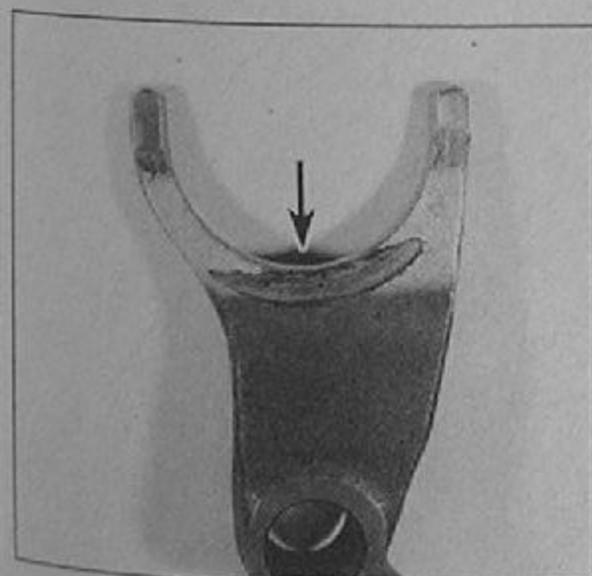
8 Check the edges of the grooves in the drum for signs of excessive wear (see illustration).

9 Spin the shift drum bearing with fingers and replace it if it's rough, loose or noisy.

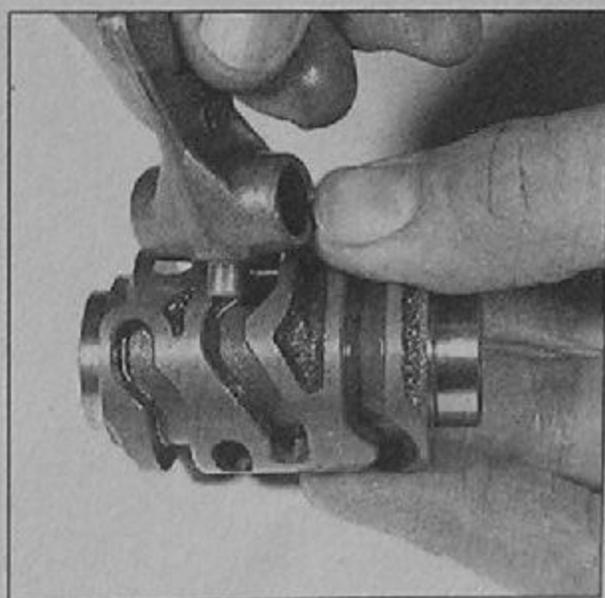
Installation

Refer to illustration 18.10

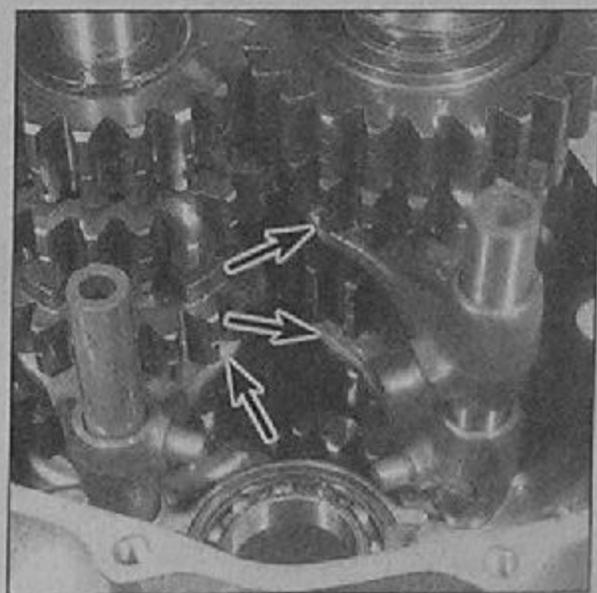
10 Installation is the reverse of the removal steps. Refer to the identifying letters (R, C and L) on the forks and make sure they're installed in the correct positions, with the letters facing in the proper direction. Engage the fork fingers with the gear grooves (see illustration). **Note:**



18.6 An arc-shaped burn mark like this means the fork was rubbing against a gear, probably due to bending or worn fork fingers



18.8 Check the shift drum grooves for wear, especially at the points; this is where the most friction occurs



18.10 The fork fingers engage the gear grooves like this (shift drum removed for clarity)



19.4 Both transmission shafts have a thrust washer on the left side

The forks on some models are identified by a single letter, which faces the right side of the engine when the fork is installed. On other models, the position letter is incorporated into a number, which faces the left side of the engine when the fork is installed.

