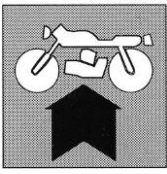




Regina^{EVO}

ENGINE OVERHAUL



ENGINE OVERHAUL

Regina^{EVO}

Section

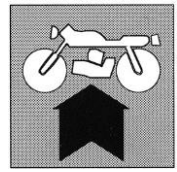
B





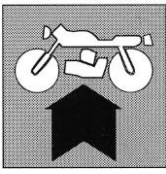
ENGINE OVERHAUL

Regina^{EVO}



Cleaning parts	B3
Clearances	B3
Cylinder Head	B3
Valve seat refacing	B4
Valve guide	B6
Valve guide replacement	B6
Valve	B7
Valve spring	B7
Valve installation	B8
Rocker arm inspection	B9
Camshaft	B10
Timing chain and gears	B11
Timing chain tensioners	B11
Cylinder	B12
Piston	B12
Cylinder to piston clearance	B13
Piston diameter	B13
Piston pin	B14
Piston rings	B15
Piston ring to cylinder clearance	B15
Piston ring to groove clearance	B16
Big end radial clearance	B17
Balancing countershaft	B17
Crankshaft	B18
Crankshaft straightness	B18
Small end bushing replacement	B18
Clutch	B19
Friction plate to clutch housing clearance	B20
Clutch spring	B20
Shifter forks and gears	B22
Selector drum	B22
Selector drum to shifter fork pins clearance	B23
Oil pump disassembly	B24





Cleaning parts

All parts must be cleaned with gasoline and dried with compressed air.

Flammable vapours develop during this procedure and metal filings blown by compressed air may get into your eyes. Perform this procedure away from open flames or sources of ignition and wear an eye protection.

Clearances

To ensure the best operating conditions and maximum performance, all clearances must be within the specified tolerance. A tight fit will lead to seizure as moving parts heat up, whereas a loose fit will cause annoying vibration resulting in early wear of moving parts.

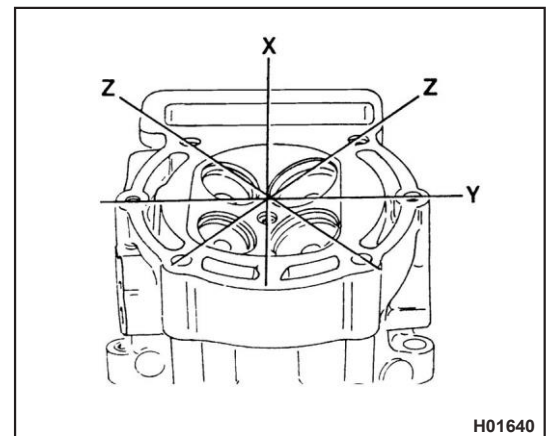
Cylinder head

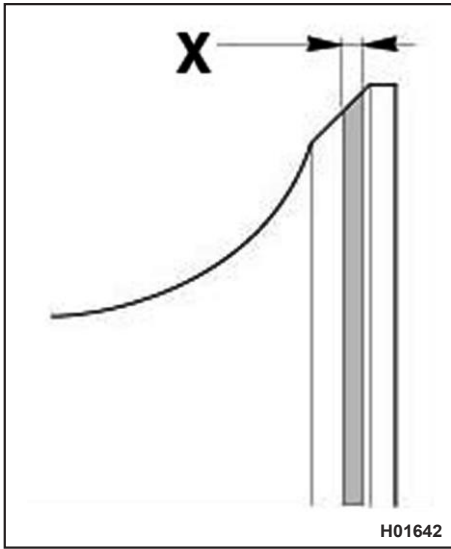
Remove fouling deposits from the combustion chamber using a rounded scraper.

Do not use sharp tools or you might damage valve seats and spark plug thread.

Check the machined surface of the cylinder head for warpage using a straight-edge and a feeler gauge at the positions shown in the figure. If warpage exceeds the service limit at any one point, grind the cylinder mating surface.

Head warpage: service limit 0.05 mm (0.002 in.).





Valve seat refacing

Clean off any Fouling deposits From the valve. Apply Prussian Blue to the valve and rotate it in its seat using a rubber hose or other similar tool.

Remove the valve and measure the width "X" of the seating Face. If width is greater than 1.5 mm (0.059 in.), the seat needs to be refaced.

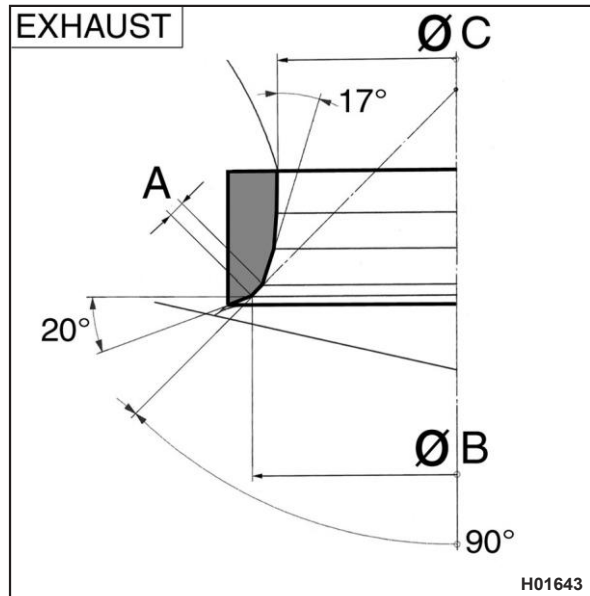
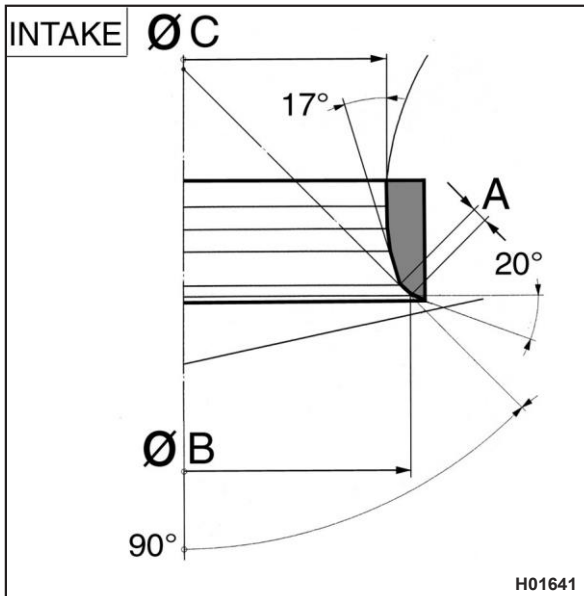
The standard width (measured as shown) of the seating Face of the valve is:

A= 0.9-1.1 mm (0.035-0.043 in.) for INTAKE

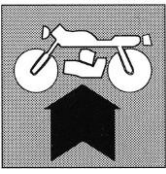
A= 0.9-1.0 mm (0.035-0.039 in.) for EXHAUST



Valves cannot be ground and must be replaced if damaged.



