HYOSUNG

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Comet650

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HYOSUNG MOTORS & MACHINERY INC.

SERVICE MANUAL

SERVICE MANUAL

99000-94810

FOREWORD

This manual contains an introductory description on HYOSUNG『Comet650』and procedures for its inspection/service and overhaul of its main components. Other information considered as generally known is not included.
Read GENERAL INFORMATION section to familiarize yourself with outline of the vehicle and MAINTENANCE and other sections to use as a guide for proper inspection and service.
This manual will help you know the vehicle better so that you can assure your customers of your optimum and quick service.

❖ **This manual has been prepared on the basis of the latest specification at the time of publication.**
If modification has been made since then, difference may exist between the content of this manual and the actual vehicle.
❖ **Illustrations in this manual are used to show the basic principles of operation and work procedures.**
They may not represent the actual vehicle exactly in detail.

⚠ WARNING

This manual is intended for those who have enough knowledge and skills for servicing HYOSUNG vehicles. Without such knowledge and skills, you should not attempt servicing by relying on this manual only.
Instead, please contact your nearby authorized HYOSUNG motorcycle dealer.

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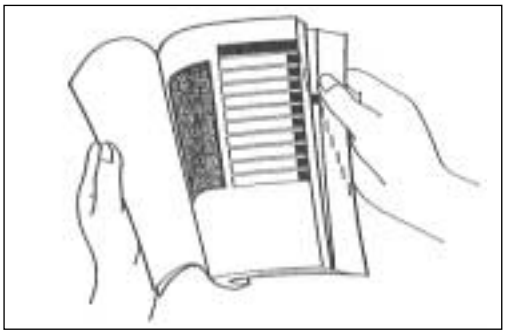
HOW TO USE THIS MANUAL

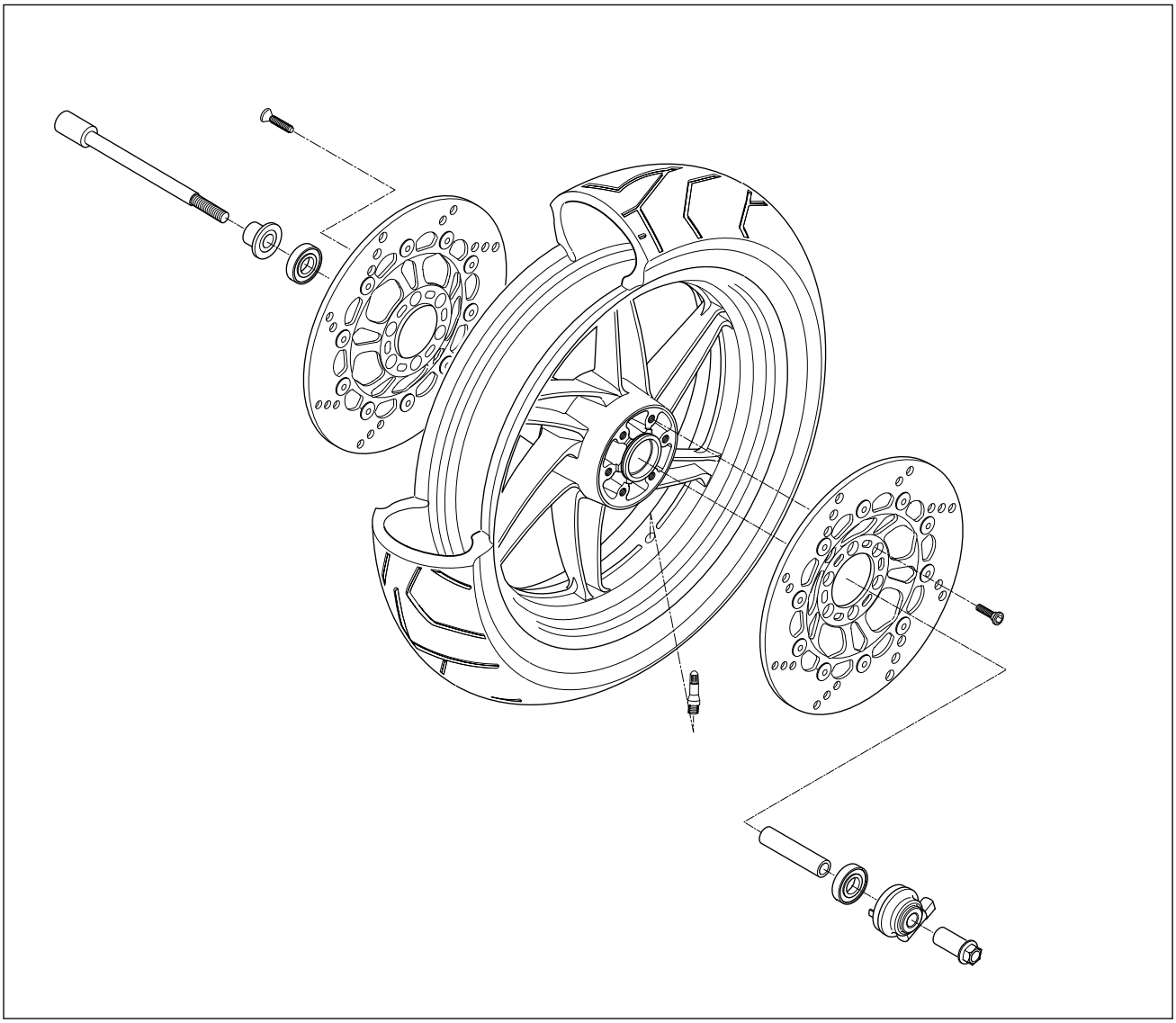
TO LOCATE WHAT YOU ARE LOOKING FOR:

1. The text of this manual is divided into sections.
2. As the title of these sections are listed on the previous page as GROUP INDEX, select the section where you are looking for.
3. Holding the manual as shown at the right will allow you to find the first page of the section easily.
4. On the first page of each section, its contents are listed. Find the item and page you need.



COMPONENT PARTS

Example: Front wheel



SYMBOL

Listed in the table below are the symbols indicating instructions and other information necessary for servicing and meaning associated with them respectively.

SYMBOL	DEFINITION	SYMBOL	DEFINITION
	Torque control required. Data beside it indicates specified torque.		Apply THREAD LOCK “1324”.
	Apply oil. Use engine oil unless otherwise specified.		Apply or use brake fluid.
	Apply SUPER GREASE “A”.		Measure in voltage range.
	Apply SUPER GREASE “C”.		Measure in resistance range.
	Apply SILICONE GREASE.		Measure in current range.
	Apply MOLY PASTE.		Use special tool.
	Apply BOND “1215”.		Use engine coolant.
	Use fork oil.		

NOTE

Difference between photographs and actual motorcycles depends on the markets.

GENERAL INFORMATION

1

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WARNING / CAUTION / NOTE

Please read this manual and follow its instructions carefully. To emphasize special information, the symbol and the words WARNING, CAUTION and NOTE have special meanings. Pay special attention to the messages highlighted by these signal words.

⚠ WARNING

Indicates a potential hazard that could result in death or injury.

⚠ CAUTION

Indicates a potential hazard that could result in vehicle damage.

NOTE

Indicates special information to make maintenance easier or instructions cleaner.

Please note, however, that the warning and cautions contained in this manual cannot possibly cover all potential hazards relating to the servicing, or lack of servicing, of the motorcycle. In addition to the WARNING and CAUTION stated, you must use good judgement and basic mechanical safety principles. If you are unsure about how to perform a particular service operation, ask a more experienced mechanic for advice.

GENERAL PRECAUTIONS

⚠ WARNING

- **Proper service and repair procedures are important for the safety of the service machanic and the safety and reliability of the vehicle.**
- **When 2 or more persons work together, pay attention to the safety of each other.**
- **When it is necessary to run the engine indoors, make sure that exhaust gas is forced outdoors.**
- **When working with toxic or flammable materials, make sure that the area you work in is well-ventilated and that you follow all off the material manufacturer' s instructions.**
- **Never use gasoline as a cleaning solvent.**
- **To avoid getting burned, do not touch the engine, engine oil or exhaust system during or for a while after engine operation.**
- **After servicing fuel, oil, exhaust or brake systems, check all lines and fittings related to the system for leaks.**

⚠ WARNING

- ❖ If parts replacement is necessary, replace the parts with HYOSUNG Genuine Parts or their equivalent.
- ❖ When removing parts that are to be reused, keep them arranged in an orderly manner so that they may be reinstalled in the proper order and orientation.
- ❖ Be sure to use special tools when instructed.
- ❖ Make sure that all parts used in reassembly are clean, and also lubricated when specified.
- ❖ When use of a certain type of lubricant, bond, or sealant is specified, be sure to use the specified type.
- ❖ When removing the battery, disconnect the negative cable first and then positive cable. When reconnecting the battery, connect the positive cable first and then negative cable, and replace the terminal cover on the positive terminal.
- ❖ When performing service to electrical parts, if the service procedures do not require use of battery power, diconnect the negative cable at the battery.
- ❖ Tighten cylinder head and case bolts and nuts, beginning with larger diameter and ending with smaller diameter, from inside to outside diagonally, to the specified tightening torque.
- ❖ Whenever you remove oil seals, gaskets, packing, O-rings, locking washers, cotter pins, circlips, and certain other parts as specified, be sure to replace them with new ones. Also, before installing these new parts, be sure to remove any left over material from the mating surfaces.
- ❖ Never reuse a circlip. When installing a new circlip, take care not to expand the end gap larger than required to slip the circlip over the shaft. After installing a circlip, always ensure that it is completely seated in its groove and securely fitted.
- ❖ Do not use self-locking nuts a few times over.
- ❖ Use a torque wrench to tighten fasteners to the torque values when specified. Wipe off grease or oil if a thread is smeared with them.
- ❖ After reassembly, check parts for tightness and operation.

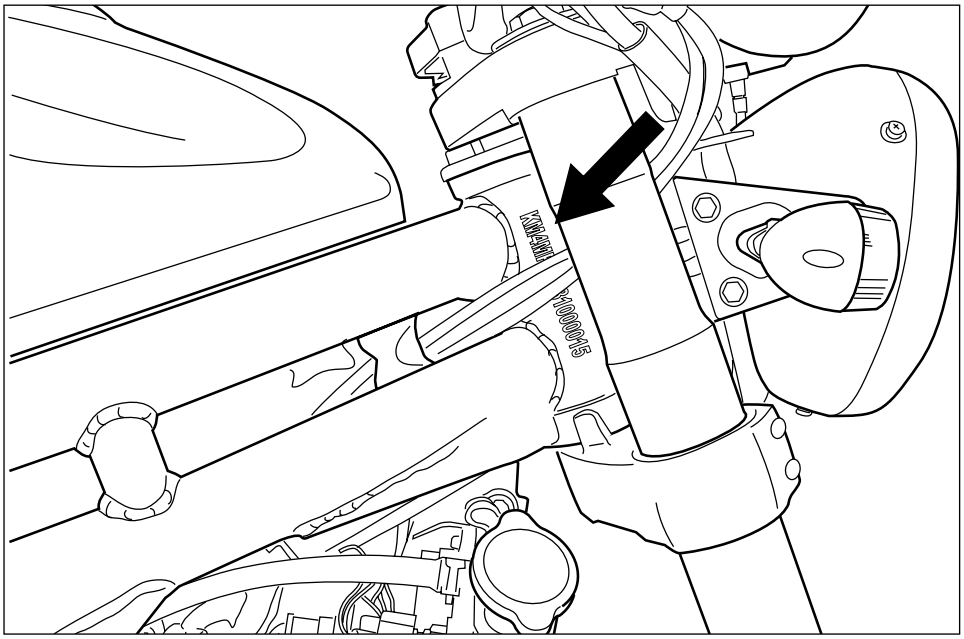
⚠ WARNING

- ❖ To protect environment, do not unlawfully dispose of used motor oil and other fluids: batteries, and tires.
- ❖ To protect Earth' s natural resouces, properly dispose of used vehicles and parts.

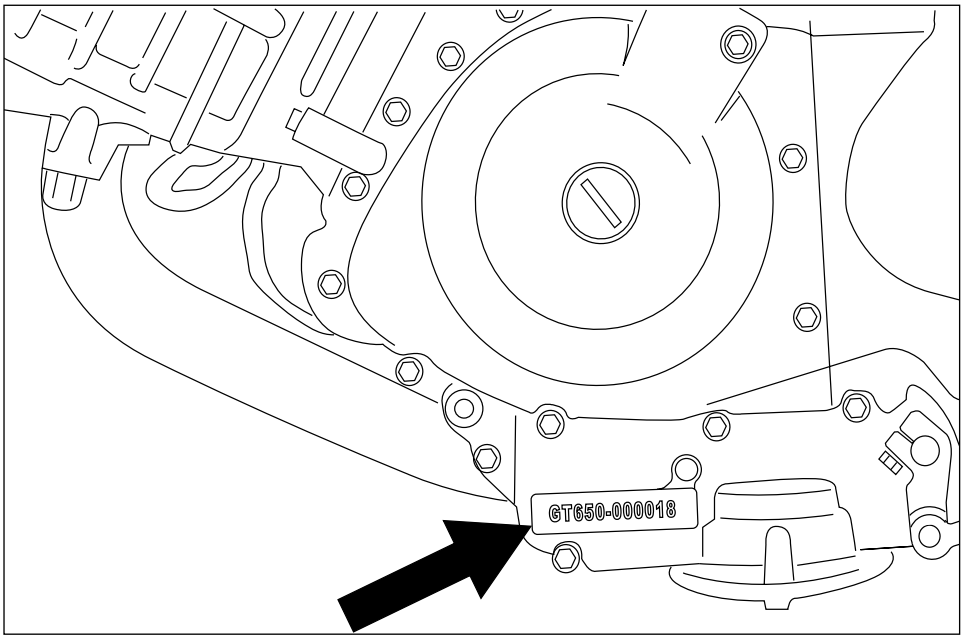
SERIAL NUMBER LOCATION

The frame serial number or V.I.N. (Vehicle Identification Number) is stamped on the steering head tube. The engine serial number is located on the left down of crankcase assembly.
These numbers are required especially for registering the machine and ordering spare parts.

⊙ FRAME SERIAL NUMBER



⊙ ENGINE SERIAL NUMBER



FUEL, OIL AND ENGINE COOLANT RECOMMENDATIONS

⊙ FUEL

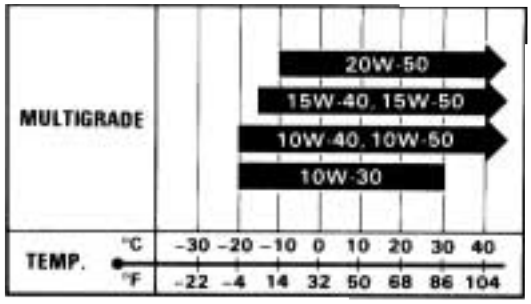
Gasoline used should be graded 91 octane (Research Method) or higher. An unleaded gasoline type is recommended.

⊙ ENGINE OIL

■ ENGINE OIL SPECIFICATION

Classification system	Grade
API	Over SG
SAE	10W/40

✳ ***If an SAE 10W/40 motor oil is not available, select an alternative according to the following chart.***



Use a premium quality 4-stroke motor oil to ensure longer service life of your motorcycle.

⚠ WARNING

- **Don't mix the unrecommended oil. It could damage the engine.**
- **When refilling the oil tank, don't allow the dust to get inside.**
- **Mop the oil spilt.**
- **Don't put the patch on the cap. It could disturb the oil to be provided and damage the engine.**

⊙ BRAKE FLUID

Specification and classification (Front brake) : DOT4

(Rear brake) : DOT4

⚠ WARNING

Since the brake system of this motorcycle is filled with a glycol-based brake fluid by the manufacturer, do not use or mix different types of fluid such as silicone-based and petroleum-based fluid for refilling the system, otherwise serious damage will result.
Do not use any brake fluid taken from old or used or unsealed containers.
Never re-use brake fluid left over from a previous servicing, which has been stored for a long period.

⊙ FRONT FORK OIL

Use fork oil : TELLUS #32

⊙ ENGINE COOLANT

Use an anti-freeze/engine coolant compatible with an aluminum radiator, mixed with distilled water only.

■ WATER FOR MIXING

Use distilled water only. Water other than distilled water can corrode and clog the aluminum radiator.

■ ANTI-FREEZE/ENGINE COOLANT

The engine coolant perform as a corrosion and rust inhibitor as well as anti-freeze. Therefore, the engine coolant should be used at all times even though the atmospheric temperature in your area does not go down to freezing point. Hyosung recommends the use of HYOSUNG COOLANT anti-freeze/engine coolant. If this is not available, use an equivalent which is compatible with an aluminum radiator.

■ LIQUID AMOUNT OF WATER/ENGINE COOLANT

For engine coolant mixture information, refer to cooling system section, page 5-1

⚠ CAUTION

Mixing of anti-freeze/engine coolant should be limited to 60%. Mixing beyond it would reduce its efficiency. If the anti-freeze/engine coolant mixing ratio is below 50%, rust inhabiting performance is greatly reduced. Be sure to mix it above 50% even though the atmospheric temperature does not go down to the freezing point.

BREAK-IN PROCEDURES

During manufacture only the best possible materials are used and all machined parts are finished to a very high standard but it is still necessary to allow the moving parts to "BREAK-IN" before subjecting the engine to maximum stresses. The future performance and reliability of the engine depends on the care and restraint exercised during its early life. The general rules are as follows:

● Keep to these break-in procedures:

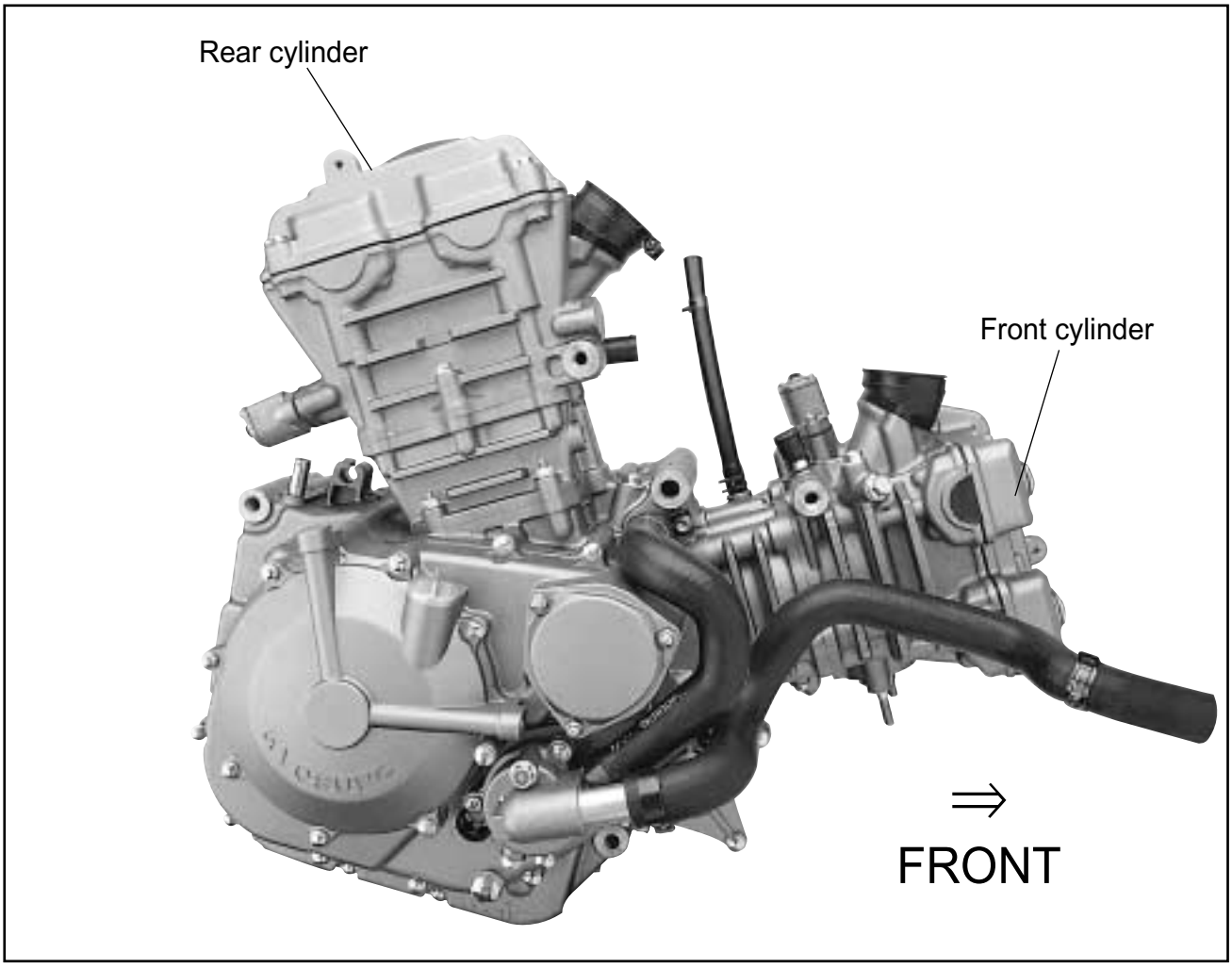
Initial 800km	**Less than 1/2 throttle**
Up to 1,600km	**Less than 3/4 throttle**

● Upon reaching an odometer reading of 1,600 km you can subject the motorcycle to full throttle operation.

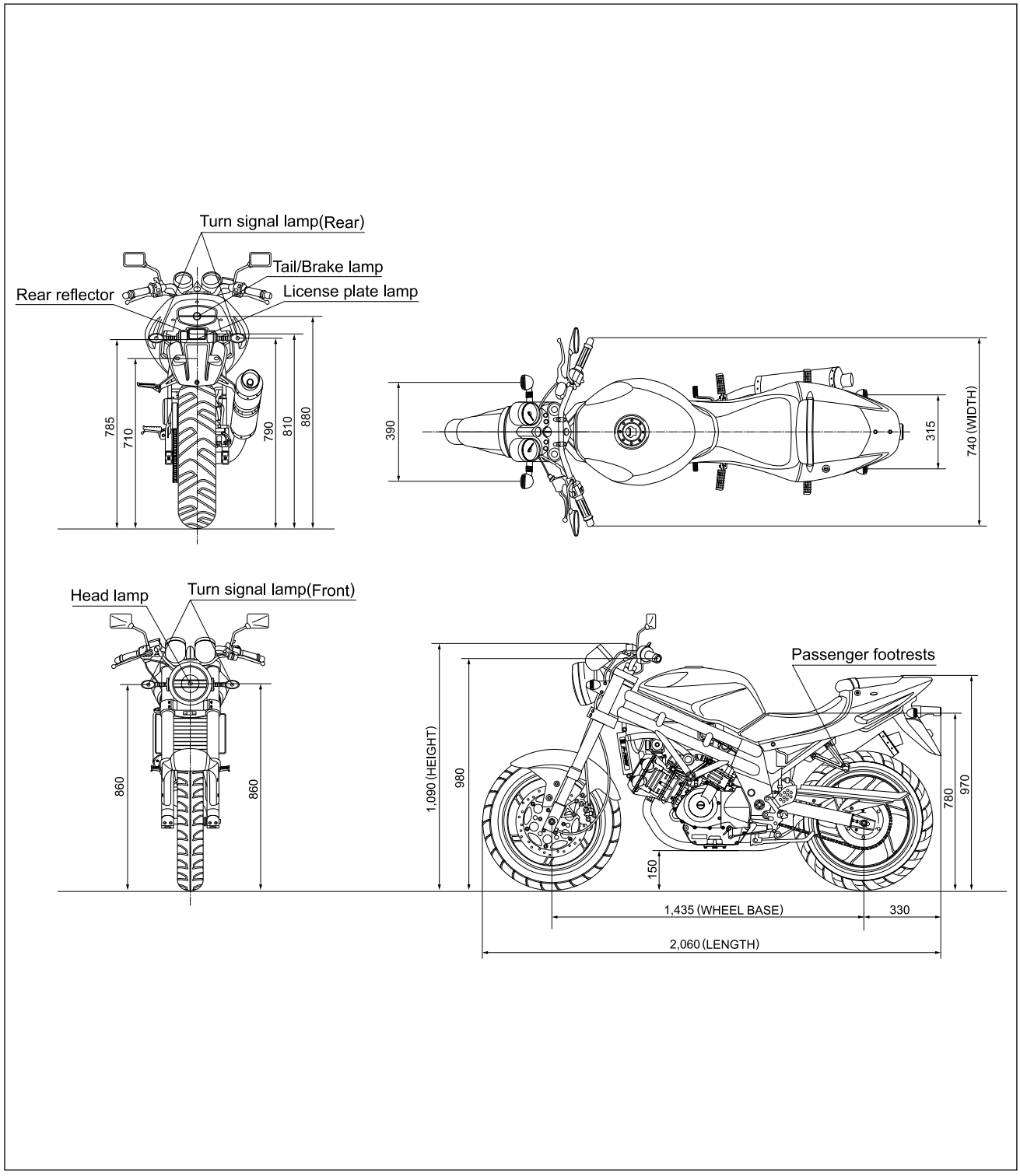
● Do not maintain constant engine speed for an extended period during any portion of the break-in. Try to vary the throttle position.

CYLINDER CLASSIFICATION

The engine of 『Comet650』 is composed of the two cylinder, is classified into the front cylinder and rear cylinder as basis of the motorcycle ahead.



EXTERIOR ILLUSTRATION



SPECIFICATIONS

DIMENSIONS AND DRY MASS

ITEM	Comet650
Overall length	2,060 mm (81.1 in)
Overall width	740 mm (29.1 in)
Overall height	1,090 mm (42.9 in)
Wheelbase	1,435 mm (56.5 in)
Ground clearance	150 mm (5.9 in)
Unladen mass	185 kg (408 lbs)

ENGINE

ITEM	Comet650
Type	Four-stroke, DOHC, Liquid-cooled
Number of cylinder	V-2 cylinder
Bore	81.5 mm (3.21 in)
Stroke	62.0 mm (2.44 in)
Piston displacement	647 cm³ (39.5 in^3)
Carburetor	BDSR39 TYPE (DOUBLE)
Starter system	Electric starter
Lubrication system	Wet sump

TRANSMISSION

ITEM	Comet650
Clutch	Wet multi-plate type
Transmission	6-speed constant mesh
Gearshift pattern	1-down, 5-up
Final reduction	2.93
Gear ratio, 1st	2.46
2nd	1.60
3rd	1.32
4th	1.13
5th	0.96
6th	0.85
Drive chain	RK525XSO 108 links

CHASSIS

ITEM	Comet650
Front suspension	Telescopic type
Rear suspension	Swingarm type
Steering angle	30 ° (right & left)
Caster	25.5 °
Trail	85 mm (3.35 in)
Front brake	Double disk brake
Rear brake	Disk brake
Front tire size	120/60 - ZR 17 55W
Rear tire size	160/60 - ZR 17 69W
Front fork stroke	120 mm (4.72 in)

ELECTRICAL

ITEM	Comet650
Ignition type	"Igniter" type
Ignition timing	5 ° B.T.D.C.at 1,500 rpm
Spark plug	CR8E
Battery	12V 12Ah
Fuse	Main : 30 A
	Head lamp : 15 A
Head lamp	HI : 60 W
	LO : 55 W
Turn signal lamp	10 W
Brake / Tail lamp	21 / 5 W
Illumination lamp	1.7 W×3
High beam indicator lamp	1.7 W
Turn signal indicator lamp(right & left)	1.7 W×2
License plate lamp	5 W
Neutral indicator lamp	1.7 W
Fuel indicator lamp	1/2 : 1.7W E : 1.7W

CAPACITIES

ITEM	Comet650
Fuel tank	17.0 ℓ
Engine oil, oil change	3,000 mℓ
with filter change	3,200 mℓ
overhaul	3,400 mℓ
Front fork oil capacity(One side)	380 cc

NOTE

The specifications are subject to change without notice.

PERIODIC MAINTENANCE

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PERIODIC MAINTENANCE SCHEDULE

The chart below lists the recommended intervals for all the required periodic service work necessary to keep the motorcycle operating at peak performance and economy.

⚠ CAUTION

More frequent servicing should be performed on motorcycles that are used under severe conditions.

PERIODIC MAINTENANCE CHART

⊙ ENGINE

Item \ Interval	Initial 1,000 km	Every 4,000 km	Every 8,000 km	page
Air cleaner element	Clean every 3,000 km · Replace every 12,000 km			2- 7
Exhaust pipe nuts and muffler mounting bolts	Tighten	Tighten	—	2-6
Valve clearance adjust	Inspect	Inspect	—	2- 3
Cylinder head bolt	Tighten	Tighten		3-50
Cylinder head & Cylinder	—	—	Remove carbon	3-21
Spark plug	Clean	Clean	Replace	2- 5
Fuel hose	Inspect	Inspect	—	2- 8
	Replace every 4 years			
Engine oil filter	Replace	Replace	—	2-11
Engine oil	Replace	Replace	—	2- 9
Throttle cable	Inspect	Inspect	—	2- 8
Idle speed	Inspect	Inspect	—	2- 7
Clutch	Inspect	Inspect	—	2- 9
Engine coolant	Replace every 2 years			2-20
Radiator hoses	—	Inspect	—	2-22
	Replace every 4 years			

⊙ CHASSIS

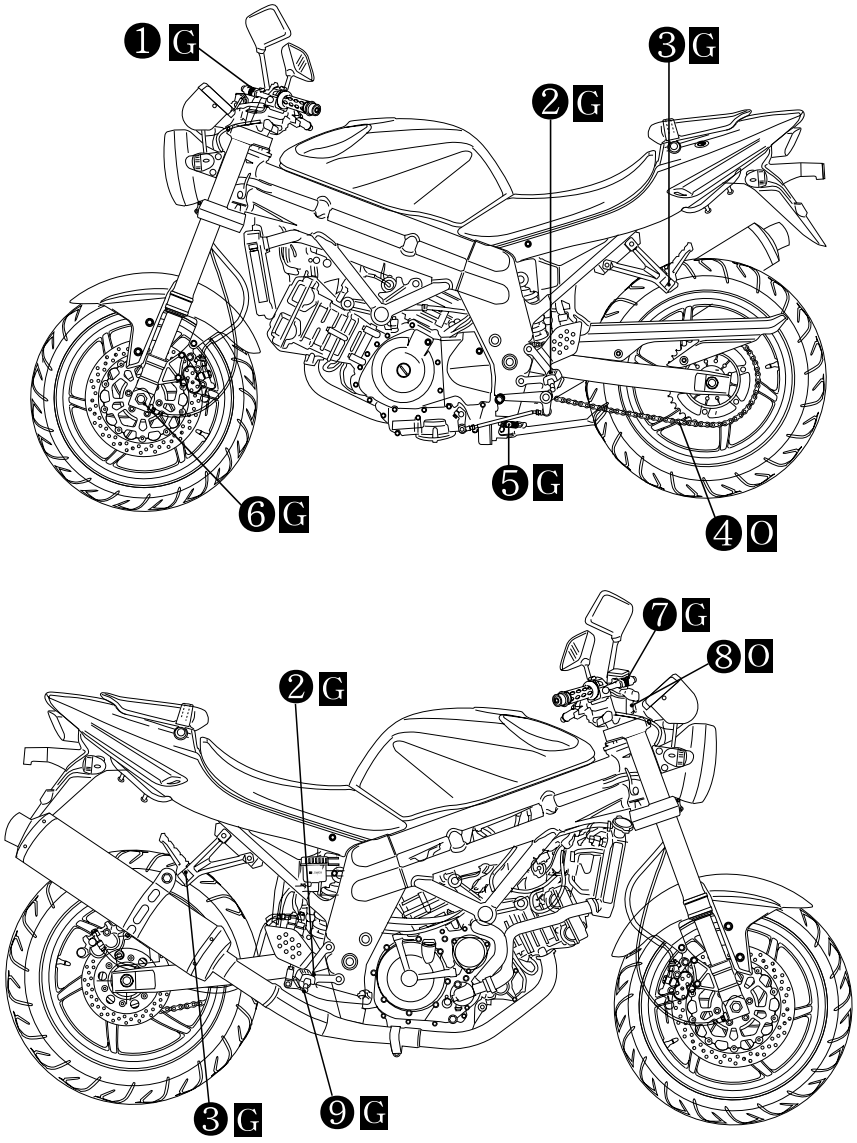
Item \ Interval	Initial 1,000 km	Every 4,000 km	Every 8,000 km	page
Drive chain	Clean and lubricate every 1,000km			2-12
Brake	Inspect	Inspect	—	2-14
Brake hose	Inspect	Inspect	—	2-14
	Replace every 4 years			
Brake fluid	Inspect	Inspect	—	2-14
	Replace every 2 years			
Tires	Inspect	Inspect	—	2-19
Steering	Inspect	Inspect	—	2-18
Front forks	—	Inspect	—	2-18
Rear suspension	—	Inspect	—	2-18
Chassis bolts and nuts	Tighten	Tighten	—	2-19

⚠ CAUTION

Using poor quality replacement parts can cause your motorcycle to wear more quickly and shorten its useful life. Use only genuine Hyoung replacement parts or their equivalent.

LUBRICATION POINT

Proper lubrication is important for smooth operation and long life of each working part of the motorcycle. Major lubrication points are indicated below.



① Clutch lever holder and clutch cable
② Footrests pivot
③ Passenger footrests pivot
④ Drive chain
⑤ Side stand pivot and spring hook
⑥ Speedometer gear box
⑦ Front brake lever holder
⑧ Throttle cable
⑨ Rear brake pedal pivot

O - Motor oil, G - Grease

NOTE

- ***Before lubricating each part, clean off any rusty spots and wipe off any grease, oil, dirt or grime.***
- ***Lubricate exposed parts which are subject to rust, with either motor oil or grease whenever the motorcycle has been operated under wet or rainy condition.***

MAINTENANCE PROCEDURES

This section describes the service procedure for each section of the periodic maintenance.

VALVE CLEARANCE

Inspect Interval

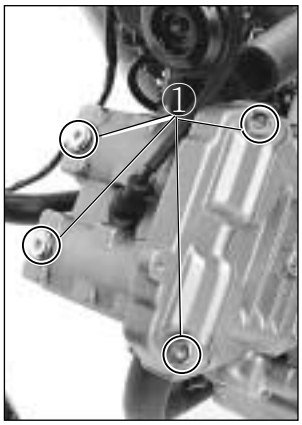
Inspect Initial 1,000 km and Every 4,000 km.

⚠ CAUTION

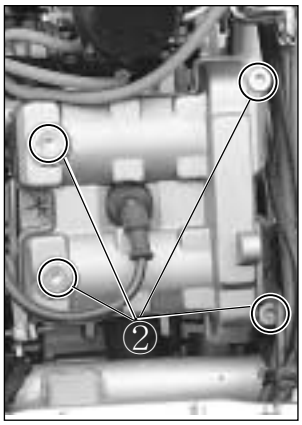
The clearance specification is for COLD state.

The valve clearance specification is different for intake and exhaust valves.
Valve clearance adjustment must be checked and adjusted,
1) at the time of periodic inspection,
2) when the valve mechanism is serviced, and
3) when the camshaft is disturbed by removing it for servicing.

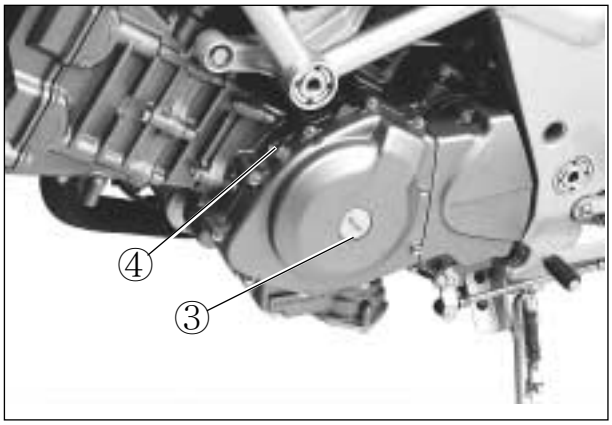
- Remove the spark plug. (Refer to page 2-5)
- Remove the fuel tank. (Refer to page 4-1)
- Remove the radiator. (Refer to page 5-2)
- Remove the cylinder head cover bolt ① and ②.
- Remove the magneto cover plug ③ and the timing inspection plug ④.



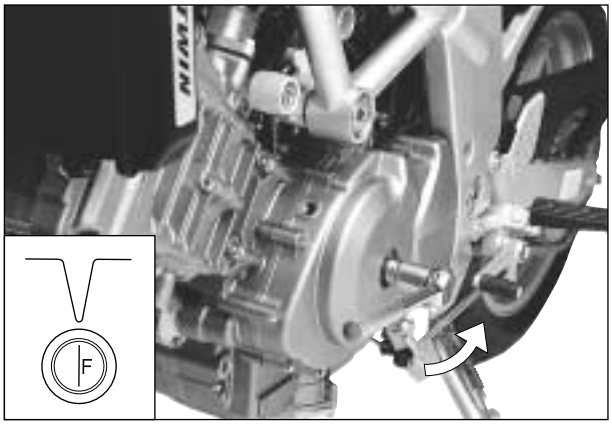
[FRONT CYLINDER]



[REAR CYLINDER]



- Rotate the magneto rotor counter-clockwise to set the front cylinder's piston at TDC (Top Dead Center) of the compression stroke.
  (Rotate the rotor until "|F" line on the rotor is aligned with the center of hole on the crankcase.)

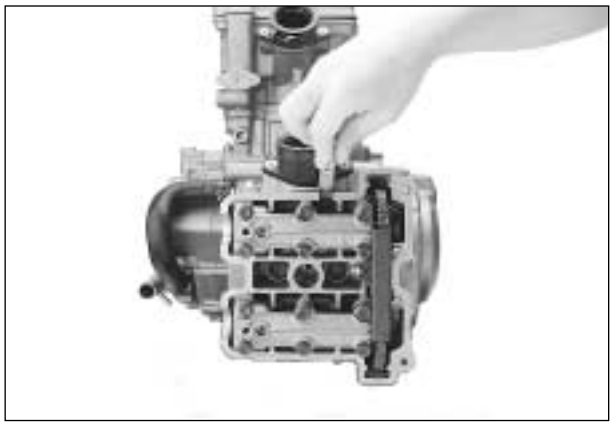


- To inspect the front cylinder's valve clearance, insert the thickness gauge to the clearance between the camshaft and the tappet.

Valve clearance	Standard (When cold)
IN.	0.1 ~ 0.2 mm (0.004 ~ 0.008 in)
EX.	0.2 ~ 0.3 mm (0.008 ~ 0.012 in)

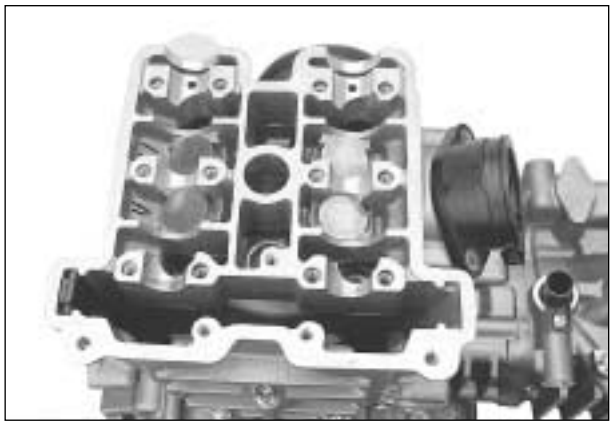
TOOL **Thickness gauge : 09900-20806**

● If the clearance is out of specification, first remove the cam chain tensioner, camshaft housing, camshaft.
To install the tappet shim at original position, record the shim NO. and clearance to present by "A", "B", "C", "D" mark on the cylinder head.

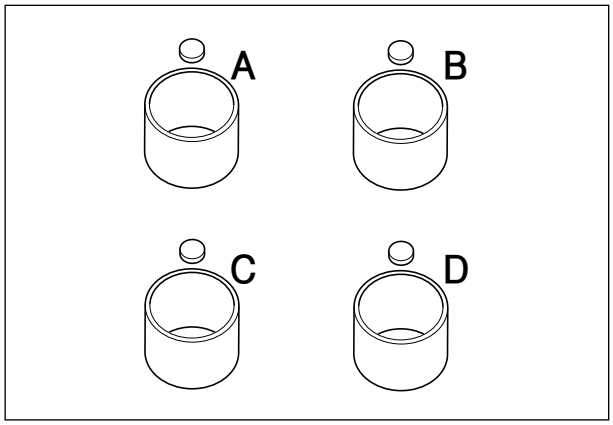


Select the tappet that agree with tappet clearance (vertical line) and shim NO.(horizontal line) as refer to the tappet shim selection chart. (Refer to page 8-29 · 30)

Adjust valve timing, install the camshaft housing and the tensioner.
After the crankshaft rotate about 10 times, measure the valve clearance.
If the clearance be not agree, adjust the standard clearance as the same manner above.



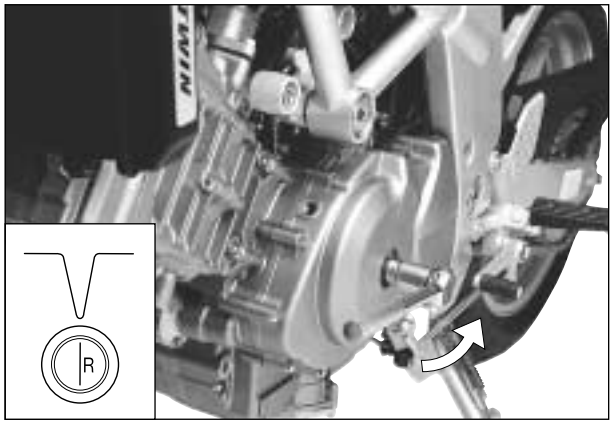
● In case that valve adjustment which there is no the tappet shim selection chart, please follow instructions of example in the below.
For example, the intake clearance is 0.4 and the shim is 170 (1.70 mm), select 195 (1.95 mm) of the shim which 170 (1.70 mm) of the shim add up the excess clearance 0.25 mm when adjust with the standard 0.15 as the intake standard clearance 0.1～0.2 mm.



⚠ CAUTION

- **Valve clearance should be checked when the engine is cold.**
- **If you don't rotate the crankshaft about 10 times before measuring the valve clearance, there is no meaning of valve clearance.**

● Rotate the magneto rotor to set the rear cylinder's piston at TDC(Top Dead Center) of the compression stroke.
(Rotate the rotor 285° counter-clockwise from the "|F" line, and until the "|R" line on the rotor is aligned with the center of hole on the crankcase.)

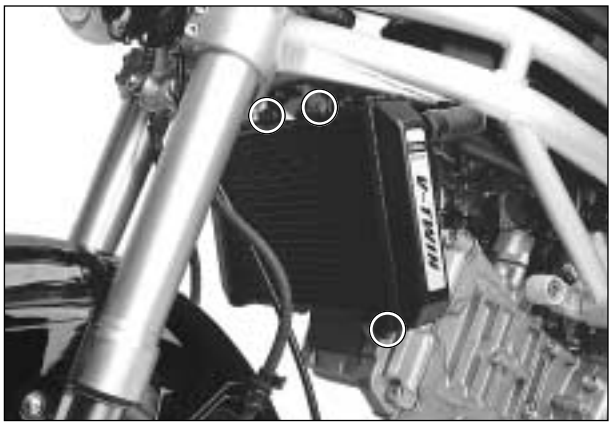


● Inspect the rear cylinder's valve clearance with the same manner of the front cylinder.

SPARK PLUG

Inspect Interval

Clean Initial 1,000 km and Every 4,000 km,
Replace Every 8,000 km.



● Remove the three radiator mounting bolts.

⚠ WARNING

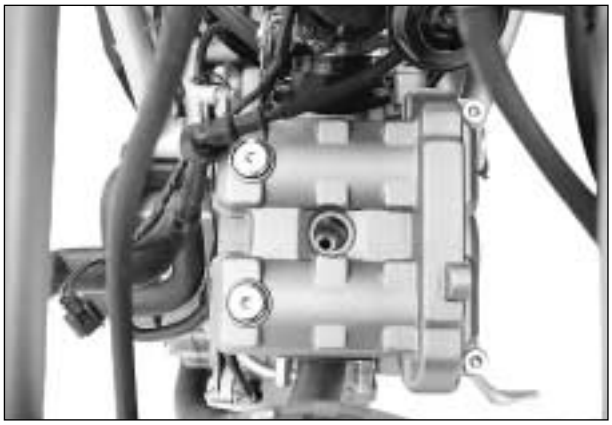
The hot radiator and the hot engine can burn you. Wait until the radiator and the engine are cool enough to touch.

⚠ CAUTION

- **Be careful not to damage the radiator fins.**
- **Do not extract the radiator hose.**

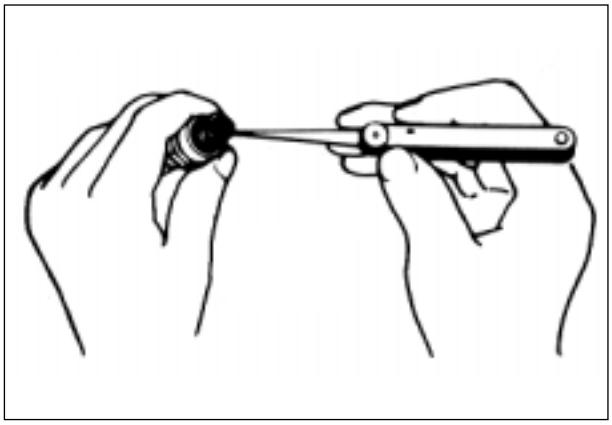
● Remove the fuel tank.

● Disconnect the spark plug caps.
● Remove the spark plugs.



TYPE	SPARK PLUG SPECIFICATION
Hot type	CR7E
Standard type	CR8E
Cold type	CR9E

Remove the carbon deposit with wire or pin and adjust the spark plug gap to 0.7～0.8 mm(0.028~0.032 in), measuring with a thickness gauge.



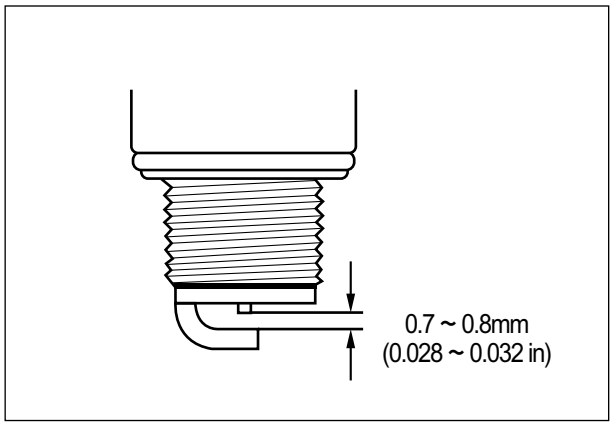
Spark plug gap	0.7～0.8 mm (0.028~0.032 in)

TOOL **Thickness gauge : 09900-20806**

Check to see the worn or burnt condition of the electrodes.
If it is extremly worn or burnt, replace the plug.
And also replace the plug if it has a broken insulator, damaged thread, etc.

● Install the spark plug, and then tighten it to specified torque.

Spark plug : 11 N · m (1.1 kg · m)



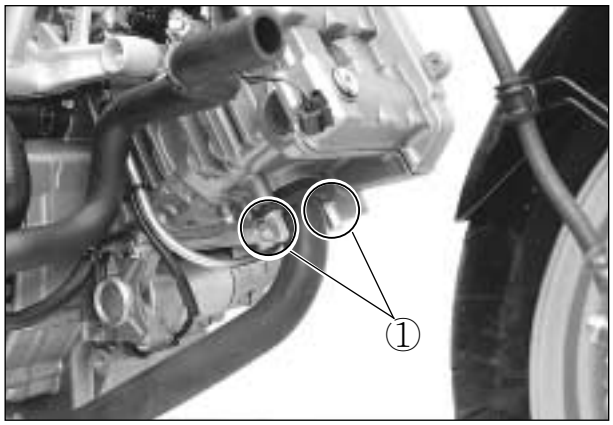
EXHAUST PIPE NUTS AND MUFFLER MOUNTING BOLTS

Inspect Interval

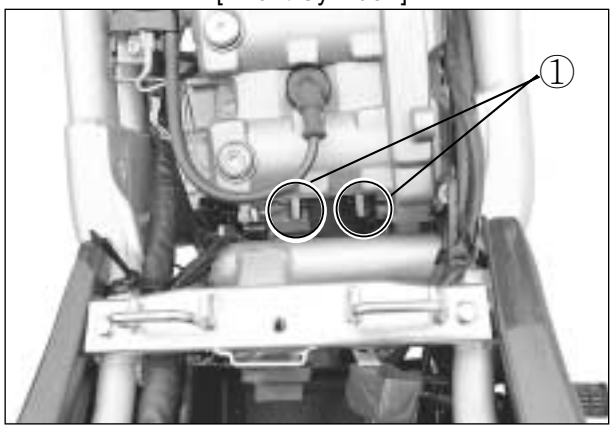
Tighten Initial 1,000 km and Every 4,000 km.

● Tighten the exhaust pipe nuts ①, and muffler mounting bolts ② to the specified torque.

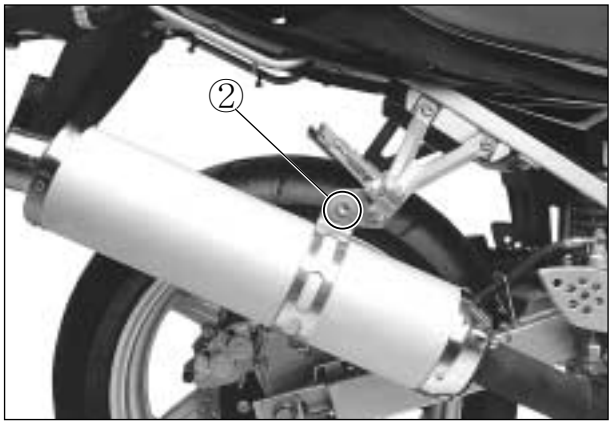
Exhaust pipe nut : 23 N · m (2.3 kg · m)
Muffler mounting bolt
: 23 N · m (2.3 kg · m)

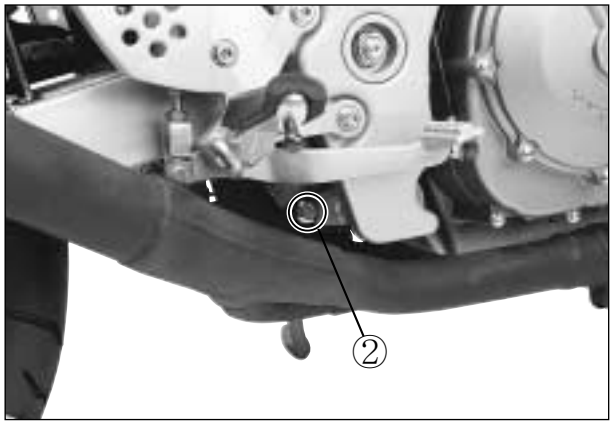


[Front Cylinder]



[Rear Cylinder]



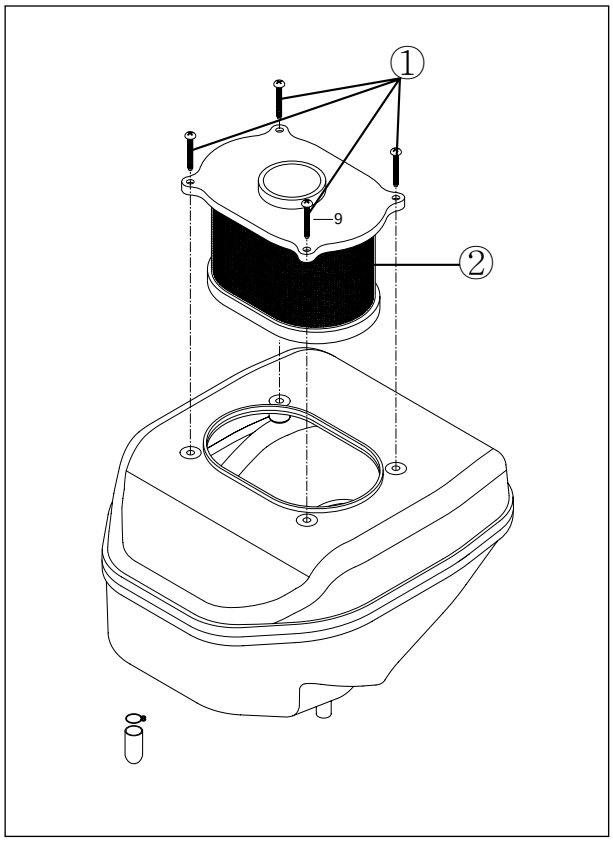


AIR CLEANER

Inspect Interval

Clean Every 3,000 km,
Replace Every 12,000 km.

- Remove the front and rear seat.
- The air cleaner is located under the fuel tank. Remove the fuel tank.
- Remove the four screw ①.
- Pull up the air cleaner cover and the air cleaner element ②.



Clean the air cleaner element for the following:

- When the air cleaner element clean with the air gun, necessarily blow at the inside by compressed air.
- Carefully examine the air cleaner element for tears during cleaning. Replace it with a new one if it is torn.
- Assemble the element completely or damage severely the engine.
- Be careful not to allow water to go inside the air cleaner element.

⚠ CAUTION

More frequent servicing may be performed on motorcycles that are used under severe conditions, also clean the air cleaner element when replacing the oil to prevent damage of the engine.

CARBURETOR

Inspect Interval

Inspect Initial 1,000 km and Every 4,000 km.

⊙ IDLE SPEED

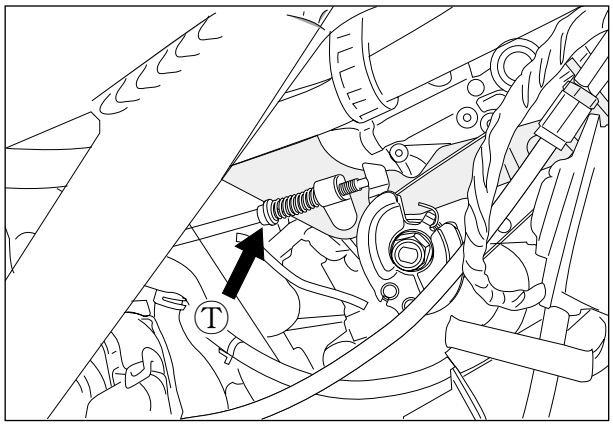
NOTE

Make this inspection when the engine is hot.

● Connect an engine tachometer to the high tension cord.
Start up the engine and set its speed at anywhere 1,300 and 1,500 rpm by turning throttle stop screw Ⓣ.

Engine idle speed	1,300～1,500 rpm

TOOL **Engine tachometer : 09900-26006**

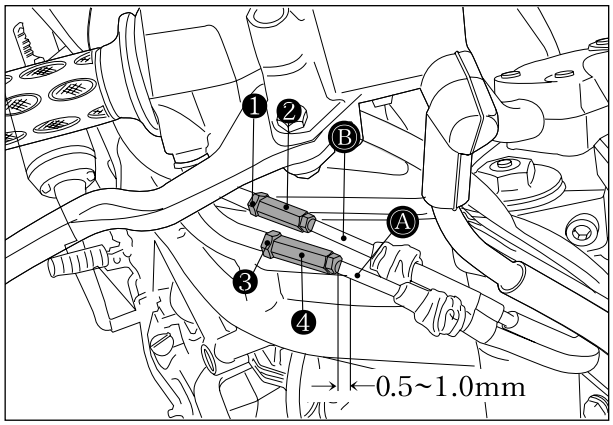


⊙ THROTTLE CABLE PLAY

This motorcycle has a twin throttle cable system. Cable Ⓐ is for throttle cable and cable Ⓑ is for returning cable. There should be 0.5~1.0mm play on the throttle cable.
To adjust the throttle cable play.

● Loosen the lock nut ① of the returning cable Ⓑ and fully turn in the adjuster ②.
● Loosen the lock nut ③ of the throttle cable Ⓐ.
● Turn the adjuster ④ in or out until the throttle cable play is between 0.5 ~ 1.0mm(0.02 ~ 0.04 in).
● Tighten the lock nut ③ while holding the adjuster ④.
● While holding the throttle grip at the fully closed position, slowly turn out the adjuster ② of the returning cable Ⓑ until resistance is felt.
● Tighten the lock nut ① while holding the adjuster ②.

Throttle cable play	0.5～1.0 mm (0.02 ~ 0.04 in)



⚠ CAUTION

After the adjustment is completed, check that throttle grip movement does not raise the engine idle speed and that the throttle grip returns smoothly and automatically.

⚠ CAUTION

Inadequate throttle cable play can cause engine speed to rise suddenly when you turn the throttle grip. This can lead to loss of rider control.

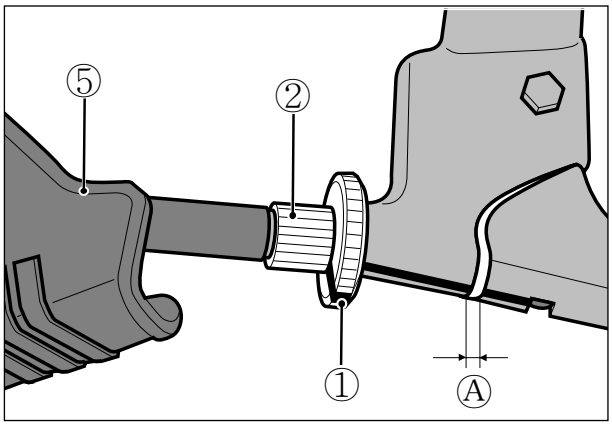
FUEL HOSE

Inspect Interval

Inspect Initial 1,000 km and Every 4,000 km,
Replace every 4 years.

● Remove the front and rear seat. (Refer to page 7-1)
● Remove the fuel tank.
Inspect the fuel hoses for damage and fuel leakage. If any defects are found, the fuel hoses must be replaced.

CLUTCH



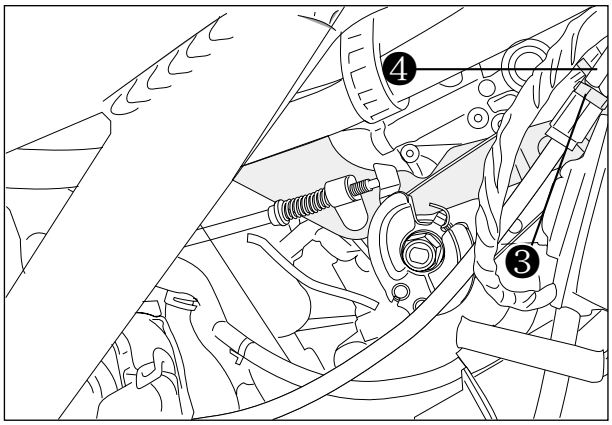
Inspect Interval

Inspect Initial 1,000 km and Every 4,000 km.

Clutch play should be 2 mm(0.08 in) as measured at the clutch lever holder before the clutch begins to disengage. If the play in the clutch is incorrect, adjust it in the following way :

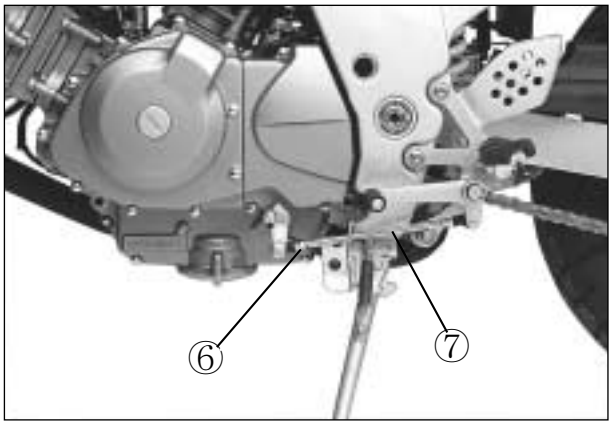
- A basis adjustment be allowed by the clutch lever adjuster ②.
- Loosen the clutch lever adjuster ②.
- Screw the lock nut ① clockwise fully, after finishing adjustment.
- After end of adjustment, tighten the lock nut ① and cover the rubber boot ⑤.
- If not adjust by the adjuster ②, loosen the clutch cable adjuster lock nut ③.
- Turn the clutch cable adjuster ④ in or out to acquire the specified play.
- After end of adjustment, tighten the lock nut ③.
- The clutch cable should be lubricated with a light weight oil whenever it is adjusted.

Clutch cable play Ⓐ	2 mm (0.08 in)



⊙ GEARSHIFT LEVER HEIGHT ADJUSTMENT

- Loosen the lock nut ⑥.
- With the link rod ⑦ turned, adjust the gearshift lever height.
- Tighten the lock nut ⑥.



ENGINE OIL

Inspect Interval

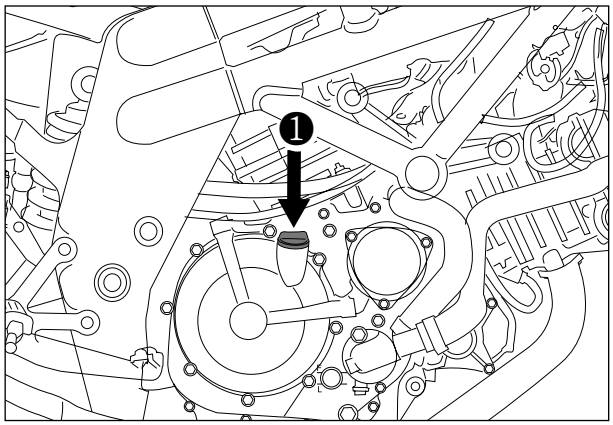
Replace Initial 1,000 km and Every 4,000 km.

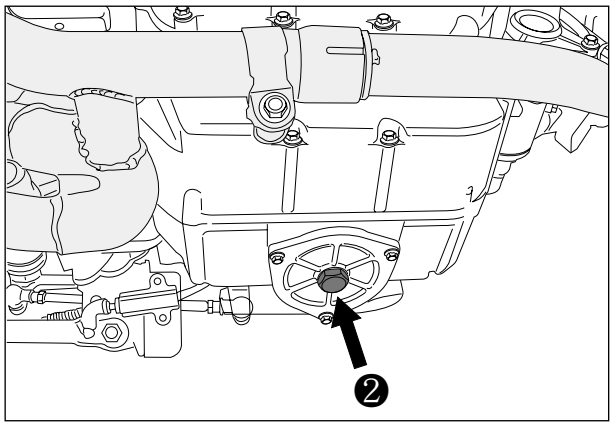
Necessary amount of engine oil	
Oil change	3,000 ㎖
Filter change	3,200 ㎖
Overhaul engine	3,400 ㎖
Engine oil type	SAE 10W/40 API Over SG

Oil should be changed while the engine is warm. Oil filter replacement at the above intervals, should be together with the engine oil change.

- Keep the motorcycle upright.
- Place an oil pan below the engine, and drain the oil by removing the filler cap ① and drain plug ②.
- Tighten the drain plug ② to the specified torque, and pour fresh oil through the oil filler. Use an API classification of Over SG oil with SAE 10W/40 viscosity.

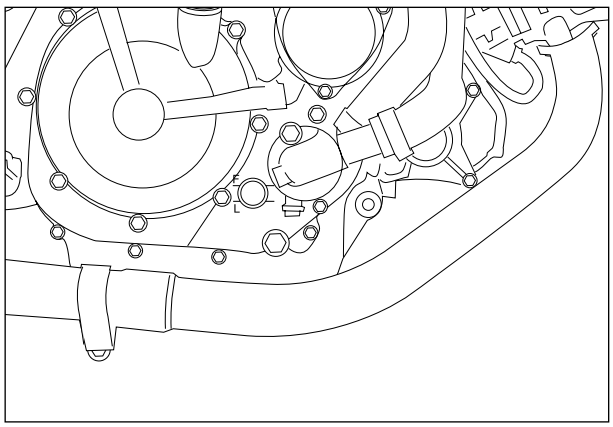
Oil drain plug : 21 N · m (2.1 kg · m)





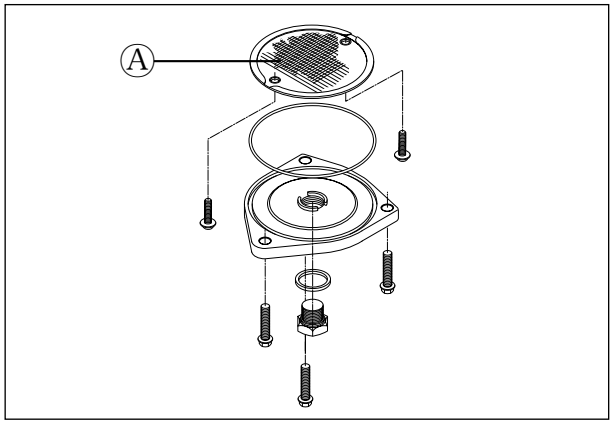
- Start up the engine and allow it to run for several minutes at idling speed.

- Turn off the engine and wait about three minutes, then check the oil level through the inspection window. If the level is below mark "L", add oil to "F" level. If the level is above mark "F", drain oil to "F" level.



⚠ CAUTION

Never operate the motorcycle if the engine oil level is below the "Lower line mark(L)" in the inspection window. Never fill the engine oil above the "Upper line mark(F)".
Engine oil level being most suitable about 1mm under the "Upper line mark(F)" of the engine oil lens. In case of the engine oil pouring in excessively, the engine output being made insufficient.
Be careful not to pour the oil excessively into engine.



⚠ CAUTION

Necessarily, confirm and clean the oil strainer Ⓐ when replace the engine oil (specially, when first replacement).

⚠ CAUTION

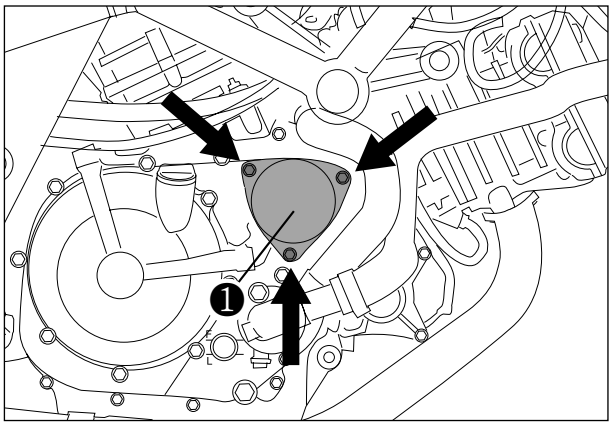
More frequent servicing may be performed on motorcycles that are used under severe conditions.

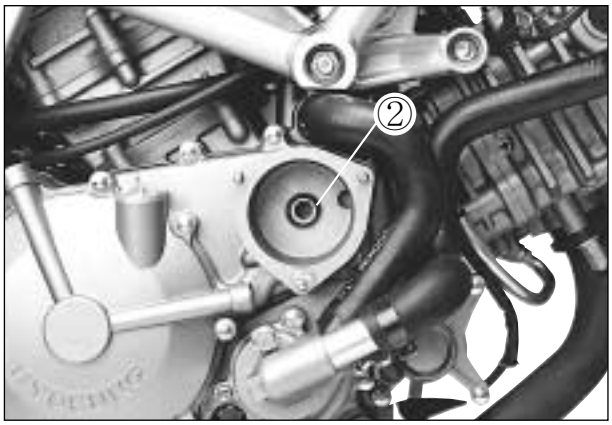
ENGINE OIL FILTER

Inspect Interval

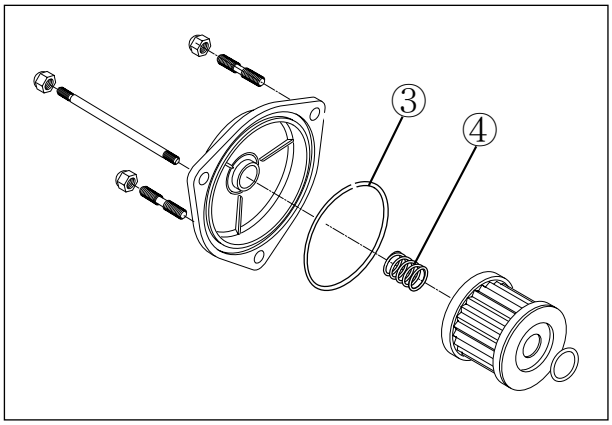
Replace Initial 1,000 km and Every 4,000 km.

- Drain the engine oil as described in the engine oil replacement procedure.
- Remove the oil filter cap ①.
- Remove the oil filter.
- Install the new O-ring ②.





- Install the new oil filter.
- Install the new O-ring ③ and spring ④ to the oil filter cap.
- Install the oil filter cap.



⚠ CAUTION

Before installing the oil filter cap, apply engine oil lightly to the new O-ring ③.

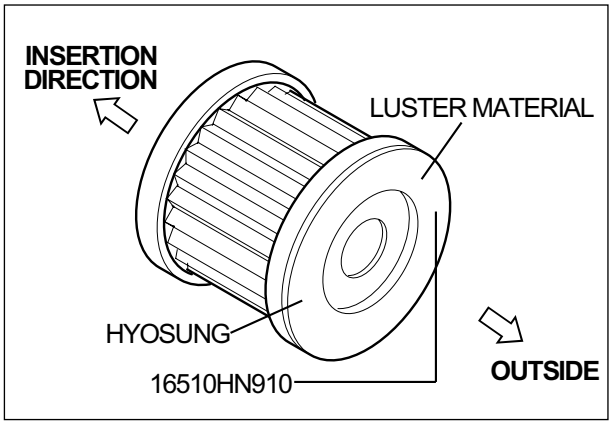
⊙ OIL FILTER INSTALLATION

⚠ CAUTION

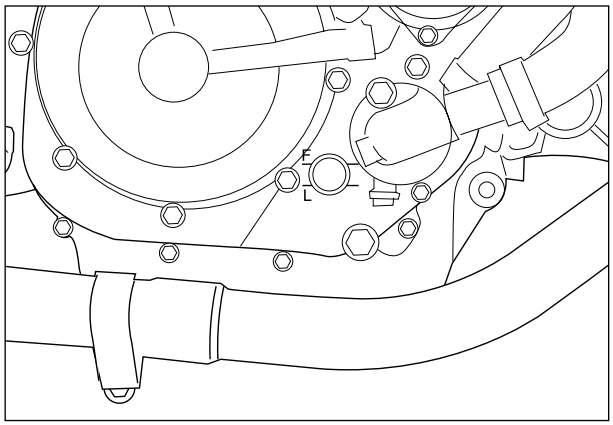
When install the oil filter, necessarily, "HYOSUNG" character and "16510HN910" part' s NO. install toward the outside, otherwise can damage the engine.

⚠ WARNING

Engine oil and exhaust pipes can be hot enough to burn you.
Wait until the oil drain plug and exhaust pipes are cool enough to touch with bare hands before draining oil.



● Add new engine oil and check the oil level as described in the engine oil replacement procedure.



⚠ CAUTION

Use HYOSUNG MOTORS GENUINE OIL FILTER only, since the other make's genuine filters and after-market parts may differ filtering performance and durability, which could cause engine damage or oil leaks. Hyosung motors genuine oil filter is also not usable for the motocycles.

DRIVE CHAIN

Inspect Interval

Clean and Lubricate Every 1,000 km.

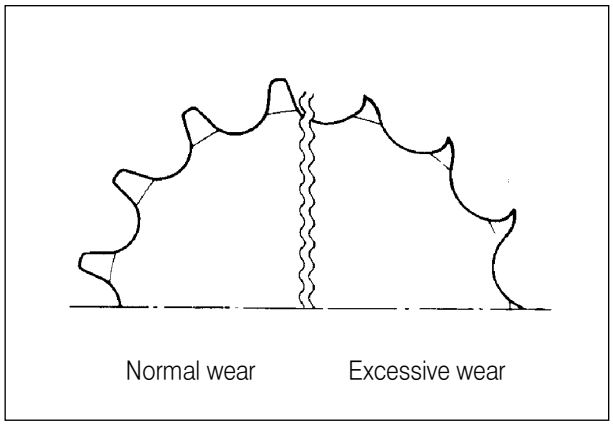
Visually check the drive chain for the possible defects listed below. (Support the motorcycle by the jack or block, turn the rear wheel slowly by hand with the trans-mission shifted to Neutral.)

● Loose pins
● Excessive wear
● Damaged rollers
● Improper chain adjustment
● Missing X-Oring seals
● Dry or rusted links
● Kinked or binding links

If any defects are found, the drive chain must be replaced.

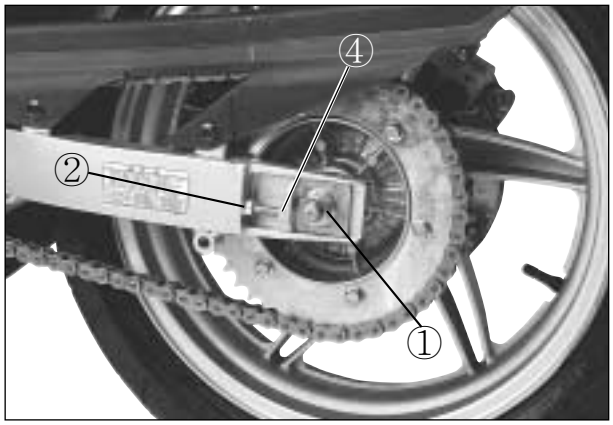
Damage to the drive chain means that the sprocket may also be damaged.

If any defects are found, the sprocket must be replaced.



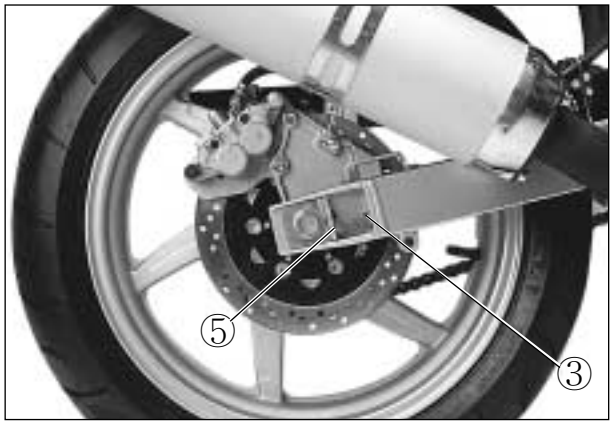
NOTE

When replacing the drive chain, replace the drive chain and sprocket as a set.



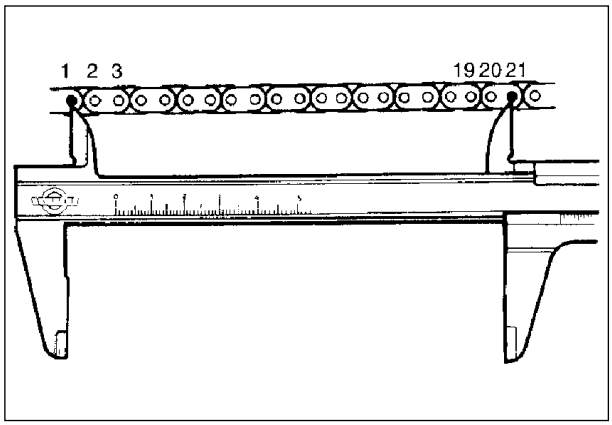
⊙ INSPECTION OF DRIVE CHAIN LENGTH

● Loosen the axle nut ①.
● Loosen the lock nuts ②, ③.
● Tense the drive chain fully by turning both chain adjusters ④, ⑤.



● Count out 21 pins (20 pitches) on the chain and measure the distance between the two points. If the distance exceeds the service limit, the chain must be replaced.

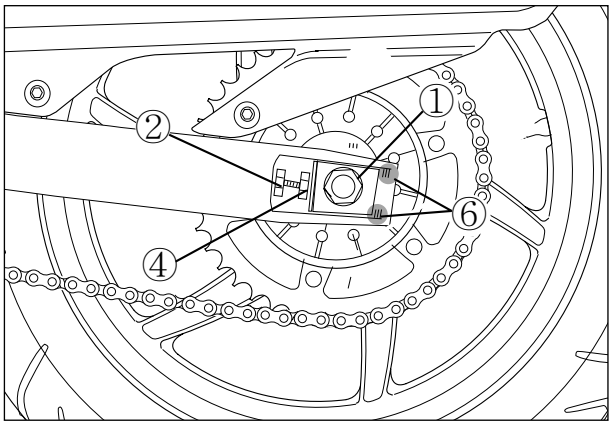
Drive chain 20pitch length	Service limit
	319.4 mm (12.58 in)



⊙ ADJUSTMENT OF DRIVE CHAIN SLACK

● Loosen the axle nut ①.
● Loosen the lock nuts ②, ③.
● Loosen or tighten both chain adjusters ④, ⑤ until the chain has 20 ~ 30 mm of slack in the middle between the engine and rear sprockets. The marks ⑥, ⑦ on both chain adjusters must be at the same position on the scale to ensure that the front and rear wheels are correctly aligned.

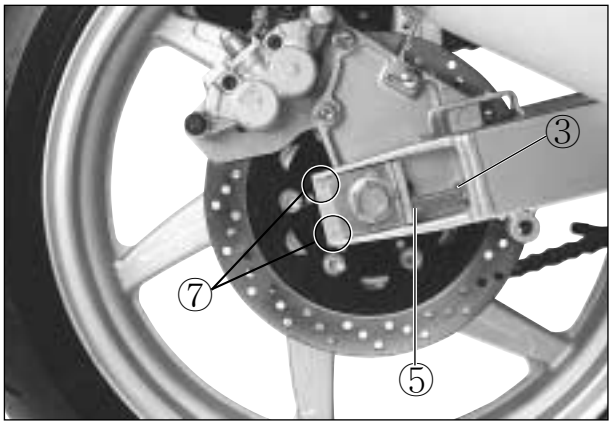
Drive chain slack	20 ~ 30 mm (0.79 ~ 1.18 in)



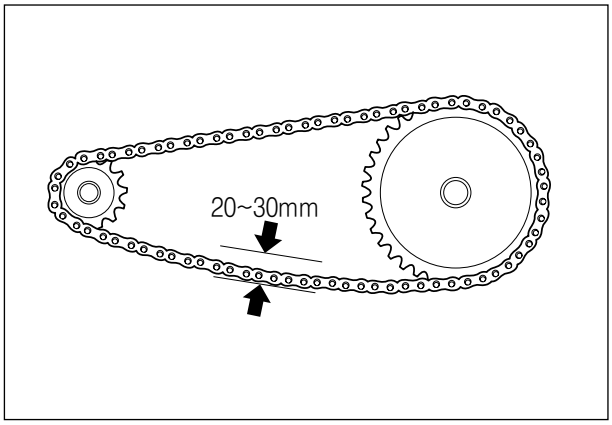
● Place the motorcycle on jack or block for accurate adjustment.
● After adjusting the drive chain, tighten the axle nut to the specified torque.

Rear axle nut : 90~130 N · m (9.0~13.0 kg · m)

● Tighten both chain adjuster lock nuts ②, ③ securely.

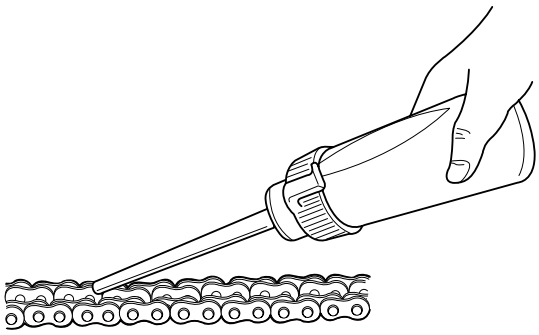


● Recheck the drive chain slack after tightening the rear axle nut.



⊙ CLEANING AND LUBRICATING

- Wash the drive chain with kerosine. If the drive chain tends to rust quickly, the intervals must be shortened. Kerosene is a petroleum product and will provide some lubrication as well as cleaning action.
- After washing and drying the chain, oil it with a engine oil or chain lubricating oil.



⚠ CAUTION

The drive chain for this motorcycle is made of the special material.
The chain should be replaced with a RK525XSO for 『Comet650』.
Use of another chain may lead to premature chain failure.

⚠ CAUTION

Some drive chain lubricants contain solvents and additives which could damage the X-Orings in your chain.

Use Hyosung chain lube or an equivalent that is specifically intended for use with X-Oring chains.

⚠ CAUTION

Cleaning the chain with gasoline or commercial cleaning solvents can damage X-Orings and ruin the chain.

Clean the drive chain with kerosene only.

BRAKE SYSTEM

Inspect Interval

[BRAKE]
Inspect Initial 1,000 km and Every 4,000 km.

[BRAKE HOSE & BRAKE FLUID]
Inspect Initial 1,000 km and Every 4,000 km.
Replace the brake hoses Every 4 years,
Replace the brake fluid Every 2 years.

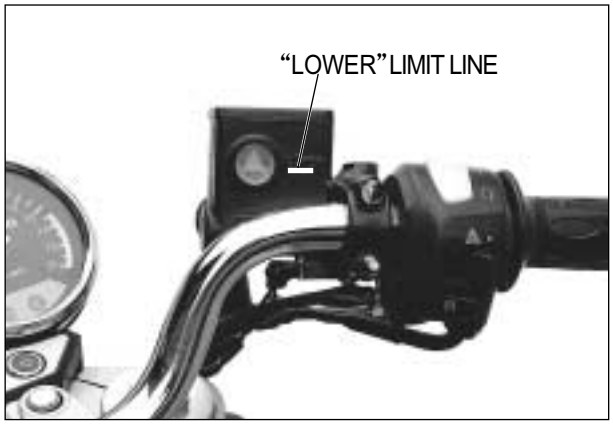
⊙ BRAKE FLUID LEVEL CHECK

- Keep the motorcycle upright and place the handle-bars straight.
- Check the brake fluid level by observing the lower limit line (LOWER) on the front brake fluid reservoir.
- When the level is below the lower limit line (LOWER), replenish with brake fluid that meets the following specification.

BF **Specification and Classification**
(Front brake) : DOT 4
(Rear brake) : DOT 4

⚠ CAUTION

Do not spill any brake fluid on the brake pad of disk.



[Front Brake]

⚠ WARNING

The brake system of this motorcycle is filled with a glycol-based brake fluid. Do not use or mix different types of fluid such as silicone-based or petroleum-based. Do not use any brake fluid taken from old, used or unsealed containers. Never re-use brake fluid left over from the last servicing or stored for a long period.

⚠ WARNING

Brake fluid, if it leaks, will interfere with safe running and immediately discolor painted surfaces. Check the brake hoses and hose joints for cracks and oil leakage before riding.

⊙ BRAKE PAD WEAR

The extend of brake pad wear can be checked by observing the grooved limit Ⓐ on the pad. When the wear exceeds the grooved limit, replace the pads with new ones.

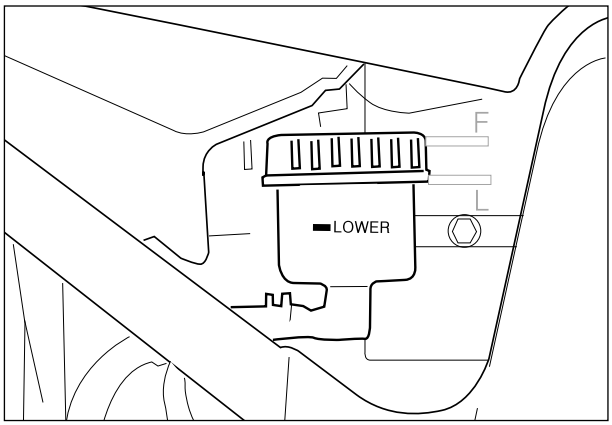
⚠ CAUTION

Replace the brake pad as a set, otherwise braking performance will be adversely affected.

