Strada 125ie E4

Engine Work Shop Manual

RIEJU

...for everyday adventure

Index

Main Technical Parameters

Main Technical Parameters

Main Technical Parameters

1. Main Technical Parameters

Item				Specification
Engine	Model number			ZS152FMI-5
	Type			Single-cylinder, water-cooling, four-stroke, camshaft upward
	Bore × stroke			Φ52.4×57.8mm
	Displacement			125ml
	Compression ratio			9.2:1
	Valve Timing	IN	OPEN	（5°BTDC）
			CLOSE	（37°ABDC）
		EX	OPEN	（50°BBDC）
			CLOSE	（3°ATDC）
	Max. power/corresponding speed			7.2(1±5%)kW/7500(1±5%) r/min
	Max. torque/corresponding speed			9.2(1±5%)N.m/6000(1±5%) r/min
	Idle speed			（1400±100） r /min
Transmission System	Clutch			Manual wet multi-plate
	Transmission			Constant mesh, two-stage transmission, 5-speed gearshift
	Gearshift method			1-N-2-3-4-5
	Primary reduction ratio			3.35（67/20）
	Gear ratio		1st	3.077（40/13）
			2nd	1.789(34/19)
			3rd	1.304(30/23)
			4th	1.091(24/22)
			5th	0.929(26/28)

2. Parameters of maintenance

Item			Standard	Service Limit
Engine oil	Specification		SJ 10W/40	1.2L
	Capacity	when filter is not removed	1	
		when filter is removed	1.1L	
		when engine is completely dry	1.2	
spark plug	Standard		CPR8EA-8(NGK)	
	Long hours at high speed		CPR9EA-9(NGK)	
	Spark Plug Gap		(0.8-1.0)mm	
Engine idle speed			（1400±100） r /min	

3. Cylinder Head and Valve

unit: mm

Item			Standard	Service Limit
Valve Clearance		Inlet	0.04-0.06	0.10
		Exhaust	0.04-0.06	0.15
Valve Stem Diameter		Inlet	4.975-4.990	4.92
		Exhaust	4.955-4.970	4.90
Valve Guide Inside Diameter		Inlet Exhaust	5.000-5.012	5.04
Valve/Valve Guide Clearance		Inlet	0.010-0.037	0.07
		Exhaust	0.030-0.057	0.09
Width of valve sealing strip			0.9-1.1	1.5
Valve Spring Free Length		In	38.5-39.5	37.8
		Outer	41.5-42.5	40.8
Rocker arm hole diameter			10.000-10.012	10.1
rocker shaft diameter			9.973-9.984	9.91
With the rocker arm and rocker arm shaft clearance			0.016-0.039	0.10
Camshaft	Cam Height	Inlet	31.830-31.930	31.8
		Exhaust	31.559-31.659	31.5

4. Cylinder and Piston

unit: mm

Item			Standard	Service Limit
Cylinder	Inner diameter of cylinder		Φ52.400~φ52.410	Φ52.5
	Roundness		0.004	0.10
	Planeness of cylinder face		0.03	0.10
Piston, Piston Ring and Piston Pin	Outer diameter of piston		Φ52.38~φ52.39	Φ52.3
	Inner diameter of piston pin hole		φ14.002~φ14.008	φ14.04
	Closure clearance of piston ring	Top	0.1~0.25	0.35
		second	0.15-0.30	0.4
		Oil	0.2~0.7	0.85
	Piston Ring/Groove Clearance:	Top	0.02~0.06	0.10
		second	0.02~0.06	0.10
	Piston/Cylinder Clearance		0.01~0.03	0.07
	Outer diameter of piston pin		φ13.994~φ14	φ13.96
	Clearance between piston pin and piston pin hole		0.002~0.014	0.04
Small End of Connecting Rod	Inner diameter		φ14.015~φ14.028	φ14.06
	Clearance between small end of connecting rod and piston pin		0.015~0.03	0.10

5. Clutch

unit: mm

Item		Standard	Service Limit
Clutch	Clutch Spring Free Length	41.1-41.9	40
	Friction Plate Thickness	2.92-3.08	2.6
	Planeness of clutch driven plate		0.20
	Driven gear inner hole diameter	Φ23.000~φ23.021	φ23.08
Shaft sleeve	Collar diameter	Φ22.960~φ22.975	Φ22.93
	Bushing aperture	Φ16.990~φ17.008	φ17.04
	The spindle diameter	Φ16.966~φ16.984	Φ16.95

6. Drive Train

unit: mm

Item			Standard	Service Limit
Crankshaft, Connecting Rods	Connecting Rod Big End:	Radial Clearance	0~0.008	0.03
		Side Clearance	0.1~0.35	0.5
	Crankshaft Runout		0.03	0.08
fork	Outer diameter of fork shaft		Φ9.966~φ9.984	Φ9.93
	Inner diameter of fork		Φ10.000~φ10.018	φ10.05
	Shift Fork Ear Thickness		4.93~5.00	4.5
Transmission	Gear tooth inner hole diameter	M4	Φ20.000~φ20.021	Φ20.04
		M5	Φ20.000~φ20.021	Φ20.04
		C1	Φ20.500~φ20.521	Φ20.55
		C2	Φ23.000~φ23.021	Φ23.04
		C3	Φ23.025~φ23.046	Φ23.06
	Bushing diameter	M4	Φ19.959~φ19.980	Φ19.93
		M5	Φ19.959~φ19.980	Φ19.93
		C1	Φ20.459~φ20.480	Φ20.41
		C2	Φ22.984~φ23.005	Φ22.95
	Bushing inside diameter	M4	Φ17.000~φ17.018	φ17.04
		C1	Φ17.000~φ17.018	φ17.04
		C2	Φ20.000~φ20.021	Φ20.04
	The shaft diameter	M4	φ16.966~φ16.984	φ16.93
		C1	φ16.966~φ16.984	φ16.93
		C2	φ19.974~φ19.987	φ19.94
		C3	φ19.979~φ20.000	φ19.95

7. Requirement of tightening torque

Spark plug: 16N•m
Oil drain bolt: 24N•m
Valve clearance adjusting nut: 10N·m
Rocker arm shaft fastening bolt：5N.m
Timing sprocket bolt：10N•m
Cylinder head cylinder block connecting bolts：10N•m
Fastening bolt of locating plate: 10N.m
Fastening bolt of clutch cover: 10N.m
Tensioner screw：10N•m
Tightening torque of AB bolt: 11N.m
AB bolt fastening nuts：35N•m
Locknut of clutch: 45N.m
Locknut of crankshaft: 65N.m
Locknut of balanced gear: 45N.m
Locknut of magnetor: 65N.m
Tightening torque of GB5783 bolt: 10N.m
Tightening torque of GB5789 bolt: 10N.m
Tightening torque of GB16674 bolt: 10N.m

Normal Maintenance and Care

Normal Maintenance and Care

1. Maintenance interval of engine

Interval / ITEM	Check before driving (Pre-delivery)	Odometer reading (×1000km)			
		1.000	4.000	8.000	12.000
Spark plug			I	R	I
Valve clearance		I	I	I	I
Engine oil	I	R	R	R	R
Oil Strainer		C			C
Idle speed		I	I	I	I

I: INSPECT, CLEAN, ADJUST, LUBRICATE OR REPLACE IF NECESSARY ; C: CLEAN R: REPLACE

Engine oil quality is the chief factor affecting engine service life. Change engine oil as specified in the maintenance schedule (page 12). When running in very dusty conditions, oil change should be performed more frequently than specified in the maintenance schedule.

Please dispose of used engine oil in an environmental-friendly manner. We suggest you keep it in a sealed container to your local recycling centre or service station for reclamation. Do not discard it in the trash or pour it into the soil or down a drain.

Used engine oil may cause skin cancer if it contacts skin for prolonged periods. It is suggested that you should wash your hands with soap and clean water as soon as possible after you handle used engine oil.

2. Maintenance standard of engine

Item			Standard	Service Limit
Engine oil	Specification		SJ 10W/40	1.2L
	Capacity	when filter is not removed	1	
		when filter is removed	1.1L	
		when engine is completely dry	1.2	
Valve Clearance	Inlet		(0.04-0.06)mm	0.10mm
	Exhaust		(0.04-0.06)mm	0.15mm
Spark plug	Standard		CPR8EA-8 (NGK)	
	Long hours at high speed		CPR9EA-9(NGK)	
	Spark Plug Gap		(0.8-1.0)mm	
Engine idle speed			（1400±100） r/min	

3. Requirement of tightening torque

Spark plug: 16Nm

Oil drain bolt: 24Nm

Oil filter cover bolt: 4Nm

Valve clearance adjusting nut: 14Nm

4. Maintenance of spark plug

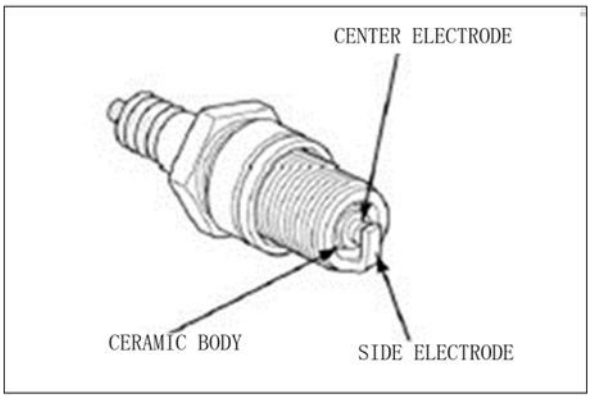
Spark plug recommended

Under standard condition	CPR8EA (NGK)
When driving at high speed for long time	CPR9EA (NGK)

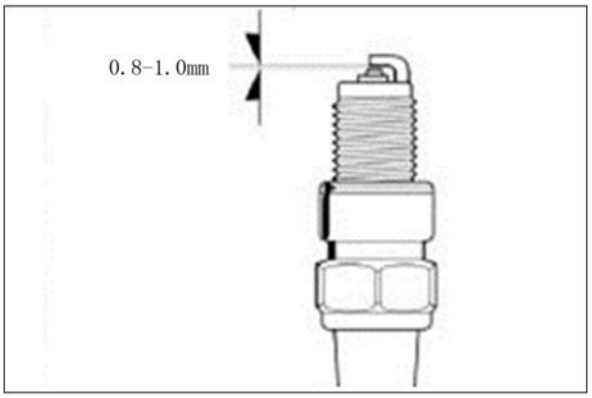
Note:

If spark plug with unsuitable calorific value is used, the engine will be damaged severely.

If the electrodes and centre electrode are eroded or covered with heavy carbon deposit, the spark plug shall be cleaned or replaced.



Spark plug gap: (0.8-1.0) mm



Tightening torque of spark plug: 16N•m

Note:

If the spark plug is not tightened appropriately, the engine may be damaged. If the spark plug is not tightened sufficiently, the piston may be damaged; if the spark plug is tightened excessively, the threads may be damaged.

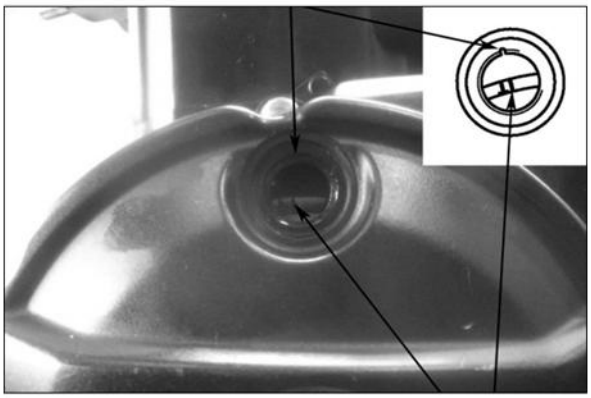
5. Valve clearance adjustment

Too large valve clearance will result in noise and ultimately in damage of engine. Too small valve clearance or no clearance will result in that valves are not closed tightly, thus causing damage of valve, power loss of the engine.

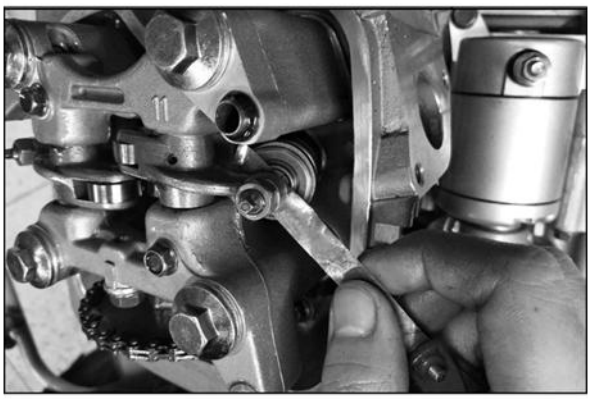
Remove caps with big and small eyehole respectively from engine.

Turn crankshaft until the engine is at timing position (Markline T on rotor of magneto is aligned with centre of eyehole.)

Remove upper cover of cylinder head (refer to page 34)



Check if valve clearances meet the requirement.



Note:

Valve clearance shall be checked and adjusted when the engine is in Cold state. The clearance will change with temperature rise of the engine.

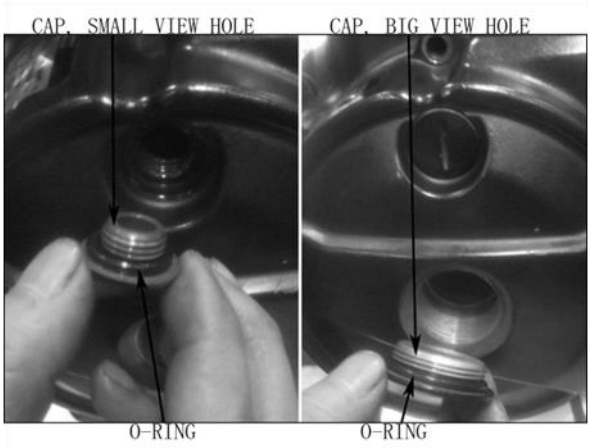
Adjust valve clearance

Clearance of inlet and exhaust valve:

0.04 - 0.06 mm

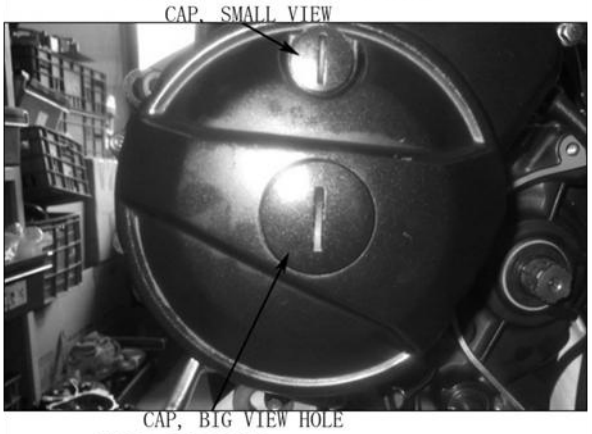
Tightening torque of adjusting nut: 14N.m

Check O-ring of eyehole cap for deformation and damage. If there is, replace the O-ring with a new one. Apply appropriate amount of lube oil on the new O-ring before install it.



Tighten caps of large and small eyeholes respectively.

Install upper cover of cylinder head (refer to page 35) and check the engine for leakage.

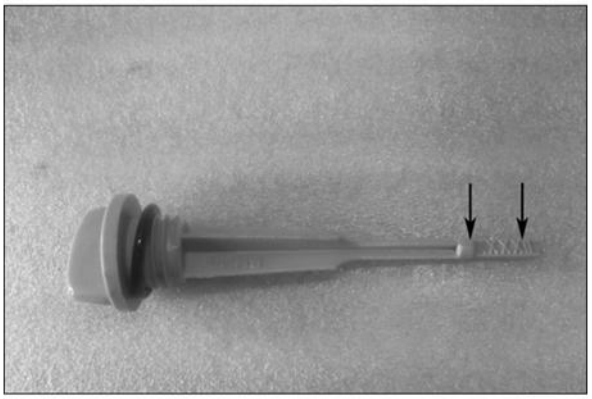


6. Check of engine oil volume

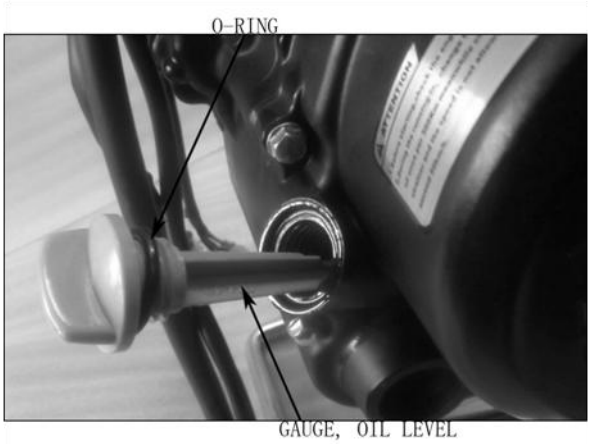
Check engine oil prior to driving every day. Engine oil level must be kept between the upper and the lower limits on the oil level gauge.

Check:

1. Start the engine and let it runs at idle speed for 3-5minutes.
2. Stop the engine and support the vehicle with main stand on flat ground. After the engine kills for 2~3 minutes, remove oil level gauge, wipe it up and reinsert it. Then put it out again to check oil level, which must be kept between the upper and lower limits on the gauge.



3. Fill engine with dedicated engine oil until the level reaches upper limit on the gauge if necessary. Never exceed the upper limit.

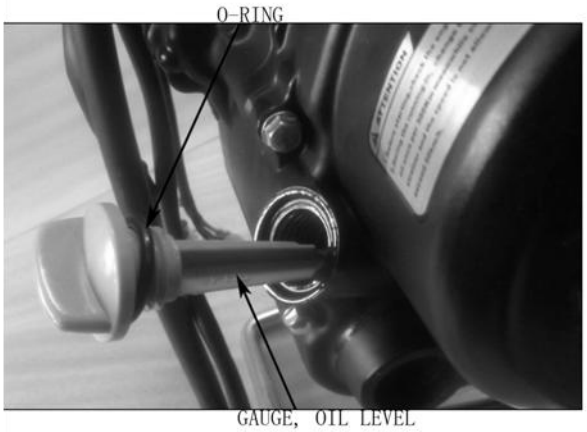


4. Install oil level gauge and O-ring, and tighten the gauge.

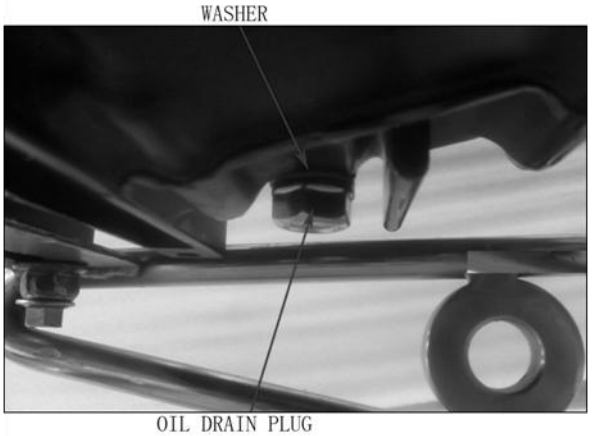
7. VII. Renewal of engine oil and replacement of oil filter

Renew engine oil with the engine at normal operating temperature and the vehicle resting on its side stand to ensure complete and rapid draining.

1. Place a drain pan under the crankcase.



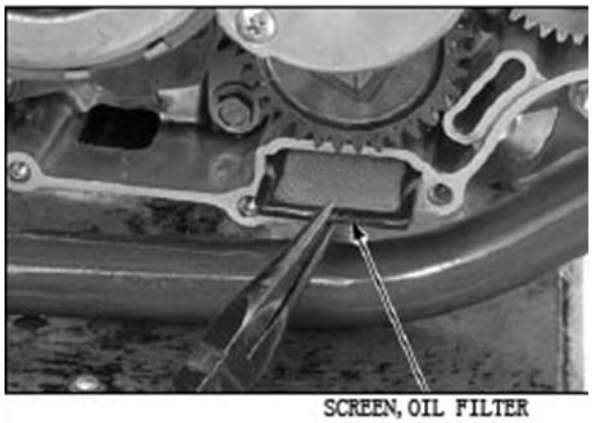
2. Remove oil level gauge, drain bolt and sealing washer to drain off the oil.

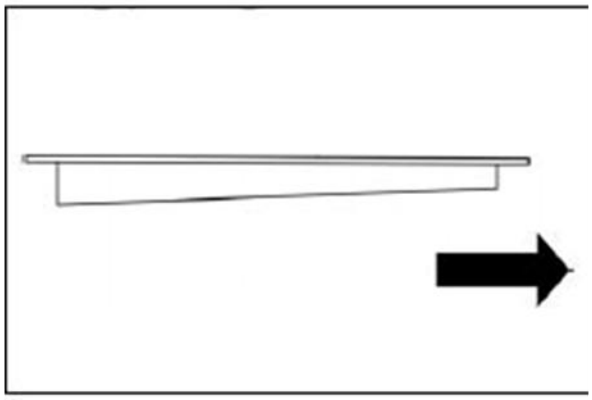


3. If necessary, clean the oil screen (refer to maintenance interval).

   Remove the right cover. Refer to Page 68 for removal of right cover.

   Take out oil screen to clean foreign matters from it. Then reinstall it according to direction shown in the figure.


SCREEN, OIL FILTER

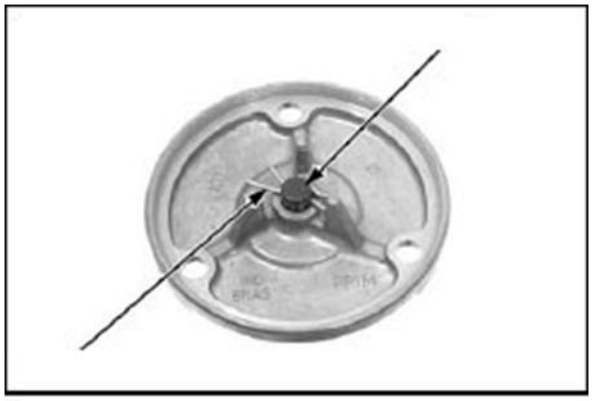


> **Note**
>
> Foreign matters on the oil screen can be used to determine preliminarily if there is abnormal damage on the engine. If too much metallic dust is detected, the engine shall be subject to inspection.
>
> The oil screen shall not be cleaned with gasoline or other solvents that may damage rubber.

4. Dismantle bolt from oil filter cover to remove the filter cover and paper gasket.

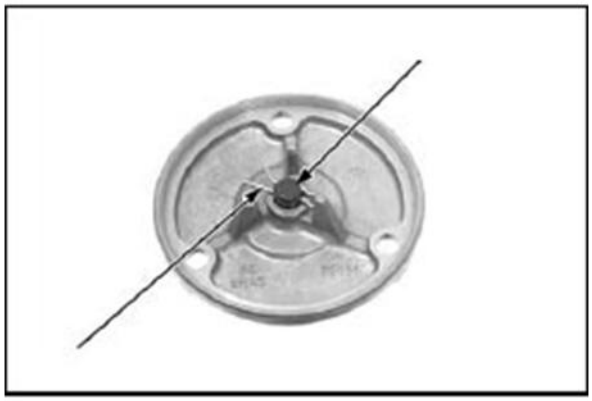
5. Clean up the remaining oil

6. Remove the open pin. Oil filter outlet pipe and spring.



7. Check if the open pin Oil filter outlet pipe and spring are damaged. If they are, replace them with new ones.

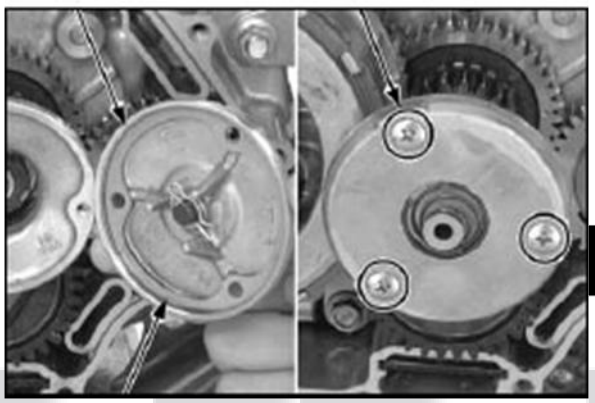
8. Assemble the open pin. Oil filter outlet pipe and spring.



9. Assemble the filter cover and paper gasket. Tighten bolt.
   Tightening torque: 4 N.m

Note

Check if the sealing washer is damaged. If they are, replace them with new ones.



Reinstall the right cover (refer to Page 70).

10. Check if drain bolt and sealing washer are in good condition. Replace the drain bolt and sealing washer with new ones if necessary, then tighten the bolt. Always replace the sealing washer whenever renewing the engine oil.

    Tightening torque of engine oil drain bolt: 24N.m

11. Fill the engine with oil of equivalent grade according to requirements of maintenance (SJ/10W-40);

12. Reinstall the oil level gauge.

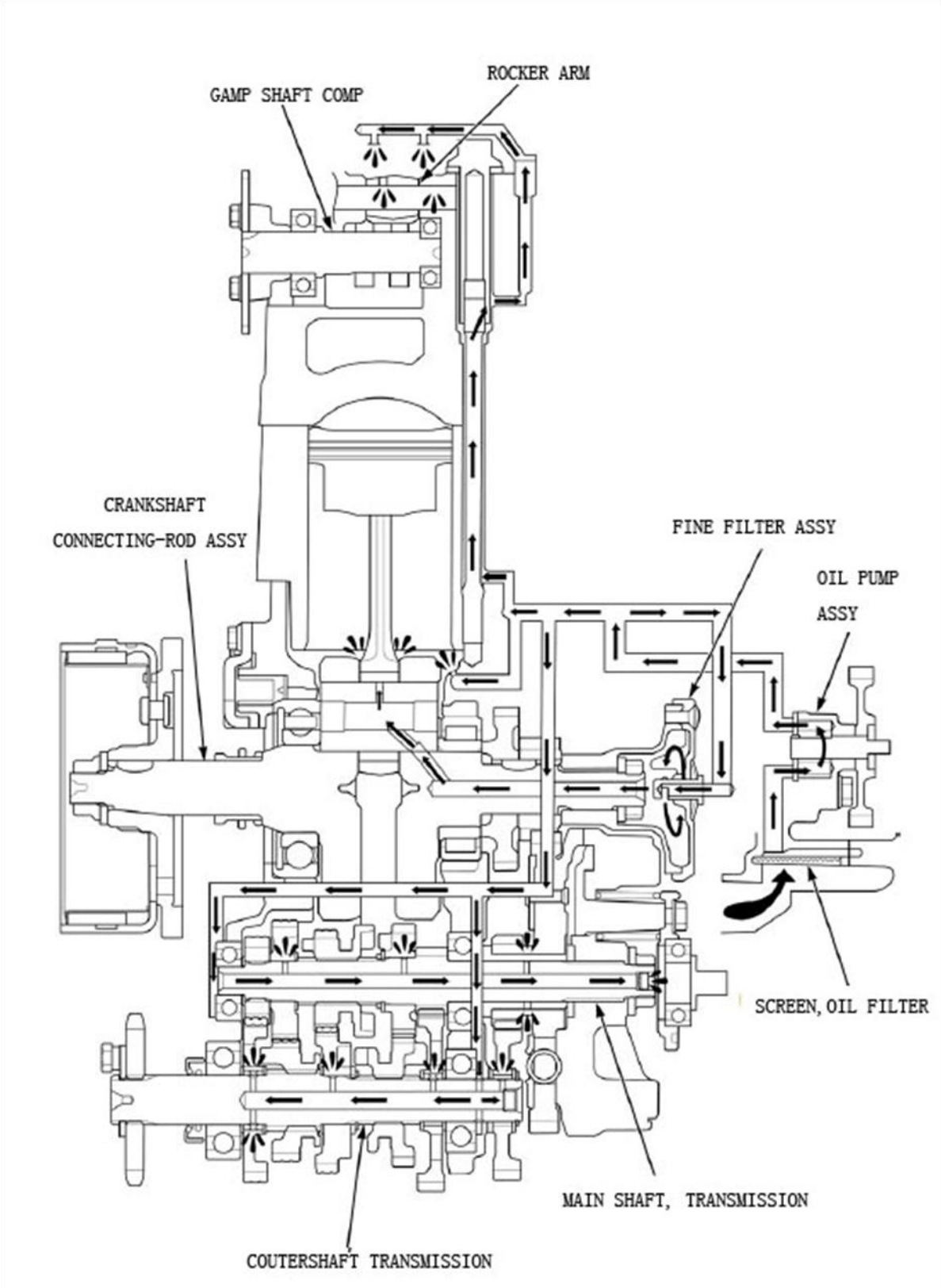
13. Check if oil level is correct according to Page 15 and confirm the engine free of any leakage.

