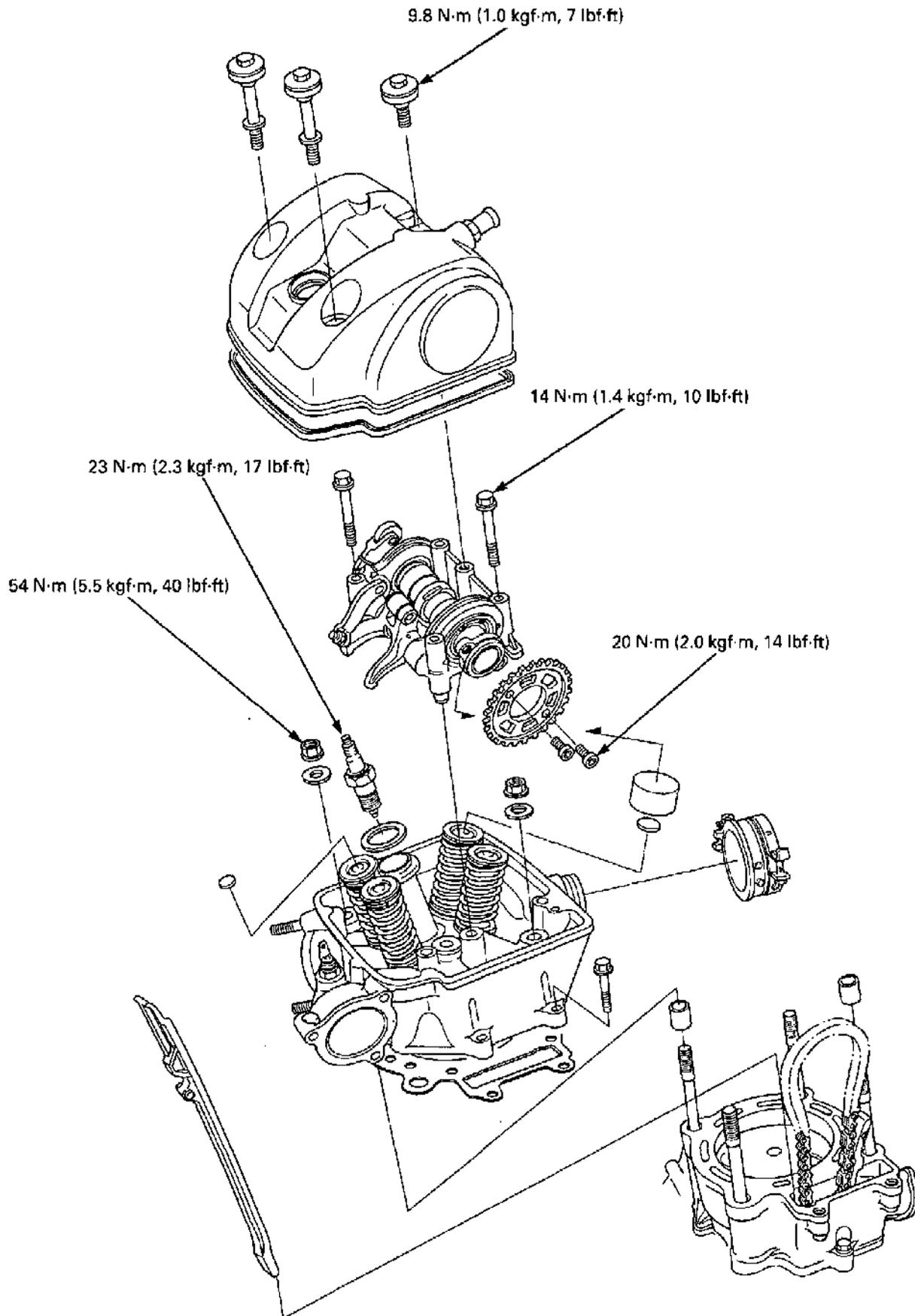


11. CYLINDER HEAD/VALVE

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CYLINDER HEAD/VALVE SYSTEM COMPONENTS



SERVICE INFORMATION

GENERAL

- This section covers service of the camshafts, rocker arms, cylinder head and valves. These services can be done with the engine installed in the frame.
- When disassembling, mark and store the disassembled parts to ensure that they are reinstalled in their original locations.
- Clean all disassembled parts with cleaning solvent and dry them by blowing them off with compressed air before inspection.
- Camshaft and rocker arm lubricating oil is fed through oil passage in the cylinder head and camshaft holder. Clean the oil passages before assembling them.
- Be careful not to damage the mating surfaces when removing the cylinder head cover and cylinder head.

SPECIFICATIONS

'04 - '05:

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Cylinder compression			745 kPa (7.6 kgf/cm ² , 108 psi)	-
Valve clearance		IN	0.16 ± 0.03 (0.006 ± 0.001)	-
		EX	0.28 ± 0.03 (0.011 ± 0.001)	-
Decompressor clearance			Right side exhaust valve clearance + 0.15 ± 0.02 mm (0.006 ± 0.001 in)	-
Valve, valve guide	Valve stem O.D.	IN	5.475 - 5.490 (0.2156 - 0.2161)	5.46 (0.215)
		EX	5.455 - 5.470 (0.2148 - 0.2154)	5.44 (0.214)
	Valve guide I.D.	IN/EX	5.500 - 5.512 (0.2165 - 0.2170)	5.52 (0.217)
	Stem-to-guide clearance	IN	0.010 - 0.037 (0.0004 - 0.0015)	0.12 (0.005)
		EX	0.030 - 0.057 (0.0012 - 0.0022)	0.14 (0.006)
	Valve guide projection above cylinder head	IN	16.8 - 17.2 (0.66 - 0.68)	-
EX		17.9 - 18.3 (0.70 - 0.72)	-	
Valve spring	Valve seat width	IN	1.1 - 1.3 (0.043 - 0.051)	2.0 (0.08)
		EX	1.3 - 1.5 (0.051 - 0.059)	2.0 (0.08)
	Free length	IN	40.68 (1.602)	39.7 (1.56)
		EX	43.16 (1.699)	42.2 (1.66)
Exhaust rocker arm	Arm I.D.		12.000 - 12.018 (0.4724 - 0.4731)	12.05 (0.474)
	Shaft O.D.		11.967 - 11.975 (0.4711 - 0.4715)	11.92 (0.469)
	Arm-to-shaft clearance		0.025 - 0.051 (0.0010 - 0.0020)	0.10 (0.004)
Camshaft	Cam lobe height	IN	36.630 - 36.790 (1.4421 - 1.4484)	36.48 (1.436)
		EX	34.753 - 34.913 (1.3682 - 1.3745)	34.60 (1.362)
Valve lifter O.D.			25.978 - 25.993 (1.0228 - 1.0233)	25.97 (1.022)
Valve lifter bore I.D.			26.010 - 26.026 (1.0240 - 1.0246)	26.04 (1.025)
Cylinder head warpage			-	0.05 (0.002)

CYLINDER HEAD/VALVE

After '05:

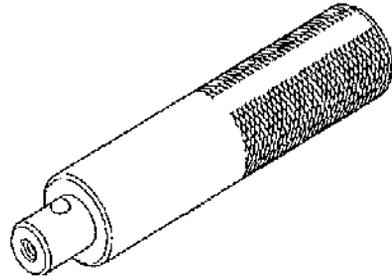
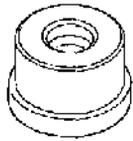
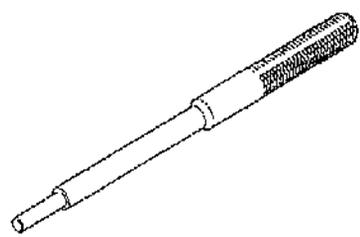
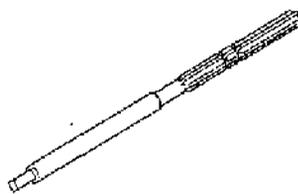
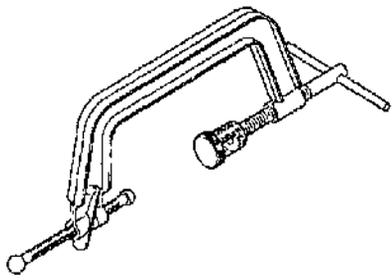
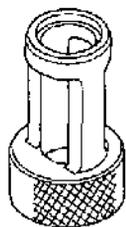
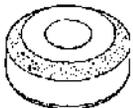
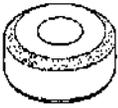
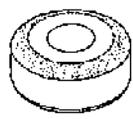
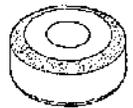
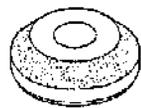
Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Cylinder compression	TRX450ER		343 – 382 kPa (3.5 – 3.9 kgf/cm ² , 50 – 56 psi)	–
	TRX450R		961 – 1000 kPa (9.8 – 10.2 kgf/cm ² , 139 – 145 psi)	–
Valve clearance	IN		0.16 ± 0.03 (0.006 ± 0.001)	–
	EX		0.28 ± 0.03 (0.011 ± 0.001)	–
Decompressor clearance			Right side exhaust valve clearance + 0.25 ± 0.02 mm (0.010 ± 0.001 in)	–
Valve, valve guide	Valve stem O.D.	IN	5.475 – 5.490 (0.2156 – 0.2161)	5.46 (0.215)
		EX	4.965 – 4.980 (0.1955 – 0.1961)	4.96 (0.195)
	Valve guide I.D.	IN	5.500 – 5.512 (0.2165 – 0.2170)	5.52 (0.217)
		EX	5.000 – 5.012 (0.1969 – 0.1973)	5.052 (0.1989)
	Stem-to-guide clearance	IN	0.010 – 0.037 (0.0004 – 0.0015)	0.12 (0.005)
		EX	0.020 – 0.047 (0.0008 – 0.0019)	0.13 (0.005)
	Valve guide projection above cylinder head	IN	16.1 – 16.3 (0.63 – 0.64)	–
		EX	17.9 – 18.1 (0.70 – 0.71)	–
Valve seat width	IN	1.1 – 1.3 (0.043 – 0.051)	2.0 (0.08)	
	EX	1.3 – 1.5 (0.051 – 0.059)	2.0 (0.08)	
Valve spring	Free length	IN	40.68 (1.602)	39.7 (1.56)
		EX	42.82 (1.686)	42.2 (1.66)
Exhaust rocker arm	Arm I.D.		12.000 – 12.018 (0.4724 – 0.4731)	12.05 (0.474)
	Shaft O.D.		11.967 – 11.975 (0.4711 – 0.4715)	11.92 (0.469)
	Arm-to-shaft clearance		0.025 – 0.051 (0.0010 – 0.0020)	0.10 (0.004)
Camshaft	Cam lobe height	IN	35.040 – 35.280 (1.3795 – 1.3890)	34.89 (1.374)
		EX	34.214 – 34.454 (1.3470 – 1.3565)	34.06 (1.341)
Valve lifter O.D.			25.978 – 25.993 (1.0228 – 1.0233)	25.97 (1.022)
Valve lifter bore I.D.			26.010 – 26.026 (1.0240 – 1.0246)	26.04 (1.025)
Cylinder head warpage			–	0.05 (0.002)

