

Classic &
MOTORCYCLE
MECHANICS

No 121

November 1997

USA \$5.75

£2.40

WIN - STANLEY SOCKET SETS INSIDE

**Still the
dogs...**



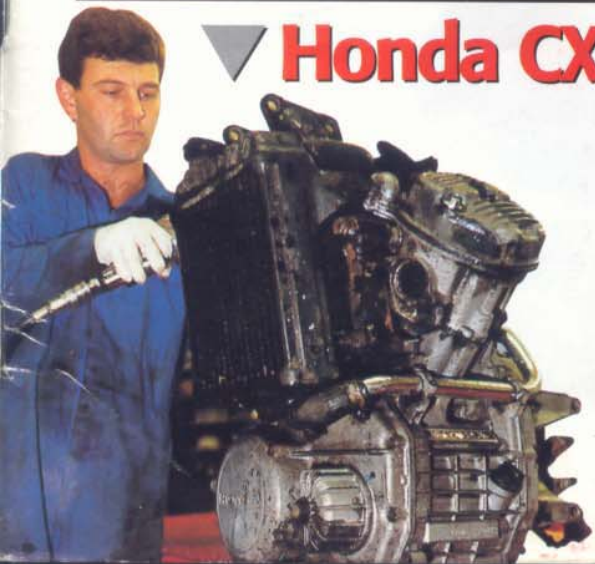
Back aboard an old friend - the RD400

▼ **Honda CX500 engine rebuild**

**Also fettling: GT250,
Commando, GPz550,
GT750, K2, XS750.**

**PLUS: Suzuki
Super Six**

**1,000's of
Bikes'n'Bits for
sale inside**



CX500

ENGINE REBUILD

THE CX500 introduced in early 1978 was a departure from the familiar assortment of fours and twins which made up the bulk of Honda's range of medium to large capacity models.

The 80-degree V-twin was a compact unit which permitted a short wheelbase.

Twisting the four-valve cylinder heads avoided the carburettors fouling the rider's knees, and incorporation of the gearbox in the crankcase helped reduce the physical size of the motor.

The shaft-drive bike topped the sales charts and became the number one choice with couriers.

'Mikes Bikes' (contact Ian or John on 0181 983 4896) regularly see examples with 200,000 miles on the clock. Even then many require little more than a new set of piston rings.

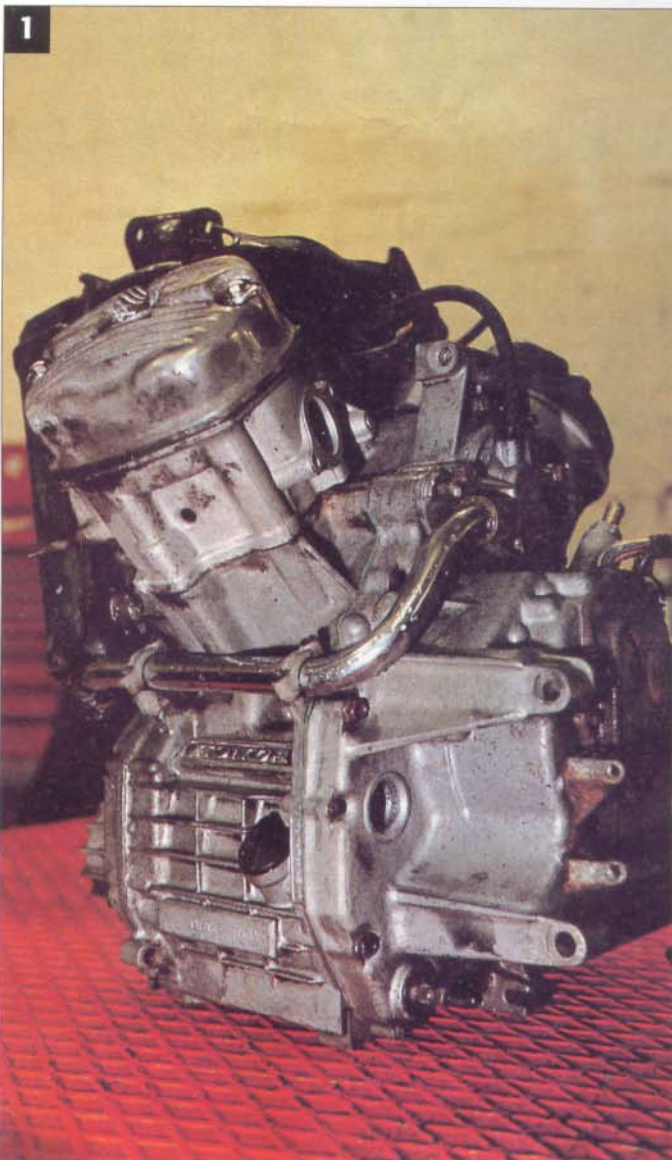
Most parts are still readily available, but a shortage of cranks is becoming evident.

The major cause of mechanical problems with the CX is abuse and lack of maintenance. They are prone to oil and water leaks which can cause terrible damage if left unchecked. Riders should keep a close eye on the temperature gauge as engine damage quickly occurs.

Common coolant faults are:

- Securing nut falls off cooling fan. Fan then hits radiator causing leak and overheating.
- Water pump/impeller securing nut loosens and water leaks behind impeller.
- Leaking radiator caused by damage.

Disturbing noises from the bottom end of this 1980 Honda CX500 engine announced the need for a complete overhaul. Jason Loff of CX500 specialists 'Mikes Bikes' of London (0181 983 4896) tackles the job. Words and pictures: Nick O'Brien.



1



2

1 We start work on the unit with the engine removed from the frame. The carburettors and exhausts have been removed, the oil drained and the unit steam cleaned.

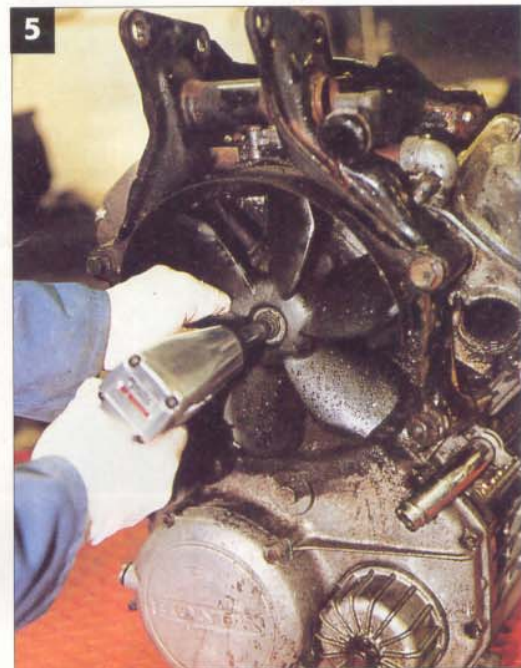
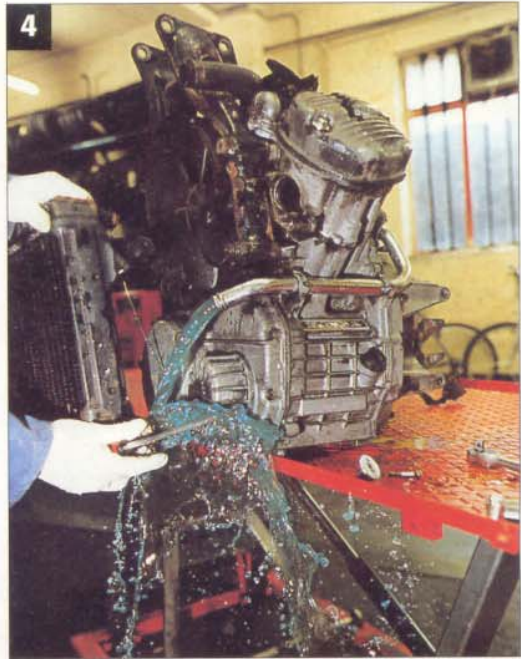
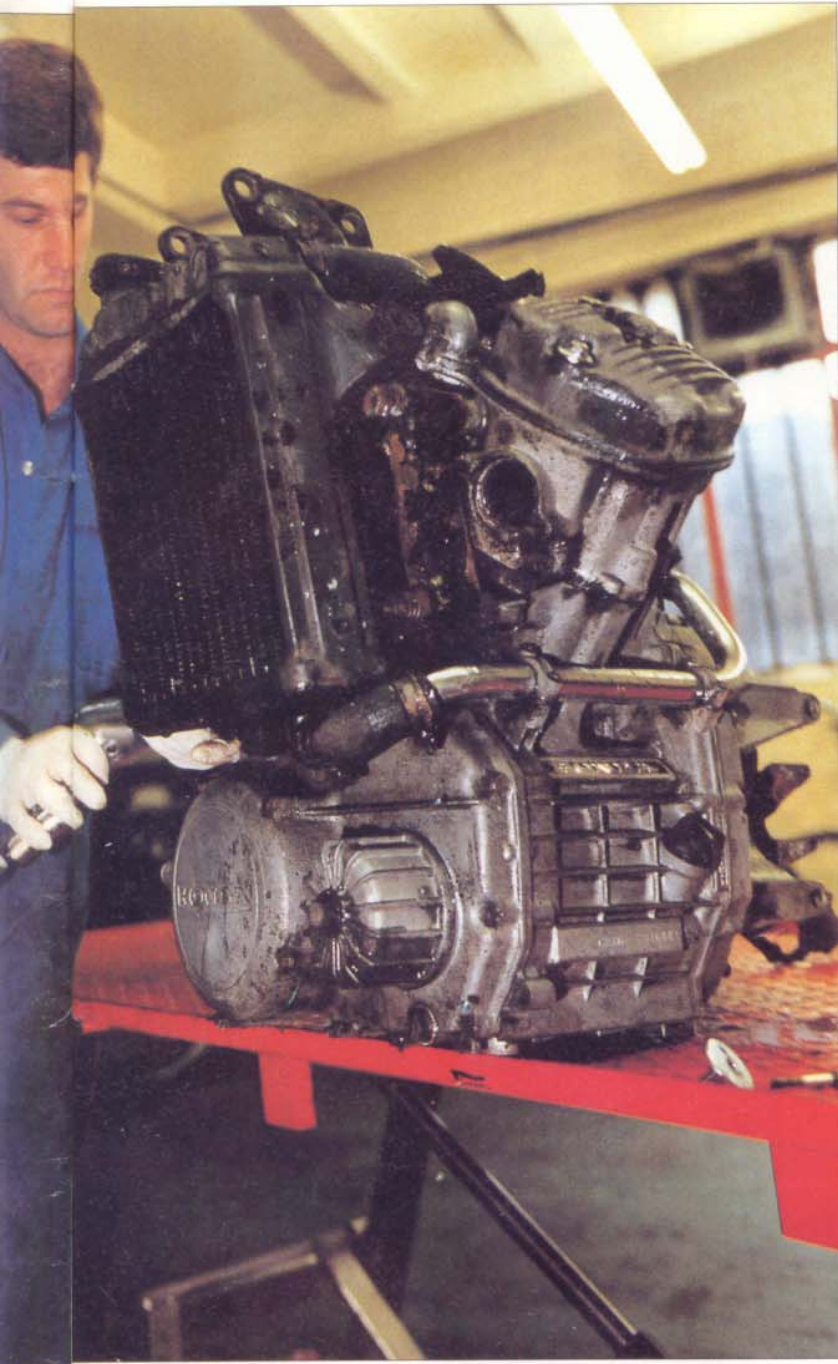
2 Remove the radiator grill/guard and the three 12mm radiator mounting bolts.