Lubrication system

Lubrication system

Lubrication system

1. Schematic diagram of lubrication system



2. Technical specifications of lubrication system

Unit: mm

Item			Standard	Service Limit
Engine oil	Specification		SJ 10W/40	
	Capacity	when filter is not removed	1L	
		when filter is removed	1.1L	
		when engine is completely dry	1.2L	
Oil pump	Backlash between outer rotor and pump body			0.28
	Backlash between inner and outer rotors			0.20
	Axial clearance between rotor and pump body			0.15

Requirements of tightening torque:

Fastening bolt of oil pump: 10Nm

Screw on cover plate of oil pump: 3Nm

3. Troubleshooting:

Name of component	Type of damage	Symptom of component	Symptom of engine	Remedy
Oil pump	Excessive wear of inner and outer rotors of oil pump	Oil is not pumped freely or no oil is pumped.	Engine overheats and is insufficient in power.	Replace the oil pump.
Oil screen	Too much foreign matters on it or clogged.			Clean the screen
Lubrication system	Clogged passage			Clean and unblock the oil path.

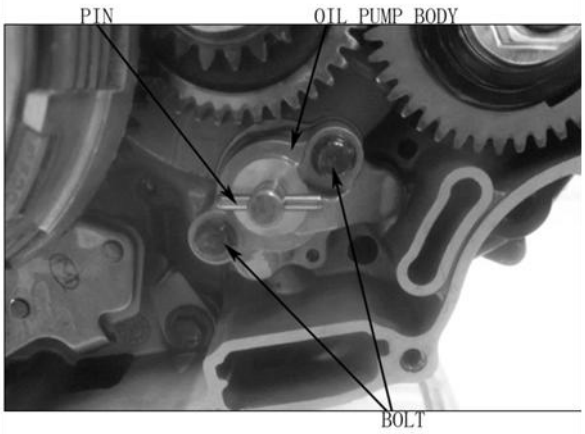
4. Removal and installation of oil pump

a. Removal of oil pump

1. Dismantle right cover (refer to Page 68);

2. Dismantle circlip and take out gears of oil pump.

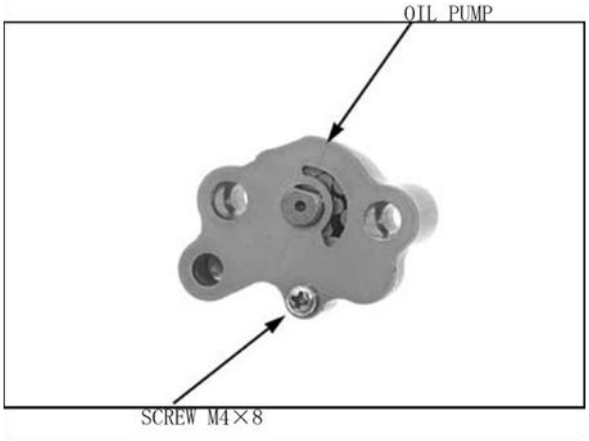
3. Take out the pin and remove fastening bolt of oil pump. Take out oil pump.



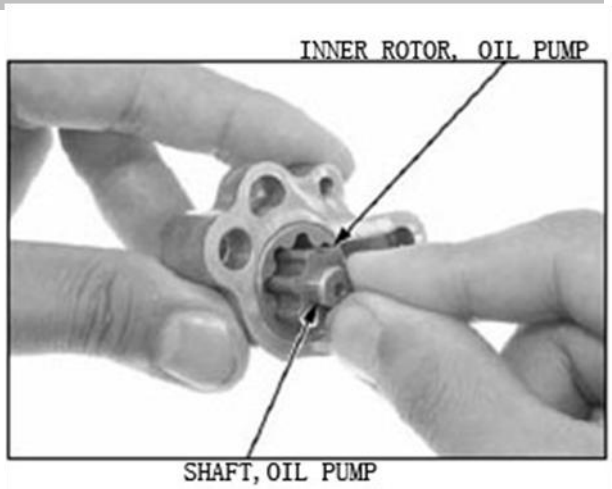
4. Remove the two locating pins.

b. Disassembly of oil pump

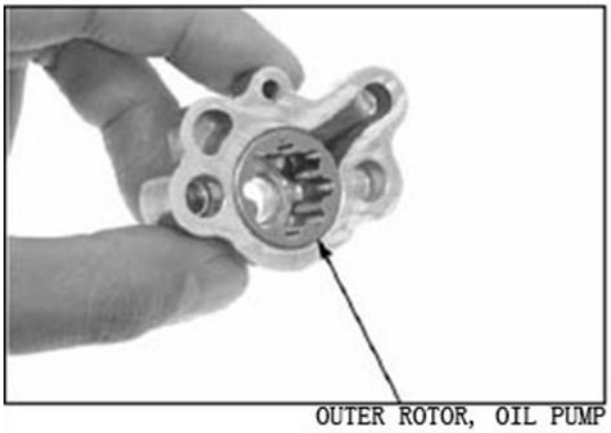
1. Remove set screw from cover plate.



2. Remove the inner rotor, pin and pin shaft from oil pump.



3. Take out outer rotor of oil pump and clean the components disassembled thoroughly.

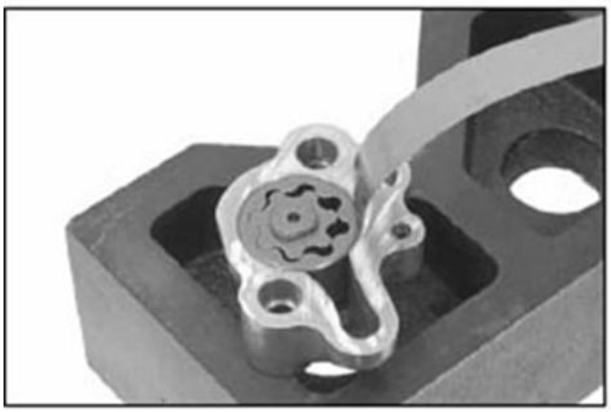


c. Check of oil pump

Note:

When checking oil pump, turn the rotor to measure it at multiple points, so as to judge if its wear is beyond service limit.

If wear measured at any point is beyond the service limit, the oil pump shall be replaced with a new one.



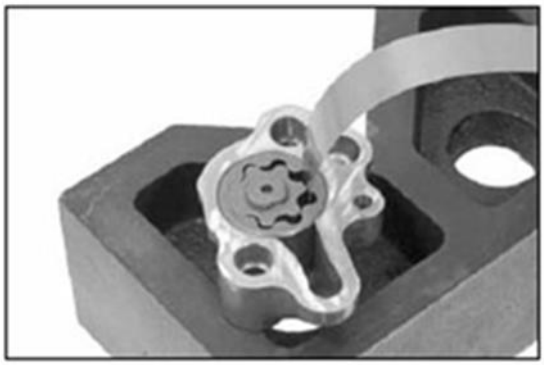
1. Assemble inner and outer rotors, pin shaft, pin of the oil pump.

Check side clearance between outer rotor and casing

Service limit	0.28mm

2. Check fit clearance between outer and inner rotors of oil pump;

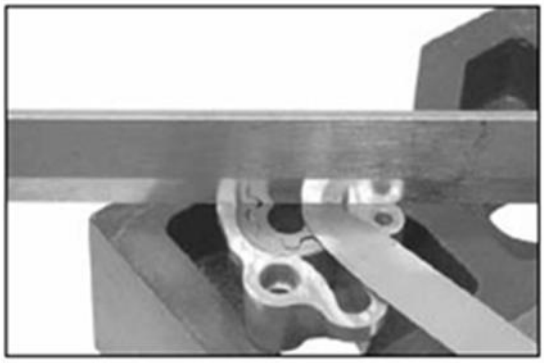
Service limit	0.20mm



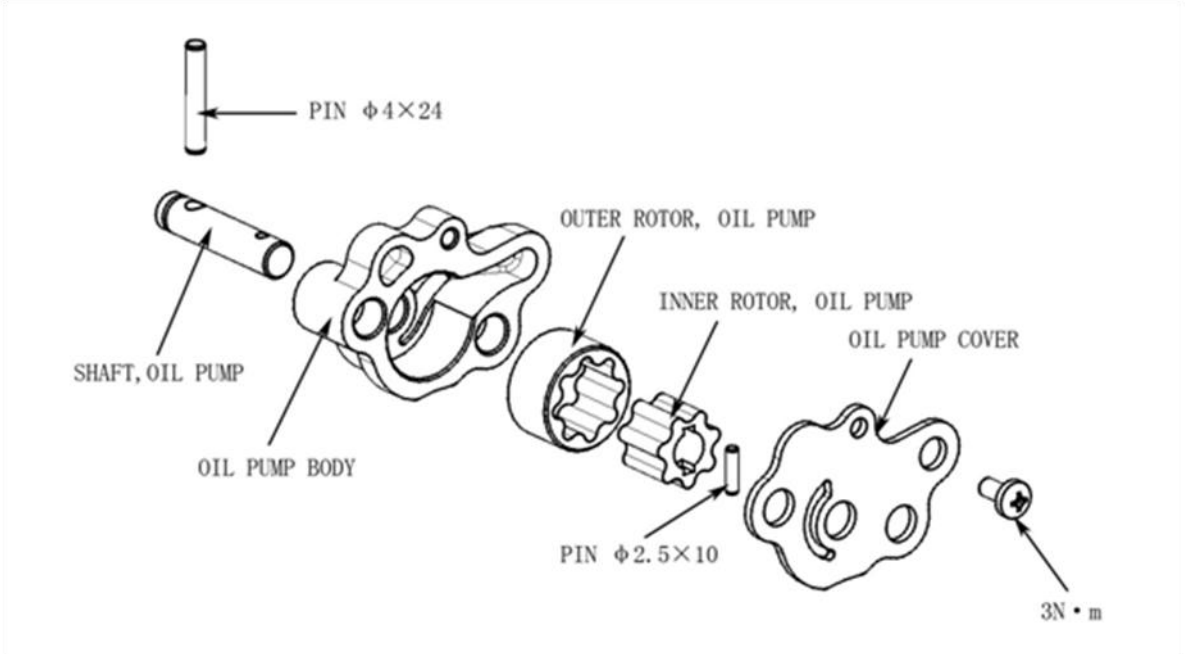
3. Take out the shaft and pin from the oil pump;.

Use knife straight edge and feeler gauge to measure axial clearance between rotor and casing of the oil pump.

Service limit	0.15mm

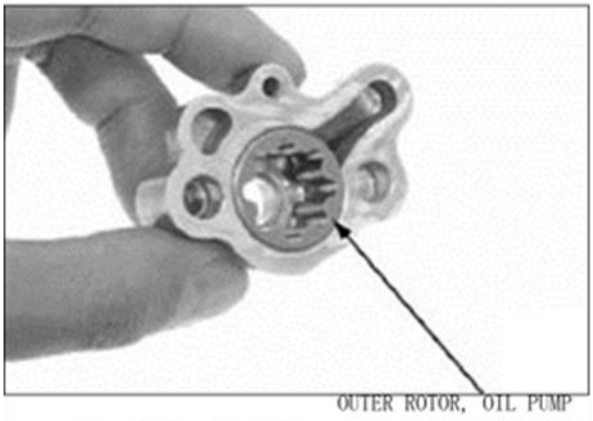


5. Installation of oil pump

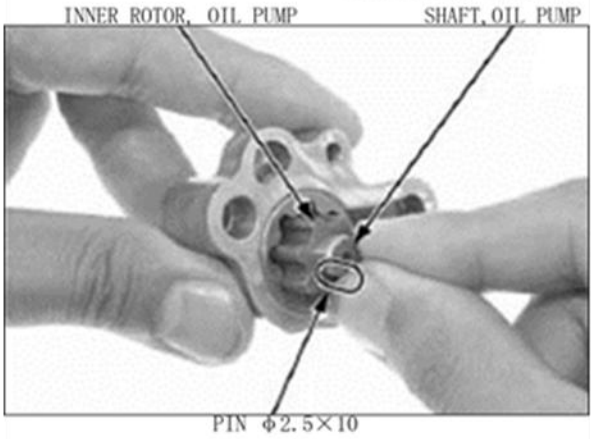


Lubrication system

1. Apply lube oil on the circumference of outer rotor and install the rotor into casing of oil pump.

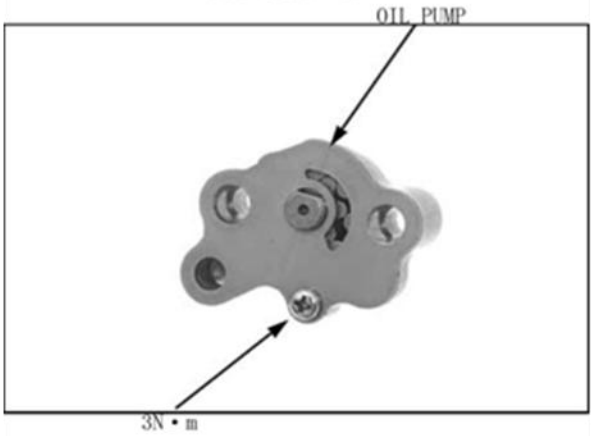


2. Apply lube oil on the circumference of inner rotor, pin shaft and pin and install them into casing of oil pump.

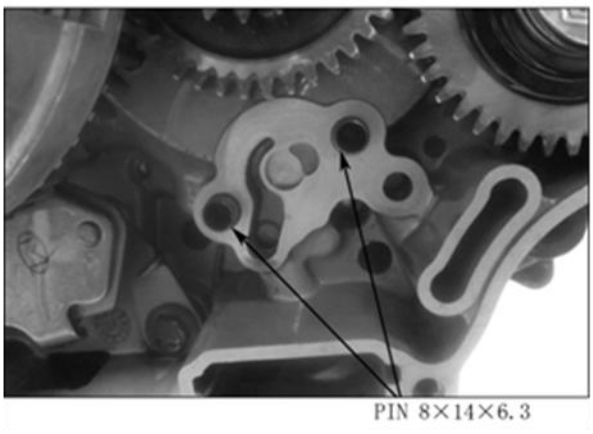


3. Install cover plate of oil pump and tighten the screw.

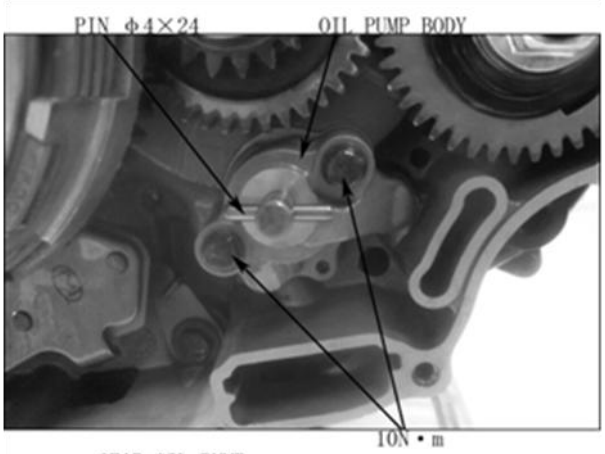
Tightening torque: 3N.m



4. Install locating pin on the engine.



5. Assemble oil pump and tighten the bolt. Assemble the pin.



6. Install gears of oil pump onto pin shaft and install circlip. Apply appropriate amount of lube oil on the gears.

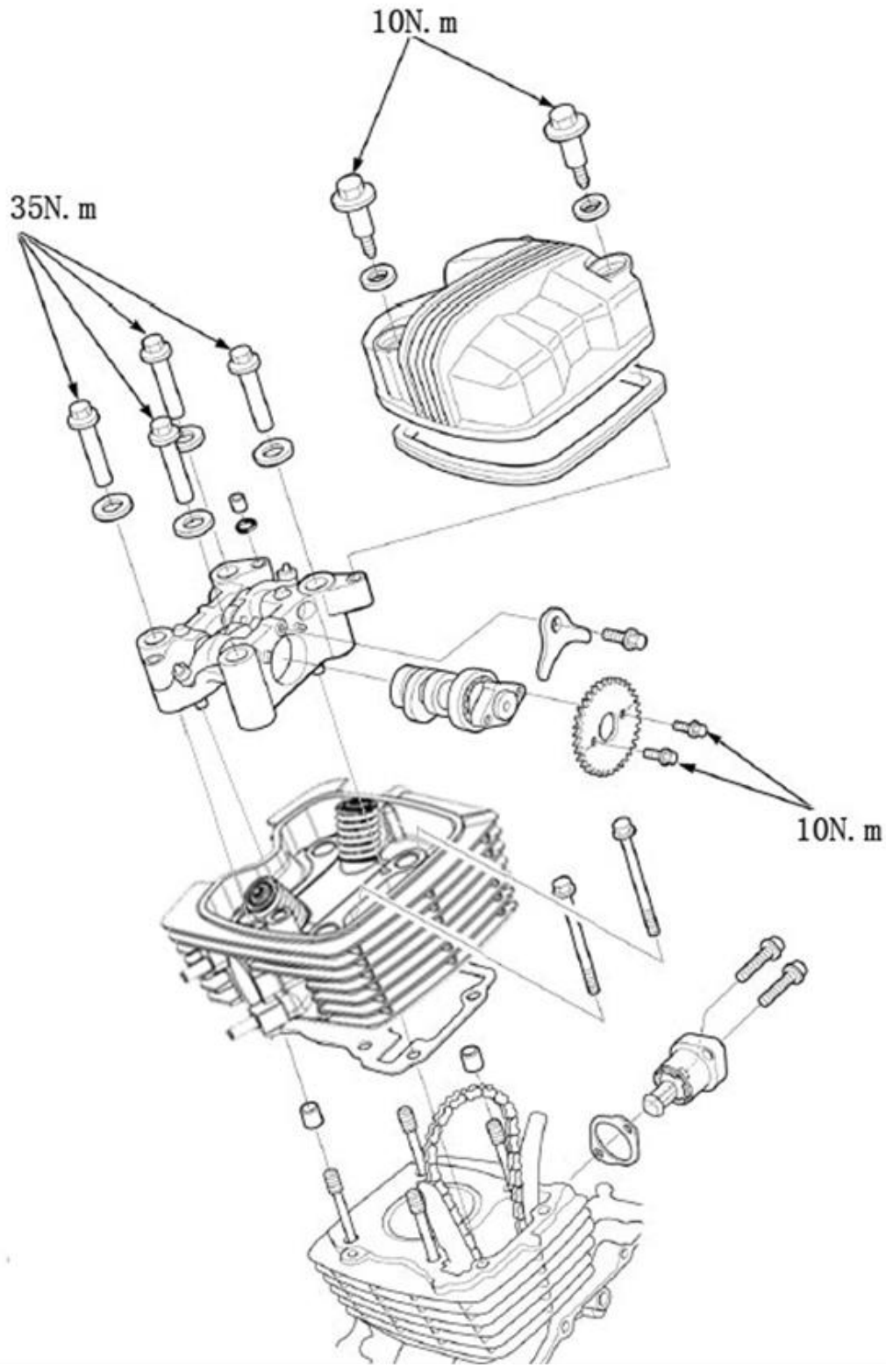
7. Install the right cover of onto engine (Page 70).

Maintenance of Cylinder Head Assembly

Maintenance of Cylinder Head Assembly

Maintenance of Cylinder Head Assembly

1. Exploded view of cylinder head assembly



2. Limits for service

unit: mm

Item			Standard	Service Limit
Valve Clearance		Inlet	0.04-0.06	
		Exhaust	0.04-0.06	
Valve Stem Diameter		Inlet	4.975-4.990	4.92
		Exhaust	4.955-4.970	4.90
Valve Guide Inside Diameter		Inlet Exhaust	5.000-5.012	5.04
Valve/Valve Guide Clearance		Inlet	0.010-0.037	0.07
		Exhaust	0.030-0.057	0.09
Width of valve sealing strip			0.9-1.1	1.5
Valve Spring Free Length		In	38.5-39.5	37.8
		Outer	41.5-42.5	40.8
Rocker arm hole diameter			10.000-10.015	10.1
rocker shaft diameter			9.972-9.987	9.91
With the rocker arm and rocker arm shaft clearance			0.013-0.043	0.10
Camshaft	Cam Height	Inlet	31.0059-31.1059	31.8
		Exhaust	30.8002-31.9002	31.5

Requirement of tightening torque

Tightening torque of GB5789 bolt: 10N.m

Tightening torque of GB16674 bolt: 10N.m

Rocker arm shaft fastening bolt：5N.m

AB nuts：35N•m

Cylinder head cylinder block connecting bolts：10N•m

Fastening bolt of upper cover: 10N.m

Tensioner screw：10N•m

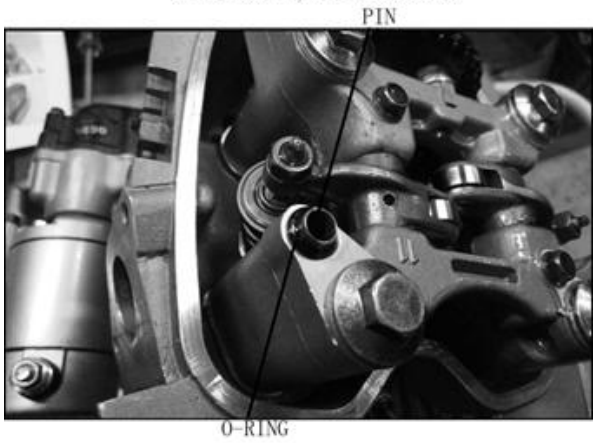
Maintenance of Cylinder Head Assembly

3. Maintenance of upper cover of cylinder head

1. Remove two bolts from upper cover of cylinder head.

2. Take out upper cover and corresponding seal ring.

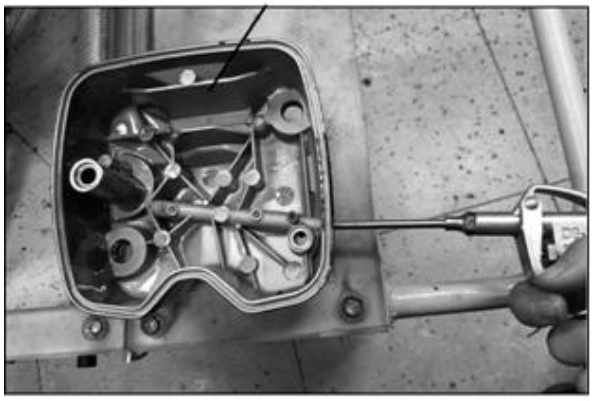
3. Remove locating pin of oil path and O ring.



4. Remove oil-pumping bolt and washer from upper cover of cylinder head

Maintenance of Cylinder Head Assembly

5. Use air gun to check oil path in upper cover for blockage.

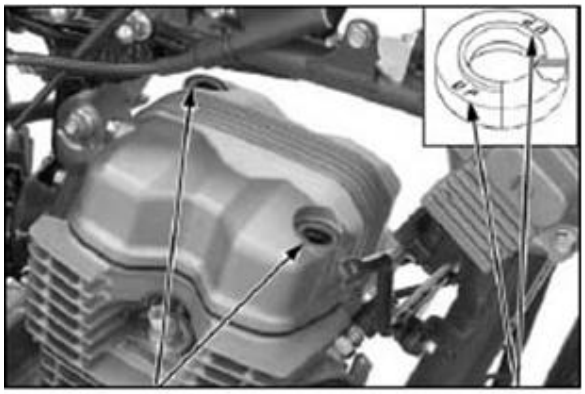


6. After upper cover is checked, reinstall bolt and washer (replace the washer with new one).

7. Install locating pin and a new O-ring.

8. Fit a new seal ring into the seal ring groove on upper cover, then install the upper cover onto cylinder head.

9. After confirming that the upper cover is installed on right place, install rubber gasket of bolt of cylinder head (with mark UP upwards).



