Manuel de l'utilisateur

user's Manual

Congratulations!

You have just bought a SCORPA T-RIDE 250F. Welcome in the family of the SCORPA's customers.

This motorbike is the fruit of the experience of the high level of trial and of advanced technology. As all products of our range, it benefits from the expertise of our suppliers and from the high level of quality in the manufacturing of our motorbikes, which is well known in the world of trial.

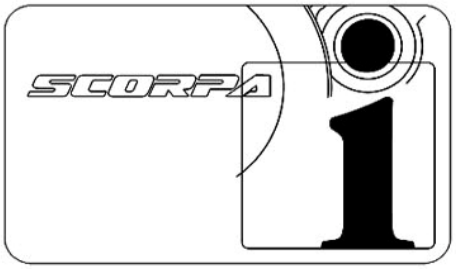
The use of T-RIDE 250F motorbike requires the greatest precaution in order to take advantage of the abilities. It is very important to read this user manual before starting the bike. In this, you could find the pieces of information about the maintenance and the controls of your SCORPA T-RIDE 250F. First and foremost you will find all security instructions to avoid the risks and the danger of motorbike-riding.

Moreover, the advice given in this manual will help you to keep your motorbike in perfect working order. If necessary, do not hesitate to go and see your dealer SCORPA. The company SCORPA wishes you would find pleasure in riding your SCORPA T-RIDE 250F. Do not forget the security must always be the first preoccupation.

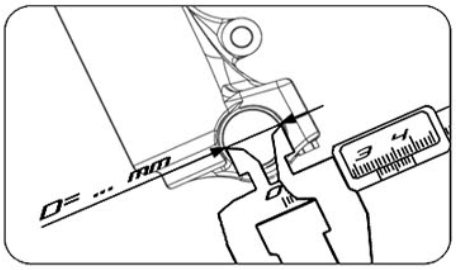
Thank you very much.

SCORPA

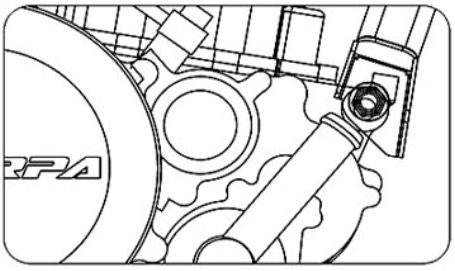
MANUEL DE L'UTILISATEUR



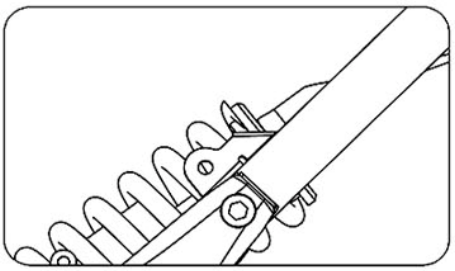
General Information



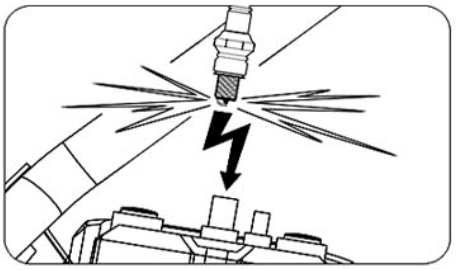
Technical Data



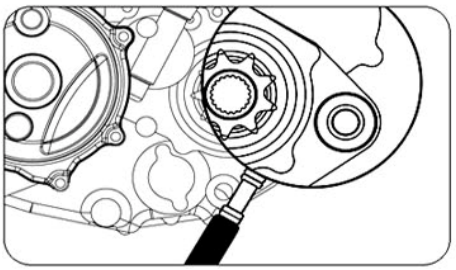
Engine



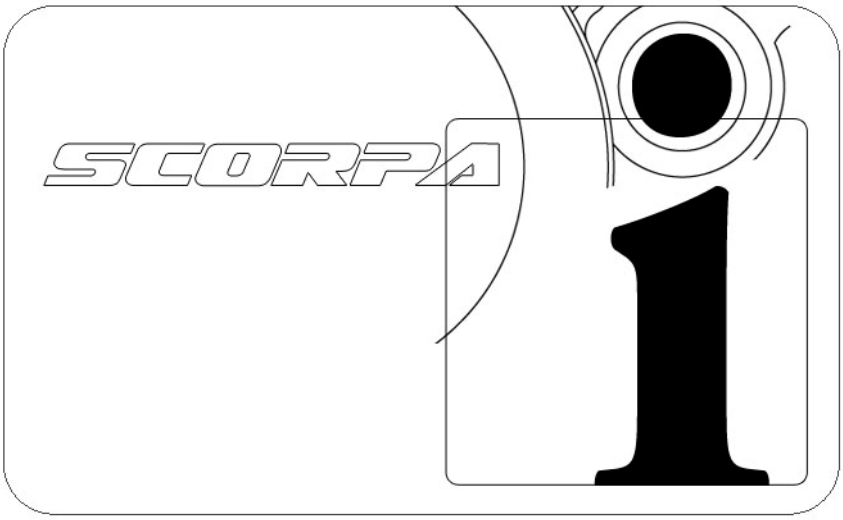
Chassis



Electrical Equipment



Part List



GENERAL INFORMATION

Those symbols give you pieces of information about the most important notions. They are described here:

⚠ **WARNING**	DANGER! BE CAREFUL, IT CONCERNS THE SECURITY
⚠ WARNING	If the instructions given are not respected, it can have serious consequences for the health of the rider, of third party and of the people who work on the bike. This symbol concerns the indications, the precautions and the instructions which must be followed to avoid the deterioration of your vehicle.
NB	This symbol introduces pieces of information which will allow you to maintain your bike.

NB : The user manual takes part in the bike and must be given to the new owner in case the bike is sold. SCORPA is always working to develop and to improve its products, so that you could find a few modifications in this manual in comparison with your bike.

CONTENTS

1 SECURITY

The motorbike is a really particular vehicle, which gives incomparable sensations of power and freedom. However, it is very important not to forget that the best motorbike has only two wheels, so that it can not escape from physical laws.

As a consequence, the vehicle has to be maintained in the best work order. That is exactly the same for the rider. SCORPA recommends you to respect the laws of the country where you are riding, not to ride under the influence of alcohol or of drugs. To be in a great form, without extreme fatigue, can allow you a safe driving and quick reflexes.

Riding motorbike implies that you wear sturdy bike clothes. The helmet, the clothes (of leather or of reinforced synthetic materials), solid shoes (preferably bike boots) and gloves are essential for the rider.

Wearing such equipments must not lead to change of the way of riding, and the security instructions must be respected.

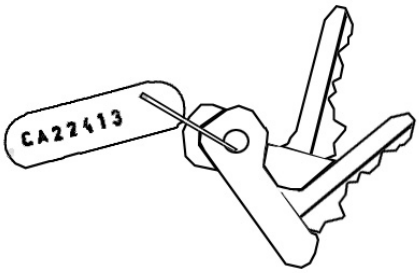
⚠ AVERTISSEMENT

This bike is not design for an intensive full power using.

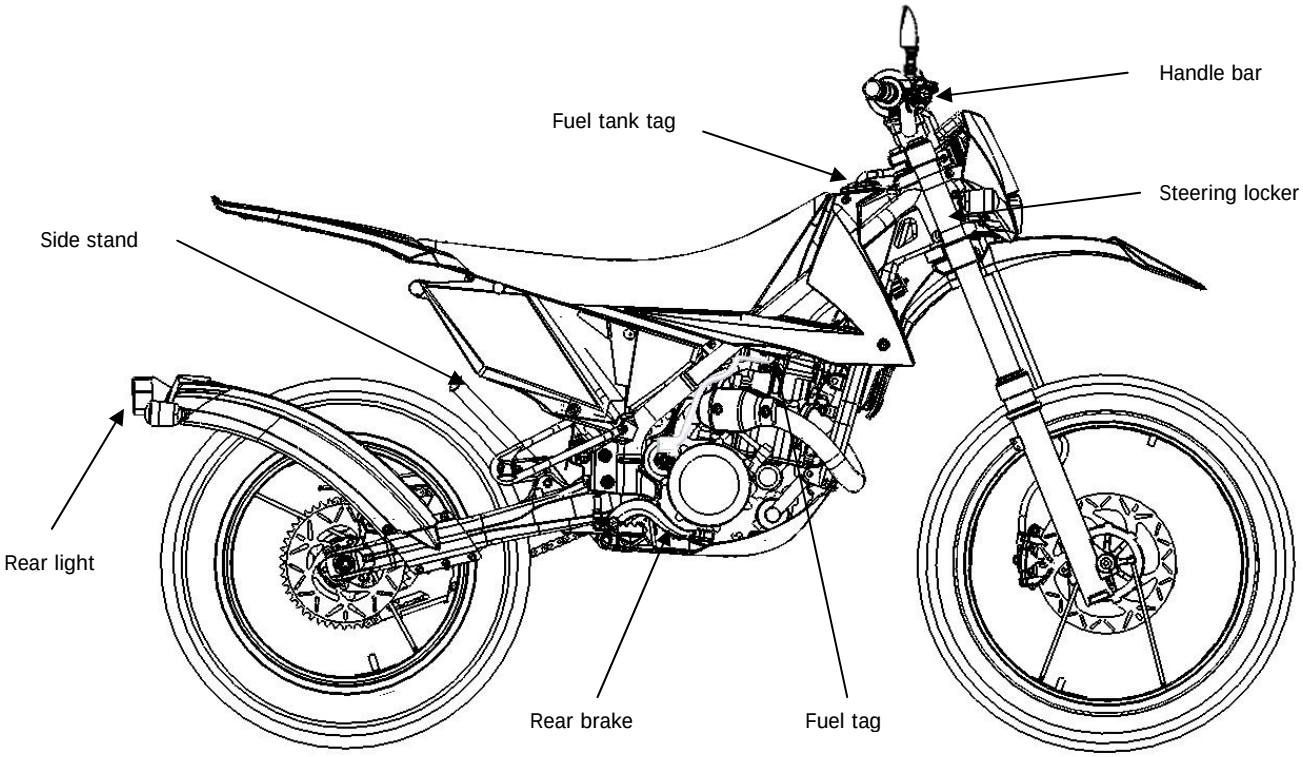
2 VEHICLE DESCRIPTION

2.1 Identification

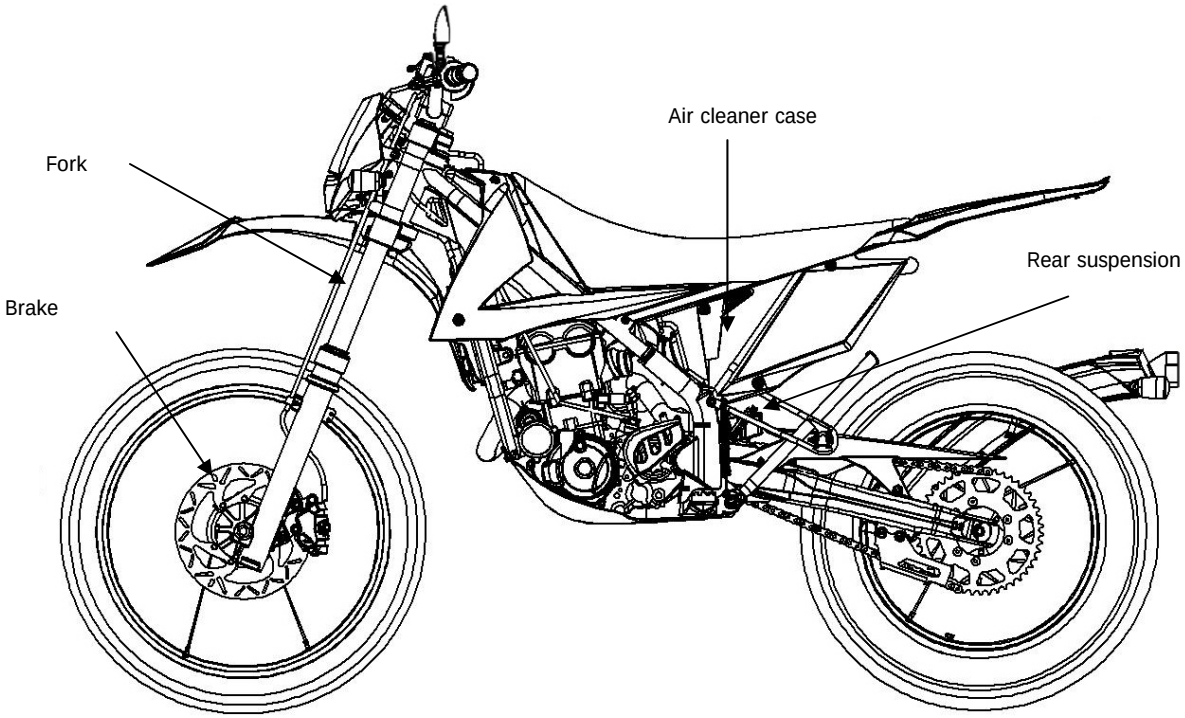
Your SCORPA T-ride 250 F is identified with a **serial number** placed on the right side of the steering column.
Your SCORPA T-ride 250 F has a **homologation plate** where is written the number of the frame.
The keys used to block the steering have an identification number. This number must be used if you need a new key, in case of loosing the original one.



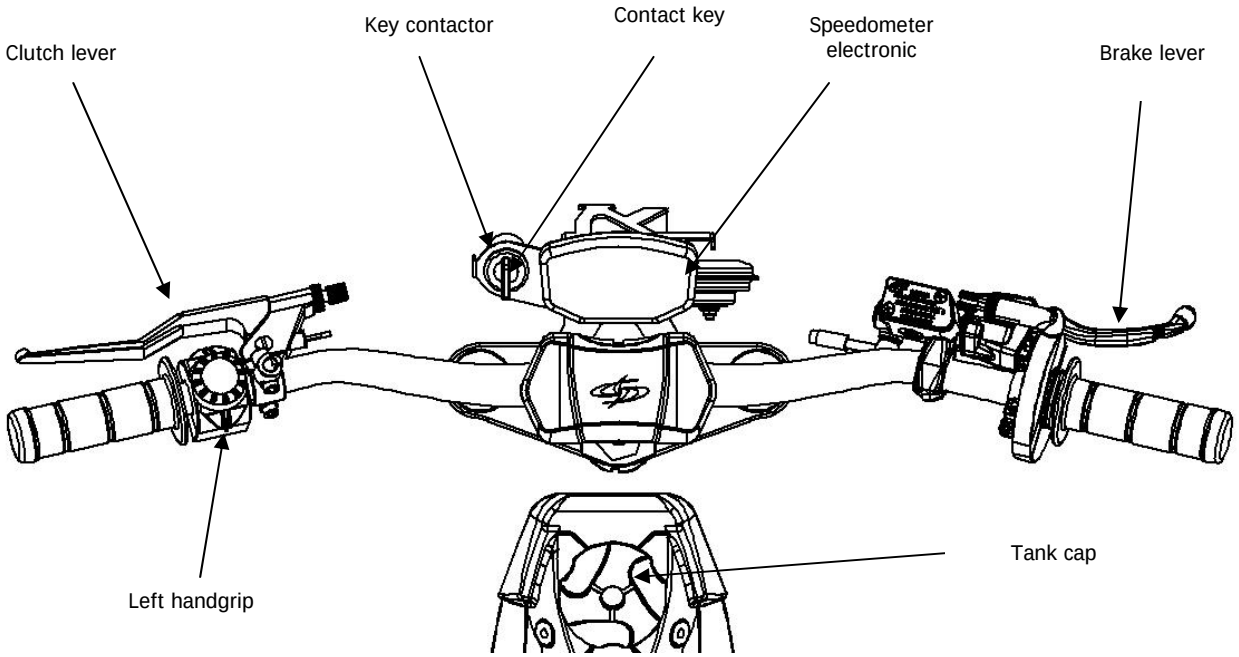
2.2 Right side



2.3 Left side



2.4 Handle bar controls



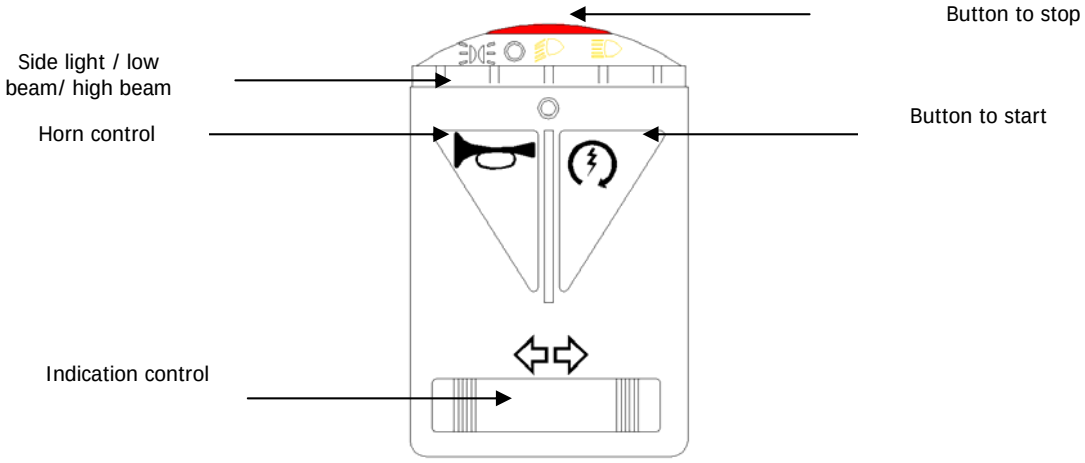
3 CONTROLS AND INSTRUMENTS

3.1 Controls and electric switches

3.1.1 Contact key

To start the motorcycle, the key has must to be on the position IGNITION (red). In case of emergency, the motorcycle maybe stopped by turning the key on the position OFF.

3.1.2 Commodo



This part is made up of three controls:

- Side light / low beam / high beam : ◊ ≤ ≥◊ / ≥◊ / ⫽◊

  You put the control on " ≥◊" to switch on the high beam, on "⫽◊" to switch on the low beam.
  The sidelight is shown by the symbol " ≥◊◊≤ "

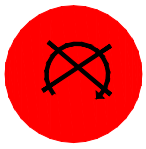
- Indication control : "⇦⇨"

  In order to indicate a turn to the left: push the control to the left, towards the symbol "⇦".
  In order to indicate a turn to the right: push the control to the right: towards the symbol "⇨".

  NB: when the indicators control is released, it goes back to the middle. In order to turn the indicators off, press the control when it is back in central position.

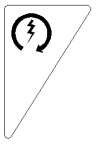
- Button to stop:

  To stop the bike, you must on the button to stop, red button situated on the top of the comodo.



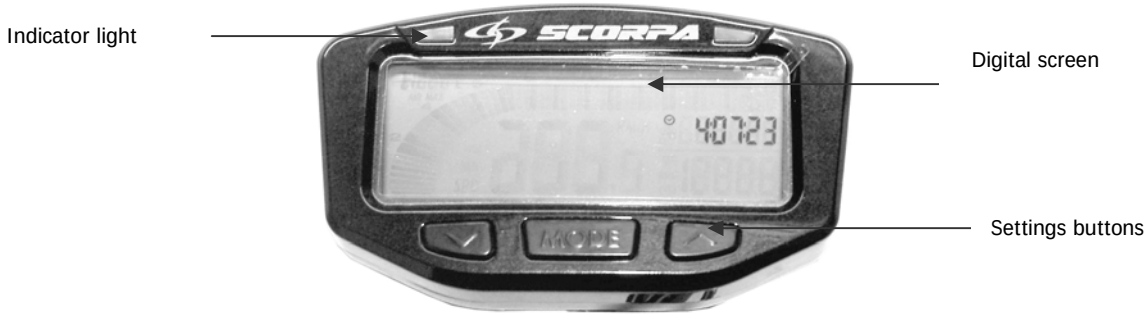
- Button to start

  The motorcycle has an electric starter, to start the bike you have to push on this button:



- Horn control: the horn rings when you push this control.

3.2 Speedometer



3.2.1 Precautions

WARNING:
When using Scorpa speedometer, follow basic precautions, including the following:
• Use Scorpa speedometer only for its intended function.
• To reduce the risk of injury, do not disassemble Scorpa speedometer or its accessories.
• Scorpa speedometer cannot be used underwater.
• Do not leave the main unit in direct sunlight when not riding.
• Check relative positions and gap between sensor and magnet periodically.
• Do not bend, twist, kink or otherwise abuse the black sensor cable. A damaged cable may produce incorrect readings.
• Do not abuse wires on back of Scorpa speedometer. The wires carry high voltage power from the vehicles ignition system. Damaged wires may also produce incorrect readings.
• Avoid contact with gasoline, degreasers or other chemical cleaners as they may damage the computer.

3.2.2 Overview

Scorpa speedometer Computer:
Scorpa speedometer holds a large amount of information in a small space. There are three buttons for easy navigation, two LED's for alerts and warnings, and a brightly lit LCD panel for easy viewing.

Quickstart Commands:

- <MODE> = Switch between screens in Normal Mode.
- <LEFT> + <MODE> = Reset Trip Data, Maximum Speed, Distance, Ride Time, Stop Watch, Max Engine Temperature, and Max RPM.
- <RIGHT> = Toggle between features in Normal Mode screens.
- <MODE> FOR 3 SEC = Edit Trip Distance (DST) value.
  - <LEFT> or <RIGHT> = Increment or scroll distance value.
- <LEFT> <CENTER> + <RIGHT> = Enter Data Setting Mode.
  - <MODE> = Move to next data setting screen.
  - <LEFT> = Increment or scroll through current data setting.
  - <RIGHT> = Move to next digit in data setting mode.

Backlight:
Scorpa speedometer is equipped with a backlight for easy viewing during night-time operation. To activate backlight manually, press the right button.
If connected to 12V power, press any key to activate the backlight.

Internal Battery:
Scorpa speedometer has an internal 3.0V watch type battery (#CR2032). The computer can be run from this battery alone.
To change the battery, unscrew the battery cap on the back of the computer with a coin. Make sure the positive side of the battery is facing up when replaced.
Replace with battery model number #CR2032.

3.2.3 Data setting mode

Overview:
Data Setting Mode is very important for Scorpa speedometer to operate correctly.
Available Settings:
• Kilometers or Miles per Hour
• 24 hour or 12 hour Clock Format
• Time of Day
• Temperature Unit of Measure, °F or °C
• High Temperature Warning Point
• RPM Shift Indicator
• Over Shift Indicator Warning
After a setting is confirmed, Scorpa speedometer will move on to the next setting in order.
If no button is pressed for 15 seconds, Scorpa speedometer will return to Normal Mode.

Enter data setting mode:
To enter data setting mode, hold LEFT, CENTER and RIGHT for 3 sec.
Release buttons to continue.

Program kilometers or miles per hour:
To cycle between M/H and Km/H, press LEFT. To confirm, press CENTER.
Scorpa speedometer will go to the next setting.

Program wheel size:
The good size for the T-Ride is **2109.**
Modify flashing digit by pressing LEFT. Change to next digit by pressing RIGHT. To confirm, press CENTER.
Scorpa speedometer will go on to the next setting.

Program 12 or 24 hour clock format:
Scorpa speedometer defaults to 12H format.
To cycle between 12H and 24H, press LEFT. To confirm, press CENTER.
Scorpa speedometer will go to the next setting.

Program time of day:
Modify flashing digit by pressing LEFT. Change to next digit by pressing RIGHT. To confirm, press CENTER.
Scorpa speedometer will go on to the next setting.

Program pulses per revolution (PPR) step 1:
For the T-Ride you have to put **1.**
Modify flashing digit by pressing LEFT. Change to next digit by pressing RIGHT. To confirm, press CENTER.
Scorpa speedometer will go on to the next setting.

Program pulses per revolution (PPR) step 2:
For the T-Ride you have to put **0000.**
Modify flashing digit by pressing LEFT. Change to next digit by pressing RIGHT. To confirm, press CENTER.
Scorpa speedometer will go on to the next setting.

Program temperature unit of measure:
Choose between °C or °F. Modify flashing digit by pressing LEFT. Change to next digit by pressing RIGHT. To confirm, press CENTER.
Scorpa speedometer will go on to the next setting.

Program high temp warning point*: *OPTION
Scorpa speedometer defaults to 90°C (190°F). When the engine temperature sensor reaches the value of this setting, the left LED will turn on as a warning. Note: This step is only necessary if an optional engine temperature sensor is installed.
Modify flashing digit by pressing LEFT. Change to next digit by pressing RIGHT. To confirm, press CENTER.
Scorpa speedometer will go on to the next setting.

Program high temp warning point*: *OPTION
Scorpa speedometer defaults to 110°C (230°F). When the engine temperature sensor reaches the value of this setting, the right LED will turn on as a critical warning alarm. This step is only necessary if an optional engine temperature sensor is installed.
Modify flashing digit by pressing LEFT. Change to next digit by pressing RIGHT. To confirm, press CENTER.
Scorpa speedometer will go on to the next setting.

Program RPM shift indicator:
Scorpa speedometer's shift indicator defaults to 6000 RPM. The left LED will flash when it's time to shift.
Scorpa speedometer defaults to 0.
Modify flashing digit by pressing LEFT. Change to next digit by pressing RIGHT. To confirm, press CENTER.
Scorpa speedometer will go on to the next setting.

Program over shift indicator warning:
Scorpa speedometer's over shift warning indicator defaults to 10,000 RPM. The right LED will flash when the engine is revving too high.
Scorpa speedometer defaults to 0.
Modify flashing digit by pressing LEFT. Change to next digit by pressing RIGHT. To confirm, press CENTER.
Scorpa speedometer will go on to the next setting.

3.2.4 Normal mode screens

Switch between the 3 Normal Mode Screens:
All of the information that Scorpa speedometer provides is on one of these 3 screens.
When riding, the user has the choice of staying on Screen 1 or Screen 2. Screen 3 will default back to Screen 1 after 5 seconds.
To switch between screens, press CENTER. To edit trip distance(DST), hold RIGHT for 2seconds.

Screen 1:
Screen 1 Displays:
• Speed (SPD) • Distance (DST)
• Time of Day • Ambient Air Temperature • RPM Bar Graph

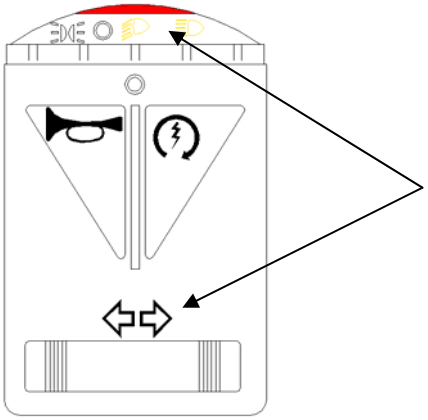
Screen 2:
Screen 2 Displays:
• Speed (SPD) • Revolutions per Minute (RPM)
• Stop Watch (TT) • Ride Time (RT)
• Engine Temperature* • RPM Bar Graph

Screen 3:
Screen 3 Displays:
• Maximum Speed (MS) • Maximum RPM (MR)
• Accumulated Ride Time (ART) • Odometer (ODO)
• Maximum Temperature (MAX)*

OPTION:
Note: Engine Temperature readings require optional sensor.

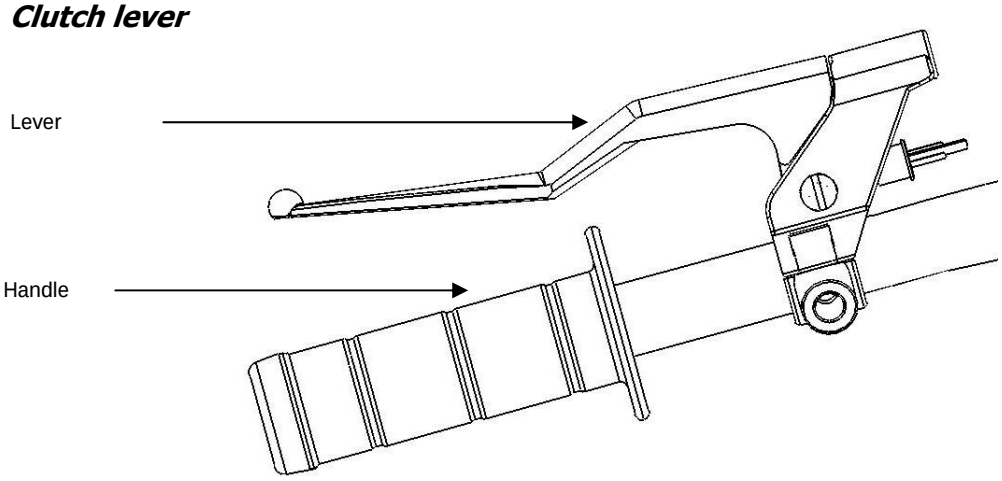
3.3 Mechanical controls and indicators

3.3.1 Comodo



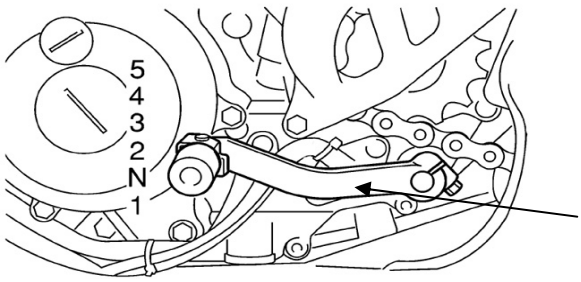
This element allows to choose several commands. The drawings of indicators and various types of lights are brilliant witnesses.

3.3.2 Clutch lever



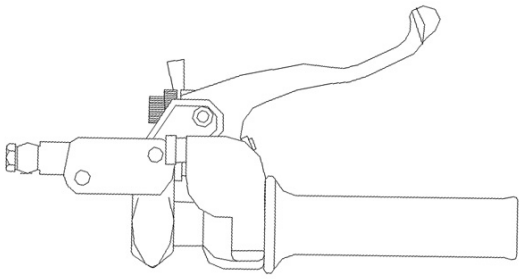
The clutch lever is located on the left side of the handlebar. It is fixed near the left handgrip. To decltch, pull the lever towards the handgrip. To engage, just release the lever. If you would like to obtain smoothly driving, the solution is to pull the lever very quickly and to release it very progressively.

3.3.3 Gearshift lever



The gearshift lever is situated on the left side of the bike, at left toes level, when the heel rests on the left rest-foot. The use of the gearshift lever must be done only when the engine is released. That means the clutch lever is pulled towards the handgrip. The gearshift lever allows choosing one of the 5 gears of the gearbox.

3.3.4 Front brake lever

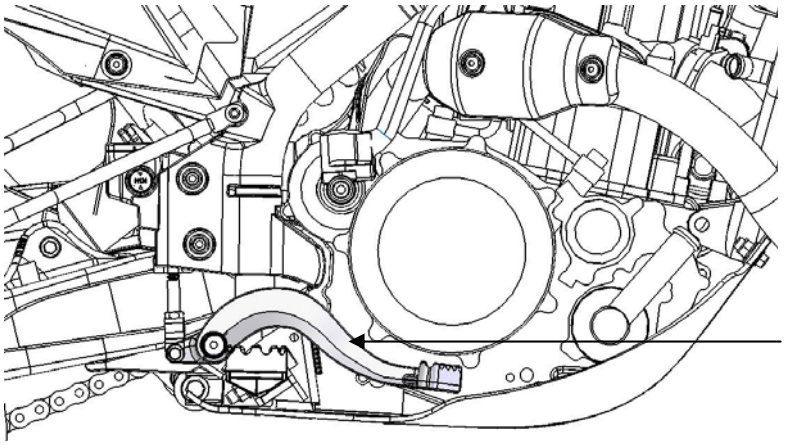


The front brake lever is situated on the right side of the handlebar. To operate the front brake, pull the lever towards the handgrip.

Precautions in the handling of the brake levers.

The brake levers handling must be accompanied by high precautions. In fact, a wheel lock often means the fall of the rider and its bike. That is one of the main reasons why the motorcyclists can fall. It is recommended to pull the lever as progressively as possible.

3.3.5 Rear brake pedal

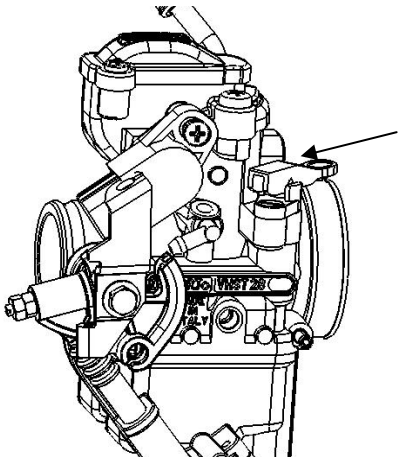


The rear brake pedal is situated on the right side of the bike, at the front of the right foot level, when the heel rests on the right rest-foot. To operate the rear brake, push the pedal towards the ground.

Precautions in the rear brake handling

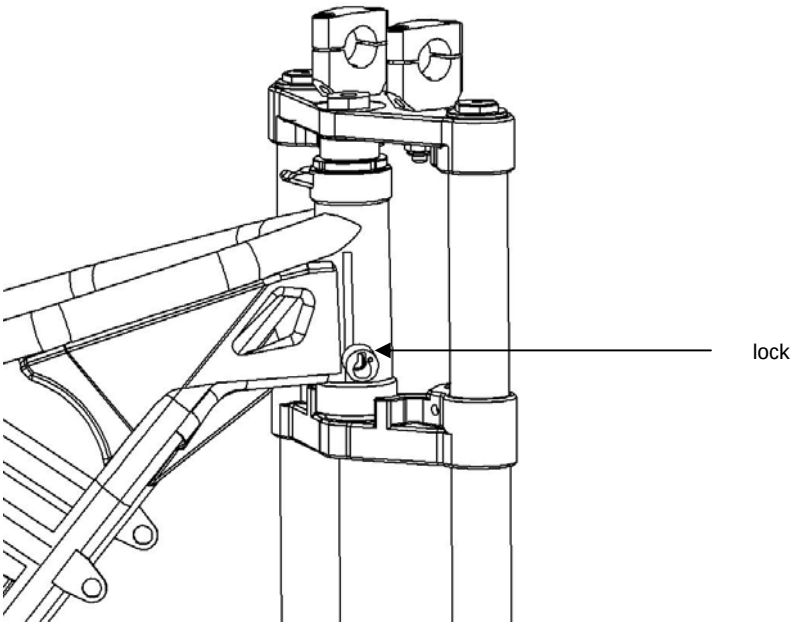
As told for the front brake lever, be careful not to operate too strongly the rear brake pedal. Otherwise it can lead to the lock of the rear wheel and the fall of the rider.

3.3.6 Choke handling



As the engine is cold, it may need to have recourse to the choke, in order to make the air / fuel mixture richer. Pull the control to open the choke and enrich the mixture. Push the control towards the ground to close the choke and to impoverish the air / fuel mixture.

3.3.7 Antitheft lock



Locking the direction: insert the key in the lock and turn it a quarter of turn towards left. Push it and, while maintaining it pushed, turn it a quarter of turn towards right. Withdraw the key, the direction is locked.

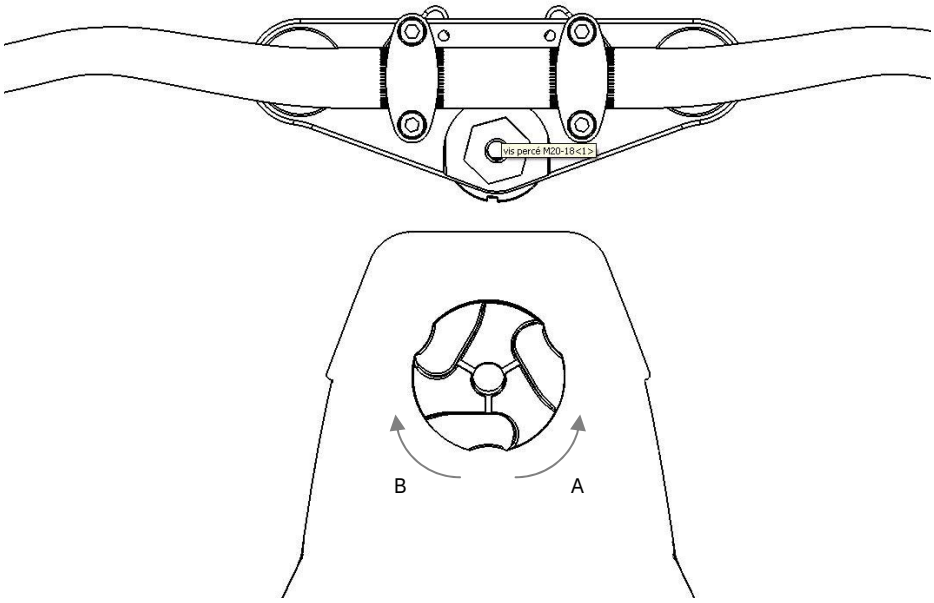
Unlocking the direction: insert the key in the lock and turn it a quarter of turn towards left: the lock goes up. Turn the key a quarter of turn towards right to withdraw the key and put it in your pocket.

WARNING

Do not let the key in the key while riding. Always withdraw it before starting using your bike.

3.4 Fuel tank

3.4.1 Fuel tank cap



To remove the cap from the fuel tank, turn it anticlockwise (in the direction A), until it can be taken away. As soon as the cap is not screwed on the fuel tank, you can take it.
To put it back, turn the cap clockwise into the fuel tank (in the direction B)
When the tightening becomes harder, it is important to give one more effort, in order to be sure the fuel cap is tightened enough.

WARNING

It is very important to check that the cap is tightened enough before starting the engine and riding the bike.

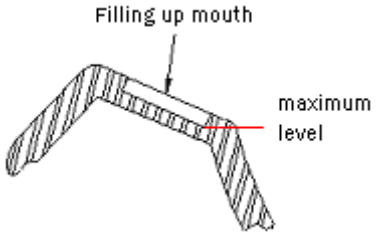
3.4.2 Fuel

The recommended fuel is only lead-free high octane petrol. The highest capacity of the fuel tank is 7,0L and the reserve is 1,5L.

WARNING

It is very important to check that the cap is tightened enough before starting the engine and riding the bike.

WARNING: the use of another fuel than this recommended by the manufacturer can cause serious deteriorations on the engine and on the exhaust system. SCORPA will not be responsible for any problem in that case.
Before each use, check that the quantity of fuel is sufficient. In case it is not, complete in the tank. The filling up must absolutely not exceed the maximum level. Otherwise, the fuel contained in the tank could easily flow along it.



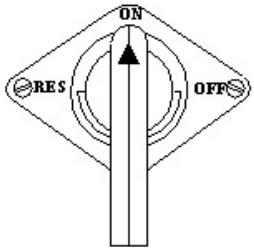
WARNING

The fuel tank must not be too much filled. In fact, as the engine is very close, the overflowing would be increased by the expansion due to the warmth.
The filling up has to be operated with a lot of precautions. There must not be fuel on the engine. This is recommended not to fill the fuel tank near a flame or near a source of heat.

WARNING :
When a little amount of fuel overflows on the tank during the filling up, wipe it thanks to a sweet, soft and dry duster, in order to avoid to damage plastic, polished and painted parts.

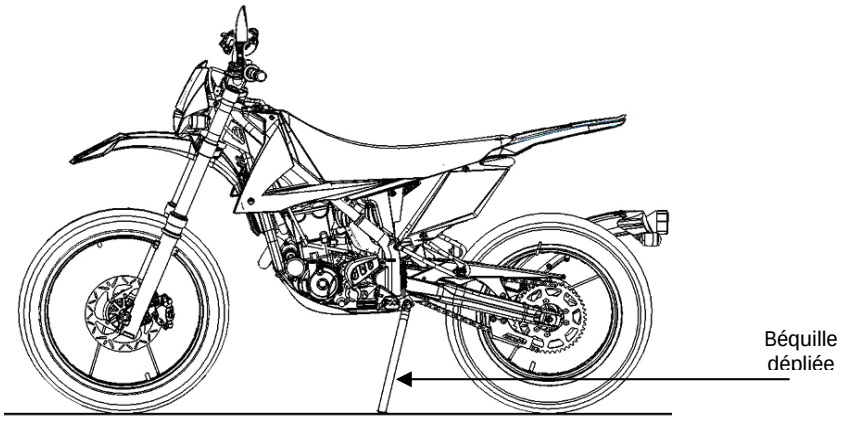
3.4.3 Fuel tap

Its aim is to control the flow of fuel from the fuel tank to the carburetor, as the rider wants it to be regulated. This tap contains a filter, which role is to hold back the particles which could damage the engine. This diagram shows the three different possible positions. The chosen one is pointed out thanks to the drawn arrow.
There are three different positions:



- OFF: The tap is off and the fuel is not able to flow to the carburetor. The tap must be on 'off' when the engine does not run.
- ON: the tap is running and the fuel can flow to the carburetor. The tap must be on 'on' before trying to start the engine and during the use of the bike.
- RES (Reserve): when the fuel tank is almost empty and the fuel does not flow anymore, put the tap on the position 'res.'. This system is expected to allow you to join the first filling station. Fill up the fuel tank as soon as possible. When the tank is full, put back the tap on the position 'on'.

3.5 Side stand



The side stand is fixed to the swinging arm on the right side of the bike. It automatically folds back as soon as the bike is put vertical.

WARNING

During the fallback of the side stand, take care not to let one of your limbs near the mechanism and be sure the third parties do so. That is the way to minimize the risks of plucking.

4 CHECK LIST BEFORE USE

The owner is responsible for the condition of his vehicle. The bike may suffer damages during the use and during the parking too (bad weather or acts of vandalism for example). The damaging of parts which take part in the security can have very serious consequences. SCORPA recommends you to check visually those sensitive spots. If necessary, a more detailed check is naturally advocated. In case you have any doubt, do not hesitate to get in touch with your dealer.

4.1 Check points before use

Heading	Check points
Fuel	• Fuel level check. • Filling up if necessary. • Fuel hose check to detect a possible leak.
Engine oil	• Engine oil level check. • If necessary, filling up to the recommended level, with the indicated oil: *Motul 300V Sport 100% synthesis-ester-SAE 10w40.* • Visual check to detect a possible leak.
Front brake	• Check of the functioning. • In case the brakes are soft or spongy, ask your dealer to bleed the circuits. • Check of the play of the lever. • Adjustment if necessary • If necessary filling up to the recommended level : **Motul Brake fluid DOT 5.1 or 4** • Check of the circuit to find a potential leak.
Rear brake	• Check of the functioning. • In case the brakes are soft or spongy, ask your dealer to bleed the circuits. • Check of the play of the lever. • Adjustment if necessary. • If necessary filling up to the recommended level: **Motul Brake fluid DOT 5.1 or 4** • Check of the circuit to find a potential leak.
Throttle	• Make sure of the functioning progressiveness. • Check of the play of the accelerator cable. • If needs be, ask your dealer to adjust the play, and to lubricate the cable and the housing of the accelerator handle.

Clutch	• Check the functioning • Check of the play of the lever • Adjustment if necessary
Chain	• Check of the tension. • Adjustment if necessary. • Check of the condition. • Lubrication if necessary: *Motul Chain lub Off Road.*
Wheels and tyres	• Check of the condition. • Check of the depth of the treads. • Check of the air in the tires. • Bring back to the recommended pressure if necessary.
Gearshift lever	• Make sure of the functioning progressiveness and regularity. • Lubrication of the rotating parts if necessary: *Motul EZ Lub.*
Brake levers and clutch lever	• Make sure of the functioning progressiveness and regularity. • Lubrication of the rotating parts if necessary: *Motul EZ Lub.*
Frame fastenings	• Check of the nuts and screws tightening. • Tighten if necessary.
Lights, signalling and electric contacts	• Check the functioning • Adjustment and correct if necessary

NB: It is strongly recommended to check all those points before each use. It only takes a few minutes and the security depends on it.

WARNING

In case there still is a problem after the adjustments, fillings and lubrications please make it check by your dealer before starting or using the bike.

5 INSTRUCTIONS AND ADVICES BEFORE STARTING

WARNING

Before using the T-ride, it is recommended to familiarize yourself with the engine and verify all of the functional commands in a non-hazardous area. When in doubt, refer to the T-ride manual and if need be your local dealer.

The engine never must be started in a closed area or room, even for a very short period of time because exhaust gases could very toxic. Some of them are colorless and odorless, but can cause very serious suffocating (even fatal).

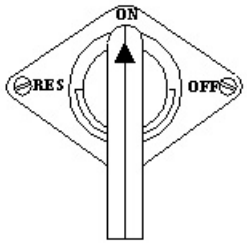
5.1 Starting (cold engine)

❖ Start up with the kick:

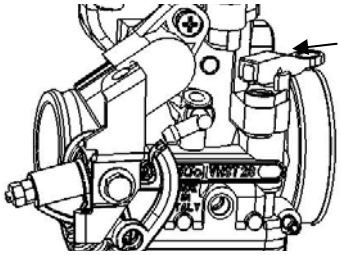
Before you start the engine, you have to put the gearbox in neutral position for security reasons:

- The gearbox is placed on neutral
- If the bike is in gear, the clutch lever must be pulled and the side stand folded up.

1. Turn the tap towards to 'ON':



2. Pull the choke lever and release the accelerator handling:



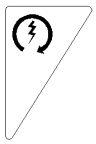
3. Turn the key on the position IGNITION:

4. Spread the kick-starter.
4. Place you right foot on it and step very violently on it towards to the ground.
5. If the engine does not start, operate the two last indications again.
6. As soon as the engine starts, release the first half of the choke lever.
7. When it is warm enough, release totally the choke lever.

❖ **Start up with the electric start:**

The step 1, 2 et 3 are the same compared kick start.

4: Push the button to start situated on the Comodo on the left part of the handlebar:



5. If the motor don't start, back to the step 4.
6. From the starting up of the engine, leave the starter activated without putting of gas
7. When it is warm enough, release totally the choke lever.

NB: you can consider that the engine is warm enough when it accelerates well, even when the choke is totally released.

WARNING: in order to improve the useful life of your vehicle, make sure the engine is not excessively accelerated until it is warm enough!

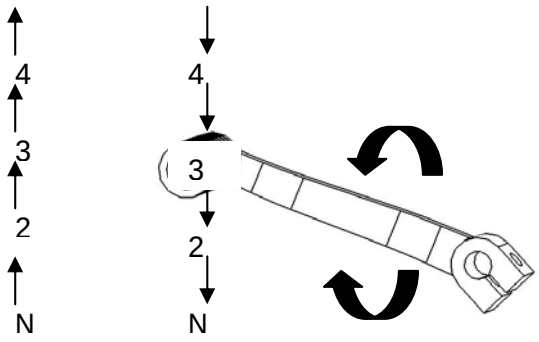
5.2 Start (when the engine is already warm)

The process is the same as this with a cold engine, but you do not have to use the choke here.

5.3 Gear change

The gearbox allows you to control the power transmitted to the rear wheel. That is very useful for the hill starts, the accelerations, the hills and the bends...

This diagram shows the way you must use to change the gears thanks to the gearshift lever.



1

WARNING:

- It is recommended not to ride on the neutral for a too long time, especially when the engine does not run. Do not tow the bike for long distances, even on neutral. The lubrication of the gearbox is only sufficient when the engine runs. The problem is that a lack of lubrication will damage seriously the gearbox, even the engine of your bike.
- It is essential always to operate the clutch lever when you change the gears. Otherwise you will damage the gearbox, the engine and the transmission. Those parts are not conceived for such shocks and stresses, caused by the change in force of the gears.

5.4 Fuel consumption reduction

The fuel consumption directly depends on the way you ride. Despite everything, a few tricks can help you to save up in this field:

- Release the choke as soon as possible.
- Change quickly the gears, without letting it rev hard during the acceleration.
- Do not accelerate needlessly during the deceleration or during the stops.
- Stop the engine when the traffic jam is long enough, or in front of a level crossing.

5.5 Engine lapping

The length of the bike's use life depends on the first 12 hours of use. That implies you have to respect scrupulously the following indications. During the lapping, all parts are new and must grind each other. The fragility of the parts during this period imposes not to subject them to violent shocks and important stresses for a long time.

- 0 to 6 hours

Avoid accelerating more than a third of the throttle for a long lapse of time.

- 6 to 12 hours

Avoid accelerating more than an half of the accelerator handling for a long period.

- At 12 hours

Replace the engine oil and clean the oil filter element.

- After 12 hours

The running-it is complete. You also can use the bike in the normal conditions, which are given in this manual.

⚠ **WARNING**: If a problem appears during the lapping, SCORPA recommends submitting the matter to your dealer as soon as possible.

5.6 Parking

When the bike is parked, the control of the fuel tank tap has to be turned to 'OFF'.

⚠ **WARNING**

- The hot engine and exhaust pipes could cause very serious burns to the children or to the pedestrians. Therefore it is really imperative to park the bikes in a way which help to prevent the people from burning themselves with those hot metallic parts.
- Take care to the area where you decide to park the bike.

6 MAINTENANCE AND LITTLE REPAIRING

A good motorbike rider is first and foremost expected to worry about the security. Those precautions begin by taking care about the 'active security'. That means that the rider has to respect the indications given in this manual about the checks, the maintenance, the adjustments and lubrications.

The different checks are listed in the paragraph which title is '**CHECK LIST BEFORE USE**'. The other indications are going to be given to you in the current paragraph.

NB : All pieces of information given in this manual are adapted for the normal conditions of use and ride. Each owner is expected to adapt all values and frequency for his way of driving and for the particular using conditions of his vehicle. If the use can be considered as sporting or intensive, or if the atmospheric and area conditions are bad, the frequency of checks, maintenances and lubrications must be shortened.

WARNING

If you do not master the techniques enough, or if you do not have the required tools, it is preferable for you to leave the work to your dealer.

6.1 Tools

In most operations are only used usual tools. So they often can be bought in simple equipment or do-it-yourself stores. If you do have not the necessary tools for one of the task, you can leave the work to your dealer.

6.2 Regular lubrications and maintenance

NB : An annual global check of the bike must occur only in case no check has been done in the year. The operations preceded by an asterisk can only be carried out by people specially trained, with the required tools. In fact, it would be safer to delegate the complicated maintenance to them.

Elément	Checks / Maintenance	Frequency				
		After lapping	Each race (or 3h)	Every 500 km	Every 1000 km	Every 5000 km
Fuel hose	• Check the state of the hose (no leak and not cracked)	◆	◆		◆	
Spark plug	• Check the valve clearances (cold engine) and the play • Adjust (every 6 months)	◆		◆		
	• Replace					◆
Valves	• Contrôler le jeu aux soupapes (à froid) • Régler (tous les 6 mois)	◆		◆	◆	◆
	• Check the valve seats and valve stems for wear			◆		◆
	• Replace					◆

Valve springs	• Check the free length and the tilt • Replace			◆		◆
Valve lifters	• Check for scratches and wear • Replace			◆		◆ ◆
Camshafts	• Inspect the camshaft surface • Replace			◆		◆ ◆
Timing chain sprockets, timing chain	• Check for wear on the teeth and for damage • Replace			◆		◆ ◆
Piston	• Inspect crack • Clean carbon deposits • Replace			◆		◆ ◆ ◆
Piston ring	• Check ring end gap • Replace			◆		◆ ◆
Piston pin	• Inspect • Replace			◆ ◆		◆ ◆
Cylinder head	• Clean carbon deposits • Change gasket			◆		◆
Cylindre	• Inspect score marks and wear, clean • Replace			◆ ◆		◆ ◆
Air filter element	• Clean with *Motul air filter clean* • Lubricate with *Motul air filter oil* • Replace	◆	◆			◆
Clutch	• Inspect housing, friction plate, clutch plate and spring • Adjust • Replace	◆ ◆	◆ ◆			◆ ◆
Transmission	• Inspect • Replace the bearing	◆	◆			◆
Shift fork, shift cam, guide bar	• Inspect wear	◆	◆			◆
Rotor nut	• Retighten	◆	◆	◆		◆
Exhaust pipe, silencer	• Inspect and retighten • Clean • Replace	◆ ◆ ◆	◆ ◆ ◆	◆ ◆ ◆		◆ ◆ ◆
Crank	• Inspect and clean		◆	◆		◆
Cooling system	• Check coolant level and leakage • Check radiator cap operation • Replace coolant • Inspect hoses	◆ ◆ ◆	◆ ◆ ◆	◆ ◆ ◆		◆ ◆ ◆
Screws and nuts	• Inspect and retighten all screws and nuts	◆	◆	◆		◆
Frame	• Clean and inspect	◆	◆	◆		◆

Fuel tank, cock	• Clean and inspect	◆	◆	◆		◆
Brakes	• • Adjust lever position and pedal height • Lubricate pivot point • Check brake disc surface • Check fluid level and leakage • Retighten brake disc bolts, caliper bolts, master cylinder bolts and union bolts	◆	◆			
	• Replace pads					◆
	• Replace brake fluid				◆	◆
Brake hose	• Check the state • Make sure the hoses are not cracked and there is no leak	◆		◆		
	• Replace					◆
Tire, wheels	• Inspect aire pressure, wheel run-out, tire wear and spoke looseness • Retighten sprocket bolt	◆	◆			
	• Inspect bearings			◆		
	• Replace bearings					◆
Wheel bearing	• Check the lack of damage and of an excessive play	◆	◆			
Swingarm	• Inspect, lube and retighten • Check the excessive play in the arm	◆	◆			
Transmission chain	• Check the chain tension • Check the alignment of the rear wheel • Clean with *Motul chaine clean* and lube with *Motul chaine lub off road*	◆	◆			
	• Dismount and lube the chain puller	◆	◆	◆		◆
	• Replace the chain					◆
Guide chain and training wheel	• Check	◆	◆			◆
Steering head	• Inspect free play and retighten	◆	◆			◆
	• Clean and grease	◆	◆	◆		◆
	• Replace the bearings	◆	◆			◆
Direction bearings	• Inspect free play and hard point in the direction	◆	◆			
Frame screws	• Check the screws and the nuts • Check if the guard is tightened	◆	◆			
Side stand	• Check the functionning • Lube	◆		◆		
Front fork	• Check the functionning and the leak, adjust	◆	◆			
	• Replace oil	◆	◆	◆		
	• Replace oil seal • Check if the crowns are tightened					◆

Front fork oil and dust seal	• Clean and lube (with lithium base grease)	◆	◆			◆
Rear shock absorber	• Check the functionning and the lack of leak, adjust, retighten • Lube (after rain ride)	◆	◆	◆	◆	
Carburettor	• Check the funtionning of the choke • Adjust the idle • Clean	◆	◆			
Engine oil	• Replace • Check the level of oil and the lack of oil leak	◆	◆	◆		◆
Oil tank	• Control the absence of leak • Tighten or to change	◆	◆	◆		◆
Oil filter	• Replace	◆		◆		
Moving parts	• Lube		◆			
Accelerator cable and handle	• Check routing and connection and play • Lube with *Motul EZ lube* • Inspect and clean (throttle cable)	◆	◆			
Clutch lever	• Check routing and connection and play • Lube with *Motul EZ lube* • Inspect and clean (throttle cable) • Check routing and connection and play • Lube with *Motul EZ lube* • Inspect and clean (throttle cable)	◆	◆			◆
Lights, signalling and electric contacts	• Check the functionning • Adjust the beam of lights • Check the functionning of the front brake electric contact	◆	◆			

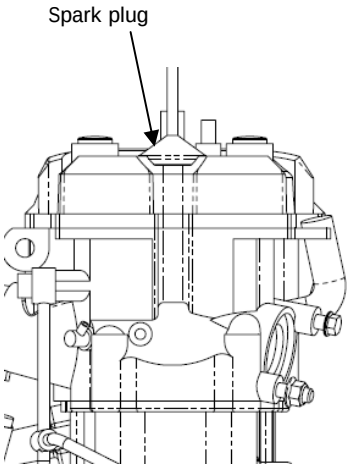
NB :

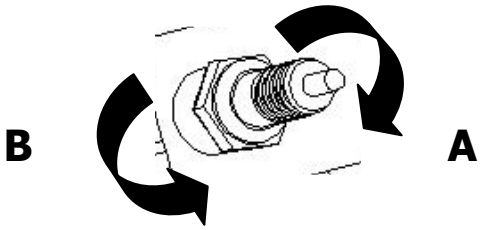
- The 'unusual' conditions of use must imply the increase of the maintenance frequency. All the parts which have to be lubricated or greased are concerned, as far as the air filter, which needs to be more frequently and after all "off road" ride. Those conditions are the rain, the humidity, the sand or the dust.

- The T-Ride is equipped with two hydraulic disk brakes, which require a special maintenance :
  - Replacement of the brake master-cylinders components and callipers and the brake fluid change every two years.
  - Replacement of all brake hoses every four years or as soon as they are cracked or there is a fluid leak.

- After all "off road" ride you must carry out all the controls indicated in this table.

6.3 Spark plug check





The spark plug has one of the essential roles in the functioning of the engine. That is why it is really of the primordial importance to check its state as often as written in the list. Bad adjustments, the heat and all the deposits can all damage the spark plug. For this bike, SCORPA recommends to use the following model : *NGK R CR 8E*

In order to take the spark plug off, follow those two stages:

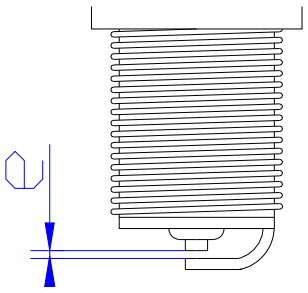
1. Take off the anti-interference system
2. Unscrew the spark plug in the direction (B) thanks to a spark plug spanner.

The spark plug state check consists in two stages too:

1. Make sure the porcelain color around the electrodes is dark or light coffee colored, because that color shows the spark plug works in good conditions.
2. Check the weakening level and that the carbon deposits thickness are not excessive. If one of those situations happens, it is time to replace the spark plug.

There are four phases in the spark plug reassembly :

1. Measurement of the electrodes gap, thanks to a wedge whole set. If needs be, adjust to the recommended value: 0,6 to 0,7mm



2. Clean the joint surface and the spark plug thread.

3. Put the spark-plug in the cylinder-head. Then begin to tighten it with the hand, in order not to damage the head cylinder tapping (direction A). Tighten the spark plug thanks to torque wrench: the recommended torque is : 17,5 Nm (1,75 m.kgf).
If you have not got this tool, the solution is to tighten with the hand at the most, before to tighten from ¼ to ½ turn with a usual wrench. After that, adjust to the recommended torque with a torque wrench as soon as possible.

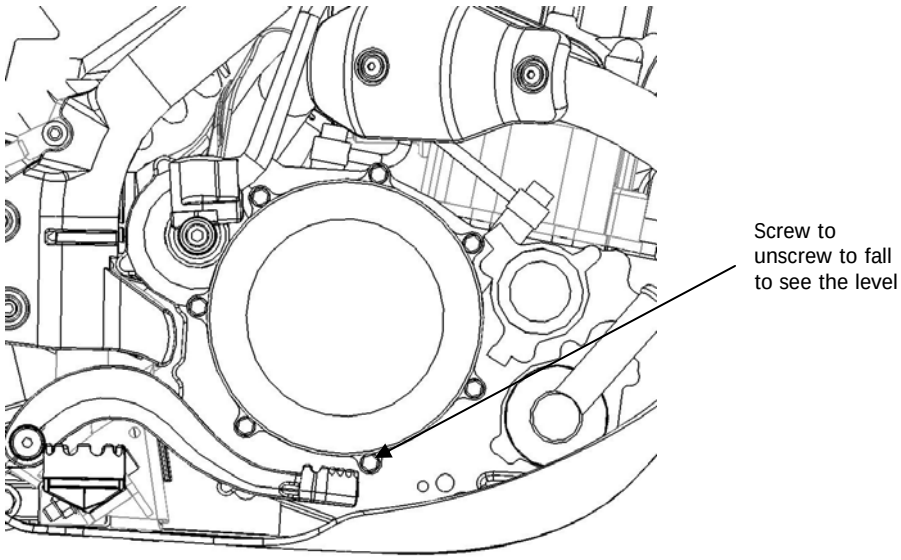
4. Put back the spark plug cap.

6.4 Engine oil

It is imperative to check the engine oil level before every use. The lack of engine oil can cause an insufficient lubrication of the moving parts as far as a superheating. The list of regular maintenance and lubrications gives you the recommended frequency for each task. For a greater longevity of the engine, use the *Motul 300 V 100 % synthesis-ester-SAE 10w40 four strokes high performances.*

6.4.1 Engine oil level check

1. Start the engine during five minutes.
2. Place the motorcycle on a horizontal ground and position it upright.
3. The control is made at the level of the driving crankcase of clutch by falling the screw the lowest of the crankcase. The level of oil has to be on the surface of the hole of the screw, that is by tilting any young little the motorcycle to the right, the oil has to flow. If it is necessary to tilt excessively the motorcycle, it means that there is enough oil in the engine. Control made when the engine is hot.

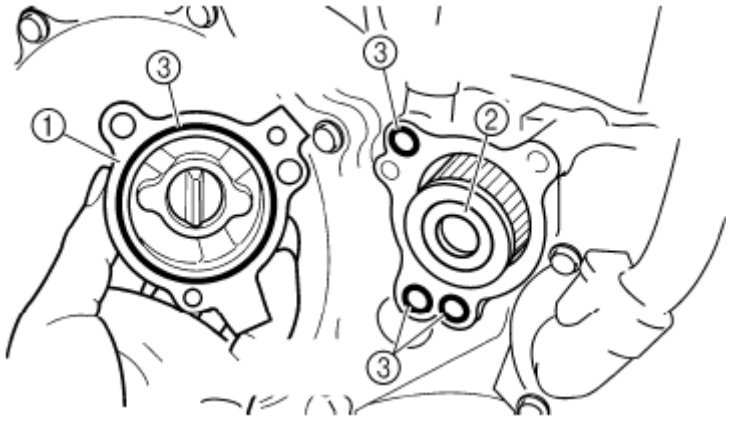


4. In case there is not oil enough, add oil up to the recommended level. The oil filling up hole is on the top of the ignition crankcase.

6.4.2 Oil change

1. Start the engine and let it warm up for a few minutes, and after that switch it off.
2. Put an oil change tray under the oil drain plug. It will help you to collect the old oil.
3. Unscrew the cap and the drain plug. The oil should begin to flow.
4. to empty the oil tank, unscrew the banjo screw of the right oil hose who is near the engine.
5. As soon as all the oil of the engine is evacuated, screw up the drain plug.
6. Fill the engine with *Motul oil 300 V 100 % synthesis-ester-SAE 10w40 four strokes high performances* by the opening of filling by taking care to check the oil level with the stopper of filling.
7. Start the engine and to let it heat a few minutes, then to switch it off.
8. Check the oil level again (see paragraph on the control of the oil level).

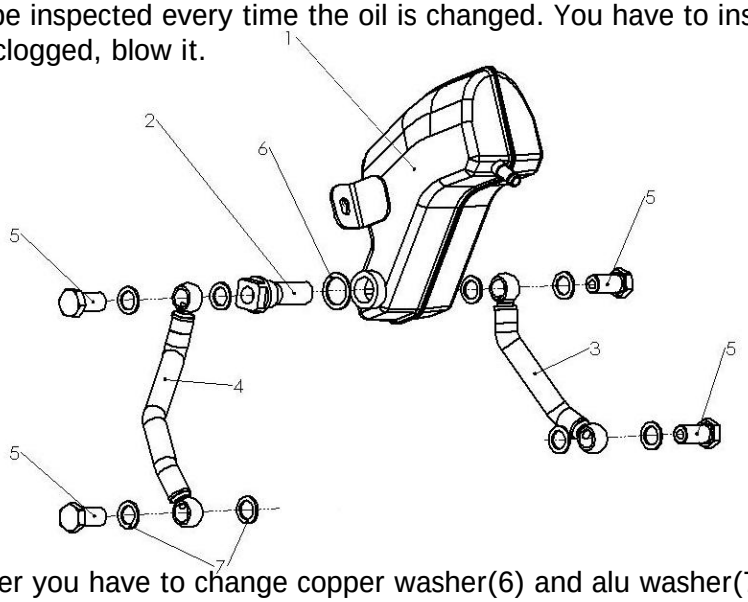
6.4.3 Oil filter change



1. Remove the guard engine
2. Open the drain plug and remove the cover of the oil filter (1).
3. Change the oil filter (2).
4. To remove the screw highly-rated straight ahead of the cover oil and cleaning the oil strainer (to see paragraph "Inspection of the oil strainer").
5. Check O-rings (3) and replace them if they are cracked or damaged.
6. Install the new oil filter and the cover.
7. Install the drain plug and the guard engine.
8. Pour 1.3L of oil Motul 300V 100 % synthese-ester SAE 10W40 high performance by the opening of filling.
9. Start up the engine and let it warm some minutes, then switch off it.
10. Verify again the level of oil. (See paragraph on the control of the level of oil).

6.4.4 Inspection of the oil strainer

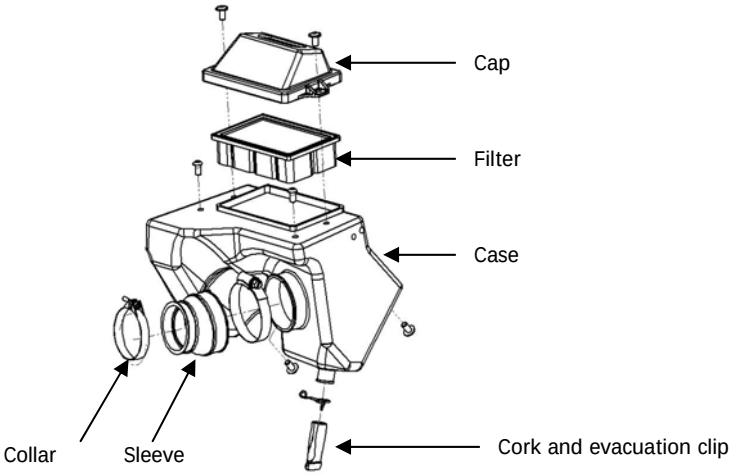
Oil strainer (2) needs to be inspected every time the oil is changed. You have to inspect if it is not clogged. If oil strainer is clogged, blow it.



Before installing oil strainer you have to change copper washer(6) and alu washer(7).
(refer to oil tank part)

6.5 Air filter cleaning

In order to keep the high level of performances of the bike and its reliability, it is essential to clean regularly the air filter, following the indications given by the list of regular checks and maintenance. As it has already been advised, the cleaning must be more frequent if the atmospheric and use conditions are humid or dusty.



Follow the 8 stages:

1. Pull out .the cap.
2. Separate the protection cover and the filter.
3. Clean the filter with *Green filter NH10.*
4. Coat the filter with recommended oil, *Green filter NH10*, then remove the excess.
5. Make sure that the protection cover is clean and dry, if necessary clean off excess dirt and dry with a clean cloth.
6. Put the protection cover back over the filter.

6.6 Carburetor adjustment

The carburetor is one of the essential parts for the functioning of the engine, in order to have the best performances, and to increase the engine reliability. It needs to be very precisely adjusted, preferably by a professional especially trained and tooled.

6.6.1 Tuning engine

The air/fuel mixture will vary depending on atmospheric conditions. Therefore, it is necessary to take into consideration the air pressure, ambient temperature, humidity, etc... when adjusting the carburetor. Perform a test run to check for proper engine performance (e.g., throttle response) and spark plug discoloration or fouling. Use these readings to determine the best possible carburetor setting.

NOTE:
It is recommended to keep a record of all carburetor settings and external conditions (e.g., atmospheric conditions, track/surface conditions, lap times) to make future carburetor setting easier.

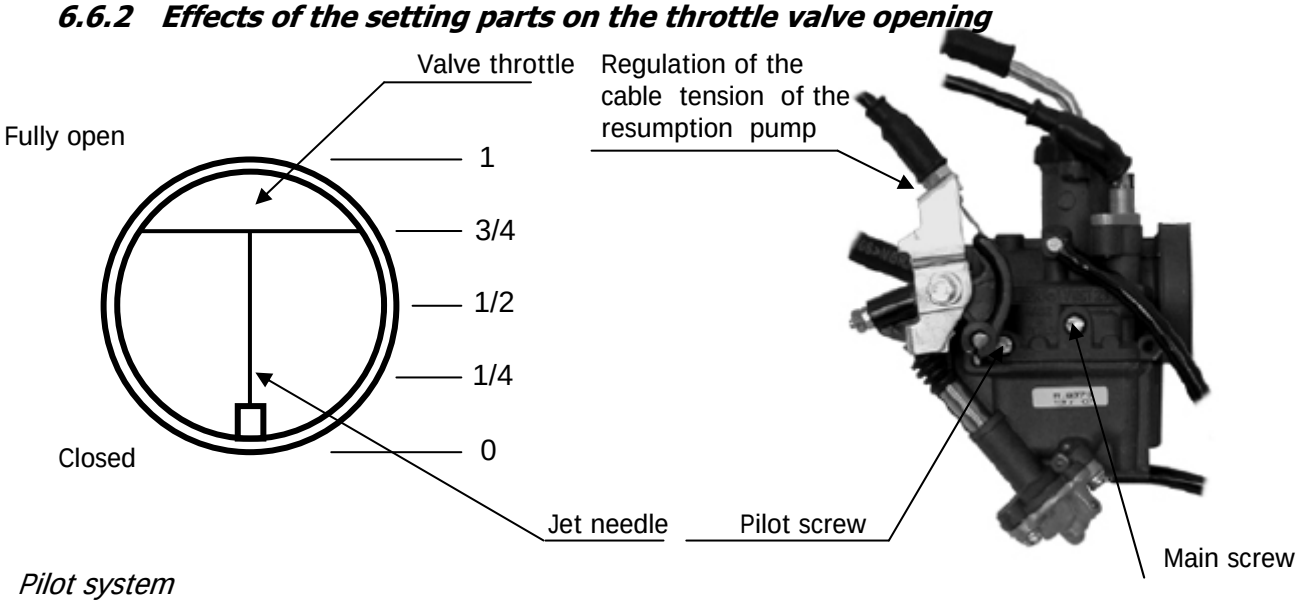
WARNING

- The carburetor is a part of the fuel line. Therefore, be sure to install it in a well-ventilated area, away from flammable objects and any sources of fire.
- Never look into the carburetor intake. Flames may shoot out from the pipe if the engine back-fires while it is being started. Gasoline may be discharged from the accelerator pump nozzle when the carburetor has been removed.

- The carburetor is extremely sensitive to foreign matter (dirt, sand, water, etc.) During installation, do not allow foreign matter to get into the carburetor.
- Always handle the carburetor and its components carefully. Even slight scratches, bends or damage to carburetor parts may prevent the carburetor from functioning correctly. Carefully perform all servicing with the appropriate tools and without applying excessive force.
- When the engine is stopped or when riding at no load, do not open and close the throttle unnecessarily. Otherwise, too much fuel may be discharged, starting may become difficult or the engine may not run well.