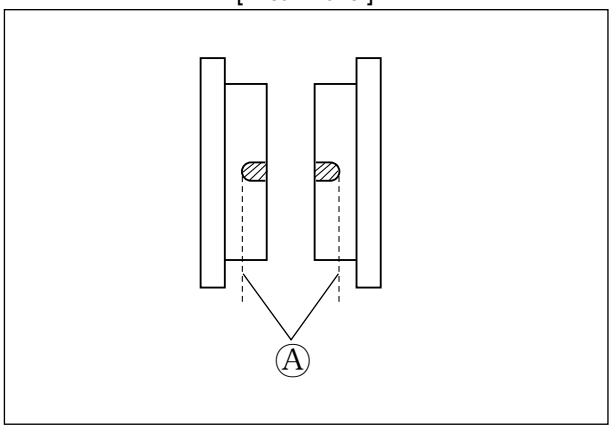
⊙ FRONT AND REAR BRAKE PAD REPLACEMENT

- Remove the brake caliper.
- Remove the brake pads.
- To reassemble, reverse the above sequence.

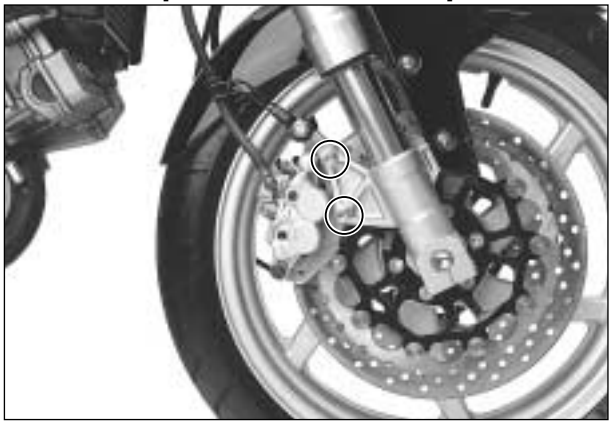
Front brake caliper mounting bolt
: 18~28 N · m (1.8~2.8 kg · m)
Rear brake caliper mounting bolt
: 18~28 N · m (1.8~2.8 kg · m)



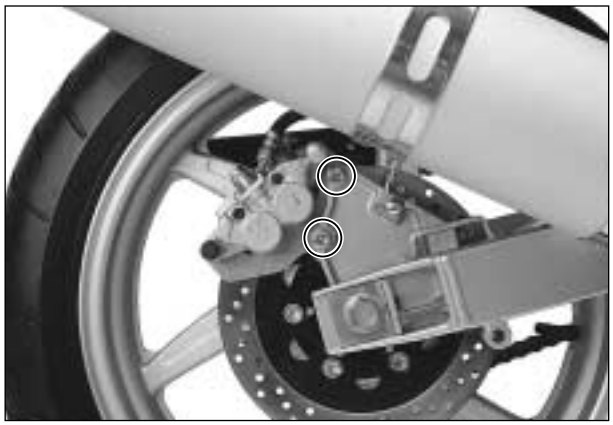
[Rear Brake]



[Left side of Front Brake]



[Right side of Front Brake]

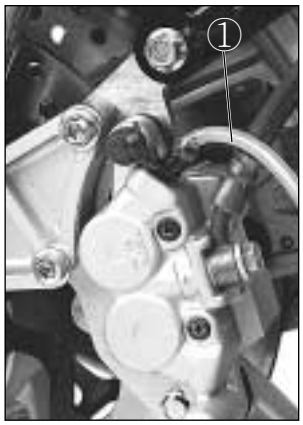


[Rear Brake]

⊙ FRONT AND REAR BRAKE FLUID REPLACEMENT

- Place the motorcycle on a level surface and keep the handlebars straight.
- Remove the master cylinder reservoir cap and diaphragm.
- Suck up the old brake fluid as much as possible.
- Fill the reservoir with new brake fluid.

Specification and Classification
(Front brake) : DOT 4
(Rear brake) : DOT 4



- Connect a clear hose ① to the air bleeder valve and insert the other end of the hose into a receptacle.
- Loosen the air bleeder valve and pump the brake lever until the old brake fluid is completely out of the brake system.

- Close the air bleeder valve and disconnect the clear hose. Fill the reservoir with new brake fluid to the upper line.
- Replace the rear brake's fluid with the same manner of the front brake.

Front brake caliper air bleeder valve
: 6~9 N · m (0.6~0.9 kg · m)
Rear brake caliper air bleeder valve
: 6~9 N · m (0.6~0.9 kg · m)

⊙ AIR BLEEDING OF THE BRAKE FLUID CIRCUIT

Air trapped in the brake fluid circuit acts like a cushion to absorb a large proportion of the pressure developed by the master cylinder and thus interferes with the full braking performance of the brake caliper. The presence of air is indicated by "sponginess" of the brake lever and also by lack of braking force. Considering the danger to which such trapped air exposes the machine and rider, it is essential that, after remounting the brake and restoring the brake system to the normal condition, the brake fluid circuit be purged of air in the following manner :

- Fill the master cylider reservoir to top of the inspection window. Replace the reservoir cap to prevent dirt from entering it.
- Attach a hose to the air bleeder valve, and insert the free end of the hose into a receptacle.
- Bleed air from the brake system.
- Squeeze and release the brake lever several times in rapid succession and sqeeze the lever fully without releasing it. Loosen the bleeder valve by turning it a quarter of a turn so that the brake fluid runs into the receptacle, this will remove the tension of the brake lever causing it to touch the handlebar grip. Then, close the air bleeder valve, pump and squeeze the brake lever, and open the valve. Repeat this process until the fluid flowing into the receptacle no longer contains air bubbles.

NOTE

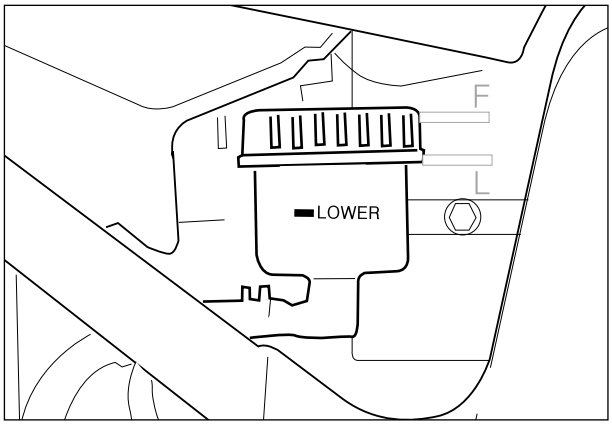
While bleeding the brake system, replenish the brake fluid in the reservoir as necessary. Make sure that there is always some fluid visible in the reservoir.

- Close the air bleeder valve, and disconnect the hose. Fill the reservoir with brake fluid to the upper line.
- Bleed the rear brake's air with the same manner of front brake.

Front brake caliper air bleeder valve
: 6~9 N · m (0.6~0.9 kg · m)
Rear brake caliper air bleeder valve
: 6~9 N · m (0.6~0.9 kg · m)

⚠ CAUTION

Handle brake fluid with care : the fluid reacts chemically with paint, plastics, rubber materials, etc.

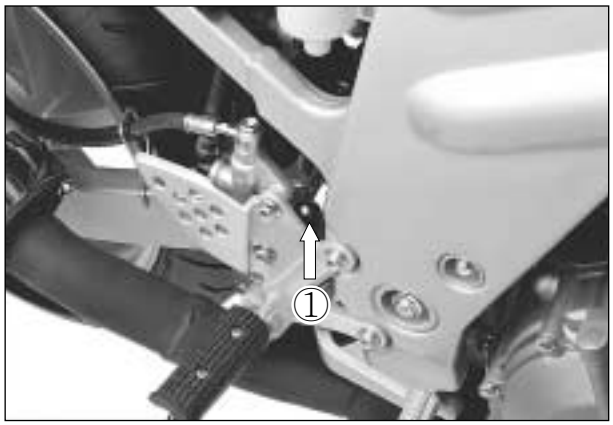


⊙ FRONT BRAKE LAMP SWITCH

The front brake lamp switch is located beneath the front brake lever. Loosen the switch fitting screws and adjust the timing by moving the switch body forward or backward. (Refer to page 6-1)

⊙ REAR BRAKE LAMP SWITCH

Adjust the rear brake lamp switch ① so that the brake lamp will come on just before pressure is felt when the brake pedal is depressed.



STEERING

Inspect Interval

Inspect Initial 1,000 km and Every 4,000 km.

Steering should be adjusted properly for smooth turning of handlebars and safe running. Overtight steering prevents smooth turning of the handlebars and too loose steering will cause poor stability. Check that there is no play in the steering stem while grasping the lower fork tubes by supporting the machine so that the front wheel is off the ground, with the wheel straight ahead, and pull forward. If play is found, perform steering stem nut adjustment as described in page 7-25 of this manual.

FRONT FORK

Inspect Interval

Inspect Every 4,000 km.

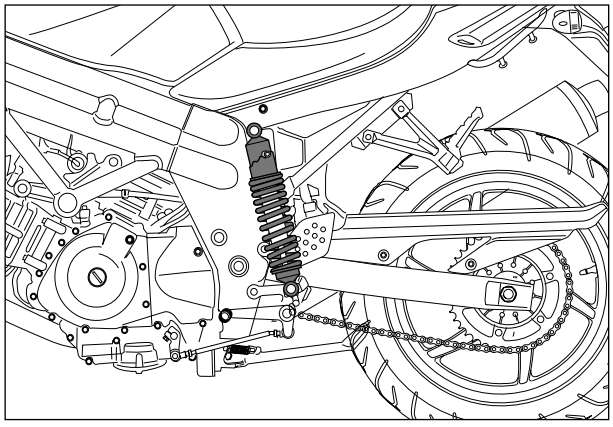
Inspect the front forks for oil leakage, scoring or scratches on the outer surface of the inner tubes. Replace any defective parts, if necessary.

REAR SUSPENSION

Inspect Interval

Inspect Every 4,000 km.

Inspect the rear shock absorber for oil leakage and mounting rubbers including engine mounting for wear and damage. Replace any defective parts, if necessary.(Refer to page 7-32)



TIRE

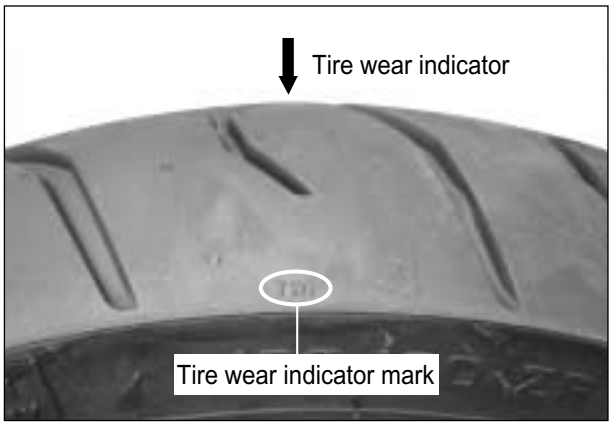
Inspect Interval

Inspect Initial 1,000 km and Every 4,000 km.

⊙ TIRE TREAD CONDITION

Operating the motorcycle with excessively worn tires will decrease riding stability and can lead to loss of control.

- Inspect shortage of tire thread's depth by the 『 tire wear indicator 』.
- Replace the front and rear tires at once when appear the 『 tire wear indicator 』.



⊙ TIRE PRESSURE

If the tire pressure is too high or too low, steering will be adversely affected and tire wear increased. Therefore, maintain the correct tire pressure for good roadability or shorter tire life will result. Cold inflation tire pressure is as follows.

COLD INFLATION TIRE PRESSURE	SOLO RIDING			DUAL RIDING		
	KPa	kgf/cm²	psi	KPa	kgf/cm²	psi
Front	221	2.25	33.0	221	2.25	33.0
Rear	245	2.50	36.0	245	2.50	36.0

⚠ CAUTION

The standard tire on 『 Comet 650 』 is 120/60-ZR 17 55W for front and 160/60-ZR 17 69W for rear.
The use of tires other than those specified may cause instability. It is highly recommended to use a HYOSUNG Genuine Tire.

CHASSIS BOLTS AND NUTS

Inspect Interval

Tighten Initial 1,000 km and Every 4,000 km.

Check that all chassis bolts and nuts are tightened to their specified torque.(Refer to page 8-13)

ENGINE COOLANT

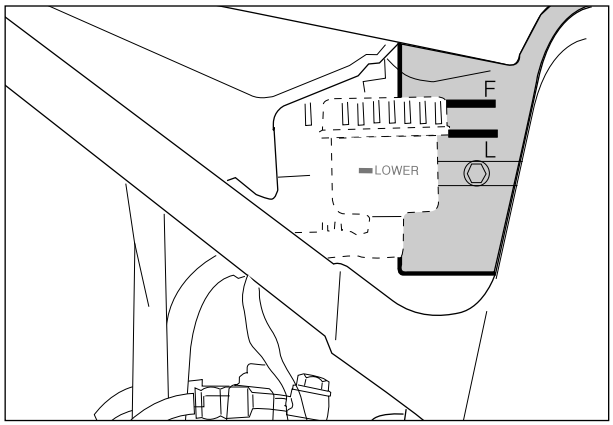
Inspect Interval

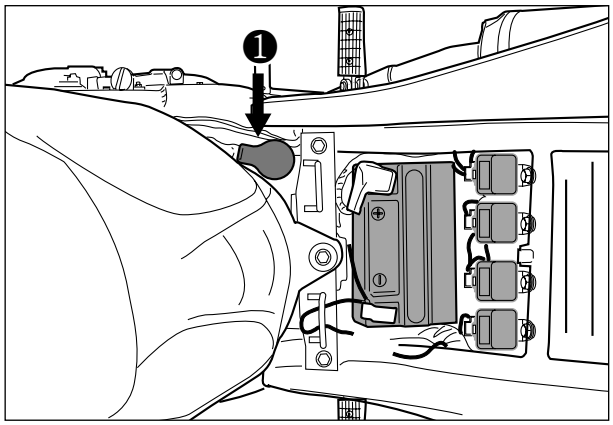
Replace the engine coolant Every 2 years.

⊙ ENGINE COOLANT LEVEL CHECK

- Keep the motorcycle upright.
- Check the engine coolant level by observing the full line(F) and lower line(L) on the engine coolant reserve tank.
- If the level is below the lower line(L), add engine coolant to the full line from the engine coolant reserve tank filler ①.

Engine coolant capacity	
Reserve tank side	230㎖
Radiator side	430㎖
Engine side	940㎖





⚠ WARNING

- **Engine coolant is harmful if swallowed of if it comes in contact with skin of eyes.**
- **Keep out of the reach of children and animals.**

⚠ CAUTION

- **Use distilled water only. Water other than distilled water can corrode and clog the aluminum radiator.**
- **The 50 : 50 mixture of distilled water and ethylene glycol anti-freeze will provide the optimum corrosion protection and excellent heat protection, and will protect the cooling system from freezing at temperatures above -31℃(-24℉).**

NOTE

Bleed air from the cooling circuit when the engine overheat.

⊙ ENGINE COOLANT CHANGE

⚠ WARNING

Do not open the radiator cap when the engine is hot, as you may be injured by escaping hot liquid or vapor.

- Remove the radiator cap ②.
- Drain engine coolant by removing the drain bolt.

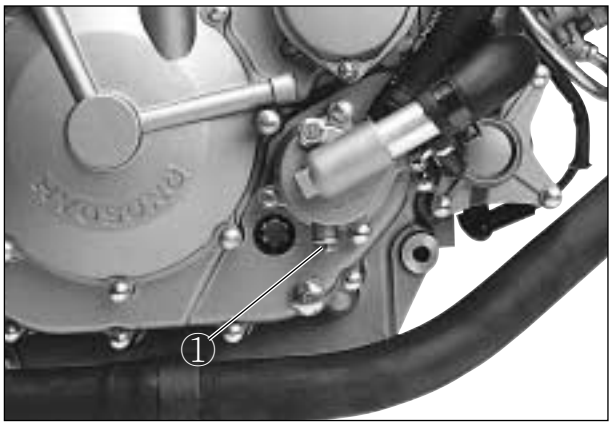
● Flush the radiator with fresh water if necessary.
● Install the water hose.
● Tighten the coolant drain bolt ① to the specified torque.

Coolant drain bolt
: 11~14 N · m (1.1~1.4 kg · m)

● Pour the engine coolant through the radiator cap inlet.

Engine coolant capacity	
Reserve tank side	230㎖
Radiator side	430㎖
Engine side	940㎖

● Bleed the air from the engine coolant circuit as following procedure.



NOTE

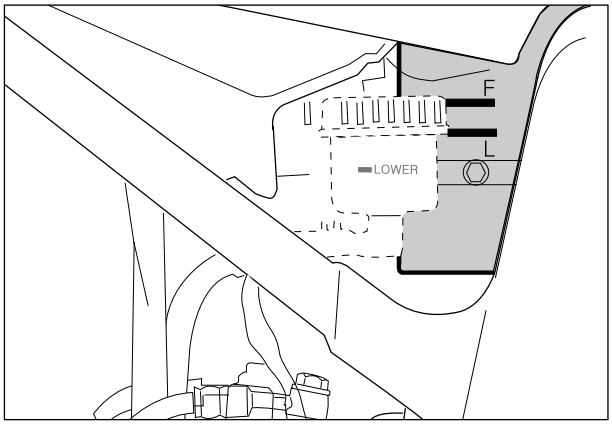
For engine coolant information, refer to page 5-1

⊙ AIR BLEEDING THE COOLING CIRCUIT

● Add engine coolant up to the raditor cap inlet.
● Support the motorcycle upright.
● Slowly swing the motorcycle, right and left, to bleed the air trapped in the cooling circuit.
● Add engine coolant up to the radiator cap inlet.

● Start up the engine and bleed air from the radiator cap inlet completely.
● Add engine coolant up to the radiator cap inlet.
● Repeat the above procedure until no air bleed from the radiator cap inlet.

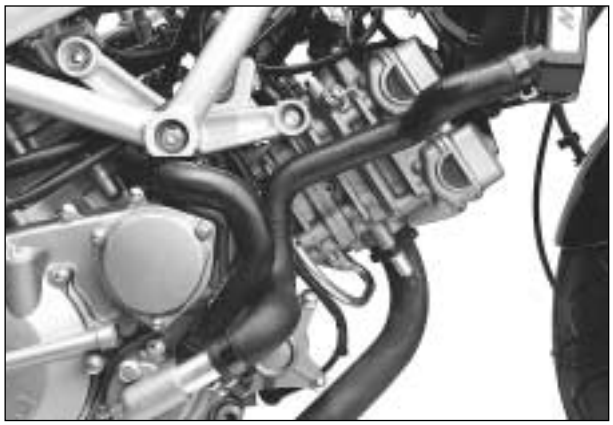
● Close the radiator cap securely.
● After warming up and cooling down the engine several times, add the engine coolant up to the full line(F) of the reserve tank.



⚠ CAUTION

Repeat the above procedure several times and make sure that the radiator is filled with engine coolant up to the reserve tank full line(F).

RADIATOR HOSE



Inspect Interval

Inspect Every 4,000km,
Replace the radiator hose Every 4 years.

Check to see the radiator hose for crack, damage or engine coolant leakage.
If any defects are found, replace the radiator hoses with new ones.

COMPRESSION PRESSURE

The compression of a cylinder is a good indicator of its internal condition.
The decision to overhaul the cylinder is often based on the results of a compression test. Periodic maintenance records kept at your dealership should include compression reading for each maintenance service.

Compression pressure	
Standard	14 kg/cm^2 (at 500 rpm)
Service limit	12 kg/cm^2 (at 500 rpm)
Difference	2 kg/cm^2 (at 500 rpm)

⊙ COMPRESSION TEST PROCEDURE

NOTE

- ❖ ***Before testing the engine for compression pressure, make sure that the cylinder head bolts are tightened to the specified torque values and valves are properly adjusted.***
- ❖ ***Have the engine warmed up by idling before testing.***
- ❖ ***Be sure that the battery used is in fully-charged condition.***

Remove the parts concerned and test the compression pressure in the following manner.
- Loosen the radiator mounting bolts from the frame.

⚠ WARNING

The hot radiator and the hot engine can burn you. Wait until the radiator and the engine are cool enough to touch.

⚠ CAUTION

- **Be careful not to damage the radiator fins.**
- **Do not extract the radiator hose.**

- Remove the fuel tank.
- Remove all the spark plug.
- Fit the compression gauge in one of the plug holes, while taking care that the connection is tighten.
- Keep the throttle grip in full-open position.
- Crank the engine a few seconds with the starter, and record the maximum gauge reading as the compression of that cylinder.

TOOL **Compression gauge : 09915-64510**

Low compression pressure can indicate any of the following conditions :
- Excessively worn cylinder wall
- Worn-down piston or piston rings
- Piston rings stuck in grooves
- Poor seating of valves
- Ruptured or otherwise defective cylinder head gasket

Overhaul the engine in the following cases :
- Compression pressure in one of the cylinder is less than 12kg/㎠.
- The difference in compression pressure between any two cylinder is more than 2kg/㎠.
- All compression pressure readings are nearly 12kg/㎠ even when they measure more than 12kg/㎠.

OIL PRESSURE

Check the oil pressure periodically. This will give a good indication of the condition of the moving parts.

	Standard
Oil pressure	2.0 ~ 6.0 kg/㎠ (at 60 ℃ · 3,000 rpm)

If the oil pressure is lower or higher than the specification, the following causes may be considered.

⊙ LOW OIL PRESSURE

- Oil leakage from the oil passage
- Damaged O-ring
- Defective oil pump
- Combination of above items

⊙ HIGH OIL PRESSURE

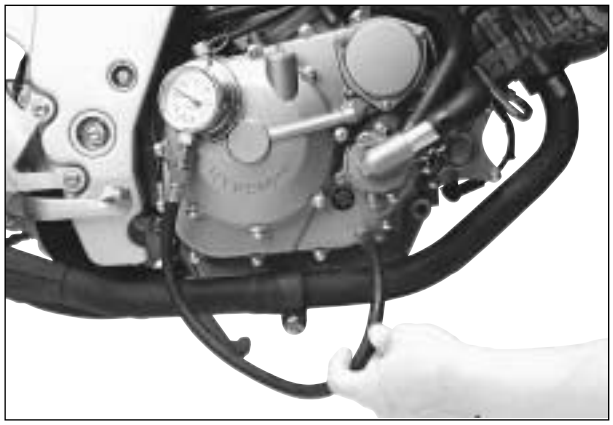
- Engine oil viscosity is too high
- Clogged oil passage
- Combination of the above items

⊙ OIL PRESSURE TEST PROCEDURE

Check the oil pressure in the following manner.

- Remove the oil check plug and install the adapter of oil pressure gauge at the removed position.
- Connect an engine tachometer.
- Warm up the engine as follows :
  Summer : 10 min. at 2,000 rpm.
  Winter : 20 min. at 2,000 rpm.
- After warming up, increase the engine speed to 3,000 rpm. (with the engine tachometer), and read the oil pressure gauge.

TOOL **Oil pressure gauge : 09915-74510**
Engine tachometer : 09900-26006



ENGINE

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⚠ CAUTION

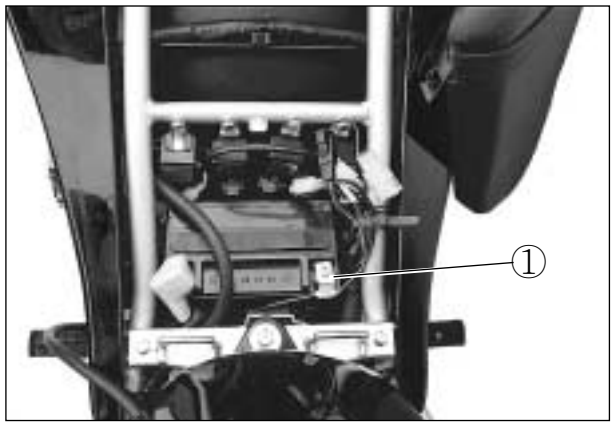
- ❖ Mark an identification of assembly location on each removed part so that each will be restored to the original position during reassembly.
- ❖ Wash clean and dry the removed parts before inspecting and measuring.
- ❖ Oil the rotating or sliding parts before assembly.
- ❖ Make sure to use the correct type of lubricant where specified.
- ❖ Check that each rotating or sliding part moves or operates smoothly after assembly.
- ❖ Make sure to follow the bolt tightening order where specified.
- ❖ If the correct length of the bolt is confused when tightening the crankcase or cover, insert all the bolts and check that the tightening margin is equal in each bolt.

ENGINE REMOVAL AND REINSTALLATION

ENGINE REMOVAL

NOTE

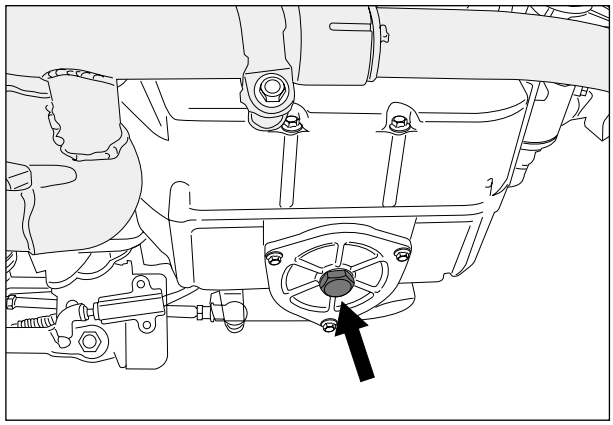
If the engine is dirtied, wash the machine with a suitable cleaner before removing the engine.



- Remove the front seat.(Refer to page 7-1)
- Remove the fuel tank.(Refer to page 4-1)
- Disconnect the battery ⊖ lead wire ①.

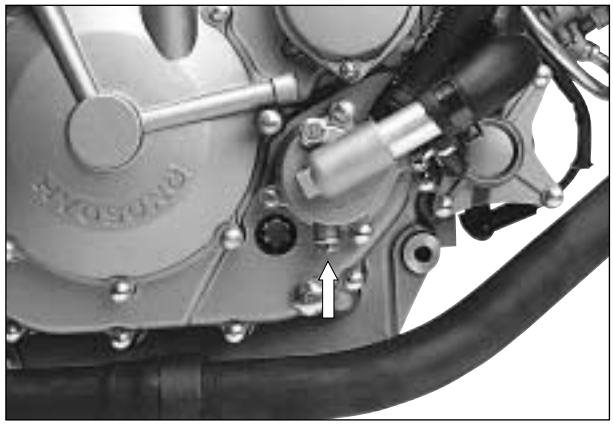
⚠ CAUTION

First, disconnect the ⊖ lead wire.



- Drain engine oil. (Refer to page 2-10)

- Drain engine coolant. (Refer to page 2-20)

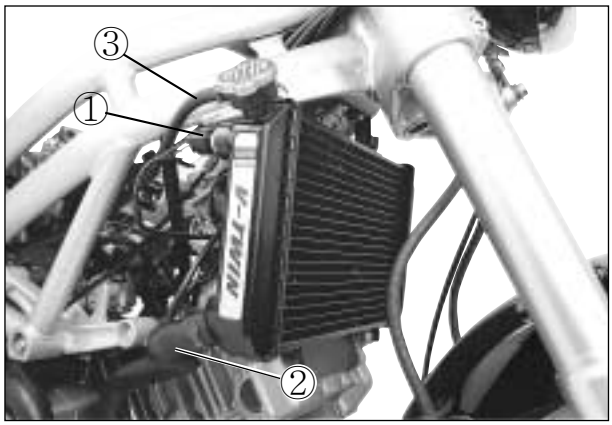


⊙ AIR CLEANER

- With the four hose and the two clamp screw loosened, remove the air cleaner case.

⊙ COOLING FAN

● Disconnect the cooling fan thermo-switch lead wire coupler ①.
● Disconnect the radiator outlet hose ②.
● Disconnect the reserve tank hose ③.
● Remove the radiator mounting bolts. (Refer to page 5-2)



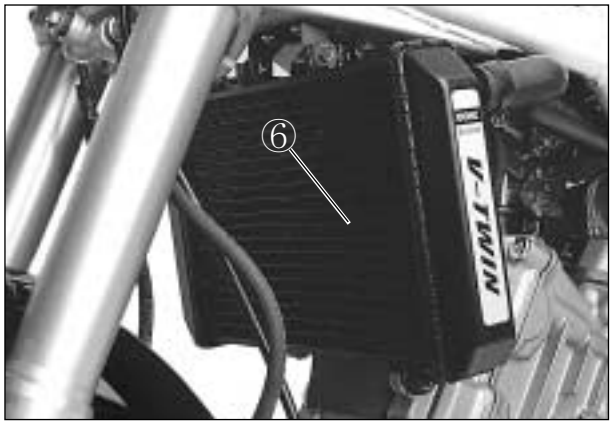
● Disconnect the radiator inlet hose ④.

● Disconnect the cooling fan motor lead wire coupler ⑤.

● Remove the radiator ⑥.

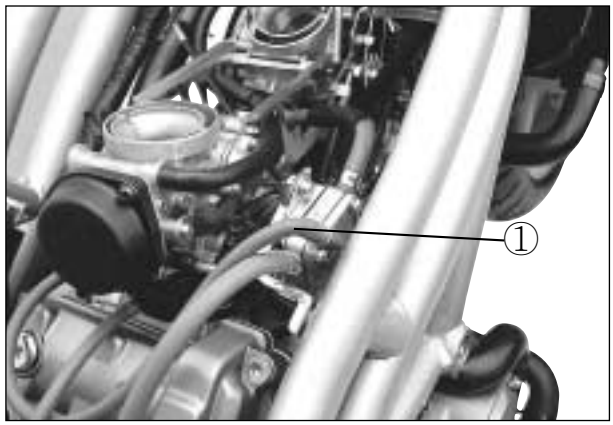
⚠ CAUTION

Be careful not to bend the radiator fin.



⊙ CARBURETOR

● Remove the carburetor after removed the intake pipes. (Refer to page 4-4)
● Disconnect the vacuum hoses ①.

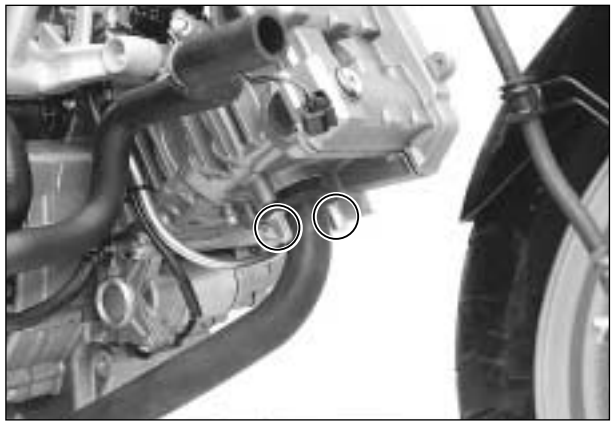


⊙ CLUTCH CABLE

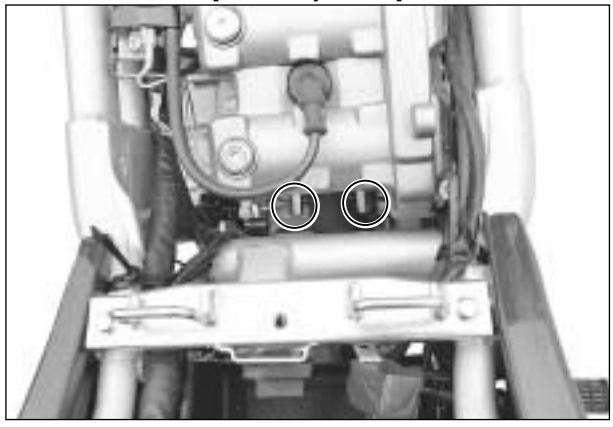
● Disconnect the clutch cable end out of clutch lever.
● Disconnect the clutch cable end out of clutch release arm.

⊙ EXHAUST PIPE AND MUFFLER

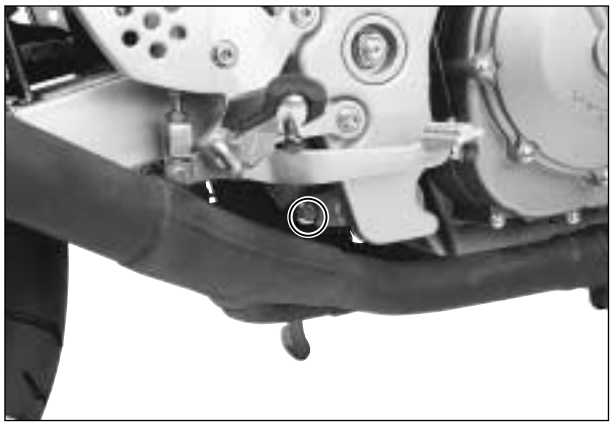
● With the exhaust pipe bolts and muffler mounting bolts removed, remove the exhaust pipes and muffler.



[Front Cylinder]

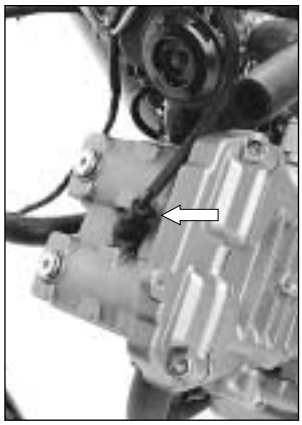


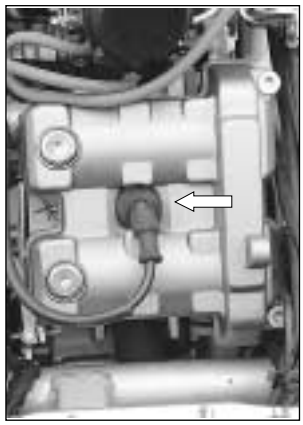
[Rear Cylinder]



⊙ ELECTRIC PARTS

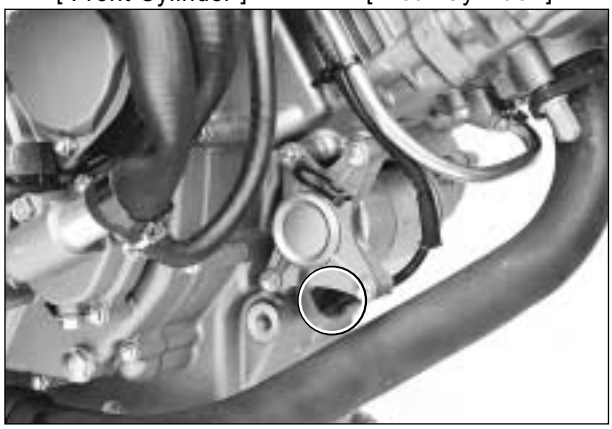
● With take out the spark plug caps, remove the spark plug.



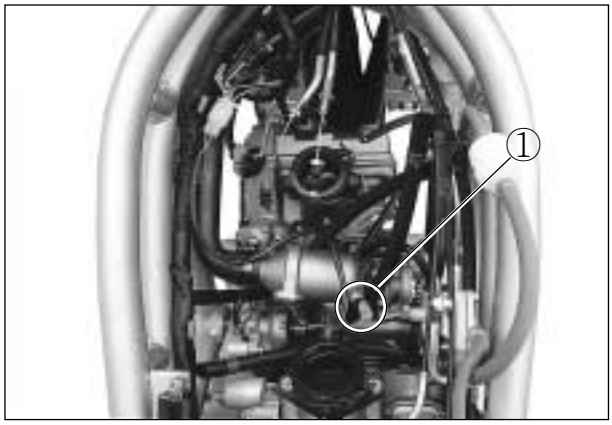


[Front Cylinder] [Rear Cylinder]

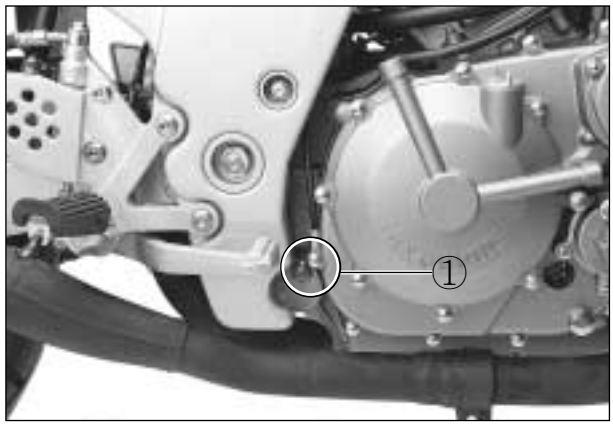
● Remove the starter motor lead wire.



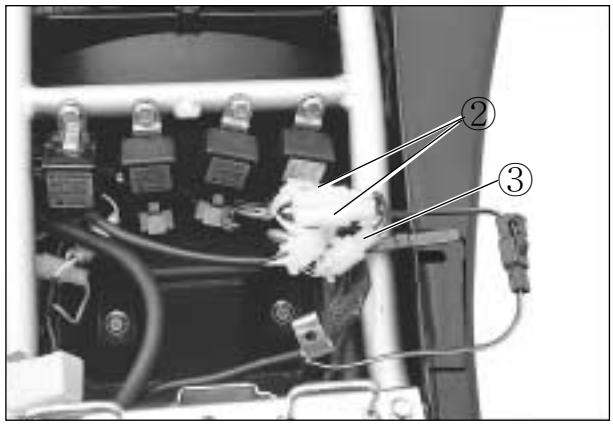
● Disconnect the engine coolant temperature sensor lead wire ①.



● Remove the engine ground lead wire ①.

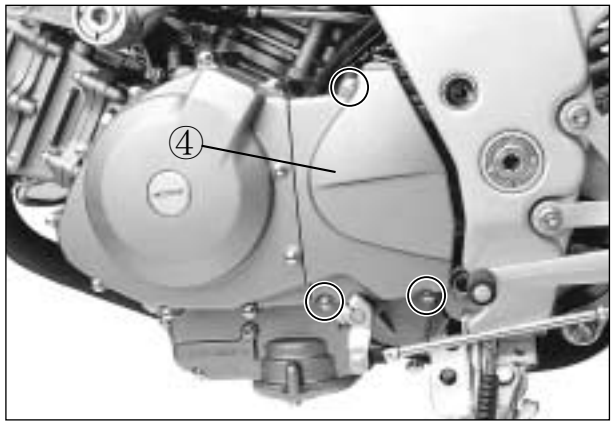


● Disconnect the two magneto coupler ②.
● Disconnect the neutral switch terminal.
● Disconnect the side-stand switch lead wire couper ③.

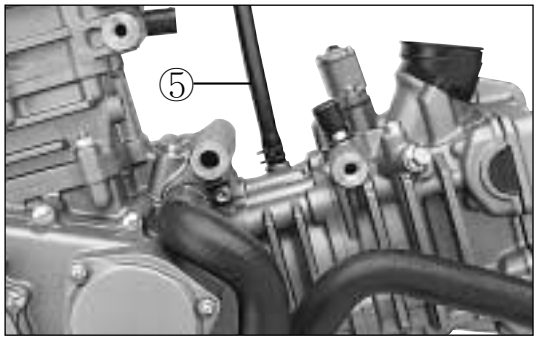


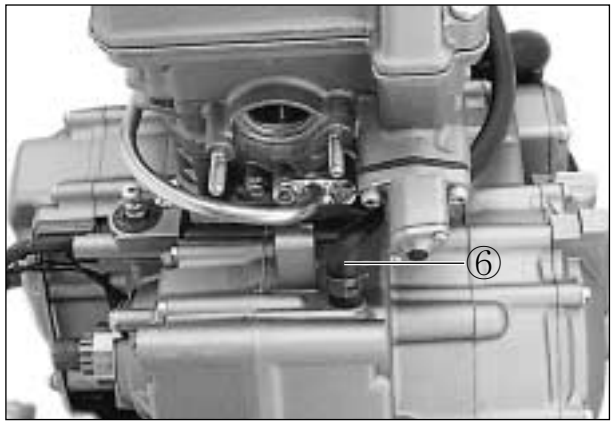
⊙ ENGINE SPROCKET

● Remove the engine sprocket cover ④.

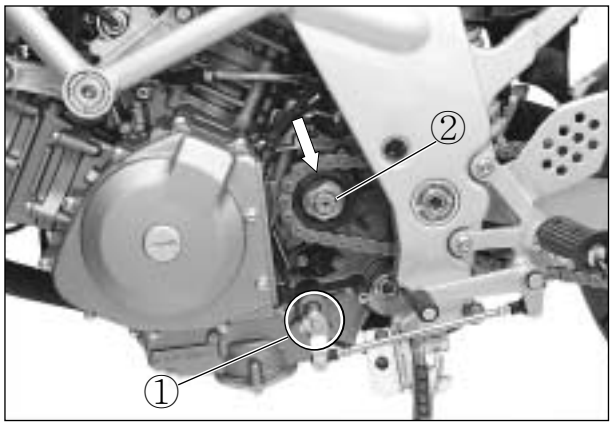


● Disconnect the front side of crankcase breather hose ⑤ and rear side of crankcase breather hose ⑥.





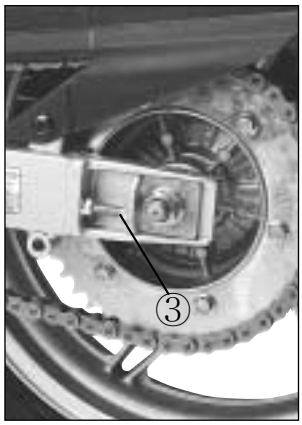
● Remove the gearshift arm ①.
● Flatten the lock washer.
● Remove the engine sprocket nut ② and washer.

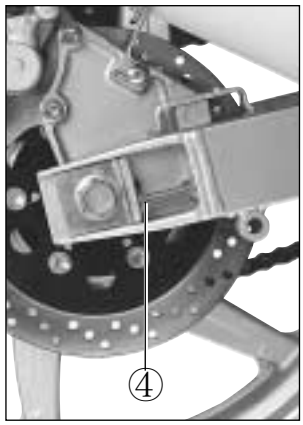


NOTE

When loosening the engine sprocket nut, depress the brake pedal.

● Remove the engine sprocket.



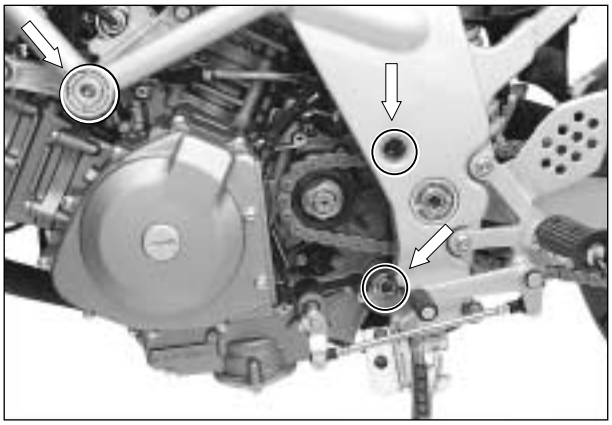


NOTE

If it is difficult to remove the engine sprocket, loosen the rear axle nut, chain adjusters ③ · ④ to provide additional chain slack.(Refer to page 2-13)

● Support the engine using an engine jack.
● Remove the engine mounting nuts, bolts and engine mounting lock nuts with the special tool.

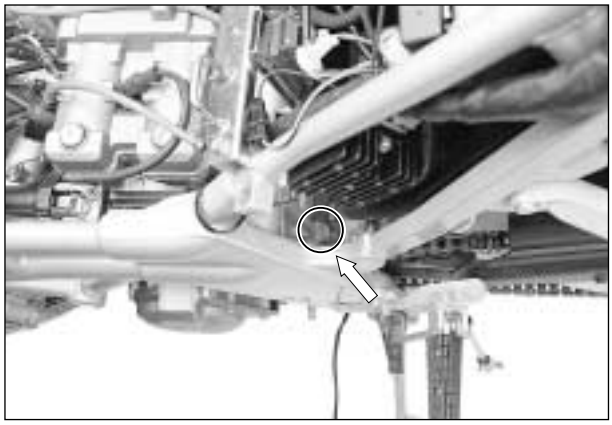
TOOL Engine mounting socket wrench (M20) : 09940H30010
Engine mounting socket wrench (M26) : 09940H35010



● Remove the engine from the frame.

⚠ CAUTION

Remove the carburetor when removing or installing the engine necessarily.
When removing the carburetor , loosen the intake pipe mounting bolts at the same time.



ENGINE REINSTALLATION

Reinstall the engine in the reverse order of engine removal.

● Install the engine mounting bolts, nuts and engine mounting lock nuts with the special tool.

TOOL Engine mounting socket wrech (M20)
: 09940H30010
Engine mounting socket wrech (M26)
: 09940H35010

● Tighten the engine mounting bolts, nuts and engine mounting lock nuts to the specified torque.

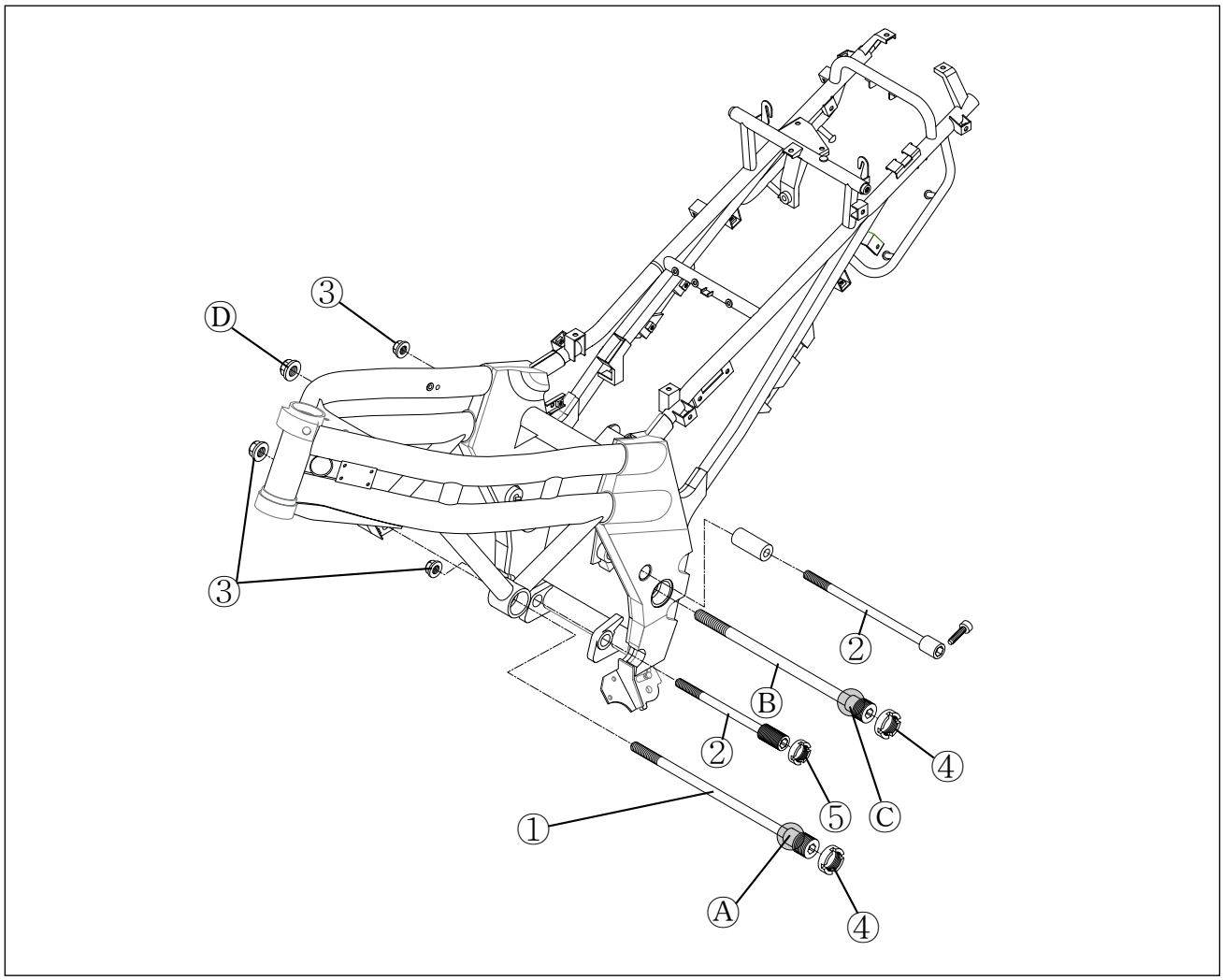
Engine mounting bolt ①, ②
: 40～80 N · m (4.0～8.0 kg · m)
Engine mounting nut ③
: 45～70 N · m (4.5～7.0 kg · m)
Engine mounting lock nut (M26) ④
: 45~70 N · m (4.5～7.0 kg · m)
Engine mounting lock nut (M20) ⑤
: 35~55 N · m (3.5～5.5 kg · m)

⚠ CAUTION

Set the part Ⓐ of engine mounting bolt ① align center line by the hand temporarily and install the engine mounting bolt to the specified torque.
If otherwise, it is damage to the thread of engine mounting bolt.

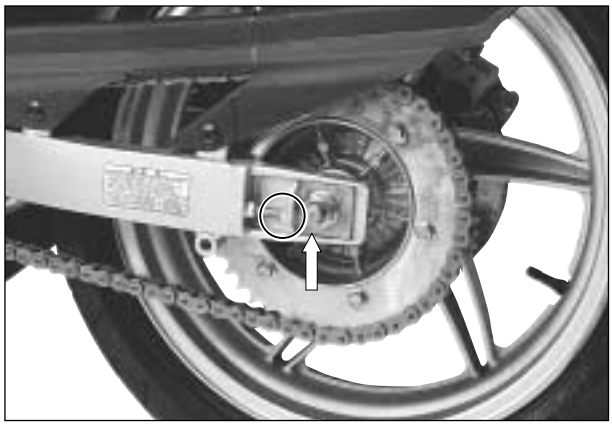
NOTE

Set the part Ⓒ of swingarm pivot shaft Ⓑ align center line by the hand temporarily and install the swingarm pivot shaft to the specified torque.
Swingarm pivot shaft Ⓑ
: 40~80 N · m (4.0~8.0 kg · m)
Swingarm pivot nut Ⓓ
: 50~80 N · m (5.0~8.0 kg · m)



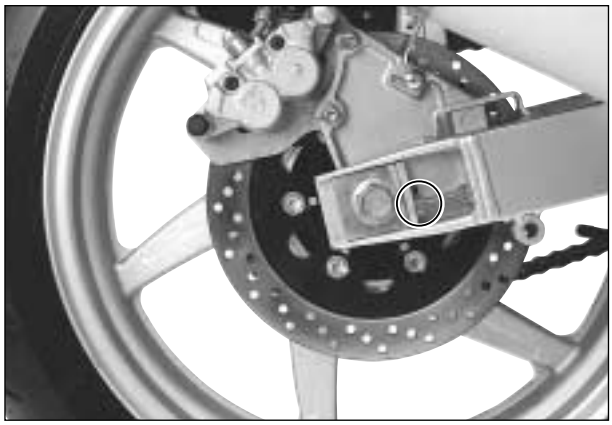
⊙ ENGINE SPOCKET

- Loosen the rear axle nut and chain adjusters, left and right.
- Install the engine sprocket.



- Tighten the engine sprocket nut ① to the specified torque.

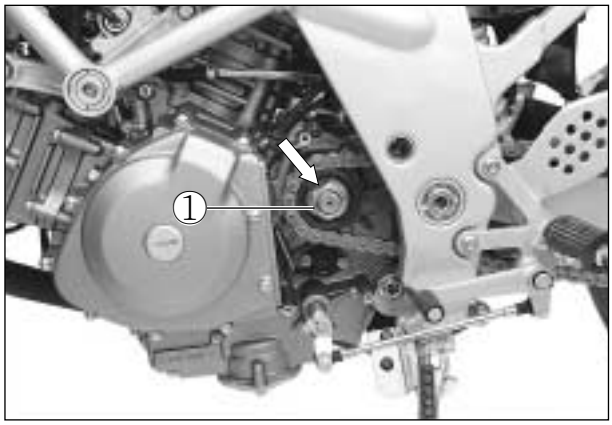
Engine sprocket nut
: 130~160 N · m (13.0~16.0 kg · m)



NOTE
When tightening the engine sprocket nut, depress the rear brake pedal.

- Bend the lock washer securely.

- Install the gearshift arm and adjust the gearshift lever height.(Refer to page 2-9)



- Install the breather hose and engine sprocket cover.
- Connect each electric parts and its couplers.(Refer to page 8-24~28)
- Install the exhaust pipes and mufflers.
- Install the carburetor and air cleaner. (Refer to page 4-7)
- Install the radiator. (Refer to page 5-4)

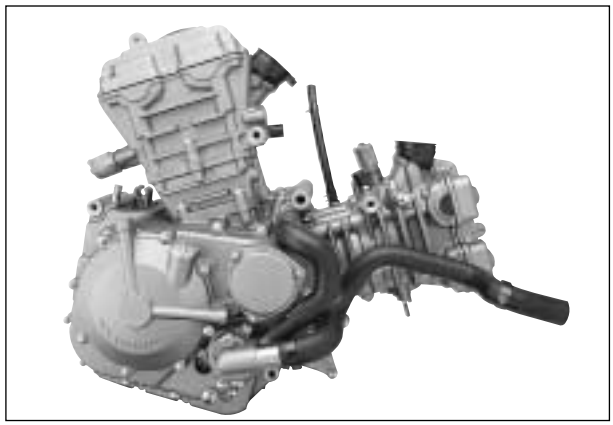
- After remounting the engine, the following adjustments are necessary.

Engine idling speed ..... Refer to page 2-7
Throttle cable play ..... Refer to page 2-8
Clutch cable play ..... Refer to page 2-9
Drive chain ..... Refer to page 2-12
Gearshift lever height ..... Refer to page 2-9
Engine oil level ..... Refer to page 2-9
Engine coolant ..... Refer to page 2-20

ENGINE DISASSEMBLY

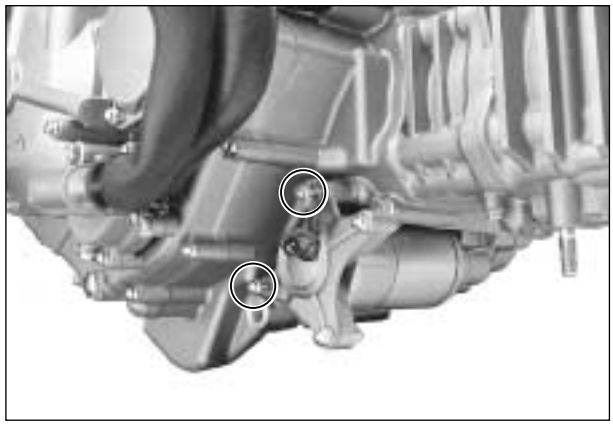
⚠ CAUTION

Identify the position of each removed part. Organize the parts in their respective groups so that they can be reinstalled in their original positions.

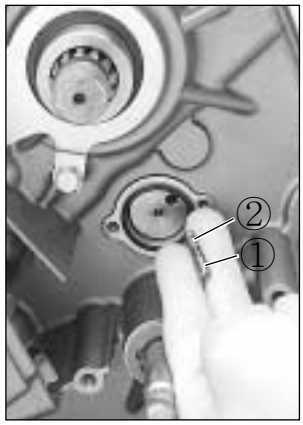


STARTER MOTOR

● Remove the starter motor.



● Remove the gear position switch.
● Remove the contacts ① and springs ②.

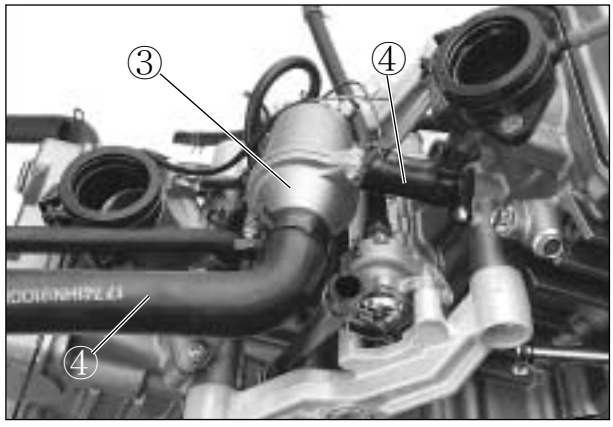


THERMOSTAT

● Remove the thermostat case ③ along with the hose ④.

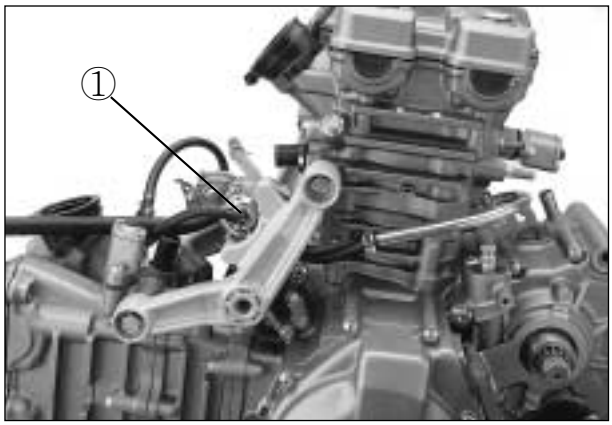
NOTE

Thermostat inspection and servicing
: Refer to page 5-8



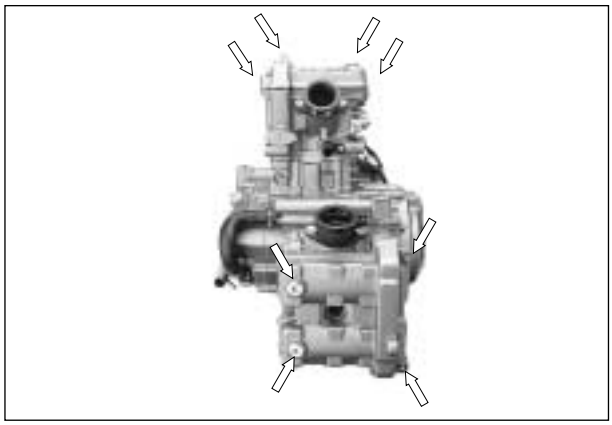
2ND AIR VALVE

● Remove the 2nd air valve ① with the bracket.



CYLINDER HEAD COVER

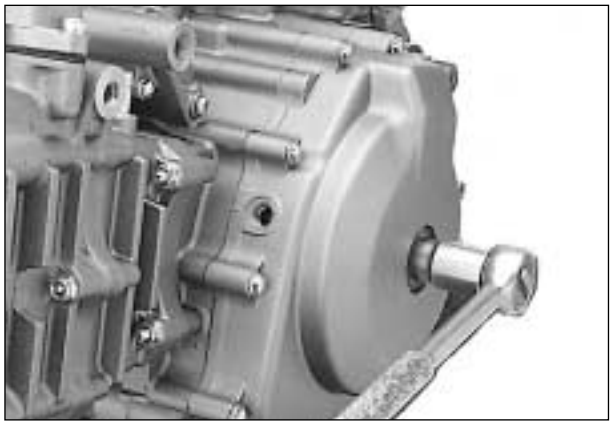
● Remove the cylinder head cover.



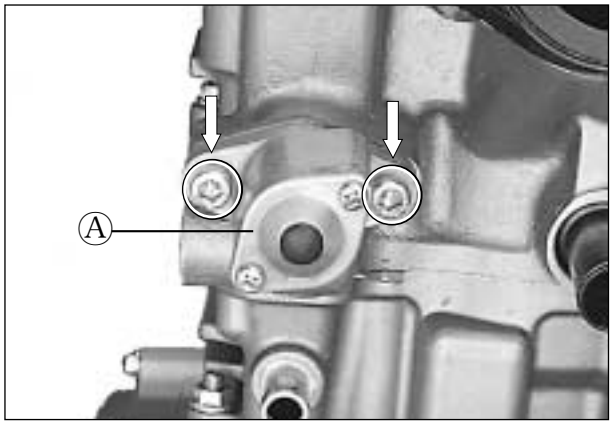
● To set the piston at TDC(Top Dead Center).

⚠ CAUTION

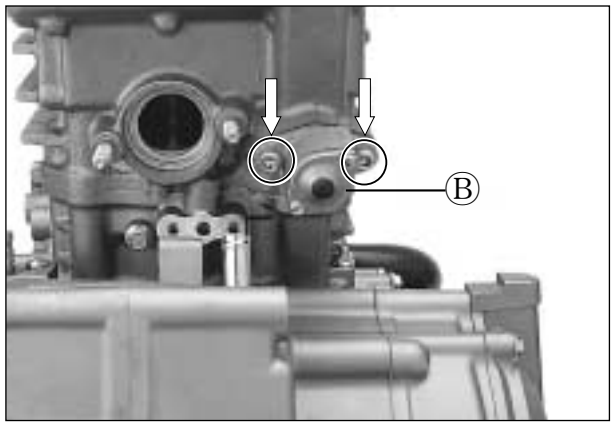
Align the index mark on the magneto rotor with the index mark on the magneto cover as turn the crankshaft counter-clockwise.
To set piston at TDC(Top Dead Center) of the compression stroke as align the " ∣F" mark for front cylinder and the " ∣R" mark for rear cylinder.



● Remove the cam chain tensioner Ⓐ, Ⓑ.

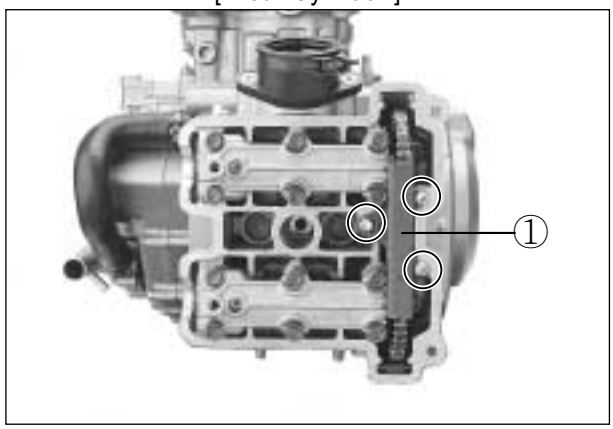


[Front Cylinder]



[Rear Cylinder]

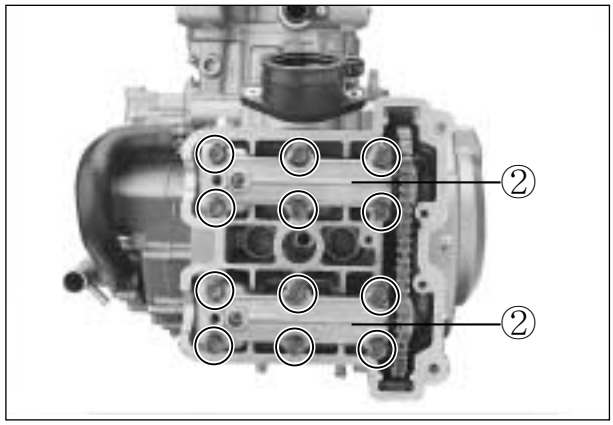
● With the three bolts removed, remove the cam chain guide NO.2 ①.



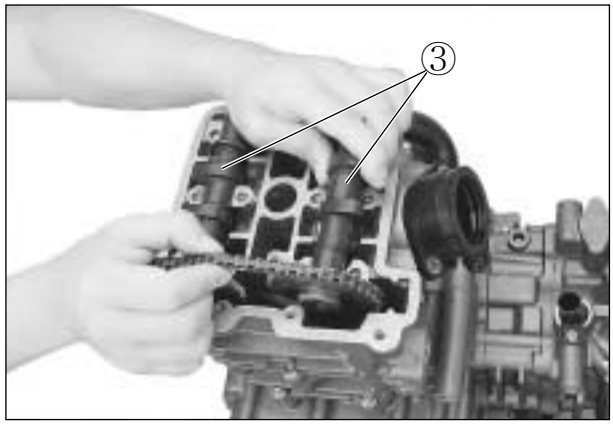
● Remove the camshaft housing ②.

NOTE

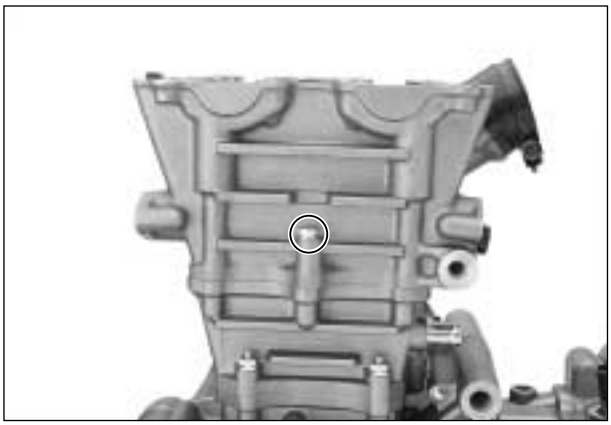
Mark an identification of assembly location on each removed parts so that each will be restored to the original position during reassembly.



● Remove the camshaft (IN. · EX.) ③.



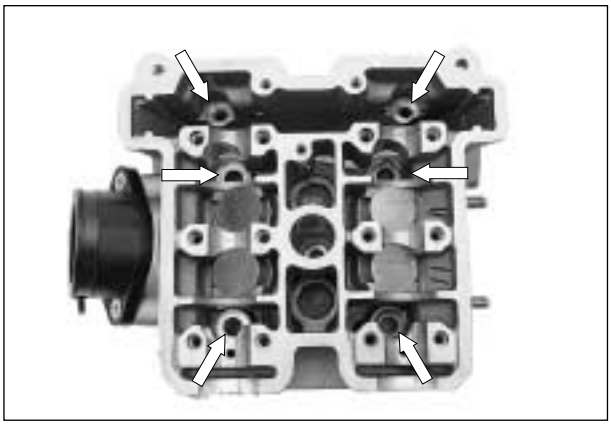
● Loosen the cylinder head base bolt.



● Loosen the six cylinder head bolts.

NOTE

When loosening the cylinder head bolts, loosen each bolt little by little diagonally.

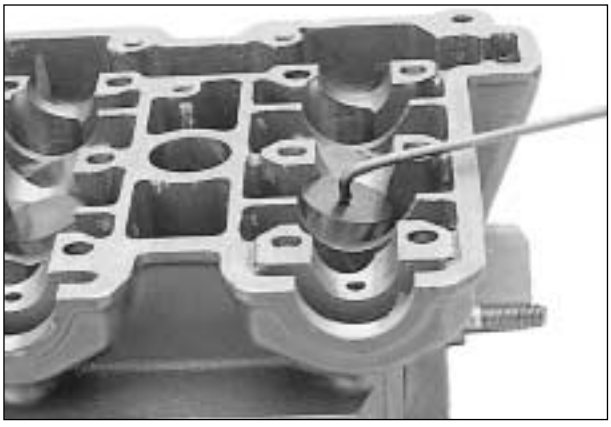


● Remove the chain guide NO.1 and cylinder head.

● Remove the tappet and the shim.

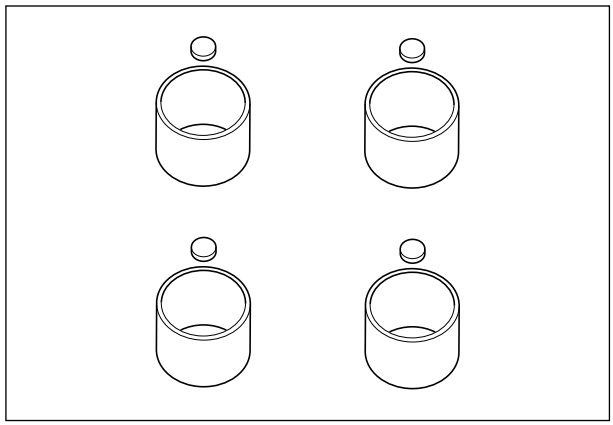
⚠ CAUTION

Draw out the tappet and shim with the strong magnet not to be scratched.



⚠ CAUTION

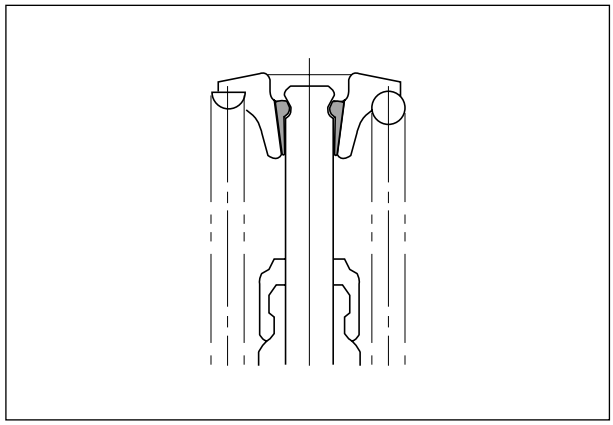
The tappet and shim should be lined so that each will be restored to the original position during reassembly.



● Compress the valve spring by using the special tool.

TOOL **Valve spring compressor : 09916-14510**
Valve spring compressor attachment : 09916-14520

● Take out the valve cotter from the valve stem.
● Remove the valve spring retainer.
● Pull out valve from the other side.

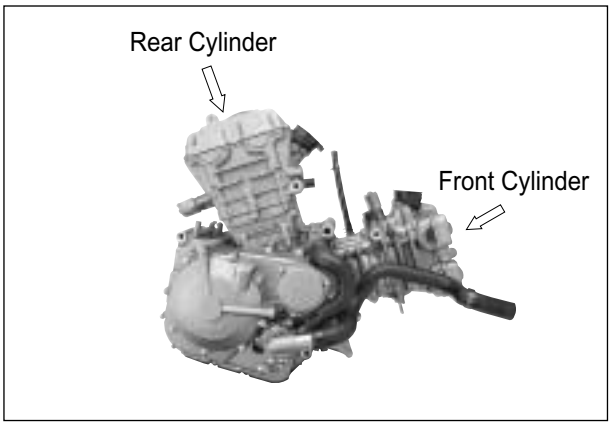


● Remove the two cylinder base nuts and cylinder.

⚠ CAUTION

If tapping with the plastic hammer is necessary, pay attention to break the fins.

● Remove the rear cylinder head and cylinder with the same manner of the front cylinder head and cylinder removal.



PISTION

● Place a clean rag over the cylinder base to prevent piston pin circlips from dropping into crankcase. Remove the piston pin circlips with long-nose pliers.

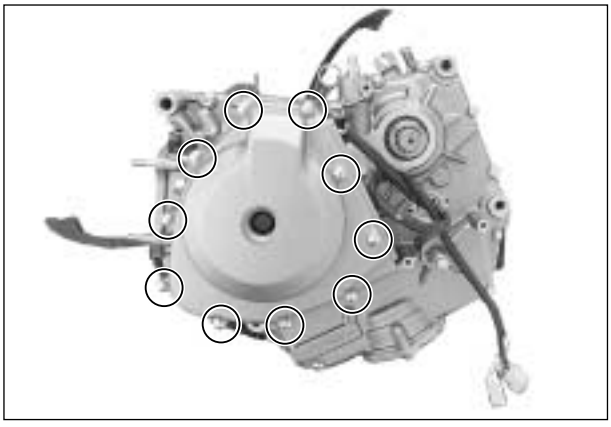
● Remove the piston pin by using the special tool.

TOOL Piston pin puller : 09910-34510

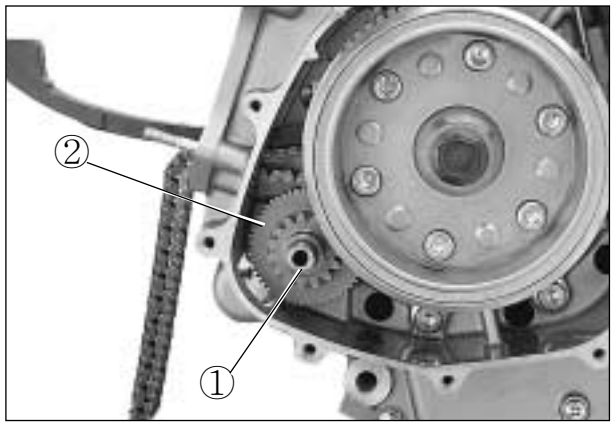
NOTE
Make an identification on each piston head so that confirmed the cylinder.

MAGNETO COVER

● Remove the magneto cover.



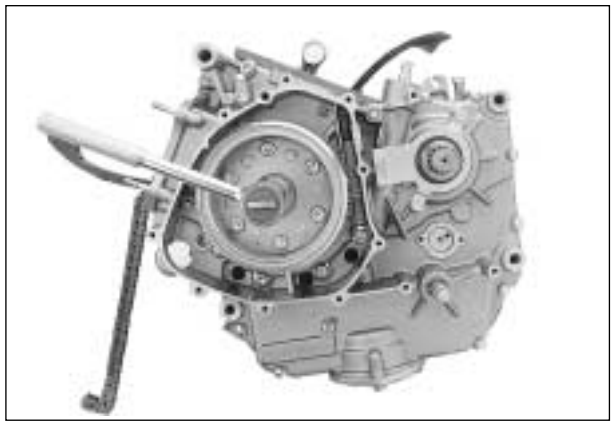
● Remove the starter idle shaft ①, starter idle gear ②.



MAGNETO ROTOR

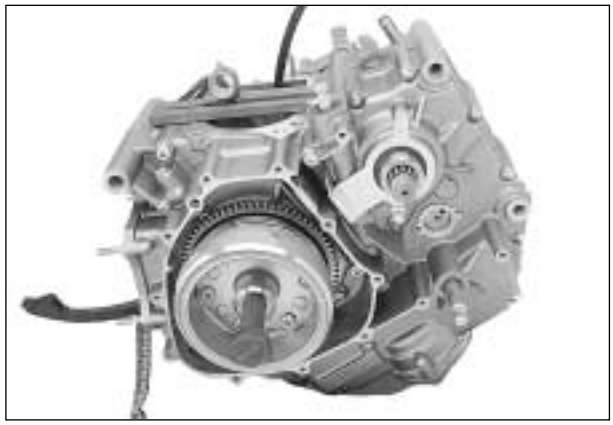
● With the magneto rotor held immovable using the special tool, loosen the rotor nut.

TOOL **Conrod holder : 09910-20115**

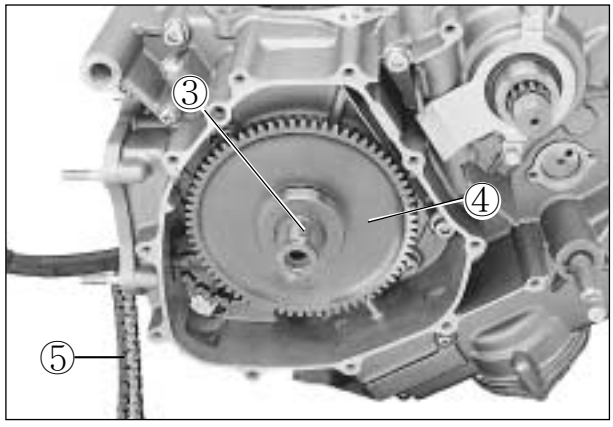


● Remove the magneto rotor by using the special tool.

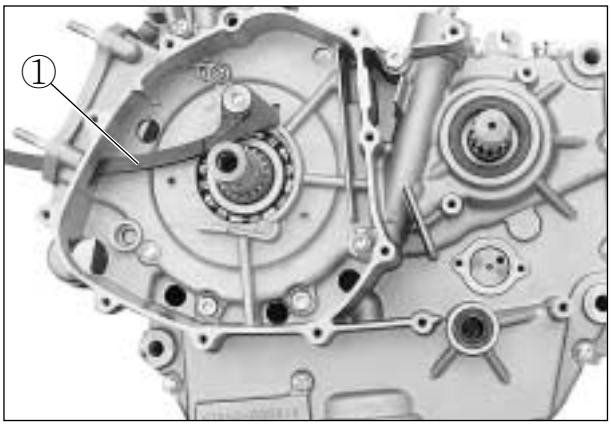
TOOL **Rotor remover : 09930-30165**



● Remove the key ③.
● Remove the starter driven gear ④.
● Remove the cam chain ⑤.

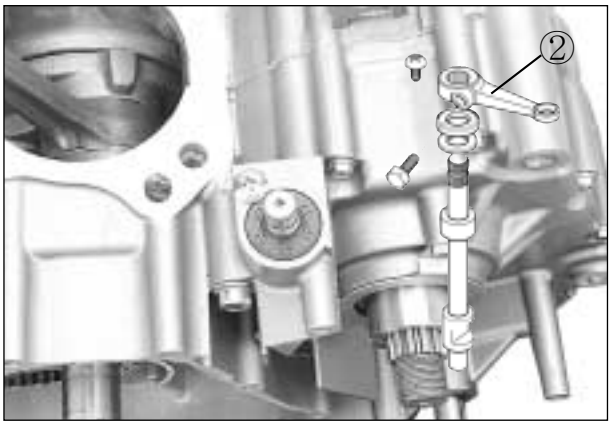


● Remove the cam chain tensioner ①.

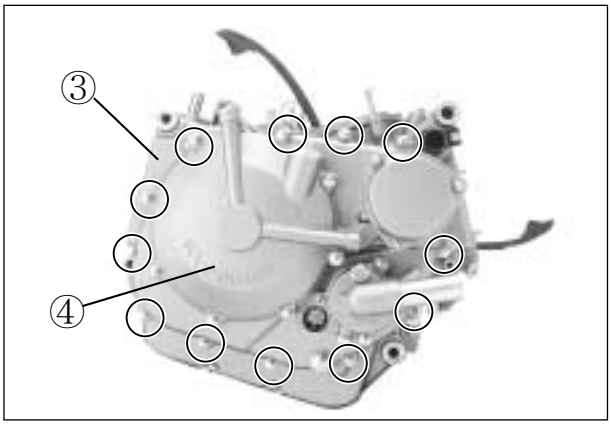


CLUTCH COVER

● Remove the clutch release arm ②.



● Remove the clutch cover bolts.
● Remove the clutch cover ③.



NOTE

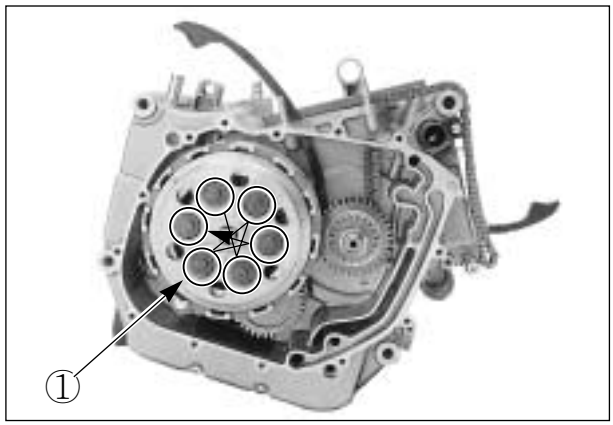
When remove or inspect the clutch drive and driven plate, remove only the clutch pressure cover ④.

CLUTCH

● With the primary drive gear held immovable using the special tool, remove the clutch spring mounting bolts diagonally.

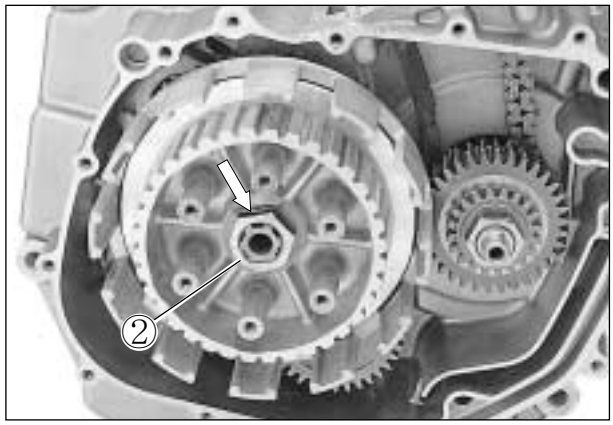
TOOL **Conrod holder : 09910-20115**

● Remove the disk pressure ①.



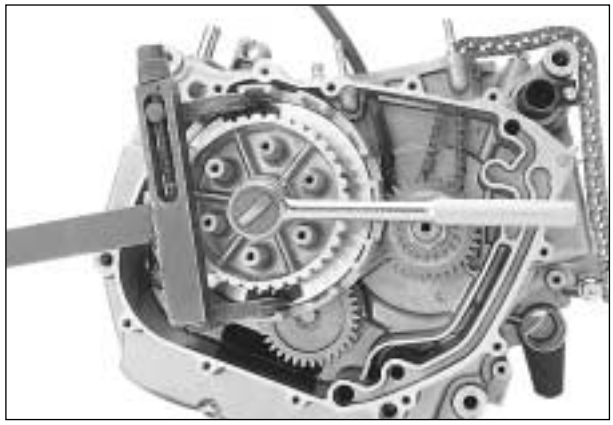
● Remove the clutch drive plates NO. 1 and driven plates.
● Remove the spring washer and spring washer seat.
● Remove the clutch drive plate NO. 2.

● Flatten the lock washer ②.

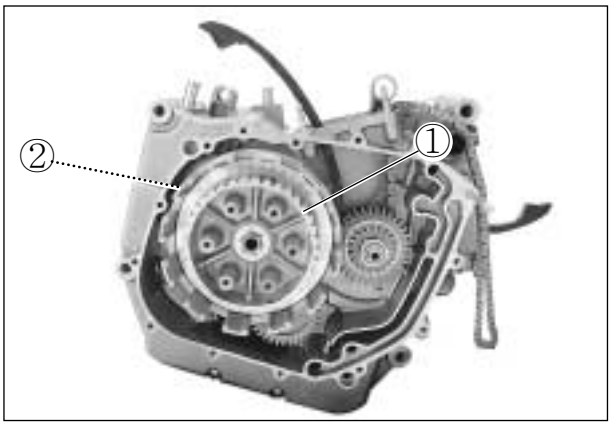


● With the clutch sleeve hub held immovable using special tool, remove the clutch sleeve hub nut.

TOOL **Clutch sleeve hub holder : 09920-53710**



● Remove the clutch sleeve hub ① and primary driven gear assembly ② .



PRIMARY DRIVE GEAR

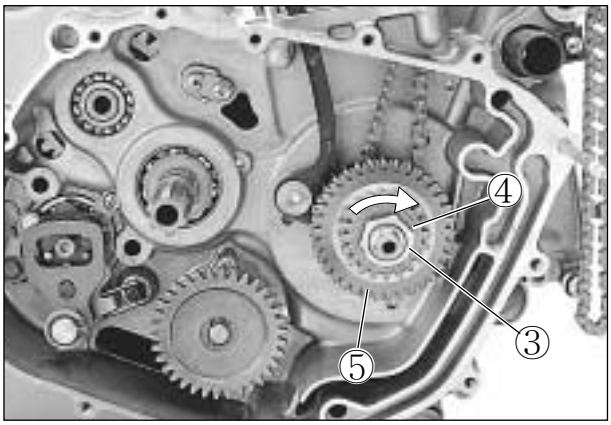
● With the crankshaft held immovable using special tool, remove the primary drive gear nut ③.

● Remove the water pump drive gear ④ and primary drive gear ⑤.

TOOL **Conrod holder : 09910-20115**

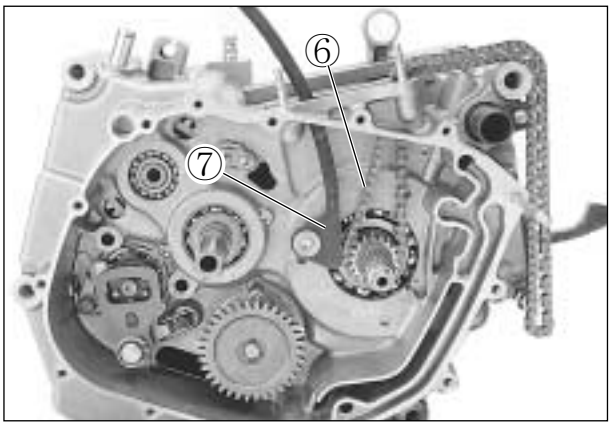
⚠ CAUTION

This nut has left-hand thread. If turning it counterclockwise (↶), it may cause damage.
Pay attention at the primary drive gear nut with a washer, and water pump drive gear with a washer.