10. Install and tighten bolt of upper cover.

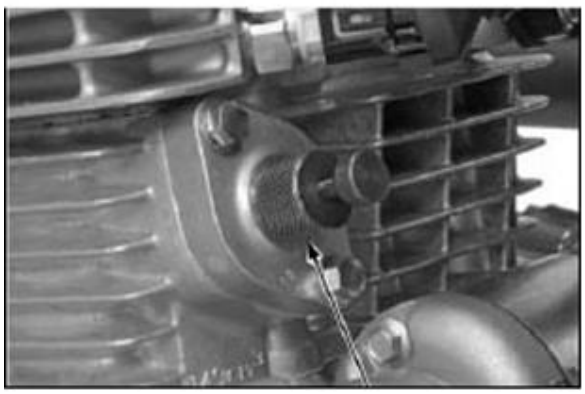
Tightening torque: 10N•m

4. Maintenance of rocker arm assembly

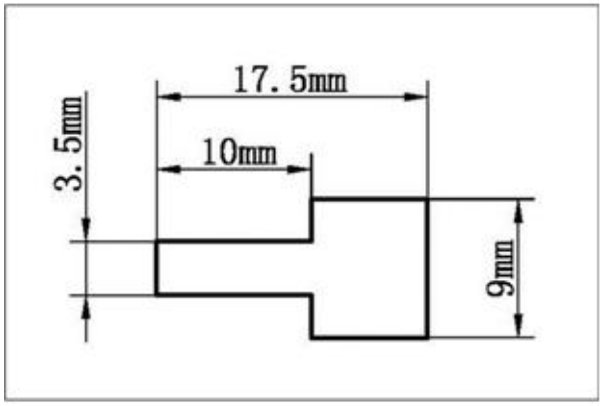
a. <u>Removal of rocker arm assembly</u>

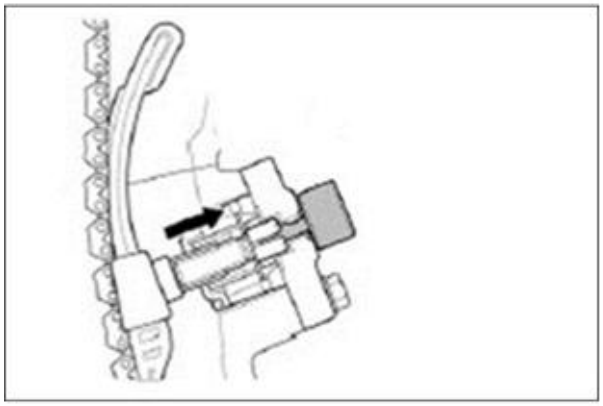
1. Dismantle screw of tensioner.

2. Adjust tensioner until it becomes loose.

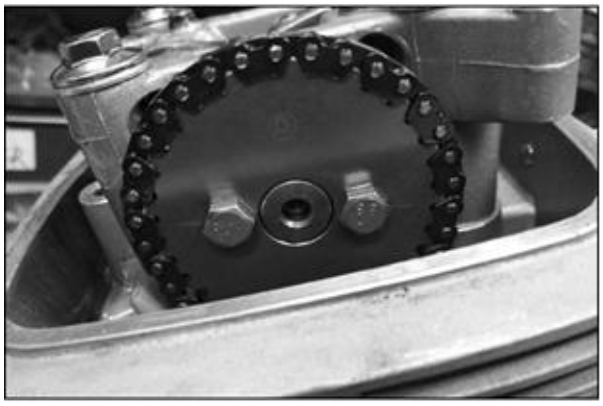


Maintenance of Cylinder Head Assembly





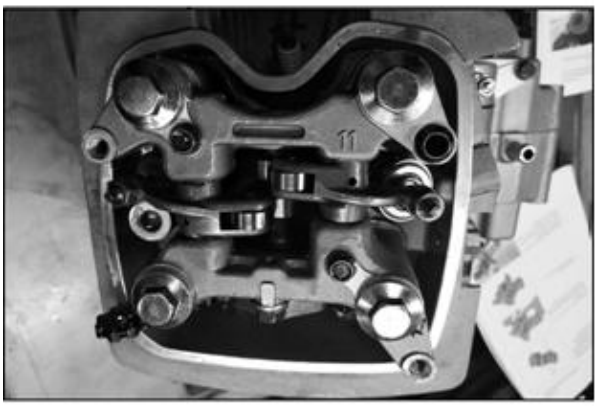
3. Remove the fastening bolt from timing sproket chain.



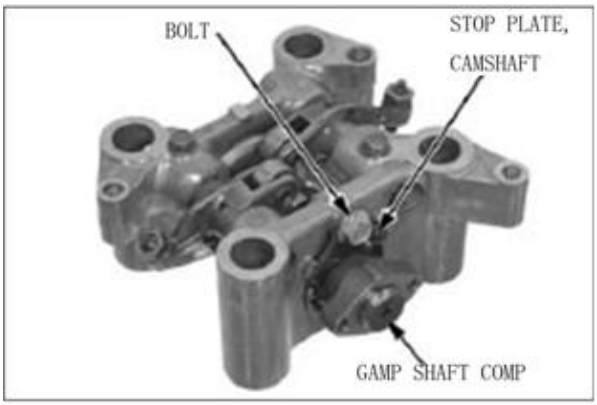
4. Remove the timing sprocket chain. Care shall be taken when using a tool to fix the chain so as to avoid dropping it into the crankcase.

Maintenance of Cylinder Head Assembly

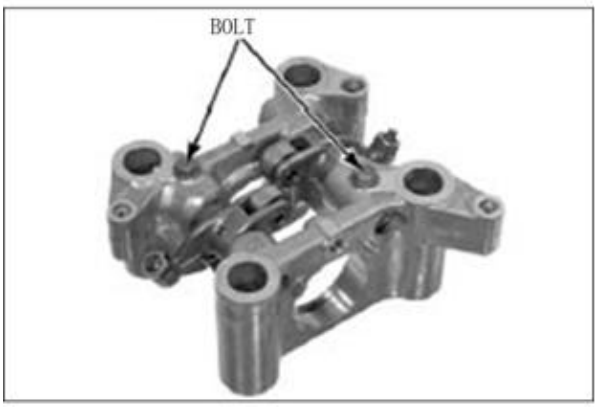
5. Remove AB nut to take out rocker arm assembly.



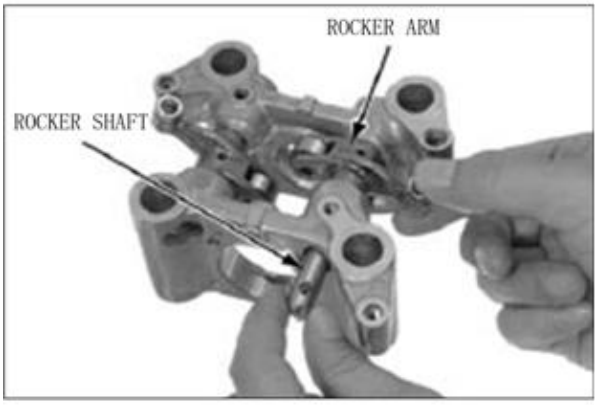
6. Loosen fastening bolt on stop plate and remove the stop plate. Then remove camshaft.



7. Remove fastening bolt of rocker arm shaft.



8. Take out rocker arm shaft and rocker arm.



Maintenance of Cylinder Head Assembly

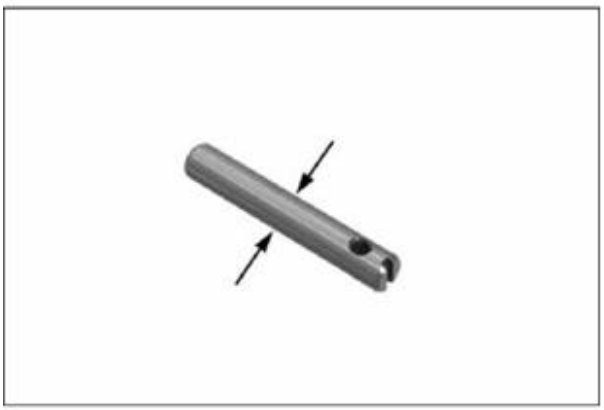
9. Check bearing at both ends of camshaft for free rotation.

10. Check camshaft for wear.

Service limit	Inlet：31.8mm
	Exhaust：31.5mm

11. Check rocker arm shaft for wear.

Service limit	9.91mm

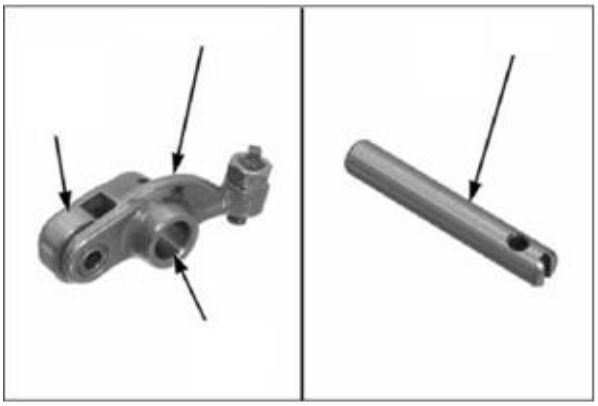


12. Check rocker arm shaft hole for wear; check if rocker arm roller clearance is correct.

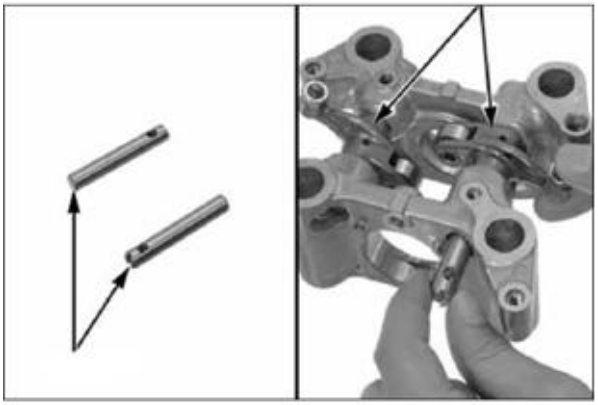
Service limit	10.1mm

b. Installation of rocker arm assembly

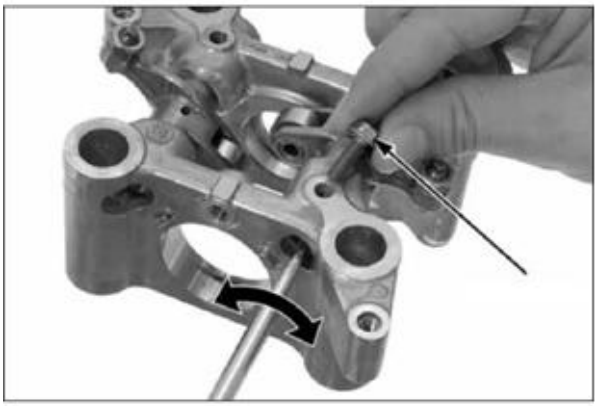
1. Apply appropriate amount of lube oil on rocker arm hole, roller and rocker arm shaft before installing them.



2. Install rocker arm and rocker arm shaft in accordance with sequence shown in the figures.



3. Use flat screwdriver to turn rocker arm shaft so that screw hole on rocker arm shaft is aligned with through hole on rocker arm bracket. Then install fastening bolt manually.



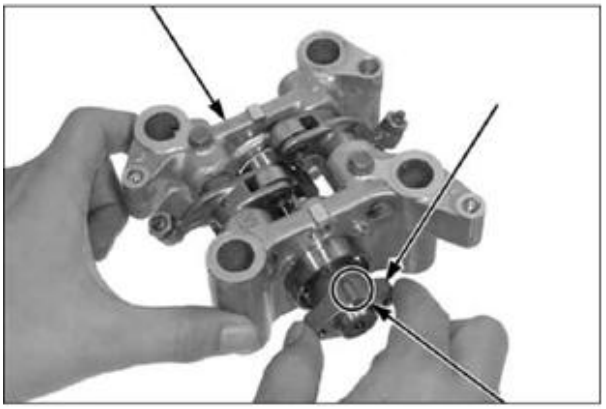
4. After confirming that the bolts are installed to their right position, use tightening spanner to tighten the bolts to specified torque.

Tightening torque: 5N•m

Maintenance of Cylinder Head Assembly

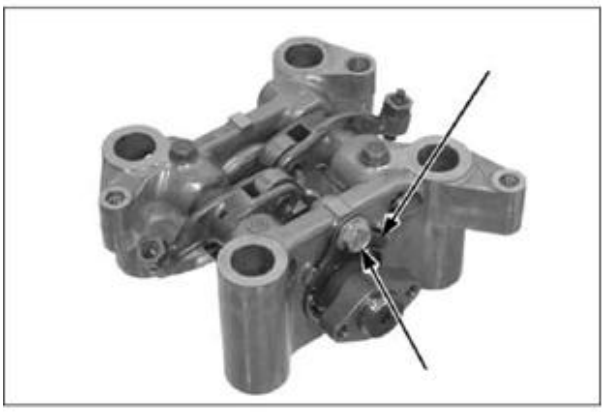
5. Before installing camshaft, apply appropriate amount of lube oil on circumference of bearings at both ends. Apply appropriate amount of SO2 grease onto cams.

6. Install camshaft into rocker arm bracket. Care shall be taken that projected point on flange shall be upward, as shown in the figure.

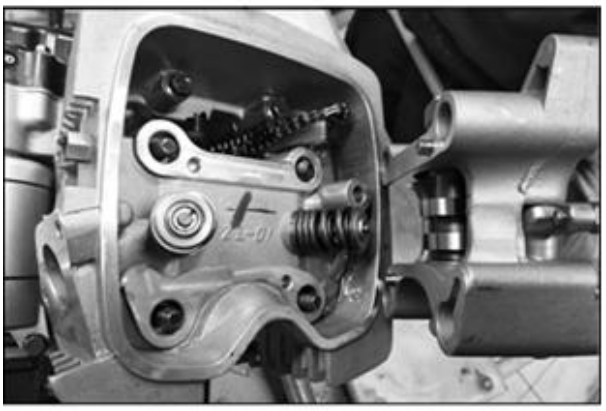


7. Stop plate and fastening bolt.

Tightening torque: 10N•m

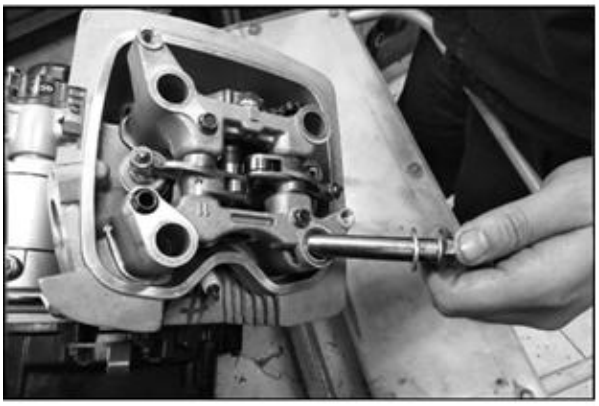


8. Install the completed rocker arm assembly onto cylinder head. Care shall be taken to check if two locating pins are in good condition before installation



Maintenance of Cylinder Head Assembly

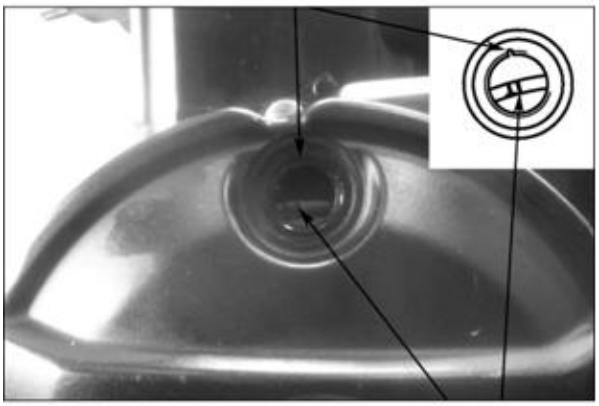
9. Apply appropriate amount of lube oil onto both sides of gasket and external surface of nut, then install them into rocker arm bracket.



10. Tighten AB nuts in turns.

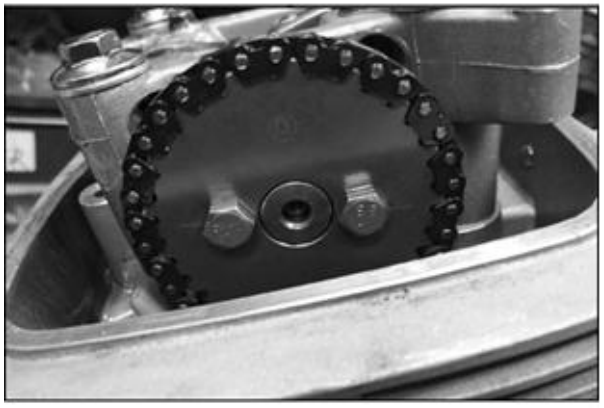
Tightening torque: 35N•m

11. Adjust the engine to TDC in accordance with sequence above-mentioned.

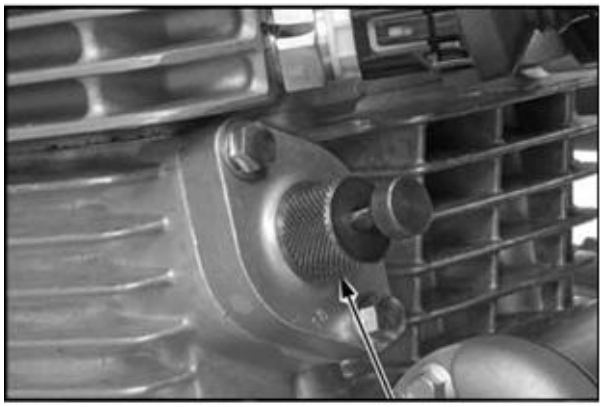


12. Install chain and timing sprocket, and adjust the sprocket to position as shown in the figure.

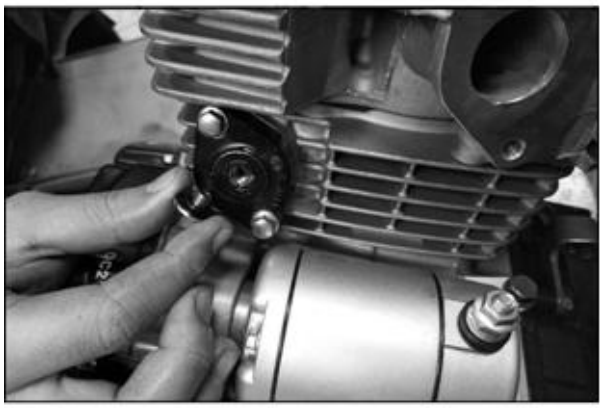
13. Install fastening bolt.
Tightening torque: 10N•m



14. Loosen tensioner to check if chain is tensioned.



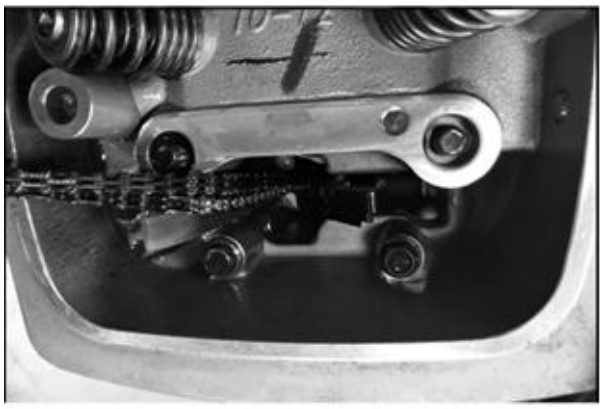
15. Replace O-ring with a new one, then install tensioner screw.



5. Maintenance of cylinder head assembly

a. <u>Removal of cylinder head</u>

1. Dismantle two bolts connecting cylinder head with cylinder block.



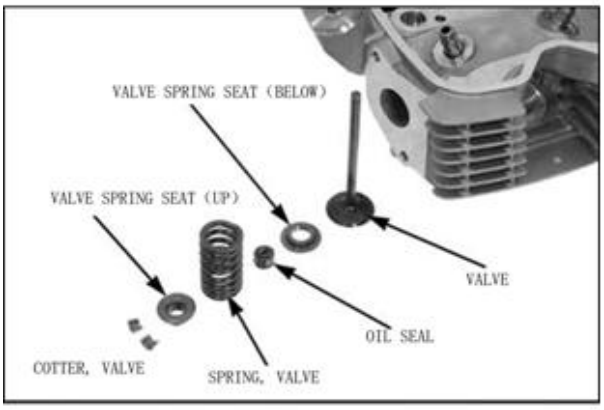
Maintenance of Cylinder Head Assembly

2. Dismantle cylinder head assembly.

3. Take out cylinder head seal gasket and two locating pins.

4. Use special tooling to dismantle valve collet seat ring, valve, valve stem seal, and valve spring respectively.

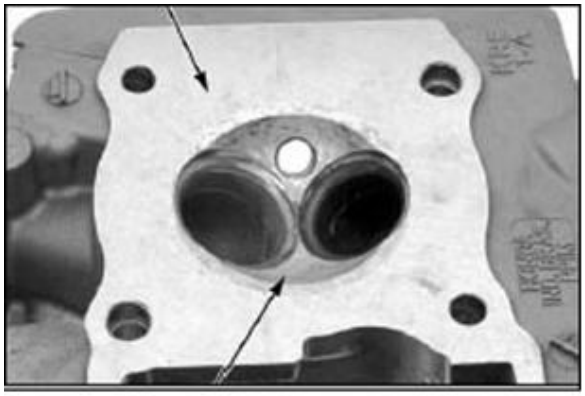
5. Place the components dismantled in order.



Maintenance of Cylinder Head Assembly

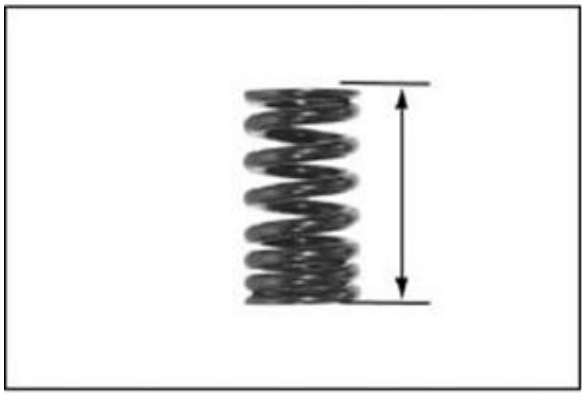
b. Check of cylinder head assembly

1. Check combustion chamber of cylinder head and clean off carbon deposit.



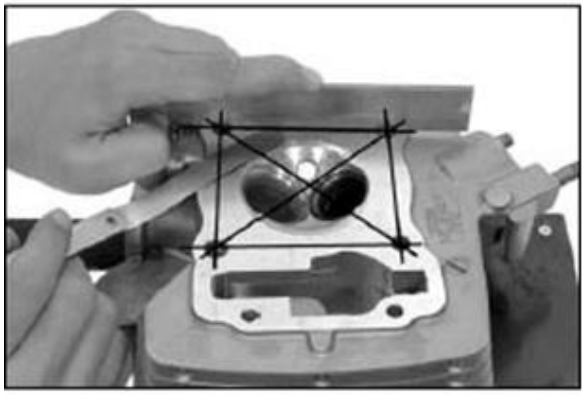
2. Check valve spring for free length.

Service limit	In：37.8mm
	Outer：40.8mm

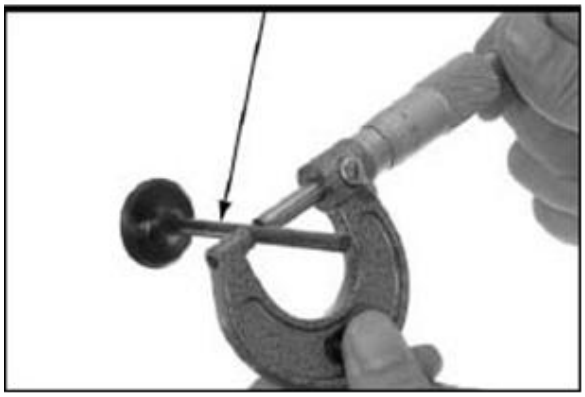


3. Check planeness of end face of cylinder head.

Service limit	0.04mm



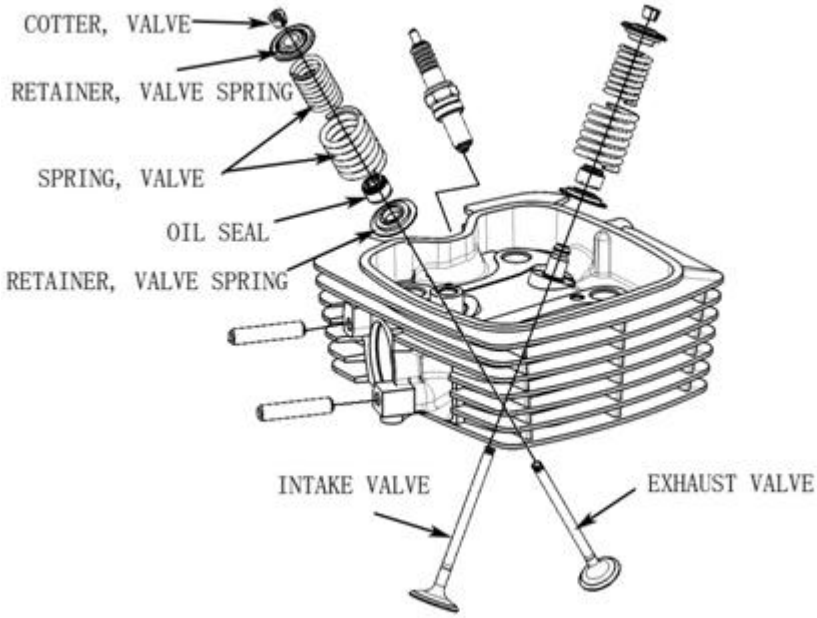
4. Check valve stem for wear.



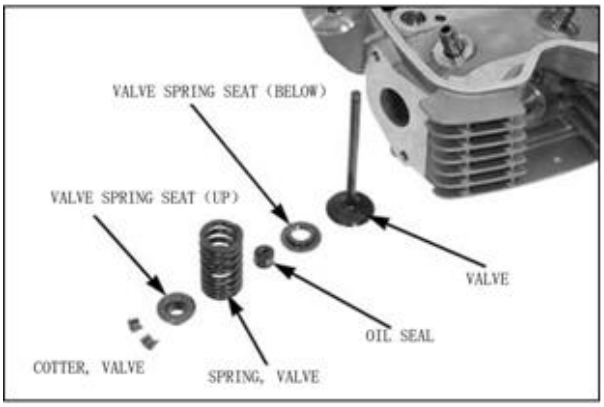
Maintenance of Cylinder Head Assembly

b. Installation of cylinder head assembly

Exploded view of cylinder head assembly



1. Assemble the components in accordance with the sequence shown in exploded view.



2. When installing valve spring, care shall be taken that the dense coil end of spring shall be directed downwards.

Maintenance of Cylinder Head Assembly

3. Use special tool to install valve collet.

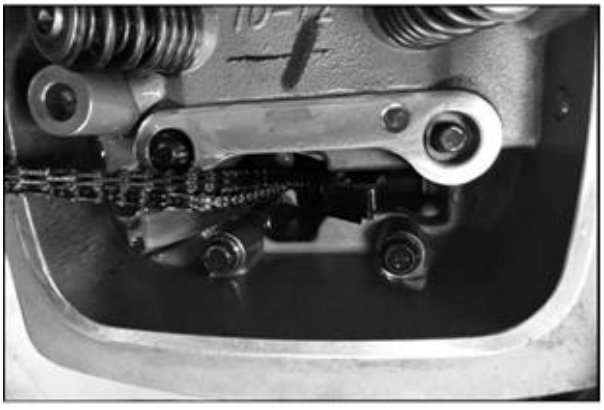
The completed cylinder head assembly shall be subject to air tightness test. Next operation shall not be done unless the cylinder head assembly is confirmed air-tight.

