RIEJU

CENTURY 125CC E5
MARATHON 125CC LC E5
ENGINE SERVICE MANUAL

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CONTENTS

1. MAIN TECHNICAL PARAMETERS

Item				Specification
Engine	Model number			ZS158MI-2
	Type			Single cylinder,4-stroke, water-cooling, camshaft upward, with balance shaft
				28 kg
	Bore × stroke			58×47mm
	Displacement			124.2ml
	Compression ratio			12:1
	Valve Timing	IN	OPENS	17.5°BTDC
			CLOSES	27.5°ABDC
		EX	CLOSES	8°BBDC
			OPENS	28°ATDC
	Max. power/corresponding speed			9.5(1±10%)kW/9500(1±5%)r/min
	Max. torque/corresponding speed			10.5(1±10%)N.m/7500(1±5%)r/min
	Idle speed			1500±100 r/min
	Lubrication method			Pressure + Splash
	Lubricating oil			SJ-10W/40
	Grease			SO_2
Transmissión System	Clutch			Manual wet multi-plate
	Transmission			Constant mesh, 6-speeds
	Gearshift method			1-N-2-3-4-5-6
	Primary reduction ratio			3.35 67/20
	Gear ratio	1st		2.833(34/12)
		2nd		1.875(30/16)
		3rd		1.421(27/19)
		4th		1.19(25/21)
		5th		1.043(24/23)
		6th		0.88(22/25)

PARAMETERS OF MAINTENANCE

Item			Standard	Service Limit
Cylinder	Specification		SJ 10W/40	
	Capacity	when filter is not removed	1L	
		when filter is removed	1.1L	
		when engine is completely dry	1.2L	
Spark plug	Standard		CR9E (NGK)	
	Spark Plug Gap		(0.6-0.7)mm	
Engine idle speed			1500 +/- 100 r/pm	

CYLINDER HEAD AND VALVE

UNIT: MM

Item			Standard	Service Limit
Valve Clearance		IN	0.10-0.15	/
		EX	0.15-0.20	/
Valve stem O.D.		IN	3.97-3.985	3.96
		EX	3.96 -3.975	3.95
Valve guide I.D.		IN	4-4.012	4.04
		EX		
Stem-to-guide clearance		IN	0.015-0.042	0.065
		EX	0.025-0.052	0.075
Width of valve sealing strip		IN	1.05-1.35	1.7
		EX	1.25-1.55	1.9
Valve Spring Free Length			33-33.5	32.5
Camshaft	Cam Height	IN	31.398-31.578	31.35
		EX	30.774-30.954	30.73

CYLINDER AND PISTON

UNIT: MM

Item			Standard	Service Limit
Cylinder	Inner diameter of cylinder		58.01~58.017	58.1
	Roundness		0.004	0.10
	Planeness of cylinder face		0.04	0.10
Piston, Piston Ring and Piston Pin	Outer diameter of piston		57.958~57.965	57.95
	Inner diameter of piston pin hole		15.003~15.008	15.04
	Closure clearance of piston ring	Top	0.2~0.35	0.4
		Second	0.2-0.35	0.4
		Oil	0.2~0.7	0.85
	Piston Ring/Groove Clearance:	Top	0.03~0.062	0.10
		Second	0.02~0.052	0.10
	Piston/Cylinder Clearance		0.045~0.059	0.05
	Outer diameter of piston pin		14.994~15	14.96
	Clearance between piston pin and piston pin hole		0.003~0.014	0.04
Small End of Connecting Rod	Inner diameter		15.01~15.018	15.04
	Clearance between small end of connecting rod and piston pin		0.01~0.024	0.10

CLUTCH

UNIT: MM

Item		Standard	Service Limit
Clutch	Clutch Spring Free Length	40.1-40.9	39.5
	Friction Plate Thickness	2.95-3.05	2.8
	Planeness of clutch driven plate	0.08	0.20
	Driven gear inner hole diameter	23.000~23.021	23.03
Shaft sleeve	Collar diameter	22.955~22.975	22.945
	Bushing aperture	16.99~17.008	17.015
	The spindle diameter	16.972~16.985	16.965

DRIVE TRAIN

UNIT: MM

Item				Standard	Service Limit
Crankshaft, Connecting Rods	Connecting Rod Big End:		Radial Clearance	0.008~0.016	0.03
			Side Clearance	0.1~0.30	0.5
	Crankshaft Runout			0.03	0.08
Fork	Outer diameter of fork shaft			9.966~9.984	9.93
	Inner diameter of fork			10.000~10.018	10.05
	Shift Fork Ear Thickness			4.93~5.00	4.5
Transmission	Gear tooth inner hole diameter		M5	20.000~20.021	20.04
			M6	20.000~20.021	20.04
			C1	20.500~20.513	20.53
			C2	23.020~23.033	23.05
			C3	23.020~23.033	23.05
			C4	23.020~23.033	23.05
	Bushing diameter		M5	19.972~19.993	19.965
			M6	19.972~19.993	19.965
			C1	20.459~20.480	20.41
			C2	22.979~23	22.95
			C3	22.979~23	22.95
			C4	22.979~23	22.95
	Bushing inside diameter		M5	17.000~17.018	17.023
			C1	17.000~17.018	17.04
			C2	20.020~20.041	20.05
			C3	20.020~20.041	20.05
			C4	20.020~20.041	20.05
	The shaft diameter		M4	16.966~16.984	16.93
			C1	16.983~16.994	16.95
			C2	19.980~19.993	19.95
			C3	19.980~19.993	19.95
			C4	19.980~19.993	19.95

REQUIREMENT OF TIGHTENING TORQUE

Spark plug: 16N•m

Oil drain bolt: 24N•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: 12N.m

Tensioner screw 10N•m

Cylinder head fixing bolt 27N•m+90°

Locknut of clutch: 74N.m

2. NORMAL MAINTENANCE AND CARE

I. MAINTENANCE INTERVAL OF ENGINE

Interval / Item	Odometer reading (×1000km)				
	1	4	7	10	+3
Spark plug	I	I	I	R	I - R (+10)
Valve clearance	I		I		I (+6)
Engine oil	R	R	R	R	R
Oil Strainer	C	C			C
Oil filter	R	R	R	R	R
Idle speed	I		I		I (+6)

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 (View section). 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 center 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 you hands wit soap and clean water as soon as possible after you handle used engine oil.

II. MAINTENANCE STANDARD OF ENGINE

Item			Standard	Service Limit
Cylinder	Specification		SJ 10W/40	
	Capacity	when filter is not removed	1L	
		when filter is removed	1.1L	
		when engine is completely dry	1.2L	
Valve Clearance	Inlet		0.10-0.15 mm	0.2mm
	Exhaust		0.15-0.2 mm	0.25mm
Spark plug	Standard		CR9E (NGK)	
	Spark Plug Gap		(0.6-0.7)mm	
Engine idle speed			(1500±100) r/min	

III. REQUIREMENT OF TIGHTENING TORQUE

Spark plug: 16N•m

Oil drain bolt: 24N•m

Oil filter cover bolt: 10N•m

IV. MAINTENANCE OF SPARK PLUG

Spark plug recommended.

Under standard condition	CR9E (NGK)

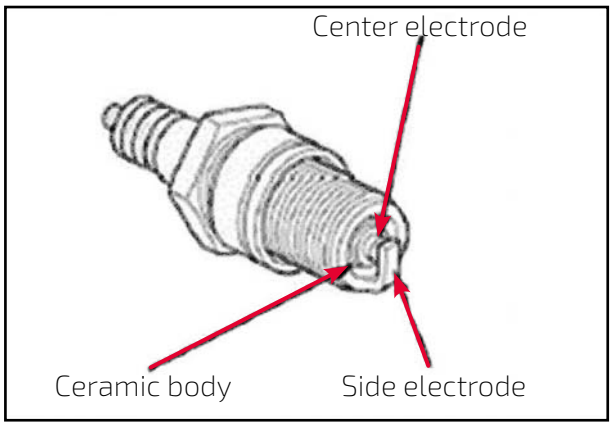
NOTE:
IF SPARK PLUG WITH UNSUITABLE CALORIFIC VALUE IS USED, THE ENGINE WILL BE DAMAGED SEVERELY.

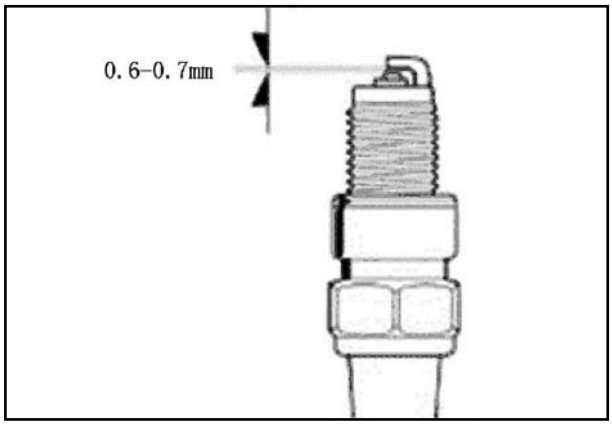
If the electrodes and center electrode are eroded or covered with heavy carbon deposit, the spark plug shall be cleaned or replaced.

Spark plug gap: (0.6~0.7) 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.





V. VALVE CLEARANCE ADJUSTMENT

Too large valve clearance will result in noise and ultimately in damage of engine. Too small valve clearance or noclearance will result in that valves arenot closed tightly, thus causing damageof 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 magnetor is aligned with center of eyehole.)

Remove upper cover of cylinder head (refer to 4-3) and fix the camshaft with tooling.

Check if valve clearance 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.

Clearance of inlet valve: 0.10-0.15

Clearance of exhaust valve: 0.15-0.20

Adjust valve clearance.
Loosen tensioner.
Remove the chain, support and camshaft.
Remove the old valve stem.
Replace the valve stem with a new one.

CALCULATION METHOD OF SPECIFICATION REPLACEMENT OF VALVE STEM

A=B-C+D

A: SPECIFICATION OF NEW VALVE STEM

B: MEASURED VALVE CLEARANCE

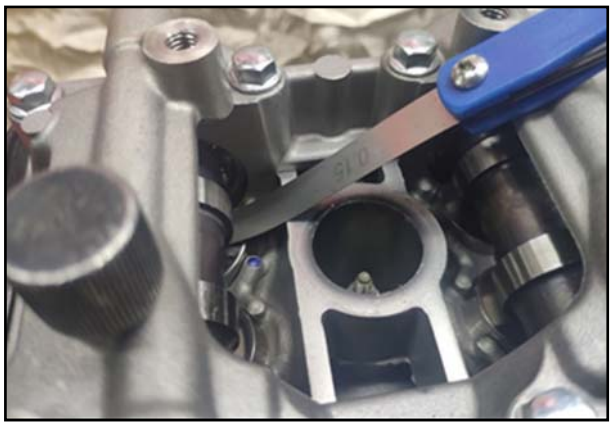
C:VALVE CLEARANCE STANDARD VALUE

D: SPECIFICATION OF OLD VALVE STEM

Install camshaft and support, and tighten bolts.

Tightening torque: 9N•m

Re check whether the valve clearance meet the requirement.

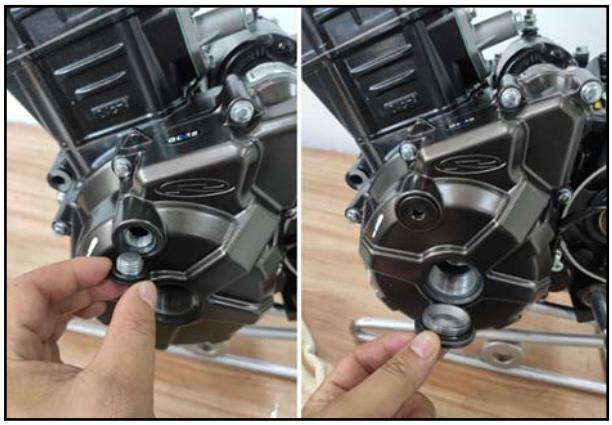


Assemble the timing sprocket and chain, and fasten them with bolts.

Tightening torque: 24N•m

Loosen tensioner to check if chain is tensioned.

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.



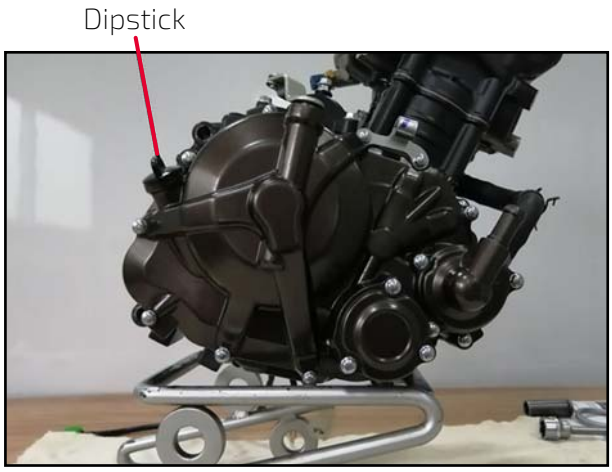
Tighten caps of large and small eyeholes respectively.

Remove the fixed tooling.Install upper cover of cylinder head (View section) and check the engine for leakage.

VI. CHECK OF ENGINE OIL VOLUME

Check engine oil prior to driving everyday.

Engine oil level must be kept between the upper and the lower limits on the oil level gauge.



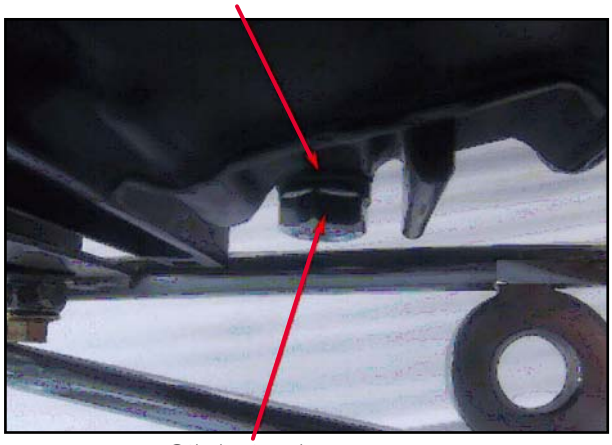
Check:

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.

VII. RENEWAL OF ENGINE OIL AND REPLACEMENT OF FILTER

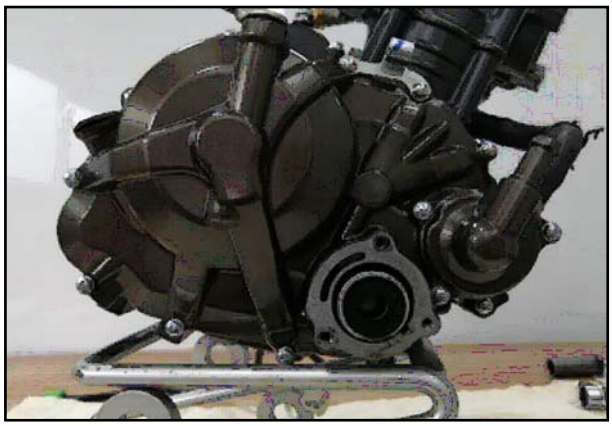
Renew engine oil with the engine at normal operating temperature and the vehicle resting on its side stand to ensure complete and rapid draining.

Flat washer



Oil drain plug

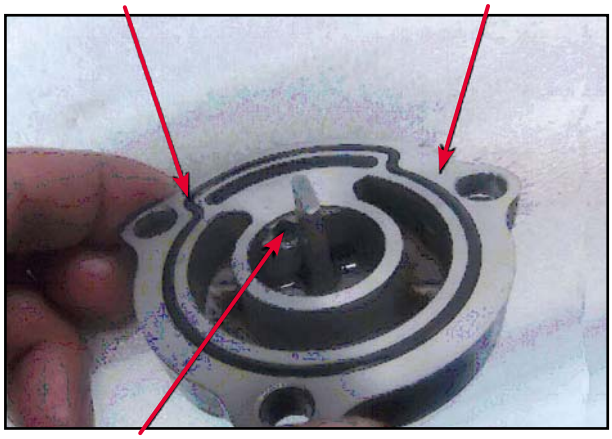
1. Place a drain pan under the crankcase.
2. Remove oil level gauge, drain bolt and sealing washer to drain off the oil.
3. Dismantle bolt from filter cover to remove the filter cover, sealing washer and filter.



Joint

Oil filtrer cover

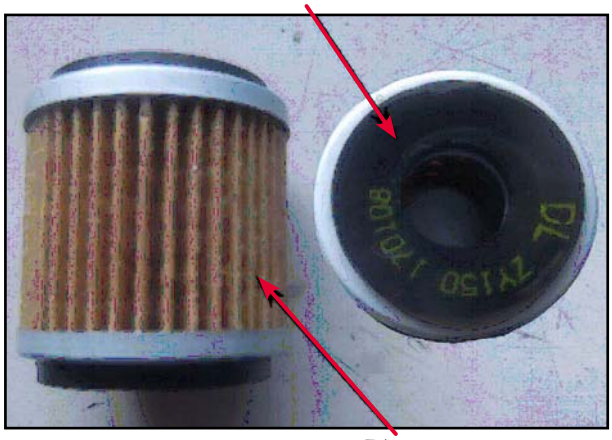
4. Check if oil path on the filter cover is clear, sealing washer is in good condition; otherwise, replace the washer with a new one.



Oil channel

Filter

5. Install a new oil filter with the "DL" mark facing out.

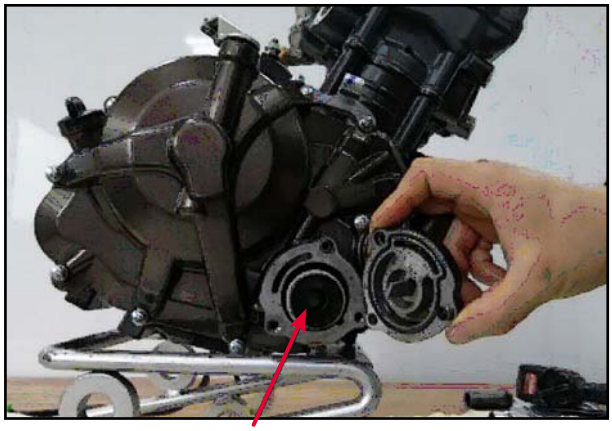


Filter

NOTE:

USE ONLY ORIGINAL OIL FILTERS OR A FILTER OF AN EQUIVALENT QUALITY SPECIFIC TO YOUR MODEL. USE OF THE WRONG FILTER OF A NON-EQUIVALENT QUALITY MAY RESULT IN ENGINE DAMAGE.

6. Install locating pin. Fix a new sealing washer on the filter cover, then install the cover on the right cover.



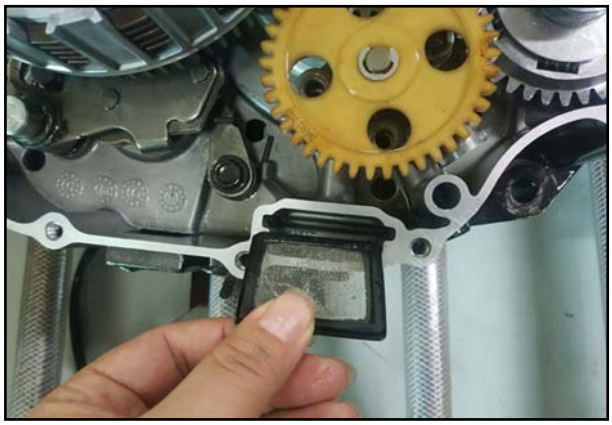
7. Install and tighten the bolt of filter cover.

   Tightening torque of oil filter cover bolts: 10N.m;

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

   Remove the right cover. Refer to (View section) for removal of right cover.

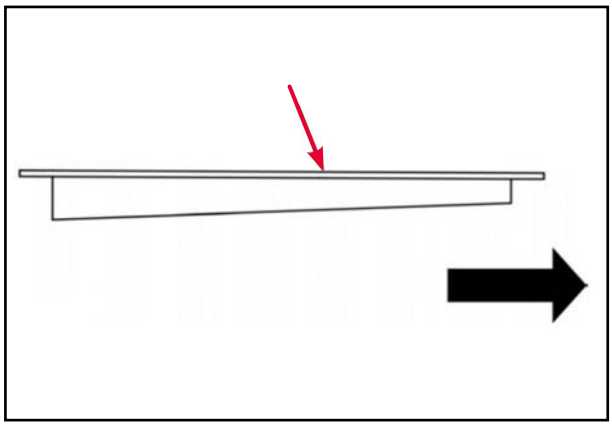
   Take out oil screen to clean foreign matters from it. Then reinstall it according to direction shown in the figure.



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.



Reinstall the right cover (View section).

9. Check if drain bolt and sealing washer are in good condition. then tighten the bolt. Always replace the sealing washer whenever renewing the engine oil.

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

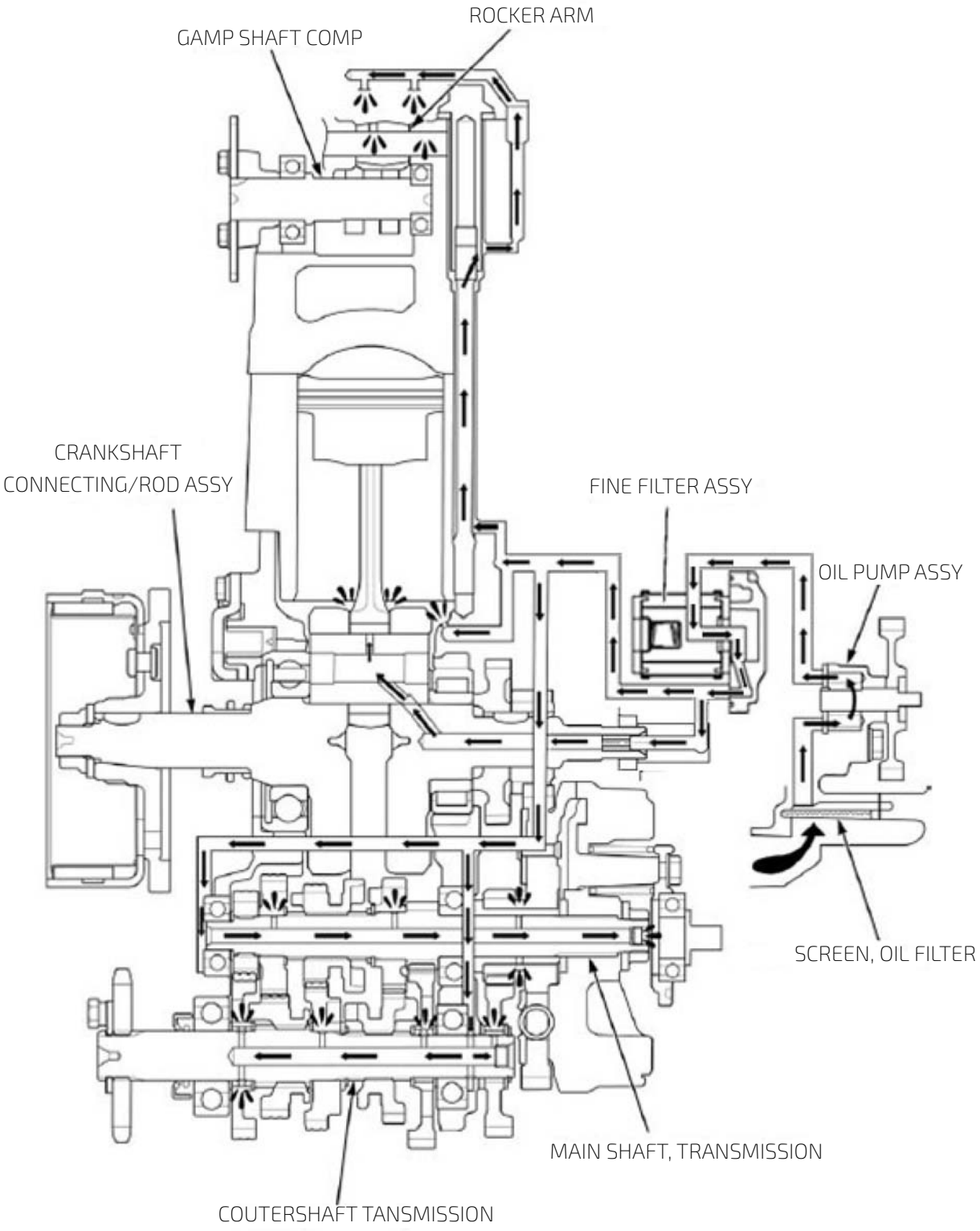
10. Fill the engine with oil of equivalent grade according to requirements of maintenance (SJ/10W-40).

