

## **7. CYLINDER HEAD/VALVES**

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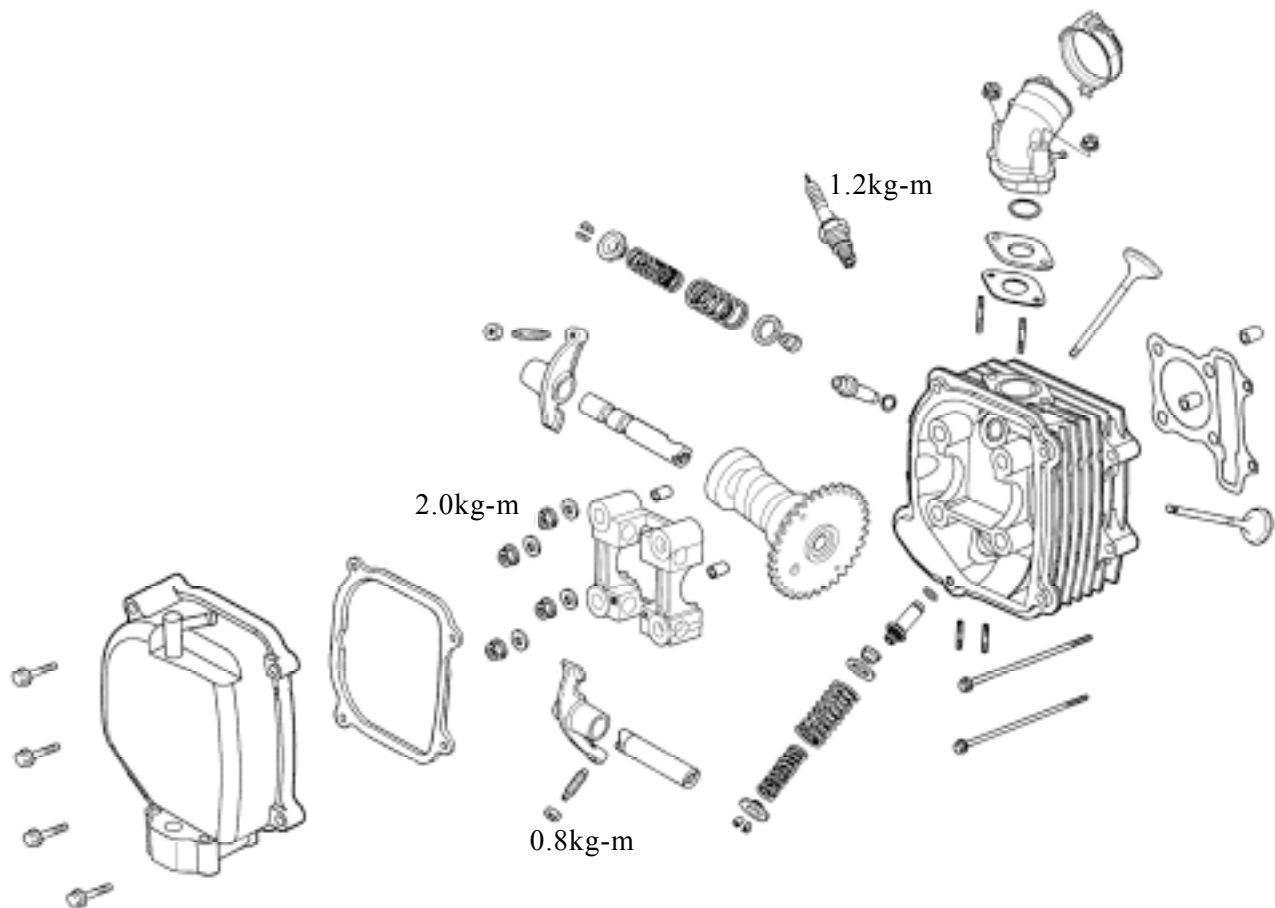
# **7**

### **CYLINDER HEAD/VALVES**

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## 7. CYLINDER HEAD/VALVES



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### SERVICE INFORMATION

#### GENERAL INSTRUCTIONS

- The cylinder head can be serviced with the engine installed in the frame.
- When assembling, apply molybdenum disulfide grease or engine oil to the valve guide movable parts, valve arm and camshaft sliding surface for initial lubrication.
- The camshaft is lubricated by engine oil through the cylinder head engine oil passages. Clean the oil passages before assembling the cylinder head.
- After disassembly, clean the removed parts and dry them with compressed air before inspection.
- After removal, mark and arrange the removed parts in order. When assembling, install them in the reverse order of removal.