4. Install locating pin and replace sealing gasket of cylinder head with a new one.

5. Install the completed cylinder head assembly.

6. Tighten the two connecting bolts.

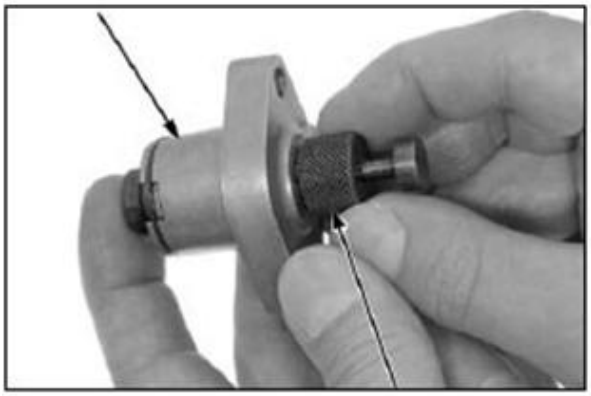
Tightening torque: 10N•m

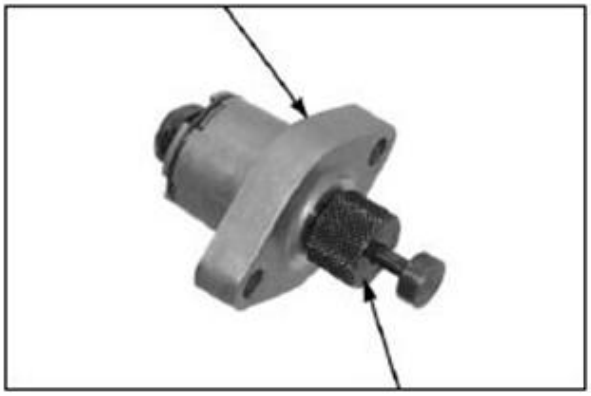


6. Removal and installation of tensioner

1. Remove screw of tensioner.

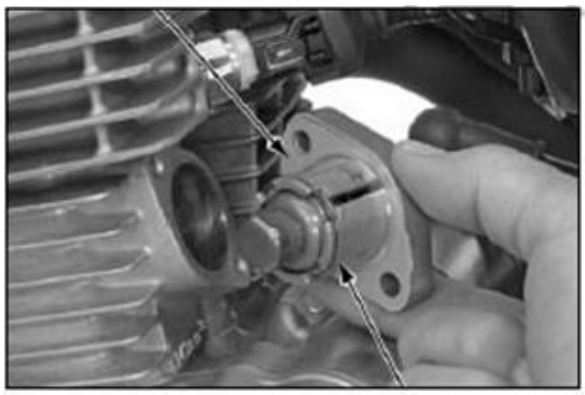
2. Use tools to adjust tensioner until it becomes loose.





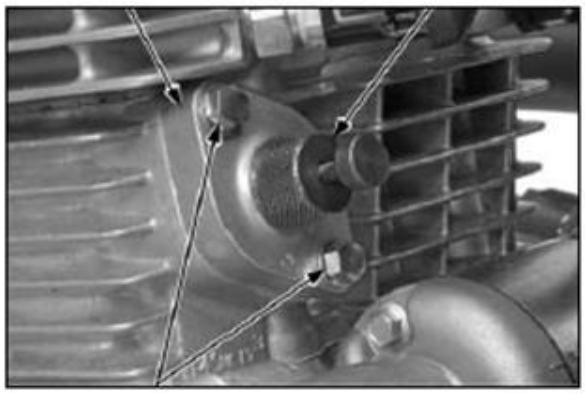
Maintenance of Cylinder Head Assembly

3. Install tensioner.

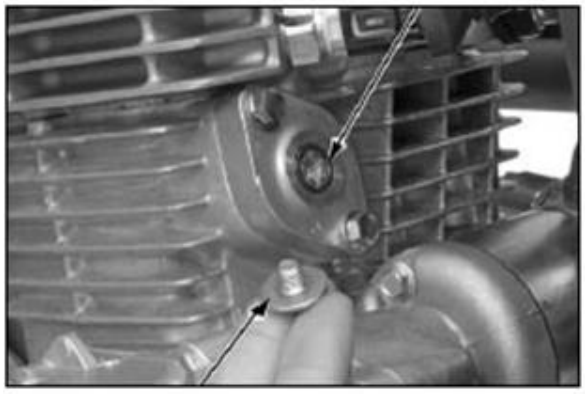


4. Tighten the bolt, Use tools to adjust tensioner until it was tight.

Tightening torque: 10N•m



5. Replace O-ring with a new one.



6. Tighten the screw.

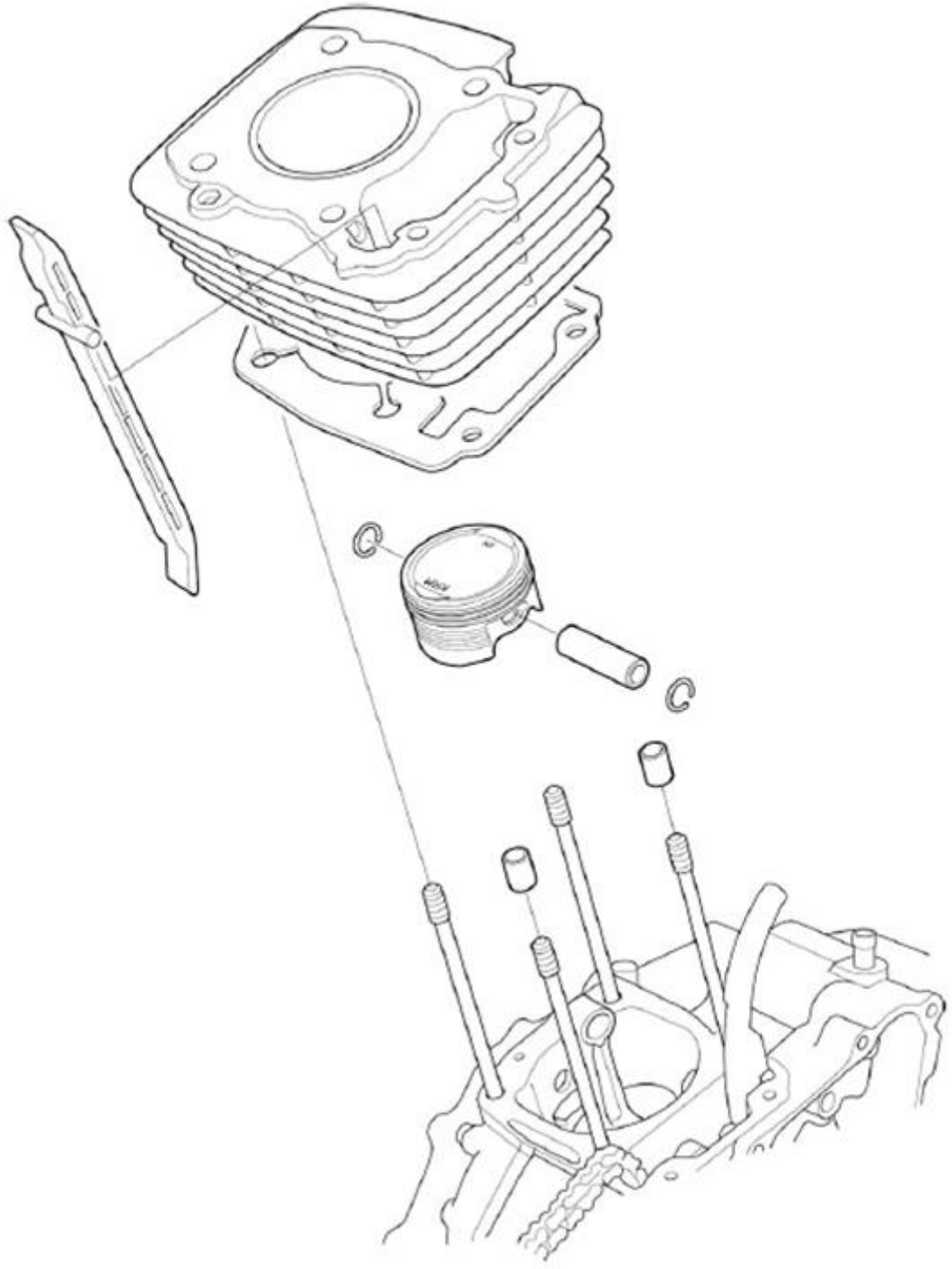
Tightening torque: 10N•m

Maintenance of Cylinder block / piston

Maintenance of Cylinder block / piston

Maintenance of Cylinder block / piston

1. Exploded view of cylinder block and piston



2. Limits for service

unit: mm

Item			Standard	Service Limit
Cylinder	Inner diameter of cylinder		Φ52.400~φ52.410	Φ52.5
	Roundness		0.004	0.10
	Planeness of cylinder face		0.03	0.10
Piston, Piston Ring and Piston Pin	Outer diameter of piston		Φ52.38~φ52.39	Φ52.3
	Inner diameter of piston pin hole		φ14.002~φ14.008	φ14.04
	Closure clearance of piston ring	Top	0.1~0.25	0.35
		second	0.15-0.30	0.4
		Oil	0.2~0.7	0.85
	Piston Ring/Groove Clearance:	Top	0.02~0.06	0.10
		second	0.02~0.06	0.10
	Piston/Cylinder Clearance		0.01~0.03	0.07
	Outer diameter of piston pin		φ13.994~φ14	φ13.96
	Clearance between piston pin and piston pin hole		0.002~0.014	0.04
Small End of Connecting Rod	Inner diameter		φ14.015~φ14.028	φ14.06
	Clearance between small end of connecting rod and piston pin		0.015~0.03	0.10

Tightening torque of AB bolt: 11N.m

3. Trouble remedy

Cylinder pressure is too low or there is no cylinder pressure. Performance at low speed is not acceptable.

Severely worn or broken piston ring

Damaged or broken cylinder block or piston

Cylinder pressure is too high. Engine overheats.

Too much carbon deposit on piston top

Engine oil is consumed significantly, and engine smokes heavily.

Severely worn or broken cylinder block and piston

Improper assembly of piston ring

Abnormal noise

Improper assembly of piston

Fit clearance is too large between piston and piston pin, and the cylinder block and piston are severely worn.

4. Removal and installation of cylinder block/piston

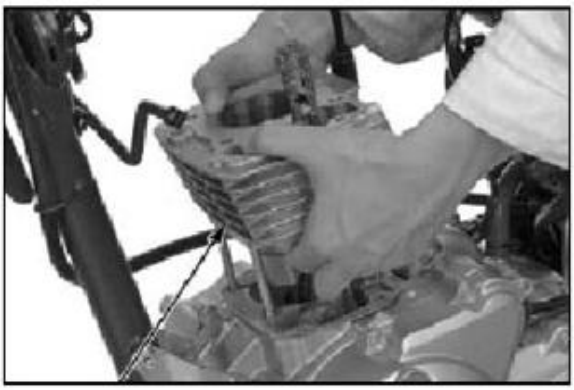
a. Disassembly and inspection of cylinder block

1. Dismantle cylinder head (Page 43);

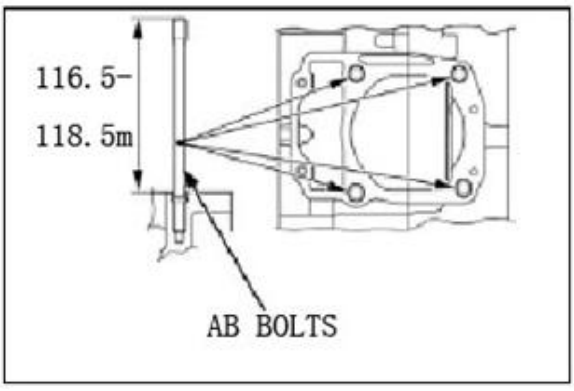
Take out guide plate.

2. Knock cylinder block slightly with rubber hammer to separate cylinder block from crankcase. Take out cylinder block upwards.

Care shall be taken not to damage piston when dismantling cylinder block.



3. Take out locating pin and paper gasket of cylinder block.



Maintenance of Cylinder block / piston

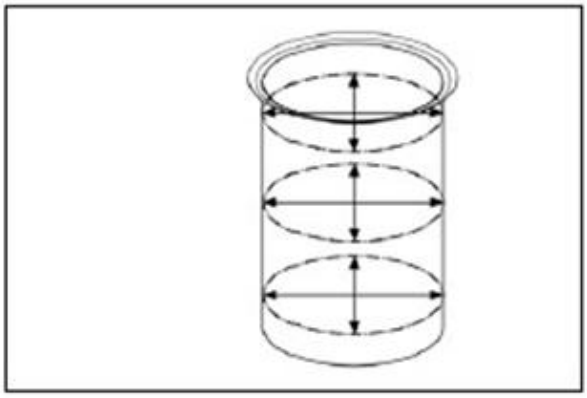
b. Check cylinder block

1. Check diameter of cylinder bore. When doing that, measure the diameter at three layers respectively, i.e. top, middle and bottom of piston stroke, and measurement shall be taken at two directions mutually perpendicular at every layer.

Service limit	Φ52.5mm

2. Calculate cylindricity of cylinder bore in accordance with the maximum value measured at the positions.

Service limit	0.10mm

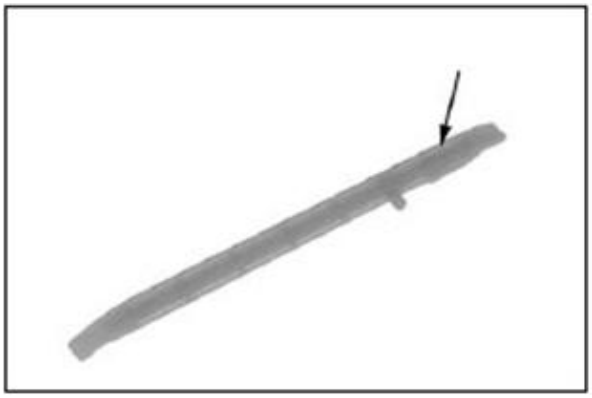


If the measurement exceeds the service limit, the cylinder block must be replaced with a new one.

3. Use knife straight edge and feeler gauge to check planeness of cylinder block.

Service limit	0.10mm

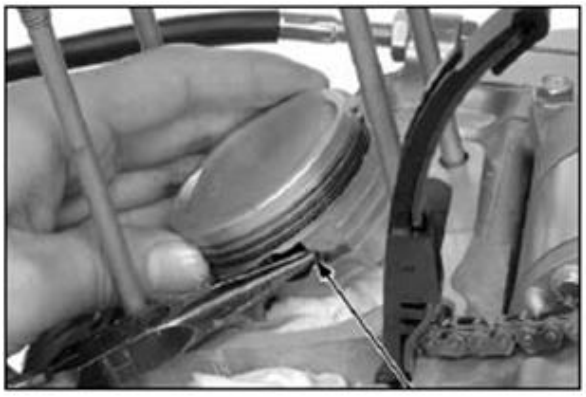
4. Check guide plate of chain for evident wear or damage. If there is, replace the plate with a new one.



Maintenance of Cylinder block / piston

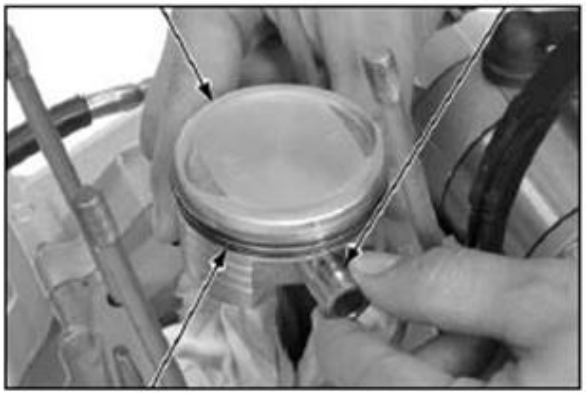
c. Remove piston

1. Place a clean cloth under the piston to guard against that circlip of piston pin falls into crankcase during removal.

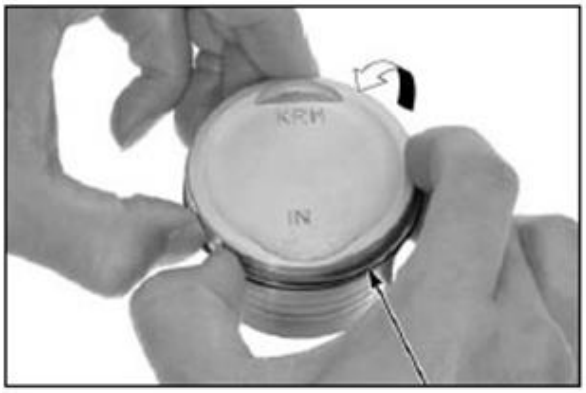


2. Use long-nose pliers to remove circlip of piston pin.

3. Take out piston pin.



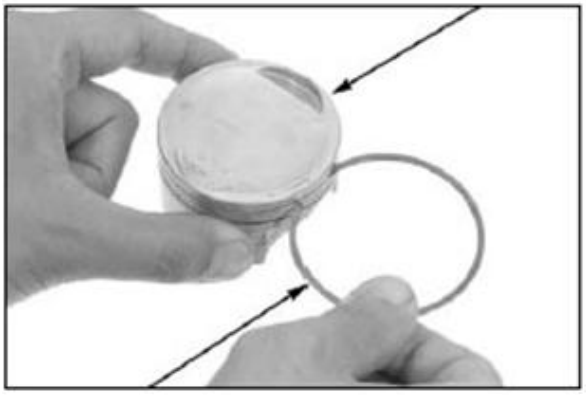
4. Turn piston rings manually to check if the piston rings can rotate freely on the piston without seizure.
Use thumbs to increase gap slightly between ends of the piston ring to take out the piston ring.



Note

Do not damage piston and piston ring when taking out piston ring.

Clean off carbon deposit from piston ring groove with the aid of discarded piston ring



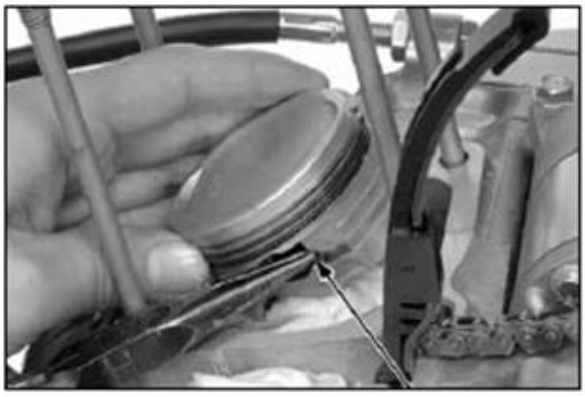
Maintenance of Cylinder block / piston

d. Remove piston

Check piston for damage or break.

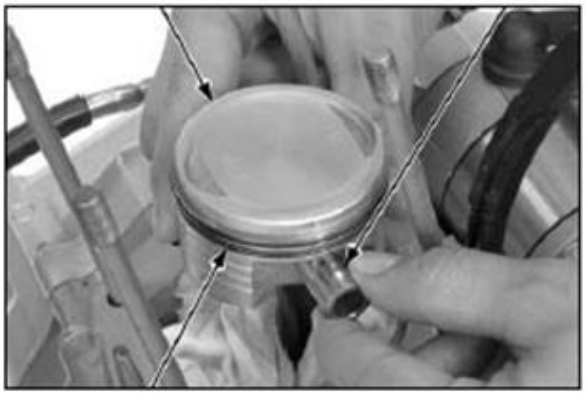
Check diameter of skirt at 8mm height.

Service limit	Φ52.3mm



After measure diameters of cylinder bore and piston skirt, calculate their fit clearance.

Service limit	0.09mm

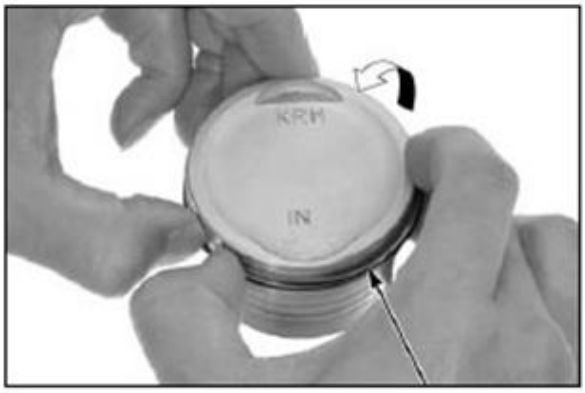


Measure diameter of piston pin hole

Service limit	φ14.04mm

Measure diameter of piston pin

Service limit	φ13.96mm

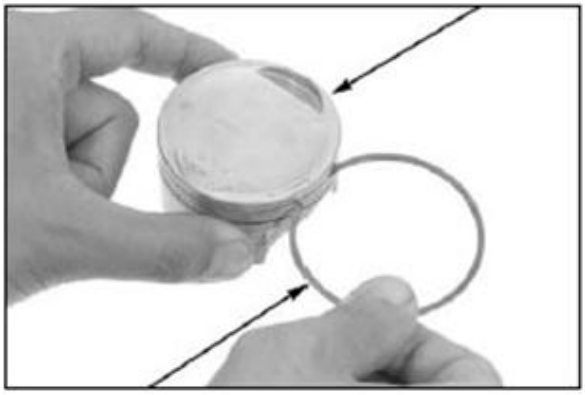


Fit clearance between piston pin and piston pin hole

Service limit	0.04mm

Check diameter of pin hole at small end of connecting rod

Service limit	φ14.06mm



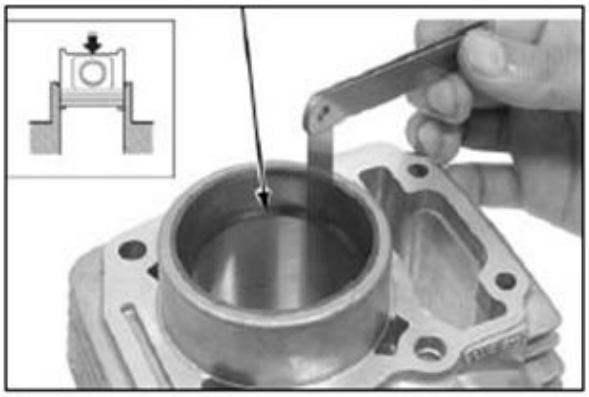
Fit clearance between connecting rod and piston pin

Service limit	0.10mm

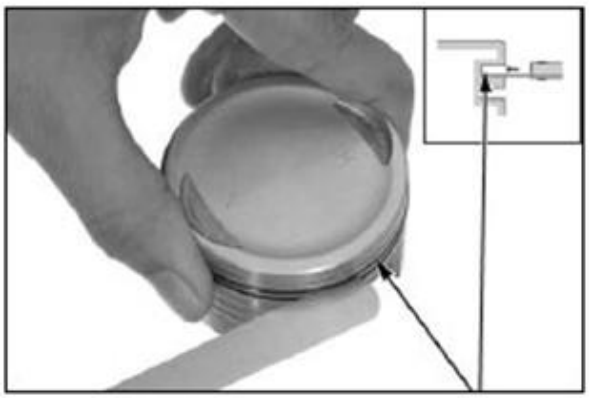
Maintenance of Cylinder block / piston

Check gap of piston ring

Install piston ring into cylinder block, and press them down with piston. Check gap of each piston ring with feeler gauge.



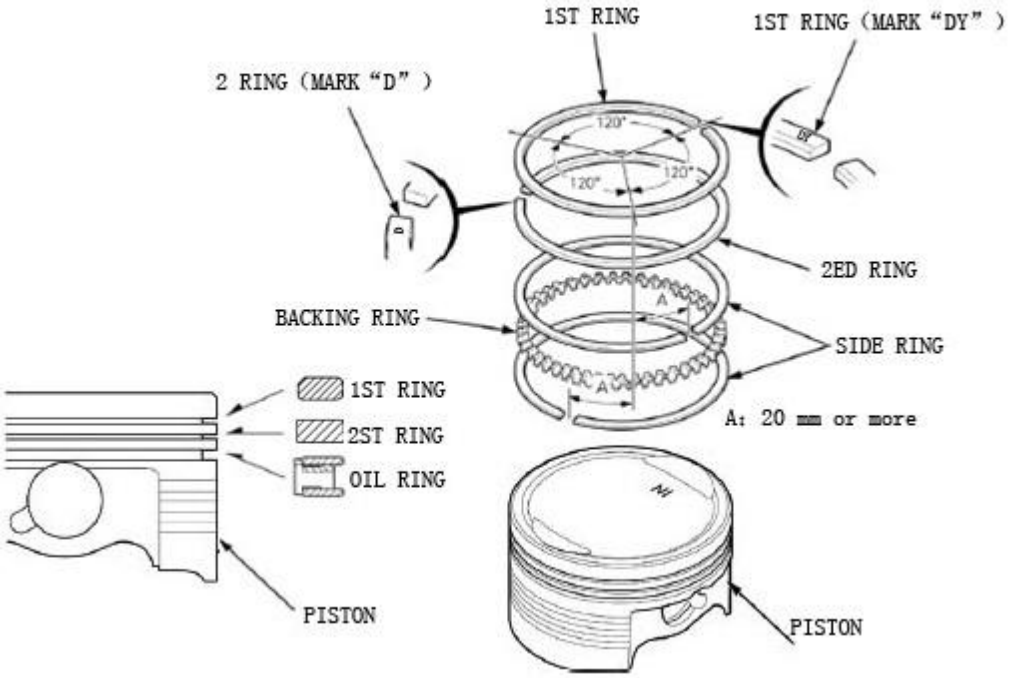
Service limit	1st ring 0.40mm
	2nd ring 0.40mm
	Scraper ring 0.85mm



Check for clearance between piston ring and ring groove

Service limit	1st ring 0.10mm
	2nd ring 0.10mm

Schematic diagram of installation of piston ring



Maintenance of Cylinder block / piston

Note
Do not damage piston and piston ring during assembling;
Check if piston ring can rotate freely on the piston without any seizure after rings are assembled.
After piston rings are assembled, the splits of piston rings must staggered away from each other by 120°.
Improper assembly of piston rings will result directly in burning engine oil, abnormal wear of piston, etc.

e. Installation of piston/cylinder block

Note
When checking cylinder block and piston, place a clean cloth at crankcase to guard against dust and foreign matters falling into crankcase.

Clean off paper gasket, oil and other foreign matters from mating surface between crankcase and cylinder block before installing cylinder block and piston.

When assembling piston, direct face with mark IN towards intake side. Then assemble piston pin.