11. Reinstall the oil level gauge.

12. Check if oil level is correct according to (View section) and confirm the engine free of any leaka.

3. LUBRICATION SYSTEM

I. SCHEMATIC DIAGRAM OF LUBRICATION SYSTEM



II. 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: 10N.m

Screw on cover plate of oil pump: 3N.m

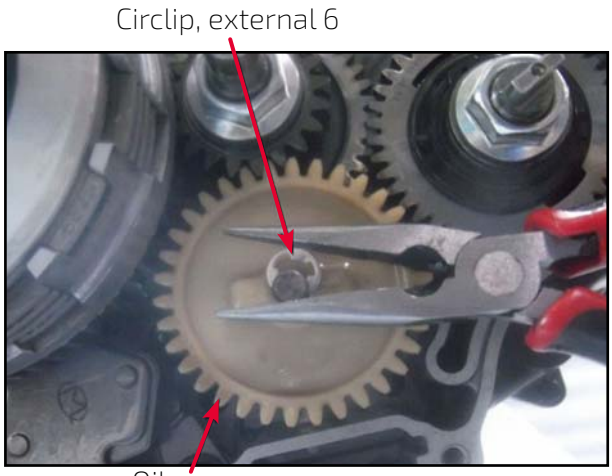
III. TROUBLESHOOTING

Name of	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
Oil filter	Too much foreign matters on it or clogged.			Replace the oil filter
	Clogged passage			Clean and unblock the oil path

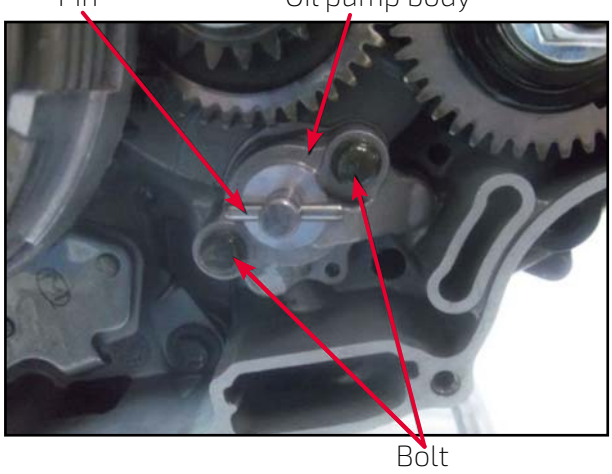
IV. REMOVAL AND INSTALLATION OF OIL PUMP

I) Removal of oil pump.

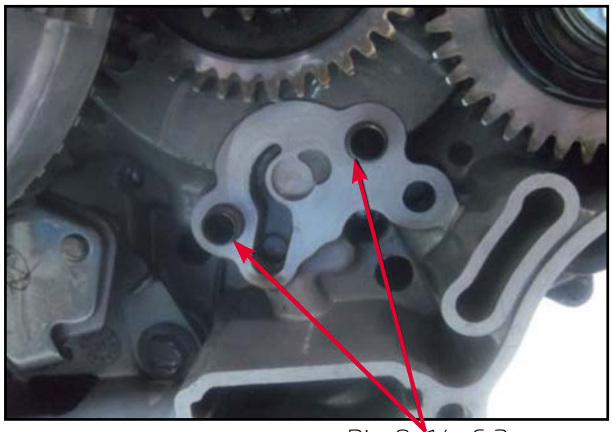
1. Dismantle clutch cover (View section).
2. Dismantle circlip and take out gears of oil pump.



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

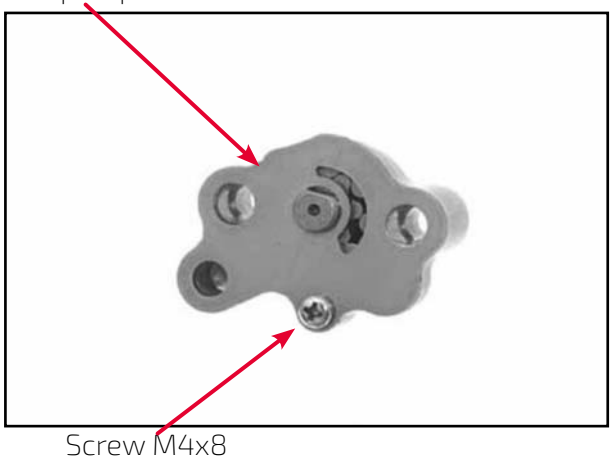


4. Remove the two locating pins.

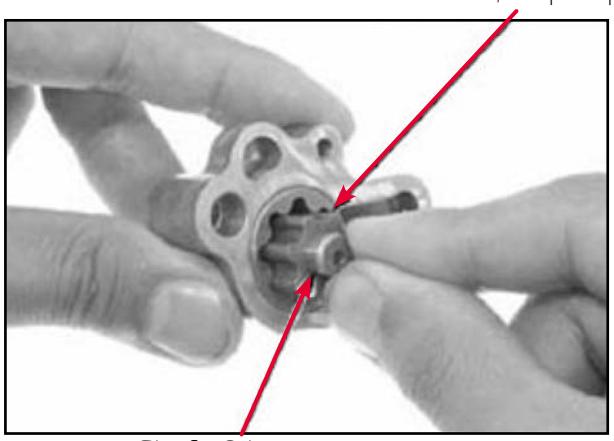


II) Disassembly of oil pump.

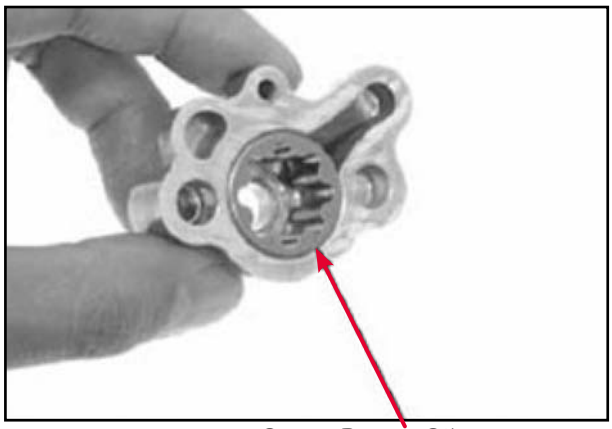
1. Remove set screw from cover plate.



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.

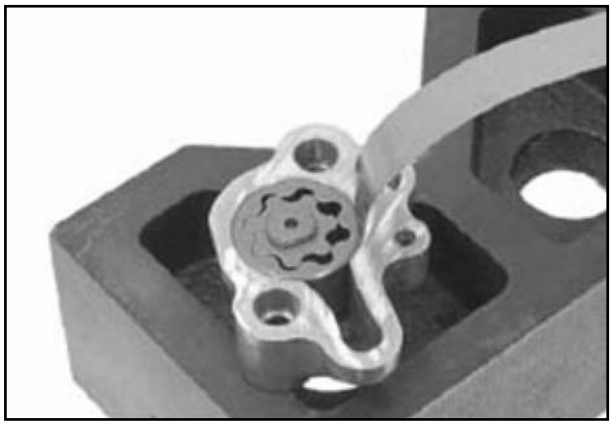


III) Check of oil pump.

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.

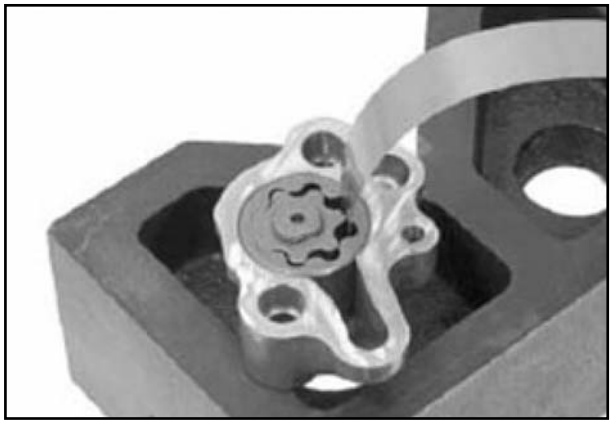


1. Assemble inner and outer rotors, pin shaft, pin of the oil pump.

   Check side clearance between outer rotor and casing.

Service limit	0.28mm

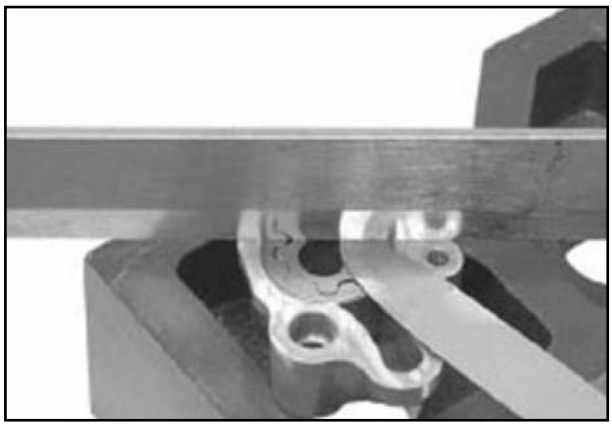
2. Check fit clearance between outer and inner rotors of oil pump;



Service limit	0.20mm

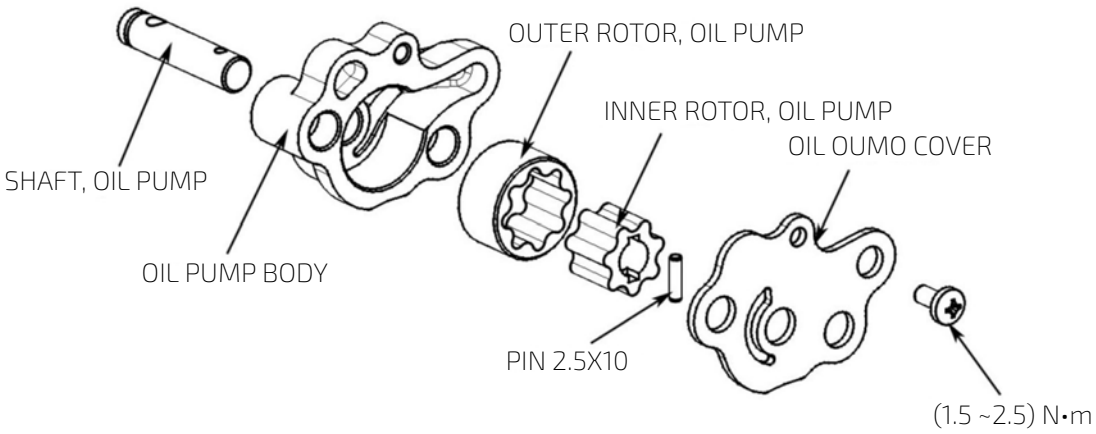
3. Take out the shaft and pin from the oil pump.

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

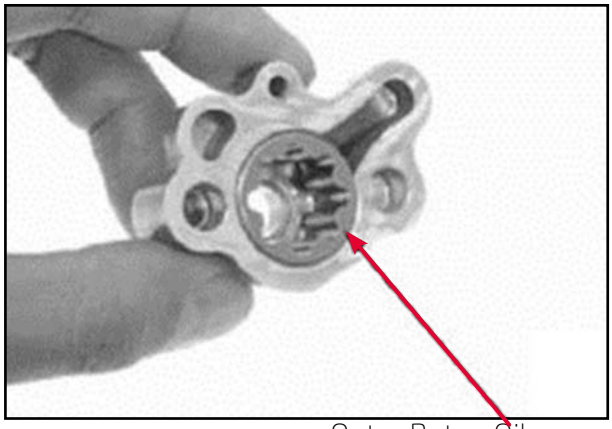


Service limit	0.15mm

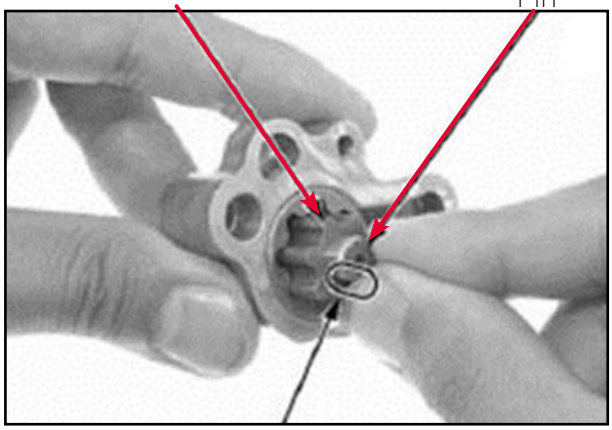
IV) Installation of oil pump



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

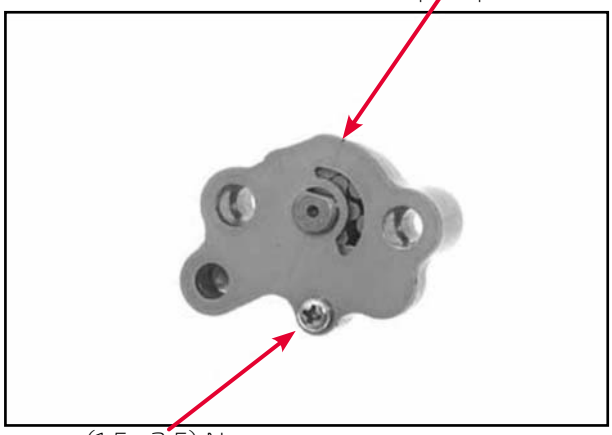


2. Apply lube oil on the circumference of inner rotor, pin shaft and pin and install them into casing of oil pump.

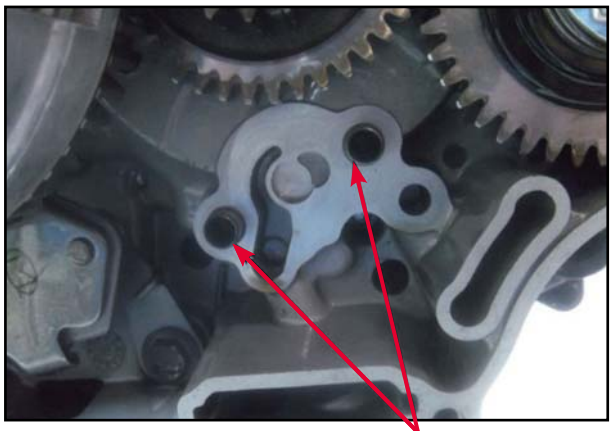


3. Install cover plate of oil pump and tighten the screw.

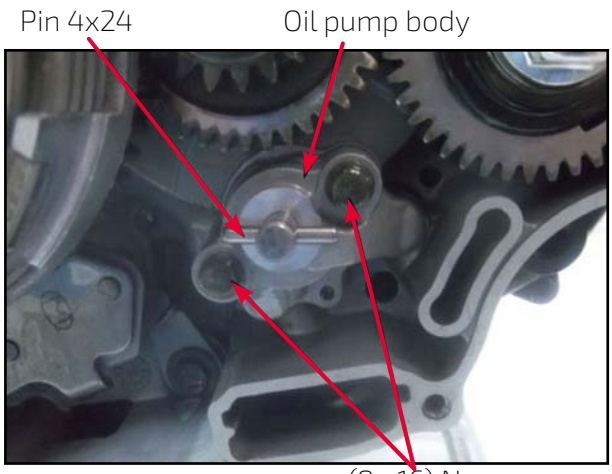
   Tightening torque: 3N.m



4. Install locating pin on the engine.

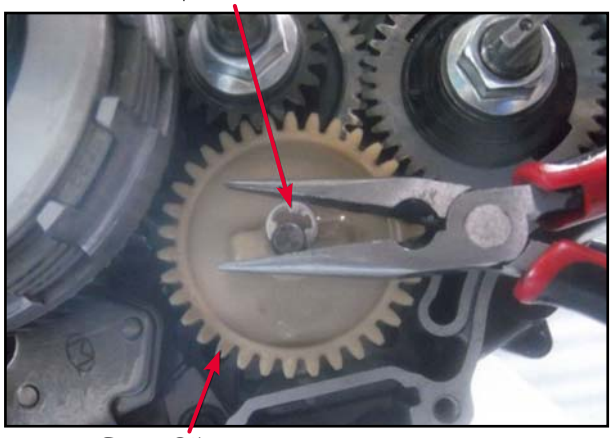


5. Assemble oil pump and tighten the bolt. Assemble the pin.



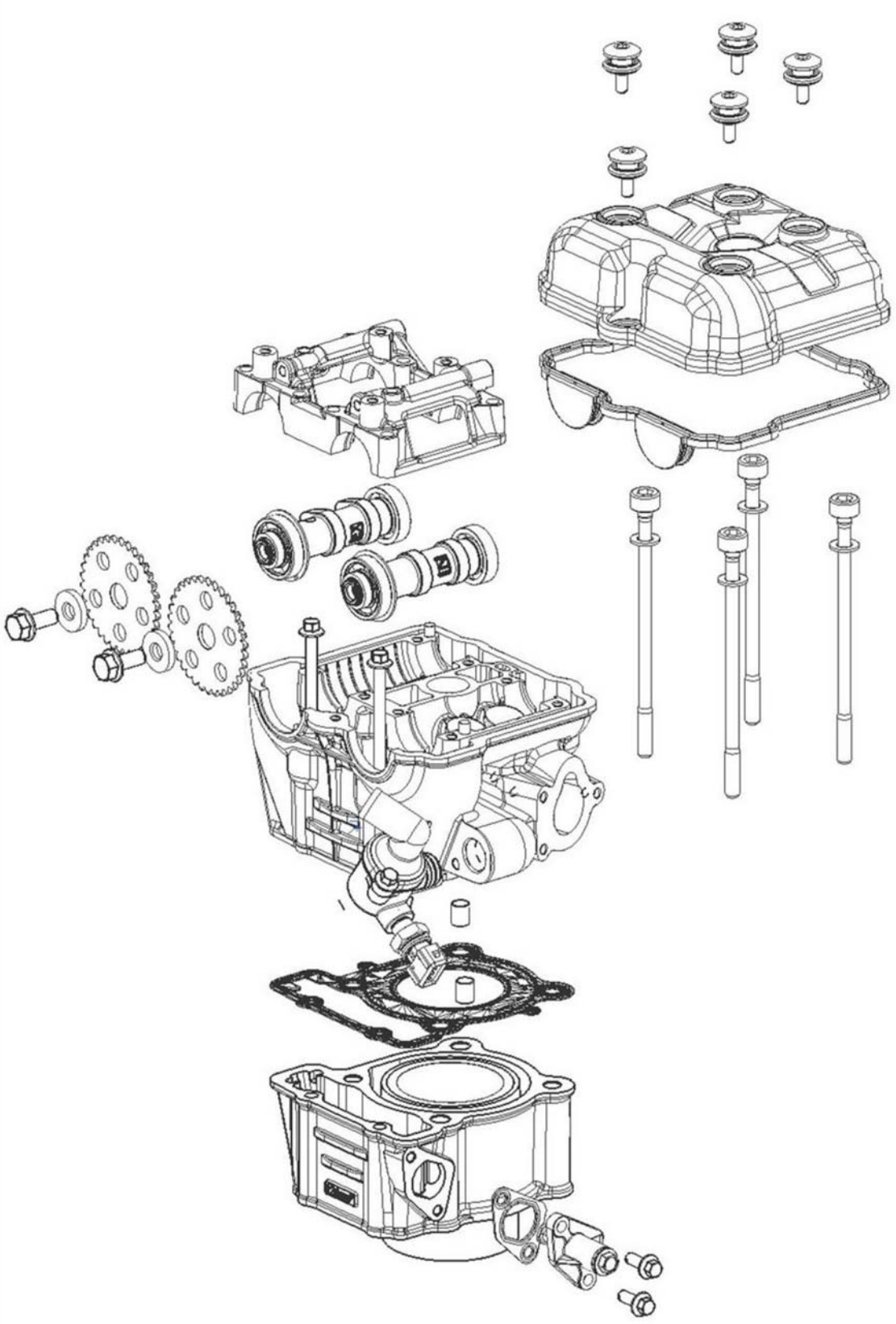
6. Apply lube oil on the circumference of inner rotor, pin shaft and pin and install them into casing of oil pump.

7. Install the cover plate of clutch onto engine (View section).



4. MAINTENANCE OF CYLINDER HEAD ASSEMBLY

I. EXPLODED VIEW OF CYLINDER HEAD ASSEMBLY



II. LIMITS FOR SERVICE

UNIT: MM

Item			Standard	Service Limit
Valve Clearance		IN	0.10-0.15	/
		EX	0.15-0.20	/
Valve stem O.D.		IN	3.97-3.985	3.96
		EX	3.96 -3.975	3.95
Valve guide I.D.		IN	4-4.012	4.04
		EX		
Stem-to-guide clearance		IN	0.015-0.042	0.065
		EX	0.025-0.052	0.075
Width of valve sealing strip		IN	1.05-1.35	1.7
		EX	1.25-1.55	1.9
Valve Spring Free Length			33-33.5	32.5
Camshaft	Cam Height	IN	31.398-31.578	31.35
		EX	30.774-30.954	30.73

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

Cylinder head fixing bolt 27N•m+90°

Cylinder head cylinder block connecting bolts 10N•m

Fastening bolt of upper cover: 10N.m

Tensioner screw 10N•m

III. DISASSEMBLY AND ASSEMBLY OF UPPER COVER OF CYLINDER HEAD

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

2. Take out upper cover and upper cover seal ring and spark plug hole sealing ring.

3. Fit a new upper cover seal ring and spark plug hole sealing ring into the seal ring groove on upper cover, then install the upper cover onto cylinder head.

4. After confirming that the upper cover is installed on right place, put the upper cover bolt rubber pad on the cover bolt, install ang tighten bolt of upper cover.

   Tightening torque: 10N·m

IV. MAINTENANCE OF COMSHAFT

I) Removal of comshaft.

1. Remove thermostat.

2. Loosen the adjusting screw, remove the mounting bolt of the tensioner and take off the tensioner.

3. Fix the camshaft with tooling and remove the fastening bolt from timing sproket chain.

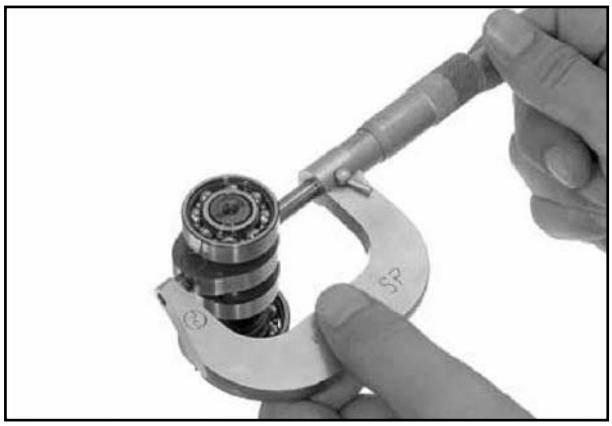
4. Remove the timing sprocket chain. Care shall be taken when using a tool to fix the chain so as to avoid dropping it into the crankcase.

5. Remove the bolts of the cylinder head bracket and take out the bracket.

6. Remove camshaft.

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

8. Check camshaft for wear.



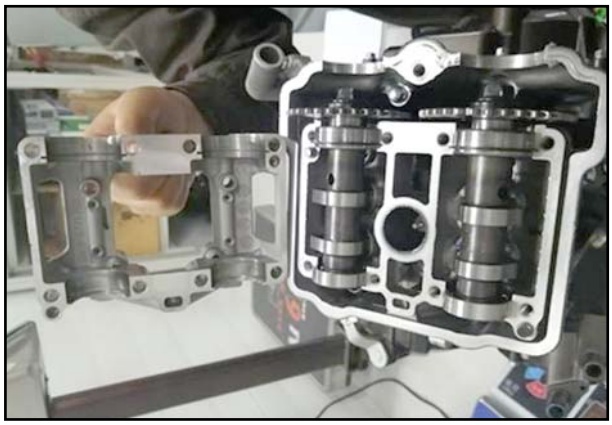
Service limit	Inlet 31.35mm
	Exhaust 30.73mm

II) Installation of camshaft.