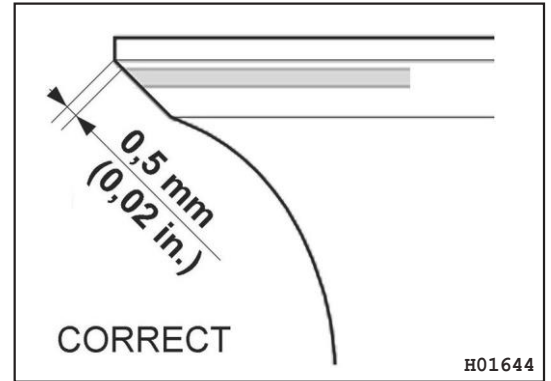
INTAKE	B	36,60c-36,65 mm 1,44H,443 in.
	C	33mm 1,299 in.
EXHAUST	B	30,60c-30,65 1,205c-1,207 in.
	C	27,5 mm 1,083 in.



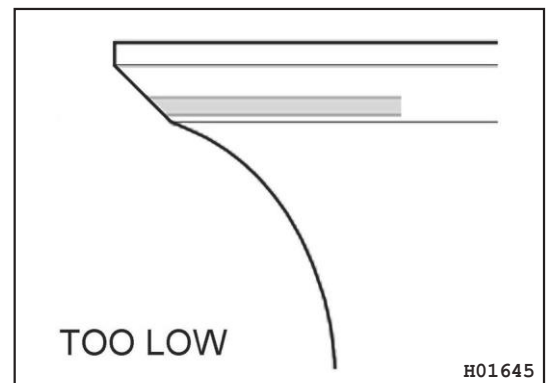
ENGINE OVERHAUL

Regina^{EVO}

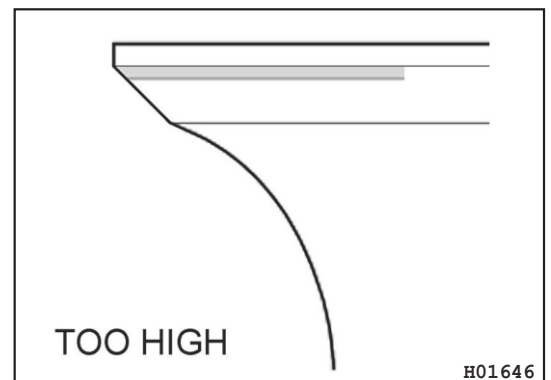
Inspect valve seat and reface it if you find any signs of damage. Correct valve seating position is very important. Use a dye to check seat contact surface position, it should be 0.5 mm (0.02 in.) from valve edge.

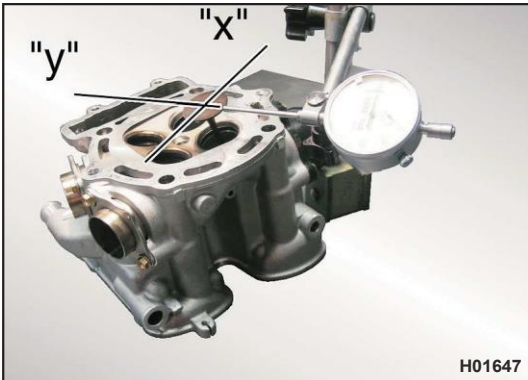
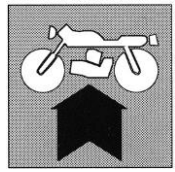


If seat contact surface is too low on valve face, reface the seat with 73° and 45° cutters.



If the contact surface is too high on valve face, reface the seat with 20° and 45° cutters. Ensure that seat contact surface is the correct width.





Valve guide

Perform a careful visual inspection of the valve guide.

To determine wear, measure valve to valve guide clearance in the "x" and "y" directions {at right angles to each other} using a suitably positioned dial gauge.

Intake valve: normal clearance: 0.008 - 0.035 mm (0.0003-0.0014 in.)

Service limit: 0.05 mm (0.002 in.)

Exhaust valve: normal clearance: 0.018 - 0.045 mm (0.0007 - 0.0018 in.)

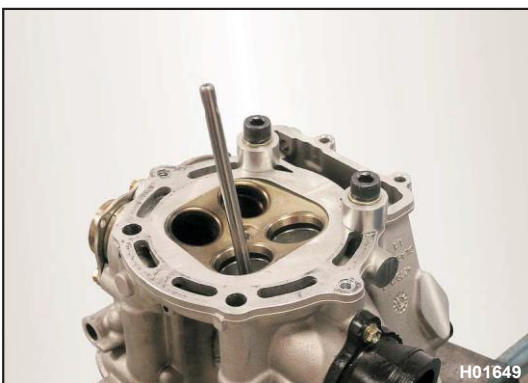
Service limit: 0.08 mm (0.0031 in.)



Valve guide replacement

Remove the valve guide From the cylinder head using a suitable punch.

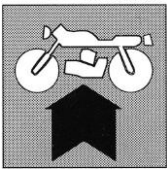
Make sure that the cylinder head is not damaged.



Heat up the head in a Furnace up to 170 °C.

Install the new guide From the top of the head using a suitable punch. Smear the guide with oil before installation. Fit new sealing rings.

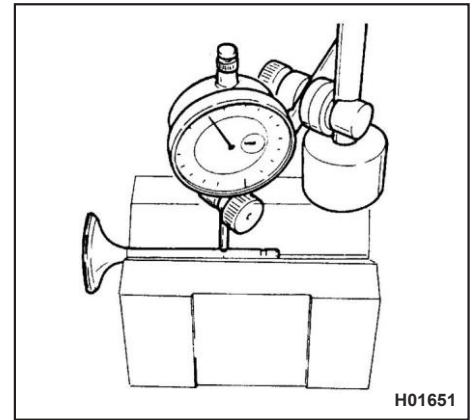




Ream the valve guide using a suitable reamer and lubricate with cutting Fluid. Rotate the reamer when extracting it to avoid scoring the valve guide.



When a valve guide is changed, the valve seat must be refaced.



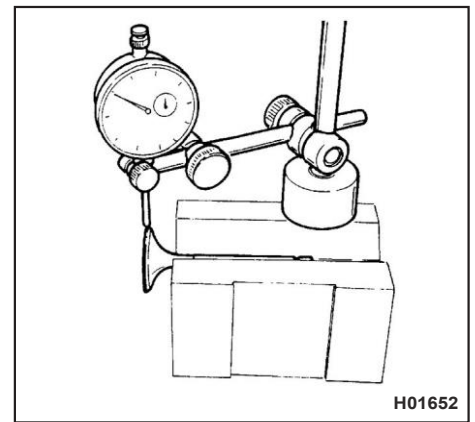
H01651

Valve

Inspect valve stem and valve seating Face to make sure they are in good condition. There should be no signs of pitting, cracking, distortion or wear. Check For the Following:

Valve stem runout: place valve on a V block and measure runout with a dial gauge. (Service limit: 0.05 mm (0.002 in.)).

Valve head out-of-round: place valve on a V block and check with a dial gauge at right angles to the head while turning the valve. (Service limit: 0.03 mm (0.0012 in.)).



H01652

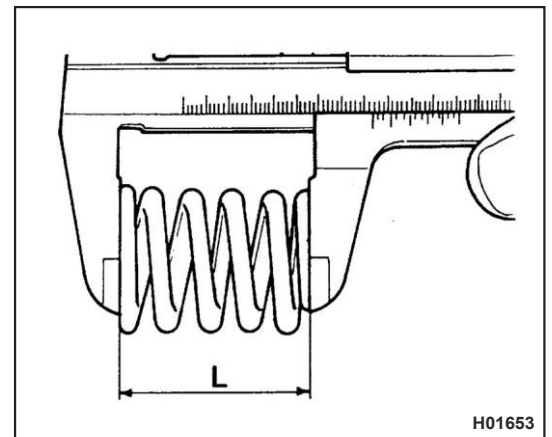
Valve spring

Check Free length "L". IF outside the specified service limit, replace the springs.