#### SPECIFICATIONS

Item		Standard (mm)		Service Limit (mm)	
		125cc	150cc	125cc	150cc
Valve clearance (cold)	IN	0.10	0.10	—	—
	EX	0.10	0.10	—	—
Cylinder head compression pressure		13 (kg/cm <sub>2</sub> )	15 (kg/cm <sub>2</sub> )	—	—
Cylinder head warpage		—	—	—	—
Camshaft cam height	IN	29.7064	29.803	29.3	29.4
	EX	29.4251	29.4388	29.15	29.05
Valve rocker arm I.D.	IN	10.000-10.015		10.10	
	EX	10.00-10.015		10.10	
Valve rocker arm shaft O.D.	IN	9.972-9.987		9.91	
	EX	9.972-9.987		9.91	
Valve seat width	IN	1.0		1.8	
	EX	1.0		1.8	
Valve stem O.D.	IN	4.975-4.990		4.90	
	EX	4.975-4.990		4.90	
Valve guide I.D.	IN	5.000-5.012		5.30	
	EX	5.000-5.012		5.30	
Valve stem-to-guide clearance	IN	0.10-0.037		0.08	
	EX	0.030-0.057		0.10	

## 7. CYLINDER HEAD/VALVES

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### TORQUE VALUES

Cylinder head nut	2.0kg-m	Apply engine oil to threads
Valve clearance adjusting nut	0.8kg-m	Apply engine oil to threads

### TROUBLESHOOTING

- The poor cylinder head operation can be diagnosed by a compression test or by tracing engine top-end noises.

#### Poor performance at idle speed

- Compression too low

#### Compression too low

- Incorrect valve clearance adjustment
- Burned or bend valves
- Incorrect valve timing
- Broken valve spring
- Poor valve and valve seat contact
- Leaking cylinder head gasket
- Warped or cracked cylinder head contact surface
- Poorly installed spark plug

#### Compression too high

- Excessive carbon build-up in combustion chamber

#### White smoke from exhaust muffler

- Worn valve stem or valve guide
- Damaged valve stem seal

#### Abnormal noise

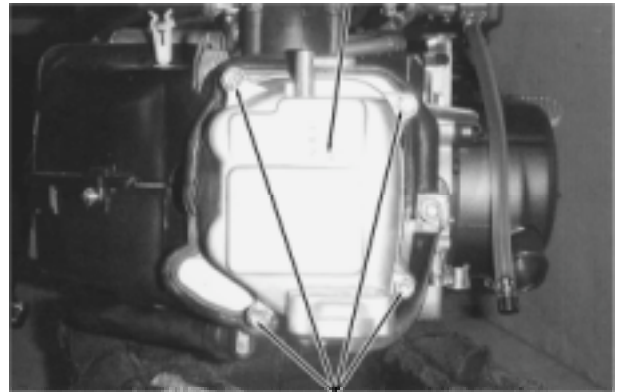
- Incorrect valve clearance adjustment
- Sticking valve or broken valve spring
- Damaged or worn camshaft
- Worn cam chain guide
- Worn camshaft and rocker arm

## 7. CYLINDER HEAD/VALVES

### CAMSHAFT REMOVAL

Remove the center cover.  
Remove the four cylinder head cover bolts to remove the cylinder head cover.