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

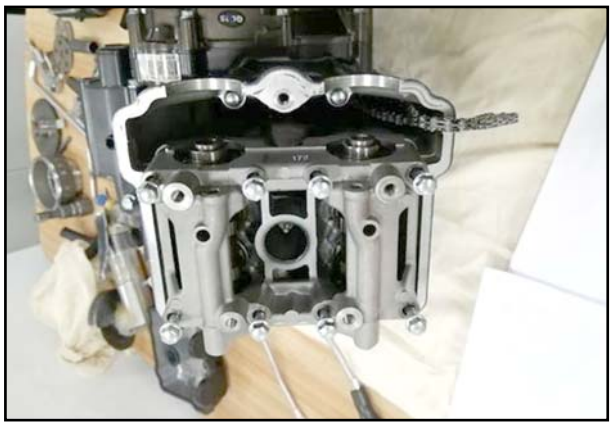
2. Install camshaft into cylinder head. Care shall be taken that distinguish the intake and exhaust camshaft.

3. Install the cylinder head bracket onto cylinder head. Care shall be taken to check if two locating pins are in good condition before installation.



4. Tighten bolt in turns.

   Tightening torque: 10N•m



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

6. Fix the camshaft with tooling and install chain and timing sprocket.

7. Install fastening bolt.

Tightening torque: 10N•m

8. Install tensioner (refer to 4-10) and thermostat.

V. MAINTENANCE OF CYLINDER HEAD ASSEMBLY

I) Removal of cylinder head.

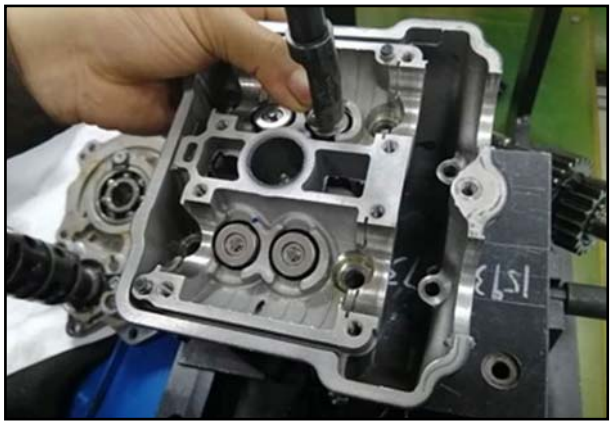
1. Dismantle the cylinder head bracket and camshaft.

2. Dismantle 2 bolts connecting cylinder head with cylinder block and 4 cylinder head fixing bolt.

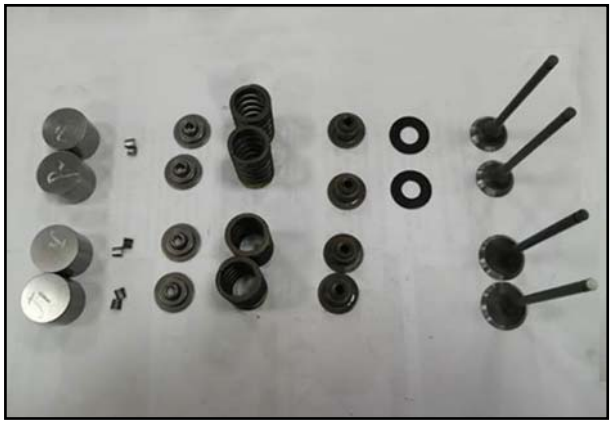
3. Dismantle cylinder head assembly.

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

5. Take out the valve tappet.Use special tooling to dismantle valve collet seat ring, valve, valve stem seal, and valve spring respectively.



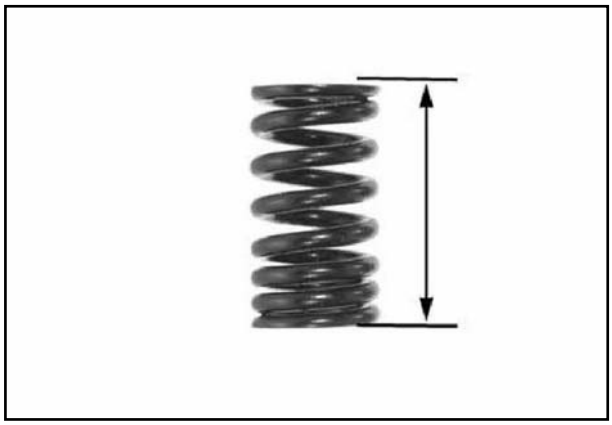
6. Place the components dismantled in order.



II) Check of cylinder head assembly.

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

2. Check valve spring for free length.

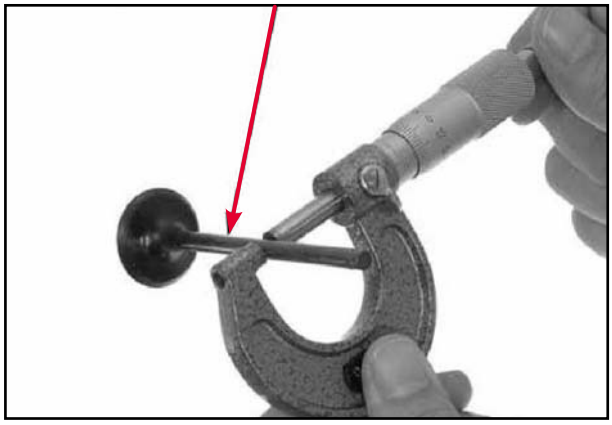


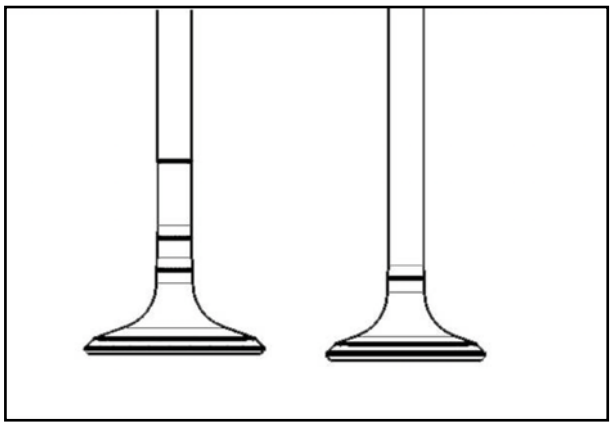
Service limit	32.5mm

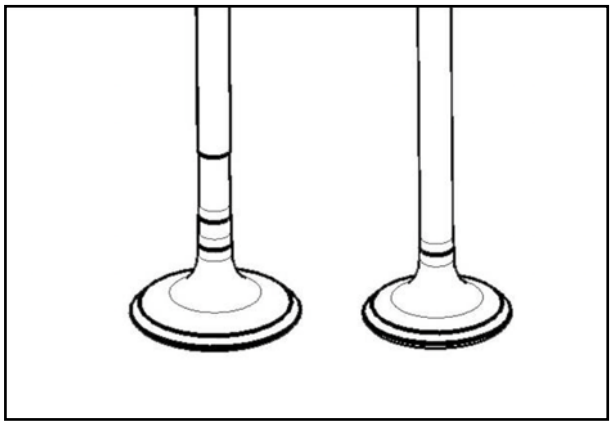
3. Check planeness of end face of cylinder head.

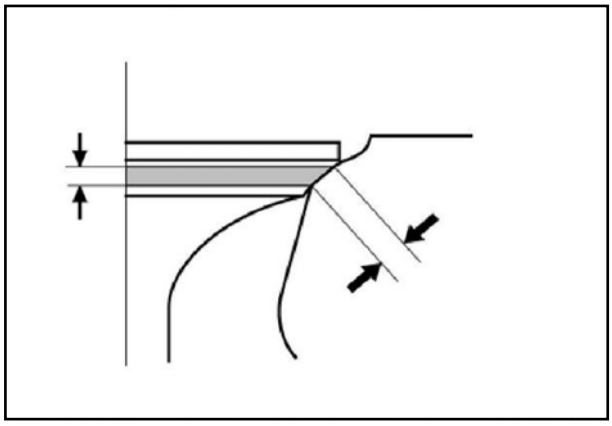
Service limit	0.04

4. Check valve stem for wear.



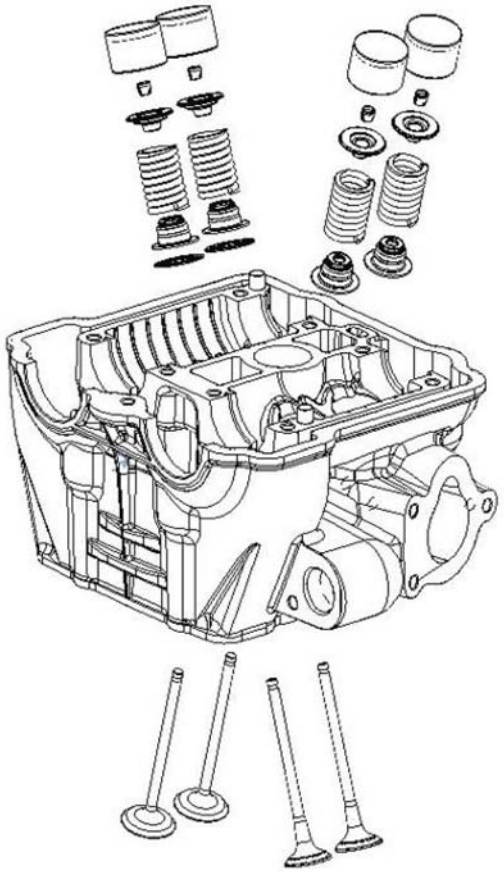






III) Installation of cylinder head assembly.

Exploded view of cylinder head assembly.



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

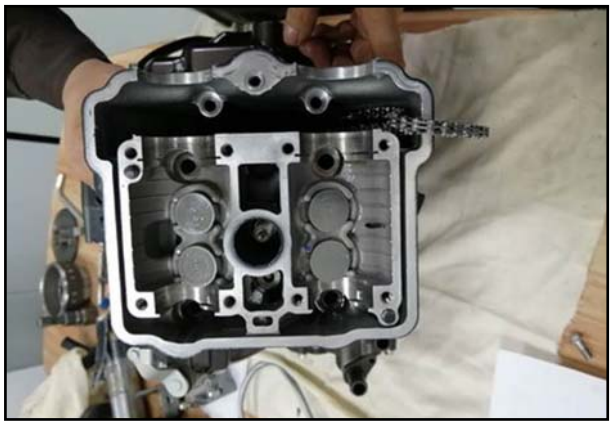
2. When installing valve spring, care shall be taken that the dense coil end of spring shall be directed downward

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.

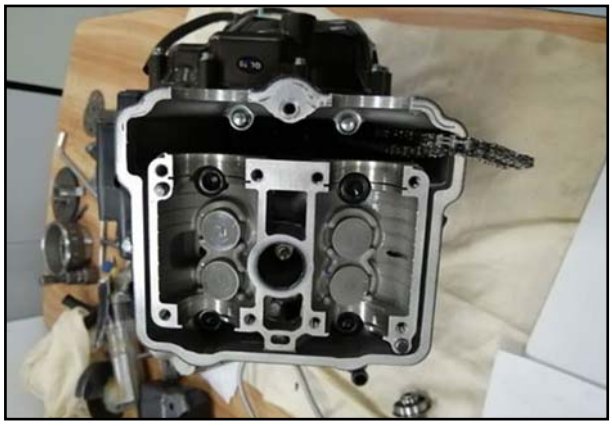
5. Install the completed cylinder head assembly, Install the valve tappet.



6. Tighten the 2 connecting bolts and 4 cylinder head fixing bolt.

   Connecting bolts: 10N•m

   Cylinder head fixing bolt: 27N•m + 90°



VI. REMOVAL AND INSTALLATION OF TENSIONER

1. Remove the tensioner bolt and take out the spring.

2. Remove the fixing bolts of the tensioner and take down the tensioner and the paper pad.

3. Adjust tensioner until it becomes loose.

4. Replace the paper pad with a new one,Install the tensioner and tighten the bolt.

   Tightening torque: 10N·m

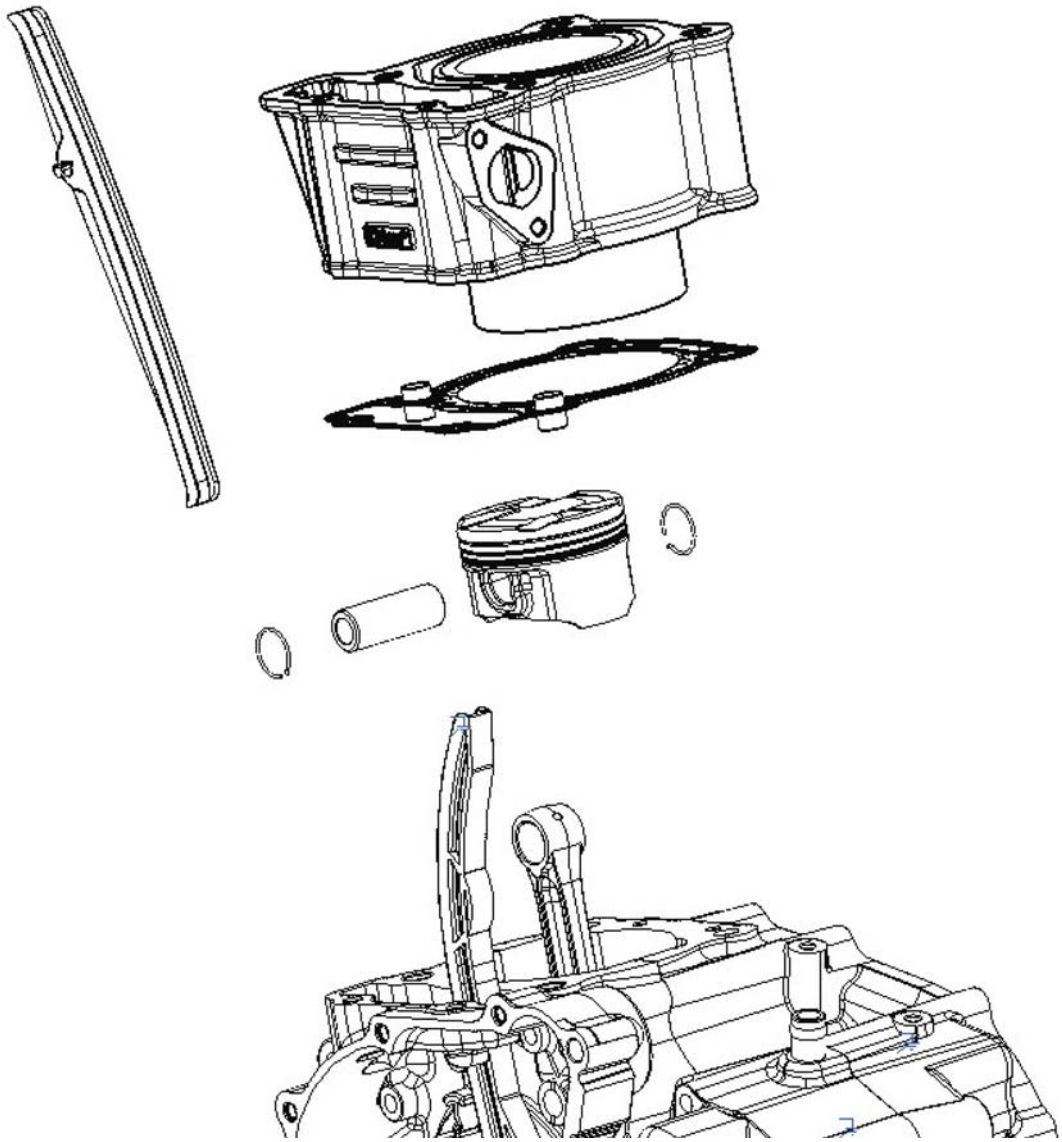
5. Use tools to adjust tensioner until it was tight.

6. Install the spring and tighten the bolt.

   Tightening torque: 10N•m

5. MAINTENANCE OF CYLINDER BLOCK/ PISTON

I. EXPLODED VIEW OF CYLINDER BLOCK AND PISTON



II. LIMITS FOR SERVICE

UNIT: MM

Item			Standard	Service Limit
Cylinder	Inner diameter of cylinder		58.01~58.017	58.1
	Roundness		0.004	0.10
	Planeness of cylinder face		0.04	0.10
Piston, Piston Ring and Piston Pin	Outer diameter of piston		57.958~57.965	57.95
	Inner diameter of piston pin hole		1 5.003~15.008	15.04
	Closure clearance of piston ring	Top	0.2~0.35	0.4
		Second	0.2-0.35	0.4
		Oil	0.2~0.7	0.85
	Piston Ring/Groove Clearance:	Top	0.03~0.062	0.10
		Second	0.02~0.052	0.10
	Piston/Cylinder Clearance		0.045~0.059	0.05
	Outer diameter of piston pin		14.994~15	14.96
	Clearance between piston pin and piston pin hole		0.003~0.014	0.04
Small End of Connecting Rod	Inner diameter		15.01~15.018	15.04
	Clearance between small end of connecting rod and piston pin		0.01~0.024	0.10

Tightening torque of cylinder head fixing bolt: 27N•m+90°

III. TROUBLE REMEDY

1. 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.

2. Cylinder pressure is too high. Engine overheats.

   Too much carbon deposit on piston top.

3. Engine oil is consumed significantly, and engine smokes heavily.

   Severely worn or broken cylinder block and piston.

   Improper assembly of piston ring.

4. 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.

IV. REMOVAL AND INSTALLATION OF CYLINDER BLOCK/PISTON

I) Disassembly and inspection of cylinder block.

1. Dismantle cylinder head (View section); Take out guide plate and water pipe.

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.

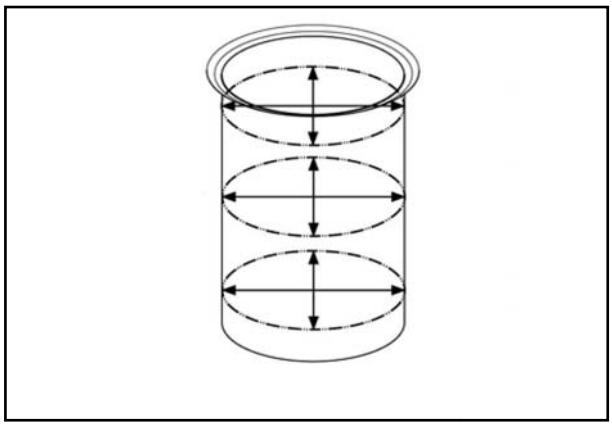
3. Take out locating pin and paper gasket of cylinder block.

II) 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	58.1mm

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



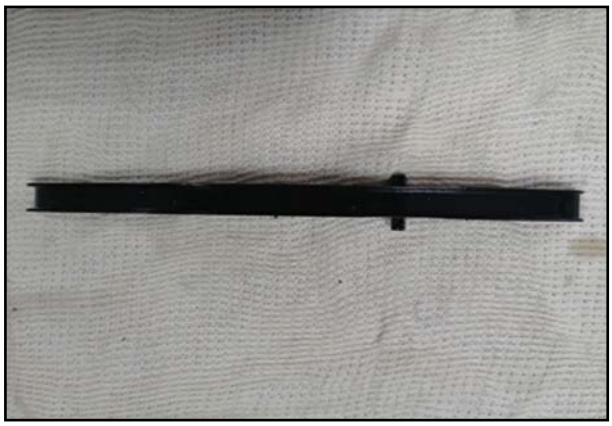
Service limit	0.10mm

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.



III) 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.

IV) Check piston.

1. Check piston for damage or break.
2. Check diameter of skirt at 8mm height.

Service limit	Ø 57.9mm

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

Service limit	0.09mm

4. Measure diameter of piston pin hole.

Service limit	Ø 14.96mm

5. Measure diameter of piston pin.

Service limit	Ø 14.96mm

6. Fit clearance between piston pin and piston pin hole.

Service limit	0.04mm

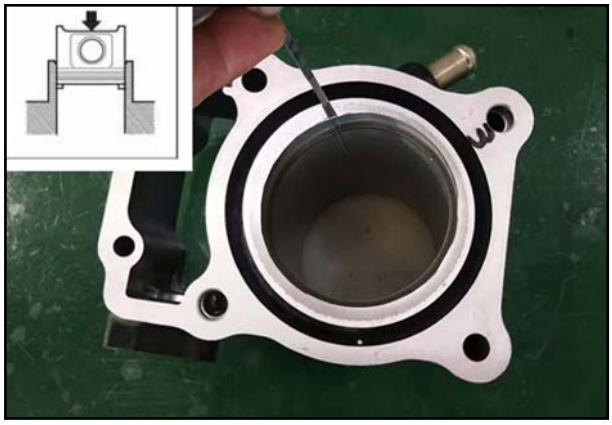
7. Check diameter of pin hole at small end of connecting rod.

Service limit	15.06mm

8. Fit clearance between connecting rod and piston pin.

Service limit	0.10mm

9. Check gap of piston ring.



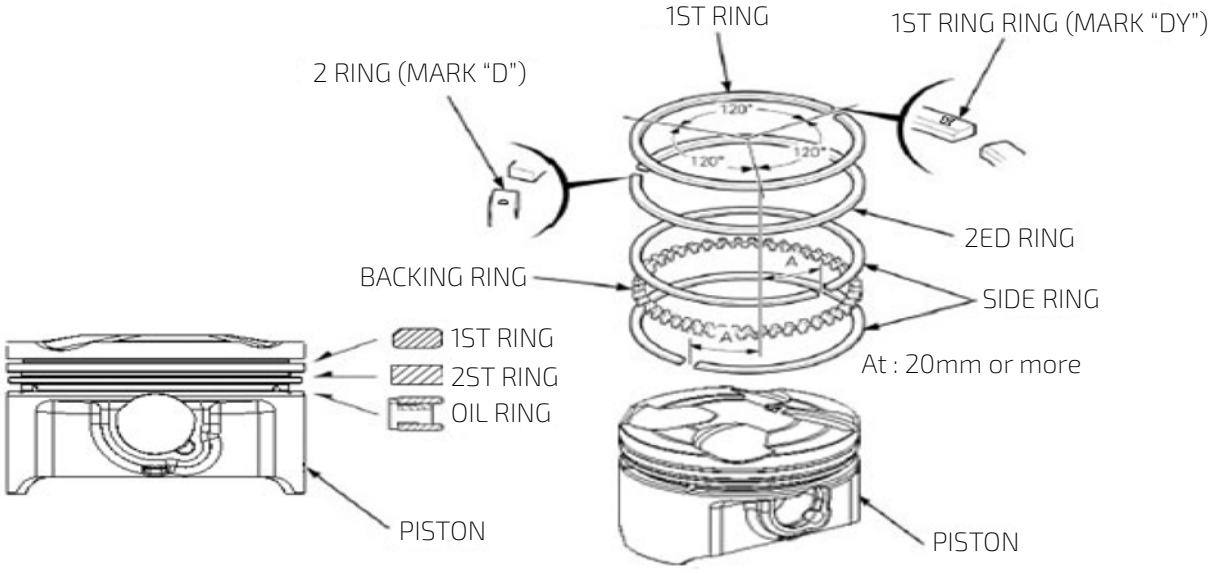
10. Install piston ring into cylinder block, and press them down with piston. Check gap of each piston ring with feeler gauge.

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

11. Check for clearance between piston ring and ring groove.

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

12. Schematic diagram of installation of piston ring.



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°.

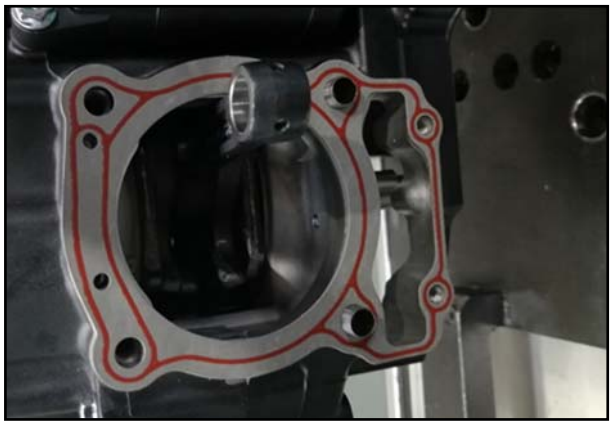
IMPROPER ASSEMBLY OF PISTON RINGS WILL RESULT DIRECTLY IN BURNING ENGINE OIL, ABNORMAL WEAR OF PISTON, ETC.