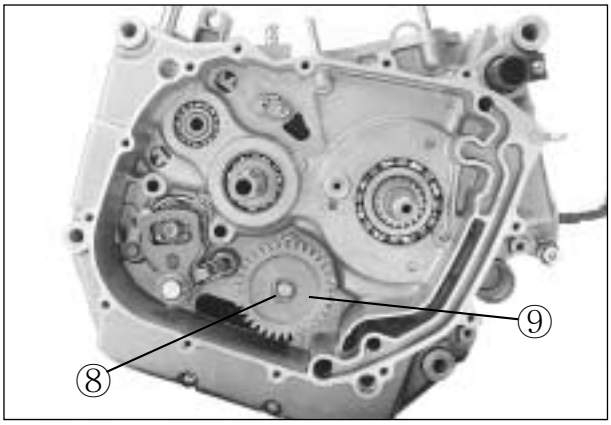
● Remove the cam chain ⑥.

● Remove the cam chain tensioner ⑦.

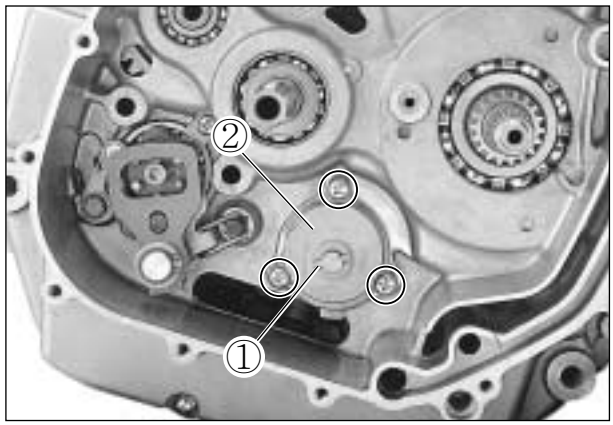


OIL PUMP

● Remove the circlip ⑧ and oil pump driven gear ⑨.

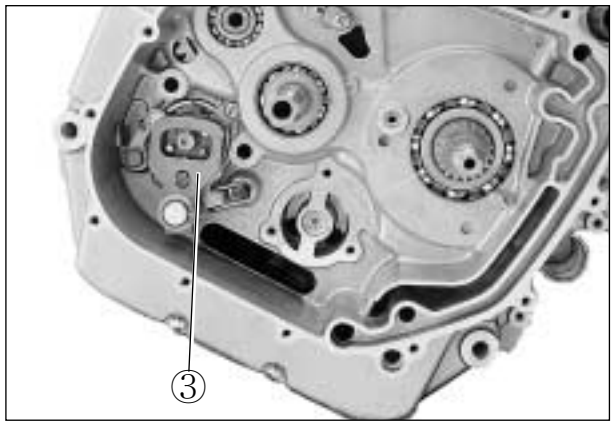


● Remove the pin ① and shim.
● With the three screws loosened, remove the oil pump ②.

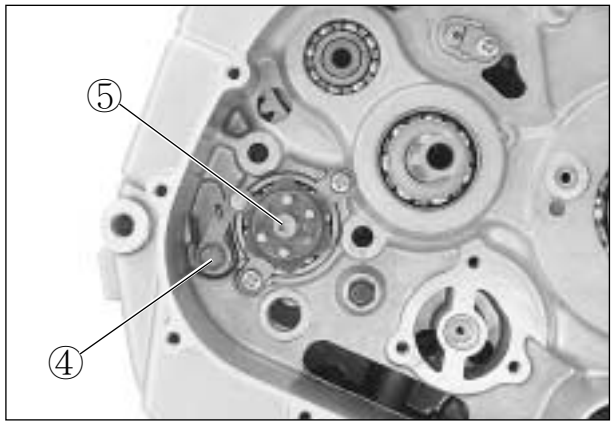


GEARSHIFT SHAFT

● Draw out the gearshift shaft ③.



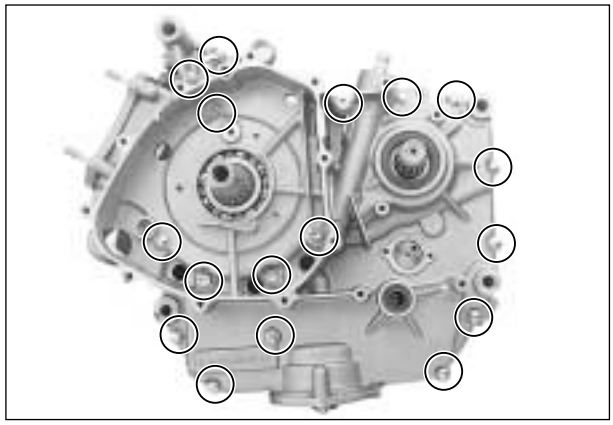
● Remove the gearshift cam stopper ④.
● Loosen the gearshift cam plate bolt ⑤.
● Remove the gearshift cam stopper plate.

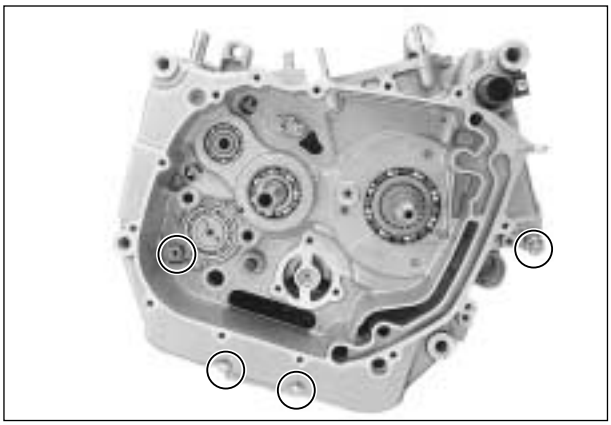


● Remove the crankcase securing bolts, right and left.

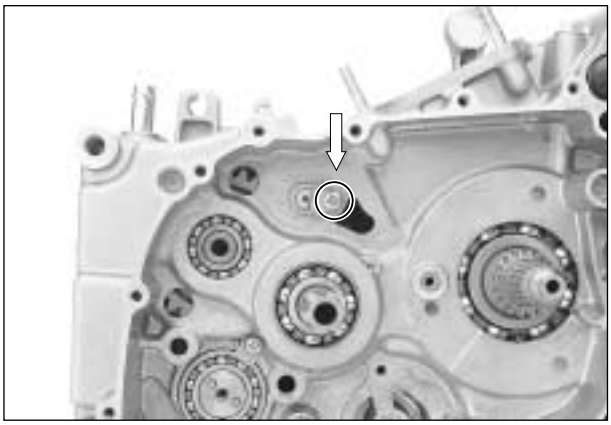
NOTE

Loosen the crankcase bolts diagonally and smaller sizes first.





● Remove the mission oil pipe mounting bolt.



● Separate the crankcase into 2 parts, right and left, with a special tool.

TOOL **Crankcase separator : 09920-13120**

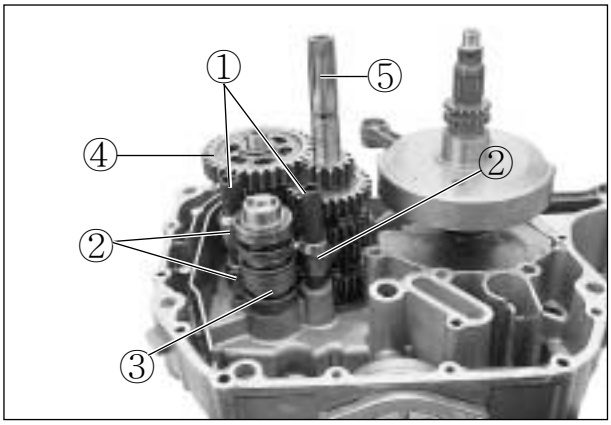
⚠ CAUTION

When separating the crankcase, necessarily, remove it after installed the special tool (Crankcase separator) on the side of clutch.
In case separate oppositely, the gearshift cam stopper will be damaged in the side of magneto.

NOTE

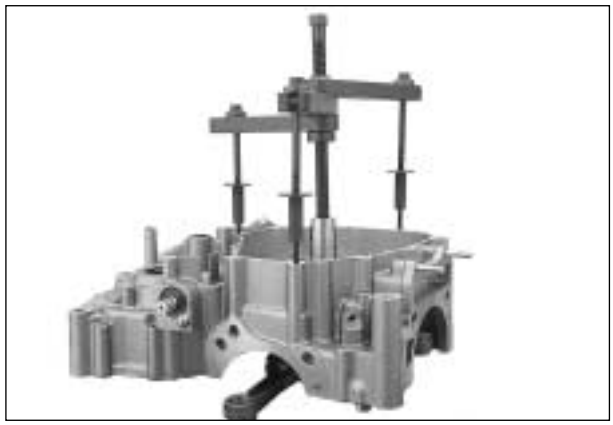
Fit the crankcase separater, so that the tool arms parallel the side of the crankcase.

● Remove the gearshift fork shaft ① and gearshift fork ②.
● Remove the gearshift cam ③.
● Remove the driveshaft assembly ④, countershaft assembly ⑤.



● Remove the crankshaft by using the special tool.

TOOL **Crankcase separator : 09920-13120**



ENGINE COMPONENT INSPECTION AND SERVICE

⚠ CAUTION

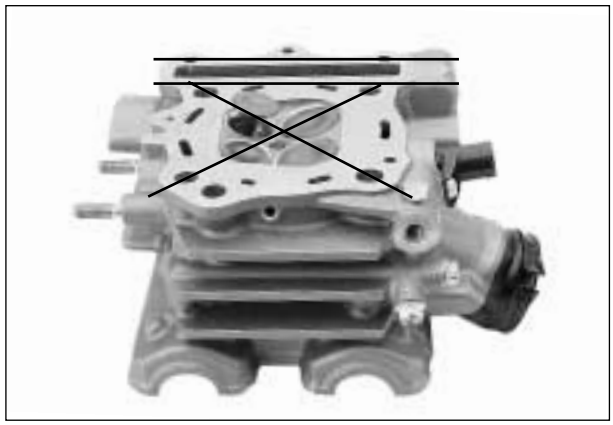
Be sure to identify each removed part as to its location, and lay the parts out in groups designated as "Front cylinder", "Rear cylinder", "Exhaust", "Intake", so that each will be restored to the original location during assembly.

⊙ CYLINDER HEAD DISTORTION

Decarbonate in combustion chamber.
Check the gasketed surface of the cylinder head for distortion with a straightedage and thickness gauge, taking a clearance reading at several places as indicated. If the largest reading at any position of the straightedge exceeds the limit, replace the cylinder head.

Cylinder head distortion	Service limit
	0.05 mm (0.002 in)

TOOL **Thickness gauge : 09900-20806**

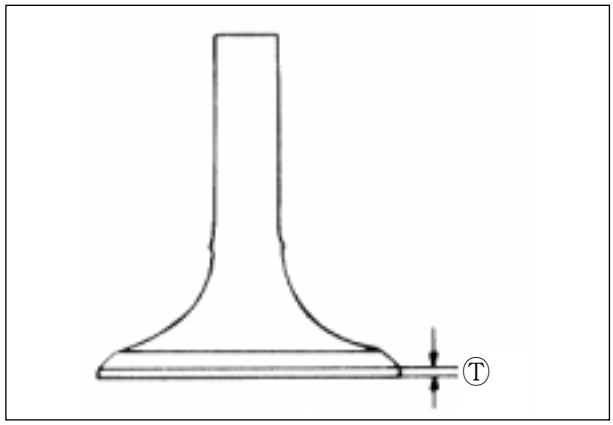


⊙ VALVE FACE WEAR

Visually inspect each valve face for wear. Replace any valve with an abnormally worn face. The thickness of the valve face decreases as the face wears. Measure the valve head thickness Ⓣ. If it is out of specification, replace the valve with a new one.

Valve head thickness Ⓣ	Service limit
	0.5 mm (0.02 in)

TOOL **Vernier calipers : 09900-20101**

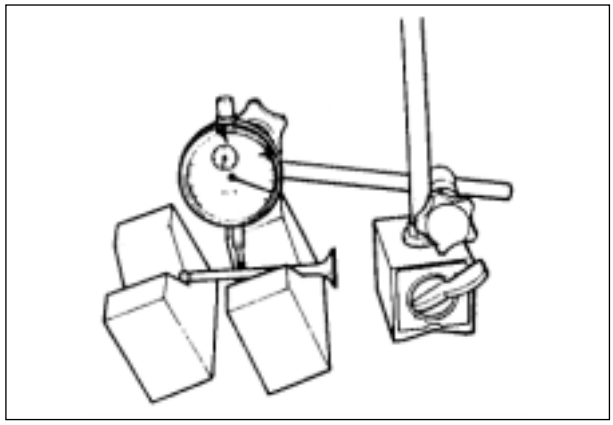


⊙ VALVE STEM RUNOUT

Check the valve stem for abnormal wear or bend.
Place the valve on V-blocks and measure runout.
If the service limit is exceeded or abnormal condition exists, replace the valve.

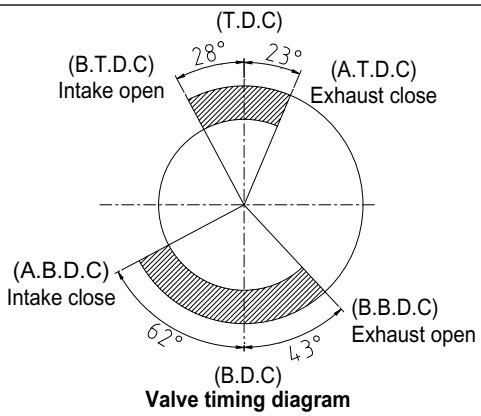
Valve stem runout	Service limit
	0.05 mm (0.002 in)

TOOL **Dial gauge : 09900-20606**
Magnetic stand : 09900-20701
V-block : 09900-21304



⊙ CAMSHAFT

The camshaft should be checked for runout and also for wear of cams and journals if the engine has been noted to produce abnormal noise or vibration or a lack of output power. Any of these abnormality could be caused by a worn camshaft.



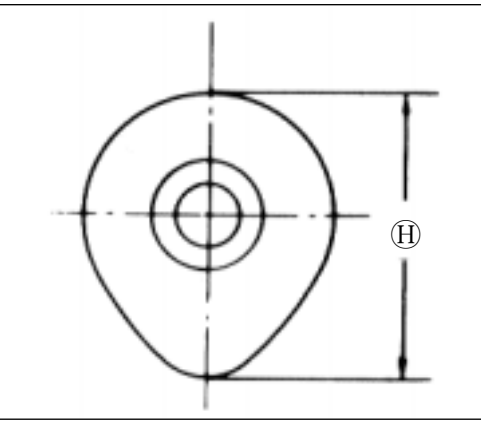
Valve timing diagram

■ CAMSHAFT WEAR

Worn-down cams are often the cause of mistimed valve operation resulting in reduced output power.

The limit of cam wear is specified for both intake and exhaust cams in terms of cam height Ⓗ, which is to be measured with a micrometer. Replace camshafts if found it worn down to the limit.

Cam height Ⓗ	Service limit
Intake cam	34.98 mm (1.377 in)
Exhaust cam	33.08 mm (1.302 in)



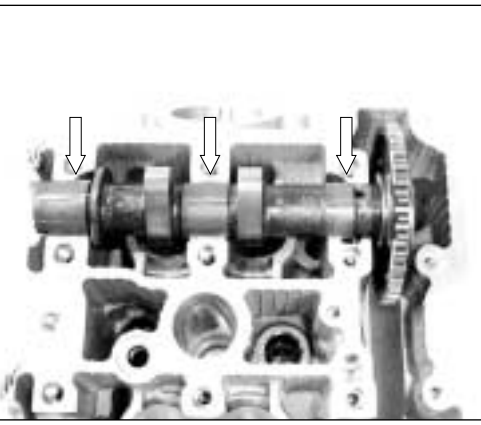
TOOL **Micrometer(25~50 mm) : 09900-20202**

■ CAMSHAFT JOURNAL WEAR

Determine whether or not each journal is worn down to the limit by measuring the oil clearance with the camshaft installed in place.

● Use the plastigauge to read the clearance at the widest portion, which is specified as follows :

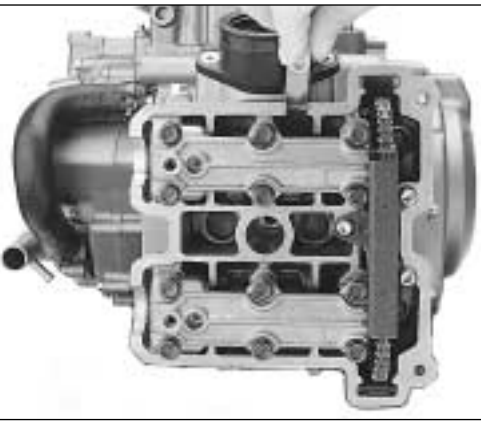
Camshaft journal oil clearance (IN & EX)	Service limit
	0.15 mm (0.006 in)



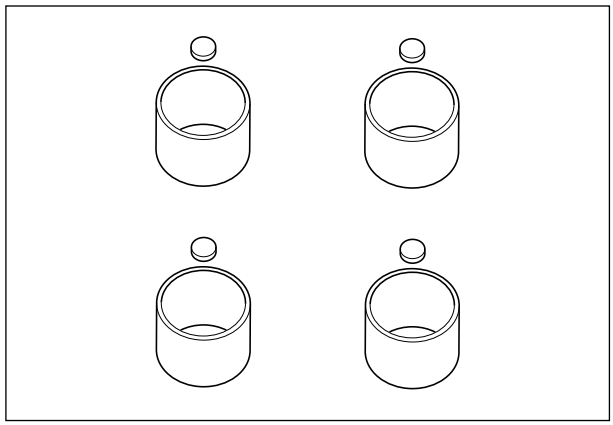
⊙ TAPPET & SHIM WEAR

When measuring the valve clearance, the clearance should be within the standard range.

Valve clearance	Standard(When cold)
Intake valve	0.1 ~ 0.2 mm (0.004 ~ 0.008 in)
Exhaust valve	0.2 ~ 0.3 mm (0.008 ~ 0.012 in)



● Inspect the tappet for wear and scratch.
If modification or scratch is present, replace the tappet.
● When you checked the valve clearance, if the valve clearance is wide please replace the present shim into thick one, if the valve clearance is narrow please replace the present shim into thin shim. (Refer to page 8-29 · 30)

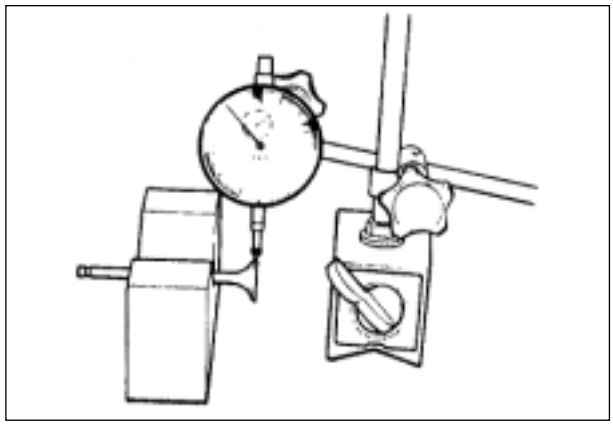


■ SHIM KIND
There are 41 kinds of shim which thickness is increased by each 0.025 mm from 1.20 mm to 2.20 mm.

⊙ VALVE HEAD RADIAL RUNOUT

Place a dial gauge as shown and measure valve head radial runout.
If the service limit is exceeded, replace the valve.

Valve head radial runout	Service limit
	0.03 mm (0.0012 in)

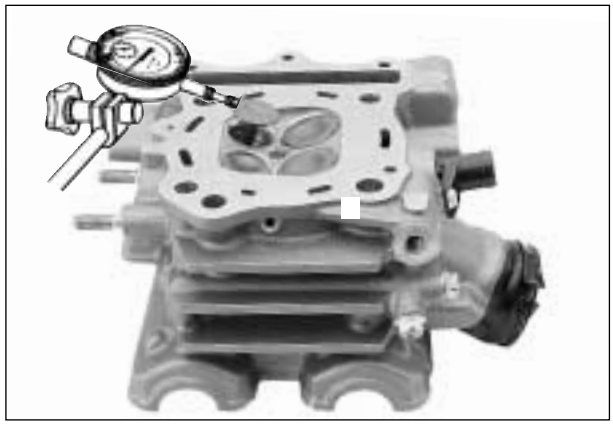


TOOL **Dial gauge : 09900-20606**
Magnetic stand : 09900-20701
V-block : 09900-21304

⊙ VALVE GUIDE-VALVE STEM CLEARANCE

Measure the clearance in the valve guide-valve stem, by rigging up the dial gauge as shown. If the clearance is measured exceeds the limit specified below, then determine whether the valve or the guide should be replaced to reduce the clearance to within the standard range:

Valve guide-valve stem clearance	Standard
IN.	0.020~0.047 mm (0.0008~0.0019 in)
EX.	0.030~0.057 mm (0.0012~0.0022 in)

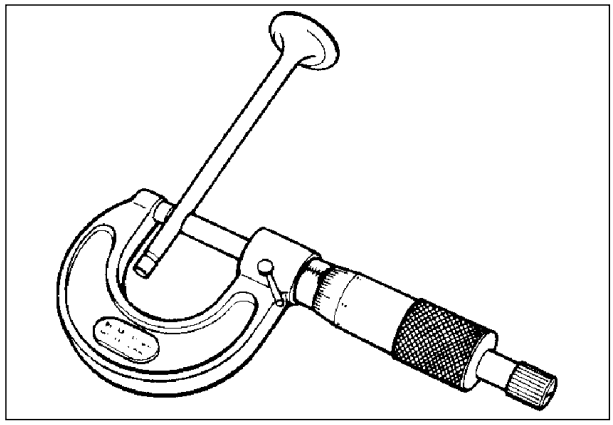


TOOL **Dial gauge : 09900-20606**
Magnetic stand : 09900-20701

⊙ VALVE STEM DIAMETER

Measure the valve stem outside diameter.
If the diameter measured exceeds the standard, replace the valve.

Valve stem diameter	Standard
IN.	4.465~4.480 mm (0.1758~0.1764 in)
EX.	4.455~4.470 mm (0.1754~0.1760 in)

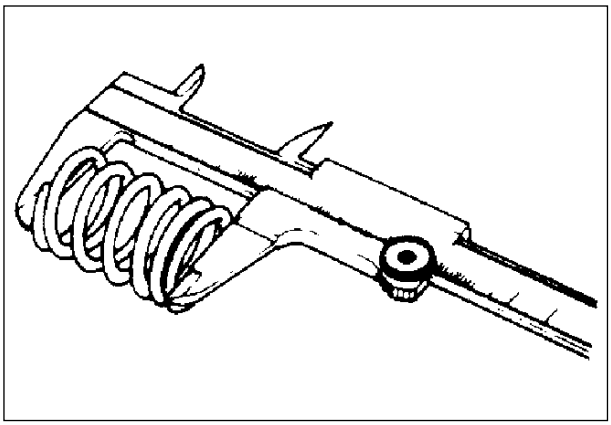


TOOL **Micrometer(0~25 mm) : 09900-20201**

⊙ VALVE SPRING

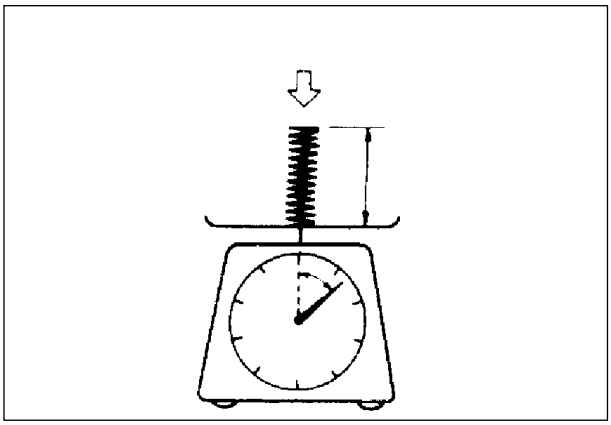
The force of the coil spring keeps the valve seat tight. A weakened spring results in reduced engine power output and often accounts for the chattering noise coming from the valve mechanism.

Check the valve springs for proper strength by measur ing their free length and also by the force required to compress them. If the spring length is less than the service limit or if the force required to compress the spring does not fall within the specified range, replace both the inner and outer springs as a set.



Valve spring free length	Service limit
Inner	36.8 mm (1.45 in)
Outer	39.8 mm (1.57 in)

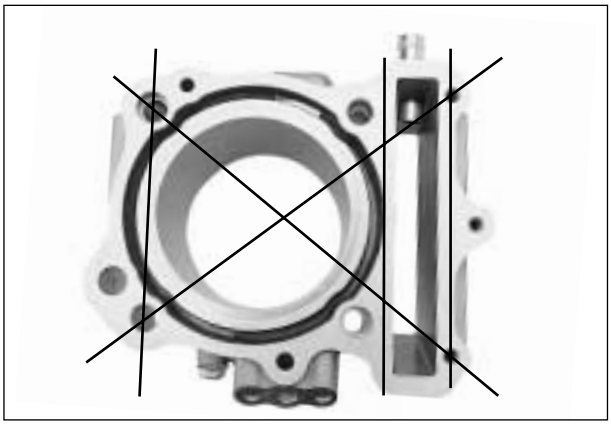
TOOL **Venier calipers : 09900-20101**



Valve spring tension	Standard
Inner	4.2~4.8 kgf (9.3~10.6 lbs) at length 29.9 mm (1.18 in)
Outer	17.0~19.6 kgf (37.5~43.2 lbs) at length 33.4 mm (1.32 in)

⊙ CYLINDER DISTORTION

Check the gasketed surface of the cylinder for distortion with a straightedge and thickness gauge, taking a clearance reading at several places as indicated. If the largest reading at any position of the straightedge exceeds the limit, replace the cylinder.

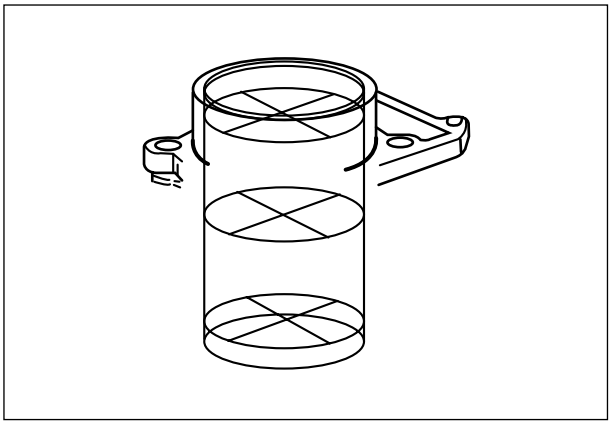


Cylinder distortion	Service limit
	0.05 mm (0.002 in)

TOOL **Thickness gauge : 09900-20806**

⊙ CYLINDER BORE

Measure the cylinder bore diameter at six place. If any one of the measurements exceeds the limit, overhaul the cylinder and replace the piston with an oversize, or replace the cylinder.

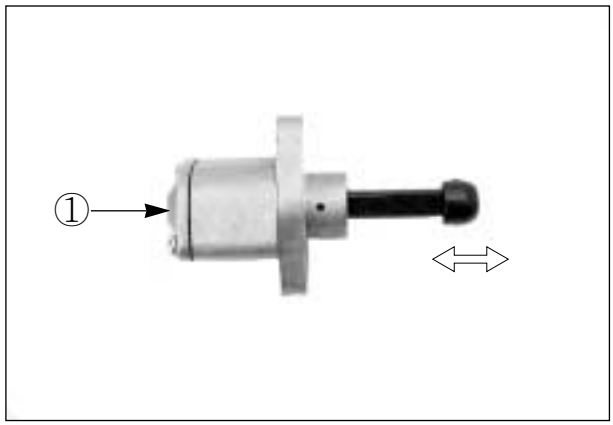


	Standard	Service limit
Cylinder bore	81.500~81.515 mm (3.2087~3.2093 in)	81.575 mm (3.2116 in)

TOOL **Cylinder gauge set : 09900-20508**

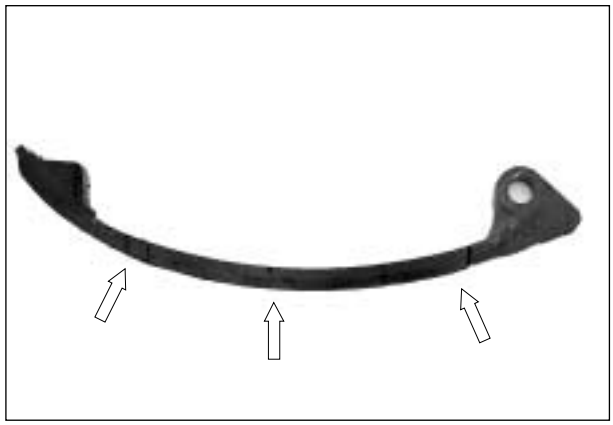
⊙ CAM CHAIN TENSION ADJUSTER

Check that the push rod slides smoothly with the lock shaft handle ① clockwise.
If it does not slide smoothly, replace the cam chain tension adjuster with a new one.



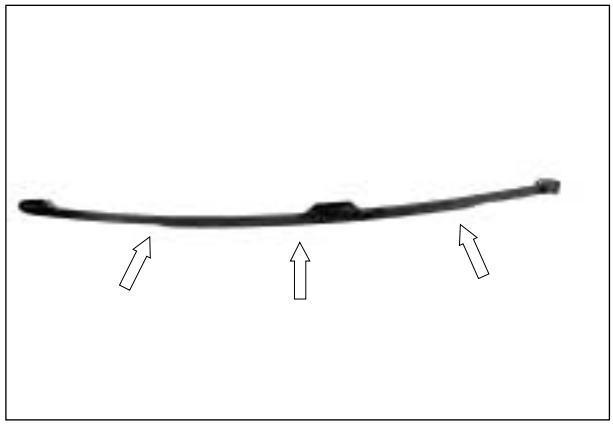
⊙ CAM CHAIN TENSIONER

Check the contacting surface of the cam chain tensioner.
If it is worn or damaged, replace it with a new one.



⊙ CAM CHAIN AND CAM CHAIN GUIDE

Check the cam chain for wear, damage and kinked or binding links. If any defects are found, replace it with a new one.
Check the cam chain guide for wear and damage. If it is found to be damaged, replace it with a new one.

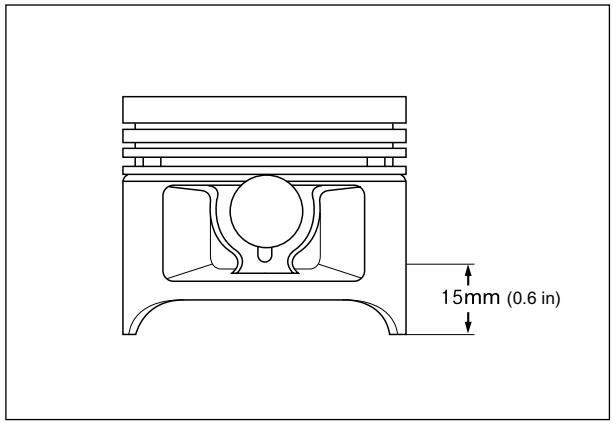


⊙ PISTON DIAMETER INSPECTION

Measure the outside diameter of piston in the direction perpendicular to the piston pin axis at the height from the skirt as shown in the illustration using a micrometer.
If the measurement is found less than the service limit, replace the piston.

	Service limit
Piston diameter	81.380 mm (3.2039 in)
Piston oversize	0.5, 1.0 mm (0.02, 0.04 in)

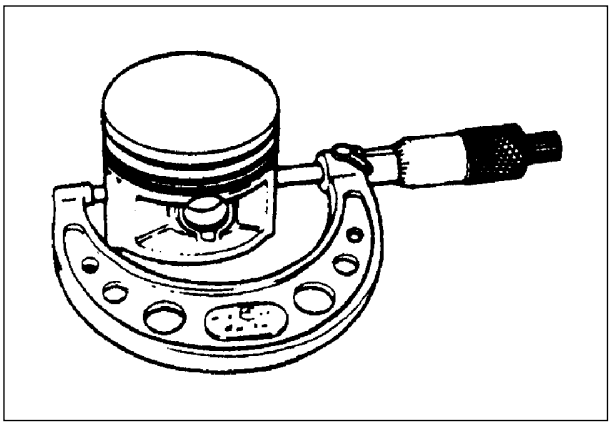
TOOL **Micrometer(75~100 mm) : 09900-20204**



⊙ PISTON-TO-CYLINDER CLEARANCE

To determine the piston-to-cylinder clearance, calculate the difference between the cylinder bore and outside diameter of the piston.

	Standard	Service limit
Piston-to-cylinder clearance	0.045~0.075 mm (0.0018~0.0030 in)	0.120 mm (0.0047 in)

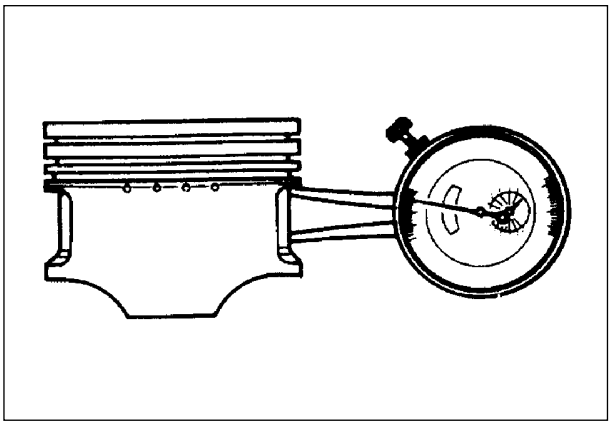


⊙ PISTON PIN HOLE BORE

Using a dial calipers, measure the piston pin hole bore both in the vertical and horizontal directions.
If the measurement exceeds the service limit, replace the piston.

	Service limit
Piston pin hole bore	20.030 mm (0.7886 in)

TOOL **Dial calipers : 09900-20605**

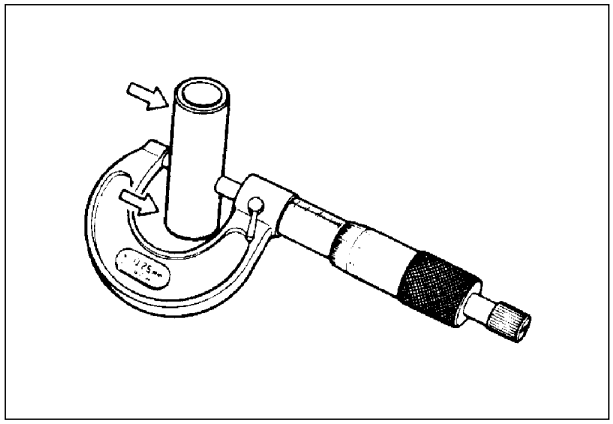


⊙ PISTON PIN DIAMETER INSPECTION

Using a micrometer, measure the piston pin outside diameter at three position, both the ends and the center.
If any of the measurements is founds less than the service limit, replace the pin.

	Service limit
Piston pin diameter	19.980 mm(0.7866 in)

TOOL **Micrometer(0~25 mm) : 09900-20201**



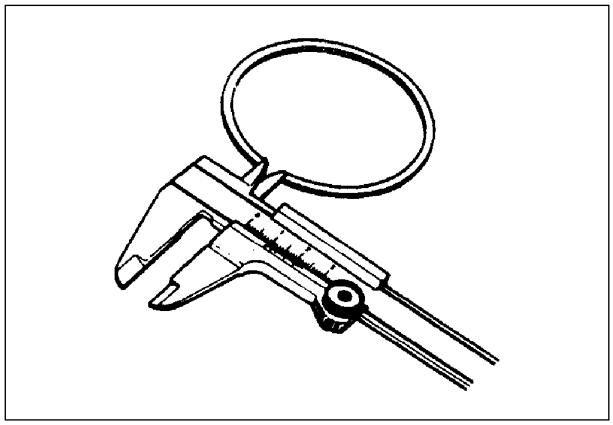
⊙ PISTON RING FREE END GAP INSPECTION

Before installing piston rings, measure the free end gap of each ring using vernier calipers. If the gap is less than the service limit, replace the ring.

Piston ring free end gap	Standard
1st	Approx 9.9 mm (0.390 in)
2nd	Approx 10.5 mm (0.413 in)

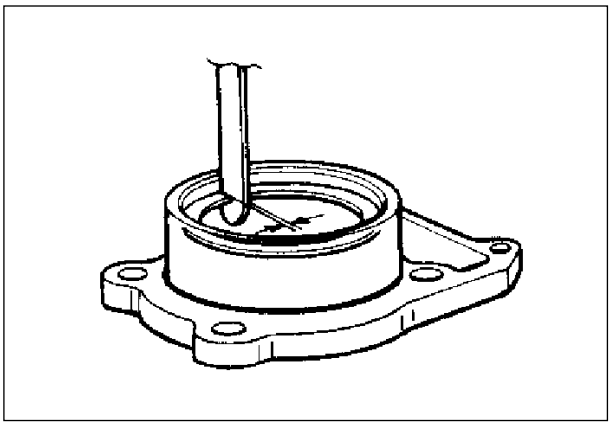
Piston ring free end gap	Service limit
1st	7.9 mm (0.311 in)
2nd	8.4 mm (0.330 in)

TOOL **Vernier calipers : 09900-20101**



⊙ PISTON RING END GAP INSPECTION

Insert the piston ring squarely into the cylinder using the piston head.
Measure the end gap with a thickness gauge.
If the gap exceeds the service limit, replace the piston ring.



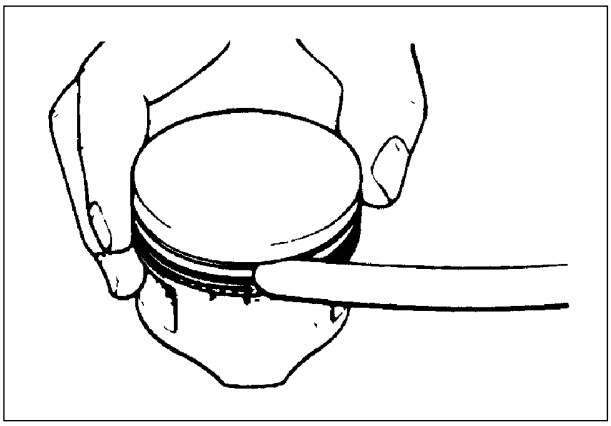
Piston ring end gap (Assembly condition)	Standard
1st	0.20~0.35 mm (0.008~0.013 in)
2nd	0.20~0.35 mm (0.008~0.013 in)

Piston ring end gap(Assembly condition)	Service limit
1st	0.5 mm (0.020 in)
2nd	0.7 mm (0.028 in)

TOOL **Thickness gauge : 0990-20806**

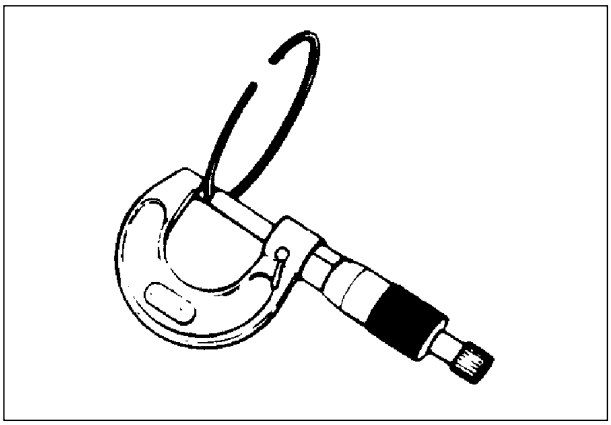
⊙ PISTON RING-TO-GROOVE CLEARANCE INSPECTION

Remove carbon deposit both from the piston ring and its groove.
Fit the piston ring into the groove. With the ring compressed and lifted up, measure the clearance on the bottom side of the ring using a thickness gauge.



Piston ring-groove clearance	Service limit
1st	0.180 mm (0.007 in)
2nd	0.150 mm (0.006 in)

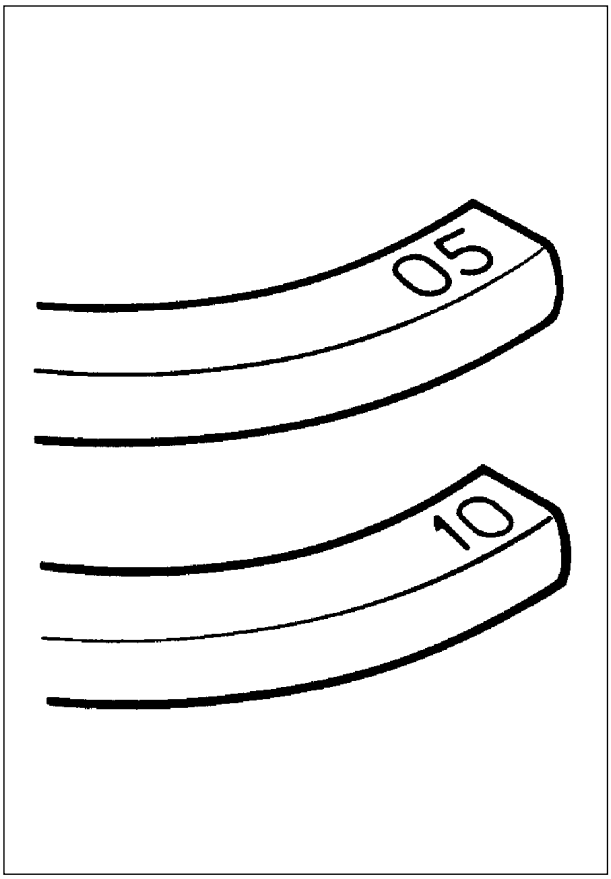
Piston ring-groove width	Standard
1st	1.21~1.23 mm (0.0476~0.0484 in)
2nd	1.01~1.03 mm (0.040~0.041 in)
Oil	2.01~2.03 mm (0.079~0.080 in)



Piston ring thickness	Standard
1st	0.970~0.990 mm (0.0382~0.0390 in)
2nd	1.170~1.190 mm (0.0461~0.0469 in)

TOOL **Thickness gauge : 09900-20806**
Micrometer(0~25 mm) : 09900-20201

⊙ OVERSIZE RINGS



■ Oversize piston ring

The following two types of oversize piston ring are used.
They bear the following identification numbers.

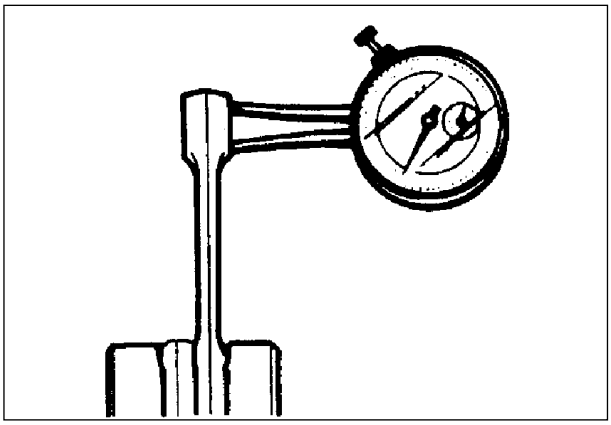
Oversize piston ring	1st	2nd
0.5 mm	05	05
1.0 mm	10	10

■ Oversize oil ring

The following two types of oversize oil ring are used.
They bear the following identification marks.

Oversize oil ring	Color classification
0.5 mm	Painted red
1.0 mm	Painted yellow

⊙ CONROD SMALL END INSIDE DIAMETER INSPECTION

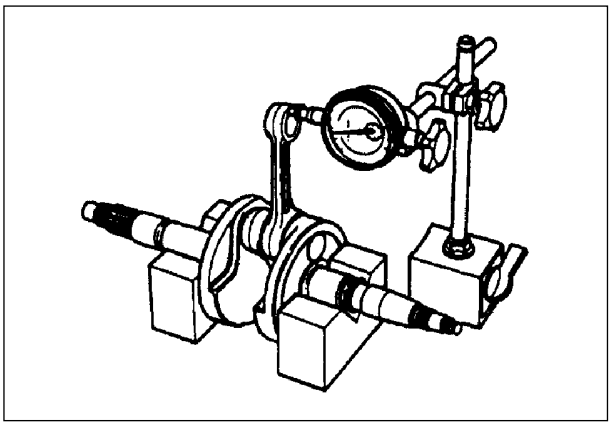


Using a dial calipers, measure the conrod small end inside diameter both in vertical and horizontal directions.
If any of the measurements exceeds the service limit, replace the conrod.

Conrod small end I.D.	Standard	Service limit
	20.006~20.014 mm (0.7876~0.7880 in)	20.040 mm (0.7890 in)

TOOL **Dial calipers : 09900-20605**

⊙ CONROD DEFLECTION INSPECTION



Move the small end sideways while holding the big end immovable in thrust direction.
Measure the amount of deflection.
Turn the conrod and see if it moves smoothly without play and noise. This method can check the extent of wear on the parts of the conrod' s big end.

Conrod deflection	Service limit
	3.0mm (0.12 in)

TOOL **Dial gauge : 09900-20606**
Magnetic stand : 09900-20701
V-block : 09900-21304

⊙ CONROD BIG END SIDE CLEARANCE INSPECTION

Using a thickness gauge, measure the side clearance at the conrod big end. If the measurement is out of standard value, measure the conrod big end and the crank pin widths individually to determine which one is to be replaced.

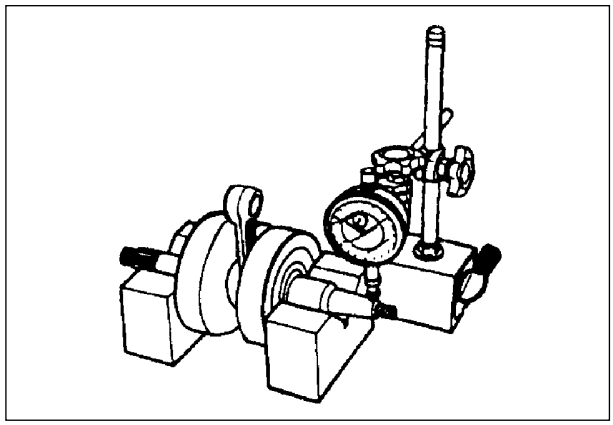
	Standard	Service limit
Conrod big end side clearance	0.17~0.32 mm (0.007~0.013 in)	0.50 mm (0.020 in)

⊙ CRANKSHAFT RUNOUT INSPECTION

With the right and left crank journals supported with V-block, turn the crankshaft slowly. At this time, measure the crankshaft end runout using a dial gauge. If the runout exceeds the service limit, replace the crankshaft.

	Service limit
Crankshaft runout	0.05 mm (0.002 in)

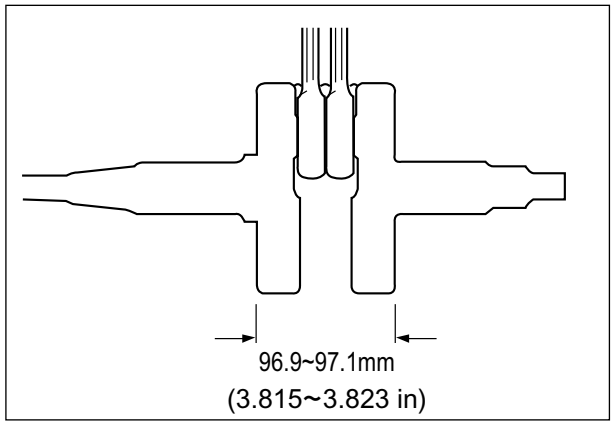
TOOL **Magnetic stand : 09900-20701**
Dial gauge : 09900-20606
V-block : 09900-21304



⊙ CRANKSHAFT REASSEBLY

Measure the width between the webs referring to the figure below when rebuilding the crankshaft.

	Standard
Width between webs	96.9~97.1 mm (3.815~3.823 in)

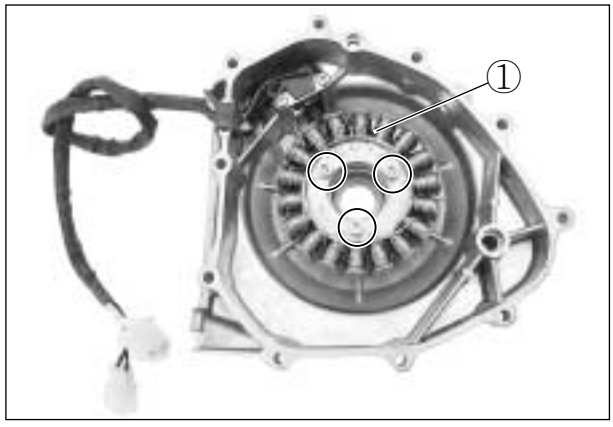


⊙ MAGNETO COVER

■ **MAGNETO INSPECTION(Refer to page 6-4)**

■ **DISASSEMBLY**

● Remove the stator ①.



⊙ STARTER CLUTCH

Install the starter driven gear onto the starter clutch and turn the starter driven gear by hand(the gear turns in only one direction). The starter driven gear should turn smoothly. If excessive resistance is felt while turning the starter driven gear, inspect the starter clutch. Also, inspect the surface of the starter driven gear which contacts the starter clutch, for wear or damage. If any wear or damage is found, replace the defective parts.

■ DISASSEMBLY

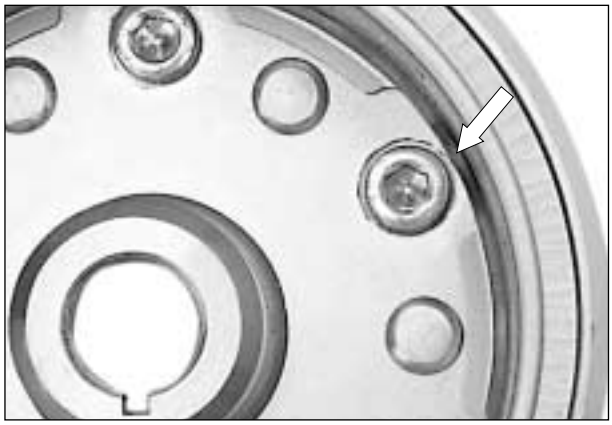
● With the magneto rotor held immovable, remove the starter clutch bolts.

■ REASSEMBLY

● Apply a small quantity of THREAD LOCK "1324" to the starter clutch bolts and tighten them to the specified torque with the magneto rotor held immovable.

Thread Lock "1324"

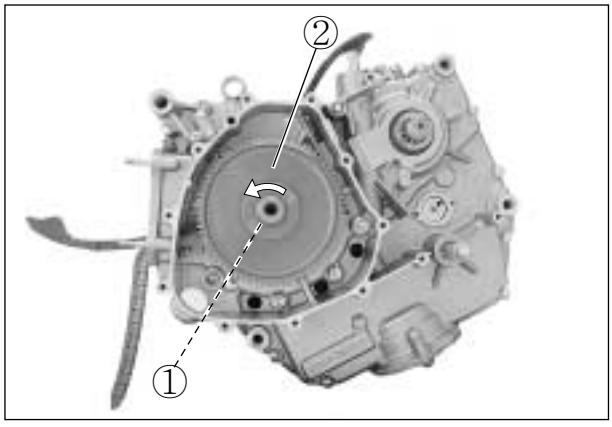
Starter clutch bolt
: 23~28 N · m (2.3~2.8 kg · m)



⊙ STARTER DRIVEN GEAR

■ STARTER DRIVEN GEAR BUSH

Install the starter driven gear bush ① and gear ② onto the crankshaft and turn the starter driven gear by hand. Inspect the starter driven gear bush for smooth rotation and any abnormal noise. If the bush does not turn smoothly or there is any abnormal noise, replace it.



⊙ DISASSEMBLY

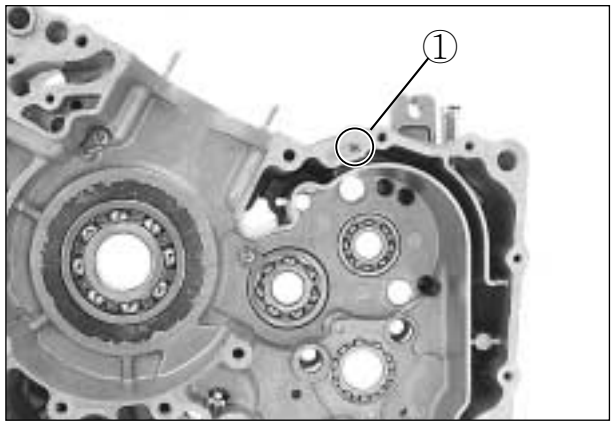
● Remove the bush using the special tool.

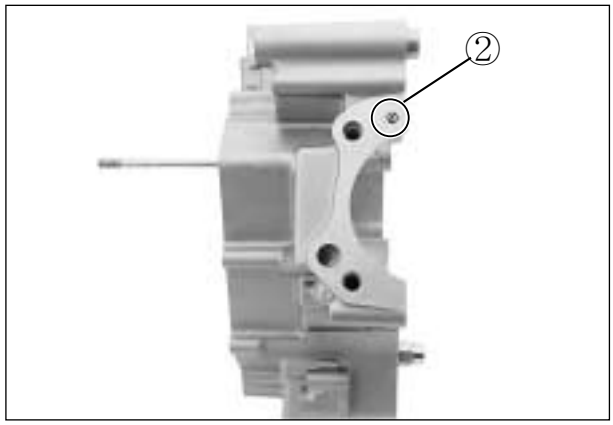
TOOL Bearing remover (20~35 mm)
: 09923-74510

⊙ OIL JET

■ REMOVAL

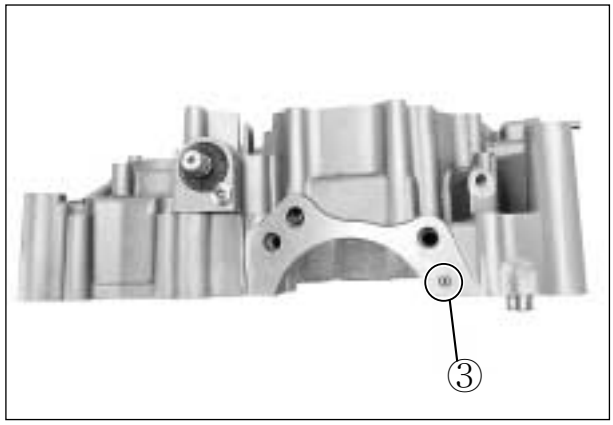
● Remove the oil jet ①, ② from the right crankcase half.





● Remove the oil jet ③ from the left crankcase half.

NOTE
If it is difficult to remove the oil jet, use a sting.



■ **INSPECTION AND CLEANING**

● Check the oil jets for clogging.

● If they are clogged, clean their oil passage with a proper wire and compressed air.

■ **INSTALLATION**

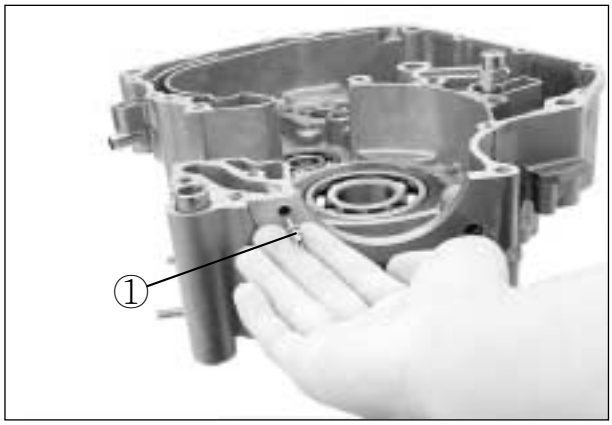
● Fit the new O-ring to each oil jets.

⚠ CAUTION
Use the new O-ring to prevent oil leakage.

● Apply engine oil to the O-ring.

● Install the oil jet ① to the oil hole of crankcase.

NOTE
Push the oil jet the crankcase until it stops.



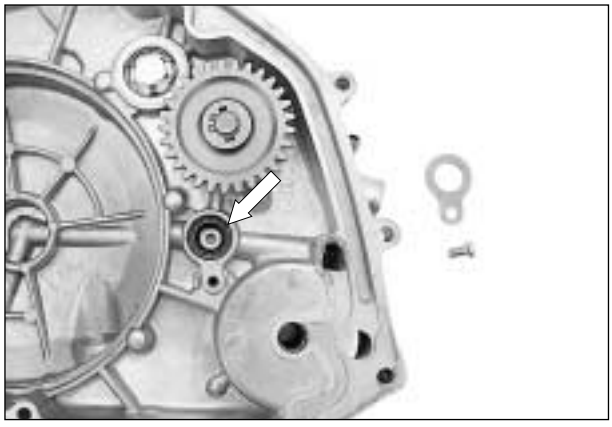
⊙ CLUTCH COVER

■ **OIL FILTER REPLACEMENT (Refer to page 2-11)**

■ **DISASSEMBLY**

● Remove the circlip and right crankshaft oil seal.

TOOL **Oil seal remover : 09913-50121**

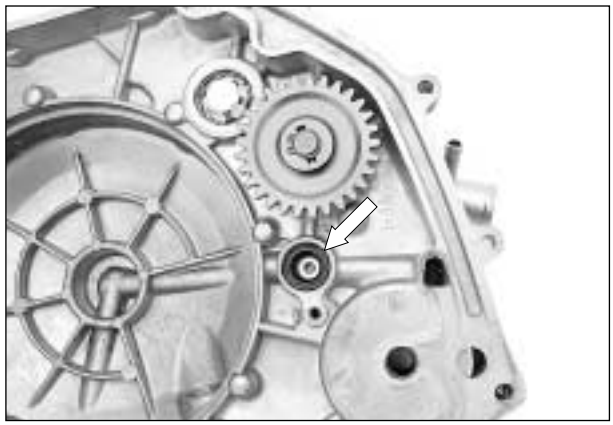


■ **REASSEMBLY**

● Drive in the oil seal using the special tool.

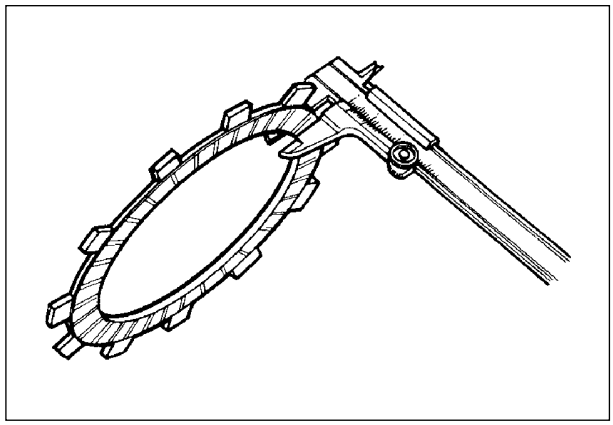
TOOL **Bearing installer : 09913-75820**

● Install the circlip.



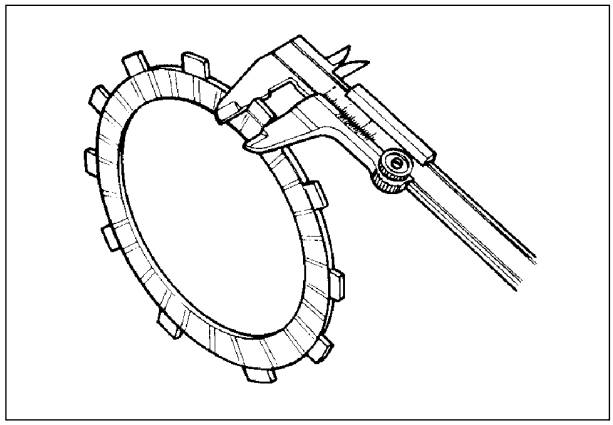
⊙ CLUTCH DRIVE PLATES

Measure the thickness and claw width of the clutch drive plates using vernier calipers. If a clutch drive plate is not within the service limit, replace the clutch plates as a set.



Clutch drive plate thickness	Standard	
	NO.1	2.92~3.08 mm (0.115~0.121 in)
	NO.2	3.42~3.58 mm (0.135~0.141 in)

Clutch drive plate thickness	Service limit	
	NO.1	2.62 mm (0.103 in)
	NO.2	3.12 mm (0.123 in)



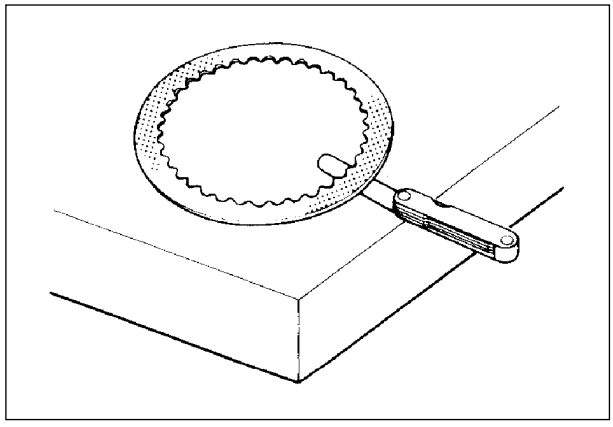
Clutch drive plate claw width	Standard	
	NO.1	15.9~16.0 mm (0.626~0.630 in)
	NO.2	15.9~16.0 mm (0.626~0.630 in)

Clutch drive plate claw width	Service limit	
	NO.1	15.1 mm (0.595 in)
	NO.2	15.1 mm (0.595 in)

TOOL **Vernier calipers : 09900-20101**

⊙ CLUTCH DRIVEN PLATES

Measure each clutch driven plate for distortion using the thickness gauge. If a clutch driven plate is not within the service limit, replace the clutch plates as a set.



Clutch driven plate distortion	Service limit
	0.1 mm (0.004 in)

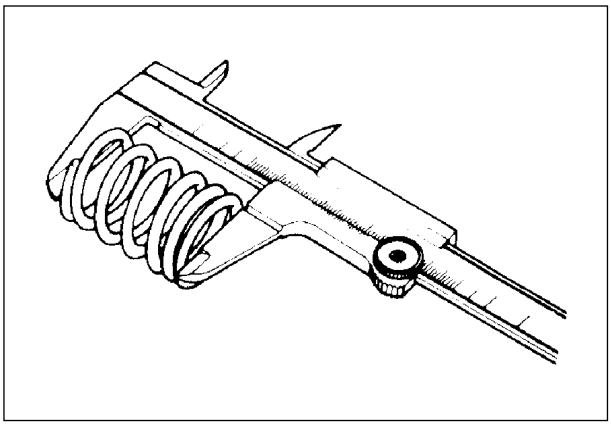
TOOL **Thickness gauge : 09900-20806**

⊙ CLUTCH SPRING FREE LENGTH

Measure the free length of each clutch spring using vernier calipers. If any spring is not within the service limit, replace all of the spring.

Clutch spring free length	Service limit
	54 mm (2.126 in)

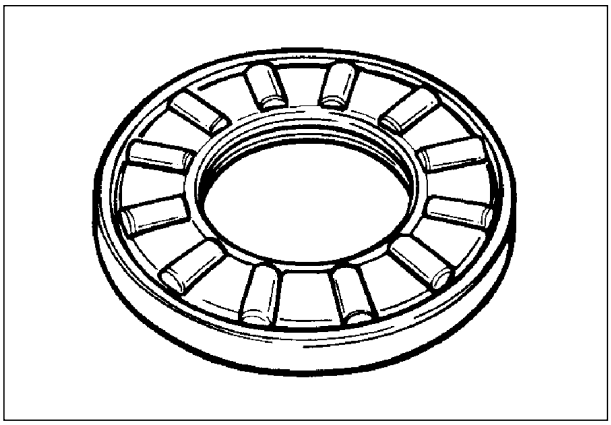
TOOL **Vernier calipers : 09900-20101**



⊙ CLUTCH RELEASE BEARING

Inspect the clutch release bearing for any abnormality, especially cracks. When removing the bearing from the clutch, decide whether it can be reused or if it should be replaced.

Smooth engagement and disengagement of the clutch depends on the condition of this bearing.



⊙ PRIMARY DRIVEN GEAR

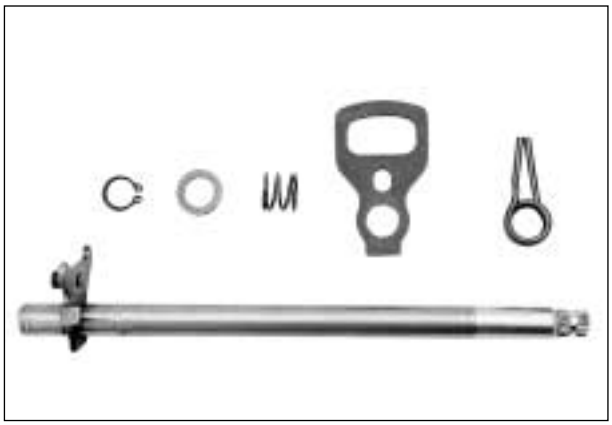
Inspect the primary driven gear bearing for any damage. If any abnormal condition are found, replace the primary driven gear.

⊙ OIL PUMP

Turn the oil pump shaft and check that rotation is smooth. If any abnormal condition is found, replace the oil pump with new one.

⊙ GEARSHIFT SHAFT

Disassemble and reassemble the gearshift shaft as shown in right picture.



⊙ TRANSMISSION

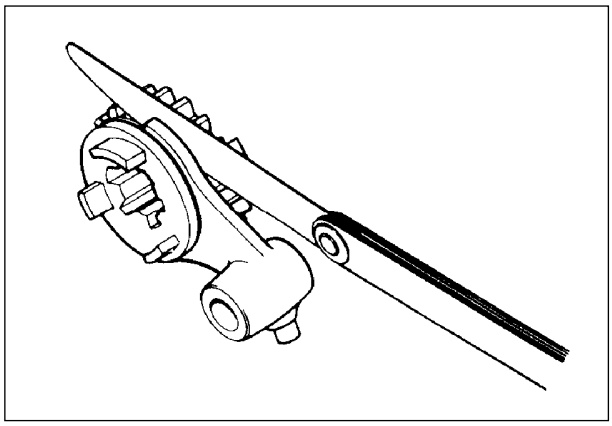
■ INSPECTION

★ GEAR-SHIFTING FORK

Using a thickness gauge, check the clearance between in the groove of its gear and shifting fork.

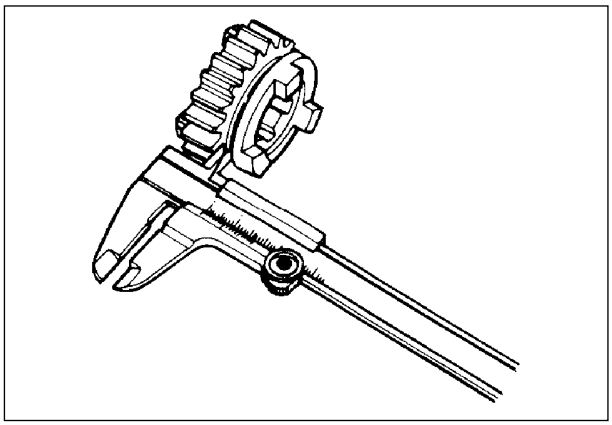
The clearance for each of the three shifting forks plays an important role in the smoothness and positiveness of shifting action.

If the clearance checked is noted to exceed the limit specified, replace the fork or its gear, or both.



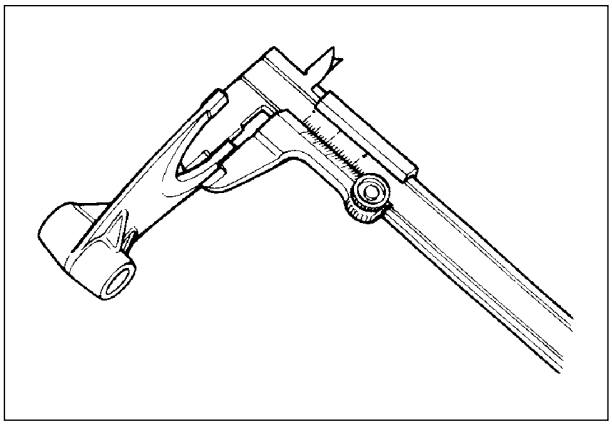
Shift fork-groove clearance	Standard	Service limit
	0.10~0.30 mm (0.004~0.012 in)	0.5 mm (0.020 in)

Shift fork groove width	Standard
NO.1 & NO.2	4.85~5.00 mm (0.191~0.197 in)
NO.3	4.85~5.00 mm (0.191~0.197 in)



Shift fork thickness	Standard
NO.1 & NO.2	5.3~5.4 mm (0.209~0.213 in)
NO.3	5.3~5.4 mm (0.209~0.213 in)

TOOL Thickness gauge : 09900-20806
Vernier calipers : 09900-20101



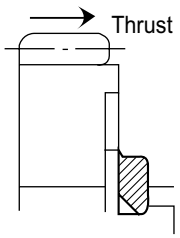
■ REASSEMBLY

Assemble the countershaft and drive shaft in the reverse order of disassembly. Pay attention to following points :

NOTE
Before installing the gears, coat lightly engine oil to the driveshaft and countershaft.

⚠ CAUTION

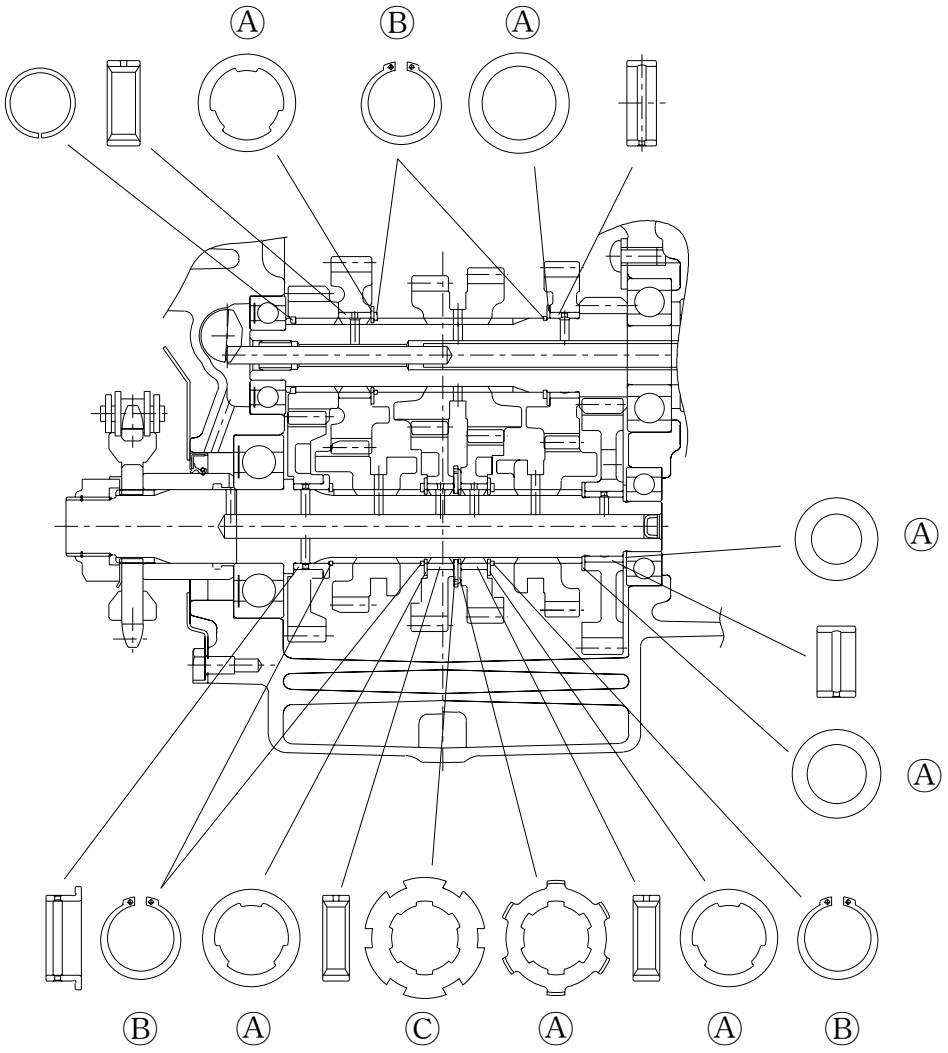
- ❖ **Never reuse a circlip. After a circlip has been removed from a shaft, it should be discarded and a new circlip must be installed.**
- ❖ **When installing a new circlip, care must be taken not to expand the end gap larger than required to slip the circlip over the shaft.**
- ❖ **After installing a circlip, always ensure that it is completely seated in its groove and securely fitted.**



● When installing a new circlip, pay attention to the direction of the circlip. Fit it to the side where the thrust is as shown in figure.

■ TRANSMISSION GEARS AND RELATED PARTS

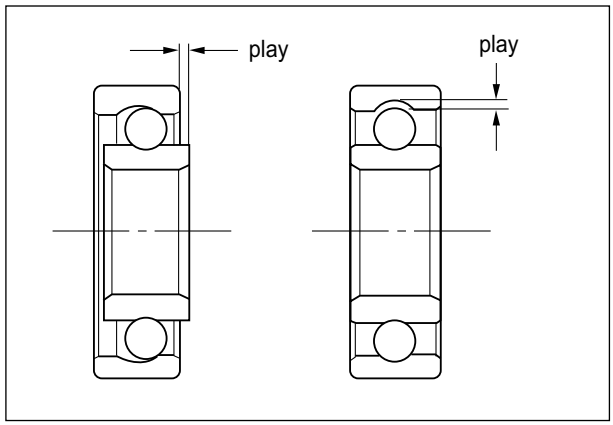
Thickness for washers, circlips and spacers
Ⓐ 1.0mm
Ⓑ 1.2mm
Ⓒ 1.5mm



⊙ CRANKCASE

■ BEARING INSPECTION

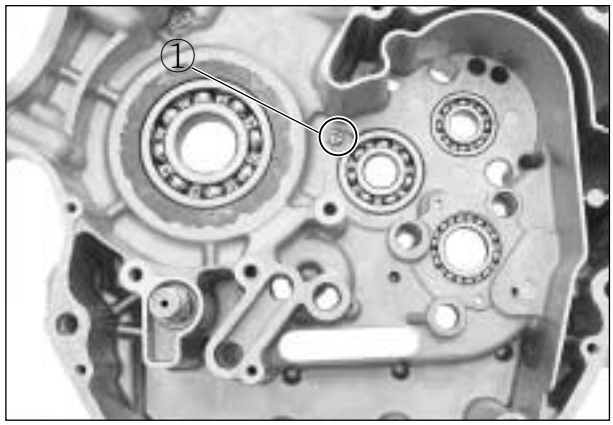
Rotate the bearing inner race by finger to inspect for abnormal play, noise and smooth rotation while the bearings are in the crankcase.
Replace the bearing in the following procedure if there is anything unusual.

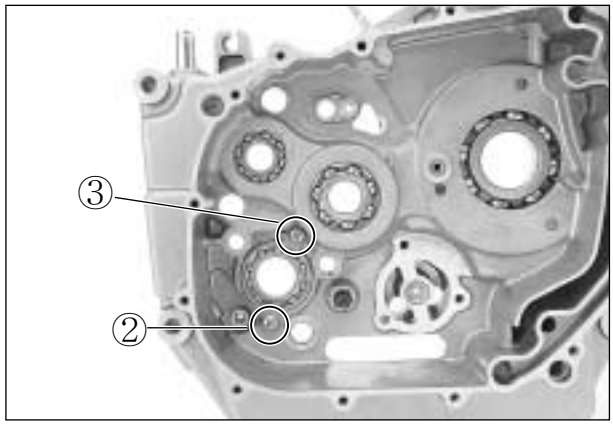


■ DISASSEMBLY

★ RIGHT CRANKCASE BEARING

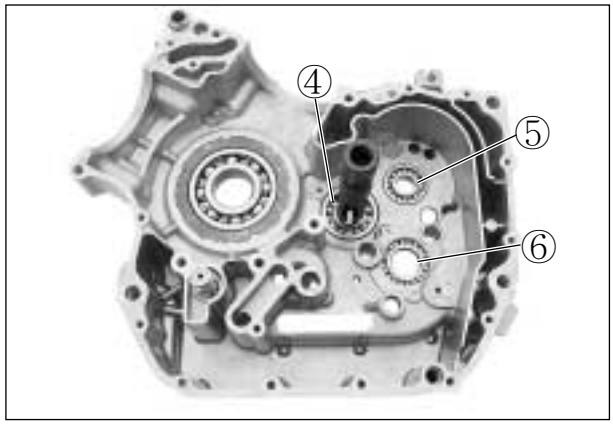
● Remove the bearing retainer bolt ①, ②, and ③.
● Remove the bearing retainer.





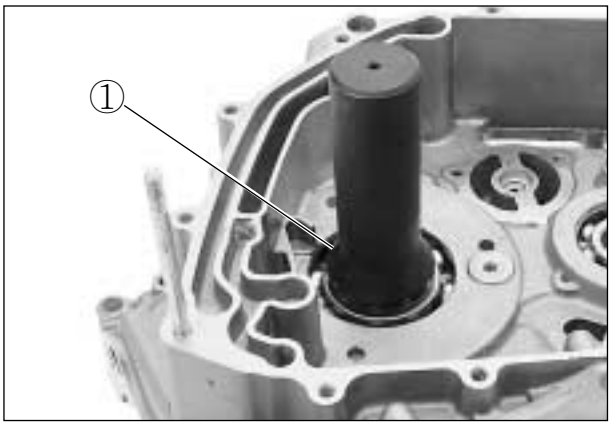
● Remove the bearings ④, ⑤ and ⑥.

TOOL **Bearing remover(17 mm) : 09923-73210**
Bearing remover(20~35 mm)
: 09923-74510



● Remove the bearing ①.

TOOL **Bearing installer : 09913-76010**



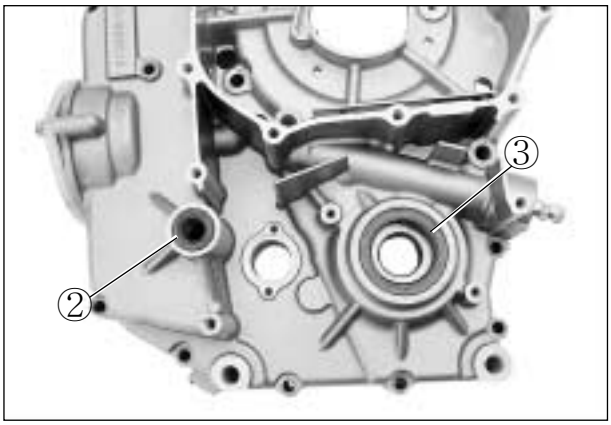
⚠ CAUTION

The removed bearing should be replaced with a new one.

★ LEFT CRANKCASE BEARING

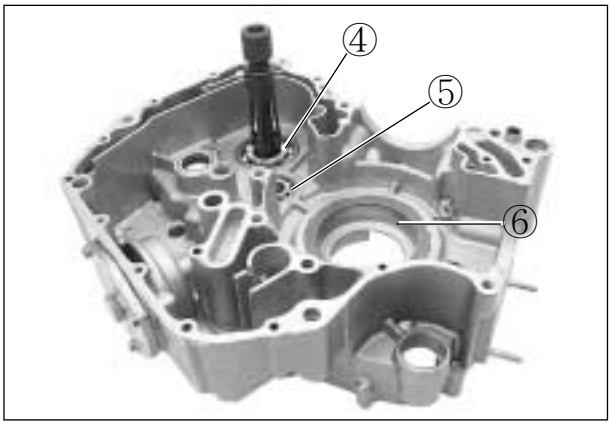
● Remove the oil seals ② and ③.

TOOL **Oil seal remover : 09913-50121**



● Remove the bearings ④, ⑤, and ⑥.

TOOL **Bearing remover(17 mm) : 09923-73210**
Bearing remover(20~35 mm) : 09923-74510

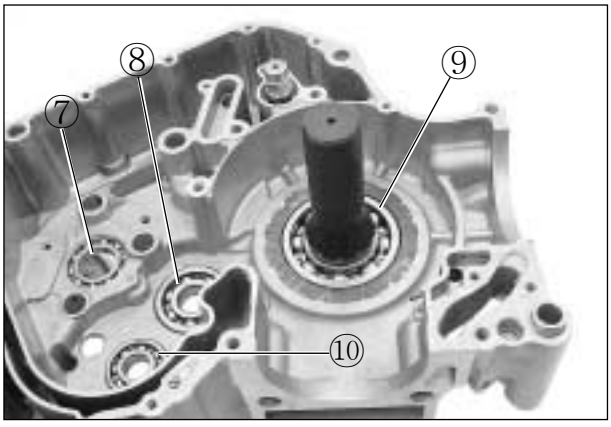


■ REASSEMBLY

★ RIGHT CRANKCASE BEARING

● Drive in the bearings ⑦, ⑧, ⑨ and ⑩.

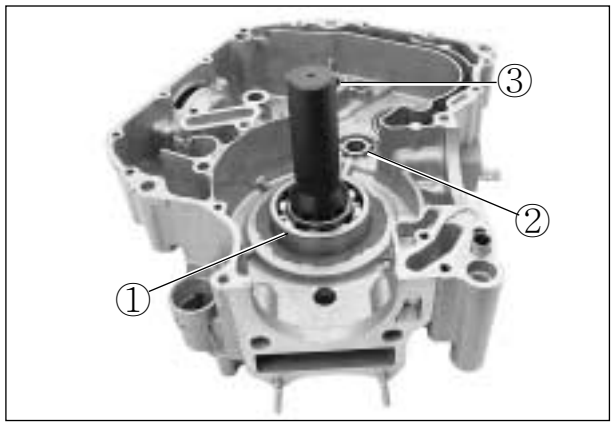
TOOL **Bearing installer : 09913-70122**
Bearing installer : 09913-76010



★ **LEFT CRANKCASE BEARING**

● Drive in the bearings ①, ② and ③.

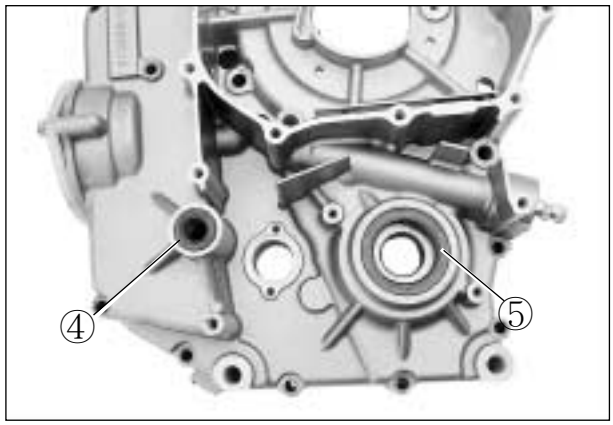
TOOL **Bearing installer : 09913-70122**
Bearing installer : 09913-76010



● Install the oil seals ④ and ⑤.

● Apply SUPER GREASE "A" on the lip of oil seal.

A **SUPER GREASE "A"**



ENGINE REASSEMBLY

The engine reassembly can be performed in the reverse order of disassembly procedures. However, the following points must be observed in the reassembly operation.