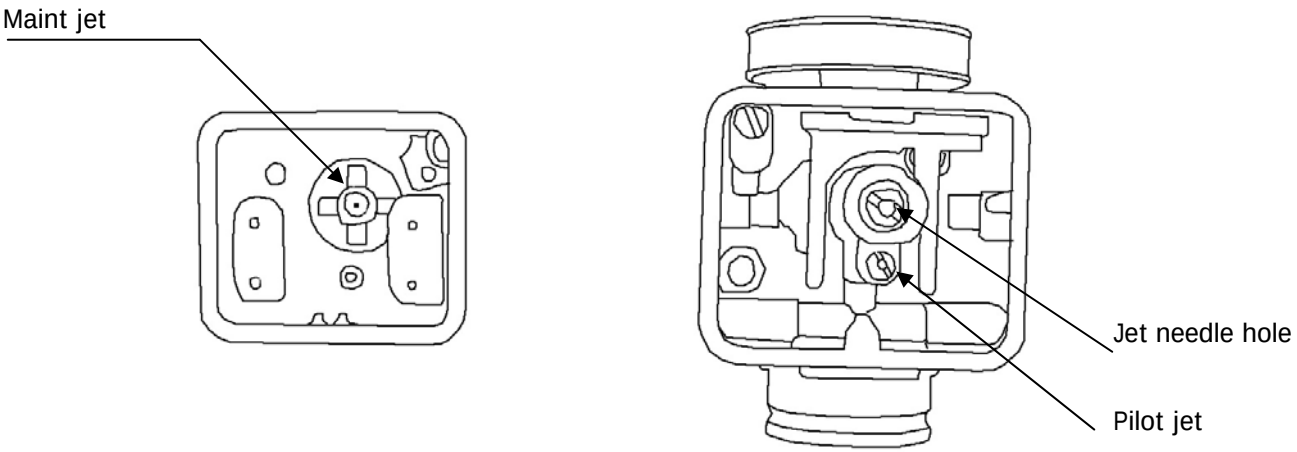
After installing the carburetor, check that the throttle operates correctly and opens and closes smoothly

6.6.2 Effects of the setting parts on the throttle valve opening



Pilot system

The FLATCR carburetor is manufactured with a pilot screw. The pilot screw adjustment ranged from fully closed throttle (don't tighten) to 3 turn open throttle.



Main jet adjustment
The richness of the air-fuel mixture at full throttle can be set by changing the main jet.
If the air-fuel mixture is too rich or too lean, the engine power will drop, resulting in poor acceleration.

Main screw adjustment
The richness of the air-fuel mixture with the throttle fully closed to ¼ open can be set by turning the main screw. Turning in the main screw will make the mixture lean at low speeds, and turning it out will enrich it.

NOTE :
If the engine idling speed fluctuates, turn the main screw only ½ of a turn in either direction.

Pilot jet adjustment
The richness of the air-fuel mixture with the throttle open ¼ or less can be set by adjusting the pilot jet.

Jet needle groove position adjustment
Adjusting the jet needle position affects the acceleration when the throttle is 1/8 to ¾ open.

Too rich at intermediate speeds
Rough engine operation is felt and the engine will not pick up speed smoothly. In this case, step up the jet needle clip by one groove and move down the needle to lean out the mixture.
Too lean at intermediate speeds
The engine breathes hard and will net pick up speed quickly.
Step down the jet needle clip by one groove and move up the needle to enrich the mixture.

Jet needle adjustment
The needle is adjusted by changing it. The needles are available with different straight-portion diameters and with different tapered sections.

Regulation of the pump of resumption
Turn the throttle handle, when the valve start to go up, the actuator of the pump of resumption have to start to turn. In contrary you have to set the tension of the pump cable. The valve and the actuator have to start to move at the same time.

6.7 Play of the valves

As the time goes along, the play of the valves changes and it may alter the ratio of air to fuel of the inlet air-fuel mixture.
The solution is so to make it adjust by your dealer, as often as written in 'List of the regular maintenance and lubrications'.
It is a really complicated operation, which requires a professional expertise.

6.8 Wheel-axle units

6.8.1 Front wheel removal

1. Loosen the front wheel-axle and the screws on the bottom of the front fork arms.
2. Lift the front wheel, by using a raising stand or by putting a jack under the engine protection. Take care the bike is stalled enough to prevent it from overturning.
3. Remove successively the axle and the wheel.

6.8.2 Front wheel fitting

1. Lift the wheel up within the two front fork arms, and make sure the brake disk is situated within the brake pads.
2. Thread the wheel axle through the right front fork arm, the wheel hub, the spacer and the left front fork arm.
3. Tighten the screw on the right front fork arm.
4. Tighten the axle to the recommended torque: **30 Nm (3,0 m.Kgf).**
5. Loosen the screw on the right front fork arm, compress the fork many time.
6. Tighten the screws on the bottom of the front fork arms.

6.8.3 Rear wheel removal

1. Loosen the wheel axle nut.
2. Turn the two chain tension eccentrics in the direction which allows the wheel to move towards the front of the bike.
3. Lift the rear wheel, by using a raising stand or by putting a jack under the engine protection. Take care the bike is stalled enough to prevent it from overturning.
4. Remove successively the axle nut and the axle.
5. Make the wheel move to the front of the bike, and remove the chain from the rear sprocket.
6. Remove the rear wheel from the swinging arm.

6.8.4 Fitting of the rear wheel

1. Place the wheel within the arms and put back the chain on the rear sprocket (not completely).
2. Thread the axle through the first eccentric and through the first arm of the swinging arm.
3. Place the brake calliper in order to stop it on the swinging arm lug and to align its axle and this of the wheel.
4. Thread the axle through the hub and the brake calliper, then through the second arm and the second eccentric.
5. Tighten the nut on the wheel axle.
6. Let the rear wheel lean on the ground.
7. Adjust the tension of the transmission chain by turning simultaneously the two eccentrics
8. Tighten the axle nut to the recommended torque: **60 Nm (9,0 m.Kgf).**

6.9 Tires

Here are the different principles to follow, with the aim to improve the use life, the performances and the security of your tires.

- Air in the tires : it must be checked and adjusted before each use :

Recommended pressure (checks on cold tires)	
Front tire	Rear tire
100kPa (1,0 kgf/cm² = 15psi)	193 kPa (1,93 kgf/cm² = 28 psi)

WARNING

The load carried by the vehicle has an important impact on the engine performances, on the braking, on the suspension, but first and foremost on the road holding and on the tyres performances. To avoid risks at the maximum, a few precautions have to be taken:

- DO NOT EXCEED THE TECHNICAL MAXIMAL LOAD. That could damage the tyres, and even the lost of control by the rider so that an accident could happen.
- Make sure meticulously that the transported objects are efficiently stowed. Try to place the heaviest objects near the center of the bike, and check they are well shared out among the left and the right.
- Adapt the air in the tires to the transported load.
- The air in the tires, their condition and the depth of their treads must be checked before each use.

6.9.1 Check of the conditions and of the treads depth of the tires

Some conditions must imply the replacement of the concerned tire:

- If the depth of the treads has reached the minimum legal value,
- If there are one or some foreign bodies (nail, glass or metallic fragments) inlaid in the tire,
- If the flanks of the tire are cracked.

NB: the minimum depth of the treads is not the same everywhere in the world. That is why it is advisable to respect the legal value of the Country where you are riding.

6.9.2 Pieces of information about the tires

- The front and rear tires are preferably from the same manufacturer, with the same structure, with the aim to improve the road holding.
- Here are the different tires which are homologated for the SCORPA T-Ride 250F :

Front :

Fabricant	Taille	Modèle
Vee Rubber	2,75-21"	VRM308F

Rear :

Fabricant	Taille	Modèle
Vee Rubber	4,00-18"	VRM308R

6.10 The spoke wheel

The normal functioning of the bike, its reliability and the security depend on the following precautions:

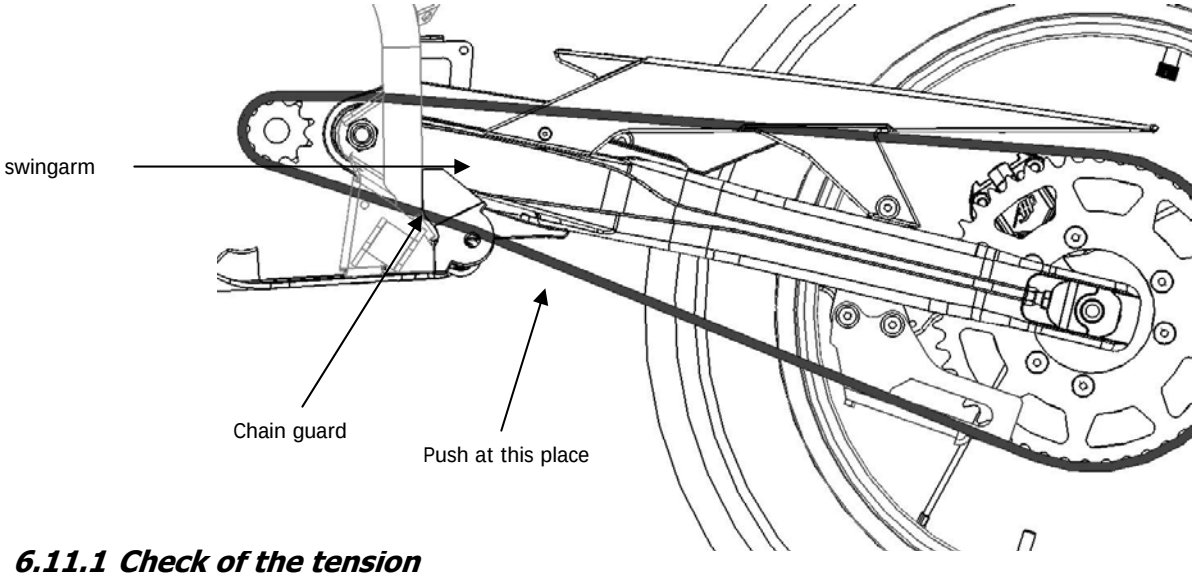
- Before each use, check the lack of cracks on the rims
- Check the spoke tightening and tighten it again if necessary as explained in the dedicated paragraph.
- Make sure the wheel is not buckled.
- Every time the tire or the rim is replaced by another, it has to be rebalanced. A non-balanced wheel disrupts the road holding and shortens the length of the use life.
- After the tire replacement, it is advised not to ride to fast, until the tire is well run.

⚠ WARNING

Never try to repair an old and cracked or a buckled rim! It must imperatively be replaced by a new one.

6.11 Transmission chain

The tension of the transmission chain has to be check before each use, and adjusted if it needs to be.

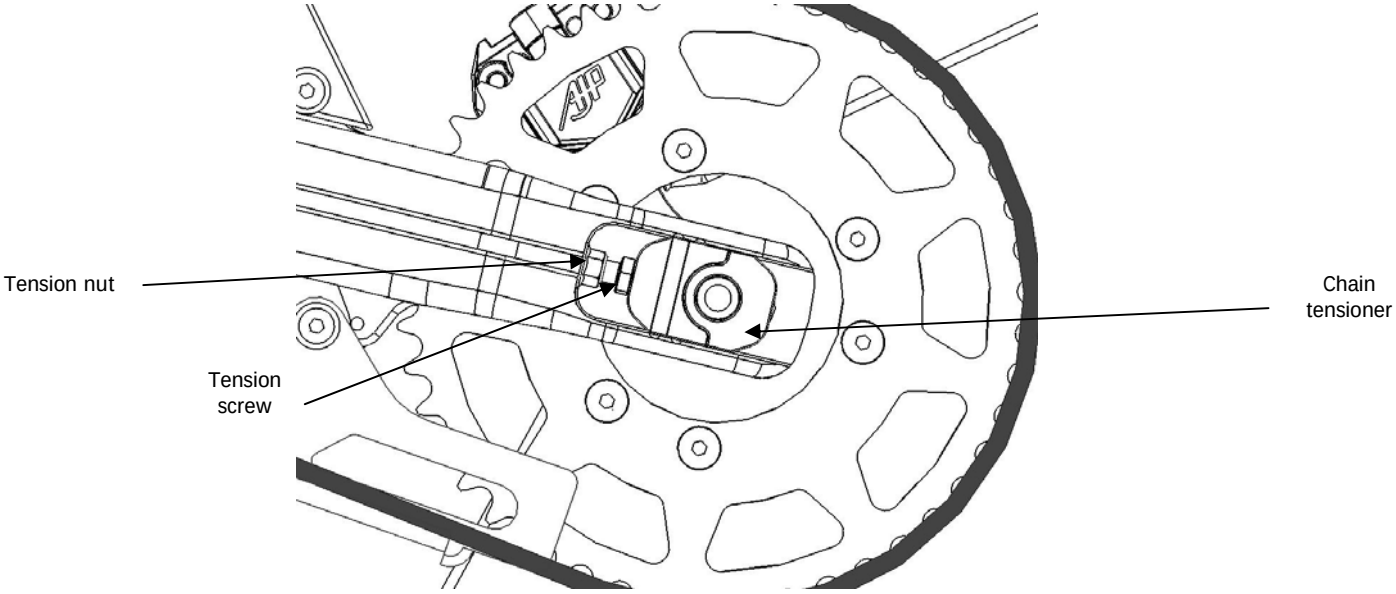


6.11.1 Check of the tension

1. Place the bike on a horizontal area and set it upright. Careful! There must not be any load on the bike, during the checks.
2. Put the gearbox in neutral.
3. Make the bike move forward, in order to locate the place where the tension is at its maximum.
4. Check the distance between the rubber chain-adjuster and the swinging arm as shown on the diagram. The distance must be bounded by 9 and 11 mm**.**

6.11.2 Setting

1. Loosen the rear wheel axle.
2. To tighten the chain, turn the left eccentric clockwise (c) and the right one anticlockwise. On the contrary, to release the chain turn the right eccentric clockwise (c) and the left one anticlockwise, then push the wheel towards the front of the bike, until the eccentrics lean on their stop on the swinging arm again.
3. Tighten the wheel-axle nut to the recommended torque: **60 Nm (6,0M.Kgf).**



NB: The two eccentrics must be adjusted exactly in the same way and the same position, to keep the wheel aligned with the rest of the bike. To do this setting, you have to use the geometry of the chain tensioner who are symmetrical and the machining of the swingarm.

WARNING: if the chain is not tightened enough, it can cause chain jumps and even the wheel locking, which imply the risk to make the rider fall. Moreover, that includes very strong stresses on the transmission parts (chain, sprockets) and on the engine.

6.11.3 Lubrication

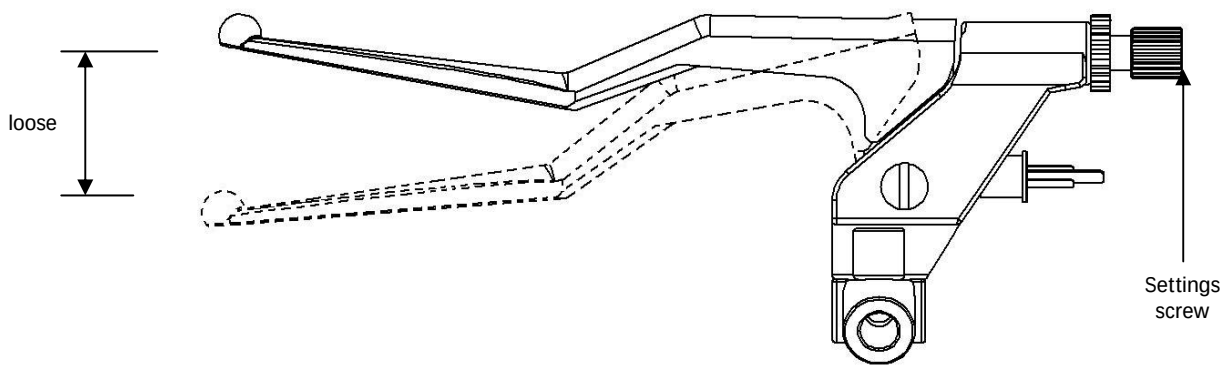
It is essential to clean and lubrication the chain as often as said in the 'List of the regular maintenance and lubrication'. Otherwise, the chain will deteriorate quickly, particularly if you ride in humid and dusty areas.

- After the first cleaning of the bike, brush out the mud and the grime thanks to an old piece of rag or a brush.
- Spray **Motul chaine lub off road** for transmission chain onto the chain, on both sides and on the top of the chain, to lubricate at best all the rolls.

6.12 Adjustment of the clutch lever loose

The clutch lever play must be bounded by 10 and 15 mm as shown on the following diagram. It has to be checked and adjusted before each use. Here is the process:

3) Loosen the lock nut of the clutch lever.
4) To increase the loose, turn the screw clockwise. To reduce it, turn it anticlockwise.
5) Then there are two possibilities. In case the adjustment is efficient and sufficient, tighten the lock nut. In case not, ask your dealer to adjust it.

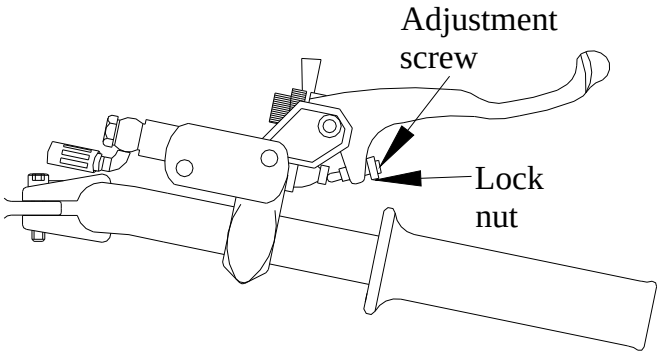


6.13 Brakes

WARNING

The new plates must be ground, so that the brake provides optimal proportioning and best deceleration. For that, make about thirty accelerations until approximately 30km/h, and slow down gradually until the total stop.

6.13.1 Adjustment of the brake levers loose



The front brake lever loose must be bounded by 5 and 8 mm. The way to measure it is the same as for this of the clutch lever. It has to be checked and adjusted before each use. Here is the process:

Loosen the lock nut of the brake lever.

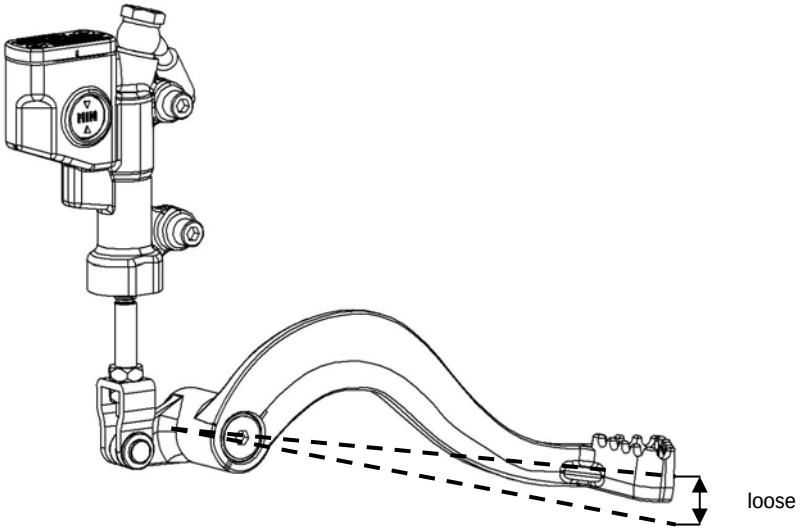
- To increase the loose, turn the screw clockwise. To reduce it, turn it anticlockwise.
- As soon as the recommended loosed is reached, tighten the lock nut. In case you do not manage to adjust it, ask your dealer to adjust it.

6.13.2 Adjustment of the rear brake pedal loose

The loose of the brake pedal must be bounded by 20 and 30 mm, as shown on the diagram. It must be checked regulary and adjusted to the recommended value, if necessary.

Loosen the lock nut of the brake pedal.

- Tighten the setting screw to increase the loose, and loosen it to reduce the loose.
- As soon as the good loose is reached, tighten the lock nut of the brake pedal.

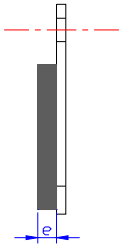


WARNING

- Check the functioning of the front brake every time you adjust the lever loose.
- If the lever gives a feeling of being spongy, it is probably due to air bubbles in the hydraulic circuit. You need confide the bleeding of the brake circuit to your dealer, to avoid a loss of braking efficiency.
- If the needed loose can not be reached, confide this task to your dealer.

6.13.3 Pad wear control

Take care to check the brake pads wear, in accordance to the frequency given by the 'List of the regular maintenance and lubricating:



Make sure that the thickness of the brake pads lining is sufficient. It must not be less than 1 mm. Otherwise, make the pads replaced by your dealer and your brakes adjusted.

WARNING

Don't touch immediately the disc or the brake pads after use, you are likely to burn you.

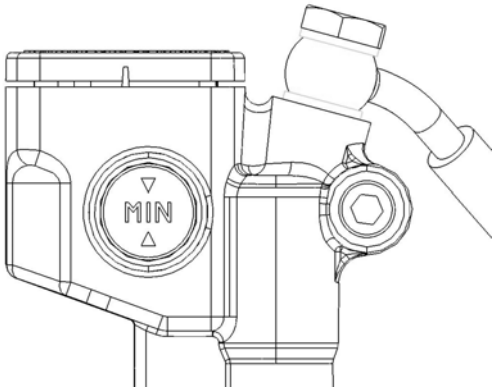
6.13.4 Brake fluid level control

If the level of brake fluid is not sufficient, that may create air bubbles in the hydraulic circuit; so that the brakes could work badly. The consequences could be very serious for the rider.

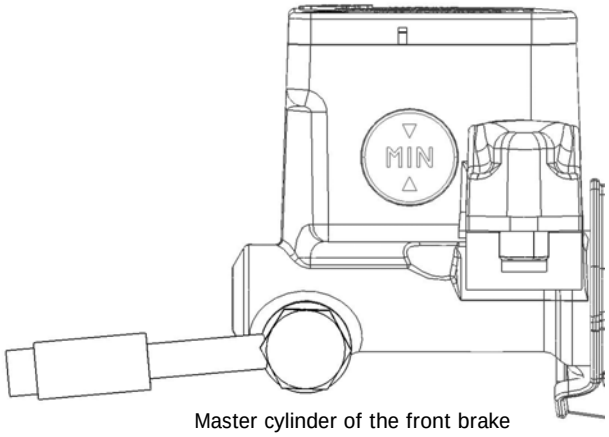
The regular check (before each use of the bike) and the filling up are essential.

The fall of the brake fluid level may be caused by an excessive pads wear or by bubbles in the hydraulic circuit. In this case, it is recommended to make sure the circuit is not cracked and there is no leak too.

A few precautions will help you to check and maintain at the best brake circuit of your bike.



Master cylinder of the rear brake



Master cylinder of the front brake

- The check of the brake fluid level must be operated when the top of the fluid tanks is horizontal, with the aim not to alter the level measurement.
- The filling up has to be operated with the recommended brake fluid: **Motul Brake Fluid DOT 5.1**, and the same type as this of the fluid of the circuit, to avoid the risk of chemical reaction.
- It is essential not to introduce bubbles of air in the brake fluid, because it could decrease the fusion temperature and to create steam in the circuit.

Be careful not to let brake fluid flow on plastic or painted parts during the filling up: wipe carefully with a soft piece of rag.

6.13.5 The brake liquid Change

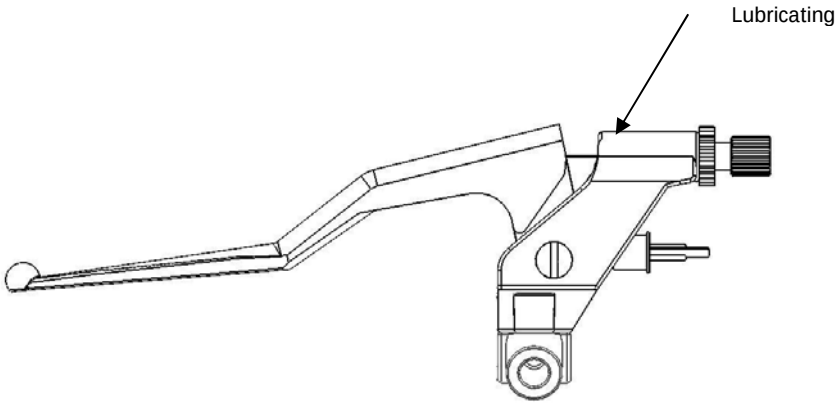
The brake fluid change must occur in accordance with the indications given in the 'List of the regular maintenance and lubricating.
It is preferable to confide this task to your dealer, and ask him to replace the collar joint of the master cylinder and of the caliper, as far as the brake fluid hose, following the recommended frequency and in case of leak of fluid.

- collar joint : replace every two years
- brake hose : replace every four years

6.14 Lubrications

6.14.1 Câble

The accelerator cable, the choke and clutch cables have to be checked before each use. So a good functioning of the controls is obtained and it is easier to detect all dry and damaged cables.

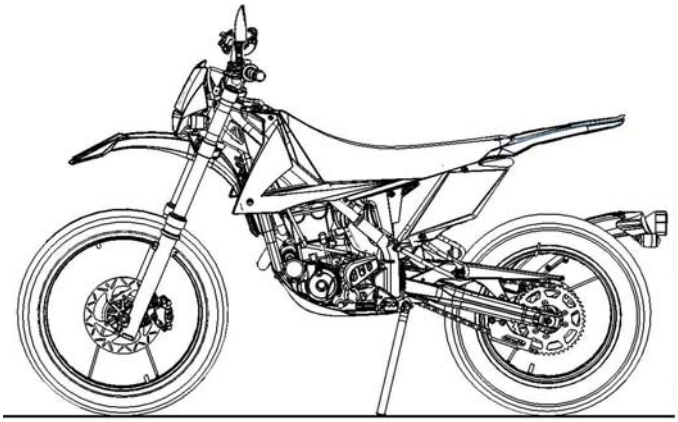


In case the cable is damaged, if the functioning is uneven, if the progressiveness of the control is insufficient or if the cable is damaged, it is vital to replace the defective part.
It is important to lubricate the cable as shown on the diagram, to the frequency given in the 'List of the regular maintenance and lubricating; recommended lubricant: *Motul EZ Lub multi protect*

6.14.2 Brake pedal, gearshift levers

The functioning of those controls must be given much care and needs to be checked before each use. If it needs to be, lubricate the articulations with the recommended lubricant, which is: *Motul Tech Grease 300*

6.15 Side stand



Just as for the levers, the functioning of the side stand has to be checked before each use. In fact, a bad functioning can prevent the side stand from folding up. If the stand does not totally fold up, it can make the driving very dangerous.
If needs be, lubricate the articulation of the stand as far as all contact surfaces, which take part in the rotation, with **EZ Lub multi protect**.

WARNING

If the side stand does not work properly despite the lubrication, it is strongly recommended to make it check by your dealer. If it needs to be, replace the defective part.

6.16 Front suspension

Furthermore, the owner must follow the indications of the board of the maintenances and the periodic greasing as for the lubrication of both points pivots of the back suspension. The recommended lubricant is Motul Tech Grease 300.

6.16.1 Inspection

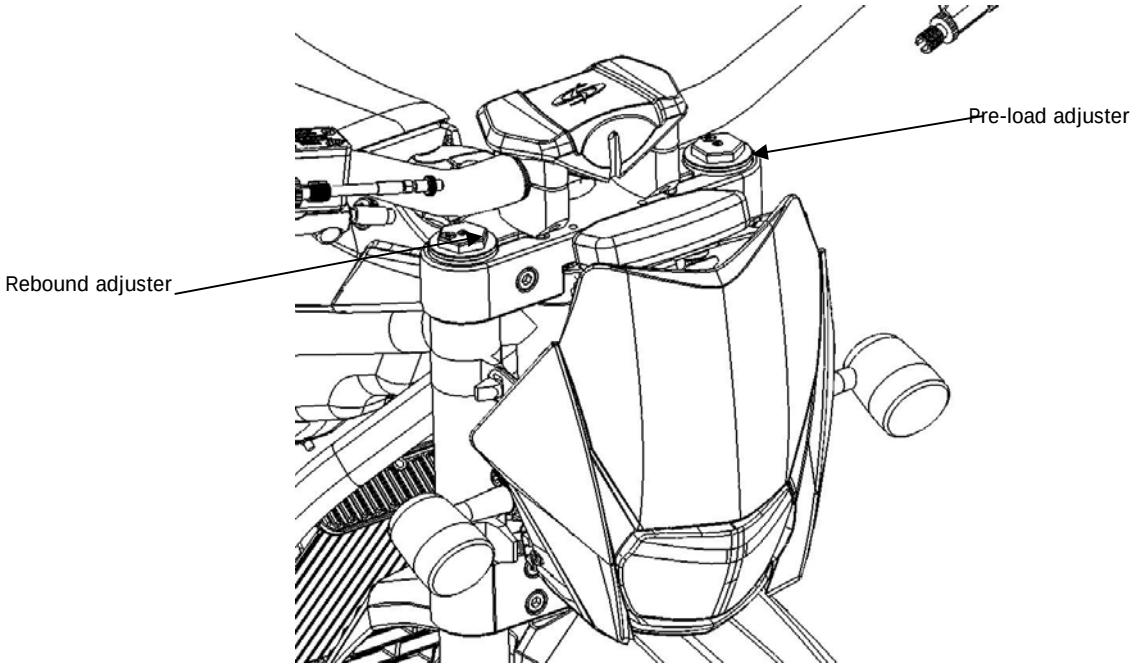
- Fork surfaces and dust seals must be clean.
- If there is an oil leakage, fork seal should be replaced before riding the bike.
- Check the fork by locking the front brake and pushing on the handlebar.
- You should try factory settings before attempting any adjustments.

6.16.2 Adjustement

The fork can be adjusted for the rider's weight and track conditions :

- Rebound and compression damping (right fork) : turning the adjuster changes how quickly the fork extends. Turning clockwise makes the fork softer.
- Compression (left(awkward) sheath): by turning the screw one adjust the speed of compression of the fork. By screwing we harden the fork during its phase of compression, the fork will sink less faster. On the contrary, by undoing the fork will sink more easily and more quickly.
- Preforced: the regulation of preconstraint is made by placing holds on springs internal of the fork. These holds allow to force more or less the spring. There is a spring in every tube of fork, of this fact it is important to put holds of the same thickness in every tube.

NB : Modify one adjustment a time, in one-click increments in order not to get confused. If no just return to the standard position and start over.



6.17 Rear suspension

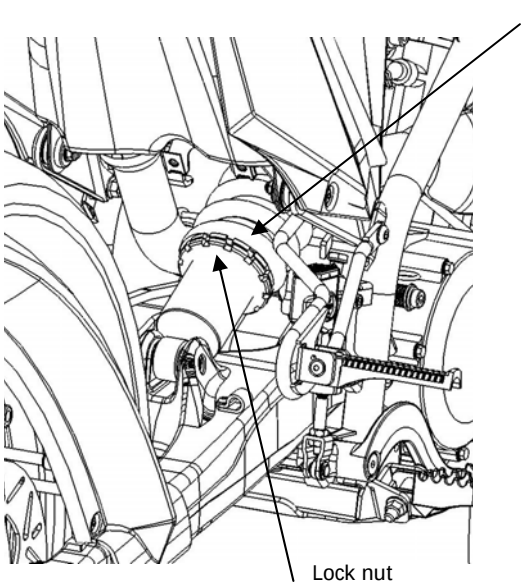
6.17.1 Inspection

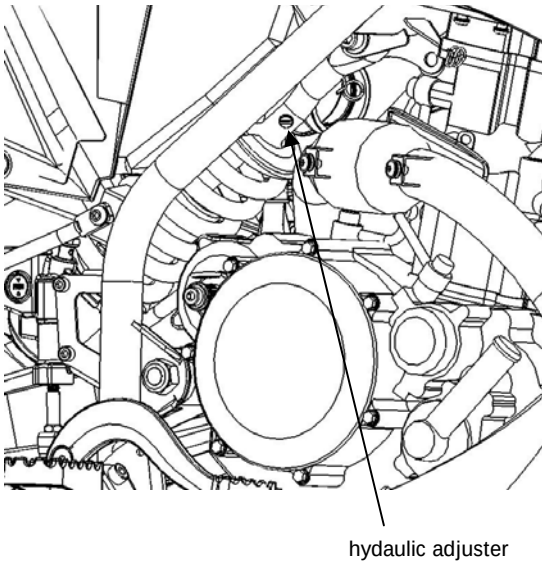
- Check for a broken or collapsed spring.
- Check the suspension action by bouncing the rear of the machine.
- Check the rear shock absorber for a bent shaft or oil leaks. If there is a problem, make it inspect by your dealer, and replace it if there is a serious problem.

6.17.2 Adjustment

The swingarm is controlled by a shock absorber. It's also possible to be adjusted for the rider's weight and track conditions.

- Spring pre-load : turning the spring pre-load adjuster adjusts the spring initial pre-load length.
- Rebound damping : turning the screw adjusts how quickly the shock absorber extends.





WARNING

Uncontrolled landings after jumps may damage the shock leading to possible health and life danger

6.18 Front fork and steering

6.18.1 Front fork check

Check the condition of the front fork pipes (lack of scratch, of claw mark or of damage) and the lack of fork oil leak. If there is one, it must be minor. Otherwise, the fork has to be inspected by your dealer, then repaired or replaced.

WARNING

This operation requires putting well the bike on blocks to prevent it from overturning.

6.18.2 Check of the functioning of the fork

1. Place the bike the most vertically possible, on a horizontal area.
2. Operate a few times the front brake (in order to stop the bike from moving) while you compress strongly the front fork by pressing on the handlebar. So it is easier to check the progressiveness of the fork during the compression and the release.

WARNING : if the functioning or the progressiveness of the front fork is not satisfactory, make it inspect by your dealer, and replace it if there is a serious problem.

6.18.3 Check of the steering

It might happen that the steering bearings are loose or damaged. Then they may cause serious dysfunction in the steering. That is why the owner is expected to check it as often as possible (look at the 'List of the regular maintenance and lubrications').

Here are the different operations to follow :

1. Put the bike on blocks to allow you to lift the front wheel off the ground. A wedge placed under the engine protection is the simplest solution. Make sure the bike will not overturn during the operation.
2. Hold one fork pipe a hand and try to make them move forward and backwards many times. If a loose appears, ask your dealer to check it, and to repair or replace the defective parts if necessary.

6.18.4 Check of the wheel bearings

Check the condition and the progressiveness of the wheels bearings in accordance with the pieces of information of the 'List of the regular maintenance and lubrications'. In case the buckles have loose, or in case the wheels do not revolve well, it has to be inspected and maybe repaired or replaced by an occupational mechanistic.

6.19 Replacement of electric elements

6.19.1 Replacement of a light bulb

If one of the bulbs is dud, you can replace it, by following the instructions:

- Undo the two screws of the head light.
- Remove the light of the headlight.
- Separate the bulb support from the light.
- Remove the dud bulb by pressing on it while you turn it, until the bulb is pulled away.
- Put a new bulb on the bulb support, press on it and turn clockwise, until the bulb is stopped into the support.
- Put back the bulb support on the light.
- Replace the light on the headlight and tighten the two screws.

WARNING:

- The bulb becomes hot very quickly after the beginning of its use. To avoid the risks of burns and inflammation, it is essential to hold the bulb with a piece of rag and to operate far away from the sources of heat and flames.
- The glass of light bulbs must absolutely not be touched by the fingers, in order not to let greasy deposits. In fact they reduce the transparency of the glass so that the light beam is not as intensive as it is expected to be. Clean the traces with a soft duster, alcohol or solvent, AFTER THE COMPLETE COOLING OF THE BULB.

6.19.2 Replacement of the indicators bulbs

- Remove the screw of the indicator orange lens.
- Remove the dud bulb by pressing on it while you turn it, until the bulb is pulled away.
- Put a new bulb on the bulb support, press on it and turn clockwise, until the bulb is stopped into the support.
- Put back the orange lens on the indicator and tighten the screw. Do not tighten too much strongly, because the plastic part might become fragile after some removals.

6.19.3 Replacement of the rear light bulb

- Remove the two screws of the rear light red lens.
- Remove the dud bulb by pressing on it while you turn it, until the bulb is pulled away.
- Put a new bulb on the bulb support, press on it and turn clockwise, until the bulb is stopped into the support.
- Replace the red lens on the rear light. Then tighten the two screws.

6.20 Diagram of breakdowns and dedicated checks

Despite the care, the complete check list, the static and dynamic checks, the quality controls led by SCORPA during the development and the manufacturing of its bikes, a breakdown could happen

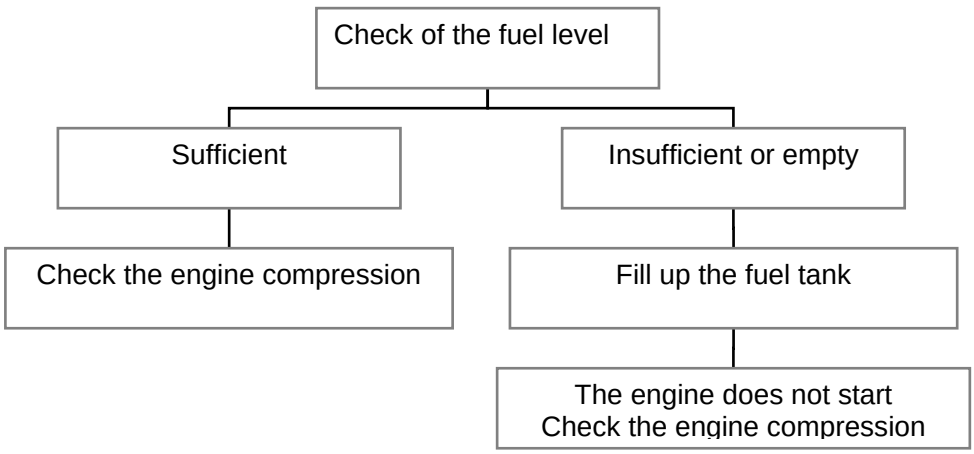
A problem could cause difficulty for the start out, a loss of performance or an abnormal functioning.

The following diagram gives some pieces of information about the checks you could operate, in order to set better the probable reasons for the breakdown.

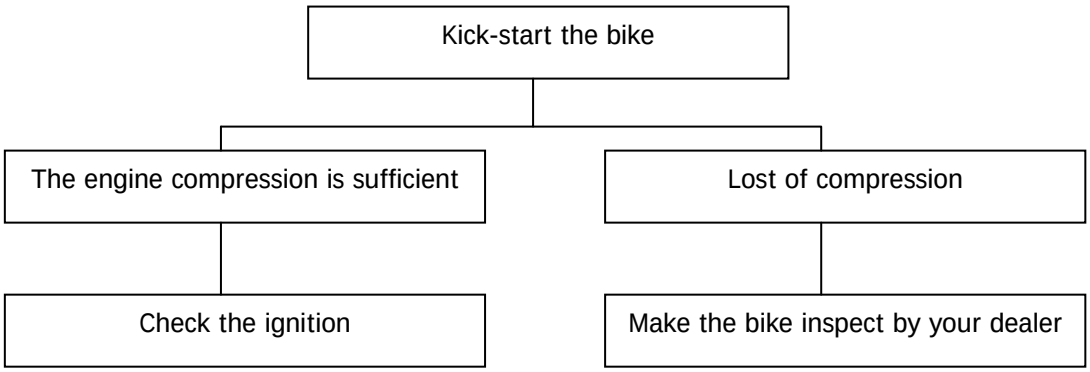
If any important operation has to occur, it is strongly recommended to confide it to your dealer, who is especially trained therefore.

The quality and sturdiness of the 'adaptable' parts is so very often lower. Then they will lead to additional cost in short or medium term, or to damage and repairing very expensive.

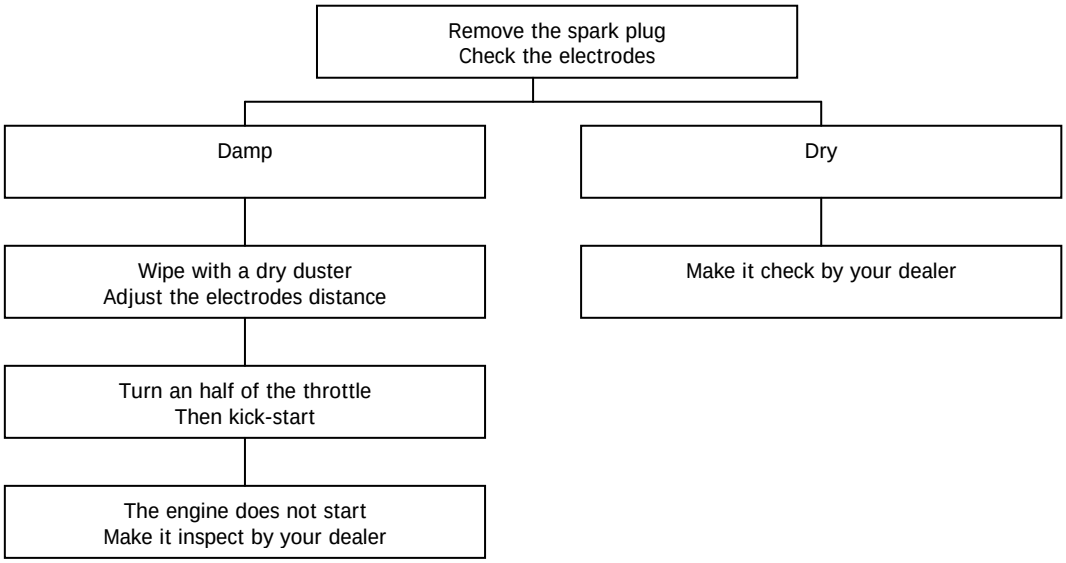
6.20.1 Fuel



6.20.2 Compression



6.20.3 Ignition



7 CARE AND STORING OF THE BIKE

7.1 Care

The lack of coachwork exposes almost all parts of the bike to the stresses of the surroundings. The impacts caused by the throwing and the scratches weaken the surface of the parts, even if those of the best quality. Then they could begin to corrode and tarnish.

7.1.1 Before cleaning

- Make sure the electric terminal spad tags, the spark plug cap and all caps are well protected and positioned.
- Wait for the cooling of the engine and all warm parts.
- Put a watertight cap on the exhaust silencer end.
- It is possible to use a brush and a spot remover only in case it is never brought into contact with the joints, the axles, the bearings, the sprockets and the chain. It is essential to rinse thoroughly with water.

7.1.2 Cleaning

Warning :

- All the parts made of plastic or rubber have to be cleaned by soft sponges or pieces of rag, water and **Moto Wash Motul**. It is forbidden to use acid or basic chemicals.
- SCORPA strongly advise against high pressure or vapor cleaners. In fact an important amount of water could infiltrate joints, bearings, electric components or the air box. The bike is only expected to work in atmospheric and ground humidity. The high pressure or vapor cleaners would cause serious dysfunctions or damage several parts.

The cleaning is different according to the conditions and the area of use. The classic one is made of warm water and **Moto Wash Motul**. It has to be followed by a copious water rinsing.
If the bike is used in particular conditions or if the air level of salinity is high, the way to clean the vehicle is a little bit different:

- 1. Cleaning with cold water and **Moto Wash Motul** as soon as the bike is cooled.
- Protection against corrosion of all metallic surfaces (even if they are chromium-plated or anodized) by spraying **Motul EZ Lub Multi Protect**.

7.1.3 After the cleaning

- The drying of the bike has to be as quick as possible. If it is not the case, dry it with a soft piece of rag.
- As soon as the bike is dried, lubrificate the chain with **Motul Chaine lub Off Road** and all parts which could corrode.
- Scrub the chromium-plated or anodized metallic surfaces with a clean piece of rag and an anticorrosion chemical.
- Do not cover and store the bike before it is totally dry.

7.2 Putting away

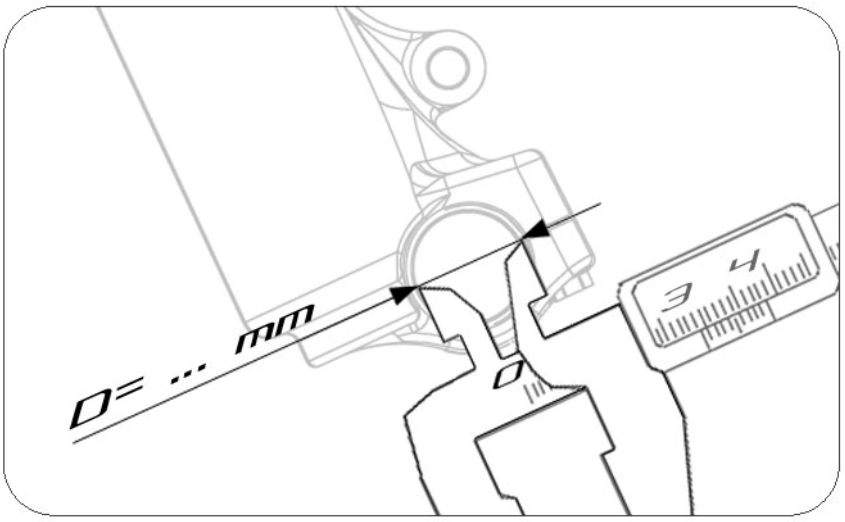
Here are explained two different ways to put away the bike, according to the length of non-use. If it is short enough, about a few days, all you have to do is store the bike in a dry and fresh place. If this place is dusty and if animals could damage the bike, cover it with a porous dust cover.

For a longer period, it is recommended to follow those instructions:

- Clean the bike as explained in the previous paragraph.
- Remove the switch key and position all controls on 'OFF' (fuel tank tap, choke, light controls.
- Empty the carburetor tank by loosing the drain plug and use **Motul Carbu Clean**. That is expected to fight against the formation of deposits. Another solution consists in putting the fuel tap on 'OFF' while the engine is still running, so that the engine stops a few seconds later. Make sure the bike is totally cooled before putting it away.
- If possible, add a fuel stabilizer in the tank to prevent the fuel from deteriorating.
- Respect the following recommendations to allow the engine to be protected :
  A. Remove the spark plug and its cap
  B. Pour about 3 centiliters of engine oil in the spark plug hole.
  C. Operate several times and very slowly the kick-start in order to spread the oil everywhere in the engine.
  D. Replace the spark plug and its cap.

- Lubrificate all cables, levers, pedals, gearshift lever, side stand and articulations with **Motul EZ Lub Multi Protect**.
- If possible, it is preferable to heighten the bike, so that the humidity is not concentrated in the same place of the tires.

Put a cap on the end of the exhaust pipe. Store the bike in a fresh and dry place. If this place is dusty and if animals could damage the bike, cover it with a porous dust cover.

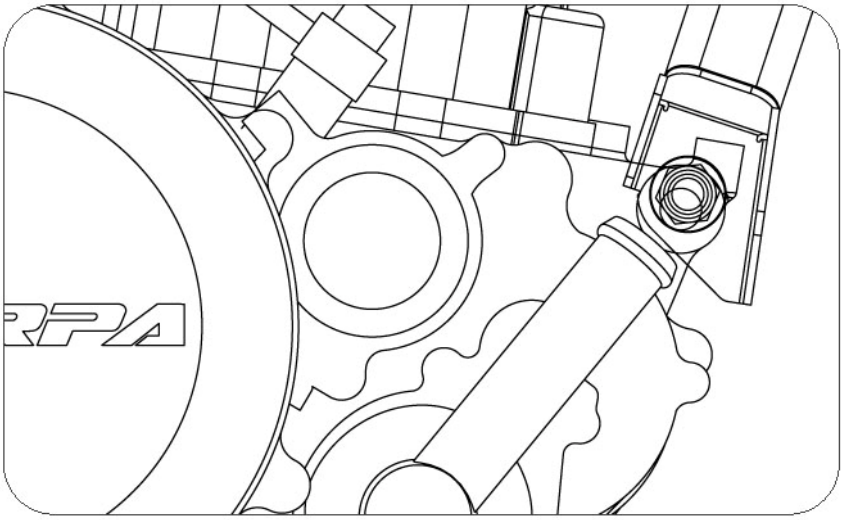


TECHNICAL DATA

DESIGN FEATURES

Model name	T-ride 250 F
Identification number	
Type	Adhesive plate
Position	Steering column of the frame
Dimensions :	
Overall lenght	2093 mm
Overall width	840 mm
Overall height	1400mm
Seat height	880 mm
Wheelbase	1404 mm
Ground clearance	325 mm
Motor :	
Type	4 stroke Essence liquid
Cylinder arrangement	Oblique mono cylinder forwards
Displacement	249 cm^3
Bore x stroke	77.0 x 53.6 mm
Compression ratio	11.0 : 1
Starting system	Kick and electric start
System of greasing:	dry Crankcase
Engine oil : Type	Motul 300V 100% syntheses 10W40 -10 à 30°C : SAE 10W30 -10 à 40°C : SAE 10W40 -0 à 40°C : SAE 15W40 -5 à 40°C : SAE 20W40 -5 à 50°C : SAE 20W50 Oil of type API Service, of classe SE, SF, Sgmin
Oil Quantity	1,3 L
Liquid of cooling :	
Quantity	0,6 L
Air filter:	Cotton filter
Fuel :	
Type	Unleaded gasoline
Capacity	7,0 L
Reserve	1,5 L
Carburetor :	
Fabricant	Dell'Orto
Model	VHST 28 pompe de reprise
Spark :	
Type	NGK R CR8E
Gap	0.7 – 0.8 mm
Clutch type :	Wet multi-disks

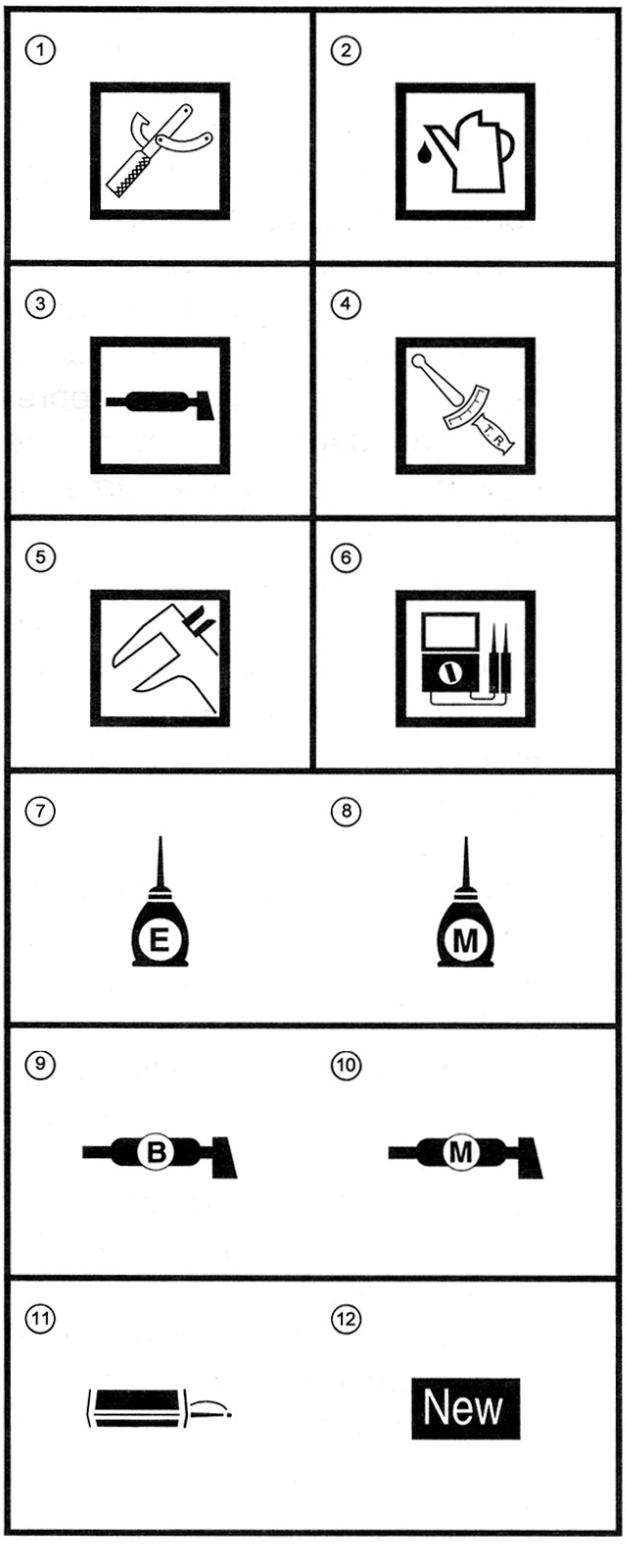
Transmission :	
Primary reduction system	Gear
Primary reduction ratio	17/57 (0.298)
Secondary reduction system	Chain drive
Secondary reduction ratio	12/47 (0.255)
Transmission type	constant mesh, 5 speed
Operation	Left foot
Reduction ratio : 1st	13/31 (0.419)
2nd	16/28 (0.57)
3rd	21/28 (0.75)
4th	24/25 (0.96)
5th	27/22 (1.227)
Chassis:	
Frame type	Perimetral
Materials	Acier 25CD4S
Castor angle	22,1°
Chases away	90.6 mm
Tires :	
Type	Tube type
Front tire	Vee Rubber VRM308F 2.75 x 21
Rear tire	Vee Rubber VRM308R 4.00 x 18
Pressure front tire	100 kPa
Pressure rear tire	187 kPa
Brakes :	
Front :Type	Single disc Ø 260
Operation	Right hand
Rear : Type	Single disc Ø 220
Operation	Right foot
Liquid	Oil Motul brake fluid DOT4
Suspension :	
Front suspension	Telescopic fork, Spring helical / hydraulic shock absorber
Rear suspension	Swing arm, spring helical / hydraulic shock absorber
Wheel travel :	
Front	200 mm
Rear	200 mm
Electrical :	
Ignition system	CDI
Generator	Magnéto CA
Battery	YT4L-BS
Tension / Capacity battery	12V / 4A



ENGINE

CONTENTS

1 GLOSSARY



Illustrated symbols ① to ⑥ are used to identify the specifications appearing in the text.

① Special tool
② Filling fluid
③ Lubricant
④ Tightening
⑤ Specified value, Service limit
⑥ Resistance (Ω), Voltage (V), Electric current (A)

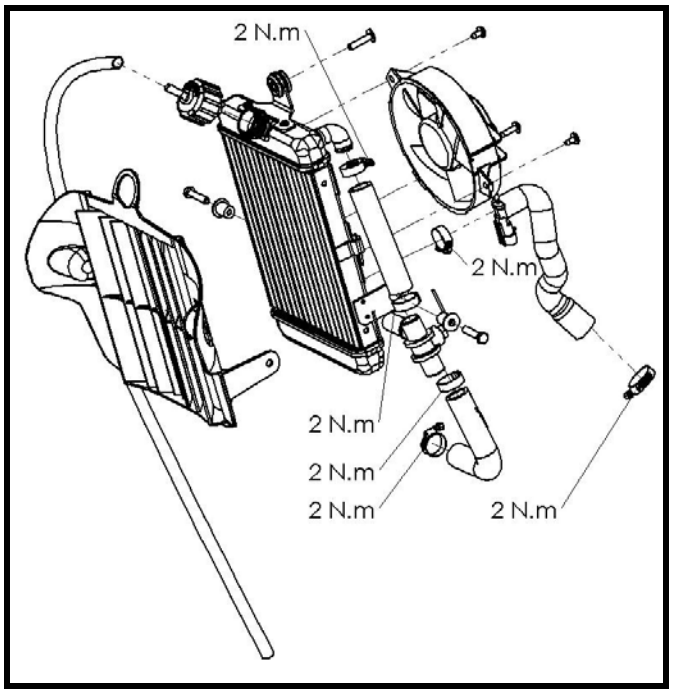
Illustrated symbols ⑦ to ⑩ in the exploded diagrams indicate grade of lubricant and location of lubrication point.

⑦ Apply engine oil
⑧ Apply molybdenum disulfide oil
⑨ Apply lightweight lithium-soap base grease
⑩ Apply molybdenum disulfide grease

Illustrated symbols ⑪ to ⑫ in the exploded diagrams indicate where to apply a locking agent and where to install new parts.

⑪ Apply locking agent (LOCTITE®)
⑫ Use new one

2 RADIATOR



2.1 Radiator removal

- Remove the fuel tank and side covers (refer to "fuel tank removal").
- Open the bleed screw of the water pump.
- Open the radiator cap and keep the cooler liquid.

WARNING: this operation must be done when the engine is cold. Don't throw out the liquid in the nature).

- Unscrew the water pump hose collars and the engine hose collars.
- Take out the water pump hose and the engine hose.
- Unscrew the radiator fixing bolt.
- Unplug the temperature sensor.
- Remove carefully the radiator from the frame.
- Unscrew the radiator hose collars
- Take out the radiator hoses.

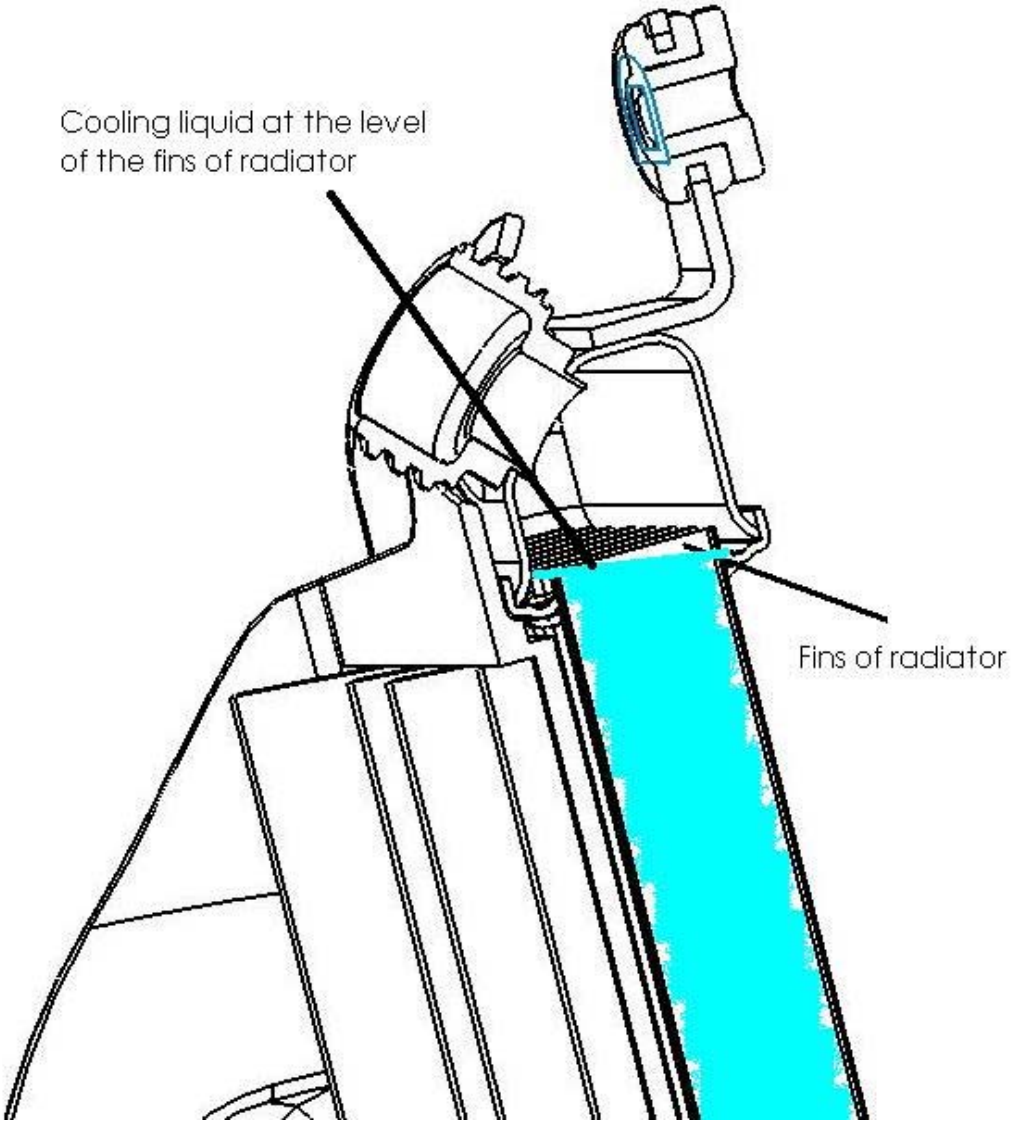
2.2 Radiatot installation

- Install the hoses on the radiator.
- Screw the radiator hose collars.
- Plug the temperature sensor.
- Install the radiator in the frame.
- Install the hose on the engine and screw the collar.
- Install the hose on the water pump and screw the collar.
- Screw the down fixing bolt in the wellnuts.
- Screw the upper fixing bolt.
- Fill the radiator with cooler liquid.
- Screw the radiator cap.
- Install the fuel tank and the side covers (refer to "fuel tank installation").

2.3 Level of cooling liquid

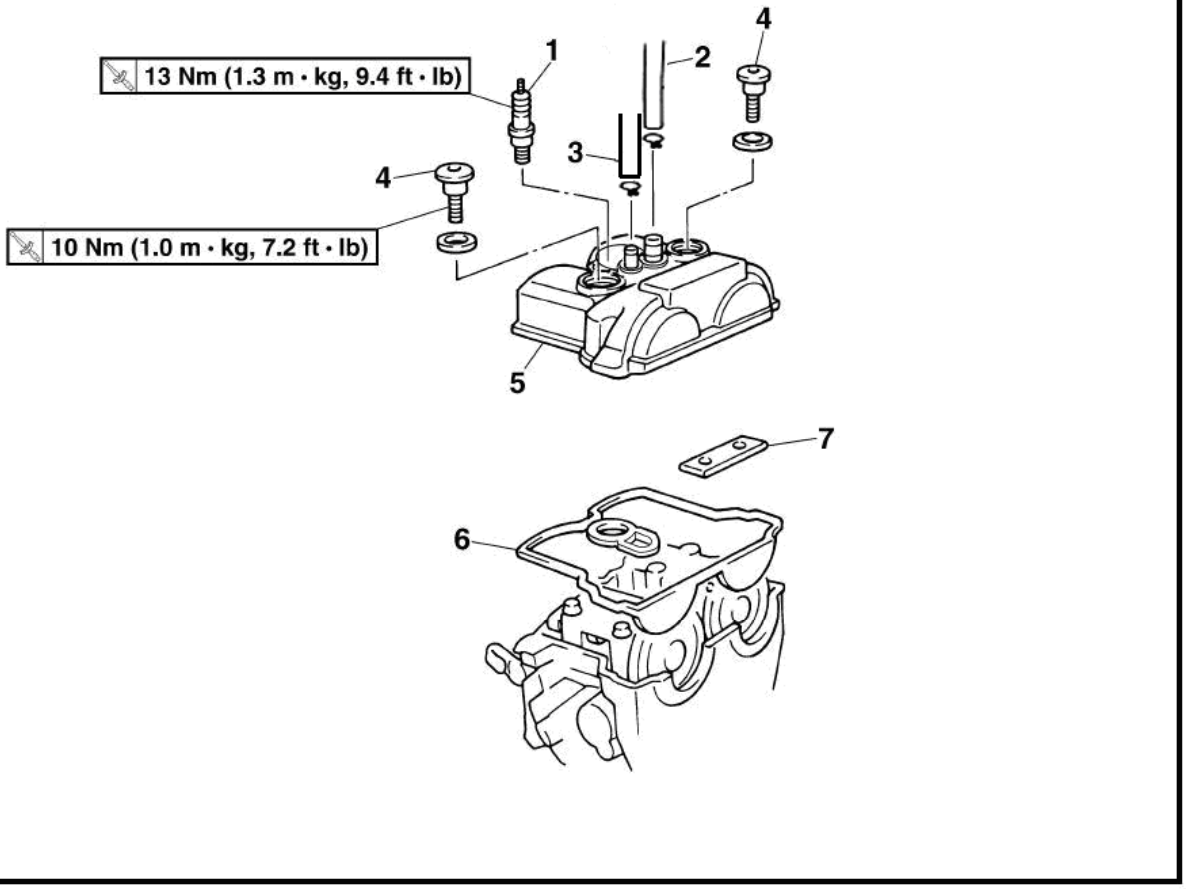
WARNING: this operation must be done when the engine is cold. Don't throw out the liquid in the nature).

- Open the radiator cap
- The liquid must be at the level of the radiator fins (like the schema)
- Close the radiator cap



3 CAMSHAFTS

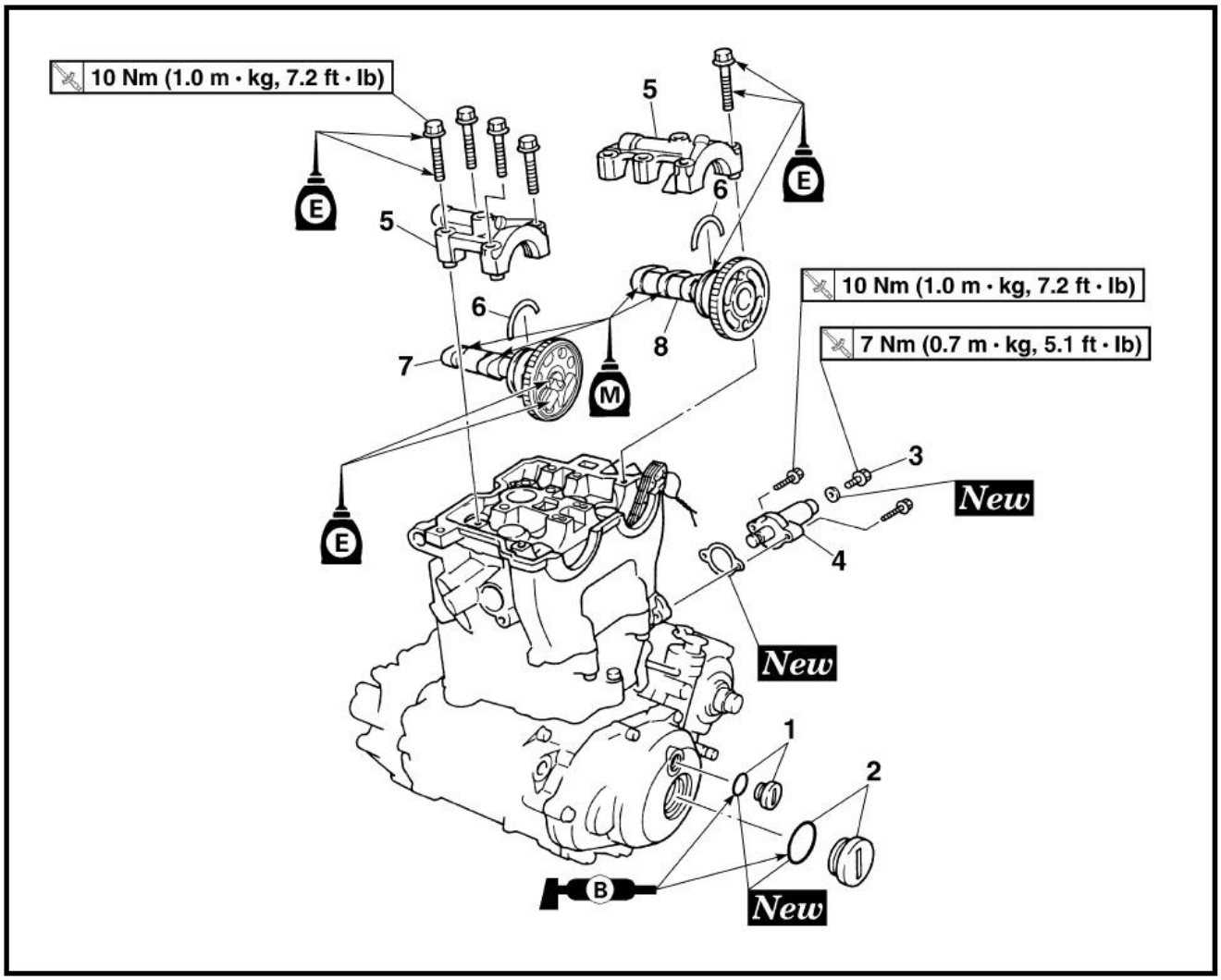
3.1 Cylinder head cover



Extent of removal: ① Cylinder head cover removal

Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		**CYLINDER HEAD COVER REMOVAL** Seat and fuel tank Carburetor		Refer to "SEAT, FUEL TANK AND SIDE COVERS" section. Refer to "CARBURETOR" section.
①	1	Spark plug	1	
	2	Cylinder head breather hose	1	
	3	Oil tank breather hose	1	
	4	Bolt (cylinder head cover)	2	
	5	Cylinder head cover	1	
	6	Cylinder head cover gasket	1	
	7	Timing chain guide (top side)	1	

3.2 Camshafts

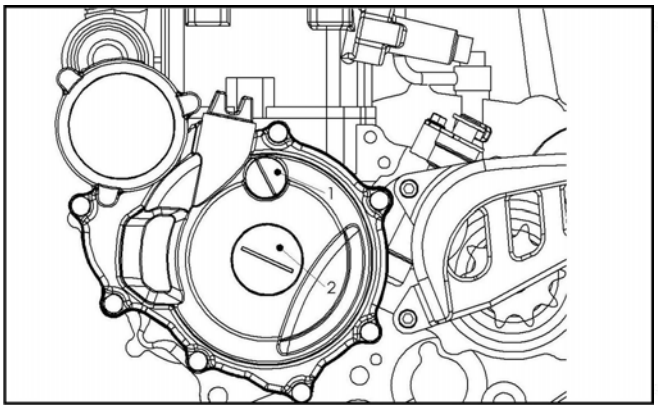


Extent of removal: ① Camshaft removal

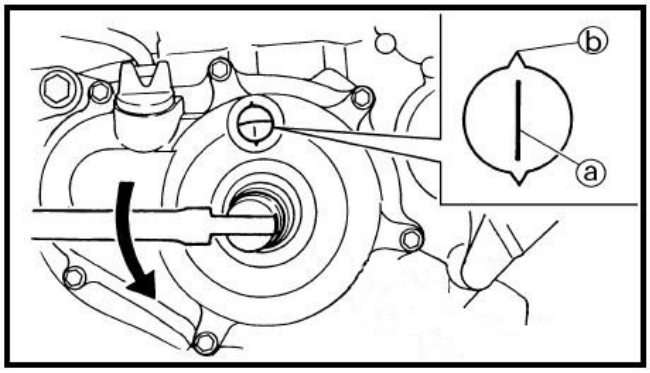
Extent of removal	Order	Part name	Q'ty	Remarks
		CAMSHAFTS REMOVAL		
①	1	Timing mark accessing screw	1	Refer to "REMOVAL POINTS".
	2	Crankshaft end accessing screw	1	
	3	Timing chain tensioner cap bolt	1	
	4	Timing chain tensioner	1	
	5	Camshaft cap	2	
	6	Clip	2	
	7	Exhaust camshaft	1	
	8	Intake camshaft	1	

3.3 Removal points

3.3.1 Camshafts

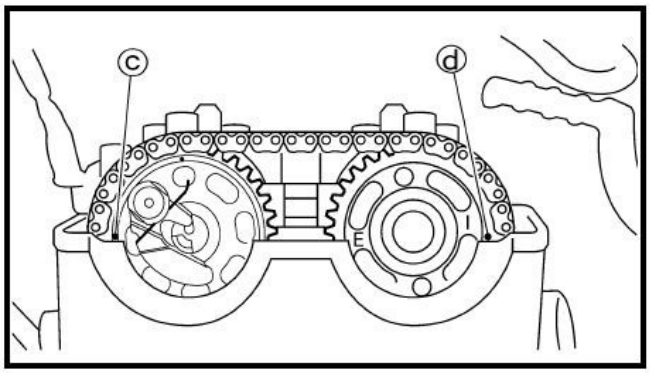


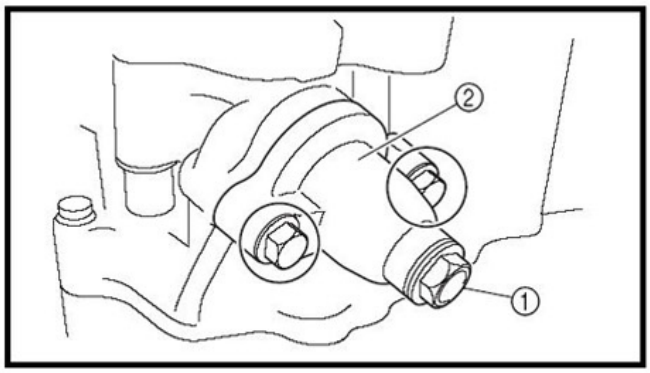
1. Remove:
   - Timing mark accessing screw ①
   - Crankshaft end accessing screw ②
2. Align:
   - T.D.C. mark
     With align mark.