V) Installation of piston/cylinder block.

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

NOTE:
WHEN CHECKING CYLINDER BLOCK AND PISTON, PLACE A CLEAN CLOTH AT CRANKCASE TO GUARD AGAINST DUST AND FOREIGN MATTERS FALLING INTO CRANKCASE.

2. Install locating pin and new sealing gasket of cylinder block.
3. 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.

4. When assembling piston, direct face with mark towards exhaust side.
5. Then assemble piston pin.
6. Apply appropriate amount of lube oil on piston pin, piston pin hole, piston skirt before assembling.
7. Installing new piston ping circlip.

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.

THE HOOK OF CIRCLIP SHALL BE ASSEMBLED AT THE NOTCH OF THE PISTON PIN HOLE RETAINING RING.

8. Install cylinder block.
9. Apply appropriate amount of lube oil evenly on surface of cylinder block, piston and piston ring.
10. 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.

11. Install the Water Pipe on the cylinder block.
12. Install guide plate of chain into cylinder block.

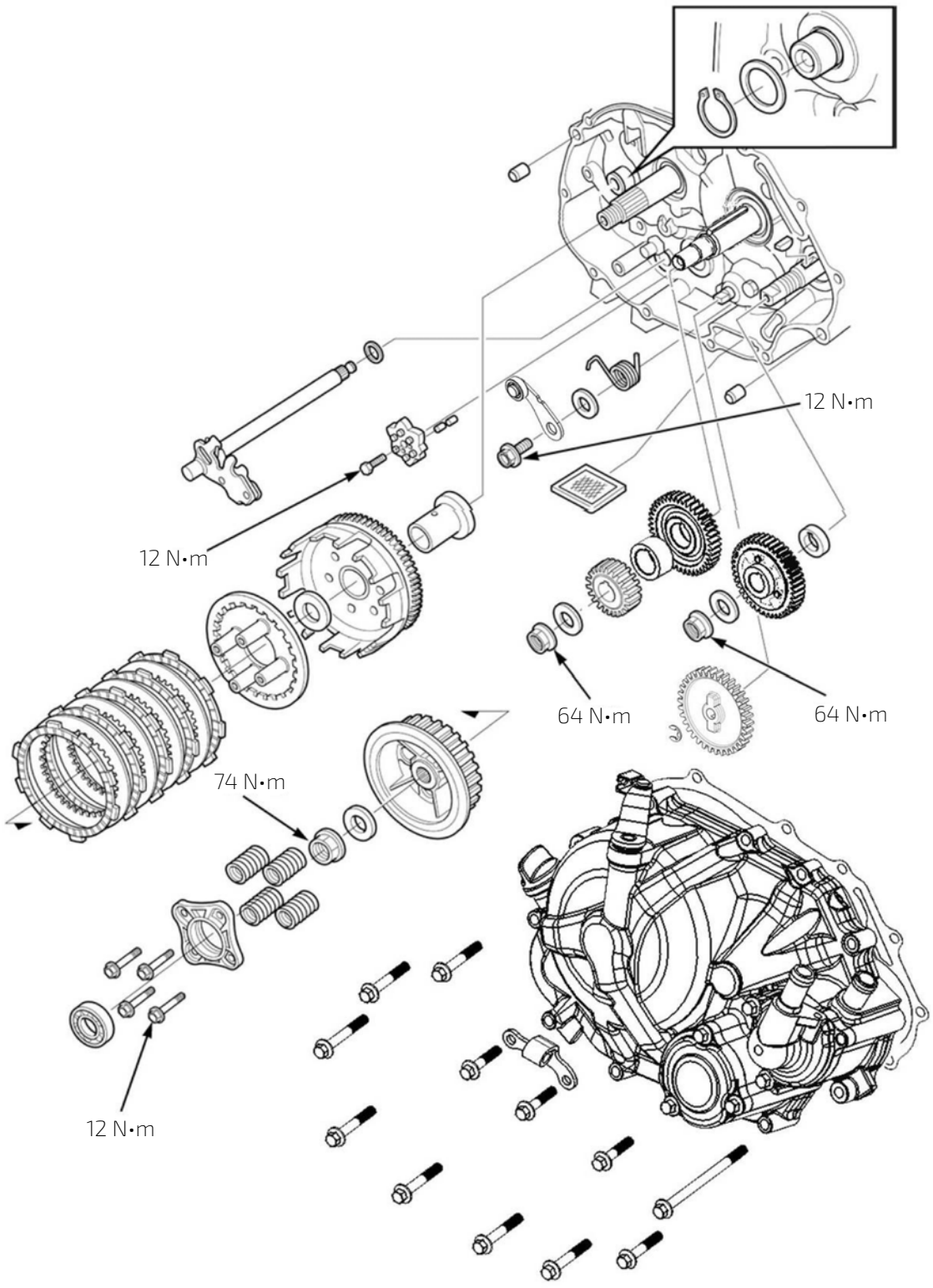
NOTE:

GUIDE PLATE SHALL BE INSTALLED TO ITS PLACE AS SHOWN IN THE FIGURE; OTHERWISE, THE PLATE MAY BE DAMAGED ABNORMALLY.

13. Assemble cylinder head and tensioner (View section).

6. RIGHT COVER / CLUTCH / BALANCED GEAR / GEARSHIFT

I. EXPLODED VIEW OF RIGHT COVER/ CLUTCH/ BALANCED GEAR/ GEARSHIFT



II. TECHNICAL SPECIFICATIONS OF THE CLUTCH

UNIT: MM

Item		Standard	Service Limit
Clutch	Clutch Spring Free Length	40.1-40.9	39.5
	Friction Plate Thickness	2.95-3.05	2.8
	Planeness of clutch driven plate	0.08	0.20
	Driven gear inner hole diameter	23.000~23.021	23.03
Shaft sleeve	Collar diameter	22.955~22.975	22.945
	Bushing aperture	16.99~17.008	17.015
	The spindle diameter	16.972~16.985	16.965

III. REQUIREMENT OF TIGHTENING TORQUE

Locknut of clutch: 74N.m

Locknut of crankshaft: 64N.m

Locknut of balanced gear: 64N.m

Fastening bolt of star-shaped plate: 12N.m

Fastening bolt of locating plate: 12N.m

Fastening bolt of clutch cover: 12N.m

Tightening torque of impeller of water pump: 12N.m

IV. 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;

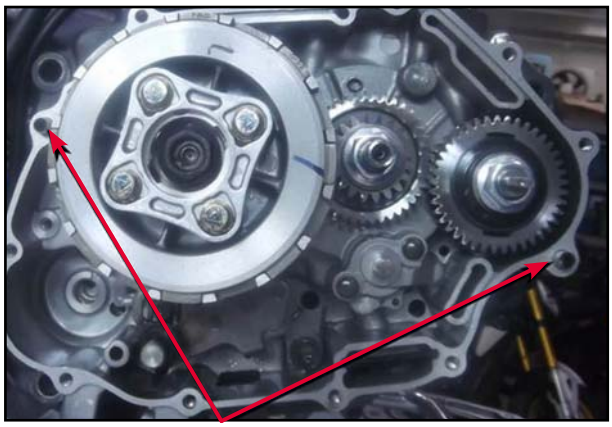
3. Gearshift becomes difficult and seized.
   Clutch does not disengage thoroughly;
   Gearshift arm bends, deforms and severely wears;
   Fork plate of gearshift arm deforms and does not return;
   Break of spring of locating plate.

V. REMOVAL AND INSTALLATION OF RIGHT COVER

I) Drain off engine oil from engine and water from radiator.

II) Remove connecting water pipe from right cover. Remove bolt from right cover.

III) Remove paper gasket and locating pin.



IV) Removal of right cover.

1. Check if oil seal of crankshaft is in good condition.

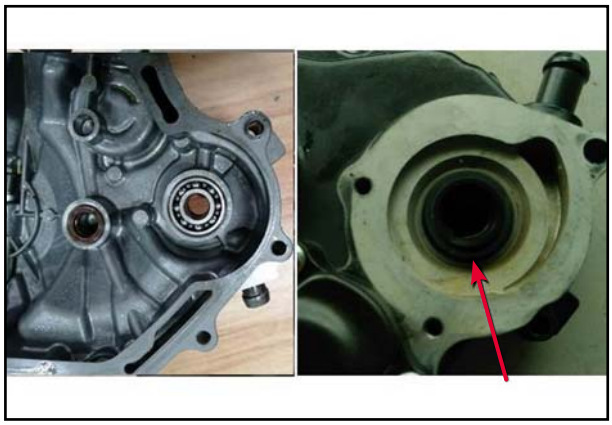
2. Removal of water cooling system.

2.1-Remove water pump cover to check if seal ring of water pump cover is in good condition.

2.2-Dismantle impeller of water pump.

2.3-Dismantle packing and water pump shaft.

2.4-Use special tools to dismantle mechanical seal assembly and bearing, and take out water seal.



3. Take out pushing rod of clutch.

4. Rotate control arm and take out spring.

5. Take out clutch control arm and oil seal.

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

V) Partial assembly of right cover.

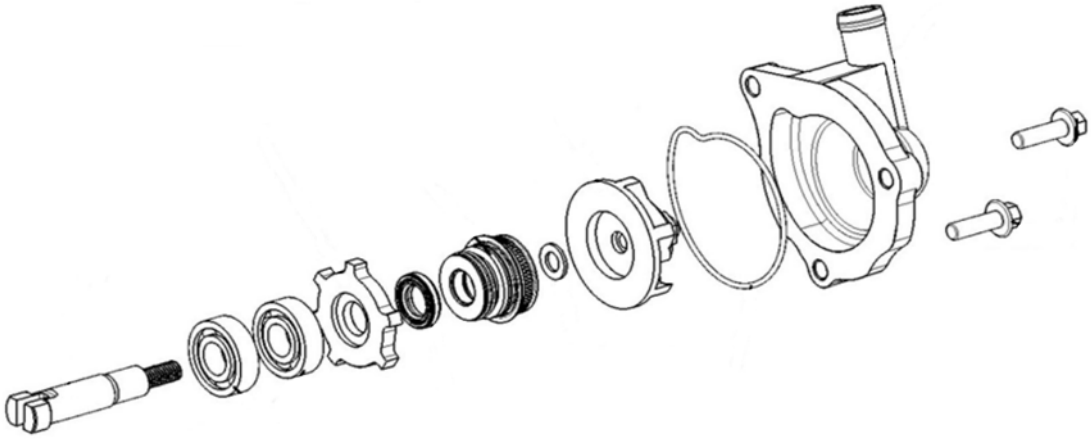
1. Replace oil seal of control arm with new one. Apply appropriate amount of lube oil onto lever of control arm, then install the arm into right cover.

2. Insert the sping into the pin hole on the end of the control arm.

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

4. Assembly of cooling system.

4.1-Exploded view of cooling system.



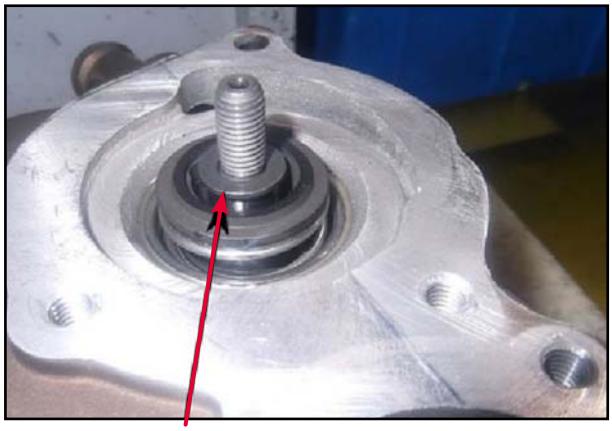
4.2-Cleaning.

4.3-Assemble 2 bearings (6001) and water pump shaft.

4.4-Assemble oil seal of water pump shaft.

4.5-Assemble mechanical seal assembly.

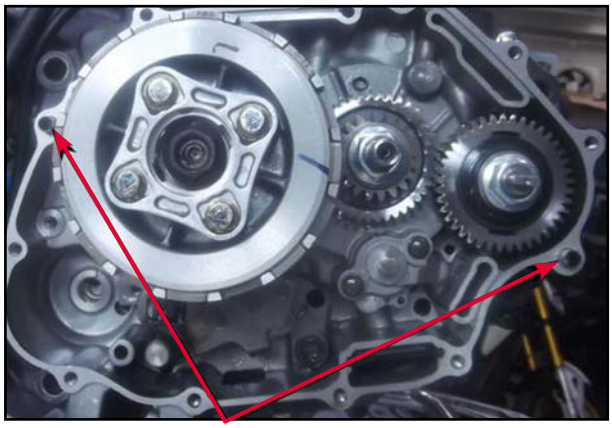
4.6-Assemble impeller packing of water pump.



4.7-Assemble impeller of water pump.

VI) Assemble locating pin and new paper gasket.

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



VI) Assemble right cover, bracket, bolts. First, tighten the bolt at locating pin, then tighten other bolts alternatively.

NOTE:
WHEN FITTING RIGHT COVER, ROTATE IMPELLER OF WATER PUMP SO THAT WATER PUMP SHAFT IS ALIGNED WITH BALANCED SHAFT, THEN INSTALL THE RIGHT COVER TO ITS POSITION.

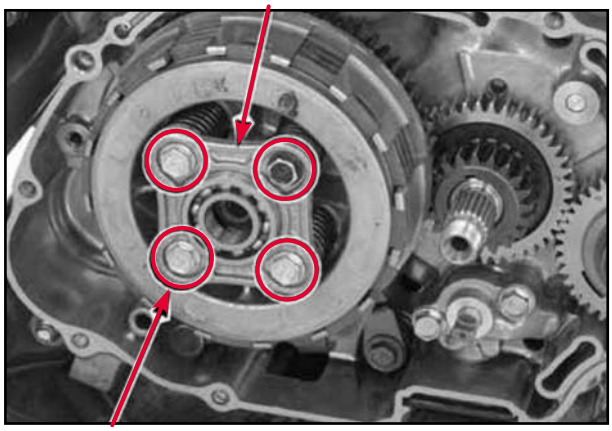
VIII) When assembling water pump cover, check if seal ring of water pump is in good condition, then fix the water pump cover with bolt.

IX) Assemble water pipe and fix it with clamp.

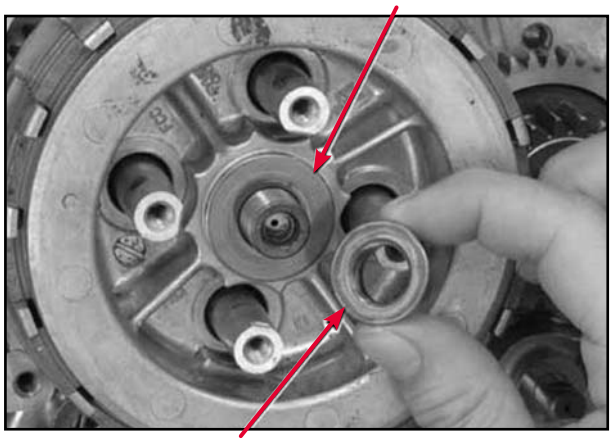
VI. REMOVAL AND INSTALLATION OF CLUTCH

I) Removal of clutch.

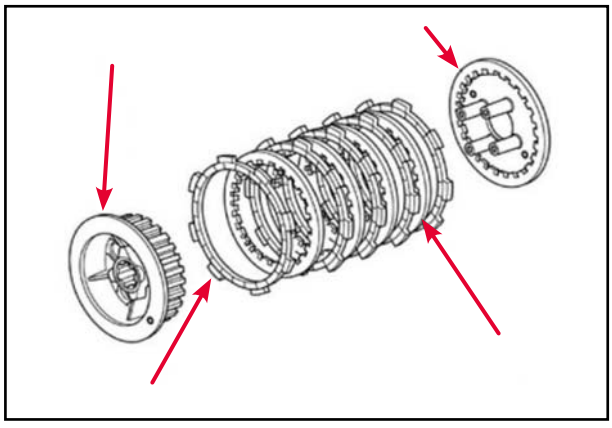
1. Dismantle 4 bolts from end cover of clutch, then take out end cover of clutch, bearing, declutch spring.



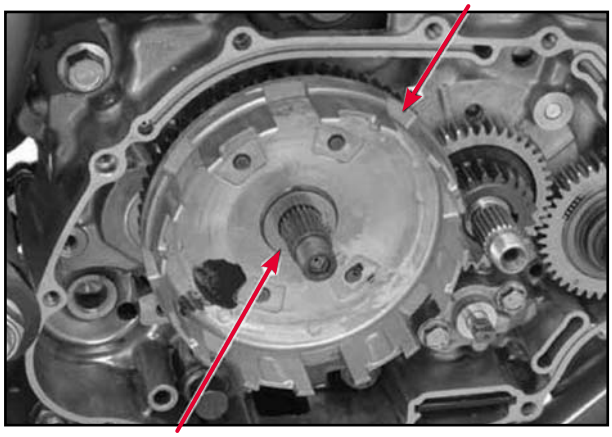
2. Dismantle locknut and washer of clutch.



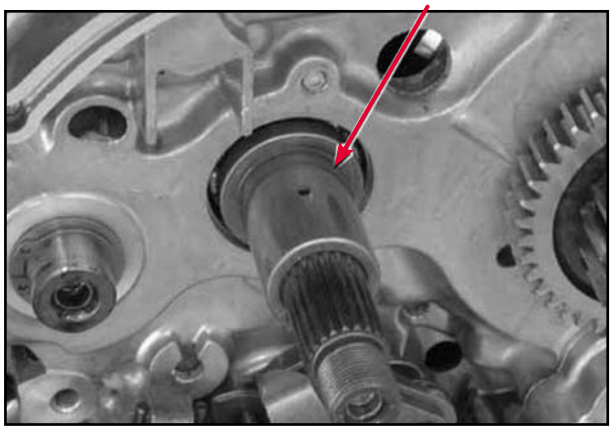
3. Take out upper and lower pressure plate of clutch, drive and driven friction plate.



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

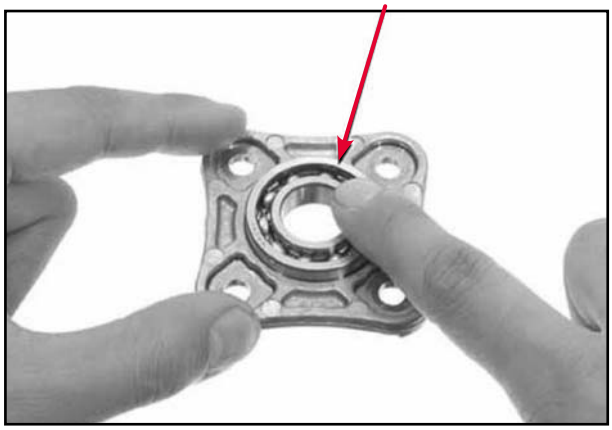


5. Take out declutch shaft sleeve.

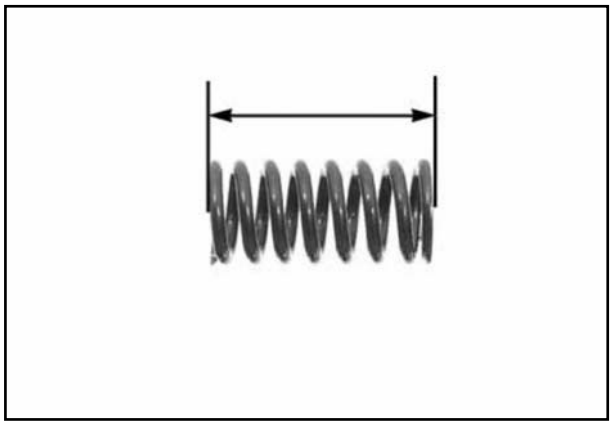


II) Check of clutch.

1. Check bearing of clutch for free rotation.

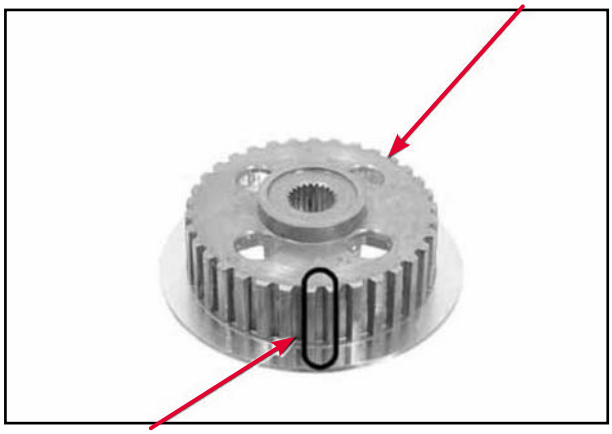


2. Check declutch spring of clutch for damage. Measure free length of spring.



Service limit	39.5mm

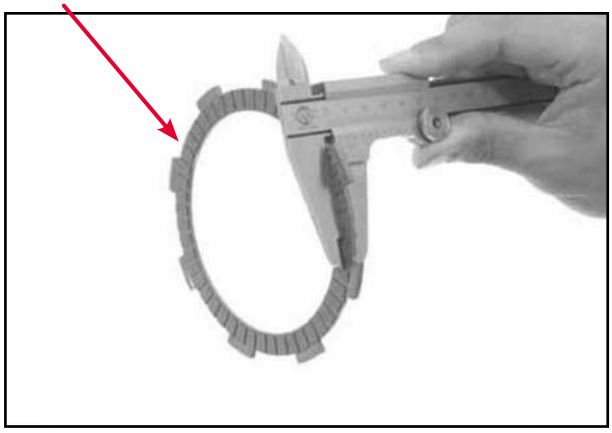
3. Check retaining groove of pressure plate for abnormal wear.



4. Check if drive friction plates discolors.

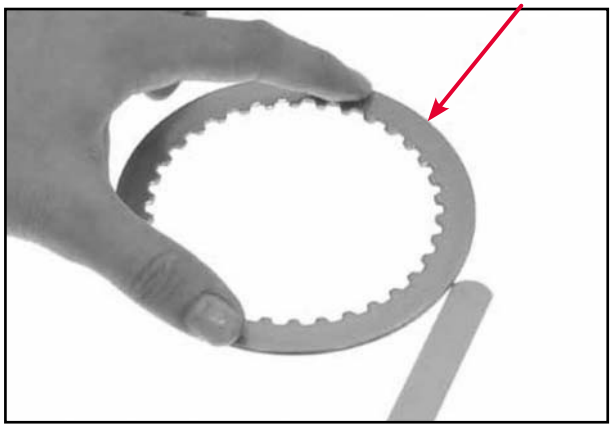
Measure thickness of drive friction plate.

Service limit	2.6mm



5. Check planeness of driven friction plates.

Service limit	0.20mm

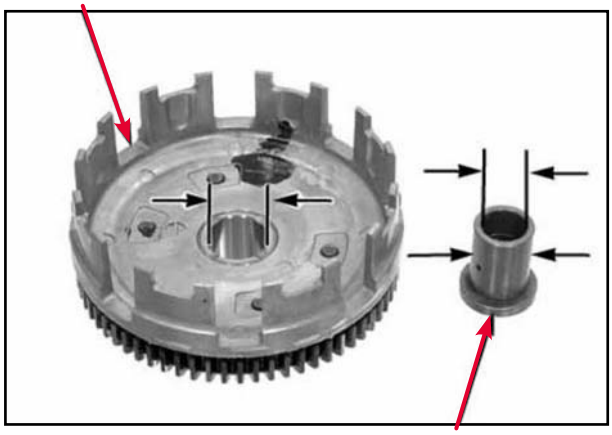


6. Check declutch spring of clutch for damage. Measure free length of spring.

Service limit	39.5mm

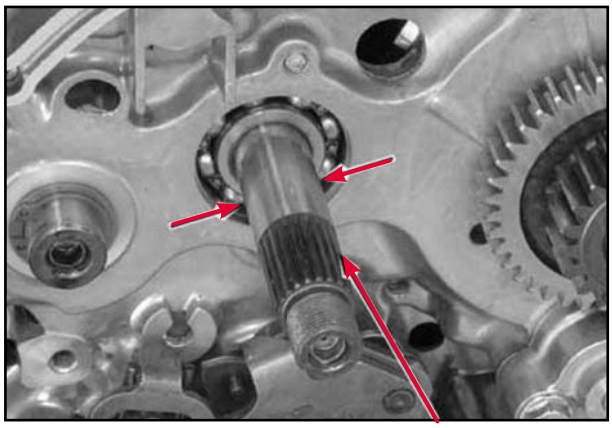
Measure inner and outer diameters of shaft sleeve.