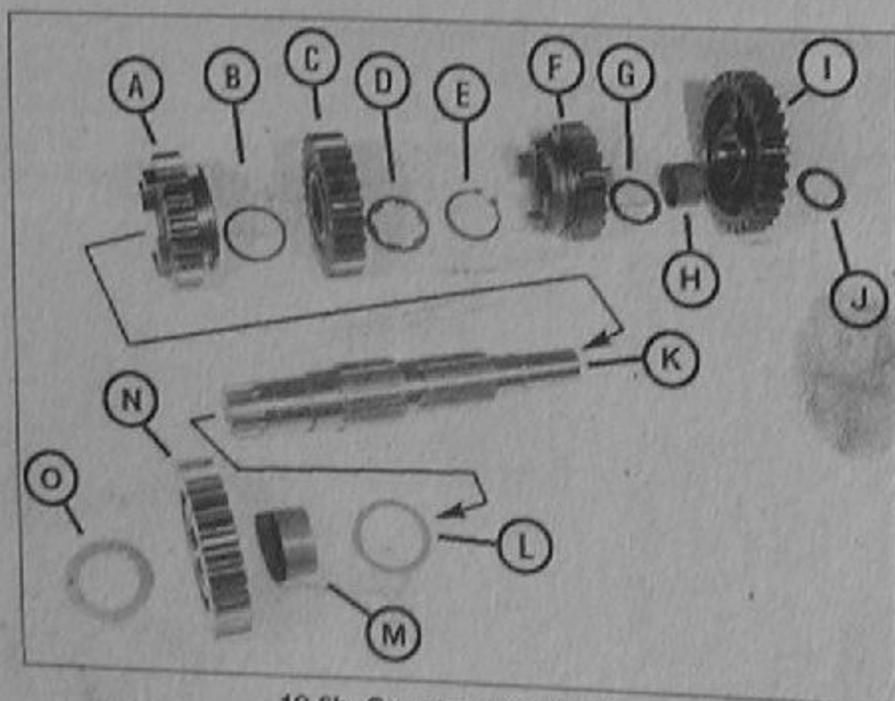
19 Transmission shafts - removal, disassembly, inspection, assembly and installation