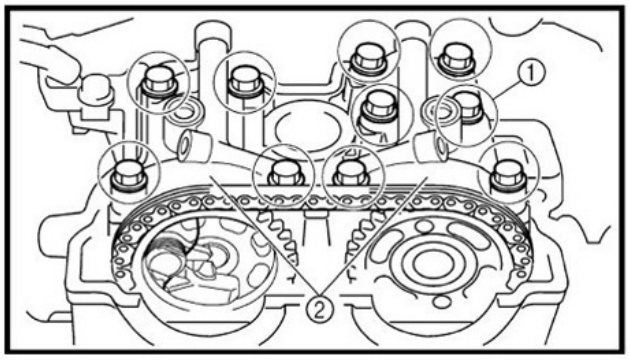
Checking steps:
- Turn the crankshaft counterclockwise with a wrench.
- Align the T.D.C. mark ⓐ on the rotor with the align mark ⓑ on the crankcase cover when piston is at T.D.C. on compression stroke.

NOTE:
In order to be sure that the piston is at Top Dead Center, the punch mark ⓒ on the exhaust camshaft and the punch mark ⓓ on the intake camshaft must align with the cylinder head surface, as shown in the illustration.





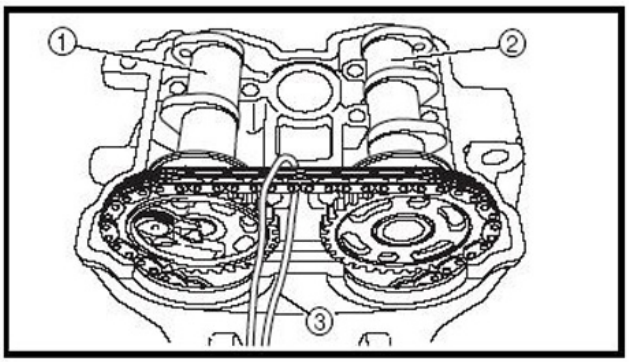
3. Remove:
   - Timing chain tensioner cap bolt ①
   - Timing chain tensioner ②
   - Gasket



4. Remove:
   - Bolt (camshaft cap) ①
   - Camshaft cap ②
   - Clip

NOTE:
Remove the bolts (camshaft cap) in a criss-cross pattern, working from the outside in.

CAUTION:
The bolts (camshaft cap) must be removed evenly to prevent damage to the cylinder head, camshafts or camshaft caps.

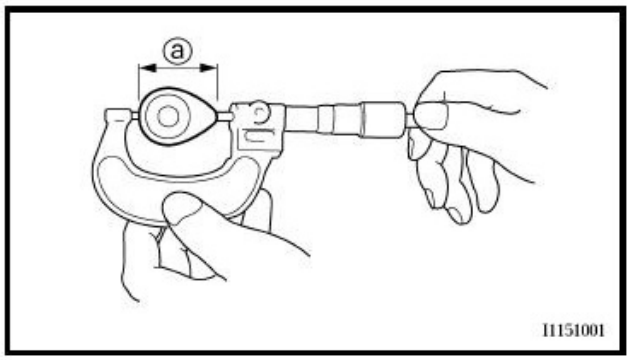


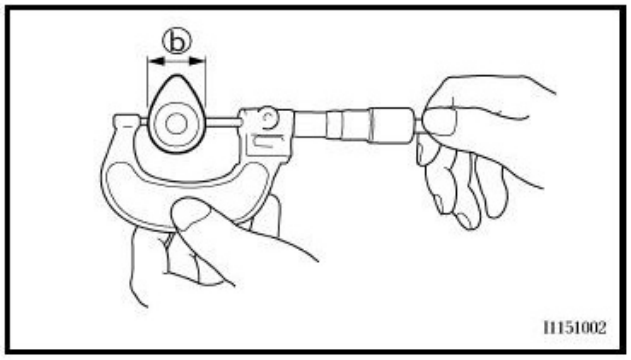
5. Remove:
   - Exhaust camshaft ①
   - Intake camshaft ②

NOTE:
Attach a wire ③ to the timing chain to prevent it from falling into the crankcase.

3.4 Inspection

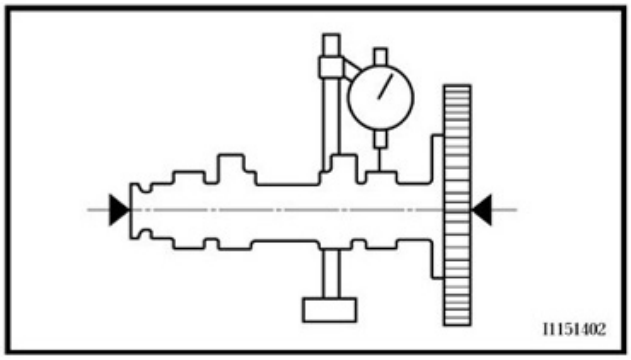
3.4.1 Camshafts





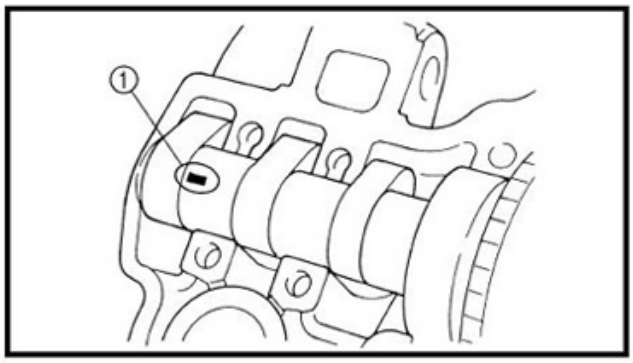
1. Inspect:
   - Cam lobe
     Pitting/scratches/blue discoloration → Replace.
2. Measure:
   - Cam lobe length ⓐ and ⓑ
     Out of specification → Replace.

Cam lobes length:
Intake:
ⓐ 30.296 ~ 30.346 mm (1.1923 ~ 1.1947 in)
<Limit>: 30.196 mm (1.1888 in)
ⓑ 22.45 ~ 22.55 mm (0.8839 ~ 0.8878 in)
<Limit>: 22.35 mm (0.8799 in)
Exhaust:
ⓐ 30.399 ~ 30.499 mm (1.1968 ~ 1.2007 in)
<Limit>: 30.299 mm (1.1929 in)
ⓑ 22.45 ~ 22.55 mm (0.8839 ~ 0.8878 in)
<Limit>: 22.35 mm (0.8799 in)



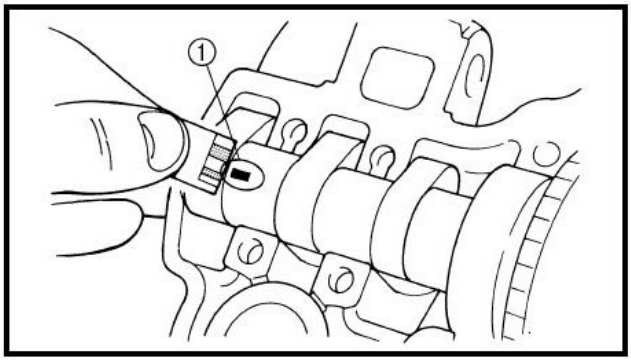
3. Measure:
   - Runout (camshaft)
     Out of specification → Replace.

Runout (camshaft):
Less than 0.03 mm (0.0012 in)



4. Measure:
   - Camshaft-to-cap clearance
     Out of specification → Measure camshaft outside diameter.

Camshaft-to-cap clearance:
0,020 à 0,054 mm
(0,0008 à 0,0021 in)
<Limit> : 0,08 mm (0,003 in)

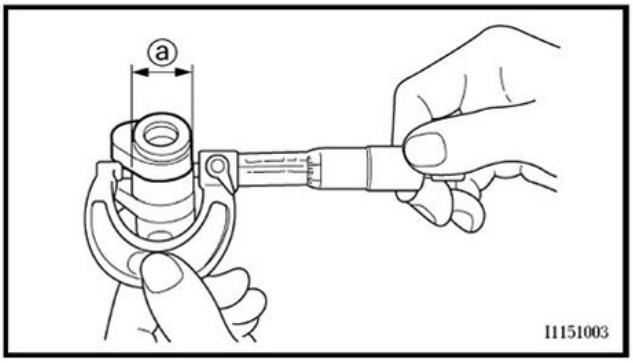


Measurement steps:
- Install the camshaft onto the cylinder head.
- Position a strip of Plastigauge® ① onto the camshaft.
- Install the clip, dowel pins and camshaft caps.

Bolt (camshaft cap):
10 Nm (1.0 m • kg, 7.2 ft • lb)

NOTE:
- Tighten the bolts (camshaft cap) in a criss-cross pattern from innermost to outer caps.
- Do not turn the camshaft when measuring clearance with the Plastigauge®.

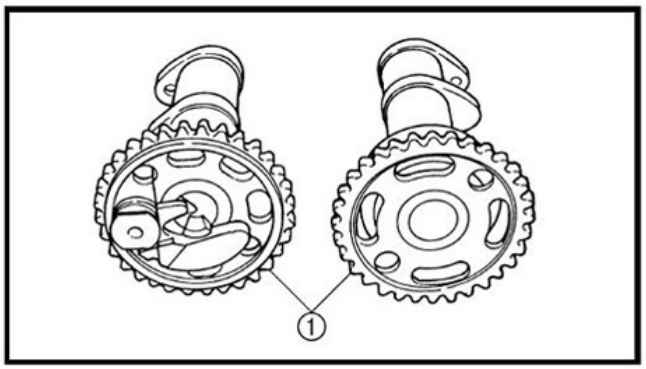
- Remove the camshaft caps and measure the width of the Plastigauge® ①.



5. Measure:
   - Camshaft outside diameter ⓐ
     Out of specification → Replace the camshaft.
     Within specification → Replace camshaft case and camshaft caps as a set.

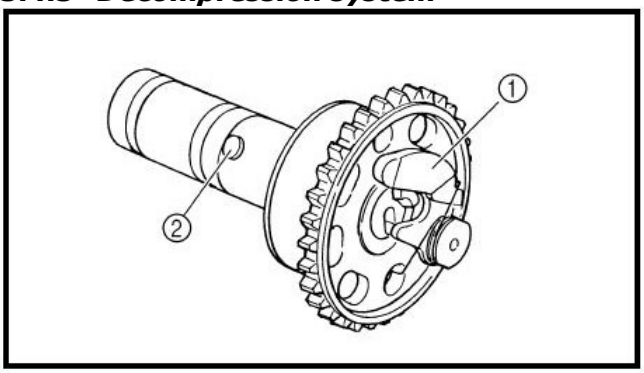
Camshaft outside diameter:
21,967 to 21,980 mm
(0,8648 to 0,8654 in)

3.4.2 Camshaft sprocket



1. Inspect:
   - Camshaft sprocket ①
     Wear/damage → Replace the camshaft assembly and timing chain as a set.

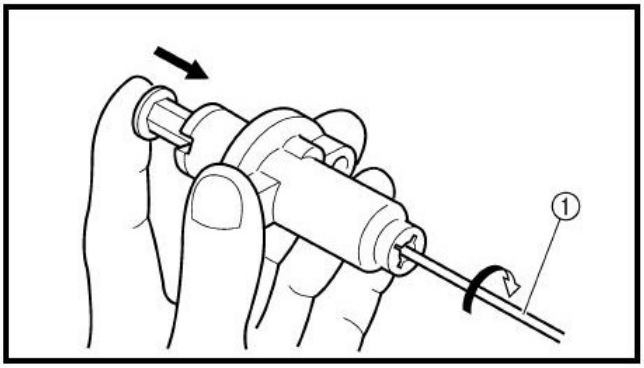
3.4.3 Decompression system

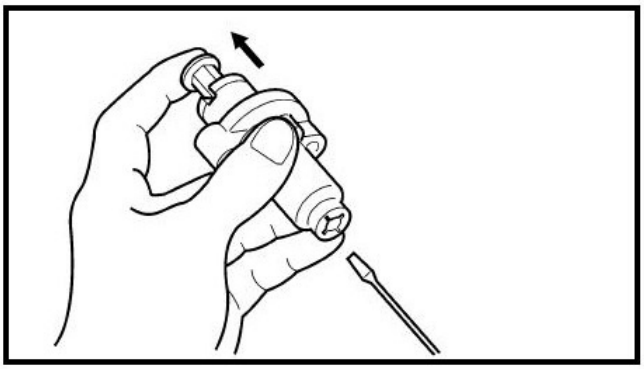


1. Check:
   - Decompression system

Checking steps:
- Check that the decompression mechanism cam ① moves smoothly.
- Check that the decompression mechanism cam lever pin ② projects from the camshaft.

3.4.4 Timing chain tensioner

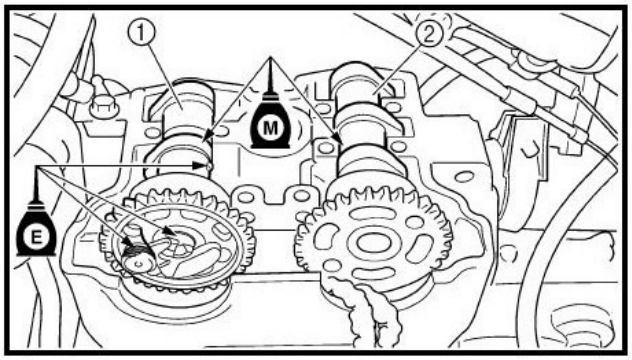


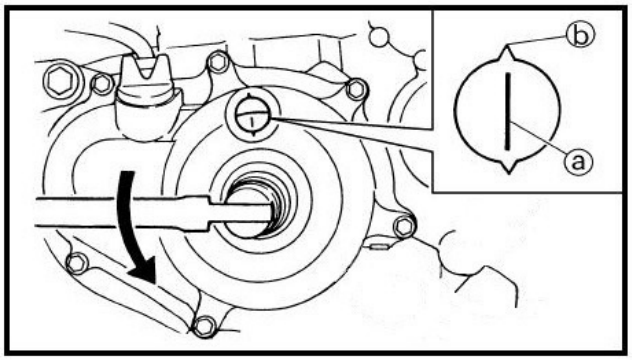


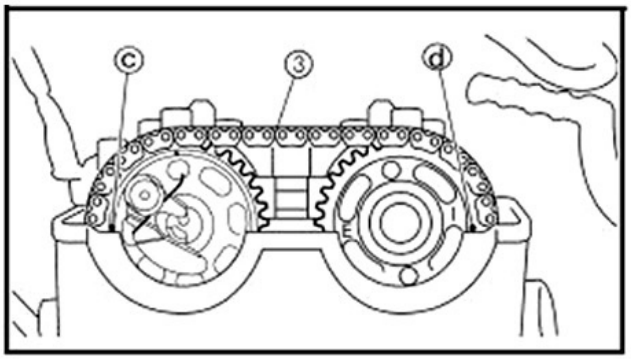
1. Check:
   - While pressing the tensioner rod lightly with fingers, use a thin screwdriver ① and wind the tensioner rod up fully clockwise.
   - When releasing the screwdriver by pressing lightly with fingers, make sure that the tensioner rod will come out smoothly.
   - If not, replace the tensioner assembly.

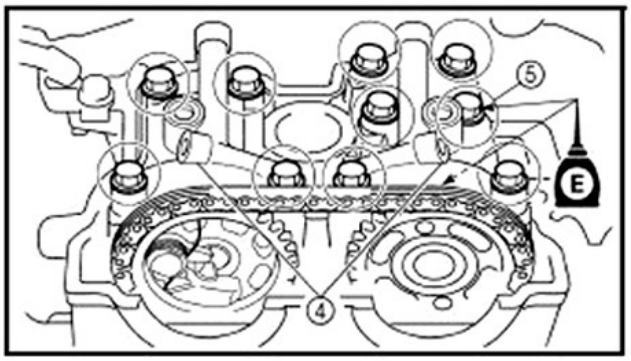
3.5 Assembly and installation

3.5.1 Camshaft









1. Install:
   - Exhaust camshaft ①
   - Intake camshaft ②

Installation steps:
- Turn the crankshaft counterclockwise with a wrench.

NOTE:
- Apply the molybdenum disulfide oil on the camshafts.
- Apply the engine oil on the decompression system.
- Squeezing the decompression lever allows the crankshaft to be turned easily.

- Align the T.D.C. mark ⓐ on the rotor with the align mark ⓑ on the crankcase cover when piston is at T.D.C. on compression stroke.
- Fit the timing chain ③ onto both camshaft sprockets and install the camshafts on the cylinder head.

NOTE:
The camshafts should be installed onto the cylinder head so that the punch mark ⓒ on the exhaust camshaft and the punch mark ⓓ on the intake camshaft must align with the cylinder head surface, as shown in the illustration.

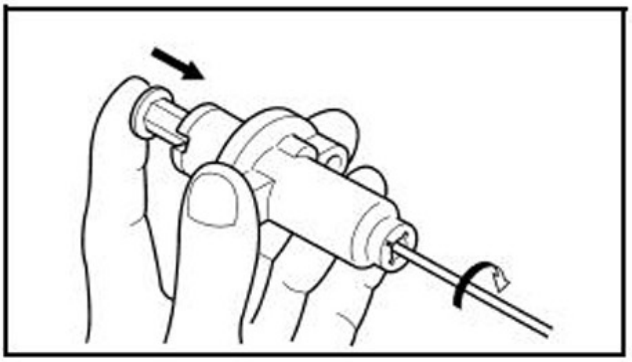
CAUTION:
Do not turn the crankshaft during the camshaft installation. Damage or improper valve timing will result.

- Install the clips, camshaft caps ④ and bolts (camshaft cap) ⑤.

Bolt (camshaft cap):
10 Nm (1.0 m • kg, 7.2 ft • lb)

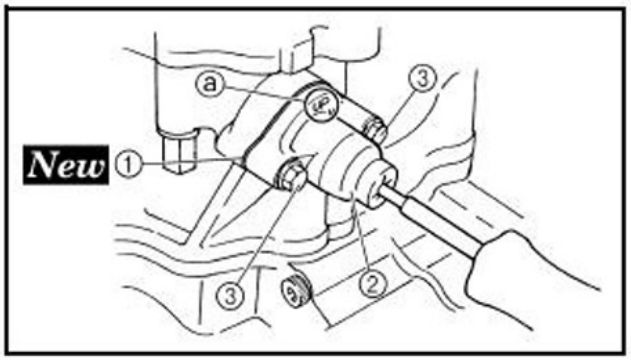
NOTE:
- Before removing the clips, cover the cylinder head with a clean rag to prevent the clips from into the cylinder head cavity.
- Apply the engine oil on the thread and contact surface of the bolts (camshaft cap).
- Tighten the bolts (camshaft cap) in a criss-cross pattern.

CAUTION:
The bolts (camshaft cap) must be tightened evenly, or damage to the cylinder head, camshaft caps, and camshaft will result.



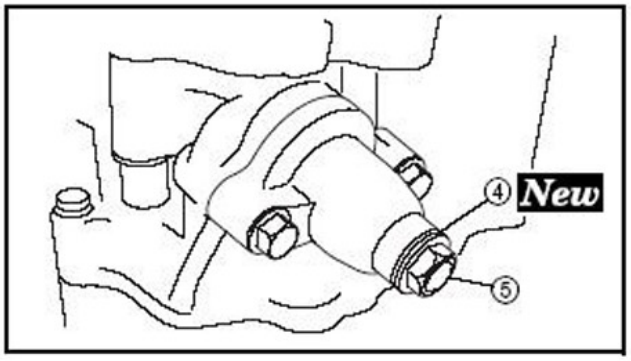
2. Install:
   - Timing chain tensioner

Installation steps:
- While pressing the tensioner rod lightly with fingers, use a thin screwdriver and wind the tensioner rod up fully clockwise.
- With the rod fully wound and the chain tensioner UP mark ⓐ facing upward, install the gasket ① and the timing chain tensioner ②, and tighten the bolt ③ to the specified torque.

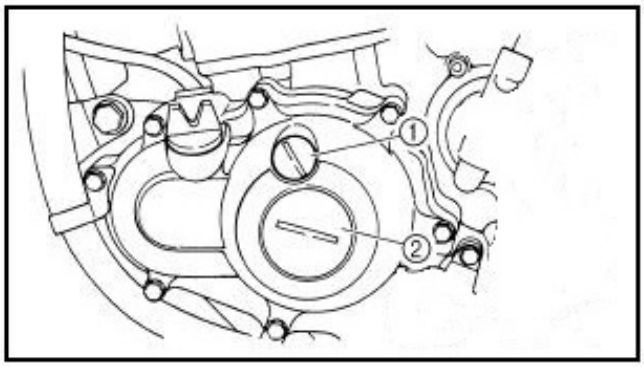


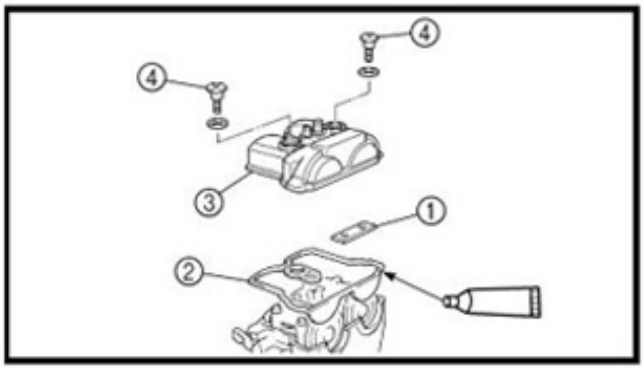
Bolt (timing chain tensioner):
10 Nm (1.0 m • kg, 7.2 ft • lb)

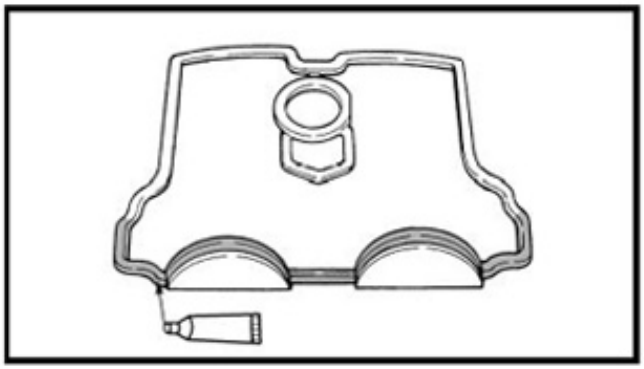
- Release the screwdriver, check the tensioner rod to come out and tighten the gasket ④ and the cap bolt ⑤ to the specified torque.



Tensioner cap bolt:
7 Nm (0.7 m • kg, 5.1 ft • lb)







3. Turn:
   - Crankshaft
     Counterclockwise several turns.
4. Check:
   - Rotor T.D.C. mark
     Align with the crankcase align mark.
   - Camshaft match marks
     Align with the cylinder head surface.
     Out of alignment → Adjust.

5. Install:
   - Timing mark accessing screw ①
   - Crankshaft end accessing screw ②

6. Install:
   - Timing chain guide (top side) ①
   - Cylinder head cover gasket ②
   - Cylinder head cover ③
   - Bolt (cylinder head cover) ④

10 Nm (1.0 m · kg, 7.2 ft · lb)

NOTE:
Apply the sealant on the cylinder head cover gasket.

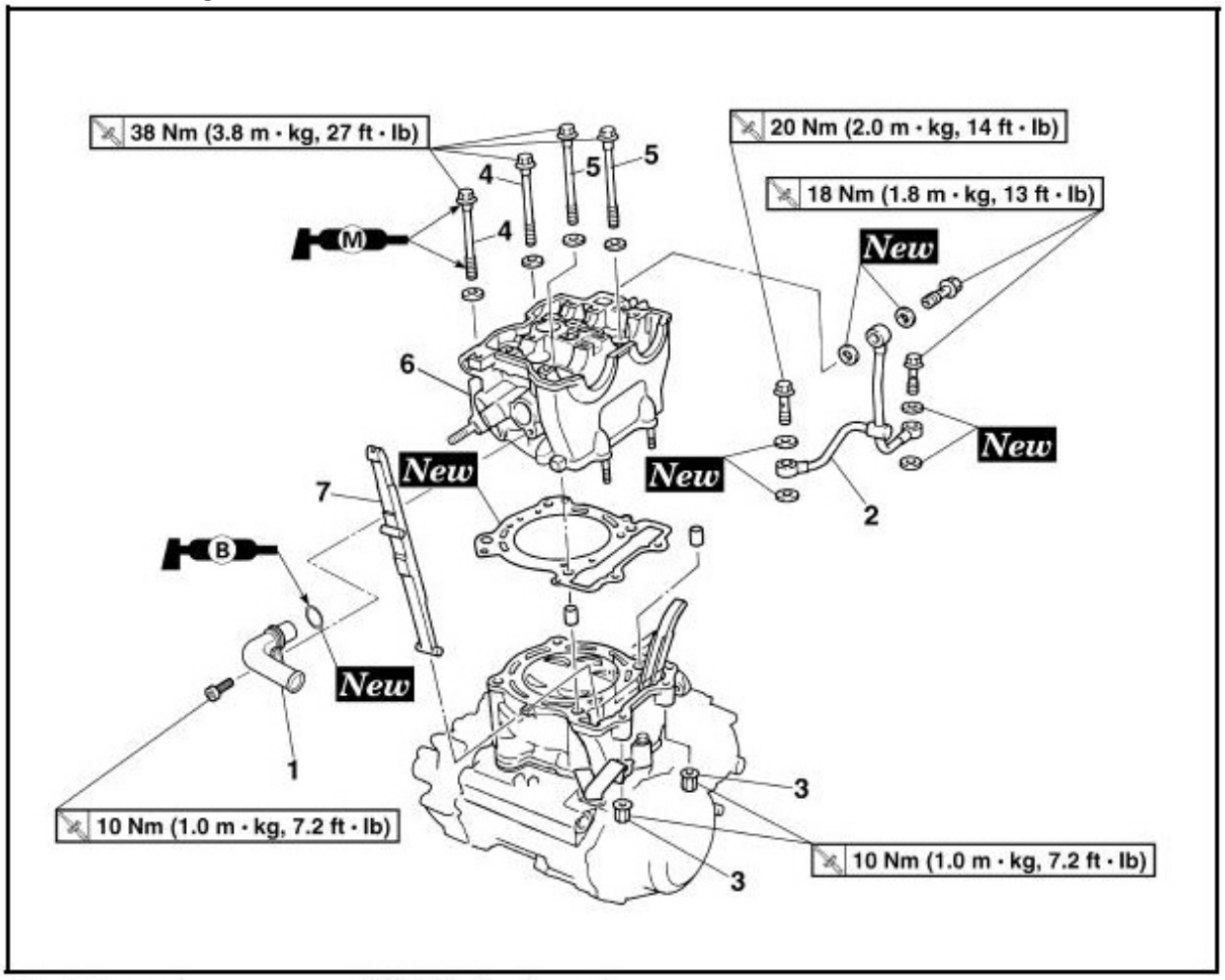
Quick gasket®: ACC-QUICK-GS-KT YAMAHA Bond No. 1215: 90890-85505

7. Install:
   - Oil tank breather hose
   - Cylinder head breather hose
   - Spark plug

13 Nm (1.3 m · kg, 9.4 ft · lb)

4 CYLINDER HEAD

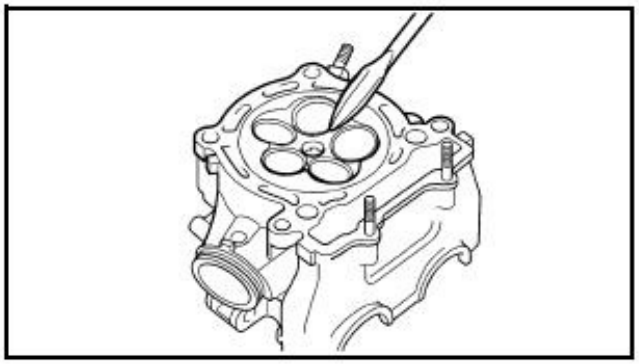
4.1 Removal points



Extent of removal: ① Cylinder head removal

Extent of removal	Order	Part name	Q'ty	Remarks
		CYLINDER HEAD REMOVAL		
Preparation for removal		Seat and fuel tank		Refer to "SEAT, FUEL TANK AND SIDE COVERS" section.
		Exhaust pipe and silencer		Refer to "EXHAUST PIPE AND SILENCER" section.
		Radiator hose 1		Disconnect at cylinder head side.
		Carburetor		Refer to "CARBURETOR" section.
		Camshaft		Refer to "CAMSHAFTS" section.
		Upper engine bracket		Refer to "ENGINE REMOVAL" section.
①	1	Radiator pipe	1	
	2	Oil delivery pipe	1	
	3	Nut	2	
	4	Bolt [L = 135 mm (5.31 in)]	2	
	5	Bolt [L = 145 mm (5.71 in)]	2	
	6	Cylinder head	1	
	7	Timing chain guard (exhaust side)	1	

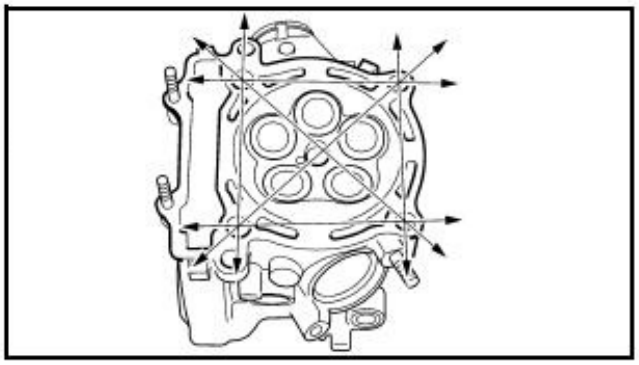
4.2 Inspection



1. Eliminate:
   - Carbon deposits (from the combustion chambers)
     Use a rounded scraper.

NOTE:
Do not use a sharp instrument to avoid damaging or scratching:
- Spark plug threads
- Valve seats

2. Inspect:
   - Cylinder head
     Scratches/damage → Replace.



3. Measure:
   - Cylinder head warpage
     Out of specification → Resurface.

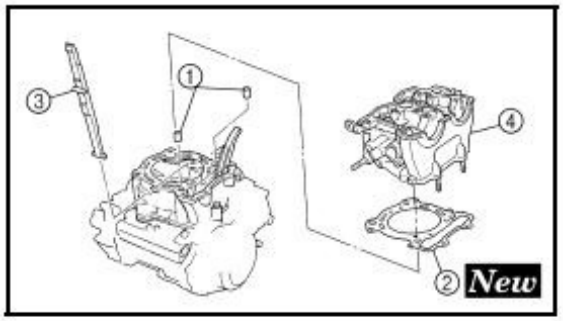
Cylinder head warpage:
Less than 0.05 mm (0.002 in)

Warpage measurement and resurfacement steps:
- Place a straightedge and a feeler gauge across the cylinder head.
- Use a feeler gauge to measure the warpage.
- If the warpage is out of specification, resurface the cylinder head.
- Place a 400 ~ 600 grit wet sandpaper on the surface plate, and resurface the head using a figure-eight sanding pattern.

NOTE:
To ensure an even surface rotate the cylinder head several times.

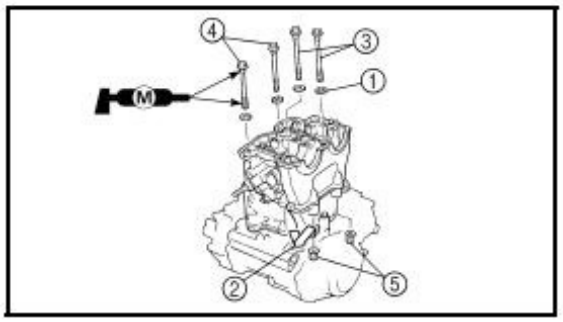
4.3 Assembly and installation

4.3.1 Cylinder head

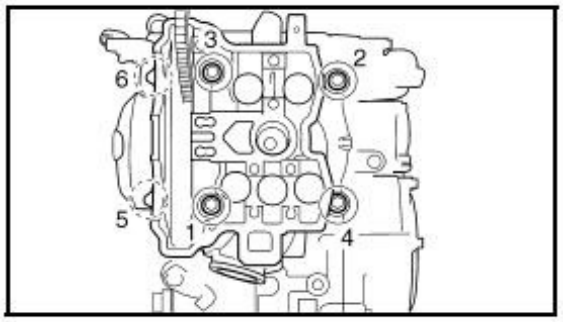


1. Install:
   - Dowel pin ①
   - Cylinder head gasket ② **New**
   - Timing chain guide (exhaust side) ③
   - Cylinder head ④

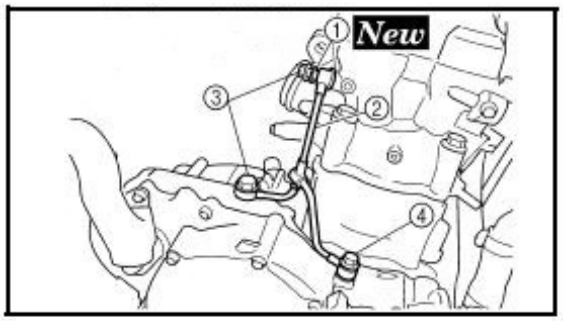
NOTE:
While pulling up the timing chain, install the timing chain guide (exhaust side) and cylinder head.



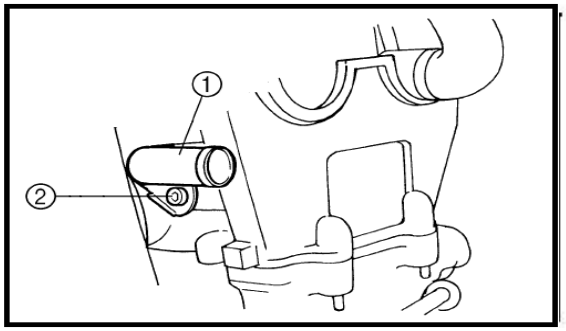
2. Install:
   - Washer ①
   - Cable guide ②
   - Bolts [L = 145 mm (5.71 in)] ③
     38 Nm (3.8 m · kg, 27 ft · lb)
   - Bolts [L = 135 mm (5.31 in)] ④
     38 Nm (3.8 m · kg, 27 ft · lb)
   - Nuts ⑤
     10 Nm (1.0 m · kg, 7.2 ft · lb)



NOTE:
- Apply the molybdenum disulfide grease on the thread and contact surface of the bolts.
- Follow the numerical order shown in the illustration. Tighten the bolts and nuts in two stages.

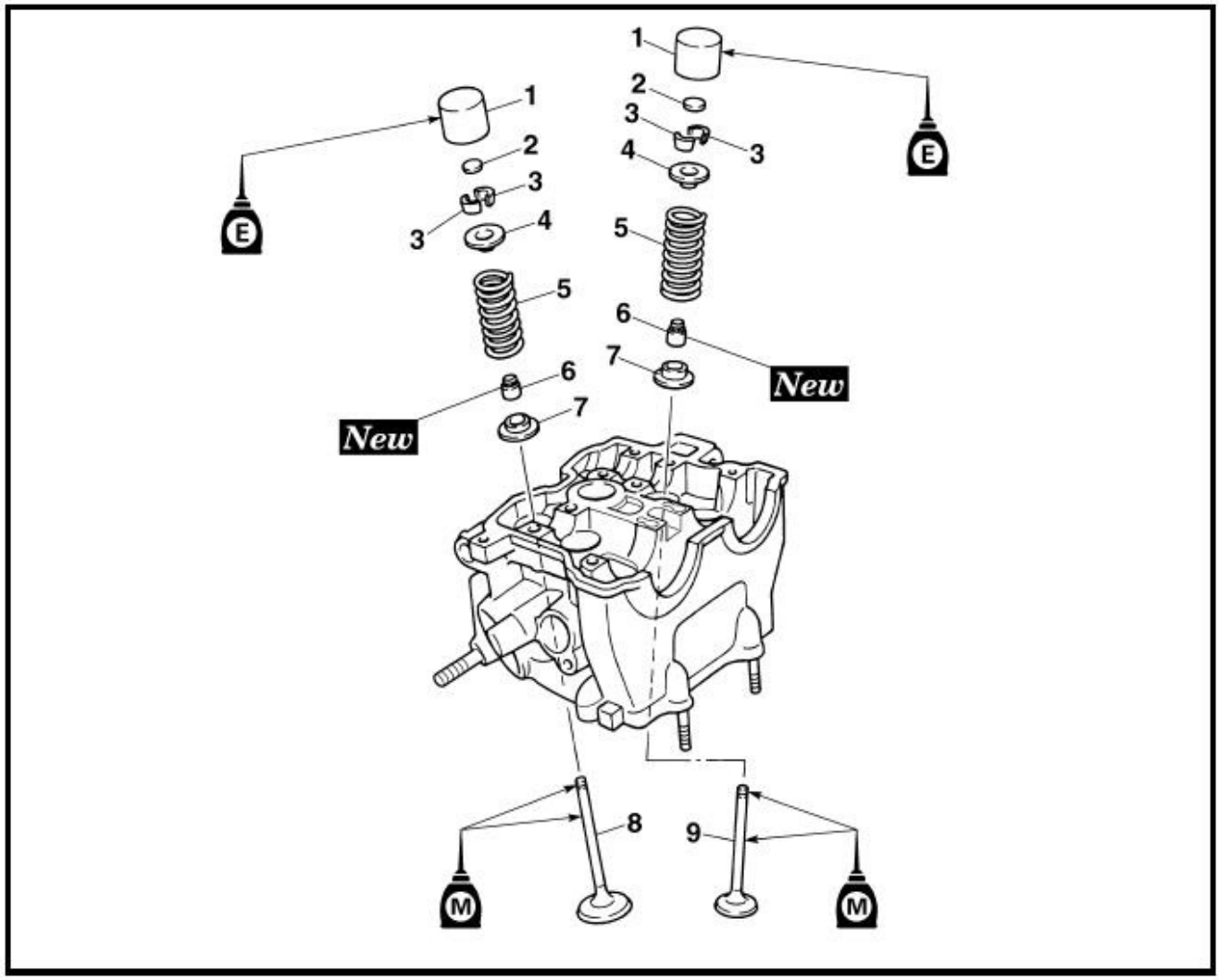


3. Install:
   - Copper washer ① **New**
   - Oil delivery pipe ②
   - Union bolt (M8) ③
     18 Nm (1.8 m · kg, 13 ft · lb)
   - Union bolt (M10) ④
     20 Nm (2.0 m · kg, 14 ft · lb)



4. Install:
   - Radiator pipe ①
   - Bolt (radiator pipe) ②
     10 Nm (1.0 m · kg, 7.2 ft · lb)

5 VALVES AND VALVE SPRINGS

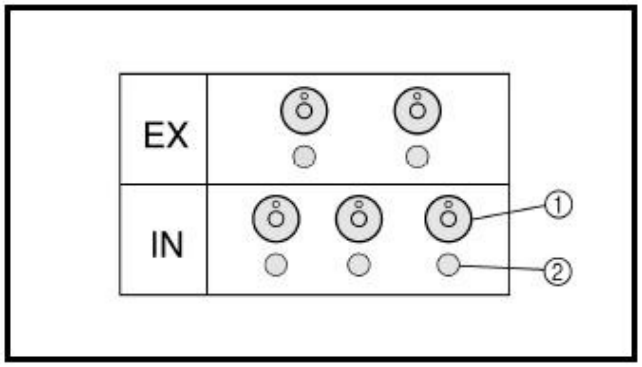


Extent of removal: ① Valve removal

Extent of removal	Order	Part name	Q'ty	Remarks
		VALVES AND VALVE SPRINGS REMOVAL		
Preparation for removal		Cylinder head		Refer to "CYLINDER HEAD" section.
①	1	Valve lifter	5	Use special tool. Refer to "REMOVAL POINTS".
	2	Adjusting pad	5	
	3	Valve cotter	10	
	4	Valve spring retainer	5	
	5	Valve spring	5	
	6	Valve stem seal	5	
	7	Valve spring seat	5	
	8	Exhaust valve	2	
	9	Intake valve	3	

5.1 Removal points

5.1.1 Valve lifter and valve cotter



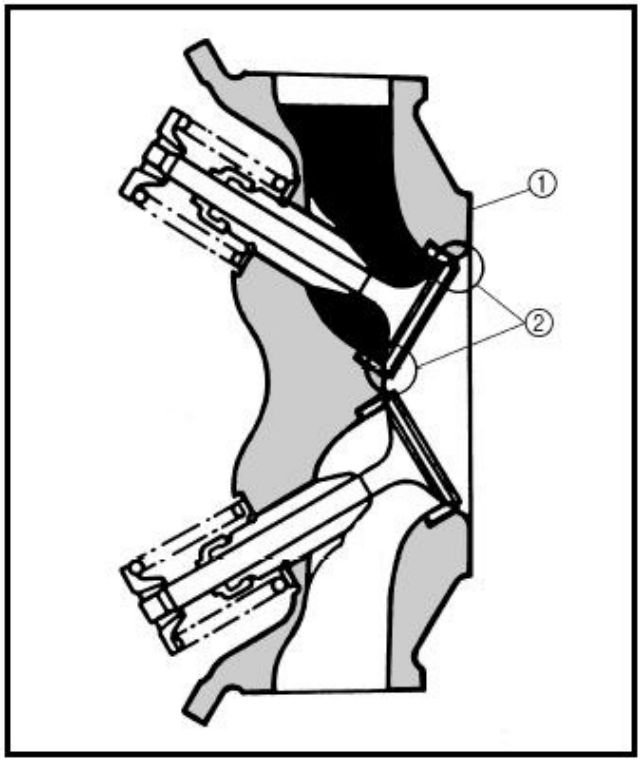
REMOVAL POINTS

Valve lifter and valve cotter

1. Remove:
   - Valve lifter ①
   - Pad ②

NOTE:

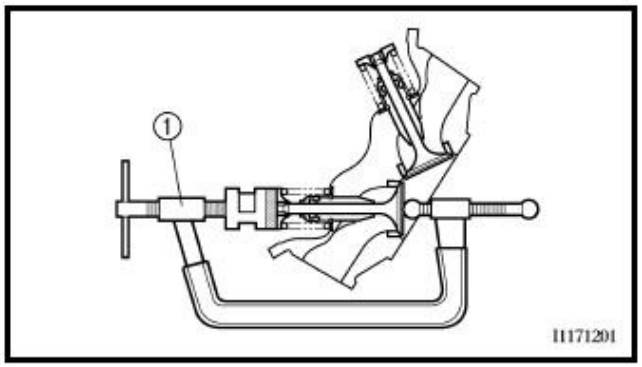
Identify each lifter ① and pad ② position very carefully so that they can be reinstalled in their original place.



2. Check:
   - Valve sealing
     Leakage at the valve seat → Inspect the valve face, valve seat and valve seat width.

Checking steps:

- Pour a clean solvent ① into the intake and exhaust ports.
- Check that the valve seals properly.
  There should be no leakage at the valve seat ②.



3. Remove:
   - Valve cotter

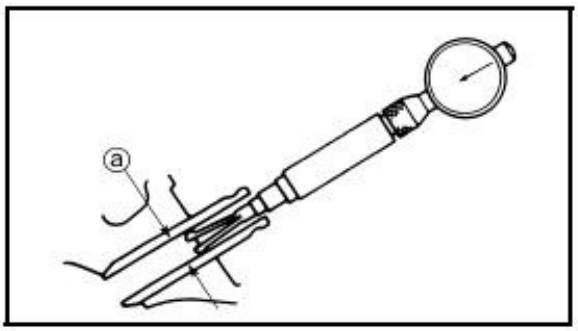
NOTE:

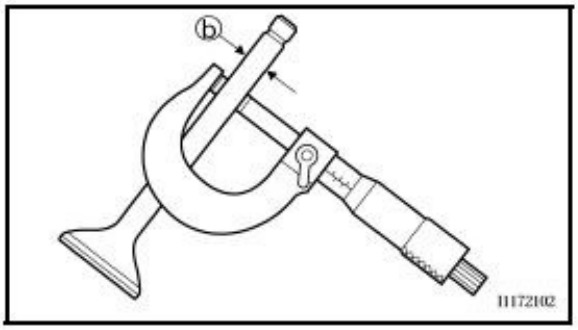
Attach a valve spring compressor ① between the valve spring retainer and the cylinder head to remove the valve cotters.

Valve spring compressor:
YM-4019/90890-04019

5.2 Inspection

5.2.1 Valve



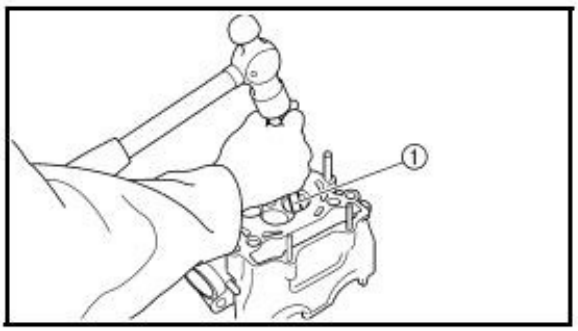


1. Measure:
   • Stem-to-guide clearance

Stem-to-guide clearance =
valve guide inside diameter ⓐ –
valve stem diameter ⓑ

Out of specification → Replace the valve guide.

Clearance (stem to guide):
Intake:
0.010 ~ 0.037 mm
(0.0004 ~ 0.0015 in)
<Limit>: 0.08 mm (0.003 in)
Exhaust:
0.025 ~ 0.052 mm
(0.0010 ~ 0.0020 in)
<Limit>: 0.10 mm (0.004 in)

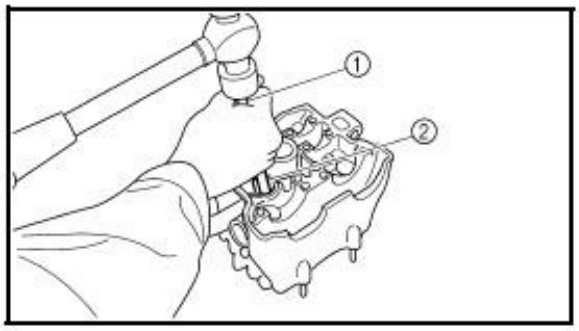


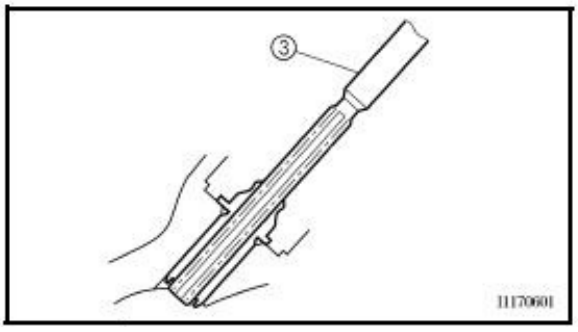
2. Replace:
   • Valve guide

Replacement steps:

NOTE:
To ease guide removal, installation and to maintain correct fit heat the cylinder head in an over to 100 °C (212 °F).

- Remove the valve guide using a valve guide remover ①.
- Install the new valve guide using a valve guide remover ① and valve guide installer ②.
- After installing the valve guide, bore the valve guide using a valve guide reamer ③ to obtain proper stem-to-guide clearance.

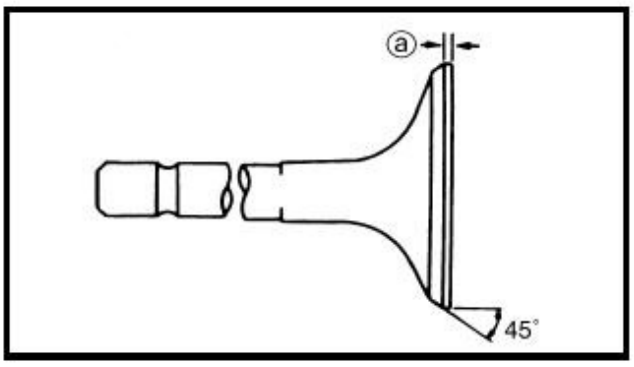




Valve guide remover:
Intake: 4.0 mm (0.16 in)
YM-4111/90890-04111
Exhaust: 4.5 mm (0.18 in)
YM-4116/90890-04116
Valve guide installer:
Intake: 4.0 mm (0.16 in)
YM-4112/90890-04112
Exhaust: 4.5 mm (0.18 in)
YM-4117/90890-04117
Valve guide reamer:
Intake: 4.0 mm (0.16 in)
YM-4113/90890-04113
Exhaust: 4.5 mm (0.18 in)
YM-4118/90890-04118

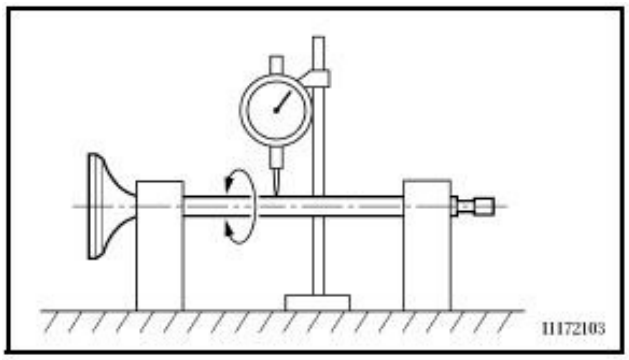
NOTE:
After replacing the valve guide reface the valve seat.

3. Inspect:
   - Valve face
     Pitting/wear → Grind the face.
   - Valve stem end
     Mushroom shape or diameter larger than the body of the stem → Replace.



4. Measure:
   - Margin thickness ⓐ
     Out of specification → Replace.

Margin thickness:
Intake:
0.8 mm (0.0315 in)
Exhaust:
0.7 mm (0.0276 in)

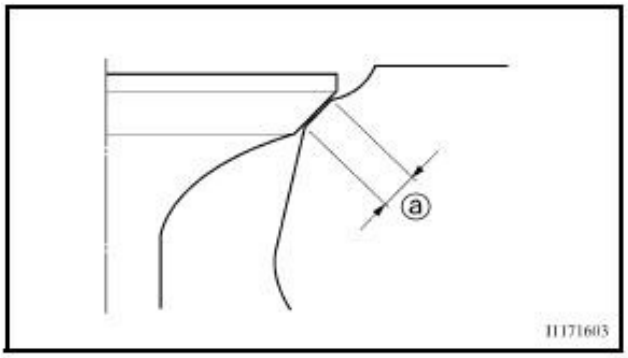


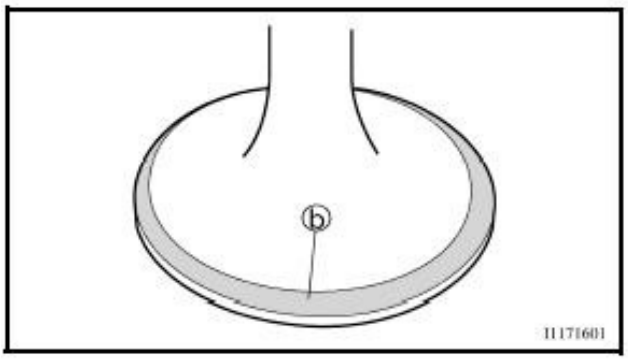
5. Measure:
   • Runout (valve stem)
   Out of specification → Replace.

Runout limit:
0.01 mm (0.0004 in)

NOTE:
- When installing a new valve always replace the guide.
- If the valve is removed or replaced always replace the oil seal.

6. Eliminate:
   • Carbon deposits
   (from the valve face and valve seat)
7. Inspect:
   • Valve seat
   Pitting/wear → Reface the valve seat.





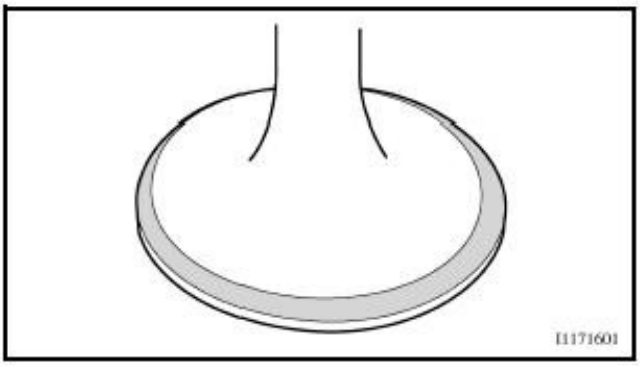
8. Measure:
   • Valve seat width ⓐ
   Out of specification → Reface the valve seat.

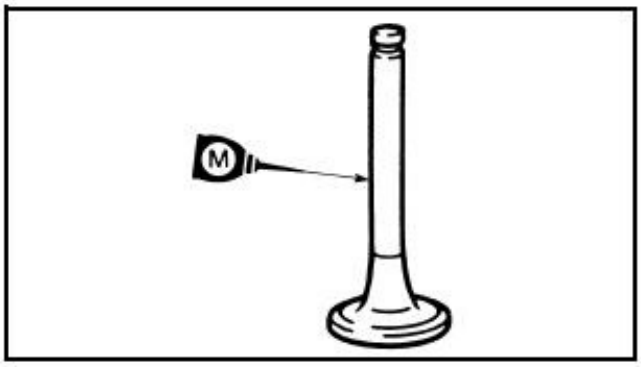
Valve seat width:
Intake:
0.9 ~ 1.1 mm
(0.0354 ~ 0.0433 in)
<Limit>: 1.6 mm (0.0630 in)
Exhaust:
0.9 ~ 1.1 mm
(0.0354 ~ 0.0433 in)
<Limit>: 1.6 mm (0.0630 in)

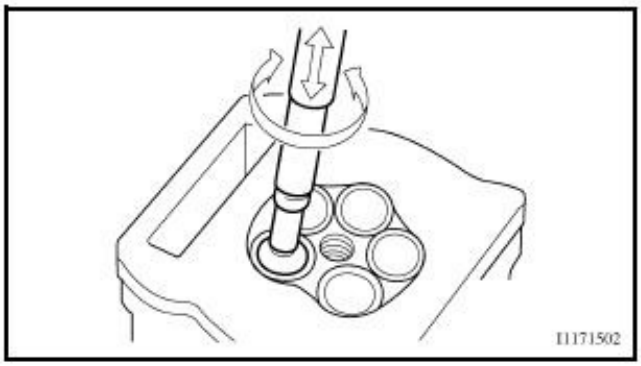
Measurement steps:
- Apply Mechanic's blueing dye (Dykem) ⓑ to the valve face.
- Install the valve into the cylinder head.
- Press the valve through the valve guide and onto the valve seat to make a clear pattern.
- Measure the valve seat width. Where the valve seat and valve face made contact, blueing will have been removed.
- If the valve seat is too wide, too narrow, or the seat is not centered, the valve seat must be refaced.

9. Lap:
   - Valve face
   - Valve seat

NOTE:
After refacing the valve seat or replacing the valve and valve guide, the valve seat and valve face should be lapped.







Lapping steps:
- Apply a coarse lapping compound to the valve face.

CAUTION:
Do not let the compound enter the gap between the valve stem and the guide.

- Apply molybdenum disulfide oil to the valve stem.
- Install the valve into the cylinder head.
- Turn the valve until the valve face and valve seat are evenly polished, then clean off all of the compound.

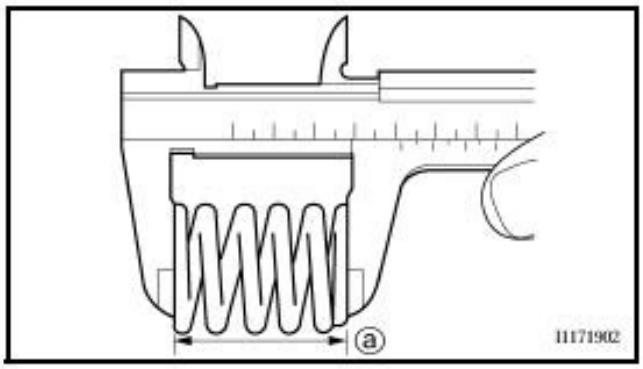
NOTE:
For best lapping results, lightly tap the valve seat while rotating the valve back and forth between your hands.

- Apply a fine lapping compound to the valve face and repeat the above steps.

NOTE:
After every lapping operation be sure to clean off all of the compound from the valve face and valve seat.

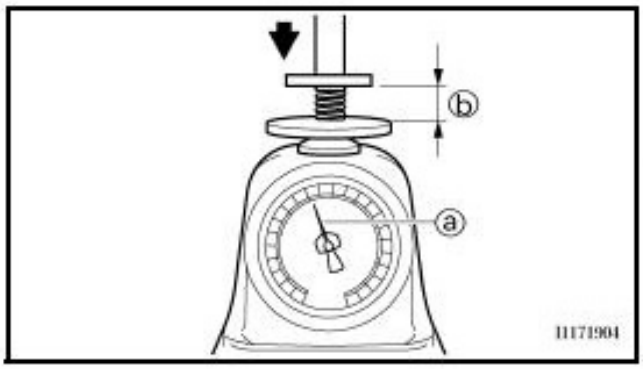
- Apply Mechanic's blueing dye (Dykem) to the valve face.
- Install the valve into the cylinder head.
- Press the valve through the valve guide and onto the valve seat to make a clear pattern.
- Measure the valve seat width again. If the valve seat width is out of specification, reface and relap the valve seat.

5.2.2 Valve spring



1. Measure:
   • Valve spring free length ⓐ
   Out of specification → Replace.

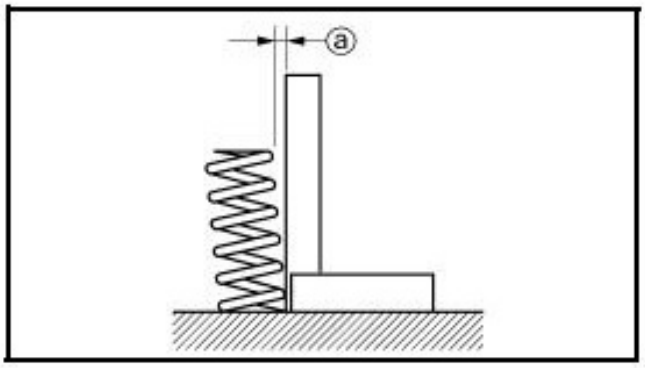
Free length (valve spring):
Intake:
37.81 mm (1.49 in)
<Limit>: 36.81 mm (1.45 in)
Exhaust:
37.54 mm (1.48 in)
<Limit>: 36.54 mm (1.44 in)



2. Measure:
   • Compressed spring force ⓐ
   Out of specification → Replace.

ⓑ Installed length

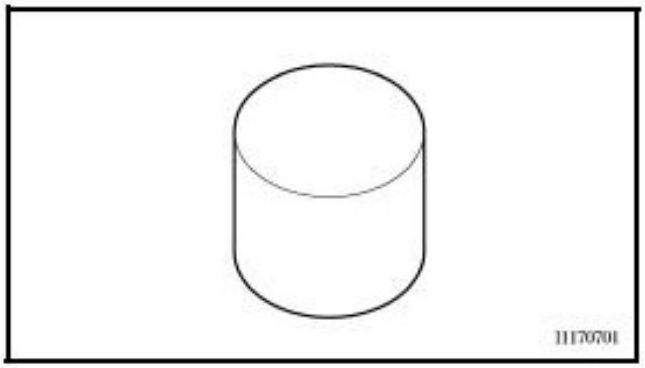
Compressed spring force:
Intake:
99 ~ 114 N at 29.13 mm
(9.9 ~ 11.4 kg at 29.13 mm,
22.27 ~ 25.57 lb at 1.15 in)
Exhaust:
126 ~ 144 N at 29.30 mm
(12.6 ~ 14.4 kg at 29.30 mm,
28.44 ~ 32.41 lb at 1.15 in)



3. Measure:
   • Spring tilt ⓐ
   Out of specification → Replace.

Spring tilt limit:
Intake:
2.5°/1.7 mm (0.067 in)
Exhaust:
2.5°/1.6 mm (0.063 in)

5.2.3 Valve lifter



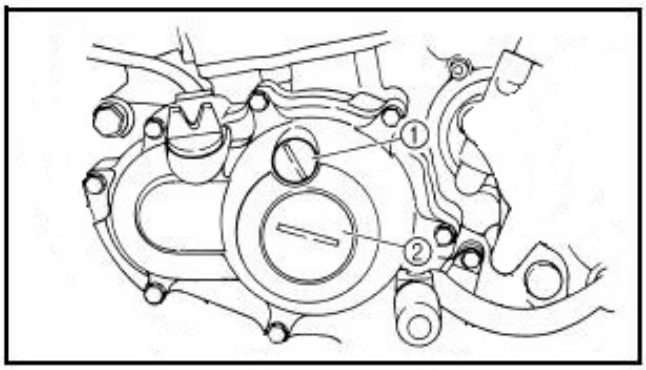
1. Inspect:
   • Valve lifter
   Scratches/damage → Replace both lifters and cylinder head.

5.3 Valve clearance inspection and adjustment

NOTE:
- The valve clearance should be adjusted when the engine is cool to the touch.
- The piston must be at Top Dead Center (T.D.C.) on compression stroke to check or adjust the valve clearance.

1. Drain:
   - Coolant

   Refer to "COOLANT REPLACEMENT" section.

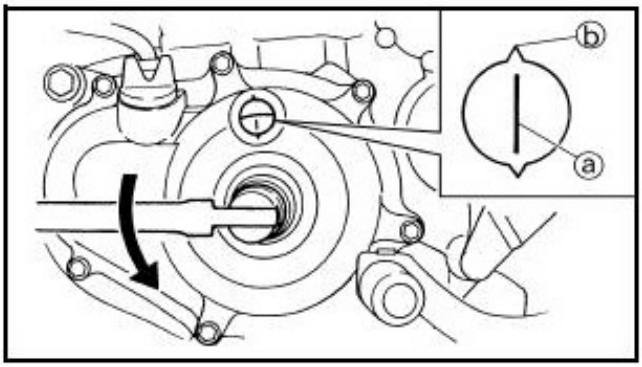


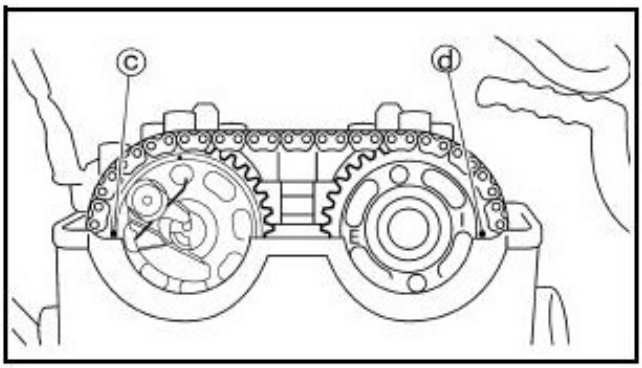
2. Remove:
   - Timing mark accessing screw ①
   - Crankshaft end accessing screw ②
   - O-ring

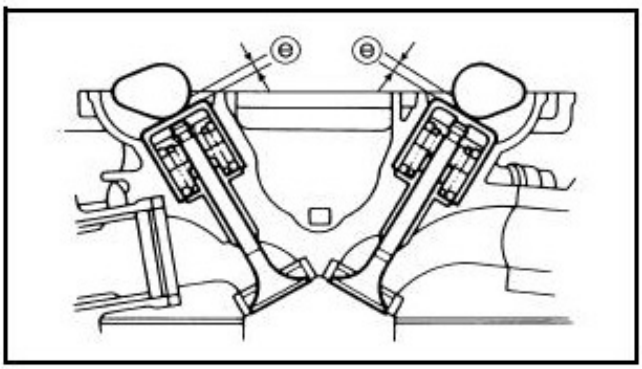
3. Check:
   - Valve clearance

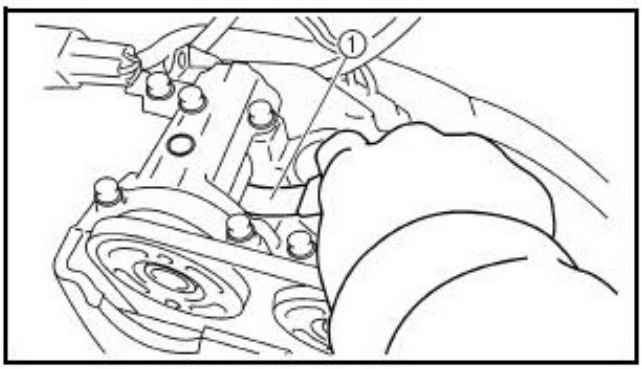
   Out of specification → Adjust.

Valve clearance (cold):
Intake valve:
0.10 ~ 0.15 mm
(0.0039 ~ 0.0059 in)
Exhaust valve:
0.17 ~ 0.22 mm
(0.0067 ~ 0.0087 in)









Checking steps:

- Turn the crankshaft counterclockwise with a wrench.
- Align the T.D.C. mark ⓐ on the rotor with the align mark ⓑ on the crankcase cover when piston is at T.D.C. on compression stroke.

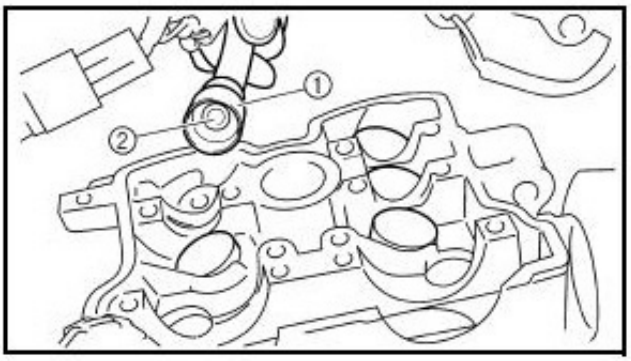
NOTE:

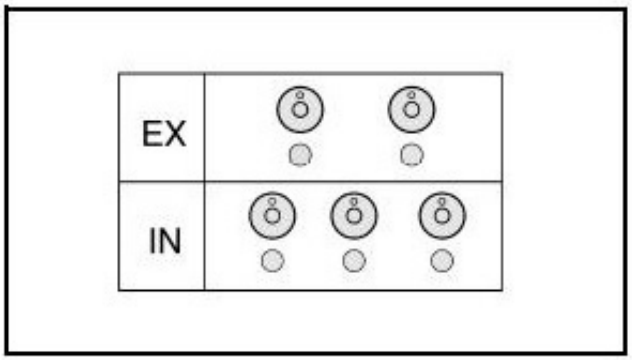
In order to be sure that the piston is at Top Dead Center, the punch mark ⓒ on the exhaust camshaft and the punch mark ⓓ on the intake camshaft must align with the cylinder head surface, as shown in the illustration.

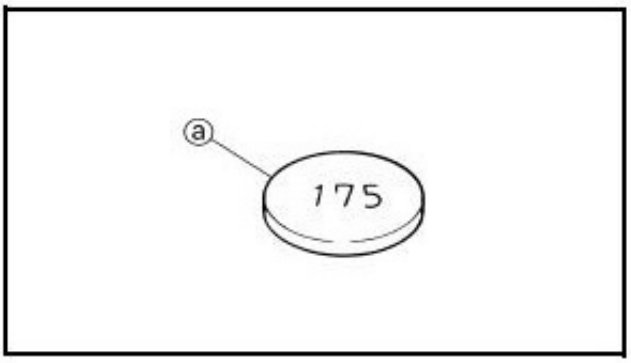
- Measure the valve clearance ⓔ using a feeler gauge ①.

NOTE:

Record the measured reading if the clearance is incorrect.







4. Adjust:
   - Valve clearance

Adjustment steps:
- Remove the camshaft (intake and exhaust).
  Refer to "CAMSHAFTS" section
- Remove the valve lifters ① and the pads ②.

NOTE:
- Place a rag in the timing chain space to prevent pads from falling into the crankcase.
- Identity each valve lifter and pad position very carefully so that they can be reinstalled in their original place.

- Select the proper pad using the pad selecting table.

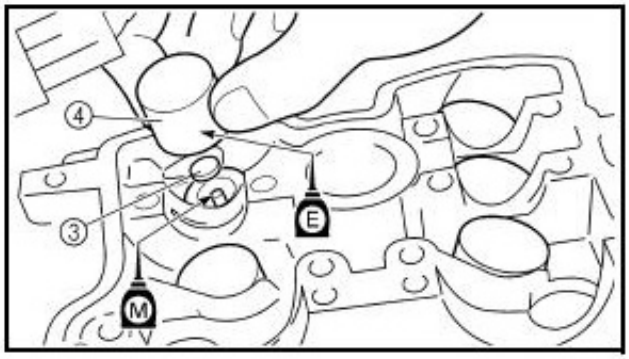
Pad range		Pad Availability: 25 increments
No. 120 ~ No. 240	1.20 mm ~ 2.40 mm	Pads are available in 0.05 mm increments

NOTE:
The thickness ⓐ of each pad is indicated in hundreths of millimeters on the pad upper surface.

- Round off the last digit of the installed pad number to the nearest increment.

Last digit of pad number	Rounded value
0, 1 or 2	0
4, 5 or 6	5
8 or 9	10

EXAMPLE:
Installed pad number = 148
Rounded off value = 150



NOTE:
Pads can only be selected in 0.05 mm increments.

- Locate the rounded-off value and the measured valve clearance in the chart "PAD SELECTION TABLE". The field where these two coordinates intersect shows the new pad number to use.

NOTE:
Use the new pad number only as a guide when verifying the valve clearance adjustment.