3 Unscrew radiator hoses' pipe clips. There are two - one at the top of the radiator, the other at the bottom.

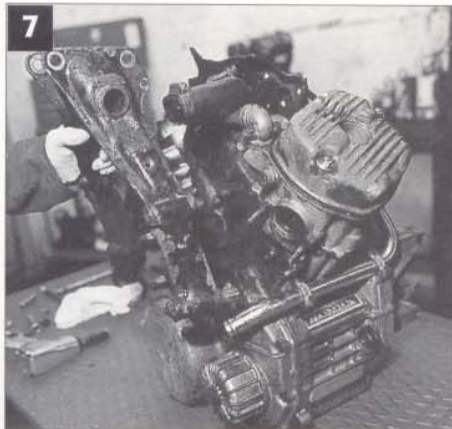
4 Remove and drain radiator.

5 Holding fan, release fan centre nut/washer and withdraw fan assembly.

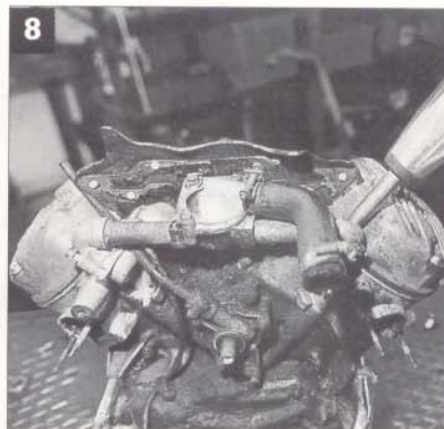
6 Release and remove radiator shroud.



7 On this machine, bolts have been used to replace the nuts and studs holding the engine mounting wishbone (fan housing). Unscrew and remove.



8 Unscrew the four 6mm bolts, (10mm heads) from the cylinder coolant manifolds and the two bolts from thermostat housing. Detach pipe from water pump and remove assembly.



9 Still at front of engine, the fan drive shaft/rev counter assembly can be inspected. The rev counter cable is still attached here. Leave this assembly in place for now. This is also the camshaft assembly.



A common problem, as can be seen here, is engine oil leakage. This is easily rectified with a new gasket but on this machine poor re-assembly (over or uneven tightening of bolts) has left an oil leak. If this problem occurs it can be fixed with the engine in frame.

10 Slacken water pump hoses' clips via Allen keys.



11 Remove the 13 6mm bolts (8mm heads) securing clutch cover, hold clutch lever up and gently tap around oil filter position to ease cover away.



12 Withdrawing clutch cover carefully, locate two large oil dowels and one small one at 12 o'clock 5 o/c and 10 o/c positions. These oil seals should be replaced.

13 Inspect clutch cover/assembly.

14 Remove clutch assembly thrust bearing which is held by four 6mm bolts (10mm heads). Loosen evenly and remove the four springs.

15 The clutch centre nut can be released with a special Honda tool. Alternatively the job can be accomplished with a drift and hammer and by refitting two diagonal bolts with springs to hold clutch assembly in place while the centre nut is released.

While the clutch assembly is still secured in position, a coin can be used to lock the gearing to aid the later removal of the crankshaft, allowing the main shaft nut on the oil pump, sprocket and primary drive sprocket to be slackened.

16 Remove clutch assembly.

17 Release the three 6mm bolts (10mm heads) from oil pump and detach chain. Keep one dowel retainer.

18 Still at front of engine, tip forward to remove excess oil. A good tip at this stage is to place items on bench or in boxes from left/right and front/back to aid reassembly.

19 Now at rear of engine unit, release the five water pump bolts - three 6mm (8mm heads) and two 8mm bolts (12mm heads). Also release the attached pipe.



20 The water pump can now be eased away evenly by two large flat bladed screwdrivers. Be careful not to damage the pump housing.

21 Release and remove the 10mm nut and copper washer holding water impeller in place.

Do so carefully as damage will result in the need for a whole new camshaft/fan drive shaft assembly.

22 Impeller with retaining copper washer and nut removed. Check the splines/thread for wear. It is common for the rear seal to wear, detectable by forward movement when secured.

23 Remove water impeller.

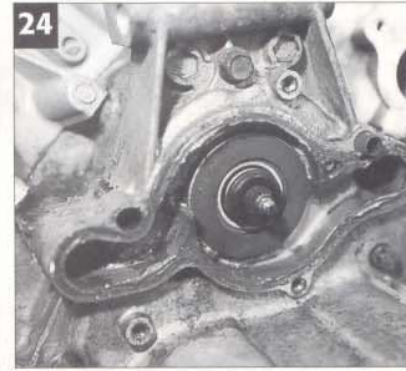
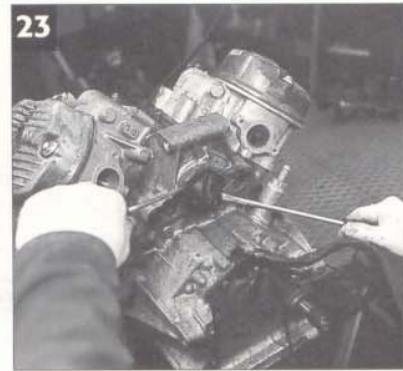
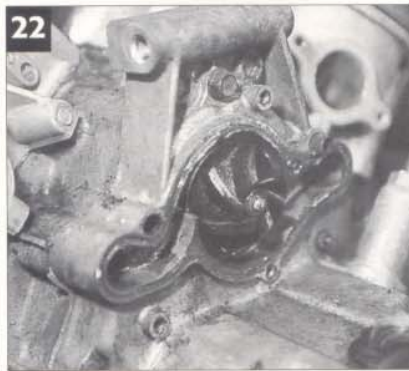
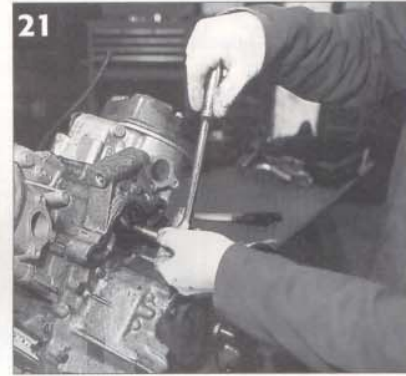
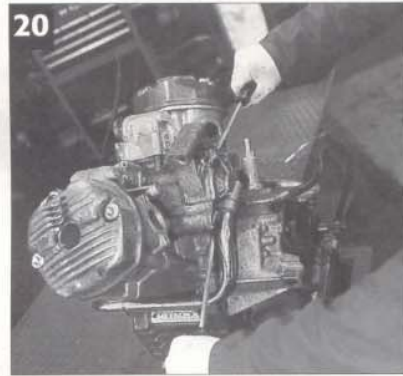
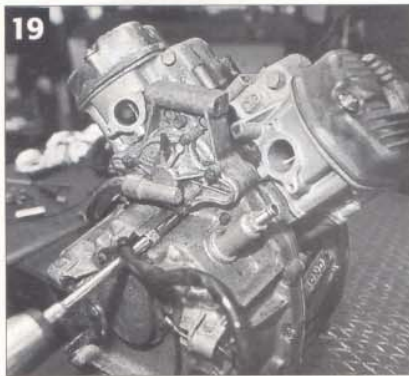
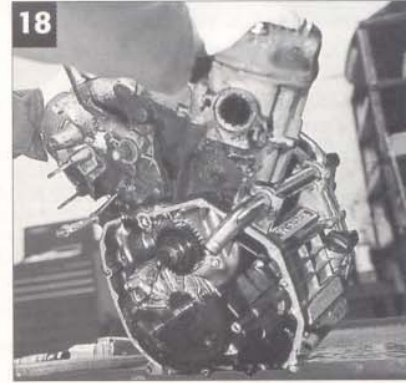
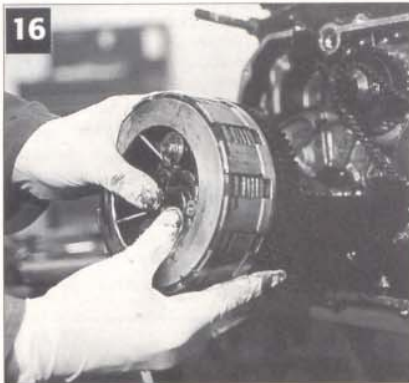
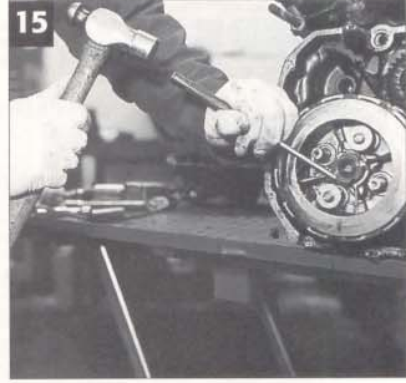
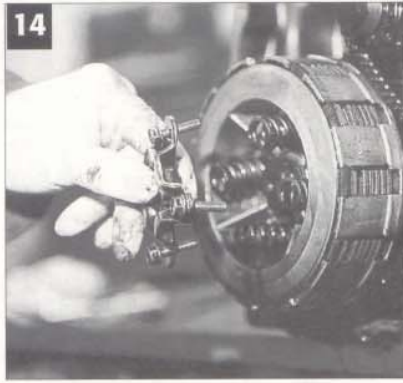
24 Check and replace rear impeller seal.

25 Remove crank breather pipe.

26 Still at rear of engine, remove all seven 6mm bolts (8mm heads) from the crankcase. Using Nylon hammer, tap at the four engine mounting points to break seal.

27 Then, using two large screwdrivers in top mounting points, tap and lever crankcase away. Push gear lever in as springs will be stretched.

Jason's dismantling of the motor continues next month. Don't miss the December issue on sale November 19.



CX500

ENGINE REBUILD

Mechanic Jason Loff of 'Mikes Bikes' of London (0181 983 4896) continues to strip the V-twin Honda and discovers the cause of the disturbing noises that drove the owner to seek help. Words and pictures: Nick O'Brien.

28 Lever crankcase from seals.

29 Remove rear engine crankcase.

30 Closer inspection and examination of engine's electrical and cam drive gearing assemblies.

31 Release and carefully remove starter ring drive and washer assembly.

32 Remove rotor which is secured by 6mm bolt (10 mm head). Undo on a compression engine stroke or hold flywheel to release bolt and rotor.

33 For removal of flywheel, strike with hammer the 17mm retaining nut holding it in place. Otherwise use a 'rattler' air tool.

34 Using an extractor tool, withdraw flywheel off its tapered shaft.

35 Remove gear change assembly - be careful not to misplace spring joining the two parts.

36 Release 6mm bolt (10 mm head) holding selector drum and withdraw carefully.

37 Note and mark position of cam chain tensioner.

38 To remove chain drive assembly first remove four cover plate bolts - note the top bolt is longest. Then unclip

spring from chain tensioner.