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

Removal

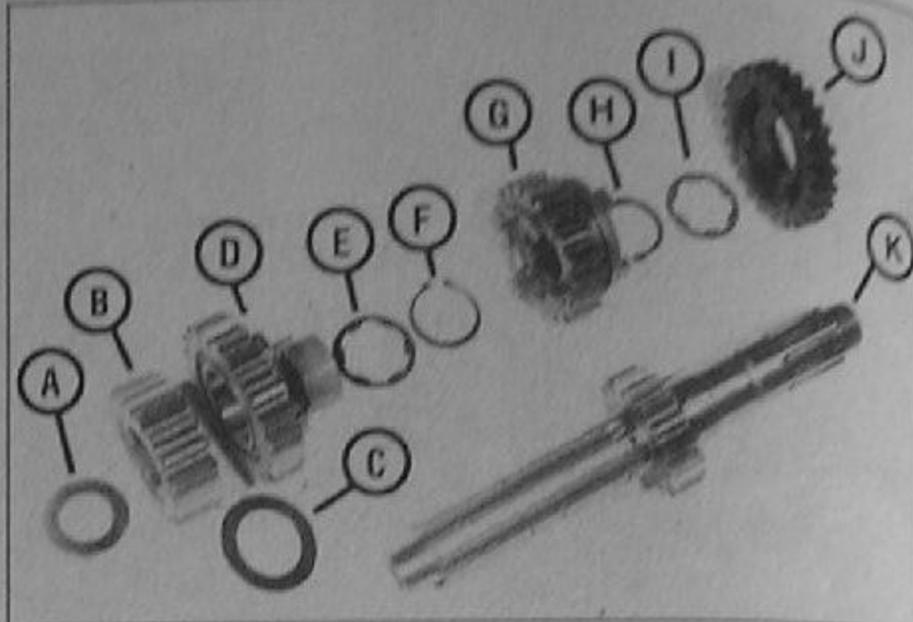
Refer to illustration 19.4

- 1 Remove the engine, then separate the case halves (see Sections 6 and 16).
- 2 The transmission components remain in the right case half when the case is separated (see illustration 16.11c).
- 3 Refer to Section 18 and remove the shift drum and forks.
- 4 Take the thrust washers off the transmission shafts (see illustration). Lift the transmission shafts out of the case together, then remove



19.6b Countershaft details

- | | | |
|------------------|-----------------|-----------------|
| A Fourth gear | F Fifth gear | K Countershaft |
| B Thrust washer | G Thrust washer | L Thrust washer |
| C Third gear | H Bushing | M Bushing |
| D Splined washer | I First gear | N Second gear |
| E Snap-ring | J Thrust washer | O Thrust washer |



19.6a Mainshaft details

- | | | |
|-------------------|------------------|------------------|
| A Thrust washer | E Splined washer | I Splined washer |
| B Second gear | F Snap-ring | J Fifth gear |
| C Thrust washer | G Third gear | K Mainshaft |
| D Splined bushing | H Snap-ring | |

the thrust washers from the case.

- 5 Separate the shafts once they're lifted out. If you're not planning to disassemble them right away, reinstall the thrust washers and place a large rubber band over both ends of each shaft so the gears won't slide off.

Disassembly

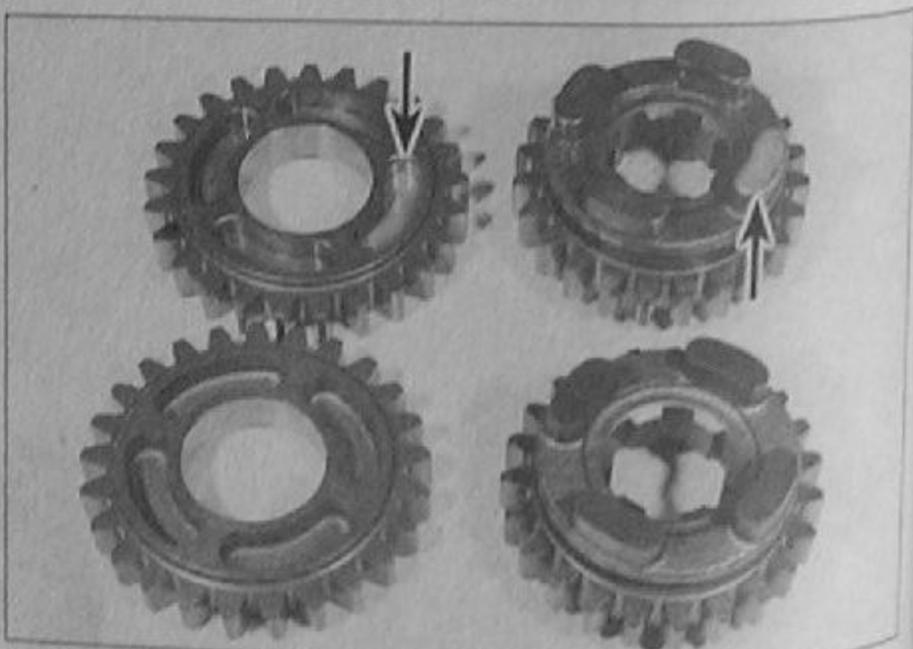
Refer to illustrations 19.6a and 19.6b

- 6 To disassemble the shafts, remove the snap-rings and slide the gears, bushings and thrust washers off (see illustrations).