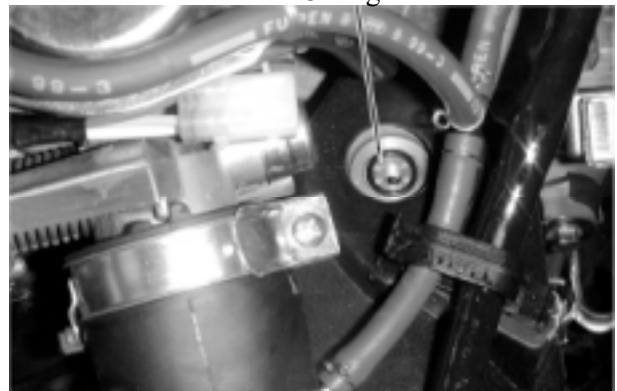
Cylinder Head Cover



bolt

Remove the cam chain tensioner cap screw and the O-ring.

O-ring



Turn the cam chain tensioner screw clockwise to tighten it.

Tensioner Screw



Camshaft Gear

Turn the flywheel counterclockwise so that the "T" mark on the flywheel aligns with the index mark on the crankcase to bring the round hole on the camshaft gear facing up to the top dead center on the compression stroke.



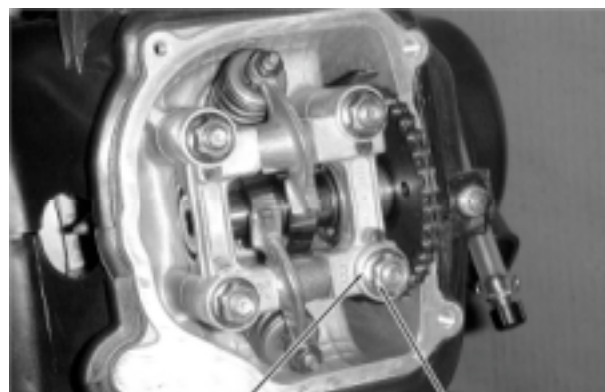
Round Hole

Punch Marks

## 7. CYLINDER HEAD/VALVES

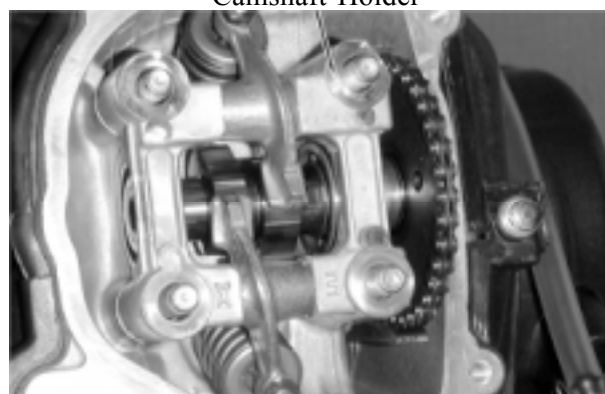
Remove the four cylinder head nuts and washers.

- \* Diagonally loosen the cylinder head nuts in 2 or 3 times.



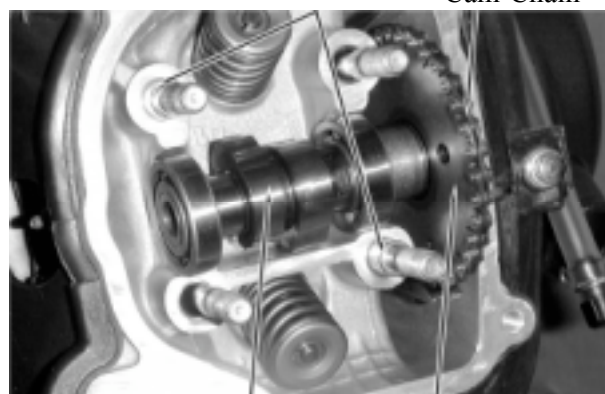
Washer Nut  
Camshaft Holder

Remove the camshaft holder and dowel pins.



Dowel Pins Cam Chain

Remove the camshaft gear from the cam chain and remove the camshaft.



Camshaft Camshaft Gear

### CAMSHAFT INSPECTION

Check each cam lobe for wear or damage.  
Measure the cam lobe height.