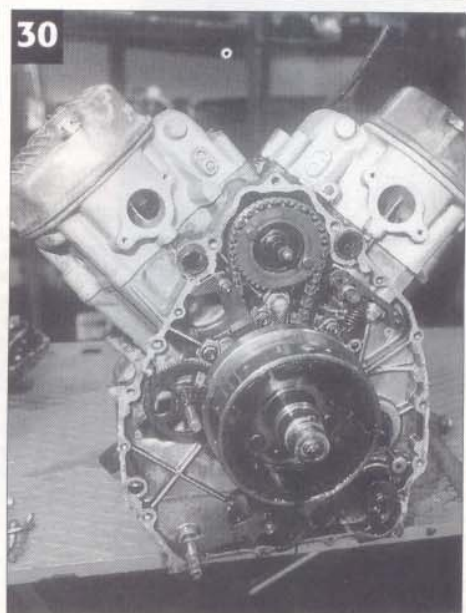
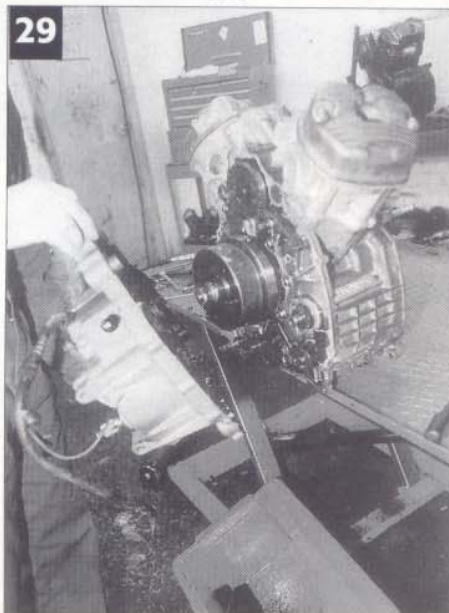
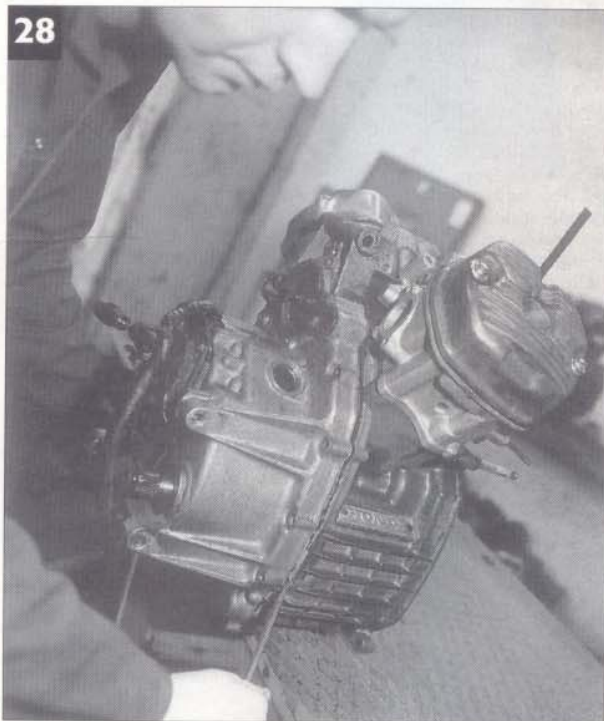
39 Remove camchain guide tensioner left hand side.

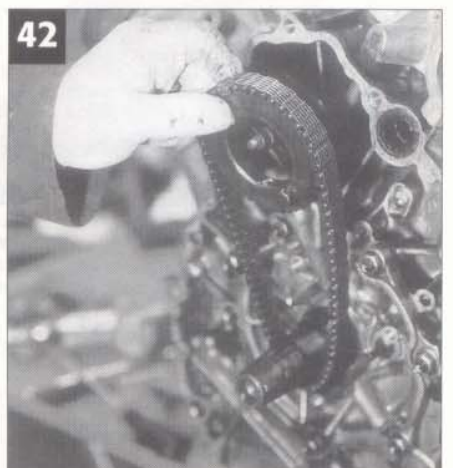
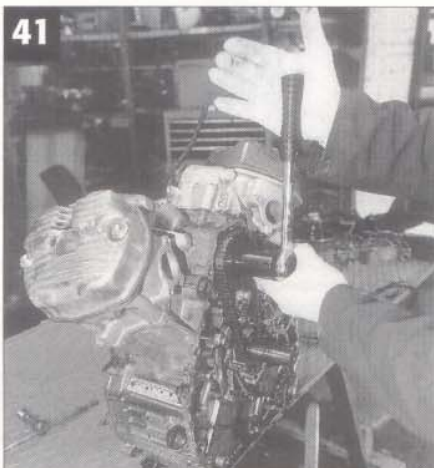
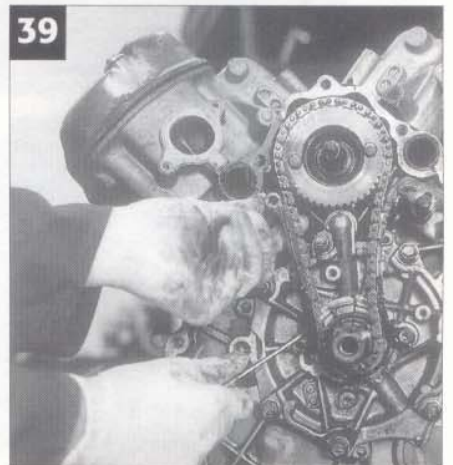
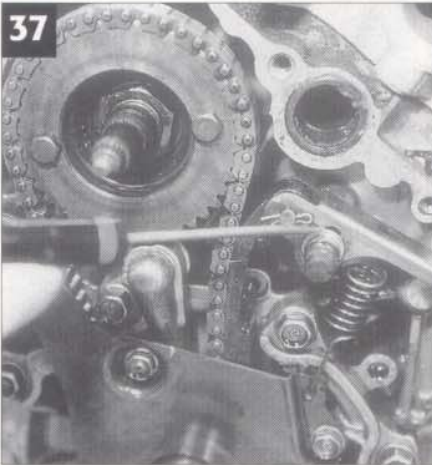
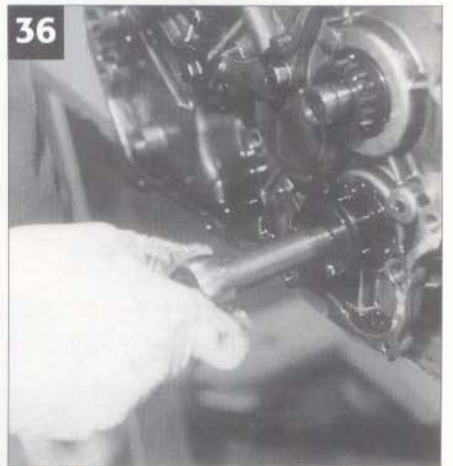
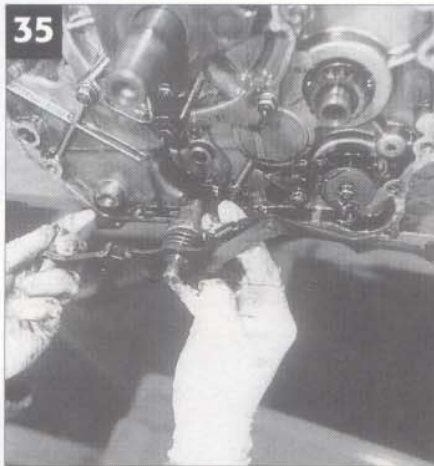
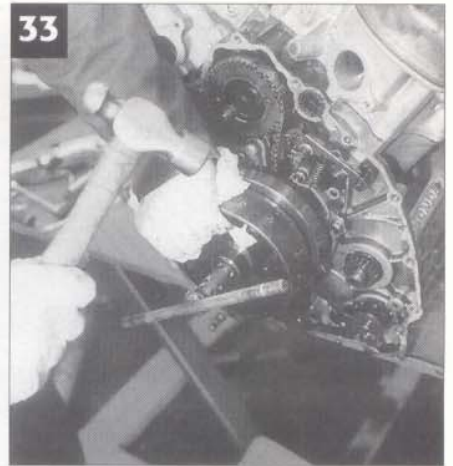
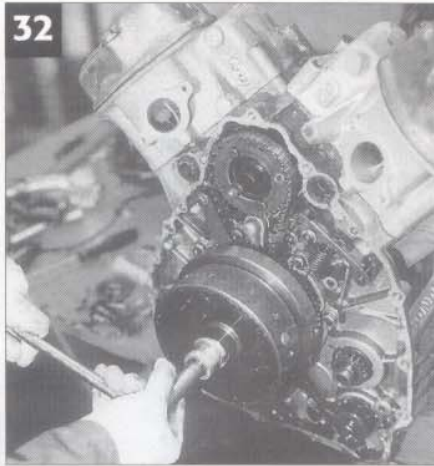
40 Remove camchain guide tensioner adjuster from right hand side.

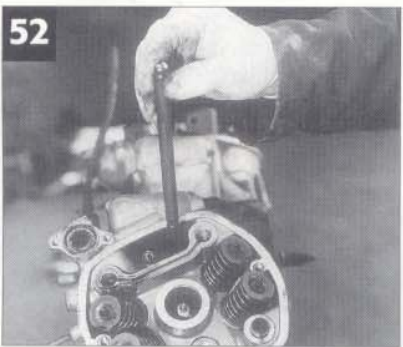
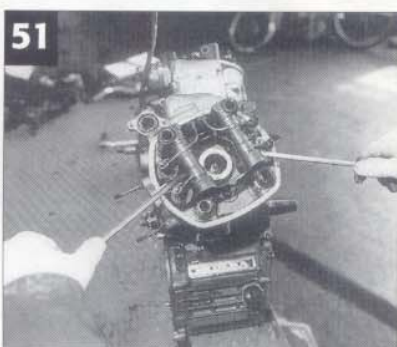
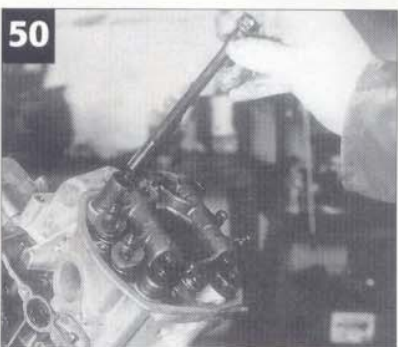
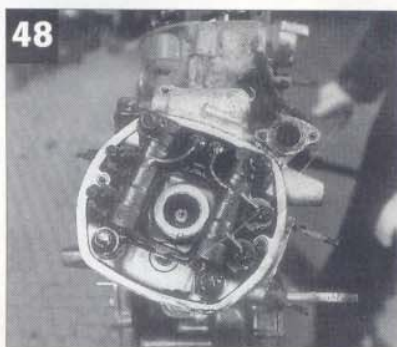
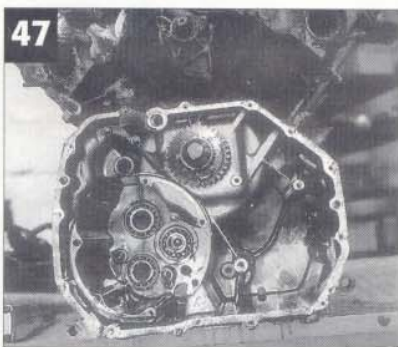
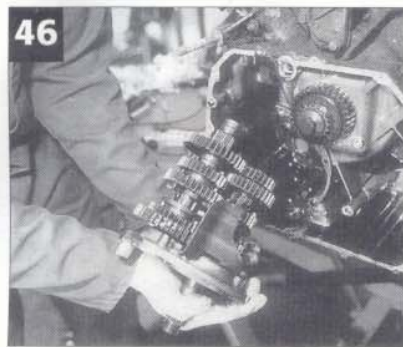
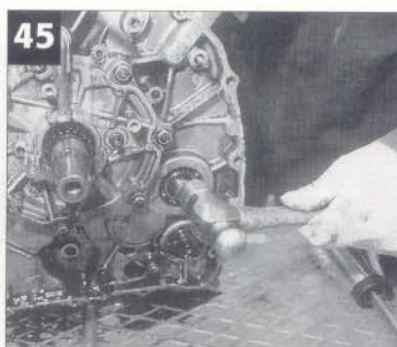
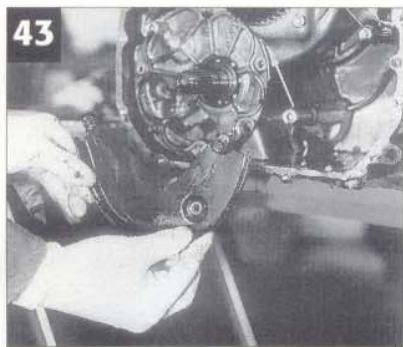
41 For removal of camchain main sprocket drive, release 27mm centre nut with ratchet.

42 Release the two 6mm bolts (10mm heads) on sprocket.

Continued page 16







43 To remove gearbox, first return to front of engine and undo the two 6mm bolts (10mm heads) holding cover plate and two further bolts underneath coverplate.