- Install the new pads ③ and the valve lifters ④.

NOTE:
- Apply the engine oil on the valve lifters.
- Apply the molybdenum disulfide oil on the valve stem ends.
- Valve lifter must turn smoothly when rotated with a finger.
- Be careful to reinstall valve lifters and pads in their original place.

- Install the camshafts (exhaust and intake). Refer to "CAMSHAFTS" section

INTAKE

MEASURED CLEARANCE	INSTALLED PAD NUMBER
0.00 ~ 0.04	120 125 130 135 140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240
0.05 ~ 0.09	120 125 130 135 140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235
0.10 ~ 0.15	STANDARD CLEARANCE
0.16 ~ 0.20	125 130 135 140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240
0.21 ~ 0.25	130 135 140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240
0.26 ~ 0.30	135 140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240
0.31 ~ 0.35	140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240
0.36 ~ 0.40	145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240
0.41 ~ 0.45	150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240
0.46 ~ 0.50	155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240
0.51 ~ 0.55	160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240
0.56 ~ 0.60	165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240
0.61 ~ 0.65	170 175 180 185 190 195 200 205 210 215 220 225 230 235 240
0.66 ~ 0.70	175 180 185 190 195 200 205 210 215 220 225 230 235 240
0.71 ~ 0.75	180 185 190 195 200 205 210 215 220 225 230 235 240
0.76 ~ 0.80	185 190 195 200 205 210 215 220 225 230 235 240
0.81 ~ 0.85	190 195 200 205 210 215 220 225 230 235 240
0.86 ~ 0.90	195 200 205 210 215 220 225 230 235 240
0.91 ~ 0.95	200 205 210 215 220 225 230 235 240
0.96 ~ 1.00	205 210 215 220 225 230 235 240
1.01 ~ 1.05	210 215 220 225 230 235 240
1.06 ~ 1.10	215 220 225 230 235 240
1.11 ~ 1.15	220 225 230 235 240
1.16 ~ 1.20	225 230 235 240
1.21 ~ 1.25	230 235 240
1.26 ~ 1.30	235 240
1.31 ~ 1.35	240

VALVE CLEARANCE (cold):
0.10 ~ 0.15 mm
Example: Installed is 175
Measured clearance is 0.23 mm
Replace 175 pad with 185 pad
Pad number: (example)
Pad No. 175 = 1.75 mm
Pad No. 185 = 1.85 mm

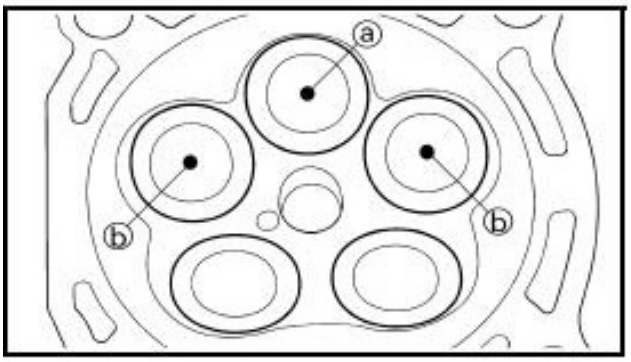
EXHAUST

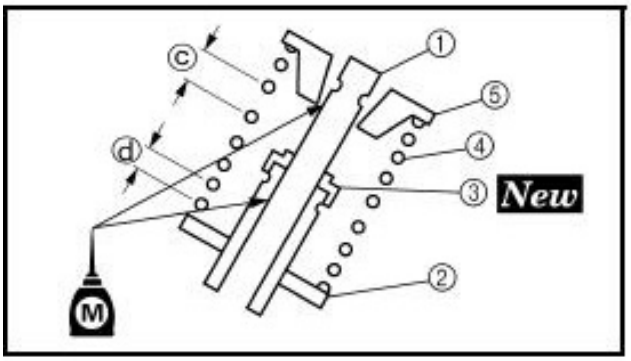
MEASURED CLEARANCE	INSTALLED PAD NUMBER
0.00 ~ 0.04	120 125 130 135 140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240
0.05 ~ 0.09	120 125 130 135 140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230
0.10 ~ 0.16	120 125 130 135 140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235
0.17 ~ 0.22	STANDARD CLEARANCE
0.23 ~ 0.25	125 130 135 140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240
0.26 ~ 0.30	130 135 140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240
0.31 ~ 0.35	135 140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240
0.36 ~ 0.40	140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240
0.41 ~ 0.45	145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240
0.46 ~ 0.50	150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240
0.51 ~ 0.55	155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240
0.56 ~ 0.60	160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240
0.61 ~ 0.65	165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240
0.66 ~ 0.70	170 175 180 185 190 195 200 205 210 215 220 225 230 235 240
0.71 ~ 0.75	175 180 185 190 195 200 205 210 215 220 225 230 235 240
0.76 ~ 0.80	180 185 190 195 200 205 210 215 220 225 230 235 240
0.81 ~ 0.85	185 190 195 200 205 210 215 220 225 230 235 240
0.86 ~ 0.90	190 195 200 205 210 215 220 225 230 235 240
0.91 ~ 0.95	195 200 205 210 215 220 225 230 235 240
0.96 ~ 1.00	200 205 210 215 220 225 230 235 240
1.01 ~ 1.05	205 210 215 220 225 230 235 240
1.06 ~ 1.10	210 215 220 225 230 235 240
1.11 ~ 1.15	215 220 225 230 235 240
1.16 ~ 1.20	220 225 230 235 240
1.21 ~ 1.25	225 230 235 240
1.26 ~ 1.30	230 235 240
1.31 ~ 1.35	235 240
1.36 ~ 1.40	240

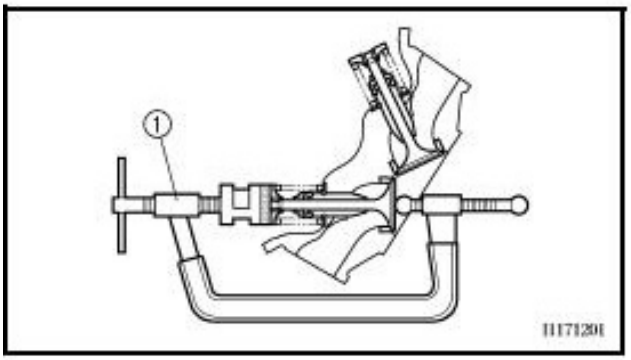
VALVE CLEARANCE (cold):
0.17 ~ 0.22 mm
Example: Installed is 175
Measured clearance is 0.27 mm
Replace 175 pad with 185 pad
Pad number: (example)
Pad No. 175 = 1.75 mm
Pad No. 185 = 1.85 mm

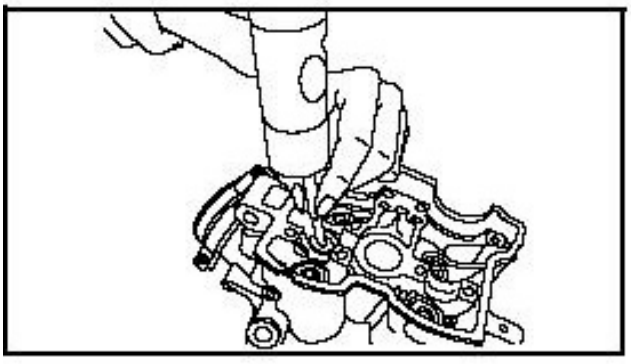
5.4 Assembly and installation

5.4.1 Valve and valve spring









1. Apply:
   - Molybdenum disulfide oil
     Onto the valve stem and valve stem seal.

2. Install:
   - Valve ①
   - Valve spring seat ②
   - Valve stem seal ③ **New**
   - Valve spring ④
   - Valve spring retainer ⑤
     To cylinder head.

NOTE:
- Make sure that each valve is installed in its original place, also referring to the painted color as follows.
  Intake (middle) ⓐ: yellow
  Intake (right/left) ⓑ: white
  Exhaust: no paint
- Install the valve springs with the larger pitch ⓒ facing upward.

ⓓ Smaller pitch

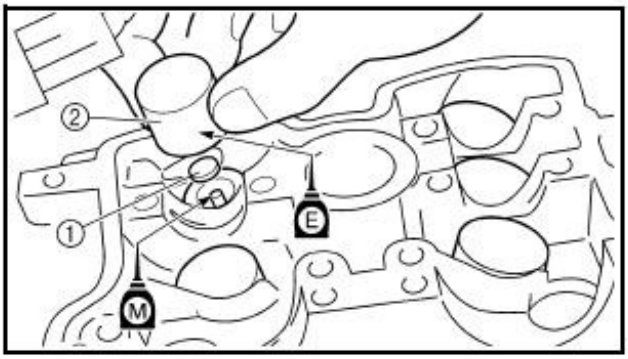
3. Install:
   - Valve cotter

NOTE:
While compressing the valve spring with a valve spring compressor ① install the valve cotters.

	Valve spring compressor: YM-4019/90890-04019

4. To secure the valve cotters onto the valve stem, lightly tap the valve tip with a piece of wood.

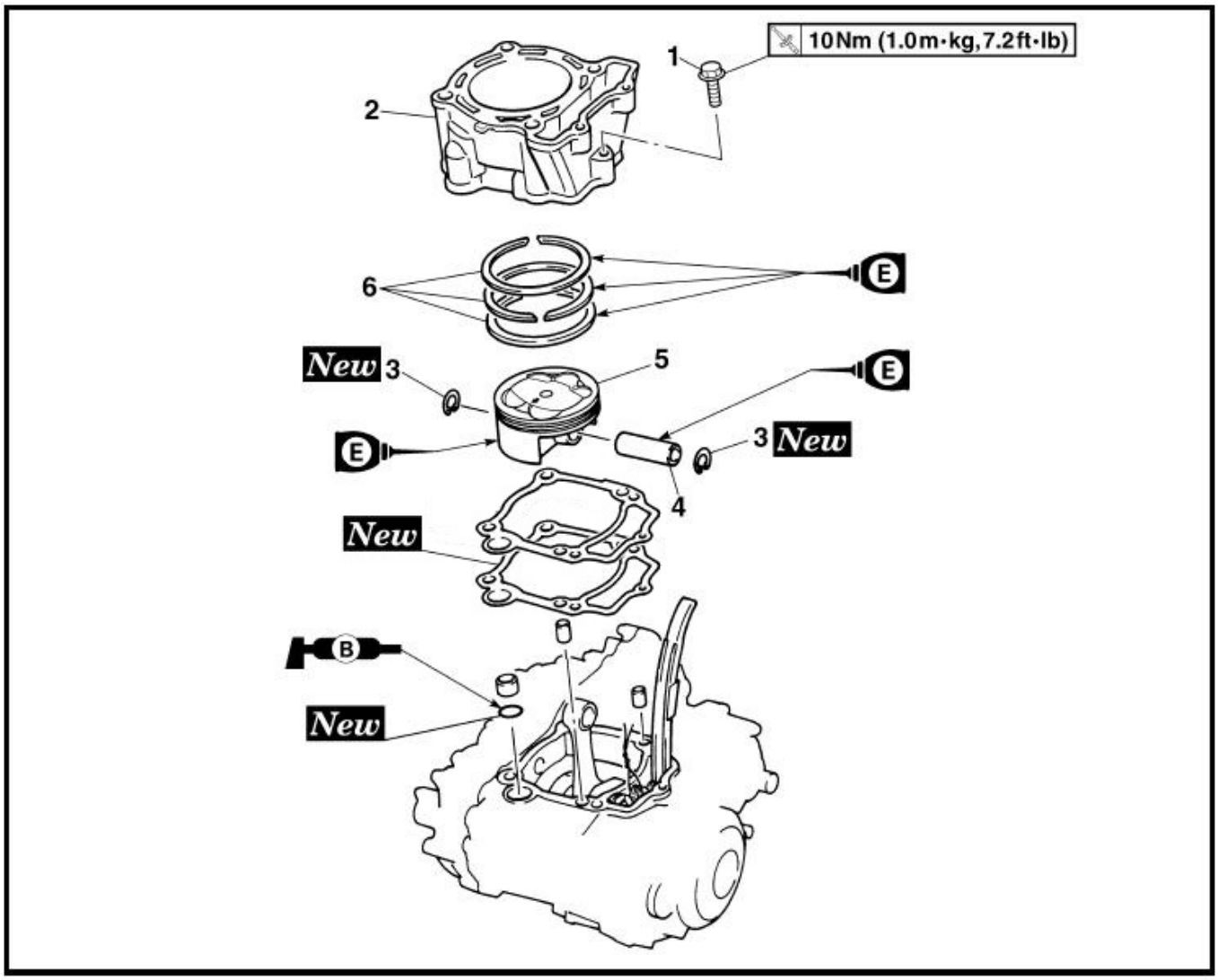
CAUTION:
Hitting the valve tip with excessive force could damage the valve.



5. Install:
   - Adjusting pad ①
   - Valve lifter ②

NOTE:
- Apply the molybdenum disulfide oil on the valve stem end.
- Apply the engine oil on the valve lifters.
- Valve lifter must turn smoothly when rotated with a finger.
- Be careful to reinstall valve lifters and pads in their original place.

6 CYLINDER AND PISTON

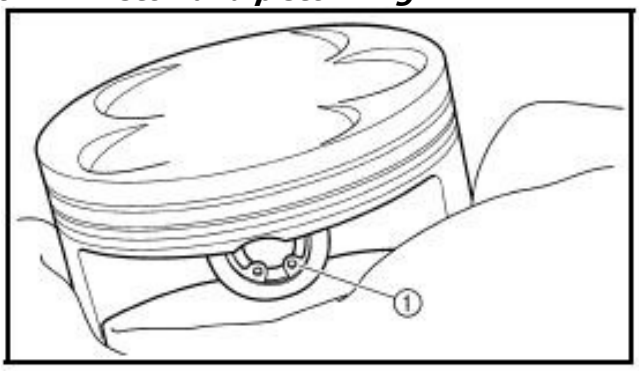


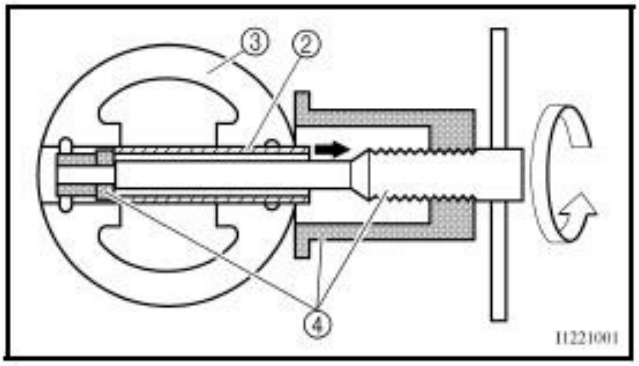
Extent of removal: ① Cylinder removal ② Piston removal

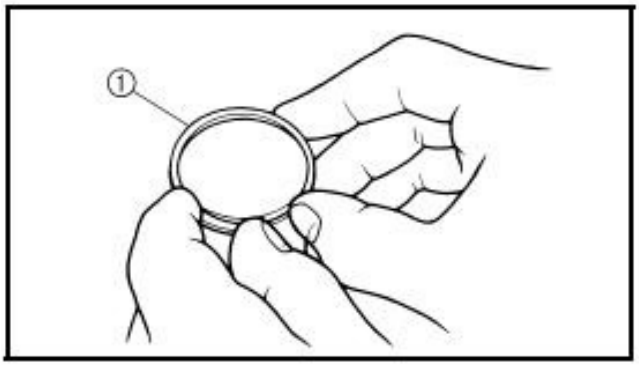
Extent of removal	Order	Part name	Q'ty	Remarks
		CYLINDER AND PISTON REMOVAL		
Preparation for removal		Cylinder head		Refer to "CYLINDER HEAD" section.
①	1	Bolt (cylinder)	1	
	2	Cylinder	1	
②	3	Piston pin clip	2	
	4	Piston pin	1	Use special tool.
	5	Piston	1	Refer to "REMOVAL POINTS".
	6	Piston ring set	1	

6.1 Removal points

6.1.1 Piston and piston ring







1. Remove:
   - Piston pin clip ①
   - Piston pin ②
   - Piston ③

NOTE:
- Put identification marks on each piston head for reference during reinstallation.
- Before removing each piston pin, deburr the clip groove and pin hole area. If the piston pin groove is deburred and the piston pin is still difficult to remove, use the piston pin puller set ④.

	**Piston pin puller set: YU-1304/90890-01304**

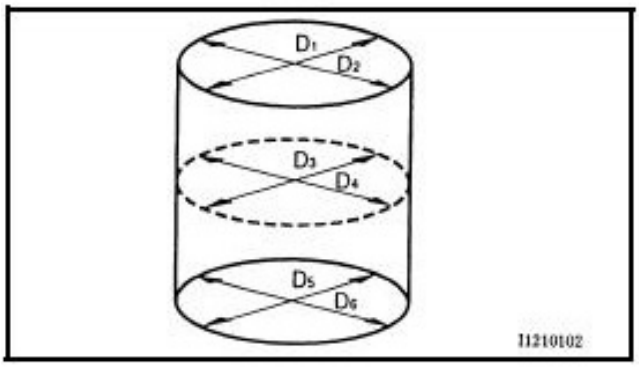
CAUTION:
Do not use a hammer to drive the piston pin out.

2. Remove:
   - Piston ring ①

NOTE:
Spread the end gaps apart while at the same time lifting the piston ring over the top of the piston crown, as shown in the illustration.

6.2 Inspection

6.2.1 Cylinder and piston



1. Inspect:
   - Cylinder and piston walls
     Vertical scratches → Replace cylinder and piston.
2. Measure:
   - Piston-to-cylinder clearance

Measurement steps:
1st step:
- Measure the cylinder bore "C" with a cylinder bore gauge.

NOTE:
Measure the cylinder bore "C" in parallel to and at right angles to the crankshaft. Then, find the average of the measurements.

Cylinder bore "C"	77.00 ~ 77.01 mm (3.0315 ~ 3.0319 in)
Taper limit "T"	0.05 mm (0.002 in)
Out of round "R"	0.05 mm (0.002 in)

"C" = Maximum D

"T" = (Maximum D_1 or D_2) – (Maximum D_5 or D_6)

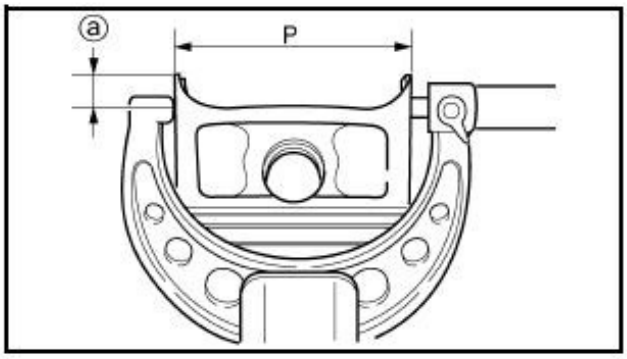
"R" = (Maximum D_1, D_3 or D_5) – (Minimum D_2, D_4 or D_6)

- If out of specification, replace the cylinder, and replace the piston and piston rings as set.

2nd step:

- Measure the piston skirt diameter "P" with a micrometer.

ⓐ 8 mm (0.31 in) from the piston bottom edge



	Piston size "P"
Standard	76.955 ~ 76.970 mm (3.0297 ~ 3.0303 in)

- If out of specification, replace the piston and piston rings as a set.

3rd step:

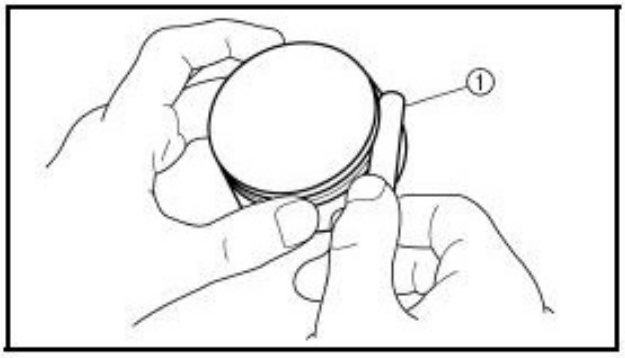
- Calculate the piston-to-cylinder clearance with following formula:

Piston-to-cylinder clearance = Cylinder bore "C" – Piston skirt diameter "P"

Piston-to-cylinder clearance: 0.040 ~ 0.065 mm (0.0016 ~ 0.0026 in) <Limit>: 0.1 mm (0.004 in)

- If out of specification, replace the cylinder, and replace the piston and piston rings as set.

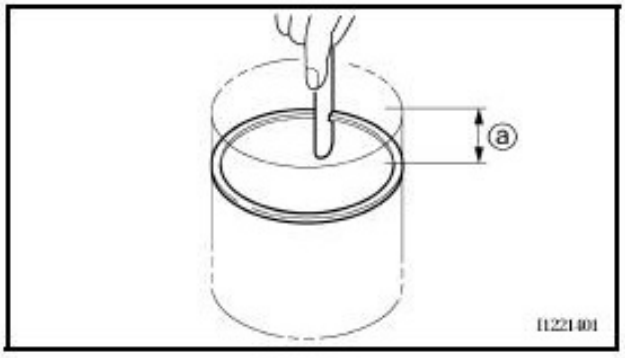
6.2.2 Piston ring



1. Measure:
   • Ring side clearance
   Use a feeler gauge ①.
   Out of specification → Replace the piston and rings as a set.

NOTE:
Clean carbon from the piston ring grooves and rings before measuring the side clearance.

	Side clearance:	
	Standard	<Limit>
Top ring	0.030 ~ 0.065 mm (0.0012 ~ 0.0026 in)	0.12 mm (0.005 in)
2nd ring	0.020 ~ 0.055 mm (0.0008 ~ 0.0022 in)	0.12 mm (0.005 in)



2. Position:
   • Piston ring
   (in cylinder)

NOTE:
Insert a ring into the cylinder and push it approximately 10 mm (0.39 in) into the cylinder. Push the ring with the piston crown so that the ring will be at a right angle to the cylinder bore.

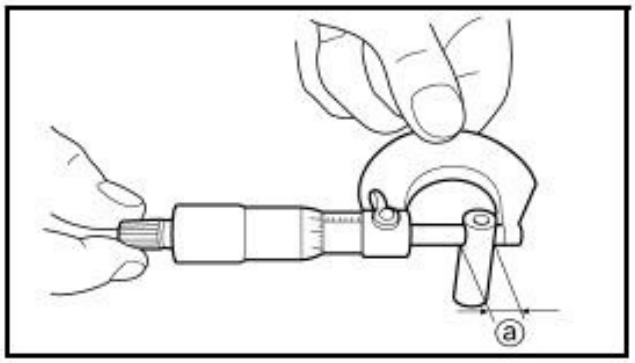
ⓐ 10 mm (0.39 in)

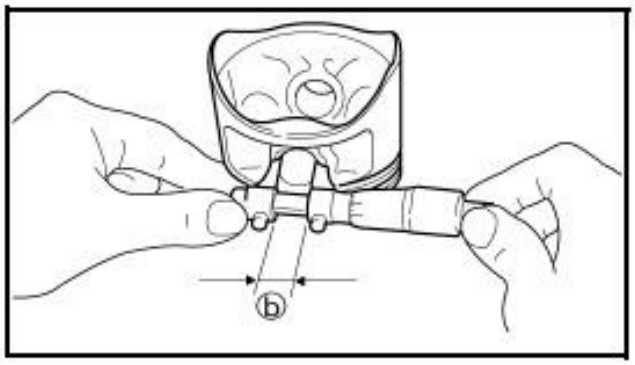
3. Measure:
   • Ring end gap
   Out of specification → Replace.

NOTE:
You cannot measure the end gap on the expander spacer of the oil control ring. If the oil control ring rails show excessive gap, replace all three rings.

	End gap:	
	Standard	<Limit>
Top ring	0.15 ~ 0.25 mm (0.006 ~ 0.010 in)	0.50 mm (0.020 in)
2nd ring	0.30 ~ 0.45 mm (0.012 ~ 0.018 in)	0.80 mm (0.031 in)
Oil ring	0.10 ~ 0.40 mm (0.004 ~ 0.016 in)	—

6.3 Piston pin





1. Inspect:
   - Piston pin
     Blue discoloration/grooves → Replace, then inspect the lubrication system.
2. Measure:
   - Piston pin-to-piston clearance

Measurement steps:

- Measure the outside diameter (piston pin) ⓐ.
  If out of specification, replace the piston pin.

Outside diameter (piston pin):
15.991 ~ 16.000 mm
(0.6296 ~ 0.6299 in)

- Measure the inside diameter (piston) ⓑ.

Inside diameter (piston):
16.002 ~ 16.013 mm
(0.6300 ~ 0.6304 in)

- Calculate the piston pin-to-piston clearance with the following formula.

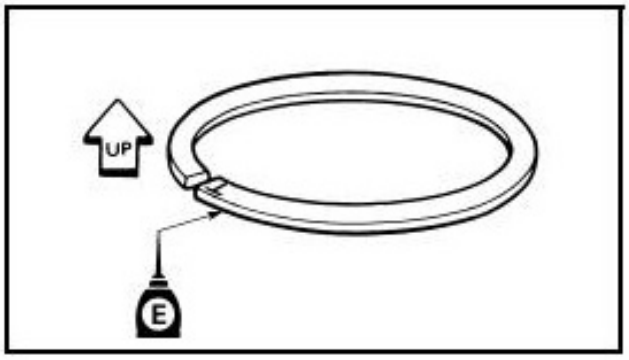
Piston pin-to-piston clearance =
Inside diameter (piston) ⓑ –
Outside diameter (piston pin) ⓐ

- If out of specification, replace the piston.

Piston pin-to-piston clearance:
0.002 ~ 0.022 mm
(0.0001 ~ 0.0009 in)
<Limit>: 0.07 mm (0.003 in)

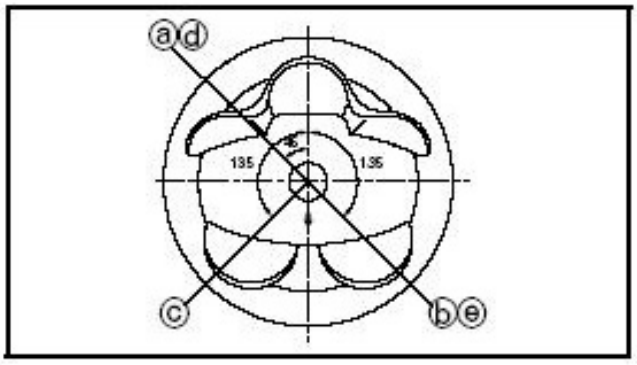
6.4 Assembly and installation

6.4.1 Piston ring and piston



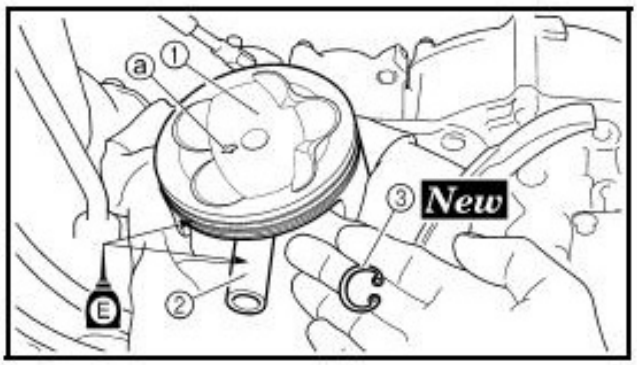
1. Install:
   - Piston ring
     Onto the piston.

NOTE:
- Be sure to install the piston rings so that the manufacturer's marks or numbers are located on the upper side of the rings.
- Lubricate the piston and piston rings liberally with engine oil.



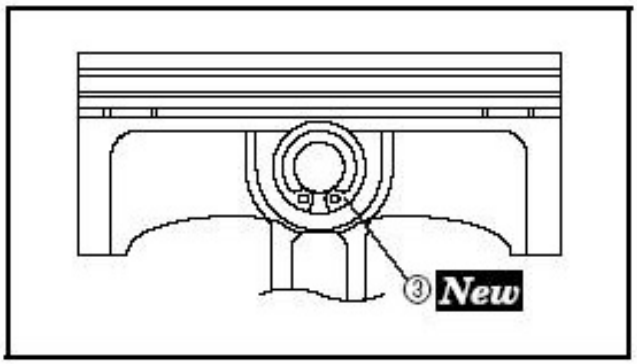
2. Position:
   - Top ring
   - 2nd ring
   - Oil ring
     Offset the piston ring end gaps as shown.

ⓐ Top ring end
ⓑ 2nd ring end
ⓒ Oil ring end (upper)
ⓓ Oil ring
ⓔ Oil ring end (lower)



3. Install:
   - Piston ①
   - Piston pin ②
   - Piston pin clip ③ **New**

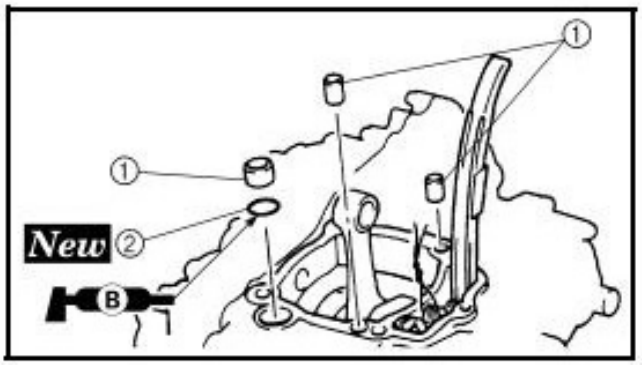
NOTE:
- Apply engine oil onto the piston pin and piston.
- Be sure that the arrow mark ⓐ on the piston points to the exhaust side of the engine.
- Before installing the piston pin clip, cover the crankcase with a clean rag to prevent the piston pin clip from falling into the crankcase.
- Install the piston pin clips with their ends facing downward.



6.5 Cylinder

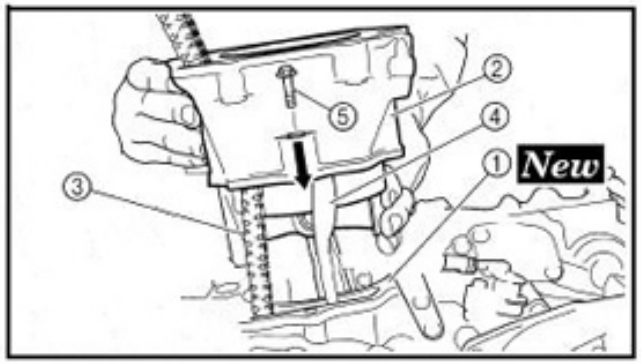
1. Lubricate:
   - Piston
   - Piston ring
   - Cylinder

NOTE:
Apply a liberal coating of engine oil.



2. Install:
   - Dowel pin ①
   - O-ring ② New

NOTE:
Apply the lithium soap base grease on the O-ring.



3. Install:
   - Cylinder gasket ① New
   - Cylinder ②

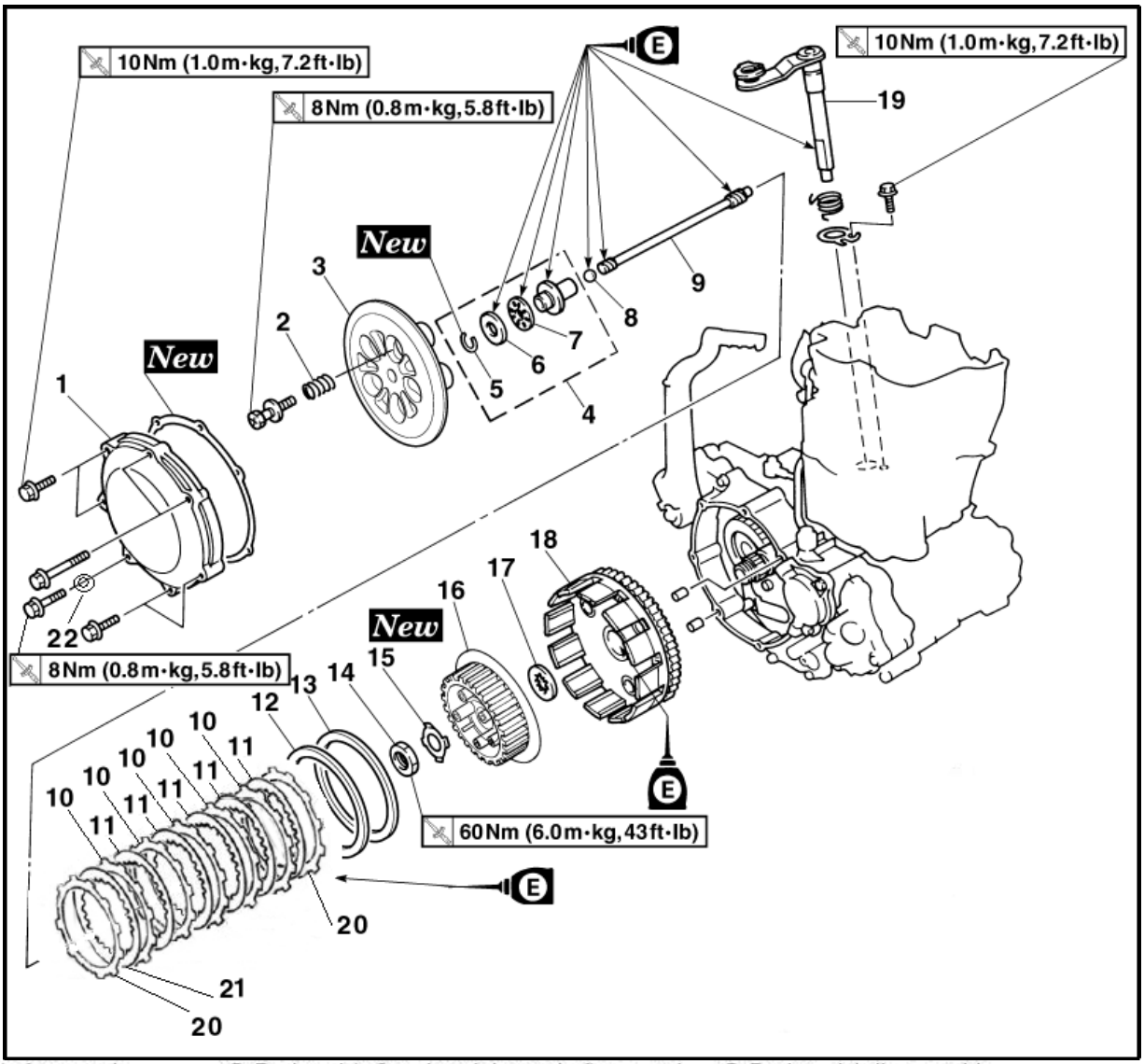
NOTE:
Install the cylinder with one hand while compressing the piston rings with the other hand.

CAUTION:
- **Pass the timing chain ③ through the timing chain cavity.**
- **Be careful not to damage the timing chain guide ④ during installation.**

4. Install:
   - Bolt (cylinder) ⑤

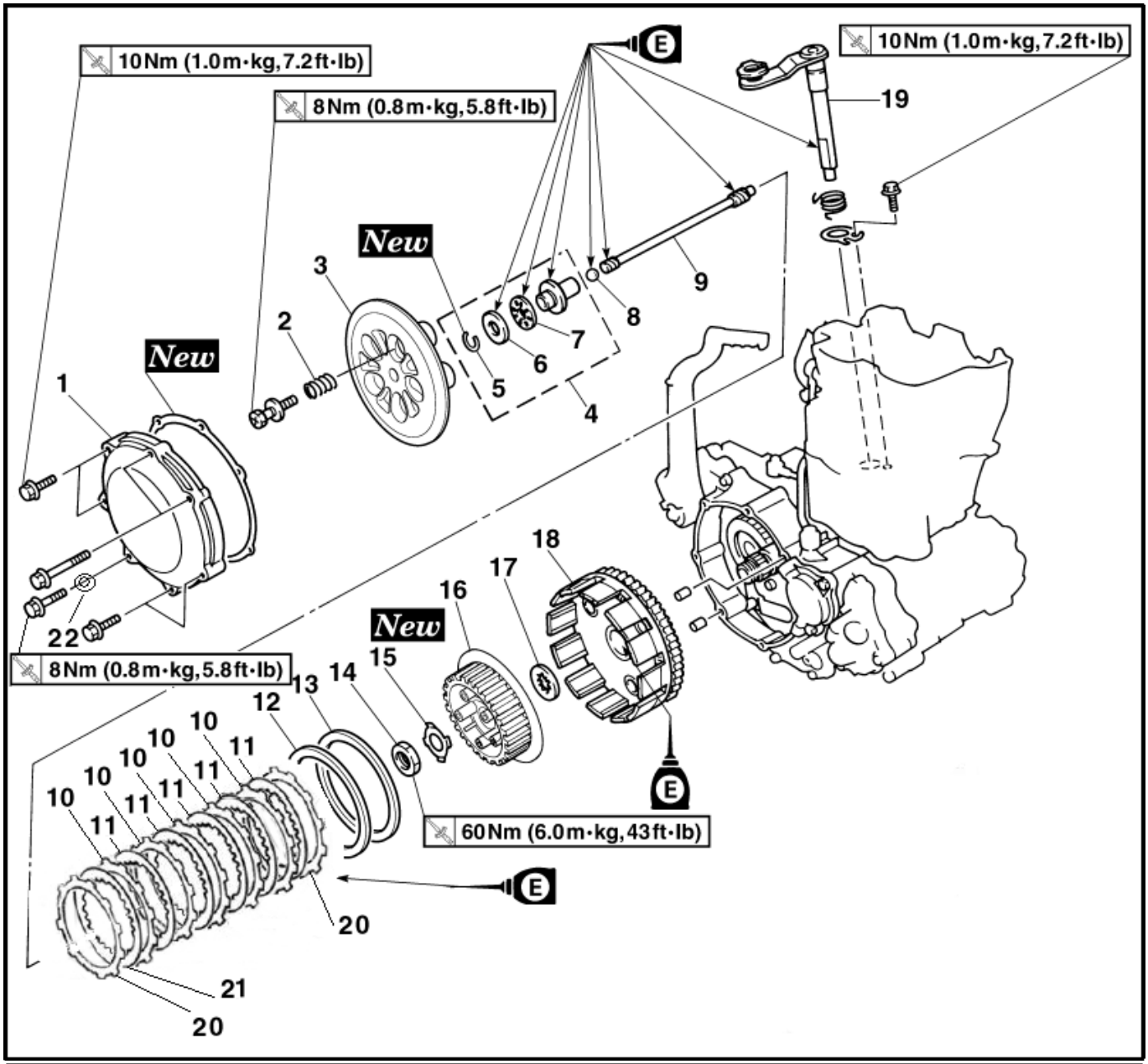
	10 Nm (1.0 m · kg, 7.2 ft · lb)

7 CLUTCH



Extent of removal: ① Push rod 1, 2 and push lever shaft removal ② Push pod 1 disassembly ③ Friction plate and clutch plate removal ④ Primary driven gear removal

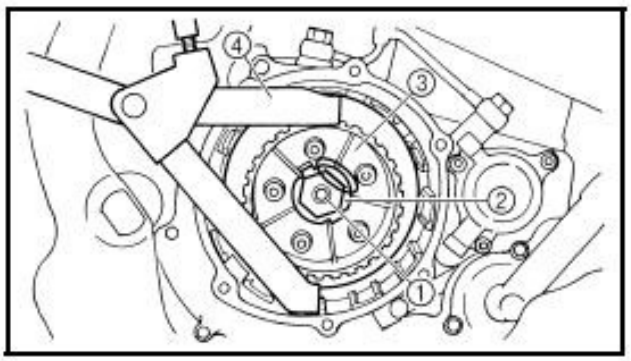
Extent of removal	Order	Part name	Q'ty	Remarks
		CLUTCH REMOVAL		
Preparation for removal		Drain the engine oil.		Refer to "ENGINE OIL REPLACEMENT"
		Brake pedal		Refer to "ENGINE REMOVAL" section.
		Clutch cable		Disconnect at engine side.
①②③④①	1	Clutch cover	1	
	2	Clutch spring	5	
	3	Pressure plate	1	
	4	Push rod 1	1	
	5	Circlip	1	
	6	Washer	1	
	7	Bearing	1	
	8	Ball	1	
	9	Push rod 2	1	



Extent of removal	Order	Part name	Q'ty	Remarks
③ ↕	10	Friction plate	9	
	11	Clutch plate	8	
	12	Cushion spring	1	
	13	Seat plate	1	
④ ↕	14	Nut (clutch boss)	1	Use special tool. Refer to "REMOVAL POINTS".
	15	Look washer	1	
	16	Clutch boss	1	
	17	Thrust washer	1	
	18	Primary driven gear	1	
① ↕	19	Push lever shaft	1	
	20	Friction plate	2	
	21	Clutch plate	1	
	22	washer	1	

7.1 Removal points

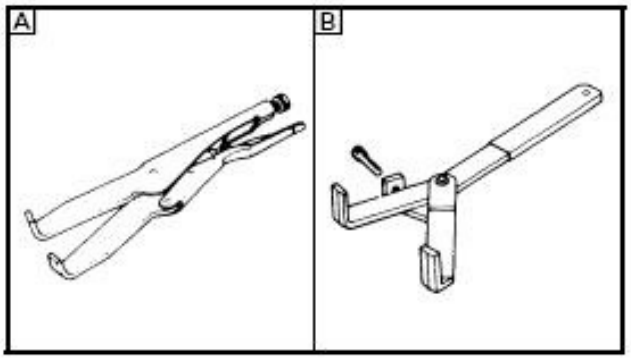
7.1.1 Clutch boss



1. Remove:
   - Nut ①
   - Lock washer ②
   - Clutch boss ③

NOTE:
Straighten the lock washer tab and use the clutch holding tool ④ to hold the clutch boss.

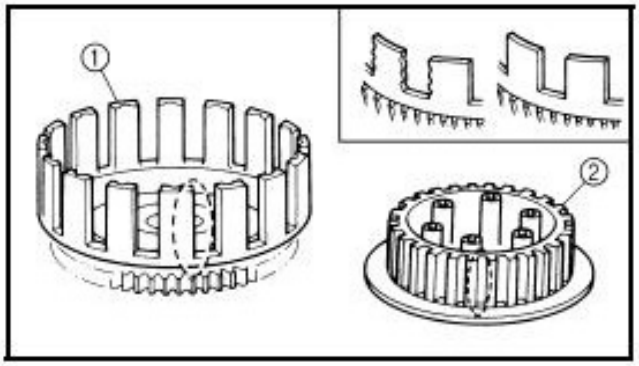
	**Clutch holding tool:** **YM-91042/90890-04086**



A For USA and CDN
B Except for USA and CDN

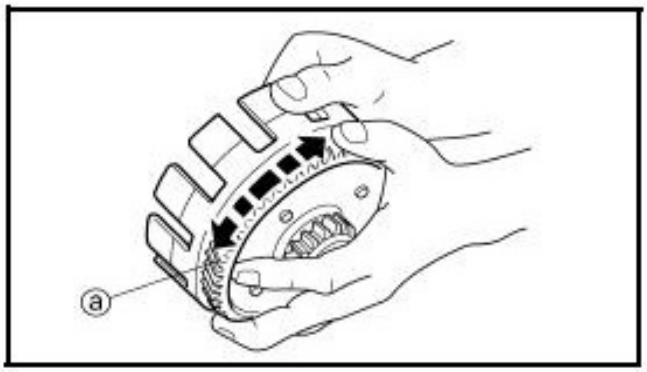
7.2 Inspection

7.2.1 Clutch housing and boss



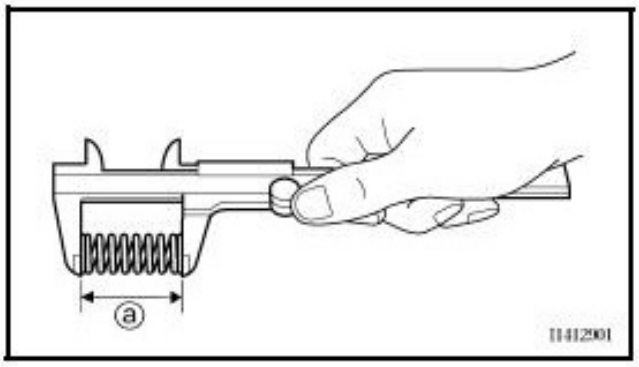
1. Inspect:
   - Clutch housing ①
     Cracks/wear/damage → Replace.
   - Clutch boss ②
     Scoring/wear/damage → Replace.

7.2.2 Primary driven gear



1. Check:
   - Circumferential play
     Free play exists → Replace.
   - Gear teeth ⓐ
     Wear/damage → Replace.

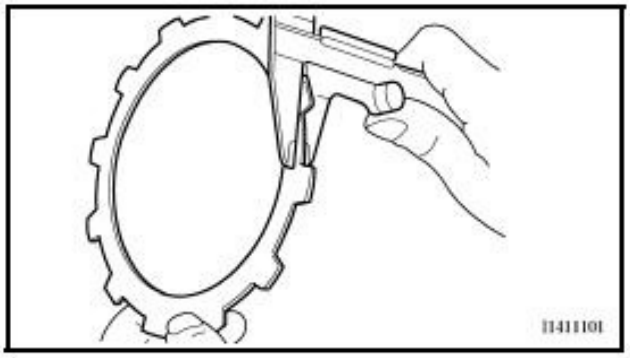
7.2.3 Clutch spring



1. Measure:
   - Clutch spring free length ⓐ
     Out of specification → Replace springs as a set.

Clutch spring free length:
40.4 mm (1.59 in)
<Limit>: 39.4 mm (1.55 in)

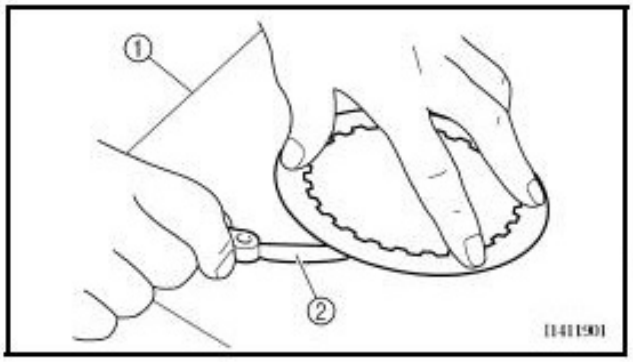
7.2.4 Friction plate



1. Measure:
   - Friction plate thickness
     Out of specification → Replace friction plate as a set.
     Measure at all four points.

Friction plate thickness:
2.9 ~ 3.1 mm
(0.114 ~ 0.122 in)
<Limit>: 2.7 mm (0.106 in)

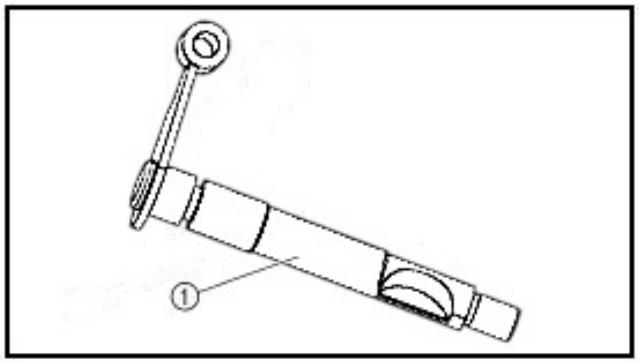
7.2.5 Clutch plate



1. Measure:
   - Clutch plate warpage
     Out of specification → Replace clutch plate as a set.
     Use a surface plate ① and thickness gauge ②.

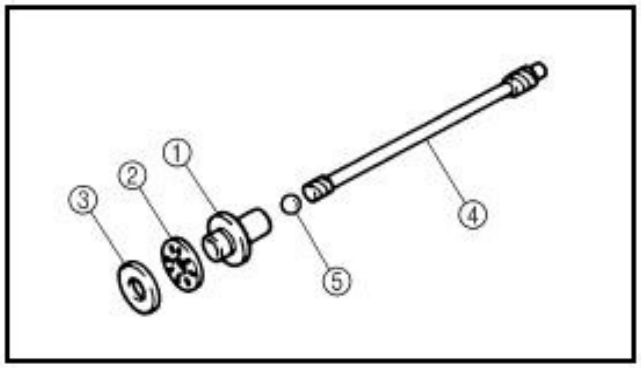
Warp limit:
0.1 mm (0.004 in)

7.2.6 Push lever shaft



1. Inspect:
   - Push lever shaft ①
     Wear/damage → Replace.

7.2.7 Push rod

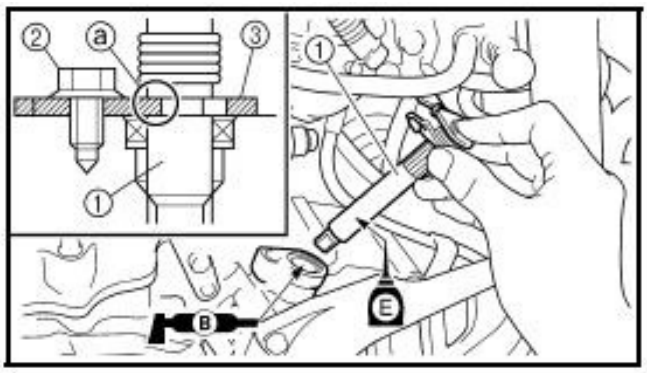


1. Inspect:
   - Push rod 1 ①
   - Bearing ②
   - Washer ③
   - Push rod 2 ④
   - Ball ⑤

   Wear/damage/bend → Replace.

7.3 Assembly and installation

7.3.1 Push lever shaft

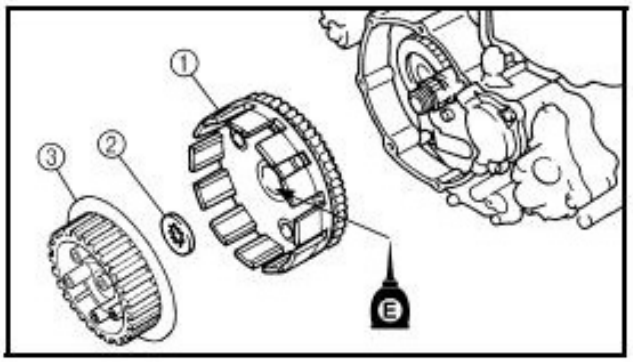


1. Install:
   - Push lever shaft ①
   - Bolt (push lever shaft) ②

     10 Nm (1.0 m · kg, 7.2 ft · lb)

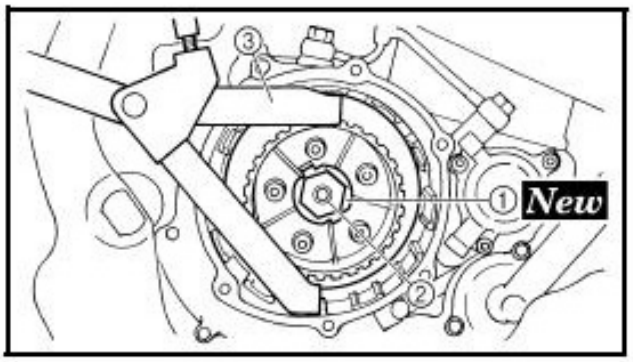
NOTE:
- Apply the lithium soap base grease on the oil seal lip.
- Apply the engine oil on the push lever shaft.
- Fit the seat plate ③ in the groove ⓐ of the push lever shaft and tighten the bolt (seat plate).

7.3.2 Clutch



1. Install:
   - Primary driven gear ①
   - Thrust washer ②
   - Clutch boss ③

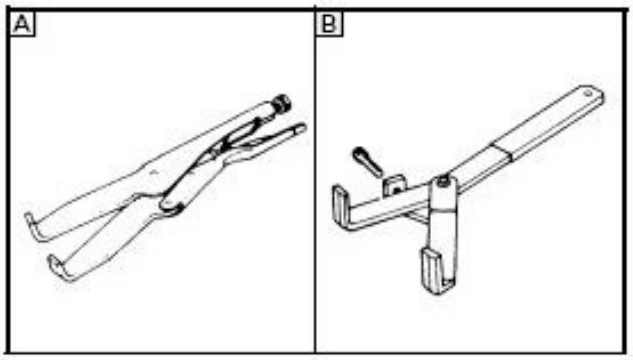
NOTE:
Apply the engine oil on the primary driven gear inner circumference.



2. Install:
   - Lock washer ① **New**
   - Nut (clutch boss) ②

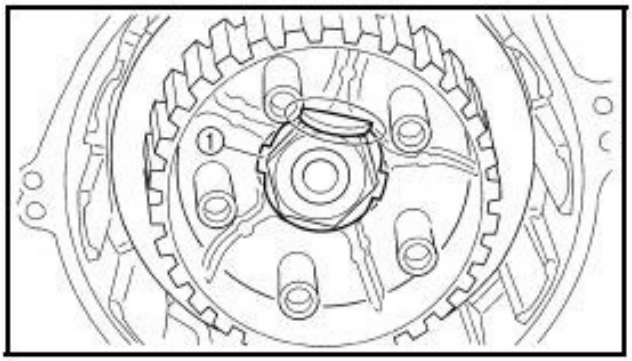
	60 Nm (6.0 m · kg, 43 ft · lb)

NOTE:
Use the clutch holding tool ③ to hold the clutch boss.

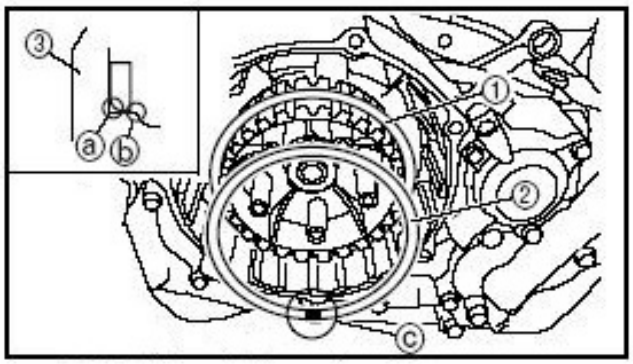


	Clutch holding tool: **YM-91042/90890-04086**

A For USA and CDN
B Except for USA and CDN

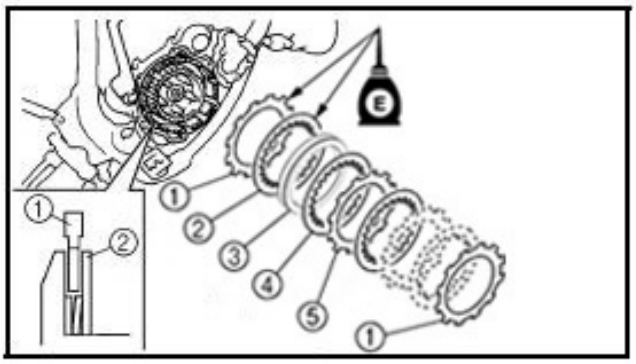


3. Bend the lock washer ① tab.



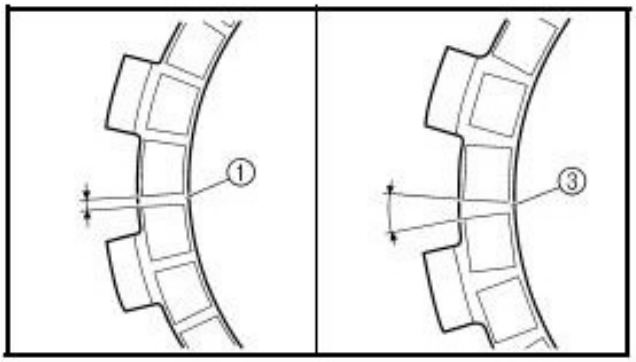
4. Install:
   - Seat plate ①
   - Cushion spring ②

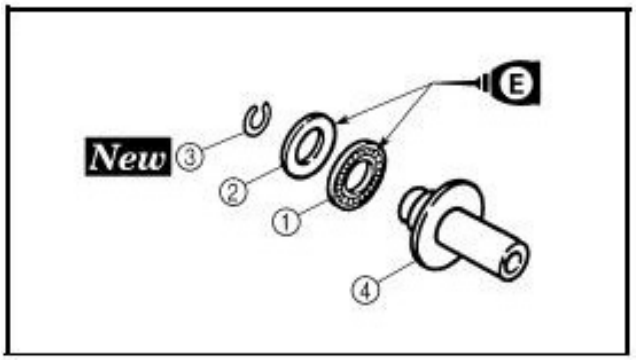
NOTE:
- Install the seat plate with its chamfered portion ⓐ facing the clutch boss ③.
- Install the seat plate so that it is not caught on the step ⓑ.
- Install the cushion spring with the paint ⓒ facing out.



5. Install:
   - Friction plate 1 ①
   - Clutch plate 1 ②
   - Clutch shim ③
   - Clutch plate 2 ④
   - Friction plate 2 ⑤

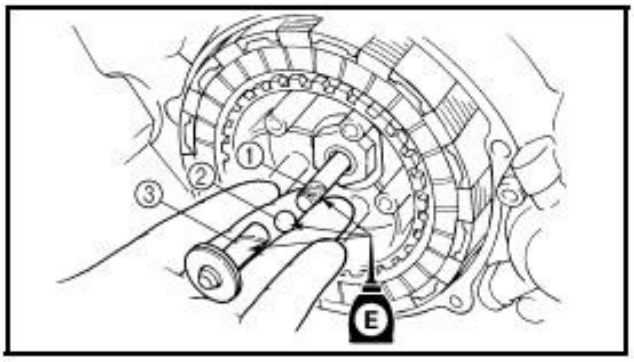
NOTE:
- Install the clutch plates and friction plates alternately on the clutch boss, starting with a friction plate and ending with a friction plate.
- Use the friction plates 1 for the first and final while paying attention to the difference in surface pattern.
- Apply the engine oil on the friction plates and clutch plates.
- Unlike the clutch plate 2, the clutch plate 1 has no surface gloss. Use the clutch plate 1 for the first while paying attention to the difference in surface gloss.





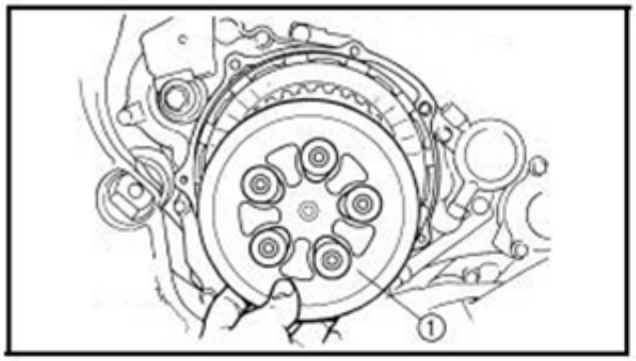
6. Install:
   - Bearing ①
   - Washer ②
   - Circlip ③ **New**
     To push rod 1 ④.

NOTE:
Apply the engine oil on the bearing and washer.

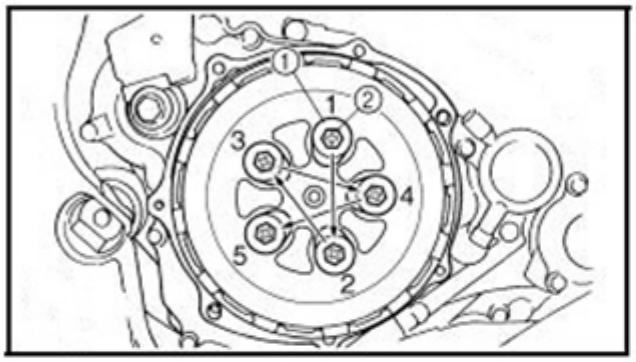


7. Install:
   - Push rod 2 ①
   - Ball ②
   - Push rod 1 ③

NOTE:
Apply the engine oil on the push rod 1, 2 and ball.



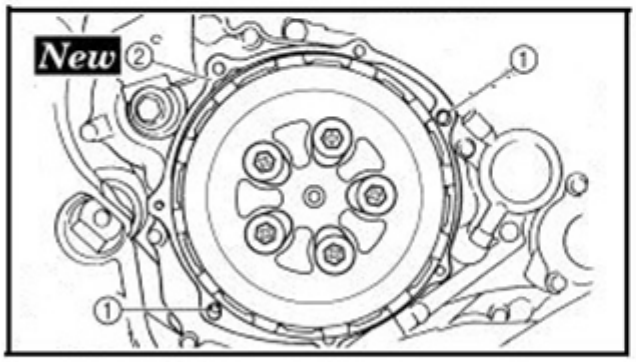
8. Install:
   - Pressure plate ①



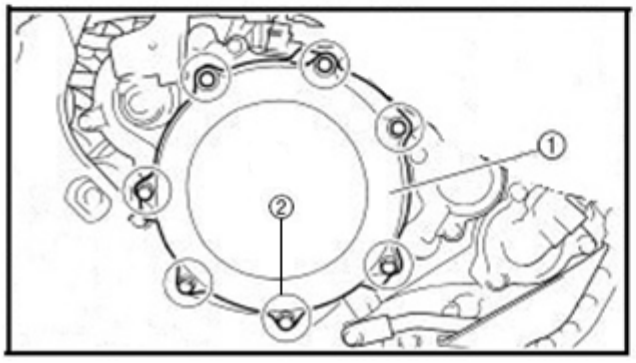
9. Install:
   - Clutch spring ①
   - Bolt (clutch spring) ②

8 Nm (0.8 m · kg, 5.8 ft · lb)

NOTE:
Tighten the bolts in stage, using a crisscross pattern.



10. Install:
    - Dowel pin ①
    - Gasket (clutch cover) ② **New**



11. Install:
    - Clutch cover ①
    - Bolt (clutch cover)

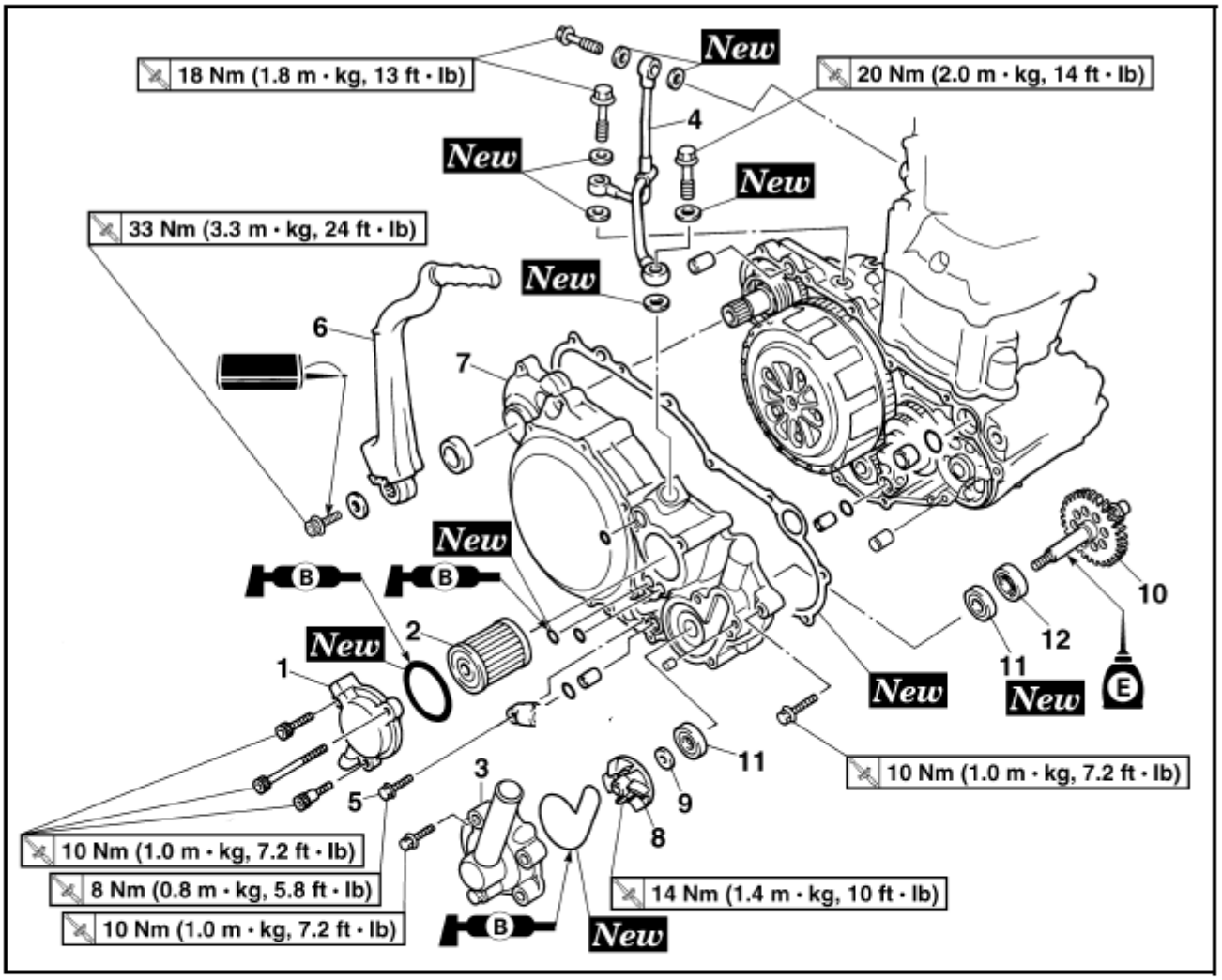
8 Nm (0.8 m · kg, 5.8 ft · lb)

    - Bolt (clutch cover)

10 Nm (1.0 m · kg, 7.2 ft · lb)

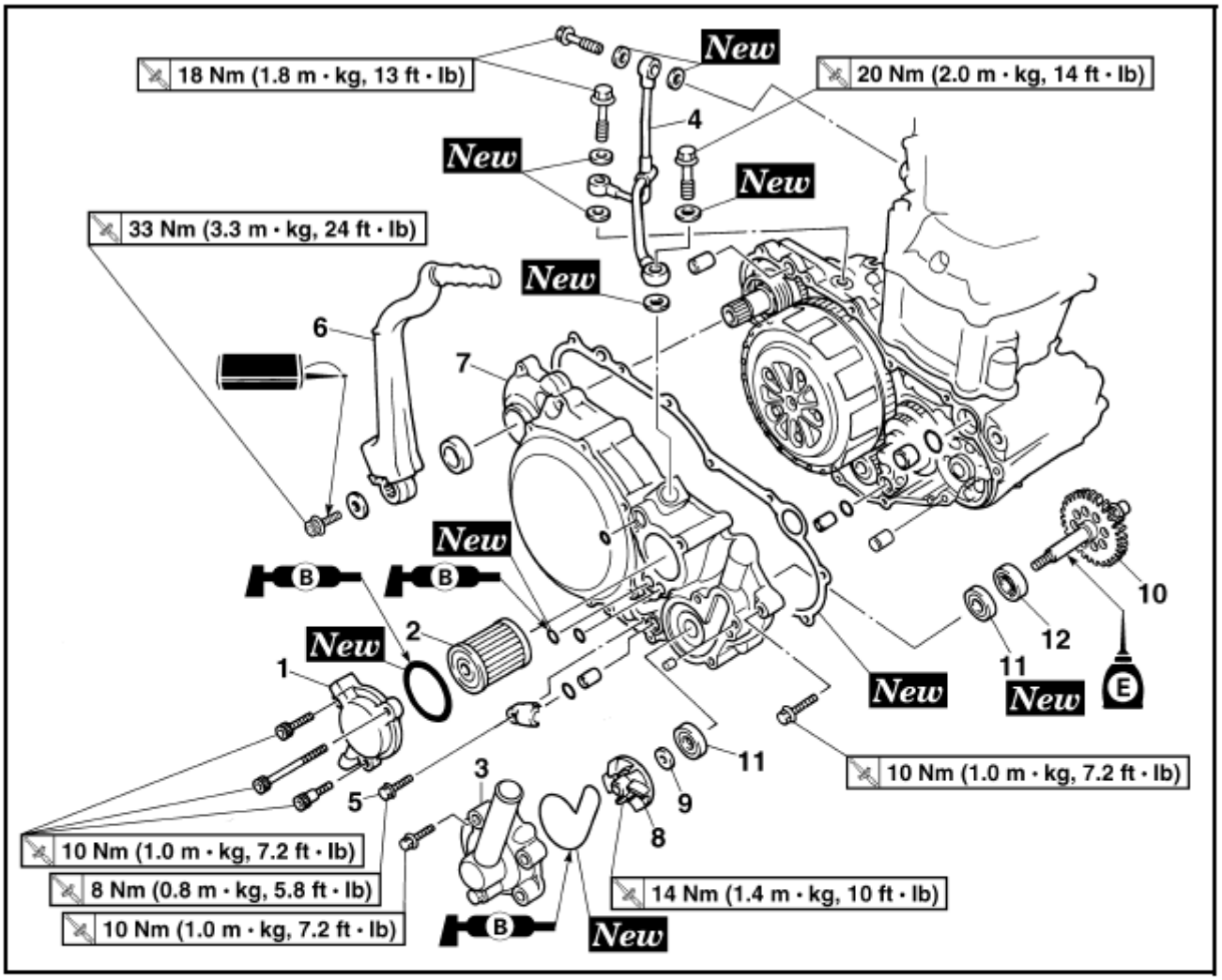
NOTE:
Tighten the bolts in stage, using a crisscross pattern.