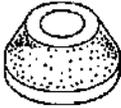
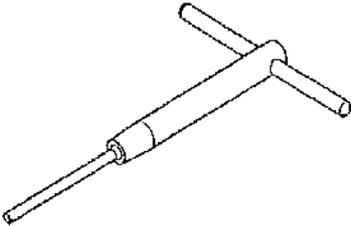
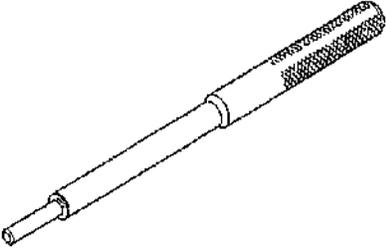
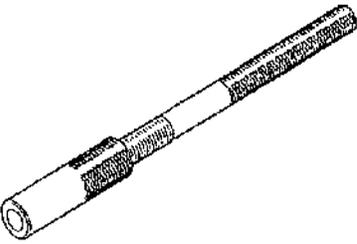
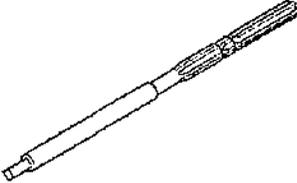
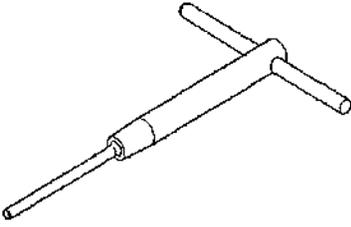
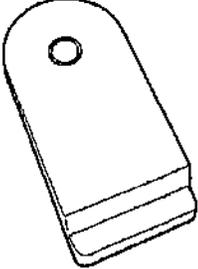
TORQUE VALUES

Cylinder head nut	54 N·m (5.5 kgf·m, 40 lbf·ft)	Apply engine oil to the threads and seating surface.
Cylinder head cover bolt	9.8 N·m (1.0 kgf·m, 7 lbf·ft)	
Camshaft holder bolt	14 N·m (1.4 kgf·m, 10 lbf·ft)	Apply engine oil to the threads and seating surface.
Decompressor lifter arm nut	22 N·m (2.2 kgf·m, 16 lbf·ft)	Apply engine oil to the threads and seating surface.
Decompressor cam bolt	25 N·m (2.5 kgf·m, 18 lbf·ft)	Apply locking agent to the threads.
Cam sprocket bolt	20 N·m (2.0 kgf·m, 14 lbf·ft)	Apply locking agent to the threads.
Upper engine hanger nut	54 N·m (5.5 kgf·m, 40 lbf·ft)	
Upper engine hanger plate bolt	26 N·m (2.7 kgf·m, 20 lbf·ft)	
Carburetor insulator band screw	See page 11-24	

TOOLS

<p>Driver 07749-0010000</p> 	<p>Attachment, 32 x 35 mm 07746-0010100</p> 	<p>Pilot, 20 mm 07746-0040500</p> 
<p>Valve guide driver, 5.5 mm 07742-0010100</p> 	<p>Valve guide reamer, 5.5 mm 07984-2000001 or 07984-200000D (U.S.A. only)</p> 	<p>Valve spring compressor 07757-0010000</p> 
<p>Spring compressor attachment 07959-KM30101</p> 	<p>Valve seat cutter, 36 mm (45° IN) 07780-0010400 or equivalent commercially available in U.S.A.</p> 	<p>Valve seat cutter, 33 mm (45° EX) 07780-0010800 or equivalent commercially available in U.S.A.</p> 
<p>Flat cutter, 36 mm (32° IN) 07780-0013500 or equivalent commercially available in U.S.A.</p> 	<p>Flat cutter, 33 mm (32° EX) 07780-0012900 or equivalent commercially available in U.S.A.</p> 	<p>Interior cutter, 37.5 mm (60° IN) 07780-0014100 or equivalent commercially available in U.S.A.</p> 

CYLINDER HEAD/VALVE

<p>Interior cutter, 34 mm (60° EX) 07780-0014700</p>  <p>or equivalent commercially available in U.S.A.</p>	<p>Cutter holder, 5.5 mm 07781-0010101</p>  <p>or equivalent commercially available in U.S.A.</p>	<p>Cam chain tensioner holder 07ZMG-MCAA400 (U.S.A. only)</p> 
<p>Tensioner stopper 070MG-0010100</p>  <p>or 07AMG-001A100 (U.S.A. only)</p>	<p>Valve guide driver, 5.0 mm 07942-MA60000</p> 	<p>Valve guide driver 07743-0020000</p>  <p>not available in U.S.A.</p>
<p>Valve guide reamer, 5.0 mm 07984-MA60001 or</p>  <p>07984-MA6000D (U.S.A. only)</p>	<p>Cutter holder, 5.0 mm 07781-0010400</p>  <p>or equivalent commercially available in U.S.A.</p>	<p>Cam sprocket holder 07AMB-MEBA100 (U.S.A. only)</p> 

TROUBLESHOOTING

- Engine top-end problems usually affect engine performance. These problems can be diagnosed by a compression test, or by tracing top-end noise with a sounding rod or stethoscope.
- If the performance is poor at low speeds, check for white smoke in the crankcase breather hose. If the hose is smoky, check for a seized piston ring (page 12-7).

Compression too low, hard starting or poor performance at low speed

- Valves
 - Incorrect valve adjustment
 - Burned or bent valve
 - Incorrect valve timing
 - Weak valve spring
 - Uneven valve seating
 - Valve stuck open
- Cylinder head
 - Leaking or damaged cylinder head gasket
 - Warped or cracked cylinder head
 - Loose spark plug
- Cylinder/piston problem (page 12-4).

Compression too high

- Excessive carbon build-up on piston head or combustion chamber
- Worn or damaged decompressor system

Excessive smoke

- Worn valve stem or valve guide
- Damaged stem seal
- Cylinder/piston problem (page 12-4).

Excessive noise

- Incorrect valve adjustment
- Sticking valve or broken valve spring
- Excessive worn valve seat
- Worn or damaged camshaft
- Worn rocker arm and/or shaft
- Worn rocker arm follower and valve stem end
- Worn or damaged valve lifter
- Worn cam sprocket teeth
- Worn cam chain
- Worn or damaged cam chain tensioner
- Cylinder/piston problem (page 12-4).

Rough idle

- Low cylinder compression

CYLINDER HEAD/VALVE

CYLINDER COMPRESSION

Warm the engine to normal operating temperature.

Stop the engine and remove the spark plug (page 4-9).

Install the compression gauge into the spark plug hole.

Shift the transmission in neutral.

Open the throttle all the way and operate the kickstarter forcefully several times until the gauge reading stops rising.

The cylinder compression specification is comparatively low because the camshaft has a decompression device installed.

COMPRESSION PRESSURE:

'04 - '05:

745 kPa (7.6 kgf/cm², 108 psi)

After '05:

TRX450ER;

343 - 382 kPa (3.5 - 3.9 kgf/cm², 50 - 56 psi)

TRX450R;

961 - 1000 kPa (9.8 - 10.2 kgf/cm², 139 - 145 psi)

Low compression can be caused by:

- blown cylinder head gasket
- improper valve adjustment
- valve leakage
- worn piston ring or cylinder

High compression can be caused by:

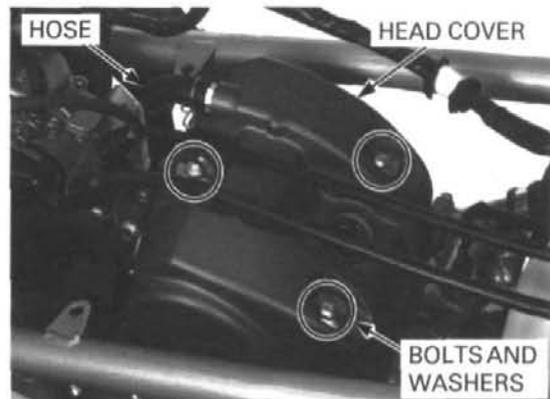
- carbon deposits in combustion chamber or on piston head



CYLINDER HEAD COVER REMOVAL

Remove the following:

- fuel tank (page 3-9)
- heat guard plate ('04 - '05: page 3-9, After '05: page 3-9)
- spark plug cap (page 4-9)
- crankcase breather hose
- three bolts and special washers
- cylinder head cover



CAMSHAFT HOLDER REMOVAL

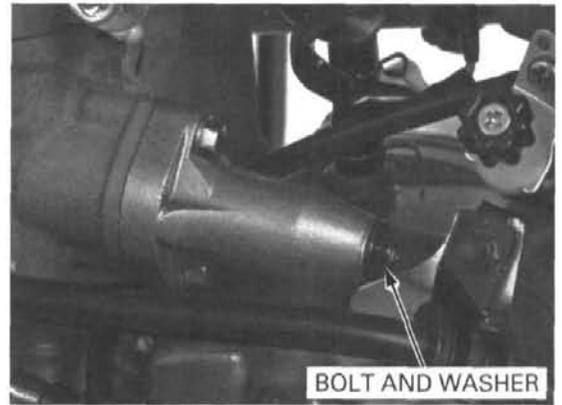
Remove the following:

- cylinder head cover (page 11-8)
- spark plug (page 4-9)

Remove the crankshaft hole cap and set the piston position to Top Dead Center on the compression stroke (page 4-10).

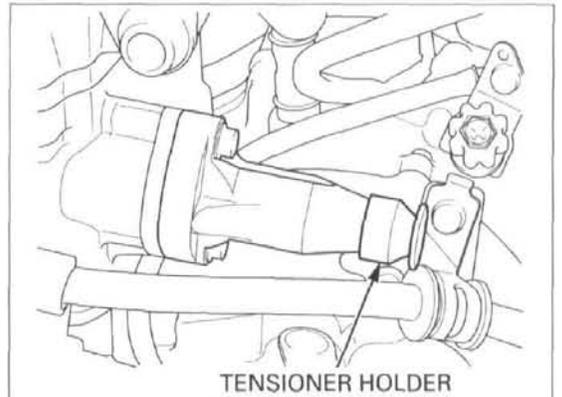


Remove the tensioner lifter sealing bolt and washer.



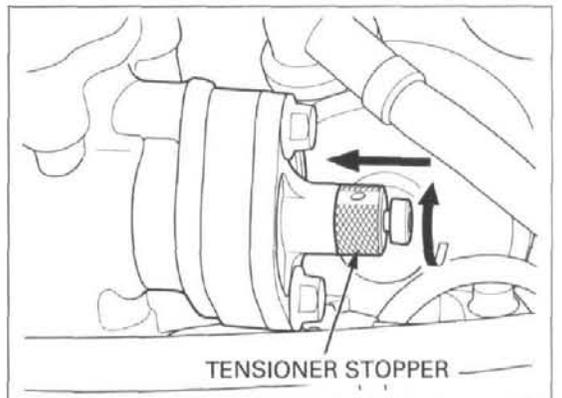
'04 - '05: Turn the cam chain tensioner lifter shaft clockwise fully and secure it with the special tool to loosen the tensioner lifter.

TOOL:
Cam chain tensioner holder 07ZMG-MCAA400 or
 07AMG-001A100
 (U.S.A only)

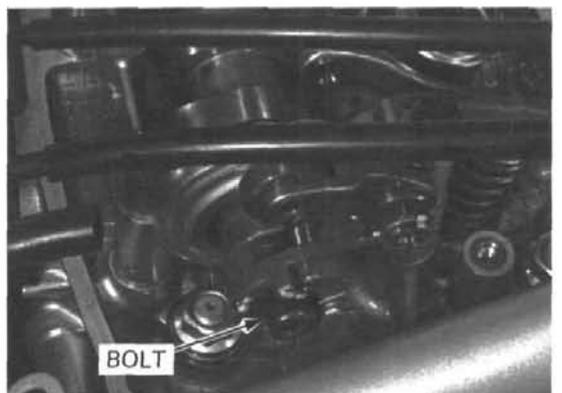


After '05: Turn the cam chain tensioner lifter shaft clockwise fully and secure it with the special tool to loosen the tensioner lifter.

TOOL:
Tensioner stopper 070MG-0010100 or
 07AMG-001A100
 (U.S.A only)



Loosen the decompressor cam bolt while holding the crankshaft. If the decompressor cam will be removed.