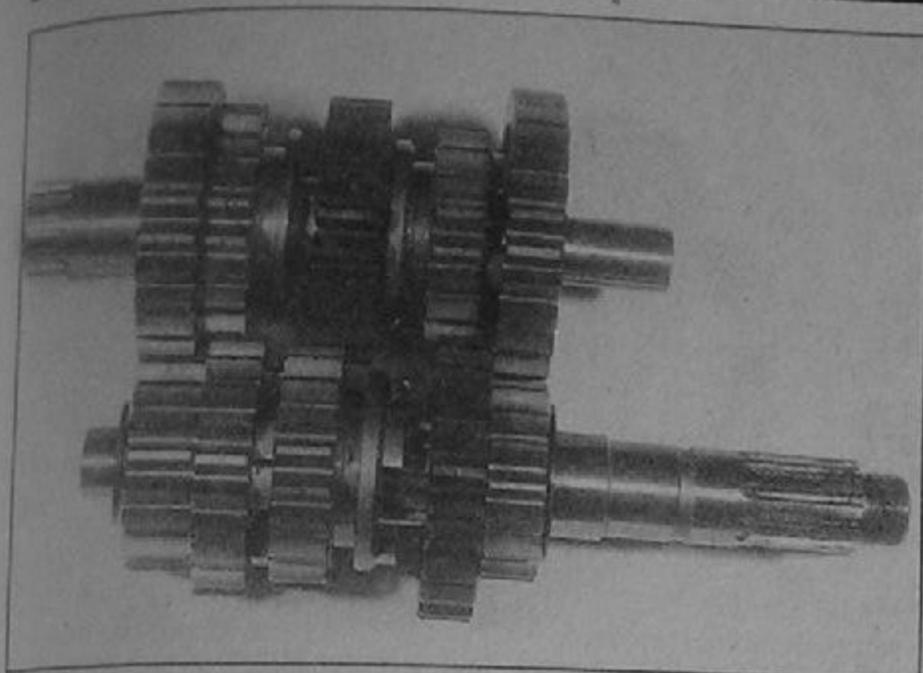
Inspection

Refer to illustration 19.10

- 7 Wash all of the components in clean solvent and dry them off.
- 8 Inspect the shift fork grooves in gears so equipped. If a groove is worn or scored, replace the affected gear and inspect its corresponding shift fork.
- 9 Check the gear teeth for cracking and other obvious damage. Check the bushing or surface in the inner diameter of the freewheeling gears for scoring or heat discoloration. Measure the inside diameters of the gears and compare them to the values listed in this Chapter's Specifications. Replace parts that are damaged or worn beyond the limits.



19.10 Check the slots (left arrow) and dogs (right arrow) for wear, especially at the edges; rounded corners cause the transmission to jump out of gear - new gears (bottom) have sharp corners



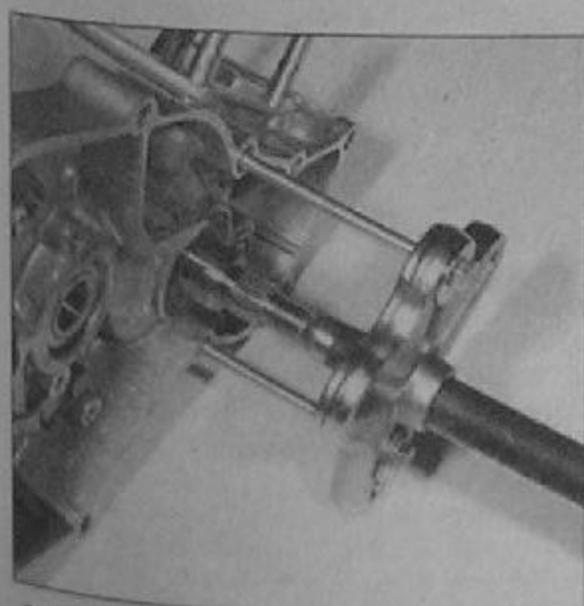
19.17 The assembled shafts and gears should look like this

- 10 Inspect the engagement dogs and dog holes on gears so equipped for excessive wear or rounding off (see illustration). Replace the paired gears as a set if necessary.
- 11 Measure the transmission shaft diameters at the points listed in this Chapter's Specifications. If they're worn beyond the limits, replace the shaft(s).
- 12 Measure the inner and outer diameters of the gear bushings and replace any that are worn beyond the limit listed in this Chapter's Specifications.
- 13 Inspect the thrust washers. Honda doesn't specify wear limits, but they should be replaced if they show any visible wear or scoring. It's a good idea to replace them whenever the transmission is disassembled.
- 14 Check the transmission shaft bearings in the crankcase for roughness, looseness or noise and replace them if necessary.
- 15 Discard the snap-rings and use new ones on reassembly.