44 Returning to rear of engine, tap gearshaft with hammer.

45 Tip engine forward and continue to direct gearbox out with light hammer blows, collecting all loose washers as you do so.

46 Collect gearbox from front of engine block, keep gear selector in place and store.

47 Inspection of unit with gearbox removed from front of engine.

48 Remove rocker covers from each cylinder head for inspection of rocker assemblies.

49 Assistance to hold engine block is required while undoing the four 8mm bolts (14mm heads) holding the rocker assemblies as they are tightened to around 55 lb/ft.

50 Release and remove evenly the four bolts.

51 Carefully lever rocker assembly off with two large flat bladed screwdrivers.

52 Remove pushrods and check for straightness and damage. Note sides and positions removed from cylinders for re-assembly.

53 Examine rocker adjusters for edge damage, pitting or uneven wear. Replace if necessary.

54 Carefully lever cylinder head block off with screwdrivers.

55 Lift off and remove cylinder head, retaining oil dowels.

56 Check oil gallery feed (indicated with screwdriver). Retain oil seal as sometimes

not included in new gasket kits.

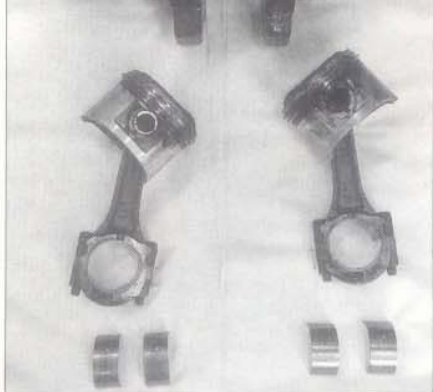
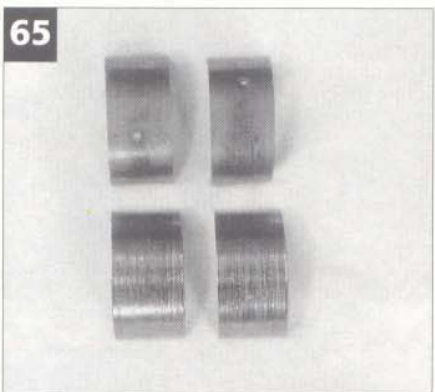
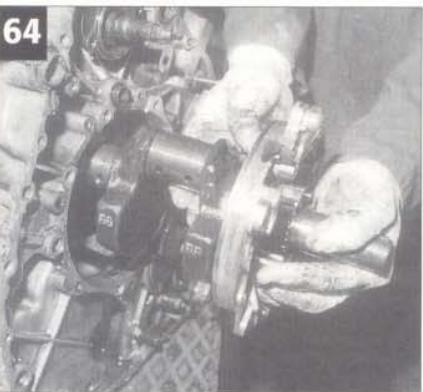
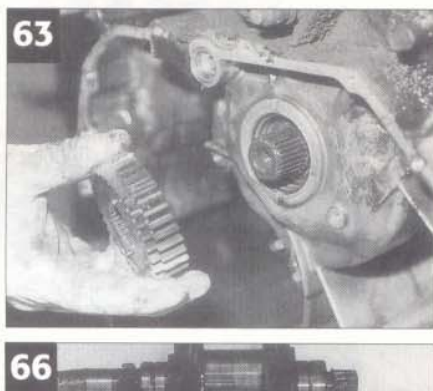
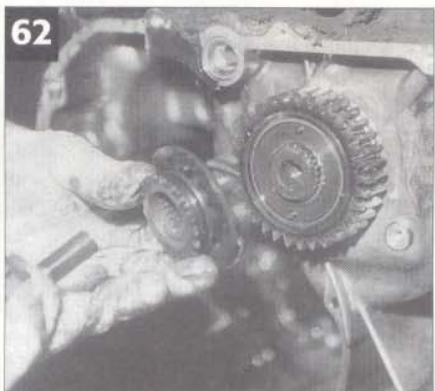
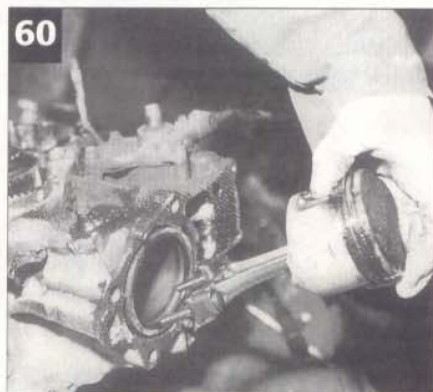
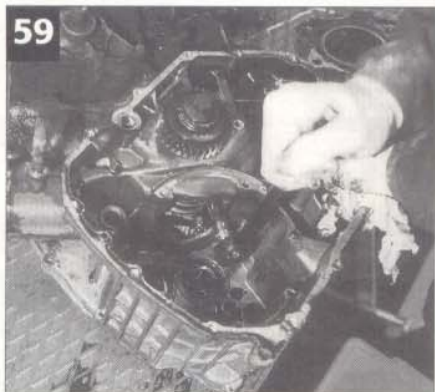
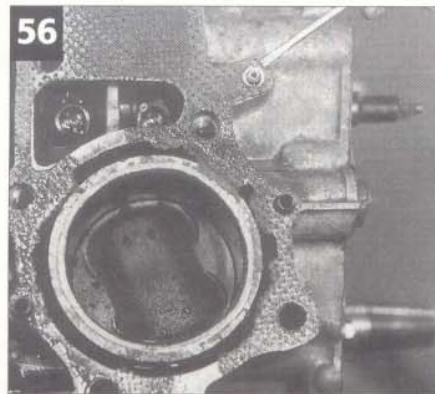
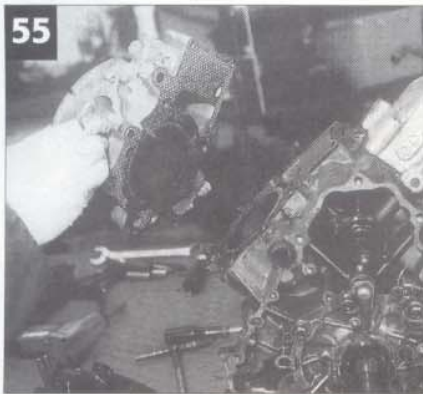
57 Check condition of cylinder heads and valves.

58 Carefully ease RHS (viewed from front of engine) piston to top position by rotating engine shaft.

59 With the exposed shell cap at bottom LHS of engine, use a 12mm socket to release the two retaining nuts.

60 Remove RHS piston/conrod assembly, followed by LHS Piston assembly. Label and store.

61 The crankshaft nut can



either be released when gear-box/clutch assembly is in place by locking them with a coin between the gearing teeth, or by later using an air 'rattler' tool. Gently tap shaft to release.

62 Remove crankshaft nut and side plate, spring plate and pump drive sprocket.

63 Remove primary drive

pinion with auxiliary pinion.

64 At rear of engine, release seven bolts (12mm heads) and carefully withdraw crankshaft main bearing and crankshaft mounting plate which can be further separated.

65 The fault revealed on this engine is worn shells between the conrod end caps and crankshaft main bearing caus-

ing an engine imbalance and rattle. Fortunately the main crankshaft bearing is not too badly affected, otherwise a replacement would be required. The likely cause of problem overheating and lack of engine oil.

66 The piston assemblies and crankshaft, with the worn shells on the right.

**More next month.
January issue
on sale
December 17th**

CX500 ENGINE REBUILD

Mechanic Jason Loff of Mikes Bikes of London checks over the camshaft for wear before beginning to reassemble the V-twin engine. Words and pictures Nick O'Brien.

REMOVAL of camshaft. Not necessary for this service but shown for illustration and generally inspection of components.

67 At front of engine, remove the four 6mm bolts (8mm heads) holding the rev-counter/camshaft bearing housing assembly.

68 Carefully lever away assembly with two flat-bladed screwdrivers.

69 Remove and inspect rev counter/bearing assembly.

70 At rear of engine, lock flange lug with grips or sprocket grip to prevent rotation then remove retaining nut.

71 From front of engine, withdraw camshaft and inspect cam lobes for signs of wear. Look out for scoring or uneven surfaces and chipping of the hardened outer surfaces. Measure the cam lobes at the highest point of lift (max diameter).

72 Release one of the 6mm bolts (10mm head) and repeat other side.

73 Withdraw cam-follower spindle.

74 Note two cam-followers and spring positions for reassembly.

ENGINE REASSEMBLY

75 Engine casing, gaskets and parts cleaned and prepared for

reassembly.

76 Engine parts - note layout of left-hand and right-hand components.

77 Hone cylinder linings with lube 2000, working top to bottom evenly. Clean cylinders with WD40.

78 Oil main bearings/crankshaft and feed unit into rear of engine.

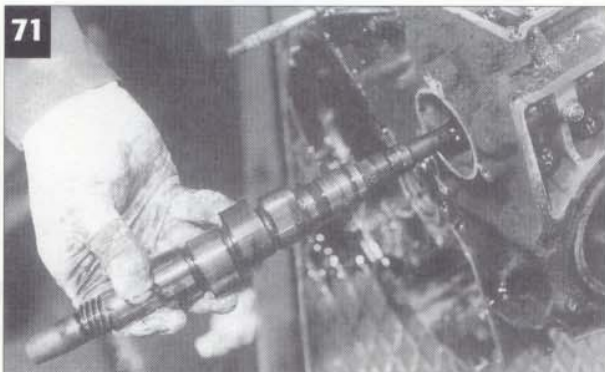
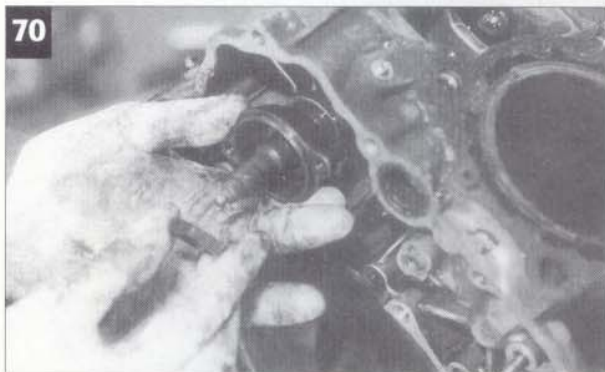
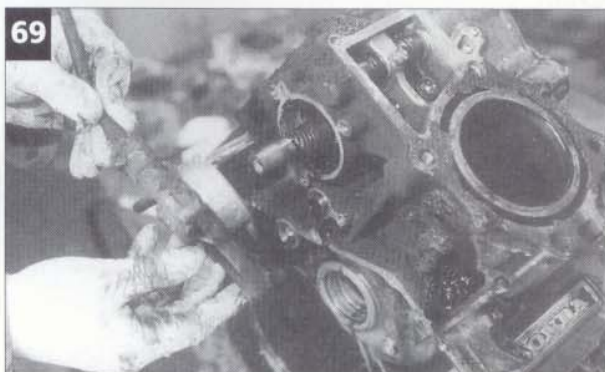
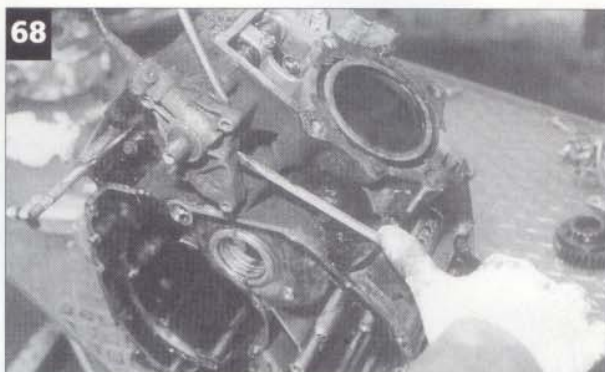
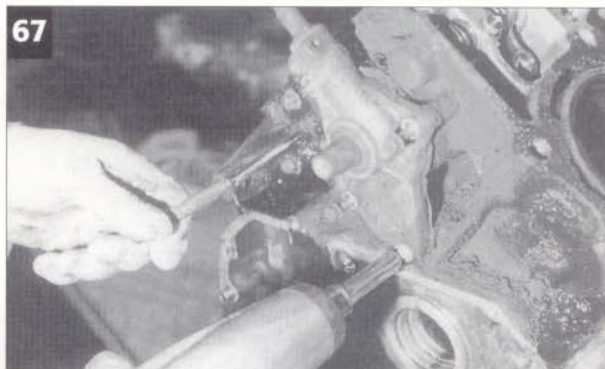
79 It is vital to ensure the new oil/dowel and O-ring are in place at 12 o'clock position at rear of engine.