CYLINDER HEAD/VALVE

Be careful not to let the bolts fall into the crankcase.

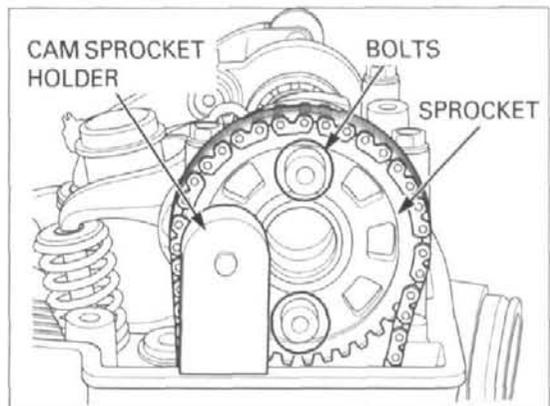
Remove the following:

- two sprocket bolts (while holding the camshaft with the special tool)
- cam sprocket with the cam chain (off the camshaft)

TOOL:

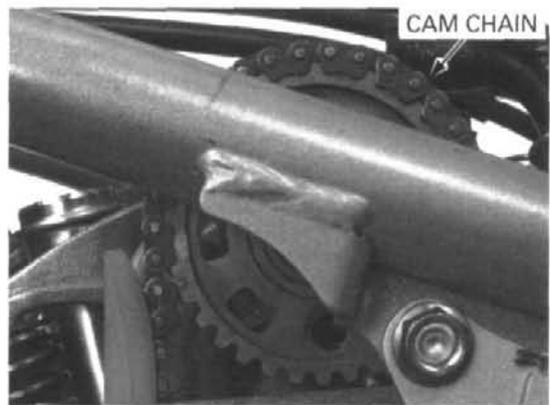
Cam sprocket holder

07AMB-MEBA100
(U.S.A only)



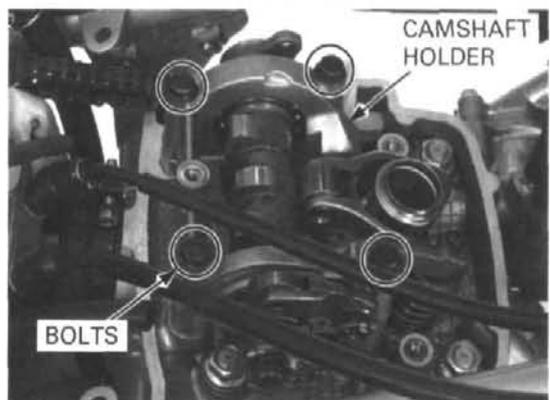
Attach a piece of wire to the cam chain to prevent it from falling into the crankcase.

- cam sprocket (from the cam chain)



Shims may stick to the inside of the valve lifters in the camshaft holder. Do not allow the shims to fall into the crankcase.

- four bolts (by loosening them in a crisscross pattern in several steps)
- camshaft holder assembly

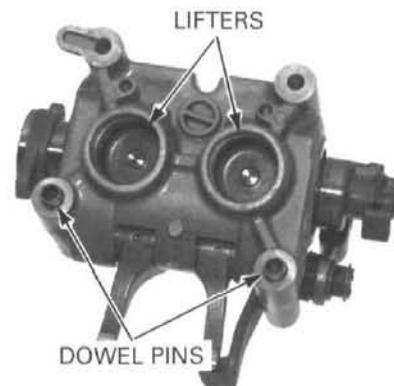
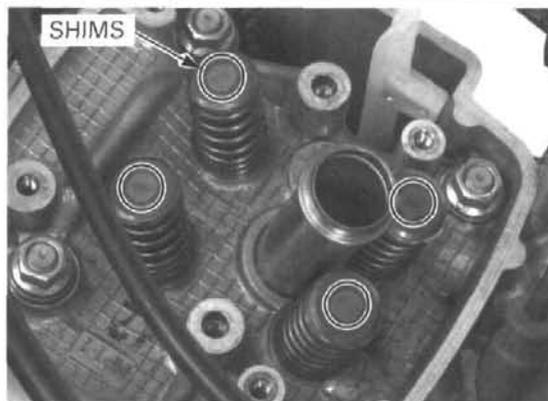


Be careful not to damage the valve lifter bore.

- shims
- valve lifters

NOTE:

- The shims can be easily removed with tweezers or a magnet.
- Mark each valve lifter and shim to ensure correct reassembly in their original locations.
- Do not forcibly remove the dowel pins from the camshaft holder.

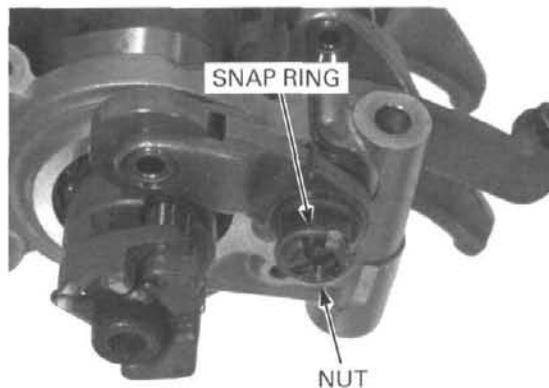


CAMSHAFT/DECOMPRESSOR DISASSEMBLY

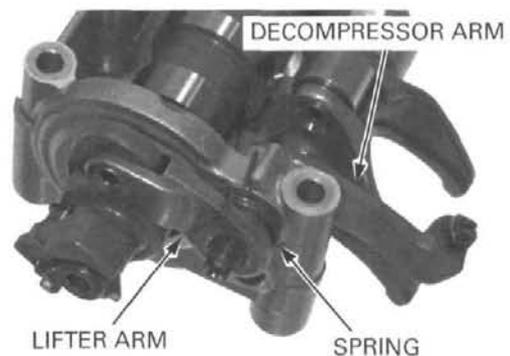
Remove the camshaft holder assembly (page 11-8).

Remove the following:

- snap ring
- nut

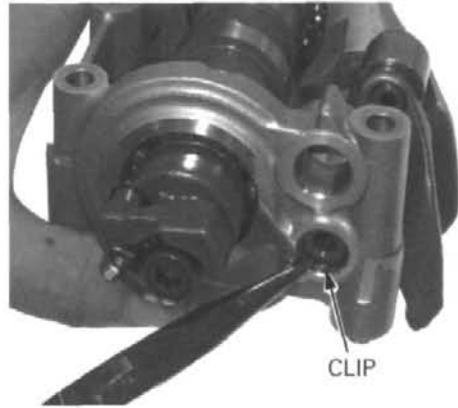


- lifter arm
- return spring
- decompressor arm

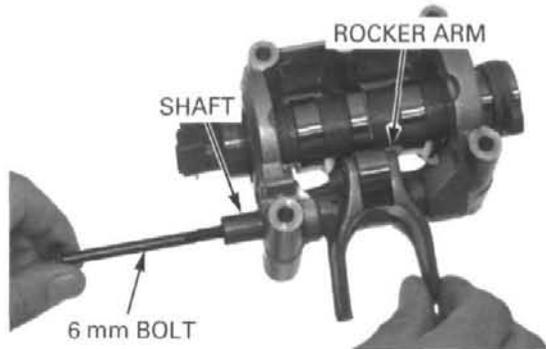


CYLINDER HEAD/VALVE

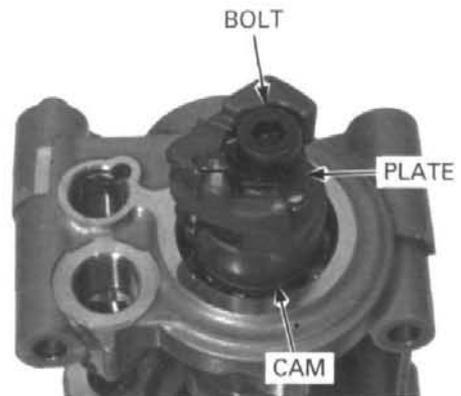
- stopper clip



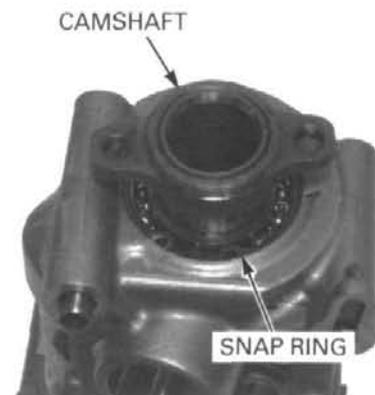
- rocker arm shaft (by screwing a 6-mm bolt and pull it out)
- rocker arm



- bolt
- setting plate
- decompressor cam assembly



- snap ring
- camshaft



For cam chain tensioner lifter inspection, see page 12-9.

INSPECTION

CAMSHAFT

Check the sprocket teeth for wear or damage.

Turn the camshaft bearings with your finger. The bearings should turn smoothly and quietly.

For bearing replacement in the camshaft holder, see page 11-14.



Check the cam surfaces for scoring, scratches or evidence of insufficient lubrication.

Measure each cam lobe height.

SERVICE LIMITS:

'04 - '05;

IN: 36.48 mm (1.436 in)

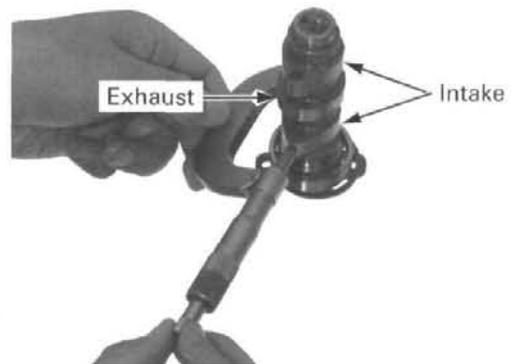
EX: 34.60 mm (1.362 in)

After '05;

IN: 34.89 mm (1.374 in)

EX: 34.06 mm (1.341 in)

If the cam lobe is damaged or excessively worn, inspect the oil passage and rocker arm.



EXHAUST ROCKER ARM/SHAFT

Inspect the sliding surfaces of the rocker arms and shaft for wear or damage.

If the roller is excessive worn or damaged, inspect the cam lobe and oil passage.

Measure each rocker arm I.D.

SERVICE LIMIT: 12.05 mm (0.474 in)

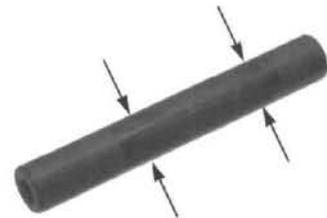


Measure the shaft O.D. at the rocker arm sliding areas.

SERVICE LIMIT: 11.92 mm (0.469 in)

Calculate the rocker arm-to-shaft clearance.

SERVICE LIMIT: 0.10 mm (0.004 in)



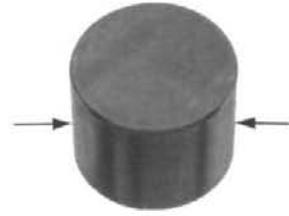
CYLINDER HEAD/VALVE

INTAKE VALVE LIFTER

Check the valve lifter for scoring, scratches or abnormal wear.

Measure each valve lifter O.D.

SERVICE LIMIT: 25.97 mm (1.022 in)



Check the valve lifter bore for scoring, scratches or abnormal wear.

Measure each valve lifter bore I.D.

SERVICE LIMIT: 26.04 mm (1.025 in)



DECOMPRESSOR CAM

Check the cam and weight for excessive wear or damage.

Check the weight spring for damage.



CAMSHAFT BEARING REPLACEMENT

Drive the bearing out of the camshaft holder.