#### Service Limits:

( 125 cc )

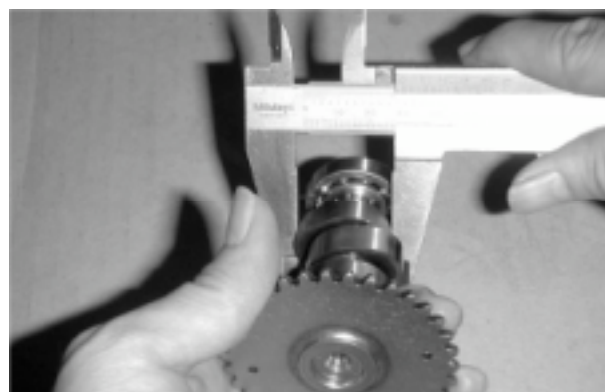
IN : 29.30mm replace if below

EX: 29.15mm replace if below

( 150 cc )

IN : 29.40mm replace if below

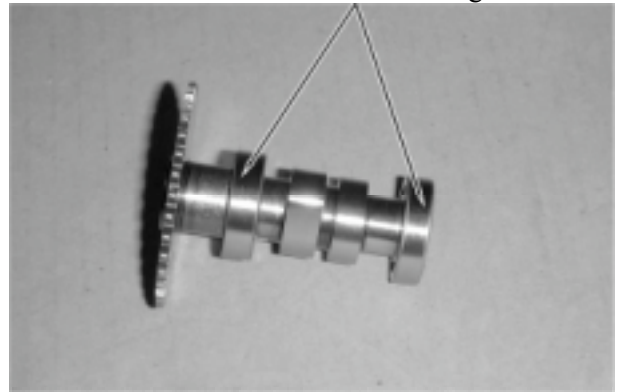
EX: 29.05mm replace if below



## 7. CYLINDER HEAD/VALVES

Check each camshaft bearing for play or damage. Replace the camshaft assembly with a new one if the bearings are noisy or have excessive wear.

Camshaft Bearings

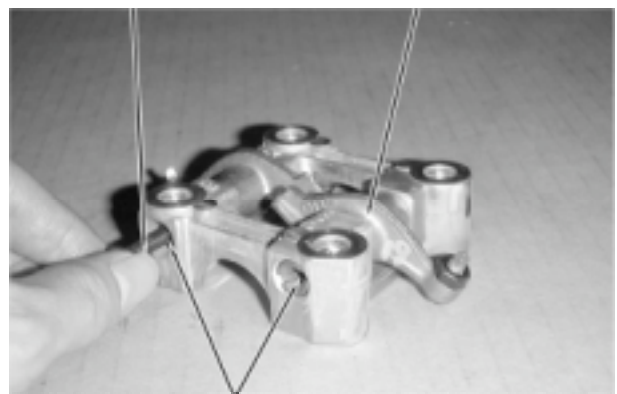


### CAMSHAFT HOLDER DISASSEMBLY

Take out the valve rocker arm shafts using a 5mm bolt.  
Remove the valve rocker arms.

5mm Bolt

Rocker Arm



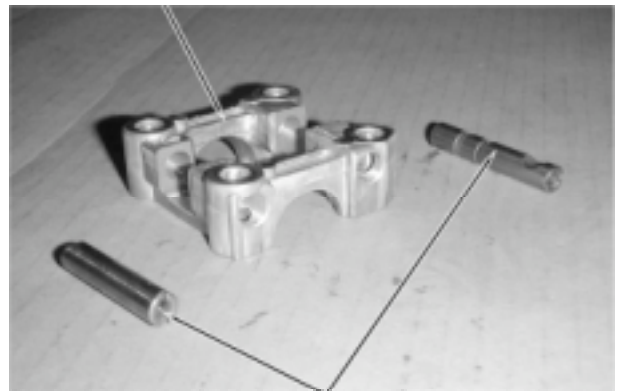
Rocker Arm Shaft

### CAMSHAFT HOLDER INSPECTION

Inspect the camshaft holder, valve rocker arms and rocker arm shafts for wear or damage.

- \* If the valve rocker arm contact surface is worn, check each cam lobe for wear or damage.

Camshaft Holder



Rocker Arm Shafts

Measure the I.D. of each valve rocker arm.

**Service Limits:** IN: 10.10mm replace if over

EX: 10.10mm replace if over

Measure each rocker arm shaft O.D.