80 Oil bearing point where crankshaft rear main bearing cap fits.

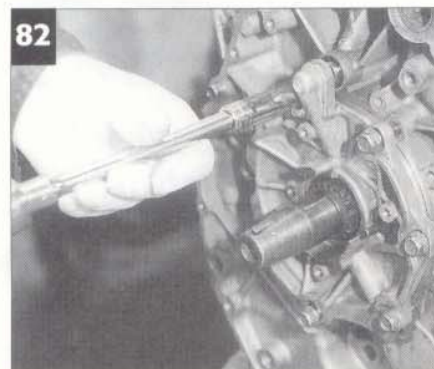
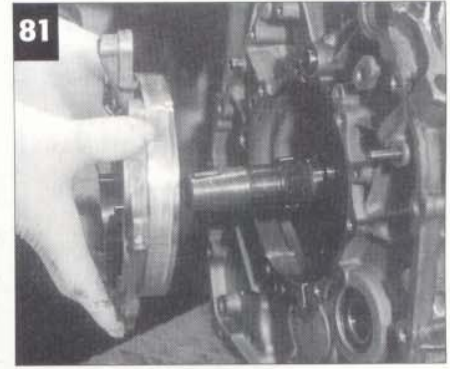
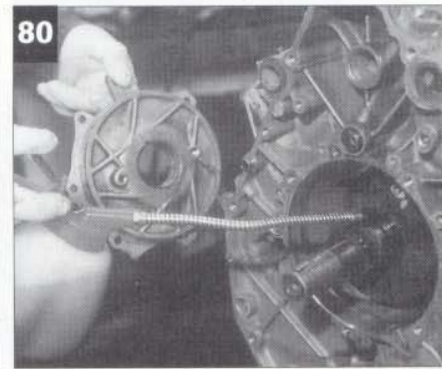
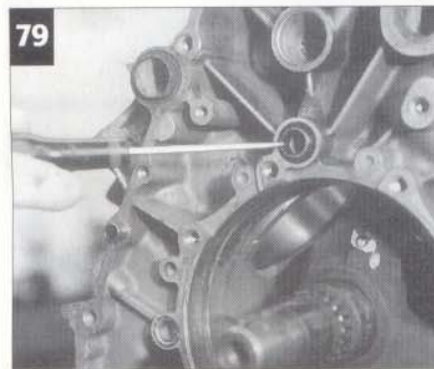
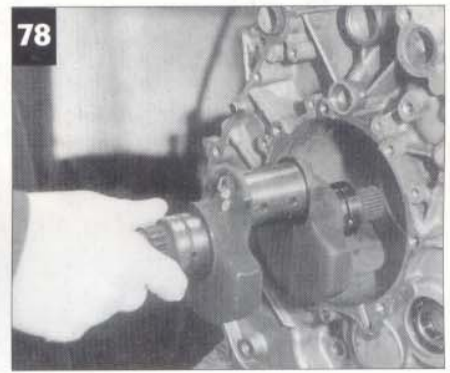
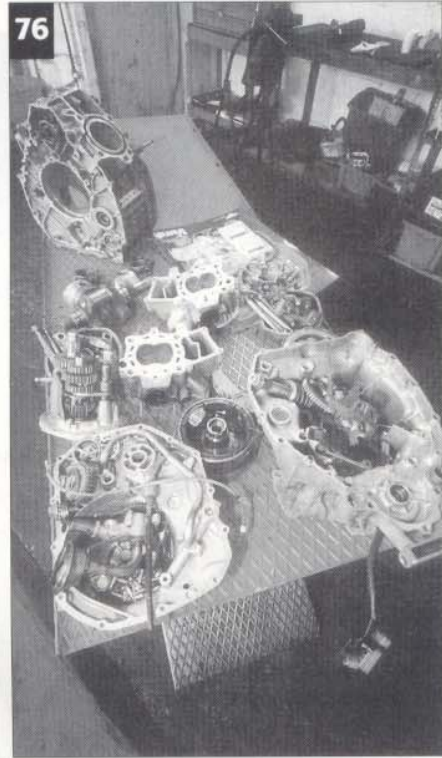
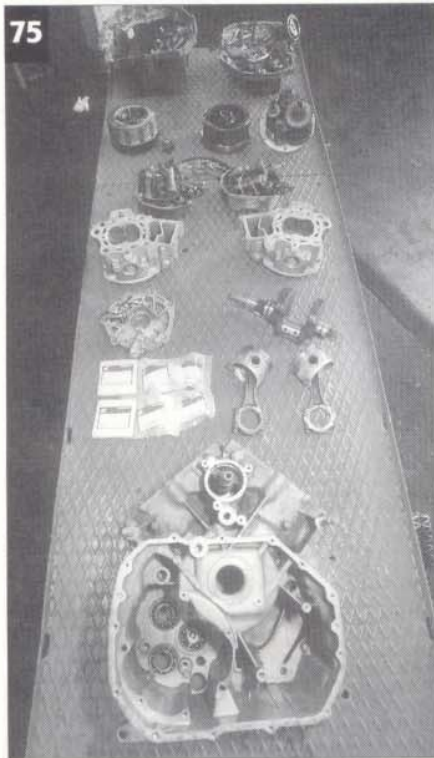
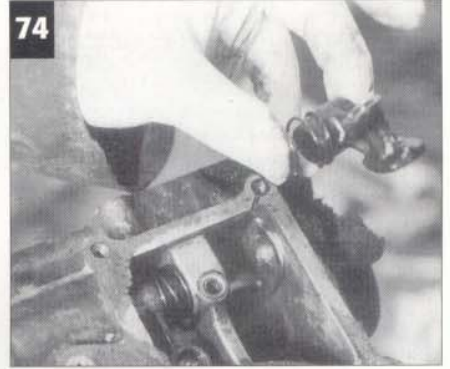
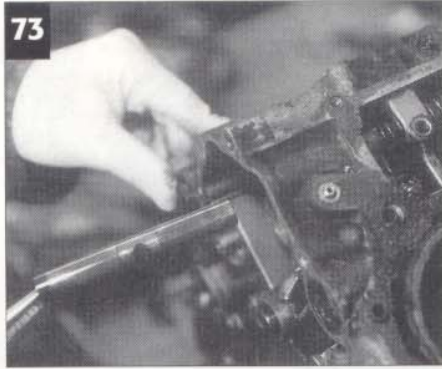
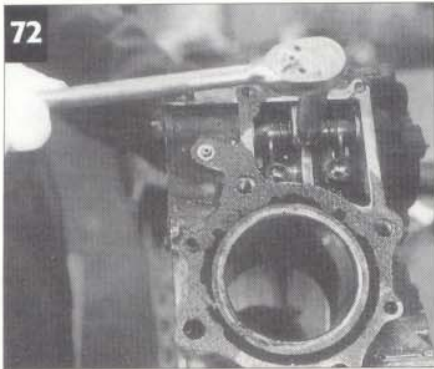
81 Fit crankshaft rear main bearing cap.

82 Tighten evenly seven 8mm bolts (12mm heads) to fix bearing cap in place.

83 One of the bolts here has been damaged by the camchain being slack and should be replaced. Throughout tightening sequence check that crankshaft continues to rotate freely. (At this stage ignore end float movement of crank).



Continued page 16



Continued from page 14

84 Fit new piston rings with the oil/collector rings at base. The middle ring is of dark appearance with no shiny edge. Its N-mark faces upwards.

85 Fit top ring, shiny edge and with N-mark upwards. Position ring openings near opposite gudgeon pin 120 degrees apart, NOT on thrust side of pistons.

86 Fit new shell bearings. Oil bottom of bearing at bottom of conrod.

87 Check that the right size of shell bearing is being fitted and ensure that the locating tang seats properly.

88 Generously oil crank journal in preparation for insertion of piston assembly.

89 Oil cylinder lining.

90 Oil base of shell-bearing to be inserted.

91 Oil piston skirt and top sides of piston.

92 As viewed from the front of engine, re-install left-hand piston. Ensure crank journal is at furthest point down by rotating the crank - check from the bottom right-hand side window. Also note IN mark on crown of piston denoting inlet side.

93 Using a piston ring squeezer, compress rings and guide assembly into cylinder. Take care to ensure that bolts from bottom of conrod do not mark or damage crank journal.

94 With piston ring squeezer in place, tap piston crown with base of hammer to carefully direct down into cylinder. Ensure crank does not move.

95 With piston pushed into cylinder, fit end caps onto conrod assembly. Oil end shell and fixing nuts prior to fitting.

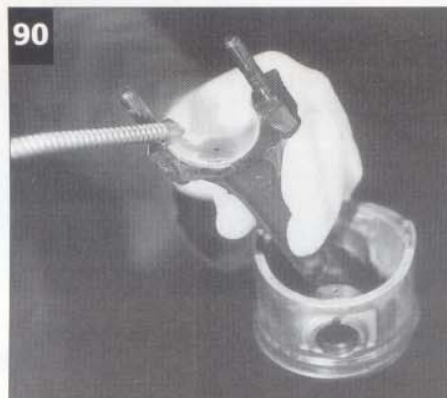
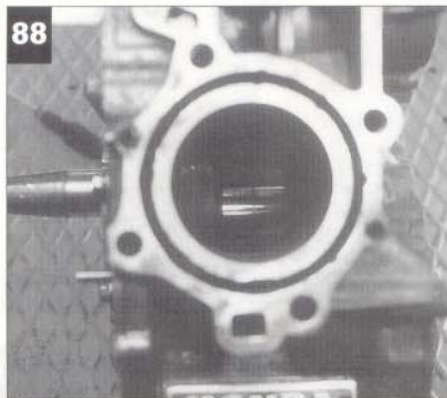
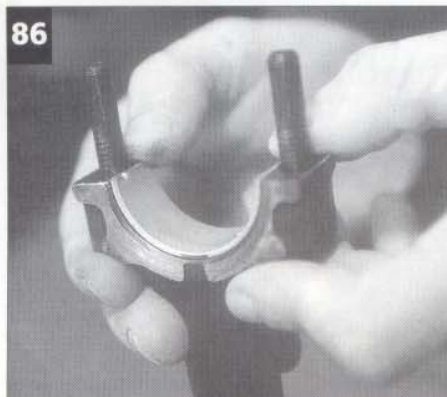
96 Rotate crank to ensure free movement before fitting second piston assembly.

97 Tighten end cap nuts to torque 20-24 lb/ft. Both pistons can now be rolled over by hand revolution of the crank.

98 At front of engine, re-fit the primary drive pinion, with auxiliary pinion, oil pump drive assembly and retaining bolt.

99 Tap pinions into place after oiling shaft splines.

100 Generously oil gearbox components prior to re-installation. Check condition of fork levers (selectors) and replace as



necessary.