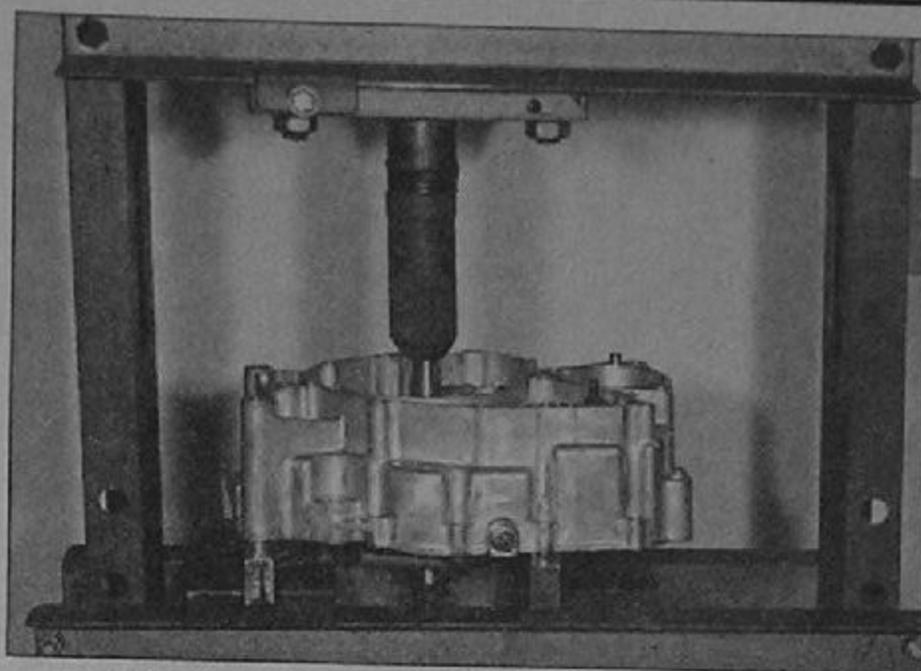
Assembly and installation

Refer to illustration 19.17

- 16 Assembly and installation are the reverse of the removal procedure, but take note of the following points:
 - a) Make sure the snap-rings are securely seated in their grooves, with their rounded sides facing the direction of thrust (toward the gears they hold on the shafts). The ends of the snap-rings must fit in raised splines, so the gap in the snap-ring aligns with a spline groove.
 - b) Lubricate the components with engine oil before assembling them.



20.1b ... you can also use a puller if you have the correct adapters



20.1a Press the crankshaft out of the crankcase . . .

- 17 After assembly, check the gears to make sure they're installed correctly (see illustration).

20 Crankshaft and connecting rod - removal, inspection and installation

Crankshaft

Removal

Refer to illustrations 20.1a, 20.1b and 20.1c

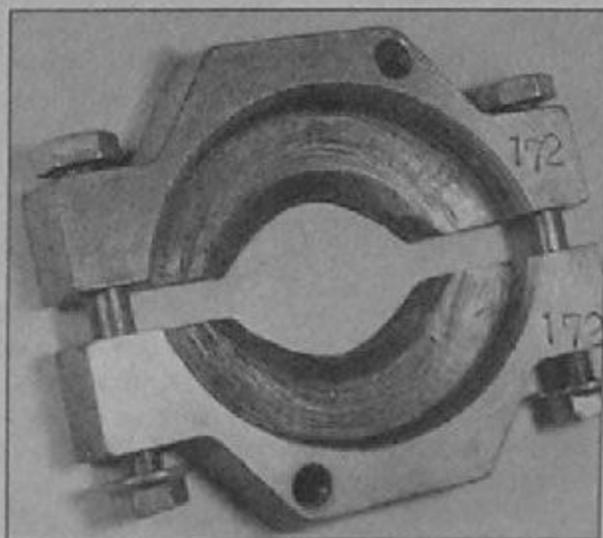
Note: Removal and installation of the crankshaft require a press and some special tools. If you don't have the necessary equipment or suitable substitutes, have the crankshaft removed and installed by a Honda dealer.