Spring: L = 43.4 mm (1.709 in.) - Service limit: 41 mm (1.614 in.)



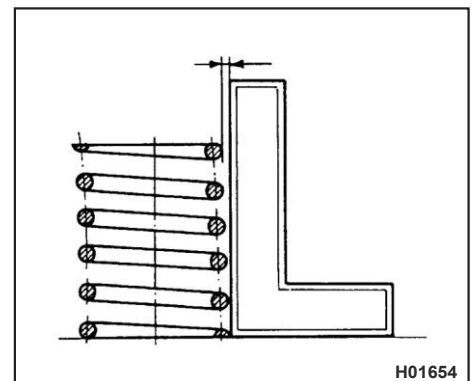
Replace all valve springs whenever any one spring exceeds the service limit.



H01653

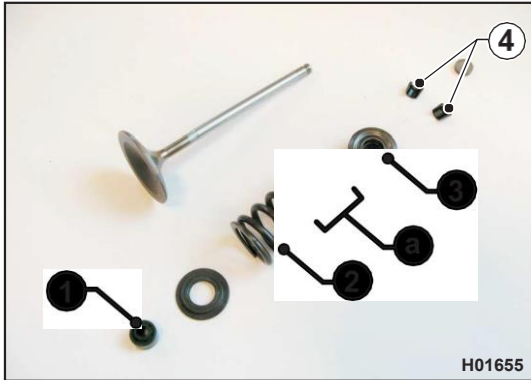
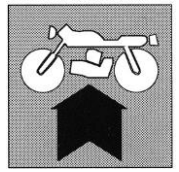
Check the valve springs For proper squareness.

Maximum acceptable deviation is 1.5 mm (0.059 in.) on each side.



H01654





a: Head side

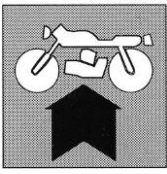
Valve installation

Smear valve guides and stems with oil before installation.

Fit sealing ring (1), springs (2) and valve spring retainer (3).

Use tool no. 8000 39521 to compress the valve springs and install the valve collets (4).

Do not compress the springs too much and avoid damage to the cylinder head.



ENGINE OVERHAUL

Regina^{EVO}

B9

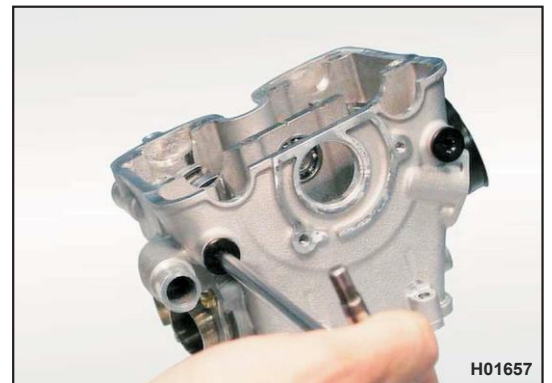
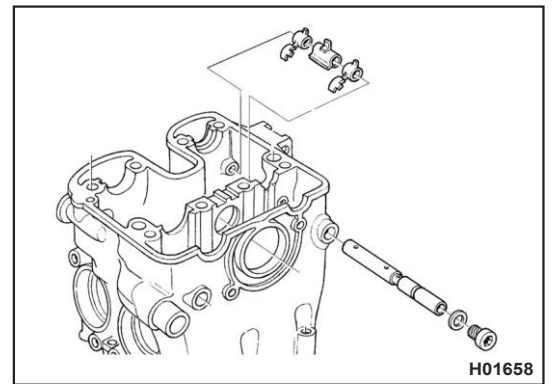
Lightly tap valve stem with a plastic hammer to help the valve collets become Fully seated.

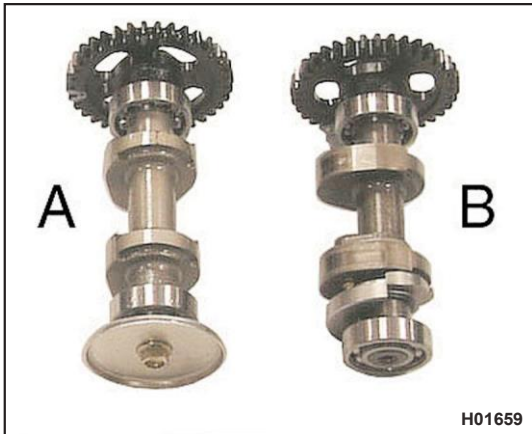
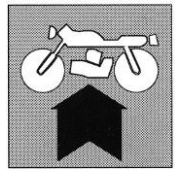
Tap the valve stem tip to avoid pushing the valve off centre.



Rocker arm inspection

Check rocker arm to shaft clearance. Measure rocker arm inside diameter and shaft diameter and calculate clearance. Maximum clearance 0.1 mm (0.004 in.). IF the limit is exceeded, replace both rocker arms. On assembly, tighten shaft bolts to 25 Nm-2.55 Kgm-18.4 Ft/lb. (+LOCTITE 243).

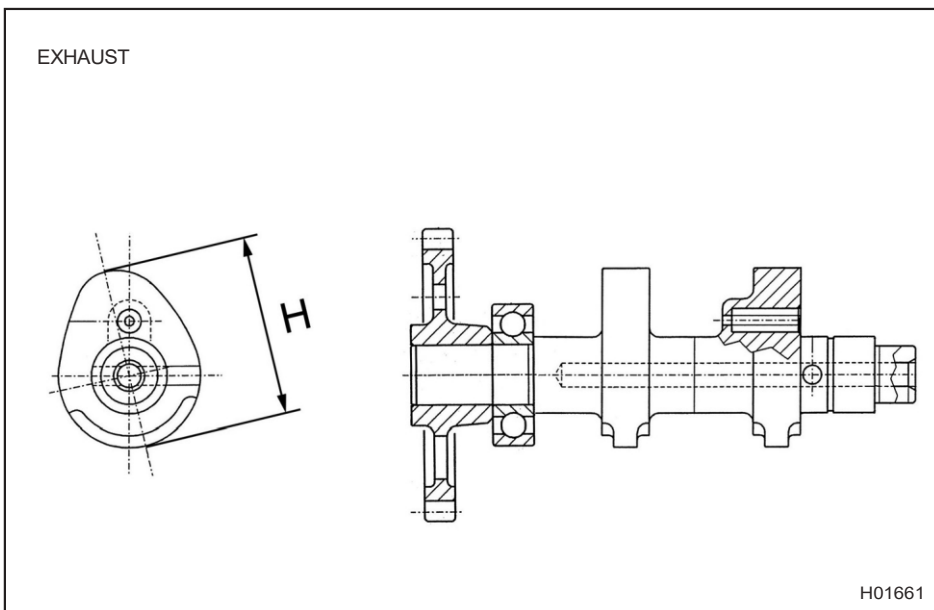
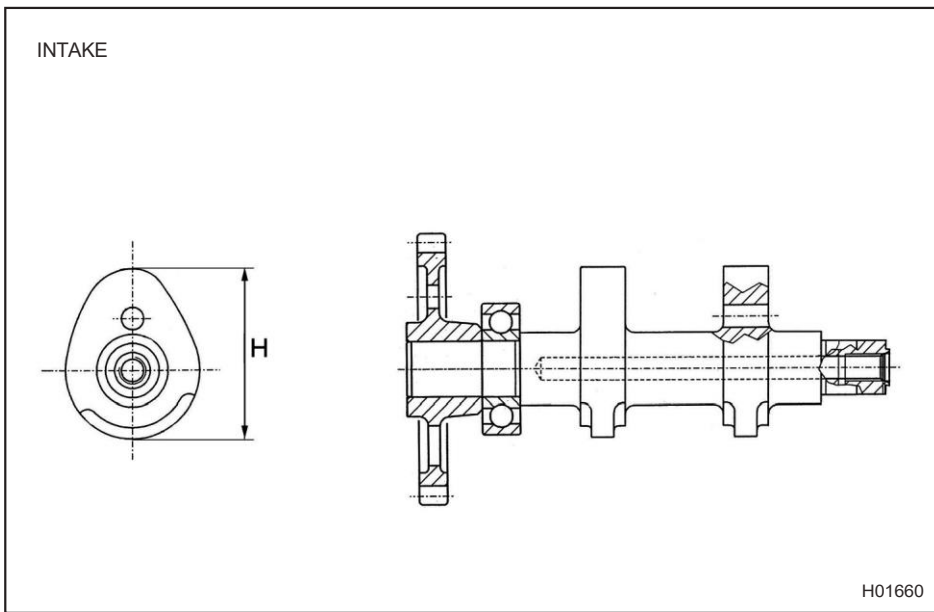