**Service Limits:** IN: 9.91mm replace if below

EX: 9.91mm replace if below





## 7. CYLINDER HEAD/VALVES

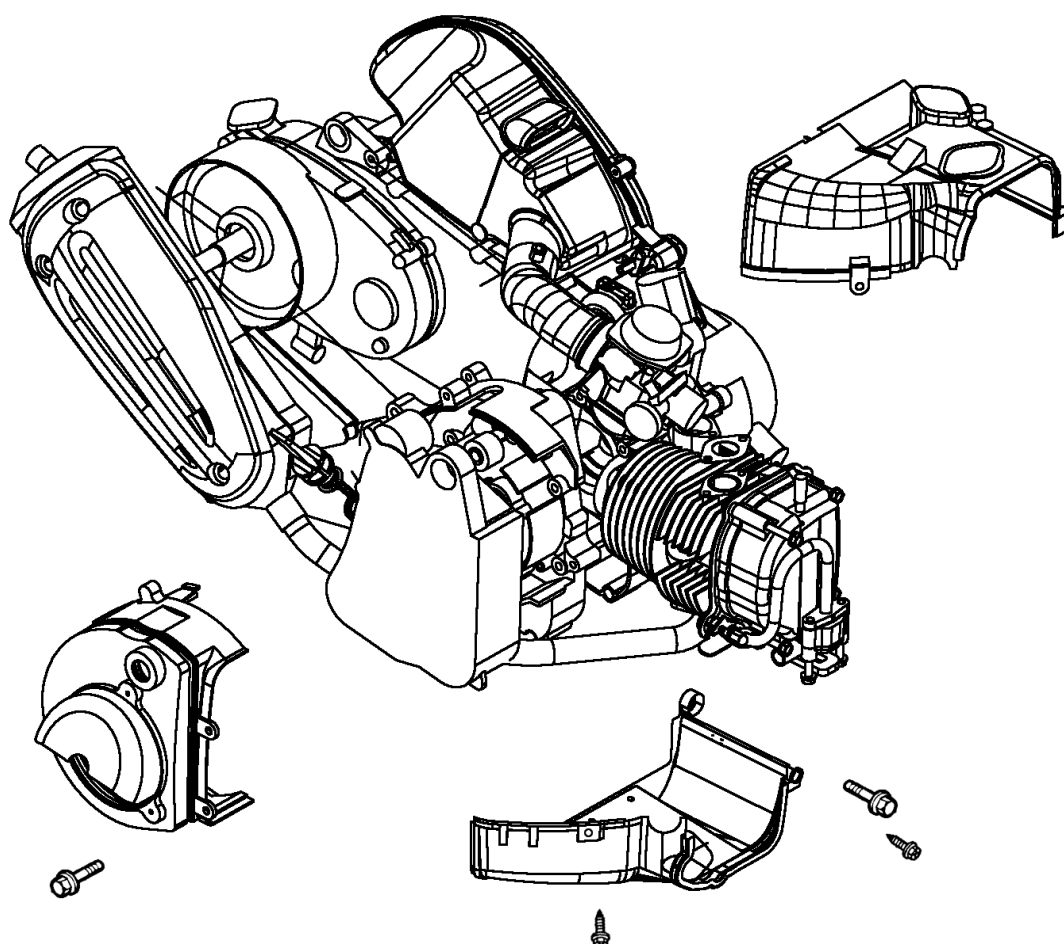
### CYLINDER HEAD REMOVAL

Remove the camshaft. (⇒ 7-4)  
 Remove the carburetor. (⇒ 5-4)  
 Remove the exhaust muffler.  
 Remove the carburetor intake manifold.

Intake Manifold



Remove the cooling fan cover. (⇒ 14-7)  
 Remove the engine cover bolts and screws.  
 Separate the engine cover joint claws.