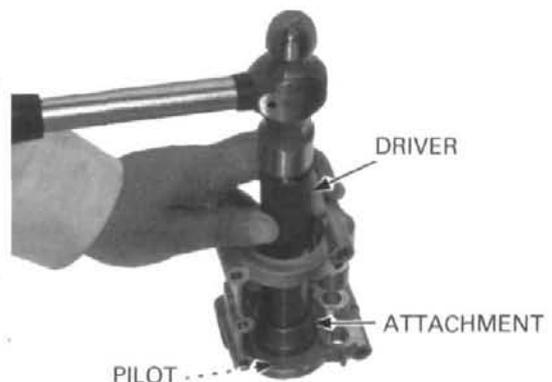
Apply engine oil to a new bearing.

Drive in the bearing squarely with the marked side facing up until it is fully seated.

TOOLS:

Driver	07749-0010000
Attachment, 32 x 35 mm	07746-0010100
Pilot, 20 mm	07746-0040500

See page 11-27 for camshaft/decompressor assembly.

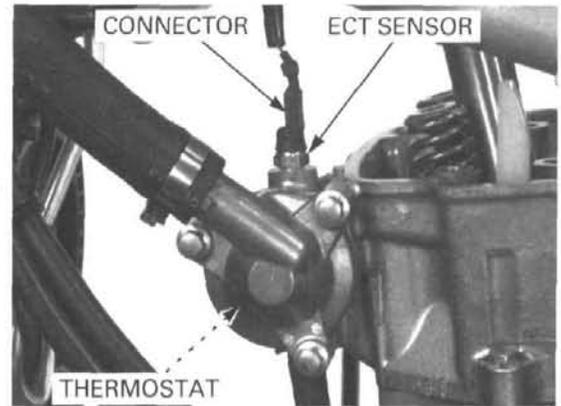


CYLINDER HEAD REMOVAL

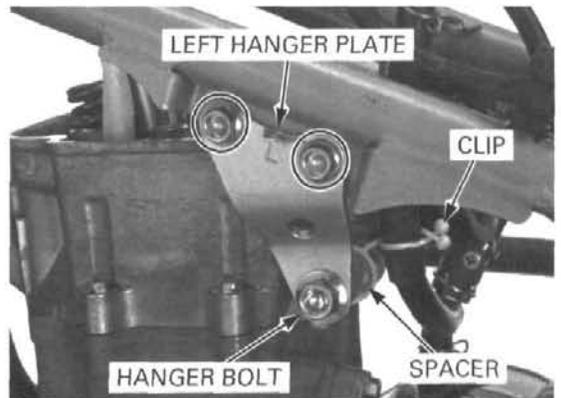
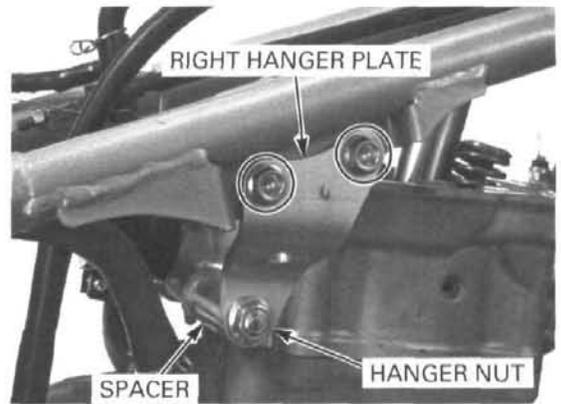
Remove the camshaft holder (page 11-8).

Remove the following:

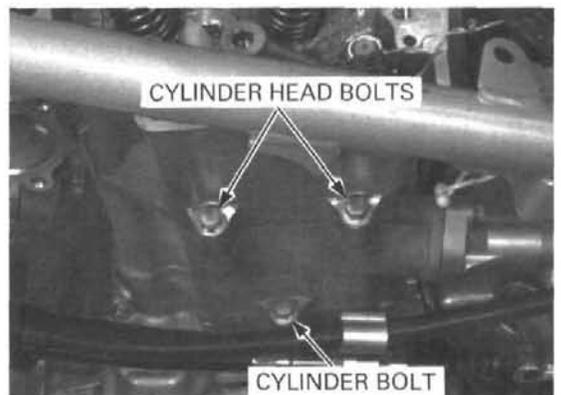
- exhaust system (page 3-10)
- carburetor ('04 - '05: page 7-6, After '05: page 8-7)
- thermostat (page 9-8)
- engine coolant temperature (ECT) sensor connector
- ECT sensor



- hose clip ('04 - '05 model only)
- engine hanger nut
- hanger bolt and spacers
- hanger plate bolts
- hanger plates



- two cylinder head bolts
- cylinder bolt (loosen)



CYLINDER HEAD/VALVE

Take care not to drop the nuts and washers into the crankcase.

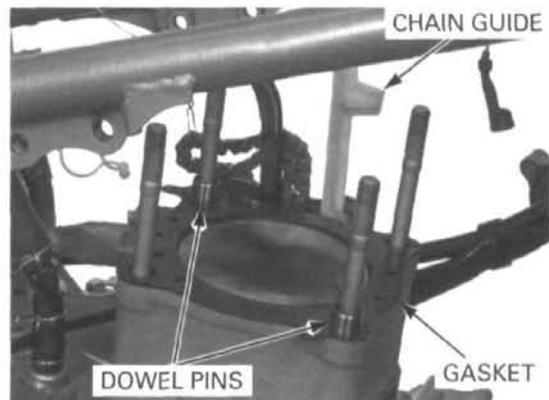
- four nuts and washers (by loosening them in a crisscross pattern in several steps)
- cylinder head

NOTE:

- Do not strike the cylinder head too hard and do not damage the mating surface with a screwdriver.

- gasket
- dowel pins
- cam chain guide

NUTS AND WASHERS

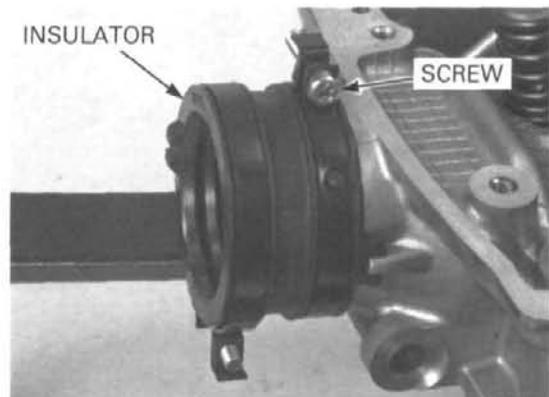


CYLINDER HEAD DISASSEMBLY

Remove the cylinder head (page 11-15).

- '04 - '05: Loosen the band screw and remove the carburetor insulator.

INSULATOR



To prevent loss of tension, do not compress the valve springs more than necessary.

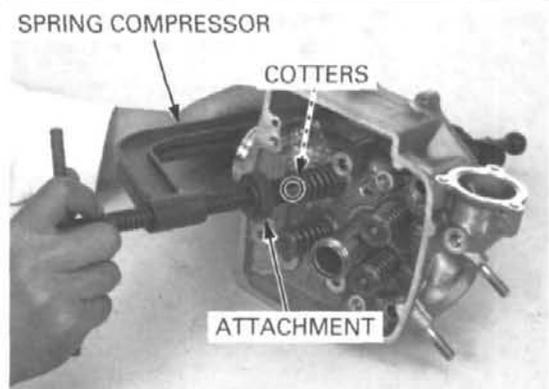
Remove the valve spring cotters using the valve spring compressor.

TOOLS:

Valve spring compressor
Compressor attachment

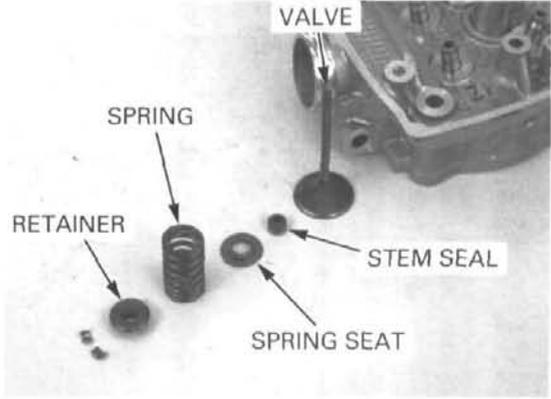
07757-0010000
07959-KM30101

SPRING COMPRESSOR



Mark all the parts so they can be placed back in their original locations.

- Remove the following:
- spring retainer
 - valve spring
 - valve
 - stem seal
 - spring seat



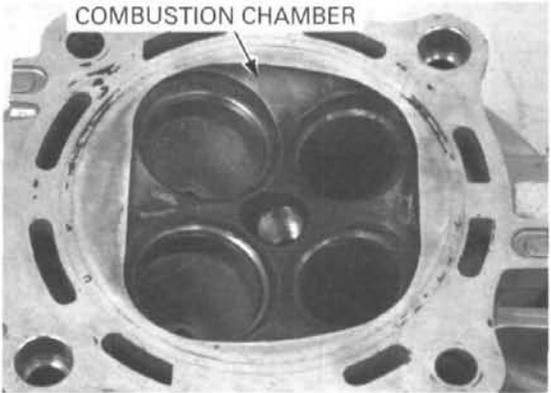
INSPECTION

CYLINDER HEAD

Be careful not to damage the valve seat and gasket surfaces.

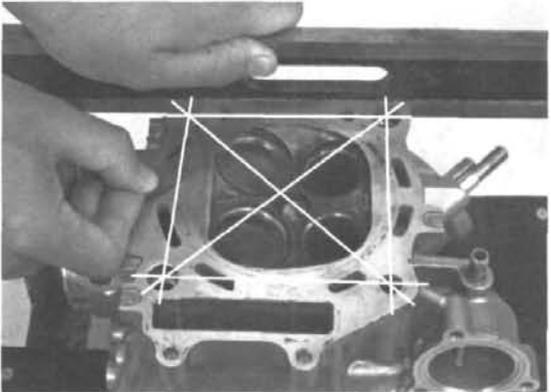
Remove the carbon deposits from the combustion chamber.

Check the spark plug hole and valve areas for cracks.



Check the cylinder head for warpage with a straight edge and feeler gauge across the stud holes.

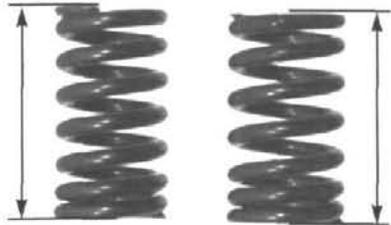
SERVICE LIMIT: 0.05 mm (0.002 in)



VALVE SPRING

Check the valve springs for fatigue or damage. Measure the valve spring free length.

**SERVICE LIMITS: IN: 39.7 mm (1.56 in)
EX: 42.2 mm (1.66 in)**



CYLINDER HEAD/VALVE

VALVE/VALVE GUIDE

Check that the valve moves smoothly in the guide. Check the valve for bending, burning or abnormal wear.

Measure each valve stem O.D. and record it.

SERVICE LIMITS: IN: 5.46 mm (0.215 in)
EX: '04 - '05;
5.44 mm (0.214 in)
After '05;
4.96 mm (0.195 in)

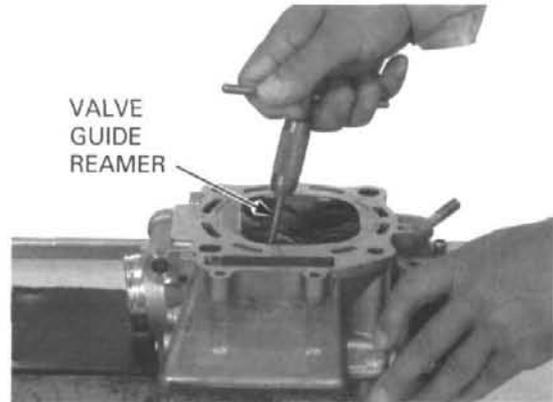


Ream the guides to remove any carbon build-up before measuring the guide. Insert the reamer from the combustion chamber side of the head and always rotate the reamer clockwise.