101 At front of engine, place gearbox assembly into engine block.

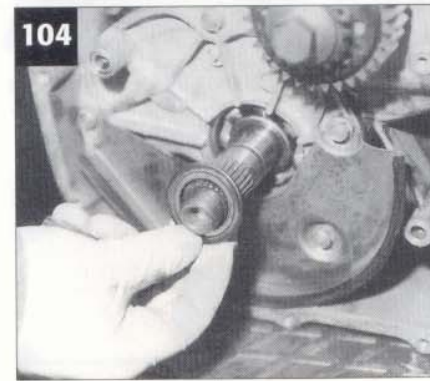
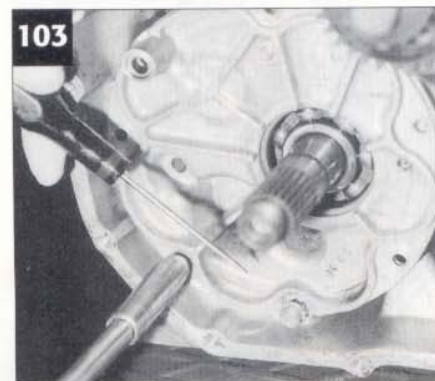
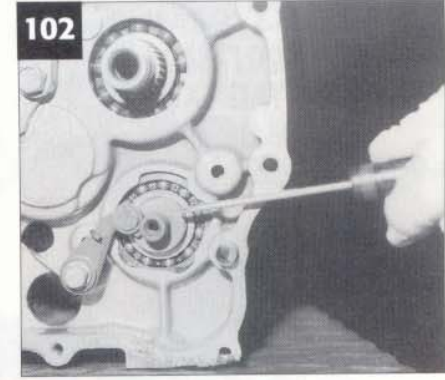
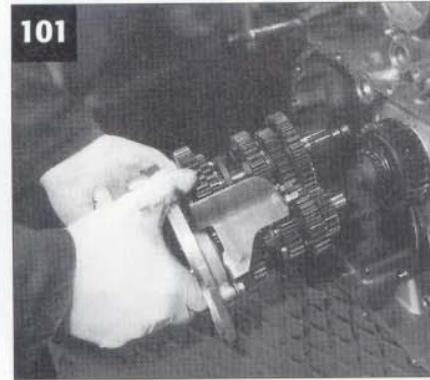
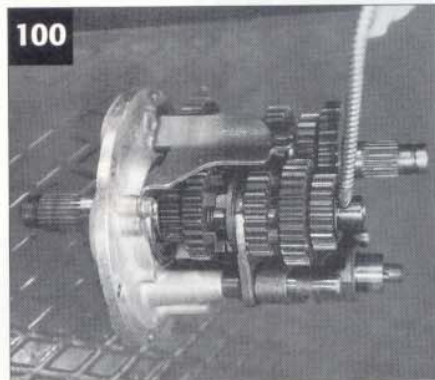
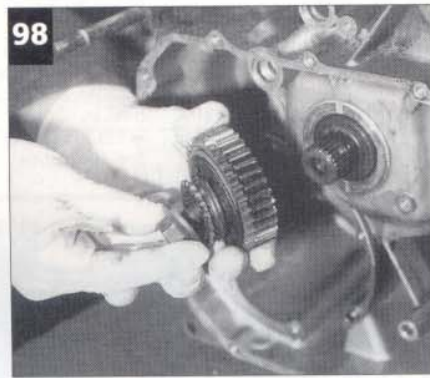
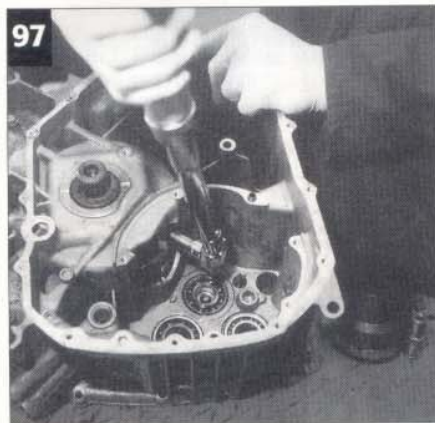
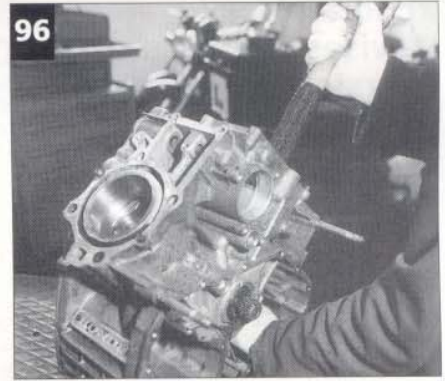
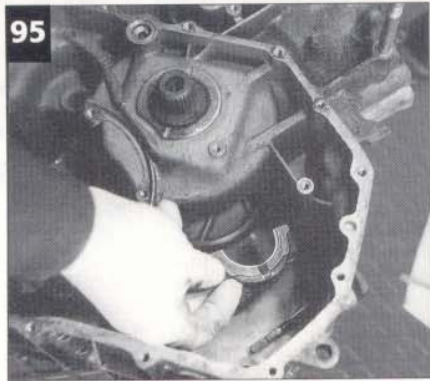
102 Feed gearbox assembly into place at rear of engine. Push lever (drum selector) away from the gearbox shaft to enable the gearbox to be pushed fully home.

103 At front of engine, tighten the two bottom gearbox 6mm bolts (10mm heads).

104 Re-install gearbox cover plate with remaining three bolts - noting there are two long bolts. Put thrust washer on gearbox shaft.

105 Put centre sleeve on gearbox shaft.

The rebuild continues next month. February issue on sale January 21st.



CX500 ENGINE REBUILD

Mechanic Jason Loff of Mikes Bikes of London (0181 983 4896) gets as far as refitting the cylinder heads in this month's episode.

Words and pictures: Nick O'Brien.

106 Fit clutch assembly as one unit after replacement of plates if necessary.

107 Fit clutch lock-washer which is of Belville type. Fit as marked (outside).

108 Lock clutch centre and tighten retaining nut to specified torque 58/72 lb/ft

109 Remove two bolt/spring retaining bolts from clutch assembly, refit four springs/bolts with pressure plate.

110 Lock clutch/primary drive pinion with 2p coin and tighten 24mm bolt to specified torque 58/69 lb/ft.

111 Refit oil pump. Ensure oil dowel is in place, reposition in engine block and put in place three 6mm bolts (10mm heads).

112 Fit oil pump drive chain and take up slack before tightening pump mounting bolts.

113 Return cam followers/springs to original positions.

114 Oil and re-insert cam spindles with slotted end to rear.

115 Secure with retaining bolt.

116 Oil camshaft and feed into position, with washer, from front of engine block.

117 Ensure dowel and new oil ring below camshaft at 6 o'clock is fitted. Use LM2 grease and fit new gasket.

118 Refit camshaft bearing/rev counter assembly.

119 Refit four 6mm bolts (8mm heads) to secure cover. Use lock 'n Seal on threads. Don't over tighten bolts as this may lead to poor joining of surfaces and water leaks.

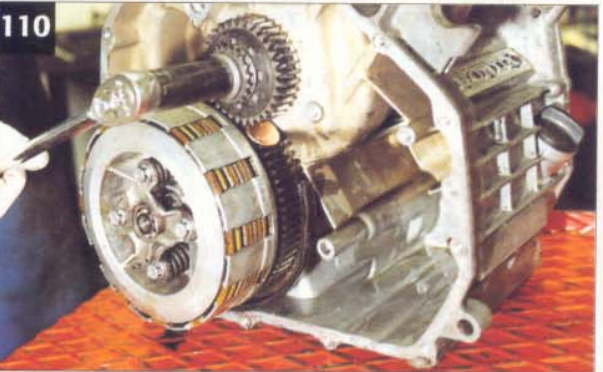
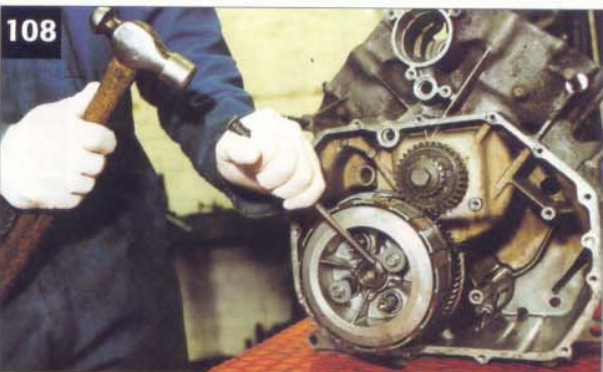
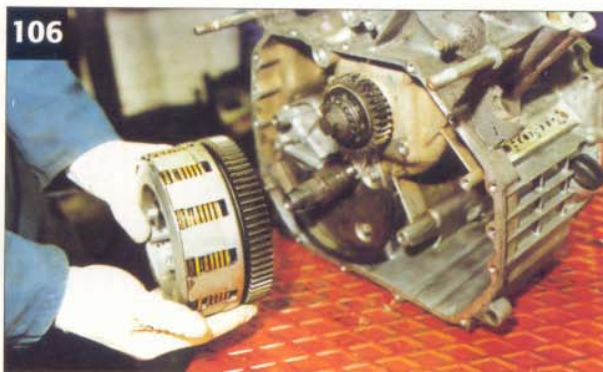
120 At rear of engine, refit keyed sprocket flange on camshaft. Drive pin should be in 2 o'clock position. Include washer and retaining nut.

121 Lock flange lug as shown to tighten retaining nut to torque 58/72.00 lb/ft

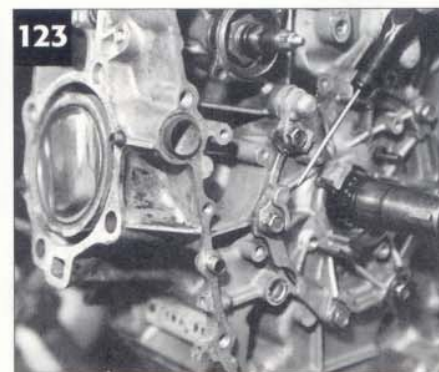
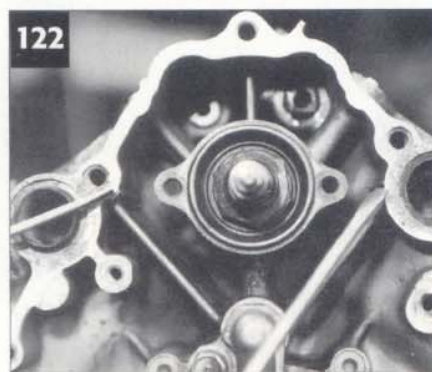
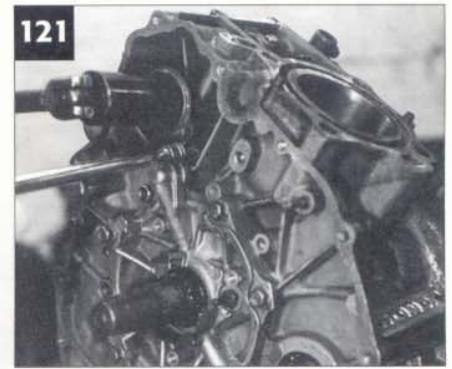
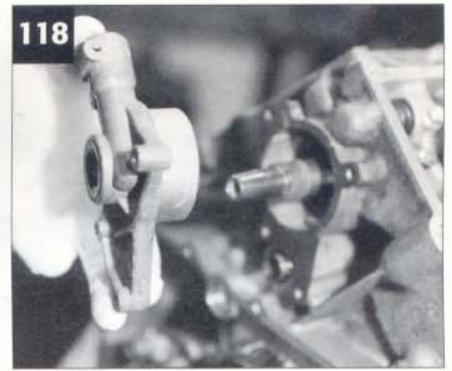
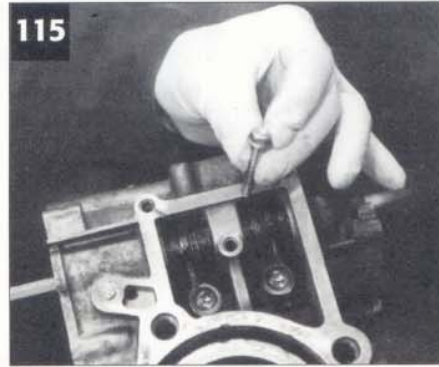
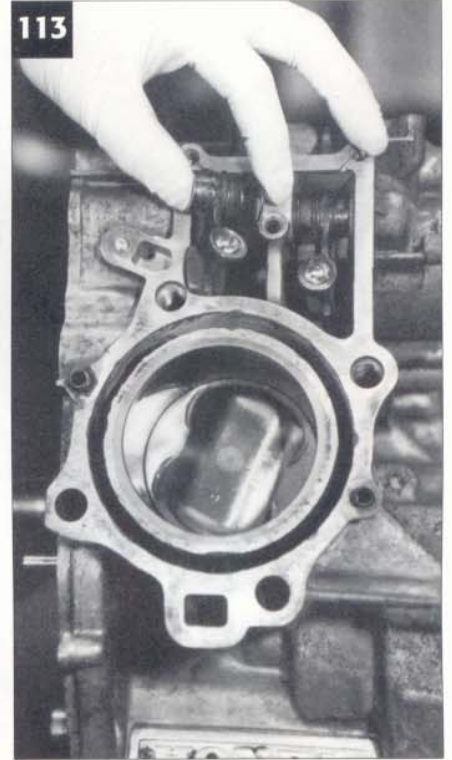
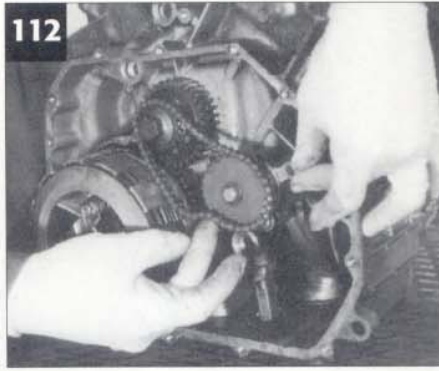
122 To set timing, rotate camshaft so that flange lugs are 180 degrees from crankcase index marks. Now check the camshaft. The front lobe should be UP and the second lobe DOWN. A further 180-degree revolution has both lobes pointing upward.