8 OIL FILTER ELEMENT, WATER PUMP AND RIGHT CRANKCASE COVER



Extent of removal: ① Oil filter element removal ② Water pump removal ③ Right crankcase cover removal

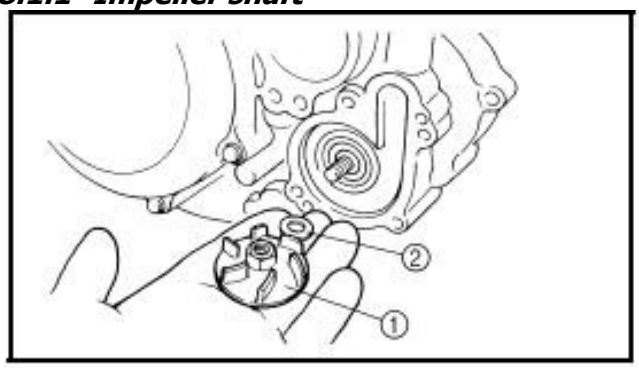
Extent of removal	Order	Part name	Q'ty	Remarks
		OIL FILTER ELEMENT, WATER PUMP AND RIGHT CRANK-CASE COVER REMOVAL		
Preparation for removal		Drain the engine oil.		Refer to "ENGINE OIL REPLACEMENT" section in the CHAPTER 3.
		Drain the coolant.		Refer to "COOLANT REPLACEMENT" section in the CHAPTER 3.
		Radiator hose 3		Disconnect at water pump side.
		Exhaust pipe		Refer to "EXHAUST PIPE AND SILENCER" section.
		Brake pedal		Refer to "ENGINE REMOVAL" section.
		Right engine guard		
① ③	1	Oil filter element cover	1	
	2	Oil filter element	1	

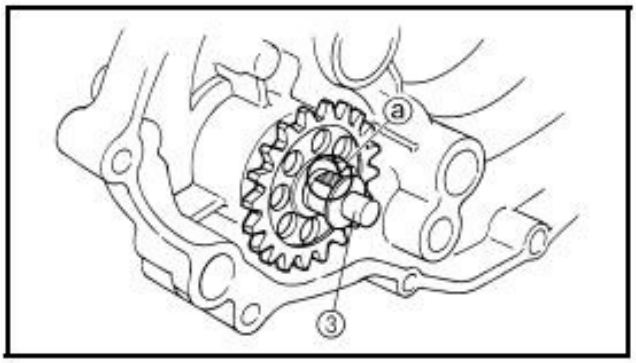


Extent of removal	Order	Part name	Q'ty	Remarks
② ③	3	Water pump housing	1	
	4	Oil delivery pipe	1	
	5	Bolt (oil hose)	1	
	6	Kickstarter crank	1	
	7	Right crankcase cover	1	
	8	Impeller	1	Refer to "REMOVAL POINTS".
	9	Washer	1	
	10	Impeller shaft	1	
	11	Oil seal	2	
	12	Bearing	1	

8.1 Removal points

8.1.1 Impeller shaft

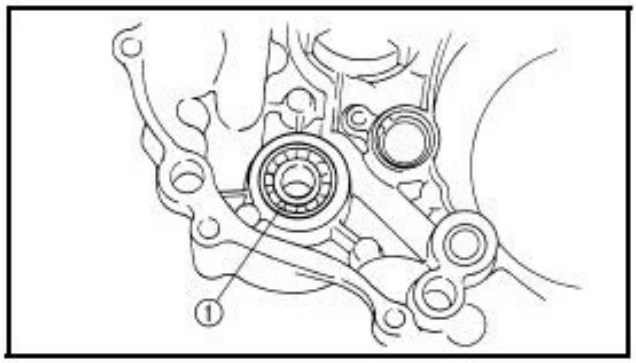


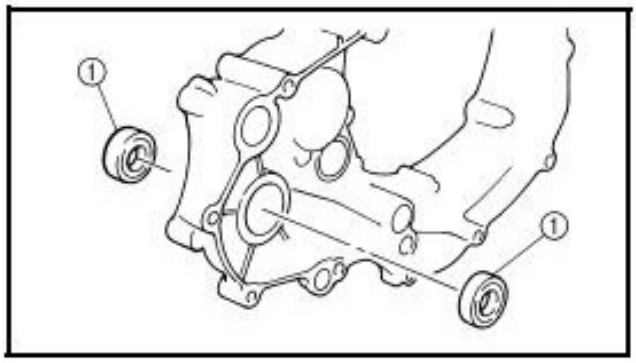


1. Remove:
   - Impeller ①
   - Washer ②
   - Impeller shaft ③

NOTE:
Hold the impeller shaft on its width across the flats ⓐ with spanners, etc. and remove the impeller.

8.1.2 Oil seal





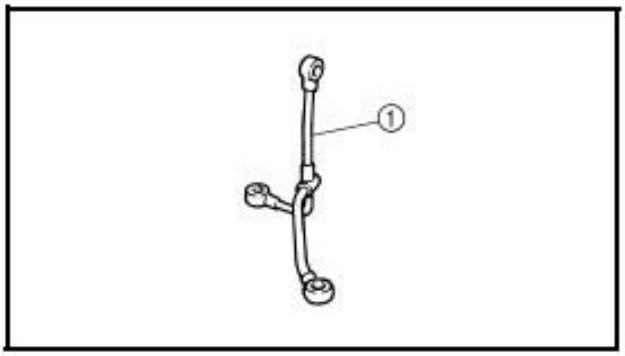
NOTE:
It is not necessary to disassemble the water pump, unless there is an abnormality such as excessive change in coolant level, discoloration of coolant, or milky transmission oil.

1. Remove:
   - Bearing ①

2. Remove:
   - Oil seal ①

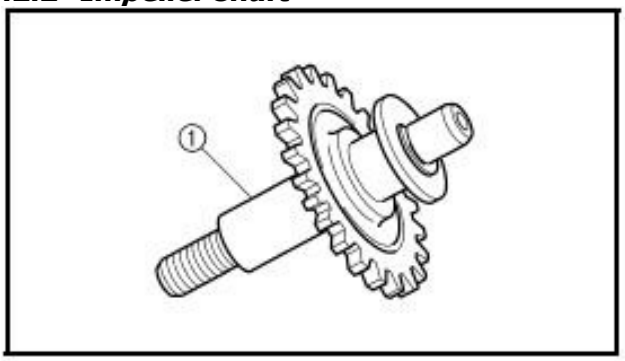
8.2 Inspection

8.2.1 Oil delivery pipe



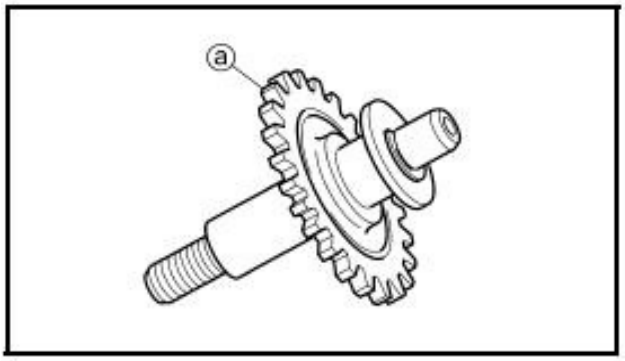
1. Inspect:
   - Oil delivery pipe ①
     Bend/damage → Replace.
     Clogged → Blow.

8.2.2 Impeller shaft



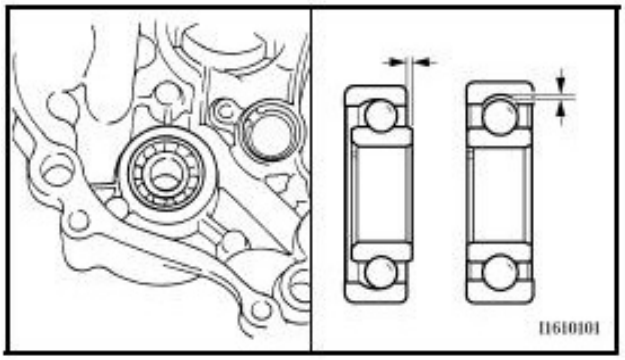
1. Inspect:
   - Impeller shaft ①
     Bend/wear/damage → Replace.
     Fur deposits → Clean.

8.2.3 Impeller shaft gear



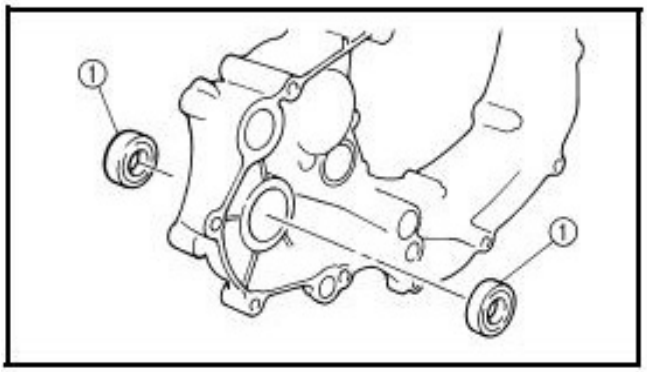
1. Inspect:
   - Gear teeth ⓐ
     Wear/damage → Replace.

8.2.4 Bearing



1. Inspect:
   - Bearing
     Rotate inner race with a finger.
     Rough spot/seizure → Replace.

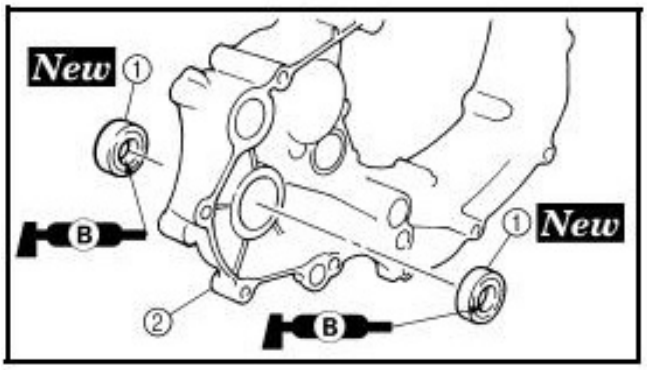
8.2.5 Oil seal



1. Inspect:
   - Oil seal ①
     Wear/damage → Replace.

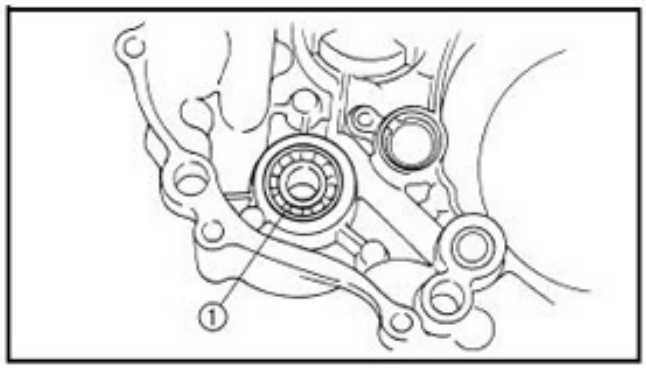
8.3 Assembly and installation

8.3.1 Oil seal



1. Install:
   - Oil seal ① New

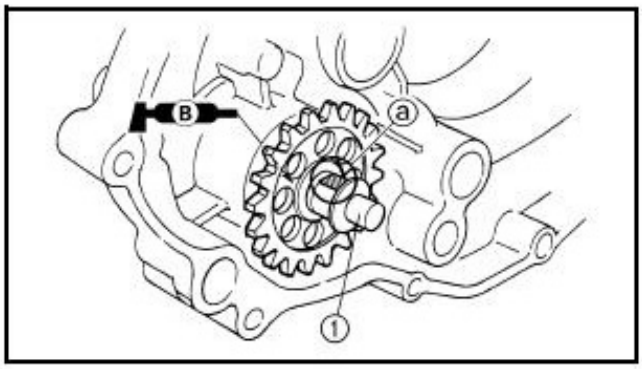
NOTE:
- Apply the lithium soap base grease on the oil seal lip.
- Install the oil seal with its manufacture's marks or numbers facing the right crankcase cover ②.

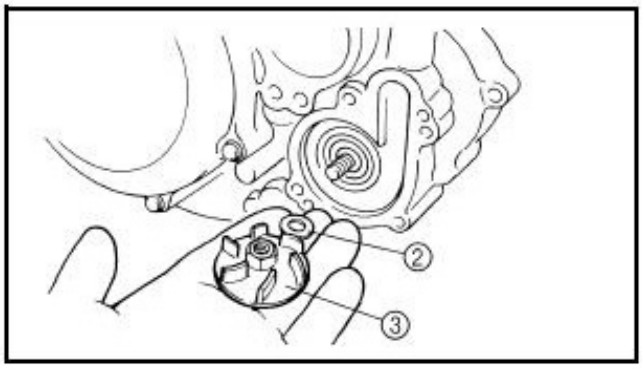


2. Install:
   - Bearing ①

NOTE:
Install the bearing by pressing its outer race parallel.

8.3.2 Impeller shaft





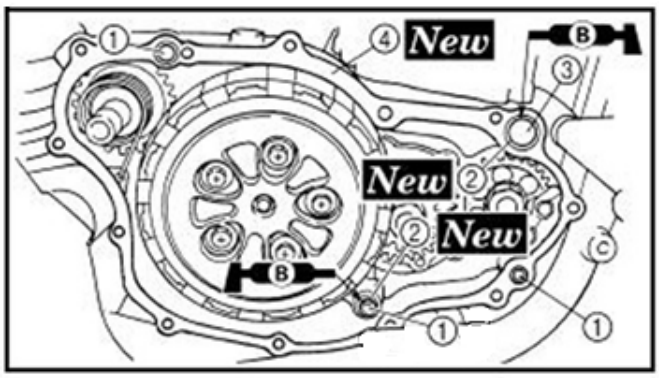
1. Install:
   - Impeller shaft ①
   - Washer ②
   - Impeller ③

	14 Nm (1.4 m · kg, 10 ft · lb)

NOTE:

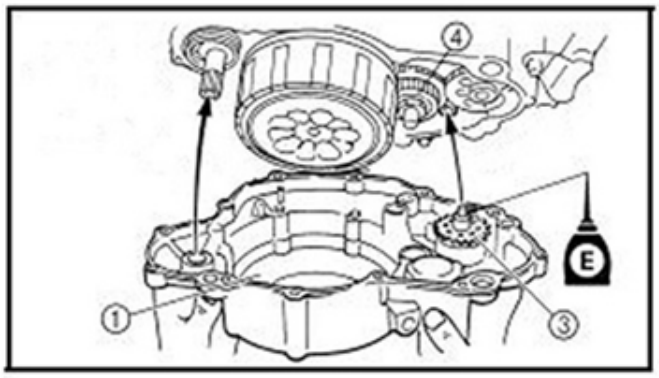
- Take care so that the oil seal lip is not damaged or the spring does not slip off its position.
- When installing the impeller shaft, apply the lithium soap base grease on the oil seal lip and impeller shaft. And install the shaft while turning it.
- Hold the impeller shaft on its width across the flats ⓐ with spanners, etc. and install the impeller.

8.3.3 Right crankcase cover



1. Install:
   - Dowel pin ①
   - O-ring ② **New**
   - Collar ③
   - Gasket ④ **New**

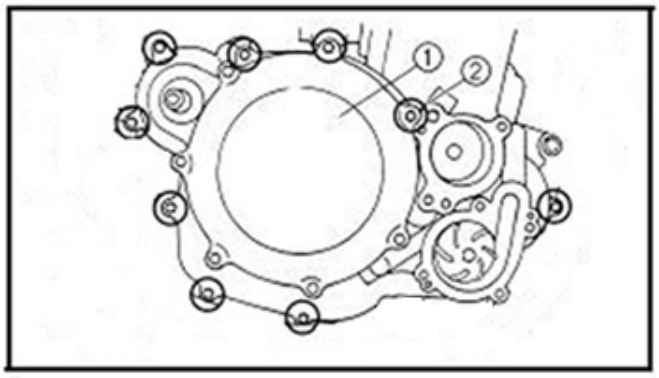
NOTE:
Apply the lithium soap base grease on the O-ring.



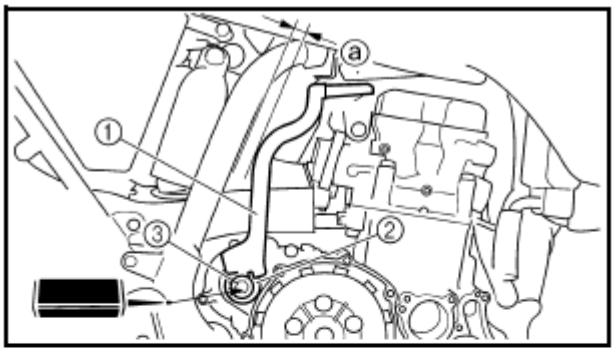
2. Install:
   - Right crankcase cover ①
   - Bolt (right crankcase cover) ②

10 Nm (1.0 m · kg, 7.2 ft · lb)

NOTE:
- Apply the engine oil on the impeller shaft end.
- Mesh the impeller shaft gear ③ with primary drive gear ④.
- Tighten the bolts in stage, using a crisscross pattern.



8.4 Kickstarter crank

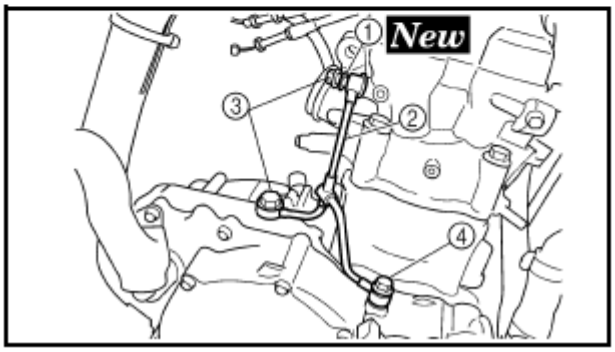


Kickstarter crank

1. Install:
   - Kickstarter crank ①
   - Washer ②
   - Bolt (kickstarter crank) ③

33 Nm (3.3 m · kg, 24 ft · lb)

NOTE:
Install the kickstarter crank so that the kickstarter crank is as vertical as possible with the distance ⓐ between the kickstarter crank and the frame being 8 mm (0.31 in) or more.



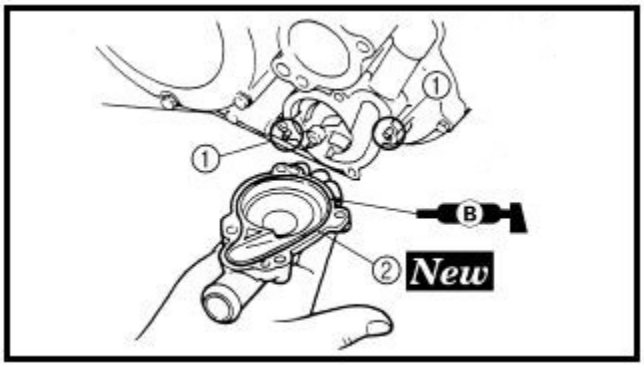
2. Install:
   - Copper washer ① **New**
   - Oil delivery pipe ②
   - Union bolt (M8) ③

18 Nm (1.8 m · kg, 13 ft · lb)

   - Union bolt (M10) ④

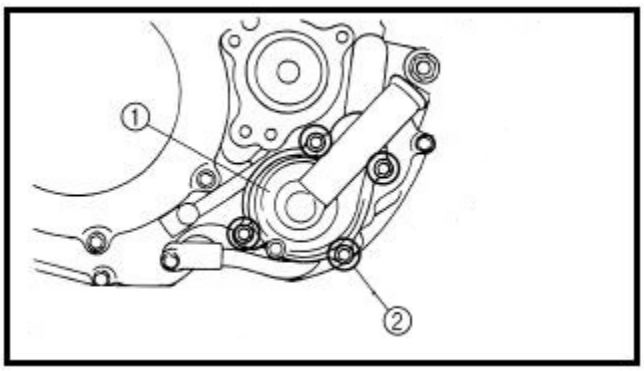
20 Nm (2.0 m · kg, 14 ft · lb)

8.4.1 Water pump housing



1. Install:
   - Dowel pin ①
   - O-ring ② **New**

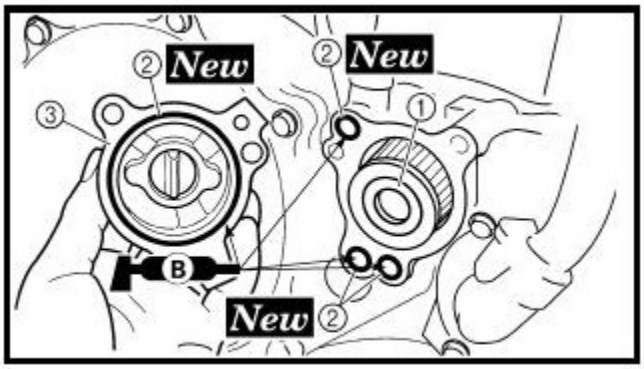
NOTE:
Apply the lithium soap base grease on the O-ring.



2. Install:
   - Water pump housing ①
   - Bolt (water pump housing) ②

10 Nm (1.0 m · kg, 7.2 ft · lb)

8.4.2 Oil filter element

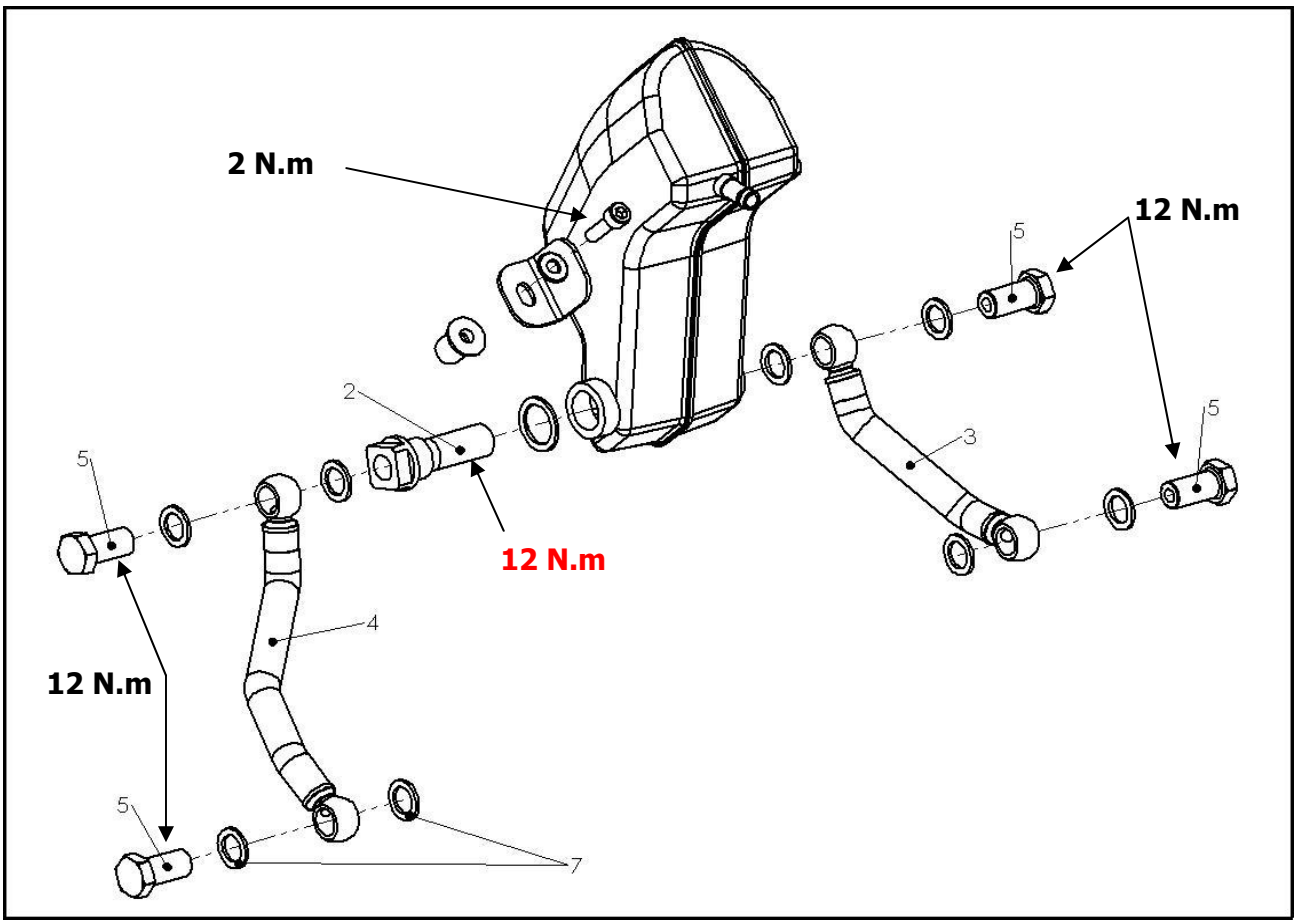


1. Install:
   - Oil filter element ①
   - O-ring ② New
   - Oil filter element cover ③
   - Bolt (oil filter element cover)

	10 Nm (1.0 m · kg, 7.2 ft · lb)

NOTE:
Apply the lithium soap base grease on the O-ring.

9 OIL TANK AND OIL STRAINER



9.1 Removal points

After the oil drain you can remove oil tank.

1. Unscrew all screws (5).
2. Unscrew oil strainer (2).
3. Remove oil tank (1).

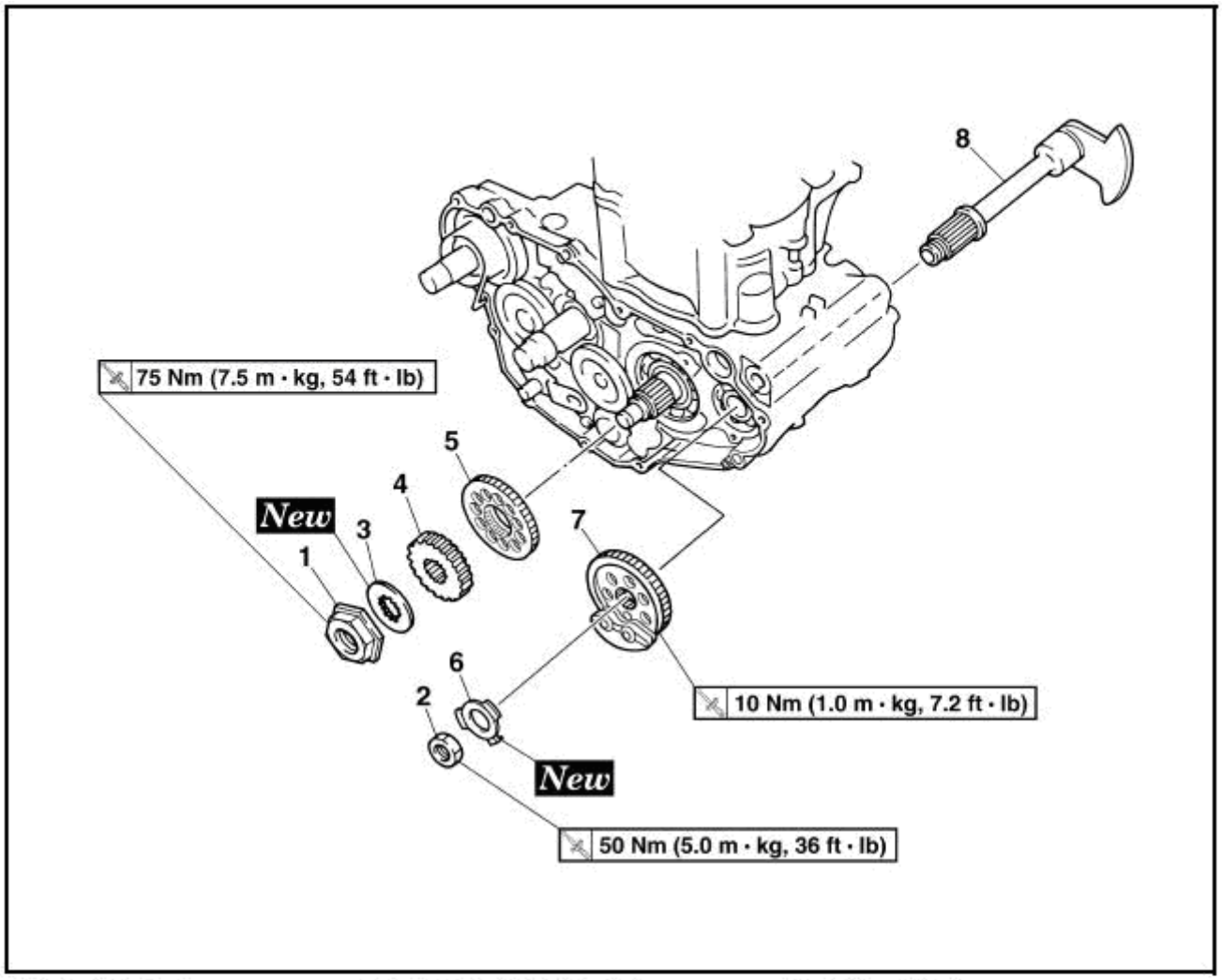
9.2 Inspection

1. Oil strainer clogged ⟶ blow it.
2. Oil tank damage ⟶ change it.
3. Inspection of the hose to don't have some escape.

9.3 Assembly and installation

1. Install oil strainer with new copper washer(6).
2. Install hoses on oil tank with new alu washers(7).
3. Install oil tank on the frame.
4. Install hoses on the motor with new alu washers(7).
5. Screw all screws(5).

10 BALANCER

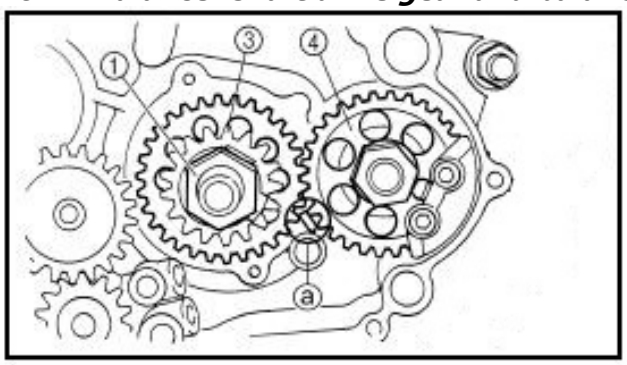


Extent of removal: ① Balancer shaft drive gear ② Balancer shaft

Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		**BALANCER REMOVAL** Primary driven gear Right crankcase cover Stator		 Refer to "CLUTCH" section. Refer to "OIL FILTER ELEMENT, WATER PUMP AND RIGHT CRANK-CASE COVER" section. Refer to "AC MAGNETO" section.
② ① ②	1 2 3 4 5 6 7 8	Nut (primary drive gear) Nut (balancer shaft driven gear) Lock washer Primary drive gear Balancer shaft drive gear Lock washer Balancer shaft driven gear Balancer shaft	1 1 1 1 1 1 1 1	Refer to "REMOVAL POINTS". Refer to "REMOVAL POINTS".

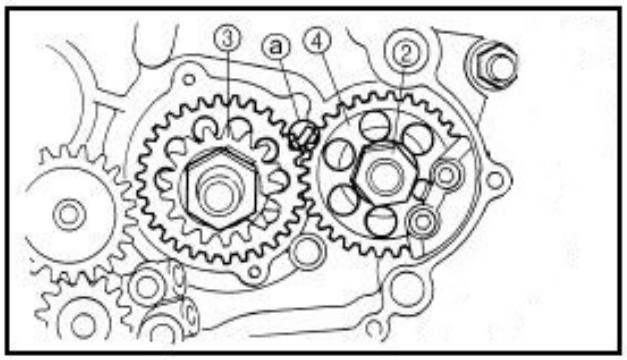
10.1 Removal points

10.1.1 Balancer shaft drive gear and balancer shaft driven gear

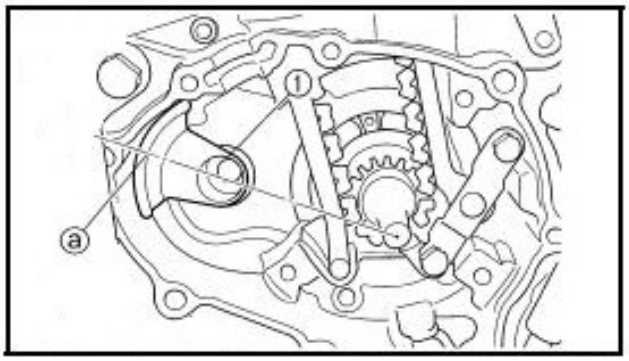


1. Straighten the lock washer tab.
2. Loosen:
   - Nut (primary drive gear) ①
   - Nut (balancer shaft driven gear) ②

NOTE:
Place an aluminum plate ⓐ between the teeth of the balancer shaft drive gear ③ and driven gear ④.



10.1.2 Balancer

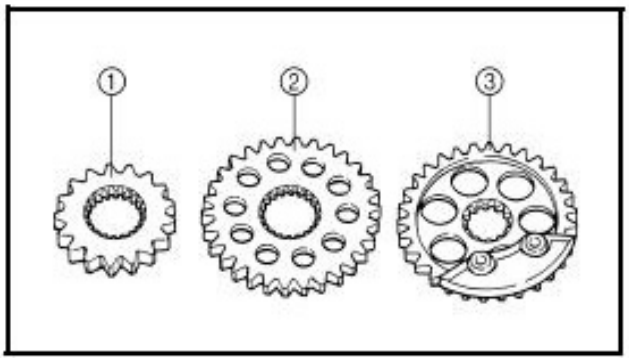


1. Remove:
   - Balancer shaft ①

NOTE:
When removing the balancer shaft, align the center ⓐ of the balancer shaft weight along the line connecting the centers of the crankshaft and balancer shaft.

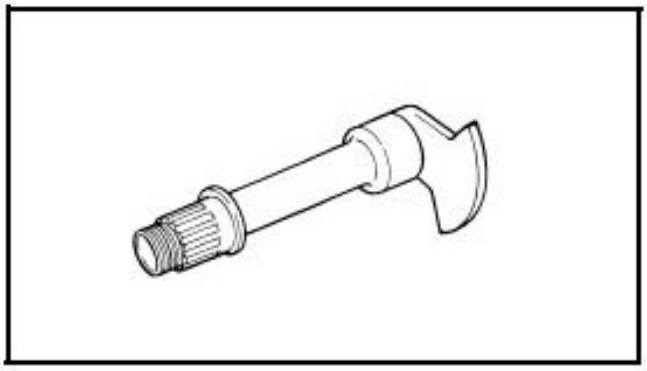
10.2 Inspection

10.2.1 Primary drive gear, balancer shaft drive gear and balancer shaft driven gear



1. Inspect:
   - Primary drive gear ①
   - Balancer shaft drive gear ②
   - Balancer shaft driven gear ③
     Wear/damage → Replace.

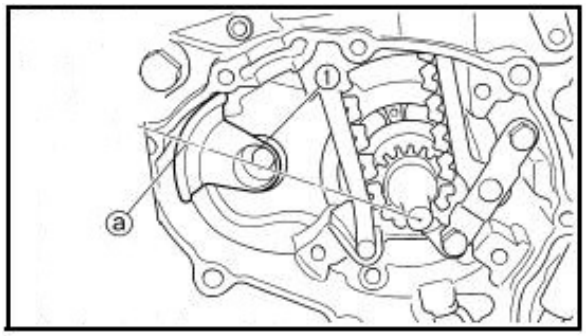
10.2.2 Balancier



1. Inspect:
   - Balancer shaft
     Cracks/damage → Replace.

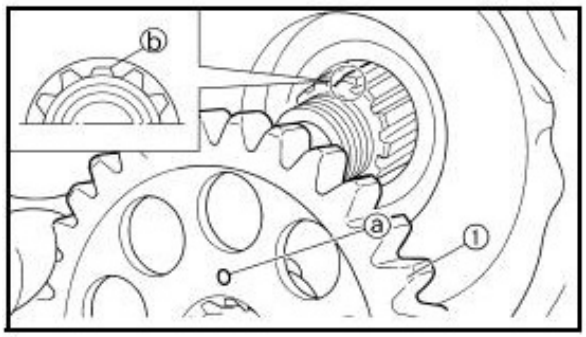
10.3 Assembly and installation

10.3.1 Balancer shaft drive gear and balancer shaft drive gear



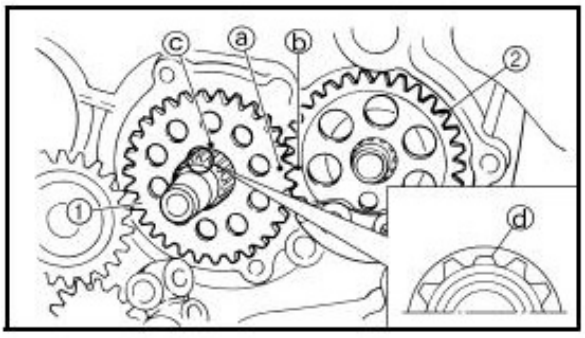
1. Install:
   - Balancer shaft ①

NOTE:
- Apply the engine oil on the bearing.
- When installing the balancer shaft, align the center ⓐ of the balancer shaft weight along the line connecting the centers of the crankshaft and balancer shaft.



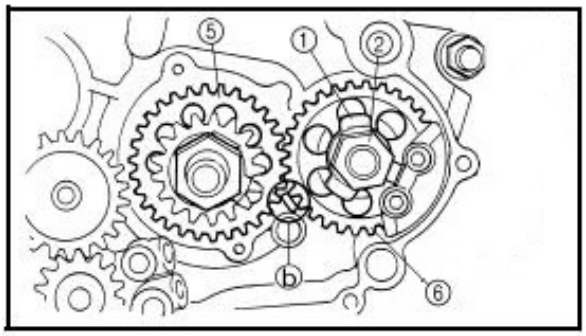
2. Install:
   - Balancer shaft driven gear ①

NOTE:
Install the balancer shaft driven gear onto the balancer shaft while aligning the punch mark ⓐ on the balancer shaft driven gear with the lower spline ⓑ on the balancer shaft end.



3. Install:
   - Balancer shaft drive gear ①

NOTE:
- Align the punched mark ⓐ on the balancer shaft drive gear with the punched mark ⓑ on the balancer shaft driven gear ②.
- Align the punched mark ⓒ on the balancer shaft drive gear with the lower spline ⓓ on the crankshaft end.

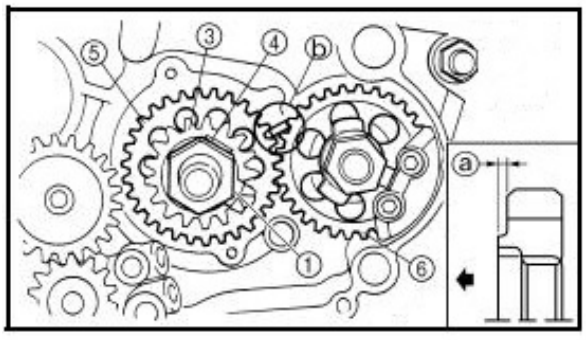


4. Install:
   - Lock washer ①
   - Nut (balancer shaft driven gear) ②

     50 Nm (5.0 m · kg, 36 ft · lb)
   - Primary drive gear ③
   - Nut (primary drive gear) ④

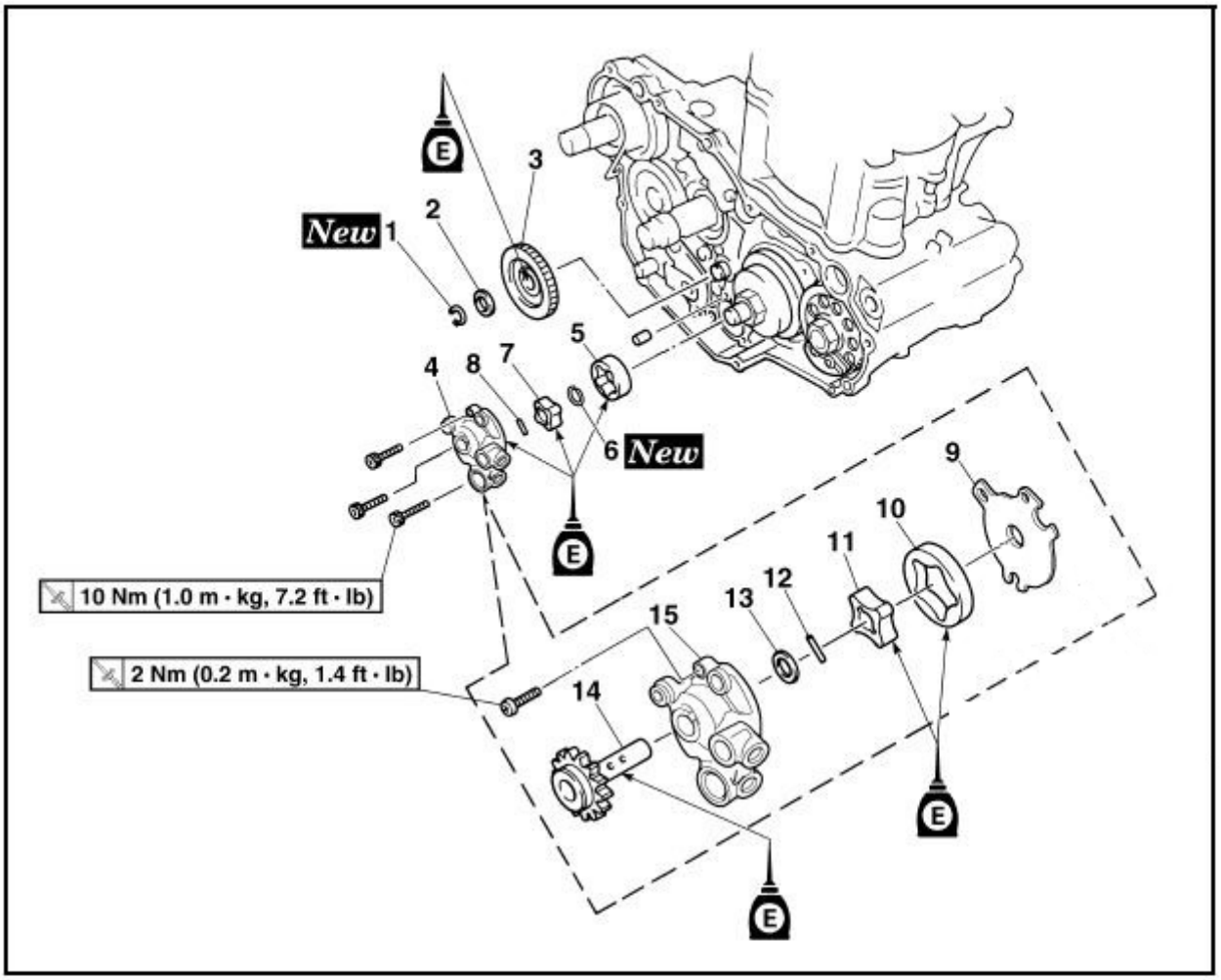
     75 Nm (7.5 m · kg, 54 ft · lb)

NOTE:
- Install the primary drive gear with its stepped side ⓐ facing the engine.
- Place an aluminum plate ⓑ between the teeth of the balancer shaft drive gear ⑤ and driven gear ⑥.



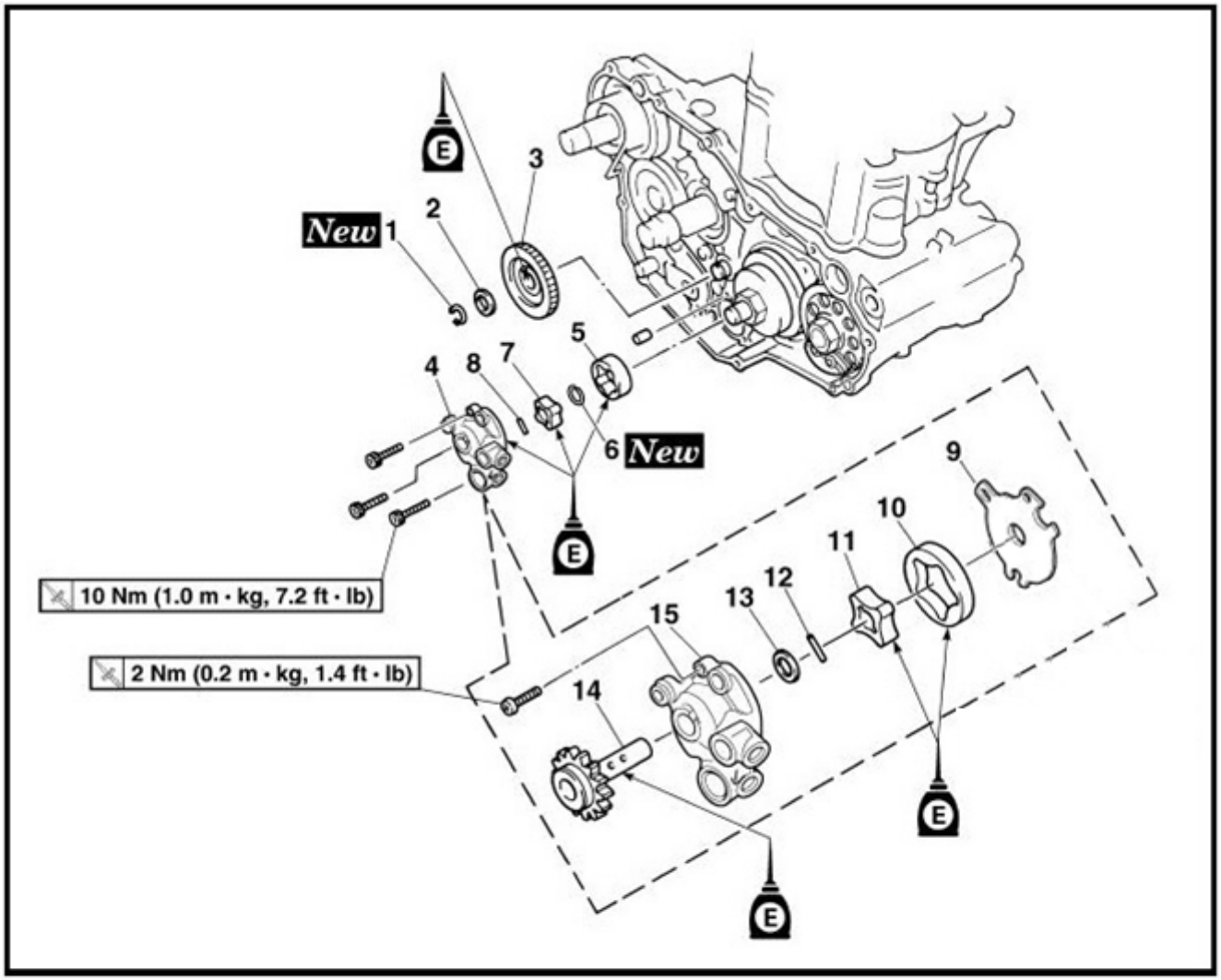
5. Bend the lock washer tab.

11 OIL PUMP



Extent of removal: ① Oil pump removal ② Oil pump disassembly

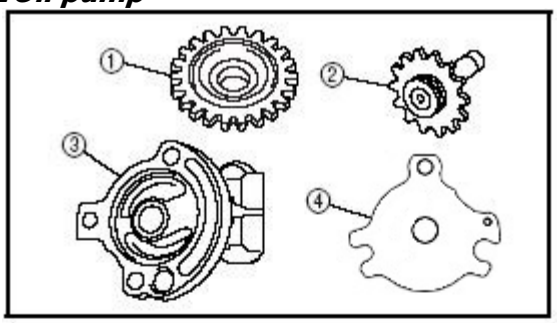
Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		**OIL PUMP REMOVAL AND DISASSEMBLY** Primary driven gear Right crankcase cover		 Refer to "CLUTCH" section. Refer to "OIL FILTER ELEMENT, WATER PUMP AND RIGHT CRANKCASE COVER" section.
①	1	Circlip	1	
	2	Washer	1	
	3	Oil pump drive gear	1	
	4	Oil pump assembly	1	
②	5	Outer rotor 2	1	
	6	Circlip	1	
	7	Inner rotor 2	1	
	8	Dowel pin	1	
	9	Oil pump cover	1	
	10	Outer rotor 1	1	
	11	Inner rotor 1	1	



Extent of removal	Order	Part name	Q'ty	Remarks
②	12	Dowel pin	1	
	13	Washer	1	
	14	Oil pump drive shaft	1	
	15	Rotor housing	1	

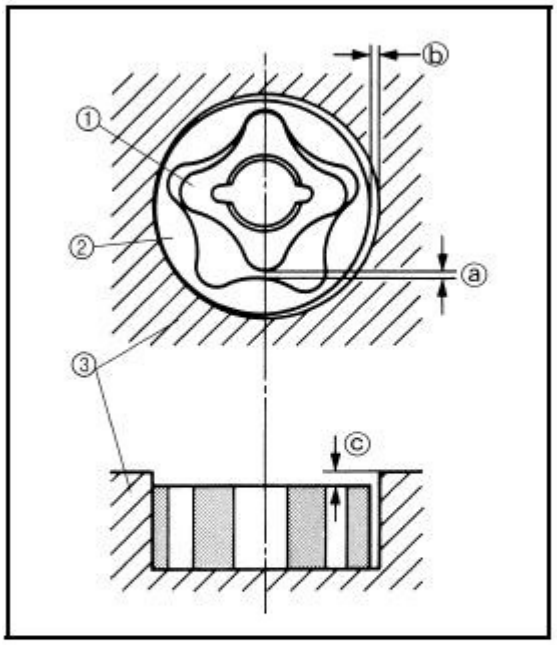
11.1 Inspection

11.1.1 Oil pump



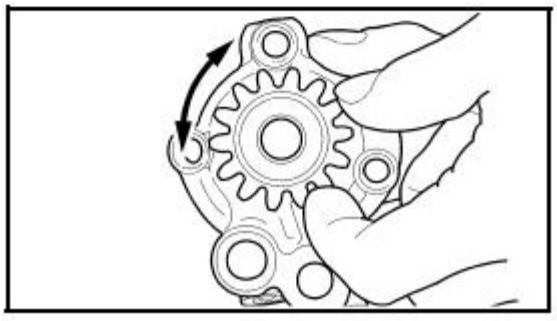
1. Inspect:
   - Oil pump drive gear ①
   - Oil pump drive shaft ②
   - Rotor housing ③
   - Oil pump cover ④

⚠ **WARNING** SCORPA Special part
Ref: S10B-10500-00-00
Cracks/wear/damage → Replace.



2. Measure:
   - Tip clearance ⓐ
     (between the inner rotor ① and outer rotor ②)
   - Side clearance ⓑ
     (between the outer rotor ② and rotor housing ③)
   - Housing and rotor clearance ⓒ
     (between the rotor housing ③ and rotors ① ②)
     Out of specification → Replace the oil pump assembly.

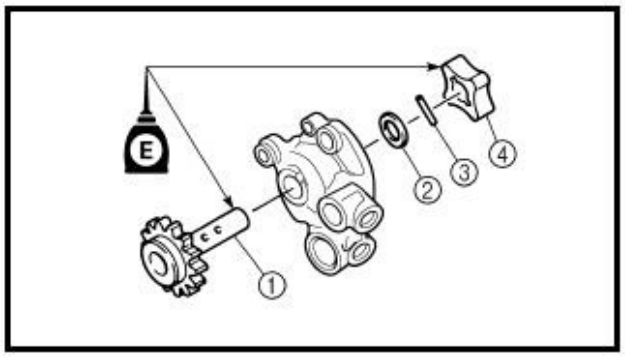
Tip clearance ⓐ:
0.12 mm or less
(0.0047 in or less)
<Limit>: 0.20 mm (0.008 in)
Side clearance ⓑ:
0.09 ~ 0.17 mm
(0.0035 ~ 0.0067 in)
<Limit>: 0.24 mm (0.009 in)
Housing and rotor clearance ⓒ:
0.03 ~ 0.10 mm
(0.0012 ~ 0.0039 in)
<Limit>: 0.17 mm (0.0067 in)



3. Check:
   - Unsmooth → Repeat steps #1 and #2 or replace the defective parts.

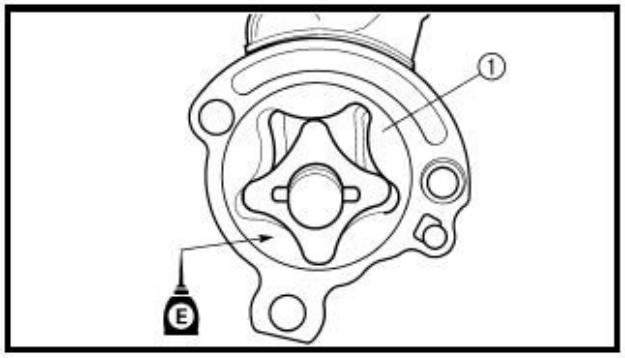
11.2 Assembly and installation

11.2.1 oil pump



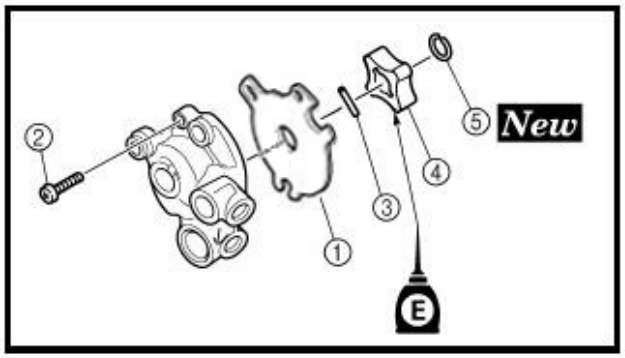
1. Install:
   - Oil pump drive shaft ①
   - Washer ②
   - Dowel pin ③
   - Inner rotor 1 ④

NOTE:
- Apply the engine oil on the oil pump drive shaft and inner rotor 1.
- Fit the dowel pin into the groove in the inner rotor 1.



2. Install:
   - Outer rotor 1 ①

NOTE:
Apply the engine oil on the outer rotor 1.



3. Install:
   - Oil pump cover ①

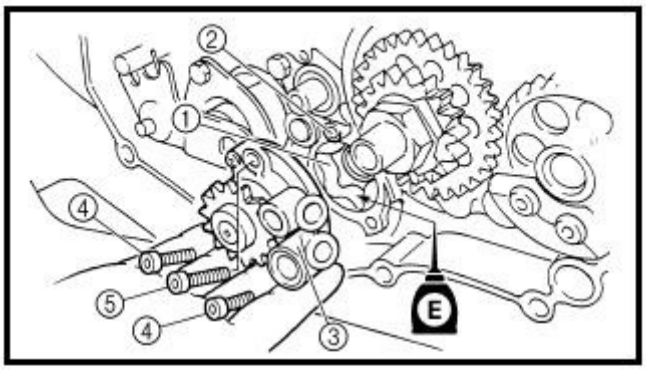
⚠ WARNING SCORPA Special part
Ref: S10B-10500-00-00

   - Screw (oil pump cover) ②

	2 Nm (0.2 m · kg, 1.4 ft · lb)

   - Dowel pin ③
   - Inner rotor 2 ④
   - Circlip ⑤ *New*

NOTE:
- Apply the engine oil on the inner rotor 2.
- Fit the dowel pin into the groove in the inner rotor 2.

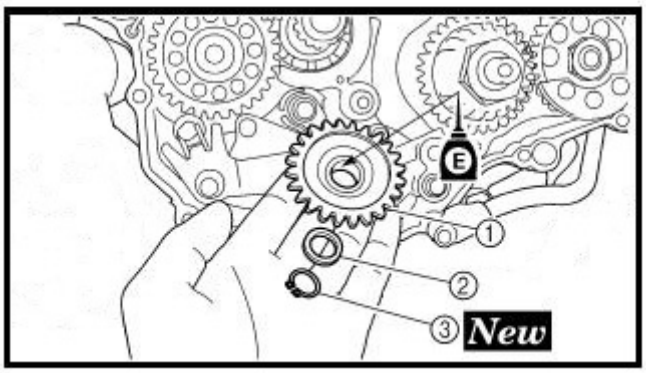


4. Install:
   - Outer rotor 2 ①
   - Dowel pin ②
   - Oil pump assembly ③
   - Bolt (oil pump assembly) [L = 25 mm (0.94 in)] ④

     10 Nm (1.0 m · kg, 7.2 ft · lb)
   - Bolt (oil pump assembly) [L = 30 mm (1.18 in)] ⑤

     10 Nm (1.0 m · kg, 7.2 ft · lb)

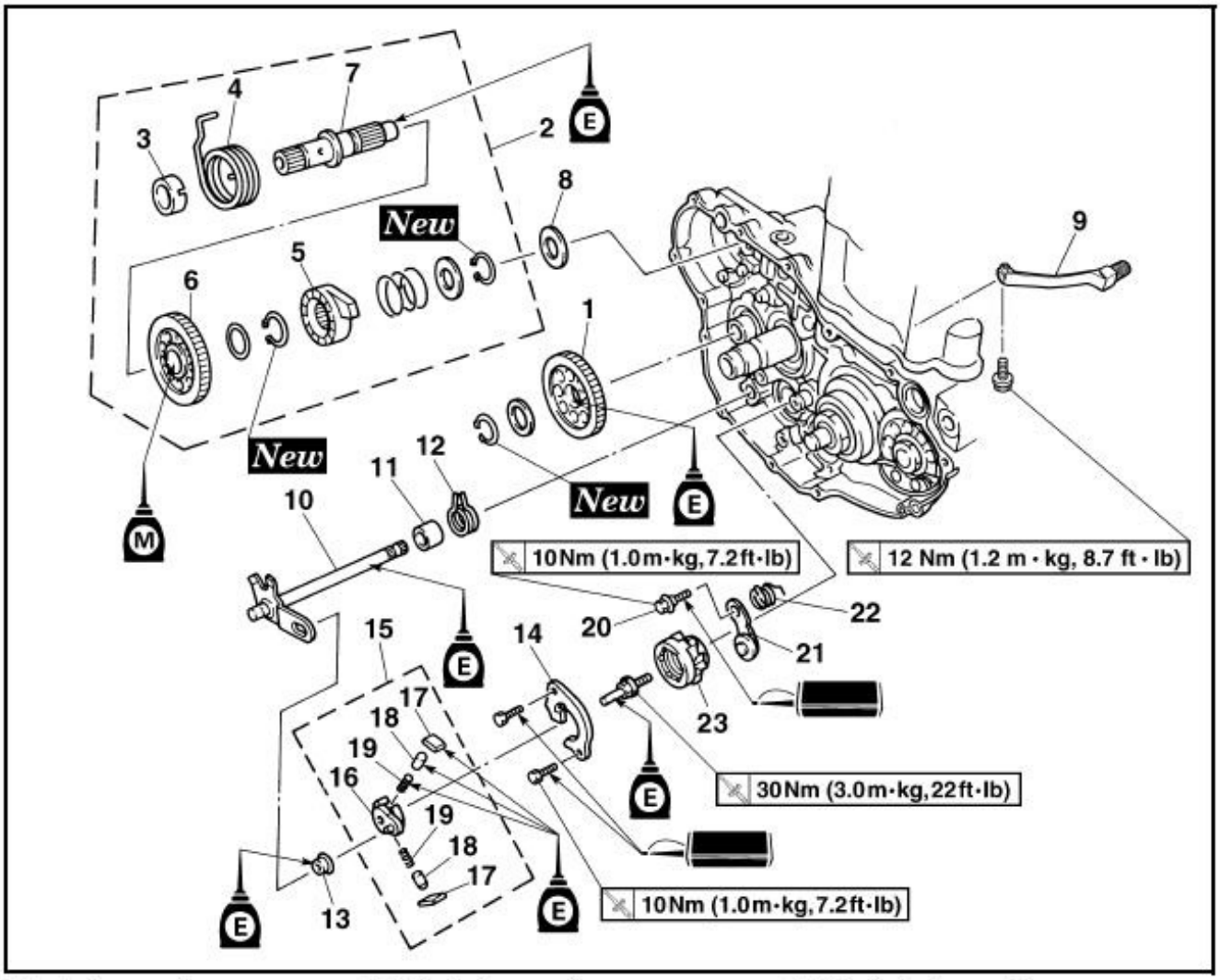
NOTE:
Apply the engine oil on the outer rotor 2.



5. Install:
   - Oil pump drive gear ①
   - Washer ②
   - Circlip ③ **New**

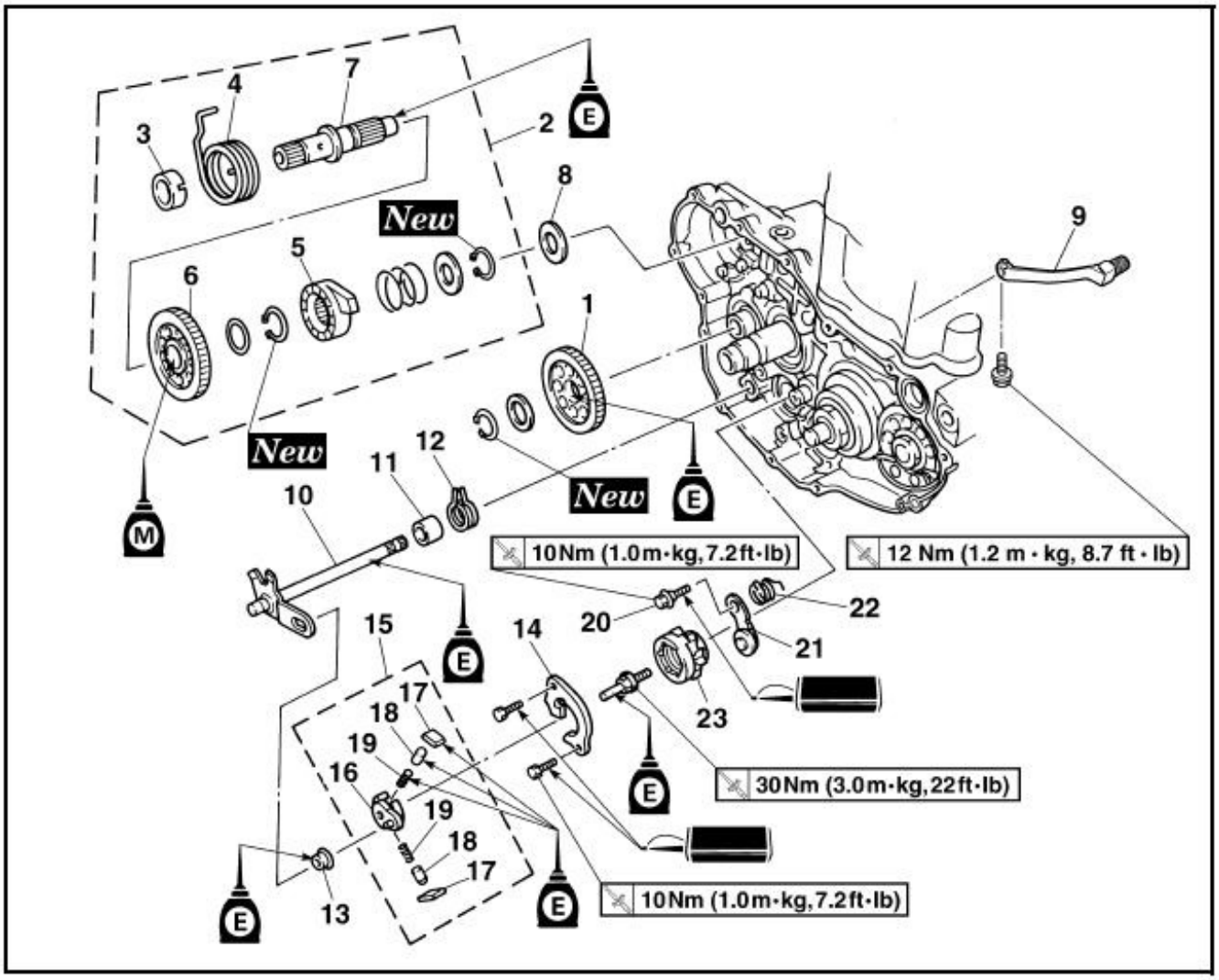
NOTE:
Apply the engine oil on the oil pump drive gear inner circumference.

12 KICK SHAFT AND SHIFT SHAFT



Extent of removal:
① Kick shaft removal
② Kick shaft disassembly
③ Shift shaft removal
④ Segment removal

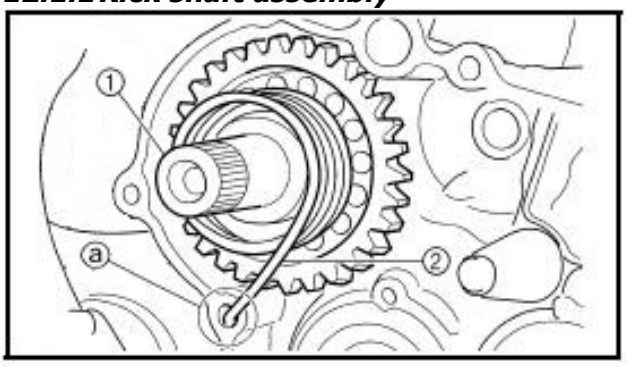
Extent of removal	Order	Part name	Q'ty	Remarks
		KICK SHAFT AND SHIFT SHAFT REMOVAL		
Preparation for removal		Oil pump		Refer to "OIL PUMP" section.
①	1	Kick idle gear	1	
	2	Kick shaft assembly	1	Refer to "REMOVAL POINTS".
	3	Spring guide	1	
②	4	Torsion spring	1	
	5	Ratchet wheel	1	
	6	Kick gear	1	
	7	Kick shaft	1	
①	8	Washer	1	
	9	Shift pedal	1	
③ ④	10	Shift shaft	1	
	11	Collar	1	



Extent of removal	Order	Part name	Q'ty	Remarks
③	12	Torsion spring	1	
	13	Roller	1	
	14	Shift guide	1	Refer to "REMOVAL POINTS".
	15	Shift lever assembly	1	
	16	Shift lever	1	
④	17	Pawl	2	
	18	Pawl pin	2	
	19	Spring	2	
	20	Bolt (stopper lever)	1	
	21	Stopper lever	1	
	22	Torsion spring	1	
	23	Segment	1	Refer to "REMOVAL POINTS".

12.1 Removal points

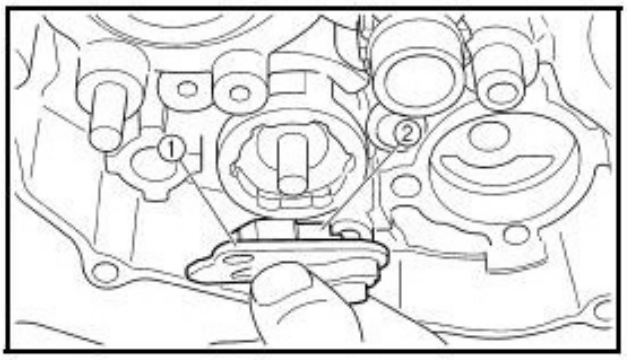
12.1.1 Kick shaft assembly



1. Remove:
   - Kick shaft assembly ①

NOTE:
Unhook the torsion spring ② from the hole ⓐ in the crankcase.

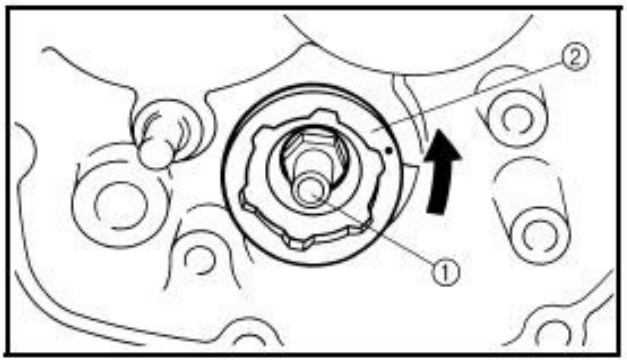
12.1.2 Shift guide and shift lever assembly



1. Remove:
   - Bolt (shift guide)
   - Shift guide ①
   - Shift lever assembly ②

NOTE:
The shift lever assembly is disassembled at the same time as the shift guide.

12.1.3 Segment

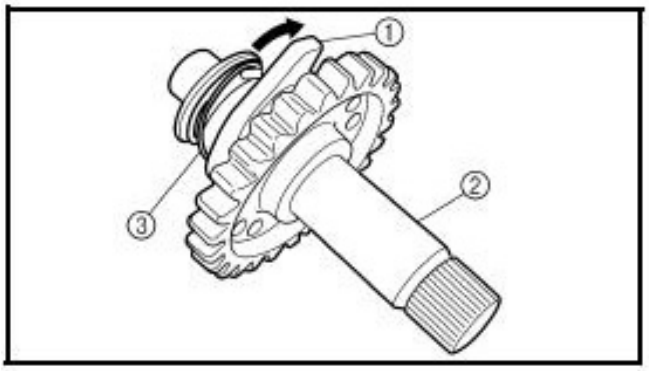


1. Remove:
   - Bolt (segment) ①
   - Segment ②

NOTE:
Turn the segment counterclockwise until it stops and loosen the bolt.

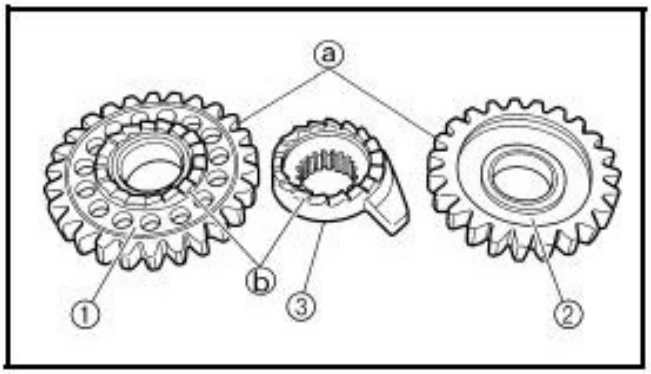
12.2 Inspection

12.2.1 Kick shaft and ratchet wheel



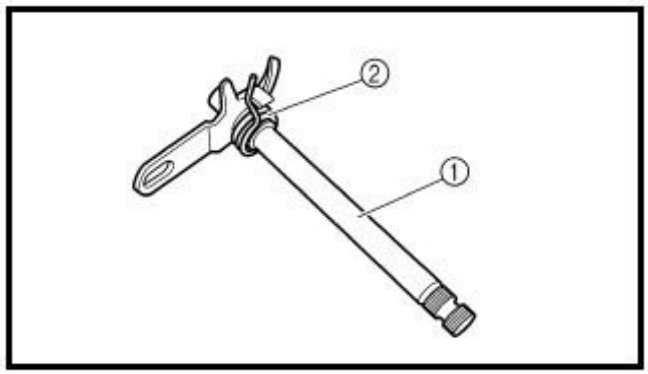
1. Check:
   - Ratchet wheel ① smooth movement
     Unsmooth movement → Replace.
   - Kick shaft ②
     Wear/damage → Replace.
   - Spring ③
     Broken → Replace.

12.2.2 Kick gear, kick idle gear and ratchet wheel



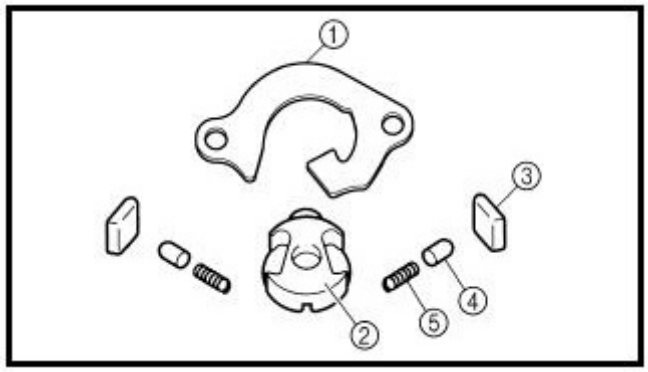
1. Inspect:
   - Kick gear ①
   - Kick idle gear ②
   - Ratchet wheel ③
   - Gear teeth ⓐ
   - Ratchet teeth ⓑ
     Wear/damage → Replace.

12.2.3 Shift shaft



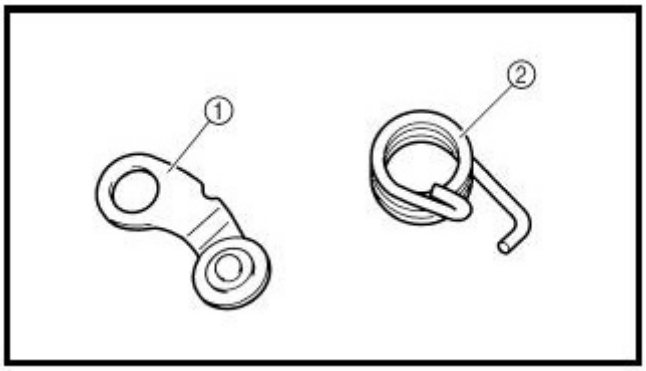
1. Inspect:
   - Shift shaft ①
     Bend/damage → Replace.
   - Spring ②
     Broken → Replace.