TOOL:

Valve guide reamer, 5.5 mm **07984-2000001 or 07984-200000D (U.S.A. only)**

After '05; EX:
Valve guide reamer, 5.0 mm **07984-MA60001 or 07984-MA6000D (U.S.A. only)**



Measure each valve guide I.D. and record it.

SERVICE LIMIT: IN/EX: 5.52 mm (0.217 in)

After '05; EX:
SERVICE LIMIT: 5.052 mm (0.1989 in)

Subtract each valve stem O.D. from the corresponding guide I.D. to obtain the stem-to-guide clearance.

SERVICE LIMITS: IN: 0.12 mm (0.005 in)
EX: '04 - '05;
0.14 mm (0.006 in)
After '05;
0.13 mm (0.005 in)



Inspect and reface the valve seats whenever the valve guides are replaced (page 11-20).

If the stem-to-guide clearance exceeds the service limit, determine if a new guide with standard dimensions would bring the clearance within tolerance. If so, replace any guides as necessary and ream to fit.

If the stem-to-guide clearance exceeds the service limit with a new guide, also replace the valve.

VALVE GUIDE REPLACEMENT

Mark new valve guides at the specified height indicated on the next page, using a marker. Chill the new valve guides in a freezer for about an hour.

Heat the cylinder head to 130°C–140°C (275°F–290°F) with a hot plate or oven. Do not heat the cylinder head beyond 150°C (300°F). Use temperature indicator sticks, available from welding supply stores, to be sure the cylinder head is heated to the proper temperature.

NOTICE

Using a torch to heat the cylinder head may cause warpage.

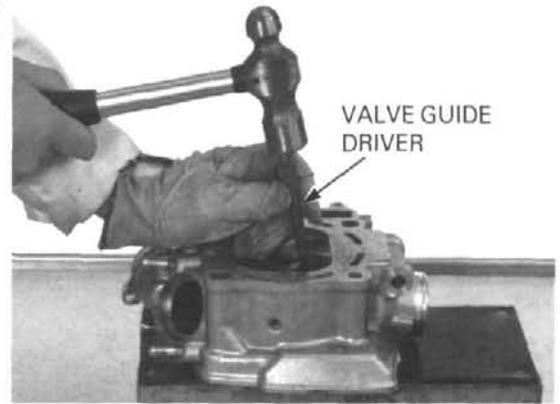
Support the cylinder head and drive the valve guides out of the cylinder head from the combustion chamber side using the special tool.

TOOL:

Valve guide driver, 5.5 mm 07742-0010100

After '05; EX:

Valve guide driver, 5.0 mm 07942-MA60000



Remove the guides from the freezer.

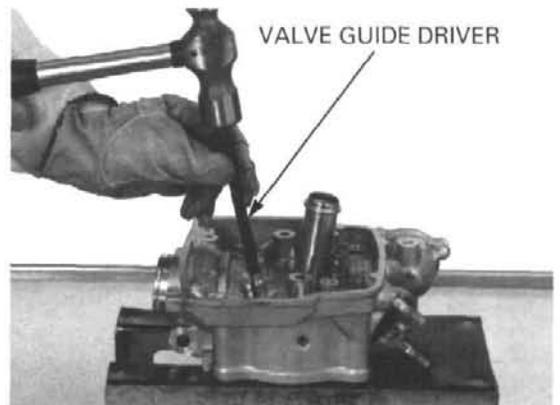
While the cylinder head is still heated, drive new valve guides into the cylinder head from the camshaft side until the exposed height is at the specified value (at the mark).

TOOL:

Valve guide driver, 5.5 mm 07742-0010100

After '05; EX:

Valve guide driver 07743-0020000
not available in U.S.A



VALVE GUIDE PROJECTION:

'04 - '05;

IN: 16.8 - 17.2 mm (0.66 - 0.68 in)

EX: 17.9 - 18.3 mm (0.70 - 0.72 in)

After '05;

IN: 16.1 - 16.3 mm (0.63 - 0.64 in)

EX: 17.9 - 18.1 mm (0.70 - 0.71 in)

Let the cylinder head cool to room temperature.

Take care not to tilt or lean the reamer in the guide while reaming. Use cutting oil on the reamer during this operation.

Ream the new valve guides.

Insert the reamer from the combustion chamber side of the cylinder head and always rotate the reamer clockwise.

TOOL:

Valve guide reamer, 5.5 mm 07984-2000001 or 07984-200000D (U.S.A. only)

After '05; EX:

Valve guide reamer, 5.0 mm 07984-MA60001 or 07984-MA6000D (U.S.A. only)



Clean the cylinder head thoroughly to remove any metal particles after reaming and reface the valve seat (page 11-20).

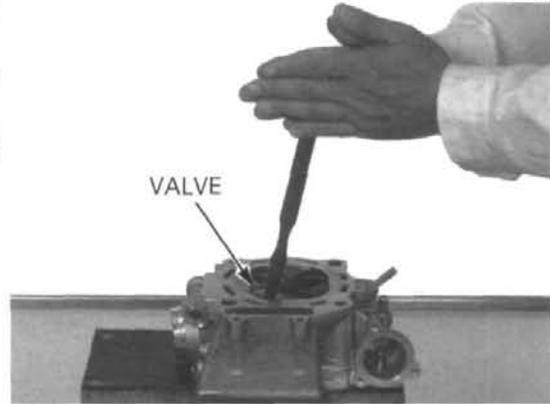
VALVE SEAT INSPECTION/REFACING

Clean the intake and exhaust valves thoroughly to remove carbon deposits.

Apply a light coat of Prussian Blue to each valve seat.

Tap the valve against the valve seat several times without rotating the valve, to check for proper valve seat contact.

VALVE



The valve cannot be ground. If the valve face is burned or badly worn or if it contacts the seat unevenly, replace the valve.

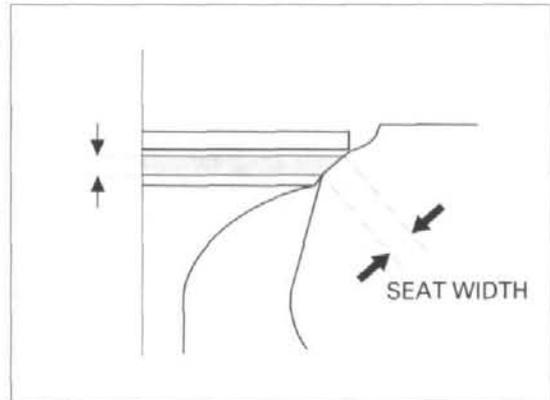
Remove the valve and inspect the valve seat face. The valve seat contact should be within the specified width and even all around the circumference.

STANDARD: IN: 1.1 – 1.3 mm (0.043 – 0.051 in)

EX: 1.3 – 1.5 mm (0.051 – 0.059 in)

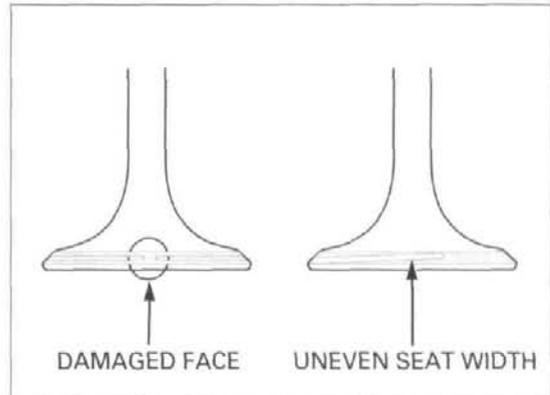
SERVICE LIMIT: IN/EX: 2.0 mm (0.08 in)

If the seat width is not within specification, reface the valve seat.

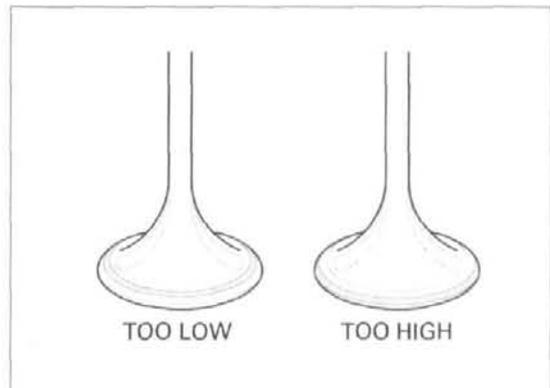


Inspect the valve seat face for:

- Damaged face:
 - Replace the valve and reface the valve seat.
- Uneven seat width:
 - Replace the valve and reface the valve seat.



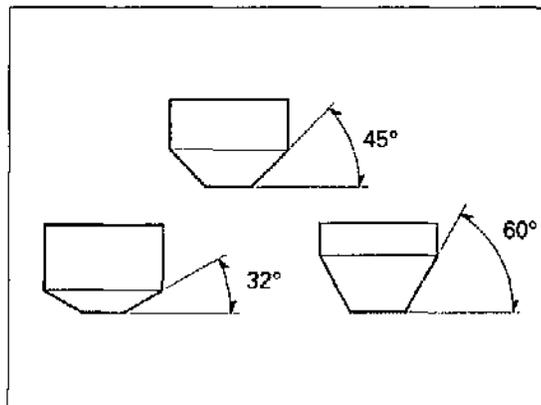
- Contact area (too high or too low)
 - Reface the valve seat.



REFACING

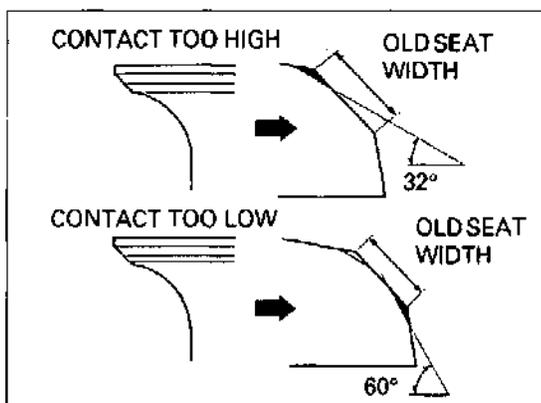
NOTE:

- Follow the refacer manufacturer's operating instructions.
- Be careful not to grind the seat more than necessary.



If the contact area is too high on the valve, the seat must be lowered using a 32° flat cutter.

If the contact area is too low on the valve, the seat must be raised using a 60° interior cutter.

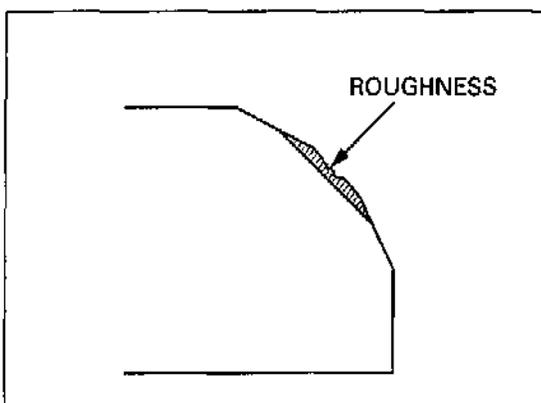


Use a 45° seat cutter to remove any roughness or irregularities from the seat.

TOOLS:

- Seat cutter, 35 mm (45° IN) 07780-0010400
- Seat cutter, 33 mm (45° EX) 07780-0010800
- Cutter holder, 5.5 mm (IN) 07781-0010101
- Cutter holder, 5.0 mm (After '05; EX) 07781-0010400

or equivalent commercially available in U.S.A.