123 Align crankshaft key-way with rear main bearing housing index mark, indicated by screwdriver. Left hand piston should be TDC.

124 Refit cam sprocket and chain.



Continued page 22



HONDA CX500 ENGINE REBUILD: PART FOUR

Continued from page 20

125 Position and correctly align cam sprocket chain.

126 Tighten two 6mm bolts (10mm heads) and Loctite bolts retaining camchain sprocket.

127 Fit LHS top plate and camchain tensioner.

128 Fit RHS chain tensioner via mounting point and bolt. (The type fitted to the bike shown is an early unmodified version.)

129 Refit chain guide plate, spring and tighten three bolts. With the left hand cylinder at TDC and the cam lobes for that cylinder away from the cam followers, loosen the tensioner adjuster bolt to allow free movement of the arm and then tighten the bolt to specified torque 6/9 lb/ft. The chain is correctly tensioned.

130 Refit gearbox drum selector.

131 Refit gear lever selector mechanism linkage.

132 Refit gear lever/spring, noting washer on shaft mounting position.

133 Completed gear lever linkage assembly.

134 Refit alternator flywheel and bearing.

135 Re-install flywheel rotor retaining bolt.

136 Refit drive shaft and adaptor gearbox output shaft.

137 Tighten alternator flywheel 17mm bolt to specified torque 58/72 lb/ft.

138 Refit pick-up magnet on flywheel shaft with key hole slot, tighten 6mm bolt (10mm head).

139 Refit starter ring pinion with thrust washers on either side.

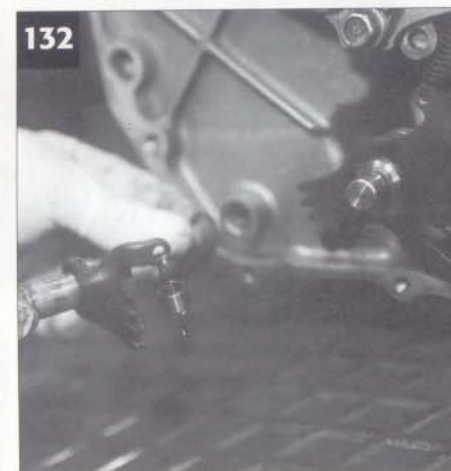
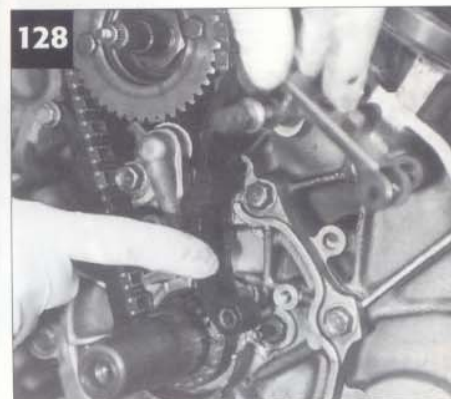
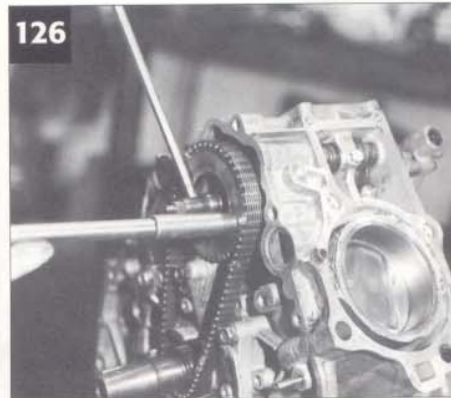
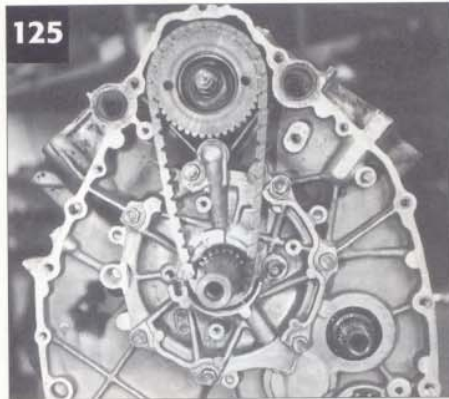
140 Fit dry cylinder head gaskets.

141 Ensure the two dowels in the cylinder block are in place, fix gasket in place and fit new O-ring seal.

142 Refit LHS cylinder head, ensuring 'O' ring does not fall out and two dowels in cylinder head remain in place.

143 Return lubricated pushrods to original positions. LHS started first with piston at TDC (firing stroke) and cam followers cups down.

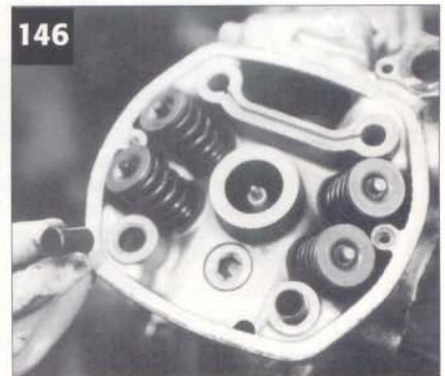
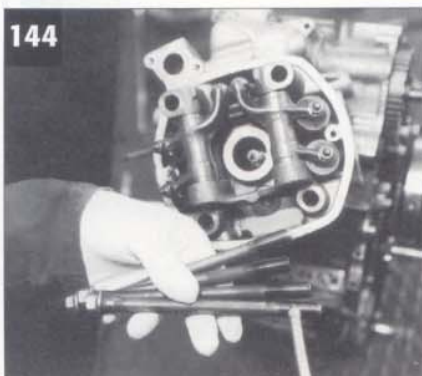
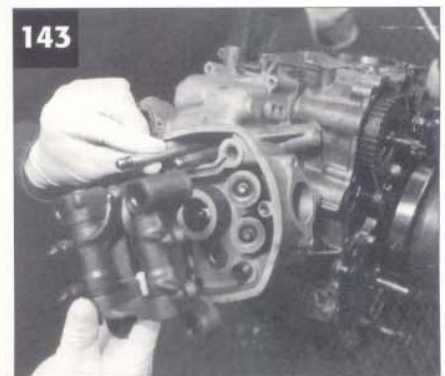
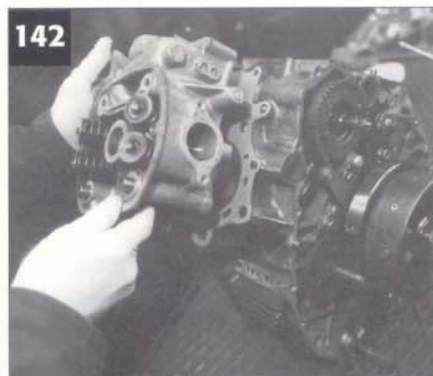
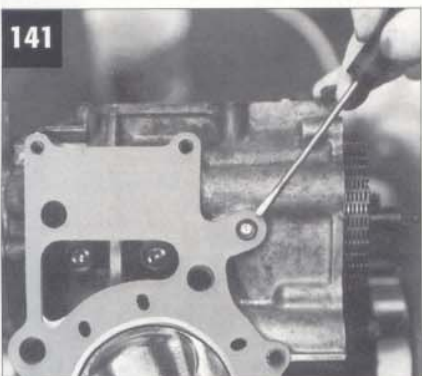
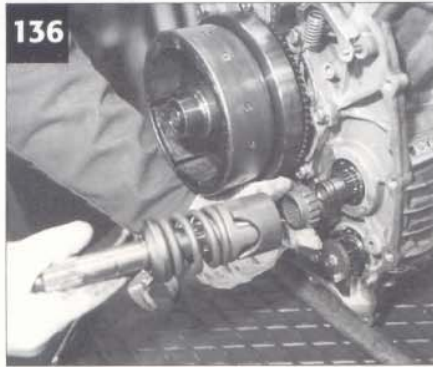
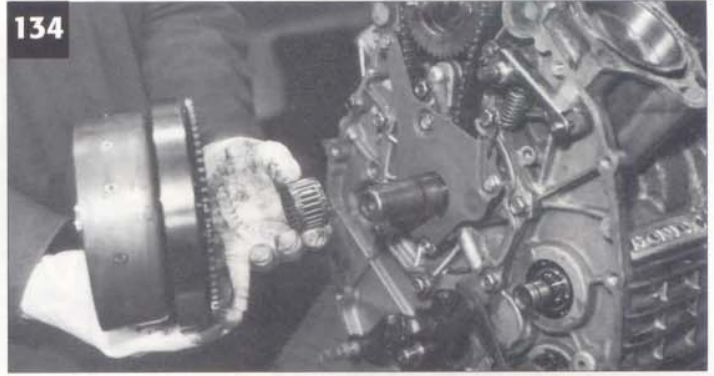
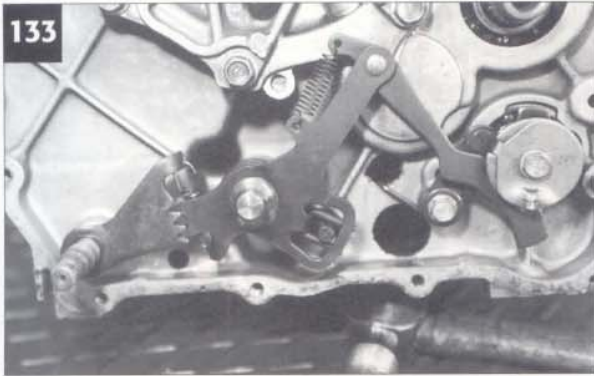
144 Drop in place the four cylinder head bolts.