Apply appropriate amount of lube oil on piston pin, piston pin hole, piston skirt before assembling.

Installing new piston ping circlip

Maintenance of Cylinder block / piston

Note

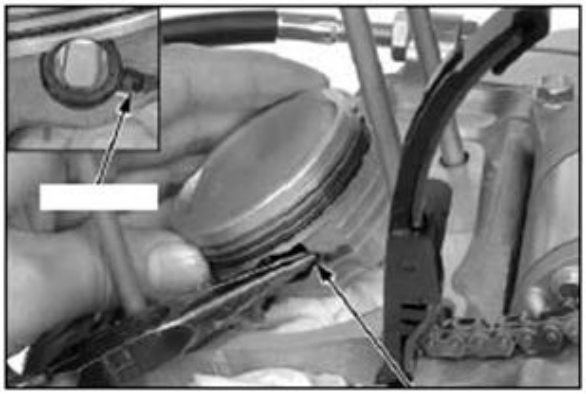
Place a clean cloth under the piston to guard against circlip falling into crankcase. It is forbidden to reuse circlip; otherwise, the engine may be damaged.

Piston pin circlip must be installed to its place.

Split of circlip shall be alternated away from the installing position on the piston. Split of circlip must be kept downwards.

Install locating pin and new sealing gasket of cylinder block

Clean off engine oil from end face of crankcase before installing paper gasket to avoid false phenomena of oil leakage.



Note

Paper gasket of cylinder block is forbidden to reuse. It must be replaced with a new one.

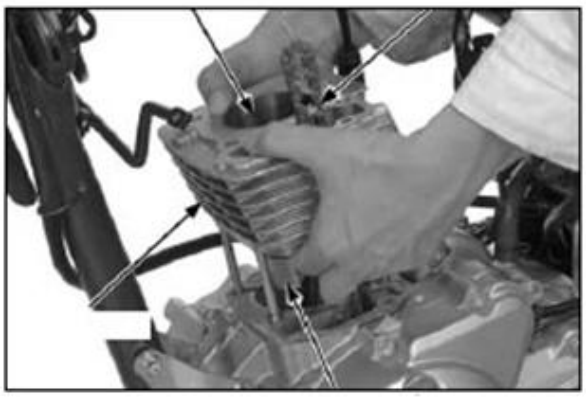
Install cylinder block,

Apply appropriate amount of lube oil evenly on surface of cylinder block, piston and piston ring.

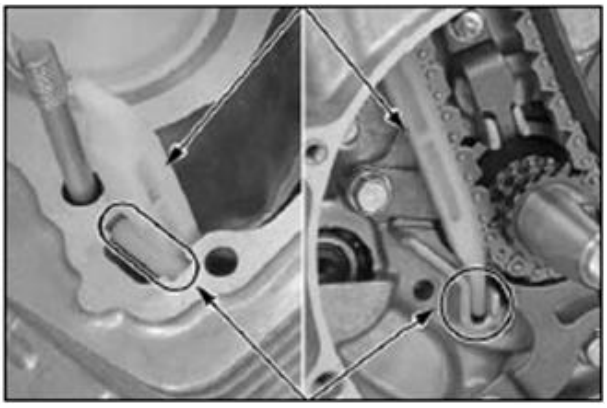
Install piston and piston ring into cylinder block, then install the block assembly in the right position.

Note

Do not damage piston surface and cylinder block.



Install guide plate of chain into cylinder block



Note

Guide plate shall be installed to its place as shown in the figure; otherwise, the plate may be damaged abnormally.

Assemble cylinder head and tensioner.

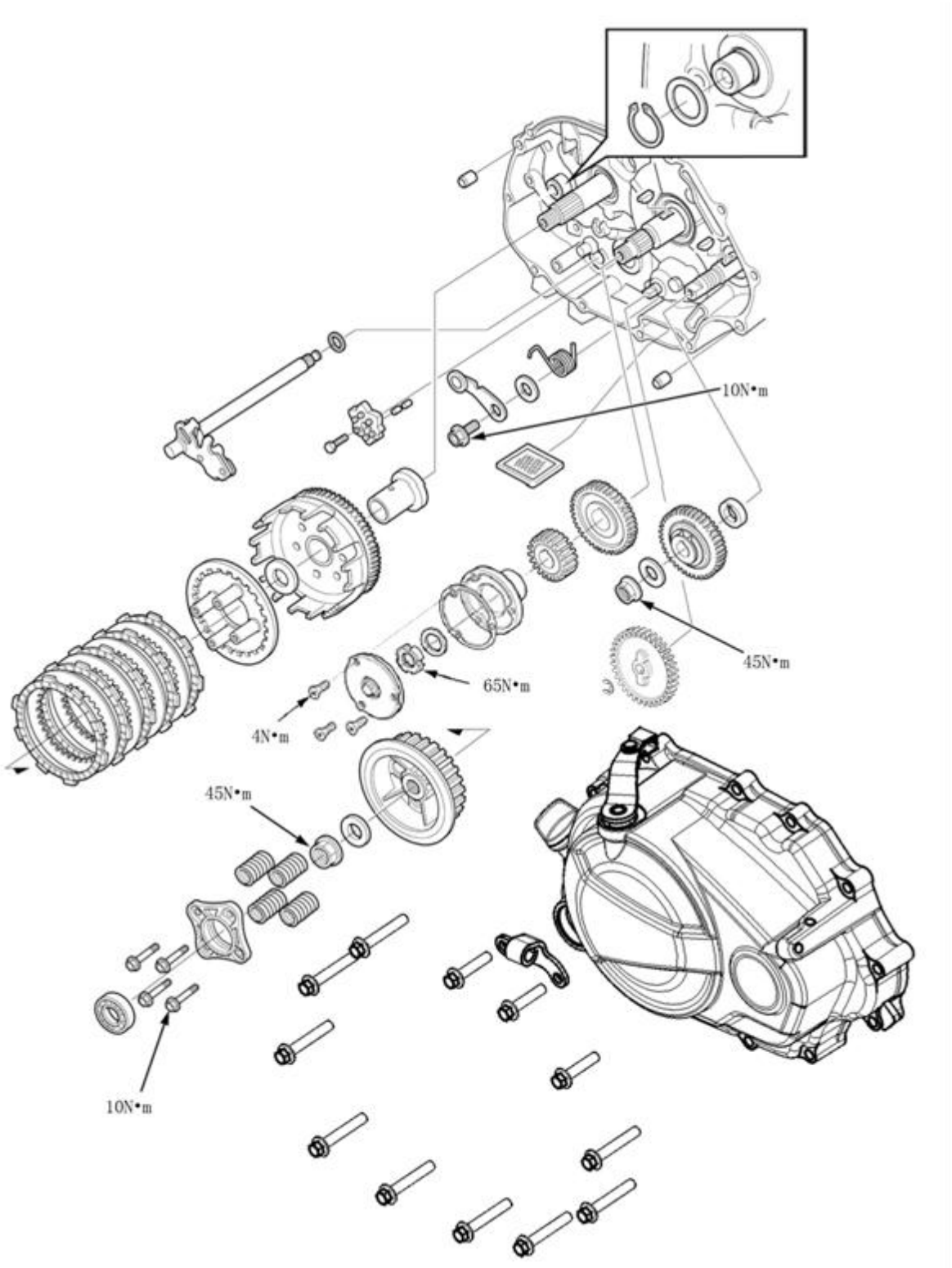
（Page 46）

Right Cover / Clutch / Balanced Gear / Gearshift

Maintenance of Cylinder block / piston

Maintenance of Cylinder block / piston

1. Exploded view of right cover/ clutch/ balanced gear/ gearshift



2. Technical specifications of the clutch

unit: mm

Item		Standard	Service Limit
Free Travel of Separate Handle			
Clutch	Clutch Spring Free Length	41.1-41.9	40
	Friction Plate Thickness	2.92-3.08	2.6
	Planeness of clutch driven plate		0.20
	Driven gear inner hole diameter	Φ23.000~φ23.021	φ23.08
Shaft sleeve	Collar diameter	Φ22.960~φ22.975	Φ22.93
	Bushing aperture	Φ16.990~φ17.008	φ17.04
	The spindle diameter	Φ16.966~φ16.984	Φ16.95

3. Requirement of tightening torque

Locknut of clutch: 45N.m

Locknut of crankshaft: 65N.m

Locknut of balanced gear: 45N.m

Fastening bolt of locating plate: 10N.m

Fastening bolt of clutch cover: 10N.m

Fastening bolt of filter cover cover: 4N.m

Tightening torque of GB5783 bolt: 10N.m

Tightening torque of GB16674 bolt: 10N.m

4. Troubleshooting

1. Clutch does not release or not fully release.
Improper free travel of control arm;
Damaged control arm, declutch bearing or pushing rod;
Severely deformed drive friction plate of clutch;
Lock-up of separate shaft sleeve, separate washer and driven gear;
Severely worn outer case of clutch;

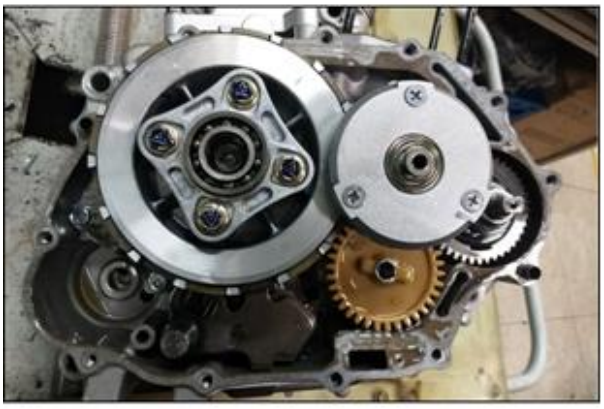
2. Clutch skids:
Severely worn friction plates;
Seizure of declutch mechanism;
Improper of free travel of control arm;

3. Gearshift becomes difficult and seized.
Clutch does not disengage thoroughly;
Gearshift arm bends, deforms and severely wears;
Fork plate of gearshift arm deforms and does not return;
Break of spring of locating plate.

5. Removal and installation of right cover

a. Drain off engine oil from engine.
b. Remove bolt from right cover.

c. Remove paper gasket and locating pin.

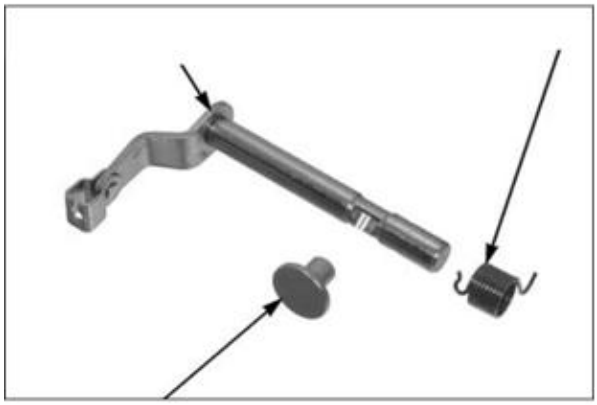


d. Removal of right cover
1. Take out pushing rod of clutch.

2. Use tools to dismantle cotter pin on control arm and take out spring.

3. Take out clutch control arm and oil seal.

4. Check clutch control arm for deformation; check if pushing rod and spring are damaged. If they are, replace them with new ones.



e. <u>Partial assembly of right cover</u>

1. Replace oil seal of control arm with new one. Apply appropriate amount of lube oil onto lever of control arm, then install the arm into right cover.

2. Use tools to knock cotter pin into corresponding hole of control arm.

3. Rotate control arm, so that spring falls into position as shown in figure. Then install pushing rod of clutch.

4. Assemble locating pin and new paper gasket.

Clean off residual paper gasket and engine oil from crankcase before assembling.

Assemble right cover, bracket, bolts.

First, tighten the bolt at locating pin, then tighten other bolts alternatively.

Tightening torque: 10N.m

6. Removal and installation of clutch

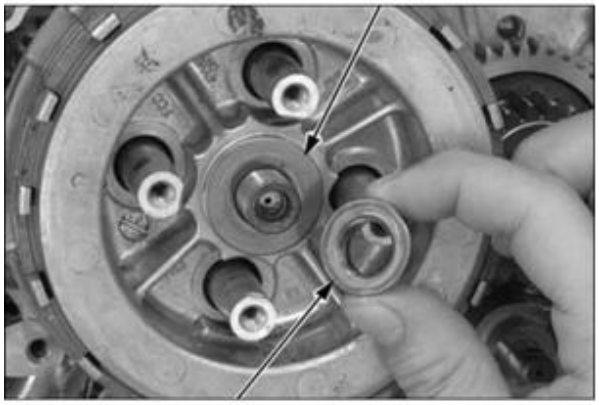
Dismantle the oil filter and gears of oil pump.

Maintenance of Cylinder block / piston

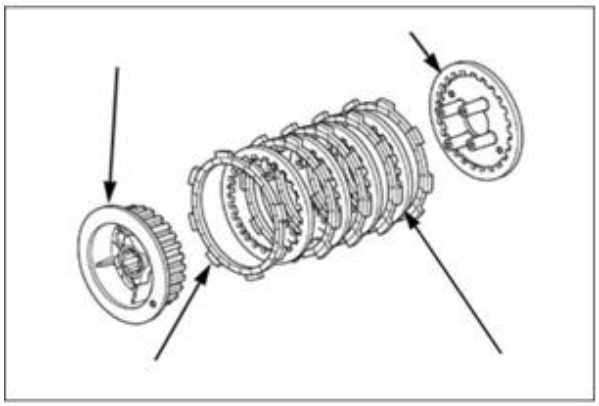
a. <u>Removal of clutch</u>

1. Dismantle 4 bolts from end cover of clutch, then take out end cover of clutch, bearing, declutch spring.

2. Dismantle locknut and washer of clutch.



3. Take out upper and lower pressure plate of clutch, drive and driven friction plate.

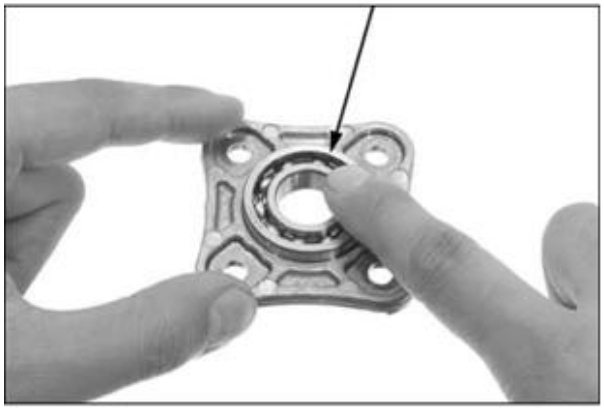


4. Take out declutch gasket and outer case of clutch.

5. Take out declutch shaft sleeve.

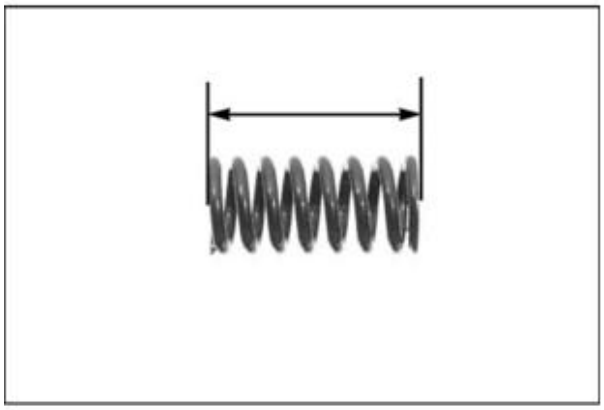
b. Check of clutch

1. Check bearing of clutch for free rotation.

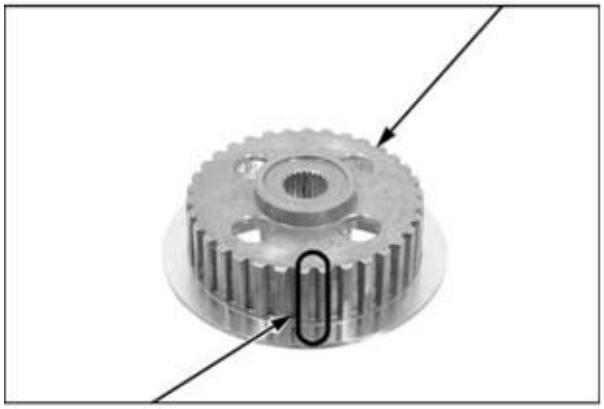


2. Check declutch spring of clutch for damage. Measure free length of spring.

Service limit	40.0mm



3. Check retaining groove of pressure plate for abnormal wear.

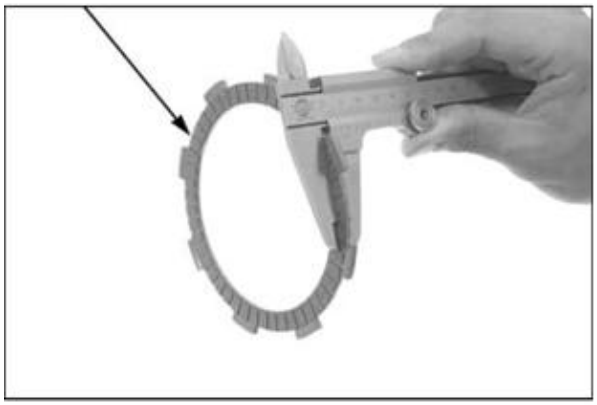


Maintenance of Cylinder block / piston

4. Check if drive friction plates discolors.

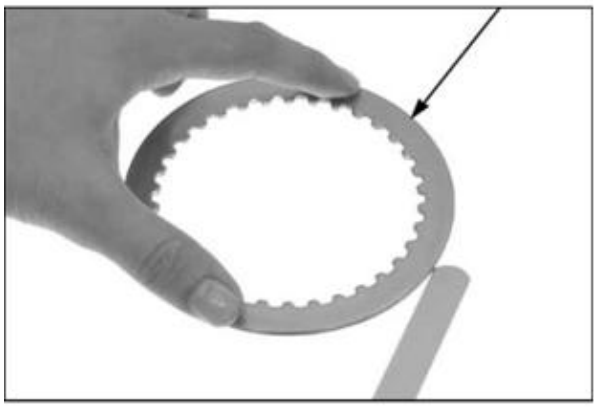
Measure thickness of drive friction plate.

Service limit	2.6mm



5. Check planeness of driven friction plates.

Service limit	0.20mm

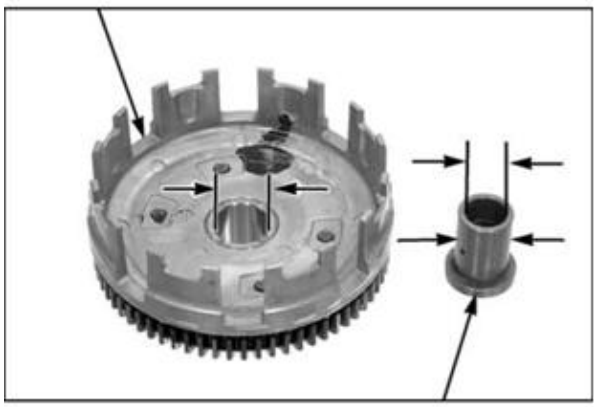


6. Check outer case of clutch and shaft sleeve for abnormal. Measure diameter of inner hole of driven gear on outer case.

Service limit	23.8mm

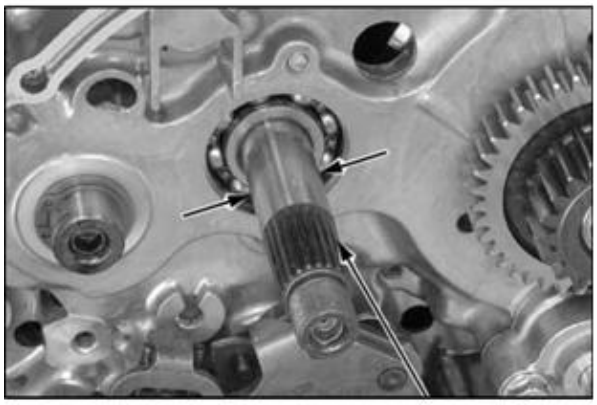
Measure inner and outer diameters of shaft sleeve.

Service limit	Inner Ø 17.04mm
	Outer Ø 22.93mm



7. Measure diameter of main shaft.

Service limit	16.95mm



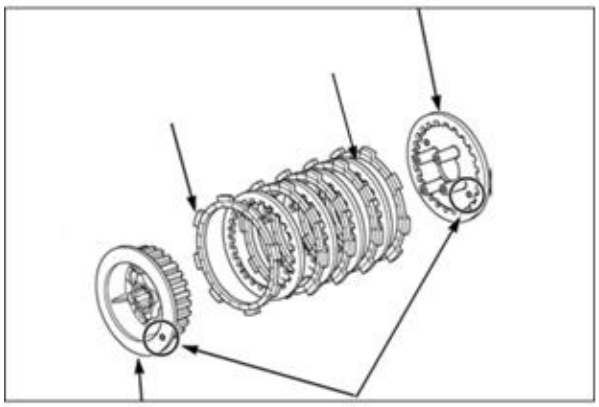
Maintenance of Cylinder block / piston

c. Assembly of clutch

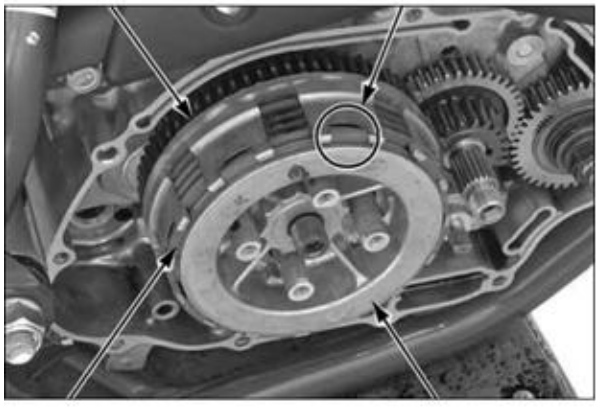
1. Apply appropriate amount of engine oil onto internal and external surface of shaft sleeve, then assemble declutch shaft sleeve onto main shaft.

2. Apply appropriate amount of lube oil onto gears. Assemble outer case and declutch washer of clutch.

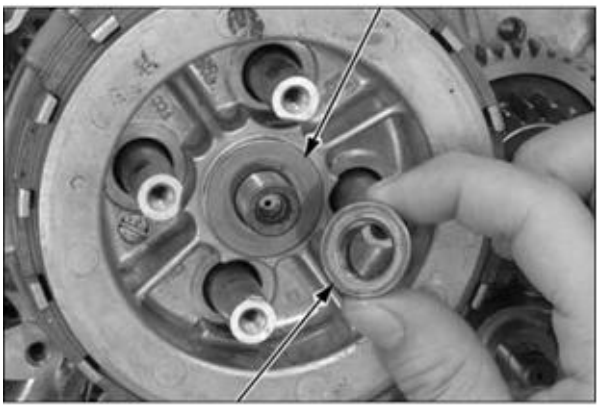
3. New friction plates shall be immersed in engine oil before assembly. When assemble central sleeve of clutch, care shall be taken to align mark on upper pressure plate with that on lower pressure plate.



4. When assemble central sleeve, the upmost friction plate on clutch shall be staggered from other friction plates.

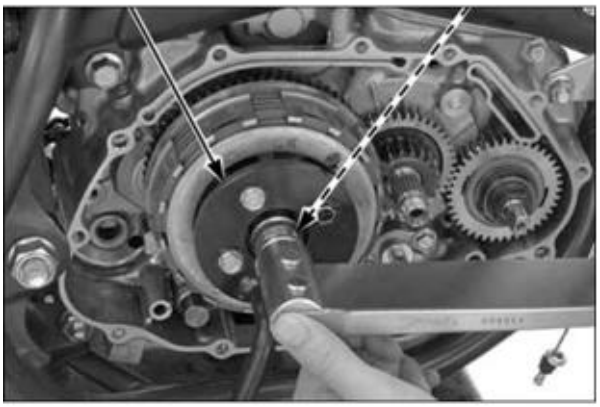


5. Assemble gaskets and nut. Apply appropriate amount of engine oil onto end face of nut.



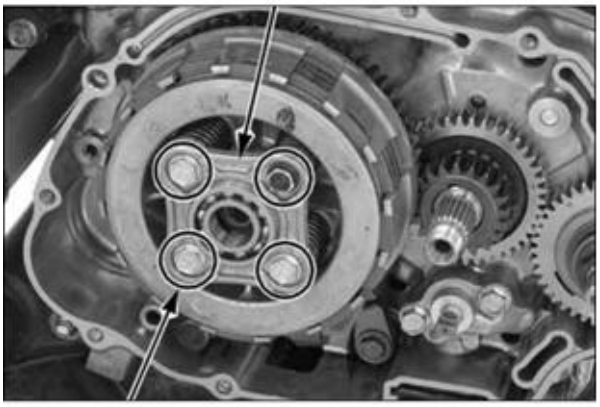
6. Use tools to fix pressure plate and tighten locknut of clutch. Tightening torque shall meet specified requirement.

Tightening torque: 45N.m



7. Assemble spring and clutch end cover, and tighten bolts on the end cover in sequence.

Tightening torque: 10N.m



7. Removal and installation of gearshift arm

1. Take out components of gearshift arm.

Note
Do not fall washer into crankcase.

Maintenance of Cylinder block / piston

1. Remove bolt of star-shaped plate, then dismantle the plate.

2. Dismantle components and parts in turns:

Pin

Locating plate

Bolt of locating plate

Spring of locating plate

Washer

3. Check of gearshift arm

Check if lever of arm bends, deforms or wears abnormally;

Check spring for damage and break;

Check if fork plate bends or deforms.

4. Assemble locating plate, spring, bolt and washer. Hook of spring shall be snapped into groove of locating plate.

Tighten bolt of locating plate.

Tightening torque: 10N.m

5. After displace locating plate with flat screwdriver, assemble pin and star-shaped plate. Pin holes on the star-shaped plate shall be aligned with two cylindrical pins.

6. Tighten bolt on star-shaped plate.
Tightening torque: 10 N.m

7. Apply lube oil on to gearshift arm shaft.

8. Insert return spring of gearshift arm on locating bolt. Rotate gearshift arm to confirm that it is installed to its position.