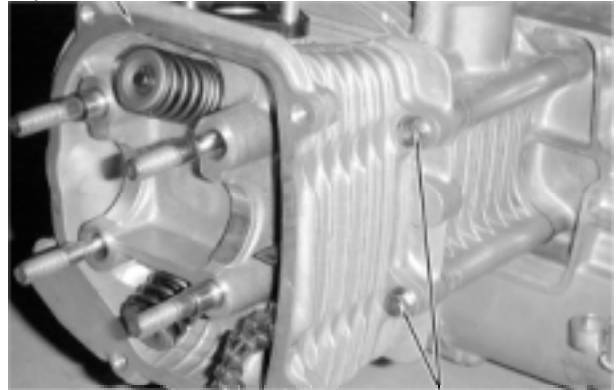




## 7. CYLINDER HEAD/VALVES

Remove the two cylinder head bolts.  
Remove the cylinder head.

Cylinder Head



Remove the dowel pins and cylinder head gasket.  
Remove the cam chain guide.

Bolts  
Dowel Pins Cylinder Head Gasket



Cam Chain Guide

Remove all gasket remnants from the cylinder surface.

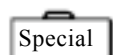
- \* • Avoid damaging the cylinder contact surface.
- Be careful not to drop any gasket remnants into the engine.



### CYLINDER HEAD DISASSEMBLY

Remove the valve spring cotters, retainers, springs, spring seats and valve stem seals using a valve spring compressor.

- \* • Be sure to compress the valve springs with a valve spring compressor.
- Mark all disassembled parts to ensure correct reassemble.



Valve Spring Compressor

Valve Spring Compressor Attachment

Valve Spring Compressor



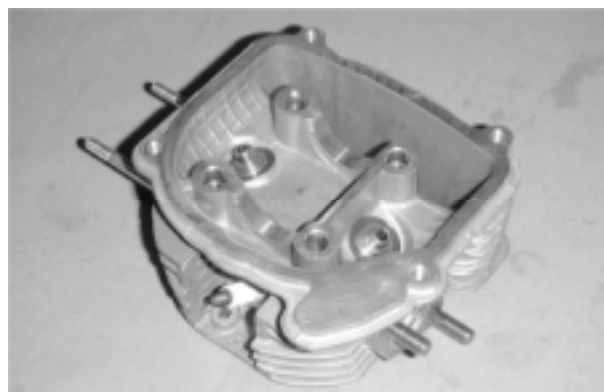
Valve Spring Compressor Attachment

## 7. CYLINDER HEAD/VALVES

Remove carbon deposits from the combustion chamber.

Clean off any gasket remnants from the cylinder head contact surface.

- \* Be careful not to damage the cylinder head mating surface.



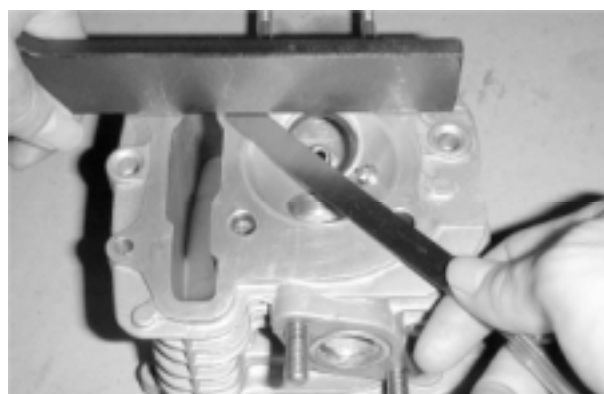
### INSPECTION

#### CYLINDER HEAD

Check the spark plug hole and valve hole areas for cracks.

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

**Service Limit:** 0.05mm repair or replace if over



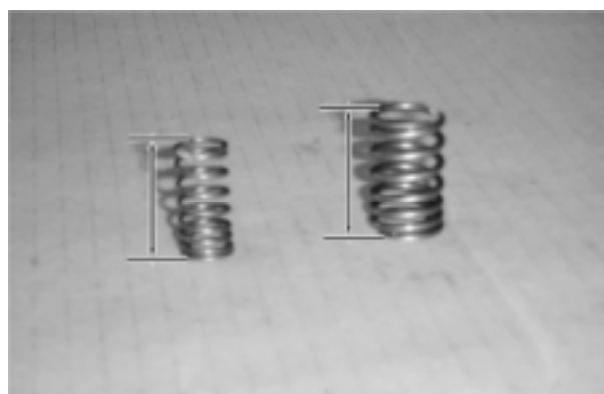
#### VALVE SPRING FREE LENGTH

Measure the free length of the inner and outer valve springs.