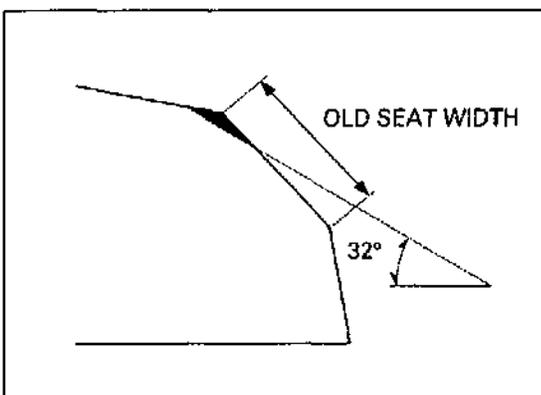


Using a 32° flat cutter, remove 1/4 of the existing valve seat material.

TOOLS:

- Flat cutter, 36 mm (32° IN) 07780-0013500
- Flat cutter, 33 mm (32° EX) 07780-0012900
- Cutter holder, 5.5 mm (IN) 07781-0010101
- Cutter holder, 5.0 mm (After '05; EX) 07781-0010400

or equivalent commercially available in U.S.A.



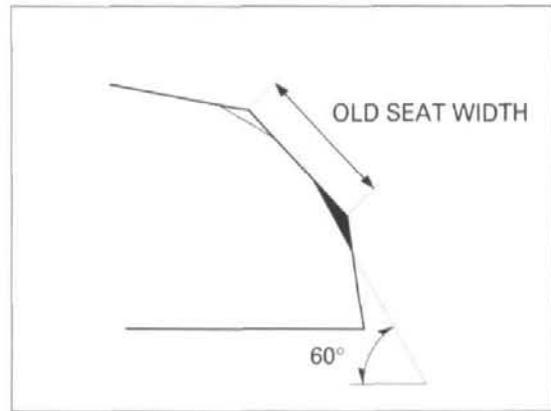
CYLINDER HEAD/VALVE

Using a 60° interior cutter, remove 1/4 of the existing valve seat material.

TOOLS:

Interior cutter, 37.5 mm (60° IN) 07780-0014100
Interior cutter, 34 mm (60° EX) 07780-0014700
Cutter holder, 5.5 mm 07781-0010101
Cutter holder, 5.0 mm
(After '05; EX) 07781-0010400

or equivalent commercially available in U.S.A.

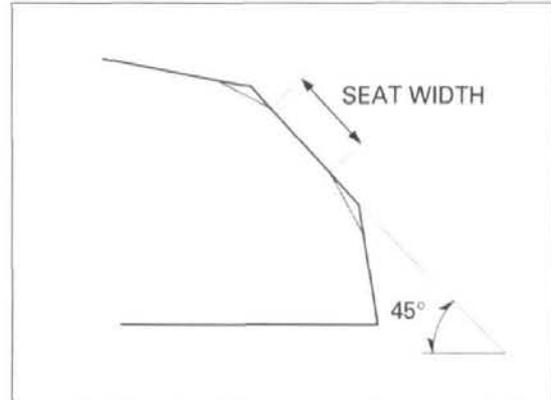


Using a 45° seat cutter, cut the seat to the proper width.

VALVE SEAT WIDTH:

IN: 1.1 – 1.3 mm (0.043 – 0.051 in)
EX: 1.3 – 1.5 mm (0.051 – 0.059 in)

Make sure that all pitting and irregularities are removed.



'04 – '05; INTAKE & EXHAUST SIDE and After '05; EXHAUST SIDE:

After cutting the seat, apply lapping compound and engine oil to the valve face, and lap the valve using light pressure.

After lapping, wash any residual compound off the cylinder head and valve. Recheck the seat contact after lapping.

NOTICE

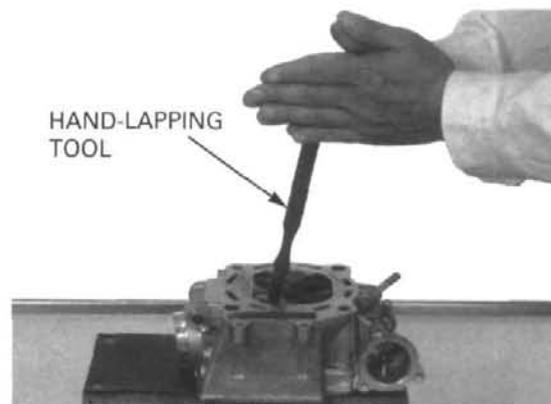
- Excessive lapping pressure may deform or damage the seat.
- Change the angle of lapping tool frequently to prevent uneven seat wear.
- Do not allow lapping compound to enter the guides.

After '05; INTAKE SIDE:

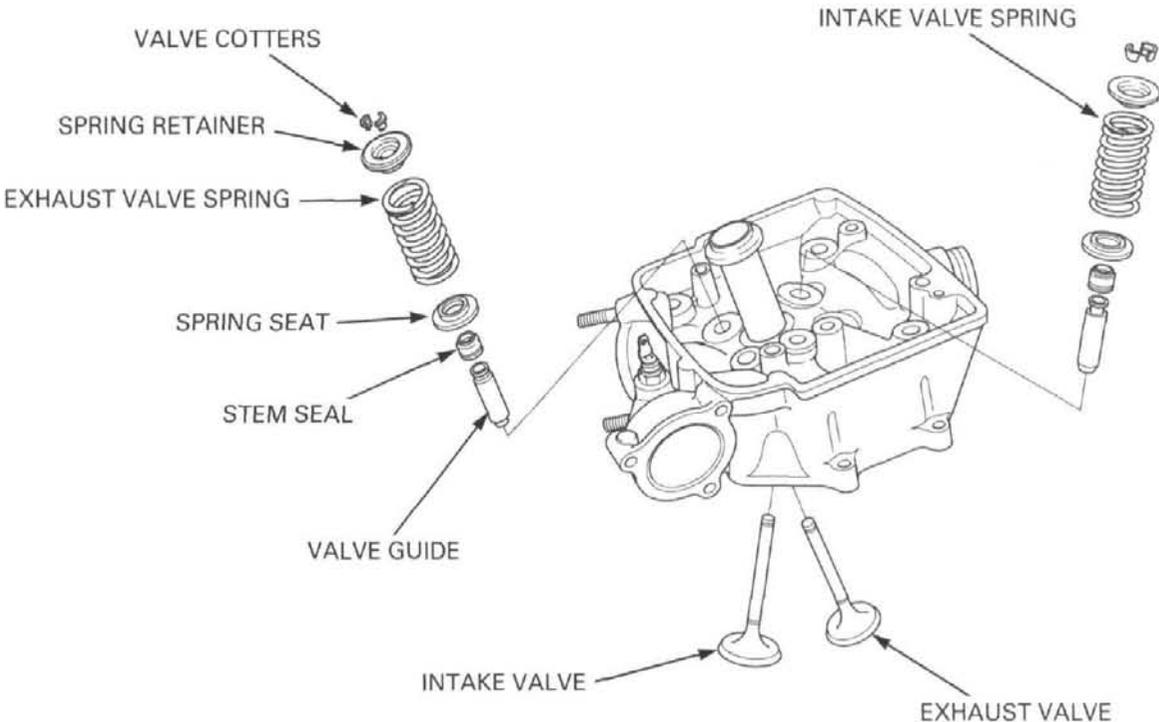
After refacing, wash the cylinder head and valve.

NOTICE

- Do not lap the intake valves. They are titanium and have a thin oxide coating. Lapping will damage this coating.
- Use the intake valve as a new one.



CYLINDER HEAD ASSEMBLY

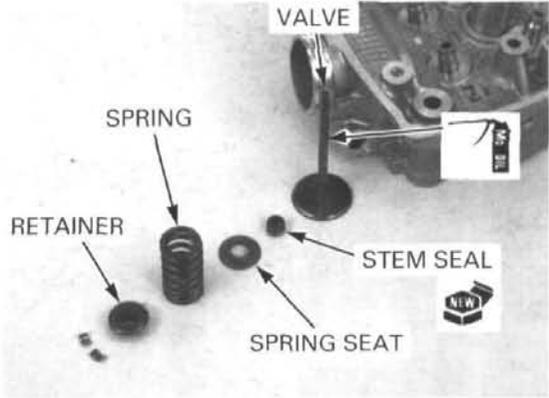


Blow through the oil passage in the cylinder head with compressed air.

Install the spring seats and new stem seals.

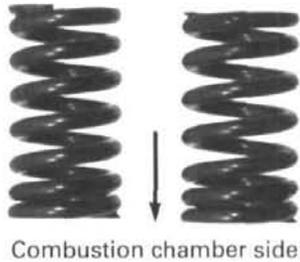
Lubricate the valve stem sliding surface with molybdenum oil solution.

Insert the valve into the guide while turning it slowly to avoid damaging to the stem seal.



Install the intake and exhaust valve springs with the tightly wound coils facing the combustion chamber.

Install the spring retainer.



CYLINDER HEAD/VALVE

To prevent loss of tension, do not compress the valve springs more than necessary.

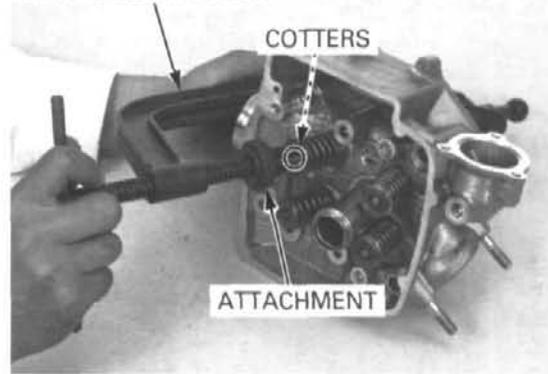
Install the valve cotters using the valve spring compressor.

TOOLS:

Valve spring compressor
Compressor attachment

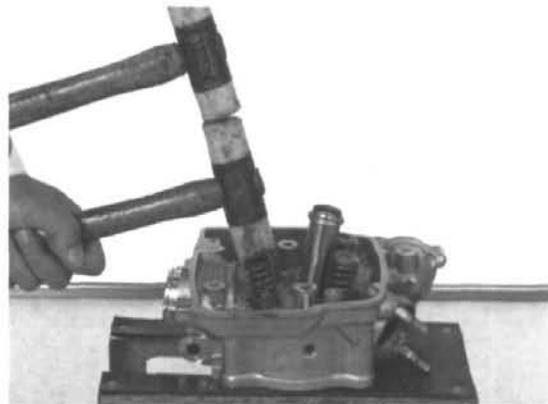
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SPRING COMPRESSOR



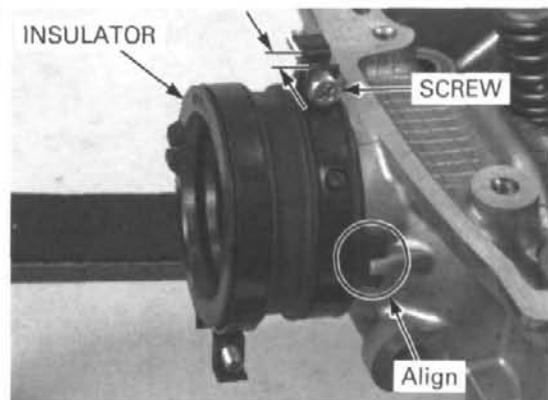
Support the cylinder head so the valve heads will not contact anything that cause damage.

Tap the valve stems gently with two plastic hammers to seat the cotters firmly.



'04 - '05: Install the carburetor insulator, aligning the groove with the lug on the cylinder head. Tighten the band screw until the ends clearance is 7 ± 1 mm (0.28 ± 0.04 in).