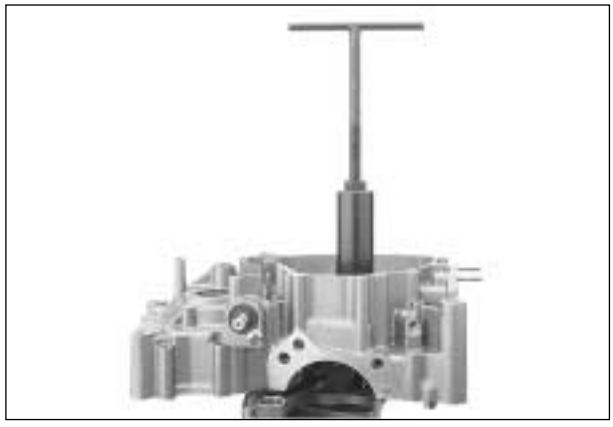
⚠ CAUTION

Make sure to coat the rotating and sliding sections with engine oil.

⊙ CRANKSHAFT

● Using the special tool, press in the crankshaft into the left crankcase.

TOOL **Crankshaft installer : 09910-32812**
Crankshaft installer adapter
: 09910-32813



⚠ CAUTION

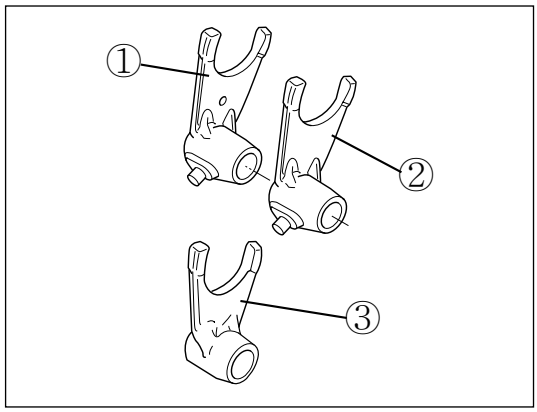
Never fit the crankshaft into crankcase by striking it with a plastic hammer.
Always use the special tool, otherwise crankshaft alignment accuracy will be affected.

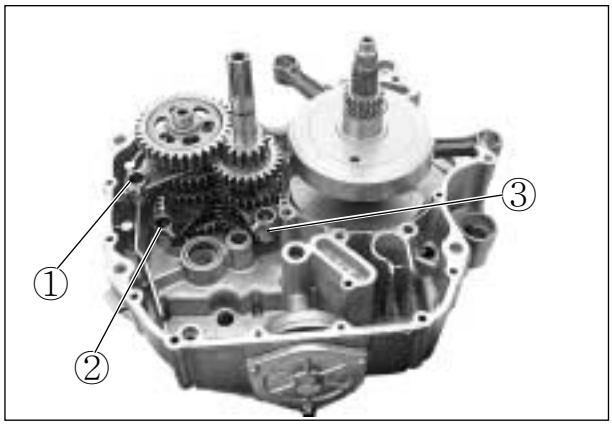
⊙ TRANSMISSION

● Install the transmission.

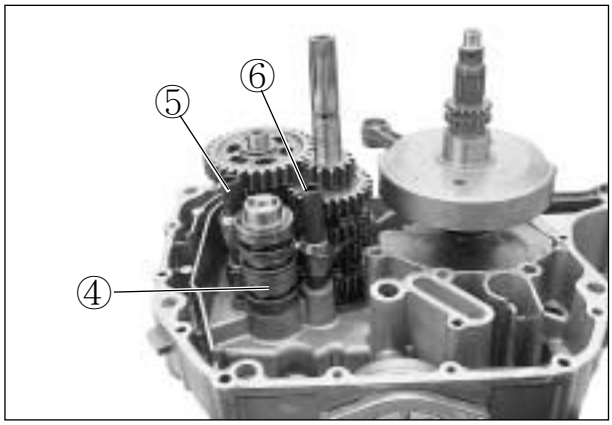
⊙ GEARSHIFT CAM AND GEARSHIFT FORKS

● Install the gearshift fork NO.1 ①, NO.2 ②, and NO.3 ③.



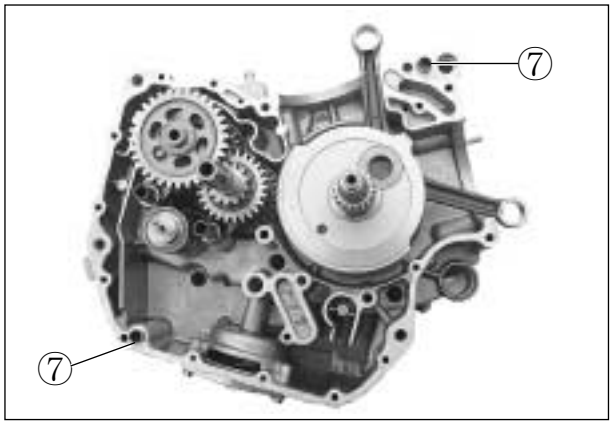


● Install the gearshift cam ④, and gearshift fork shaft ⑤, ⑥.



● Install the dowel pins ⑦.

● Before assembling the crankcase, apply the engine oil to each gear and bearing.



● Apply BOND "1215" to the right crankcase.

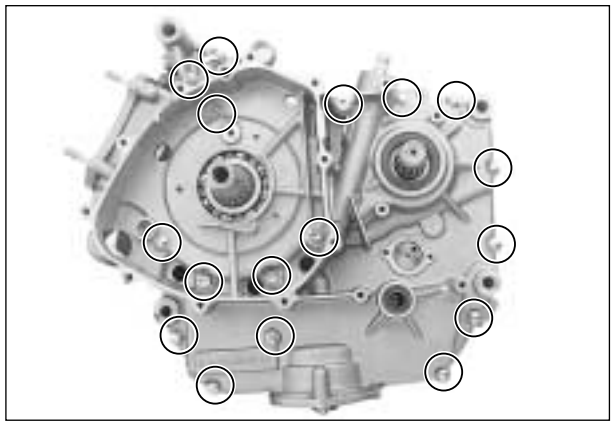
1215 **BOND "1215"**

⚠ CAUTION

❖ **Application of BOND "1215" must be performed within a short period of time.**
❖ **Take extreme care not to let BOND "1215" enter into the oil hole or bearing.**

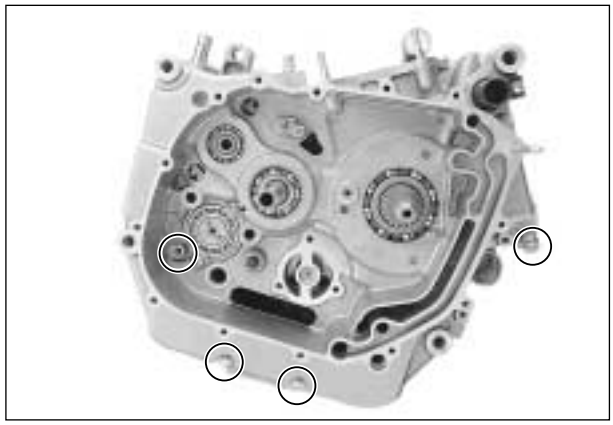
● Install the crankcase.
● Install the crankcase bolts, right and left.

Crankcase bolt (M6)
: 11 N · m (1.1 kg · m)
Crankcase bolt (M8)
: 26 N · m (2.6 kg · m)



NOTE

When tightening the crankcase bolts, tighten each bolt little by little diagonally.



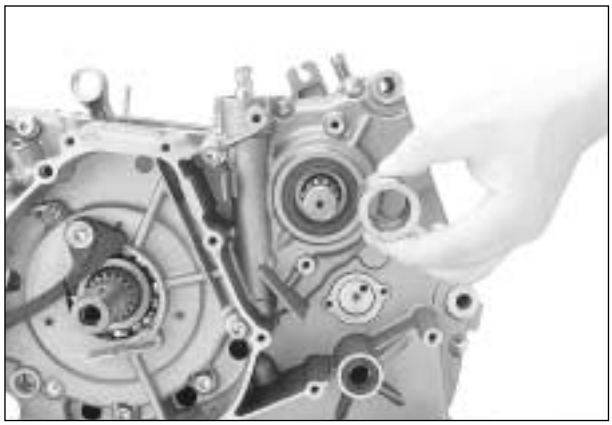
NOTE

❖ ***After the crankcase bolts have been tightened, make sure that the crankshaft, countershaft and driveshaft rotate smoothly.***
❖ ***If these shafts do not rotate smoothly, try to free it by tapping with a plastic hammer.***

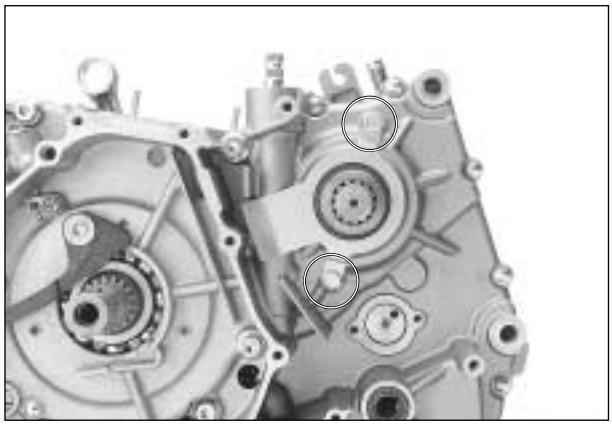
● Apply the SUPER GREASE "A" to the driveshaft O-ring and oil seal lip.

SUPER GREASE "A"

● Install the driveshaft spacer.



● Install the oil seal retainer.



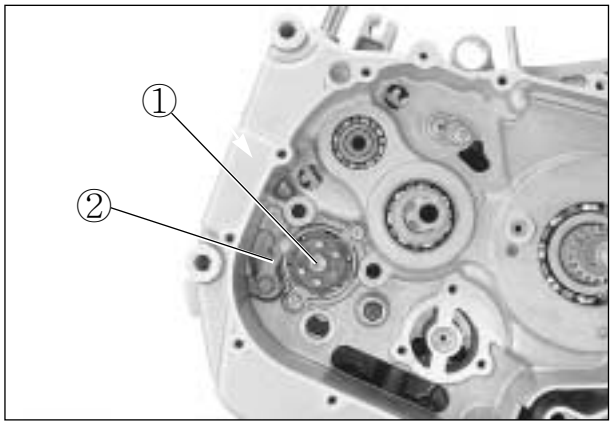
■ GEARSHIFT CAM STOPPER

● Apply a small quantity THREAD LOCK "1324" to the gearshift cam plate bolt ①.

THREAD LOCK "1324"

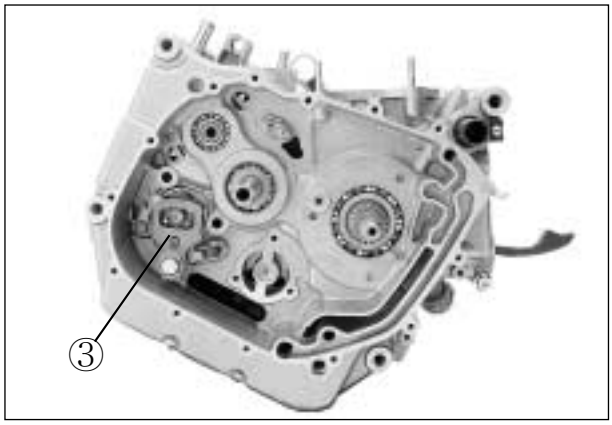
● Install the gearshift cam stopper plate and gearshift cam plate bolt ①.

● Install the gearshift cam stopper ②.



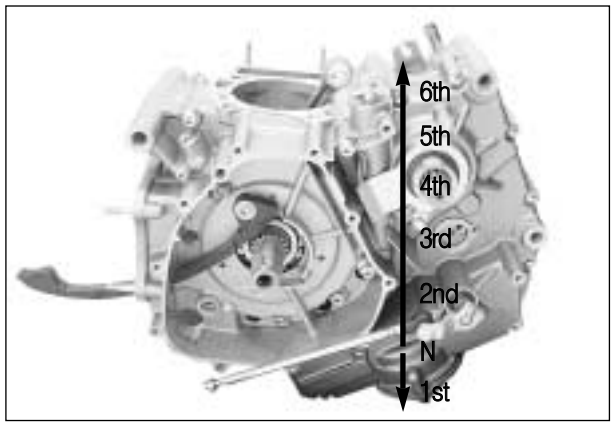
■ GEARSHIFT SHAFT

● Install the gearshift shaft ③.



⚠ CAUTION

After the cam driven gear, cam guide, gearshift shaft and neutral cam stopper have been fitted, confirm that gear change is normal while turning the countshaft and driveshaft. If gear change is not obtained, it means that assembly of gears or installation of gear shifting fork is incorrect. In this case, disassemble and trace the mistake.

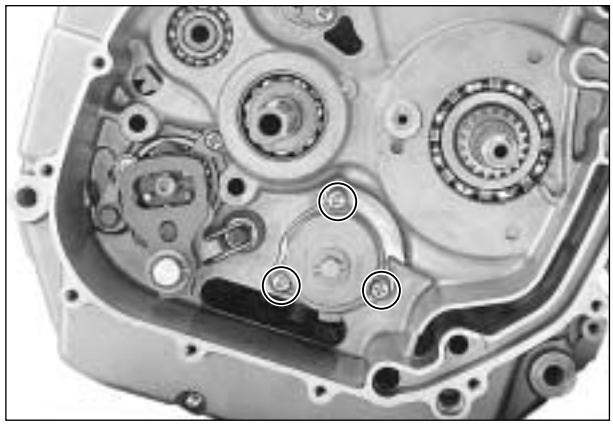


⊙ OIL PUMP

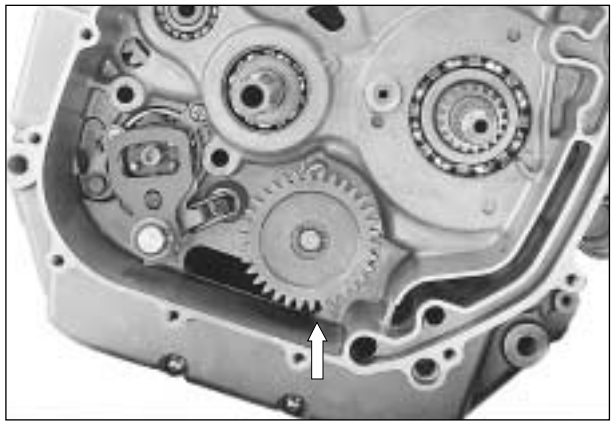
- Before installing the oil pump, apply the engine oil to the contact face of case, outer rotor, inner rotor and shaft.
- Apply a small quantity THREAD LOCK "1324" to the oil pump securing screws.

1324 THREAD LOCK "1324"

- Tighten the oil pump securing screws.
- Install the oil pump shim and pin.

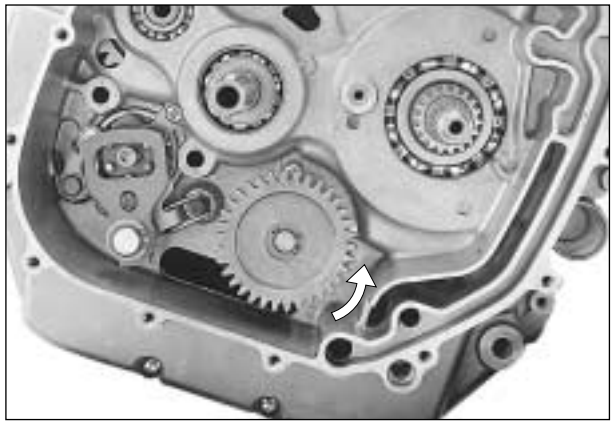


- Put in the oil pump driven gear, and install the circlip.



⚠ CAUTION

When installing the oil pump to the crankcase, turn the pump gear and check that rotation is smooth by the hand.

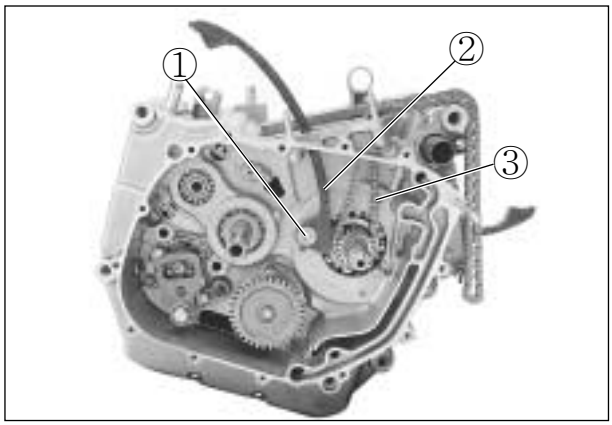


⊙ CAM CHAIN TENSIONER

● Install the washer and cam chain tensioner ②, tighten the cam chain tensioner bolt ①.

Cam chain tensioner bolt
: 8~12 N · m(0.8~1.2 kg · m)

● Install the cam chain ③.

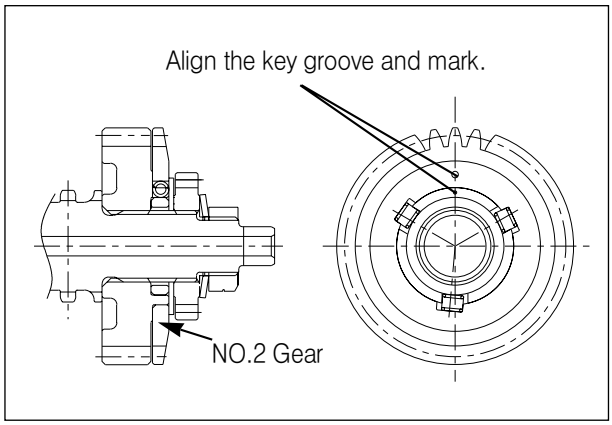


⊙ PRIMARY DRIVE GEAR

● Install the primary drive gear and NO.2 gear to the crankshaft, put the key to the key groove.

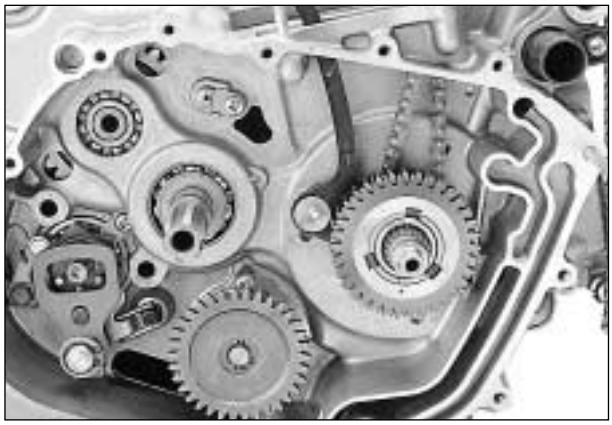
⚠ CAUTION

When installing the NO.2 gear, install so that the mark on the gear align the key groove as shown in figure.



⚠ CAUTION

Pay attention to the each washer to lower end of the water pump drive gear and primary drive gear nut in times of assemblage.



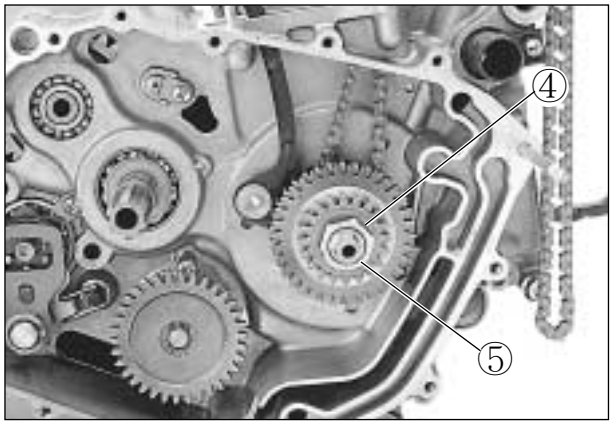
● With the crankshaft held immovable using special tool, install the water pump drive gear ④ and primary drive gear nut ⑤.

Conrod holder : 09910-20115

Primary drive gear nut
: 40~60 N · m(4.0~6.0 kg · m)

NOTE

The primary drive gear nut has left-hand thread.



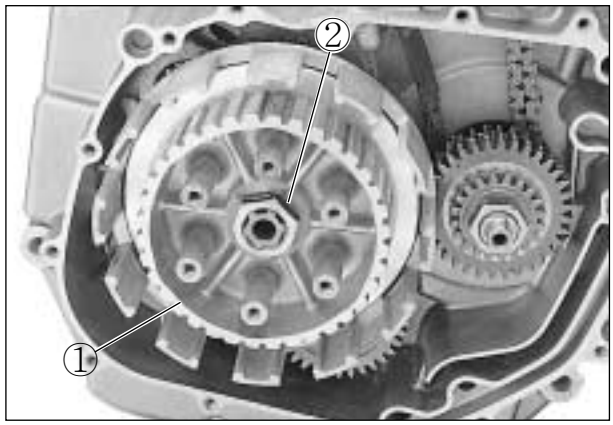
⊙ PRIMARY DRIVEN GEAR

NOTE
Apply the engine oil to the inside face of primary driven gear bearing.

● Install the primary driven gear assembly.

⊙ CLUTCH

● Install the clutch sleeve hub ①, lock washer ②.

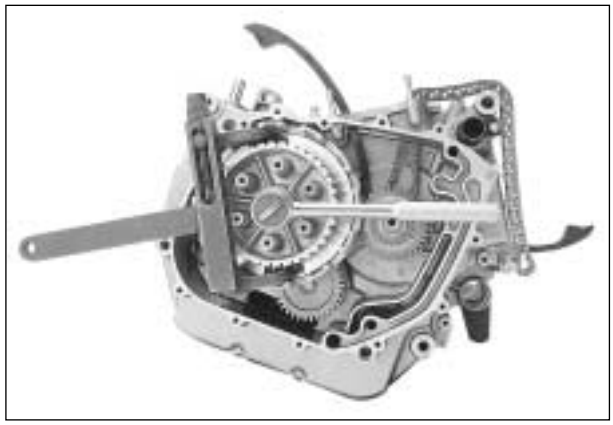


● Install the clutch sleeve hub nut, and tighten it to the specified torque using the special tool.

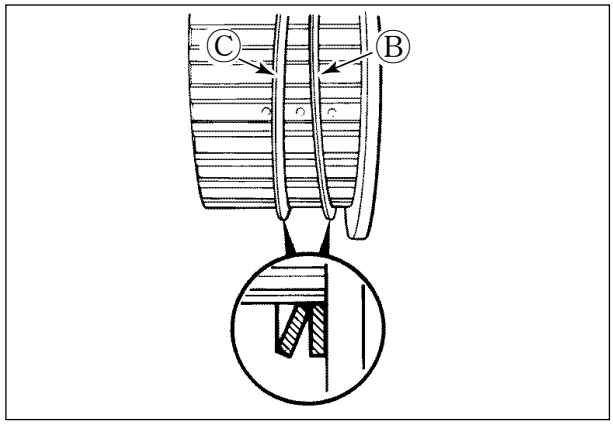
TOOL Clutch sleeve hub holder : 09920-53710

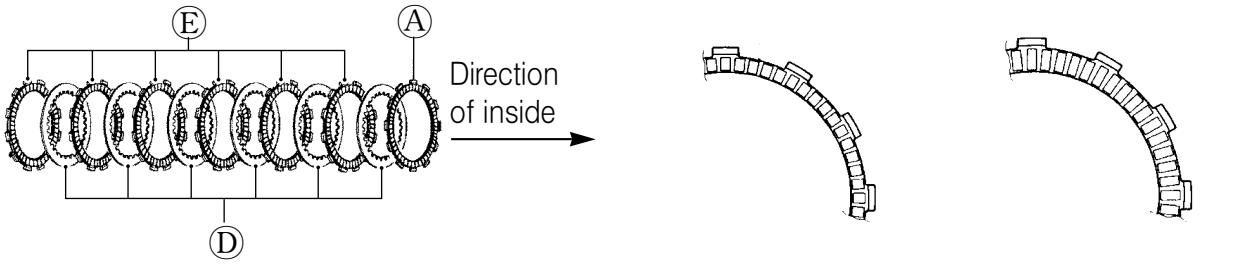
Clutch sleeve hub nut
: 40~60 N · m(4.0~6.0 kg · m)

● Bend the lock washer securely.

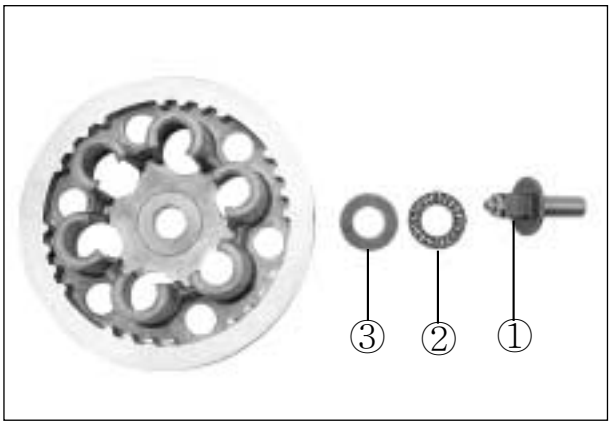


● Install the clutch drive plate NO. 2 Ⓐ.
● Install the spring washer seat Ⓑ and spring washer Ⓒ onto the clutch sleeve hub correctly.
● Install the clutch driven plates Ⓓ and drive plates NO. 1 Ⓔ one by one into the clutch sleeve hub in the prescribed order.

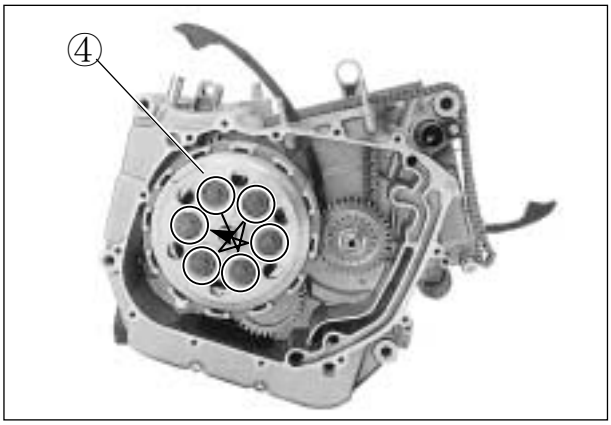




● Install the clutch release rack ①, bearing ② and washer ③.



● Install the clutch pressure plate ④, retainer, clutch springs and clutch spring mounting bolts.
● Hold the primary drive gear nut and tighten the clutch spring mounting bolts in a crisscross pattern.

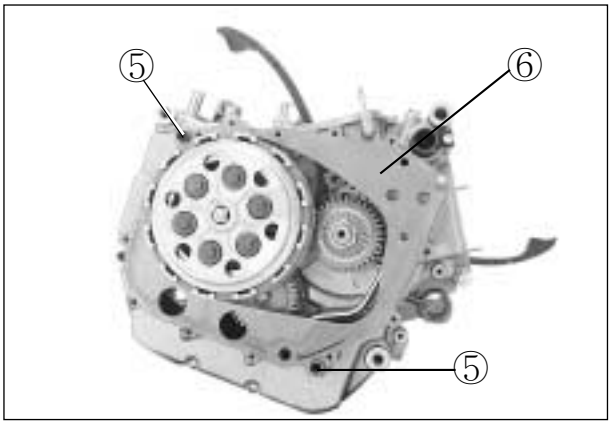


NOTE

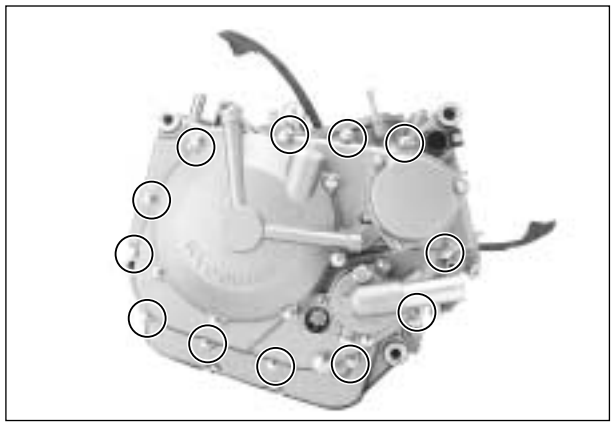
Make sure that the clutch pressure plate is installed correctly.

■ CLUTCH COVER

● Install the two dowel pins ⑤ and new gasket ⑥.
● Apply engine oil to each gears, bearings and clutch plates.



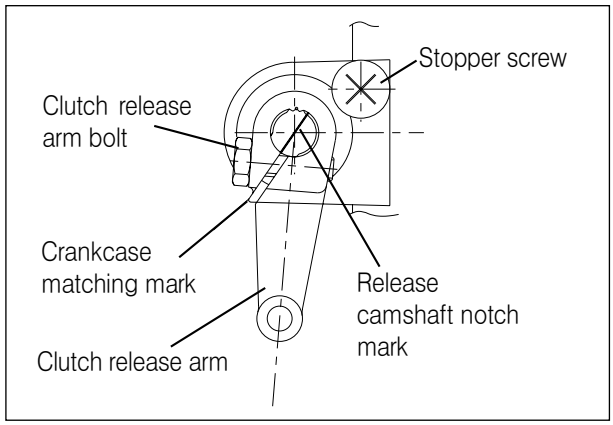
● Install the clutch cover, and tighten the clutch cover bolts securely.



● Install the clutch release arm as following:

① Turn the clutch release shaft toward(This time, mark on the shaft align outside contact line the stopper screw) the right.

② Install that the release camshaft notch mark align matching mark of the crankcase as shown in the right figure.



⊙ OIL DRAIN PLUG

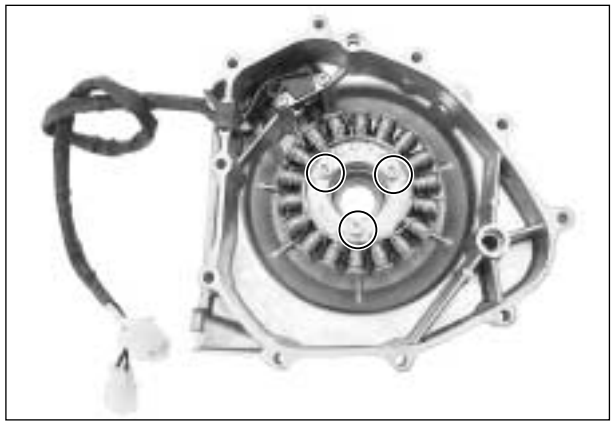
● Tighten the oil drain plug to the specified torque.

Engine oil drain plug
: 21 N · m (2.1 kg · m)

⊙ STATOR

● Apply a small quantity of THREAD LOCK "1324" to the threaded parts of screws.

THREAD LOCK "1324"



⊙ STARTER CLUTCH

● When installing the starter clutch and rotor, apply the THREAD LOCK "1324" to the bolts and tighten to the specified torque.

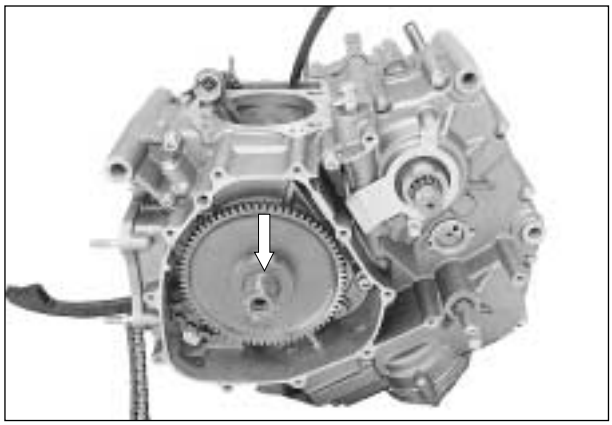
THREAD LOCK "1324"

Starter clutch bolt
: 23~28 N · m (2.3~2.8 kg · m)

⊙ MAGNETO ROTOR

● Fit the key into the key slot on the crankshaft.
● With the magneto rotor, install the starter clutch on the crankshaft.
● Apply a small quantity of THREAD LOCK "1324" to the threaded parts of crankshaft.

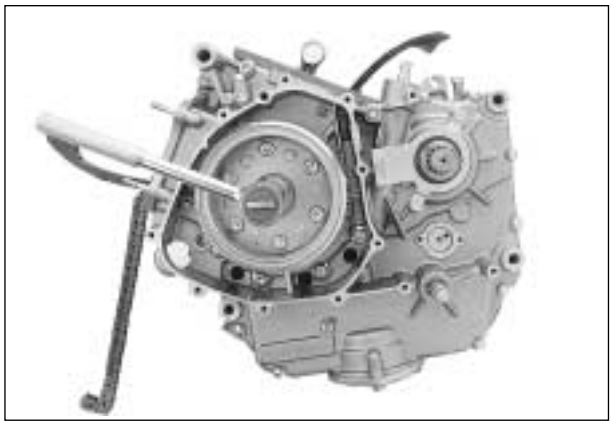
THREAD LOCK "1324"



● Tighten the magneto rotor bolt to the specified torque.

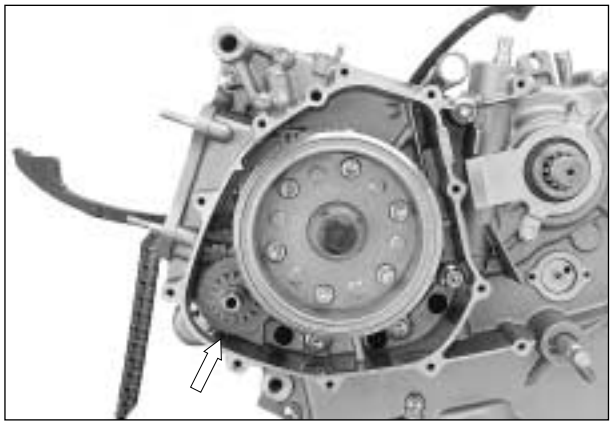
Conrod holder : 09910-20115

Magneto rotor bolt
: 110~170 N · m (11.0~17.0 kg · m)

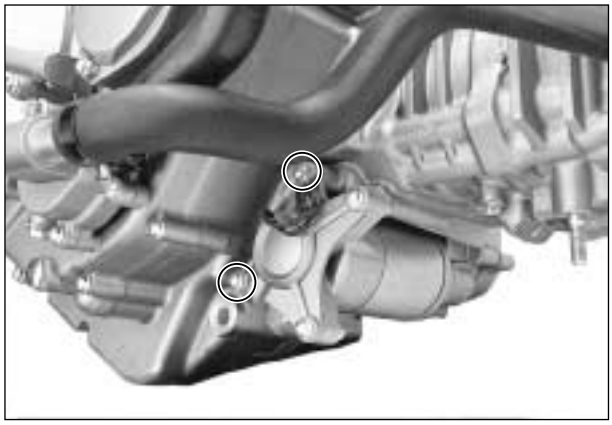


⊙ STARTER IDLE GEAR AND MOTOR

● Install the starter idle gear, shaft.

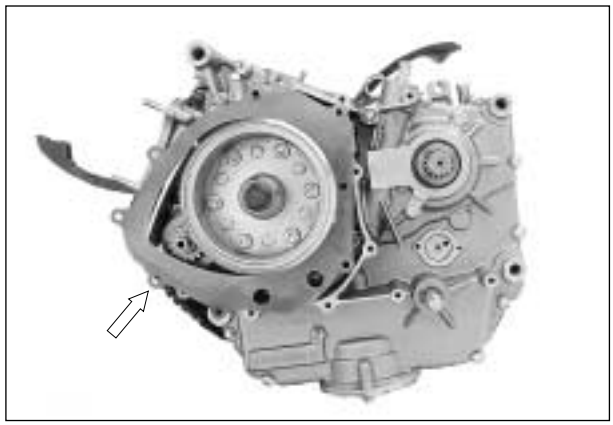


● Install the starter motor.



⊙ MAGNETO COVER

● Install the new gasket and dowel pin.
● Apply oil to the each gear, bearing and starter clutch.

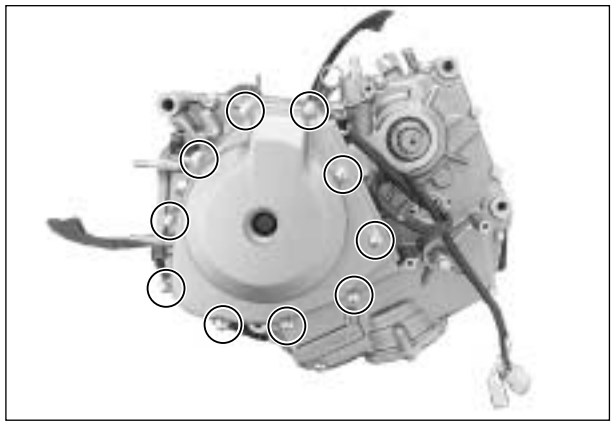


● Install the magneto cover and tighten the magneto cover bolts.

Magneto cover bolt
: 10 N · m (1.0 kg · m)

⊙ PISTON RING

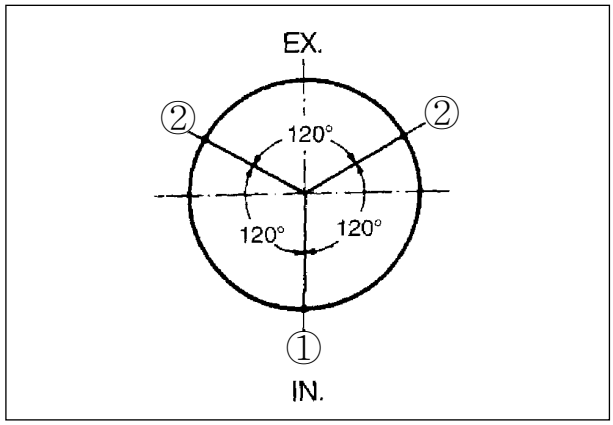
● Install the piston ring in order of oil ring, 2nd ring and 1st ring at first at the front cylinder.

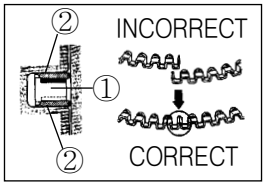


⚠ CAUTION

Be careful not to cause scratch on the piston when inserting the piston ring to the piston.
Also, do not expand the piston ring more than necessary as the ring can break.

● When all the piston rings have been assembled, check that each can turn smoothly.
● To minimize compression and oil leaks, locate each piston ring end gap in the position as shown in the right illustration
● Install the spacer ①.
● Install the upper and lower side rail ②.



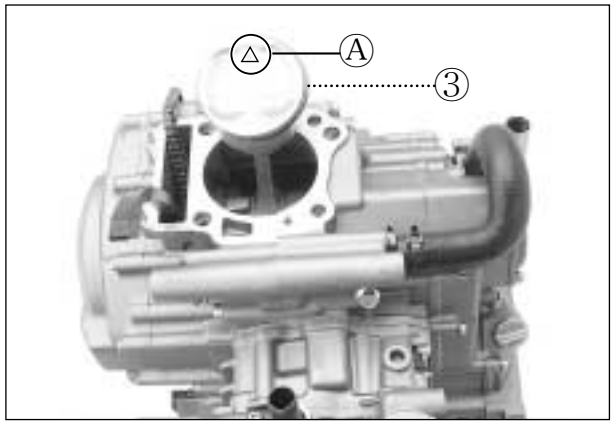


⊙ PISTON

● Apply the MOLY PASTE to the piston pin.

MOLY PASTE

● When installing the piston, turn the mark Ⓐ on the piston head to exhaust side.
● After the piston pin has been inserted through the conrod, install the circlip ③.



⚠ CAUTION

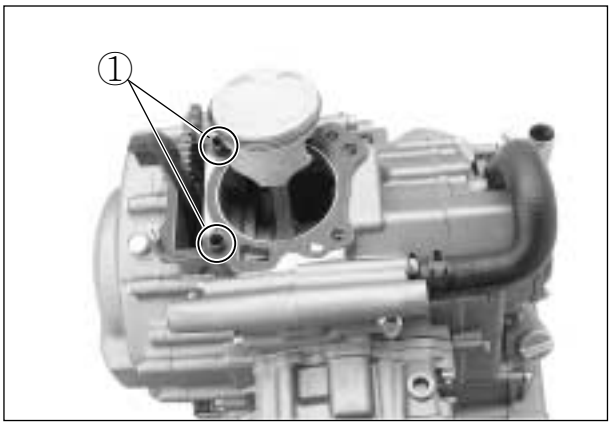
Replace the circlip with a new one.
Place a piece of rag under the piston when installing the circlip to prevent it from falling into the crankcase.

⊙ CYLINDER

● Apply BOND "1215" to the parting line of crankcase.

1215 BOND "1215"

● Place the dowel pin ① and new gasket on the crankcase.



⚠ CAUTION

Make sure to replace the gasket with a new one.

● Apply the engine oil to the conrod small end, piston and the piston rings.
● Coat the cylinder wall with oil.
● Install the cylinder and tighten the cylinder base nuts.

Cylinder base nut
: 7~11 N · m (0.7~1.1 kg · m)

This cylinder is different from the front and rear.

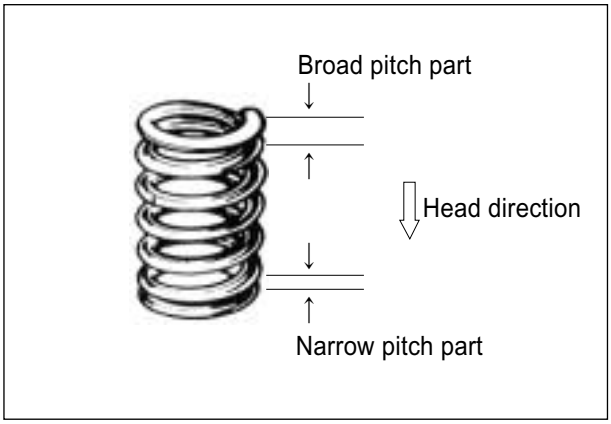
⊙ VALVE AND SPRING

● Insert the valve, with their stems coated with MOLY PASTE.

M MOLY PASTE

Apply the oil to the lip of the stem seal.

● The narrow pitch side of each spring face to the head when the valve spring install. The pitch of inside spring and outside spring is changed. The pitch of spring is decreased from the upper side to the lower side.



⊙ CYLINDER HEAD

● Put in the valve spring and retainer, install the cotter with compressed the spring by using the valve spring compressor.

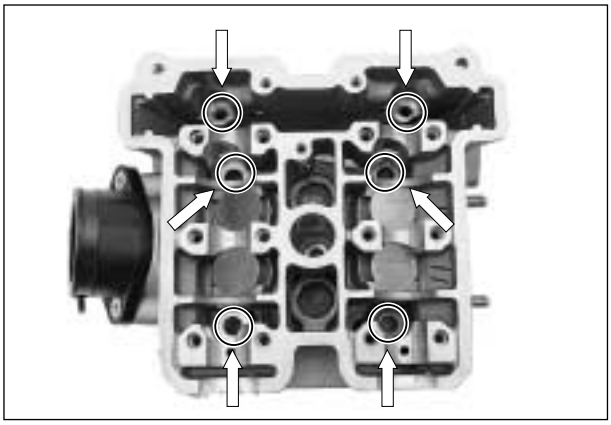
TOOL Valve spring compressor : 09916-14510
Valve spring compressor attachment
: 09916-14520

⚠ CAUTION

After installing the valve cotter, tap the valve stem end by using the plastic hammer at 2~3 times for assembly of the valve and cotter.

● Fit the cylinder head and tighten the six cylinder head bolts diagonally.

Cylinder head bolt (M6)
: 8~12 N · m (0.8~1.2 kg · m)
Cylinder head bolt (M10)
: 40~45 N · m (4.0~4.5 kg · m)

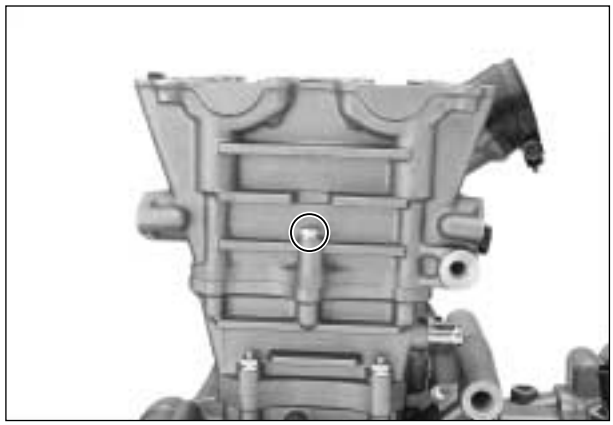


⚠ CAUTION

Pay caution to prevent the cam chain from dropping into the crankcase.

● Tighten the cylinder head base bolt.

Cylinder head base bolt
: 8~12 N · m (0.8~1.2 kg · m)



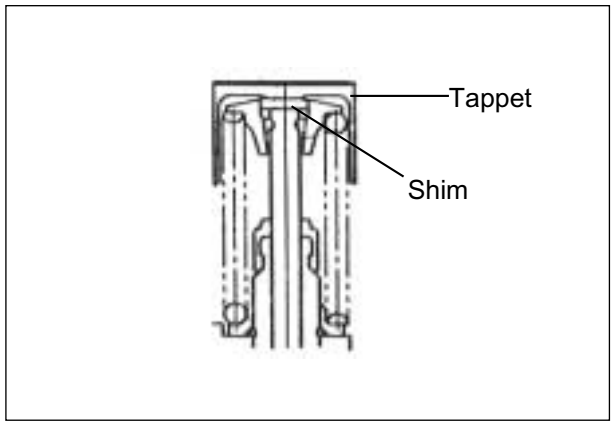
● Install the tappet and shim.

⚠ CAUTION

With the tappet fit, it should be replaced if it doesn't turn smoothly by the hand.

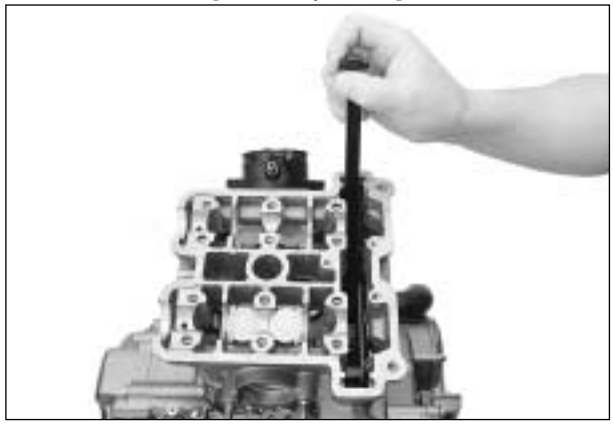
⚠ CAUTION

The tappet and shim should be installed at the original position when removed.
If otherwise, it is difficult to adjust the valve clearance.



● Fit the chain guide.

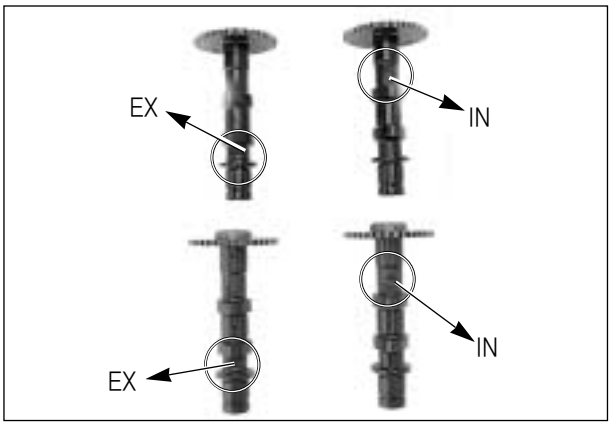
[Front Cylinder]



[Rear Cylinder]

⊙ CAMSHAFT ASSEMBLY

● Distinguish the "EX" mark for the exhaust camshaft, the "IN" mark for the intake camshaft.



● With pull up the camshaft drive chain, align the " | F" mark of magneto rotor into the punching mark of magneto cover to turn the crankshaft.(Front cylinder)

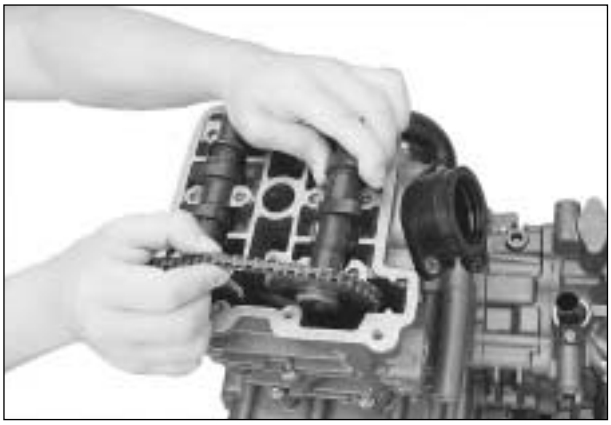
⚠ CAUTION

When adjusting the rear cylinder, align the " | R" mark of magneto rotor into turn counter-clockwise 285° at the position of front cylinder.

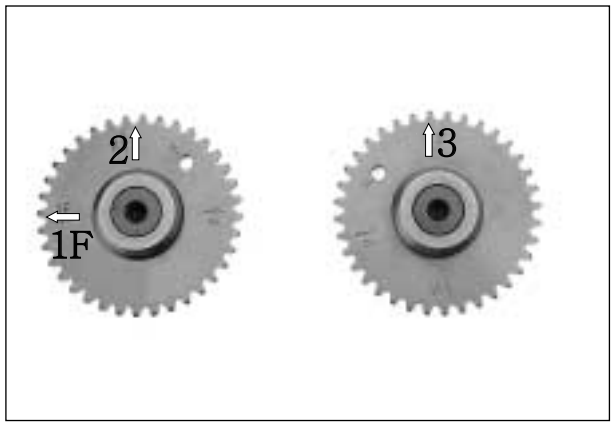
⚠ CAUTION

If turn the crankshaft without pulling up the camshaft drive chain, the chain may be fallen off between the crankcase and cam chain drive sprocket.

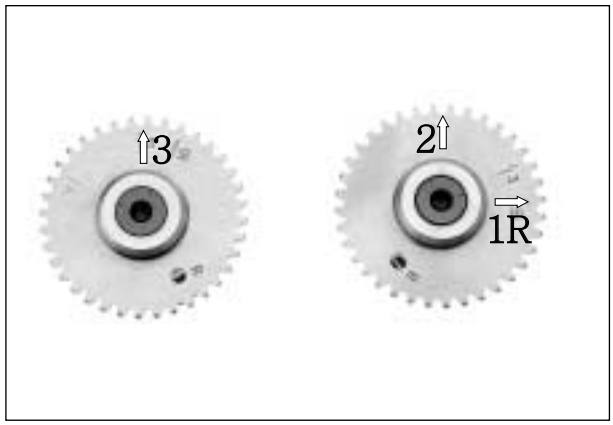
● The front cylinder head install first the exhaust camshaft, following the intake camshaft.
The rear cylinder head install first the intake as the cam chain tension adjuster exist exhaust side.



● The "1F" arrow of exhaust camshaft sprocket should be toward the outside and aligned with the plane of FRONT cylinder head.
At that time, the "2" arrow of exhaust camshaft sprocket should be in a vertical position to the plane of cylinder head when exhaust camshaft sprocket was geared into camchain.



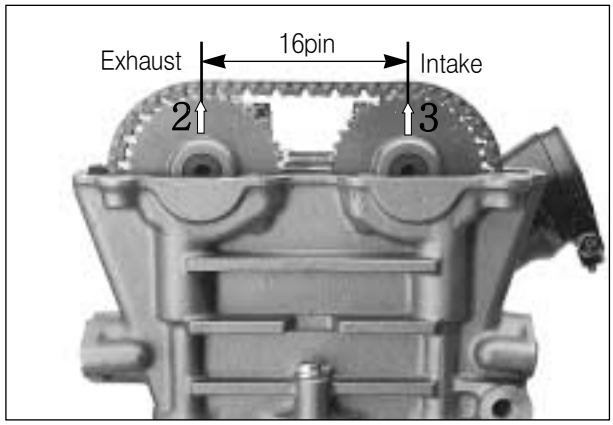
● The "1R" arrow of intake camshaft sprocket should be toward the outside and aligned with the plane of REAR cylinder head. At that time, the "2" arrow of intake camshaft sprocket should be in a vertical position to the plane of cylinder head when the intake camshaft sprocket was geared into the camchain.



● Gear into the chain at the "3" arrow of intake sprocket that count the 16th of chain roller pin from the roller pin on the "2" arrow of exhaust sprocket to the intake camshaft.

⚠ CAUTION

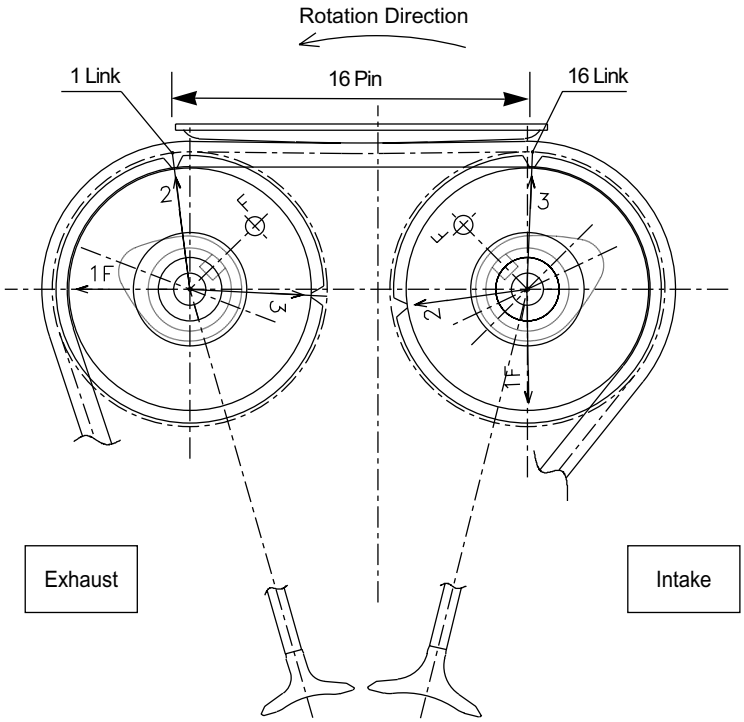
The REAR cylinder gear into that count the 16th of chain roller pin from the "2" arrow of intake sprocket to the "3" arrow of exhaust sprocket.



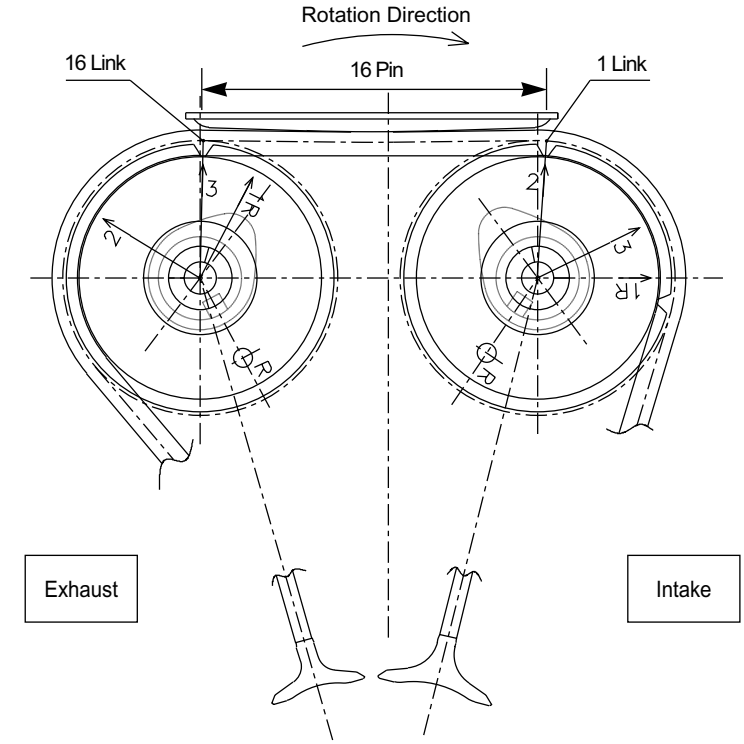
● Install the "3" arrow punching mark of intake camshaft sprocket with the surface of cylinder head vertically.

⚠ CAUTION

The cam chain is installed to the all of three sprocket.
Be sure to lie the crankshaft until the two holder and cam chain tension adjuster are installed completely.



[Front cylinder]



[Rear cylinder]

NOTE

The camshaft housing should be installed in the same manner with the front engine.

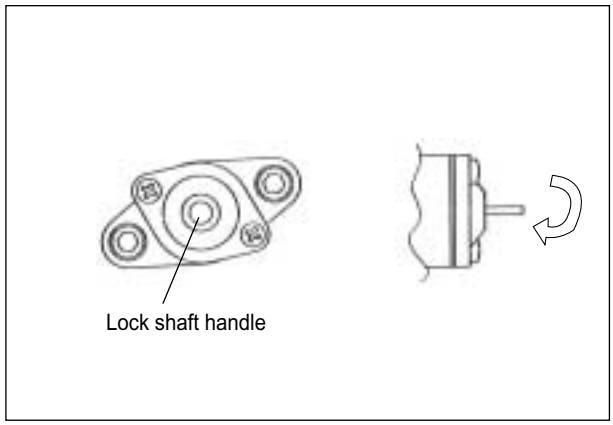
● Put the intake or exhaust camshaft housing to the cylinder head upper surface.
● Tighten the camshaft housing bolt with the specified torque diagonally.

⚠ CAUTION

The camshaft housing bolt is made of the special material.
This bolt is superior at the degree of hardness more than the different high tension bolt.
Pay special caution that the different type of bolt should not be used.
This bolt head is punched the "9" mark.

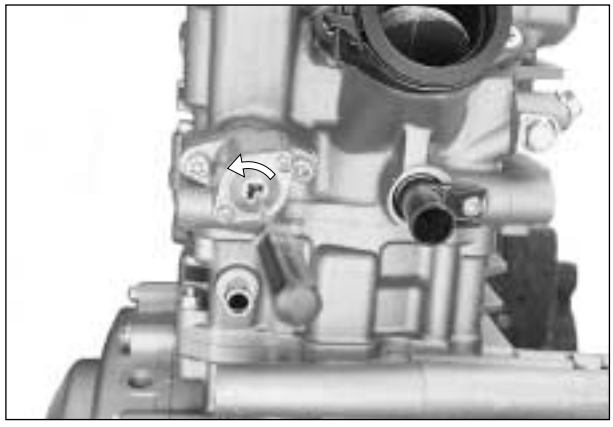
Camshaft housing bolt
: 12 N · m (1.2 kg · m)

● If turn the lock shaft handle in clockwise (↘) direction, the pushrod is inserted in.
Turn the mechanial spring continually until the handle is turned to the end.



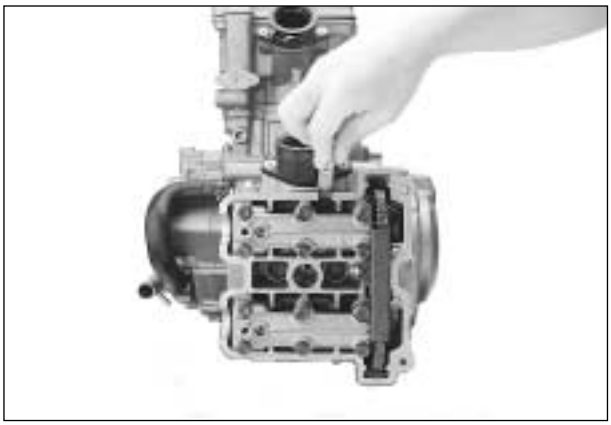
● Fix the adjuster into the cylinder block.

● Get out the pushrod for the front to turn the lock shaft handle in counter-clockwise (↩).



● Turn the crankshaft about 10 times counter-clockwise (↶) on the basis of the magneto rotor.
● If the valve clearance is within standard after measured the valve clearance, begin the next operation.
If it is out of stanadard, adjust the valve clearance within standard limit after disassembled the camshaft and replaced the proper shim.

Valve clearance	Standard
IN.	0.1 ~ 0.2 mm (0.004 ~ 0.008 in)
EX.	0.2 ~ 0.3 mm (0.008 ~ 0.012 in)



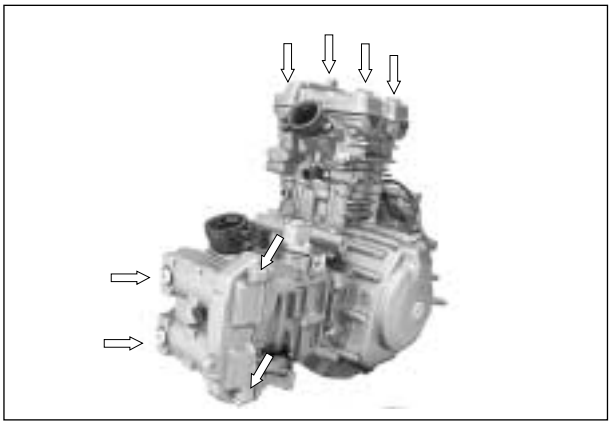
● Adjust the valve clearance of rear cylinder with the same manner of the front cylinder.(Refer to page 2-3)

⚠ CAUTION

If you don't turn the crankshaft about 10 times before measured the valve clearance, there is no meaning in valve clearance.

● Apply BOND "1215" to the surface of cylinder head cover packing block.

1215 **BOND "1215"**



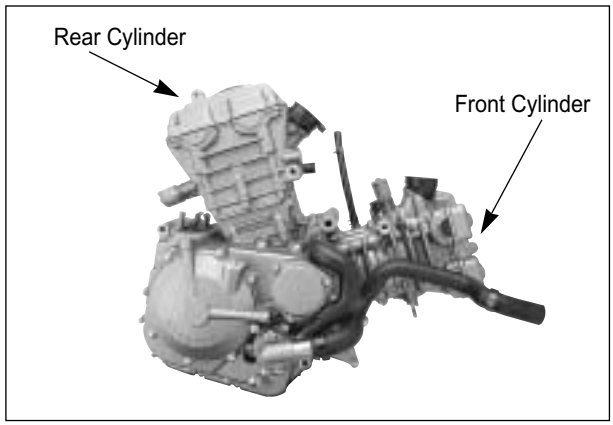
● Tighten the cylinder head cover bolts with the specified torque.

Cylinder head cover bolt
: 12~16 N · m (1.2~1.6 kg · m)

⊙ SPARK PLUG

● Install the spark plug.(Refer to page 2-5)

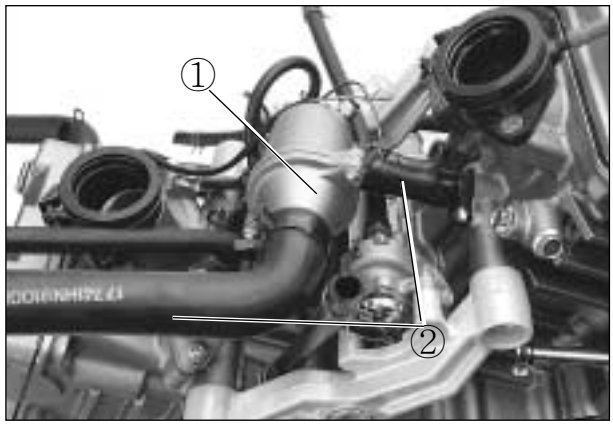
● Install the rear cylinder head and cylinder with the same manner which installed the front cylinder head and cylinder.



⊙ THERMOSTAT

● Install the thermostat case ① along with the hose ②.

NOTE
Thermostat reassembly ***: Refer to page 5-9***

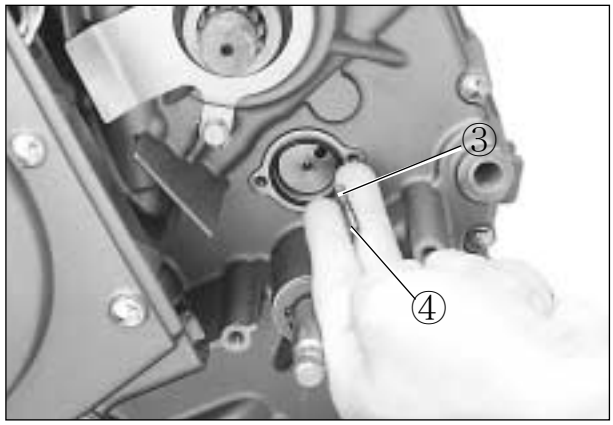


⊙ GEAR POSITION SWITCH

● Install the spring ③ and contact ④.

● Apply SUPER GREASE "A" to the O-ring and install the gear position switch.

SUPER GREASE "A"



FUEL SYSTEM

CONTENTS

FUEL TANK / FUEL COCK 4- 1

FUEL PUMP 4- 2

CARBURETOR 4- 3

⚠ CAUTION

Gasoline must be handled carefully in an area well ventilated and away from fire or sparks.

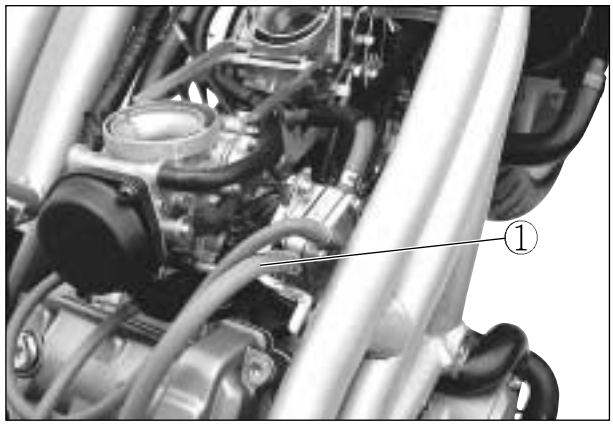
FUEL TANK / FUEL COCK

⊙ REMOVAL

⚠ WARNING

Gasoline is very explosive. Extreme care must be taken.

- Remove the front seat. (Refer to page 7-1)
- Remove the fuel tank mounting bolt, and take off the hooks.
- Disconnect the fuel hose ① and remove the fuel tank.

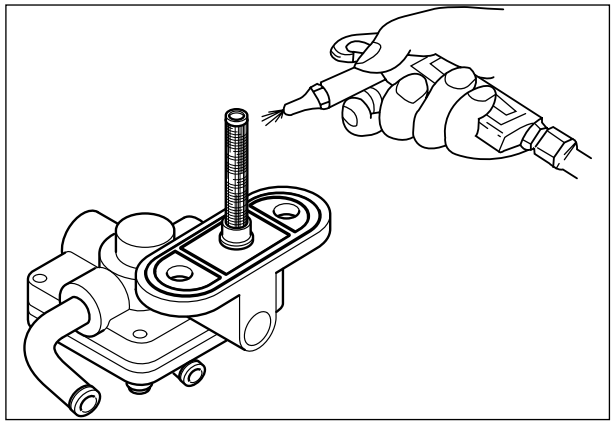


- Remove the fuel cock.

⊙ INSPECTION

■ FUEL COCK

If the fuel filter is dirty with sediment or rust, fuel will not flow smoothly and loss of engine power may result.
Clean the fuel filter.
Also check the fuel cock for cracks.

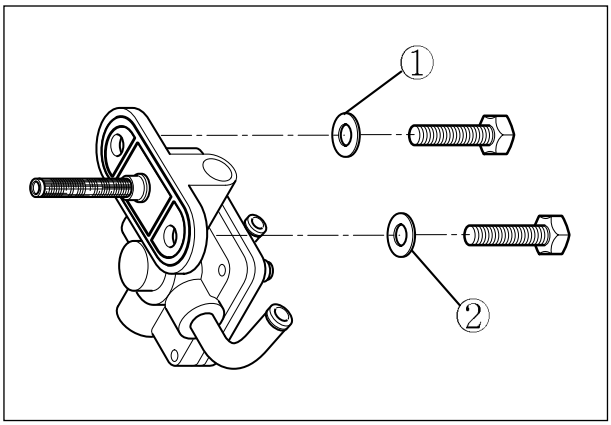


⊙ REMOUNTING

Remount the fuel tank and fuel cock in the reverse order of removal.

⚠ CAUTION

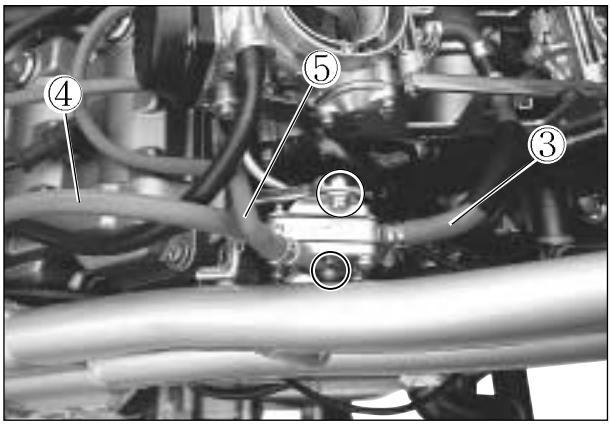
- **Gaskets ① and ② must be replaced with new ones to prevent fuel leakage.**
- **Tighten the fuel cock bolts evenly.**



FUEL PUMP

⊙ REMOVAL

- Remove the front seat and fuel tank.
- Disconnect the fuel hoses ③, ④ and vacuum hose ⑤.



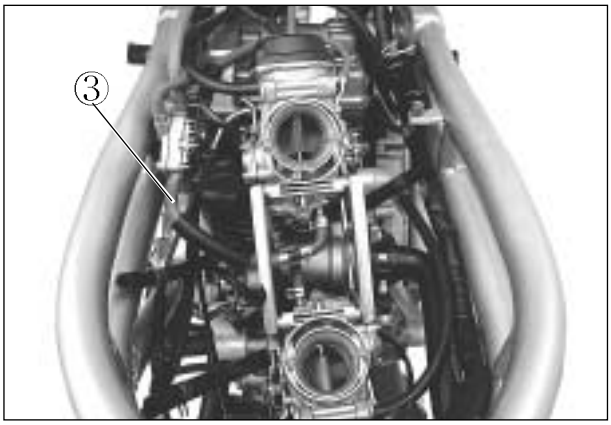
⊙ INSPECTION

⚠ WARNING

Gasolin is very explosive. Extreme care must be taken.

- Disconnect the fuel hose ③, connect the suitable hose and insert the free end of the hose into a receptacle.

Check the fuel flow when starting the engine for a few seconds by pressing the starter switch.
If the fuel flow is not found, check the fuel cock. (Refer to page 4-1)
If the fuel cock and hoses are not fault, replace the fuel pump.

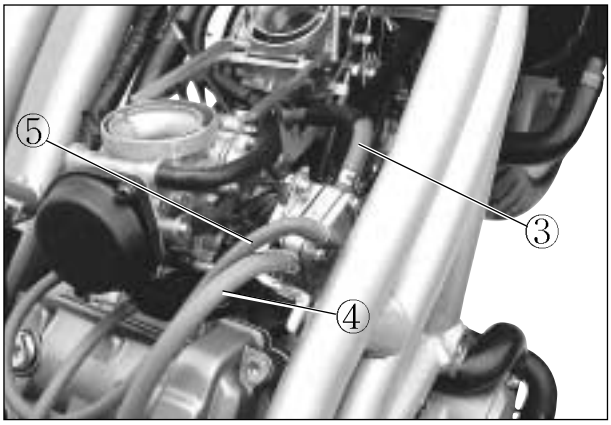


⊙ REASSEMBLY

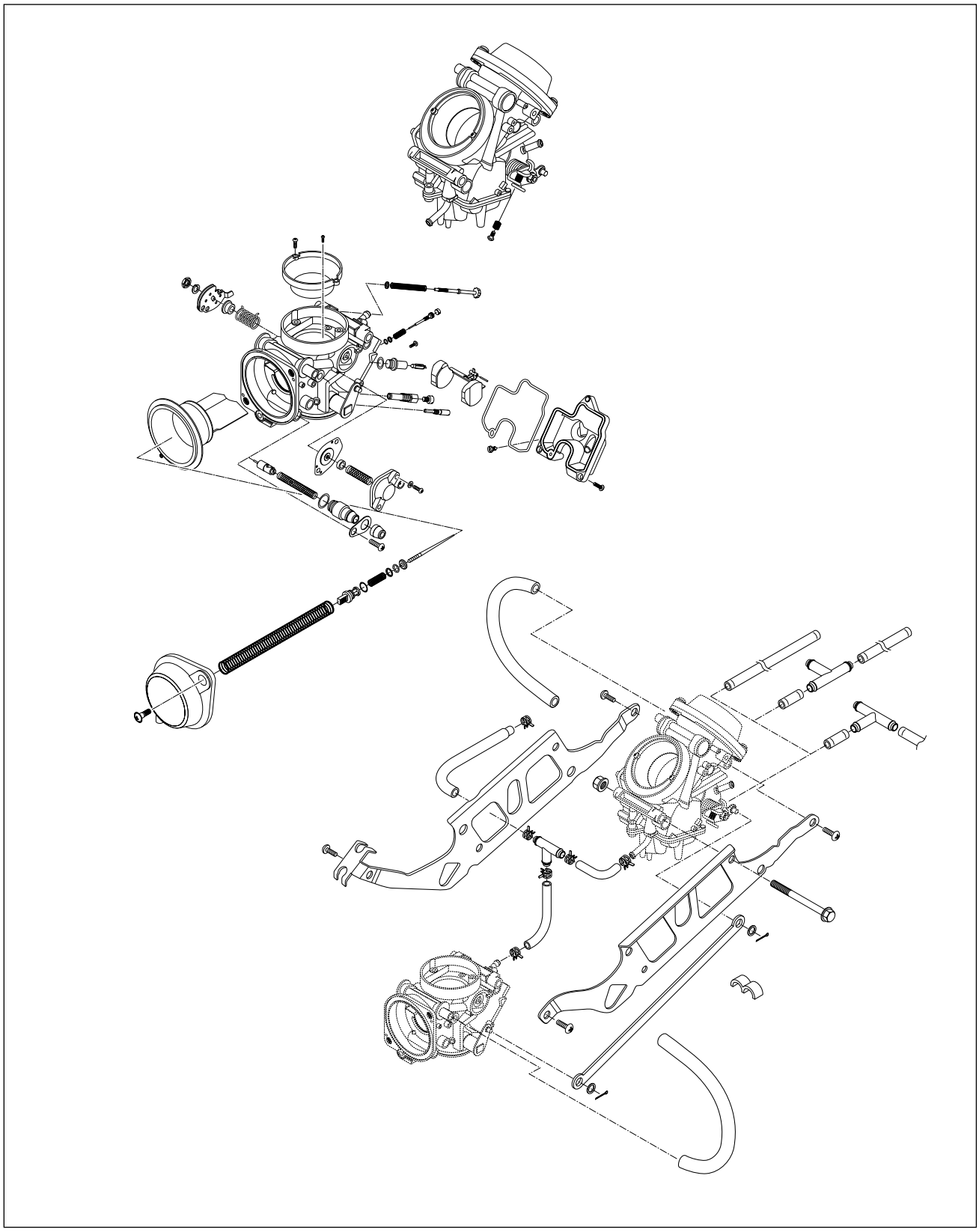
Carry out the assembly procedure in the reverse order of disassembly.

- Tighten the fuel pump mounting bolts.
- Connect the fuel hoses ③, ④ and vacuum hose ⑤ securely.

FUEL HOSE ROUTING :
Fuel hose ③ (To carburetor)
Fuel hose ④ (To fuel cock)
Vacuum hose ⑤ (To carburetor vacuum pipe).

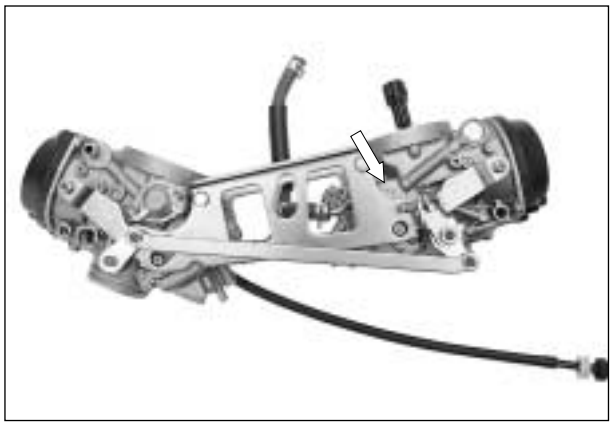


CARBURETOR



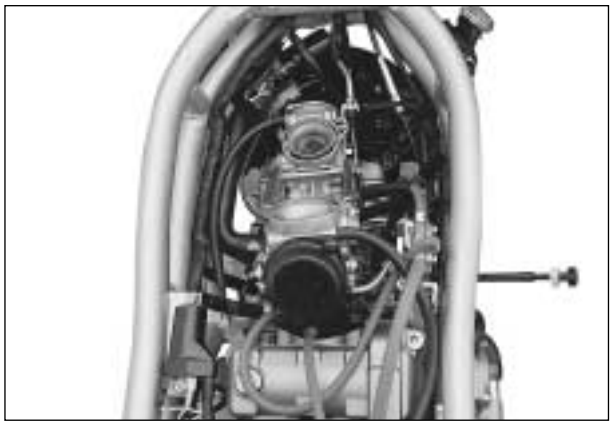
⊙ LOCATION OF CARBURETOR I.D. NO.

The carburetor I.D. is stamped on the location on the carburetor as shown in the right photo.

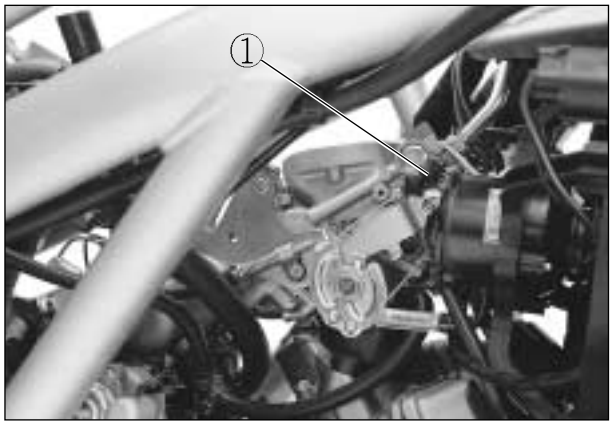


⊙ REMOVAL

● Remove the fuel tank. (Refer to page 4-1)
● Remove the fuel hose.

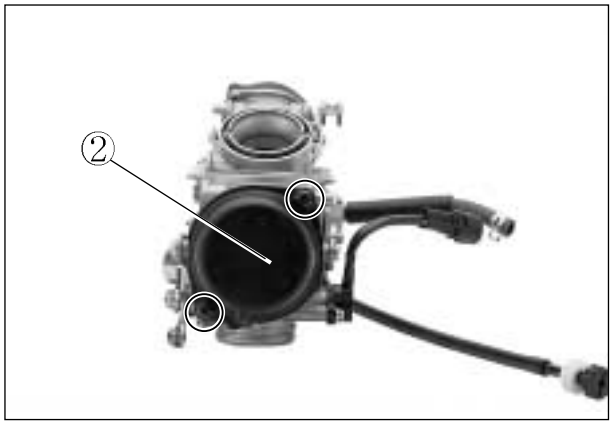


● Remove the throttle cables ① and choke cable.
● Loosen the clamp screw and remove the carburetor.

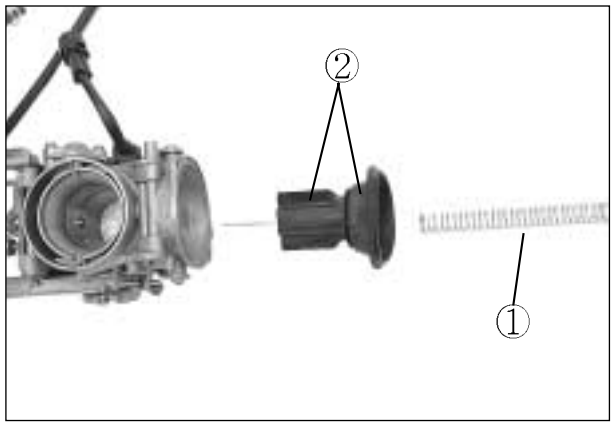


⊙ DISASSEMBLY

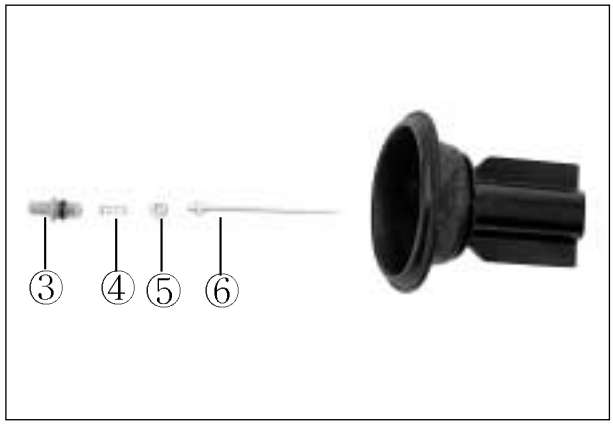
● Remove the diaphragm cover ②.



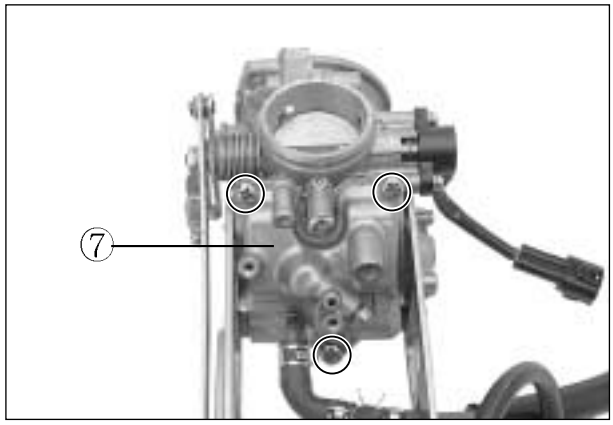
● Remove the spring ① along with diaphragm ②.



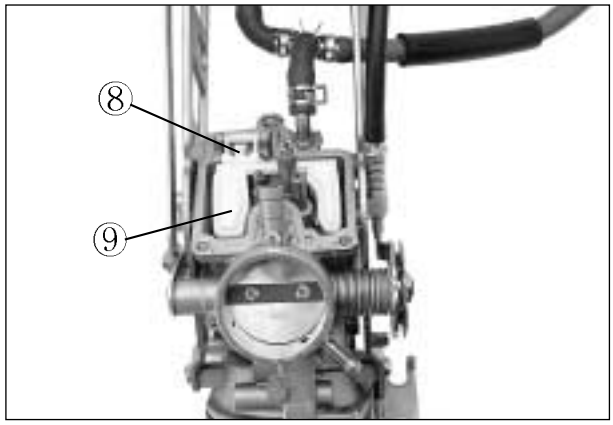
● Remove the jet needle cap ③, spring ④, retainer ⑤, and jet needle ⑥.



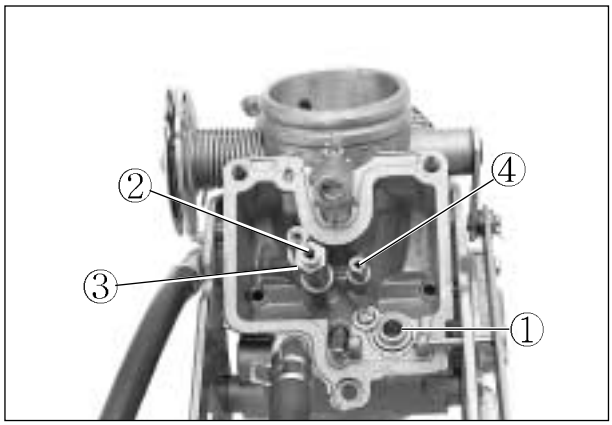
● Remove the float chamber body ⑦.