#### Service Limits:

Inner : 31.2mm replace if below

Outer : 34.1mm replace if below



#### VALVE /VALVE GUIDE

Inspect each valve for bending, burning, or abnormal stem wear.

Check valve movement in the guide.

Measure each valve stem O.D.

**Service Limits:** IN : 4.90mm replace if below

EX: 4.90mm replace if below



## 7. CYLINDER HEAD/VALVES

### CYLINDER HEAD ASSEMBLY

Install the valve spring seats and valve stem seals.

Lubricate each valve stem with engine oil and insert the valves into the valve guides.

Be sure to install new valve stem seals.

Tap the valve stems gently with a plastic hammer for 2\_ 3 times to firmly seat the cotters.

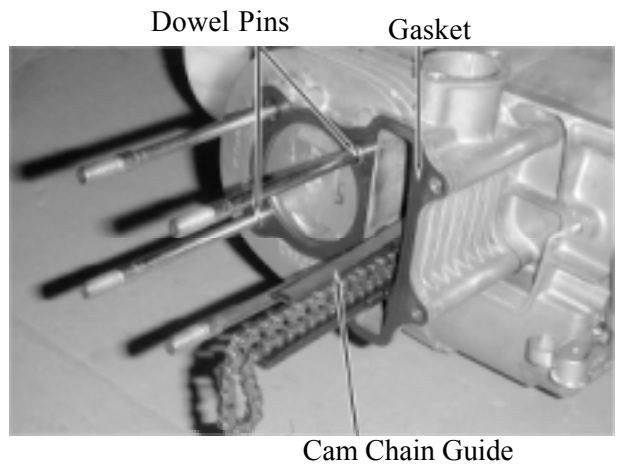
\* Be careful not to damage the valves.



### CYLINDER HEAD INSTALLATION

Install the dowel pins and a new cylinder head gasket.

Install the cam chain guide.

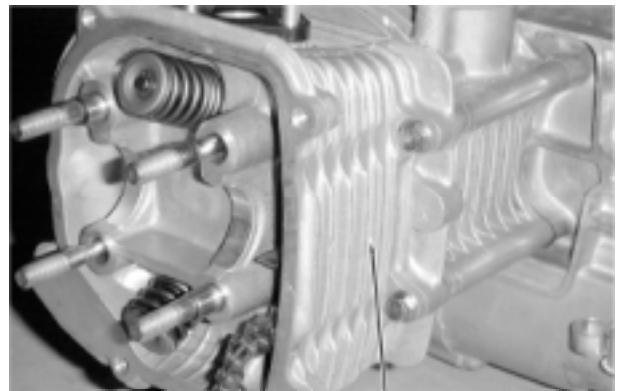


Dowel Pins

Gasket

Cam Chain Guide

Install the cylinder head.



Cylinder Head

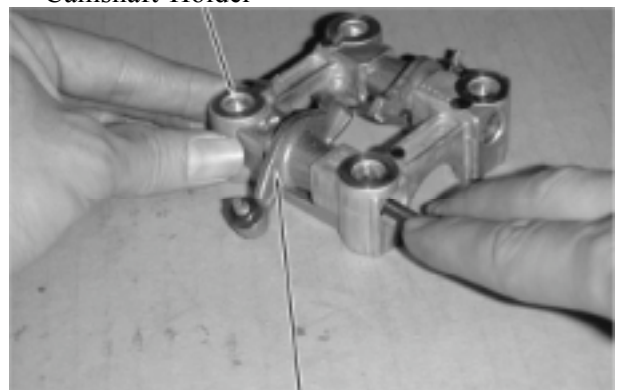
Camshaft Holder

### CAMSHAFT HOLDER ASSEMBLY

Install the exhaust valve rocker arm to the "EX" mark side of the camshaft holder.

Install the intake valve rocker arm and the rocker arm shafts.