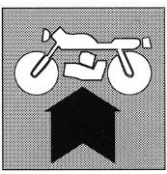


Camshaft

Check the contact faces of the lobes for streaks, scoring, dents and waviness. Clamp the camshaft between centres and check deviation using two dial gauges. Service limit: 0.1 mm (0.004in.). Check that the lobes are in pristine conditions, without signs of scoring or distortion.

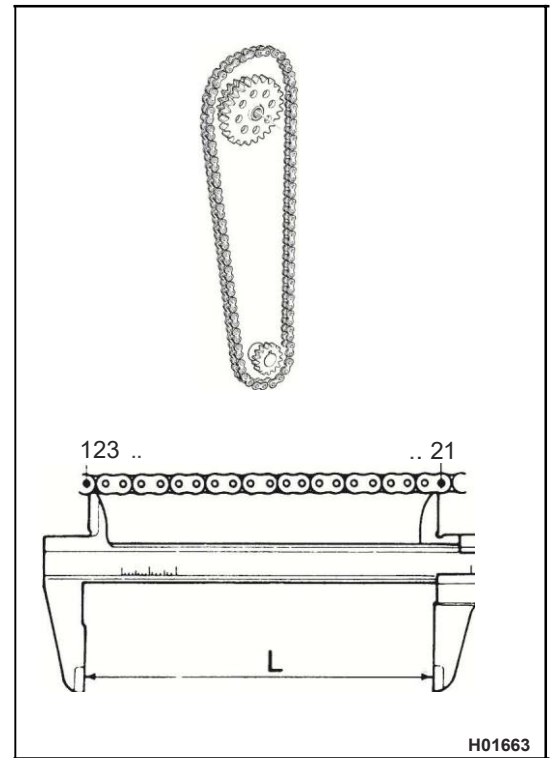
Height "H" of lobes when new
 INTAKE= 36.57 mm (1.44 in.)
 EXHAUST= 35.94 mm (1.415 in.)





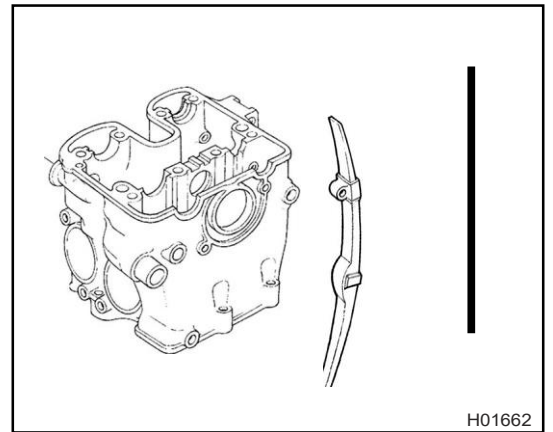
Timing chain and gears

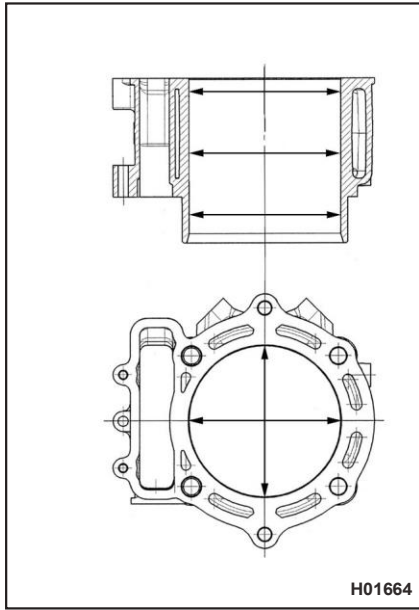
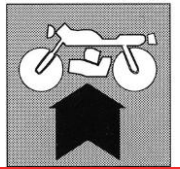
Check the chain For wear at each engine overhaul.
Replace chain is too noisy or worn.



Timing chain tensioners

Chain tensioners must be replaced when the lower area of the wear indicators is worn down to the metal.





Cylinder

Check the walls For dents or scuffing. Measure cylinder bore diameter at three different positions. Measure each diameter in two directions at right angles to each other to determine taper and out-of-round.

Max. taper (wear limit): 0.05 mm (0.002 in.).

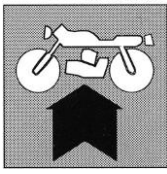
Max. out-of-round (wear limit): 0.05 mm. (0.002 in.)

IF cylinder is worn beyond these limits, replace both cylinder and piston. The liner undergoes a special hardening treatment and cannot be ground.

Piston

Clean off any carbon deposits From piston crown and grooves. Perform a careful visual inspection of the piston and check its dimensions. There should be no signs of Forcing, scuffing, cracking or other damage.