- 1 Place the left crankcase half in a press and press out the crankshaft, or remove it with a puller (see illustrations). The ball bearing may remain in the crankcase or come out with the crankshaft. If it stays on the crankshaft, remove it with a bearing splitter (see illustration). Discard the bearing, no matter what its apparent condition, and use a new one on installation.

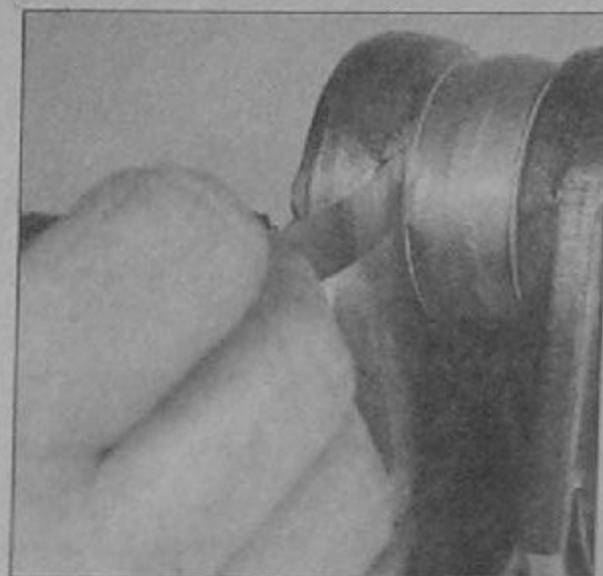
Inspection

Refer to illustrations 20.2 and 20.3

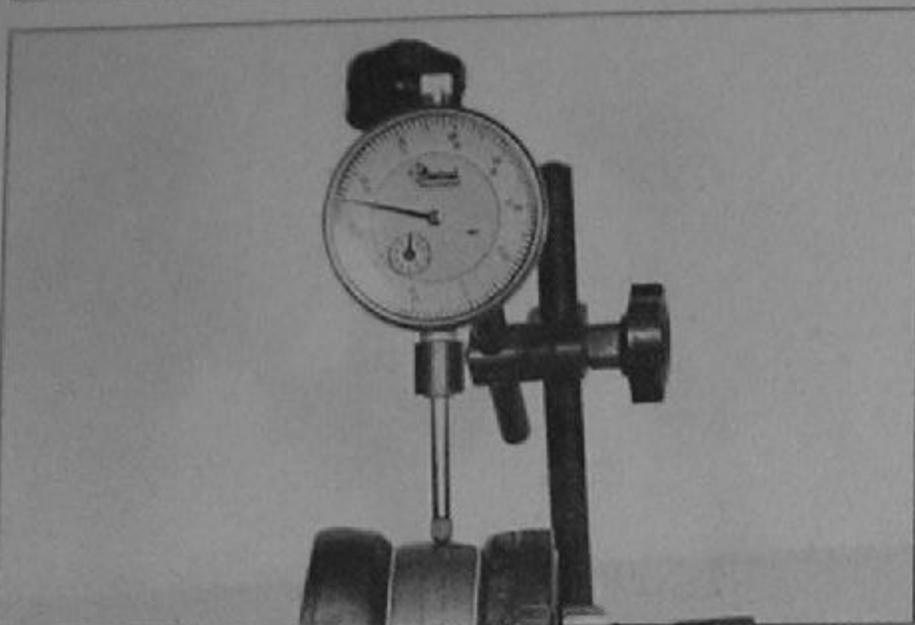
- 2 Measure the side clearance between connecting rod and crankshaft with a feeler gauge (see illustration). If it's more than the limit listed in this Chapter's Specifications, replace the crankshaft and connecting rod as an assembly.