8. Removal and installation of drive gear and balanced gear

a. Removal of balanced drive gear

1. Dismantle the oil filter and clutch to Page 70.

2. Take out drive gear.

3. Take out balanced drive gear

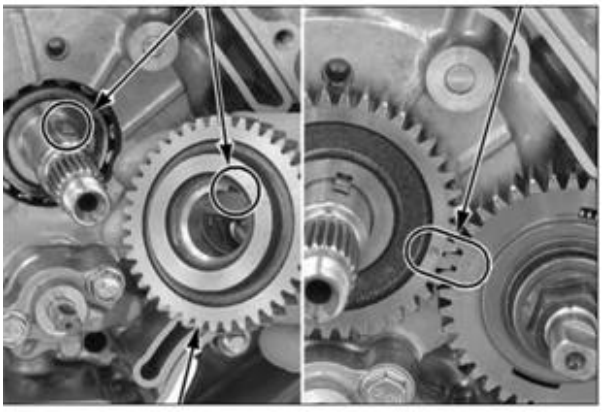
Note

Do not damage woodruff and circumference of crankshaft when removing drive gear and balanced drive gear.

b. Assembly of drive gear and balanced drive gear

1. Check woodruff key for soundness, abnormal wear. If the key is damaged, replace it with a new one.

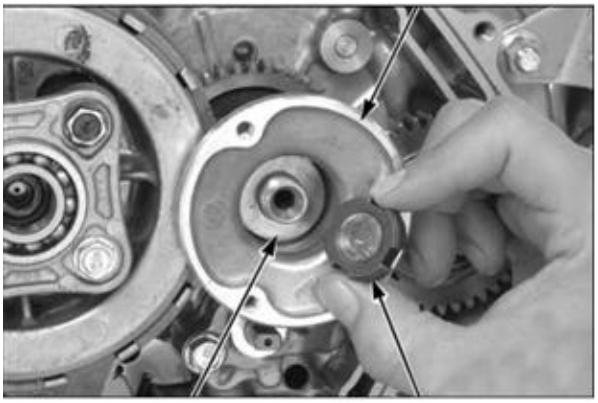
2. When assemble, align keyway of balanced drive gear with woodruff key on crankshaft, and with timing mark on balanced drive gear.



3. Apply appropriate amount of engine oil on balanced gear.

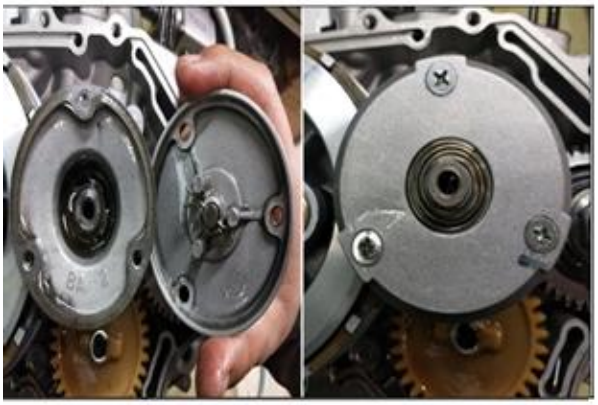
4. Align keyway on drive gear with woodruff key on crankshaft and assemble them. Apply appropriate amount of engine oil on gears.

5. Assemble oil filter, washer and locknut.



6. Tighten nut to specified torque;
Tightening torque: 65N.m

7. Assemble the filter cover and paper gasket. Tighten bolt
Tightening torque: 4 N.m



Maintenance of Cylinder block / piston

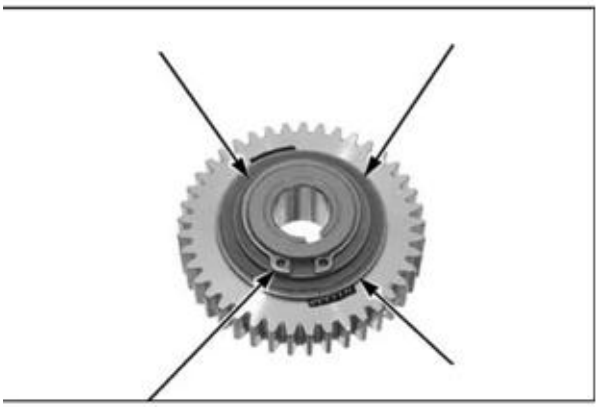
c. <u>Removal of balanced driven gear</u>

1. Dismantle locknut and washer;

2. Take out shaft sleeve and woodruff key.

3. Disassembly and assembly of balanced driven gear

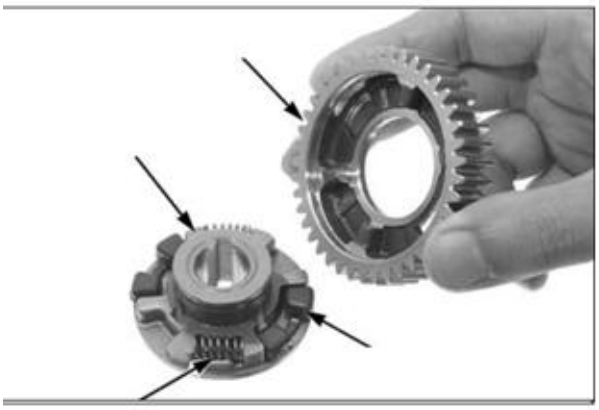
1) Dismantle circlip, washer, disc washer, flat washer in turn;



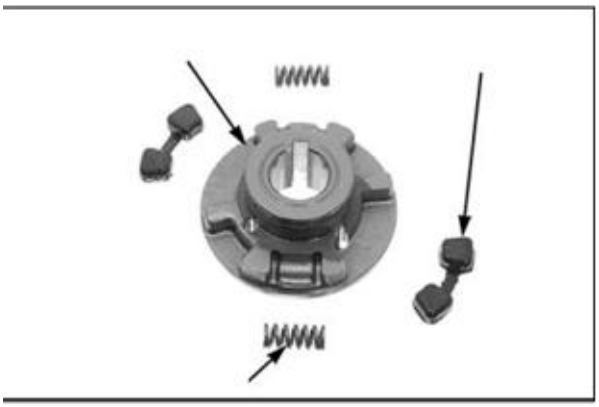
2) Take out balanced driven gear, two springs, two buffer rubber bushing.

3) Check spring for break and damage;

Check rubber bushing for hardening, damage and deformation;



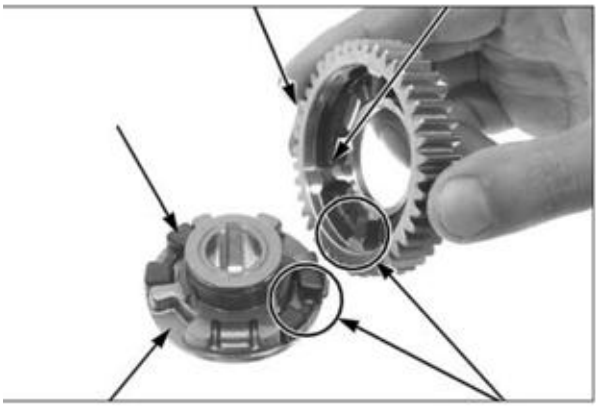
Check driven gear hub for wear; Check driven gear for damage or wear.



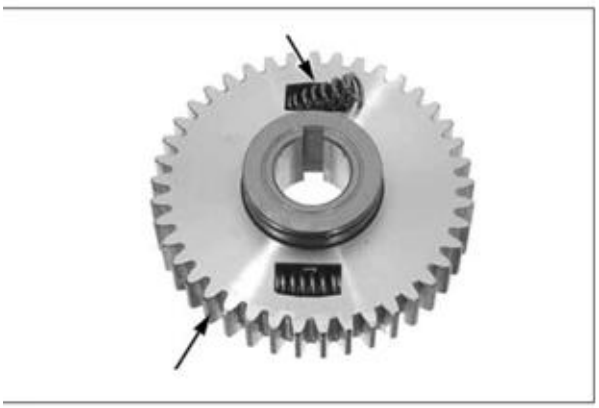
4) Apply engine oil on mating face between gear and hub;

5) Install buffer rubber bushing on corresponding position on the hub;

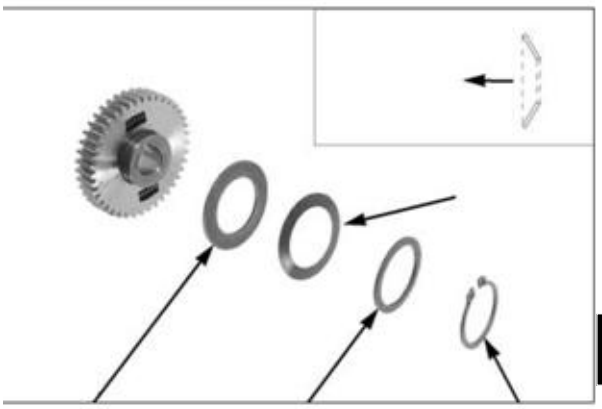
6) Install driven gear onto the hub;



7) Install buffer spring into gear.



8) Install washer, disc washer, washer, circlip in turn according to sequence shown in figure.



Note

Concave face of disc washer shall be directed toward driven gear.

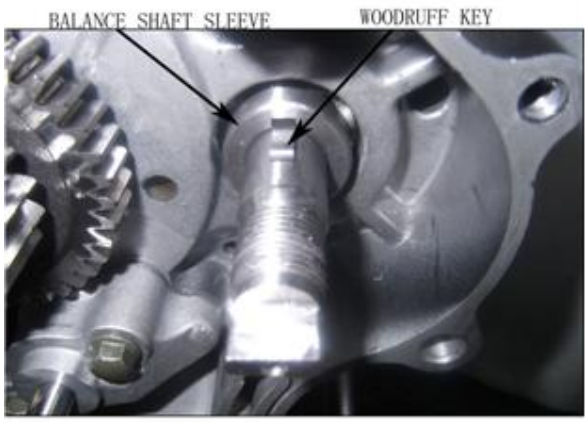
Maintenance of Cylinder block / piston

d. <u>Assembly of driven gear of balanced shaft</u>

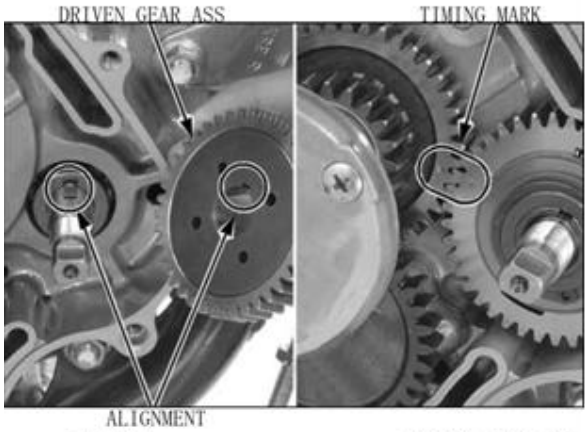
1. Assemble shaft sleeve and woodruff key onto balanced shaft.

Note

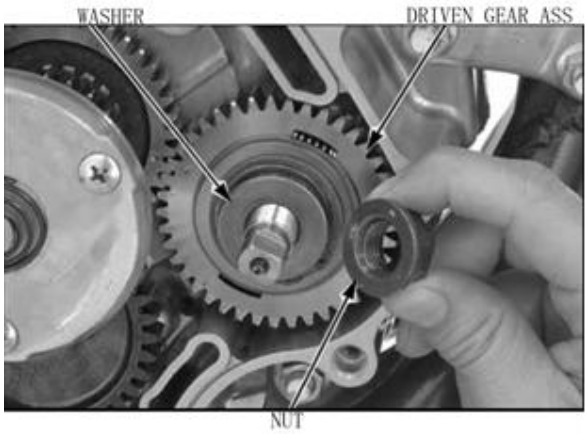
Do not damage circumference of balanced shaft and keyway



2. Align keyway of balanced driven gear with woodruff key on balanced shaft. Meanwhile, rotate balanced driven gear to align the keyway with timing mark on balanced drive gear.



3. Assembly washer and locknut. Apply appropriate amount of engine oil onto flange face of the nut.



4. Tighten the nut to specified torque.
Tightening torque: 45N.m

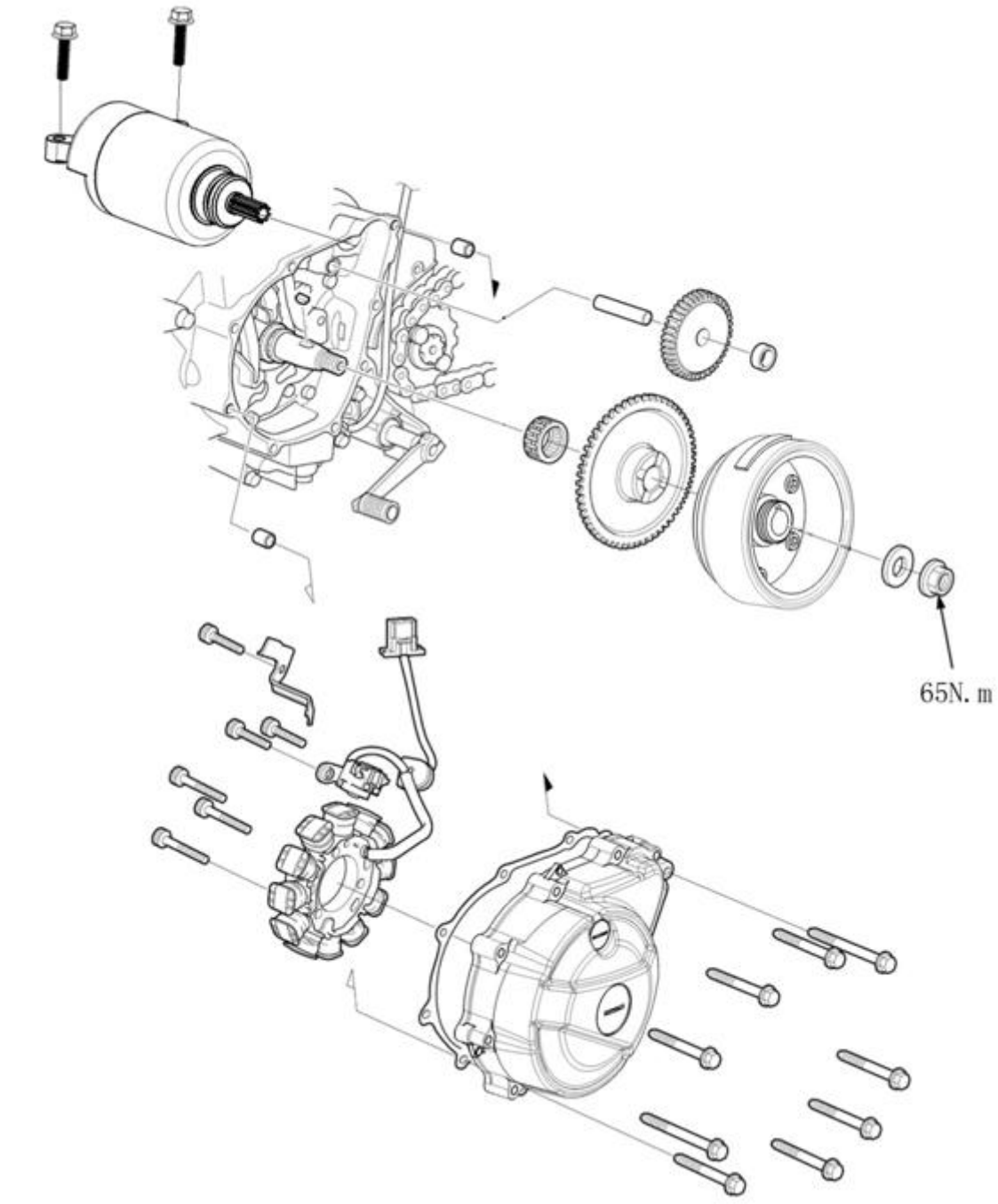
5. Assemble right cover (refer to Page 70).

Left Cover / Starting motor System / Magnetor

Left Cover / Starting motor System / Magnetor

Left Cover / Starting motor System / Magnetor

1. Exploded view of left cover/ starting motor system/ magnetor



2. Requirement of tightening torque

Locknut of magnetor: 65N.m

Tightening torque of GB5783 bolt: 10N.m

Tightening torque of GB16674 bolt: 10N.m

3. Removal and installation of left cover

1. Take out gearshift switch harness from harness groove.

2. Loosen fastening bolt on left cover and remove left cover.

3. Take out locating pin and paper gasket. Assemble locating pin and new paper gasket.

4. Install left cover and tighten fastening bolt in accordance with specified sequence.

Tightening torque: 10N.m

5. Insert gearshift switch harness into harness groove on left cover.

4. Removal and installation of starting motor system

1. Dismantle left cover and take out shaft sleeve, dual gear shaft and dual gear.

2. Dismantle bolt of starting motor.

3. Check O-ring for condition.

Left Cover / Starting motor System / Magnetor

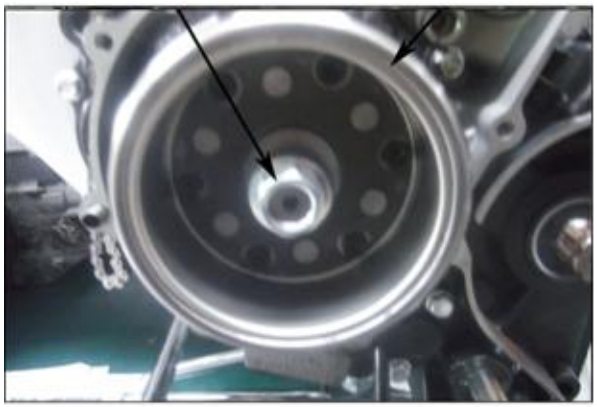
4. Dismantle locknut on magnetor. Use special tools to dismantle magnetor rotor.

5. Take out turning gear.Check needle bearing, woodruff key on crankshaft for damage.

6. Clean off engine oil from tapered face of crankshaft. Install magnetor rotor and turning gear on crankshaft, and align keyway with woodruff key.

7. Install washer and locknut.

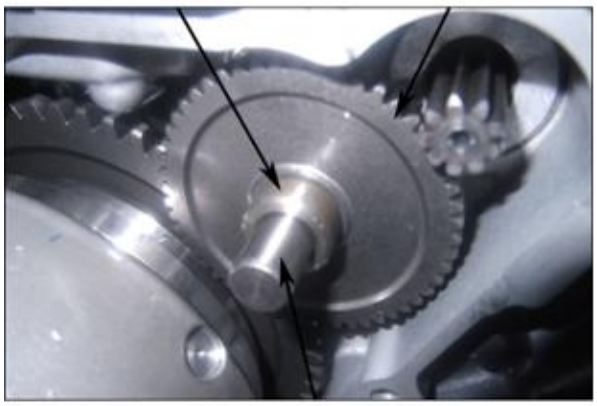
8. Use tools to fix magnetor and tighten nut to specified torque.
Tightening torque: 65N.m



9. Replace O-ring with a new one. Apply appropriate amount of lube oil onto O-ring before assemble it.

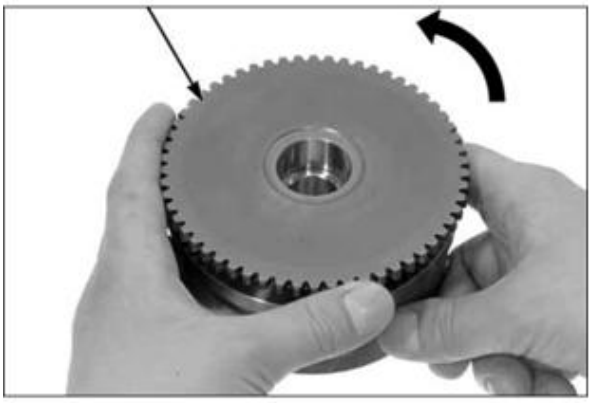
10. Assemble starting motorand lock bolt.
Tightening torque: 10N.m

11. Apply appropriate amount of lube oil onto dual gear shaft, then assemble dual gear, dual gear shaft and shaft sleeve. Apply appropriate amount of lube oil onto teeth of the dual gear.



12. Check of starting motor system

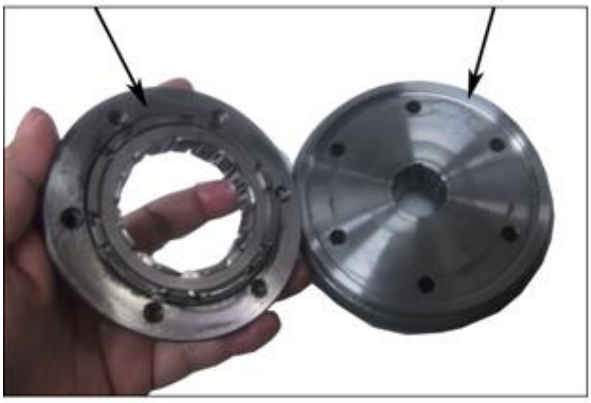
Assemble large starting gear onto magnetor rotor, then check if the gear can rotate normally by rotating it counterclockwise.



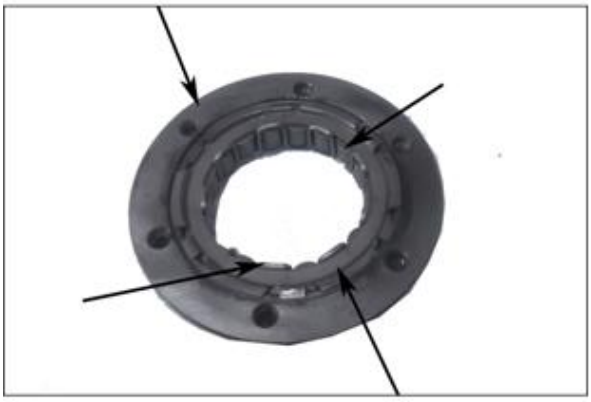
13. Disassembly of magnetor rotor

1) Use special tools to fix rotor, then dismantle fastening bolt in the rotor.

2) Take out overrunning clutch.

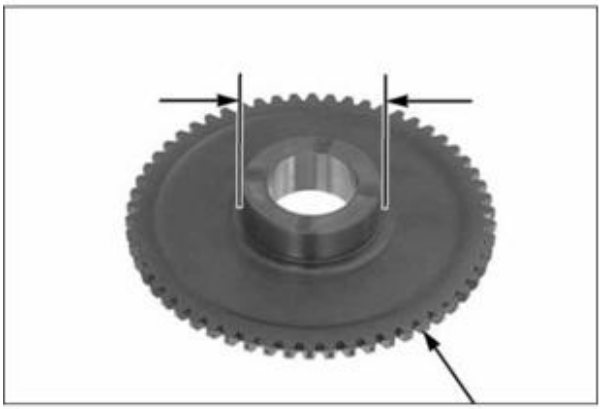


3) Check holder and wedge block for damage.

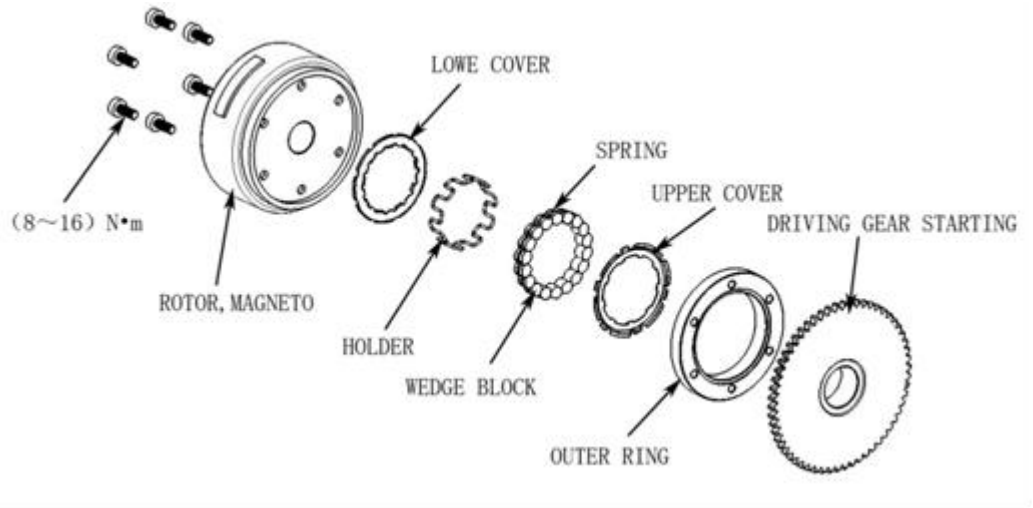


4) Check teeth of large starting gear for damage.
Measure outer diameter of large starting gear

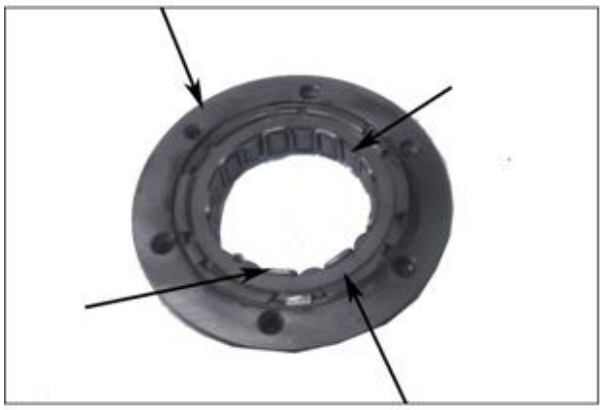
Service limit	45.60mm



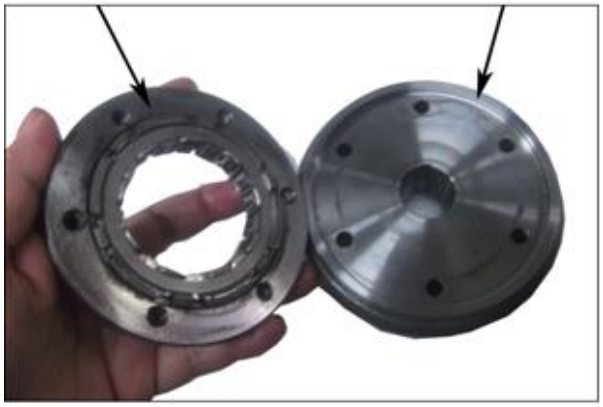
5) Exploded view of magnetor rotor



6) Assemble overrunning clutch.



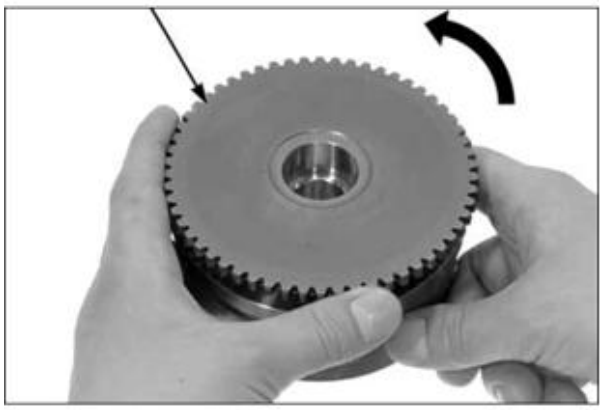
7) Install overrunning clutch onto magnetor rotor, and align through hole with threaded hole.