Service limit	Inner diameter	17.04mm
	Outer diameter	22.93mm



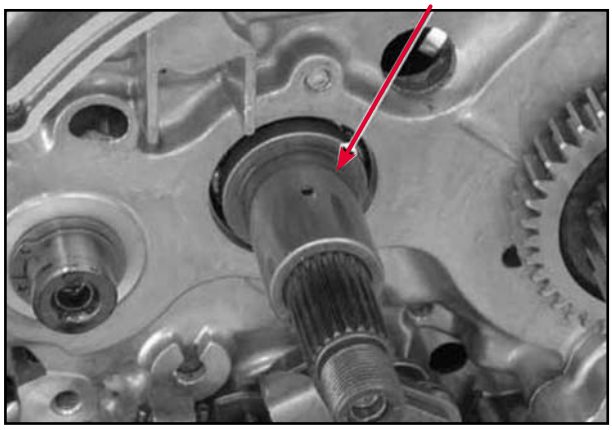
7. Measure diameter of main shaft.

Service limit	16.95mm

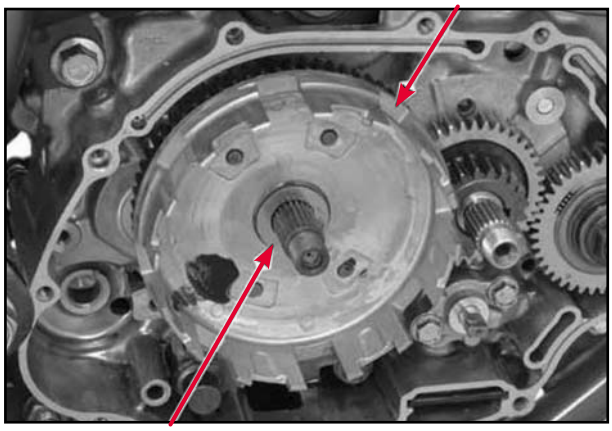


III) Assembly of clutch.

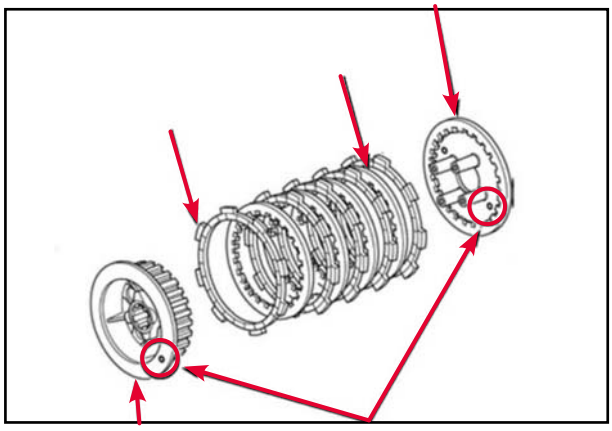
1. Apply appropriate amount of engine oil onto internal and external surface of shaft sleeve, then assemble de-clutch shaft sleeve onto main shaft.



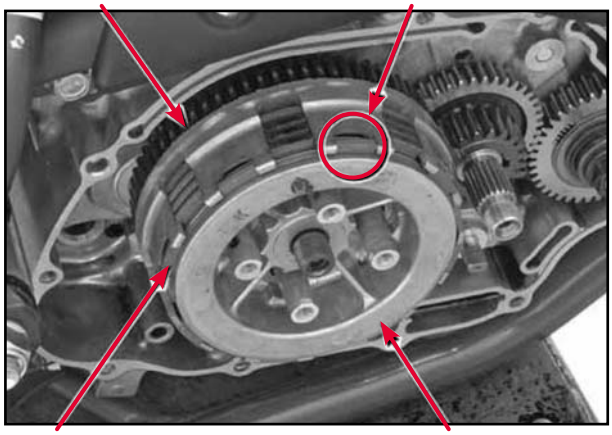
2. Apply appropriate amount of lube oil onto gears. Assemble outer case and declutch washer of clutch.



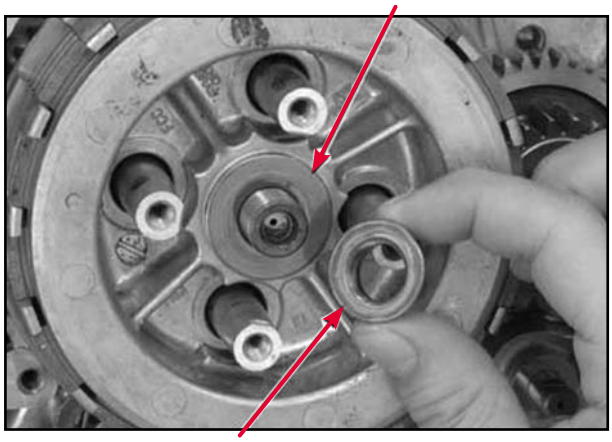
3. New friction plates shall be immersed in engine oil before assembly. When assemble central sleeve of clutch, care shall be taken to align mark on upper pressure plate with that on lower pressure plate.



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

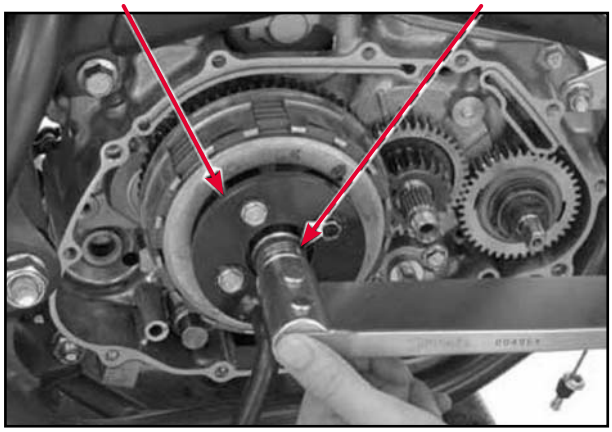


5. Assemble gaskets and nut. Apply appropriate amount of engine oil onto end face of n.



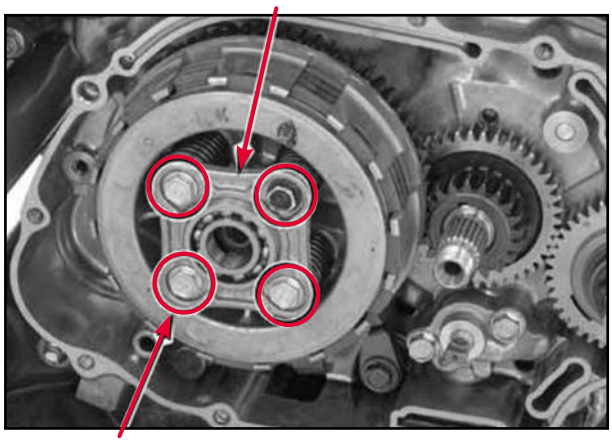
6. Use tools to fix pressure plate and tighten locknut of clutch. Tightening torque shall meet specified requirement.

   Tightening torque: 74N.m



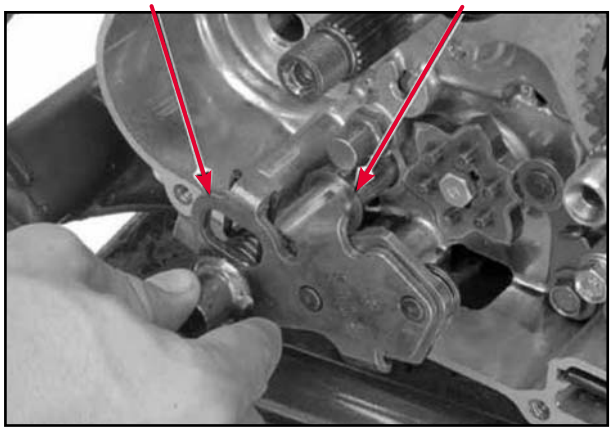
7. Assemble spring and clutch end cover, and tighten bolts on the end cover in sequence.

   Tightening torque: 12N.m



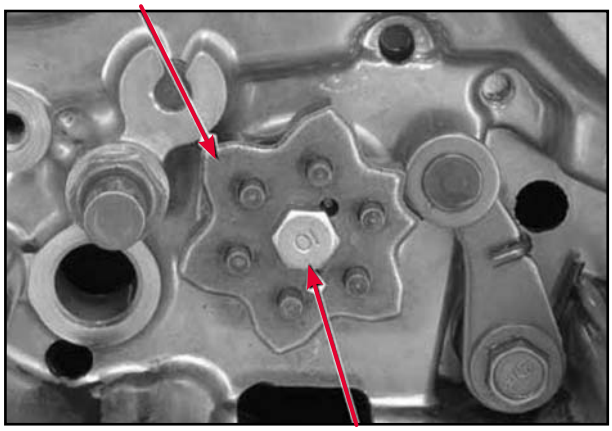
VII. REMOVAL AND INSTALLATION OF GEARSHIFT ARM

1. Take out components of gearshift arm.



NOTE:
DO NOT FALL WASHER INTO CRANKCASE.

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



3. Dismantle components and parts in turns:

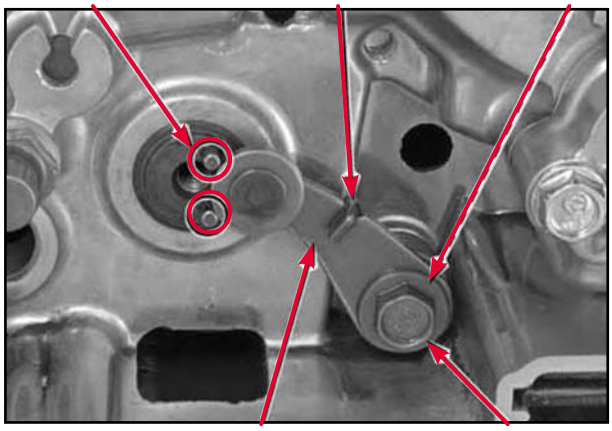
   Pin

   Locating plate

   Bolt of locating plate

   Spring of locating plate

   Washer

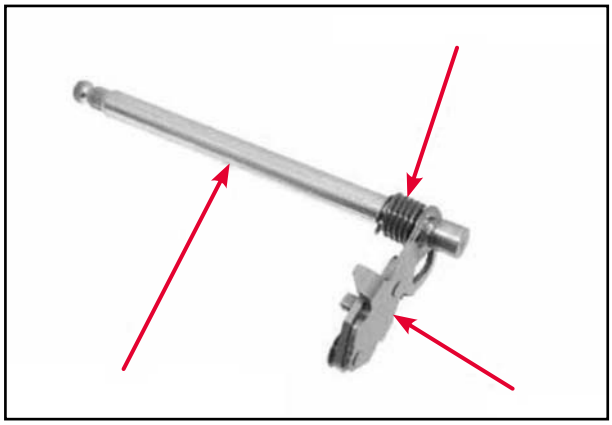


4. Check of gearshift arm.

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

   Check spring for damage and break;

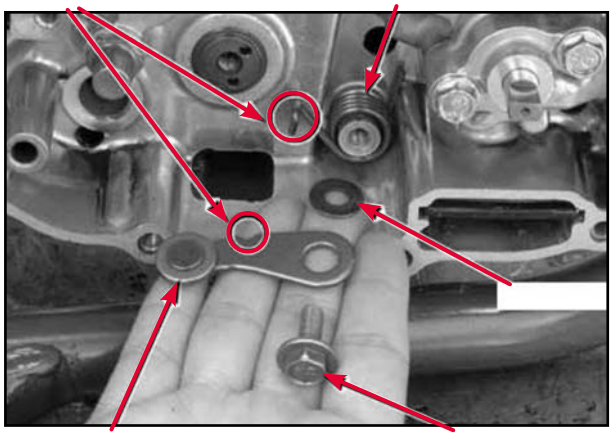
   Check if fork plate bends or deforms.



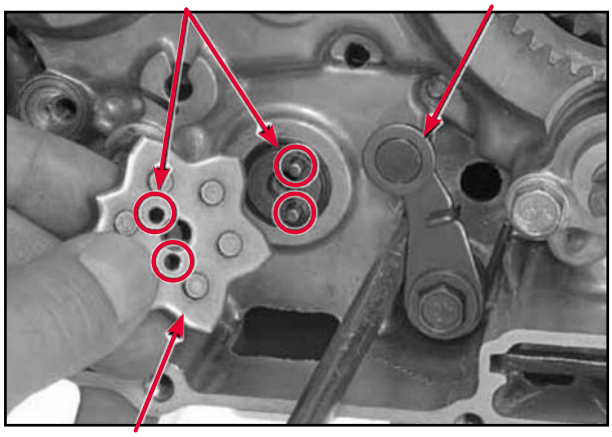
5. Assemble locating plate, spring, bolt and washer. Hook of spring shall be snapped into groove of locating plate.

   Tighten bolt of locating plate.

   Tightening torque: 12N.m

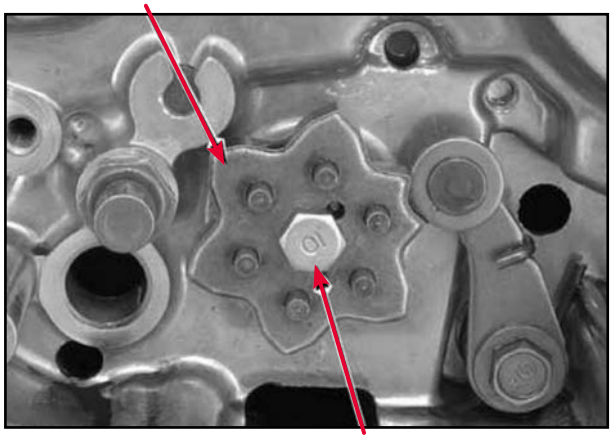


6. After displace locating plate with flat screwdriver, assemble pin and star-shaped plate. Pin holes on the star-shaped plate shall be aligned with two cylindrical pins.

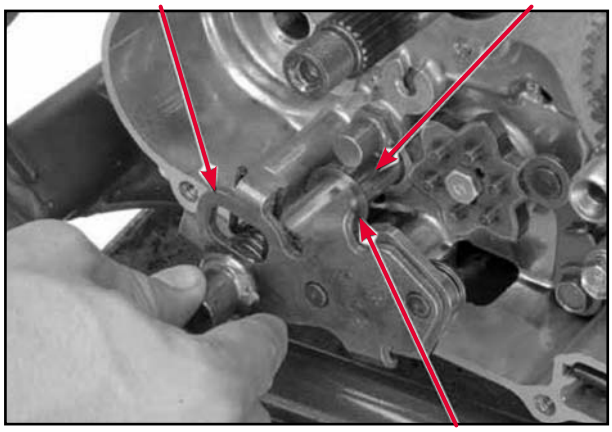


7. Tighten bolt on star-shaped plate.

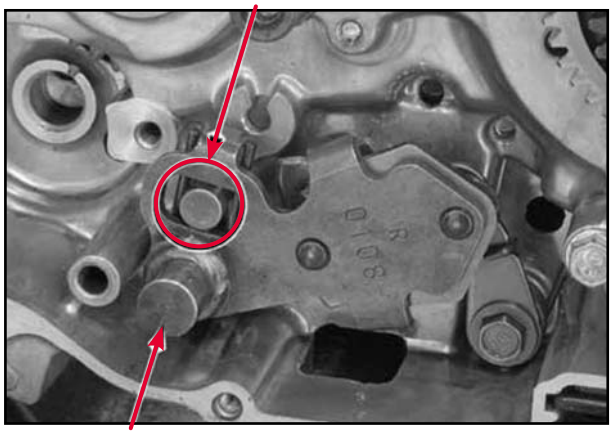
   Tightening torque: 12 N.m



8. Apply lube oil on to gearshift arm shaft.



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



VIII. REMOVAL AND INSTALLATION OF DRIVE GEAR AND BALANCED GEAR

I) Removal of balanced drive gear.

1. Dismantle locknut and washer of drive gear.

2. Take out drive gear.

3. Take out balanced gear.

NOTE:
DO NOT DAMAGE WOODRUFF AND CIRCUMFERENCE OF CRANKSHAFT WHEN REMOVING DRIVE GEAR AND BALANCED GEAR.

II) 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 washer, locknut of drive-gear.

6. Tighten nut to specified torque;

   Tightening torque: 64N.m

III) Removal of balanced driven gear.

1. Dismantle locknut and washer;

2. Take out shaft sleeve and woodruff key.

IV) Assembly of driven gear of balanced shaft.

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.

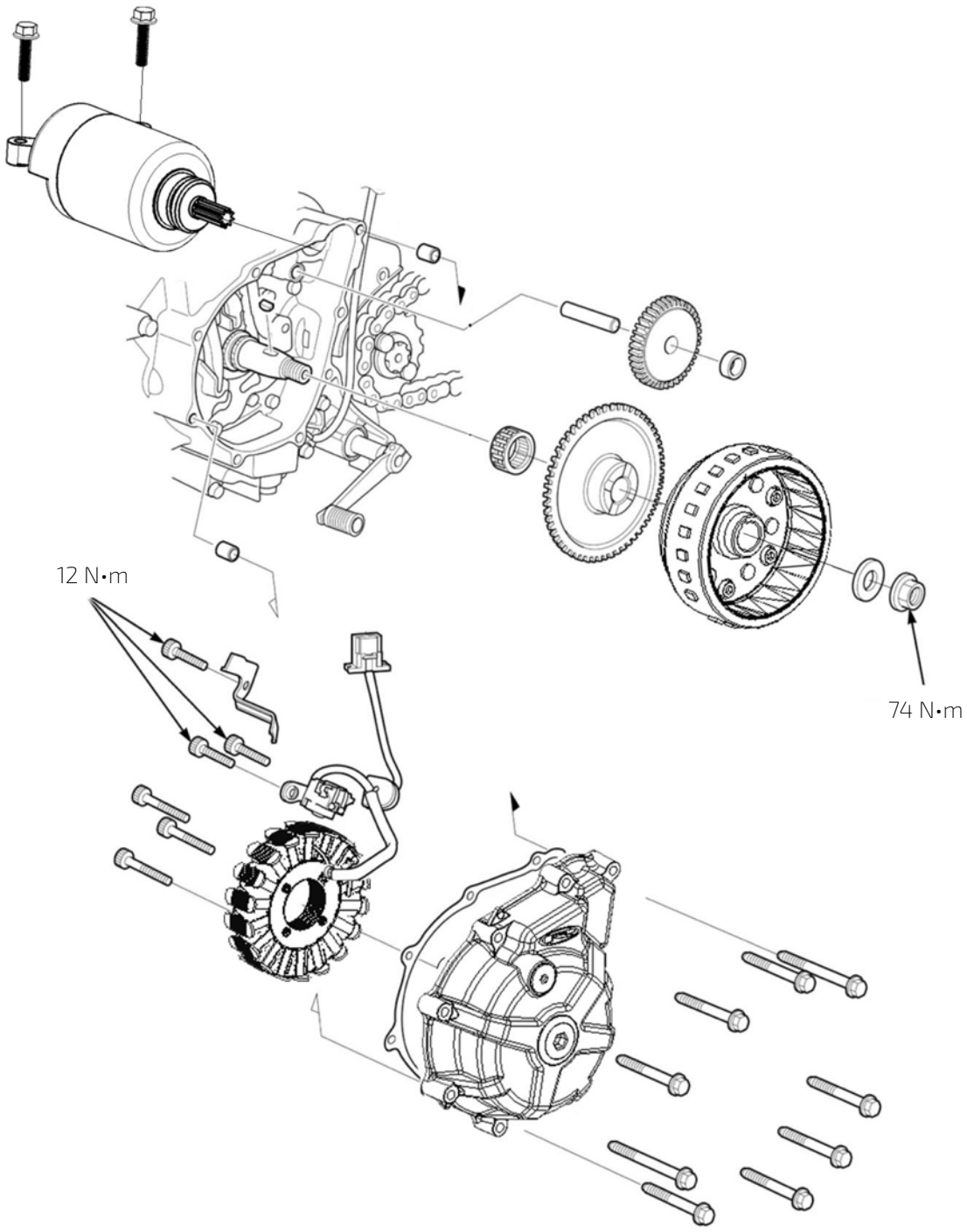
4. Tighten the nut to specified torque.

   Tightening torque: 65N.m

5. Assemble right cover (View section).

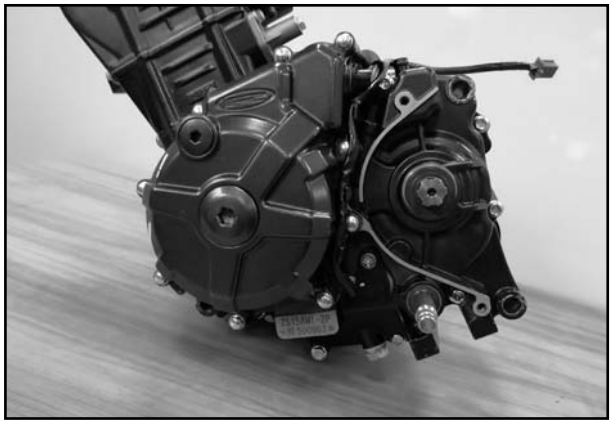
7. LEFT COVER / STARTING MOTOR SYSTEM / MAGNETOR

I. EXPLODED VIEW OF LEFT COVER/ STARTING MOTOR SYSTEM/ MAGNETOR

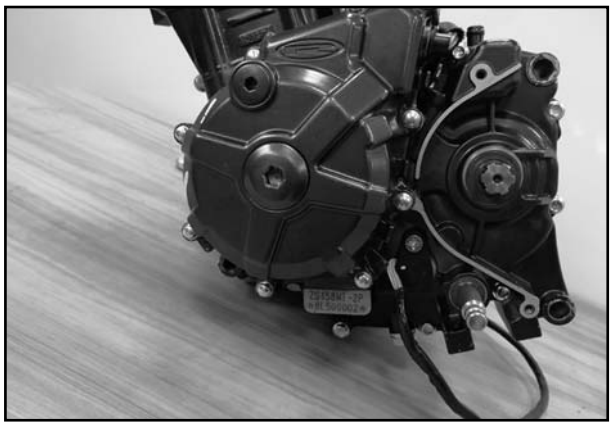


II. REMOVAL AND INSTALLATION OF LEFT COVER

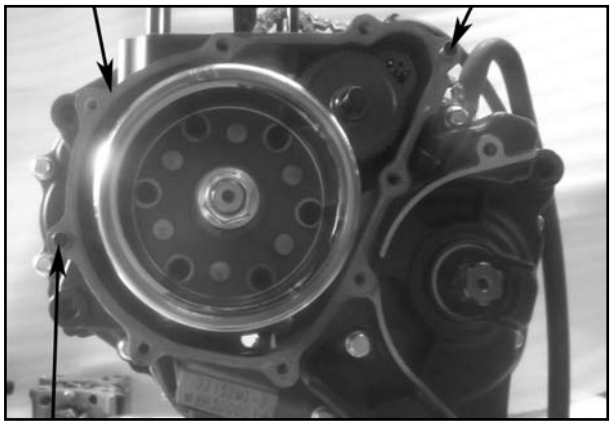
1. Take out gearshift switch harness from harness groove.



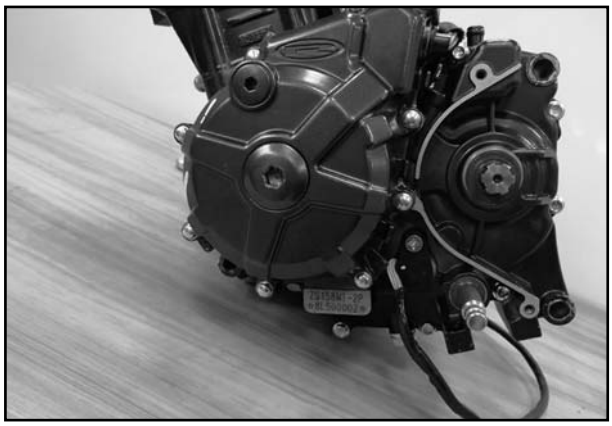
2. Loosen fastening bolt on left cover and remove left cover.