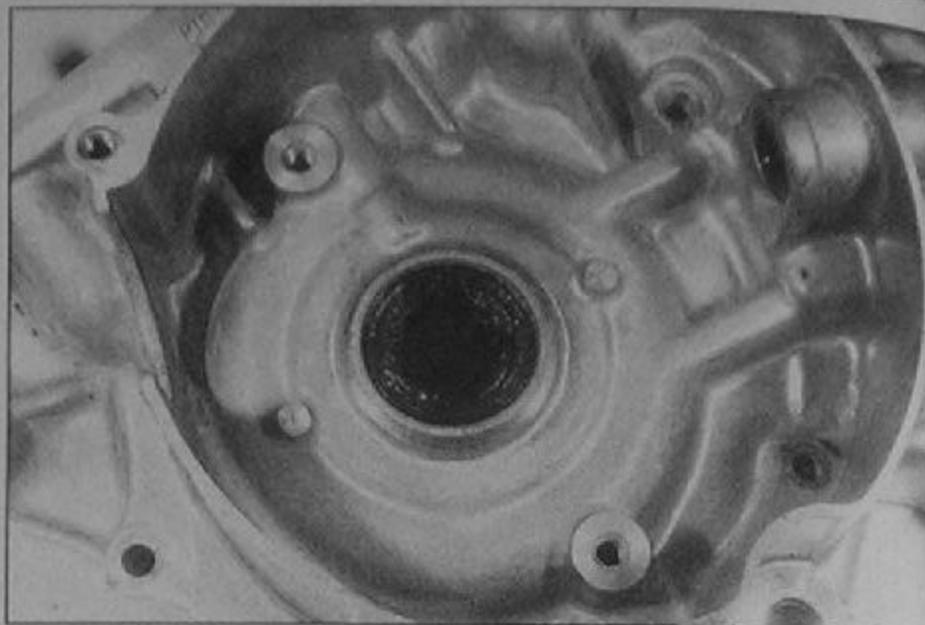
20.1c If the bearing stays on the crankshaft, remove it with a press and bearing splitter



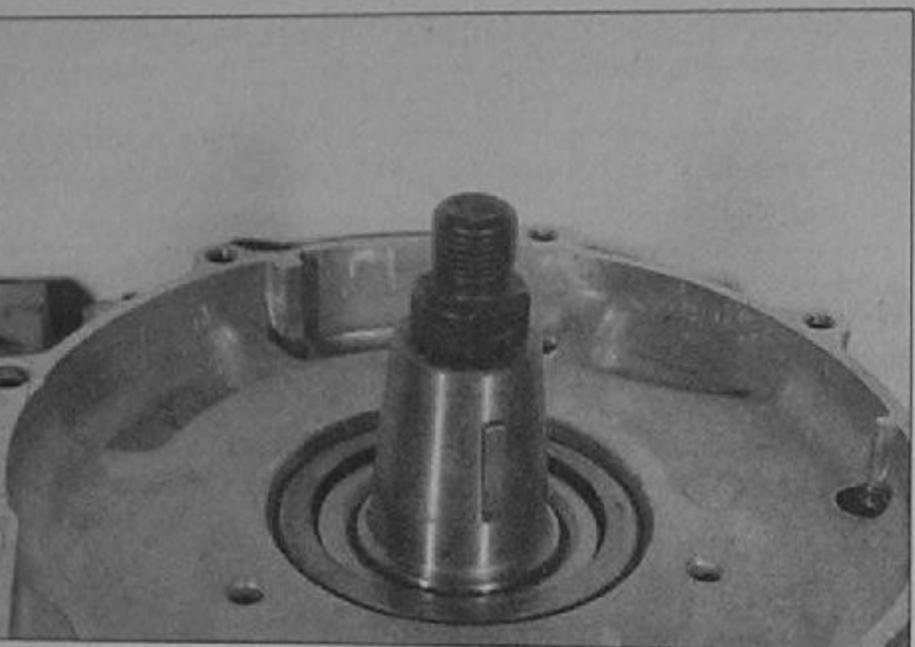
20.2 Check the connecting rod side clearance with a feeler gauge