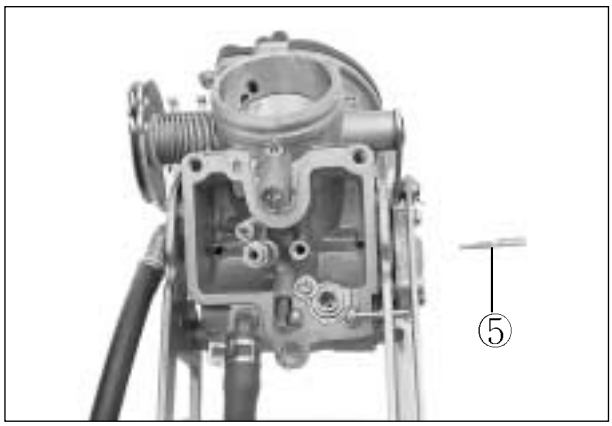
● Remove the float assembly ⑨ along with the needle valve ⑧ by removing the pin.



● Remove the valve seat ①.
● Remove the main jet ②, jet holder ③ and pilot jet ④.



● Remove the pilot screw ⑤ counting and tightening the number of turn.



NOTE

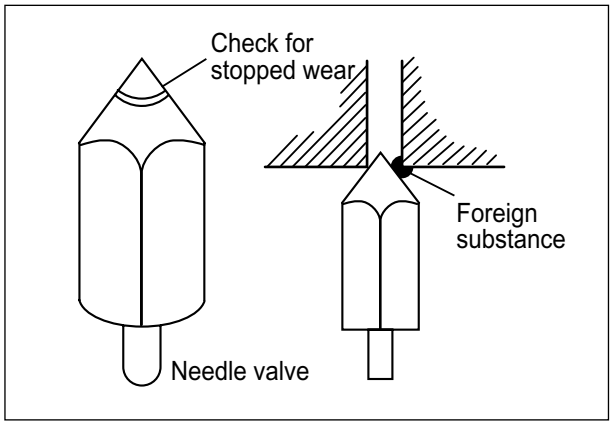
Record the number of turn for the pilot screw when install to confer.

⊙ INSPECTION

Check the following parts for damage and clogging.

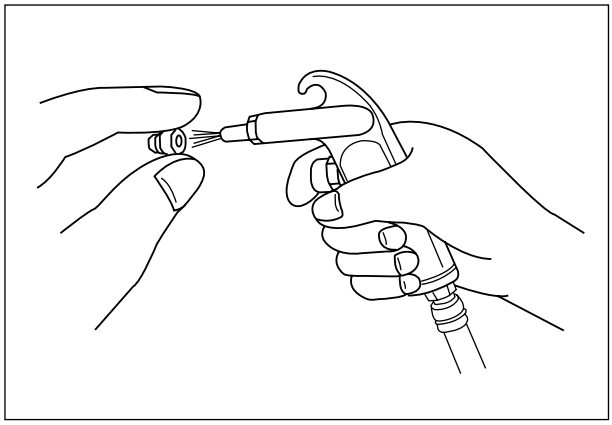
- Pilot jet
- Main jet
- Main air jet
- Pilot air jet
- Needle jet holder
- Needle valve
- Valve seat
- Piston valve
- Starter jet
- Gaskets and O-rings
- Pilot outlet and bypass
- Float
- Jet needle

If any abnormal condition is found, wash the part clean. If damage or clogging is found, replace the part with a new one.



⊙ CLEANING

● Clean all jets by using compressed air.
● After cleaning, reassemble the carburetor with new seals and gaskets.

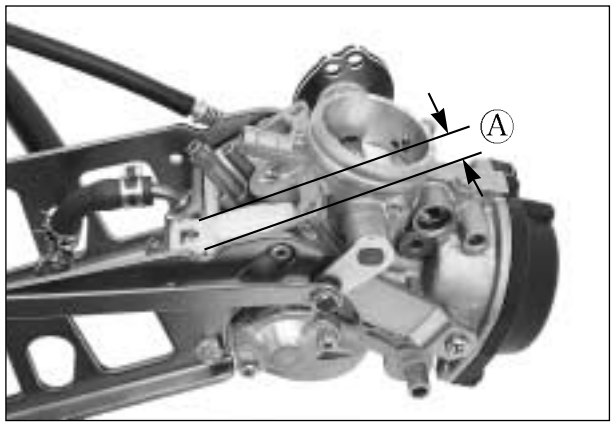


⊙ FLOAT HEIGHT ADJUSTMENT

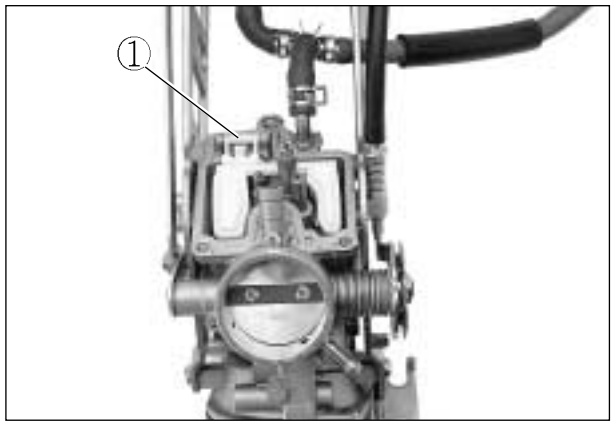
To check the float height, turn the carburetor upside down. Measure the float height Ⓐ while the float arm is just contacting the needle valve using vernier calipers.

Float height Ⓐ	7 mm (0.28 in)

TOOL **Vernier calipers : 09900-20101**



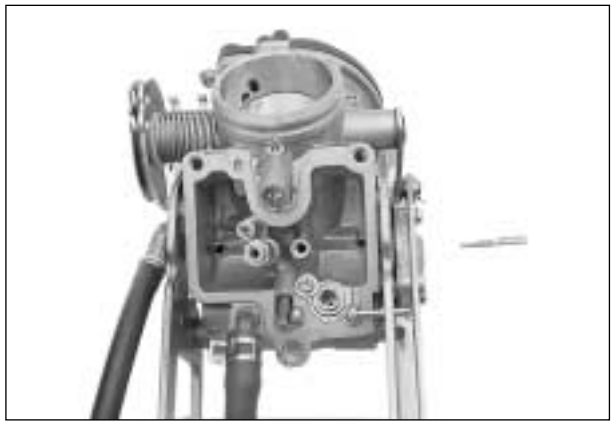
- Bend the float arm ① as necessary to bring the height to the specified level.
- After adjustment, check the float height and the fuel level again.



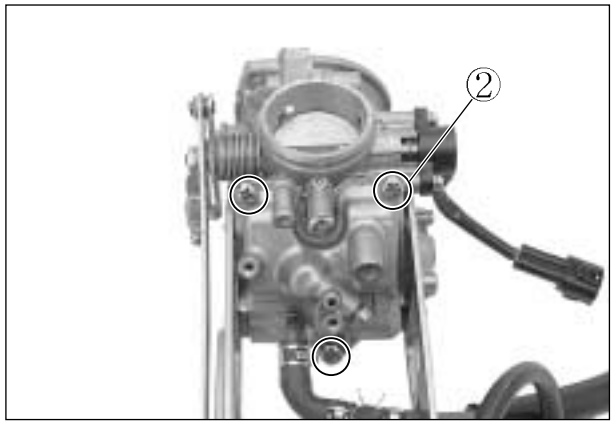
⊙ REASSEMBLY

Carburetor reassembly can be performed in the reverse order of disassembly. When reassembling, carefully observe the following instructions.

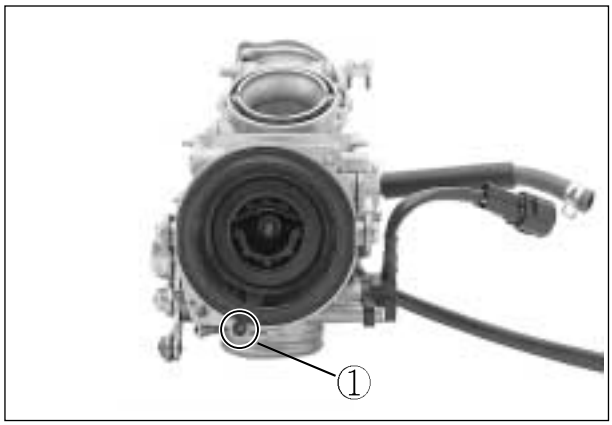
- After cleaning, reinstall the pilot screw to the original number of turn that is recorded during disassembly.



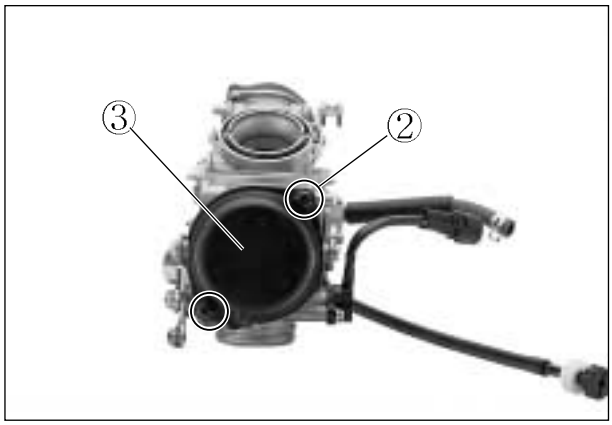
- Fit the seal rings securely to the float chamber and install the float chamber to the carburetor body.
- Install the three screw ②.



● Align the hole ① of the diaphragm with passage way on the carburetor body.

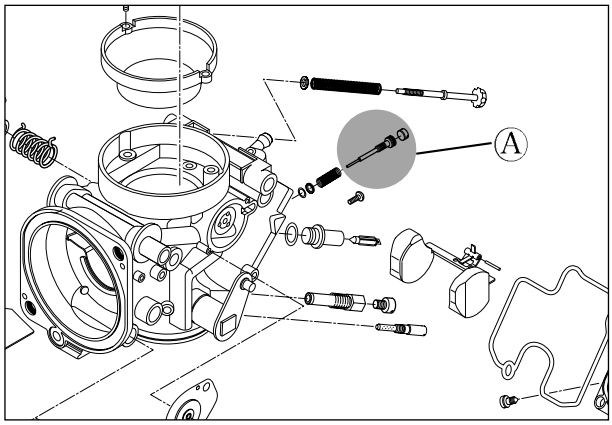


● Install the two screw ② and diaphragm cover ③.



⚠ CAUTION

Never adjust "CO adjust screw" Ⓐ of the carburetor. If adjust at discretion, have a bad influence upon output of the engine as the two carburetor is disharmonious.



● After the assembly and installation on the engine have been completed, perform the following adjusment.

Throttle cable adjustment. (Refer to page 2-8)

Idle speed adjustment. (Refer to page 2-7)

COOLING SYSTEM

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COOLING CIRCUIT 5- 2
RADIATOR 5- 2
COOLING FAN 5-5
COOLING FAN THERMO-SWITCH 5-6
ENGINE COOLANT TEMPERATURE SENSOR 5- 7
THERMOSTAT 5- 8
WATER PUMP 5-10

ENGINE COOLANT

At the time of manufacture, the cooling system is filled with a 50 : 50 mixture of distilled water and ethylene glycol anti-freeze.

This 50 : 50 mixture will provide the optimum corrosion protection and excellent heat protection, and will protect the cooling system from freezing at temperatures above -31℃ (-24°F)

If the motorcycle is to be exposed to temperatures below -31℃ (-24°F), this mixing ratio should be increased up to 55% or 60% according to the figure.

⚠ CAUTION

- **Use a high quality ethylene glycol base anti-freeze, mixed with distilled water. Do not mix an alcohol base anti-freeze and different brands of anti-freeze.**
- **Do not rut in more than 60% anti-freeze or less than 50%. (Refer to Right figure.)**
- **Do not use a radiator anti-leak additive.**

50% Engine coolant including reserve tank capacity	
Anti-freeze	0.8 ℓ
Water	0.8 ℓ

Anti-freeze density	Freezing point
50%	−31℃ (−24°F)
55%	−40℃ (−40°F)
60%	−55℃ (−67°F)

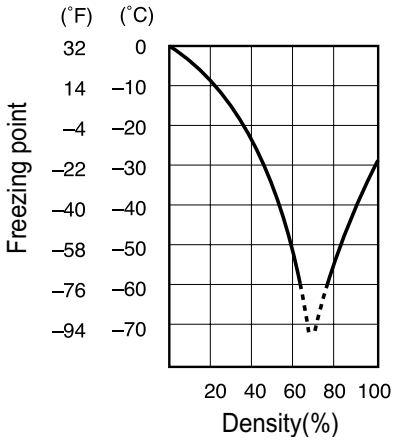


Fig.1 Engine coolant density-freezing point curve.

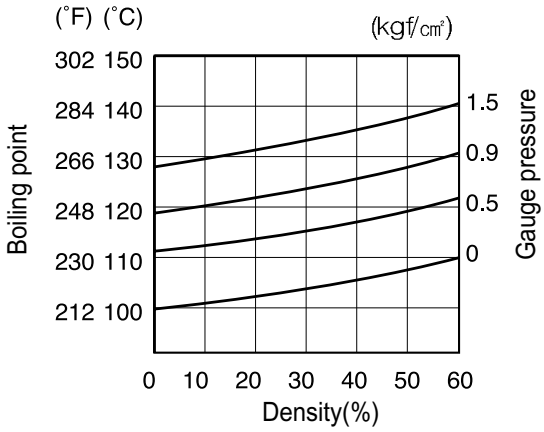
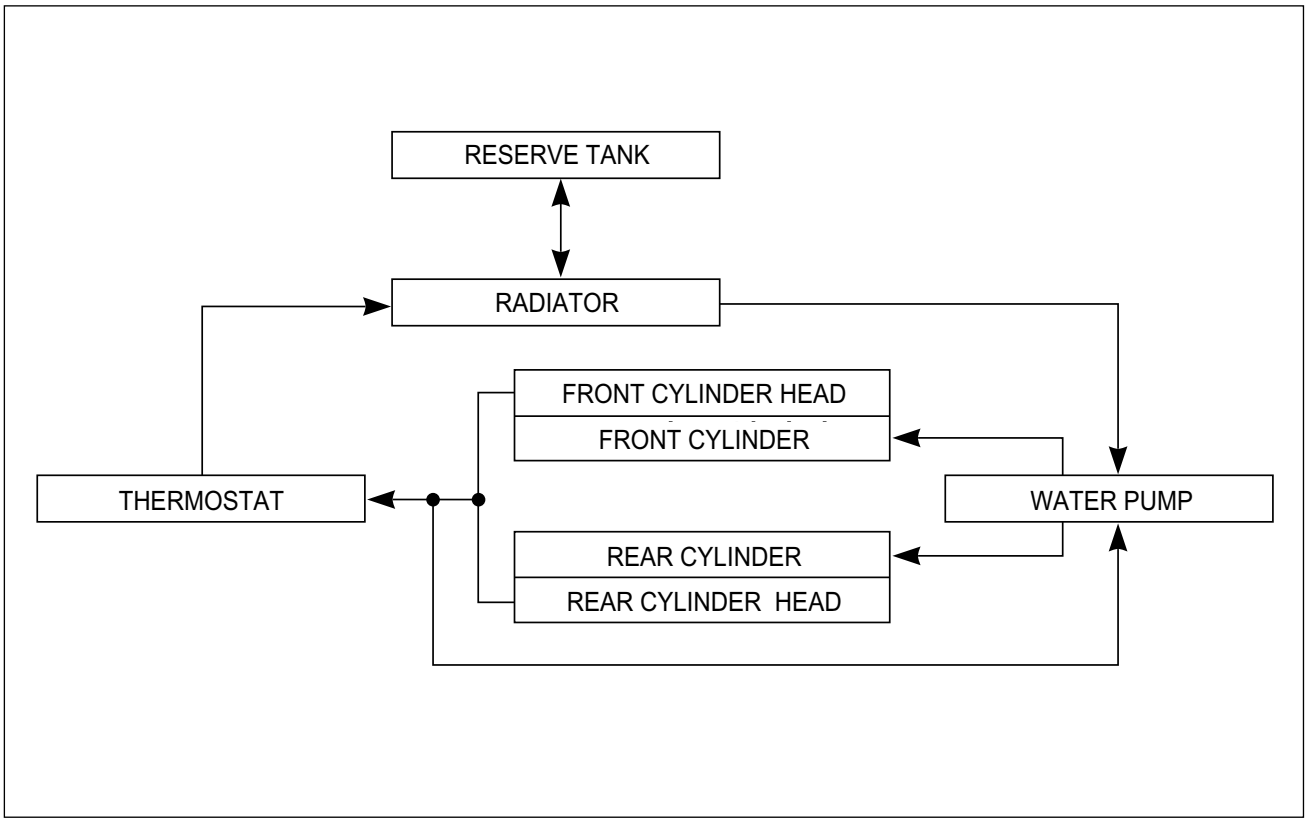


Fig.2 Engine coolant density-boiling point curve.

⚠ WARNING

- **You can be injured by scalding fluid or steam if you open the radiator cap when the engine is hot. After the engine cools, wrap a thick cloth around cap and carefully remove the cap by turning it a quarter turn to allow pressure to escape and then turn the cap all the way off.**
- **The engine must be cool before servicing the cooling system.**
- **Coolant is harmful;**
  - ✳ **If it comes in contact with skin or eyes, flush with water.**
  - ✳ **If swallowed accidentally, induce vomiting and call physician immediately.**
  - ✳ **Keep it away from children.**

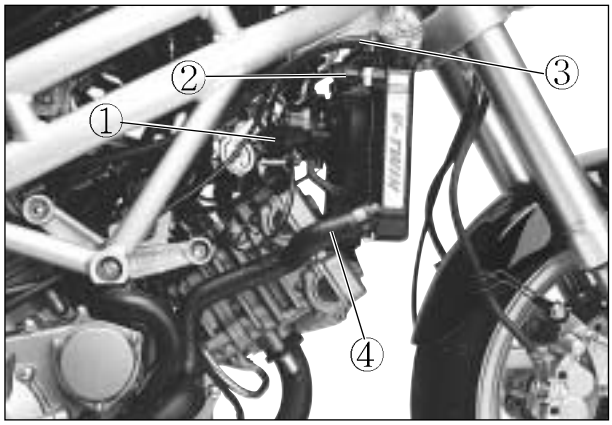
COOLING CIRCUIT

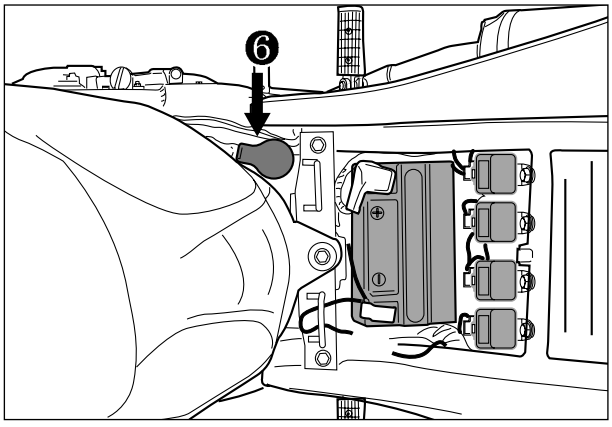


RADIATOR

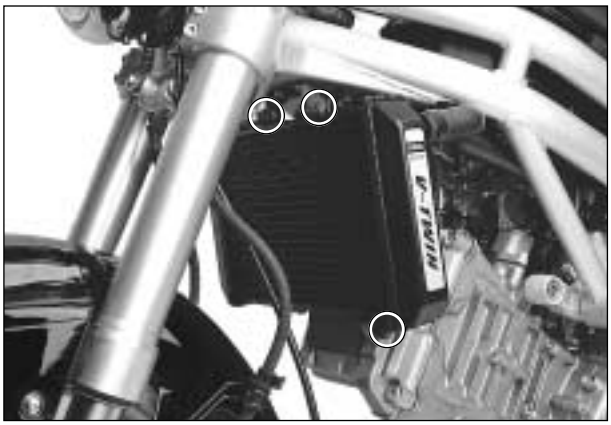
⊙ REMOVAL

- Drain engine coolant. (Refer to page 2-20)
- Disconnect the cooling fan motor lead wire coupler ① and its thermo-switch lead wire coupler ②.
- Remove the water hose ③, ④, ⑤ and reserve tank ⑥ from the radiator.





● Remove the radiator by mounting bolt.
● Remove the radiator.



⊙ INSPECTION AND CLEANING

Road dirt or trash stuck to the fins must be removed.
Use of compressed air is recommended for this cleaning.

Fins bent down or dented can be repaired by straightening them with the blade of a small screwdriver.

⊙ INSPECTION OF WATER HOSE

Any water hose found in a cracked condition or flattened or water leaked must be replaced.
Any leakage from the connecting section should be corrected by proper tightening.

⊙ INSTALLATION

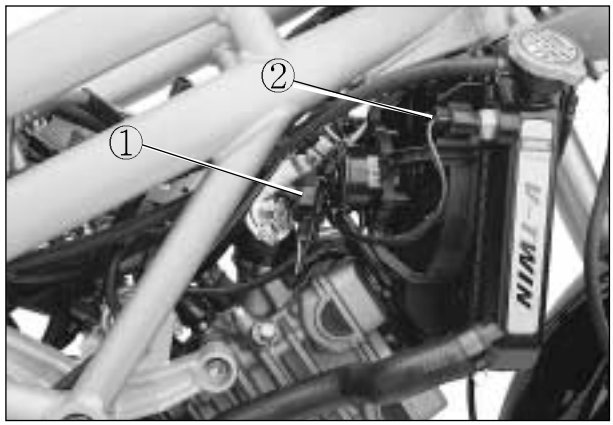
The radiator reassembly can be performed in the reverse order of disassembly procedures.
However, the following points must be observed in the reassembly operation.

● Install the radiator with the specified torque.

Radiator mounting bolt
: 8~12N · m (0.8~1.2kg · m)

* Pour engine coolant ..... Refer to page 2-20
* Bleed air from the cooling circuit ..... Refer to page 2-21

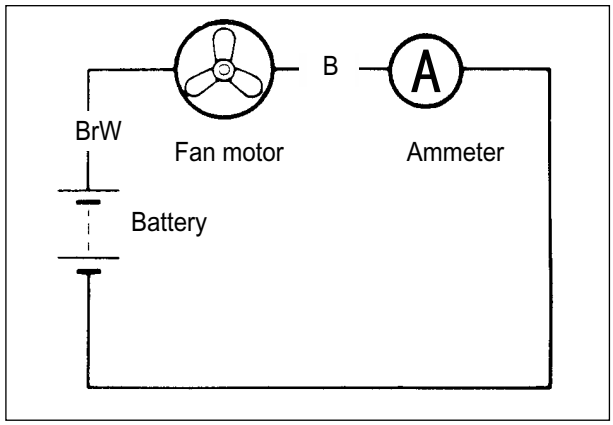
COOLING FAN



⊙ INSPECTION

● Disconnect the cooling fan motor lead wire coupler ① and its thermo-switch lead wire coupler ②.

Test the cooling fan motor for load current with an ammeter connected as shown in the illustration.

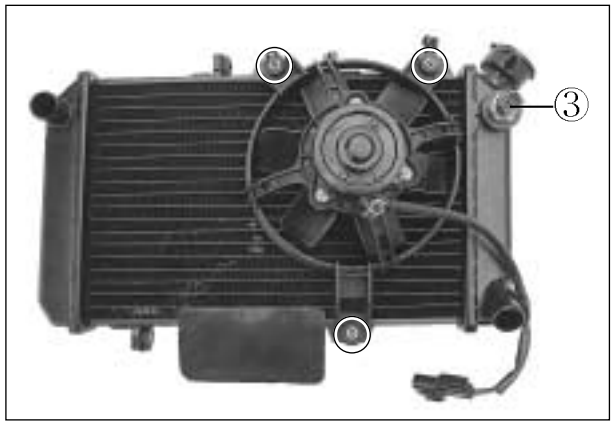


The voltmeter is for making sure that the battery applies 12 volts to the motor. With the motor with electric motor fan running at full speed, the ammeter should be indicating not more than 5 amperes. If the fan motor does not turn, replace the motor assembly with a new one.

NOTE
When making above test, it is not necessary to remove the cooling fan.

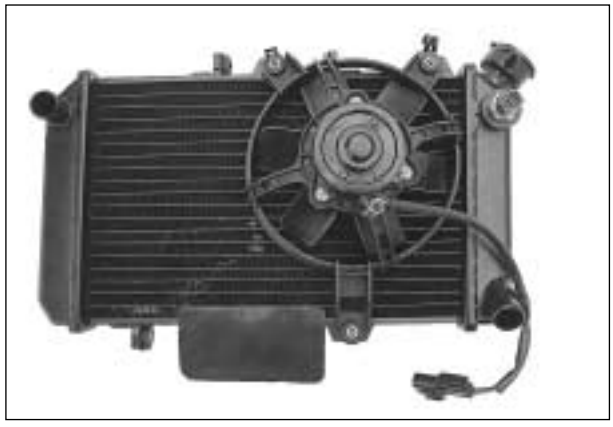
⊙ REMOVAL

● Drain engine coolant. (Refer to page 2-20)
● Remove the radiator. (Refer to page 5-2)
● Disconnect the cooling fan thermo-switch ③.
● Remove the cooling fan.



⊙ INSTALLATION

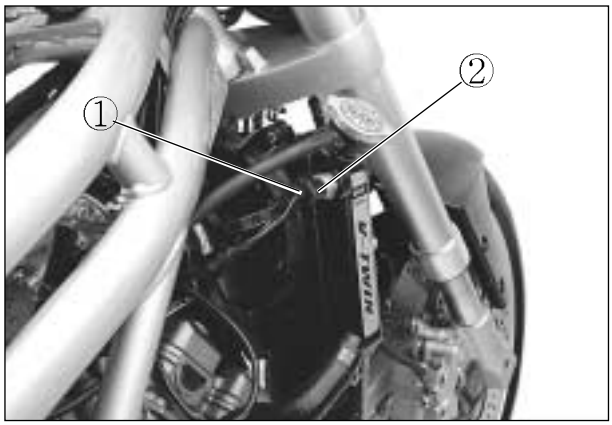
● Install the cooling fan to the radiator.
Cooling fan mounting bolt
: 8~12 N · m (0.8~1.2 kg · m)
Cooling fan motor mounting bolt
: 8 N · m (0.8 kg · m)
● Install the radiator.
● Route the radiator hoses properly.
● Pour engine coolant. (Refer to page 2-20)
● Bleed the air from the cooling circuit. (Refer to page 2-21)



COOLING FAN THERMO-SWITCH

⊙ REMOVAL

- Drain engine coolant. (Refer to page 2-20)
- Disconnect the cooling fan thermo-switch lead wire coupler ①.
- Remove the cooling fan thermo-switch ②.

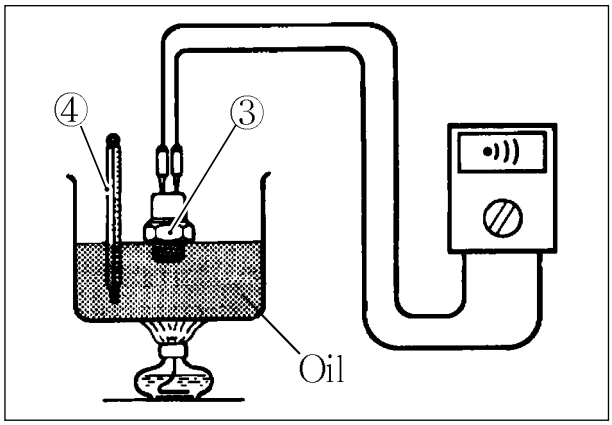


⊙ INSPECTION

- Check the thermo-switch closing or opening temperatures by testing it at the bench as shown in the figure. Connect the thermo-switch ③ to a circuit tester and place it in the OIL contained in a pan, which is placed on a stove.
- Heat the oil to raise its temperature slowly and read the column thermometer ④ when the switch closes of opens.

Cooling fan thermo-switch operating temperature	Standard
ON → OFF	Over 88 ℃ (190 °F)
OFF → ON	Approx. 95 ℃ (203 °F)

TOOL **Multi circuit tester set : 09900-25008**



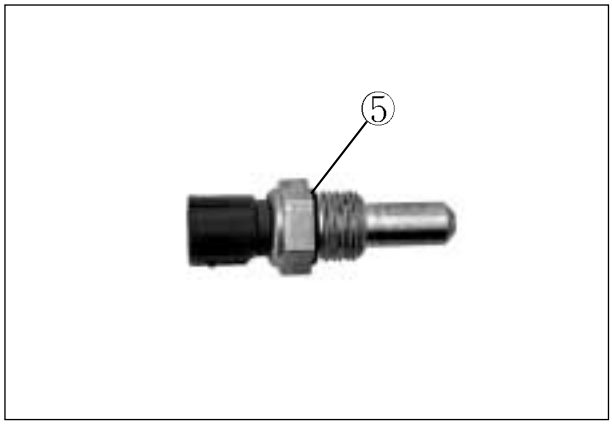
⚠ CAUTION

- **Take special care when handling the thermo-switch.**
  It may cause damage if it gets a sharp impact.
- **Do not contact the cooling fan thermo-switch ③ and the column thermometer ④ with a pan.**

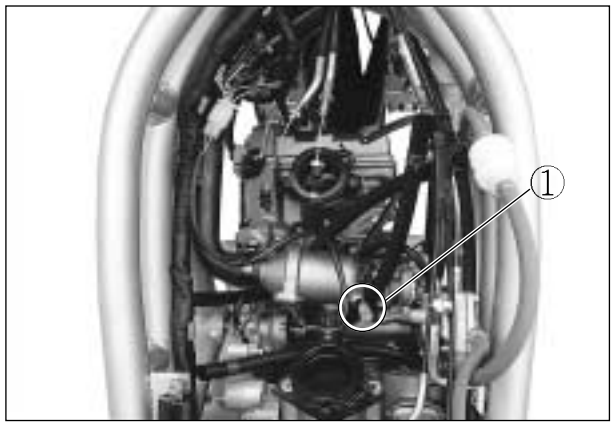
⊙ INSTALLATION

- Install a new O-ring ⑤ and apply engine coolant to the O-ring.
- Tighten the cooling fan thermo-switch to the specified torque.

  Cooling fan thermo-switch
  : 13 N · m (1.3 kg · m)
- Pour engine coolant. (Refer to page 2-20)
- Bleed air from the cooling circuit. (Refer to page 2-21)



ENGINE COOLANT TEMPERATURE SENSOR

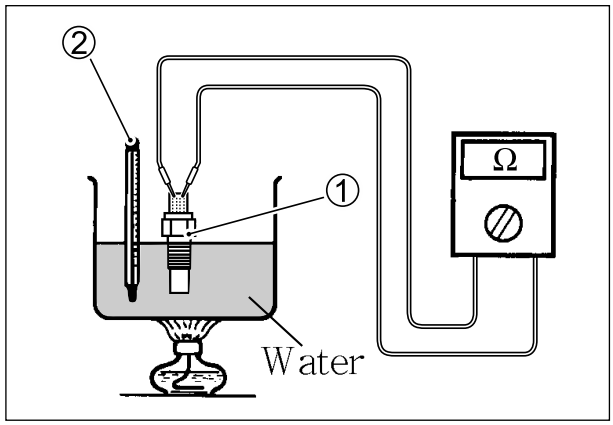


⊙ REMOVAL

- Drain engine coolant. (Refer to page 2-20)
- Remove the front and rear seat. (Refer to page 7-1)
- Remove the fuel tank. (Refer to page 4-1)
- Disconnect the engine coolant temperature sensor lead wire coupler.
- Place a rag under the sensor and remove the engine coolant temperature sensor ①.

⊙ INSPECTION

- Check the engine coolant temperature by testing it at the bench as shown in the figure. Connect the temperature sensor ① to a circuit tester and place it in the WATER contained in a pan, which is placed on a stove.
- Heat the water to raise its temperature slowly and read the column thermometer ② and the ohmmeter.



Temperature sensor specification	
Temperature	**Standard resistance**
60 ℃	Approx. 125 Ω
85 ℃	Approx. 48.5 Ω
110 ℃	Approx. 24 Ω
125 ℃	Approx. 15 Ω

TOOL Multi circuit tester set : 09900-25008

If the resistance noted to show infinity or too much different resistance value, replace the temperature sensor with a new one.

⚠ CAUTION

- **Take special care when handling the temperature sensor. It may cause damage if it gets a sharp impact.**
- **Do not contact the engine coolant temperature sensor ① and the column thermometer ② with a pan.**

⊙ INSTALLATION

- Tighten the engine coolant temperature sensor to the specified torque.

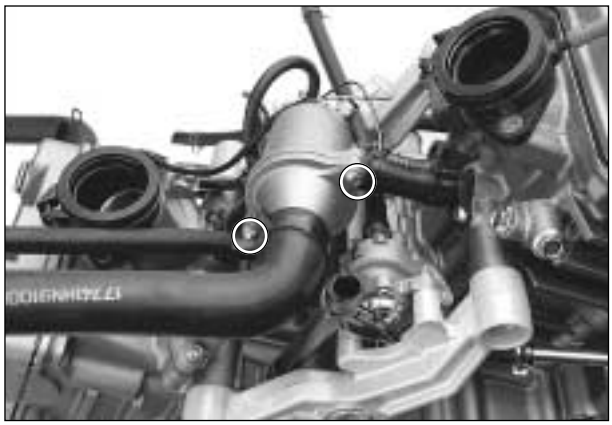
  Engine coolant temperature sensor
  : 18 N · m (1.8 kg · m)

- Pour engine coolant. (Refer to page 2-20)
- Bleed air from the cooling circuit. (Refer to page 2-21)

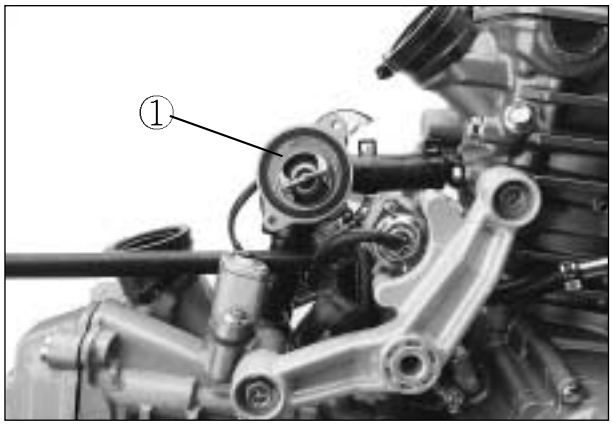
THERMOSTAT

⊙ REMOVAL

- Drain engine coolant. (Refer to page 2-20)
- Place a rag under the thermostat case.
- Remove the thermostat case cap.



- Remove the thermostat ①.

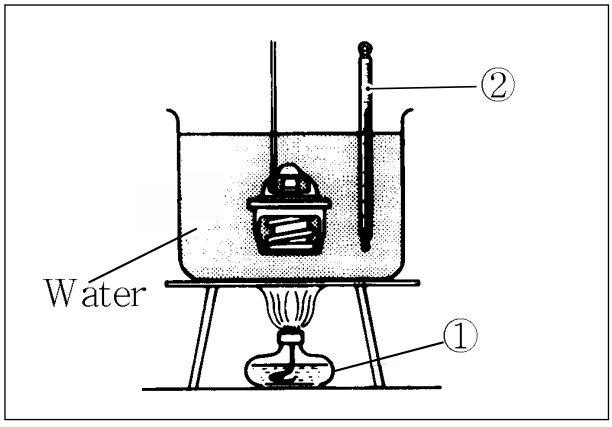


⊙ INSPECTION

Inspect the thermostat pellet for signs of cracking.
Test the thermostat at the bench for control action, in the follwing manner.

- Pass a string between flange, as shown in the photograph.
- Immerse the thermostat in the WATER contained in a beaker, as shown in the illustration. Note that the immersed thermostat is in suspension. Heat the water by placing the beaker on a stove ① and observe the rising temperature on a thermometer ②.
- Read the thermometer just when opening the thermostat. This reading, which is the temperature level at which the thermostat valve begins to open, should be within the standard value.

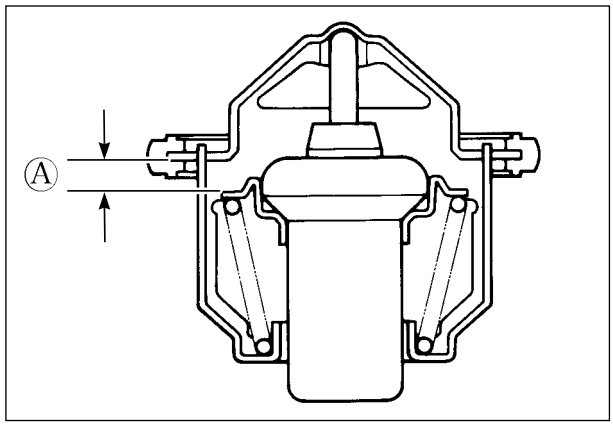
Thermostat valve operation temperature	Standard
Valve opening	88℃ (190°F)
Valve full open	100℃ (212°F)
Valve closing	83℃ (181°F)



● Keep on heating the water to raise its temperature.
● Just when the water temperature reaches specified value, the thermostat valve should have lifted by at least 8.0 mm (0.31 in).

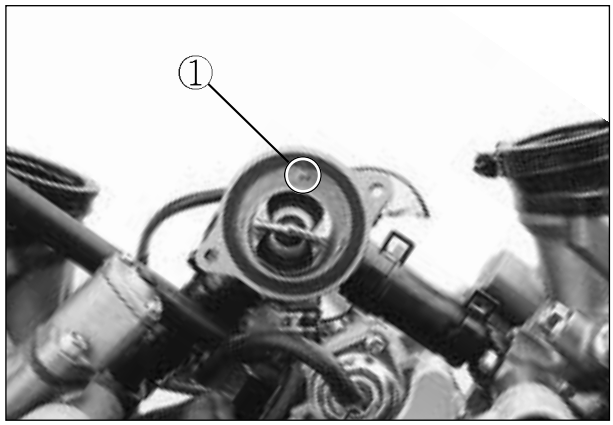
	Standard
Thermostat valve lift Ⓐ	Over 8.0mm at 100℃ (Over 0.31in at 212°F)

● A thermostat failing to satisfy either of the two requirements, start-to-open temperature and valve lift, must be replaced.



⊙ INSTALLTION

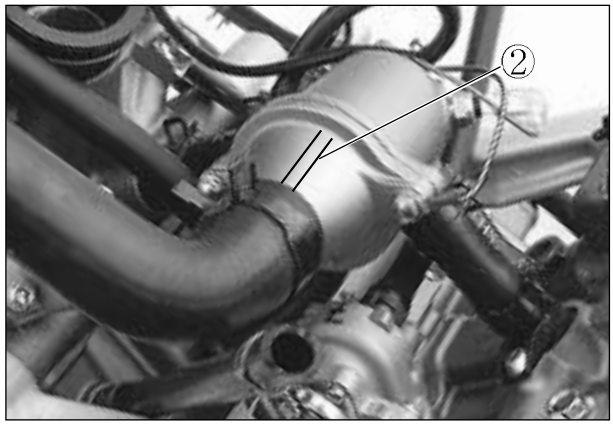
● Apply engine coolant to the rubber seal on the thermostat.
● Install the thermostat.



NOTE

The jiggle valve ① of the thermostat faces upside.

● Install the thermostat case cap ②.



NOTE

The rib of the thermostat case cap ② should be faced upward.

● Tighten the thermostat case bolts to the specified torque.

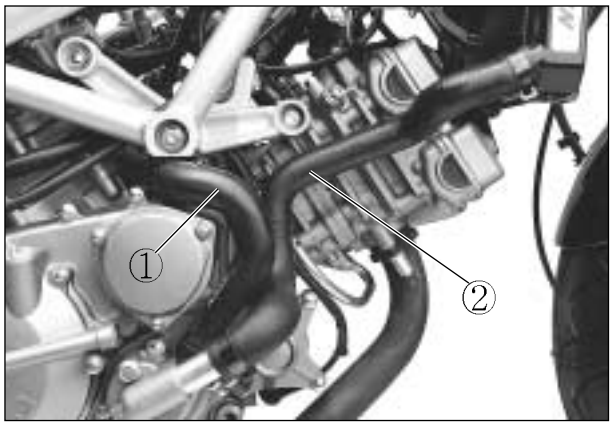
Thermostat case bolt
: 10 N · m (1.0 kg · m)

● Pour engine coolant. (Refer to page 2-20)
● Bleed air from the cooling circuit. (Refer to page 2-21)

WATER PUMP

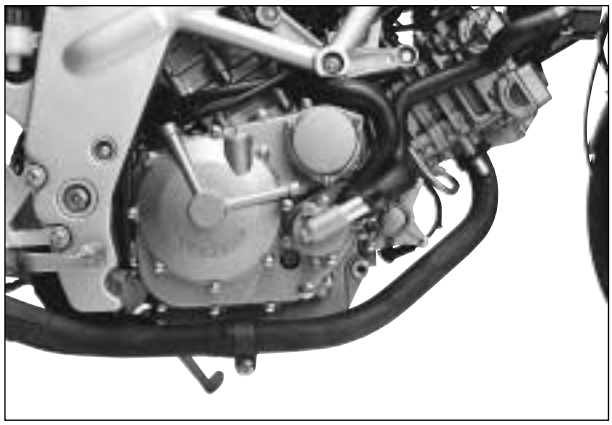
⊙ REMOVAL AND DISASSEMBLY

- Drain engine coolant. (Refer to page 2-20)
- Drain engine oil. (Refer to page 2-10)
- Disconnect the water hoses ①, ②.
- Remove the water pump case and clutch cover. (Refer to page 3-16)

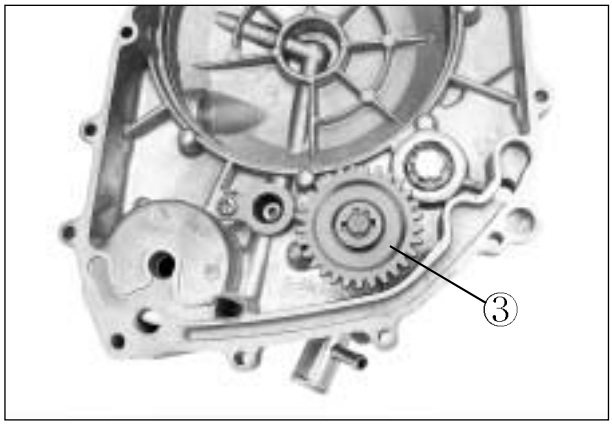


NOTE

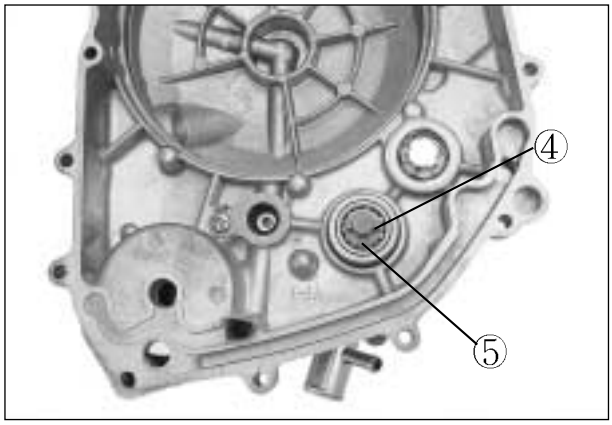
Before draining engine oil and engine coolant, inspect engine oil and coolant leakage between the water pump and clutch cover.
If engine oil is leaking, visually inspect the oil seal and O-ring. If engine coolant is leaking, visually inspect the O-ring



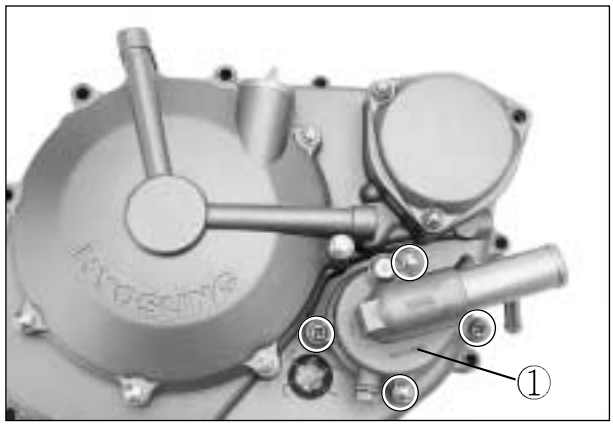
- Remove the snap ring and water pump driven gear ③.



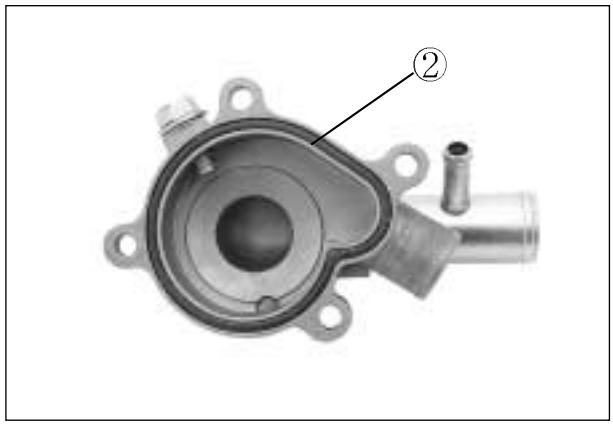
- Remove the pin ④ and washer ⑤.



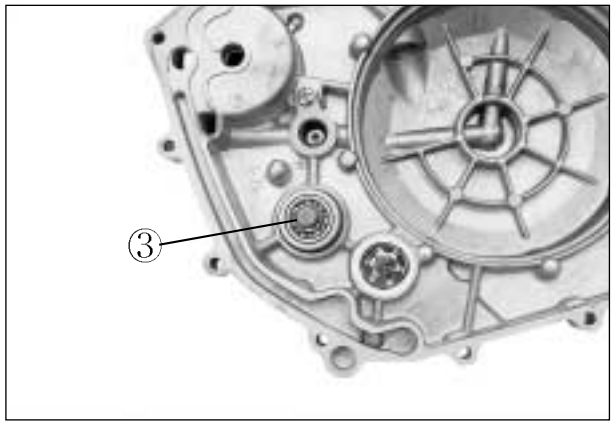
● Remove the water pump ① from the clutch cover.



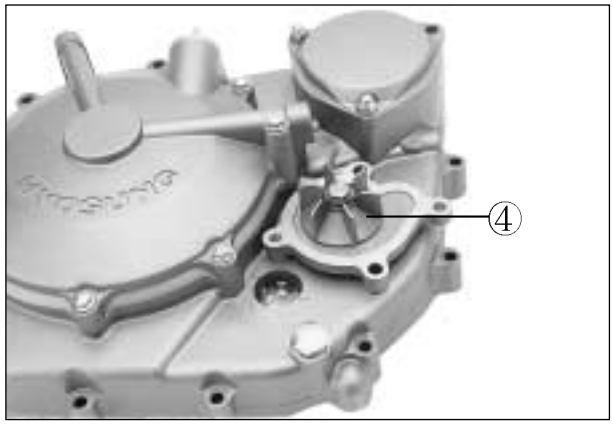
● Remove the O-rings ②.



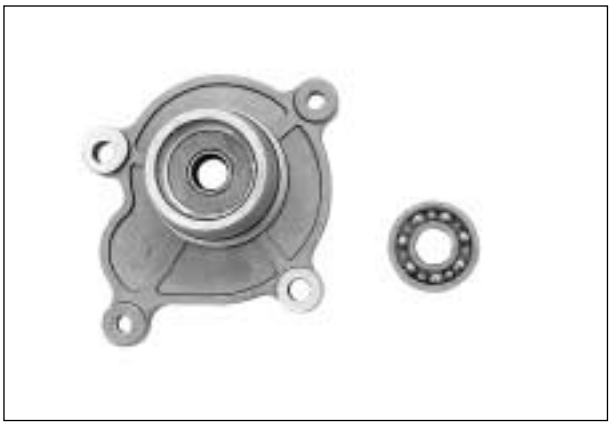
● Remove the E-ring ③ from the impeller shaft.



● Remove the impeller ④ from the other side.



● Remove the bearing.



NOTE

If there is no abnormal noise, bearing removal is not necessary.

⊙ INSPECTION

■ BEARING

Inspect the play of the bearing by hand while it is in the water pump case.
Rotate the inner race by hand to inspect for abnormal noise and smooth rotation.
Replace the bearing if there is anything unusual.

■ BEARING CASE

Visually inspect the bearing case for damage.
Replace the water pump body if necessary.

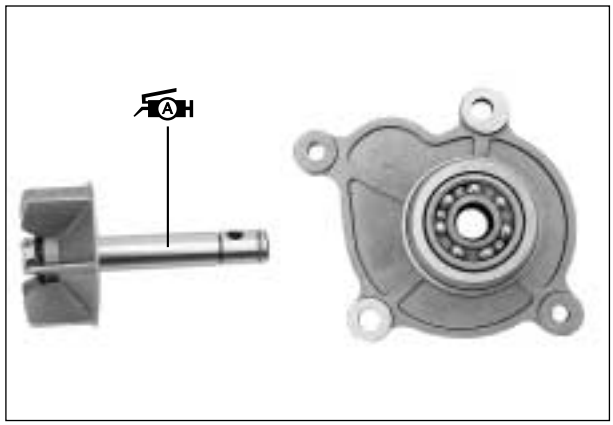
⊙ REASSEMBLY AND INSTALLATION

● Install the bearing.

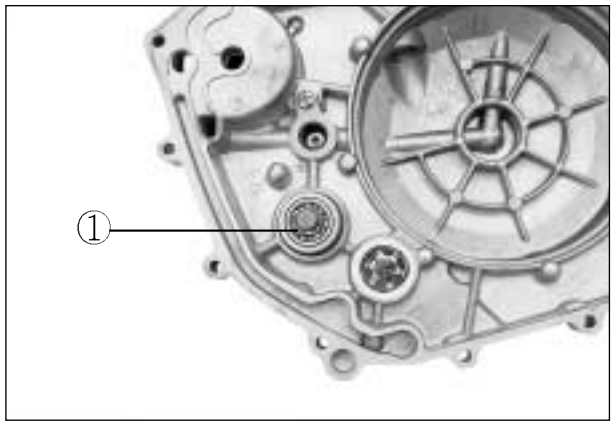
NOTE

The stamped mark on the bearing faces to the crankcase side.

● Apply SUPER GREASE "A" to the impeller shaft.
SUPER GREASE "A"
● Install the impeller to the water pump body.



● Fix the impeller shaft with the E-ring ①.
● Fill the bearing with engine oil until engine oil comes out from the hole of the bearing housing.

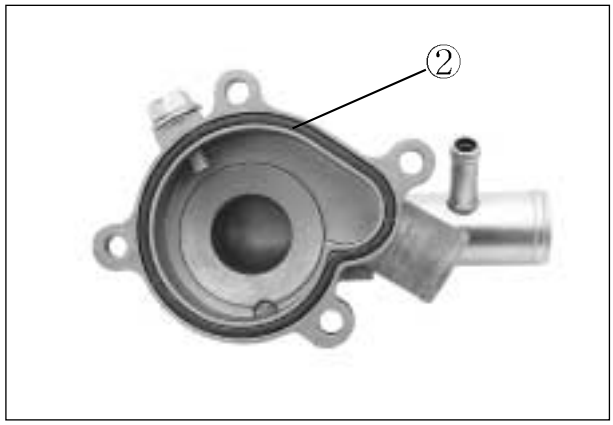


● Apply engine coolant to the O-ring ②.
● Install a new O-ring.

⚠ CAUTION

Use a new O-ring to prevent engine coolant leakge.

● Connect the water hoses.
● Pour engine coolant. (Refer to page 2-20)
● Pour engine oil. (Refer to page 2-10)



ELECTRICAL SYSTEM

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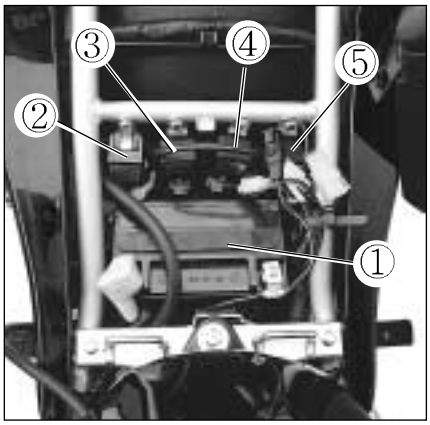
STARTER SYSTEM AND
SIDE STAND IGNITION INTERLOCK SYSTEM 6- 11

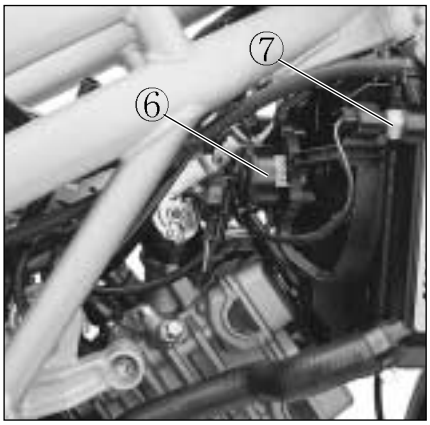
SWITCHES 6- 15

LAMP 6- 16

BATTERY 6- 18

LOCATION OF ELECTRICAL COMPONENTS

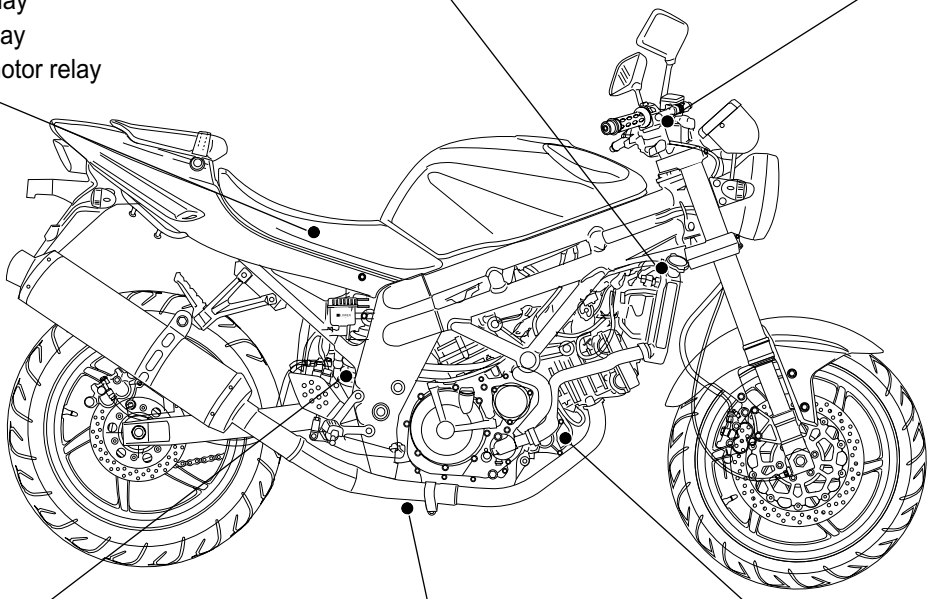


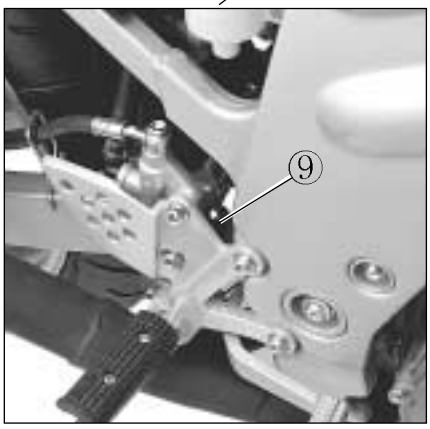


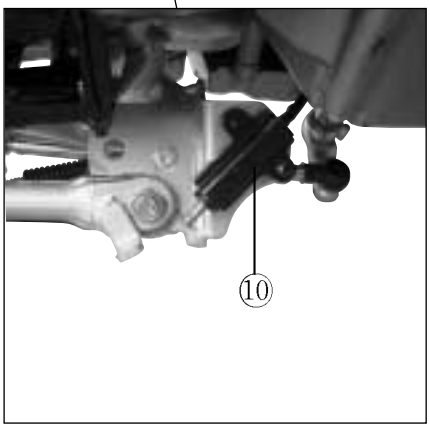
① Battery
② Turn signal relay
③ Head lamp relay
④ Side stand relay
⑤ Cooling fan motor relay

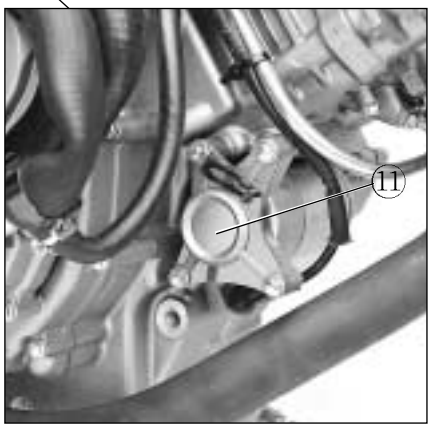
⑥ Cooling fan motor
⑦ Cooling fan thermo-switch

⑧ Front brake lamp switch





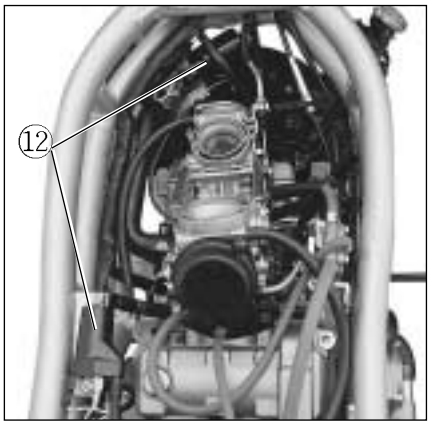




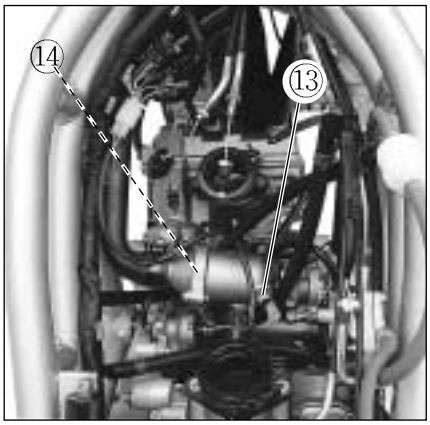
⑨ Rear brake lamp switch

⑩ Side stand switch

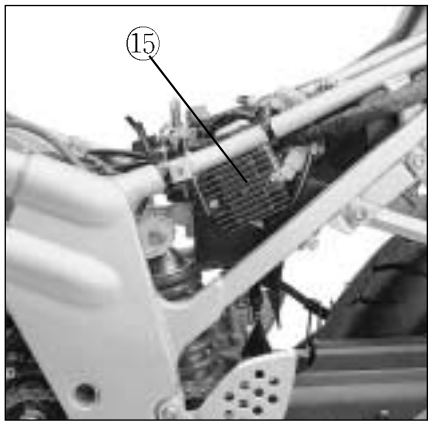
⑪ Starter motor



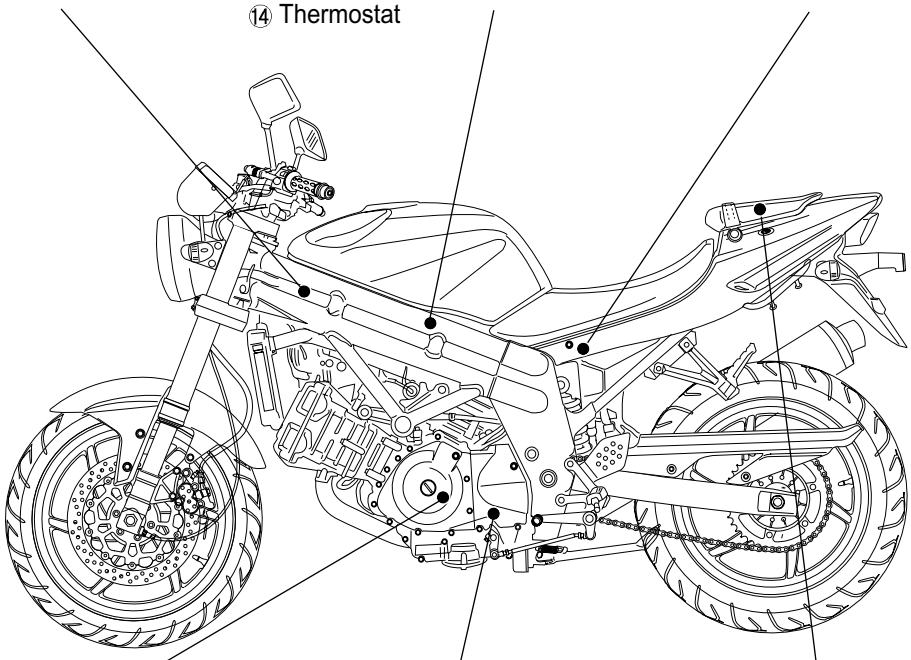
⑫ Ignition coil (NO.1 & NO.2)

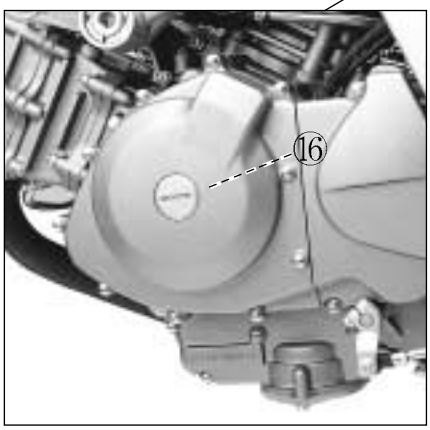


⑬ Engine coolant temperature sensor
⑭ Thermostat

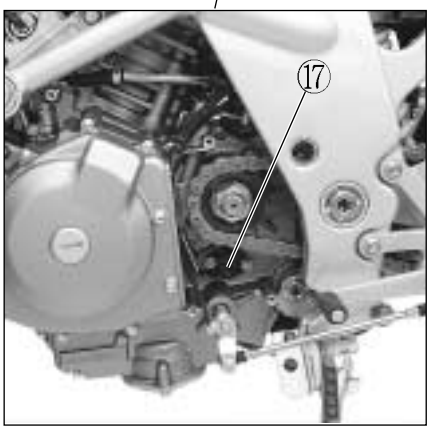


⑮ Regulator / Rectifier

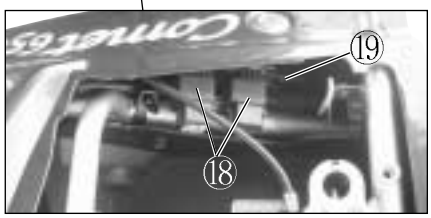


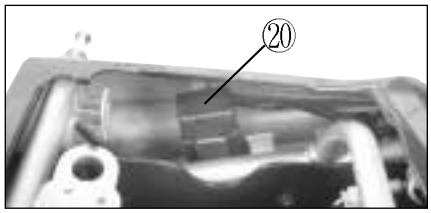


⑯ Magneto



⑰ Gear position switch

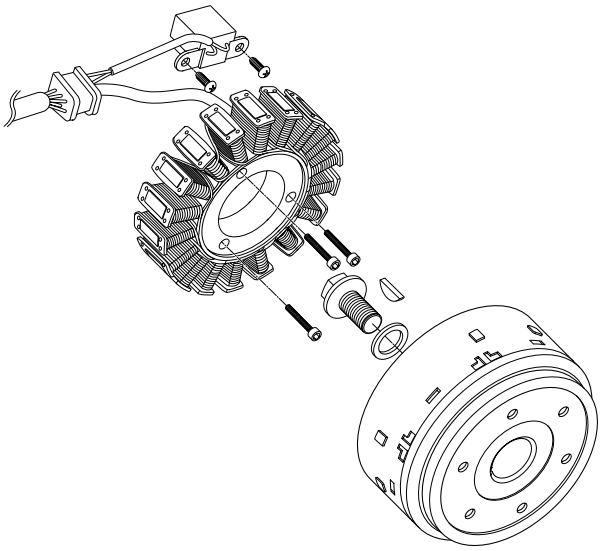




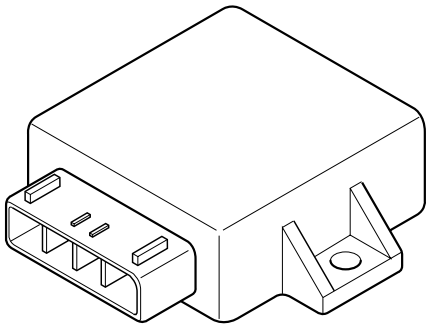
⑱ Fuse
⑲ Igniter
⑳ Pulse control unit

IGNITION SYSTEM

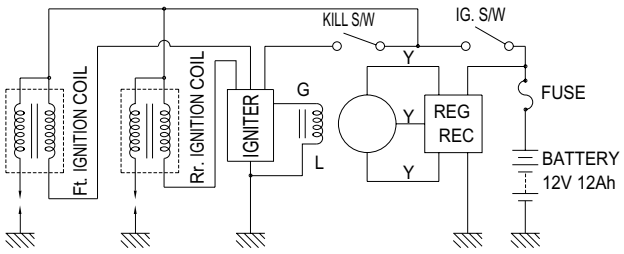
『Comet650』is started as the battery discharged ignition system without a contact point. The battery ignition system is composed a rotor with four rotor tip, the igniter, the ignition coil and battery. This system ignites after get signal from ignition timing of pick-up with the electric energy of this battery and occur the 1st electric current. Therefore, a high voltage current is induced in the secondary winding of the ignition coil and results in strong spark between spark plug gap.

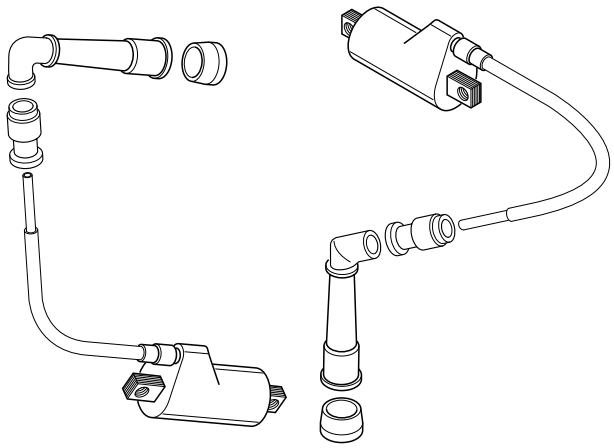


Magneto



Igniter





Ignition coil & Spark plug

⊙ INSPECTION

■ MAGNETO

Using the pocket tester, measure the resistance between the lead wires in the following table.

Pick-up coil	G - L 90 ~ 110 Ω
Charging coil	Y - Y 0.7 ~ 1.5 Ω

TOOL **Pocket Tester : 09900-25002**

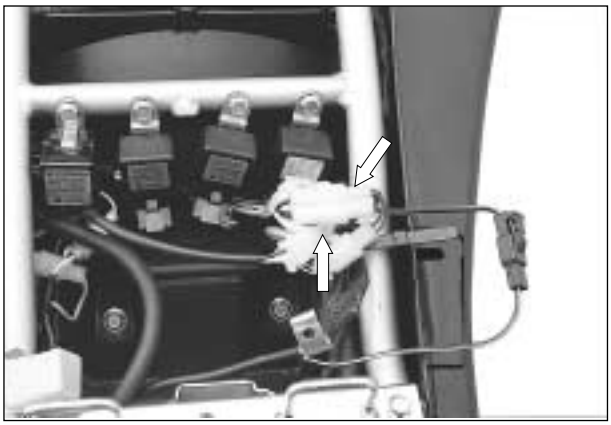
⚠ CAUTION

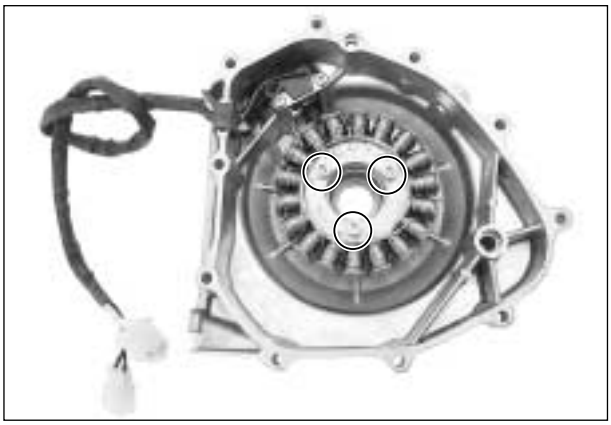
When mounting the stator on the magneto cover, apply a small quantity of THREAD LOCK "1324" to the threaded parts of screws.

1324 **THREAD LOCK "1324"**

WIRE COLOR

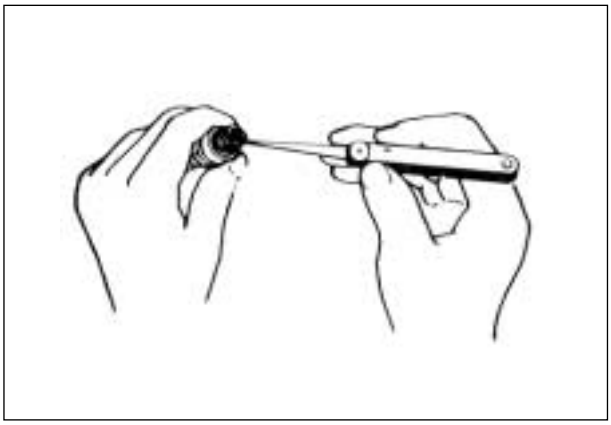
L : Blue
G : Green
Y : Yellow
BY : Black with Yellow tracer
OB : Orange with Black tracer
Br : Brown
BW : Black with White tracer
WL : White with Blue tracer
YG : Yellow with Green tracer





■ SPARK PLUG

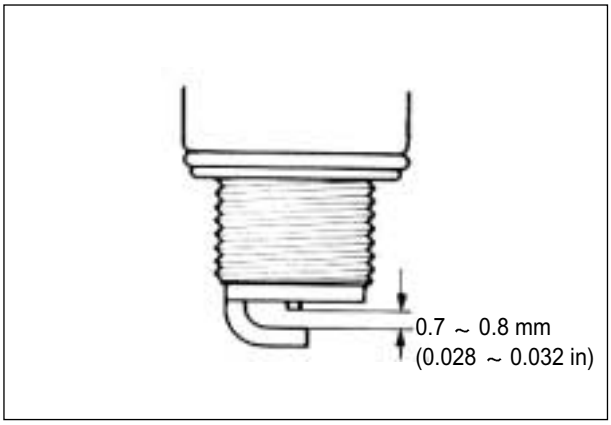
Clean the plug with a wire brush and pin. Use the pin to remove carbon, taking care not to damage the porcelain.



● Check the gap with a thickness gauge.

TOOL **Thickness gauge : 09900-20806**

Spark plug gap	0.7 ~ 0.8 mm (0.028 ~ 0.032 in)

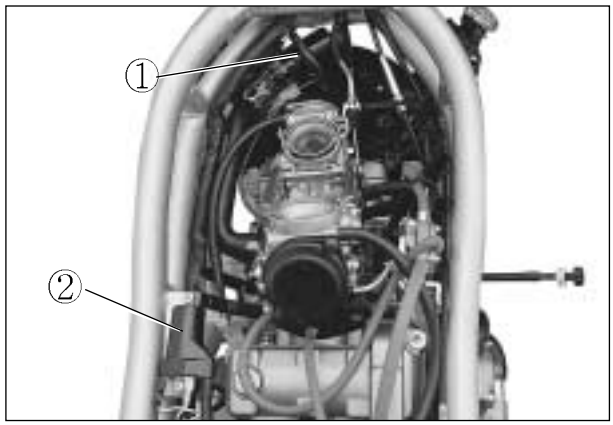


■ IGNITION COIL

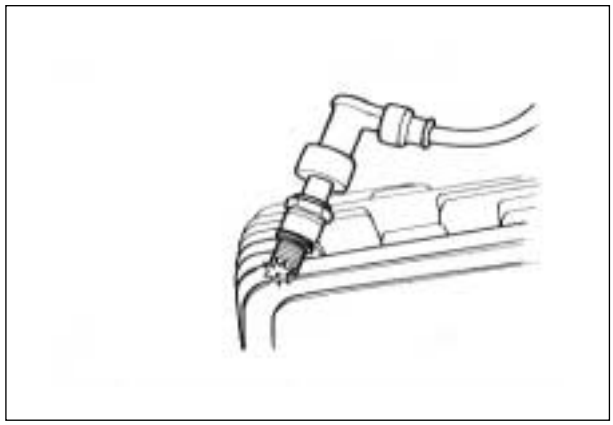
- Pull out the spark plug.
- Place it on the cylinder head after installing it at the plug cap to obtain ground.
- Push the electric starter switch to rotate the starter motor, to have the test of sparking performance.
- If spark doesn't emit or the spark bring out the orange color, replace the ignition coil.

⚠ CAUTION

The ignition coil is marked the "F" for front, and the "R" for rear.
If otherwise, it may occure severe damage to the engine.



①Front cylinder ignition coil ②Rear cylinder ignition coil

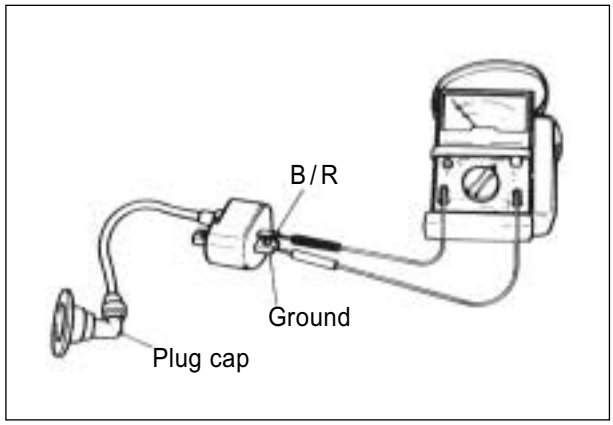


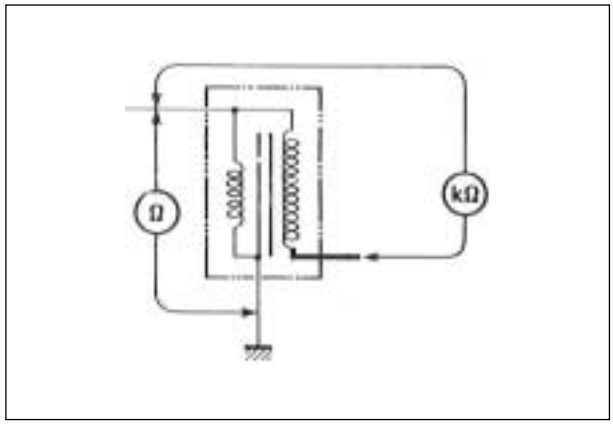
■ IGNITION COIL (Checking with Pocket Tester)

- A pocket tester or an ohm meter may be used, instead of the electro tester. In either case, the ignition coil is to be checked for continuity in both primary and secondary windings. Exact ohmic readings are not necessary, but, if the windings are in sound condition, their continuity will be noted with approximate ohmic values.

Ignition coil resistance		
Primary	3.5～5.5 Ω	Tester knob indication × 1 Ω range
Secondary	20 ～31 kΩ	Tester knob indication × 1kΩ range
Check to attached plug cap		

TOOL **Pocket tester : 09900-25002**



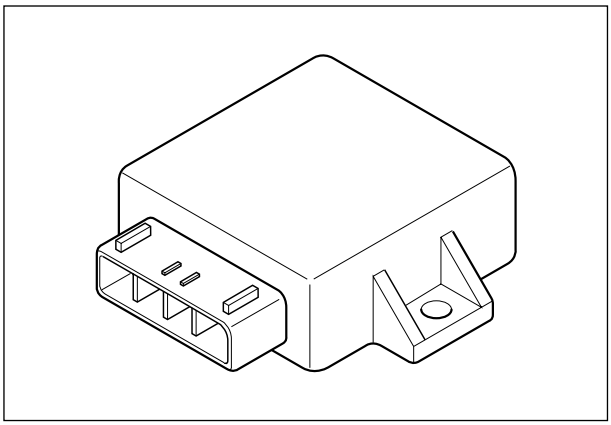


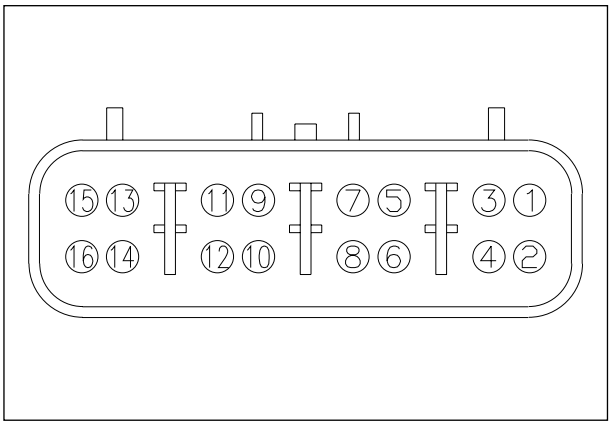
■ **IGNITER**

Using the pocket tester(R × 1kΩ range), measure the resistance between the terminal in the following table.

⚠ CAUTION

- ❖ **Numberical value may differ a little according to the tester.**
- ❖ **Please remind that there may be a defect which can not be identified even though the measurement by using the tester indicates a low voltage.**
- ❖ **The range of measurement adjust a [x 1kΩ] unit.**





TOOL **Pocket Tester : 09900-25002**

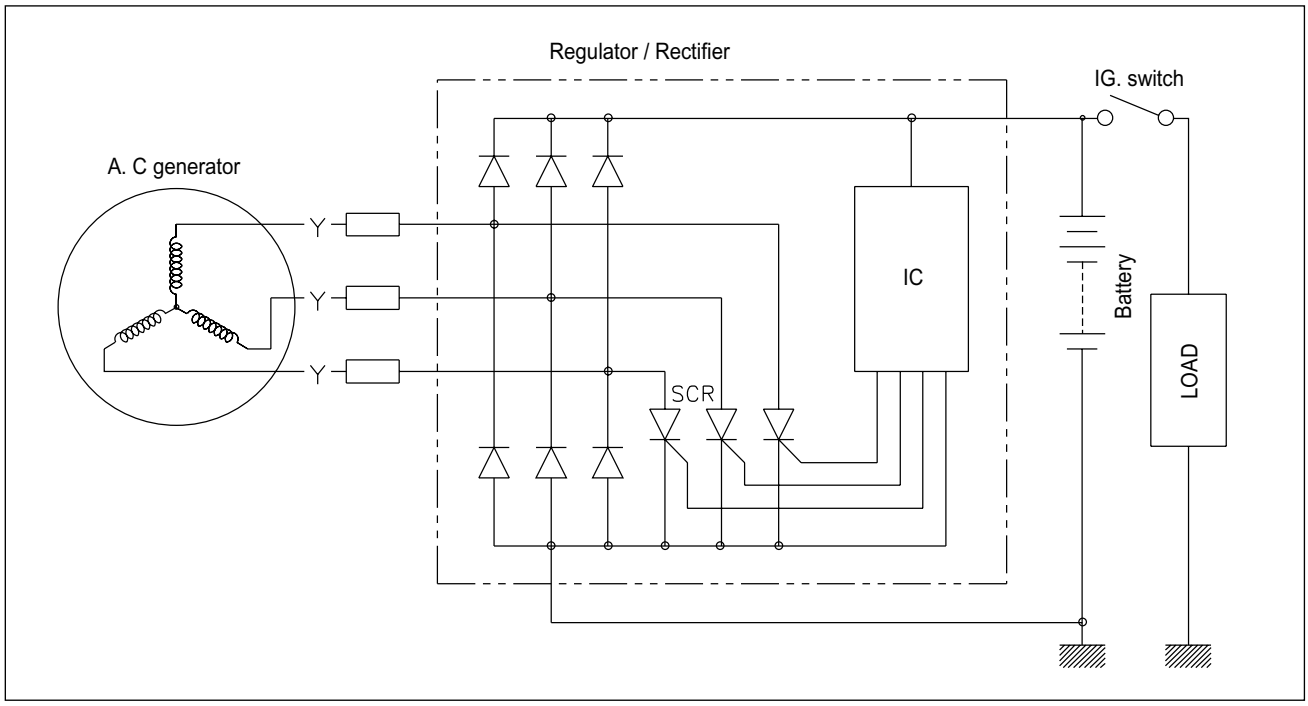
Unit : kΩ

⊖ TESTER PROBE \ ⊕ TESTER PROBE	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮	⑯
①		OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
②	OFF		OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
③	12.5	12.5		5.5	OFF	OFF	40.0	OFF	11.5	9.0	9.5	5.5	200.0	17.5	7.8	8.3
④	2.8	2.8	3.4		OFF	OFF	20.0	OFF	3.8	2.4	2.6	0	60.0	4.7	3.5	1.9
⑤	OFF	OFF	OFF	OFF		OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
⑥	OFF	OFF	OFF	OFF	OFF		OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
⑦	40.0	40.0	45.0	24.0	OFF	OFF		OFF	24.0	23.0	23.0	24.0	150.0	40.0	28.0	22.0
⑧	OFF	OFF	OFF	OFF	OFF	OFF	OFF		OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
⑨	8.5	8.5	9.5	4.3	OFF	OFF	24.0	OFF		2.9	1.3	4.3	75.0	10.5	8.3	2.4
⑩	6.5	6.5	7.5	2.7	OFF	OFF	21.0	OFF	3.0		1.6	2.7	70.0	8.5	6.5	0.8
⑪	7.2	7.2	8.0	3.3	OFF	OFF	22.0	OFF	1.3	1.6		3.3	75.0	9.0	7.2	1.5
⑫	2.8	2.8	3.4	0	OFF	OFF	20.0	OFF	3.8	2.5	2.6		65.0	4.7	3.5	2.0
⑬	400.0	400.0	400.0	200.0	OFF	OFF	400.0	OFF	200.0	200.0	200.0	200.0		400.0	200.0	200.0
⑭	16.0	16.0	18.5	7.5	OFF	OFF	35.0	OFF	7.8	5.5	6.3	7.5	180.0		13.5	4.9
⑮	7.8	7.8	9.4	3.5	OFF	OFF	26.0	OFF	8.0	6.5	7.0	3.5	55.0	10.5		5.5
⑯	5.7	5.7	6.5	2.2	OFF	OFF	20.0	OFF	23.0	0.7	1.4	2.2	70.0	7.6	6.0	

(⊖ TESTER PROBE)

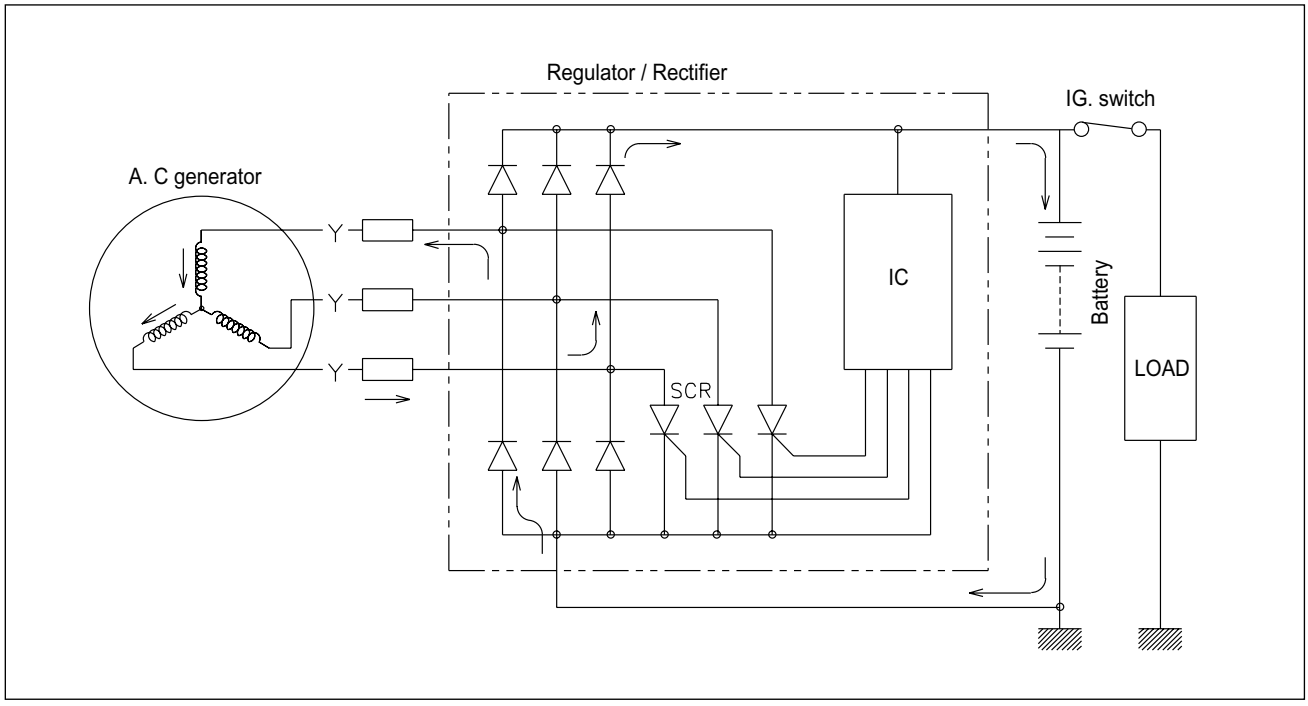
CHARGING SYSTEM

The circuit of the charging system is indicated in figure, which is composed of the AC generator, regulator / rectifier unit and battery. The AC current generated from the AC generator is converted by the rectifier and is turned into the DC current, then it charges the battery.