8) Apply appropriate amount of fastening adhesive onto threads of bolt, then use tools to locate and tighten the bolt.
Tightening torque: 16N.m

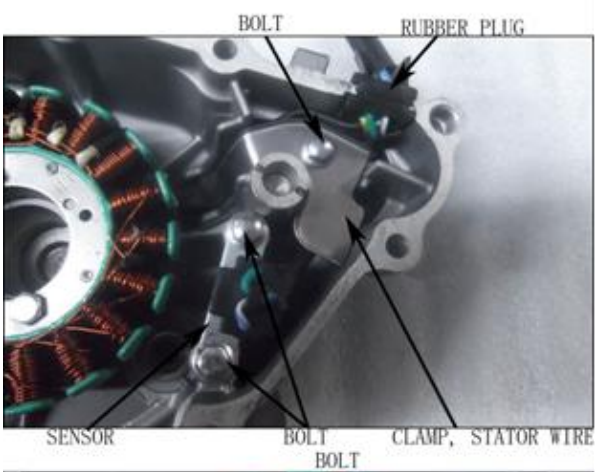
9) Install large starting gear onto assembled magnetor rotor, and rotate gear counterclockwise.
Gear shall be coated with lube oil properly;

Ensure that the gear can rotate freely counterclockwise, but cannot rotate clockwise.

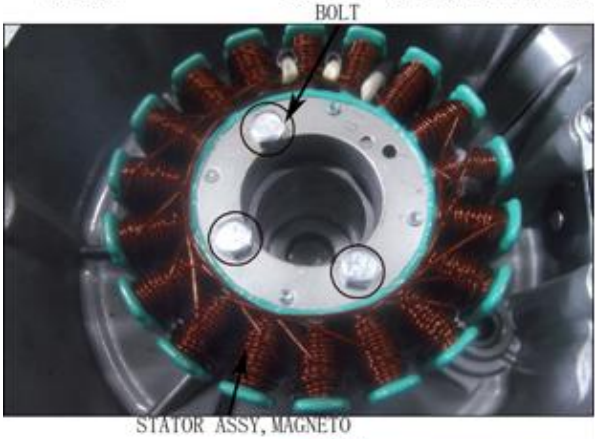


5. IV. Removal and installation of magnetor stator

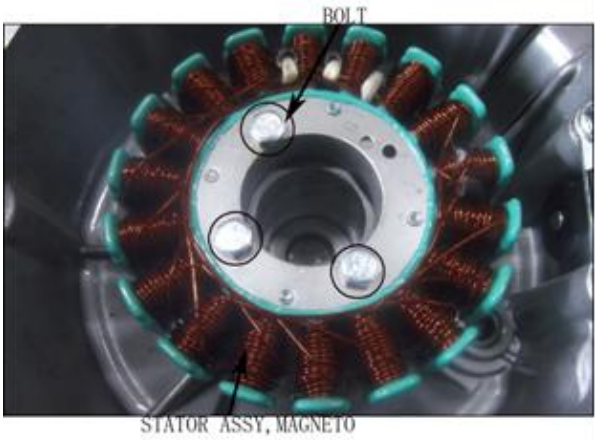
1. Remove rubber plug, magnetor cable clip and sensor.



2. Dismantle fastening bolt on stator and take out magnetor.



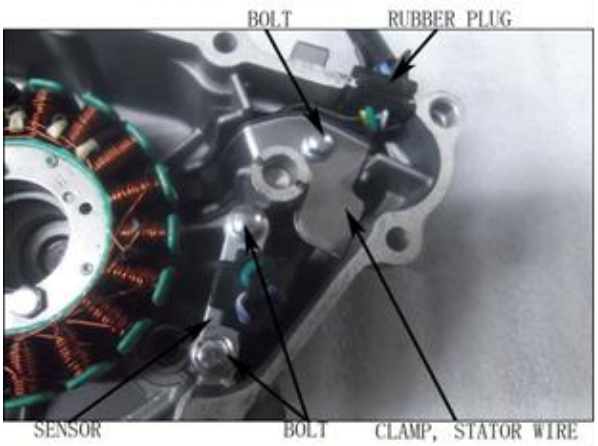
3. Install a new magnetor onto left cover, then tighten bolts.
Tightening torque of bolt: 10N.m



4. Install sensor and tighten bolts. Press cable clip of magnetor into corresponding position on left cover, and tighten bolts.

Note

When assemble magnetor cable clip, collect the harness into groove to avoid damage of the harness; otherwise, short circuit may be engendered.



Tightening torque of bolt: 10N.m

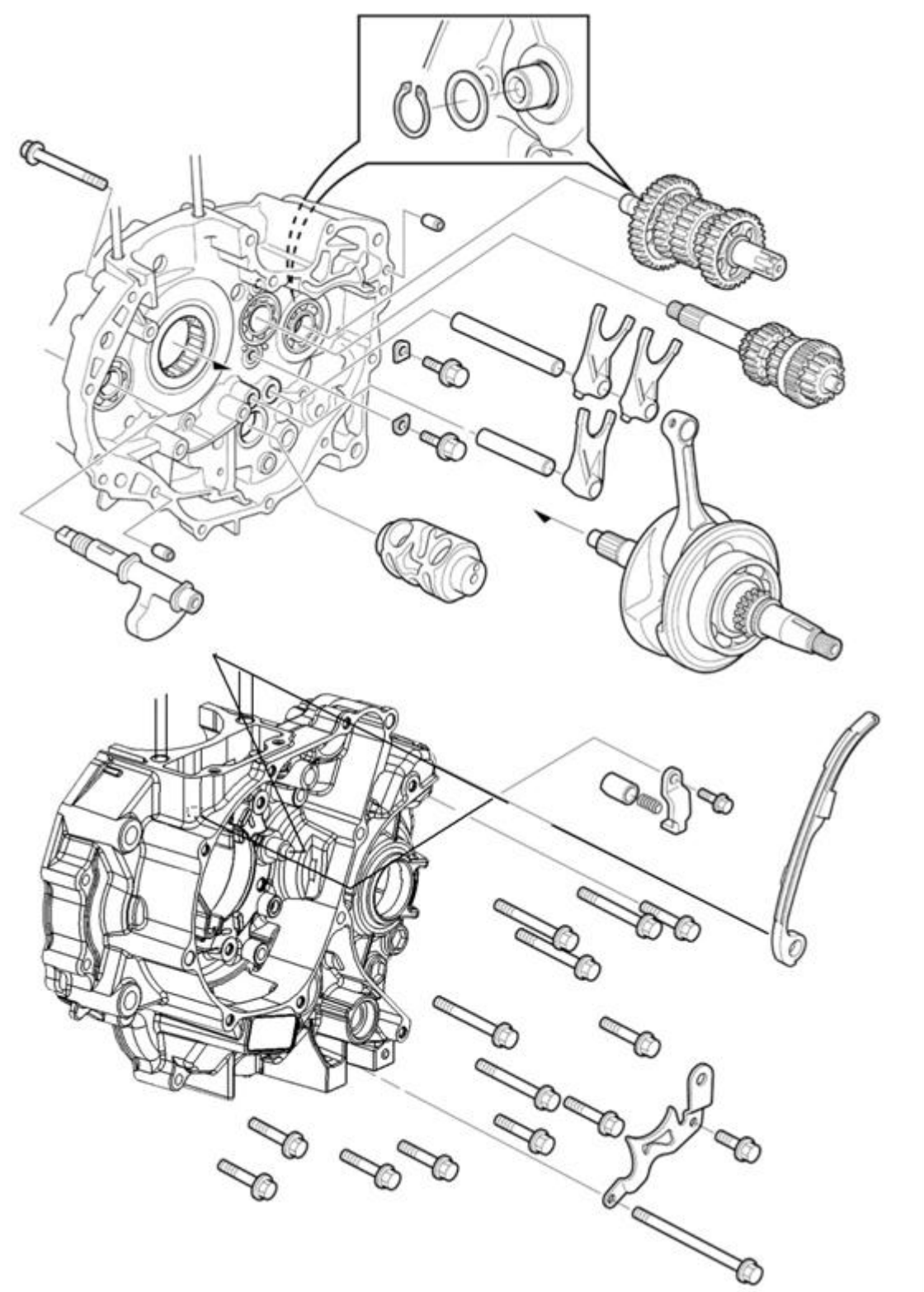
5. Install left cover onto engine (refer to Page 87)

Removal and Installation of Crankcase

Removal and Installation of Crankcase

Removal and Installation of Crankcase

1. Exploded view of crankcase



2. Adopted specifications

unit: mm

Item			Standard	Service Limit
Crankshaft, Connecting Rods	Connecting Rod Big End:	Radial Clearance	0~0.008	0.03
		Side Clearance	0.1~0.35	0.5
	Crankshaft Runout		0.03	0.08
fork	Outer diameter of fork shaft		Φ9.966~φ9.984	Φ9.93
	Inner diameter of fork		Φ10.000~φ10.018	φ10.05
	Shift Fork Ear Thickness		4.93~5.00	4.5
Transmission	Gear tooth inner hole diameter	M4	Φ20.000~φ20.021	Φ20.04
		M5	Φ20.000~φ20.021	Φ20.04
		C1	Φ20.500~φ20.521	Φ20.55
		C2	Φ23.000~φ23.021	Φ23.04
		C3	Φ23.025~φ23.046	Φ23.06
	Bushing diameter	M4	Φ19.959~φ19.980	Φ19.93
		M5	Φ19.959~φ19.980	Φ19.93
		C1	Φ20.459~φ20.480	Φ20.41
		C2	Φ22.984~φ23.005	Φ22.95
	Bushing inside diameter	M4	Φ17.000~φ17.018	φ17.04
		C1	Φ17.000~φ17.018	φ17.04
		C2	Φ20.000~φ20.021	Φ20.04
	The shaft diameter	M4	φ16.966~φ16.984	φ16.93
		C1	φ16.966~φ16.984	φ16.93
		C2	φ19.974~φ19.987	φ19.94
		C3	φ19.979~φ20.000	φ19.95

Requirement of tightening torque

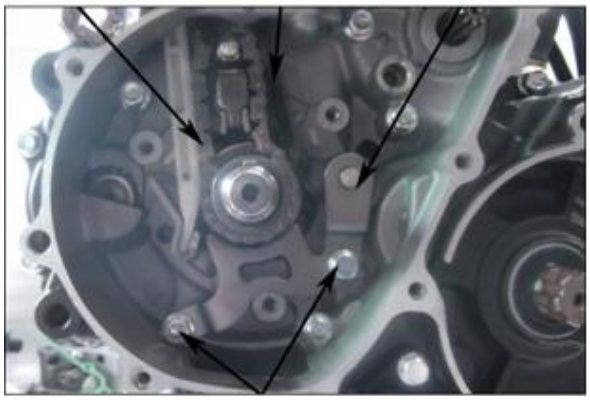
Tightening torque of GB5789 bolt: 10N.m

Tightening torque of GB16674 bolt: 10N.m

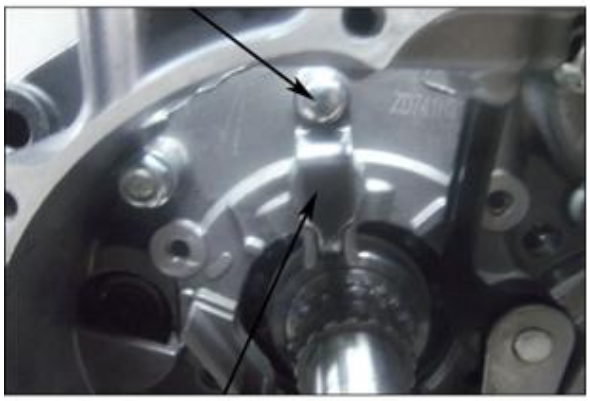
Removal and Installation of Crankcase

3. Removal of crankshaft

1. Dismantle corresponding components and parts (cylinder head, cylinder block, right cover, left cover) in accordance with steps described in foregoing text.



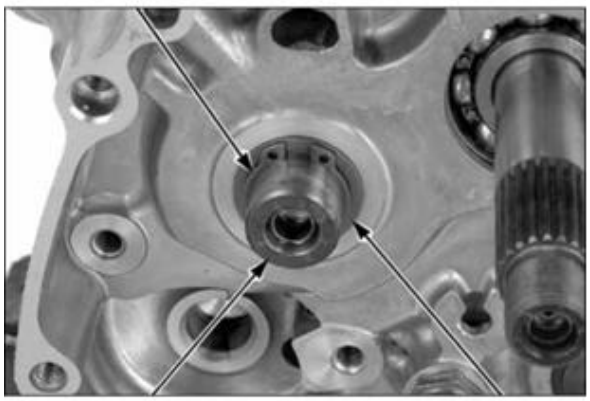
2. Loosen and dismantle fastening bolt on chain guard, then take out chain guard, tension plate, guide plate and chain.



3. Dismantle fastening bolt on pressing pin body, then take out guard plate of pressing pin body.

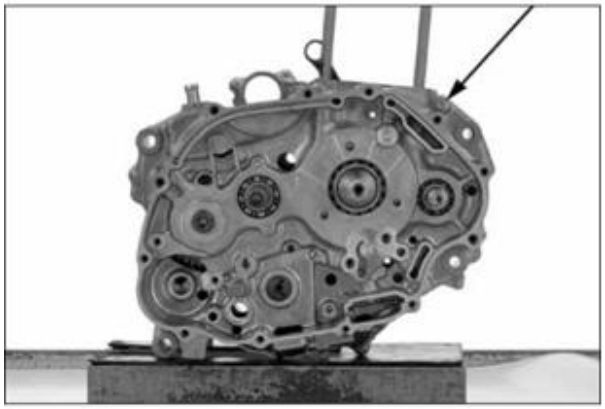
4.Take out pressing pin body and spring.

5. Remove circlip and washer on counter shaft.

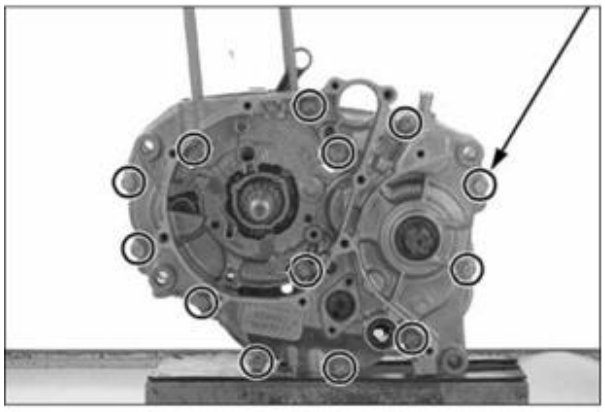


Removal and Installation of Crankcase

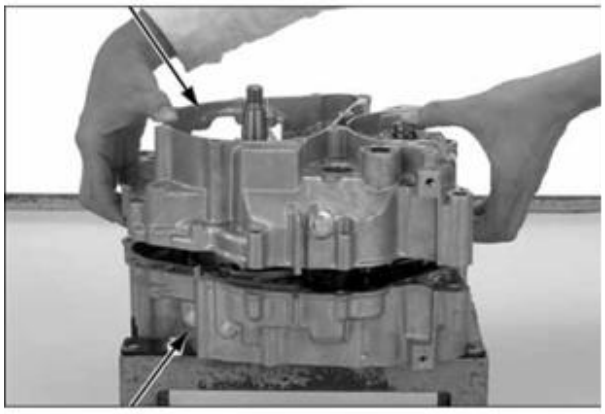
6. Dismantle fastening bolt on right crankshaft.



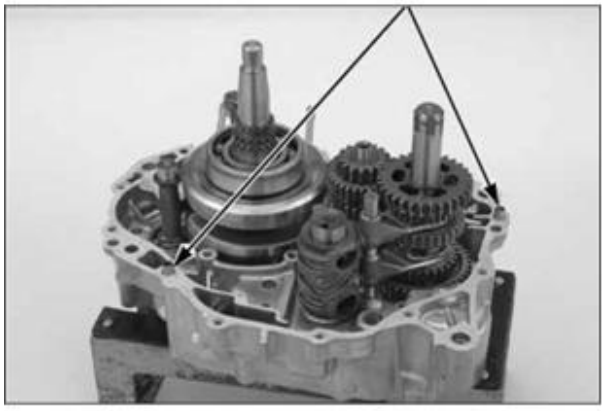
7. Dismantle fastening bolts on crankshaft.



8. Place crankcase properly with right half downwards. Knock counter shaft and crankshaft with rubber hammer to loosen adhesive on left and right halves. Place horizontally the crankcase and remove left half upwards.



9. Dismantle locating pin.

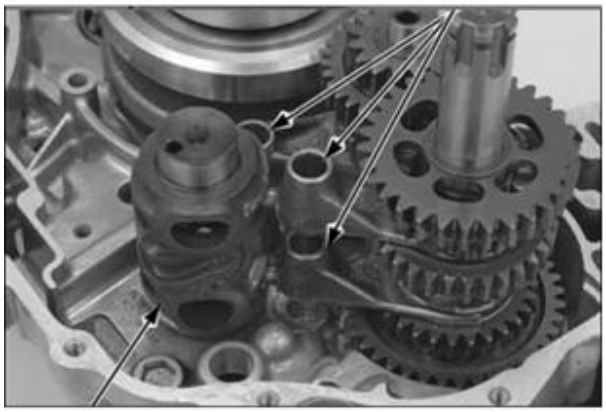


10. Check chain tension plate for severe wear or damage. If there is, replace the tension plate with a new one.

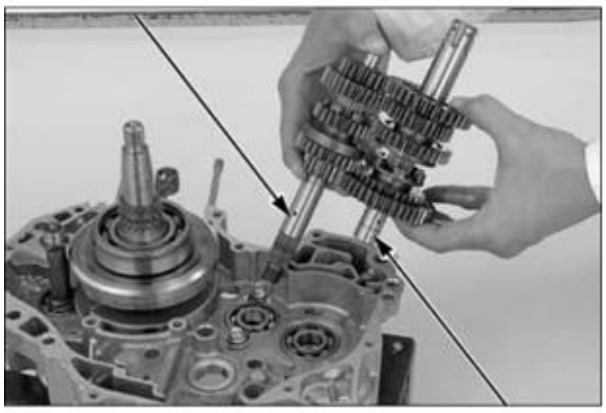
4. Removal and check of drive train

1. Take out fork shaft of main and counter shafts.

2. Take out fork and gearshift drum from both sides.

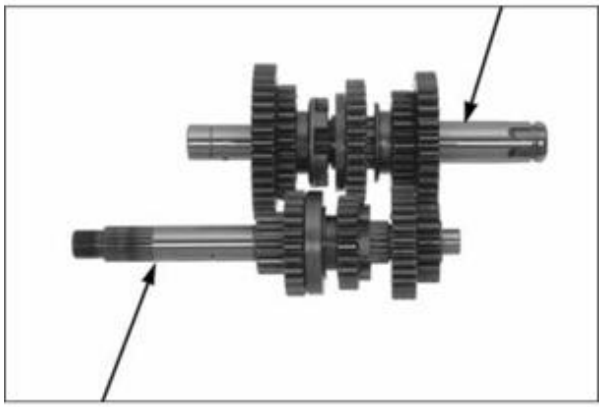


3. Take out main and counter shafts.



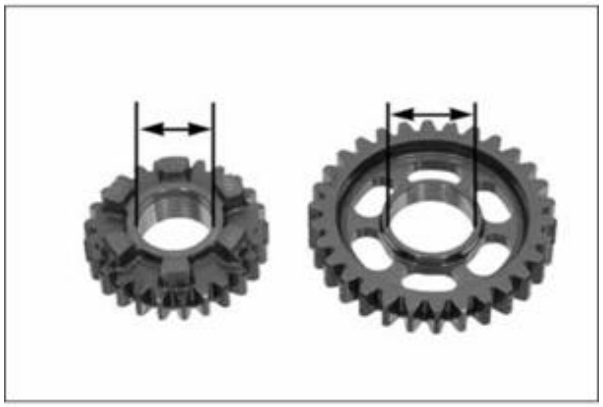
3. Check of main and counter shafts

1) Disassemble gears on main and counter shafts.



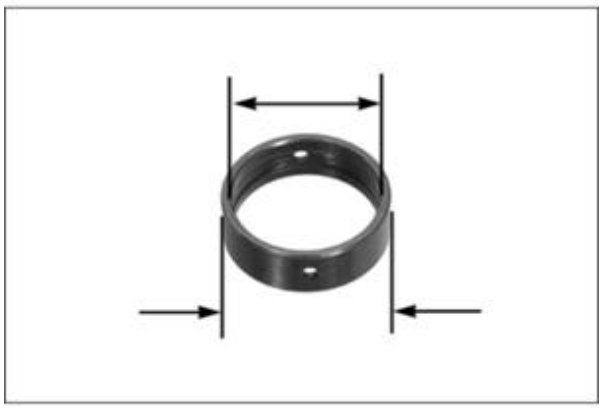
2) Check gears for severe wear or damage. Check inner diameter of the gears.

Service limit	M4	Φ20.04mm
	M5	Φ20.04mm
	C1	Φ20.55mm
	C2	Φ23.07mm
	C3	Φ23.07mm



3) Check shaft sleeve for severe wear and damage. Measure inner and outer diameters of shaft sleeve.

Service limit of outer diameter of bushing	M4	Φ19.93mm
	M5	Φ19.93mm
	C1	Φ20.41mm
	C2	Φ22.95mm
Service limit of inner diameter of bushing	M4	Φ17.04mm
	C1	Φ17.04mm
	C2	Φ20.04mm

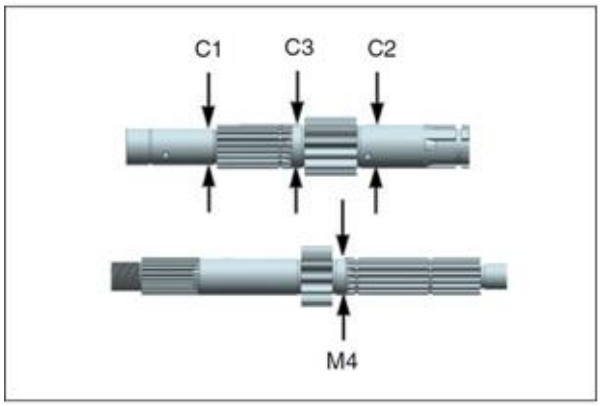


Calculate fit clearance between shaft sleeve and gear

Service limit	0.10mm

4) Check spline key and shaft of main and counter shaft for abnormal wear and damage.

Measure diameter of shaft at gear-mating position.



Service limit of outer φ of main and counter shafts	M4	φ16.93mm
	C1	φ16.93mm
	C2	φ19.94mm
	C3	φ19.95mm

Calculate fit clearance between gears and shaft sleeve

Service limit	0.10mm

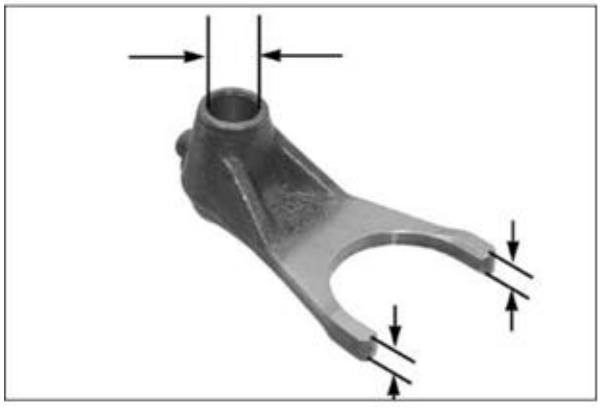
4. Check of gearshift drum

1) Check both ends of gearshift drum and profiled groove for abnormal wear or damage.

2) Check fork for abnormal wear and deformation.

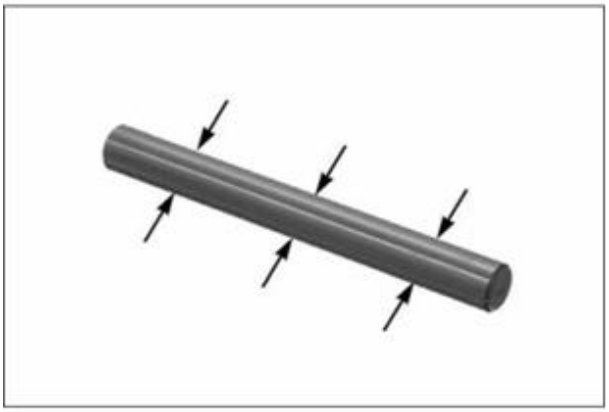
Measure inner hole diameter and ear thickness of fork.

Service limit	Inner hole diameter	10.07mm
	Ear thickness	4.50mm



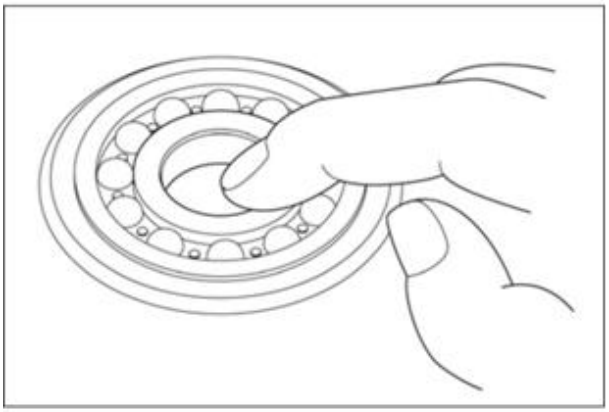
3) Check fork shaft for abnormal wear and damage.
Measure diameter of shaft

Service limit	Φ9.93 mm



5. Replacement of bearing

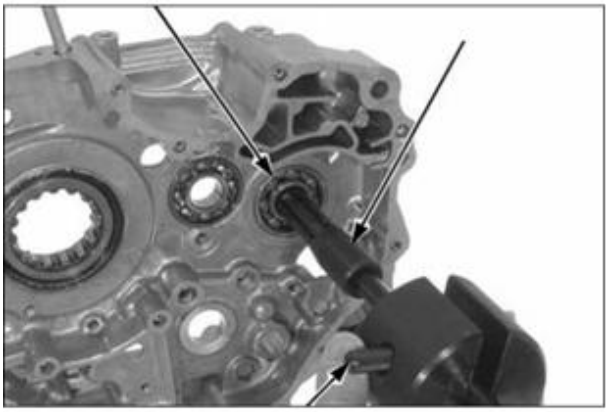
1) Turn inner race of bearing to check if it can rotate freely.
2) Check cage and ball of the bearing for severe wear and damage.