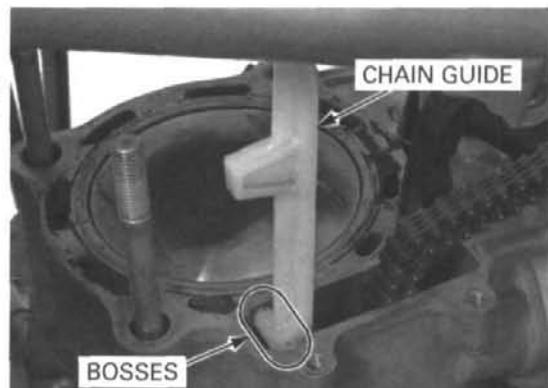
Install the cylinder head (page 11-24).



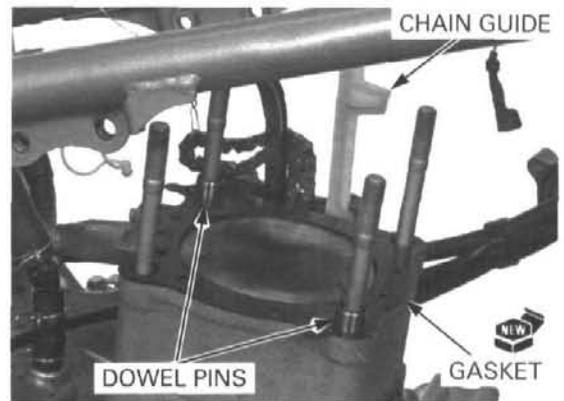
CYLINDER HEAD INSTALLATION

Clean the gasket mating surfaces of the cylinder and cylinder head, being careful not to damage them.

Install the cam chain guide by aligning the guide end with the groove in the crankcase and the bosses with the grooves in the cylinder.



Install the two dowel pins and a new gasket.

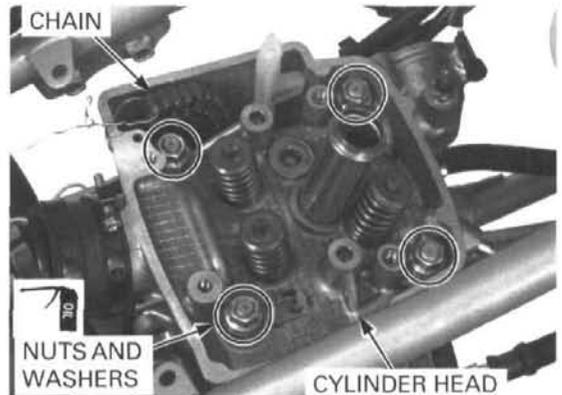


Route the cam chain through the cylinder head and install the cylinder head.

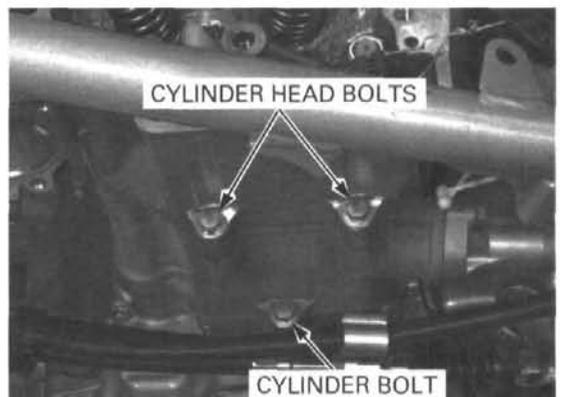
Apply engine oil to the threads and seating surfaces of the cylinder head nuts and install them with the washers.

Tighten the four nuts in a crisscross pattern in several steps.

TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)



Install the two cylinder head bolts. Tighten the cylinder bolt and head bolts alternately.



CYLINDER HEAD/VALVE

Install the following:

- The hanger plates are identified by the marks;
- L: left side
 - R: right side
- engine hanger plates with the two bolts
 - engine hanger bolt (from the left side), spacers and nut
 - hose clip ('04 - '05 model only)

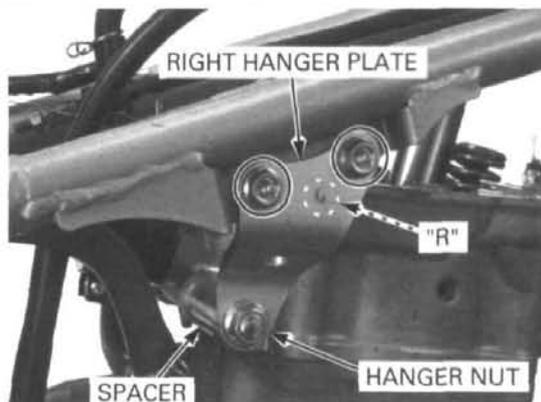
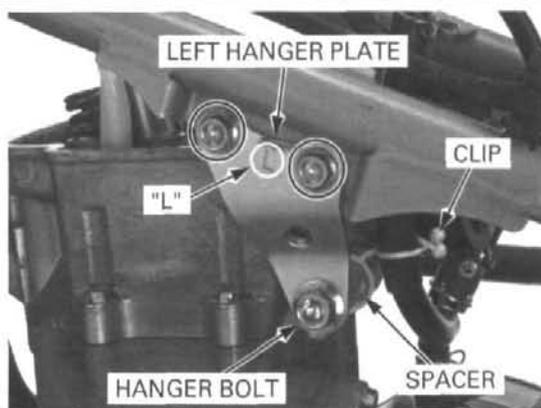
NOTE:

The identified marks of after '05 model are inside of the hanger plates.

Tighten the fasteners in order as follows.

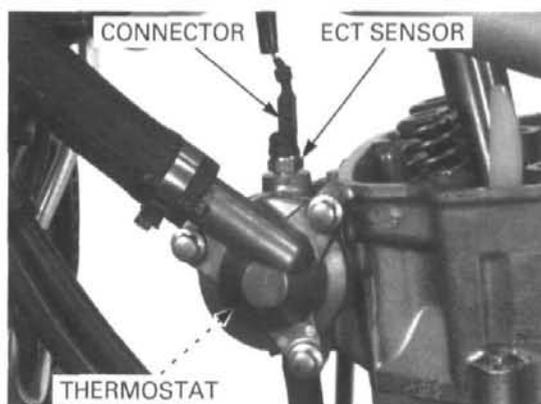
TORQUE:

- Hanger plate bolt: 26 N·m (2.7 kgf·m, 20 lbf·ft)
- Engine hanger nut: 54 N·m (5.5 kgf·m, 40 lbf·ft)

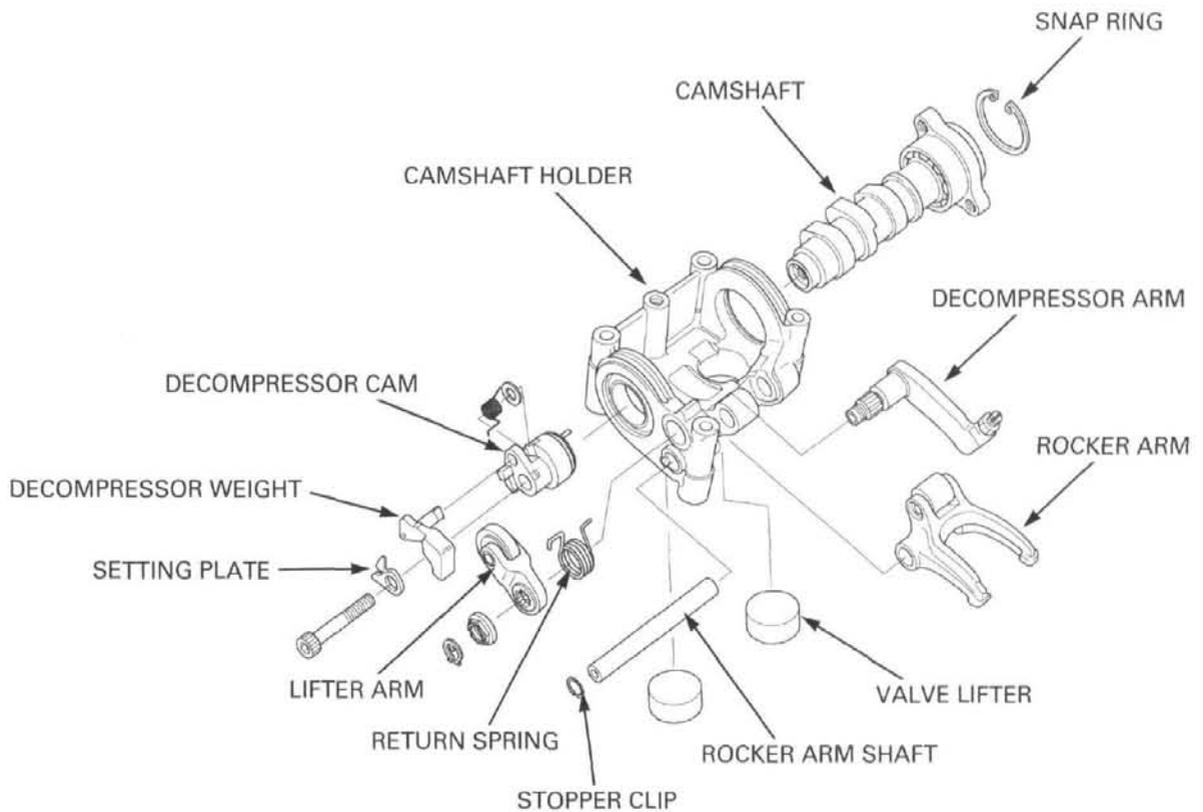


Install the following:

- engine coolant temperature (ECT) sensor ('04 - '05: page 20-24, After '05: page 24-11).
- ECT sensor connector
- thermostat (page 9-9)
- carburetor ('04 - '05: page 7-21, After '05: page 8-22)
- exhaust system (page 3-12)
- camshaft holder assembly (page 11-29)



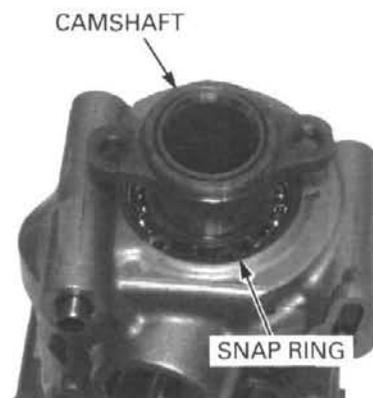
CAMSHAFT/DECOMPRESSOR ASSEMBLY



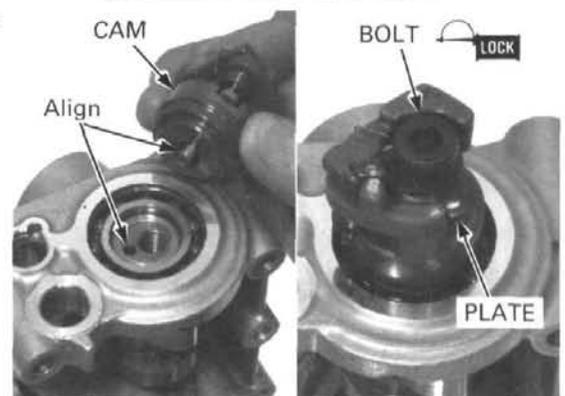
Blow through the oil passage in the camshaft holder with compressed air.