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



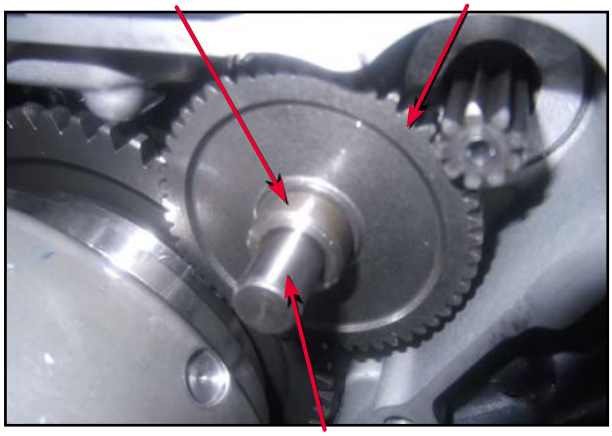
4. Install left cover and tighten fastening bolt in accordance with specified sequence.



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

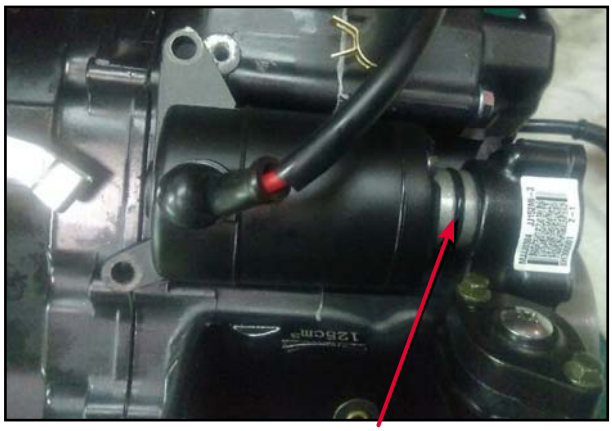
III. REMOVAL AND INSTALLATION OF STARTING MOTOR SYSTEM

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



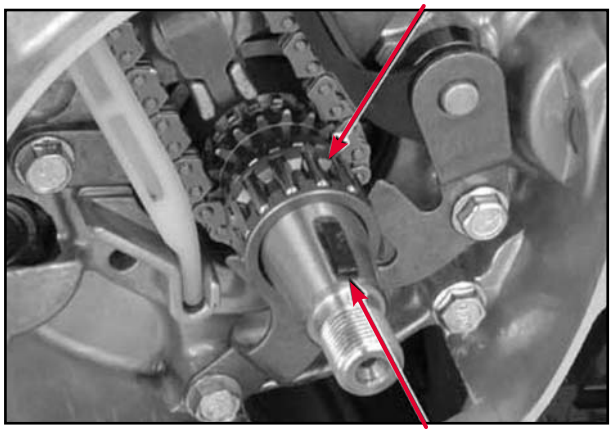
2. Dismantle bolt of starting motor.

3. Check O-ring for condition.

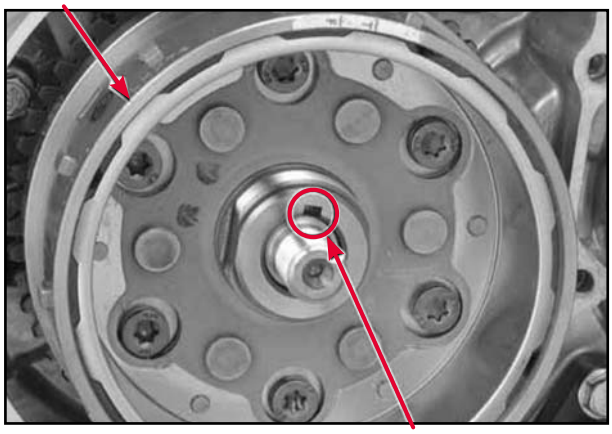


4. Dismantle locknut on magnetor. Use special tools to dismantle magnetor rotor.

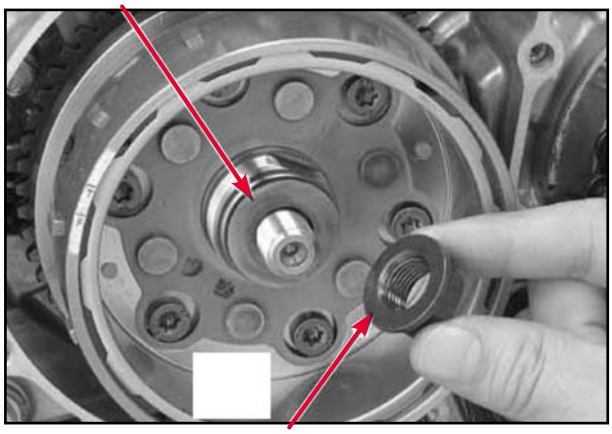
5. Check needle bearing, woodruff key on crankshaft for damage.



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

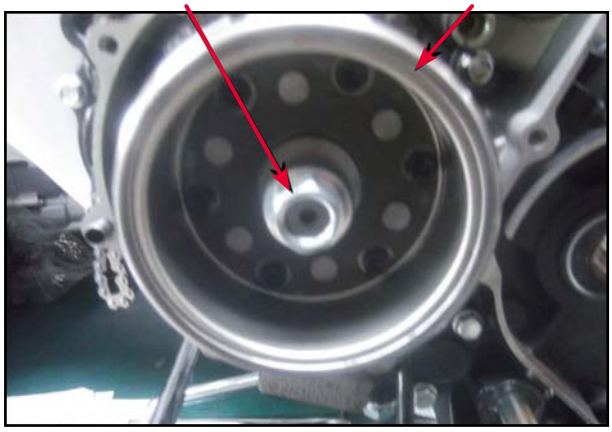


7. Install washer and locknut.



8. Use tools to fix magnetor and tighten nut to specified torque.

   Tightening torque: 74N.m

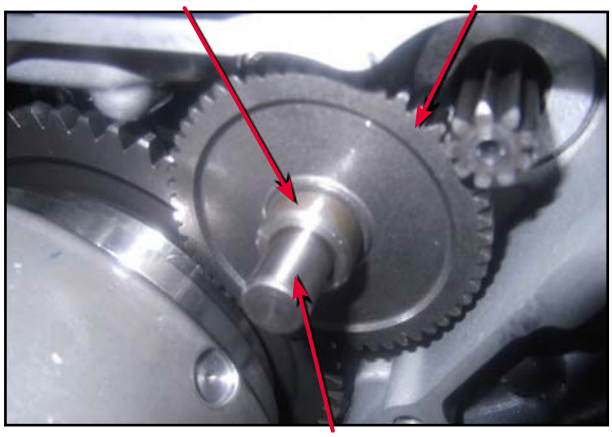


9. Replace O-ring with a new one.

   Apply appropriate amount of lube oil onto O-ring before assemble it.

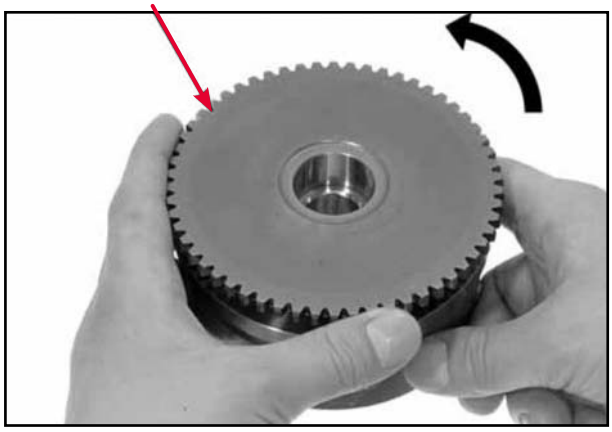
10. Assemble starting motor.

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.



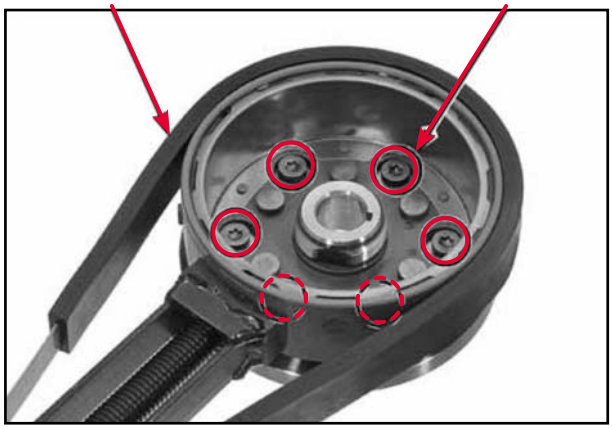
12. Check of starting motor system.

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

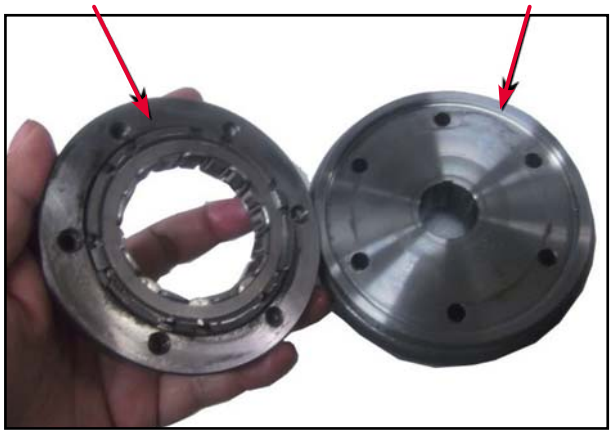


13. Disassembly of magnetor rotor

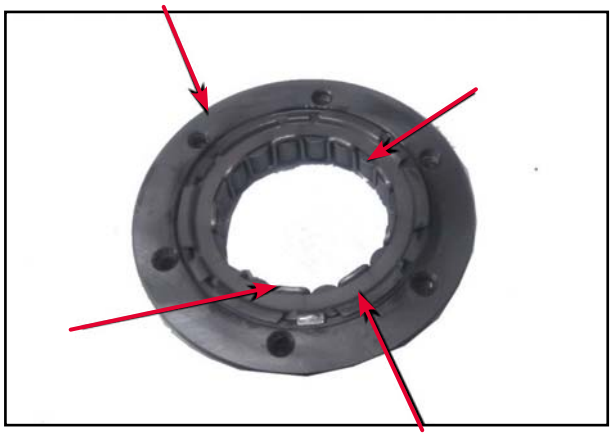
13.1-Use special tools to fix rotor, then dismantle fastening bolt in the rotor.



13.2-Take out overrunning clutch.

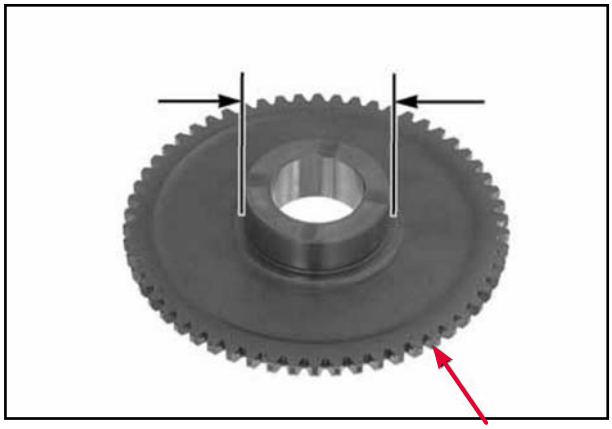


13.3-Check holder and wedge block for damage.



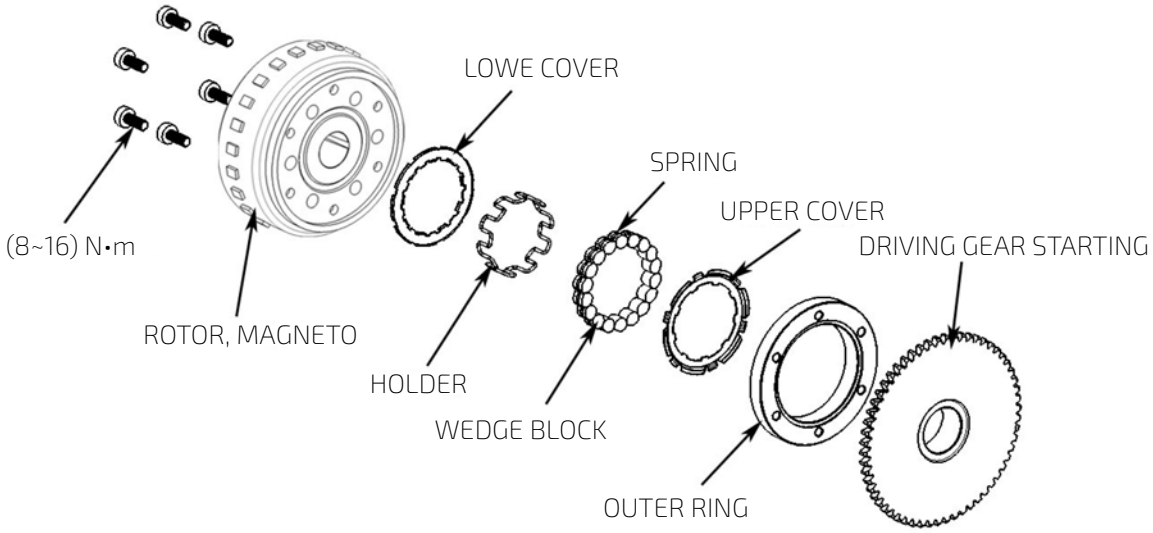
13.4-Check teeth of large starting gear for damage.

Measure outer diameter of large starting gear

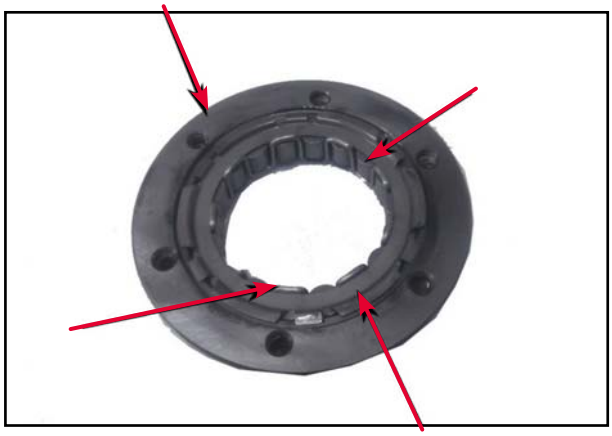


Service limit	45.60mm

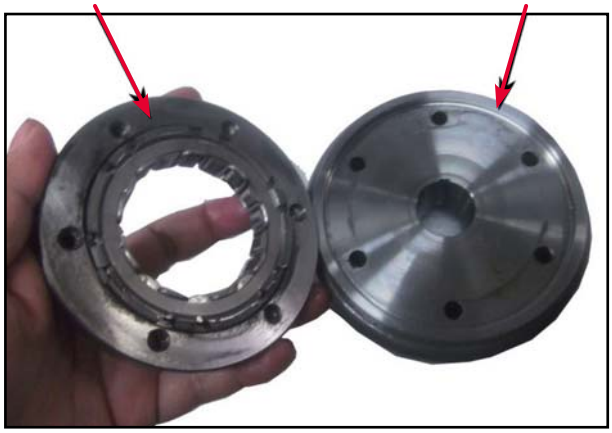
13.5-Exploded view of magnetor rotor.



13.6-Assemble overrunning clutch.

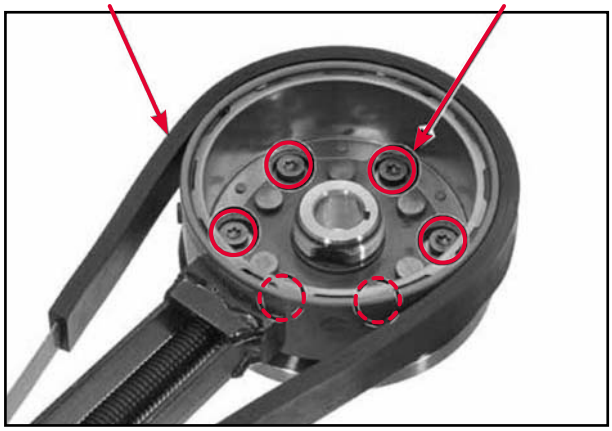


13.7-Install overrunning clutch onto magnetor rotor, and align through hole with threaded hole.



13.8-Apply appropriate amount of fastening adhesive onto threads of bolt, then use tools to locate and tighten the bolt.

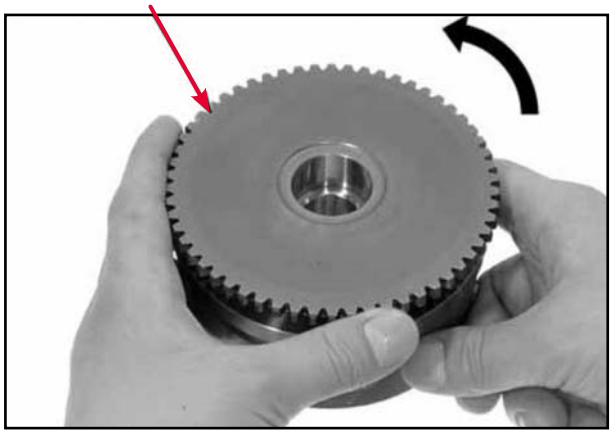
Tightening torque: 16N.m



13.9-Install large starting gear onto assembled magnetor rotor, and rotate gear counterclockwise.

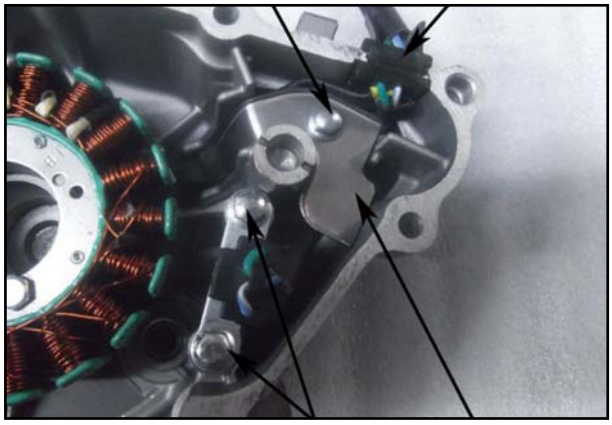
Gear shall be coated with lube oil properly;

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

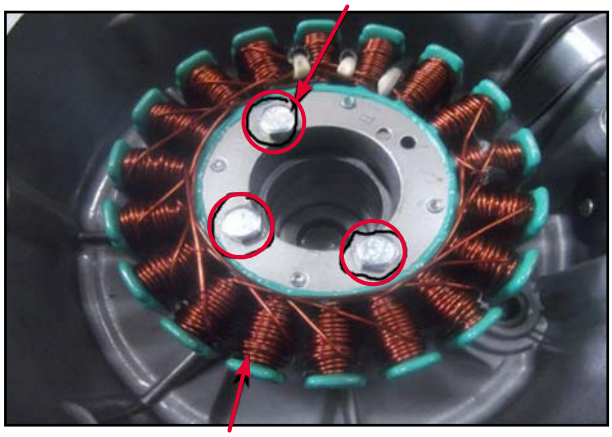


IV. REMOVAL AND INSTALLATION OF MAGNETOR STATOR

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



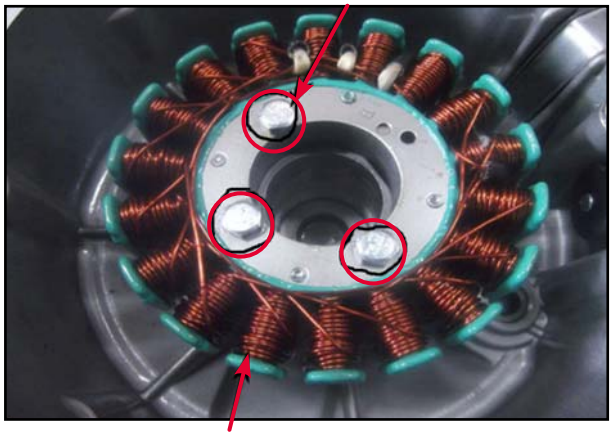
2. Dismantle fastening bolt on stator and take out magnetor.



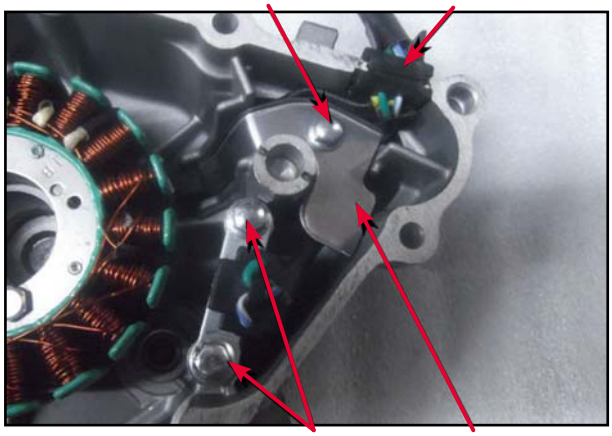
3. Install a new magnetor onto left cover, then tighten bolts.

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.