Cylinder to piston clearance

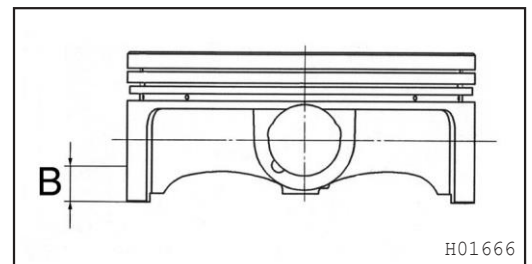
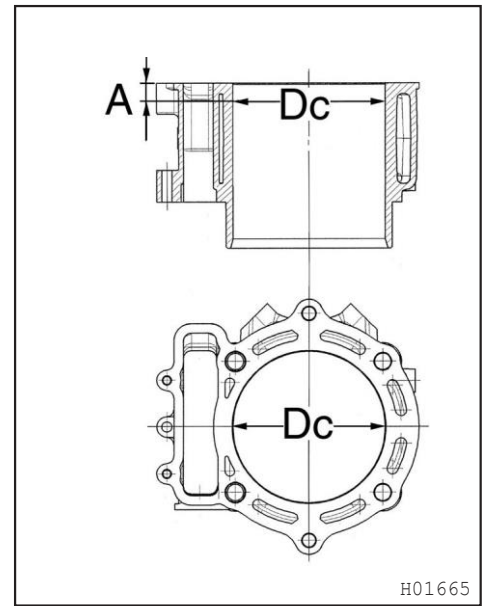
Cylinder diameter

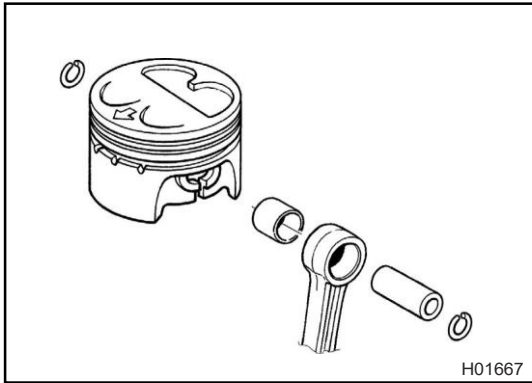
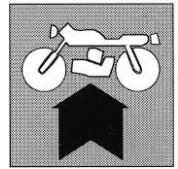
Measure inside diameter (Dc) with an internal bore micrometer 10 mm (0.394 in.) below the edge (distance "A").

Piston diameter

Measure piston diameter (Dp) 8-9 mm (0.315-0.354 in.) above skirt edge (distance "B").
Clearance is calculated as $Follows = Dc - Dp$.

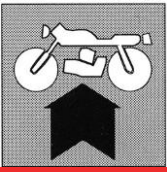
CLEARANCE (Dc-Dp)	SERVICE LIMIT
0.025-0.055 mm (0.0010-0.0022 in.)	0.12mm (0.0047 in)





Piston pin

The piston pin must be perfectly smooth, with no signs of scoring, dents or bluing due to overheating.



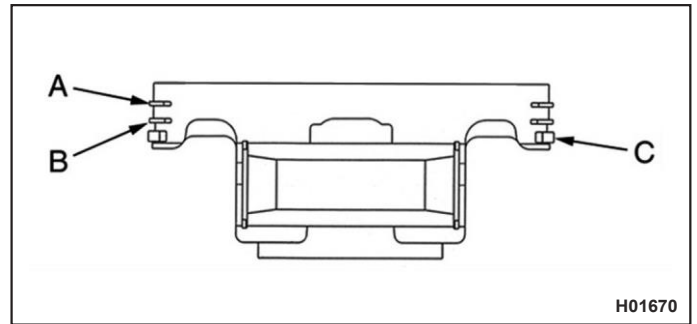
Piston rings

They should show no signs of Forcing or scoring.

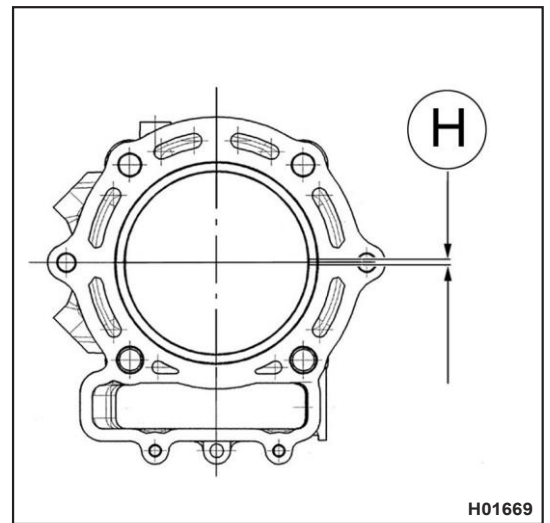
Replacement pistons come with piston rings and piston pin.

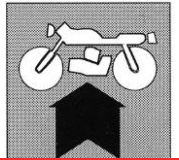
Piston ring to cylinder clearance

Insert the piston ring at the bottom of the bore (where minimum wear occurs) taking care to position it squarely and measure end gap.



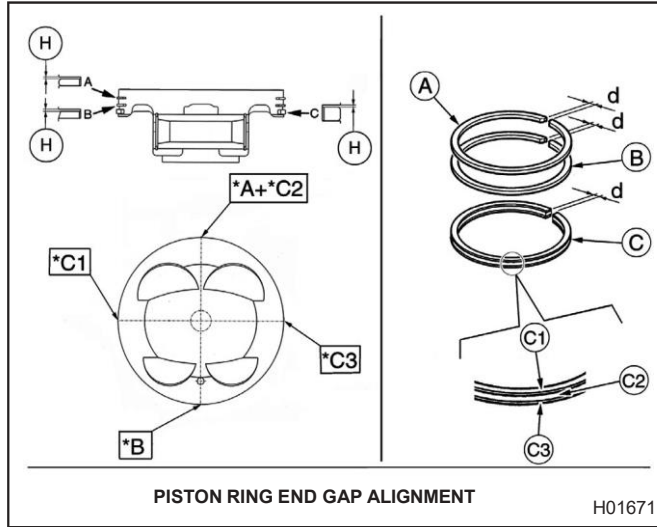
PISTON RING	MOUNTING CLEARANCE (H)	SERVICE LIMIT
"A"	0.20-0.45 mm (0.00787-0.0177 in.)	0.7mm (0.027 in.)
"B"	0.20-0.45 mm (0.00787-0.0177 in.)	0.7mm (0.027 in.)
"C"	0.10-0.20 mm (0.00394-0.00787 in.)	0.35 mm (0.014 in.)





Piston ring to groove clearance

Use a Feeler gauge to measure the axial clearance (H) of piston rings. IF the piston ring is marked on one side, that side must be Facing up.



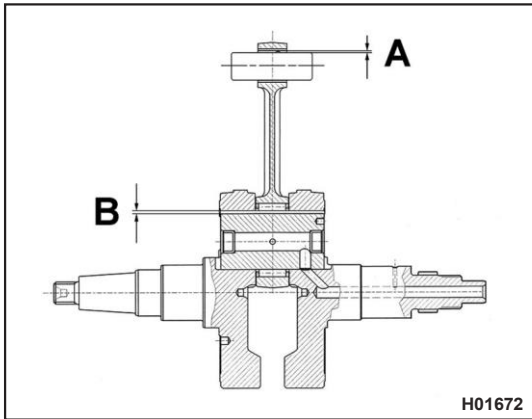
Piston pin to small end clearance (A): 0.012-0.027 mm (0.0005-0.0011 in.).

SERVICE LIMIT: 0.055 mm (0.0022 in.)

Big end side clearance (B): 0.026-0.036 mm (0.001-0.0014 in.).

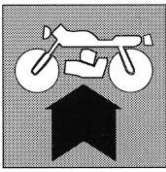
SERVICE LIMIT: 0.080 mm (0.0031 in.)