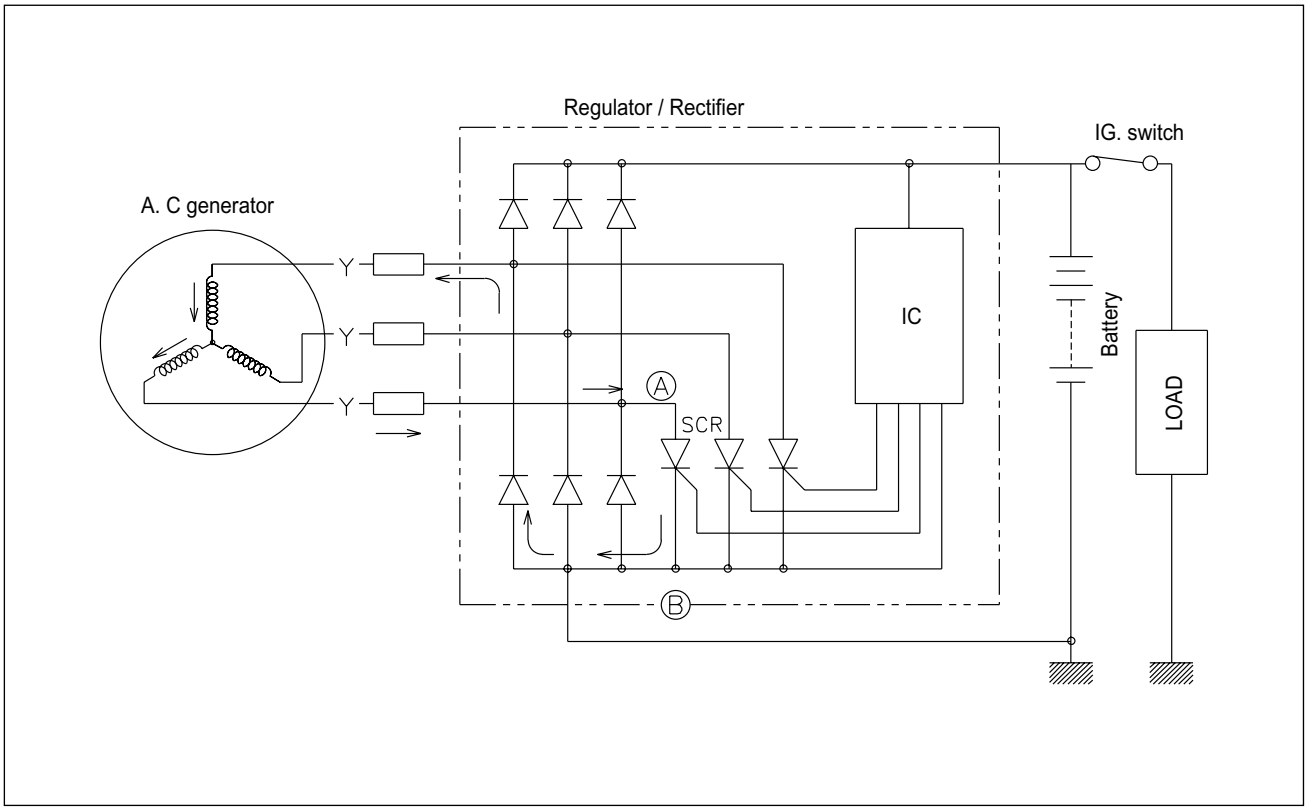


⊙ FUNCTION OF REGULATOR

While the engine rpm is low and the generated current of the AC generator is lower than the adjusted voltage of the regulator, the regulator does not function, incidentally the generated current charges the battery directly.



When the engine rpm become higher, the generated voltage of the AC generator also becomes higher and the voltage between points Ⓐ and Ⓑ of the regulator according becomes high, and when it reaches the adjusted voltage of the control unit, consequently the control unit becomes "ON" condition. On the "ON" condition of the control unit, signal will be sent to the SCR (Thyristor) gate probe and SCR will become "ON" condition. Then the SCR becomes conductive to the direction from point Ⓐ to point Ⓑ. Namely at the state of this, the current generated from the AC generator gets through SCR without charging the battery and returns to the AC generator again. At the end of this state, since the AC current generated from the AC generator flows into the point Ⓑ, reverse current tends to flow to SCR, then the circuit of SCR turns to "OFF" mode and begins to charge the battery again. Thus these repetitions maintain charging constant voltage to the battry and protect it from overcharging.



⊙ INSPECTION

■ CHARGING OUTPUT CHECK

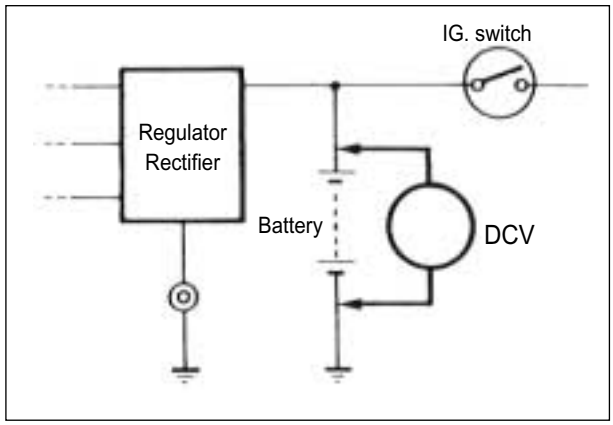
Start the engine and keep it running at 5,000 rpm.
Using the pocket tester, measure the DC voltage between the battery terminal ⊕ and ⊖.
If the tester reads under 13.5V or over 15.0 V, check the magneto no-load performance and regulator / rectifier.

⚠ CAUTION

When making this test, be sure that the battery is full-charged condition.

TOOL **Pocket tester : 09900-25002**

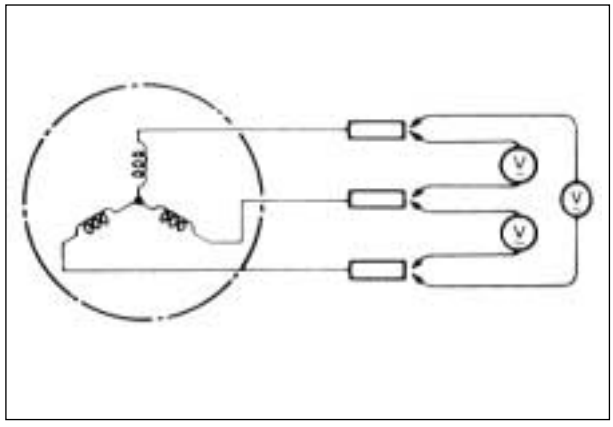
Standard charge	13.5～15.0V (at 5,000 rpm)



■ MAGNETO NO-LOAD PERFORMANCE

Disconnect the three lead wires from the magneto terminal.
Start the engine and keep it running at 5,000 rpm.
Using the pocket tester, measure the AC voltage between the three lead wires.
If the tester reads under 70 V the magneto is faulty.

Standard NO-load performance of magneto	Over 70 V (at 5,000 rpm)



■ REGULATOR / RECTIFIER

● Disconnect the coupler.

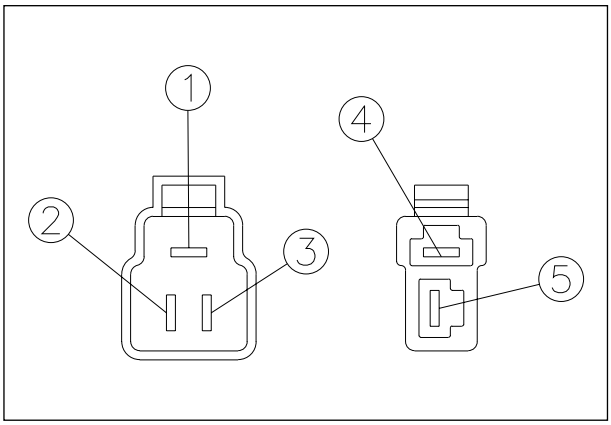
● Using the pocket tester (× 1 MΩ range), measure the resistance between the terminals in the following table.

If the resistance checked is incorrect, replace the regu lator / rectifier.

TOOL **Pocket tester : 09900-25002**

Unit : MΩ

⊖ Tester probe	⊕ Tester probe ①	②	③	④	⑤
①		3 ~ 4 MΩ	3 ~ 4 MΩ	1 ~ 2 MΩ	1 ~ 2 MΩ
②	3 ~ 4 MΩ		3 ~ 4 MΩ	1 ~ 2 MΩ	1 ~ 2 MΩ
③	3 ~ 4 MΩ	3 ~ 4 MΩ		1 ~ 2 MΩ	1 ~ 2 MΩ
④	1 ~ 2 MΩ	1 ~ 2 MΩ	1 ~ 2 MΩ		32 kΩ
⑤	1 ~ 2 MΩ	1 ~ 2 MΩ	1 ~ 2 MΩ	32 kΩ	



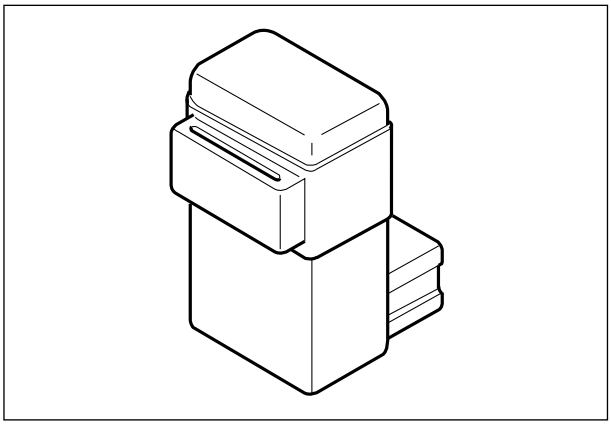
■ PULSE CONTROL UNIT

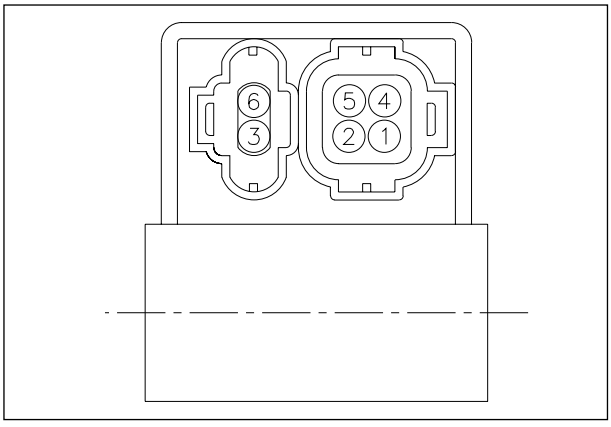
● Using the pocket tester (R × 1 kΩ range), measure the resistance between the terminals in the following table.

TOOL **Pocket tester : 09900-25002**

Unit : kΩ

⊖ TESTER PROBE	⊕ TESTER PROBE ①	②	③	④	⑤	⑥
①		10~500	10~500	off	10~500	off
②	off		off	off	1~100	off
③	10~500	10~300		off	10~500	off
④	10~500	10~300	10~500		10~500	off
⑤	10~500	10~500	10~500	off		off
⑥	off	off	off	off	off	

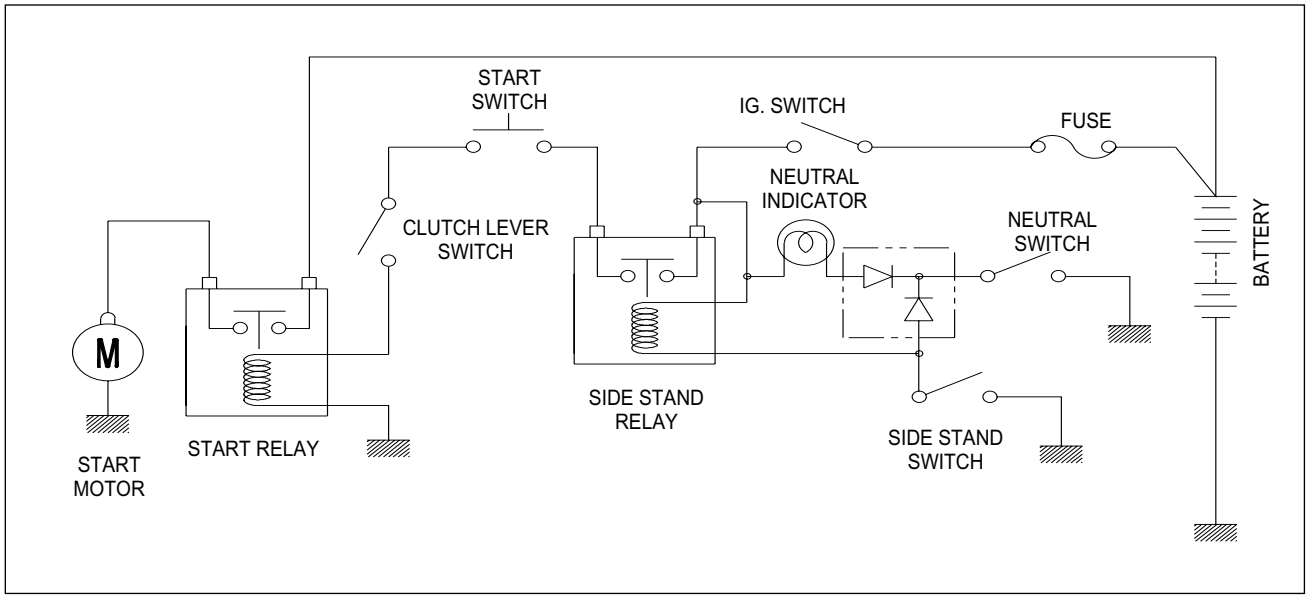




STARTER SYSTEM AND SIDE STAND IGNITION INTERLOCK SYSTEM

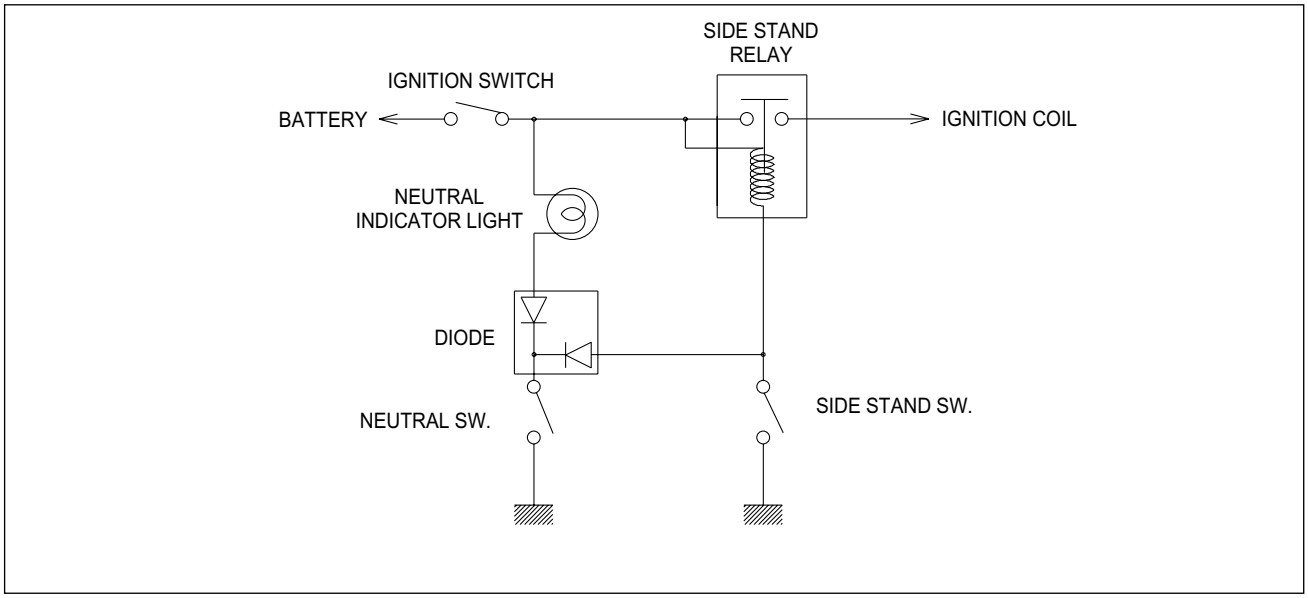
⊙ STARTER SYSTEM DESCRIPTION

The starter system consists of the following components : the starter motor, starter relay, clutch lever position switch, igniter, side stand switch, gear position switch, starter switch, engine stop switch, ignition switch and battery.
Pressing the starter switch (on the right handlebar switch) energizes the starter relay, causing the contact points to close, thus completing the circuit from the starter motor to the battery.

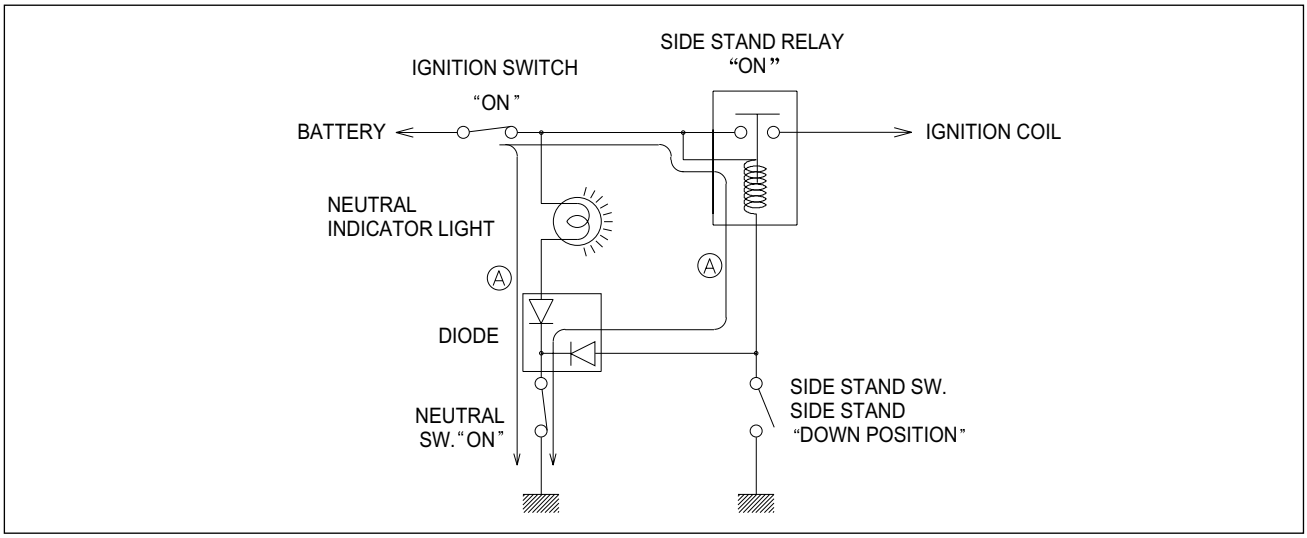


⊙ SIDE STAND / IGNITION INTERLOCK SYSTEM DESCRIPTION

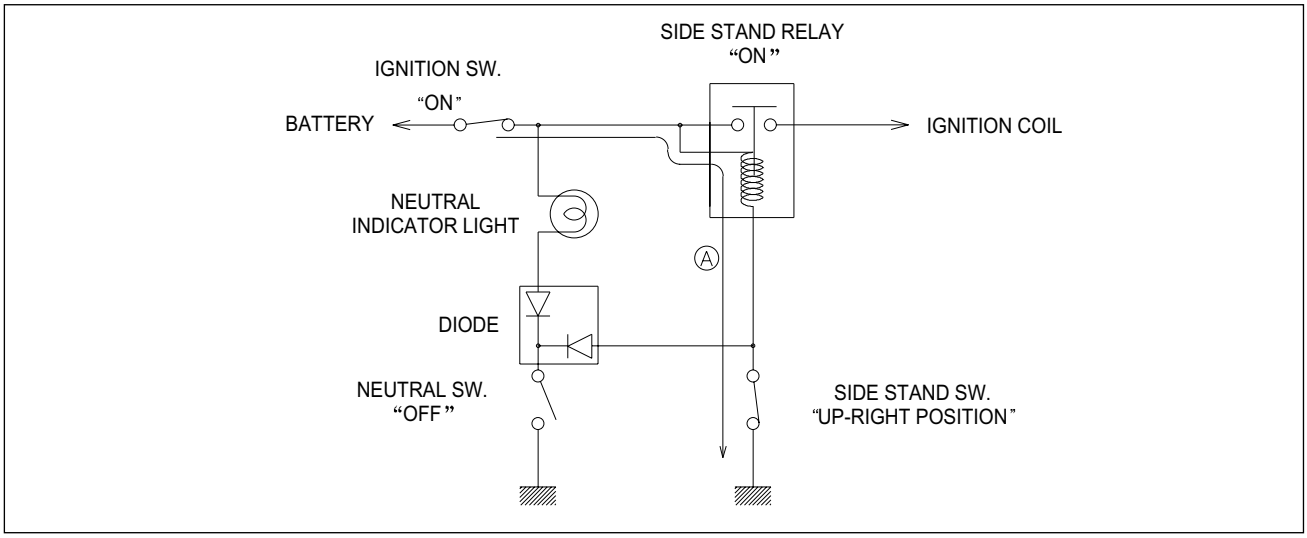
This side stand / ignition interlock system prevents the motorcycle from being started with side stand down.
The system is operated by an electric circuit provided between the battery and ignition coil.
The circuit consists of the igniter, neutral indicator light and switches.
The ignition coils will send voltage to the spark plugs dependant on what gear the transmission is in and whether the side stand is either up or down.
The gear position and side stand switches work together in this system.
The ignition coil work only in two situations as follows.



■ **TRANSMISSION :** Neutral - "ON"
Side stand - Down
Clutch lever - Pull



■ **TRANSMISSION :** Neutral - "OFF"
Side stand - Up
Clutch lever - Pull



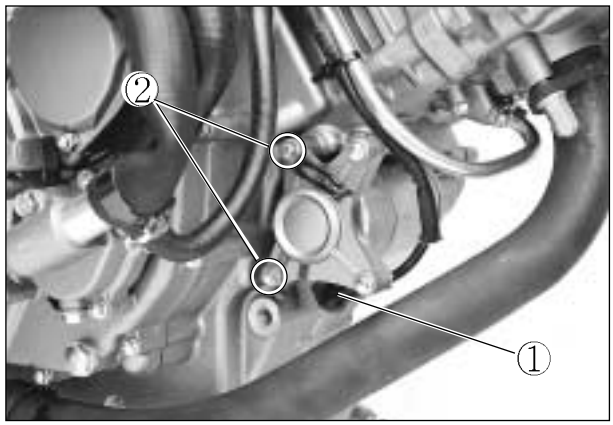
『Comet650』is equipped with the side stand ignition interlock system.
If the transmission is in neutral or side stand up, you can only start the engine with pulling in the clutch lever.

No	Neutral switch	Clutch lever	Side stand	Engine Start
1	●	●	△	Possible
2	△	●	●	Possible
3	●	△	△	Impossible
4	△	●	△	Impossible
5	△	△	●	Impossible

NOTE	
●	*On or Up.*
△	*Off or Down*

⊙ STARTER MOTOR REMOVAL AND DISASSEMBLY

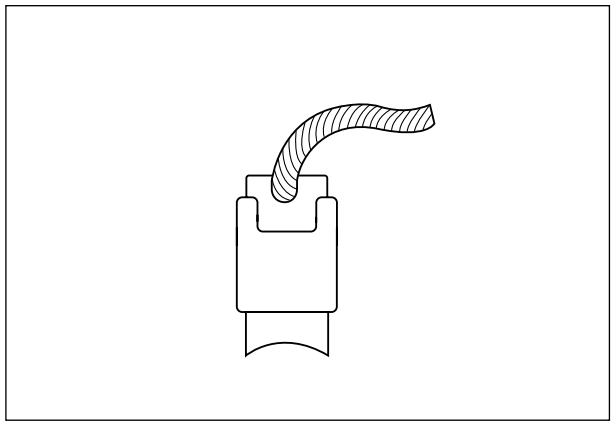
- Disconnect the starter motor lead wire ①.
- With loosening the bolt ②, remove the starter motor.
- Disassemble the starter motor.



⊙ STARTER MOTOR INSPECTION

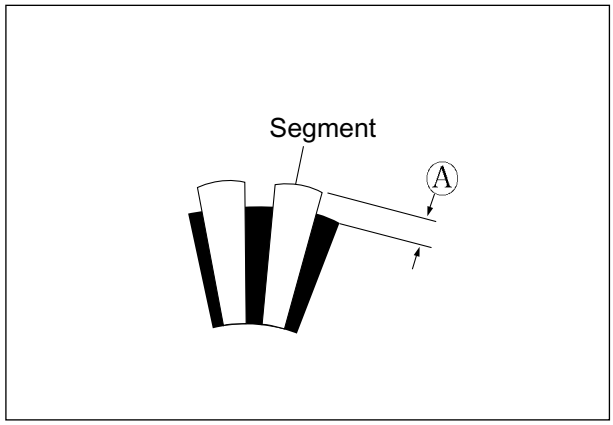
■ CARBON BRUSH

Inspect the brushes for abnormal wear, crack or smoothness in the brush holder.
If the brush has failed, replace the brush sub assy.



■ COMMUTATOR

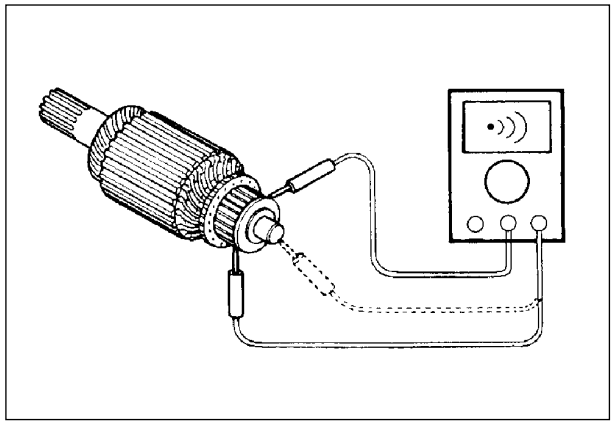
Inspect the commutator for discoloration, abnormal wear or undercut Ⓐ.
If the commutator is abnomally worn, replace the armature.
When surface is discolored, polish it with #400 sand paper and clean it with dry cloth.



■ ARMATURE COIL INSPECTION

Check for continuity between each segment.
Check for continuity between each segment and the armature shaft.
If there is no continuity between the segments or there is continuity between the segment and shaft, replace the starter motor with a new one.

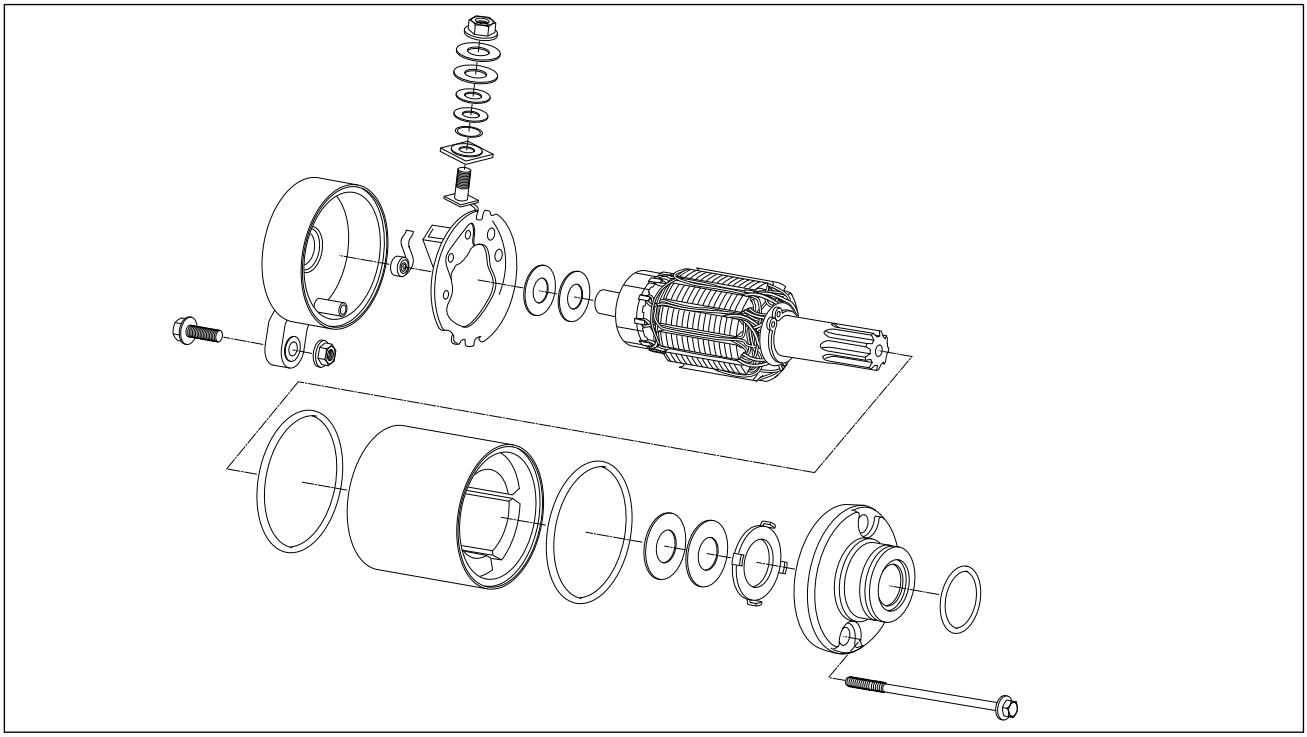
TOOL **Pocket tester : 09900-25002**



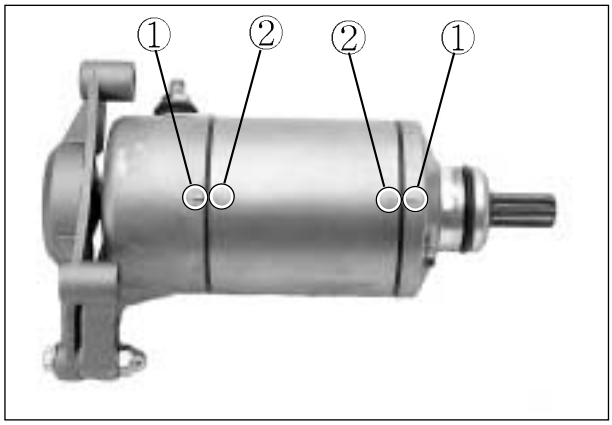
■ **STARTER MOTOR REASSEMBLY**

Reassemble the starter motor. Pay attention to the following points :

● Reassembly the starter motor as shown in the illustration.

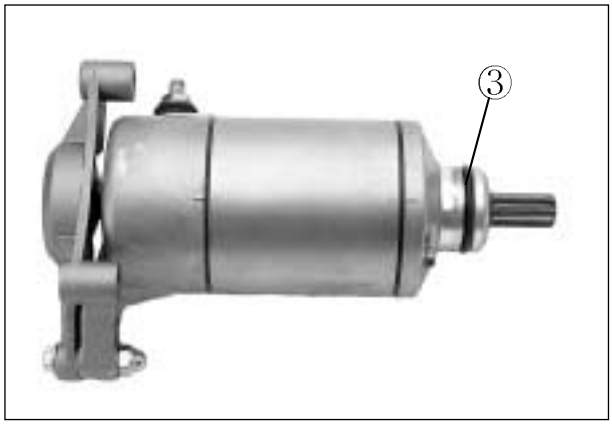


● Align the mark ① on the housing with the line ② on the housing end.



● Apply SUPER GREASE "A" to the O-ring ③ and remount the starter motor.

SUPER GREASE "A"



SWITCHES

Measure each switch for continuity using a tester. If any abnormality is found, replace the respective switch assemblies with new ones.

Pocket tester : 09900-25002

IGNITION SWITCH				
	R	O	BW	BR
ON	○	○		
OFF			○	○
LOCK			○	○

ENGINE STOP SWITCH		
	O	OB
⊗		
∩	○	○

HAZARD SWITCH		
	Sb	Gr
ON	○	○
OFF		

STARTER SWITCH		
	OB	YR
ON	○	○
OFF		

DIMMER SWITCH			
	YW	Y	W
HI	○	○	
LO	○		○

HORN SWITCH		
	BBr	BW
ON	○	○
OFF		

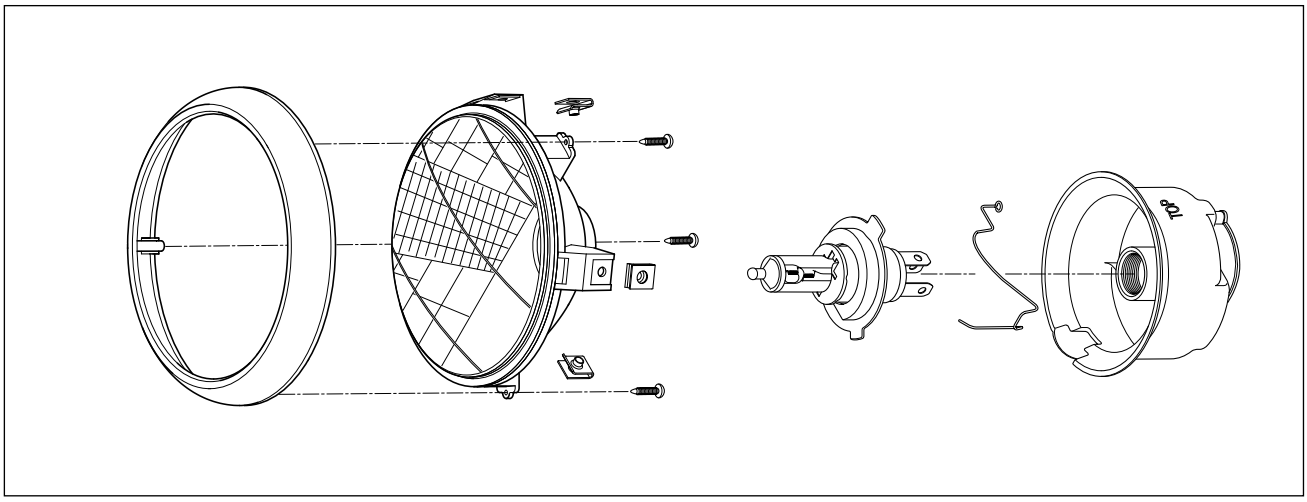
TURN SIGNAL SWITCH			
	Lg	Sb	B
L		○	○
PUSH			
R	○	○	

FRONT/REAR BRAKE LAMP SWITCH		
	O	WB
ON	○	○
OFF		

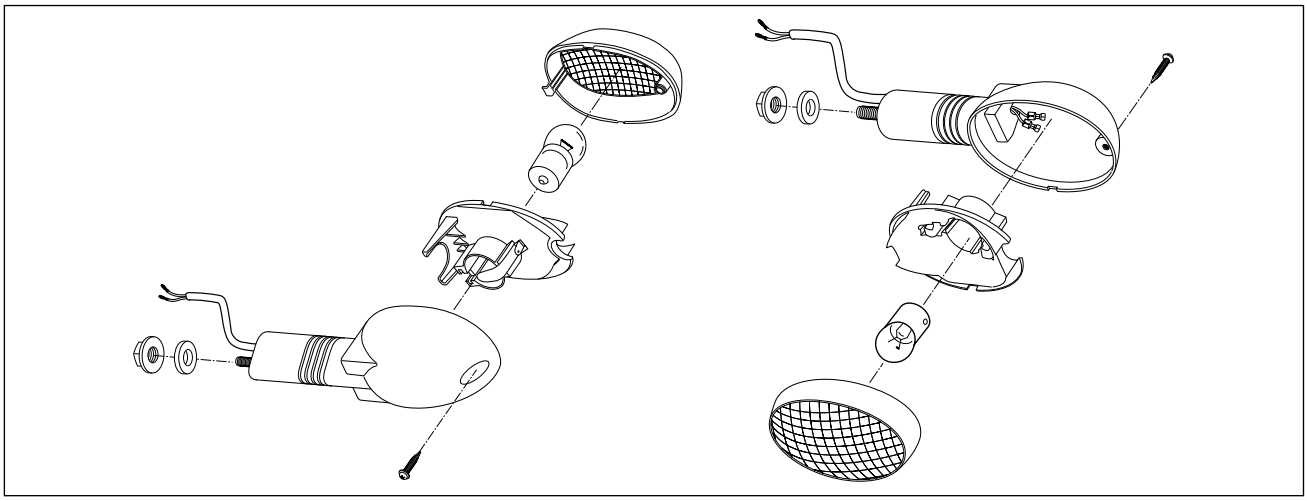
PASS SWITCH		
	O	Y
ON	○	○
OFF		

LAMP

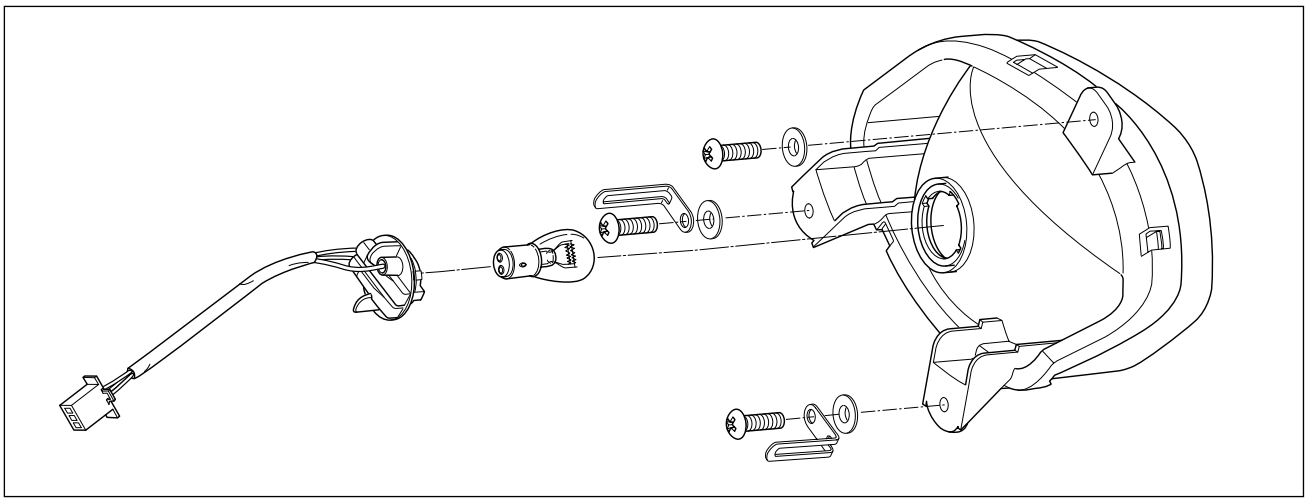
⊙ HEADLAMP



⊙ TURN SIGNAL LAMP

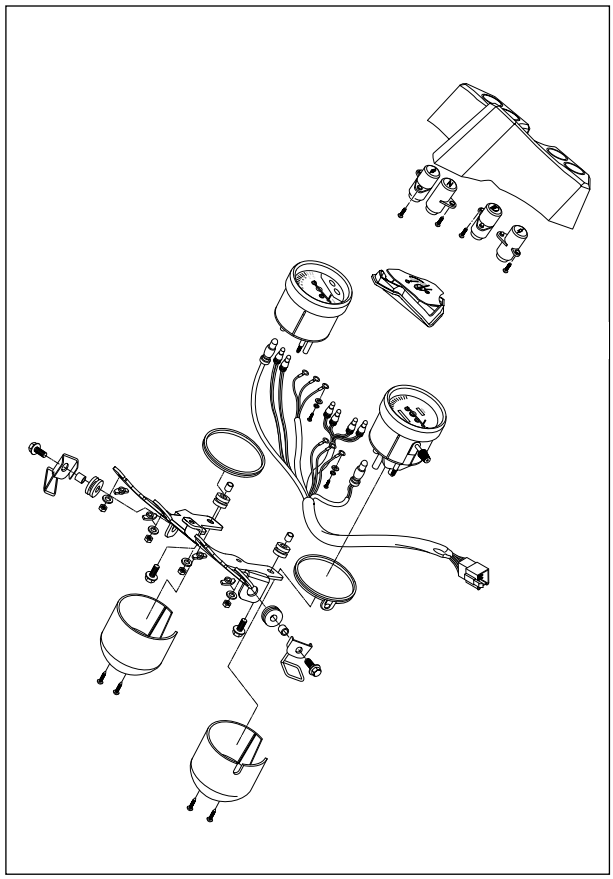


⊙ TAIL / BRAKE LAMP



⊙ COMBINATION METER

Remove the combination meter.
Disassemble the combination meter as shown in the illustration.



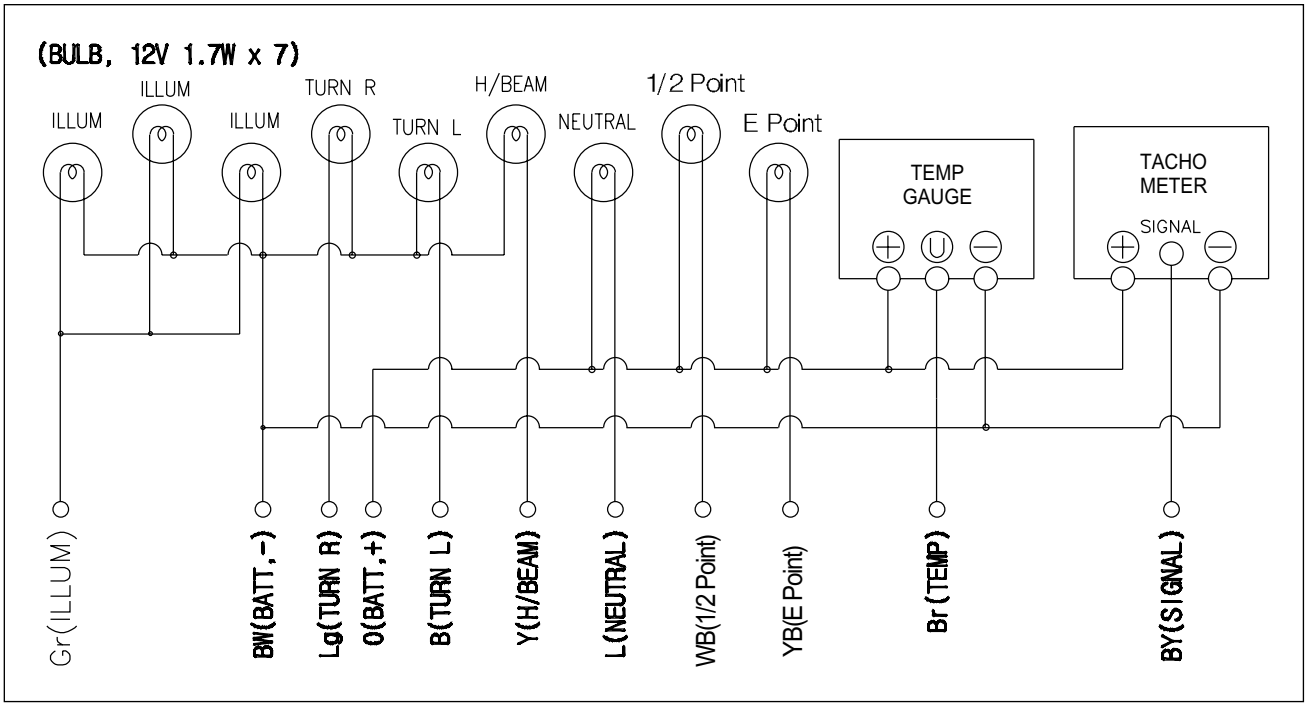
■ INSPECTION

Using the pocket tester, check the continuity between lead wires in the following illustration.
If the continuity measured incorrect, replace the respective part.

TOOL **Pocket tester : 09900-25002**

⚠ CAUTION

When making this test, it is not necessary to remove the combination meter.



BATTERY

⊙ CAUTION OF BATTERY TREATMENT

The battery needs attention generally as it occur flammability gas.
If you don't follow the instruction in the below, there may be a explosion and severe accident.
Therefore, please pay attention to the following points.

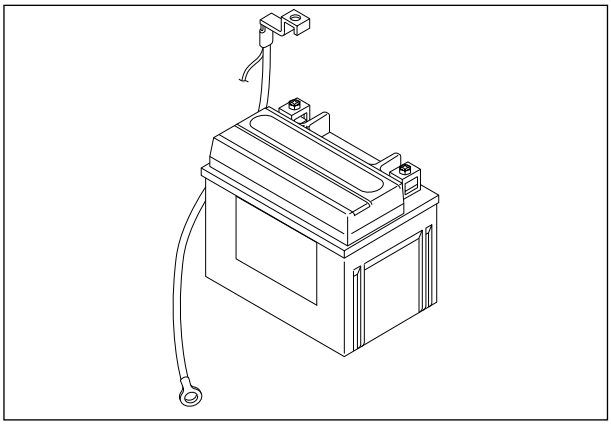
- Prohibit positively battery from contacting to short, spark or firearms.
- The recharge of battery should be done in the wide place where the wind is well ventilated.
  Please don't recharge it at the sight of wind-proof.

⊙ CAUTION OF BATTERY ELECTROLYTE TREATMENT

- Pay attention for the battery electrolyte not to stains the chassis or the humanbody.
- If stains the chassis or the humanbody, at once wash a vast quantity of water.
  When it be stained, clothes should come into being a hole or painting should take off.
  Consult a doctor.
- When the battery electrolyte was dropped to the surface of land, wash a vast quantity of water.
  Neutralize by hydroxide, bicarbonate of soda and so on.

⊙ CAUTION OF MAINTENANCE FREE BATTERY TREATMENT

- Do not remove the aluminum tape to seal the battery electrolyte filler hole untill use as battery of completely seal type.
- Do not use it except the battery electrolyte.
- When pour into the battery electrolyte, necessarily use the electrolyte of the specified capacity.
- Do not open the sealing cap after recharging the battery eletrolyte.



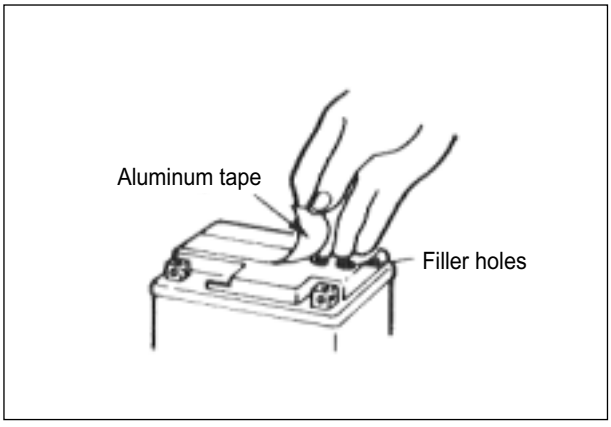
- Filling electrolyte.

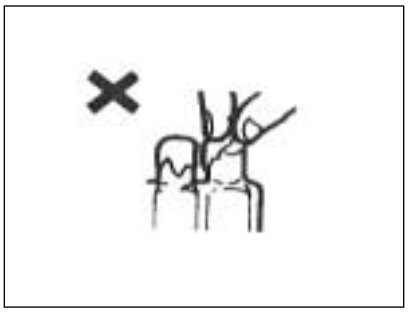
① Put the battery on even land and remove the aluminum tape sealing.

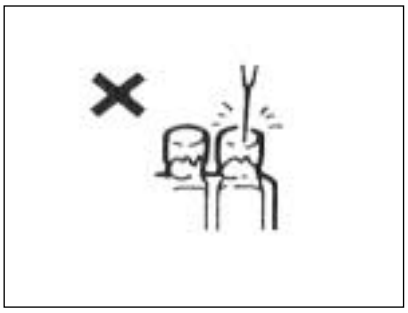
② Remove the cap at the electrolyte container.

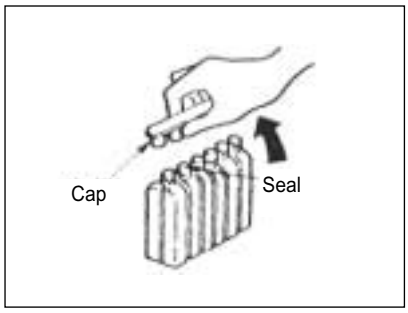
⚠ CAUTION

Do not remove the seal of the electrolyte container, not prick with sharp thing.





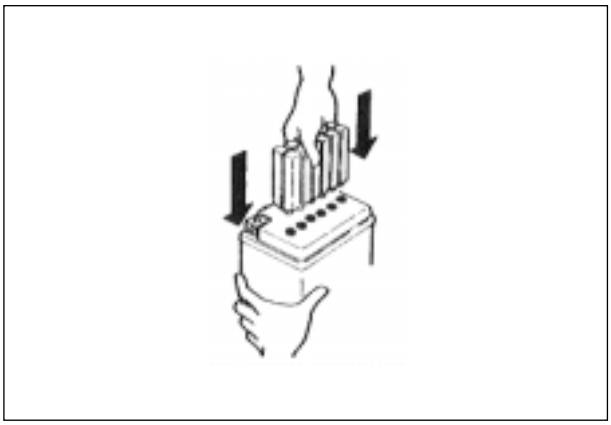


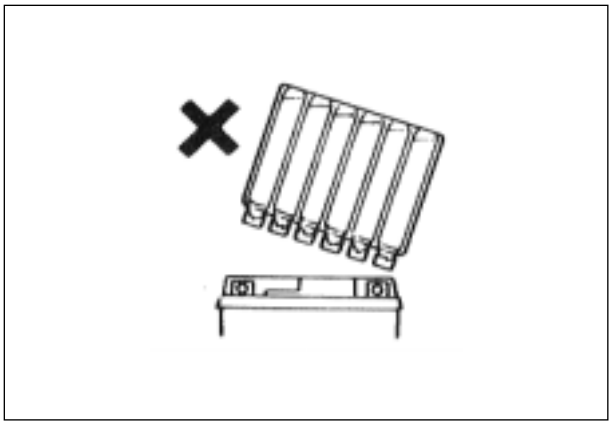


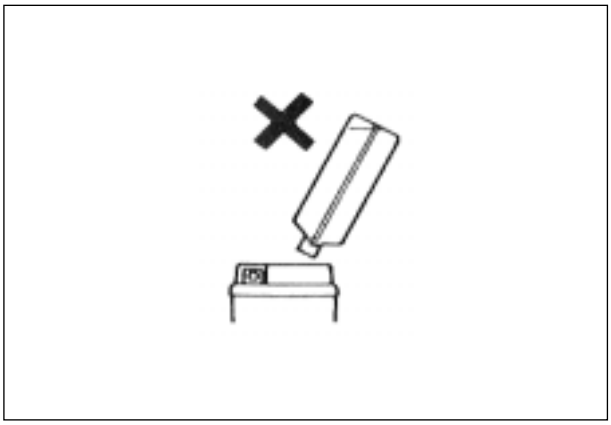
③ Pouring of battery electrolyte
When insert the nozzles of the electrolyte container into the battery's electrolyte filler holes, holding the container firmly so that it does not fall.
Take precaution not to allow any fluid to spill.

⚠ CAUTION

The pouring of electrolyte may not be done if the electrolyte container is pushed slopely.



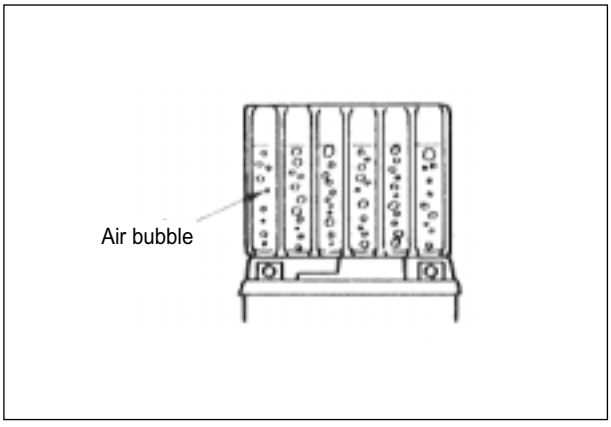




④ Confirmation of pour
Make sure that air bubbles are coming up each electrolyte container, and keep this position for more than about 20 minutes.

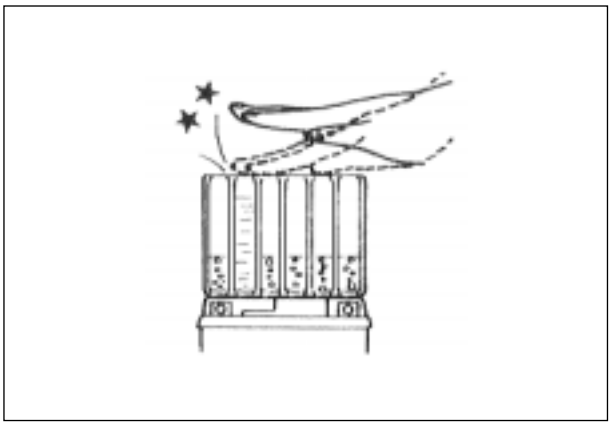
⚠ CAUTION

If no air bubbles are coming up from a filler port, tap the bottom of the two or three times.



⑤ Separation of electrolyte container

After confirming that you entered the electrolyte into battery completely, remove the electrolyte containers from the battery.

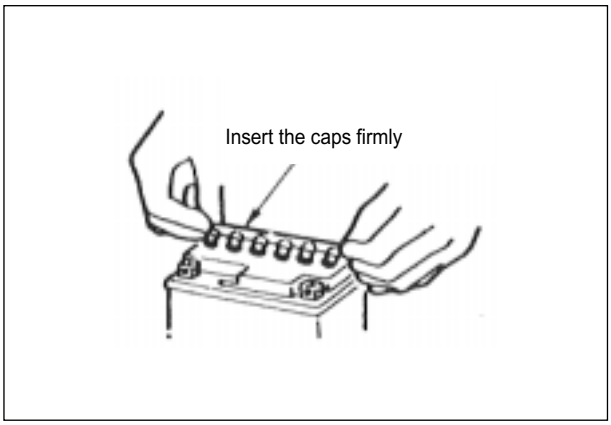


⚠ CAUTION

Draw the empty receptacle out slowly because there may be a chance which remaining electrolyte vaporize.

⑥ Insert the caps

Insert the cap into the filler holes, pressing it firmly so that the top of the caps do not protrude above the upper surface of the battery's top cover.



⊙ SERVICING

Visually inspect the surface of the battery container. If any signs of cracking or electrolyte leakage from the sides of the battery have occurred, replace the battery with a new one. If the battery terminals are found to be coated with rust or an acidic white powdery substance, then this can be cleaned away with sandpaper.

⊙ RECHARGING OPERATION

- Using the pocket tester, check the battery voltage. If the voltage reading is less than the 12.0V (DC), recharge the battery with a battery charger.

How to charge	
Standard	1.2 A × 5~10 hours
Fast	6 A × 30 minutes

⚠ CAUTION

When recharging the battery, remove the battery from the motorcycle.

NOTE

Do not remove the caps on the battery top while recharging.

⚠ CAUTION

Be careful not to permit the charging current to exceed 6A at any time.

- After recharging, wait for more than 30 minutes and check the battery voltage with a pocket tester.
- If the battery voltage is less than the 12.5V, recharge the battery again.
- If battery voltage is still less than 12.5V, after recharging, replace the battery with a new one.
- When the motorcycle is not used for a long period, check the battery every 1 month to prevent the battery discharge.

CHASSIS

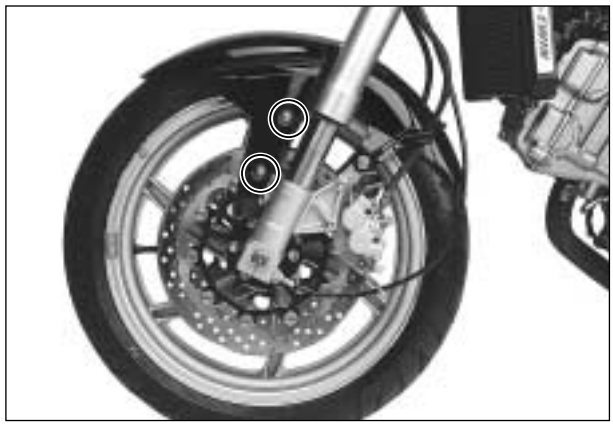
CONTENTS

EXTERIOR PARTS 7- 1
FRONT WHEEL 7- 2
FRONT BRAKE 7- 6
HANDLEBARS 7- 13
FRONT FORK 7- 15
STEERING 7- 23
REAR WHEEL 7- 26
REAR BRAKE 7- 30
REAR SHOCK ABSORBER 7- 32
SWING ARM 7- 33

EXTERIOR PARTS

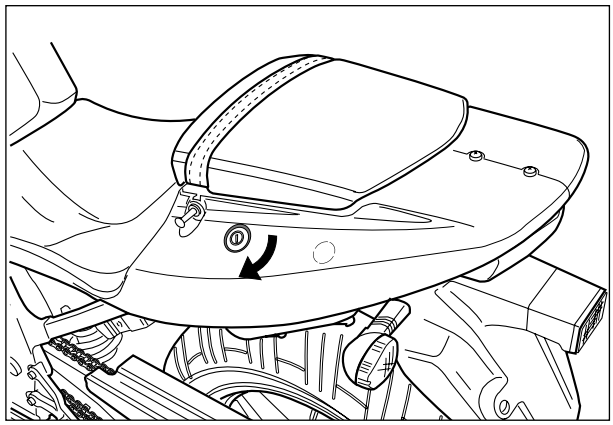
⊙ FRONT FENDER

● With the bolts removed, remove the front fender.



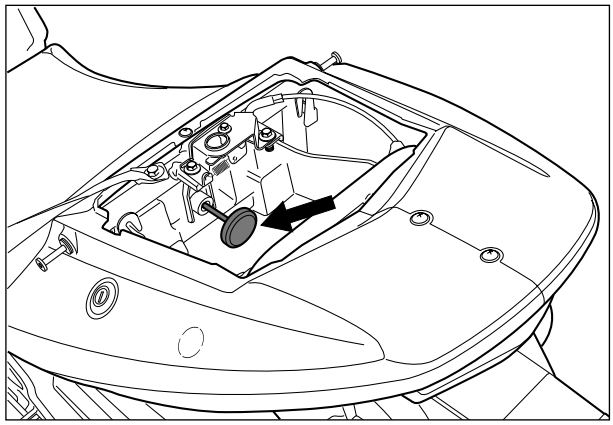
⊙ REAR SEAT

● Remove the rear seat with the ignition key.

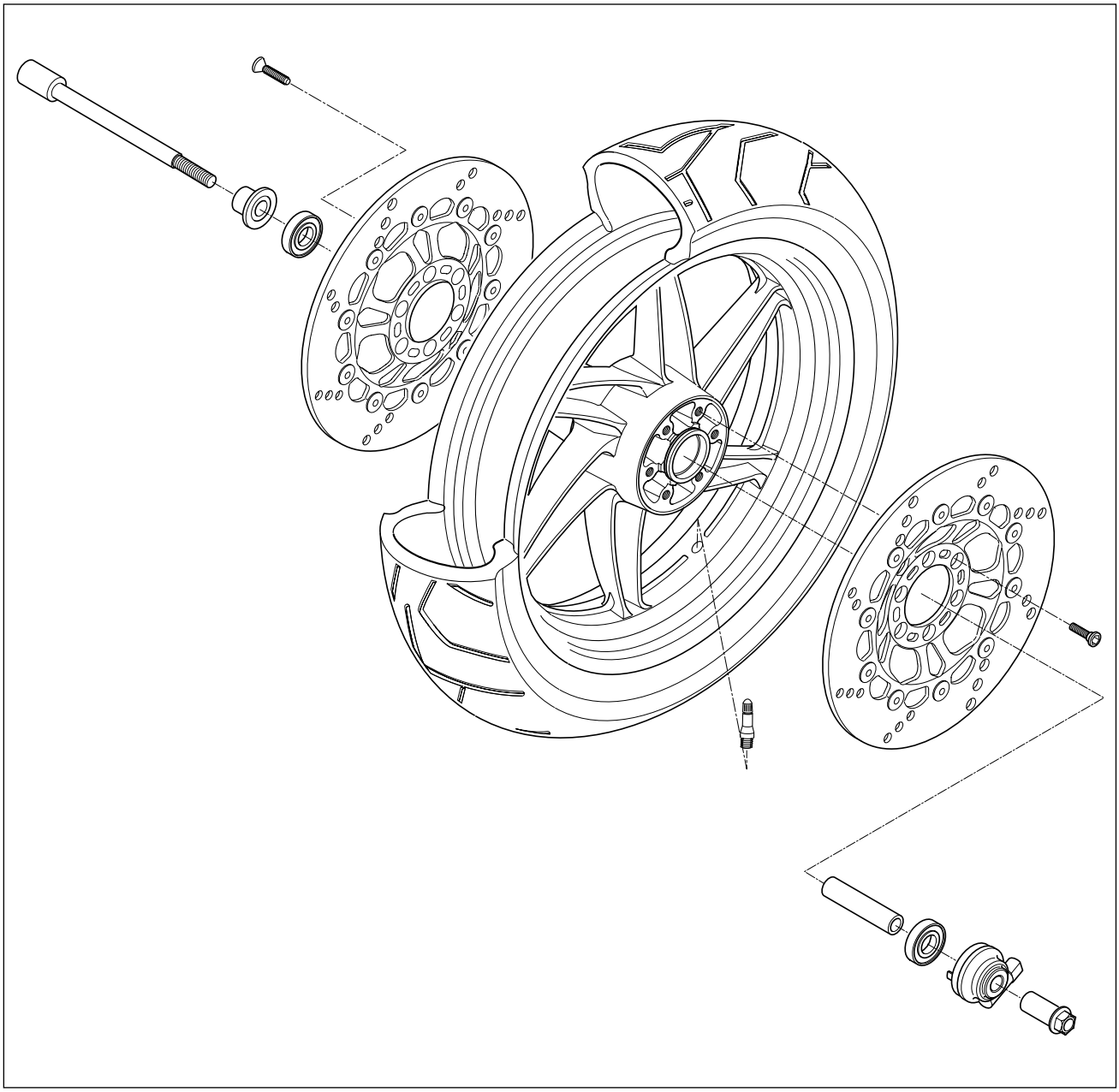


⊙ FRONT SEAT

● To remove the front seat, pull the knob located under the rear seat.

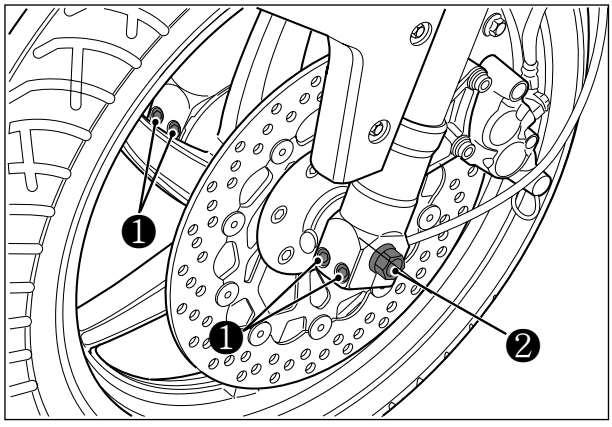


FRONT WHEEL



⊙ REMOVAL

- Loosen the axle pinch bolt ①, right and left.
- Loosen the front axle ②.
- Raise the front wheel off the ground with a block or jack.

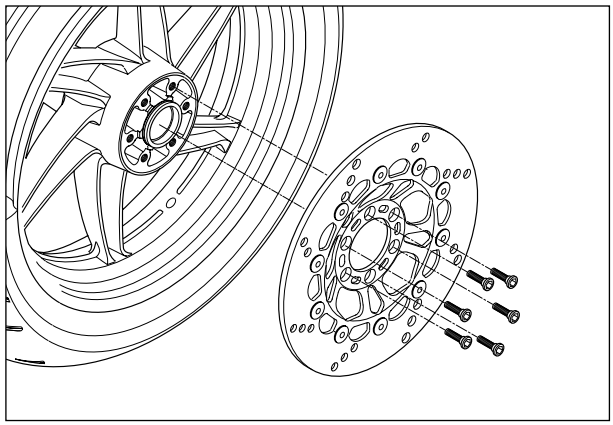


⚠ CAUTION

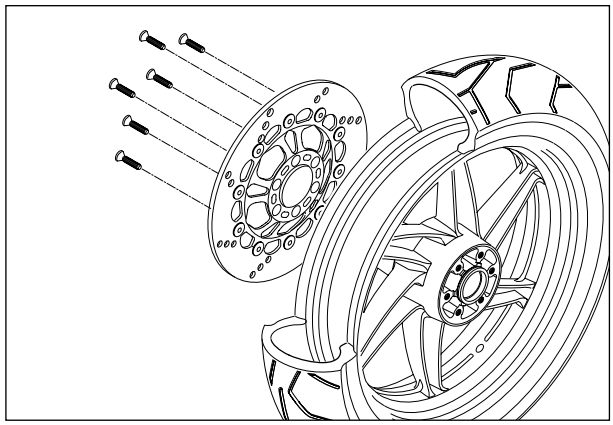
When using a jack, take care not to cause scratches on the chassis.

- Remove the front wheel by removing the front axle ②.

● Remove the brake disk, right and left.



[Left front brake]



[Right front brake]

⊙ INSPECTION AND DISASSEMBLY

■ TIRE

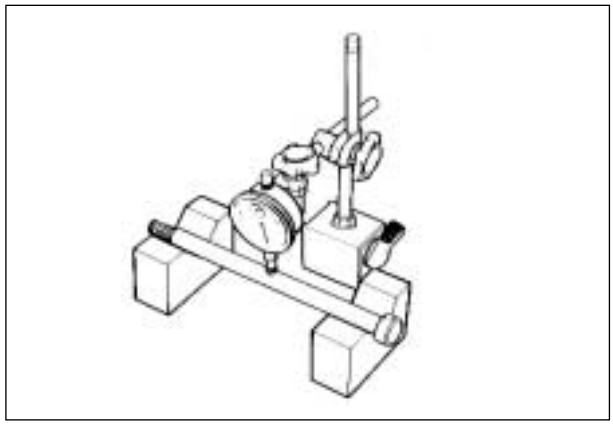
For inspection of the tire : Refer to page 2-19.

■ FRONT AXLE

Measure the front axle runout using the dial gauge. If the runout exceeds the limit, replace the front axle.

Axle shaft runout	Service limit
	0.25 mm (0.01 in)

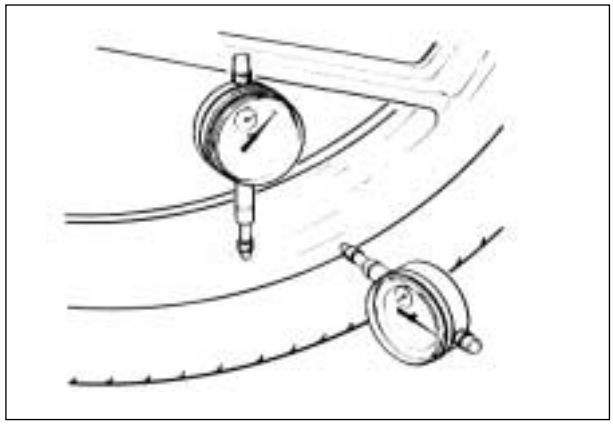
TOOL **Dial gauge : 09900-20606**
Magnetic stand : 09900-20701
V-block : 09900-21304



■ WHEEL

Make sure that the wheel runout (axial and radial) does not exceed the service limit when checked as shown. An excessive amount of runout is usually due to worn or loose wheel bearings and can be corrected by replacing the bearings. If bearing replacement fails to reduce the wheel.

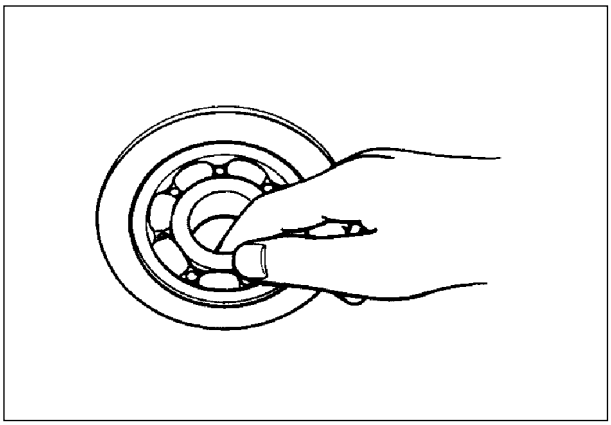
Wheel runout (axial and radial)	Service limit
	2.0 mm (0.08 in)



■ **WHEEL BEARING**

Inspect the play of the wheel bearings by finger while they are in the wheel. Rotate the inner race by finger to inspect for abnormal noise and smooth rotation.

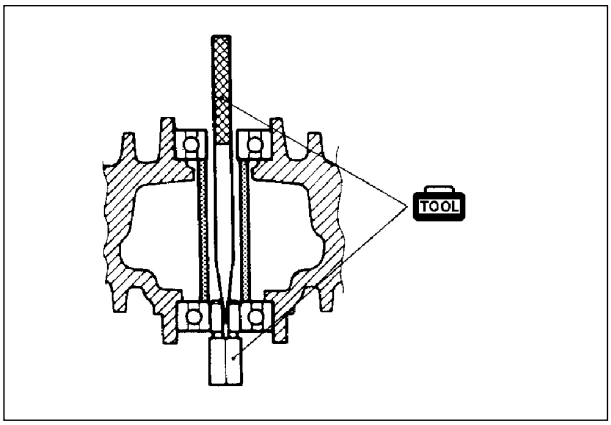
Replace the bearing in the following procedure if there is anything unusual.



■ **WHEEL BEARING REMOVAL**

● Remove the wheel bearing by using the special tool.

TOOL **Wheel bearing remover : 09941-50111**



⚠ CAUTION

The removed bearing should be replaced with new ones.

⊙ REASSEMBLY

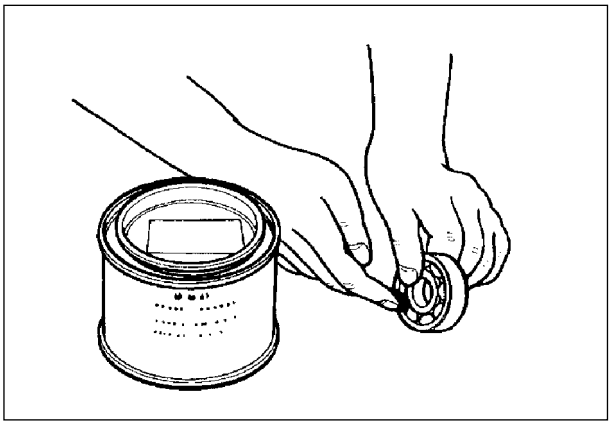
Reassemble the front wheel in the reverse order of removal and disassembly.

Pay attention to the following points :

■ **WHEEL BEARING**

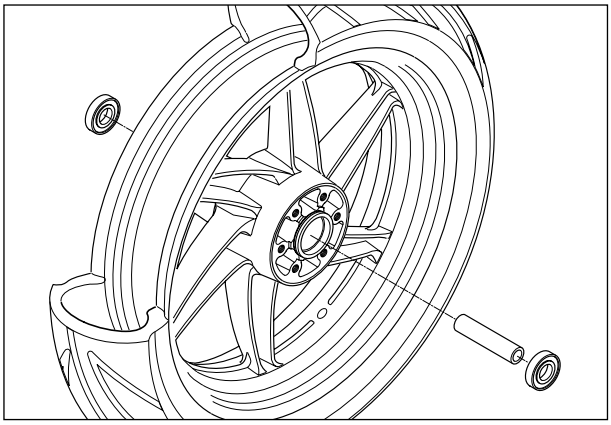
● Apply SUPER GREASE "A" to the wheel bearings.

A **SUPER GREASE "A"**



● Install the wheel bearings as follows by using the special tools.

TOOL **Steering race installer : 09941-34513**



⚠ CAUTION

First install the right wheel bearing, then install the left wheel bearing.

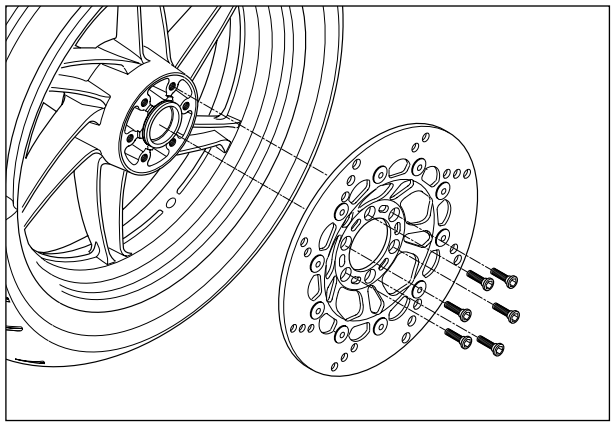
■ **BRAKE DISK**

Make sure that the brake disk is clean and free of any greasy matter.

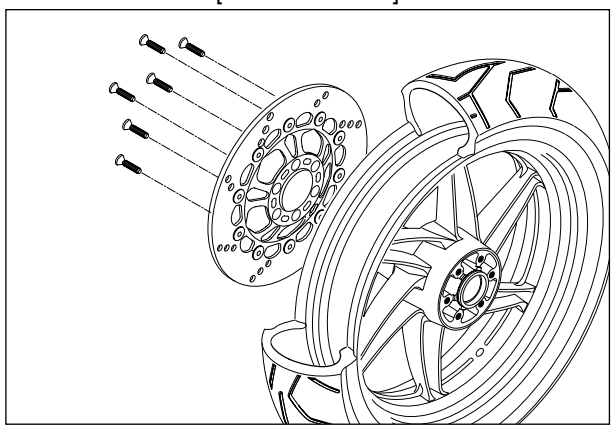
● Apply THREAD LOCK "1324" to the right and left disk mounting bolts and tighten them to the specified torque.

Brake disk bolt
: 18~28 N · m (1.8 ~2.8 kg · m)

THREAD LOCK "1324"



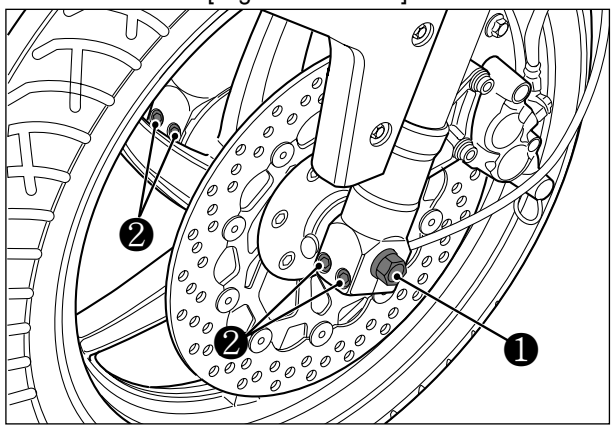
[Left front brake]



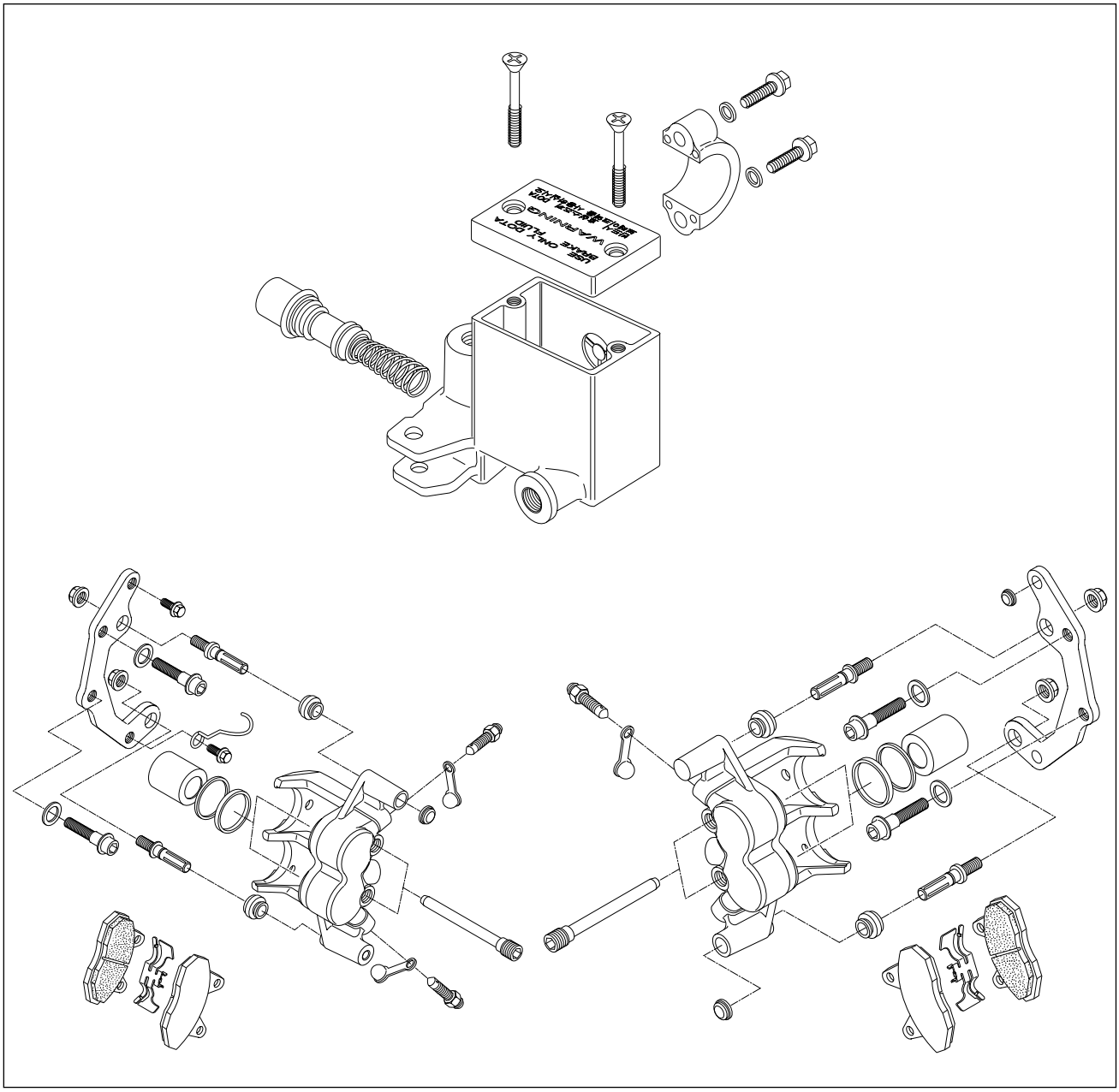
[Right front brake]

● Tighten the front axle bolt ① and axle pinch bolt ② to the specified torque.

Front axle bolt : 50~80 N · m (5.0 ~8.0 kg · m)
Front axle pinch bolt
: 15~25 N · m (1.5 ~2.5 kg · m)



FRONT BRAKE



⚠ WARNING

- ❖ Do not mix brake fluid with different brand.
- ❖ Do not use a brake fluid kept in an open container or stored for long period of time.
- ❖ To store brake fluid, make sure to seal the container and keep it in a safe place to be out of reach of children.
- ❖ When filling brake fluid, take care not to allow water or dirt to enter the system.
- ❖ To wash the brake system parts, use brake fluid and not any other material.
- ❖ Do not allow dirt and fluid to contact the brake disk or pad.

⚠ CAUTION

Do not allow brake fluid to contact the paint surface, plastic or rubber parts, or its chemical reaction can cause discoloration or crack.

⊙ BRAKE FLUID REPLACEMENT

● For replacing procedure of brake fluid : Refer to page 2-16

⊙ BRAKE PAD REPLACEMENT

● For replacing procedure of brake pad : Refer to page 2-15

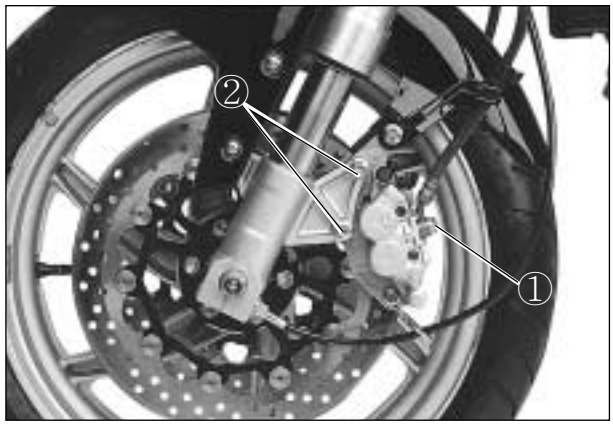
⊙ CALIPER DISASSEMBLY

● Drain brake fluid. (Refer to page 2-16)

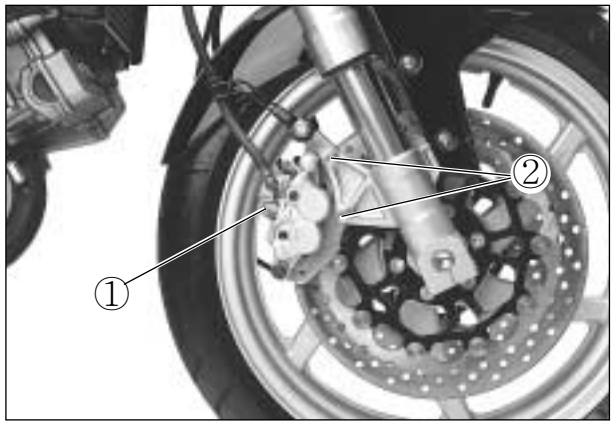
⚠ CAUTION

To prevent brake fluid from splashing on the parts nearby, cover the parts with cloth.