\* • Align the cutout on the front end of the intake valve rocker arm shaft with the bolt of the camshaft holder.  
• Align the cross cutout on the exhaust valve rocker arm shaft with the bolt of the camshaft holder.



Valve Rocker Arm

## 7. CYLINDER HEAD/VALVES

### CAMSHAFT INSTALLATION

Turn the flywheel so that the “T” mark on the flywheel aligns with the index mark on the crankcase.

Keep the round hole on the camshaft gear facing up and align the punch marks on the camshaft gear with the cylinder head surface (Position the intake and exhaust cam lobes down.) and install the camshaft onto the cylinder head.

Install the cam chain over the camshaft gear.

Cam Chain

Camshaft Gear

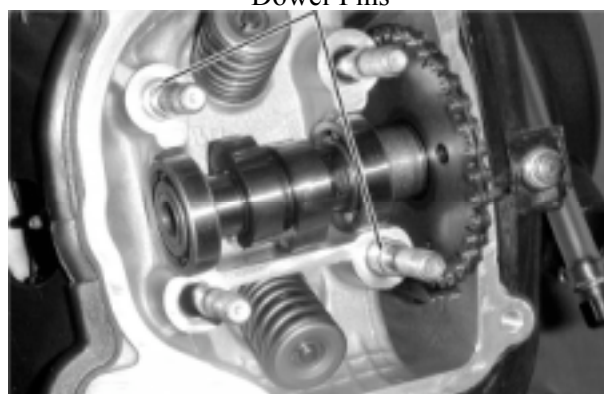


Round Hole

Punch Marks

Install the dowel pins.

Dowel Pins



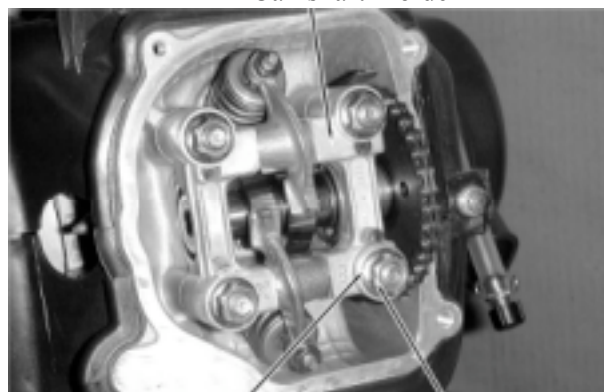
Install the camshaft holder, washers and nuts on the cylinder head.

Tighten the four cylinder head nuts and two bolts.

**Torque:** Cylinder head nut: 2.0kg-m

- \*
  - Apply engine oil to the threads of the cylinder head nuts.
  - Diagonally tighten the cylinder head nuts in 2\_ 3 times.

Camshaft Holder



Washer

Nut

Tensioner Screw

Adjust the valve clearance. (⇒3-5)

Turn the cam chain tension screw counter-clockwise to release it.





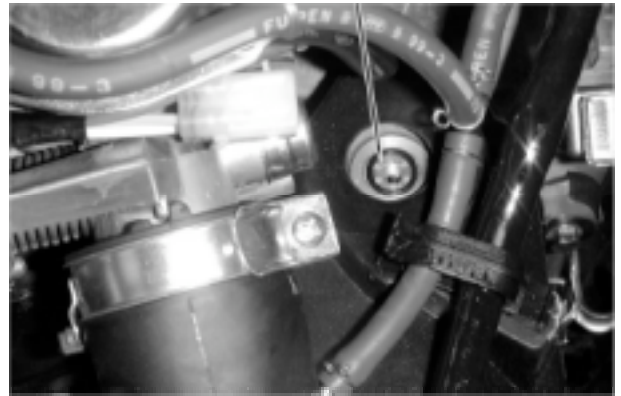
## 7. CYLINDER HEAD/VALVES

Apply engine oil to a new O-ring and install it.

Tighten the cam chain tension cap screw.

- \* Be sure to install the O-ring into the groove properly.

O-ring



Install a new cylinder head cover gasket and install the cylinder head cover.  
Install and tighten the cylinder head cover bolts.

- \* Be sure to install the gasket into the groove properly.

Cylinder Head Cover