": position of end gap "d"



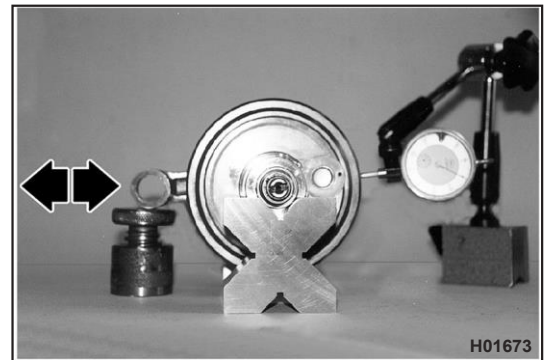
PISTON RING	MOUNTING CLEARANCE (H)	SERVICE LIMIT
"A"	0.030-0.065 mm (0.00012-0.0025 in.)	0.13 mm (0.0051 in.)
"B"	0.020-0.055 mm (0.0008-0.0022 in.)	0.11mm (0.0043 in.)
"C"	0.010-0.180 mm (0.0004-0.0071 in.)	0.35 mm (0.0138 in.)





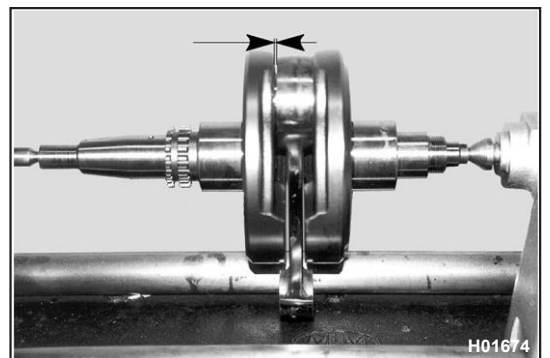
Big end radial clearance

STANDARD	WEAR LIMIT
0.02-0.028 mm (0.0008-0.00112 in.)	0.04mm (0.0016 in)



Big end radial clearance

STANDARD	WEAR LIMIT
0.50-0.70 mm (0.0197-0.0275 in.)	0.080 mm (0.00315 in)



Balancing countershaft

Clamp the countershaft between centres and check that journals run concentric using a dial gauge (maximum runout allowed 0.02 mm (0.0008 in.)).

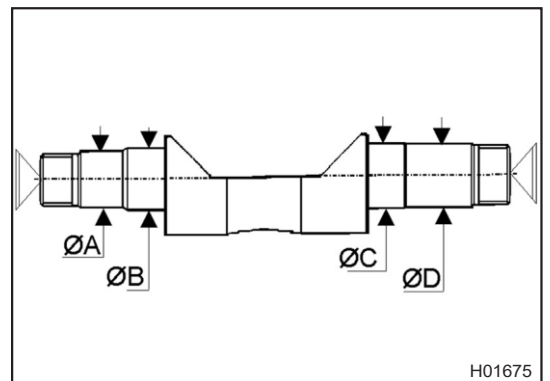
Measure diameters A,B,C and D:

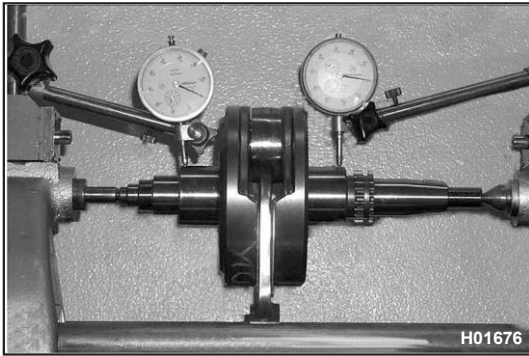
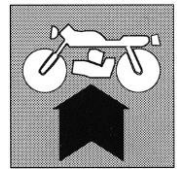
0A wear limit= 16.945 mm (0.6671 in.).

0B wear limit= 19.965 mm (0.786 in.).

0C wear limit= 19.965 mm (0.786 in.).

0D wear limit= 19.960 mm (0.7858 in.).





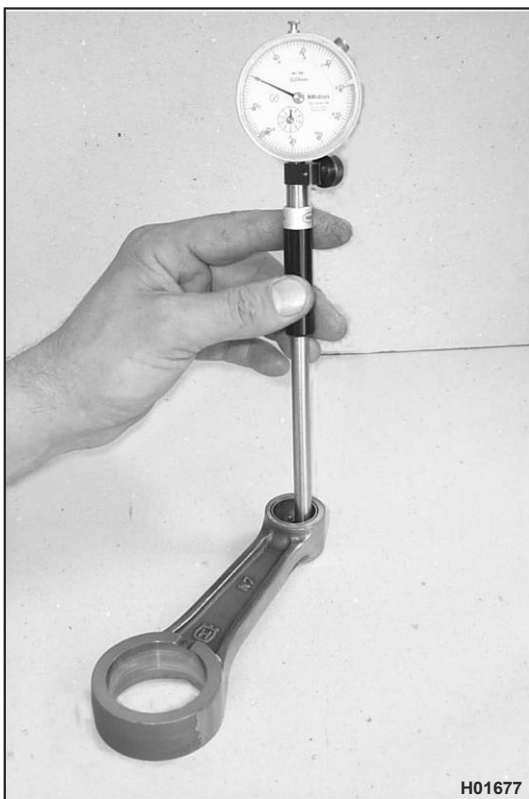
Crankshaft

Main Journals and crank pins should show no scoring or scuffing. Threads, keyways and splines must be in good condition.

Clamp the shaft between centres and check that crank pins run concentric using a dial gauge (maximum runout allowed 0.02 mm (0.0008 in.)).

Crankshaft straightness

STANDARD	MAX WEAR LIMIT
less than 0.03 mm (0.012 in)	0.05mm (0.0019 in)

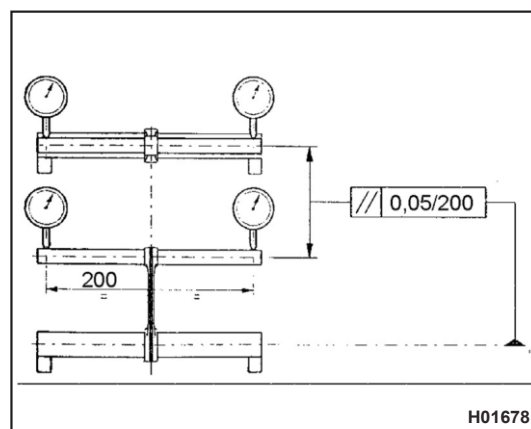


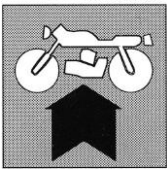
Small end bushing replacement

You will need an appropriate punch and a press to change the bushing. Smear the outer face of the bushings with moly grease before installation.

The bushing should be mounted with an interference fit of: 0.049-0.095 mm (0.00196-0.0038 in.) Match the oil holes of the new bushing with those in the connecting rod; ream the bushing bore to 20 mm: *f* (0.79 in. ; "o"o"i:a).

Check bore concentricity as shown in the diagram.



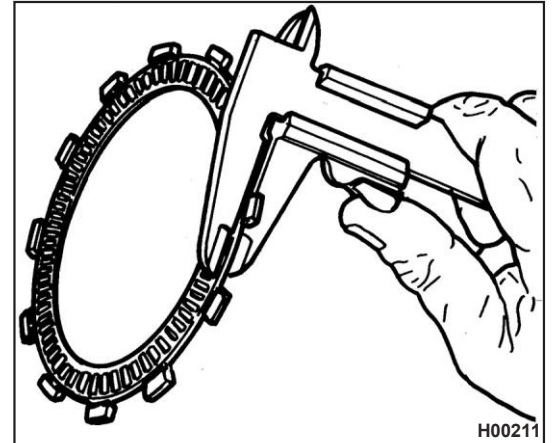


Clutch

Inspect all clutch components to make sure they are in the best conditions. Clutch plates should show no signs of bluing, scoring or distortion. Measure the thickness of Friction plates.