● Remove the right and left front brake union bolt ① and caliper mounting bolts ②.
● Remove the brake pad. (Refer to page 2-15)

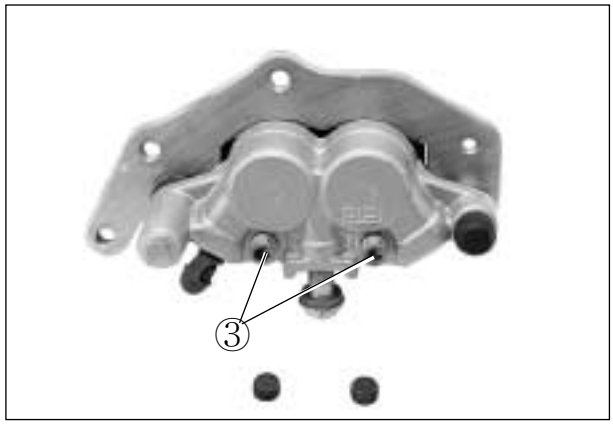


[Left front brake]

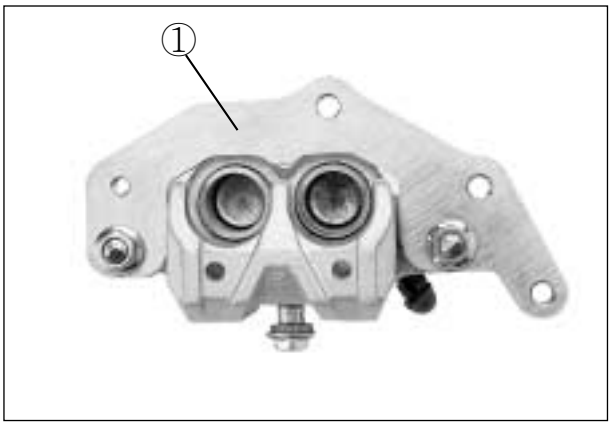


[Right front brake]

● Remove the brake pad mounting bolt ③.



● Remove the brake caliper holder ①.



● Using an air gun, push out the caliper piston.

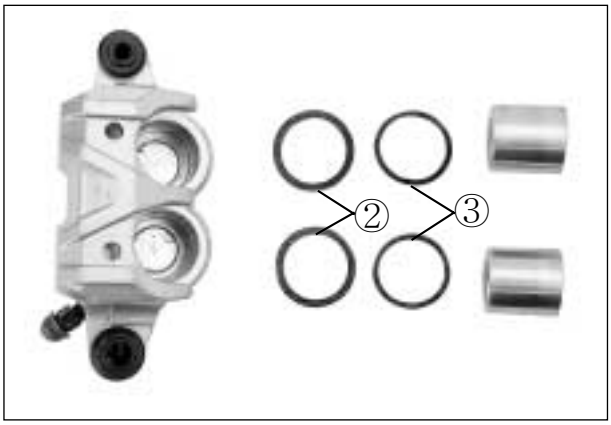
⚠ WARNING

- ❖ **Place a rag over the piston to prevent it from popping out and flying and keeping hand off the piston.**
- ❖ **Be careful of brake fluid which can possibly splash.**
- ❖ **Do not use high pressure air but increase the pressure gradually.**

● Remove the dust seal ② and piston seal ③.

⚠ CAUTION

- ❖ **Care not to cause scratch on the cylinder bore.**
- ❖ **Do not reuse the piston seal and dust seal that have been removed.**



⊙ CALIPER INSPECTION

Inspect the caliper cylinder wall and piston surface for scratch, corrosion or other damages.
If any abnormal condition is noted, replace the caliper.

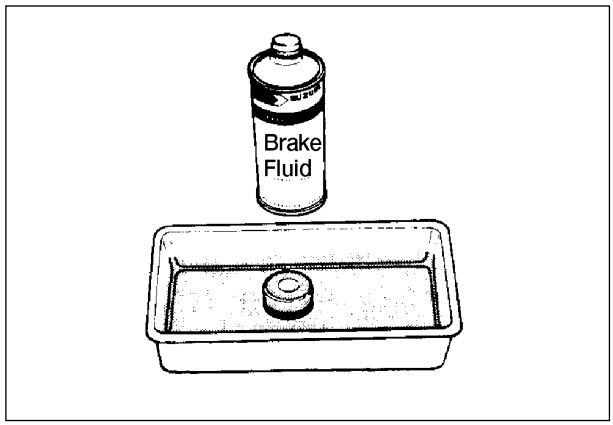
⊙ CALIPER REASSEMBLY

Reassemble the caliper in the reverse order of disassembly procedures and observe the following points.

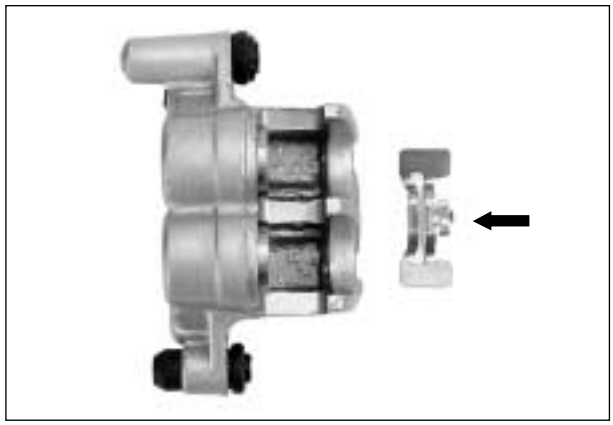
⚠ CAUTION

- ❖ **Wash the caliper components with fresh brake fluid before reassembly. Do not wipe off brake fluid after washing the components.**
- ❖ **Replace the piston seal and dust seal with new ones with brake fluid applied.**

BF Brake fluid specification and classification
(Front brake) : DOT 4
(Rear brake) : DOT 4



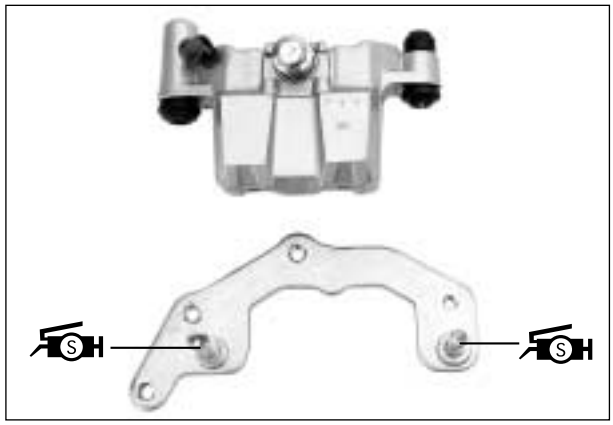
● Install the brake pad spring.



● Apply SILICONE GREASE to the brake caliper holder.

S SILICONE GREASE

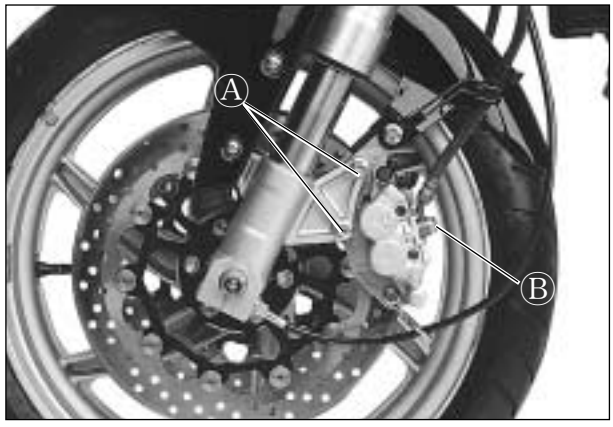
● Install the brake pads. (Refer to page 2-15)



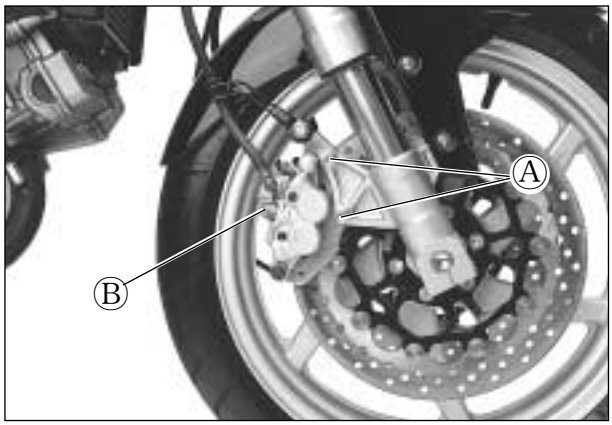
● Tighten the caliper mounting bolts Ⓐ.
● With the hose end seated to the stopper, tighten the right and left front brake hose union bolt Ⓑ.

Front brake caliper mounting bolts
:18~28 N · m (1.8~2.8 kg · m)
Front brake hose union bolts
:20~25 N · m (2.0~2.5 kg · m)

● Fill the system with brake fluid and bleed air. (Refer to page 2-17)
Inspection after reassembly : Refer to page 2-14



[Left front brake]



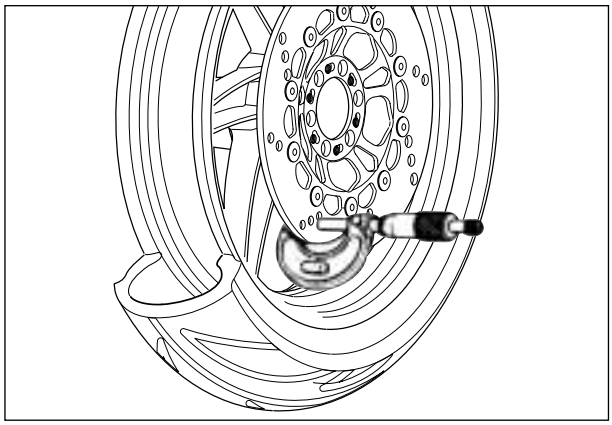
[Right front brake]

⊙ BRAKE DISK INSPECTION

Check the brake disk for damage or cracks. Measure the thickness using the micrometer.
Replace the brake disk if the thickness is less than the service limit or if damage is found.

Brake disk thickness	Service limit
	3.0 mm (0.12 in)

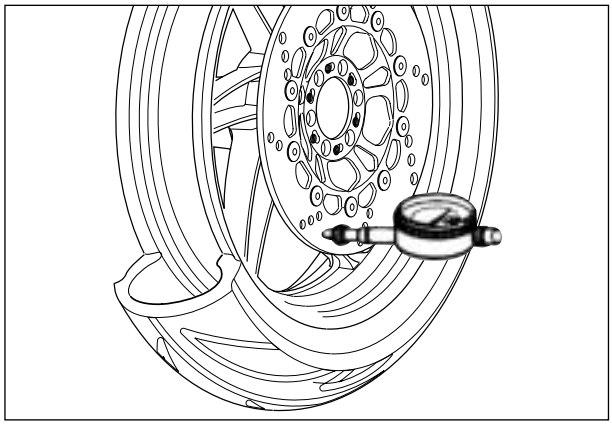
TOOL **Micrometer (0～25 mm) : 09900-20201**



Measure the runout using the dial gauge.
Replace the brake disk if the runout exceeds the service limit.

Brake disk runout	Service limit
	0.3 mm (0.012 in)

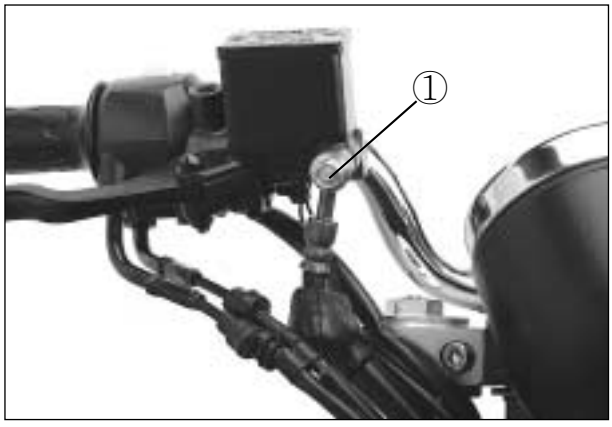
TOOL **Dial gauge : 09900-20606**
Magnetic stand : 09900-20701



● If either measurement exceeds the service limit, replace the brake disk. (Refer to page 7-3)

⊙ MASTER CYLINDER DISASSEMBLY

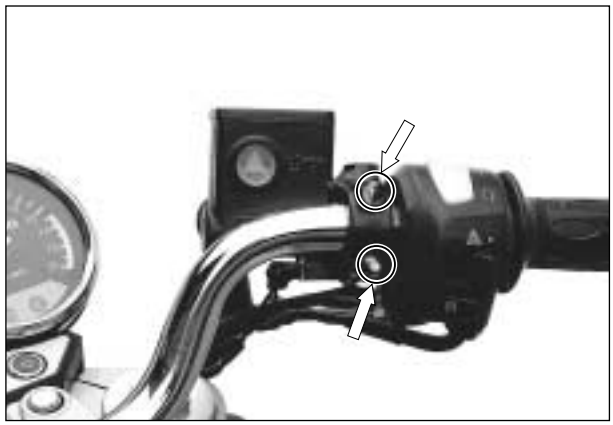
● Drain brake fluid the master cylinder.
● Disconnect the brake lamp switch lead wire coupler.
● Remove the union bolt ①.



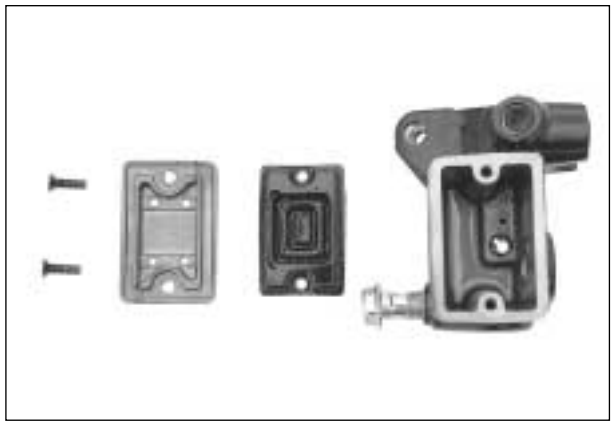
⚠ CAUTION

Place a rag under the union bolt so that brake fluid can not contact the parts.

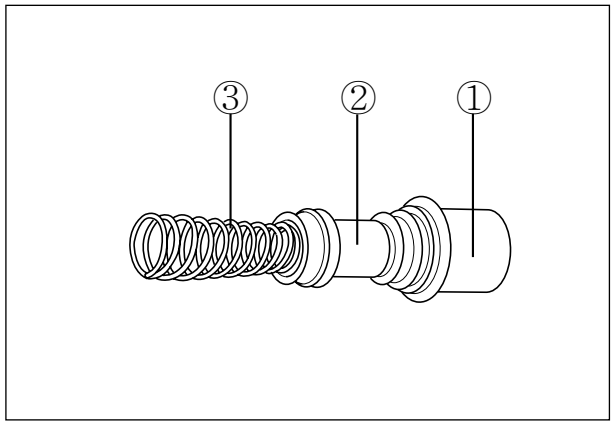
● Remove the two clamp bolts and take off the master cylinder.



● Remove the two fitting screws and separate the cap and diaphragm.

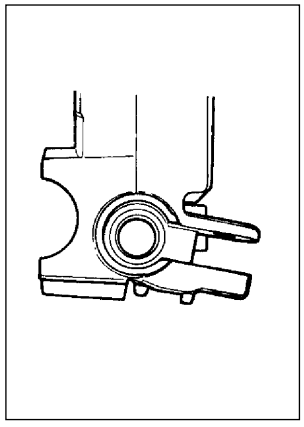


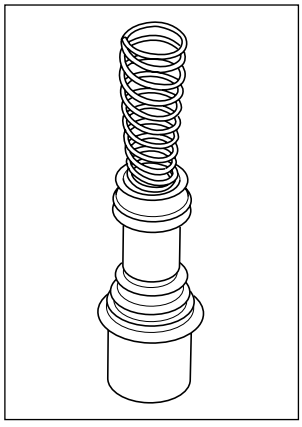
● Detach the dust seal boot ① and remove the circlip.
● Pull out the piston/cup set ② and spring ③.



⊙ MASTER CYLINDER INSPECTION

Inspect the master cylinder bore for any scratches or other damage.
Inspect the piston surface for any scratches or other damage.



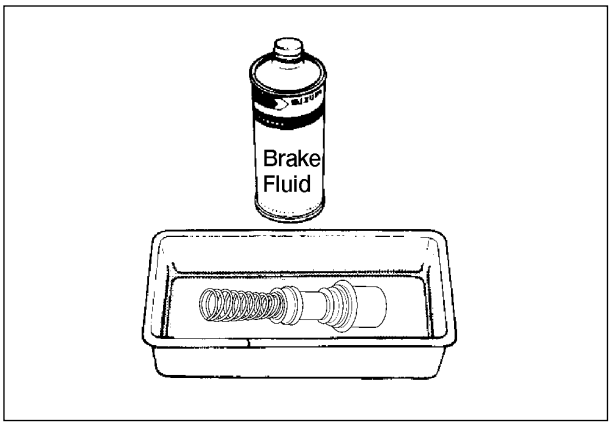


⊙ MASTER CYLINDER REASSEMBLY

Reassemble the master cylinder in the reverse order of disassembly.
Pay attention to the following points :

⚠ CAUTION

- ❖ **Wash the master cylider components with new brake fluid before reassembly.**
- ❖ **When washing the components, use the specified brake fluid. Never use different types of fluid or cleaning solvents such as gasoline, kerosine, etc.**

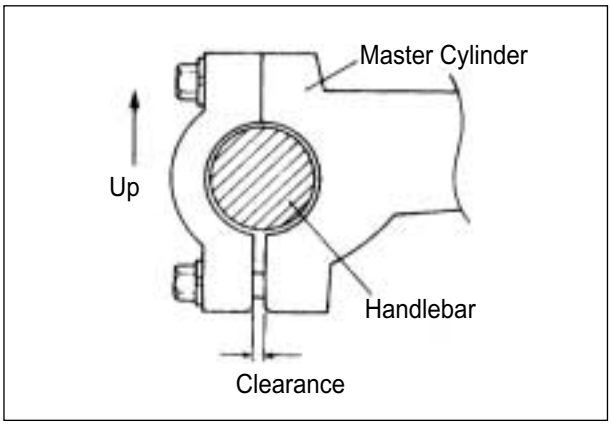


BF **Brake fluid specification and classification**
(Front brake) : DOT 4
(Rear brake) : DOT 4

NOTE

When installing the circlip, make sure that the sharp edge of the circlip faces outside.

● When remounting the master cylinder to the handlebars, first tighten the clamp bolts for upside as shown.



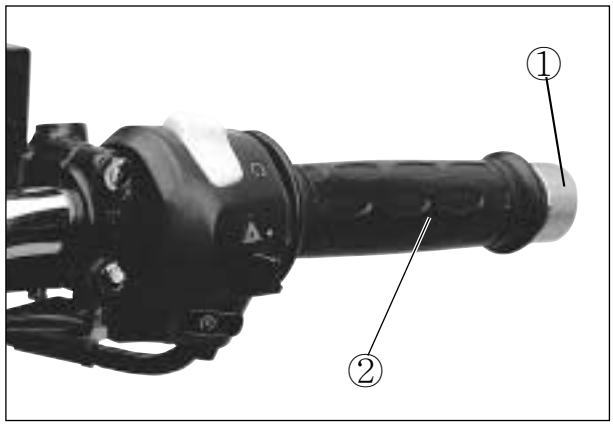
⚠ WARNING

Bleed air from the brake fluid circuit after assembling master cylinder.(See page 2-17)

HANDLEBARS

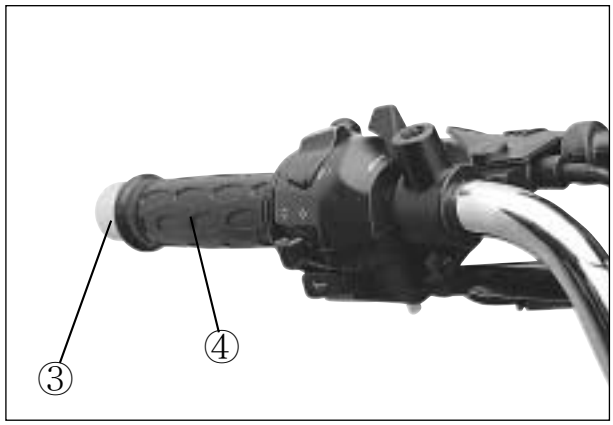
⊙ HANDLEBARS RIGHT SIDE PARTS REMOVAL

- Remove the right handlebar switches.
- Disconnect the brake lamp switch lead wires and remove the master cylinder. (Refer to page 7-10)
- Remove the handlebar balancer ① and grip ②.



⊙ HANDLEBARS LEFT SIDE PARTS REMOVAL

- Remove the left handlebar switches.
- Remove the handlebar balancer ③ and grip ④.
- Remove the clutch lever holder.



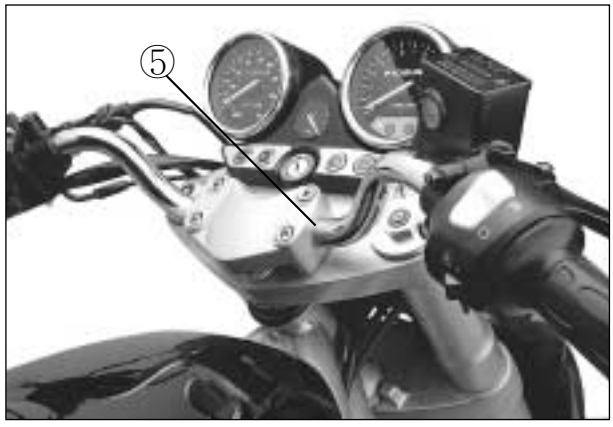
- Remove the clamp bolts and detach the handlebar holders.
- Remove the handlebar.

⊙ REMOUNTING

Perform the remounting work in the reverse order of the removal procedures while observing the following instructions.

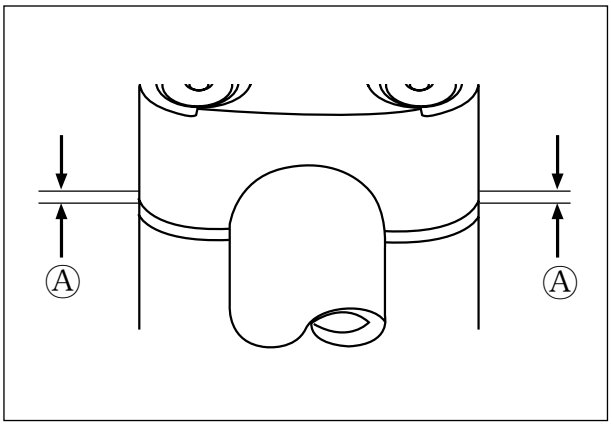
- Install the handlebars with the punch mark ⑤ aligned with the handlebar clamp as shown.
- Tighten the handlebar clamp bolts to the specified torque.

Handlebar clamp bolts
: 18~28 N · m (1.8 ~2.8 kg · m)

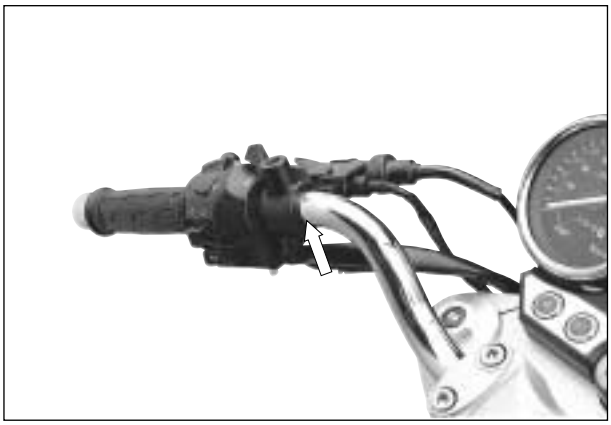


NOTE

The gap Ⓐ between the handlebar clamp and holder should be even.



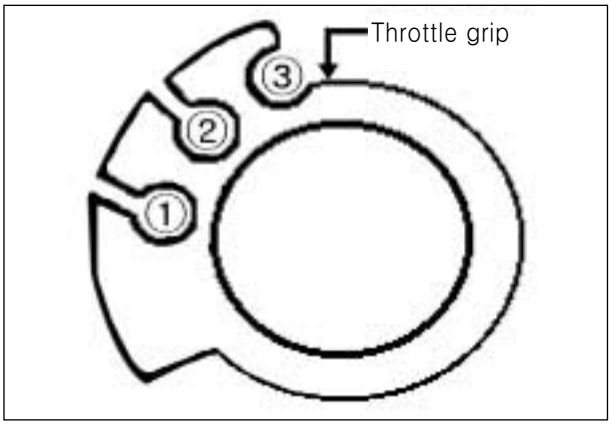
- Align the mating face of clutch lever holders with the respective punch marks and tighten the bolt.
- Install the brake master cylinder. (Refer to page 7-12).

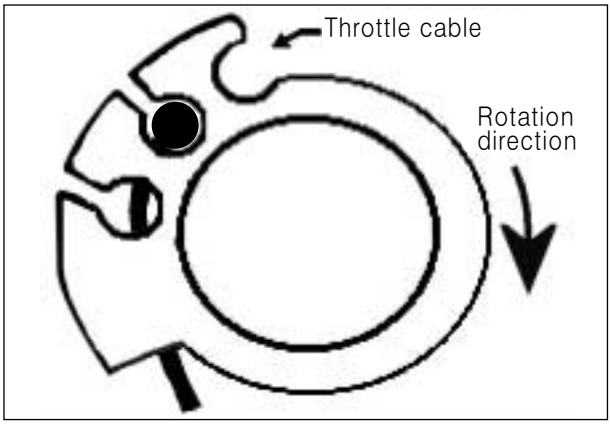


- Apply SUPER GREASE "A" to the throttle cables.

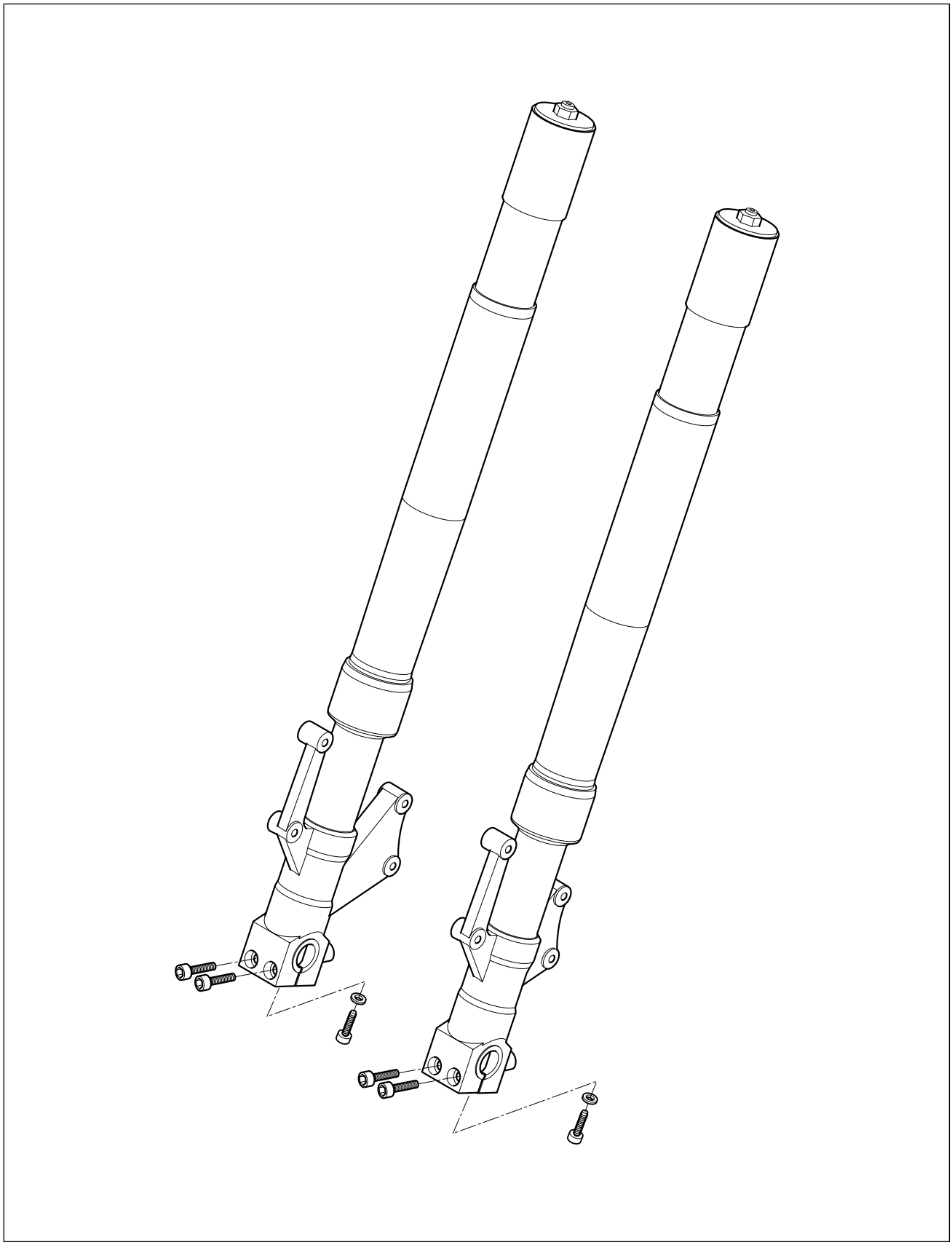
  SUPER GREASE "A"

- Install the throttle cable and returning cable to the throttle grip ①, ②.
  ① : Throttle cable
  ② : Returning cable





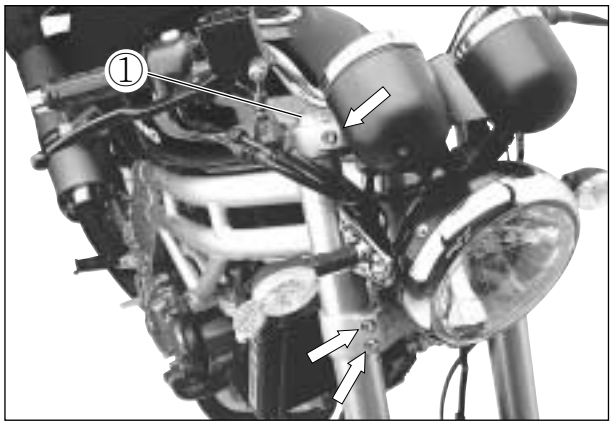
FRONT FORK



⊙ REMOVAL AND DISASSEMBLY

- Remove the front fender. (Refer to page 7-1)
- Take off the front wheel. (Refer to page 7-2)

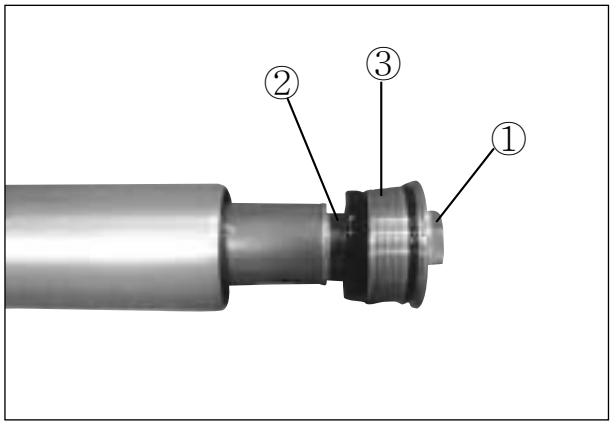
- Loosen the right and rear front fork upper and lower clamp bolts.
- Remove the front brake hose clamp.
- Pull down right and left front forks.



NOTE

Slightly loosen the front fork cap bolt ① to facilitate later disassembly.

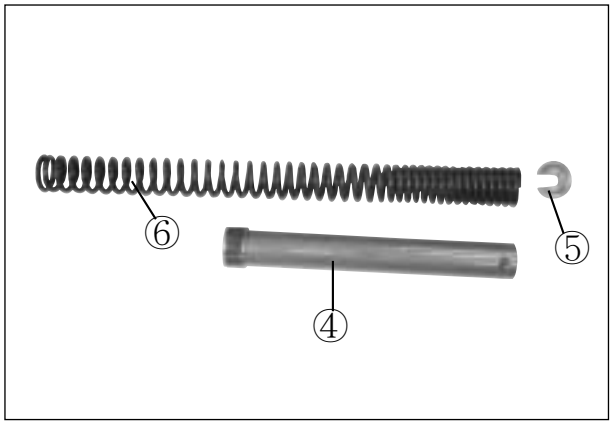
- Remove the front fork cap bolt ① from the inner rod by loosening the lock nut ②.



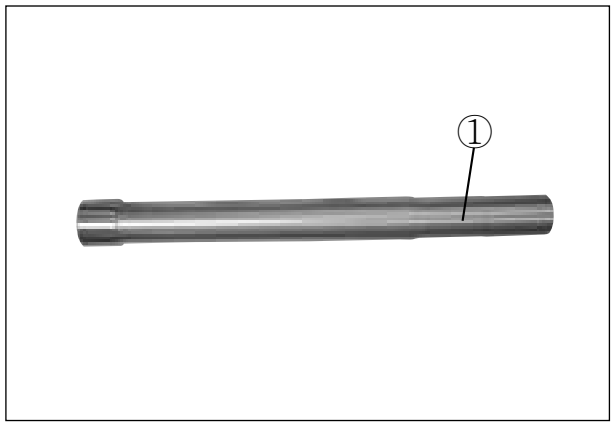
⚠ CAUTION

Do not disassemble the front fork cap ③.

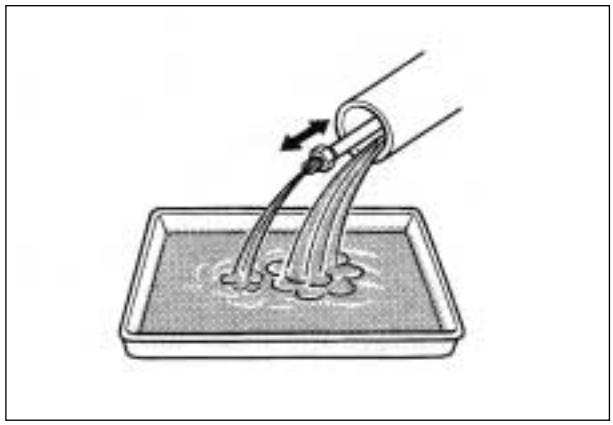
- Remove spacer ④, spring retainer ⑤ and spring ⑥.



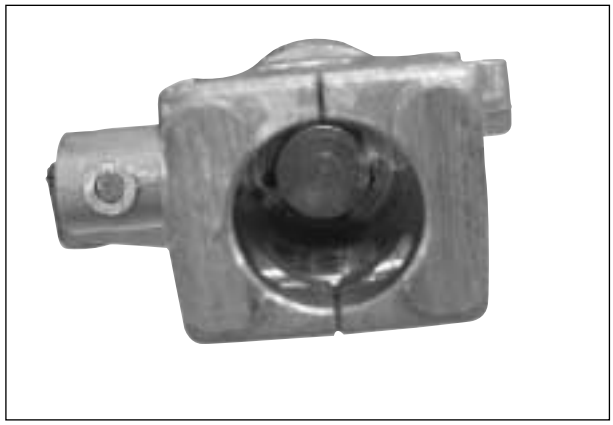
● Remove the outer tube ① from the inner tube.



● Invert the front fork and stroke the inner rod several times to let out fork oil.
● Under the inverted condition of front fork, drain oil to hold it for a few time.



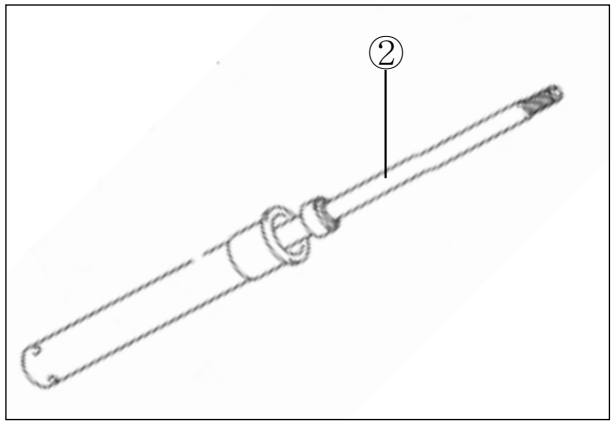
● Remove the damper rod bolt.



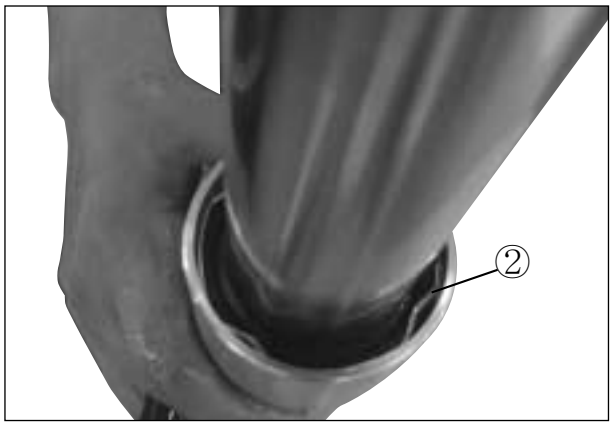
● Remove the inner rod/damper rod ②.

⚠ CAUTION

Do not disassemble the inner rod/damper rod(cartridge).

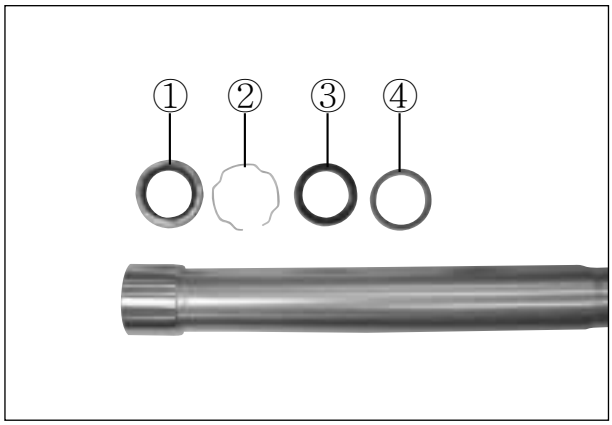


● Remove the dust seal ① and the oil seal stopper ring ②.



● Remove the oil seal ③ and oil seal retainer ④ by using the special tool.

TOOL Oil seal remover : 09913-50121



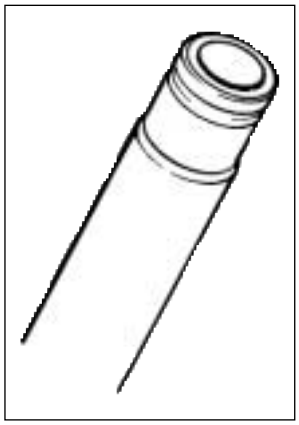
⚠ CAUTION

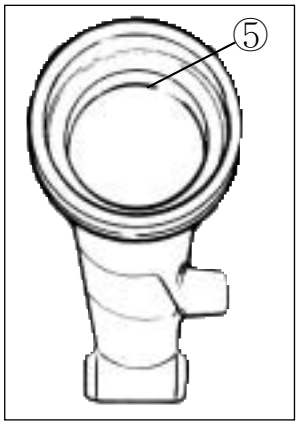
The removed oil seal must be replaced with a new one.

⊙ INSPECTION

■ INNER AND OUTER TUBES

Inspect the inner tube outer surface and outer tube slide metal ⑤ face for scratches.
If any defects are found, replace them with a new one.





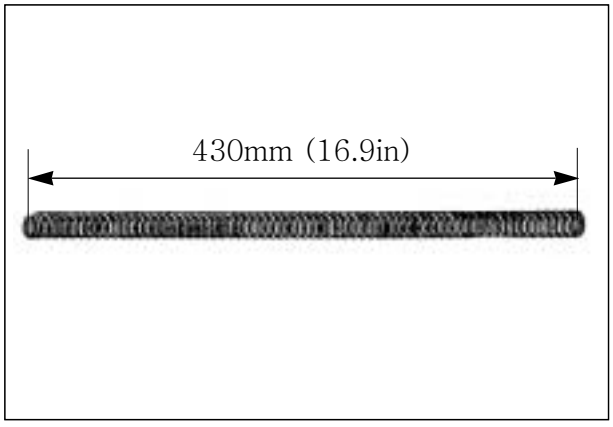
⚠ CAUTION

Don't remove the outer tube slide metal ⑤.

■ FORK SPRING

Measure the fork spring free length.
If it is shorter than the service limit, replace it with a new one.

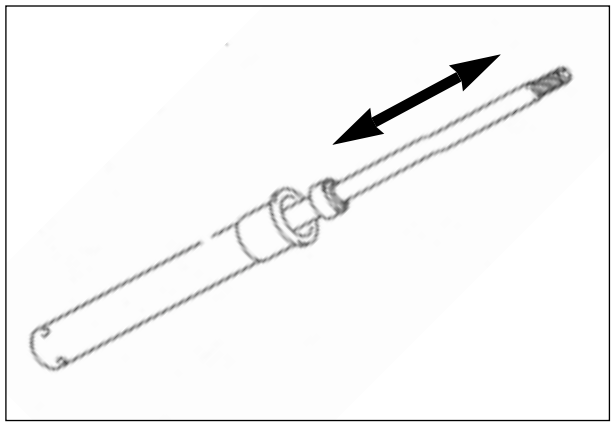
Front fork spring free length	Service limit
	430mm (16.9in)



■ **INNER ROD/DAMPER ROD**

Move the inner rod by hand to examine it for smoothness.

If any abnormal points are found, replace inner rod/damper rod with a new one.



⊙ REASSEMBLY AND REMOUNTING

Reassemble and remount the front fork in the reverse order of removal and disassembly. Pay attention to the following points :

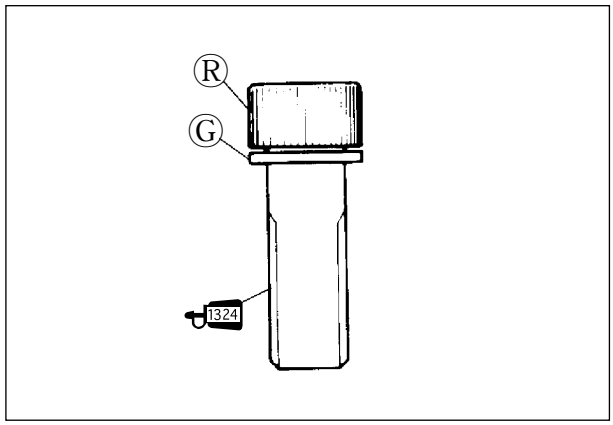
■ **DAMPER ROD BOLT**

- Insert the inner rod/damper rod into the inner tube.
- Install the gasket Ⓖ to the damper rod bolt Ⓡ, and apply THREAD LOCK "1324" to the damper rod bolt Ⓡ and tighten it to the specified torque.

1324 THREAD LOCK "1324"

Damper rod bolt

: 30~40 N · m (3.0~4.0 kg · m)



⚠ CAUTION

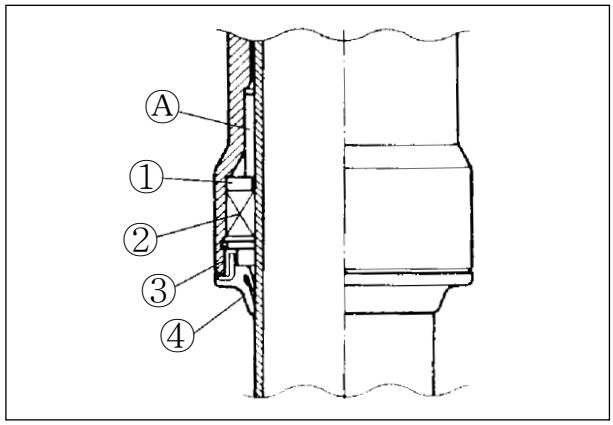
Use a new gasket to prevent oil leakage.

■ **OIL SEAL AND DUST SEAL**

- Apply SUPER GREASE "A" to the new oil seal and dust seal lips lightly before installing it.

Ⓐ SUPER GREASE "A"

- Install the oil seal retainer ①, oil seal ②, oil seal stopper ring ③ and dust seal ④ to the outer tube.

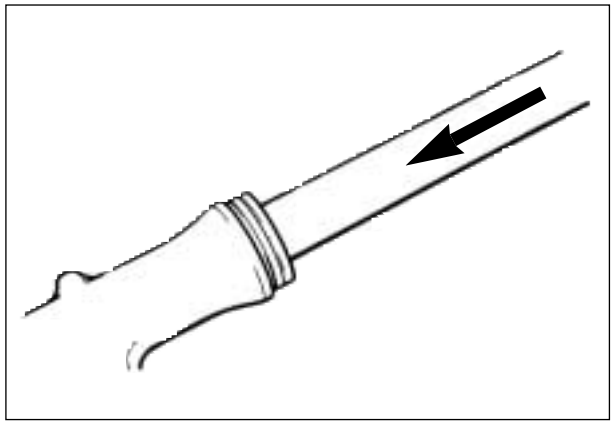


⚠ CAUTION

- **When installing the oil seal to outer tube, be careful not to damage the oil seal lip.**
- **Do not use solvents for washing to prevent oil seal damage.**
- **Apply fork oil to the Anti-friction meatal Ⓐ.**
- **Make sure that the oil seal stopper ring ③ has been fitted securely.**

■ **OUTER TUBE**

- Install the outer tube to the inner tube.

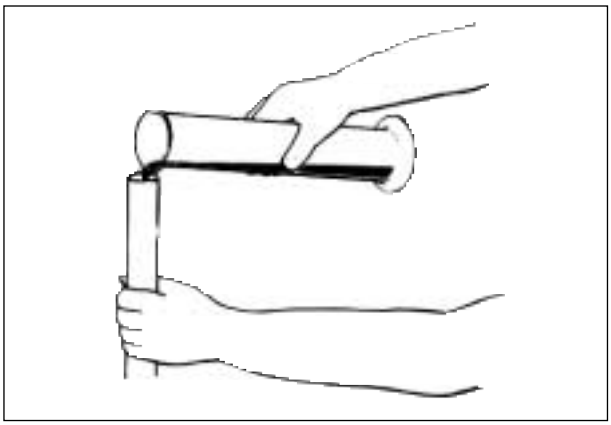


⚠ CAUTION

Be careful not to damage the dust seal lip and the oil seal lip, when installing the outer tube.

■ **FORK OIL**

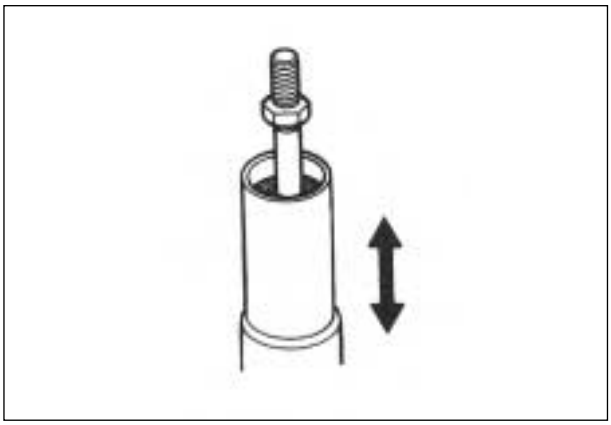
- Place the front fork vertically without spring.
- Compress it fully.
- Pour specified front fork oil up to the top level of the outer tube.
- Move the inner rod slowly more than ten times until bubbles do not come out from the oil.



NOTE

Refill front fork oil up to the top of the outer tube to find bubbles while bleeding air.

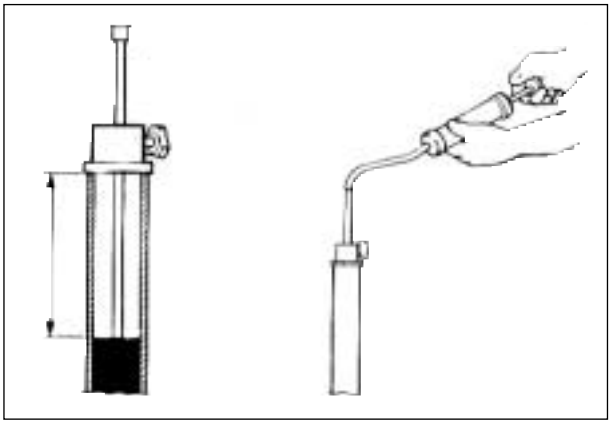
- Refill specified front fork oil up to the top level of the outer tube again. Move the outer tube up and down several strokes until bubbles do not come out from the oil.
- Keep the front fork vertically and wait 5-6 minutes.



NOTE

- ***Always keep oil level over the tube top end, or air may enter the tube during this procedure.***
- ***Take extreme attention to pump out air completely.***

- Hold the front fork vertically and adjust fork oil level with the special tool.



NOTE

When adjusting the fork oil level, remove the fork spring and compress the outer tube fully.

Front fork oil capacity	Each leg
	380cc

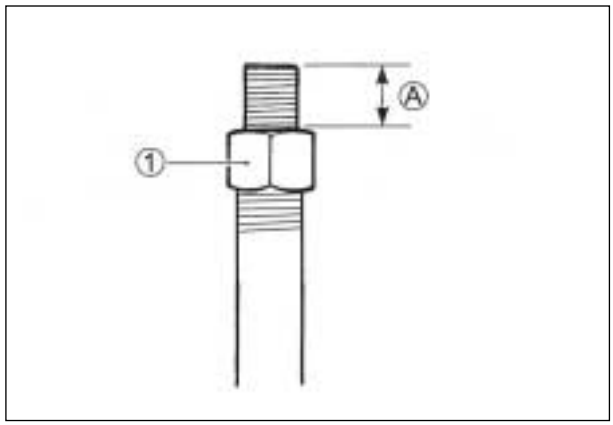
Front fork oil level	Standard
	146mm(5.8 in) from end of outer tube (when maximum compressed without spring)

FORK Front fork oil specification : TELLUS #32

TOOL Front fork oil level gauge : 09943-74111

■ **FRONT FORK INNER ROD LOCK NUT**

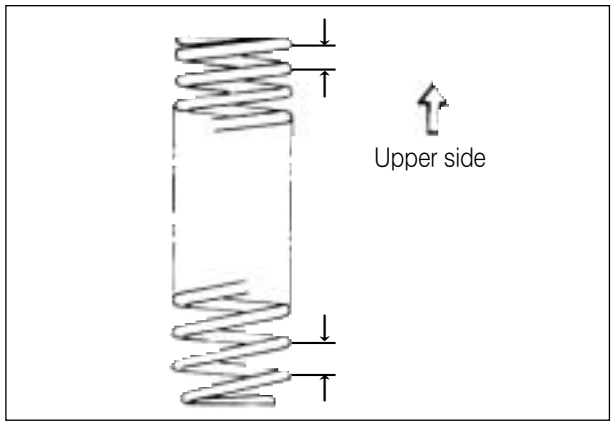
● Adjust the height Ⓐ of the inner rod threads by turning the lock nut ① at 11mm(0.43 in) as shown in illustration.



■ **FORK SPRING**

● Install the fork spring as shown in the illustration.

● Install the spring retainer and the spacer.

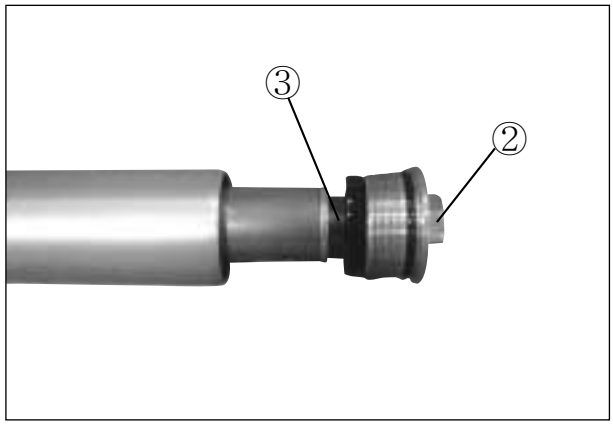


■ **FRONT FORK CAP BOLT**

● Hold the cap bolt ② and tighten the lock nut ③ to the specified torque.

Inner rod lock nut

: 17.5~22.5N · m (1.75~2.25 kg · m)



● Install the front fork cap bolt to the outer tube temporarily.

● Set the front fork to the lower bracket temporarily, tighten the front fork cap bolt ④ to the specified torque.

Front fork cap bolt

: 30~40N · m (3.0~4.0 kg · m)

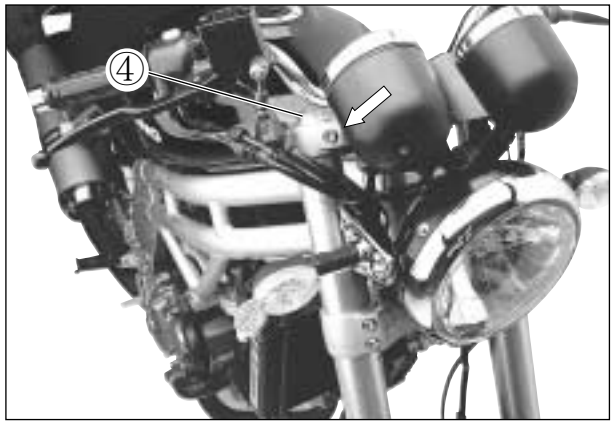
● With the front fork upper face contacted with the handlebar holder, tighten the front fork upper and lower clamp bolts to the specified torque.

Front fork upper clamp bolt

: 22~35N · m (2.2~3.5 kg · m)

Front fork lower clamp bolt

: 22~35N · m (2.2~3.5 kg · m)



- Install the left front fork in the same manner as the right one.
- Install the front fender and tighten its mounting bolts with finger.
- Install the front wheel. (Refer to page 7-4)
- Install the brake calipers. (Refer to page 7-9)
- Swing the motorcycle up and down several times.
- Tighten the front fender mounting bolts.
- Install the brake hose securely.

⊙ FRONT FORK SETTING

After installing the front fork, adjust the rebound and compression damping force as follows.

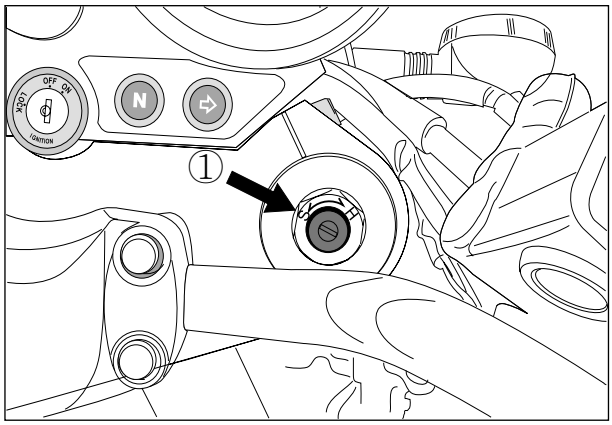
■ DAMPING FORCE ADJUSTMENT

1.Rebound damping force

To adjust the rebound damping force turn in the adjuster ① fully for "S" or "H" direction.

Count the number of clicks from the fully turned-in position.

Fully turned-in "H" direction provides stiffest rebound damping force and turning "S" direction the adjuster will soften rebound damping force.



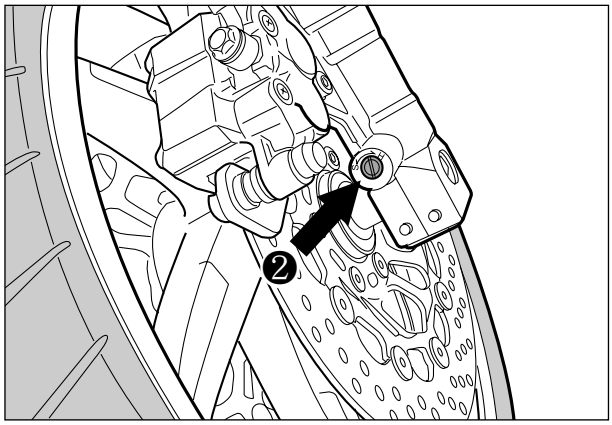
Front fork rebound damping force adjuster	Standard
	3 clicks out from end of "H"direction

2. Compression damping force

To adjust the compression damping force turn in the adjuster ② fully for "S" or "H" direction.

Count the number of clicks from the fully turned-in position.

Fully turned-in "H" direction provides stiffest compression damping force and turning "S" direction the adjuster will soften compression damping force.



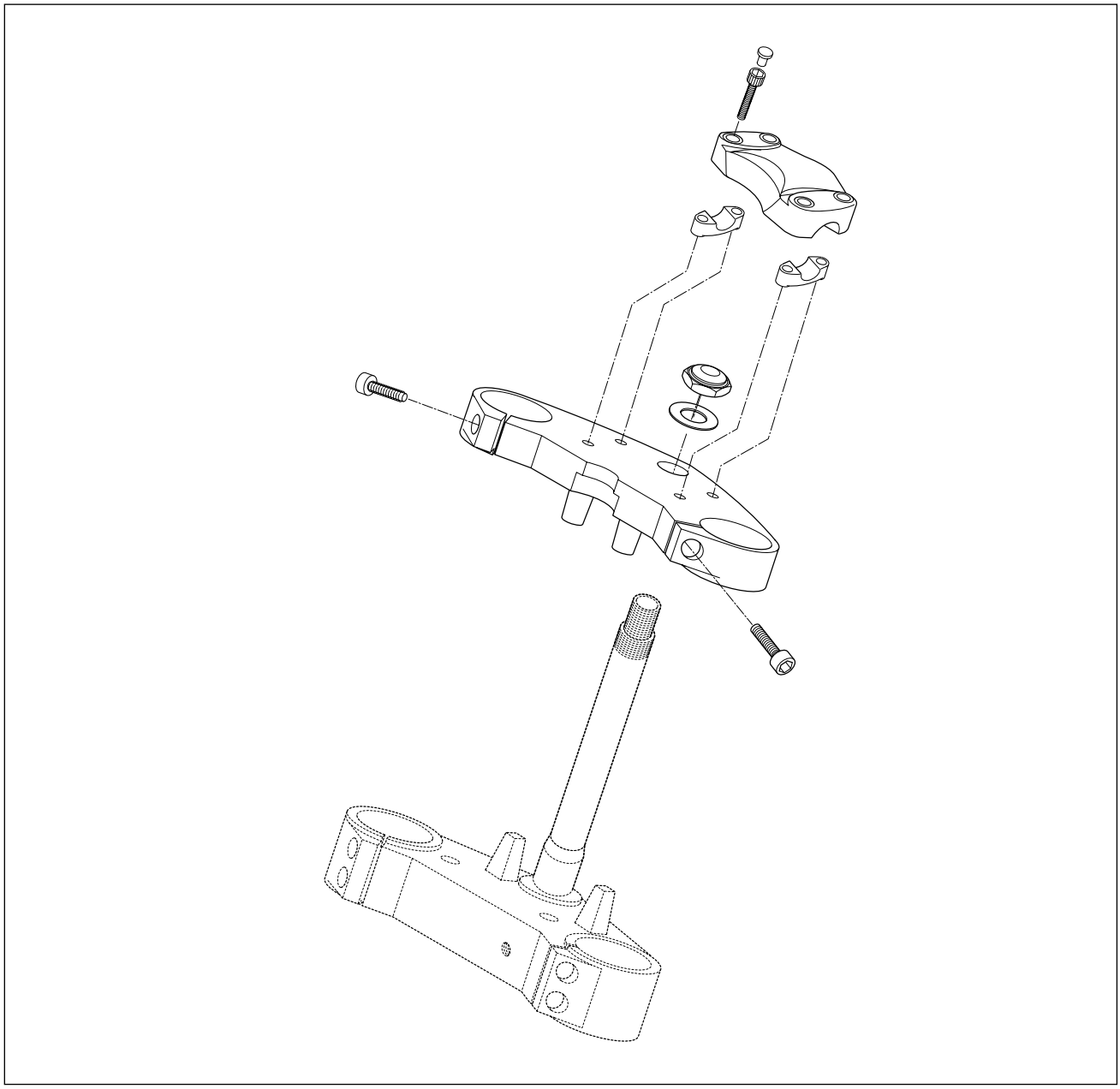
Front fork compression damping force adjuster	Standard
	End of "S"direction

STANDARD FRONT FORK DAMPING FORCE			
		Rebound	Compression
Solo riding	Softer	Turn to "S" direction	Turn to "S" direction
	Standard	3 clicks out from end of "H" direction	End of "S" direction
	Stiffer	Turn to "H" direction	Turn to "H" direction
Dual riding		3 clicks out from end of "H" direction	2 clicks out from end of "S" direction

⚠ WARNING

Be sure to adjust the rebound and compression damping force on both front fork legs equally.

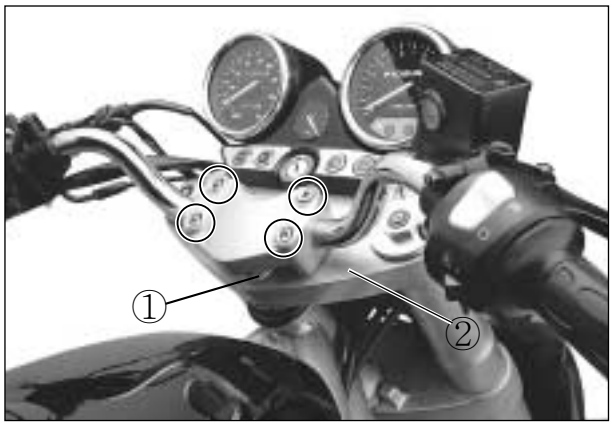
STEERING



⊙ REMOVAL AND DISASSEMBLY

- Take off the front wheel. (See page 7-2)
- Remove the four bolts and front fender.
- Take off the front fork. (See page 7-16)

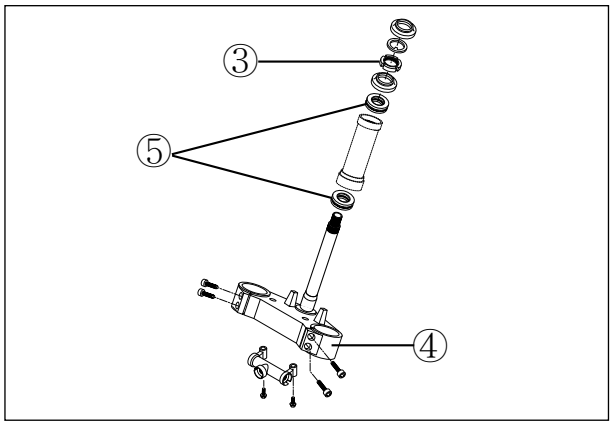
● Remove the handlebar clamp bolts.
● Remove the steering stem head nut ① and take off the steering stem upper bracket ②.



● Remove the steering stem nut ③ and draw out the steering stem.

TOOL **Clamp wrench : 09940-10122**

● Take off the steering stem lower bracket ④.

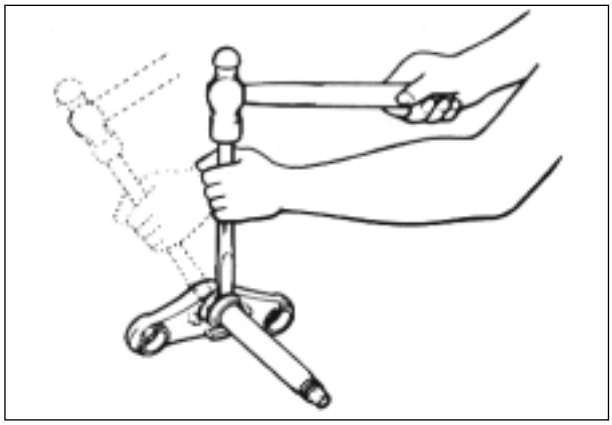


CAUTION

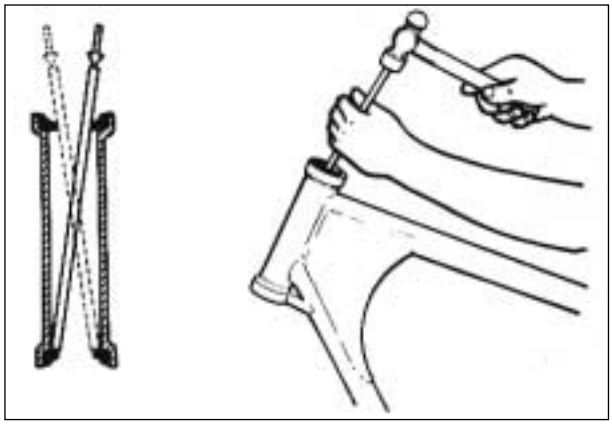
Hold the steering stem lower bracket by hand to prevent from falling.

● Remove the upper and lower bearing ⑤.

● Remove the outer race fitted on the steering stem. This can be done with a chisel.



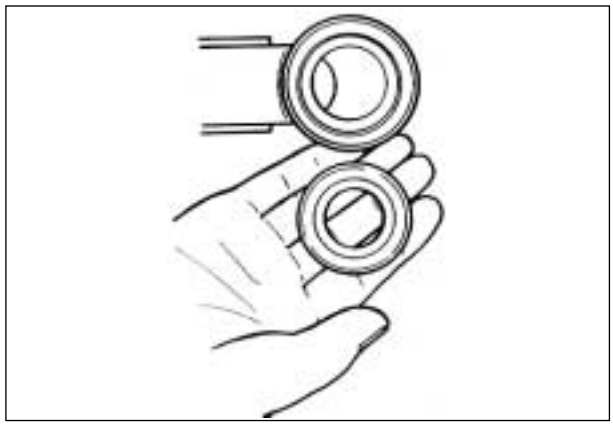
● Draw out the two inner races fitted to the top and bottem ends of the head pipe.



⊙ INSPECTION

Inspect and check the removed parts for the following abnormalities.

- Handlebar distortion.
- Handlebar clamp wear.
- Abnormality operation of bearing.
- Worn or damaged races.
- Distortion of steering stem.



⊙ REASSEMBLY

Reassemble and remount the steering stem in the reverse order of disassembly and removal, and also carry out the following steps :

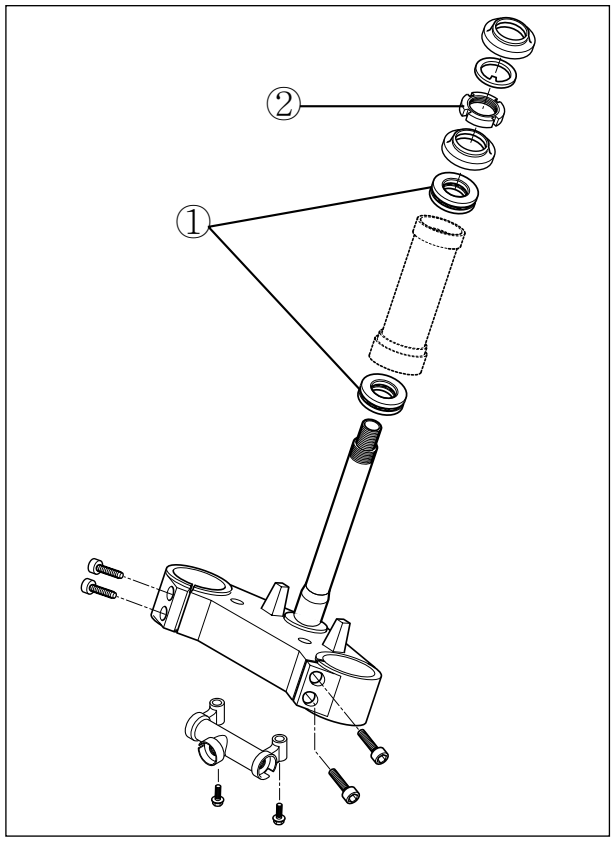
● Apply SUPER GREASE "A" to the upper bearing and lower bearing ①.

SUPER GREASE "A"

● Tighten the steering stem nut ② with the special tool.

Clamp wrench : 09940-10122

Steering stem nut : 80~100 N · m (8.0~10.0kg · m)



● Turn the steering stem right and left, lock-to-lock, five or six times.

● Tighten the steering stem head nut to the specified torque.

Steering stem head nut
: 80~100 N · m (8.0~10.0 kg · m)

⚠ CAUTION

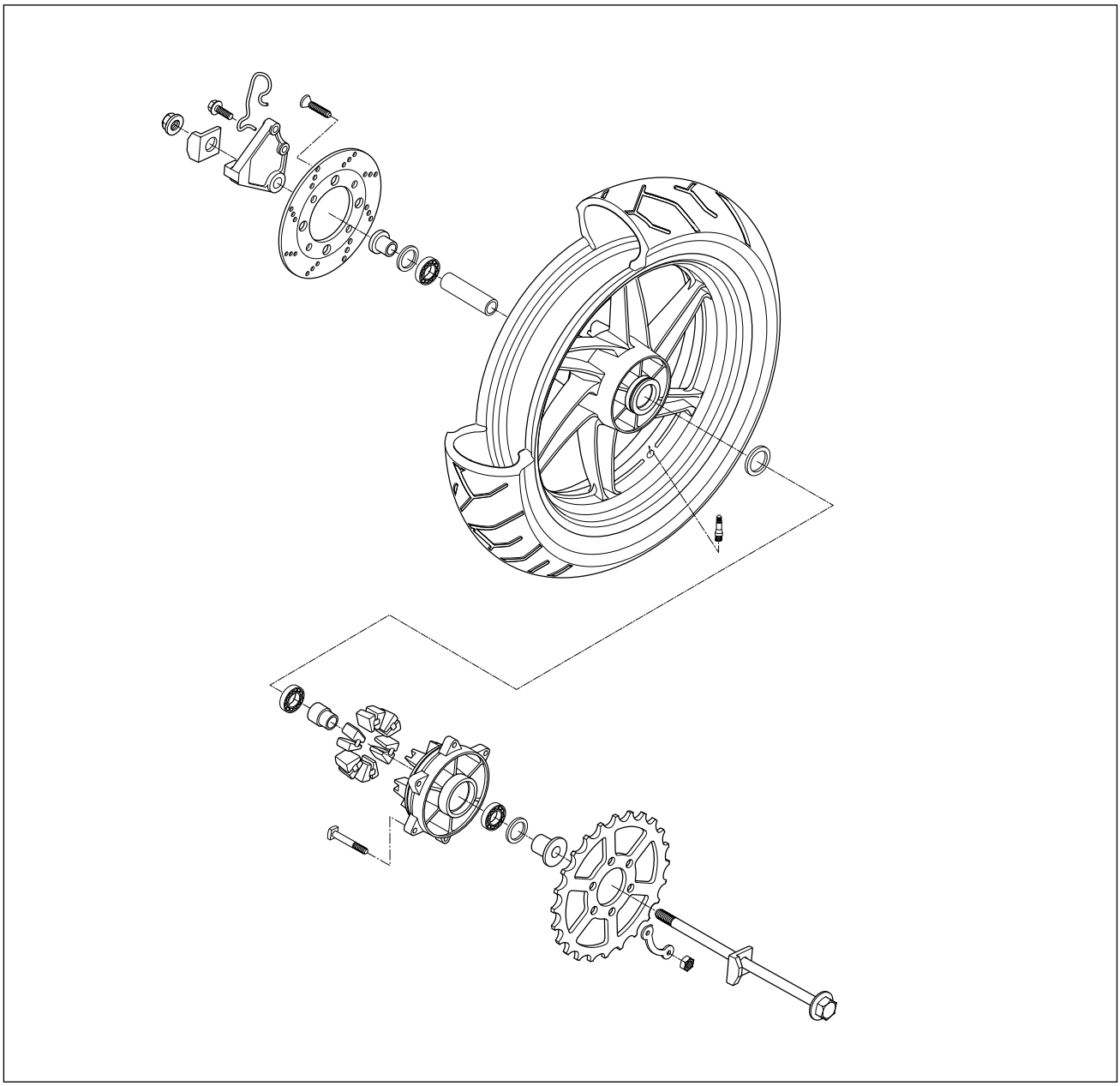
After performing the adjustment and installing the steering stem upper bracket, rock the front wheel assembly forward and backward to ensure that there is no play and that the procedure was accomplished correctly. If play is noticeable, re-adjust the steering stem nut.

● Set the handlebars to match its punched mark to the mating face of the holder.

● Secure the each handlebar clamp bolts in such a way that the clearances ahead of and behind the handlebars should be equalized.

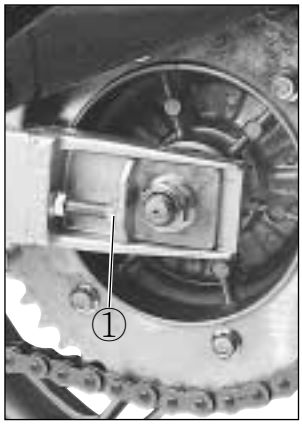
Handlebar clamp bolts
: 18~28 N · m (1.8~2.8 kg · m)

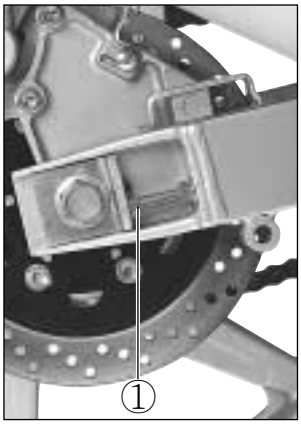
REAR WHEEL



⊙ REMOVAL

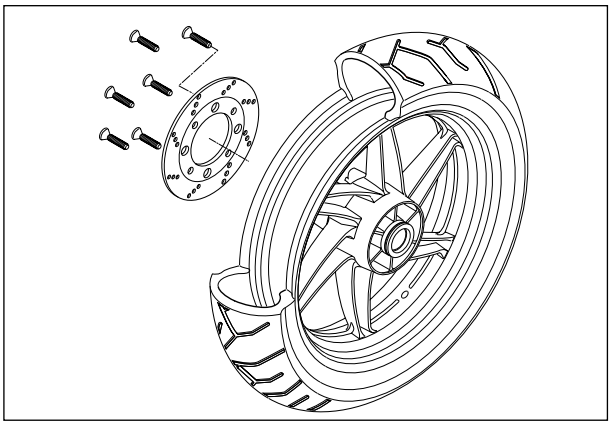
- Raise the rear wheel off the ground with a jack or block.
- Loosen the drive chain adjuster ①, right and left.
- Disengage the drive chain from the rear sprocket.



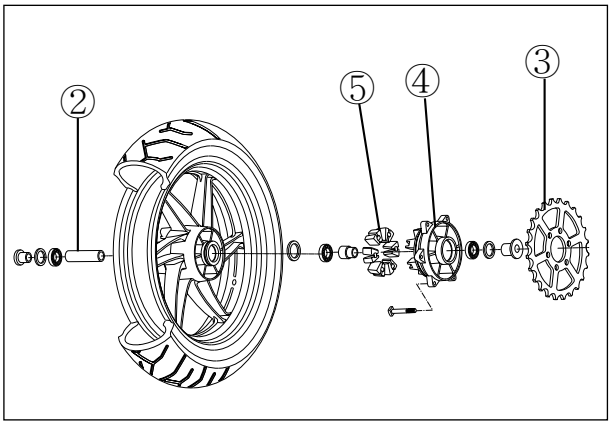


● Remove the rear wheel by removing the rear axle ①.

● Remove the brake disk.



● Remove the spacer ②.
● Remove the rear sprocket ③ with mounting drum ④ from the rear wheel.



NOTE

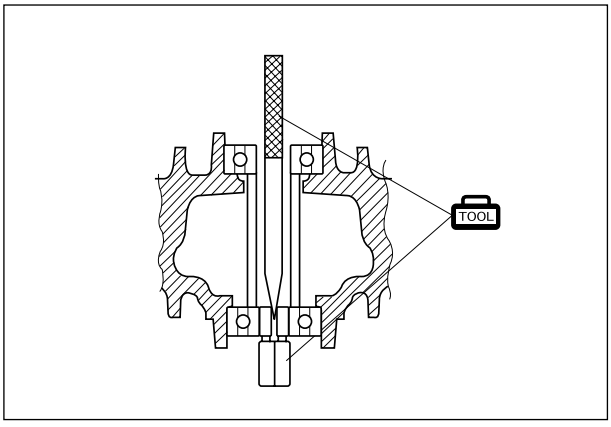
Before separating the rear sprocket and mounting drum, slightly loosen the rear sprocket bolts.

● Remove the rear wheel shock absorber ⑤.
● Remove the rear sprocket ③ from the rear sprocket mounting drum.

■ **WHEEL BEARING REMOVAL**

● Remove the bearing by using the special tool.

TOOL **Wheel bearing remover : 09941-50111**



⚠ CAUTION

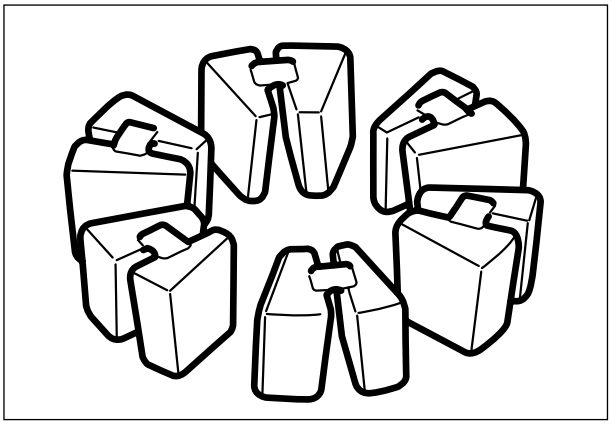
The removed bearing should be replaced with new one.

⊙ INSPECTION

WHEEL AXLE : Refer to page 7-3
WHEEL : Refer to page 7-3
WHEEL BEARING : Refer to page 7-4
TIRE : Refer to page 2-19

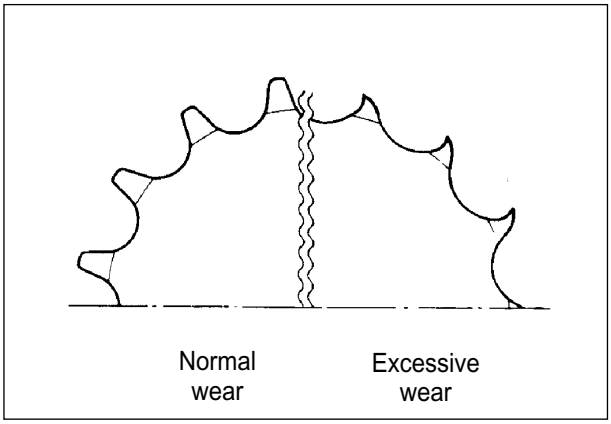
■ REAR WHEEL SHOCK ABSORBER

Inspect the rear wheel shock absorber for wear and damage.
Replace the rear wheel shock absorber if there is anything unusual.



■ SPROCKET

Inspect the sprocket's teeth for wear. If they are worn, replace the sprocket and drive chain as a set.

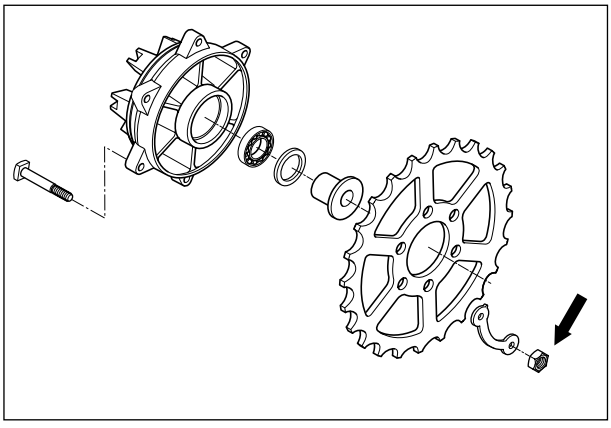


⊙ REASSEMBLY

Reassemble the rear wheel and rear brake in the reverse order of disassembly.
Pay attention to the following points :

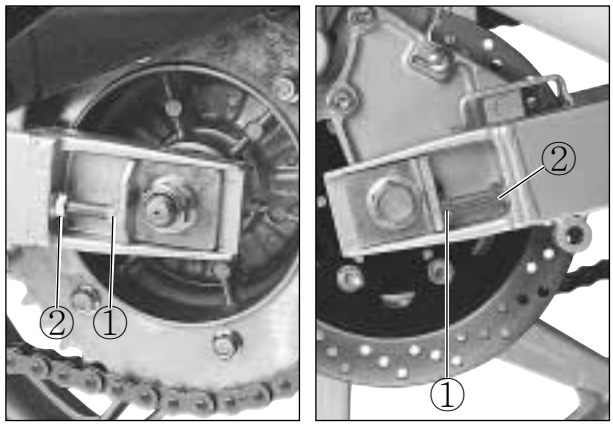
● Tighten the rear sprocket nuts to the specified torque.

Rear sprocket nut
: 20~30 N · m (2.0~3.0 kg · m)



● Install the rear wheel.
After installing the drive chain to the rear sprocket, adjust the drive chain by turning both chain adjusters ①.

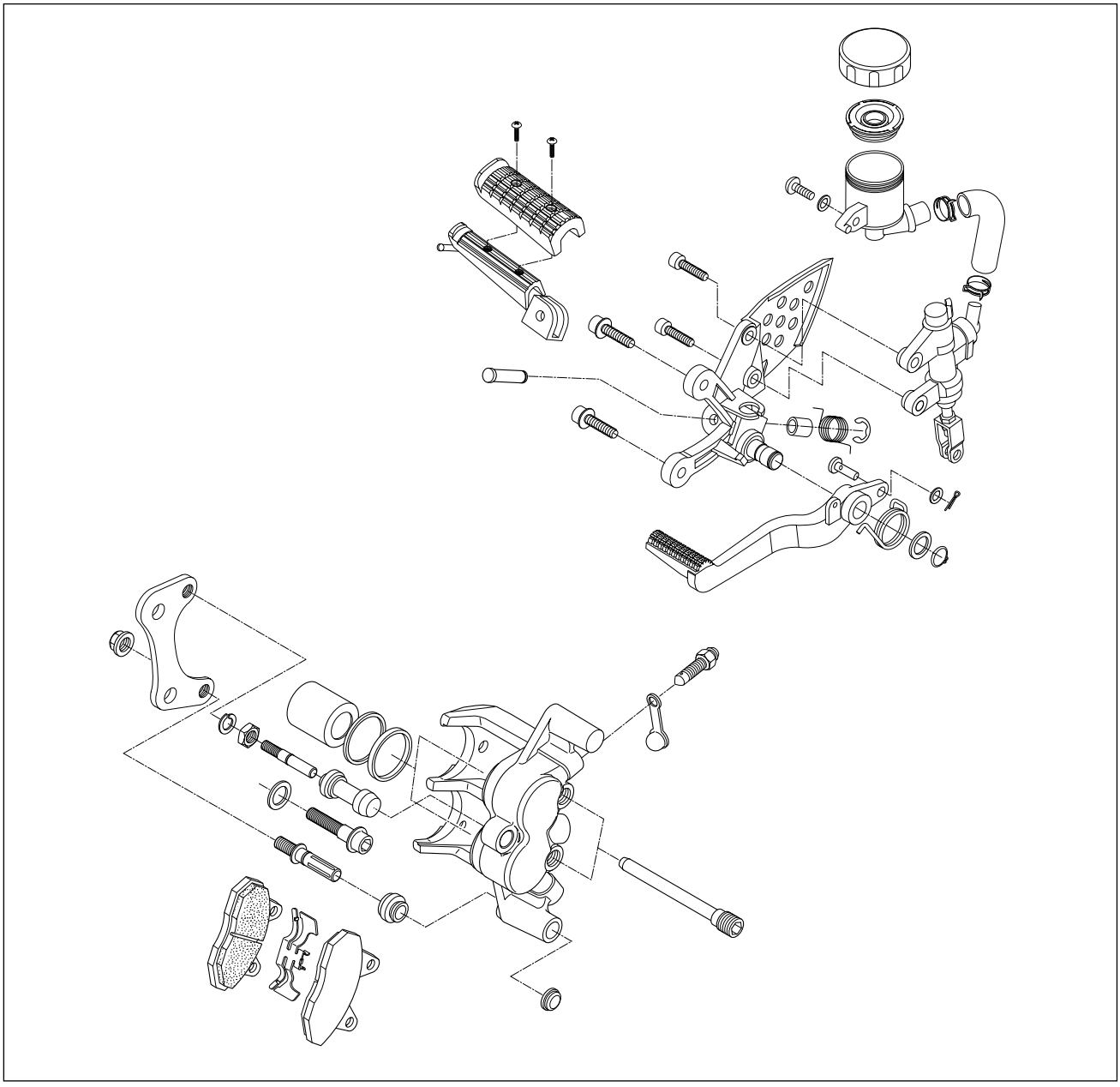
● Tighten both chain adjuster lock nuts ② securely.