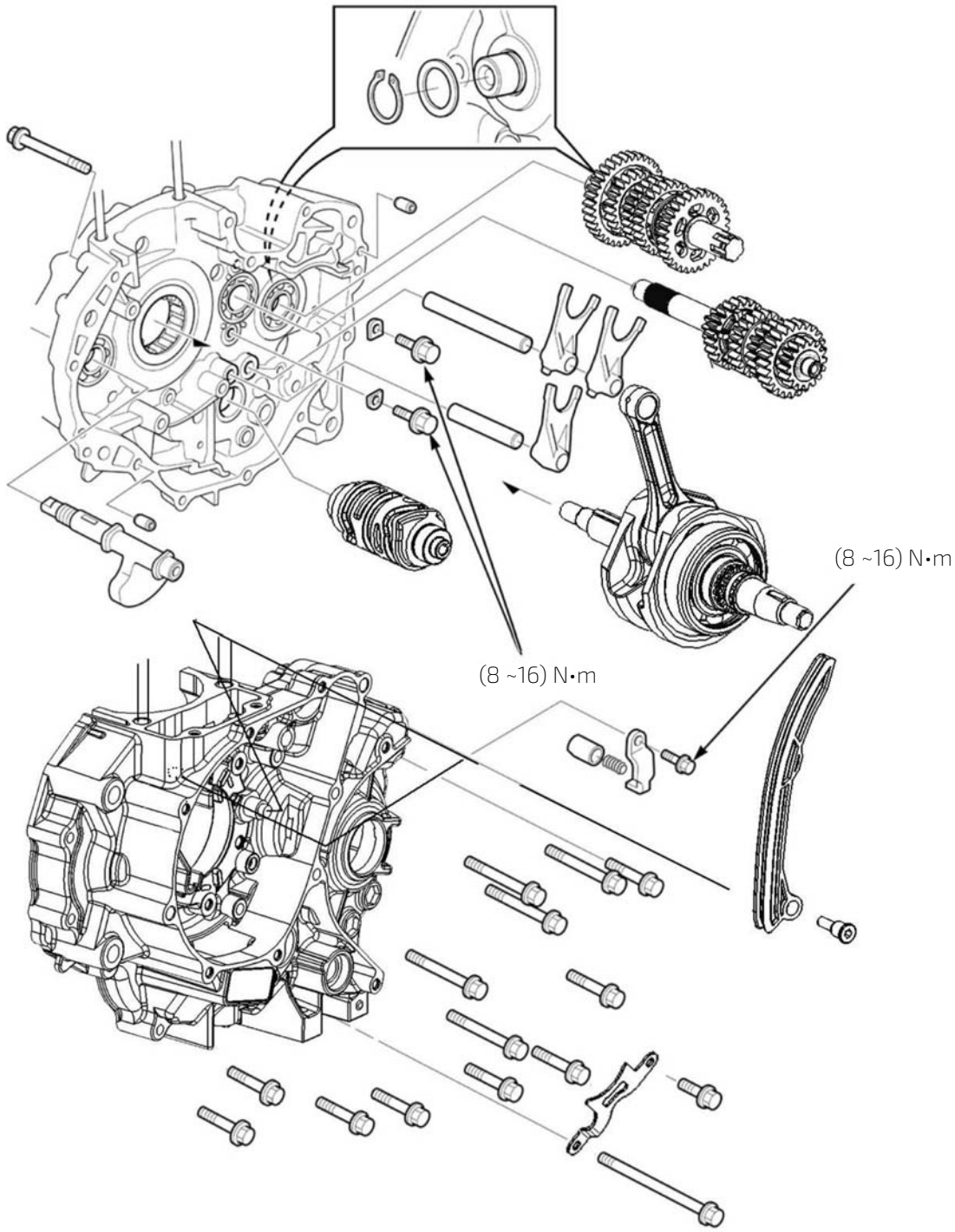


Tightening torque of bolt: 12N.m

5. Install left cover onto engine (View section).

8. REMOVAL AND INSTALLATION OF CRANKCASE

I. EXPLODED VIEW OF CRANKCASE



II. ADOPTED SPECIFICATIONS

UNIT: MM

Item				Standard	Service Limit
Crankshaft, Connecting Rods	Connecting Rod Big End:		Radial Clearance	0.008~0.016	0.03
			Side Clearance	0.1~0.30	0.5
	Crankshaft Runout			0.03	0.08
Fork	Outer diameter of fork shaft			9.966~9.984	9.93
	Inner diameter of fork			10.000~10.018	10.05
	Shift Fork Ear Thickness			4.93~5.00	4.5
Transmission	Gear tooth inner hole diameter		M5	20.000~20.021	20.04
			M6	20.000~20.021	20.04
			C1	20.500~20.513	20.53
			C2	23.020~23.033	23.05
			C3	23.020~23.033	23.05
			C4	23.020~23.033	23.05
	Bushing diameter		M5	19.972~19.993	19.965
			M6	19.972~19.993	19.965
			C1	20.459~20.480	20.41
			C2	22.979~23	22.95
			C3	22.979~23	22.95
			C4	22.979~23	22.95
	Bushing inside diameter		M5	17.000~17.018	17.023
			C1	17.000~17.018	17.04
			C2	20.020~20.041	20.05
			C3	20.020~20.041	20.05
			C4	20.020~20.041	20.05
	The shaft diameter		M4	16.966~16.984	16.93
			C1	16.983~16.994	16.95
			C2	19.980~19.993	19.95
			C3	19.980~19.993	19.95
			C4	19.980~19.993	19.95

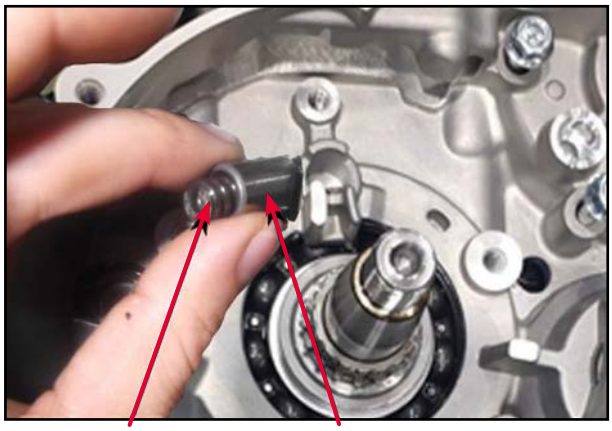
III. REMOVAL OF CRANKSHAFT

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

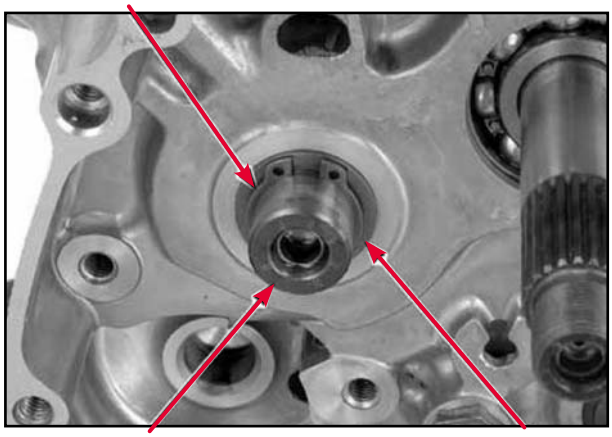
2. Loosen and dismantle fastening bolt on chain guard, then take out chain guard, tension plate and chain.

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

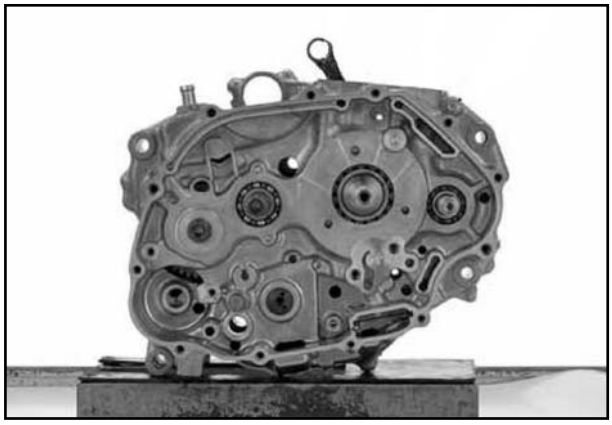
4. Take out pressing pin body and spring.



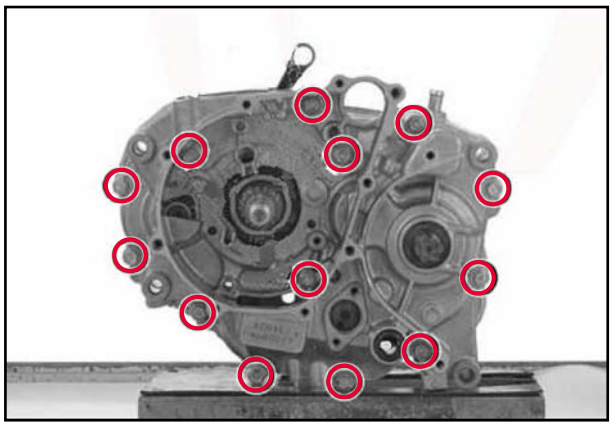
5. Remove circlip and washer on counter shaft.



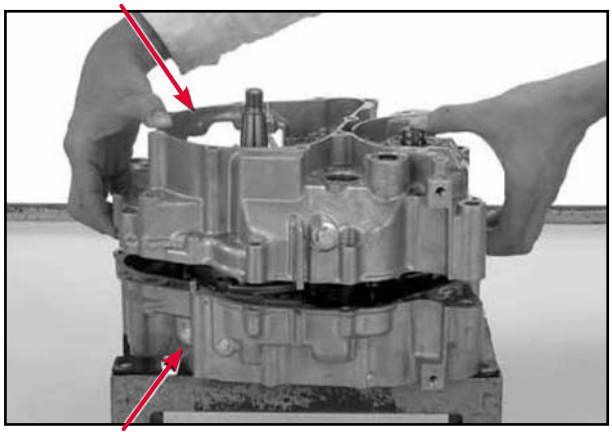
6. Dismantle fastening bolt on right crankshaft.



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.

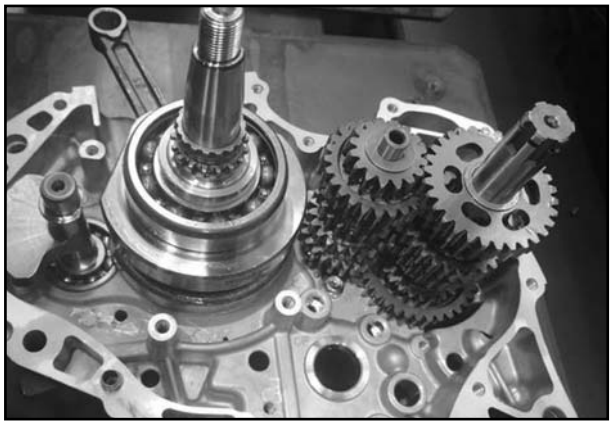
10. Check chain tension plate for severe wear or damage. If there is, replace the tension plate with a new one.

IV. REMOVAL AND CHECK OF DRIVE TRAIN

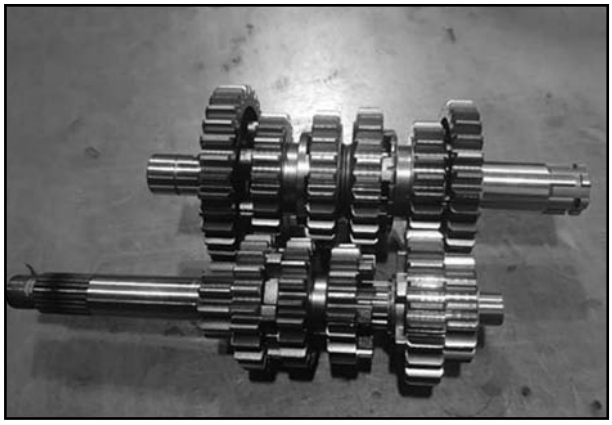
1. Take out fork shaft of main and counter shafts.

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

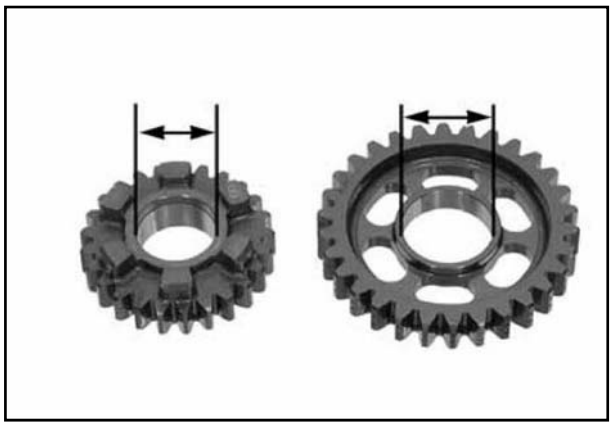
3. Take out main and counter shafts.



3.1-Disassemble gears on main and counter shafts.



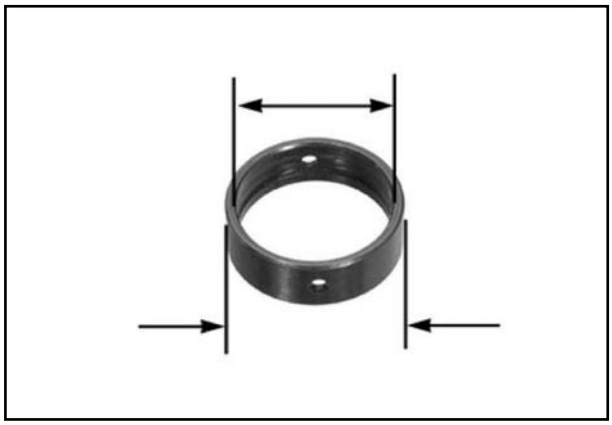
3.2-Check gears for severe wear or damage. Check inner diameter of the gears.



Service limit	M5	20.04
	M6	20.04
	C1	20.55
	C2	23.05
	C3	23.05
	C4	23.05

3.3-Check shaft sleeve for severe wear and damage.

3.4-Measure inner and outer diameters of shaft sleeve.



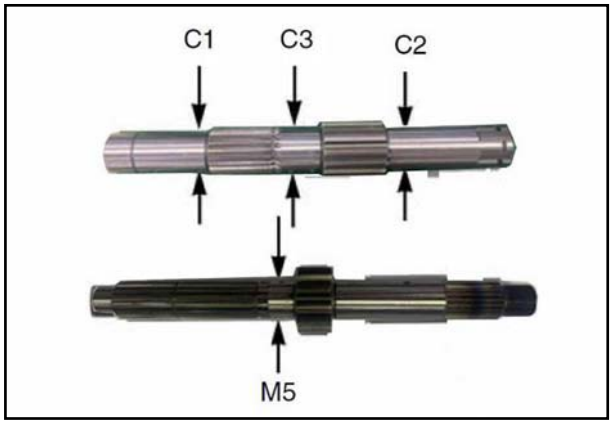
Service limit of outer diameter of bushing	M5	1 9.965
	M6	19.965
	C1	20.41
	C2	22.95
	C3	22.95
	C4	22.95
Service limit of inner diameter of bushing	M5	17.023
	M6	17.04
	C1	20.05
	C2	20.05
	C3	20.05

3.5-Calculate fit clearance between shaft sleeve and gear.

Service limit	0.10

3.6-Check spline key and shaft of main and counter shaft for abnormal wear and damage.

3.7-Measure diameter of shaft at gear-mating position.



Service limit of outer diameter of main and counter shafts	M4	16.93
	M6	16.95
	C1	16.95
	C2	16.95
	C3	16.95

3.8-Calculate fit clearance between gears and shaft sleeve.

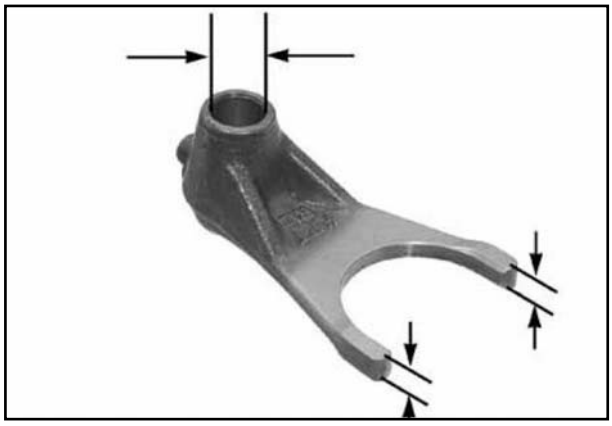
Service limit	0.10

4. Check of gearshift drum.

4.1-Check both ends of gearshift drum and profiled groove for abnormal wear or damage.

4.2-Check fork for abnormal wear and deformation.

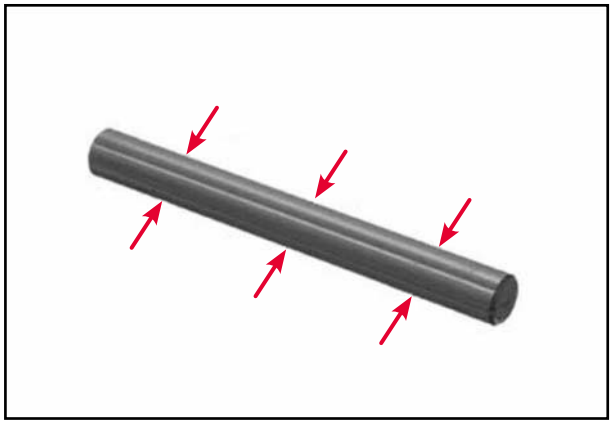
Measure inner hole diameter and ear thickness of fork.



Service limit	Inner hole diameter	17.04mm
	Ear thickness	4.50mm

4.3-Check fork shaft for abnormal wear and damage.

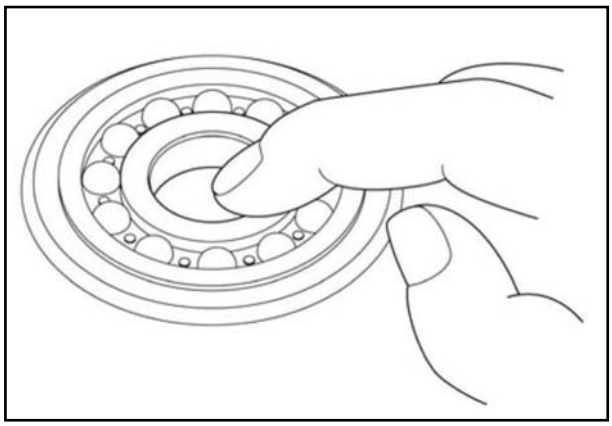
Measure diameter of shaft.



5. Replacement of bearing.

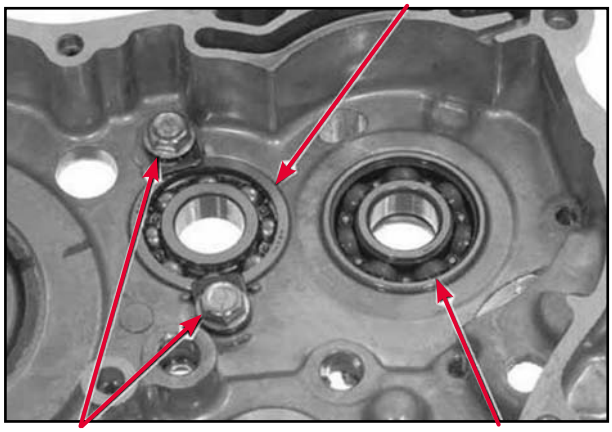
5.1-Turn inner race of bearing to check if it can rotate freely.

5.2-Check cage and ball of the bearing for severe wear and damage.

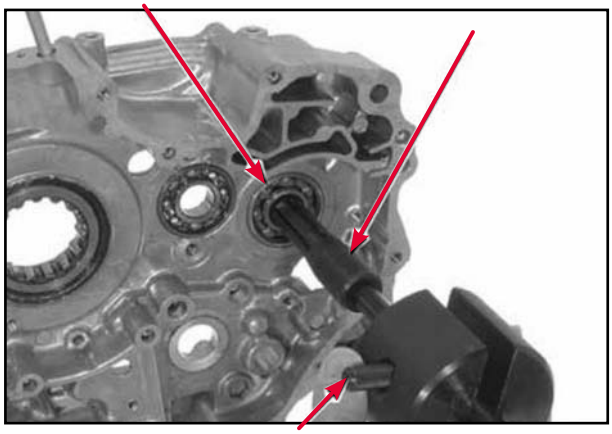


V. REMOVAL OF BEARING

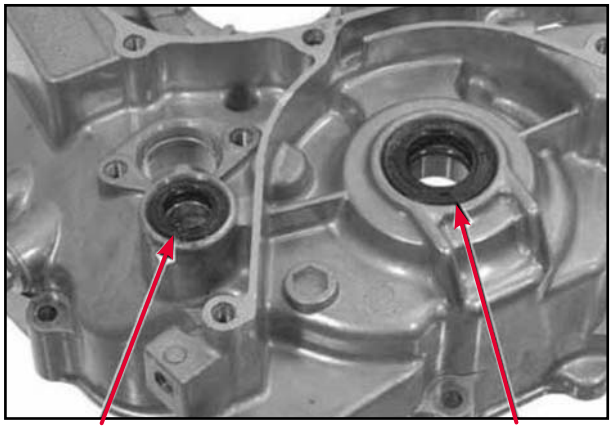
1. Dismantle bearing guard and bolt.



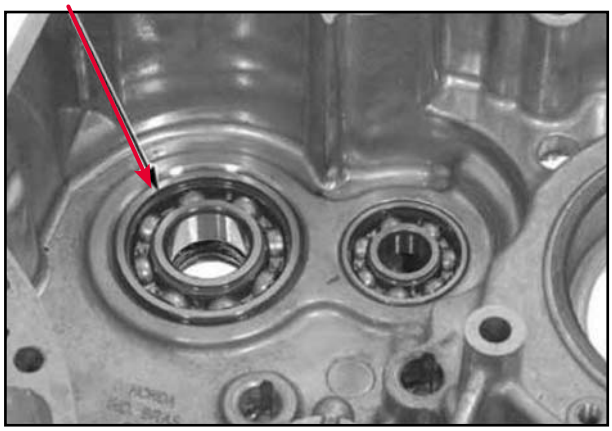
2. Take out bearing from right half with the aid of bearing puller.

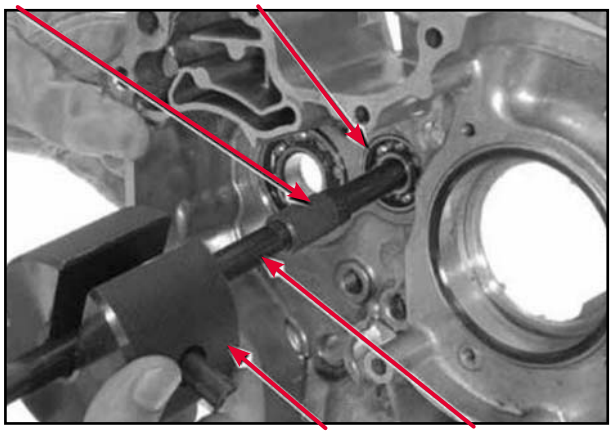


3. Dismantle oil seal of counter shaft and that of gearshift arm on left half.



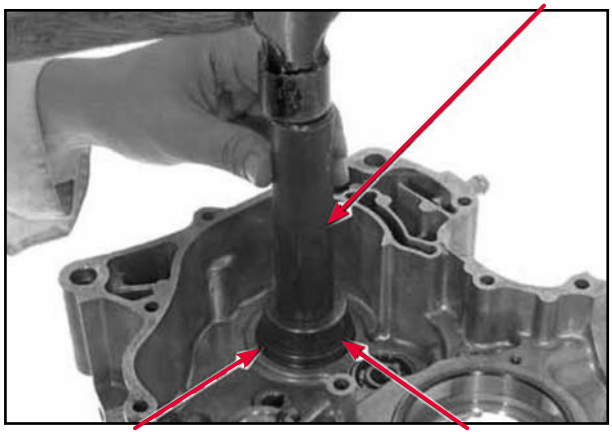
4. Dismantle bearing from left half with the aid of bearing puller.





VI. INSTALLATION OF BEARING

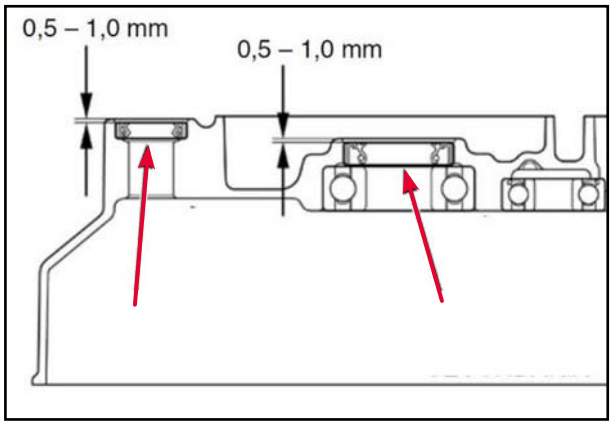
1. Apply appropriate amount of engine oil on outer race of bearing, then press the bearings of various models into corresponding holes with special tools.



NOTE:

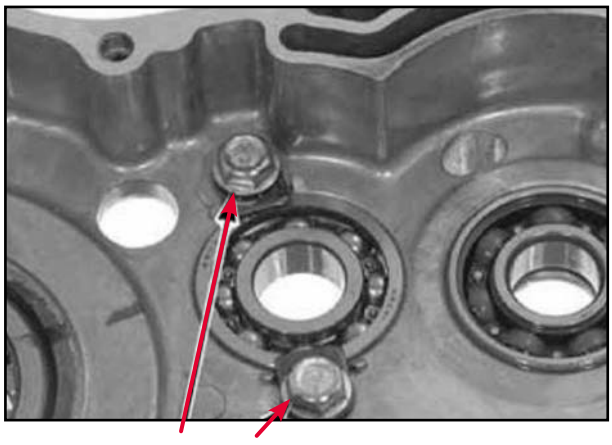
1. **BEARING SHALL BE INSTALLED WITH THE AID OF SPECIAL TOOLS.**
2. **WHEN PRESSING BEARING, FORCE SHALL BE APPLIED ON OUTER RACE OF BEARING ONLY; OTHERWISE, THE BEARING MAY BE DAMAGED.**

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: 12N.m



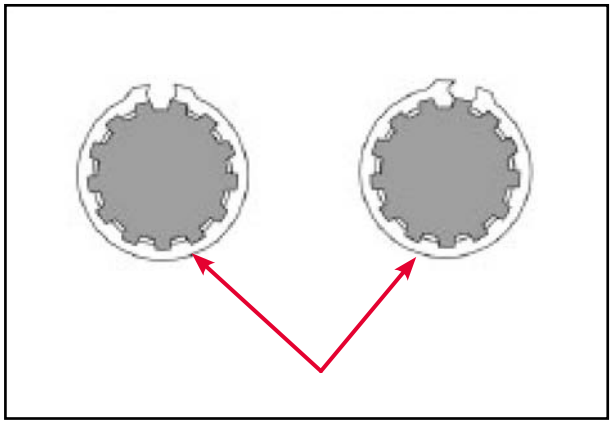
VII. ASSEMBLY OF DRIVE TRAIN

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.