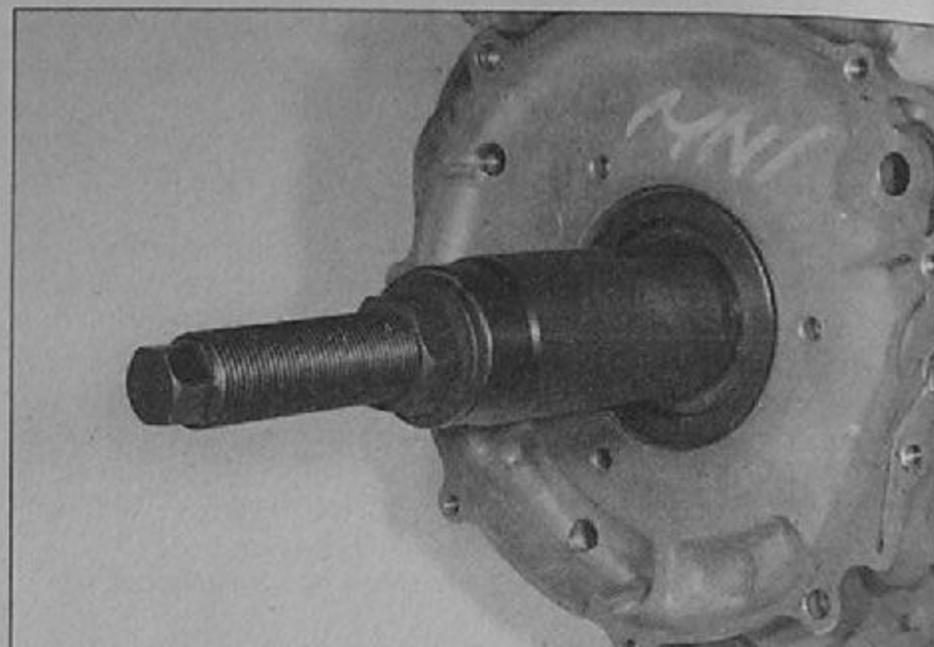
20.3 Check the connecting rod radial clearance with a dial indicator



20.6 The crankshaft seals have a major effect on two-stroke engine performance



20.7 Thread the adapter into the end of the crankshaft . . .



20.8 . . . and attach the puller to the adapter

3 Set up the crankshaft in V-blocks with a dial indicator contacting the big end of the connecting rod (**see illustration**). Move the connecting rod up-and-down against the indicator pointer and compare the reading to the value listed in this Chapter's Specifications. If it's beyond the limit, replace the crankshaft and connecting rod as an assembly.

4 Check the crankshaft and splines for visible wear or damage, such as step wear of the splines or scoring. If any of these conditions are found, replace the crankshaft and connecting rod as an assembly.

5 Set the crankshaft in a pair of V-blocks, with a dial indicator contacting each end. Rotate the crankshaft and note the runout. If the runout at either end is beyond the limit listed in this Chapter's Specifications, replace the crankshaft and connecting rod as an assembly.

Installation

Refer to illustrations 20.6, 20.7 and 20.8

6 Pry out the crankshaft seals, then install new ones with a seal driver or a socket the same diameter as the seal (**see illustration**).

7 Thread a puller adapter into the end of the crankshaft (**see illustration**).

8 Install the crankshaft puller and collar on the end of the crankshaft (**see illustration**).

9 Hold the puller shaft with one wrench and turn the nut with another wrench to pull the crankshaft into the center race of the ball bearing.

10 Remove the special tools from the crankshaft.

11 Installation is the reverse of the removal steps.

21 Recommended start-up and break-in procedure

1 This procedure should be followed each time the piston and rings, cylinder, crankshaft or crankshaft bearings are replaced. Make sure the transmission and controls, especially the brakes, function properly before riding the machine.

2 Place pieces of tape on the throttle twist grip and the handlebar next to it to indicate the half throttle and three-quarter throttle positions.

3 Make sure there is fresh fuel in the tank, then operate the choke.

4 Start the engine and ride for ten minutes, using no more than half throttle. Use the transmission to keep from lugging or over-revving the engine.

5 Shut the engine off and let it cool completely. Once the engine has cooled, ride for another ten minutes, again using no more than half throttle, without lugging or over-revving the engine.

6 Let the engine cool again, then ride for 10 minutes using no more than three-quarters throttle. Again, do not lug or over-rev the engine.

7 Let the engine cool, then ride for three more ten-minute periods, again using no more than three-quarters throttle, letting the engine cool completely between each period.

8 Check carefully for transmission oil and coolant leaks.

9 Upon completion of the break-in rides, and after the engine has cooled down completely, recheck the transmission oil and coolant level (see Chapter 1).