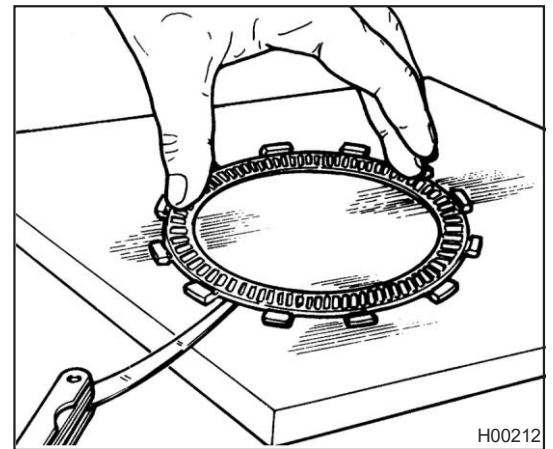
Plate thickness when new: 2.92-3.08 mm (0.1149-0.1212 in.)

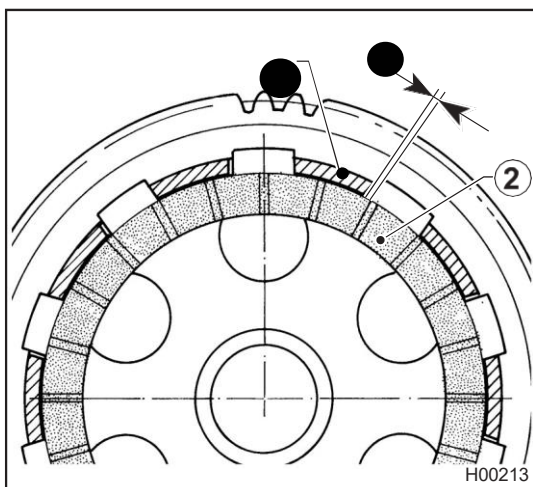
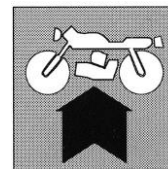
Service limit: 2.65 mm (0.106 in.).



Place each (Friction and steel) plate on a surface plate and check For distortion using a Feeler gauge; Use a Feeler gauge.

Service limit: 0.15 mm (0.006 in.)



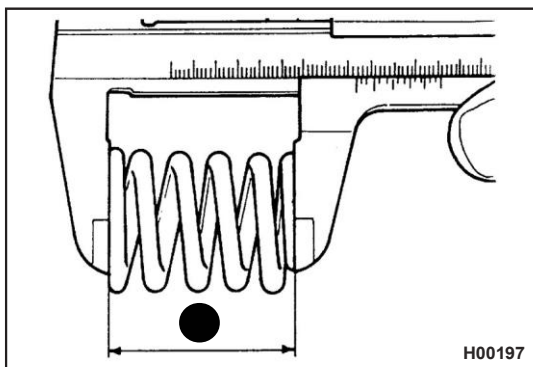


Friction plate to clutch housing clearance

Measure clearance "A" between clutch housing (2) and plate (1) with a Feeler gauge and compare measured clearance with the table below.

STANDARD	SERVICE LIMIT
0.30-0.50 mm (0.012-0.020 in.)	0.6mm (0.024 in.)

If measured clearance exceeds the service limit, replace clutch plates or housing and repeat measurement. If measurement is still outside the service limit, replace the complete clutch assembly.



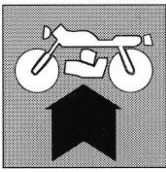
Clutch spring

Measure the Free length "L" of each spring with a calliper.

New spring L= 41 mm (1.61 in.).

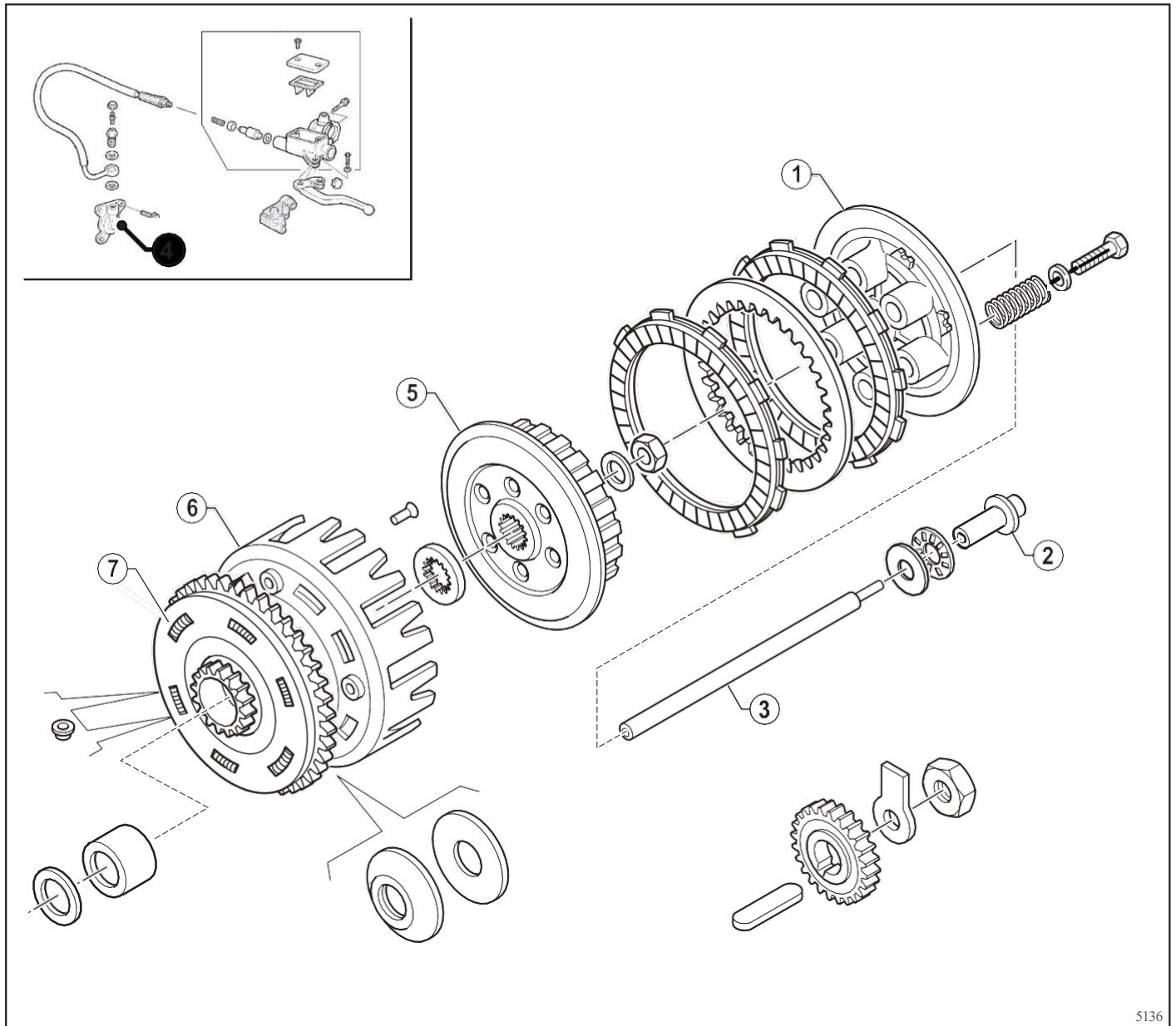
Service limit: 39 mm (1.38 in.).