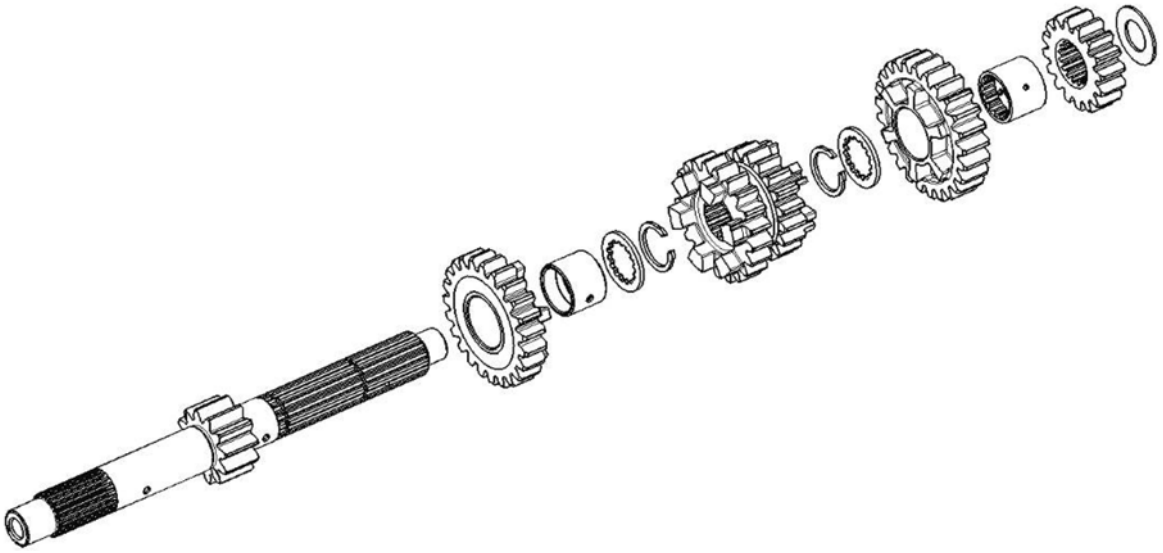
NOTE:

ALL GEARS ASSEMBLED SHALL BE ABLE TO ROTATE AND MOVE FREELY.

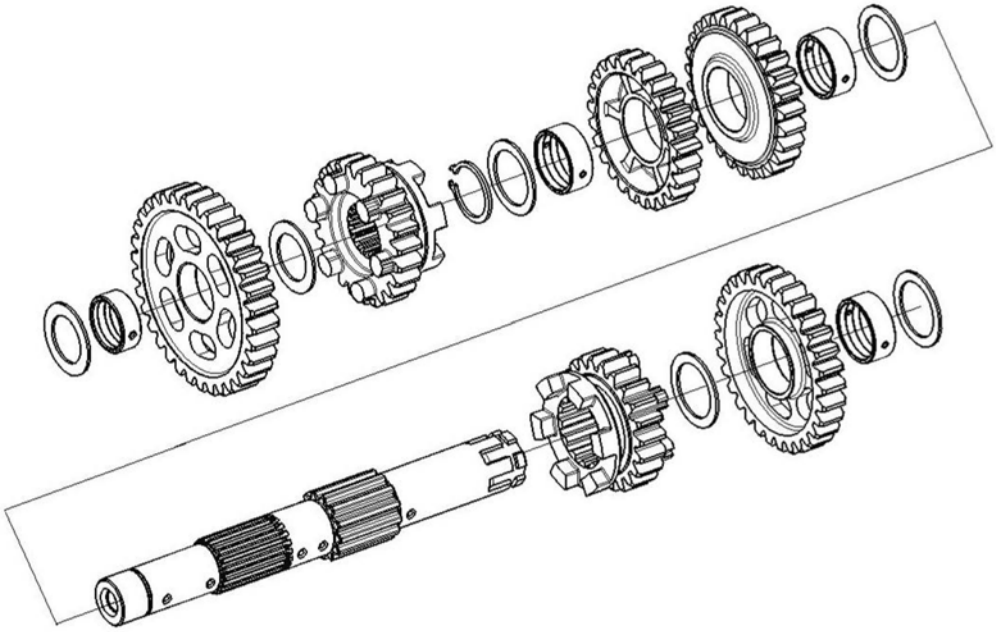
WASHER SHALL BE INSTALLED IN ACCORDANCE WITH SPECIFIED DIRECTION.

CIRCLIP MUST BE REPLACED WITH A NEW ONE. USED CIRCLIP IS LESS IN RESILIENT FORCE, CASING LOOSENESS.
AFTER THE CIRCLIP IS INSTALLED, SPLIT OF CIRCLIP SHALL BE ALIGNED WITH SPLINE KEYWAY ON THE SHAFT.

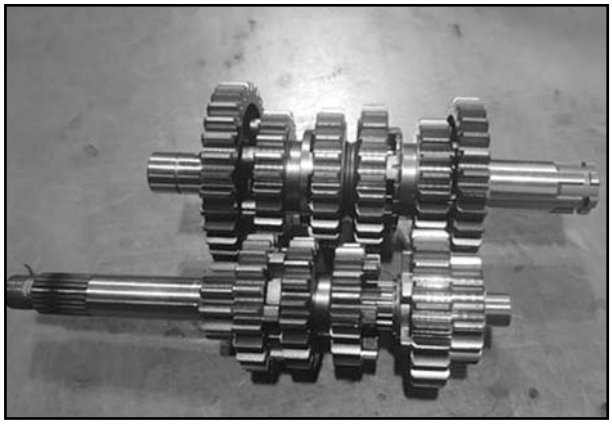
5. Exploded view of main shaft



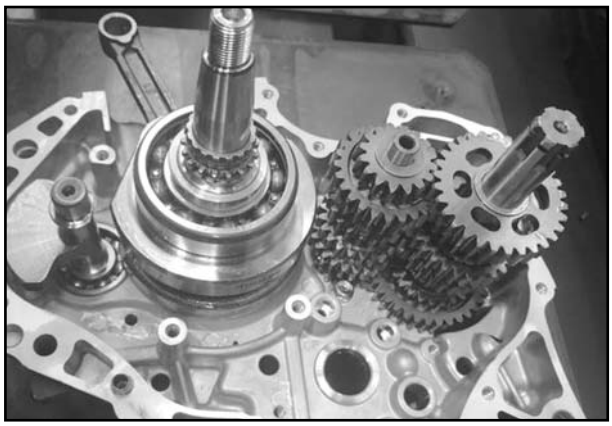
6. Exploded view of counter shaft



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



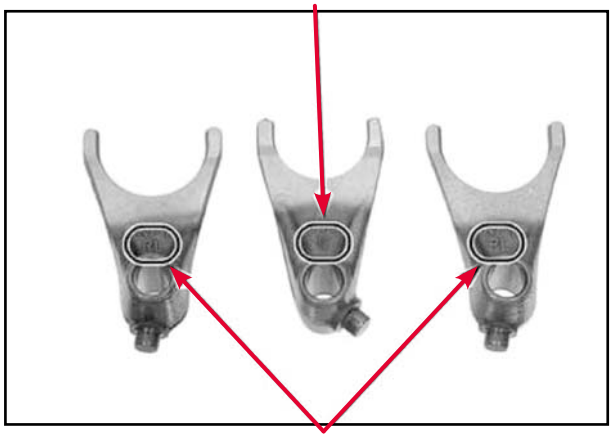
8. Install main and counter shafts into right half of crankcase. Care shall be take not to miss washers at both ends of the shafts.



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.

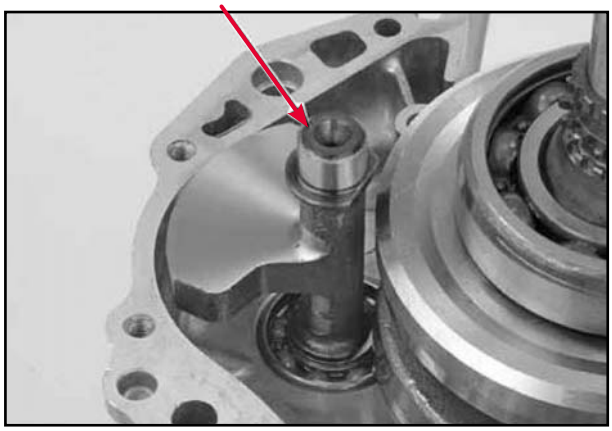
    Apply appropriate amount of lube oil onto profiled groove of gearshift drum.

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

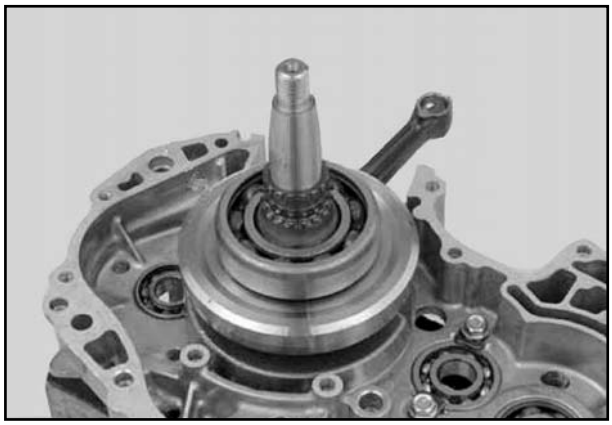
11. Apply appropriate amount of engine oil onto fork shaft and insert the shaft into fork hole. Rotate counter shaft to check if all components and parts are installed into positions, and main and counter shafts can rotate freely.

VIII. REMOVAL AND INSTALLATION OF CRANKSHAFT

1. Dismantle balanced shaft.

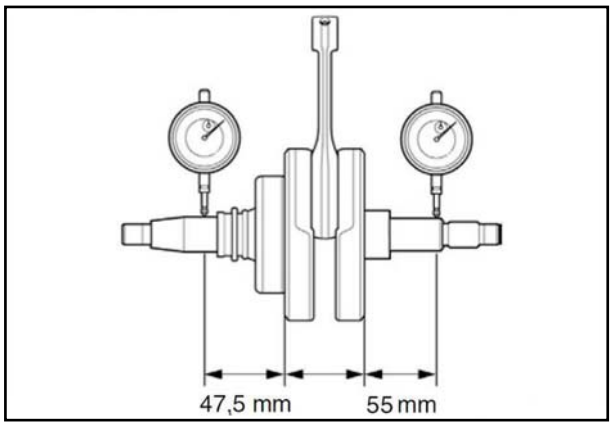


2. Dismantle crankshaft.



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.

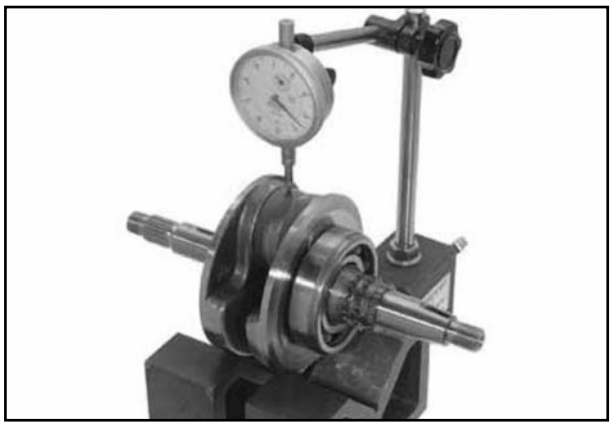


Service limit	0.08mm

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

Service limit	0.5mm

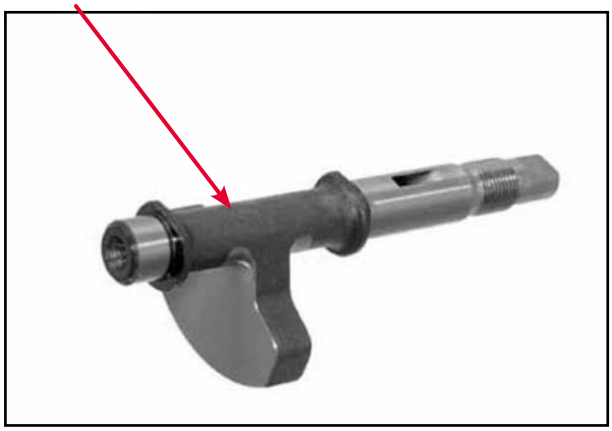
5. Measure radial clearance of big-end of connecting rod.



Service limit	0.5mm

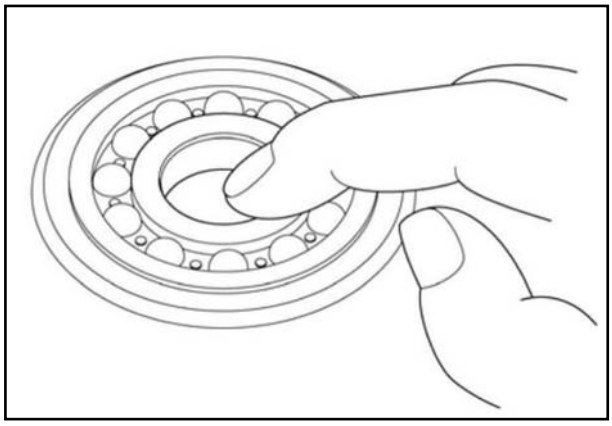
Check timing drive sprocket on crankshaft for abnormal wear and damage. If there is, check correspondingly timing driven sprocket, chain, tensioner, etc. for abnormal condition.

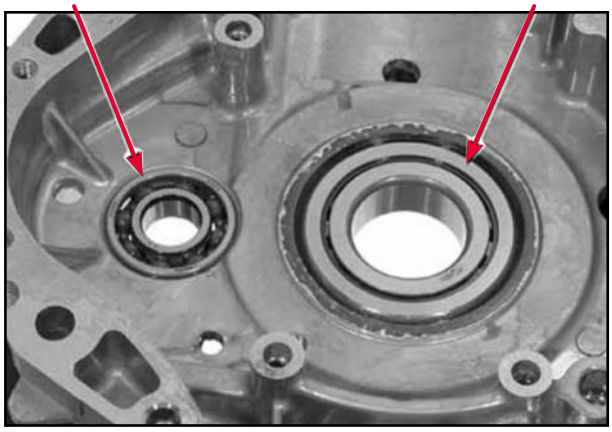
When it is necessary to replace timing drive sprocket, tooth crown of drive sprocket shall be aligned with center of crankpin.

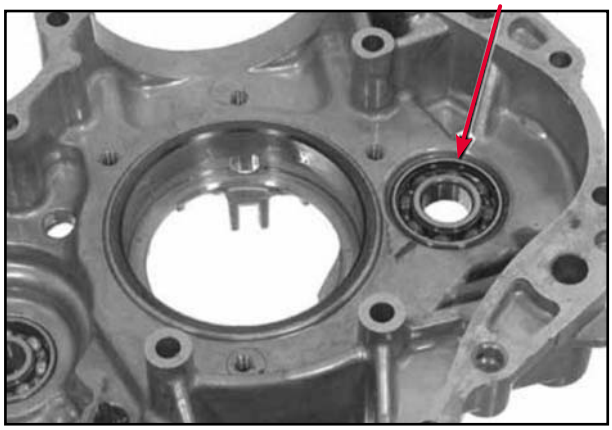


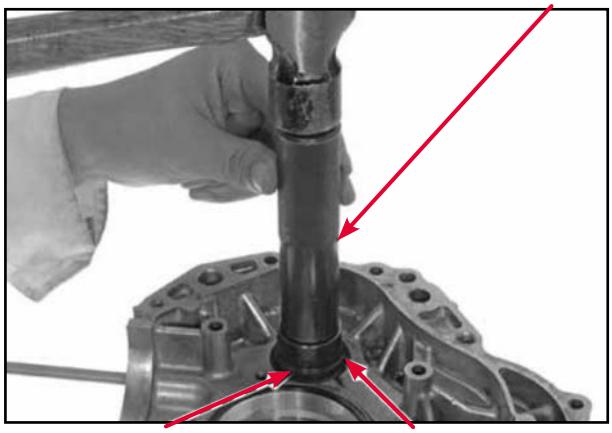
6. Check balanced shaft for abnormal wear. Replace it with a new one if necessary.

7. Check if bearing can rotate freely.



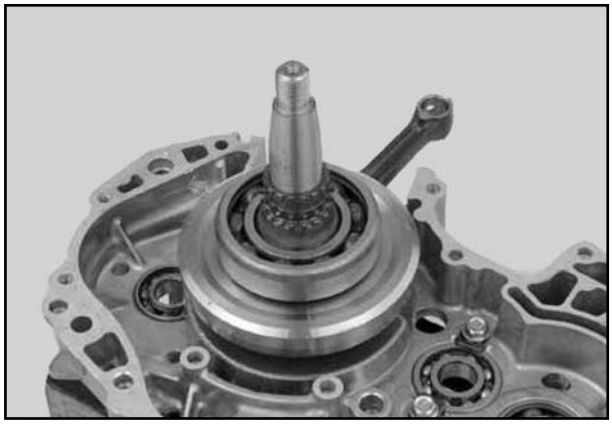




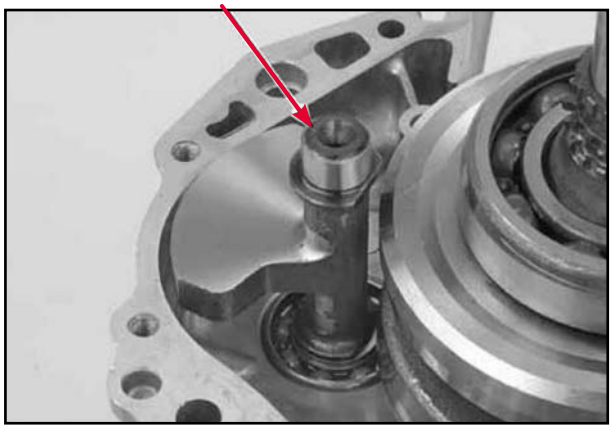


IX. INSTALLATION OF CRANKCASE

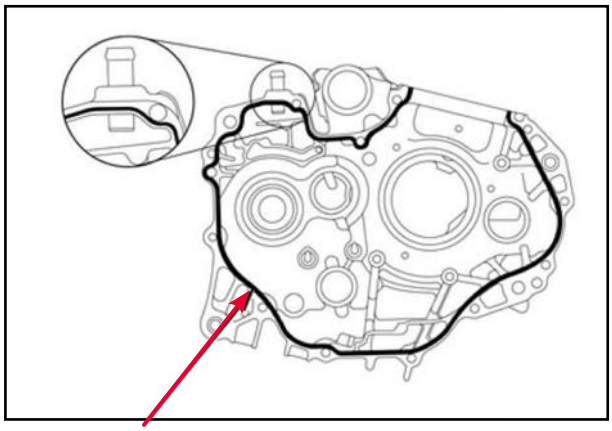
1. Install crankshaft that meets requirements into right half of crankcase.



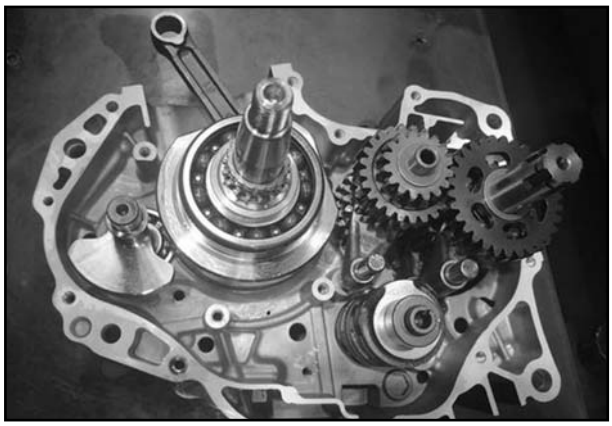
2. Install balanced shaft.



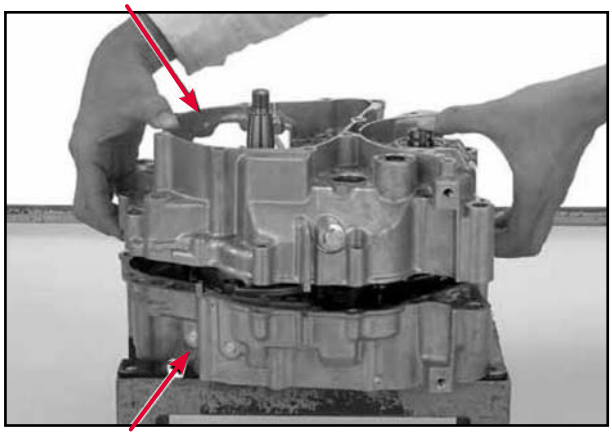
3. Clean mating face of left and right halves of crankcase. Apply sealing adhesive on mating face of left half as shown in the figure.



4. Install locating pin.



5. Assemble left half of crankcase onto right half.

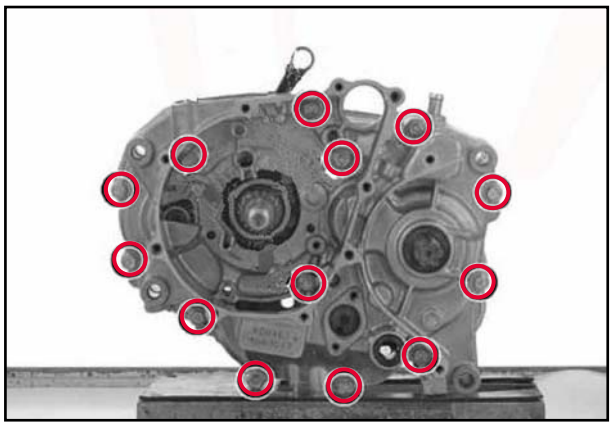


NOTE:

WHEN INSTALLING LEFT HALF OF CRANCASE, 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: 12N.m

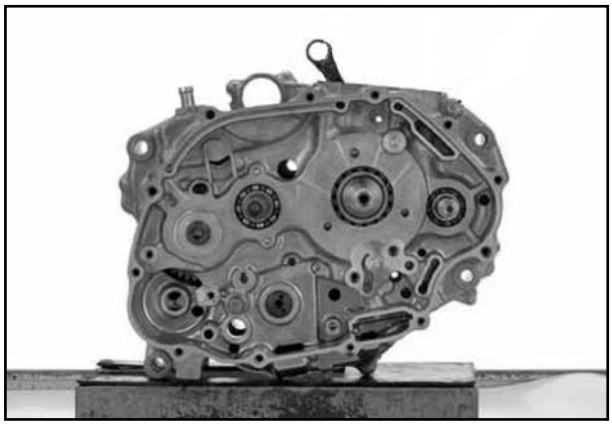


NOTE:

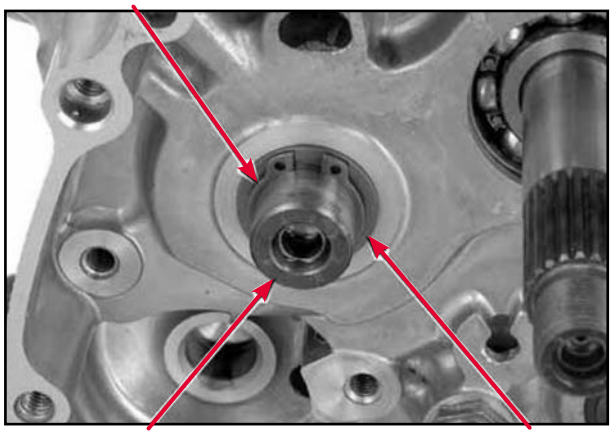
AFTER THE BOLTS ARE TIGHTENED, CHECK MAIN AND COUNTER SHAFTS, CRANKSHAFT, BALANCED SHAFT FOR FREE ROTATION.

TIGHTEN 4 BOLTS INSIDE LEFT COVER FIRST, THEN TIGHTEN OTHER BOLTS CROSSWISE.

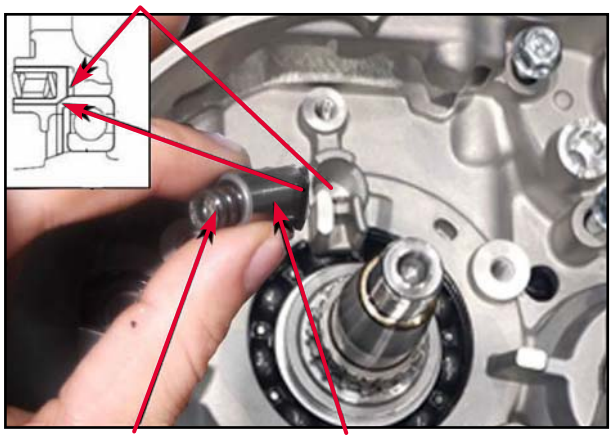
7. Tighten bolts on right half of crankcase.



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.

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