12.2.4 Shift guide and shift lever assembly



1. Inspect:
   - Shift guide ①
   - Shift lever ②
   - Pawl ③
   - Pawl pin ④
   - Spring ⑤
     Wear/damage → Replace.

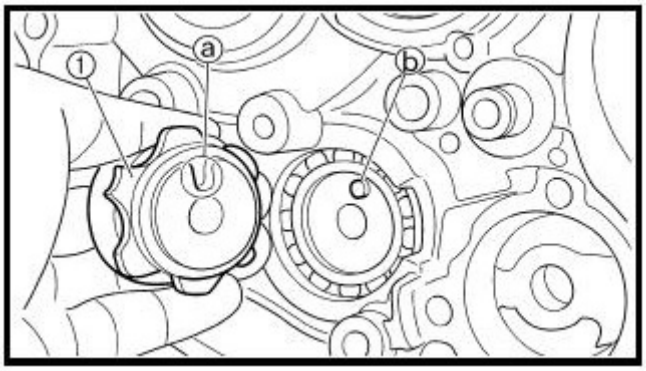
12.2.5 Stopper lever



1. Inspect:
   - Stopper lever ①
     Wear/damage → Replace.
   - Torsion spring ②
     Broken → Replace.

12.3 Assembly and installation

12.3.1 Segment

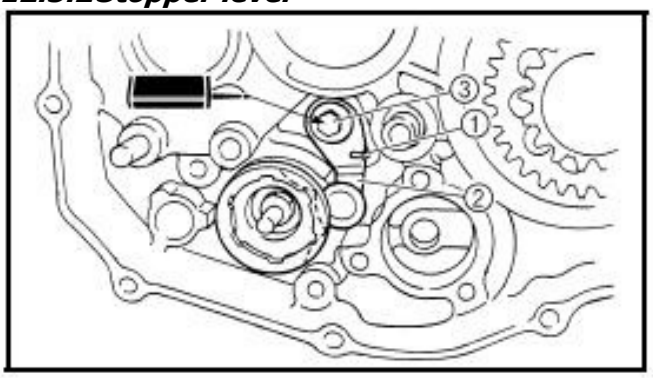


1. Install:
   - Segment ①
   - Bolt (segment)

30 Nm (3.0 m · kg, 22 ft · lb)

NOTE:
Align the notch ⓐ on the segment with the pin ⓑ on the shift cam.

12.3.2 Stopper lever

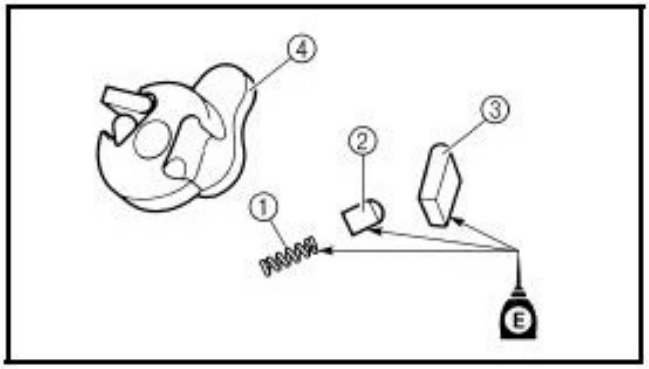


1. Install:
   - Torsion spring ①
   - Stopper lever ②
   - Bolt (stopper lever) ③

10 Nm (1.0 m · kg, 7.2 ft · lb)

NOTE:
Align the stopper lever roller with the slot on segment.

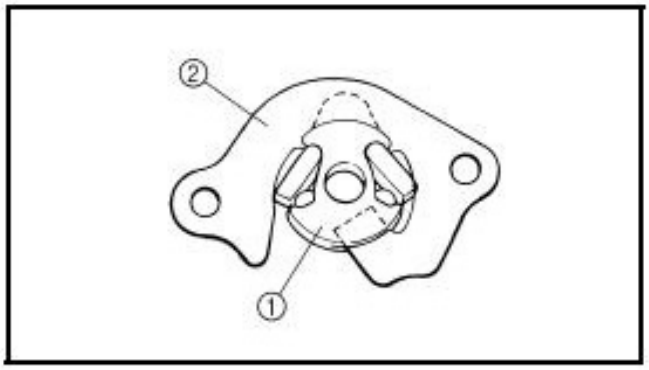
12.3.3 Shift guide and shift lever assembly



1. Install:
   - Spring ①
   - Pawl pin ②
   - Pawl ③

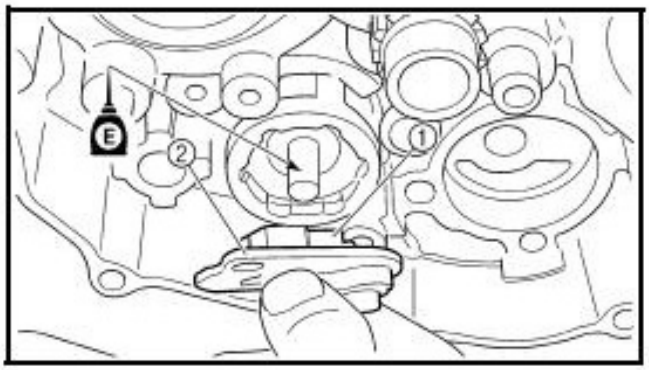
   To shift lever ④.

NOTE:
Apply the engine oil on the spring, pawl pin and pawl.



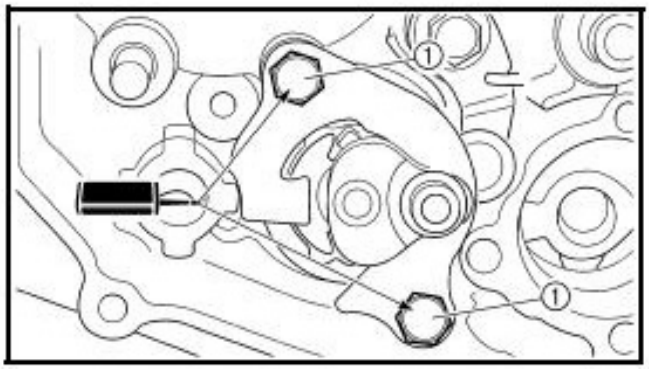
2. Install:
   - Shift lever assembly ①

   To shift guide ②.



3. Install:
   - Shift lever assembly ①
   - Shift guide ②

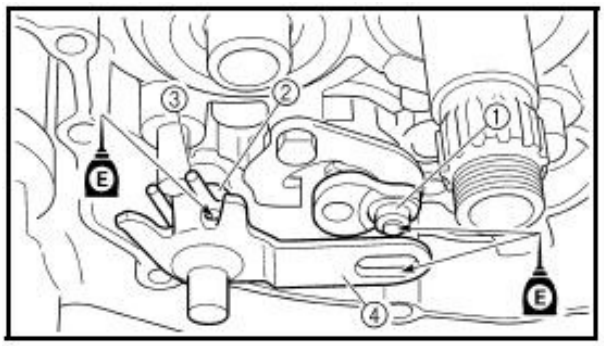
NOTE:
- The shift lever assembly is installed at the same time as the shift guide.
- Apply the engine oil on the bolt (segment) shaft.



4. Install:
   - Bolt (shift guide) ①

10 Nm (1.0 m · kg, 7.2 ft · lb)

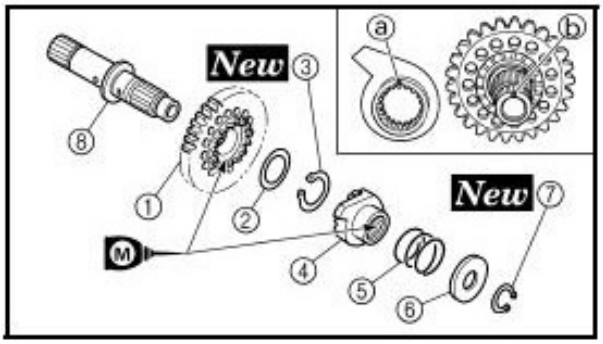
12.3.4 Shift shaft



1. Install:
   - Roller ①
   - Collar ②
   - Torsion spring ③
   - Shift shaft ④

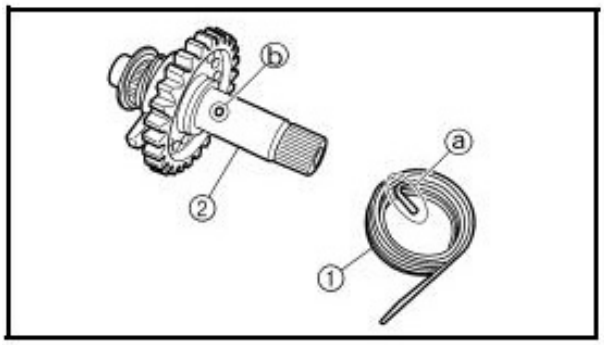
NOTE:
Apply the engine oil on the roller and shift shaft.

12.3.5 Kick shaft assembly



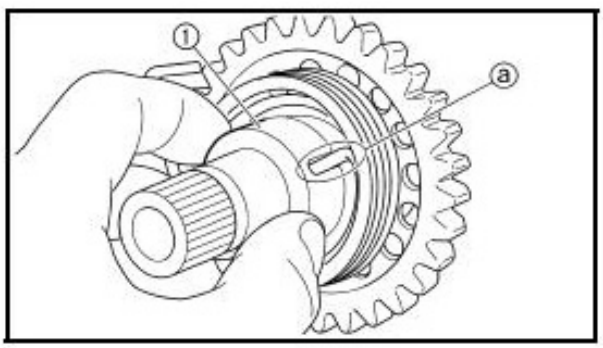
1. Install:
   - Kick gear ①
   - Washer ②
   - Circlip ③ **New**
   - Ratchet wheel ④
   - Spring ⑤
   - Washer ⑥
   - Circlip ⑦ **New**
     To kick shaft ⑧.

NOTE:
- Apply the molybdenum disulfide oil on the inner circumferences of the kick gear and ratchet wheel.
- Align the punch mark ⓐ on the ratchet wheel with the punch mark ⓑ on the kick shaft.



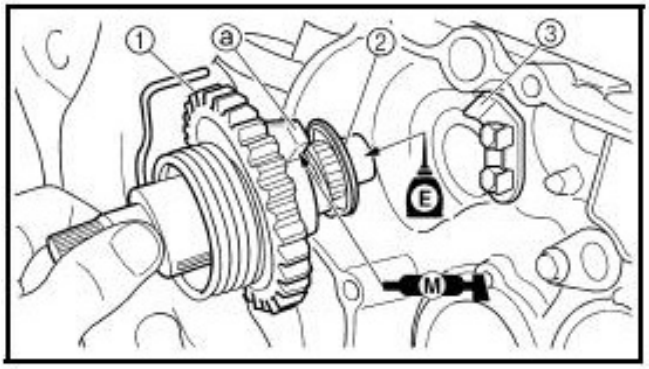
2. Install:
   - Torsion spring ①
     To kick shaft ②.

NOTE:
Make sure the stopper ⓐ of the torsion spring fits into the hole ⓑ on the kick shaft.



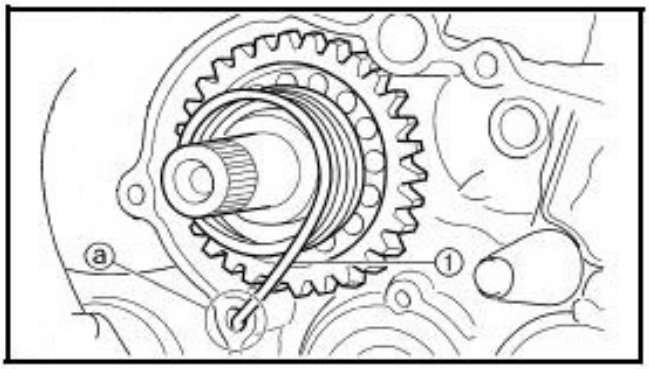
3. Install:
   - Spring guide ①

NOTE:
Slide the spring guide into the kick shaft, make sure the groove ⓐ in the spring guide fits on the stopper of the torsion spring.



4. Install:
   - Kick shaft assembly ①
   - Washer ②

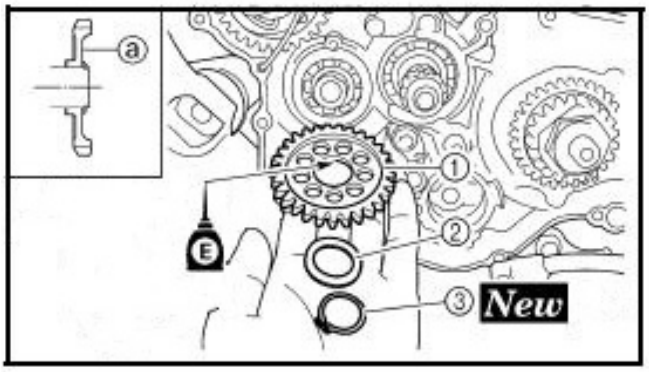
NOTE:
- Apply the molybdenum disulfide grease on the contacting surfaces of the kick shaft stopper ⓐ and kick shaft ratchet wheel guide ③.
- Apply the engine oil on the kick shaft.
- Slide the kick shaft assembly into the crankcase and make sure the kick shaft stopper ⓐ fits into the kick shaft ratchet wheel guide.



5. Hook:
   - Torsion spring ①

NOTE:
Turn the torsion spring clockwise and hook into the proper hole ⓐ in the crankcase.

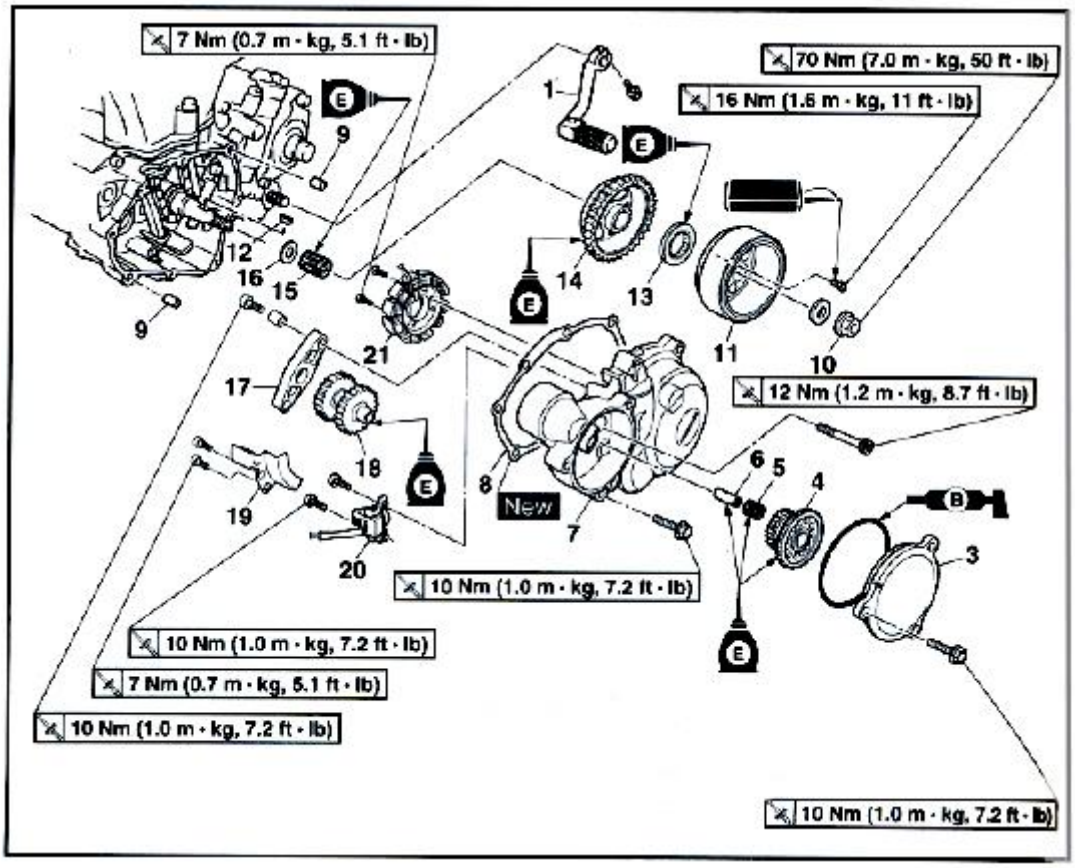
12.3.6 Kick idle gear



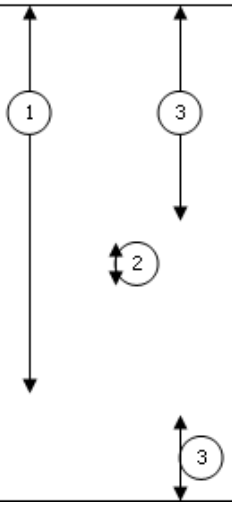
1. Install:
   - Kick idle gear ①
   - Washer ②
   - Circlip ③ **New**

NOTE:
- Apply the engine oil on the kick idle gear inner circumference.
- Install the kick idle gear with its depressed side ⓐ toward you.

13 AC MAGNETO AND STARTER CLUTCH

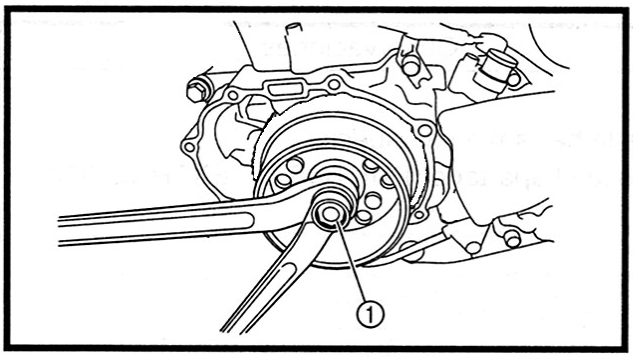


Extent of removal 1 starter clutch/wheel gear removal 2 rotor removal
3 pickup coil/ stator removal

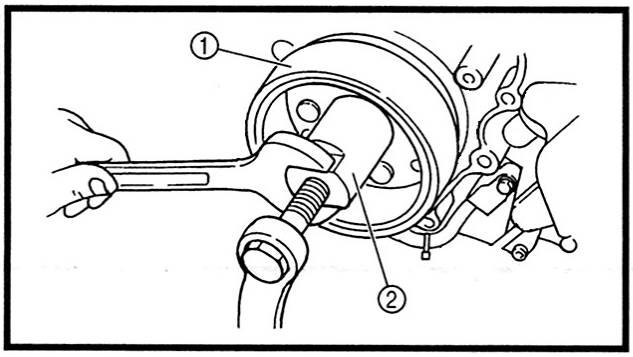
Extent of removal	Order	Part name	Qty	Remarks
Préparation for removal		**AC MAGNETO AND STATOR REMOVAL** Drain the engine oil Disconnect the AC magneto lead. Seat and fuel tank		Refer to « engine oil replacement Refer to « fuel tank »
	1 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21	Shift pedal Cover (idle gear 1) Idle gear 1 Bearing Shaft Crankcase cover (left) Gasket Dowel pin Nut (rotor) Rotor Woodruff key Starter clutch Starter clutch drive gear Bearing Plain washer Idle gear plate Idle gear 2 Holder Pickup oil Stator	1 1 1 1 1 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1	Refer to « removal points »

13.1 Removal points

13.1.1 Rotor



1. Remove:
   - Nut (rotor) ①
   - Plain washer

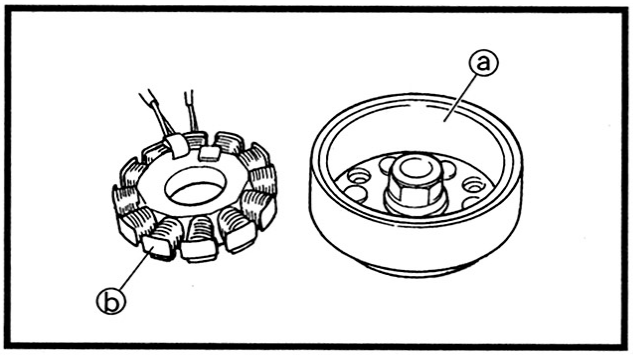


2. Remove:
   - Rotor ①
     Use the rotor puller ②.

Rotor puller:
YM-04141/90890-04141

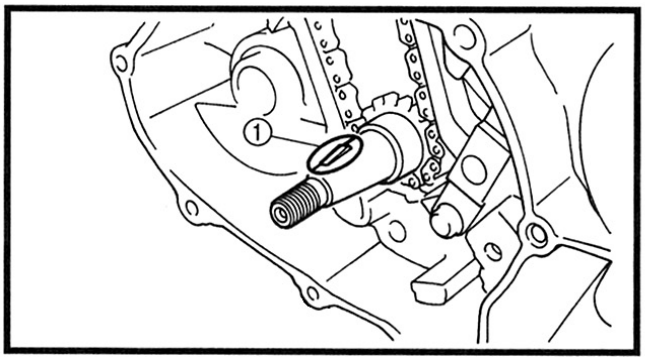
13.2 Inspection

13.2.1 AC Magneto



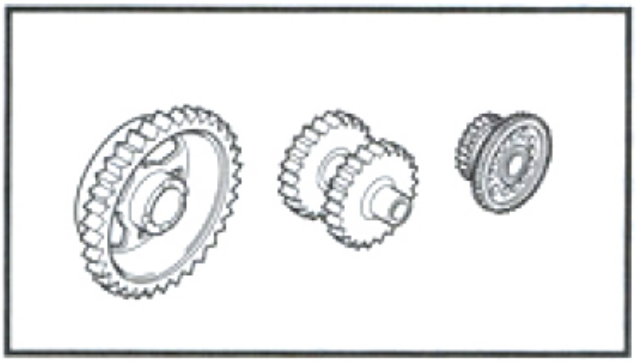
1. Inspect:
   - Rotor inner surface ⓐ
   - Stator outer surface ⓑ
     Damage → Inspect the crankshaft runout and crankshaft bearing.
     If necessary, replace AC magneto and/or stator.

13.2.2 Woodruff key



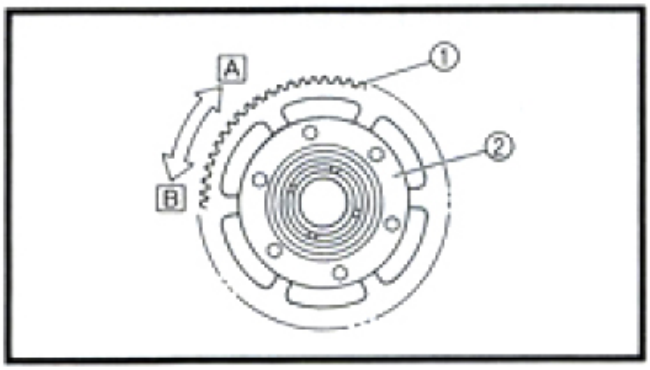
1. Inspect:
   - Woodruff key ①
     Damage → Replace.

13.2.3 Starter clutch



Starter clutch

1. Check:
   - Starter clutch
     Damage/wear → Replace.
2. Check:
   - Idle gear
   - Idle gear shaft
   - Starter clutch gear
     Pitting/burrs/chips/roughness/wear → Replace the defective parts.

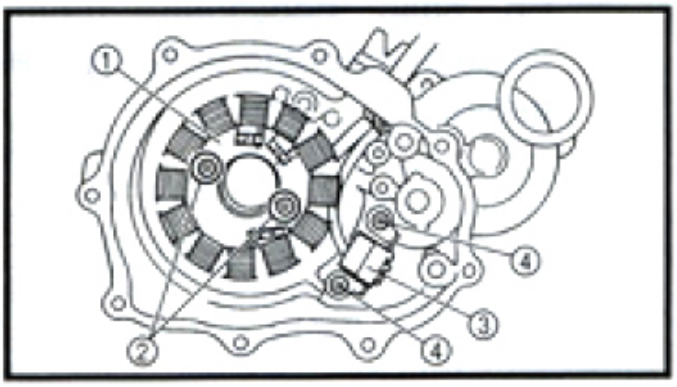


3. Check:
   - Starter clutch operation

- Install the starter clutch drive gear ① onto the starter clutch ② and hold the starter clutch.
- When turning the starter clutch drive gear counterclockwise [B], the starter clutch and the starter clutch drive gear should engage. If the starter clutch drive gear and starter clutch do not engage, the starter clutch is faulty and must be replaced.
- When turning the starter clutch drive gear clockwise [A], it should turn freely.
  If the starter clutch drive gear does not turn freely, the starter clutch is faulty and must be replaced.

13.3 Assembly and installation

13.3.1 AC Magneto and starter clutch

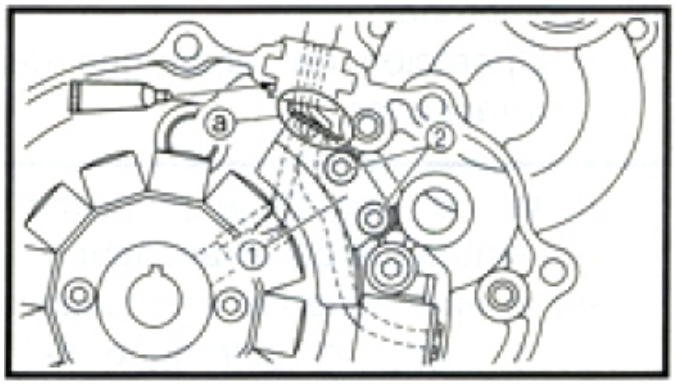


1. Install:
   - Stator ①
   - Bolt (stator) ②

7 Nm (0.7 m · kg, 5.1 ft · lb)

   - Pickup coil ③
   - Bolt (pickup coil) ④

10 Nm (1.0 m · kg, 7.2 ft · lb)



2. Install:
   - Holder ①
   - Bolt ②

7 Nm (0.7 m · kg, 5.1 ft · lb)

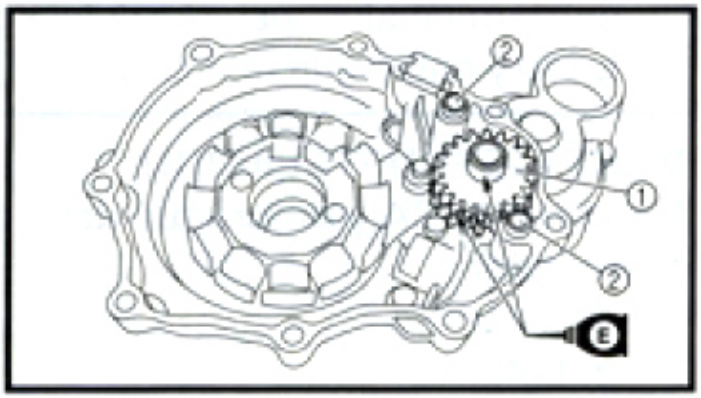
CAUTION:

Pass the pickup coil lead and charging coil lead under the holder while taking care not to allow these leads to get caught with each other. Also take care to pass the leads so that they do not become loose at the bend of the holder ⓐ in order to avoid their contacting the starter clutch drive gear.

NOTE:

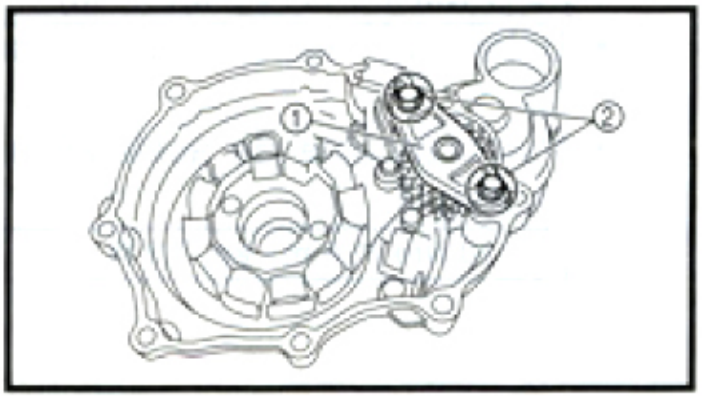
Apply the sealant to the grommet of the AC magneto lead.

Quick gasket®:
ACC-QUICK-GS-KT
YAMAHA Bond No. 1215:
90890-85505



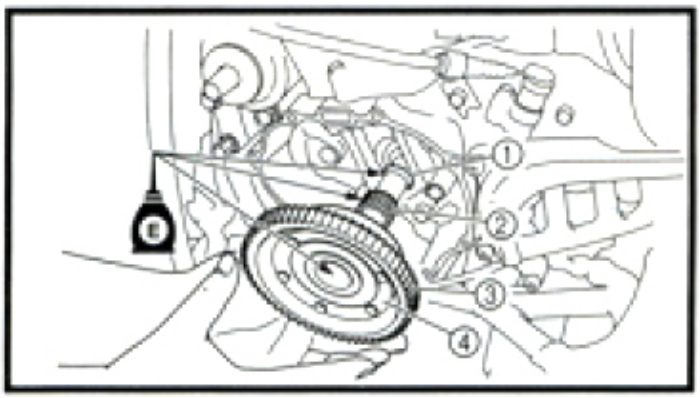
3. Install:
   - Idle gear 2 ①
   - Dowel pin ②

NOTE:
Apply the engine oil on the idle gear 2.



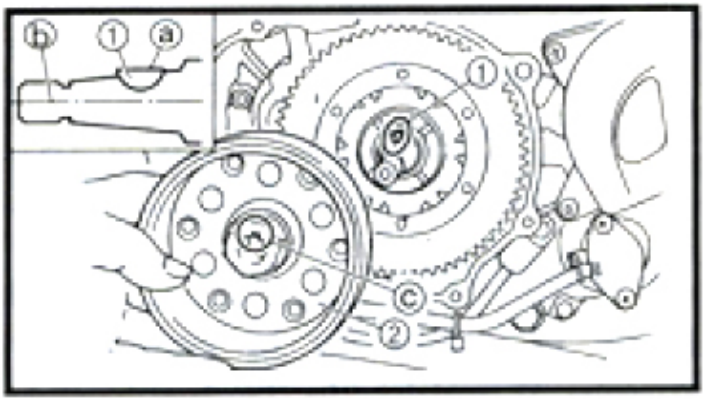
4. Install:
   - Idle gear plate ①
   - Bolt (idle gear plate) ②

	10 Nm (1.0 m · kg, 7.2 ft · lb)



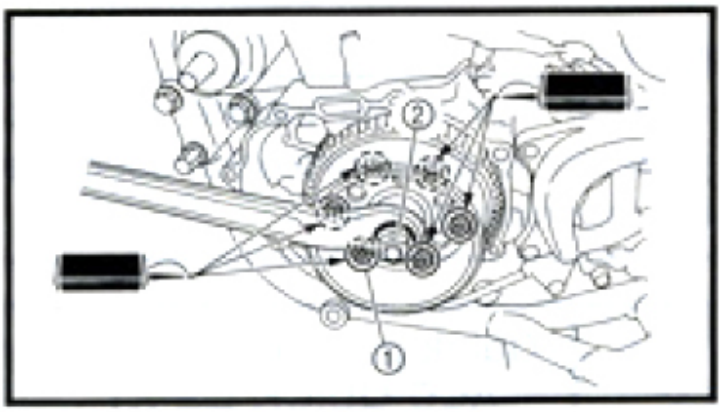
5. Install:
   - Plain washer ①
   - Bearing ②
   - Starter clutch drive gear ③
   - Starter clutch ④

NOTE:
Apply the engine oil on the plain washer, bearing and starter clutch drive gear inner circumference.

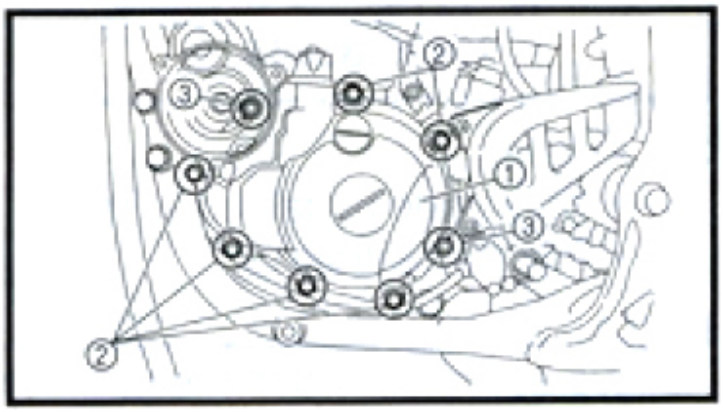


6. Install:
   - Woodruff key ①
   - Rotor ②

NOTE:
- Clean the tapered portions of the crankshaft and rotor.
- When installing the woodruff key, make sure that its flat surface ⓐ is in parallel with the crankshaft center line ⓑ.
- When installing the rotor, align the keyway ⓒ of the rotor with the woodruff key.

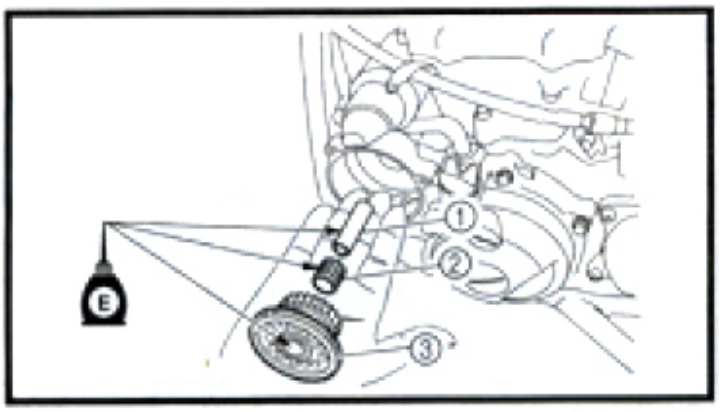


7. Install:
   - Bolt (starter clutch) ①
     16 Nm (1.6 m · kg, 11 ft · lb)
   - Plain washer (rotor)
   - Nut (rotor) ②
     70 Nm (7.0 m · kg, 50 ft · lb)



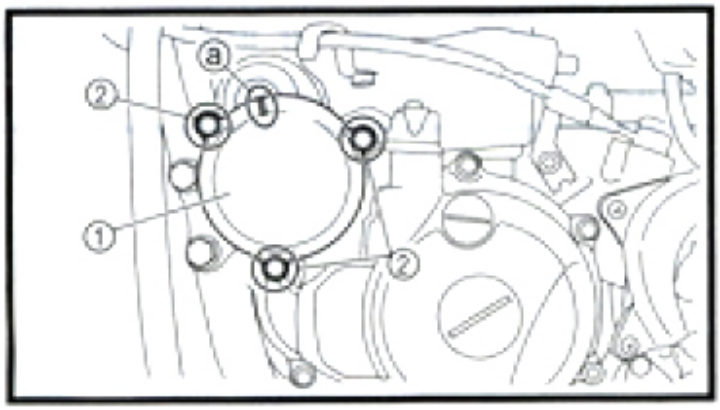
8. Install:
   - Dowel pin
   - Gasket [crankcase cover (left)]
     New
   - Crankcase cover (left) ①
   - Bolt [crankcase cover (left)] ②
     10 Nm (1.0 m · kg, 7.2 ft · lb)
   - Bolt [crankcase cover (left)] ③
     12 Nm (1.2 m · kg, 8.7 ft · lb)

NOTE:
Tighten the bolts in stage, using a crisscross pattern.



9. Install:
   - Shaft ①
   - Bearing ②
   - Idle gear 1 ③

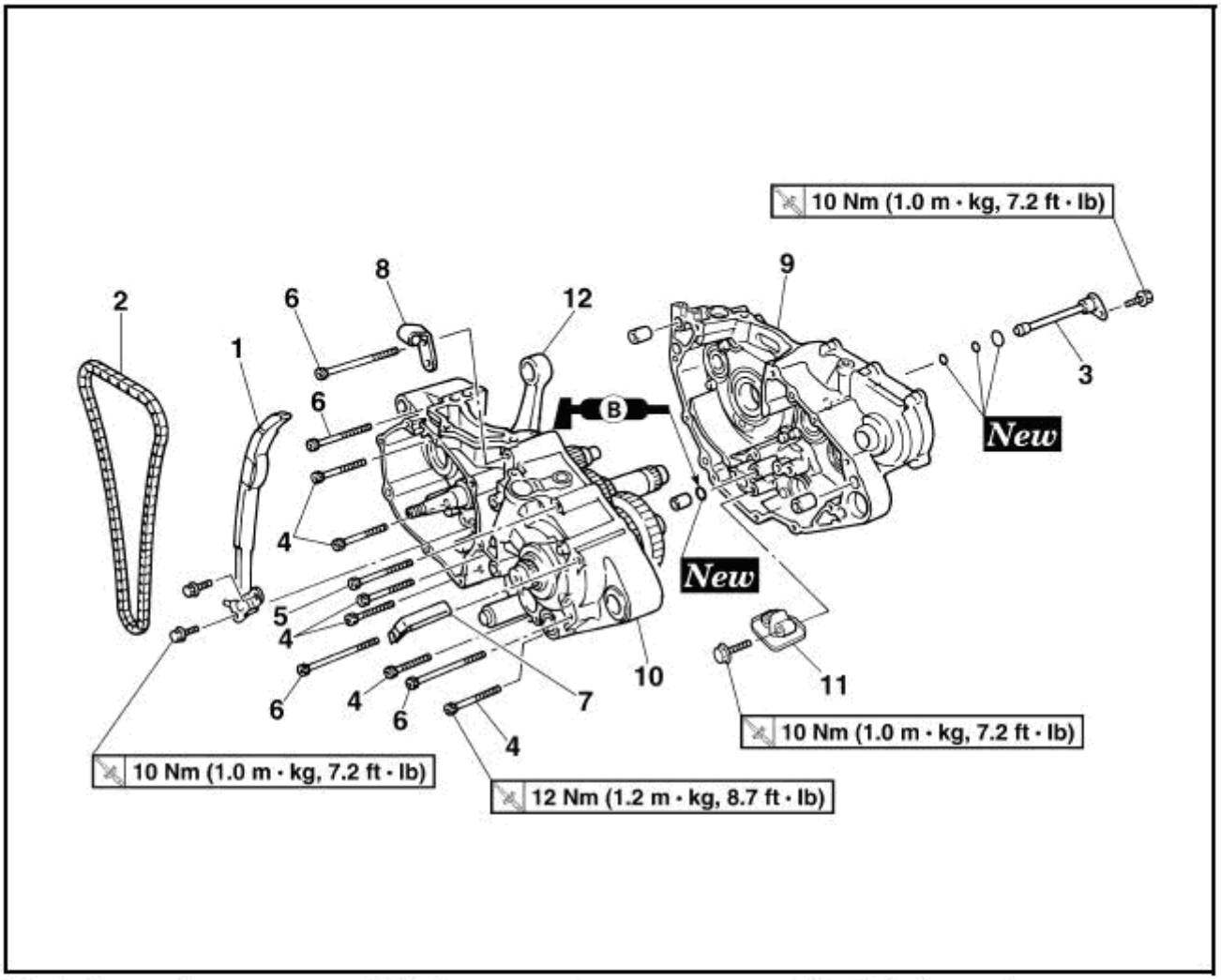
NOTE:
Apply the engine oil on the shaft, bearing and idle gear inner circumference.



10. Install:
    - Cover (idle gear 1) ①
    - Bolt ②
      10 Nm (1.0 m · kg, 7.2 ft · lb)

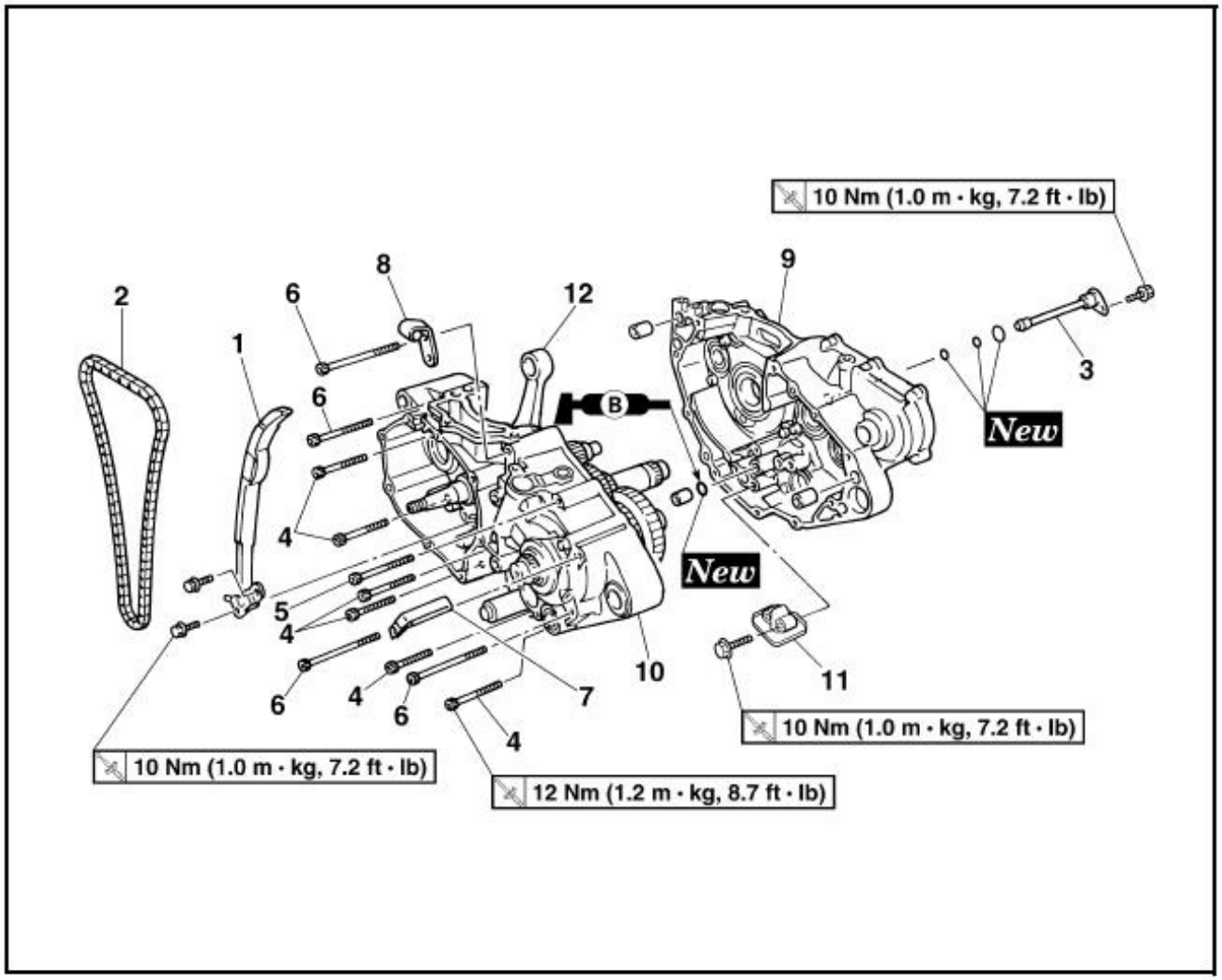
NOTE:
Install the cover (idle gear 1) with its mark ⓐ facing upward.

14 CRANKCASE AND CRANKSHAFT



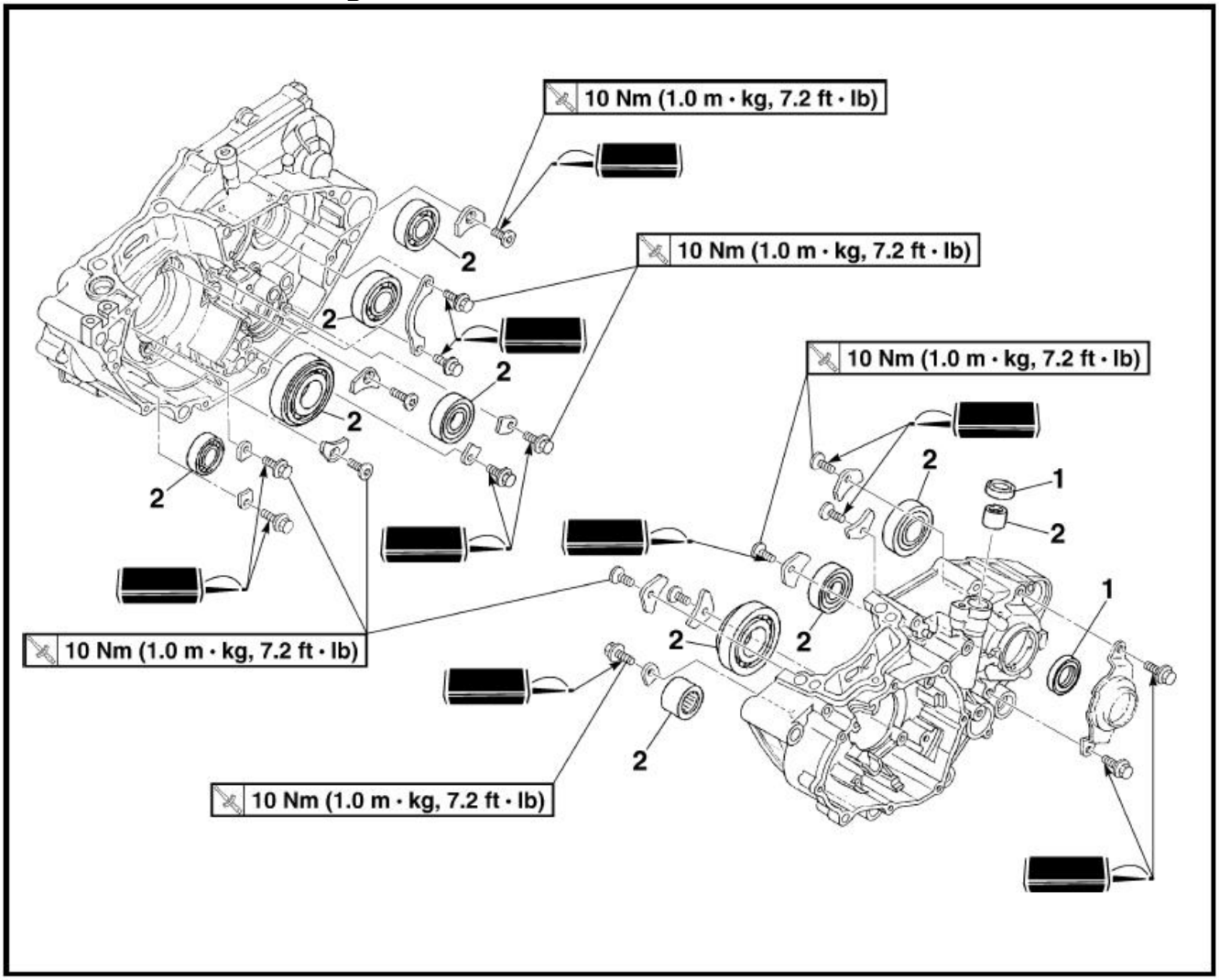
Extent of removal: ① Crankcase separation ② Crankshaft removal

Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		**CRANKCASE AND CRANKSHAFT REMOVAL** Engine Piston Kick shaft assembly Segment Stator Balancer shaft		 Refer to "ENGINE REMOVAL" section. Refer to "CYLINDER AND PISTON" section. Refer to "KICK SHAFT AND SHIFT SHAFT" section. Refer to "AC MAGNETO" section. Refer to "BALANCER" section.
① ②	1 2 3	Timing chain guide (intake side) Timing chain Oil delivery pipe 2	1 1 1	



Extent of removal	Order	Part name	Q'ty	Remarks
① ②	4	Bolt [L = 45 mm (1.77 in)]	6	Refer to "REMOVAL POINTS".
	5	Bolt [L = 55 mm (2.17 in)]	1	
	6	Bolt [L = 70 mm (2.76 in)]	4	
	7	Hose guide	1	
	8	Clutch cable holder	1	
	9	Right crankcase	1	
	10	Left crankcase	1	
	11	Oil strainer	1	
	12	Crankshaft	1	Use special tool. Refer to "REMOVAL POINTS".

14.1 Crankcase bearing

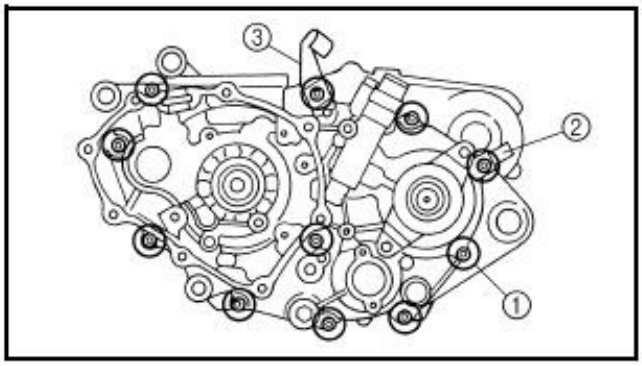


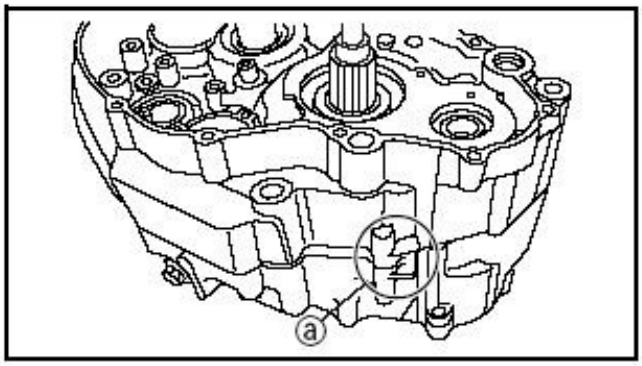
Extent of removal: ① Crankcase bearing removal

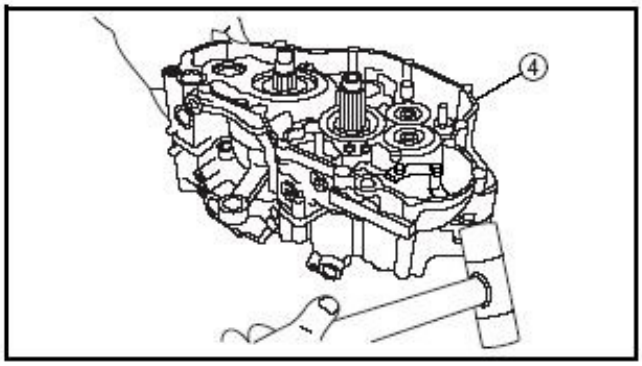
Extent of removal	Order	Part name	Q'ty	Remarks
		CRANKCASE BEARING REMOVAL		
Preparation for removal		Transmission Shift cam and shift fork		Refer to "TRANSMISSION, SHIFT CAM AND SHIFT FORK" section.
①	1	Oil seal	2	
	2	Bearing	10	Refer to "REMOVAL POINTS".

14.2 Removal points

14.2.1 Crankcase







1. Separate:
   - Right crankcase
   - Left crankcase

Separation steps:

- Remove the crankcase bolts ①, hose guide ② and clutch cable holder ③.

NOTE:

Loosen each bolt 1/4 of a turn at a time and after all the bolts are loosened, remove them.

- Remove the right crankcase ④.

NOTE:

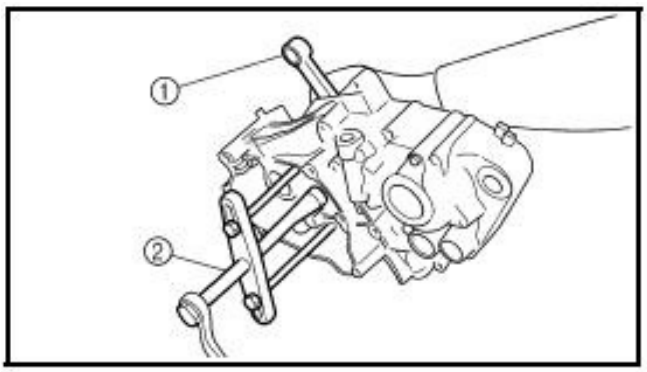
- Place the crankcase with its left side downward and split it by inserting a screwdriver tip into the splitting slit ⓐ in the crankcase.
- Lift the right crankcase horizontally while lightly patting the case splitting slit and engine mounting boss using a soft hammer, and leave the crankshaft and transmission with the left crankcase.

CAUTION:

Use soft hammer to tap on the case half. Tap only on reinforced portions of case. Do not tap on gasket mating surface. Work slowly and carefully. Make sure the case halves separate evenly. If one end "hangs up", take pressure off the push screw, realign, and start over. If the cases do not separate, check for a remaining case screw or fitting. Do not force.

- Remove the dowel pins and O-ring.

14.2.2 Crankshaft

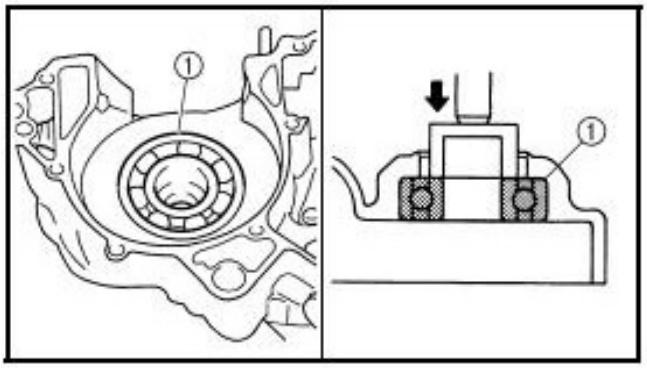


1. Remove:
   - Crankshaft ①
     Use the crankcase separating tool ②.

	Crankcase separating tool: YU-1135-A/90890-01135

CAUTION:
Do not use a hammer to drive out the crankshaft.

14.2.3 Crankcase bearing

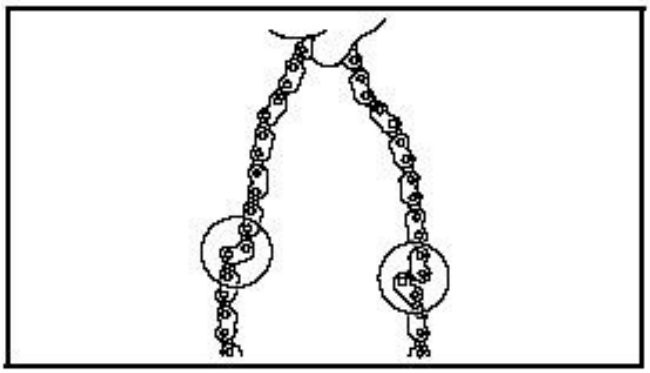


1. Remove:
   - Bearing ①

NOTE:
- Remove the bearing from the crankcase by pressing its inner race.
- Do not use the removed bearing.

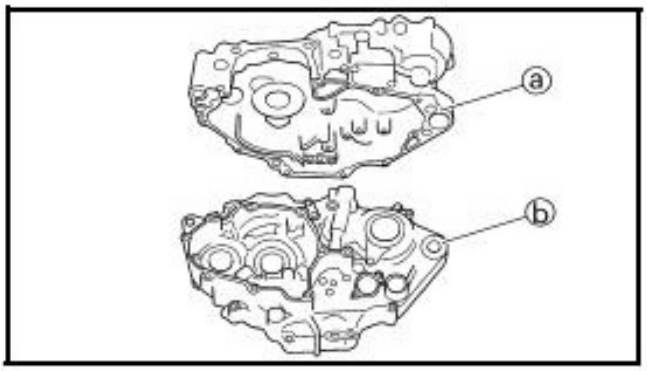
14.3 Inspection

14.3.1 Timing chain and timing chain guide

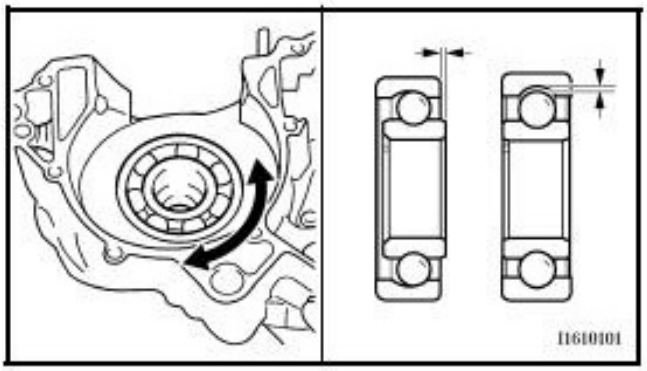


1. Inspect:
   - Timing chain
     Cracks/stiff → Replace the timing chain and camshaft sprocket as a set.
2. Inspect:
   - Timing chain guide
     Wear/damage → Replace.

14.3.2 Crankcase

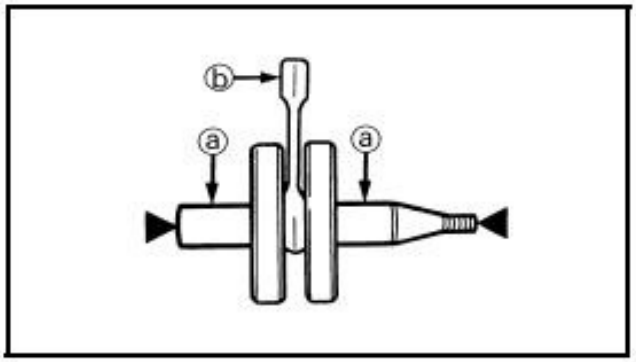


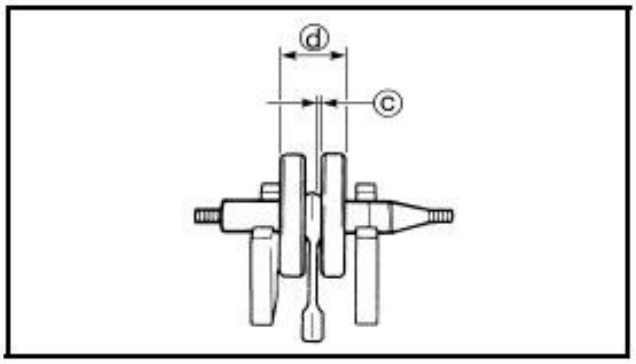
1. Inspect:
   - Contacting surface ⓐ
     Scratches → Replace.
   - Engine mounting boss ⓑ, crankcase
     Cracks/damage → Replace.



2. Inspect:
   - Bearing
     Rotate inner race with a finger.
     Rough spot/seizure → Replace.
3. Inspect:
   - Oil seal
     Damage → Replace.

14.3.3 Crankshaft



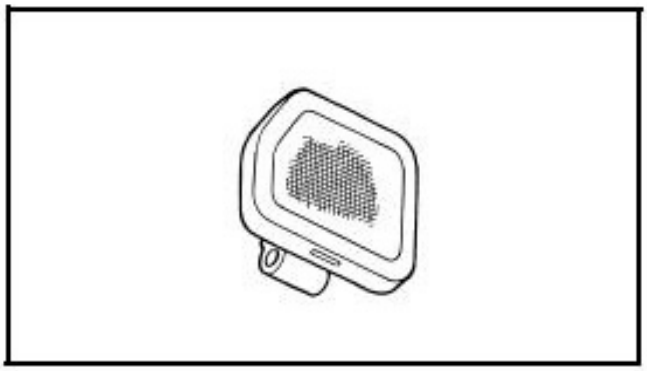


1. Measure:
   - Runout limit ⓐ
   - Small end free play limit ⓑ
   - Connecting rod big end side clearance ⓒ
   - Crank width ⓓ
     Out of specification → Replace.
     Use the dial gauge and a thickness gauge.

	Dial gauge and stand: YU-3097/90890-01252

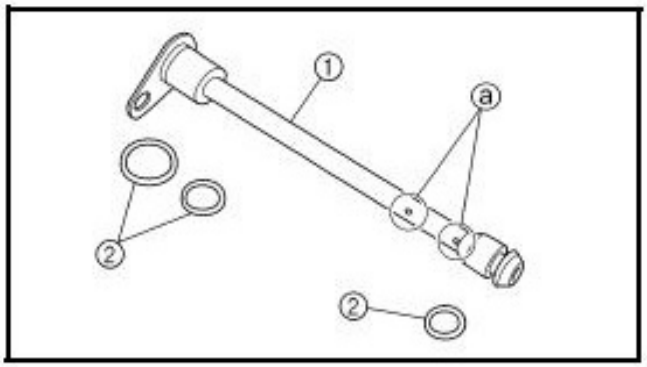
	Standard	<Limit>
Runout limit:	0.03 mm (0.0012 in)	0.05 mm (0.002 in)
Small end free play:	0.4 ~ 1.0 mm (0.016 ~ 0.039 in)	2.0 mm (0.08 in)
Side clearance:	0.15 ~ 0.45 mm (0.0059 ~ 0.0177 in)	0.50 mm (0.02 in)
Crack width:	55.95 ~ 56.00 mm (2.203 ~ 2.205 in)	—

14.3.4 Oil stainer



1. Inspect:
   - Oil strainer
     Damage → Replace.

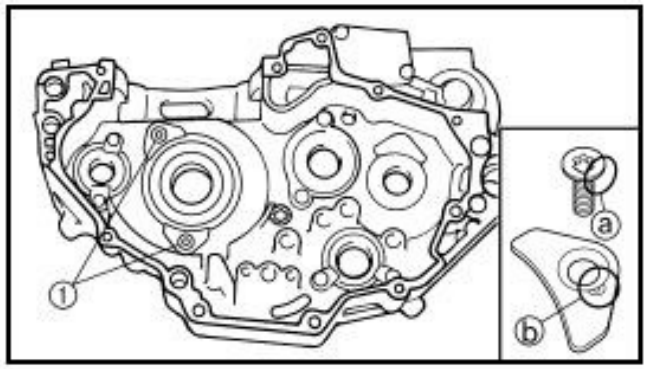
14.3.5 Oil delivery pipe 2



1. Inspect:
   - Oil delivery pipe 2 ①
   - O-ring ②
     Damage → Replace.
   - Oil orifice ⓐ
     Clogged → Blow.

14.4 Assembly and installation

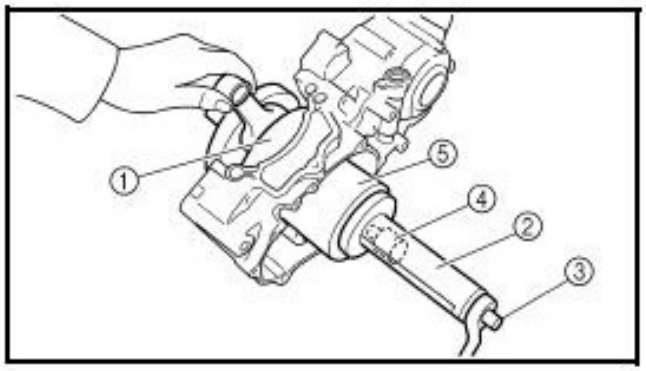
14.4.1 crankcase bearing

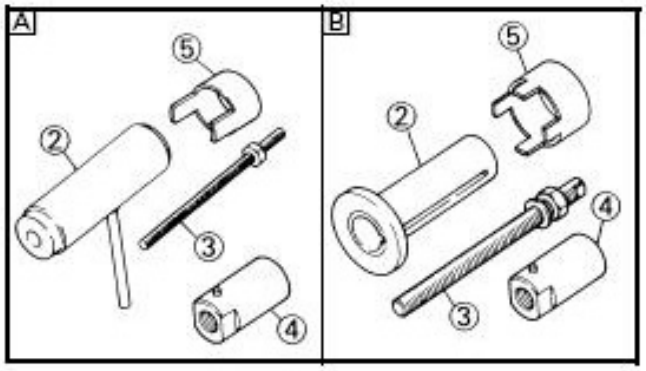


1. Install:
   - Bearing **New**
   - Bearing stopper
   - Bolt (bearing stopper)
     10 Nm (1.0 m · kg, 7.2 ft · lb)
   - Screw (bearing stopper)
     10 Nm (1.0 m · kg, 7.2 ft · lb)
   - Screw [bearing stopper (crankshaft)] ①
     10 Nm (1.0 m · kg, 7.2 ft · lb)
     To left and right crankcase.

NOTE:
- Install the bearing by pressing its outer race parallel.
- To prevent the screw [bearing stopper (crankshaft)] from becoming loose, crush the screw head periphery ⓐ into the concave ⓑ using a punch etc. In so doing, take care not to damage the screwdriver receiving hole in the screw head.

14.4.2 Cranshaft





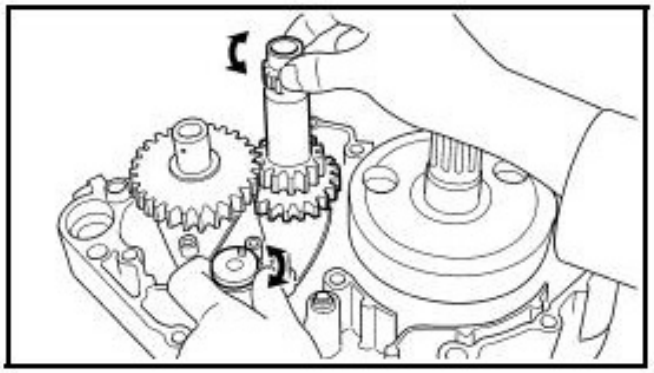
1. Install:
   - Crankshaft ①
     Use the crankshaft installing tool ②, ③, ④ and ⑤.

Crankshaft installing pot ②:
YU-90050/90890-01274
Crankshaft installing bolt ③:
YU-90050/90890-01275
Adapter (M12) ④:
YU-90063/90890-01278
Spacer (crankshaft installer) ⑤:
YU-91044/90890-04081

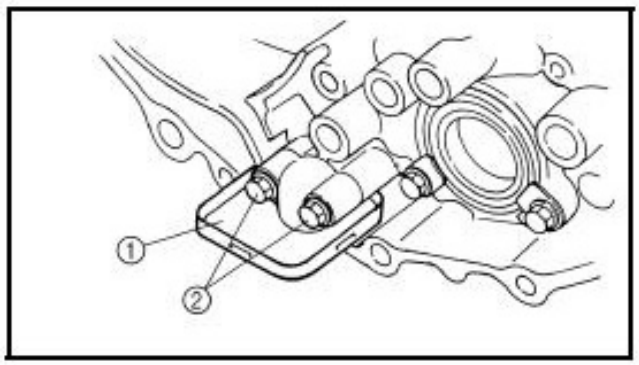
A For USA and CDN
B Except for USA and CDN

NOTE:
- Hold the connecting rod at top dead center with one hand while turning the nut of the installing tool with the other. Operate the installing tool until the crankshaft bottoms against the bearing.
- Before installing the crankshaft, clean the contacting surface of crankcase.

CAUTION:
Do not use a hammer to drive in the crankshaft.

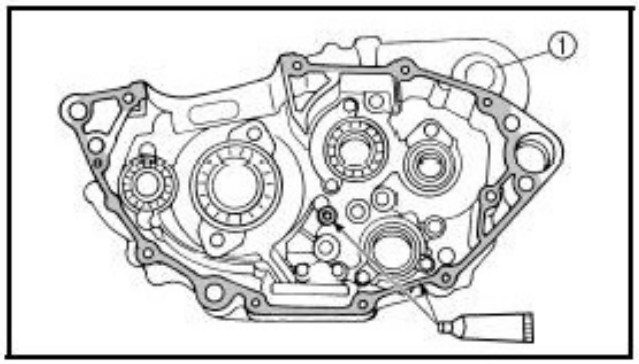


2. Check:
   - Shifter operation
   - Transmission operation
     Unsmooth operation → Repair.



3. Install:
   - Oil strainer ①
   - Bolt (oil strainer) ②

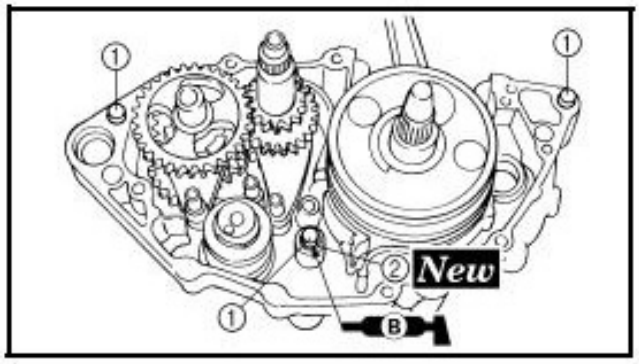
	10 Nm (1.0 m · kg, 7.2 ft · lb)



4. Apply:
   - Sealant
     On the right crankcase ①.

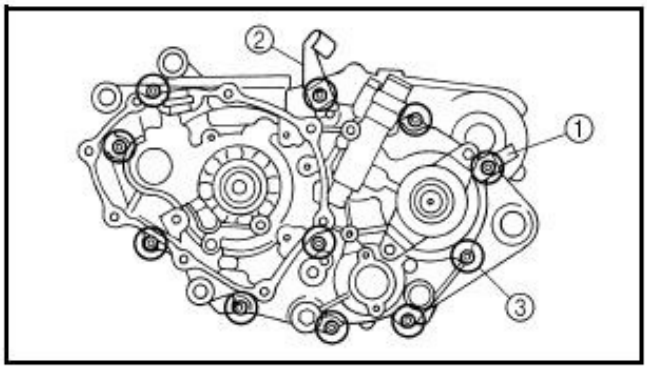
	Quick gasket®: **ACC-QUICK-GS-KT** **YAMAHA Bond No. 1215:** **90890-85505**

NOTE:
Clean the contacting surface of left and right crankcase before applying the sealant.



5. Install:
   - Dowel pin ①
   - O-ring ② New
   - Right crankcase
     To left crankcase.

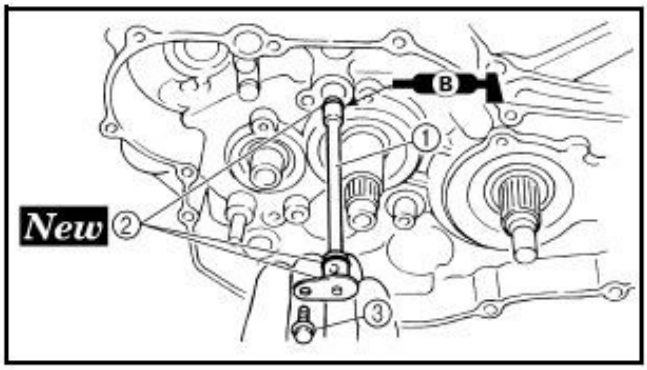
NOTE:
- Fit the right crankcase onto the left crankcase. Tap lightly on the case with soft hammer.
- When installing the crankcase, the connecting rod should be positioned at TDC (top dead center).