145 Tighten evenly to final torque of 40 lb/ft. Apply torque in 'sweeping' manner evenly and gradually.

146 Position RHS piston at TDC and refit rockers with two oil dowels with four bolts to specified torque.

Don't miss the concluding part of our CX500 engine rebuild. March issue on sale February 18th.



CX500 ENGINE REBUILD

There at last! Jason Loff of 'Mikes Bikes' in London (0181 983 4896) completes the rebuild of our CX500 engine. Serviced and maintained these motors can go on to chalk up 250,000 miles or more.

Words and pictures: Nick O'Brien

147 Preparing rear cover gaskets use an even application of LM2 grease on crankcase surfaces to ensure good mating. The grease on gasket prevents it going brittle. A Complete set of Vespa CX 500 gaskets/oil rings is approx £90.

148 Fitting new dowels, marked and sealing with grease.

149 Check and replace water seal (indicated), and oil seal on shaft to housing point.

150 Fit rear engine cover and secure with copper slip bolts.

151 Check and replace cam-chain tensioner bolt 'O' ring seal that protrudes rear engine case - located above inspection hole.

152 Ensure porcelain washer is in place behind water impeller.

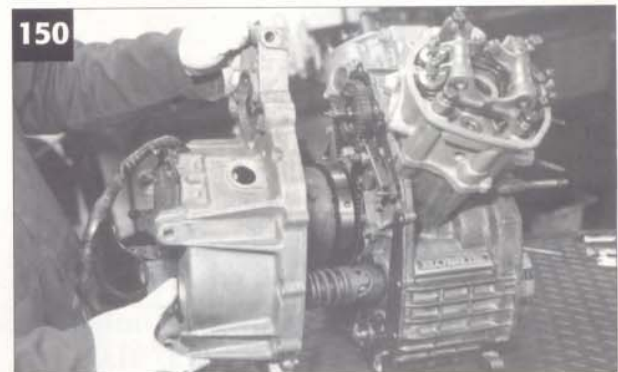
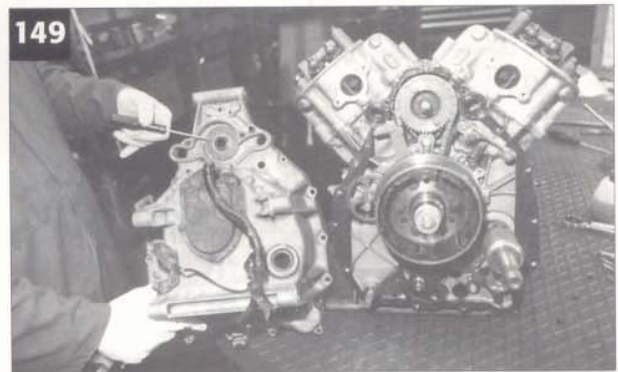
153 Place water impeller on shaft with copper washer and retaining nut. DO NOT over tighten. Use thread lock.

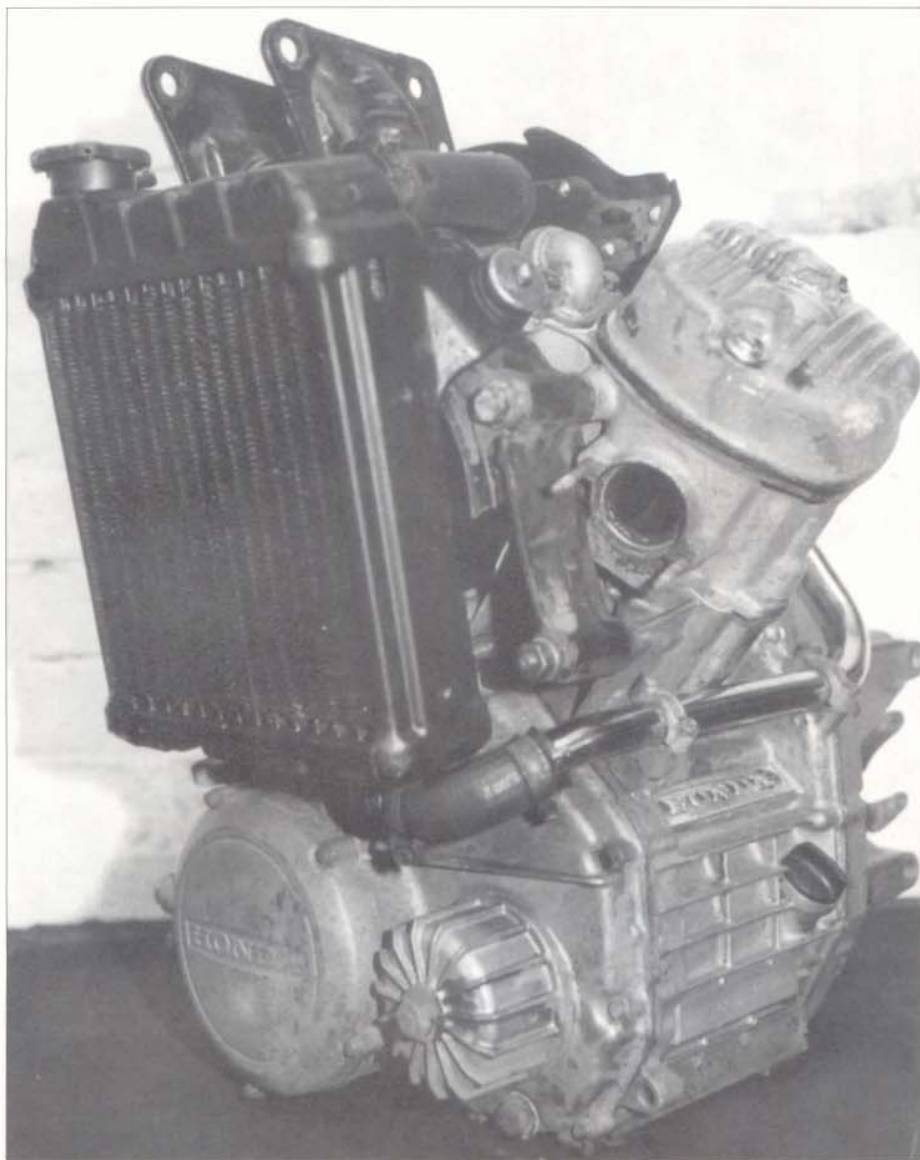
154 Refit impeller cover seal edges with silica grease.

155 Carefully tap impeller cover in place and secure with four bolts; 6mm (8mm heads) and 8mm (12mm heads).

156 Tappet timing adjustment; rotate main drive shaft CLOCKWISE via socket for TL.

Continued page 24





Left: The completed CX500 engine. It is 20 years since the bike made its debut at France's Nogaro race track but it is still rated as one of the best middleweight tourers ever made.

We carried a road test of the CX500 in our November 1997 issue.

Back copies of that test and the earlier episodes of this rebuild are available. For details turn to page 60.

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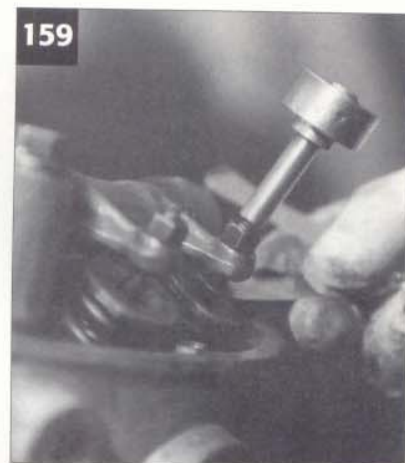
HONDA CX500 ENGINE REBUILD: PART FIVE



157



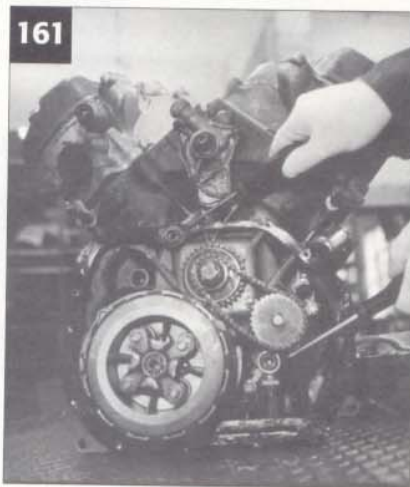
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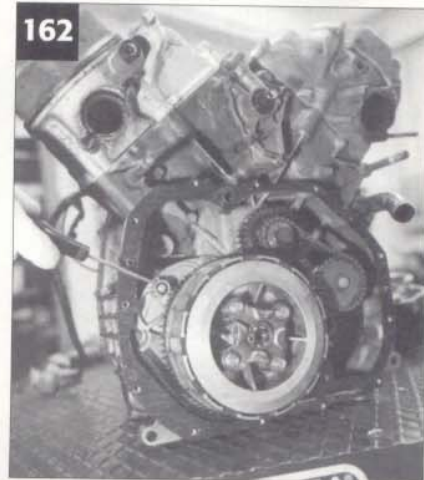
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Continued from page 22

index marks at inspection hole.

157 Method of rotating engine for TL index mark. Then release tappet locknut.

158 Measurement of LHS tappets for gaps between $\frac{3}{5000}$ th inch, INLET 0.08mm(0.005in) EXHAUST 0.10mm(0.004in).

159 Repeat for RHS tappets. Rotate for TR at inspection hole and Right Piston at TDC.

Note 'home made' tappet adjuster - measure width of tappet and drill hole in larger section of metal rod, then weld a larger diameter disc on top, then heat until red hot and then hammer smaller rod onto an old tappet to mould shape and form tappet adjustment tool.

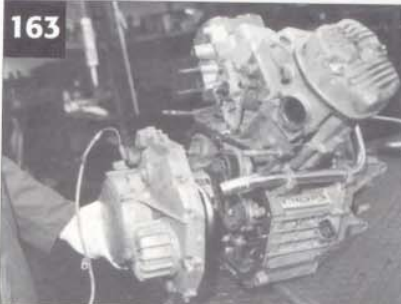
160 Oil rockers before refitting rocker cover, fitting new gasket and sealing, ideally with blue Hylomar. Secure with two 6mm bolts (10mm heads).

161 At front of engine, grease gasket and fit two oil dowels marked.

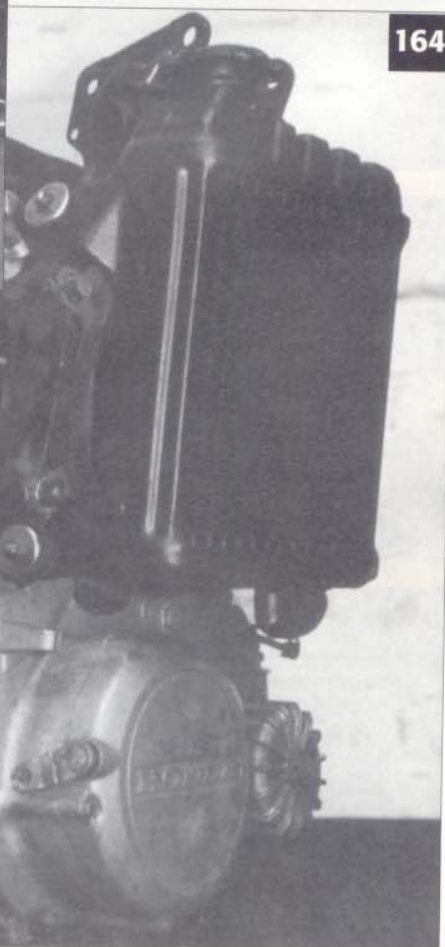
162 Refit oil seal marked.

163 Fit front cover and secure with copper slip bolts.

164 Fill engine with 3 litres of engine oil, refit water hoses and thermostat housing and coolant pipe manifolds to each cylinder sealing with silica grease on joining surfaces. Refit cooling fan, shroud, radiator and hose. Job done.



163



164