Install the following:

- camshaft
- snap ring (into the groove properly)

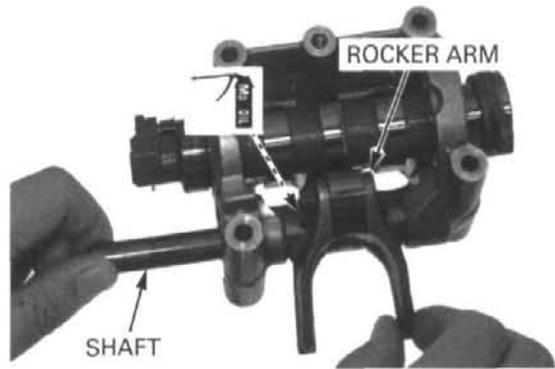


- Tighten the bolt after installing the camshaft holder onto the engine.*
- decompressor cam assembly (by aligning the dowel pin with the hole in the camshaft)
 - setting plate
 - bolt (apply locking agent to the threads)



CYLINDER HEAD/VALVE

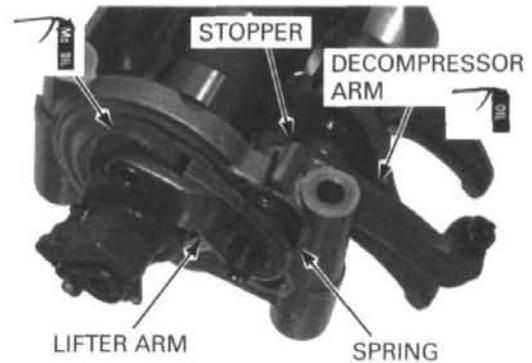
- rocker arm (apply molybdenum oil solution to the pivot)
- rocker arm shaft



- new stopper clip



- decompressor arm (apply engine oil to the pivot surface)
- return spring (hang the bent end over the lifter arm and set the straight end against the stopper)
- lifter arm (so the arms are lined up straight, and apply molybdenum oil solution to the roller surface)

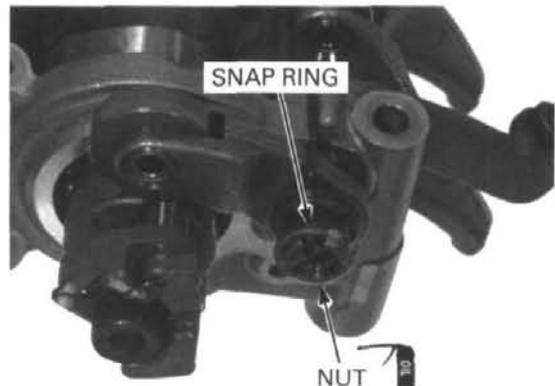


- nut (apply engine oil to the threads and seating surface)

TORQUE: 22 N·m (2.2 kgf·m, 16 lbf·ft)

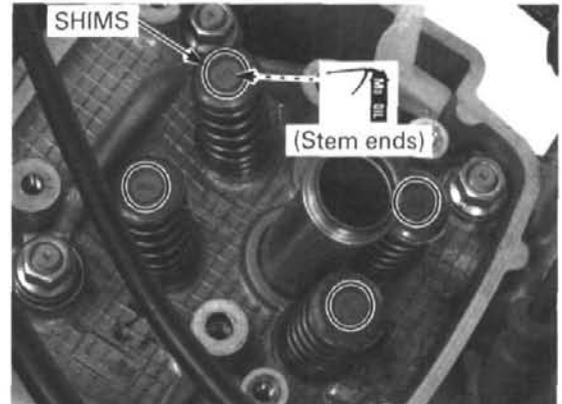
- snap ring

Install the camshaft holder assembly (page 11-29).



CAMSHAFT HOLDER INSTALLATION

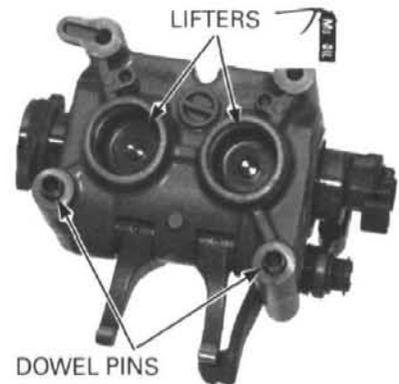
Apply molybdenum oil solution to the valve stem ends.
Install the valve shims in their original locations.



Be careful not to damage the sliding surfaces of the lifters and bores.

Coat the outer surfaces of the valve lifters with molybdenum oil solution.
Install the valve lifters in their original lifter bores in the camshaft holder.

Install the dowel pins.



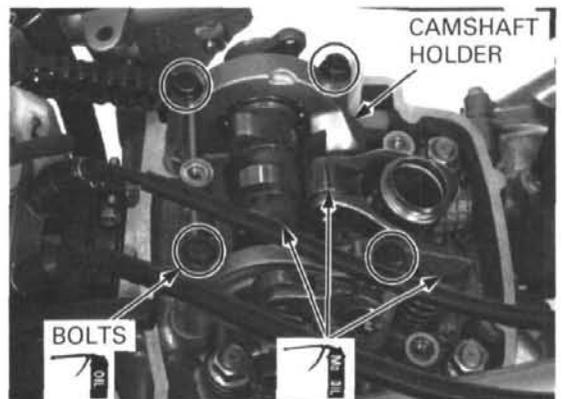
Lubricate the cam lobes, roller and shim contact areas of the rocker arms with molybdenum oil solution.

Install the camshaft assembly onto the cylinder head with the cam lobes facing up.

Apply engine oil to the holder bolt threads and seating surface.

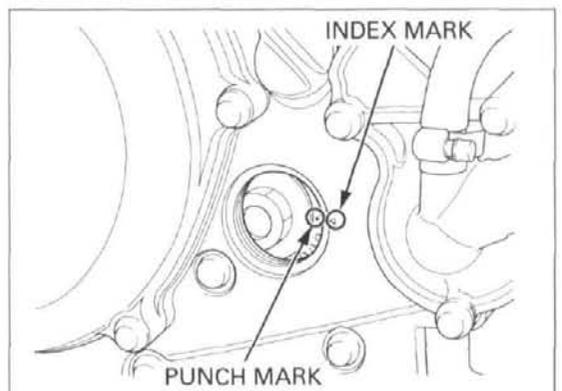
Install the four bolts and tighten them.

TORQUE: 14 N·m (1.4 kgf·m, 10 lbf·ft)



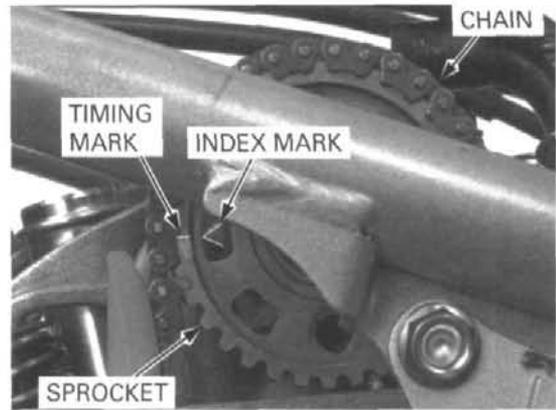
Take care not to jam the cam chain at the crankshaft when turning.

Turn the crankshaft clockwise and align the punch mark on the primary drive gear with the index mark on the right crankcase cover.



CYLINDER HEAD/VALVE

Carefully set the cam sprocket onto the cam chain so the timing marks on the sprocket are aligned with the index marks on the camshaft holder. Install the cam sprocket onto the camshaft.



Make sure the timing marks on the sprocket align with the index marks when the punch mark on the primary drive gear is aligned with the index mark.

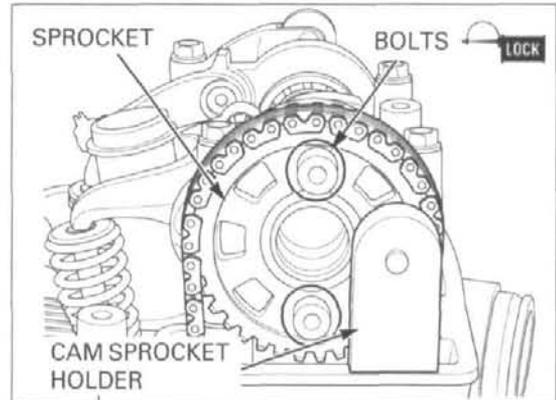
Apply locking agent to the sprocket bolt threads. Align the bolt holes in the sprocket and camshaft flange. Install the sprocket bolts, being careful not to let them fall into the crankcase.

Tighten the sprocket bolts while holding the camshaft with the special tool.

TOOL:

Cam sprocket holder **07AMB-MEBA100**
(U.S.A only)

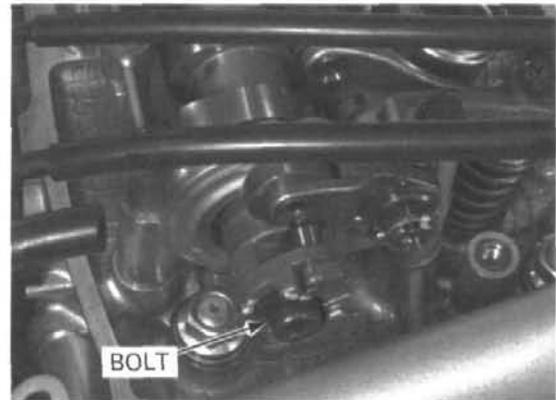
TORQUE: 20 N·m (2.0 kgf·m, 14 lbf·ft)



If the decompressor cam was removed, tighten the socket bolt while holding the crankshaft.

TORQUE: 25 N·m (2.5 kgf·m, 18 lbf·ft)

Check the valve clearances and adjust if necessary (page 4-10).

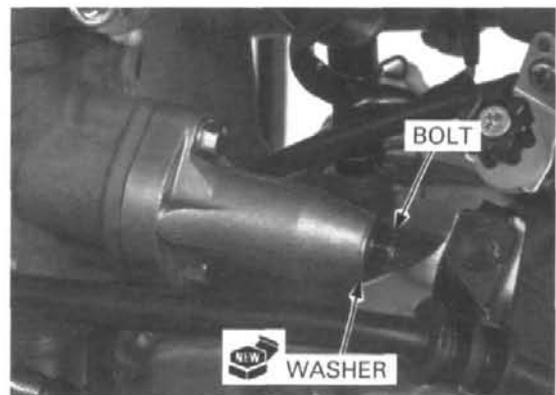


Remove the stopper tool (tensioner holder) from the tensioner lifter.

Install the sealing bolt with a new sealing washer and tighten it.

Install the following:

- crankshaft hole cap (page 4-14)
- spark plug (page 4-9)
- cylinder head cover (page 11-31)



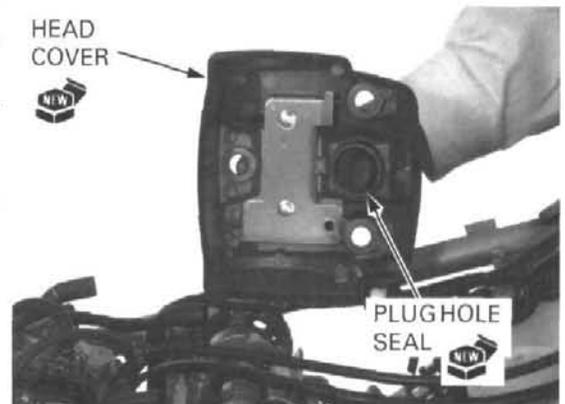
CYLINDER HEAD COVER INSTALLATION

Clean the mating surfaces of the cylinder head and cover thoroughly, being careful not to damage them.

Apply adhesive to the gasket groove in the cylinder head cover and install a new gasket.

Install a new rubber seal into spark plug hole.

Install the head cover by aligning the plug hole with the plug sleeve, being careful not to damage the rubber seal.



Install the washer with the "UP" mark facing the bolt head.

Install the cover bolts with the special washers.



Tighten the three cover bolts in several steps.

TORQUE: 9.8 N·m (1.0 kgf·m, 7 lbf·ft)

Connect the crankcase breather hose.

Install the following:

- spark plug cap
- heat guard plate ('04 - '05: page 3-9, After '05: page 3-9)
- fuel tank (page 3-9)