6. Tighten:
   - Hose guide ①
   - Clutch cable holder ②
   - Bolt (crankcase) ③

12 Nm (1.2 m · kg, 8.7 ft · lb)

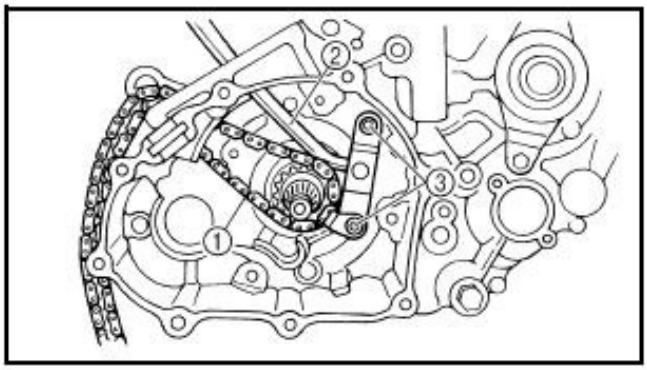
NOTE:
Tighten the crankcase tightening bolts in stage, using a crisscross pattern.



7. Install:
   - Oil delivery pipe 2 ①
   - O-ring ② **New**
   - Bolt (oil delivery pipe 2) ③

10 Nm (1.0 m · kg, 7.2 ft · lb)

NOTE:
Apply the lithium soap base grease on the O-rings.

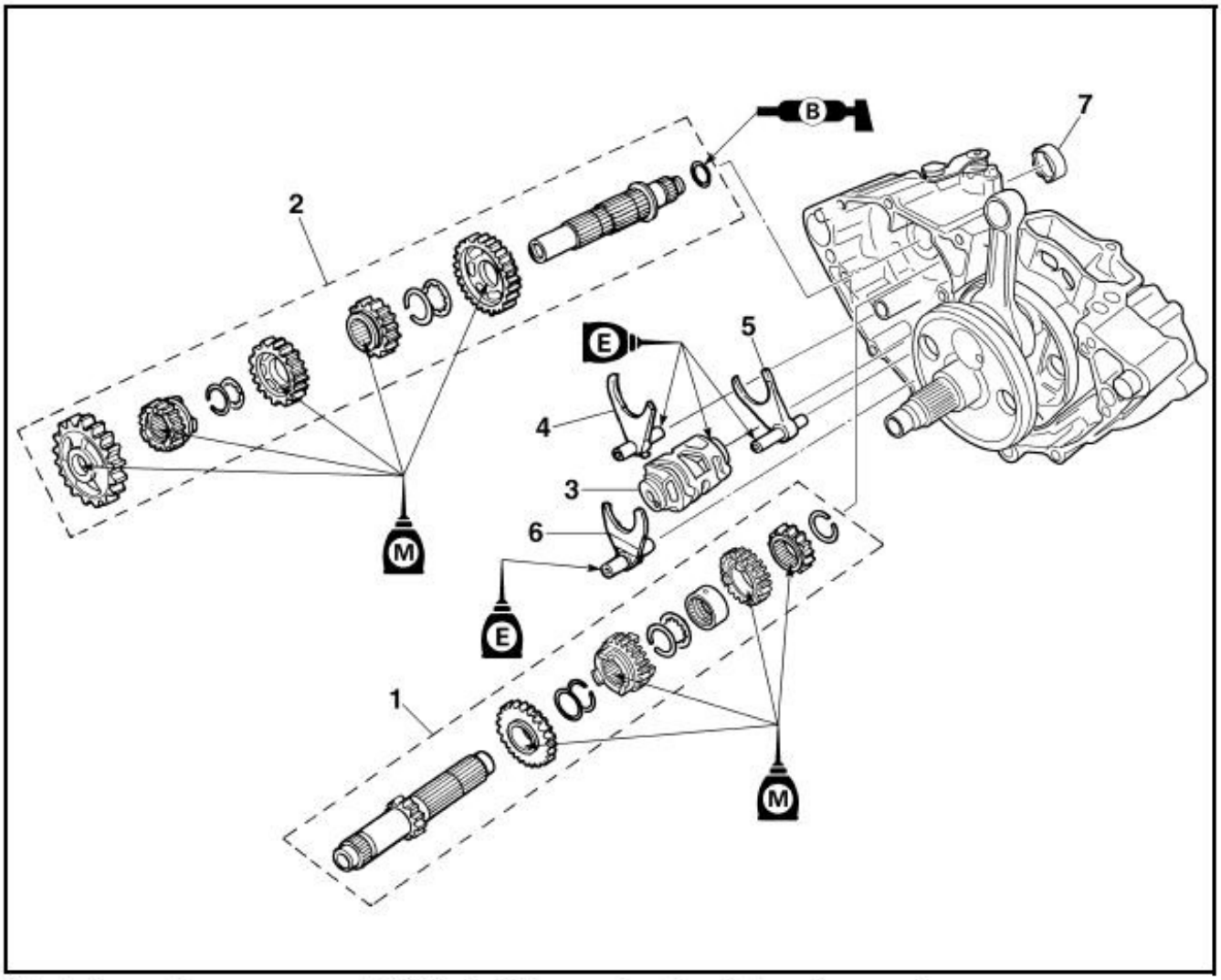


8. Install:
   - Timing chain ①
   - Timing chain guide (intake side) ②
   - Bolt (timing chain guide) ③

10 Nm (1.0 m · kg, 7.2 ft · lb)

9. Remove:
   - Sealant
     Forced out on the cylinder mating surface.
10. Apply:
    - Engine oil
      To the crank pin, bearing and oil delivery hole.
11. Check:
    - Crankshaft and transmission operation.
      Unsmooth operation → Repair.

15 TRANSMISSION

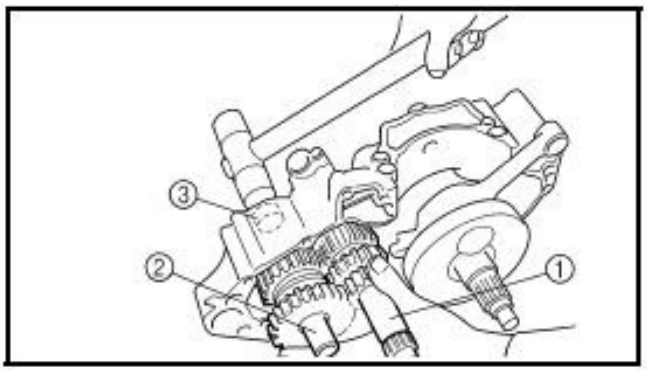


Extent of removal: ① Shift fork, shift cam, main axle and drive axle removal

Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		**TRANSMISSION, SHIFT CAM AND SHIFT FORK REMOVAL** Engine Separate the crankcase.		Refer to "ENGINE REMOVAL" section. Refer to "CRANKCASE AND CRANKSHAFT" section.
①	1	Main axle	1	Refer to "REMOVAL POINTS".
	2	Drive axle	1	
	3	Shift cam	1	
	4	Shift fork 3	1	
	5	Shift fork 2	1	
	6	Shift fork 1	1	
	7	Collar	1	

15.1 Removal points

15.1.1 Transmission

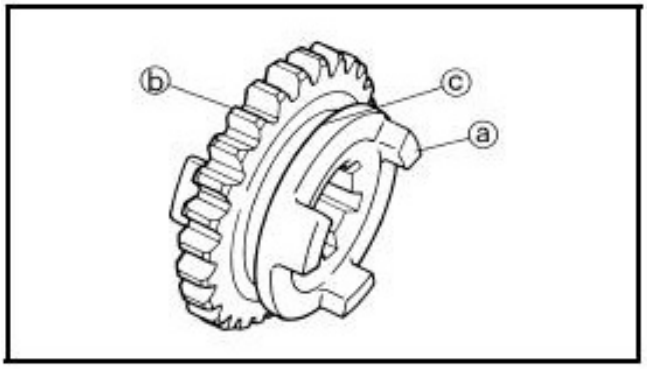


1. Remove:
   - Main axle ①
   - Drive axle ②
   - Shift cam
   - Shift fork 3
   - Shift fork 2
   - Shift fork 1

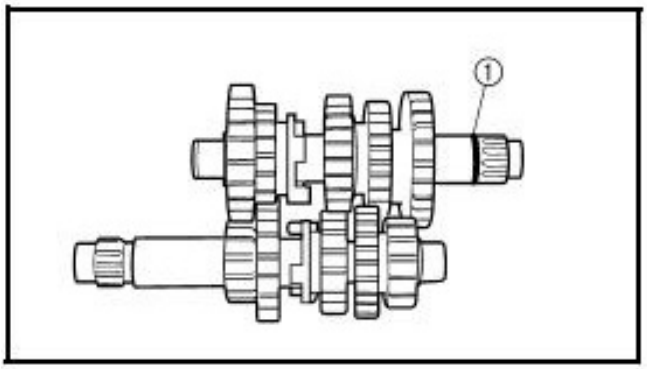
NOTE:
- Remove assembly with the collar ③ installed to the crankcase.
- Remove assembly carefully. Note the position of each part. Pay particular attention to the location and direction of shift forks.
- Remove the main axle, drive axle, shift cam and shift fork all together by tapping lightly on the transmission drive axle with a soft hammer.

15.2 Inspection

15.2.1 Gears

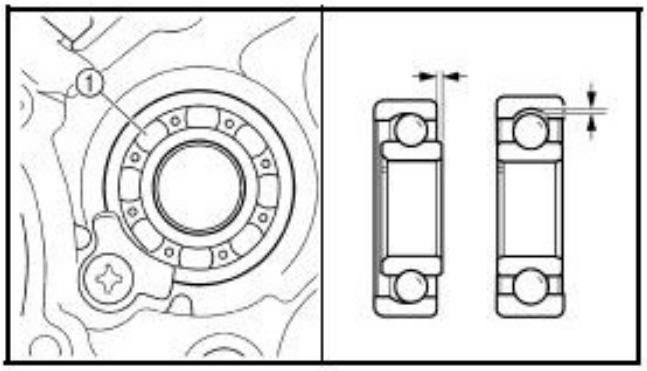


1. Inspect:
   - Matching dog ⓐ
   - Gear teeth ⓑ
   - Shift fork groove ⓒ
   Wear/damage → Replace.



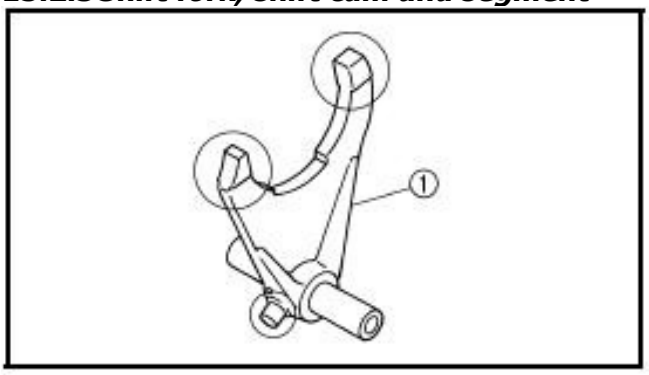
2. Inspect:
   - O-ring ①
   Damage → Replace.
3. Check:
   - Gears movement
   Unsmooth movement → Repair or replace.

15.2.2 Bearing

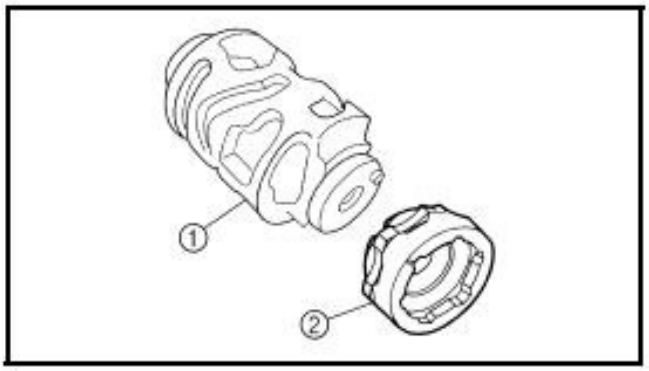


1. Inspect:
   - Bearing ①
   Rotate inner race with a finger.
   Rough spot/seizure → Replace.

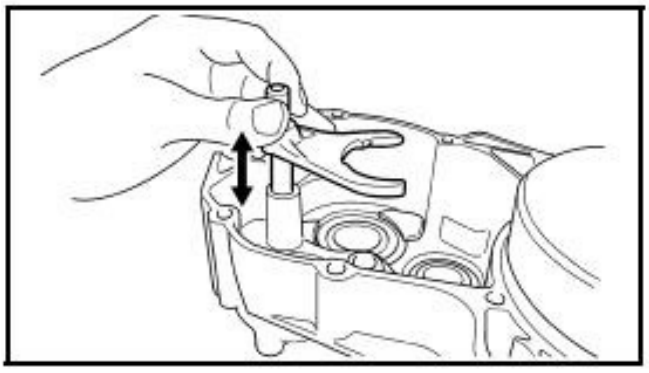
15.2.3 Shift fork, shift cam and segment



1. Inspect:
   - Shift fork ①
   Wear/damage/scratches → Replace.



2. Inspect:
   - Shift cam ①
   - Segment ②
   Wear/damage → Replace.

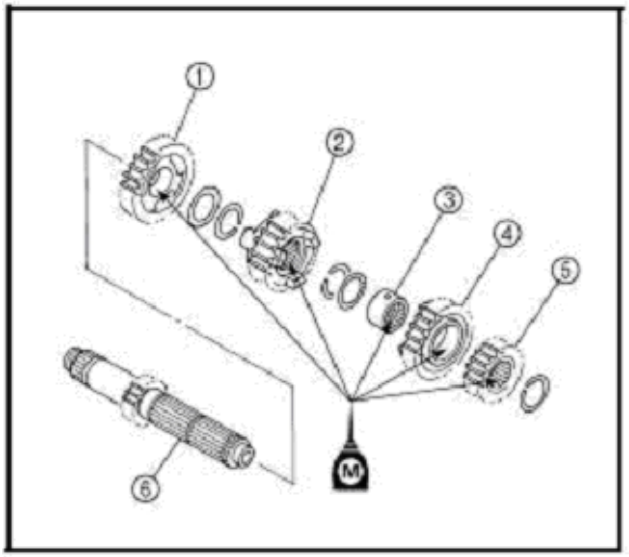


3. Check:
   - Shift fork movement
   Unsmooth operation → Replace shift fork.

NOTE:
For a malfunctioning shift fork, replace not only the shift fork itself but the two gears each adjacent to the shift fork.

15.3 Assembly and installation

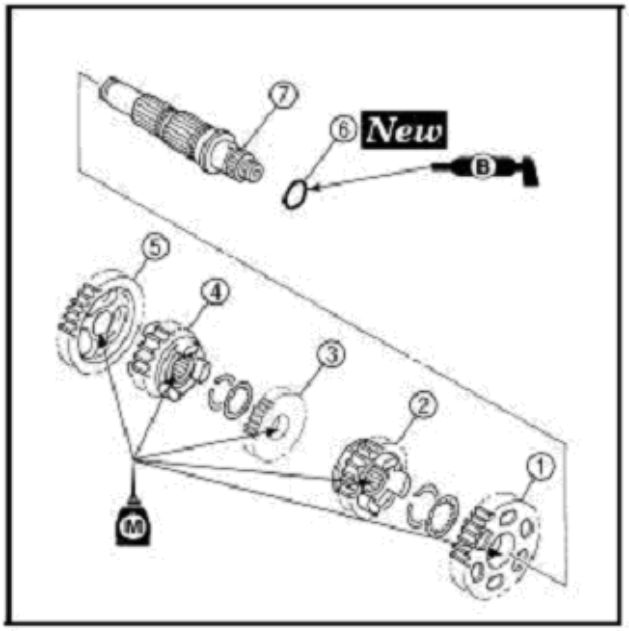
15.3.1 Transmission



1. Install:
   - 5th pinion gear [27T] ①
   - 3rd pinion gear [21T] ②
   - Collar ③
   - 4th pinion gear [24T] ④
   - 2nd pinion gear [16T] ⑤

   To main axle ⑥.

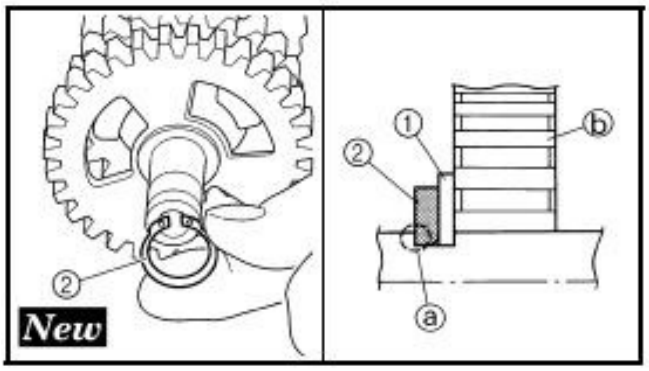
NOTE:
Apply the molybdenum disulfide oil on the inner and end surface of the idler gear and on the inner surface of the sliding gear, then install.



2. Install:
   - 2nd wheel gear [28T] ①
   - 4th wheel gear [25T] ②
   - 3rd wheel gear [28T] ③
   - 5th wheel gear [22T] ④
   - 1st wheel gear [31T] ⑤
   - O-ring ⑥ New

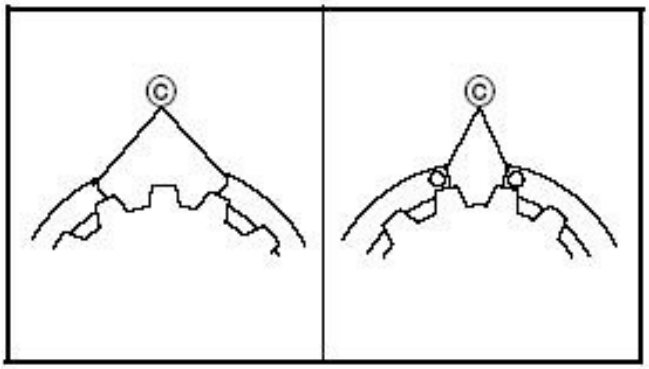
   To drive axle ⑦.

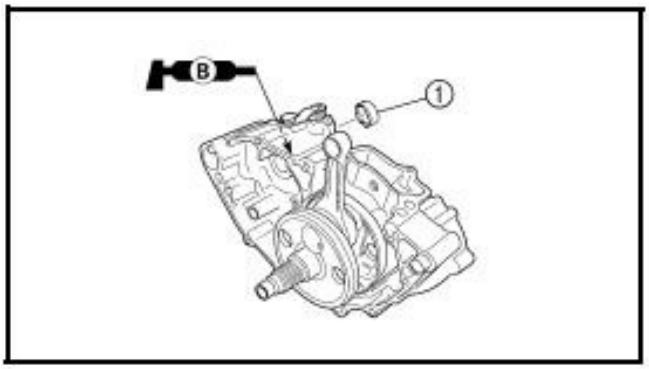
NOTE:
- Apply the molybdenum disulfide oil on the inner and end surface of the idler gear and on the inner surface of the sliding gear, then install.
- Apply the lithium soap base grease on the O-ring.



3. Install:
   - Washer ①
   - Circlip ② **New**

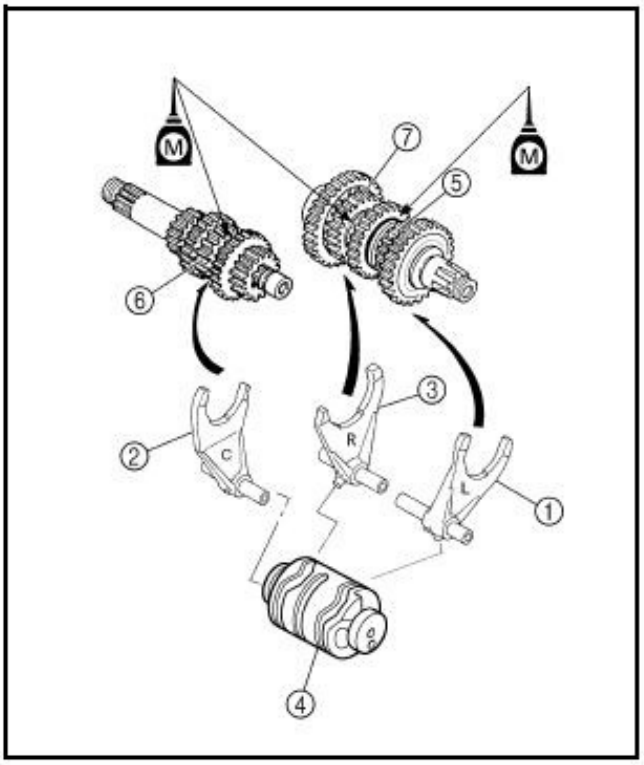
NOTE:
- Be sure the circlip sharp-edged corner ⓐ is positioned opposite side to the washer and gear ⓑ.
- Install the circlip with its ends ⓒ settled evenly on the spline crests.





4. Install:
   - Collar ①

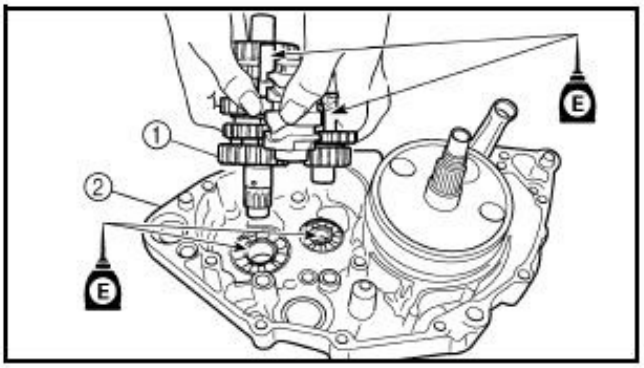
NOTE:
- Apply the lithium soap base grease on the oil seal lip.
- When installing the collar into the crankcase, pay careful attention to the crankcase oil seal lip.



5. Install:
   - Shift fork 1 (L) ①
   - Shift fork 2 (C) ②
   - Shift fork 3 (R) ③
   - Shift cam ④

   To main axle and drive axle.

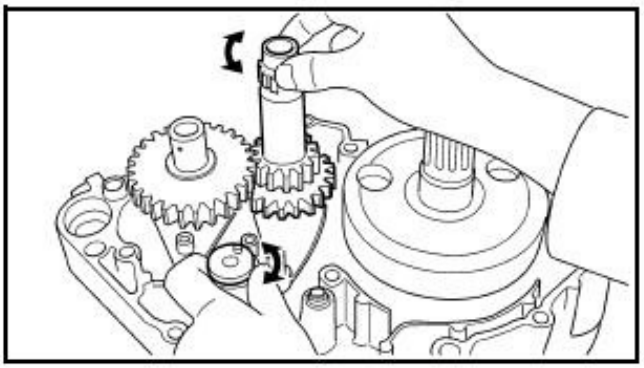
NOTE:
- Apply the molybdenum disulfide oil on the shift fork grooves.
- Mesh the shift fork #1 (L) with the 4th wheel gear ⑤ and #3 (R) with the 5th wheel gear ⑦ on the drive axle.
- Mesh the shift fork #2 (C) with the 3rd pinion gear ⑥ on the main axle.



6. Install:
   - Transmission assembly ①

   To left crankcase ②.

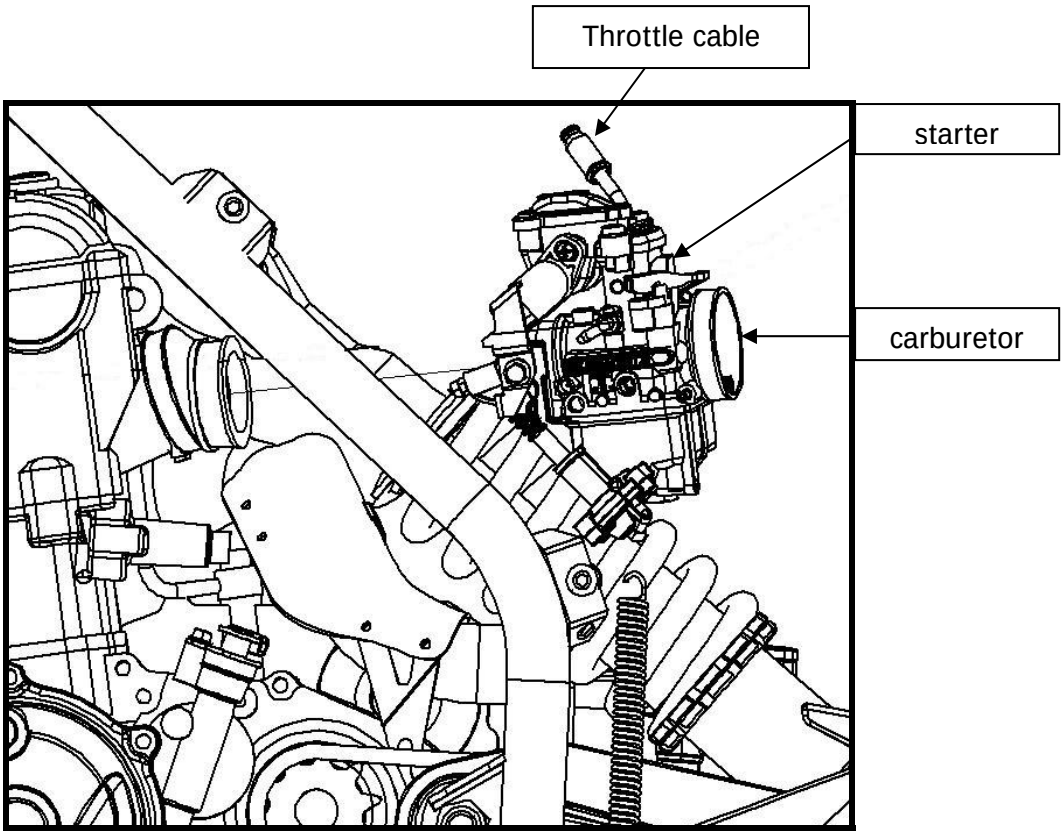
NOTE:
Apply the engine oil on the bearings and guide bars.



7. Check:
   - Shifter operation
   - Transmission operation

   Unsmooth operation → Repair.

16 CARBURETOR

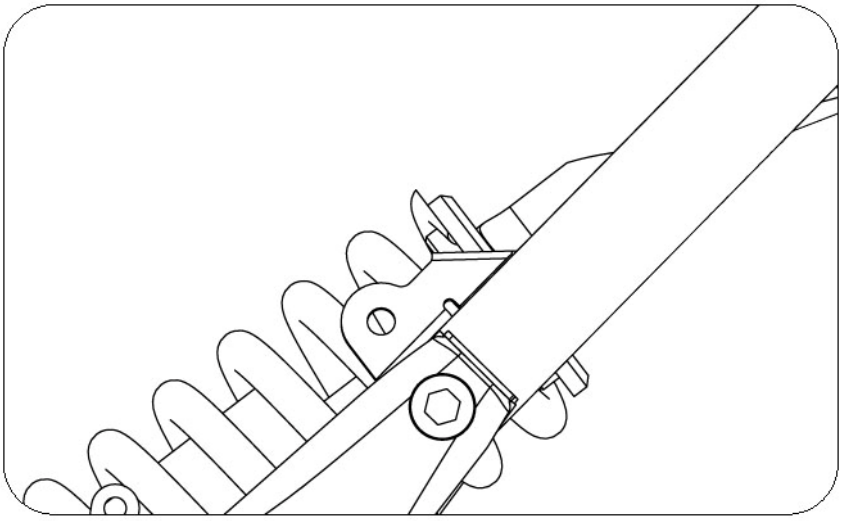


16.1 Carburetor removal

- Remove side covers, seat and fuel tank (refer to «side covers removal»).
- Remove the muffler.
- Unscrew the collar of the carburetor.
- Unscrew and remove the two upper bolt of rear sub frame.
- Tip over the rear sub frame.
- Remove the trhottle cable.
- Remove the carburetor.
- Unplug the pod of the valve position sensor.

16.2 Carburetor installation

- Plug the pod of the valve position sensor.
- Install the carburetor.
- Screw the collar of the carburetor
- Install the throttle cable.
- Tip over the rear sub frame and be carefull of the good way of the carburetor.
- Screw the collar of the carburetor.
- Install the muffler.
- Install fuel tank, side covers and seat (refer to «side covers installation»).



CHASSIS

CONTENTS

1 GLOSSARY

Lubricate with grease.

Lubricate with copper grease.

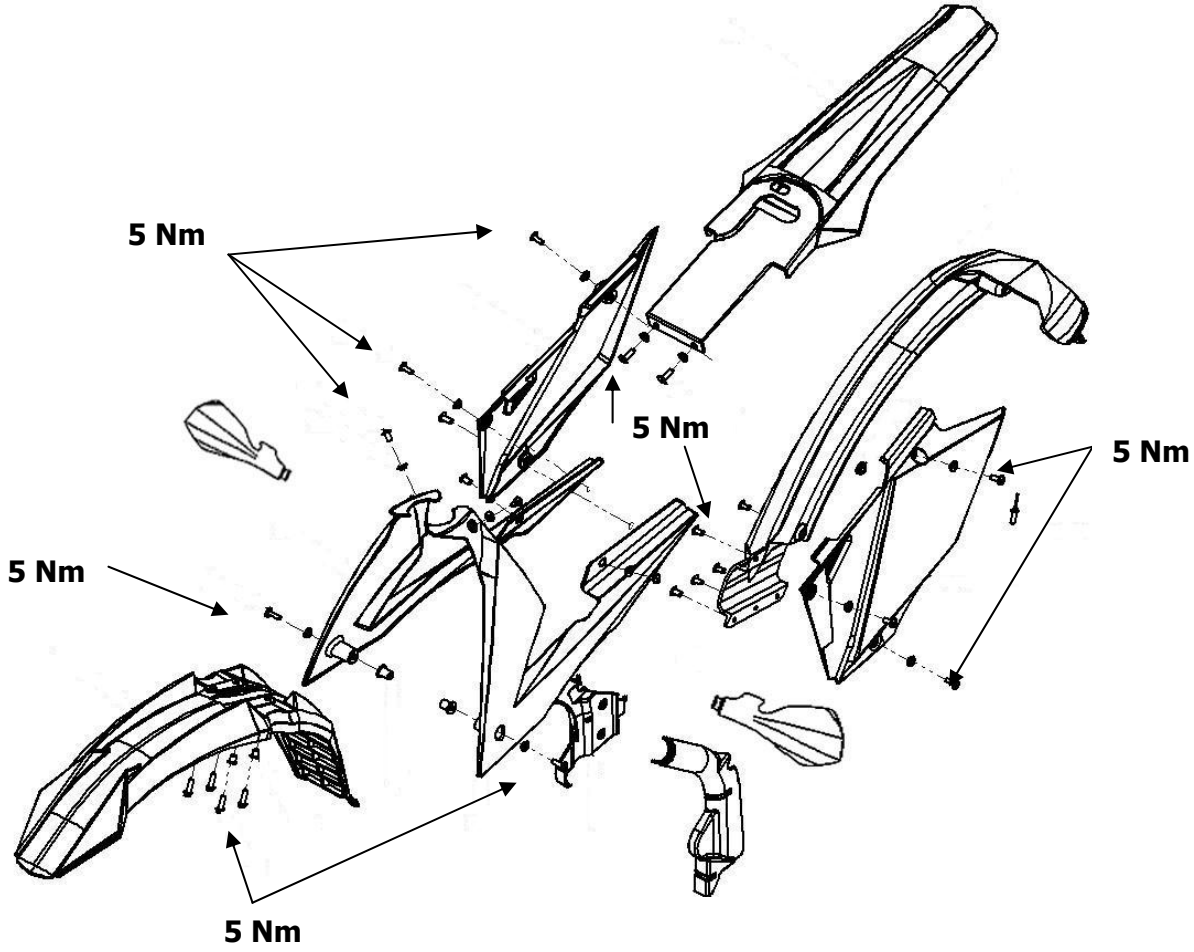
Use hard locking agent.

Use soft locking agent.

6 N.m

Tightening torque.

2 SIDE COVERS



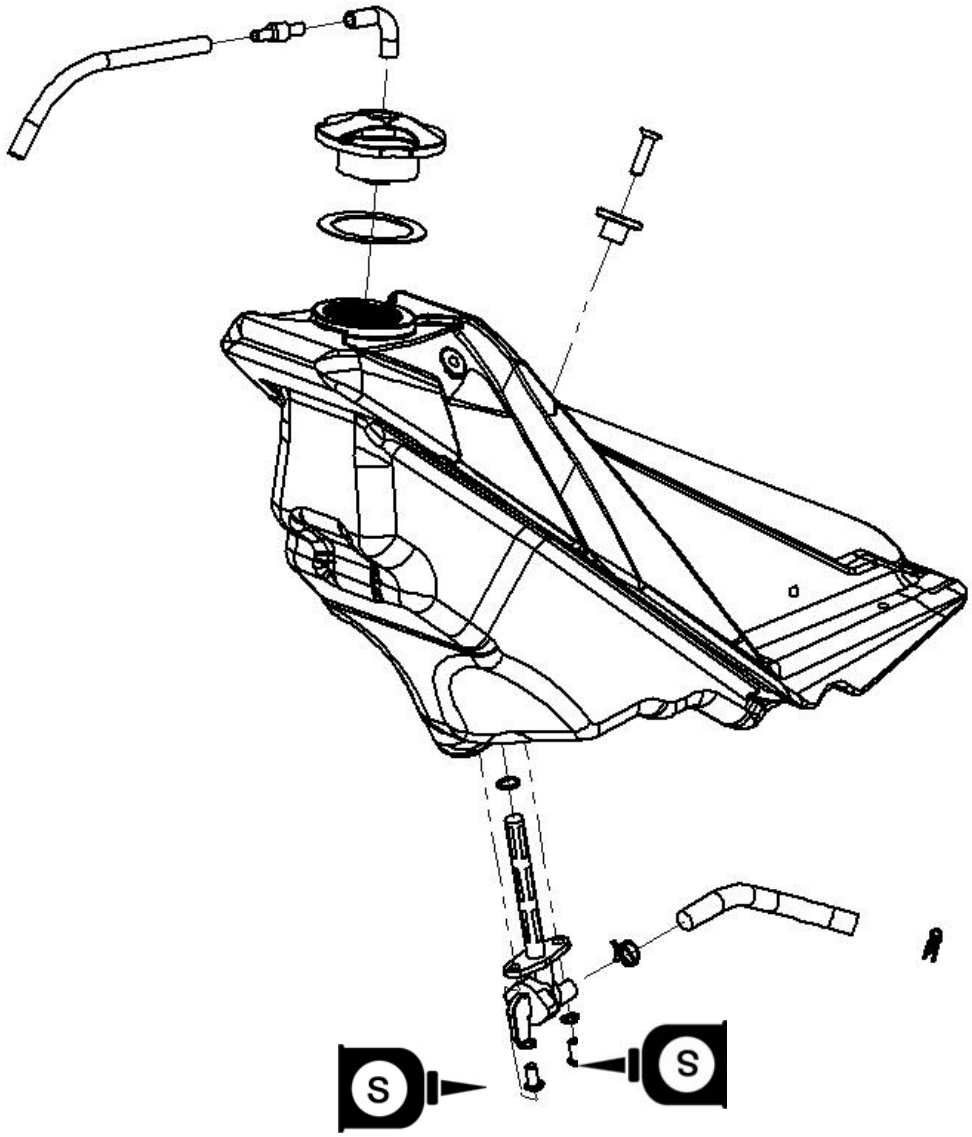
2.1 Side covers removal

- Unscrew the 4 bolt which maintain the Front fender and put down it.
- Remove the saddle.
- Unscrew the 3 bolt which maintain the side panel tank and put down it.
- Unscrew the bolt wich maintain the hand protection and put down it.
- Unscrew the 3 bolt which maintain the protective plaque side and put down it.
- To remove the rear fender, remove the saddle by unscrewing the bolt situated behind the saddle; then push the saddle on the forward to disengage it. Then unscrew the 2 bolt of the rear fender and remove the rear fender.
- Unscrew the 5 bolt of the support license plate, disconnect the pod et put down the support license plate.

2.2 Side covers installation

- Install the rear fender and screw the 2 bolt. Indeed return 2 rectangular tubes of the rear sub frame on the rear fender.
- Position the saddle and engage it on the fuel tank and screwing the maintain bolt on the back of the saddle.
- Screw the 3 bolt of each side panel tank.
- Position the rear protective side panel and screw the 3 bolt of each part.
- Position on the frame the frame protective and fix them with 2 rilsans for each protection.
- Screw the support license plate on the swingarm with his 5 bolt.
- Screw the 4 bolt of the front fender on the triple clamp lower
- Screw the bolt of the protection hand on the clutch lever and on the brake lever.

3 FUEL TANK



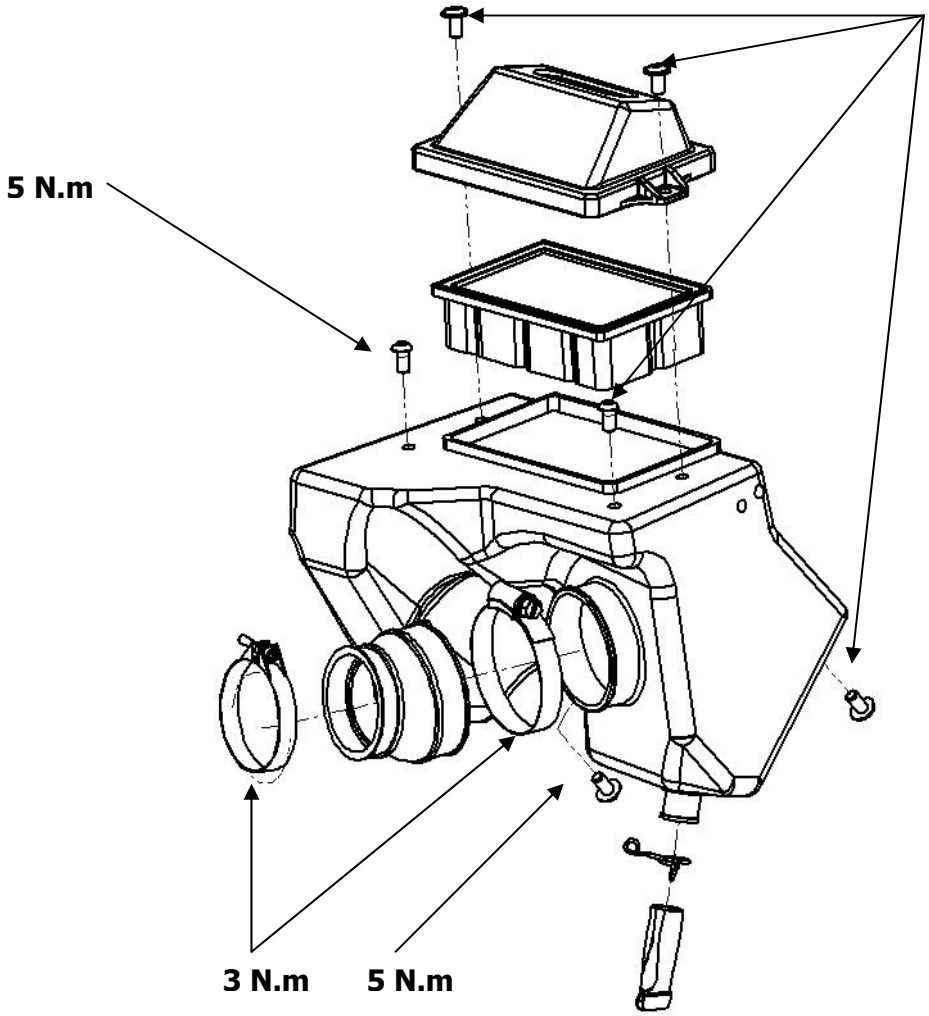
3.1 Fuel tank and side covers removal

- Unscrew the bolt situated on the rear and remove the saddle.
- Unscrew the 3 bolt which maintain the side panel tank and put down it.
- Dismounting the fuel hose clip and disconnecting the hose (warning, the cock position must be on «OFF»)
- Remove the side covers.
- Remove the fuel tank.

3.2 Fuel tank and side covers installation

- Install the fuel tank.
- Connecting the fuel hose with the clip.
- Screw the 3 bolts of each side panel.
- Install the saddle and screw the bolt situated behind.

4 AIR CLEANER CASE



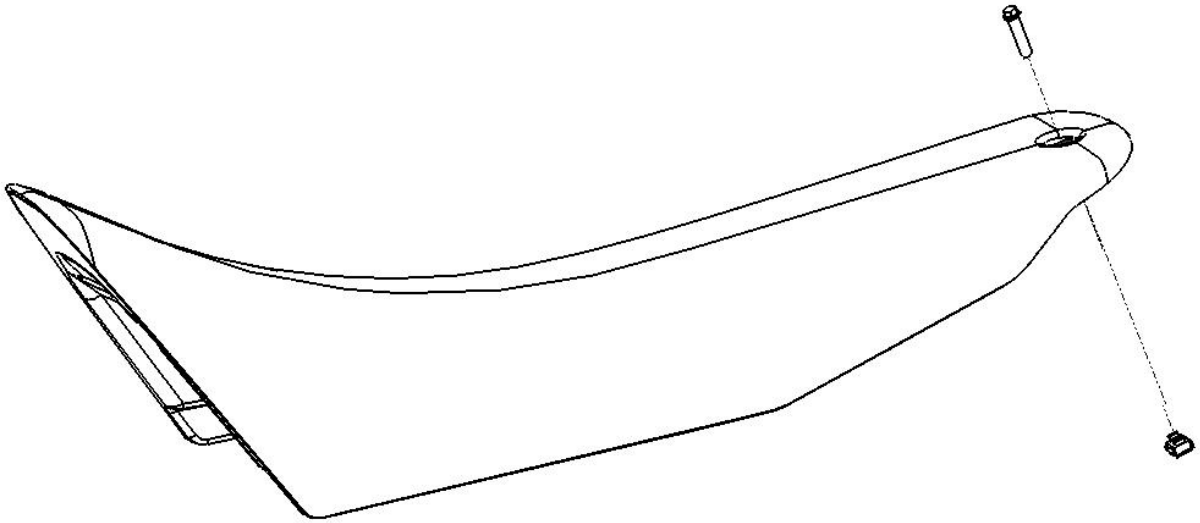
4.1 Air cleaner case removal

- Unscrew the air cleaner sleeve collar and remove the saddle, the fuel tank, the muffler and the rear sub frame.
- On the rear sub frame, unscrew the 4 bolts which maintain the air cleaner and put down the air cleaner.
- Unscrew the 2 bolts of the air cleaner cap and remove it.
- Remove the air cleaner filter.

4.2 Air cleaner case installation

- Install the air cleaner filter.
- Install the air cleaner cap on the air cleaner filter and screw it.
- Install the air cleaner in the rear sub frame and screw the 4 bolts.
- joint the air cleaner sleeve to the carburettor.
- Install the rear sub frame and screw the collar.
- Install the muffler.
- Install the fuel tank, the side panel and the saddle.

5 SEAT



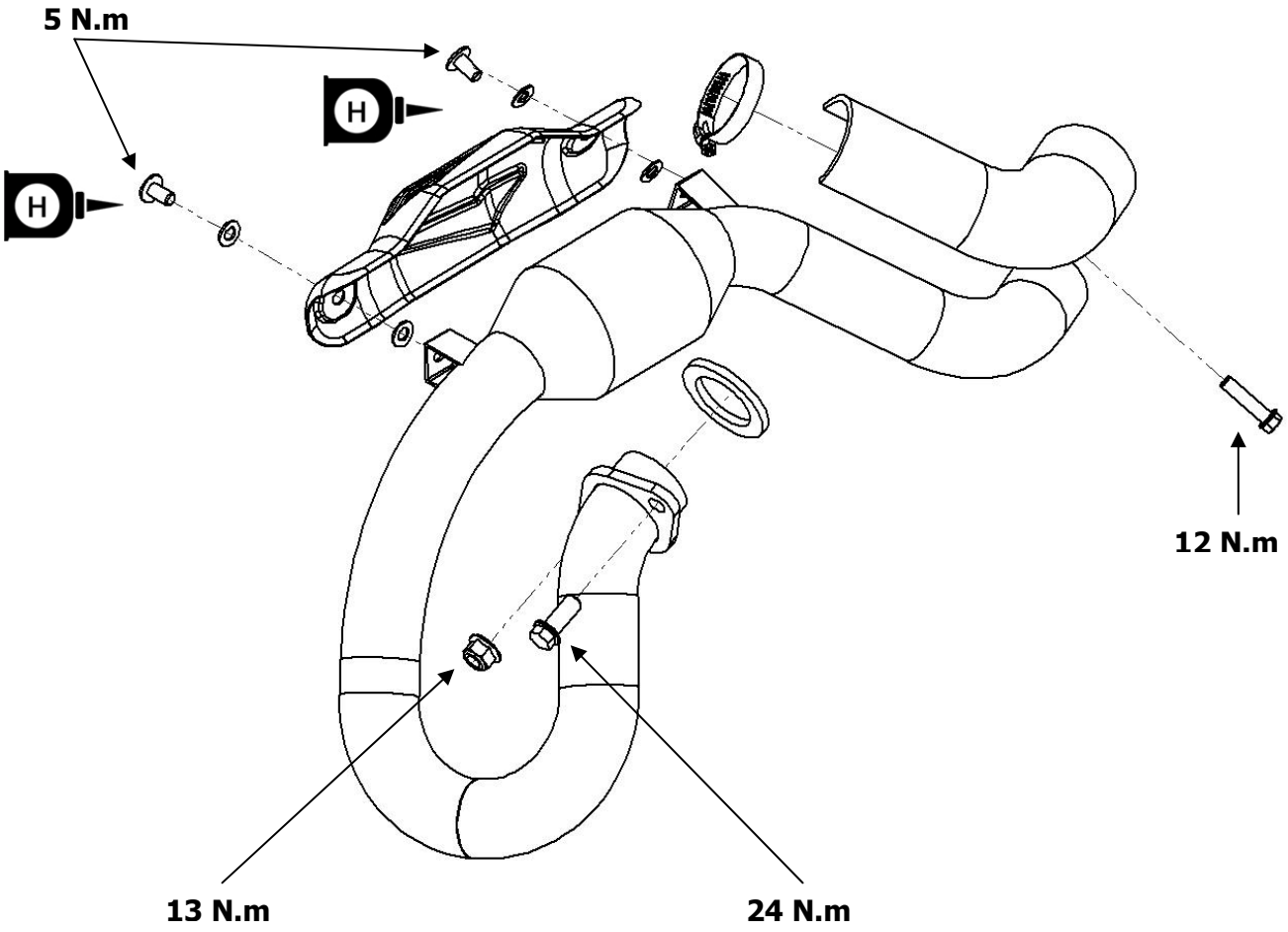
5.1 Seat removal

- Unscrew the bolt on the back of the seat.
- Move the seat forwards to disengage it.
- Remove the seat.

5.2 Seat installation

- Engage the seat, put it on the fuel tank and make slide towards the back.
- Screw the bolt on the back of the seat.

6 EXHAUST PIPE



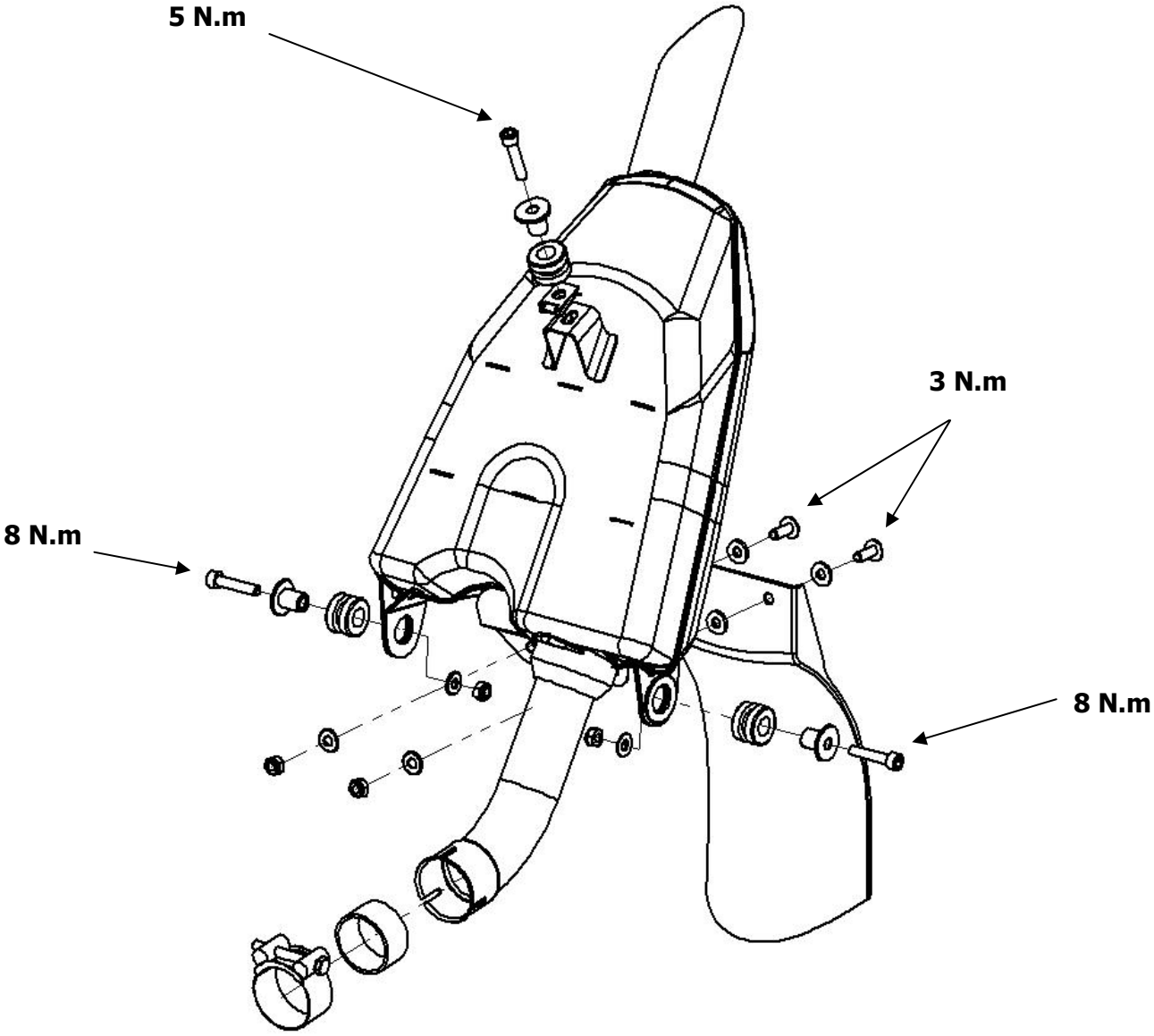
6.1 Exhaust pipe removal

- Unscrew the exhaust pipe fixing nut and bolt.
- Unscrew the collar between the ewhaust pipe and the muffler.
- Remove the exhaust pipe.

6.2 Exhaust pipe installation

- Place the exhaust pipe (put a new seal).
- Screw the exhaust pipe fixing nut and bolt.
- Screw the collar between the exhaust pipe and the muffler.

7 MUFFLER



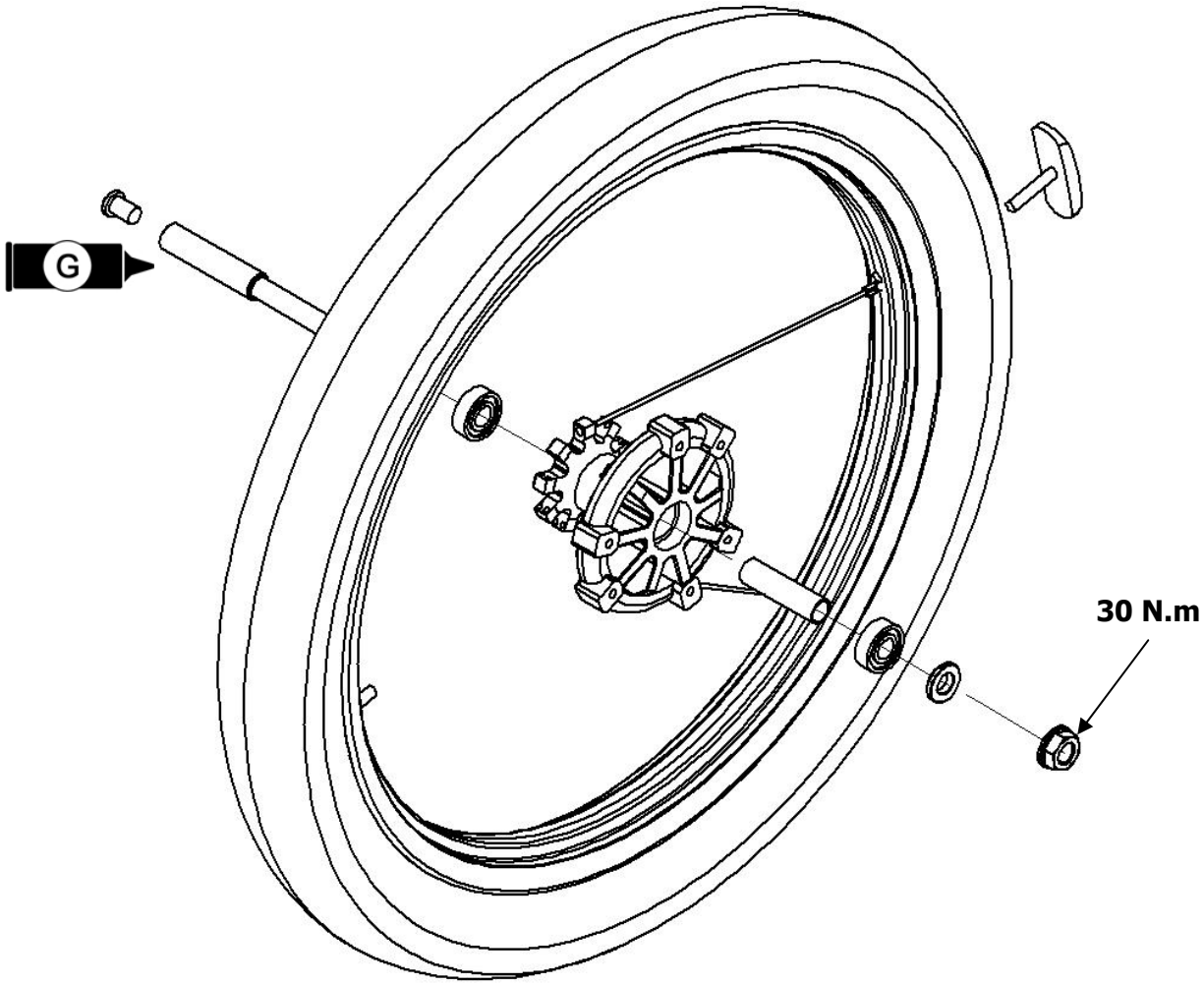
7.1 Muffler removal

- Remove the saddle and the protective plate side (see «side cover removal»).
- Unscrew the collar between the muffler and te exhaust pipe.
- Unscrew the 3 bolts fixing the silencer to the frame.
- Remove the silencer of the exhaust pipe.

7.2 Muffler installation

- Joint the silencer to the exhaust pipe.
- Screw the 3 bolts fixing the silencer to the frame.
- Screw the collar between the exhaust pipe and the muffler.
- Install the saddle and the protective plate side. (see «side cover installation»).

8 FRONT WHEEL



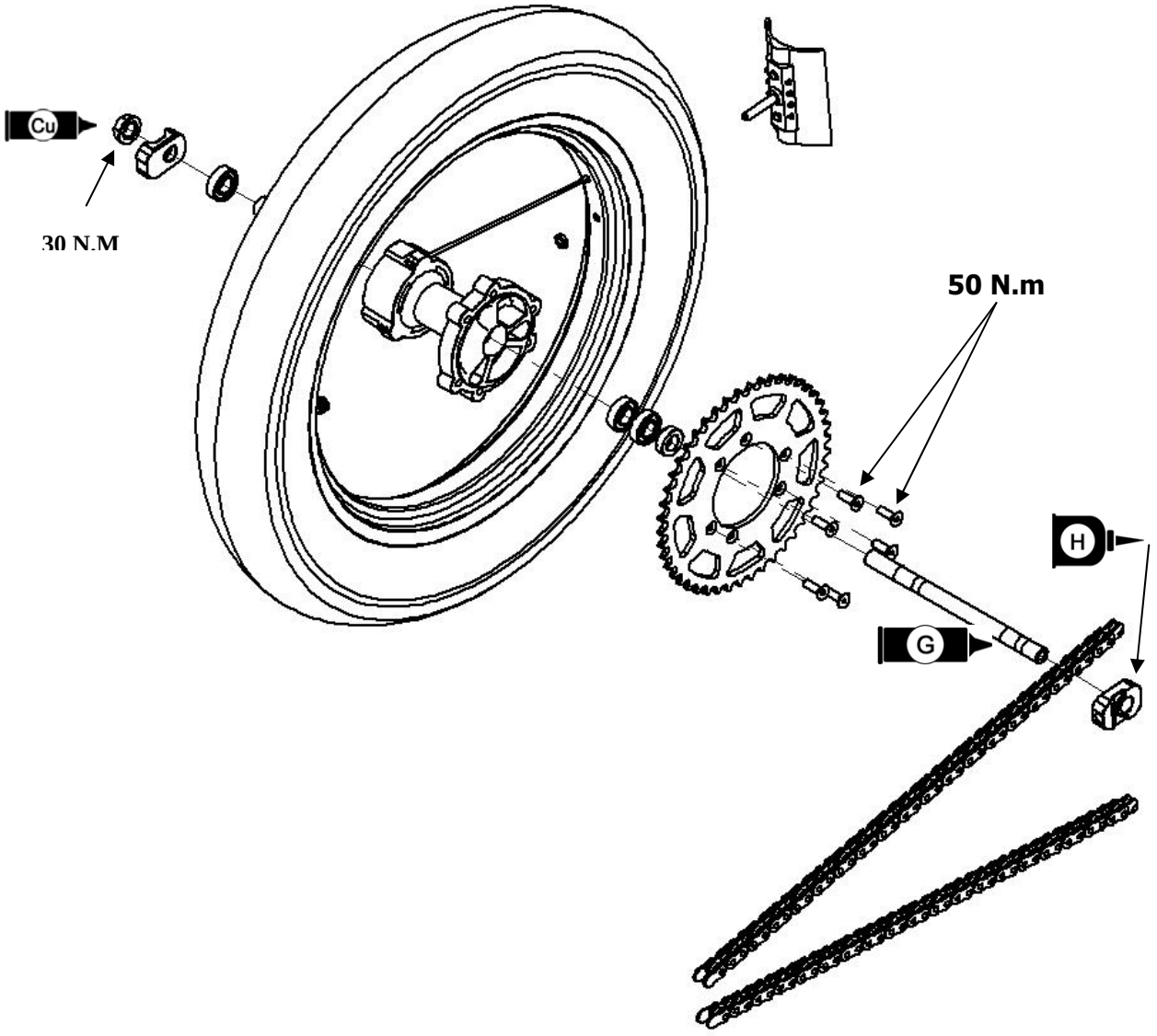
8.1 Front wheel removal

- Unscrew the 2 bottom fork axle bolts.
- Unscrew the axle with hexagonal tool.
- Remove the axle.
- Remove the front wheel.
- Warning: don't use the brake without the wheel (put a key between the pads).

8.2 Front wheel installation

- Lubricate the front wheel axle and lubricate the threading with copper grease.
- Place the front wheel (with the disc between the pad kit) and install the axle, with the spacer (at the calliper side).
- Screw the axle.
- Unscrew (partly) the 2 bolts at the right side of the front fender bracket.
- Lock the front brake and push down on the handlebar several times.
- Screw the bottom fork bolts.
- Screw the fender bracket bolts.

9 REAR WHEEL



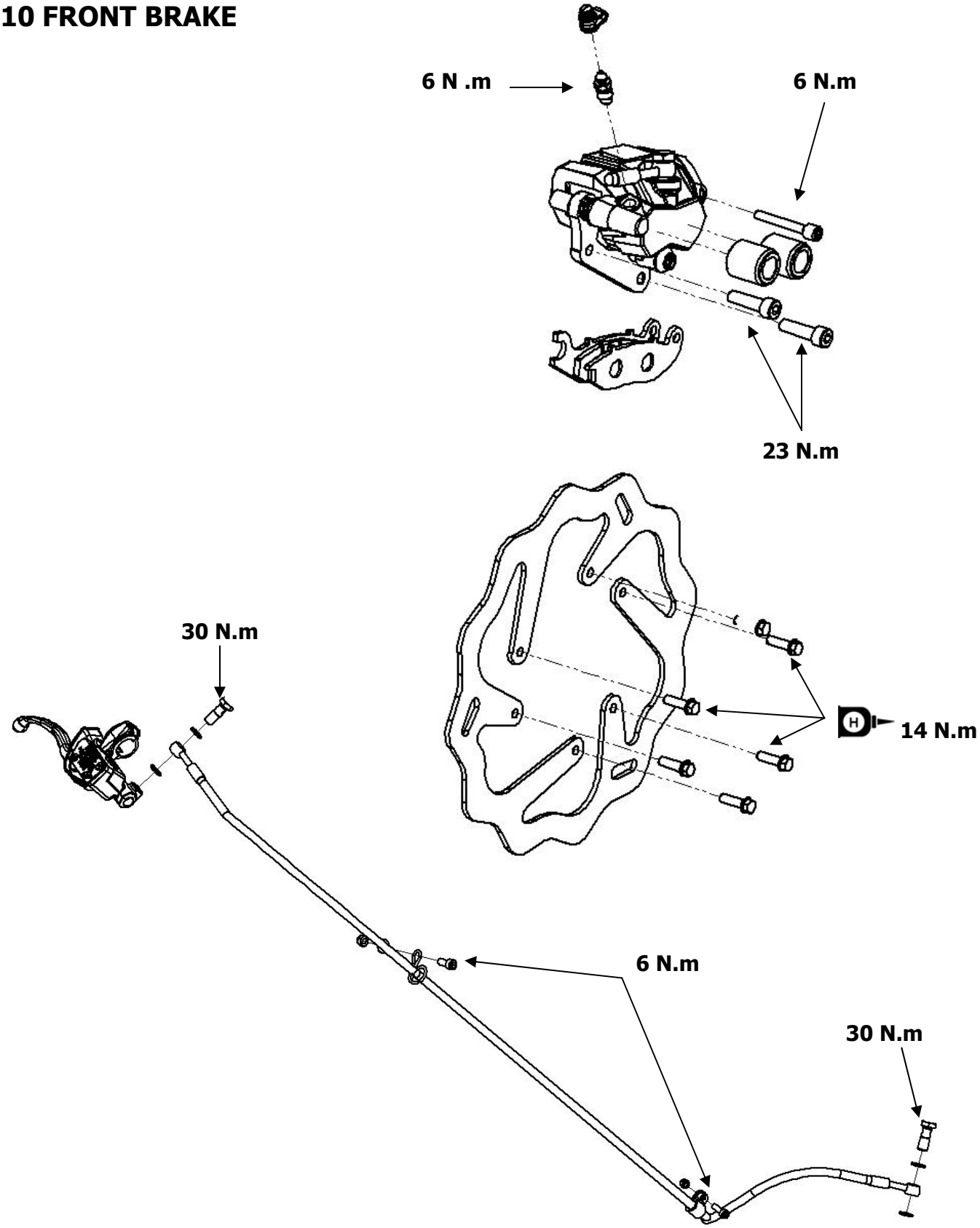
9.1 Rear wheel removal

- Unscrew the rear wheel nut.
- Remove the chain tensioner right.
- Remove the chain tensioner left with the rear wheel axle.
- Remove the rear wheel.
- Warning: don't operate the brake without the wheel (put a key between the pads).

9.2 Rear wheel installation

- Place the rear wheel (and the chain).
- Lubricate the axle.
- Install the axle with the chain tensioner left.
- Install the right chain tensioner.
- Lubricate the axle nut threading with copper grease.
- Adjust the drive chain slack.
- Screw the rear wheel nut.

10 FRONT BRAKE



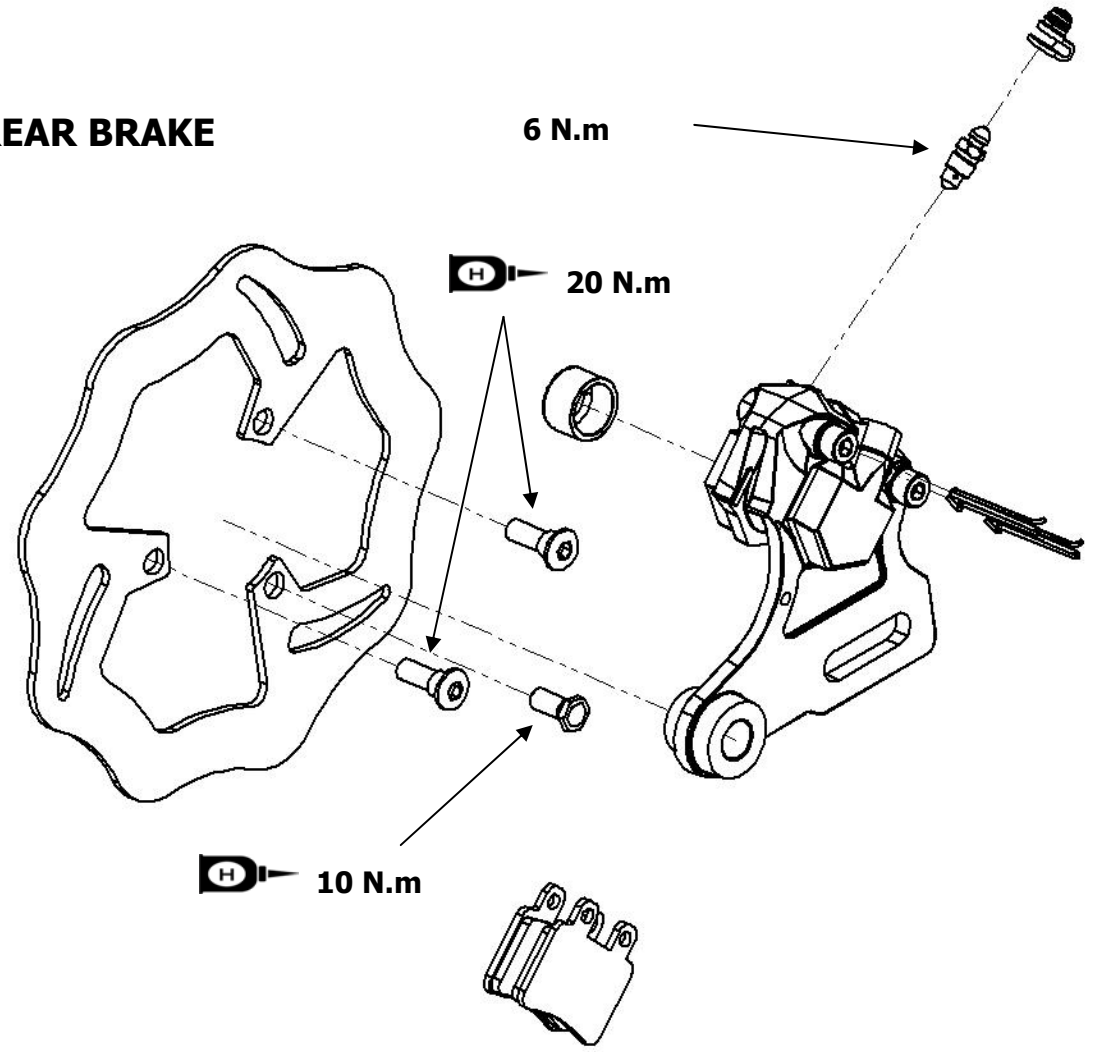
10.1 Front brake control removal

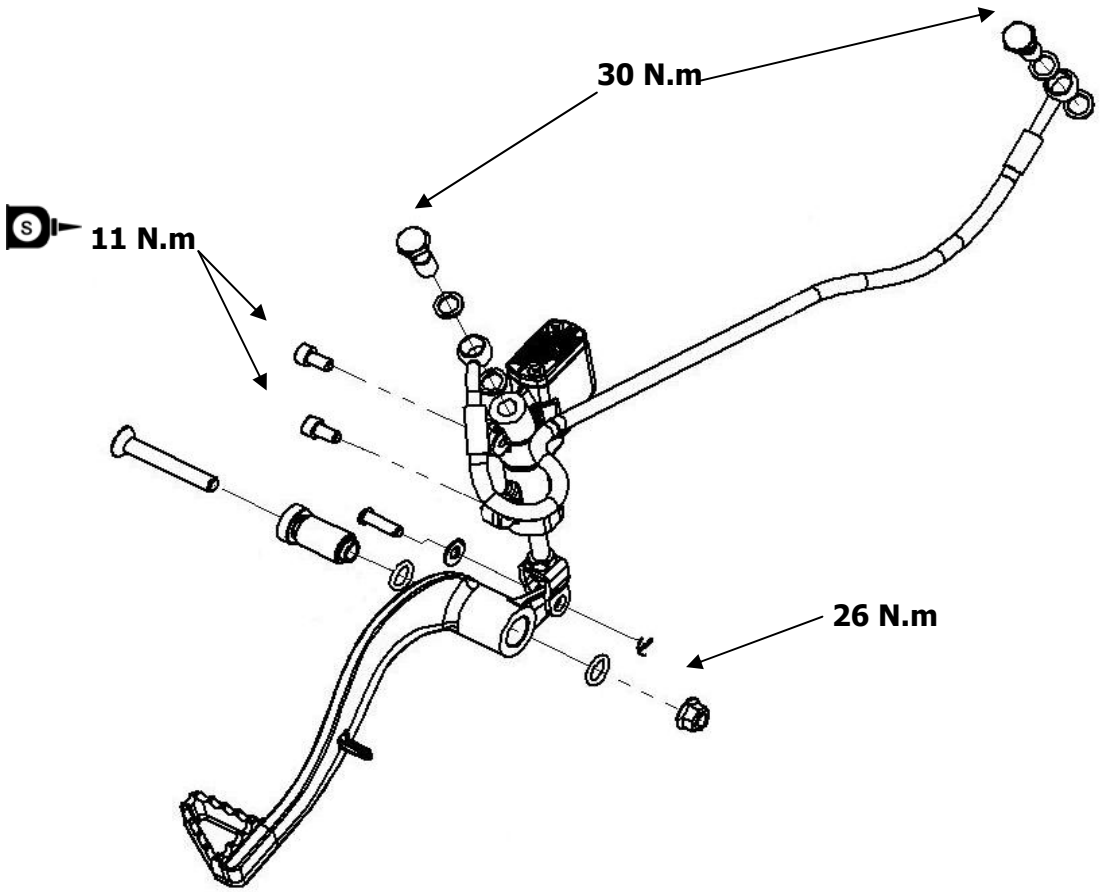
- Unscrew the two front brake calliper.
- To take out the disc: remove the front wheel (see «front wheel removal») then unscrew the 6 disc fixing bolts.
- To remove the pad kit: unscrew the bolt and remove the lock pin.
- To remove the master cylinder cover: unscrew the 2 cover bolts (warning: this task must be done the master cylinder fixed to the handlebar, and the bike stable and straight).
- To remove the master cylinder from the handlebar: unscrew the 2 master cylinder bracket bolts.
- To remove the lever: unscrew the nut then unscrew the bolt and finally remove the lever (be careful to the spacers).
- To remove the hose, unscrew the pipe portion bolt, near the slave cylinder then near the master cylinder (warning: the liquid is corrosive for the painting and dangerous for the body).