Change any spring that is outside the service limit.



ENGINE OVERHAUL

Regina^{EVO}



5136

1- Pressure plate, 2- Clutch actuator plate, 3- Pushrad, 4- Piston assembly: Check these parts For signs of wear or Failure. IF any are Found, replace the part.

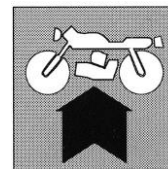
5- Clutch hub: Check the steel plate slots For signs of wear or Failure. IF any are Found, replace the part.

6- Clutch housing: Check the Friction plate slots For signs of wear or Failure.

Check the needle roller bearing seats For signs of wear. IF any are Found, replace the part.

7- Primary drive gear pair: Check gear teeth For signs of wear or Failure. IF any are Found, replace the part.



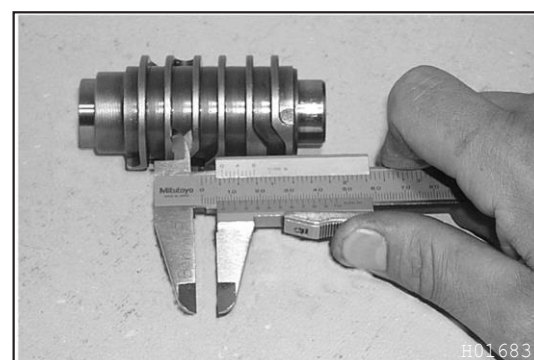
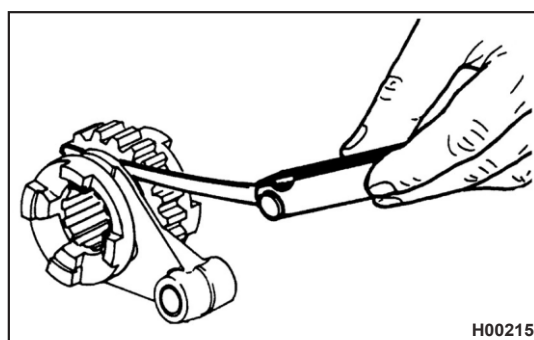


Shifter forks and gears

Visually inspect the shifter forks (1) and replace any bent forks. A bent fork will make gears hard to engage or let the transmission jump out of gear unexpectedly under loading.

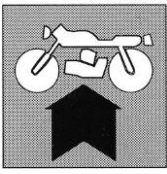
Check the clearance of the each shifter fork in its gear groove using a feeler gauge. If any one of the three gears is outside the service limit, measure the width of gear groove and fork thickness to determine which component needs to be replaced. Shifter fork to groove clearance (new fork and gear): 0.070 - 0.225 mm (0.0028 - 0.0088 in.)

Service limit: 0.26 mm (0.010 in.).



Selector drum

Check drum grooves for wear or dents and make sure the selector drum is not bent, worn or damaged.



ENGINE OVERHAUL

Regina^{EVO}

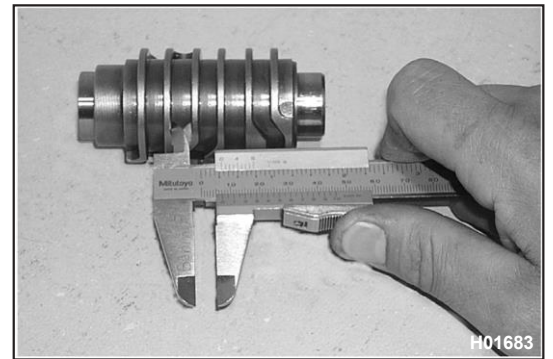
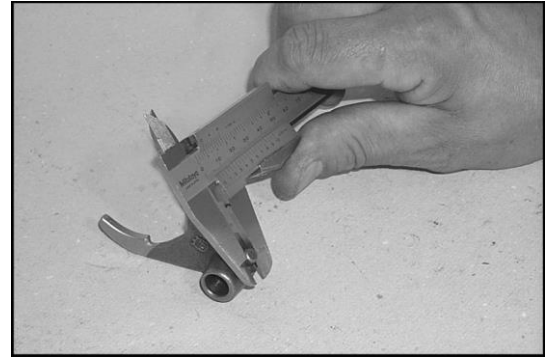
Selector drum to shifter fork pins clearance

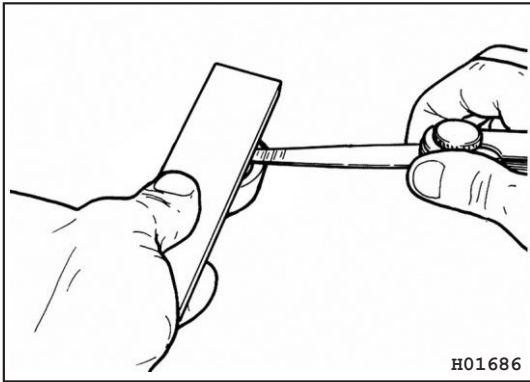
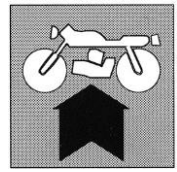
Determine clearance between shifter fork pin and drum groove taking the necessary measurements with a calliper. If service limit is exceeded, compare the components with new parts to determine which one needs to be removed.

Shifter fork to drum groove clearance (from new):

0.15-0.35 mm (0.006-0.014 in.)

Service limit: 0.5 mm (0.02 in.)





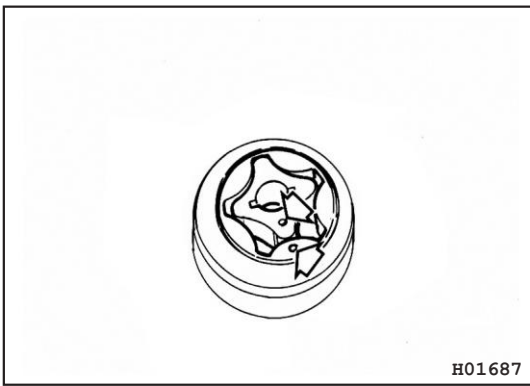
Oil pump disassembly

Remove the oil pump from the right crankcase as described in the Section "F".

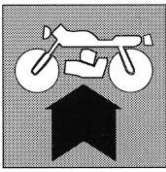
Check side clearance to determine whether the pump needs replacing; use a feeler gauge and a straight-edge.

If pump rotors (1) and (2) have been separated from pump body, make sure to line up the dots on inner and outer rotors on assembly. Check pump body mating face for scoring, dents or scuffing.

On assembly, inspect the seals (3) and make sure the pins (4) are located correctly; for tightening torque figures, see Sections "H" and "X".



Side clearance	0.10 mm (0.0039 in.)
----------------	-------------------------



ENGINE OVERHAUL

Regina^{EVO}