● Tighten the rear axle nut to the specified torque.

Rear axle nut : 90~130 N · m (9.0~13.0 kg · m)

REAR BRAKE

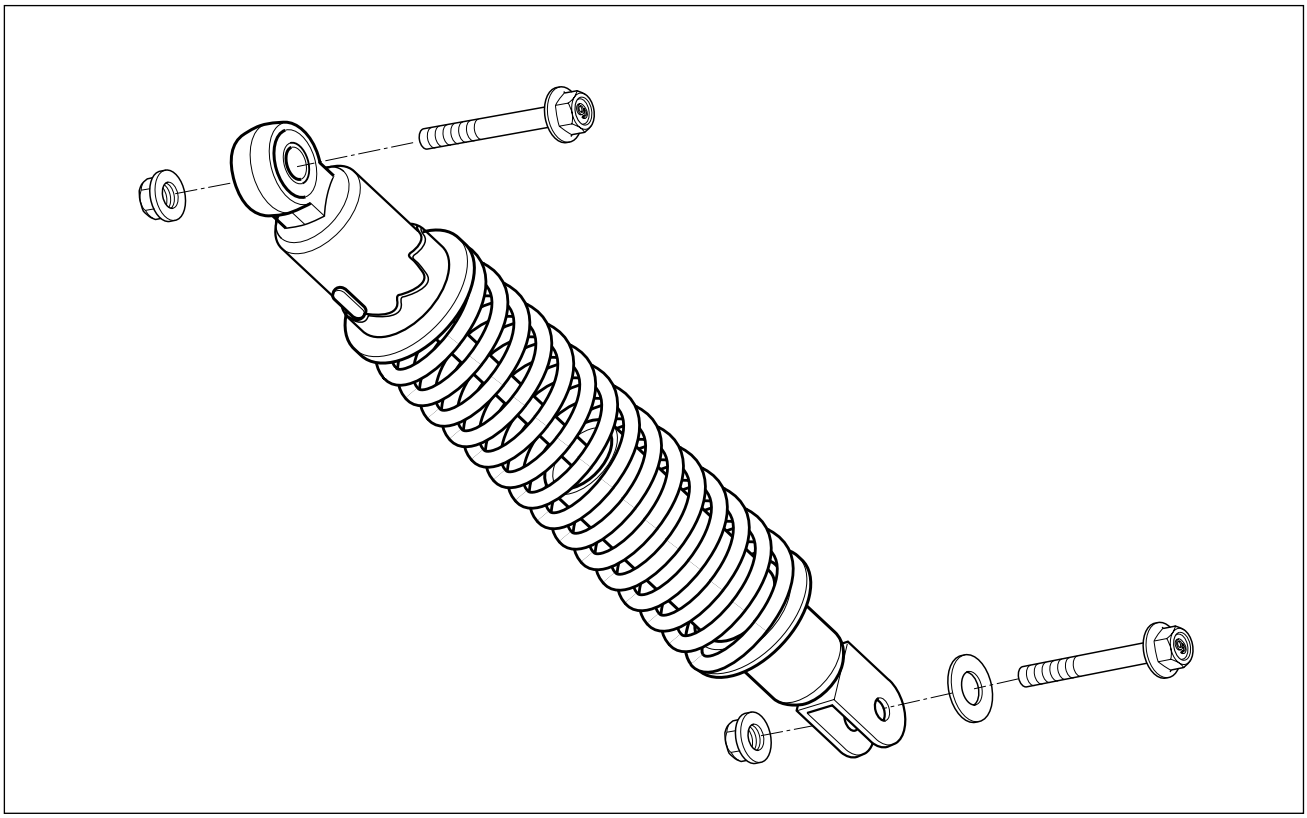


⚠ WARNING

- ❖ Do not mix brake fluid with different brand.
- ❖ Do not use a brake fluid kept in an open container or stored for a long period.
- ❖ To store brake fluid, make sure to seal the container and keep it in a safe place to be out of reach of children.
- ❖ When filling brake fluid, take care not to allow water or dirt to enter the system.
- ❖ To wash the brake system parts, use brake fluid and not any other material.
- ❖ Do not allow dirt and fluid to contact the brake disk or pad.

⊙ Brake fluid replacement : Refer to page 2-16
⊙ Brake pad replacement : Refer to page 2-15
⊙ Disassembly of caliper : Refer to page 7-7
⊙ Inspection of caliper : Refer to page 7-8
⊙ Reassembly of caliper : Refer to page 7-9
⊙ Inspection of brake disk : Refer to page 7-10

REAR SHOCK ABSORBER

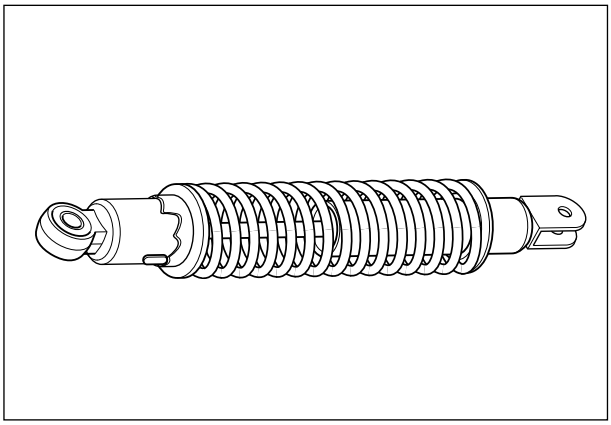


⊙ REMOVAL

● Remove the rear shock absorbers by removing their nuts.

⊙ INSPECTION

Inspect the rear shock absorber for damage and oil leakage. If any defects are found, replace the rear shock absorber with a new one.



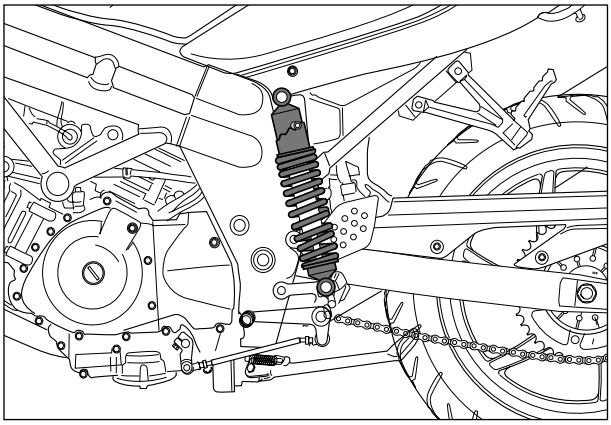
⚠ CAUTION

Do not attempt to disassemble the rear shock absorber. It is unserviceable.

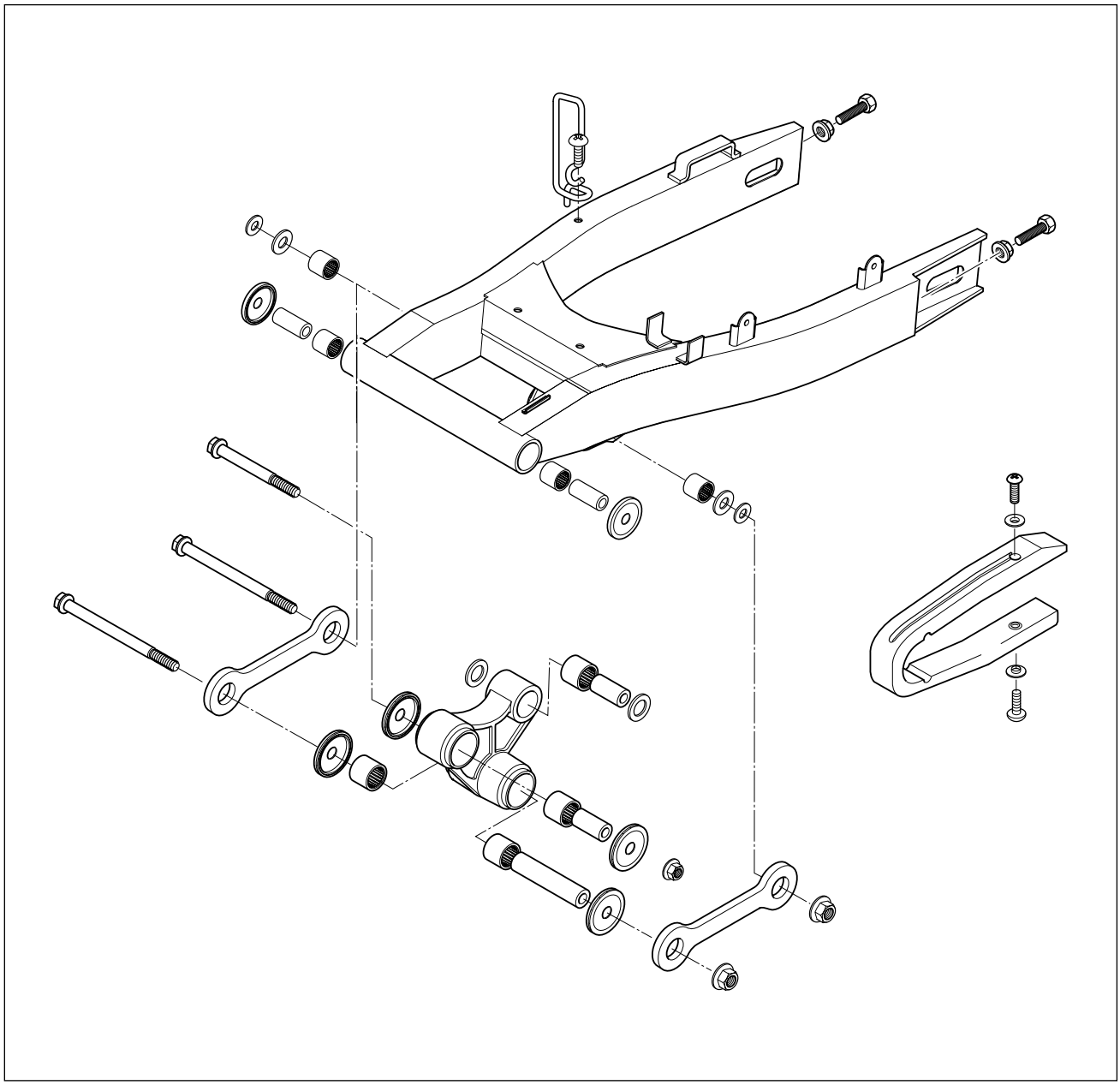
⊙ REMOUNTING

● Install the rear shock absorber and tighten the nuts to the specified torque.

Shock absorber mounting nut (upper)
: 40~60 N · m (4.0~6.0 kg · m)
Shock absorber mounting nut (lower)
: 40~60 N · m (4.0~6.0 kg · m)



SWINGARM

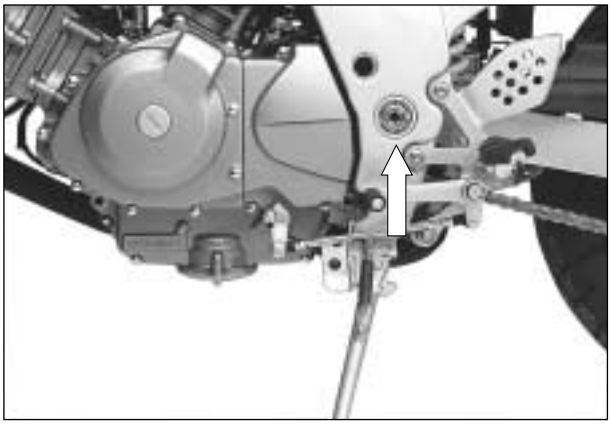


⊙ REMOVAL AND DISASSEMBLY

- Remove the rear wheel. (See page 7-26)
- Remove the rear shock absorber fitting nut and bolt. (See page 7-32)
- Remove the swingarm pivot nut.
- Remove the engine mounting lock nut with the special tool.

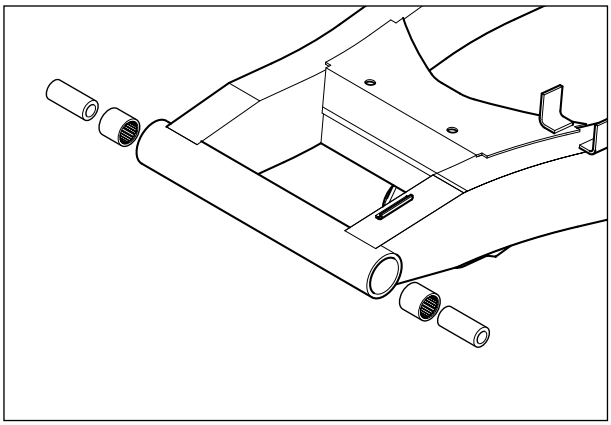
  TOOL **Engine mounting socket wrench (M26) : 09940H35010**

- Draw out the pivot shaft and take off the swingarm.



● Remove the chain case.
● Remove the two spacers.
● Remove the bearing by using the special tools.

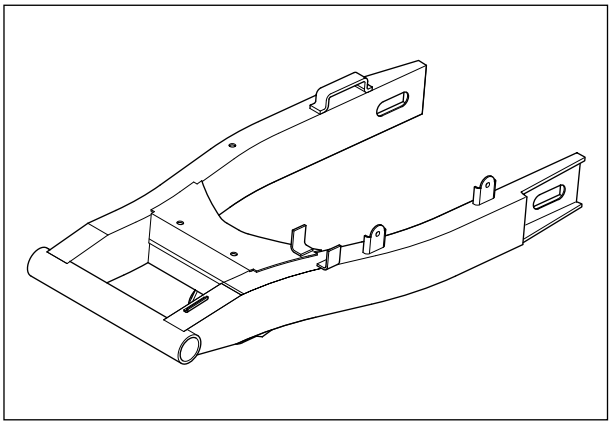
TOOL **Bearing remover (17 mm) : 09923-73210**
Rotor remover sliding shaft : 09930-30102



⊙ INSPECTION

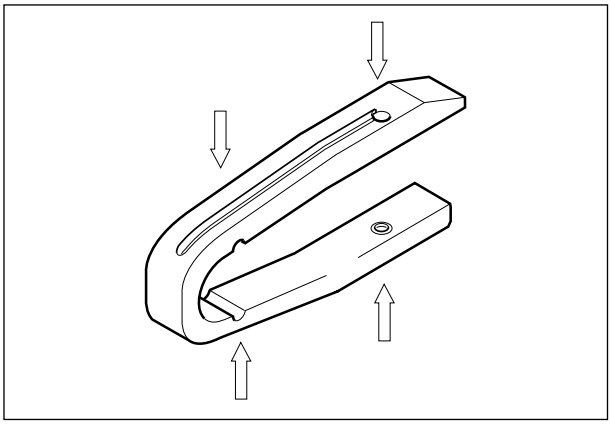
■ SWINGARM

Inspect the swingarm for damage.
If any defects are found, replace the swingarm with a new one.



■ CHAIN BUFFER

Inspect the chain buffer for wear and damage. If any defects are found, replace the chain buffer with a new one.

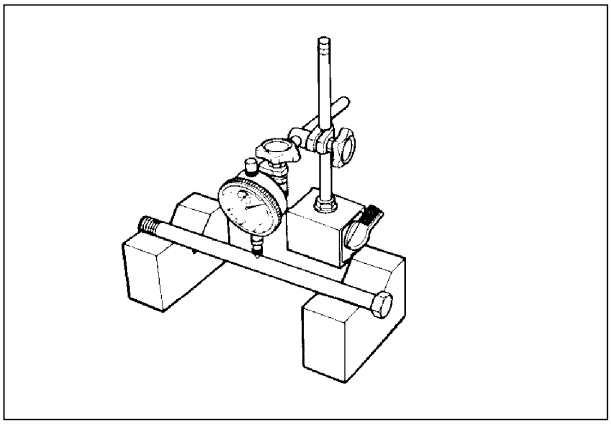


■ SWINGARM PIVOT SHAFT

Measure the pivot shaft runout using the dial gauge. If the pivot shaft exceeds the service limit, replace it with a new one.

Swingarm pivot shaft runout	Service limit
	0.6 mm (0.024 in)

TOOL **Dial gauge : 09900-20606**
Magnetic stand : 09900-20701
V-block : 09900-21304



⊙ REASSEMBLY

Reassemble the swingarm and rear shock absorber in the reverse order of disassembly.
Pay attention to the following points :

● Press the needle bearings into the swingarm pivot using the special tool.

TOOL **Steering race installer : 09941-34513**

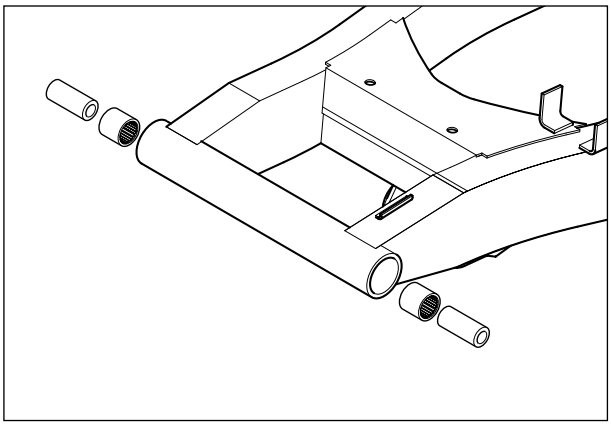
● Apply SUPER GREASE "A" to the needle bearing and spacers.

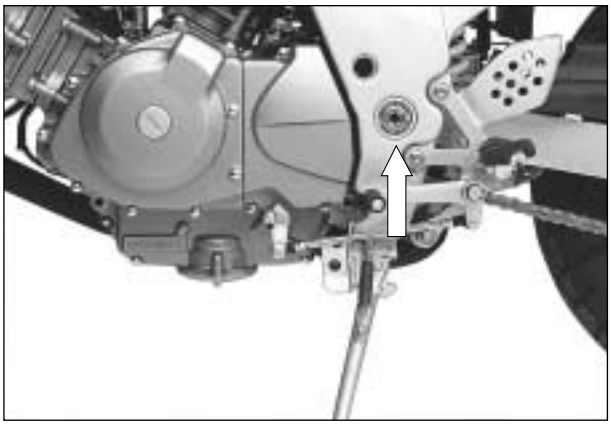
SUPER GREASE "A"

● Install the swingarm and tighten the swingarm pivot shaft, nut and engine mounting lock nut with the special tool to the specified torque.

Swingarm pivot nut ①
: 50~80 N · m (5.0~8.0 kg · m)
Swingarm pivot shaft ②
: 40~80 N · m (4.0~8.0 kg · m)
Engine mounting lock nut (M26) ③
: 45~70 N · m (4.5~7.0 kg · m)
TOOL **Engine mounting socket wrench (M26)**
: 09940H35010

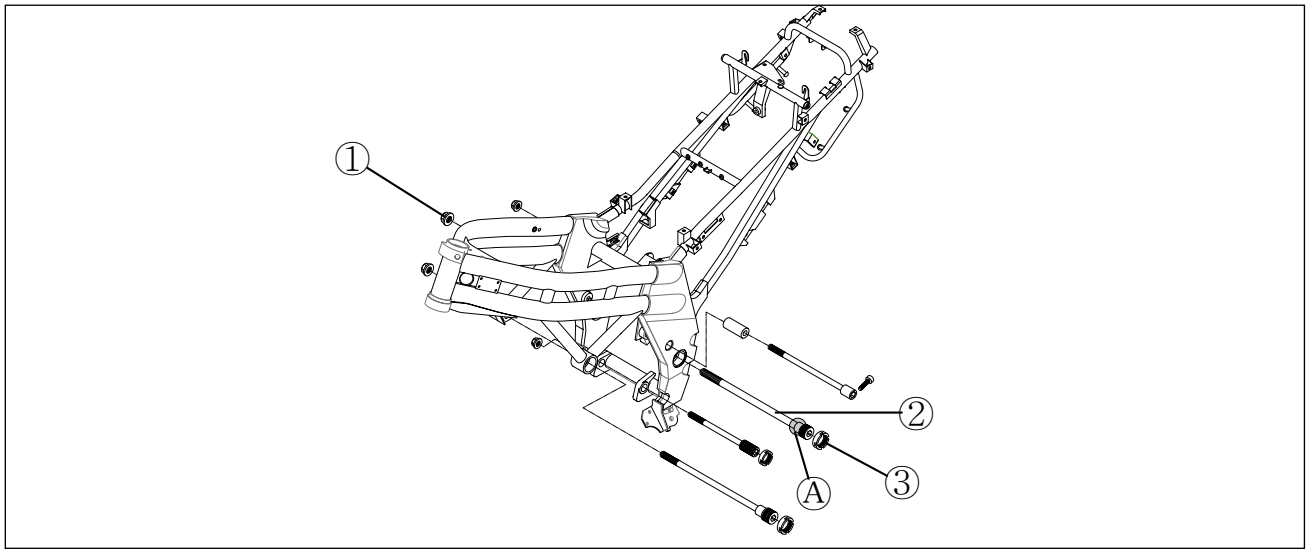
● Install the rear wheel. (Refer to page 7-28)
● Install the rear shock absorber. (Refer to page 7-32)
● Adjust the following points :
Drive chain slack : Refer to page 2-13





⚠ CAUTION

Set the part Ⓐ of swingarm pivot shaft ② align center line by the hand temporarily and install the swingarm pivot shaft to the specified torque.
If otherwise, it is damage to the thread of swingarm pivot shaft.



SERVICING INFORMATION

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TROUBLESHOOTING

ENGINE

Complaint	Symptom and possible causes	Remedy
Engine will not start, or is hard to start.	**Compression too low**	
	1. Valve clearance out of adjustment.	Adjust.
	2. Worn valve guides or poor seating of valves.	Repair or replace.
	3. Valves mistiming	Adjust.
	4. Piston rings excessively worn.	Replace.
	5. Worn-down cylinder bore.	Replace or rebore.
	6. Poor seating of spark plug.	Retighten.
	7. Starter motor cranks but too slowly.	Consult “electrical complaints”
	Plug not sparking	
	1. Fouled spark plug.	Clean or replace.
	2. Wet spark plug.	Clean and dry.
	3. Defective ignition coil.	Replace.
	4. Open or short circuit in high tension cord.	Replace..
	No fuel reaching the carburetor	
	1. Clogged hole in the fuel tank cap.	Clean.
	2. Clogged or defective fuel cock.	Clean or replace.
	3. Defective carburetor float valve.	Replace.
	4. Clogged fuel pipe.	Clean or replace.
Engine stalls easily.	1. Fouled spark plug.	Clean.
	2. Clogged fuel hose.	Clean.
	3. Clogged jets in carburetor.	Clean.
	4. Valve clearance out of adjustment.	Adjust.
Noisy engine.	**Excessive valve chatter**	
	1. Valve clearance too large.	Adjust.
	2. Weakened or broken valve springs.	Replace.
	3. Worn down camshaft.	Replace.
	Noise appears to come from piston	
	1. Piston or cylinder worn down.	Replace.
	2. Weakened or broken valve springs.	Replace.
	3. Worn down piston pin or piston pin bore.	Replace.
	4. Piston rings or ring groove worn.	Replace.
	Noise seems to come from timing chain	
	1. Stretched chain.	Replace.
	2. Worn sprockets.	Replace.
	3. Tension adjuster not working.	Repair or replace.
	Noise seems to come from clutch	
	1. Worn splines of countershaft or hub.	Replace.
	2. Worn teeth of cluth plates.	Replace.
	3. Distorted clutch plates, driven and drive.	Replace.
	Noise seems to come from crankshaft	
	1. Worn or broken bearings.	Replace.
	2. Big-end bearings worn and broken.	Replace.
	3. Thrust clearance too large.	Replace.

Complaint	Symptom and possible causes	Remedy
Noisy engine.	**Noise seems to come from transmission**	
	1. Gears worn or rubbing.	Replace.
	2. Badly worn splines.	Replace.
	3. Primary gears worn or rubbing.	Replace.
	3. Badly worn bearings.	Replace.
	Noise seems to come from water pump	
	1. Too much play on pump shaft bearing.	Replace.
	2. Worn or damaged impeller shaft.	Replace.
	3. Contact between pump case and impeller.	Replace.
Slipping clutch.	1. Clutch control out of adjustment or too much play.	Adjust.
	2. Weakened clutch springs.	Replace.
	3. Worn or distorted pressure plate.	Replace.
	4. Distorted clutch plates, driven and drive.	Replace.
Dragging clutch.	1. Clutch control out of adjustment or too much play.	Adjust.
	2. Weakened clutch springs.	Replace.
	3. Distorted clutch plates, driven and drive.	Replace.
Transmission will not shift.	1. Broken gearshift cam.	Replace.
	2. Distorted gearshift forks.	Replace.
	3. Worn gearshift pawl.	Replace.
Transmission will not shift back.	1. Broken return spring on shift shaft.	Replace.
	2. Shift shafts are rubbing or sticky.	Repair.
	3. Distorted or worn gearshift forks.	Replace.
Transmission jumps out of gear.	1. Worn shifting gears on driveshaft or countershaft.	Replace.
	2. Distorted or worn gearshift forks.	Replace.
	3. Weakened stopper pawl spring on gearshift cam.	Replace.
	4. Worn gearshift pawl.	Replace.
Engine idles poorly.	1. Valve clearance out of adjustment.	Adjust.
	2. Poor seating of valves.	Replace.
	3. Defective valve guides.	Replace.
	4. Defective pick-up coil.	Replace.
	5. Spark plug gap too wide.	Adjust or replace.
	6. Defective ignition coil resulting in weak sparking.	Replace.
	7. Float-chamber fuel level out of adjustment in carburetor.	Adjust.
	8. Clogged jets.	Clean.
Engine runs poorly in high speed range.	1. Valve springs weakened.	Replace.
	2. Valve timing out of adjustment.	Adjust.
	3. Worn cams.	Replace.
	4. Spark plug gap too narrow.	Repair.
	5. Defective ignition coil.	Replace.
	6. Float-chamber fuel level too low.	Adjust .
	7. Clogged air cleaner element.	Clean.
	8. Clogged fuel hose, resulting in inadequate fuel supply to carburetor.	Clean or replace.

Complaint	Symptom and possible causes	Remedy
Dirty or heavy exhaust smoke	1. Too much engine oil in the engine.	Check with inspection window, drain out excess oil.
	2. Worn piston rings or cylinder.	Replace.
	3. Worn valve guides.	Replace.
	4. Cylinder wall scored or scuffed.	Replace.
	5. Worn valves stems.	Replace.
	6. Defective stem seals.	Replace.
	7. Worn side rails.	Replace.
Engine lacks power.	1. Loosen of valve clearance.	Adjust.
	2. Weakened valve springs.	Replace.
	3. Valve timing out of adjustment.	Adjust.
	4. Worn piston ring or cylinder.	Replace.
	5. Poor seating of valves.	Repair or replace.
	6. Fouled spark plug.	Clean or replace.
	7. Worn camshaft.	Replace.
	8. Spark plug gap incorrect.	Adjust or replace.
	9. Clogged jets in carburetor.	Clean.
	10. Float-chamber fuel level out of adjustment.	Adjust.
	11. Clogged air cleaner element.	Clean.
	12. Too much enging oil.	Drain out excess oil.
	13. Defective air intake pipe.	Retighten or replace.
Engine overheats.	1. Heavy carbon deposit on piston head.	Clean.
	2. Not enough oil in the engine.	Add oil.
	3. Defective oil pump or clogged oil circuit.	Repair or clean.
	4. Fuel level too low in float chamber.	Adjust.
	5. Air leak from intake pipe.	Retighten or replace.
	6. Use of incrrect engine oil.	Change.
	7. Defective cooling system.	See “Cooling system” section.

CARBURETOR

Complaint	Symptom and possible causes	Remedy
Trouble with starting.	1. Starter jet is clogged. 2. Starter pipe is clogged. 3. Air leaking from a joint between starter body and carburetor. 4. Starter plunger is not operating properly.	Clean. Clean. Check starter body and carburetor for tightness, adjust and replace gasket. Check and adjust.
Idling or low-speed trouble.	1. Pilot jet, pilot air jet are clogged or loose. 2. Pilot outlet or bypass is clogged. 3. Starter plunger is not fully closed.	Check and clean. Check and clean. Check and clean.
Medium or high speed trouble.	1. Main jet or main air jet is clogged. 2. Needle jet is clogged. 3. Throttle valve is not operating properly. 4. Filter is clogged.	Check and clean. Check and clean. Check throttle valve for operation. Check and clean.
Overflow and fuel level fluctuations.	1. Needle valve is worn or damaged. 2. Spring in needle valve is borken. 3. Float is not working properly. 4. Foreign matter has adhered to needle valve. 5. Fuel level is too high or low.	Replace. Replace. Check and adjust. Clean. Adjust float height.

RADIATOR (COOLING SYSTEM)

Complaint	Symptom and possible causes	Remedy
Engine overheats.	1. Not enough engine coolant. 2. Radiator core clogged with dirt or scale. 3. Faulty cooling fan. 4. Defective cooling fan thermo-switch. 5. Clogged water passage. 6. Air trapped in the cooling circuit. 7. Defective water pump. 8. Use of incorrect engine coolant. 9. Defective thermostat.	Add coolant. Clean. Repair or replace. Replace. Clean. Bleed out air. Replace. Replace. Replace.
Engine overcools.	1. Defective cooling fan thermo-switch. 2. Extremely cold weather. 3. Defective thermostat.	Replace. Put on the radiator cover. Replace.

ELECTRICAL

Complaint	Symptom and possible causes	Remedy
No sparking or poor sparking.	1. Defective ignition coil. 2. Defective spark plug. 3. Defective igniter.	Replace. Replace. Replace.
Spark plug soon become fouled with carbon.	1. Mixture too rich. 2. Idling speed set too high. 3. Incorrect gasoline. 4. Dirty element in air cleaner. 5. Spark plug too cold.	Adjust carburetor. Adjust carburetor. Change. Clean or replace. Replace by hot type plug.
Spark plug become fouled too soon.	1. Worn piston rings. 2. Pistons or cylinder worn. 3. Excessive clearance of valve stems in valve guides. 4. Worn stem oil seal.	Replace. Replace. Replace. Replace.
Spark plug electrodes overheat or burn.	1. Spark plug too hot. 2. The engine overheats. 3. Spark plug loose. 4. Mixture too lean.	Replace by cold type plug. Tune up. Retighten. Adjust carburetor.
Generator charge, but charging rate is below the specification.	1. Lead wires tend to get shorted or open-circuited or loosely connected at terminals. 2. Grounded or open-circuited stator coils of generator. 3. Defective regulator/rectifier. 4. Not enough electrolyte in the battery. 5. Defective cell plates in the battery.	Repair or retighten. Replace. Replace. Add distilled water between the level lines. Replace the battery.
Generator overcharges.	1. Internal short-circuit in the battery. 2. Resistor element in the regulator/rectifier damaged or defective. 3. Regulator/rectifier poorly grounded.	Replace the battery. Replace. Clean and tighten ground connection.
Unstable charging.	1. Lead wire insulation frayed due to vibration resulting in intermittent shorting. 2. Generator internally shorted. 3. Defective regulator/rectifier.	Repair or replace Replace. Replace.
Starter switch is not effective.	1. Battery run down. 2. Defective switch contacts. 3. Brushes not seating properly on commutator in starter motor. 4. Defective starter relay.	Recharge or replace. Replace. Repair or replace. Replace.

BATTERY

Complaint	Symptom and possible causes	Remedy
"Sulfation" acidic white powdery substance or spots on surfaces of cell plates.	1. Not enough electrolyte. 2. Battery case is cracked. 3. Battery has been left in a run-down condition for a long time. 4. Contaminated electrolyte. (Foreign matter has enters the battery and become mixed with the electrolyte.)	Add distilled water, if the battery has not been damaged and "sulfation" has not advanced too far, and recharge. Replace the battery. Replace the battery or recharge. If "sulfation" has not advanced far, try to restore the battery by replacing the electrolyte, recharing it fully with the battery detached from the motorcycle and then adjusting electrolyte specific gravity.
Battery runs down quickly.	1. The charging method is not correct. 2. Cell plates have lost much of their active material as a result of over-charging. 3. A short-circuit condition exists within the battery due to excessive accumulation of sediments caused by the high electrolyte specific gravity. 4. Electrolyte specific gravity is too low. 5. Contaminated electrolyte. 6. Battery is too old.	Check the generator, regulator /rectifier and circuit connections, and make necessary adjustments to obtain specified charging operation. Replace the battery, and correct the charging system. Replace the battery. Recharge the battery fully and adjust electrolyte specific gravity. Replace the electrolyte, recharge the battery and then adjust specific gravity. Replace the battery.
Reversed battery polarity.	The battery has been connected the wrong way round in the system, so that it is being charged in the reverse direction.	Replace the battery and be sure to connect the battery properly.
Battery "sulfation"	1. Charging rate too low or too high. (When not in use, batteries should be recharged at least once a month to avoid sulfation.) 2. Battery electrolyte excessive or insufficient, or its specific gravity too high or too low. 3. The battery left unused for too long in cold climate.	Replace the battery. Keep the electrolyte up to the prescribed level, or adjust the specific gravity by consulting the battery maker's directions. Replace the battery, if badly sulfated.
Battery discharges too rapidly.	1. Dirty container top and sides. 2. Impurities in the electrolyte or electrolyte specific gravity is too high.	Clean. Change the electrolyte by consulting the battery maker's directions.

CHASSIS

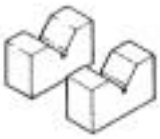
Complaint	Symptom and possible causes	Remedy
Steering feels too heavy or stiff.	1. Steering stem nut overtightened. 2. Worn bearing or race in steering stem. 3. Distorted steering stem. 4. Not enough pressure in tires.	Adjust. Replace. Replace. Adjust.
Steering oscillation.	1. Loss of balance between right and left front suspensions. 2. Distorted front fork. 3. Distorted front axle or crooked tire. 4. Loose steering stem nut. 5. Worn or incorrect tire or wrong tire pressure. 6. Worn bearing/race in steering stem.	Replace. Repair or replace. Replace. Adjust. Adjust or replace. Replace.
Wobbling front wheel.	1. Distorted wheel rim. 2. Worn-down wheel bearings. 3. Defective or incorrect tire. 4. Loosen nut on axle. 5. Incorrect front fork oil level. 6. Incorrect front wheel weight balance.	Replace. Replace. Replace. Retighten. Adjust. Adjust.
Front suspension too soft.	1. Weakened springs. 2. Not enough fork oil. 3. Wrong viscous fork oil. 4. Improperly set front fork damping force adjuster.	Replace. Refill. Replace. Adjust.
Front suspension too stiff.	1. Fork oil too viscous. 2. Too much fork oil. 3. Bent front axle. 4. Improperly set front fork damping force adjuster.	Replace. Drain excess oil. Replace. Adjust.
Noisy front suspension.	1. Not enough fork oil. 2. Loosen nuts on suspension.	Refill. Retighten.
Wobbling rear wheel.	1. Distorted wheel rim. 2. Worn-down rear wheel bearing. 3. Defective or incorrect tire. 4. Loose nut on axle. 5. Worn swing arm bushing or bearing. 6. Loosen nut on the rear shock.	Replace. Replace. Replace. Retighten. Replace. Retighten.
Rear suspension too soft.	1. Weakened springs. 2. Rear suspension adjuster improperly set.	Replace. Adjust.
Rear suspension too stiff.	1. Rear suspension adjuster improperly set. 2. Worn swing arm bushing or bearing.	Adjust. Replace.
Noisy rear suspension.	1. Loosen nuts on suspension. 2. Worn swing arm bushing or bearing.	Retighten. Replace.

BRAKES

Complaint	Symptom and possible causes	Remedy
Poor braking (FRONT and REAR)	1. Not enough brake fluid in the reservoir. 2. Air trapped in brake fluid circuit. 3. Pads worn down. 4. Too much play on brake lever or pedal. 5. Oil adhesion on friction surface of pads. 6. Worn disk.	Refill to level mark. Bleed air out. Replace. Adjust. Clean disk and pads. Replace.
Insufficient brake power.	1. Leakage of brake fluid from hydraulic system. 2. Worn pads. 3. Oil adhesion of engaging surface of pads. 4. Worn disk. 5. Air in hydraulic system.	Repair or replace. Replace. Clean disk and pads. Replace. Bleed air.
Brake squeaking.	1. Carbon adhesion on pad surface. 2. Tilted pad. 3. Damaged wheel bearing. 4. Loosen front-wheel axle or rear-wheel axle. 5. Worn pads. 6. Foreign material in brake fluid. 7. Clogged return port of master cylinder.	Repair surface with sandpaper. Modify pad fitting. Replace. Tighten to specified torque. Replace. Replace brake fluid. Disassemble and clean master cylinder.
Excessive brake lever stroke.	1. Air in hydraulic system. 2. Insufficient brake fluid. 3. Improper quality of brake fluid.	Bleed air. Replenish fluid to specified level ; bleed air. Replace with correct fluid.
Leakage of brake fluid.	1. Insufficient tightening of connection joints. 2. Cracked hose. 3. Worn piston and/or cup.	Tighten to specified torque. Replace. Replace piston and/or cup.

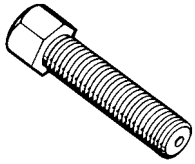
SPECIAL TOOLS

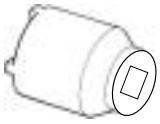
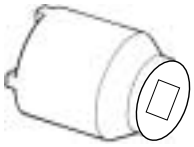
Special tools	Part Number · Part Name · Description
	09900-20101 Vernier Caliper Used to conveniently measure various dimensions.
	09900-20201 Micrometer(0~25mm) Used for precise measurement (00~25mm measure ranges).
	09900-20202 Micrometer(25~50mm) Used for precise measurement (25~50mm measure ranges).
	09900-20203 Micrometer(50~75mm) Used for precise measurement (50~75mm measure ranges).
	09900-20204 Micrometer(75~100mm) Used for precise measurement (75~100mm measure ranges).
	09900-20508 Cylinder gauge set Measure inside diameter of cylinder.
	09900-20605 Dial calipers Meassure width of conrod big-end.
	09900-20606 Dial gauge Meassure oscillation of wheel with using magnetic stand.
	09900-20701 Magnetic stand With using dial gauge.

Special tools	Part Number · Part Name · Description
	09900-20806 Thickness gauge Measure clearance of piston ring.
	09900-21109 Torque wrench Measure torque of tightening.
	09900-21304 V-block With using magnetic stand.
	09900-22301 Plastigauge Measure clearance of crankshaft thrust.
	09900-22401 Small bore gauge Measure inside diameter of conrod small-end.
	09900-25002 Pocket tester Measure voltage, electric current, resistance.
	09900-25008 Multi circuit tester set Inspect thermo-switch or temperature sensor.
	09900-26006 Engine tachometer Measure rotational frequency of engine.
	09900-28107 Electro tester Inspect ignition coil.

Special tools	Part Number · Part Name · Description
	09910-20115 Conrod holder
	Used to lock the crankshaft.
	09910-32812 Crankshaft installer
	Used to install the crankshaft in the crankcase.
	09910-32813 Crankshaft installer adapter
	Used to with the crankshaft installer.
	09910-34510 Piston pin puller
	Use to remove the piston pin.
	09913-10760 Fuel level gauge
	Measure height of carburetor.
	09913-50121 Oil seal remover
	Used to remove the oil seal.
	09913-70122 Bearing installer
	Used to drive bearing in.
	09913-75820 Bearing installer
	Used to drive bearing in.
	09913-76010 Bearing installer
	Used to drive crankshaft bearing in.

Special tools	Part Number · Part Name · Description
	09913-80112 Bearing installer
	Used to drive bearing in.
	09915-63310 Compression gauge adapter
	Used with compression gauge.
	09915-64510 Compression gauge
	Measure cylinder compression.
	09915-74510 Oil pressure gauge
	Measure oil pressure of 4-stroke engine.
	09916-14510 Valve spring compressor
	Used to remove and remounting valve stem.
	09916-14520 Valve spring compressor attachment
	Used with valve spring compressor.
	09920-13120 Crankcase separater
	Separate to crankcase.
	09920-53710 Clutch sleeve hub holder
	Used to install or remove clutch sleeve hub nut.
	09921-20200 Bearing remover(10mm)
	Used to remove oil seal or bearing.

Special tools	Part Number · Part Name · Description
	09921-20210 Bearing remover(12mm) Used to remove oil seal or bearing.
	09923-73210 Bearing remover(17mm) Used to remove bearing with the rotor remove sliding shaft.
	09923-74510 Bearing remover(20~35mm) Used to remove bearing with the rotor remove sliding shaft.
	09930-30102 Rotor remove sliding shaft Used to with bearing remover.
	09930-30165 Rotor remover Used to remove rotor.
	09930-40113 Rotor holder Widely used to lock rotary parts such as a flywheel magneto.
	09930-44510 Rotor holder Widely used to lock rotary parts such as a flywheel magneto.
	09940-10122 Clamp wrench A hook wrench to adjust the steering head of motorcycle.
	09940-34520 T-handle Remove and remounting front fork oil cylinder.

Special tools	Part Number · Part Name · Description
	09940-34561 Front fork assembling tool attachment “D” Used with T-handle.
	09940-50113 Front fork oil seal installer Install front fork oil seal.
	09940H30010 Engine mounting socket wrench (M20) Used to install or remove engine mounting lock nut.
	09940H35010 Engine mounting socket wrench (M26) Used to install or remove engine mounting lock nut.
	09941-34513 Steering race installer Used to install steering outer race.
	09941-50111 Wheel bearing remover Used to remove wheel bearing.
	09943-74111 Front fork oil level gauge Used to drain the fork oil to the specified level.

TIGHTENING TORQUE

ENGINE

ITEM		N · m	kg · m
Coolant temperature sensor		18	1.8
Coolant drain bolt		11 ~ 14	1.1 ~ 1.4
Cooling fan mounting bolt		8 ~ 12	0.8 ~ 1.2
Cooling fan motor mounting bolt		8	0.8
Cooling fan thermo-switch		13	1.3
Radiator mounting bolt		8 ~ 12	0.8 ~ 1.2
Magneto rotor bolt		110 ~ 170	11.0 ~ 17.0
Magneto cover bolt		10	1.0
Muffler mounting bolt		23	2.3
Exhaust pipe nut		23	2.3
Thermostat case bolt		10	1.0
Starter clutch bolt		23 ~ 28	2.3 ~ 2.8
Cylinder head bolt	M 6	8 ~ 12	0.8 ~ 1.2
	M 10	40 ~ 45	4.0 ~ 4.5
Cylinder head cover bolt		12 ~ 16	1.2 ~ 1.6
Cylinder head base bolt		8 ~ 12	0.8 ~ 1.2
Cylinder base nut		7 ~ 11	0.7 ~ 1.1
Engine sprocket nut		130 ~ 160	13.0 ~ 16.0
Engine oil drain plug		21	2.1
Engine mounting nut		45 ~ 70	4.5 ~ 7.0
Engine mounting lock nut	M 26	45 ~ 70	4.5 ~ 7.0
	M 20	35 ~ 55	3.5 ~ 5.5
Engine mounting bolt		40 ~ 80	4.0 ~ 8.0
Spark plug		11	1.1
Cam chain tensioner bolt		8 ~ 12	0.8 ~ 1.2
Cam chain tension adjuster bolt		8 ~ 12	0.8 ~ 1.2
Crankcase bolt	M 6	11	1.1
	M 8	26	2.6
Clutch sleeve hub nut		40 ~ 60	4.0 ~ 6.0
Primary drive gear nut		40 ~ 60	4.0 ~ 6.0
Camshaft housing bolt		12	1.2
Horn mounting bolt		8 ~ 12	0.8 ~ 1.2

CHASSIS

ITEM	N · m	kg · m
Rear shock absorber mounting nut (Upper)	40 ~ 60	4.0 ~ 6.0
Rear shock absorber mounting nut (Lower)	40 ~ 60	4.0 ~ 6.0
Rear sprocket nut	20 ~ 30	2.0 ~ 3.0
Rear axle nut	90 ~ 130	9.0 ~ 13.0
Swingarm pivot nut	50 ~ 80	5.0 ~ 8.0
Swingarm pivot shaft	40 ~ 80	4.0 ~ 8.0
Steering stem nut	80 ~ 100	8.0 ~ 10.0
Steering stem head nut	80 ~ 100	8.0 ~ 10.0
Front and Rear brake disk bolt	18 ~ 28	1.8 ~ 2.8
Front brake master cylinder mounting bolt	5 ~ 8	0.5 ~ 0.8
Rear brake master cylinder mounting bolt	18 ~ 28	1.8 ~ 2.8
Front and Rear brake caliper air bleeder valve	6 ~ 9	0.6 ~ 0.9
Front and Rear brake caliper mounting bolt	18 ~ 28	1.8 ~ 2.8
Front and Rear brake hose union bolt	20 ~ 25	2.0 ~ 2.5
Front axle bolt	50 ~ 80	5.0 ~ 8.0
Front axle pinch bolt	15 ~ 25	1.5 ~ 2.5
Front fork damper rod bolt	30 ~ 40	3.0 ~ 4.0
Front fork upper clamp bolt	22 ~ 35	2.2 ~ 3.5
Front fork cap bolt	30 ~ 40	3.0 ~ 4.0
Front fork lower clamp bolt	22 ~ 35	2.2 ~ 3.5
Front fork inner rod lock nut	17.5 ~ 22.5	1.75 ~ 2.25
Front footrest bolt	22 ~ 35	2.2 ~ 3.5
Handlebar clamp bolt	18 ~ 28	1.8 ~ 2.8

SERVICE DATA

VALVE + GUIDE

Unit : mm (in)

ITEM	STANDARD		LIMIT
Valve diam.	IN.	31.0 (1.22)	———
	EX.	25.5 (1.00)	———
Valve clearance (When cold)	IN.	0.1 ~ 0.2 (0.004 ~ 0.008)	———
	EX.	0.2 ~ 0.3 (0.008 ~ 0.012)	———
Valve guide to valve stem clearance	IN.	0.020 ~ 0.047 (0.0008 ~ 0.0019)	———
	EX.	0.030 ~ 0.057 (0.0012 ~ 0.0022)	———
Valve stem deflection	IN. & EX.	———	0.35 (0.014)
Valve guide I.D.	IN. & EX.	4.500 ~ 4.512 (0.1771 ~ 0.1776)	———
Valve stem O.D.	IN.	4.465 ~ 4.480 (0.1758 ~ 0.1764)	———
	EX.	4.455 ~ 4.470 (0.1754 ~ 0.1760)	———
Valve stem runout	IN. & EX.	———	0.05 (0.002)
Valve head thickness	IN. & EX.	———	0.50 (0.02)
Valve seat width	1.2 ~ 1.7 (0.047 ~ 0.067)		———
Valve seat angle	IN. & EX.	45°	
Valve head radial runout	IN. & EX.	———	0.03 (0.0012)
Valve spring free length	Inner	———	36.8 (1.45)
	Outer	———	39.8 (1.57)
Valve spring tension	Inner.	4.2 ~ 4.8kgf (9.3 ~ 10.6 lbs) at length 29.9mm (1.18 in)	———
	Outer	17.0 ~ 19.6kgf (37.5 ~ 43.2 lbs) at length 33.4mm (1.32 in)	———

CYLINDER + PISTON + PISTON RING

Unit : mm (in)

ITEM	STANDARD		LIMIT
Compression pressure	14kg/cm^2 (at 500 rpm)		12 kg/cm^2
Piston to cylinder clearance	0.045 ~ 0.075 (0.0018 ~ 0.0030)		0.120 (0.0047)
Cylinder bore	81.500 ~ 81.515 (3.2087 ~ 3.2093)		81.575 (3.2116)
Piston diam.	81.440 ~ 81.455 (3.2063 ~ 3.2069) (Measure at 15mm (0.6 in) from the skirt end)		81.380 (3.2039)
Cylinder or cylinder head distortion	——		0.05 (0.002)
Piston ring free end gap	1st	Approx 9.9 (0.390)	7.9 (0.311)
	2nd	Approx 10.5 (0.413)	8.4 (0.330)
Piston ring end gap (Assembly condition)	1st	0.20 ~ 0.35 (0.008 ~ 0.013)	0.5 (0.020)
	2nd	0.20 ~ 0.35 (0.008 ~ 0.013)	0.7 (0.028)
Piston ring to groove clearance	1st	——	0.180 (0.007)
	2nd	——	0.150 (0.006)
Piston ring groove width	1st	1.21 ~ 1.23 (0.0476 ~ 0.0484)	——
	2nd	1.01 ~ 1.03 (0.040 ~ 0.041)	——
	Oil	2.01 ~ 2.03 (0.079 ~ 0.080)	——
Piston ring thickness	1st	0.970 ~ 0.990 (0.0382 ~ 0.0390)	——
	2nd	1.170 ~ 1.190 (0.0461 ~ 0.0469)	——
Piston pin hole bore	20.002 ~ 20.008 (0.7875 ~ 0.7877)		20.030 (0.7886)
Piston pin O.D.	19.996 ~ 20.000 (0.7872 ~ 0.7874)		19.980 (0.7866)

OIL PUMP

ITEM	STANDARD	NOTE
Oil pressure	2.0 ~ 6.0 kg/cm^2 (at 60 ℃, 3,000 rpm)	———
Oil pump reduction ratio	1.3 (45/34)	———

CLUTCH

Unit : mm (in)

ITEM	STANDARD		LIMIT
Clutch cable play	2 (0.08)		———
Drive plate thickness	NO. 1	2.92 ~ 3.08 (0.115 ~ 0.121)	2.62 (0.103)
	NO. 2	3.42 ~ 3.58 (0.135 ~ 0.141)	3.12 (0.123)
Drive plate claw width	NO. 1	15.9 ~ 16.0 (0.626 ~0.630)	15.1 (0.595)
	NO. 2	15.9 ~ 16.0 (0.626 ~0.630)	15.1 (0.595)
Driven plate distortion	———		0.1 (0.004)
Clutch spring free length	54.2 (2.134)		54 (2.126)

CAMSHAFT + CYLINDER HEAD

Unit : mm (in)

ITEM	STANDARD		LIMIT
Cam height	IN.	35.28 ~ 35.32 (1.389 ~ 1.391)	34.98 (1.377)
	EX.	33.38 ~ 33.42 (1.314 ~ 1.316)	33.08 (1.302)
Camshaft journal holder I.D.	IN. & EX.	21.959 ~ 21.980 (0.8645 ~ 0.8654)	———
Camshaft journal oil clearance	IN. & EX.	———	0.15 (0.006)
Cylinder and cylinder head distortion	———		0.05 (0.002)
Cylinder head cover distortion	———		0.05 (0.002)
Cam chain pin (Arrow “3”)	16th pin		———

CONROD + CRANKSHAFT

Unit : mm (in)

ITEM	STANDARD	LIMIT
Conrod small end I.D.	20.006 ~ 20.014 (0.7876 ~ 0.7880)	20.040 (0.7890)
Conrod deflection	———	3.0 (0.12)
Conrod big end side clearance	0.17 ~ 0.32 (0.007 ~ 0.013)	0.50 (0.020)
Conrod big end width	20.95 ~ 21.00 (0.825 ~ 0.827)	———
Crank web to web width	96.9 ~ 97.1 (3.815 ~ 3.823)	———
Crankshaft runout	———	0.05 (0.002)

TRANSMISSION + DRIVE CHAIN

Unit : mm (in)

ITEM	STANDARD		LIMIT
Primary reduction ratio	2.09 (71/34)		———
Secondary reduction ratio	2.93 (44/15)		———
Gear ratio	1st	2.46 (32/13)	———
	2nd	1.60 (32/20)	———
	3rd	1.32 (29/22)	———
	4th	1.13 (27/24)	———
	5th	0.96 (25/26)	———
	6th	0.85 (23/27)	———
Shift fork to groove clearance	0.10 ~ 0.30 (0.004 ~ 0.012)		0.5 (0.020)
Shift fork groove width	NO.1 & NO.2	4.85 ~ 5.00 (0.191 ~ 0.197)	———
	NO.3	4.85 ~ 5.00 (0.191 ~ 0.197)	———
Shift fork thickness	NO.1 & NO.2	5.3 ~ 5.4 (0.209 ~ 0.213)	———
	NO.3	5.3 ~ 5.4 (0.209 ~ 0.213)	———
Drive chain	Type	RK525XSO	———
	Links	108 LINKS	———
	20-pitch length	———	319.4 (12.58)
Drive chain slack	20~30 (0.79 ~ 1.18)		———

CARBURETOR

Unit : mm (in)

ITEM		SPECIFICATION					
Carburetor type		BDSR39 TYPE(DOUBLE)					
Bore size		ϕ 39					
Idle r.p.m.		1,300~1,500 rpm					
Float height		7 (0.28)					
Throttle cable play		0.5~1.0 (0.02 ~ 0.04)					
		FRONT			**REAR**		
Main jet	(M.J.)	130			130		
Main air jet	(M.A.J.)	45			45		
Jet needle	(J.N.)	6E44-54-3			6E44-54-3		
Needle jet	(N.J.)	P-OM			P-OM		
Pilot jet	(P.J.)	20			20		
Throttle valve	(TH.V.)	95			95		
By-pass	(B.P.)	#1 0.8	#2 0.8	#3 0.8	#1 0.8	#2 0.8	#3 0.8
Valve seat	(V.S.)	1.5			1.5		
Starter jet	(G.S.)	50			50		
Pilot screw	(P.S.)	STD			STD		
Pilot outlet	(P.O.)	0.9			0.9		
PV. Stroke	(P.V.)	30.7			30.7		

THERMOSTAT+COOLING FAN+COOLANT

ITEM	STANDARD		LIMIT
Thermostat valve operating temperature	Valve opening	88℃	
	Valve full open	100℃	
	Valve closing	83℃	
Thermostat valve lift	Over 8mm /100℃		
Engine coolant temperature sensor resistance	60℃	Approx. 125Ω	
	85℃	Approx. 48.5Ω	
	110℃	Approx. 24Ω	
	125℃	Approx. 15Ω	
Cooling fan thermo-switch operating temperature	OFF→ON	Approx. 95℃	
	ON→OFF	Over 88℃	
Engine coolant type	Use an antifreeze/coolant compatible with aluminum radiator, mixed with distilled water only, at the ratio of 50 : 50		
Engine coolant capacity	Reserve tank side	230㎖	
	Radiator side	430㎖	
	Engine side	940㎖	

ELECTRICAL

Unit : mm (in)

ITEM	STANDARD		NOTE
Ignition timing	BTDC 5°/1,500rpm		
Spark plug	Type	CR8E	
	Gap	0.7~0.8 (0.028 ~ 0.032)	
	Hot type	CR7E	
	Standard type	CR8E	
	Cold type	CR9E	
Spark performance	Over 8mm (0.32)		
Ignition coil resistance	Primary	3.5 ~ 5.5 Ω	
	Secondary	20 ~ 31 kΩ	
Magneto coil resistance	Pick-up coil	90 ~ 110 Ω	G-L
	Charging coil	0.7 ~ 1.5 Ω	Y-Y
Magneto no-load voltage	Over 70V/5,000 rpm		
Battery standard charging voltage	13.5 ~ 15.0V/5,000 rpm		
Battery	Type	STX 14A-BS	
	Capacity	12V 12Ah	
	Standard electrolyte S.G.	1.320 at 20℃ (68℉)	
Fuse size	Main	30A	
	Head lamp	15A	

WATTAGE

Unit : W

ITEM	SPECIFICATION	
Head lamp	HI	60W
	LO	55W
License plate lamp	5W	
Brake/Tail lamp	21/5W	
Turn signal lamp	10W	
Illumination lamp	1.7W×3	
Neutral indicator lamp	1.7W	
Turn signal indicator lamp (Right & left)	1.7W×2	
High beam indicator lamp	1.7W	
Fuel indicator lamp	1/2	1.7 W
	E	1.7 W

⚠ CAUTION

Do not use except the specified bulb (Wattage).

SUSPENSION

Unit : mm (in)

ITEM	STANDARD	LIMIT
Front fork stroke	120 (4.72)	———
Front fork spring free length	433.3 (17.1)	430 (16.9)
Front fork oil type	TELLUS #32	———
Front fork oil level	146mm(5.8 in) from end of outer tube (when maximum compressed without spring)	———
Front fork oil capacity (each leg)	380cc	———
Rear wheel travel	110 (4.33)	———
Swingarm pivot shaft runout	———	0.6 (0.024)
Rear shock absorber pre-load position	3 / 5 position	———
Rear shock absorber spring free length	165 (6.50)	———

STANDARD FRONT FORK DAMPING FORCE			
		Rebound	Compression
Solo riding	Softer	Turn to “S” direction	Turn to “S” direction
	Standard	3 clicks out from end of “H” direction	End of “S” direction
	Stiffer	Turn to “H” direction	Turn to “H” direction
Dual riding		3 clicks out from end of “H” direction	2 clicks out from end of “S” direction

BRAKE + WHEEL

Unit : mm (in)

ITEM	STANDARD		LIMIT
Rear brake pedal height	290 (11.4) [when one person riding from the ground]		———
Brake disk thickness	Front	4.0 (0.16)	3.0 (0.12)
	Rear	4.3 (0.17)	3.0 (0.12)
Brake disk runout	Front · Rear	———	0.3 (0.012)
Master cylinder bore	Front	15.870 ~ 15.913 (0.6248 ~ 0.6265)	———
	Rear	12.700 ~ 12.743 (0.5000 ~ 0.5017)	———
Master cylinder piston diam.	Front	15.827 ~ 15.854 (0.6227 ~ 0.6242)	———
	Rear	12.657 ~ 12.684 (0.4983 ~ 0.4994)	———
Brake caliper cylinder bore	Front · Rear	25.4 (1.00)	———
Brake caliper piston diam.	Front · Rear	25.4 (1.00)	———
Brake fluid type	Front	DOT4	———
	Rear	DOT4	———
Wheel runout	Axial	———	2.0 (0.08)
	Radial	———	2.0 (0.08)
Wheel axle runout	Front	———	0.25 (0.01)
	Rear	———	0.25 (0.01)
Tire size	Front	120/60 - ZR 17 55W	———
	Rear	160/60 - ZR 17 69W	———
Wheel rim size	Front	J17×MT3.00	———
	Rear	J17×MT4.50	———

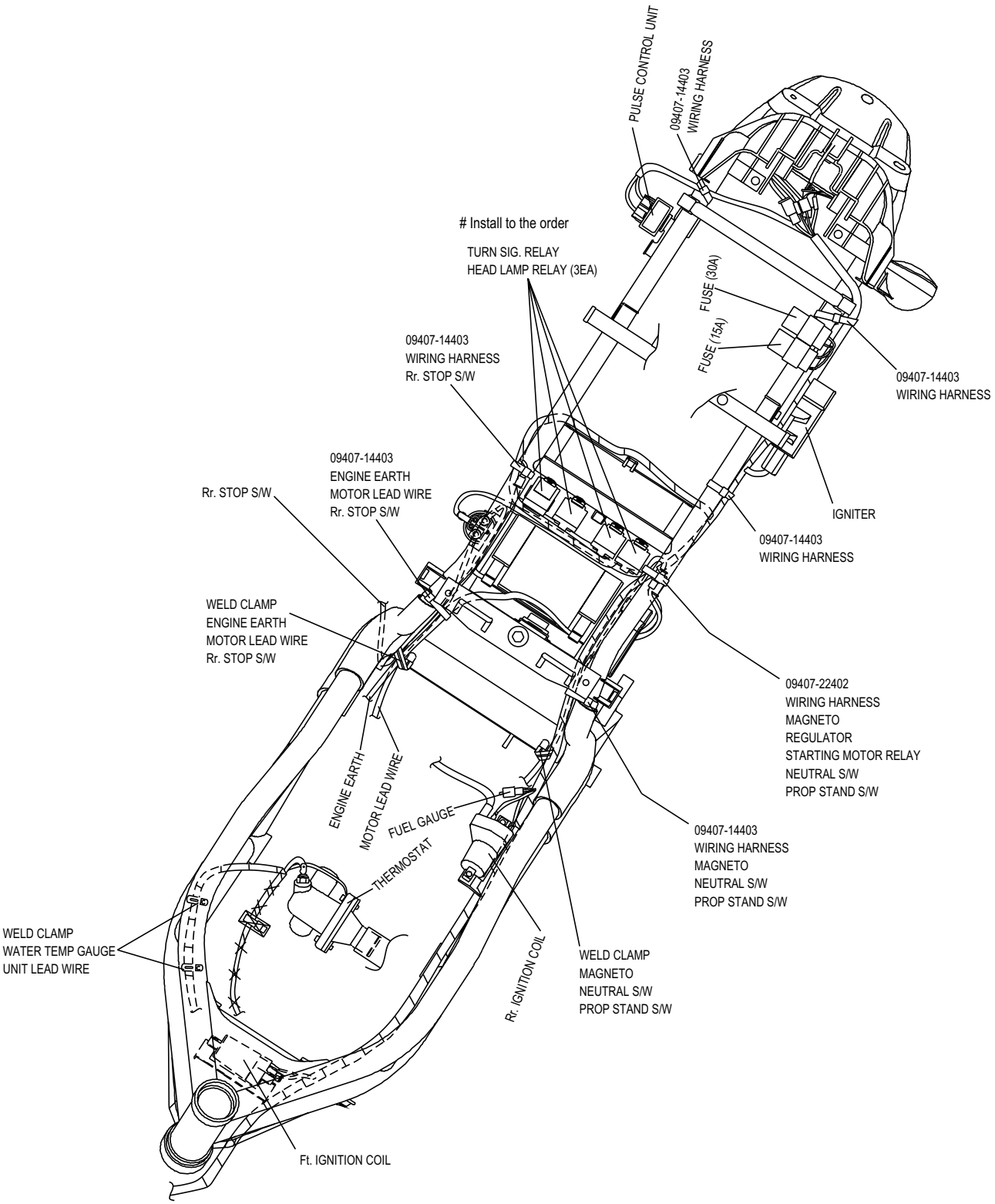
TIRE PRESSURE

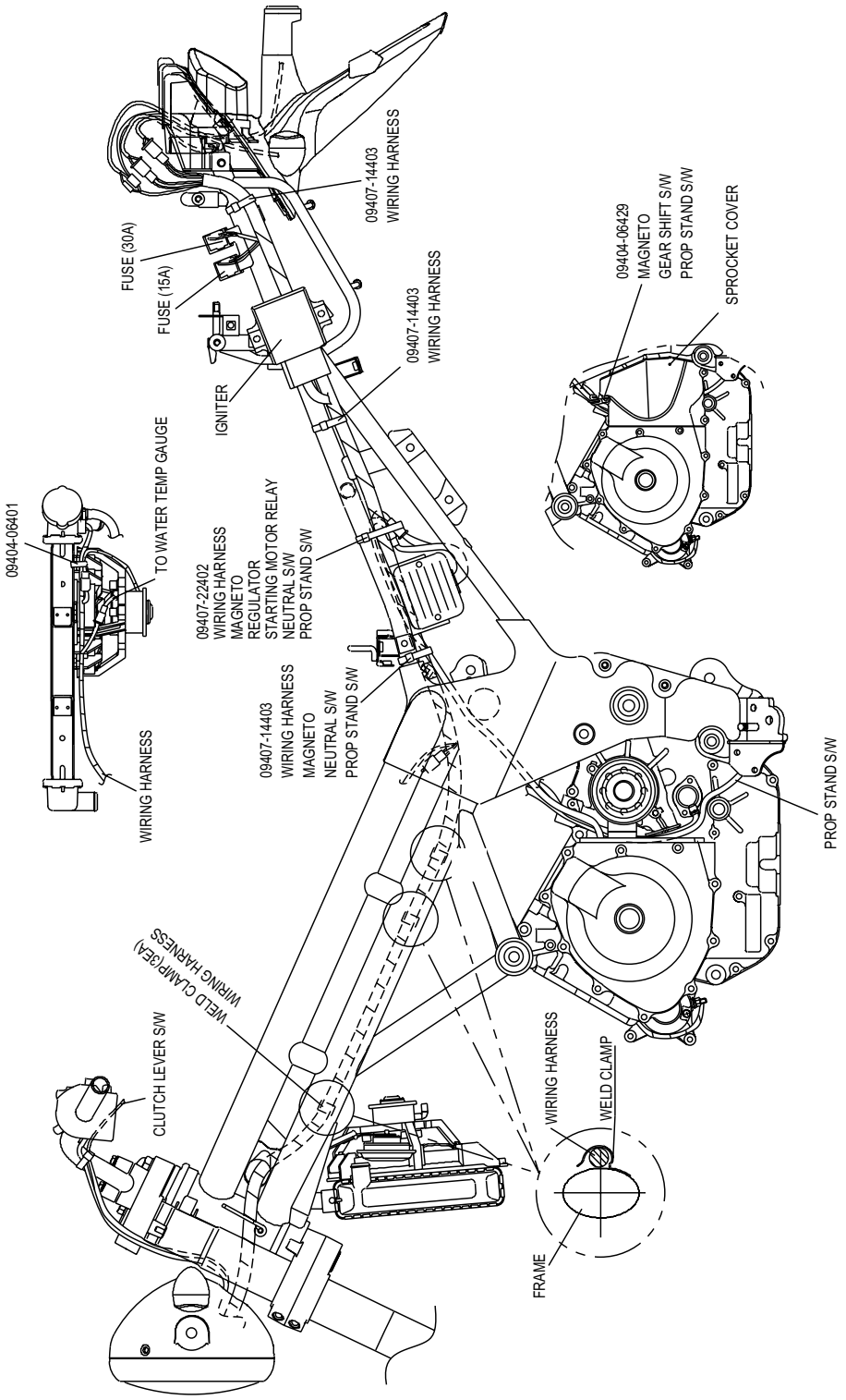
COLD INFLATION TIRE PRESSURE	NORMAL RIDING					
	SOLO RIDING			DUAL RIDING		
	kPa	kg/cm²	psi	kPa	kg/cm²	psi
FRONT	221	2.25	33.0	221	2.25	33.0
REAR	245	2.50	36.0	245	2.50	36.0

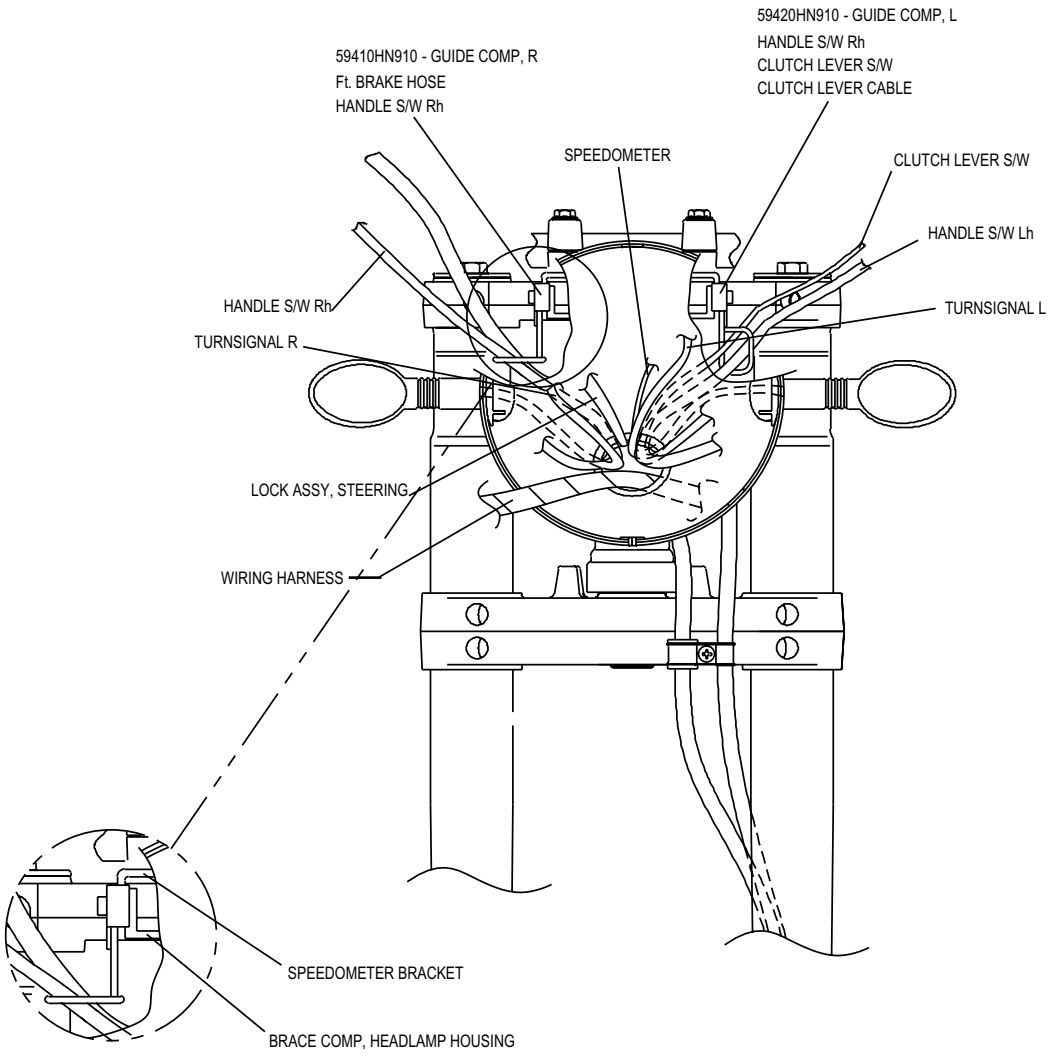
FUEL + OIL

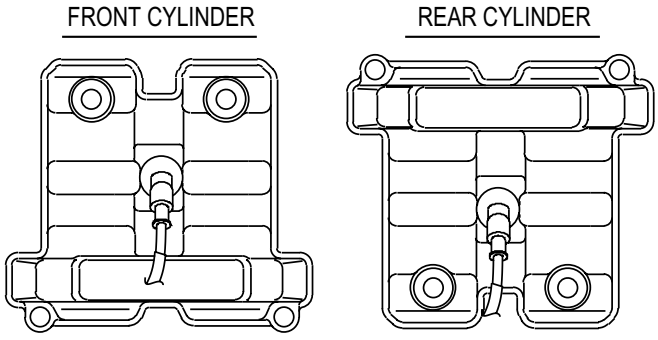
ITEM	SPECIFICATION		NOTE
Fuel type	Gasoline used should be graded 91 octane or higher. An unleaded gasoline is recommened.		
Fuel tank capacity	Including reserve	17 ℓ	
	Reserve	3 ℓ	
Engine oil type	API Over SG (SAE 10W/40)		
Engine oil capacity	Change	3,000 mℓ	
	Filter change	3,200 mℓ	
	Overhaul	3,400 mℓ	

WIRE AND CABLE ROUTING

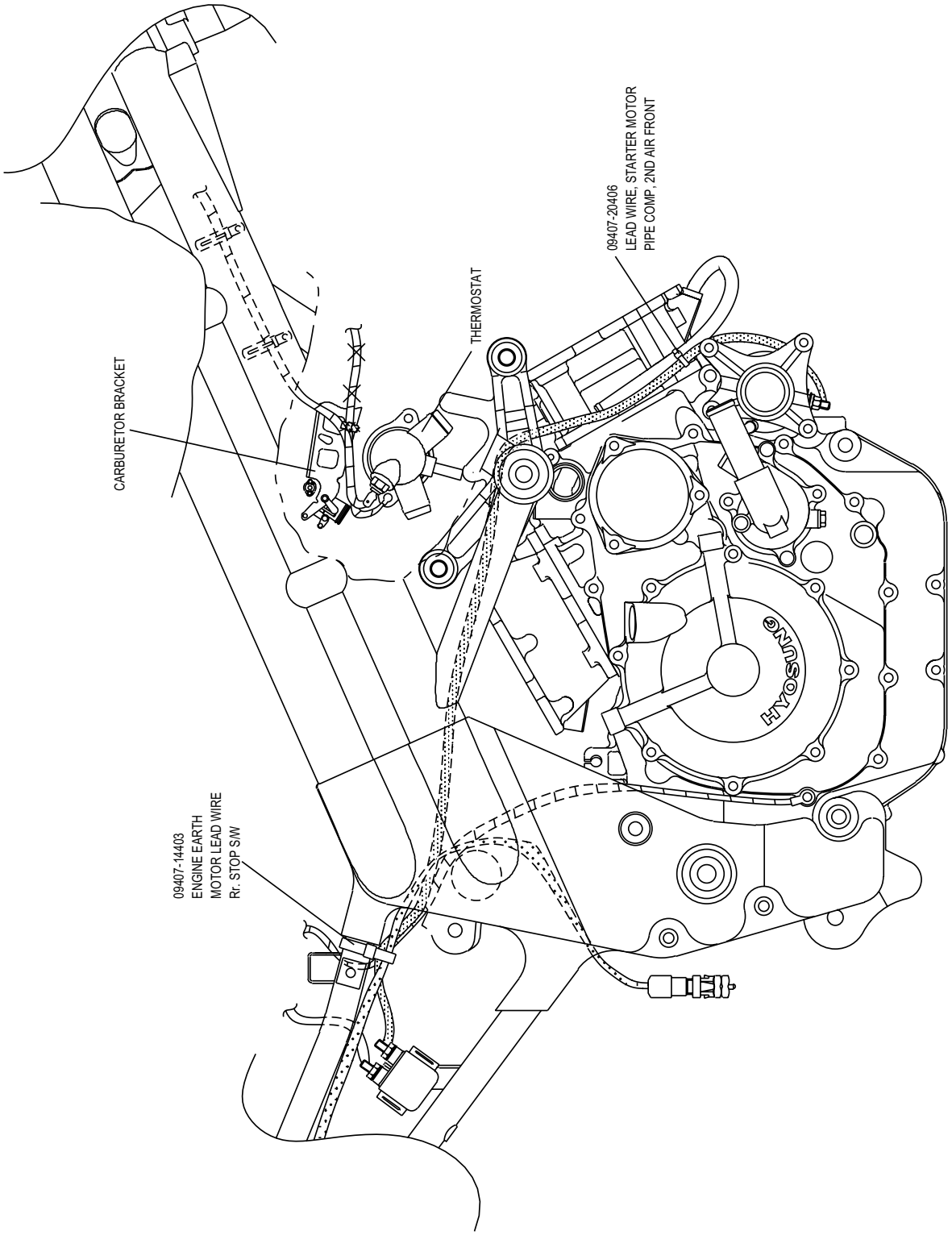



09404-06401
TO WATER TEMP GAUGE
WIRING HARNESS
09407-22402
WIRING HARNESS
MAGNETO
REGULATOR
STARTING MOTOR RELAY
NEUTRAL S/W
PROP STAND S/W
09407-14403
WIRING HARNESS
MAGNETO
NEUTRAL S/W
PROP STAND S/W
IGNITER
FUSE (30A)
FUSE (15A)
09407-14403
WIRING HARNESS
09407-14403
WIRING HARNESS
09404-06429
MAGNETO
GEAR SHIFT S/W
PROP STAND S/W
SPROCKET COVER
PROP STAND S/W
WELD CLAMP(SEA)
WIRING HARNESS
CLUTCH LEVER S/W
WIRING HARNESS
WELD CLAMP
FRAME

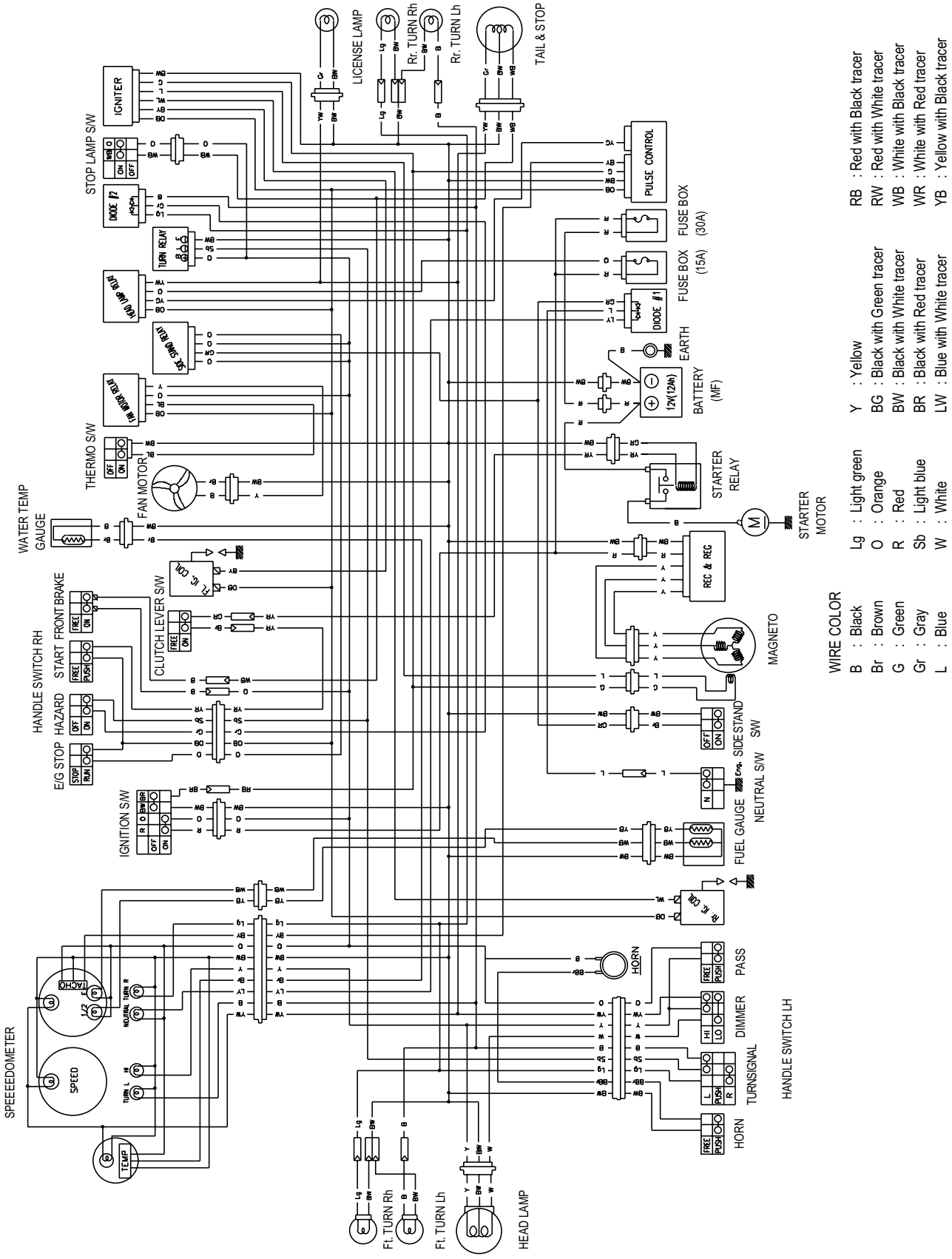




CAUTION FOR HIGHTENTION CORD INSTALLATION DIRECTION


09407-20406
LEAD WIRE, STARTER MOTOR
PIPE COMP, 2ND AIR FRONT
THERMOSTAT
CARBURETOR BRACKET
09407-14403
ENGINE EARTH
MOTOR LEAD WIRE
Rr. STOP S/W

WIRING DIAGRAM



TAPPET SHIM SELECTION CHART (IN.)

MEASURING TAPPET CLEARANCE (mm) \ SHIM No.	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220
SHIM THICKNESS AT PRESENT (mm)	1.20	1.25	1.30	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20
0.00-0.04			1.20	1.25	1.30	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10
0.05-0.09		1.20	1.25	1.30	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15
0.10-0.20	Specified clearance - Adjustment unnecessary																				
0.21-0.25	1.30	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20	2.20	
0.26-0.30	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20			
0.31-0.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20				
0.36-0.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20					
0.41-0.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20						
0.46-0.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20							
0.51-0.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20								
0.56-0.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20									
0.61-0.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20										
0.66-0.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20											
0.71-0.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20												
0.76-0.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20													
0.81-0.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20														
0.86-0.90	1.95	2.00	2.05	2.10	2.15	2.20															
0.91-0.95	2.00	2.05	2.10	2.15	2.20																
0.96-1.00	2.05	2.10	2.15	2.20																	
1.01-1.05	2.10	2.15	2.20																		
1.06-1.10	2.15	2.20																			
1.11-1.15	2.20																				

HOW TO USE THE CHART

1. Measure the tappet clearance.(When cold)
2. Measure the shim thickness at present.
3. Look for meeting space in that horizontal line for thickness and vertical line for clearance.

(EXAMPLE)
When the tappet clearance is 0.23mm and the shim thickness at present is 1.70mm, the shim thickness should be used 1.80mm.

HYOSUNG MOTORS & MACHINERY INC.

TAPPET SHIM SELECTION CHART (EX.)

MEASURING TAPPET CLEARANCE (mm) \ SHIM No.	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220
SHIM THICKNESS AT PRESENT (mm)	1.20	1.25	1.30	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20
0.05-0.09				1.20	1.25	1.30	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05
0.10-0.14			1.20	1.25	1.30	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10
0.15-0.19		1.20	1.25	1.30	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15
0.20-0.30	Specified clearance - Adjustment unnecessary																				
0.31-0.35	1.30	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20	2.20	
0.36-0.40	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20			
0.41-0.45	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20				
0.46-0.50	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20					
0.51-0.55	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20						
0.56-0.60	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20							
0.61-0.65	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20								
0.66-0.70	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20									
0.71-0.75	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20										
0.76-0.80	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20											
0.81-0.85	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20												
0.86-0.90	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20													
0.91-0.95	1.90	1.95	2.00	2.05	2.10	2.15	2.20														
0.96-1.00	1.95	2.00	2.05	2.10	2.15	2.20															
1.01-1.05	2.00	2.05	2.10	2.15	2.20																
1.06-1.10	2.05	2.10	2.15	2.20																	
1.11-1.15	2.10	2.15	2.20																		
1.16-1.20	2.15	2.20																			
1.21-1.25	2.20																				

HOW TO USE THE CHART

1. Measure the tappet clearance.(When cold)
2. Measure the shim thickness at present.
3. Look for meeting space in that horizontal line for thickness and vertical line for clearance.

(EXAMPLE)
When the tappet clearance is 0.33mm and the shim thickness at present is 1.70mm, the shim thickness should be used 1.80mm.

HYOSUNG MOTORS & MACHINERY INC.

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