10.2 Front brake control installation

- To install the hose: screw the pipe portion bolt to the master cylinder after changing the washer seals, then screw the pipe portion bolt the slave cylinder after changing the washer seals.
- To install the lever: put the 2 spacers then screw the bold after positioning the lever and finally, screw the nut.
- To install the master cylinder cover: screw the 2 cover bolts.
- To install the master cylinder on the handlebar: install the bracket and screw the 2 fixing bolts.
- To install the disc: put the 6 washers and the 6 spacers then screw the 6 bolts with hard locking agent, and finally install the front wheel (see «front wheel installation»).
- Install the calliper and the front disc protective plate then screw the 2 calliper fixing bolts.
- Warning: if the hose has been removed, you must air bleed the front brake control.

11 REAR BRAKE





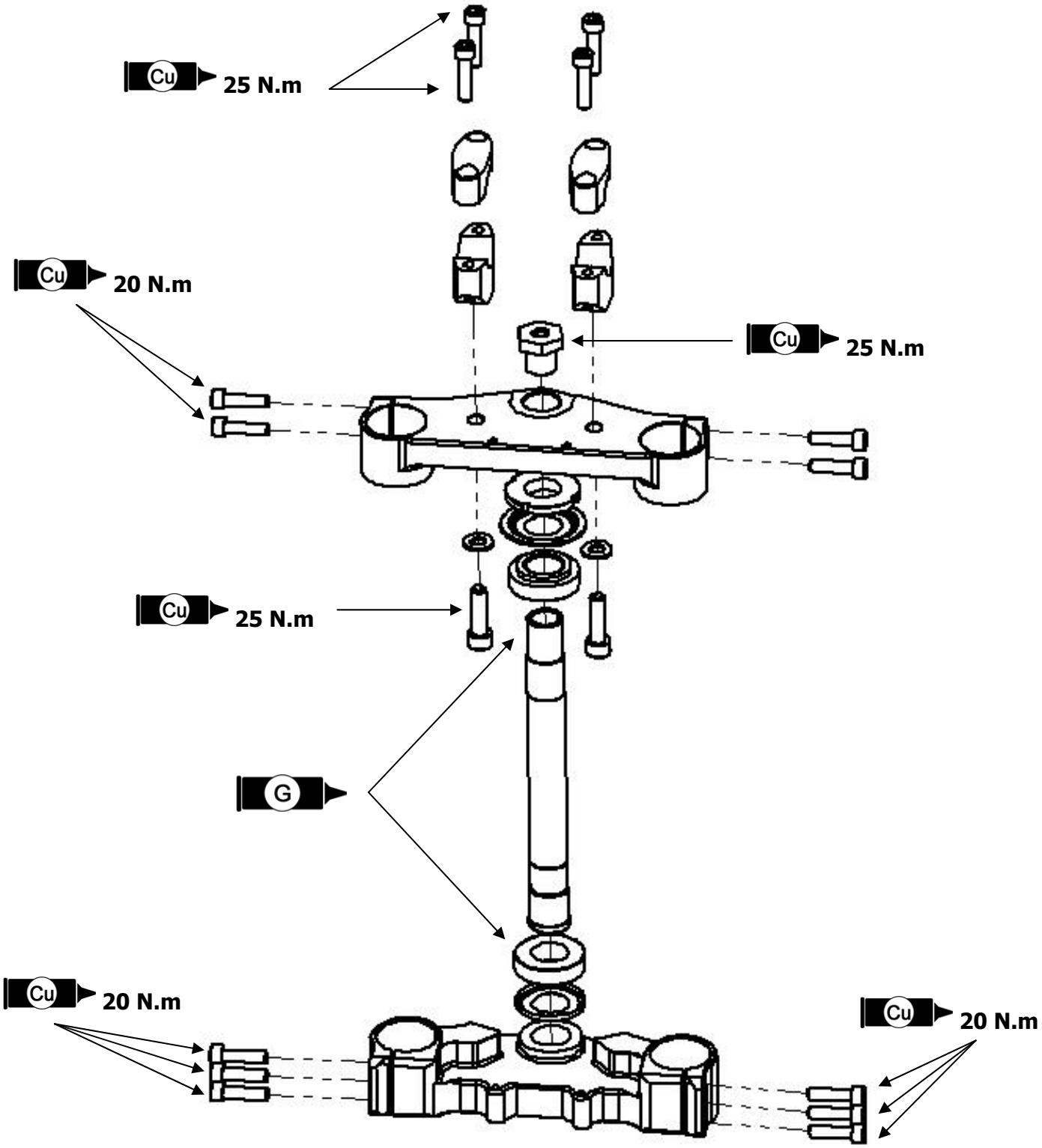
11.1 Rear brake control removal

- Remove the rear wheel (see «rear wheel removal»).
- Remove the rear brake calliper.
- Unscrew the rear brake pedal bolt.
- Take out the bolt and remove the pedal.
- Unscrew the liquid container screw.
- Warning: the liquid container must be kept with the cap upwards to avoid the air bleed.
- Unscrew the 2 rear brake master cylinder fixing bolts and remove it.
- To remove the brake hose: unscrew the master cylinder fixing hose fixing bolt then unscrew the slave cylinder hose fixing bolt (Warning: the liquid is corrosive for the painting and dangerous for the body).

11.2 Rear brake control installation

- To install the hose: screw the pipe portion bolt to the master cylinder after changing the washer seals, then screw the pipe portion bolt the slave cylinder after changing the washer seals.
- Install the rear master cylinder and the 2 fixing bolts.
- Install the liquid container then screw the two fixing bolts.
- Lubricate the brake pedal spacer.
- Install the brake pedal and install the fixing bolt.
- Screw the pedal axle nut.
- Install the rear brake calliper.
- Install the rear wheel (see «rear wheel installation»).
- Warning: if the hose has been removed, you must air bleed the front brake control.

12 STEERING



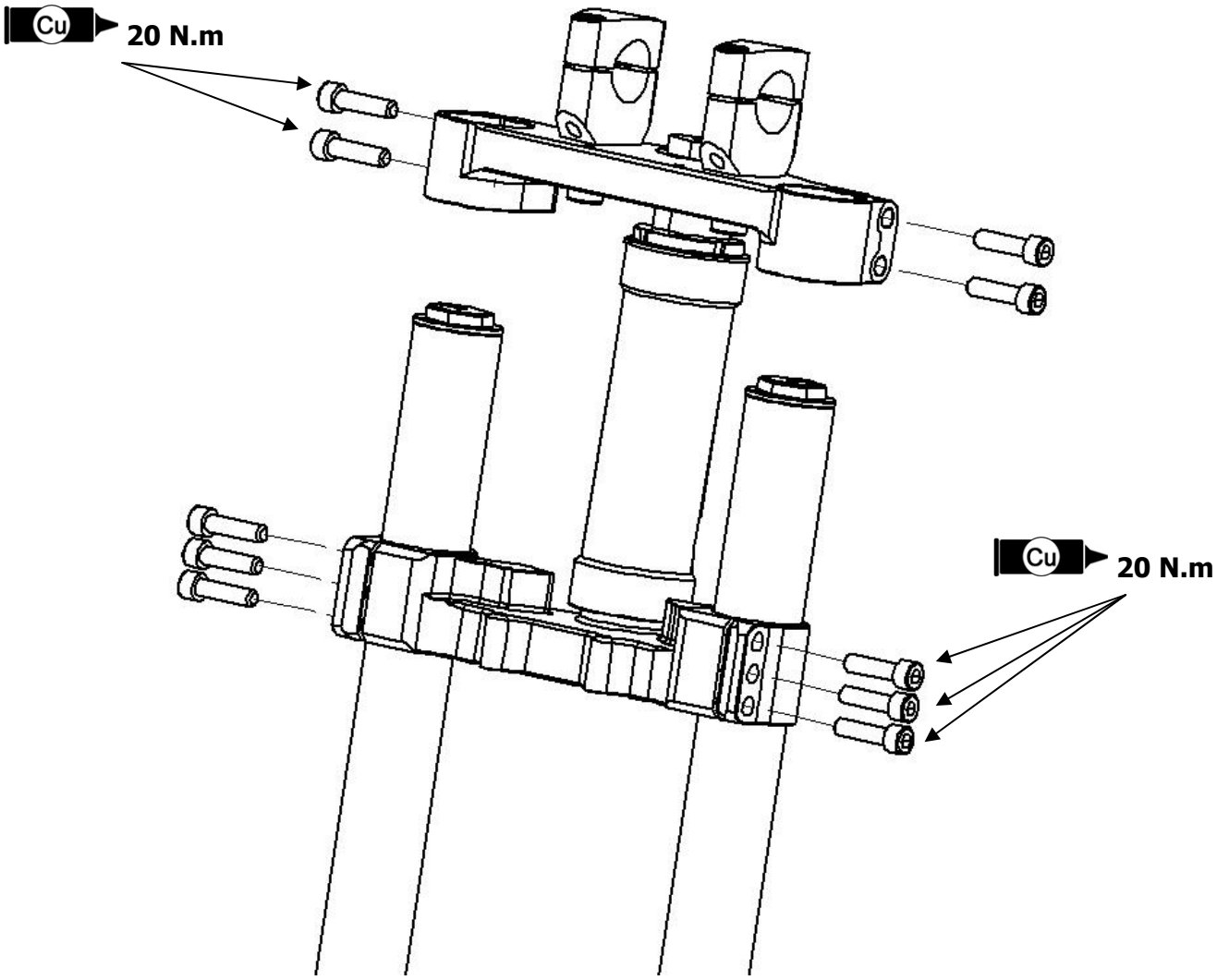
12.1 Handle crowns removal

- Remove the fork (see « fork removal »).
- Unscrew the 4 handle upper holders fixing bolts and remove the holders.
- Remove the handlebar.
- Unscrew the nut steering shaft
- Remove the upper handle crown.
- Unscrew the upper bearing support nut.
- Remove the protection and the bearing.
- Remove the lower handle crown.

12.2 Handle crowns installation

- Lubricate the lower steering bearing.
- Install the upper handle crown in the steering.
- Lubricate and install the upper steering bearing.
- Install the protection then screw the upper bearing support nut with the steering nut wrench (screw to eliminate the play, make sure there are no hard points in the steering).
- Install the upper handle crown and screw the front fork cap nut.
- Install the handle bar.
- Install the upper handle holders and screw the 4 fixing bolts.
- Install the fork (see «fork installation»).

13 FORK



13.1 Fork removal

- Remove the front wheel (see « front wheel removal »).
- Unscrew the 2 front calliper fixing bolts and remove the calliper.
- Remove the hose guide on the left barrel.
- Unscrew the 2 upper crown bolts.
- Unscrew the 2 lower crown bolts (warning: the inner tube will fall).
- Repeat this work for the second inner tube.

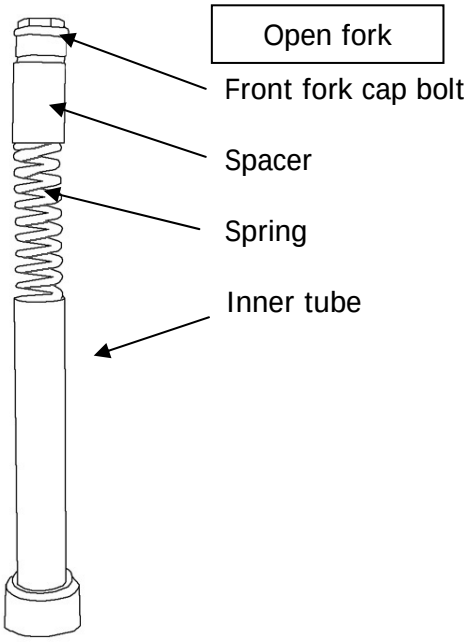
13.2 Fork installation

- Install correctly the inner tube (the upper line should be just visible at the top of the upper crown).
- Screw temporarily the lower crown bolts.
- Screw the upper crown bolts (lubricated with copper grease).
- Screw the lower crown bolts (lubricated with copper grease).
- Repeat the work for the other inner tube.
- Install the front fender and screw the 2 fixing bolts.
- Install the holder, then screw the 2 fixing bolts.
- Install the hose guide on the left barrel.
- Install the front wheel (see «front wheel installation»).

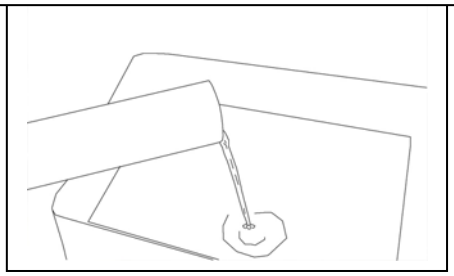
13.3 Fork oil change

1. Remove the front fork cap bolt
2. Leave spacer and spring
3. Return the fork to empty oil.
4. For completely empty oil of the fork, move several time inner tube and damper rod
5. When oil is completely evacuate, return the fork and add some ml of new oil for rinse the interior of fork .
6. Repeat operation 3 and 4.
7. Return fork in the good feel and fill it with oil, MOTUL Fork Oil factory line Light Medium 7.5W.
8. Pump several time to distribute oil fork.
9. The oil quantity is good then the level of oil is 130 mm (4.33 in) with inner tube and damper rod in lower position.
10. Pump several time (inner tube and damper rod) and check the level. If the level isn't constant, supplement.
11. Install the spring and the spacer (metal ring in contact with spring)
12. Remove Front fork cap bolt and tighten it (20Nm ; 15Ibf.ft)

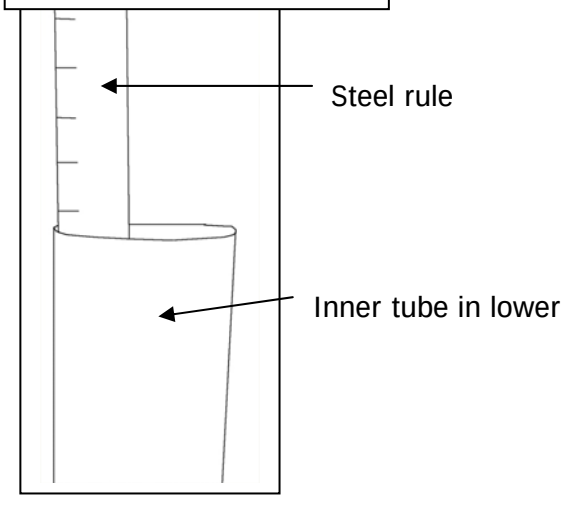
Open fork



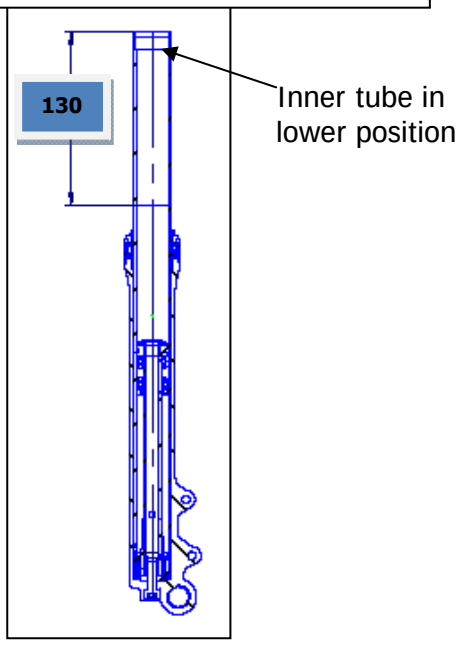
Recover oil and deposit it in the places envisaged for this purposes (dechetery,..).



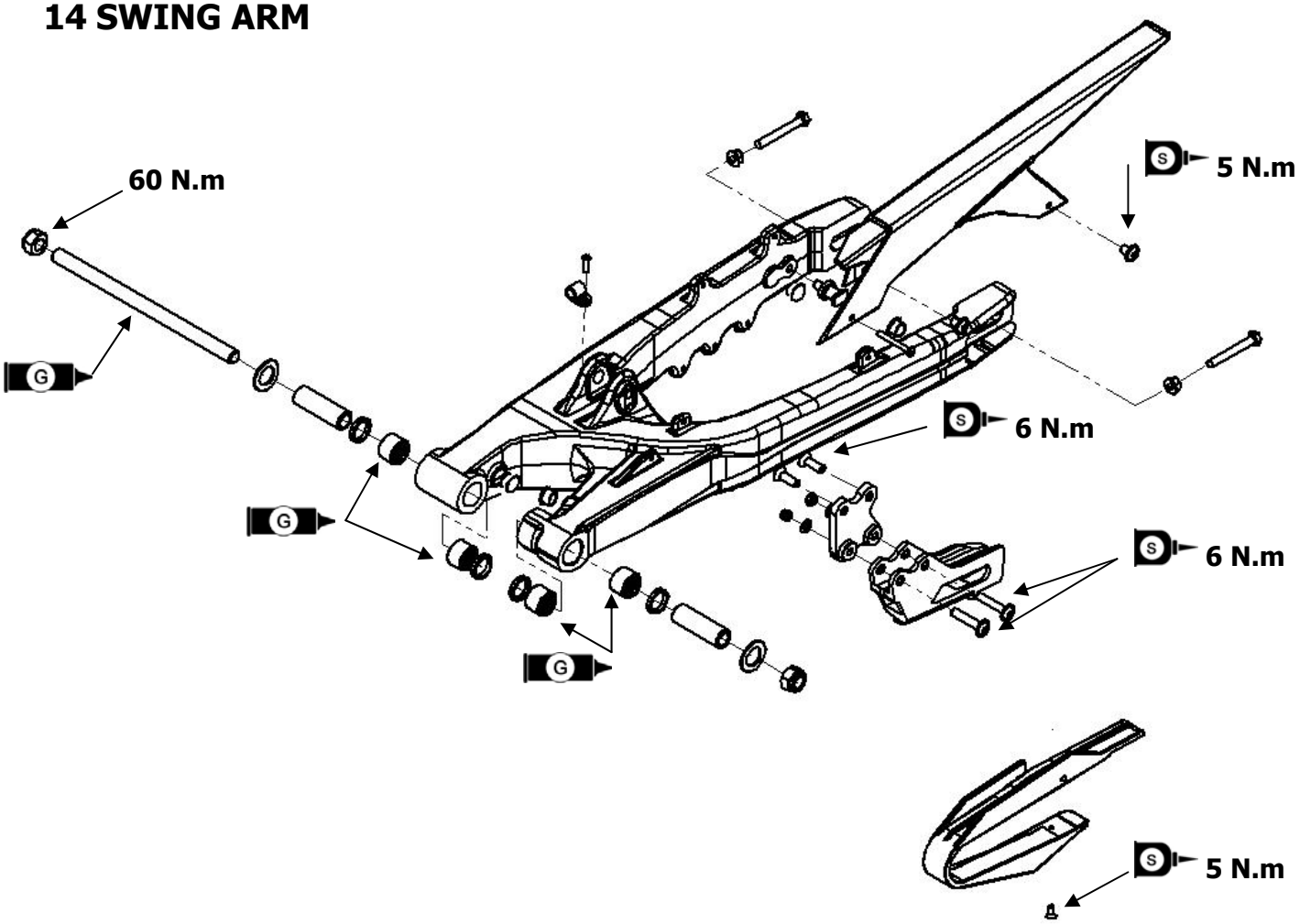
Oil level measure



Oil level



14 SWING ARM



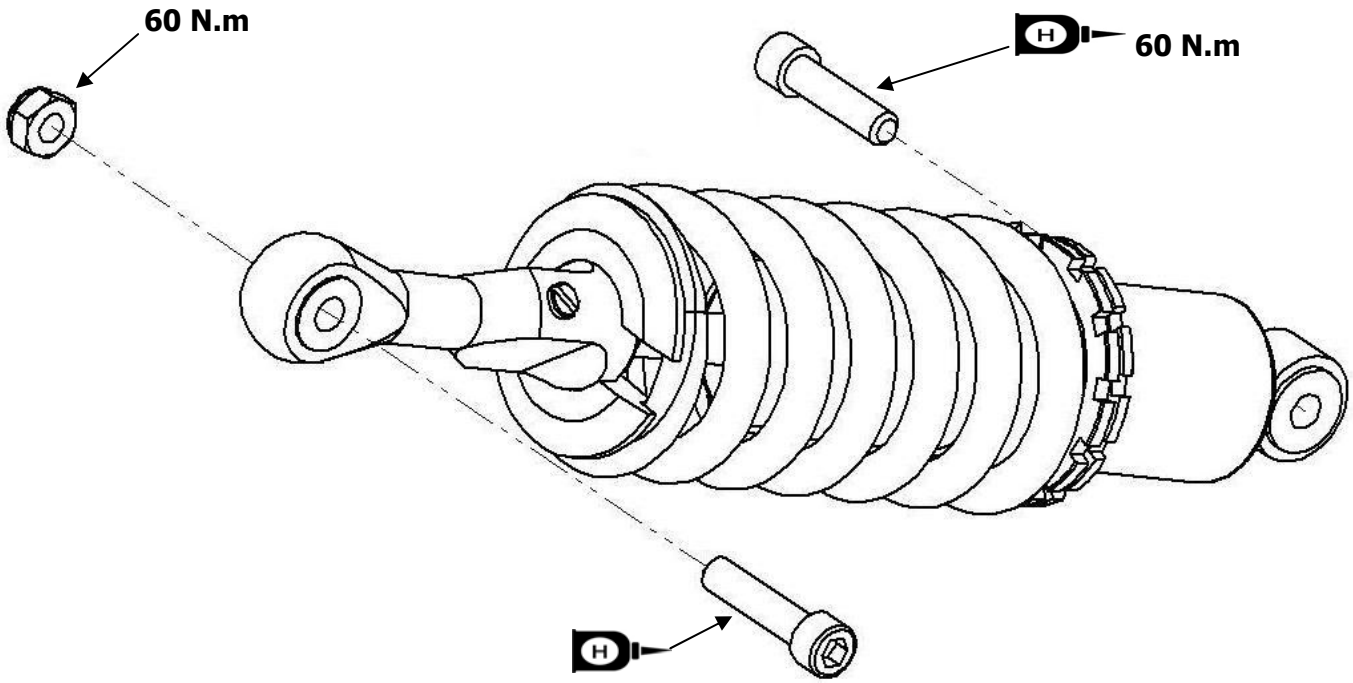
14.1 Swing arm removal

- Remove the rear wheel (see « rear wheel removal »).
- Remove the quick disconnect fastener.
- Unscrew the brake hose holder bolt.
- Remove the rear shock.
- Unscrew the swing arm axle and remove it.
- Remove the swing arm.
- Unscrew the chain guard bolts and remove the chain guard.
- Unscrew the upper and lower of the seal chain guard and remove it.
- Unscrew the screw chain tension.
- Unscrew the rear brake calliper stop.
- Unscrew the chain cover fixing bolt and nut, remove the bolt then remove the chain cover.

14.2 Swing arm installation

- Install the chain cover and the fixing bolts.
- Screw the chain cover nut and bold (use soft locking agent on the bolt).
- Screw the rear brake calliper stop and the nut.
- Install the guide chain et screw the bolts.
- Screw the chain tension.
- Screw the seal chain guard.
- Lubricate the swing arm bearings.
- Install the swing arm and install the axle (by the left side).
- Install the rear shock.
- Screw the rear wheel axle nut.
- Install the chain.
- Install the rear wheel (see «rear wheel installation»).

15 SHOCK ABSORBER



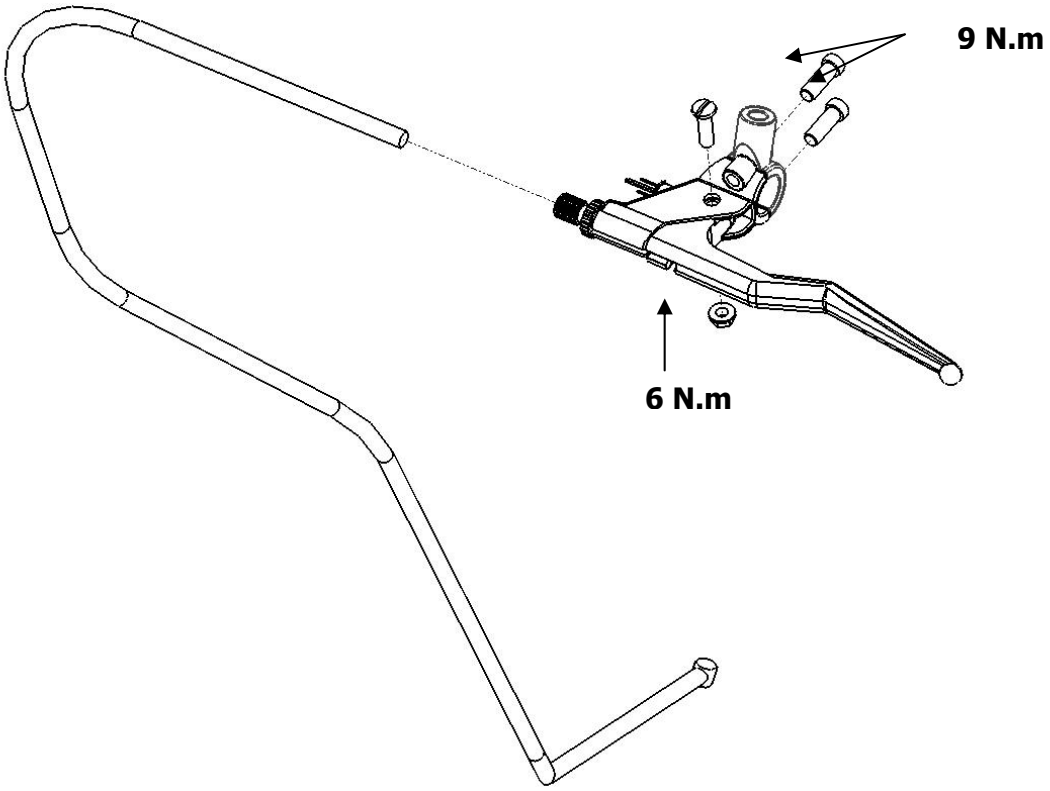
15.1 Rear shock absorber removal

- Remove the saddle (see « saddle removal »).
- Remove the fuel tank (see « fuel tank removal»).
- Unscrew and take out the absorber lower fixing bolt.
- Hold the swing arm to avoid damages.
- Unscrew and take out the absorber upper fixing bolt.
- Take out the absorber.

15.2 Rear shock absorber installation

- Place the absorber.
- Screw the absorber upper fixing bolt with hard locking agent).
- Place and hold up the swing arm.
- Screw the absorber lower fixing bolt.
- Install the fuel tank (see « fuel tank install»).
- Install the saddle (see « saddle removal»).

16 CLUTCH CONTROL



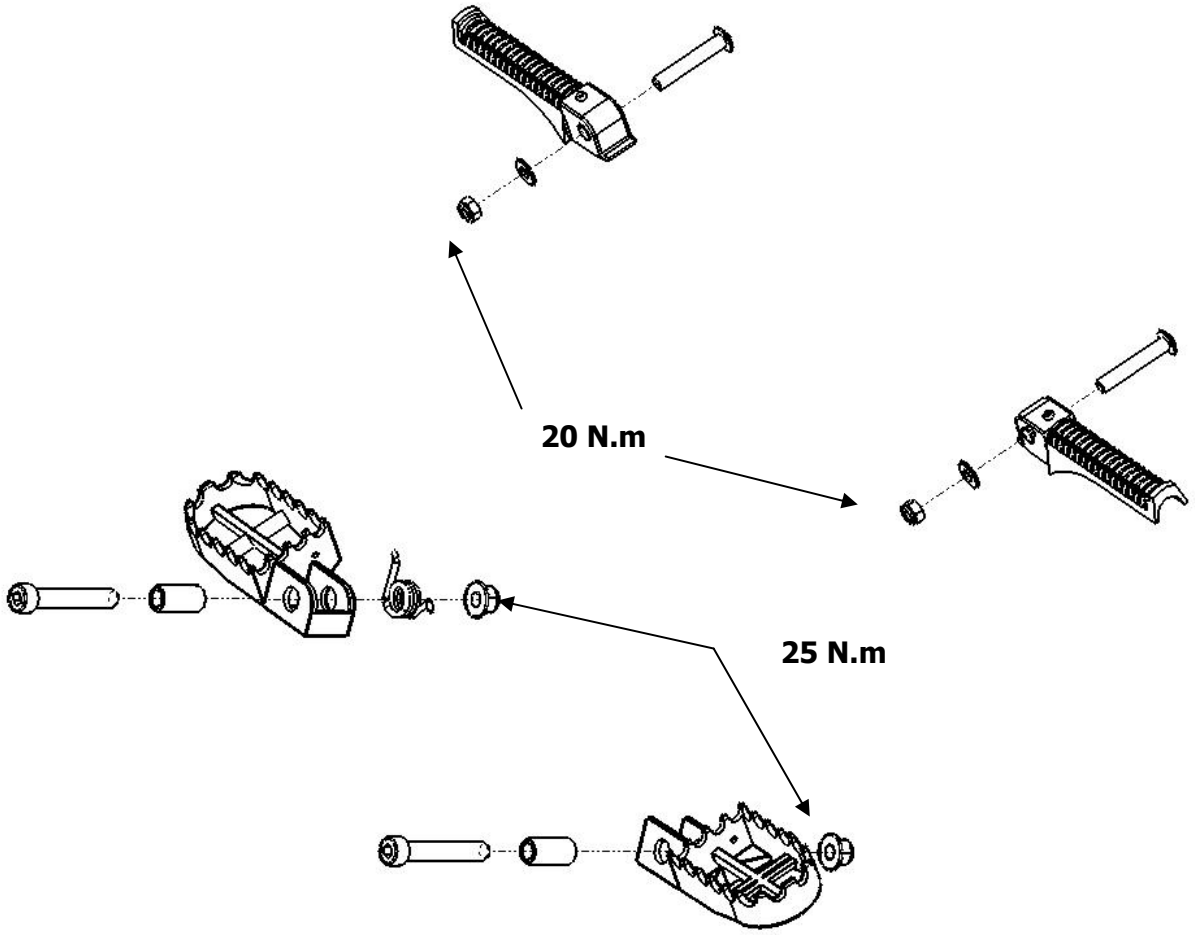
16.1 Clutch control removal

- Remove the saddle (see « saddle removal »).
- Remove the fuel tank (see « fuel tank removal »).
- Remove the extremity of the cable at the level of the control lever of clutch.
- Remove the other extremity of the cable at the level of the push raise and remove the cable.
- To remove the lever: unscrew the nut then unscrew the bolt and finally remove the lever (be careful to the spacers).

16.2 Clutch control installation

- To install the lever: put the 2 spacers then screw the bold after positioning the lever and finally, screw the nut.
- Install the saddle (see «saddle installation»).
- Install the fuel tank (see «fuel tank installation»).
- Warning: if the hose has been removed, you must air bleed the clutch control.

17 FOOT REST



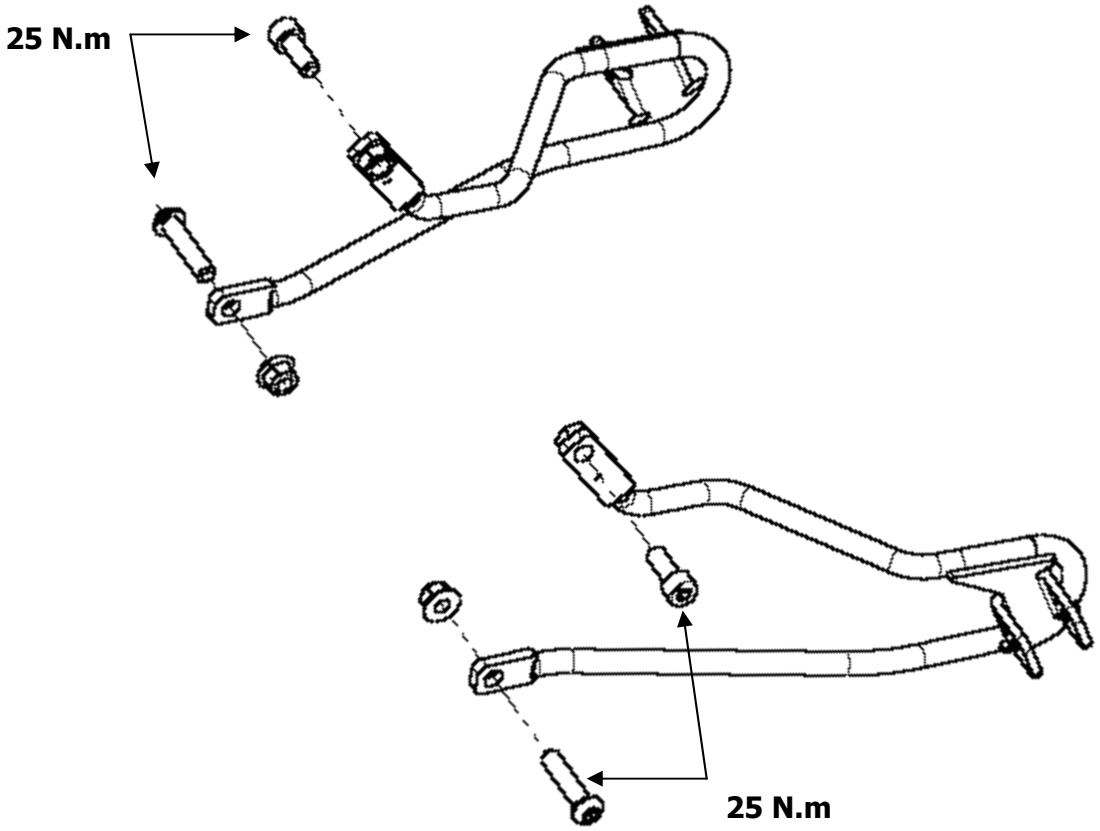
17.1 Foot rest removal

- Unscrew the footrest nut.
- Remove the footrest fixing bolt.
- Take out the footrest from the bracket.
- Take out the spacer (be careful of the spring).
- Unscrew the footrest bracket fixing nuts.
- Take out the bolts and take out the bracket.

17.2 Foot rest installation

- Place the footrest bracket on the frame and put the bolts.
- Screw the nuts.
- Put the spacer in the footrest with the spring.
- Place the footrest on the bracket and put the bolt.
- Screw the footrest axle nut.

18 SUPPORT BACK FOOT REST



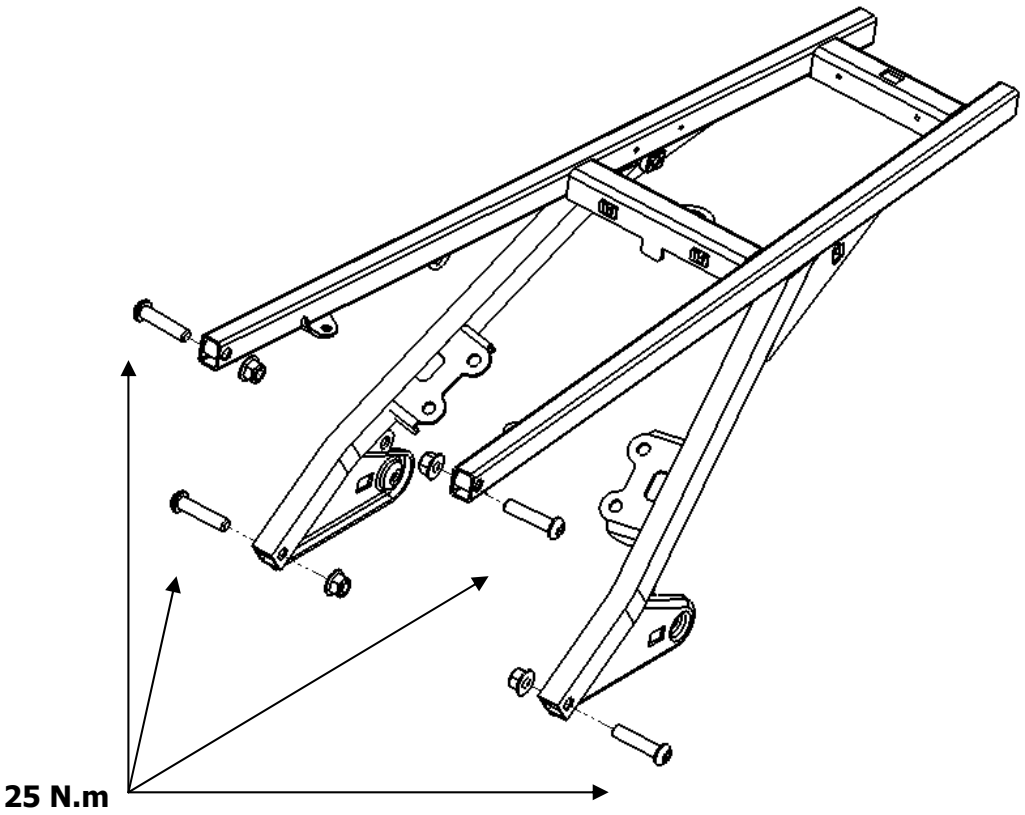
18.1 Support back foot rest removal

- Unscrew the low nut of the support.
- Remove the fixation bolt of the support .
- Unscrew the high nut of the support.
- Remove the fixation bolt of the support .
- Remove the support.

18.2 Support back foot rest installation

- Position the support.
- Pass the fixation bolt in the top of the support and screw the nut
- Pass the fixation bolt in the bottom of the support and screw the nut

19 REAR SUB FRAME



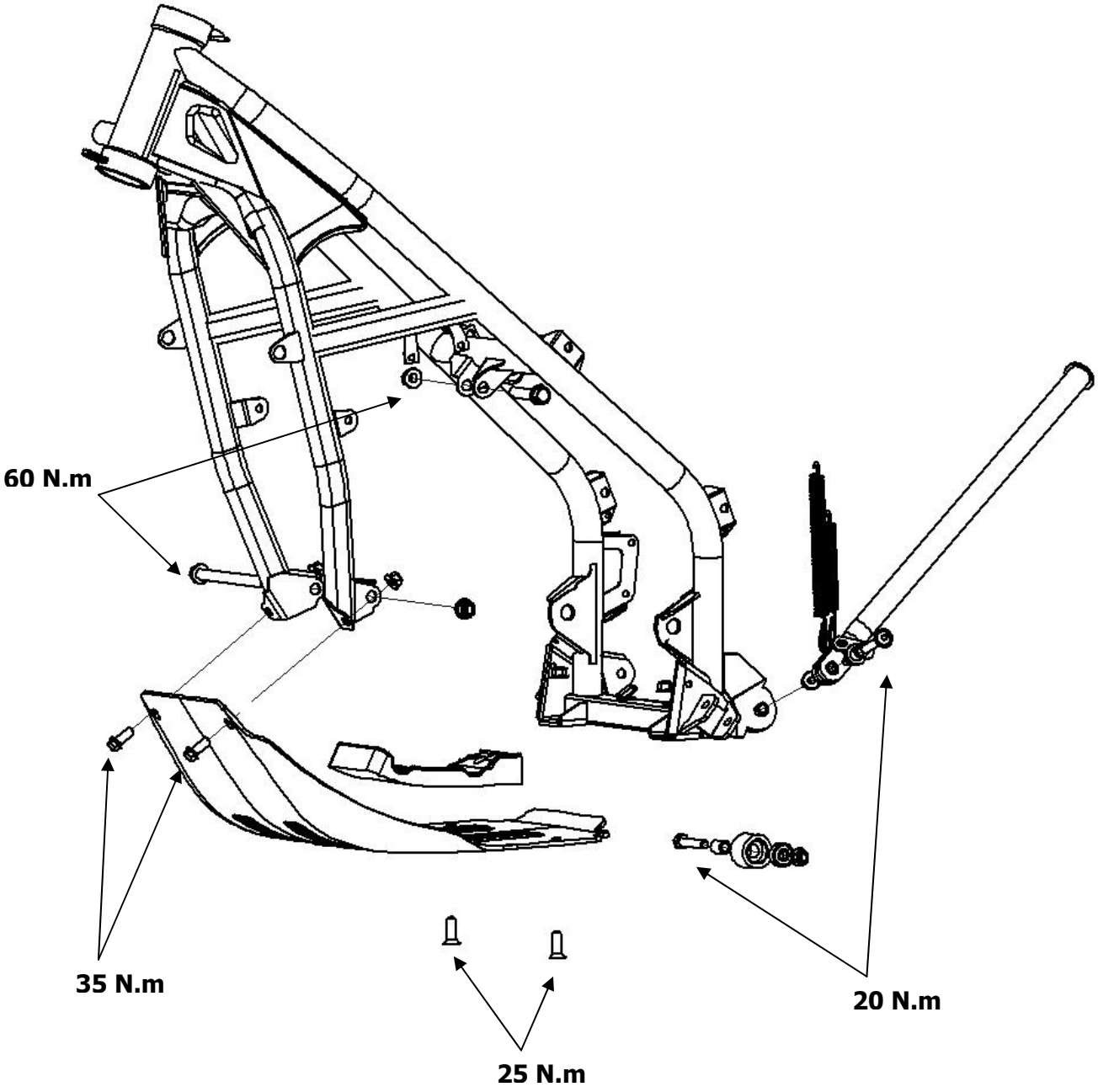
19.1 Rear sub frame removal

- Unscrew the low nuts of the rear sub frame.
- Remove the fixation bolts of the rear sub frame.
- Unscrew the high nuts of the rear sub frame.
- Remove the fixation bolts of the rear sub frame.
- Remove the rear sub frame.

19.2 Rear sub frame installation

- Position the rear sub frame.
- Pass the fixation bolts in the top of the rear sub frame and screws the nut
- Pass the fixation bolts in the bottom of the rear sub frame and screws the nut

20 FRAME



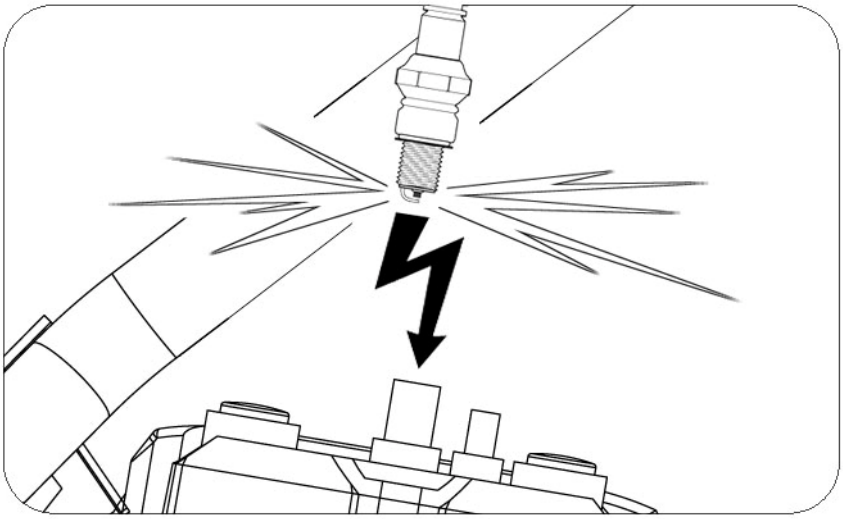
20.1 Engine removal

- Unscrew the 2 guard engine rear fixing bolts.
- Unscrew the 2 guard engine front fixing nuts.
- Remove the guard engine front bolts.
- Remove the saddle (see «saddle remove»).
- Remove the fuel tank (see «fuel tank removal»).
- Remove the protective plate side (see «side covers removal»)
- Remove the clutch control (see «clutch control removal»).
- Remove the front fork (see «front fork removal»).
- Remove the swing arm (see «swing arm removal»).
- Remove the muffler (see «muffler removal»)
- Remove the shock absorber (see «shock absorber removal»)
- Remove the carburettor (see «carburettor removal»).
- Remove the rear sub frame (see «rear sub frame removal»).
- Remove the carburettor (see «carburettor removal»).
- Remove the radiator (see «radiator removal»).
- Remove the oil tank.
- Unplug the electric cables near the front light and near the switches, then unscrew the bolt linking the electric cables to the frame and remove it.
- Unscrew the 2 engine fixing bolts and remove it.
- Remove the main frame from the motor.

20.2 Engine installation

- Install the main frame on the engine.
- Place the 2 frame fixing bolts and place the nuts.
- Install the oil tank.
- Install the swing arm (see «swing arm installation»).
- Install the shock absorber (see «shock absorber installation»).
- Install the clutch control (see «clutch control installation»)
- Install the radiator (see «radiator installation»).
- Screw the engine fixing bolts on the frame near the cylinder.
- Screw the engine fixing bolts on the frame in the front.
- Plug the electric cables near the front light and near the switches, then screw the bolt linking the electric cables to the frame.
- Install the rear brake master cylinder (see «rear brake control» installation»).
- Install the rear brake master cylinder (see «rear brake control installation»).
- Install the carburettor (see «carburettor installation»).
- Install the rear sub frame (see «rear sub frame installation»)
- Install the protective plate side (see «side covers installation»)
- Install the front fork (see «front fork installation»).
- Install the fuel tank (see «fuel tank installation»).
- Install the engine guard and place the rear and front fixing bolts (use hard locking agent for the rear bolts).
- Screw the engine guard front fixing nuts then screw the rear fixing bolts.

⚠ Indeed make sure that the engine is to stall or to girth on a foot or on a fixed surface to avoid that it once falls frame to remove.

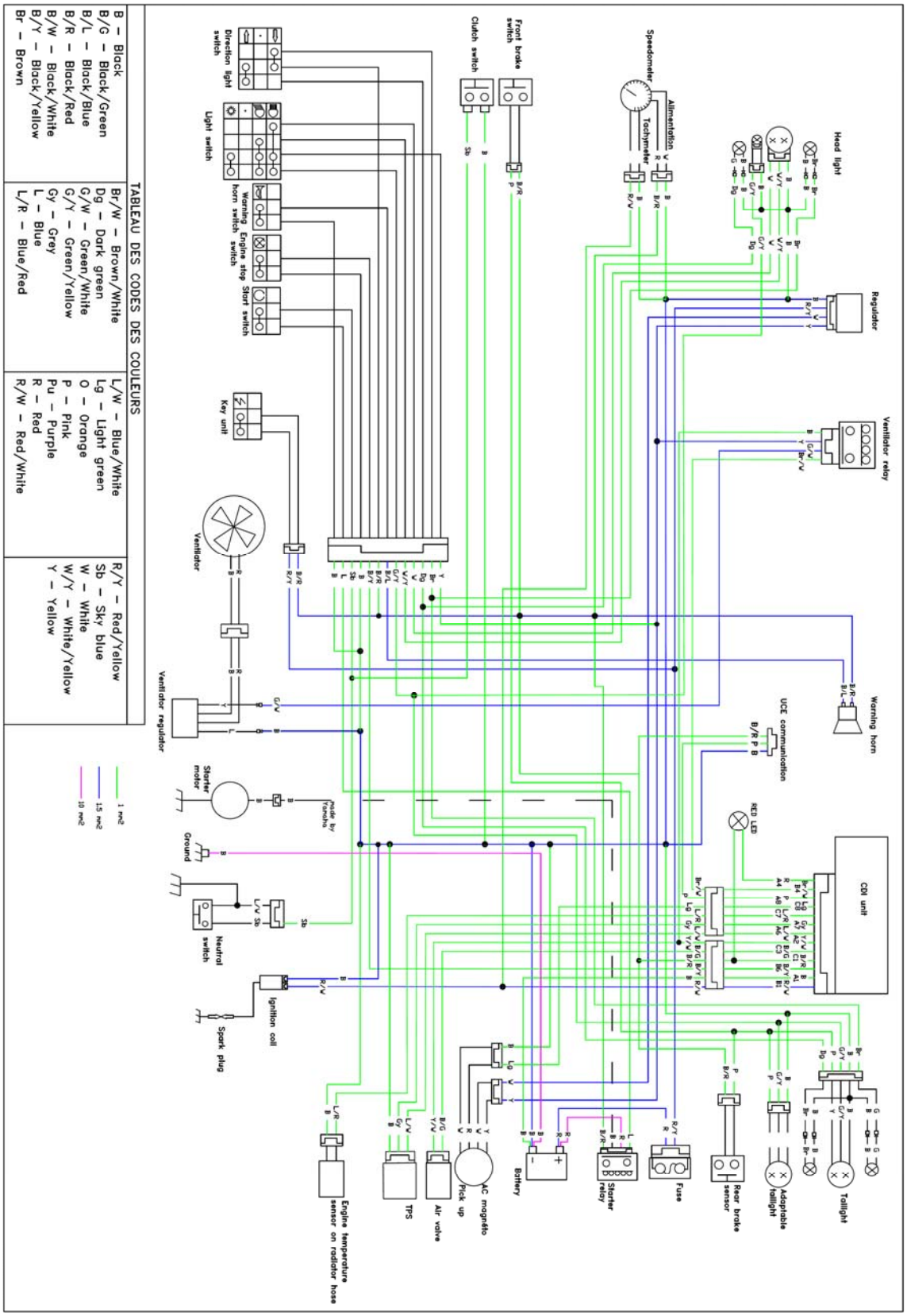


ELECTRICAL EQUIPMENT

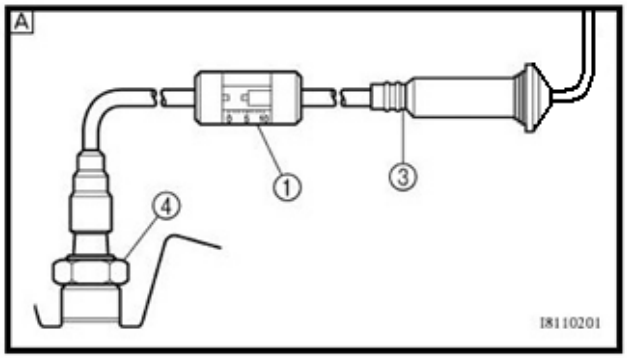
CONTENTS

1 ELECTRICAL

1.1 Wiring diagram

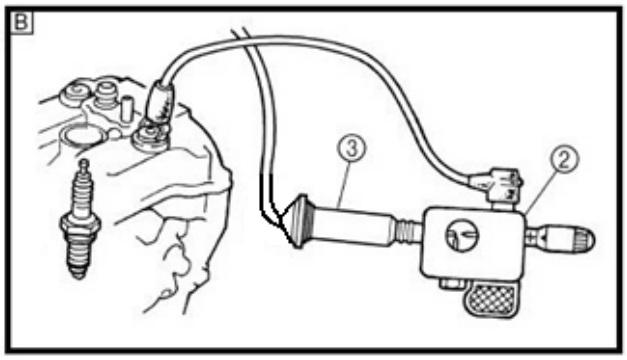


1.2 Spark gap test



1. Disconnect the spark plug cap from spark plug.
2. Connect the dynamic spark tester ① (ignition checker ②) as shown.
   - Ignition coil ③
   - Spark plug ④

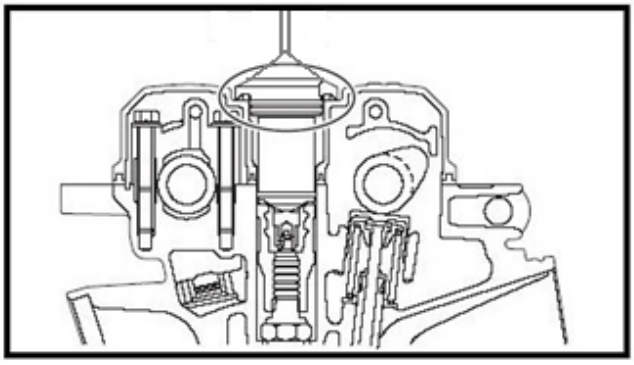
A For USA and CDN
B Except for USA and CDN



3. Kick the kickstarter crank.
4. Check the ignition spark gap.
5. Start engine, and increase spark gap until misfire occurs. (for USA and CDN only)

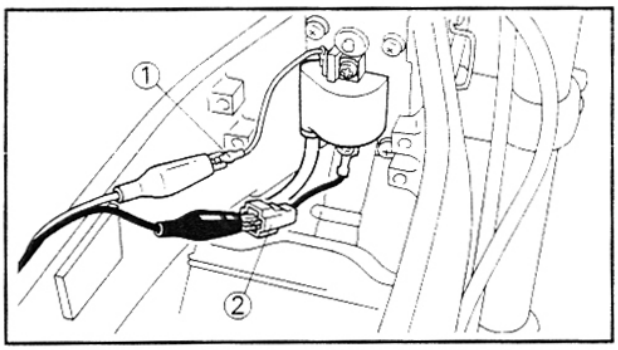
Minimum spark gap:
6.0 mm (0.24 in)

1.3 Leads and ignition coil connection inspection



1. Check:
   - Couplers and leads connection
     Rust/dust/looseness/short-circuit → Repair or replace.

1.4 Ignition coil inspection

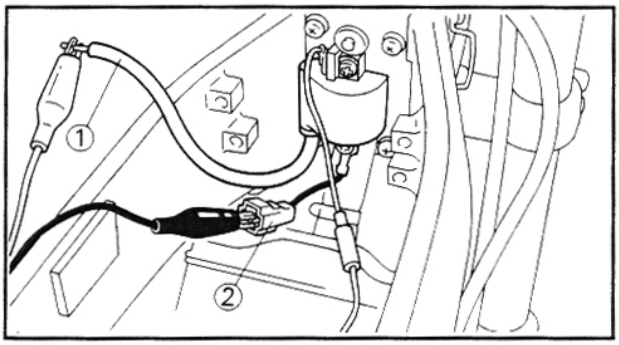


IGNITION COIL INSPECTION

1. Inspect:
   - Primary coil resistance
     Out of Specification → Replace.

Tester (+) lead → Orange lead ①
Tester (−) lead → Black lead ②

	Primary coil resistance	Tester selector position
	0.85 ~ 1.15Ω at 20°C (68°F)	Ω × 1

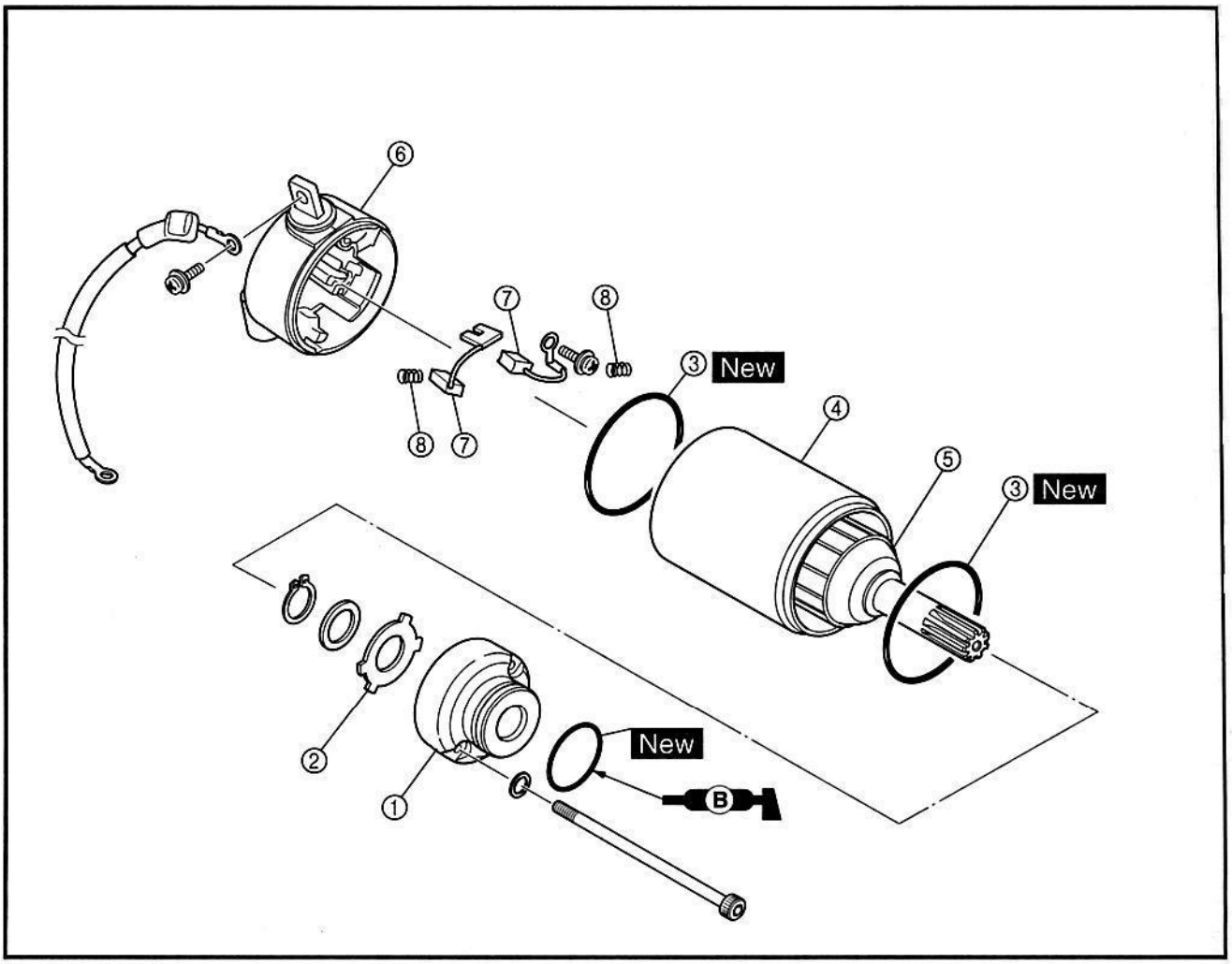


2. Inspect:
   - Secondary coil resistance
     Out of specification → Replace.

Tester (+) lead → Spark plug lead ①
Tester (−) lead → Black lead ②

	Secondary coil resistance	Tester selector position
	5.0 ~ 6.8kΩ at 20°C (68°F)	kΩ × 1

2 ELECTRIC STARTING SYSTEM



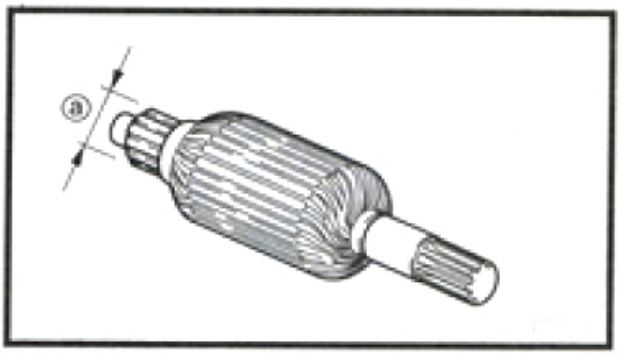
Organisation de la dépose: ① Démontage du moteur dé demarreur

Organisation de la dépose	Ordre	Nom de pièce	Qté	Remarques
Préparation à la dépose		**DEPOSE DU MOTEUR DE DEMARREUR**		
		Tuyau d'échappement		Se reporter à la section "TUYAU D'ECHAPPEMENT ET SILENCIEUX" au CHAPITRE 4.
	1	Moteur de démarreur	1	
①		**DEMONTAGE DU MOTEUR DE DEMARREUR**		
	①	Couvercle avant de démarreur	1	
	②	Rondelle (couvercle avant de démarreur)	1	
	③	Rondelle	2	
	④	Stator de démarreur	1	
	⑤	Ensemble de l'armature	1	
	⑥	Couvercle arrière de démarreur	1	
	⑦	Balais	2	
	⑧	Ressort de balais	2	

2.1 Inspection and repair

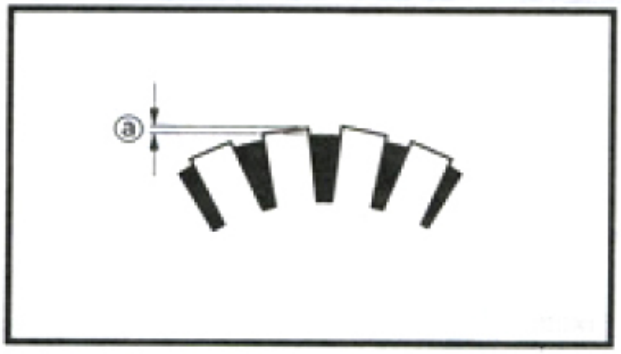
INSPECTION AND REPAIR

1. Check:
   - Commutator
     Dirt → Clean with 600 grit sandpaper.



2. Measure:
   - Commutator diameter ⓐ
     Out of specification →
     Replace the starter motor.

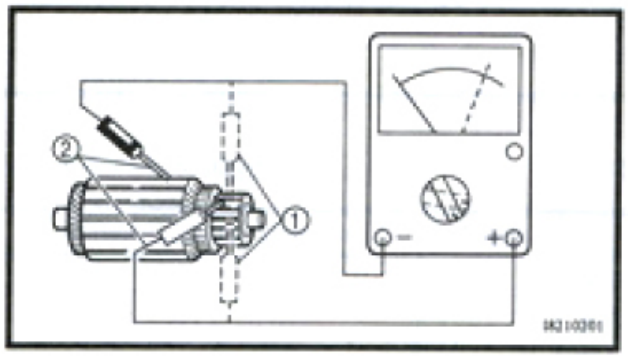
Min. commutator diameter:
16.6 mm (0.65 in)



3. Measure:
   - Mica undercut ⓐ
     Out of specification → Scrape the mica to the proper measurement with a hacksaw blade which has been grounded to fit the commutator.

Mica undercut:
1.5 mm (0.06 in)

NOTE:
The mica must be undercut to ensure proper operation of the commutator.



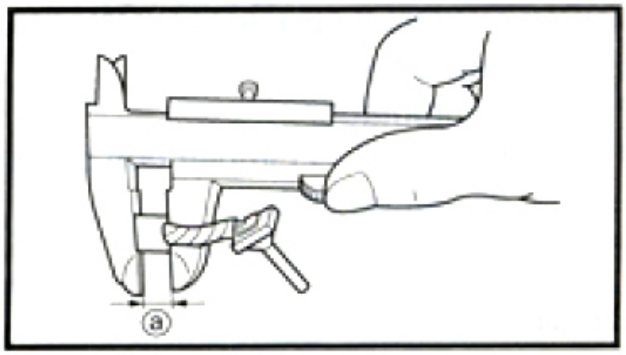
4. Measure:
   - Armature assembly resistances (commutator and insulation)
     Out of specification →
     Replace the starter motor.

- Measure the armature assembly resistances with the pocket tester.

Pocket tester:
YU-3112-C/
90890-03112

Armature assembly:
Commutator resistance ①:
0.0189 ~ 0.0231 Ω at 20 °C (68 °F)
Insulation resistance ②:
Above 1 MΩ at 20 °C (68 °F)

- If any resistance is out of specification, replace the starter motor.



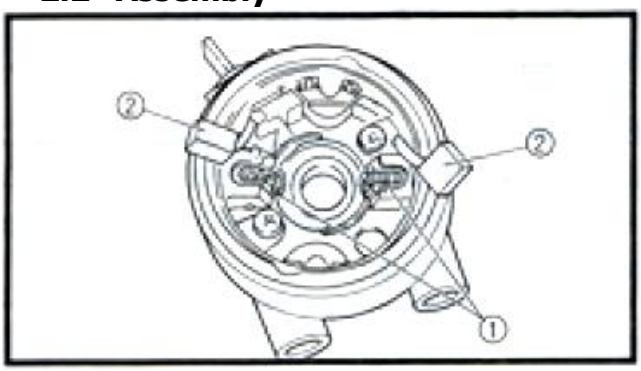
5. Measure:
   - Brush length ⓐ
     Out of specification →
     Replace the brushes as a set.

	Min. brush length: **3.5 mm (0.14 in)**

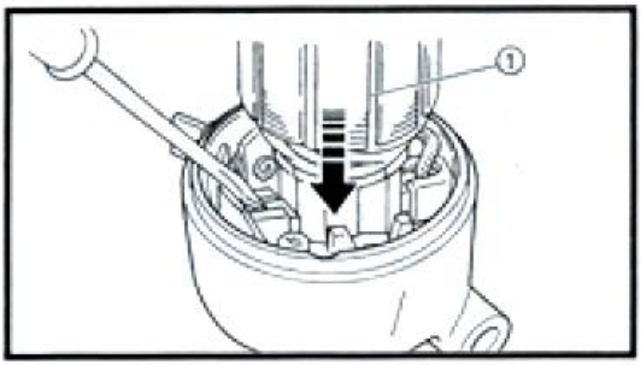
6. Measure:
   - Brush spring force
     Out of specification →
     Replace the brush springs as a set.

	Brush spring force: **3.92 ~ 5.88 N** **(400 ~ 600 gf,** **14.1 ~ 21.2 oz)**

2.2 Assembly



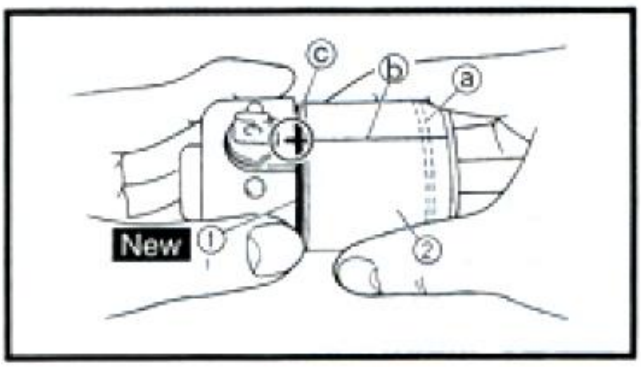
1. Install:
   - Brush spring ①
   - Brush ②



2. Install:
   - Armature assembly ①
     Install while holding down the brush using a thin screw driver.

CAUTION:

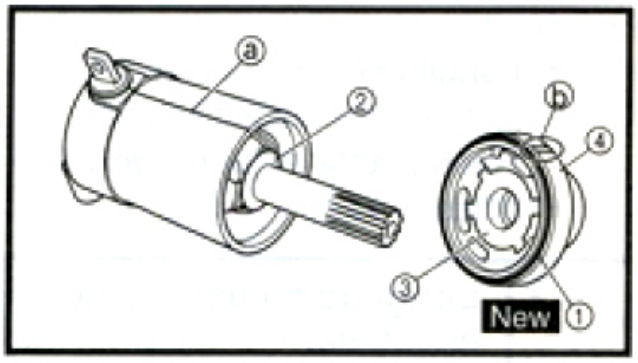
Be careful not to damage the brush during installation.



3. Install:
   - Gasket ① New
   - Starter motor yoke ②

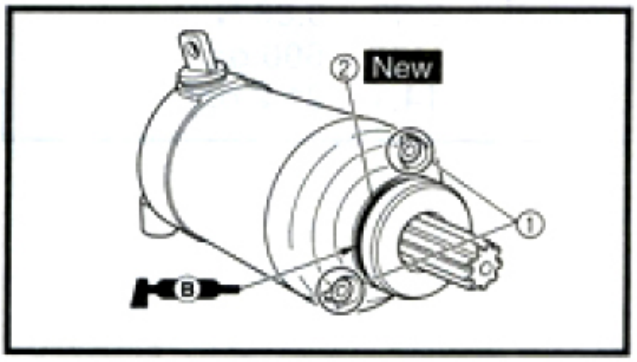
NOTE:

- Install the starter motor yoke with its groove ⓐ facing front cover.
- Align the match mark ⓑ on the starter motor yoke with the match mark ⓒ on the starter motor rear cover.



4. Install:
   - Gasket ① New
   - Circlip
   - Plain washer ②
   - Washer (starter motor front cover) ③
   - Starter motor front cover ④

NOTE:
- For installation, align the projections on the washer with the slots in the front cover.
- Align the match mark ⓐ on the starter motor yoke with the match mark ⓑ on the starter motor front cover.



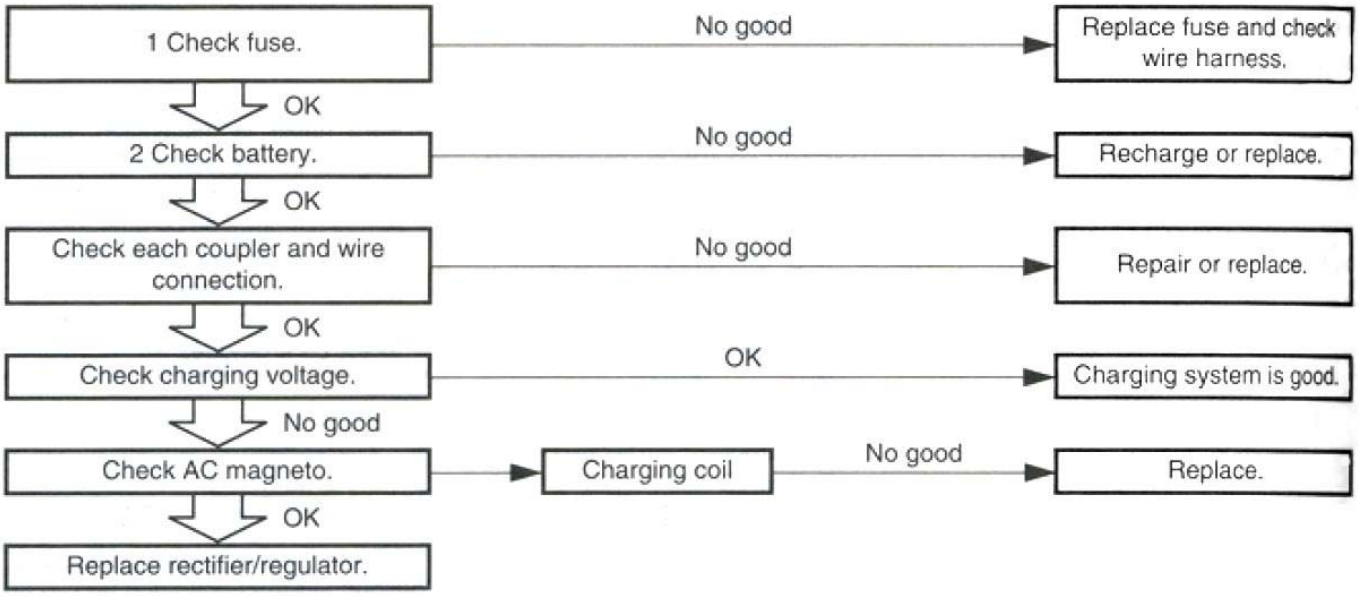
5. Install:
   - Gasket
   - Bolt ①
   - O-ring ② New

NOTE:
Apply the lithium soap base grease on the O-ring.

3 CHARGING SYSTEM

INSPECTION STEPS

If the battery is not charged, use the following inspection steps.



NOTE:

- Remove the following parts before inspection.
  1) Seat
  2) Fuel tank
- Use the following special tool in this inspection.

Pocket tester:
YU-3112-C/
90890-03112
Inductive tachometer:
YU-8036-B
Engine tachometer:
90890-03113

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