5. Removal of bearing

1. Dismantle bearing guard and bolt.

2. Take out bearing from right half with the aid of bearing puller.



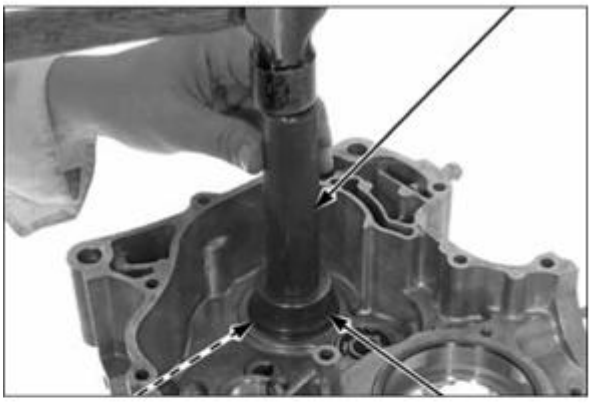
Removal and Installation of Crankcase

3. Dismantle oil seal of counter shaft and that of gearshift arm on left half.

4. Dismantle bearing from left half with the aid of bearing puller.

6. Installation of bearing

1. Apply appropriate amount of engine oil on outer race of bearing, then press the bearings of various models into corresponding holes with special tools.

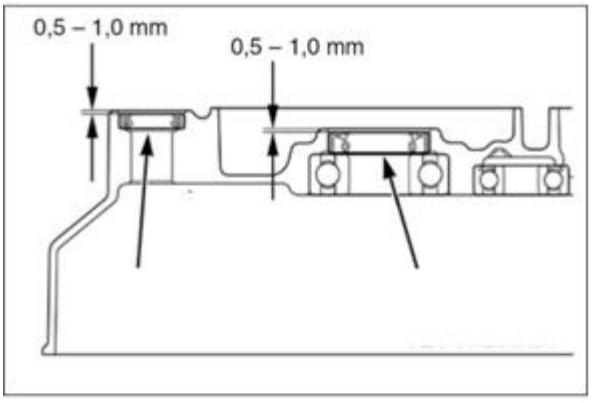


Note

1. Bearing shall be installed with the aid of special tools.

2. When pressing bearing, force shall be applied on outer race of bearing only; otherwise, the bearing may be damaged

2. Apply appropriate amount of lube oil onto inner and outer races, then use special tools to press oil seal to its position.



3. Install locating plate of bearing and tighten the bolts to specified torque.

Tightening torque: 10N.m

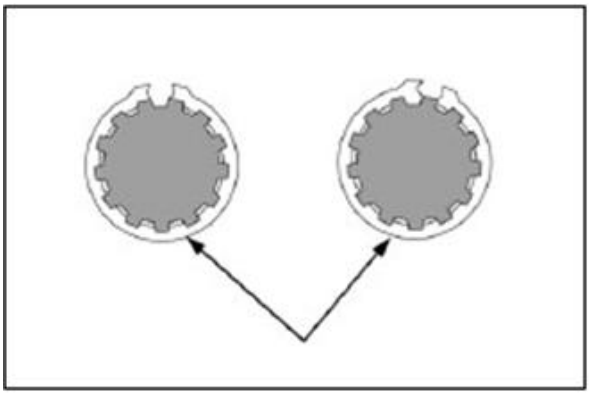
7. Assembly of drive train

1. Clean the components and parts with cleaning agent.

2. Dry the cleaned components and parts in air and apply engine oil on it.

3. Apply appropriate amount of grease onto inner and outer races of bushing to guarantee initial lubrication.

4. Install the components and parts onto their original positions.



Note

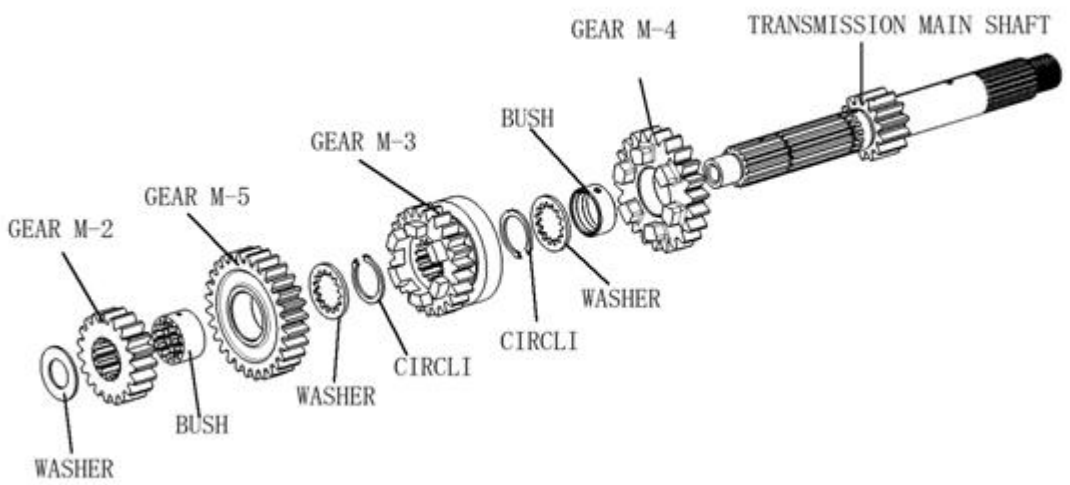
All gears assembled shall be able to rotate and move freely.

Washer shall be installed in accordance with specified direction.

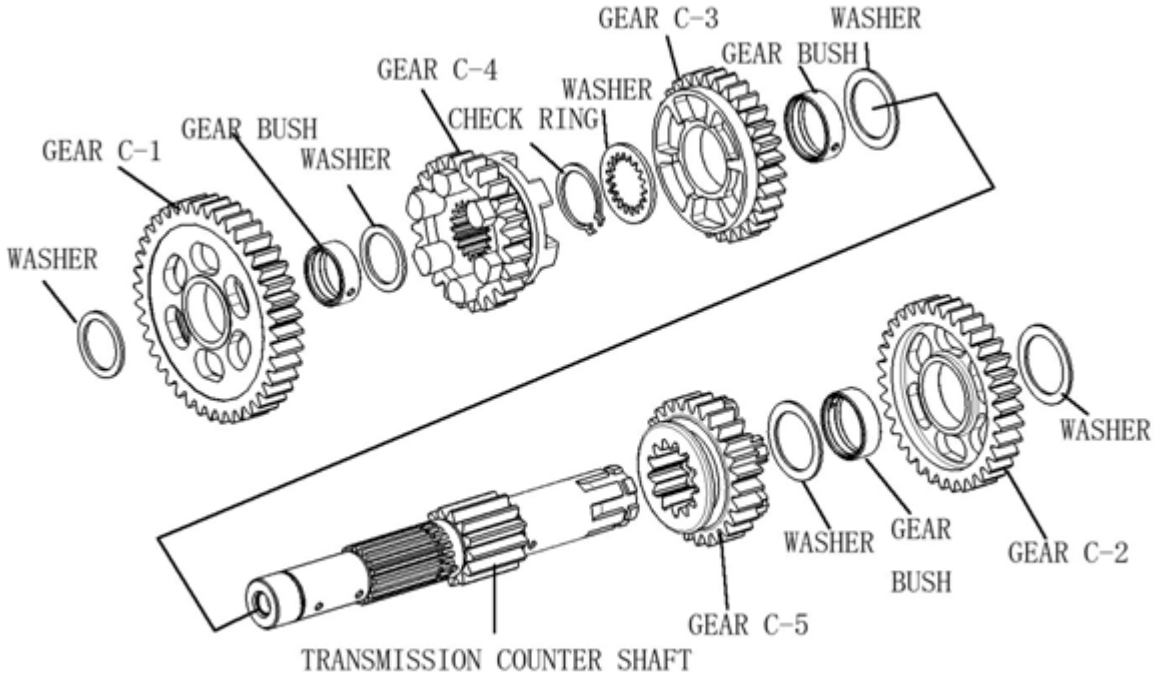
Circlip must be replaced with a new one. Used circlip is less in resilient force, causing looseness.

After the circlip is installed, split of circlip shall be aligned with spline keyway on the shaft

5. Exploded view of main shaft

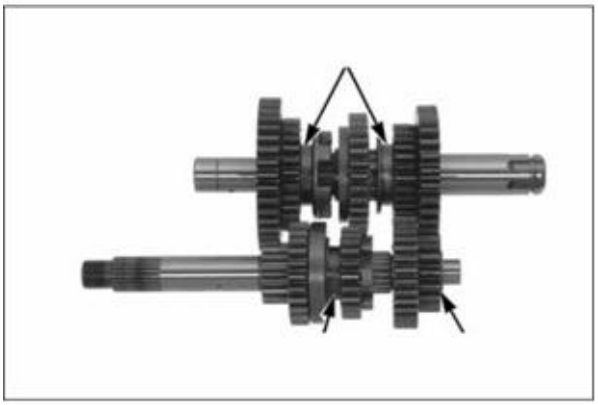


6. Exploded view of counter shaft

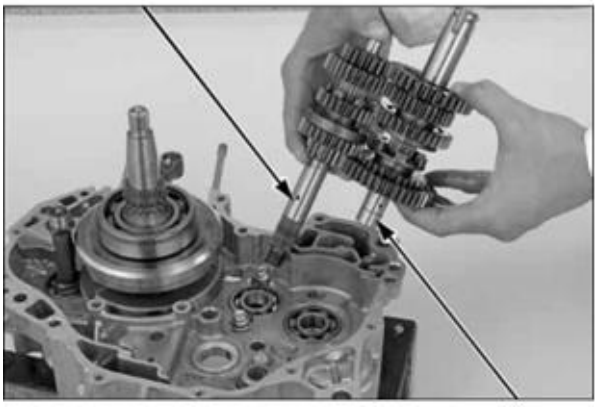


Removal and Installation of Crankcase

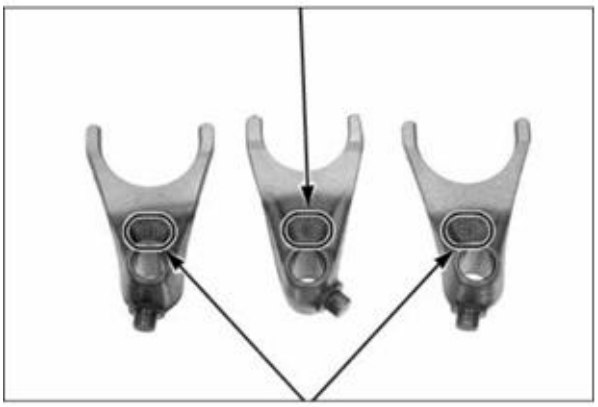
7. Apply appropriate amount of lube oil onto fork groove and gears.



8. Install main and counter shafts into right half of crankcase. Care shall be take not to miss washers at both ends of the shafts.

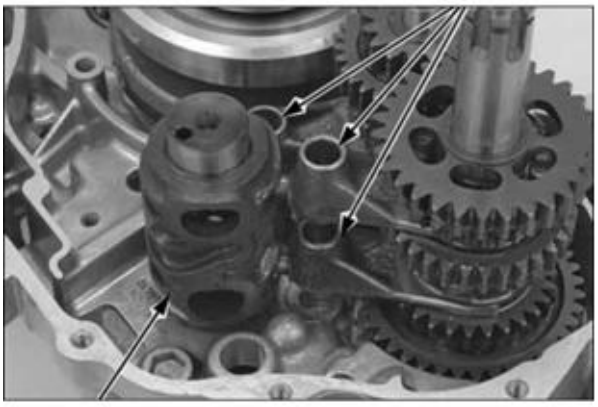


9. Marks on fork
Fork on main shaft
R/L: Fork on counter shaft



10. Install forks of counter and main shafts into corresponding positions.
Face of fork with mark shall be directed upwards.
Apply appropriate amount of lube oil onto profiled groove of gearshift drum.

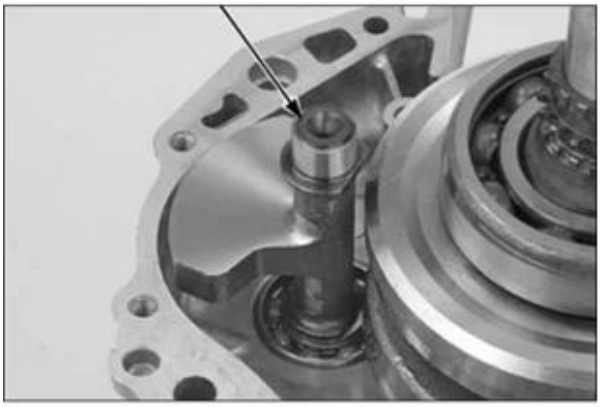
Install gearshift drum into right half of crankcase, and install fork into gearshift drum along guidance of the drum.



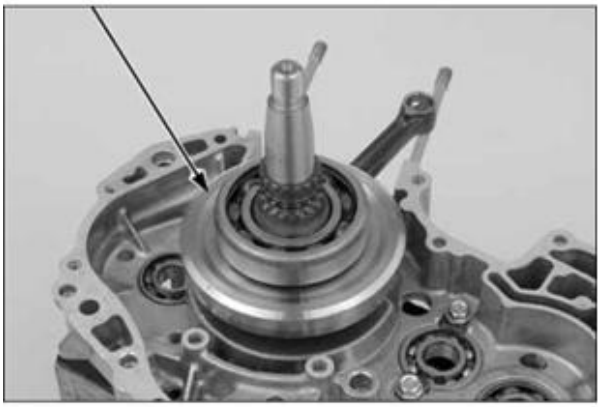
11. Apply appropriate amount of engine oil onto fork shaft and insert the shaft into fork hole. Rotate counter shaft to check if all components and parts are installed into positions, and main and counter shafts can rotate freely.

8. Removal and installation of crankshaft

1. Dismantle balanced shaft.



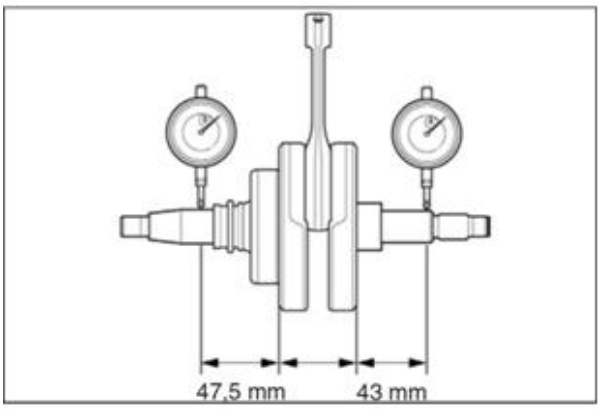
2. Dismantle crankshaft.



3. Check of crankshaft.

Rest crankshaft on V-shaped steel stand. Calibrate dial gauge to be used for check. Rotate crankshaft to take the maximum reading change on the gauge.

Service limit	0.08 mm



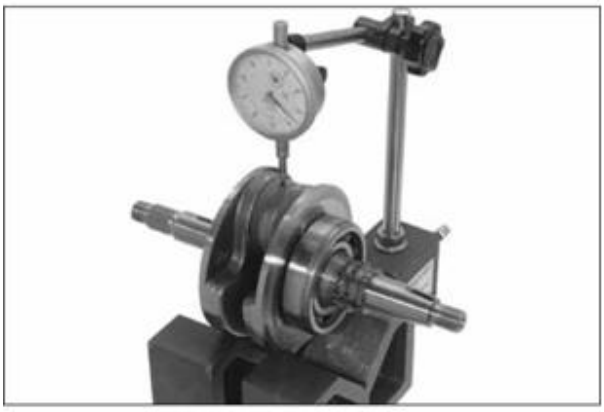
Removal and Installation of Crankcase

4. Measure side clearance between big-end of connecting rod and crankpin with feeler gauge.

Service limit	0.5 mm

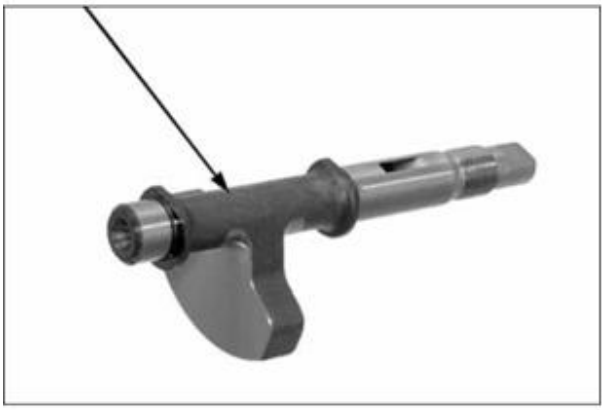
5. Measure radial clearance of big-end of connecting rod

Service limit	0.05 mm

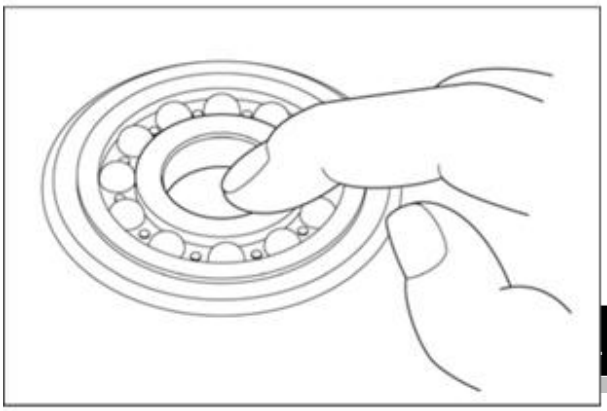


Check timing drive sprocket on crankshaft for abnormal wear and damage. If there is, check correspondingly timing driven sprocket, chain, tensioner, etc. for abnormal condition.
When it is necessary to replace timing drive sprocket, tooth crown of drive sprocket shall be aligned with center of crankpin.

6. Check balanced shaft for abnormal wear. Replace it with a new one if necessary



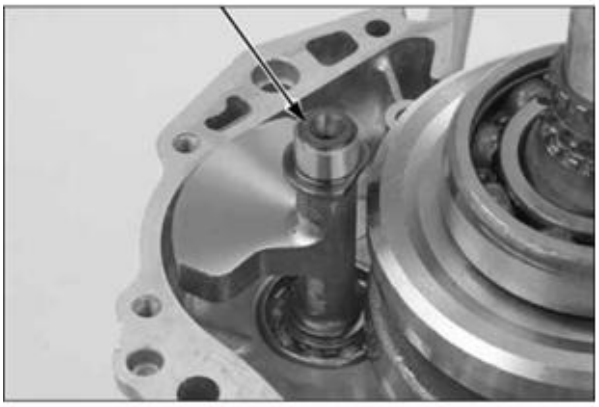
7. Check if bearing can rotate freely.



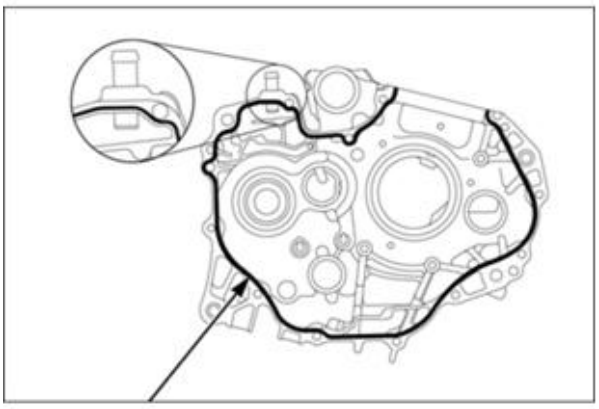
9. Installation of crankcase

1. Install crankshaft that meets requirements into right half of crankcase.

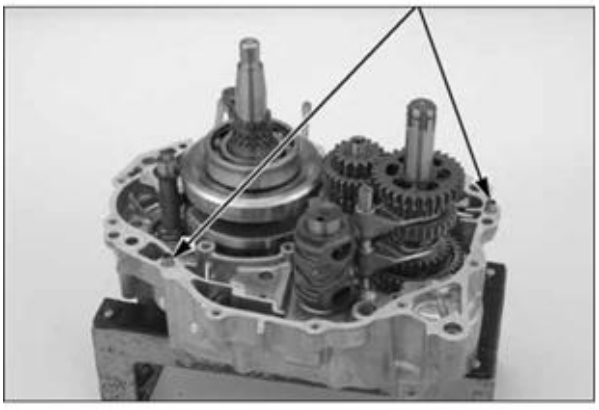
2. Install balanced shaft.



3. Clean mating face of left and right halves of crankcase. Apply sealing adhesive on mating face of left half as shown in the figure.

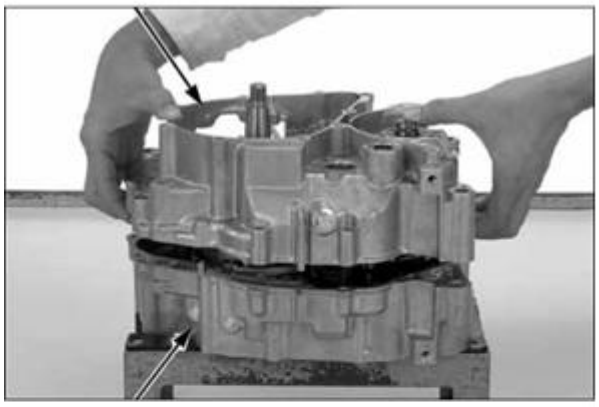


4. Install locating pin.



Removal and Installation of Crankcase

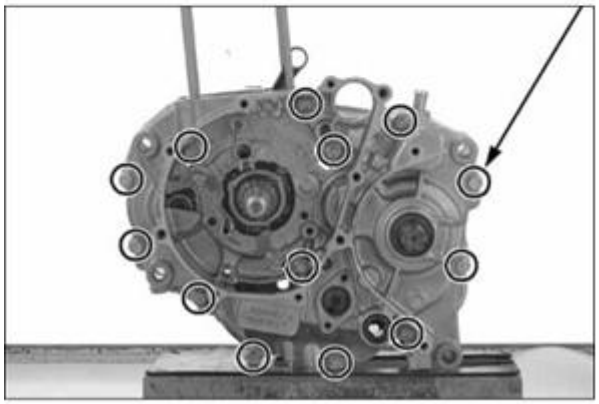
5. Assemble left half of crankcase onto right half.



Note

When installing left half of crankcase, if it is found that the two halves cannot bind closely together, check if the components inside the halves are installed onto their positions, and if there are foreign matters in the crankcase

6. Install and pretighten bolts, then tighten them with torque spanner to specified torque.

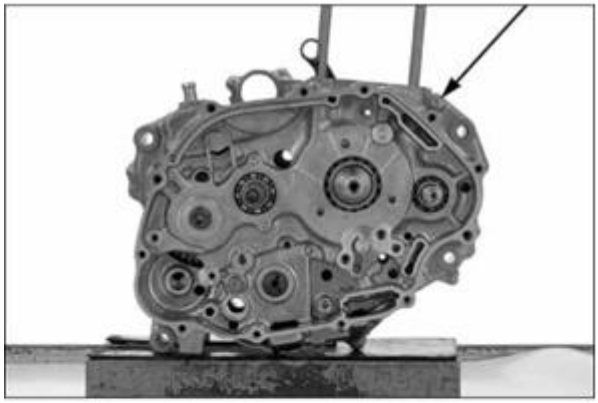


Tightening torque: 10N.m

Note

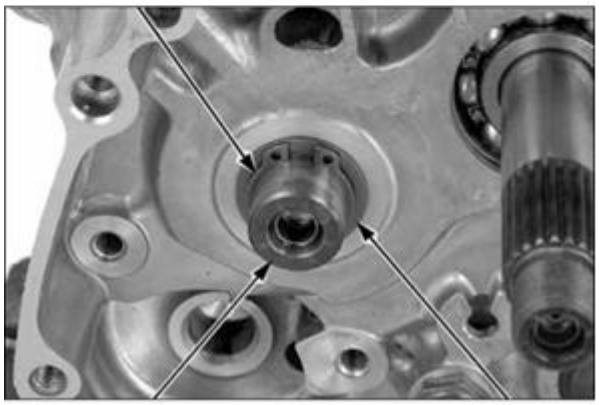
After the bolts are tightened, check main and counter shafts, crankshaft, balanced shaft for free rotation.

Tighten 4 bolts inside left cover first, then tighten other bolts crosswise

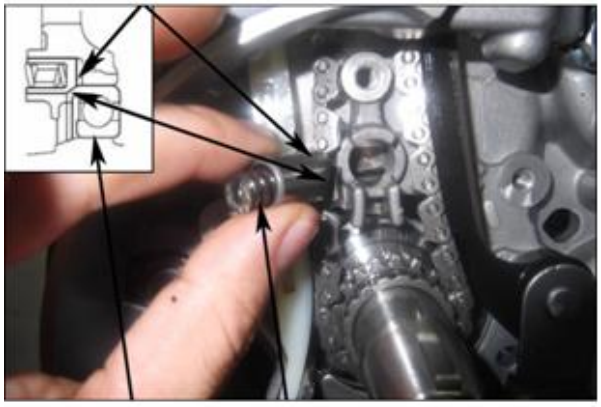


7. Tighten bolts on right half of crankcase.

8. Assemble washer and circlip on counter shaft.



9. Install pressing pin body and pressing pin body spring.

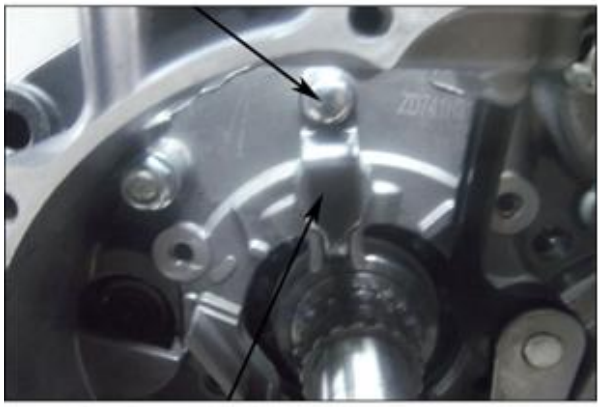


Note

Tapered face of pressing pin body shall contact bearing.

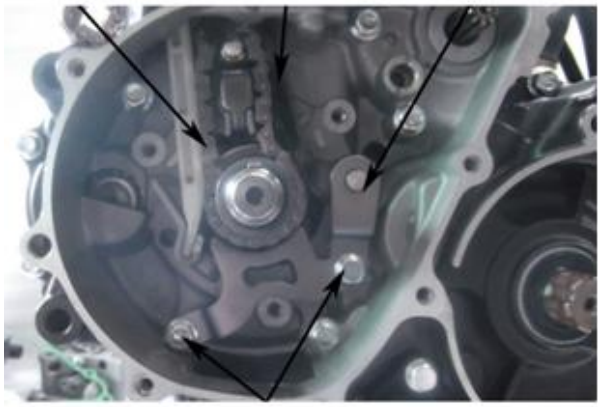
10. Apply threads fastening adhesive on 2~3 turns on bolt, then install pressing pin body guard and bolts onto crankshaft case. Tighten the bolts to specified value.

Tightening torque: 10N.m



11. Install chain, tension plate, chain guard plate in turn, and tighten bolts.

Tightening torque: 10N.m



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